

# CarrLane®

MANUFACTURING CO.



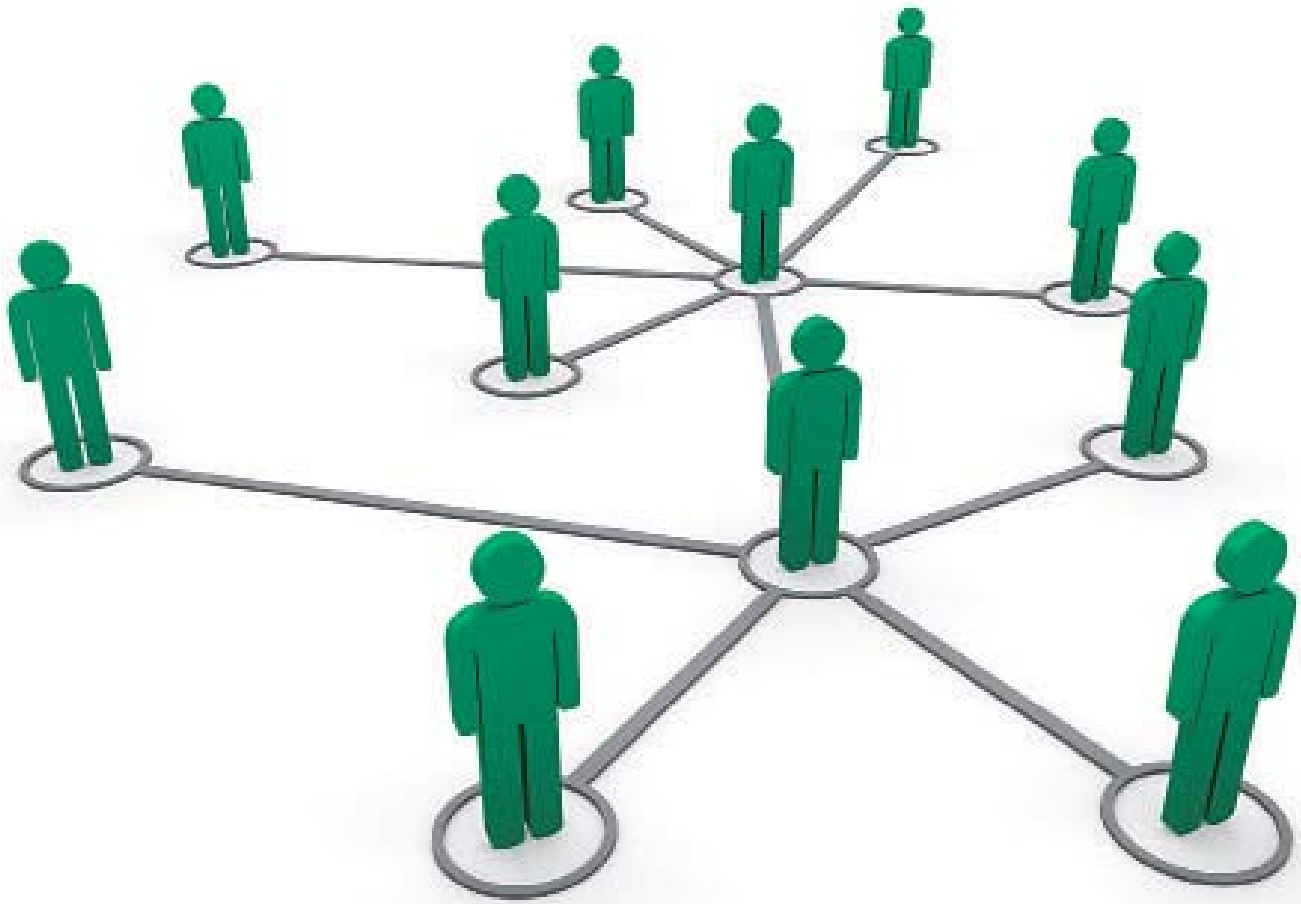
Standard Components for Tooling and Production

**2017 Catalog**

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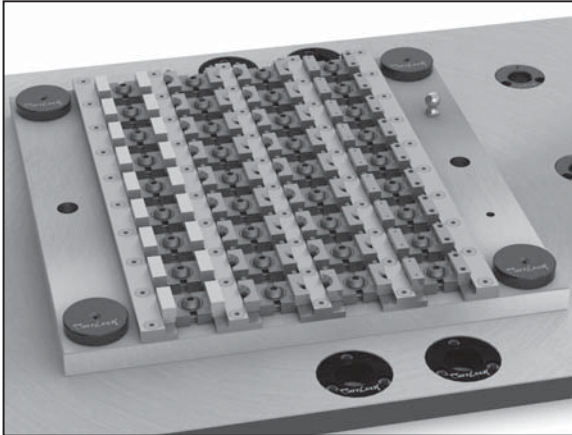
# CATALOG SECTIONS

PICTORIAL INDEX PP. 4-14; ALPHABETICAL INDEX PP. 15-24

	<b>Alignment Pins..... 27-58</b>	<b>1</b>
	<b>Hoist Rings..... 59-75</b>	<b>2</b>
	<b>Handles, Knobs, and Screw Clamps ..... 76-140</b>	<b>3</b>
	<b>Spring-Loaded Devices ..... 141-172</b>	<b>4</b>
	<b>Supports, Rests, and Feet..... 173-200</b>	<b>5</b>
	<b>Locators ..... 201-214</b>	<b>6</b>
	<b>Clamps and Accessories ..... 215-296</b>	<b>7</b>
	<b>Threaded Inserts ..... 297-302</b>	<b>8</b>
	<b>Jig and Fixture Bases ..... 303-368</b>	<b>9</b>
	<b>Modular Fixturing..... 369-420</b>	<b>10</b>
	<b>Toggle Clamps ..... 421-504</b>	<b>11</b>
	<b>Drill-Jig Bushings ..... 505-574</b>	<b>12</b>
	<b>ROEMHELD Power Workholding ..... 575-695</b>	<b>13</b>

# TINY VISE® Edge Clamps

## The Most Versatile Clamp Available!



Maximize part density to optimize production.

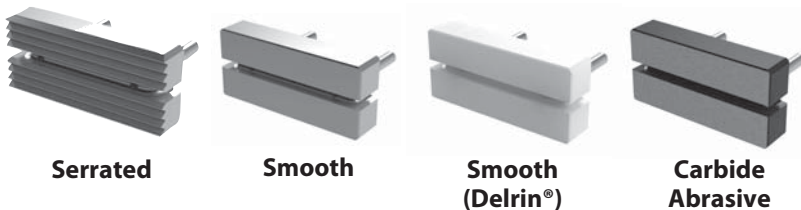


**NEW!**  
Low-profile Version

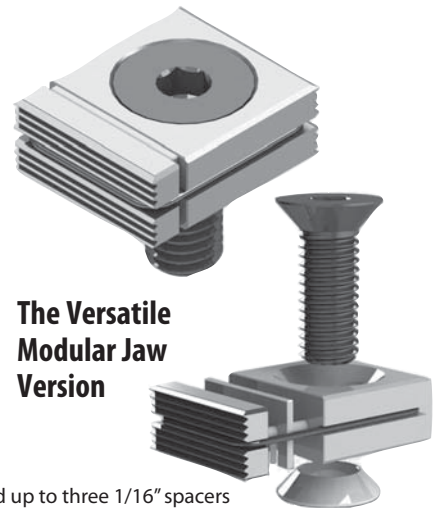
The lowest profile clamping device just got lower!

Patented Tiny Vise® edge clamps from Carr Lane Manufacturing grip the side of a workpiece to keep the top clear for machining.

**NEW!**  
Choice of Four Modular Jaw Faces:



Choice of four modular jaw faces: 1) Serrated hardened steel, for maximum gripping bite; 2) Smooth hardened steel, to avoid marring on finished surfaces; 3) Smooth Delrin®, to further protect finished surfaces when less clamping force is required; 4) Carbide-abrasive-coated steel, for strong gripping with minimal surface penetration. Any of the four jaws can be mounted on the same body.



**The Versatile  
Modular Jaw  
Version**

Add up to three 1/16" spacers to customize your support.

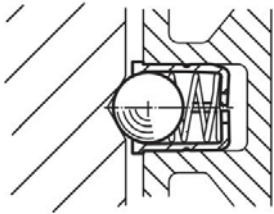
Clamping force is applied with the easy turn of a hex wrench  
Only Tiny Vise® Edge Clamps truly exert down thrust force on the workpiece, to prevent it from lifting  
Patented, more durable than similar clamps

Wide range of sizes. Versions include regular single, v-jaw single, regular double, v-jaw double, and modular. Now introducing low-profile version.  
Made in USA.

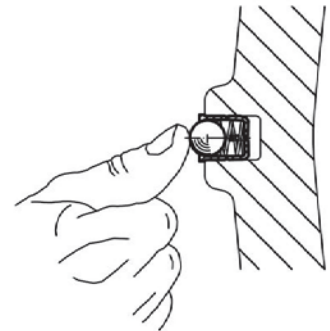
# New Self-Retaining Ball Plungers

**The slotted end of the thermoplastic body expands to compensate for hole tolerances up to .008".**

Due to their self-retaining design, these press-fit ball plungers can be securely installed in an ordinary drilled hole.



These plungers can be installed in a plain hole, with the shoulder exposed, or slightly counterbored for flush installation.



Self-Retaining Ball Plungers can often be installed by hand, due to the body's flexible design.

**See Page 153**

# Increase Productivity With Power Workholding



Power Workholding allows you to quickly clamp, position or support workpieces on CNC machines

- Reduce load time
- Reduce operator fatigue
- Increase quality and safety



**Work Supports**



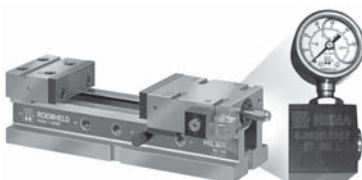
**Compact Clamps**



**Swing Clamps**



**Fixture Clamps**



**CNC Machine Vises**



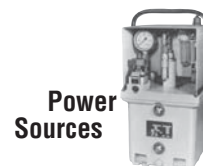
**Extending Clamps**



**Hinge/Link Clamps**



**Quintus Quick-Change Riser**



**Power Sources**



**Valves, Fittings & Accessories**

**See Pages 575-695**

# PICTORIAL INDEX

## Alignment Pins

### L PINS, T PINS & JIG PINS



**L Pins**  
p. 27



**T Pins**  
p. 27



**Shoulder Pins**  
p. 28



**Jig Pins**  
p. 28



**Locking L Pins**  
p. 29



**Locking T Pins**  
p. 29



**Locking Pin Bushings**  
p. 29

### CLAMPING PINS



**Clamping Pins**  
p. 30



**Locking Clamping Pins**  
p. 30

### SLOTTED LOCATOR BUSHINGS



**Press Fit**  
p. 31



**Knurled**  
p. 32



**Template Type**  
p. 33

## BALL LOCK PINS



**Technical Information**  
pp. 34-35



**Ball Lock Pins**  
pp. 36-37



**Marine Ball Lock Pins**  
pp. 38-39



**Heavy-Duty Ball Lock Pins**  
pp. 40-41



**Adjustable Ball Lock Pins**  
pp. 42-43



**Double-Acting Ball Lock Pins**  
pp. 44-45



**Lifting Pins**  
p. 46



**Ball Lock Receiver Caps**  
p. 48

## DETENT PINS



**Detent Pins**  
p. 49



**Marine Detent Pins**  
p. 50



**Threaded Detent Pins**  
p. 51

## EXPANDING PINS



**Cam Handle**  
p. 52



**Hex Head**  
p. 53

## CABLE



**Cable Assemblies**  
pp. 54-55



**Cable**  
p. 56



**Ferrules**  
p. 56



**Terminals**  
p. 56



**Cable Rings**  
p. 57



**Cable Tabs**  
p. 57



**Crimping Tools**  
p. 57



**Nylon Lanyards**  
p. 58



**Ball Lock Coupling Rings**  
p. 58

### ALSO SEE:

**Carr Lock® System (Jig and Fixture Bases)**  
pp. 303-320



### ALSO SEE:

**Hand-Retractable Plungers (Spring-Loaded Devices)**  
pp. 155-162



### ALSO SEE:

**Index Plungers (Spring-Loaded Devices)**  
pp. 163-165



# Hoist Rings



**Hoist Ring Safety Precautions**  
p. 60



**Swivel Hoist Rings**  
pp. 62-69



**Side-Pull Swivel Hoist Rings**  
pp. 71-72



**Pivoting Hoist Rings**  
pp. 73



**Lifting Eyes**  
pp. 74



**Hoist Ring Accessories**  
pp. 75



**ALSO SEE: Lifting Pins (Alignment Pins)**  
p. 46

# Handles, Knobs, and Screw Clamps

## FLUTED KNOBS



**Palm-Grip Hand Knobs (Aluminum)**  
p. 78



**Fluted Knobs (Phenolic)**  
p. 79



**Fluted Knobs (Thermoplastic)**  
p. 80



**Star Knobs (Thermoplastic)**  
p. 81



**Star Knobs (Cushion Grip)**  
p. 81

## FOUR-PRONG KNOBS & SCREW CLAMPS



**Hand Knobs (Aluminum)**  
p. 82



**Hand Knobs (Cast Iron)**  
p. 82



**Hand Knobs (Stainless Steel)**  
p. 86



**Hand Knob Assemblies**  
p. 83



**Swivel-Washer Hand Knob Assemblies**  
p. 84

(continued)



**Knob Shoe Assemblies**  
p. 85



**Bar-Lok Quick-Acting Screw Clamps**  
pp. 95-96



**Quick-Acting Knobs**  
p. 89



**Four-Prong Knobs (Phenolic)**  
pp. 87-88



**Four-Prong Knobs (Thermoplastic)**  
p. 88



**Three-Prong Knobs**  
p. 90

## T-HANDLE KNOBS



**T-Handle Knobs**  
p. 91



**ALSO SEE: Clamping Pins (Alignment Pins)**  
p. 30

## BAR-HANDLE KNOBS & SCREW CLAMPS



**Bar-Handle Screw Clamps**  
pp. 93-94



**Bar-Handle Nuts**  
p. 94



**Bar-Lok Quick-Acting Screw Clamps**  
pp. 96-97



**Bar Knobs**  
p. 89

## KNURLED KNOBS & SCREW CLAMPS



**Knurled-Head Screws**  
p. 95



**Swivel Head Screws**  
pp. 100, 102



**Knurled Knobs**  
p. 98



**Adjustable-Torque Thumb Screws**  
p. 104



**Quick-Acting Knurled Knobs**  
p. 105



**Adjustable-Torque Knobs**  
p. 105



**Knurled Knobs (Plastic)**  
p. 99



**ALSO SEE:  
Knurled Nuts**  
p. 264

## SOCKET-HEAD SCREW CLAMPS



**Swivel Screw Clamps**  
pp. 100, 103



**ALSO SEE:  
Jig Feet Leveling (Supports, Rests, and Feet)**  
p. 176



**ALSO SEE:  
Gripper Swivel Contact Bolts (Supports, Rests, and Feet)**  
p. 186



**ALSO SEE:  
Gripper Swivel Screws (Supports, Rests, and Feet)**  
p. 190



**Feet For Swivel Screws**  
p. 101

## LATCH SCREWS



**Quarter-Turn Screws**  
p. 92



**Half-Turn Screws**  
p. 92

## HAND WHEELS



**Hand-Wheel Modifications**  
p. 106



**Cast Iron**  
pp. 107-108



**Aluminum**  
pp. 107, 109



**Stainless Steel**  
p. 110



**Thermoplastic**  
pp. 111-114



**Phenolic**  
pp. 115-116



**Finger Pins**  
p. 117



**Solid Handles**  
p. 117



**Revolving Handles**  
pp. 118-120

## LEVER HANDLES & CRANK HANDLES



**Lever Handles and Lever Bars**  
pp. 121-122



**Crank Handles**  
p. 123



**Speed Ball Handles**  
p. 123



**Balanced Crank Handles**  
p. 124



**Crank Handles Thermoplastic**  
p. 125

## ADJUSTABLE HANDLES



**Steel Body & Plastic Handle**  
p. 126



**Stainless Body & Plastic Handle**  
p. 127



**Steel Body & Zinc Handle**  
p. 128



**Adjustable Lever Handles**  
pp. 129-130

## KNOB HANDLES



**Ball Knobs**  
pp. 131-133



**Oval Ball Knobs**  
p. 132



**Oval Tapered Knobs**  
p. 134



**Tapered Knobs**  
p. 135



**Palm-Grip Handles**  
p. 135



**Knob Handles**  
p. 136



**Tapered Knobs and Handles**  
p. 137



**Pull Knobs**  
p. 138



**T Handles**  
p. 138



**Pull Handles**  
pp. 139-140



# Spring-Loaded Devices

## SPRING PLUNGERS



**Spring Plungers**  
pp. 144-145



**Short Spring Plungers**  
p. 146



**Short Spring Plungers with Extended Travel**  
p. 147



**Press-Fit Spring Plungers**  
p. 143

## BALL PLUNGERS



**Technical Information**  
p. 148



**Ball Plungers**  
pp. 150-151



**Press-Fit Ball Plungers**  
p. 152



**Self-Retaining Ball Plungers**  
p. 153



**Ball Detents**  
p. 154



**Plunger Wrenches**  
p. 154

## HAND-RETRACTABLE PLUNGERS



**Knurled Head**  
p. 155



**Threaded Stud for Knob Handle**  
p. 156



**Pull Ring (Locking Type)**  
p. 157



**Pull Ring (Non-Locking Type)**  
p. 158



**L Handle (Short Stroke)**  
p. 159



**L Handle (Long Stroke)**  
p. 160



**Knob Handle**  
p. 161



**Knob Handle with Mounting Plate**  
p. 162

## INDEX PLUNGERS



**Tapered Index Plungers**  
pp. 163-165



**Straight Index Plungers**  
pp. 163-165

## SPRING STOP BUTTONS



**Spherical Radius**  
p. 166



**Flat Face with Tang**  
p. 168



**Flat Face**  
p. 167



**ALSO SEE: Spring-Stop Button Adaptors (Modular Fixturing)**  
p. 407

## SPRING LOCATING PINS



**Steel Pin (Coil Spring)**  
p. 169



**Stainless Pin (Polyurethane Spring)**  
p. 170



**Delrin® Pin (Polyurethane Spring)**  
p. 171



**Tapped Receptacle**  
p. 172



**Eccentric Liners**  
p. 172



**ALSO SEE: Adjustable-Torque Thumb Screws (Handles, Knobs, and Screw Clamps)**  
p. 103



**ALSO SEE: Adjustable-Torque Knobs (Handles, Knobs, and Screw Clamps)**  
p. 104



**ALSO SEE: Torque Screw Jacks (Supports, Rests, and Feet)**  
p. 198

# Supports, Rests, and Feet

## LEVELING FEET



**Leveling Feet**  
p. 174



**Stud Leveling Feet**  
p. 175



**Jig Leveling Feet**  
p. 176



**Jig Feet Leveling Assemblies**  
p. 176



**Threaded Tube Ends**  
p. 177

## SWIVEL PADS



**Swivel Pads**  
p. 178



**Swivel Nuts**  
p. 178



**Swivel Pad Feet**  
p. 179



**Swivel Contact Bolts**  
p. 194

## GRIPPERS



**Round Grippers**  
pp. 180-182



**Square Grippers**  
pp. 182-183



**Edge Grippers**  
p. 184



**Gripper Contact Bolts**  
p. 185



**Gripper Swivel Contact Bolts**  
pp. 186-187



**Gripper Swivel Pads**  
pp. 188-189



**Gripper Swivel Screws**  
p. 190

## REST BUTTONS & PADS



**Rest Buttons**  
p. 192



**Jig Rest Buttons**  
p. 192



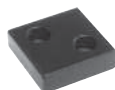
**Screw Rest Pads**  
p. 195



**Screw Rest Buttons**  
p. 193



**Spherical-Radius Locator Buttons**  
p. 194



**Jig Leg Plates**  
p. 196

(continued)



**Heavy-Duty Rest Pads**  
p. 196



**Drill Jig Feet**  
p. 193



**Double-End Jig Feet**  
p. 195



**ALSO SEE:  
Height Shims  
(Modular Fixturing)**  
p. 399



**Manual Work Supports**  
p. 197

## SCREW JACKS



**Knurled Screw Jacks**  
p. 198



**Torque Screw Jacks**  
p. 198



**Adjustable Locating Buttons**  
p. 198



**Heavy-Duty Screw Jacks**  
p. 199



**Eccentric Leveling Lugs**  
p. 200



**ALSO SEE:  
Modular Supports  
& Locators  
(Modular Fixturing)**  
pp. 396-407

# Locators

## LOCATING PINS



**Floating Locating Pins**  
p. 203



**Round & Diamond Pins**  
p. 202



**Round & Diamond Locating Pins**  
pp. 204-205



**Bullet-Nose Dowels**  
p. 207



**Cone Locator Pins**  
p. 207



**Bullet-Nose Round & Diamond Pins**  
p. 206

## CONSTRUCTION BALLS



**Construction Balls (Shoulder Type)**  
p. 208



**Construction Balls (Adjustable Type)**  
p. 209



**Construction-Ball Pads**  
p. 210



**Construction-Ball Covers**  
p. 209

## FIXTURE KEYS



**Fixture Keys**  
p. 211



**Step Fixture Keys**  
p. 211



**Sure-Lock™ Fixture Keys**  
p. 212



**Reamed-Hole Fixture Keys**  
p. 212

(continued)



**Locating Keys**  
p. 213



**Subplate Locating Keys**  
p. 213



**Pallet Fixture Keys**  
p. 214



**Mill Fixture Keys**  
p. 214



**ALSO SEE:**  
**Carr Lock® System (Jig and Fixture Bases)**  
pp. 303-320



**ALSO SEE:**  
**Fixture Locating Pins (Modular Fixturing)**  
p. 395



**ALSO SEE:**  
**Bore Clamps**  
pp. 262-263

# Clamps and Accessories

## CLAMP STRAPS



**Forged Adjustable Clamps**  
p. 235



**Aluminum Adjustable Clamps**  
p. 234



**Slotted-Heel Clamp Straps**  
pp. 217-222



**Tapped-Heel Clamp Straps**  
pp. 223-228



**Swivel-Heel Clamp Straps**  
p. 231



**Double-End Clamp Straps**  
pp. 232-233



**Step Blocks & Clamps**  
pp. 236-237



**Forged U Clamps**  
p. 228

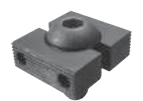


**ALSO SEE:  
High-Rise Clamps  
(Modular Fixturing)**  
pp. 410-412

## EDGE CLAMPS



**Tiny Vise® Edge Clamps**  
pp. 238-247



**Tiny Vise® Double Edge Clamps**  
pp. 238, 244-245, 247

(continued)



**Serrated Adjustable Edge Clamps**  
p. 248



**Serrated Fixed Edge Clamps**  
p. 249



**Cam Edge Clamps**  
p. 250



**ALSO SEE:  
Pivoting Edge Clamps  
(Modular Fixturing)**  
p. 417



**ALSO SEE:  
Toggle Edge Clamps  
(Toggle Clamps)**  
pp. 476-477



**ALSO SEE:  
Hydraulic Edge Clamps  
(ROEMHELD Power Workholding)**  
p. 591

## SWING CLAMPS



**Hook Clamps**  
pp. 252-254



**One-Touch Quick Acting Swing Clamps**  
pp. 255-257



**Swing Clamp Assemblies**  
pp. 258-259



**Up-Thrust Clamps**  
p. 260



**ALSO SEE:  
Hydraulic and Air-Powered Swing Clamps  
(ROEMHELD Power Workholding)**  
pp. 595-606



**ID Clamps**  
pp. 262-263

## NUTS



**Acorn Nuts**  
p. 264



**Knurled Nuts**  
p. 264



**Knurled Check Nuts**  
p. 264



**Hex Nuts**  
p. 265



**Jam Nuts**  
p. 265



**Flange Nuts**  
p. 266



**Coupling Nuts**  
p. 266



**Spherical Nuts & Washers**  
p. 267



**ALSO SEE:  
Bar-Handle Nuts  
(Handles, Knobs,  
and Screw Clamps)**  
p. 94



**ALSO SEE:  
Bar Knobs (Handles,  
Knobs, and Screw  
Clamps)**  
p. 89

## WASHERS



**Spherical Washers**  
p. 267



**Flat Washers**  
p. 268



**Knurled-Face Washers**  
p. 268



**C Washers**  
p. 269



**Swing C Washers**  
p. 269



**ALSO SEE:  
Flanged Washers  
(Toggle Clamps)**  
p. 504

## STUDS, BOLTS, AND T NUTS



**Shoulder Screws**  
p. 270



**Studs**  
pp. 271-272



**T Nuts**  
pp. 273-274



**Rotary T Nuts**  
p. 275



**T Bolts**  
p. 276



**T-Slot Bolts**  
p. 277



**Eye Bolts**  
p. 278



**Swing Bolts**  
p. 279

## CAMS



**Cam Handles**  
p. 280

**ALSO SEE:**  
**Clamp-Strap Assemblies with Cam Handles**  
pp. 221, 223-224, 233-234



**ALSO SEE:**  
**Cam Edge Clamps**  
p. 250



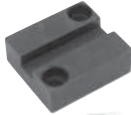
**ALSO SEE:**  
**Vertical-Handle Cam Clamps (Toggle Clamps)**  
p. 448



## CLAMP RESTS & ACCESSORIES



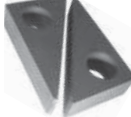
**Clamp Rests**  
p. 281



**Guide Blocks**  
p. 282



**Clamp Springs**  
p. 282

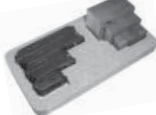


**Step Blocks**  
pp. 236-237



**ALSO SEE:**  
**Stud Leveling Feet (Supports, Rests, and Feet)**  
p. 175

## CLAMPING KITS



**Step Block & Clamp Sets**  
p. 237



**T Nut & Stud Sets**  
p. 274



**Rotary T Nut & Stud Sets**  
p. 275



**T-Slot Bolt Kits**  
p. 277



**Clamping Kits**  
p. 283



**Deluxe Clamping Kits**  
pp. 284-285

## PORTABLE CLAMPS



**Shark Clamps**  
p. 286



**Plastic C Clamps**  
p. 287



**Swing C Clamps**  
p. 288



**Also see Forged Toggle Pliers (Toggle Clamps)**  
pp. 487-489



**Also see Toggle Bar Clamps (Toggle Clamps)**  
p. 490



**Drill-Press Clamps**  
pp. 289-290

## HAMMERS & HAND TOOLS



**No-Mar Aluminum Hammers**  
p. 237



**T-Slot Cleaners**  
p. 274



**Simplex Hammers**  
pp. 291-293



**No-Rebound Hammers**  
pp. 294-296



**Soft-Face Punches**  
p. 296

# Threaded Inserts

## KEY INSERTS



**Technical Information**  
p. 297



**Key Inserts (Heavy Duty)**  
pp. 298-299



**Key Inserts (Heavy Duty, Internal Thread Locking)**  
p. 299



**Key Inserts (Thinwall)**  
p. 300



**Key Inserts (Thinwall, Internal Thread Locking)**  
p. 300



**Solid Key Inserts**  
p. 301



**Key Insert Installation Tools**  
pp. 298-302



**Key Insert Assortments**  
p. 302

# Jig and Fixture Bases

## CarrLock<sup>®</sup> SYSTEM



**Carr Lock<sup>®</sup> Clamps**  
p. 303



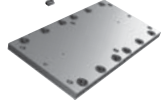
**Carr Lock<sup>®</sup> Liner Bushings**  
p. 304



**Carr Lock<sup>®</sup> Receiver Bushings**  
p. 305



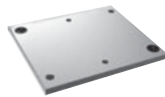
**Carr Lock<sup>®</sup> System Kits**  
pp. 306-313, 320



**Carr Lock<sup>®</sup> Subplates**  
pp. 306-313



**Carr Lock<sup>®</sup> Tooling Blocks**  
pp. 317-318



**Carr Lock<sup>®</sup> Fixture Plates**  
pp. 314-316, 319



## QUICK-CHANGE 5-AXIS WORKHOLDING



**System Features and Options**  
pp. 322-325



**Quintus Quick-Change Risers**  
pp. 326-328



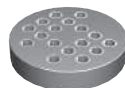
**Riser Blocks**  
p. 329



**5-Axis Vises**  
pp. 330-331

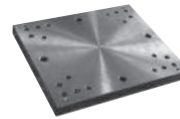


**Dovetail Clamping**  
pp. 332-333



**Fixture Plates**  
pp. 334-341, 630-636

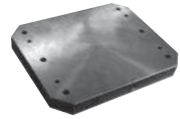
## BLANK TOOLING PLATES



**Rectangular Tooling Plates**  
p. 343

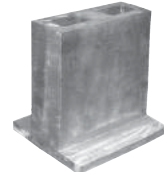


**Square Pallet Tooling Plates**  
p. 344



**Rectangular Pallet Tooling Plates**  
p. 345

## BLANK TOOLING BLOCKS



**Two-Sided Tooling Blocks**  
p. 346



**Window Tooling Blocks**  
p. 347



**Three-Sided Tooling Blocks**  
pp. 348-349



**Four-Sided Tooling Blocks**  
pp. 350-352



**Six-Sided Tooling Blocks**  
p. 353

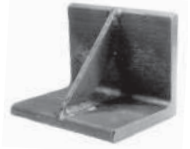


**Eight-Sided Tooling Blocks**  
p. 354

## ANGLE BRACKETS



**Angle Brackets**  
p. 355



**Gusseted Angle Brackets**  
p. 355



**Angle Brackets with Locating Holes**  
p. 356



**Adjustable Angles**  
p. 357

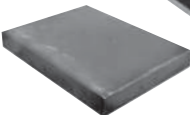
## CAST SECTIONS



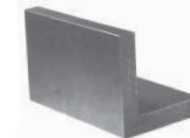
**T**  
p. 362



**Offset T**  
p. 358



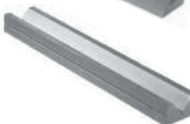
**Flat**  
p. 362



**L**  
p. 361



**U**  
p. 361



**V**  
p. 361

(continued)



**Square**  
p. 363



**Rectangular**  
p. 363



**H**  
p. 363

## TRUNNIONS



**Trunnions**  
p. 359



**Spherical Trunnions**  
p. 360

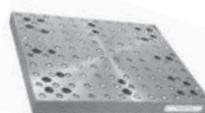
## ADJUSTABLE LOCKING HUBS



**Heavy Duty/ Stainless**  
pp. 365-367



**Medium Duty/ Plastic**  
p. 368



**ALSO SEE:**  
**Modular Tooling Plates & Blocks (Modular Fixturing)**  
pp. 383-393

# Modular Fixturing



**Technical Information**  
pp. 374-377



**Toolroom Starter Sets**  
pp. 378-382



**Modular Tooling Plates & Blocks**  
pp. 383-393



**Modular Mounting Accessories**  
pp. 394-395



**Modular Supports & Locators**  
pp. 396-407



**Modular Clamps**  
pp. 408-420

## Toggle Clamps



**Technical Information**  
p. 422



**Horizontal-Handle Toggle Clamps**  
p. 425 (Index)



**Vertical-Handle Toggle Clamps**  
pp. 435-436 (Index)



**Push/Pull Toggle Clamps (Plunger Type)**  
p. 463 (Index)



**Toggle Edge Clamps**  
p. 476 (Index)



**Latch-Action Toggle Clamps**  
p. 478 (Index)



**Toggle Pliers**  
p. 486 (Index)



**Air-Powered Clamps**  
p. 491 (Index)



**Toggle Clamp Accessories**  
pp. 500-504

## Drill Bushings



**Technical Information**  
pp. 508-512



**Press-Fit Bushings**  
pp. 513-524



**Renewable Bushings**  
pp. 525-531



**Liner Bushings**  
pp. 532-537



**Lockscrews and Clamps**  
pp. 538-539



**Chip-Breaker Bushings**  
pp. 540-541



**Directed-Coolant Bushings**  
pp. 542-543



**Oil-Groove Bushings**  
pp. 544-546



**Castable Bushings**  
pp. 547-551



**Template Bushings**  
pp. 552-555



**Gun-Drill Bushings**  
pp. 556-558



**Air-Feed Bushings**  
pp. 559-573

## ROEMHELD Power Workholding



**Product Features, Design Information, and Safety Precautions**  
pp. 578-586



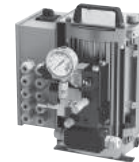
**Clamps & Cylinders**  
pp. 587-588 (Index)  
p. 607 (Index)  
p. 616 (Index)



**Work Supports**  
p. 619 (Index)



**Power Vises and Concentric Clamping**  
p. 623-624 (Index)



**Power Sources**  
p. 643-644 (Index)



**Valves**  
p. 656-657 (Index)



**Fittings & Accessories**  
p. 668 (Index)



**Lifting & Handling Devices**  
pp. 693-694



# ALPHABETICAL INDEX

## KEY TO PAGE NUMBERS

Section 1.	Main Catalog .....	27-368
Section 2.	Modular Fixturing .....	369-420
Section 3.	Toggle Clamps .....	421-504
Section 4.	Drill Jig Bushings .....	505-574
Section 5.	Power Workholding .....	575-696

## A

A.....	559-573
AA.....	357
AB.....	355
ABA.....	355
ABK.....	356
ABLB.....	356
ABP.....	42-43
Accessories, Toggle Clamp.....	500-504
Accumulators.....	678
Acorn Nuts.....	264
ACV.....	499
Adjustable Angles.....	357
Adjustable Ball Lock Pins.....	42-43
Adjustable Clamps, Aluminum.....	234
Adjustable Clamps, Forged.....	235, 284, 416
Adjustable Clamps, Serrated.....	248-249, 418-419
Adjustable Handles.....	126-128
Adjustable Lever Handles.....	129-130
Adjustable Locking Hubs.....	364-368
Adjustable Locating Buttons.....	198
Adjustable-Torque Knobs.....	105
Adjustable-Torque Thumb Screws.....	104
AED.....	682
AF.....	687
AFC.....	682
AFL.....	568
AGNS.....	230
AH.....	128
AHL.....	129-130
AHP.....	126-127
AHTC.....	432
Air-Control Accessories.....	499, 682
Air Feed Bushings.....	559-569
Air-Feed Lockscrews.....	571
Air Fittings.....	499, 687
Air Power Units.....	649-651
Air-Powered Swing Clamps.....	595-596
Air-Powered Toggle Clamps.....	491-499
ALCS.....	230
ALH.....	365-368
Alignment Pins.....	27-58
Aluminum Adjustable Clamps.....	234
Aluminum Goose-Neck Clamp Straps.....	230
Aluminum Hand Knobs.....	78, 82
Aluminum Hand Wheels.....	107, 109

Aluminum Locator-Nose Clamp Straps.....	230
Aluminum Straight Clamp Straps.....	230
AN.....	264
Anchor Shackles.....	75
Angle Brackets.....	355-357
Angle Brackets, Gussetted.....	355, 357
Angle Plates.....	389, 393
Angle Tooling Plates.....	389
Angles, Adjustable.....	357
Angles, Cast Section.....	358-360
AP.....	649-651
ASCA.....	596
ASCS.....	230
Assemblies, Cable.....	54-55
Assemblies, Hand Knob.....	83-84
Assemblies, Hook Clamp.....	252-254, 415
Assemblies, Jig-Feet Leveling.....	176
Assemblies, Knob Shoe.....	85
AT.....	570
ATC.....	449
ATEC.....	477
ATK.....	105
Automotive Clamps.....	450-453
Automatic Toggle Clamps.....	432, 449, 477
Automatic Toggle Edge Clamps.....	477

## B

B.....	205-206
Backstops, Locating.....	417
Balanced Crank Handles.....	124
Ball Detents.....	154
Ball Knobs.....	131-133
Ball Lock Coupling Rings.....	58
Ball Lock Pins.....	34-46
Ball Lock Receiver Caps.....	48
Ball Plungers.....	148-152
Balls, Construction.....	208-209
Balls, Plastic.....	131-132
Bar Clamps, Toggle.....	490
Bar-Handle Screw Clamps.....	93-94
Bar-Handle Nuts.....	94
Bar Knobs.....	89
Bar-Lok Quick-Acting Screw Clamps.....	96-97
BC.....	613

BCD.....	613
BD.....	154
BDP.....	206
BF.....	343-345
BHCS.....	245, 247
BHN.....	94
BHS.....	93
BK.....	89
Blank Tooling Blocks.....	346-354
Blank Tooling Plates.....	314-315
.....	334-339, 343-345
BLCR.....	58
BLH.....	40-41
BLK.....	97
BLM.....	96
Block Clamps.....	612-613
Block Cylinders.....	612-613
Block Push Clamps.....	612-613
Blocks, Four-Sided Tooling.....	391
Blocks, Guide.....	282
Blocks, Riser.....	396, 412
Blocks, Step.....	236-237
Blocks, Tooling.....	317-318, 346-354, 390
Blocks, Two-Sided Tooling.....	390
Blocks, V.....	359, 403-404
BLP.....	36-37
BLR.....	48
BLT.....	97
BND.....	205-206
Bodies for Swivel Screws.....	100
Bolt Retainers.....	504
Bolts, Angle Bracket Locating.....	356
Bolts, Contact.....	192, 194-195, 197-198
.....	413, 500-503, 691
Bolts, Eye.....	278
Bolts, Latch (See Swing Bolts).....	279
Bolts, Swing.....	279
Bolts, T.....	276
Bolts, T-Slot.....	277
Bore Clamps.....	262-263
BP.....	150
BPD.....	44-45
BR.....	504
BRP.....	206
Brackets, Angle.....	355-357
BS.....	236
BSH.....	237
BSS.....	100

Bullet-Nose Dowels and Bushings .....	205
Bullet-Nose Pins and Bushings.....	206
Bushings, Air Feed .....	559-571
Bushings, Bullet-Nose Dowel Pin.....	205
Bushings, Chip Breaker .....	540-541
Bushings, Circuit Board .....	See website
Bushings, Cone Locator Pin.....	205
Bushings, Diamond Groove .....	547-548
Bushings, Directed Coolant .....	542-543
Bushings, Drill Jig .....	507-574
Bushings, EZ Cast .....	551
Bushings, Gun Drill .....	556-558
Bushings, Head Liner .....	535-536
Bushings, Head Press Fit .....	518-522
Bushings, Liner .....	532-534
Bushings, Locating.....	394
Bushings, Locating Pin .....	203-206
Bushings, Oil Groove.....	544-546
Bushings, Press Fit .....	513-524
Bushings, Serrata Groove .....	549
Bushings, Serrated Press Fit .....	523-524
Bushings, Slip/Fix Renewable .....	525-529
Bushings, Slotted Locator .....	31-33
Bushings, Straight Index Plungers.....	163-165
Bushings, Tapered Index Plungers.....	163-165
Bushings, Template .....	552-555
Bushings, Un-A-Lok™ Liner .....	537
Bushings, Un-A-Lok™ Liner, Diamond Knurl .....	550
Buttons, Adjustable Locating .....	198
Buttons, Jig Rest .....	192
Buttons, Rest .....	192
Buttons, Screw Rest .....	193
Buttons, Spherical-Radius Locator .....	194
Buttons, Spring-Stop .....	166-168, 407
 <b>C</b>	
C.....	56
C Clamps.....	287-288
C Washers.....	269
C Washers, Swing .....	269
CA.....	252
CAA.....	359
Cable Assemblies.....	54-55
Cable Rings.....	57
Cables .....	54-56
Cable Tabs.....	57
CAC.....	254
Cam-Action Hold-Down Clamps .....	448
Cam Edge Clamps .....	250, 416
Cam Handles .....	280
Cam-Type Clamp Straps.....	221, 223-224, 233-234
Cams, Double.....	280
Cams, Single.....	280
Cap Screws, Hex-Head.....	395
Cap Screws, Socket-Head .....	394
Carr Lock® Clamps.....	303
Carr Lock® Fixture Plates.....	314-316
Carr Lock® Liner Bushings .....	304
Carr Lock® Receiver Bushings .....	305
Carr Lock® System .....	304-320
Carr Lock® System Kits .....	306-313
Carr Lock® Subplates .....	307-313
Cast Sections .....	361-363
CAU.....	362
CB.....	209, 691
CBP.....	210
CBPK.....	210
CBPR.....	210
CBU .....	See website
CC.....	502
CF .....	361
CH.....	280, 540
CHB.....	124
Check Nuts, Knurled .....	264
Check Valves, Air.....	499
Check Valves, Hydraulic .....	665, 667
CHM.....	541
CHP .....	125
Chip Breaker Drill Bushings .....	540-541
Circuit Board Drill Bushings.....	See website
CK .....	283
CKH.....	283
CKMH.....	283
CL5® 5-Axis Workholding .....	321-342
CLK.....	342
Clamp Assemblies, Cam-Type .....	221, 223-224, 233-234
Clamp Assemblies, Double-End .....	234-235, 409
Clamp Assemblies, Hook .....	252-254, 415
Clamp Assemblies, Slotted-Heel .....	219-224, 408
Clamp Assemblies, Swing .....	255-259, 414
Clamp Assemblies, Swivel Heel .....	233
Clamp Assemblies, Tapered-Nose .....	228
Clamp Assemblies, Tapped-Heel .....	225-230
Clamp Assemblies, Wide-Nose .....	229
Clamp Heels (See Clamp Rests) .....	281
Clamp Rest Screws.....	281
Clamp Rests .....	281
Clamp Springs .....	282
Clamp Strap Assemblies.....	217, 220-224 230, 233-235, 409-410
Clamp Straps, Aluminum Gooseneck.....	230
Clamp Straps, Aluminum Locator-Nose .....	230
Clamp Straps, Aluminum Straight .....	230
Clamp Straps, Cam-Type .....	221, 223-224, 233-234
Clamp Straps, Double-End .....	232-233, 409
Clamp Straps, Forged Gooseneck .....	229
Clamp Straps, Forged Straight .....	229
Clamp Straps, Locator Nose .....	229-230
Clamp Straps, Slotted-Heel.....	217-222, 408
Clamp Straps, Swivel-Heel .....	231
Clamp Straps, Tapered-Nose .....	226
Clamp Straps, Tapped-Heel.....	223-230
Clamp Straps, Tapped-Heel Padded.....	228
Clamp Straps, U-Shaped .....	218
Clamp Straps, Wide-Nose .....	227
Clamping Kits.....	283-285
Clamping Pins.....	30
Clamping Valves .....	658-660
Clamps, Air-Powered .....	493-500, 595-596
Clamps, Aluminum Adjustable .....	234
Clamps, Automotive.....	450-453
Clamps, Bar .....	490
Clamps, Block.....	612-613
Clamps, Bushing .....	538-539
Clamps, C.....	287-288
Clamps, Cam-Action Hold-Down .....	448
Clamps, Cam Edge .....	250
Clamps, Carr Lock® .....	303
Clamps, Drill-Press .....	289-290
Clamps, Edge .....	250, 476-477, 591
Clamps, Electric.....	See website
Clamps, Expanding.....	262-263
Clamps, Extending .....	589, 592-594
Clamps, Flat .....	589-590
Clamps, Forged Adjustable .....	235, 416
Clamps, Forged Strap .....	217-218, 231
Clamps, Forged U .....	234
Clamps, High-Rise .....	410-412
Clamps, Hinge .....	593-594
Clamps, Hook.....	252-254, 415
Clamps, Hold-Down Toggle .....	425-462
Clamps, Hydraulic .....	582-675
Clamps, ID .....	262-263
Clamps, Internal.....	262-263
Clamps, Latch Action .....	478-485
Clamps, Plain .....	236
Clamps, Plate.....	450-453
Clamps, Power.....	491-499, 575-696
Clamps, Push/Pull Toggle.....	463-475
Clamps, Quick-Acting Screw .....	95-96
Clamps, Round .....	538-539
Clamps, Screw .....	83-85, 88, 92-103 105, 126-130, 420
Clamps, Self-Adjusting Plunger.....	467, 471, 475
Clamps, Serrated Adjustable .....	418
Clamps, Shark .....	286
Clamps, Step .....	236-237
Clamps, Strap.....	217-235
Clamps, Power Workholding .....	578-642
Clamps, Swing .....	252-259, 288 414-415, 595-606
Clamps, Swivel Screw .....	85, 93-96, 99-103
Clamps, Toe .....	239-250, 416-419, 591
Clamps, Toggle.....	421-504

Clamps, Tubing .....	686
Clamps, Up-Thrust .....	260, 414
CLB.....	206-207
CLBR .....	305
CLC.....	303, 306-316
Clevis Pins.....	280
CLFP.....	306-316
CLFR.....	305
Clinch-Lok <sup>®</sup> (See Template Bushings) .....	552-553
Clips, Hoist Ring .....	75
CLK.....	342
CLMK.....	320
CLP .....	207
CLPK .....	303
CLPL.....	304
CLPP .....	320, 395
CLRS .....	341
CLSK .....	306-313
CLSL.....	304
CLSP.....	306-313
CLTW .....	320
CLVP .....	280
CN.....	266
Collet Vises.....	See website
Compact Clamps .....	592
Concentric Clamps.....	See website
Concentric Vises.....	637-638
Cone-Cushion Spindles.....	502
Cone Locator Pins and Bushings .....	207
Construction-Ball Covers .....	209
Construction-Ball Pads .....	210
Construction Balls .....	208-209
Construction Balls, Shoulder .....	208
Contact-Bolt Extensions.....	413
Contact-Bolt Holders.....	413
Contact Bolts.....	185-187, 190, 194 ..... 413, 500-503, 691
Control Cylinders.....	See website
Coupling Elements .....	679-680
Coupling Nuts.....	266
Coupling Rings, Ball Lock .....	58
Couplings, Hydraulic.....	669-680
Couplings, Rotary .....	669-671
Couplings, Rotary Valve .....	672-675
COVER.....	200, 209
Covers, Construction-Ball.....	209
Covers, Eccentric-Leveling-Lug .....	200
Covers, Optical-Cup Mount .....	See website
CP .....	30, 224, 228
CPU.....	See website
CR.....	220
Crank Handles.....	123-125
Crank Handles, Balanced .....	124
Crimping Tools .....	57
CRS.....	281
CS .....	217-219, 222-223, 228, 231-232, 408-409
CSA .....	362
CSH.....	363
CSR.....	363
CSS.....	363

CST .....	361
CSU .....	362
CSV.....	362
CT .....	57
CUT .....	361
CW.....	269
Cylinders, Hydraulic.....	607-615
Cylinders, Riser .....	399
Cylinders, Support .....	400-401

## D

DBP .....	150-151
DC.....	287, 542
DCHL.....	543
DCK.....	285
DCKN.....	285
DCL .....	543
DCS .....	287
DCT .....	287
DEA.....	232
Decouplers, Pallet .....	676-677
DEJF.....	195
Delt-A-Groove (See Diamond Groove Bushings) .....	547-548
Deluxe Clamping Kits.....	284-285
DEP .....	49
Detent Pins .....	49-51
Detents, Ball .....	154
DG.....	547
DGM .....	548
Diamond Groove Drill Bushings.....	547-548
Diamond Locating Pins.....	204-205
Diamond Pins .....	202-204, 206, 395
Directed Coolant Bushings .....	542-543
Directional-Control Valves.....	499, 658-660
Disconnects, Hydraulic Quick .....	683
DJF .....	193
DLT.....	204-205
Double Cams .....	280
Double-Acting Ball Lock Pins .....	44-45
Double Edge Clamps, TINY VISE <sup>®</sup> .....	244-245
Double-End Clamp Straps.....	232-233, 409
Double-End Jig Feet.....	195
Dowels, Bullet-Nose .....	205
DPT .....	204-205
DPX.....	202
DPY .....	202
DPZ .....	202
Drill Bushings, Air Feed .....	559-573
Drill Bushings, Chip Breaker .....	540-541
Drill Bushings, Circuit Board.....	See website
Drill Bushings, Diamond Groove.....	547-548
Drill Bushings, Directed Coolant .....	542-543
Drill Bushings, EZ Cast .....	551
Drill Bushings, Gun Drill .....	556-558
Drill Bushings, Head Liner .....	535-537
Drill Bushings, Head Press Fit.....	518-522
Drill Bushings, Liner.....	532-534

Drill Bushings, Oil Groove.....	544-546
Drill Bushings, Press Fit .....	513-517
Drill Bushings, Serrata Groove.....	549
Drill Bushings, Serrated Press Fit.....	523-524
Drill Bushings, Slip/Fix Renewable.....	525-529
Drill Bushings, Template.....	552-555
Drill Bushings, Un-A-Lok <sup>™</sup> Liner .....	537
Drill Bushings, Un-A-Lok <sup>™</sup> Liner, Diamond Knurl.....	550
Drill Jig Feet.....	193
Drill-Press Clamps .....	289-290
Duraclamp Plastic C Clamps.....	287
DVJI .....	333

## E

EB.....	278
EC .....	591
Eccentric Leveling Lugs.....	200
Eccentric Leveling Lug Covers.....	200
Eccentric Liner .....	172
Edge Clamps, Cam .....	250, 416
Edge Clamps, Hydraulic.....	591
Edge Clamps, Serrated .....	248-249, 418-419
Edge Clamps, TINY VISE <sup>®</sup> .....	238-247
Edge Clamps, Toggle .....	476-477
Edge Grippers .....	184
Edge Supports .....	402
EG .....	184
Electric Clamps.....	See website
Electric Power Units.....	645-648
ELL.....	200
EP.....	645-648
EX .....	589-590
EXP.....	52
Expanding Clamps.....	262-263
Expanding Pins.....	52-53
EXPH.....	53
Extending Clamps .....	587-594
Extension Nuts (see Coupling Nuts) .....	266
Extension Supports.....	397-398
Eye Bolts.....	278
Eye Bolts, Lifting .....	74
EZ.....	551
EZ Cast Drill Bushings .....	551
EZ-Torque <sup>®</sup> Swivel Hoist Rings.....	69

## F

F .....	56, 669-670, 676, 682-683, 687-690
FAC .....	235, 289, 416
FACA .....	235, 289
FAS.....	75
Fast-Lok <sup>™</sup> Plate Lifting System .....	.....See website

FC	501, 539
FCP	501
FCQA	501
FD	See website
Feet, Double-End Jig	188
Feet, Drill Jig	193
Feet, Jig Leveling	176
Feet, Jig-Leveling Assembly	176
Feet, Leveling	174-176
Feet, Stud Leveling	175
Feet, Swivel Screw	101
Ferrules	56
FFN	266
FGNS	229
FHN	265
FHSS	249
FHW	116
Fifth-Axis (see CL5 <sup>®</sup> )	321-342
Filter/Regulators	682
Filters, High-Pressure Inline	684
Finger Handles	117
Finger Pins	117
Fittings, Air & Hydraulic	499, 687-688
Five-Axis Vises	330-333, 630-636
Five-Axis Workholding	321-342, 630-636
Fixture Bases, Blank	306, 314-317, 319 334-339, 343-345
Fixture Clamps	640-642
Fixture Hose	685
Fixture Keys	211-214
Fixture Keys, Mill	214
Fixture Keys, Pallet	214
Fixture Keys, Reamed-Hole	212
Fixture Keys, Step	211
Fixture Keys, Sure-Lock <sup>™</sup>	212
Fixture Machining Kits	320
Fixture Plates	306-320, 334-345 384-389, 392-393
Fixture Plates, Blank	314-316, 334-339 343-345
Fixture Plates, Carr Lock <sup>®</sup>	314-320
FJN	265
FK	211
FL	685
Flange Nuts	266
Flanged Washers	504
Flat Cast Sections	358
Flat Clamps	539
Flat-Cushion Spindles	501
Flat-Head Socket Screws	249
Flat Milled Renewable Drill Bushings	530
Flat Washers	268
Floating Locating Pins	203
Flow-Control Valves	666-667
FLP	203
FLPS	See website
Fluid, Hydraulic	685
Fluid Pressure Gauges	682
Fluted Knobs	79-80, 116

FM	530-531
FN	266
Foldable Revolving Handles	120
Foot Pumps	652
Forged Adjustable Clamps	235, 289, 416
Forged Anchor Shackles	75
Forged Gooseneck Clamp Straps	229
Forged Rings	75
Forged Straight Clamp Straps	229
Forged U Clamps	234
Four-Prong Knobs	82-89
Four-Sided Tooling Blocks	391
FP	117
FR	75, 682
FRH	120
FRL	682
FRCS	229
FSCS	229
FSS	101
FTS	227, 272
FUC	234
Fully Threaded Studs	272
FW	268

## G

GA	682
GAB	355
Gages, Locating	395
Gauges, Hydraulic Pressure	682
GB	282
GBF	187
GBFN	187
GCB	185
GCS	221, 233
GCSA	221, 233
GD	556-558
GDD	558
GDE	558
GDH	558
GDI	557
GDL	556
Gooseneck Clamp Straps	221, 229-230, 233, 396
Gripper Contact Bolts	185
Gripper Swivel Contact Bolts	186-187
Gripper Swivel Pads	188-189
Gripper Swivel Screws	190
Grippers	180-190
GSB	187
GSF	190
GSP	188
GSPF	189
GSPN	189
GSPS	189
GSS	190
Guide Blocks	282
Gun Drill Bushings	556-558
Gusseted Angle Brackets	355

## H

H	123, 518-520, 685
H Cast Sections	360
Half-Turn Screws	92
Halfway Extension Supports	398
Hammers, No-Rebound	294-296
Hammers, No-Mar	237
Hammers, Simplex	291-293
Hand-Knob Assemblies	83-85
Hand Knobs	78-91
Hand Knobs, Fluted	79-80, 116
Hand Knobs, Four-Prong	82-89
Hand Knobs, Star	81
Hand Knobs, T-Handle	91
Hand Knobs, Three-Prong	90
Hand Knobs, Palm Grip	78
Hand Pumps	652
Hand Retractable Plungers	155-162
Hand Wheel Handles	117
Hand Wheels	107-116
Hand Wheels, Fluted	116
Hand Wheel Modifications	106
Handles, Adjustable	126-130
Handles, Cam	280
Handles, Crank	123-125
Handles, Finger	117
Handles, Hand Wheel	117-120
Handles, Knob	131-138
Handles, Lever	122
Handles, Palm Grip	135
Handles, Plastic	119-120, 125-127 131-132, 134-139
Handles, Revolving	118-120
Handles, Revolving Ball	120
Handles, Speed Ball	123
Handles, Solid	117
Handles, T	138
Handles, Tapered	137
HC	618
HCA	618
HDC	460-462
HDLE	See website
HDRP	196
Head Liner Drill Bushings	535-536
Head Press Fit Drill Bushings	518-522
Heavy-Duty Ball Lock Pins	40-41
Heavy-Duty Lifting Eyes	See website
Heavy-Duty Rest Pads	196
Heavy-Duty Screw Jacks	199, 405
Heavy-Duty Swivel Hoist Rings	67-69
Heavy-Duty Toggle Clamps	450-453, 460-462
Height Shims	399
Hex Nuts (HN)	265
Hex-Head Cap Screws	395
Hex-Head Spindles	500
HI	See website
High-Pressure Inline Filters	684
High-Rise Clamps	410-412

HILMA Precision Machine Vises .....	626-627
Hinge Clamps .....	593-594
HK.....	82, 86
HKT .....	83
HL .....	535
HLD.....	572
HLL.....	572
HM.....	522, 536
HN .....	265
Hoist Ring Clips .....	75
Hoist Rings, Pivoting .....	73
Hoist Rings, Safety .....	70
Hoist Rings, Shackle.....	See website
Hoist Rings, Side Pull.....	71-72
Hoist Rings, Swivel.....	62-69
Hollow Plunger Clamps .....	617
Hook Clamps.....	252-254, 415
Horizontal-Handle Toggle Clamps .....	425-434
Horizontal V Blocks .....	404
Hose, Hydraulic .....	See website
HP .....	652
HPA.....	652
HR.....	73
HRC.....	75
HRP .....	155
HRPK.....	161
HRPM .....	162
HRPT.....	156
HTC .....	425-434
HTCA .....	290
HTCD .....	290
HTS.....	92
Hubs, Adjustable Locking .....	364-368
HVTC.....	450-453
HWAF .....	107
HWAR.....	108, 115
HWAS.....	111
HWSD.....	114
HWSF.....	107
HWSS.....	109-110, 113, 115
HWTR .....	112
HWTS.....	109
Hydraulic Clamps .....	578-642
Hydraulic Cylinders.....	587-618
Hydraulic Fittings & Accessories.....	668-694
Hydraulic Fluid .....	685
Hydraulic Intensifiers .....	654
Hydraulic Machine Vises .....	625
Hydraulic Swing Clamps.....	595-606
Hydraulic Valves.....	625-667
Hydraulic Work Supports .....	620-622

## I

IDC .....	262
ID Clamps .....	262-263
Index Plungers .....	163-165
Inline Filters, High-Pressure.....	684

Inserts, Key .....	297-302
Inserts, Threaded .....	297-302
Intensifiers, Hydraulic .....	654-655

## J

Jacks, Screw .....	198-199, 406-407
Jam Nuts.....	265
Jaws, Vise.....	628-629, 636
JF .....	176
JFL .....	176
Jig Feet, Double-End.....	195
Jig Feet, Drill.....	193
Jig Feet, Leveling.....	176
Jig Feet, Leveling Assembly.....	176
Jig Leg Plates.....	196
Jig Pins.....	28
Jig Rest Buttons.....	192
JLP.....	196
JN.....	265
JP .....	28
JRB.....	192

## K

KA .....	54-55
Key Insert Assortments.....	302
Key Inserts .....	297-302
Key Rings, Ball Lock .....	58
Keys, Center Locating .....	342
Keys, Fixture .....	211-214
Keys, Locating.....	213, 342
Keys, Mill Fixture .....	214
Keys, Reamed-Hole Fixture .....	212
Keys, Step Fixture .....	211
Keys, Subplate Locating.....	213
Keys, Sure-Lock™ Fixture.....	212
KFW .....	268
KH.....	136
KHS .....	95
Kits, Carr Lock® System .....	303-320
Kits, Clamping.....	283-285
Kits, Modular Fixturing .....	378-382
Kits, T Nut and Stud .....	274-275
Kits, T-Slot Bolt .....	277
KK .....	98
KN.....	264
Knob-Shoe Assemblies.....	85
Knob Handles .....	131-138
Knobs, Adjustable Torque .....	105
Knobs, Ball.....	131-133
Knobs, Bar .....	89
Knobs, Hand.....	78-91, 95-96
Knobs, Fluted.....	78-81, 116
Knobs, Four-Prong.....	82-89
Knobs, Knurled .....	97-99, 105
Knobs, Oval Ball.....	132
Knobs, Oval Tapered .....	134

Knobs, Palm-Grip Hand.....	78
Knobs, Plastic .....	79-81, 87-88, 90-91, 105
.....	131-132, 134-138
Knobs, Pull .....	138
Knobs, Quick-Acting.....	89
Knobs, Quick-Acting Knurled.....	104
Knobs, Star .....	81
Knobs, Tapered .....	134-137
Knobs, T-Handle.....	138
Knobs, Three-Prong.....	90
Knurled Check Nuts.....	264
Knurled-Face Washers .....	268
Knurled Head Screws .....	95
Knurled Knobs.....	97-99, 104-105
Knurled Nuts .....	264
Knurled Screw Jacks .....	198, 405
Knurled Torque Knobs.....	103-104
KR .....	57
KS.....	298, 302
KSA.....	85, 420
KSC.....	302
KSF .....	302
KSJ.....	198, 405
KSK.....	298
KSM.....	298
KSMC.....	302
KSMT .....	298-299
KSS.....	301-302
KSSM .....	301
KSSS.....	302
KSST.....	299, 301-302
KST .....	298-300, 302
KTK.....	99

## L

L Pins .....	27
L .....	532-533
Lanyards, Cable.....	54-55
Lanyards, Nylon .....	58
Latch-Action Toggle Clamps.....	478-485
Latch Bolts (see Swing Bolts).....	279
Latch Plates.....	479-484
LB.....	198
LCP .....	30
LE .....	74
Leg Plates, Jig .....	196
Leveling Assemblies, Jig Feet .....	176
Leveling Feet.....	174-175
Leveling Feet, Jig .....	176
Leveling Feet, Stud .....	181
Leveling Lugs, Eccentric.....	200
Lever Bars .....	121
Lever Handles .....	121-130
Lever Handle Hubs.....	122
LF .....	174
LFN.....	174
LFP .....	46
LFPM .....	47

LFS.....	174
LHH.....	122
LHRP.....	159-160
Lifting Devices.....	59-75, 693-694
Lifting Eyes.....	74
Lifting Pins.....	46-47
Lifting Units.....	694
Linear Actuators.....	693
Liner Drill Bushings.....	532-537
Liner Bushings, Carr Lock®.....	304
Link Clamps.....	593-594
LL.....	570
LLP.....	29
Locating Bolts for Angle Brackets.....	356
Locating Bushings.....	394
Locating Buttons, Adjustable.....	198
Locating Gages.....	395
Locating Jigs for Lockscrews.....	538
Locating Keys.....	213, 342
Locating Keys, Subplate.....	213
Locating Pins, Diamond.....	201-202
.....	204-206, 395
Locating Pins, Floating.....	203
Locating Pins, Relieved.....	201-204, 206, 395
Locating Pins, Round.....	201-202,
.....	204-206, 395
Locating Pins, Spring.....	169-172, 407
Locating Screws.....	394
Locating Tools for Slotted	
Locator Bushings.....	32
Locator Bushings, Slotted.....	31-33
Locator Buttons, Spherical Radius.....	194
Locator-Nose Clamp Straps.....	231-232
Locator Template Bushings, Slotted.....	33
Lock Liners.....	570, 572-573
Lock Strips.....	571
Locking Clamping Pins.....	30
Locking Hubs, Adjustable.....	364-368
Locking L Pins.....	29
Locking-Pin Bushings.....	29
Locking T Pins.....	29
Lockscrews.....	538-539
Lok-A-Pin® (See Locking L Pins, T Pins,	
and Clamping Pins).....	29-30
LP.....	27
LPA.....	482-483
LPB.....	29
LS.....	203, 538
LSLJ.....	538
LSM.....	538, 571, 573
LSPC.....	468
LTP.....	29
LVB.....	121
LVTC.....	439, 441, 443, 445, 455

## M

Machine Vises.....	330-333, 624-629
.....	630-638, 640-642

Manifold Mounting.....	689-690
Manifolds, Hydraulic.....	682
Manual Work Supports.....	197, 406
Marine Ball Lock Pins.....	38-39
Marine Detent Pins.....	50
MBP.....	38-39
MDP.....	50
MFK.....	214
MF.....	194, 195, 197, 199, 250
.....	252-253, 266, 369-420
Mill Fixture Keys.....	214
Modular Fixturing.....	369-420
Modular Lifting Units.....	694
Multipurpose Extension Supports.....	398
Multipurpose Riser Blocks.....	396

## N

Narrow Riser Blocks.....	412
NL.....	58
NMH.....	237
No-Bounce Hammers.....	294-296
No-Mar Hammers.....	237
No-Rebound Hammers.....	294-296
NRH.....	294-296
Nuts, Acorn.....	264
Nuts, Coupling.....	266
Nuts, Flange.....	266
Nuts, Hex.....	265
Nuts, Jam.....	265
Nuts, Knurled.....	264
Nuts, Knurled Check.....	264
Nuts, Spherical.....	267
Nuts, Swivel.....	178
Nuts, T.....	273-275
Nylon Cable Assemblies.....	54-55
Nylon Cables.....	54-55
Nylon Lanyards.....	58

## O

OBK.....	132
Oil Groove Bushings.....	544-546
One-Touch Swing Clamps.....	255-257
Oval Ball Knobs.....	132
Oval Tapered Knobs.....	134

## P

P.....	513-515
PA.....	479-485
Pad Covers, Rubber.....	174
Pads, Clamp Strap.....	224, 230
Pads, Construction Ball.....	210
Pads, Rest.....	192-193, 195-196
Pads, Swivel.....	188-190
Pallet Decouplers.....	676-680
Pallet Fixture Keys.....	214

Pallet Tooling Plates.....	344-345, 386-388
Palm-Grip Hand Knobs.....	78
Palm-Grip Handles.....	135
PB.....	131-132
PBP.....	152
PBPN.....	152
PBPS.....	152
PBPSN.....	152
PC.....	236, 240, 244, 472, 516
PCA.....	499
PCAV.....	499
PCBE.....	499
PCBR.....	504
PCBT.....	499
PCCP.....	499
PCCR.....	499
PCEM.....	499
PCHN.....	499
PCQD.....	499
PCQDP.....	499
PCQDS.....	499
PCSE.....	499
PCTC.....	499
PCTE.....	499
PD.....	676-677
PDA.....	676-677
PFK.....	79-80
PFKC.....	214
PFKR.....	214
PGH.....	135
PH.....	137
PHK.....	78
PHR.....	140
PHRC.....	140
PHRP.....	157
PHS.....	139
PHSC.....	139
Pilot-Operated Check Valves.....	665
Pins, Adjustable Ball Lock.....	42-43
Pins, Alignment.....	27-58
Pins, Ball Lock.....	34-46
Pins, Bullet-Nose.....	206
Pins, Clamping.....	30
Pins, Clevis.....	280
Pins, Cone Locator.....	207
Pins, Detent.....	49-51
Pins, Diamond.....	202
Pins, Diamond Locating.....	204-205, 395
Pins, Expanding.....	52-53
Pins, Finger.....	117
Pins, Floating Locating.....	203
Pins, Jig.....	28
Pins, L.....	27
Pins, Lifting.....	46
Pins, Quick Release.....	34-53
Pins, Round.....	202
Pins, Round Locating.....	204-205, 395
Pins, Shoulder.....	28
Pins, Spring Locating.....	169-170, 407
Pins, T.....	27

Pivot Clamps .....	589-594
Pivoting Edge Clamps.....	417
Pivoting Hoist Rings .....	73
PK .....	138
PKO.....	138
PKR.....	138
PL.....	487-490
Plain Clamps.....	236
Plastic Balls.....	131-132
Plastic C Clamps, Duraclamp .....	287
Plastic Handles .....	119-120, 125-127
.....	131-132, 134-139
Plastic Knobs .....	79-80, 87-88, 90-91
.....	131-132, 134-138
Plate Clamps.....	450-453
Plates, Angle.....	355-357, 359, 389, 393
Plates, Jig Leg .....	196
Plates, Riser.....	392
Plates, Tooling .....	306-320, 334-345
.....	383-389, 392-393
Platform Tooling Plates.....	388
Pliers, Toggle.....	486-490
PLS .....	486
Plugs, Protection .....	320, 395
Plunger Wrenches.....	154
Plungers, Ball .....	148-152
Plungers, Hand-Retractable.....	155-162
Plungers, Index .....	163-165
Plungers, Spring .....	144-147
PM .....	517, 534
Pneumatic Toggle Clamps .....	491-498
Power Toggle Clamps.....	491-498
Power Units .....	645-651
Power Workholding .....	575-696
PPC.....	497-498
PPK.....	87-88
Preset Torque Wrenches.....	320
Press-Fit Ball Plungers.....	152
Press-Fit Drill Bushings .....	513-524
Press-Fit Spring Plungers.....	143
Pressure Gauges, Hydraulic .....	682
Pressure Monitoring.....	682
Pressure-Reducing Valves .....	664
Pressure-Relief Valves .....	666
Pressure Switches.....	681
Protection Plugs .....	320, 395
PS.....	681
PSA.....	681
PSP .....	143
PSPN.....	143
PSPS.....	143
PSPSN .....	143
PTC.....	492-496
PTK.....	134
Pull-Action Toggle Clamps .....	463-475
Pull Clamps .....	616
Pull Knobs .....	138
Pumps, Air.....	649-651
Pumps, Electric.....	645-648
Pumps, Hand.....	652

Pumps, Screw.....	653
Push Clamps, Hydraulic.....	608-612
Push/Pull Toggle Clamps.....	492-496

## Q

QAK.....	89
QFP .....	338
QKK.....	105
QRFP.....	335, 337, 339-340
QSC.....	258-259, 262
QSCH.....	257
QSCR .....	255
QSCV .....	256
QTS .....	92
Quarter-Turn Screws .....	92
Quick-Acting Knobs.....	89
Quick-Acting Knurled Knobs.....	105
Quick-Acting Screw Clamps .....	95-96
Quick-Acting Swing Clamps,	
One-Touch.....	255-257
Quick-Change Fixturing	
.....	303-342, 630-636
Quick-Change Tooling Plates	
.....	306-325, 334-341
Quick-Change Workholding	
.....	303-342, 630-636
Quick Connects/ .....	499, 676-677
Disconnects, Power .....	679-680, 683
Quick-Release Pins.....	34-46, 49-52
Quintus Fixture Plates .....	337-339
Quintus Riser.....	326-328, 635

## R

RB .....	192
RBF.....	329
RBH .....	120
RC .....	538
RCM .....	538
Reamed-Hole Fixture Keys.....	212
Receiver Bushings, Carr Lock <sup>®</sup> .....	305
Receiver Caps, Ball Lock .....	48
Rectangular Cast Sections .....	360
Rectangular Pallet Tooling Plates.....	345, 387
Rectangular Tooling Plates.....	343, 384-385
Relief Valves.....	666
Renewal Road Plates .....	See website
Rest Buttons .....	192
Rest Buttons, Jig.....	192
Rest Buttons, Screw .....	193
Rest Pads, Heavy-Duty.....	196
Rests, Clamp .....	281
Retracting Clamps.....	587-594
Revolving Ball Handles.....	120
Revolving Handles .....	118-120
Revolving Trunnions .....	361
RFK.....	212

RFP .....	334-336, 340
RG.....	180
RGB .....	182
RGBD.....	182
RGC.....	180
RGD.....	180
RGF .....	181
RGFN .....	181
RGFT.....	181
RGT .....	180
RGU.....	180
RH.....	118-119
RHRP.....	158
Rings, Cable .....	57
Rings, Hoist .....	59-75
Riser Blocks .....	396, 412
Riser Cylinders .....	399
Riser Plates.....	392
Riser, Quick Change.....	328
RK .....	539
RLT .....	204-205
Road Plates .....	See website
Rocker Clamps.....	589-594
Rotary Air Valve Couplings .....	676
Rotary Couplings .....	669-671
Rotary T Nuts.....	275
Rotary T Nuts & Stud Sets.....	275
Rotary Valve Couplings .....	672-674
Round Clamps .....	538
Round Grippers.....	180-182
Round Locating Pins .....	202-206, 395
Round Pins.....	202
Round Tooling Plates.....	383
RP .....	202
RPC.....	174
RPT .....	204-205
RRP.....	See website
RTN .....	275
RTNS.....	275
Rubber Pad Covers .....	174

## S

S.....	504
SA .....	413, 500
SAC .....	248, 418
Safety Hoist Rings.....	70
SB.....	279
SBB.....	237
SBC.....	237
SBH.....	123
SBK.....	133
SBP .....	150
SBPN.....	151
SBS.....	237
SC .....	56, 598, 600, 602
SCA .....	219, 598
SCB.....	208
SCC.....	288

SCD.....	597, 600, 601-602	Shutoff Valves.....	666	SPN.....	145-147
Scissor-Lok™		Side-Pull Hoist Rings.....	71-72	Spring-Loaded Spindles.....	503
Plate Lifting System.....	See website	Simplex Hammers.....	291-292	Spring Locating Pins.....	169-172, 407
Screw Clamp Adaptors.....	420	Single Cams.....	280	Spring Plungers.....	144-147
Screw Clamps.....	83-85, 88, 92-103, 105	SIP.....	163-165	Spring-Plunger Wrenches.....	154
.....	126-130, 420	SIPB.....	163-165	Spring-Stop Buttons.....	166-168, 407
Screw Jacks.....	198-199, 405-406	SK.....	81	Springs, Clamp.....	282
Screw Pumps.....	653	SKA.....	54-55	SPS.....	145-147
Screw Rest Pads.....	195, 403	SKR.....	57	SPW.....	154
Screw Rest Buttons.....	193	SKS.....	299-300, 302	Square Cast Sections.....	360
Screws, Adjustable Torque Thumb.....	103	SKSC.....	302	Square Grippers.....	183-184
Screws, Bodies for Swivel.....	99	SKSL.....	299	Square Pallet Tooling Plates.....	344, 386
Screws, Clamp Rest.....	281	SKSM.....	299	SRB.....	193
Screws, Feet for Swivel.....	100	SL.....	503	SRBP.....	153
Screws, Half Turn.....	92	SLB.....	194	SS.....	270, 378-382
Screws, Knurled Head.....	95	SLF.....	175	SSB.....	166-168
Screws, Locating.....	394	SLFK.....	212	SSC.....	103, 420, 502
Screws, Quarter Turn.....	92	SLFN.....	175	SSPN.....	145-147
Screws, Shoulder.....	270	Slip/Fixed Renewable Bushings.....	525-529	SSPS.....	145-147
Screws, Swivel Head.....	102	SLKD.....	213	Standard Adjustable Spindles.....	413
Screws, Thumb, Adjustable Torque.....	103	SLKR.....	213	Star Knobs.....	81
SCW.....	269	LLB.....	31-32	Starter Kits, Carr Lock™.....	303-320
Sections, Cast.....	358-360	SLLT.....	32	Starter Sets, Modular Fixturing.....	378-382
Self-Centering Vises.....	637-638	Slotted-Heel Clamp Straps.....	217-222, 408	STC.....	236
Self-Retaining Ball Plungers.....	153	Slotted-Heel Padded Clamp Straps.....	222	Steel Handles.....	117-118
Sequence Valves.....	662-663	Slotted Locator Bushings.....	31-32	Step Blocks.....	236-237
Serrata Groove Drill Bushings.....	549	Slotted Locator Template Bushings.....	33	Step Clamps.....	236-237
Serrated Adjustable		SLP.....	169, 172	Step Fixture Keys.....	211
Edge Clamps.....	248, 419-420	SLPE.....	172	Straddle Cam-Clamp Assemblies.....	221
Serrated Edge Clamps.....	248-250, 419-420	SLPP.....	171-172	Straight Index Plungers.....	163-165
Serrated Face Washers.....	268	SLPR.....	172	Strap Clamps.....	217-237
Serrated Fixed Edge Clamps.....	249	SLPS.....	170	Stud Leveling Feet.....	175
Serrated Press Fit Drill Bushings.....	523-524	SLPT.....	171	Studs.....	271-272
SF.....	525-527	SLTB.....	33	Subplates.....	306-313, 318, 340-341
SFC.....	249, 418, 528	SN.....	178	Subplate Locating Keys.....	213
SFK.....	211	SNW.....	267	Super Coil™ Swivel Hoist Ring	
SFM.....	529	Socket-Head Cap Screws.....	394	.....	See website
SFP.....	296	Soft-Face Punches.....	296	Support Cylinders.....	400-401
SG.....	183, 549	Solenoid Valves.....	659	Support Riser Blocks.....	396
SGB.....	182	Solid Handles.....	117	Supports, Edge.....	402
SGC.....	183	SP.....	28, 523, 653	Supports, Extension.....	397-398
SGT.....	183	SPA.....	178	Sure-Lock™ Fixture Keys.....	212
SH.....	117	Spacer Blocks.....	412	SW.....	267, 309
SHA.....	218	Spacer Shims (see Height Shims).....	399	SWA.....	258-259
Shackle Hoist Rings.....	See website	SPC.....	463-471	SWHA.....	231
Shackle Pins (see Lifting Pins).....	46	Speed-Ball Handles.....	123	<b>SWIFTSURE</b>	
Shackles.....	75	SPF.....	179	Power Workholding.....	578-694
Shark Clamps.....	286	SPFN.....	179	Swing Bolts.....	279
SHCS.....	394	SPG.....	282	Swing C Clamps.....	288
Shims, Height.....	399	SPH.....	291-292	Swing C Washers.....	269
SHKT.....	84	Spherical Nuts and Washers.....	267	Swing-Clamp Assemblies.....	258-259, 414-415
SHPA.....	222	Spherical-Radius Locator Buttons.....	194	Swing Clamps, Air.....	595-596
Shoulder Construction Balls.....	208-209	Spherical Trunnions.....	360	Swing Clamps, Hydraulic.....	597-606
Shoulder Pins.....	28	Spherical Washers.....	267	Swing Clamps,	
Shoulder Screws.....	270	SPHR.....	71-72	Manual.....	255-257, 258-259, 414-415
Shoulder Support Cylinders.....	401	Spindles, Toggle Clamp.....	500-503	Swing Clamps, One-Touch.....	255-257
SHR.....	62-70	Spin-N-Lok™ Swivel Hoist Ring		Switches, Pressure.....	681
SHRB.....	62-63, 66-68, 70	.....	See website	Swivel Contact Bolts.....	186, 194, 413, 691
SHRK.....	286	SPM.....	524	Swivel-Foot Spindles.....	502
SHS.....	102, 420			Swivel-Head Screws.....	102



Swivel-Heel Clamp Straps .....	231
Swivel Hoist Rings .....	62-69
Swivel Nuts .....	178
Swivel Pads .....	178
Swivel Pad Feet .....	179
Swivel Pads, Gripper .....	188-189
Swivel Screw Bodies .....	100
Swivel Screw Clamps .....	103
Swivel Screw Feet .....	101
Swivel Screws, Gripper .....	190
Swivel-Washer Hand Knob Assemblies .....	84
System Kit, Carr Lock .....	303-320

## T

T .....	685
T Bolts .....	276
T Cast Sections .....	358
T Handles .....	138
T Handle Knobs .....	91
T Nut and Stud Sets .....	274-275
T Nuts .....	273
T Nuts, Rotary .....	275
T Pins .....	27
T-Slot Bolt Kits .....	277
T-Slot Bolts .....	277
T-Slot Cleaners .....	274
TAPK .....	135
Tapered Handles .....	137
Tapered Index Plungers .....	163-165
Tapered Knobs .....	134-137
Tapered-Nose Clamp Straps .....	226
Taper-Lok Bushings (See Air Feed Bushings) .....	569-573
Taper-Lok Air-Feed Lockscrews .....	571
Taper-Lok Liners .....	572
Tapped-Heel Clamp Straps .....	223-232
Tapped-Heel Padded Clamp Straps .....	228
TB .....	276, 552-553, 608-611
TBA .....	608-611
TBC .....	679
TBCH .....	680
TBT .....	See website
TC .....	427, 433, 456-459
TC .....	See website
TCA .....	See website
TDP .....	51
Template Bushings .....	552-555
Tenons (See Fixture Keys) .....	211
TERM .....	56
Terminals .....	56
TH .....	138
THA .....	224
THPA .....	228
Threaded-Body Push Clamps .....	608-609
Threaded-Body Work Supports .....	620-622
Threaded Detent Pins .....	51
Threaded Inserts .....	297-302
Threaded Inserts, Weld In .....	See website

Threaded Push Clamps .....	607-611
Threaded Template Bushings .....	554-555
Threaded Tube Ends .....	177
Three-Prong Knobs .....	90
Thumb Screws .....	92, 97-99, 102-105
Thumb Screws, Adjustable Torque .....	104
TINY VISE® Edge Clamps .....	238-247
TIP .....	163-165
TIPB .....	163-165
TK .....	91
TL .....	358, 360, 686
TLD .....	572
TLL .....	571
TN .....	273
TNH .....	274-275
TNS .....	274
Toe Clamps .....	239-250, 416-419, 591
Torque Wrenches .....	320
Toggle Clamp Accessories .....	500-504
Toggle Clamp Adaptors .....	290
Toggle Clamps .....	421-504
Toggle Clamps, Self-Adjusting .....	432, 449, 477
Toggle Clamps, .....	439, 441, 443, 445
with Safety Lock .....	455, 465, 473
Toggle Edge Clamps .....	476-477
Toggle Pliers .....	486-490
Toggle Push Clamps .....	463-475
Tooling-Ball Pads .....	210
Tooling Balls .....	208-209
Tooling Blocks, Eight-Sided .....	354
Tooling Blocks, Four-Sided .....	350-352, 391
Tooling Blocks, Six-Sided .....	353
Tooling Blocks, Three-Sided .....	348-349
Tooling Blocks, Two-Sided .....	318, 346, 390
Tooling Blocks, Window .....	347
Tooling Plates, Angle .....	389
Tooling Plates, Platform .....	388
Tooling Plates, Quick-Change .....	303-342
Tooling Plates, Rectangular .....	307-316
.....	319, 338, 343, 345
Tooling Plates, Round .....	323-324
.....	334-337, 339-340, 383
Tooling Plates, Square Pallet .....	344, 386
Tooling Plates, Vertical .....	319
Toolroom Starter Sets, Modular Fixturing .....	378-382
Tools, Cable Crimping .....	57
Tools, Key Insert .....	297-302
Tools, Spring Locating Pin .....	171
Tools, Tubing .....	686
Torque Screw Jacks .....	198, 406
Torque Thumb Screws, Adjustable .....	103
Torque Wrenches .....	320
TP .....	27
TPC .....	474-475
TPK .....	90
TR .....	359
Trunnions .....	358-359
Trunnions, Spherical .....	360
TS .....	104

TSA .....	104
TSB .....	104, 277, 420
TSBK .....	277
TSC .....	103
TSCL .....	274
TSD .....	104
TSJ .....	198, 406
TSJN .....	264, 405
TSKS .....	300
TSKSL .....	300
TSTB .....	318, 346, 390
TTB .....	554
TTBF .....	555
TTBT .....	555
TTE .....	177
TTR .....	554-555
Tubing Clamps .....	686
Tubing, Hydraulic .....	685-688
Tubing Tools .....	686
TV .....	241, 244-245
TVLP .....	239
TVM .....	242-243
TVMC .....	242-243
TVMN .....	242-243
TVMS .....	242-243
TVR .....	246-247
TW .....	504, 538
Two-Sided Tooling Blocks .....	318, 346, 390

## U

U Clamps, Forged .....	218
U Cast Sections .....	359
UL .....	537
ULD .....	550
ULDm .....	550
ULM .....	537
ULR .....	See website
ULT .....	537
Unequal T Sections .....	358
Universal Lifting Rings .....	See website
Un-A-Lok® Liner Bushings .....	537
Un-A-Lok® Liner Bushings, Diamond Knurl .....	550
Universal Cylinders .....	614-615
Up-Thrust Clamps .....	260, 414

## V

V .....	658-659, 660-667, 672-675, 684
V Blocks .....	359, 403-404
V Cast Sections .....	359
VA .....	662-663
VAC .....	234
VCC .....	448
Valves, Air .....	499
Valves, Clamping .....	656-660
Valves, Hydraulic .....	656-668
Vertical-Handle Toggle Clamps .....	435-462

Vertical Tooling Plates .....	319
Vertical V Blocks .....	403
Vise Jaws.....	333, 628-629, 636
Vises, Machine ...	330-333, 624-638, 640-642
Vises, Power.....	330-333, 624-638, 640-642
Vises, Self-Centering.....	630-638
VS .....	627, 633-634, 637
VSA.....	627-629, 633, 635-636, 638
VTC.....	437-447
VTCA .....	290
VTCD .....	290
VTD .....	290

## W

Washers, C .....	269
Washers, Flanged .....	504
Washers, Flat .....	268
Washers, Knurled Face .....	268
Washers, Serrated Face .....	268
Washers, Spherical .....	267
Washers, Swing C .....	269
Weld-In Threaded Inserts .....	See website
Wheels, Hand .....	106-116
Wide-Nose Clamp Straps.....	227
Window Tooling Blocks.....	347
Work Supports, Hydraulic .....	620-622
Work Supports, Manual.....	197, 406
Wrenches, Spring-Plunger .....	154
WS .....	620-622
WTI.....	See website

## 0

0001.....	395
01XX .....	343
01XX .....	384-385
03XX .....	383
04XX .....	389, 393
05XX .....	393
06XX .....	390
07XX .....	391
08XX .....	344-345
08XX .....	386-388
09XX .....	390

## 1

1XX.....	266-267, 269
100X .....	417
110X .....	417
11XXX .....	272
11XXX .....	561
12XX .....	420
12XXX .....	562-563
13XXX .....	564-565
14XX .....	396
1444X.....	572-573

14XXX .....	566-568
14X.....	267
15X.....	267
15XX .....	414
15XXX .....	568-569
165XX.....	571-573
16XXX .....	98
17XXX .....	219
18XXX .....	225, 227
190X .....	410
199XX.....	571

## 2

2XX.....	268, 274
20XX .....	410-411
20XXX .....	228
21XXX .....	561
210X .....	411
22XXX .....	235, 562-563
220X .....	411
23XX .....	412
23XXX .....	97
23XXX .....	564-565
24XXX .....	566-567
240X .....	412
25X.....	268
25XXX .....	568-569
250X .....	194
250X .....	413
26X.....	268
260X .....	413
26XXX .....	192
27XX .....	222
28XX .....	222
29XX .....	222

## 3

30XX .....	222
31XX .....	227
31XX .....	400-401
32XX .....	227
320X .....	401
33XX .....	227
330X .....	397
34XX .....	227
340X .....	199
340X .....	405
350X .....	199
350X .....	405
360X .....	398
370X .....	402
380X .....	402
390X .....	407

## 4

4XXX.....	228
40XX .....	228
41XX .....	228
42XX .....	228
43XX .....	394-395
44XX .....	213
44XXX .....	229
450X .....	395
460X .....	395
47XX .....	398
480X .....	195
480X .....	403

## 5

50XX .....	253
50XX .....	415
510X .....	254
510X .....	415
520X .....	399
530X .....	260
530X .....	414
56XX .....	250
56XX .....	416
570X .....	197
570X .....	406
58XX .....	254

## 6

600X .....	404
610X .....	403

## 7

7XXX .....	399
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**NOTE:** Page references within text are labeled with **INFO+** for your convenience.

# GO LEAN IN 3 SIMPLE STEPS:

## CarrLock®



### The 3 Part Carr Lock® System

1. Subplate with locating bushings
2. Fixture plate with alignment bushings
3. Carr Lock® Clamp

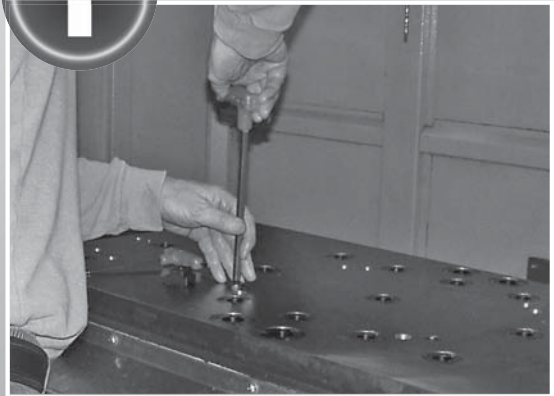
## CarrLane®

MANUFACTURING CO.

See Pages 303-320

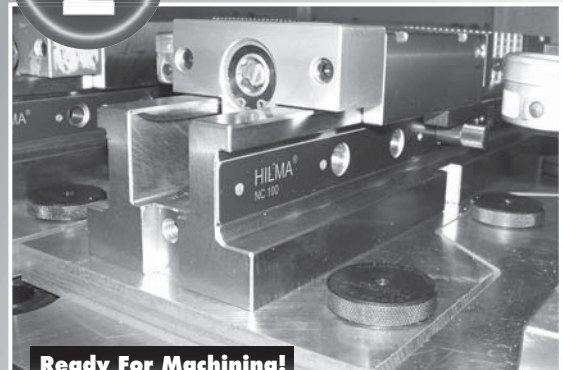
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Easily affix the subplate to the machining table.



2

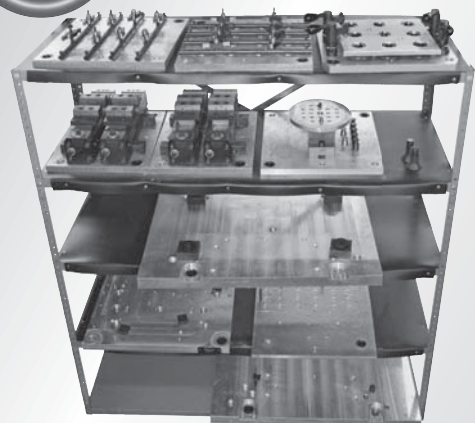
Assemble your tooling on the fixture plate, clamp and locate it onto the subplate.



Ready For Machining!

3

Changeover time from job to job is measured in seconds. Repeatability is .0004".



Stored Fixtures Are Ready For Machining!

# GENERAL INFORMATION

## ORDERING INFORMATION:

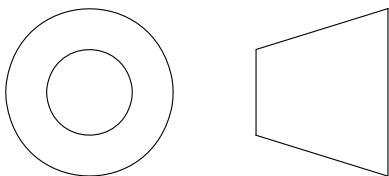
Carr Lane Manufacturing products are sold by authorized distributors located throughout North America and the rest of the world. Please see our website or contact us for the name of our qualified stocking distributor nearest you. For technical information, contact our factory engineering staff at 314-647-6200 (1-800-827-2526 for power workholding technical information).

## SPECIALS:

Carr Lane Manufacturing will gladly make any special tooling components or company tooling standards to your specifications. Please send a print or sketch with your request. Our wide range of manufacturing capabilities allows us to quickly produce special items for you at economical prices.

## DIMENSIONS AND TOLERANCES:

All drawings in this catalog are shown in Third-Angle Projection:



In general, the following maximum tolerances apply to dimensions in this catalog, unless otherwise specified:

.xxx ±.005

.xx ±.020

.x ±.050

Fractions ± 1/32

Castings, forgings, molded plastics, and assemblies ± 1/8

## FINISH SPECIFICATIONS:

The finishes shown in this catalog are applied according to the following specifications:

Black Oxide—MIL-C-13924C

Zinc Plate Yellow Chromate

Zinc Plate Clear Chromate

Cadmium Plate—QQ-P-416, Class 3, Type 1

Black Anodize—MIL-A-8625, Type II, Class 2

Other finishes are available as specials.

## ANSI & TCMAI STANDARDS:

Whenever appropriate, our tooling components meet the

standards of the American National Standards Institute (ANSI) and the Tooling Component Manufacturers Association International (TCMAI).

## TRADEMARKS:

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All Carr Lane Manufacturing products are continually subject to possible design improvements. We include any engineering changes as soon as possible in our catalogs and other literature. However, due to inevitable time lags, dimensions and specifications are subject to change without notice.

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Carr Lane Manufacturing warrants that the products described herein will be free from defects in material and workmanship. If you find any failure to conform to this warranty within 90 days from date of receipt of the product, and give us immediate notification thereof, we will replace the defective product or make suitable repairs. If we are unable to correct such nonconformity by replacing the product or making suitable repairs, whether due to the nature of such nonconformity, your use of the product, or for any other reason, we will refund the purchase price upon receipt of the nonconforming product f.o.b. our plant. No product should be returned to us without a return-authorization number. In no event shall we be liable either directly or by way of contribution or indemnity, for direct, special, incidental or consequential damages such as, but not limited to, property damage, loss of profit, or damages based on loss of use of the product, whether the claim for any such damages be based on warranty, express or implied, contract, tort, or otherwise. This warranty does not apply to products that are misapplied, altered, or abused. The foregoing is our sole warranty with respect to the product. We make no other warranties, express or implied, including implied warranties of merchantability and fitness for a particular purpose.

## SAFETY PRECAUTIONS:

Machine tools pose many potential hazards. Observe all appropriate safety precautions, including those specifically listed in this catalog.

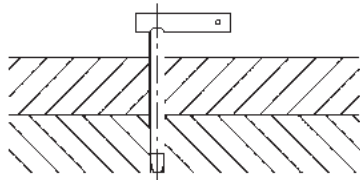
# L & T PINS

PIN: 12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH  
HANDLE: 12L14 STEEL, BLACK OXIDE FINISH

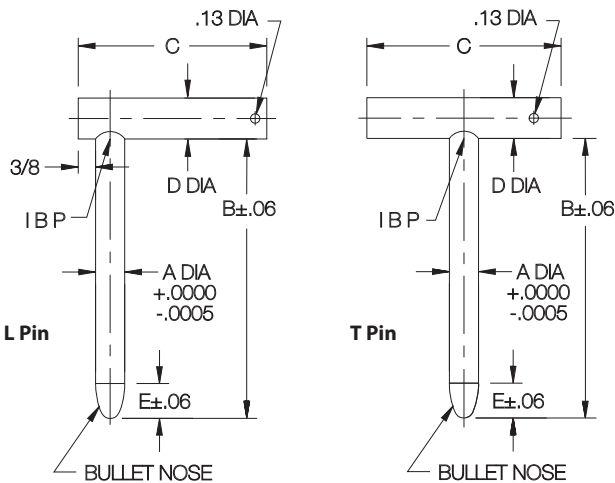


L Pin

T Pin



L and T Pins are removable locating pins, precision ground for accurately aligning holes. The pin is inset in the handle and silver soldered to create a sturdy assembly. The handle is drilled for attaching a cable.



To order L or T Pins with a standard 10-12" cable assembly attached, add "-C" to the part number. (CL-2-C cable with a terminal for #10-32 or M5 attachment screw).  
Example: CL-7-LP-C

## INCH

L PIN PART NO.	T PIN PART NO.	A DIA		B	C	D DIA	E
		NOMINAL	ACTUAL				
CL-0-LP	CL-0-TP	1/8	.1250	2-1/2	1-1/2	1/4	1/4
CL-41-LP	CL-41-TP	#30	.1285	3			
CL-00-LP	CL-00-TP	5/32	.1562	3-1/2	2-1/2	5/16	1/4
CL-1-LP	CL-1-TP	3/16	.1875	3			
CL-21-LP	CL-21-TP			4			
CL-2-LP	CL-2-TP			6			
CL-3-LP	CL-3-TP	#11	.1910	3			
CL-23-LP	CL-23-TP			4			
CL-4-LP	CL-4-TP			6			
CL-43-LP	CL-43-TP	#10	.1935	3	2-1/2	3/8	3/8
CL-20-LP	CL-20-TP	#9	.1960	3			
CL-44-LP	CL-44-TP	7/32	.2188	3			
CL-38-LP	CL-38-TP	1/4	.2500	2			
CL-5-LP	CL-5-TP			3			
CL-25-LP	CL-25-TP			4			
CL-6-LP	CL-6-TP	F	.2570	6			
CL-17-LP	CL-17-TP			3			
CL-37-LP	CL-37-TP			4			
CL-45-LP	CL-45-TP	9/32	.2812	4	3	7/16	1/2
CL-39-LP	CL-39-TP	5/16	.3125	2	2-1/2		
CL-7-LP	CL-7-TP			3-1/2	3		
CL-27-LP	CL-27-TP			4			
CL-8-LP	CL-8-TP	3/8	.3750	6	2-1/2	1/2	1/2
CL-40-LP	CL-40-TP			3			
CL-9-LP	CL-9-TP			4			
CL-29-LP	CL-29-TP			5			
CL-10-LP	CL-10-TP			6			
CL-30-LP	CL-30-TP			7			
CL-11-LP	CL-11-TP	7/16	.4375	4	3-1/2	9/16	5/8
CL-31-LP	CL-31-TP			5			
CL-12-LP	CL-12-TP			6			
CL-32-LP	CL-32-TP	1/2	.5000	7	3-1/2	5/8	5/8
CL-13-LP	CL-13-TP			4			
CL-14-LP	CL-14-TP			6			
CL-33-LP	CL-33-TP	9/16	.5625	7	3-1/2	7/8	3/4
CL-34-LP	CL-34-TP			9			
CL-18-LP	CL-18-TP			4			
CL-19-LP	CL-19-TP	5/8	.6250	6	3-1/2	7/8	3/4
CL-15-LP	CL-15-TP			8			
CL-35-LP	CL-35-TP			8			
CL-16-LP	CL-16-TP	3/4	.7500	6	3-1/2	7/8	3/4
CL-36-LP	CL-36-TP			8			

## METRIC

CLM-4-LP	CLM-4-TP	4mm	.1575	3-1/2	2-1/2	5/16	3/16
CLM-5-LP	CLM-5-TP	5mm	.1969	3			
CLM-50-LP	CLM-50-TP	6mm	.2362	6	2-1/2	3/8	1/4
CLM-6-LP	CLM-6-TP			3			
CLM-60-LP	CLM-60-TP	8mm	.3150	6	3	7/16	7/16
CLM-8-LP	CLM-8-TP			3-1/2			
CLM-80-LP	CLM-80-TP	10mm	.3937	3	2-1/2	1/2	7/16
CLM-10-LP	CLM-10-TP			6			
CLM-100-LP	CLM-100-TP	12mm	.4724	4	3-1/2	5/8	7/16
CLM-12-LP	CLM-12-TP			6			
CLM-120-LP	CLM-120-TP	16mm	.6299	6	3-1/2	7/8	11/16
CLM-16-LP	CLM-16-TP			8			
CLM-160-LP	CLM-160-TP	20mm	.7874	6	3-1/2	7/8	11/16
CLM-20-LP	CLM-20-TP			8			

# SHOULDER PINS

PIN: 12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH  
HANDLE: 12L14 STEEL, BLACK OXIDE FINISH

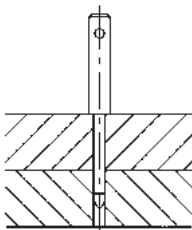
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To order Shoulder Pins with a standard 10-12" cable assembly attached, add "-C" to the part number. (CL-2-C cable with a terminal for #10-32 or M5 attachment screw).

Example: CL-7-SP-C

Removable locating pin with a straight handle, precision ground for accurately aligning holes. The handle is drilled for attaching a cable.

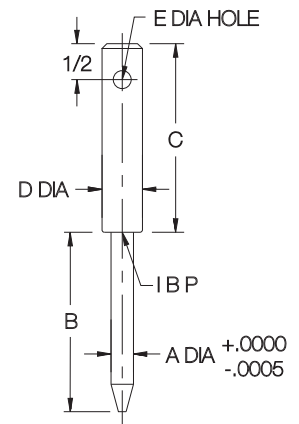


## INCH

PART NO.	A DIA.		B	C	D DIA.	E DIA.
	NOMINAL	ACTUAL				
CL-7-SP	1/4	.2500	2-1/2	2-5/8	1/2	1/4
CL-10-SP	5/16	.3125			4	
CL-14-SP	3/8	.3750	4		5/8	1/4
CL-19-SP	1/2	.5000	3		3/4	5/16

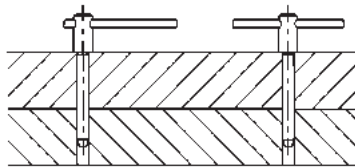
## METRIC

PART NO.	A DIA.		B	C	D DIA.	E DIA.
	NOMINAL	ACTUAL				
CLM-6-SP	6mm	.2362	2.56	2.6	1/2	1/4
CLM-8-SP	8mm	.3150			9/16	
CLM-10-SP	10mm	.3937	3.94		5/8	1/4
CLM-12-SP	12mm	.4724	2.95		3/4	5/16



# JIG PINS

PIN: 1144 STEEL, HEAT TREATED, BLACK OXIDE FINISH  
HANDLE: SPRING STEEL, BLACK OXIDE FINISH



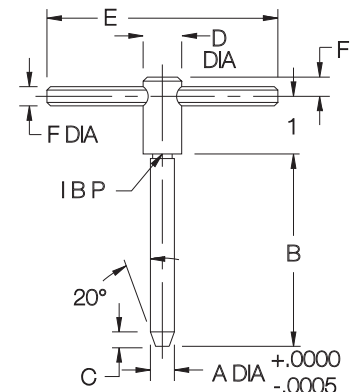
## INCH

PART NO.	A DIA.		B	C	D DIA.	E	F
	NOMINAL	ACTUAL					
CL-10-JP	3/16	.1872	1-7/8	1/8	3/8	2	3/16
CL-20-JP	1/4	.2497	2	5/32			
CL-30-JP	5/16	.3120	2-1/2	3/16	1/2	2	1/4
CL-40-JP	3/8	.3745	3-1/4	1/4			
CL-50-JP	1/2	.4995	4	9/32	9/16	3	1/4

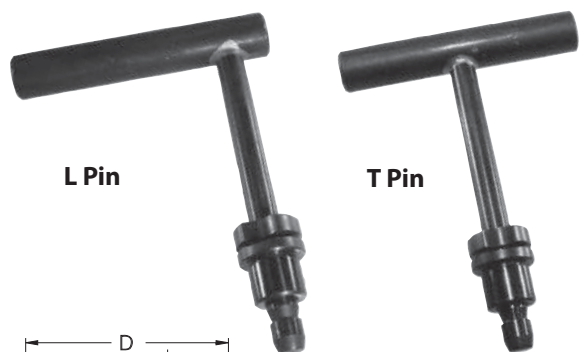
## METRIC

PART NO.	A DIA.		B	C	D DIA.	E	F
	NOMINAL	ACTUAL					
CLM-5-JP	5mm	.1966	1-7/8	1/8	3/8	2	3/16
CLM-6-JP	6mm	.2359	2	5/32			
CLM-8-JP	8mm	.3145	2-1/2	3/16	1/2	3	1/4
CLM-10-JP	10mm	.3932	3-1/4	1/4			
CLM-12-JP	12mm	.4719	4	9/32	9/16	3	1/4

Similar to L and T Pins, but with a shoulder to keep the handle raised. Pins are ground slightly undersize. To convert from an L handle to a T handle, slide the roll-pin handle by tapping it with a hammer.

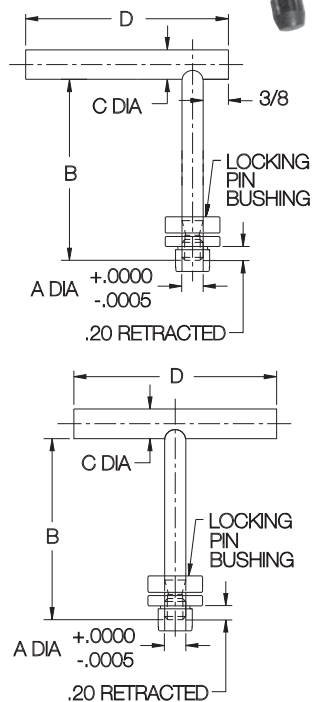
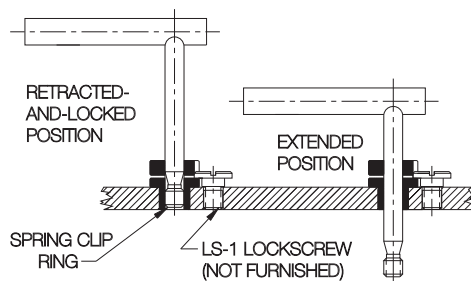


# LOCKING L & T PINS



LOCKING L & T PINS  
 PIN: 12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH  
 HANDLE: 12L14 STEEL, BLACK OXIDE FINISH  
 BUSHING: 8620 STEEL, CASE HARDENED, BLACK OXIDE FINISH

Locating pin is positively retained in the bushing. The bushing's spring clip ring locks the pin fully retracted into the pin's groove. Spring pressure also holds the pin in intermediate positions, an advantage especially if the fixture is turned upside down. Patent No. 3,471,186.



## INCH

L PIN COMPLETE ASSY PART NO.	L PIN ONLY PART NO.	T PIN COMPLETE ASSY PART NO.	T PIN ONLY PART NO.	BUSHING ONLY PART NO.	A DIA		B	C DIA	D
					NOMINAL	ACTUAL			
CL-1A-LLP-B	CL-1A-LLP	CL-1A-LTP-B	CL-1A-LTP	CL-3-LPB	3/16	.1865	1-1/2	5/16	2-1/2
CL-1-LLP-B	CL-1-LLP	CL-1-LTP-B	CL-1-LTP				3		
CL-38-LLP-B	CL-38-LLP	CL-38-LTP-B	CL-38-LTP				2		
CL-5-LLP-B	CL-5-LLP	CL-5-LTP-B	CL-5-LTP	CL-4-LPB	1/4	.2490	3	3/8	2-1/2
CL-25-LLP-B	CL-25-LLP	CL-25-LTP-B	CL-25-LTP				4		
CL-39-LLP-B	CL-39-LLP	CL-39-LTP-B	CL-39-LTP	CL-5A-LPB	5/16	.3115	2	5/8	3
CL-7-LLP-B	CL-7-LLP	CL-7-LTP-B	CL-7-LTP				3-1/2		
CL-8-LLP-B	CL-8-LLP	CL-8-LTP-B	CL-8-LTP				6		
CL-40A-LLP-B	CL-40A-LLP	CL-40A-LTP-B	CL-40A-LTP	CL-6A-LPB	3/8	.3740	2	5/8	3-1/2
CL-9-LLP-B	CL-9-LLP	CL-9-LTP-B	CL-9-LTP				4		
CL-10-LLP-B	CL-10-LLP	CL-10-LTP-B	CL-10-LTP				6		
CL-13A-LLP-B	CL-13A-LLP	CL-13A-LTP-B	CL-13A-LTP	CL-8A-LPB	1/2	.4990	2	5/8	3-1/2
CL-13-LLP-B	CL-13-LLP	CL-13-LTP-B	CL-13-LTP				4		
CL-14-LLP-B	CL-14-LLP	CL-14-LTP-B	CL-14-LTP				6		

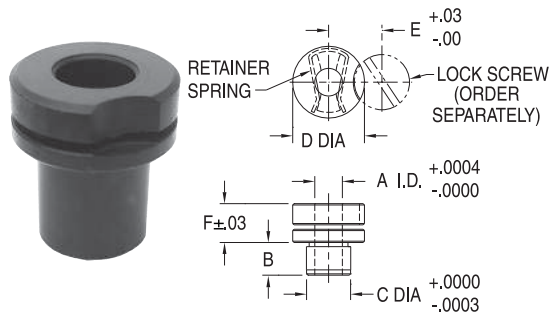
## METRIC

CLM-6-LLP-B	CLM-6-LLP	CLM-6-LTP-B	CLM-6-LTP	CLM-6-LPB	6mm	.2352	3	3/8	2-1/2
CLM-8-LLP-B	CLM-8-LLP	CLM-8-LTP-B	CLM-8-LTP	CLM-8-LPB	8mm	.3140	3	7/16	3
CLM-10-LLP-B	CLM-10-LLP	CLM-10-LTP-B	CLM-10-LTP	CLM-10-LPB	10mm	.3927	3	1/2	2-1/2
CLM-12-LLP-B	CLM-12-LLP	CLM-12-LTP-B	CLM-12-LTP	CLM-12-LPB	12mm	.4715	4	5/8	2-1/2

\*See below for additional bushings or more-detailed bushing dimensions.

# LOCKING-PIN BUSHINGS

8620 STEEL, CASE HARDENED, BLACK OXIDE FINISH



## INCH

PART NO.	A DIA		B	C DIA		D DIA	E	F	MATCHING P BUSHING FOR BOTTOM PLATE
	NOMINAL	ACTUAL		NOMINAL	ACTUAL				
CL-3-LPB	3/16	.1868	.31	13/32	.4078	13/16	.62	.44	P-26-6-.1865
CL-4-LPB	1/4	.2493	.31	13/32	.4078	13/16	.62	.44	P-26-6-.2490
CL-4A-LPB			.50						
CL-5-LPB	5/16	.3118	.31	1/2	.5017	13/16	.62	.44	P-32-6-.3115
CL-5A-LPB			.37						
CL-5B-LPB			.50						
CL-6-LPB	3/8	.3743	.31	5/8	.6267	13/16	.62	.44	P-40-8-.3740
CL-6A-LPB			.50						
CL-8-LPB	1/2	.4993	.50	3/4	.7518	1-1/16	.75	.44	P-48-12-.4990
CL-8A-LPB			.75						

## METRIC

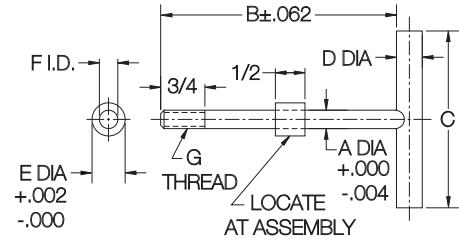
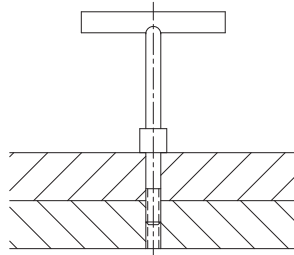
CLM-6-LPB	6mm	.2355	.31	10mm	.3952	.87	.630	.47	—
CLM-8-LPB	8mm	.3143	.39	13mm	.5135	.87	.630	.47	—
CLM-10-LPB	10mm	.3930	.47	16mm	.6316	.87	.630	.47	—
CLM-12-LPB	12mm	.4717	.71	20mm	.7892	1.02	.709	.47	—

Locking-Pin Bushings are equipped with a retainer spring clip on the inside diameter. These bushings are used with Locking L Pins, Locking T Pins, and Locking Clamping Pins. Designed for a press fit in a standard reamed hole. Secure with a Lockscrew to positively hold the bushing in place – order separately as part number LS-1 (inch) or LSM-3 (metric).

# CLAMPING PINS

PIN: 12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH  
 BUSHING: 12L14 STEEL, BLACK OXIDE FINISH

1



Threaded alignment pin that is usually used to clamp two parts together. Weld bushing in place at the proper length to suit the application.

## INCH

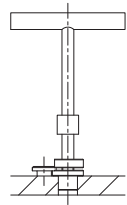
PART NO.	A DIA		B	C	D DIA	E DIA	F DIA	G
	NOMINAL	ACTUAL						
CL-0-CP	#10	.193	3	1-1/2	1/4	3/8	.203	#10-24
CL-0A-CP								#10-24
CL-1-CP	1/4	.250	4	2-1/2	3/8	1/2	.252	1/4-20
CL-2-CP	5/16	.312		3	7/16	9/16	.315	5/16-18
CL-3-CP	3/8	.375	4-1/2	3-1/2	1/2	5/8	.378	3/8-16
CL-4-CP	1/2	.500	5		5/8	3/4	.503	1/2-13

## METRIC

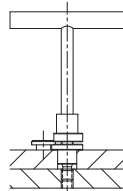
CLM-6-CP	6mm	.236	4	2-1/2	3/8	1/2	.252	M6
CLM-8-CP	8mm	.315		3	7/16	9/16	.315	M8
CLM-10-CP	10mm	.394	4-1/2	3-1/2	1/2	5/8	.378	M10
CLM-12-CP	12mm	.472	5		5/8	3/4	.503	M12

# LOCKING CLAMPING PINS

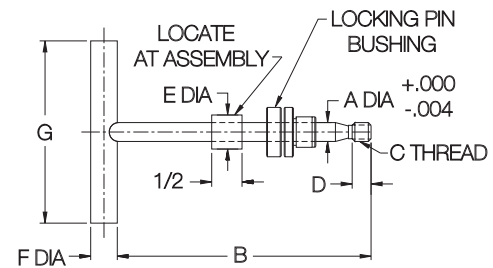
PIN: 12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH  
 BUSHING: 8620 STEEL, CASE HARDENED, BLACK OXIDE FINISH



Retracted-and-locked position



Clamped position



## INCH

COMPLETE ASSY PART NO.	PIN ONLY PART NO.	BUSHING ONLY PART NO.*	A DIA		B	C	D	E DIA	F DIA	G
			NOMINAL	ACTUAL						
CL-1-LCP-B	CL-1-LCP	CL-4-LPB	1/4	.2490	4	1/4-20	1/4	1/2	3/8	2-1/2
CL-2-LCP-B	CL-2-LCP	CL-5A-LPB	5/16	.3115	4	5/16-18	5/16	9/16	7/16	3
CL-3-LCP-B	CL-3-LCP	CL-6A-LPB	3/8	.3740	4-1/2	3/8-16	3/8	5/8	1/2	3-1/2
CL-4-LCP-B	CL-4-LCP	CL-8A-LPB	1/2	.4990	5	1/2-13	1/2	3/4	5/8	3-1/2

## METRIC

CLM-6-LCP-B	CLM-6-LCP	CLM-6-LPB	6mm	.2352	4	M6	.24	1/2	3/8	2-1/2
CLM-8-LCP-B	CLM-8-LCP	CLM-8-LPB	8mm	.3140	4	M8	.31	9/16	7/16	3
CLM-10-LCP-B	CLM-10-LCP	CLM-10-LPB	10mm	.3927	4-1/2	M10	.39	5/8	1/2	3-1/2
CLM-12-LCP-B	CLM-12-LCP	CLM-12-LPB	12mm	.4715	5	M12	.47	3/4	5/8	3-1/2

\*See page 29 for additional bushings or more-detailed bushing dimensions.

Similar to the Clamping Pins shown above, except that the pin is positively retained in the bushing. The bushing's spring clip ring locks the pin in fully retracted position by snapping into the pin's groove. Patent No. 3,471,186.

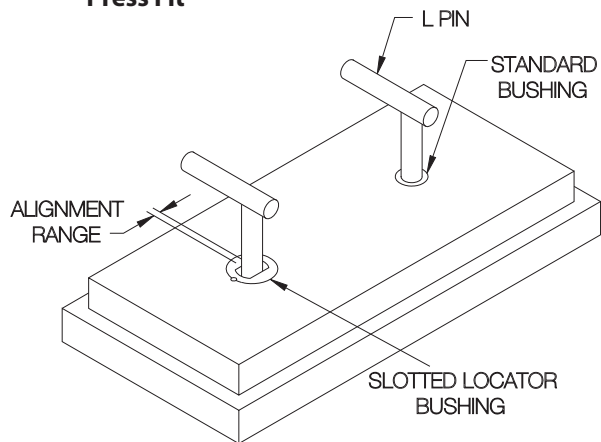


# SLOTTED LOCATOR BUSHINGS

STEEL: TOOL STEEL, HEAT TREATED RC 58-62, BLACK OXIDE FINISH  
 STAINLESS: 440C STAINLESS STEEL, HEAT TREATED



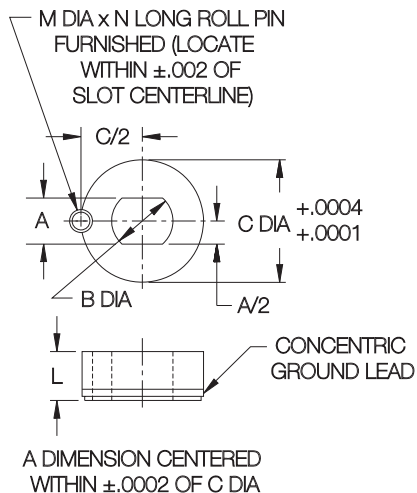
Press Fit



Use with L Pins, T Pins, Shoulder Pins, or Carr Lock® Clamps to align two holes without binding. Precision bushing with a tight tolerance in one direction and full relief in the perpendicular direction. Available for 1/8 through 1" diameter pins (5mm-25mm in metric sizes). To install, first drill and ream hole for roll pin (furnished), then bore large bushing hole for .0003-.0005 press fit. Press in bushing and roll pin simultaneously for accurate orientation. Patent No. 3,381,554.

## PRESS FIT (INCH)

PART NO.		PIN DIA	A	B DIA	C DIA	L	M DIA	N
STEEL	STAINLESS							
CL-2-SLLB	—	1/8	.1251/.1257	.250	.7500	.40	3/16	3/8
CL-3-SLLB-.1285	—	#30	.1286/.1292	.312	.7500	.40		
CL-3-SLLB-.1562	—	5/32	.1563/.1569	.312	.7500	.40		
CL-3-SLLB	CL-3-SLLB-S	3/16	.1876/.1882	.312	.7500	.40		
CL-4-SLLB-.1910	—	#11	.1911/.1917	.375	.7500	.40		
CL-4-SLLB-.1935	—	#10	.1936/.1942	.375	.7500	.40		
CL-4-SLLB-.1960	—	#9	.1961/.1967	.375	.7500	.40		
CL-4-SLLB-.2188	—	7/32	.2189/.2195	.375	.7500	.40		
CL-4-SLLB	CL-4-SLLB-S	1/4	.2501/.2507	.375	.7500	.40		
CL-4A-SLLB	—				1.0000			
CL-5-SLLB-.2570	—	F	.2571/.2577	.437	1.0000	.40		
CL-5-SLLB-.2812	—	9/32	.2813/.2819	.437	1.0000	.40		
CL-5-SLLB	CL-5-SLLB-S	5/16	.3126/.3132	.437	1.0000	.40		
CL-6-SLLB	CL-6-SLLB-S	3/8	.3751/.3757	.500	1.0000	.40		
CL-8A-SLLB	CL-8A-SLLB-S	1/2	.5001/.5007	.625	1.0000	.40		
CL-8-SLLB	—					.90		
CL-10-SLLB	CL-10-SLLB-S	5/8	.6251/.6257	.750	1.2500	.90		
CL-12-SLLB	CL-12-SLLB-S	3/4	.7501/.7510	.812	1.5000	1.00		
CL-14-SLLB	—	7/8	.8751/.8760	1.000	1.5000	1.00		
CL-16-SLLB	—	1	1.0001/1.0010	1.062	1.5000	1.00		



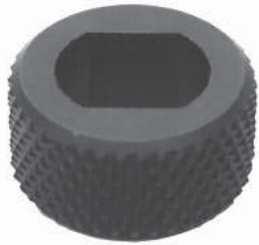
## PRESS FIT (METRIC)

CLM-5-SLLB	—	5mm	.1970/.1980	.315	.7874	.35	5mm	8mm
CLM-6-SLLB	CLM-6-SLLB-S	6mm	.2363/.2373	.354	.7874	.35		
CLM-8-SLLB	CLM-8-SLLB-S	8mm	.3151/.3161	.433		.35		
CLM-10-SLLB	CLM-10-SLLB-S	10mm	.3938/.3948	.512	.9449	.55		
CLM-12-SLLB	CLM-12-SLLB-S	12mm	.4725/.4735	.591		.55		
CLM-16-SLLB	CLM-16-SLLB-S	16mm	.6300/.6310	.709	1.1811	.47		
CLM-20-SLLB	CLM-20-SLLB-S	20mm	.7875/.7885	.866	1.4173			
CLM-25-SLLB	—	25mm	.9844/.9854	1.063	1.5748	.75		

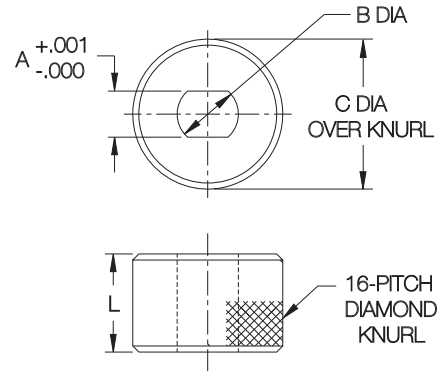
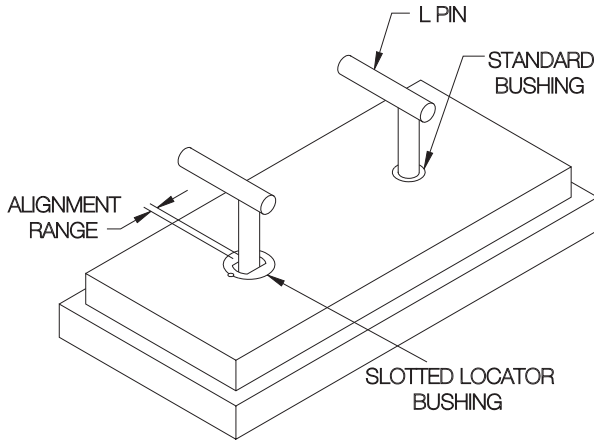
# SLOTTED LOCATOR BUSHINGS

BUSHING: TOOL STEEL, HEAT TREATED RC 58-62, BLACK OXIDE FINISH  
 LOCATING TOOL: O-2 DRILL ROD

1



**Knurled  
Slotted Locator Bushing**



Slotted Locator Bushings with a knurled design for embedding in plastic tooling. Use with L Pins, T Pins, and Shoulder Pins to align two holes without binding. Precision bushing with a tight tolerance in one direction and full relief in the perpendicular direction. Available for 3/16 through 1/2" pin diameters.

## KNURLED SLOTTED LOCATOR BUSHINGS (INCH)

PART NO.	PIN DIA	A	B DIA	C DIA	L
CL-30-SLLB	3/16	.188	.312	.565	1/2
CL-40-SLLB	1/4	.250	.375	.640	
CL-50-SLLB	5/16	.313	.437	.765	
CL-60-SLLB	3/8	.375	.500	.890	
CL-80-SLLB	1/2	.500	.625	1.015	

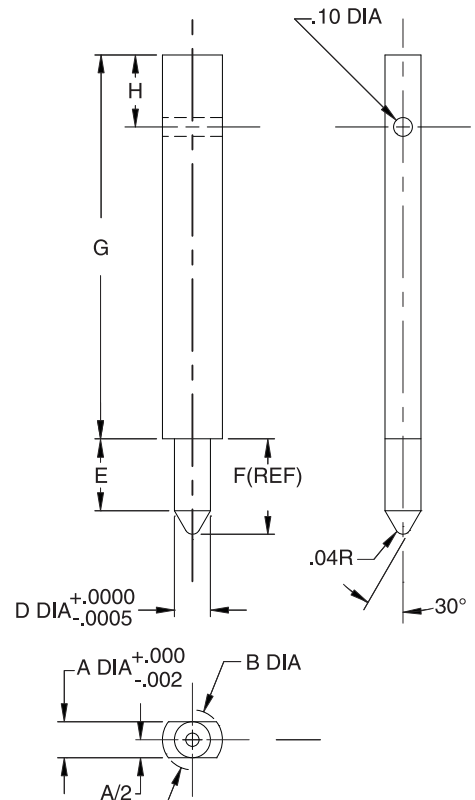


**Locating Tool**

Handy locating tool for holding knurled Slotted Locator Bushings in place during embedment. This stepped locating pin has a slip-fit-tolerance shank to fit a locating liner bushing in a template plate, and a head diameter with flats to fit a Slotted Locator Bushing perfectly.

## LOCATING TOOLS (INCH)

PART NO.	PIN DIA	A	B DIA	D DIA	E	F	G	H
CL-3-SLLT	3/16	.188	.312	.1875	.37	.50	2.00	.37
CL-4-SLLT	1/4	.250	.375	.2500	.50	.68		
CL-5-SLLT	5/16	.313	.437	.3125	.50	.73		
CL-6-SLLT	3/8	.375	.500	.3750	.50	.78		
CL-8-SLLT	1/2	.500	.625	.5000	.50	.89		



# SLOTTED LOCATOR TEMPLATE BUSHINGS

BUSHING: 1144 STEEL, HEAT TREATED, BLACK OXIDE FINISH  
RETAINER RING: ALUMINUM



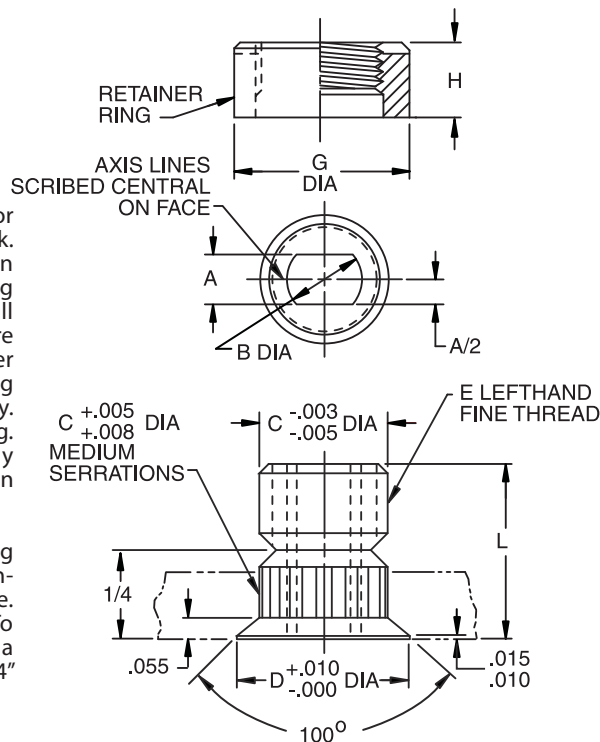
Retainer Ring



Bushing

These Slotted Locator Bushings are designed for thin template jig plates from 3/64" to 3/8" thick. Use with L Pins, T Pins, or Shoulder Pins to align two holes without binding. Precision bushing with a tight tolerance in one direction and full relief in the perpendicular direction. Bushings are held in place by a threaded Retainer Ring (order separately). Flush contact of the Retainer Ring against the jig plate ensures perpendicularity. OD serrations prevent the bushing from rotating. Threaded Template Bushings can be easily removed to replace or reuse. Available for pin diameters from 3/16 to 3/4".

To install, drill hole in jig plate to nominal bushing OD (B diameter). Countersink 90° to allow bushing to seat flush to .015" below surface of plate. Install and tighten Retainer Ring to secure. To make Retainer Ring installation easier, we offer a handy Socket-Type Installation Tool that fits 1/4" square drives — **INFO+**: see page 555.



## INCH

PART NO.	PIN DIA	A	B DIA	C DIA	D DIA	E	L	RETAINER RING PART NO.	TEMPLATE THICKNESS	G DIA	H
CL-40-SLTB-1875	3/16	.1876/.1882	3/8	.625	.725	5/8-18 LH	1/2	TTR-40-6	.047-.125	3/4	3/8
								TTR-40-5	.126-.188		5/16
								TTR-40-3	.189-.375		3/16
CL-40-SLTB-1935	#10	.1936/.1942	3/8	.625	.725	5/8-18 LH	1/2	TTR-40-6	.047-.125	3/4	3/8
								TTR-40-5	.126-.188		5/16
								TTR-40-3	.189-.375		3/16
CL-40-SLTB-2500	1/4	.2501/.2507	3/8	.625	.725	5/8-18 LH	1/2	TTR-40-6	.047-.125	3/4	3/8
								TTR-40-5	.126-.188		5/16
								TTR-40-3	.189-.375		3/16
CL-48-SLTB-3125	5/16	.3126/.3132	7/16	.750	.850	3/4-16 LH	1/2	TTR-48-6	.047-.125	1	3/8
								TTR-48-5	.126-.188		5/16
								TTR-48-3	.189-.375		3/16
CL-48-SLTB-3750	3/8	.3752/.3757	1/2	.750	.850	3/4-16 LH	1/2	TTR-48-6	.047-.125	1	3/8
								TTR-48-5	.126-.188		5/16
								TTR-48-3	.189-.375		3/16
CL-48-SLTB-5000	1/2	.5001/.5007	5/8	.750	.850	3/4-16 LH	1/2	TTR-48-6	.047-.125	1	3/8
								TTR-48-5	.126-.188		5/16
								TTR-48-3	.189-.375		3/16
CL-64-SLTB-6250	5/8	.6251/.6257	3/4	1.000	1.100	1"-14 LH	5/8	TTR-64-6	.047-.125	1-1/4	3/8
								TTR-64-5	.126-.188		5/16
								TTR-64-3	.189-.375		3/16
CL-64-SLTB-7500	3/4	.7501/.7510	13/16	1.000	1.100	1"-14 LH	5/8	TTR-64-6	.047-.125	1-1/4	3/8
								TTR-64-5	.126-.188		5/16
								TTR-64-3	.189-.375		3/16

# BALL LOCK PINS

1

## TYPES



### BALL LOCK PINS

Precision alignment pin with a ground shank. Positive locking until released by pushing the button. Widest range of types and sizes. Steel or stainless steel. Four handle styles. Any grip length up to 6" (150mm) is available as standard at no extra charge.



### MARINE BALL LOCK PINS

Similar to BLP above, except this type has its handle and button made of 300-series stainless steel. Two handle styles. Available from stock only (not made to order).



### HEAVY-DUTY BALL LOCK PINS

Similar to BLP above, except this type has a heavier handle for rough service. Stainless steel only. Four handle styles. Available from stock only (not made to order).



### ADJUSTABLE BALL LOCK PINS

With an adjustable grip length, this type can be used for clamping or simply to provide a variable grip length. Steel or stainless steel. Three handle styles.



### DOUBLE-ACTING BALL LOCK PINS

Similar to a single-acting pin, except the center spindle has two grooves instead of one, to release the ball by either pushing or pulling. Steel or stainless steel. Three handle styles. Any grip length up to 6" (150mm) is available as standard at no extra charge.



### LIFTING PINS

A single-acting design with a solid one-piece body and four balls for high tension loads. Sturdy forged shackle for heavy lifting. Available from stock only (not made to order).

## STANDARD MATERIALS

COMPONENT	ALLOY STEEL PINS	STAINLESS STEEL PINS
Shank	4130 steel, heat treated, 160,000 psi min. tensile strength, zinc or cadmium plated**	17-4 PH, heat treated, 180,000 psi min. tensile strength, or equivalent (300 Series on Detent Pins)**
Spindle	4130 steel or 416 stainless	17-4 PH or 416 stainless steel
Handle-BLPT,BLPL,ABP	Aluminum alloy, black or plain finish	Aluminum alloy, black or plain finish
Handle-BLPR,BLPB,BPD	Carbon steel, zinc or cadmium plated, or aluminum alloy, black finish	303 stainless, or aluminum alloy, black finish
Collar	Carbon steel, zinc or cadmium plated	303 stainless
Button	Carbon steel, zinc or cadmium plated, or aluminum alloy, anodized	302 or 303 stainless, or aluminum alloy, anodized
Balls	440 C stainless	440 C stainless
Spring	17-7PH, 302 stainless, or music wire	17-7PH or 302 stainless
Handle Ring	Carbon steel, zinc or cadmium plated, or 302 stainless	302 stainless
S-Hook	Carbon steel, zinc or cadmium plated, or 302 stainless	302 stainless
S-Hook Band	Carbon steel, zinc or cadmium plated, or 15-7MO or 302 stainless	15-7MO or 302 stainless

\*\*Pins with grip lengths over 8" (special) are not heat treated, in order to maintain straightness. Double shear strength will be reduced approximately 20-50%. Steel pins over 8" long will have a black oxide finish instead of plating. Pins in larger diameters than listed here are available as specials (may be made from alternate steels).

\*\*\*2:1 Safety factor

# BALL LOCK PINS

## SELECTION CHART:

STYLE	DIAMETER																	
	3/16"	5MM	1/4"	6MM	5/16"	8MM	3/8"	10MM	7/16"	1/2"	12MM	9/16"	5/8"	16MM	3/4"	20MM	7/8"	1"
Single Acting Steel	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Single Acting, Stainless	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Double Acting, Steel	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Double Acting, Stainless	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Marine Ball Lock Pins	X	X	X	X	X	X	X	X		X	X		X	X				
Heavy-Duty Ball Lock Pins	X	X	X	X	X	X	X	X	X	X	X							
Adjustable Ball Lock Pins	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Lifting Pins			X				X			X					X			X

## STRENGTH DATA (INCH)

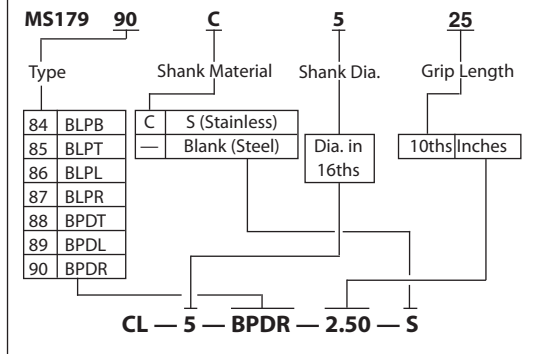
NOM. DIA	RECOMMENDED HOLE DIA		BLP, BPD, ABP APPROXIMATE PULL OUT STRENGTH (LBS)	BLP, BPD, ABP, LFP CALCULATED DOUBLE SHEAR STRENGTH (LBS)***		DEP CALCULATED DOUBLE SHEAR STRENGTH (LBS)***		BLP, BPD APPROX. WEIGHT (OUNCES)		DEP INSERTION/REMOVAL FORCE (LBS)	
	MAX	MIN		STEEL	STAINLESS	STEEL	STAINLESS	HANDLE	PER IN.	MAX	MIN
3/16 (#10)	.194	.190	200	2,100	2,300	2,200	2,000	1.25	.15	7	2
1/4	.254	.250	230	4,000	4,500	4,200	2,200	1.75	.25	7	2
5/16	.317	.313	510	6,000	7,100	6,700	3,500	2.00	.40	14	6
3/8	.379	.375	575	9,200	10,200	9,700	5,000	2.40	.50	14	6
7/16	.443	.438	710	12,300	13,600	13,200	7,000	2.90	.62	17	8
1/2	.505	.500	1160	16,000	18,000	17,500	9,200	3.40	.80	22	10
9/16	.568	.563	1420	20,500	23,000	22,000	11,500	3.65	1.20	22	10
5/8	.630	.625	2070	25,500	28,700	27,500	13,500	4.00	1.35	30	15
3/4	.757	.750	2970	36,700	41,000	39,500	20,500	4.25	2.30	30	15
7/8	.882	.875	3900	50,000	56,200	50,000	28,500	8.31	2.73	35	20
1	1.010	1.000	5400	65,500	73,500	70,700	37,200	9.00	3.47	40	20

## STRENGTH DATA (METRIC)

5mm	.201	.197	230	2,600	3,000	2,500	1,400	1.25	.15	7	2
6mm	.240	.236	230	4,000	4,400	4,000	2,100	1.75	.25	7	2
8mm	.319	.315	510	7,000	8,000	7,200	3,700	2.00	.40	14	6
10mm	.398	.394	710	11,000	12,500	11,400	5,800	2.40	.50	14	6
12mm	.477	.472	1160	16,000	18,000	16,500	8,500	3.40	.80	22	10
16mm	.635	.630	2070	29,000	32,500	29,500	15,400	4.00	1.35	30	15
20mm	.794	.787	2970	45,200	50,900	46,100	21,600	4.25	2.30	30	15

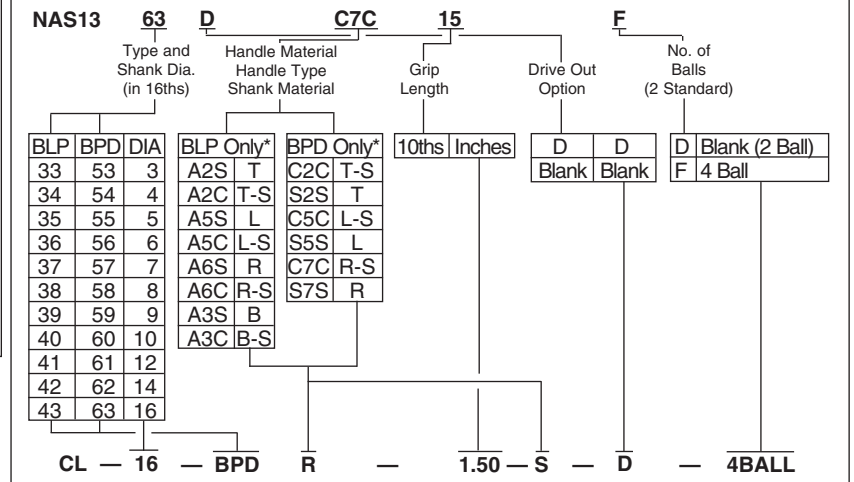
### MS CONVERSIONS

(MS-certified pins available as specials at higher cost)



### NAS CONVERSIONS

(NAS-certified pins available as specials at higher cost)



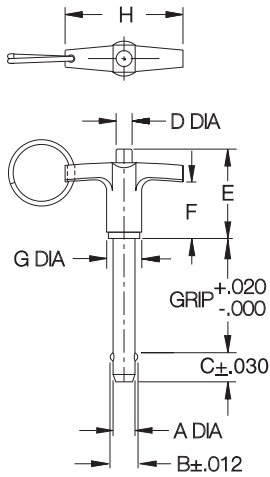
# BALL LOCK PINS

INFO+: SEE PAGE 34 FOR MATERIAL SPECIFICATIONS

1



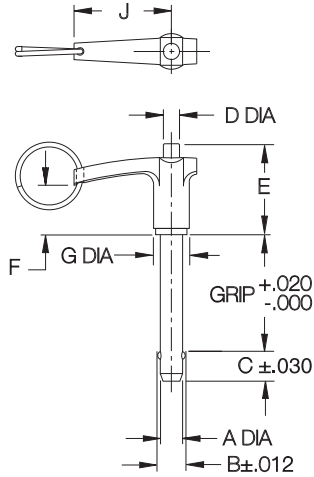
T Handle



BLPT



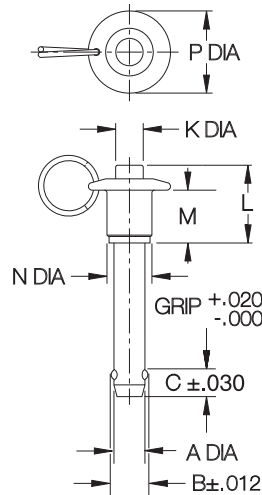
L Handle



BLPL



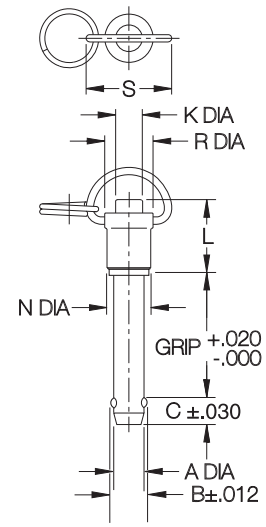
Button Handle



BLPB



Ring Handle



BLPR

INCH

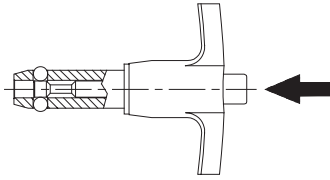
PART NO.	A DIA		B	C	D DIA	E	F	G DIA	H	J	K DIA	L	M	N DIA	P DIA	R DIA	S	
	NOMINAL	ACTUAL																
CL- 3-BLPx-x.xx	3/16 (#10)	.1885/.1870	.219	.245														
CL- 4-BLPx-x.xx	1/4	.2485/.2470	.290	.275	.22	1.26	.78	.47	1.75	1.50	.22	1.26	.89	.47	.82	.57	1.13	
CL- 5-BLPx-x.xx	5/16	.3110/.3095	.375	.315														
CL- 6-BLPx-x.xx	3/8	.3735/.3720	.438	.350	.27	1.47	.94	.59	2.00	1.62	.27	1.47	1.02	.59	1.00	.69	1.13	
CL- 7-BLPx-x.xx	7/16	.4360/.4345	.508	.365														
CL- 8-BLPx-x.xx	1/2	.4985/.4970	.592	.445	.39	1.61	1.06	.75	2.25	1.88	.39	1.61	1.08	.75	1.31	.82	1.33	
CL- 9-BLPx-x.xx	9/16	.5610/.5595	.666	.495														
CL-10-BLPx-x.xx	5/8	.6235/.6220	.750	.565	.50	1.81	1.06	.93	3.00	2.50	.50	1.81	1.25	.93	1.56	1.01	1.33	
CL-12-BLPx-x.xx	3/4	.7485/.7470	.886	.655														
CL-14-BLPx-x.xx	7/8	.8735/.8720	1.044	.745	.71	2.07	1.25	1.31	3.50	2.90	.71	2.07	1.49	1.31	2.16	1.41	1.90	
CL-16-BLPx-x.xx	1	.9985/.9970	1.217	.875														

METRIC

CLM-5-BLPx-xx	5mm	.1954/.1939	.212	.245														
CLM-6-BLPx-xx	6mm	.2347/.2332	.278	.275	.22	1.26	.78	.47	1.75	1.50	.22	1.26	.89	.47	.82	.57	1.13	
CLM-8-BLPx-xx	8mm	.3135/.3120	.371	.315														
CLM-10-BLPx-xx	10mm	.3922/.3907	.469	.350	.27	1.47	.94	.59	2.00	1.62	.27	1.47	1.02	.59	1.00	.69	1.13	
CLM-12-BLPx-xx	12mm	.4709/.4694	.567	.445														
CLM-16-BLPx-xx	16mm	.6284/.6269	.748	.565	.50	1.81	1.06	.93	3.00	2.50	.50	1.81	1.25	.93	1.56	1.01	1.33	
CLM-20-BLPx-xx	20mm	.7859/.7844	.948	.795														

# BALL LOCK PINS

INFO+: SEE PAGE 34 FOR MATERIAL SPECIFICATIONS



Precision alignment pin with a ground shank. This popular single-acting type is positive locking until released by pushing the button, which moves the center spindle forward to allow the locking balls to retract into a radial groove. Widest range of types and sizes, in steel or stainless steel. Choice of four handle styles: T, L, Button, and Ring. Standard shank diameters from 3/16 to 1" (5 to 20mm in metric). Any grip length up to 6" (150mm in metric) is available as standard, at no extra charge. Available from stock in many standard grip lengths, or quickly made to order in custom lengths and diameters.

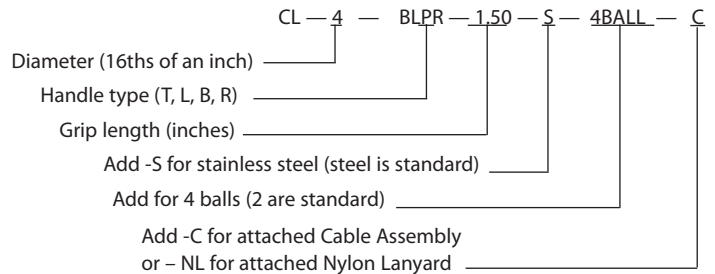


Options

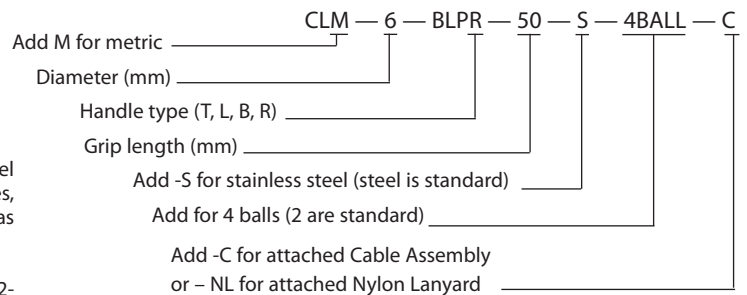
Ball Lock Pins are optionally available in stainless steel instead of alloy steel for greater corrosion resistance. (Note: Both types have aluminum handles, and buttons.) Pins are also available with four balls instead of two, as specials, for more-distributed ball-contact force.

The optional attached Cable Assembly (-C) is 12" long (part no. CL-82-KA-12.0 if ordered separately), while the optional attached Nylon Lanyard (-NL) is 10" long (part no. CL-1-NL-10 if ordered separately). Both have an eyelet at the free end for a #10 or M5 attachment screw.

### Ordering Example (INCH):



### Ordering Example (Metric):



### STOCK GRIP LENGTHS (INCH)

PART NO.	NOMINAL SHANK DIA	GRIP LENGTH (INCHES)															
		.50	.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00
CL-3-BLPx-xxx	3/16 (#10)	●●●●	● ●	X X X X	X ●●●	X X X X		X ●●●		●●●	●●●●	●	●				
CL-4-BLPx-xxx	1/4	X X X ●	X ● X ●	X X X X	X ●●●	X X X X	●●●●	X X X X	●●●●	X X X ●	X ● X ●	●●●●	X ●●●	●●●	●●		●
CL-5-BLPx-xxx	5/16	● ● ●	● ● ●	X X X X	●●●●	X X X X	● ● ●	X X X ●	●	X X X ●	●●●●	●●●●	●	●			●
CL-6-BLPx-xxx	3/8	● ● ●	X ● ●	X X X X	●●●●	X X X X	●●●●	X X X ●	●●●●	X X X ●	X X X ●	X X X ●	X ●●●	X ●●●	●●●●	●	●●
CL-7-BLPx-xxx	7/16			● ● ●		● ● ●		● ● ●		● ●	● ●		●				
CL-8-BLPx-xxx	1/2	●	● ●	X ●●●	X X ●	X X X ●	X X ●●	X X X ●	● ●	X X X ●	X X ●●	X ●●●	X ●●●	●●●●	●●●●	●●●●	X ●●●
CL-9-BLPx-xxx	9/16							●●●●		●●●●	●●		●				
CL-10-BLPx-xxx	5/8					● ● ●		●●●●		●●●●	●●●●	●●●●	●●●●	●●	●●	●●	●
CL-12-BLPx-xxx	3/4					● ●		X ●●●		X X ●●	X X ●●	X ●	X ● ●	●●	X ●●●	●●●	X ●
CL-14-BLPx-xxx	7/8							●●		●●	● ●					●●	
CL-16-BLPx-xxx	1							●●		●	●●●	●●	●●	●	●●		●●

### STOCK GRIP LENGTHS (METRIC)

PART NO.	NOMINAL SHANK DIA	GRIP LENGTH (mm)															
		10	15	20	25	30	40	50	60	70	80	90	100				
CLM-5-BLPx-xx	5mm																
CLM-6-BLPx-xx	6mm	● ●	● ●	● ●	●●	●●	●●	●●								●●	
CLM-8-BLPx-xx	8mm			●	●	●	●	●●									
CLM-10-BLPx-xx	10mm				● ●	●●	●●	●●								●●	
CLM-12-BLPx-xx	12mm					● ●	● ●	●●				●			●●		
CLM-16-BLPx-xx	16mm							●●									
CLM-20-BLPx-xx	20mm																

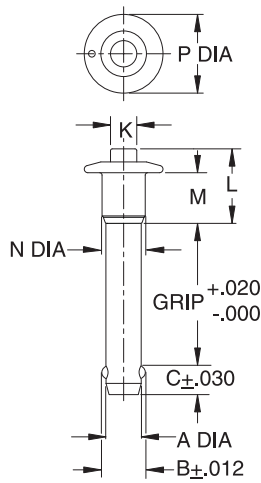
● = STOCKED IN ALLOY STEEL ONLY  
 X = STOCKED IN ALLOY AND STAINLESS STEEL

# MARINE BALL LOCK PINS

1



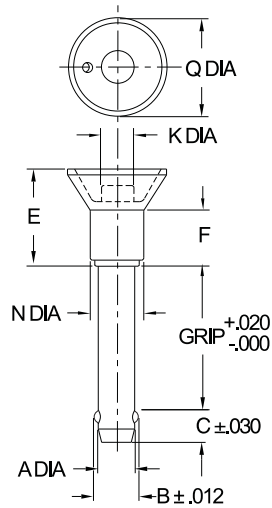
**Button Handle (B)**



**MBPB**



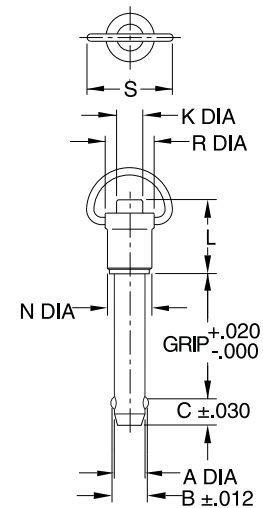
**Recessed Button Handle (M)**



**MBPM**



**Ring Handle (R)**



**MBPR**

**INCH**

PART NO.	A DIA		B	C	E	F	K DIA	L	M	N DIA	P DIA	Q DIA	R	S
	NOMINAL	ACTUAL												
CL-3-MBPx-x.xx-S	3/16 (#10)	.1885/.1870	.219	.245	.94	.62	.25	.81	.56	.47	.79	1.00	.52	1.13
CL-4-MBPx-x.xx-S	1/4	.2485/.2470	.290	.275										
CL-5-MBPx-x.xx-S	5/16	.3110/.3095	.375	.315	1.00	.68	.31	.92	.65	.59	1.00	1.00	.64	1.13
CL-6-MBPx-x.xx-S	3/8	.3735/.3720	.438	.350	1.06	.78								
CL-8-MBPx-x.xx-S	1/2	.4985/.4970	.592	.445	1.19	.93	.44	1.20	.80	.75	1.31	1.33	.80	1.33
CL-10-MBPx-x.xx-S	5/8	.6235/.6220	.750	.565	1.50	1.00	.44	1.56	1.00	.93	1.56	1.50	1.01	1.33
CL-12-MBPx-x.xx-S	3/4	.7485/.7470	.886	.655										

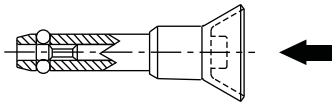
**METRIC**

CLM-5-MBPx-xx-S	5mm	.1954/.1939	.212	.245	.94	.62	.22	.81	.56	.47	.82	1.00	.52	1.13
CLM-6-MBPx-xx-S	6mm	.2347/.2332	.278	.275										
CLM-8-MBPx-xx-S	8mm	.3135/.3120	.371	.315	1.00	.68	.27	.92	.65	.59	1.00	1.00	.64	1.13
CLM-10-MBPx-xx-S	10mm	.3922/.3907	.469	.350	1.06	.78								
CLM-12-MBPx-xx-S	12mm	.4709/.4694	.567	.445	1.19	.93	.39	1.20	.80	.75	1.31	1.33	.80	1.33
CLM-16-MBPx-xx-S	16mm	.6283/.6268	.748	.565	1.50	1.00	.50	1.56	1.00	.93	1.56	1.50	1.01	1.33

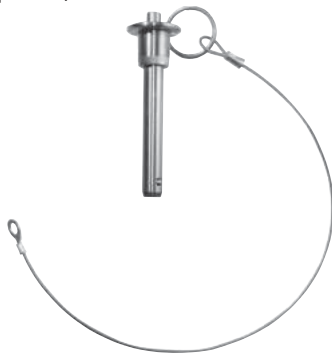


# MARINE BALL LOCK PINS

SHANK & SPINDLE: 17-4PH STAINLESS STEEL  
 HANDLE AND BUTTON: 300-SERIES STAINLESS STEEL  
 SPRING: 17-7 OR 300-SERIES STAINLESS STEEL  
 BALLS: 440C OR 300-SERIES STAINLESS STEEL



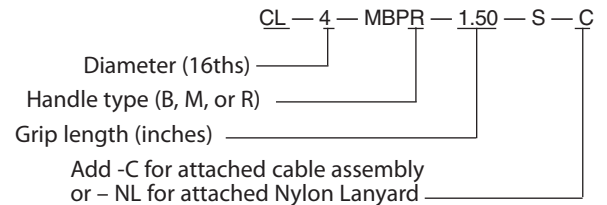
Similar to our standard single-acting Ball Lock Pins in stainless steel, except this type has its handle and button made of 300-series stainless steel. Choice of three handle styles: Buttons, Recessed Button and Ring. Shank diameters from 3/16 to 3/4" (5 to 16mm in metric), each available in a choice of several standard grip lengths. Available from stock only in the standard grip lengths listed below (other grip length available as specials).



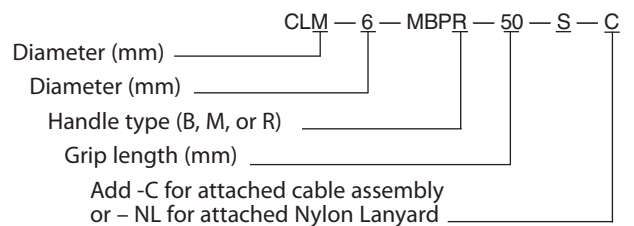
Optional Cable

The optional attached Cable Assembly (-C) is 12" long (part no. CL-82-KA-12.0 if ordered separately), while the optional attached Nylon Lanyard (-NL) is 10" long (part no. CL-1-NL-10 if ordered separately). Both have an eyelet at the free end for a #10 or M5 attachment screw.

### Ordering Example (INCH):



### Ordering Example (Metric):



## STANDARD STOCK GRIP LENGTHS (INCH)

PART NO.	NOMINAL SHANK DIA	GRIP LENGTH (INCHES)												
		0.50 BMR	0.75 BMR	1.00 BMR	1.25 BMR	1.50 BMR	1.75 BMR	2.00 BMR	2.25 BMR	2.50 BMR	3.00 BMR	3.50 BMR	4.00 BMR	4.50 BMR
CL-3-MBPx-x.xx-S	3/16 (#10)	XXX	XXX	XXX	XXX	XXX		XXX		XXX	XXX			
CL-4-MBPx-x.xx-S	1/4	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX			
CL-5-MBPx-x.xx-S	5/16		XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	
CL-6-MBPx-x.xx-S	3/8		XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	
CL-8-MBPx-x.xx-S	1/2			XXX		XXX		XXX		XXX	XXX	XXX	XXX	XXX
CL-10-MBPx-x.xx-S	5/8					XXX		XXX		XXX	XXX			
CL-12-MBPx-x.xx-S	3/4							XXX		XXX	XXX			

## STANDARD STOCK GRIP LENGTHS (METRIC)

PART NO.	NOMINAL SHANK DIA	GRIP LENGTH (mm)											
		10 BMR	15 BMR	20 BMR	25 BMR	30 BMR	40 BMR	50 BMR	60 BMR	70 BMR	80 BMR	100 BMR	
CLM-5-MBPx-xx-S	5mm	XXX	XXX	XXX	XXX	XXX	XXX	XXX					
CLM-6-MBPx-xx-S	6mm	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX				
CLM-8-MBPx-xx-S	8mm			XXX	XXX	XXX	XXX	XXX	XXX			XXX	XXX
CLM-10-MBPx-xx-S	10mm			XXX	XXX	XXX	XXX	XXX	XXX			XXX	XXX
CLM-12-MBPx-xx-S	12mm				XXX	XXX	XXX	XXX	XXX			XXX	XXX
CLM-16-MBPx-xx-S	16mm							XXX					

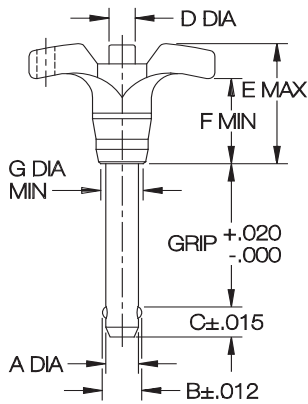
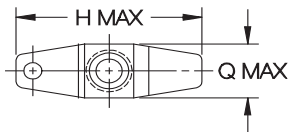
X = STOCKED IN STAINLESS STEEL

# HEAVY-DUTY BALL LOCK PINS

1



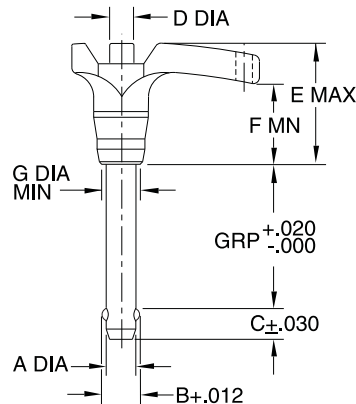
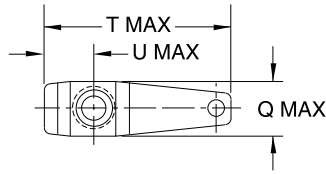
**T Handle**



**BLHT**



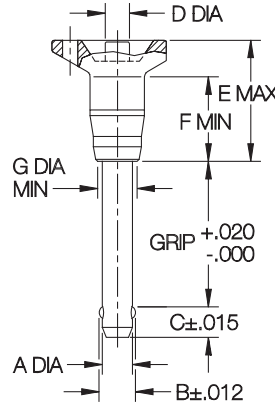
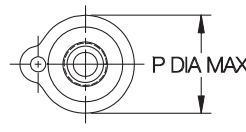
**L Handle**



**BLHL**



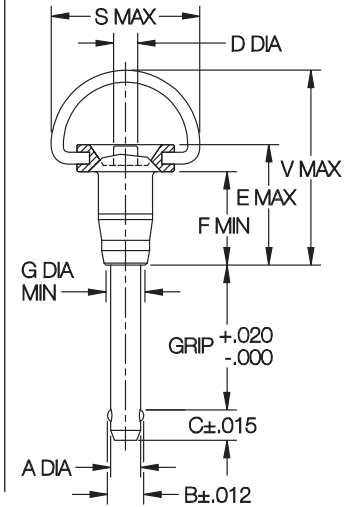
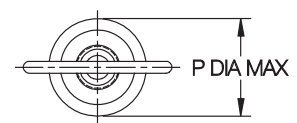
**Button Handle**



**BLHB**



**Ring Handle**



**BLHR**

**INCH**

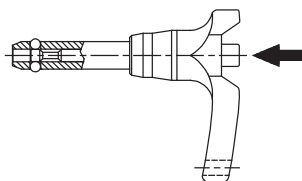
PART NO.	A DIA		B	C	D DIA	E	F	G DIA	H	P DIA	Q	S	T	U	V
	NOMINAL	ACTUAL													
CL-3-BLHx-x.xx-S	3/16 (#10)	.1885/.1870	.220	.245											
CL-4-BLHx-x.xx-S	1/4	.2485/.2470	.289	.275	.25	1.27	.70	.38	1.82	1.07	.63	1.56	1.95	.54	2.13
CL-5-BLHx-x.xx-S	5/16	.3110/.3095	.375	.315											
CL-6-BLHx-x.xx-S	3/8	.3735/.3720	.440	.350											
CL-7-BLHx-x.xx-S	7/16	.4360/.4345	.509	.365	.30	1.60	.85	.51	2.35	1.39	.80	2.00	2.51	.70	2.34
CL-8-BLHx-x.xx-S	1/2	.4985/.4970	.594	.445											

**METRIC**

CLM-5-BLHx-xx-S	5mm	.1954/.1939	.210	.245											
CLM-6-BLHx-xx-S	6mm	.2347/.2332	.275	.275	.25	1.27	.70	.38	1.82	1.07	.63	1.56	1.95	.54	2.13
CLM-8-BLHx-xx-S	8mm	.3135/.3120	.371	.315											
CLM-10-BLHx-xx-S	10mm	.3922/.3907	.467	.350	.30	1.60	.85	.51	2.35	1.39	.80	2.00	2.51	.70	2.34
CLM-12-BLHx-xx-S	12mm	.4709/.4694	.569	.445											

# HEAVY-DUTY BALL LOCK PINS

SHANK & SPINDLE: 17-4PH OR 15-7MO STAINLESS STEEL  
 HANDLE: 300-SERIES STAINLESS STEEL  
 HEAD & BUTTON: 303 STAINLESS STEEL  
 R-HANDLE RING: 302 STAINLESS STEEL  
 SPRING & ATTACHING RING: 17-7PH OR 302 STAINLESS STEEL  
 BALLS: 440C STAINLESS STEEL



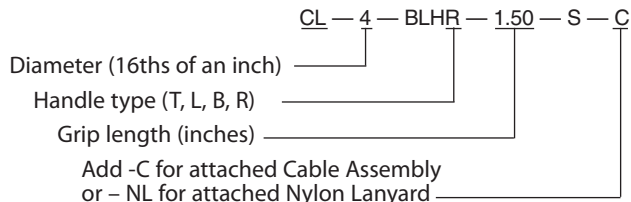
Similar to our standard single-acting Ball Lock Pins, except with a heavier handle for rough service. Available only in stainless steel. Handles are made of solid stainless for maximum impact strength, and are specially shaped to prevent accidentally pressing the release button. Choice of four handle styles: T, L, Button, and Ring. Shank diameters from 3/16 to 1/2" (5 to 12mm in metric), each in a choice of several standard grip lengths. Available from stock only (not made to order).



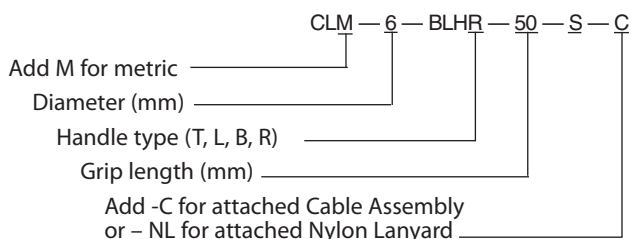
Optional Cable

The optional attached Cable Assembly (-C) is 12" long, while the optional attached Nylon Lanyard (-NL) is 10" long. Both have an eyelet at the free end for a #10 or M5 attachment screw.

### Ordering Example (INCH):



### Ordering Example (Metric):



## STANDARD STOCK GRIP LENGTHS (INCH)

PART NO.	NOMINAL SHANK DIA	GRIP LENGTH (INCHES)														
		.50	.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50	3.00	3.50	4.00	4.50	5.00	6.00
CL-3-BLHx-xx-S	3/16 (#10)	x	x	x	x	x										
CL-4-BLHx-xx-S	1/4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
CL-5-BLHx-xx-S	5/16	x	x	x	x	x	x	x	x	x	x	x	x	x		
CL-6-BLHx-xx-S	3/8	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
CL-7-BLHx-xx-S	7/16			x	x	x	x	x	x	x	x					
CL-8-BLHx-xx-S	1/2			x	x	x	x	x	x	x	x	x	x	x	x	x

## STOCK GRIP LENGTHS (METRIC)

PART NO.	NOMINAL SHANK DIA	GRIP LENGTH (mm)													
		10	15	20	25	30	40	50	60	70	80	100			
CLM-5-BLHx-xx-S	5mm	x	x	x	x	x	x	x	x	x					
CLM-6-BLHx-xx-S	6mm	x	x	x	x	x	x	x	x	x					x
CLM-8-BLHx-xx-S	8mm			x	x	x	x	x	x	x					x
CLM-10-BLHx-xx-S	10mm			x	x	x	x	x	x	x			x		x
CLM-12-BLHx-xx-S	12mm				x	x	x	x	x	x	x	x	x	x	x

X = Stocked in stainless steel.

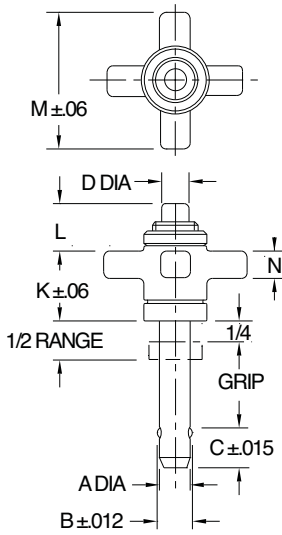
# ADJUSTABLE BALL LOCK PINS

INFO+: SEE PAGE 34 FOR MATERIAL SPECIFICATIONS

1



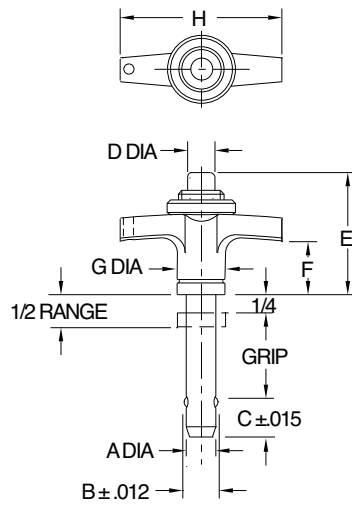
Knob Handle



ABPK



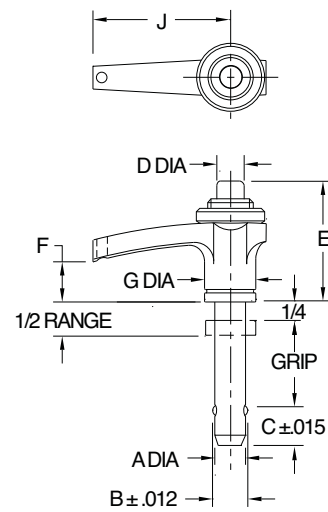
T Handle



ABPT



L Handle



ABPL

## INCH

PART NO.	A DIA		B	C	D DIA	E	F	G DIA	H	J	K	L	M	N
	NOMINAL	ACTUAL												
CL-4-ABPx-x.xx	1/4	.2485/.2470	.290	.275	.22	1.51	1.06	.75	2.25	1.87	.88	.58	1.75	.38
CL-5-ABPx-x.xx	5/16	.3110/.3095	.375	.315		1.45								
CL-6-ABPx-x.xx	3/8	.3735/.3720	.438	.350	.27	1.48	1.06	.93	3.00	2.50	.88	.63	2.12	.44
CL-7-ABPx-x.xx	7/16	.4360/.4345	.508	.365										
CL-8-ABPx-x.xx	1/2	.4985/.4970	.592	.445	.39	1.55	1.06	.93	3.00	2.50	1.00	.55	2.12	.44
CL-9-ABPx-x.xx	9/16	.5610/.5595	.666	.495										
CL-10-ABPx-x.xx	5/8	.6235/.6220	.750	.565	.50	2.07	1.25	1.31	3.50	2.87	1.25	1.13	2.75	.50
CL-12-ABPx-x.xx	3/4	.7485/.7470	.886	.655										
CL-14-ABPx-x.xx	7/8	.8735/.8720	1.044	.745	.71	2.34	1.62	1.50	4.30	4.00	1.62	1.00	4.00	.75
CL-16-ABPx-x.xx	1	.9985/.9970	1.217	.875										

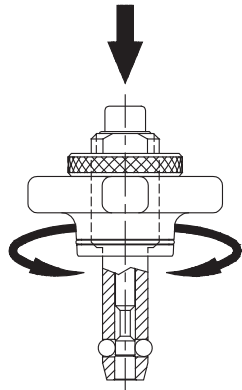
## METRIC

CLM-6-ABPx-xx	6mm	.2346/.2331	.278	.275	.22	1.51	1.06	.75	2.25	1.87	.88	.65	1.75	.38
CLM-8-ABPx-xx	8mm	.3134/.3118	.371	.315		1.45						.75		
CLM-10-ABPx-xx	10mm	.3921/.3906	.469	.350	.27	1.48	1.06	.93	3.00	2.50	.88	.72	2.12	.44
CLM-12-ABPx-xx	12mm	.4709/.4693	.567	.445							1.00	.73	2.12	.44
CLM-16-ABPx-xx	16mm	.6283/.6268	.748	.565	.50	2.07	1.25	1.31	3.50	2.87	1.25	1.13	2.75	.50
CLM-20-ABPx-xx	20mm	.7858/.7843	.948	.795							2.00	1.00		

# ADJUSTABLE BALL LOCK PINS

INFO+: SEE PAGE 34 FOR MATERIAL SPECIFICATIONS

1



Adjustable Ball Lock Pins can be used for clamping, or simply to provide a variable grip length.

These Ball Lock Pins have an adjustable grip length. They can be used for clamping, or simply to provide a variable grip length. The threaded handle turns to provide a +/- 1/4" clamping range or adjustment range. When used just for variable grip length (not for clamping), the handle can be secured with the supplied knurled locknut. These single-acting pins are manufactured with four balls as standard, instead of two, for more-distributed ball-pullout force in clamping applications. Available in steel or stainless steel.

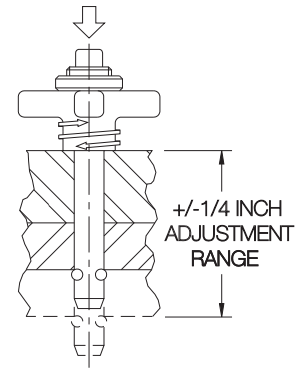
Choice of three handle styles: Knob, T, and L. Standard shank diameters from 1/4 to 1" (6 to 20mm in metric), each in a choice of many standard grip lengths. Available from stock only in the standard grip lengths listed below. Other grip lengths are available as specials (extra charge and longer delivery time).

Pins are optionally available in stainless steel instead of alloy steel, for greater corrosion resistance. Note: both steel and stainless pins have aluminum handles and buttons. Add "-S" to the part number:

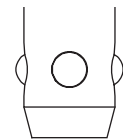
- CL-4-ABPK-1.50 (steel)
- CL-4-ABPK-1.50-S (stainless)

To order pins with a standard Cable Assembly attached (#2 cable size, 12" long, with a terminal at the free end for a #10 or M5 attachment screw), add "-C" to the part number:

- CL-4-ABPK-1.50-S-C



Grip length adjusts +/- 1/4" from nominal.



Four balls are standard on Adjustable Ball Lock Pins, to provide more distributed ball-pullout force in clamping applications.

## STOCK GRIP LENGTHS (INCH)

PART NO.	NOMINAL SHANK DIA	GRIP LENGTH (INCHES)																	
		.50	.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00		
CL-4-ABPx-xxx	1/4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
CL-5-ABPx-xxx	5/16	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
CL-6-ABPx-xxx	3/8	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
CL-7-ABPx-xxx	7/16																		
CL-8-ABPx-xxx	1/2			x	x	x	x	x	x	x	x	x	x	x	x	x	x		
CL-9-ABPx-xxx	9/16																		
CL-10-ABPx-xxx	5/8			x	x	x		x	x	x		x	x	x					
CL-12-ABPx-xxx	3/4			x	x	x		x	x	x		x	x	x					
CL-14-ABPx-xxx	7/8																		
CL-16-ABPx-xxx	1								x	x	x		x	x	x		x	x	x

## STOCK GRIP LENGTHS (METRIC)

PART NO.	NOMINAL SHANK DIA	GRIP LENGTH (mm)															
		10	15	20	25	30	40	50	60	70	80	90	100				
CLM-6-ABPx-xx	6mm			x	x	x		x	x	x	x	x	x				
CLM-8-ABPx-xx	8mm			x	x	x		x	x	x	x	x	x				
CLM-10-ABPx-xx	10mm							x	x	x	x	x	x				
CLM-12-ABPx-xx	12mm																
CLM-16-ABPx-xx	16mm																
CLM-20-ABPx-xx	20mm																

X = STOCKED IN ALLOY AND STAINLESS STEEL

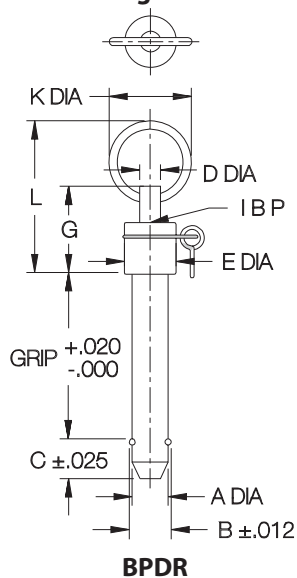
# DOUBLE-ACTING BALL LOCK PINS

INFO+: SEE PAGE 34 FOR MATERIAL SPECIFICATIONS

1



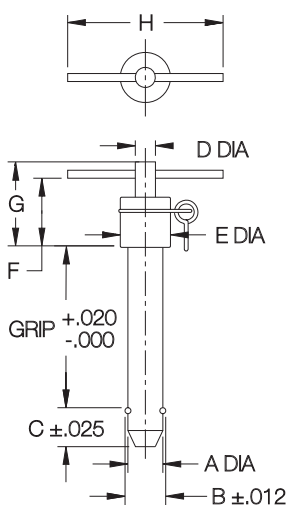
Ring Handle



BPDR



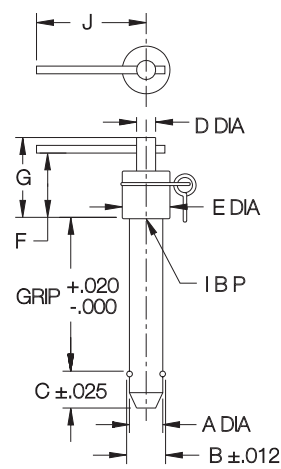
T Handle



BPDT



L Handle



BPDL

## INCH

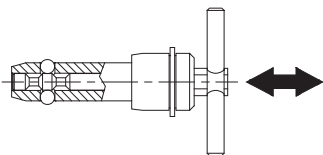
PART NO.	A DIA		B	C	D DIA	E DIA	F	G	H	J	K DIA	L	M	
	NOMINAL	ACTUAL												
CL-3-BPDx-x.xx	3/16 (#10)	.1885/.1870	.219	.385	.19	7/16	.86	1.02	1-1/2	1-1/4	1	1.86	.12	
CL-4-BPDx-x.xx	1/4	.2485/.2470	.290	.415	.25	1/2	.86	1.06	1-15/16	1-7/16			.12	
CL-5-BPDx-x.xx	5/16	.3110/.3095	.375	.485	.31	5/8	.86	1.24	2-3/16	1-19/32			.14	
CL-6-BPDx-x.xx	3/8	.3735/.3720	.438	.565	.43	13/16	.86	1.44	2-7/16	1-3/4			.15	
CL-7-BPDx-x.xx	7/16	.4360/.4345	.508	.635	.56	1-1/8	1.14	1.59	2-25/32	2-3/16			.16	
CL-8-BPDx-x.xx	1/2	.4985/.4970	.592	.725	.43	1-1/4	1.29	1.77	2-25/32	2-3/16			.18	
CL-9-BPDx-x.xx	9/16	.5610/.5595	.666	.725	.43	1-1/4	1.29	1.77	2-25/32	2-3/16	.18			
CL-10-BPDx-x.xx	5/8	.6235/.6220	.750	.725	.43	1-1/4	1.29	1.77	2-25/32	2-3/16	1-5/16	2.45	.26	
CL-12-BPDx-x.xx	3/4	.7485/.7470	.886	.765	.56	1-1/8	1.29	1.59	2-25/32	2-3/16			2.44	.29
CL-14-BPDx-x.xx	7/8	.8735/.8720	1.044	.925	.56	1-1/8	1.29	1.59	2-25/32	2-3/16			2.62	.28
CL-16-BPDx-x.xx	1	.9985/.9970	1.217	1.075	.56	1-1/4	1.47	1.77	2-25/32	2-3/16			2.79	.30

## METRIC

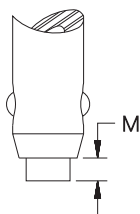
CLM-5-BPDx-xx	5mm	.1954/.1939	.212	.385	.19	7/16	.86	1.02	1-1/2	1-1/4	1	1.86	.12
CLM-6-BPDx-xx	6mm	.2347/.2332	.278	.415	.25	1/2	.86	1.06	1-15/16	1-7/16			.12
CLM-8-BPDx-xx	8mm	.3135/.3120	.371	.485	.31	5/8	.86	1.06	1-15/16	1-7/16			.14
CLM-10-BPDx-xx	10mm	.3922/.3907	.469	.565	.43	13/16	.86	1.06	1-15/16	1-7/16			.15
CLM-12-BPDx-xx	12mm	.4709/.4694	.567	.635	.31	11/16	.97	1.24	2-3/16	1-19/32			.18
CLM-16-BPDx-xx	16mm	.6284/.6269	.748	.725	.43	13/16	1.14	1.44	2-7/16	1-3/4			.26
CLM-20-BPDx-xx	20mm	.7859/.7844	.948	.925	.56	1-1/8	1.29	1.59	2-25/32	2-3/16	1-5/16	2.62	.28

# DOUBLE-ACTING BALL LOCK PINS

INFO+: SEE PAGE 34 FOR MATERIAL SPECIFICATIONS

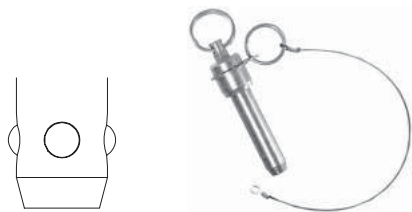


Similar to a single-acting pin, except the center spindle has two grooves instead of one, to release the ball by either pushing or pulling. Pushing on the handle releases the balls and inserts the pin in one motion. Pulling on the handle releases the balls and removes the pin in one motion. Available in steel or stainless steel. Choice of three handle styles: T, L, and Ring. Standard shank diameters from 3/16 to 1" (5 to 20mm in metric). Any grip length up to 6" (150mm in metric) is available as a standard, at no extra charge. Available from stock in some standard grip lengths, or quickly made to order in custom lengths and diameters.



### Drive-Out Option

Double-acting Ball Lock Pins are available with a "drive-out" option, where the center spindle extends slightly beyond the shank end (see M dimension). This allows removing a pin under slight shear load by tapping the shank end with a hammer (releasing the balls at the same time).

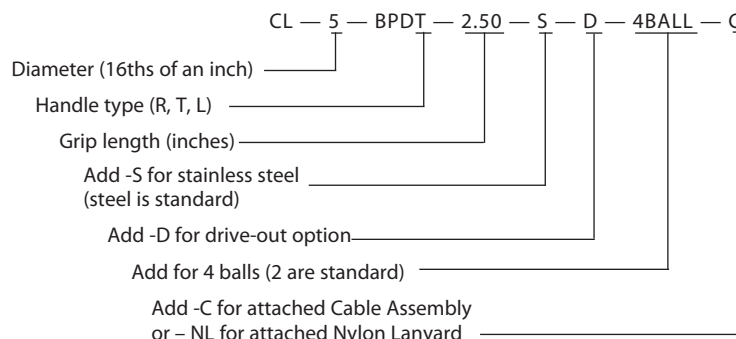


### Other Options

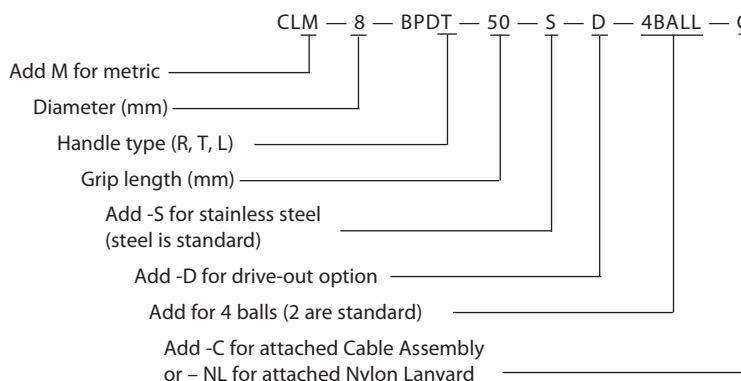
Ball Lock Pins are optionally available in stainless steel instead of alloy steel for greater corrosion resistance. Pins are also available with four balls instead of two, as specials, for additional pull-out strength and more distributed ball-contact force.

The optional attached Cable Assembly (-C) is 12" long (part no. CL-82-KA-12.0 if ordered separately), while the optional attached Nylon Lanyard (-NL) is 10" long (part no. CL-1-NL-10 if ordered separately). Both have an eyelet at the free end for a #10 or M5 attachment screw.

### Ordering Example (INCH):



### Ordering Example (Metric):



### STOCK GRIP LENGTHS (INCH) ALLOY STEEL

PART NO.	NOMINAL SHANK DIA	GRIP LENGTH (INCHES)									
		1.00 RTL	1.25 RTL	1.50 RTL	1.75 RTL	2.00 RTL	2.50 RTL	3.00 RTL	3.50 RTL	4.00 RTL	5.00 RTL
CL-3-BPDx-x.xx	3/16 (#10)	••		••							
CL-4-BPDx-x.xx	1/4	••	•	••		••	•				
CL-5-BPDx-x.xx	5/16										
CL-6-BPDx-x.xx	3/8	••		••		••	••	•			
CL-7-BPDx-x.xx	7/16										
CL-8-BPDx-x.xx	1/2	•		•••	•	••	••	••	••	•	•
CL-9-BPDx-x.xx	9/16										
CL-10-BPDx-x.xx	5/8										
CL-12-BPDx-x.xx	3/4										
CL-14-BPDx-x.xx	7/8										
CL-16-BPDx-x.xx	1										

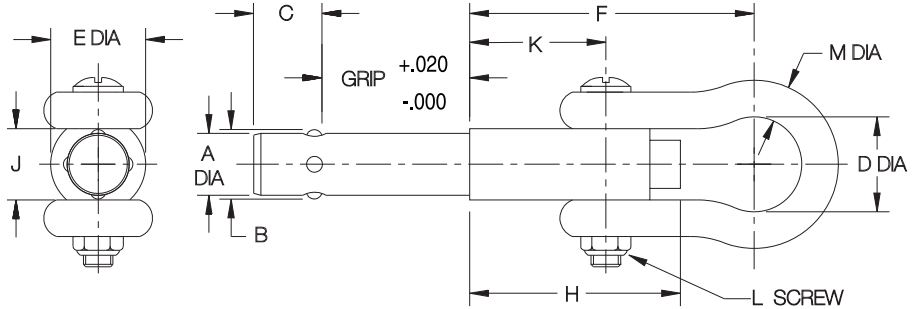
# LIFTING PINS

SHANK: 17-4PH STAINLESS STEEL, HEAT TREATED RC 40 MIN; SPINDLE: 17-4PH STAINLESS STEEL;  
 SHACKLE: FORGED STEEL PER RR-C271, ZINC PLATED CLEAR CHROMATE; BUTTON: 303 STAINLESS STEEL;  
 CAP SCREW, NUT, AND BUSHING: 300-SERIES STAINLESS STEEL; SPRING: 302 STAINLESS STEEL; BALLS: 440C STAINLESS STEEL

1



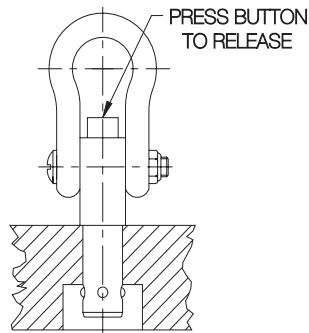
Stainless Steel



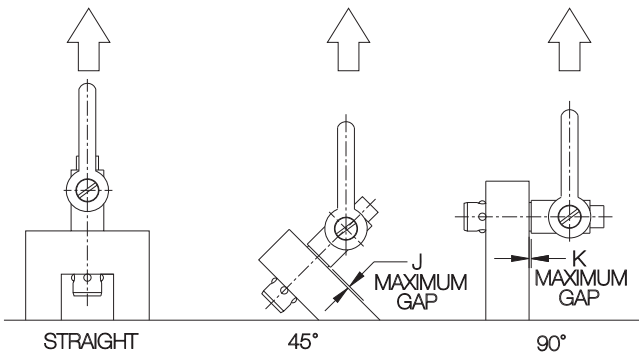
A single-acting ball lock pin with a solid, one-piece body and four balls for high tension loads. Sturdy forged shackle for heavy lifting. Shank diameters from 1/4 to 1" are available, in several standard lengths. **INFO+**: See safety precautions on page 60.

## STAINLESS STEEL (INCH)

PART NO.	A DIA	GRIP	B	C	D DIA	E DIA	F	H	J	K	L	M DIA
CL-4-LFP-0.25-S	1/4 .2470/.2485	0.25	.287	.333	9/16	9/16	2.45	1.50	1/2	7/8	M6	3/16
CL-4-LFP-0.50-S		0.50										
CL-4-LFP-1.00-S		1.00										
CL-4-LFP-1.50-S		1.50										
CL-4-LFP-2.00-S		2.00										
CL-6-LFP-0.25-S	3/8 .3720/.3735	0.25	.438	.425	11/16	3/4	2.85	1.60	9/16	15/16	5/16-18	1/4
CL-6-LFP-0.50-S		0.50										
CL-6-LFP-1.00-S		1.00										
CL-6-LFP-1.50-S		1.50										
CL-6-LFP-2.00-S		2.00										
CL-6-LFP-3.00-S	3.00											
CL-8-LFP-0.50-S	1/2 .4970/.4985	0.50	.593	.519	13/16	13/16	3.15	1.80	11/16	1	3/8-16	5/16
CL-8-LFP-1.00-S		1.00										
CL-8-LFP-1.50-S		1.50										
CL-8-LFP-2.00-S		2.00										
CL-8-LFP-3.00-S		3.00										
CL-12-LFP-0.50-S	3/4 .7470/.7485	0.50	.887	.707	1-1/8	1-1/8	4.05	2.20	7/8	1-1/4	1/2-13	7/16
CL-12-LFP-1.00-S		1.00										
CL-12-LFP-2.00-S		2.00										
CL-12-LFP-3.00-S		3.00										
CL-16-LFP-0.50-S		1 .9970/.9985										
CL-16-LFP-1.00-S	1.00											
CL-16-LFP-2.00-S	2.00											



TYPICAL INSTALLATION



## TECHNICAL DATA

PART NO.	LOAD CAPACITY (LBS)*			J (45°)	K (90°)	RECOMMENDED HOLE DIA	
	STRAIGHT	45°	90°			MAX	MIN
CL-4-LFP-x.xx-S	210	170	120	.031	.037	.254	.250
CL-6-LFP-x.xx-S	520	520	350	.036	.042	.379	.375
CL-8-LFP-x.xx-S	980	900	770			.505	.500
CL-12-LFP-x.xx-S	2200	2200	2000	.041	.047	.757	.750
CL-16-LFP-x.xx-S	2900	2800	2500	.046	.052	1.010	1.000

\* 5:1 Safety factor, based on the average failing load of test specimens. See above for allowable installation-hole tolerances. Straight pull capacity assumes pin is installed in a hardened tool steel plate or bushing. Use standard lifting hook so that button is not depressed while lifting.

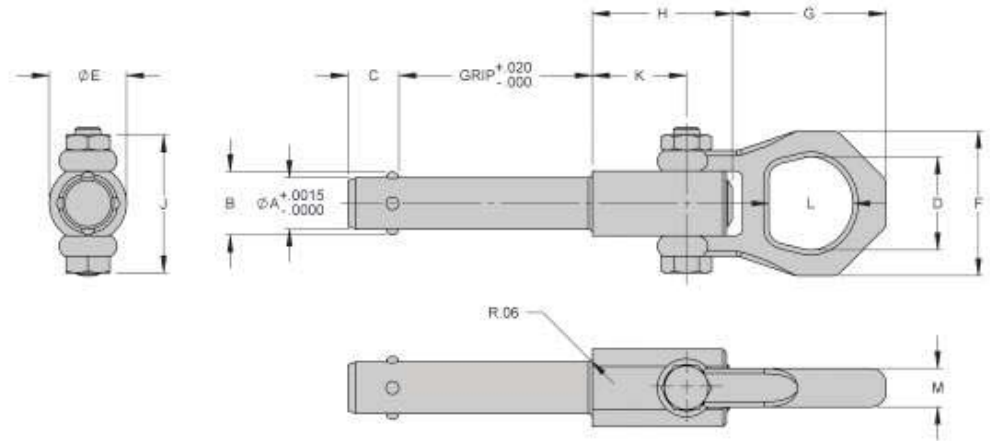


# LIFTING PINS

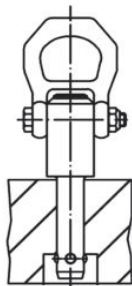
SHANK: ALLOY STEEL, HEAT TREATED, MANGANESE PHOSPHATE FINISH; SPINDLE: ALLOY STEEL, MANGANESE PHOSPHATE FINISH;  
SHACKLE: ALLOY STEEL, HEAT TREATED, MANGANESE PHOSPHATE FINISH; BUTTON: ALUMINUM ALLOY, RED ANODIZED;  
CAP SCREW, NUT, AND BUSHING: STEEL, ZINC PLATED CLEAR CHROMATE; SPRING: STAINLESS STEEL; BALLS: 440C STAINLESS STEEL



**Alloy Steel**



A single-acting ball lock pin with a solid, one-piece body and four balls for high tension loads. Positive locking until released by pushing the button. Sturdy forged shackle for heavy lifting. Manganese phosphate finish provides excellent lubricity and corrosion resistance. **INFO+**: See safety precautions on page 60.



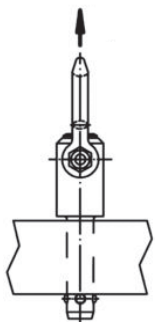
## ALLOY STEEL (INCH)

PART NO.	A	GRIP	B	C	D	E	F	G	H	J	K	L	M
CL-4-LFPM-1.00	1/4 .2470/.2485	1.00	.29	.33	1.18	0.85	1.93	1.94	1.50	2.06	1.01	1.06	0.37
CL-6-LFPM-0.50	3/8 .3720/.3735	0.50	.44	.40									
CL-6-LFPM-1.00		1.00											
CL-8-LFPM-2.00	1/2 .4970/.4985	2.00	.59	.44									
CL-8-LFPM-3.00		3.00											

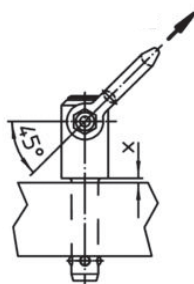
## TECHNICAL DATA

PART NO.	LOAD CAPACITY (LBS)*			X		RECOMMENDED HOLE DIA	
	STRAIGHT	45°	90°	MIN	MAX	MAX	MIN
CL-4-LFPM-1.00-X.XX	210	170	110	.06	.20	.254	.250
CL-6-LFPM-0.50-X.XX	600	540	470		.39	.379	.375
CL-8-LFPM-2.00-X.XX	790	720	630		.59	.505	.500

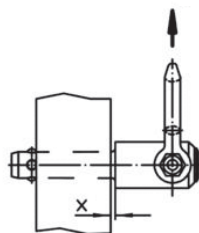
\* 5:1 Safety factor, based on the average failing load of test specimens. See above for allowable installation-hole tolerances. Straight pull capacity assumes pin is installed in a hardened tool steel plate or bushing. Use standard lifting hook so that button is not depressed while lifting.



**Straight**



**45°**

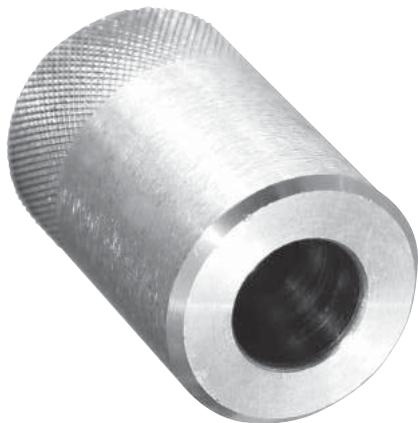


**90°**

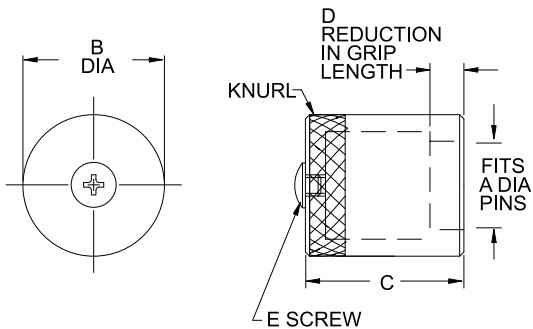
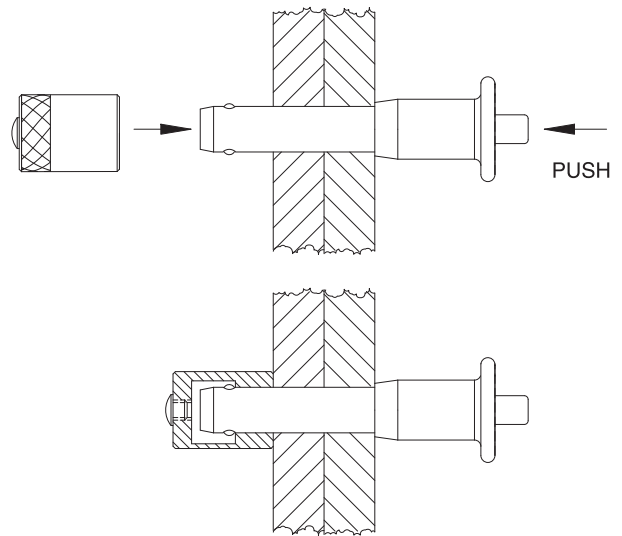
# BALL LOCK RECEIVER CAPS

300-SERIES STAINLESS STEEL, PASSIVATED

1



Receiver Caps are ideal for securing Ball Lock Pins used in clevis applications, especially when the through-hole has excess clearance. The Receiver Cap's inside diameter fits the Ball Lock Pin exactly, and is stepped to provide a perfect locking surface for the balls. Available to fit Ball Lock Pin diameters from 3/16 to 1" (5 to 20mm in metric). Made of 300-series stainless steel. Please note, using a Receiver Cap reduces the Ball Lock Pin's effective grip length slightly (see D dimension).



Receiver Caps are tapped to allow fastening the eyelet end of a standard Ball Lock Pin Cable Assembly (12" long) or Nylon Lanyard (10" long), and include a fastening screw.

## INCH

PART NO.	A DIA	B DIA	C	D	E
CL-3-BLR-S	3/16 (#10)	.50	.72	1/4	#10-32
CL-4-BLR-S	1/4	.50	.81		
CL-5-BLR-S	5/16	.63	.81		
CL-6-BLR-S	3/8	.75	1.16	1/2	
CL-7-BLR-S	7/16	.75	1.16		
CL-8-BLR-S	1/2	.88	1.25		
CL-9-BLR-S	9/16	.88	1.25		
CL-10-BLR-S	5/8	1.00	1.31		
CL-12-BLR-S	3/5	1.25	1.45		
CL-14-BLR-S	7/8	1.50	1.48		
CL-16-BLR-S	1	1.50	1.69		

## METRIC

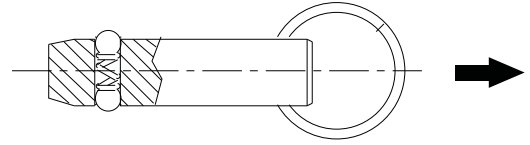
PART NO.	A DIA	B DIA	C	D	E
CLM-5-BLR-S	5mm	.50	.93	.39 (10mm)	M5
CLM-6-BLR-S	6mm	.50	.95		
CLM-8-BLR-S	8mm	.63	1.00		
CLM-10-BLR-S	10mm	.75	1.03		
CLM-12-BLR-S	12mm	.88	1.13		
CLM-16-BLR-S	16mm	1.00	1.25		
CLM-20-BLR-S	20mm	1.25	1.50		



# MARINE DETENT PINS

SHANK: 316 STAINLESS STEEL  
 RING: 316 OR 300-SERIES STAINLESS STEEL  
 SPRING & BALLS: 316 STAINLESS STEEL

1



Marine Detent pins are made of 316 stainless steel for extra corrosion resistance. Economical shear pin, without a head for applications where exact grip length is not important. Solid alignment pins with spring-loaded locking balls (not positive locking like a Ball Lock Pin). Simply push pin to insert, and pull to remove. Shank diameters from 3/16" to 1/2", each available in a choice of several standard grip lengths. Note: 3/16-diameter pins have one ball, instead of two, due to their small size. Available from stock only in the standard grip lengths listed below (other grip lengths available as specials).

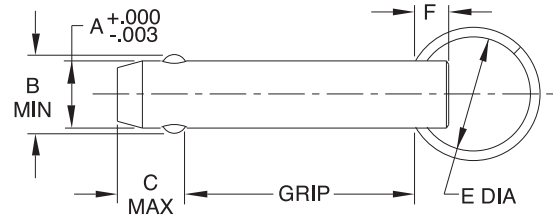
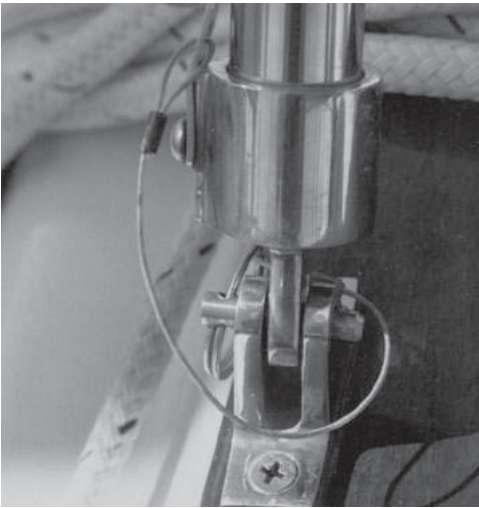
### Optional Cable

The optional attached Cable Assembly (-C) is 12" long (part no. CL-82-KA-12.0 if ordered separately), while the optional attached Nylon Lanyard (-NL) is 10" long (part no. CL-1-NL-10 if ordered separately). Both have an eyelet at the free end for a #10 or M5 attachment screw.

### Ordering Example (INCH):

CL - 4 - MDP - 1.50 - S - C

Diameter (16ths of an inch) ————  
 Grip length (inches) ————  
 Add -C for attached Cable Assembly  
 or -NL for attached Nylon Lanyard



### DIMENSIONS (INCH)

PART NO.	A DIA		B	C	E DIA	F DIA
	NOMINAL	ACTUAL				
CL-3-MDP-x.xx-S	3/16 (#10)	.1880	.200	.329	1.00	.25
CL-4-MDP-x.xx-S	1/4	.2480	.280	.344		
CL-5-MDP-x.xx-S	5/16	.3105	.360	.359		
CL-6-MDP-x.xx-S	3/8	.3730	.430	.390		
CL-8-MDP-x.xx-S	1/2	.4980	.570	.516		

### STANDARD STOCK GRIP LENGTHS (INCH)

PART NO.	NOMINAL SHANK DIA	GRIP LENGTH (INCHES)											
		0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50	3.00	3.50	4.00
CL-3-MDP-x.xx-S	3/16 (#10)	X	X	X	X	X	X	X	X	X			
CL-4-MDP-x.xx-S	1/4	X	X	X	X	X	X	X	X	X	X		
CL-5-MDP-x.xx-S	5/16		X	X	X	X	X	X	X	X	X	X	X
CL-6-MDP-x.xx-S	3/8		X	X	X	X	X	X	X	X	X	X	X
CL-8-MDP-x.xx-S	1/2			X	X	X	X	X		X	X	X	X

X-Stocked in stainless steel.

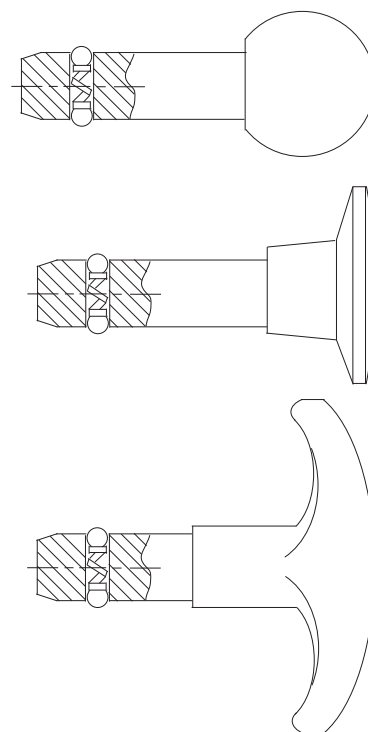
# THREADED DETENT PINS

SHANK: 300-SERIES STAINLESS STEEL  
 SPRING: 17-7PH OR 302 STAINLESS STEEL  
 BALLS: 440C STAINLESS STEEL

1



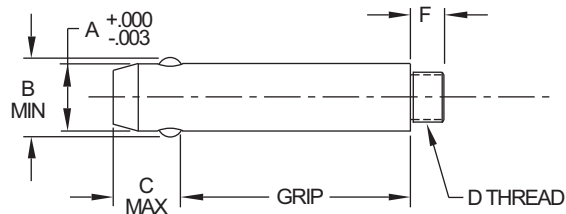
Threaded Detent Pins are solid alignment pins with a ground shank and a threaded end for a knob handle. Two locking balls hold the pin in place by spring force. Simply push to insert, and pull to remove. The threaded end accepts virtually any type of knob handle (order separately — available in steel, stainless steel, and several different plastics). Knob handles can be permanently secured with thread-locking adhesive if desired. Threaded Detent Pins are available in stainless steel only. Standard shank diameters from 3/16 to 1/2" (6 to 10mm in metric), each in a choice of many standard grip lengths. Note: 3/16-diameter pins have only one locking ball instead of two due to their small size. Available from stock only in the standard grip lengths listed (other grip lengths available as specials).



## INCH

PART NO.	A DIA		GRIP LENGTH	B	C	D	F
	NOMINAL	ACTUAL					
CL-3-TDP-0.50-S	3/16(#10)	.1880	.50	.200	.250	#8-32	1/4
CL-3-TDP-0.75-S			.75				
CL-3-TDP-1.00-S			1.00				
CL-3-TDP-1.25-S			1.25				
CL-3-TDP-1.50-S			1.50				
CL-3-TDP-1.75-S			1.75				
CL-3-TDP-2.00-S			2.00				
CL-4-TDP-0.50-S	1/4	.2480	.50	.280	.344	#10-32	1/4
CL-4-TDP-0.75-S			.75				
CL-4-TDP-1.00-S			1.00				
CL-4-TDP-1.25-S			1.25				
CL-4-TDP-1.50-S			1.50				
CL-4-TDP-1.75-S			1.75				
CL-4-TDP-2.00-S			2.00				
CL-4-TDP-2.50-S	2.50						
CL-4-TDP-3.00-S	3.00						
CL-5-TDP-0.75-S	5/16	.3105	.75	.360	.359	1/4-20	3/8
CL-5-TDP-1.00-S			1.00				
CL-5-TDP-1.25-S			1.25				
CL-5-TDP-1.50-S			1.50				
CL-5-TDP-1.75-S			1.75				
CL-5-TDP-2.00-S			2.00				
CL-5-TDP-2.50-S			2.50				
CL-5-TDP-3.00-S	3.00						
CL-6-TDP-0.75-S	3/8	.3730	.75	.430	.390	1/4-20	3/8
CL-6-TDP-1.00-S			1.00				
CL-6-TDP-1.25-S			1.25				
CL-6-TDP-1.50-S			1.50				
CL-6-TDP-1.75-S			1.75				
CL-6-TDP-2.00-S			2.00				
CL-6-TDP-2.50-S			2.50				
CL-6-TDP-3.00-S	3.00						
CL-6-TDP-3.50-S	3.50						
CL-6-TDP-4.00-S	4.00						
CL-8-TDP-1.00-S	1/2	.4980	1.00	.570	.516	3/8-16	1/2
CL-8-TDP-1.50-S			1.50				
CL-8-TDP-2.00-S			2.00				
CL-8-TDP-2.50-S			2.50				
CL-8-TDP-3.00-S			3.00				
CL-8-TDP-3.50-S			3.50				
CL-8-TDP-4.00-S			4.00				

**INFO+:** For a wide selection of knob handles to fit these Threaded Detent Pins, see pages 131-138.



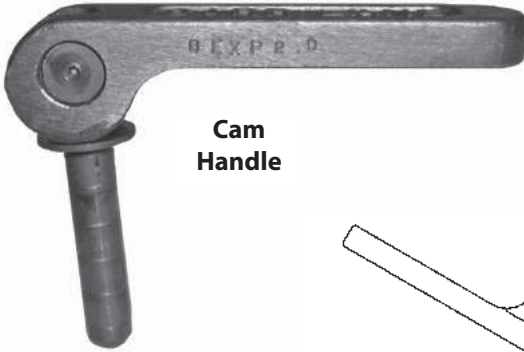
## METRIC

PART NO.	A DIA		GRIP LENGTH	B	C	D	F
	NOMINAL	ACTUAL					
CLM-6-TDP-15-S	6mm	.2342	15mm	.266	.344	M5	.24
CLM-6-TDP-20-S			20mm				
CLM-6-TDP-25-S			25mm				
CLM-6-TDP-30-S			30mm				
CLM-6-TDP-40-S			40mm				
CLM-6-TDP-50-S			50mm				
CLM-8-TDP-20-S	8mm	.3130	20mm	.363	.359	M6	.39
CLM-8-TDP-25-S			25mm				
CLM-8-TDP-30-S			30mm				
CLM-8-TDP-40-S			40mm				
CLM-8-TDP-50-S	50mm						
CLM-10-TDP-20-S	10mm	.3917	20mm	.451	.390	M8	.39
CLM-10-TDP-25-S			25mm				
CLM-10-TDP-30-S			30mm				
CLM-10-TDP-40-S			40mm				
CLM-10-TDP-50-S			50mm				

# EXPANDING PINS

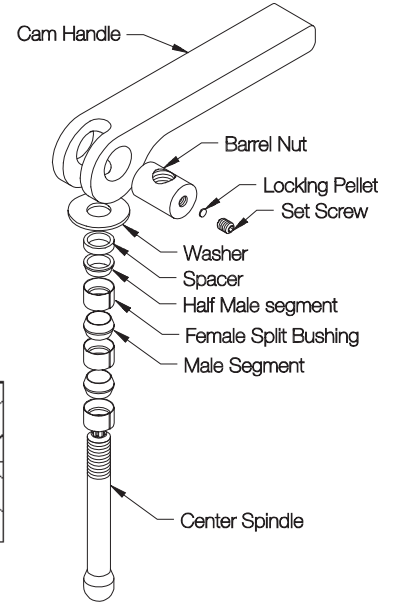
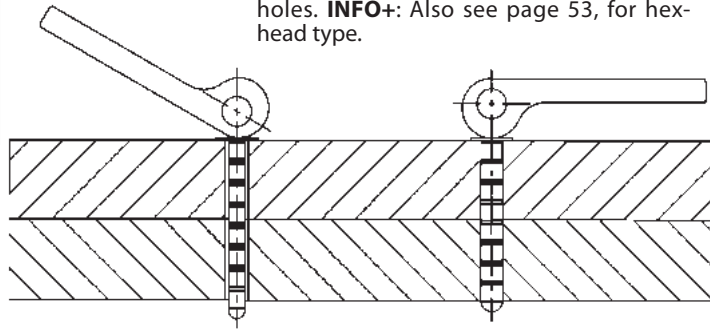
SPLIT BUSHINGS, MALE SEGMENTS, & SPACERS: 17-4PH STAINLESS STEEL, RC 40 MIN, PASSIVATED, DRY FILM LUBE  
 CENTER SPINDLE: 17-4PH STAINLESS STEEL, RC 36-40, PASSIVATED, DRY FILM LUBE  
 BARREL NUT & WASHER: 17-4PH STAINLESS STEEL, PASSIVATED, DRY FILM LUBE  
 HANDLE: ALUMINUM ALLOY, BLACK ANODIZED

1

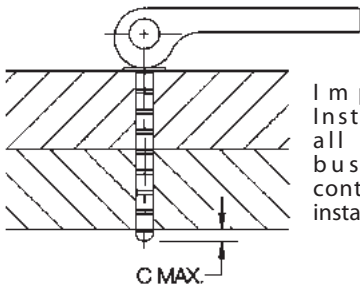


Cam Handle

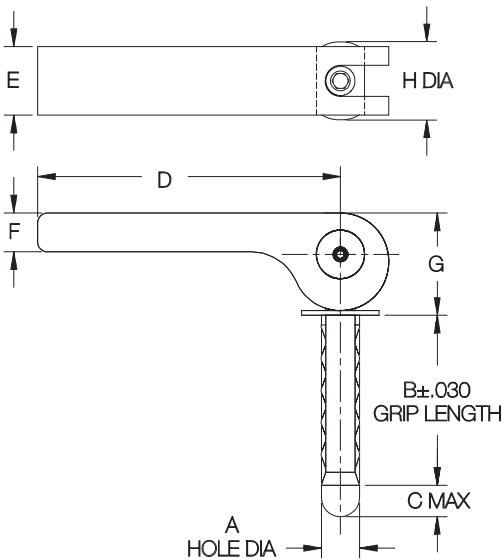
Precision alignment pin that expands up to .006 inches to tighten up hole clearance. The pin is an assembly of female split bushings separated by male segments, on a center spindle, that expands when drawn together. This assembly provides excellent shear strength, comparable to a solid pin. Diameters from 1/4 to 3/4" are available in several standard lengths. Pins can be installed in through holes or blind holes. **INFO+**: Also see page 53, for hex-head type.



Moving the cam handle expands pin diameter up to .006 inches, to take up slack and secure the pin in place. If additional adjustment is required, remove set screw and turn the cam handle.



**Important:** Install so that all expanding bushings are contained in the installation hole.



## CAM HANDLE

PART NO.	A DIA			B	C	D	E	F	G	H DIA	DOUBLE-SHEAR STRENGTH (LBS)*
	NOMINAL	MIN	MAX								
CL-4-EXP-0.50	1/4	.250	.254	.50	1/4	2-3/8	1/2	5/16	.81	5/8	4,000
CL-4-EXP-0.75				.75							
CL-4-EXP-1.00				1.00							
CL-4-EXP-1.50				1.50							
CL-4-EXP-2.00				2.00							
CL-4-EXP-3.00	3.00										
CL-5-EXP-1.00	5/16	.312	.317	1.00	5/16	2-3/8	1	1/2	1.12	1	6,300
CL-5-EXP-2.00				2.00							
CL-5-EXP-3.00				3.00							
CL-6-EXP-1.00	3/8	.375	.380	1.00	3/8	4-1/2	1	1/2	1.12	1	9,000
CL-6-EXP-1.50				1.50							
CL-6-EXP-2.00				2.00							
CL-6-EXP-3.00	3.00										
CL-8-EXP-0.50	1/2	.500	.505	.50	1/2	4-1/2	1	1/2	1.12	1	16,100
CL-8-EXP-1.00				1.00							
CL-8-EXP-1.50				1.50							
CL-8-EXP-2.00				2.00							
CL-8-EXP-3.00				3.00							
CL-10-EXP-1.00	5/8	.625	.630	1.00	5/8	4-1/2	1	1/2	1.31	1	25,100
CL-10-EXP-1.50				1.50							
CL-10-EXP-2.00				2.00							
CL-10-EXP-3.00				3.00							
CL-12-EXP-2.00	3/4	.750	.757	2.00	3/4	6	1-1/4	3/4	2.09	1-1/4	36,200
CL-12-EXP-3.00				3.00							
CL-12-EXP-4.00				4.00							

\* 2:1 Safety Factor

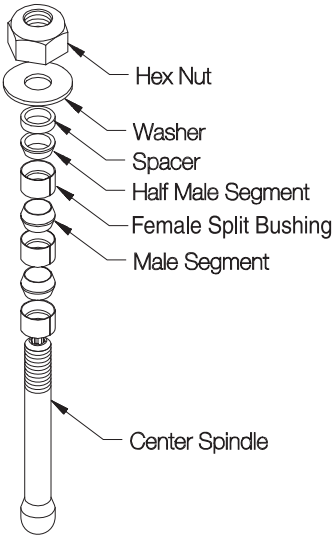
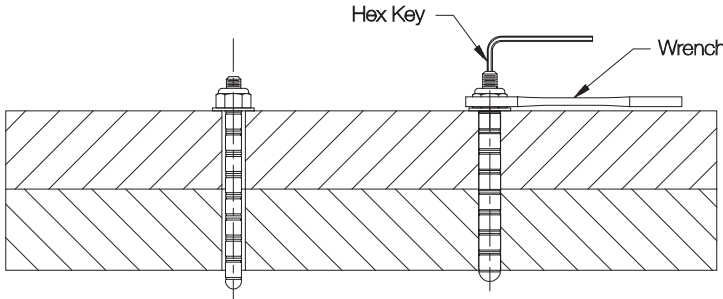
# EXPANDING PINS

SPLIT BUSHINGS, MALE SEGMENTS, & SPACERS: 17-4PH STAINLESS STEEL, RC 40 MIN, PASSIVATED, DRY FILM LUBE  
 CENTER SPINDLE: 17-4PH STAINLESS STEEL, RC 36-40, PASSIVATED, DRY FILM LUBE  
 WASHER: 17-4PH STAINLESS STEEL, PASSIVATED, DRY FILM LUBE  
 HEX NUT: 17-4PH STAINLESS STEEL, WITH LOCKING ELEMENT

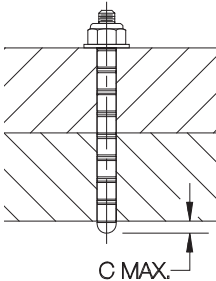


Hex Head

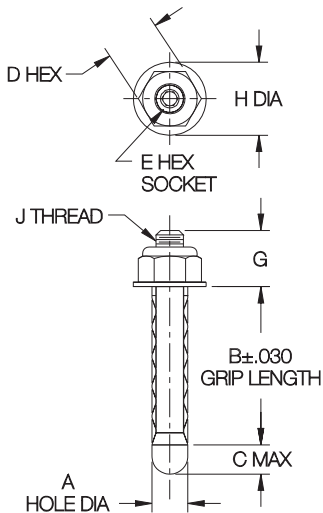
Precision alignment pin that expands up to .006 inches to tighten up hole clearance. The pin is an assembly of female split bushings separated by male segments, on a center spindle, that expands when drawn together. This assembly provides excellent shear strength, comparable to a solid pin. Diameters from 1/4 to 3/4" are available in several standard lengths. Pins can be installed in through holes or blind holes. **INFO+**: Also see page 52, for cam-handle type.



Tightening the hex nut with a wrench expands pin diameter up to .006 inches, to take up slack and secure the pin in place. Hold center spindle stationary with a hex key while tightening.



Important: Install pin so that all split bushings are contained in the installation hole.



### HEX HEAD

PART NO.	A DIA			B	C	D	E	G	H DIA	J	DOUBLE-SHEAR STRENGTH (LBS)*	INSTALLATION TORQUE (FT-LBS)
	NOMINAL	MIN	MAX									
CL-4-EXPH-0.50	1/4	.250	.254	.50	1/4	3/8	3/32	.39	.67	#10-32	4,000	3
CL-4-EXPH-0.75				.75								
CL-4-EXPH-1.00				1.00								
CL-4-EXPH-1.50				1.50								
CL-4-EXPH-2.00				2.00								
CL-4-EXPH-3.00	3.00											
CL-5-EXPH-1.00	5/16	.312	.317	1.00	5/16	3/8	3/32	.40	.67	#10-32	6,300	3
CL-5-EXPH-2.00				2.00								
CL-5-EXPH-3.00				3.00								
CL-6-EXPH-1.00	3/8	.375	.380	1.00	3/8	7/16	1/8	.49	.67	1/4-28	9,000	7.5
CL-6-EXPH-1.50				1.50								
CL-6-EXPH-2.00				2.00								
CL-6-EXPH-3.00	3.00											
CL-8-EXPH-0.50	1/2	.500	.505	.50	1/2	9/16	3/16	.71	.92	3/8-24	16,100	29
CL-8-EXPH-1.00				1.00								
CL-8-EXPH-1.50				1.50								
CL-8-EXPH-2.00				2.00								
CL-8-EXPH-3.00				3.00								
CL-10-EXPH-1.00	5/8	.625	.630	1.00	5/8	3/4	1/4	.90	1.22	1/2-20	25,100	83
CL-10-EXPH-1.50				1.50								
CL-10-EXPH-2.00				2.00								
CL-10-EXPH-3.00				3.00								
CL-12-EXPH-2.00	3/4	.750	.757	2.00	3/4	7/8	1/4	1.02	1.35	9/16-18	36,200	121
CL-12-EXPH-3.00				3.00								
CL-12-EXPH-4.00				4.00								

\* 2:1 Safety Factor

# CABLE ASSEMBLIES

INFO+: SEE PAGES 56-57 FOR MATERIAL SPECIFICATIONS

1

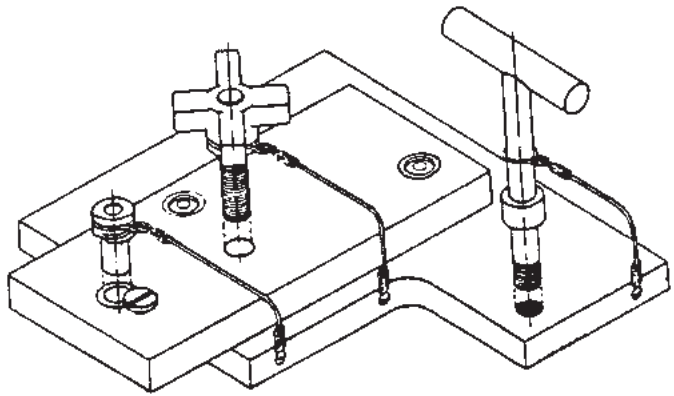


Cable Assemblies are ideal for attaching removable tooling components. High-strength stranded wire cable with a green nylon coating. These versatile attachment cables are available with various loops, Cable Rings, Terminals, and Cable Tabs (see page 55 for assembly drawings and example part numbers).

Cable Assemblies are available in four cable sizes, in steel or stainless steel (#1 cable is only available in stainless steel). Stainless Cable Assemblies with Cable Rings are furnished with stainless Cable Rings. Minimum assembly length is 3.0". Length tolerance is held to  $\pm 1/4"$  up to 24" long. **INFO+:** See page 56-57 for dimensions and specifications of Ferrules, Cable Rings, Terminals, and Cable Tabs. Note: These Cable Assemblies should not be used for lifting and other high-tension applications.

**INFO+:** To order Cable Assemblies with an uncrimped ferrule (for installation), add a suffix to the part number shown on page 55:

- L for uncrimped left end
- R for uncrimped right end
- LR for both ends uncrimped

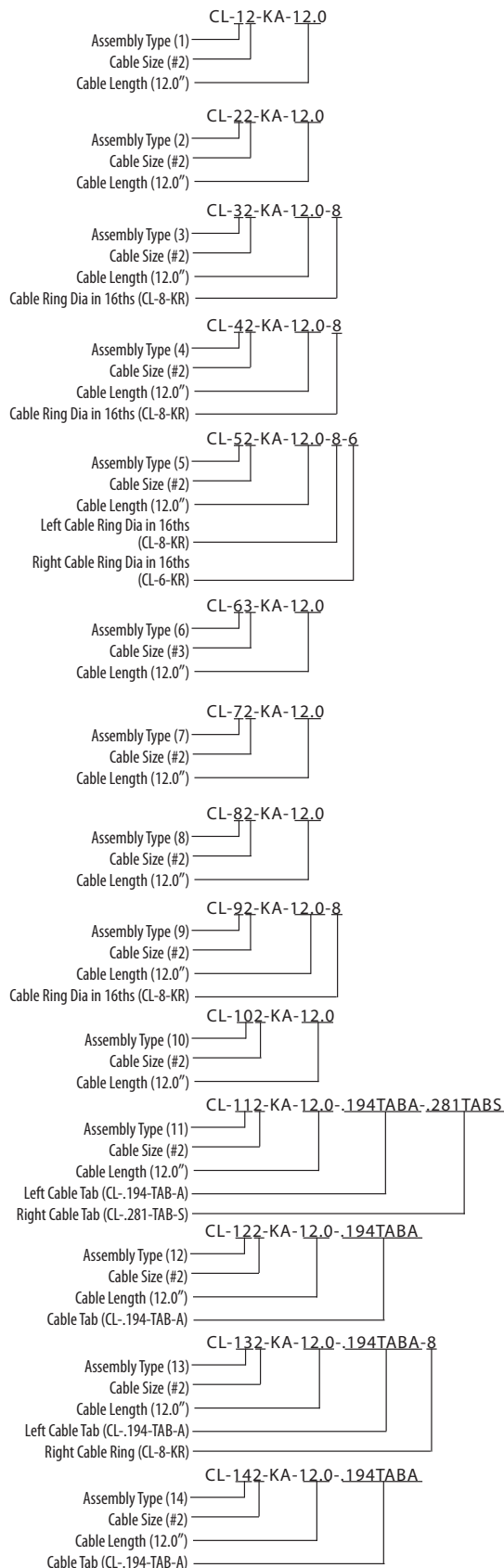
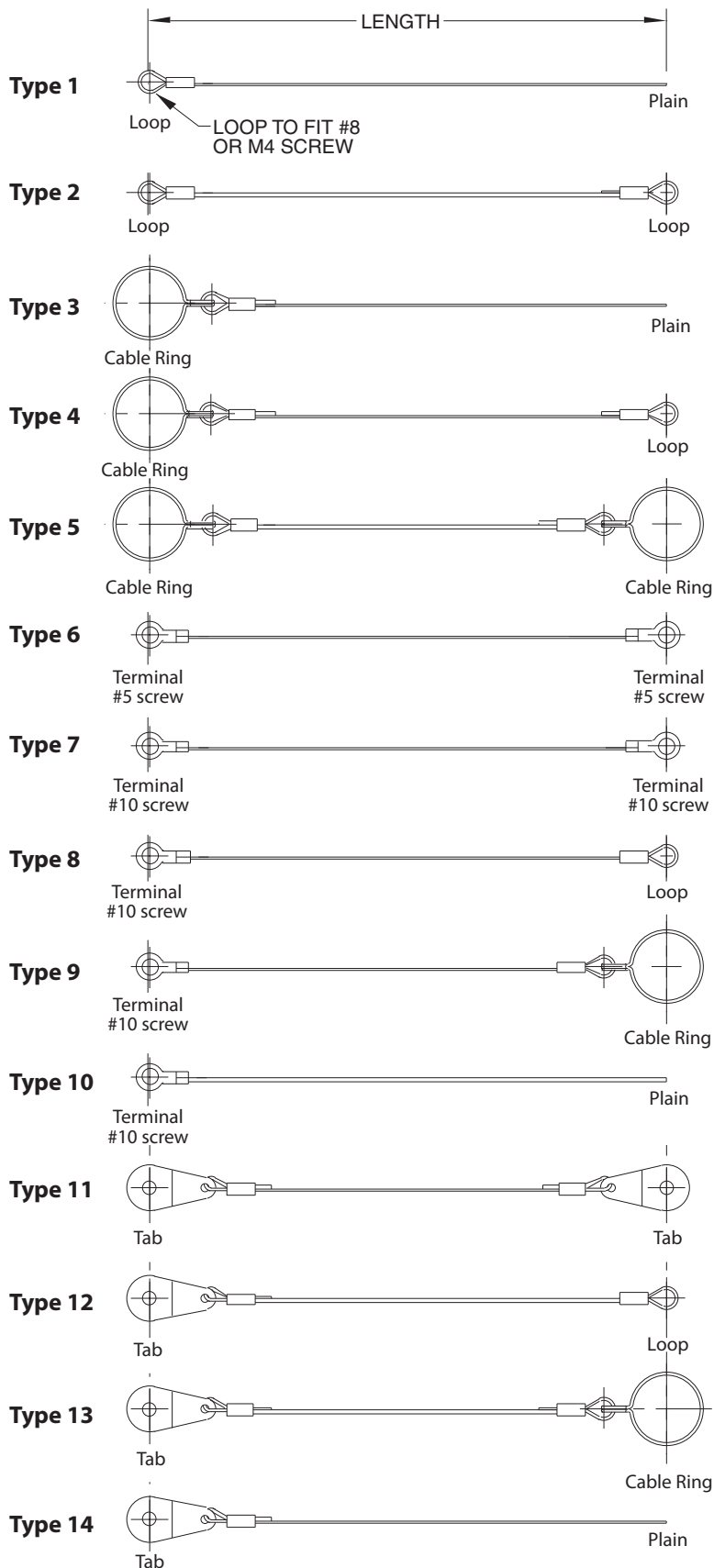


Cable Sizes

ASSEMBLY TYPE	LEFT END	RIGHT END	CABLE SIZES							
			1		2		3		4	
			STAINLESS	STEEL	STAINLESS	STEEL	STAINLESS	STEEL	STAINLESS	STEEL
1	LOOP	PLAIN	CL-11-KA	CL-12-KA	CL-12-SKA	CL-13-KA	CL-13-SKA	CL-14-KA	CL-14-SKA	
2	LOOP	LOOP	CL-21-KA	CL-22-KA	CL-22-SKA	CL-23-KA	CL-23-SKA	CL-24-KA	CL-24-SKA	
3	CABLE RING	PLAIN	CL-31-KA	CL-32-KA	CL-32-SKA	CL-33-KA	CL-33-SKA	--	--	
4	CABLE RING	LOOP	CL-41-KA	CL-42-KA	CL-42-SKA	CL-43-KA	CL-43-SKA	--	--	
5	CABLE RING	CABLE RING	CL-51-KA	CL-52-KA	CL-52-SKA	CL-53-KA	CL-53-SKA	--	--	
6	#5 TERMINAL	#5 TERMINAL	--	--	--	CL-63-KA	CL-63-SKA	--	--	
7	#10 TERMINAL	#10 TERMINAL	--	CL-72-KA	CL-72-SKA	CL-73-KA	CL-73-SKA	--	--	
8	#10 TERMINAL	LOOP	--	CL-82-KA	CL-82-SKA	--	--	--	--	
9	#10 TERMINAL	CABLE RING	--	CL-92-KA	CL-92-SKA	--	--	--	--	
10	#10 TERMINAL	PLAIN	--	CL-102-KA	CL-102-SKA	--	--	--	--	
11	TAB	TAB	CL-111-KA	CL-112-KA	CL-112-SKA	CL-113-KA	CL-113-SKA	--	--	
12	TAB	LOOP	CL-121-KA	CL-122-KA	CL-122-SKA	CL-123-KA	CL-123-SKA	--	--	
13	TAB	CABLE RING	CL-131-KA	CL-132-KA	CL-132-SKA	CL-133-KA	CL-133-SKA	--	--	
14	TAB	PLAIN	CL-141-KA	CL-142-KA	CL-142-SKA	CL-143-KA	CL-143-SKA	--	--	



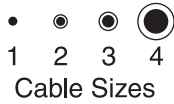
# CABLE ASSEMBLIES



# CABLE

GALVANIZED STEEL OR STAINLESS STEEL,  
 NYLON COATED (GREEN)

1



High-strength stranded wire cable with a green nylon coating. Choice of four cable diameters. Cable size 1 is made of stainless steel. Sizes 2, 3, and 4 are available in either galvanized steel or stainless steel. Cable is available in cut pieces (by the inch) or in bulk lengths 50 feet and above. Cut pieces are held to a  $\pm 1/4$ " length tolerance up to 24" long. Examples:

CL-2-C-12.0 (Cut piece, #2 cable, 12" long)



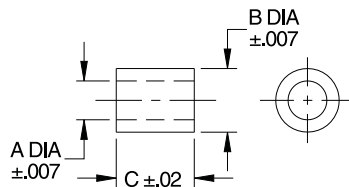
CABLE SIZE	MATERIAL	PART NO.	LENGTH	D DIA		CONSTRUCTION	BREAKING STRENGTH (LBS)
				COATED	WIRE		
1	STAINLESS STEEL	CL-1-C-50FT	50 Feet	.044	.024	1x7	80
		CL-1-C-100FT	100 Feet				
		CL-1-C-250FT	250 Feet				
		CL-1-C-500FT	500 Feet				
2	STEEL	CL-2-C-50FT	50 Feet	.062	.047	7x7	270
		CL-2-C-100FT	100 Feet				
		CL-2-C-250FT	250 Feet				
		CL-2-C-500FT	500 Feet				
	STAINLESS STEEL	CL-2-SC-50FT	50 Feet				
		CL-2-SC-100FT	100 Feet				
		CL-2-SC-250FT	250 Feet				
		CL-2-SC-500FT	500 Feet				
3	STEEL	CL-3-C-50FT	50 Feet	.094	.062	7x7	480
		CL-3-C-100FT	100 Feet				
		CL-3-C-250FT	250 Feet				
		CL-3-C-500FT	500 Feet				
	STAINLESS STEEL	CL-3-SC-50FT	50 Feet				
		CL-3-SC-100FT	100 Feet				
		CL-3-SC-250FT	250 Feet				
		CL-3-SC-500FT	500 Feet				
4	STEEL	CL-4-C-50FT	50 Feet	.187	.125	7x19	800
		CL-4-C-100FT	100 Feet				
		CL-4-C-250FT	250 Feet				
		CL-4-C-500FT	500 Feet				
	STAINLESS STEEL	CL-4-SC-50FT	50 Feet				
		CL-4-SC-100FT	100 Feet				
		CL-4-SC-250FT	250 Feet				
		CL-4-SC-500FT	500 Feet				

# FERRULES

COPPER, ELECTRO TIN PLATED



Ferrules are for crimping on our nylon-coated cable to make a loop. Ferrules may be slightly elliptical (precrimped) at our option. Available for all four standard cable sizes. Extra-long ferrules are available for #2 and #3 cable, to allow double crimping.



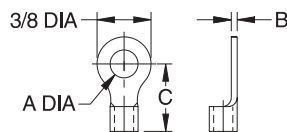
PART NO.	FITS CABLE	A	B	C
CL-1-F	SIZE 1	.094	.154	.315
CL-2-F	SIZE 2	.138	.213	.335
CL-4-F				.591
CL-3-F	SIZE 3	.185	.276	.374
CL-5-F	SIZE 4	.378	.520	.827
CL-6-F				1.260

# TERMINALS

COPPER, ELECTRO TIN PLATED



Terminals are for crimping on our nylon-coated cable, to allow attaching the end with a screw. Available for #2 and #3 cable.



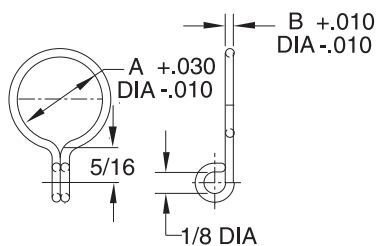
PART NO.	FITS CABLE	A		B	C
		A DIA	SCREW SIZE		
CL-.194-TERM-2	SIZE 2	.21	#10 (or M5)	.03	15/32
CL-.129-TERM	SIZE 3	.13	#5 (or M3)	.04	19/32
CL-.194-TERM		.21	#10 (or M5)	.04	

# CABLE RINGS

SPRING STEEL WIRE, BLACK OXIDE FINISH



Cable Rings allow attaching Cable Assemblies to a diameter or radial groove. Can be used with cable sizes #1, #2, and #3. Available in steel or stainless steel.



PART NO. STEEL	PART NO. STAINLESS	A DIA	B WIRE DIA	
			STEEL	STAINLESS
CL-2-KR	CL-2-SKR	1/8 (also 3mm)	.045	.062
CL-3-KR	CL-3-SKR	3/16 (also 4&5mm)		
CL-4-KR	CL-4-SKR	1/4 (also 6&7mm)		
CL-5-KR	CL-5-SKR	5/16 (also 8mm)		
CL-6-KR	CL-6-SKR	3/8 (also 9&10mm)		
CL-7-KR	CL-7-SKR	7/16 (also 11mm)		
CL-8-KR	CL-8-SKR	1/2 (also 12&13mm)		
CL-9-KR	CL-9-SKR	9/16 (also 14&15mm)		
CL-10-KR	CL-10-SKR	5/8 (also 16mm)		
CL-11-KR	CL-11-SKR	11/16 (also 17&18mm)		
CL-12-KR	CL-12-SKR	3/4 (also 19&20mm)		
CL-13-KR	CL-13-SKR	13/16 (also 21mm)		
CL-14-KR	CL-14-SKR	7/8 (also 22 or 23mm)		
CL-15-KR	CL-15-SKR	15/16 (also 24mm)		
CL-16-KR	CL-16-SKR	1 (also 25&26mm)		
CL-17-KR	CL-17-SKR	1-1/16 (also 27mm)		
CL-18-KR	CL-18-SKR	1-1/8 (also 28&29mm)		
CL-19-KR	CL-19-SKR	1-3/16 (also 30&31mm)		
CL-20-KR	CL-20-SKR	1-1/4 (also 32mm)		
CL-21-KR	CL-21-SKR	1-5/16 (also 33&34mm)		
CL-22-KR	CL-22-SKR	1-3/8 (also 35 mm)		
CL-23-KR	CL-23-SKR	1-7/16 (also 36&37mm)		
CL-24-KR	CL-24-SKR	1-1/2 (also 38mm)		

# CABLE TABS

ALUMINUM: 6061 ALUMINUM ALLOY, CLEAR ANODIZED. STAINLESS: 300-SERIES STAINLESS STEEL, PASSIVATED

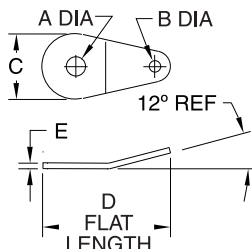


Teardrop



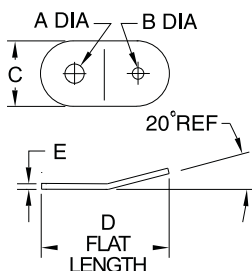
Rectangular

Cable Tabs attach to our nylon-coated cable, to allow attaching the end with a screw. Can be used with cable sizes #1, #2, and #3. Available in two shapes, teardrop and rectangular. Available in aluminum and stainless steel.



## TEARDROP

PART NO. ALUMINUM	PART NO. STAINLESS STEEL	FITS CABLE	A		B DIA	C	D	E
			DIA	SCREW SIZE				
CL-.129-TAB-A	CL-.129-TAB-S	SIZES 1 TO 3	.13	#5 (or M3)	.13	.69	1.31	.06
CL-.194-TAB-A	CL-.194-TAB-S		.20	#10 (or M4)				
CL-.281-TAB-A	CL-.281-TAB-S		.28	1/4 (or M6)				

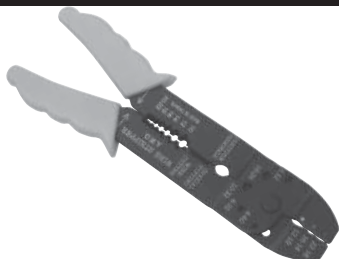


## RECTANGULAR

PART NO. ALUMINUM	PART NO. STAINLESS STEEL	FITS CABLE	A		B DIA	C	D	E
			DIA	SCREW SIZE				
CL-.129-TABR-2-A	CL-.129-TABR-2-S	SIZES 1 TO 2	.13	#5 (or M3)	.09	1/2	1.14	.06
CL-.194-TABR-2-A	CL-.194-TABR-2-S		.20	#10 (or M4)				
CL-.281-TABR-2-A	CL-.281-TABR-2-S		.28	1/4 (or M6)				
CL-.194-TABR-3-A	CL-.194-TABR-3-S	SIZES 1 TO 3	.20	#10 (or M4)	.19	1/2	1.14	.06
CL-.281-TABR-3-A	CL-.281-TABR-3-S		.28	1/4 (or M6)				

# CRIMPING TOOLS

STEEL WITH PLASTIC HANDGRIPS



Plier tool for manually crimping ferrules on our nylon-coated cable. Crimps ferrules on either #1 or #2 cable. Heavier cable sizes require power crimping and should be ordered finish-crimped from the factory whenever possible.

PART NO.	FOR CABLE	FOR FERRULES
CL-1-CT	SIZE 1	CL-1-F
	SIZE 2	CL-2-F CL-4-F

# NYLON LANYARDS

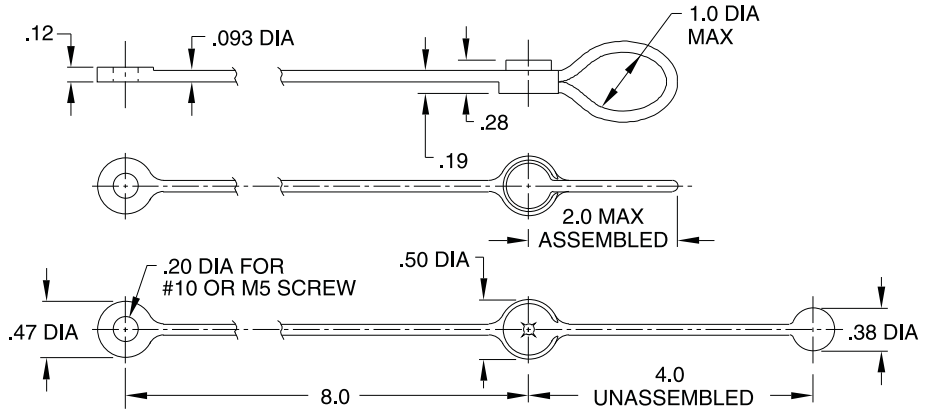
ZYTEL<sup>®</sup> HIGH-STRENGTH NYLON, BLACK

1



High-strength nylon lanyard with one eyelet end and one loop end. The eyelet end can be fastened with a screw. The loop end is supplied open – simply snap together to create a permanent assembly. Snap assembly allows on-site attachment without a crimping tool. These economical lanyards are ideal for applications where the attached item is occasionally removed, by cutting the lanyard, and replaced.

Available in one length (10" assembled). Eyelet accepts a #10 or M5 screw. A minimum pass-through diameter of 3/8" is required for attachment. Made in USA.



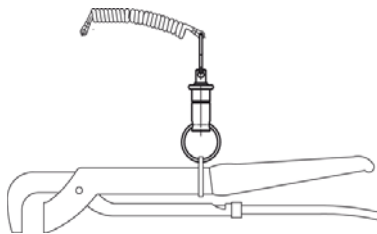
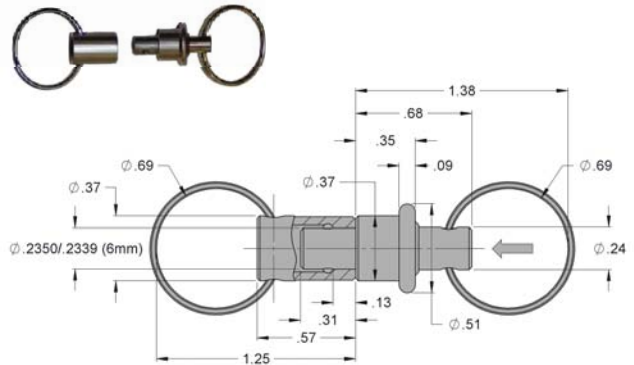
PART NO.	LANYARD DIA	LENGTH (ASSEMBLED)	EYELET	
			ID	FOR SCREW
CL-1-NL-10	.093	10	.20	#10 OR M5

# BALL LOCK COUPLING RINGS

PIN AND RECEIVER: 303 STAINLESS STEEL  
RINGS, SPRING, AND BALLS: STAINLESS STEEL



This tiny quick-release coupling assembly incorporates a rugged, high-quality Ball Lock Pin mechanism. Allows quick, reliable connection and disconnection of items attached to a cable assembly. Simply press the button to release. One half of the coupling ring is essentially a small Ball Lock Pin with a split ring through the push button; the other half is a mating receiver, also with a split ring through it. The coupling is positive locking until released by pushing the button, which moves the center spindle forward to allow the locking balls to retract. Made of 300-series stainless steel for excellent corrosion resistance. Note: photo at left is show actual size.



PART NO.	PIN DIA	RATED LOAD CAPACITY (LBS)	MAXIMUM OPERATING TEMPERATURE
CLM-6-BLCR-S	6MM	7	480°F

# SWIVEL HOIST RINGS

## AVAILABLE EXCLUSIVELY ONLINE AT [WWW.CARRLANE.COM](http://WWW.CARRLANE.COM)

The following hoist ring selections may be found online in the product catalog at [carrlane.com](http://carrlane.com)



### FORGED ROAD-PLATE SWIVEL HOIST RINGS\*

These hoist rings have a shorter, larger-diameter bolt, ideal for lifting heavy plates. Patent no. 4,570,987, no. 4,641,986, no. 5,405,210 and others pending.



### FORGED BAR-TITE™ SWIVEL HOIST RINGS\*

These hoist rings have a steel bar knob for tightening with a level bar instead of a wrench. Patent no. 4,570,987, no. 4,641,986, no. 5,405,210 and others pending.



### FORGED SPIN-N-LOK™ SWIVEL HOIST RINGS\*

These hoist rings have a spoked lug nut for tightening without a wrench. Patent no. 4,570,987, 4,641,986, 5,405,210 and other patents pending.



### FORGED WELD-MOUNT SWIVEL HOIST RINGS\*

These hoist rings mounted by welding. Patent no. 4,570,987, no. 4,641,986, no. 5,405,210 and others pending.



### FORGED HEAVY-DUTY SWIVEL HOIST RINGS\*

The next generation of Swivel Hoist Rings, with a heavy-duty forged steel ring. Pivots 180 degrees and swivels 360 degrees simultaneously to allow lifing from any direction. Patent no. 4,570,987, no. 4,641,986, no. 5,405,210 and others pending.



### FORGED SWIVEL LIFT PLATES

These swivel hoist rings have a center through-hole instead of a bolt, for mounting with a custom anchoring system. Patent no. 4,570,987, no. 4,641,986, no. 5,405,210 and others pending.



### SHACKLE HOIST RINGS\*

These swivel hoist rings are designed for permanent mounting on tooling and equipment. Forged alloy-steel shackle pivots 180 degrees and swivels 360 degrees simultaneously to allow lifting from any direction. Patent no. 5,823,588.



### FAST-LOK™ PLATE LIFTING SYSTEM

Plate-lifting system with a weld-on base and totally removable shackle assembly, allowing the plate surface to remain totally free of obstructions. Patent pending. FEATURES: Fast-Lok™ Clevis, Fast-Lok™ Base, Forged Anchor Shackle, Fast-Lok™ Detent Pin.



### SCISSOR-LOK™ PLATE LIFTING SYSTEM

Plate-lifting system with a weld-on base and totally removable shackle assembly, allowing the plate surface to remain total free of obstructions. Patent pending, FEATURES: Scissor-Lok™ Tool, Fast-Lok™ Base, Forged Anchor Shackle, and Fast-Lok™ Detent Pin.



### HEAVY-DUTY LIFTING EYES

These lifting eyes have a short, large-diameter thread, making them ideal for lifting heavy plates. Designed for straight vertical lifting only. High-tensile alloy steel. Patent pending.



### UNIVERSAL LIFTING RINGS

Removable hoist rings with a forged alloy-steel shackle. Each Universal Lifting Ring fits three different thread sizes. Designed for straight vertical lifting only. Patent no. 4,557,513.

### HOIST RING ACCESSORIES — AVAILABLE EXCLUSIVELY ONLINE:



WELD-IN THREADED INSERTS



RENEWAL ROAD PLATES ROUND



RENEWAL ROAD PLATES SQUARE

\*Forged alloy-steel shackle pivots 180 degrees and swivels 360 degrees simultaneously to allow lifting from any direction.

# SWIVEL HOIST RINGS

2

## SELECTION CHART:

CAPACITY	SWIVEL			SIDE-PULL	PIVOTING	LIFTING EYES
	STEEL	STAINLESS	NICKEL			
< 500 LBS	X	X				X
500-1,000 LBS.	X		X	X		X
1,000-2,500 LBS.	X	X	X	X	X	X
2,500-5,000 LBS.	X	X	X	X	X	X
5,000-7,500 LBS.	X	X		X	X	X
7,500-10,000 LBS.	X	X		X	X	X
10,000-25,000 LBS.	X	X		X	X	X
>25,000 LBS.	X	X		X		

## HOIST RING SAFETY PRECAUTIONS

**INFO+:** The following safety precautions apply to all lifting devices on pages 62-75 and page 46. Also see these individual pages for additional precautions and installation guidelines.

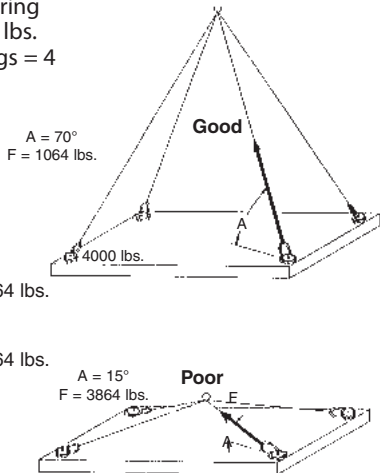
1. **IMPORTANT!** The load on each hoist ring is not simply total weight divided by the number of hoist rings. The resultant force can be significantly greater at shallow lift angles and with unevenly distributed loads. See the example below:

F = Force on each hoist ring  
 W = Total weight = 4000 lbs.  
 N = Number of hoist rings = 4  
 A = Lifting angle

$$F = \frac{W}{N \sin A}$$

If A = 70°,  $F = \frac{4000}{4 \sin 70^\circ} = 1064 \text{ lbs.}$

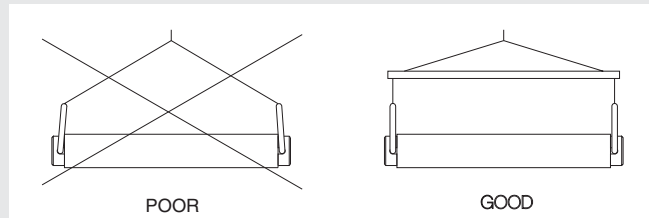
If A = 15°,  $F = \frac{4000}{4 \sin 15^\circ} = 3864 \text{ lbs.}$



2. Despite the 5:1 safety factor on hoist rings, never exceed the rated load capacity. This safety margin is needed in case of misuse, which could drastically lower load capacity.

3. Tensile strength of parent material should be above 80,000 psi to achieve full load rating. For weaker material, consider through-hole mounting with a nut and washer on the other side.

4. Do not allow hoist rings to bind. Use a spreader bar, if necessary, to avoid binding.



5. Do not use spacers between the hoist ring and the mounting surface.

6. Mounting surface must be flat and smooth for full contact under hoist ring. Tapped mounting holes must be perpendicular to the mounting surface.

7. Tighten mounting screws to the torque recommended. Periodically check torque because screws could loosen in extended service. For hoist rings not furnished with screws, mount using only high-quality socket-head cap screws.

8. Never lift with a hook or other device that could deform the lifting ring. **INFO+:** Do not use cable assemblies on pages 54-55 for lifting.

9. Do not apply shock loads. Always lift gradually. Repeat magnaflux testing if shock loading ever occurs.

10. After installation, check that ring rotates and pivots freely in all directions.

# SWIVEL HOIST RINGS

## TYPES

2



### SWIVEL HOIST RINGS

The original, patented safety-engineered Hoist Ring, and the only one that has a production sample destructively pull tested to guarantee each production run meets or exceeds the 5:1 safety factor. Pivots 180 degrees and swivels 360 degrees simultaneously to allow lifting from any direction. Black oxide finish is standard, with cadmium plating available as a special. Also available in 300-series stainless steel, with a load rating equal to 50% of the steel version. Heavy duty versions are available in capacities up to 250,000 lbs. Some varieties available electroless nickel plated, for a less-hazardous corrosion-resistant finish. Made in USA. **INFO+**: Pages 60-69.



### PIVOTING HOIST RINGS

An economical lifting device ideal for permanent installation. Also has a low profile and high load capacity. Forged base and solid-loop forged ring. Pivots a full 180 degrees, but does not rotate. Safety factor = 5:1. Made in USA. **INFO+**: Page 73.



### SIDE-PULL HOIST RINGS

Required for side mounting. Flip and turn loads without unhooking (use with a spreader bar). Forged alloy-steel ring pivots 180 degrees and swivels 360 degrees simultaneously to allow lifting from any direction. Large, weldless forged ring can accommodate larger lifting hooks. Meets OSHA standards and military specifications MIL-STD-209J and MIL-STD-1365(11). Safety factor = 5:1. Made in USA. **INFO+**: Pages 71-72.



### LIFTING EYES

Forged steel eyebolts with an integral shoulder for greater strength. These simple, economical products are suitable for vertical lifting in-line with the threaded bolt, such as when lifting from a single point or from two points with a spreader bar. For lifting at an angle, Swivel Hoist Rings should be used instead. Manufactured and tested according to ASTM A489 and ANSI B18.15 specifications. Safety factor = 5:1. Made in USA. **INFO+**: Page 74.

## MATERIALS

### STEEL

Alloy steel, heat treated, black oxide finish (cadmium plating available as a special). Every production lot of swivel Hoist Rings is subjected to testing, including the industry's most rigorous pull testing. We destructively pull test every production lot to ensure that they meet or exceed our 5:1 safety factor.

### STAINLESS STEEL

The stainless steel version of our original, patented safety-engineered hoist ring comes with a load rating equal to 50% of the steel version. Useful for corrosive, cryogenic, or elevated-temperature environments.

### NICKEL-PLATED STEEL

Alloy-steel Swivel Hoist Rings are available with electroless nickel plating. This optional finish offers excellent corrosion and wear resistance while still providing the full load capacity of our heat-treated alloy-steel hoist rings.

*All hoist rings are made in the USA, and available DFARS and RoHS compliant.*

# SWIVEL HOIST RINGS

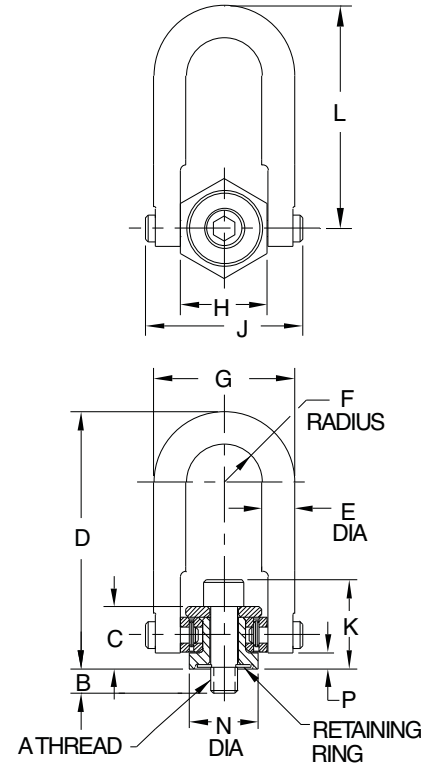
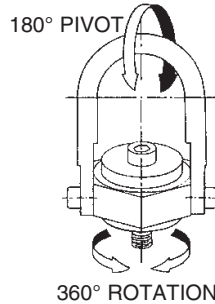
ALLOY STEEL, HEAT TREATED, BLACK OXIDE FINISH, 100% MAGNAFLUX INSPECTED

2



The original safety-engineered hoist ring. Pivots 180 degrees and swivels 360 degrees simultaneously to allow lifting from any direction. Safety factor = 5:1. Black oxide finish is standard, with cadmium plating available as a special (add -C to part number). Swivel Hoist Rings are also available in 300-series stainless steel, with a load rating equal to 50% of the steel version (**INFO+** see pages 64-65). Patent no. 3,297,293, 4,705,422, and 5,848,815.

Fasten hoist rings using the installation torque specified in the dimension table. Always install so that the hoist ring can pivot and swivel freely. Some hoist rings are available with a choice of bolt lengths. Use the shortest bolt length only for steel plates, the other lengths for weaker materials and for through-hole mounting with a washer and nut. **INFO+**: See general Hoist Ring Safety Precautions on page 60.



## STANDARD RING (INCH)

PART NO.	LOAD RATING (LBS)	A	B	C	D	E DIA	F	G	H	J	K	L	N DIA	P	INSTALLATION TORQUE (FT-LBS)	REPLACEMENT BOLT (WITH RETAINING RING)	
CL-550-SHR-2	550	1/4-20	.54	.71	2.67	3/8	.43	1.61	1.00	1.84	.96	2.31	.75	.17	5	—	
CL-800-SHR-1	800	5/16-18	.29	.72	2.63	3/8	.44	1.62	1.00	1.82	1.03	2.35	.75	.17	7	CL-800-SHRB-1	
CL-800-SHR-2			.54													CL-800-SHRB-2	
CL-1000-SHR-1	1000	3/8-16	.54	.72	2.63	3/8	.44	1.62	1.00	1.82	1.09	2.35	.75	.17	12	CL-1000-SHRB-1	
CL-23301-SHR	2500	1/2-13	1.07	.93	3.77	1/2	.70	2.40	1.49	2.58	1.43	3.31	1.25	.20	28	CL-23318-SHRB-1	
CL-2500-SHR-1	2500	1/2-13	.77	1.23	4.77	3/4	.88	3.25	2.00	3.52	1.73	4.24	1.50	.16	28	CL-2500-SHRB-1	
CL-2500-SHR-2			1.02													CL-2500-SHRB-2	
CL-2500-SHR-3			1.27													CL-2500-SHRB-3	
CL-4000-SHR-1			.77													CL-4000-SHRB-1	
CL-4000-SHR-2	4000	5/8-11	1.02	1.23	4.77	3/4	.88	3.25	2.00	3.52	1.86	4.24	1.50	.16	60	CL-4000-SHRB-2	
CL-4000-SHR-3			1.27													CL-4000-SHRB-3	
CL-5000-SHR-1			.77													CL-5000-SHRB-1	
CL-5000-SHR-2	5000	3/4-10	1.02	1.23	4.77	3/4	.88	3.25	2.00	3.52	1.98	4.24	1.50	.16	100	CL-5000-SHRB-2	
CL-7000-SHR-1			1.52													CL-7000-SHRB-1	
CL-7000-SHR-2	7000	3/4-10	1.03	1.72	6.55	1-1/16	1.40	4.94	3.00	5.06	2.47	5.80	2.37	.24	100	CL-7000-SHRB-2	
CL-8000-SHR-1			1.53													CL-8000-SHRB-1	
CL-8000-SHR-2	8000	7/8-9	1.03	1.72	6.55	1-1/16	1.40	4.94	3.00	5.06	2.60	5.80	2.37	.24	160	CL-8000-SHRB-2	
CL-10000-SHR-1			1.53													CL-10000-SHRB-1	
CL-10000-SHR-2	10000	1"-8	1.28	1.72	6.55	1-1/16	1.40	4.94	3.00	5.06	2.72	5.80	2.37	.24	230	CL-10000-SHRB-2	
CL-10000-SHR-3			1.53													CL-10000-SHRB-3	
CL-15000-SHR-1			2.28													CL-15000-SHRB-1	
CL-15000-SHR-1	15000	1-1/4"-7	1.89	2.11	8.73	1-1/4	1.75	6.00	3.76	6.50	3.36	7.75	3.20	.35	470	CL-15000-SHRB-1	
CL-24000-SHR-1	24000	1-1/2"-6	2.70	2.81	12.47	1-3/4	2.25	8.00	4.87	8.55	4.36	11.12	4.20	.47	800	CL-24000-SHRB-1	
CL-30000-SHR-1	30000	2"-4-1/2	2.96	2.81	12.47	1-3/4	2.25	8.00	4.87	8.55	5.36	11.12	4.20	.47	1100	—	
CL-23503-SHR	50000	2-1/2"-4	4.00	4.09	16.87	2-1/4	3.00	10.50	6.52	11.67	6.59	14.50	5.75	1.12	2100	—	
CL-23501-SHR																2-1/2"-8	—
CL-23600-SHR																75000	3"-4
CL-23701-SHR	100000	3-1/2"-4	7.00	7.00	22.09	3-1/4	4.00	14.50	8.60	15.90	9.56	19.25	7.75	1.09	6600	—	



# SWIVEL HOIST RINGS

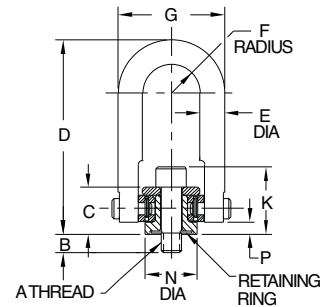
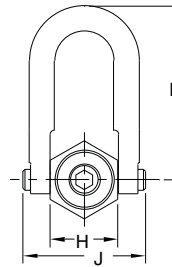
## STANDARD RING (METRIC)

PART NO.	LOAD RATING (LBS)	A	B	C	D	E DIA	F	G	H	J	K	L	N DIA	P	INSTALLATION TORQUE (FT-LBS)	REPLACEMENT BOLT WITH (RETAINING RING)
CLM-800-SHR-2	880	M8	.66	.72	2.63	3/8	.44	1.62	1.00	1.82	1.02	2.35	.75	.17	7	CLM-800-SHRB-2
CLM-1000-SHR-1	1000	M10	.66	.72	2.63	3/8	.44	1.62	1.00	1.82	1.10	2.35	.75	.17	12	CLM-1000-SHRB-1
CLM-2500-SHR-1	2300	M12	.74	1.23	4.77	3/4	.88	3.25	2.00	3.52	1.70	4.24	1.50	.16	27	CLM-2500-SHRB-1
CLM-4000-SHR-2	4000	M16	1.13	1.23	4.77	3/4	.88	3.25	2.00	3.52	1.86	4.24	1.50	.16	59	CLM-4000-SHRB-2
CLM-24020-SHR	4800	M20	1.18	1.23	4.77	3/4	.88	3.25	2.00	3.52	2.01	4.25	1.50	.16	100	CLM-24220-SHRB
CLM-7000-SHR-2	6600	M20	1.26	1.72	6.55	1-1/16	1.40	4.94	3.00	5.06	2.51	5.80	2.31	.24	100	CLM-7000-SHRB-2
CLM-9000-SHR-2	9200	M24	1.46	1.72	6.55	1-1/16	1.40	4.94	3.00	5.06	2.66	5.80	2.31	.24	159	CLM-9000-SHRB-2
CLM-10000-SHR-1	10000	M30	2.12	1.71	6.52	1	1.40	4.80	3.00	5.14	2.72	5.80	2.31	.24	230	CLM-24230-SHRB
CLM-15000-SHR-1	15000	M30	1.81	2.11	8.73	1-1/4	1.75	6.00	3.76	6.50	3.36	7.75	3.20	.35	470	CLM-24421-SHRB
CLM-24042-SHR			CLM-24433-SHRB													
CLM-24000-SHR-1	24000	M36	2.72	2.81	12.47	1-3/4	2.25	8.00	4.87	8.55	4.36	11.12	4.20	.47	800	CLM-24223-SHRB
CLM-27000-SHR-1	27000	M42	3.11	2.81	12.47	1-3/4	2.25	8.00	4.87	8.55	4.86	11.12	4.20	.47	800	CLM-24230-SHRB
CLM-30000-SHR-1	30000	M48	3.11	2.81	12.47	1-3/4	2.25	8.00	4.87	8.55	5.36	11.12	4.20	.47	800	CLM-24225-SHRB
CLM-24060-SHR	48000	M64	4.02	4.09	16.87	2-1/4	3.00	10.50	6.52	11.67	6.61	14.50	5.75	1.12	2100	CLM-24527-SHRB
CLM-24062-SHR	69000	M72	5.20	5.27	19.50	2-3/4	3.75	13.00	8.10	14.50	8.27	17.00	7.25	1.00	4200	CLM-24627-SHRB
CLM-24064-SHR	110000	M90	7.01	6.06	22.09	3-1/4	4.00	14.50	8.60	15.90	9.56	19.25	7.75	1.09	7100	CLM-24727-SHRB



Optional Long-Ring Version

Long-ring version provides extra reach and allows using larger lifting hooks.



## LONG RING (INCH)

PART NO.	LOAD RATING (LBS)	A	B	C	D	E DIA	F	G	H	J	K	L	N DIA	P	INSTALLATION TORQUE (FT-LBS)	REPLACEMENT BOLT WITH (RETAINING RING)
CL-23322-SHR	2500	1/2-13	.78	1.22	6.72	3/4	.88	3.25	1.99	3.52	1.72	6.19	1.50	.16	28	CL-23024-SHRB
CL-23323-SHR			1.03													CL-23025-SHRB
CL-23324-SHR			1.28													CL-23026-SHRB
CL-23320-SHR	4000	5/8-11	1.03	1.22	6.72	3/4	.88	3.25	1.99	3.52	1.85	6.19	1.50	.16	60	CL-23022-SHRB
CL-23321-SHR			1.28													CL-23023-SHRB
CL-23325-SHR	5000	3/4-10	1.03	1.22	6.72	3/4	.88	3.25	1.99	3.52	1.97	6.19	1.50	.16	100	CL-23027-SHRB
CL-23327-SHR			1.53													CL-23029-SHRB
CL-23329-SHR	7000	3/4-10	1.04	1.71	8.11	1	1.40	4.80	3.00	5.14	2.46	7.38	2.37	.24	100	CL-23122-SHRB
CL-23330-SHR			1.54													CL-23123-SHRB
CL-23328-SHR	8000	7/8-9	1.04	1.71	8.11	1	1.40	4.80	3.00	5.14	2.59	7.38	2.37	.24	160	CL-23121-SHRB
CL-23331-SHR	10000	1"-8	1.29	1.71	8.11	1	1.40	4.80	3.00	5.14	2.71	7.38	2.37	.24	230	CL-23125-SHRB
CL-23332-SHR			1.54													CL-23126-SHRB
CL-23333-SHR			2.29													CL-23127-SHRB

## LONG RING (METRIC)

CLM-24014-SHR	2300	M12	.75	1.22	6.72	3/4	.88	3.25	1.99	3.52	1.69	6.19	1.50	.16	27	CLM-24212-SHRB
CLM-24018-SHR	4000	M16	.94	1.22	6.72	3/4	.88	3.25	1.99	3.52	1.85	6.19	1.50	.16	59	CLM-24216-SHRB
CLM-24021-SHR	4800	M20	1.18	1.22	6.72	3/4	.88	3.25	1.99	3.52	2.01	6.19	1.50	.16	100	CLM-24220-SHRB
CLM-24023-SHR	6600	M20	1.14	1.71	8.11	1	1.40	4.80	3.00	5.14	2.50	7.38	2.37	.24	100	CLM-24222-SHRB
CLM-24026-SHR	9200	M24	1.34	1.71	8.11	1	1.40	4.80	3.00	5.14	2.65	7.38	2.37	.24	230	CLM-24224-SHRB
CLM-24032-SHR	10000	M30	2.13	1.71	8.11	1	1.40	4.80	3.00	5.14	2.89	7.38	2.37	.24	230	CLM-24230-SHRB

# STAINLESS SWIVEL HOIST RINGS

300-SERIES STAINLESS STEEL, PASSIVATED, 100% LIQUID-PENETRANT INSPECTED

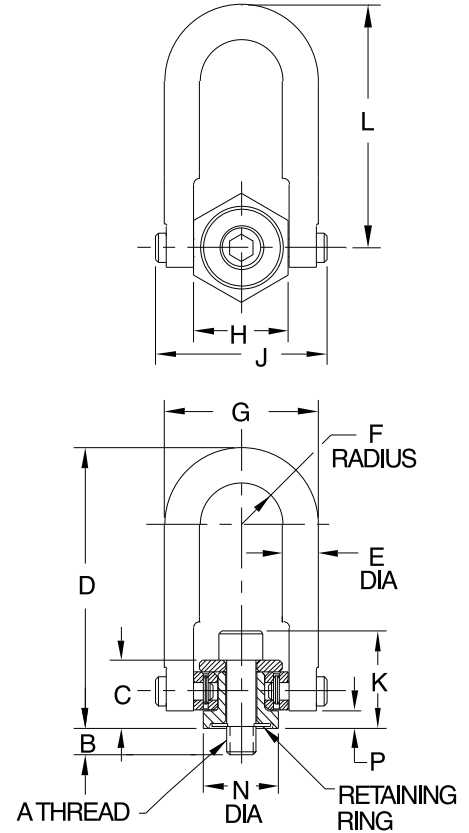
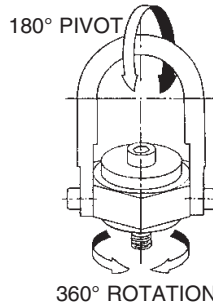
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**Stainless Steel**

Stainless steel version of our original safety-engineered hoist ring, with a load rating equal to 50% of the alloy steel version. Useful for corrosive, cryogenic, or elevated-temperature environments. Pivots 180 degrees and swivels 360 degrees simultaneously to allow lifting from any direction. Safety factor = 5:1. Patent no. 3,297,293, 4,705,422, and 5,848,815.

Fasten hoist rings using the installation torque specified in the dimension table. Always install so that the hoist ring can pivot and swivel freely. Some hoist rings are available with a choice of bolt lengths. Use the shortest bolt length only for steel plates, the other lengths for weaker materials and for through-hole mounting with a washer and nut. **INFO+:** See general Hoist Ring Safety Precautions on page 60.



## STANDARD RING — STAINLESS STEEL (INCH)

PART NO.	LOAD RATING (LBS)	A	B	C	D	E DIA	F	G	H	J	K	L	N DIA	P	INSTALLTION TORQUE (FT-LBS)
CL-275-SHR-1-S	275	1/4-20	.54	.71	2.67	3/8	.43	1.61	1.00	1.84	.96	2.31	.75	.17	2.5
CL-400-SHR-1-S	400	5/16-18	.29	.71	2.67	3/8	.43	1.61	1.00	1.84	.96	2.31	.75	.17	3.5
CL-400-SHR-2-S			.54												
CL-500-SHR-1-S	500	3/8-16	.54	.71	2.67	3/8	.43	1.61	1.00	1.84	1.09	2.31	.75	.17	6
CL-29301-SHR-S	1250	1/2-13	1.07	.93	3.77	1/2	.70	2.40	1.49	2.58	1.43	3.31	1.25	.20	4
CL-1250-SHR-1-S	1250	1/2-13	.78	1.22	4.78	3/4	.88	3.25	1.99	3.52	1.72	4.25	1.50	.16	14
CL-1250-SHR-2-S			1.03												
CL-1250-SHR-3-S			1.28												
CL-2000-SHR-1-S	2000	5/8-11	.78	1.22	4.78	3/4	.88	3.25	1.99	3.52	1.85	4.25	1.50	.16	30
CL-2000-SHR-2-S			1.03												
CL-2000-SHR-3-S			1.28												
CL-2500-SHR-1-S	2500	3/4-10	1.03	1.22	4.78	3/4	.88	3.25	1.99	3.52	1.97	4.25	1.50	.16	50
CL-2500-SHR-2-S			1.53												
CL-29102-SHR-S	3500	3/4-10	1.04	1.71	6.52	1	1.40	4.80	3.00	5.14	2.46	5.78	2.37	.24	50
CL-29103-SHR-S			1.54												
CL-29101-SHR-S	4000	7/8-9	1.04	1.71	6.52	1	1.40	4.80	3.00	5.14	2.59	5.78	2.37	.24	80
CL-29105-SHR-S	5000	1"-8	1.29	1.71	6.52	1	1.40	4.80	3.00	5.14	2.71	5.78	2.37	.24	115
CL-29106-SHR-S			1.54												
CL-29107-SHR-S			2.29												
CL-29401-SHR-S	7500	1-1/4"-7	1.89	2.11	8.73	1-1/4	1.75	6.00	3.76	6.50	3.36	7.75	3.20	.35	235
CL-29202-SHR-S	12000	1-1/2"-6	2.70	2.81	12.47	1-3/4	2.25	8.00	4.87	8.55	4.31	11.12	4.20	.47	400
CL-29200-SHR-S	15000	2"-4-1/2	2.96	2.81	12.47	1-3/4	2.25	8.00	4.87	8.55	5.31	11.12	4.20	.47	550
CL-29503-SHR-S	25000	2-1/2"-4	4.00	4.09	16.87	2-1/4	3.00	10.50	6.52	11.67	6.59	14.50	5.75	1.12	1050
CL-29501-SHR-S		2-1/2"-8													
CL-29600-SHR-S	37500	3"-4	5.20	5.27	19.50	2-3/4	3.75	13.00	8.10	14.15	8.27	17.00	7.25	1.00	2150
CL-29701-SHR-S	50000	3-1/2"-4	7.00	6.06	22.09	3-1/4	4.00	14.50	8.60	15.90	9.56	19.25	7.75	1.09	3300

# STAINLESS SWIVEL HOIST RINGS

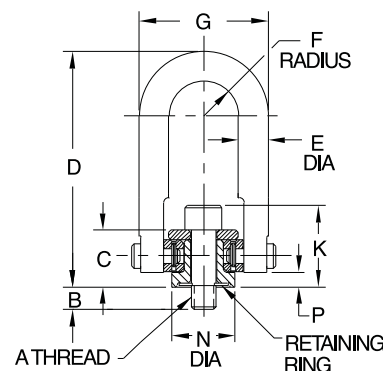
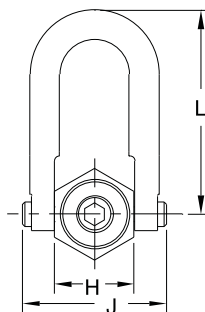
## STANDARD RING — STAINLESS STEEL (METRIC)

PART NO.	LOAD RATING (LBS)	A	B	C	D	E DIA.	F	G	H	J	K	L	N DIA.	P	INSTALLATION TORQUE (FT-LBS)
CLM-440-SHR-2-S	440	M8	.67	.71	2.67	3/8	.43	1.61	1.00	1.84	1.03	2.31	.75	.17	3.5
CLM-500-SHR-1-S	500	M10	.67	.71	2.67	3/8	.43	1.61	1.00	1.84	1.11	2.31	.75	.17	6
CLM-1150-SHR-1-S	1150	M12	.75	1.22	4.78	3/4	.88	3.25	2.00	3.52	1.69	4.25	1.50	.16	14
CLM-2000-SHR-2-S	2000	M16	.94	1.22	4.78	3/4	.88	3.25	2.00	3.52	1.85	4.25	1.50	.16	30
CLM-2400-SHR-2-S	2400	M20	1.18	1.22	4.78	3/4	.88	3.25	2.00	3.52	2.01	4.25	1.50	.16	50
CLM-29822-SHR-S	3300	M20	1.14	1.71	6.53	1	1.40	4.77	3.00	5.14	2.50	5.78	2.31	.24	50
CLM-29824-SHR-S	4600	M24	1.34	1.71	6.53	1	1.40	4.77	3.00	5.14	2.65	5.78	2.31	.24	115
CLM-29830-SHR-S	5000	M30	2.13	1.71	6.53	1	1.40	4.77	3.00	5.14	2.89	5.78	2.31	.24	115
CLM-29840-SHR-S	7500	M30	1.81	2.11	8.73	1.25	1.75	6.00	3.76	6.50	3.29	7.75	3.20	.35	235
CLM-29842-SHR-S			2.60												
CLM-29850-SHR-S	12000	M36	2.72	2.81	12.47	1.75	2.25	8.00	4.87	8.55	4.23	11.12	4.20	.47	400
CLM-29852-SHR-S	13500	M42	3.11	2.81	12.47	1.75	2.25	8.00	4.87	8.55	4.46	11.12	4.20	.47	400
CLM-29854-SHR-S	15000	M48	3.11	2.81	12.47	1.75	2.25	8.00	4.87	8.55	4.70	11.12	4.20	.47	400
CLM-29860-SHR-S	24000	M64	4.02	4.09	16.87	2.25	3.00	10.50	6.52	11.67	6.61	14.50	5.75	1.12	1050



Optional Long-Ring Version

Long-ring version provides extra reach and allows using larger lifting hooks.



## LONG RING — STAINLESS STEEL (INCH)

PART NO.	LOAD RATING (LBS)	A	B	C	D	E DIA.	F	G	H	J	K	L	N DIA.	P	INSTALLATION TORQUE (FT-LBS)
CL-29322-SHR-S	1250	1/2-13	.78	1.22	6.72	3/4	.88	3.25	1.99	3.52	1.72	6.19	1.50	.16	14
CL-29323-SHR-S			1.03												
CL-29324-SHR-S			1.28												
CL-29320-SHR-S	2000	5/8-11	1.03	1.22	6.72	3/4	.88	3.25	1.99	3.52	1.85	6.19	1.50	.16	30
CL-29321-SHR-S			1.28												
CL-29325-SHR-S	2500	3/4-10	1.03	1.22	6.72	3/4	.88	3.25	1.99	3.52	1.97	6.19	1.50	.16	50
CL-29327-SHR-S			1.53												
CL-29329-SHR-S	3500	3/4-10	1.04	1.71	8.11	1	1.40	4.80	3.00	5.14	2.46	7.38	2.37	.24	50
CL-29330-SHR-S			1.54												
CL-29328-SHR-S	4000	7/8-9	1.04	1.71	8.11	1	1.40	4.80	3.00	5.14	2.59	7.38	2.37	.24	80
CL-29331-SHR-S	5000	1"-8	1.29	1.71	8.11	1	1.40	4.80	3.00	5.14	2.71	7.38	2.37	.24	115
CL-29332-SHR-S			1.54												
CL-29333-SHR-S			2.29												

## LONG RING — STAINLESS STEEL (METRIC)

CLM-29814-SHR-S	1150	M12	.75	1.22	6.72	3/4	.88	3.25	1.99	3.52	1.69	6.19	1.50	.16	14
CLM-29818-SHR-S	2000	M16	.94	1.22	6.72	3/4	.88	3.25	1.99	3.52	1.85	6.19	1.50	.16	30
CLM-29821-SHR-S	2400	M20	1.18	1.22	6.72	3/4	.88	3.25	1.99	3.52	2.01	6.19	1.50	.16	50
CLM-29823-SHR-S	3300	M20	1.14	1.71	8.11	1	1.40	4.80	3.00	5.14	2.50	7.38	2.37	.24	50
CLM-29826-SHR-S	4600	M24	1.34	1.71	8.11	1	1.40	4.80	3.00	5.14	2.65	7.38	2.37	.24	115
Please contact factory	5000	M30	2.13	1.71	8.11	1	1.40	4.80	3.00	5.14	2.89	7.38	2.37	.24	235

# NICKEL-PLATED SWIVEL HOIST RINGS

ALLOY STEEL, HEAT TREATED, ELECTROLESS NICKEL PLATED, 100% MAGNAFLUX INSPECTED

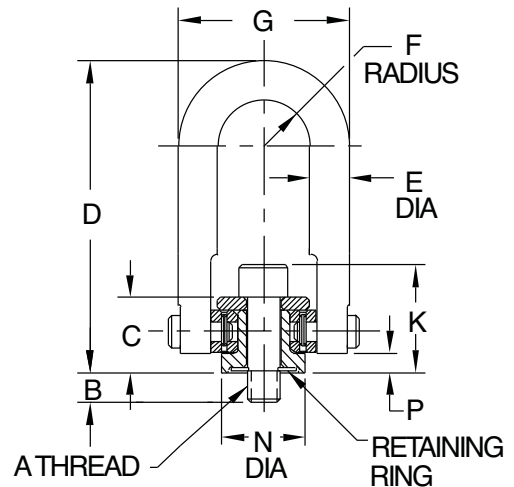
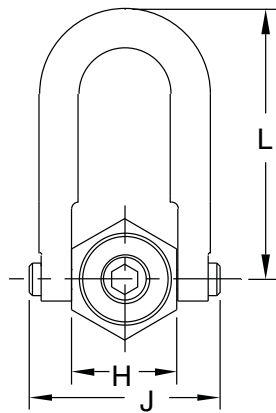
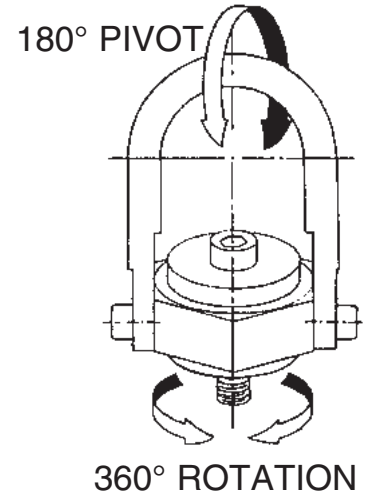
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Nickel Plating

Our original alloy-steel Swivel Hoist Rings are now available with electroless nickel plating. These hoist rings offer excellent corrosion and wear resistance while still providing the full load capacity of our heat-treated alloy-steel hoist rings. Electroless nickel is a hard, uniform coating that is very resistant to a wide range of chemicals, which makes these hoist rings suitable for many corrosive and marine environments. Swivel Hoist Rings pivot 180 degrees and swivel 360 degrees simultaneously to allow lifting from any direction. Safety factor = 5:1. Patent no. 3,297,293, 4,705,422, and 5,848,815.

Fasten hoist rings using the installation torque specified in the dimension table. Always install so that the hoist ring can pivot and swivel freely. Some hoist rings are available with a choice of bolt lengths. Use the shortest bolt length only for steel plates, the other lengths for weaker materials and for through-hole mounting with a washer and nut. **INFO+**: See general Hoist Ring Safety Precautions on page 60.



## STANDARD RING, ELECTROLESS NICKEL PLATED (INCH)

PART NO.	LOAD RATING (LBS)	A	B	C	D	E DIA	F	G	H	J	K	L	N DIA	P	INSTALLATION TORQUE (FT-LBS)	REPLACEMENT BOLT (WITH RETAINING RING)
CL-800-SHR-2-N	800	5/16-18	.54	.72	2.63	3/8	.44	1.62	1.00	1.82	1.03	2.35	.75	.17	7	CL-800-SHRB-2-N
CL-1000-SHR-1-N	1000	3/8-16	.54	.72	2.63	3/8	.44	1.62	1.00	1.82	1.09	2.35	.75	.17	12	CL-1000-SHRB-1-N
CL-2500-SHR-1-N	2500	1/2-13	.77	1.23	4.77	3/4	.88	3.25	2.00	3.52	1.73	4.24	1.50	.16	28	CL-2500-SHRB-1-N
CL-2500-SHR-2-N			1.02													CL-2500-SHRB-2-N
CL-2500-SHR-3-N			1.27													CL-2500-SHRB-3-N
CL-4000-SHR-1-N	4000	5/8-11	.77	1.23	4.77	3/4	.88	3.25	2.00	3.52	1.86	4.24	1.50	.16	60	CL-4000-SHRB-1-N
CL-4000-SHR-2-N			1.02													CL-4000-SHRB-2-N
CL-4000-SHR-3-N			1.27													CL-4000-SHRB-3-N
CL-5000-SHR-1-N	5000	3/4-10	1.02	1.23	4.77	3/4	.88	3.25	2.00	3.52	1.98	4.24	1.50	.16	100	CL-5000-SHRB-1-N
CL-5000-SHR-2-N			1.52													CL-5000-SHRB-2-N

# HEAVY-DUTY® SWIVEL HOIST RINGS

ALLOY STEEL, HEAT TREATED, BLACK OXIDE FINISH, 100% MAGNAFLUX INSPECTED

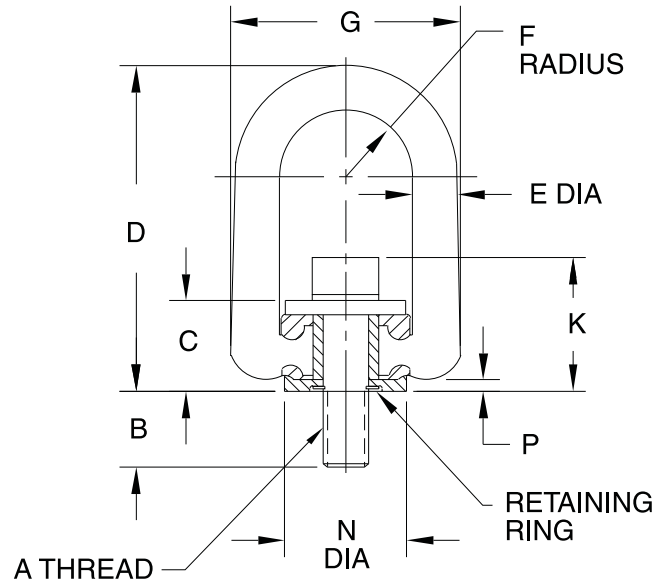
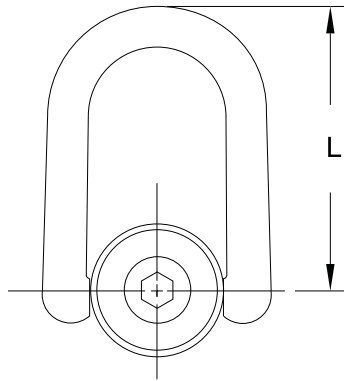


The next generation of Swivel Hoist Rings, with a heavy-duty forged steel ring. Pivots 180 degrees and swivels 360 degrees simultaneously to allow lifting from any direction. Safety factor = 5:1. Meets OSHA standards and Military Specification MIL-STD-1365(11) or MIL-STD-209C. Patent no. 4,570,987, 4,641,986, 5,405,210, and other patents pending.

Fasten hoist rings using the installation torque specified in the dimension table.

Always install so that the hoist ring can pivot and swivel freely. Some hoist rings are available with a choice of bolt lengths. Use the shortest bolt length only for steel plates, the other lengths for weaker materials and for through-hole mounting with a washer and nut. **INFO+:** See general Hoist Ring Safety Precautions on page 60.

2



## STANDARD RING (INCH)

PART NO.	LOAD RATING (LBS)	A	B	C	D	E DIA	F	G	K	L	N DIA	P	INSTALLATION TORQUE (FT-LBS)	REPLACEMENT BOLT (WITH RETAINING RING)
CL-33106-SHR	10000	1"-8	1.20	2.05	7.37	1.00	1.40	5.10	3.05	6.62	2.81	.18	230	CL-33126-SHRB
CL-33105-SHR			1.45											CL-33125-SHRB
CL-33107-SHR			2.20											CL-33127-SHRB
CL-33402-SHR	15000	1-1/4"-7	1.88	2.87	9.22	1.25	2.00	6.75	4.23	8.12	3.88	.32	470	CL-33419-SHRB
CL-33401-SHR			2.63											CL-33421-SHRB
CL-33420-SHR	20000	1-3/8"-6	2.63	2.87	9.22	1.25	2.00	6.75	4.35	8.12	3.88	.32	670	CL-33429-SHRB
CL-33424-SHR	24000	1-1/2"-6	2.63	2.87	9.22	1.25	2.00	6.75	4.48	8.12	3.88	.32	800	CL-33422-SHRB
CL-33427-SHR	30000	2"-4-1/2 2"-8	2.96	2.87	9.22	1.25	2.00	6.75	4.48	8.12	3.88	.32	1100	—
CL-33432-SHR														—

# HEAVY-DUTY® SWIVEL HOIST RINGS

## STANDARD RING (METRIC)

PART NO.	LOAD RATING (LBS)	A	B	C	D	E DIA	F	G	K	L	N DIA	P	INSTALLATION TORQUE (FT-LBS)	REPLACEMENT BOLT (WITH RETAINING RING)
CLM-34102-SHR	9200	M24	1.10	2.05	7.37	1.00	1.40	5.10	3.00	6.62	2.81	.18	230	CLM-34121-SHRB
CLM-34103-SHR			M30											CLM-34123-SHRB
CLM-34105-SHR	10000	M30	1.50	2.05	7.37	1.00	1.40	5.10	3.23	6.62	2.81	.18	230	CLM-34126-SHRB
CLM-34107-SHR			M36											CLM-34127-SHRB
CLM-34401-SHR	15000	M30	2.64	2.87	9.22	1.25	2.00	6.75	4.23	8.12	3.88	.32	470	CLM-34421-SHRB
CLM-34402-SHR	24000	M36	2.64	2.87	9.22	1.25	2.00	6.75	4.48	8.12	3.88	.32	800	CLM-34422-SHRB
CLM-34403-SHR	27000	M42	3.15	2.87	9.22	1.25	2.00	6.75	4.48	8.12	3.88	.32	800	CLM-24232-SHRB
CLM-34404-SHR	30000	M48	3.15	2.87	9.22	1.25	2.00	6.75	4.48	8.12	3.88	.32	800	CLM-24225-SHRB



Optional Long-Ring Version

Long-ring version provides extra reach and allows using larger lifting hooks.

## LONG RING (INCH)

PART NO.	LOAD RATING (LBS)	A	B	C	D	E DIA	F	G	K	L	N DIA	P	INSTALLATION TORQUE (FT-LBS)	REPLACEMENT BOLT (WITH RETAINING RING)
CL-33165-SHR	10000	1"-8	1.20	2.05	9.00	1.00	1.40	5.10	3.05	8.25	2.81	.18	230	CL-33126-SHRB
CL-33166-SHR			1.45											CL-33125-SHRB
CL-33167-SHR			2.20											CL-33127-SHRB

## LONG RING (METRIC)

CLM-34162-SHR	9200	M24	1.10	2.05	9.00	1.00	1.40	5.10	3.00	8.25	2.81	.18	230	CLM-34121-SHRB
CLM-34163-SHR			1.50											CLM-34123-SHRB
CLM-34165-SHR	10000	M30	1.50	2.05	9.00	1.00	1.40	5.10	3.23	8.25	2.81	.18	230	CLM-34126-SHRB
CLM-34167-SHR			1.89											CLM-34127-SHRB

# Aerospace Is In Our DNA

*Carr Lane Manufacturing was founded in 1952 to produce tooling components for the aerospace industry. Let us show you what more than six decades of industry knowledge and experience can bring to your next project.*

Specialty Ball Lock Pins



L Pins



Lifting Pins



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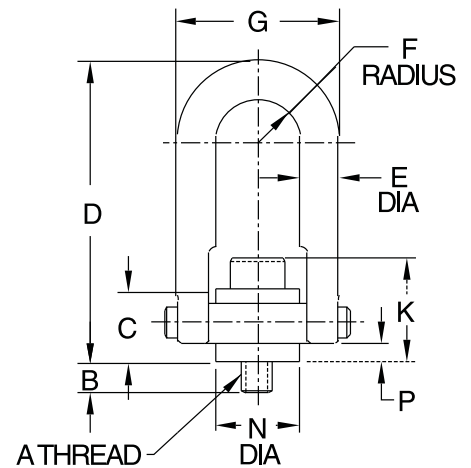
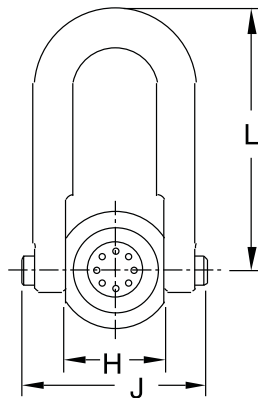
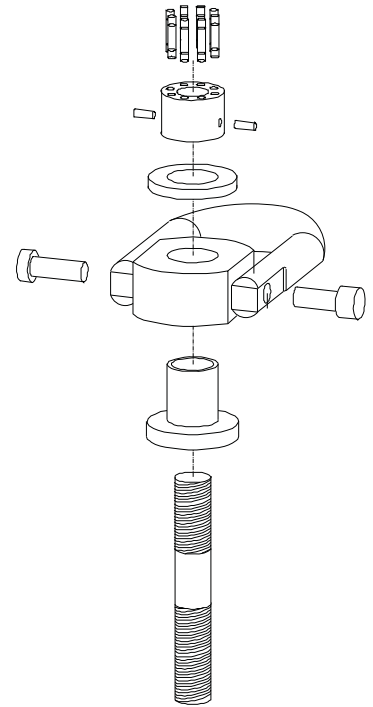
# E-Z TORQUE® SWIVEL HOIST RINGS

ALLOY STEEL, HEAT TREATED, BLACK OXIDE FINISH, 100% MAGNAFLUX INSPECTED



**E-Z Torque®  
Swivel Hoist Rings**

Extra-large Swivel Hoist Rings with our patented system that allows tightening several smaller bolt heads with a standard torque wrench instead of tightening one large bolt with a special tool. Swivel Hoist Rings pivot 180 degrees and swivel 360 degrees simultaneously to allow lifting from any direction. Safety factor = 5:1. Black oxide finish is standard, with cadmium plating available as a special. Available in load capacities up to 250000 lbs. Patent no. 3,297,293, 4,705,422, 5,848,815, and 6,199,925. Fasten hoist rings using the installation torque specified in the dimension table. Always install so that the hoist ring can pivot and swivel freely. **INFO+:** See general Hoist Ring Safety Precautions on page 60.

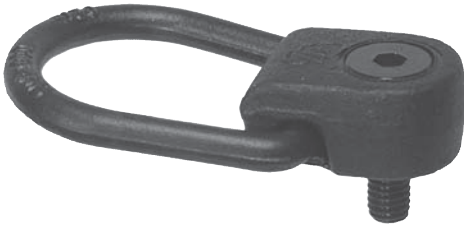


## E-Z-TORQUE® SWIVEL HOIST RINGS (INCH)

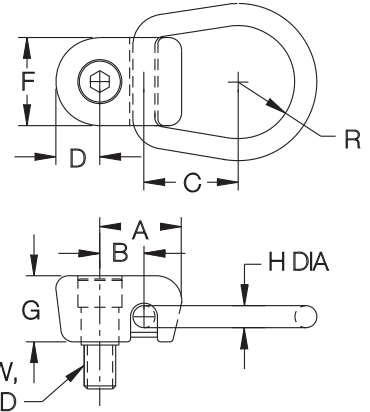
PART NO.	LOAD RATING (LBS)	A	B	C	D	E DIA	F	G	H	J	K	L	N DIA	P	INSTALLATION TORQUE (FT-LBS)
CL-23490-SHR	15000	1-1/4"-7	1.89	2.11	8.73	1-1/4	1.75	6.0	3.76	6.50	3.60	7.75	3.20	.35	10
CL-23494-SHR	24000	1-1/2"-6	2.70	2.81	12.47	1-3/4	2.25	8.0	4.87	8.55	4.60	11.12	4.20	.47	18
CL-23290-SHR	30000	2"-4-1/2	2.96	2.81	12.47	1-3/4	2.25	8.0	4.87	8.55	4.60	11.12	4.20	.47	26
CL-23592-SHR	50000	2-1/2"-4	4.00	4.09	16.87	2-1/4	3.00	10.5	6.52	11.67	6.89	14.50	5.75	1.12	49
CL-23590-SHR		2-1/2"-8													
CL-23690-SHR	75000	3"-4	5.20	5.27	19.50	2-3/4	3.75	13.0	8.10	14.15	8.72	17.00	7.25	1.00	92
CL-23790-SHR	100000	3-1/2"-4	7.00	6.06	22.09	3-1/4	4.00	14.5	8.60	15.90	9.56	19.25	7.75	1.09	98
CL-23792-SHR	150000	4-1/4"-4	8.50	7.50	27.38	4	5.00	18.0	10.75	19.69	10.45	23.81	9.87	1.33	123
CL-23794-SHR	200000	5"-4	9.00	9.00	33.00	5	6.00	22.0	13.00	24.00	13.00	28.50	12.38	1.88	193
CL-23798-SHR	250000	6"-4	9.00	9.00	33.00	5	6.00	22.0	13.00	24.00	13.00	28.50	12.38	1.88	207

# SAFETY HOIST RINGS

RING: FORGED 4130 STEEL, HEAT TREATED, BLACK OXIDE FINISH, 100% MAGNAFLUX INSPECTED  
 BASE: FORGED 1045 STEEL, BLACK OXIDE FINISH



Forged base rotates 360 degrees while the solid-loop forged ring pivots 180 degrees, to allow lifting from any direction. High-strength shoulder screw furnished. Safety factor = 5:1. Fasten hoist ring using the installation torque specified in the dimension table. Always install so that the hoist ring can pivot and swivel freely. **INFO+**: See general Hoist Ring Safety Precautions on page 60.



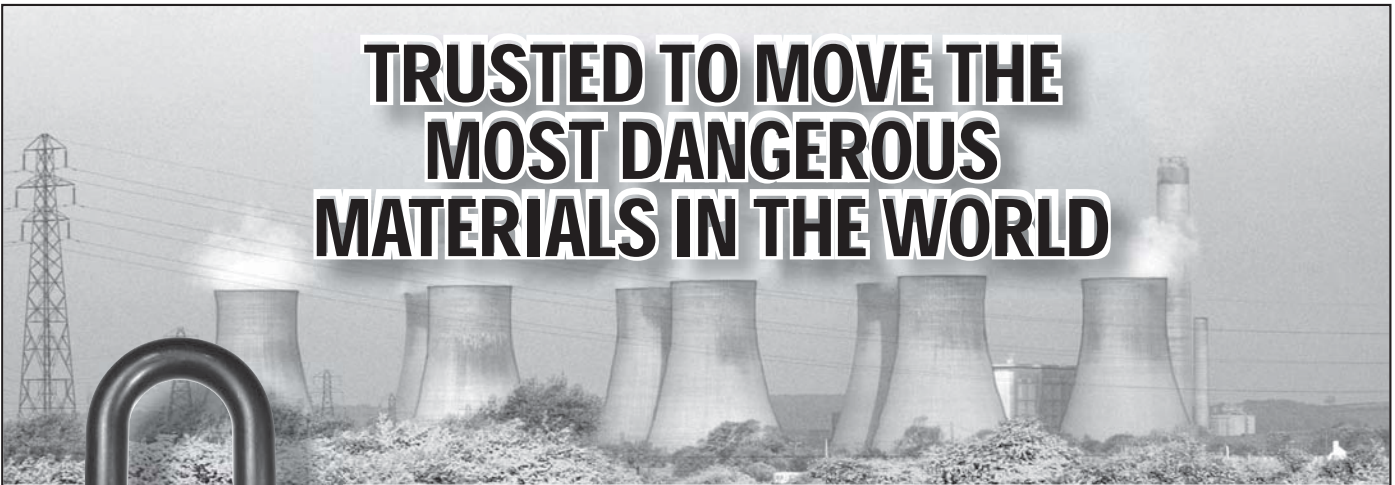
## INCH

PART NO.	LOAD RATING (LBS)	A	B	C	D	F	G	H DIA	J	K	R	INSTALLTION TORQUE (FT-LBS)	REPLACEMENT SHOULDER SCREW
CL-10-SHR	1000	1-1/8	5/8	1-1/2	5/8	1-1/4	7/8	5/16	3/8-16	5/8	13/16	7-10	CL-10-SHRB
CL-25-SHR	2500	1-5/8	7/8	1-7/8	7/8	1-3/4	1-5/16	7/16	5/8-11	7/8	1-1/8	42-50	CL-25-SHRB

## METRIC

CLM-10-SHR	1000	1-1/8	5/8	1-1/2	5/8	1-1/4	7/8	5/16	M10	.59	13/16	7-10	CLM-10-SHRB
CLM-25-SHR	2500	1-5/8	7/8	1-7/8	7/8	1-3/4	1-5/16	7/16	M16	.79	1-1/8	42-50	CLM-25-SHRB

## TRUSTED TO MOVE THE MOST DANGEROUS MATERIALS IN THE WORLD



We offer more hoist rings than any other manufacturer, with more than 20 different types, ranging from economical, low profile versions to heavy-duty, extra-large types with load capacities up to 250,000 lbs.

- Swivel hoist rings
- Safety hoist rings
- Pivoting hoist rings
- Lifting eyes
- Side-pull hoist rings

**CarrLane**  
MANUFACTURING CO.

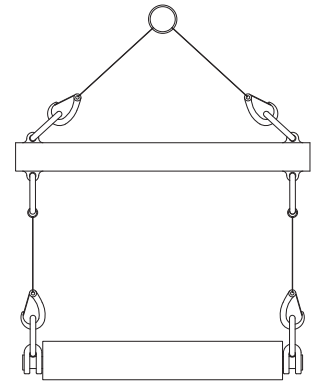


# SIDE-PULL HOIST RINGS

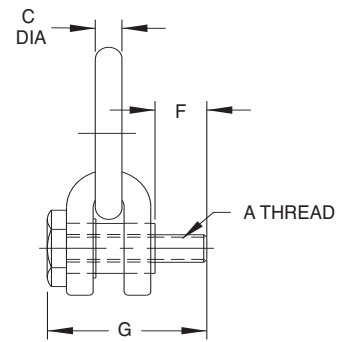
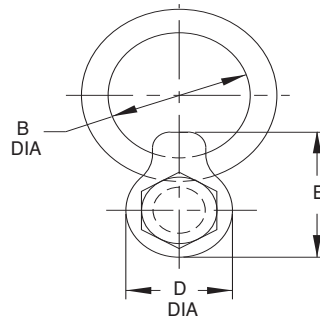
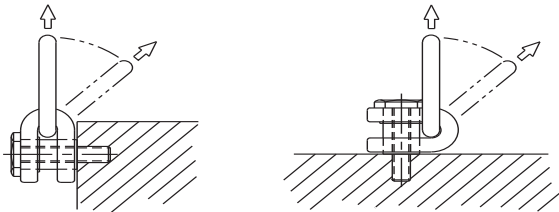
ALLOY STEEL, BLACK OXIDE FINISH, 100% MAGNAFLUX INSPECTED



Side-Pull Hoist Rings are ideal for side mounting. Flip and turn loads without unhooking (use with a spreader bar). Forged alloy-steel ring pivots 180 degrees and swivels 360 degrees simultaneously to allow lifting from any direction. Large, weldless forged ring can accommodate larger lifting hooks. Meets OSHA standards and Military Specifications MIL-STD-209C and MIL-STD-1365(11). Safety factor = 5:1. Fasten hoist ring using the installation torque specified in the dimension table. Always install so that the hoist ring can pivot and swivel freely. **INFO+**: See general Hoist Ring Safety Precautions on page 60.



Side-Pull Hoist Rings are ideal whenever side mounting is required.



INCH

PART NO.	LOAD RATING (LBS)	A DIA	B DIA	C DIA	D DIA	E	F	G	INSTALLATION TORQUE (FT-LBS)
CL-650-SPHR	650	5/16-18	2	3/8	1-1/2	2	5/8	2-5/16	3.5
CL-800-SPHR	800	3/8-16					3/4	2-5/8	4.5
CL-1800-SPHR	1800	1/2-13	3	5/8	2-3/8	3-3/16	1	3-1/2	15
CL-2500-SPHR	2500	5/8-11					1-1/4	3-7/8	25
CL-4000-SPHR	4100	3/4-10	4	1	3-3/4	5	1-1/2	5-3/4	50
CL-7000-SPHR	7100	1"-8					1-3/4	6	90
CL-14000-SPHR	14000	1-1/4"-7	6	1-3/8	4-5/8	6-13/16	2	6-7/8	150
CL-36143-SPHR		1-1/4"-8							
CL-36145-SPHR	17000	1-1/2"-6	6	1-3/8	4-5/8	6-13/16	2-1/2	7-7/8	250
CL-36148-SPHR		1-1/2"-8							
CL-36150-SPHR	29000	2"-4-1/2	5-1/4 X 10-1/2 OVAL	1-1/2	4-5/8	6-13/16	3-1/8	8-9/16	300
CL-36155-SPHR		2"-8							

METRIC

CLM-36710-SPHR	880	M8	2	3/8	1-1/2	2	.63	2.13	6
CLM-36715-SPHR	1100	M10					.79	2.29	12
CLM-36720-SPHR	1900	M12	3	5/8	2-3/8	3-3/16	.94	3.32	20
CLM-36725-SPHR	3500	M16					1.26	4.76	47
CLM-36730-SPHR	5500	M20	4	1	3-3/4	5	1.57	5.07	92
CLM-36735-SPHR	7700	M24					1.89	5.39	150
CLM-36740-SPHR	12000	M30	6	1-3/8	4-5/8	6-13/16	2.36	6.54	300
CLM-36745-SPHR	17000	M36					2.83	7.02	530
CLM-36748-SPHR	24000	M42	5-1/4 X 10-1/2 OVAL	1-1/2	4-5/8	6-13/16	3.31	7.49	850
CLM-36750-SPHR	30000	M48					3.78	7.96	1200
CLM-36755-SPHR	55000	M64	5.04	9.22	3000				

# HEAVY-DUTY® SIDE-PULL HOIST RINGS

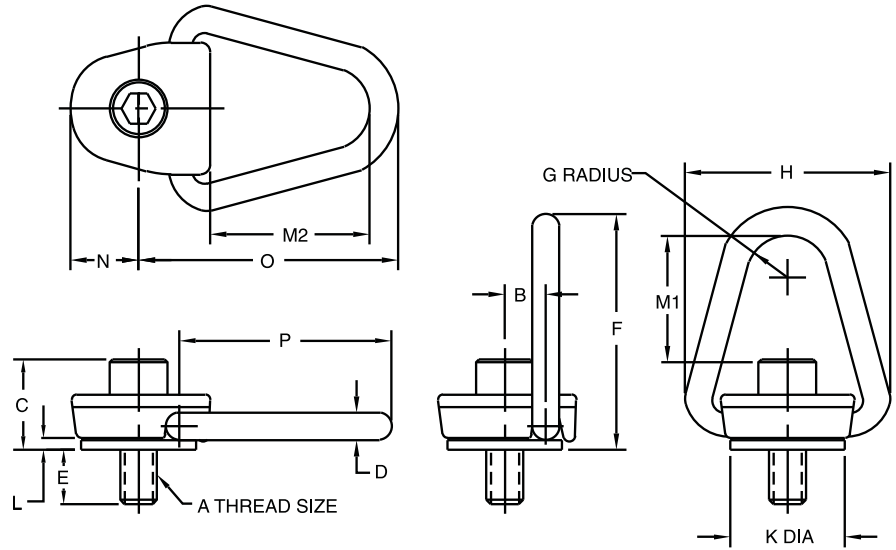
ALLOY STEEL, BLACK OXIDE FINISH, 100% MAGNAFLUX INSPECTED

2



Heavy-Duty version of our Side-Pull Hoist Rings offers greater load capacity in a given mounting-thread size. Side-Pull Hoist Rings are ideal for side mounting. Flip and turn loads without unhooking (use with a spreader bar). Forged alloy-steel ring pivots and swivels 360 degrees simultaneously to

allow lifting from any direction. Safety factor = 5:1. Patent no. 6,267,422. Fasten hoist ring using the installation torque specified in the dimension table. Always install so that the hoist ring can pivot and swivel freely. **INFO+:** See general Hoist Ring Safety Precautions on page 60.



## INCH

PART NO.	LOAD RATING (LBS)	A	B	C	D	E	F	G	H	K DIA	L	M1	M2	N	O	P	INSTALLTION TORQUE (FT-LBS)
CL-36305-SPHR	800	5/16-18	.88	1.33	.50	.48	4.72	.75	3.88	2.19	.22	2.89	3.19	1.25	5.12	4.25	7
CL-36310-SPHR	1000	3/8-16		1.39								2.84					12
CL-36315-SPHR	2500	1/2-13	1.25	1.53	.75	1.25	6.25	.88	5.25	3.25	.25	2.70	4.19	1.62	6.75	5.62	28
CL-36320-SPHR	4000	5/8-11		1.64								2.92					60
CL-36325-SPHR	5000	3/4-10		1.78								2.94					100
CL-36330-SPHR	7000	3/4-10	1.25	2.12	.75	1.25	6.25	.88	5.25	3.25	.25	4.00	4.19	1.62	6.75	5.62	100
CL-36335-SPHR	8000	7/8-9		2.25								3.88					160
CL-36340-SPHR	10000	1"-8		2.38								3.75					230

## METRIC

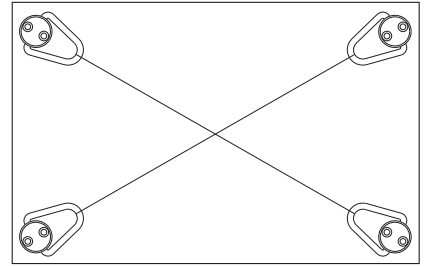
CLM-36805-SPHR	880	M8	.88	1.34	.50	.55	4.72	.75	3.88	2.20	.20	2.87	3.19	1.25	5.12	4.25	7
CLM-36810-SPHR	1000	M10		1.42								.94					12
CLM-36815-SPHR	2300	M12	1.25	1.50	.75	1.46	6.25	.88	5.25	3.11	.24	2.72	4.19	1.62	6.75	5.62	27
CLM-36820-SPHR	4000	M16		1.65								2.56					59
CLM-36825-SPHR	4800	M20		1.81								2.40					100
CLM-36830-SPHR	6600	M20	1.25	2.24	.75	1.54	6.25	.88	5.25	3.11	.24	3.27	4.19	1.62	6.75	5.62	100
CLM-36835-SPHR	9200	M24		2.40								3.11					230

# PIVOTING HOIST RINGS

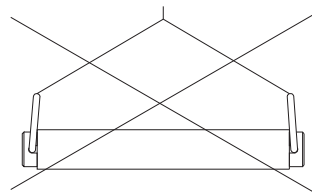
RING: FORGED 4130 STEEL, HEAT TREATED, BLACK OXIDE FINISH, 100% MAGNAFLUX INSPECTED PER ASTM E-1444  
 BASE: FORGED 1045 STEEL, BLACK OXIDE FINISH



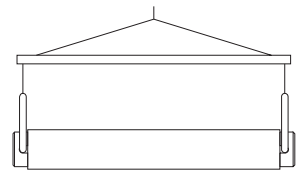
Economical hoist ring with a low profile and high load capacity. Forged base and solid-loop forged ring. Pivots a full 180 degrees, but does not rotate (install so that lifting force is applied in the pivoting direction). Safety factor = 5:1. Fasten hoist ring with grade-8 Socket-Head Cap Screws, using the installation torque specified in the dimension table. The smallest three sizes have two mounting holes, the largest two sizes have four. **INFO+**: See general Hoist Ring Safety Precautions on page 60.



Install hoist rings so that lifting force is applied in the pivoting direction.



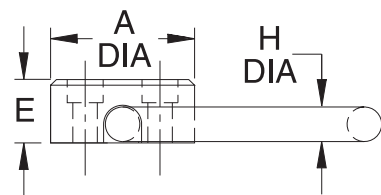
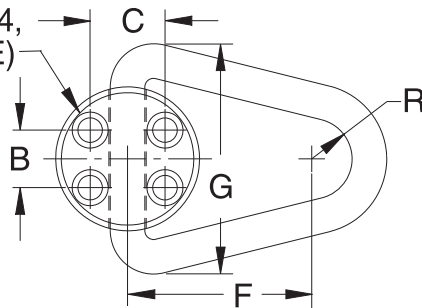
POOR



GOOD

Do not allow hoist rings to bind. Use a spreader bar, if necessary, to avoid binding.

FOR D SOCKET-HEAD CAP SCREWS (2 OR 4, DEPENDING ON SIZE)



PART NO.	LOAD RATING (LBS)	A DIA	B	C	D THREAD X MIN. LENGTH	E DIA	F	G	H DIA	R	INSTALLATION TORQUE (FT-LBS)	SCREW EXTENSION BELOW BASE
CL-20-HR	2000	1-3/4	0	1	5/16-18x1.00 (or M8x25mm)	3/4	2	2-1/2	5/16	1/2	4-7	.58 (or 14mm)
CL-25-HR	2500	2-1/4		1-1/8	3/8-16x1.25 (or M10x30mm)	7/8	2-1/2	3-3/16	3/8	5/8	7-10	.79 (or 18mm)
CL-50-HR	5000	2-5/8		1-1/2	1/2-13x1.50 (or M12x40mm)	1-1/8	3	3-7/8	1/2	3/4	20-25	.90 (or 25mm)
CL-120-HR	12000	3-1/8	1-1/4	1-5/8	1/2-13x1.75 (or M12x45mm)	1-3/8	4	5	3/4	7/8	20-25	.90 (or 23mm)
CL-200-HR	20000	3-5/8		2-1/16	5/8-11x2.50 (or M16x65mm)	1-7/8	5	6-3/16	1	1	42-50	1.25 (or 33mm)

# LIFTING EYES

FORGED CARBON STEEL, QUENCHED AND DRAWN, PLAIN FINISH

2

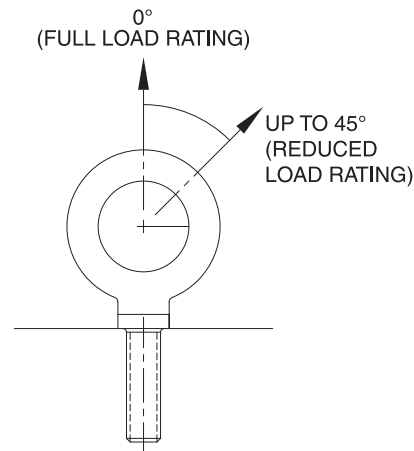


Lifting Eyes are forged steel eyebolts with an integral shoulder for greater strength. These simple, economical lifting devices are suitable for vertical lifting in-line with the threaded bolt, such as when lifting from a single point or from two points with a spreader bar. For lifting at an angle, Swivel Hoist Rings should be used instead. Lifting Eyes should be inspected before each use for possible defects and installed by a person trained in the installation of lifting devices. The tapped receiving hole should be countersunk, free of any debris, and deep enough to ensure proper shoulder seating. Firm hand tightening is recommended for installation; do not use wrenches or bars. Angular lifting should be avoided, because angular lifts significantly reduce rated capacity. Any angular loads must be radial in the plane of the eye, never at an angle to that plane. A steel washer or shim may be used under the shoulder to achieve proper

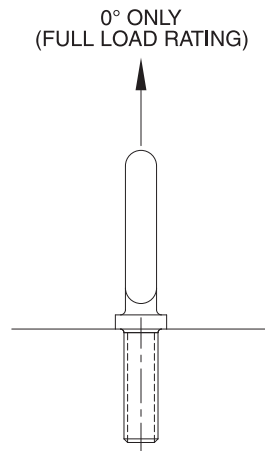
eye orientation, but its thickness should not exceed one thread pitch. A washer may also be required to ensure flush seating on rough mounting surfaces.

Do not exceed rated load capacity. Maximum load rating applies to straight vertical lifting only. Lifting at an angle reduces load rating significantly – see table below for reduced load rating at 45° (this reduced rating should be used for any lift other than at 0° vertical). Do not work, stand, or crawl near the load of a Lifting Eye. Do not use a Lifting Eye to lift a load that can rotate; Swivel Hoist Rings should be used for such loads. Do not shock load Lifting Eyes; instead gradually increase lifting of the load to minimize load shock. Do not force hooks or any other fittings into the eye; they must fit freely. Do not weld or machine Lifting Eyes, or perform any repair. Do not expose Lifting Eyes to extreme temperatures or environmental conditions, as this may permanently reduce load capacity. Periodic inspection of installed Lifting Eyes is highly recommended. **INFO+**: Also see general Hoist Ring Safety Precautions on page 60.

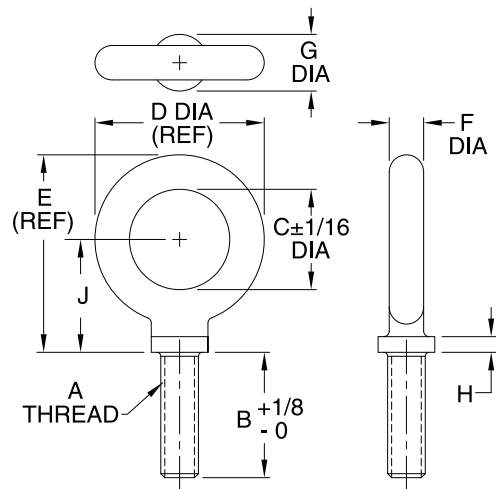
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Angular lifting at up to 45° is allowable in this direction (plane of the eye) but load rating is reduced.



Only straight lifting is allowable in this direction.



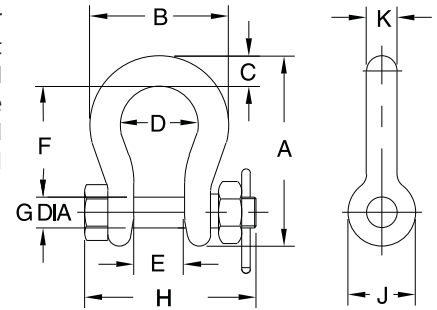
## INCH

PART NO.	A	B	C DIA	D DIA	E	F DIA	G DIA	H	J	LOAD RATING (LBS)	
										0°	45°
CL-4-LE	1/4-20	1	3/4	1-3/16	1-11/32	7/32	17/32	5/32	3/4	500	125
CL-5-LE	5/16-18	1-1/8	7/8	1-7/16	1-21/32	9/32	19/32	5/32	15/16	900	225
CL-6-LE	3/8-16	1-1/4	1	1-11/16	1-31/32	11/32	21/32	5/32	1-1/8	1300	325
CL-8-LE	1/2-13	1-1/2	1-3/16	2-1/8	2-7/16	15/32	29/32	7/32	1-3/8	2400	600
CL-10-LE	5/8-11	1-3/4	1-3/8	2-9/16	2-15/16	19/32	1-1/32	9/32	1-21/32	4000	1000
CL-12-LE	3/4-10	2	1-1/2	2-13/16	3-7/32	21/32	1-3/16	9/32	1-13/16	5000	1250
CL-16-LE	1"-8	2-1/2	1-3/4	3-19/16	4-3/32	29/32	1-9/16	13/32	2-5/16	9000	2250

# HOIST RING ACCESSORIES



High-strength forged alloy-steel anchor shackle. Supplied with thin-head bolt and nut with cotter pin. Meets Federal Specification RR-C 271D, Type IVA, Grade A, Class 3. Safety factor = 6:1. Heat treated with black oxide finish. **INFO+**: See general Hoist Ring Safety Precautions on page 60.



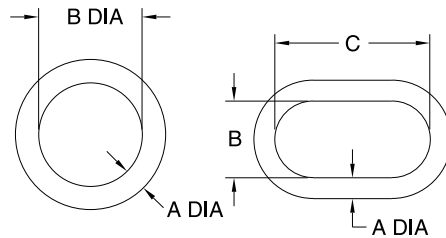
**Forged Anchor Shackles**

**FORGED ANCHOR SHACKLES (INCH)**

PART NO.	LOAD RATING (LBS)	NOMINAL SHACKLE SIZE	A	B	C	D	E	F	G DIA.	H	J	K
CL-36511-FAS	2000	3/8	2.49	1.78	.38	1.03	.66	1.44	.44	2.17	.91	3/8
CL-36521-FAS	3000	7/16	2.91	2.03	.44	1.16	.75	1.69	.50	2.51	1.06	7/16
CL-36531-FAS	4000	1/2	3.28	2.31	.50	1.31	.81	1.88	.63	2.80	1.19	1/2
CL-36541-FAS	6500	5/8	4.19	2.94	.69	1.69	1.06	2.38	.75	3.53	1.50	5/8
CL-36551-FAS	13000	7/8	5.83	4.03	.97	2.28	1.44	3.31	1.00	4.71	2.09	7/8
CL-36561-FAS	19000	1-1/8	7.47	5.16	1.25	2.91	1.81	4.25	1.25	5.09	2.69	1-1/8
CL-36571-FAS	24000	1-1/4	8.25	5.75	1.38	3.25	2.03	4.69	1.38	6.51	3.00	1-1/4



**Forged Rings**



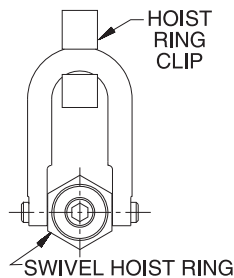
High-strength weldless forged alloy-steel ring. Meets Federal Specification RR-C 271D, Type VI. Safety factor = 6:1. Heat treated with black oxide finish. The largest-size Forged Ring (49000 lbs capacity) is oval shaped. **INFO+**: See general Hoist Ring Safety Precautions on page 60.

**FORGED RINGS**

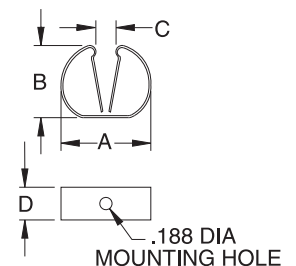
PART NO.	LOAD RATING (LBS)	A DIA.	B DIA.	C
CL-36111-FR	3800	3/8	2	—
CL-36121-FR	6100	5/8	3	—
CL-36131-FR	18000	1	4	—
CL-36141-FR	30000	1-3/8	6	—
CL-36151-FR	49000	1-1/2	5-1/4	10-1/2



**Hoist-Ring Clips**



Handy holddown clip to keep Swivel Hoist Rings and Side-Pull Hoist Rings from rotating when not in use. Spring steel, zinc plated. Available in two sizes, one fitting ring diameters from 3/8" to 5/8", the other fitting ring diameters from 3/4" to 1-1/16".









**HOIST-RING CLIPS**

PART NO.	FITS RING DIAMETER	A	B	C	D
CL-1-HRC	3/8, 7/16, 5/8	1-3/8	15/16	5/16	1/2
CL-2-HRC	3/4, 1-1/16	1-5/8	1-1/4	3/4	5/8

# HAND KNOBS







## TYPES

3

	MADE IN THE USA	ALUMINUM	STEEL	CAST IRON	STAINLESS STEEL	PLASTIC
 <p><b>PALM-GRIP HAND KNOBS</b> Polished full-grip hand knob. Choose from two sizes, each available blank, tapped, or reamed.</p>	X	X				
 <p><b>FLUTED KNOBS</b> Large easy-grip knob that is excellent for either fine adjustment or high-torque applications.</p>	X					X
 <p><b>STAR KNOBS</b> Five lobes provide a firm, sure grip for applications requiring quick tightening and high torque.</p>	X					X
 <p><b>HAND KNOBS – CAST IRON</b> Classic easy-to-grip clamping knob. Choose from five sizes, each available blank, tapped, tapped through, or reamed.</p>	X			X		
 <p><b>HAND KNOBS – ALUMINUM</b> Classic easy-to-grip clamping knob. Choose from five sizes, each available blank, tapped, tapped through, or reamed.</p>	X	X				
 <p><b>HAND KNOBS – STAINLESS STEEL</b> High-quality beautiful polished finish. Four-prong design provides a firm grip for applications requiring quick tightening and high torque.</p>	X				X	
 <p><b>HAND KNOB ASSEMBLIES</b> Classic, easy-to-grip aluminum knob with an integral steel clamping screw.</p>	X	X				

# HAND KNOBS

## TYPES

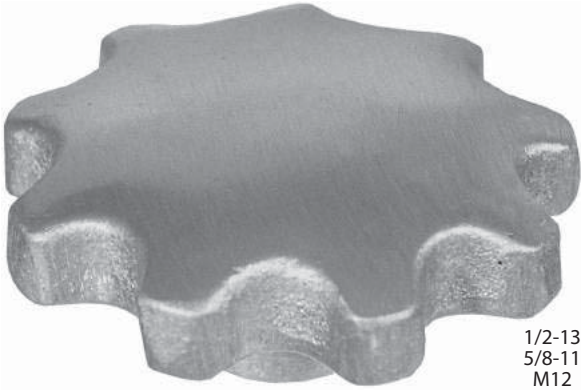
		MADE IN THE USA	ALUMINUM	STEEL	CAST IRON	STAINLESS STEEL	PLASTIC
	<p><b>SWIVEL-WASHER HAND KNOB ASSEMBLIES</b></p> <p>Hand-knob assembly with a captive, freely rotating washer to prevent marring in clamping applications. Now available with a choice of steel or nylon washer.</p>	X	X				
	<p><b>KNOB SHOE ASSEMBLIES</b></p> <p>Features an integral steel clamping screw with a removable swivel foot. Uses our patented left-hand-thread swivel foot system.</p>	X	X				
	<p><b>FOUR PRONG KNOBS</b></p> <p>Design provides a strong grip for clamping and other applications requiring quick tightening and high torque.</p>	X					X
	<p><b>QUICK-ACTING KNOBS</b></p> <p>Slides in and out of clamping position quickly; ideal when the knob must be completely removed for loading.</p>	X			X		
	<p><b>BAR KNOBS</b></p> <p>Heavy-duty knob that can be turned easily by hand, then tightened by inserting a bar between the prongs.</p>	X				X	
	<p><b>THREE-PRONG KNOBS</b></p> <p>Modern design provides quick tightening and high torque. Textured non-slip, non-glare finish.</p>	X					X
	<p><b>T-HANDLE KNOBS</b></p> <p>Provides maximum leverage for heavy-duty clamping.</p>	X					

3

# PALM-GRIP HAND KNOBS

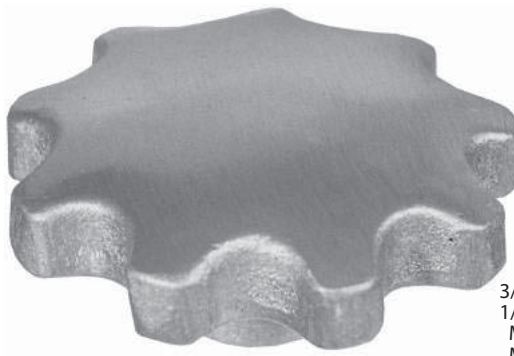
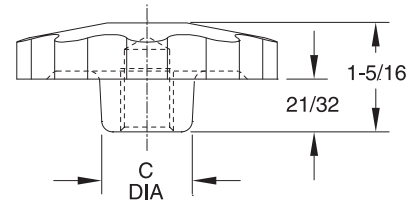
319 ALUMINUM ALLOY

3

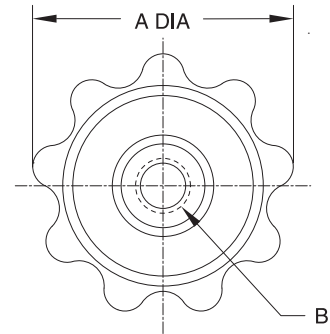


1/2-13  
5/8-11  
M12  
M16

Polished full-grip hand knob. Choose from two knob sizes, each available blank, tapped or reamed.  
Note: Catalog photos are actual size.

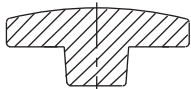


3/8-16  
1/2-13  
M10  
M12

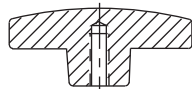


## INCH & METRIC

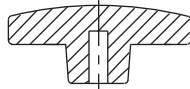
PART NO.	A DIA	C DIA	HOLE TYPE	B		
CL-11-PHK	2-3/4	1	BLANK	—		
CL-13-PHK			TAPPED	3/8-16 X 3/4 DEEP		
CL-14-PHK			TAPPED	1/2-13 X 3/4 DEEP		
CLM-13-PHK			TAPPED	M10 X 3/4 DEEP		
CLM-14-PHK			TAPPED	M12 X 3/4 DEEP		
CL-12-PHK			REAMED	3/8 X 7/8 DEEP		
CL-15-PHK			REAMED	1/2 X 7/8 DEEP		
CLM-12-PHK			REAMED	10mm X 7/8 DEEP		
CLM-15-PHK			REAMED	12mm X 7/8 DEEP		
CL-21-PHK			3-1/8	1	BLANK	—
CL-23-PHK					TAPPED	1/2-13 X 3/4 DEEP
CL-24-PHK					TAPPED	5/8-11 X 3/4 DEEP
CLM-23-PHK					TAPPED	M12 X 3/4 DEEP
CLM-24-PHK					TAPPED	M16 X 3/4 DEEP
CL-22-PHK					REAMED	1/2 X 7/8 DEEP
CL-25-PHK	REAMED	5/8 X 1 DEEP				
CLM-22-PHK	REAMED	12mm X 7/8 DEEP				
CLM-25-PHK	REAMED	16mm X 1 DEEP				



Blank



Tapped



Reamed



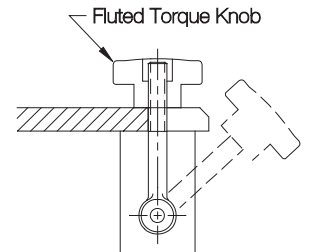
# FLUTED KNOBS

BLACK PHENOLIC PLASTIC OR THERMOPLASTIC WITH BRASS INSERT

## Phenolic — Tapped



Large easy-grip knob that is excellent for either fine-adjustment or high-torque applications. Molded-in brass insert provides superior thread strength. Choice of four knob sizes. Non-standard thread sizes, reamed holes, or molded-in studs are available in quantities of 500 and above. Note: Catalog photos are actual size.



3

1/2-13 CL-88-PFK  
5/8-11 CL-810-PFK

## Phenolic — Tapped Through Hole



3/8-16 CL-66-PFK  
1/2-13 CL-68-PFK  
M12 CLM-612-PFK



3/8-16 CL-660-PFK

## Phenolic — Tapped Short Hub



3/8-16 CL-666-PFK



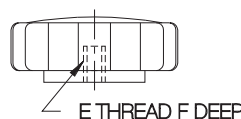
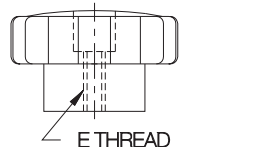
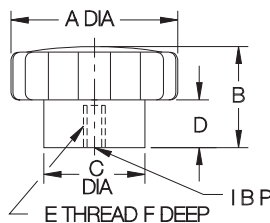
3/8-16 CL-466-PFK



5/16-18 CL-450-PFK



1/4-20 CL-44-PFK  
5/16-18 CL-45-PFK  
3/8-16 CL-46-PFK  
M8 CLM-48-PFK  
M10 CLM-410-PFK



#10-32 CL-23-PFK  
1/4-20 CL-24-PFK  
5/16-18 CL-25-PFK  
M6 CLM-26-PFK

## PHENOLIC — TAPPED (INCH & METRIC)

PART NO.	A DIA	B	C DIA	D	E	F
CL-23-PFK	1-3/8	27/32	27/32	25/64	#10-32	5/16
CL-24-PFK					1/4-20	7/16
CL-25-PFK					5/16-18	
CLM-26-PFK	1-3/4	1-1/16	1-1/16	1/2	M6	7/16
CL-44-PFK					1/4-20	
CL-45-PFK					5/16-18	
CL-46-PFK	2-3/8	1-5/16	1-1/4	5/8	3/8-16	1/2
CLM-48-PFK					M8	7/16
CLM-410-PFK					M10	
CL-66-PFK	3-1/4	1-25/32	2	7/8	3/8-16	1/2
CL-68-PFK					1/2-13	5/8
CLM-612-PFK					M12	
CL-88-PFK	1-3/4	1-9/32	1-1/4	5/8	1/2-13	5/8
CL-810-PFK					5/8-11	3/4

## PHENOLIC — TAPPED THROUGH HOLE (INCH)

CL-450-PFK	1-3/4	61/64	1-1/16	1/2	5/16-18	5/8
CL-660-PFK	2-3/8	1-9/32	1-1/4	5/8	3/8-16	5/8

## PHENOLIC — TAPPED, SHORT HUB (INCH)

CL-466-PFK	1-3/4	11/16	3/4	1/8	3/8-16	3/8
CL-666-PFK	2-3/8	13/16	3/4	1/8	3/8-16	1/2

# FLUTED KNOBS

BLACK THERMOPLASTIC OR PHENOLIC PLASTIC WITH BRASS INSERT

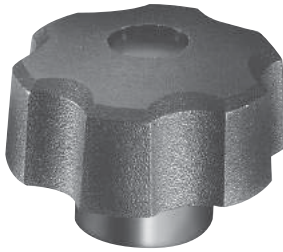
## Thermoplastic — Tapped



5/16-18 CL-750-PFK  
3/8-16 CL-760-PFK



5/16-18 CL-550-PFK  
3/8-16 CL-560-PFK



1/4-20 CL-340-PFK  
5/16-18 CL-350-PFK

**INFO+:** Thermoplastic version of the Fluted Knobs on page 79, with a textured non-slip, non-glare finish. Choice of three knob sizes. Molded-in brass insert provides superior thread strength. Non-standard thread sizes, reamed holes, molded-in studs, or special colors are available in quantities of 500 and above. Note: Catalog photos are actual size.

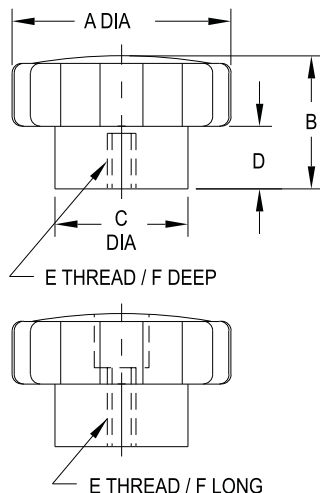
## Thermoplastic — Tapped Through Hole



5/16-18 CL-551-PFK  
3/8-16 CL-561-PFK



1/4-20 CL-341-PFK  
5/16-18 CL-351-PFK



### THERMOPLASTIC — TAPPED

PART NO.	A DIA	B	C DIA	D	E	F
CL-340-PFK	1-1/2	1	3/4	3/8	1/4-20	5/8
CL-350-PFK					5/16-18	
CL-550-PFK	2-5/32	1-1/8	3/4	3/8	5/16-18	3/4
CL-560-PFK					3/8-16	
CL-750-PFK	3-1/4	1-5/8	2	3/4	5/16-18	3/4
CL-760-PFK					3/8-16	

### THERMOPLASTIC — TAPPED THROUGH HOLE

CL-341-PFK	1-1/2	1	3/4	3/8	1/4-20	5/8
CL-351-PFK					5/16-18	
CL-551-PFK	2-5/32	1-1/8	3/4	3/8	5/16-18	7/8
CL-561-PFK					3/8-16	

# STAR KNOBS

BLACK THERMOPLASTIC OR CUSHION-GRIP PLASTIC WITH BRASS INSERT

## Thermoplastic — Tapped

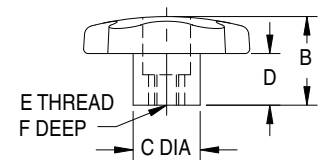
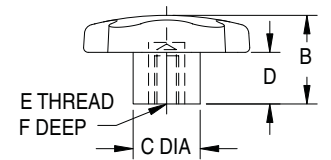
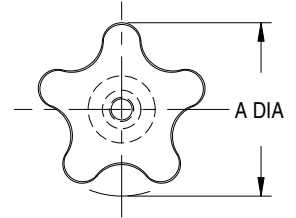


1/4-20 CL-632-SK  
5/16-18 CL-642-SK  
3/8-16 CL-652-SK

## Thermoplastic — Tapped Through Hole



1/4-20 CL-636-SK  
5/16-18 CL-646-SK  
3/8-16 CL-656-SK



Star Knobs have five lobes to provide a firm, sure grip for applications requiring quick tightening and high torque. Smooth, rounded lobes prevent snagging. Thermoplastic version has a textured, non-slip, non-glare finish. Cushion-Grip version is made from a unique material that feels soft to the touch, comfortable yet rugged. Molded-in brass insert provides superior thread strength. Non-standard thread sizes, reamed holes, molded-in studs, or special colors are available in quantities of 500 and above. Note: Catalog photos are actual size.

## Cushion Grip — Tapped



5/16-18 CL-755-SK  
3/8-16 CL-765-SK



1/4-20 CL-545-SK  
5/16-18 CL-555-SK  
3/8-16 CL-565-SK



1/4-20 CL-345-SK  
5/16-18 CL-355-SK

### THERMOPLASTIC — TAPPED

PART NO.	A DIA	B	C DIA	D	E	F
CL-632-SK	2-1/4	1	7/8	1/2	1/4-20	1/2
CL-642-SK					5/16-18	5/8
CL-652-SK					3/8-16	1/2

### THERMOPLASTIC — TAPPED THROUGH HOLE

PART NO.	A DIA	B	C DIA	D	E	F
CL-636-SK	2-1/4	1	7/8	1/2	1/4-20	5/8
CL-646-SK					5/16-18	
CL-656-SK					3/8-16	

### CUSHION GRIP — TAPPED

PART NO.	A DIA	B	C DIA	D	E	F
CL-345-SK	1-1/2	1-3/32	11/16	15/64	1/4-20	5/8
CL-355-SK					5/16-18	
CL-545-SK	2	1-3/8	3/4	33/64	1/4-20	5/8
CL-555-SK					5/16-18	
CL-565-SK					3/8-16	
CL-755-SK	2-3/8	1-5/8	3/4	11/16	5/16-18	5/8
CL-765-SK					3/8-16	

# HAND KNOBS

CAST IRON, ZINC PLATED CLEAR CHROMATE  
OR 319 ALUMINUM ALLOY



5/8-11  
3/4-10  
M16  
M20



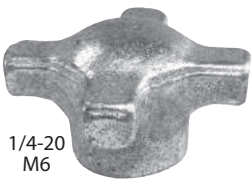
1/2-13  
5/8-11  
M12  
M16



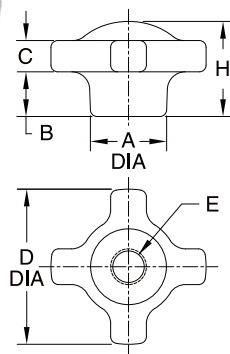
3/8-16  
1/2-13  
M10  
M12



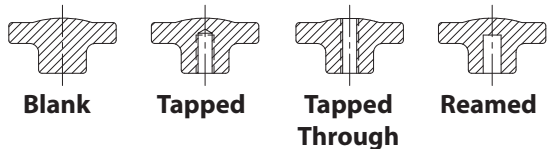
1/4-20  
5/16-18  
M6  
M8



1/4-20  
M6



Classic easy-to-grip clamping knob, available in cast iron or aluminum. Choose from five knob sizes, each available blank, tapped, tapped through, or reamed. Note: catalog photos are actual size.



## INCH & METRIC

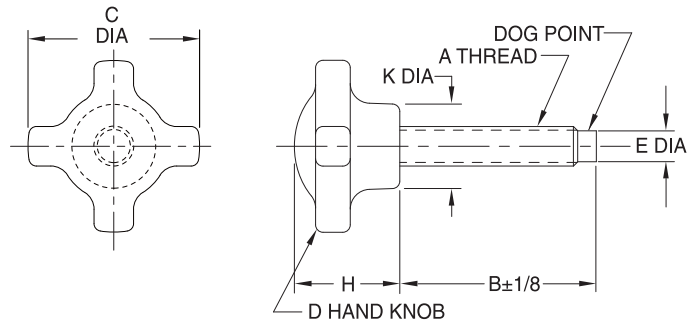
PART NO. CAST IRON	PART NO. ALUMINUM	D DIA	A DIA	B	C	H	HOLE TYPE	E
CL-85-HK-8	CL-85-HK-8A	1-1/8	9/16	5/16	5/16	7/8	BLANK	—
CL-80-HK-8	CL-80-HK-8A						TAPPED	1/4-20 x 1/2 DEEP
CLM-80-HK-8	CLM-80-HK-8A						TAPPED	M6 x 1/2 DEEP
CL-8-HK-8	CL-8-HK-8A						THROUGH	1/4-20
CLM-8-HK-8	CLM-8-HK-8A	1-3/4	3/4	1/2	3/8	1-1/8	THROUGH	M6
CLM-28-HK-8	CLM-28-HK-8A						REAMED	1/4 x 1/2 DEEP
CLM-28-HK-8	CLM-28-HK-8A						REAMED	6mm x 1/2 DEEP
CL-25-HK-2	CL-25-HK-2A						BLANK	—
CL-10-HK-2	CL-10-HK-2A	2-1/8	1	5/8	7/16	1-3/8	TAPPED	1/4-20 x 7/8 DEEP
CL-20-HK-2	CL-20-HK-2A						TAPPED	5/16-18 x 7/8 DEEP
CLM-10-HK-2	CLM-10-HK-2A						TAPPED	M6 x 7/8 DEEP
CLM-20-HK-2	CLM-20-HK-2A						TAPPED	M8 x 7/8 DEEP
CL-1-HK-2	CL-1-HK-2A						THROUGH	1/4-20
CL-2-HK-2	CL-2-HK-2A						THROUGH	5/16-18
CLM-1-HK-2	CLM-1-HK-2A						THROUGH	M6
CLM-2-HK-2	CLM-2-HK-2A						THROUGH	M8
CL-21-HK-2	CL-21-HK-2A						REAMED	1/4 x 7/8 DEEP
CL-22-HK-2	CL-22-HK-2A						REAMED	5/16 x 7/8 DEEP
CLM-21-HK-2	CLM-21-HK-2A						REAMED	6mm x 7/8 DEEP
CLM-22-HK-2	CLM-22-HK-2A						REAMED	8mm x 7/8 DEEP
CL-45-HK-4	CL-45-HK-4A	2-1/8	1	5/8	7/16	1-3/8	BLANK	—
CL-20-HK-4	CL-20-HK-4A						TAPPED	5/16-18 x 1 DEEP
CL-30-HK-4	CL-30-HK-4A						TAPPED	3/8-16 x 1 DEEP
CL-40-HK-4	CL-40-HK-4A						TAPPED	1/2-13 x 1 DEEP
CLM-20-HK-4	CLM-20-HK-4A						TAPPED	M8 x 1 DEEP
CLM-30-HK-4	CLM-30-HK-4A						TAPPED	M10 x 1 DEEP
CLM-40-HK-4	CLM-40-HK-4A						TAPPED	M12 x 1 DEEP
CL-2-HK-4	CL-2-HK-4A						THROUGH	5/16-18
CL-3-HK-4	CL-3-HK-4A						THROUGH	3/8-16
CL-4-HK-4	CL-4-HK-4A						THROUGH	1/2-13
CLM-2-HK-4	CLM-2-HK-4A						THROUGH	M8
CLM-3-HK-4	CLM-3-HK-4A						THROUGH	M10
CLM-4-HK-4	CLM-4-HK-4A						THROUGH	M12
CL-23-HK-4	CL-23-HK-4A						REAMED	3/8 x 1 DEEP
CL-24-HK-4	CL-24-HK-4A						REAMED	1/2 x 1 DEEP
CLM-23-HK-4	CLM-23-HK-4A						REAMED	10mm x 1 DEEP
CLM-24-HK-4	CLM-24-HK-4A	REAMED	12mm x 1 DEEP					
CL-105-HK-10	CL-105-HK-10A	2-1/2	1-1/8	1	1/2	1-5/8	BLANK	—
CL-90-HK-9	CL-90-HK-9A						TAPPED	1/2-13 x 1-1/4 DEEP
CL-100-HK-10	CL-100-HK-10A						TAPPED	5/8-11 x 1-1/4 DEEP
CLM-90-HK-9	CLM-90-HK-9A						TAPPED	M12 x 1-1/4 DEEP
CLM-100-HK-10A	CLM-100-HK-10A						TAPPED	M16 x 1-1/4 DEEP
CL-9-HK-9	CL-9-HK-9A						THROUGH	1/2-13
CL-10-HK-10	CL-10-HK-10A						THROUGH	5/8-11
CLM-9-HK-9	CLM-9-HK-9A						THROUGH	M12
CLM-10-HK-10	CLM-10-HK-10A						THROUGH	M16
CL-29-HK-9	CL-29-HK-9A						REAMED	1/2 x 1-1/4 DEEP
CL-31-HK-10	CL-31-HK-10A						REAMED	5/8 x 1-1/4 DEEP
CLM-29-HK-9	CLM-29-HK-9A						REAMED	12mm x 1-1/4 DEEP
CLM-31-HK-10	CLM-31-HK-10A	REAMED	16mm x 1-1/4 DEEP					
CL-65-HK-6	CL-65-HK-6A	2-3/4	1-3/8	3/4	1/2	1-1/2	BLANK	—
CL-50-HK-6	CL-50-HK-6A						TAPPED	5/8-11 x 1-1/8 DEEP
CL-60-HK-6	CL-60-HK-6A						TAPPED	3/4-10 x 1-1/8 DEEP
CLM-50-HK-6	CLM-50-HK-6A						TAPPED	M16 x 1-1/8 DEEP
CLM-60-HK-6	CLM-60-HK-6A						TAPPED	M20 x 1-1/8 DEEP
CL-5-HK-6	CL-5-HK-6A						THROUGH	5/8-11
CL-6-HK-6	CL-6-HK-6A						THROUGH	3/4-10
CLM-5-HK-6	CLM-5-HK-6A						THROUGH	M16
CLM-6-HK-6	CLM-6-HK-6A						THROUGH	M20
CL-25-HK-6	CL-25-HK-6A						REAMED	5/8 x 1-1/8 DEEP
CL-26-HK-6	CL-26-HK-6A						REAMED	3/4 x 1-1/8 DEEP
CLM-25-HK-6	CLM-25-HK-6A						REAMED	16mm x 1-1/8 DEEP
CLM-26-HK-6	CLM-26-HK-6A	REAMED	20mm x 1-1/8 DEEP					

# HAND KNOB ASSEMBLIES

KNOB: 319 ALUMINUM ALLOY  
SCREW: 12L14 STEEL, BLACK OXIDE FINISH OR ZINC PLATED CLEAR CHROMATE



Classic, easy-to-grip aluminum knob with an integral steel clamping screw. Four-prong design provides a firm grip for applications requiring quick tightening and high torque. Choice of three knob sizes. Available in thread sizes from 1/4-20 to 3/4-10 (M6 to M20 in metric), most in a choice of several thread lengths. **INFO+**: See page 82 for additional hand-knob dimensions.



## INCH

PART NO.	A	B	C DIA	D	E DIA	H	K DIA
CL-1-HK2T	1/4-20	1	1-3/4	CL-25-HK-2A	.15	1-1/8	3/4
CL-2-HK2T		1-1/2					
CL-2A-HK2T		2					
CL-2B-HK2T		3					
CL-3A-HK2T	5/16-18	1	1-3/4	CL-25-HK-2A	.20	1-1/8	3/4
CL-3-HK2T		1-3/4					
CL-4-HK2T		2-1/2					
CL-4A-HK2T		3					
CL-5A-HK4T	3/8-16	1	2-1/8	CL-45-HK-4A	.25	1-3/8	1
CL-5B-HK4T		1-1/2					
CL-5-HK4T		2					
CL-6-HK4T		2-1/2					
CL-6A-HK4T	1/2-13	3	2-1/8	CL-45-HK-4A	.34	1-3/8	1
CL-7A-HK4T		1					
CL-7B-HK4T		1-1/2					
CL-7C-HK4T		2					
CL-7-HK4T	1/2-13	2-1/2	2-1/8	CL-45-HK-4A	.34	1-3/8	1
CL-8-HK4T		3					
CL-9-HK6T	5/8-11	1-3/4	2-3/4	CL-65-HK-6A	.46	1-1/2	1-3/8
CL-10-HK6T		3					
CL-12-HK6T	3/4-10	3	2-3/4	CL-65-HK-6A	.56	1-1/2	1-3/8

## METRIC

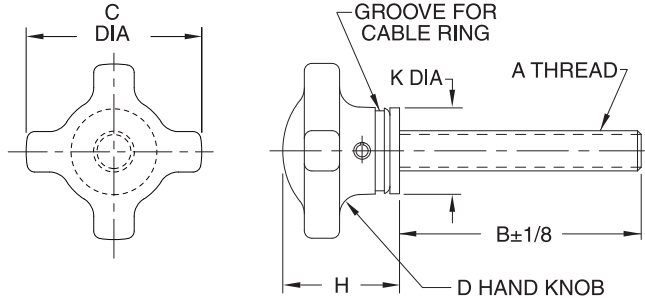
PART NO.	A	B	C DIA	D	E DIA	H	K DIA
CLM-1-HK2T	M6	.98	1-3/4	CL-25-HK-2A	.17	1-1/8	3/4
CLM-2-HK2T		1.57					
CLM-3A-HK2T	M8	.98	1-3/4	CL-25-HK-2A	.23	1-1/8	3/4
CLM-3-HK2T		1.77					
CLM-4-HK2T	M10	2.56	2-1/8	CL-45-HK-4A	.27	1-3/8	1
CLM-5A-HK4T		.98					
CLM-5B-HK4T		1.57					
CLM-5-HK4T		1.97					
CLM-6-HK4T	M12	2.56	2-1/8	CL-45-HK-4A	.35	1-3/8	1
CLM-7A-HK4T		.98					
CLM-7B-HK4T		1.57					
CLM-7C-HK4T		1.97					
CLM-7-HK4T	M16	2.56	2-3/4	CL-65-HK-6A	.47	1-1/2	1-3/8
CLM-8-HK4T		2.95					
CLM-9-HK6T	M20	1.77	2-3/4	CL-65-HK-6A	.59	1-1/2	1-3/8
CLM-10-HK6T		2.95					
CLM-12-HK6T	M20	2.95	2-3/4	CL-65-HK-6A	.59	1-1/2	1-3/8

# SWIVEL-WASHER HAND KNOB ASSEMBLIES

KNOB: 319 ALUMINUM ALLOY  
 SCREW: 12L14 STEEL, BLACK OXIDE FINISH.  
 WASHER: MILD STEEL (OR NYLON)



3



Now also available with nylon washer!

Hand-knob assembly with a captive, freely rotating washer to prevent marring in clamping applications. Four-prong design provides a firm grip for applications requiring quick tightening and high torque. Plain-end screw with no dogpoint. Choice of three knob sizes. Available in thread sizes from 1/4-20 to 3/4-10, most in a choice of several thread lengths. **INFO+**: See page 82 for additional hand-knob dimensions.

## ASSEMBLY WITH STEEL WASHER (INCH)

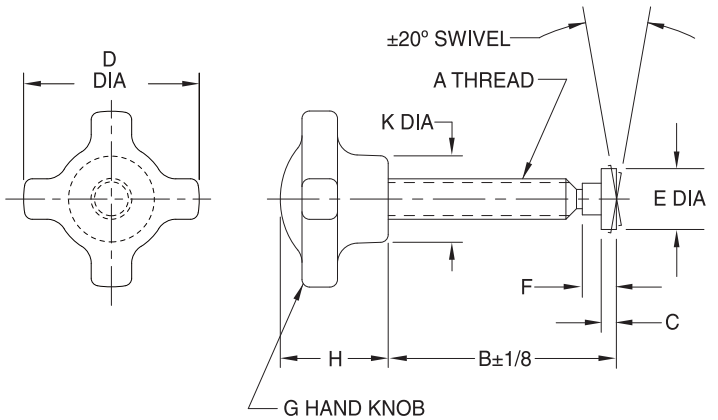
PART NO.	A	B	C DIA	D	H	K DIA	CABLE RING SIZE
CL-1-SHK2T	1/4-20	1	1-3/4	CL-25-HK-2A	1.33	3/4	CL-11-KR
CL-2-SHK2T		1-1/2					
CL-2A-SHK2T		2					
CL-2B-SHK2T		3					
CL-3A-SHK2T	5/16-18	1	1-3/4	CL-25-HK-2A	1.34	3/4	CL-11-KR
CL-3-SHK2T		1-3/4					
CL-4-SHK2T		2-1/2					
CL-4A-SHK2T		3					
CL-5A-SHK4T	3/8-16	1	2-1/8	CL-45-HK-4A	1.47	1	CL-14-KR
CL-5B-SHK4T		1-1/2					
CL-5-SHK4T		2					
CL-6-SHK4T		2-1/2					
CL-6A-SHK4T	1/2-13	3	2-1/8	CL-45-HK-4A	1.53	1	CL-14-KR
CL-7A-SHK4T		1					
CL-7B-SHK4T		1-1/2					
CL-7C-SHK4T		2					
CL-7-SHK4T	1/2-13	2-1/2	2-1/8	CL-45-HK-4A	1.53	1	CL-14-KR
CL-8-SHK4T		3					
CL-9-SHK6T	5/8-11	1-3/4	2-3/4	CL-65-HK-6A	1.66	1-3/8	CL-19-KR
CL-10-SHK6T		3					
CL-12-SHK6T	3/4-10	3	2-3/4	CL-65-HK-6A	1.77	1-3/8	CL-19-KR

## ASSEMBLY WITH NYLON WASHER (INCH)

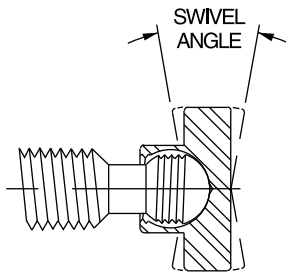
PART NO.	A	B	C DIA	D	H	K DIA	CABLE RING SIZE
CL-1-SHK2TN	1/4-20	1	1-3/4	CL-25-HK-2A	1.33	3/4	CL-11-KR
CL-2-SHK2TN		1-1/2					
CL-3-SHK2TN	5/16-18	1-3/4	1-3/4	CL-25-HK-2A	1.34	3/4	CL-11-KR
CL-5A-SHK4TN	3/8-16	1	2-1/8	CL-45-HK-4A	1.47	1	CL-14-KR
CL-7A-SHK4TN	1/2-13	1					
CL-7B-SHK4TN		1-1/2	1	2-1/8	CL-45-HK-4A	1.53	1

# KNOB SHOE ASSEMBLIES

KNOB: 319 ALUMINUM ALLOY  
 SCREW: 12L14 STEEL, BLACK OXIDE FINISH OR ZINC PLATED YELLOW CHROMATE  
 FOOT: 12L14 STEEL, BLACK OXIDE FINISH OR ZINC PLATED YELLOW CHROMATE (OR DELRIN®)



This hand-knob assembly features an integral steel clamping screw with a removable swivel foot. Four-prong design provides a firm grip for applications requiring quick tightening and high torque. Choice of four knob sizes. Available in thread sizes from 1/4-20 to 3/4-10 (M6 to M20 in metric), most in a choice of several thread lengths. **INFO+**: See page 82 for additional hand-knob dimensions.



Knob Shoe Assemblies use our patented left-hand-thread swivel-foot system. The ball end of the body screws into the foot for easy installation and removal. Once the ball threads pass beyond the foot threads, the foot can rotate and pivot freely (20° total angle). Foot threads are left-hand to positively prevent accidental backout during use. Delrin® feet are optional. To order with a Delrin® foot, add "N" to the part number, e.g. CL-1-KSAN. Note: Delrin® feet are not threaded – they snap on and off. **INFO+**: For other foot types, see Feet for Swivel Screws on page 100 (order separately).

## INCH

PART NO.	A	B	C	D DIA	E DIA	F	G	H	K DIA
CL-1-KSA	1/4-20	1-1/4	1/8	1-1/8	3/8	5/16	CL-85-HK-8A	7/8	9/16
CL-2-KSA		2							
CL-2A-KSA	1/4-20	2	1/8	1-3/4	3/8	5/16	CL-25-HK-2A	1-1/8	3/4
CL-3-KSA	3/8-16	1-1/2	5/32	1-3/4	1/2	11/32	CL-25-HK-2A	1-1/8	3/4
CL-4-KSA		2-1/4							
CL-4A-KSA		2							
CL-5-KSA	3/8-16	2-1/16	3/16	2-1/8	9/16	7/16	CL-45-HK-4A	1-3/8	1
CL-6-KSA		2-13/16							
CL-7-KSA		3-9/16							
CL-8-KSA		2-13/16			3/4	27/64			
CL-9-KSA	1/2-13	3-9/16							
CL-10-KSA		4-5/16							
CL-11-KSA	5/8-11	3-5/16	7/32	2-3/4	15/16	33/64	CL-65-HK-6A	1-1/2	1-3/8
CL-13-KSA		4-13/16							
CL-14-KSA	3/4-10	3-5/16							
CL-16-KSA		4-13/16							

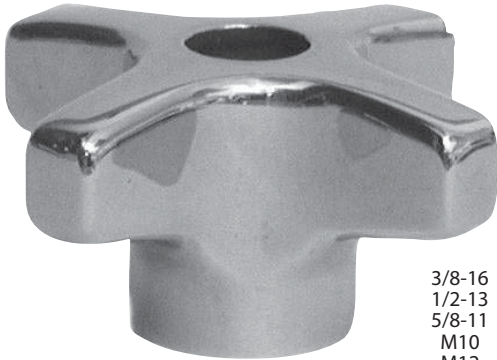
## METRIC

PART NO.	A	B	C	D DIA	E DIA	F	G	H	K DIA
CLM-1-KSA	M6	.98	1/8	1-1/8	3/8	5/16	CL-85-HK-8A	7/8	9/16
CLM-2-KSA		1.97							
CLM-3-KSA	M8	1.57	5/32	1-3/4	1/2	11/32	CL-25-HK-2A	1-1/8	3/4
CLM-4-KSA		2.36							
CLM-5-KSA	M10	1.97	3/16	2-1/8	9/16	7/16	CL-45-HK-4A	1-3/8	1
CLM-6-KSA		3.54							
CLM-7-KSA		2.76			3/4	27/64			
CLM-8-KSA	M12	4.33							
CLM-9-KSA	M16	3.15	7/32	2-3/4	5/16	33/64	CL-65-HK-6A	1-1/2	1-3/8
CLM-10-KSA		4.72							

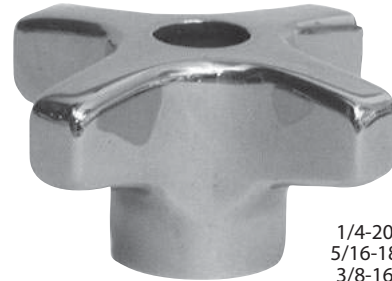
# HAND KNOBS STAINLESS STEEL

300-SERIES STAINLESS STEEL

3

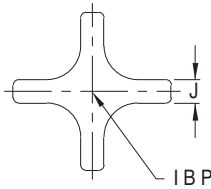


3/8-16  
1/2-13  
5/8-11  
M10  
M12  
M16

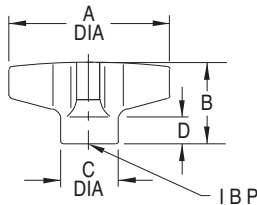


1/4-20  
5/16-18  
3/8-16  
M6  
M8  
M10

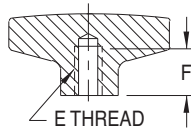
High-quality, stainless steel knob with a beautiful polished finish. Four-prong design provides a firm grip for applications requiring quick tightening and high torque. Choose from two knob sizes, each available blank, tapped, tapped through, or reamed. Note: Catalog photos are actual size.



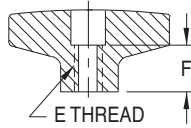
Blank



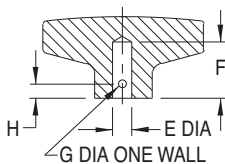
Tapped



Tapped Through Hole



Reamed



## INCH & METRIC

PART NO.	A DIA	B	C DIA	D	HOLE TYPE	E	F	G	H	J
CL-200-HK-S	2	1.02	.78	.34	BLANK	—	—	—	—	.33
CL-240-HK-S					TAPPED	1/4-20	11/16	—	—	
CL-250-HK-S						5/16-18				
CL-260-HK-S						3/8-16				
CLM-260-HK-S						M6				
CLM-280-HK-S					M8	1/2	—	—		
CLM-2100-HK-S					M10					
CL-241-HK-S					1/4-20					
CL-251-HK-S					5/16-18					
CL-261-HK-S					3/8-16	3/4	—	—		
CLM-261-HK-S	M6	1/2								
CLM-281-HK-S	M8	5/8								
CLM-2101-HK-S	M10	3/4								
CL-255-HK-S	2	1.02	.78	.34	REAMED	5/16	11/16	1/8	3/16	
CL-265-HK-S					3/8	5/32				
CL-600-HK-S	3	1.50	1.14	.50	BLANK	—	—	—	—	.47
CL-660-HK-S					TAPPED	3/8-16	1	—	—	
CL-680-HK-S						1/2-13				
CL-6100-HK-S						5/8-11				
CLM-6100-HK-S						M10				
CLM-6120-HK-S						M12				
CLM-6160-HK-S					M16					
CL-661-HK-S					TAPPED THROUGH	3/8-16	3/4	—	—	
CL-681-HK-S						1/2-13	1			
CL-6101-HK-S						5/8-11	1-1/4			
CLM-6101-HK-S						M10	1			
CLM-6121-HK-S						M12				
CLM-6161-HK-S					M16					
CL-665-HK-S					REAMED	3/8	1	5/32	1/4	
CL-685-HK-S						1/2				



# FOUR-PRONG KNOBS

KNOB: BLACK PHENOLIC PLASTIC WITH BRASS INSERT  
STUD: MILD STEEL, ZINC PLATED CLEAR CHROMATE

## Phenolic — Tapped



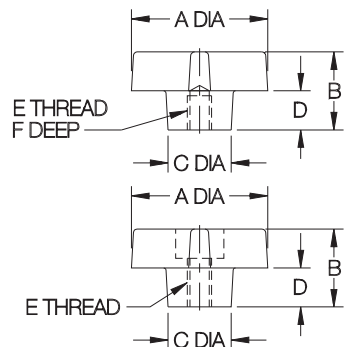
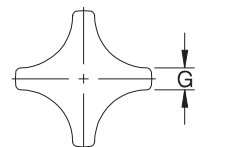
5/16-18 CL-20-PPK-4  
3/8-16 CL-30-PPK-4  
1/2-13 CL-40-PPK-4  
M10 CLM-10-PPK-4



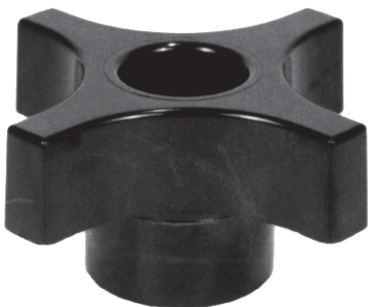
1/4-20 CL-10-PPK-2  
5/16-18 CL-20-PPK-2  
3/8-16 CL-30-PPK-2  
M8 CLM-8-PPK-2



#10-24 CL-10B-PPK-1  
#10-32 CL-10A-PPK-1  
1/4-20 CL-10-PPK-1  
5/16-18 CL-20-PPK-1  
M6 CLM-6-PPK-1



## Phenolic — Tapped Through Hole



5/16-18 CL-2-PPK-4  
3/8-16 CL-3-PPK-4  
1/2-13 CL-4-PPK-4



1/4-20 CL-1-PPK-2  
5/16-18 CL-2-PPK-2  
3/8-16 CL-3-PPK-2



#10-24 CL-1B-PPK-1  
#10-32 CL-1A-PPK-1  
1/4-20 CL-1-PPK-1

Four-prong design provides a strong grip for clamping and other applications requiring quick tightening and high torque. Choice of three knob sizes. Molded-in brass insert provides superior thread strength. **INFO+**: Also available with a molded-in clamping stud (page 88). Non-standard thread sizes, reamed holes, or other lengths of molded-in studs are available in quantities of 500 and above. Note: Catalog photos are actual size.

### PHENOLIC — TAPPED (INCH & METRIC)

PART NO.	A	B	C DIA	D	E	F	G
CL-10B-PPK-1	1-1/4	7/8	5/8	3/8	#10-24	5/16	1/4
CL-10A-PPK-1					#10-32		
CL-10-PPK-1					1/4-20		
CL-20-PPK-1					5/16-18		
CLM-6-PPK-1					M6	7/16	
CL-10-PPK-2	1-3/4	1	13/16	1/2	1/4-20	1/2	9/32
CL-20-PPK-2					5/16-18		
CL-30-PPK-2					3/8-16		
CLM-8-PPK-2					M8		
CL-20-PPK-4	2-1/4	1-1/8	1	9/16	5/16-18	7/16	5/16
CL-30-PPK-4					3/8-16	1/2	
CL-40-PPK-4					1/2-13	5/8	
CLM-10-PPK-4					M10		

### PHENOLIC — TAPPED THROUGH HOLE (INCH)

CL-1B-PPK-1	1-1/4	7/8	5/8	3/8	#10-24	5/16	1/4
CL-1A-PPK-1					#10-32		
CL-1-PPK-1					1/4-20	1/2	
CL-1-PPK-2	1-3/4	1	13/16	1/2	1/4-20	5/8	9/32
CL-2-PPK-2					5/16-18		
CL-3-PPK-2					3/8-16		
CL-2-PPK-4					5/16-18	5/8	
CL-3-PPK-4	3/8-16						
CL-3-PPK-4	2-1/4	1-1/8	1	9/16	3/8-16		
CL-4-PPK-4					1/2-13		

# FOUR-PRONG KNOBS

3



3/8-16 x 1  
3/8-16 x 1-1/2  
3/8-16 x 2  
3/8-16 x 2-1/2  
1/2-13 x 1-1/2  
1/2-13 x 2  
1/2-13 x 2-1/2  
M10 x 40mm

CL-5A-PPK4T  
CL-5B-PPK4T  
CL-5-PPK4T  
CL-6-PPK4T  
CL-7B-PPK4T  
CL-7C-PPK4T  
CL-7-PPK4T  
CLM-1040-PPK4T



1/4-20 x 1  
5/16-18 x 1  
5/16-18 x 1-1/2  
5/16-18 x 2  
M8 x 30mm

CL-1-PPK2T  
CL-3A-PPK2T  
CL-4A-PPK2T  
CL-4B-PPK2T  
CLM-830-PPK-2T

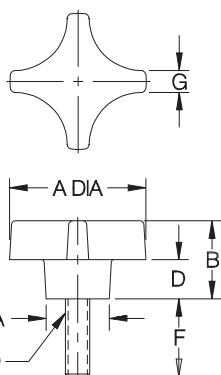


#10-24 x 3/4  
#10-32 x 3/4  
1/4-20 x 1  
M6 x 20mm

CL-1B-PPK1T  
CL-1A-PPK1T  
CL-1-PPK1T  
CLM-620-PPK1T

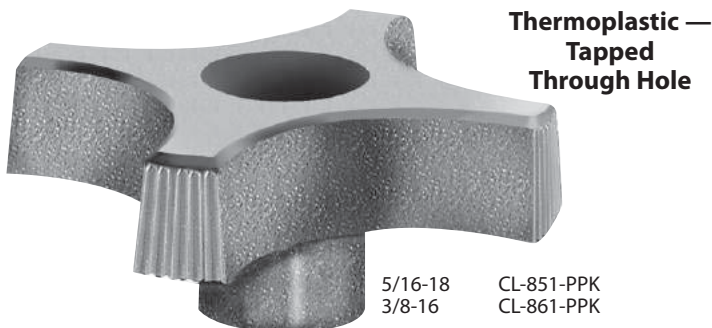
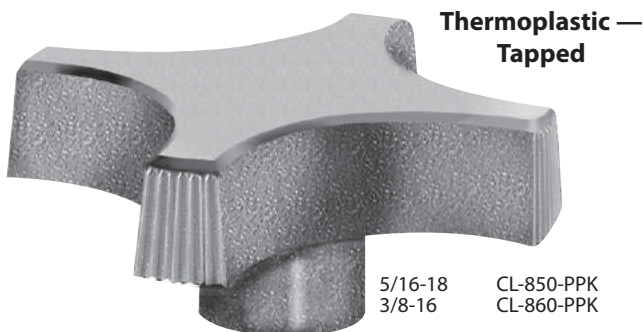
## PHENOLIC — STUD TYPE (INCH & METRIC)

PART NO.	A	B	C DIA	D	E	F	G
CL-1B-PPK1T	1-1/4	7/8	5/8	3/8	#10-24	3/4	1/4
CL-1A-PPK1T					#10-32	3/4	
CL-1-PPK1T					1/4-20	1	
CLM-620-PPK1T					M6	.79	
CL-1-PPK2T	1-3/4	1	13/16	1/2	1/4-20	1	9/32
CL-3A-PPK2T					1		
CL-4A-PPK2T					5/16-18	1-1/2	
CL-4B-PPK2T					2		
CLM-830-PPK2T					M8	1.18	
CL-5A-PPK4T	2-1/4	1-1/8	1	9/16	3/8-16	1	5/16
CL-5B-PPK4T						1-1/2	
CL-5-PPK4T						2	
CL-6-PPK4T						2-1/2	
CL-7B-PPK4T					1-1/2		
CL-7C-PPK4T					1/2-13	2	
CL-7-PPK4T					2-1/2		
CLM-1040-PPK4T					M10	1.57	

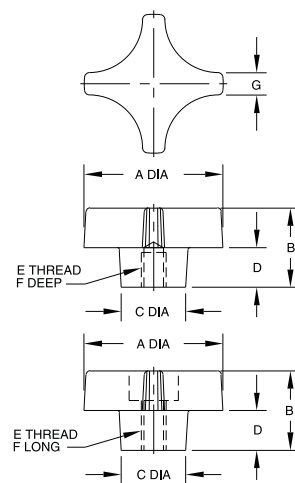


# FOUR-PRONG KNOBS

BLACK THERMOPLASTIC WITH BRASS INSERT



Four-prong design in thermoplastic, with a textured non-slip, non-glare finish. Molded-in brass insert provides superior thread strength. Non-standard thread sizes, reamed holes, molded-in studs, or special colors are available in quantities of 500 and above. Note: Catalog photos are actual size.



## THERMOPLASTIC — TAPPED (INCH)

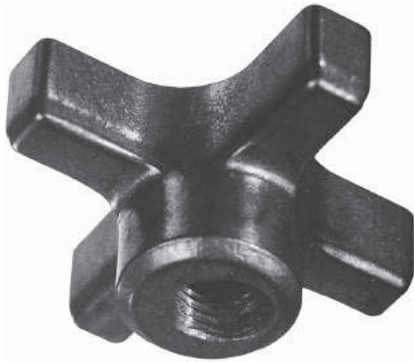
PART NO.	A	B	C DIA	D	E	F	G
CL-850-PPK	3	1-1/4	7/8	9/16	5/16-18	5/8	1/2
CL-860-PPK					3/8-16		

## THERMOPLASTIC — TAPPED THROUGH HOLE (INCH)

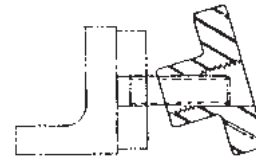
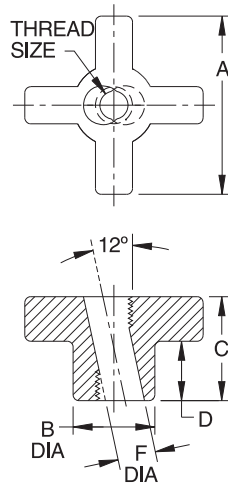
PART NO.	A	B	C DIA	D	E	F	G
CL-851-PPK	3	1-1/4	7/8	9/16	5/16-18	5/8	1/2
CL-861-PPK					3/8-16		

# QUICK-ACTING KNOBS

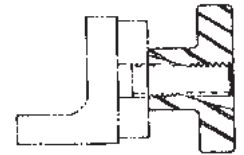
SINTERED IRON, BLACK OXIDE FINISH



Quick-acting four-prong knob that slides in and out of clamping position, ideal when the knob must be completely removed for loading. Tilt knob to slide in, then straighten to engage threads and tighten. To remove, loosen knob, then tilt to slide out. Four-prong design provides a firm grip for applications requiring quick tightening and high torque. For full strength, use a stud that extends slightly beyond the knob, to engage all threads.



Tilt knob to slide in and out.



Straighten knob to engage threads for clamping.

## INCH

PART NO.	THREAD SIZE	A	B DIA	C	D	F DIA
CL-1-QAK	1/4-20	1-1/8	9/16	5/8	5/16	17/64
CL-2-QAK	5/16-18	1-1/2	11/16	7/8	1/2	21/64
CL-3-QAK	3/8-16	2	13/16	1		25/64
CL-4-QAK	1/2-13	2-1/2	1	1-1/8	9/16	33/64
CL-5-QAK	5/8-11	3	1-1/4	1-1/4	5/8	41/64

## METRIC

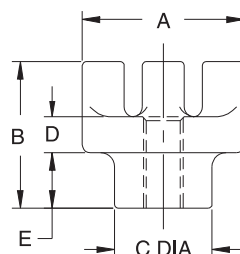
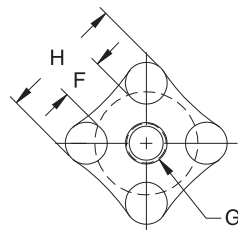
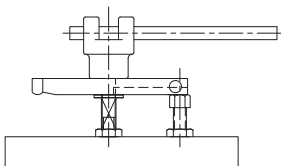
PART NO.	THREAD SIZE	A	B DIA	C	D	F DIA
CLM-6-QAK	M6	1-1/8	9/16	5/8	5/16	.25
CLM-8-QAK	M8	1-1/2	11/16	7/8	1/2	.33
CLM-10-QAK	M10	2	13/16	1		.41
CLM-12-QAK	M12	2-1/2	1	1-1/8	9/16	.49
CLM-16-QAK	M16	3	1-1/4	1-1/4	5/8	.65

# BAR KNOBS

CAST IRON, ZINC PLATED CLEAR CHROMATE



Heavy-duty knob that can be turned easily by hand, then tightened by inserting a bar between the prongs. Choose from three knob sizes, each available blank or with a choice of tapped holes.



## INCH & METRIC

PART NO.	A	B	C DIA	D	E	F	G	H
CL-1-BK	2	2-1/8	1-1/4	1/2	7/8	7/16	BLANK	1-5/8
CL-2-BK							3/8-16	
CL-4-BK							1/2-13	
CL-6-BK							5/8-11	
CLM-2-BK							M10	
CLM-4-BK							M12	
CL-8-BK	2-1/2	2-3/8	1-1/2	9/16	15/16	11/16	BLANK	2
CL-9-BK							1/2-13	
CL-11-BK							5/8-11	
CL-13-BK							3/4-10	
CLM-9-BK							M12	
CLM-11-BK							M16	
CL-15-BK	3-1/2	2-3/8	2-1/8	9/16	15/16	1-5/16	BLANK	2-7/8
CL-16-BK							3/4-10	
CL-18-BK							7/8-9	
CL-20-BK							1"-8	
CLM-16-BK							M20	
CLM-20-BK							M24	

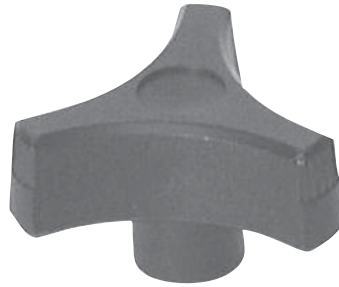
# THREE-PRONG KNOBS

BLACK THERMOPLASTIC WITH BRASS INSERT

3



5/16-18 CL-850-TPK  
3/8-16 CL-860-TPK



1/4-20 CL-640-TPK  
5/16-18 CL-650-TPK  
3/8-16 CL-660-TPK



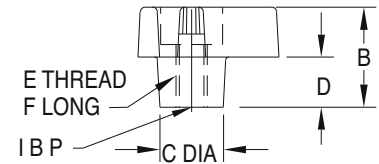
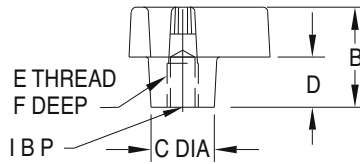
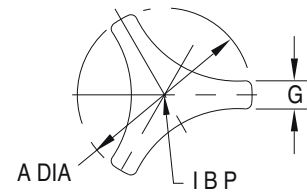
1/4-20 CL-440-TPK  
5/16-18 CL-450-TPK

Thermoplastic — Tapped



5/16-18 CL-851-TPK  
3/8-16 CL-861-TPK

Thermoplastic — Tapped Through Hole



Modern three-prong design provides quick tightening and high torque. Textured non-slip, non-glare finish. Choice of three knob sizes. Molded-in brass insert provides superior thread strength. Non-standard thread sizes, reamed holes, molded-in studs, or special colors are available in quantities of 500 and above.

## THERMOPLASTIC — TAPPED (INCH)

PART NO.	A DIA	B	C DIA	D	E	F	G
CL-440-TPK	1-1/2	7/8	1/2	3/8	1/4-20	7/16	9/32
CL-450-TPK					5/16-18		
CL-640-TPK	2	1-1/16	5/8	1/2	1/4-20	7/16	3/8
CL-650-TPK					5/16-18		
CL-660-TPK					3/8-16		
CL-850-TPK	2-1/2	1-1/8	3/4	1/2	5/16-18	7/16	1/2
CL-860-TPK					3/8-16	1/2	

## THERMOPLASTIC — TAPPED THROUGH HOLE (INCH)

PART NO.	A DIA	B	C DIA	D	E
CL-851-TPK	2-1/2	1-1/8	3/4	1/2	5/16-18
CL-861-TPK					3/8-16

# T-HANDLE KNOBS

BLACK PHENOLIC PLASTIC OR THERMOPLASTIC WITH BRASS INSERT

## Phenolic — Tapped



- 1/4-20 CL-632-TK
- 5/16-18 CL-642-TK
- 3/8-16 CL-652-TK
- 3/8-24 CL-654-TK
- M8 CLM-642-TK
- M10 CLM-652-TK

## Thermoplastic — Tapped



- 1/4-20 CL-6320-TK
- 5/16-18 CL-6420-TK
- 3/8-16 CL-6520-TK
- M8 CLM-6420-TK
- M10 CLM-6520-TK

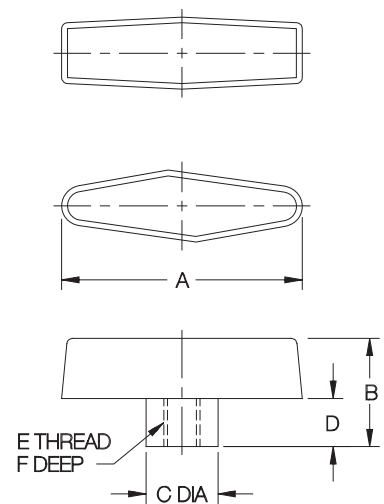


- 1/4-20 CL-432-TK
- 5/16-18 CL-442-TK
- 3/8-16 CL-452-TK
- M6 CLM-432-TK
- M8 CLM-442-TK



- 1/4-20 CL-232-TK
- M6 CLM-232-TK

T-Handle Knobs provide maximum leverage for heavy-duty clamping. Ideal for fastening fold-down handles and stands. Available in phenolic plastic (one knob size) for a shiny polished finish, or in thermoplastic (three knob sizes) for a textured non-slip, non-glare finish. Molded-in brass insert provides superior thread strength. Non-standard thread sizes, reamed holes, molded-in studs, or special colors (thermoplastic only) are available in quantities of 500 and above. Note: Catalog photos are actual size.



### PHENOLIC — TAPPED (INCH & METRIC)

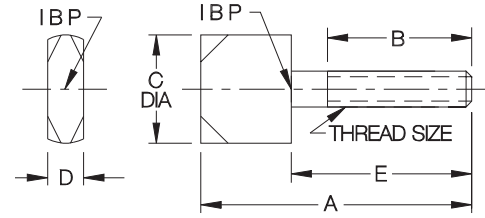
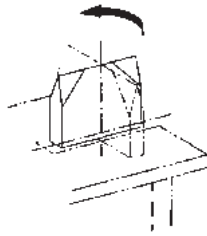
PART NO.	A	B	C DIA	D	E	F
CL-632-TK	2-1/2	2-1/2	2-1/2	2-1/2	1/4-20	5/8
CL-642-TK					5/16-18	
CL-652-TK					3/8-16	1/2
CL-654-TK					3/8-24	
CLM-642-TK					M8	
CLM-652-TK					M10	1/2

### THERMOPLASTIC — TAPPED (INCH & METRIC)

PART NO.	A	B	C DIA	D	E	F
CL-232-TK	1	7/8	1/2	3/8	1/4-20	7/16
CLM-232-TK					M6	
CL-432-TK	2	1-1/8	3/4	1/2	1/4-20	5/8
CL-442-TK					5/16-18	
CL-452-TK					3/8-16	1/2
CLM-432-TK					M6	
CLM-442-TK					M8	
CL-6320-TK					2-1/2	1-1/4
CL-6420-TK	5/16-18					
CL-6520-TK	3/8-16	1/2				
CLM-6420-TK	M8					
CLM-6520-TK	M10		1/2			

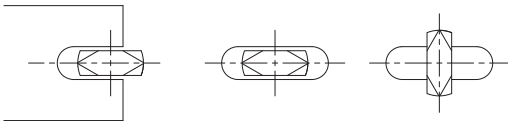
# QUARTER-TURN SCREWS

12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH



3

Rotate screw 90 degrees (1/4 turn) to latch. Ideal for swing-away lids and jig plates. Beveled edges allow easy insertion into a slot. Also available soft (not carburized-hardened) for customizing as desired.



Use quarter-turn screws in either open or closed slots.

## INCH

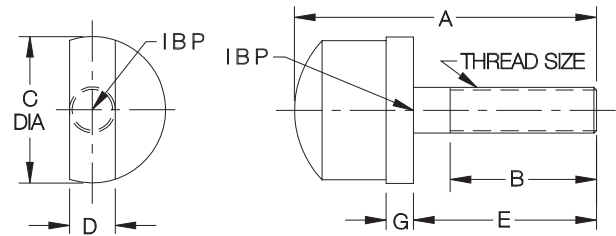
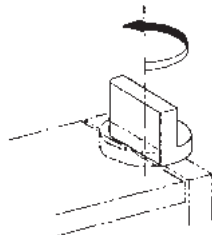
PART NO. HARDENED	PART NO. SOFT	THREAD SIZE	A	B	C DIA	D	E
CL-1-QTS	CL-10-QTS	#10-24	1-1/2	7/8	5/8	3/16	1
CL-2-QTS	CL-20-QTS	#10-32			1/2		
CL-3-QTS	CL-30-QTS	1/4-20	1-7/8	1	3/4	1/4	1-1/4
CL-4-QTS	CL-40-QTS	5/16-18	2-1/4	1-1/4	1	5/16	1-1/2
CL-5-QTS	CL-50-QTS	3/8-16	2-1/2			3/8	
CL-6-QTS	CL-60-QTS	1/2-13	2-3/4	1-1/2	1-1/4	1/2	1-3/4

## METRIC

CLM-5-QTS	—	M5	1.57	.79	.63	.20	.98
CLM-6-QTS	—	M6	1.97	.98	.75	.24	1.18
CLM-8-QTS	—	M8	2.36	1.38	1.00	.31	1.57
CLM-10-QTS	—	M10	2.56		1.00	.39	
CLM-12-QTS	—	M12	2.76	1.57	1.26	.47	1.77

# HALF-TURN SCREWS

12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH



## INCH

PART NO. HARDENED	THREAD SIZE	A	B	C DIA	D	E	G
CL-1-HTS	#10-32	1-11/16	7/8	3/4	3/16	1	3/16
CL-2-HTS	1/4-20	2	1	3/4	1/4	1-1/4	
CL-3-HTS	5/16-18	2-1/16		1	1		5/16
CL-4-HTS	3/8-16	2-11/16	1-1/2	1-1/16	3/8	1/4	
CL-5-HTS	1/2-13	2-3/4		1-1/4	1/2		

## METRIC

CLM-5-HTS	M5	1.69	.87	.75	.20	.98	.20
CLM-6-HTS	M6	1.93	.94	.75	.24	1.18	
CLM-8-HTS	M8	1.97		1.00	.31		1.77
CLM-10-HTS	M10	2.72	1.54	1.06	.39	.24	

Rotate screw 180 degrees (1/2 turn) to latch. Allows latching swing-away lids and jig plates without machining a slot.

# BAR-HANDLE SCREW CLAMPS

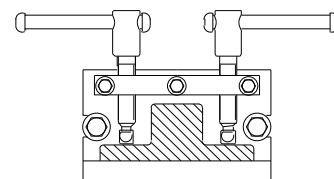
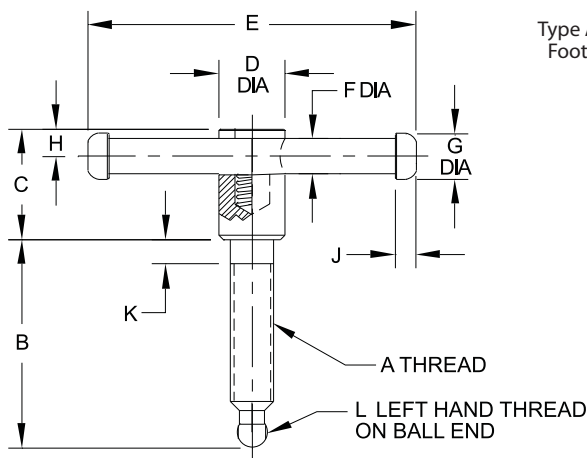
STEEL: 12L14 STEEL BODY, CARBURIZED HARDENED, BLACK OXIDE FINISH. 12L14 STEEL HANDLE, BLACK OXIDE FINISH. 300-SERIES STAINLESS STEEL SPRING. STAINLESS: 300-SERIES STAINLESS STEEL.



Screw clamp with a sliding bar handle for excellent leverage. The bar can be moved to any position, for convenient tightening, and is held in place by light spring force. These screw clamps accept all standard feet for swivel screws (**INFO+**: see page 100 for foot dimensions and specifications). Type A and B feet are also available in Delrin, by adding "N" to the part number (examples: CL-620-BHSA-N, CL-620-BHSA-SN). Available in screw sizes from 5/16-18 to 5/8-11 (M8 to M16 in metric), each in several lengths.



Type A Foot      Type B Foot      Type D Foot      Type E Foot



Sliding bar can be moved to any position for convenient tightening, such as when two clamps are close to each other.

## GENERAL DIMENSIONS

A THREAD SIZE	C	D DIA	E	F DIA	G DIA	H	J	K	L
5/16-18 or M8	1-1/8	5/8	2-3/8	1/4	3/8	1/4	1/4	5/16	#12-28 LH
3/8-16 or M10	1-1/4	3/4	3-1/8	5/16	7/16	9/32	9/32	3/8	1/4-28 LH
1/2-13 or M12	1-3/8	13/16	3-15/16	3/8	1/2	11/32	11/32	3/8	5/16-24 LH
5/8-11 or M16	1-5/8	1	4-3/4	1/2	5/8	13/32	13/32	3/8	7/16-20 LH

## STEEL (INCH)

A THREAD SIZE	B LENGTH	PART NO. WITHOUT FOOT	PART NO. WITH TYPE A SMALL FOOT	PART NO. WITH TYPE B LARGE FOOT	PART NO. WITH TYPE D BALL FOOT	PART NO. WITH TYPE E EXTRA-LARGE FOOT
5/16-18	2	CL-520-BHS	CL-520-BHSA	CL-520-BHSB	CL-520-BHSD	—
	3	CL-530-BHS	CL-530-BHSA	CL-530-BHSB	CL-530-BHSD	—
3/8-16	2	CL-620-BHS	CL-620-BHSA	CL-620-BHSB	CL-620-BHSD	—
	3	CL-630-BHS	CL-630-BHSA	CL-630-BHSB	CL-630-BHSD	—
	4	CL-640-BHS	CL-640-BHSA	CL-640-BHSB	CL-640-BHSD	—
1/2-13	2	CL-820-BHS	CL-820-BHSA	CL-820-BHSB	CL-820-BHSD	CL-820-BHSE
	3	CL-830-BHS	CL-830-BHSA	CL-830-BHSB	CL-830-BHSD	CL-830-BHSE
	4	CL-840-BHS	CL-840-BHSA	CL-840-BHSB	CL-840-BHSD	CL-840-BHSE
5/8-11	3	CL-1030-BHS	CL-1030-BHSA	CL-1030-BHSB	CL-1030-BHSD	CL-1030-BHSE
	4	CL-1040-BHS	CL-1040-BHSA	CL-1040-BHSB	CL-1040-BHSD	CL-1040-BHSE

More items on next page.

# BAR-HANDLE SCREW CLAMPS

Continued from prior page.

## STAINLESS STEEL (INCH)

5/16-18	2	CL-520-BHS	CL-520-BHSA	CL-520-BHSB	—	—
	3	CL-530-BHS	CL-530-BHSA	CL-530-BHSB	—	—
3/8-16	2	CL-620-BHS	CL-620-BHSA	CL-620-BHSB	—	—
	3	CL-630-BHS	CL-630-BHSA	CL-630-BHSB	—	—
	4	CL-640-BHS	CL-640-BHSA	CL-640-BHSB	—	—
1/2-13	2	CL-820-BHS	CL-820-BHSA	CL-820-BHSB	—	—
	3	CL-830-BHS	CL-830-BHSA	CL-830-BHSB	—	—
	4	CL-840-BHS	CL-840-BHSA	CL-840-BHSB	—	—
5/8-11	3	CL-1030-BHS	CL-1030-BHSA	CL-1030-BHSB	—	—
	4	CL-1040-BHS	CL-1040-BHSA	CL-1040-BHSB	—	—

## STEEL (METRIC)

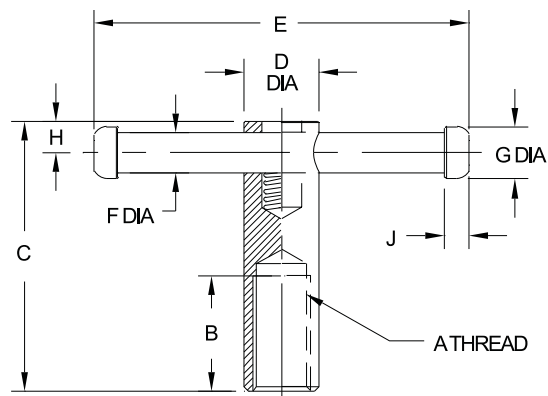
M8	1.97 (50mm)	CLM-850-BHS	CLM-850-BHSA	CLM-850-BHSB	CLM-850-BHSD	—
	2.95 (75mm)	CLM-875-BHS	CLM-875-BHSA	CLM-875-BHSB	CLM-875-BHSD	—
M10	1.97 (50mm)	CLM-1050-BHS	CLM-1050-BHSA	CLM-1050-BHSB	CLM-1050-BHSD	—
	3.94 (100mm)	CLM-10100-BHS	CLM-10100-BHSA	CLM-10100-BHSB	CLM-10100-BHSD	—
M12	1.97 (50mm)	CLM-1250-BHS	CLM-1250-BHSA	CLM-1250-BHSB	CLM-1250-BHSD	CLM-1250-BHSE
	3.94 (100mm)	CLM-12100-BHS	CLM-12100-BHSA	CLM-12100-BHSB	CLM-12100-BHSD	CLM-12100-BHSE
M16	2.76 (70mm)	CLM-1670-BHS	CLM-1670-BHSA	CLM-1670-BHSB	CLM-1670-BHSD	CLM-1670-BHSE
	4.33 (110mm)	CLM-16110-BHS	CLM-16110-BHSA	CLM-16110-BHSB	CLM-16110-BHSD	CLM-16110-BHSE

# BAR-HANDLE NUTS

STEEL: 12L14 STEEL BODY, CARBURIZED HARDENED, BLACK OXIDE FINISH. 12L14 STEEL HANDLE, BLACK OXIDE FINISH. 300-SERIES STAINLESS STEEL SPRING. STAINLESS: 300-SERIES STAINLESS STEEL.



Extension nut with a sliding bar handle for excellent leverage. The bar can be moved to any position, for convenient tightening, and is held in place by light spring force. Available in thread sizes from 3/8-16 to 5/8-11 (M10 to M16 in metric).



## STEEL (INCH)

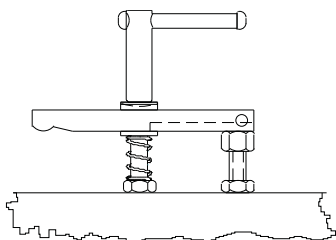
PART NO.	A	B	C	D DIA	E	F DIA	G DIA	H	J
CL-6-BHN	3/8-16	7/8	2-3/8	3/4	3-1/8	5/16	7/16	9/32	9/32
CL-8-BHN	1/2-13	1-1/8	2-3/4	13/16	3-15/16	3/8	1/2	11/32	5/16
CL-10-BHN	5/8-11	1-3/8	3-3/8	1	4-3/4	1/2	5/8	13/32	3/8

## STAINLESS STEEL (INCH)

CL-6-BHN-S	3/8-16	7/8	2-3/8	3/4	3-1/8	5/16	7/16	9/32	9/32
CL-8-BHN-S	1/2-13	1-1/8	2-3/4	13/16	3-15/16	3/8	1/2	11/32	5/16
CL-10-BHN-S	5/8-11	1-3/8	3-3/8	1	4-3/4	1/2	5/8	13/32	3/8

## STEEL (METRIC)

CLM-10-BHN	M10	.79	2.36	3/4	3-1/8	5/16	7/16	9/32	9/32
CLM-12-BHN	M12	.98	2.76	13/16	3-15/16	3/8	1/2	11/32	5/16
CLM-16-BHN	M16	1.38	3.35	1	4-3/4	1/2	5/8	13/32	3/8



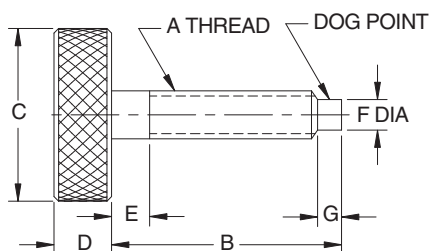
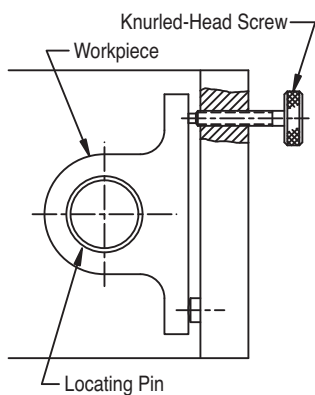


# KNURLED HEAD SCREWS

STEEL: 12L14, CARBURIZED-HARDENED, BLACK OXIDE FINISH.  
STAINLESS STEEL: 300-SERIES, PASSIVATED



Handy thumb screw. Knurled head provides a positive grip for finger tightening in light clamping applications.



## STEEL (INCH)

PART NO.	A	B	C DIA	D	E	F DIA	G
CL-1-KHS	#10-24	1	3/4	1/4	1/4	.12	.09
CL-2-KHS		1-1/2					
CL-3-KHS		2					
CL-1A-KHS	#10-32	1	1	5/16	1/4	.15	.12
CL-2A-KHS		1-1/2					
CL-3A-KHS		2					
CL-4-KHS	1/4-20	1-1/2	1	5/16	1/4	.15	.12
CL-5-KHS		2					
CL-6-KHS		2-1/2					
CL-7-KHS	5/16-18	1-1/2	1-1/8	3/8	1/4	.20	.16
CL-8-KHS		2					
CL-9-KHS		2-1/2					
CL-10-KHS	3/8-16	2	1-1/4	7/16	1/4	.25	.19
CL-11-KHS		2-1/2					
CL-12-KHS		3					
CL-13-KHS	1/2-13	3	1-1/4	1/2	1/4	.34	.25
CL-14-KHS		3-1/2					

## STAINLESS STEEL (INCH)

PART NO.	A	B	C DIA	D	E	F DIA	G
CL-23207	#10-32	3/4	1/2	3/16	1/8	.12	.09
CL-23210		1					
CL-23212		1-1/4					
CL-23215		1-1/2					
CL-23507	1/4-20	3/4	1	5/16	1/8	.15	.12
CL-23510		1					
CL-23512		1-1/4					
CL-23515		1-1/2					
CL-23520		2					
CL-23615	5/16-18	1-1/2	1-1/8	3/8	3/16	.20	.16
CL-23620		2					
CL-23625		2-1/2					
CL-23820		2					
CL-23825	3/8-16	2-1/2	1-1/4	7/16	3/16	.25	.19
CL-23830		3					

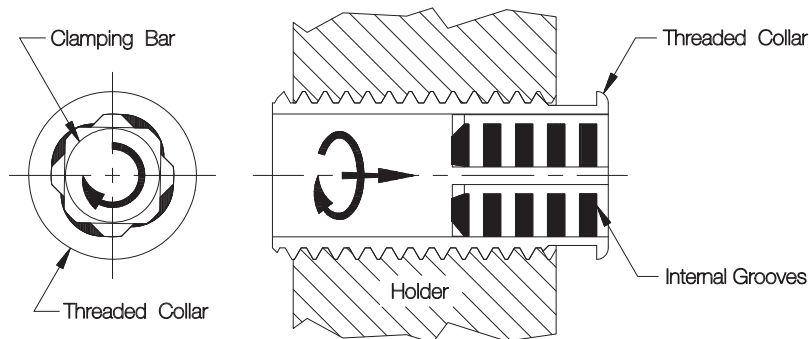
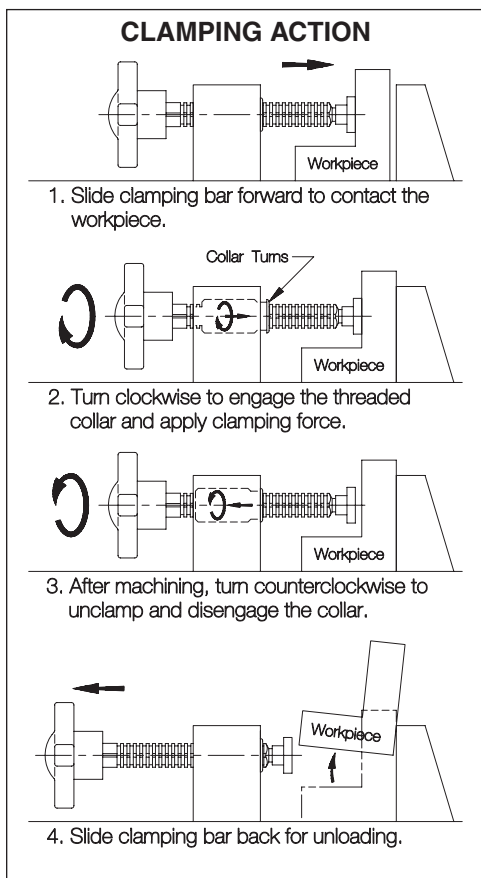
## STEEL (METRIC)

PART NO.	A	B	C DIA	D	E	F DIA	G
CLM-1-KHS	M5	.98	3/4	1/4	1/4	.13	.11
CLM-2-KHS		1.57					
CLM-3-KHS		1.97					
CLM-4-KHS	M6	1.57	1	5/16	1/4	.17	.13
CLM-5-KHS		1.97					
CLM-6-KHS		2.56					
CLM-7-KHS	M8	1.57	1-1/8	3/8	1/4	.23	.18
CLM-8-KHS		1.97					
CLM-9-KHS		2.56					
CLM-10-KHS	M10	1.97	1-1/4	7/16	1/4	.27	.19
CLM-11-KHS		2.56					
CLM-12-KHS		2.95					
CLM-13-KHS	M12	2.95	1-1/4	1/2	1/4	.35	.25
CLM-14-KHS		3.54					

# BAR-LOK QUICK-ACTING SCREW CLAMPS

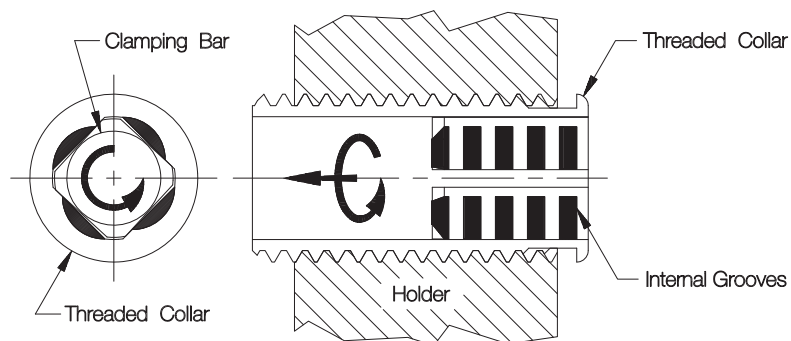
12L14 STEEL, CARBURIZED-HARDENED, ZINC PLATED YELLOW CHROMATE  
 KNOB HANDLE: 319 ALUMINUM ALLOY

3



**Clockwise**

Turning the clamping bar clockwise engages internal grooves in the threaded collar. Both components then turn together as a single unit to apply screw force.

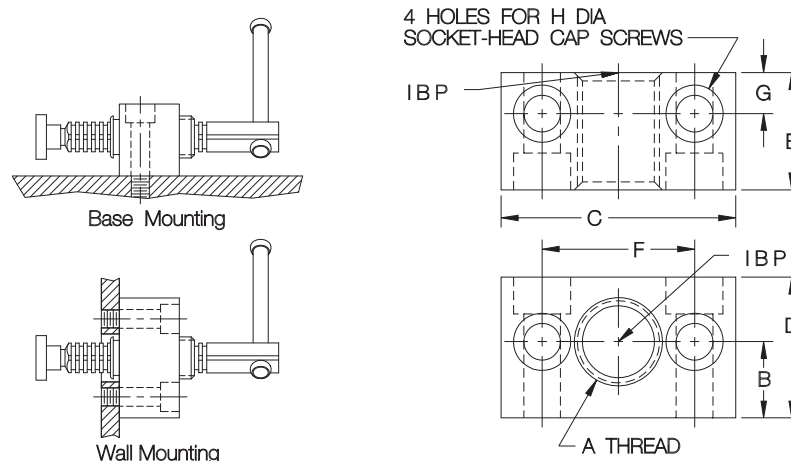


**Counterclockwise**

Turning the clamping bar counterclockwise loosens the screw clamp and disengages the collar, allowing the bar to slide back and forth.



**Mounting Block**

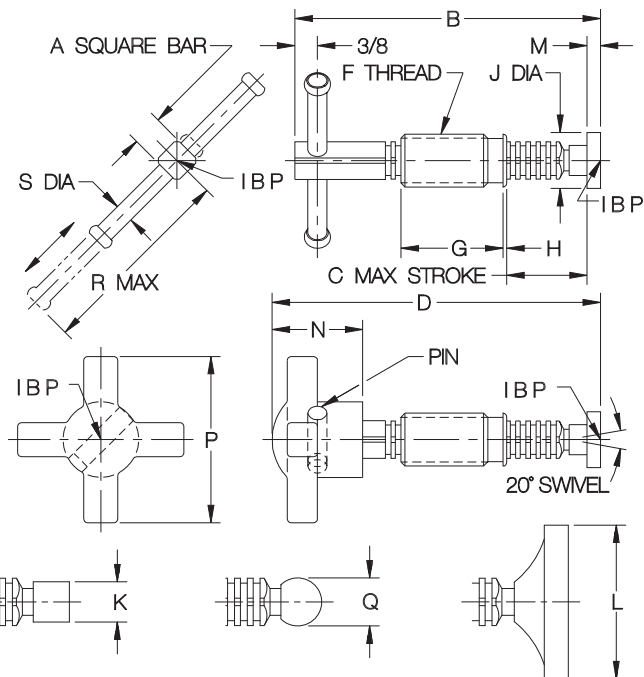
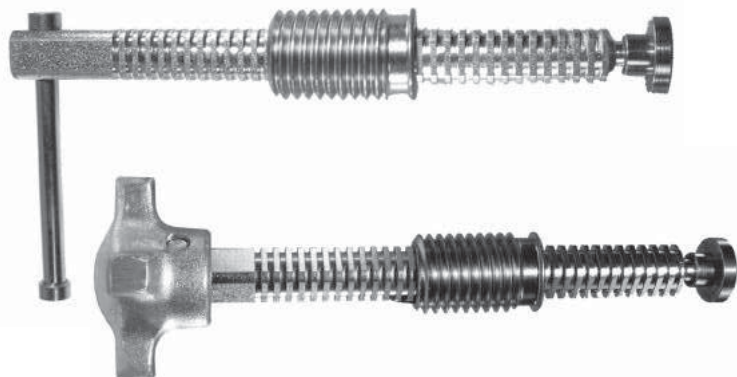


**MOUNTING BLOCKS**

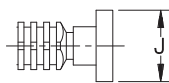
PART NO.	A THREAD	B	C	D	E	F	G	H DIA
CL-1-BLM	3/4-10	13/16	2-1/8	1-3/8	1-1/4	1-3/8	7/16	5/16 OR M8
CL-2-BLM	7/8-9		2-1/2	1-1/2		1-5/8		3/8 OR M10
CL-3-BLM	1-1/8-7	1	3-1/8	1-3/4	1-1/2	2-1/8	1/2	1/2 OR M12

# BAR-LOK QUICK-ACTING SCREW CLAMPS

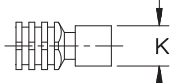
12L14 STEEL, CARBURIZED-HARDENED, ZINC PLATED YELLOW CHROMATE  
KNOB HANDLE: 319 ALUMINUM ALLOY



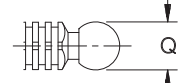
Definitely the best quick-acting screw clamp available anywhere! This patented sliding-bar design works smoothly and positively – just slide the bar forward, then twist to apply force. As strong as a standard screw clamp, but much faster. Choose either a comfortable knob handle or a sliding handle for extra leverage. Available in 3/8", 1/2", and 5/8" bar sizes, each in a choice of several lengths and foot styles. Ball and foot are threaded to allow easy installation and removal, a lefthand thread to positively prevent backout when turning the screw counterclockwise. Once the threads clear during installation, the foot rotates and pivots freely (20° included angle).



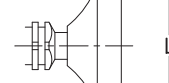
With standard foot:  
CL-14-BLK  
CL-14-BLKN (Delrin®)



With small foot, add A:  
CL-14-BLKA  
CL-14-BLKAN (Delrin®)



With ball foot, add -D:  
CL-14-BLKD



With large foot, add E:  
CL-14-BLKE

## SLIDING HANDLE (INCH)

PART NO.	A	B	C	D	F THREAD	G	H	J DIA	K DIA	L DIA	M	N	P	Q	R	S DIA	OLD BAR-LOK NUMBER
CL-14-BLT	3/8	4	1-9/16	—	3/4-10	1-3/8	1/8	.750	.390	1.50	.187	—	—	.500	2-15/16	1/4	S-204-T
CL-15-BLT		5	2-9/16														S-205-T
CL-16-BLT		6	3-9/16														S-206-T
CL-25-BLT	1/2	5	2-3/16	—	7/8-9	1-11/16	1/16	.930	.500	2.00	.218	—	—	.625	3-5/16	5/16	M-205-T
CL-26-BLT		6	3-3/16														M-206-T
CL-28-BLT		8	5-3/16														M-208-T
CL-210-BLT		10	7-3/16														M-210-T
CL-212-BLT		12	9-3/16														M-212-T
CL-35-BLT	5/8	5	2-3/16	—	1-1/8-7	1-11/16	1/16	.930	.500	2.00	.218	—	—	.625	3-1/4	5/16	H-205-T
CL-36-BLT		6	3-3/16														H-206-T
CL-38-BLT		8	5-3/16														H-208-T
CL-310-BLT		10	7-3/16														H-210-T
CL-312-BLT		12	9-3/16														H-212-T

## KNOB HANDLE (INCH)

CL-14-BLK	3/8	—	1-5/16	4-11/16	3/4-10	1-3/8	1/8	3/4	.390	1.50	.187	1-7/16	2-1/8	.500	—	—	—
CL-15-BLK			2-5/16	5-11/16													
CL-16-BLK			3-5/16	6-11/16													
CL-25-BLK	1/2	—	1-5/8	5-3/8	7/8-9	1-11/16	1/16	15/16	.500	2.00	.218	1-1/2	2-3/4	.625	—	—	—
CL-26-BLK			2-5/8	6-3/8													
CL-28-BLK			4-5/8	8-3/8													
CL-210-BLK			6-5/8	10-3/8													
CL-212-BLK			8-5/8	12-3/8													
CL-35-BLK	5/8	—	1-5/8	5-3/8	1-1/8-7	1-11/16	1/16	15/16	.500	2.00	.218	1-1/2	2-3/4	.625	—	—	—
CL-36-BLK			2-5/8	6-3/8													
CL-38-BLK			4-5/8	8-3/8													
CL-310-BLK			6-5/8	10-3/8													
CL-312-BLK			8-5/8	12-3/8													

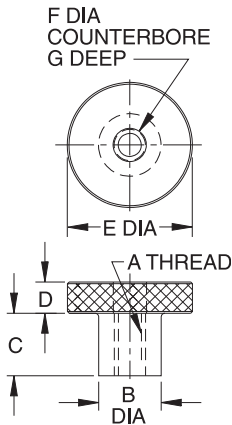
# KNURLED KNOBS

STEEL: 12L14, CARBURIZED-HARDENED, BLACK OXIDE FINISH.  
STAINLESS STEEL: 300-SERIES, PASSIVATED

3



High-quality knurled-head knob provides a positive grip for quick finger tightening in light clamping applications. Available in steel with a black oxide finish or stainless steel.



## STEEL (INCH)

PART NO.	A	B DIA	C	D	E DIA	F DIA	G
CL-4-KK	1/4-20	5/8	1/2	1/4	1	NONE	NONE
CL-5-KK	5/16-18	5/8	1/2	5/16	1-1/4		
CL-6-KK	3/8-16	3/4	5/8	1/2	1-1/4		
CL-8-KK	1/2-13	1	3/4	1/2	1-1/2		

## STAINLESS STEEL (INCH)

PART NO.	A	B DIA	C	D	E DIA	F DIA	G		
CL-16312	#10-24	3/8	1/4	3/16	1/2	NONE	NONE		
CL-16322			1/2						
CL-16314			1/4	3/16	1			NONE	NONE
CL-16324			1/2						
CL-16412	#10-32	3/8	1/4	3/16	1/2	NONE	NONE		
CL-16422			1/2						
CL-16414			1/4	3/16	1			NONE	NONE
CL-16424			1/2						
CL-16513	1/4-20	1/2	1/4	1/4	3/4	NONE	NONE		
CL-16514			1/4						
CL-16524			1/2	1/4	1			17/64	1/4
CL-16534			3/4						
CL-16625	5/16-18	5/8	1/2	5/16	1-1/4	21/64	1/4		
CL-16635			3/4				1/2		
CL-16725	3/8-16	3/4	1/2	3/8	1-1/4	25/64	1/4		
CL-16735			3/4				1/2		
CL-8-KK-S	1/2-13	1	3/4	1/2	1-1/2	NONE	NONE		

## STEEL (METRIC)

PART NO.	A	B DIA	C	D	E DIA	F DIA	G
CLM-5-KK	M5	.39	.30	.16	.79	NONE	NONE
CLM-6-KK	M6	.47	.39	.20	.94		
CLM-8-KK	M8	.63	.47	.24	1.18		
CLM-10-KK	M10	.79	.59	.31	1.42		
CLM-12-KK	M12	.79	.59	.31	1.57		

## STAINLESS STEEL (METRIC)

PART NO.	A	B DIA	C	D	E DIA	F DIA	G
CLM-5-KK-S	M5	.39	.30	.16	.79	NONE	NONE
CLM-6-KK-S	M6	.47	.39	.20	.94		
CLM-8-KK-S	M8	.63	.47	.24	1.18		
CLM-10-KK-S	M10	.79	.59	.31	1.42		
CLM-12-KK-S	M12	.79	.59	.31	1.57		

# KNURLED KNOBS

KNOB: BLACK PHENOLIC PLASTIC OR THERMOPLASTIC, WITH BRASS INSERT  
 STUD: MILD STEEL, ZINC PLATED CLEAR CHROMATE



5/16-18 CL-642-KTK  
 3/8-16 CL-652-KTK  
 M8 CLM-642-KTK  
 M10 CLM-652-KTK



1/4-20 CL-532-KTK  
 5/16-18 CL-542-KTK  
 M6 CLM-532-KTK  
 M8 CLM-542-KTK



#10-32 CL-424-KTK  
 1/4-20 CL-432-KTK  
 M5 CLM-422-KTK  
 M6 CLM-432-KTK



#10-32 CL-324-KTK  
 1/4-20 CL-332-KTK  
 M5 CLM-322-KTK



#10-32 CL-124-KTK



#6-32 CL-202-KTK  
 #8-32 CL-212-KTK

**Thermoplastic — Tapped**

**Phenolic — Tapped**



**Phenolic — Stud Type**

3/8-16 X 1 CL-652-KTK-16  
 M10 X 25mm CLM-652-KTK-25



1/4-20 X 1/2 CL-532-KTK-8  
 5/16-18 X 1 CL-542-KTK-16  
 M8 X 25mm CLM-542-KTK-25



1/4-20 X 1 CL-432-KTK-16  
 M6 X 25mm CLM-432-KTK-25

#8-32 X 1/2 CL-312-KTK-8  
 #10-32 X 1/2 CL-324-KTK-8  
 #10-32 X 1 CL-324-KTK-16  
 1/4-20 X 1/2 CL-332-KTK-8  
 M5 X 20mm CLM-322-KTK-20

**Phenolic — Stud Type Short Hub**



3/8-16 X 1 CL-656-KTK-16



#6-32 X 3/4 CL-406-KTK-12  
 1/4-20 X 3/4 CL-436-KTK-12

## THERMOPLASTIC — TAPPED (INCH)

PART NO.	A DIA	B	C DIA	D	E	F
CL-202-KTK	3/4	15/32	5/8	1/4	#6-32	5/16
CL-212-KTK					#8-32	

## PHENOLIC — TAPPED (INCH & METRIC)

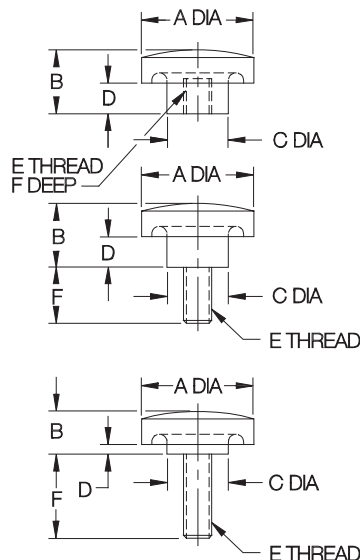
CL-124-KTK	5/8	9/16	1/2	—	#10-32	5/16
CL-324-KTK	3/4	17/32	7/16	1/16	#10-32	5/16
CL-332-KTK					1/4-20	
CLM-322-KTK					M5	
CL-424-KTK	1	21/32	5/8	5/16	#10-32	5/16
CL-432-KTK					1/4-20	
CLM-422-KTK					M5	
CLM-432-KTK					M6	3/8
CL-532-KTK	1-3/8	25/32	3/4	3/8	1/4-20	7/16
CL-542-KTK					5/16-18	
CLM-532-KTK					M6	
CLM-542-KTK					M8	
CL-642-KTK	1-7/8	1	1	1/2	5/16-18	7/16
CL-652-KTK					3/8-16	1/2
CLM-642-KTK					M8	7/16
CLM-652-KTK					M10	1/2

## PHENOLIC — STUD TYPE (INCH & METRIC)

CL-312-KTK-8	3/4	17/32	7/16	1/16	#8-32	1/2
CL-324-KTK-8					#10-32	1
CL-324-KTK-16					1/4-20	1/2
CL-332-KTK-8					M5	.79
CLM-322-KTK-20	1	21/32	5/8	5/16	1/4-20	1
CL-432-KTK-16					M6	.98
CLM-432-KTK-25					1/4-20	1/2
CL-532-KTK-8	1-3/8	25/32	3/4	3/8	5/16-18	1
CL-542-KTK-16					M8	.98
CLM-542-KTK-25					M8	.98
CL-652-KTK-16	1-7/8	1	1	1/2	3/8-16	1
CLM-652-KTK-25					M10	.98

## PHENOLIC — STUD TYPE, SHORT HUB (INCH)

CL-406-KTK-12	1	13/32	1/2	1/16	#6-32	3/4
CL-436-KTK-12					1/4-20	
CL-656-KTK-16	1-7/8	3/4	1	1/4	3/8-16	1



Knurled head provides a positive grip for finger tightening in light clamping applications. Choice of six knob sizes. Molded-in brass insert provides superior thread strength. Also available with a molded-in clamping stud. Non-standard thread sizes, or other lengths of molded-in studs are available in quantities of 500 and above. Note: Catalog photos are actual size.

# BODIES FOR SWIVEL SCREWS

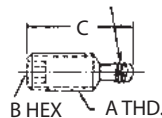
STEEL: 12L14 OR 1144, HEAT TREATED, ZINC PLATED YELLOW CHROMATE OR BLACK OXIDE FINISH  
 STAINLESS STEEL: 300-SERIES



**Socket Head**

Swivel-screw bodies that accept any of the feet shown on the opposite page. Socket-head version allows applying strong clamping force using a hex wrench. Patented.

D LEFT HAND THD.

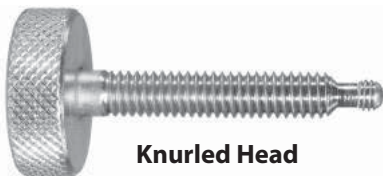


## SOCKET HEAD (INCH)

PART NO. STEEL ZINC PLATED	PART NO. STEEL BLACK OXIDE	PART NO. STAINLESS STEEL	A	B	C	D			
CL-1-BSS	CL-1-BSS-BO	—	1/4-20	1/8	15/32	#8-36 L.H.			
CL-2-BSS	CL-2-BSS-BO	CL-2-BSS-S			23/32				
CL-3-BSS	CL-3-BSS-BO	CL-3-BSS-S			31/32				
CL-4-BSS	CL-4-BSS-BO	CL-4-BSS-S			1-15/32				
CL-5-BSS	CL-5-BSS-BO	—	5/16-18	5/32	23/32	#12-28 L.H.			
CL-6-BSS	CL-6-BSS-BO	CL-6-BSS-S			31/32				
CL-7-BSS	CL-7-BSS-BO	CL-7-BSS-S			1-15/32				
CL-8-BSS	CL-8-BSS-BO	CL-8-BSS-S			1-31/32				
CL-9-BSS	CL-9-BSS-BO	—	3/8-16	3/16	11/16	1/4-28 L.H.			
CL-10-BSS	CL-10-BSS-BO	—			15/16				
CL-11-BSS	CL-11-BSS-BO	CL-11-BSS-S			1-7/16				
CL-12-BSS	CL-12-BSS-BO	CL-12-BSS-S			1-15/16				
CL-13-BSS	CL-13-BSS-BO	CL-13-BSS-S	1/2-13	1/4	2-15/16	5/16-24 L.H.			
CL-15-BSS	CL-15-BSS-BO	—			1-7/16				
CL-16-BSS	CL-16-BSS-BO	CL-16-BSS-S			1-15/16				
CL-17-BSS	CL-17-BSS-BO	CL-17-BSS-S			2-15/16				
CL-18-BSS	CL-18-BSS-BO	CL-18-BSS-S	5/8-11	5/16	3-15/16	7/16-20 L.H.			
CL-20-BSS	CL-20-BSS-BO	—			1-15/16				
CL-21-BSS	CL-21-BSS-BO	—			2-15/16				
CL-22-BSS	CL-22-BSS-BO	—			3-15/16				
CL-23-BSS	CL-23-BSS-BO	—	5/16-24 L.H.	1/4	4-15/16	5/16-24 L.H.			
CLM-1-BSS-BO	CLM-1-BSS-BO	—			1.52		M12	6mm	5/16-24 L.H.
CLM-2-BSS-BO	CLM-2-BSS-BO	—			1.91				
CLM-3-BSS-BO	CLM-3-BSS-BO	—			2.89				
CLM-4-BSS-BO	CLM-4-BSS-BO	—	3.88						
CLM-5-BSS-BO	CLM-5-BSS-BO	—	M16	8mm	1.89	7/16-20 L.H.			
CLM-6-BSS-BO	CLM-6-BSS-BO	—			2.87				
CLM-7-BSS-BO	CLM-7-BSS-BO	—			3.86				
CLM-8-BSS-BO	CLM-8-BSS-BO	—			4.85				

## SOCKET HEAD (METRIC)

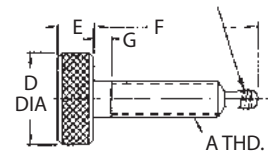
PART NO. STEEL BLACK OXIDE	A	B	C	D
CLM-1-BSS-BO	M6	3mm	.56	#8-36 L.H.
CLM-2-BSS-BO			.76	
CLM-3-BSS-BO			.95	
CLM-4-BSS-BO			1.54	
CLM-5-BSS-BO	M8	4mm	.74	#12-28 L.H.
CLM-6-BSS-BO			.94	
CLM-7-BSS-BO			1.53	
CLM-8-BSS-BO			1.92	
CLM-9-BSS-BO	M10	5mm	.73	1/4-28 L.H.
CLM-10-BSS-BO			.93	
CLM-11-BSS-BO			1.52	
CLM-12-BSS-BO			1.92	
CLM-13-BSS-BO	M12	6mm	2.90	5/16-24 L.H.
CLM-15-BSS-BO			1.52	
CLM-16-BSS-BO			1.91	
CLM-17-BSS-BO			2.89	
CLM-18-BSS-BO	M16	8mm	3.88	7/16-20 L.H.
CLM-20-BSS-BO			1.89	
CLM-21-BSS-BO			2.87	
CLM-22-BSS-BO			3.86	
CLM-23-BSS-BO	M16	8mm	4.85	7/16-20 L.H.



**Knurled Head**

Similar to the above screws, except with a knurled head for finger tightening.

H LEFT HAND THD.



## KNURLED HEAD (INCH)

PART NO. STEEL ZINC PLATED	PART NO. STEEL BLACK OXIDE	PART NO. STAINLESS STEEL	A	D DIA	E	F	G	H
CL-24-BSS	CL-24-BSS-BO	CL-24-BSS-S	1/4-20	1	5/16	31/32	1/8	#8-36 L.H.
CL-25-BSS	CL-25-BSS-BO	CL-25-BSS-S				1-15/32		
CL-26-BSS	CL-26-BSS-BO	CL-26-BSS-S				1-31/32		
CL-27-BSS	CL-27-BSS-BO	CL-27-BSS-S				2-31/32		
CL-28-BSS	CL-28-BSS-BO	—	5/16-18	1-1/8	3/8	31/32	3/16	#12-28 L.H.
CL-29-BSS	CL-29-BSS-BO	CL-29-BSS-S				1-15/32		
CL-30-BSS	CL-30-BSS-BO	CL-30-BSS-S				1-31/32		
CL-31-BSS	CL-31-BSS-BO	CL-31-BSS-S				2-31/32		
CL-33-BSS	CL-33-BSS-BO	—	3/8-16	1-1/4	7/16	1-7/16	3/16	1/4-28 L.H.
CL-34-BSS	CL-34-BSS-BO	CL-34-BSS-S				1-15/16		
CL-35-BSS	CL-35-BSS-BO	CL-35-BSS-S				2-15/16		
CL-36-BSS	CL-36-BSS-BO	CL-36-BSS-S				3-15/16		
CL-38-BSS	CL-38-BSS-BO	—	1/2-13	1-1/4	1/2	1-7/16	3/16	5/16-24 L.H.
CL-39-BSS	CL-39-BSS-BO	—				1-15/16		
CL-40-BSS	CL-40-BSS-BO	CL-40-BSS-S				2-15/16		
CL-41-BSS	CL-41-BSS-BO	CL-41-BSS-S				3-15/16		
CL-43-BSS	CL-43-BSS-BO	—	5/8-11	1-1/4	1/2	1-15/16	3/16	7/16-20 L.H.
CL-44-BSS	CL-44-BSS-BO	—				2-15/16		
CL-45-BSS	CL-45-BSS-BO	—				3-15/16		
CL-46-BSS	CL-46-BSS-BO	—				4-15/16		

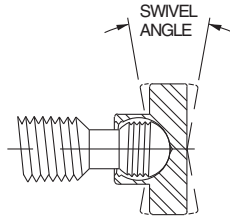
## KNURLED HEAD (METRIC)

PART NO. STEEL BLACK OXIDE	A	D DIA	E	F	G	H
CLM-24-BSS-BO	M6	1	5/16	.95	1/8	#8-36 L.H.
CLM-25-BSS-BO				1.54		
CLM-26-BSS-BO				1.94		
CLM-27-BSS-BO				2.92		
CLM-28-BSS-BO	M8	1-1/8	3/8	.94	3/16	#12-28 L.H.
CLM-29-BSS-BO				1.53		
CLM-30-BSS-BO				1.92		
CLM-31-BSS-BO				2.91		
CLM-33-BSS-BO	M10	1-1/4	7/16	1.52	3/16	1/4-28 L.H.
CLM-34-BSS-BO				1.92		
CLM-35-BSS-BO				2.90		
CLM-36-BSS-BO				3.88		
CLM-38-BSS-BO	M12	1-1/4	1/2	1.52	3/16	5/16-24 L.H.
CLM-39-BSS-BO				1.91		
CLM-40-BSS-BO				2.89		
CLM-41-BSS-BO				3.88		
CLM-43-BSS-BO	M16	1-1/4	1/2	1.89	3/16	7/16-20 L.H.
CLM-44-BSS-BO				2.88		
CLM-45-BSS-BO				3.86		
CLM-46-BSS-BO				4.85		

# FEET FOR SWIVEL SCREWS

STEEL: (TYPES A, B, D, E), 12L14 STEEL, ZINC PLATED YELLOW CHROMATE (BLACK OXIDE OPTIONAL)  
 STAINLESS: 300-SERIES STAINLESS STEEL  
 DELRIN® : WHITE DELRIN® 500

Matching feet for the swivel-screw bodies on the opposite page. Types A, B, and D can be used with any body-thread size. Type E can be used with the largest two sizes.

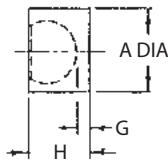


Ball and foot are threaded to allow easy installation and removal, a lefthand thread to positively prevent backout when turning the screw counterclockwise. Once the threads clear during installation, the foot rotates and pivots freely (20° included angle). Note: Delrin® feet are not threaded — they snap on and off.

3



**Type A  
Small Foot**

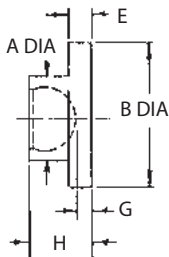


## TYPE A — SMALL FOOT

PART NO. STEEL ZINC PLATED	PART NO. STEEL BLACK OXIDE	PART NO. STAINLESS STEEL	PART NO. DELRIN®	FITS BODY THREAD SIZE	A DIA	G	H
CL-1A-FSS	CL-1A-FSS-BO	CL-1A-FSS-S	CL-1A-FSSN	1/4-20 and M6	.187	.200	.031
CL-2A-FSS	CL-2A-FSS-BO	CL-2A-FSS-S	CL-2A-FSSN	5/16-18 and M8	.250	.255	.046
CL-3A-FSS	CL-3A-FSS-BO	CL-3A-FSS-S	CL-3A-FSSN	3/8-16 and M10	.298	.315	.053
CL-4A-FSS	CL-4A-FSS-BO	CL-4A-FSS-S	CL-4A-FSSN	1/2-13 and M12	.390	.359	.058
CL-5A-FSS	CL-5A-FSS-BO	CL-5A-FSS-S	CL-5A-FSSN	5/8-11 and M16	.500	.470	.076



**Type B  
Large Foot**

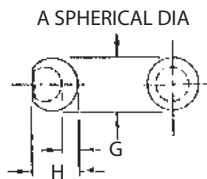


## TYPE B — LARGE FOOT

PART NO. STEEL ZINC PLATED	PART NO. STEEL BLACK OXIDE	PART NO. STAINLESS STEEL	PART NO. DELRIN®	FITS BODY THREAD SIZE	A DIA	B DIA	E	G	H
CL-1B-FSS	CL-1B-FSS-BO	CL-1B-FSS-S	CL-1B-FSSN	1/4-20 and M6	.187	.375	.125	.131	.300
CL-2B-FSS	CL-2B-FSS-BO	CL-2B-FSS-S	CL-2B-FSSN	5/16-18 and M8	.250	.500	.156	.141	.350
CL-3B-FSS	CL-3B-FSS-BO	CL-3B-FSS-S	CL-3B-FSSN	3/8-16 and M10	.298	.562	.187	.177	.437
CL-4B-FSS	CL-4B-FSS-BO	CL-4B-FSS-S	CL-4B-FSSN	1/2-13 and M12	.390	.750	.187	.119	.420
CL-5B-FSS	CL-5B-FSS-BO	CL-5B-FSS-S	CL-5B-FSSN	5/8-11 and M16	.500	.930	.218	.121	.515



**Type D  
Ball Foot**

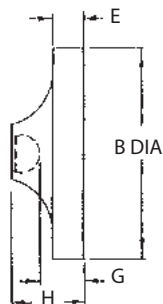


## TYPE D — BALL FOOT

PART NO. STEEL ZINC PLATED	PART NO. STEEL BLACK OXIDE	FITS BODY THREAD SIZE	A DIA	G	H
CL-1D-FSS	CL-1D-FSS-BO	1/4-20 and M6	.250	.051	.220
CL-2D-FSS	CL-2D-FSS-BO	5/16-18 and M8	.312	.071	.280
CL-3D-FSS	CL-3D-FSS-BO	3/8-16 and M10	.375	.064	.325
CL-4D-FSS	CL-4D-FSS-BO	1/2-13 and M12	.500	.144	.443
CL-5D-FSS	CL-5D-FSS-BO	5/8-11 and M16	.620	.137	.531



**Type E  
Extra-Large Foot**



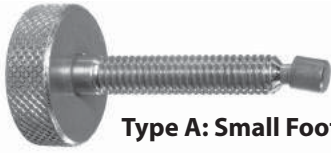
## TYPE E — EXTRA-LARGE FOOT

PART NO. STEEL ZINC PLATED	PART NO. STEEL BLACK OXIDE	FITS BODY THREAD SIZE	B DIA	E	G	H
CL-4E-FSS	CL-4E-FSS-BO	1/2-13 and M12	1.50	1/4	.26	.56
CL-5E-FSS	CL-5E-FSS-BO	5/8-11 and M16	2.00	5/16	.31	.70

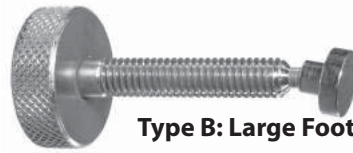
# SWIVEL HEAD SCREWS

BODY: 12L14 STEEL, CARBURIZED-HARDENED, ZINC PLATED YELLOW CHROMATE (OR 300-SERIES STAINLESS STEEL)  
 FOOT: 12L14 STEEL, ZINC PLATED YELLOW CHROMATE (OR 300-SERIES STAINLESS STEEL, OR DELRIN™)

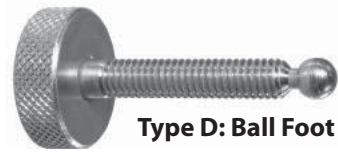
**INFO+:** Knurled-head swivel-screw assemblies that combine the bodies on page 100 with the feet on page 101. The steel version is optionally available with a black oxide finish by adding "-BO" to the part number (example: CL-1-SHS-BO). Type A and B feet are optionally available in Delrin™ by adding "N" to the part number (examples: CL-1-SHSN, CL-1-SHS-BON, CL-1-SHS-SN).



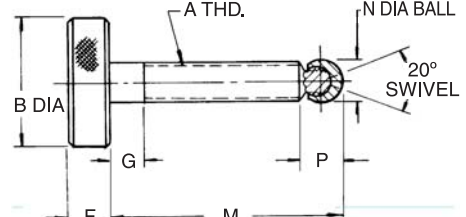
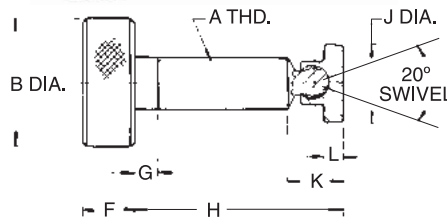
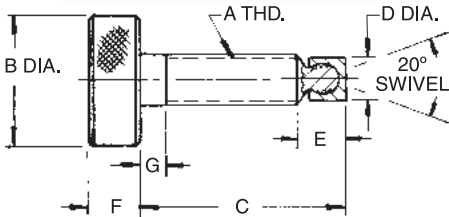
**Type A: Small Foot**



**Type B: Large Foot**



**Type D: Ball Foot**



INCH

TYPE A STEEL PART NO.*	TYPE A STAINLESS PART NO.	TYPE B STEEL PART NO.*	TYPE B STAINLESS PART NO.	TYPE D STEEL PART NO.*	A	B DIA	C	D DIA	E	F	G	H	J DIA	K	L	M	N	P
CL-1-SHS	CL-1-SHS-S	CL-17-SHS	CL-17-SHS-S	CL-47-SHS	1/4-20	1	1	3/16	9/32	5/16	1/8	1-3/32	3/8	23/64	1/8	1-1/32	1/4	5/16
CL-2-SHS	CL-2-SHS-S	CL-18-SHS	CL-18-SHS-S	CL-48-SHS			1-1/2					1-17/32						
CL-3-SHS	CL-3-SHS-S	CL-19-SHS	CL-19-SHS-S	CL-49-SHS			2					2-1/32						
CL-33-SHS	CL-33-SHS-S	CL-40-SHS	CL-40-SHS-S	CL-50-SHS			3					3-3/32						
CL-4-SHS	—	CL-20-SHS	—	CL-51-SHS	5/16-18	1-1/8	1	1/4	11/32	3/8	3/16	1-3/32	1/2	27/64	5/32	1-1/64	5/16	23/64
CL-5-SHS	CL-5-SHS-S	CL-21-SHS	CL-21-SHS-S	CL-52-SHS			1-1/2					1-33/64						
CL-6-SHS	CL-6-SHS-S	CL-22-SHS	CL-22-SHS-S	CL-53-SHS			2					2-1/64						
CL-34-SHS	CL-34-SHS-S	CL-41-SHS	CL-41-SHS-S	CL-54-SHS			3					3-1/64						
CL-8-SHS	—	CL-24-SHS	—	CL-56-SHS	3/8-16	1-1/4	1-1/2	19/64	3/8	7/16	3/16	1-5/8	9/16	5/8	3/16	1-9/16	3/8	7/16
CL-9-SHS	CL-9-SHS-S	CL-25-SHS	CL-25-SHS-S	CL-57-SHS			2					2-1/16						
CL-35-SHS	CL-35-SHS-S	CL-42-SHS	CL-42-SHS-S	CL-58-SHS			3					3-1/16						
CL-36-SHS	CL-36-SHS-S	CL-43-SHS	CL-43-SHS-S	CL-59-SHS			4					4-1/16						
CL-11-SHS	—	CL-27-SHS	—	CL-61-SHS	1/2-13	1-1/4	1-1/2	13/32	15/32	1/2	3/16	1-9/16	3/4	17/32	3/16	1-19/32	3/8	9/16
CL-12-SHS	—	CL-28-SHS	—	CL-62-SHS			2					2-3/32						
CL-13-SHS	CL-13-SHS-S	CL-29-SHS	CL-29-SHS-S	CL-63-SHS			3					3-1/16						
CL-37-SHS	CL-37-SHS-S	CL-44-SHS	CL-44-SHS-S	CL-64-SHS			4					4-3/32						
CL-15-SHS	—	CL-31-SHS	—	CL-66-SHS	5/8-11	1-1/4	2	1/2	5/8	1/2	3/16	2-3/64	15/16	21/32	7/32	2-1/8	5/8	11/16
CL-16-SHS	—	CL-32-SHS	—	CL-67-SHS			3					3-3/64						
CL-38-SHS	—	CL-45-SHS	—	CL-68-SHS			4					4-3/64						
CL-39-SHS	—	CL-46-SHS	—	CL-69-SHS			5					5-3/64						

## METRIC

CLM-1-SHS-BO	—	CLM-17A-SHS-BO	—	CLM-47-SHS-BO	M6	1	.98	3/16	9/32	5/16	1/8	1.08	3/8	23/64	1/8	1.03	1/4	5/16
CLM-2-SHS-BO	—	CLM-18A-SHS-BO	—	CLM-48-SHS-BO			1.57					1.67						
CLM-3-SHS-BO	—	CLM-19-SHS-BO	—	CLM-49-SHS-BO			1.97					2.07						
CLM-4-SHS-BO	—	CLM-40-SHS-BO	—	CLM-50-SHS-BO			2.95					3.05						
CLM-5-SHS-BO	—	CLM-20-SHS-BO	—	CLM-51-SHS-BO	M8	1-1/8	.98	1/4	11/32	3/8	3/16	1.08	1/2	27/64	5/32	1.05	5/16	23/64
CLM-6-SHS-BO	—	CLM-21-SHS-BO	—	CLM-52-SHS-BO			1.57					1.67						
CLM-7-SHS-BO	—	CLM-22-SHS-BO	—	CLM-53-SHS-BO			1.97					2.06						
CLM-8-SHS-BO	—	CLM-41-SHS-BO	—	CLM-54-SHS-BO			2.95					3.05						
CLM-9-SHS-BO	—	CLM-24-SHS-BO	—	CLM-56-SHS-BO	M10	1-1/4	1.57	19/64	3/8	7/16	3/16	1.70	9/16	5/8	3/16	1.61	3/8	7/16
CLM-10-SHS-BO	—	CLM-25-SHS-BO	—	CLM-57-SHS-BO			1.97					2.10						
CLM-11-SHS-BO	—	CLM-42-SHS-BO	—	CLM-58-SHS-BO			2.95					3.08						
CLM-12-SHS-BO	—	CLM-43-SHS-BO	—	CLM-59-SHS-BO			3.94					4.06						
CLM-11A-SHS-BO	—	CLM-27-SHS-BO	—	CLM-61-SHS-BO	M12	1-1/4	1.57	13/32	15/32	1/2	3/16	1.64	3/4	17/32	3/16	1.69	1/2	9/16
CLM-12A-SHS-BO	—	CLM-28-SHS-BO	—	CLM-62-SHS-BO			1.97					2.03						
CLM-13-SHS-BO	—	CLM-29-SHS-BO	—	CLM-63-SHS-BO			2.95					3.01						
CLM-14-SHS-BO	—	CLM-44-SHS-BO	—	CLM-64-SHS-BO			3.94					4.00						
CLM-15-SHS-BO	—	CLM-31-SHS-BO	—	CLM-66-SHS-BO	M16	1-1/4	1.97	1/2	5/8	1/2	3/16	2.01	15/16	21/32	7/32	2.06	5/8	11/16
CLM-16-SHS-BO	—	CLM-32-SHS-BO	—	CLM-67-SHS-BO			2.95					3.00						
CLM-17-SHS-BO	—	CLM-45-SHS-BO	—	CLM-68-SHS-BO			3.94					3.98						
CLM-18-SHS-BO	—	CLM-46-SHS-BO	—	CLM-69-SHS-BO			4.92					4.97						

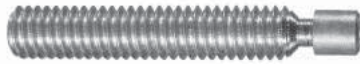
\* Inch sizes are available zinc plated or with black oxide finish. Metric sizes are available only with black oxide finish (-BO only).



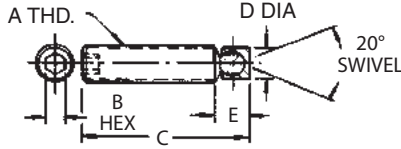
# SWIVEL SCREW CLAMPS

BODY: 12L14 OR 1144 STEEL, HEAT TREATED, ZINC PLATED YELLOW CHROMATE (OR 300-SERIES STAINLESS STEEL)  
 FOOT: 12L14 STEEL, ZINC PLATED YELLOW CHROMATE (OR 300-SERIES STAINLESS STEEL, OR DELRIN®)

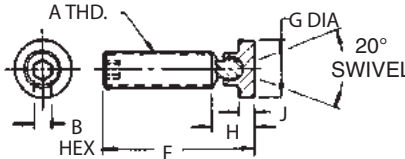
**INFO+:** Socket-head swivel-screw assemblies that combine the bodies on page 100 with the feet on page 101. The steel version is optionally available with black oxide finish by adding "-BO" to the part number (example: CL-2-SSC-BO). Type A and B feet are optionally available in Delrin® by adding "N" to the part number (examples: CL-2-SSCN, CL-2-SSC-BON, CL-2-SSC-SN).



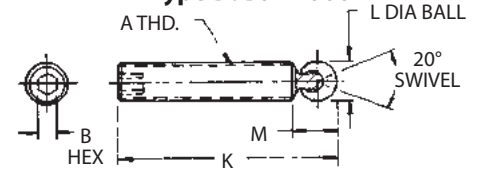
**Type A: Small Foot**



**Type B: Large Foot**



**Type D: Ball Foot**



3

## INCH

TYPE A STEEL PART NO.*	TYPE A STAINLESS PART NO.	TYPE B STEEL PART NO.*	TYPE B STAINLESS PART NO.	TYPE D STEEL PART NO.*	A	B	C	D DIA	E	F	G DIA	H	J	K	L DIA	M	
CL-1-SSC	—	CL-20-SSC	—	CL-47-SSC	1/4-20	1/8	1/2	3/16	9/32	19/32	3/8	23/64	1/8	.69	1/4	5/16	
CL-2-SSC	CL-2-SSC-S	CL-21-SSC	CL-21-SSC-S	CL-48-SSC			3/4			.89							
CL-3-SSC	CL-3-SSC-S	CL-22-SSC	CL-22-SSC-S	CL-49-SSC			1			1.08							
CL-4-SSC	CL-4-SSC-S	CL-23-SSC	CL-23-SSC-S	CL-50-SSC	5/16-18	5/32	1-1/2	1/4	11/32	1-19/32	1/2	27/64	5/32	1.67	5/16	23/64	
CL-5-SSC	—	CL-24-SSC	—	CL-51-SSC			3/4			.88							
CL-6-SSC	CL-6-SSC-S	CL-25-SSC	CL-25-SSC-S	CL-52-SSC			1			1.08							
CL-7-SSC	CL-7-SSC-S	CL-26-SSC	CL-26-SSC-S	CL-53-SSC	3/8-16	3/16	1-1/2	19/64	3/8	1-19/32	9/16	5/8	3/16	1.67	3/8	7/16	
CL-8-SSC	CL-8-SSC-S	CL-27-SSC	CL-27-SSC-S	CL-54-SSC			2			2.06							
CL-9-SSC	—	CL-28-SSC	—	CL-55-SSC			3/4			.91							
CL-10-SSC	—	CL-29-SSC	—	CL-56-SSC	1/2-13	1/4	1	13/32	15/32	1-1/8	3/4	17/32	3/16	1.11	3/8	9/16	
CL-11-SSC	CL-11-SSC-S	CL-30-SSC	CL-30-SSC-S	CL-57-SSC			1-1/2			1.64							
CL-12-SSC	CL-12-SSC-S	CL-31-SSC	CL-31-SSC-S	CL-58-SSC			2			2.03							
CL-39-SSC	CL-39-SSC-S	CL-43-SSC	CL-43-SSC-S	CL-59-SSC	5/8-11	5/16	3	1/2	5/8	3-1/8	15/16	21/32	7/32	3.08	5/8	11/16	
CL-14-SSC	—	CL-33-SSC	—	CL-61-SSC			4			4.00							
CL-15-SSC	CL-15-SSC-S	CL-34-SSC	CL-34-SSC-S	CL-62-SSC			2			2.01							
CL-16-SSC	CL-16-SSC-S	CL-35-SSC	CL-35-SSC-S	CL-63-SSC	CL-18-SSC	—	3	CL-19-SSC	—	3-3/64	CL-37-SSC	—	CL-38-SSC	—	CL-66-SSC	CL-67-SSC	—
CL-40-SSC	CL-40-SSC-S	CL-44-SSC	CL-44-SSC-S	CL-64-SSC			4			4.00							
CL-18-SSC	—	CL-37-SSC	—	CL-66-SSC			2			2.01							
CL-41-SSC	—	CL-45-SSC	—	CL-68-SSC	CL-21-SSC	—	4	CL-46-SSC	—	4-3/64	CLM-20A-SSC-BO	—	CLM-21A-SSC-BO	—	CLM-47-SSC-BO	CLM-48-SSC-BO	CLM-49-SSC-BO
CL-42-SSC	—	CL-46-SSC	—	CL-69-SSC			5			4.97							

## METRIC

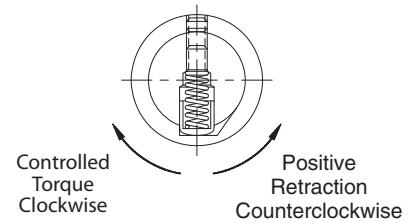
CLM-1-SSC-BO	CLM-2-SSC-BO	CLM-3-SSC-BO	CLM-4-SSC-BO	CLM-5-SSC-BO	CLM-6-SSC-BO	CLM-7-SSC-BO	CLM-8-SSC-BO	CLM-9-SSC-BO	CLM-10-SSC-BO	CLM-11-SSC-BO	CLM-12-SSC-BO	CLM-13-SSC-BO	CLM-14-SSC-BO	CLM-15-SSC-BO	CLM-16-SSC-BO	CLM-17-SSC-BO	CLM-18-SSC-BO	CLM-19-SSC-BO	CLM-20-SSC-BO	CLM-21-SSC-BO
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
CLM-20A-SSC-BO	CLM-21A-SSC-BO	CLM-22-SSC-BO	CLM-23-SSC-BO	CLM-24-SSC-BO	CLM-25-SSC-BO	CLM-26-SSC-BO	CLM-27-SSC-BO	CLM-28-SSC-BO	CLM-29-SSC-BO	CLM-30-SSC-BO	CLM-31-SSC-BO	CLM-32-SSC-BO	CLM-33-SSC-BO	CLM-34-SSC-BO	CLM-35-SSC-BO	CLM-36-SSC-BO	CLM-37-SSC-BO	CLM-38-SSC-BO	CLM-39-SSC-BO	CLM-40-SSC-BO
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
CLM-47-SSC-BO	CLM-48-SSC-BO	CLM-49-SSC-BO	CLM-50-SSC-BO	CLM-51-SSC-BO	CLM-52-SSC-BO	CLM-53-SSC-BO	CLM-54-SSC-BO	CLM-55-SSC-BO	CLM-56-SSC-BO	CLM-57-SSC-BO	CLM-58-SSC-BO	CLM-59-SSC-BO	CLM-61-SSC-BO	CLM-62-SSC-BO	CLM-63-SSC-BO	CLM-64-SSC-BO	CLM-66-SSC-BO	CLM-67-SSC-BO	CLM-68-SSC-BO	CLM-69-SSC-BO
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

\* Inch sizes are available zinc plated or with black oxide finish. Metric sizes are available only with black oxide finish (-BO only).

# ADJUSTABLE-TORQUE THUMB SCREWS

SCREW: 12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH  
 KNOB: 12L14 STEEL, BLACK OXIDE FINISH  
 SPRING: MUSIC WIRE

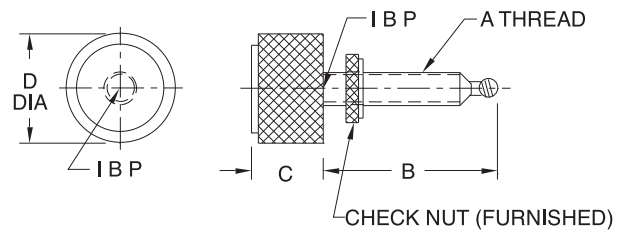
3



Knurled-head thumb screw that exerts positive, repeatable force. Clockwise, the knob declutches and turns freely when you reach the desired torque. Counterclockwise, the knob locks for positive retraction. Adjustable-Torque Thumb Screws are furnished with your choice of swivel foot, and a Knurled Check Nut.

To set desired force, first remove the outer cover screw at the side of the knob, to expose the adjustment screw. Next, insert a hex wrench to turn the adjustment screw until desired torque is achieved. Reinstall the outer cover screw when finished. Torque can be adjusted from 3 to 6 inch-lbs, resulting in a contact force of 10 to 125 lbs, but these values are approximate. Force can vary +/- 30% depending on lubrication and other operating conditions.

Choice of four foot types. Adjustable-Torque Thumb Screws use our patented left-hand-thread swivel-foot system. The ball end of the body screws into the foot for easy installation and removal. Once the ball threads pass beyond the foot threads, the foot can rotate and pivot freely (20° total angle). Foot threads are left-hand to positively prevent accidental backout during use. Delrin® feet are optional for types A and B. To order with a Delrin® foot, add "N" to the part number, e.g. CL-415-TSAN. Note: Delrin® feet are not threaded – they snap on and off.



## INCH

PART NO.				A	B	C	D DIA	ADJUSTMENT RANGE	
DOG POINT	A FOOT	B FOOT	D FOOT					TORQUE (IN.-LBS)	END FORCE (LBS)*
CL-312-TS	—	—	—	#10-24	1-1/4	21/32	15/16	3-6	10-125
CL-312A-TS	—	—	—	#10-32					
—	CL-415-TSA	CL-415-TSB	CL-415-TSD	1/4-20	1-1/2	21/32	15/16	3-6	10-125
—	CL-425-TSA	CL-425-TSB	CL-425-TSD		2-1/2				
—	CL-517-TSA	CL-517-TSB	CL-517-TSD	5/16-18	1-3/4	21/32	1-3/16	3-6	10-125
—	CL-527-TSA	CL-527-TSB	CL-527-TSD		2-3/4				
—	CL-620-TSA	CL-620-TSB	CL-620-TSD	3/8-16	2	21/32	1-3/16	3-6	10-125
—	CL-630-TSA	CL-630-TSB	CL-630-TSD		3				
—	CL-820-TSA	CL-820-TSB	CL-820-TSD	1/2-13	2	21/32	1-3/16	3-6	10-125
—	CL-830-TSA	CL-830-TSB	CL-830-TSD		3				
—	CL-1020-TSA	CL-1020-TSB	CL-1020-TSD	5/8-11	2	21/32	1-3/16	3-6	10-125
—	CL-1030-TSA	CL-1030-TSB	CL-1030-TSD		3				

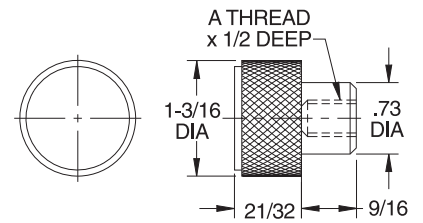
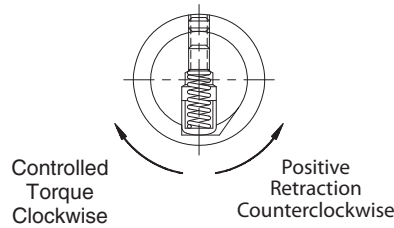
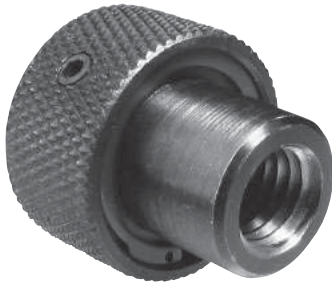
## METRIC

PART NO.				A	B	C	D DIA	ADJUSTMENT RANGE	
DOG POINT	A FOOT	B FOOT	D FOOT					TORQUE (IN.-LBS)	END FORCE (LBS)*
CLM-5-TS	—	—	—	M5	1.18	21/32	15/16	3-6	10-125
—	CLM-6-TSA	CLM-6-TSB	CLM-6-TSD	M6	2.53				
—	CLM-8-TSA	CLM-8-TSB	CLM-8-TSD	M8	2.71				
—	CLM-10-TSA	CLM-10-TSB	CLM-10-TSD	M10	2.90	21/32	1-3/16	3-6	10-125
—	CLM-12-TSA	CLM-12-TSB	CLM-12-TSD	M12	2.89				
—	CLM-16-TSA	CLM-16-TSB	CLM-16-TSD	M16	2.88				

\* End force can vary +/-30% depending on lubrication and other operating conditions.

# ADJUSTABLE-TORQUE KNOBS

KNOB: 12L14 STEEL, BLACK OXIDE FINISH  
 SPRING: 17-7 PH STAINLESS STEEL



Knurled knob that exerts positive, repeatable force. Clockwise, the knob declutches and turns freely when you reach the desired torque. Counterclockwise, the knob locks for positive retraction. Can be used as a controlled-torque nut, or as a thumb screw by installing a custom-made screw in the tapped hole.

To set desired force, first remove the outer cover screw at the side of the knob, to expose the adjustment screw. Next, insert a hex wrench to turn the adjustment screw until desired torque is achieved. Reinstall the outer cover screw when finished. Torque can be adjusted from 3 to 6 inch-lbs, resulting in a contact force of 10 to 125 lbs, but these values are approximate. Force can vary +/- 30% depending on lubrication and other operating conditions.

## INCH

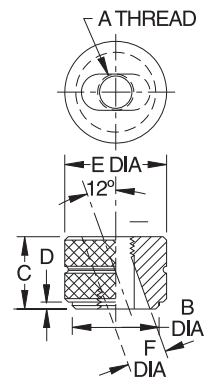
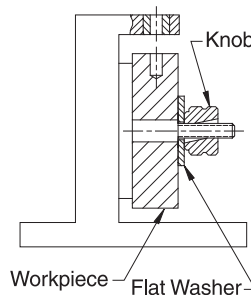
PART NO.	A	ADJUSTMENT RANGE	
		TORQUE (IN.-LBS)	END FORCE (LBS)*
CL-4-ATK	1/4-20	3-6	10-125
CL-5-ATK	5/16-18		10-125
CL-6-ATK	3/8-16		10-125
CL-8-ATK	1/2-13		10-125

## METRIC

CLM-6-ATK	M6	3-6	10-125
CLM-8-ATK	M8		10-125
CLM-10-ATK	M10		10-125
CLM-12-ATK	M12		10-125

# QUICK-ACTING KNURLED KNOBS

12L14 STEEL, BLACK OXIDE FINISH



## INCH

PART NO.	A	B DIA	C	D	E DIA	F DIA
CL-1-QKK	#10-24	1/2	7/16		5/8	7/32
CL-2-QKK	1/4-20	5/8	9/16	1/16	3/4	9/32
CL-3-QKK	5/16-18	3/4	5/8		7/8	11/32
CL-4-QKK	3/8-16	7/8	3/4	1/8	1	13/32
CL-5-QKK	1/2-13	1			1-1/8	17/32

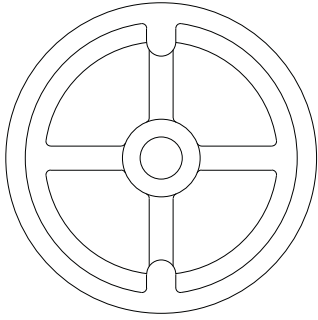
## METRIC

CLM-5-QKK	M5	.51	.43		5/8	.23
CLM-6-QKK	M6	.63	.55	.08	3/4	.27
CLM-8-QKK	M8	.75			7/8	.35
CLM-10-QKK	M10	.87	.63	.12	1	.42
CLM-12-QKK	M12	.98			.75	.12

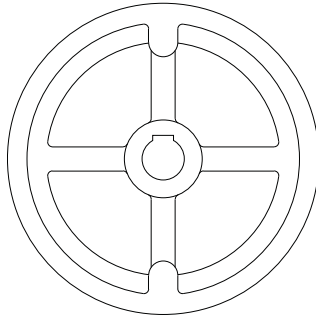
Quick-acting knob that slides in and out of clamping position, ideal when the knob must be completely removed for loading. Tilt knob to slide in, then straighten to engage threads and tighten. To remove, loosen knob, then tilt to slide out. For full strength, use a stud that extends slightly beyond the knob, to engage all threads.

# HAND-WHEEL MODIFICATIONS

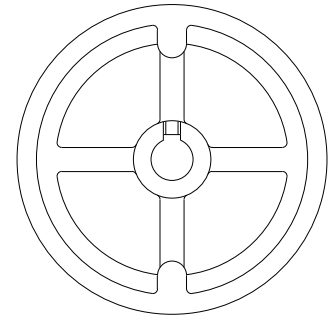
3



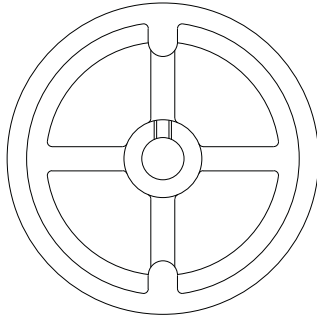
**Bored Hole**



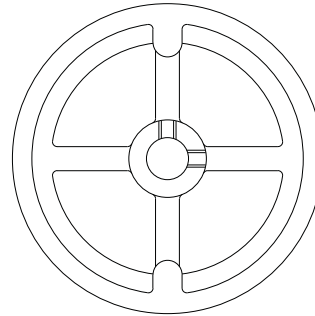
**Bored Hole with Keyway**



**Bored Hole with Setscrew Hole over Keyway**



**Bored Hole with Setscrew Hole**



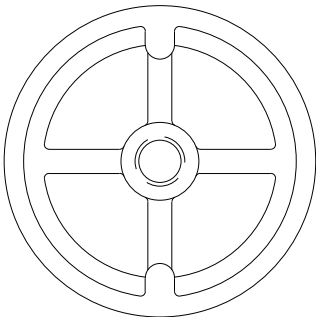
**Bored Hole with 2 Setscrew Holes at 90°**

## BORE SIZE

HAND WHEEL DIA	STANDARD BORE SIZE (+0/+.002)	MAXIMUM BORE SIZE
4	.375	.750
5	.375	1.000
6	.500	1.125
8	.625	1.375
10	.625	1.500
12	.750	2.000

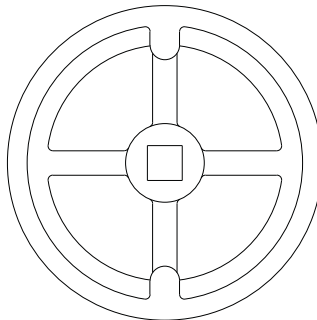
## KEYWAYS & SETSCREWS

BORE SIZE	STANDARD SQUARE KEYWAY	STANDARD SETSCREW HOLE
.375-.438	3/32	#10-32
.439-.562	1/8	#10-32
.563-.875	3/16	1/4-20
.876-1.250	1/4	5/16-18
1.251-1.375	5/16	3/8-16
1.376-1.750	3/8	3/8-16
1.751-2.000	1/2	1/2-13



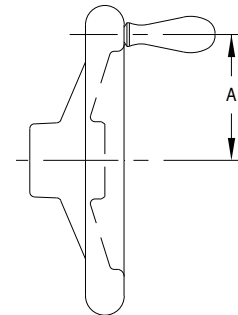
**TAPPED HOLE**

HAND WHEEL DIA	AVAILABLE THREAD SIZES
4	3/8 to 3/4, M10 to M20
5	3/8 TO 1, M10 to M24
6	1/2 to 1-1/4, M12 to M30
8	1/2 to 1-3/8, M12 to M36
10	5/8 to 1-1/2, M16 to M36
12	3/4 to 2, M20 to M48



**SQUARE HOLE**

HAND WHEEL DIA	AVAILABLE SQUARE HOLE SIZES
4	1/2
5	1/2, 5/8
6	1/2, 5/8
8	1/2, 5/8
10	1/2, 5/8
12	1/2, 5/8



**HANDLE INSTALLATION**

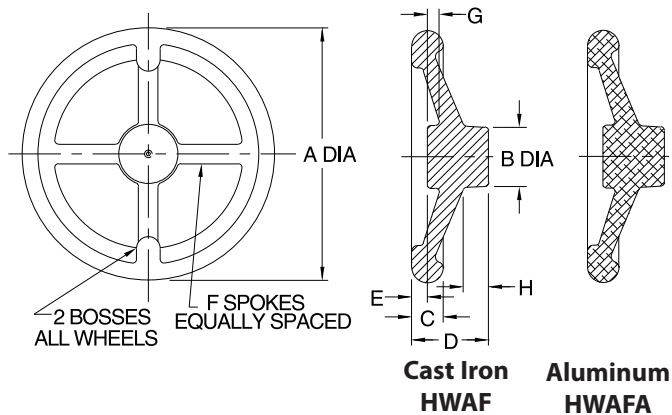
HAND WHEEL DIA	A
4	1-9/16
5	2
6	2-1/2
8	3-1/4
10	4-3/16
12	5-1/8

# HAND WHEELS

CAST IRON PER ASTM-A48 CLASS 30 OR 319 ALUMINUM ALLOY



**Angled-Spoke  
Rounded Design  
Cast Iron or Aluminum**



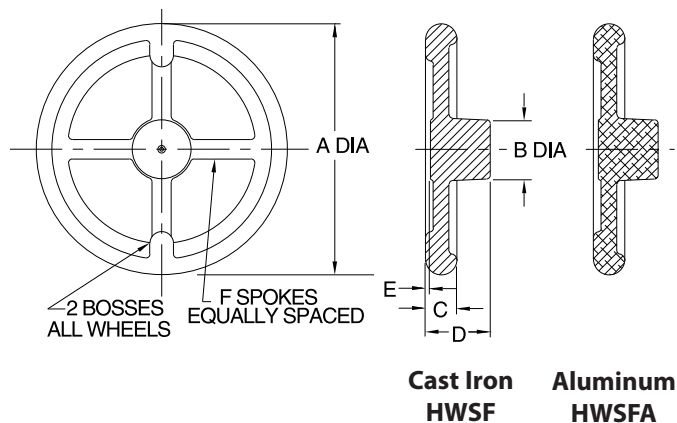
Utility-grade Hand Wheels that can be easily customized for any application. **INFO+:** See page 106 for factory modifications available. Wide range of sizes from 4 to 12" in diameter. Choose either cast iron for maximum strength, or aluminum for light weight.

## ANGLED SPOKES

PART NO. CAST IRON	PART NO. ALUMINUM	A DIA	B DIA	C	D	E	F	G	H	J DIA	HANDLE		
											SIZE	SOLID	REVOLVING
CL-4-HWAF	CL-4-HWAFA	4	1-1/4	5/8	1-11/16	1/8	4	9/32	3/4	11/16	SIZE 2	<b>INFO+:</b> SEE PAGE 117	<b>INFO+:</b> SEE PAGES 118-120
CL-5-HWAF	CL-5-HWAFA	5	1-1/2	3/4	1-7/8	3/8		5/16					
CL-6-HWAF	CL-6-HWAFA	6	1-5/8		1	2	13/32	3/8	13/16	1	SIZE 4		
CL-8-HWAF	CL-8-HWAFA	8	1-7/8	2-7/16		1/2							
CL-10-HWAF	CL-10-HWAFA	10	2-1/4	1	3-1/32	11/16	8	7/16	1-1/16	1-3/4	SIZE 5		
CL-12-HWAF	CL-12-HWAFA	12	1		4-3/32	1-1/16			1-3/4	2-1/2			



**Straight-Spoke  
Rounded Design  
Cast Iron or Aluminum**



Same as the Hand Wheels shown above, except with straight spokes for a flatter profile.

## STRAIGHT SPOKES

PART NO. CAST IRON	PART NO. ALUMINUM	A DIA	B DIA	C	D	E	F	J DIA	HANDLE		
									SIZE	SOLID	REVOLVING
CL-4-HWSF	CL-4-HWSFA	4	1-1/4	5/8	1-11/16	1/8	4	11/16	SIZE 2	<b>INFO+:</b> SEE PAGE 117	<b>INFO+:</b> SEE PAGES 118-120
CL-5-HWSF	CL-5-HWSFA	5	1-1/2	3/4							
CL-6-HWSF	CL-6-HWSFA	6	1-5/8		1	2-1/16	5/32	8	1-3/8		
CL-8-HWSF	CL-8-HWSFA	8	1-7/8	2-1/2		1/8					
CL-10-HWSF	CL-10-HWSFA	10	2-1/4	1	3-1/4	1/8	8	1-3/4	SIZE 5		
CL-12-HWSF	CL-12-HWSFA	12	3		3-1/4			2-1/2			

# HAND WHEELS

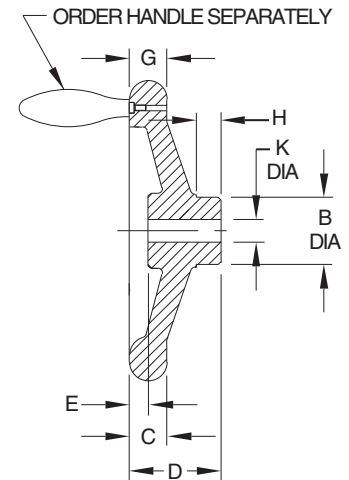
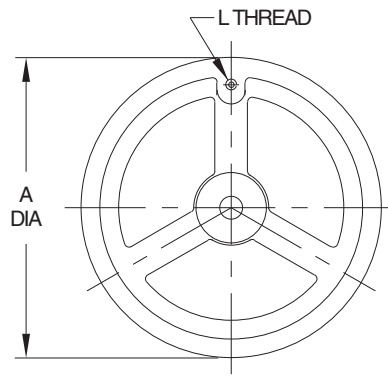
CAST IRON, CHROME PLATED

3

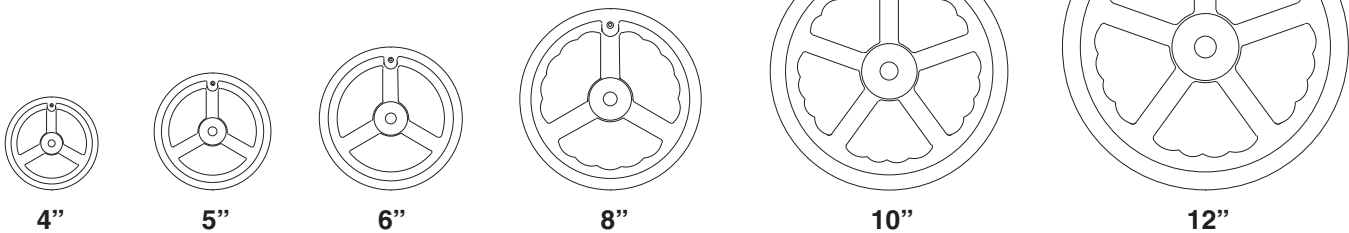


**Angled-Spoke Rounded Design**  
**Cast Iron**  
**Chrome Plated with Polished Rim**

High-quality Hand Wheel with contemporary design. Beautiful chrome-plated finish with a polished rim. Hand Wheel is bored to the standard shaft diameter for its size, and is also tapped for a standard Solid or Revolving Handle. Order handle separately. **INFO+**: See table below for matching rounded-design handle (stainless steel), or pages 111-114 for additional styles. To use without a handle, see table below to order a matching Handle Plug, for the tapped hole (chrome-plated steel).



Hand wheels up through 8" diameter have three spokes; sizes 10" and larger have five spokes. Sizes 8" and larger have a wavy inside rim for better gripping.



**ORDER HAND WHEEL AND SOLID/REVOLVING HANDLE SEPARATELY**

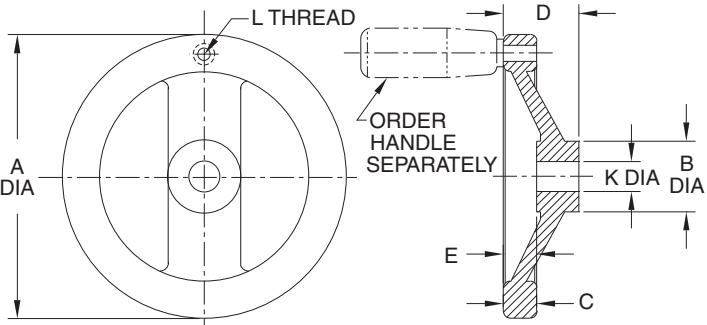
PART NO. WITH TAPPED HOLE FOR HANDLE	A DIA	B DIA	C	D	E	H	K DIA	L	MATCHING HANDLE			HANDLE PLUG
									SIZE	SOLID	REVOLVING	
CL-40-HWAR	4	1-1/8	9/16	1-1/2	7/16	1/2	3/8	1/4-20	SIZE 2	CL-250-SH-S	CL-250-RH-S	CL-2-HW-PLUG
CL-50-HWAR	5	1-1/4	19/32	1-5/8					SIZE 3	CL-350-SH-S	CL-350-RH-S	CL-3-HW-PLUG
CL-60-HWAR	6	1-3/8	21/32	1-13/16	9/16	9/16	1/2	5/16-18	SIZE 4	CL-450-SH-S	CL-450-RH-S	CL-4-HW-PLUG
CL-80-HWAR	8	1-21/32	7/8	2-3/16	11/16	5/8	5/8	3/8-16	SIZE 5	CL-550-SH-S	CL-550-RH-S	CL-5-HW-PLUG
CL-100-HWAR	10	1-7/8	15/16	2-3/8	23/32	3/4			SIZE 5	CL-550-SH-S	CL-550-RH-S	CL-5-HW-PLUG
CL-120-HWAR	12	2-5/32	1	2-1/2	23/32	7/8	3/4	1/2-13	SIZE 5	CL-550-SH-S	CL-550-RH-S	CL-5-HW-PLUG

# HAND WHEELS

ALUMINUM, GRAVITY DIE CAST



High-quality Hand Wheel with two spokes, with contemporary design. Rim is machined and highly polished on all sides. Spokes are shot blasted to a satin finish. These Hand Wheels are bored to the standard shaft diameter for their size, and are tapped for a Solid or Revolving Handle (also available without tapped hole for handle). Rim is concentric and square to the bore. Order Solid or Revolving Handle separately. Matching square-design stainless steel handles are recommended.

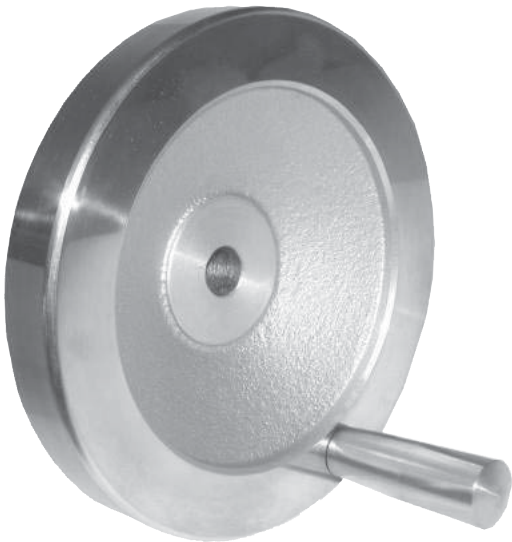


## TWO-SPOKE SQUARE DESIGN — ALUMINUM

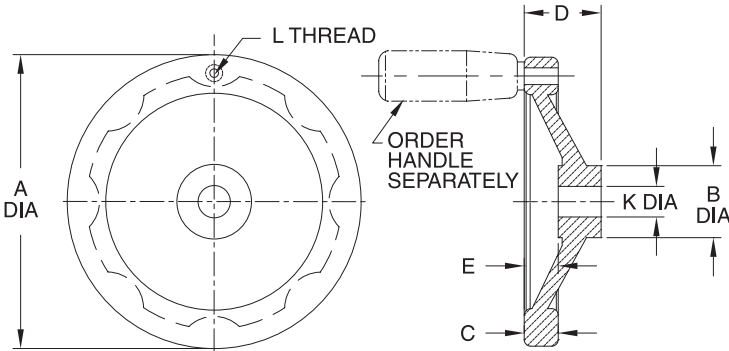
PART NO. WITH TAPPED HOLE FOR HANDLE	PART NO. WITHOUT TAPPED HOLE FOR HANDLE	A DIA	B DIA	C	D	E	K DIA	L	HANDLE		
									SIZE	SOLID	REVOLVING
CL-50-HWTS-A	CL-5-HWTS-A	4.92	1.22	.59	1.30	.59	.375	1/4-20	SIZE 2	SEE PAGE 117	SEE PAGES 118-120
CL-60-HWTS-A	CL-6-HWTS-A	6.30	1.42	.71	1.54	.75	.500	5/16-18	SIZE 3		
CL-80-HWTS-A	CL-8-HWTS-A	7.87	1.65	.81	1.77	.83	.625	3/8-16	SIZE 4		
CL-100-HWTS-A	CL-10-HWTS-A	9.84	1.89	.91	2.01	.91					

INFO+

3



High-quality aluminum Hand Wheel, with contemporary design. Rim is machined and highly polished on all sides. Solid inner dish is shot-blasted to a satin finish. These Hand Wheels are bored to the standard shaft diameter for their size, and are tapped for a Solid or Revolving Handle (also available without tapped hole for handle). Rim is concentric and square to the bore. Order Solid or Revolving Handle separately. Matching square-design stainless steel handles are recommended.



## SOLID SQUARE DESIGN — ALUMINUM

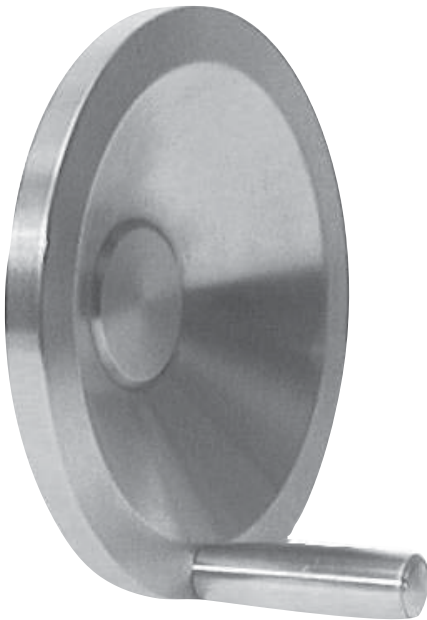
PART NO. WITH TAPPED HOLE FOR HANDLE	PART NO. WITHOUT TAPPED HOLE FOR HANDLE	A DIA	B DIA	C	D	E	K DIA	L	HANDLE		
									SIZE	SOLID	REVOLVING
CL-40-HWSS-A	CL-4-HWSS-A	3.94	1.10	.55	1.18	.51	.375	1/4-20	SIZE 2	SEE PAGE 117	SEE PAGES 118-120
CL-50-HWSS-A	CL-5-HWSS-A	4.92	1.22	.59	1.30	.59					
CL-60-HWSS-A	CL-6-HWSS-A	6.30	1.42	.71	1.54	.75	.500	5/16-18	SIZE 3		
CL-80-HWSS-A	CL-8-HWSS-A	7.87	1.65	.81	1.77	.83	.625	3/8-16	SIZE 4		
CL-100-HWSS-A	CL-10-HWSS-A	9.84	1.89	.91	2.01	.91					

INFO+

# HAND WHEELS

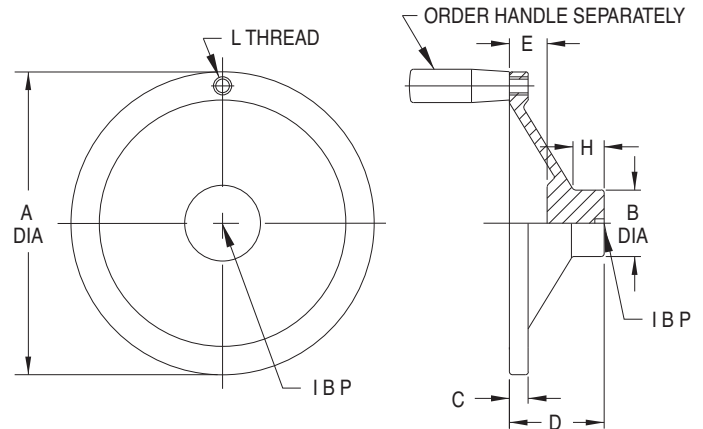
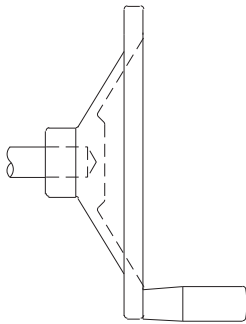
300-SERIES STAINLESS STEEL

3



**Solid Square Design  
Stainless Steel**

High-quality, stainless steel Hand Wheel. Contemporary square design, completely machined to a fine finish from solid 300-series stainless steel. This precision Hand Wheel is extremely strong, yet lightweight. Stainless steel Hand Wheels are center drilled, and also tapped for a standard Solid or Revolving Handle. Order handle separately. **INFO+**: See table below for matching square-design handle (stainless steel), or pages 111-114 for additional styles.



These Hand Wheels can be bored with a blind hole to hide the shaft, for an extremely attractive finished appearance.

## ORDER HAND WHEEL AND SOLID/REVOLVING HANDLE SEPARATELY

PART NO. WITH TAPPED HOLE FOR HANDLE	A DIA	B DIA	C	D	E	H	L	MATCHING HANDLE		
								SIZE	SOLID	REVOLVING
CL-30-HWSS-S	3	.87	1/4	1.10	.43	3/8	1/4-20	SIZE 1	CL-100-SH-S	CL-100-RH-S
CL-40-HWSS-S	4	1.02	5/16	1.25	.54	7/16		SIZE 2	CL-200-SH-S	CL-200-RH-S
CL-60-HWSS-S	6	1.50	1/2	1.50	.63	1/2	5/16-18	SIZE 3	CL-300-SH-S	CL-300-RH-S
CL-80-HWSS-S	8	1.80	9/16	1.80	.85	5/8		SIZE 4	CL-400-SH-S	CL-400-RH-S
CL-100-HWSS-S	10	2	5/8	2	.95	3/4	3/8-16			



# HAND WHEELS

BODY: BLACK FIBER-REINFORCED NYLON THERMOPLASTIC  
HUB: MILD STEEL, ZINC PLATED CLEAR CHROMATE

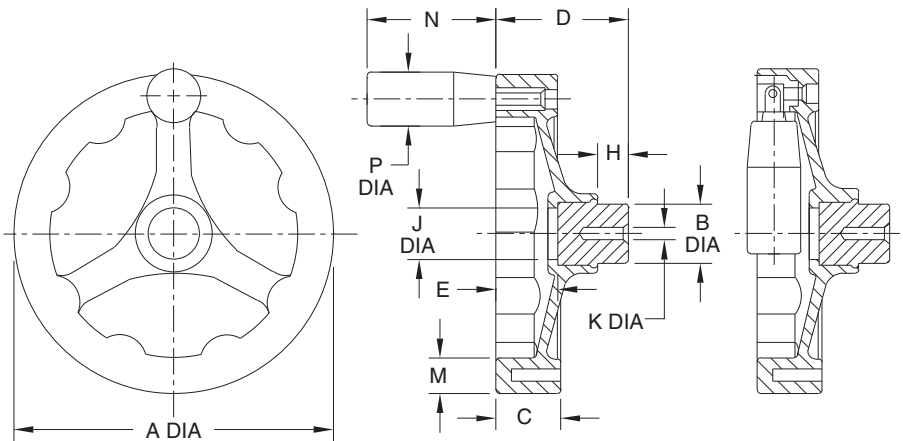


**Angled-Spoke Square Design  
Thermoplastic  
with Revolving Handle**



**Angled-Spoke Square Design  
Thermoplastic  
with Foldable Revolving Handle**

High-quality, thermoplastic Hand Wheel with three spokes, with contemporary design. Molded-in steel hub, blank with a pilot hole. Available with either a Revolving Handle, a Foldable Revolving Handle, or a plain rim without a handle. Matte black fiber-reinforced nylon thermoplastic (textured surface for secure gripping, excellent impact resistance, operating temperatures to 230°F).



PART NO. WITH REVOLVING HANDLE	PART NO. WITH FOLDABLE REVOLVING HANDLE	PART NO. WITHOUT HANDLE (NOT TAPPED)	A DIA	B DIA	C	D	E	H	J DIA	K DIA	M	N	P DIA
CL-41-HWAS-P	CL-42-HWAS-P	CL-4-HWAS-P	3.94	.94	.79	1.69	.75	.47	.71	.157	.59	1.97	.83
CL-51-HWAS-P	CL-52-HWAS-P	CL-5-HWAS-P	4.92		.94	2.01	.91		.79	.236	.67		
CL-61-HWAS-P	CL-62-HWAS-P	CL-6-HWAS-P	6.30	1.26	1.10	2.40	1.18	.59	1.18	.236	.79	2.76	.91
CL-81-HWAS-P	CL-82-HWAS-P	CL-8-HWAS-P	7.87	1.57	1.26	2.87	1.30		1.38		.91		

# HAND WHEELS

BODY: MATTE BLACK HIGH-IMPACT THERMOPLASTIC  
 HUB: MILD STEEL, BLACK OXIDE FINISH  
 CENTER TRIM COVER: ALUMINUM, ANODIZED

3



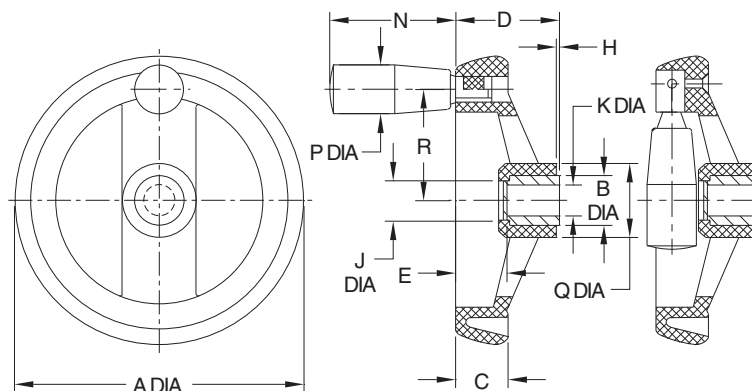
**Two-Spoke Rounded Design  
 Thermoplastic  
 with Revolving Handle**



**Two-Spoke Rounded Design  
 Thermoplastic  
 with Foldable Revolving Handle**

**ELESA  
 ORIGINAL  
 DESIGN**

High-quality, thermoplastic Hand Wheel with two spokes, with contemporary design. Molded-in steel hub. These Hand Wheels are bored to the standard shaft diameter for their size. Available with either a Revolving Handle, a Foldable Revolving Handle, or a plain rim without a handle. Matte black high-impact thermoplastic (textured surface for secure gripping, excellent impact resistance, operating temperatures to 230°F).



PART NO. WITH REVOLVING HANDLE	PART NO. WITH FOLDABLE REVOLVING HANDLE	PART NO. WITHOUT HANDLE (NOT TAPPED)	A DIA	B HUB DIA	C	D	E	H	J DIA	K BORE DIA	N	P DIA	Q DIA	R
CL-41-HWTR-P	CL-42-HWTR-P	CL-4-HWTR-P	3.90	.71	.79	1.46	.79	.01	.67	.375	1.97	.83	.98	1.45
CL-51-HWTR-P	CL-52-HWTR-P	CL-5-HWTR-P	4.88	.87	.87	1.73	.87		.83	.375	2.56	.91	1.22	1.83
CL-61-HWTR-P	CL-62-HWTR-P	CL-6-HWTR-P	6.30	1.02	.98	2.01	.94		.98	.500		1.57	2.56	
CL-81-HWTR-P	CL-82-HWTR-P	CL-8-HWTR-P	7.87	1.18	1.10	2.40	1.06		1.22	.625	3.15	1.02	1.97	3.30

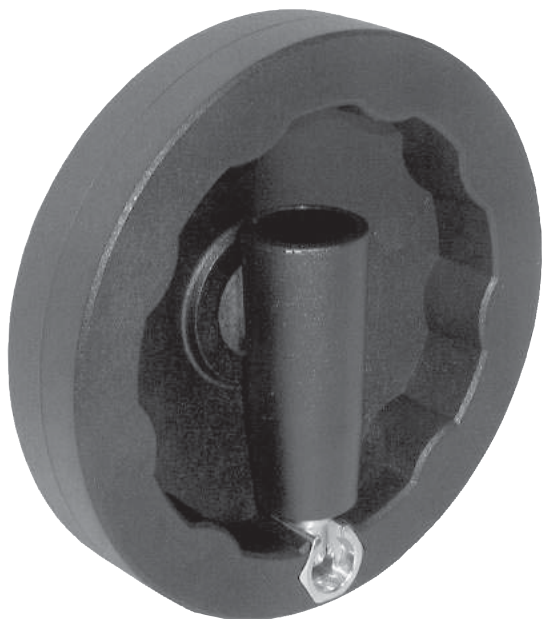
# HAND WHEELS

BODY: MATTE BLACK FIBER-REINFORCED NYLON THERMOPLASTIC  
 HUB: MILD STEEL, ZINC PLATED CLEAR CHROMATE

3

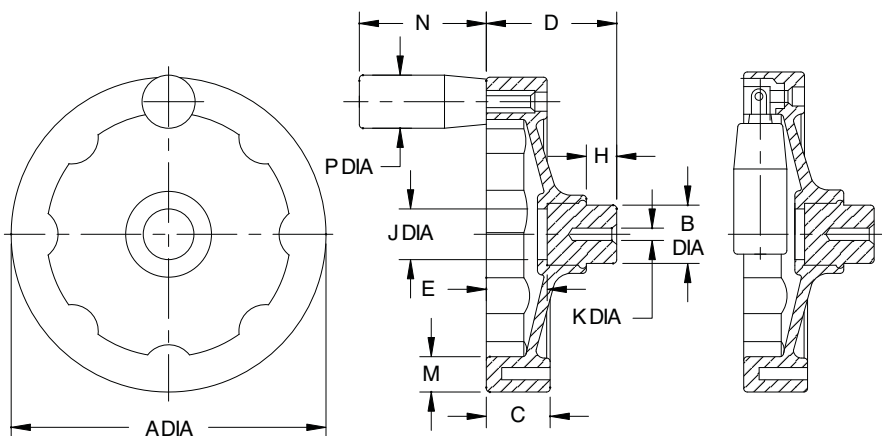


**Solid Square Design  
 Thermoplastic  
 with Revolving Handle**



**Solid Square Design  
 Thermoplastic  
 with Foldable Revolving Handle**

High-quality, thermoplastic Hand Wheel with two spokes, with contemporary design. Molded-in steel hub. These Hand Wheels are bored to the standard shaft diameter for their size. Available with either a Revolving Handle, a Foldable Revolving Handle, or a plain rim without a handle. Matte black high-impact thermoplastic (textured surface for secure gripping, excellent impact resistance, operating temperatures to 230°F).



PART NO. WITH REVOLVING HANDLE	PART NO. WITH FOLDABLE REVOLVING HANDLE	PART NO. WITHOUT HANDLE (NOT TAPPED)	A DIA	B DIA	C	D	E	H	J DIA	K DIA	M	N	P DIA
CL-41-HWSS-P	CL-42-HWSS-P	CL-4-HWSS-P	3.94	.94	.79	1.81	.87	.47	.71	.157	.59	1.97	.83
CL-51-HWSS-P	CL-52-HWSS-P	CL-5-HWSS-P	4.92		.94	2.01	.91		.79	.236	.67		
CL-61-HWSS-P	CL-62-HWSS-P	CL-6-HWSS-P	6.30	1.26	1.10	2.40	1.18	.59	1.18	.236	.79	2.76	.91
CL-81-HWSS-P	CL-82-HWSS-P	CL-8-HWSS-P	7.87	1.57	1.26	2.91	1.34		1.38	.94	3.54		

# HAND WHEELS

BODY: MATTE BLACK HIGH-IMPACT THERMOPLASTIC  
 HUB: MILD STEEL, BLACK OXIDE FINISH  
 CENTER TRIM COVER: GRAY THERMOPLASTIC, PUSH FIT

3



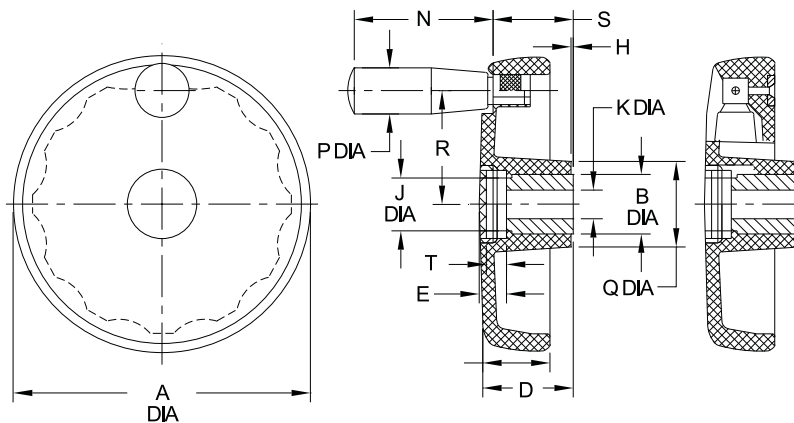
**Solid Disk Design  
 Thermoplastic  
 with Revolving Handle**



**ELESA  
 ORIGINAL  
 DESIGN**

**Solid Disk Design  
 Thermoplastic  
 with Foldable Revolving Handle**

High-quality, solid-disk thermoplastic Hand Wheel, with contemporary design. Molded-in steel hub. These Hand Wheels are bored to the standard shaft diameter for their size. Available with either a Revolving Handle, a Foldable Revolving Handle, or a plain rim without a handle. Matte black high-impact thermoplastic (textured surface for secure gripping, excellent impact resistance, operating temperatures to 230°F).



PART NO. WITH REVOLVING HANDLE	PART NO. WITH FOLDABLE REVOLVING HANDLE	A DIA	B HUB DIA	C	D	E	H	J DIA	K BORE DIA	N	P DIA	Q DIA	R	S	T
CL-41-HWSD-P	CL-42-HWSD-P	4.02	.87	.94	1.34	.47	.01	.79	.375	1.97	.83	1.18	1.53	1.18	.35
CL-51-HWSD-P	CL-52-HWSD-P	4.92	1.02	1.10	1.54	.47		.94	.375	2.20	.87	1.38	1.93	1.38	.31
CL-61-HWSD-P	CL-62-HWSD-P	5.91		1.26	1.73	.55		.500	2.56	.91	1.50	2.28	1.57	.39	
CL-81-HWSD-P	CL-82-HWSD-P	7.87	1.57	1.54	2.09	.67		1.50	.625	3.54	1.10	1.97	3.19	1.89	.51

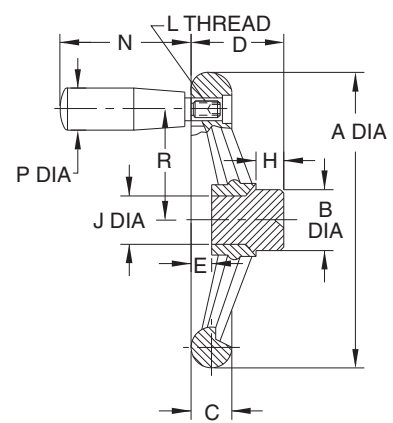
# HAND WHEELS

BODY: BLACK PHENOLIC PLASTIC  
 HUB (ANGLED SPOKE): MILD STEEL, BLACK OXIDE FINISH  
 HUB (SOLID): MILD STEEL, ZINC PLATED CLEAR CHROMATE



High-quality, phenolic Hand Wheel with three spokes, with contemporary design. Molded-in steel hub, blank without a pilot hole. Available with either a Revolving Handle or a plain rim without a handle. Black phenolic plastic (glossy smooth finish, extremely hard, electrical insulator, operating temperatures to 300°F, resistant to oils and most common chemicals).

**ELESA  
 ORIGINAL  
 DESIGN**



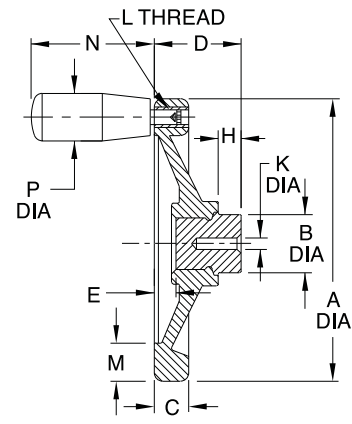
3

## ANGLED-SPOKE ROUNDED DESIGN — PHENOLIC

PART NO. WITH REVOLVING HANDLE	PART NO. WITHOUT HANDLE (NOT TAPPED)	A DIA	B DIA	C	D	E	H	J DIA	L	N	P DIA
CL-41-HWAR-F	CL-4-HWAR-F	3.86	.94	.55	1.57	.16	.47	.79	M6	1.57	.71
CL-51-HWAR-F	CL-5-HWAR-F	4.88		.71	1.38	.35			M8	1.97	.83
CL-61-HWAR-F	CL-6-HWAR-F	6.18	1.26	.87	1.57	.47	.59	.94	M8	2.56	.91
CL-81-HWAR-F	CL-8-HWAR-F	7.80	1.57	.94	2.20	.51			1.22	M10	3.15



High-quality, phenolic Hand Wheel, with contemporary design. Molded-in steel hub, blank with a pilot hole. Available with either a Revolving Handle or a plain rim without a handle. Black phenolic plastic (glossy smooth finish, extremely hard, electrical insulator, operating temperatures to 300°F, resistant to oils and most common chemicals).



## SOLID SQUARE DESIGN — PHENOLIC

PART NO. WITH REVOLVING HANDLE	PART NO. WITHOUT HANDLE (NOT TAPPED)	A DIA	B DIA	C	D	E	H	K DIA	L	M	N	P DIA
CL-31-HWSS-F	CL-3-HWSS-F	3.15	.79	.55	1.22	.16	.39	.157	M6	.59	1.57	.71
CL-41-HWSS-F	CL-4-HWSS-F	3.94	.94		1.38	.24	.43		M8	.63	1.97	.83
CL-51-HWSS-F	CL-5-HWSS-F	4.92	1.26	.63	1.73	.35	.51	.236	M8	.71	2.17	.91
CL-61-HWSS-F	CL-6-HWSS-F	5.91	1.26	.71	1.89	.43	.51		M10	.79	2.56	1.02
CL-81-HWSS-F	CL-8-HWSS-F	7.87	1.57	.83	2.28	.55	.63		M10	.94		

# FLUTED HAND WHEELS

BODY: BLACK PHENOLIC PLASTIC  
 HUB: MILD STEEL, ZINC PLATED CLEAR CHROMATE

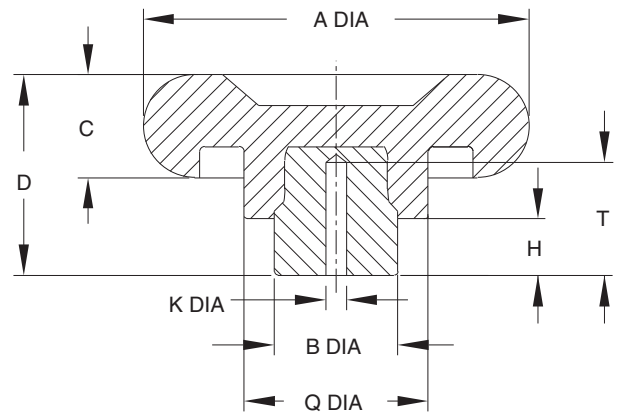
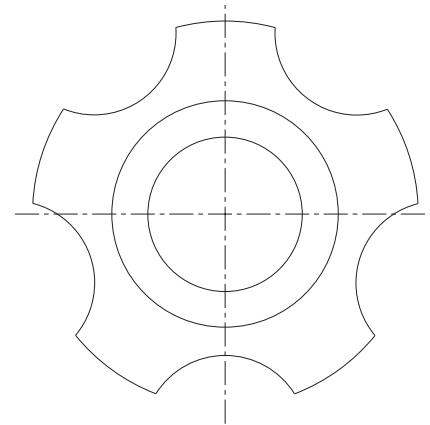
3



CL-4-FHW



CL-3-FHW



Small five-lobed phenolic hand wheels that are useful as control knobs or clamping knobs. Available in two diameters. Molded-in steel hub, blank with a pilot hole. Black phenolic plastic (glossy smooth finish, extremely hard, electrical insulator, operating temperatures to 300°F, resistant to oils and most common chemicals).  
 Note: Catalog photos are actual size.

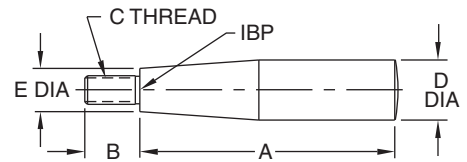
PART NO.	A DIA	B DIA	C	D	H	K DIA	Q DIA	T
CL-3-FHW	2.95	.94	.79	1.54	.43	.157	1.34	.87
CL-4-FHW	3.54	1.26		1.65	.47	.236	1.73	.98

# SOLID HANDLES

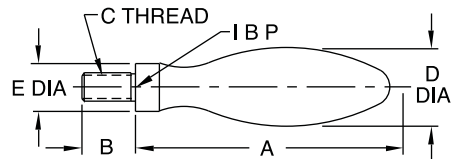
STEEL: 12L14, BLACK OXIDE FINISH. STAINLESS STEEL: 300 SERIES.



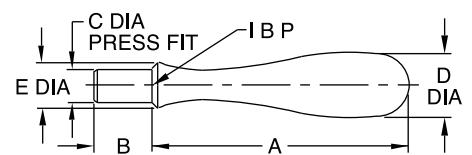
**Square Design  
Threaded  
Stainless Steel**



**Rounded Design  
Threaded  
Stainless Steel**



**Rounded Design  
Press Fit  
Steel, Black Oxide Finish**



## SQUARE DESIGN, THREADED — STAINLESS (INCH)

PART NO.	SIZE	A	B	C	D DIA	E DIA
CL-100-SH-S	1	1-1/2	9/32	1/4-20	1/2	13/32
CL-200-SH-S	2	2	7/16			
CL-300-SH-S	3	2-1/2	9/16	5/16-18	5/8	15/32
CL-400-SH-S	4	3-1/4	11/16	3/8-16	3/4	19/32

## ROUNDED DESIGN, THREADED — STAINLESS (INCH)

CL-250-SH-S	2	2	1/2	1/4-20	5/8	.44
CL-350-SH-S	3	2-5/8	9/16	5/16-18	13/16	.53
CL-450-SH-S	4	3-3/16	11/16	3/8-16	1	.63
CL-550-SH-S	5	3-3/4	13/16	1/2-13	1-1/4	.75

## ROUNDED DESIGN, PRESS FIT — STEEL (INCH)

CL-1-SH	2	2	9/16	3/8	11/16	5/8
CL-2-SH	4	3-1/4	3/4	7/16	1	11/16
CL-3-SH	5	3-7/8	1	1/2	1-3/16	7/8

Attractive fixed handles available in steel with a black oxide finish, or stainless steel with a polished finish. Available in square or rounded designs, each in several sizes. Choice of threaded type or press-fit type (do not use press-fit handles on aluminum hand wheels).

## SQUARE DESIGN, THREADED — STAINLESS (METRIC)

PART NO.	SIZE	A	B	C	D DIA	E DIA
CLM-100-SH-S	1	1-1/2	9/32	M6	1/2	13/32
CLM-200-SH-S	2	2	7/16			
CLM-300-SH-S	3	2-1/2	9/16	M8	5/8	15/32
CLM-400-SH-S	4	3-1/4	11/16	M10	3/4	19/32

## ROUNDED DESIGN, THREADED — STAINLESS (METRIC)

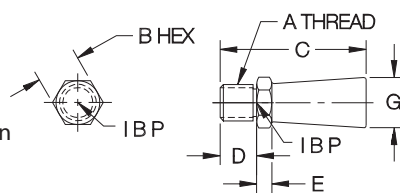
CLM-250-SH-S	2	2	1/2	M6	5/8	.44
CLM-350-SH-S	3	2-5/8	9/16	M8	13/16	.53
CLM-450-SH-S	4	3-3/16	11/16	M10	1	.63
CLM-550-SH-S	5	3-3/4	13/16	M12	1-1/4	.75

# FINGER PINS

12L14 STEEL, BLACK OXIDE FINISH



Miniature, fixed finger handle in steel, with a black oxide finish.



## INCH

PART NO.	A	B	C	D	E	G DIA
CL-0-FP	#10-32	1/4	3/4	1/4	7/64	1/4
CL-1-FP	#10-24					
CL-2-FP	5/16-18	3/8	1-1/4	5/16	5/32	3/8

## METRIC

CLM-5-FP	M5	6mm	.75	M6	.12	.24
CLM-8-FP	M8	10mm	1.26	M8	.16	.39

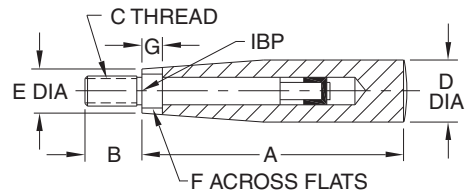
# REVOLVING HANDLES

STEEL: 12L14, BLACK OXIDE FINISH. STAINLESS STEEL: 300 SERIES

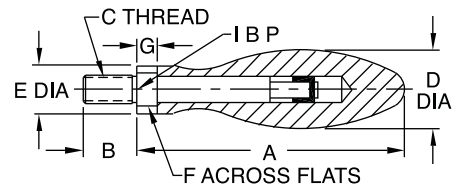
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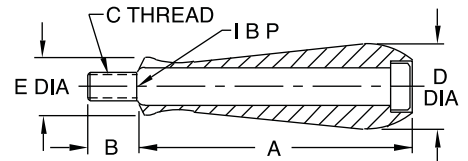
**Square Design Threaded Stainless Steel**



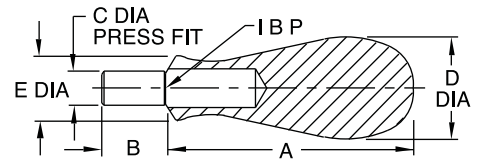
**Rounded Design Threaded Stainless Steel**



**Rounded Design Shoulder Screw Steel, Black Oxide Finish**



**Rounded Design Press Fit Steel, Black Oxide Finish**



Revolving Handles have an internal bearing that allows the handle to remain fixed in your hand, for firm gripping, while turning a hand wheel or crank. These attractive handles are available in steel with a black oxide finish, or stainless steel with a polished finish. Available in square or rounded designs, each in several sizes. Choice of threaded type or press-fit type (do not use press-fit handles on aluminum hand wheels).

## SQUARE DESIGN, THREADED — STAINLESS (INCH)

PART NO.	SIZE	A	B	C	D DIA	E DIA	F	G
CL-100-RH-S	1	1-1/2	9/32	1/4-20	1/2	13/32	5/16	.25
CL-200-RH-S	2	2	1/2					.28
CL-300-RH-S	3	2-1/2	9/16	5/16-18	5/8	15/32	3/8	.32
CL-400-RH-S	4	3-1/4	5/8	3/8-16	3/4	19/32	7/16	.39

## ROUNDED DESIGN, THREADED — STAINLESS (INCH)

CL-250-RH-S	2	2-1/4	1/2	1/4-20	5/8	.44	5/16	.25
CL-350-RH-S	3	2-13/16	9/16	5/16-18	13/16	.53	3/8	.28
CL-450-RH-S	4	3-3/8	5/8	3/8-16	1	.63	7/16	.32
CL-550-RH-S	5	4	3/4	1/2-13	1-1/4	.75	5/8	.39

## ROUNDED DESIGN, SHOULDER SCREW — STEEL (INCH)

CL-1-RH	2	2	7/16	1/4-20	11/16	5/8	—	—
CL-2-RH	4	3-1/4	9/16	3/8-16	1	11/16	—	—
CL-3-RH	5	3-7/8	3/4	1/2-13	1-3/16	7/8	—	—

## ROUNDED DESIGN, PRESS FIT — STEEL (INCH)

CL-4-RH	2	2-3/8	19/32	3/8	11/16	5/8	—	—
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## SQUARE DESIGN, THREADED — STAINLESS (METRIC)

PART NO.	SIZE	A	B	C	D DIA	E DIA	F	G
CLM-100-RH-S	1	1-1/2	9/32	M6	5/8	15/32	5/16	.20
CLM-200-RH-S	2	2	1/2			7/16		.25
CLM-300-RH-S	3	2-1/2	9/16	M8	3/4	15/32	3/8	.28
CLM-400-RH-S	4	3-1/4	5/8	M10	7/8	19/32	7/16	.32

## ROUNDED DESIGN, THREADED — STAINLESS (INCH)

CLM-250-RH-S	2	2-1/4	1/2	M6	5/8	.44	5/16	.25
CLM-350-RH-S	3	2-13/16	9/16	M8	13/16	.53	3/8	.28
CLM-450-RH-S	4	3-3/8	5/8	M10	1	.63	7/16	.32
CLM-550-RH-S	5	4	3/4	M12	1-1/4	.75	5/8	.39

## ROUNDED DESIGN, SHOULDER SCREW — STEEL (INCH)

CLM-1-RH	2	2	7/16	M6	13/16	3/4	—	—
CLM-2-RH	4	3-1/4	9/16	M10	1-1/4	15/16	—	—
CLM-3-RH	5	3-7/8	3/4	M12	1-1/2	1-1/8	—	—



# REVOLVING HANDLES

BODY: BLACK PHENOLIC PLASTIC OR NYLON THERMOPLASTIC  
 THREADED SPINDLE: MILD STEEL, ZINC PLATED CLEAR CHROMATE

3

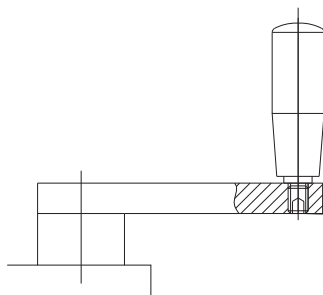


**Phenolic  
with Steel Body**

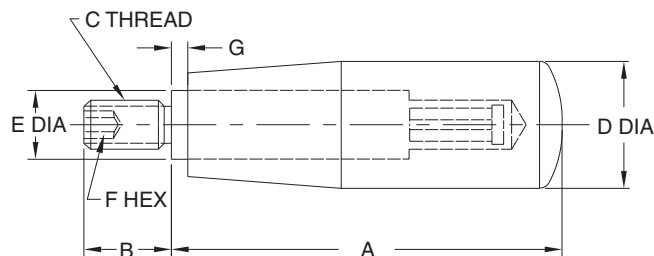


**Thermoplastic  
with Steel Body**

Modern square-design handle with a threaded steel spindle. Revolving Handles have an internal bearing that allows the handle to remain fixed in your hand, for firm gripping while turning a Hand Wheel or crank. Threaded spindle has a hex socket for easy installation. Available in two handle materials: Black phenolic plastic (glossy smooth finish, extremely hard, electrical insulator, operating temperatures to 300°F, resistant to oils and most common chemicals) or matte black nylon thermoplastic (textured surface for secure gripping, excellent impact resistance, operating temperatures to 230°F).



Revolving Handles can be used to make custom crank handles.



## INCH

PART NO. PHENOLIC	PART NO. THERMOPLASTIC	SIZE	A	B	C	D DIA	E DIA	F	G
CL-100-RH-F	CL-100-RH-P	1	1.67	.47	1/4-20	.71	.39	3mm	.10
CL-200-RH-F	CL-200-RH-P	2	2.07	.51		.83			
CL-300-RH-F	CL-300-RH-P	3	2.66	.55	5/16-18	.91	4mm		
CL-400-RH-F	CL-400-RH-P	4	3.25	.63	3/8-16	1.02		5mm	
CL-500-RH-F	—	5	4.12	.79	1/2-13	1.22	6mm		

## METRIC

CLM-100-RH-F	CLM-100-RH-P	1	1.67	.47	M6	.71	.39	3mm	.10
CLM-200-RH-F	CLM-200-RH-P	2	2.07	.51	M6	.83		3mm	
CLM-201-RH-F	—				M8	4mm			
CLM-300-RH-F	CLM-300-RH-P	3	2.66	.55	M8	.91	4mm		
CLM-400-RH-F	CLM-400-RH-P	4	3.25	.63	M10	1.02	5mm		
CLM-500-RH-F	—	5	4.12	.79	M12	1.22	6mm		

# FOLDABLE REVOLVING HANDLES

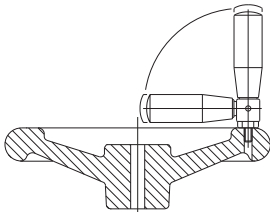
BODY: 300-SERIES STAINLESS STEEL. HANDLE: BLACK THERMOPLASTIC



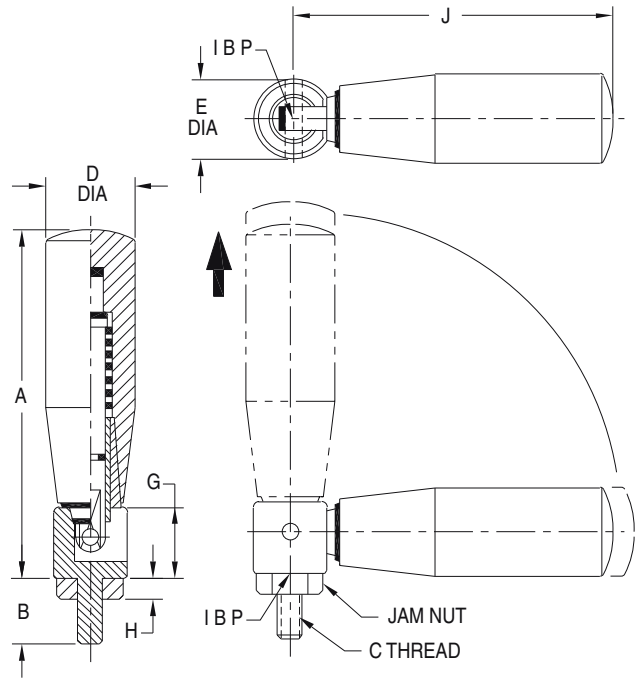
## Thermoplastic with Stainless Steel Body

3

Unique revolving handle that can fold away when not in use. Handle is positively locked in extended position. Like other revolving handles, this foldable handle has an internal bearing that allows it to remain fixed in your hand, for firm gripping, while turning a hand wheel or crank. To allow folding, the handle must first be pulled outward, against a spring force, then moved 90°. Once folded, the handle is held in that position also by spring force.



To install handle in tapped hole, screw in as far as possible, then back off until the handle is at the desired orientation. Tighten Jam Nut to secure at that orientation.

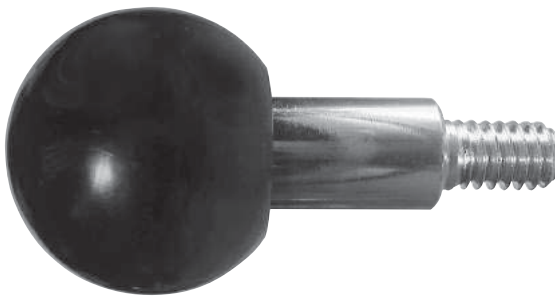


INCH

PART NO.	SIZE	A	B	C	D DIA	E DIA	G	H	J
CL-200-FRH-S	2	2-1/2	5/8	1/4-20	7/8	.63	1/2	11/64	2-3/8
CL-300-FRH-S	3	3-1/4	3/4	5/16-18	15/16	.78	5/8	13/64	3-1/8
CL-400-FRH-S	4	3-3/4	7/8	3/8-16	1	.78	5/8	15/64	3-5/8

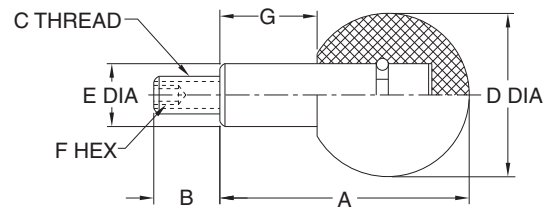
# REVOLVING BALL HANDLES

BALL KNOB: BLACK PHENOLIC PLASTIC  
 THREADED SPINDLE: MILD STEEL, BLACK OXIDE FINISH OR ZINC PLATED CLEAR CHROMATE



## Phenolic with Steel Body

Revolving handle with a ball knob made of phenolic plastic and a threaded steel spindle. This version is especially useful for hand wheels or cranks mounted horizontally with the handle used as a hand rest. Revolving Ball Handles have an internal bearing that allows the handle to remain fixed in your hand, for firm gripping. Threaded spindle has a hex socket for easy installation.



INCH

PART NO.	SIZE	A	B	C	D DIA	E DIA	F	G
CL-200-RBH	2	1.48	.43	1/4-20	.98	.39	3mm	.59
CL-300-RBH	3	1.89	.51	5/16-18	1.26	.51	4mm	.75
CL-400-RBH	4	2.40	.55	3/8-16	1.57	.63	5mm	.94
CL-500-RBH	5	3.07	.83	1/2-13	1.97	.79	6mm	1.22

METRIC

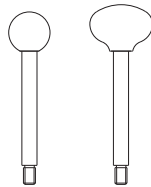
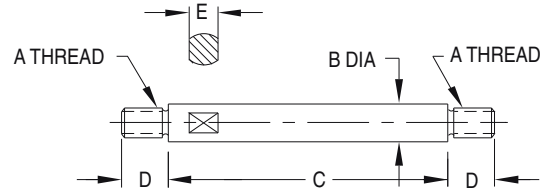
PART NO.	SIZE	A	B	C	D DIA	E DIA	F	G
CLM-200-RBH	2	1.48	.43	M6	.98	.39	3mm	.59
CLM-300-RBH	3	1.89	.51	M8	1.26	.51	4mm	.75
CLM-400-RBH	4	2.40	.55	M10	1.57	.63	5mm	.94
CLM-500-RBH	5	3.07	.83	M12	1.97	.79	6mm	1.22

# LEVER BARS

300-SERIES STAINLESS STEEL



Versatile Lever Bars available in three diameters, each in several lengths. 300-series stainless steel polished to a beautiful finish. **INFO+**: Can be used with the hubs on page 122 to make lever handles. Wrench flat allows firm tightening.



## INCH

PART NO.	A	B DIA	C	D	E
CL-515-LVB-S	5/16-18	.39	1.5	7/16	5/16
CL-522-LVB-S			2.2		
CL-530-LVB-S			3.0		
CL-540-LVB-S			4.0		
CL-555-LVB-S			5.5		
CL-620-LVB-S	3/8-16	.47	2.0	1/2	3/8
CL-627-LVB-S			2.7		
CL-637-LVB-S			3.7		
CL-647-LVB-S			4.7		
CL-660-LVB-S			6.0		
CL-837-LVB-S	1/2-13	.55	3.7	5/8	7/16
CL-847-LVB-S			4.7		
CL-857-LVB-S			5.7		
CL-867-LVB-S			6.7		



## Hoist Rings



Many Varieties  
Of Hoist Rings

### Trusted to Move Your Most Important Materials.

- Swivel Hoist Rings
- Pivoting Hoist Rings
- Safety Hoist Rings
- Lifting Eyes
- Side-Pull Hoist Rings

SEE PAGES 59-75

# LEVER HANDLES

300-SERIES STAINLESS STEEL

3



**Single  
Lever Handle**

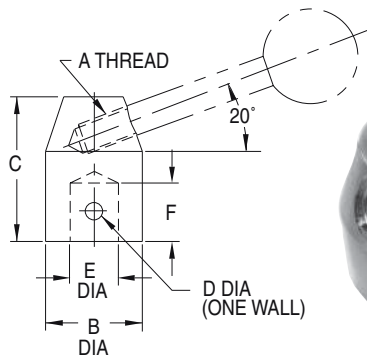


**Triple  
Lever Handle**

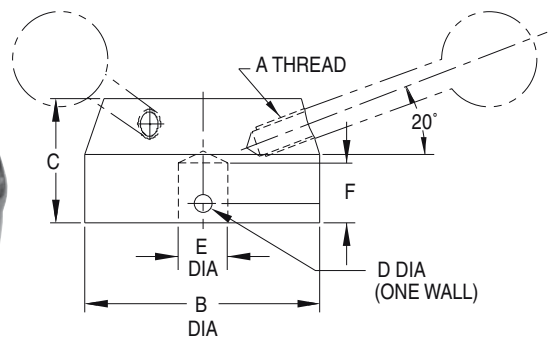
Fast, efficient levers that provide high torque. These attractive Lever Handles are made of 300-series stainless steel, polished to a beautiful finish. Hubs are available in single-handle or triple-handle versions, each in two sizes. Lever Handles can be totally customized by choosing Lever Bar length (**INFO+**: see page 121) and Knob type (**INFO+**: see pages 131-135).



**Single Hub**



**Triple Hub**



**SINGLE LEVER HANDLE — ORDER HUB, LEVER BAR, AND KNOB SEPARATELY (INCH)**

PART NO. HUB ONLY	A	B DIA	C	D DIA	E	F	PART NO. LEVER BAR	PART NO. KNOB
CL-116-LHH-S	5/16-18	1	1-1/2	1/8	3/8 DIA REAMED	5/8	<b>INFO+</b> : SEE PAGE 121	<b>INFO+</b> : SEE PAGES 131-135
CL-1160-LHH-S				—	3/8-16 TAPPED	9/16		
CL-128-LHH-S	3/8-16	1-1/4	1-7/8	5/32	1/2 DIA REAMED	3/4		
CL-1280-LHH-S				—	1/2-13 TAPPED	11/16		

**TRIPLE LEVER HANDLE — ORDER HUB, LEVER BARS, AND KNOBS SEPARATELY (INCH)**

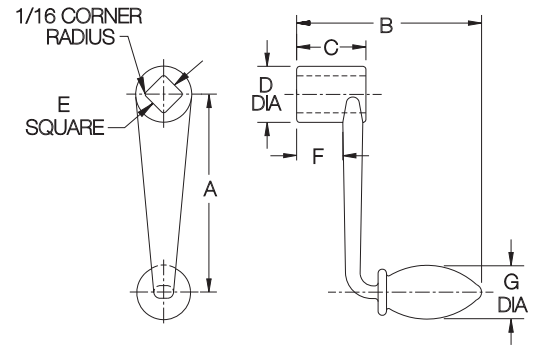
CL-316-LHH-S	5/16-18	2	1	3/16	3/8 DIA REAMED	3/4	<b>INFO+</b> : SEE PAGE 121	<b>INFO+</b> : SEE PAGES 131-135
CL-328-LHH-S	3/8-16	2-3/8	1-3/16	3/16	1/2 DIA REAMED	7/8		

# CRANK HANDLES

NODULAR IRON PER ASTM A536 CLASS 65-45-12, ZINC PLATED CLEAR CHROMATE



Rugged crank handle with a comfortable grip. Choice of three sizes that fit all common square drives.



PART NO.	SQUARE DRIVE SIZE	A	B	C	D DIA	E	F	G DIA
CL-0-H	3/8 or 10mm	2-1/4	3	1	7/8	13/32	5/8	5/8
CL-1-H	1/2 or 12mm	3-3/4	4-3/16	1-5/16	1-1/16	17/32	7/8	7/8
CL-2-H	5/8 or 16mm	5-1/4	5-1/2	2-1/2	1-3/8	21/32	1-3/4	1

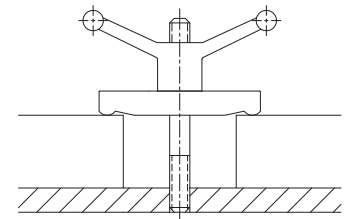
# SPEED BALL HANDLES

NODULAR IRON PER ASTM-A536 CLASS 65-45-12, ZINC PLATED CLEAR CHROMATE



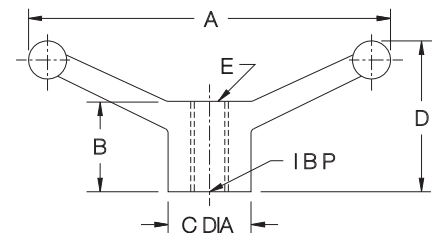
Double Arm

Speed handles that are weighted for quick turning. Long arm extensions provide excellent leverage for hand tightening.



## DOUBLE ARM (INCH & METRIC)

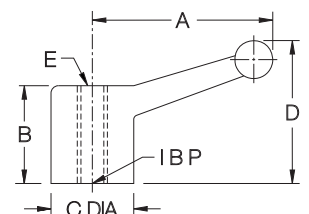
PART NO.	A	B	C DIA	D	E
CL-4-SBH	4-7/8	1-5/8	1-1/8	2-1/4	BLANK
CL-44-SBH					1/2-13
CLM-44-SBH					M12
CL-6-SBH	6	1-5/8	1-3/8	2-3/8	BLANK
CL-64-SBH					5/8-11
CLM-64-SBH					M16
CL-8-SBH	8	1-13/16	1-3/4	2-7/8	BLANK
CL-84-SBH					3/4-10
CLM-84-SBH					M20



Single Arm

## SINGLE ARM (INCH & METRIC)

PART NO.	A	B	C DIA	D	E
CL-5-SBH	3	1-5/8	1-3/8	2-3/8	BLANK
CL-55-SBH					1/2-13
CL-59-SBH					5/8-11
CLM-55-SBH					M12
CLM-59-SBH					M16
CL-7-SBH	4-3/8	2	1-5/8	3-1/2	BLANK
CL-75-SBH					3/4-10
CLM-75-SBH					M20



# BALANCED CRANK HANDLES

300-SERIES STAINLESS STEEL

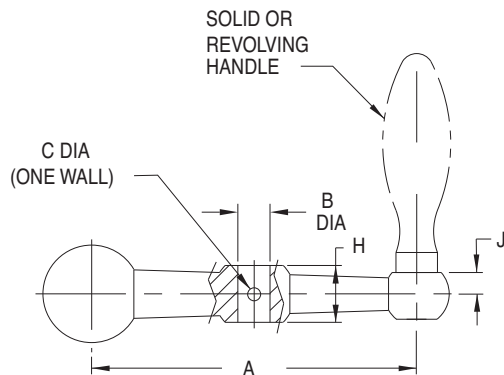
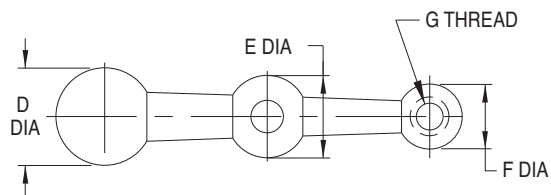
3



**Rounded Handle  
(Solid or Revolving)  
Stainless Steel**



**Square Handle  
(Solid or Revolving)  
Stainless Steel**



High-quality, stainless steel crank handle with a beautiful polished finish. Handle is balanced for smooth operation, and so that no rotation occurs due to handle weight. The reamed center hole is cross-drilled in one wall for easy installation by pinning. Order body and handle separately, with a choice of four handle types:

**INFO+:**

- Rounded-design Solid Handle (p. 117)
- Rounded-design Revolving Handle (p. 118)
- Square-design Solid Handle (p. 117)
- Square-design Revolving Handle (p. 118)

**ORDER BODY AND SOLID/REVOLVING HANDLE SEPARATELY**

PART NO. BODY ONLY	A	B DIA	C DIA	D DIA	E DIA	F DIA	G	H	J	PART NO. — SOLID OR REVOLVING HANDLE			
										ROUNDED SOLID	ROUNDED REVOLVING	SQUARE SOLID	SQUARE REVOLVING
CL-20-CHB-S	2-1/2	5/16	1/8	1	3/4	5/8	1/4-20	9/16	1/4	CL-250-SH-S	CL-250-RH-S	CL-200-SH-S	CL-200-RH-S
CL-30-CHB-S	3-1/8	3/8	5/32	1-1/4	1	3/4	5/16-18	11/16	5/16	CL-350-SH-S	CL-350-RH-S	CL-300-SH-S	CL-300-RH-S
CL-40-CHB-S	4												
CL-50-CHB-S	5	1/2	3/16	1-1/2	1-1/4	1	3/8-16	7/8	3/8	CL-450-SH-S	CL-450-RH-S	CL-400-SH-S	CL-400-RH-S
CL-51-CHB-S		5/8*											

\*1/8" Square keyway on this size only.

# CRANK HANDLES

CRANK BODY & REVOLVING HANDLE: MATTE BLACK THERMOPLASTIC  
 HUB: MILD STEEL, BLACK OXIDE FINISH  
 CENTER TRIM COVER: ALUMINUM, MATTE ANODIZED  
 REVOLVING HANDLE SPINDLE: MILD STEEL, ZINC PLATED CLEAR CHROMATE



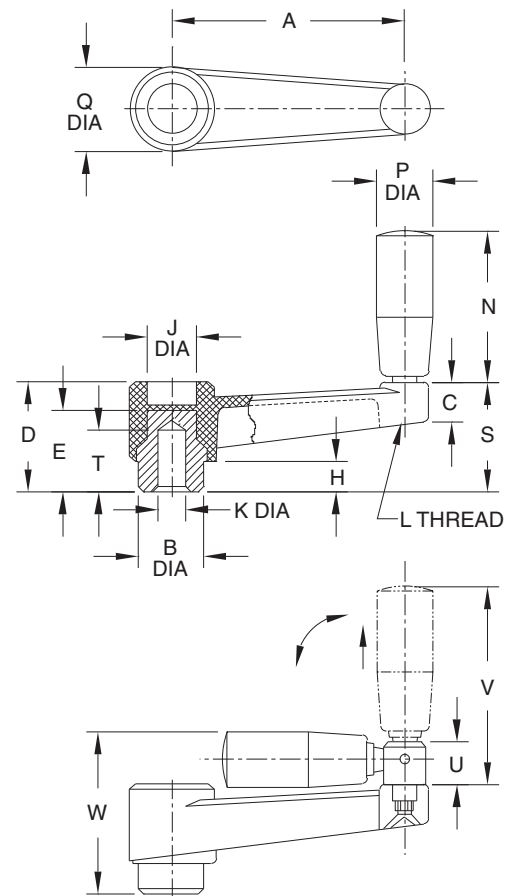
Thermoplastic  
with  
Revolving Handle



Thermoplastic  
with  
Foldable Revolving Handle

ELESA  
ORIGINAL  
DESIGN

High-quality, fiber-reinforced technopolymer Crank Handle, available in five sizes. High-strength design suitable for heavy-duty applications. Matte black high-strength thermoplastic (resistant to oils, solvents, and grease; excellent impact resistance, operating temperatures to 230°F). Molded-in steel hub, blank with a pilot hole. Center trim cover is self-adhesive (apply after modifying hub). Furnished with a Revolving Handle or a Foldable Revolving Handle. Foldable handle is positively locked in extended position. To allow folding, the handle must first be pulled outward, against a spring force, then folded 90°. Once folded, the handle is held in that position also by spring force.



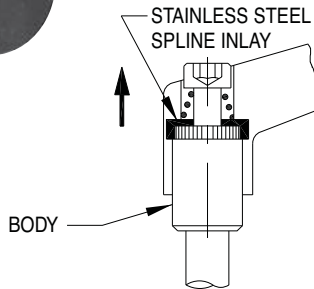
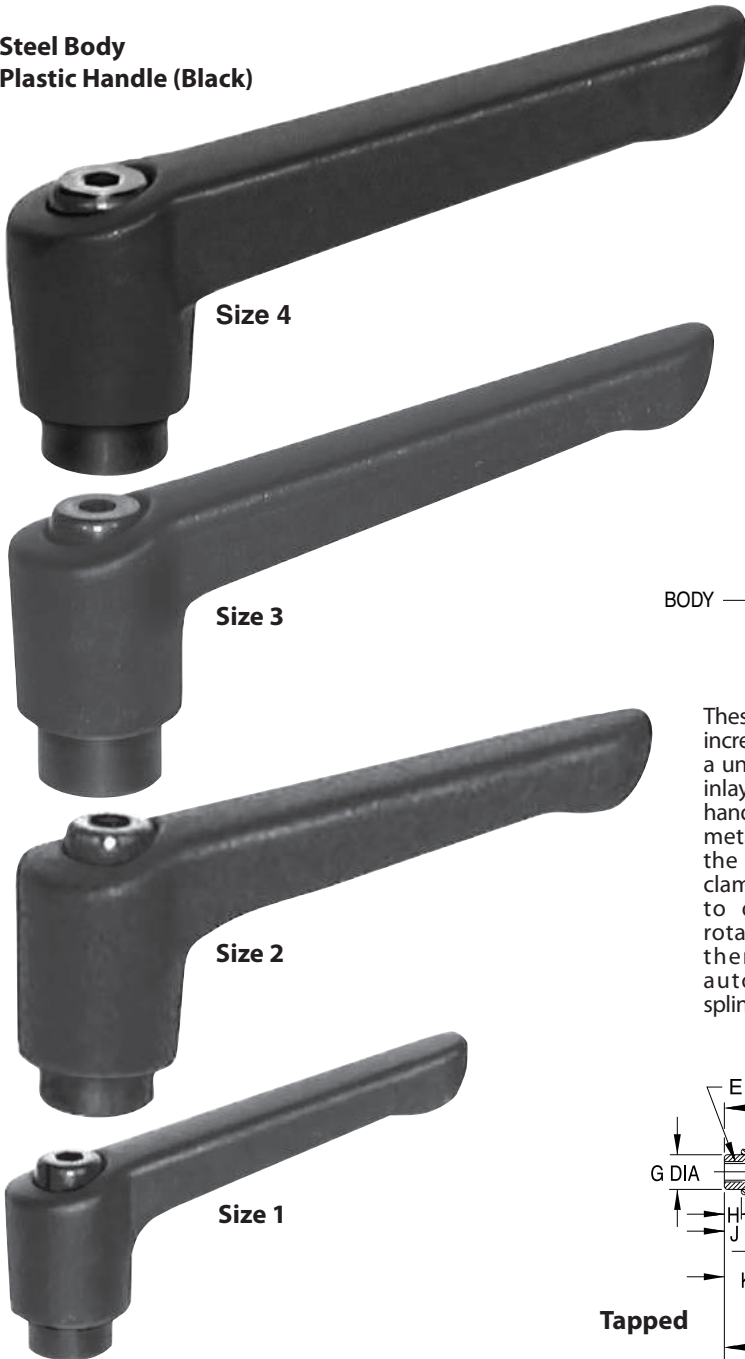
PART NO. WITH REVOLVING HANDLE	PART NO. WITH FOLDABLE REVOLVING HANDLE	A	B DIA	C	D	E	H	J DIA	K DIA	L	N	P DIA	Q DIA	S	T	U	V	W
CL-21-CHP	—	2.52	.71	.51	1.30	1.14	.39	.63	.236	M6	1.57	.71	1.06	1.30	.71	—	—	—
CL-31-CHP	CL-32-CHP	3.15	.87		1.42	1.26		.67			1.97	.83	1.18	1.42	1.02	.59	2.95	2.20
CL-41-CHP	CL-42-CHP	3.94	.94	.63	1.57	1.46	.39	.83	.315	M8	2.56	.91	1.34	1.61	1.10	.79	3.43	2.48
CL-51-CHP	CL-52-CHP	5.12	1.10		1.93	1.73	.55	.98	.394	M10	3.15	1.02	1.57	1.97	1.18	.79	3.43	2.80
CL-61-CHP	CL-62-CHP	6.30	1.34	.71	2.17	1.93	.59	1.06	.394	M10	3.54	1.10	1.77	2.20	1.18	.79	4.09	3.11

# ADJUSTABLE HANDLES

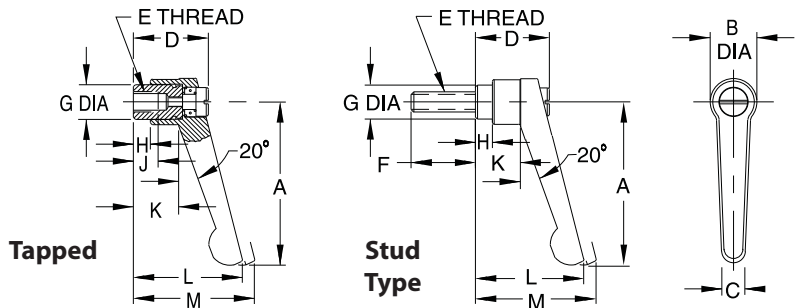
HANDLE: FIBER-REINFORCED THERMOPLASTIC WITH STAINLESS STEEL INSERT  
 BODY, SCREW, AND SPRING: STEEL, BLACK OXIDE FINISH

Steel Body  
 Plastic Handle (Black)

3



These Adjustable Handles are incredibly strong! They feature a unique stainless steel spline inlay, molded into the plastic handle. This provides positive metal-to-metal mating with the serrated body, for high clamping torque. Lift handle to disengage serrations, rotate to desired position, then release handle to automatically re-engage spline.



Adjustable handle that can be reset to any angle. Ideal for clamping in a confined space, or when a specific handle position is desired. Available in steel (with a black plastic handle) or stainless steel (with a metallic-gray plastic handle, **INFO+** see page 127). Rugged spring-loaded spline mechanism. Choice of four handle sizes. Available with a tapped hole or with an integral stud. Note: Catalog photos above are actual size.



Stud Type

## TAPPED (INCH)

PART NO. STEEL BLACK	SIZE	E	J
CL-3-AHP-1	1	#10-32	.31
CL-4-AHP-1		1/4-20	
CL-4-AHP-2	2	1/4-20	.39
CL-5-AHP-2		5/16-18	
CL-5-AHP-3	3	5/16-18	.55
CL-6-AHP-3		3/8-16	
CL-6-AHP-4	4	3/8-16	.67
CL-8-AHP-4		1/2-13	

## TAPPED (METRIC)

CLM-6-AHP-1	1	M6	.31
CLM-8-AHP-2	2	M8	.39
CLM-10-AHP-3	3	M10	.55
CLM-12-AHP-4	4	M12	.67

## STUD TYPE (INCH)

PART NO. STEEL BLACK	SIZE	E	F
CL-408-AHP-1	1	1/4-20	.78
CL-416-AHP-1		1.57	
CL-508-AHP-2	2	5/16-18	.78
CL-516-AHP-2		1.57	
CL-525-AHP-2	3	3/8-16	2.48
CL-610-AHP-3			.98
CL-616-AHP-3	4	1/2-13	1.57
CL-625-AHP-3			2.48
CL-813-AHP-4	4	1/2-13	1.26
CL-816-AHP-4			1.57
CL-825-AHP-4	2.48		

## STUD TYPE (METRIC)

CLM-620-AHP-1	1	M6	.78
CLM-640-AHP-1			1.57
CLM-820-AHP-2	2	M8	.78
CLM-840-AHP-2			1.57
CLM-1030-AHP-3	3	M10	1.26
CLM-1050-AHP-3			1.97
CLM-1230-AHP-4	4	M12	1.26
CLM-1250-AHP-4			1.97

## GENERAL DIMENSIONS

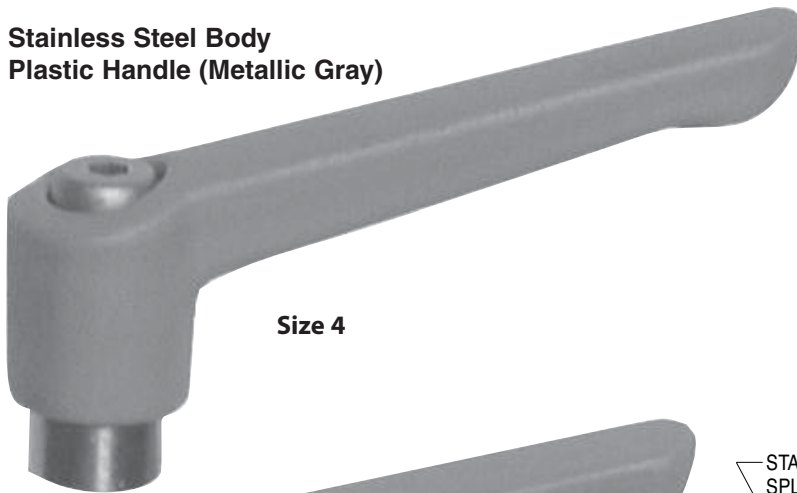
SIZE	A	B DIA	C	D	G DIA	H	K	L	M
1	1-3/4	19/32	5/16	31/32	3/8	5/32	7/16	1-3/8	1-1/2
2	2-1/2	3/4	13/32	1-7/32	17/32	1/4	13/16	1-25/32	1-15/16
3	3-1/16	7/8	17/32	1-7/16	5/8	5/16	7/8	2-5/32	2-5/16
4	3-5/8	1	9/16	1-11/16	3/4	7/16	1-3/16	2-9/16	2-23/32



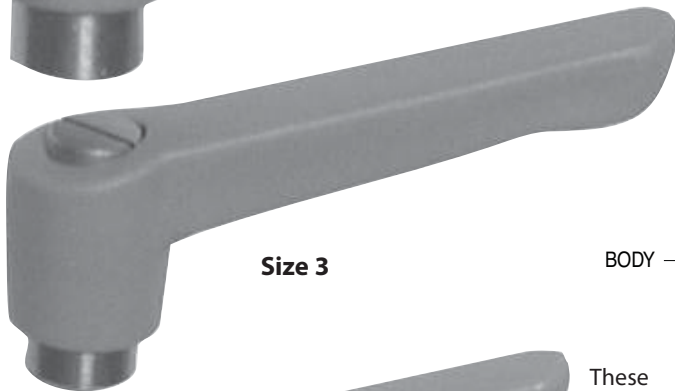
# ADJUSTABLE HANDLES

HANDLE: FIBER-REINFORCED THERMOPLASTIC WITH STAINLESS STEEL INSERT  
BODY, SCREW, AND SPRING: 300-SERIES STAINLESS STEEL

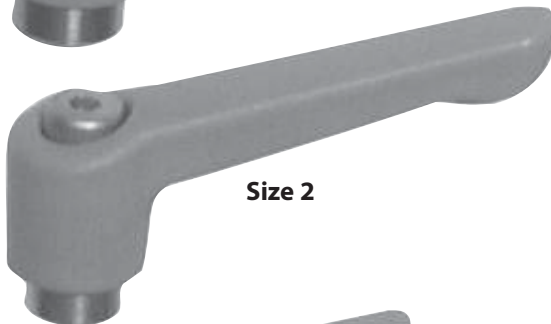
Stainless Steel Body  
Plastic Handle (Metallic Gray)



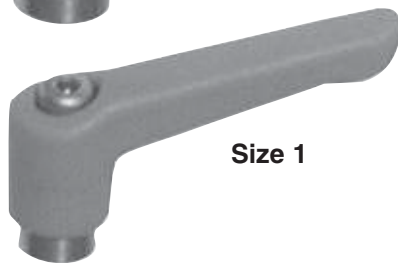
Size 4



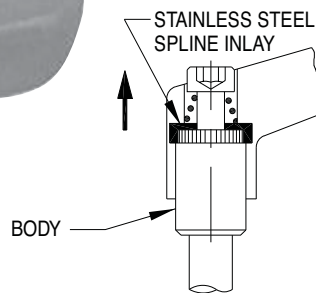
Size 3



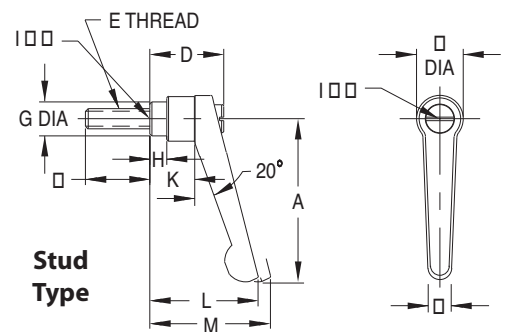
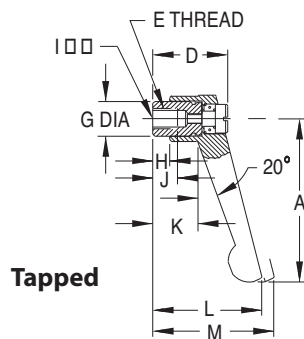
Size 2



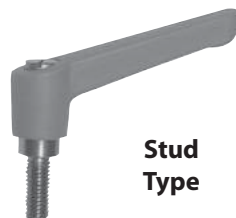
Size 1



These Adjustable Handles are incredibly strong! They feature a unique stainless steel spline inlay, molded into the plastic handle. This provides positive metal-to-metal mating with the serrated body, for high clamping torque. Lift handle to disengage serrations, rotate to desired position, then release handle to automatically re-engage spline.



Adjustable handle that can be reset to any angle. Ideal for clamping in a confined space, or when a specific handle position is desired. Available in stainless steel (with a metallic-gray plastic handle), or steel (with a black plastic handle, **INFO+**: see page 126). Rugged spring-loaded spline mechanism. Choice of four handle sizes. Available with a tapped hole or with an integral stud. Note: Catalog photos above are actual size.



## TAPPED (INCH)

PART NO. STAINLESS METALLIC GRAY	SIZE	E	J
CL-3-AHP-1-S	1	#10-32	.31
CL-4-AHP-1-S		1/4-20	
CL-4-AHP-2-S	2	1/4-20	.39
CL-5-AHP-2-S		5/16-18	
CL-5-AHP-3-S	3	5/16-18	.55
CL-6-AHP-3-S		3/8-16	
CL-6-AHP-4-S	4	3/8-16	.67
CL-8-AHP-4-S		1/2-13	

## TAPPED (METRIC)

CLM-6-AHP-1-S	1	M6	.31
CLM-8-AHP-2-S	2	M8	.39
CLM-10-AHP-3-S	3	M10	.55
CLM-12-AHP-4-S	4	M12	.67

## STUD TYPE (INCH)

PART NO. STAINLESS METALLIC GRAY	SIZE	E	F
CL-408-AHP-1-S	1	1/4-20	.78
CL-416-AHP-1-S			1.57
CL-508-AHP-2-S	2	5/16-18	.78
CL-516-AHP-2-S			1.57
CL-525-AHP-2-S	3	3/8-16	2.48
CL-610-AHP-3-S			.98
CL-616-AHP-3-S	4	1/2-13	1.57
CL-625-AHP-3-S			2.48
CL-813-AHP-4-S	4	1/2-13	1.26
CL-816-AHP-4-S			1.57
CL-825-AHP-4-S			2.48

## STUD TYPE (METRIC)

CLM-620-AHP-1-S	1	M6	.78
CLM-640-AHP-1-S			1.57
CLM-820-AHP-2-S	2	M8	.78
CLM-840-AHP-2-S			1.57
CLM-1030-AHP-3-S	3	M10	1.26
CLM-1050-AHP-3-S			1.97
CLM-1230-AHP-4-S	4	M12	1.26
CLM-1250-AHP-4-S			1.97

## GENERAL DIMENSIONS

SIZE	A	B DIA	C	D	G DIA	H	K	L	M
1	1-3/4	19/32	5/16	31/32	3/8	5/32	7/16	1-3/8	1-1/2
2	2-1/2	3/4	13/32	1-7/32	17/32	1/4	13/16	1-25/32	1-15/16
3	3-1/16	7/8	17/32	1-7/16	5/8	5/16	7/8	2-5/32	2-5/16
4	3-5/8	1	9/16	1-11/16	3/4	7/16	1-3/16	2-9/16	2-23/32

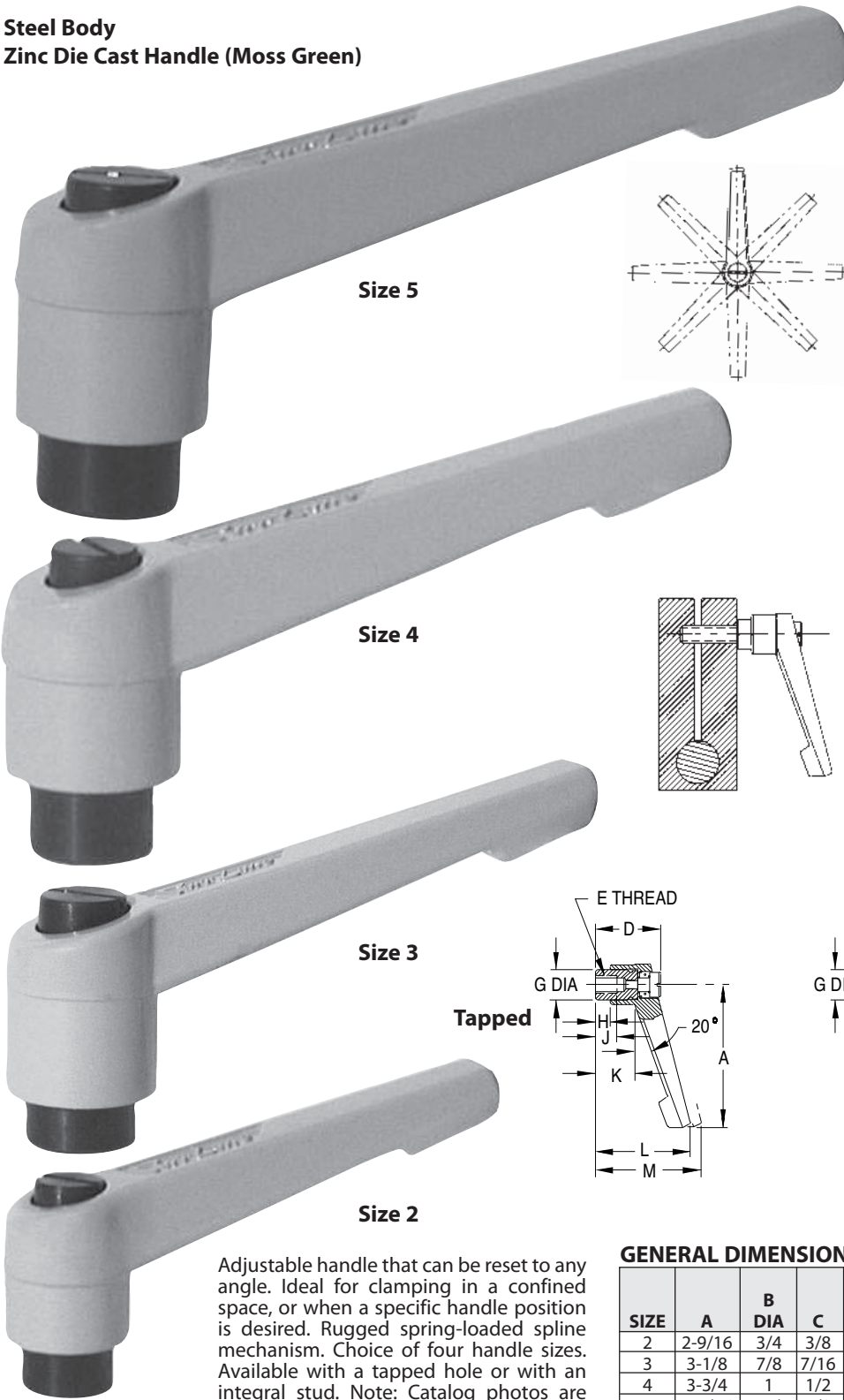
# ADJUSTABLE HANDLES

HANDLE: ZINC DIE CASTING; ENAMEL PAINT  
 BODY: 12L14 STEEL, BLACK OXIDE FINISH. SPRING: MUSIC WIRE

## Steel Body

### Zinc Die Cast Handle (Moss Green)

3



Size 5

Size 4

Size 3

Size 2

### TAPPED (INCH)

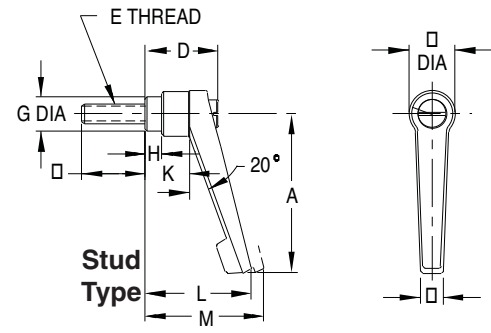
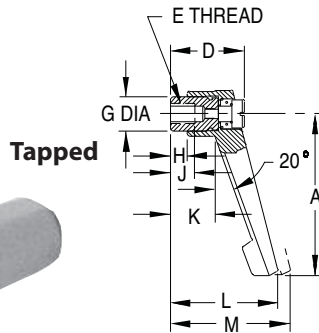
PART NO.	SIZE	E	J
CL-4-AH-2	2	1/4-20	1/2
CL-5-AH-2		5/16-18	
CL-5-AH-3	3	5/16-18	9/16
CL-6-AH-3		3/8-16	
CL-6-AH-4	4	3/8-16	5/8
CL-8-AH-4		1/2-13	
CL-8-AH-5	5	1/2-13	7/8
CL-10-AH-5		5/8-11	

### TAPPED (METRIC)

CLM-8-AH-2	2	M8	1/2
CLM-10-AH-3	3	M10	9/16
CLM-12-AH-4	4	M12	5/8
CLM-16-AH-5	5	M16	7/8

### STUD TYPE (INCH)

PART NO.	SIZE	E	F
CL-510-AH-2	2	5/16-18	1
CL-515-AH-2			1-1/2
CL-520-AH-2	3	3/8-16	2
CL-610-AH-3			1
CL-615-AH-3	4	1/2-13	1-1/2
CL-620-AH-3			2
CL-810-AH-4	5	5/8-11	1
CL-815-AH-4			1-1/2
CL-820-AH-4	5	5/8-11	2
CL-830-AH-4			3
CL-1015-AH-5			1-1/2
CL-1020-AH-5	5	5/8-11	2
CL-1030-AH-5			3



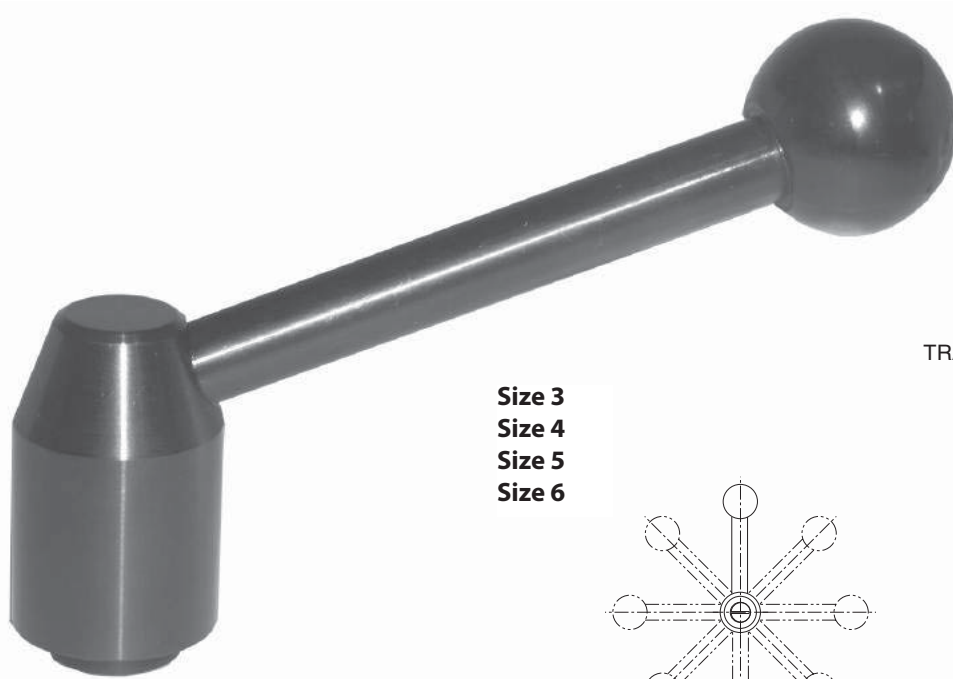
### GENERAL DIMENSIONS

SIZE	A	B DIA	C	D	G DIA	H	K	L	M
2	2-9/16	3/4	3/8	1-1/8	17/32	1/4	11/16	1-11/16	1-7/8
3	3-1/8	7/8	7/16	1-1/2	5/8	13/32	15/16	2-3/16	2-5/16
4	3-3/4	1	1/2	1-11/16	3/4	13/32	1-1/16	2-1/2	2-11/16
5	4-5/16	1-1/4	5/8	2	15/16	15/32	1-5/16	2-15/16	3-1/8

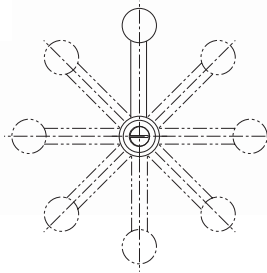
Adjustable handle that can be reset to any angle. Ideal for clamping in a confined space, or when a specific handle position is desired. Rugged spring-loaded spline mechanism. Choice of four handle sizes. Available with a tapped hole or with an integral stud. Note: Catalog photos are actual size.

# ADJUSTABLE LEVER HANDLES

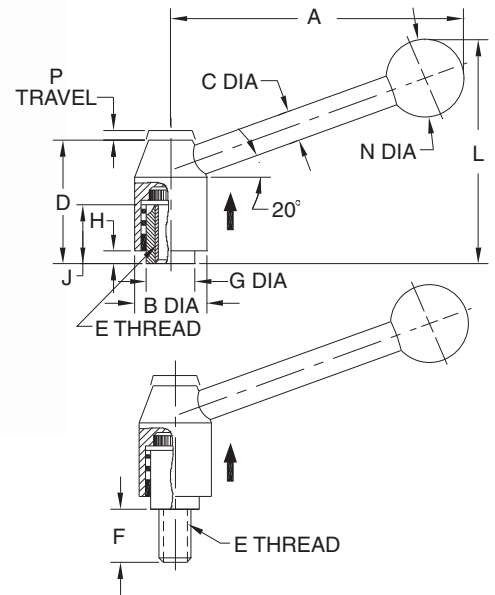
LEVER ARM, HUB, INSERT, AND SPRING: MILD STEEL, BLACK OXIDE FINISH  
BALL KNOB: BLACK PHENOLIC PLASTIC



Size 3  
Size 4  
Size 5  
Size 6



Steel



Heavy-duty adjustable handle that can be reset to any angle. Ideal for clamping in a confined space, or when a specific handle position is desired. Rugged spring-loaded spline mechanism. Lift handle to disengage serrations, rotate to desired position, then release handle to automatically re-engage spline. Available with a tapped hole or an integral stud.

## STEEL — TAPPED (INCH)

PART NO.	SIZE	A	B DIA	C DIA	D	E	F	G	H	J	L	N DIA	P
CL-6-AHL-3	3	3.94	.94	.39	1.57	3/8-16	—	.63	.10	.55	2.95	.98	.18
CL-8-AHL-4	4	4.53	1.10	.47	1.91	1/2-13	—	.75	.18	.67	3.54	1.18	
CL-10-AHL-5	5	5.12	1.30	.47	2.17	5/8-11	—	.91	.24	.91	3.94	1.26	
CL-12-AHL-6	6	5.71	1.57	.55	2.68	3/4-10	—	1.10		1.42	4.33	1.38	.22

## STEEL — TAPPED (METRIC)

CLM-10-AHL-3	3	3.94	.94	.39	1.57	M10	—	.63	.10	.55	2.95	.98	.18
CLM-12-AHL-4	4	4.53	1.10	.47	1.91	M12	—	.75	.18	.67	3.54	1.18	
CLM-16-AHL-5	5	5.12	1.30	.47	2.17	M16	—	.91	.24	.91	3.94	1.26	
CLM-20-AHL-6	6	5.71	1.57	.55	2.68	M20	—	1.10		1.42	4.33	1.38	.22

## STEEL — STUD TYPE (INCH)

CL-613-AHL-3	3	3.94	.94	.39	1.57	3/8-16	1.26	.63	.10	—	2.95	.98	.18
CL-625-AHL-3							2.48						
CL-813-AHL-4	4	4.53	1.10	.47	1.91	1/2-13	1.26	.75	.18	—	3.54	1.18	
CL-825-AHL-4							2.48						
CL-1016-AHL-5	5	5.12	1.30	.47	2.17	5/8-11	1.57	.91	.24	—	3.94	1.26	.22
CL-1025-AHL-5							2.48						

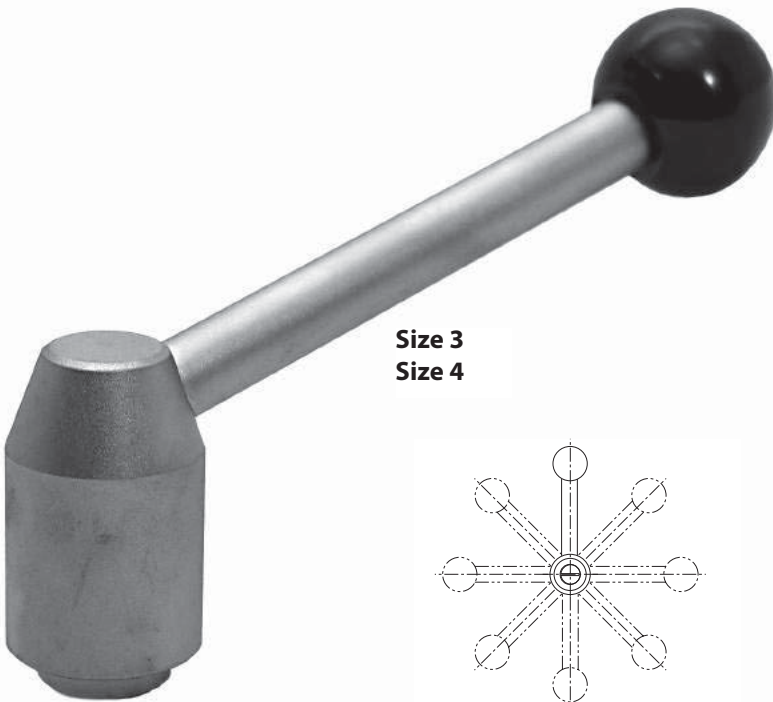
## STEEL — STUD TYPE (METRIC)

CLM-1050-AHL-3	3	3.94	.94	.39	1.57	M10	1.97	.63	.10	—	2.95	.98	.18
CLM-1250-AHL-4	4	4.53	1.10	.47	1.91	M12	1.97	.75	.18	—	3.54	1.18	
CLM-1650-AHL-5	5	5.12	1.30	.47	2.17	M16	1.97	.91	.24	—	3.94	1.26	

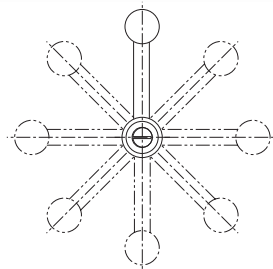
# ADJUSTABLE LEVER HANDLES

LEVER ARM, HUB, INSERT, AND SPRING: STAINLESS STEEL  
BALL KNOB: PHENOLIC PLASTIC

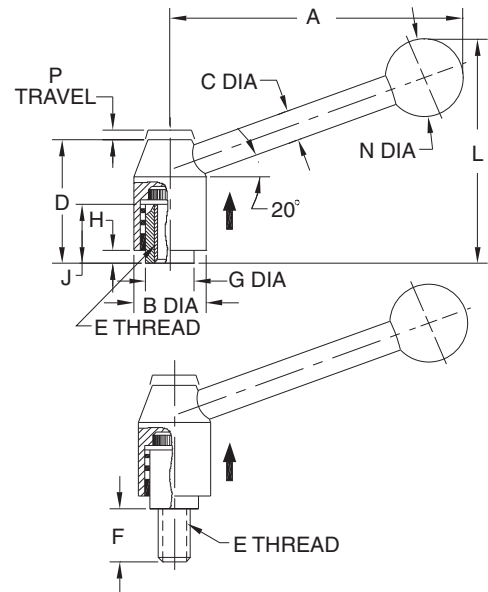
3



Size 3  
Size 4



Stainless  
Steel



Heavy-duty stainless steel adjustable handle that can be reset to any angle. Ideal for clamping in a confined space, or when a specific handle position is desired. Rugged spring-loaded spline mechanism. Lift handle to disengage serrations, rotate to desired position, then release handle to automatically re-engage spline. Available with a tapped hole or an integral stud.

## STAINLESS STEEL — TAPPED (INCH)

PART NO.	SIZE	A	B DIA	C DIA	D	E	F	G	H	J	L	N DIA	P
CL-6-AHL-3-S	3	3.94	.94	.39	1.57	3/8-16	—	.63	.10	.55	2.95	.98	.18
CL-8-AHL-4-S	4	4.53	1.10	.47	1.91	1/2-13	—	.75	.18	.67	3.54	1.18	.18

## STAINLESS STEEL — TAPPED (METRIC)

CLM-10-AHL-3-S	3	3.94	.94	.39	1.57	M10	—	.63	.10	.55	2.95	.98	.18
CLM-12-AHL-4-S	4	4.53	1.10	.47	1.91	M12	—	.75	.18	.67	3.54	1.18	.18

## STAINLESS STEEL — STUD TYPE (INCH)

CL-613-AHL-3-S	3	3.94	.94	.39	1.57	3/8-16	1.26	.63	.10	—	2.95	.98	.18
CL-625-AHL-3-S							2.48						
CL-813-AHL-4-S	4	4.53	1.10	.47	1.91	1/2-13	1.26	.75	.18	—	3.54	1.18	.18
CL-825-AHL-4-S							2.48						

## STAINLESS STEEL — STUD TYPE (METRIC)

CLM-1050-AHL-3-S	3	3.94	.94	.39	1.57	M10	1.97	.63	.10	—	2.95	.98	.18
CLM-1250-AHL-4-S	4	4.53	1.10	.47	1.91	M12	1.97	.75	.18	—	3.54	1.18	.18

# BALL KNOBS

BLACK PHENOLIC, THERMOPLASTIC, OR CUSHION GRIP PLASTIC WITH BRASS INSERT

## Phenolic — Tapped



3/8-16 CL-852-PB  
3/8-24 CL-854-PB  
1/2-13 CL-872-PB  
5/8-18 CL-882-PB  
M10 CLM-852-PB  
M12 CLM-872-PB  
M16 CLM-882-PB



3/8-16 CL-752-PB  
1/2-13 CL-772-PB  
M10 CLM-752-PB  
M12 CLM-772-PB



1/4-20 CL-632-PB  
5/16-18 CL-642-PB  
3/8-16 CL-652-PB  
3/8-24 CL-654-PB  
1/2-13 CL-672-PB  
1/2-20 CL-674-PB  
M10 CLM-652-PB  
M12 CLM-672-PB



1/4-20 CL-532-PB  
5/16-18 CL-542-PB  
3/8-16 CL-552-PB  
3/8-24 CL-554-PB  
M8 CLM-542-PB  
M10 CLM-552-PB



#10-32 CL-424-PB  
1/4-20 CL-432-PB  
1/4-28 CL-234-PB  
5/16-18 CL-442-PB  
5/16-24 CL-444-PB  
3/8-16 CL-452-PB  
M6 CLM-432-PB  
M8 CLM-442-PB



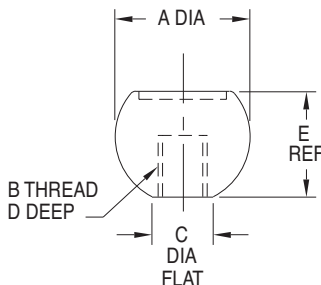
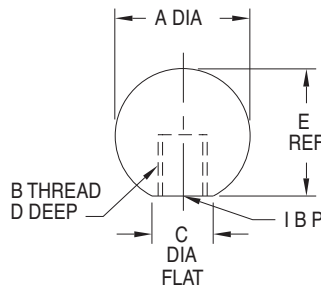
#8-32 CL-212-PB  
#10-32 CL-224-PB  
1/4-20 CL-232-PB  
M5 CLM-222-PB  
M6 CLM-232-PB

## Phenolic — Tapped Recessed Top



3/8-16 CL-856-PB  
3/8-24 CL-858-PB  
1/2-13 CL-876-PB

\* This size is solid plastic, without a brass insert.



Durable multi-purpose knob, suitable for many applications. Molded-in brass insert provides superior thread strength. Choice of seven ball sizes. The largest size is available with a recessed top (1-1/4" dia) for adding custom decals or inlays. Non-standard thread sizes, molded-in studs, or special colors (thermoplastic and cushion grip only) are available in quantities of 500 and above. Note: Catalog photos are actual size.

### Choose From Three Materials

1. Phenolic plastic — glossy smooth finish, extremely hard, electrical insulator, operating temperatures to 300°F, resistant to oils and most common chemicals.
2. Thermoplastic — textured surface for improved gripping, excellent impact resistance, operating temperatures to 150°F.
3. Cushion Grip — unique plastic that feels soft to the touch, matte finish, comfortable yet rugged, excellent impact resistance, operating temperatures to 150°F, excellent gripability even when wet or oily, absorbs vibration.

### PHENOLIC — TAPPED (INCH & METRIC)

PART NO.	A DIA	B	C DIA	D	E		
CL-212-PB	3/4	#8-32	3/8	5/16	45/64		
CL-224-PB		#10-32					
CL-232-PB		1/4-20					
CLM-222-PB		M5					
CLM-232-PB		M6					
CL-424-PB	1	#10-32	1/2	7/16	31/32		
CL-432-PB		1/4-20					
CL-234-PB		1/4-28					
CL-442-PB		5/16-18					
CL-444-PB		5/16-24					
CL-452-PB		3/8-16					
CLM-432-PB		M6					
CLM-442-PB	M8						
CL-532-PB	1-3/16	1/4-20	9/16	1/2	1-1/8		
CL-542-PB		5/16-18					
CL-552-PB		3/8-16					
CL-554-PB		3/8-24					
CLM-542-PB		M8					
CLM-552-PB		M10					
CL-632-PB		1/4-20				5/8	7/16
CL-642-PB	5/16-18						
CL-652-PB	3/8-16						
CL-654-PB	3/8-24						
CL-672-PB	1/2-13						
CL-674-PB	1/2-20						
CLM-652-PB	M10						
CLM-672-PB	M12						
CL-752-PB	3/8-16	11/16	1/2	1-37/64			
CL-772-PB	1/2-13						
CLM-752-PB	M10						
CLM-772-PB	M12						
CL-852-PB	1-7/8	3/8-16	3/4	7/8	1-51/64		
CL-854-PB		3/8-24					
CL-872-PB		1/2-13					
CL-882-PB*		5/8-18					
CLM-852-PB		M10					
CLM-872-PB		M12					
CLM-882-PB		M16					

### PHENOLIC — TAPPED RECESSED TOP (INCH)

CL-856-PB	1-7/8	3/8-16	3/4	1/2	1-15/32
CL-858-PB		3/8-24			
CL-876-PB		1/2-13			

# BALL KNOBS

BLACK PHENOLIC, THERMOPLASTIC, OR CUSHION-GRIP PLASTIC WITH BRASS INSERT

3

## Thermoplastic — Tapped



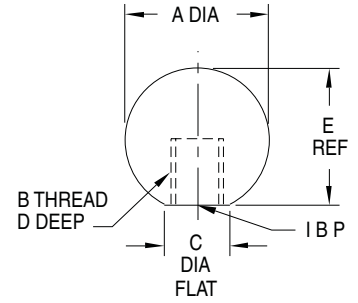
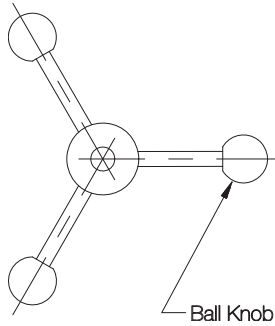
1/4-20 CL-6320-PB  
 5/16-18 CL-6420-PB  
 3/8-16 CL-6520-PB  
 1/2-13 CL-6720-PB

## Cushion Grip — Tapped



1/4-20 CL-6325-PB  
 5/16-18 CL-6425-PB  
 3/8-16 CL-6525-PB  
 1/2-13 CL-6725-PB

Ball Knobs are now available in three materials: phenolic plastic (**INFO+**: see page 131), thermoplastic, and cushion-grip plastic.



### THERMOPLASTIC — TAPPED (INCH)

PART NO.	A DIA	B	C DIA	D	E
CL-6320-PB	1-1/2	1/4-20	5/8	5/8	1-15/64
CL-6420-PB		5/16-18			
CL-6520-PB		3/8-16			
CL-6720-PB		1/2-13			

### CUSHION GRIP — TAPPED (INCH)

PART NO.	A DIA	B	C DIA	D	E
CL-6325-PB	1-1/2	1/4-20	5/8	5/8	1-15/64
CL-6425-PB		5/16-18			
CL-6525-PB		3/8-16			
CL-6725-PB		1/2-13			

# OVAL BALL KNOBS

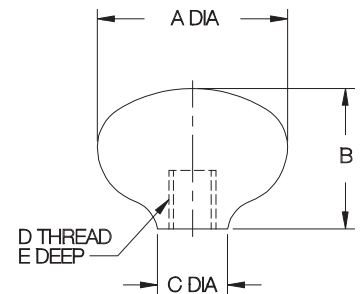
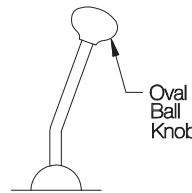
BLACK PHENOLIC PLASTIC WITH BRASS INSERT

## Phenolic — Tapped



3/8-16 CL-852-OBK  
 3/8-24 CL-854-OBK  
 1/2-13 CL-872-OBK

1/4-20 CL-532-OBK  
 5/16-18 CL-542-OBK  
 3/8-16 CL-552-OBK



### PHENOLIC — TAPPED (INCH)

PART NO.	A DIA	B	C DIA	D	E
CL-532-OBK	1-1/8	1-7/16	1/2	1/4-20	7/16
CL-542-OBK				5/16-18	
CL-552-OBK				3/8-16	
CL-852-OBK	2-1/32	1-1/2	3/4	3/8-16	1/2
CL-854-OBK				3/8-24	
CL-872-OBK				1/2-13	

Comfortable-grip ball knobs that are ideal for shift levers, control levers and push/pull rods. Molded-in brass insert provides superior thread strength. Choice of two shapes. Non-standard thread sizes or molded-in studs are available in quantities of 500 and above. Note: Catalog photos are actual size.

# BALL KNOBS

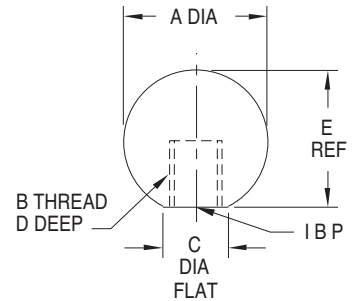
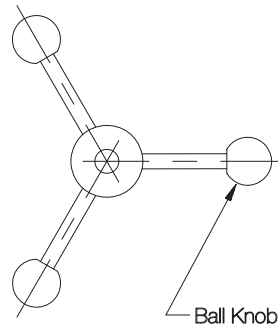
1018 STEEL, BLACK OXIDE FINISH, OR 316 STAINLESS STEEL



**Steel — Tapped**

1/4-20	CL-632-SBK
5/16-18	CL-642-SBK
3/8-16	CL-652-SBK
1/2-13	CL-672-SBK
M6	CLM-632-SBK
M8	CLM-642-SBK
M10	CLM-652-SBK
M12	CLM-672-SBK

Heavy-duty knob handle made of steel with a black oxide finish. This durable, multi-purpose knob is suitable for many applications. Ideal when added weight is desirable for easier lever actuation. Note: Catalog photo is actual size.



## STEEL — TAPPED (INCH)

PART NO.	A DIA	B	C DIA	D	E
CL-632-SBK	1-1/2	1/4-20	5/8	9/16	1-7/16
CL-642-SBK		5/16-18		5/8	
CL-652-SBK		3/8-16			
CL-672-SBK		1/2-13			

## STEEL — TAPPED (METRIC)

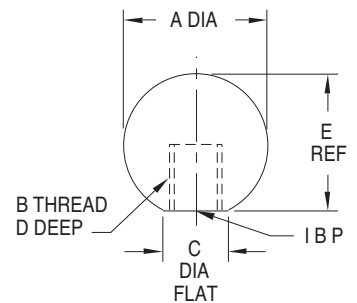
PART NO.	A DIA	B	C DIA	D	E
CLM-632-SBK	1-1/2	M6	5/8	9/16	1-7/16
CLM-642-SBK		M8		5/8	
CLM-652-SBK		M10			
CLM-672-SBK		M12			



**Stainless Steel — Tapped**

1/4-20	CL-632-SBK-S
5/16-18	CL-642-SBK-S
3/8-16	CL-652-SBK-S
1/2-13	CL-672-SBK-S
M6	CLM-632-SBK-S
M8	CLM-642-SBK-S
M10	CLM-652-SBK-S
M12	CLM-672-SBK-S

Heavy-duty knob handle made of type 316 stainless steel for excellent corrosion resistance. This durable, multi-purpose knob is suitable for many applications, including marine and chemical environments. Ideal when added weight is desirable for easier lever actuation. Attractive polished finish. Note: Catalog photo is actual size.



## STAINLESS STEEL — TAPPED (INCH)

PART NO.	A DIA	B	C DIA	D	E
CL-632-SBK-S	1-1/2	1/4-20	5/8	9/16	1-7/16
CL-642-SBK-S		5/16-18		5/8	
CL-652-SBK-S		3/8-16			
CL-672-SBK-S		1/2-13			

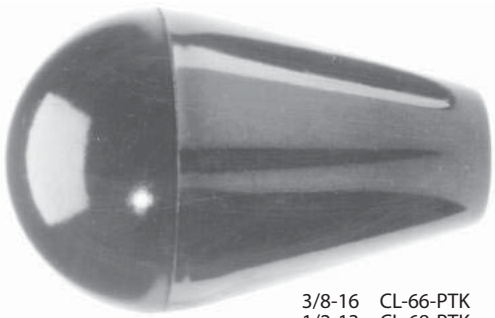
## STAINLESS STEEL — TAPPED (METRIC)

PART NO.	A DIA	B	C DIA	D	E
CLM-632-SBK-S	1-1/2	M6	5/8	9/16	1-7/16
CLM-642-SBK-S		M8		5/8	
CLM-652-SBK-S		M10			
CLM-672-SBK-S		M12			

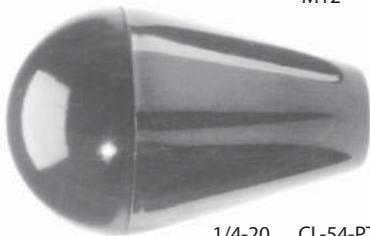
# OVAL TAPERED KNOBS

BLACK PHENOLIC OR CUSHION-GRIP PLASTIC WITH BRASS INSERT

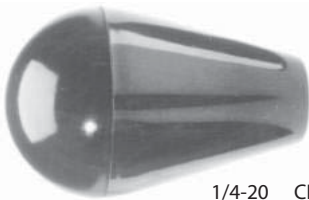
## Phenolic — Tapped



3/8-16 CL-66-PTK  
1/2-13 CL-68-PTK  
M10 CLM-610-PTK  
M12 CLM-612-PTK



1/4-20 CL-54-PTK  
5/16-18 CL-55-PTK  
M8 CLM-58-PTK

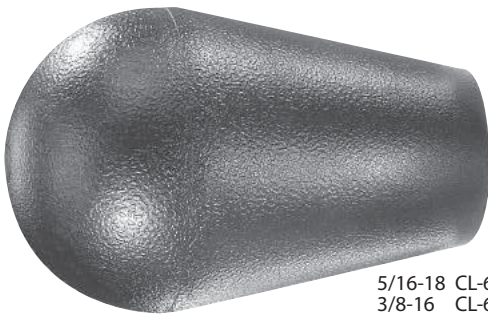


1/4-20 CL-44-PTK  
5/16-18 CL-45-PTK  
3/8-16 CL-46-PTK  
M6 CLM-46-PTK



#10-32 CL-23-PTK  
1/4-20 CL-24-PTK  
M6 CLM-26-PTK

## Cushion Grip — Tapped



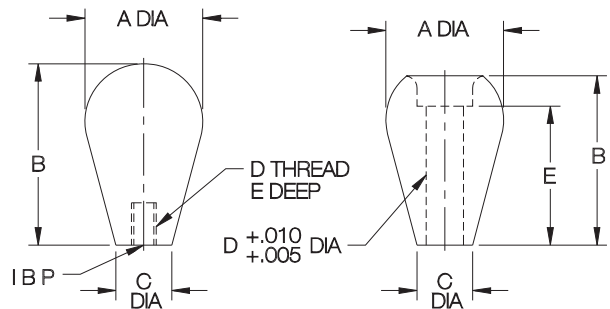
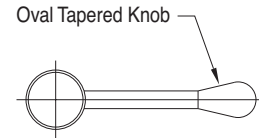
5/16-18 CL-650-PTK  
3/8-16 CL-660-PTK

Attractive design suitable for control levers and push/pull rods. Molded-in brass insert provides superior thread strength. The solid-plastic through-hole version can be used with a Shoulder Screw as a revolving crank handle. Choice of four knob sizes. Non-standard thread sizes, molded-in studs, or special colors (cushion grip only) are available in quantities of 500 and above. Note: Catalog photos are actual size.

## Phenolic — Through Hole



3/8 Dia CL-560-PTK



## PHENOLIC — TAPPED (INCH & METRIC)

PART NO.	A DIA	B	C DIA	D	E
CL-23-PTK	3/4	1-1/4	3/8	#10-32	5/16
CL-24-PTK*				1/4-20	7/16
CLM-26-PTK*				M6	
CL-44-PTK	1	1-5/8	1/2	1/4-20	7/16
CL-45-PTK				5/16-18	
CL-46-PTK				3/8-16	
CLM-46-PTK				M6	
CL-54-PTK				1/4-20	
CL-55-PTK	1-3/16	1-7/8	9/16	5/16-18	7/16
CLM-58-PTK				M8	
CL-66-PTK				3/8-16	
CL-68-PTK	1-5/8	2-1/2	7/8	1/2-13	5/8
CLM-610-PTK				M10	1/2
CLM-612-PTK				M12	5/8

## PHENOLIC — THROUGH HOLE

CL-560-PTK*	1-3/16	1-3/4	9/16	.375	1-7/16
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## CUSHION GRIP — TAPPED (INCH)

CL-650-PTK	1-5/8	2-1/2	7/8	5/16-18	5/8
CL-660-PTK				3/8-16	

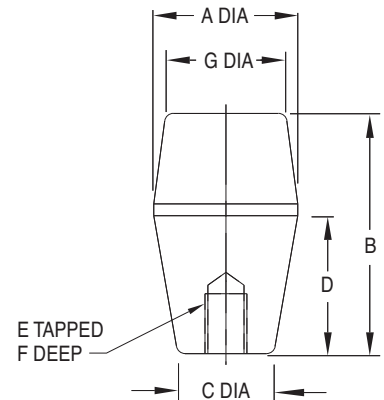
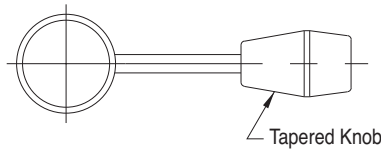
\* These sizes are solid plastic, without a brass insert.



# TAPERED KNOBS

BLACK CUSHION-GRIP PLASTIC WITH BRASS INSERT

## Cushion Grip — Tapped



5/16-18 CL-655-TAPK  
 3/8-16 CL-665-TAPK  
 1/2-13 CL-685-TAPK

Attractive square design, ideal for lever handles. Made from Cushion Grip plastic, a unique material that feels soft to the touch, comfortable yet rugged. Textured non-slip, non-glare finish. Molded-in brass insert provides superior thread strength. Non-standard thread sizes, molded-in studs, or special colors are available in quantities of 500 and above. Note: Catalog photo is actual size.

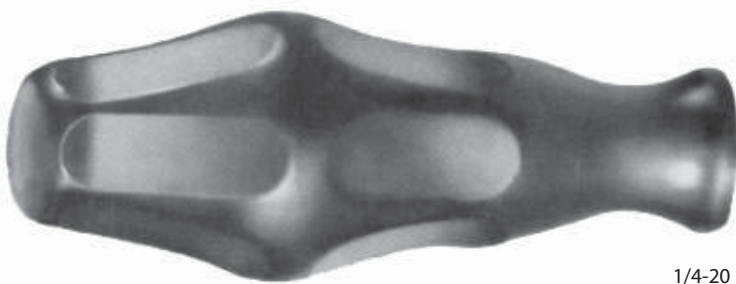
## CUSHION GRIP — TAPPED (INCH)

PART NO.	A DIA	B	C DIA	D	E	F	G DIA
CL-655-TAPK					5/16-18	3/4	
CL-665-TAPK	1-1/2	2-1/2	15/16	1-1/2	3/8-16	5/8	1-1/8
CL-685-TAPK					1/2-13		

# PALM-GRIP HANDLES

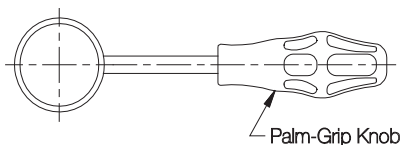
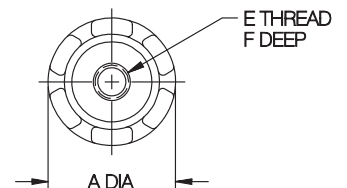
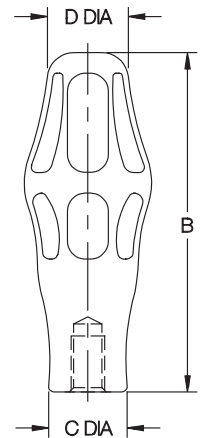
BLACK THERMOPLASTIC WITH BRASS INSERT

## Thermoplastic — Tapped



1/4-20 CL-632-PGH  
 5/16-18 CL-642-PGH  
 3/8-16 CL-652-PGH

This unique, ergonomically designed handle provides an extremely comfortable grip. Greatly reduces stress on hands, wrists, and arms to help eliminate the risk of repetitive-motion disorders. Textured non-slip, non-glare finish. Molded-in brass insert provides superior thread strength. Non-standard thread sizes, molded-in studs, or special colors are available in quantities of 500 and above. Note: Catalog photo is actual size.



## THERMOPLASTIC — TAPPED (INCH)

PART NO.	A DIA	B	C DIA	D DIA	E	F
CL-632-PGH					1/4-20	7/8
CL-642-PGH	1-3/8	3-3/4	7/8	7/8	5/16-18	5/8
CL-652-PGH					3/8-16	

# KNOB HANDLES

BLACK CUSHION-GRIP PLASTIC. TAPPED VERSION WITH BRASS INSERT

3



5/16-18 CL-855-KH  
3/8-16 CL-865-KH  
3/8 DIA CL-866-KH



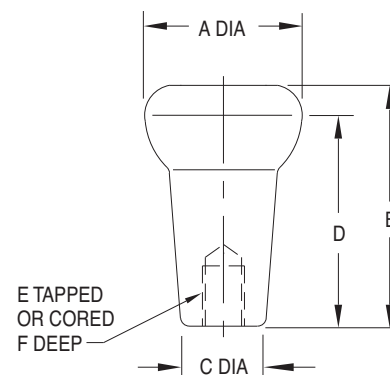
5/16-18 CL-655-KH  
3/8-16 CL-665-KH  
3/8 DIA CL-666-KH



5/16-18 CL-455-KH  
3/8-16 CL-465-KH  
3/8 DIA CL-466-KH

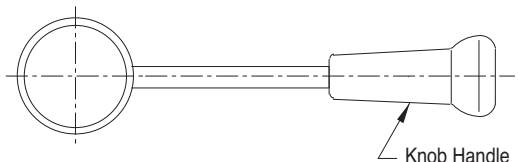
**Cushion Grip —  
Tapped or Cored**

Tapered handle with a knob end for secure gripping. Made from Cushion-Grip plastic, a unique material that feels soft to the touch, comfortable yet rugged. Non-slip, non-glare finish. Molded-in brass insert on the tapped version provides superior thread strength. Optionally available with a plain cored hole to press fit on a shaft. The cored hole is somewhat undersize to grip tightly on a nominal-size shaft without requiring pinning. Non-standard thread sizes, molded-in studs, or special colors are available in quantities of 500 and above. Note: Catalog photos are actual size.



## CUSHION GRIP — TAPPED (INCH)

PART NO.	A DIA	B	C DIA	D	E	F
CL-455-KH	1-3/8	2-1/8	13/16	11-1/4	5/16-18	5/8
CL-465-KH					3/8-16	
CL-655-KH	1-5/8	2-1/2	7/8	1-1/2	5/16-18	
CL-665-KH					3/8-16	
CL-855-KH	1-1/2	4-3/8	7/8	3-1/2	5/16-18	7/16
CL-865-KH					3/8-16	1/2



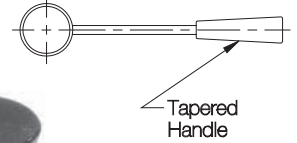
Combination knob and tapered handle. The knob end helps prevent operator's hand from sliding off the handle.

## CUSHION GRIP — CORED

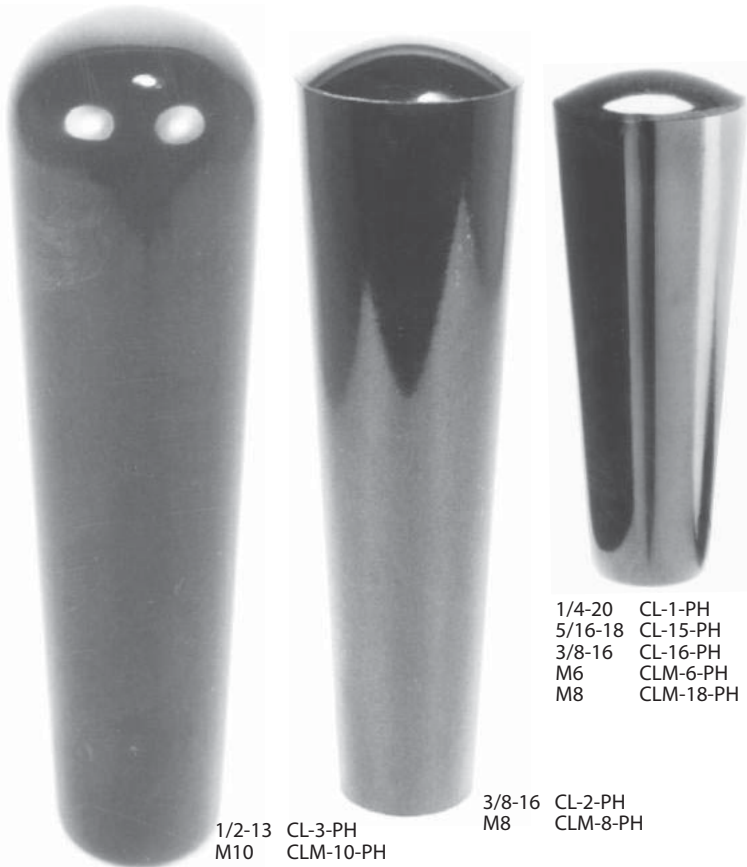
PART NO.	A DIA	B	C DIA	D	E		F
					FOR SHAFT DIA	ACTUAL DIA	
CL-466-KH	1-3/8	2-1/8	13/16	1-1/4	3/8	.312-.327	1
CL-666-KH	1-5/8	2-1/2	7/8	1-1/2			
CL-866-KH	1-1/2	4-3/8	7/8	3-1/2			

# TAPERED HANDLES

BLACK PHENOLIC PLASTIC WITH BRASS INSERT



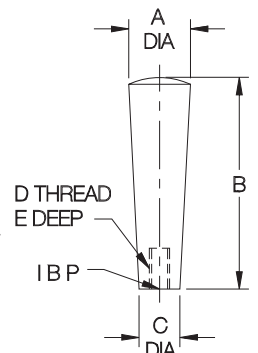
**Phenolic — Tapped**



1/4-20 CL-0-PH  
5/16-18 CL-05-PH  
M6 CLM-06-PH  
M8 CLM-08-PH

#10-32 CL-00-PH  
M5 CLM-005-PH

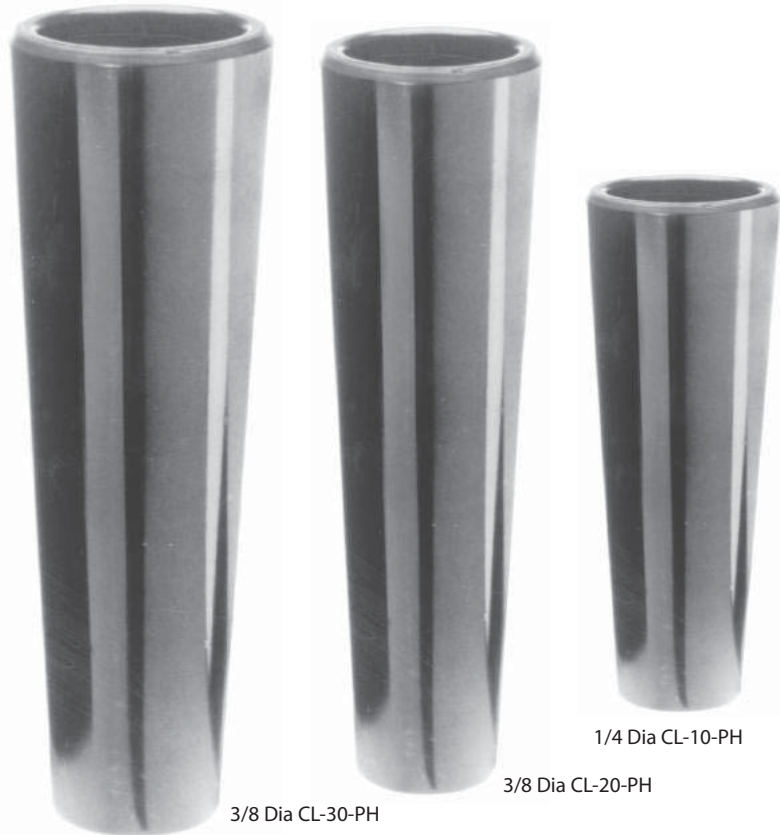
Heavy-duty design that makes an excellent grasp handle or machine shift lever. Molded-in brass insert provides superior thread strength. The solid-plastic through-hole version can be used with a Shoulder Screw as a revolving crank handle. Choice of five handle sizes. Non-standard thread sizes or molded-in studs are available in quantities of 500 and above. Note: Catalog photos are actual size.



1/4-20 CL-1-PH  
5/16-18 CL-15-PH  
3/8-16 CL-16-PH  
M6 CLM-6-PH  
M8 CLM-18-PH

3/8-16 CL-2-PH  
M8 CLM-8-PH

1/2-13 CL-3-PH  
M10 CLM-10-PH



1/4 Dia CL-10-PH

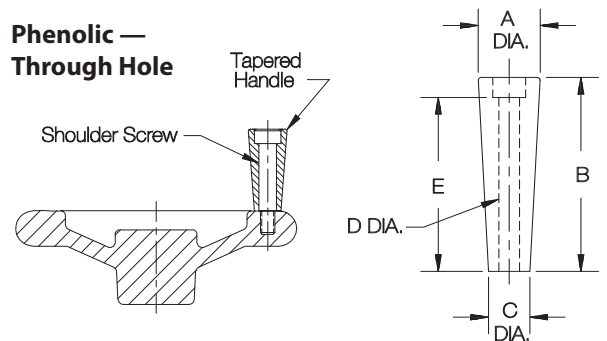
3/8 Dia CL-20-PH

3/8 Dia CL-30-PH

## PHENOLIC — TAPPED (INCH & METRIC)

PART NO.	A DIA	B	C DIA	D	E
CL-00-PH	3/4	7/8	3/8	#10-32	5/16
CLM-005-PH				M5	
CL-0-PH	1	1-1/4	1/2	1/4-20	7/16
CL-05-PH				5/16-18	
CLM-06-PH				M6	3/8
CLM-08-PH				M8	
CL-1-PH	1	2-5/8	5/8	1/4-20	7/16
CL-15-PH				5/16-18	
CL-16-PH				3/8-16	1/2
CLM-6-PH				M6	
CLM-18-PH	M8	7/16			
CL-2-PH	1-1/8	3-7/8	3/4	3/8-16	5/8
CLM-8-PH				M8	
CL-3-PH	1-3/8	4-1/2	1	1/2-13	2
CLM-10-PH				M10	

**Phenolic — Through Hole**



## PHENOLIC — THROUGH HOLE

PART NO.	A DIA	B	C DIA	D		E
				NOMINAL	ACTUAL	
CL-10-PH*	1	2-9/16	5/8	1/4	.251/.256	5/8
CL-20-PH*	1-1/8	3-11/16	3/4	3/8	.380/.385	2-5/8
CL-30-PH*	1-3/8	4-3/32	1	3/8	.380/.390	2-5/8

\*This size is solid plastic, without a brass insert.

# PULL KNOBS

BLACK PHENOLIC PLASTIC WITH BRASS INSERT

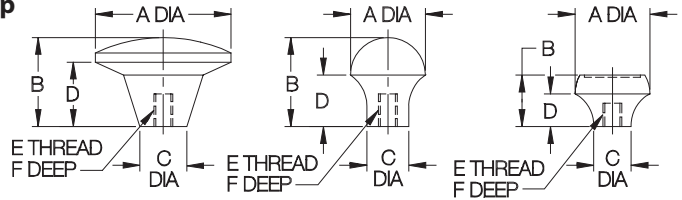


1/4-20 CL-632-PK  
5/16-18 CL-642-PK  
3/8-16 CL-652-PK  
M8 CLM-642-PK



#10-32 CL-424-PK  
1/4-20 CL-432-PK  
M5 CLM-422-PK  
M6 CLM-432-PK

**Phenolic—Tapped  
Flat Top**



Versatile knob with an enlarged head for pulling, pushing, or lifting. Molded-in brass insert provides superior thread strength. Choice of three types, in two sizes each. Non-standard thread sizes or molded-in studs are available in quantities of 500 and above. Note: Catalog photos are actual size.

3



3/8-24 CL-654-PKO



#10-32 CL-424-PKO  
1/4-20 CL-432-PKO  
M5 CLM-422-PKO  
M6 CLM-432-PKO

**Phenolic—Tapped  
Oval Top**

**PHENOLIC — TAPPED, FLAT TOP (INCH & METRIC)**

PART NO.	A DIA	B	C DIA	D	E	F
CL-424-PK	1-3/8	7/8	5/8	5/8	#10-32	5/16
CL-432-PK					1/4-20	7/16
CLM-422-PK					M5	5/16
CLM-432-PK	1-13/16	1-3/16	5/8	7/8	1/4-20	7/16
CL-632-PK					5/16-18	1/2
CL-642-PK					3/8-16	
CL-652-PK					M8	
CLM-642-PK						



#10-32 CL-424-PKR  
1/4-20 CL-432-PKR



#6-32 CL-202-PKR  
#8-32 CL-212-PKR  
#10-32 CL-224-PKR  
1/4-20 CL-232-PKR

**Phenolic—Tapped  
Recessed Top**

**PHENOLIC — TAPPED, OVAL TOP (INCH & METRIC)**

PART NO.	A	B	C DIA	D	E	F
CL-424-PKO	1	1-3/16	9/16	11/16	#10-32	5/16
CL-432-PKO					1/4-20	7/16
CLM-422-PKO					M5	5/16
CLM-432-PKO					M6	7/16
CL-654-PKO	1-5/8	1	5/8	3/8	3/8-24	1/2

**PHENOLIC — TAPPED, RECESSED TOP (INCH)**

PART NO.	A	B	C DIA	D	E	F
CL-202-PKR	3/4	3/4	1/2	21/32	#6-32	5/16
CL-212-PKR					#8-32	
CL-224-PKR					#10-32	
CL-232-PKR					1/4-20	
CL-424-PKR	1	11/16	1/2	7/16	#10-32	5/16
CL-432-PKR					1/4-20	

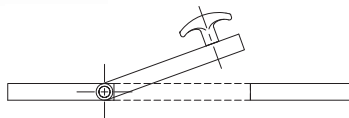
# T HANDLES

BLACK PHENOLIC PLASTIC WITH BRASS INSERT

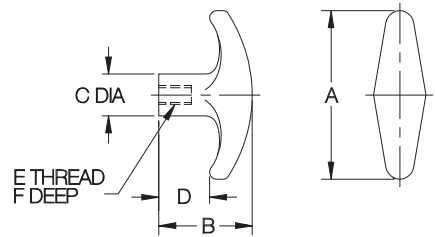


**Phenolic—Tapped**

#10-32 CL-424-TH  
1/4-20 CL-432-TH  
1/4-28 CL-434-TH  
5/16-18 CL-442-TH  
M5 CLM-422-TH  
M6 CLM-432-TH  
M8 CLM-442-TH



Easy-gripping handle for push/pull applications, such as release latches and cabinet doors. Molded-in brass insert provides superior thread strength. Non-standard thread sizes or molded-in studs are available in quantities of 500 and above. Note: Catalog photo is actual size.

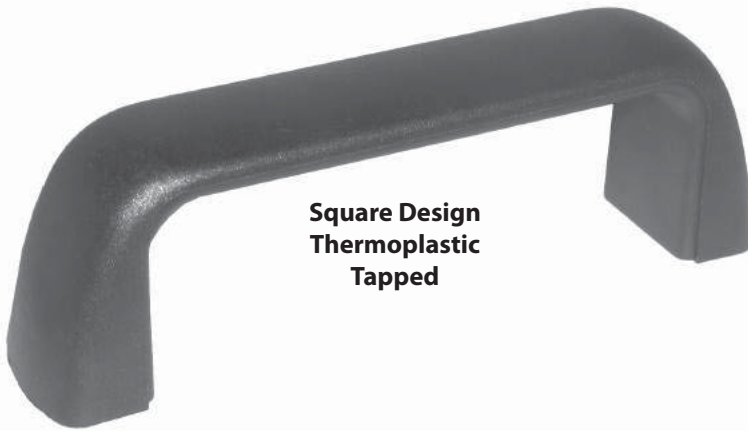


**PHENOLIC — TAPPED (INCH & METRIC)**

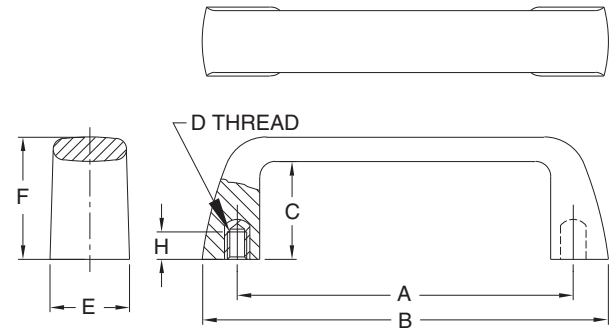
PART NO.	A	B	C DIA	D	E	F
CL-424-TH	2-1/4	1-1/4	9/16	11/16	#10-32	5/16
CL-432-TH					1/4-20	
CL-434-TH					1/4-28	7/16
CL-442-TH					5/16-18	5/16
CLM-422-TH					M5	
CLM-432-TH					M6	
CLM-442-TH					M8	

# PULL HANDLES

BLACK THERMOPLASTIC WITH BRASS INSERT



**Square Design  
Thermoplastic  
Tapped**



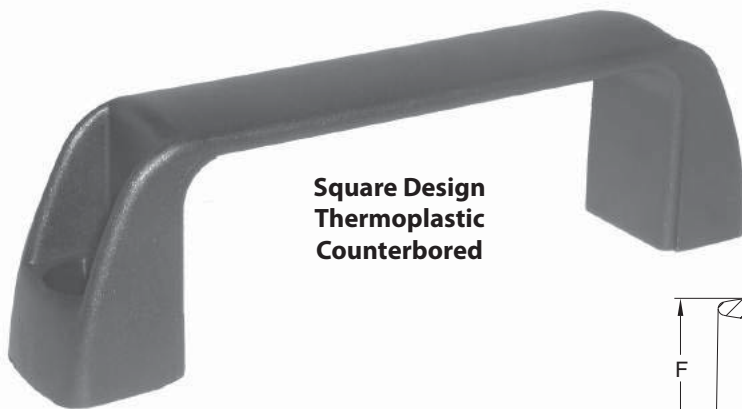
Attractive, modern-design handle that provides a comfortable grip with good ergonomic features. Excellent durability. Textured non-slip, non-glare finish. Molded-in brass insert provides superior thread strength. Black fiber-reinforced nylon thermoplastic (textured surface for secure gripping, excellent impact resistance, operating temperatures to 230°F). Choice of two handle sizes, available with either inch or metric threads.

## TAPPED (INCH)

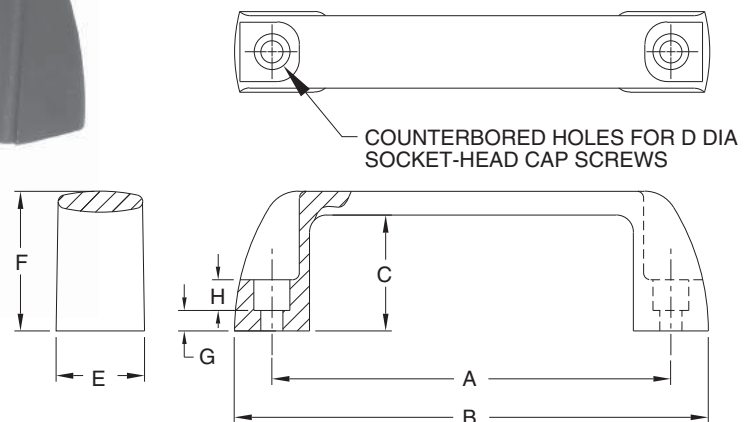
PART NO.	A	B	C	D	E	F	H
CL-105-PHS-4	4.13	4.76	1.14	1/4-20	1.02	1.46	.35
CL-117-PHS-5	4.61	5.24	1.26	5/16-18		1.57	

## TAPPED (METRIC)

PART NO.	A	B	C	D	E	F	H
CLM-105-PHS-6	4.13	4.76	1.14	M6	1.02	1.46	.35
CLM-117-PHS-8	4.61	5.24	1.26	M8		1.57	



**Square Design  
Thermoplastic  
Counterbored**



Attractive, modern-design handle that provides a comfortable grip with good ergonomic features. Excellent durability. Textured non-slip, non-glare finish. Counterbored for Socket-Head Cap Screws. Choice of four handle sizes. Black fiber-reinforced nylon thermoplastic (textured surface for secure gripping, excellent impact resistance, operating temperatures to 230°F).

## COUNTERBORED

PART NO.	A	B	C	D DIA	E	F	G	H
CL-94-PHSC-4	3.68	4.41	1.18	1/4 or M6	.83	1.42	.24	.28
CL-117-PHSC-5	4.61	5.47	1.34		1.02	1.61	.24	
CL-132-PHSC-5	5.20	6.14	1.46	5/16 or M8	1.06	1.77	.28	.35
CL-179-PHSC-5	7.05	8.03	1.65		1.10	1.97	.31	

# PULL HANDLES

ALUMINUM, BLACK POWDER-COATED FINISH, OR 304 STAINLESS STEEL

3

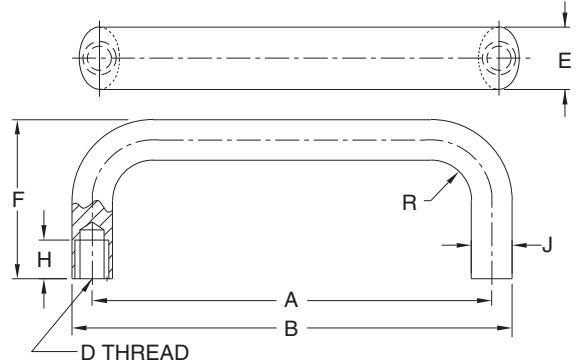


**Rounded Design  
Aluminum  
Tapped**



**Rounded Design  
Stainless Steel  
Tapped**

Attractive, modern-design aluminum handle provides a comfortable grip with good ergonomic features. Durable black powder-coated pebble finish. Tapped holes for mounting. Choice of four handle sizes, available with either inch or metric threads. Also available in stainless steel, shot blasted with a satin finish (two sizes).



## ALUMINUM — TAPPED (INCH)

PART NO.	A	B	D	E	F	H	J	R
CL-112-PHR-4	4.41	4.92	1/4-20	.79	1.93	.39	.51	.51
CL-128-PHR-4	5.04	5.55			2.01			
CL-160-PHR-5	6.30	6.97	5/16-18	1.02	2.24	.47	.67	.67
CL-192-PHR-5	7.56	8.23						

## ALUMINUM — TAPPED (METRIC)

PART NO.	A	B	D	E	F	H	J	R
CLM-112-PHR-6	4.41	4.92	M6	.79	1.93	.39	.51	.51
CLM-128-PHR-6	5.04	5.55			2.01			
CLM-160-PHR-8	6.30	6.97	M8	1.02	2.24	.47	.67	.67
CLM-192-PHR-8	7.56	8.23						

## STAINLESS STEEL — TAPPED (METRIC)

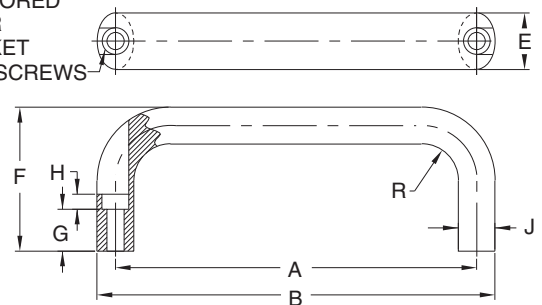
PART NO.	A	B	D	E	F	H	J	R
CLM-112-PHR-6-S	4.41	4.92	M6	.79	1.93	.39	.51	.51
CLM-128-PHR-6-S	5.04	5.55			2.01			



**Rounded Design  
Aluminum  
Counterbored**

Similar to the handles above, except counterbored for Socket-Head Cap Screws. Attractive, modern-design aluminum handle provides a comfortable grip with good ergonomic features. Durable black powder-coated pebble finish. Choice of four handle sizes.

COUNTERBORED  
HOLES FOR  
D DIA SOCKET  
HEAD CAP SCREWS



## ALUMINUM — COUNTERBORED

PART NO.	A	B	D	E	F	G	H	J	R
CL-116-PHRC-4	4.57	5.08	1/4 or M6	1.02	2.09	.39	.28	.67	.67
CL-132-PHRC-4	5.20	5.71			2.17				
CL-164-PHRC-4	6.46	6.97			2.24				
CL-196-PHRC-4	7.72	8.23							

# SPRING PLUNGERS

## TYPES



### STANDARD

Long bearing length on plunger for smooth operation. Locking element holds the unit securely in place after installation. Install and/or adjust from either end (when using the slot at the plunger end).



### SHORT

Compact, short-stroke version of our standard Spring Plungers. Self-contained plunger-and-spring device available in many sizes and forces. Locking element holds the unit securely in place after installation.



### SHORT WITH EXTENDED TRAVEL

This self-contained plunger-and-spring device is available in a wide range of sizes. Locking element holds the unit securely in place after installation.



### PRESS FIT

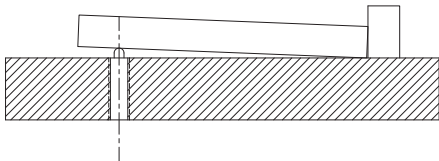
Sturdy shoulder provides a fixed seating position and positively resists detent force (installation hole can be counterbored to recess the shoulder).

## SELECTION CHART

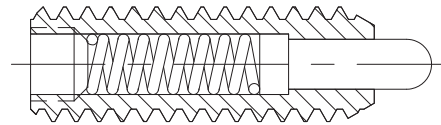
STYLE	OD																
	#6-32	#8-32	#8-36	#10-32	M5	1/4-20	M6	1/4-28	5/16-18	M8	3/8-16	M10	1/2-13	M12	5/8-11	3/4-10	1"-8
<b>Spring Plunger</b>																	
Steel Nose	X	X		X		X	X	X	X	X	X	X	X	X	X	X	X
Stainless Steel	X	X		X		X	X	X	X	X	X	X	X				
Delrin Nose		X		X		X	X		X	X	X	X	X	X	X		
Stainless Steel, Delrin Nose		X		X		X	X		X	X	X	X	X	X			
<b>Short Spring Plunger</b>																	
Steel Nose		X	X	X	X	X	X		X	X	X	X	X				
Stainless Steel		X	X	X	X	X			X		X		X				
Delrin Nose		X	X	X	X	X	X		X	X	X	X	X		X		
Stainless Steel, Delrin Nose		X	X	X	X	X			X		X		X				
Extended Travel, Steel Nose		X	X	X	X	X	X		X	X	X	X	X		X		
Extended Travel, Stainless Steel		X	X	X	X	X			X		X		X				
Extended Travel, Delrin Nose		X	X	X	X	X	X		X	X	X	X	X		X		
Extended Travel, Stainless Steel, Delrin Nose		X	X	X	X	X			X		X		X				
<b>Press Fit Spring Plunger</b>																	
Steel Nose		1/8"		3/16"		1/4"			5/16"		3/8"		1/2"				
Stainless Steel		1/8"		3/16"		1/4"			5/16"		3/8"		1/2"				
Delrin Nose		1/8"		3/16"		1/4"			5/16"		3/8"		1/2"				
Stainless Steel, Delrin Nose		1/8"		3/16"		1/4"			5/16"		3/8"		1/2"				

# SPRING PLUNGERS

## TECHNICAL INFORMATION



Spring plungers are often used to lift parts after machining to make unloading easier.



Nose Extended

4

Spring Plungers are self-contained plunger-and-spring devices that apply force over a relatively wide range of travel. The plunger nose has a long bearing length to provide smooth, linear operation. Spring Plungers are available in a wide range of sizes and forces, most in a choice of light or heavy end force. A Spring Plunger's end force is very consistent -- beginning at the stated "initial" value, and increasing linearly (due to spring compression) through the range of travel, until it reaches the stated "final" value at maximum travel.

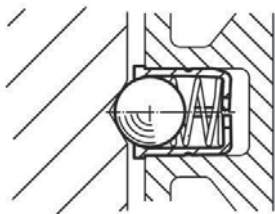
Most Spring Plungers have a locking element to hold it securely in place after installation. This element is a locking patch on small diameters and a nylon locking pellet on larger sizes. To obtain full holding torque on sizes with a locking pellet, countersink the installation hole to avoid cutting the pellet. Countersink at a 90° angle to a diameter 1/32" larger than the major thread diameter. Then, as you screw the plunger into its hole, the locking pellet will be compressed, not cut. The locking pellet does not apply excessive force, so it also works well in softer metals such as aluminum.

Spring Plungers are recommended only for applying straight-line force, not for sideways breakaway from a detent position. For breakaway applications, the rolling ball and short stroke of a Ball Plunger are crucial features for smooth, repeatable operation.

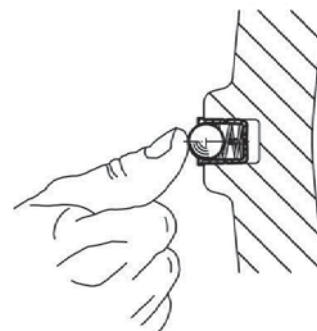
## New Self-Retaining Ball Plungers

**The slotted end of the thermoplastic body expands to compensate for hole tolerances up to .008".**

Due to their self-retaining design, these press-fit ball plungers can be securely installed in an ordinary drilled hole.



These plungers can be installed in a plain hole, with the shoulder exposed, or slightly counterbored for flush installation.



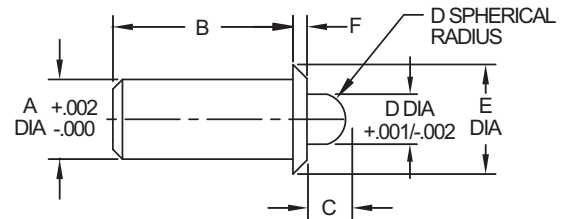
Self-Retaining Ball Plungers can often be installed by hand, due to the body's flexible design.

**See Page 153**



# PRESS-FIT SPRING PLUNGERS

STEEL – BODY: 12L14 STEEL, BLACK OXIDE FINISH. PLUNGER NOSE: 12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH OR ZINC PLATED CLEAR CHROMATE (OR DELRIN®). SPRING: MUSIC WIRE.  
 STAINLESS STEEL – BODY: 300-SERIES STAINLESS. PLUNGER NOSE: 300-SERIES STAINLESS (OR DELRIN®). SPRING: 302 STAINLESS



Simple, economical spring-loaded plunger ideal for installation in softer materials, such as aluminum, wood or plastic. Sturdy shoulder provides a fixed seating position and positively resists detent force (installation hole can be counterbored to recess the shoulder). Use when a threaded hole would be impractical and/or adjustment is not required. Choice of six sizes, each in light or heavy force. Available in steel, with a hardened plunger nose, or stainless steel. Optionally available with a Delrin® nose to prevent marring. Note: Catalog photos are actual size.

## STANDARD PLUNGER NOSE, LIGHT FORCE

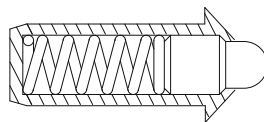
PART NO.		A DIA	END FORCE (LBS)		B	C	D	E DIA	F
STEEL	STAINLESS		INITIAL	FINAL					
CL-2-PSP-1	CL-2-PSPS-1	.125	.5	1	.252	.062	.070	.187	.032
CL-3-PSP-1	CL-3-PSPS-1	.188	.8	2.5	.405	.094	.121	.250	.035
CL-4-PSP-1	CL-4-PSPS-1	.250	1.5	3	.481	.125	.168	.312	.044
CL-5-PSP-1	CL-5-PSPS-1	.312	2	5	.643	.151	.186	.375	.045
CL-6-PSP-1	CL-6-PSPS-1	.375	2.5	7	.785	.187	.234	.500	.078
CL-8-PSP-1	CL-8-PSPS-1	.500	4	9	1.130	.250	.332	.688	.088

## STANDARD PLUNGER NOSE, HEAVY FORCE

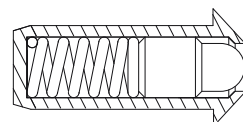
PART NO.		A DIA	END FORCE (LBS)		B	C	D	E DIA	F
STEEL	STAINLESS		INITIAL	FINAL					
CL-2-PSP-2	CL-2-PSPS-2	.125	1	2	.252	.062	.070	.187	.032
CL-3-PSP-2	CL-3-PSPS-2	.188	1.5	4.5	.405	.094	.121	.250	.035
CL-4-PSP-2	CL-4-PSPS-2	.250	2.5	6	.481	.125	.168	.312	.044
CL-5-PSP-2	CL-5-PSPS-2	.312	4	10	.643	.151	.186	.375	.045
CL-6-PSP-2	CL-6-PSPS-2	.375	5	14	.785	.187	.234	.500	.078
CL-8-PSP-2	CL-8-PSPS-2	.500	8	18	1.130	.250	.332	.688	.088

## DELRIN® PLUNGER NOSE, LIGHT FORCE

PART NO.		A DIA	END FORCE (LBS)		B	C	D	E DIA	F
STEEL	STAINLESS		INITIAL	FINAL					
CL-2-PSPN-1	CL-2-PSPSN-1	.125	.5	1	.252	.062	.070	.187	.032
CL-3-PSPN-1	CL-3-PSPSN-1	.188	.8	2.5	.405	.094	.121	.250	.035
CL-4-PSPN-1	CL-4-PSPSN-1	.250	1.5	3	.481	.125	.168	.312	.044
CL-5-PSPN-1	CL-5-PSPSN-1	.312	2	5	.643	.151	.186	.375	.045
CL-6-PSPN-1	CL-6-PSPSN-1	.375	2.5	7	.785	.187	.234	.500	.078
CL-8-PSPN-1	CL-8-PSPSN-1	.500	4	9	1.130	.250	.332	.688	.088



Nose Extended



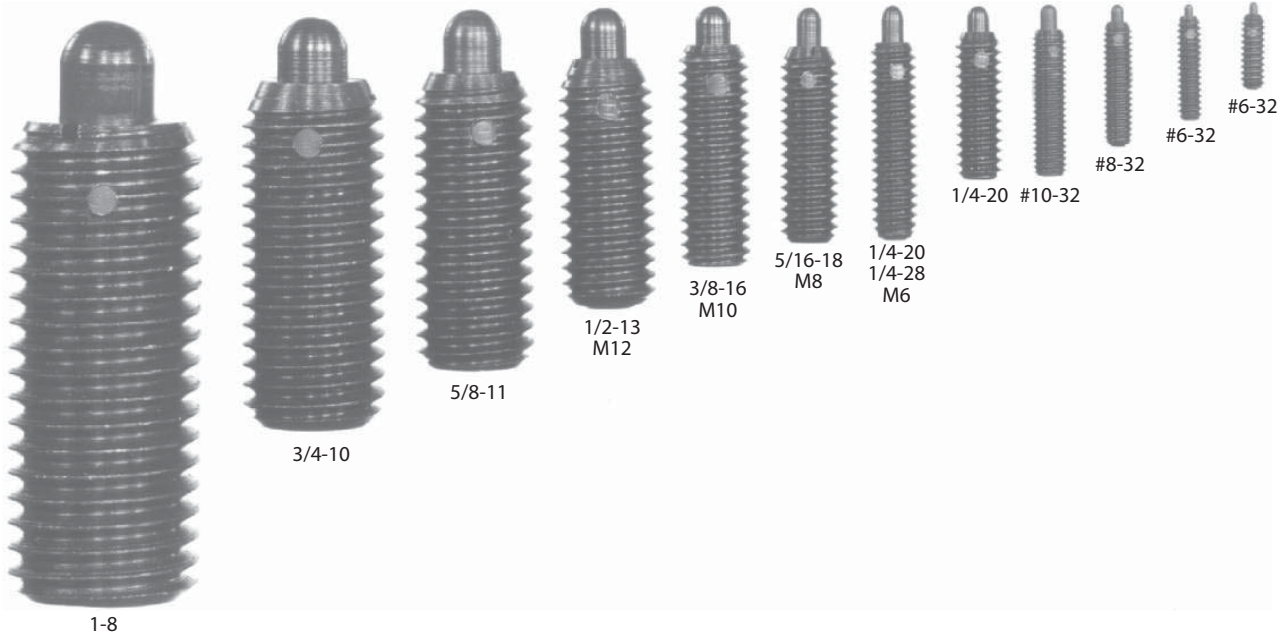
Nose Retracted

## DELRIN® PLUNGER NOSE, HEAVY FORCE

PART NO.		A DIA	END FORCE (LBS)		B	C	D	E DIA	F
STEEL	STAINLESS		INITIAL	FINAL					
CL-2-PSPN-2	CL-2-PSPSN-2	.125	1	2	.252	.062	.070	.187	.032
CL-3-PSPN-2	CL-3-PSPSN-2	.188	1.5	4.5	.405	.094	.121	.250	.035
CL-4-PSPN-2	CL-4-PSPSN-2	.250	2.5	6	.481	.125	.168	.312	.044
CL-5-PSPN-2	CL-5-PSPSN-2	.312	4	10	.643	.151	.186	.375	.045
CL-6-PSPN-2	CL-6-PSPSN-2	.375	5	14	.785	.187	.234	.500	.078
CL-8-PSPN-2	CL-8-PSPSN-2	.500	8	18	1.130	.250	.332	.688	.088

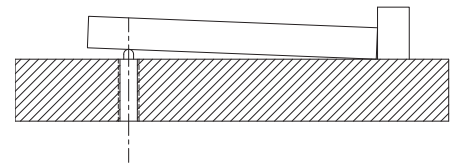
# SPRING PLUNGERS

STEEL – BODY: 12L14 STEEL, BLACK OXIDE FINISH (METRIC SIZES ZINC PLATED CLEAR CHROMATE).  
 PLUNGER NOSE: 12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH OR  
 ZINC PLATED CLEAR CHROMATE (OR DELRIN®). SPRING: MUSIC WIRE.  
 STAINLESS STEEL – BODY: 300-SERIES STAINLESS.  
 PLUNGER NOSE: 300-SERIES STAINLESS (OR DELRIN®). SPRING: 302 STAINLESS.

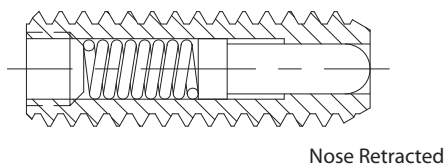
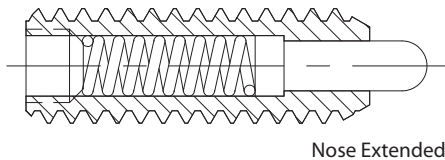


Self-contained plunger-and-spring device available in many sizes and forces. Long bearing length on plunger for smooth operation. Locking element holds the unit securely in place after installation. Install and/or adjust from either end (when using the slot at the plunger end, install with a Plunger Wrench to avoid over-compressing the spring).

Available in thread sizes from #6-32 to 1"-8 (M6 to M12 in metric). Choice of light or heavy force in each thread size. Available in steel, with hardened plunger nose, or stainless steel. Optionally available with a Delrin® nose to prevent marring. Note: Catalog photos are actual size.



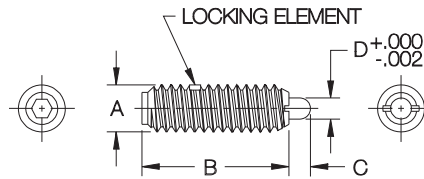
Spring plungers are often used to lift parts after machining to make unloading easier.



## PLUNGER NOSE COLOR CODES

BODY	NOSE	FORCE	COLOR CODE
STEEL	STEEL	LIGHT	SILVER
		HEAVY	BLACK
	DELRIN®	LIGHT	WHITE
		HEAVY	BROWN
STAINLESS	STAINLESS	LIGHT	PLAIN
		HEAVY	PLAIN
	DELRIN®	LIGHT	WHITE
		HEAVY	BROWN

# SPRING PLUNGERS



## STANDARD PLUNGER NOSE, LIGHT FORCE (INCH)

PART NO.		A	END FORCE (LBS)		B	C	D DIA
STEEL	STAINLESS		INITIAL	FINAL			
CL-10-SPS-2	CL-10-SSPS-2	#6-32	0.5	1.5	17/32	1/16	.046
CL-20-SPS-2	CL-20-SSPS-2	#8-32	0.7	2.3	5/8	3/32	.070
CL-30-SPS-2	CL-30-SSPS-2	#10-32	1.3	2.7	3/4	1/8	.093
CL-40-SPS-2	CL-40-SSPS-2	1/4-20	1	4	1	3/16	.119
CL-41-SPS-2	CL-41-SSPS-2	1/4-28	1	4	1	3/16	.119
CL-50-SPS-2	CL-50-SSPS-2	5/16-18	1.5	4.5	1	3/16	.135
CL-60-SPS-2	CL-60-SSPS-2	3/8-16	2.8	7.2	1-1/8	3/16	.186
CL-70-SPS-2	CL-70-SSPS-2	1/2-13	2.7	9.3	1-1/4	1/4	.248
CL-80-SPS-2	—	5/8-11	3.5	10.5	1-1/2	5/16	.310
CL-90-SPS-2	—	3/4-10	4	16	1-3/4	5/16	.374
CL-95-SPS-2	—	1"-8	4	31	2-13/32	1/2	.499

## DELRIN® PLUNGER NOSE, LIGHT FORCE (INCH)

PART NO.		A	END FORCE (LBS)		B	C	D DIA
STEEL	STAINLESS		INITIAL	FINAL			
—	—	#6-32	—	—	—	—	—
CL-20-SPN-2	CL-20-SSPN-2	#8-32	0.7	2.3	5/8	3/32	.070
CL-30-SPN-2	CL-30-SSPN-2	#10-32	1.3	2.7	3/4	1/8	.093
CL-40-SPN-2	CL-40-SSPN-2	1/4-20	1	4	1	3/16	.119
—	—	1/4-28	—	—	—	—	—
CL-50-SPN-2	CL-50-SSPN-2	5/16-18	1.5	4.5	1	3/16	.135
CL-60-SPN-2	CL-60-SSPN-2	3/8-16	2.8	7.2	1-1/8	3/16	.186
CL-70-SPN-2	CL-70-SSPN-2	1/2-13	2.7	9.3	1-1/4	1/4	.248
CL-80-SPN-2	—	5/8-11	3.5	10.5	1-1/2	5/16	.310
—	—	3/4-10	—	—	—	—	—
—	—	1"-8	—	—	—	—	—

## STANDARD PLUNGER NOSE, HEAVY FORCE (INCH)

PART NO.		A	END FORCE (LBS)		B	C	D DIA
STEEL	STAINLESS		INITIAL	FINAL			
CL-11-SPS-1	CL-11-SSPS-1	#6-32	1.0	1.6	3/8	1/16	.046
CL-10-SPS-1	CL-10-SSPS-1		1.5	4.5	17/32		
CL-20-SPS-1	CL-20-SSPS-1	#8-32	2.7	7.3	5/8	3/32	.070
CL-30-SPS-1	CL-30-SSPS-1	#10-32	2.9	11.1	3/4	1/8	.093
CL-42-SPS-1	CL-42-SSPS-1	1/4-20	2	9	3/4	1/8	.119
CL-40-SPS-1	CL-40-SSPS-1		3	13	1	3/16	
CL-41-SPS-1	CL-41-SSPS-1	1/4-28	3	13	1	3/16	.119
CL-50-SPS-1	CL-50-SSPS-1	5/16-18	3	15	1	3/16	.135
CL-60-SPS-1	CL-60-SSPS-1	3/8-16	5.5	14.5	1-1/8	3/16	.186
CL-70-SPS-1	CL-70-SSPS-1	1/2-13	6.6	17.4	1-1/4	1/4	.248
CL-80-SPS-1	—	5/8-11	10.5	25.5	1-1/2	5/16	.310
CL-90-SPS-1	—	3/4-10	6.7	37.3	1-3/4	5/16	.374
CL-95-SPS-1	—	1"-8	16	68	2-13/32	1/2	.499

## DELRIN® PLUNGER NOSE, HEAVY FORCE (INCH)

PART NO.		A	END FORCE (LBS)		B	C	D DIA
STEEL	STAINLESS		INITIAL	FINAL			
—	—	#6-32	—	—	—	—	—
—	—		—	—	—	—	—
CL-20-SPN-1	CL-20-SSPN-1	#8-32	2.7	7.3	5/8	3/32	.070
CL-30-SPN-1	CL-30-SSPN-1	#10-32	2.9	11.1	3/4	1/8	.093
—	—	1/4-20	—	—	—	—	—
CL-40-SPN-1	CL-40-SSPN-1		3	13	1	3/16	.119
—	—	1/4-28	—	—	—	—	—
CL-50-SPN-1	CL-50-SSPN-1	5/16-18	3	15	1	3/16	.135
CL-60-SPN-1	CL-60-SSPN-1	3/8-16	5.5	14.5	1-1/8	3/16	.186
CL-70-SPN-1	CL-70-SSPN-1	1/2-13	6.6	17.4	1-1/4	1/4	.248
CL-80-SPN-1	—	5/8-11	10.5	25.5	1-1/2	5/16	.310
—	—	3/4-10	—	—	—	—	—
—	—	1"-8	—	—	—	—	—

## STANDARD PLUNGER NOSE, LIGHT FORCE (METRIC)

PART NO.		A	END FORCE (LBS)		B	C	D DIA
STEEL	STAINLESS		INITIAL	FINAL			
CLM-6-SPS-1	CLM-6-SSPS-1	M6	1.0	4.0	1	3/16	.119
CLM-8-SPS-1	CLM-8-SSPS-1	M8	1.5	4.5	1	3/16	.135
CLM-10-SPS-1	CLM-10-SSPS-1	M10	2.8	7.2	1-1/8	3/16	.186
CLM-12-SPS-1	CLM-12-SSPS-1	M12	2.7	9.3	1-1/4	1/4	.248

## DELRIN® PLUNGER NOSE, LIGHT FORCE (METRIC)

PART NO.		A	END FORCE (LBS)		B	C	D DIA
STEEL	STAINLESS		INITIAL	FINAL			
CLM-6-SPN-1	CLM-6-SSPN-1	M6	1.0	4.0	1	3/16	.119
CLM-8-SPN-1	CLM-8-SSPN-1	M8	1.5	4.5	1	3/16	.135
CLM-10-SPN-1	CLM-10-SSPN-1	M10	2.8	7.2	1-1/8	3/16	.186
CLM-12-SPN-1	CLM-12-SSPN-1	M12	2.7	9.3	1-1/4	1/4	.248

## STANDARD PLUNGER NOSE, HEAVY FORCE (METRIC)

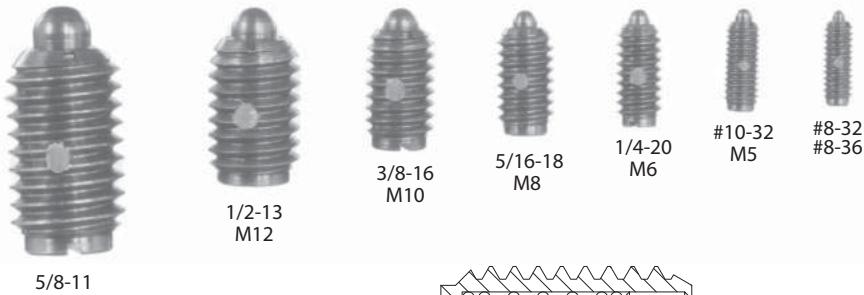
PART NO.		A	END FORCE (LBS)		B	C	D DIA
STEEL	STAINLESS		INITIAL	FINAL			
CLM-6-SPS-2	CLM-6-SSPS-2	M6	3.0	13.0	1	3/16	.119
CLM-8-SPS-2	CLM-8-SSPS-2	M8	3.0	15.0	1	3/16	.135
CLM-10-SPS-2	CLM-10-SSPS-2	M10	5.5	14.5	1-1/8	3/16	.186
CLM-12-SPS-2	CLM-12-SSPS-2	M12	6.6	17.4	1-1/4	1/4	.248

## DELRIN® PLUNGER NOSE, HEAVY FORCE (METRIC)

PART NO.		A	END FORCE (LBS)		B	C	D DIA
STEEL	STAINLESS		INITIAL	FINAL			
CLM-6-SPN-2	CLM-6-SSPN-2	M6	3.0	13.0	1	3/16	.119
CLM-8-SPN-2	CLM-8-SSPN-2	M8	3.0	15.0	1	3/16	.135
CLM-10-SPN-2	CLM-10-SSPN-2	M10	5.5	14.5	1-1/8	3/16	.186
CLM-12-SPN-2	CLM-12-SSPN-2	M12	5.5	17.4	1-1/4	1/4	.248

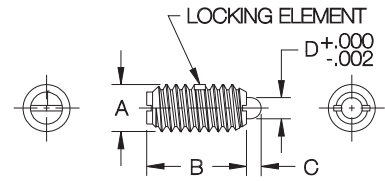
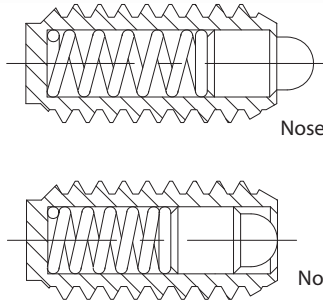
# SHORT SPRING PLUNGERS

STEEL – BODY: 12L14 STEEL, BLACK OXIDE FINISH. PLUNGER NOSE: 12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH OR ZINC PLATED CLEAR CHROMATE (OR DELRIN®). SPRING: MUSIC WIRE.  
 STAINLESS STEEL – BODY: 300-SERIES STAINLESS.  
 PLUNGER NOSE: 300-SERIES STAINLESS (OR DELRIN®). SPRING: 302 STAINLESS.



Compact, short-stroke version of our standard Spring Plungers. Self-contained plunger-and-spring device available in many sizes and forces. Locking element holds the unit securely in place after installation. Install and/or adjust from either end (when using the slot at the plunger end, install with a Plunger Wrench to avoid over-compressing the spring).

Available in thread sizes from #8-32 to 5/8-11 (M5 to M12 in metric). Choice of light or heavy force in each thread size. Available in steel, with a hardened plunger nose, or stainless steel. Optionally available with a Delrin® nose to prevent marring. Note: Catalog photos are actual size.



## STANDARD PLUNGER NOSE, LIGHT FORCE (INCH)

PART NO.		A	END FORCE (LBS)		B	C	D DIA
STEEL	STAINLESS		INITIAL	FINAL			
CL-21-SPS-2	CL-21-SSPS-2	#8-32	0.5	1.5	7/16	.052	.070
CL-22-SPS-2	CL-22-SSPS-2	#8-36					
CL-31-SPS-2	CL-31-SSPS-2	#10-32	0.75	2.5	15/32	.065	.093
CL-43-SPS-2	CL-43-SSPS-2	1/4-20	1	3.5	17/32	.078	.119
CL-51-SPS-2	CL-51-SSPS-2	5/16-18	1.5	4	9/16	.084	.135
CL-61-SPS-2	CL-61-SSPS-2	3/8-16	1.5	5	5/8	.110	.186
CL-71-SPS-2	CL-71-SSPS-2	1/2-13	1.75	5.5	3/4	.151	.248
CL-81-SPS-2	—	5/8-11	2	8.5	1-1/16	.215	.310

## DELRIN® PLUNGER NOSE, LIGHT FORCE (INCH)

PART NO.		A	END FORCE (LBS)		B	C	D DIA
STEEL	STAINLESS		INITIAL	FINAL			
CL-21-SPN-2	CL-21-SSPN-2	#8-32	0.5	1.5	7/16	.052	.070
CL-22-SPN-2	CL-22-SSPN-2	#8-36					
CL-31-SPN-2	CL-31-SSPN-2	#10-32	0.75	2.5	15/32	.065	.093
CL-43-SPN-2	CL-43-SSPN-2	1/4-20	1	3.5	17/32	.078	.119
CL-51-SPN-2	CL-51-SSPN-2	5/16-18	1.5	4	9/16	.084	.135
CL-61-SPN-2	CL-61-SSPN-2	3/8-16	1.5	5	5/8	.110	.186
CL-71-SPN-2	CL-71-SSPN-2	1/2-13	1.75	5.5	3/4	.151	.248
CL-81-SPN-2	—	5/8-11	2	8.5	1-1/16	.215	.310

## STANDARD PLUNGER NOSE, HEAVY FORCE (INCH)

CL-21-SPS-1	CL-21-SSPS-1	#8-32	1.5	4.75	7/16	.052	.070
CL-22-SPS-1	CL-22-SSPS-1	#8-36					
CL-31-SPS-1	CL-31-SSPS-1	#10-32	1.75	6.25	15/32	.065	.093
CL-43-SPS-1	CL-43-SSPS-1	1/4-20	3	10.5	17/32	.078	.119
CL-51-SPS-1	CL-51-SSPS-1	5/16-18	3.75	15.5	9/16	.084	.135
CL-61-SPS-1	CL-61-SSPS-1	3/8-16	4.5	18.5	5/8	.110	.186
CL-71-SPS-1	CL-71-SSPS-1	1/2-13	5	28	3/4	.151	.248
CL-81-SPS-1	—	5/8-11	7	50	1-1/16	.215	.310

## DELRIN® PLUNGER NOSE, HEAVY FORCE (INCH)

CL-21-SPN-1	CL-21-SSPN-1	#8-32	1.5	4.75	7/16	.052	.070
CL-22-SPN-1	CL-22-SSPN-1	#8-36					
CL-31-SPN-1	CL-31-SSPN-1	#10-32	1.75	6.25	15/32	.065	.093
CL-43-SPN-1	CL-43-SSPN-1	1/4-20	3	10.5	17/32	.078	.119
CL-51-SPN-1	CL-51-SSPN-1	5/16-18	3.75	15.5	9/16	.084	.135
CL-61-SPN-1	CL-61-SSPN-1	3/8-16	4.5	18.5	5/8	.110	.186
CL-71-SPN-1	CL-71-SSPN-1	1/2-13	5	28	3/4	.151	.248
CL-81-SPN-1	—	5/8-11	7	50	1-1/16	.215	.310

## STANDARD PLUNGER NOSE, LIGHT FORCE (METRIC)

CLM-51-SPS-1	CLM-61-SPS-1	CLM-81-SPS-1	CLM-101-SPS-1	CLM-121-SPS-1
—	—	—	—	—
M5	M6	M8	M10	M12
.7	1	1.5	5	5.5
2.5	3.5	4	18.5	18.5
.47	.53	.56	.62	.75
.065	.078	.084	.110	.151
.093	.119	.135	.186	.248

## DELRIN® PLUNGER NOSE, LIGHT FORCE (METRIC)

CLM-51-SPN-1	CLM-61-SPN-1	CLM-81-SPN-1	CLM-101-SPN-1	CLM-121-SPN-1
—	—	—	—	—
M5	M6	M8	M10	M12
.7	1	1.5	5	5.5
2.5	3.5	4	18.5	18.5
.47	.53	.56	.62	.75
.065	.078	.084	.110	.151
.093	.119	.135	.186	.248

## STANDARD PLUNGER NOSE, HEAVY FORCE (METRIC)

CLM-51-SPS-2	CLM-61-SPS-2	CLM-81-SPS-2	CLM-101-SPS-2	CLM-121-SPS-2
—	—	—	—	—
M5	M6	M8	M10	M12
1.8	3	3.8	4.5	5
6.3	10.5	15.5	18.5	28
.47	.53	.56	.62	.75
.065	.078	.084	.110	.151
.093	.119	.135	.186	.248

## DELRIN® PLUNGER NOSE, HEAVY FORCE (METRIC)

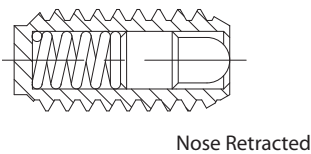
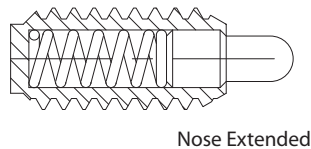
CLM-51-SPN-2	CLM-61-SPN-2	CLM-81-SPN-2	CLM-101-SPN-2	CLM-121-SPN-2
—	—	—	—	—
M5	M6	M8	M10	M12
1.8	3	3.8	4.5	5
6.3	10.5	15.5	18.5	28
.47	.53	.56	.62	.75
.065	.078	.084	.110	.151
.093	.119	.135	.186	.248

# SHORT SPRING PLUNGERS WITH EXTENDED TRAVEL

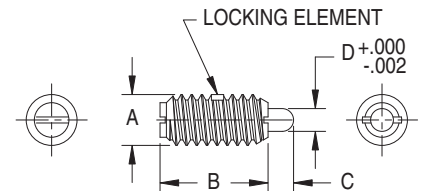
STEEL- BODY: 12L14 STEEL, BLACK OXIDE FINISH. PLUNGER NOSE: 12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH OR ZINC PLATED CLEAR CHROMATE (OR DELRIN®). SPRING: MUSIC WIRE  
 STAINLESS STEEL- BODY: 300-SERIES STAINLESS.  
 PLUNGER NOSE: 300-SERIES STAINLESS (OR DELRIN®). SPRING: 302 STAINLESS.



These Spring Plungers have the body length of a Short Spring Plunger while providing the longer stroke of a standard Spring Plunger (spring force is somewhat reduced). This self-contained plunger-and-spring device is available in a wide range of sizes. Locking element holds the unit securely in place after installation. Install and/or adjust from either end (when using the slot at the plunger end, install with a Plunger Wrench to avoid over-compressing the spring).



Available in thread sizes from #8-32 to 5/8-11 (M5 to M12 in metric). Available in steel, with a hardened plunger nose, or stainless steel. Optionally available with a Delrin® nose to prevent marring. Note: Catalog photos are actual size.



## STANDARD PLUNGER NOSE (INCH)

PART NO.		A	END FORCE (LBS)		B	C	D DIA
STEEL	STAINLESS		INITIAL	FINAL			
CL-25-SPS-1	CL-25-SSPS-1	#8-32	1.0	3.2	7/16	.093	.070
CL-26-SPS-1	CL-26-SSPS-1	#8-36					
CL-35-SPS-1	CL-35-SSPS-1	#10-32	1.2	4.2	15/32	.125	.093
CL-45-SPS-1	CL-45-SSPS-1	1/4-20	2.0	7.0	17/32	.187	.119
CL-55-SPS-1	CL-55-SSPS-1	5/16-18	2.5	10.5	9/16	.187	.135
CL-65-SPS-1	CL-65-SSPS-1	3/8-16	3.0	12.5	5/8	.187	.186
CL-75-SPS-1	CL-75-SSPS-1	1/2-13	3.5	19	3/4	.250	.248
CL-85-SPS-1	—	5/8-11	4.5	34	1-1/16	.312	.310

## DELRIN® PLUNGER NOSE (INCH)

PART NO.		A	END FORCE (LBS)		B	C	D DIA
STEEL	STAINLESS		INITIAL	FINAL			
CL-25-SPN-1	CL-25-SSPN-1	#8-32	1.0	3.2	7/16	.093	.070
CL-26-SPN-1	CL-26-SSPN-1	#8-36					
CL-35-SPN-1	CL-35-SSPN-1	#10-32	1.2	4.2	15/32	.125	.093
CL-45-SPN-1	CL-45-SSPN-1	1/4-20	2.0	7.0	17/32	.187	.119
CL-55-SPN-1	CL-55-SSPN-1	5/16-18	2.5	10.5	9/16	.187	.135
CL-65-SPN-1	CL-65-SSPN-1	3/8-16	3.0	12.5	5/8	.187	.186
CL-75-SPN-1	CL-75-SSPN-1	1/2-13	3.5	19	3/4	.250	.248
CL-85-SPN-1	—	5/8-11	4.5	34	1-1/16	.312	.310

## STANDARD PLUNGER NOSE (METRIC)

PART NO.		A	END FORCE (LBS)		B	C	D DIA
STEEL	STAINLESS		INITIAL	FINAL			
CLM-55-SPS-1	—	M5	1.2	4.2	.47	.125	.093
CLM-65-SPS-1	—	M6	2.0	7.0	.53	.187	.119
CLM-85-SPS-1	—	M8	2.5	10.5	.56	.187	.135
CLM-105-SPS-1	—	M10	3.0	12.5	.62	.187	.186
CLM-125-SPS-1	—	M12	3.5	19	.75	.250	.248

## DELRIN® PLUNGER NOSE (METRIC)

PART NO.		A	END FORCE (LBS)		B	C	D DIA
STEEL	STAINLESS		INITIAL	FINAL			
CLM-55-SPN-1	—	M5	1.2	4.2	.47	.125	.093
CLM-65-SPN-1	—	M6	2.0	7.0	.53	.187	.119
CLM-85-SPN-1	—	M8	2.5	10.5	.56	.187	.135
CLM-105-SPN-1	—	M10	3.0	12.5	.62	.187	.186
CLM-125-SPN-1	—	M12	3.5	19	.75	.250	.248

# BALL PLUNGERS

## TYPES



### STANDARD, STEEL BALL

Self-contained ball-and-spring device available in many sizes and forces. Locking element holds the unit securely in place after installation. Install and/or adjust from either end.



### STANDARD, DELRIN® BALL

Self-contained ball-and-spring device available in many sizes and forces. Locking element holds the unit securely in place after installation. Install and/or adjust from either end.



### PRESS FIT

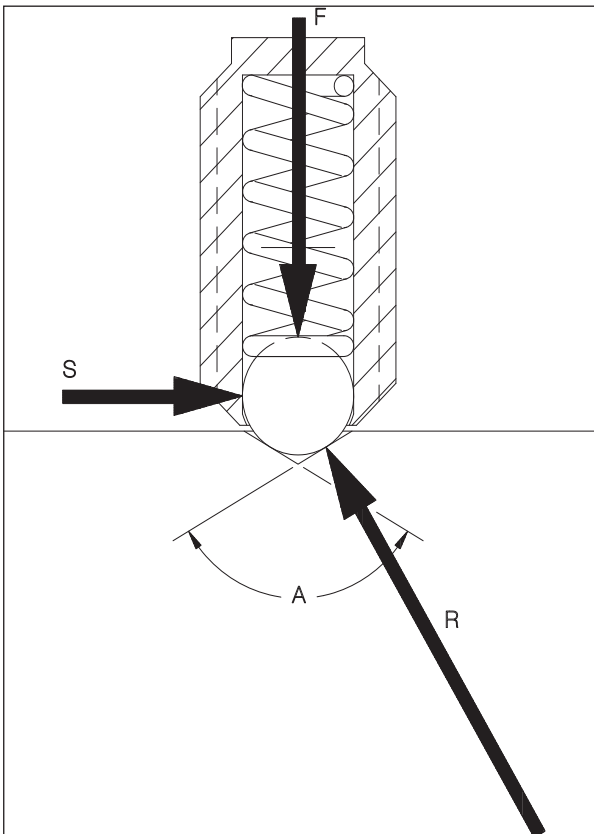
Simple, economical spring-loaded plunger ideal for installation in softer materials, such as aluminum, wood, or plastic. Sturdy shoulder provides a fixed seating position.



### SELF-RETAINING

Due to their self-retaining design, these press-fit ball plungers can be securely installed in an ordinary drilled hole. The slotted end of the thermoplastic body expands to compensate for hole tolerances up to .008" oversize.

## TECHNICAL INFORMATION

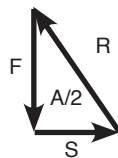


### INSTALLATION:

To obtain full locking torque, countersink the installation hole to avoid cutting the locking element. Countersink at a 90-100° angle to a diameter 1/32" larger than the major thread diameter. Then, as you screw the plunger into its hole, the locking element will be compressed, not cut. **INFO+:** See page 154 for plunger wrenches.

### BREAKAWAY FORCE:

To calculate the side force needed to slide a ball plunger out of its detent hole, refer to the free-body force diagram to the left. In the diagram,  $S$ = Side force,  $F$ = End force (spring force),  $R$ = Reaction force, and  $A$ = Countersink angle. The reaction force ( $R$ ) is perpendicular to the contact surface. Solving for side force ( $S$ ):



$$S = \frac{F}{\tan(A/2)}$$

End force ( $F$ ) depends on how far the spring will be compressed, which depends on how far away from the sliding surface the ball plunger is installed. Maximum spring compression and end force occur as the ball breaks out of its hole.

### BREAKAWAY-FORCE EXAMPLE:

A CL-40-BP-3 ball plunger (1/4-20) exerts an initial force of 4 lbs, a half-way force of 8 lbs, and a final force of 12 lbs. With a 90° countersink angle and half-way compression:

$$S = \frac{8 \text{ lbs}}{\tan(90^\circ/2)} = 8 \text{ lbs}$$

$$S = \frac{8 \text{ lbs}}{\tan(120^\circ/2)} = 4.6 \text{ lbs}$$

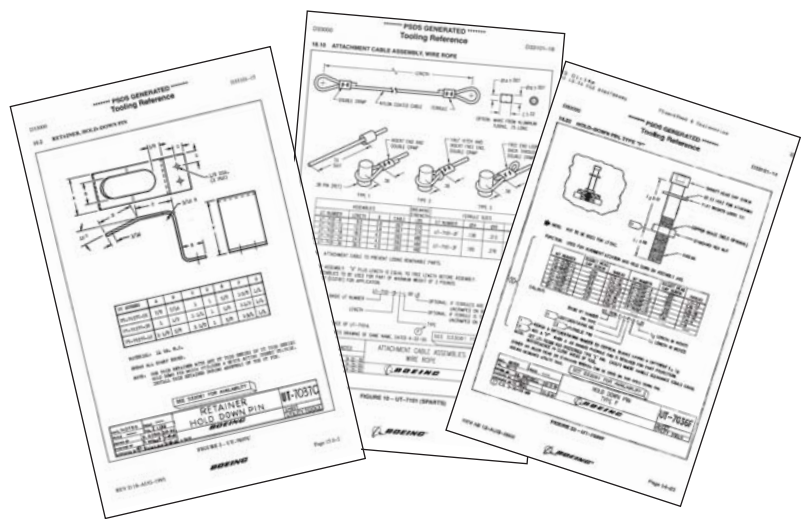
# BALL PLUNGERS

## SELECTION CHART:

STYLE	4-48	5-40	M3	6-40	8-32	M4	8-36	10-32	M6	1/4-20	M8	5/16-18	M10	3/8-16	M12	1/2-13	M16	5/8-11
Ball Plunger	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ball Plunger, Stainless Steel	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ball Plunger, Delrin® Body										X		X		X				
Ball Plunger, Delrin® Ball	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ball Plunger, Stainless Steel, Delrin® Ball	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ball Plunger, Delrin® Body, Delrin® Ball										X		X		X				
Press Fit Ball Plunger					1/8"			3/16"		1/4"		5/16"		3/8"		1/2"		
Press Fit Ball Plunger, Stainless Steel Ball					1/8"			3/16"		1/4"		5/16"		3/8"		1/2"		
Press Fit Ball Plunger, Delrin® Ball					1/8"			3/16"		1/4"		5/16"		3/8"		1/2"		
Press Fit Ball Plunger, Stainless Steel, Delrin® Ball					1/8"			3/16"		1/4"		5/16"		3/8"		1/2"		
Self-Retaining Stainless Steel Ball								3/16"		1/4"				3/8"		1/2"		

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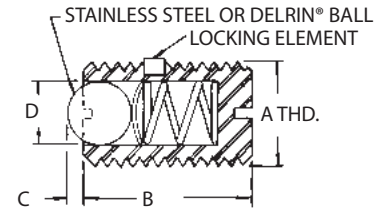
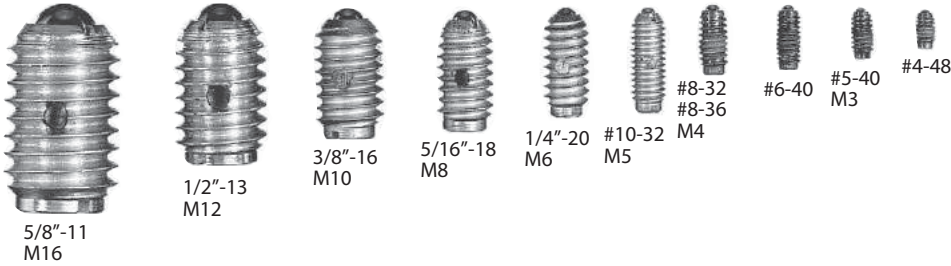
# BALL PLUNGERS

STEEL – BODY: 12L14 STEEL, ZINC PLATED OR BLACK OXIDE FINISH.

BALL: 440C STAINLESS. SPRING: MUSIC WIRE

STAINLESS STEEL – BODY: 300-SERIES STAINLESS. BALL: 440C STAINLESS. SPRING: 302 STAINLESS.

DELRIN® – BODY: DELRIN® 500, WHITE, BLACK, OR YELLOW. BALL: 440C STAINLESS. SPRING: 302 STAINLESS



4

## STANDARD BALL (INCH)

PART NO.			A	END FORCE (LBS)		B	C	D DIA	COLOR CODE
STEEL BODY	STAINLESS BODY	DELRIN® BODY		INITIAL	FINAL				
CL-5-BP-1	CL-5-SBP-1	—	#4-48	1/8	1/2	3/16	.020	.062	PLAIN
CL-10-BP-1	CL-10-SBP-1	—	#5-40	1/4	3/4	1/4			
CL-15-BP-1	CL-15-SBP-1	—	#6-40	1/2	1	5/16			
CL-22-BP-1	CL-22-SBP-1	—	#8-32	1/2	1-1/4	11/32	.025	.093	PLAIN
CL-20-BP-1	CL-20-SBP-1	—	#8-36						
CL-30-BP-1	CL-30-SBP-1	—	#10-32	1/2	1-1/2	33/64	.025	.093	PLAIN
CL-30-BP-2	CL-30-SBP-2	—		1-1/2	3				BLACK
CL-30-BP-3	CL-30-SBP-3	—		2	5				YELLOW
CL-40-BP-1	CL-40-SBP-1	CL-40-DBP-1-LL	1/4-20	2	4	17/32	.035	.125	PLAIN
CL-40-BP-2	CL-40-SBP-2	CL-40-DBP-2-LL		3	7				BLACK
CL-40-BP-3	CL-40-SBP-3	CL-40-DBP-3-LL		4	12				YELLOW
CL-50-BP-1	CL-50-SBP-1	CL-50-DBP-1-LL	5/16-18	2	4-1/2	37/64	.040	.156	PLAIN
CL-50-BP-2	CL-50-SBP-2	CL-50-DBP-2-LL		4	9				BLACK
CL-50-BP-3	CL-50-SBP-3	CL-50-DBP-3-LL		6	17				YELLOW
CL-60-BP-1	CL-60-SBP-1	CL-60-DBP-1-LL	3/8-16	2-1/2	5	5/8	.048	.187	PLAIN
CL-60-BP-2	CL-60-SBP-2	CL-60-DBP-2-LL		5	10				BLACK
CL-60-BP-3	CL-60-SBP-3	CL-60-DBP-3-LL		6	21				YELLOW
CL-70-BP-1	CL-70-SBP-1	—	1/2-13	3	6	3/4	.072	.281	PLAIN
CL-70-BP-2	CL-70-SBP-2	—		6	12				BLACK
CL-70-BP-3	CL-70-SBP-3	—		6	30				YELLOW
CL-80-BP-1	CL-80-SBP-1	—	5/8-11	4-1/2	9	63/64	.096	.375	PLAIN
CL-80-BP-2	CL-80-SBP-2	—		9	18				BLACK
CL-80-BP-3	CL-80-SBP-3	—		7	50				YELLOW

## STANDARD BALL (METRIC)

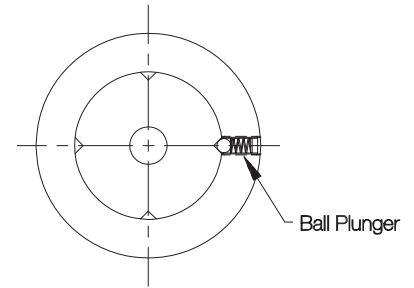
—	CLM-3-SBP-1	—	M3	.12	.5	.19	.020	.062	PLAIN
CLM-4-BP-1	CLM-4-SBP-1	—	M4	0.6	1.1	.34	.024	.094	PLAIN
CLM-5-BP-2	CLM-5-SBP-2	—	M5	.5	1.5	.51	.024	.094	PLAIN
CLM-5-BP-1	CLM-5-SBP-1	—		1.5	2.9				GREEN
CLM-5-BP-3	CLM-5-SBP-3	—		2	4.9				YELLOW
CLM-6-BP-2	CLM-6-SBP-2	—	M6	2	4	.53	.035	.125	PLAIN
CLM-6-BP-1	CLM-6-SBP-1	—		2.9	7				GREEN
CLM-6-BP-3	CLM-6-SBP-3	—		4	12				YELLOW
CLM-8-BP-2	CLM-8-SBP-2	—	M8	2.2	4.4	.58	.039	.156	PLAIN
CLM-8-BP-1	CLM-8-SBP-1	—		3.9	8.8				GREEN
CLM-8-BP-3	CLM-8-SBP-3	—		6.1	17.1				YELLOW
CLM-10-BP-2	CLM-10-SBP-2	—	M10	2.5	5.0	.63	.047	.187	PLAIN
CLM-10-BP-1	CLM-10-SBP-1	—		5.0	9.9				GREEN
CLM-10-BP-3	CLM-10-SBP-3	—		6.1	20.9				YELLOW
CLM-12-BP-2	CLM-12-SBP-2	—	M12	3.0	6.1	.75	.079	.281	PLAIN
CLM-12-BP-1	CLM-12-SBP-1	—		6.1	12.1				GREEN
CLM-12-BP-3	CLM-12-SBP-3	—		6.1	29.7				YELLOW
CLM-16-BP-2	CLM-16-SBP-2	—	M16	4.5	9	.98	.098	.375	PLAIN
CLM-16-BP-1	CLM-16-SBP-1	—		9	18				GREEN
CLM-16-BP-3	CLM-16-SBP-3	—		7	50				YELLOW



# BALL PLUNGERS

STAINLESS STEEL – BODY: 300-SERIES STAINLESS. BALL: WHITE DELRIN® 500. SPRING: 302 STAINLESS.  
 DELRIN® – BODY: DELRIN® 500, BLACK, OR YELLOW. BALL: WHITE DELRIN® 500. SPRING: 302 STAINLESS.

Self-contained ball-and-spring device available in many sizes and forces. Available in thread sizes from #4-48 to 5/8-11 (M3 to M16 in metric). Choice of light, medium, or heavy force in most thread sizes. Available in steel, stainless steel or Delrin®, all with a 440C stainless steel ball (optionally available with a Delrin® ball). Locking element (steel and stainless only) holds the unit securely in place after installation. Install and/or adjust from either end (when using the slot at the ball end, install with a Plunger Wrench to avoid over-compressing the spring). The three smallest sizes, and all Delrin® sizes, have no slot at the ball end. Note: Catalog photos are actual size.



## DELRIN® BALL (INCH)

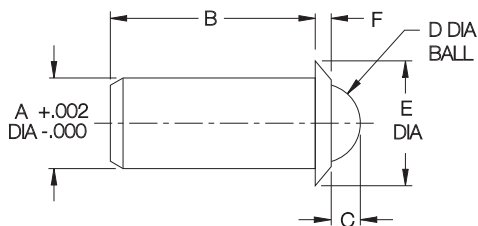
PART NO.		A	END FORCE (LBS)		B	C	D DIA	COLOR CODE
STAINLESS BODY	DELRIN® BODY		INITIAL	FINAL				
CL-5-SBPN-1	—	#4-48	1/8	1/2	3/16	.020	.062	PLAIN
CL-10-SBPN-1	—	#5-40	1/4	3/4	1/4			
CL-15-SBPN-1	—	#6-40	1/2	1	5/16	.023	.078	
CL-22-SBPN-1	—	#8-32						
CL-20-SBPN-1	—	#8-36	1/2	1-1/4	11/32	.025	.093	PLAIN
CL-30-SBPN-1	—		1/2	1-1/2				
CL-30-SBPN-2	—	#10-32	1-1/2	3	33/64	.025	.093	
CL-30-SBPN-3	—		2	5				YELLOW
CL-40-SBPN-1	CL-40-DBPN-1-LL		2	4				PLAIN
CL-40-SBPN-2	CL-40-DBPN-2-LL	1/4-20	3	7	17/32	.035	.125	BLACK
CL-40-SBPN-3	CL-40-DBPN-3-LL		4	12				YELLOW
CL-50-SBPN-1	CL-50-DBPN-1-LL		2	4-1/2				PLAIN
CL-50-SBPN-2	CL-50-DBPN-2-LL	5/16-18	4	9	37/64	.040	.156	BLACK
CL-50-SBPN-3	CL-50-DBPN-3-LL		6	17				YELLOW
CL-60-SBPN-1	CL-60-DBPN-1-LL		2-1/2	5				PLAIN
CL-60-SBPN-2	CL-60-DBPN-2-LL	3/8-16	5	10	5/8	.048	.187	BLACK
CL-60-SBPN-3	CL-60-DBPN-3-LL		6	21				YELLOW
CL-70-SBPN-1	—		3	6				PLAIN
CL-70-SBPN-2	—	1/2-13	6	12	3/4	.072	.281	BLACK
CL-70-SBPN-3	—		6	30				YELLOW
CL-80-SBPN-1	—		4-1/2	9				PLAIN
CL-80-SBPN-2	—	5/8-11	9	18	63/64	.096	.375	BLACK
CL-80-SBPN-3	—		7	50				YELLOW

## DELRIN® BALL (METRIC)

CLM-3-SBPN-1	—	M3	.12	.5	.19	.020	.062	PLAIN
CLM-4-SBPN-1	—	M4	.9	2.2	.34	.024	.094	PLAIN
CLM-5-SBPN-2	—		.5	1.5				PLAIN
CLM-5-SBPN-1	—	M5	1.5	2.9	.51	.024	.094	GREEN
CLM-5-SBPN-3	—		2	4.9				YELLOW
CLM-6-SBPN-2	—		2	4				PLAIN
CLM-6-SBPN-1	—	M6	2.9	7	.53	.035	.125	GREEN
CLM-6-SBPN-3	—		4	12				YELLOW
CLM-8-SBPN-2	—		2.2	4.4				PLAIN
CLM-8-SBPN-1	—	M8	3.9	9	.58	.039	.156	GREEN
CLM-8-SBPN-3	—		6	17				YELLOW
CLM-10-SBPN-2	—		2.5	5				PLAIN
CLM-10-SBPN-1	—	M10	5	10	.63	.047	.187	GREEN
CLM-10-SBPN-3	—		6	21				YELLOW
CLM-12-SBPN-2	—		3	6				PLAIN
CLM-12-SBPN-1	—	M12	6	12	.75	.079	.281	GREEN
CLM-12-SBPN-3	—		6	30				YELLOW
CLM-16-SBPN-2	—		4.5	9				PLAIN
CLM-16-SBPN-1	—	M16	9	18	.98	.098	.375	GREEN
CLM-16-SBPN-3	—		7	50				YELLOW

# PRESS-FIT BALL PLUNGERS

STEEL – BODY: 12L14 STEEL, BLACK OXIDE FINISH. BALL: 440C STAINLESS (OR DELRIN®). SPRING: MUSIC WIRE  
 STAINLESS STEEL – BODY: 300-SERIES STAINLESS. BALL: 440C STAINLESS (OR DELRIN®). SPRING: 302 STAINLESS



4

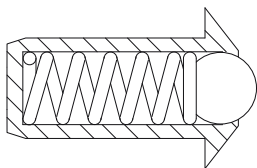
Simple, economical ball plunger ideal for installation in softer materials, such as aluminum, wood or plastic. Sturdy shoulder provides a fixed seating position and positively resists detent force (installation hole can be counterbored to recess the shoulder). Use when a threaded hole would be impractical and/or adjustment is not required. Available in steel or stainless steel. Choice of six sizes, each in light or heavy force, with a stainless steel or Delrin® ball. Note: Catalog photos are actual size.

## STANDARD BALL, LIGHT FORCE

PART NO.		A DIA	END FORCE (LBS)		B	C	D DIA	E DIA	F
STEEL	STAINLESS		INITIAL	FINAL					
CL-2-PBP-1	CL-2-PBPS-1	.125	.5	1	.252	.035	.093	.187	.032
CL-3-PBP-1	CL-3-PBPS-1	.188	1	2.5	.405	.058	.156	.250	.035
CL-4-PBP-1	CL-4-PBPS-1	.250	1.5	3.5	.481	.070	.188	.312	.044
CL-5-PBP-1	CL-5-PBPS-1	.312	2	5	.643	.090	.250	.375	.045
CL-6-PBP-1	CL-6-PBPS-1	.375	2.5	7	.785	.110	.312	.500	.078
CL-8-PBP-1	CL-8-PBPS-1	.500	4	9	1.130	.161	.438	.688	.088

## STANDARD BALL, HEAVY FORCE

PART NO.		A DIA	END FORCE (LBS)		B	C	D DIA	E DIA	F
STEEL	STAINLESS		INITIAL	FINAL					
CL-2-PBP-2	CL-2-PBPS-2	.125	.75	2.5	.252	.035	.093	.187	.032
CL-3-PBP-2	CL-3-PBPS-2	.188	2	5	.405	.058	.156	.250	.035
CL-4-PBP-2	CL-4-PBPS-2	.250	3	7	.481	.070	.188	.312	.044
CL-5-PBP-2	CL-5-PBPS-2	.312	4	10	.643	.090	.250	.375	.045
CL-6-PBP-2	CL-6-PBPS-2	.375	5	14	.785	.110	.312	.500	.078
CL-8-PBP-2	CL-8-PBPS-2	.500	8	18	1.130	.161	.438	.688	.088

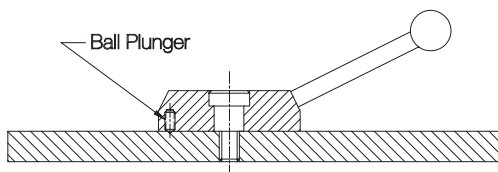


## DELRIN® BALL, LIGHT FORCE

PART NO.		A DIA	END FORCE (LBS)		B	C	D DIA	E DIA	F
STEEL	STAINLESS		INITIAL	FINAL					
CL-2-PBPN-1	CL-2-PBPSN-1	.125	.5	1	.252	.035	.093	.187	.032
CL-3-PBPN-1	CL-3-PBPSN-1	.188	1	2.5	.405	.058	.156	.250	.035
CL-4-PBPN-1	CL-4-PBPSN-1	.250	1.5	3.5	.481	.070	.188	.312	.044
CL-5-PBPN-1	CL-5-PBPSN-1	.312	2	5	.643	.090	.250	.375	.045
CL-6-PBPN-1	CL-6-PBPSN-1	.375	2.5	7	.785	.110	.312	.500	.078
CL-8-PBPN-1	CL-8-PBPSN-1	.500	4	9	1.130	.161	.438	.688	.088

## DELRIN® BALL, HEAVY FORCE

PART NO.		A DIA	END FORCE (LBS)		B	C	D DIA	E DIA	F
STEEL	STAINLESS		INITIAL	FINAL					
CL-2-PBPN-2	CL-2-PBPSN-2	.125	.75	2.5	.252	.035	.093	.187	.032
CL-3-PBPN-2	CL-3-PBPSN-2	.188	2	5	.405	.058	.156	.250	.035
CL-4-PBPN-2	CL-4-PBPSN-2	.250	3	7	.481	.070	.188	.312	.044
CL-5-PBPN-2	CL-5-PBPSN-2	.312	4	10	.643	.090	.250	.375	.045
CL-6-PBPN-2	CL-6-PBPSN-2	.375	5	14	.785	.110	.312	.500	.078
CL-8-PBPN-2	CL-8-PBPSN-2	.500	8	18	1.130	.161	.438	.688	.088

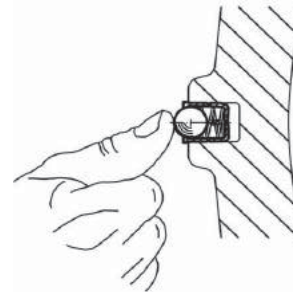


# SELF-RETAINING BALL PLUNGERS

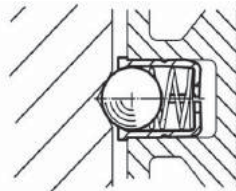
BODY: BLACK THERMOPLASTIC (POM)  
 BALL: STAINLESS STEEL, HARDENED  
 SPRING: STAINLESS STEEL



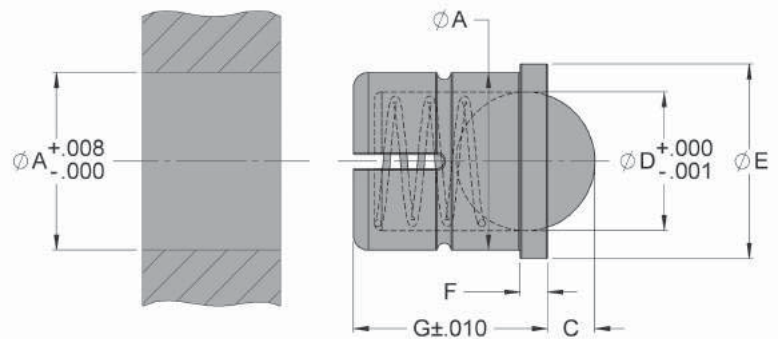
Due to their self-retaining design, these press-fit ball plungers can be securely installed in an ordinary drilled hole. The slotted end of the thermoplastic body expands to compensate for hole tolerances up to .008" oversize. Sturdy shoulder provides a fixed seating position and positively resists detent force. Installation hole can be counterbored to recess the shoulder. Note: catalog photos are actual size.



Self-Retaining Ball Plungers can often be installed by hand, due to the body's flexible design.



These plungers can be installed in a plain hole, with the shoulder exposed, or slightly counterbored for flush installation.

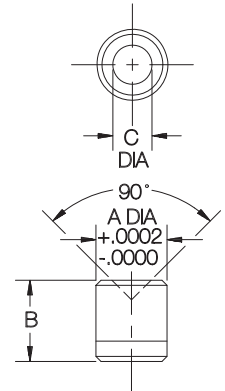
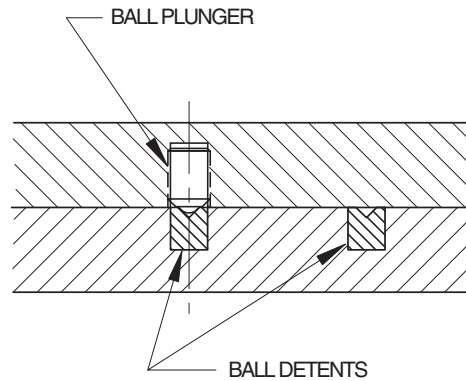


## INCH

PART NO.	A DIA	END FORCE (LBS)		C	D DIA	E DIA	F	G
		INITIAL	FINAL					
CL-3-SRBP-1	.188	1.3	2.1	.031	.157	.220	.039	.236
CL-4-SRBP-1	.250	1.4	2.8	.039	.197	.276	.039	.276
CL-6-SRBP-1	.375	2.7	5.0	.063	.315	.433	.059	.531
CL-8-SRBP-1	.500	3.1	5.6	.078	.394	.551	.059	.630

# BALL DETENTS

440C STAINLESS STEEL, HEAT TREATED

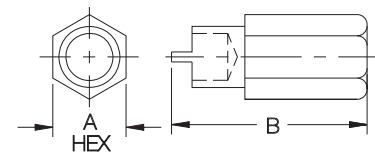
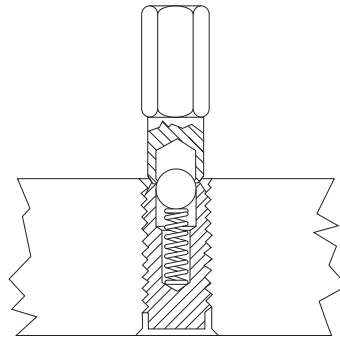


Press-in receptacle that provides a perfect mating hole for a Ball Plunger. Hole has a 90° point for smooth detent action and reliable retention. These hardened Ball Detents resist side loads to prevent wear to the parent material. Available in sizes to fit all Ball Plungers, from #4-48 to 5/8-11 (M4 to M12 in metric).

PART NO.	FOR BALL PLUNGER	A DIA	B	C DIA
CL-1-BD	#4-48, #5-40, M3	.1075	1/8	.056
CL-2-BD	#6-40	.1175	1/8	.061
CL-3-BD	#8-32, #8-36, #10-32, M4, M5	.1614	3/16	.082
CL-4-BD	1/4-20, M6	.2034	1/4	.111
CL-5-BD	5/16-18, M8	.2659	5/16	.139
CL-6-BD	3/8-16, M10	.3284	3/8	.164
CL-8-BD	1/2-13, M12	.4378	1/2	.241
CL-10-BD	5/8-11, M16	.5472	5/8	.330

# PLUNGER WRENCHES

STEEL

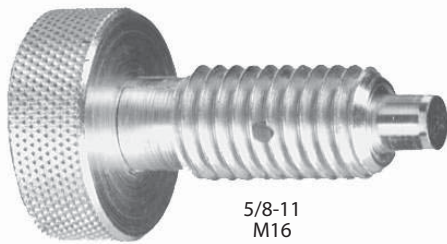


Handy tool to speed up installation of Ball Plungers or Spring Plungers. Much better than using a screwdriver on the ball/nose end, because the clearance hole in the center prevents over-compressing the plunger's internal spring. Available in sizes to fit all Ball Plungers and Spring Plungers, from #4-48 to 1"-8 (M4 to M12 in metric).

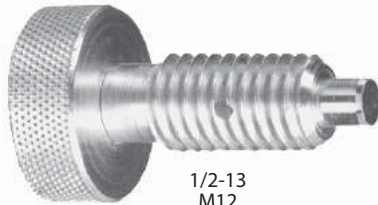
PART NO.	FITS THESE PLUNGER SIZES	A	B
CL-2-SPW	#4-48, #5-40, #6-32, #6-40	1/4	7/8
CL-4-SPW	#8-32, #8-36, M4	1/4	7/8
CL-6-SPW	#10-32, M5	1/4	7/8
CL-8-SPW	1/4-20, 1/4-28, M6	1/4	1
CL-10-SPW	5/16-18, M8	3/8	1
CL-12-SPW	3/8-16, M10	3/8	1
CL-14-SPW	1/2-13, M12	1/2	1
CL-16-SPW	5/8-11	5/8	1-1/8
CL-18-SPW	3/4-10	3/4	1-1/8
CL-20-SPW	1"-8	7/8	1-3/8

# HAND-RETRACTABLE PLUNGERS

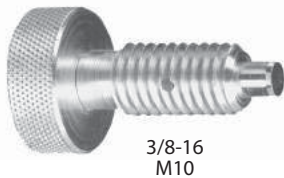
STEEL: 12L14 BODY, 12L14 PLUNGER CARBURIZED-HARDENED (OR DELRIN®, 17-7PH SPRING). ALL STEEL COMPONENTS ZINC PLATED CLEAR CHROMATE. STAINLESS STEEL: 300 SERIES



5/8-11  
M16



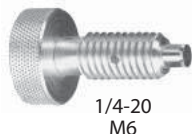
1/2-13  
M12



3/8-16  
M10



5/16-18  
M8

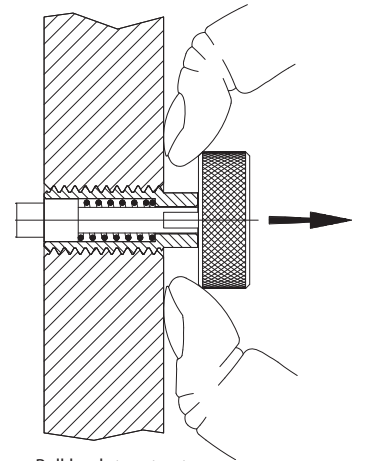


1/4-20  
M6

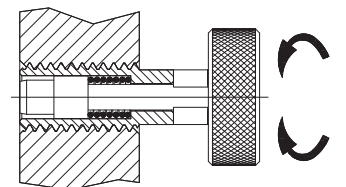


#10-32

Spring-loaded plunger that locks in retracted position. To lock, pull knurled knob back and turn 90°. Standard plunger has a slight taper on plunger tip for easy alignment. Also available with a radiused Delrin® plunger (slightly larger diameter and lighter spring force). Available in steel or stainless steel. Note: Catalog photos are actual size.

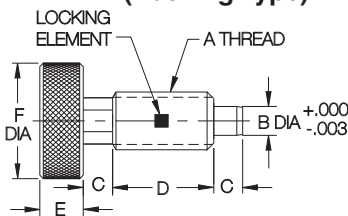


Pull knob to retract...

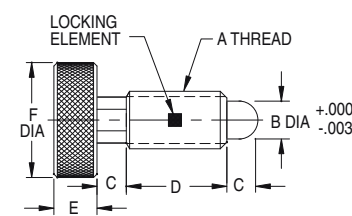


...then turn 90° in either direction to lock.

## Knurled Head (Locking Type)



Standard Plunger



Radiused Delrin® Plunger

## KNURLED HEAD — STEEL (INCH)

PART NO. STANDARD PLUNGER	PART NO. RADIUSED DELRIN PLUNGER	A	STANDARD PLUNGER				RADIUSED DELRIN® PLUNGER				C	D	E	F DIA
			END FORCE (LBS)		B DIA		END FORCE (LBS)		B DIA					
			INITIAL	FINAL	NOMINAL	ACTUAL	INITIAL	FINAL	NOMINAL	ACTUAL				
CL-3-HRP	—	#10-32	1	3.5	7/64	.105	—	—	—	—	3/32	13/32	3/16	3/8
CL-4-HRP	CL-4-HRPN	1/4-20	1	5	1/8	.125	.5	2.5	5/32	.145	1/8	1/2	1/4	1/2
CL-5-HRP	CL-5-HRPN	5/16-18	1.5	6	5/32	.156	.7	3	3/16	.180	3/16	5/8	9/32	5/8
CL-6-HRP	CL-6-HRPN	3/8-16	1.5	8	3/16	.187	.7	4	7/32	.217	7/32	3/4	5/16	3/4
CL-8-HRP	CL-8-HRPN	1/2-13	2.5	10	1/4	.250	1.2	5	5/16	.311	1/4	7/8	3/8	1
CL-10-HRP	CL-10-HRPN	5/8-11	5	10	5/16	.312	3	6	3/8	.374	5/16	1	3/8	1-1/8

## KNURLED HEAD — STAINLESS (INCH)

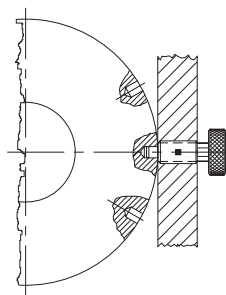
CL-3-HRP-S	—	#10-32	1	3.5	7/64	.105	—	—	—	—	3/32	13/32	3/16	3/8
CL-4-HRP-S	CL-4-HRPN-S	1/4-20	1	5	1/8	.125	.5	2.5	5/32	.145	1/8	1/2	1/4	1/2
CL-5-HRP-S	CL-5-HRPN-S	5/16-18	1.5	6	5/32	.156	.7	3	3/16	.180	3/16	5/8	9/32	5/8
CL-6-HRP-S	CL-6-HRPN-S	3/8-16	1.5	8	3/16	.187	.7	4	7/32	.217	7/32	3/4	5/16	3/4
CL-8-HRP-S	CL-8-HRPN-S	1/2-13	2.5	10	1/4	.250	1.2	5	5/16	.311	1/4	7/8	3/8	1
CL-10-HRP-S	CL-10-HRPN-S	5/8-11	5	10	5/16	.312	3	6	3/8	.374	5/16	1	3/8	1-1/8

## KNURLED HEAD — STEEL (METRIC)

CLM-6-HRP	—	M6	1	5	3mm	.118	—	—	—	—	1/8	1/2	1/4	1/2
CLM-8-HRP	—	M8	1.5	6	4mm	.157	—	—	—	—	3/16	5/8	9/32	5/8
CLM-10-HRP	—	M10	1.5	8	5mm	.197	—	—	—	—	7/32	3/4	5/16	3/4
CLM-12-HRP	—	M12	2.5	10	6mm	.236	—	—	—	—	1/4	7/8	3/8	1
CLM-16-HRP	—	M16	5	10	8mm	.315	—	—	—	—	5/16	1	3/8	1-1/8

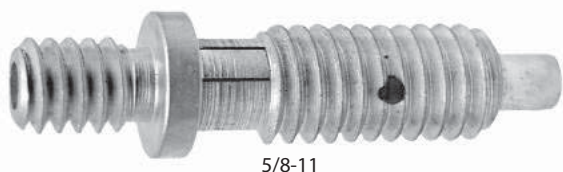
## KNURLED HEAD — STAINLESS (METRIC)

CLM-6-HRP-S	—	M6	1	5	3mm	.118	—	—	—	—	1/8	1/2	1/4	
CLM-8-HRP-S	—	M8	1.5	6	4mm	.157	—	—	—	—	3/16	5/8	9/32	
CLM-10-HRP-S	—	M10	1.5	8	5mm	.197	—	—	—	—	7/32	3/4	5/16	
CLM-12-HRP-S	—	M12	2.5	10	6mm	.236	—	—	—	—	1/4	7/8	3/8	
CLM-16-HRP-S	—	M16	5	10	8mm	.315	—	—	—	—	5/16	1	3/8	



# HAND-RETRACTABLE PLUNGERS

STEEL: 12L14 BODY, 12L14 PLUNGER CARBURIZED-HARDENED, 17-7PH SPRING.  
 ALL STEEL COMPONENTS ZINC PLATED CLEAR CHROMATE.  
 STAINLESS STEEL: 300 SERIES



5/8-11



1/2-13  
M12



3/8-16  
M10



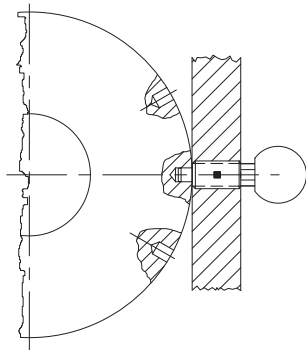
5/16-18  
M8



1/4-20  
M6

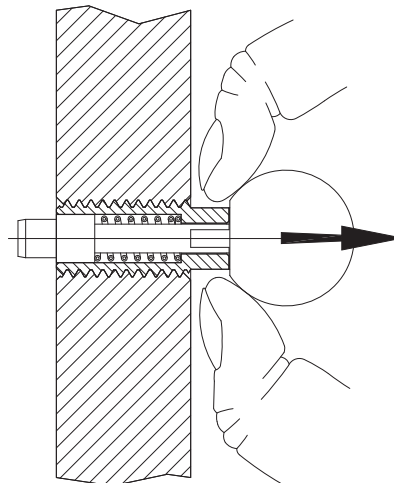
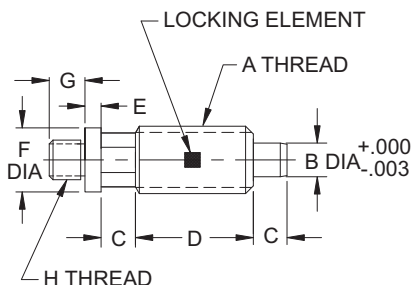


#10-32

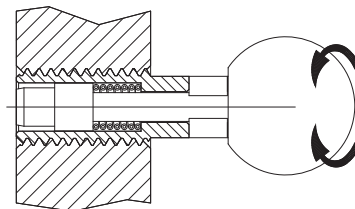


## Threaded Stud for Knob Handle (Locking Type)

Spring-loaded plunger that locks in retracted position. To lock, pull knob back and turn 90°. Slight taper on plunger tip for easy alignment. Available in steel or stainless steel. The threaded-stud version shown here accepts virtually any type of knob handle (**INFO+**: order separately — available in steel, stainless steel, and several different plastics, see pages 131-138). Knob handles can be permanently secured with thread-locking adhesive if desired. Note: Catalog photos are actual size.



Pull knob to retract...



... then turn 90° in either direction to lock.

### THREADED STUD FOR KNOB HANDLE — STEEL (INCH)

PART NO.	A	END FORCE (LBS)		B DIA		C	D	E	F DIA	G	H
		INITIAL	FINAL	NOMINAL	ACTUAL						
CL-3-HRPT	#10-32	1	3	—	.105	3/32	13/32	5/64	5/16	15/64	#10-32
CL-4-HRPT	1/4-20	1	5	1/8	.125	1/8	1/2	3/32	5/16	15/64	#10-32
CL-5-HRPT	5/16-18	1.5	6	5/32	.156	3/16	5/8	3/32	5/16	11/32	1/4-20
CL-6-HRPT	3/8-16	1.5	8	3/16	.187	7/32	3/4	1/8	3/8	13/32	5/16-18
CL-8-HRPT	1/2-13	2.5	10	1/4	.250	1/4	7/8	1/8	1/2	7/16	3/8-16
CL-10-HRPT	5/8-11	5	10	5/16	.312	5/16	1	5/32	5/8	1/2	1/2-13

### THREADED STUD FOR KNOB HANDLE — STAINLESS (INCH)

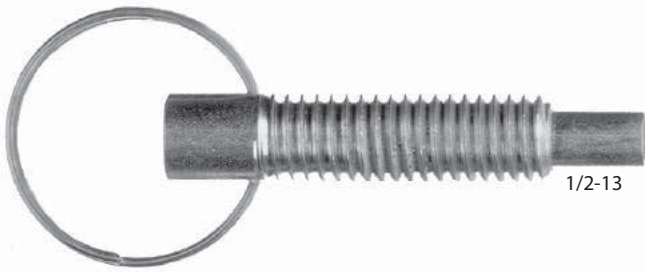
PART NO.	A	END FORCE (LBS)	B DIA	C	D	E	F DIA	G	H		
CL-3-HRPT-S	#10-32	1	3.5	7/64	.105	3/32	13/32	5/64	5/16	15/64	#10-32
CL-4-HRPT-S	1/4-20	1	5	1/8	.125	1/8	1/2	3/32	5/16	15/64	#10-32
CL-5-HRPT-S	5/16-18	1.5	6	5/32	.156	3/16	5/8	3/32	5/16	11/32	1/4-20
CL-6-HRPT-S	3/8-16	1.5	8	3/16	.187	7/32	3/4	1/8	3/8	13/32	5/16-18
CL-8-HRPT-S	1/2-13	2.5	10	1/4	.250	1/4	7/8	1/8	1/2	7/16	3/8-16
CL-10-HRPT-S	5/8-11	5	10	5/16	.312	5/16	1	5/32	5/8	1/2	1/2-13

### THREADED STUD FOR KNOB HANDLE — STEEL (METRIC)

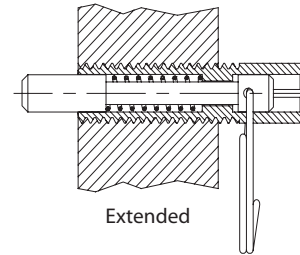
PART NO.	A	END FORCE (LBS)	B DIA	C	D	E	F DIA	G	H		
CLM-6-HRPT	M6	1	5	3mm	.1181	1/8	1/2	3/32	5/16	15/64	#10-32
CLM-8-HRPT	M8	1.5	6	4mm	.1575	3/16	5/8	3/32	5/16	11/32	1/4-20
CLM-10-HRPT	M10	1.5	8	5mm	.1969	7/32	3/4	1/8	3/8	13/32	5/16-18
CLM-12-HRPT	M12	2.5	10	6mm	.2362	1/4	7/8	1/8	1/2	7/16	3/8-16

# HAND-RETRACTABLE PLUNGERS

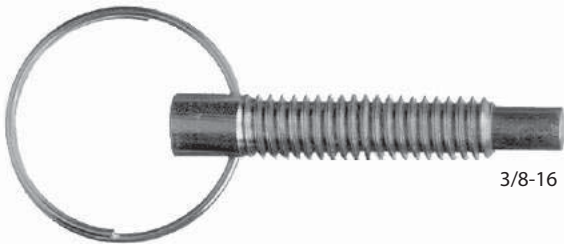
STEEL: 12L14 BODY, 12L14 PLUNGER CARBURIZED-HARDENED, 17-7PH SPRING  
 ALL STEEL COMPONENTS ZINC PLATED CLEAR CHROMATE  
 STAINLESS STEEL: 300 SERIES



1/2-13

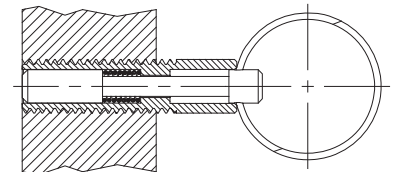


Extended



3/8-16

Spring-loaded plunger that can be withdrawn completely into the body and locked in retracted position. Comfortable pull ring allows quick actuation, yet stays out of the way when not in use. Note: Catalog photos are actual size.

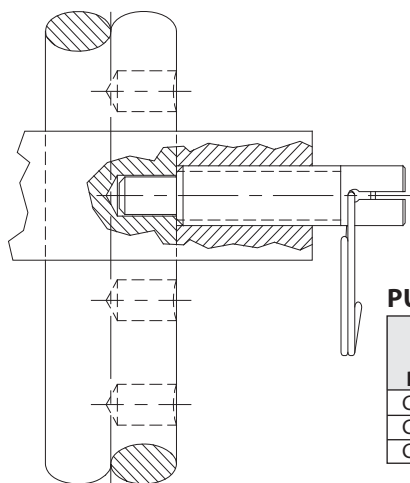
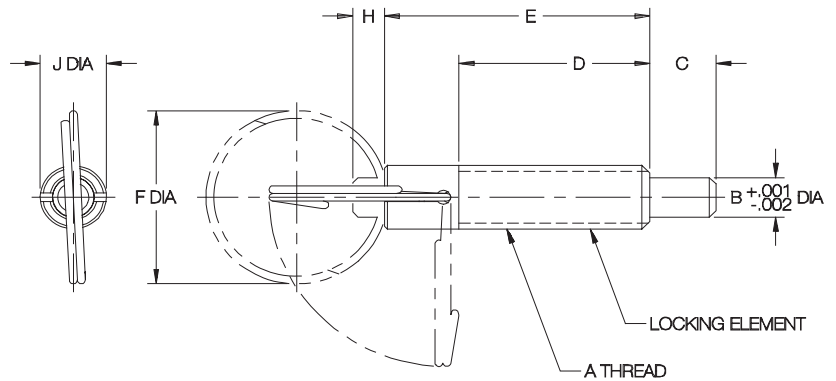


Retracted

**Pull Ring  
(Locking Type)**



1/4-20



**PULL RING, LOCKING TYPE — STEEL (INCH)**

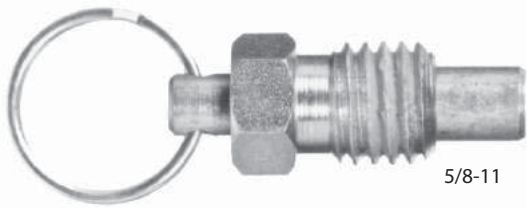
PART NO.	A	END FORCE (LBS)		B DIA	C	D	E	F DIA	H	J DIA
		INITIAL	FINAL							
CL-4-PHRP	1/4-20	1	2.5	.156	1/4	13/16	1-1/8	1	7/64	1/4
CL-6-PHRP	3/8-16	2	4	.250	3/8	1-1/4	1-11/16	1-1/4	3/16	3/8
CL-8-PHRP	1/2-13	2.5	5	.312	1/2	1-7/16	2	1-3/8	1/4	1/2

**PULL RING, LOCKING TYPE — STAINLESS STEEL (INCH)**

PART NO.	A	END FORCE (LBS)		B DIA	C	D	E	F DIA	H	J DIA
		INITIAL	FINAL							
CL-4-PHRP-S	1/4-20	1	2.5	.156	1/4	13/16	1-1/8	1	7/64	1/4
CL-6-PHRP-S	3/8-16	2	4	.250	3/8	1-1/4	1-11/16	1-1/4	3/16	3/8
CL-8-PHRP-S	1/2-13	2.5	5	.312	1/2	1-7/16	2	1-3/8	1/4	1/2

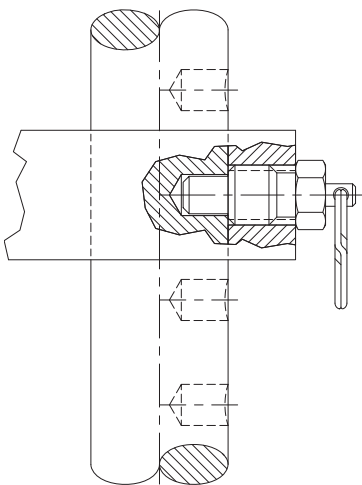
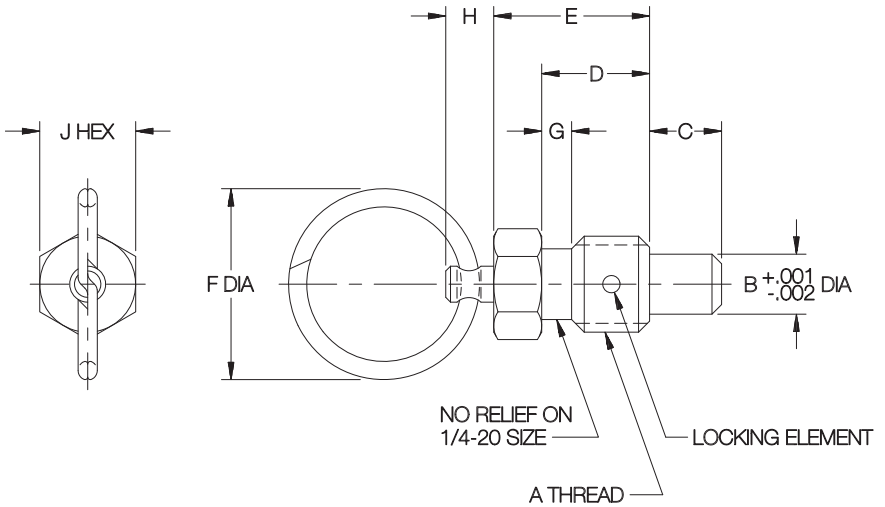
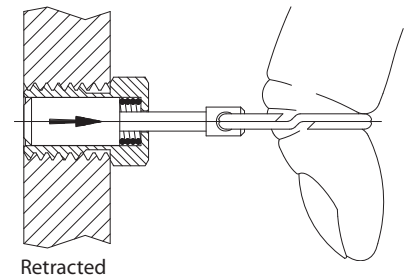
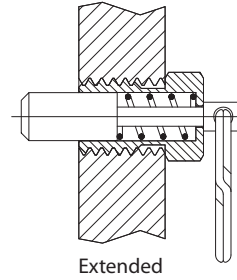
# HAND-RETRACTABLE PLUNGERS

STEEL: 12L14 BODY, 12L14 PLUNGER CARBURIZED-HARDENED, 17-7PH SPRING  
 ALL STEEL COMPONENTS ZINC PLATED CLEAR CHROMATE  
 STAINLESS STEEL: 300 SERIES



Extremely compact spring-loaded plunger that extends unless manually held in retracted position. Comfortable pull ring allows quick actuation, yet stays out of the way when not in use. Note: Catalog photos are actual size.

## Pull Ring (Non-Locking Type)



### PULL RING, NON-LOCKING TYPE — STEEL (INCH)

PART NO.	A	END FORCE (LBS)		B DIA	C	D	E	F DIA	G	H	J
		INITIAL	FINAL								
CL-4-RHRP	1/4-20	.5	2	.156	3/16	9/32	7/16	3/4	1/32	5/32	1/4
CL-6-RHRP	3/8-16	.75	3	.250	9/32	7/16	5/8		1/8	3/16	3/8
CL-8-RHRP	1/2-13	1	4	.312	3/8	9/16	13/16	1	5/32	1/4	1/2
CL-10-RHRP	5/8-11	1.25	5	.375	7/16	11/16	1			5/16	5/8

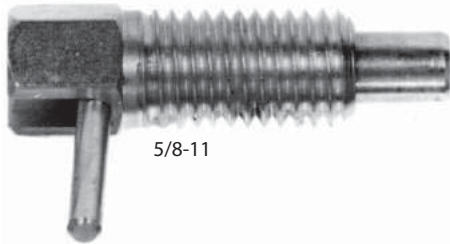
### PULL RING, NON-LOCKING TYPE — STAINLESS STEEL (INCH)

PART NO.	A	END FORCE (LBS)		B DIA	C	D	E	F DIA	G	H	J
		INITIAL	FINAL								
CL-4-RHRP-S	1/4-20	.5	2	.156	3/16	9/32	7/16	3/4	1/32	5/32	1/4
CL-6-RHRP-S	3/8-16	.75	3	.250	9/32	7/16	5/8		1/8	3/16	3/8
CL-8-RHRP-S	1/2-13	1	4	.312	3/8	9/16	13/16	1	5/32	1/4	1/2
CL-10-RHRP-S	5/8-11	1.25	5	.375	7/16	11/16	1			5/16	5/8

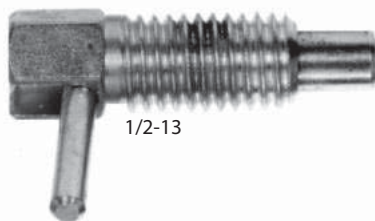


# HAND-RETRACTABLE PLUNGERS

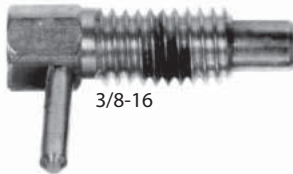
STEEL: 12L14 BODY, 12L14 PLUNGER CARBURIZED-HARDENED, 17-7PH SPRING  
 ALL STEEL COMPONENTS ZINC PLATED CLEAR CHROMATE  
 STAINLESS STEEL: 300 SERIES



5/8-11



1/2-13



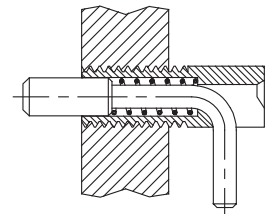
3/8-16



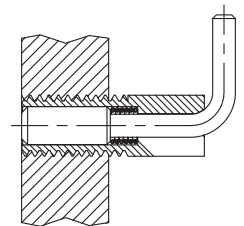
1/4-20

Spring-loaded plunger that locks in retracted position. Convenient L handle for quick retraction and locking. Note: Catalog photos are actual size.

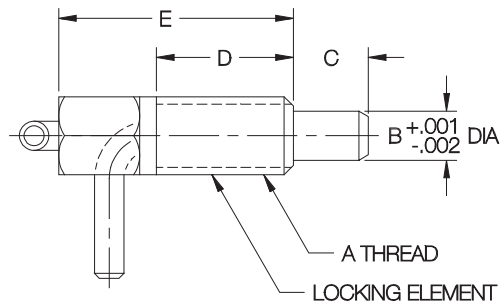
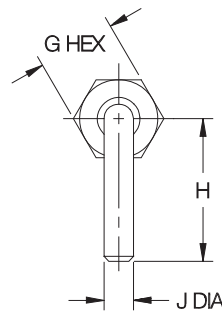
## L Handle Short Stroke (Locking Type)



Extended Position



Retracted Position



### L HANDLE, SHORT STROKE — STEEL (INCH)

PART NO.	A	END FORCE (LBS)		B DIA	C	D	E	G	H	J DIA
		INITIAL	FINAL							
CL-40-LHRP	1/4-20	.12	.5	.156	3/16	7/16	3/4	1/4	9/16	3/32
CL-60-LHRP	3/8-16	.25	1.25	.250	5/16	5/8	1-1/8	3/8	3/4	9/64
CL-80-LHRP	1/2-13	.5	2	.312	13/32	7/8	1-1/2	1/2	1	3/16
CL-100-LHRP	5/8-11	.75	2.5	.375	1/2	1-1/8	1-7/8	5/8	1-3/16	

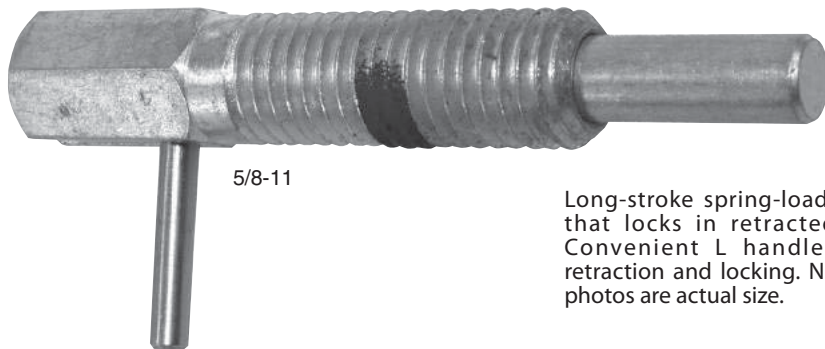
### L HANDLE, SHORT STROKE — STAINLESS STEEL (INCH)

PART NO.	A	END FORCE (LBS)		B DIA	C	D	E	G	H	J DIA
		INITIAL	FINAL							
CL-40-LHRP-S	1/4-20	.12	.5	.156	3/16	7/16	3/4	1/4	9/16	3/32
CL-60-LHRP-S	3/8-16	.25	1.25	.250	5/16	5/8	1-1/8	3/8	3/4	9/64
CL-80-LHRP-S	1/2-13	.5	2	.312	13/32	7/8	1-1/2	1/2	1	3/16
CL-100-LHRP-S	5/8-11	.75	2.5	.375	1/2	1-1/8	1-7/8	5/8	1-3/16	

# HAND-RETRACTABLE PLUNGERS

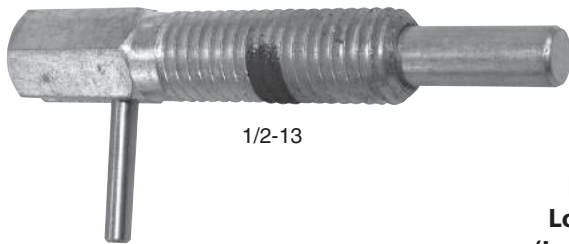
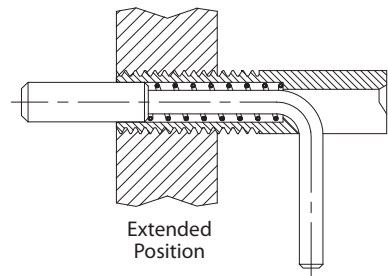
STEEL: 12L14 BODY, 12L14 PLUNGER CARBURIZED-HARDENED, 17-7PH SPRING  
 ALL STEEL COMPONENTS ZINC PLATED CLEAR CHROMATE  
 STAINLESS STEEL: 300 SERIES

4



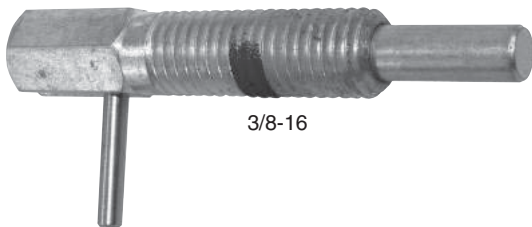
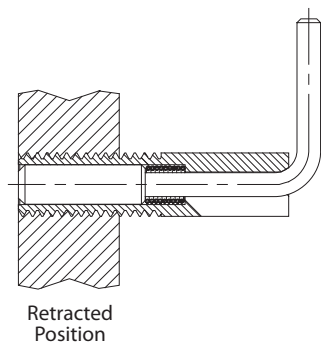
5/8-11

Long-stroke spring-loaded plunger that locks in retracted position. Convenient L handle for quick retraction and locking. Note: Catalog photos are actual size.

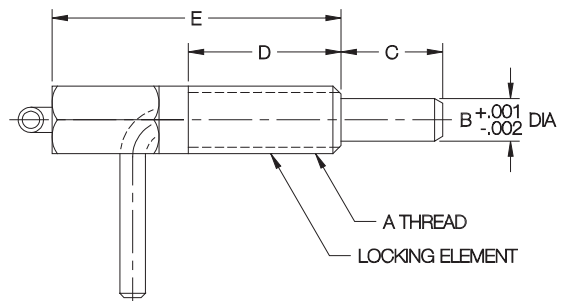
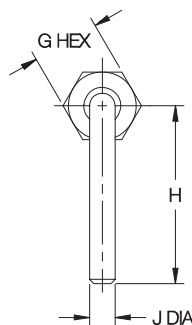


1/2-13

**L Handle  
 Long Stroke  
 (Locking Type)**



3/8-16



1/4-20

## L HANDLE, LONG STROKE — STEEL (INCH)

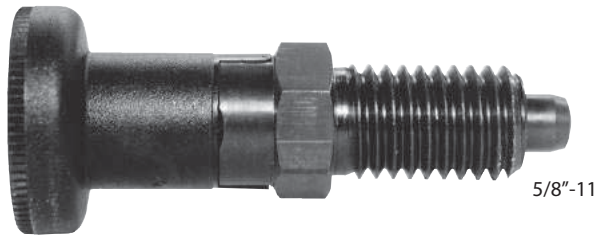
PART NO.	A	END FORCE (LBS)		B DIA	C	D	E	G	H	J DIA
		INITIAL	FINAL							
CL-4-LHRP	1/4-20	.5	2.5	.156	3/8	5/8	1-1/4	1/4	5/8	3/32
CL-6-LHRP	3/8-16	.75	3.75	.250	9/16	1-1/16	2	3/8	15/16	9/64
CL-8-LHRP	1/2-13	1	5	.312	3/4	1-1/8	2-1/8	1/2	1-1/4	3/16
CL-10-LHRP	5/8-11			.375	1	1-3/4	3	5/8	1-5/16	

## L HANDLE, LONG STROKE — STAINLESS (INCH)

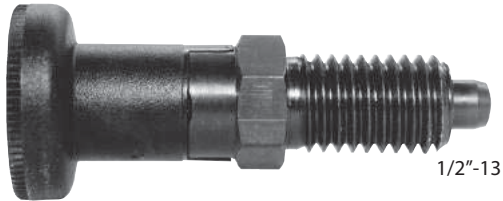
CL-4-LHRP-S	1/4-20	.5	2.5	.156	3/8	5/8	1-1/4	1/4	5/8	3/32
CL-6-LHRP-S	3/8-16	.75	3.75	.250	9/16	1-1/16	2	3/8	15/16	9/64
CL-8-LHRP-S	1/2-13	1	5	.312	3/4	1-1/8	2-1/8	1/2	1-1/4	3/16
CL-10-LHRP-S	5/8-11			.375	1	1-3/4	3	5/8	1-5/16	

# HAND-RETRACTABLE PLUNGERS

KNOB: MATTE BLACK FIBER-REINFORCED NYLON THERMOPLASTIC  
 PLUNGER: STEEL, HEAT TREATED.  
 BODY: STEEL, BLACK OXIDE FINISH



5/8"-11

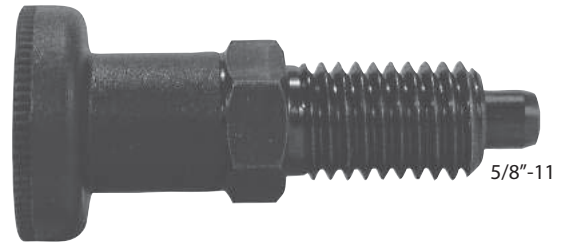


1/2"-13

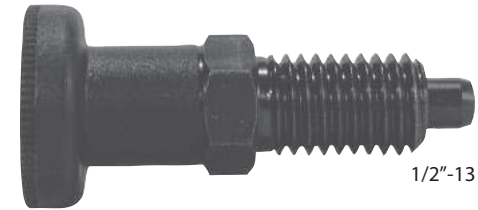


3/8"-24

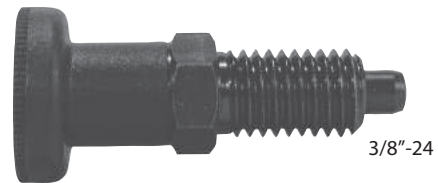
**Knob Handle  
(Locking Type)**



5/8"-11



1/2"-13



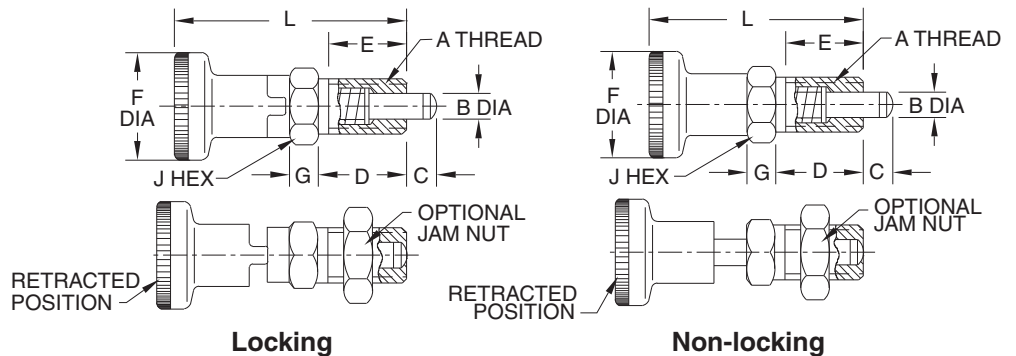
3/8"-24

**Knob Handle  
(Non-Locking Type)**

Precision indexing plunger with a attractive knob handle for convenient retraction. Threaded-body version provides adjustment and can be secured with optional Jam Nut. High strength and durability in an extremely compact assembly (catalog photos are actual size). Hardened and ground plunger tip has a slight taper for easy alignment. Available in two types, locking and non-locking.

Locking type has a spring-loaded plunger that locks in retracted position. To lock, pull knurled knob back and turn 90°. Body is notched at 90° to keep the knob in its retracted position.

Non-locking type has a spring-loaded plunger that stays extended by spring force except when manually held in retracted position.



## LOCKING TYPE (INCH)

PART NO.	A	B DIA		C	D	E	F DIA	G	J	L	END FORCE (LBS)		JAM NUT (OPTIONAL)
		NOMINAL	ACTUAL								INITIAL	FINAL	
CL-6-HRPK-L	3/8-24	5mm	.1961/.1953	.20	.67	.59	.83	.20	12mm	1.73	1.6	3.6	CL-6-FJN
CL-8-HRPK-L	1/2-13	6mm	.2354/.2346	.24	.79	.67	.98	.24	14mm	2.09	1.5	3.4	CL-8-JN
CL-10-HRPK-L	5/8-11	8mm	.3142/.3134	.28	1.02	.91	1.22	.31	19mm	2.62	2.7	7.0	CL-10-JN

## NON-LOCKING TYPE (INCH)

CL-6-HRPK-N	3/8-24	5mm	.1961/.1953	.20	.67	.59	.83	.20	12mm	1.73	1.6	3.6	CL-6-FJN
CL-8-HRPK-N	1/2-13	6mm	.2354/.2346	.24	.79	.67	.98	.24	14mm	2.09	1.5	3.4	CL-8-JN
CL-10-HRPK-N	5/8-11	8mm	.3142/.3134	.28	1.02	.91	1.22	.31	19mm	2.62	2.7	7.0	CL-10-JN

# HAND-RETRACTABLE PLUNGERS

KNOB: MATTE BLACK FIBER-REINFORCED NYLON THERMOPLASTIC  
 PLUNGER: STEEL, HEAT TREATED  
 BODY PLATE: STEEL, ZINC PLATED CLEAR CHROMATE



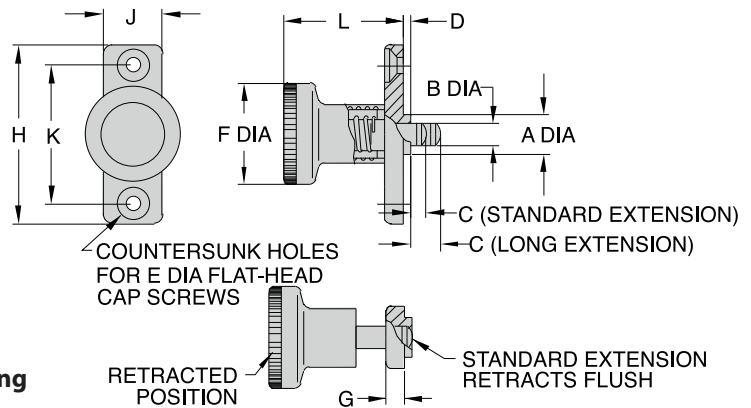
**Knob Handle  
with Mounting Plate  
(Locking Type)**

**Knob Handle  
with Mounting Plate  
(Non-Locking Type)**

Precision indexing plunger with an attractive knob handle for convenient retraction. Mounting-plate version installs in a fixed position with two flat-head screws, and is available with either a short or long plunger extension. High strength and durability in an extremely compact assembly (catalog photos are actual size). Hardened and ground plunger tip has a slight taper for easy alignment. Available in two types, locking and non-locking, each with a choice of short or long plunger extension.

Locking type has a spring-loaded plunger that locks in retracted position. To lock, pull knurled knob back and turn 90°. The body is notched at 90° to keep the knob in its retracted position.

Non-locking type has a spring-loaded plunger that stays extended by spring force except when manually held in retracted position.



**Locking  
and  
Non-Locking**

## LOCKING TYPE

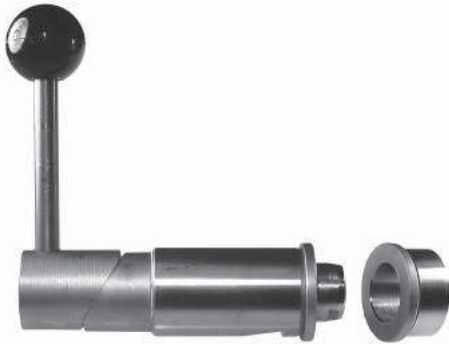
PART NO. STANDARD EXTENSION	PART NO. LONG EXTENSION	A DIA		B DIA		C		D	E DIA	F DIA	G	H	J	K	L	END FORCE (LBS)	
		NOMINAL	ACTUAL	NOMINAL	ACTUAL	STANDARD EXTENSION	LONG EXTENSION									INITIAL	FINAL
CL-8-HRPM-L	CL-8-HRPM-LE	10mm	.393/.390	6mm	.2354/.2346	.24	.55 (24 stroke)	.10	#8 or M4	.98	.18	1.57	.71	1.181	1.12	1.9	4.9
CL-10-HRPM-L	CL-10-HRPM-LE	12mm	.472/.468	8mm	.3142/.3134	.31	.71 (31 stroke)		#10 or M5	1.22	.22	1.81	.79	1.339	1.32	3.5	6.3

## NON-LOCKING TYPE

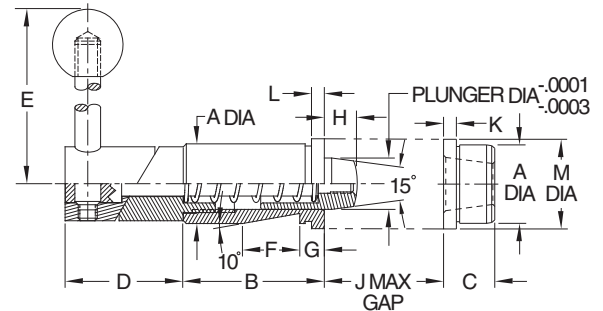
CL-8-HRPM-N	CL-8-HRPM-NE	10mm	.393/.390	6mm	.2354/.2346	.24	.55 (24 stroke)	.10	#8 or M4	.98	.18	1.57	.71	1.181	1.12	1.9	4.9
CL-10-HRPM-N	CL-10-HRPM-NE	12mm	.472/.468	8mm	.3142/.3134	.31	.71 (31 stroke)		#10 or M5	1.22	.22	1.81	.79	1.339	1.32	3.5	6.3

# INDEX PLUNGERS

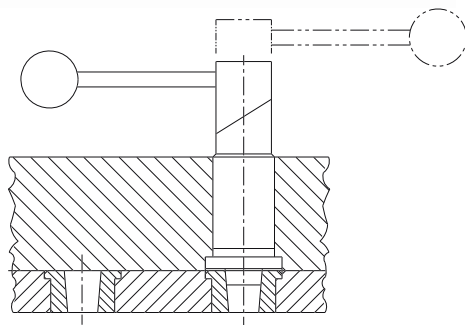
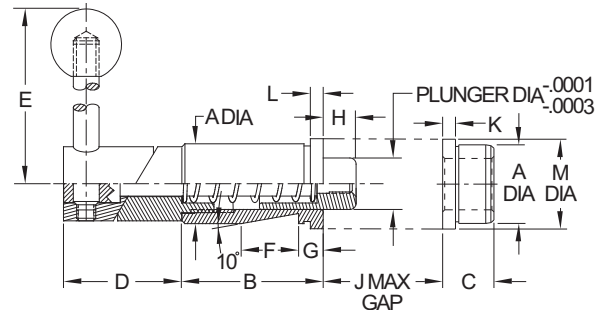
PLUNGER, BODY, CAM, AND BUSHING: 1144 STEEL, HEAT TREATED. CENTER SHAFT: 11L44 STEEL. SPRING: MUSIC WIRE. BALL KNOB: BLACK PHENOLIC PLASTIC WITH MOLDED-IN BRASS INSERT



**Tapered Index Plungers  
Rotary Cam  
Standard Mount**



**Straight Index Plungers  
Rotary Cam  
Standard Mount**



Index Plungers are precision, heavy-duty assemblies with a retractable spring-loaded plunger and a matching locating bushing. Tapered Index Plungers feature a 15° taper on the plunger tip with a mating taper on the bushing. The taper makes alignment easier and also eliminates any binding during retraction. Straight Index Plungers have an entirely cylindrical plunger with a slight radius at the tip, used together with a straight bushing. A straight plunger provides slightly greater positional accuracy. Order plunger and bushing separately.

The rotary-cam version completely retracts when the handle is rotated 180°. Cam surfaces are hardened steel. The standard-mount configuration has a precision ground body with a whistle notch for orientation with a setscrew (also available with a slightly oversize unground body to allow custom grinding to size). Index Plungers are manufactured with precision working tolerances and are designed for very light interference-fit installations to avoid binding of the mechanism. Set screws with nylon tip inserts are recommended. Set screws should firmly contact the whistle notch, but not exert significant force.

## TAPERED INDEX PLUNGERS ROTARY CAM — STANDARD MOUNT (INCH)

PART NO. INDEX PLUNGER	PART NO. BUSHING	PLUNGER DIA	A DIA			B	C	D	E	F	G	H	J	K	L	M DIA	N DIA	P DIA
			NOMINAL	GROUND	UNGROUND													
CL-22018-TIP	CL-22032-TIPB	1/2	3/4	.7518/.7515	—	1-3/8	1/2	1-1/8	3	7/16	5/16	5/16	3/32	1/8	1/8	7/8	—	—
CL-22016-TIP	CL-22030-TIPB			—	.766/.765													
CL-22118-TIP	CL-22132-TIPB	3/4	1-1/8	1.1268/1.1265	—	2	5/8	1-5/8	3-1/2	9/16	3/8	13/32	1/8	1/8	1/8	1-1/4	—	—
CL-22116-TIP	CL-22130-TIPB			—	1.141/1.140													
CL-22218-TIP	CL-22232-TIPB	1	1-1/2	1.5021/1.5018	—	2-1/4	3/4	2-1/8	4-1/2	11/16	7/16	7/16	1/8	1/8	1/8	1-5/8	—	—
CL-22216-TIP	CL-22230-TIPB			—	1.516/1.515													

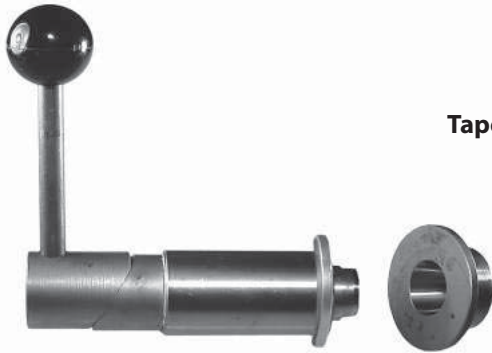
## STRAIGHT INDEX PLUNGERS ROTARY CAM — STANDARD MOUNT (INCH)

CL-22006-SIP	CL-22028-SIPB	1/2	3/4	.7518/.7515	—	1-3/8	1/2	1-1/8	3	7/16	5/16	5/16	3/32	1/8	1/8	7/8	—	—
CL-22004-SIP	CL-22026-SIPB			—	.766/.765													
CL-22106-SIP	CL-22128-SIPB	3/4	1-1/8	1.1268/1.1265	—	2	5/8	1-1/2	3-1/2	9/16	3/8	13/32	1/8	1/8	1/8	1-1/4	—	—
CL-22104-SIP	CL-22126-SIPB			—	1.141/1.140													
CL-22206-SIP	CL-22228-SIPB	1	1-1/2	1.5021/1.5018	—	2-1/4	3/4	1-7/8	4-1/2	11/16	7/16	7/16	1/8	1/8	1/8	1-5/8	—	—
CL-22204-SIP	CL-22226-SIPB			—	1.516/1.515													

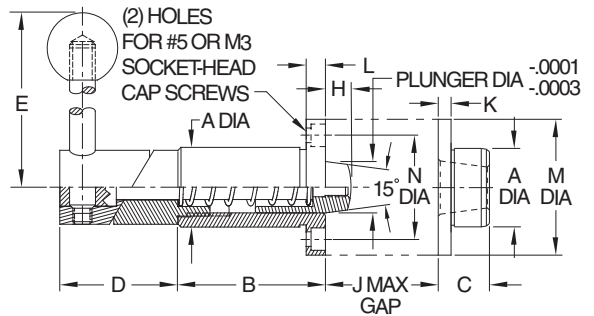
# INDEX PLUNGERS

PLUNGER, BODY, RETAINER, AND CAM: 1144 STEEL, HEAT TREATED. CENTER SHAFT: 11L44 STEEL. SPRING: MUSIC WIRE.  
BALL KNOB: BLACK PHENOLIC PLASTIC WITH MOLDED-IN BRASS INSERT

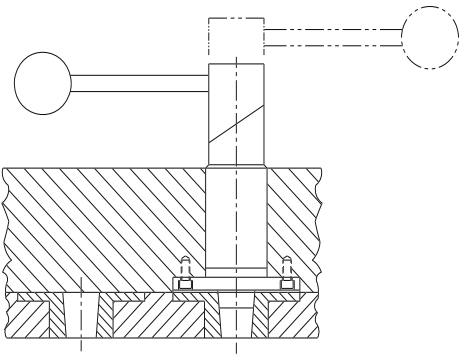
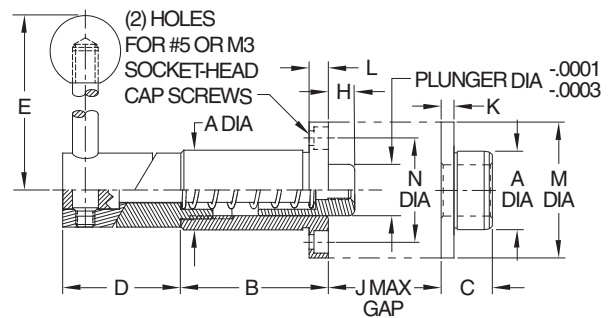
4



**Tapered Index Plungers  
Rotary Cam  
Flange Mount**



**Straight Index Plungers  
Rotary Cam  
Flange Mount**



Index Plungers are precision, heavy-duty assemblies with a retractable spring-loaded plunger and a matching locating bushing. Tapered Index Plungers feature a 15° taper on the plunger tip with a mating taper on the bushing. The taper makes alignment easier and also eliminates any binding during retraction. Straight Index Plungers have an entirely cylindrical plunger with a slight radius at the tip, used together with a straight bushing. A straight plunger provides slightly greater positional accuracy. Order plunger and bushing separately.

The rotary-cam version completely retracts when the handle is rotated 180°. Cam surfaces are hardened steel. The flange-mount configuration shown here has a precision ground body with a flange used for orientation by fastening with two Socket-Head Cap Screws (also available with a slightly oversize unground body to allow custom grinding to size). Flange mounting is designed for installations where a cross hole for a set screw is not practical. Index plungers are manufactured with precision working tolerances and are designed for a very light interference-fit installations to avoid binding of the mechanism.

## TAPERED INDEX PLUNGERS ROTARY CAM — STANDARD MOUNT (INCH)

PART NO. INDEX PLUNGER	PART NO. BUSHING	PLUNGER DIA	A DIA			B	C	D	E	F	G	H	J	K	L	M DIA	N DIA	P DIA
			NOMINAL	GROUND	UNGROUND													
CL-22019-TIP	CL-22033-TIPB	1/2	3/4	.7518/.7515	—	1-3/8	1/2	1-1/8	3	—	—	5/16	3/32	1/8	3/16	1-5/16	1	—
CL-22017-TIP	CL-22031-TIPB			—	.766/.765													
CL-22119-TIP	CL-22133-TIPB	3/4	1-1/8	1.1268/1.1265	—	2	5/8	1-1/2	3-1/2	—	—	13/32	1/8	1/8	3/16	1-11/16	1-3/8	—
CL-22117-TIP	CL-22131-TIPB			—	1.141/1.140													

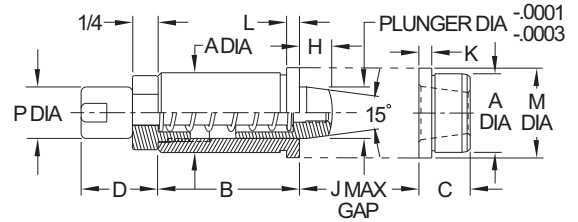
## STRAIGHT INDEX PLUNGERS ROTARY CAM — FLANGE MOUNT (INCH)

CL-22007-SIP	CL-22029-SIPB	1/2	3/4	.7518/.7515	—	1-3/8	1/2	1-1/8	3	—	—	5/16	3/32	1/8	3/16	1-5/16	1	—
CL-22005-SIP	CL-22027-SIPB			—	.766/.765													
CL-22107-SIP	CL-22129-SIPB	3/4	1-1/8	1.1268/1.1265	—	2	5/8	1-1/2	3-1/2	—	—	13/32	1/8	1/8	3/16	1-11/16	1-3/8	—
CL-22105-SIP	CL-22127-SIPB			—	1.141/1.140													

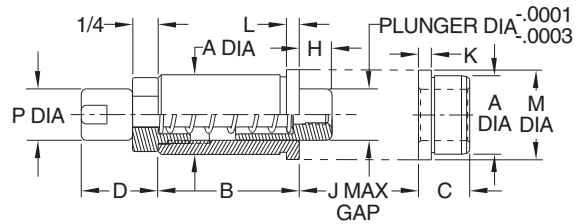
# INDEX PLUNGERS

PLUNGER, BODY, CAM, AND BUSHING: 1144 STEEL, HEAT TREATED. CENTER SHAFT: 11L44 STEEL. SPRING: MUSIC WIRE.

## Tapered Index Plunger Blank Machinable End



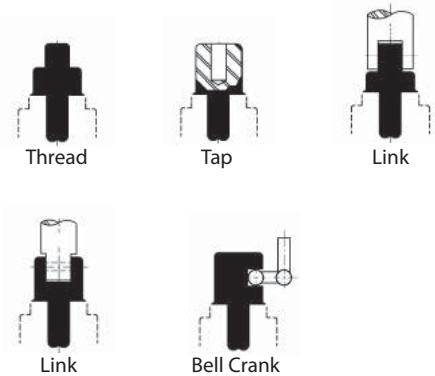
## Straight Index Plunger Blank Machinable End



4

Index Plungers are precision, heavy-duty assemblies with a retractable spring-loaded plunger and a matching locating bushing. Tapered Index Plungers feature a 15° taper on the plunger tip with a mating taper in the bushing. The taper makes alignment easier and also eliminates any binding during retraction. Straight Index Plungers have an entirely cylindrical plunger with a slight radius at the tip, used together with a straight bushing. A straight plunger provides slightly greater positional accuracy. Order plunger and bushing separately.

The version shown on this page has a blank machinable end for easy adaptation to various actuating devices, including automated setups. Precision ground body (also available with a slightly oversize unground body to allow custom grinding to size). Index Plungers are manufactured with precision working tolerances and are designed for a very light interference-fit installations to avoid binding of the mechanism.



### TAPERED INDEX PLUNGERS BLANK MACHINABLE END (INCH)

PART NO. INDEX PLUNGER	PART NO. BUSHING	PLUNGER DIA	A DIA			B	C	D	E	F	G	H	J	K	L	M DIA	N DIA	P DIA
			NOMINAL	GROUND	UNGROUND													
CL-22014-TIP	CL-22032-TIPB	1/2	3/4	.7518/.7515	—	1-3/8	1/2	3/4	—	—	—	5/16	3/32	1/8	1/8	7/8	—	1/2
CL-22012-TIP	CL-22030-TIPB	1/2	3/4	—	.766/.765	1-3/8	1/2	3/4	—	—	—	5/16	3/32	1/8	1/8	7/8	—	1/2
CL-22114-TIP	CL-22132-TIPB	3/4	1-1/8	1.1268/1.1265	—	2	5/8	1	—	—	—	3/8	1/8	1/8	1/8	1-1/4	—	3/4
CL-22112-TIP	CL-22130-TIPB	3/4	1-1/8	—	1.141/1.140	2	5/8	1	—	—	—	3/8	1/8	1/8	1/8	1-1/4	—	3/4
CL-22214-TIP	CL-22232-TIPB	1	1-1/2	1.5021/1.5018	—	2-1/4	3/4	1-1/4	—	—	—	3/8	1/8	1/8	1/8	1-5/8	—	15/16
CL-22212-TIP	CL-22230-TIPB	1	1-1/2	—	1.5021/1.5018	2-1/4	3/4	1-1/4	—	—	—	3/8	1/8	1/8	1/8	1-5/8	—	15/16

### STRAIGHT INDEX PLUNGERS BLANK MACHINABLE END (INCH)

CL-22002-SIP	CL-22028-SIPB	1/2	3/4	.7518/.7515	—	1-3/8	1/2	3/4	—	—	—	5/16	3/32	1/8	1/8	7/8	—	1/2
CL-22102-SIP	CL-22128-SIPB	3/4	1-1/8	1.1268/1.1265	—	2	5/8	1	—	—	—	1/2	1/8	1/8	1/8	1-1/4	—	3/4
CL-22202-SIP	CL-22228-SIPB	1	1-1/2	1.5021/1.5018	—	2-1/4	3/4	1-1/4	—	—	—	5/8	1/8	1/8	1/8	1-5/8	—	15/16

# SPRING STOP BUTTONS

BODY: ALUMINUM ALLOY; SPRING: SPRING STEEL (OR STAINLESS STEEL)  
 PLUNGER: MILD STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH (OR STAINLESS STEEL, OR DELRIN®)



**Large**  
CL-30A-SSB

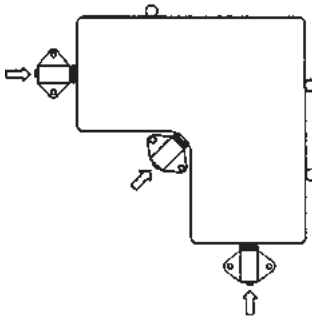


**Medium**  
CL-20A-SSB



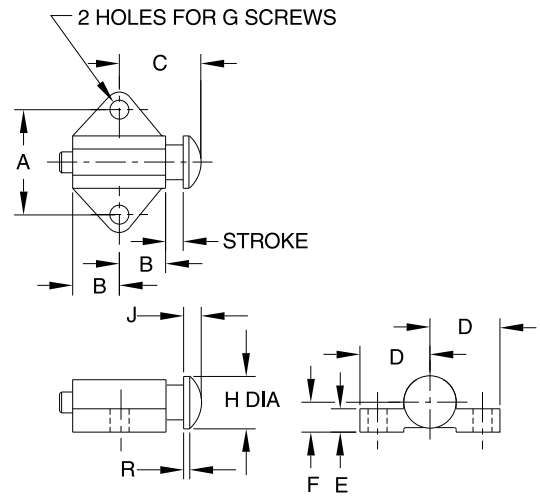
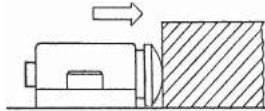
**Small**  
CL-10A-SSB

4



Spring Stop Buttons are ideal for holding a workpiece against its locators until clamps are in place, and for other light clamping jobs. Choice of three sizes in each type. The smallest of the three sizes is optionally available with light spring force. Note: Catalog photos are actual size.

**Type A**  
Spherical Radius



Spring-loaded plunger has a spherical radius to exert contact force at a single point. Choice of steel, stainless steel, or Delrin® plunger.

## TYPE A – SPHERICAL RADIUS (STEEL)

PART NO. STANDARD FORCE	PART NO. LIGHT FORCE	STROKE	STANDARD CONTACT FORCE (LBS)			LIGHT CONTACT FORCE (LBS)			A	B	C	D	E	F	G DIA	H DIA	J	R
			INITIAL	HALFWAY	FINAL	INITIAL	HALFWAY	FINAL										
CL-10A-SSB	CL-10A-SSB-2	1/8	5	10	15	1.5	2	2.5	.656	11/32	19/32	7/16	3/16	7/32	#6-32 or M3.5	3/8	1/8	1/16
CL-20A-SSB	—	3/16	2	14	26	—	—	—	1.125	1/2	7/8	3/4	1/4	5/16	#10-32 or M5	9/16	3/16	1/16
CL-30A-SSB	—	1/4	16	32	48	—	—	—	1.500	11/16	1-7/32	1	1/4	7/16	1/4-20 or M6	13/16	9/32	9/64

## TYPE A – SPHERICAL RADIUS (STAINLESS STEEL)

CL-10A-SSB-S	CL-10A-SSB-2-S	1/8	5	10	15	1.5	2	2.5	.656	11/32	19/32	7/16	3/16	7/32	#6-32 or M3.5	3/8	1/8	1/16
CL-20A-SSB-S	—	3/16	2	14	26	—	—	—	1.125	1/2	7/8	3/4	1/4	5/16	#10-32 or M5	9/16	3/16	1/16
CL-30A-SSB-S	—	1/4	16	32	48	—	—	—	1.500	11/16	1-7/32	1	1/4	7/16	1/4-20 or M6	13/16	9/32	9/64

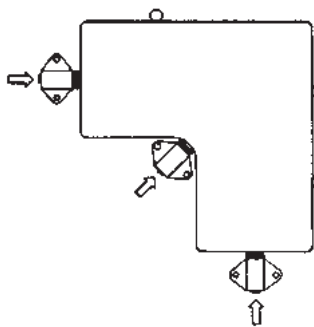
## TYPE A – SPHERICAL RADIUS (DELRIN®)

CL-10A-SSBN	CL-10A-SSBN-2	1/8	5	10	15	1.5	2	2.5	.656	11/32	19/32	7/16	3/16	7/32	#6-32 or M3.5	3/8	1/8	1/16
CL-20A-SSBN	—	3/16	2	14	26	—	—	—	1.125	1/2	7/8	3/4	1/4	5/16	#10-32 or M5	9/16	3/16	1/16
CL-30A-SSBN	—	1/4	16	32	48	—	—	—	1.500	11/16	1-7/32	1	1/4	7/16	1/4-20 or M6	13/16	9/32	9/64



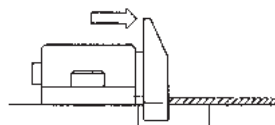
# SPRING STOP BUTTONS

BODY: ALUMINUM ALLOY; SPRING: SPRING STEEL  
 PLUNGER: MILD STEEL, CARBURIZED-HARDENED, ZINC PLATED CLEAR CHROMATE

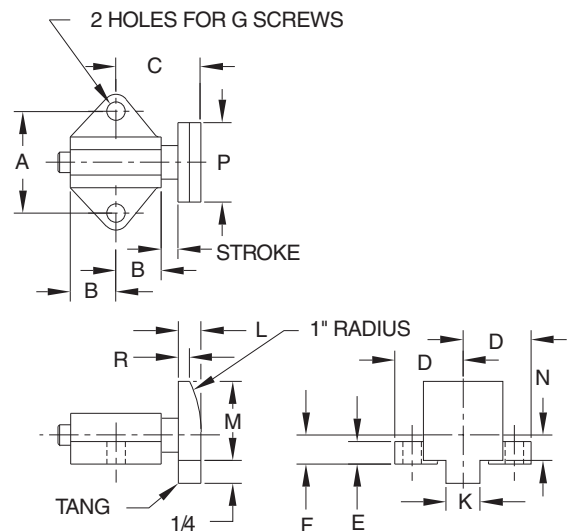


Spring Stop Buttons are ideal for holding a workpiece against its locators until clamps are in place, and for other light clamping jobs. Choice of three sizes in each type. The smallest of the three sizes is optionally available with light spring force. Note: Catalog photos are actual size.

**Type B**  
Flat Face with Tang



Designed for thin workpieces and sheets. Tang prevents sheet from sliding under plunger. Requires machining a slot in the fixture base for the tang. Large bevel on plunger makes loading easier.



## TYPE B – FLAT FACE WITH TANG (STEEL)

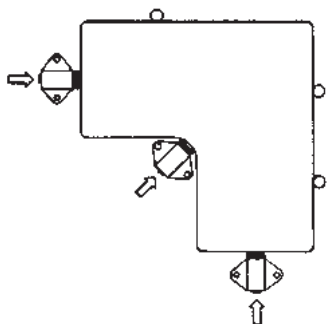
PART NO. STANDARD FORCE	PART NO. LIGHT FORCE	STROKE	STANDARD CONTACT FORCE (LBS)			LIGHT CONTACT FORCE (LBS)			A	B	C	D	E	F	G DIA	K	L	M	N	P	R
			INITIAL	HALFWAY	FINAL	INITIAL	HALFWAY	FINAL													
CL-10B-SSB	CL-10B-SSB-2	1/8	5	10	15	1.5	2	2.5	.656	11/32	21/32	7/16	3/16	7/32	#6-32 or M3.5	1/4	3/16	5/8	3/16	5/8	1/16
CL-20B-SSB	—	3/16	2	14	26	—	—	—	1.125	1/2	15/16	3/4	1/4	5/16	#10-32 or M5	3/8	1/4	7/8	9/32	7/8	3/32
CL-30B-SSB	—	1/4	16	32	48	—	—	—	1.500	11/16	1-5/16	1	1/4	7/16	1/4-20 or M6	1/2	3/8	1-1/4	13/32	1-1/4	3/32

# SPRING STOP BUTTONS

BODY: ALUMINUM ALLOY; SPRING: SPRING STEEL  
 PLUNGER: MILD STEEL, CARBURIZED-HARDENED, ZINC PLATED CLEAR CHROMATE

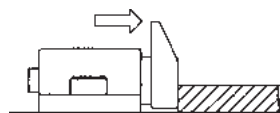


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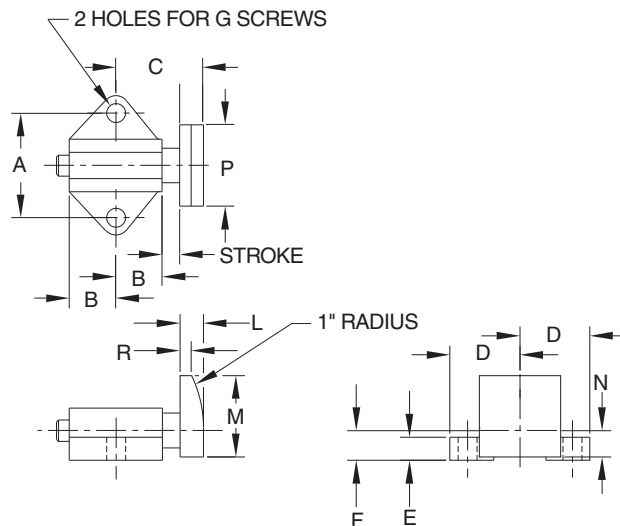


Spring Stop Buttons are ideal for holding a workpiece against its locators until clamps are in place, and for other light clamping jobs. Choice of three sizes in each type. The smallest of the three sizes is optionally available with light spring force. Note: Catalog photos are actual size.

Type C  
Flat Face



Flat contact surface is ideal for short workpieces. Large bevel on plunger makes loading easier.



## TYPE C – FLAT FACE (STEEL)

PART NO. STANDARD FORCE	PART NO. LIGHT FORCE	STROKE	STANDARD CONTACT FORCE (LBS)			LIGHT CONTACT FORCE (LBS)			A	B	C	D	E	F	G DIA	K	L	M	N	P	R
			INITIAL	HALFWAY	FINAL	INITIAL	HALFWAY	FINAL													
CL-10C-SSB	CL-10C-SSB-2	1/8	5	10	15	1.5	2	2.5	.656	11/32	21/32	7/16	3/16	7/32	#6-32 or M3.5	—	3/16	5/8	3/16	5/8	1/16
CL-20C-SSB	—	3/16	2	14	26	—	—	—	1.125	1/2	15/16	3/4	1/4	5/16	#10-32 or M5	—	1/4	7/8	9/32	7/8	3/32
CL-30C-SSB	—	1/4	16	32	48	—	—	—	1.500	11/16	1-5/16	1	1/4	7/16	1/4-20 or M6	—	3/8	1-1/4	13/32	1-1/4	3/32

# SPRING LOCATING PINS

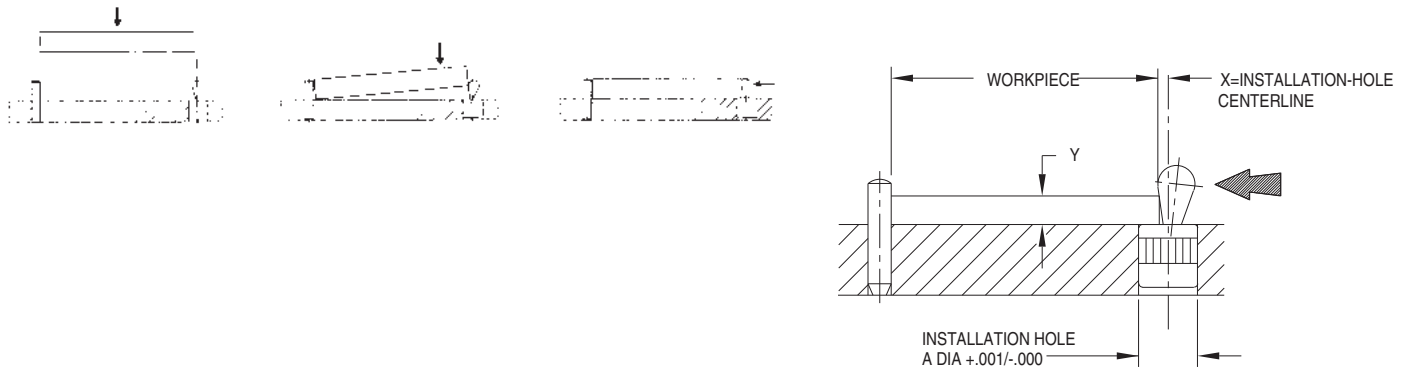
PIN: MILD STEEL, CARBURIZED-HARDENED, ZINC PLATED CLEAR CHROMATE  
 SPRING: MUSIC WIRE. HOUSING: ALUMINUM



**Hardened Steel Pin  
Coil Spring**

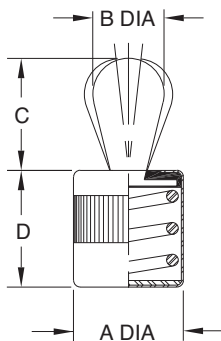
Our patented Spring Locating Pins are an extremely compact way to apply side force to a workpiece. The tapered contact pin is securely anchored in a spring base. Unit installs easily in a drilled hole. Available in five sizes, each in light, medium, or heavy force. Choice of steel, stainless steel, or Delrin® contact pin. **INFO+**: Also available with a tapped receptacle (p. 172) for custom contact pins. Note: Catalog photos are actual size. Our most popular version is shown on this page, with a durable case-hardened steel contact pin and aluminum body containing a coil spring. Protective rubber seal around contact pin keeps out chips and coolant. This type has the most travel, so it allows the most part-size variation.

4



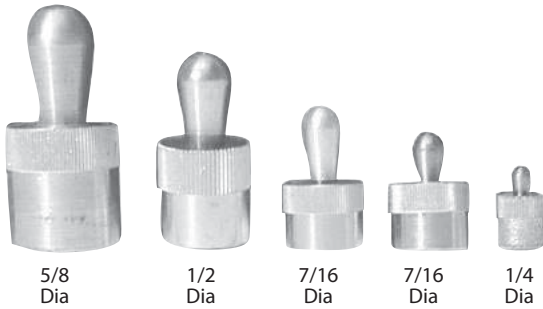
## HARDENED STEEL PIN, COIL SPRING

PART NO.	A DIA	APPROX SIDE FORCE (LBS)	ALLOWABLE WORKPIECE TOLERANCE	B DIA	C	D	X DIMENSION WHEN Y EQUALS						
							1/16	1/8	3/16	1/4	5/16	3/8	7/16 OR MORE
CL-4-SLP-1	1/4	2.2	.020	.118	.158	.268	.022	.024	.024	.024	.024	.024	.024
CL-4-SLP-2		4.5											
CL-4-SLP-3		9											
CL-7-SLP-1	7/16	4.5	.031	.197	.236	.434	—	.055	.055	.055	.055	.055	.055
CL-7-SLP-2		11											
CL-7-SLP-3		22											
CL-7A-SLP-1	7/16	9	.039	.236	.394	.434	—	—	.049	.059	.059	.059	.059
CL-7A-SLP-2		17											
CL-7A-SLP-3		34											
CL-8-SLP-1	1/2	11	.051	.315	.530	.520	—	—	—	.077	.087	.087	.087
CL-8-SLP-2		22											
CL-8-SLP-3		45											
CL-10-SLP-1	5/8	22	.063	.394	.640	.705	—	—	—	—	.098	.107	.110
CL-10-SLP-2		45											
CL-10-SLP-3		67											



# SPRING LOCATING PINS

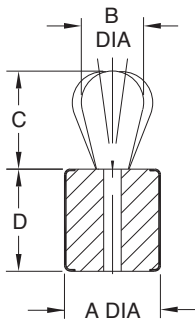
PIN: 300-SERIES STAINLESS STEEL  
 SPRING: SOLID POLYURETHANE. HOUSING: ALUMINUM



**Stainless Steel Pin  
 Solid Polyurethane Spring**

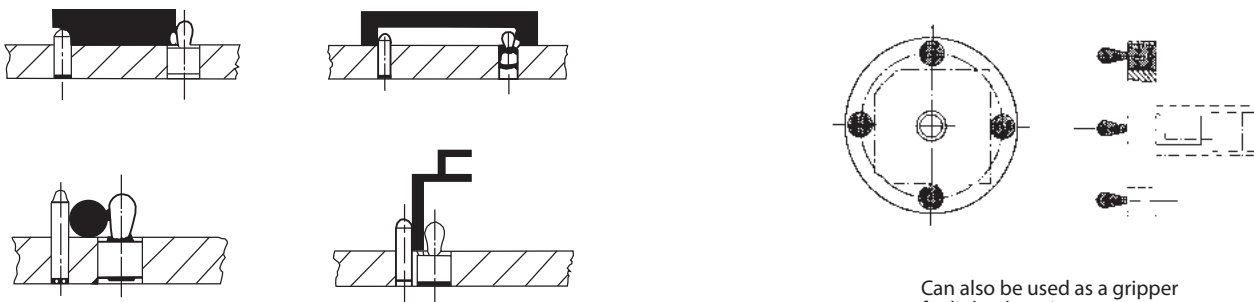
Stainless steel contact pin is ideal for corrosive environments and hygienic applications. Solid polyurethane body is covered by an aluminum shell.

## STAINLESS STEEL PIN, SOLID POLYURETHANE SPRING



PART NO.	A DIA	APPROX SIDE FORCE (LBS)	ALLOWABLE WORKPIECE TOLERANCE	B DIA	C	D	X DIMENSION WHEN 7 EQUALS						
							1/16	1/8	3/16	1/4	5/16	3/8	7/16 OR MORE
CL-4-SLPS-1	1/4	2.2	.008	.118	.158	.008	.022	.024	.024	.024	.024	.024	.024
CL-4-SLPS-2		4.5											
CL-7-SLPS-1	7/16	6.7	.016	.197	.292	.016	—	.055	.055	.055	.055	.055	.055
CL-7-SLPS-2		13											
CL-7-SLPS-3		20											
CL-7A-SLPS-1	7/16	6.7	.016	.236	.473	.016	—	—	.049	.059	.059	.059	.059
CL-7A-SLPS-2		13											
CL-7A-SLPS-3		20											
CL-8-SLPS-1	1/2	11	.024	.315	.512	.024	—	—	—	.077	.087	.087	.087
CL-8-SLPS-2		22											
CL-8-SLPS-3		33											
CL-10-SLPS-1	5/8	22	.031	.394	.640	.658	—	—	—	—	.098	.107	.110
CL-10-SLPS-2		45											
CL-10-SLPS-3		67											

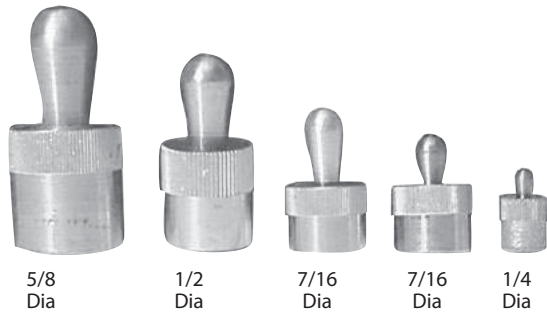
## APPLICATION EXAMPLES



Can also be used as a gripper for light clamping.

# SPRING LOCATING PINS

PIN: DELRIN®  
 SPRING: SOLID POLYURETHANE. HOUSING: ALUMINIUM

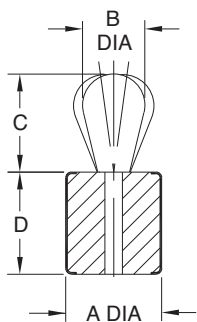


**Delrin® Pin  
 Solid Polyurethane Spring**

Delrin® contact pin avoids marring soft or finished surfaces. Solid polyurethane body is covered by an aluminium shell.

**4**

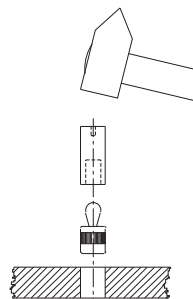
## DELRIN® PIN, SOLID POLYURETHANE SPRING



PART NO.	A DIA	APPROX SIDE FORCE (LBS)	ALLOWABLE WORKPIECE TOLERANCE	B DIA	C	D	X DIMENSION WHEN 7 EQUALS						
							1/16	1/8	3/16	1/4	5/16	3/8	7/16 OR MORE
CL-4-SLPS-1	1/4	2.2	.008	.118	.158	.291	.022	.024	.024	.024	.024	.024	.024
CL-4-SLPS-2		4.5											
CL-7-SLPS-1	7/16	6.7	.016	.197	.292	.371	—	.055	.055	.055	.055	.055	.055
CL-7-SLPS-2		13											
CL-7A-SLPS-1	7/16	6.7	.016	.236	.473	.371	—	—	.049	.059	.059	.059	.059
CL-7A-SLPS-2		13											
CL-8-SLPS-1	1/2	11	.024	.315	.512	.551	—	—	—	.077	.087	.087	.087
CL-8-SLPS-2		22											
CL-10-SLPS-1	5/8	22	.031	.394	.640	.658	—	—	—	.098	.107	.110	.110
CL-10-SLPS-2		45											



**Installation Tools**



Handy tool to speed up installation of Spring Locating Pins. Use with any of the three types.

## INSTALLATION TOOLS

PART NO.	USE TO INSTALL		
CL-4-SLPT	CL-4-SLP-x	CL-4-SLPS-x	CL-4-SLPP-x
CL-7-SLPT	CL-7-SLP-x	CL-7-SLPS-x	CL-7-SLPP-x
CL-7A-SLPT	CL-7A-SLP-x	CL-7A-SLPS-x	CL-7A-SLPP-x
CL-8-SLPT	CL-8-SLP-x	CL-8-SLPS-x	CL-8-SLPP-x
CL-10-SLPT	CL-10-SLP-x	CL-10-SLPS-x	CL-10-SLPP-x

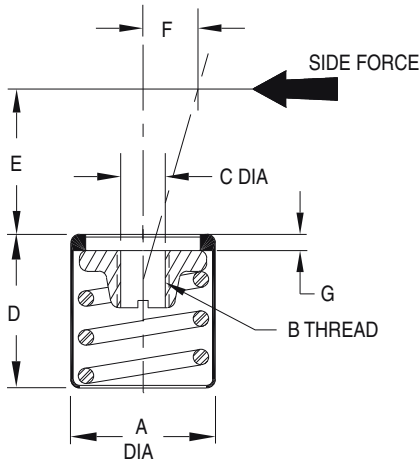
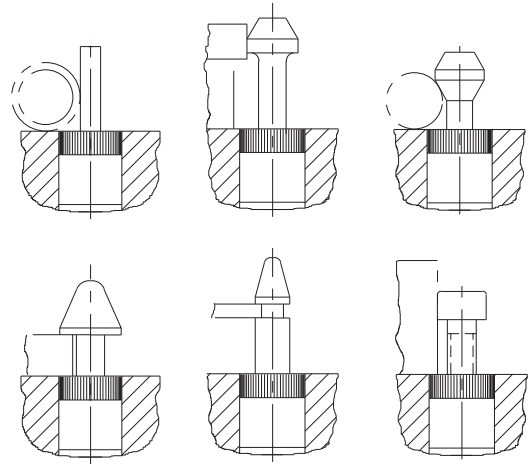
# SPRING LOCATING PINS

RECEPTACLE: MILD STEEL, BLACK OXIDE FINISH  
 SPRING: MUSIC WIRE. HOUSING: ALUMINUM



## Tapped Receptacle for Custom Pin Coil Spring

This version has a tapped receptacle for installing custom contact pins. Available in two sizes, each in light, medium, or heavy force. Dimension E is a theoretical contact height which allows F maximum travel and provides the side force listed in the table. Taller pins will have more travel and less force, while shorter pins will have less travel and more force. To achieve maximum travel, the bottom diameter of the custom pin should be approximately equal to the C dimension.

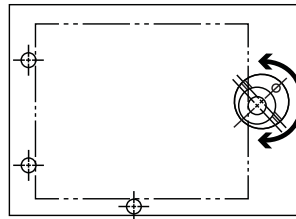


## TAPPED RECEPTACLE FOR CUSTOM PIN, COIL SPRING

PART NO.	A DIA	B	APPROX SIDE FORCE (LBS)	C	D	E	F	G
CL-7-SLPR-1	7/16	#8-32	4.5	.164	.434	.16	.063	.04
CL-7-SLPR-2			11					
CL-7-SLPR-3			22					
CL-10-SLPR-1	5/8	1/4-20	22	.250	.705	.45	.126	.06
CL-10-SLPR-2			45					
CL-10-SLPR-3			67					



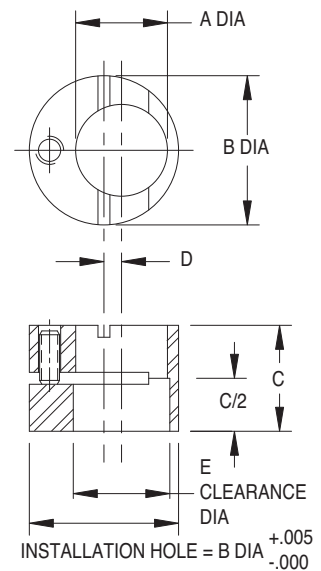
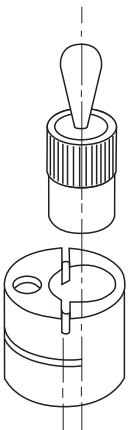
**Eccentric Liners**



Eccentric Liners provide additional adjustment for workpieces with looser tolerances. Steel.

## EXCENTRIC LINERS

PART NO.	FITS THESE PINS	A DIA		B DIA		C	D
		NOMINAL	ACTUAL	NOMINAL	ACTUAL		
CL-4-SLPE	CL-4-SLP-x CL-4-SLPS-x CL-4-SLPP-x	1/4	.2500 .2507	1/2	.5000 .4983	.390	.079
CL-4-SLPE	CL-7-SLP-x CL-7-SLPS-x CL-7-SLPP-x CL-7A-SLP-x CL-7A-SLPS-x CL-7A-SLPP-x	7/16	.4375 .4386	11/16	.6875 .6858	.469	.079
CL-4-SLPE	CL-8-SLP-x CL-8-SLPS-x CL-8-SLPP-x	1/2	.5000 .5011	3/4	.7500 .7480	.547	.079
CL-4-SLPE	CL-10-SLP-x CL-10-SLPS-x CL-10-SLPP-x	5/8	.6250 .6261	1	1.000 .9980	.705	.118



# LEVELING FEET

## TYPES



### LEVELING FOOT

High-quality, heavy-duty leveling foot with large-diameter pad. Large ball provides high load capacity with a 20° total swivel angle.



### STUD LEVELING FOOT

High-quality, heavy-duty leveling foot with large-diameter pad and integral stud. Stud and ball are one solid piece. Large ball provides high load capacity with a 20° total swivel angle.



### JIG FEET LEVELING

Medium-duty leveling foot with removable pad. Lefthand thread in pad prevents backout while pad rotates and pivots freely.



### JIG FEET LEVELING ASSEMBLIES

Complete leveling assembly includes radius-head screw, plate, and hex nut.

5

## MATERIALS

### STEEL

12L14 steel, carburized-hardened, zinc plated yellow chromate. This material is the most economical and wear resistant choice for maximum load capacities.

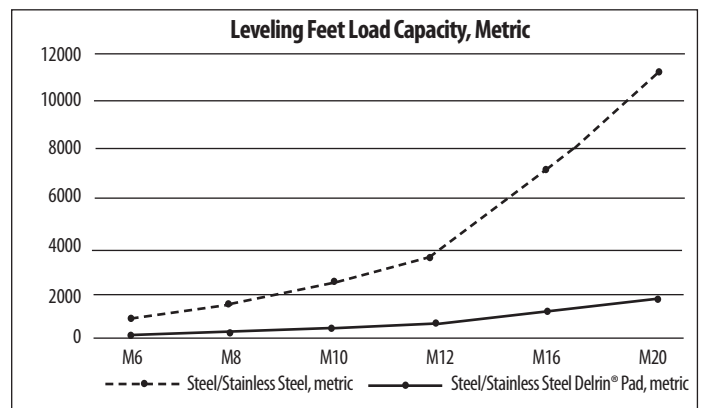
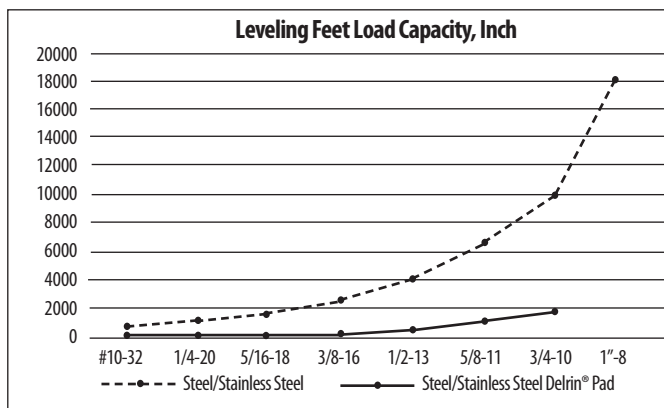
### STAINLESS STEEL

300-series stainless steel provides excellent resistance to rust, can be sanitized, and works well in corrosive environments. DFARS and RoHS compliant.

### DELRIN®

White Delrin® 500 is non-marking, will not rust and can be sanitized. Has the lowest load capacity of these materials.

## LOAD RATINGS



# LEVELING FEET

STEEL: 12L14, CARBURIZED-HARDENED (BODY ONLY), ZINC PLATED YELLOW CHROMATE OR BLACK OXIDE FINISH  
 STAINLESS STEEL: 300 SERIES. DELRIN® PAD: WHITE DELRIN® 500.



**Steel  
Zinc Plated**



**Steel  
Zinc Plated  
with Delrin® Pad**



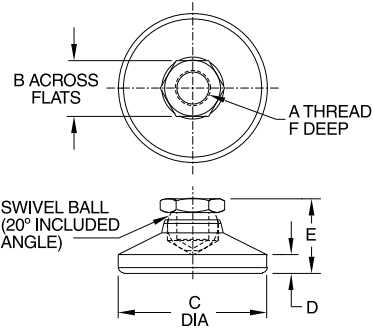
**Steel  
Black Oxide Finish**



**Stainless Steel**



**Stainless Steel  
with Delrin® Pad**



High-quality, heavy-duty leveling foot with large-diameter pad. Large ball provides high load capacity with a 20° total swivel angle.

5

## INCH

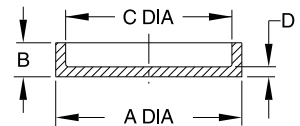
PART NO. STEEL ZINC PLATED	PART NO. STEEL ZINC PLATED DELRIN® PAD	PART NO. STEEL BLACK OXIDE	PART NO. STAINLESS	PART NO. STAINLESS DELRIN® PAD	A	B	C DIA	D	E	F	LOAD RATING (LBS)*	
											STEEL & STAINLESS	DELRIN®
CL-3-LF	CL-3-LFN	CL-3-LF-BO	CL-3-LF-S	CL-3-LFN-S	#10-32	3/8	3/4	7/64	17/32	1/4	700	150
CL-4-LF	CL-4-LFN	CL-4-LF-BO	CL-4-LF-S	CL-4-LFN-S	1/4-20	1/2	1	5/32	45/64	5/16	1,000	200
CL-5-LF	CL-5-LFN	CL-5-LF-BO	CL-5-LF-S	CL-5-LFN-S	5/16-18	9/16	1-1/8	3/16	3/16	3/8	1,500	250
CL-6-LF	CL-6-LFN	CL-6-LF-BO	CL-6-LF-S	CL-6-LFN-S	3/8-16	5/8	1-1/4	3/16	7/8	13/32	2,300	300
CL-8-LF	CL-8-LFN	CL-8-LF-BO	CL-8-LF-S	CL-8-LFN-S	1/2-13	3/4	1-7/8	1/4	1-1/8	1/2	4,200	700
CL-10-LF	CL-10-LFN	CL-10-LF-BO	CL-10-LF-S	CL-10-LFN-S	5/8-11	15/16	2-1/2	5/16	1-1/4	1/2	6,600	1,200
CL-12-LF	CL-12-LFN	CL-12-LF-BO	CL-12-LF-S	CL-12-LFN-S	3/4-10	1-1/8	3	1/2	1-1/2	5/8	10,000	1,800
CL-16-LF	—	CL-16-LF-BO	CL-16-LF-S	—	1"-8	1-1/2	4	13/32	1-7/8	15/16	18,000	—

## METRIC

CLM-6-LF	CLM-6-LFN	CLM-6-LF-BO	CLM-6-LF-S	CLM-6-LFN-S	M6	10mm	1	5/32	45/64	5/16	900	180
CLM-8-LF	CLM-8-LFN	CLM-8-LF-BO	CLM-8-LF-S	CLM-8-LFN-S	M8	13mm	1-1/8	3/16	13/16	3/8	1,500	250
CLM-10-LF	CLM-10-LFN	CLM-10-LF-BO	CLM-10-LF-S	CLM-10-LFN-S	M10	17mm	1-1/4	3/16	7/8	13/32	2,600	300
CLM-12-LF	CLM-12-LFN	CLM-12-LF-BO	CLM-12-LF-S	CLM-12-LFN-S	M12	19mm	1-7/8	1/4	1-1/8	1/2	3,800	700
CLM-16-LF	CLM-16-LFN	CLM-16-LF-BO	CLM-16-LF-S	CLM-16-LFN-S	M16	24mm	2-1/2	5/16	1-1/4	1/2	7,200	1,200
CLM-20-LF	CLM-20-LFN	CLM-20-LF-BO	CLM-20-LF-S	CLM-20-LFN-S	M20	30mm	3	1/2	1-1/2	5/8	11,000	1,800

\*Safe static load with stud securely mounted in a plate at least one-stud-diameter thick, at maximum stud extension (2:1 safety factor). Leveling Feet are rated with the same-length stud as on Stud Leveling Feet. Load capacity will drop significantly with longer studs.

Rubber Pad Covers fit over the bottom of Leveling Feet. These pad covers provide increased gripping to prevent sliding on sloped or uneven surfaces. They reduce walking and transmitted machine vibrations. Durable PVC material. Note: load capacity will be reduced with Rubber Pad Covers. See table below.



**Rubber Pad Covers  
for Leveling Feet**



## RUBBER PAD COVERS

PART NO.	FITS LEVELING FEET	A DIA	B	C DIA	D	LOAD RATING (LBS)
CL-6-RPC	3/8-16 and M10	1-1/2	3/8	1-1/4	1/8	300
CL-8-RPC	1/2-13 and M12	2-1/8	3/8	1-7/8		700
CL-10-RPC	5/8-11 and M16	2-3/4	7/16	2-1/2		1,200
CL-12-RPC	3/4-10 and M20	3-1/4	1/2	3		1,800



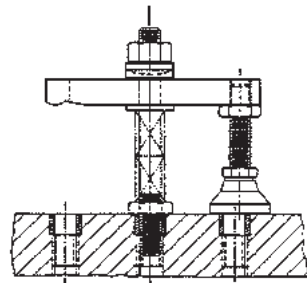
# STUD LEVELING FEET

STEEL: 12L14, CARBURIZED-HARDENED (BODY ONLY), ZINC PLATED YELLOW CHROMATE OR BLACK OXIDE FINISH  
 STAINLESS STEEL: 300 SERIES. DELRIN® PAD: WHITE DELRIN® 500.

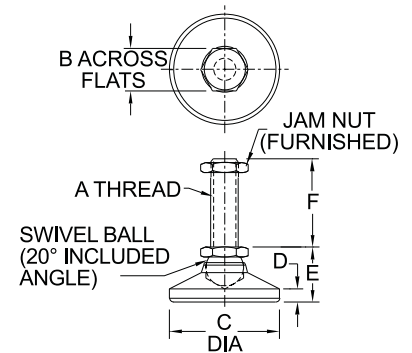


High-quality, heavy-duty leveling foot with large-diameter pad and integral stud. Stud and ball are one solid piece. Large ball provides high load capacity with a 20° total swivel angle.

\* Safe static load with stud securely mounted in a plate at least one-stud-diameter thick, at maximum stud extension (2:1 safety factor). Load capacity will drop significantly with longer studs.



Can also be used as a clamp rest for Tapped-Heel Clamp Straps.



## INCH

PART NO. STEEL ZINC PLATED	PART NO. STEEL ZINC PLATED DELRIN® PAD	PART NO. STEEL BLACK OXIDE	PART NO. STAINLESS	PART NO. STAINLESS DELRIN® PAD	A	B	C DIA	D	E	F	LOAD RATING (LBS)*	
											STEEL & STAINLESS	DELRIN®
CL-3-SLF	CL-3-SLFN	CL-3-SLF-BO	CL-3-SLF-S	CL-3-SLFN-S	#10-32	3/8	3/4	7/64	17/32	1	700	150
CL-3-SLF-2	CL-3-SLFN-2	CL-3-SLF-2-BO	CL-3-SLF-2-S	CL-3-SLFN-2-S							200	
CL-4-SLF	CL-4-SLFN	CL-4-SLF-BO	CL-4-SLF-S	CL-4-SLFN-S	1/4-20	1/2	1	5/32	45/64	1-1/4	1,000	200
CL-4-SLF-2.5	CL-4-SLFN-2.5	CL-4-SLF-2.5-BO	CL-4-SLF-2.5-S	CL-4-SLFN-2.5-S							250	
CL-5-SLF	CL-5-SLFN	CL-5-SLF-BO	CL-5-SLF-S	CL-5-SLFN-S	5/16-18	9/16	1-1/8	3/16	13/16	2	1,500	250
CL-5-SLF-4	CL-5-SLFN-4	CL-5-SLF-4-BO	CL-5-SLF-4-S	CL-5-SLFN-4-S							400	
CL-6-SLF	CL-6-SLFN	CL-6-SLF-BO	CL-6-SLF-S	CL-6-SLFN-S	3/8-16	5/8	1-1/4	3/16	7/8	2	2,300	300
CL-6-SLF-4	CL-6-SLFN-4	CL-6-SLF-4-BO	CL-6-SLF-4-S	CL-6-SLFN-4-S							600	
CL-8-SLF	CL-8-SLFN	CL-8-SLF-BO	CL-8-SLF-S	CL-8-SLFN-S	1/2-13	3/4	1-7/8	1/4	1-1/8	2	4,200	700
CL-8-SLF-4	CL-8-SLFN-4	CL-8-SLF-4-BO	CL-8-SLF-4-S	CL-8-SLFN-4-S							1,100	
CL-10-SLF	CL-10-SLFN	CL-10-SLF-BO	CL-10-SLF-S	CL-10-SLFN-S	5/8-11	15/16	2-1/2	5/16	1-1/4	2	6,600	1,200
CL-10-SLF-4	CL-10-SLFN-4	CL-10-SLF-4-BO	CL-10-SLF-4-S	CL-10-SLFN-4-S							1,700	
CL-12-SLF	CL-12-SLFN	CL-12-SLF-BO	CL-12-SLF-S	CL-12-SLFN-S	3/4-10	1-1/8	3	1/2	1-1/2	2	10,000	1,800
CL-12-SLF-4	CL-12-SLFN-4	CL-12-SLF-4-BO	CL-12-SLF-4-S	CL-12-SLFN-4-S							2,500	
CL-16-SLF	—	CL-16-SLF-BO	CL-16-SLF-S	—	1"-8	1-1/2	4	13/32	1-7/8	4-1/4	18,000	—
CL-16-SLF-8	—	CL-16-SLF-8-BO	CL-16-SLF-8-S	—							8	

## METRIC

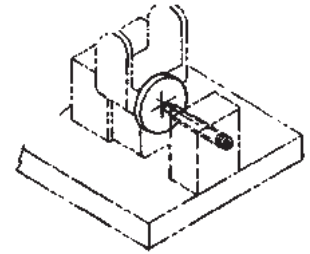
CLM-6-SLF	CLM-6-SLFN	CLM-6-SLF-BO	CLM-6-SLF-S	CLM-6-SLFN-S	M6	10mm	1	5/32	45/64	1.57	900	180
CLM-8-SLF	CLM-8-SLFN	CLM-8-SLF-BO	CLM-8-SLF-S	CLM-8-SLFN-S	M8	13mm	1-1/8	3/16	13/16	1.97	1,500	250
CLM-10-SLF	CLM-10-SLFN	CLM-10-SLF-BO	CLM-10-SLF-S	CLM-10-SLFN-S	M10	17mm	1-1/4	3/16	7/8	2	2,600	300
CLM-12-SLF	CLM-12-SLFN	CLM-12-SLF-BO	CLM-12-SLF-S	CLM-12-SLFN-S	M12	19mm	1-7/8	1/4	1-1/8		3,800	700
CLM-16-SLF	CLM-16-SLFN	CLM-16-SLF-BO	CLM-16-SLF-S	CLM-16-SLFN-S	M16	24mm	2-1/2	5/16	1-1/4	2	7,200	1,200
CLM-20-SLF	CLM-20-SLFN	CLM-20-SLF-BO	CLM-20-SLF-S	CLM-20-SLFN-S	M20	30mm	3	1/2	1-1/2		11,000	1,800

# JIG FEET LEVELING

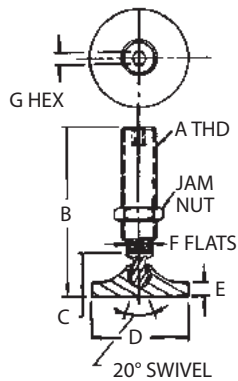
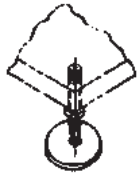
PATENT NO. 2,531,892  
 SCREW: 12L14 STEEL, CARBURIZED-HARDENED, ZINC PLATED YELLOW CHROMATE  
 FOOT: 12L14 STEEL, ZINC PLATED YELLOW CHROMATE



Medium-duty leveling foot with removable pad. Lefthand thread in pad prevents backout while pad rotates and pivots freely.



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## INCH

PART NO.	A	B	C	D DIA	E	F	G	*LOAD RATING (LBS)
CL-1-JFL	1/2-13	2-7/32	7/8	1-1/2	1/4	3/8	1/4	1,400
CL-2-JFL		4-7/32						430
CL-3-JFL	5/8-11	3-1/4	29/32	2	5/16	1/2	5/16	2,900
CL-4-JFL		5-1/4						1,200
CL-5A-JFL	3/4-10	3-1/2	1-1/6	2-1/2	3/8	9/16	3/8	3,700
CL-6-JFL		5-17/32						1,800
CL-7A-JFL	1-8	3-1/2	1-19/32	3-1/2	1/2	3/4	1/2	6,700
CL-8-JFL		5-19/32						6,400

## METRIC

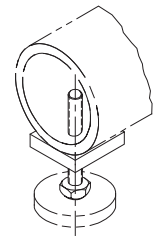
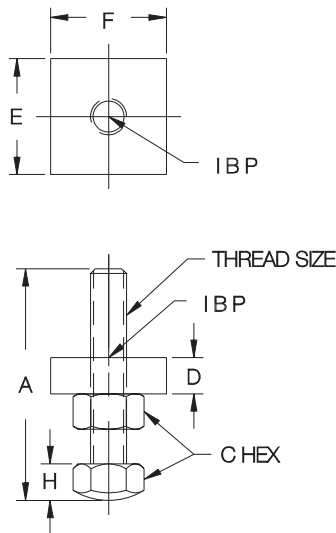
CLM-1-JFL	M12	2.17	.87	1-1/2	1/4	10mm	6mm	1,400
CLM-2-JFL	4.33	430						
CLM-3-JFL	M16	3.35	.91	2	5/16	13mm	8mm	2,900
CLM-4-JFL		5.31						1,200
CLM-5A-JFL	M20	3.54	1.06	2-1/2	3/8	17mm	10mm	3,700
CLM-6-JFL		5.51						1,800
CLM-7A-JFL	M24	3.54	1.61	3-1/2	1/2	19mm	12mm	6,700
CLM-8-JFL		5.71						6,400

# JIG FEET LEVELING ASSEMBLIES

MILD STEEL, BLACK OXIDE FINISH



Complete leveling assembly includes radius-head screw, plate, and hex nut.



## INCH

PART NO.	THREAD SIZE	A	C	D	E	F	H	*LOAD RATING (LBS)
CL-1-JFL	1/2-13	2-7/32	7/8	1-1/2	1-1/2	1-3/4	.42	2,300
CL-2-JFL		4-7/32			1-3/4	2	.53	4,200
CL-3-JFL	5/8-11	3-1/4	29/32	5/8	2	2	.63	6,600
CL-4-JFL							.75	10,000
CL-5A-JFL	3/4-10	3-1/2	1-1/6	3/4			1.06	18,000

## METRIC

CLM-1-JFL	M12	2.17	.87	1/2	1-1/2	1-3/4	.43	2,600
CLM-2-JFL	4.33		1-3/4		2	.55	3,800	
CLM-3-JFL	M16	3.35	.91	5/8	2	2	.63	7,200
CLM-4-JFL		5.31					.75	11,000
CLM-5A-JFL	M20	3.54	1.06	3/4			1.06	16,000

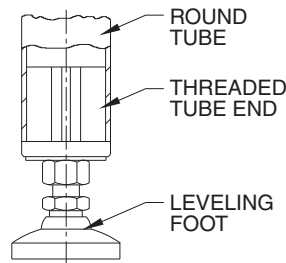
\* Safe static load with stud securely mounted in a plate at least one-stud-diameter thick, at maximum stud extension (2:1 safety factor). Jig Feet Leveling Assemblies are rated with the standard plate provided.

# THREADED TUBE ENDS

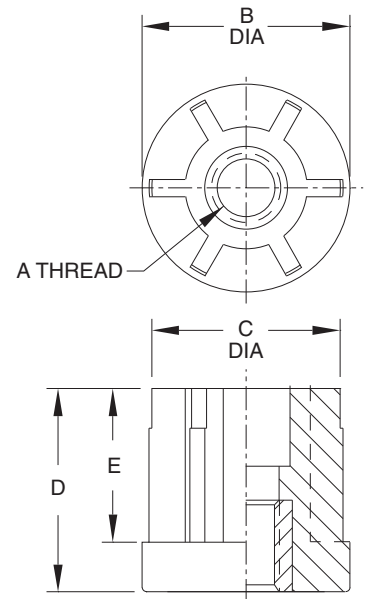
BODY: BLACK NYLON THERMOPLASTIC  
THREADED INSERT: BRASS, MOLDED IN



Round



Ideal for mounting a Leveling Foot into the end of a round tube. High-strength ribbed design presses into the tube end, up to the shoulder, providing 1100 lbs load capacity. Available in three thread sizes, to fit round tubing with 1-1/2" outside diameter and .065 to .070" wall thickness.

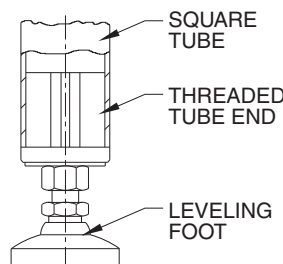


## ROUND (INCH)

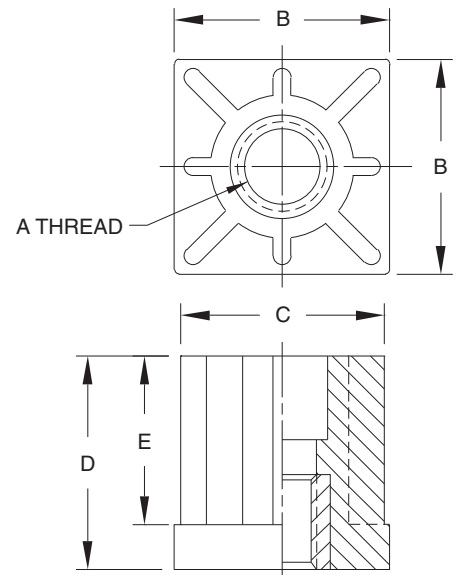
PART NO.	TUBING EXTERNAL DIA	TUBING WALL THICKNESS	A	B DIA	C DIA	D	E	LOAD RATING (LBS)
CL-6-TTER-112	1.50	.065/.070	3/8-16	1.50	1.40	1.70	1.34	1100
CL-8-TTER-112			1/2-13					
CL-10-TTER-112			5/8-11					



Square



Ideal for mounting a Leveling Foot into the end of a square tube. High-strength ribbed design presses into the tube end, up to the shoulder, providing 1300 lbs load capacity. Available in two thread sizes, to fit 1-1/2" square tubing with .065 to .070" wall thickness. Also available to fit 1-1/2" heavy-wall square tubing with .120 to .130" wall thickness.



## SQUARE (INCH)

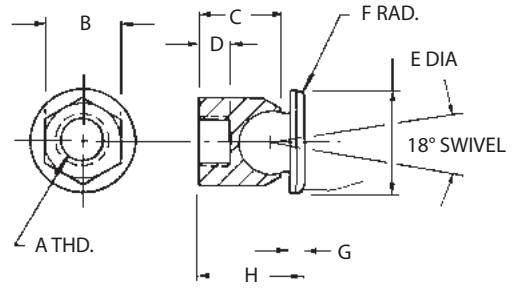
PART NO.	TUBING EXTERNAL DIA	TUBING WALL THICKNESS	A	B	C	D	E	LOAD RATING (LBS)
CL-8-TTES-112	1.50	.065/.070	1/2-13	1.50	1.37	1.69	1.38	1300
CL-10-TTES-112			5/8-11		1.25			
CL-8-TTES-112H		1/2-13	1.25					
CL-10-TTES-112H		5/8-11		1.25				

# SWIVEL PADS

PAD: 12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH OR DELRIN®  
 NUT: 12L14 STEEL, BLACK OXIDE FINISH



Heavy-duty swivel foot pivots to contact sloped surfaces evenly. Large ball provides high load capacity with a 18° total swivel angle. Choice of steel or Delrin® pad.



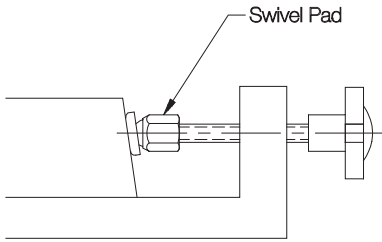
## INCH

PART NO. STEEL PAD	PART NO. DELRIN® PAD	A	B	C	D	E DIA	F	G	H
CL-1-SPA	CL-1-SPAN	1/4-20	1/2	.50	.23	5/8	.06	.10	.67
CL-2-SPA	CL-2-SPAN	5/16-18	9/16	.58	.27	3/4			.75
CL-3-SPA	CL-3-SPAN	3/8-16	5/8	.71	.29	7/8	.09	.15	.91
CL-4-SPA	CL-4-SPAN	1/2-13	3/4	.81	.31	1			1.05
CL-5-SPA	CL-5-SPAN	5/8-11	7/8	1.00	.35	1-1/8	.09	.15	1.25
CL-6-SPA	—	3/4-10	1-1/16	1.12		1-1/4			1.38
CL-7-SPA	—	1-8	1-3/8	1.50		1-5/8		.20	1.82

## METRIC

CLM-6-SPA	—	M6	10mm	.56	.23	1/2	.04	.08	.67
CLM-8-SPA	—	M8	13mm	.58	.22	3/4	.06	.10	.75
CLM-10-SPA	—	M10	17mm	.71	.29	7/8			.91
CLM-12-SPA	—	M12	19mm	.81	.31	1	.09	.15	1.05
CLM-16-SPA	—	M16	24mm	1.00	.35	1-1/8			1.25
CLM-20-SPA	—	M20	30mm	1.12		1-1/4	1.38		

5

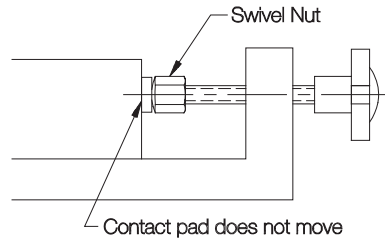


# SWIVEL NUTS

NUT: 12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH  
 PAD: 12L14 STEEL, BLACK OXIDE FINISH



Nut turns freely without pivoting while pad remains stationary, to avoid moving or marring the workpiece.

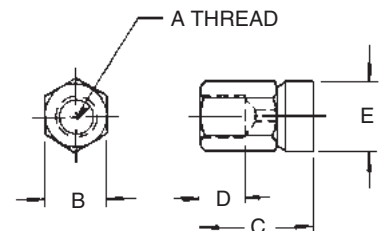


## INCH

PART NO.	A	B	C	D	E DIA
CL-4-SN	1/4-20	5/16	7/16	3/16	3/8
CL-5-SN	5/16-18	3/8	15/32	1/4	7/16
CL-6-SN	3/8-16	7/16	17/32	17/64	1/2
CL-8-SN	1/2-13	5/8	21/32	3/8	11/16
CL-10-SN	5/8-11	3/4	27/32	7/16	7/8
CL-12-SN	3/4-10	7/8	1	1/2	1

## METRIC

CLM-6-SN	M6	8mm	.43	3/16	.39
CLM-10-SN	M10	13mm	.55	17/64	.51
CLM-12-SN	M12	17mm	.67	3/8	.71



# SWIVEL PAD FEET

STEEL PAD: 12L14 STEEL, ZINC PLATED YELLOW CHROMATE OR BLACK OXIDE FINISH  
 DELRIN® PAD: WHITE DELRIN 500. STAINLESS PAD: 300-SERIES STAINLESS STEEL  
 STEEL NUT: 12L14 STEEL, CARBURIZED-HARDENED ZINC PLATED YELLOW CHROMATE OR BLACK OXIDE FINISH  
 STAINLESS NUT: 300-SERIES STAINLESS STEEL



**Steel  
Zinc Plated**



**Steel  
Zinc Plated  
with Delrin® Pad**

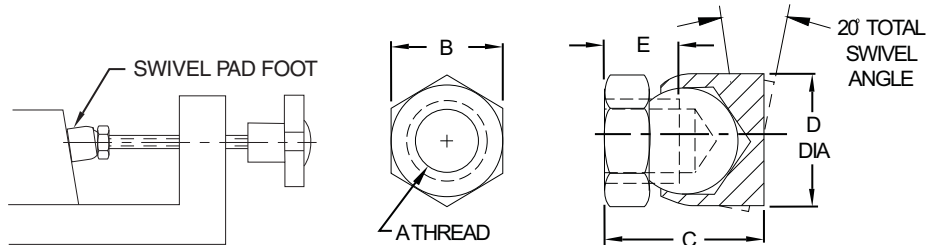


**Steel  
Black Oxide Finish**



**Stainless  
Steel**

Heavy-duty swivel foot pivots to contact sloped surfaces evenly. Large ball provides high load capacity with a 20° total swivel angle. Available in steel (zinc plated or black oxide finish), steel with a Delrin® pad, and stainless steel.



## STEEL — ZINC PLATED (INCH)

PART NO.	A	B	C	D DIA	E
CL-4-SPF	1/4-20	1/2	5/8	5/8	5/16
CL-5-SPF	5/16-18	9/16	3/4	11/16	3/8
CL-6-SPF	3/8-16	5/8	13/16	3/4	
CL-8-SPF	1/2-13	3/4	15/16	7/8	7/16
CL-10-SPF	5/8-11	7/8	1	1	
CL-12-SPF	3/4-10	1-1/16	1-11/32	1-1/4	5/8

## STEEL — ZINC PLATED (METRIC)

PART NO.	A	B	C	D DIA	E
CLM-6-SPF	M6	10mm	5/8	5/8	5/16
CLM-8-SPF	M8	13mm	3/4	11/16	3/8
CLM-10-SPF	M10	17mm	13/16	3/4	
CLM-12-SPF	M12	19mm	15/16	7/8	7/16
CLM-16-SPF	M16	24mm	1	1	
CLM-20-SPF	M20	30mm	1-11/32	1-1/4	5/8

## STEEL — ZINC PLATED WITH DELRIN® PAD (INCH)

PART NO.	A	B	C	D DIA	E
CL-4-SPFN	1/4-20	1/2	5/8	5/8	5/16
CL-5-SPFN	5/16-18	9/16	3/4	11/16	3/8
CL-6-SPFN	3/8-16	5/8	13/16	3/4	
CL-8-SPFN	1/2-13	3/4	15/16	7/8	7/16
CL-10-SPFN	5/8-11	7/8	1	1	
CL-12-SPFN	3/4-10	1-1/16	1-11/32	1-1/4	5/8

## STEEL — ZINC PLATED WITH DELRIN® PAD (METRIC)

PART NO.	A	B	C	D DIA	E
CLM-6-SPFN	M6	10mm	5/8	5/8	5/16
CLM-8-SPFN	M8	13mm	3/4	11/16	3/8
CLM-10-SPFN	M10	17mm	13/16	3/4	
CLM-12-SPFN	M12	19mm	15/16	7/8	7/16
CLM-16-SPFN	M16	24mm	1	1	
CLM-20-SPFN	M20	30mm	1-11/32	1-1/4	5/8

## STEEL — BLACK OXIDE FINISH (INCH)

PART NO.	A	B	C	D DIA	E
CL-4-SPF-BO	1/4-20	1/2	5/8	5/8	5/16
CL-5-SPF-BO	5/16-18	9/16	3/4	11/16	3/8
CL-6-SPF-BO	3/8-16	5/8	13/16	3/4	
CL-8-SPF-BO	1/2-13	3/4	15/16	7/8	7/16
CL-10-SPF-BO	5/8-11	7/8	1	1	
CL-12-SPF-BO	3/4-10	1-1/16	1-11/32	1-1/4	5/8

## STEEL — BLACK OXIDE FINISH (METRIC)

PART NO.	A	B	C	D DIA	E
CLM-6-SPF-BO	M6	10mm	5/8	5/8	5/16
CLM-8-SPF-BO	M8	13mm	3/4	11/16	3/8
CLM-10-SPF-BO	M10	17mm	13/16	3/4	
CLM-12-SPF-BO	M12	19mm	15/16	7/8	7/16
CLM-16-SPF-BO	M16	24mm	1	1	
CLM-20-SPF-BO	M20	30mm	1-11/32	1-1/4	5/8

## STAINLESS STEEL (INCH)

PART NO.	A	B	C	D DIA	E
CL-4-SPF-S	1/4-20	1/2	5/8	5/8	5/16
CL-5-SPF-S	5/16-18	9/16	3/4	11/16	3/8
CL-6-SPF-S	3/8-16	5/8	13/16	3/4	
CL-8-SPF-S	1/2-13	3/4	15/16	7/8	7/16
CL-10-SPF-S	5/8-11	7/8	1	1	
CL-12-SPF-S	3/4-10	1-1/16	1-11/32	1-1/4	5/8

## STAINLESS STEEL (METRIC)

PART NO.	A	B	C	D DIA	E
CLM-6-SPF-S	M6	10mm	5/8	5/8	5/16
CLM-8-SPF-S	M8	13mm	3/4	11/16	3/8
CLM-10-SPF-S	M10	17mm	13/16	3/4	
CLM-12-SPF-S	M12	19mm	15/16	7/8	7/16
CLM-16-SPF-S	M16	24mm	1	1	
CLM-20-SPF-S	M20	30mm	1-11/32	1-1/4	5/8

# ROUND GRIPPERS

HARDENED TOOL STEEL: M-2 TOOL STEEL, HEAT TREATED RC 60-62, BLACK OXIDE FINISH  
 CARBIDE TIPPED: ALLOY STEEL, HEAT TREATED, WITH BRAZED CARBIDE INSERT, BLACK OXIDE FINISH  
 SOLID CARBIDE: CARBIDE WITH STEEL THREAD INSERT  
 ABRASIVE DIAMOND: 17-4PH STAINLESS STEEL, HEAT TREATED RC 43-46, WITH FUSED ABRASIVE DIAMOND SURFACE  
 BONDED URETHANE: 300-SERIES STAINLESS STEEL WITH BONDED URETHANE SURFACE



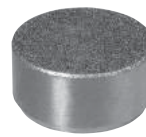
**Hardened Tool Steel (Serrated)**



**Carbide Tipped (Serrated)**



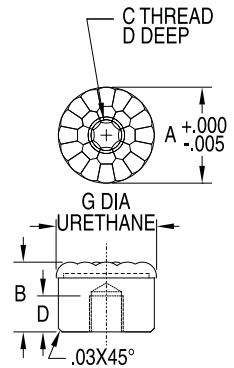
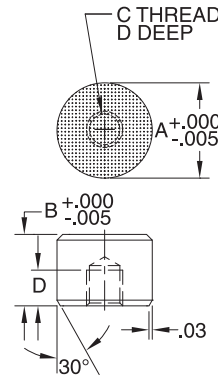
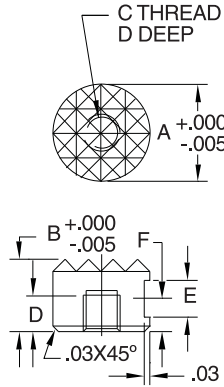
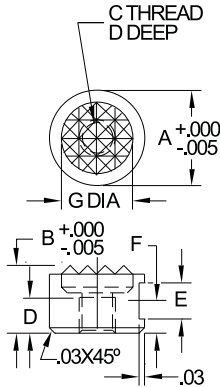
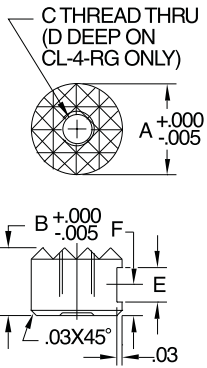
**Solid Carbide (Serrated)**



**Abrasive Diamond**



**Bonded Urethane**



Round Grippers are replaceable inserts that provide additional holding force and/or wear resistance when installed in a fixture. Fasten from behind with a socket-head cap screw, or clamp with a setscrew on the O.D. locking flat (where provided). Grippers can be recess-mounted in a flat-bottom hole, or surface mounted to use as a rest pad. Round Grippers can also be installed in Gripper Swivel Pads and Gripper Swivel Contact Bolts.

Serrated grippers are designed to slightly penetrate the workpiece to significantly increase gripping force, rather than relying on static friction alone. The hardened-tool-steel version is the most economical and impact resistant. The carbide-tipped version is still economical and impact resistant while providing extra durability. The solid-carbide version is the most durable.

Abrasive-diamond grippers have an abrasive-diamond surface permanently fused to a hardened stainless steel pad. This abrasive surface, comparable to a 100-grit abrasive, provides significant holding force with relatively low clamping pressure and minimal surface marring. This diamond-particle surface also offers excellent wear resistance.

Bonded-urethane grippers have a urethane surface permanently bonded to a stainless steel pad. This non-marking, non-staining urethane provides excellent protection against damage to finished workpieces. The bubbled texture of the urethane surface offers firm gripping, yet allows air to escape so that no suction is created under load. Urethane also provides excellent wear resistance, and is available in three firmnesses to suit a wide variety of applications.

## INCH

PART NO. HARDENED TOOL STEEL (SERRATED)	PART NO. CARBIDE TIPPED (SERRATED)	PART NO. SOLID CARBIDE (SERRATED)	PART NO. ABRASIVE DIAMOND	A DIA	B	C	D	E	F	G DIA	SERRATIONS	PART NO. BONDED URETHANE	URETHANE			
													B	D	G DIA	
CL-4-RG	—	—	—	1/4	3/8	#8-32	3/16	—	—	—	Extra Fine	—	—	—	—	
CL-6-RG	CL-6-RGT	—	CL-6-RGD	3/8		#10-32		3/16	3/16	11/64	5/16	Fine	.094x90°	CL-6-RGU-1*	1/4	.39
CL-8-RG	CL-8-RGT	CL-8-RGC	CL-8-RGD	1/2		3/8					CL-8-RGU-1*		.51			
CL-10-RG	CL-10-RGT	CL-10-RGC	CL-10-RGD	5/8		1/2		CL-10-RGU-1*	.63							
CL-12-RG	CL-12-RGT	CL-12-RGC	CL-12-RGD	3/4		5/8		CL-12-RGU-1*	.83							
CL-16-RG	CL-16-RGT	—	CL-16-RGD	1	3/4	CL-16-RGU-1*	1.06									

## METRIC

CLM-10-RG	CLM-10-RGT	—	CLM-10-RGD	.394 (10mm)	.3937 (10mm)	M5	.18	.185	.177	—	Extra Fine	CLM-10-RGU-1*	.472 (12mm)	.24	.39
CLM-12-RG	CLM-12-RGT	—	CLM-12-RGD	.472 (12mm)							M6	.094x90°			CLM-12-RGU-1*
CLM-16-RG	CLM-16-RGT	—	CLM-16-RGD	.630 (16mm)		Fine						.125x90°	CLM-16-RGU-1*	.63	
CLM-20-RG	CLM-20-RGT	—	CLM-20-RGD	.787 (20mm)							CLM-20-RGU-1*	.83			
CLM-25-RG	CLM-25-RGT	—	CLM-25-RGD	.984 (25mm)							CLM-25-RGU-1*	1.06			

\* -1=35 Durometer, -2=60 Durometer, -3=80 Durometer

# ROUND GRIPPERS

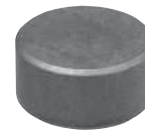
CARBIDE TIPPED: ALLOY STEEL, HEAT TREATED, WITH BRAZED CARBIDE INSERT, BLACK OXIDE FINISH  
 HARDENED STEEL: 8620 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH  
 HARDENED STAINLESS STEEL: 17-4 STAINLESS STEEL, HEAT TREATED RC 43-46  
 DELRIN®: WHITE DELRIN® 500



**Carbide Tipped (Flat)**



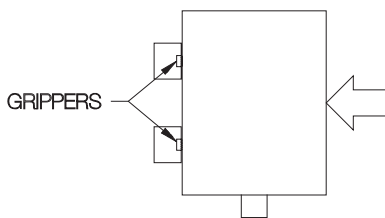
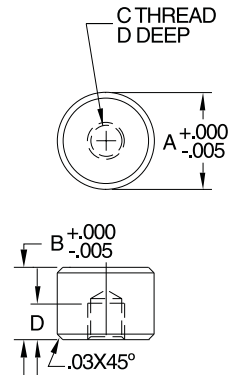
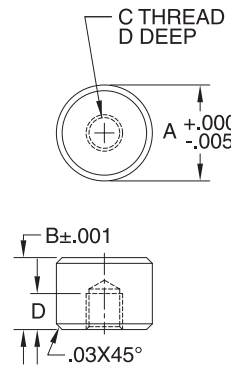
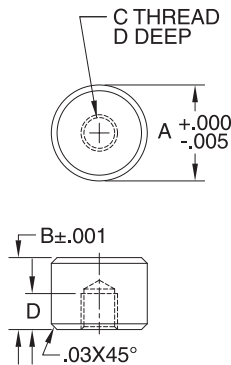
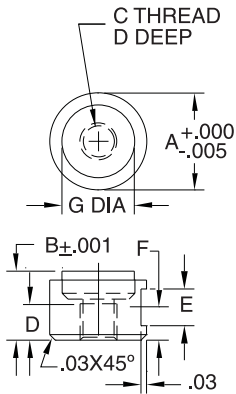
**Hardened Steel (Flat)**



**Hardened Stainless Steel (Flat)**

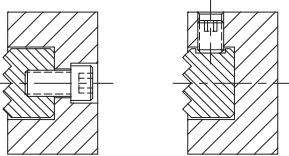


**Delrin® (Flat)**



Serrated grippers recessed into a fixture's locating surfaces dramatically increase resistance to movement by embedding themselves in the workpiece.

Flat grippers can be used to provide additional wear resistance, or as precision rest pads. The carbide-tipped version is the most durable. The hardened-steel version is the most economical and impact resistant. The hardened-stainless-steel version provides high strength and excellent corrosion resistance. The Delrin® version helps avoid marring finished workpieces.



## INCH

PART NO. CARBIDE TIPPED (FLAT)	PART NO. HARDENED STEEL (FLAT)	PART NO. HARDENED STAINLESS (FLAT)	PART NO. DELRIN® (FLAT)	A DIA	B	C	D	E	F	G DIA
CL-6-RGFT	CL-6-RGF	CL-6-RGF-S	CL-6-RGFN	3/8	3/8	#10-32	3/8	3/16	11/64	5/16
CL-8-RGFT	CL-8-RGF	CL-8-RGF-S	CL-8-RGFN	1/2		3/8				1/2
CL-10-RGFT	CL-10-RGF	CL-10-RGF-S	CL-10-RGFN	5/8	1/4-28	3/8	3/16	11/64	1/2	5/8
CL-12-RGFT	CL-12-RGF	CL-12-RGF-S	CL-12-RGFN	3/4						3/4
CL-16-RGFT	CL-16-RGF	CL-16-RGF-S	CL-16-RGFN	1						3/4

## METRIC

—	CLM-10-RGF	CLM-10-RGF-S	CLM-10-RGFN	.394 (10mm)	.3937 (10mm)	M5	.18	.185	.177	—
—	CLM-12-RGF	CLM-12-RGF-S	CLM-12-RGFN	.472 (12mm)		M6				
—	CLM-16-RGF	CLM-16-RGF-S	CLM-16-RGFN	.630 (16mm)						
—	CLM-20-RGF	CLM-20-RGF-S	CLM-20-RGFN	.787 (20mm)						
—	CLM-25-RGF	CLM-25-RGF-S	CLM-25-RGFN	.984 (25mm)						

Round Grippers can be fastened from behind with a Socket-Head Cap Screw. Some gripper types also have an O.D. locking flat for fastening with a set screw.

5

# ROUND GRIPPERS (COUNTERBORED)

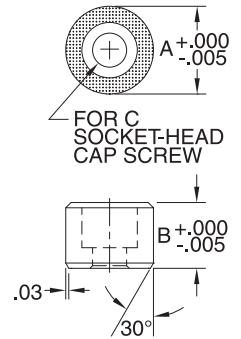
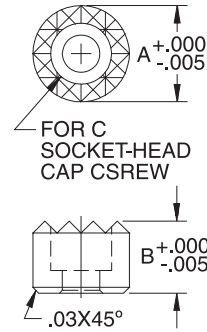
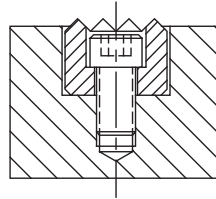
HARDENED TOOL STEEL: M-2 TOOL STEEL, HEAT TREATED RC 60-62, BLACK OXIDE FINISH  
 ABRASIVE DIAMOND: 17-4 STAINLESS STEEL, HEAT TREATED RC 43-46, WITH ABRASIVE DIAMOND SURFACE



**Hardened Tool Steel  
(Serrated)**



**Diamond Abrasive**



5

Counterbored Round Grippers are ideal for blind-hole installation and surface mounting. Fasten with a standard socket-head cap screw. The serrated version, made of hardened tool steel, is designed to slightly penetrate the workpiece to significantly increase gripping force. The abrasive-diamond version has an abrasive-diamond surface permanently fused to a hardened stainless steel pad. This abrasive surface, comparable to a 100-grit abrasive, provides significant holding force with relatively low clamping pressure and minimal surface marring. This diamond-particle surface also offers excellent wear resistance.

## INCH

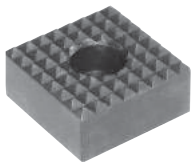
PART NO. HARDENED TOOL STEEL (SERRATED)	PART NO. DIAMOND ABRASIVE	A DIA	B	C	SERRATIONS (HARDENED TOOL STEEL VERSION)	
CL-8-RGB	CL-8-RGBD	1/2	3/8	#8	Fine	.125x90°
CL-10-RGB	CL-10-RGBD	5/8				
CL-12-RGB	CL-12-RGBD	3/4	1/2	#10		
CL-16-RGB	CL-16-RGBD	1				

## METRIC

CLM-12-RGB	CLM-12-RGBD	.472 (12mm)	.394 (10mm)	M4	Fine	.125x90°
CLM-16-RGB	CLM-16-RGBD	.630 (16mm)				
CLM-20-RGB	CLM-20-RGBD	.787 (20mm)	.472 (12mm)	M5		
CLM-25-RGB	CLM-25-RGBD	.984 (25mm)				

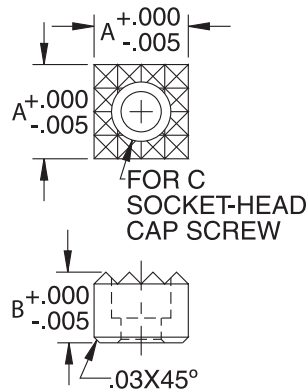
# SQUARE GRIPPERS (COUNTERBORED)

M-2 TOOL STEEL, HEAT TREATED RC 60-62, BLACK OXIDE FINISH



**Hardened Tool Steel  
(Serrated)**

Counterbored Round Grippers are ideal for blind-hole installation and surface mounting. Fasten with a standard socket-head cap screw.



## COUNTERBORED (INCH)

PART NO. HARDENED TOOL STEEL (SERRATED)	A	B	C	SERRATIONS	
CL-8-SGB	1/2	1/2	#10	Fine	.125x90°
CL-12-SGB	3/4				
CL-16-SGB	1	1/4			

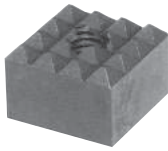
## COUNTERBORED (METRIC)

CLM-12-SGB	.472 (12mm)	.472 (12mm)	M4	Fine	.125x90°
CLM-20-SGB	.787 (20mm)				
CLM-25-SGB	.984 (25mm)	M6			

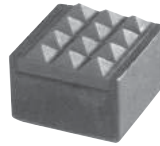


# SQUARE GRIPPERS

HARDENED TOOL STEEL: M-2 TOOL STEEL, HEAT TREATED RC 60-62, BLACK OXIDE FINISH  
 CARBIDE TIPPED: ALLOY STEEL, HEAT TREATED, WITH BRAZED CARBIDE INSERT, BLACK OXIDE FINISH  
 SOLID CARBIDE: CARBIDE WITH STEEL THREAD INSERT



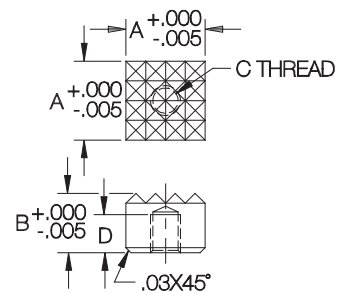
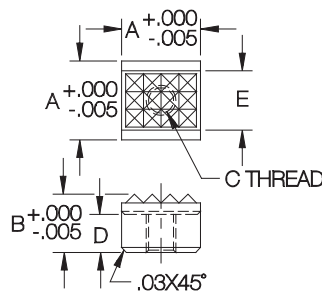
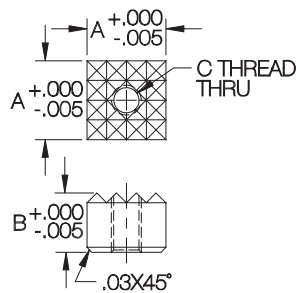
**Hardened Tool Steel (Serrated)**



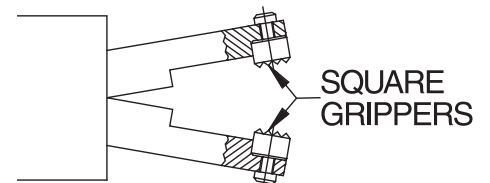
**Carbide Tipped (Serrated)**



**Solid Carbide (Serrated)**



Square Grippers are similar to Round Grippers, but their shape is useful when positive resistance to rotation is required (they can be mounted against a step to prevent rotation). These serrated grippers are hard, replaceable inserts that provide additional holding force and/or wear resistance when installed in a fixture. They are designed to slightly penetrate the workpiece to significantly increase gripping force, rather than relying on static friction alone. The hardened-tool-steel version is the most economical and impact resistant. The carbide-tipped version is still economical and impact resistant while providing extra durability. The solid-carbide version is the most durable.



Square Grippers can be mounted against a step for positive resistance to rotation.

## INCH

PART NO. HARDENED TOOL STEEL (SERRATED)	PART NO. CARBIDE TIPPED (SERRATED)	PART NO. SOLID CARBIDE (SERRATED)	A	B	C	D	E	SERRATIONS	
CL-6-SG	—	—	3/8	3/8	#10-32	—	—	XFine	.094x90°
CL-8-SG	CL-8-SGT	CL-8-SGC	1/2			3/16	13/32		
CL-12-SG	—	—	3/4			—	—	Fine	.125x90°
CL-16-SG	—	—	1			1/4-28	—		

## INCH

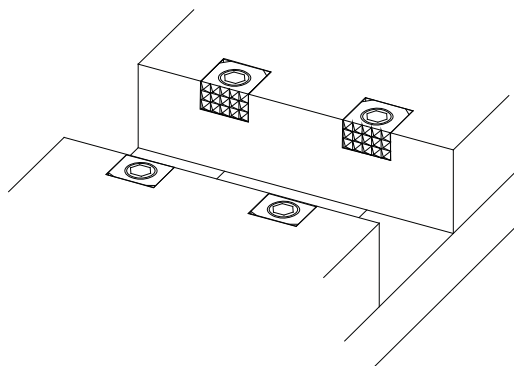
CLM-10-SG	—	—	.394(10mm)	.394 (10mm)	M5	—	—	XFine	.094x90°
CLM-12-SG	CLM-12-SGT	—	.472(12mm)			3/16	13/32		
CLM-20-SG	—	—	.787(20mm)			—	—	Fine	.125x90°
CLM-25-SG	—	—	.984(25mm)			M6	—		

# EDGE GRIPPERS

M-2 TOOL STEEL, HEAT TREATED RC 60-62, BLACK OXIDE FINISH



**Serrated  
Hardened Tool Steel**



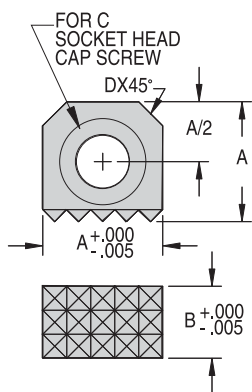
Edge Grippers are ideal for mounting at the top edge of a clamping face such as a vise jaw.

Edge Grippers are helpful for applications where traditional face-mounted grippers are difficult to install. They have a useful flat profile because the mounting screw is parallel to the serrated face. These serrated grippers are hard, replaceable inserts used to provide additional holding force and/or wear resistance when installed in a fixture. They are designed to slightly penetrate the workpiece to significantly increase gripping force, rather than relying on static friction alone. Edge Grippers should be mounted in a flat-bottom recess that provides support behind the gripper. Fasten with a standard socket-head cap screw (on the largest three sizes, a low-head cap screw can be used to keep the screw head below the top surface). The serrated face should project 50 to 100% of serration height for maximum effectiveness (serration height is .062" on grippers with fine serrations, .047" on grippers with extra-fine serrations, and .031" on grippers with super-fine serrations).

5

## INCH

PART NO.	A	B	SERRATIONS	C	COUNTERBORE DEPTH	D				
CL-6-EG-4	3/8	1/4	Extra Fine .094x90°	#6	.146	1/16				
CL-6-EG-4-SF			Super Fine .062x90°							
CL-6-EG-6		3/8	Extra Fine .094x90°							
CL-6-EG-6-SF			Super Fine .062x90°							
CL-8-EG-4	1/2	1/4	Fine .125x90°	#8	.170	3/32				
CL-8-EG-4-EF			Extra Fine .094x90°							
CL-8-EG-6		3/8	Fine .125x90°				.175			
CL-8-EG-6-EF			Extra Fine .094x90°							
CL-8-EG-8		1/2	Fine .125x90°							
CL-8-EG-8-EF			Extra Fine .094x90°							
CL-10-EG-4		5/8	1/4		Fine .125x90°		1/4	.130	1/8	
CL-10-EG-4-EF					Extra Fine .094x90°					
CL-10-EG-6	3/8		Fine .125x90°							
CL-10-EG-6-EF			Extra Fine .094x90°							
CL-10-EG-8	1/2		Fine .125x90°							
CL-10-EG-8-EF			Extra Fine .094x90°							
CL-12-EG-4	3/4		1/4	Fine .125x90°	5/16	.161				1/8
CL-12-EG-4-EF				Extra Fine .094x90°						
CL-12-EG-6		3/8	Fine .125x90°							
CL-12-EG-6-EF			Extra Fine .094x90°							
CL-12-EG-8		1/2	Fine .125x90°							
CL-12-EG-8-EF			Extra Fine .094x90°							
CL-16-EG-6		1	3/8	Fine .125x90°			3/8	.194	1/8	
CL-16-EG-6-EF				Extra Fine .094x90°						
CL-16-EG-8	1/2		Fine .125x90°							
CL-16-EG-8-EF			Extra Fine .094x90°							



## METRIC

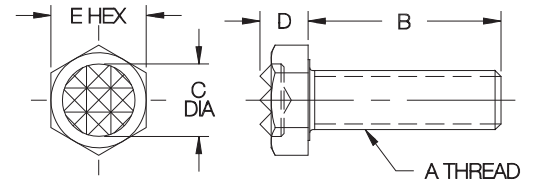
CLM-10-EG-6	.394(10mm)	.236(6mm)	Extra Fine	.094x90°	M3 or #6	.148	.06
CLM-10-EG-10		.394(10mm)					
CLM-12-EG-6	.472(12mm)	.236(6mm)	Fine	.125x90°	M4 or #8	.160	.09
CLM-12-EG-10		.394(10mm)					
CLM-12-EG-12		.472(12mm)					
CLM-16-EG-6	.630(16mm)	.236(6mm)	Fine	.125x90°	M6 or 1/4	.165	.13
CLM-16-EG-10		.394(10mm)					
CLM-16-EG-12		.472(12mm)					
CLM-20-EG-6	.787(20mm)	.236(6mm)	Fine	.125x90°	M8 or 5/16	.200	.13
CLM-20-EG-10		.394(10mm)					
CLM-20-EG-12		.472(12mm)					
CLM-25-EG-10	.984(25mm)	.394(10mm)	Fine	.125x90°	M10 or 3/8	.260	.13
CLM-25-EG-12		.472(12mm)					

# GRIPPER CONTACT BOLTS

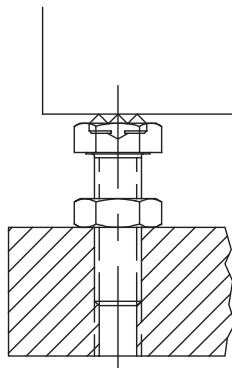
STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH, WITH BRAZED CARBIDE GRIPPER



**Carbide Tipped  
(Serrated)**



Fully threaded contact bolt with a carbide-tipped gripper head. Can be used as an adjustable support, or as a contact bolt in a clamp. Available in thread sizes from 1/4-20 to 5/8-11 (M6 to M16 in metric) each in a choice of lengths.



## INCH

PART NO.	A	B	C DIA	D	E	SERRATIONS	
CL-405-GCB	1/4-20	1/2	5/16	13/64	7/16	Extra Fine	.094x90°
CL-410-GCB		1					
CL-505-GCB	5/16-18	1/2	3/8	1/4	1/2	Fine	.125x90°
CL-510-GCB		1					
CL-515-GCB		1-1/2					
CL-605-GCB	3/8-16	1/2	1/2	9/32	9/16	Fine	.125x90°
CL-610-GCB		1					
CL-615-GCB		1-1/2					
CL-810-GCB	1/2-13	1	5/8	23/64	3/4	Fine	.125x90°
CL-815-GCB		1-1/2					
CL-1010-GCB	5/8-11	1	3/4	7/16	15/16	Fine	.125x90°
CL-1020-GCB		2					

## METRIC

CLM-612-GCB	M6	.47	5/16	.20	10mm	Extra Fine	.094x90°
CLM-625-GCB		.98					
CLM-812-GCB	M8	.47	3/8	.25	13mm	Fine	.125x90°
CLM-825-GCB		.98					
CLM-835-GCB		1.38					
CLM-1012-GCB	M10	.47	1/2	.30	17mm	Fine	.125x90°
CLM-1025-GCB		.98					
CLM-1040-GCB		1.57					
CLM-1225-GCB	M12	.98	5/8	.34	19mm	Fine	.125x90°
CLM-1240-GCB		1.57					
CLM-1635-GCB	M16	1.38	3/4	.43	24mm	Fine	.125x90°
CLM-1650-GCB		1.97					

# GRIPPER SWIVEL CONTACT BOLTS

BODY AND GRIPPER SCREW: STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH  
 SWIVEL BALL: 440C STAINLESS STEEL, HEAT TREATED. O-RING: RUBBER  
**INFO+:** SEE PAGES 180-181 FOR ROUND GRIPPER MATERIAL SPECIFICATIONS



**Hardened Tool Steel (Serrated)**



**Carbide Tipped (Serrated)**



**Solid Carbide (Serrated)**



**Abrasive Diamond**



**Bonded Urethane**

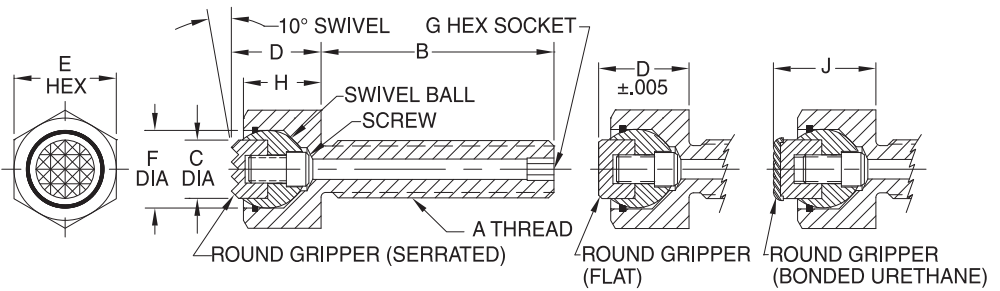


**Carbide Tipped (Flat)**



**Hardened Steel or Delrin® (Flat)**

Threaded contact bolt with a built-in swivel ball to hold a Round Gripper. This swivel ball, held by a retaining ring, is removable to allow installing any of the eleven different gripper types (order gripper separately). A fastening screw is furnished with the contact bolt. This screw serves as a positive stop to prevent the ball from swiveling too far. Can be used as a contact bolt, or as a support. Available in thread sizes from 3/8-16 to 1"-8 (M10 to M24 in metric), most in a choice of several lengths.



## BODY AND GRIPPER — ORDER SEPARATELY (INCH)

PART NO. BODY WITHOUT GRIPPER	PART NO. — ROUND GRIPPER							A	B	C DIA	D	E	F DIA	G	H	J	SERRATIONS	
	HARDENED TOOL STEEL (SERRATED)	CARBIDE TIPPED (SERRATED)	SOLID CARBIDE (SERRATED)	ABRASIVE DIAMOND	BONDED URETHANE	CARBIDE TIPPED (FLAT)	STEEL, SS, OR DELRIN® (FLAT)										Extra Fine	.094x90°
CL-605-GSB	CL-6-RG	CL-6-RGT	—	CL-6-RGD	CL-6-RGU-1	CL-6-RGFT	CL-6-RGF	3/8-16	1/2	3/8	5/8	5/8	1/2	1/8	1/2	3/4	Extra Fine	.094x90°
CL-610-GSB					CL-6-RGU-2		CL-6-RGF-S		1									
CL-615-GSB					CL-6-RGU-3		CL-6-RGFN		1-1/2									
CL-810-GSB	CL-8-RG	CL-8-RGT	CL-8-RGC	CL-8-RGD	CL-8-RGU-1	CL-8-RGFT	CL-8-RGF	1/2-13	1	1/2	3/4	13/16	5/8	3/16	5/8	7/8	Fine	.125x90°
CL-815-GSB					CL-8-RGU-2		CL-8-RGF-S		1-1/2									
					CL-8-RGU-3		CL-8-RGFN											
CL-1010-GSB	CL-10-RG	CL-10-RGT	CL-10-RGC	CL-10-RGD	CL-10-RGU-1	CL-10-RGFT	CL-10-RGF	5/8-11	1	5/8	13/16	15/16	3/4	1/4	11/16	15/16	Fine	.125x90°
CL-1020-GSB					CL-10-RGU-2		CL-10-RGF-S		2									
CL-1020-GSB					CL-10-RGU-3		CL-10-RGFN											
CL-1210-GSB	CL-12-RG	CL-12-RGT	CL-12-RGC	CL-12-RGD	CL-12-RGU-1	CL-12-RGFT	CL-12-RGF	3/4-10	1	3/4	7/8	1-1/8	7/8	5/16	3/4	1	Fine	.125x90°
CL-1210-GSB					CL-12-RGU-2		CL-12-RGF-S		2-1/2									
CL-1225-GSB					CL-12-RGU-3		CL-12-RGFN											
CL-1620-GSB	CL-16-RG	CL-16-RGT	—	CL-16-RGD	CL-16-RGU-1	CL-16-RGFT	CL-16-RGF	1"-8	2	1	1-1/8	1-1/2	1-1/8	3/8	1	1-1/4		

## BODY AND GRIPPER — ORDER SEPARATELY (METRIC)

CLM-1015-GSB	CLM-10-RG	CLM-10-RGT	—	CLM-10-RGD	CLM-10-RGU-1	—	CLM-10-RGF	M10	.59	.394	.669	17mm	.51	3mm	.51	.75	Extra Fine	.094x90°
CLM-1030-GSB					CLM-10-RGU-2		CLM-10-RGF-S		1.18									
					CLM-10-RGU-3		CLM-10-RGFN											
CLM-1220-GSB	CLM-12-RG	CLM-12-RGT	—	CLM-12-RGD	CLM-12-RGU-1	—	CLM-12-RGF	M12	.79	.472	.748	19mm	.59	5mm	.59	.83	Fine	.125x90°
CLM-1240-GSB					CLM-12-RGU-2		CLM-12-RGF-S		1.57									
					CLM-12-RGU-3		CLM-12-RGFN											
CLM-1625-GSB	CLM-16-RG	CLM-16-RGT	—	CLM-16-RGD	CLM-16-RGU-1	—	CLM-16-RGF	M16	.98	.630	.906	24mm	.79	6mm	.75	.98	Fine	.125x90°
CLM-1650-GSB					CLM-16-RGU-2		CLM-16-RGF-S		1.97									
					CLM-16-RGU-3		CLM-16-RGFN											
CLM-2030-GSB	CLM-20-RG	CLM-20-RGT	—	CLM-20-RGD	CLM-20-RGU-1	—	CLM-20-RGF	M20	1.18	.787	.945	30mm	.91	8mm	.79	1.02	Fine	.125x90°
CLM-2030-GSB					CLM-20-RGU-2		CLM-20-RGF-S		2.36									
CLM-2060-GSB					CLM-20-RGU-3		CLM-20-RGFN											
CLM-2440-GSB	CLM-25-RG	CLM-25-RGT	—	CLM-25-RGD	CLM-25-RGU-1	—	CLM-25-RGF	M24	1.57	.984	1.181	36mm	1.10	10mm	1.02	1.26		

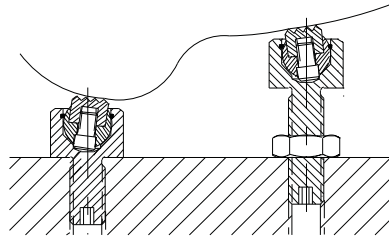
# GRIPPER SWIVEL CONTACT BOLTS

BODY: STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH  
O-RING: RUBBER

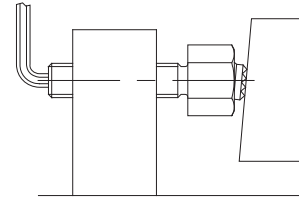
SERRATED SWIVEL BALL: HIGH-SPEED TOOL STEEL, BLACK OXIDE FINISH

FLAT SWIVEL BALL: STEEL, HARDENED, BLACK OXIDE FINISH

FLAT DELRIN® SWIVEL BALL: WHITE DELRI® 500



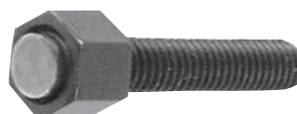
Gripper Swivel Contact Bolts are ideal as either fixed or adjustable supports under workpieces with curved or sloped surfaces.



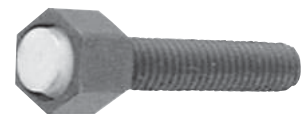
Gripper Swivel Contact Bolts can also be used as screw clamps by turning them with a hex wrench (large sizes only).



**Hardened Tool Steel (Serrated)**



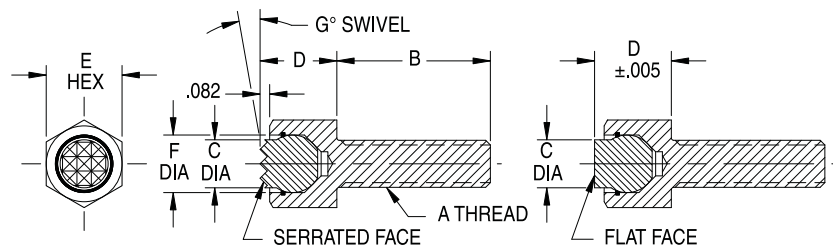
**Hardened Steel (Flat)**



**Delrin® (Flat)**

## Mini Sizes

Mini threaded contact bolt with a built-in swivel ball held by a retaining ring. Choose from the three gripper types shown, serrated or flat. The gripper face is machined directly on the swivel ball. A positive stop prevents the ball from swiveling too far. Can be used as a contact bolt, or as a support. Available in thread sizes from #10-32 to 5/16-18 (M6 to M8 in metric), most in a choice of several lengths.



## MINI — COMPLETE ASSEMBLY (INCH)

PART NO. — COMPLETE			A	B	C DIA	D	E	F DIA	G	SERRATIONS	
HARDENED TOOL STEEL (SERRATED)	HARDENED STEEL (FLAT)	DELRIN® (FLAT)								Super Fine	.062x90°
CL-305-GSB	CL-305-GBF	CL-305-GBFN	#10-32	1/2	5/32	5/16	3/8	3/16	14°	Super Fine	.062x90°
CL-405-GSB	CL-405-GBF	CL-405-GBFN	1/4-20	1/2	1/4	3/8	7/16	7/32			
CL-410-GSB	CL-410-GBF	CL-410-GBFN		1							
CL-415-GSB	CL-415-GBF	CL-415-GBFN		1-1/2							
CL-505-GSB	CL-505-GBF	CL-505-GBFN	5/16-18	1/2	5/16	7/16	1/2	3/8	14°	Extra Fine	.094x90°
CL-510-GSB	CL-510-GBF	CL-510-GBFN		1							
CL-515-GSB	CL-515-GBF	CL-515-GBFN		1-1/2							

## MINI — COMPLETE ASSEMBLY (METRIC)

CLM-612-GSB	CLM-612-GBF	CLM-612-GBFN	M6	.47	.24	.374	10mm	.28	14°	Super Fine	.062x90°
CLM-625-GSB	CLM-625-GBF	CLM-625-GBFN		.98							
CLM-640-GSB	CLM-640-GBF	CLM-640-GBFN		1.57							
CLM-812-GSB	CLM-812-GBF	CLM-812-GBFN	M8	.47	.33	.512	13mm	.39	12°	Extra Fine	.094x90°
CLM-825-GSB	CLM-825-GBF	CLM-825-GBFN		.98							
CLM-840-GSB	CLM-840-GBF	CLM-840-GBFN		1.57							

# GRIPPER SWIVEL PADS

BODY AND GRIPPER SCREW: STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH. O-RING: RUBBER  
 SWIVEL BALL ON STANDARD SIZES: 440C STAINLESS STEEL, HEAT TREATED  
**INFO+:** SEE PAGES 180-181 FOR ROUND GRIPPER MATERIAL SPECIFICATIONS



**Hardened Tool Steel (Serrated)**



**Carbide Tipped (Serrated)**



**Solid Carbide (Serrated)**



**Abrasive Diamond**



**Bonded Urethane**

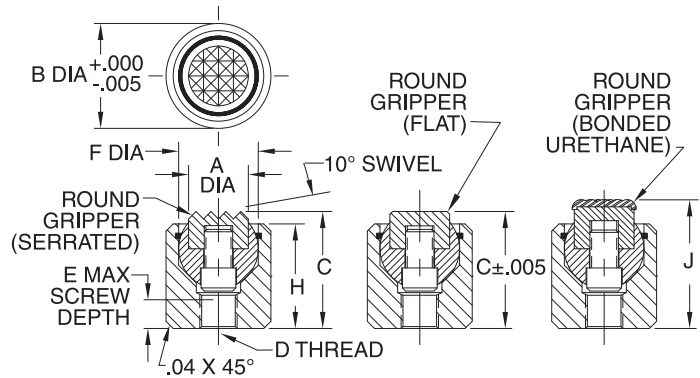


**Carbide Tipped (Flat)**



**Hardened Steel or Stainless, or Delrin® (Flat)**

Rest pad with a built-in swivel ball held by a retaining ring. A positive stop prevents the ball from swiveling too far. The swivel ball is removable to allow installing any of 11 different Round-Gripper types (order separately). Simply insert a hex wrench or rod to push the ball out from behind. Gripper Swivel Pads are available in a wide range of sizes. They can be surface-mounted or installed in a counterbored hole.



## BODY AND GRIPPER — ORDER SEPARATELY (INCH)

PART NO. BODY WITHOUT GRIPPER	PART NO. — ROUND GRIPPER							A DIA	B DIA	C	D	E	F DIA	H	J	SERRATIONS
	HARDENED TOOL STEEL (SERRATED)	CARBIDE TIPPED (SERRATED)	SOLID CARBIDE (SERRATED)	ABRASIVE DIAMOND	BONDED URETHANE	CARBIDE TIPPED (FLAT)	STEEL, SS, OR DELRIN® (FLAT)									
CL-6-GSP	CL-6-RG	CL-6-RGT	—	CL-6-RGD	CL-6-RGU-1 CL-6-RGU-2 CL-6-RGU-3	CL-6-RGFT	CL-6-RGF CL-6-RGF-S CL-6-RGFN	3/8	5/8	7/8	1/4-28	.24	1/2	3/4	1	XFine .094x90°
CL-8-GSP	CL-8-RG	CL-8-RGT	CL-8-RGC	CL-8-RGD	CL-8-RGU-1 CL-8-RGU-2 CL-8-RGU-3	CL-8-RGFT	CL-8-RGF CL-8-RGF-S CL-8-RGFN	1/2	13/16	1	5/16-24	.35	5/8	7/8	1-1/8	Fine .125x90°
CL-10-GSP	CL-10-RG	CL-10-RGT	CL-10-RGC	CL-10-RGD	CL-10-RGU-1 CL-10-RGU-2 CL-10-RGU-3	CL-10-RGFT	CL-10-RGF CL-10-RGF-S CL-10-RGFN	5/8	15/16	1	3/8-24	.28	3/4	7/8	1-1/8	
CL-12-GSP	CL-12-RG	CL-12-RGT	CL-12-RGC	CL-12-RGD	CL-12-RGU-1 CL-12-RGU-2 CL-12-RGU-3	CL-12-RGFT	CL-12-RGF CL-12-RGF-S CL-12-RGFN	3/4	1-1/8	1-1/16	1/2-20	.25	7/8	15/16	1-3/16	
CL-16-GSP	CL-16-RG	CL-16-RGT	—	CL-16-RGD	CL-16-RGU-1 CL-16-RGU-2 CL-16-RGU-3	CL-16-RGFT	CL-16-RGF CL-16-RGF-S CL-16-RGFN	1	1-1/2	1-3/8			.44	1-1/8	1-1/4	1-1/2

## BODY AND GRIPPER — ORDER SEPARATELY (METRIC)

CLM-10-GSP	CLM-10-RG	CLM-10-RGT	—	CLM-10-RGD	PART NO. — ROUND GRIPPER			10mm	.67	.866	M6	.29	.512	.71	.95	XFine .094x90°
					CLM-10-RGU-1 CLM-10-RGU-2 CLM-10-RGU-3	—	CLM-10-RGF CLM-10-RGF-S CLM-10-RGFN									
CLM-12-GSP	CLM-12-RG	CLM-12-RGT	—	CLM-12-RGD	CLM-12-RGU-1 CLM-12-RGU-2 CLM-12-RGU-3	—	CLM-12-RGF CLM-12-RGF-S CLM-12-RGFN	12mm	.75	.945	M8	.33	.591	.79	1.02	Fine .125x90°
CLM-16-GSP	CLM-16-RG	CLM-16-RGT	—	CLM-16-RGD	CLM-16-RGU-1 CLM-16-RGU-2 CLM-16-RGU-3	—	CLM-16-RGF CLM-16-RGF-S CLM-16-RGFN	16mm	.94	1.102	M10	.35	.787	.95	1.18	
CLM-20-GSP	CLM-20-RG	CLM-20-RGT	—	CLM-20-RGD	CLM-20-RGU-1 CLM-20-RGU-2 CLM-20-RGU-3	—	CLM-20-RGF CLM-20-RGF-S CLM-20-RGFN	20mm	1.18	1.181	M12	.33	.906	1.02	1.26	
CLM-25-GSP	CLM-25-RG	CLM-25-RGT	—	CLM-25-RGD	CLM-25-RGU-1 CLM-25-RGU-2 CLM-25-RGU-3	—	CLM-25-RGF CLM-25-RGF-S CLM-25-RGFN	25mm	1.42	1.417	M12	.47	1.102	1.26	1.50	

# GRIPPER SWIVEL PADS

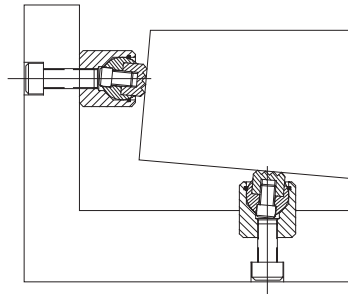
BODY: STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH

O-RING: RUBBER

SERRATED SWIVEL BALL: HIGH-SPEED TOOL STEEL, BLACK OXIDE FINISH

FLAT SWIVEL BALL: STEEL, HARDENED, BLACK OXIDE FINISH

FLAT DELRIN® SWIVEL BALL: WHITE DELRIN® 500



Gripper Swivel Pads can be surface mounted or installed in a counterbored hole.



**Hardened Tool Steel (Serrated)**



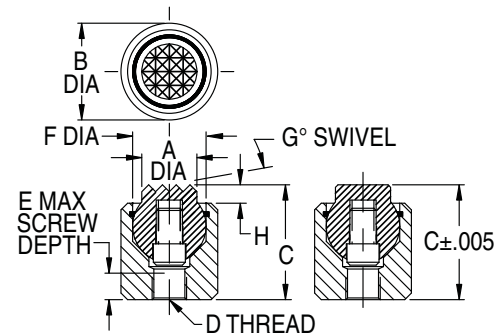
**Hardened Steel (Flat)**



**Delrin® (Flat)**

## Mini sizes

Mini-size rest pad with a built-in swivel ball held by a retaining ring. Choose from the three gripper types shown, serrated or flat. The gripper face is machined directly on the swivel ball. A positive stop prevents the ball from swiveling too far. Gripper Swivel Pads can be surface mounted or installed in a counterbored hole. Available in the following body diameters from 3/8 to 5/8" (10 to 17mm in metric).



## MINI — COMPLETE ASSEMBLY (INCH)

PART NO. — COMPLETE			A DIA	B DIA	C	D	E	F BALL DIA	G	H	SERRATIONS	
HARDENED TOOL STEEL (SERRATED)	HARDENED STEEL (FLAT)	DELRIN® (FLAT)									Super Fine	.062x90°
CL-3-GSPS	CL-3-GSPF	CL-3-GSPN	5/32	3/8	3/8	#4-40	1/4	3/16	14°	.062	Super Fine	.062x90°
CL-4-GSPS	CL-4-GSPF	CL-4-GSPN	1/4	7/16	7/16	#8-32	5/32	9/32	14°	.062	Extra Fine	.094x90°
CL-5-GSPS	CL-5-GSPF	CL-5-GSPN	5/16	1/2	9/16	#10-32	5/32	3/8	14°	.062	Extra Fine	.094x90°
CL-6-GSPS	CL-6-GSPF	CL-6-GSPN	3/8	5/8	15/16	1/4-28	1/4	1/2	17°	.125	Extra Fine	.094x90°

## MINI — COMPLETE ASSEMBLY (METRIC)

CLM-6-GSPS	CLM-6-GSPF	CLM-6-GSPN	.24	.39	.472	M4	.14	.276	14°	.059	SFine	.062x90°
CLM-8-GSPS	CLM-8-GSPF	CLM-8-GSPN	.33	.51	.630	M5	.25	.394	12°	.059	Extra Fine	.094x90°
CLM-10-GSPS	CLM-10-GSPF	CLM-10-GSPN	.39	.67	.768	M6	.27	.512	21°	.059	Extra Fine	.094x90°

# GRIPPER SWIVEL SCREWS

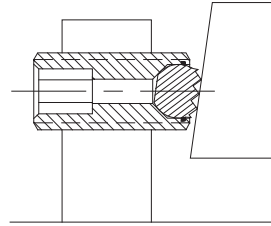
BODY: STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH  
 SWIVEL BALL: HIGH-SPEED TOOL STEEL



**Hardened Tool Steel (Serrated)**

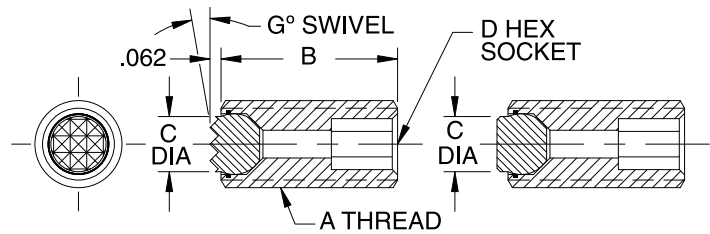


**Hardened Tool Steel (Flat)**



5

Screw clamp with a hardened tool steel swivel ball, either serrated or flat. A positive stop prevents the ball from swiveling too far. Serrated grippers are designed to slightly penetrate the workpiece to significantly increase gripping force, rather than relying on static friction alone. Available in thread sizes from 3/8-16 to 5/8-11 (M10 to M16 in metric) each in a choice of several lengths.



## COMPLETE ASSEMBLY (INCH)

PART NO. — COMPLETE		A	B	C DIA	D	G	SERRATIONS	
HARDENED TOOL STEEL (SERRATED)	HARDENED TOOL STEEL (FLAT)						Super Fine	
CL-605-GSS	CL-605-GSF	3/8-16	1/2	5/32	3/16	14°	Super Fine	.062x90°
CL-610-GSS	CL-610-GSF		1					
CL-620-GSS	CL-620-GSF		2					
CL-810-GSS	CL-810-GSF	1/2-13	1	1/4	1/4		Extra Fine	.094x90°
CL-820-GSS	CL-820-GSF		2					
CL-830-GSS	CL-830-GSF		3					
CL-1010-GSS	CL-1010-GSF	5/8-11	1	5/16	5/16			
CL-1020-GSS	CL-1020-GSF		2					
CL-1030-GSS	CL-1030-GSF		3					

## COMPLETE ASSEMBLY (METRIC)

PART NO. — COMPLETE		A	B	C DIA	D	G	SERRATIONS	
HARDENED TOOL STEEL (SERRATED)	HARDENED TOOL STEEL (FLAT)						Super Fine	
CLM-1025-GSS	CLM-1025-GSF	M10	.98	.16	5mm	15°	Super Fine	.062x90°
CLM-1050-GSS	CLM-1050-GSF		1.97					
CLM-1225-GSS	CLM-1225-GSF	M12	.98	.24	6mm	14°	Extra Fine	.094x90°
CLM-1250-GSS	CLM-1250-GSF		1.97					
CLM-1625-GSS	CLM-1625-GSF	M16	.98	.33	8mm	12°		
CLM-1650-GSS	CLM-1650-GSF		1.97					



# REST BUTTONS

## TYPES



### REST BUTTONS

Precision height locator with a close-tolerance shank for installation in a reamed hole. Rest Buttons are extremely useful as supports, side locator pads, and jig feet. Available in steel or stainless steel.



### SPHERICAL RADIUS LOCATOR BUTTONS

Precision height locator with a spherical-radius head to minimize workpiece contact area. Close-tolerance shank allows press-fit installation in a reamed hole.



### JIG REST BUTTONS

Precision height locator with a counterbored hole for mounting with a Socket-Head Cap Screw (not furnished). Jig Rest Buttons are extremely useful as supports, side locator pads, and jig feet.



### SCREW REST PADS

Precision height locator with a threaded shank for installation in a tapped hole. Cone shape provides a small contact area in combination with a large stable base. Screw Rest Pads are extremely useful as supports, side locator pads, and jig feet.



### SCREW REST BUTTONS

Threaded rest button with a hex head machined .005 to .010" over nominal height for finish grinding after installation.



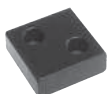
### DRILL JIG FEET

Precision jig foot available in four heights. Dowel in place to prevent rotation.



### DOUBLE-END JIG FEET

Tapped jig foot commonly used in pairs with a stud.



### JIG LEG PLATES

Precision ground pad with a large contact area. Can be used either as a jig foot, or as a rest pad for heavy workpieces. Choice of three sizes.



### HEAVY-DUTY REST PADS

Large, precision rest pad for heavy-duty applications. These hardened pads have a large, durable contact surface to support heavy workpieces, or to serve as wear plates. Choice of four sizes.

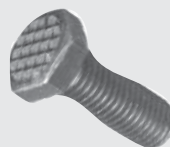
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## SEE ALSO:

HYDRAULIC WORK SUPPORTS:  
p. 619



GRIPPERS & CONTACT BOLTS:  
pp. 180-190



SCREW JACKS:  
pp. 198-199

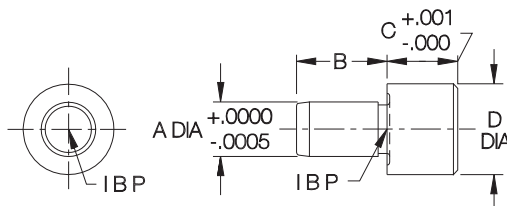


# REST BUTTONS

STEEL: 1144, HEAT TREATED RC 40-45 BLACK OXIDE FINISH  
 STAINLESS STEEL: 300-SERIES



Precision height locator with a close-tolerance shank for installation in a reamed hole. Rest Buttons are extremely useful as supports, side locator pads, and jig feet. Available in steel or stainless steel.



## STEEL (INCH)

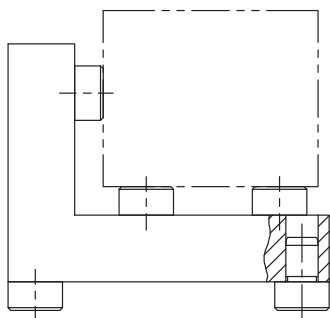
PART NO.	A DIA		B	C		D DIA
	NOMINAL	ACTUAL		NOMINAL	ACTUAL	
CL-12-RB	3/16	.1885	3/8	1/4	.2500	3/8
CL-13-RB				3/8	.3750	
CL-14-RB				1/2	.5000	
CL-2-RB	1/4	.2510	1/2	1/4	.2500	1/2
CL-3-RB				3/8	.3750	
CL-1-RB				1/2	.5000	
CL-5-RB	3/8	.3760	5/8	1/4	.2500	5/8
CL-6-RB				3/8	.3750	
CL-4-RB				1/2	.5000	
CL-7-RB				5/8	.6250	
CL-8-RB				3/4	.7500	
CL-15-RB	1/2	.5010	5/8	3/8	.3750	7/8
CL-9-RB				1/2	.5000	
CL-16-RB				5/8	.6250	
CL-17-RB	5/8	.6260	3/4	3/8	.3750	1
CL-10-RB				1/2	.5000	
CL-18-RB				3/4	.7500	
CL-19-RB	3/4	.7515	7/8	1/2	.5000	1-1/4
CL-11-RB				5/8	.6250	

## STAINLESS STEEL (INCH)

PART NO.	A DIA		B	C		D DIA
	NOMINAL	ACTUAL		NOMINAL	ACTUAL	
CL-26432	3/16	.1885	1/4	1/4	.2500	3/8
CL-26433				3/8	.3750	
CL-26434				1/2	.5000	
CL-26542	1/4	.2510	5/16	1/4	.2500	1/2
CL-26646	5/16	.3135	5/16	3/4	.7500	1/2

## STEEL (METRIC)

PART NO.	B DIA	A DIA	B	C	D DIA	
						NOMINAL
CLM-605-RB	6mm	.2372	.31	5mm	.1969	.39
CLM-610-RB				10mm	.3937	
CLM-805-RB	8mm	.3160	.39	5mm	.1969	.63
CLM-810-RB				10mm	.3937	
CLM-815-RB				15mm	.5906	
CLM-820-RB				20mm	.7874	
CLM-1010-RB	10mm	.3947	.47	10mm	.3937	.79
CLM-1015-RB				15mm	.5906	
CLM-1020-RB				20mm	.7874	



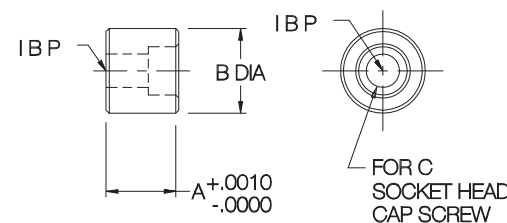
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# JIG REST BUTTONS

12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH



Precision height locator with a counterbored hole for mounting with a Socket-Head Cap Screw (not furnished). Jig Rest Buttons are extremely useful as supports, side locator pads, and jig feet.



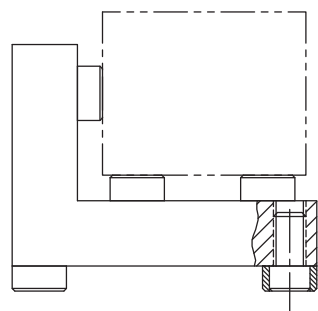
## INCH

PART NO.	B DIA	A		C	
		NOMINAL	ACTUAL		
CL-24-JRB	1/2	1/8	.1250	#8 Flat Head*	
CL-00-JRB		3/8	.3750		
CL-0-JRB		1/2	.5000		
CL-12-JRB	5/8	1/4	.2500	#10 Flat Head*	
CL-13-JRB		3/8	.3750		
CL-1-JRB		1/2	.5000		
CL-14-JRB		5/8	.6250	1/4	
CL-2-JRB		3/4	.7500		
CL-16-JRB	7/8	1	1.0000	5/16	
CL-17-JRB		3/8	.3750		1/4
CL-18-JRB		1/2	.5000		
CL-3-JRB	1-1/4	5/8	.6250	3/8	
CL-19-JRB		3/4	.7500		
CL-20-JRB		1	1.0000		
CL-25-JRB	1-1/4	1/2	.5000	3/8	
CL-21-JRB		3/4	.7500		
CL-6-JRB		1	1.0000		
CL-7-JRB		1-1/2	1.5000		
CL-8-JRB	2	2.0000			

## METRIC

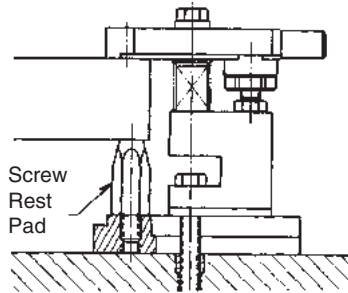
PART NO.	B DIA	A		C
		NOMINAL	ACTUAL	
CLM-1-JRB	.63	10mm	.3937	M5
CLM-2A-JRB		15mm	.5906	
CLM-4-JRB		10mm	.3937	
CLM-6A-JRB	.79	15mm	.5906	M6
CLM-7A-JRB		20mm	.7874	
CLM-8-JRB		25mm	.9843	
CLM-11A-JRB		15mm	.5906	
CLM-12A-JRB	.98	20mm	.7874	M8
CLM-13-JRB		25mm	.9843	
CLM-14A-JRB		20mm	.7874	
CLM-15-JRB	1.26	25mm	.9843	M10
CLM-16A-JRB		30mm	1.1811	
CLM-17A-JRB		50mm	1.9685	

\* Countersunk for Flat-head screw these sizes only.

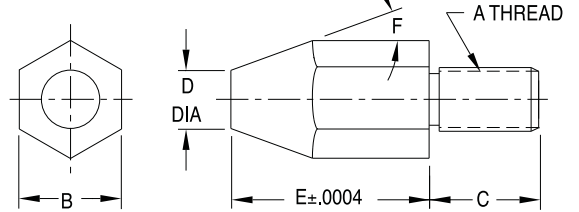


# SCREW REST PADS

12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH



Precision height locator with a threaded shank for installation in a tapped hole. Cone shape provides a small contact area in combination with a large stable base. Screw Rest Pads are extremely useful as supports, side locator pads, and jig feet.



## INCH

PART NO.	A	B	C	D DIA	E	F
CL-MF25-4801	5/16-18	3/4	5/8	5/16	.2500	75°
CL-MF25-4802					.3750	60°
CL-MF25-4803					.5000	35°
CL-MF25-4804					.7500	25°
CL-MF25-4805					1.0000	20°
CL-MF25-4806					1.2500	
CL-MF25-4807					1.5000	15°
CL-MF40-4801	1/2-13	7/8	15/16	1/2	.2500	
CL-MF40-4802					.3750	75°
CL-MF40-4803					.5000	60°
CL-MF40-4804					.7500	35°
CL-MF40-4805					1.0000	25°
CL-MF40-4806					1.2500	20°
CL-MF40-4807					1.5000	
CL-MF40-4808					2.0000	15°
CL-MF50-4801	5/8-11	1	1-1/4	5/8	.2500	
CL-MF50-4802					.3750	75°
CL-MF50-4803					.5000	60°
CL-MF50-4804					.7500	35°
CL-MF50-4805					1.0000	25°
CL-MF50-4806					1.2500	20°
CL-MF50-4807					1.5000	
CL-MF50-4808					2.0000	15°

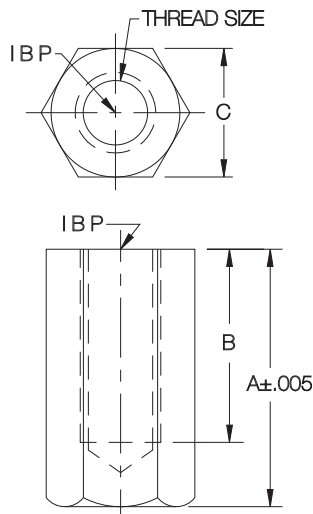
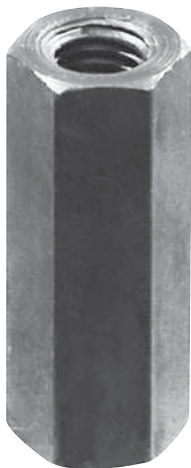
## METRIC

PART NO.	A	B	C	D DIA	E	F
CL-MF08-4801	M8	17mm	.63	.31	.1969 (5mm)	75°
CL-MF08-4802					.3937 (10mm)	60°
CL-MF08-4803					.5906 (15mm)	35°
CL-MF08-4804					.7874 (20mm)	25°
CL-MF08-4805					.9843 (25mm)	20°
CL-MF08-4806					1.1811 (30mm)	
CL-MF08-4808					1.5748 (40mm)	15°
CL-MF12-4801					M12	19mm
CL-MF12-4802	.3937 (10mm)	75°				
CL-MF12-4803	.5906 (15mm)	60°				
CL-MF12-4804	.7874 (20mm)	35°				
CL-MF12-4805	.9843 (25mm)	25°				
CL-MF12-4806	1.1811 (30mm)	20°				
CL-MF12-4808	1.5748 (40mm)					
CL-MF12-4810	1.9685 (50mm)	15°				
CL-MF16-4802	M16	24mm	1.26	.63	.3937 (10mm)	
CL-MF16-4803					.5906 (15mm)	60°
CL-MF16-4804					.7874 (20mm)	35°
CL-MF16-4805					.9843 (25mm)	25°
CL-MF16-4806					1.1811 (30mm)	20°
CL-MF16-4808					1.5748 (40mm)	
CL-MF16-4810					1.9685 (50mm)	15°

5

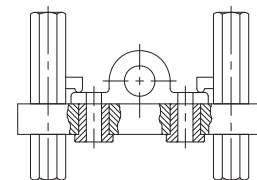
# DOUBLE-END JIG FEET

12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH



## INCH

PART NO.	THREAD SIZE	A	B	C
CL-1-DEJF	5/8-11	1.000	5/8	1
CL-3-DEJF		1.500	1	
CL-5-DEJF		2.000	1-1/2	
CL-7-DEJF		3.000		
CL-9-DEJF		4.000		
CL-10-DEJF		6.000		
CL-11-DEJF		8.000		



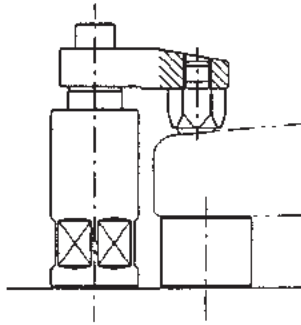
Tapped jig foot commonly used in pairs with a stud.

# SWIVEL CONTACT BOLTS

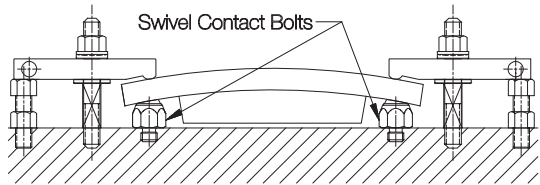
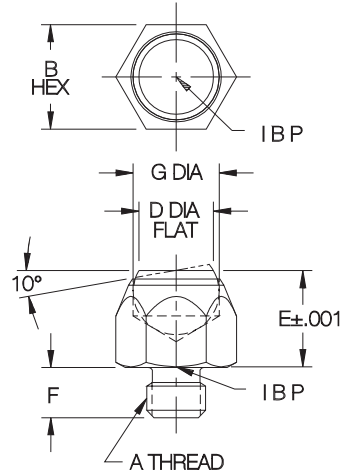
BALL: CHROME STEEL, HEAT TREATED RC 60-67  
 BODY: 1144 STEEL, HEAT TREATED RC 35-40, BLACK OXIDE FINISH



Precision swivel ball that can be used as either a contact bolt or rest pad.



Swivel Contact Bolts are ideal for evenly distributing clamping pressure on sloped surfaces.



Swivel Contact Bolts are precision ground for accurate height location, even on sloped surfaces. **INFO+:** See pages 396-399 for Riser Blocks, Extension Supports, and Height Shims.

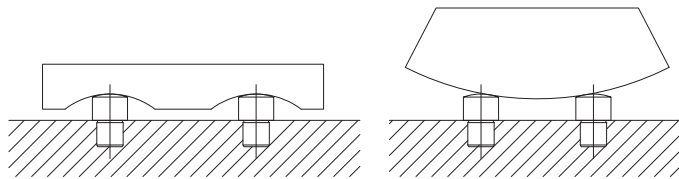
PART NO.	A	B	D DIA	E		F	G
				NOMINAL	ACTUAL		
CL-MF25-2502	5/16-18	9/16	13/32	1/2	.5000	.32	15/32
CL-MF30-2503	3/8-16	13/16	19/32	13/16	.8125	.47	23/32
CL-MF40-2501	1/2-13	7/8	5/8	13/16	.8125	.41	23/32
CL-MF50-2501	5/8-11	1-1/16	13/16	1	1.0000	.61	29/32

# SPHERICAL RADIUS LOCATOR BUTTONS

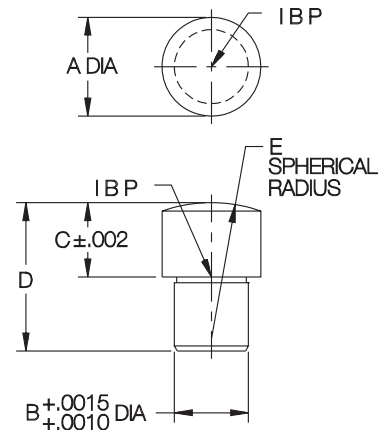
1144 STEEL, HEAT TREATED RC 40-45, BLACK OXIDE FINISH



Precision height locator with a spherical-radius head to minimize workpiece contact area. Close-tolerance shank allows press-fit installation in a reamed hole. Spherical-Radius Locator Buttons are extremely useful as supports, side locator pads, and jig feet.



PART NO.	B DIA	A DIA	C	D	E
CL-1-SLB	3/16	5/16	.1250	3/8	1/2
CL-2-SLB	1/4	3/8	.1875	1/2	5/8
CL-3-SLB	3/8	1/2	.1875	9/16	3/4
CL-4-SLB			.2500	5/8	
CL-5-SLB			.3750	3/4	
CL-6-SLB			.5000	7/8	



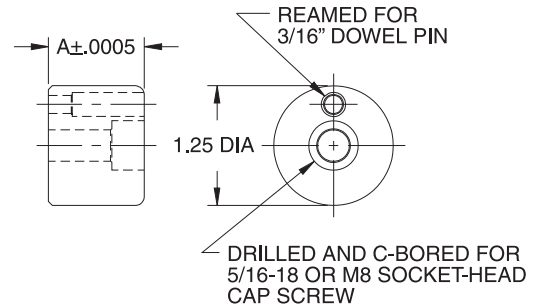
# DRILL JIG FEET

12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH



Precision jig foot available in four heights. Dowel in place to prevent rotation.

A	A
CL-1-DJF	.5000
CL-2-DJF	1.0000
CL-3-DJF	2.0000
CL-4-DJF	3.0000



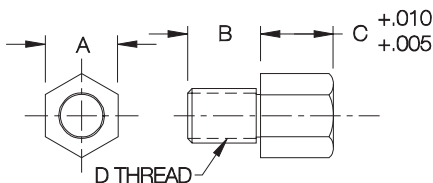
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# SCREW REST BUTTONS

12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH



Threaded rest button with a hex head machined .005 to .010" over nominal height for finish grinding after installation.



## INCH

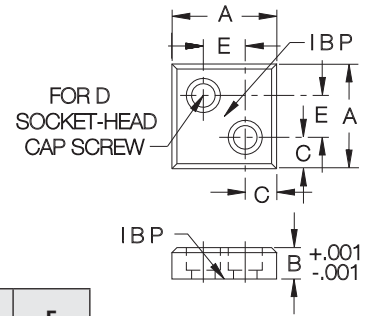
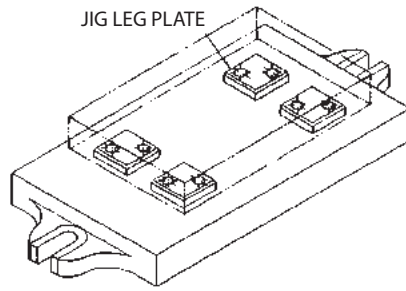
PART NO.	A	B	C		D
			NOMINAL	ACTUAL	
CL-1-SRB	3/8	3/8	1/4	.2500	1/4-20
CL-2-SRB			3/8	.3750	
CL-3-SRB			1/2	.5000	
CL-4-SRB			3/4	.7500	
CL-5-SRB			1	1.0000	
CL-6-SRB	1/2	1/2	1/4	.2500	3/8-16
CL-7-SRB			3/8	.3750	
CL-8-SRB			1/2	.5000	
CL-9-SRB			3/4	.7500	
CL-10-SRB	5/8	5/8	1	1.0000	1/2-13
CL-11-SRB			1/4	.2500	
CL-12-SRB			3/8	.3750	
CL-13-SRB			1/2	.5000	
CL-14-SRB			5/8	.6250	
CL-15-SRB			3/4	.7500	
CL-16-SRB			1	1.0000	

## METRIC

PART NO.	A	B	C		D
			NOMINAL	ACTUAL	
CLM-605-SRB	10mm	.39	5mm	.1969	M6
CLM-610-SRB			10mm	.3937	
CLM-615-SRB			15mm	.5906	
CLM-620-SRB			20mm	.7874	
CLM-625-SRB			25mm	.9843	
CLM-1005-SRB	13mm	.51	5mm	.1969	M10
CLM-1010-SRB			10mm	.3937	
CLM-1015-SRB			15mm	.5906	
CLM-1020-SRB			20mm	.7874	
CLM-1025-SRB			25mm	.9843	

# JIG LEG PLATES

1020 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH



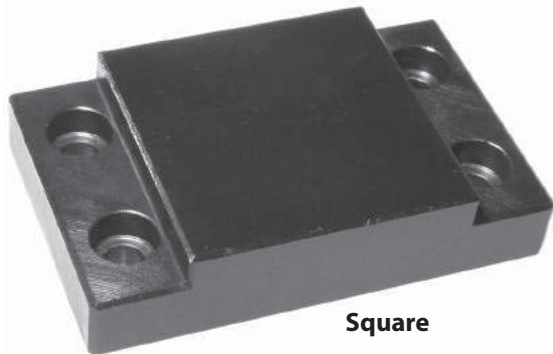
Precision ground pad with a large contact area. Can be used either as a jig foot, or as a rest pad for heavy workpieces. Choice of three sizes.

PART NO.	A	B	C	D	E
CL-1-JLP	1	.3125	5/16	#10-32 OR M5	3/8
CL-2-JLP	1-1/4	.3750	3/8	1/4-20 OR M6	1/2
CL-3-JLP	1-1/2	.4375	7/16		5/8

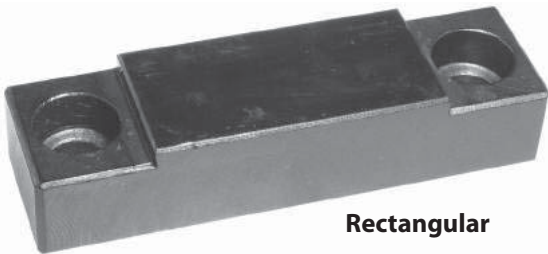
5

# HEAVY-DUTY REST PADS

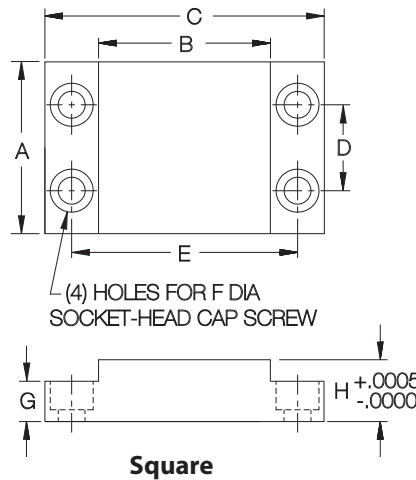
1018 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH



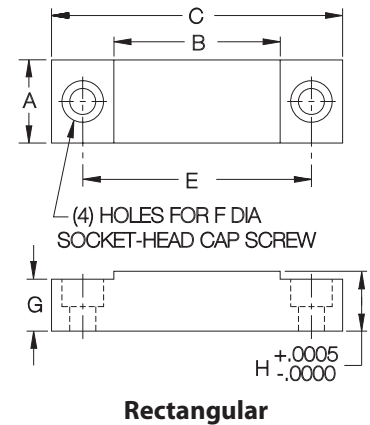
**Square**



**Rectangular**



**Square**



**Rectangular**

Large, precision rest pad for heavy-duty applications. These hardened pads have a large, durable contact surface to support heavy workpieces, or to serve as wear plates. Choice of four sizes.

## SQUARE

PART NO.	A	B	C	D	E	F	G	H
CL-1-HDRP	2	2	3-1/4	1	2-1/2	1/4-20 OR M6	1/2	.7500

## RECTANGULAR

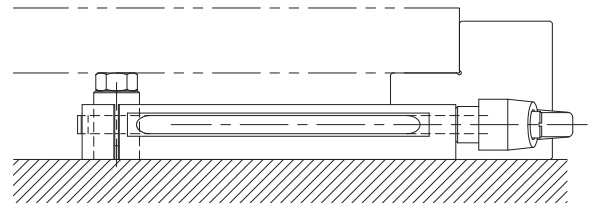
CL-2-HDRP	1	2	3-1/2	—	2-3/4	5/16-18 OR M8	5/8	.7500
CL-3-HDRP		3	4-1/2		3-3/4			
CL-4-HDRP		4	5-1/2		4-3/4			

# MANUAL WORK SUPPORTS

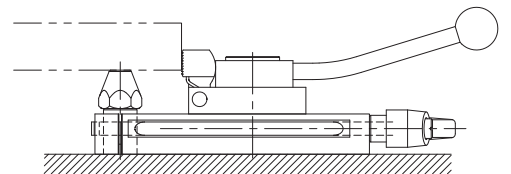
BODY & PLUNGER: CARBON STEEL, CASE HARDENED, BLACK OXIDE FINISH  
HANDLE: ZINC DIE CASTING, ENAMEL PAINT



Spring-extended work support with an extremely low profile. Ideal for supporting in hard-to-reach places, because the handle can be positioned for convenient access. Turning the handle counterclockwise unlocks the plunger, allowing the plunger to float. Turning the handle clockwise locks the plunger. If desired, the plunger can be locked in retracted position before loading, for easier loading of light parts. The zinc die-cast Adjustable Handle can be reset to any angle for best leverage.



Low profile allows reaching far underneath low workpieces.



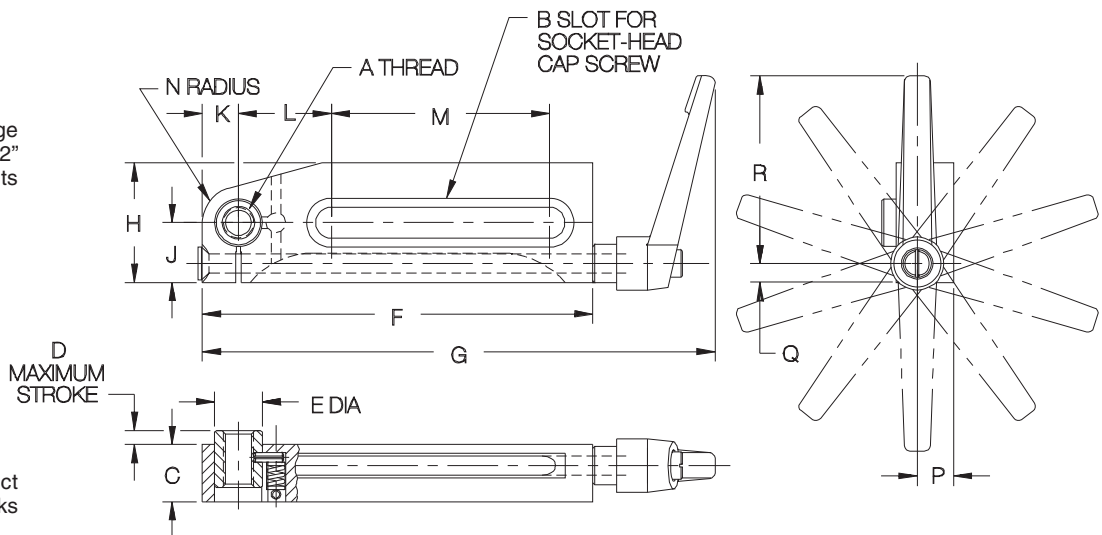
Mounting slot allows stacking other components, such as this Cam Edge Clamp, on top of the support.



Screw Rest Pads (INFO+ page 195), available from 1/4" to 2" tall, are ideal fixed contact bolts to use in the support plunger.



INFO+: For adjustable contact screws, see Knurled Screw Jacks (page 198).



## INCH

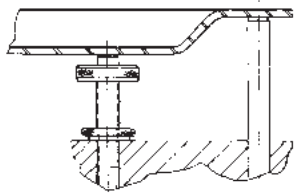
PART NO.	A	B	C	D	E DIA	F	G	H	J	K	L	M	N	P	Q	R	LOAD CAPACITY (LBS)
CL-MF25-5701	5/16-18	5/16-18 or M8	.708	.118	.591	3-3/8	5-1/16	1-3/16	25/32	13/32	1-1/16	1-13/32	13/32	.433	9/32	2-9/16	110
CL-MF40-5701	1/2-13	1/2-13 or M12	.945	.236	.787	6-1/2	8-9/16	2	1	19/32	1-17/32	3-9/16	19/32	.551	5/16	3-1/8	550
CL-MF50-5701	5/8-11	5/8-11 or M16	1.339	.433	1.102	7-1/2	10-7/16	2-3/8	1-9/16	13/16	1-3/4	4-1/16	13/16	.846	1/2	4-5/16	1100

## METRIC

PART NO.	A	B	C	D	E DIA	F	G	H	J	K	L	M	N	P	Q	R	LOAD CAPACITY (LBS)
CL-MF08-5701	M8	5/16-18 or M8	.708	.118	.591	3-3/8	5-1/16	1-3/16	25/32	13/32	1-1/16	1-13/32	13/32	.433	9/32	2-9/16	110
CL-MF12-5701	M12	1/2-13 or M12	.945	.236	.787	6-1/2	8-9/16	2	1	19/32	1-17/32	3-9/16	19/32	.551	5/16	3-1/8	550
CL-MF16-5701	M16	5/8-11 or M16	1.339	.433	1.102	7-1/2	10-7/16	2-3/8	1-9/16	13/16	1-3/4	4-1/16	13/16	.846	1/2	4-5/16	1100

# KNURLED SCREW JACKS

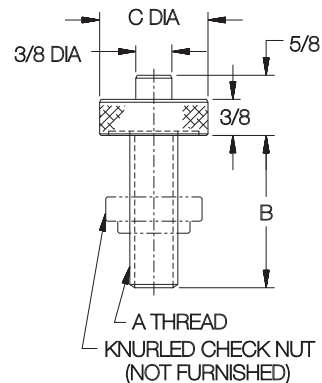
12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH



Knurled head allows quick, easy, finger adjustment. **INFO+:** Order Knurled Check Nut separately (page 264).

INCH

PART NO.	A	B	C DIA	KNURLED CHECK NUT (NOT FURNISHED)
CL-0-KSJ	5/16-18	1-5/8	7/8	CL-51618-TSJN
CL-1-KSJ	3/8-16	1-1/4	1-1/8	CL-3816-TSJN
CL-2-KSJ		1-5/8		
CL-3-KSJ		2		
CL-4-KSJ	1/2-13	1-1/4	1-1/8	CL-1213-TSJN
CL-5-KSJ		1-5/8		
CL-6-KSJ		2		
CL-7-KSJ		2-1/2		
CL-8-KSJ	5/8-11	1-5/8	1-3/8	CL-5811-TSJN
CL-9-KSJ		2		
CL-10-KSJ		2-1/2		



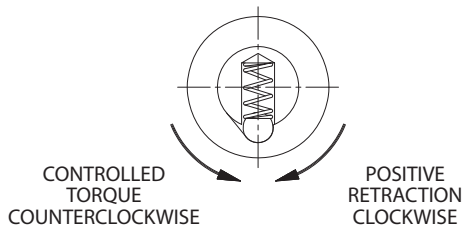
# TORQUE SCREW JACKS

12L14 STEEL, BLACK OXIDE FINISH

5

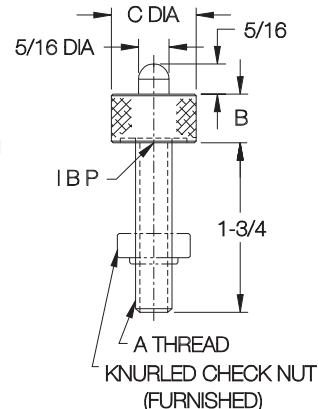


When indicated end force is reached, the knurled head disengages, eliminating the possibility of exerting excessive pressure on thinwall pieces. Furnished with Knurled Check Nut (**INFO+:** see page 264 for dimensions).



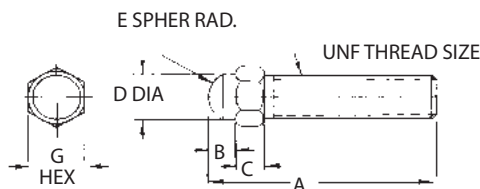
INCH

PART NO.	A	END FORCE (LBS)	B	C DIA	KNURLED CHECK NUT (FURNISHED)
CL-4-TSJ	1/4-20	12-14	7/16	7/8	CL-1420-TSJN
CL-4A-TSJ	5/16-18	14-16			CL-51618-TSJN
CL-5-TSJ	3/8-16	16-18	1/2	1-1/8	CL-3816-TSJN
CL-6-TSJ	1/2-13	18-20			CL-1213-TSJN
CL-8-TSJ	5/8-11	20-22			CL-5811-TSJN



# ADJUSTABLE LOCATING BUTTONS

12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH



A support screw with fine threads for precise adjustment. (Metric threads and CL-LB-2A are coarse).

INCH

PART NO.	THREAD SIZE	A	B	C	D DIA	E	G
CL-LB-1	#10-32	1	1/8	1/8	3/16	1/8	1/4
CL-LB-2	1/4-28	1-1/2	3/16	3/16	1/4	3/16	3/8
CL-LB-2A	1/4-20						
CL-LB-7	5/16-24	1-3/4	1/4	1/4	5/16	3/16	7/16
CL-LB-3	3/8-24	2			3/8	1/4	1/2
CL-LB-4	1/2-20	2-1/2	5/16	5/16	1/2	5/16	5/8
CL-LB-5	5/8-18	3	3/8	3/8	5/8	3/8	3/4
CL-LB-6	3/4-16	3-1/2	7/16	7/16	3/4	7/16	7/8

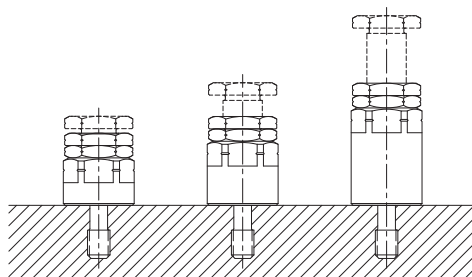
METRIC

CLM-5-LB	M5	.98	.12	.12	.20	.20	8mm
CLM-6-LB	M6	1.57	.20	.20	.24	.20	10mm
CLM-8-LB	M8	1.77	.24	.24	.31	.20	13mm
CLM-10-LB	M10	1.97			.39	.24	17mm
CLM-12-LB	M12	2.56	.31	.31	.47	.31	19mm
CLM-16-LB	M16	2.95	.39	.39	.63	.39	24mm

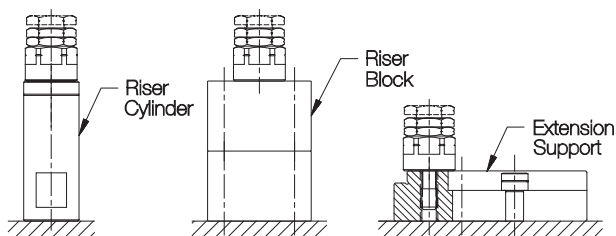
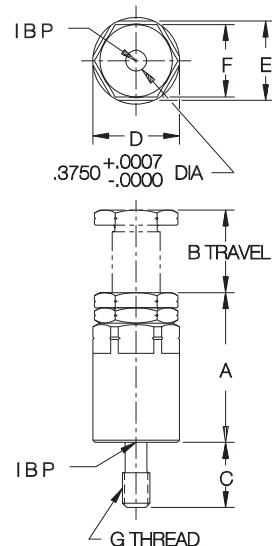


# HEAVY-DUTY SCREW JACKS

JACK SCREW: 4135 STEEL, HEAT TREATED, BLACK OXIDE FINISH  
 TIP: 1144 OR 1045 STEEL, HEAT TREATED, BLACK OXIDE FINISH  
 BODY: 1045 STEEL, BLACK OXIDE FINISH



Heavy-duty adjustable support that accepts any of the three tips shown below. Choice of three heights in each size cover the full range of height possibilities.



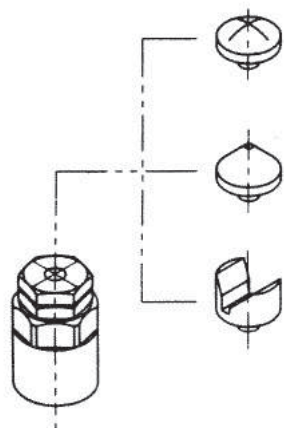
**INFO+:** For additional height and/or mounting flexibility, use Riser Cylinders (page 399), Support Riser Blocks (page 396), or Extension Supports (page 397).

## SCREW JACKS (INCH)

PART NO.	MOUNTING SCREW SIZE	A	B	C	D DIA	E	F	G
CL-MF40-3401	1/2-13	1-5/8	3/8	1-1/4	1-9/16	1-7/16	1-5/16	1/2-13
CL-MF40-3402		2	3/4					
CL-MF40-3403		2-3/4	1-1/2					
CL-MF50-3401	5/8-11	1-5/8	3/8	1-3/8	1-9/16	1-7/16	1-5/16	5/8-11
CL-MF50-3402		2	3/4					
CL-MF50-3403		2-3/4	1-1/2					

## SCREW JACKS (METRIC)

PART NO.	MOUNTING SCREW SIZE	A	B	C	D DIA	E	F	G
CL-MF12-3401	M12	1-5/8	3/8	1-1/4	1-9/16	1-7/16	1-5/16	M12
CL-MF12-3402		2	3/4					
CL-MF12-3403		2-3/4	1-1/2					
CL-MF16-3401	M16	1-5/8	3/8	1-3/8	1-9/16	1-7/16	1-5/16	M16
CL-MF16-3402		2	3/4					
CL-MF16-3403		2-3/4	1-1/2					



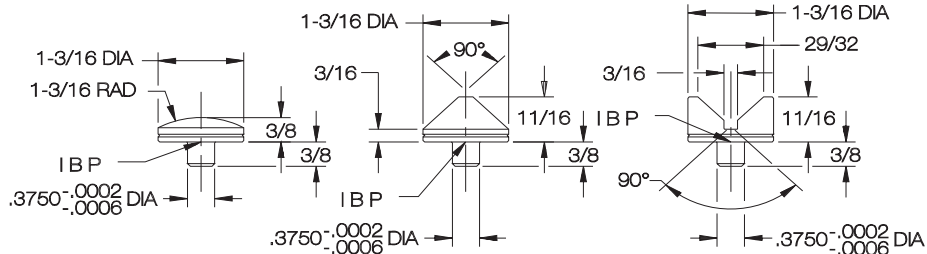
**Radius Tip**



**Conical Tip**



**V-Shaped Tip**



## SCREW-JACK TIPS

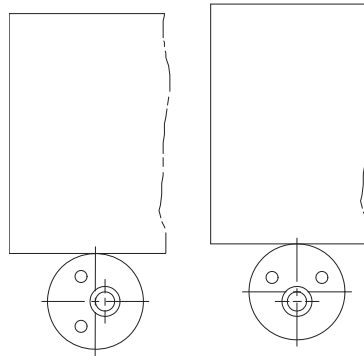
PART NO.	TYPE	FITS SCREW JACKS
CL-MF10-3501	RADIUS	ALL SIZES
CL-MF10-3502	CONICAL	
CL-MF10-3503	V-SHAPED	

# ECENTRIC LEVELING LUGS

12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH



Precision side locator that can be doweled in place after adjustment. Use for vertical leveling or horizontal locating. Available hardened, or soft to allow drilling and reaming after installation.

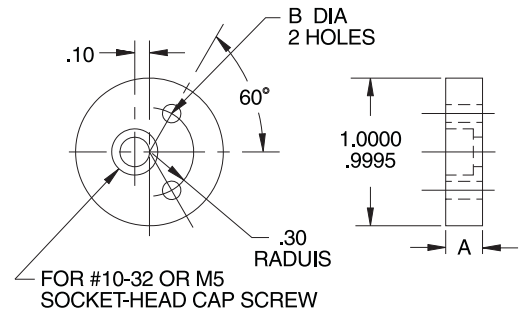


## HARDENED

PART NO.	A	B DIA
CL-3-ELL	1/4	1/8 REAMED
CL-4-ELL	3/8	

## SOFT

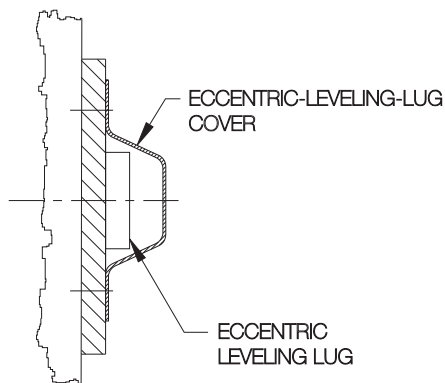
PART NO.	A	B DIA
CL-1-ELL	1/4	#31
CL-2-ELL	3/8	



5

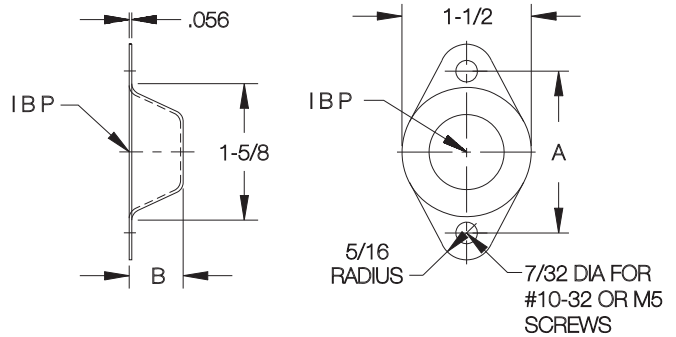
# ECENTRIC-LEVELING-LUG COVERS

MILD STEEL, BLACK OXIDE FINISH



Sturdy cover that protects an Eccentric Leveling Lug from damage or misadjustment after setting.

PART NO.	A	B
CL-1-COVER	1-7/8	5/8



# LOCATING PINS

## TYPES



### ROUND & DIAMOND PINS

Precision locating pins with a chamfered tip for easy part loading, and a shoulder to resist downward forces. Round Pins and Diamond Pins are frequently used together to locate from two holes in a workpiece, or align two pieces or a fixture, without binding.



### ROUND & DIAMOND LOCATING PINS

Functionally similar to Round and Diamond Pins, except with a wider selection of head diameters (including any custom diameter from .1150" to 1.0400") and a large shoulder to resist downward forces. Frequently used together to locate from two holes in a workpiece without binding.



### FLOATING LOCATING PINS

These locating pins slide in a slotted bushing to provide precise location in one axis while allowing considerable float in the perpendicular axis. Functionally similar to Diamond Pins, except that they allow greater variation in hole spacing.



### BULLET-NOSE DOWELS

Precision locating pin often used with a mating bushing to align two pieces of a fixture.



### BULLET-NOSE PINS

Bullet-nose round pins and diamond pins are often used together, each with a mating bushing, to align two pieces of a fixture. The pin's shank diameter and the bushing's OD are the same size, to allow boring the installation hole in both fixture pieces at the same time, for greater accuracy.



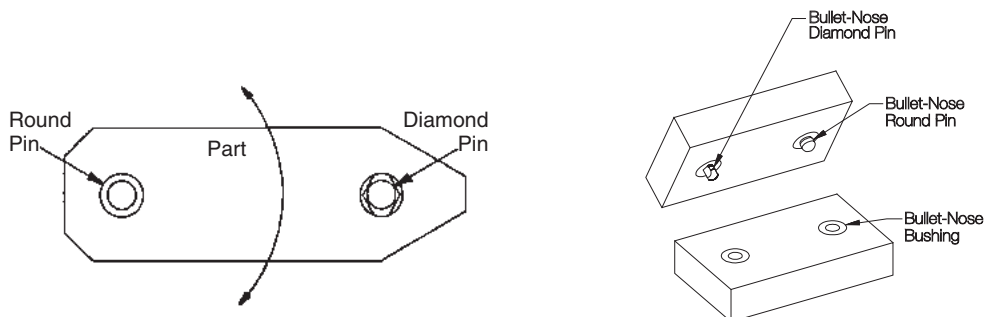
### CONE-LOCATOR PINS

Medium-accuracy tapered locating pin used with a mating tapered bushing. Can be used for quick assembly of two fixture pieces.

6

## TECHNICAL INFORMATION

Round Pins and Diamond Pins are frequently used together. Diamond Pins are relieved to locate only radially around the Round Pin, avoiding redundant location. This prevents binding while loading and unloading the part, yet still maintains high accuracy. The Round Pin serves as the primary, 2-axis locator, while the Diamond Pin is the secondary, 1-axis locator.



# ROUND & DIAMOND PINS

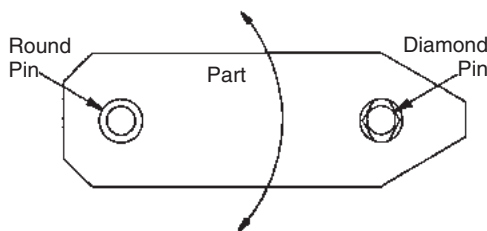
1144 STEEL, HEAT TREATED RC 50-55 K OXIDE FINISH



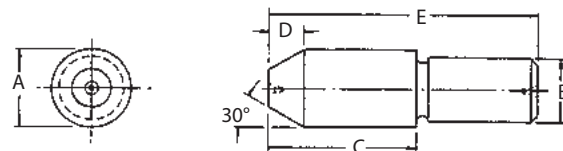
Round Pin



Diamond Pin



Round Pins and Diamond (relieved) Pins are frequently used together to locate from holes in a workpiece. Diamond Pins are relieved to locate only radially around the Round Pin, avoiding redundant location. This prevents binding while loading and unloading the part, yet still maintains high accuracy. Note: Round Pins also make excellent edge locators. Head and shank diameters are concentric to within .0005 TIR.

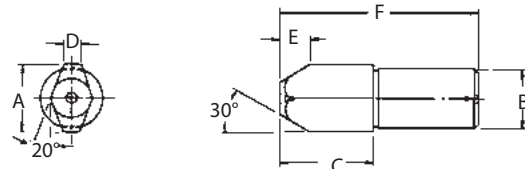


## ROUND PINS (INCH)

PART NO.	A HEAD DIA		B SHANK DIA		C	D	E
	NOMINAL	ACTUAL	NOMINAL	ACTUAL			
CL-1-RP	1/4	.2495/.2492	3/16	.1878/.1876	11/32	3/32	3/4
CL-2-RP	5/16	.3120/.3117	1/4	.2503/.2501	13/32		7/8
CL-3-RP	3/8	.3745/.3742	5/16	.3128/.3126	1/2	1/8	1
CL-4-RP	7/16	.4370/.4367	3/8	.3753/.3751	19/32		1-1/4
CL-5-RP	1/2	.4995/.4992	7/16	.4378/.4376	21/32	5/32	1-3/8
CL-6-RP	9/16	.5620/.5617	1/2	.5003/.5001	3/4	3/16	1-1/2
CL-7-RP	5/8	.6240/.6237	9/16	.5628/.5626	27/32	7/32	1-3/4
CL-8-RP	11/16	.6865/.6862	5/8	.6253/.6251	29/32		2
CL-9-RP	3/4	.7490/.7487	11/16	.6885/.6880	1	1/4	2-1/8
CL-10-RP	13/16	.8115/.8112	3/4	.7510/.7505	1-3/32	9/32	2-1/4
CL-11-RP	7/8	.8740/.8737	13/16	.8135/.8130	1-5/32		2-1/2
CL-12-RP	15/16	.9365/.9362	7/8	.8760/.8755	1-1/4	5/16	2-3/4
CL-13-RP	1	.9985/.9980	15/16	.9385/.9380	1-5/16		2-7/8

## ROUND PINS (METRIC)

CLM-60-RP	6mm	.2357/.2354	5mm	.1972/.1970	11/32	3/32	3/4
CLM-80-RP	8mm	.3145/.3142	6mm	.2365/.2363	13/32		7/8
CLM-100-RP	10mm	.3932/.3929	8mm	.3153/.3151	1/2	1/8	1
CLM-120-RP	12mm	.4719/.4716	10mm	.3940/.3938	21/32	5/32	1-3/8
CLM-140-RP	14mm	.5507/.5504	12mm	.4727/.4725	3/4	3/16	1-1/2
CLM-160-RP	16mm	.6289/.6286	14mm	.5515/.5513	27/32	7/32	1-3/4
CLM-180-RP	18mm	.7077/.7074	16mm	.6302/.6300	29/32		2
CLM-200-RP	20mm	.7864/.7861	18mm	.7097/.7092	1-3/32	9/32	2-1/4



## DIAMOND PINS (INCH)

PART NO.			A HEAD DIA				B SHANK DIA		C	D	E	F
X (Tight)	Y (Medium)	Z (Loose)	NOMINAL	X	Y	Z	NOMINAL	ACTUAL				
CL-1-DPX	CL-1-DPY	CL-1-DPZ	1/4	.2493/.2490	.2485/.2482	.2470/.2467	3/16	.1878/.1876	11/32	.062	3/32	3/4
CL-2-DPX	CL-2-DPY	CL-2-DPZ	5/16	.3118/.3115	.3110/.3107	.3095/.3092	1/4	.2503/.2501	13/32	.078		7/8
CL-3-DPX	CL-3-DPY	CL-3-DPZ	3/8	.3743/.3740	.3735/.3732	.3720/.3717	5/16	.3128/.3126	1/2	.093	1/8	1
CL-4-DPX	CL-4-DPY	CL-4-DPZ	7/16	.4368/.4365	.4360/.4357	.4345/.4342	3/8	.3753/.3751	19/32	.109	5/32	1-1/4
CL-5-DPX	CL-5-DPY	CL-5-DPZ	1/2	.4993/.4990	.4985/.4982	.4970/.4967	7/16	.4378/.4376	21/32	.125		1-3/8
CL-6-DPX	CL-6-DPY	CL-6-DPZ	9/16	.5615/.5610	.5595/.5590	.5575/.5570	1/2	.5003/.5001	3/4	.140	3/16	1-1/2
CL-7-DPX	CL-7-DPY	CL-7-DPZ	5/8	.6240/.6235	.6220/.6215	.6200/.6195	9/16	.5628/.5626	27/32	.156	7/32	1-3/4
CL-8-DPX	CL-8-DPY	CL-8-DPZ	11/16	.6865/.6860	.6845/.6840	.6825/.6820	5/8	.6253/.6251	29/32	.172		2
CL-9-DPX	CL-9-DPY	CL-9-DPZ	3/4	.7490/.7485	.7470/.7465	.7450/.7445	11/16	.6885/.6880	1	.187	1/4	2-1/8
CL-10-DPX	CL-10-DPY	CL-10-DPZ	13/16	.8115/.8110	.8095/.8090	.8075/.8070	3/4	.7510/.7505	1-3/32	.203	9/32	2-1/4
CL-11-DPX	CL-11-DPY	CL-11-DPZ	7/8	.8740/.8735	.8720/.8715	.8700/.8695	13/16	.8135/.8130	1-5/32	.219		2-1/2
CL-12-DPX	CL-12-DPY	CL-12-DPZ	15/16	.9365/.9360	.9345/.9340	.9325/.9320	7/8	.8760/.8755	1-1/4	.234	5/16	2-3/4
CL-13-DPX	CL-13-DPY	CL-13-DPZ	1	.9980/.9972	.9960/.9952	.9920/.9912	15/16	.9385/.9380	1-5/16	.250		2-7/8

## DIAMOND PINS (METRIC)

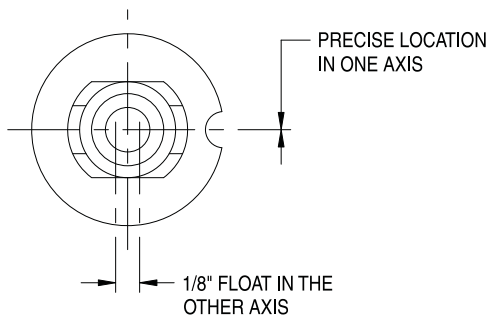
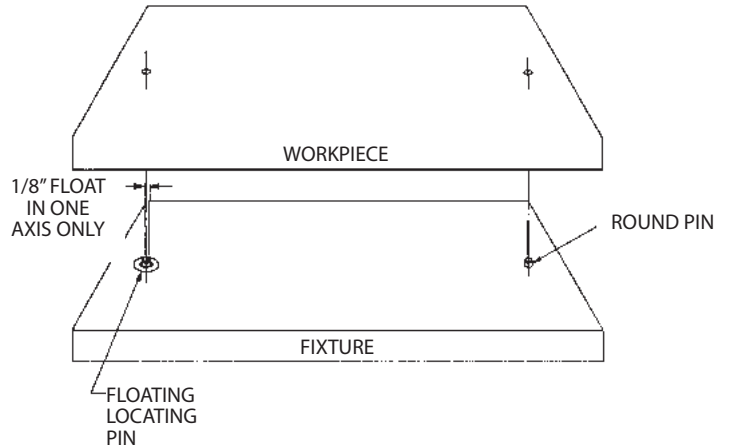
CLM-60-DPX	CLM-60-DPY	CLM-60-DPZ	6mm	.2355/.2352	.2347/.2344	.2332/.2329	5mm	.1972/.1970	11/32	.062	3/32	3/4
CLM-80-DPX	CLM-80-DPY	CLM-80-DPZ	8mm	.3143/.3140	.3135/.3132	.3120/.3117	6mm	.2365/.2363	13/32	.078		7/8
CLM-100-DPX	CLM-100-DPY	CLM-100-DPZ	10mm	.3930/.3927	.3922/.3919	.3907/.3904	8mm	.3153/.3151	1/2	.093	1/8	1
CLM-120-DPX	CLM-120-DPY	CLM-120-DPZ	12mm	.4717/.4714	.4709/.4706	.4694/.4691	10mm	.3940/.3938	21/32	.125	5/32	1-3/8
CLM-140-DPX	CLM-140-DPY	CLM-140-DPZ	14mm	.5502/.5497	.5482/.5477	.5462/.5457	12mm	.4727/.4725	3/4	.140	3/16	1-1/2
CLM-160-DPX	CLM-160-DPY	CLM-160-DPZ	16mm	.6289/.6284	.6269/.6264	.6249/.6244	14mm	.5515/.5513	27/32	.156	7/32	1-3/4
CLM-180-DPX	CLM-180-DPY	CLM-180-DPZ	18mm	.7077/.7072	.7057/.7052	.7037/.7032	16mm	.6302/.6300	29/32	.172		2
CLM-200-DPX	CLM-200-DPY	CLM-200-DPZ	20mm	.7864/.7859	.7844/.7839	.7824/.7819	18mm	.7097/.7092	1-3/32	.203	9/32	2-1/4

# FLOATING LOCATING PINS

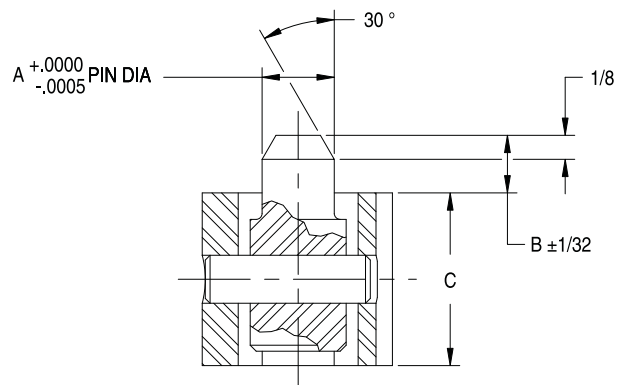
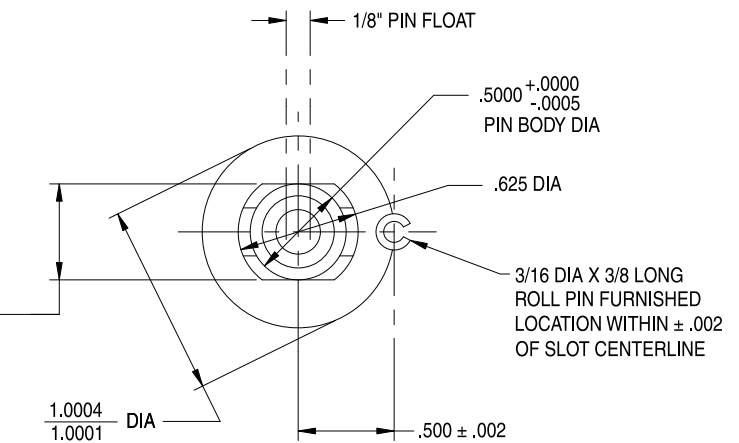
BODY: TOOL STEEL, HEAT TREATED, BLACK OXIDE FINISH  
PIN: 1144 STEEL, HEAT TREATED, BLACK OXIDE FINISH



Provides precise location in one axis while allowing considerable float in the perpendicular axis. Use in conjunction with a Round Pin when loose workpiece-hole tolerances require more float than a Diamond Pin would allow. Special pin diameters (A dimensions) are available. Please contact factory. Patent No. 3,381,554.



$\frac{.5001}{.5007}$  SLOT WIDTH  
CENTERED WITHIN  $.0005$  TIR



PART NO.	A DIA	B	C
CL-4-FLP	.2500	.300	.400
CL-4A-FLP	.2500	.300	.900
CL-5-FLP	.3125	.300	.400
CL-5A-FLP	.3125	.300	.900
CL-6-FLP	.3750	.300	.400
CL-6A-FLP	.3750	.300	.900
CL-8-FLP	.5000	.300	.400
CL-8A-FLP	.5000	.300	.900
CL-10-FLP	.6250	.310	.400
CL-10A-FLP	.6250	.310	.900

# ROUND & DIAMOND LOCATING PINS

1144 STEEL, HEAT TREATED RC 50-55, BLACK OXIDE FINISH



**Press-Fit Type Round Pin**



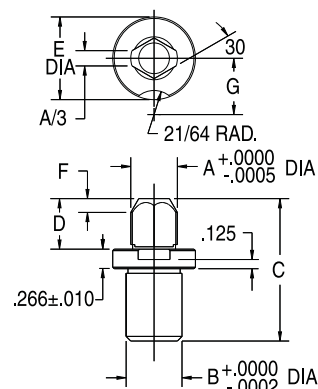
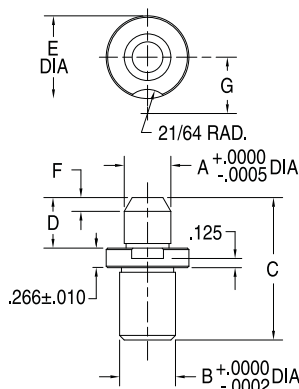
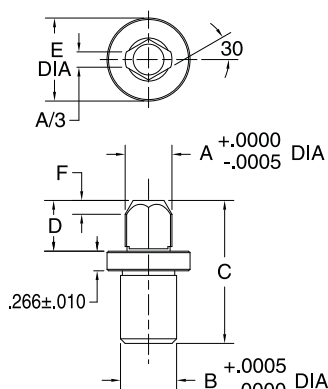
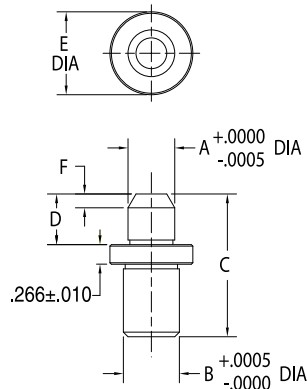
**Press-Fit Type Diamond Pin**



**Lockscrew-Type Round Pin**



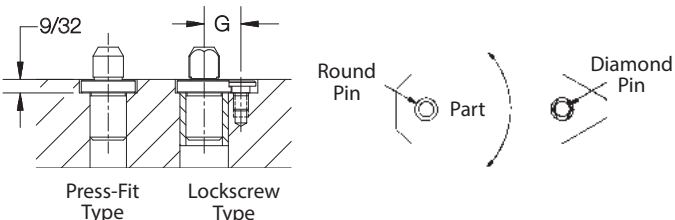
**Lockscrew-Type Diamond Pin**



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Similar in function to the Round and Diamond Pins (INFO+) on page 202, except with a wider selection of head diameters. The added shoulder also resists forces from above, even when the head diameter is smaller than the shank diameter.

Available either with a press-fit shank for permanent installation, or a slip-fit shank and lockscrew slot for renewable installation. Each nominal head diameter is available in a choice of two fits: medium or tight. Head and shank diameters are concentric to within .0005 TIR.



Special head diameters (A dimensions) are readily available in any of the four standard shank diameters:

5 = 5/16" shank (.1150-.3180 head dia)  
 8 = 1/2" shank (.2780-.5040 head dia)  
 12 = 3/4" shank (.4640-.7540 head dia)  
 16 = 1" shank (.7140-1.0040 head dia)

Example: For a press-fit round pin with a 1/2-inch shank and A=.4000 inches, order CL-8-RPT-.4000.

Order liner bushings and lock screws separately. See table below for proper sizes. (See drill-bushing catalog section for additional dimensions).

## METRIC HEAD DIAMETER

PRESS-FIT TYPE		LOCKSREW TYPE		B SHANK DIA	A HEAD DIA		C	D	E DIA	F	G	LINER PART NO.	HEAD LINER PART NO.	LOCK-SREW PART NO.
ROUND PIN PART NO.	DIAMOND PIN PART NO.	ROUND PIN PART NO.	DIAMOND PIN PART NO.		NOMINAL	ACTUAL								
CL-5-RPT-.2347	CL-5-DPT-.2347	CL-5-RLT-.2347	CL-5-DLT-.2347	5/16	6mm	.2347	1-3/16	7/16	5/8	3/32	33/64	L-32-8	HL-32-8	LS-1
CL-5-RPT-.2357	CL-5-DPT-.2357	CL-5-RLT-.2357	CL-5-DLT-.2357			.2357								
CL-8-RPT-.3130	CL-8-DPT-.3130	CL-8-RLT-.3130	CL-8-DLT-.3130	1/2	8mm	.3130	1-1/2	1/2	7/8	11/82	41/64	L-48-12	HL-48-12	
CL-8-RPT-.3140	CL-8-DPT-.3140	CL-8-RLT-.3140	CL-8-DLT-.3140			.3140								
CL-8-RPT-.3917	CL-8-DPT-.3917	CL-8-RLT-.3917	CL-8-DLT-.3917			.3917								
CL-8-RPT-.3927	CL-8-DPT-.3927	CL-8-RLT-.3927	CL-8-DLT-.3927			.3927								
CL-8-RPT-.4704	CL-8-DPT-.4704	CL-8-RLT-.4704	CL-8-DLT-.4704	3/4	14mm	.4704	1-15/16	11/16	1-1/8	3/16	49/64	L-64-164	HL-64-164	
CL-8-RPT-.4714	CL-8-DPT-.4714	CL-8-RLT-.4714	CL-8-DLT-.4714			.4714								
CL-12-RPT-.5492	CL-12-DPT-.5492	CL-12-RLT-.5492	CL-12-DLT-.5492	1	20mm	.5492	2-5/8	1	1-1/2	9/32	61/64	L-88-22	HL-88-22	
CL-12-RPT-.5502	CL-12-DPT-.5502	CL-12-RLT-.5502	CL-12-DLT-.5502			.5502								
CL-12-RPT-.6279	CL-12-DPT-.6279	CL-12-RLT-.6279	CL-12-DLT-.6279			.6279								
CL-12-RPT-.6289	CL-12-DPT-.6289	CL-12-RLT-.6289	CL-12-DLT-.6289			.6289								
CL-12-RPT-.7067	CL-12-DPT-.7067	CL-12-RLT-.7067	CL-12-DLT-.7067			.7067								
CL-12-RPT-.7077	CL-12-DPT-.7077	CL-12-RLT-.7077	CL-12-DLT-.7077			.7077								
CL-16-RPT-.7854	CL-16-DPT-.7854	CL-16-RLT-.7854	CL-16-DLT-.7854			.7854								
CL-16-RPT-.7864	CL-16-DPT-.7864	CL-16-RLT-.7864	CL-16-DLT-.7864			.7864								

# ROUND & DIAMOND LOCATING PINS

## INCH HEAD DIAMETER

PRESS-FIT TYPE		LOCKSCREW TYPE		B SHANK DIA	A HEAD DIA		C	D	E DIA	F	G	LINER PART NO.	HEAD LINER PART NO.	LOCK-SCREW PART NO.									
ROUND PIN PART NO.	DIAMOND PIN PART NO.	ROUND PIN PART NO.	DIAMOND PIN PART NO.		NOMINAL	ACTUAL																	
CL-123-RPT	CL-123-DPT	CL-123-RLT	CL-123-DLT	5/16	1/8	.1235	1-3/16	7/16	5/8	3/32	33/64	L-32-8	HL-32-8										
CL-124-RPT	CL-124-DPT	CL-124-RLT	CL-124-DLT		.1245																		
CL-154-RPT	CL-154-DPT	CL-154-RLT	CL-154-DLT		5/32	.1548																	
CL-155-RPT	CL-155-DPT	CL-155-RLT	CL-155-DLT			.1558																	
CL-186-RPT	CL-186-DPT	CL-186-RLT	CL-186-DLT		3/16	.1860																	
CL-187-RPT	CL-187-DPT	CL-187-RLT	CL-187-DLT			.1870																	
CL-217-RPT	CL-217-DPT	CL-217-RLT	CL-217-DLT		7/32	.2173																	
CL-218-RPT	CL-218-DPT	CL-218-RLT	CL-218-DLT			.2183																	
CL-248-RPT	CL-248-DPT	CL-248-RLT	CL-248-DLT		1/4	.2485																	
CL-249-RPT	CL-249-DPT	CL-249-RLT	CL-249-DLT			.2495																	
CL-279-RPT	CL-279-DPT	CL-279-RLT	CL-279-DLT		9/32	.2798																	
CL-280-RPT	CL-280-DPT	CL-280-RLT	CL-280-DLT			.2808																	
CL-311-RPT	CL-311-DPT	CL-311-RLT	CL-311-DLT		5/16	.3110																	
CL-312-RPT	CL-312-DPT	CL-312-RLT	CL-312-DLT			.3120																	
CL-310-RPT	CL-310-DPT	CL-310-RLT	CL-310-DLT		1/2	5/16									.3105	1-1/2	1/2	7/8	1/8	41/64	L-48-12	HL-48-12	
CL-3115-RPT	CL-3115-DPT	CL-3115-RLT	CL-3115-DLT			.3115																	
CL-341-RPT	CL-341-DPT	CL-341-RLT	CL-341-DLT	11/32		.3418																	
CL-342-RPT	CL-342-DPT	CL-342-RLT	CL-342-DLT			.3428																	
CL-373-RPT	CL-373-DPT	CL-373-RLT	CL-373-DLT	3/8		.3730																	
CL-374-RPT	CL-374-DPT	CL-374-RLT	CL-374-DLT			.3740																	
CL-404-RPT	CL-404-DPT	CL-404-RLT	CL-404-DLT	13/32		.4043																	
CL-405-RPT	CL-405-DPT	CL-405-RLT	CL-405-DLT			.4053																	
CL-435-RPT	CL-435-DPT	CL-435-RLT	CL-435-DLT	7/16		.4355																	
CL-436-RPT	CL-436-DPT	CL-436-RLT	CL-436-DLT			.4365																	
CL-466-RPT	CL-466-DPT	CL-466-RLT	CL-466-DLT	15/32		.4668																	
CL-467-RPT	CL-467-DPT	CL-467-RLT	CL-467-DLT			.4678																	
CL-498-RPT	CL-498-DPT	CL-498-RLT	CL-498-DLT	1/2		.4980																	
CL-499-RPT	CL-499-DPT	CL-499-RLT	CL-499-DLT			.4990																	
CL-4980-RPT	CL-4980-DPT	CL-4980-RLT	CL-4980-DLT	3/4		1/2	.4980	1-15/16	11/16	1-1/8	3/16	49/64	L-64-16	HL-64-16									
CL-4990-RPT	CL-4990-DPT	CL-4990-RLT	CL-4990-DLT			.4990																	
CL-529-RPT	CL-529-DPT	CL-529-RLT	CL-529-DLT		17/32	.5293																	
CL-530-RPT	CL-530-DPT	CL-530-RLT	CL-530-DLT			.5303																	
CL-560-RPT	CL-560-DPT	CL-560-RLT	CL-560-DLT		9/16	.5605																	
CL-561-RPT	CL-561-DPT	CL-561-RLT	CL-561-DLT			.5615																	
CL-591-RPT	CL-591-DPT	CL-591-RLT	CL-591-DLT		19/32	.5918																	
CL-592-RPT	CL-592-DPT	CL-592-RLT	CL-592-DLT			.5928																	
CL-623-RPT	CL-623-DPT	CL-623-RLT	CL-623-DLT		5/8	.6230																	
CL-624-RPT	CL-624-DPT	CL-624-RLT	CL-624-DLT			.6240																	
CL-654-RPT	CL-654-DPT	CL-654-RLT	CL-654-DLT		21/32	.6543																	
CL-655-RPT	CL-655-DPT	CL-655-RLT	CL-655-DLT			.6553																	
CL-685-RPT	CL-685-DPT	CL-685-RLT	CL-685-DLT		11/16	.6855																	
CL-686-RPT	CL-686-DPT	CL-686-RLT	CL-686-DLT			.6865																	
CL-716-RPT	CL-716-DPT	CL-716-RLT	CL-716-DLT		23/32	.7168																	
CL-717-RPT	CL-717-DPT	CL-717-RLT	CL-717-DLT			.7178																	
CL-748-RPT	CL-748-DPT	CL-748-RLT	CL-748-DLT	3/4	.7480																		
CL-749-RPT	CL-749-DPT	CL-749-RLT	CL-749-DLT		.7490																		
CL-7480-RPT	CL-7480-DPT	CL-7480-RLT	CL-7480-DLT	1	3/4	.7480	2-5/8	1	1-1/2	9/32	61/64	L-88-22	HL-88-22										
CL-7490-RPT	CL-7490-DPT	CL-7490-RLT	CL-7490-DLT		.7490																		
CL-779-RPT	CL-779-DPT	CL-779-RLT	CL-779-DLT		25/32	.7793																	
CL-780-RPT	CL-780-DPT	CL-780-RLT	CL-780-DLT			.7803																	
CL-810-RPT	CL-810-DPT	CL-810-RLT	CL-810-DLT		13/16	.8105																	
CL-811-RPT	CL-811-DPT	CL-811-RLT	CL-811-DLT			.8115																	
CL-841-RPT	CL-841-DPT	CL-841-RLT	CL-841-DLT		27/32	.8418																	
CL-842-RPT	CL-842-DPT	CL-842-RLT	CL-842-DLT			.8428																	
CL-873-RPT	CL-873-DPT	CL-873-RLT	CL-873-DLT		7/8	.8730																	
CL-874-RPT	CL-874-DPT	CL-874-RLT	CL-874-DLT			.8740																	
CL-904-RPT	CL-904-DPT	CL-904-RLT	CL-904-DLT		29/32	.9043																	
CL-905-RPT	CL-905-DPT	CL-905-RLT	CL-905-DLT			.9053																	
CL-935-RPT	CL-935-DPT	CL-935-RLT	CL-935-DLT		15/16	.9355																	
CL-936-RPT	CL-936-DPT	CL-936-RLT	CL-936-DLT			.9365																	
CL-966-RPT	CL-966-DPT	CL-966-RLT	CL-966-DLT		31/32	.9668																	
CL-967-RPT	CL-967-DPT	CL-967-RLT	CL-967-DLT			.9678																	
CL-998-RPT	CL-998-DPT	CL-998-RLT	CL-998-DLT	1	.9980																		
CL-999-RPT	CL-999-DPT	CL-999-RLT	CL-999-DLT		.9990																		

# BULLET-NOSE PINS

1144 STEEL, HEAT TREATED RC 50-62, BLACK OXIDE FINISH



**Bullet-Nose Round Pin**



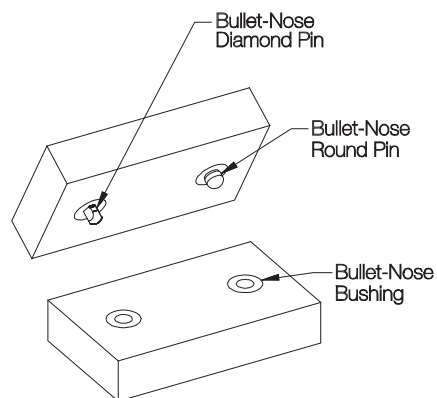
**Bullet-Nose Diamond Pin**



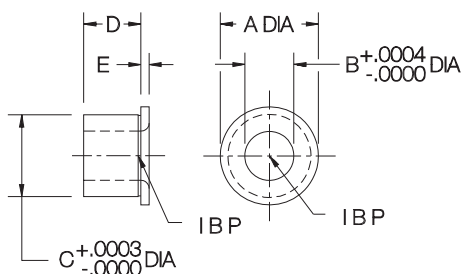
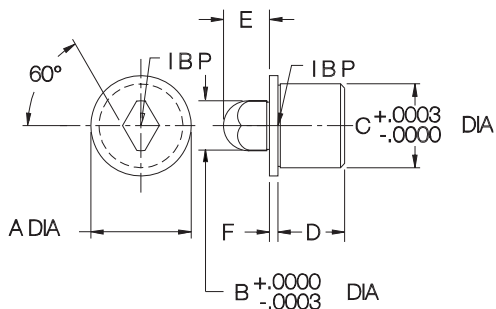
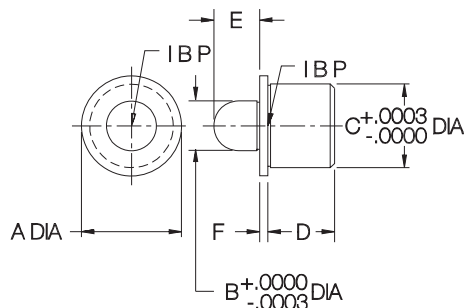
**Bushing**

Bullet-Nose Round Pins and Diamond Pins are often used together (with matching bushings) to align two pieces of a fixture. The Diamond Pin is relieved, to locate only radially around the round pin, avoiding redundant location. This prevents binding, yet still maintains high accuracy.

The pin's shank diameter and the bushing's OD are the same size to allow boring the installation hole in both fixture pieces at the same time, for greater accuracy. The pin's head and shank diameters are concentric to within .0005 TIR. The bushing's ID and OD are concentric to within .0003 TIR.



6



## ROUND PINS (INCH)

PART NO.	A DIA	B HEAD DIA		C SHANK DIA		D	E	F
		NOMINAL	ACTUAL	NOMINAL	ACTUAL			
CL-8-BND	9/16	1/4	.2499	13/32	.4075	3/8	7/32	1/16
CL-9-BND	5/8	5/16	.3124	1/2	.5014		9/32	
CL-10-BND	3/4	3/8	.3748	5/8	.6265	1/2	11/32	1/8
CL-11-BND	7/8	1/2	.4998	3/4	.7515		13/32	
CL-12-BND	1-1/8	3/4	.7498	1	1.0015	3/4	9/16	1/8
CL-13-BND	1-1/2	1	.9998	1-3/8	1.3768		3/4	

## ROUND PINS (METRIC)

CLM-6-BRP	.512	6mm	.2361	10mm	.3950	.35	.24	.079
CLM-8-BRP	.591	8mm	.3149	12mm	.4738		.28	
CLM-10-BRP	.709	10mm	.3935	15mm	.5921	.43	.35	.079
CLM-12-BRP	.866	12mm	.4722	18mm	.7102		.39	

## DIAMOND PINS (INCH)

CL-8-BDP	9/16	1/4	.2499	13/32	.4075	3/8	7/32	1/16
CL-9-BDP	5/8	5/16	.3124	1/2	.5014		9/32	
CL-10-BDP	3/4	3/8	.3748	5/8	.6265	1/2	11/32	1/8
CL-11-BDP	7/8	1/2	.4998	3/4	.7515		13/32	
CL-12-BDP	1-1/8	3/4	.7498	1	1.0015	3/4	9/16	1/8
CL-13-BDP	1-1/2	1	.9998	1-3/8	1.3768		3/4	

## DIAMOND PINS (METRIC)

CLM-6-BDP	.512	6mm	.2361	10mm	.3950	.35	.24	.079
CLM-8-BDP	.591	8mm	.3149	12mm	.4738		.28	
CLM-10-BDP	.709	10mm	.3935	15mm	.5921	.43	.35	.079
CLM-12-BDP	.866	12mm	.4722	18mm	.7102		.39	

## BUSHINGS (INCH)

PART NO.	A DIA	B DIA		C DIA		D	E
		NOMINAL	ACTUAL	NOMINAL	ACTUAL		
CLB-8000	9/16	1/4	.2501	13/32	.4075	7/16	1/16
CLB-9000	5/8	5/16	.3126	1/2	.5014		
CLB-10000	3/4	3/8	.3751	5/8	.6265	1/2	1/8
CLB-11000	7/8	1/2	.5001	3/4	.7515		
CLB-12000	1-1/8	3/4	.7502	1	1.0015	11/16	1/8
CLB-13000	1-1/2	1	1.0002	1-3/8	1.3768		

## BUSHINGS (METRIC)

CLM-6-B	.512	6mm	.2363	10mm	.3950	.31	.079
CLM-8-B	.591	8mm	.3151	12mm	.4738		
CLM-10-B	.709	10mm	.3938	15mm	.5921	.39	.079
CLM-12-B	.866	12mm	.4725	18mm	.7102		



# BULLET-NOSE DOWELS

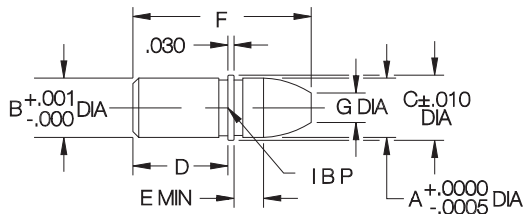
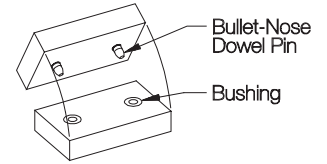
1144 STEEL, HEAT TREATED RC 50-62, BLACK OXIDE FINISH



**Dowel Pin**

**Bushing**

Precision locating pin often used with a matching bushing to align two pieces of a fixture. The pin's head and shank diameters are concentric to within .0005 TIR. The bushing's ID and OD are concentric to within .0003 TIR.



## DOWEL PINS (INCH)

PART NO.	A HEAD DIA		B SHANK DIA		C DIA	D	E	F	G DIA
	NOMINAL	ACTUAL	NOMINAL	ACTUAL					
CL-1-BND	1/4	.2499	1/4	.2510	.280	1/2	.12	.90	1/8
CL-2-BND	5/16	.3124	5/16	.3135	.344		.15	.94	5/32
CL-3-BND	3/8	.3749	3/8	.3760	.407		.18	1.03	3/16
CL-4-BND	1/2	.4999	1/2	.5010	.532		.18	1.09	1/4

## DOWEL PINS (METRIC)

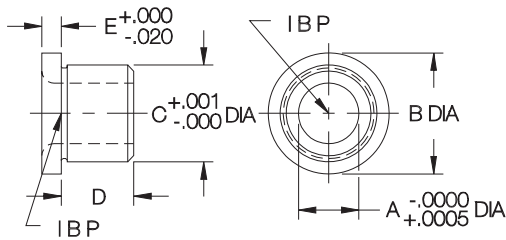
PART NO.	A DIA	ACTUAL	B DIA	ACTUAL	C DIA	D	E	F	
									CLM-60-BND
CLM-80-BND	8mm	.3149	8mm	.3160	.354	.15	.91	.16	
CLM-100-BND	10mm	.3936	10mm	.3947	.433	.19	.98	.20	
CLM-120-BND	12mm	.4723	12mm	.4734	.512	.19	1.06	.24	

## BUSHINGS (INCH)

PART NO.	A DIA		B DIA	C DIA		D	E
	NOMINAL	ACTUAL		NOMINAL	ACTUAL		
CLB-1000	1/4	.2501	.625	1/2	.5002	3/8	.100
CLB-2000	5/16	.3126	.750	5/8	.6253	1/2	
CLB-3000	3/8	.3751	.875	3/4	.7504	5/8	
CLB-4000	1/2	.5001					

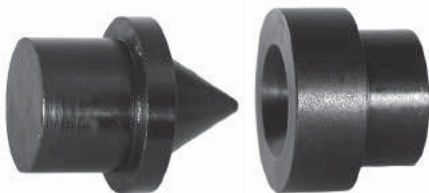
## BUSHINGS (METRIC)

PART NO.	A DIA	ACTUAL	B DIA	ACTUAL	C DIA	D	E
CLM-80-B	8mm	.3151	.591	12mm	.4726		
CLM-100-B	10mm	.3938	.709	15mm	.5909	.354	
CLM-120-B	12mm	.4725	.866	18mm	.7091	.472	



# CONE LOCATOR PINS

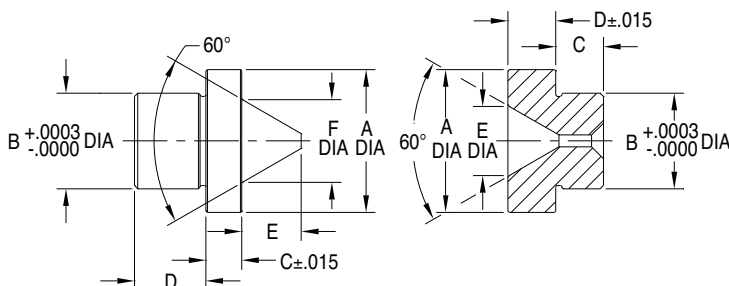
12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH



**Pin**

**Bushing**

Medium-accuracy locating pin that compensates for misalignment to allow quick assembly of two fixture pieces.



## PINS

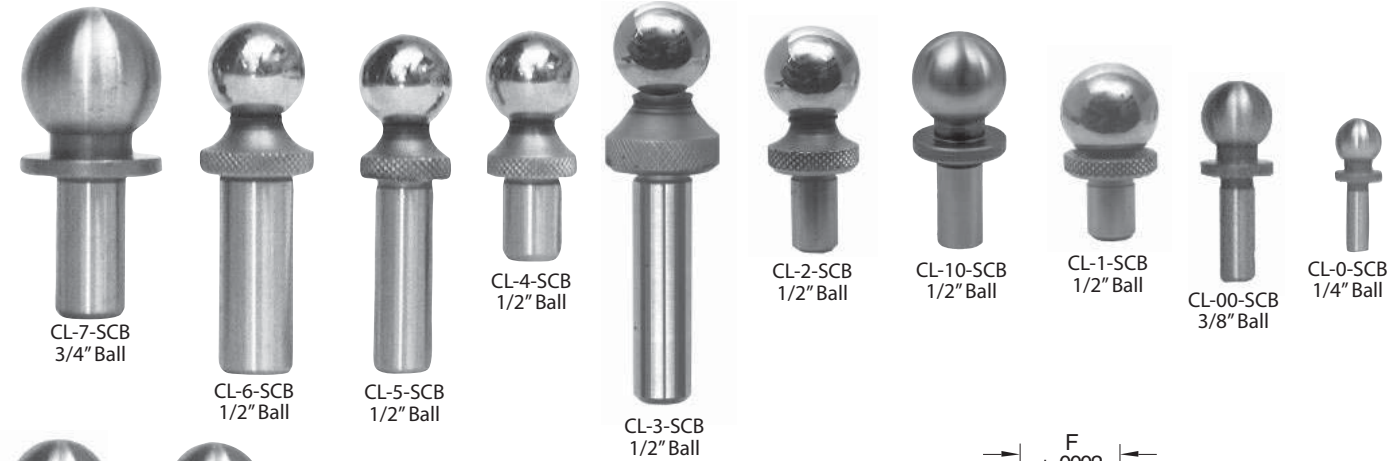
PART NO.	A DIA	B DIA	C	D	E	F DIA
CL-7-CLP	1	.7515		9/16	1/2	.676

## BUSHINGS

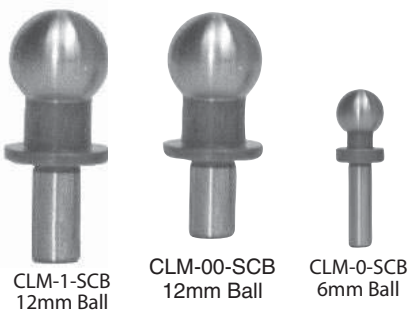
PART NO.	A DIA	B DIA	C	D	E DIA	GAP BETWEEN HEADS WITH PIN & BUSHING ASSEMBLED
CL-7-CLB	1	.7515	3/8	3/8	.616	.043-.061

# CONSTRUCTION BALLS

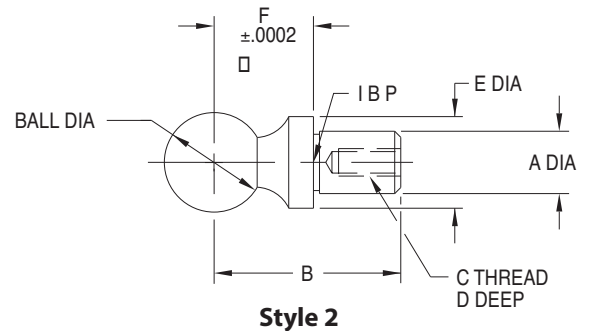
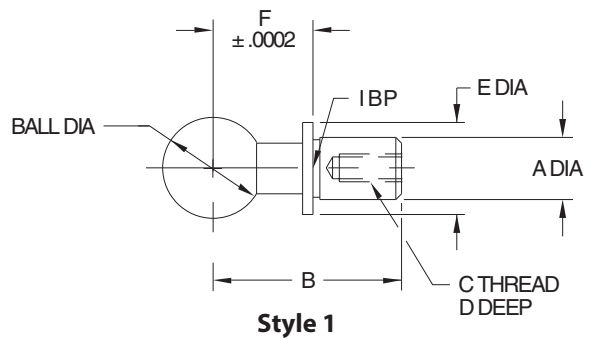
1144 STEEL, HEAT TREATED RC 54-56



Shoulder Type (Inch)



Shoulder Type (Metric)



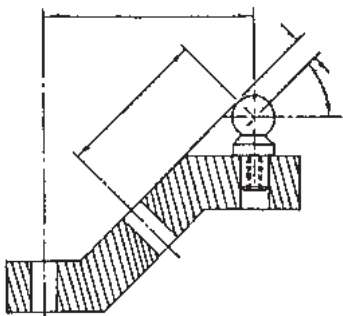
Precision tooling ball used as a reference point for critical inspection, layout, and machining operations. Shoulder type has a precision height-reference shoulder to locate the ball in three dimensions. Concentricity between ball and shank is .0002" TIR. Available with ball diameters from 1/4 to 3/4" (6 to 12mm in metric), in various shank diameters and lengths. Note: Catalog photos are actual size.

## SHOULDER TYPE (INCH)

PART NO.	BALL DIA		A DIA		B	C	D	E DIA	F	STYLE
	NOMINAL	ACTUAL	NOMINAL	ACTUAL						
CL-0-SCB	1/4	.2502/.2498	1/8	.1250/.1246	.56	—	—	.25	.2000	1
CL-00-SCB	3/8	.3752/.3748	3/16	.1875/.1871	.75	—	—	.37	.3000	
CL-1-SCB	1/2	.5000/.4997	1/4	.2500/.2497	.63	#6-32	1/4	.46	.3125	2
CL-10-SCB		.5002/.4998		.2500/.2496	.94	—	—		.4000	
CL-2-SCB		.5000/.4997		.94	#6-32	5/16	.46		.5000	2
CL-3-SCB			1.50	—	—					
CL-4-SCB			.94	#6-32	5/16					
CL-5-SCB			1.50	—	—					
CL-6-SCB	3/8	.3750/.3747	1.50	—	—	.56	.5000	1		
CL-7-SCB	3/4	.7502/.7498	3/8	.3750/.3746	1.25	—	—		.75	.5000

## SHOULDER TYPE (METRIC)

CLM-0-SCB	6mm	.2364/.2360	3mm	.1181/.1177	.47	—	—	.24	.2362 (6mm)	1
CLM-00-SCB	12mm	.4726/.4722	6mm	.2362/.2358	.87	—	—	.47	.4724 (12mm)	
CLM-1-SCB					.98	M3.5	.24			



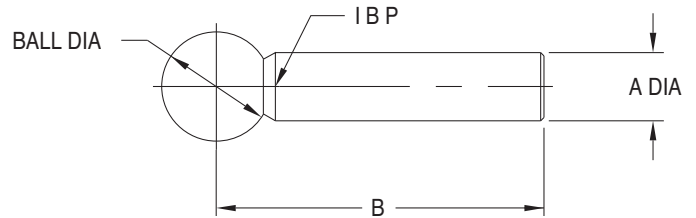
Shoulder-Type Construction Balls provide a reference point in three dimensions.

# CONSTRUCTION BALLS

1144 STEEL, HEAT TREATED RC 54-56



**Adjustable Type**



Precision tooling ball used as a reference point for critical inspection, layout, and machining operations. Adjustable type has no shoulder, so it can be set at any desired height then locked with a set screw. Concentricity between ball and shank is .0002" TIR. Available with ball diameters from 1/4 to 1/2", in various shank diameters and lengths. Note: Catalog photos are actual size.

### ADJUSTABLE TYPE (INCH)

PART NO.	BALL DIA		A DIA		B
	NOMINAL	ACTUAL	NOMINAL	ACTUAL	
CL-0-CB	1/4	.2502/.2498	1/8	.1250/.1246	.56
CL-00-CB	3/8	.3752/.3748	3/16	.1875/.1871	
CL-1-CB	1/2	.5000/.4997	1/4	.2500/.2497	1.50
CL-3-CB			5/16	.3125/.3122	
CL-5-CB			3/8	.3750/.3747	

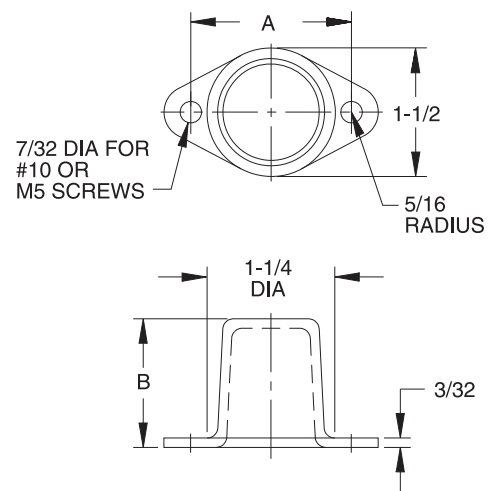
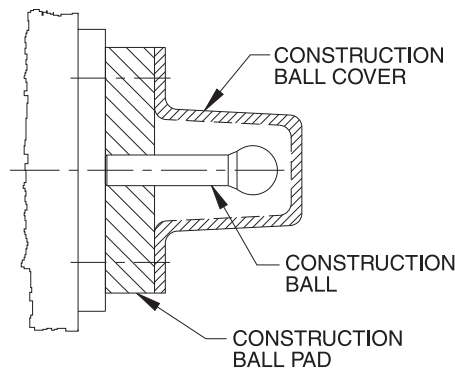
6

# CONSTRUCTION-BALL COVERS

1144 STEEL, HEAT TREATED RC 54-56



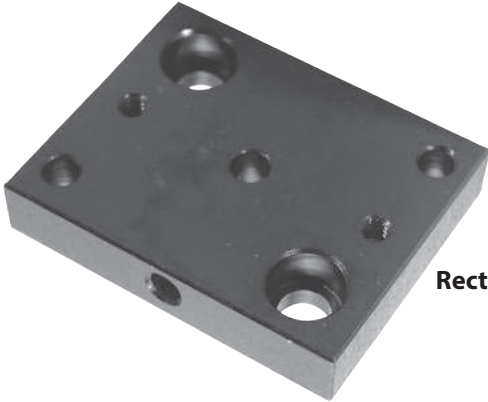
Sturdy cover that protects a Construction Ball from damage after installation.



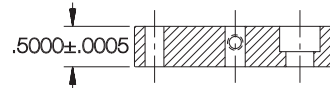
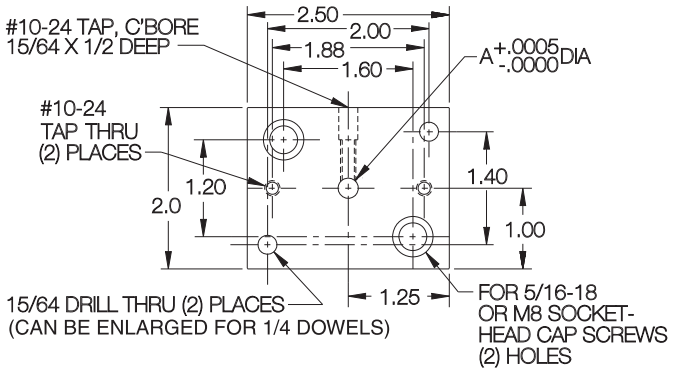
PART NO.	A	B
CL-2-COVER	1-7/8	1-1/2

# CONSTRUCTION-BALL PADS

RECTANGULAR: 1018 STEEL, BLACK OXIDE FINISH  
 ROUND: 1144 STEEL, BLACK OXIDE FINISH  
 SHANK TYPE: 8620 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH



**Rectangular**

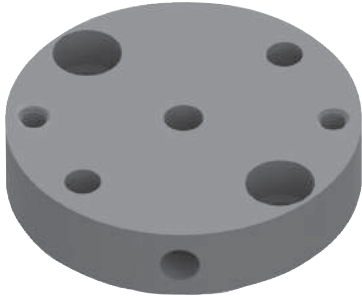


Rectangular Construction-Ball Pads should be fastened with two socket-head cap screws, then can be doweled in place to maintain accurate location. The Construction Ball can be secured by installing a #10-24 set screw (not furnished) in the crosshole.

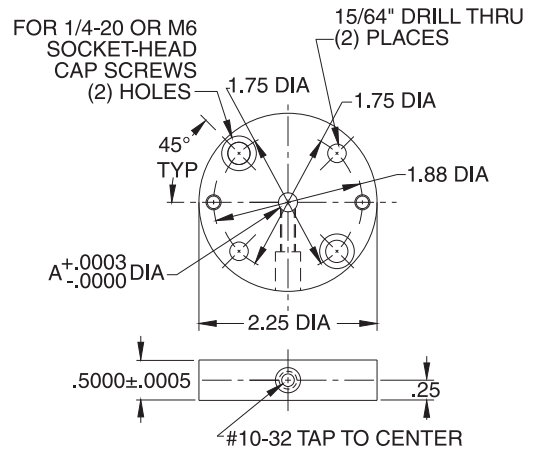
**RECTANGULAR (INCH)**

PART NO.	A DIA	
	NOMINAL	ACTUAL
CL-1-CBP	1/4	.2500
CL-2-CBP	5/16	.3125
CL-3-CBP	3/8	.3750

6



**Round**



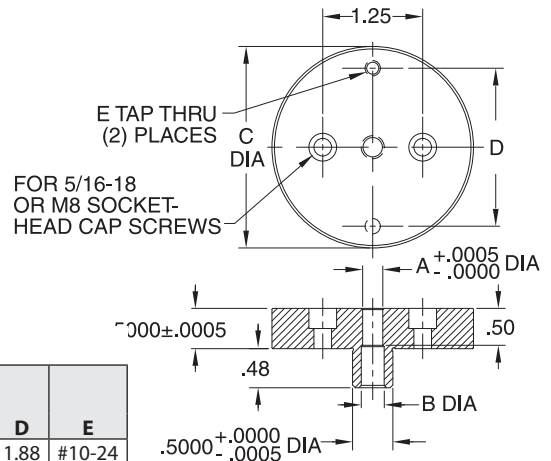
Round Construction-Ball Pads should be fastened with two socket-head cap screws, then can be doweled in place to maintain accurate location. The Construction Ball can be secured by installing a #10-32 set screw (not furnished) in the crosshole.

**ROUND (INCH)**

PART NO.	A DIA	
	NOMINAL	ACTUAL
CL-1-CBPR	1/4	.2500



**Shank Type**



Shank-type Construction-Ball Pads should be installed in a reamed hole for accurate location, then fastened with two socket-head cap screws.

**SHANK TYPE (INCH)**

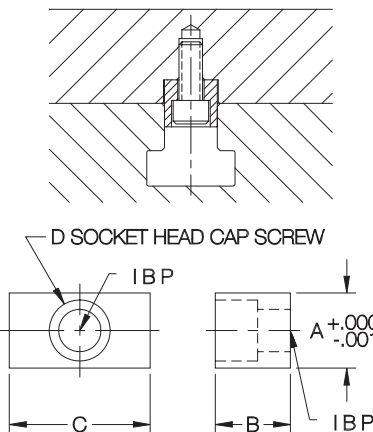
PART NO.	A DIA		B DIA	C DIA	D	E
	NOMINAL	ACTUAL				
CL-1-CBPK	1/4	.2500	.257	2.50	1.88	#10-24

# FIXTURE KEYS

1018 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH



Standard key for fixtures slotted to mount on one specific machine table. Depth of slot in fixture should be 1/2 of B dimension.



## INCH

PART NO.	TABLE SLOT SIZE	A	B	C	D
CL-1-FK	1/2	.5000	1/2	3/4	1/4-20
CL-2-FK	9/16	.5625			
CL-3-FK	5/8	.6250	1/2	1	5/16-18
CL-4-FK	11/16	.6875			
CL-5-FK	3/4	.7500			
CL-6-FK	13/16	.8125	1-1/4		
CL-7-FK	1-1/16	1.0625			

## METRIC

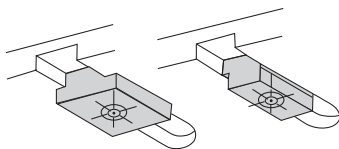
PART NO.	TABLE SLOT SIZE	A	B	C	D
CLM-12-FK	12mm	.4724	.315	.787	M5
CLM-14-FK	14mm	.5512	.394	.866	M6
CLM-16-FK	16mm	.6299			
CLM-18-FK	18mm	.7087			
CLM-20-FK	20mm	.7874			

# STEP FIXTURE KEYS

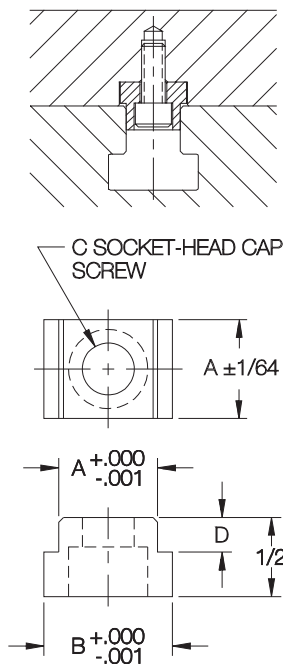
MILD STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH



Adapts a key-slotted fixture or vise to machine tables with a different slot size. Available for inch or metric slots. Top and bottom of key are centered within .0005 of each other.



Step Fixture Keys are available for machine-table slots either larger or smaller than a given fixture slot. (Viewed from underside of fixture.)



## INCH FIXTURE SLOTS

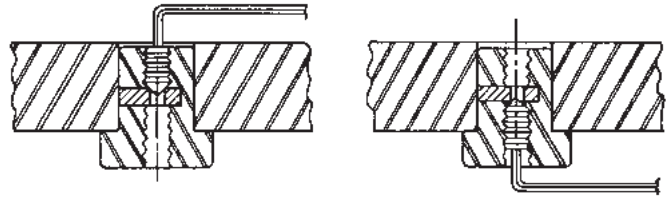
PART NO.	FIXTURE SLOT SIZE	A	TABLE SLOT SIZE	B	C SOCKET-HEAD CAP SCREW (ORDER SEPARATELY)	D
CL-8-SFK-437	1/2	.5000	7/16	.4375	CL-1/4-20X.62-SHCS	9/32
CL-8-SFK-562			9/16	.5625		7/32
CL-8-SFK-625			5/8	.6250		9/32
CL-8-SFK-687			11/16	.6875		7/32
CL-8-SFK-12			12mm	.4724		9/32
CL-8-SFK-14			14mm	.5512		7/32
CL-8-SFK-16			16mm	.6299		7/32
CL-8-SFK-18			18mm	.7087		7/32
CL-9-SFK-437	9/16	.5625	7/16	.4375	CL-1/4-20X.62-SHCS	9/32
CL-9-SFK-500			1/2	.5000		7/32
CL-9-SFK-625			5/8	.6250		9/32
CL-9-SFK-12			12mm	.4724		7/32
CL-9-SFK-14			14mm	.5512		7/32
CL-9-SFK-16	16mm	.6299	7/32			
CL-10-SFK-500	5/8	.6250	1/2	.5000	CL-5/16-18X.75-SHCS	9/32
CL-10-SFK-562			9/16	.5625		7/32
CL-10-SFK-687			11/16	.6875		9/32
CL-10-SFK-750			3/4	.7500		7/32
CL-10-SFK-812			13/16	.8125		9/32
CL-10-SFK-12			12mm	.4724		7/32
CL-10-SFK-14			14mm	.5512		7/32
CL-10-SFK-16			16mm	.6299		7/32
CL-10-SFK-18			18mm	.7087		7/32
CL-10-SFK-20			20mm	.7874		7/32
CL-11-SFK-562	11/16	.6875	9/16	.5625	CL-5/16-18X.75-SHCS	9/32
CL-11-SFK-625			5/8	.6250		7/32
CL-11-SFK-750			3/4	.7500		9/32
CL-11-SFK-812			13/16	.8125		7/32
CL-11-SFK-16			16mm	.6299		9/32
CL-11-SFK-18	18mm	.7087	7/32			
CL-11-SFK-20	20mm	.7874	7/32			
CL-12-SFK-625	3/4	.7500	5/8	.6250	CL-5/16-18X.75-SHCS	9/32
CL-12-SFK-687			11/16	.6875		7/32
CL-12-SFK-812			13/16	.8125		9/32
CL-12-SFK-18			18mm	.7087		7/32
CL-12-SFK-20	20mm	.7874	7/32			
CL-13-SFK-687	13/16	.8125	11/16	.6875	CL-5/16-18X.75-SHCS	9/32
CL-13-SFK-750			3/4	.7500		9/32
CL-13-SFK-18			18mm	.7087		9/32
CL-13-SFK-20			20mm	.7874		9/32

## METRIC FIXTURE SLOTS

PART NO.	FIXTURE SLOT SIZE	A	TABLE SLOT SIZE	B	C SOCKET-HEAD CAP SCREW (ORDER SEPARATELY)	D
CL-20-SFK-500	20mm	.7874	1/2	.5000	CLM-6X15-SHCS	9/32
CL-20-SFK-562			9/16	.5625		
CL-20-SFK-625			5/8	.6250		
CL-20-SFK-687			11/16	.6875		7/32
CL-20-SFK-750			3/4	.7500		
CL-20-SFK-812			13/16	.8125		
CL-20-SFK-12			12mm	.4724		9/32
CL-20-SFK-14			14mm	.5512		
CL-20-SFK-16			16mm	.6299		
CL-20-SFK-18			18mm	.7087		9/32

# SURE-LOCK™ FIXTURE KEYS

12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH

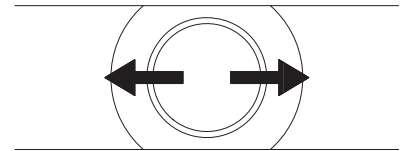


Lock in place from above or below using a hex wrench.

Perfect fixture key for most applications. Keys are interchangeable because they all fit in a 5/8 reamed hole. Allows mounting any fixture on any machine simply by switching keys. Eliminates the need to slot fixtures. Concentricity .0005 TIR or better. Available for inch or metric machine-table slots.

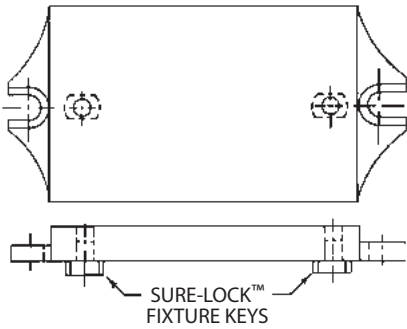
## INCH

PART NO.	TABLE SLOT SIZE	A	B	C	D
CL-375-SLFK	3/8	.3750			
CL-437-SLFK	7/16	.4375	1/2	3/8	.23
CL-500-SLFK	1/2	.5000	3/4	7/16	.41
CL-562-SLFK	9/16	.5625	1/2	3/8	.23
CL-5625-SLFK			3/4	7/16	.41
CL-625-SLFK	5/8	.6250	1/2	3/8	.23
CL-6250-SLFK			3/4	7/16	.41
CL-687-SLFK	11/16	.6875	1/2	3/8	.23
CL-6875-SLFK			3/4	7/16	.41
CL-7500-SLFK	3/4	.7500	3/4	7/16	.41
CL-8125-SLFK	13/16	.8125			



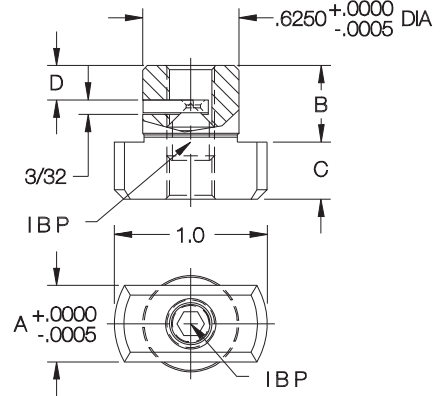
Patented locking action aligns fixture key perfectly with slot axis.

6



## METRIC

PART NO.	TABLE SLOT SIZE	A	B	C	D
CL-12-SLFK	12mm	.4724	1/2	3/8	.23
CL-14-SLFK	14mm	.5512	3/4	7/16	.41
CL-16-SLFK	16mm	.6299			
CL-18-SLFK	18mm	.7087			
CL-20-SLFK	20mm	.7874			
CL-22-SLFK	22mm	.8661			



# REAMED-HOLE FIXTURE KEYS

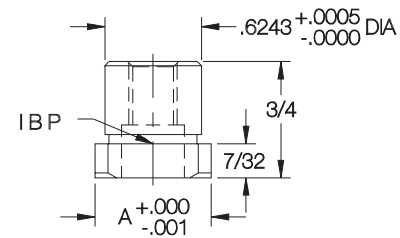
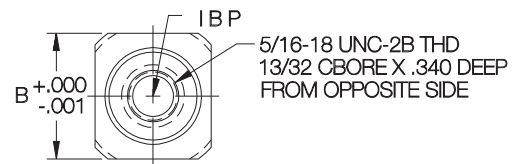
12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH



Each key fits two different table slots by turning 90°. Install in a 5/8 reamed hole. Fasten from above with a 5/16-18 Socket-Head Cap Screw, or from below with a 1/4-20 Socket-Head Cap Screw. Concentricity .0005 or better.

## INCH

PART NO.	TABLE SLOT SIZES	A	B
CL-1-RFK	5/8 and 11/16	.6875	.6250
CL-2-RFK	5/8 and 3/4	.7500	
CL-3-RFK	5/8 and 13/16	.8125	.6875
CL-4-RFK	11/16 and 3/4	.7500	
CL-5-RFK	11/16 and 13/16	.8125	.7500
CL-6-RFK	3/4 and 13/16	.8125	

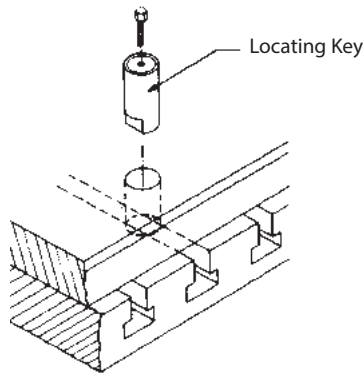
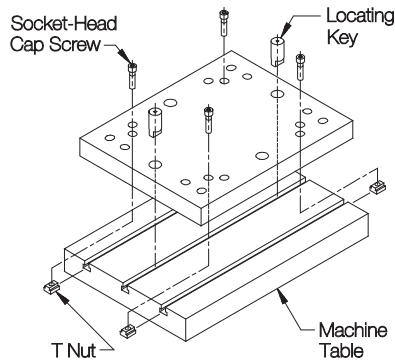


# LOCATING KEYS

1144 OR 1045 STEEL, HEAT TREATED, BLACK OXIDE FINISH



Standard removable-type fixture key for large fixtures. Can be inserted from above after placing fixture on machine, then removed again if desired after the fixture is fastened. Keeps bottom of fixture free of obstructions. Install in a 1-3/16" reamed hole. True position within .0005 or better.

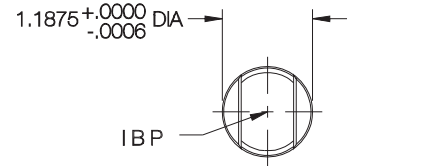
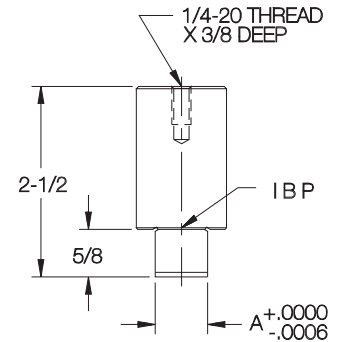


## INCH

PART NO.	TABLE SLOT SIZE	A
CL-MF10-4406	9/16	.5625
CL-MF10-4407	5/8	.6250
CL-MF10-4408	11/16	.6875
CL-MF10-4409	3/4	.7500
CL-MF10-4411	13/16	.8125
CL-MF10-4410	7/8	.8750

## METRIC

CL-MF10-4401	14mm	.5512
CL-MF10-4402	16mm	.6299
CL-MF10-4403	18mm	.7087
CL-MF10-4404	20mm	.7874
CL-MF10-4405	22mm	.8661



# SUBPLATE LOCATING KEYS

1144 STEEL, HEAT TREATED, BLACK OXIDE FINISH

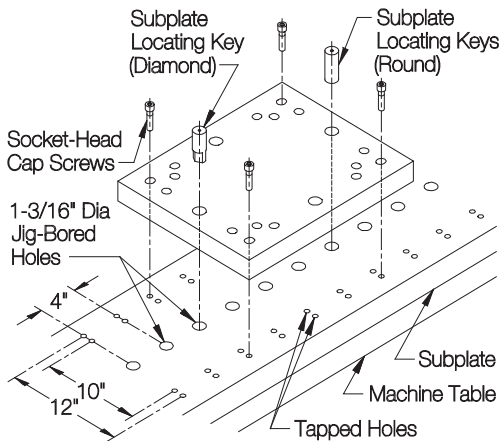


Round



Diamond

Subplate Locating Keys are the new standard for mounting quick-change fixture plates on a subplate. A Round Key and a Diamond (relieved) Key are used together for precise location without binding. Diamond Keys are marked on top to ensure proper orientation in the hole. Two standard diameters match standard fixture-key holes. This allows mounting the same fixture plate either on a subplate (3-axis location) or directly on a machine table (2-axis location). The 5/8"-diameter key fits in the same hole as a Sure-Lock™ Fixture Key, while the 1-3/16"-diameter key fits in the same hole as the Locating Keys shown above. The subplate hole pattern shown above allows mounting any size and combination of Rectangular Tooling Plates, either lengthwise or widthwise.

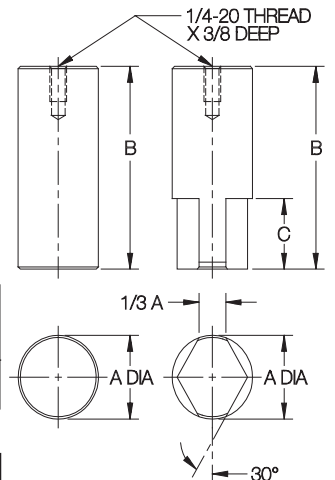


## ROUND

PART NO.	A DIA		B	C
	NOMINAL	ACTUAL		
CL-10-SLKR	5/8	.6250/.6244	2-1/4	—
CL-19-SLKR	1-3/16	1.1875/1.1869	2-7/8	—

## DIAMOND

CL-10-SLKD	5/8	.6250/.6244	2-1/4	1
CL-19-SLKD	1-3/16	1.1875/1.1869	2-7/8	



# PALLET FIXTURE KEYS

12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH

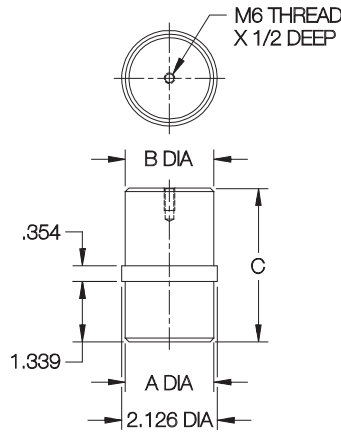


Center Pin

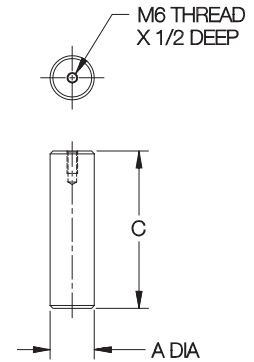


Radial Pin

Fixture keys for mounting tooling plates and blocks on standard DIN pallets. Each pallet requires one Center Pin and one Radial Pin (for orientation). The Radial Pin is usually removed after fastening the pallet to the machine table.

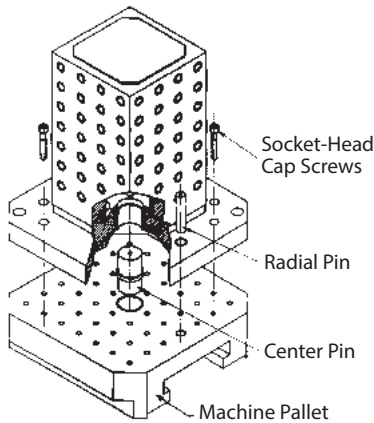


Center Pin



Radial Pin

6



## CENTER PINS

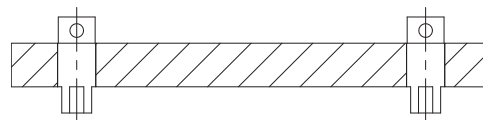
PART NO.	A DIA		B DIA		C
	NOMINAL	ACTUAL	NOMINAL	ACTUAL	
CLM-25-PFKC	50mm	1.9681/1.9676	25mm	.9839/.9835	2.87
CLM-30-PFKC			30mm	1.1808/1.1804	3.42
CLM-50-PFKC			50mm	1.9681/1.9676	

## RADIAL PINS

PART NO.	A DIA		C
	NOMINAL	ACTUAL	
CLM-20-PFKR	20mm	.7871/.7867	3.50
CLM-25-PFKR	25mm	.9839/.9835	4.92

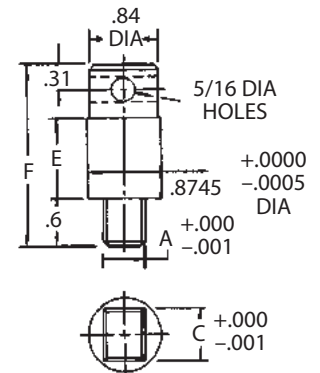
# MILL FIXTURE KEYS

12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH



## INCH

PART NO.	TABLE SLOT SIZES	A	C	E F	
				1.00	2.20
CL-1-MFK-1	11/16 or 13/16	.6873	.8123	1.00	2.20
CL-1-MFK-2				3.20	4.40



Can be removed from above after mounting fixture on machine. Fits either 11/16 or 13/16 table slots by turning 90°. Install in a 7/8 reamed hole. Concentricity .0005 or better.



## TYPES



### **SLOTTED-HEEL CLAMP STRAPS**

Popular Clamp Strap with a slot underneath to allow sliding it straight back for clear unloading. Two drill spots on the sides provide a secure grip for retracting the clamp. Available in steel or stainless steel with several strap lengths available for each size.



### **SLOTTED-HEEL GOOSENECK CLAMP STRAPS**

Gooseneck version of our Slotted-Heel Clamp Straps. This design recesses the clamping nut to provide a low overall profile. An indentation at the rear of each side provides a secure finger grip for retracting the clamp. Also available as a complete assembly.



### **SLOTTED-HEEL PADDED CLAMP STRAPS**

Slotted-Heel Clamp Strap that features a replaceable clamping pad attached with two screws (furnished). Clamp Strap also easily accepts custom pads or other attachments. Read end is tapped on either side for a Finger Pin.



### **TAPPED-HEEL CLAMP STRAPS**

Popular Clamp Strap with a tapped heel that accepts a clamping screw or rear support. Often used with a Guide Block to allow sliding the strap straight back for clear loading. Two drill spots on the sides provide a secure grip for retracting the clamp. Can also be used with a Stud Leveling Foot as a rear support.



### **TAPPED-HEEL PADDED CLAMP STRAPS**

Tapped-Heel Clamp Strap that features a replaceable clamping pad attached with two screws (furnished). Clamp Strap also easily accepts custom pads or other attachments. Replacement pads and assemblies also available.



### **FORGED CLAMP STRAPS**

High-strength Tapped-Heel Clamp Strap available in straight or gooseneck design, with a locator nose or plain nose. Locator-nose version is ideal for workpieces with machined ends. The accurately machined notch ensures precise, repeatable clamp location for increased machining clearance.



### **ALUMINUM CLAMP STRAPS**

Soft Clamp Strap made of high-strength aluminum alloy. This tapped-heel clamp is available in straight or gooseneck design, with locator nose or plain nose. Locator-nose version is ideal for workpieces with machined sides. The accurately machined notch ensures precise, repeatable clamp location for increased machining clearance.



### **TAPERED-NOSE CLAMP STRAPS**

Tapped-Heel Clamp Strap with a tapered nose for clamping in tight spaces. Available in stainless steel. Also available as a complete assembly, where a Fixture Stud has a thread-locking interference thread at the bottom end to install permanently in a fixture plate.



### **WIDE-NOSE CLAMP STRAPS**

Tapped-Heel Clamp Strap with an extra-wide nose. Available in stainless steel. Also available as a complete assembly, where a Fixture Stud has a thread-locking interference thread at the bottom end to install permanently in a fixture plate.

# CLAMP STRAPS

## TYPES



### DOUBLE-END GOOSENECK CLAMP STRAPS

Gooseneck version of our Double-End Clamp Straps. This design recesses the clamping nut to provide a low overall profile. Double-End Clamps have two clamping ends, for holding two workpieces simultaneously. Turn strap 90° for clear loading.



### DOUBLE-END CLAMP STRAPS

Clamp Strap with two clamping ends, for holding two workpieces simultaneously. A complete Clamp-Strap Assembly is available as well. Order pieces individually. See product page for details. Also available in metric.



### SWIVEL-HEEL CLAMP STRAPS

Clamp Strap that swings out of the way for clear loading. Clamp-Strap Assemblies also available. Order pieces individually. See product page for details. Also available in metric.



### FORGED U CLAMPS

Open U end allows totally removing clamp strap when unclamped. Clamp tips are stepped to provide repeatable location. Cylindrical pin end minimizes contact area and is useful for clamping in horizontal holes.



### ALUMINUM ADJUSTABLE CLAMPS

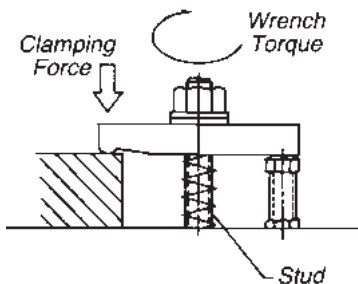
Simple, economical aluminum clamp. Instant height adjustment without blocks or shims. One-piece assembly allows quick setups and eliminates lost clamp pieces. Clamp can swing 90° in either direction for loading clearance.



### STEP BLOCKS & CLAMPS

Serrated block can be used individually or in pairs, as a clamp rest. Use a single block with Step Clamps, or a pair of blocks with Plain Clamps. All blocks and clamps are made from top-grade steel.

## CLAMPING FORCE OF STANDARD CLAMP STRAPS



### INCH

Stud Size	Recommended Torque* (ft.-lbs.)	Clamping Force (lbs.)	Tensile Force in Stud (lbs.)
#10-32	2	300	600
1/4-20	4	500	1000
5/16-18	9	900	1800
3/8-16	16	1300	2600
1/2-13	38	2300	4600
5/8-11	77	3700	7400
3/4-10	138	5500	11000
7/8-9	222	7600	15200
1-8	333	10000	20000

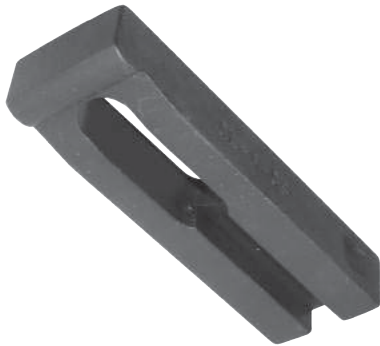
### METRIC

Stud Size	Recommended Torque* (ft.-lbs.)	Clamping Force (lbs.)	Tensile Force in Stud (lbs.)
M6	4	500	1000
M8	9	900	1800
M10	20	1500	3000
M12	35	2200	4400
M16	84	4000	8000
M20	165	6300	12600
M24	283	9000	18000

\*Clean, dry clamping stud torqued to approximately 33% of its 100,000 psi yield strength (2:1 lever ratio).

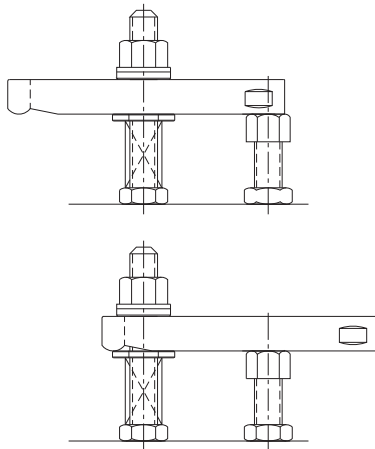
# SLOTTED-HEEL CLAMP STRAPS

STEEL: 1018, CARBURIZED-HARDENED, BLACK OXIDE FINISH  
STAINLESS STEEL: 300 SERIES

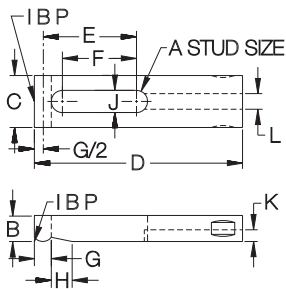


## Steel and Stainless Steel

Popular Clamp Strap with a slot underneath to allow sliding it straight back for clear loading. Two drill spots on the sides provide a secure grip for retracting the clamp. Available in steel for 1/4-20 (M6) to 3/4-10 (M20) stud sizes, or stainless steel for #10-32 to 3/8-16 stud sizes. Each size is available in several strap lengths.



**INFO+:** See pages 218-220 for complete assemblies using these Clamp Straps.



**INFO+:** See pages 410-412 for stackable high-rise clamp-strap assemblies.

## STRAPS — STEEL

PART NO.	A	B	C	D	E	F	G	H	J	K	L
CL-0-CS	1/4-20 or M6	3/8	5/8	2	27/32	19/32	1/4	11/32	9/32	5/32	3/16
CL-1-CS				2-1/2	1-3/32	13/16					
CL-1A-CS				2-1/2	27/32	1/2					
CL-1B-CS	5/16-18 or M8	1/2	3/4	3	1-11/32	1	5/16	7/16	11/32	7/32	1/4
CL-2-CS				3	1-9/32	7/8					
CL-3A-CS				3-1/2	1-17/32	1-1/8					
CL-3-CS	3/8-16 or M10	1/2	1-1/8	4	1-25/32	1-3/8	13/32	1/2	27/64	9/32	3/8
CL-4-CS				5	2-9/32	1-7/8					
CL-5-CS				6	2-25/32	2-3/8					
CL-6A-CS	1/2-13 or M12	5/8	1-1/4	3-1/2	1-1/2	1-1/32	13/32	1/2	17/32	9/32	3/8
CL-6-CS				4	1-3/4	1-9/32					
CL-8-CS				5	2-1/4	1-25/32					
CL-10-CS	5/8-11 or M16	7/8	1-1/2	6	2-3/4	2-9/32	1/2	19/32	21/32	9/32	1/2
CL-15A-CS				4	1-11/16	1-3/32					
CL-16-CS				5	2-3/16	1-19/32					
CL-18-CS	3/4-10 or M20	1	1-3/4	6	2-11/16	2-3/32	1/2	19/32	13/16	5/16	1/2
CL-18A-CS				6-1/2	2-15/16	2-11/32					
CL-19-CS				6	2-5/8	2					
CL-21-CS	3/4-10 or M20	1	1-3/4	7	3-1/8	2-9/16	1/2	19/32	13/16	5/16	1/2
CL-22A-CS				8	3-5/8	3-1/8					

## STRAPS — STAINLESS, MINIATURE

CL-17215	#10-32	1/4	1/2	1-1/2	21/32	15/32	3/16	5/16	7/32	3/32	7/32
CL-17220				2	29/32	23/32					
CL-17320	1/4-20	3/8	5/8	2	7/8	11/16	1/4	3/8	9/32	1/8	9/32
CL-17325				2-1/2	1-1/8	15/16					
CL-17420	5/16-18	3/8	3/4	2	27/32	19/32	5/16	7/16	11/32	5/32	11/32
CL-17425				2-1/2	1-3/32	27/32					
CL-17430				3	1-11/32	1-3/32					
CL-17530	3/8-16	1/2	1	3	1-5/16	1	3/8	1/2	13/32	3/16	13/32
CL-17540				4	1-13/16	1-1/2					

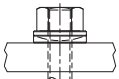
# SLOTTED-HEEL CLAMP STRAPS

**INFO+:** SEE PAGES 82, 89, 217, 264-268, 271-272, 278, 280-282 FOR MATERIAL SPECIFICATIONS

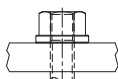


**Steel**

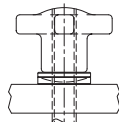
A complete clamp-strap assembly using **(INFO+)** a slotted-heel strap from page 217. Select any of the six nut/knob combinations shown below by adding the appropriate suffix to the part number. Other Stud and Clamp Rest lengths are available (order pieces individually).



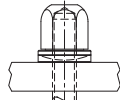
Spherical Nut & Washer  
CL-xx-SHA-1



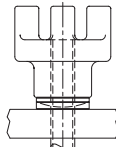
Flange Nut  
CL-xx-SHA-2



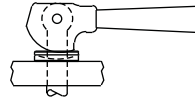
Hand Knob with Spherical Washer  
CL-xx-SHA-4



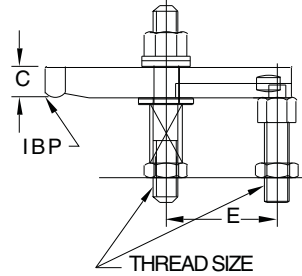
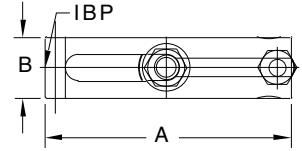
Acorn Nut with Spherical Washer  
CL-xx-SHA-5



Bar Knob with Spherical Washer\*  
CL-xx-SHA-6



Cam Handle with Spherical Washer  
**(INFO+ page 219)**



## ASSEMBLIES — STEEL (INCH)

PART NO.	THREAD SIZE	A	B	C	E	CLAMP STRAP	CLAMP REST	SPRING	FLAT WASHER	STUD
CL-0-SHA-x	1/4-20	2	5/8	3/8	27/32	CL-0-CS	CL-1-CR	CL-5-SPG	CL-7-FW	CL-1/4-20x2.50-STUD
CL-1-SHA-x		2-1/2			1-3/32	CL-1-CS				
CL-1A-SHA-x	5/16-18	2-1/2	3/4	1/2	27/32	CL-1A-CS	CL-1A-CR	CL-6-SPG	CL-14-FW	CL-5/16-18x 3.00-STUD
CL-1B-SHA-x		3			1-11/32	CL-1B-CS				
CL-2-SHA-x	3/8-16	3	1-1/8	1/2	1-9/32	CL-2-CS	CL-2-CR	CL-7-SPG	CL-1-FW	CL-3/8-16x3.00-STUD
CL-3-SHA-x		3-1/2			1-17/32	CL-3A-CS				
CL-4-SHA-x		4			1-25/32	CL-3-CS				
CL-6-SHA-x		5			2-9/32	CL-4-CS				
CL-8-SHA-x		6			2-25/32	CL-5-CS				
CL-9-SHA-x		3-1/2			1-1/2	CL-6A-CS				
CL-10-SHA-x	1/2-13	4	1-1/4	5/8	1-3/4	CL-6-CS	CL-4-CR	CL-9-SPG	CL-2-FW	CL-1/2-13x4.00-STUD
CL-12-SHA-x		5			2-1/4	CL-8-CS				
CL-14-SHA-x		6			2-3/4	CL-10-CS				
CL-20-SHA-x		4			1-11/16	CL-15A-CS				
CL-22-SHA-x	5/8-11	5	1-1/2	7/8	2-3/16	CL-16-CS	CL-6-CR	CL-11-SPG	CL-3-FW	CL-5/8-11x4.50-STUD
CL-24-SHA-x		6			2-11/16	CL-18-CS				
CL-25-SHA-x		6-1/2			2-15/16	CL-18A-CS				
CL-27-SHA-x		6			2-5/8	CL-19-CS				
CL-29-SHA-x	3/4-10	7	1-3/4	1	3-1/8	CL-21-CS	CL-8-CR	CL-13-SPG	CL-4-FW	CL-3/4-10x5.00-STUD
CL-31-SHA-x		8			3-5/8	CL-22A-CS				

## ASSEMBLIES — STEEL (METRIC)

CLM-0-SHA-x	M6	2	5/8	3/8	27/32	CL-0-CS	CLM-1-CR	CL-5-SPG	CL-7-FW	CLM-6x65-STUD
CLM-1-SHA-x	M8	2-1/2	3/4	1/2	1-3/32	CL-1-CS	CLM-1A-CR	CL-6-SPG	CL-14-FW	CLM-8x80-STUD
CLM-1A-SHA-x		2-1/2			27/32	CL-1A-CS				
CLM-1B-SHA-x	M10	3	1-1/8	1/2	1-11/32	CL-1B-CS	CLM-2-CR	CL-7-SPG	CL-1-FW	CLM-1x80-STUD
CLM-2-SHA-x		3			1-9/32	CL-2-CS				
CLM-3-SHA-x		3-1/2			1-17/32	CL-3A-CS				
CLM-4-SHA-x		4			1-25/32	CL-3-CS				
CLM-6-SHA-x		5			2-9/32	CL-4-CS				
CLM-8-SHA-x		6			2-25/32	CL-5-CS				
CLM-9-SHA-x	M12	3-1/2	1-1/4	5/8	1-1/2	CL-6A-CS	CLM-4-CR	CL-9-SPG	CL-2-FW	CLM-12x95-STUD
CLM-10-SHA-x		4			1-3/4	CL-6-CS				
CLM-12-SHA-x		5			2-1/4	CL-8-CS				
CLM-14-SHA-x		6			2-3/4	CL-10-CS				
CLM-20-SHA-x	M16	4	1-1/2	7/8	1-11/16	CL-15A-CS	CLM-5-CR	CL-11-SPG	CL-3-FW	CLM-16x110-STUD
CLM-22-SHA-x		5			2-3/16	CL-16-CS				
CLM-24-SHA-x		6			2-11/16	CL-18-CS				
CLM-25-SHA-x		6-1/2			2-15/16	CL-18A-CS				
CLM-27-SHA-x	M20	6	1-3/4	1	2-5/8	CL-19-CS	CLM-8-CR	CL-13-SPG	CLM-10-FW	CLM-20x125-STUD
CLM-29-SHA-x		7			3-1/8	CL-21-CS				
CLM-31-SHA-x		8			3-5/8	CL-22A-CS				

\* Available in thread sizes 3/8-16 and above (M10 and above in metric).

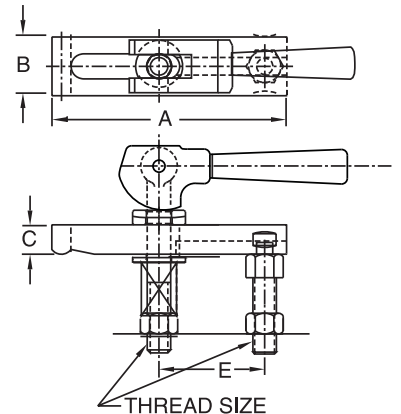
# SLOTTED-HEEL CLAMP STRAPS

INFO+: SEE PAGES 82, 89, 217, 264-268, 271-272, 278, 280-282 FOR MATERIAL SPECIFICATIONS



**Straddle Cam  
Steel**

A complete clamp-strap assembly using (INFO+) a slotted-heel strap from page 217 along with a Double Cam and Eyebolt. Other Eyebolt and Clamp Rest lengths are available (order pieces individually).



## ASSEMBLIES — STRADDLE CAM, STEEL (INCH)

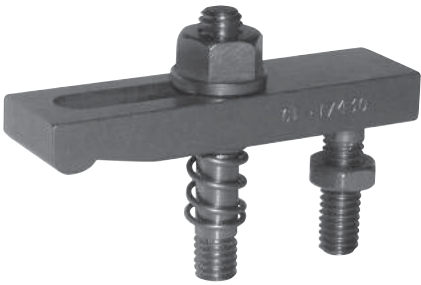
PART NO.	THREAD SIZE	A	B	C	E	CLAMP STRAP	CLAMP REST	SPRING	EYE BOLT	CAM HANDLE AND CLEVIS PIN	FLAT WASHER	SPHERICAL WASHER
CL-0-SCA	1/4-20	2	5/8	3/8	27/32	CL-0-CS	CL-1-CR	CL-5-SPG	CL-25-EB	CL-11-CH CL-610-CLVP	CL-7-FW	CL-1-SW
CL-1-SCA		2-1/2			1-3/32	CL-1-CS						
CL-1A-SCA	5/16-18	2-1/2	3/4	1/2	27/32	CL-1A-CS	CL-1A-CR	CL-6-SPG	CL-31-EB	CL-11A-CH CL-810-CLVP	CL-14-FW	CL-11-SW
CL-1B-SCA		3			1-11/32	CL-1B-CS						
CL-2-SCA	3/8-16	3	1-1/8	1/2	1-9/32	CL-2-CS	CL-2-CR	CL-7-SPG	CL-38-EB	CL-12-CH CL-1014-CLVP	CL-1-FW	CL-2-SW
CL-2A-SCA		3-1/2			1-17/32	CL-3A-CS						
CL-3-SCA		4			1-25/32	CL-3-CS						
CL-4-SCA		5			2-9/32	CL-4-CS						
CL-5-SCA		6			2-25/32	CL-5-CS						
CL-6A-SCA		3-1/2			1-1/2	CL-6A-CS						
CL-6-SCA	1/2-13	4	1-1/4	5/8	1-3/4	CL-6-CS	CL-4-CR	CL-9-SPG	CL-50-EB	CL-13-CH CL-1218-CLVP	CL-2-FW	CL-3-SW
CL-8-SCA		5			2-1/4	CL-8-CS						
CL-9A-SCA		6			2-3/4	CL-10-CS						
CL-17-SCA		4			1-11/16	CL-15A-CS						
CL-19-SCA	5/8-11	5	1-1/2	7/8	2-3/16	CL-16-CS	CL-6-CR	CL-11-SPG	CL-62-EB	CL-14-CH CL-2020-CLVP	CL-3-FW	CL-4-SW
CL-21-SCA		6			2-11/16	CL-18-CS						
CL-22-SCA		6-1/2			2-15/16	CL-18A-CS						
CL-24-SCA		6			2-5/8	CL-19-CS						
CL-26-SCA	3/4-10	7	1-3/4	1	3-1/8	CL-21-CS	CL-8-CR	CL-13-SPG	CL-75-EB	CL-15-CH CL-2024-CLVP	CL-4-FW	CL-5-SW
CL-28-SCA		8			3-5/8	CL-22A-CS						

## ASSEMBLIES — STRADDLE CAM, STEEL (METRIC)

CLM-0-SCA	M6	2	5/8	3/8	27/32	CL-0-CS	CLM-1-CR	CL-5-SPG	CLM-25A-EB	CLM-11-CH CLM-616-CLVP	CL-7-FW	CL-1-SW
CLM-1-SCA		2-1/2			1-3/32	CL-1-CS						
CLM-2-SCA	M10	3	1-1/8	1/2	1-9/32	CL-2-CS	CLM-2-CR	CL-7-SPG	CLM-40-EB	CLM-12-CH CLM-1023-CLVP	CL-1-FW	CL-2-SW
CLM-2A-SCA		3-1/2			1-17/32	CL-3A-CS						
CLM-3-SCA		4			1-25/32	CL-3-CS						
CLM-4-SCA		5			2-9/32	CL-4-CS						
CLM-5-SCA		6			2-25/32	CL-5-CS						
CLM-6A-SCA		3-1/2			1-1/2	CL-6A-CS						
CLM-6-SCA	M12	4	1-1/4	5/8	1-3/4	CL-6-CS	CLM-4-CR	CL-9-SPG	CLM-50A-EB	CLM-13-CH CLM-1229-CLVP	CL-2-FW	CL-3-SW
CLM-8-SCA		5			2-1/4	CL-8-CS						
CLM-9A-SCA		6			2-3/4	CL-10-CS						
CLM-17-SCA		4			1-11/16	CL-15A-CS						
CLM-19-SCA	M16	5	1-1/2	7/8	2-3/16	CL-16-CS	CLM-5-CR	CL-11-SPG	CLM-62-EB	CLM-14-CH CLM-1632-CLVP	CL-3-FW	CL-4-SW
CLM-21-SCA		6			2-11/16	CL-18-CS						
CLM-22-SCA		6-1/2			2-15/16	CL-18A-CS						
CLM-24-SCA		6			2-5/8	CL-19-CS						
CLM-26-SCA	M20	7	1-3/4	1	3-1/8	CL-21-CS	CLM-8-CR	CL-13-SPG	CLM-76A-EB	CLM-15-CH CLM-2038-CLVP	CLM-10-FW	CLM-20-SW
CLM-28-SCA		8			3-5/8	CL-22A-CS						

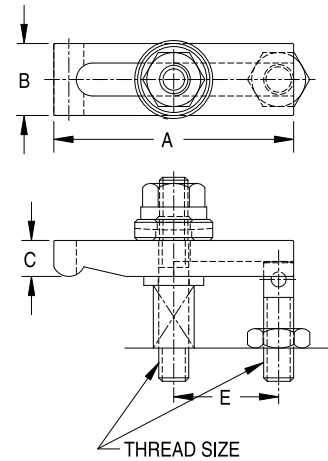
# SLOTTED-HEEL CLAMP STRAPS

INFO+: SEE PAGES 98, 217, 264-268, 271-272, 281-282 FOR MATERIAL SPECIFICATIONS

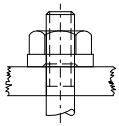


**Stainless Steel  
(Miniature)**

A complete clamp-strap assembly using (INFO+) a stainless steel slotted-heel strap from page 217. Select any of the four nut/knob combinations shown below by adding the appropriate suffix to the part number. Fixture Stud has a thread-locking interference thread at the bottom end to install permanently in a fixture plate.

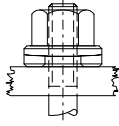


7



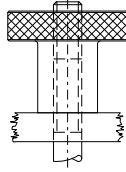
Flange Nut

CL-xxxx-1



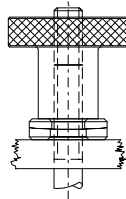
Spherical Nut and Washer

CL-xxxx-2



Knurled Knob

CL-xxxx-3



Knurled Knob and Spherical Washer  
CL-xxxx-4

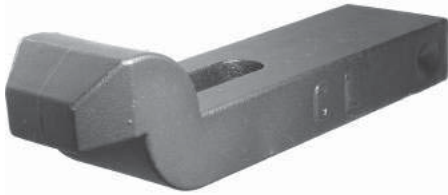
## ASSEMBLIES — STAINLESS, MINIATURE (INCH)

PART NO.	THREAD SIZE	A	B	C	E	CLAMP STRAP	CLAMP REST	SPRING	FLAT WASHER	STUD	JAM NUT
CL-2715-x	#10-32	1-1/2	1/2	1/4	21/32	CL-17215	CL-13410	CL-2430.7	CL-254	CL-11415	CL-3-FJN-S
CL-2720-x		2			29/32	CL-17220					
CL-2820-x	1/4-20	2	5/8	3/8	7/8	CL-17320	CL-13515	CL-2440.7	CL-255	CL-11520	CL-4-JN-S
CL-2825-x		2-1/2			1-1/8	CL-17325					
CL-2920-x	5/16-18	2	3/4	3/8	27/32	CL-17420	CL-13612	CL-2450.7	CL-256	CL-11620	CL-5-JN-S
CL-2925-x		2-1/2			1-3/32	CL-17425					
CL-2930-x		3			1-11/32	CL-17430					
CL-3030-x		3			1-5/16	CL-17530					
CL-3040-x	3/8-16	4	1	1/2	1-13/16	CL-17540	CL-13717	CL-2461.0	CL-257	CL-11725	CL-6-JN-S

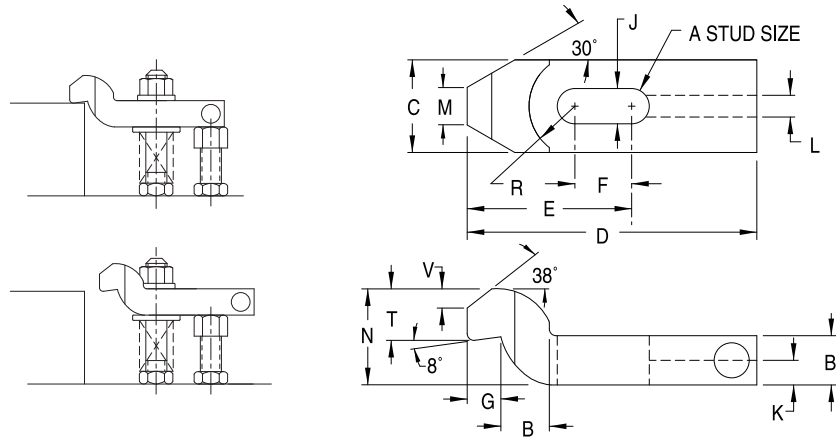
# SLOTTED-HEEL GOOSENECK CLAMP STRAPS

STRAP: ALLOY STEEL, BLACK OXIDE FINISH

INFO+: SEE PAGES 82, 264-268, 271-272, 280-282 FOR OTHER MATERIAL SPECIFICATIONS



Gooseneck version of our Slotted-Heel Clamp Straps. This design recesses the clamping nut to provide a low overall profile. Slotted-Heel Clamp Straps have a slot underneath to slide straight back for clear loading. An indentation at the rear of each side provides a secure finger grip for retracting the clamp. Available to fit 1/2-13 studs (M12 in metric).



## STRAPS – STEEL

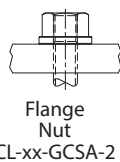
PART NO.	A	B	C	D	E	F	G	J	K	L	M	N	R	T	V
CL-85-GCS	1/2 OR M12	.79	1.57	4.92	2.87	1.02	.63	.55	.34	.38	.79	1.57	.79	.90	.34



Slotted-Heel Gooseneck Clamp Straps are also available as a complete assembly. Select any of the five nut/knob combinations shown below by adding the appropriate suffix to the part number. Other lengths of Clamping Studs and Clamp Rests are available (order pieces individually).



Spherical Nut & Washer  
CL-xx-GCSA-1



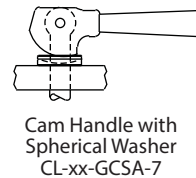
Flange Nut  
CL-xx-GCSA-2



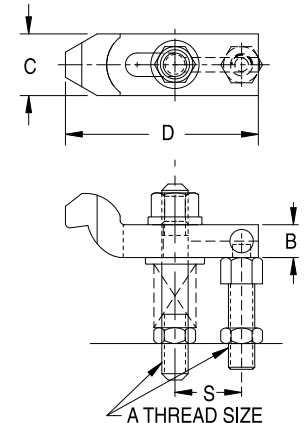
Hand Knob with Spherical Washer  
CL-xx-GCSA-4



Acorn Nut with Spherical Washer  
CL-xx-GCSA-5



Cam Handle with Spherical Washer  
CL-xx-GCSA-7



## ASSEMBLIES – STEEL (INCH)

PART NO.	A	B	C	D	S	CLAMP STRAP	CLAMP REST	SPRING	FLAT WASHER	STUD	JAM NUT
CL-85-GCSA-X	1/2 OR M12	.79	1.57	5.91	2.75	CL-85-GCS	CL-4-CR	CL-9-SPG	CL-2-FW	CL-1/2-13X4.00-STUD	CL-8-JN

## ASSEMBLIES – STEEL (METRIC)

PART NO.	A	B	C	D	S	CLAMP STRAP	CLAMP REST	SPRING	FLAT WASHER	STUD	JAM NUT
CLM-85-GCSA-X	1/2 OR M12	.79	1.57	5.91	2.75	CL-85-GCS	CLM-4-CR	CL-9-SPG	CL-2-FW	CLM-12X95-STUD	CLM-12-JN

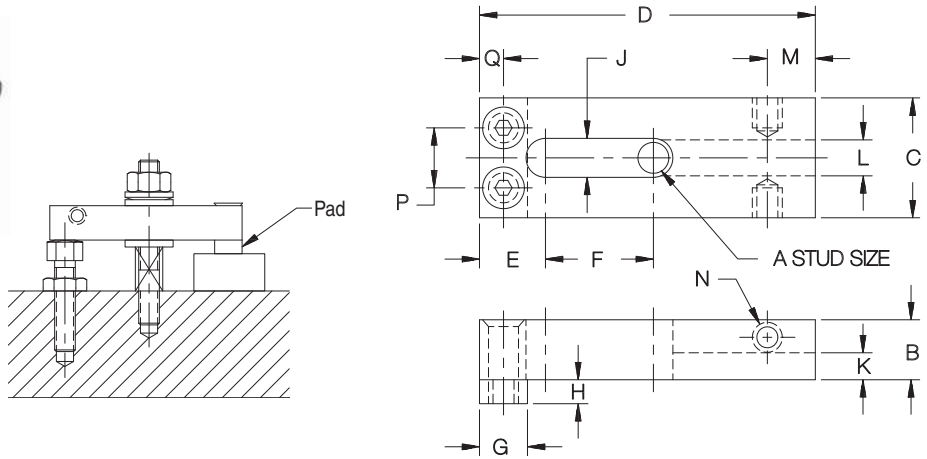
# SLOTTED-HEEL PADDED CLAMP STRAPS

STRAP & PAD: 1018 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH  
 INFO+: SEE PAGES 82, 264-268, 271, 280-282 FOR OTHER MATERIAL SPECIFICATIONS



**Steel**

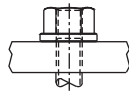
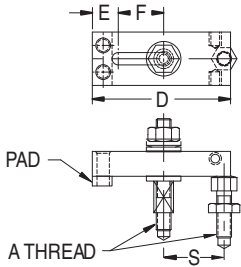
Slotted-Heel Clamp Strap that features a replaceable clamping pad attached with two screws (furnished). Clamp Strap also easily accepts custom pads or other attachments. Rear end is tapped on either side for a Finger Pin (INFO+ page 117). Available for 1/4-20 (M6) to 1/2-13 (M12) stud sizes, most in a choice of several strap lengths.



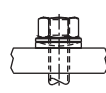
## STRAPS — STEEL WITH STEEL PAD

PART NO.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q
CL-165-CS	1/4-20 or M6	3/8	5/8	2	3/8	5/8	1/4	1/8	9/32	5/32	1/4			11/32	9/64
CL-166-CS	3/8-16 or M10	5/8	1-1/4	3-1/2	11/16	1-1/8	1/2	1/4	27/64	9/32	3/8	1/2	5/16-18	5/8	1/4
CL-168-CS				4-1/2		1-5/8									
CL-169-CS				4-1/2		1-1/4									
CL-170A-CS	1/2-13 or M12	3/4	1-1/2	6	7/8	2	5/8	3/8	17/32	9/32	3/8	1/2	5/16-18	3/4	5/16

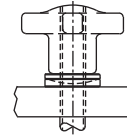
7



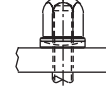
Spherical Nut & Washer  
CL-xx-SHPA-1



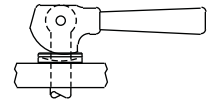
Flange Nut  
CL-xx-SHPA-2



Hand Knob with Spherical Washer  
CL-xx-SHPA-4



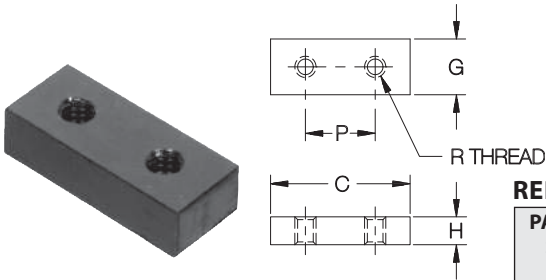
Acorn Nut with Spherical Washer  
CL-xx-SHPA-5



Cam Handle with Spherical Washer  
CL-xx-SHPA-7

## ASSEMBLIES — STEEL WITH STEEL PAD (INCH)

PART NO.	A	D	E	F	S	CLAMP STRAP	CLAMP REST	SPRING	FLAT WASHER	CLAMPING STUD
CL-165-SHPA-x	1/4-20	2	3/8	5/8	7/8	CL-165-CS	CL-1-CR	CL-5-SPG	CL-7-FW	CL-1/4-20x2.50-STUD
CL-166-SHPA-x	3/8-16	3-1/2	11/16	1-1/8	1-7/16	CL-166-CS	CL-2-CR	CL-7-SPG	CL-1-FW	CL-3/8-16x3.00-STUD
CL-168-SHPA-x				1-5/8	1-15/16	CL-168-CS				
CL-169-SHPA-x	1/2-13	4-1/2	7/8	1-1/4	2-1/8	CL-169-CS	CL-4-CR	CL-9-SPG	CL-2-FW	CL-1/2-13x4.00-STUD
CL-170A-SHPA-x				2	2-7/8	CL-170A-CS				



## REPLACEMENT PADS

PART NO. STEEL PAD	PART NO. PLASTIC PAD	PART NO. BRASS PAD	STUD SIZE	C	G	H	P	R
CL-40-CP	CL-20-CP	CL-30-CP	1/4-20 or M6	5/8	1/4	1/8	11/32	#5-40
CL-42-CP	CL-22-CP	CL-32-CP	3/8-16 or M10	1-1/4	1/2	1/4	5/8	#10-24
CL-43-CP	CL-23-CP	CL-33-CP	1/2-13 or M12	1-1/2	5/8	3/8	3/4	1/4-20

Replacement or optional pads for the Clamp Straps shown above. Available in steel, reinforced plastic, or brass.



# TAPPED-HEEL CLAMP STRAPS

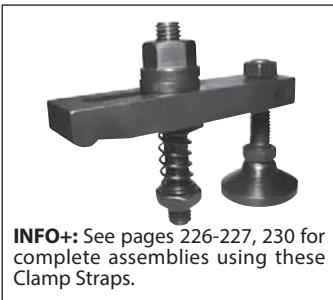
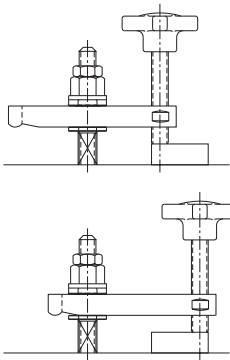
STEEL: 1018, CARBURIZED-HARDENED, BLACK OXIDE FINISH  
STAINLESS STEEL: 300 SERIES



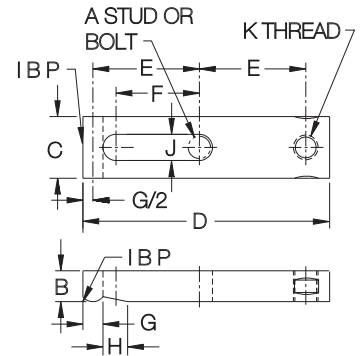
**Steel and  
Stainless Steel**

Popular Clamp Strap with a tapped heel that accepts a clamping screw or rear support. Often used with a Guide Block to allow sliding the strap straight back for clear loading. Two drill spots on the sides provide a secure grip for retracting the clamp. **INFO+:** Can also be used with a Stud Leveling Foot as a rear support (see page 175).

Available in steel for 1/4-20 to 3/4-10 stud sizes (M6 to M20 in metric), or stainless steel for #10-32 to 3/8-16 stud sizes. Each size is available in several strap lengths.



**INFO+:** See pages 226-227, 230 for complete assemblies using these Clamp Straps.



## STRAPS — STEEL (INCH)

PART NO.	A	B	C	D	E	F	G	H	J	K
CL-61-CS	1/4-20	3/8	5/8	2	13/16	9/16	1/4	11/32	9/32	1/4-20
CL-62-CS				2-1/2	1-1/16	13/16				
CL-63-CS	3/8-16	1/2	1-1/8	3	1-7/32	13/16	13/32	1/2	27/64	3/8-16
CL-65-CS				4	1-23/32	1-5/16				
CL-67-CS				5	2-7/32	1-13/16				
CL-69-CS				6	2-23/32	2-5/16				
CL-70-CS	1/2-13	5/8	1-1/4	3-1/2	1-13/32	15/16	13/32	1/2	17/32	1/2-13
CL-71-CS				4	1-21/32	1-3/16				
CL-72-CS				4-1/2	1-29/32	1-7/16				
CL-73-CS				5	2-5/32	1-11/16				
CL-74-CS				5-1/2	2-13/32	1-15/16				
CL-75-CS				6	2-21/32	2-3/16				
CL-81-CS	5/8-11	7/8	1-1/2	4	1-9/16	1	1/2	19/32	21/32	5/8-11
CL-77-CS				4-1/2	1-13/16	1-1/4				
CL-83-CS				5	2-1/16	1-1/2				
CL-85-CS				6	2-9/16	2				
CL-86-CS				6-1/2	2-13/16	2-1/4				
CL-88-CS				6	2-1/2	1-29/32				
CL-90-CS	7	3	2-13/32							
CL-92-CS	8	3-1/2	2-29/32							

## STRAPS — STEEL (METRIC)

PART NO.	A	B	C	D	E	F	G	H	J	K
CLM-61-CS	M6	3/8	5/8	2	13/16	9/16	1/4	11/32	9/32	M6
CLM-62-CS				2-1/2	1-1/16	13/16				
CLM-63-CS	M10	1/2	1-1/8	3	1-7/32	13/16	13/32	1/2	27/64	M10
CLM-65-CS				4	1-23/32	1-5/16				
CLM-67-CS				5	2-7/32	1-13/16				
CLM-70-CS				3-1/2	1-13/32	15/16				
CLM-71-CS	M12	5/8	1-1/4	4	1-21/32	1-3/16	13/32	1/2	17/32	M12
CLM-72-CS				4-1/2	1-29/32	1-7/16				
CLM-73-CS				5	2-5/32	1-11/16				
CLM-75-CS				6	2-21/32	2-3/16				
CLM-81-CS				4	1-9/16	1				
CLM-83-CS				5	2-1/16	1-1/2				
CLM-85-CS	6	2-9/16	2							
CLM-88-CS	M20	1	1-3/4	6	2-1/2	1-29/32	1/2	19/32	13/16	M20
CLM-92-CS				8	3-1/2	2-29/32				

## STRAPS — STAINLESS, MINIATURE (INCH)

PART NO.	A	B	C	D	E	F	G	H	J	K
CL-18215	#10-32	1/4	1/2	1-1/2	19/32	13/32	3/16	5/16	7/32	#10-32
CL-18220				2	27/32	21/32				
CL-18320	1/4-20	3/8	5/8	2	13/16	19/32	1/4	3/8	9/32	1/4-20
CL-18325				2-1/2	1-1/16	27/32				
CL-18420	5/16-18	3/8	3/4	2	3/4	1/2	5/16	7/16	11/32	5/16-18
CL-18425				2-1/2	1	3/4				
CL-18430				3	1-1/4	1				
CL-18530				3	1-7/32	7/8				
CL-18535	3/8-16	1/2	1	3-1/2	1-15/32	1-1/8	3/8	1/2	27/64	3/8-16
CL-18540				4	1-23/32	1-3/8				

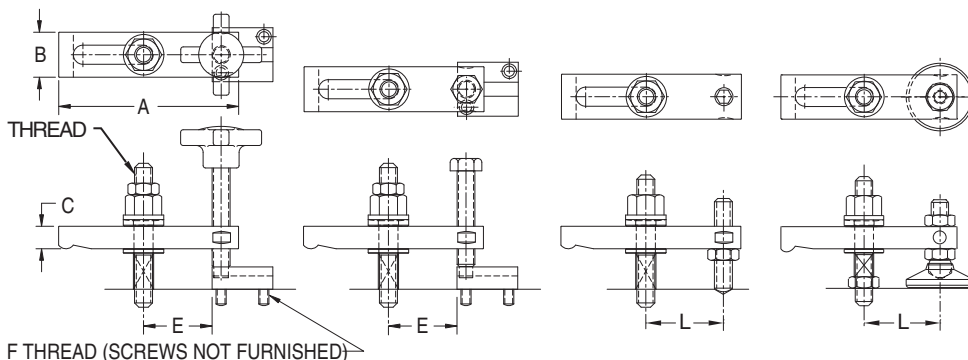
# TAPPED-HEEL CLAMP STRAPS

INFO+: SEE PAGES 82, 223, 264-268, 271-272, 282 FOR MATERIAL SPECIFICATION

A complete clamp-strap assembly using (INFO+) a tapped-heel strap from page 223. Select one of two clamping screws or a rear Clamp Rest, as shown below, by adding the appropriate suffix to the part number.



Steel



Hand-Knob Clamping Screw  
CL-xx-THA-HK

Hex-Head Clamping Screw  
CL-xx-THA-HH

Oval-Point Clamp Rest  
CL-xx-THA-OP

Leveling Foot  
CL-xx-THA-LF

## ASSEMBLIES — STEEL (INCH)

PART NO.	THREAD SIZE	A	B	C	E	F	L	CLAMP STRAP	GUIDE BLOCK*	STUD & SPRING	NUTS	FLAT WASHER	
CL-1-THA-xx	1/4-20	2	5/8	3/8	11/16	#6-32	13/16	CL-61-CS	CL-2-GB	CL-1/4-20x2.00-STUD CL-5-SPG	CL-4-JN CL-1-SNW	CL-7-FW	
CL-2-THA-xx		2-1/2			15/16		1-1/16						CL-62-CS
CL-3-THA-xx	3/8-16	3	1-1/8	1/2	1-1/32	#10-32	1-7/32	CL-63-CS	CL-4-GB	CL-3/8-16x3.00-STUD CL-7-SPG	CL-6-JN CL-2-SNW	CL-1-FW	
CL-5-THA-xx		4			1-17/32		1-23/32						CL-65-CS
CL-7-THA-xx		5			2-1/32		2-7/32						CL-67-CS
CL-9-THA-xx		6			2-17/32		2-23/32						CL-69-CS
CL-10-THA-xx	1/2-13	3-1/2	1-1/4	5/8	1-5/32	1/4-20	1-13/32	CL-70-CS	CL-6-GB	CL-1/2-13x4.00-STUD CL-9-SPG	CL-8-JN CL-3-SNW	CL-2-FW	
CL-11-THA-xx		4			1-13/32		1-21/32						CL-71-CS
CL-12-THA-xx		4-1/2			1-21/32		1-29/32						CL-72-CS
CL-13-THA-xx		5			1-29/32		2-5/32						CL-73-CS
CL-14-THA-xx		5-1/2			2-5/32		2-13/32						CL-74-CS
CL-15-THA-xx		6			2-13/32		2-21/32						CL-75-CS
CL-21-THA-xx	5/8-11	4	1-1/2	7/8	1-1/4	1/4-20	1-9/16	CL-81-CS	CL-8-GB	CL-5/8-11x4.00-STUD CL-11-SPG	CL-10-JN CL-4-SNW	CL-3-FW	
CL-17-THA-xx		4-1/2			1-1/2		1-13/16						CL-77-CS
CL-23-THA-xx		5			1-3/4		2-1/16						CL-83-CS
CL-25-THA-xx		6			2-1/4		2-9/16						CL-85-CS
CL-26-THA-xx		6-1/2			2-1/2		2-13/16						CL-86-CS
CL-28-THA-xx	3/4-10	6	1-3/4	1	2-1/8	1/4-20	2-1/2	CL-88-CS	CL-11-GB	CL-3/4-10x5.00-STUD CL-13-SPG	CL-12-JN CL-5-SNW	CL-4-FW	
CL-30-THA-xx		7			2-5/8		3						CL-90-CS
CL-32-THA-xx		8			3-1/8		3-1/2						CL-92-CS

## ASSEMBLIES — STEEL (METRIC)

CLM-1-THA-xx	M6	2	5/8	3/8	11/16	M4	13/16	CLM-61-CS	CL-2-GB	CLM-6x65-STUD CL-5-SPG	CLM-6-JN CLM-6-SNW	CL-7-FW	
CLM-2-THA-xx	M10	2-1/2	1-1/8	1/2	15/16	M5	1-1/16	CLM-62-CS	CL-4-GB	CLM-10x80-STUD CL-7-SPG	CLM-10-JN CLM-10-SNW	CL-1-FW	
CLM-3-THA-xx		3			1-17/32		1-23/32						CLM-63-CS
CLM-5-THA-xx	M12	4	1-1/4	5/8	1-17/32	M6	1-13/32	CLM-65-CS	CL-6-GB	CLM-12x95-STUD CL-9-SPG	CLM-12-JN CLM-12-SNW	CL-2-FW	
CLM-7-THA-xx		5			2-1/32		2-7/32						CLM-67-CS
CLM-10-THA-xx		3-1/2			1-5/32		1-13/32						CLM-70-CS
CLM-11-THA-xx		4			1-13/32		1-21/32						CLM-71-CS
CLM-12-THA-xx	M16	4-1/2	1-1/2	7/8	1-21/32	M6	1-29/32	CLM-72-CS	CL-8-GB	CLM-16x110-STUD CL-11-SPG	CLM-16-JN CLM-16-SNW	CL-3-FW	
CLM-13-THA-xx		5			1-29/32		2-5/32						CLM-73-CS
CLM-15-THA-xx		6			2-13/32		2-21/32						CLM-75-CS
CLM-21-THA-xx		4			1-1/4		1-9/16						CLM-81-CS
CLM-23-THA-xx		5			1-3/4		2-1/16						CLM-83-CS
CLM-25-THA-xx		6			2-1/4		2-9/16						CLM-85-CS
CLM-28-THA-xx	M20	6	1-3/4	1	2-1/8	M6	2-1/2	CLM-88-CS	CL-11-GB	CLM-20x125-STUD CL-13-SPG	CLM-20-JN CLM-20-SNW	CLM-10-FW	
CLM-32-THA-xx		8			2-5/8		3-1/2						CLM-92-CS

\* Not included on oval-point version

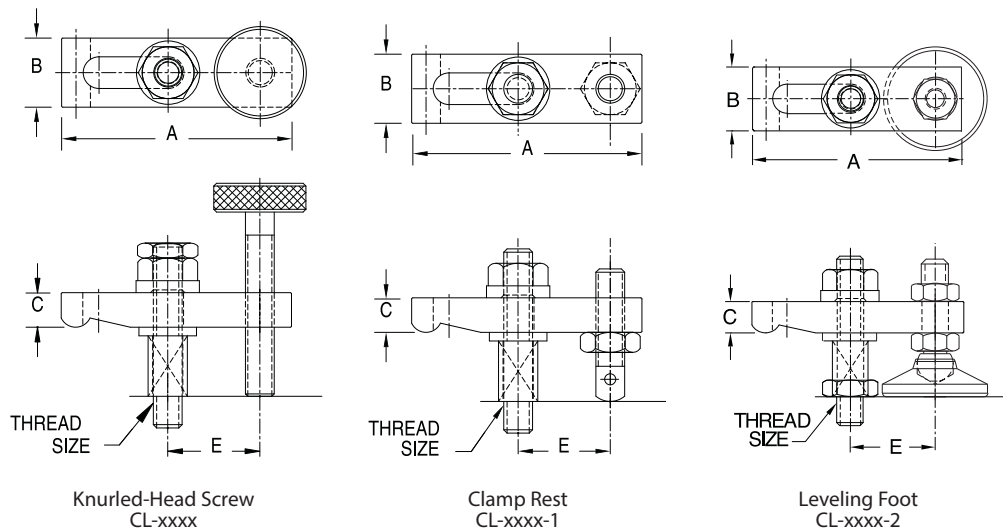
# TAPPED-HEEL CLAMP STRAPS

**INFO+:** SEE PAGES 97, 176, 225, 266, 268, 271-272, 281-282 FOR MATERIAL SPECIFICATIONS



**Stainless Steel  
(Miniature)**

A complete clamp-strap assembly using (**INFO+**) a stainless steel Tapped-Heel Strap from page 225. Fixture Stud has a thread-locking interference thread at the bottom end to install permanently in a fixture plate. Standard assembly includes a Knurled-Head Screw. To order with a rear Clamp Rest instead, add "-1" to the part number (example: CL-3115-1). To order with a Leveling Foot instead, add "-2" to the part number (example: CL-3115-2).



Knurled-Head Screw  
CL-xxxx

Clamp Rest  
CL-xxxx-1

Leveling Foot  
CL-xxxx-2

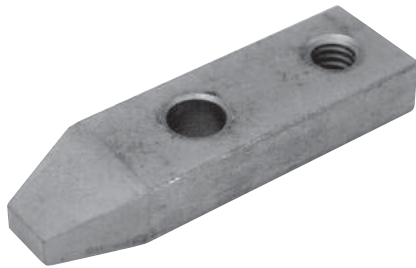
## ASSEMBLIES — STAINLESS, MINIATURE (INCH)

PART NO. WITH KNURLED HEAD SCREW	THREAD SIZE	A	B	C	E	CLAMP STRAP	KNURLED HEAD SCREW	CLAMP REST	LEVELING FOOT	SPRING	FLAT WASHER	STUD	FLANGE NUT
CL-3115	#10-32	1-1/2	1/2	1/4	19/32	CL-18215	CL-23212	CL-13410	CL-3-SLF-S	CL-2430.7	CL-254	CL-11415	CL-124
CL-3120		2			27/32	CL-18220							
CL-3220	1/4-20	2	5/8	3/8	13/16	CL-18320	CL-23515	CL-13515	CL-4-SLF-S	CL-2440.7	CL-255	CL-11520	CL-125
CL-3225		2-1/2			1-1/16	CL-18325							
CL-3320	5/16-18	2	3/4	3/8	3/4	CL-18420	CL-23620	CL-13612	CL-5-SLF-S	CL-2450.7	CL-256	CL-11620	CL-126
CL-3325		2-1/2			1	CL-18425							
CL-3330		3			1-1/4	CL-18430							
CL-3430		3			1-7/32	CL-18530							
CL-3435	3/8-16	3-1/2	1	1/2	1-15/32	CL-18535	CL-23820	CL-13717	CL-6-SLF-S	CL-2461.0	CL-257	CL-11725	CL-127
CL-3440		4			1-23/32	CL-18540							

# TAPERED-NOSE CLAMP STRAPS

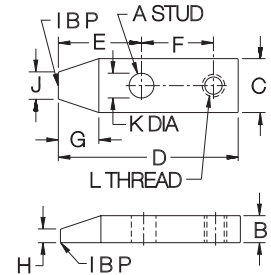
STRAP: 300-SERIES STAINLESS STEEL

INFO+: SEE PAGES 95, 266, 268, 271-272, 281-282 FOR OTHER MATERIAL SPECIFICATIONS



**Stainless Steel  
(Miniature)**

Tapped-Heel Clamp Strap with a tapered nose for clamping in tight spaces. Available in stainless steel for #10-32 to 3/8-16 stud sizes.



## STRAPS — STAINLESS, MINIATURE (INCH)

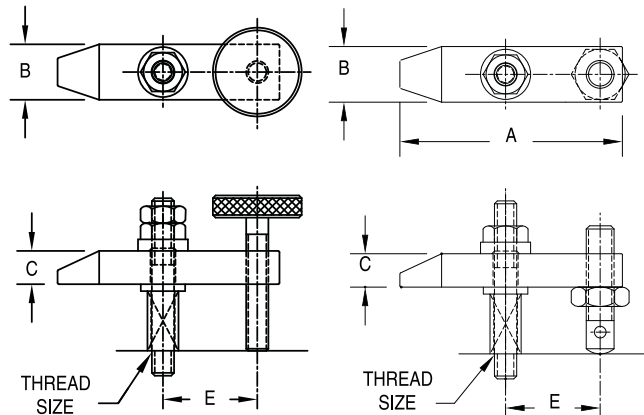
PART NO.	A	B	C	D	E	F	G	H	J	K	L
CL-20215	#10-32	1/4	1/2	1-1/2	11/16	19/32	3/8	1/8	1/4	7/32	#10-32
CL-20220				2	15/16	27/32					
CL-20320	1/4-20	3/8	5/8	2	15/16	13/16	15/32	5/32	5/16	9/32	1/4-20
CL-20325				2-1/2	1-3/16	1-1/16					
CL-20425	5/16-18	3/8	3/4	2-1/2	1-5/32	1	9/16	3/16	3/8	11/32	5/16-18
CL-20535	3/8-16	1/2	1	3-1/2	1-21/32	1-15/32	3/4	1/4	1/2	27/64	3/8-16

7



**Stainless Steel  
(Miniature)**

A complete clamp-strap assembly using one of the straps shown above. Fixture Stud has a thread-locking interference thread at the bottom end to install permanently in a fixture plate. Standard assembly includes a Knurled-Head Screw. To order with a rear Clamp Rest instead, add "-1" to the part number. Example: CL-3915-1.



Knurled-Head Screw  
CL-xxxx

Clamp Rest  
CL-xxxx-1

## ASSEMBLIES — STAINLESS, MINIATURE (INCH)

PART NO. WITH KNURLED HEAD SCREW	PART NO. WITH CLAMP REST	THREAD SIZE	A	B	C	E	CLAMP STRAP	KNURLED HEAD SCREW	CLAMP REST	SPRING	FLAT WASHER	STUD	FLANGE NUT
CL-3915	CL-3915-1	#10-32	1-1/2	1/2	1/4	19/32	CL-20215	CL-23212	CL-13410	CL-2430.7	CL-254	CL-11415	CL-124
CL-3920	CL-3920-1		2			27/32	CL-20220						
CL-4020	CL-4020-1	1/4-20	2	5/8	3/8	13/16	CL-20320	CL-23515	CL-13515	CL-2440.7	CL-255	CL-11520	CL-125
CL-4025	CL-4025-1		2-1/2			1-1/16	CL-20325						
CL-4125	CL-4125-1	5/16-18	2-1/2	3/4	3/8	1	CL-20425	CL-23620	CL-13612	CL-2450.7	CL-256	CL-11620	CL-126
CL-4235	CL-4235-1	3/8-16	3-1/2	1	1/2	1-15/32	CL-20535	CL-23820	CL-13717	CL-2461.0	CL-257	CL-11725	CL-127

# WIDE-NOSE CLAMP STRAPS

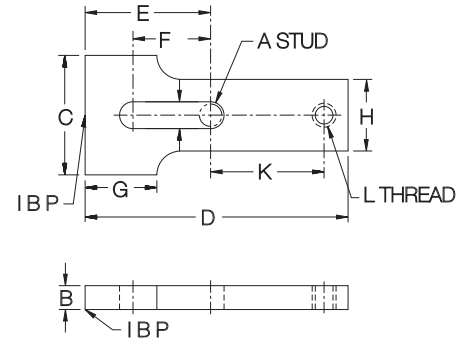
STRAP: 300-SERIES STAINLESS STEEL

INFO+: SEE PAGES 95, 176, 266, 268, 271-272, 281-282 FOR OTHER MATERIAL SPECIFICATIONS



**Stainless Steel  
(Miniature)**

Tapped-Heel Clamp Strap with an extra-wide nose. Available in stainless steel for 1/4-20 studs.



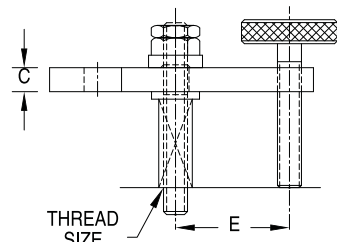
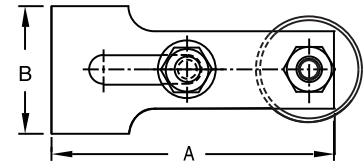
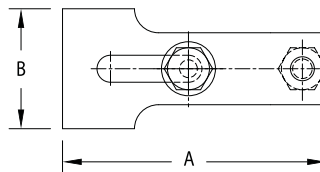
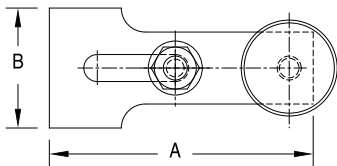
**Stainless Steel  
(Miniature)**

## STRAPS — STAINLESS, MINIATURE (INCH)

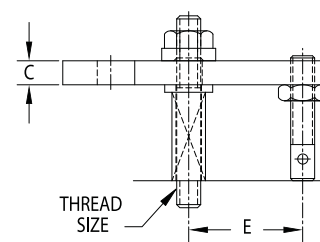
PART NO.	A	B	C	D	E	F	G	H	J	K	L
CL-22227	1/4-20	1/4	1-1/4	2-3/4	1-5/16	13/16	3/4	3/4	9/32	1-3/16	1/4-20

A complete Clamp-Strap assembly using the Clamp Strap shown above. Fixture stud has a thread-locking interference thread at the bottom end to install permanently in a fixture plate. Standard assembly includes a Knurled-Head Screw. To order with a rear Clamp Rest instead, add "-1" to the part number (CL-44227-1). To order with a levelling foot instead, add "-2" to the part number (CL-44227-2).

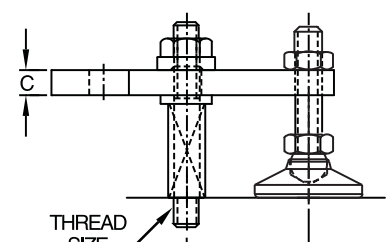
7



Knurled-Head Screw  
CL-xxxx



Clamp Rest  
CL-xxxx-1



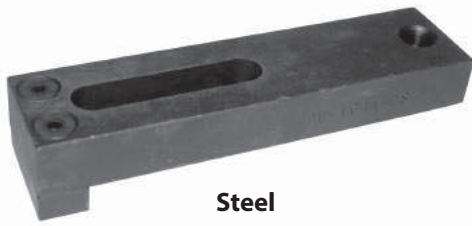
Levelling Foot  
CL-xxxx-2

## ASSEMBLIES — STAINLESS, MINIATURE (INCH)

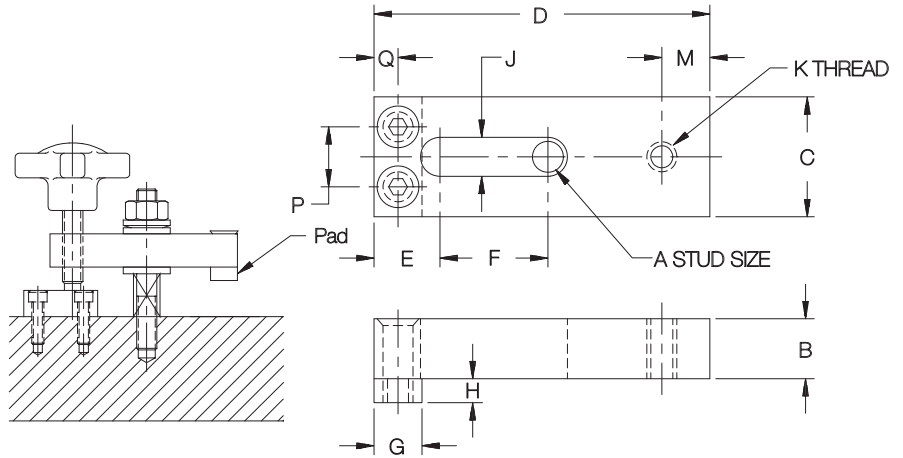
PART NO. WITH KNURLED HEAD SCREW	THREAD SIZE	A	B	C	E	CLAMP STRAP	KNURLED HEAD SCREW	CLAMP REST	LEVELING FOOT	SPRING	FLAT WASHER	STUD	FLANGE NUT
CL-44227	1/4-20	2-3/4	1-1/4	1/4	1-3/16	CL-22227	CL-23515	CL-13515	CL-13515	CL-2440.7	CL-255	CL-11520	CL-125

# TAPPED-HEEL PADDED CLAMP STRAPS

STRAP & PAD: 1018 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH  
**INFO+:** SEE PAGES 82, 176, 265, 267-268, 271, 282 FOR OTHER MATERIAL SPECIFICATIONS



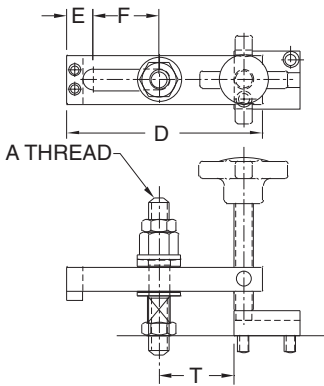
Steel



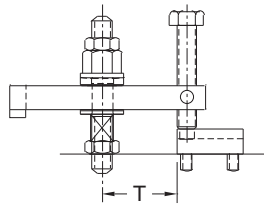
Tapped-Heel Clamp Strap that features a replaceable clamping pad attached with two screws (furnished). Clamp Strap also easily accepts custom pads or other attachments. Available for 1/4-20 to 1/2-13 stud sizes, most in a choice of several strap lengths.

## STRAPS — STEEL WITH STEEL PAD

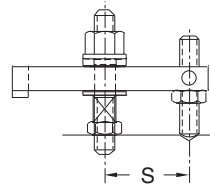
PART NO.	A	B	C	D	E	F	G	H	J	K	M	P	Q
CL-157-CS	1/4-20	3/8	5/8	2	3/8	5/8	1/4	1/8	9/32	1/4-20	7/32	11/32	9/64
CL-158A-CS	5/16-18	1/2	7/8	2-1/2	9/16	3/4	3/8	3/16	11/32	5/16-18	1/4	1/2	3/16
CL-159A-CS				3-1/2		1-1/4							
CL-160A-CS	3/8-16	5/8	1-1/4	3-1/2	11/16	1-1/8	1/2	1/4	27/64	3/8-16	3/8	5/8	1/4
CL-162A-CS				4-1/2		1-5/8							
CL-163A-CS	1/2-13	3/4	1-1/2	4-1/2	7/8	1-1/4	5/8	3/8	17/32	1/2-13	7/16	3/4	5/16
CL-164A-CS				6		2							



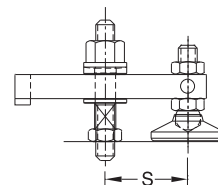
Hand-Knob Clamping Screw  
CL-xx-THPA-HK



Hex-Head Clamping Screw  
CL-xx-THPA-HH



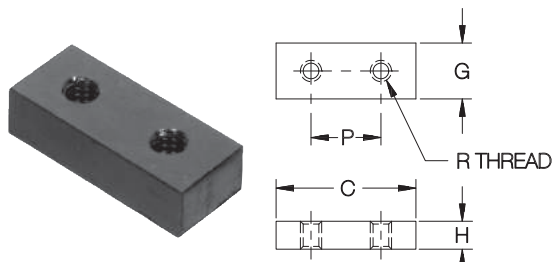
Oval-Point Clamp Rest  
CL-xx-THPA-OP



Leveling Foot  
CL-xx-THPA-LF

## ASSEMBLIES — STEEL WITH STEEL PAD (INCH)

PART NO.	A	D	E	F	S	T	CLAMP STRAP	GUIDE BLOCK	SPRING	CLAMPING STUD	NUTS	FLAT WASHER
CL-157-THPA-xx	1/4-20	2	3/8	5/8	25/32	21/32	CL-157-CS	CL-2-GB	CL-5-SPG	CL-1/4-20x2.00-STUD	CL-4-JN CL-1-SNW	CL-7-FW
CL-160A-THPA-xx	3/8-16	3-1/2	11/16	1-1/8	1-5/16	1-1/8	CL-160A-CS	CL-4-GB	CL-7-SPG	CL-3/8-16x3.00-STUD	CL-6-JN CL-2-SNW	CL-1-FW
CL-162A-THPA-xx		4-1/2		1-5/8	1-13/16	1-5/8	CL-162A-CS					
CL-163A-THPA-xx	1/2-13	4-1/2	7/8	1-1/4	1-15/16	1-11/16	CL-163A-CS	CL-8-GB	CL-9-SPG	CL-1/2-13x4.00-STUD	CL-8-JN CL-3-SNW	CL-2-FW
CL-164A-THPA-xx		6		2	2-11/16	2-7/16	CL-164A-CS					



Replacement or optional pads for the Clamp Straps shown above. Available in steel, reinforced plastic, or brass.

## REPLACEMENT PADS

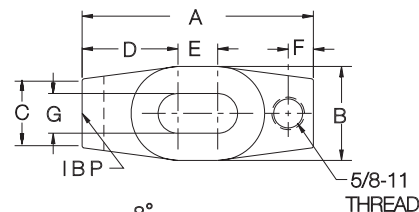
PART NO.	PART NO.	PART NO.	STUD	C	G	H	P	R
STEEL PAD	PLASTIC PAD	BRASS PAD	SIZE					
CL-40-CP	CL-20-CP	CL-30-CP	1/4-20	5/8	1/4	1/8	11/32	#5-40
CL-41-CP	CL-21-CP	CL-31-CP	5/16-18	7/8	3/8	3/16	1/2	#8-32
CL-42-CP	CL-22-CP	CL-32-CP	3/8-16	1-1/4	1/2	1/4	5/8	#10-24
CL-43-CP	CL-23-CP	CL-33-CP	1/2-13	1-1/2	5/8	3/8	3/4	1/4-20

# FORGED CLAMP STRAPS

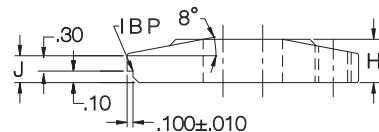
FORGED STEEL, 70,000 PSI YIELD STRENGTH, BLACK OXIDE FINISH



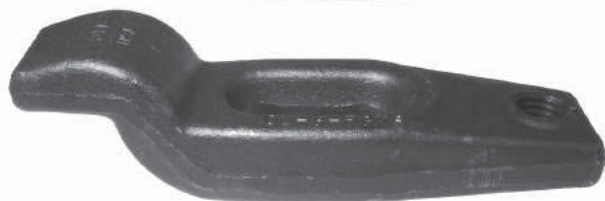
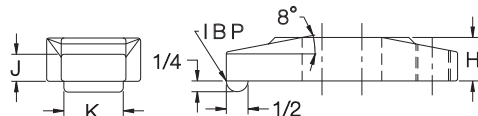
**Straight  
Locator Nose**



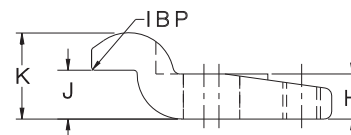
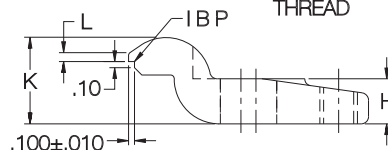
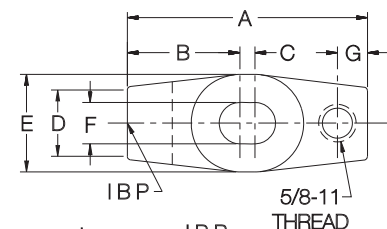
**Straight  
Plain Nose**



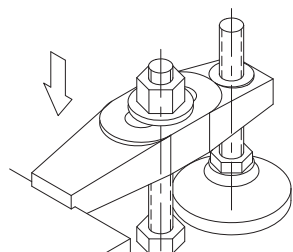
**Gooseneck  
Locator Nose**



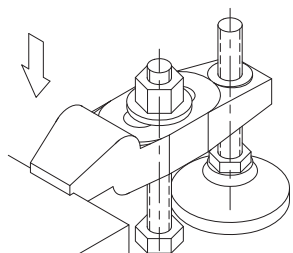
**Gooseneck  
Plain Nose**



High-strength Tapped-Heel Clamp Strap available in straight or gooseneck design, with locator nose or plain nose. Locator-nose version is ideal for workpieces with machined sides. The accurately machined notch ensures precise, repeatable clamp location for increased machining clearance. **INFO+:** For rear Clamp Rests, see Stud Leveling Feet on page 175.



**Straight  
Locator Nose  
Clamp**



**Gooseneck  
Locator Nose  
Clamp**

## STRAIGHT — LOCATOR NOSE

PART NO.	STUD SIZE	A	B	C	D	E	F	G	H	J	K
CL-4-FSCS	5/8-11	4	1-5/8	1-3/16	1-21/32	11/16	7/16	11/16	3/4	1/2	—
CL-6-FSCS		6	1-3/4	1-1/4	2-5/16	1-3/8	9/16	11/16	7/8	9/16	—
CL-8-FSCS	3/4-10	8	2-1/8	1-1/2	3	2	11/16	13/16	1-1/8	3/4	—
CL-10-FSCS	7/8-9	10	2-1/2	1-3/4	3-5/8	2-3/4	13/16	15/16	1-3/8	15/16	—

## STRAIGHT — PLAIN NOSE

PART NO.	STUD SIZE	A	B	C	D	E	F	G	H	J	K	L
CL-4-FRCS	5/8-11	4	1-5/8	1-3/16	1-21/32	11/16	7/16	11/16	3/4	1/2	—	—
CL-6-FRCS		6	1-3/4	1-1/4	2-5/16	1-3/8	9/16	11/16	7/8	9/16	—	1
CL-8-FRCS	3/4-10	8	2-1/8	1-1/2	3	2	11/16	13/16	1-1/8	3/4	1-1/4	—
CL-10-FRCS	7/8-9	10	2-1/2	1-3/4	3-5/8	2-3/4	13/16	15/16	1-3/8	15/16	1-1/2	—

## GOOSENECK — LOCATOR NOSE

PART NO.	STUD SIZE	A	B	C	D	E	F	G	H	J	K	L
CL-40-FGNS	5/8-11	4	1-31/32	3/16	1-3/16	1-3/4	11/16	1/2	3/4	3/4	1-7/16	.15
CL-60-FGNS		6	2-17/32	1	1-1/4	1-3/4		5/8	7/8	15/16	1-9/16	.25
CL-80-FGNS	3/4-10	8	3-9/32	1-5/8	1-9/16	2-1/4	13/16	1	1-1/8	1-1/8	2	.35

## GOOSENECK — PLAIN NOSE

PART NO.	STUD SIZE	A	B	C	D	E	F	G	H	J	K	L
CL-4-FGNS	5/8-11	4	1-31/32	3/16	1-3/16	1-3/4	11/16	1/2	3/4	3/4	1-7/16	—
CL-6-FGNS		6	2-17/32	1	1-1/4	1-3/4		5/8	7/8	15/16	1-9/16	—
CL-8-FGNS	3/4-10	8	3-9/32	1-5/8	1-9/16	2-1/8	13/16	1	1-1/8	1-1/8	2	—

# ALUMINUM CLAMP STRAPS

TENZALOY ALUMINUM ALLOY, 25,000 PSI YIELD STRENGTH, BRINELL HARDNESS-74



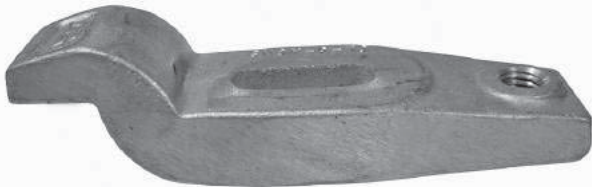
**Straight  
Locator Nose**



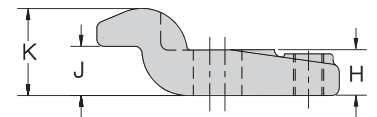
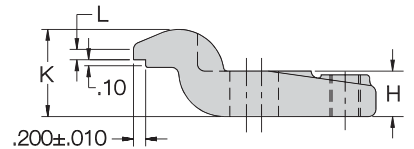
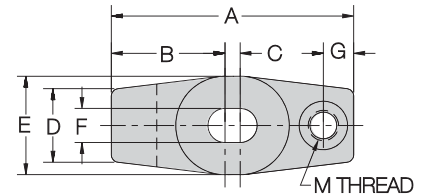
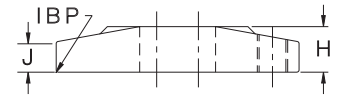
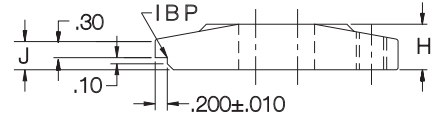
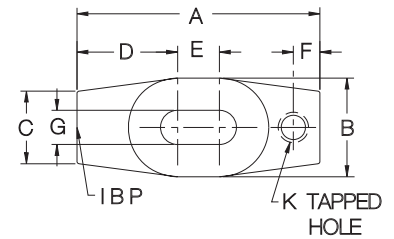
**Straight  
Plain Nose**



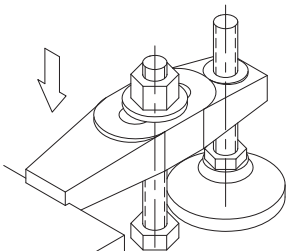
**Gooseneck  
Locator Nose**



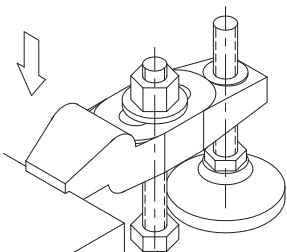
**Gooseneck  
Plain Nose**



Soft Clamp Strap made of high-strength aluminum alloy. This tapped-heel clamp is available in straight or gooseneck design, with locator nose or plain nose. Locator-nose version is ideal for workpieces with machined sides. The accurately machined notch ensures precise, repeatable clamp location for increased machining clearance. **INFO+**: For rear Clamp Rests, see Stud Leveling Feet on page 175.



**Straight  
Locator Nose  
Clamp**



**Gooseneck  
Locator Nose  
Clamp**

## STRAIGHT — LOCATOR NOSE

PART NO.	STUD SIZE	A	B	C	D	E	F	G	H	J	K
CL-4-ALCS	1/2-13	4	1-5/8	1-3/16	1-21/32	11/16	7/16	9/16	3/4	1/2	1/2-13
CL-6-ALCS		6	1-3/4	1-1/4	2-5/16	1-3/8	9/16		7/8	9/16	1/2-13
CL-8-ALCS	5/8-11	8	2-1/8	1-1/2	3	2	11/16	11/16	1-1/8	3/4	5/8-11

## STRAIGHT — PLAIN NOSE

PART NO.	STUD SIZE	A	B	C	D	E	F	G	H	J	K
CL-4-ASCS	1/2-13	4	1-5/8	1-3/16	1-21/32	11/16	7/16	9/16	3/4	1/2	1/2-13
CL-6-ASCS		6	1-3/4	1-1/4	2-5/16	1-3/8	9/16		7/8	9/16	1/2-13
CL-8-ASCS	5/8-11	8	2-1/8	1-1/2	3	2	11/16	11/16	1-1/8	3/4	5/8-11

## GOOSENECK — LOCATOR NOSE

PART NO.	STUD SIZE	A	B	C	D	E	F	G	H	J	K	L	M
CL-40-AGNS	1/2-13	4	1-7/8	1/4	1-3/16	1-5/8	9/16	1/2	3/4	13/16	1-7/16	.25	1/2-13
CL-60-AGNS		6	2-1/2	1	1-1/4	1-3/4		5/8	7/8	15/16	1-9/16	.30	1/2-13
CL-80-AGNS	5/8-11	8	3-3/16	1-5/8	1-1/2	2-1/8	11/16	1	1-1/8	1-1/8	2-1/16	.40	5/8-11

## GOOSENECK — PLAIN NOSE

PART NO.	STUD SIZE	A	B	C	D	E	F	G	H	J	K	L	M
CL-4-AGNS	1/2-13	4	1-7/8	1/4	1-3/16	1-5/8	9/16	1/2	3/4	13/16	1-7/16	—	1/2-13
CL-6-AGNS		6	2-1/2	1	1-1/4	1-3/4		5/8	7/8	15/16	1-9/16	—	1/2-13
CL-8-AGNS	5/8-11	8	3-3/16	1-5/8	1-1/2	2-1/8	11/16	1	1-1/8	1-1/8	2-1/16	—	5/8-11



# SWIVEL-HEEL CLAMP STRAPS

STRAP: 1018 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH  
**INFO+:** SEE PAGES 82, 89, 264, 266-268, 271-272, 280-282 FOR OTHER MATERIAL SPECIFICATIONS

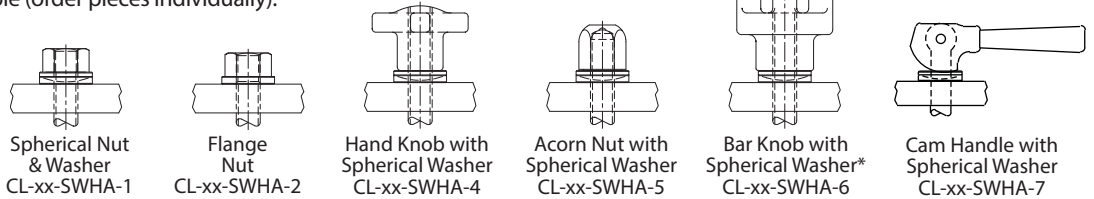
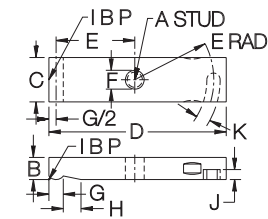


Steel

Clamp strap that swings out of the way for clear loading. Available for 1/4-20 (M6) to 3/4-10 (M20) stud sizes, each in several strap lengths. See below for complete Clamp-Strap assemblies using the straps shown above. Select any of the six nut/knob combinations shown by adding the appropriate suffix to the part number. Other Stud and Clamp Rest lengths are available (order pieces individually).

## STRAPS — STEEL

PART NO.	A	B	C	D	E	F	G	H	J	K
CL-125-CS	1/4-20 or M6	3/8	5/8	2	27/32	9/32	1/4	11/32	1/8	3/16
CL-127-CS	3/8-16 or M10	1/2	1-1/8	3	1-7/32	27/64	13/32	1/2	9/32	3/8
CL-129-CS				4	1-23/32					
CL-131-CS				5	2-7/32					
CL-134-CS	1/2-13 or M12	5/8	1-1/4	3-1/2	1-15/32	17/32	13/32	1/2	9/32	3/8
CL-135-CS				4	1-23/32					
CL-137-CS				5	2-7/32					
CL-139-CS				6	2-23/32					
CL-140-CS				4	1-5/8					
CL-142-CS	5/8-11 or M16	7/8	1-1/2	5	2-1/8	21/32	1/2	19/32	9/32	1/2
CL-144-CS				6	2-5/8					
CL-152-CS	3/4-10 or M20	1	1-3/4	6	2-5/8	13/16	1/2	19/32	5/16	1/2
CL-154-CS				7	3-1/8					
CL-156-CS				8	3-5/8					



## ASSEMBLIES — STEEL (INCH)

PART NO.	THREAD SIZE	A	B	C	E	CLAMP STRAP	CLAMP REST	FLAT WASHER	STUD & SPRING
CL-0-SWHA-x	1/4-20	2	5/8	3/8	27/32	CL-125-CS	CL-1-CR	CL-7-FW	CL-1/4-20x2.50-STUD CL-5-SPG
CL-2-SWHA-x	3/8-16	1/2	1-1/8	1/2	3	1-7/32	CL-2-CR	CL-1-FW	CL-3/8-16x3.00-STUD CL-7-SPG
CL-4-SWHA-x					4	1-23/32			
CL-6-SWHA-x					5	2-7/32			
CL-9-SWHA-x	1/2-13	5/8	1-1/4	5/8	3-1/2	1-15/32	CL-4-CR	CL-2-FW	CL-1/2-13x4.00-STUD CL-9-SPG
CL-10-SWHA-x					4	1-23/32			
CL-12-SWHA-x					5	2-7/32			
CL-14-SWHA-x					6	2-23/32			
CL-19-SWHA-x	5/8-11	7/8	1-1/2	7/8	4	1-5/8	CL-6-CR	CL-3-FW	CL-5/8-11x4.50-STUD CL-11-SPG
CL-17-SWHA-x					5	2-1/8			
CL-15-SWHA-x	3/4-10	1	1-3/4	1	6	2-5/8	CL-8-CR	CL-4-FW	CL-3/4-10x5.00-STUD CL-13-SPG
CL-27-SWHA-x					6	2-5/8			
CL-29-SWHA-x	M20	8	3-1/8	3-5/8	7	3-1/8	CL-154-CS	CLM-10-FW	CLM-20x125-STUD CL-13-SPG
CL-31-SWHA-x					8	3-5/8			

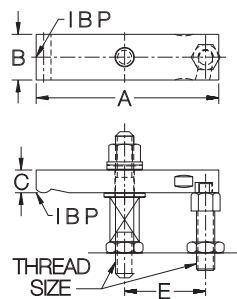
## ASSEMBLIES — STEEL (METRIC)

PART NO.	THREAD SIZE	A	B	C	E	CLAMP STRAP	CLAMP REST	FLAT WASHER	STUD & SPRING
CLM-0-SWHA-x	M6	2	5/8	3/8	27/32	CL-125-CS	CLM-1-CR	CL-7-FW	CLM-6x65-STUD CL-5-SPG
CLM-2-SWHA-x	M10	1-1/8	1/2	1/2	3	1-7/32	CLM-2-CR	CL-1-FW	CLM-10x80-STUD CL-7-SPG
CLM-4-SWHA-x					4	1-23/32			
CLM-6-SWHA-x					5	2-7/32			
CLM-9-SWHA-x	M12	5/8	1-1/4	5/8	3-1/2	1-15/32	CLM-4-CR	CL-2-FW	CLM-12x95-STUD CL-9-SPG
CLM-10-SWHA-x					4	1-23/32			
CLM-12-SWHA-x					5	2-7/32			
CLM-14-SWHA-x					6	2-23/32			
CLM-19-SWHA-x	M16	7/8	1-1/2	7/8	4	1-5/8	CLM-5-CR	CL-3-FW	CLM-16x110-STUD CL-11-SPG
CLM-17-SWHA-x					5	2-1/8			
CLM-15-SWHA-x	M20	1	1-3/4	1	6	2-5/8	CLM-8-CR	CLM-10-FW	CLM-20x125-STUD CL-13-SPG
CLM-27-SWHA-x					6	2-5/8			
CLM-29-SWHA-x	M20	8	3-1/8	3-5/8	7	3-1/8	CL-154-CS	CLM-10-FW	CLM-20x125-STUD CL-13-SPG
CLM-31-SWHA-x					8	3-5/8			

\* Available in thread sizes 3/8-16 and above (M10 and above in metric).



Steel



# DOUBLE-END CLAMP STRAPS

STRAP: 1018 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH  
**INFO+:** SEE PAGES 82, 89, 264-268, 271-272, 280-282 FOR OTHER MATERIAL SPECIFICATIONS

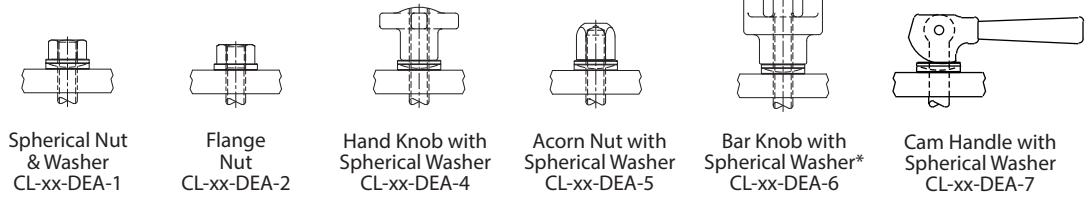
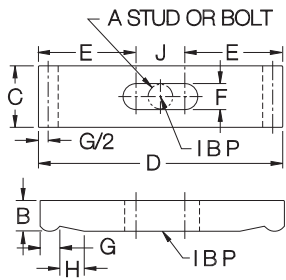


Steel

Clamp strap with two clamping ends, for holding two workpieces simultaneously. Available for 1/4-20 (M6) to 3/4-10 (M20) stud sizes, each in several strap lengths.

## STRAPS — STEEL

PART NO.	A	B	C	D	E	F	G	H	J
CL-23A-CS	1/4-20 or M6	3/8	5/8	2	11/16	9/32	1/4	11/32	5/8
CL-23B-CS				2-1/2	7/8				3/4
CL-23C-CS	5/16-18 or M8	1/2	3/4	2	1	3/8	5/16	7/16	0
CL-23D-CS				3	1-1/2				
CL-23-CS	3/8-16 or M10	1/2	1-1/8	3	1	27/64	13/32	1/2	1
CL-24-CS				4	1-1/2				
CL-25-CS				5	2				
CL-27-CS				4	1-1/2				
CL-28-CS				5	2				
CL-30-CS	1/2-13 or M12	5/8	1-1/4	6	2-1/2	17/32	13/32	1/2	1
CL-32A-CS				5	1-7/8				
CL-33-CS				6	2-3/8				
CL-37-CS	3/4-10 or M20	1	1-3/4	6	2-1/8	13/16	1/2	19/32	1-3/4
CL-38-CS				7	2-5/8				
CL-39-CS				8	3-1/8				



Spherical Nut & Washer  
CL-xx-DEA-1

Flange Nut  
CL-xx-DEA-2

Hand Knob with Spherical Washer  
CL-xx-DEA-4

Acorn Nut with Spherical Washer  
CL-xx-DEA-5

Bar Knob with Spherical Washer\*  
CL-xx-DEA-6

Cam Handle with Spherical Washer  
CL-xx-DEA-7

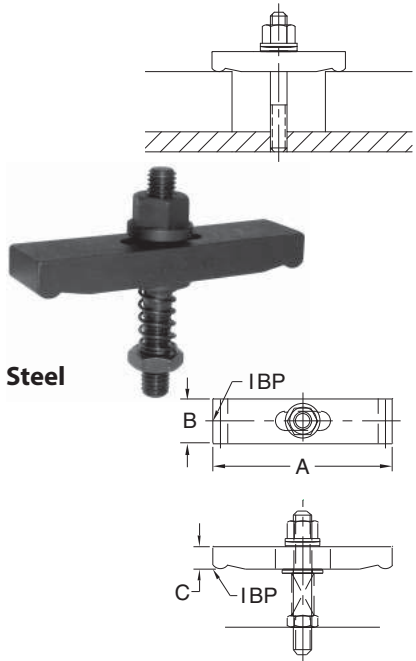
## ASSEMBLIES — STEEL (INCH)

PART NO.	THREAD SIZE	A	B	C	CLAMP STRAP	FLAT WASHER	STUD & SPRING
CL-0-DEA-x	1/4-20	2	5/8	3/8	CL-23A-CS	CL-7-FW	CL-1/4-20x2.50-STUD CL-5-SPG
CL-1-DEA-x		2-1/2			CL-23B-CS		
CL-1A-DEA-x	5/16-18	2	3/4	1/2	CL-23C-CS	CL-14-FW	CL-5/16-18x3.00-STUD CL-6-SPG
CL-1B-DEA-x		3			CL-23D-CS		
CL-2-DEA-x	3/8-16	3	1-1/8	1/2	CL-23-CS	CL-1-FW	CL-3/8-16x3.00-STUD CL-7-SPG
CL-4-DEA-x		4			CL-24-CS		
CL-6-DEA-x		5			CL-25-CS		
CL-8-DEA-x		4			CL-27-CS		
CL-10-DEA-x		5			CL-28-CS		
CL-12-DEA-x	1/2-13	6	1-1/4	5/8	CL-30-CS	CL-2-FW	CL-1/2-13x4.00-STUD CL-9-SPG
CL-15-DEA-x		5			CL-32A-CS		
CL-13-DEA-x		6			CL-33-CS		
CL-20-DEA-x	5/8-11	6	1-1/2	7/8	CL-37-CS	CL-3-FW	CL-5/8-11x4.50-STUD CL-11-SPG
CL-22-DEA-x		7			CL-38-CS		
CL-23-DEA-x		8			CL-39-CS		

## ASSEMBLIES — STEEL (METRIC)

CLM-0-DEA-x	M6	2	5/8	3/8	CL-23A-CS	CL-7-FW	CLM-6x65-STUD
CLM-1-DEA-x	M8	2-1/2	3/4	1/2	CL-23B-CS		CL-5-SPG
CLM-1A-DEA-x		2			CL-23C-CS	CLM-8x80-STUD	
CLM-1B-DEA-x	M10	3	1-1/8	1/2	CL-23D-CS	CL-6-SPG	
CLM-2-DEA-x		3			CL-23-CS	CLM-10x80-STUD CL-7-SPG	
CLM-4-DEA-x		4			CL-24-CS		
CLM-6-DEA-x		5			CL-25-CS		
CLM-8-DEA-x		4			CL-27-CS		
CLM-10-DEA-x	5	CL-28-CS					
CLM-12-DEA-x	M12	6	1-1/4	5/8	CL-30-CS	CLM-12x95-STUD CL-9-SPG	
CLM-15-DEA-x		5			CL-32A-CS	CLM-16x110-STUD CL-11-SPG	
CLM-13-DEA-x		6			CL-33-CS		
CLM-20-DEA-x	M16	6	1-1/2	7/8	CL-37-CS		CLM-20x125-STUD CL-13-SPG
CLM-22-DEA-x		7			CL-38-CS		
CLM-23-DEA-x		8			CL-39-CS		

\* Available in thread sizes 3/8-16 and above (M10 and above in metric).



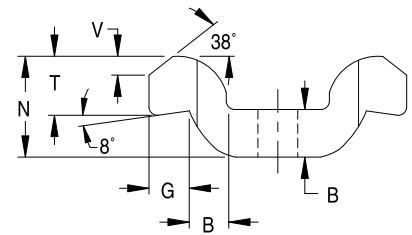
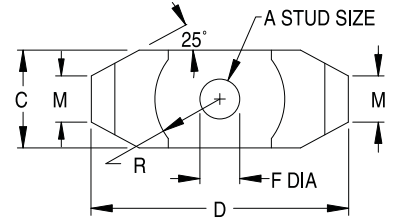
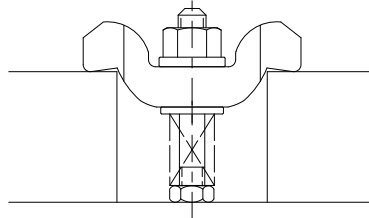
A complete clamp-strap assembly using one of the straps shown above. Select any of the six nut/knob combinations shown above by adding the appropriate suffix to the part number. Other stud lengths are available (order pieces individually).

# DOUBLE-END GOOSENECK CLAMP STRAPS

STRAP: ALLOY STEEL, BLACK OXIDE FINISH  
**INFO+:** SEE PAGES 82, 264-268, 271, 281-282 FOR OTHER MATERIAL SPECIFICATIONS



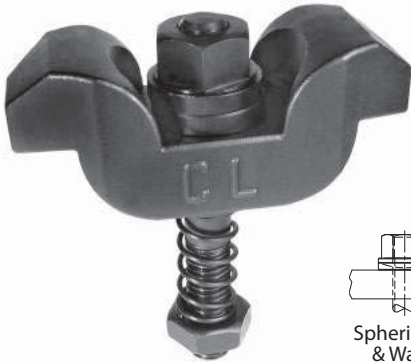
Steel



Gooseneck version of our Double-End Clamp Straps. This design recesses the clamping nut to provide a low overall profile. Double-End Clamps have two clamping ends, for holding two workpieces simultaneously. Turn strap 90° for clear loading. Available to fit 1/2-13 and 5/8-11 studs (M12 and M16 in metric).

## STRAPS – STEEL

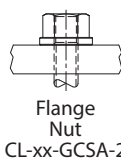
PART NO.	A	B	C	D	F	G	M	N	R	T	V
CL-842-GCS	1/2-13, 5/8-11, M12, or M16	.79	1.58	3.94	.67	.63	.79	1.58	.94	.90	.34



Double-End Gooseneck Clamp Straps are also available as a complete assembly. Select any of the four nut/knob combinations shown below by adding the appropriate suffix to the part number. Other lengths of Clamping Studs and Clamp Rests are available (order pieces individually).



Spherical Nut & Washer  
CL-xx-GCSA-1



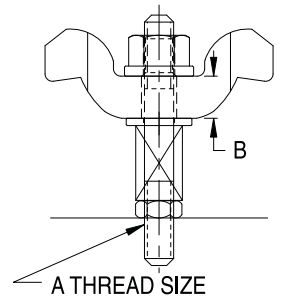
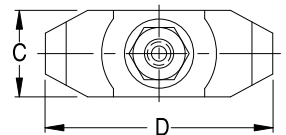
Flange Nut  
CL-xx-GCSA-2



Hand Knob with Spherical Washer  
CL-xx-GCSA-4



Acorn Nut with Spherical Washer  
CL-xx-GCSA-5



## ASSEMBLIES – STEEL (INCH)

PART NO.	A	B	C	D	CLAMP STRAP	FLAT WASHER	CLAMP SPRING	CLAMPING STUD	JAM NUT
CL-842-GCSA-x	1/2-13	.79	1.58	3.94	CL-842-GCS	CL-2-FW	CL-9-SPG	CL-1/2-13X4.00-STUD	CL-8-JN
CL-1042-GCSA-x	5/8-11					CL-3-FW	CL-11-SPG	CL-5/8-11X4.50-STUD	CL-10-JN

## ASSEMBLIES – STEEL (METRIC)

PART NO.	A	B	C	D	CLAMP STRAP	FLAT WASHER	CLAMP SPRING	CLAMPING STUD	JAM NUT
CLM-842-GCSA-x	M12	.79	1.58	3.94	CL-842-GCS	CL-2-FW	CL-9-SPG	CLM-12X95-STUD	CLM-12-JN
CLM-1042-GCSA-x	M16					CL-3-FW	CL-11-SPG	CLM-16X10-STUD	CLM-16-JN

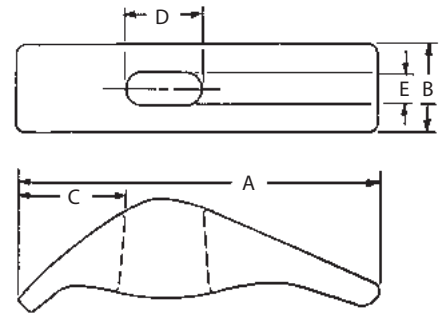
# ALUMINUM ADJUSTABLE CLAMPS

## VAR-A-CLAMPS

TENZALOY ALUMINUM ALLOY



Simple, economical aluminum clamp, (INFO+) similar in function to the Forged Adjustable Clamps shown on page 227.

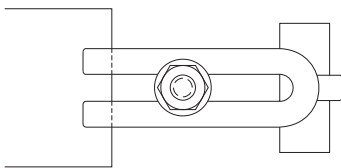


PART NO.	STUD SIZE	CLAMPING RANGE	A	B	C	D	E
CL-8-VAC	3/8 or M10	0 to 2"	4-7/8	1-1/4	1-3/8	1	13/32
CL-10-VAC	1/2 or M12	0 to 2-1/2"	5-1/2	1-1/2	1-1/2	1-1/8	17/32

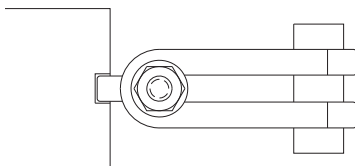
# FORGED U CLAMPS

FORGED STEEL, 70,000 PSI YIELD STRENGTH, BLACK OXIDE FINISH

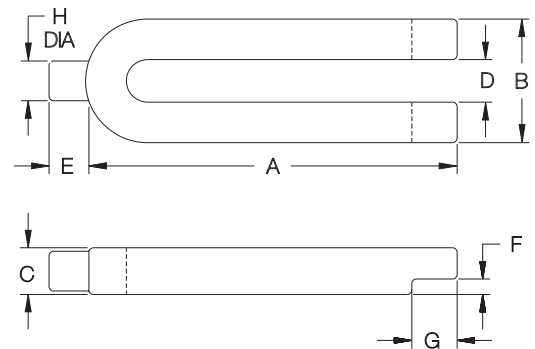
7



Open U end allows totally removing clamp strap when unclamped. Clamp tips are stepped to provide repeatable location.



Cylindrical pin end minimizes contact area and is useful for clamping in horizontal holes.

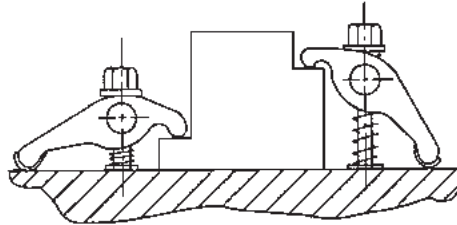


PART NO.	BOLT SIZE	A	B	C	D	E	F	G	H
CL-4-FUC	5/8-11 or M16	3-1/2	1-15/16	3/4	11/16	5/8	1/4	1/2	5/8
CL-6-FUC		5-7/16	2-1/4	7/8	11/16	3/4	5/16	3/4	3/4
CL-8-FUC	3/4-10 or M20	7-3/8	2-5/8	1-1/8	13/16	27/32	3/8	1-1/32	13/16
CL-12-FUC	1"-8 or M24	10-15/16	3-3/16	1-3/8	1-1/16	1-3/32	1/2	1-3/16	1-1/32

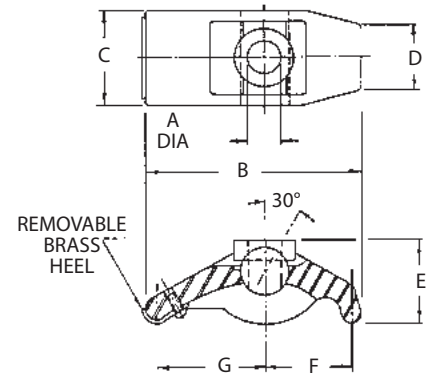
# FORGED ADJUSTABLE CLAMPS



Rugged forged steel pivot clamp. Instant height adjustment without blocks or shims. One-piece assembly allows quick setups and eliminates lost clamp pieces. Removable brass heel protects machine table. Clamp can swing 90° in either direction for loading clearance.



FORGED 1045 STEEL, BLACK OXIDE FINISH



## CLAMP STRAPS

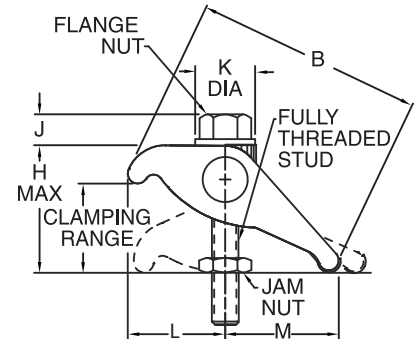
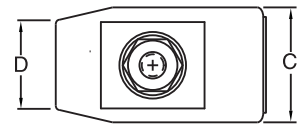
PART NO.	STUD SIZE	CLAMPING RANGE	A DIA	B	C	D	E	F	G
CL-6-FAC	5/16, 3/8, M8, or M10	0 to 1-3/4	7/16	3-1/4	1-1/4	7/8	1	1-1/8	1-7/8
CL-8-FAC	1/2 or M12	0 to 2-1/16	9/16	4	1-5/8	1-1/8	1-7/16	1-7/16	2-5/16
CL-10-FAC	5/8 or M16	0 to 3	11/16	5-1/2	1-7/8	1-3/8	1-7/8	2	3-1/4
CL-12-FAC	3/4 or M20	0 to 4-1/4	13/16	6-1/4	2-5/8	2	2-1/4	2-1/8	3-1/2
CL-16-FAC	7/8, 1, or M24	0 to 5-1/2	1-1/16	7	3-1/8	2-3/8	2-7/16	2-1/4	4



Assembly with Flange Nut  
CL-x-FACA-FN



Assembly with Hand Knob  
CL-x-FACA-HK



## ASSEMBLIES (INCH)

PART NO.	STUD SIZE	CLAMPING RANGE	H	J	K DIA	L		M		FORGED ADJUSTABLE CLAMP	FULLY THREADED STUD	JAM NUT	FLANGE NUT
						MIN	MAX	MIN	MAX				
CL-5-FACA-FN	5/16-18	0 to 1-3/4	2-1/8	3/8	3/4	1-1/16	1-1/4	1-3/4	2	CL-6-FAC	CL-5/16-18x3.00-FTS	CL-5-JN	CL-9-FN
CL-6-FACA-FN	3/8-16			1/2	7/8						CL-3/8-16x3.00-FTS	CL-6-JN	CL-2-FN
CL-8-FACA-FN	1/2-13	0 to 2-1/16	2-5/8	11/16	1-1/8	1-3/8	1-9/16	2-1/8	2-7/16	CL-8-FAC	CL-1/2-13x4.00-FTS	CL-8-JN	CL-3-FN
CL-10-FACA-FN	5/8-11	0 to 3	3-3/4	13/16	1-3/8	1-13/16	2-1/8	2-15/16	3-3/8	CL-10-FAC	CL-5/8-11x5.00-FTS	CL-10-JN	CL-4-FN
CL-12-FACA-FN	3/4-10	0 to 4-1/4	5-3/8	1	1-5/8	2-1/8	2-7/16	3-5/16	3-13/16	CL-12-FAC	CL-3/4-10x7.00-FTS	CL-12-JN	CL-5-FN
CL-14-FACA-FN	7/8-9	0 to 5-1/2	7	1-1/8	1-3/4	2-1/4	2-5/8	3-13/16	4-3/8	CL-16-FAC	CL-7/8-9x8.00-FTS	CL-14-JN	CL-6-FN
CL-16-FACA-FN	1"-8			1-1/4	2						CL-1-8x8.00-FTS	CL-16-JN	CL-7-FN

## ASSEMBLIES (METRIC)

CLM-5-FACA-FN	M8	0 to 1-3/4	2-1/8	.39	.75	1-1/16	1-1/4	1-3/4	2	CL-6-FAC	CLM-8x80-FTS	CLM-8-JN	CLM-8-FN
CLM-6-FACA-FN	M10			.51	.87						CLM-10x80-FTS	CLM-10-JN	CLM-10-FN
CLM-8-FACA-FN	M12	0 to 2-1/16	2-5/8	.67	1.10	1-3/8	1-9/16	2-1/8	2-7/16	CL-8-FAC	CLM-12x110-FTS	CLM-12-JN	CLM-12-FN
CLM-10-FACA-FN	M16	0 to 3	3-3/4	.83	1.34	1-13/16	2-1/8	2-15/16	3-3/8	CL-10-FAC	CLM-16x125-FTS	CLM-16-JN	CLM-16-FN
CLM-12-FACA-FN	M20	0 to 4-1/4	5-3/8	.98	1.61	2-1/8	2-7/16	3-5/16	3-13/16	CL-12-FAC	CLM-20x175-FTS	CLM-20-JN	CLM-20-FN
CLM-16-FACA-FN	M24	0 to 5-1/2	7	1.26	2.01	2-1/4	2-5/8	3-13/16	4-3/8	CL-16-FAC	CLM-24x200-FTS	CLM-24-JN	CLM-24-FN

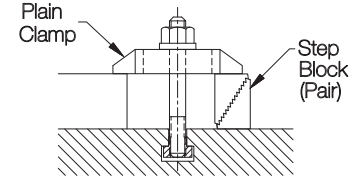
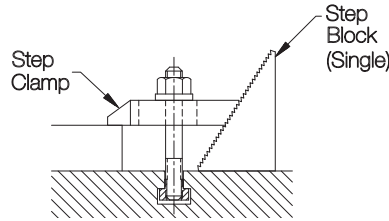
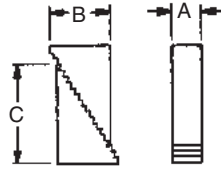
# STEP BLOCKS & CLAMPS

1018 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH



## Step Blocks (pair)

Serrated block that can be used individually or in pairs, as a clamp rest. (One part number consists of a pair of blocks). Use a single block with Step Clamps, or a pair of blocks with Plain Clamps. All blocks and clamps are made from top-grade steel.



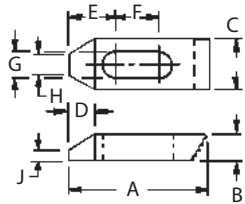
## STEP BLOCKS (PAIR)

PART NO.	A	B	C	HEIGHT RANGE
CL-10-BS	1	.681	1.104	3/4 to 1-1/2
CL-20-BS		1.068	1.747	1-1/8 to 2-1/2
CL-30-BS		2.355	3.980	2-1/2 to 6
CL-40-BS	1-1/2	1.454	2.390	1-3/4 to 3-3/4
CL-50-BS		2.355	3.890	2-1/2 to 6
CL-60-BS		3.385	5.604	3-1/2 to 9
CL-70-BS	2	1.454	2.390	1-3/4 to 3-3/4
CL-80-BS		2.355	3.890	2-1/2 to 6
CL-90-BS		3.385	5.604	3-1/2 to 9

7



## Step Clamp

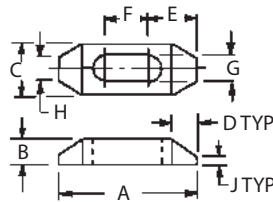


## STEP CLAMPS

PART NO.	STUD SIZE	A	B	C	D	E	F	G	H	J
CL-32-STC	3/8 or M10	2-1/2	1/2	1	7/16	7/8	13/16	7/16	7/16	1/4
CL-34-STC		4	5/8		11/16	1-3/16	1-5/16		7/16	
CL-36-STC	1/2 or M12	6	3/4	1-1/8	3/4	1-1/8	2-3/16	9/16	3/8	5/16
CL-42-STC		2-1/2	1/2	1-1/8	7/16	29/32	11/16		9/16	3/16
CL-44-STC	5/8 or M16	4	3/4	1-1/4	11/16	1-7/32	1-3/16	11/16	1/2	1/4
CL-46-STC		6	7/8		3/4	1-5/32	2-1/8		7/16	5/16
CL-52-STC	3/4 or M20	2-1/2	5/8	1-1/2	3/8	15/16	9/16	13/16	3/4	3/8
CL-54-STC		4	3/4		11/16	1-1/4	1-1/16		11/16	3/8
CL-56-STC	8	6	7/8	1-1/2	3/4	1-9/32	1-15/16	13/16	9/16	7/16
CL-64-STC		4	3/4		3/4	1-5/16	15/16		5/16	
CL-66-STC	1-3/4	6	1	1-3/4	13/16	1-1/4	1-7/8	3/4	5/8	1/2
CL-68-STC		8			3/4	1-7/8	2-3/16		3/4	5/8



## Plain Clamp

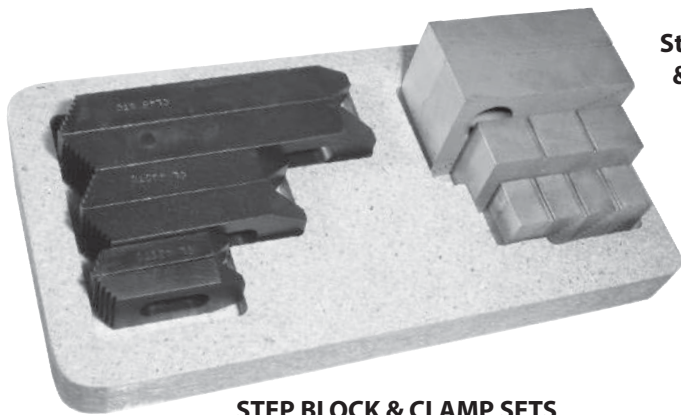


## PLAIN CLAMPS

PART NO.	STUD SIZE	A	B	C	D	E	F	G	H	J
CL-32-PC	3/8 or M10	2-1/2	1/2	1	7/16	27/32	13/16	7/16	7/16	1/4
CL-34-PC		4	5/8		11/16	1-1/32	1-7/16		7/16	
CL-36-PC	1/2 or M12	6	3/4	1-1/8	3/4	1-5/32	2-3/16	9/16	3/8	5/16
CL-42-PC		2-1/2	1/2	1-1/8	7/16	29/32	11/16		9/16	3/16
CL-44-PC	5/8 or M16	4	3/4	1-1/4	11/16	1-5/32	1-5/16	11/16	1/2	1/4
CL-46-PC		6	7/8		3/4	1-9/32	2-1/16		7/16	5/16
CL-52-PC	3/4 or M20	2-1/2	5/8	1-1/4	3/8	31/32	9/16	13/16	3/4	3/8
CL-54-PC		4	3/4		11/16	1-9/32	1-3/16		11/16	3/8
CL-56-PC	8	6	7/8	1-1/2	3/4	1-13/32	1-15/16	13/16	9/16	7/16
CL-64-PC		4	3/4		3/4	1-11/32	1-1/16		5/16	
CL-66-PC	1-3/4	6	1	1-1/2	13/16	1-15/32	1-15/16	3/4	5/8	1/2
CL-68-PC		8			1-1/8	1-3/4	3/4		1-29/32	2-3/16

# STEP BLOCKS & CLAMPS

11L17 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH



**Step Block & Clamp Set**

An assortment of Step Clamps and Step Blocks in a handy wooden holder. Available for stud sizes from 3/8-16 to 3/4-10 (M10 to M20 metric studs).

## STEP BLOCK & CLAMP SETS

PART NO.	STUD SIZE	STEP CLAMPS (2) EACH	STEP BLOCK PAIRS (2) EACH		HOLDER
CL-10-SBC	3/8-16 or M10	CL-32-STC, CL-34-STC, CL-36-STC	STANDARD	CL-10-BS, CL-20-BS, CL-30-BS	CL-1-BSH
CL-20-SBC	1/2-13 or M12	CL-42-STC, CL-44-STC, CL-46-STC	STANDARD	CL-10-BS, CL-20-BS, CL-30-BS	CL-1-BSH
CL-40-SBC			HIGH-RISE	CL-40-BS, CL-50-BS, CL-60-BS	CL-2-BSH
CL-30-SBC	5/8-11 or M16	CL-52-STC, CL-54-STC, CL-56-STC	STANDARD	CL-10-BS, CL-20-BS, CL-30-BS	CL-1-BSH
CL-50-SBC			HIGH-RISE	CL-40-BS, CL-50-BS, CL-60-BS	CL-2-BSH
CL-60-SBC	3/4-10 or M20	CL-64-STC, CL-66-STC, CL-68-STC	HIGH-RISE	CL-40-BS, CL-50-BS, CL-60-BS	CL-3-BSH



**Step Block Set**

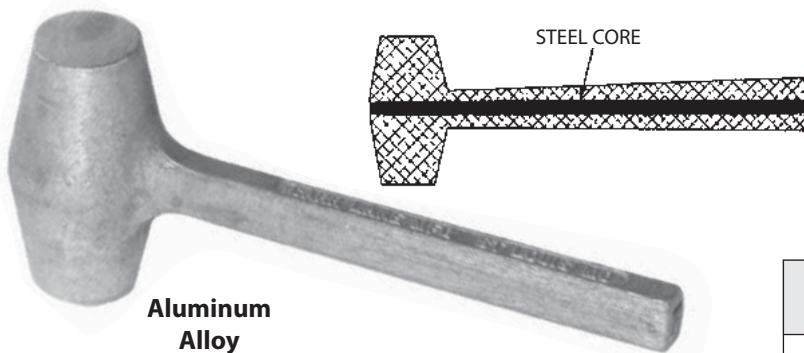
A complete assortment of Step Blocks in a handy wooden box.

## STEP BLOCK SETS

PART NO.	STEP BLOCK PAIRS	BOX
CL-30-SBS	(4)CL-10-BS, (4)CL-20-BS, (2)CL-30-BS	CL-3-SBB

# NO-MAR HAMMERS

ALUMINUM ALLOY WITH STEEL CORE



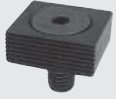
**Aluminum Alloy**

Economical aluminum alloy hammer. Excellent alternative to old-fashioned lead hammers, to eliminate the risk of lead contamination. One-piece cast construction with a steel core for extra strength. Applications include metalworking, tooling, automotive assembly and repair work, straightening work, car body work, and mold construction. Available in two sizes.

PART NO.	WEIGHT	FACE DIA	HANDLE LENGTH TO CENTERLINE OF FACE
CL-1-NMH	2 lb	1-1/2	10-1/2
CL-2-NMH	3.5 lb	2	11

# EDGE CLAMPS

## TYPES



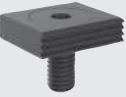
### TINY VISE® EDGE CLAMPS

Mini edge clamps grip the side of a workpiece to keep the top clear for machining. Only Tiny Vise® Edge Clamps truly exert down thrust force on the workpiece, to prevent it from lifting. A thrust washer underneath the clamp engages a mating offset countersink to provide downward action.



### TINY VISE® M-SERIES EDGE CLAMPS

Our Tiny Vise® M-Series incorporates a modular jaw design for greater adjustability. This modular system allows adjusting your workpiece engagement point by adding or removing spacers. This is useful when using the same fixture for machining a family of parts, or when workpiece size can vary somewhat between batches.



### NEW! TINY VISE® LOW-PROFILE EDGE CLAMPS

Low-profile Tiny Vise® clamps are ideal for thin workpieces, and whenever downthrust action is not required. These mini edge clamps securely grip the side of a workpiece to keep the top clear for machining. Patented design. Made in USA.



### TINY VISE® DOUBLE EDGE CLAMPS

Double edge clamps allow clamping two workpieces at the same time with equal force. These mini edge clamps grip the side of a workpiece to keep the top clear for machining. Patented design provides strong, reliable clamping force with the easy turn of a hex wrench.



### TINY VISE® V-JAW & DOUBLE V-JAW EDGE CLAMPS

The V-Jaw and Double V-Jaw versions of our popular Tiny Vise is ideal for clamping round workpieces. The 90° V-Jaw can also be used to clamp to a rectangular workpiece from two directions with a single clamp at its corner. Double V-Jaws allow clamping two workpieces at the same time with equal force.



### SERRATED EDGE CLAMPS

This low-profile clamp is ideal for gripping the side of a workpiece to keep the top clear for machining. Clamps both forward and down simultaneously, by tightening the socket-head screw in the sliding nose with a hex wrench. V-groove in nose is excellent for clamping round parts of corners.



### CAM EDGE CLAMPS

Pivoting-nose edge clamp operated by a cam handle for fast action. Smooth spiral cam locks positively anywhere within its 180 throw. Choice of two sizes. Available with either a standard base for fixed-position mounting, or a slotted base for adjustable mounting.

7

Tiny Vise®

The lowest profile  
clamping device



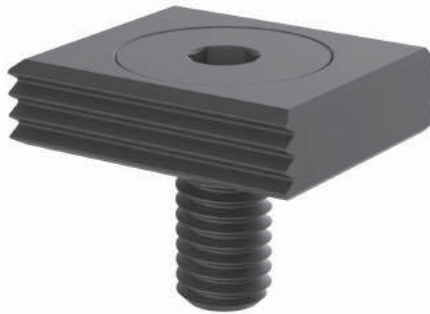
just got lower.

NEW Low-profile Tiny Vise® clamps from Carr Lane Manufacturing securely grip the side of a workpiece to keep the top clear for machining. Available in a wide range of sizes, from a miniature #8-32 thread size, up to a powerful 1"-8 thread size with 2500 lbs clamping force. Patented design. Made in USA. **See page 239.**



# TINY VISE® EDGE CLAMPS

BODY: 1018 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH  
 THRUST WASHER: 1144 STEEL, HEAT TREATED, BLACK OXIDE FINISH  
 FLAT-HEAD SOCKET SCREW: STEEL, BLACK OXIDE FINISH



## Low Profile

(Reversible — Serrated or Smooth Jaw)

## New Low-Profile Version!

Low-profile Tiny Vise® clamps are ideal for thin workpieces, and whenever downthrust action is not required. These mini edge clamps securely grip the side of a workpiece to keep the top clear for machining. Patented design features a slotted countersink to provide strong, reliable clamping force with the easy turn of a hex wrench. These compact clamps are ideal for fixturing multiple parts, small or large. Each clamp has both a serrated face (for maximum gripping) and a smooth face (to avoid marring finished parts). These clamps look so simple, but work amazingly well, with major advantages over earlier designs. Patent number 5,624,106. Made in USA.

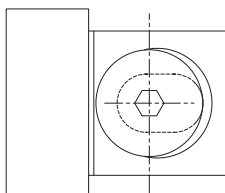
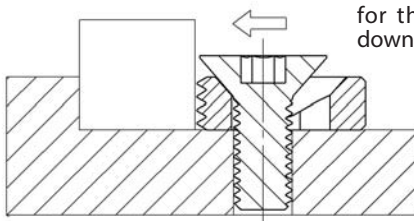
Clamping force is applied by positive screw action with the easy turn of a hex wrench (not with an unreliable, unsafe eccentric cam as used in other designs). A high-strength Flat-Head Socket Screw engages a mating slotted countersink to exert strong clamping force. Much more durable than other designs.



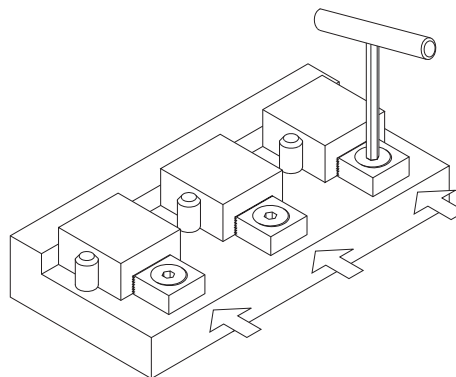
Compare the amazing low-profile Tiny Vise® clamp (right) with our standard Tiny Vise® clamp (left).

Available in a wide range of sizes, from a miniature #8-32 thread size, up to a powerful 1"-8 thread size with 2500 lbs clamping force. Tiny Vise® clamps are designed to provide strong clamping force when tightened by hand. Do not exceed the recommended tightening torque.

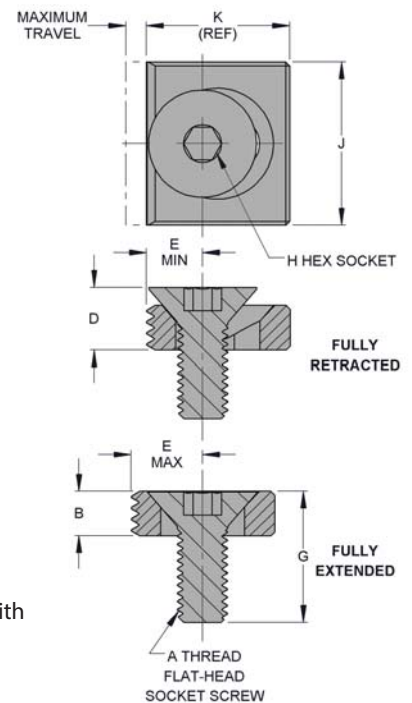
These low-profile clamps are ideal for thin workpieces, and whenever downthrust action is not required.



Patented design features a slotted countersink.



Clamping force is applied by positive screw action with the easy turn of a hex wrench.



## LOW PROFILE (INCH)

PART NO.	A	B	D	E			G	H	J	K	MAX TRAVEL	RECOMMENDED TORQUE (FT-LBS)*	APPROX. HORIZONTAL CLAMPING FORCE AT RECOMMENDED TORQUE (LBS)*
				MIN	MID RANGE	MAX							
CL-2-TVLP	#8-32	.150	.213	.175	.205	.235	1/2	3/32	9/16	.470	.060	.40	60
CL-3-TVLP	#10-32	.200	.269	.208	.242	.274	5/8	1/8	5/8	.550	.066	.50	75
CL-4-TVLP	1/4-20	.225	.310	.280	.320	.360	3/4	5/32	7/8	.720	.080	1.0	130
CL-5-TVLP	5/16-18	.250	.352	.338	.386	.434	7/8	3/16	1	.870	.096	2.4	240
CL-6-TVLP	3/8-16	.300	.419	.390	.445	.500	1	7/32	1-1/8	1.000	.110	4.6	370
CL-8-TVLP	1/2-13	.325	.456	.474	.534	.594	1-1/4	5/16	1-1/4	1.187	.120	13	800
CL-10-TVLP	5/8-11	.425	.563	.620	.685	.750	1-1/2	3/8	1-5/8	1.500	.130	24	1,200
CL-12-TVLP	3/4-10	.500	.675	.740	.820	.900	1-3/4	1/2	2	1.800	.160	46	1,800
CL-16-TVLP	1"-8	.750	.968	.988	1.088	1.188	2	5/8	2-1/2	2.375	.200	84	2,500

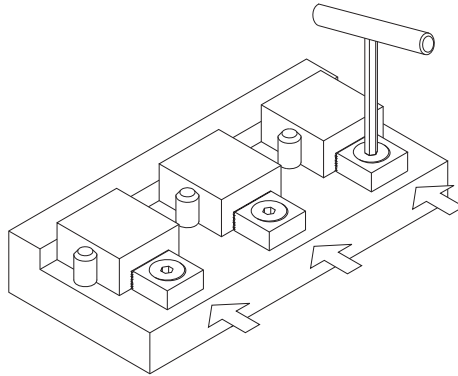
\*Recommended torque and clamping force are at 1/3 of yield strength, leaving 2/3 of holding capacity to resist external cutting forces, etc.

# TINY VISE® EDGE CLAMPS

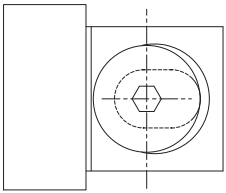
BODY: 1018 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH  
 THRUST WASHER: 1144 STEEL, HEAT TREATED, BLACK OXIDE FINISH  
 FLAT-HEAD SOCKET SCREW: STEEL, BLACK OXIDE FINISH



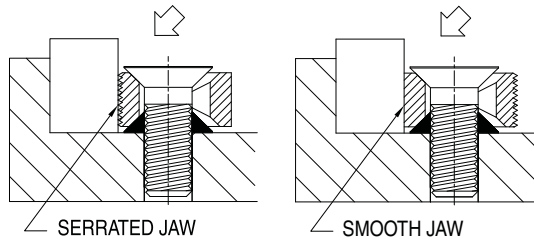
**Standard**  
 (Reversible — Serrated or Smooth Jaw)



Clamping force is applied by positive screw action with the easy turn of a hex wrench.



Patented design features a slotted countersink.



The serrated face provides maximum gripping, while the smooth face (turn 180°) helps avoid marring finished parts.

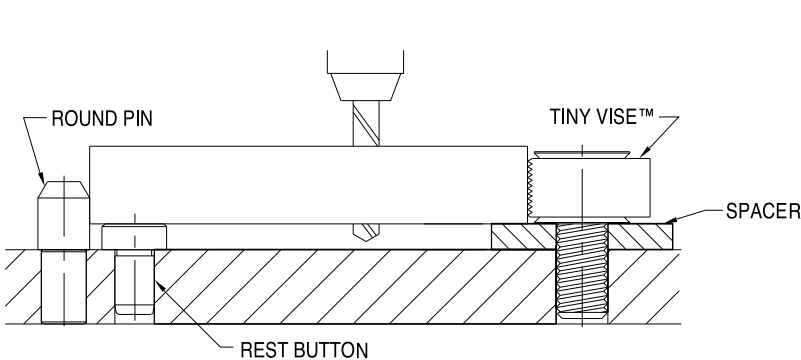
Perfect for high-density machining! These mini edge clamps grip the side of a workpiece to keep the top clear for machining. Patented design features a slotted countersink to provide strong, reliable clamping force with the easy turn of a hex wrench. These compact clamps are ideal for fixturing multiple parts, small or large. Each clamp has both a serrated face (for maximum gripping) and a smooth face (to avoid marring finished parts). These clamps look so simple, but work amazingly well, with major advantages over earlier designs. Patent number 5,624,106. Made in USA.

Clamping force is applied by positive screw action with the easy turn of a hex wrench (not with an unreliable, unsafe eccentric cam as used in other designs). A high-strength Flat-Head Socket Screw engages a mating offset countersink to exert strong clamping force. Much more durable than other designs.

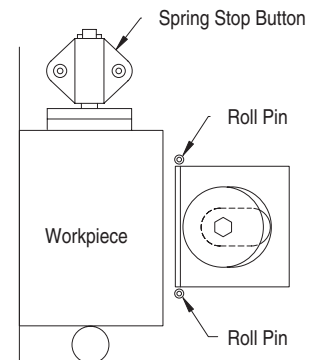
Only Tiny Vise® Edge Clamps truly exert down thrust force on the workpiece, to prevent it from lifting. A thrust washer underneath the clamp engages a mating offset countersink to provide downward action.

Available in a wide range of sizes, from a miniature #8-32 thread size, up to a powerful 1"-8 thread size with 2500 lbs clamping force.

Tiny Vise® clamps are designed to provide strong clamping force when tightened by hand. Do not exceed the recommended tightening torque.

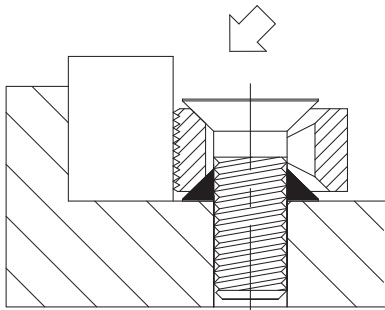


For a small amount of cutting-tool clearance, Tiny Vise® Edge Clamps can be mounted with a spacer underneath, using a longer screw. For greater clearance, clamps should be mounted into a tapped riser block fastened to the plate, to reduce bending stress on the screw.



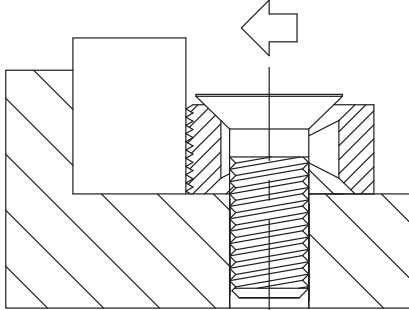
Roll pins can be installed to keep the Tiny Vise® perfectly aligned for workpiece loading (especially helpful on horizontal machining centers).

# TINY VISE® EDGE CLAMPS



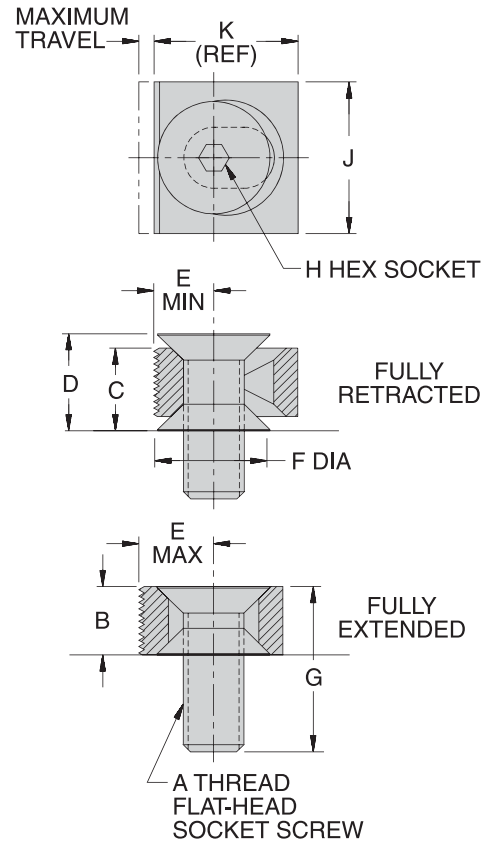
**Setup for Downthrust Force**  
(with Bottom Thrust Washer)

All clamps are supplied with an optional Bottom Thrust Washer (shown in black). Installing this washer under the clamp will raise the clamp slightly and provide downthrust force during clamping.



**Setup for Horizontal Force**  
(without Bottom Thrust Washer)

If no downthrust force is required, install the clamp without the Bottom Thrust Washer. Doing so will improve clamping speed because fewer screw turns are required.



## STANDARD (INCH) SETUP FOR DOWNTHRUST FORCE

PART NO.	A	B	C	D	E			F DIA	G	H	J	K	MAX TRAVEL	RECOMMENDED TORQUE (FT-LBS)*	APPROX. HORIZONTAL CLAMPING FORCE AT RECOMMENDED TORQUE (LBS)*
					MIN	MID RANGE	MAX								
CL-2-TV	#8-32	.250	.319	.382	.175	.205	.235	.335	5/8	3/32	9/16	.470	.060	.20	60
CL-3-TV	#10-32	.312	.390	.459	.208	.242	.274	.390	3/4	1/8	5/8	.550	.066	.25	75
CL-4-TV	1/4-20	.375	.467	.552	.280	.320	.360	.510	7/8	5/32	7/8	.720	.080	.50	130
CL-5-TV	5/16-18	.438	.550	.652	.338	.386	.434	.640	1	3/16	1	.870	.096	1.2	240
CL-6-TV	3/8-16	.500	.627	.746	.390	.445	.500	.742	1-1/8	7/32	1-1/8	1.000	.110	2.3	370
CL-8-TV	1/2-13	.562	.702	.833	.474	.534	.594	.897	1-3/8	5/16	1-1/4	1.187	.120	6.6	800
CL-10-TV	5/8-11	.750	.901	1.039	.620	.685	.750	1.148	1-5/8	3/8	1-5/8	1.500	.130	12	1,200
CL-12-TV	3/4-10	.875	1.059	1.234	.740	.820	.900	1.394	2	1/2	2	1.800	.160	23	1,800
CL-16-TV	1"-8	1.125	1.355	1.573	.988	1.088	1.188	1.890	2-1/2	5/8	2-1/2	2.375	.200	42	2,500

## STANDARD (INCH) SETUP FOR HORIZONTAL FORCE

CL-2-TV	#8-32	.250	.250	.313	.175	.205	.235	.335	5/8	3/32	9/16	.470	.060	.40	60
CL-3-TV	#10-32	.312	.312	.381	.208	.242	.274	.390	3/4	1/8	5/8	.550	.066	.50	75
CL-4-TV	1/4-20	.375	.375	.460	.280	.320	.360	.510	7/8	5/32	7/8	.720	.080	1.0	130
CL-5-TV	5/16-18	.438	.438	.540	.338	.386	.434	.640	1	3/16	1	.870	.096	2.4	240
CL-6-TV	3/8-16	.500	.500	.619	.390	.445	.500	.742	1-1/8	7/32	1-1/8	1.000	.110	4.6	370
CL-8-TV	1/2-13	.562	.652	.693	.474	.534	.594	.897	1-3/8	5/16	1-1/4	1.187	.120	13	800
CL-10-TV	5/8-11	.750	.750	.888	.620	.685	.750	1.148	1-5/8	3/8	1-5/8	1.500	.130	24	1,200
CL-12-TV	3/4-10	.875	.875	1.050	.740	.820	.900	1.394	2	1/2	2	1.800	.160	46	1,800
CL-16-TV	1"-8	1.125	1.125	1.343	.988	1.088	1.188	1.890	2-1/2	5/8	2-1/2	2.375	.200	84	2,500

\*Recommended torque and clamping force are at 1/3 of yield strength, leaving 2/3 of holding capacity to resist external cutting forces, etc.

# TINY VISE® EDGE CLAMPS

BODY: 1018 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH  
 JAW: 1018 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH (OR DELRIN)  
 THRUST WASHER: 1144 STEEL, HEAT TREATED, BLACK OXIDE FINISH  
 FLAT-HEAD SOCKET SCREW: STEEL, BLACK OXIDE FINISH



**Modular Jaw**



Modular jaw design allows adjustment for workpiece-size variations.

**Now available with a choice of jaw faces, including carbide abrasive!**

Our Tiny Vise® M-series incorporates a modular jaw design for greater adjustability. This new modular system allows adjusting the workpiece engagement point by adding or removing spacers. This is useful when using the same fixture for machining a family of parts, or when workpiece size can vary somewhat between batches. Just like our original Tiny Vise®, these mini edge clamps grip the side of a workpiece to keep the top clear for machining. The patented design features a slotted countersink to provide strong, reliable clamping force with the easy turn of a hex wrench. These compact clamps are ideal for fixturing multiple parts, small or large. They look so simple, but work amazingly well! Patent number 5,624,106. Made in USA.

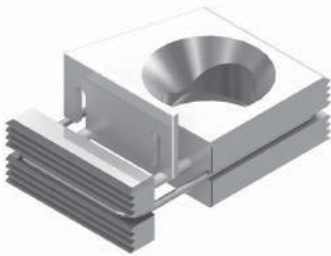
The M-series clamp body, without a jaw, is the same size as a standard Tiny Vise® -- with the same reversible jaw faces (one serrated and one smooth). The 1/4"-thick serrated modular jaw mounts into the smooth face, and each spacer adds another 1/16". Up to three spacers can be inserted to provide adjustment. The modular jaw assembly is held together securely by a tough, durable O-ring, recessed in a protective groove. The modular jaw can be easily extended to insert or remove the slotted spacers.

Clamping force is applied by positive screw action with the easy turn of a hex wrench (not with an unreliable, unsafe eccentric cam as used in other designs). A high-strength Flat-Head Socket Screw engages a mating slotted countersink to exert strong clamping force. Much more durable than other designs.

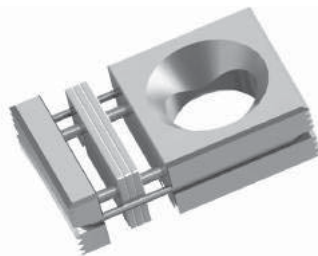
Clamps can be set up to apply force either at a downward angle or straight horizontally. All clamps are supplied with an optional bottom thrust washer. Installing this washer under the clamp will raise the clamp slightly and provide downthrust force during clamping. If no downthrust force is required, install the clamp without the bottom thrust washer. Doing so will improve clamping speed because fewer screw turns are required.

Available in two sizes, 5/16-18 thread size (240 lbs clamping force) and 1/2-13 thread size (800 lbs clamping force). Tiny Vise® clamps are designed to provide strong clamping force when tightened by hand. Do not exceed the recommended tightening torque.

7



These M-series clamps have a 1/4"-thick modular jaw that can be easily extended to insert or remove spacers. Up to three 1/16" spacers can be inserted to provide adjustment.



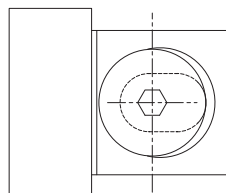
**Serrated**

**Smooth**

**Smooth (Delrin®)**

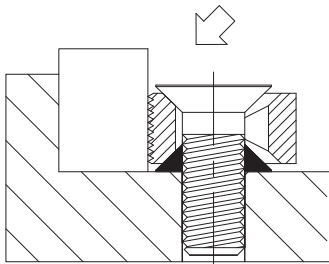
**Carbide Abrasive**

Choice of four modular jaw faces: 1) Serrated hardened steel, for maximum gripping bite; 2) Smooth hardened steel, to avoid marring on finished surfaces; 3) Smooth Delrin®, to further protect finished surfaces when less clamping force is required; 4) Carbide-abrasive-coated steel, for strong gripping with minimal surface penetration. Any of the four jaws can be mounted on the same body.

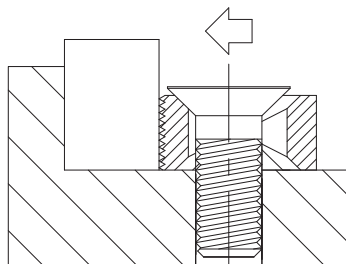


Patented design features a slotted countersink.

# TINY VISE® EDGE CLAMPS



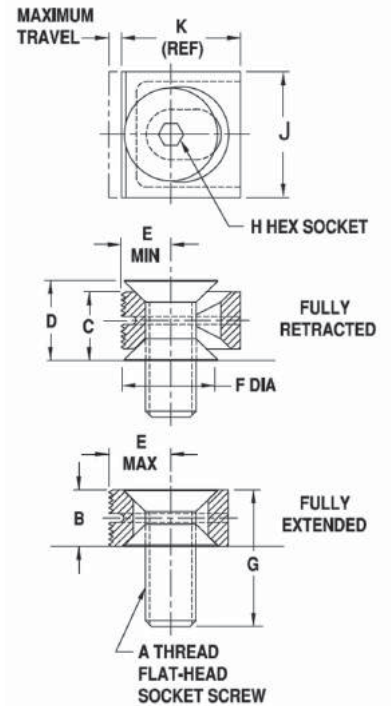
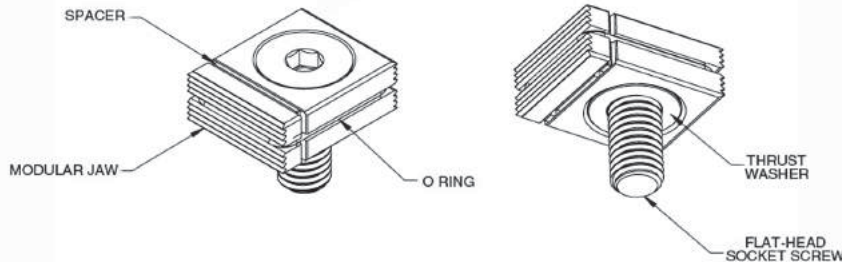
**Setup for Downthrust Force**  
(with Bottom Thrust Washer)



**Setup for Horizontal Force**  
(without Bottom Thrust Washer)

All clamps are supplied with an optional Bottom Thrust Washer (shown in black). Installing this washer under the clamp will raise the clamp slightly and provide downthrust force during clamping.

If no downthrust force is required, install the clamp without the Bottom Thrust Washer. Doing so will improve clamping speed because fewer screw turns are required.



## MODULAR JAW (INCH) SETUP FOR DOWNTHRUST FORCE

PART NO.	JAW TYPE	A	B	C	D	E			F DIA	G	H	J	K	MAX TRAVEL	RECOMMENDED TORQUE (FT-LBS)*	APPROX. HORIZONTAL CLAMPING FORCE AT RECOMMENDED TORQUE (LBS)*
						MIN	MID RANGE	MAX								
CL-5-TVM	Serrated	5/16-18	.438	.550	.652	.338	.386	.434	.640	1	3/16	1	.870	.096	1.2	240
CL-5-TVMS	Smooth															
CL-5-TVMN	Smooth (Delrin®)															
CL-5-TVMC	Carbide Abrasive															
CL-8-TVM	Serrated	1/2-13	.562	.702	.833	.474	.534	.594	.897	1-3/8	5/16	1-1/4	1.187	.120	6.6	800
CL-8-TVMS	Smooth															
CL-8-TVMN	Smooth (Delrin®)															
CL-8-TVMC	Carbide Abrasive															

## MODULAR JAW (INCH) SETUP FOR HORIZONTAL FORCE

CL-5-TVM	Serrated	5/16-18	.438	.438	.540	.338	.386	.434	.640	1	3/16	1	.870	.096	2.4	240
CL-5-TVMS	Smooth															
CL-5-TVMN	Smooth (Delrin®)															
CL-5-TVMC	Carbide Abrasive															
CL-8-TVM	Serrated	1/2-13	.562	.652	.693	.474	.534	.594	.897	1-3/8	5/16	1-1/4	1.187	.120	13	800
CL-8-TVMS	Smooth															
CL-8-TVMN	Smooth (Delrin®)															
CL-8-TVMC	Carbide Abrasive															

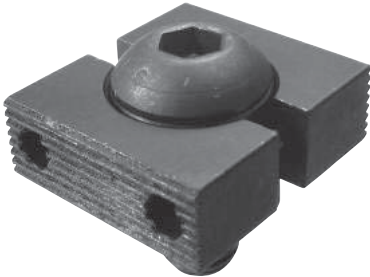
\*Recommended torque and clamping force are at 1/3 of yield strength, leaving 2/3 of holding capacity to resist external cutting forces, etc.

## SPARE PARTS

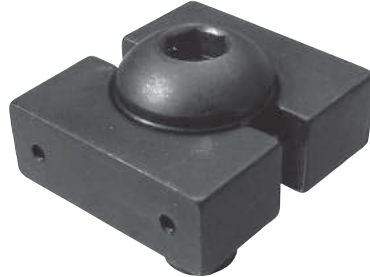
COMPLETE CLAMP PART NO.	MODULAR JAW				SPACER	O RING	THRUST WASHER	FLAT-HEAD SOCKET SCREW
	SERRATED	SMOOTH	SMOOTH (DELIRIN®)	CARBIDE ABRASIVE				
CL-5-TVM	5-TVM-JAW-ASSY	5-TVMS-JAW-ASSY	5-TVMN-JAW-ASSY	5-TVMC-JAW-ASSY	5-TVM-SPAC	5-TVM-ORING	CL-5-TV-WASH	CL-5/16-18X1.00-FHSS
CL-8-TVM	8-TVM-JAW-ASSY	8-TVMS-JAW-ASSY	8-TVMN-JAW-ASSY	8-TVMC-JAW-ASSY	8-TVM-SPAC	8-TVM-ORING	CL-8-TV-WASH	CL-1/2-13X1.38-FHSS

# TINY VISE® DOUBLE EDGE CLAMPS

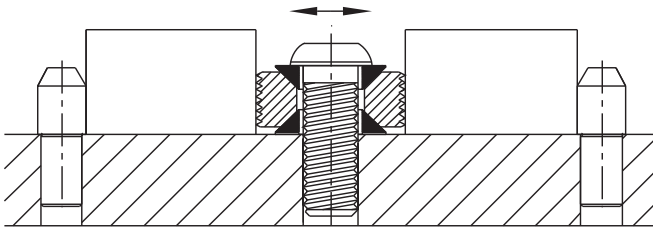
BODY: 1018 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH. SPRINGS: 302 STAINLESS STEEL  
GUIDE PINS: 17 4-PH STAINLESS STEEL. THRUST WASHER: 1144 STEEL, HEAT TREATED, BLACK OXIDE FINISH  
SOCKET-HEAD CAP SCREW: STEEL, BLACK OXIDE FINISH



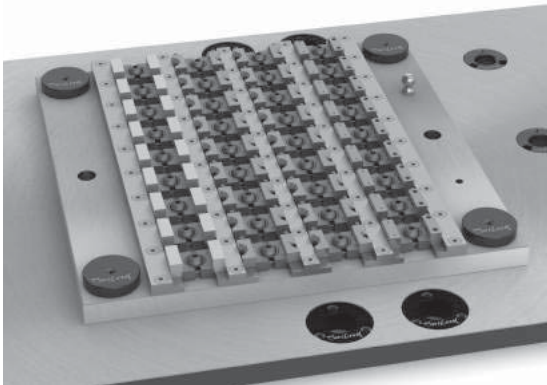
Two Serrated Jaws



Two Smooth Jaws



Thrust Washers have ID clearance to enable them to float horizontally, allowing both clamping jaws to contact their workpiece simultaneously even if parts are slightly different in size. This ensures that both parts are securely clamped with equal force.



Tiny Vise® Edge Clamps are ideal for high-density machining. This quick-change Carr Lock® fixture holds 72 parts using 36 Double Edge Clamps.

Double edge clamps allow clamping two workpieces at the same time with equal force. These mini edge clamps grip the side of a workpiece to keep the top clear for machining. Patented design provides strong, reliable clamping force with the easy turn of a hex wrench. These compact clamps are ideal for fixturing multiple parts, small or large. Available with serrated jaws (for maximum gripping) or smooth jaws (to avoid marring finished parts). These clamps look so simple, but work amazingly well, with major advantages over earlier designs. Patent number 5,961,108. Made in USA.

Clamping force is applied by positive screw action with the easy turn of a hex wrench (not with an unreliable, unsafe eccentric cam as used in other designs). A high-strength cap screw and Thrust Washer engage a mating offset countersink to exert strong clamping force. Much more durable than other designs.

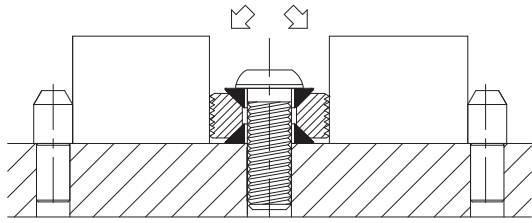
Only Tiny Vise® Mini Edge Clamps truly exert down thrust force on the workpiece, to prevent it from lifting. A Thrust Washer underneath the clamp engages a mating offset countersink to provide downward action.

Only Tiny Vise® Double Edge Clamps compensate for size variation when clamping two workpieces. Thrust Washers have ID clearance to enable them to float horizontally, allowing both clamping jaws to contact their part simultaneously. This ensures that both parts are securely clamped with equal force.

Available in four sizes, from 5/16-18 up to a powerful 1"-8 thread size with 4500 lbs clamping force (M8 to M24 in metric).

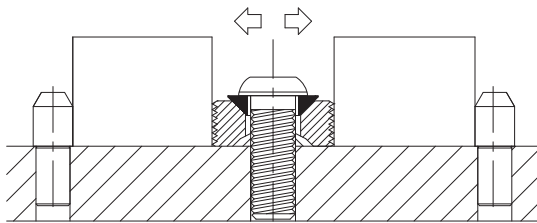
Please note: Tiny Vise® clamps are designed to provide strong clamping force when tightened by hand. Do not exceed the recommended tightening torque. Double edge clamps should always be used to hold two workpieces, not just one; otherwise recommended torque and clamping force will be significantly reduced.

# TINY VISE® DOUBLE EDGE CLAMPS



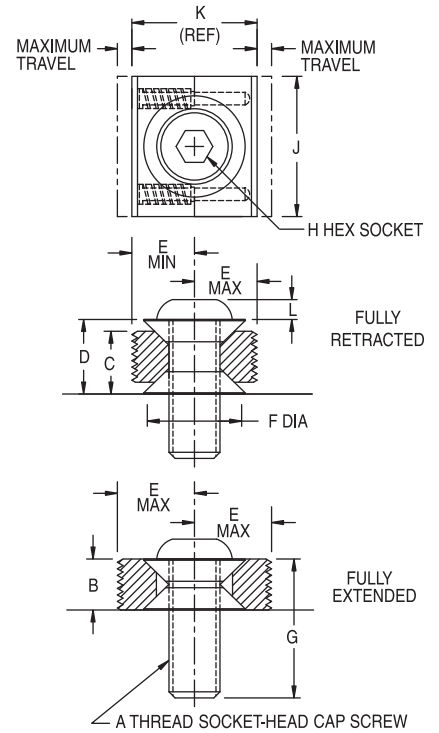
## Setup for Downthrust Force (with Bottom Thrust Washer)

All clamps are supplied with two Thrust Washers (shown in black). The Bottom Thrust Washer is optional. Installing this washer will raise the clamp slightly and provide downthrust force during clamping.



## Setup for Horizontal Force (without Bottom Thrust Washer)

If no downthrust force is required, install the clamp without the Bottom Thrust Washer. Doing so will improve clamping speed because fewer screw turns are required.



### DOUBLE JAWS (INCH) — SETUP FOR DOWNTHRUST FORCE

PART NO. SERRATED JAWS	PART NO. SMOOTH JAWS	A	B	C	D	E			F DIA	G	H	J	K	L	ALLOWABLE WORKPIECE SIZE DIFFERENTIAL	MAXIMUM TRAVEL (WITH NO SIZE DIFFERENTIAL)	RECOMMENDED TORQUE (FT-LBS)*	APPROX. HORIZONTAL CLAMPING FORCE AT RECOMMENDED TORQUE (LBS)*
						MIN	MID RANGE	MAX										
CL-50-TV	CL-55-TV	5/16-18	.375	.486	.597	.422	.470	.518	.625	1	3/16	1	.844	.16	.048	.096	4.5	450
CL-60-TV	CL-65-TV	3/8-16	.438	.570	.684	.520	.572	.625	.750	1-1/8	7/32	1-1/4	1.250	.19	.052	.105	8	650
CL-80-TV	CL-85-TV	1/2-13	.500	.635	.770	.641	.698	.755	.875	1-1/4	5/16	1-3/8	1.282	.26	.060	.114	19	1200
CL-100-TV	CL-105-TV	5/8-11	.625	.765	.905	.690	.750	.810	1.125	1-1/2	3/8	1-1/2	1.380	.32	.078	.120	38	1800
CL-160-TV	CL-165-TV	1"-8	1.000	1.159	1.318	1.109	1.178	1.247	1.875	2-1/4	3/4	2-1/2	2.218	1.00	.094	.138	150	4500

### DOUBLE JAWS (INCH) — SETUP FOR HORIZONTAL FORCE

CL-50-TV	CL-55-TV	5/16-18	.375	.375	.486	.422	.470	.518	.625	1	3/16	1	.844	.16	.048	.096	9	450
CL-60-TV	CL-65-TV	3/8-16	.438	.438	.570	.520	.572	.625	.750	1-1/8	7/32	1-1/4	1.250	.19	.052	.105	16	650
CL-80-TV	CL-85-TV	1/2-13	.500	.500	.635	.641	.698	.755	.875	1-1/4	5/16	1-3/8	1.282	.26	.060	.114	38	1200
CL-100-TV	CL-105-TV	5/8-11	.625	.625	.765	.690	.750	.810	1.125	1-1/2	3/8	1-1/2	1.380	.32	.078	.120	76	1800
CL-160-TV	CL-165-TV	1"-8	1.000	1.000	1.159	1.109	1.178	1.247	1.875	2-1/4	3/4	2-1/2	2.218	1.00	.094	.138	300	4500

### DOUBLE JAWS (METRIC) — SETUP FOR DOWNTHRUST FORCE

CLM-50-TV	CLM-55-TV	M8	.375	.486	.597	.422	.470	.518	.625	1	5mm	1	.844	.16	.048	.096	4.5	450
CLM-60-TV	CLM-65-TV	M10	.438	.570	.684	.520	.572	.625	.750	1-1/8	6mm	1-1/4	1.250	.19	.052	.105	10	750
CLM-80-TV	CLM-85-TV	M12	.500	.635	.770	.641	.698	.755	.875	1-1/4	8mm	1-3/8	1.282	.26	.060	.114	18	1100
CLM-100-TV	CLM-105-TV	M16	.625	.765	.905	.690	.750	.810	1.125	1-1/2	10mm	1-1/2	1.380	.32	.078	.120	42	2000
CLM-160-TV	CLM-160-TV	M24	1.000	1.000	1.318	1.109	1.178	1.247	1.875	2-1/4	19mm	2-1/2	2.218	1.00	.094	.138	130	4000

### DOUBLE JAWS (METRIC) — SETUP FOR HORIZONTAL FORCE

CLM-50-TV	CLM-55-TV	M8	.375	.375	.486	.422	.470	.518	.625	1	5mm	1	.844	.16	.048	.096	9	450
CLM-60-TV	CLM-65-TV	M10	.438	.438	.570	.520	.572	.625	.750	1-1/8	6mm	1-1/4	1.250	.19	.052	.105	20	750
CLM-80-TV	CLM-85-TV	M12	.500	.500	.635	.641	.698	.755	.875	1-1/4	8mm	1-3/8	1.282	.26	.060	.114	35	1100
CLM-100-TV	CLM-105-TV	M16	.625	.625	.765	.690	.750	.810	1.125	1-1/2	10mm	1-1/2	1.380	.32	.078	.120	84	2000
CLM-160-TV	CLM-160-TV	M24	1.000	1.000	1.159	1.109	1.178	1.247	1.875	2-1/4	19mm	2-1/2	2.218	1.00	.094	.138	260	4000

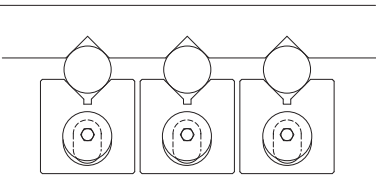
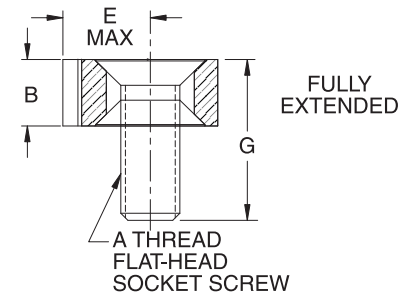
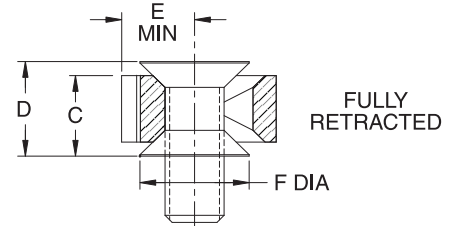
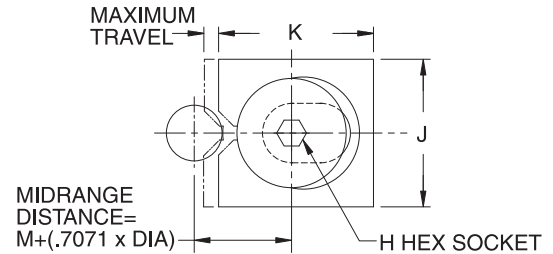
\*Recommended torque and clamping force are at 1/3 of yield strength, leaving 2/3 of holding capacity to resist external cutting forces, etc.

# TINY VISE® EDGE CLAMPS

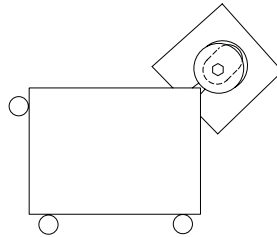


V-Jaw

The V-Jaw version of our popular Tiny Vise® is ideal for clamping round workpieces. The 90° V-Jaw can also be used to clamp a rectangular workpiece from two directions with a single clamp at its corner.



Multiple workpieces can be clamped extremely close together.



A rectangular workpiece can be clamped from two directions with a single clamp.

7

## V-JAW (INCH)

### SETUP FOR DOWNTHRUST FORCE

PART NO.	A	B	C	D	E			F DIA	G	H	J	K	M	MAXIMUM WORKPIECE DIAMETER	MAXIMUM TRAVEL	RECOMMENDED TORQUE (FT-LBS)*	APPROX. HORIZONTAL CLAMPING FORCE AT RECOMMENDED TORQUE (LBS)*
					MIN	MID RANGE	MAX										
CL-2-TVR	#8-32	.250	.319	.382	.292	.322	.352	.335	5/8	3/32	.625	.620	.212	3/8	.060	.20	60
CL-3-TVR	#10-32	.312	.390	.459	.375	.407	.940	.390	3/4	1/8	.750	.750	.253	1/2	.066	.25	75
CL-4-TVR	1/4-20	.375	.467	.552	.453	.493	.533	.510	7/8	5/32	.875	.900	.315	19/32	.080	.50	130
CL-5-TVR	5/16-18	.438	.550	.652	.562	.611	.660	.640	1	3/16	1.000	1.100	.410	11/16	.096	1.2	240
CL-6-TVR	3/8-16	.500	.627	.746	.687	.742	.797	.742	1-1/8	7/32	1.250	1.300	.454	15/16	.110	2.3	370
CL-8-TVR	1/2-13	.562	.702	.833	.812	.872	.932	.897	1-3/8	5/16	1.500	1.530	.557	1-1/32	.120	6.6	800
CL-10-TVR	5/8-11	.750	.901	1.039	1.124	1.157	1.254	1.148	1-5/8	3/8	2.000	2.100	.692	1-9/16	.130	12	1,200
CL-12-TVR	3/4-10	.875	1.059	1.234	1.344	1.424	1.504	1.394	2	1/2	2.500	2.500	.848	1-13/16	.160	23	1,800
CL-16-TVR	1"-8	1.125	1.355	1.573	1.687	1.782	1.887	1.890	2-1/2	5/8	3.000	3.200	1.137	2-1/16	.200	42	2,500

## V-JAW (INCH)

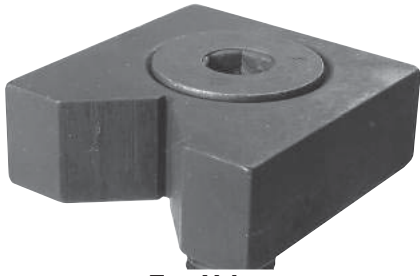
### SETUP FOR HORIZONTAL FORCE

CL-2-TVR	#8-32	.250	.250	.313	.292	.322	.352	.335	5/8	3/32	.625	.620	.212	3/8	.060	.40	60
CL-3-TVR	#10-32	.312	.312	.381	.375	.407	.940	.390	3/4	1/8	.750	.750	.253	1/2	.066	.50	75
CL-4-TVR	1/4-20	.375	.375	.460	.453	.493	.533	.510	7/8	5/32	.875	.900	.315	19/32	.080	1.0	130
CL-5-TVR	5/16-18	.438	.438	.540	.562	.611	.660	.640	1	3/16	1.000	1.100	.410	11/16	.096	2.4	240
CL-6-TVR	3/8-16	.500	.500	.619	.687	.742	.797	.742	1-1/8	7/32	1.250	1.300	.454	15/16	.110	4.6	370
CL-8-TVR	1/2-13	.562	.652	.693	.812	.872	.932	.897	1-3/8	5/16	1.500	1.530	.557	1-1/32	.120	13	800
CL-10-TVR	5/8-11	.750	.750	.888	1.124	1.157	1.254	1.148	1-5/8	3/8	2.000	2.100	.692	1-9/16	.130	24	1,200
CL-12-TVR	3/4-10	.875	.875	1.050	1.344	1.424	1.504	1.394	2	1/2	2.500	2.500	.848	1-13/16	.160	46	1,800
CL-16-TVR	1"-8	1.125	1.125	1.343	1.687	1.782	1.887	1.890	2-1/2	5/8	3.000	3.200	1.137	2-1/16	.200	84	2,500

\*Recommended torque and clamping force are at 1/3 of yield strength, leaving 2/3 of holding capacity to resist external cutting forces, etc.

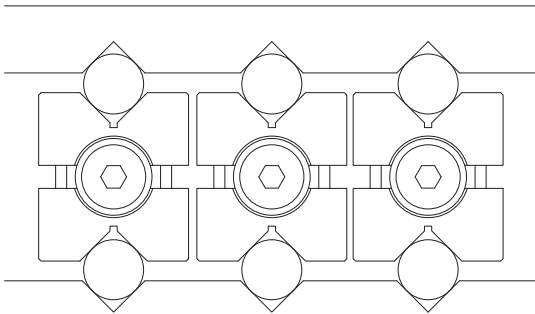


# TINY VISE® DOUBLE EDGE CLAMPS

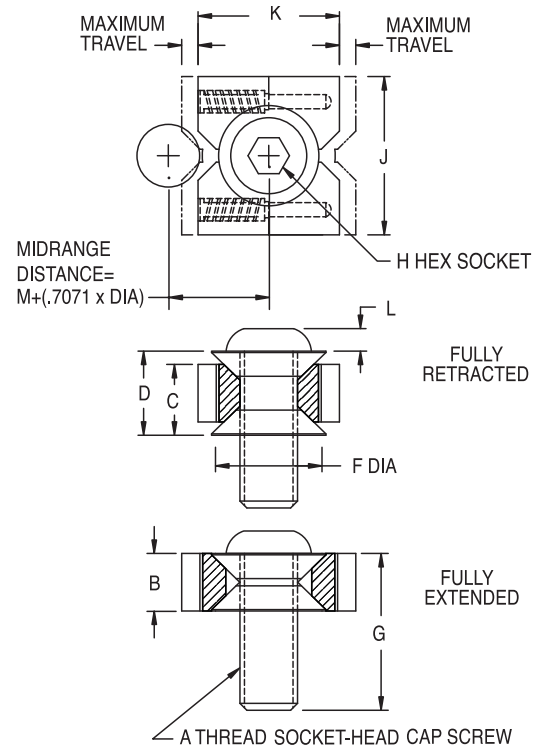


Two V-Jaws

The V-Jaw version of our popular Tiny Vise® is ideal for clamping round workpieces. The 90° V-Jaw can also be used to clamp a rectangular workpiece from two directions with a single clamp at its corner. Double edge clamps allow clamping two workpieces at the same time with equal force.



Multiple workpieces can be clamped extremely close together.



## DOUBLE V-JAWS (INCH) — SETUP FOR DOWNTHRUST FORCE

PART NO.	A	B	C	D	F DIA	G	H	J	K	L	M	MAXIMUM WORKPIECE DIAMETER	ALLOWABLE WORKPIECE SIZE DIFFERENTIAL	MAX. TRAVEL (WITH NO SIZE DIFFERENTIAL)	RECOMMENDED TORQUE (FT-LBS)*	APPROX. HORIZONTAL CLAMPING FORCE AT RECOMMENDED TORQUE (LBS)*
CL-50-TVR	5/16-18	.375	.486	.597	.625	1	3/16	1-1/4	1.308	.16	.421	3/4	.048	.096	4.5	450
CL-60-TVR	3/8-16	.438	.570	.684	.750	1-1/8	7/32	1-3/8	1.478	.19	.482	27/32	.052	.105	8	650
CL-80-TVR	1/2-13	.500	.635	.770	.875	1-1/4	5/16	1-1/2	1.706	.26	.569	15/16	.060	.114	19	1200
CL-100-TVR	5/8-11	.625	.765	.905	1.125	1-1/2	3/8	1-3/4	2.104	.32	.706	1-1/8	.078	.120	38	1800
CL-160-TVR	1"-8	1.000	1.159	1.318	1.875	2-1/4	3/4	2-1/2	3.350	1.00	1.119	1-3/4	.094	.138	150	4500

## DOUBLE V-JAWS (INCH) — SETUP FOR HORIZONTAL FORCE

CL-50-TVR	5/16-18	.375	.375	.486	.625	1	3/16	1-1/4	1.308	.16	.421	3/4	.048	.096	9	450
CL-60-TVR	3/8-16	.438	.438	.570	.750	1-1/8	7/32	1-3/8	1.478	.19	.482	27/32	.052	.105	16	650
CL-80-TVR	1/2-13	.500	.500	.635	.875	1-1/4	5/16	1-1/2	1.706	.26	.569	15/16	.060	.114	38	1200
CL-100-TVR	5/8-11	.625	.625	.765	1.125	1-1/2	3/8	1-3/4	2.104	.32	.706	1-1/8	.078	.120	76	1800
CL-160-TVR	1"-8	1.000	1.000	1.159	1.875	2-1/4	3/4	2-1/2	3.350	1.00	1.119	1-3/4	.094	.138	300	4500

## DOUBLE V-JAWS (METRIC) — SETUP FOR DOWNTHRUST FORCE

CLM-50-TVR	M8	.375	.486	.597	.625	1	3/16	1-1/4	1.308	.16	.421	3/4	.048	.096	4.5	450
CLM-60-TVR	M10	.438	.570	.684	.750	1-1/8	7/32	1-3/8	1.478	.19	.482	27/32	.052	.105	10	750
CLM-80-TVR	M12	.500	.635	.770	.875	1-1/4	5/16	1-1/2	1.706	.26	.569	15/16	.060	.114	18	1100
CLM-100-TVR	M16	.625	.765	.905	1.125	1-1/2	3/8	1-3/4	2.104	.32	.706	1-1/8	.078	.120	42	2000
CLM-160-TVR	M24	1.000	1.159	1.318	1.875	2-1/4	3/4	2-1/2	3.350	1.00	1.119	1-3/4	.094	.138	130	4000

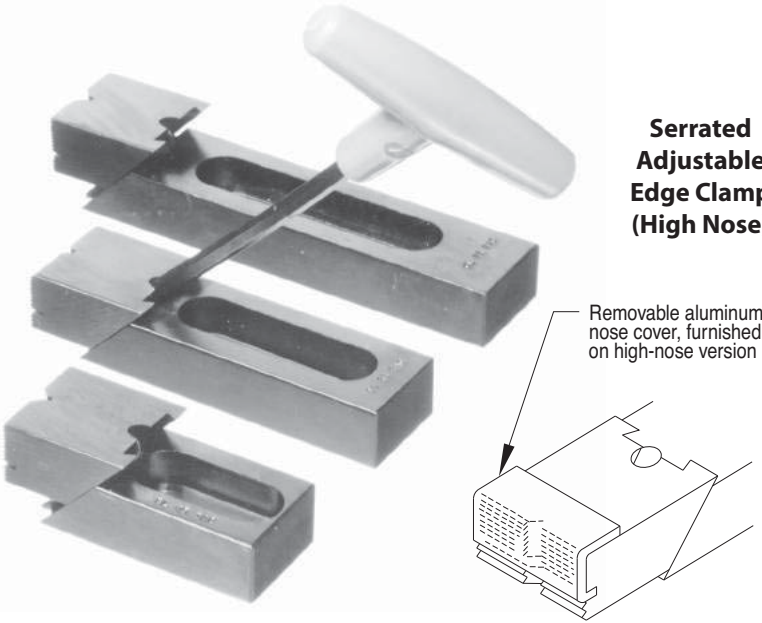
## DOUBLE V-JAWS (METRIC) — SETUP FOR HORIZONTAL FORCE

CLM-50-TVR	M8	.375	.375	.486	.625	1	3/16	1-1/4	1.308	.16	.421	3/4	.048	.096	9	450
CLM-60-TVR	M10	.438	.438	.570	.750	1-1/8	7/32	1-3/8	1.478	.19	.482	27/32	.052	.105	20	750
CLM-80-TVR	M12	.500	.500	.635	.875	1-1/4	5/16	1-1/2	1.706	.26	.569	15/16	.060	.114	35	1100
CLM-100-TVR	M16	.625	.625	.765	1.125	1-1/2	3/8	1-3/4	2.104	.32	.706	1-1/8	.078	.120	84	2000
CLM-160-TVR	M24	1.000	1.000	1.159	1.875	2-1/4	3/4	2-1/2	3.350	1.00	1.119	1-3/4	.094	.138	260	4000

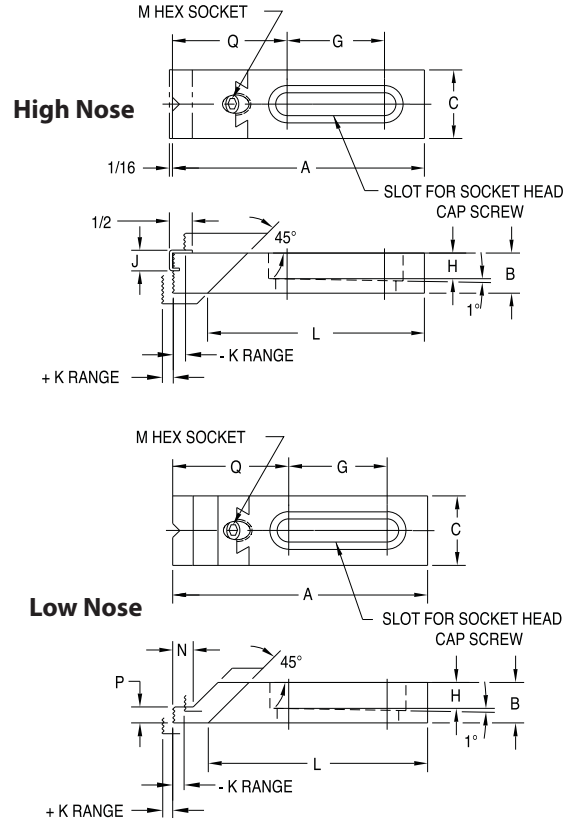
\*Recommended torque and clamping force are at 1/3 of yield strength, leaving 2/3 of holding capacity to resist external cutting forces, etc.

# SERRATED EDGE CLAMPS

BODY AND NOSE: 1018 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH  
 CLAMPING SCREW: 4140 STEEL, HEAT TREATED RC 43-45, BLACK OXIDE FINISH  
 NOSE COVER: ALUMINUM



**Serrated Adjustable Edge Clamp (High Nose)**

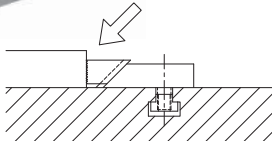


This low-profile clamp is ideal for gripping the side of a workpiece to keep the top clear for machining. Clamps both forward and down simultaneously, by tightening the socket-head screw in the sliding nose with a hex wrench. V-groove in nose is excellent for clamping round parts or corners. Choice of five sizes, each available in several slot lengths. Slot is tapered to prevent the clamp from backing off under heavy forces. Use two mounting screws on longer clamps.

7



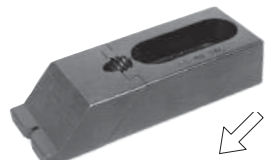
**High Nose**



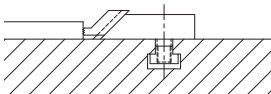
High-nose version is best for most applications. Gripping high up on the workpiece, close to the machining plane, provides maximum clamping rigidity. A removable aluminum nose cover is furnished for clamping soft or machined parts without damage.

## ADJUSTABLE — HIGH NOSE

PART NO.	MOUNTING SCREW SIZE	A	B	C	G	H	J	K	L	M	N	P	Q
CL-1-SAC	5/16-18 or M8	2	5/8	1	1/4	9/32	7/16	1/4	1-1/2	5/32	—	—	1-3/8
CL-5-SAC		3			1-1/4				2-1/2				
CL-15-SAC		3			13/16				2-3/8				
CL-25-SAC	3/8-16 or M10	4-1/4	5/8	1-1/4	1-7/16	3/8	7/16	1/4	3-5/8	3/16	—	—	1-11/16
CL-35-SAC		5			2-1/8				4-3/8				1-7/8
CL-45-SAC		4			1-1/4				3-3/16				2-1/4
CL-55-SAC	1/2-13 or M12	5-1/2	7/8	1-1/2	2-1/8	1/2	5/8	5/16	4-11/16	1/4	—	—	2-1/2
CL-65-SAC		7-1/8			3				6-5/16				2-9/16
CL-75-SAC	5/8-11 or M16	5-1/2	1-1/4	1-3/4	1-3/8	5/8	3/4	5/16	4-1/2	5/16	—	—	3-9/32
CL-95-SAC		8-1/4			4				7-1/4				3
CL-105-SAC		5-1/2			1-3/8				4-1/2				3-9/32
CL-125-SAC	3/4-10 or M20	8-1/4	1-1/4	1-3/4	4	3/4	3/4	5/16	7-1/4	5/16	—	—	3



**Low Nose**



Low-nose version is ideal for thin parts, with its extra machining clearance.

## ADJUSTABLE — LOW NOSE

PART NO.	MOUNTING SCREW SIZE	A	B	C	G	H	J	K	L	M	N	P	Q
CL-0-SAC	5/16-18 or M8	2	5/8	1	1/4	9/32	—	1/4	1-1/2	5/32	1/8	1/8	1-3/8
CL-00-SAC		3			1-1/4				2-1/2				
CL-10-SAC	3/8-16 or M10	3	5/8	1-1/4	13/16	3/8	—	1/4	2-3/8	3/16	1/4	1/4	1-11/16
CL-20-SAC		4-1/4			1-7/16				3-5/8				2-1/16
CL-30-SAC		5			2-1/8				4-3/8				1-7/8
CL-40-SAC	1/2-13 or M12	4	7/8	1-1/2	1-1/4	1/2	—	5/16	3-3/16	1/4	1/4	1/4	2-1/4
CL-50-SAC		5-1/2			2-1/8				6-5/16				2-1/2
CL-60-SAC	5/8-11 or M16	7-1/8	1-1/4	1-3/4	3	5/8	—	5/16	4-11/16	5/16	5/16	3/8	2-9/16
CL-70-SAC		5-1/2			1-3/8				4-1/2				3-9/32
CL-90-SAC		8-1/4			4				7-1/4				3
CL-100-SAC	3/4-10 or M20	5-1/2	1-1/4	1-3/4	1-3/8	3/4	—	5/16	4-1/2	5/16	5/16	3/8	3-9/32
CL-120-SAC		8-1/4			4				7-1/4				3

# SERRATED EDGE CLAMPS

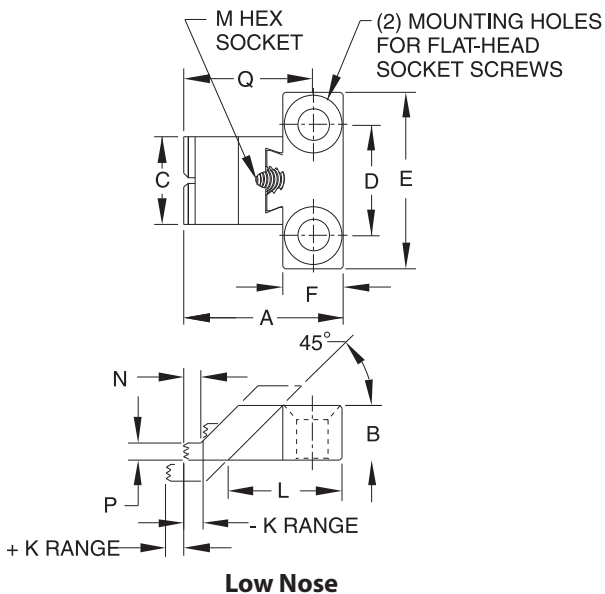
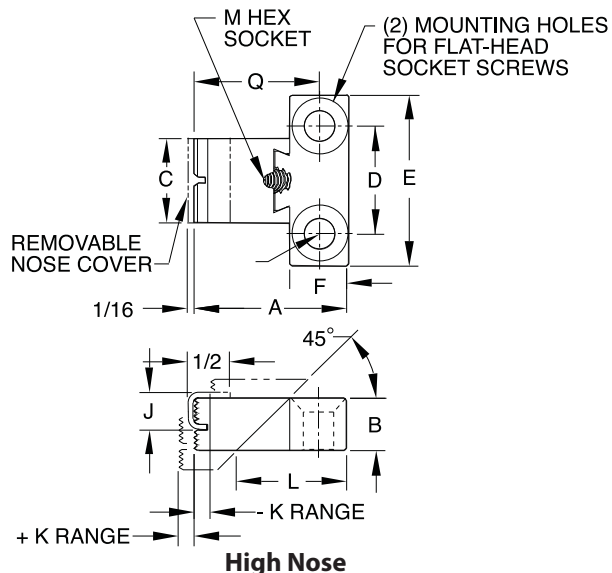
BODY AND NOSE: 1018 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH  
 CLAMPING SCREW: 4140 STEEL, HEAT TREATED RC 43-45, BLACK OXIDE FINISH  
 NOSE COVER: ALUMINUM



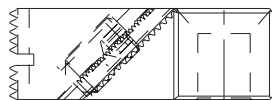
**Serrated  
Fixed  
Edge Clamp  
(High Nose)**



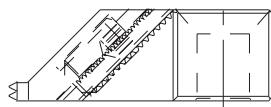
**Serrated  
Fixed  
Edge Clamp  
(Low Nose)**



Serrated Fixed Edge Clamps mount in a fixed position, rather than having a slot for adjustment. This makes the clamps more compact and ensures that they are mounted in the correct location without requiring adjustment. The fixed version is usually better for permanent fixtures, while the adjustable version is better for machine-table mounting. The Flat-Head Socket Screws used for mounting absolutely hold proper location (order separately). Choice of three clamp sizes, with either a high nose or low nose.



**High Nose**



**Low Nose**

## FIXED POSITION — HIGH NOSE

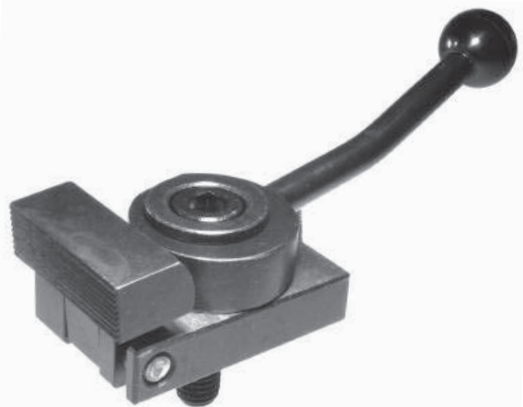
PART NO.	MOUNTING SCREW SIZE	A	B	C	D	E	F	J	K	L	M	N	P	Q	FLAT-HEAD SOCKET SCREWS (2 REQ'D) ORDER SEPARATELY
CL-5-SFC	5/16-18	1-13/16	5/8	1	1	1-3/4	11/16	7/16	1/4	1-5/16	5/32	—	—	1-15/32	CL-5/16-18x1.00-FHSS
CL-45-SFC	1/2-13	2-11/16	7/8	1-1/2	2	3	1	5/8	5/16	1-7/8	1/4	—	—	2-3/16	CL-1/2-13x1.38-FHSS
CL-75-SFC	5/8-11	3-1/2	1-1/4	1-3/4	2	3-1/4	1-1/4	3/4	5/16	2-1/2	5/16	—	—	2-7/8	CL-5/8-11x2.00-FHSS

## FIXED POSITION — LOW NOSE

PART NO.	MOUNTING SCREW SIZE	A	B	C	D	E	F	J	K	L	M	N	P	Q	FLAT-HEAD SOCKET SCREWS (2 REQ'D) ORDER SEPARATELY
CL-0-SFC	5/16-18	1-13/16	5/8	1	1	1-3/4	11/16	7/16	1/4	1-5/16	5/32	1/8	1/8	1-15/32	CL-5/16-18x1.00-FHSS
CL-40-SFC	1/2-13	2-11/16	7/8	1-1/2	2	3	1	5/8	5/16	1-7/8	1/4	1/4	1/4	2-3/16	CL-1/2-13x1.38-FHSS
CL-70-SFC	5/8-11	3-1/2	1-1/4	1-3/4	2	3-1/4	1-1/4	3/4	5/16	2-1/2	5/16	5/16	3/8	2-7/8	CL-5/8-11x2.00-FHSS

# CAM EDGE CLAMPS

BODY: STEEL, WEAR SURFACES HARDENED, BLACK OXIDE FINISH  
BALL HANDLE: BLACK PHENOLIC PLASTIC

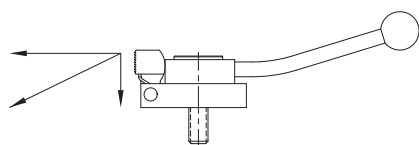


**Fixed Base**

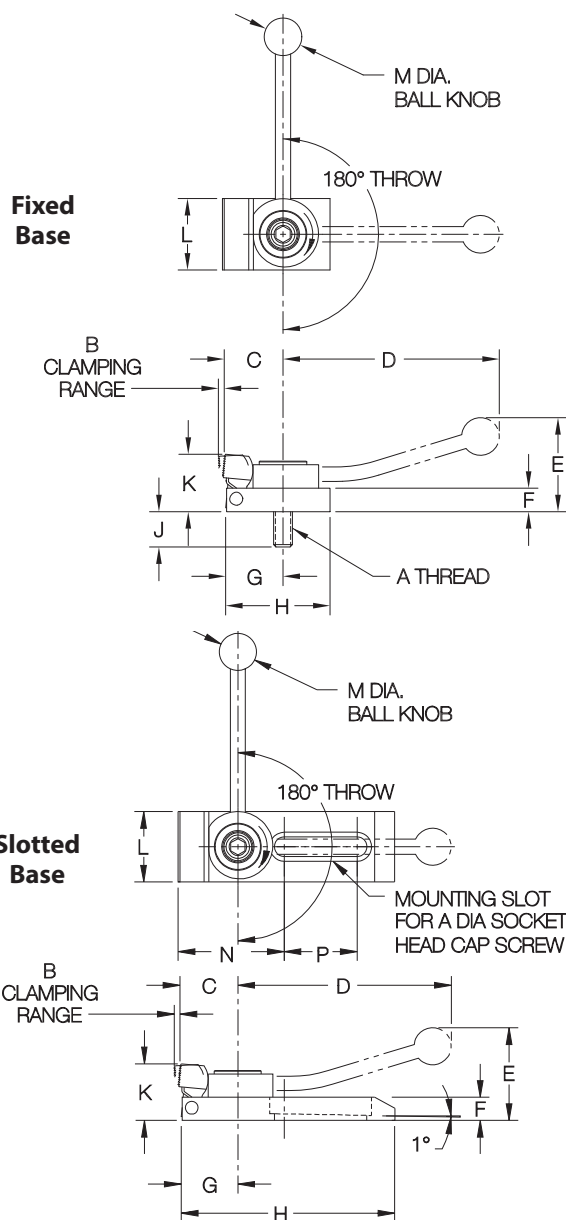


**Slotted Base**

Pivoting-nose edge clamp operated by a cam handle for fast action. Smooth spiral cam locks positively anywhere within its 180° throw. Choice of two sizes. Available with either a standard base for fixed-position mounting, or a slotted base for adjustable mounting. Choice of clockwise or counterclockwise handle rotation to clamp.



Nose pivots to exert clamping force forward and downward at the same time.



## FIXED BASE (INCH)

PART NO.		A	B	C	D	E	F	G	H	J	K		L	M	N	P	MAX CLAMPING FORCE (LBS)	
CLOCKWISE CLAMPING	CCW CLAMPING										MIN	MAX					HORIZONTAL	VERTICAL
CL-MF25-5601	CL-MF25-5602	5/16-18	5/32	1-1/8	3-15/16	1-5/8	7/16	15/16	1-3/4	11/16	7/8	1	1-1/4	3/4	—	—	750	50
CL-MF40-5601	CL-MF40-5602	1/2-13	7/32	1-9/16	5-3/4	2-1/2	5/8	1-1/2	2-3/4	15/16	1-5/16	1-1/2	1-7/8	1	—	—	1500	100

## FIXED BASE (METRIC)

CL-MF08-5601	CL-MF08-5602	M8	5/32	1-1/8	3-15/16	1-5/8	7/16	15/16	1-3/4	.31	7/8	1	1-1/4	3/4	—	—	750	50
CL-MF12-5601	CL-MF12-5602	M12	7/32	1-9/16	5-3/4	2-1/2	5/8	1-1/2	2-3/4	.47	1-5/16	1-1/2	1-7/8	1	—	—	1500	100

## SLOTTED BASE

CL-MF25-5611	CL-MF25-5612	5/16-18 or M8	5/32	1-1/8	3-15/16	1-5/8	7/16	15/16	3-1/2	—	7/8	1	1-1/4	3/4	2	1	750	50
CL-MF40-5611	CL-MF40-5612	1/2-13 or M12	7/32	1-9/16	5-3/4	2-1/2	5/8	1-1/2	6	—	1-5/16	1-1/2	1-7/8	1	2-15/16	2	1500	100

# SWING CLAMPS

## TYPES



### HOOK CLAMPS - SHORT ARM

Extremely compact swing clamp that mounts in a reamed hole. Compact assembly is ideal for installation in tight spaces and where high clamping forces are required. Choice of socket head (counterbored) or hex-nut type.



### HOOK CLAMPS - LONG ARM

Long-arm Hook Clamps are available with either a plain or tapped arm. The tapped-arm version accepts a wide variety of contact bolts or spindles to increase clamping-height range (the tapped arm is slightly longer). Ideal in tight spaces where high clamping force is required.



### HOOK CLAMPS - CAM HANDLE

The tapped-arm version is optionally available with a cam handle, to allow clamping without a separate wrench.



### HOOK CLAMP HOLDERS

This compact mounting adapter is made to work with Long-Arm Hook Clamps. Precision bored hole for smooth swing action.



### HORIZONTAL CAM LEVER - ONE-TOUCH QUICK-ACTING SWING CLAMP

One-Touch Swing Clamps are manually operated clamps that first rotate 70° clockwise into position, then clamp straight down in one continuous motion. The Horizontal Cam Lever is operated by a radial cam lever that swings in an horizontal arc.



### VERTICAL CAM LEVER - ONE-TOUCH QUICK-ACTING SWING CLAMP

One-Touch Swing Clamps are manually operated clamps that first rotate 70° clockwise into position, then clamp straight down in one continuous motion. The Vertical Cam Lever is operated by a radial cam lever that swings in a vertical arc. Ideal for confined spaces with no room for a horizontal handle swing.



### HEX DRIVE - ONE-TOUCH QUICK-ACTING SWING CLAMP

One-Touch Swing Clamps are manually operated clamps that first rotate 70° clockwise into position, then clamp straight down in one continuous motion. The Hex Drive is operated by a screw mechanism with a hex drive nut. This allows for exact clamping-force control using a torque wrench.



### SWING CLAMP ASSEMBLIES

A variety of assemblies featured on pages 258-259.



### UP-THRUST CLAMP

Combination clamp and locator with a unique upward clamping action. Pushing down the cam handle pulls the lower jaw upward. This clamps the workpiece against the stationary upper jaw, whose bottom surface is a precision-ground locator.

## SEE ALSO:



**ROEMHELD**  
HILMA ■ STARK

AIR-POWERED:  
pp. 595-596

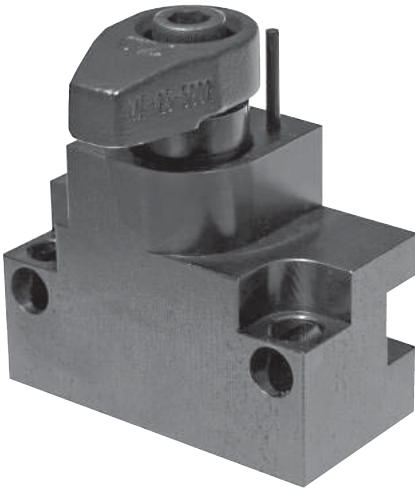


HYDRAULIC:  
pp. 597-606



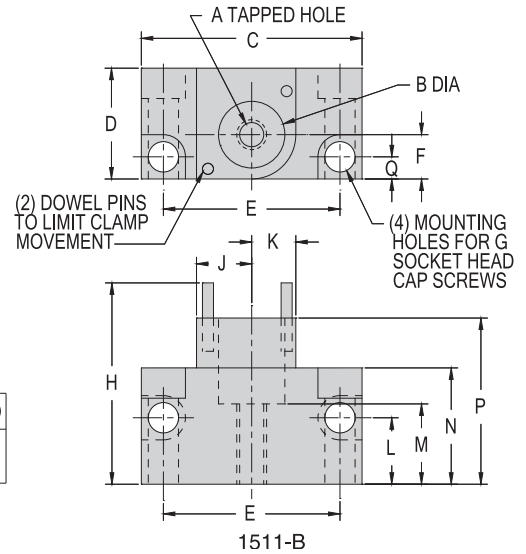
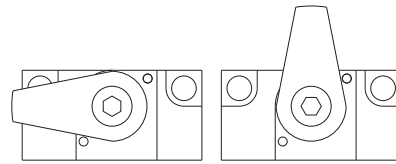
# HOOK CLAMPS

MOUNTING BLOCKS AND HOLDERS: 1045 STEEL, BLACK OXIDE FINISH



**Hook-Clamp Mounting Block**  
(order Hook-Clamp separately)

These mounting blocks for long-arm Hook Clamps have built-in 90° stops that provide consistent arm positioning in both clamped and unclamped position. Two sets of mounting holes allow either base mounting or side mounting. Precision bored hole for smooth swing action. Available for all three sizes of long-arm Hook Clamps.



## HOOK-CLAMP MOUNTING BLOCKS (INCH)

PART NO.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q
CL-MF25-5800	5/16-18	.7500	2-1/2	1-1/4	2	1/2	5/16-18 OR M8	2-1/2	5/8	1/2	3/4	29/32	1-5/16	1-7/8	1/4
CL-MF40-5800	1/2-13	1.0000	2-3/4	2	2	1	1/2-13 OR M12	3-3/4	1	3/4	1	1-5/32	1-7/8	2-3/4	3/8
CL-MF50-5800	5/8-11	1.0000	5	2	4	1	5/8-11 OR M16	3-3/4	1	1	1-1/4	1-5/32	2-1/4	2-3/4	1/2

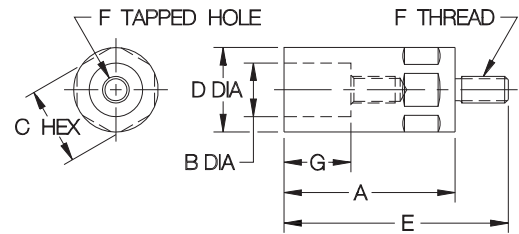
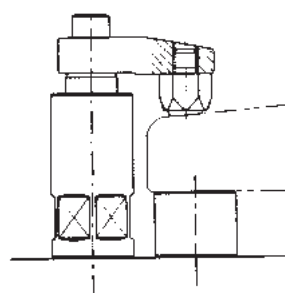
## HOOK-CLAMP MOUNTING BLOCKS (METRIC)

CL-MF08-5800	M8	.7087 (18mm)	1.97	1.00	1.50	.47	M6 or 1/4-20	2.50	.55	.55	.71	.91	.98	1.87	.25
CL-MF12-5800	M12	.9843 (25mm)	2.95	1.50	2.17	.65	M10 or 3/8-16	3.64	.79	.79	.94	1.16	1.38	2.64	.35
CL-MF16-5800	M16	1.2598 (32mm)	3.46	1.75	2.56	.77	M12 or 1/2-13	4.43	.94	.94	1.26	1.16	1.77	3.43	.39



**Hook-Clamp Holder**

Compact mounting adapter for long-arm Hook-Clamps. Precision bored hole for smooth swing action.



## HOOK-CLAMP HOLDERS (INCH)

PART NO.	F THREAD DIA	A	B DIA	C	D DIA	E	G
CL-MF25-5101	5/16-18	2-1/4	.7500	7/8	1	3	15/16
CL-MF40-5101	1/2-13	3-1/8	1.0000	1-7/16	1-9/16	4-3/8	1-9/16
CL-MF40-5102		4				5-1/4	
CL-MF50-5101	5/8-11	3-1/8	1.2500	1-3/4	2	4-3/8	1-9/16
CL-MF50-5102		4				5-1/4	

## HOOK-CLAMP HOLDERS (METRIC)

CL-MF08-5101	M8	2.17	.7087 (18mm)	.87 (22mm)	.94	2.91	.98
CL-MF12-5101	M12	3.15	.9843 (25mm)	1.42 (36mm)	1.57	4.33	1.57
CL-MF16-5101	M16	3.15	1.2598 (32mm)	1.81 (46mm)	1.97	4.33	1.57

# HOOK CLAMPS

CLAMP BODY: 4135 STEEL, HEAT TREATED, BLACK OXIDE FINISH  
 SOCKET-HEAD CAP SCREW, BLACK OXIDE FINISH  
 SPRING: SPRING STEEL, BLACK OXIDE FINISH



**Long Arm  
Socket Head**



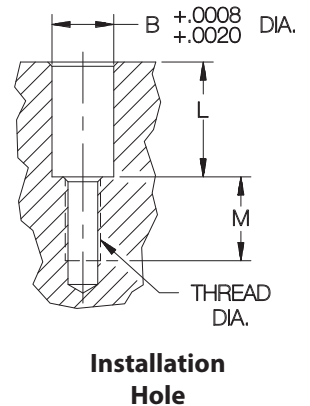
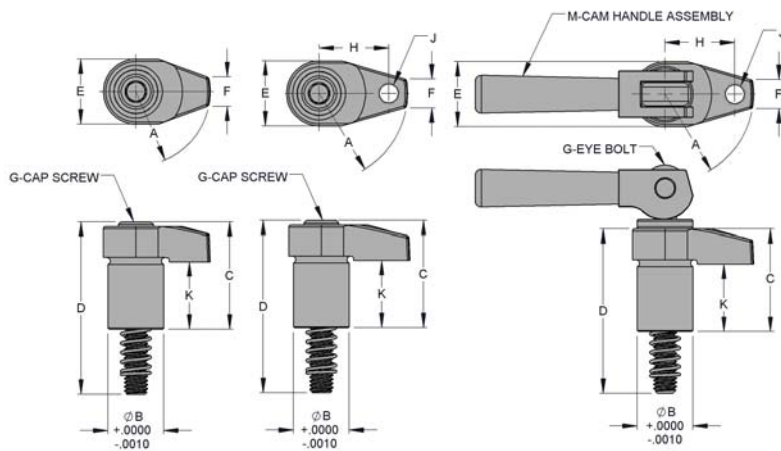
**Tapped Long Arm  
Socket Head**



**Tapped Long Arm  
Cam Handle**

Long-arm Hook Clamps available with either a plain or tapped arm. The tapped-arm version accepts a wide variety of contact bolts or spindles to increase clamping-height range (the tapped arm is also slightly longer). Mounts in a reamed hole or in a Hook-Clamp Mounting Block or Holder (order separately). Ideal in tight spaces where high clamping force is required. Available in three sizes.

The tapped-arm version is optionally available with a cam handle, to allow clamping without a separate wrench. Use with an adjustable contact bolt to utilize maximum cam travel.



## LONG ARM (INCH)

PART NO.		THREAD DIA	A	B	C	D	E	F	G	H	J	K	L	M	MAXIMUM ALLOWABLE TORQUE (FT-LBS)	MAXIMUM CLAMPING FORCE (LBS)
SOCKET HEAD	CAM HANDLE															
CL-MF25-5002	--	5/16-18	1	.7500	1-7/16	2-5/16	7/8	3/8	5/16-18	—	—	29/32	15/16	15/16	22	2200
CL-MF40-5002	--	1/2-13	2	1.0000	2-1/2	3-1/2	1-1/4	11/16	1/2-13	—	—	1-17/32	1-9/16	1	34	2700
CL-MF50-5002	--	5/8-11	2	1.2500	2-7/8	3-7/8	1-7/16	7/8	5/8-11	—	—	1-17/32	1-9/16	1	59	3700

## TAPPED LONG ARM (INCH)

CL-MF25-5013	CL-MF25-5020	5/16-18	1-3/16	.7500	1-7/16	2-5/16	7/8	3/8	5/16-18	15/16	5/16-18	29/32	15/16	15/16	22	2200
CL-MF40-5013	CL-MF40-5020	1/2-13	2-3/8	1.0000	2-1/2	3-1/2	1-1/4	11/16	1/2-13	1-13/16	1/2-13	1-17/32	1-9/16	1	34	2700
CL-MF50-5014	CL-MF50-5020	5/8-11	2-3/8	1.2500	2-7/8	3-7/8	1-7/16	7/8	5/8-11	1-13/16	5/8-11	1-17/32	1-9/16	1	59	3700

## LONG ARM (METRIC)

CL-MF08-5002	--	M8	1	.7087(18mm)	1.46	2.28	.87	.39	M8	—	—	.91	.98	.84	22	2200
CL-MF12-5002	--	M12	2	.9843(25mm)	2.68	3.62	1.25	.69	M12	—	—	1.54	1.57	.96	34	2700
CL-MF16-5002	--	M16	2	1.2598(32mm)	2.95	3.98	1.44	.87	M16	—	—	1.54	1.57	.96	59	3700

## TAPPED LONG ARM (METRIC)

CL-MF08-5013	CL-MF08-5020	M8	1.19	.7087(18mm)	1.46	2.28	.87	.39	M8	.94	M8	.98	.79	.84	22	2200
CL-MF12-5013	CL-MF12-5020	M12	2.38	.9843(25mm)	2.68	3.62	1.25	.69	M12	1.81	M12	1.54	1.57	.96	34	2700
CL-MF16-5013	CL-MF16-5020	M16	2.38	1.2598(32mm)	2.95	3.98	1.44	.87	M16	1.81	M12	1.54	1.57	.96	59	3700

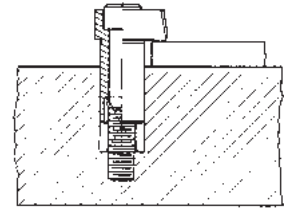
# HOOK CLAMPS

CLAMP BODY: 12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH



**Standard Arm  
Socket Head**

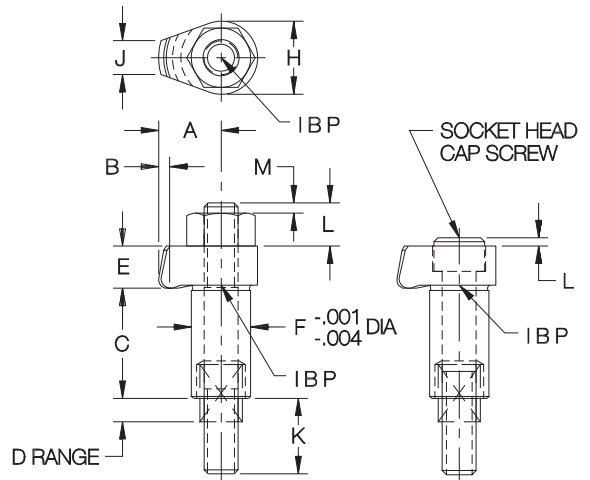
Extremely compact swing clamp that mounts in a reamed hole. Ideal in tight spaces and where high clamping forces are required. Choice of socket head (counterbored) or hex-nut type.



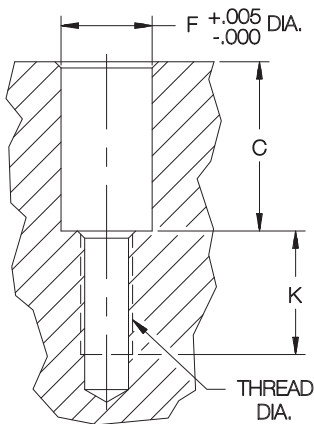
Compact assembly is easy to install in tight spaces. Socket-head type shown above offers a very low profile.



**Standard Arm  
Hex Nut**



7



**Installation  
Hole**

## STANDARD ARM, SOCKET HEAD (INCH)

PART NO.	THREAD DIA	A	B	C	D CLAMPING RANGE	E	F DIA	H DIA	J	K	L	M
CL-1-CAC	5/16-18	.67	.08	.93	.25	.55	.625	.80	.40	.69		
CL-2-CAC	1/2-13	.92	.12	1.63	.50	.63	.875	1.08	.50	1.13	.12	—
CL-3-CAC	5/8-11	1.30	.18	1.83	.70	.90	1.125	1.38	.75	1.25		

## STANDARD ARM, SOCKET HEAD (METRIC)

CLM-1-CAC	M8	.67	.08	.93	.25	.55	.625	.80	.40	.66		
CLM-2-CAC	M12	.92	.12	1.63	.50	.63	.875	1.08	.50	1.28	.12	—
CLM-3-CAC	M16	1.30	.18	1.83	.70	.90	1.125	1.38	.75	1.31		

## STANDARD ARM, HEX NUT (INCH)

CL-1-CA	5/16-18	.67	.08	.93	.25	.55	.625	.80	.40	1.14	.30	.06
CL-2-CA	1/2-13	.92	.12	1.63	.50	.63	.875	1.08	.50	1.19	.48	.08
CL-3-CA	5/8-11	1.30	.18	1.83	.70	.90	1.125	1.38	.75	1.57	.61	.09

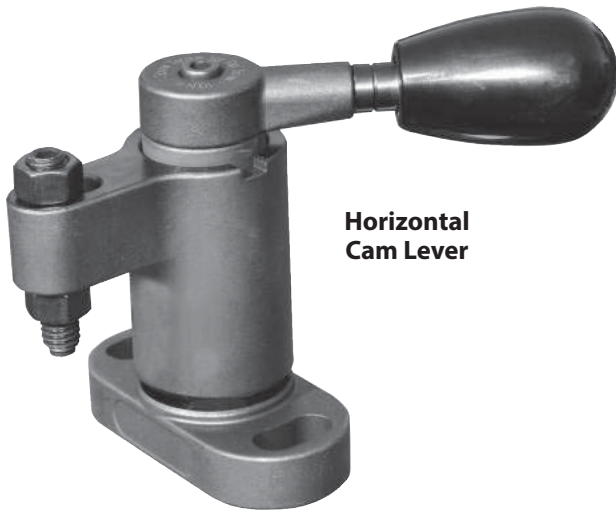
## STANDARD ARM, HEX NUT (METRIC)

CLM-1-CA	M8	.67	.08	.93	.25	.55	.625	.80	.40	.69	.32	.05
CLM-2-CA	M12	.92	.12	1.63	.50	.63	.875	1.08	.50	1.02	.47	.07
CLM-3-CA	M16	1.30	.18	1.83	.70	.90	1.125	1.38	.75	1.48	.63	.08



# ONE-TOUCH QUICK-ACTING SWING CLAMPS

BASE, SPINDLE, AND LEVER: 1045 STEEL, HEAT TREATED, BLACK OXIDE FINISH  
 CLAMPING-ARM BODY AND SPIRAL-CAM SHAFT: ALLOY STEEL, HEAT TREATED, BLACK OXIDE FINISH  
 KNOB HANDLE: BLACK PHENOLIC PLASTIC

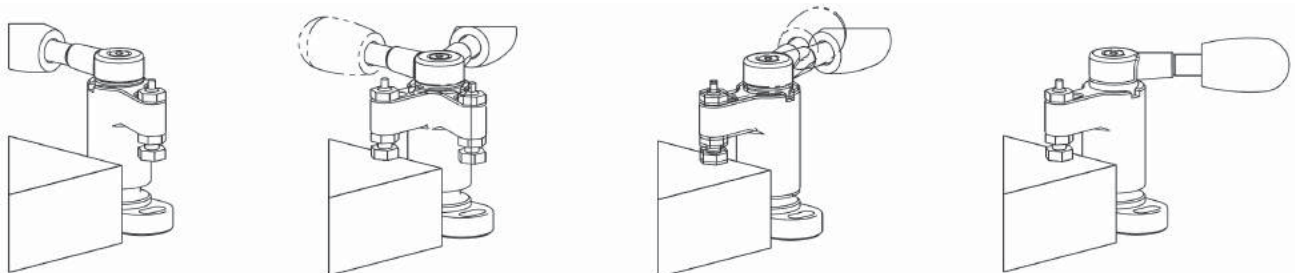
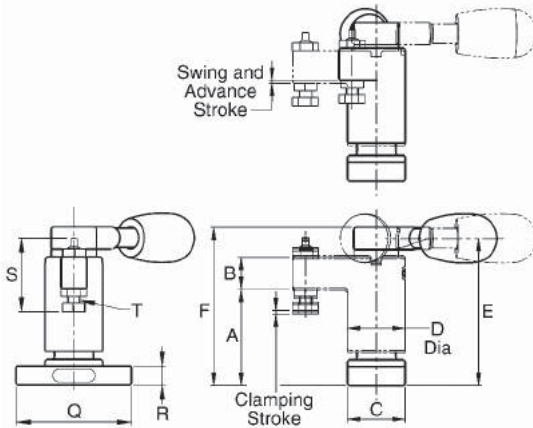
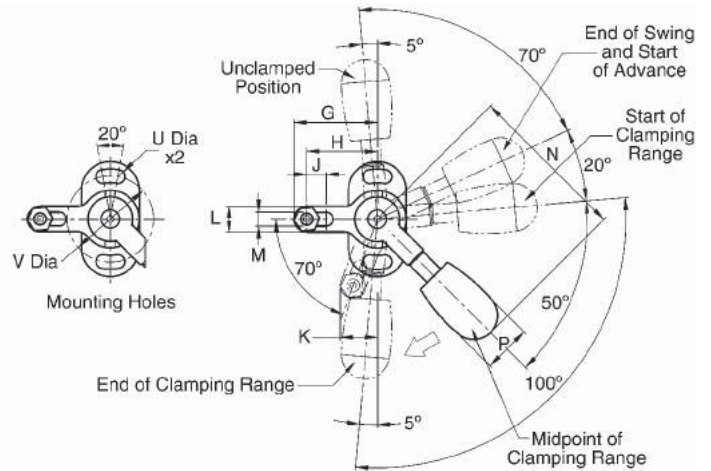


**Horizontal Cam Lever**

One-Touch Swing Clamps are manually operated clamps that first rotate 70° clockwise into position then clamp straight down in one continuous motion. The version shown here is operated by a radial cam lever that swings in an horizontal arc. Available in four sizes.

Starting with the clamping arm swung away for loading, turn the lever to rotate the arm into clamping position and automatically move the arm downward to apply clamping force. A small portion of the total vertical stroke is used to swing, and slightly advance the clamping arm, then the remaining stroke is available as the clamping range. To unclamp, reverse the lever movement to lift the arm straight up and automatically return the arm to its original position for loading.

Mount clamp with two socket-head cap screws using the two mounting slots. To allow for workpiece variation, adjust spindle extension so that full clamping force is achieved approximately in the middle of the lever's 100° clamping range.



1. Starting position, with clamping arm swung away for loading.
2. Turn lever (70°) to rotate the arm into clamping position.
3. Continue turning lever (through 90°) to advance the arm toward the workpiece.
4. Continue turning lever (90° to 190°) until full clamping force is applied.

## HORIZONTAL CAM LEVER (INCH)

PART NO.	MAX CLAMPING FORCE (LBS)	MAX. ALLOWABLE TORQUE (FT-LBS)	SWING AND ADVANCE STROKE	CLAMPING STROKE (MAX.)	A			B	C	D DIA	E	F	G	H	J	K	L	M	N	P DIA	Q	R	S	T SOCKET SET-SCREW	U DIA	V DIA
					UN-CLAMPED POSITION	START OF CLAMPING RANGE	END OF CLAMPING RANGE																			
CL-100-QSCR	250	4	.03	.04	1.21	1.18	1.14	.39	.71	.71	1.80	1.93	1.02	1.02	.24	.45	.31	.169	1.97	.59	1.42	.24	.88	#8-32	.169	1.063
CL-150-QSCR	400	7	.04	.06	1.62	1.58	1.52	.55	.91	.91	2.41	2.60	1.38	1.18	.31	.60	.39	.209	2.48	.79	1.77	.31	1.00	#10-24	.209	1.339
CL-200-QSCR	500	12	.05	.06	2.02	1.97	1.91	.71	1.18	1.18	3.01	3.23	1.77	1.46	.31	.81	.63	.331	3.15	1.02	2.56	.47	1.50	5/16-18	.331	1.890
CL-300-QSCR	800	23	.07	.07	2.43	2.36	2.29	.87	1.57	1.57	3.66	3.94	2.17	1.77	.31	1.00	.79	.409	3.94	1.30	3.35	.59	2.00	3/8-16	.409	2.520

# ONE-TOUCH QUICK-ACTING SWING CLAMPS

BASE, WASHER, AND SPINDLE: 1045 STEEL, HEAT TREATED, BLACK OXIDE FINISH  
 CLAMPING-ARM BODY AND CAM HANDLE: ALLOY STEEL, HEAT TREATED, BLACK OXIDE FINISH

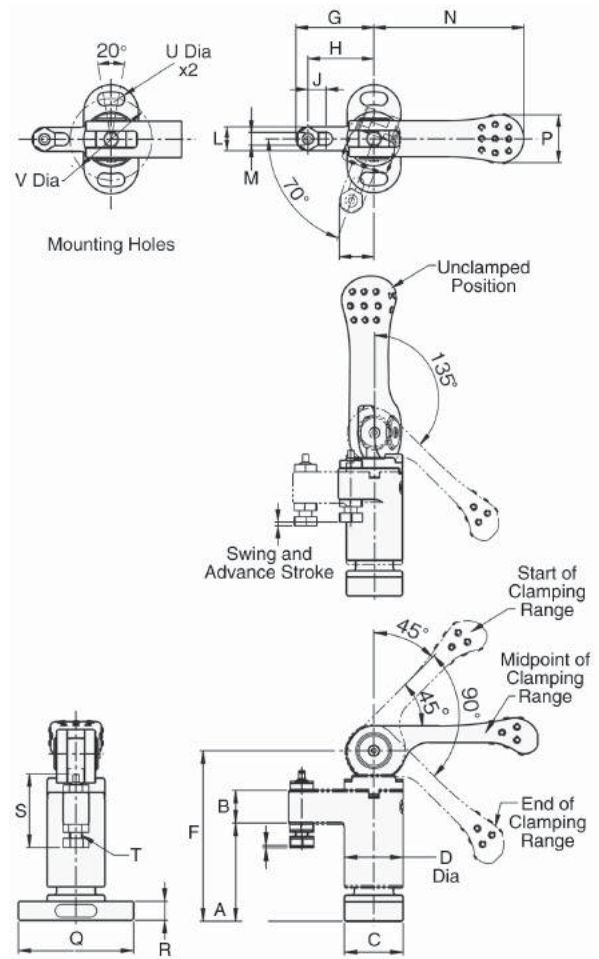


**Vertical  
Cam Handle**

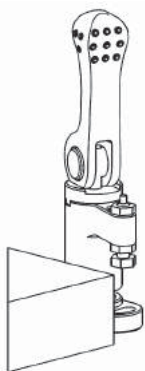
One-Touch Swing Clamps are manually operated clamps that first rotate 70° clockwise into position then clamp straight down in one continuous motion. The version shown here is operated by a cam handle that swings in a vertical arc. Ideal for confined spaces with no room for a horizontal handle swing. Available in four sizes.

Starting with the handle upright and the clamping arm swung away for loading, first twist the handle to rotate the arm into clamping position, then push the handle downward to lower the arm and apply clamping force. A small portion of the total vertical stroke is used to swing, and slightly advance the clamping arm, then the remaining stroke is available as the clamping range. Reverse the process to unclamp and return the arm to its original position for loading.

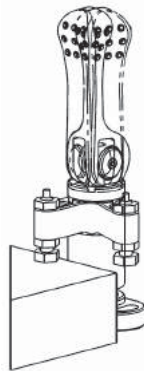
Mount clamp with two socket-head cap screws using the two mounting slots. To allow for workpiece variation, adjust spindle extension so that full clamping force is achieved approximately in the middle of the lever's 100° clamping range.



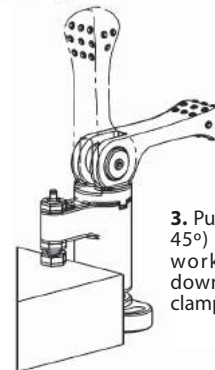
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1. Starting position, with handle upright and clamping arm swung away for loading.



2. Twist handle (70°) to rotate the arm into clamping position.



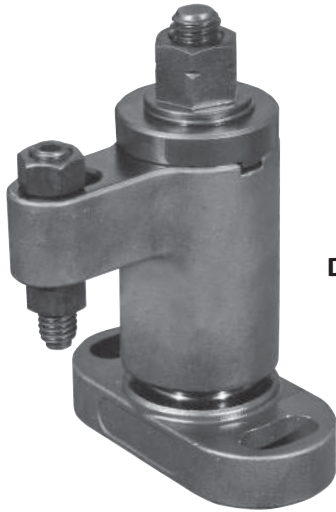
3. Push handle downward (through 45°) to advance the arm to the workpiece. Continue pushing downward (45° to 135°) until full clamping force is applied.

## VERTICAL CAM HANDLE (INCH)

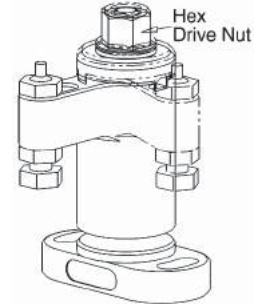
PART NO.	MAX CLAMPING FORCE (LBS)	MAX. ALLOWABLE TORQUE (FF-LBS)	SWING AND ADVANCE STROKE	CLAMPING STROKE (MAX.)	A			B	C	D DIA	F	G	H	J	K	L	M	N	P	Q	R	S	T SOCKET SET-SCREW	U DIA	V DIA
					UN-CLAMPED POSITION	START OF CLAMPING RANGE	END OF CLAMPING RANGE																		
CL-100-QSCV	180	4	.03	.04	1.21	1.18	1.14	.39	.71	.71	2.05	1.02	.87	.24	.45	.31	.169	1.97	.63	1.42	.24	.88	#8-32	.169	1.063
CL-150-QSCV	340	7	.04	.06	1.62	1.58	1.52	.55	.91	.91	2.68	1.38	1.18	.31	.60	.39	.209	2.48	.75	1.77	.31	1.00	#10-24	.209	1.339
CL-200-QSCV	470	12	.05	.06	2.02	1.97	1.91	.71	1.18	1.18	3.43	1.77	1.46	.31	.81	.63	.331	3.15	.94	2.56	.47	1.50	5/16-18	.331	1.890
CL-300-QSCV	630	22	.07	.07	2.43	2.36	2.29	.87	1.57	1.57	4.21	2.17	1.77	.31	1.00	.79	.409	3.94	1.8	3.35	.59	2.00	3/8-16	.409	2.520

# ONE-TOUCH QUICK-ACTING SWING CLAMPS

BASE, WASHER, SPINDLE, AND HEX DRIVE NUT: 1045 STEEL, HEAT TREATED, BLACK OXIDE FINISH  
CLAMPING-ARM BODY: ALLOY STEEL, HEAT TREATED, BLACK OXIDE FINISH



Hex Drive

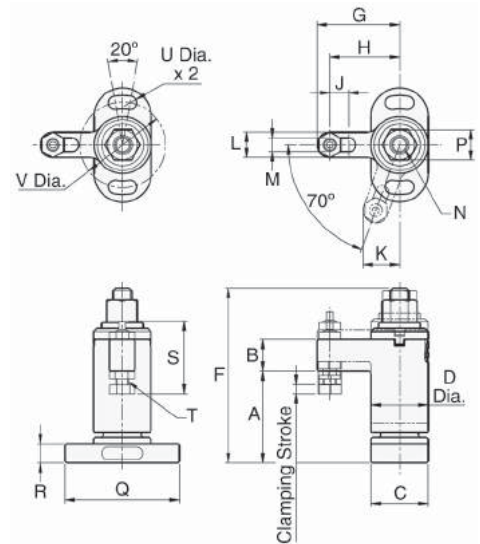


Starting with the clamping arm swung away for loading, tighten the flange nut to rotate the arm into clamping position and automatically move the arm downward to apply clamping force.

One-Touch Swing Clamps are manually operated clamps that first rotate 70° clockwise into position then clamp straight down in one continuous motion. The version shown here is operated by a screw mechanism with a hex drive nut. This allows for exact clamping-force control using a torque wrench. The screw mechanism also provides a longer clamping stroke and greater clamping force than the versions with cam locking. Available in four sizes.

Starting with the clamping arm swung away for loading, tighten the hex drive nut to rotate the arm into clamping position and automatically move the arm downward to apply clamping force. A small portion of the total vertical stroke is used to swing the clamping arm, then the remaining stroke is available as the clamping range. To unclamp, turn the flange nut counterclockwise to lift the arm straight up and automatically return the arm to its original position for loading.

Mount clamp with two socket-head cap screws using the two mounting slots. To allow for workpiece variation, adjust spindle extension so that full clamping force is achieved approximately in the middle of the lever's 100° clamping range.

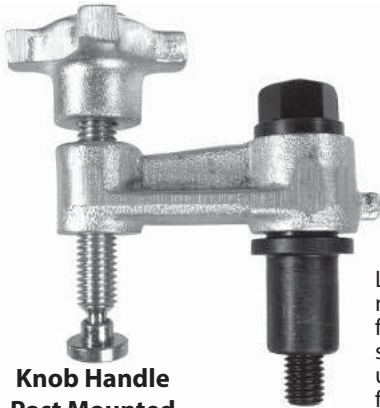


## HEX DRIVE (INCH)

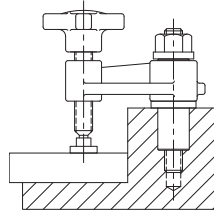
PART NO.	MAX CLAMPING FORCE (LBS)	MAX. ALLOWABLE TORQUE (FF-LBS)	SWING AND ADVANCE STROKE	CLAMPING STROKE (MAX.)	A			B	C	D DIA	F	G	H	J	K	L	M	N	P	Q	R	S	T SOCKET SET-SCREW	U DIA	V DIA
					UN-CLAMPED POSITION	START OF CLAMPING RANGE	END OF CLAMPING RANGE																		
CL-100-QSCH	500	4.5	.02	.12	1.16	1.14	1.02	.39	.71	.71	2.22	1.02	.87	.24	.45	.31	.169	1/4-20	7/16	1.42	.24	.88	#8-32	.169	1.063
CL-150-QSCH	800	8	.02	.16	1.56	1.54	1.38	.55	.91	.91	2.89	1.38	1.18	.31	.60	.39	.209	5/16-18	1/2	1.77	.31	1.00	#10-24	.209	1.339
CL-200-QSCH	1300	21	.03	.16	1.92	1.89	1.73	.71	1.18	1.18	3.58	1.77	1.46	.31	.81	.63	.331	3/8-16	9/16	2.56	.47	1.50	5/16-18	.331	1.890
CL-300-QSCH	1700	33	.03	.20	2.31	2.28	2.08	.87	1.57	1.57	4.49	2.17	1.77	.31	1.00	.79	.409	1/2-13	3/4	3.35	.59	2.00	3/8-16	.409	2.520

# SWING CLAMP ASSEMBLIES

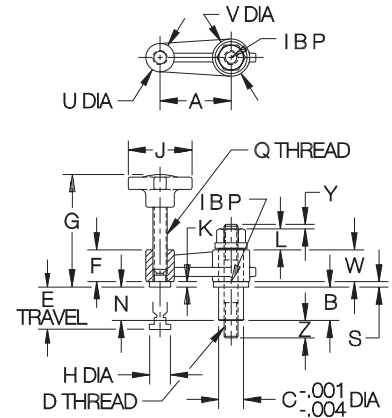
ARM: NODULAR IRON PER ASTM A536 GRADE 65-45-12, ZINC PLATED CLEAR CHROMATE  
 ALL OTHER PARTS: MILD STEEL, BLACK OXIDE FINISH



**Knob Handle  
Post Mounted**



Long-reach swing clamp that can be hand tightened for medium clamping force. The post-mounted version is ideal for tight spaces, with a long mounting post for increased strength. Swing arm can be turned over for more clearance underneath. Install in a reamed hole. To order with a Delrin® foot instead of steel, add "N" to the part number. Example: CL-1-SWA-1N.



## KNOB HANDLE, POST MOUNTED (INCH)

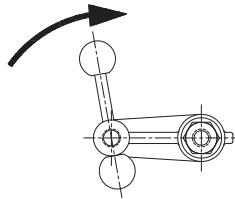
PART NO.	D THREAD SIZE	A	B	C DIA		E	F	G	H DIA	J	K	L	N	Q	S	U DIA	V DIA	W	Y	Z
				NOMINAL	ACTUAL															
CL-1-SWA-1	5/16-18	1-1/2	.80	9/16	.563	.69	3/4	2.45	1/2	1-3/4	5/32	3/8	.68	5/16-18	.16	11/16	15/16	3/4	.11	.80
CL-4-SWA-1	1/2-13	2	1.18	7/8	.875	1.50	1-1/8	3.88	3/4	2-1/8	3/16	11/16	.99	1/2-13	.19	1	1-5/16	1-1/8	.15	.67
CL-5-SWA-1		2-1/2																		
CL-2-SWA-1	5/8-11	3	1.55	1-1/8	1.125	1.59	1-5/16	4.56	15/16	2-3/4	7/32	13/16	1.33	5/8-11	.22	1-5/16	1-3/4	1-1/2	.18	.74
CL-3-SWA-1		4																		

## KNOB HANDLE, POST MOUNTED (METRIC)

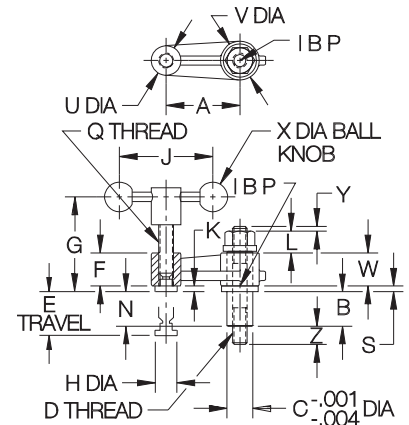
PART NO.	D THREAD SIZE	A	B	C DIA		E	F	G	H DIA	J	K	L	N	Q	S	U DIA	V DIA	W	Y	Z
				NOMINAL	ACTUAL															
CLM-1-SWA-1	M8	1-1/2	.80	14mm	.551	.69	3/4	2.45	1/2	1-3/4	5/32	.39	.68	5/16-18	.16	11/16	15/16	3/4	.10	.95
CLM-4-SWA-1	M12	2	1.18	22mm	.866	1.50	1-1/8	3.88	3/4	2-1/8	3/16	.67	.99	1/2-13	.19	1	1-5/16	1-1/8	.14	1.01
CLM-5-SWA-1		2-1/2																		
CLM-2-SWA-1	M16	3	1.55	28mm	1.102	1.59	1-5/16	4.56	15/16	2-3/4	7/32	.83	1.33	5/8-11	.22	1-5/16	1-3/4	1-1/2	.16	.66
CLM-3-SWA-1		4																		



**Ball Handle  
Post Mounted**



Same as above, except with a sliding ball handle for increased leverage.



## BALL HANDLE, POST MOUNTED (INCH)

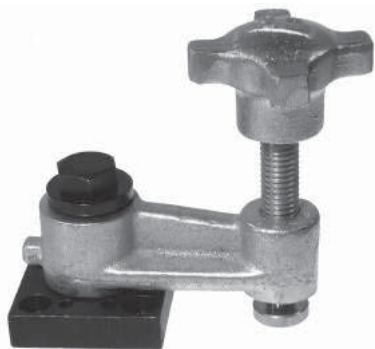
PART NO.	D THREAD SIZE	A	B	C DIA		E	F	G	H DIA	J	K	L	N	Q	S	U DIA	V DIA	W	X	Y	Z
				NOMINAL	ACTUAL																
CL-1-SWA-2	5/16-18	1-1/2	.80	9/16	.563	.88	3/4	2.39	1/2	2-1/4	5/32	3/8	.68	5/16-18	.16	11/16	15/16	3/4	3/4	.11	.80
CL-4-SWA-2	1/2-13	2	1.18	7/8	.875	.96	1-1/8	3.53	3/4	2-5/8	3/16	11/16	.99	1/2-13	.19	1	1-5/16	1-1/8	1	.15	.67
CL-5-SWA-2		2-1/2																			
CL-2-SWA-2	5/8-11	3	1.55	1-1/8	1.125	1.65	1-1/2	4.50	15/16	3	7/32	13/16	1.33	5/8-11	.22	1-5/16	1-3/4	1-1/2	1-3/8	.18	.74
CL-3-SWA-2		4																			

## BALL HANDLE, POST MOUNTED (METRIC)

PART NO.	D THREAD SIZE	A	B	C DIA		E	F	G	H DIA	J	K	L	N	Q	S	U DIA	V DIA	W	X	Y	Z
				NOMINAL	ACTUAL																
CLM-1-SWA-2	M8	1-1/2	.80	14mm	.551	.88	3/4	2.39	1/2	2-1/4	5/32	.39	.68	5/16-18	.16	11/16	15/16	3/4	3/4	.10	.95
CLM-4-SWA-2	M12	2	1.18	22mm	.866	.96	1-1/8	3.53	3/4	2-5/8	3/16	.67	.99	1/2-13	.19	1	1-5/16	1-1/8	1	.14	1.01
CLM-5-SWA-2		2-1/2																			
CLM-2-SWA-2	M16	3	1.55	28mm	1.102	1.65	1-1/2	4.50	15/16	3	7/32	.83	1.33	5/8-11	.22	1-5/16	1-3/4	1-1/2	1-3/8	.16	.66
CLM-3-SWA-2		4																			

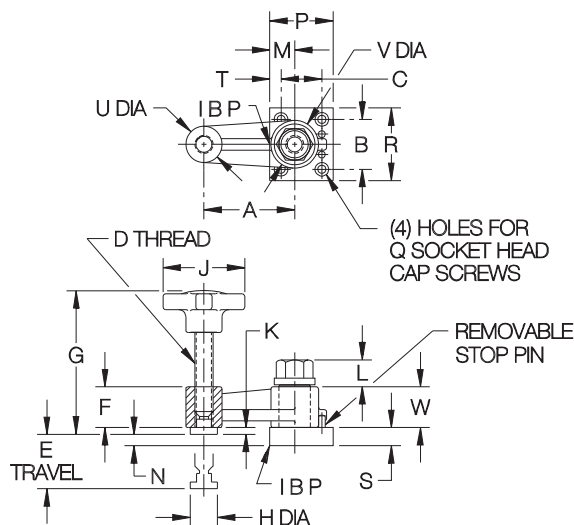
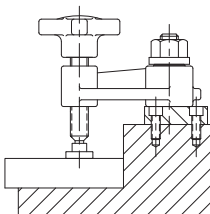
# SWING CLAMP ASSEMBLIES

ARM: NODULAR IRON PER ASTM A536 GRADE 60-40-18, ZINC PLATED CLEAR CHROMATE  
ALL OTHER PARTS: MILD STEEL, BLACK OXIDE FINISH



**Knob Handle  
Flange Mounted**

Long-reach swing clamp that can be hand tightened for medium clamping force. The flange-mounted version is ideal for mounting on flat surfaces. The stop pin furnished can be installed on either side for clockwise or counterclockwise rotation. Swing arm can be turned over for more clearance underneath. To order with a Delrin® foot instead of steel, add "N" to the part number. Example: CL-1-SWA-3N.



## KNOB HANDLE, FLANGE MOUNTED

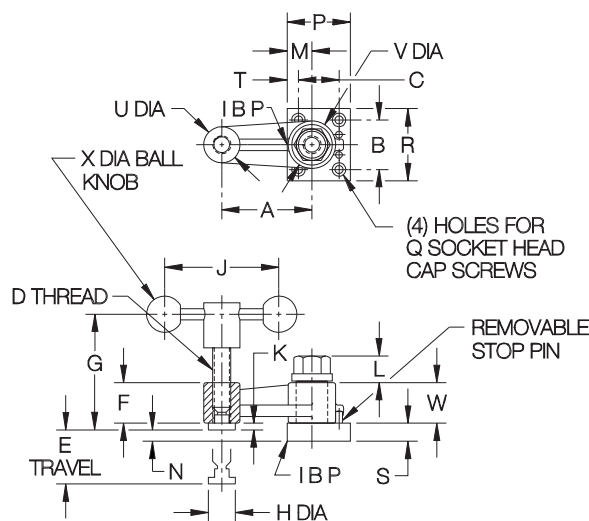
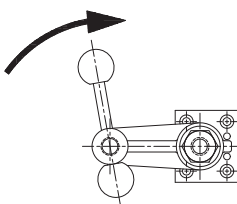
PART NO.	D THREAD SIZE	A	B	C	E	F	G	H DIA	J	K	L	M	N	P	Q	R	S	T	U	V	W
CL-1-SWA-3	5/16-18	1-1/2	1	3/4	.69	3/4	2.45	1/2	1-3/4	5/32	.33	1/2	.25	1-1/4	#10 or M5	1-1/2	3/8	1/4	11/16	15/16	3/4
CL-4-SWA-3	1/2-13	2	1-3/8	1-1/8	1.50	1-1/8	3.88	3/4	2-1/8	3/16	.44	11/16	.31	1-3/4	1/4 or M6	2	1/2	5/16	1	1-5/16	1-1/8
CL-5-SWA-3		2-1/2																			
CL-2-SWA-3	5/8-11	3	1-1/2	1-1/4	1.59	1-5/16	4.56	15/16	2-3/4	7/32	.58	1	.53	2-1/4	3/8 or M10	2-1/4	3/4	3/8	1-5/16	1-3/4	1-1/2
CL-3-SWA-3		4																			

7



**Ball Handle  
Flange Mounted**

Same as above, except with a sliding ball handle for increased leverage.

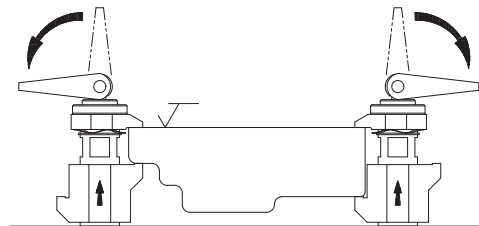
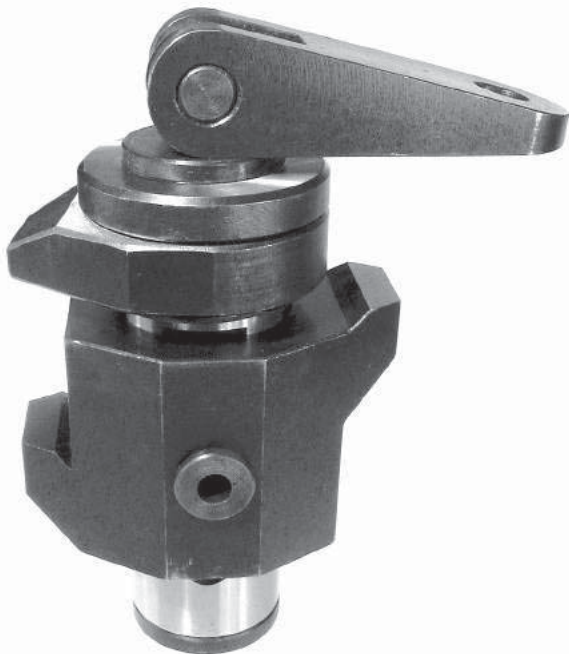


## BALL HANDLE, FLANGE MOUNTED

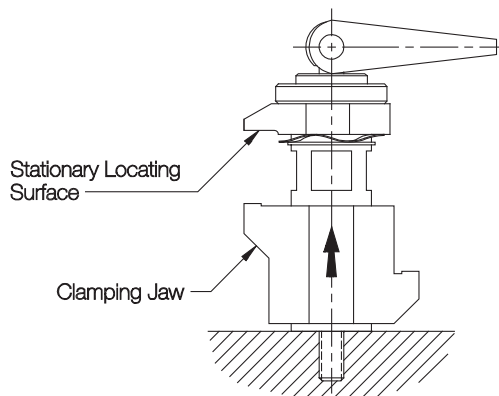
PART NO.	D THREAD SIZE	A	B	C	E	F	G	H DIA	J	K	L	M	N	P	Q	R	S	T	U	V	W	X
CL-1-SWA-4	5/16-18	1-1/2	1	3/4	.88	3/4	2.39	1/2	2-1/4	5/32	.33	1/2	.25	1-1/4	#10 or M5	1-1/2	3/8	1/4	11/16	15/16	3/4	3/4
CL-4-SWA-4	1/2-13	2	1-3/8	1-1/8	.96	1-1/8	3.53	3/4	2-5/8	3/16	.44	11/16	.31	1-3/4	1/4 or M6	2	1/2	5/16	1	1-5/16	1-1/8	1
CL-5-SWA-4		2-1/2																				
CL-2-SWA-4	5/8-11	3	1-1/2	1-1/4	1.65	1-5/16	4.50	15/16	3	7/32	.58	1	.53	2-1/4	3/8 or M10	2-1/4	3/4	3/8	1-5/16	1-3/4	1-1/2	1-3/8
CL-3-SWA-4		4																				

# UP-THRUST CLAMPS

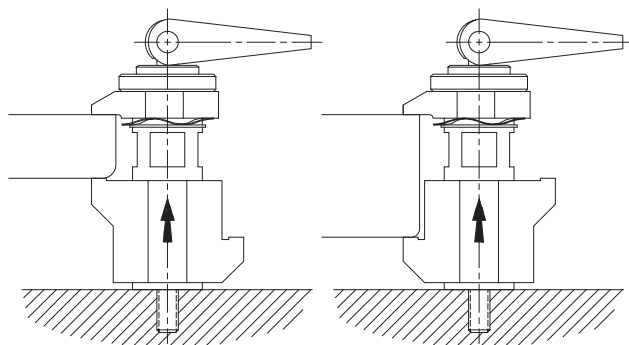
STEEL, WEAR SURFACES HARDENED, BLACK OXIDE FINISH



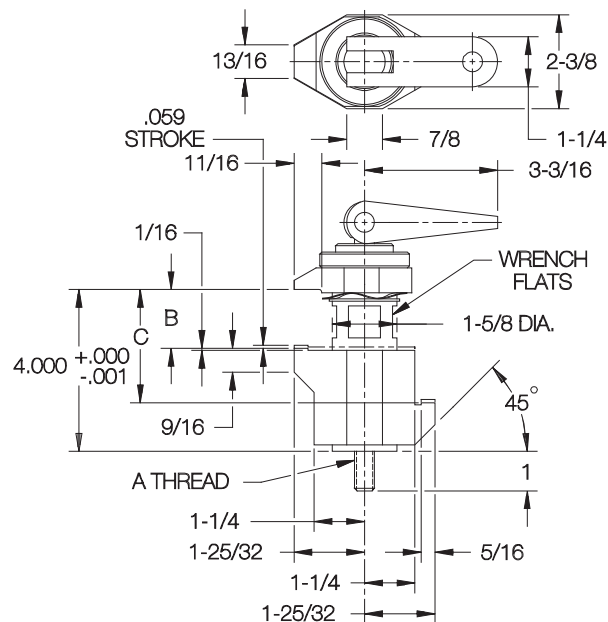
Up-Thrust Clamps locate off of the part's top surface and clamp up from below.



**7** Combination clamp and locator with a unique upward clamping action. Pushing down the cam handle pulls the lower jaw upward. This clamps the workpiece against the stationary upper jaw, whose bottom surface is a precision-ground locator.

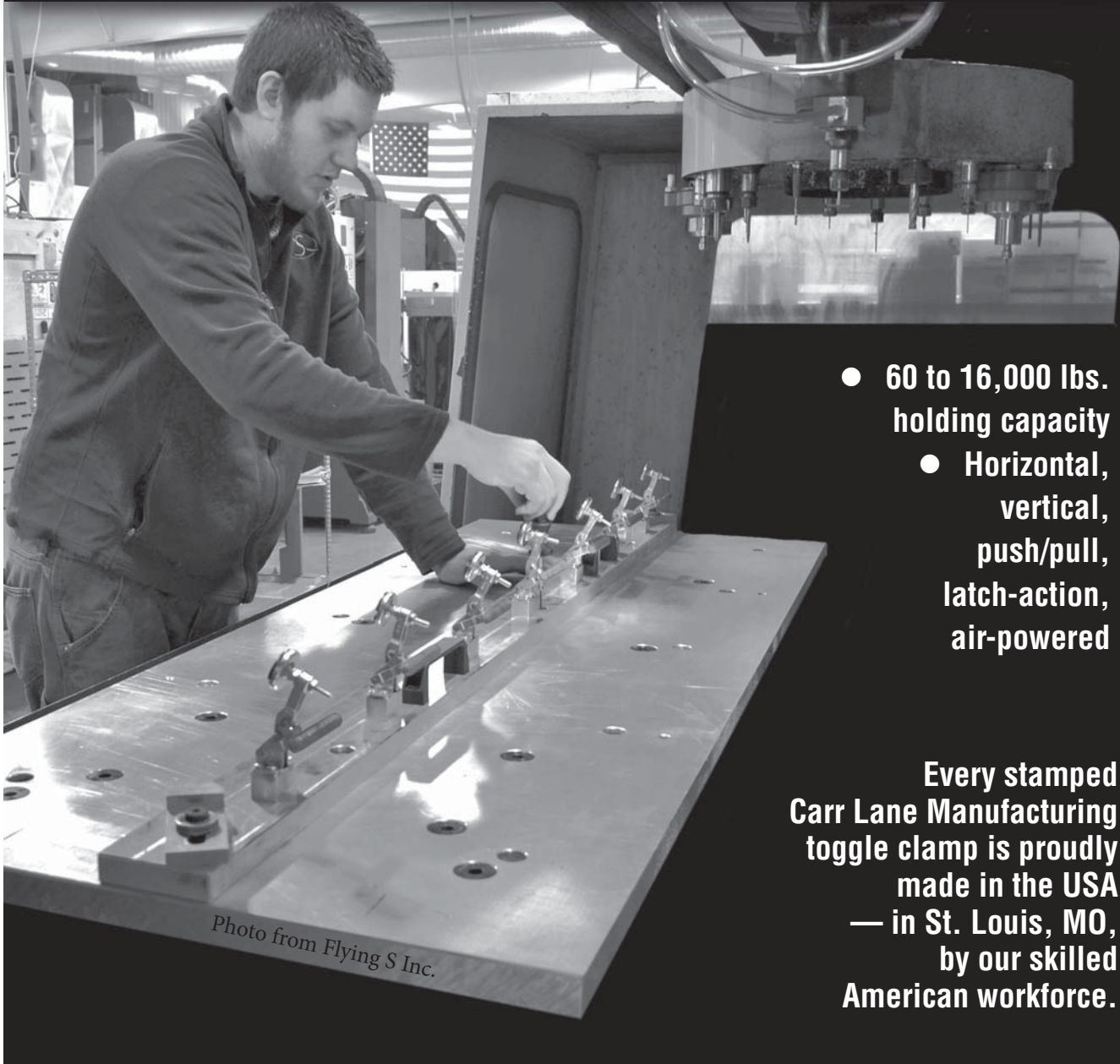


The lower jaw has two clamping surfaces 180° apart, one for thinner parts, the other for thicker parts. The cam handle rotates to screw the lower jaw up or down for fine adjustment.



PART NO.	A	B RANGE		C RANGE		MAX CLAMPING FORCE (LBS)
		MIN	MAX	MIN	MAX	
CL-MF40-5301	1/2-13	0	1-3/8	1-3/8	2-3/4	2200

# The ONLY TOGGLE CLAMPS EXCLUSIVELY MADE IN THE USA



*Photo from Flying S Inc.*

- 60 to 16,000 lbs. holding capacity
  - Horizontal, vertical, push/pull, latch-action, air-powered

Every stamped Carr Lane Manufacturing toggle clamp is proudly made in the USA — in St. Louis, MO, by our skilled American workforce.

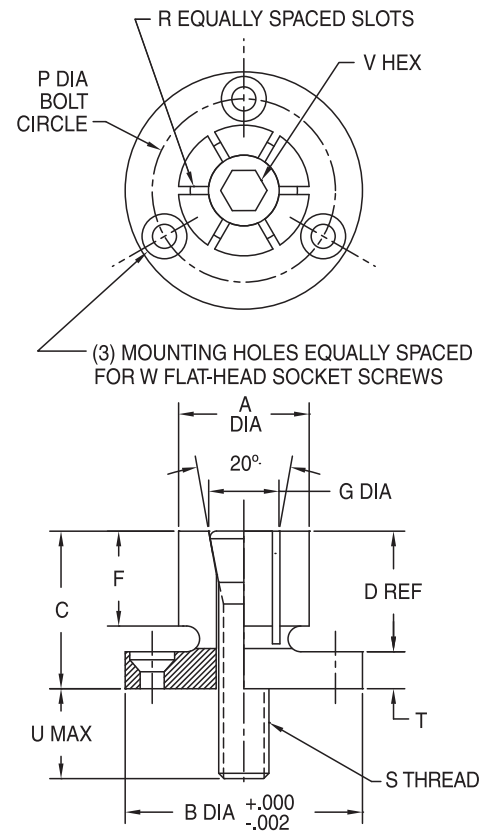
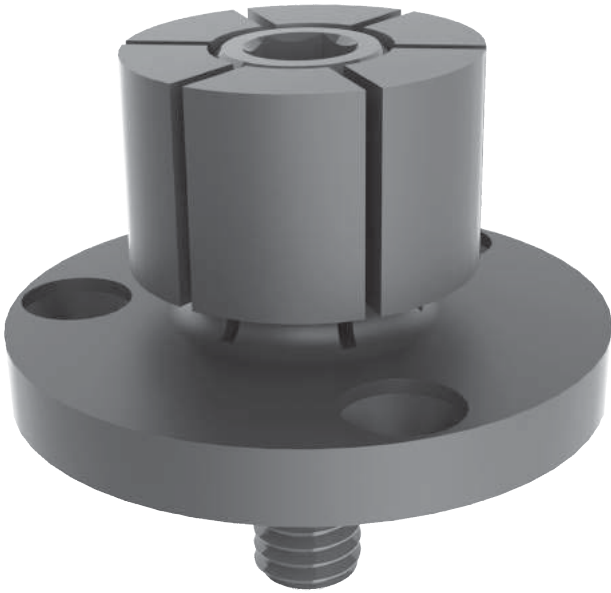
**Look for the green handle and choose Carr Lane Manufacturing!**

**See Pages 421-504**

**CarrLane**  
MANUFACTURING CO.

# ID CLAMPS

BODY: 12L14 STEEL, BLACK OXIDE FINISH  
 CENTER SCREW: ALLOY STEEL, BLACK OXIDE FINISH  
 MOUNTING SCREWS: ALLOY STEEL, BLACK OXIDE FINISH



7

ID Clamps expand to self-center and clamp on the inside diameter of a workpiece, leaving the outside clear for machining. Tightening the tapered center screw with a hex wrench pushes the clamping segments outward, and slightly downward, to exert force on the workpiece's internal bore. These clamps are designed to have their outside diameter finish machined by the customer to suit the bore size, because maximum diameter expansion is limited (.006 to .025", depending on the size). ID Clamps allow close mounting for multi-part machining on vertical and horizontal machining centers. Available in seven sizes to hold any inside diameter from .26" to 2.06". Made in USA.

For maximum locational accuracy, machine a recess in the fixture base to fit exactly with the clamp's close-tolerance flange diameter. Flat-head mounting screws are furnished. Please note, ID Clamps provide mostly radial clamping force; therefore the workpiece must be firmly supported underneath – by resting directly on the clamp's mounting flange, the fixture base, or fixed rest pads.

Before finish machining the clamp's outside diameter on a lathe or milling machine, expand the clamp slightly (.002 - .003") from its relaxed diameter by tightening the tapered center screw. Secure with a jam nut if necessary. Reduce the outside diameter only as much as required to achieve smooth workpiece loading, always staying within the expansion range for that clamp size.

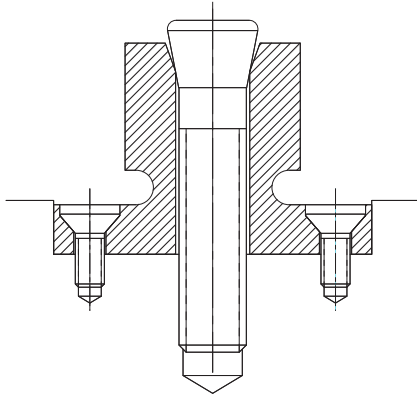
## ID CLAMPS

PART NO.	A DIA		B DIA	C	D	F	G DIA	P DIA	R	S	T	U	V	W	DIAMETER EXPANSION RANGE	RECOM-MENDED TORQUE (FT-LBS)	RADIAL HOLDING FORCE (LBS)
	BEFORE MACHINING	MINIMUM AFTER MACHINING															
CL-8-IDC	.500	.260	1.170	.86	.63	.57	.24	.825	4	#8-32	.230	.29	7/64	#6-32	.006	3.6	950
CL-10-IDC	.625	.370	1.240	.99	.76	.58	.36	.910	4	1/4-20	.230	.53	3/16	#6-32	.008	13	1900
CL-13-IDC	.813	.440	1.476	1.00	.77	.59	.43	1.140	6	5/16-18	.230	.60	1/4	#6-32	.010	28	2500
CL-18-IDC	1.125	.580	1.968	1.14	.90	.69	.57	1.550	6	3/8-16	.245	.77	5/16	#8-32	.014	49	4500
CL-23-IDC	1.438	.710	2.205	1.25	1.00	.81	.70	1.790	6	1/2-13	.250	.78	3/8	#8-32	.017	120	5900
CL-27-IDC	1.688	.910	2.736	1.56	1.25	1.06	.87	2.200	6	5/8-11	.310	.84	1/2	#10-32	.020	224	10000
CL-33-IDC	2.063	.910	2.972	1.56	1.25	1.06	.87	2.515	6	5/8-11	.310	.85	1/2	#10-32	.025	224	10000



# ID CLAMPS

BODY: 12L14 STEEL, BLACK OXIDE FINISH  
CENTER SCREW: ALLOY STEEL, BLACK OXIDE FINISH  
MOUNTING SCREWS: ALLOY STEEL, BLACK OXIDE FINISH



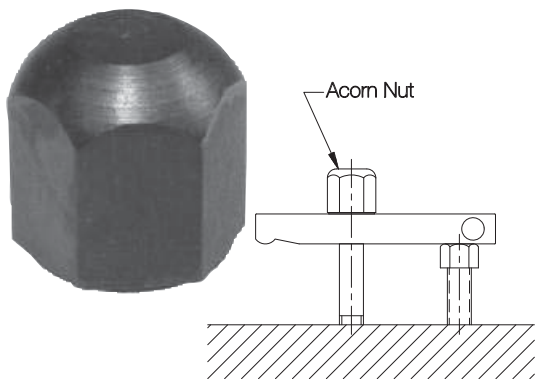
For maximum locational accuracy, machine a recess in the fixture base to fit exactly with the clamp's close-tolerance flange diameter. Flat-head mounting screws are furnished.



Each of these six workpieces is clamped by two ID Clamps – a large clamp in the large bore and a small clamp in the slot. The large clamp is also the primary locator, so would be tightened first. The small clamp is also the secondary (radial or “clocking”) locator, so would be tightened second. By using ID Clamps, the workpiece’s entire outer surface is accessible for machining.

# ACORN NUTS

12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH



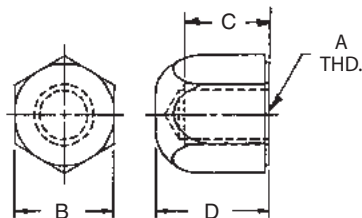
Closed end covers the end of a stud to prevent snags or thread damage.

## INCH

PART NO.	A	B	C	D
CL-0-AN	1/4-20	1/2	3/8	1/2
CL-1-AN	5/16-18	5/8	13/32	5/8
CL-5-AN	3/8-16	3/4	7/16	3/4
CL-2-AN	1/2-13	7/8	9/16	15/16
CL-3-AN	5/8-11	1-1/16	13/16	1-3/16
CL-4-AN	3/4-10	1-1/4	1	1-3/8

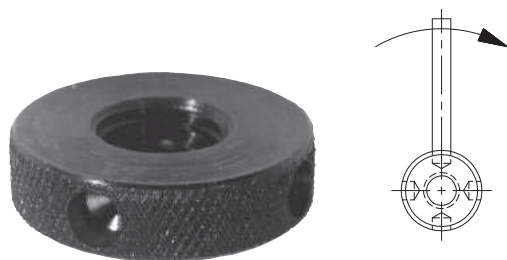
## METRIC

CLM-6-AN	M6	10mm	.39	.59
CLM-8-AN	M8	13mm		
CLM-10-AN	M10	17mm	.79	
CLM-12-AN	M12	19mm	.98	
CLM-16-AN	M16	24mm	1.18	
CLM-20-AN	M20	30mm	1.38	



# KNURLED NUTS

12L14 STEEL, BLACK OXIDE FINISH



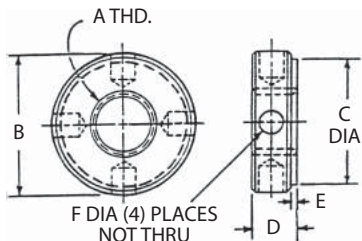
Heavy lock nut that can be tightened by hand or with an extension rod (1/4" or 6mm diameter). Large contact surface.

## INCH

PART NO.	A	B DIA	C DIA	D	E	F DIA
CL-0-KN	1/4-20	1-1/8	1	7/16	1/16	.257
CL-00-KN	5/16-18					
CL-1-KN	3/8-16					
CL-2-KN	1/2-13					
CL-3-KN	5/8-11	1-3/8				

## METRIC

CLM-6-KN	M6	1.12	.98	.43	.80	.256
CLM-8-KN	M8					
CLM-10-KN	M10					
CLM-12-KN	M12					
CLM-16-KN	M16	1.38				



# KNURLED CHECK NUTS

12L14 STEEL, BLACK OXIDE FINISH



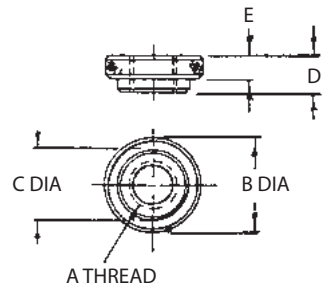
Multipurpose lock nut for finger tightening.

## INCH

PART NO.	A	B DIA	C DIA	D	E
CL-1024-TSJN	#10-24	3/4	1/2	1/4	3/16
CL-1032-TSJN	#10-32			5/16	1/4
CL-1420-TSJN	1/4-20				
CL-51618-TSJN	5/16-18	1	3/4	3/8	1/4
CL-3816-TSJN	3/8-16				
CL-1213-TSJN	1/2-13				
CL-5811-TSJN	5/8-11				

## METRIC

CLM-5-TSJN	M5	.75	.51	.24	.20
CLM-6-TSJN	M6			.31	.28
CLM-8-TSJN	M8				
CLM-10-TSJN	M10				
CLM-12-TSJN	M12	.98	.75	.39	.31
CLM-16-TSJN	M16				

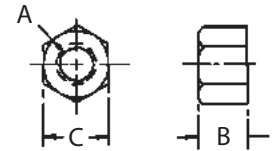


# HEX NUTS

STEEL: MILD STEEL, BLACK OXIDE FINISH  
STAINLESS STEEL: 300-SERIES, PASSIVATE FINISH



High-quality heavy Hex Nut, available in steel or stainless steel.



## INCH

STEEL PART NO.	STAINLESS STEEL PART NO.	A THREAD	B	C
CL-4-HN	CL-4-HN-S	1/4-20	15/64	1/2
CL-5-HN	CL-5-HN-S	5/16-18	19/64	9/16
CL-6-HN	CL-6-HN-S	3/8-16	23/64	11/16
CL-8-HN	CL-8-HN-S	1/2-13	31/64	7/8
CL-10-HN	CL-10-HN-S	5/8-11	39/64	1-1/16
CL-12-HN	CL-12-HN-S	3/4-10	47/64	1-1/4
CL-14-HN	—	7/8-9	55/64	1-7/16
CL-16-HN	—	1"-8	63/64	1-5/8
CL-20-HN	—	1-1/4"-7	1-7/32	2

## INCH FINE

CL-4-FHN	CL-4-FHN-S	1/4-28	7/32	7/16
CL-5-FHN	CL-5-FHN-S	5/16-24	17/64	1/2
CL-6-FHN	CL-6-FHN-S	3/8-24	21/64	9/16
CL-8-FHN	CL-8-FHN-S	1/2-20	7/16	3/4
CL-10-FHN	—	5/8-18	35/64	15/16
CL-12-FHN	—	3/4-16	41/64	1-1/8

## METRIC

STEEL PART NO.	STAINLESS STEEL PART NO.	A THREAD	B	C
CLM-6-HN	—	M6	.20	10mm
CLM-8-HN	—	M8	.26	13mm
CLM-10-HN	—	M10	.31	17mm
CLM-12-HN	—	M12	.39	19mm
CLM-16-HN	—	M16	.51	24mm
CLM-20-HN	—	M20	.63	30mm
CLM-24-HN	—	M24	.75	36mm
CLM-30-HN	—	M30	.94	46mm

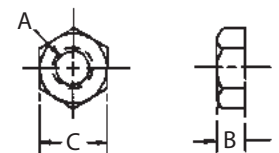
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# JAM NUTS

STEEL: MILD STEEL, BLACK OXIDE FINISH  
STAINLESS STEEL: 300-SERIES, PASSIVATE FINISH



High-quality heavy Jam Nut, available in steel or stainless steel.



## INCH

STEEL PART NO.	STAINLESS STEEL PART NO.	A THREAD	B	C
—	CL-2-JN-S	#8-32	1/8	11/32
—	CL-3-JN-S	#10-24	1/8	3/8
CL-4-JN	CL-4-JN-S	1/4-20	11/64	1/2
CL-5-JN	CL-5-JN-S	5/16-18	13/64	9/16
CL-6-JN	CL-6-JN-S	3/8-16	15/64	11/16
CL-8-JN	—	1/2-13	19/64	7/8
CL-10-JN	—	5/8-11	23/64	1-1/16
CL-12-JN	—	3/4-10	27/64	1-1/4
CL-14-JN	—	7/8-9	31/64	1-7/16
CL-16-JN	—	1"-8	35/64	1-5/8

## INCH FINE

CL-3-FJN	CL-3-FJN-S	#10-32	1/8	3/8
CL-4-FJN	CL-4-FJN-S	1/4-28	5/32	7/16
CL-5-FJN	CL-5-FJN-S	5/16-24	3/16	1/2
CL-6-FJN	CL-6-FJN-S	3/8-24	7/32	9/16

## METRIC

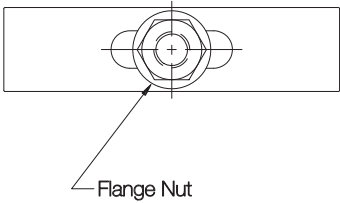
STEEL PART NO.	STAINLESS STEEL PART NO.	A THREAD	B	C
—	CLM-4-JN-S	M4	.08	7mm
—	CLM-5-JN-S	M5	.10	8mm
CLM-6-JN	CLM-6-JN-S	M6	.13	10mm
CLM-8-JN	CLM-8-JN-S	M8	.16	13mm
CLM-10-JN	CLM-10-JN-S	M10	.20	17mm
CLM-12-JN	CLM-12-JN-S	M12	.24	19mm
CLM-16-JN	CLM-16-JN-S	M16	.31	24mm
CLM-20-JN	CLM-20-JN-S	M20	.39	30mm
CLM-24-JN	—	M24	.47	36mm

# FLANGE NUTS

STEEL: 12L14, CARBURIZED-HARDENED, BLACK OXIDE FINISH  
 STAINLESS STEEL: 300-SERIES, PASSIVATE FINISH



Flanged face provides a large bearing surface to avoid damaging the part underneath, especially when clamping over a slot. Precision machined from one solid piece of steel for extra strength.



## INCH

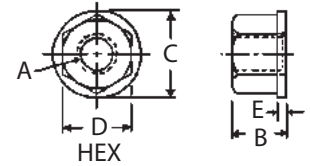
STEEL PART NO.	STAINLESS STEEL PART NO.	A	B	C DIA	D	E
—	CL-123	#10-24	5/16	1/2	3/8	.08
—	CL-125	1/4-20	5/16	9/16	7/16	.12
CL-1-FN	—			5/8	1/2	
—	CL-126	5/16-18	3/8	11/16	9/16	.09
CL-9-FN	—			3/4		
CL-2-FN	CL-127	3/8-16	1/2	7/8	11/16	.12
CL-3-FN	CL-128	1/2-13	11/16	1-1/8	7/8	.20
CL-4-FN	CL-129	5/8-11	13/16	1-3/8	1-1/16	
CL-5-FN	—	3/4-10	1	1-5/8	1-1/4	.25
CL-6-FN	—	7/8-9	1-1/8	1-3/4	1-7/16	.32
CL-7-FN	—	1"-8	1-1/4	2	1-5/8	.28
CL-10-FN	—	1-1/4"-7	1-3/8	2-1/4	1-13/16	.25

## INCH FINE

—	CL-124	#10-32	5/16	1/2	3/8	.08
CL-1-FFN	—	1/4-28	3/8	5/8	1/2	.12
CL-9-FFN	—	5/16-24		3/4	9/16	
CL-2-FFN	—	3/8-24	1/2	7/8	11/16	.20
CL-3-FFN	—	1/2-20	11/16	1-1/8	7/8	
CL-4-FFN	—	5/8-18	13/16	1-3/8	1-1/16	.25
CL-5-FFN	—	3/4-16	1	1-5/8	1-1/4	
CL-7-FFN	—	1"-14	1-1/4	2	1-5/8	.25

## METRIC

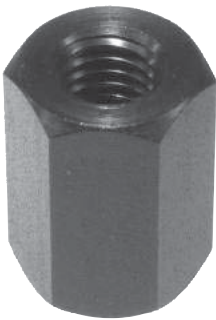
CLM-6-FN	—	M6	.31	.63	10mm	.12
CLM-8-FN	—	M8	.39	.75	13mm	
CLM-10-FN	—	M10	.51	.87	17mm	.20
CLM-12-FN	—	M12	.67	1.10	19mm	
CLM-16-FN	—	M16	.83	1.34	24mm	.24
CLM-20-FN	—	M20	.98	1.61	30mm	
CLM-24-FN	—	M24	1.26	2.01	36mm	.28



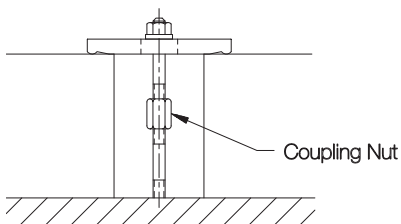
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# COUPLING NUTS

12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH



For joining two or more studs together to create an extra-long stud.

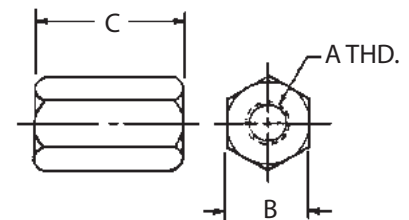


## INCH

PART NO.	A	B	C
CL-0-CN	1/4-20	1/2	5/8
CL-00-CN	5/16-18	9/16	7/8
CL-1-CN	3/8-16	11/16	1
CL-2-CN	1/2-13	7/8	1-1/4
CL-3-CN	5/8-11	1-1/16	1-5/8
CL-4-CN	3/4-10	1-1/4	1-7/8
CL-6-CN	1"-8	1-5/8	2-1/2

## METRIC

CLM-6-CN	M6	10mm	.71
CLM-8-CN	M8	13mm	.79
CLM-10-CN	M10	17mm	.98
CLM-12-CN	M12	19mm	1.18
CLM-16-CN	M16	24mm	1.57
CLM-20-CN	M20	30mm	1.97

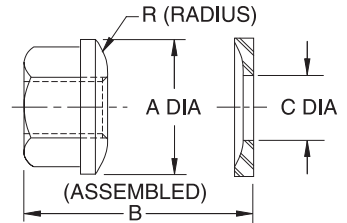


# SPHERICAL NUTS AND WASHERS

STEEL: 12L14, CARBURIZED-HARDENED, BLACK OXIDE FINISH  
 STAINLESS STEEL: 300-SERIES, PASSIVATED

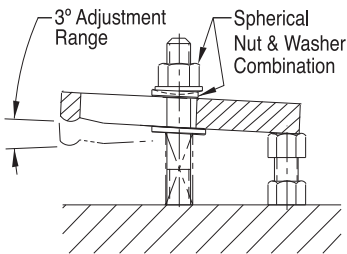


Combination nut and washer that compensates whenever a stud and clamp strap are not perpendicular. The nut has a convex spherical radius, while the washer has a matching concave spherical radius.



## INCH

STEEL PART NO.	STAINLESS STEEL PART NO.	THREAD	HEX	A DIA	B	C DIA	R
CL-1-SNW	CL-1-SNW-S	1/4-20	1/2	5/8	15/32	5/16	3/4
CL-9-SNW	CL-9-SNW-S	5/16-18	9/16	3/4	17/32	3/8	1
CL-2-SNW	CL-2-SNW-S	3/8-16	11/16	7/8	19/32	7/16	1-1/4
CL-3-SNW	CL-3-SNW-S	1/2-13	7/8	1-1/8	7/8	9/16	1-1/2
CL-4-SNW	CL-4-SNW-S	5/8-11	1-1/16	1-3/8	1	11/16	1-3/4
CL-5-SNW	CL-5-SNW-S	3/4-10	1-1/4	1-5/8	1-3/16	7/8	2-1/4
CL-6-SNW	—	7/8-9	1-7/16	1-3/4	1-5/16	1	2-1/2
CL-7-SNW	—	1"-8	1-5/8	2	1-7/16	1-1/8	2-3/4



## METRIC

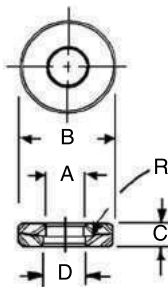
CLM-6-SNW	—	M6	10mm	5/8	.47	5/16	3/4
CLM-8-SNW	—	M8	13mm	3/4	.55	3/8	1
CLM-10-SNW	—	M10	17mm	7/8	.69	7/16	1-1/4
CLM-12-SNW	—	M12	19mm	1-1/8	.87	9/16	1-1/2
CLM-16-SNW	—	M16	24mm	1-3/8	.98	11/16	1-3/4
CLM-20-SNW	—	M20	30mm	1-5/8	1.18	7/8	2-1/4
CLM-24-SNW	—	M24	36mm	2	1.41	1	2-3/4

# SPHERICAL WASHERS

STEEL: 12L14, CARBURIZED-HARDENED, BLACK OXIDE FINISH  
 STAINLESS STEEL: 300-SERIES, PASSIVATED

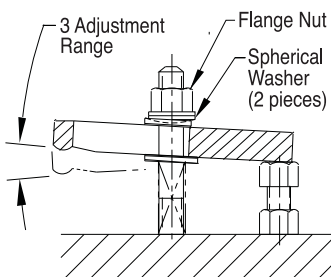


Two-piece washer that compensates whenever a stud and clamp strap are not perpendicular. The top washer has a convex spherical radius, while the bottom washer has a matching concave spherical radius.



## INCH & METRIC

STEEL PART NO.	STAINLESS STEEL PART NO.	BOLT SIZE	A DIA	B DIA	C	D DIA	R
—	CL-144	#10 & M5	7/32	1/2	1/8	1/4	3/4
CL-1-SW	CL-145	1/4 & M6	9/32	5/8	3/16	5/16	1
CL-11-SW	—	5/16 & M8	11/32	3/4	1/4	3/8	1
—	CL-146	—	—	13/16	7/32	—	—
CL-2-SW	—	3/8 & M10	13/32	7/8	1/4	7/16	1-1/4
—	CL-147	—	—	1	—	—	—
CL-3-SW	CL-148	1/2 & M12	17/32	1-1/8	5/16	9/16	1-1/2
CL-4-SW	CL-149	5/8 & M16	21/32	1-3/8	—	11/16	1-3/4
CL-5-SW	CL-150	3/4 & M18	25/32	1-5/8	—	7/8	2-1/4
CLM-20-SW	—	M20	.83	—	3/8	7/8	—
CL-6-SW	—	7/8 & M22	15/16	1-3/4	—	1	2-1/2
CL-7-SW	—	1 & M24	1-1/16	2	—	1-1/8	2-3/4
CL-8-SW	—	1-1/8	1-3/16	2-1/4	—	1-1/4	—
CL-9-SW	—	1-1/4 & M30	1-5/16	2-5/8	1/2	1-3/8	3
CL-10-SW	—	1-1/2 & M36	1-9/16	2-7/8	—	1-5/8	—



# FLAT WASHERS

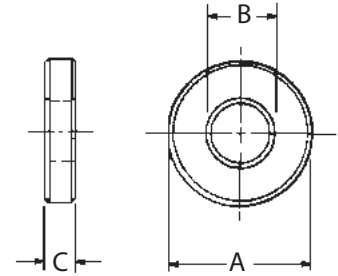
STEEL: 1010, CARBURIZED-HARDENED, BLACK OXIDE FINISH  
 STAINLESS STEEL: 300-SERIES



Thick, heavy-duty washer with both faces held flat and parallel. Available in steel or stainless steel.

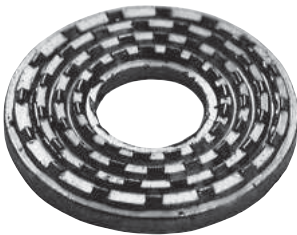
## INCH & METRIC

STEEL PART NO.	STAINLESS STEEL PART NO.	BOLT SIZE	A DIA	B DIA	C
—	CL-254	#10 or M5	7/16	7/32	5/64
—	CL-255	1/4 or M6	1/2	9/32	5/64
CL-7-FW	—		5/8		1/8
—	CL-256	5/16 or M8	5/8	11/32	3/32
CL-14-FW	—		3/4		1/8
—	CL-257	3/8 or M10	3/4	13/32	3/32
CL-1-FW	—		7/8		1/8
CL-8-FW	—		1		3/16
CL-2-FW	—	1/2 or M12	1-1/8	17/32	1/8
CL-9-FW	CL-258		3/4		3/16
CL-3-FW	—	5/8 or M16	1-3/8	21/32	1/8
CL-10-FW	CL-259		3/4		3/16
CL-4-FW	—	3/4 or M18	1-5/8	25/32	5/32
CL-11-FW	CL-260		1		1/4
CLM-10-FW	—	M20	1-5/8	.827	1/4
CL-13-FW	—	7/8 or M22	1-3/4	29/32	1/4
CL-12-FW	—	1	2	1-1/32	9/32



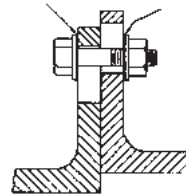
# KNURLED-FACE WASHERS

4130 STEEL, HEAT TREATED 125,000-140,000 PSI PER MIL-H-6875, ZINC PLATED YELLOW CHROMATE



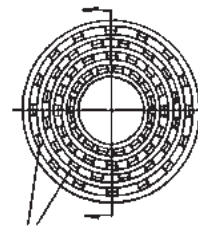
Flat washer with a serrated face to prevent two parts from sliding in relation to each other. Close tolerance on washer ID prevents the stud from slipping.

Serrated Washers  
Teeth Facing Inward

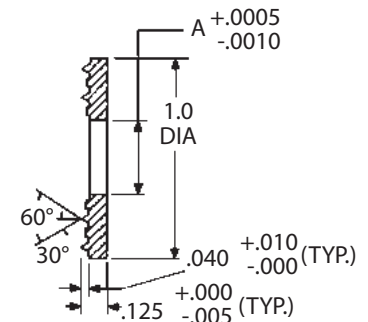


## INCH

PART NO.	BOLT DIA	A DIA
CL-3-KFW	#10	.1935
CL-4-KFW	1/4	.2500
CL-5-KFW	5/16	.3125
CL-6-KFW	3/8	.3750



64 TEETH, 16 EQUALLY SPACED ON EACH DIAMETER WITH ALTERNATE ROWS STAGGERED

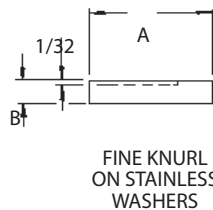
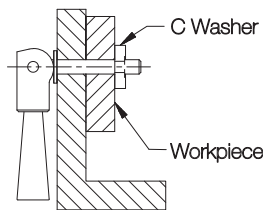
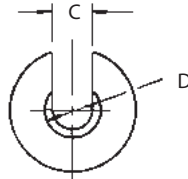


# C WASHERS

STEEL: 12L14, CARBURIZED-HARDENED, BLACK OXIDE FINISH  
STAINLESS STEEL: 300-SERIES



Washer that slides in and out of position for clear loading. Can be used with a nut, or by sliding it into a radial groove on a drawbar. Available in steel or stainless steel.

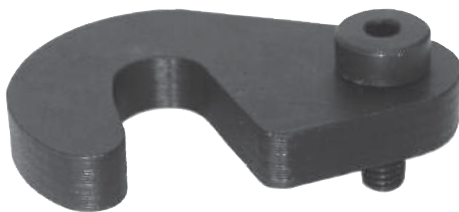


## INCH & METRIC

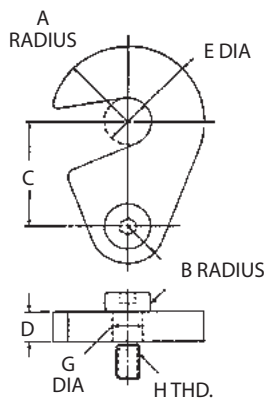
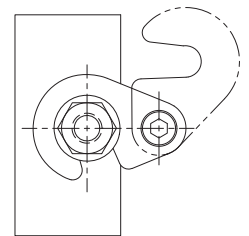
STEEL PART NO.	STAINLESS STEEL PART NO.	BOLT SIZE	A DIA	B	C	D DIA
CL-1-CW	—	#10 or M5	1/2	3/16	13/64	11/32
CL-3-CW	—	1/4 or M6	3/4	1/4	17/64	13/32
—	CL-155		7/8	3/16	9/32	25/64
CL-18-CW	—	5/16 or M8	1	1/4	17/64	13/32
CL-5-CW	—		1	3/16	21/64	1/2
—	CL-157	3/8 or M10	1-1/4	5/16	13/32	5/8
CL-6-CW	—		—	3/8		23/32
CL-7-CW	—		1-1/2	3/8	23/32	
CL-22-CW	—	1/2 or M12	1-3/4	1/4	17/32	29/32
CL-8-CW	—		1-7/8	3/8		
CL-24-CW	—	5/8 or M16	2-1/4	3/8	21/32	1-3/32
CL-9-CW	—		2-1/2	7/16		
CL-26-CW	—	3/4 or M18	2-1/2	7/16	25/32	1-9/32
CL-11-CW	—		2-1/2	7/16		
CL-12-CW	—	1 or M24	2-1/2	7/16	1-1/32	1-21/32
CL-15-CW	—		1/2	1/2		

# SWING C WASHERS

1018 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH



Permanently attached C washer that swings out of the way for clear loading. Can be reversed to swing into position either clockwise or counter-clockwise. Shoulder Screw furnished.



## INCH

PART NO.	STUD SIZE	A	B	C	D	E DIA	G DIA	H	SHOULDER SCREW (FURNISHED)
CL-1-SCW	3/8	3/4	3/8	1	1/4	13/32	3/8	5/16-18	CL-24-SS
CL-2-SCW	1/2	1	1/2	1-1/4	3/8	17/32			CL-2-SS
CL-3-SCW	5/8	1-1/8	9/16	1-1/2	3/8	21/32	1/2	3/8-16	CL-3-SS
CL-4-SCW	3/4	1-1/4	5/8	1-3/4	1/2	13/16			CL-4-SS

## METRIC

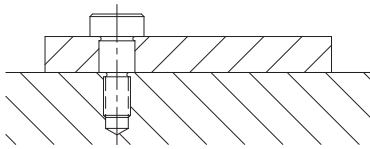
CLM-1-SCW	M10	3/4	3/8	1	.236	13/32	10mm	M8	CLM-1006-SS
CLM-2-SCW	M12	1	1/2	1-1/4	.375	17/32			CLM-1010-SS
CLM-3-SCW	M16	1-1/8	9/16	1-1/2	.375	21/32	13mm	M10	CLM-1310-SS
CLM-4-SCW	M20	1-1/4	5/8	1-3/4	.472	13/16			CLM-1312-SS

# SHOULDER SCREWS

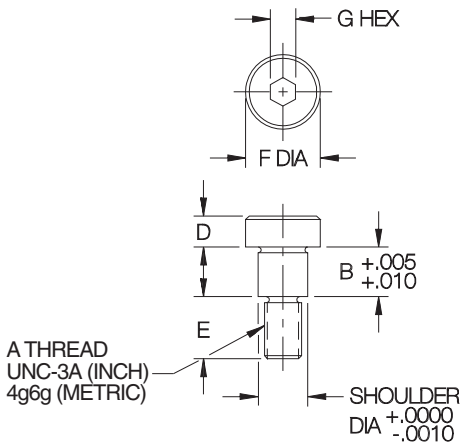
ALLOY STEEL, HEAT TREATED RC 32-43, BLACK OXIDE FINISH



Precision close-tolerance Shoulder Screw. Shoulder diameter is ground to a closer tolerance than ordinary stripper bolts for better bearing action. Shoulder length is held to a plus tolerance to allow a nominal-size plate to rotate freely underneath the head.



7



## INCH

PART NO.	SHOULDER DIA		A	B		D	E	F DIA	G
	NOMINAL	ACTUAL		NOMINAL	ACTUAL				
CL-5-SS	1/4	.2500	#10-24	1/4	.2500	3/16	3/8	3/8	1/8
CL-12-SS				3/8	.3750				
CL-13-SS				1/2	.500				
CL-37-SS				5/8	.6250				
CL-15-SS				3/4	.750				
CL-16-SS				1	1.0000				
CL-1-SS	5/16	.3125	1/4-20	1/4	.2500	7/32	7/16	7/16	5/32
CL-6-SS				5/16	.3125				
CL-11-SS				3/8	.3750				
CL-20-SS				1/2	.5000				
CL-21-SS				5/8	.6250				
CL-7-SS				3/4	.7500				
CL-8-SS	1	1.0000							
CL-24-SS	3/8	.3750	5-16-18	1/4	.2500	1/4	1/2	9/16	3/16
CL-2-SS				3/8	.3750				
CL-14-SS				1/2	.5000				
CL-9-SS				5/8	.6250				
CL-10-SS				3/4	.7500				
CL-47-SS				1	1.0000				
CL-3-SS	1/2	.5000	3/8-16	3/8	.3750	5/16	5/8	3/4	1/4
CL-4-SS				1/2	.5000				
CL-31-SS				5/8	.6250				
CL-32-SS				3/4	.7500				
CL-46-SS				1	1.0000				
CL-33-SS				1/2	.5000				
CL-34-SS	5/8	.6250	1/2-13	5/8	.6250	3/8	3/4	7/8	5/16
CL-35-SS				3/4	.7500				
CL-36-SS				1	1.0000				
CL-38-SS				1/2	.5000				
CL-39-SS	3/4	.7500	5/8-11	3/4	.7500	1/2	7/8	1	3/8
CL-40-SS				1	1.0000				

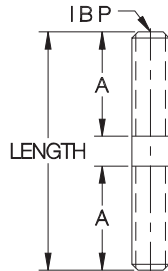
## METRIC

CLM-806-SS	8mm	.3150	M6	6mm	.2362	.22	.44	.51	4mm
CLM-808-SS				8mm	.3150				
CLM-810-SS				10mm	.3937				
CLM-812-SS				12mm	.4724				
CLM-816-SS				16mm	.6299				
CLM-820-SS				20mm	.7874				
CLM-1006-SS	10mm	.3937	M8	6mm	.2362	.28	.52	.63	5mm
CLM-1008-SS				8mm	.3150				
CLM-1010-SS				10mm	.3937				
CLM-1012-SS				12mm	.4724				
CLM-1016-SS				16mm	.6299				
CLM-1020-SS				20mm	.7874				
CLM-1310-SS	13mm	.5118	M10	10mm	.3937	.35	.65	.71	6mm
CLM-1312-SS				12mm	.4724				
CLM-1316-SS				16mm	.6299				
CLM-1320-SS				20mm	.7874				
CLM-1610-SS	16mm	.6299	M12	10mm	.3937	.43	.72	.94	8mm
CLM-1612-SS				12mm	.4724				
CLM-1616-SS				16mm	.6299				
CLM-1620-SS				20mm	.7874				
CLM-2016-SS	20mm	.7874	M16	16mm	.6299	.55	.88	1.18	10mm
CLM-2020-SS				20mm	.7874				
CLM-2025-SS				25mm	.9843				



# CLAMPING STUDS

STEEL: 1144 STEEL, 100,000 PSI MIN. YIELD, 115,000 PSI MIN. TENSILE, BLACK OXIDE FINISH  
STAINLESS STEEL: 300 SERIES



High-strength general-purpose Clamping Stud, for use with a T Nut, or for installation directly into a fixture plate. Available in thread sizes from 1/4-20 to 1"-8 (M6 to M20 in metric), each in a choice of several lengths. Now also available in stainless steel, in 3/8-16, 1/2-13, and 5/8-11 thread sizes (**INFO+**: for smaller stainless sizes, see Fixture Studs, page 272).

## STEEL (INCH)

PART NO.	THREAD SIZE	LENGTH	A	
CL-1/4-20X1.50-STUD	1/4-20	1.50	5/8	
CL-1/4-20X2.00-STUD		2.00	7/8	
CL-1/4-20X2.50-STUD		2.50	1	
CL-1/4-20X3.00-STUD		3.00		
CL-1/4-20X3.50-STUD		3.50		
CL-1/4-20X4.00-STUD		4.00		
CL-5/16-18X1.50-STUD	5/16-18	1.50	9/16	
CL-5/16-18X2.00-STUD		2.00	13/16	
CL-5/16-18X2.50-STUD		2.50	1-1/16	
CL-5/16-18X3.00-STUD		3.00	1-1/8	
CL-5/16-18X3.50-STUD		3.50		
CL-5/16-18X4.00-STUD		4.00		
CL-5/16-18X5.00-STUD	5.00			
CL-5/16-18X6.00-STUD	6.00	3/8-16		
CL-3/8-16X1.50-STUD	1.50		9/16	
CL-3/8-16X2.00-STUD	2.00		13/16	
CL-3/8-16X2.50-STUD	2.50		1-1/16	
CL-3/8-16X3.00-STUD	3.00		1-1/4	
CL-3/8-16X3.50-STUD	3.50			
CL-3/8-16X4.00-STUD	4.00			
CL-3/8-16X4.50-STUD	4.50			
CL-3/8-16X5.00-STUD	5.00		7/8-9	
CL-3/8-16X5.50-STUD	5.50			1-1/2
CL-3/8-16X6.00-STUD	6.00			
CL-3/8-16X6.50-STUD	6.50			
CL-3/8-16X7.00-STUD	7.00	2-1/4		
CL-3/8-16X7.50-STUD	7.50			
CL-3/8-16X8.00-STUD	8.00			
CL-1/2-13X2.00-STUD	1/2-13	2.00	3/4	
CL-1/2-13X2.50-STUD		2.50	1	
CL-1/2-13X3.00-STUD		3.00	1-1/4	
CL-1/2-13X3.50-STUD		3.50	1-1/2	
CL-1/2-13X4.00-STUD		4.00		
CL-1/2-13X4.50-STUD		4.50		
CL-1/2-13X5.00-STUD		5.00		
CL-1/2-13X5.50-STUD		5.50	2	
CL-1/2-13X6.00-STUD		6.00		
CL-1/2-13X6.50-STUD		6.50		
CL-1/2-13X7.00-STUD		7.00		
CL-1/2-13X7.50-STUD		7.50		
CL-1/2-13X8.00-STUD	8.00			
CL-1/2-13X9.00-STUD	9.00	1-1/4		
CL-1/2-13X10.00-STUD	10.00			
CL-1/2-13X12.00-STUD	12.00			

## STEEL (INCH) (Cont.)

PART NO.	THREAD SIZE	LENGTH	A
CL-5/8-11X2.50-STUD	5/8-11	2.50	15/16
CL-5/8-11X3.00-STUD		3.00	1-3/16
CL-5/8-11X3.50-STUD		3.50	1-7/16
CL-5/8-11X4.00-STUD		4.00	1-11/16
CL-5/8-11X4.50-STUD		4.50	1-3/4
CL-5/8-11X5.00-STUD		5.00	
CL-5/8-11X5.50-STUD		5.50	
CL-5/8-11X6.00-STUD		6.00	
CL-5/8-11X6.50-STUD		6.50	
CL-5/8-11X7.00-STUD		7.00	
CL-5/8-11X7.50-STUD		7.50	2
CL-5/8-11X8.00-STUD		8.00	
CL-5/8-11X9.00-STUD	9.00		
CL-5/8-11X10.00-STUD	10.00		
CL-5/8-11X10.00-STUD	12.00	3/4-10	
CL-5/8-11X12.00-STUD	14.00		
CL-3/4-10X3.00-STUD	3.00		1-1/8
CL-3/4-10X3.50-STUD	3.50		1-3/8
CL-3/4-10X4.00-STUD	4.00		1-5/8
CL-3/4-10X4.50-STUD	5.00		2
CL-3/4-10X6.00-STUD	6.00		
CL-3/4-10X7.00-STUD	7.00		
CL-3/4-10X8.00-STUD	8.00		
CL-3/4-10X9.00-STUD	9.00		
CL-3/4-10X10.00-STUD	10.00		
CL-3/4-10X12.00-STUD	12.00		7/8-9
CL-3/4-10X14.00-STUD	14.00		
CL-3/4-10X16.00-STUD	16.00		
CL-7/8-9X4.00-STUD	4.00	1-9/16	
CL-7/8-9X5.00-STUD	5.00	2-1/16	
CL-7/8-9X6.00-STUD	6.00	2-1/4	
CL-7/8-9X8.00-STUD	8.00		
CL-7/8-9X10.00-STUD	10.00		
CL-7/8-9X12.00-STUD	12.00		
CL-1-8X4.00-STUD	1"-8	4.00	1-1/2
CL-1-8X5.00-STUD		5.00	2
CL-1-8X6.00-STUD		6.00	2-1/2
CL-1-8X8.00-STUD		8.00	
CL-1-8X10.00-STUD		10.00	
CL-1-8X12.00-STUD		12.00	

## STAINLESS STEEL (INCH)

PART NO.	THREAD SIZE	LENGTH	A
CL-3/8-16X2.00-STUD-S	3/8-16	2.00	13/16
CL-3/8-16X2.50-STUD-S		2.50	1-1/16
CL-3/8-16X3.00-STUD-S		3.00	1-1/4
CL-3/8-16X3.50-STUD-S		3.50	
CL-3/8-16X4.00-STUD-S		4.00	
CL-3/8-16X4.50-STUD-S		4.50	
CL-3/8-16X5.00-STUD-S	5.00	2	
CL-3/8-16X6.00-STUD-S	6.00		

## STAINLESS STEEL (INCH) (Cont.)

PART NO.	THREAD SIZE	LENGTH	A	
CL-1/2-13X2.00-STUD-S	1/2-13	2.00	3/4	
CL-1/2-13X2.50-STUD-S		2.50	1	
CL-1/2-13X3.00-STUD-S		3.00	1-1/4	
CL-1/2-13X3.50-STUD-S		3.50	1-1/2	
CL-1/2-13X4.00-STUD-S		4.00		
CL-1/2-13X4.50-STUD-S		4.50		
CL-1/2-13X5.00-STUD-S		5.00		
CL-1/2-13X5.50-STUD-S		5.50		
CL-1/2-13X6.00-STUD-S		6.00		
CL-5/8-11X2.50-STUD-S		5/8-11	2.50	15/16
CL-5/8-11X3.00-STUD-S			3.00	1-3/16
CL-5/8-11X3.50-STUD-S			3.50	1-7/16
CL-5/8-11X4.00-STUD-S	4.00		1-11/16	
CL-5/8-11X4.50-STUD-S	4.50		1-3/4	
CL-5/8-11X5.00-STUD-S	5.00			
CL-5/8-11X6.00-STUD-S	6.00			

## STEEL (METRIC)

PART NO.	THREAD SIZE	LENGTH	A	
CLM-6X-35-STUD	M6	1.38 (35mm)	.59	
CLM-6X-50-STUD		1.97 (50mm)	.87	
CLM-6X-65-STUD		2.56 (65mm)	1.06	
CLM-6X-80-STUD		3.15 (80mm)		
CLM-6X-95-STUD		3.75 (95mm)		
CLM-6X-110-STUD		4.33 (110mm)		
CLM-8X-50-STUD	M8	1.97 (50mm)	.83	
CLM-8X-65-STUD		2.56 (65mm)	1.14	
CLM-8X-80-STUD		3.15 (80mm)	1.22	
CLM-8X-95-STUD		3.74 (95mm)		
CLM-8X-110-STUD	4.33 (110mm)	M10	1.38	
CLM-10X-50-STUD	1.97 (50mm)		.79	
CLM-10X-65-STUD	2.56 (65mm)		1.08	
CLM-10X-80-STUD	3.15 (80mm)		1.54	
CLM-10X-95-STUD	3.74 (95mm)			
CLM-10X-110-STUD	4.33 (110mm)			
CLM-10X-125-STUD	4.92 (125mm)			
CLM-10X-150-STUD	5.91 (150mm)			
CLM-10X-175-STUD	6.89 (175mm)			
CLM-10X-200-STUD	7.87 (200mm)	M12	1.54	
CLM-12X-65-STUD	2.56 (65mm)		1.04	
CLM-12X-80-STUD	3.15 (80mm)		1.34	
CLM-12X-95-STUD	3.74 (95mm)		1.85	
CLM-12X-110-STUD	4.33 (110mm)			
CLM-12X-125-STUD	4.92 (125mm)			
CLM-12X-150-STUD	5.91 (150mm)			
CLM-12X-175-STUD	6.89 (175mm)			
CLM-12X-200-STUD	7.87 (200mm)			
CLM-12X-250-STUD	9.84 (250mm)	M16	1.85	
CLM-12X-300-STUD	11.81 (300mm)			
CLM-16X-80-STUD	3.15 (80mm)		1.26	
CLM-16X-95-STUD	3.74 (95mm)		1.56	
CLM-16X-110-STUD	4.33 (110mm)		M20	1.85
CLM-16X-125-STUD	4.92 (125mm)			
CLM-16X-150-STUD	5.91 (150mm)			
CLM-16X-175-STUD	6.89 (175mm)			
CLM-16X-200-STUD	7.87 (200mm)			
CLM-16X-250-STUD	9.84 (250mm)			
CLM-20X-80-STUD	M20	3.15 (80mm)	1.18	
CLM-20X-95-STUD		3.74 (95mm)	1.48	
CLM-20X-110-STUD		4.33 (110mm)	1.77	
CLM-20X-125-STUD		4.92 (125mm)	2.07	
CLM-20X-150-STUD		5.91 (150mm)	2.17	
CLM-20X-175-STUD		6.89 (175mm)		
CLM-20X-200-STUD	7.87 (200mm)			

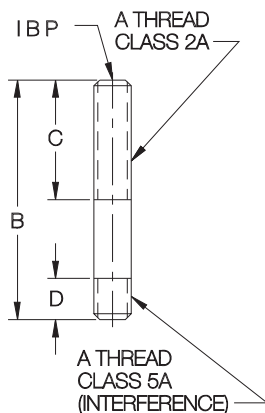
# FIXTURE STUDS

300-SERIES STAINLESS STEEL, PASSIVATED



**Stainless Steel**

Fixture Studs have a thread-locking interference thread at the bottom end to install permanently in a fixture plate. These small sizes are designed specifically for mini-size stainless clamp straps. Available in thread sizes from #10-24 to 3/8-16, each in a choice of several lengths.



**INCH**

PART NO.	A	B	C	D
CL-11310	#10-24	1	1/2	7/32
CL-11315		1-1/2	3/4	
CL-11320		2	3/4	
CL-11410	#10-32	1	1/2	7/32
CL-11415		1-1/2	3/4	
CL-11420		2	3/4	
CL-11515	1/4-20	1-1/2	5/8	9/32
CL-11520		2	3/4	
CL-11525		2-1/2	3/4	
CL-11530		3	1	
CL-11615	5/16-18	1-1/2	5/8	11/32
CL-11620		2	1	
CL-11625		2-1/2	1-1/4	
CL-11715	3/8-16	1-1/2	3/4	11/32
CL-11725		2-1/2	1-1/4	
CL-11730		3	1-3/8	
CL-11740		4	1-1/2	

# FULLY THREADED STUDS

316 STAINLESS STEEL, PASSIVATED

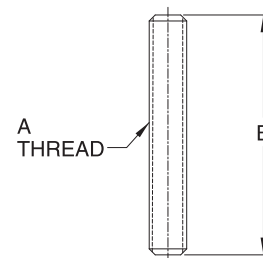


**Stainless Steel**

Fully Threaded Studs are ideal for making custom assemblies using thread-locking adhesive – including stud-type versions of any hand knob, and cushion spindles for Toggle Clamps. These studs are made of 316 stainless steel for excellent corrosion resistance. A thread-locking adhesive such as Loctite 263 is suitable for most applications. Available in thread sizes from #10-32 to 5/8-11 (M5 to M10 in metric), each in a choice of many lengths.

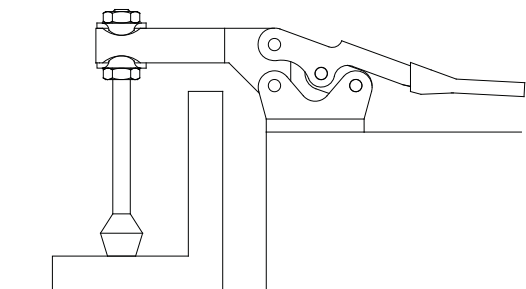
**INCH**

PART NO.	A THREAD SIZE	B OVERALL LENGTH
CL-10-32X1.00-FTS-S	#10-32	1.00
CL-10-32X1.25-FTS-S		1.25
CL-10-32X1.50-FTS-S		1.50
CL-10-32X1.75-FTS-S		1.75
CL-10-32X2.00-FTS-S		2.00
CL-10-32X2.50-FTS-S		2.50
CL-1/4-20X1.50-FTS-S	1/4-20	1.50
CL-1/4-20X1.75-FTS-S		1.75
CL-1/4-20X2.00-FTS-S		2.00
CL-1/4-20X2.50-FTS-S		2.50
CL-1/4-20X3.00-FTS-S		3.00
CL-1/4-20X3.50-FTS-S		3.50
CL-1/4-20X4.00-FTS-S	4.00	
CL-5/16-18X1.75-FTS-S	5/16-18	1.75
CL-5/16-18X2.00-FTS-S		2.00
CL-5/16-18X2.50-FTS-S		2.50
CL-5/16-18X3.00-FTS-S		3.00
CL-5/16-18X3.50-FTS-S		3.50
CL-5/16-18X4.00-FTS-S		4.00
CL-3/8-16X2.00-FTS-S	3/8-16	2.00
CL-3/8-16X2.50-FTS-S		2.50
CL-3/8-16X3.00-FTS-S		3.00
CL-3/8-16X3.50-FTS-S		3.50
CL-3/8-16X4.00-FTS-S		4.00
CL-3/8-16X5.00-FTS-S		5.00
CL-1/2-13X2.50-FTS-S	1/2-13	2.50
CL-1/2-13X3.00-FTS-S		3.00
CL-1/2-13X3.50-FTS-S		3.50
CL-1/2-13X4.00-FTS-S		4.00
CL-1/2-13X5.00-FTS-S		5.00
CL-1/2-13X6.00-FTS-S		6.00
CL-5/8-11X3.00-FTS-S	5/8-11	3.00
CL-5/8-11X4.00-FTS-S		4.00
CL-5/8-11X5.00-FTS-S		5.00
CL-5/8-11X6.00-FTS-S		6.00



**METRIC**

PART NO.	A THREAD SIZE	B OVERALL LENGTH
CLM-5X2.5-FTS-S	M5	.98 (25mm)
CLM-5X30-FTS-S		1.18 (30mm)
CLM-5X40-FTS-S		1.57 (40mm)
CLM-5X50-FTS-S		1.97 (50mm)
CLM-6X30-FTS-S	M6	1.18 (30mm)
CLM-6X40-FTS-S		1.58 (40mm)
CLM-6X50-FTS-S		1.97 (50mm)
CLM-6X60-FTS-S		2.36 (60mm)
CLM-6X70-FTS-S	M8	2.76 (70mm)
CLM-6X80-FTS-S		3.15 (80mm)
CLM-6X100-FTS-S		3.94 (100mm)
CLM-8X40-FTS-S		1.57 (40mm)
CLM-8X50-FTS-S	M8	1.97 (50mm)
CLM-8X60-FTS-S		2.36 (60mm)
CLM-8X70-FTS-S		2.76 (70mm)
CLM-8X80-FTS-S		3.15 (80mm)
CLM-8X100-FTS-S	M10	3.94 (100mm)
CLM-10X50-FTS-S		1.97 (50mm)
CLM-10X60-FTS-S		2.36 (60mm)
CLM-10X70-FTS-S		2.76 (70mm)
CLM-10X80-FTS-S	M10	3.15 (80mm)
CLM-10X100-FTS-S		3.94 (100mm)



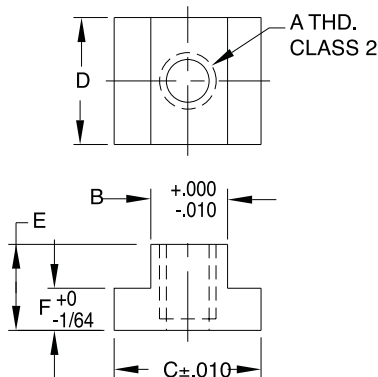
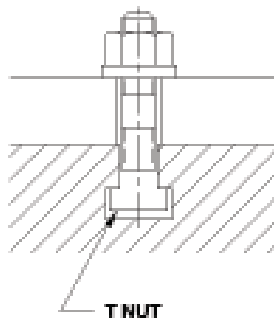
Fully Threaded Studs can be used with Polyurethane Flat Cushions to make custom Toggle Clamp spindles.

# T NUTS

STEEL: MILD STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH  
 STAINLESS: 300-SERIES STAINLESS STEEL, PASSIVATED



Sizes for all standard machine tables. Safety-stop feature prevents breaking the machine-table slot. Threads stop one short of going through T Nut to prevent a stud from jacking the nut out of the table.



## STEEL (INCH)

PART NO.	TABLE SLOT SIZE	A	B	C	D	E	F	
CL-26-TN	5/16 or 8mm	1/4-20	.307	9/16	9/16	1/4	3/16	
CL-18-TN	3/8 or 10mm	1/4-20	.370	5/8	7/8	7/16	7/32	
CL-19-TN		5/16-18						
CL-20-TN	7/16	5/16-18	.432	11/16	7/8	1/2		
CL-00-TN		3/8-16						
CL-12-TN	12mm	3/8-16	.467	3/4	3/4	1/2	17/64	
CL-21-TN	1/2	5/16-18	.495	7/8	7/8	1/2	9/32	
CL-0-TN		3/8-16						
CL-1-TN	9/16 or 14mm	3/8-16	.550		7/8	7/8	1/2	5/16
CL-9-TN		1/2-13						
CL-16-TN	5/8 or 16mm	3/8-16	.620	1	1-1/8	5/8	11/32	
CL-2-TN		1/2-13						
CL-3-TN	11/16 or 18mm	1/2-13	.682	1-1/8	1-1/4	3/4	7/16	
CL-10-TN		5/8-11						
CL-10A-TN		5/8-11	.675		1-1/2	1-1/8	15/32	
CL-17-TN		1/2-13	.745		1-1/4	1-1/4	3/4	15/32
CL-4-TN	5/8-11							
CL-14-TN	20mm	5/8-11	.782	7/8		1	9/16	
CL-5-TN	13/16	5/8-11	.807					1-1/4
CL-11-TN	3/4-10	3/4-10						
CL-15-TN	22mm	3/4-10	.861	1-1/4	1-1/2	1	1/2	
CL-6-TN	7/8	3/4-10	.870	1-1/2				
CL-7-TN	1	3/4-10	.995	1-5/8	1-3/4	1	5/8	
CL-22-TN		7/8-9						
CL-8-TN	1-1/16	3/4-10	1.057		2	1-1/8	11/16	
CL-23-TN		7/8-9						
CL-24-TN	1-1/8	7/8-9	1.120	1-3/4	2	1-1/2	3/4	
CL-25-TN		1"-8						

## STAINLESS STEEL (INCH)

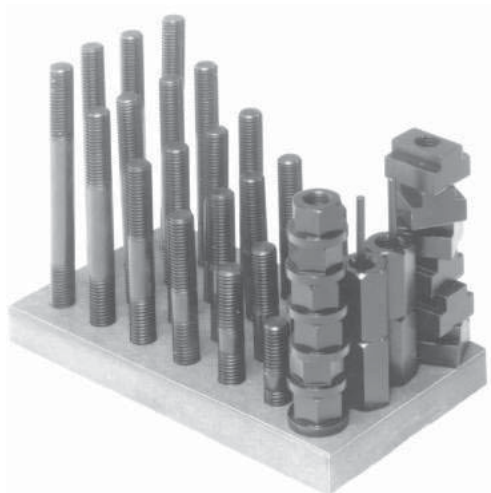
PART NO.	TABLE SLOT SIZE	A	B	C	D	E	F
CL-00-STN	7/16	3/8-16	.432	11/16	7/8	1/2	7/32
CL-0-STN	1/2		.495	7/8	7/8	1/2	9/32
CL-1-STN	9/16 or 14mm	3/8-16	.550	7/8	7/8	1/2	5/16
CL-9-STN		1/2-13					
CL-2-STN	5/8 or 16mm	1/2-13	.620	1	1-1/8	5/8	11/32
CL-3-STN	11/16 or 18mm	1/2-13	.682	1-1/8	1-1/4	3/4	7/16
CL-10-STN		5/8-11					

## STEEL (METRIC)

PART NO.	TABLE SLOT SIZE	A	B	C	D	E	F
CLM-26-TN	5/16 or 8mm	M6	.307	9/16	9/16	1/4	3/16
CLM-18-TN	3/8 or 10mm	M6	.370	5/8	7/8	7/16	7/32
CLM-19-TN		M8					
CLM-00-TN	12mm	M10	.467	3/4	3/4	1/2	17/64
CLM-0-TN	1/2	M10	.495	7/8	7/8	1/2	9/32
CLM-1-TN	9/16 or 14mm	M10	.546	7/8	7/8	5/8	5/16
CLM-9-TN		M12					
CLM-2-TN	5/8 or 16mm	M12	.620	1	1-1/8	5/8	11/32
CLM-3-TN	11/16 or 18mm	M12	.682	1-1/8	1-1/4	3/4	7/16
CLM-10-TN		M16					
CLM-4-TN	20mm	M16	.782	1-1/4	1-1/4	7/8	15/32
CLM-5-TN	13/16	M16	.807				
CLM-6-TN	22mm	M20	.861	1-1/4	1-1/2	1	1/2

# T NUT & STUD SETS

INFO+: SEE PAGES 230, 274, AND 240 FOR MATERIAL SPECIFICATIONS



## INCH

PART NO.	TABLE SLOT SIZE	STUDS (24)	T NUTS (6)	FLANGE NUTS (6)	COUPLING NUTS (4)	HOLDER (1)
CL-1-TNS	7/16	3/8-16	CL-00-TN	CL-2-FN	CL-1-CN	CL-1-TNH
CL-14-TNS	12mm		CL-12-TN			
CL-2-TNS	1/2		CL-0-TN			
CL-3-TNS	9/16 or 14mm	3/8-16	CL-1-TN	CL-2-FN	CL-1-CN	CL-1-TNH
CL-4-TNS		1/2-13	CL-9-TN	CL-3-FN	CL-2-CN	CL-2-TNH
CL-17-TNS	5/8 or 16mm	3/8-16	CL-16-TN	CL-2-FN	CL-1-CN	CL-1-TNH
CL-5-TNS		1/2-13	CL-2-TN	CL-3-FN	CL-2-CN	CL-2-TNH
CL-6-TNS	11/16 or 18mm	1/2-13	CL-3-TN	CL-3-FN	CL-2-CN	CL-2-TNH
CL-7-TNS		5/8-11	CL-10-TN	CL-4-FN	CL-3-CN	CL-3-TNH
CL-18-TNS	3/4	1/2-13	CL-17-TN	CL-3-FN	CL-2-CN	CL-2-TNH
CL-8-TNS		5/8-11	CL-4-TN	CL-4-FN	CL-3-CN	CL-3-TNH
CL-15-TNS	20mm	3/4-10	CL-14-TN	CL-5-FN	CL-4-CN	CL-4-TNH
CL-9-TNS	13/16		CL-5-TN			
CL-10-TNS	3/4-10		CL-11-TN			
CL-16-TNS	22mm	3/4-10	CL-15-TN	CL-5-FN	CL-4-CN	CL-4-TNH
CL-11-TNS	7/8		CL-6-TN			
CL-12-TNS	1		CL-7-TN			
CL-13-TNS	1-1/16		CL-8-TN			

38-piece set includes a complete range of stud lengths with matching T Nuts, Flange Nuts, and Coupling Nuts — all mounted in a handy wooden holder.

Set includes:

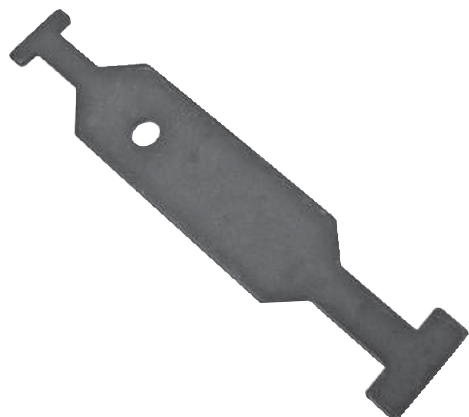
- (4) Studs of each length 3", 4", 5", 6", 7", 8", or 80, 95, 125, 150, 175, 200mm
- (6) T Nuts
- (6) Flange Nuts
- (4) Coupling Nuts
- (1) Handy Holder

## METRIC

PART NO.	TABLE SLOT SIZE	STUDS	T NUTS	FLANGE NUTS	COUPLING NUTS	HOLDER
CLM-1-TNS	12mm	M10	CLM-00-TN	CLM-10-FN	CLM-10-CN	CL-1-TNH
CLM-2-TNS	1/2		CLM-0-TN			
CLM-3-TNS	9/16 or 14mm	M10	CLM-1-TN	CLM-10-FN	CLM-10-CN	CL-1-TNH
CLM-4-TNS		M12	CLM-9-TN	CLM-12-FN	CLM-12-CN	CL-2-TNH
CLM-5-TNS	5/8 or 16mm	M12	CLM-2-TN	CLM-12-FN	CLM-12-CN	CL-2-TNH
CLM-6-TNS	11/16 or 18mm	M12	CLM-3-TN	CLM-12-FN	CLM-12-CN	CL-2-TNH
CLM-7-TNS		M16	CLM-10-TN	CLM-16-FN	CLM-16-CN	CL-3-TNH
CLM-8-TNS	20mm	M16	CLM-4-TN	CLM-16-FN	CLM-16-CN	CL-3-TNH
CLM-9-TNS	13/16		CLM-5-TN			
CLM-11-TNS	22mm		CLM-6-TN			

# T-SLOT CLEANERS

MILD STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH

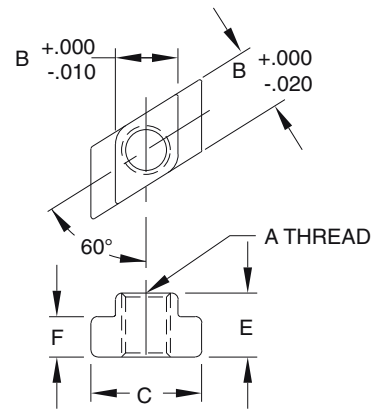
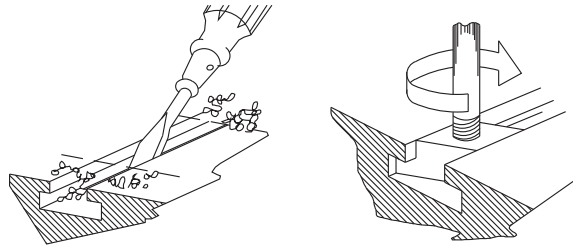
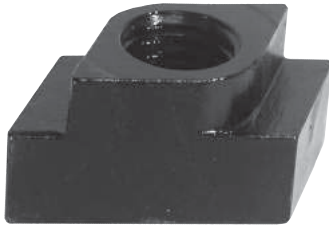


This handy tool is ideal for cleaning chips and debris out of machine-table T Slots. Much safer than blowing chips out with air. Made of heat treated steel, a full .109" thick. Use for any T Slot 3/8" (10mm) and above. One end is sized for smaller T Slots, while the other end is sized for larger T Slots.

PART NO.	OVERALL LENGTH	THICKNESS
CL-1-TSCL	6	.109

# ROTARY T NUTS

ALLOY STEEL, RC 40-45, BLACK OXIDE FINISH



Rotary T Nuts can be inserted into the top of a T slot, unlike normal T Nuts, which must be inserted at the end of the slot. This allows adding T Nuts and Studs anywhere for a new setup, without tearing down any existing setups. Make sure that the area where the Rotary T Nut will be inserted is clear of debris, to allow the T Nut to rotate a full 60 degrees. Same safety-stop thread feature as standard T Nuts.

## INCH

PART NO.	TABLE SLOT SIZE	A	B	C	E	F
CL-0-RTN	1/2	3/8-16	.495	7/8	1/2	9/32
CL-9-RTN	9/16	1/2-13	.560	7/8	5/8	11/32
CL-2-RTN	5/8 or 16mm	1/2-13	.620	1	5/8	11/32
CL-3-RTN	11/16 or 18mm	1/2-13	.682	1-1/8	3/4	7/16
CL-10-RTN		5/8-11				
CL-4-RTN	3/4 or 20mm	5/8-11	.745	1-1/4	3/4	15/32
CL-7-RTN	1	3/4-10	.995	1-5/8	1	5/8

## METRIC

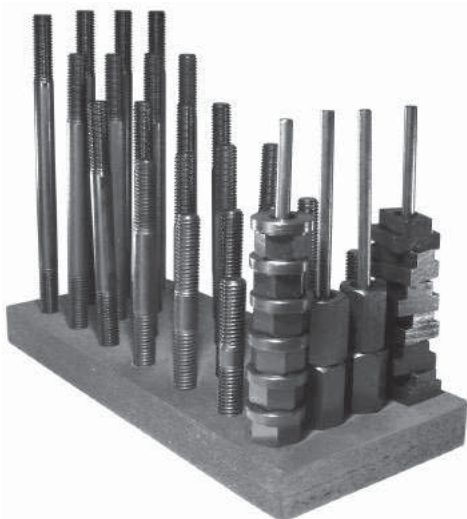
CLM-0-RTN	1/2	M10	.495	7/8	1/2	9/32
CLM-9-RTN	9/16 or 14mm	M12	.550	7/8	5/8	11/32
CLM-2-RTN	5/8 or 16mm	M12	.620	1	5/8	11/32
CLM-3-RTN	11/16 or 18mm	M12	.682	1-1/8	3/4	7/16
CLM-10-RTN		M16				
CLM-4-RTN	3/4 or 20mm	M16	.745	1-1/4	3/4	15/32

# ROTARY T NUT AND STUD SETS

INFO+: SEE PAGES 266, 271 AND 275 FOR MATERIAL SPECIFICATIONS

38-piece set includes a complete range of stud lengths with matching T Nuts, Flange Nuts, and Coupling Nuts — all mounted in a handy wooden holder. Set includes:

- (4) Studs of each length 3", 4", 5", 6", 7" and 8" (80, 95, 125, 150, 175, and 200mm in metric)
- (6) Rotary T Nuts
- (6) Flange Nuts
- (4) Coupling Nuts



## INCH

PART NO.	TABLE SLOT SIZE	STUDS (24)	ROTARY T NUTS (6)	FLANGE NUTS (6)	COUPLING NUTS (4)	HOLDER (1)
CL-2-RTNS	1/2	3/8-16	CL-0-RTN	CL-2-FN	CL-1-CN	CL-1-TNH
CL-4-RTNS	9/16 or 14mm	1/2-13	CL-9-RTN	CL-3-FN	CL-2-CN	CL-2-TNH
CL-5-RTNS	5/8 or 16mm	1/2-13	CL-2-RTN	CL-3-FN	CL-2-CN	CL-2-TNH
CL-6-RTNS	11/16 or 18mm	1/2-13	CL-3-RTN	CL-3-FN	CL-2-CN	CL-2-TNH
CL-7-RTNS		5/8-11	CL-10-RTN	CL-4-FN	CL-3-CN	CL-3-TNH
CL-8-RTNS	3/4 or 20mm	5/8-11	CL-4-RTN	CL-4-FN	CL-3-CN	CL-3-TNH
CL-12-RTNS	1	3/4-10	CL-7-RTN	CL-5-FN	CL-4-CN	CL-4-TNH

## METRIC

CLM-2-RTNS	1/2	M10	CLM-0-RTN	CLM-10-FN	CLM-10-CN	CL-1-TNH
CLM-4-RTNS	9/16 or 14mm	M12	CLM-9-RTN	CLM-12-FN	CLM-12-CN	CL-2-TNH
CLM-5-RTNS	5/8 or 16mm	M12	CLM-2-RTN	CLM-12-FN	CLM-12-CN	CL-2-TNH
CLM-6-RTNS	11/16 or 18mm	M12	CLM-3-RTN	CLM-12-FN	CLM-12-CN	CL-2-TNH
CLM-7-RTNS		M16	CLM-10-RTN	CLM-16-FN	CLM-16-CN	CL-3-TNH
CLM-8-RTNS	3/4 or 20mm	M16	CLM-4-RTN	CLM-16-FN	CLM-16-CN	CL-3-TNH

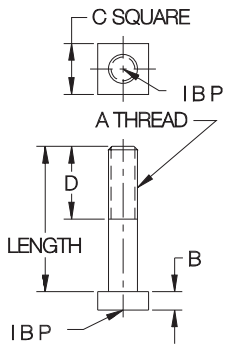
# T BOLTS

STEEL: 4140/5140, HEAT TREATED, 125,000 PSI MIN. TENSILE STRENGTH, BLACK OXIDE FINISH  
 STAINLESS STEEL: 302 STAINLESS



High-strength alloy steel clamping bolts for use in T slots. Available in larger thread sizes from 1/2-13 to 1"-8 (M10 to M20 in metric), each in a choice of several lengths, in steel or stainless steel.

7



## INCH

PART NO.		A	B	C	D	LENGTH
STEEL	STAINLESS					
CL-0-TB-1.50	CL-0-TB-1.50-S	3/8-16	1/4	11/16	1-1/4	1.50
CL-0-TB-2.00	CL-0-TB-2.00-S				1-3/4	2.00
CL-0-TB-2.50	CL-0-TB-2.50-S				2	2.50
CL-0-TB-3.00	CL-0-TB-3.00-S					3.00
CL-0-TB-3.50	—					3.50
CL-0-TB-4.00	—					4.00
CL-0-TB-5.00	—					5.00
CL-0-TB-6.00	—				6.00	
CL-1-TB-1.50	CL-1-TB-1.50-S	1/2-13	5/16	7/8	1-1/4	1.50
CL-1-TB-2.00	CL-1-TB-2.00-S				1-3/4	2.00
CL-1-TB-2.50	CL-1-TB-2.50-S				2	2.50
CL-1-TB-3.00	CL-1-TB-3.00-S					3.00
CL-1-TB-3.50	CL-1-TB-3.50-S					3.50
CL-1-TB-4.00	CL-1-TB-4.00-S					4.00
CL-1-TB-5.00	CL-1-TB-5.00-S					5.00
CL-1-TB-6.00	CL-1-TB-6.00-S				2-1/2	6.00
CL-1-TB-8.00	CL-1-TB-8.00-S					8.00
CL-2-TB-1.50	—				5/8-11	13/32
CL-2-TB-2.00	—	1-3/4	2.00			
CL-2-TB-2.50	—	2	2.50			
CL-2-TB-3.00	—		3.00			
CL-2-TB-3.50	—		3.50			
CL-2-TB-4.00	CL-2-TB-4.00-S		4.00			
CL-2-TB-5.00	CL-2-TB-5.00-S		5.00			
CL-2-TB-6.00	CL-2-TB-6.00-S	2-1/2	6.00			
CL-2-TB-8.00	CL-2-TB-8.00-S		8.00			
CL-3-TB-2.00	—	3/4-10	17/32	1-5/16		
CL-3-TB-3.00	—				2	3.00
CL-3-TB-4.00	—					4.00
CL-3-TB-5.00	CL-3-TB-5.00-S					5.00
CL-3-TB-6.00	CL-3-TB-6.00-S				2-1/2	6.00
CL-3-TB-7.00	—					7.00
CL-3-TB-8.00	CL-3-TB-8.00-S				8.00	
CL-5-TB-4.00	—				1"-8	11/16
CL-5-TB-5.00	—	4	5.00			
CL-5-TB-6.00	—		6.00			
CL-5-TB-7.00	—		7.00			
CL-5-TB-8.00	—		8.00			

## METRIC

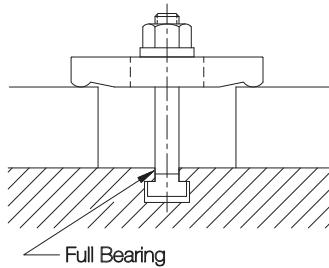
CLM-10-TB-40	—	M10	.25	.69	1.18	1.57 (40mm)
CLM-10-TB-50	—				1.77	1.97 (50mm)
CLM-10-TB-75	—				1.97	2.95 (75mm)
CLM-10-TB-100	—					3.94 (100mm)
CLM-12-TB-50	—	M12	.31	.87	1.77	1.97 (50mm)
CLM-12-TB-65	—				1.97	2.56 (65mm)
CLM-12-TB-75	—					2.95 (75mm)
CLM-12-TB-90	—					3.54 (90mm)
CLM-12-TB-100	—					3.94 (100mm)
CLM-12-TB-125	—				4.92 (125mm)	
CLM-16-TB-50	—	M16	.39	1.10	1.77	1.97 (50mm)
CLM-16-TB-75	—				1.97	2.95 (75mm)
CLM-16-TB-100	—					3.94 (100mm)
CLM-16-TB-150	—				2.56	5.91 (150mm)
CLM-20-TB-50	—	M20	.53	1.30	1.77	1.97 (50mm)
CLM-20-TB-75	—				1.97	2.95 (75mm)
CLM-20-TB-100	—					3.94 (100mm)

# T-SLOT BOLTS

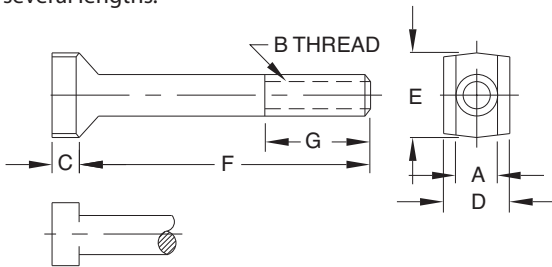
FORGED 1045 STEEL, BLACK OXIDE FINISH



**T-Slot Bolt**

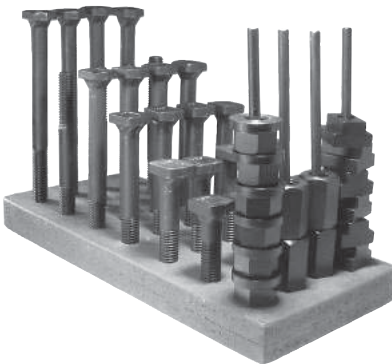


High-strength bolt for T-slotted machine tables. Full bearing surfaces prevent twisting or jamming in table slots. Available in thread sizes from 3/8-16 to 3/4-10, each in a choice of several lengths.



## T-SLOT BOLTS (INCH)

PART NO.	B THREAD	A	FITS TABLE SLOTS	C	D	E	F LENGTH	G
CL-6-TSB-1.00	3/8-16	3/8	3/8 7/16 1/2 10mm 12mm	3/16	5/8	13/16	1.00	.62
CL-6-TSB-1.50							1.50	1.00
CL-6-TSB-2.00							2.00	1.25
CL-6-TSB-2.50							2.50	1.50
CL-6-TSB-3.00							3.00	
CL-6-TSB-3.50							3.50	
CL-6-TSB-4.00	4.00							
CL-8-TSB-1.50	1/2-13	1/2	1/2 9/16 5/8 14mm 16mm	1/4	13/16	15/16	1.50	1.00
CL-8-TSB-2.00							2.00	1.25
CL-8-TSB-2.50							2.50	1.50
CL-8-TSB-3.00							3.00	
CL-8-TSB-3.50							3.50	
CL-8-TSB-4.00							4.00	
CL-8-TSB-5.00	5.00	2.00						
CL-8-TSB-6.00	6.00							
CL-10-TSB-1.50	5/8-11	5/8	5/8 11/16 3/4 18mm 20mm	5/16	1-1/32	1-3/16	1.50	1.00
CL-10-TSB-2.00							2.00	1.25
CL-10-TSB-2.50							2.50	1.50
CL-10-TSB-3.00							3.00	
CL-10-TSB-3.50							3.50	
CL-10-TSB-4.00							4.00	
CL-10-TSB-5.00	5.00	2.00						
CL-10-TSB-6.00	6.00							
CL-10-TSB-8.00	8.00	3.00						
CL-12-TSB-3.00	3/4-10	3/4	3/4 13/16 20mm 22mm	3/8	1-1/4	1-7/16	3.00	1.50
CL-12-TSB-3.50							3.50	
CL-12-TSB-4.00							4.00	
CL-12-TSB-5.00							5.00	
CL-12-TSB-6.00							6.00	2.00
CL-12-TSB-8.00							8.00	3.00



**T-Slot Bolt Kit**

34-piece set includes a complete range of T-Slot Bolt lengths, with matching extension Studs, Flange Nuts, and Coupling Nuts. Set includes:

- (4) T-Slot Bolts in each of five different lengths
- (4) Studs
- (6) Flange Nuts
- (4) Coupling Nuts
- (1) Handy Holder

## T-SLOT BOLT KITS (INCH)

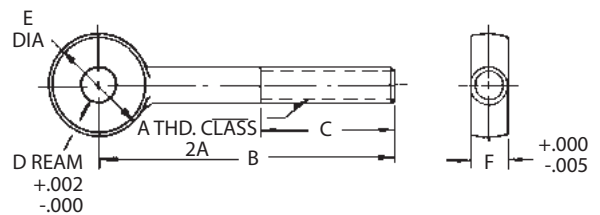
PART NO.	FITS TABLE SIZES	T-SLOT BOLTS (4 EACH)	STUDS (4)	FLANGE NUTS (6)	COUPLING NUTS (4)	HOLDER (1)
CL-6-TSBK	3/8, 7/16, 1/2 10mm, 12mm	CL-6-TSB-1.50 CL-6-TSB-2.00 CL-6-TSB-2.50 CL-6-TSB-3.00 CL-6-TSB-4.00	CL-3/8-16X4.00-STUD	CL-2-FN	CL-1-CN	CL-1-TNH
CL-8-TSBK	1/2, 9/16, 5/8 14mm, 16mm	CL-8-TSB-2.00 CL-8-TSB-3.00 CL-8-TSB-4.00 CL-8-TSB-5.00 CL-8-TSB-6.00	CL-1/2-13X5.00-STUD	CL-3-FN	CL-2-CN	CL-2-TNH
CL-10-TSBK	5/8, 11/16, 3/4 16mm, 18mm	CL-10-TSB-3.00 CL-10-TSB-4.00 CL-10-TSB-5.00 CL-10-TSB-6.00 CL-10-TSB-8.00	CL-5/8-11X6.00-STUD	CL-4-FN	CL-3-CN	CL-3-TNH
CL-12-TSBK	3/4, 13/16 20mm, 22mm	CL-12-TSB-3.00 CL-12-TSB-4.00 CL-12-TSB-5.00 CL-12-TSB-6.00 CL-12-TSB-8.00	CL-3/4-10X7.00-STUD	CL-5-FN	CL-4-CN	CL-4-TNH

# EYE BOLTS

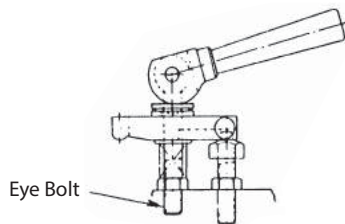
STEEL: 1144, 115,000 PSI MIN. TENSILE STRENGTH, 100,000 PSI MIN. YIELD STRENGTH, BLACK OXIDE FINISH  
 STAINLESS STEEL: 300 SERIES



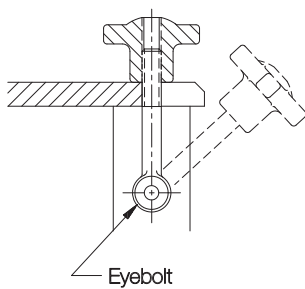
High-strength Eye Bolt with a reamed bearing hole. High-carbon steel, fully machined from solid barstock. Also available in stainless steel. Available in other lengths and materials as a special.



7



Eye Bolt



Eyebolt

## INCH

PART NO. STEEL	PART NO. STAINLESS STEEL	A	D DIA		B	C	E	F	
			NOMINAL	ACTUAL				NOMINAL	ACTUAL
CL-25-EB	CL-25-EB-S	1/4-20	3/16	.188	2	3/4	1/2	1/4	.250
CL-26-EB	CL-26-EB-S				3	1-1/4			
CL-31-EB	CL-31-EB-S	5/16-18	1/4	.250	3	1-1/2	5/8	5/16	.312
CL-32-EB	—				4	2			
CL-38-EB	—	3/8-16	5/16	.312	3	1-1/2	3/4	3/8	.375
CL-40-EB	CL-40-EB-S				3	1-1/2			
CL-37-EB	—				3-3/4	2			
CL-39-EB	CL-39-EB-S				5	2-1/2			
CL-50-EB	CL-50-EB-S	1/2-13	3/8	.375	3-3/4	1-1/2	1	1/2	.500
CL-51-EB	CL-51-EB-S				5	2			
CL-62-EB	CL-62-EB-S	5/8-11	5/8	.625	4-1/2	2	1-1/4	5/8	.625
CL-63-EB	CL-63-EB-S				6	2-1/2			
CL-75-EB	—	3/4-10	5/8	.625	6	2-1/2	1-1/2	3/4	.750
CL-76-EB	—				3/4	.750			

## METRIC

CLM-25A-EB	CLM-25A-EB-S	M6	6mm	.236	1.97	.79	.47	6mm	.236
CLM-26A-EB	—				2.95	1.18			
CLM-31A-EB	CLM-31A-EB-S	M8	8mm	.315	2.95	1.57	.63	8mm	.315
CLM-32A-EB	—				3.94	1.97			
CLM-40-EB	CLM-40-EB-S	M10	10mm	.394	2.95	1.57	.79	10mm	.394
CLM-37-EB	CLM-37-EB-S				3.94	1.97			
CLM-39-EB	—				4.92	2.56			
CLM-50A-EB	CLM-50A-EB-S				3.94	1.57			
CLM-51A-EB	CLM-51A-EB-S	M12	12mm	.472	4.92	1.97	.94	12mm	.472
CLM-62-EB	CLM-62-EB-S				4.53	1.97			
CLM-63-EB	CLM-63-EB-S	M16	16mm	.630	5.91	2.56	1.26	16mm	.630
CLM-76A-EB	—				5.91	2.56			
CLM-76A-EB	—	M20	20mm	.787	5.91	2.56	1.57	20mm	.787

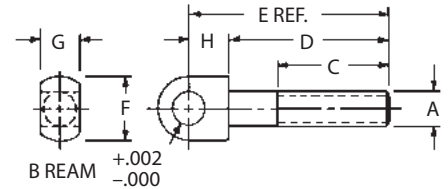


# SWING BOLTS

STEEL: 1144, 115,000 PSI MIN. TENSILE STRENGTH, 100,000 PSI MIN. YIELD STRENGTH, BLACK OXIDE FINISH

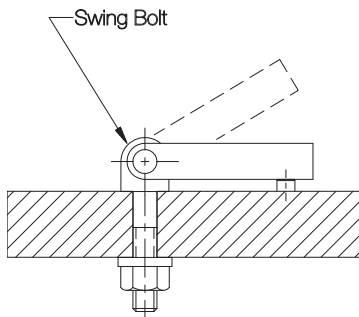


Shoulder-type Eye Bolt that can be used as a stationary hinge point. Reamed hole for smooth bearing.



## INCH

PART NO.	A	B DIA		C	D	E	F DIA	G		H
		NOMINAL	ACTUAL					NOMINAL	ACTUAL	
CL-00-SB	1/4-20	1/4	.250	3/4	1-3/16	1-1/2	1/2	5/16	.312	5/16
CL-0-SB	5/16-18	5/16	.312	1	1-5/8	2	5/8	3/8	.375	3/8
CL-1-SB	3/8-16	3/8	.375	1-3/8	2	2-1/2	3/4	1/2	.500	1/2
CL-2-SB	1/2-13	1/2	.500	1-3/4	2-1/2	3-1/8	1	5/8	.625	5/8
CL-2A-SB				2-1/4	3-1/2	4-1/8				
CL-3-SB	5/8-11	5/8	.625	1-3/4	2-3/4	3-1/2	1-1/4	3/4	.750	3/4
CL-3A-SB				2-1/2	4	4-3/4				

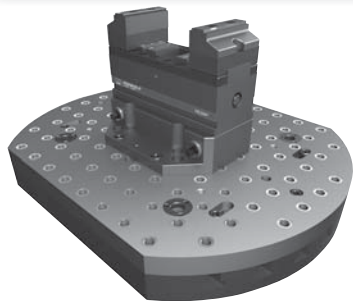


## METRIC

CLM-00-SB	M6	6mm	.236	.79	1.18	1.57	.47	8mm	.315	
CLM-0-SB	M8	8mm	.315	.98	1.57	1.96	.63	10mm	.394	.39
CLM-1-SB	M10	10mm	.394	1.38	1.97	2.56	.79	12mm	.472	.59
CLM-2B-SB	M12	12mm	.472	1.77	2.56	3.15	.94	14mm	.551	.59
CLM-2C-SB				2.17	3.54	4.13				
CLM-3-SB	M16	16mm	.630	1.77	2.76	3.55	1.26	18mm	.709	.79
CLM-3A-SB				2.56	3.94	4.73				



## 5-Axis Workholding



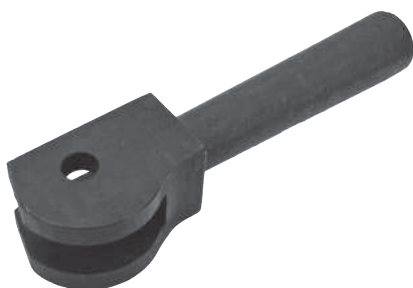
### Quick-Change With No Adaptor Plates, Blocks Or Pallets Necessary

- Quintus fixture plates available as blank, or with multi-function holes
- German-built, extremely accurate precision vises
- Allows unrestricted tool access for multiple-side machining
- Numerous jaw types and sizes available

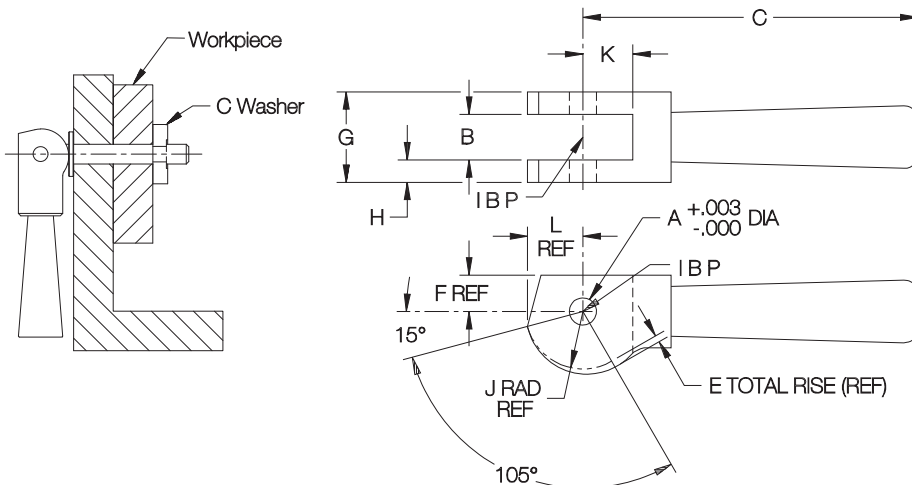
**SEE PAGES 321-342**

# DOUBLE CAMS

1020 STEEL, CARBURIZED-HARDENED BLACK OXIDE FINISH



Straddle-type cam handle that can be used with an Eyebolt or custom-made drawbar. Continuous-rise spiral cam locks securely in any position. Available in six inch and five metric sizes.



## INCH

PART NO.	MATCHING EYEBOLT SIZE	A DIA		B		C	E	F	G	H	J	K	L	CLEVIS PIN REQD
		NOMINAL	ACTUAL	NOMINAL	ACTUAL									
CL-610-CLVP	1/4-20	3/16	.188	1/4	.266	2-17/32	.046	1/4	5/8	3/16	.40	.33	.38	CL-610-CLVP
CL-810-CLVP	5/16-18	1/4	.250	5/16	.328					5/32				CL-810-CLVP
CL-1014-CLVP	3/8-16	5/16	.313	3/8	.390	3-13/16	.062	5/16	7/8	1/4	.52	.54	.50	CL-1014-CLVP
CL-1218-CLVP	1/2-13	3/8	.376	1/2	.516	4-5/8	.094	1/2	1-1/8	5/16	.79	.69	.76	CL-1218-CLVP
CL-2020-CLVP	5/8-11	5/8	.626	5/8	.641	4-15/16	.109	9/16	1-1/4		.92	.85	.89	CL-2020-CLVP
CL-2024-CLVP	3/4-10	5/8	.626	3/4	.766	5-1/8	.141	5/8	1-1/2	3/8	1.19	1.00	1.15	CL-2024-CLVP

## METRIC

CLM-11-CH	M6	6mm	.237	6mm	.266	2-17/32	.046	1/4	5/8	3/16	.40	.33	.38	CLM-616-CLVP
CLM-12-CH	M10	10mm	.395	10mm	.409	3-13/16	.062	5/16	7/8	1/4	.52	.54	.50	CLM-1023-CLVP
CLM-13-CH	M12	12mm	.473	12mm	.516	4-5/8	.094	1/2	1-1/8	5/16	.79	.69	.76	CLM-1229-CLVP
CLM-14-CH	M16	16mm	.631	16mm	.641	4-15/16	.109	9/16	1-1/4		.92	.85	.89	CLM-1632-CLVP
CLM-15-CH	M20	20mm	.788	20mm	.803	5-1/8	.141	5/8	1-1/2	3/8	1.19	1.00	1.15	CLM-2038-CLVP

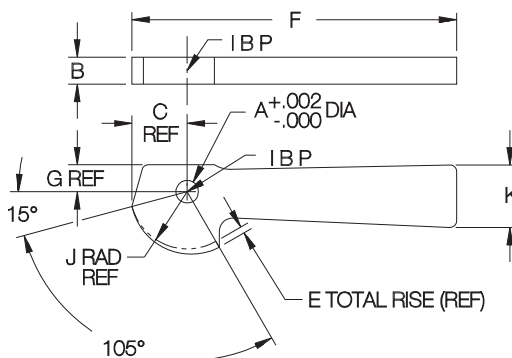
Double Cams are used with Eyebolts on Slotted-Heel Clamp Assemblies. **INFO+:** See page 221.

# SINGLE CAMS

1020 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH



Simple cam handle that mounts in a slot, or against a flat surface. Continuous-rise spiral cam locks securely in any position. Available in five sizes.



PART NO.	A DIA	B	C	E	F	G	J	K	CLEVIS PIN REQD
CL-1-CH	5/32	3/16	.38	.046	2-1/4	3/16	.40	1/2	CL-510-CLVP
CL-2-CH	1/4	1/4	.50	.062	3-1/4	1/4	.52	11/16	CL-816-CLVP
CL-3-CH	5/16	3/8	.76	.094	4-1/2	3/8	.79	7/8	CL-1020-CLVP
CL-4-CH	3/8	1/2	.89	.109	5	7/16	.92	15/16	CL-1224-CLVP
CL-5-CH	1/2	5/8	1.15	.141	5-1/2	1/2	1.19	1	CL-1628-CLVP

# CLAMP RESTS

STEEL: 12L14, CARBURIZED-HARDENED, BLACK OXIDE FINISH  
STAINLESS STEEL: 300 SERIES

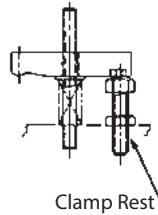
## STEEL (INCH)

PART NO.	A	C DIA	D	E	F	G
CL-1-CR	1/4-20	5/32	1/8	1/4	7/16	1-1/8
CL-1A-CR	5/16-18	7/32	3/16	5/16	1/2	1-11/16
CL-1B-CR						2-7/16
CL-2-CR	3/8-16	11/32	7/32	3/8	9/16	2-1/32
CL-3-CR						3-21/32
CL-4-CR	1/2-13	11/32	1/4	1/2	11/16	2-1/8
CL-5-CR						3-5/8
CL-6-CR	5/8-11	15/32	1/4	5/8	7/8	2-3/8
CL-7-CR						3-5/8
CL-8-CR	3/4-10	15/32	1/4	5/8	1-1/16	2-1/2
CL-9-CR						3-5/8

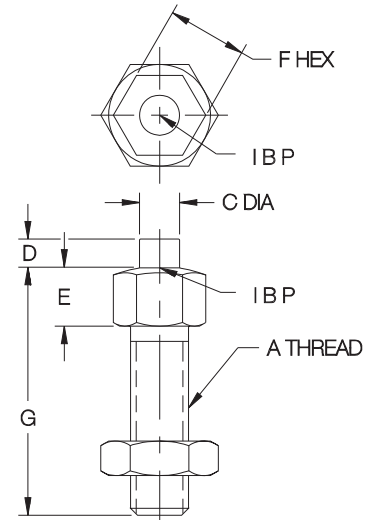


Steel

Rear support for Slotted-Heel Clamp Straps. Steel version has a hex head for adjustment, and is furnished with a Jam Nut. Stainless steel version has a drilled hole for turning with a rod.



Clamp Rest



## STEEL (METRIC)

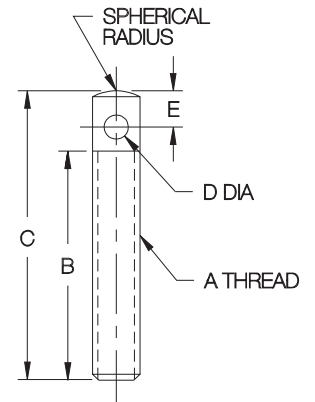
PART NO.	A	B	C	D DIA	E	G
CLM-1-CR	M6	.157	.118	.20	10mm	1.06
CLM-1A-CR	M8	.217	.157	.31	13mm	1.77
CLM-2-CR	M10	.343	.236	.39	17mm	1.93
CLM-3-CR						3.70
CLM-4-CR	M12	.343	.236	.59	19mm	2.13
CLM-4A-CR						3.70
CLM-5-CR	M16	.472	.236	.59	24mm	2.13
CLM-7-CR						3.70
CLM-8-CR	M20	.472	.276	.59	30mm	2.48
CLM-9-CR						3.66



Stainless Steel

## STAINLESS STEEL (INCH)

PART NO.	A	B	C	D DIA	E
CL-13410	#10-32	3/4	1	3/32	1/8
CL-13515	1/4-20	1-3/16	1-1/2	1/8	3/16
					1/4
CL-13612	5/16-18	7/8	1-1/4	5/32	3/16
CL-13615		1-1/8	1-1/2		
CL-13717	3/8-16	1-3/8	1-3/4	3/16	3/16

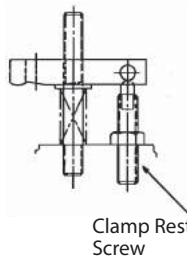


# CLAMP REST SCREWS

STEEL: 12L14, CARBURIZED-HARDENED, BLACK OXIDE FINISH



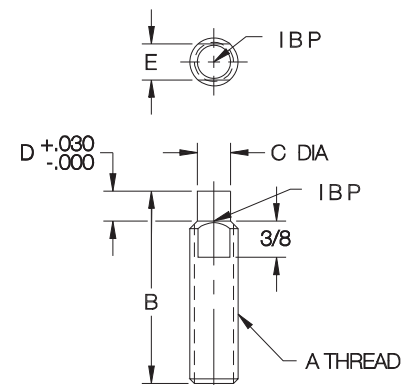
Rear support for Drill-Spot-Heel Clamp Straps.



Clamp Rest Screw

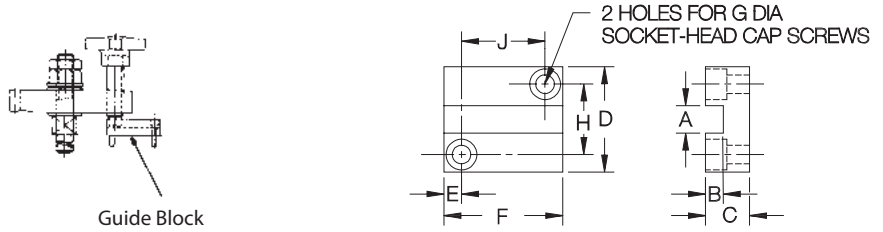
## INCH

PART NO.	A	B	C DIA	D	E
CL-1-CRS	3/8-16	2	.250	.313	1/4
CL-2-CRS		2-1/2			
CL-3-CRS	1/2-13	3	.344	.313	3/8
CL-4-CRS		2			
CL-5-CRS	3/8-16	2-1/2	.344	.313	3/8
CL-6-CRS		3			



# GUIDE BLOCKS

1018 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH



Guide Block

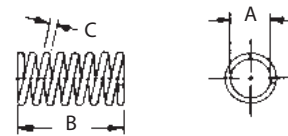
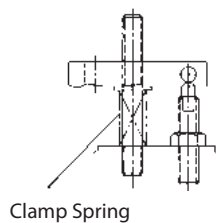
Rear slide block for Tapped-Heel Clamp Straps. Guides Clamp Strap straight back for loading.

PART NO.	FITS STUD SIZE	A	B	C	D	E	F	G	H	J
CL-2-GB	1/4-20 or M6	.198	.10	1/4	3/4	13/64	1-3/16	#6-32 or M4	15/32	25/32
CL-4-GB	3/8-16 or M10	.265	.20	1/2	1-1/8	7/32	2	#10-32 or M5	3/4	1-9/16
CL-6-GB	1/2-13 or M12	.390	.25	5/8	1-1/2	1/4	1-11/16	1/4-20 or M6	1	1-3/16
CL-8-GB	5/8-11 or M16	.515					1-5/8			
CL-11-GB	3/4-10 or M20	.640	.37	3/4	1-3/4		2-13/32		1-1/4	1-29/32

7

# CLAMP SPRINGS

STEEL: SPRING STEEL, BLACK OXIDE FINISH  
STAINLESS STEEL: 300-SERIES



Sturdy spring that holds up a Clamp Strap for clear loading. Stainless steel springs are also available in custom lengths from 0.3 inches to 10.0 inches, in 0.1-inch increments. Note: Custom-length springs have open ends, while standard-length springs have closed ends. Examples:

- CL-2430.7 Standard 0.7-inch length (#10-32)
- CL-2431.5 Custom 1.5-inch length (#10-32)

## STEEL

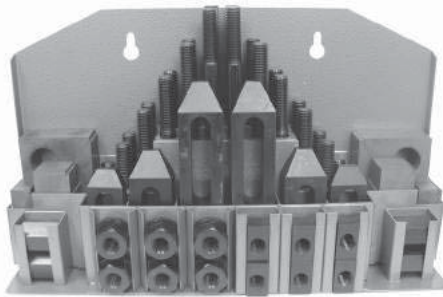
PART NO.	FITS STUD SIZE	A DIA	B	C DIA	NO. OF COILS
CL-5-SPG	1/4-20 or M6	19/64	1-1/8	.062	7
CL-6-SPG	5/16-18 or M8	23/64	1-7/32		6
CL-7-SPG	3/8-16 or M10	7/16	1-9/16		8
CL-9-SPG	1/2-13 or M12	9/16	1-11/16	.091	7
CL-11-SPG	5/8-11 or M16	11/16	1-3/4		5
CL-13-SPG	3/4-10 or M20	13/16	2-1/2		6-1/2

## STAINLESS STEEL

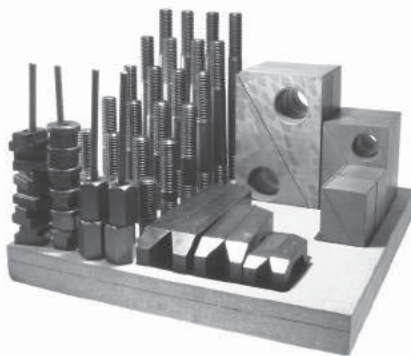
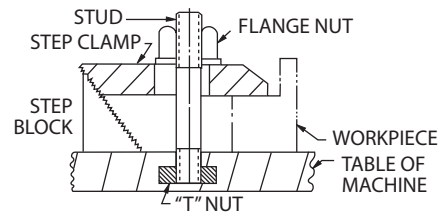
CL-2430.7	#10-32 or M5	13/64	.7	.042	5-1/2
CL-2440.7	1/4-20 or M6	17/64			
CL-2450.7	5/16-18 or M8	21/64	.7	.049	5
CL-2461.0	3/8-16 or M10	13/32			

# CLAMPING KITS

SEE CATALOG PAGE OF EACH COMPONENT FOR MATERIAL SPECIFICATIONS

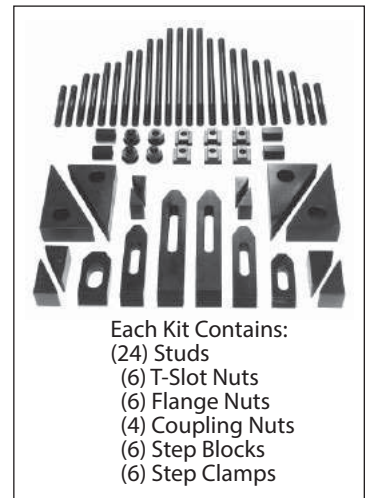


**Standard Blocks  
Metal Holder**



**High-Rise Blocks  
Wooden Holder**

Economical Clamping Kit with a wide assortment of Step Clamps and Blocks. Fully machined from top-grade steel. Available with standard Step Blocks in a metal holder (for wall or machine mounting), or with wider high-rise blocks in a wooden holder.



- Each Kit Contains:
- (24) Studs
  - (6) T-Slot Nuts
  - (6) Flange Nuts
  - (4) Coupling Nuts
  - (6) Step Blocks
  - (6) Step Clamps

## STANDARD BLOCKS (INCH)

PART NO.	STUD SIZE	TABLE SLOT SIZE	T-NUT & STUD SET (1)	STEP CLAMPS (2) EACH	STEP BLOCK PAIRS (2) EACH	HOLDER (1)
CL-1-CK	3/8-16	7/16	CL-1-TNS	CL-32-STC CL-34-STC CL-36-STC	CL-10-BS CL-20-BS CL-30-BS	CL-1-CKMH
CL-20-CK		12mm	CL-14-TNS			
CL-2-CK		1/2	CL-2-TNS			
CL-3-CK		9/16 or 14mm	CL-3-TNS			
CL-24-CK	1/2-13	5/8 or 16mm	CL-17-TNS	CL-42-STC CL-44-STC CL-46-STC	CL-10-BS CL-20-BS CL-30-BS	CL-2-CKMH
CL-4-CK		9/16 or 14mm	CL-4-TNS			
CL-5-CK		5/8 or 16mm	CL-5-TNS			
CL-6-CK		11/16 or 18mm	CL-6-TNS			
CL-25-CK		3/4	CL-18-TNS			
CL-7-CK	5/8-11	11/16 or 18mm	CL-7-TNS	CL-52-STC CL-54-STC CL-56-STC	CL-10-BS CL-20-BS CL-30-BS	CL-3-CKMH
CL-8-CK		3/4	CL-8-TNS			
CL-21-CK		20mm	CL-15-TNS			
CL-9-CK		13/16	CL-9-TNS			

## STANDARD BLOCKS (METRIC)

CLM-1-CK	M10	2mm	CLM-1-TNS	CL-32-STC	CL-10-BS	CL-1-CKMH
CLM-2-CK		1/2	CLM-2-TNS	CL-34-STC	CL-20-BS	
CLM-3-CK		9/16 or 14mm	CLM-3-TNS	CL-36-STC	CL-30-BS	
CLM-4-CK	M12	9/16 or 14mm	CLM-4-TNS	CL-42-STC	CL-10-BS	CL-2-CKMH
CLM-5-CK		5/8 or 16mm	CLM-5-TNS	CL-44-STC	CL-20-BS	
CLM-6-CK		11/16 or 18mm	CLM-6-TNS	CL-46-STC	CL-30-BS	
CLM-7-CK		11/16 or 18mm	CLM-7-TNS	CL-52-STC	CL-10-BS	
CLM-8-CK	M16	20mm	CLM-8-TNS	CL-54-STC	CL-20-BS	CL-3-CKMH
CLM-9-CK		13/16	CLM-9-TNS	CL-56-STC	CL-30-BS	

## HIGH-RISE BLOCKS (INCH)

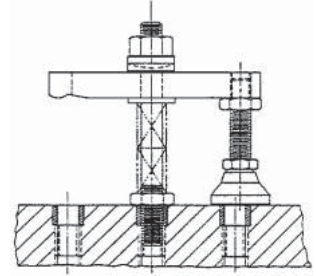
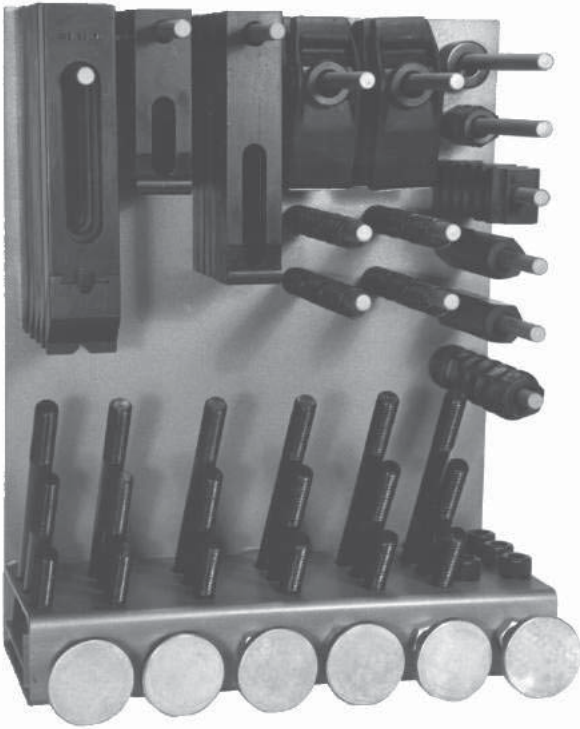
PART NO.	STUD SIZE	TABLE SLOT SIZE	T-NUT & STUD SET (1)	STEP CLAMPS (2) EACH	STEP BLOCK PAIRS (2) EACH	HOLDER (1)
CL-10-CK	1/2-13	7/16	CL-4-TNS	CL-42-STC CL-44-STC CL-46-STC	CL-40-BS CL-50-BS CL-60-BS	CL-4-CKH
CL-11-CK		12mm	CL-5-TNS			
CL-12-CK		1/2	CL-6-TNS			
CL-26-CK		9/16 or 14mm	CL-18-TNS			
CL-13-CK	5/8-11	5/8 or 16mm	CL-7-TNS	CL-52-STC CL-54-STC CL-56-STC	CL-40-BS CL-50-BS CL-60-BS	CL-5-CKH
CL-14-CK		9/16 or 14mm	CL-8-TNS			
CL-22-CK		5/8 or 16mm	CL-15-TNS			
CL-15-CK		11/16 or 18mm	CL-9-TNS			
CL-16-CK	3/4-10	3/4	CL-10-TNS	CL-64-STC CL-66-STC CL-68-STC	CL-40-BS CL-50-BS CL-60-BS	CL-6-CKH
CL-23-CK		11/16 or 18mm	CL-16-TNS			
CL-17-CK		3/4	CL-11-TNS			
CL-18-CK		20mm	CL-12-TNS			
CL-19-CK		13/16	CL-13-TNS			

## HIGH-RISE BLOCKS (METRIC)

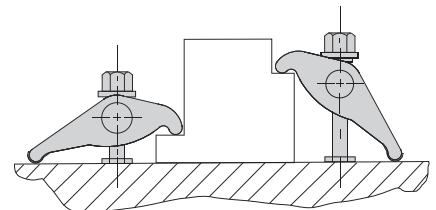
CLM-10-CK	M12	9/16 or 14mm	CLM-4-TNS	CL-42-STC	CL-40-BS	CL-4-CKH
CLM-11-CK		5/8 or 16mm	CLM-5-TNS	CL-44-STC	CL-50-BS	
CLM-12-CK		11/16 or 18mm	CLM-6-TNS	CL-46-STC	CL-60-BS	
CLM-13-CK	M16	11/16 or 18mm	CLM-7-TNS	CL-52-STC	CL-40-BS	CL-5-CKH
CLM-14-CK		20mm	CLM-8-TNS	CL-54-STC	CL-50-BS	
CLM-15-CK		13/16	CLM-9-TNS	CL-56-STC	CL-60-BS	
CLM-17-CK		M20	22mm	CLM-11-TNS	CL-64-STC CL-66-STC CL-68-STC	

# DELUXE CLAMPING KITS

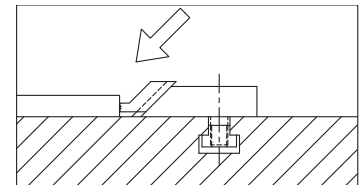
SEE CATALOG PAGE OF EACH COMPONENT FOR MATERIAL SPECIFICATIONS  
 HOLDER: STEEL, ENAMEL PAINT



**Clamp Strap Assemblies**



**Forged Adjustable Clamps**



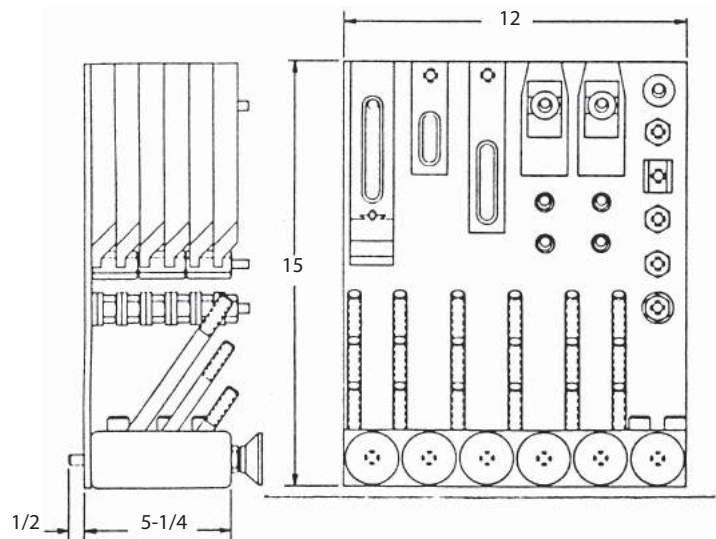
**Serrated Edge Clamps**

New, improved Clamping Kit with three different types of clamps. Safer and less cumbersome than sets using Step Blocks and Clamps. This 94-piece set includes:

- (12) Tapped-Heel Clamp Straps, short and long
- (4) Forged Adjustable Clamps
- (6) Serrated Edge Clamps
- (6) Stud Leveling Feet
- (6) T Nuts
- (6) Short Clamping Studs
- (6) Medium Clamping Studs
- (6) Long Clamping Studs
- (6) Spherical Nuts & Washers
- (6) Coupling Nuts
- (6) Jam Nuts
- (6) Flat Washers
- (12) Clamp Springs
- (6) Socket-Head Cap Screws
- (1) Sturdy Steel Rack

Available to fit table-slot sizes from 7/16" to 13/16" (12mm to 20mm in metric), in thread sizes from 3/8"-16 to 5/8"-11 (M10 to M16 in metric).

The Stud Leveling Feet in these kits serve as the rear supports for Tapped-Heel Clamp Straps. These leveling feet are optionally available with Delrin® pads to avoid marring the table when less clamping force is required, such as when used on coordinate measuring machines.



# DELUXE CLAMPING KITS



7

## INCH

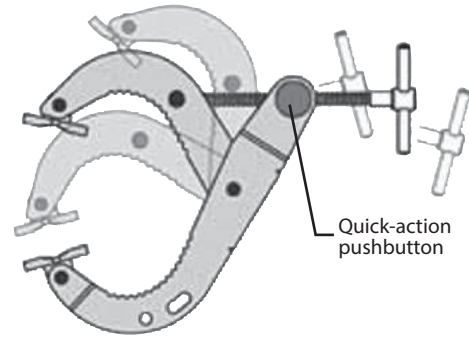
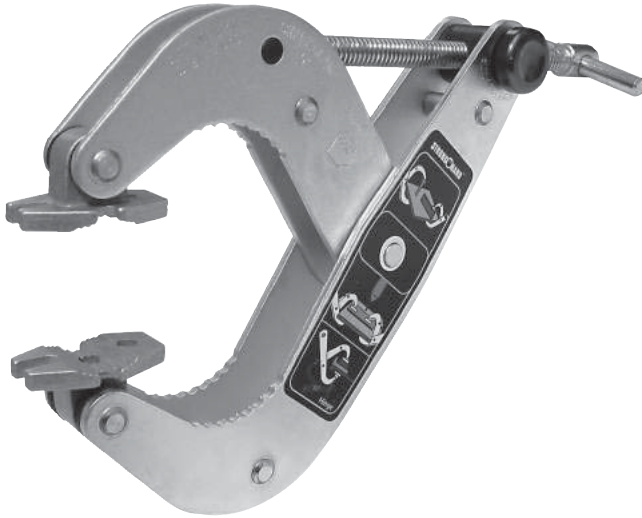
PART NO. STEEL PADS	PART NO. DELRIN® PADS	TABLE SLOT SIZE	STUD SIZE	CLAMP STRAPS (6 EACH)	FORGED ADJ. CLPS. (4)	SERR. ADJ. CLPS. (4)	STUDS (6 EACH)	LEVELING FEET (6)	T NUTS (6)	NUTS & WASHERS (6 EACH)	SPRINGS (12)	SOCKET-HEAD CAP SCREWS (6)
CL-1-DCK	CL-1-DCKN	7/16	3/8-16	CL-63-CS CL-67-CS	CL-6-FAC	CL-30-SAC	CL-3/8-16x3.00-STUD CL-3/8-16x5.00-STUD CL-3/8-16x7.00-STUD	CL-6-SLF-BO or CL-6-SLFN	CL-00-TN	CL-1-CN CL-2-SNW CL-6-JN CL-1-FW	CL-9-SPG	CL-3/8-16x1.25-SHCS
CL-20-DCK	CL-20-DCKN	12mm							CL-12-TN			
CL-2-DCK	CL-2-DCKN	1/2							CL-0-TN			
CL-3-DCK	CL-3-DCKN	9/16 or 14mm							CL-1-TN CL-16-TN			
CL-4-DCK	CL-4-DCKN	9/16 or 14mm	1/2-13	CL-71-CS CL-75-CS	CL-8-FAC	CL-60-SAC	CL-1/2-13x4.00-STUD CL-1/2-13x6.00-STUD CL-1/2-13x8.00-STUD	CL-8-SLF-BO or CL-8-SLFN	CL-9-TN	CL-2-CN CL-3-SNW CL-8-JN CL-2-FW	CL-9-SPG	CL-1/2-13x1.50-SHCS
CL-5-DCK	CL-5-DCKN	5/8 or 16mm							CL-2-TN			
CL-6-DCK	CL-6-DCKN	11/16 or 18mm							CL-3-TN			
CL-7-DCK	CL-7-DCKN	3/4							CL-17-TN			
CL-27-DCK	CL-27-DCKN	11/16 or 18mm	5/8-11	CL-81-CS CL-85-CS	CL-10-FAC	CL-90-SAC	CL-5/8-11x4.00-STUD CL-5/8-11x6.00-STUD CL-5/8-11x8.00-STUD	CL-10-SLF-BO or CL-10-SLFN	CL-10-TN	CL-10-TN CL-4-SNW CL-10-JN CL-3-FW	CL-9-SPG	CL-5/8-11x1.50-SHCS
CL-8-DCK	CL-8-DCKN	3/4							CL-4-TN			
CL-21-DCK	CL-21-DCKN	20mm							CL-14-TN			
CL-9-DCK	CL-9-DCKN	13/16							CL-5-TN			

## METRIC

CLM-1-DCK	CLM-1-DCKN	12mm	M10	CLM-63-CS CLM-67-CS	CL-6-FAC	CL-30-SAC	CLM-10x80-STUD	CLM-10-SLF-BO or CLM-10-SLFN	CLM-00-TN	CLM-10-CN CLM-10-SNW CLM-10-JN	CL-7-SPG	CLM-10x30-SHCS
CLM-2-DCK	CLM-2-DCKN	1/2					CLM-10x125-STUD		CLM-0-TN			
CLM-3-DCK	CLM-3-DCKN	9/16 or 14mm					CLM-10x175-STUD		CLM-1-TN			
CLM-4-DCK	CLM-4-DCKN	9/16 or 14mm	M12	CLM-71-CS CLM-75-CS	CL-8-FAC	CL-60-SAC	CLM-12x95-STUD	CLM-12-SLF-BO or CLM-12-SLFN	CLM-9-TN	CLM-12-CN CLM-12-SNW CLM-12-JN	CL-9-SPG	CLM-12x40-SHCS
CLM-5-DCK	CLM-5-DCKN	5/8 or 16mm					CLM-12x150-STUD		CLM-2-TN			
CLM-6-DCK	CLM-6-DCKN	11/16 or 18mm					CLM-12x200-STUD		CLM-3-TN			
CLM-7-DCK	CLM-7-DCKN	11/16 or 18mm	M16	CLM-81-CS CLM-85-CS	CL-10-FAC	CL-90-SAC	CLM-16x110-STUD	CLM-16-SLF-BO or CLM-16-SLFN	CLM-10-TN	CLM-16-CN CLM-16-SNW CLM-16-JN	CL-11-SPG	CLM-16x40-SHCS
CLM-8-DCK	CLM-8-DCKN	20mm					CLM-16x150-STUD		CLM-4-TN			
CLM-9-DCK	CLM-9-DCKN	13/16					CLM-16x200-STUD		CLM-5-TN			

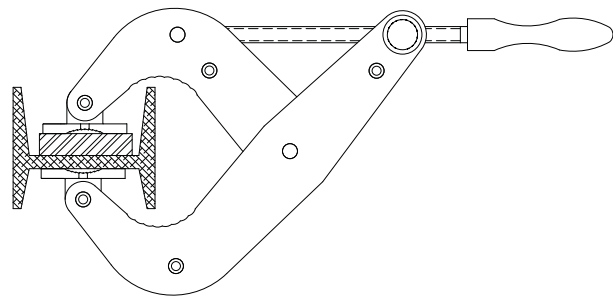
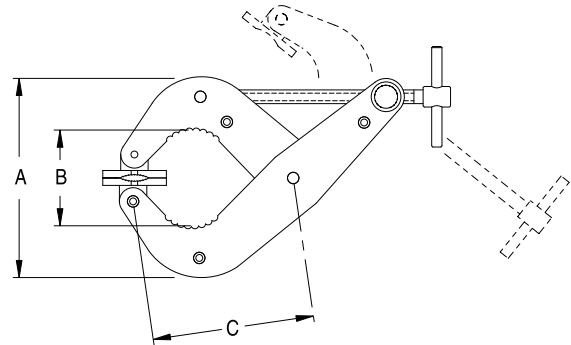
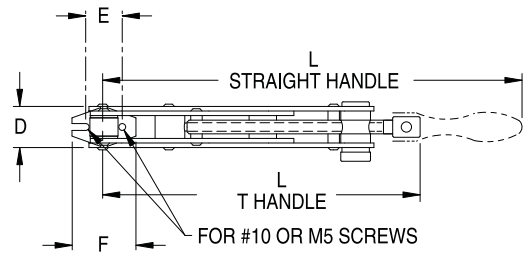
# SHARK CLAMPS

BODY: STEEL, ZINC PLATED CLEAR CHROMATE  
CLAMPING SCREW: STEEL, COPPER PLATED



Heavy-duty quick-acting jaw clamp. Simply press the side pushbutton to allow sliding the handle freely in and out. The clamping screw is copper plated to resist spatter in welding applications. The two pivoting contact pads have mounting holes to allow attaching custom clamping pads or for stationary mounting. Optional no-mar rubber pads are available separately. Choose either a T handle (for maximum tightening torque) or a screwdriver-type straight handle (for more comfortable handling). Available in two sizes. Patent no. 6,893,012.

To clamp, simply press the quick-action pushbutton to slide the handle forward, moving the jaws into clamping position, then release the button and turn the handle to apply clamping force. To unclamp, turn the handle to release clamping force, then press the pushbutton to slide the handle back.



Wide throat allows clamping over flanges.

PART NO.	MAX OPENING	HANDLE TYPE	A	B	C	D	E	F	L	MAXIMUM CLAMPING FORCE (LBS)	NO-MAR PADS (SET OF 4)
CL-500-SHRK	5	T	5.50	2.64	4.40	1.12	1.00	1.75	8.5	1000	CL-1-SHRK-P-SETOF4
CL-501-SHRK		STRAIGHT							12	200	
CL-650-SHRK	6-1/2	T	6.00	3.15	5.30	1.12	1.00	1.75	10.5	1000	
CL-651-SHRK		STRAIGHT							14	200	



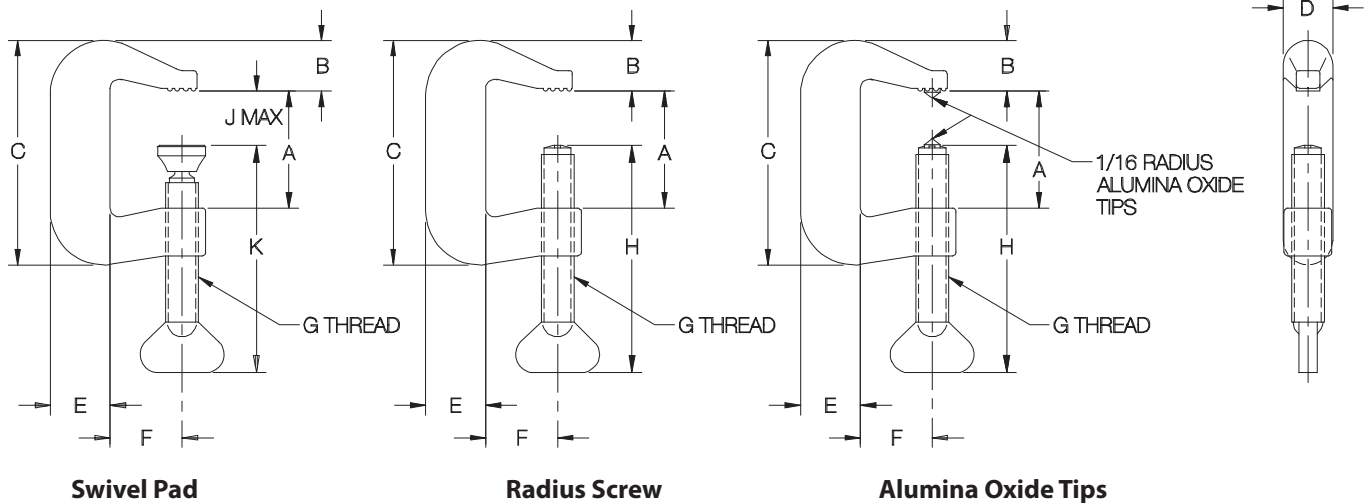
# DURACLAMP PLASTIC C CLAMPS

FIBERGLASS-REINFORCED THERMOPLASTIC



High-strength fiberglass-reinforced Plastic C Clamps, ideal for finishing operations and other corrosive environments. Also ideal wherever a lightweight C Clamp is required. Chemically inert and electrically non-conductive. Highly resistant to virtually all acid and alkali solutions, and boiling water (212° F maximum recommended continuous operating temperature, 290° F for intermittent operation). No stripping required after use. Large, comfortable thumbscrew for easy hand tightening. Available in four sizes.

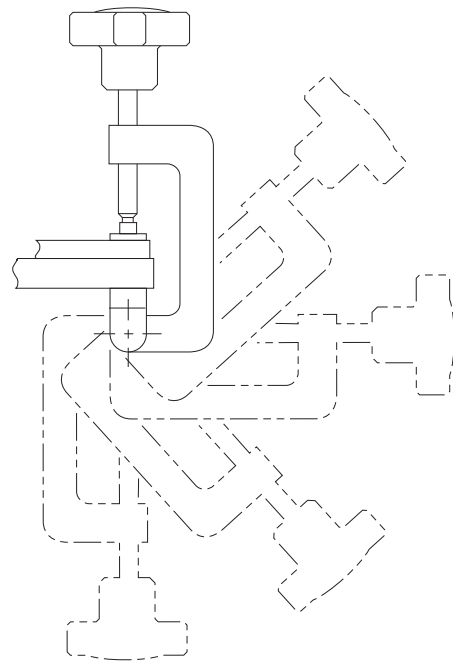
Also available with alumina oxide ( $Al_2O_3$ ) tips. Well suited for two-step anodizing processes. Dual tips allow rack mounting two parts back-to-back during finishing. These super-hard tips ( $1/16''$  radius) reduce contact area to a small point to minimize rack marks, yet still hold parts securely.



PART NO. WITH SWIVEL PAD	PART NO. WITH RADIUS SCREW	PART NO. WITH RADIUS SCREW	A	B	C	D	E	F	G	H	J	K	MAXIMUM TORQUE (IN-LBS)	MAXIMUM TORQUE (IN-LBS)
CL-318-DCS	CL-318-DC	CL-318-DC2T	1-3/16	3/4	2-3/4	13/16	29/32	25/32	9/16-12	2-13/16	3/4	3	125	.13
CL-476-DCS	CL-476-DC	CL-476-DC2T	1-13/16	1-1/8	3-15/16	1	1	1-3/16	5/8-12	3-13/16	1-3/8	4	160	.24
CL-635-DCS	CL-635-DC	—	2-3/8	1-1/4	4-27/32	1-1/16	1-1/4	1-1/2	11/16-11	4-3/4	1-7/8	4-3/4	250	.35
CL-1016-DCS	CL-1016-DC	—	3-7/8	1-3/8	6-13/16	1-1/4	1-1/2	1-3/4	13/16-10	6-1/4	3-3/8	6-1/4	350	.71

# SWING C CLAMPS

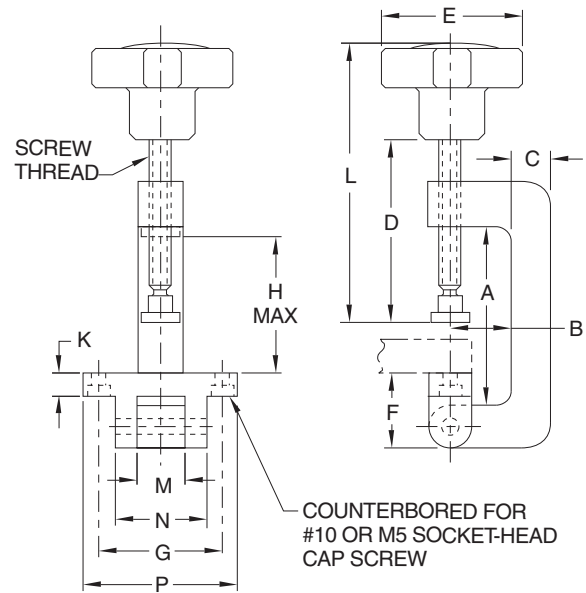
FRAME & MOUNTING PAD: MILD STEEL, ZINC PLATED CLEAR CHROMATE  
 KNOB: 319 ALUMINUM ALLOY  
 SCREW: 12L14 STEEL, NICKEL PLATED  
 FOOT: 12L14 STEEL, ZINC PLATED YELLOW CHROMATE



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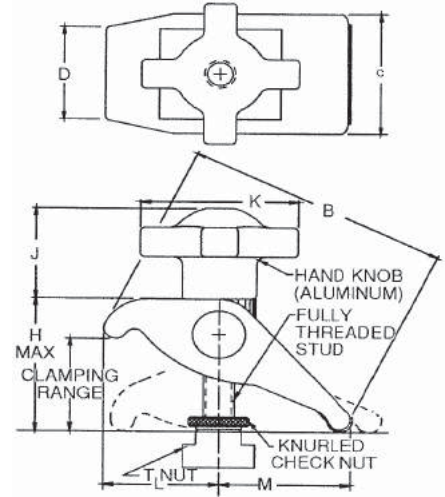
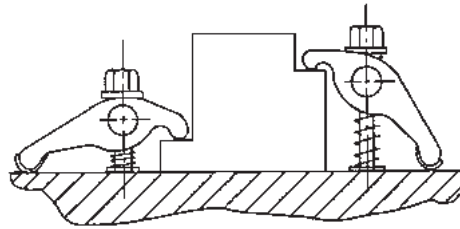
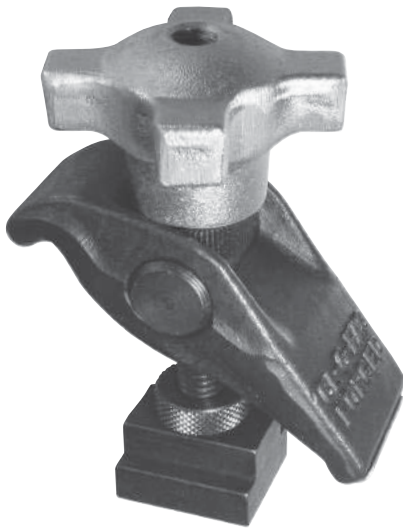
These unique C Clamps have a hinged pad for fastening permanently to a fixture, allowing them to swing clear for workpiece loading. The hinged mounting pad bolts to the fixture with two Socket-Head Cap Screws. Four-Prong Knob provides a firm grip for applications requiring quick tightening and high torque. Clamping screw is cast securely in the knob and has a removable swivel foot. Available in four sizes.

Swing C Clamps use our patented left-hand-thread swivel-foot system. The ball end of the body screws into the foot for easy installation and removal. Once the ball threads pass beyond the foot threads, the foot can rotate and pivot freely (20° total angle). Foot threads are left-hand to positively prevent accidental black out during use. For other foot types, including Delrin® feet, see Feet for Swivel Screws (order separately).



PART NO.	SCREW THREAD	A	B	C	D	E	F	G	H	K	L	M	N	P
CL-520-SCC	5/16-18	2	3/4	1/2	2-1/4	1-3/4	7/8	1-1/2	1-15/32	5/16	3-1/4	1/2	1	2
CL-525-SCC		2-1/2							1-31/32					
CL-625-SCC	3/8-16	2-1/2	1	5/8	2-13/16	2-1/8	1	1-3/4	1-15/16	5/16	4-1/16	5/8	1-1/4	2-1/4
CL-635-SCC		3-1/2			3-9/16				2-15/16		4-13/16			

# FORGED ADJUSTABLE DRILL-PRESS CLAMPS



Handy hold-down clamp assembly that includes a Forged Adjustable Clamp, ideal for clamping on T-slotted drill presses and tapped drill-jig plates. This rugged forged steel pivot clamp provides instant height adjustment without blocks or shims. Removable brass heel protects machine table. Available with stud sizes from 5/16-18 to 1/2-13 (M8 to M12 in metric), fitting T-slots from 3/8 to 3/4 (10mm to 18mm in metric). **INFO+**: For additional sizes of Forged Adjustable Clamps, see page 217.

## GENERAL DIMENSIONS

STUD SIZE	CLAMPING RANGE	B	C	D	H	J	K	L		M	
								MIN	MAX	MIN	MAX
5/16-18 or M8 3/8-16 or M10	0 to 1-3/4	3-1/4	1-1/4	7/8	2-1/8	1-3/8	2-1/8	1-1/16	1-1/4	1-3/4	2
1/2-13 or M12	0 to 2/16	4	1-5/8	1-1/8	2-5/8	1-5/8	2-1/2	1-3/8	1-9/16	2-1/8	2-7/16

## ASSEMBLY COMPONENTS (INCH)

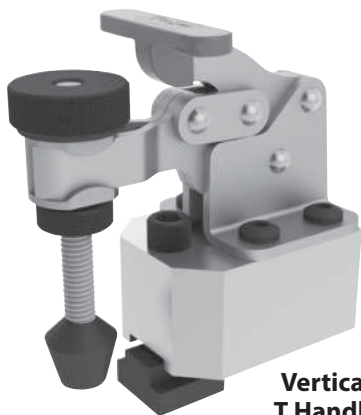
PART NO.	STUD SIZE	TABLE-SLOT SIZE	T NUT	FORGED ADJUSTABLE CLAMP	FULLY THREADED STUD	KNURLED CHECK NUT	HAND KNOB
CL-5-FACA-HKA	5/16-18	TAPPED	NONE	CL-6-FAC	CL-5/16-18x3.00-FTS	CL-51618-TSJN	CL-2-HK-4A
CL-5-FACA-HKA-19		3/8 or 10mm	CL-19-TN				
CL-5-FACA-HKA-20		7/16	CL-20-TN				
CL-5-FACA-HKA-21		1/2	CL-21-TN				
CL-6-FACA-HKA	3/8-16	TAPPED	NONE	CL-6-FAC	CL-3/8-16x3.00-FTS	CL-3816-TSJN	CL-3-HK-4A
CL-6-FACA-HKA-00		7/16	CL-00-TN				
CL-6-FACA-HKA-12		12mm	CL-12-TN				
CL-6-FACA-HKA-0		1/2	CL-0-TN				
CL-6-FACA-HKA-1		9/16 or 14mm	CL-1-TN				
CL-6-FACA-HKA-16	5/8 or 16mm	CL-16-TN					
CL-8-FACA-HKA	1/2-13	TAPPED	NONE	CL-8-FAC	CL-1/2-13x4.00-FTS	CL-1213-TSJN	CL-9-HK-9A
CL-8-FACA-HKA-9		9/16 or 14mm	CL-9-TN				
CL-8-FACA-HKA-2		5/8 or 16mm	CL-2-TN				
CL-8-FACA-HKA-3		11/16 or 18mm	CL-3-TN				
CL-8-FACA-HKA-17		3/4	CL-17-TN				

## ASSEMBLY COMPONENTS (METRIC)

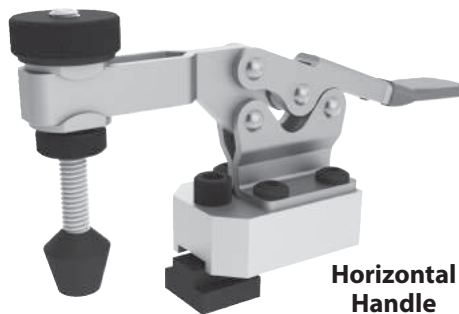
CLM-5-FACA-HKA	M8	TAPPED	NONE	CL-6-FAC	CLM-8x80-FTS	CLM-8-TSJN	CLM-2-HK-4A
CLM-5-FACA-HKA-19		3/8 or 10mm	CLM-19-TN				
CLM-6-FACA-HKA		TAPPED	NONE				
CLM-6-FACA-HKA-00	M10	12mm	CLM-00-TN	CL-6-FAC	CLM-10x80-FTS	CLM-10-TSJN	CLM-3-HK-4A
CLM-6-FACA-HKA-0		1/2	CLM-0-TN				
CLM-6-FACA-HKA-1		9/16 or 14mm	CLM-1-TN				
CLM-8-FACA-HKA	M12	TAPPED	NONE	CL-8-FAC	CLM-12x110-FTS	CLM-12-TSJN	CLM-9-HK-9A
CLM-8-FACA-HKA-9		9/16 or 14mm	CLM-9-TN				
CLM-8-FACA-HKA-2		5/8 or 16mm	CLM-2-TN				
CLM-8-FACA-HKA-3		11/16 or 18mm	CLM-3-TN				

# DRILL-PRESS TOGGLE CLAMPS

DRILL-PRESS ADAPTOR: 6061 ALUMINUM  
OTHER COMPONENTS: SEE CATALOG PAGE  
FOR EACH SPECIFIC ITEM

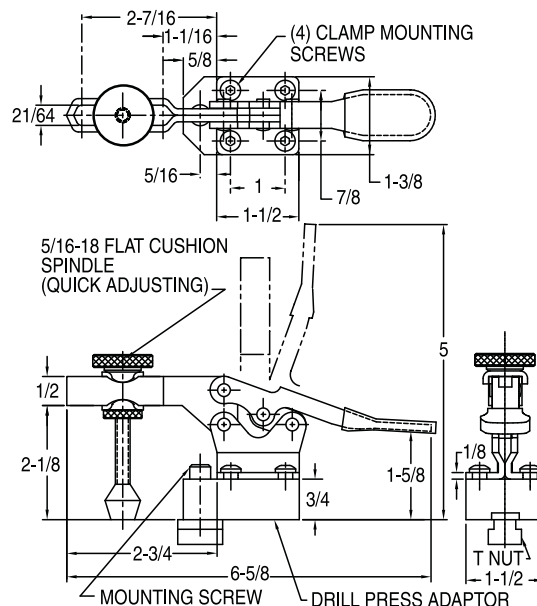
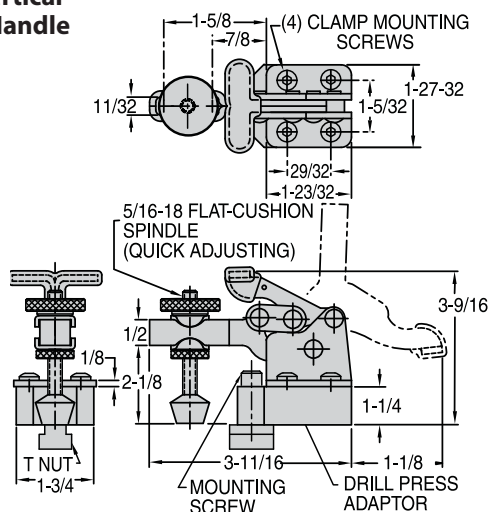


**Vertical  
T Handle**



**Horizontal  
Handle**

These hold-down Toggle Clamps are ideal for clamping on drill presses, with an adaptor base for slotted tables and a quick adjusting spindle. Choose either a compact, easy-opening vertical T handle, or a low-profile horizontal handle. Open arm provides adjustable spindle location. Supplied with two quick-adjusting Flat-Cushion Spindles, one short and one long. Choose T Nut size to fit table slots from 3/8 to 5/8" (10 to 16mm in metric).



## VERTICAL T HANDLE (INCH)

PART NO.	MOUNTING SCREW SIZE	TABLE-SLOT SIZE	T NUT	DRILL-PRESS ADAPTOR	MOUNTING SCREW	CLAMP MOUNTING SCREW(4)	QUICK-ADJUSTING SPINDLE	HOLDING CAPACITY (LBS)	
CL-300-VTCD-5	5/16-18	TAPPED	NONE	CL-300-VTCA-6	CL-5/16-18x1.75-SHCS	CL-1/4-20x.50-BHCS	CL-516212-FCQA	350	
CL-300-VTCD-5-19		3/8 or 10mm	CL-19-TN		CL-5/16-18x1.50-SHCS				
CL-300-VTCD-5-20		7/16	CL-20-TN						
CL-300-VTCD-5-21		1/2	CL-21-TN						
CL-300-VTCD-6	3/8-16	TAPPED	NONE		CL-3/8-16x1.75-SHCS				
CL-300-VTCD-6-00		7/16	CL-00-TN		CL-3/8-16x1.50-SHCS				
CL-300-VTCD-6-12		12mm	CL-12-TN						
CL-300-VTCD-6-0		1/2	CL-0-TN						
CL-300-VTCD-6-1		9/16 or 14mm	CL-1-TN						
CL-300-VTCD-6-16		5/8 or 16mm	CL-16-TN						

## HORIZONTAL HANDLE (INCH)

CL-450-HTCD-5	5/16-18	TAPPED	NONE	CL-450-HTCA-6	CL-5/16-18x1.75-SHCS	CL-1/4-20x.50-BHCS	CL-516212-FCQA	500	
CL-450-HTCD-5-19		3/8 or 10mm	CL-19-TN		CL-5/16-18x1.50-SHCS				
CL-450-HTCD-5-20		7/16	CL-20-TN						
CL-450-HTCD-5-21		1/2	CL-21-TN						
CL-450-HTCD-6	3/8-16	TAPPED	NONE		CL-3/8-16x1.75-SHCS				
CL-450-HTCD-6-00		7/16	CL-00-TN		CL-3/8-16x1.50-SHCS				
CL-450-HTCD-6-12		12mm	CL-12-TN						
CL-450-HTCD-6-0		1/2	CL-0-TN						
CL-450-HTCD-6-1		9/16 or 14mm	CL-1-TN						
CL-450-HTCD-6-16		5/8 or 16mm	CL-16-TN						

# CARR LANE SIMPLEX HAMMERS

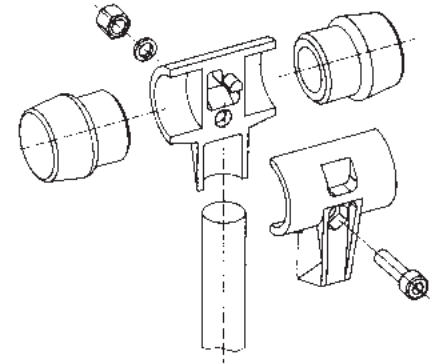
SEE COMPONENT PAGES FOR MATERIAL SPECIFICATIONS



**Wooden Handle**



**Fiberglass Handle**



Design your own custom hammers. These soft-face mallets can be customized for specific applications by selecting the proper hammer inserts. Choose the same type of insert for both sides, or build a multi-purpose hammer with a different type of insert for each face. The Simplex system uses a patented hammer housing with 3-point clamping that ensures a safe hammer assembly.

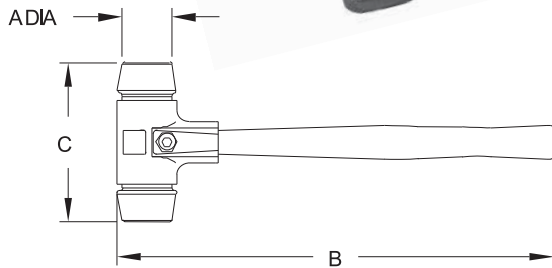
Available in four sizes, with a choice of eight different insert materials:

- Type A Blue Thermoplastic (Soft)
- Type B Gray Thermoplastic (Medium Soft)
- Type C Black Rubber (Medium Soft)
- Type D White Superplastic (Medium Hard)
- Type E Red Plastic (Hard)
- Type F White Nylon (Hard)
- Type G Soft Metal (Hard)
- Type H Copper (Hard) Fiberglass Handle Only

To order a 30mm hammer with a wooden handle, one black rubber insert (C) and one white nylon insert (F) specify:

CL-30-SPH-W-CF

Observe all appropriate safety precautions. Always wear safety goggles when using a hammer or any striking tool. Bystanders must also wear safety goggles. Never strike the hammer with or against another striking tool, hardened nail, or any other hard object that could cause damage. Chipping could occur, resulting in possible eye or other injury. Discard any chipped or damaged hammer. If assembling the hammer yourself, ensure that all parts are properly fitted into the handle housing and that the screw is tightened to the specified torque. Check hammer before each use. Using a hammer with loose or improperly fitted parts could result in serious injury. Use only genuine Simplex replacement components.



## SIMPLEX HAMMER ASSEMBLY — WOODEN HANDLE

PART NO.	A DIA	B	C	WEIGHT (LBS)
CL-30-SPH-W-xx	30mm (1.18)	11.81	3.54	0.7-0.9
CL-40-SPH-W-xx	40mm (1.57)	12.99	4.33	1.3-1.6
CL-50-SPH-W-xx	50mm (1.96)	13.78	5.32	2.4-3.0
CL-60-SPH-W-xx	60mm (2.36)	15.95	5.71	3.1-4.3

## SIMPLEX HAMMER ASSEMBLY — FIBERGLASS HANDLE

PART NO.	A DIA	B	C	WEIGHT (LBS)
CL-30-SPH-F-xx	30mm (1.18)	11.81	3.54	0.9-1.5
CL-40-SPH-F-xx	40mm (1.57)	12.99	4.33	1.8-3.1
CL-50-SPH-F-xx	50mm (1.96)	13.78	5.32	3.3-4.0
CL-60-SPH-F-xx	60mm (2.36)	15.95	5.71	3.5-5.5

# CARR LANE SIMPLEX HAMMERS



**Type A Inserts**  
Blue Thermoplastic  
(Soft)

Blue thermoplastic inserts are soft and non-smudging. Applications include assembly operations, dent removal, woodworking, furniture assembly, window and door construction, joiner's work, and floor tiling. Hardness 60-70 Shore A.

PART NO.	HAMMER SIZE (FACE DIA)
CL-30-SPH-A	30mm (1.18)
CL-40-SPH-A	40mm (1.57)
CL-50-SPH-A	50mm (1.96)
CL-60-SPH-A	60mm (2.36)



**Type B Inserts**  
Grey Thermoplastic  
(Medium Soft)

Gray thermoplastic inserts are medium soft and non-smudging. Applications include assembly operations, car-body work, woodworking, furniture assembly, window and door construction, joiner's work, floor tiling, paving, and interior construction. Hardness 85-95 Shore A.

PART NO.	HAMMER SIZE (FACE DIA)
CL-30-SPH-B	30mm (1.18)
CL-40-SPH-B	40mm (1.57)
CL-50-SPH-B	50mm (1.96)
CL-60-SPH-B	60mm (2.36)



**Type C Inserts**  
Black Rubber  
(Medium Soft)

Black Rubber inserts are medium soft. Applications include assembly operations, dent removal, prefabricated housing construction, carpenter's work, paving, masonry work, concrete-form setup, scaffold construction, gardening, landscaping, and interior construction. Hardness 90-100 Shore A.

PART NO.	HAMMER SIZE (FACE DIA)
CL-30-SPH-C	30mm (1.18)
CL-40-SPH-C	40mm (1.57)
CL-50-SPH-C	50mm (1.96)
CL-60-SPH-C	60mm (2.36)



**Type D Inserts**  
White Superplastic  
(Medium Hard)

White superplastic inserts (UHMW polyethylene) are medium hard, durable, impact resistant, acid and lye resistant, grease and oil resistant, and ideal for striking sharp edges. Applications include assembly operations, automotive assembly and repair work, repair and maintenance work, car body work, sheet metal working, dent removal, assembly of sharp-edged workpieces, paving, masonry work, scaffold construction, gardening, and landscaping. Hardness 60-70 Shore D.

PART NO.	HAMMER SIZE (FACE DIA)
CL-30-SPH-D	30mm (1.18)
CL-40-SPH-D	40mm (1.57)
CL-50-SPH-D	50mm (1.96)
CL-60-SPH-D	60mm (2.36)



**Type E Inserts**  
Red Plastic  
(Hard)

Red plastic inserts (cellulose acetate) are hard, semi-transparent, and grease and oil resistant. Applications include automotive assembly and repair work, sheet metal working, dent removal, concrete-form setup, and scaffold construction. Hardness 65-75 Shore D.

PART NO.	HAMMER SIZE (FACE DIA)
CL-30-SPH-E	30mm (1.18)
CL-40-SPH-E	40mm (1.57)
CL-50-SPH-E	50mm (1.96)
CL-60-SPH-E	60mm (2.36)



**Type F Inserts**  
White Nylon  
(Hard)

White nylon inserts are hard, grease and oil resistant, highly elastic, and have superior strike effectiveness. Applications include assembly operations, metalworking, tooling, automotive assembly and repair work, joining of workpieces, sheet metal working, dent removal, mold construction, assembly of sharp-edged workpieces, and scaffold construction. Hardness 68-78 Shore D.

PART NO.	HAMMER SIZE (FACE DIA)
CL-30-SPH-F	30mm (1.18)
CL-40-SPH-F	40mm (1.57)
CL-50-SPH-F	50mm (1.96)
CL-60-SPH-F	60mm (2.36)



**Type G Inserts**  
Soft Metal  
(Hard)

Soft metal inserts are made of an aluminum-copper alloy which is hard and resistant to heat. Excellent alternative to old-fashioned lead hammers, to eliminate the risk of lead contamination. Applications include metalworking, tooling, automotive assembly and repair work, straightening work, car body work, and mold construction.

PART NO.	HAMMER SIZE (FACE DIA)
CL-30-SPH-G	30mm (1.18)
CL-40-SPH-G	40mm (1.57)
CL-50-SPH-G	50mm (1.96)
CL-60-SPH-G	60mm (2.36)



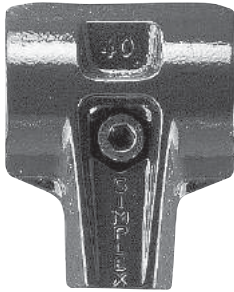
**Type H Inserts**  
Copper  
(Hard)

Copper inserts are hard and provide maximum impact. Plastic socket provides for secure mounting of the copper insert in the hammer. Applications include machine construction, automotive assembly and repair work, repair and maintenance work, and vehicle service stations.

PART NO.	HAMMER SIZE (FACE DIA)
CL-30-SPH-H	30mm (1.18)
CL-40-SPH-H	40mm (1.57)

# CARR LANE SIMPLEX HAMMERS

HOUSINGS: CAST IRON, FURNISHED WITH SOCKET-HEAD CAP SCREW, SPRING WASHER, AND NUT  
 HANDLES: EUROPEAN BLACK LOCUST WOOD, OR FIBERGLASS WITH ERGONOMIC RUBBER GRIP



Rugged cast iron housing (red), furnished with a high-strength Socket-Head Cap Screw, spring washer, and nut. Premium quality hardwood handle. Use wooden handles only with red housings.



## HOUSING & HANDLE — WOODEN HANDLE

HOUSING PART NO.	HANDLE PART NO.	HAMMER SIZE (FACE DIA)	TIGHTENING TORQUE (FT-LBS)	
			PLASTIC INSERTS	METAL INSERTS
CL-30-SPH-HWH	CL-30-SPH-WH	30mm (1.18)	11	15
CL-40-SPH-HWH	CL-40-SPH-WH	40mm (1.57)	18	30
CL-50-SPH-HWH	CL-50-SPH-WH	50mm (1.96)	22	37
CL-60-SPH-HWH	CL-60-SPH-WH	60mm (2.36)	30	48

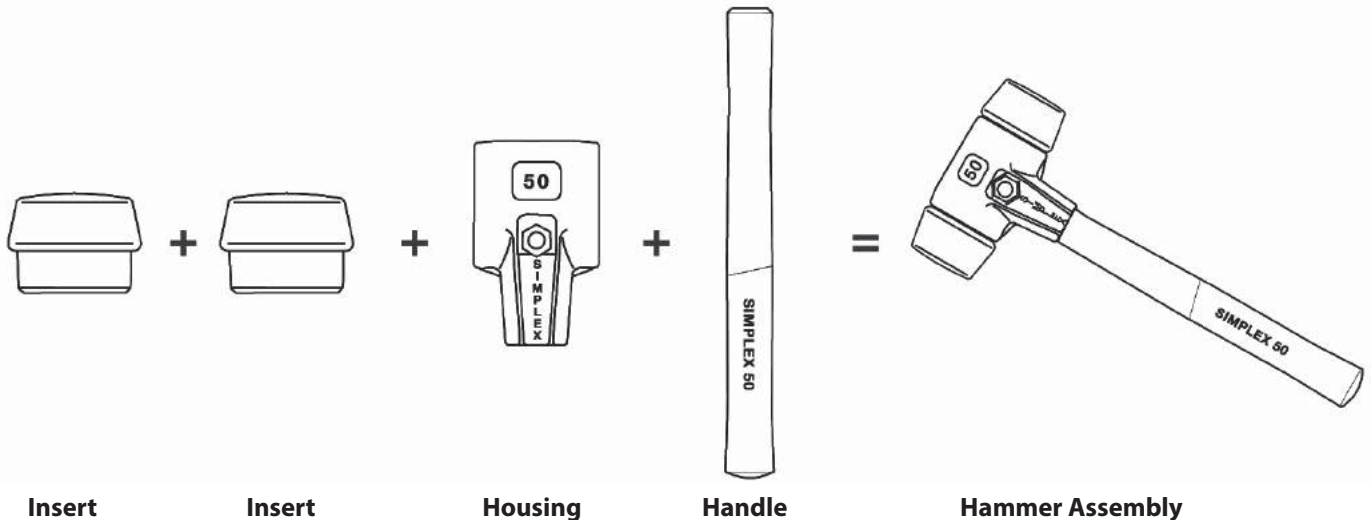


Heavy-duty cast iron housing (black), reinforced for use with a fiberglass handle, furnished with a high-strength Socket-Head Cap Screw, spring washer, and nut. High-strength fiberglass handle with an ergonomic rubber grip. Use fiberglass handles only with black housings.



## HOUSING & HANDLE — FIBERGLASS HANDLE

HOUSING PART NO.	HANDLE PART NO.	HAMMER SIZE (FACE DIA)	TIGHTENING TORQUE (FT-LBS)	
			PLASTIC INSERTS	METAL INSERTS
CL-30-SPH-HFH	CL-30-SPH-FH	30mm (1.18)	18	30
CL-40-SPH-HFH	CL-40-SPH-FH	40mm (1.57)	22	44
CL-50-SPH-HFH	CL-50-SPH-FH	50mm (1.96)	30	52
CL-60-SPH-HFH	CL-60-SPH-FH	60mm (2.36)	44	59



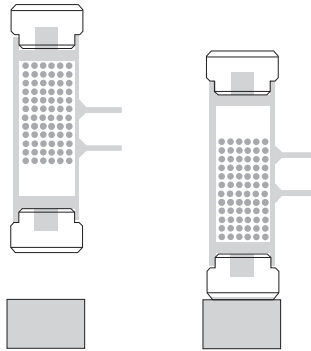
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# NO-REBOUND HAMMERS

HOUSINGS: STEEL ASSEMBLY CONTAINING STEEL PELLETS. HANDLE: HICKORY WOOD.  
 INSERTS: NYLON, NATURAL WHITE COLOR, HARDNESS 68-78 SHORE D



**Supercraft  
Hammers  
(Wooden Handle)**



No-Rebound Hammers are filled with special steel pellets that transfer momentum to the impact point.

No-Rebound Hammers deliver full impact, about 50% greater than a standard hammer. The housing is filled with special steel pellets that transfer momentum to the impact point. Ideal for assembling machine parts without damage. Speeds up work while reducing fatigue. Allows better hammer control by absorbing the bounce. Hickory-wood handle. Available in five standard sizes, plus two sledgehammer sizes.

Supercraft No-Rebound Hammers have replaceable nylon inserts. These nylon inserts are hard, grease and oil resistant, highly elastic, and have superior strike effectiveness. Applications include assembly operations, metalworking, tooling, positioning of workpieces, automotive assembly and repair work, joining of workpieces, sheet metal working, dent removal, mold construction, assembly of sharp-edged workpieces, and scaffold construction.

Observe all appropriate safety precautions. Never allow the hammer's striking faces to wear down to the point where the hammer housing makes contact with the work surface, as irreparable damage could result. Always wear safety goggles when using a hammer or any striking tool. Bystanders must also wear safety goggles. Never strike the hammer with or against another striking tool, hardened nail, or any other hard object that could cause damage. Chipping could occur, resulting in possible eye or other injury. Discard any chipped or damaged hammer.

## SUPERCRAFT HAMMERS — WOODEN HANDLE

PART NO.	FACE DIA	WEIGHT (LBS)	OVERALL LENGTH	HEAD LENGTH	REPLACEMENT INSERT (2 REQUIRED)
CL-3366-020-NRH	20mm (.78)	0.5	11.77	4.12	CL-3508-020-NRHI
CL-3366-030-NRH	30mm (1.18)	0.7	12.95	4.32	CL-3508-030-NRHI
CL-3366-040-NRH	40mm (1.57)	1.6	14.13	4.51	CL-3508-040-NRHI
CL-3366-050-NRH	50mm (1.96)	2.2	14.52	4.71	CL-3508-050-NRHI
CL-3366-060-NRH	60mm (2.36)	3.8	14.52	5.69	CL-3508-060-NRHI



**Supercraft  
Sledgehammers  
(Wooden Handle)**

## SUPERCRAFT SLEDGEHAMMERS — WOODEN HANDLE

PART NO.	FACE DIA	WEIGHT (LBS)	OVERALL LENGTH	HEAD LENGTH	REPLACEMENT INSERT (2 REQUIRED)
CL-3366-081-NRH	80mm (3.14)	9	34.5	7.85	CL-3508-080-NRHI
CL-3366-107-NRH	100mm (3.93)	15	39.2	8.24	CL-3508-100-NRHI



# NO-REBOUND HAMMERS

HOUSING & HANDLE: STEEL ASSEMBLY CONTAINING STEEL PELLETS  
 SUPERCRAFT INSERTS: NYLON, NATURAL WHITE COLOR, HARDNESS 68-78 SHORE D  
 SECURAL INSERTS: POLYURETHANE, YELLOW



**Supercraft Hammers (Steel Handle)**

**Secural Narrow Hammers (Steel Handle)**

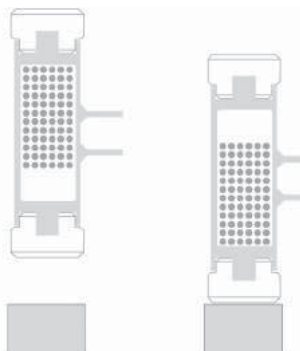
No-Rebound Hammers deliver full impact, about 50% greater than a standard hammer. The housing is filled with special steel pellets that transfer momentum to the impact point. Ideal for assembling machine parts without damage. Speeds up work while reducing fatigue. Allows better hammer control by absorbing the bounce. Steel handle with ergonomic rubber grip.

Supercraft No-Rebound Hammers are available in four sizes. Supercraft Hammers have replaceable nylon inserts. These nylon inserts are hard, grease and oil resistant, highly elastic, and have superior strike effectiveness.

Secural Narrow No-Rebound Hammers have a narrow, rectangular head that allows hammering in tight spots, and also makes storage easier in toolbox drawers. Available in one size, with a 30mm x 40mm face. Secural Narrow Hammers have replaceable polyurethane inserts. These inserts are medium soft.

Observe all appropriate safety precautions. Never allow the hammer's striking faces to wear down to the point where the hammer housing makes contact with the work surface, as irreparable damage could result. Always wear safety goggles when using a hammer or any striking tool. Bystanders must also wear safety goggles. Never strike the hammer with or against another striking tool, hardened nail, or any other hard object that could cause damage. Chipping could occur, resulting in possible eye or other injury. Discard any chipped or damaged hammer.

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No-Rebound Hammers are filled with special steel pellets that transfer momentum to the impact point.

## SUPERCRAFT HAMMERS — STEEL HANDLE

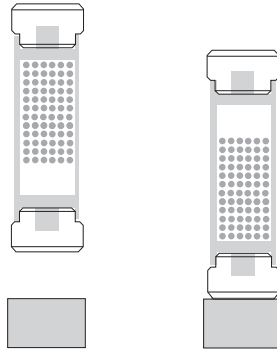
PART NO.	FACE DIA	WEIGHT (LBS)	OVERALL LENGTH	HEAD LENGTH	REPLACEMENT INSERT (2 REQUIRED)
CL-3377-030-NRH	30mm (1.18)	1.3	11.38	4.32	CL-3508-030-NRHI
CL-3377-040-NRH	40mm (1.57)	1.9	11.77	4.51	CL-3508-040-NRHI
CL-3377-050-NRH	50mm (1.96)	2.6	12.17	4.71	CL-3508-050-NRHI
CL-3377-060-NRH	60mm (2.36)	3.9	12.76	5.69	CL-3508-060-NRHI

## SECURAL NARROW HAMMERS — STEEL HANDLE

PART NO.	FACE DIMENSIONS (RECTANGULAR)	WEIGHT (LBS)	OVERALL LENGTH	HEAD LENGTH	REPLACEMENT INSERT (2 REQUIRED)
CL-3380-040-NRH	30mm x 40mm (1.18 x 1.57)	1.6	11.77	4.59	CL-3511-040-NRHI

# NO-REBOUND DROP HAMMERS

HOUSING: STEEL ASSEMBLY CONTAINING STEEL PELLETS  
 INSERTS: NYLON, NATURAL WHITE COLOR, HARDNESS 68-78 SHORE D



No-Rebound Drop Hammers are filled with special steel pellets that transfer momentum to the impact point.

No-Rebound Drop Hammers provide the impact of a normal hammer even when access is restricted. No-Rebound Hammers deliver full impact, about 50% greater than a standard hammer. The housing is filled with special steel pellets that transfer momentum to the impact point. Ideal for assembling machine parts without damage. Speeds up work while reducing fatigue. Allows better hammer control by absorbing the bounce. Available in four sizes.

No-Rebound Drop Hammers have replaceable nylon inserts. These nylon inserts are hard, grease and oil resistant, highly elastic, and have superior strike effectiveness. Applications include assembly operations, metalworking, tooling, positioning of workpieces, automotive assembly and repair work, joining of workpieces, sheet metal working, dent removal, mold construction, and assembly of sharp-edged workpieces.

PART NO.	FACE DIA	WEIGHT (LBS)	LENGTH	REPLACEMENT INSERT (2 REQUIRED)
CL-3408-020-NRH	20mm (.78)	0.5	5.89	CL-3508-020-NRHI
CL-3408-030-NRH	30mm (1.18)	1.0	6.08	CL-3508-030-NRHI
CL-3408-040-NRH	40mm (1.57)	1.8	6.28	CL-3508-040-NRHI
CL-3408-050-NRH	50mm (1.96)	2.8	6.48	CL-3508-050-NRHI

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# SOFT-FACE PUNCHES

HOUSING: STEEL. INSERTS: NYLON, NATURAL WHITE COLOR, HARDNESS 68-78 SHORE D

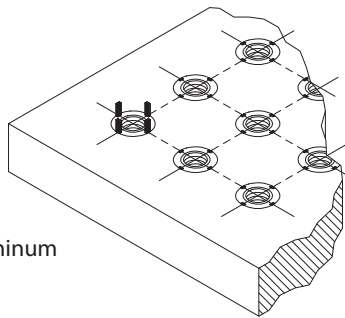


Soft-Face Punches safely extend the reach of a hammer when access is restricted. Transfers impact to difficult-to-reach places. Available in two sizes.

Soft-Face Punches have replaceable nylon inserts. These nylon inserts are hard, grease and oil resistant, highly elastic, and have superior strike effectiveness. Applications include assembly operations, metalworking, tooling, automotive assembly and repair work, joining of workpieces, sheet metal working, dent removal, and assembly of sharp-edged workpieces.

PART NO.	FACE DIA	WEIGHT (LBS)	LENGTH	REPLACEMENT INSERT (2 REQUIRED)
CL-3408-010-SFP	10mm (.39)	0.2	6.59	CL-3508-010-NRHI
CL-3408-015-SFP	15mm (.59)	0.4	6.87	CL-3508-015-NRHI

# KEY INSERTS

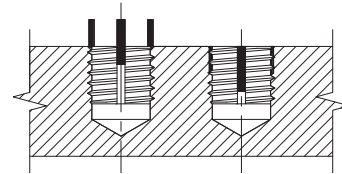


Key Inserts are often used to reinforce tapped holes in aluminum tooling plates.

These key-locking threaded inserts are ideal for thread reinforcement, especially when the mating stud or bolt will be removed frequently. They provide strong, permanent steel threads in any parent material — ferrous, non-ferrous, or non-metallic.

Key Inserts are also well suited for quick repair of stripped, damaged, or worn threads. A solid version is also available to use as a handy plug to relocate holes drilled or tapped on the wrong location.

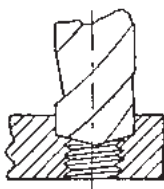
Install with standard drills and taps. Important: Use tap drill specified in table (slightly larger than standard for that thread size). Tap-drill hole tolerance should be  $-.001/+0.004$  ( $-.001/+0.005$  above .500 dia).



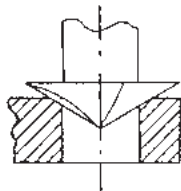
Locking keys are driven down into the parent material during installation, providing a positive mechanical lock against rotation. Inserts with an ID thread 5/16 and above have four locking keys, smaller sizes have two. Pull-out strength can be calculated approximately by the following formula:

$$\begin{array}{l} \text{Approximate} \\ \text{pull-out} \\ \text{strength} \end{array} = \begin{array}{l} \text{Shear} \\ \text{engagement} \\ \text{area of insert} \\ = (\text{see table}) \end{array} \times \begin{array}{l} \text{Minimum ultimate} \\ \text{shear strength of} \\ \text{parent material} \\ \text{X (psi)} \end{array}$$

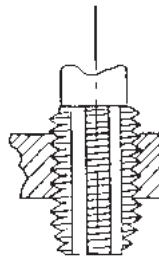
## EASY INSTALLATION



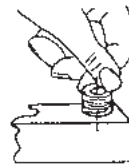
1. Drill out old threads using tap drill specified in table (Important: Correct tap drill is slightly larger than standard for that thread size).



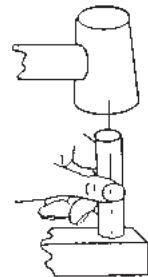
2. Countersink to diameter shown in table.



3. Tap new threads, using standard tap.

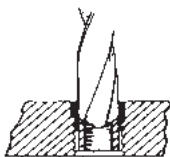


4. Screw in insert until body is slightly (.010 to .030 inches) below the surface, by hand or using installation tool. Keys act as a depth stop.

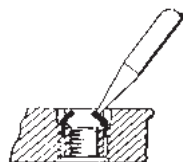


5. Drive keys down with several light hammer taps on installation tool (or directly on keys if no installation tool is available).

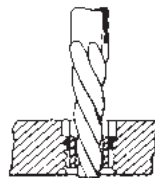
## EASY REMOVAL



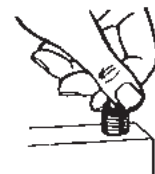
1. Drill out locking keys with specified drill diameter and depth (see table).



2. Deflect keys inward and break off.



3. Remove insert with an E-Z OUT type tool.



4. Screw replacement into original holes. Parent material is totally undamaged.

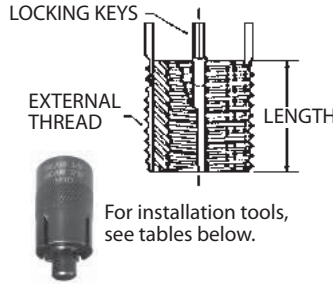
# KEY INSERTS HEAVY DUTY

BODY: 1215 STEEL, BLACK OXIDE FINISH. KEYS: 302 STAINLESS STEEL



**Heavy Duty – Steel**

General-purpose threaded inserts suitable for most applications. Available in USA ID-thread sizes from #10-24 to 1-1/2"-12, plus metric sizes from M5 to M24. Important: Use tap drill specified in table (slightly larger than standard for that thread size).



For installation tools, see tables below.



Repair Kits shown below contain an installation tool and several Key Inserts of a given size.

## HEAVY DUTY – STEEL (INCH)

PART NO.	INSERT DIMENSIONS				INSTALLATION DATA							REMOVAL DATA	
	INTERNAL THREAD	EXTERNAL THREAD	LENGTH	SHEAR ENGAG. (SQ. IN.)	REQ'D TAP DRILL	C'SINK DIA	MIN. THREAD DEPTH	STANDARD TAP UN-2B	INSTALLATION TOOL PART NO.	REPAIR KIT PART NO.	INSERTS PER KIT	DRILL SIZE	DRILL DEPTH
CL-1024-KS	#10-24	3/8-16	.31	.190	Q	3/8	3/8	3/8-16	CL-10-KST	CL-1024-KSK	15	9/32	1/8
CL-1032-KS	#10-32									CL-1032-KSK			
CL-1420-KS	1/4-20	7/16-14	.37	.284	X	7/16	7/16	7/16-14	CL-14-KST	CL-1420-KSK	13	11/32	3/16
CL-1428-KS	1/4-28									CL-1428-KSK			
CL-51618-KS	5/16-18	1/2-13	.43	.359	29/64	1/2	1/2	1/2-13	CL-516-KST	CL-51618-KSK	8	13/32	3/16
CL-51624-KS	5/16-24									CL-51624-KSK			
CL-3816-KS	3/8-16	9/16-12	.50	.498	33/64	9/16	9/16	9/16-12	CL-38-KST	CL-3816-KSK	6	15/32	3/16
CL-3824-KS	3/8-24									CL-3824-KSK			
CL-71614-KS	7/16-14	5/8-11	.62	.717	37/64	5/8	11/16	5/8-11	CL-716-KST	CL-71614-KSK	6	17/32	3/16
CL-71620-KS	7/16-20									CL-71620-KSK			
CL-1213-KS	1/2-13	3/4-16	.62	1.057	45/64	3/4	11/16	3/4-16	CL-12-KST	CL-1213-KSK	5	21/32	3/16
CL-1220-KS	1/2-20									CL-1220-KSK			
CL-91612-KS	9/16-12	3/4-16	.81	1.057	45/64	3/4	7/8	3/4-16	CL-12-KST	CL-91612-KSK	3	21/32	3/16
CL-91618-KS	9/16-18									CL-91618-KSK			
CL-5811-KS	5/8-11	7/8-14	.87	1.487	53/64	7/8	1	7/8-14	CL-58-KST	CL-5811-KSK	2	25/32	3/16
CL-5818-KS	5/8-18									CL-5818-KSK			
CL-3410-KS	3/4-10	1-1/8"-12	1.12	2.490	1-1/16	1-1/8	1-5/16	1-1/8"-12	CL-34-KST	CL-3410-KSK	2	31/32	5/16
CL-3416-KS	3/4-16									CL-3416-KSK			
CL-789-KS	7/8-9	1-1/4"-12	1.25	3.137	1-3/16	1-1/4	1-7/16	1-1/4"-12	CL-34-KST	CL-789-KSK	2	1-3/32	5/16
CL-7814-KS	7/8-14									CL-7814-KSK			
CL-18-KS	1"-8	1-3/8"-12	1.37	3.838	1-5/16	1-3/8	1-9/16	1-3/8"-12	CL-1-KST	CL-18-KSK	2	1-7/32	5/16
CL-112-KS	1"-12									CL-112-KSK			
CL-1187-KS	1-1/8"-7	1-1/2"-12	1.62	4.752	1-7/16	1-1/2	1-11/16	1-1/2"-12	CL-118-KST	CL-1187-KSK	2	1-11/32	5/16
CL-11812-KS	1-1/8"-12									CL-11812-KSK			
CL-1147-KS	1-1/4"-7	1-5/8"-12	1.81	5.446	1-35/64	1-5/8	2	1-5/8"-12	CL-114-KST	CL-1147-KSK	2	1-15/32	5/16
CL-11412-KS	1-1/4"-12									CL-11412-KSK			
CL-1126-KS	1-1/2"-6	1-7/8"-12	2.00	7.103	1-51/64	1-7/8	2-3/16	1-7/8"-12	CL-112-KST	CL-1126-KSK	2	1-23/32	5/16
CL-11212-KS	1-1/2"-12									CL-11212-KSK			

## HEAVY DUTY – STEEL (METRIC)

-	M5	M10x1.25	INFO+: AVAILABLE IN STAINLESS STEEL ONLY (PAGE 299)										
-	M6	M12x1.25											
-	M8	M14x1.5											
-	M8x1												
-	M10	M16x1.5											
-	M10x1.25												
-	M12	M18x1.5											
-	M12x1.25												
CLM-162-KSM	M16	M22x1.5	.87	1.390	20.5 or 13/16	.88	.96	M22x1.5	CL-58-KST	CLM-162-KSK	2	17.5mm or 11/16	1/4
CLM-1615-KSM	M16x1.5									CLM-1615-KSK			
CLM-2025-KSM	M20	M30x2	1.18	2.750	28mm or 1-7/64	1.19	1.36	M30x2	CL-34-KST	CLM-2025-KSK	2	26mm or 1-1/32	1/4
CLM-2015-KSM	M20x1.5									CLM-2015-KSK			
CLM-243-KSM	M24	M33x2	1.30	3.328	31mm or 1-7/32	1.31	1.48	M33x2	CLM-243-KSMT	CLM-243-KSK	2	29mm or 1-9/64	1/4
CLM-242-KSM	M24x2									CLM-242-KSK			

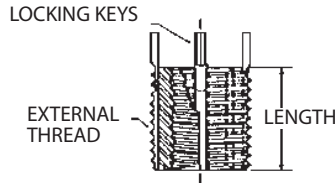
\* Installation Tool included in Repair Kit.

# KEY INSERTS HEAVY DUTY

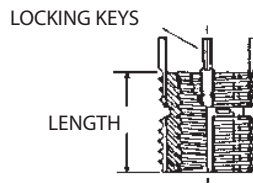
BODY: 303 STAINLESS STEEL. KEYS: 302 STAINLESS STEEL



**Heavy Duty –  
Stainless Steel**



**Heavy Duty –  
Stainless Steel  
Internal-Thread  
Locking**



Stainless steel version of our general-purpose threaded inserts with a thick, heavy-duty thread wall. Key Inserts are ideal for thread reinforcement, especially when the mating stud or bolt will be removed frequently. These stainless inserts provide strong, permanent stainless steel threads in any parent material, ferrous, non-ferrous, or non-metallic. Key Inserts are also well suited for quick repair of stripped, damaged, or worn threads. Locking keys positively prevent the insert from rotating.

Stainless Key Inserts are optionally available with “Internal Thread Locking,” which uses a modified internal thread to prevent the installed bolt or stud from rotating. This feature is useful for one-time, permanent installations.

See Technical Information at the beginning of this section for complete installation steps. Key Inserts are installed with standard drills and taps. Important: Use exactly the tap-drill size specified in the tables (slightly larger than the standard tap drill for that thread size). Locking keys are driven down into the parent material during installation, providing a positive mechanical lock against rotation. See tables for optional installation tools.

## HEAVY DUTY — STAINLESS STEEL (INCH)

PART NO.	INSERT DIMENSIONS				INSTALLATION DATA						REMOVAL DATA		MS EQUIVALENT	NAS EQUIVALENT
	INTERNAL THREAD	EXTERNAL THREAD	LENGTH	SHEAR ENGAGEMENT (SQ. IN.)	REQ'D TAP DRILL	C'SINK DIA	MIN. THREAD LENGTH	STANDARD TAP UN-2B	INSTALLATION TOOL PART NO.	DRILL SIZE	DRILL DEPTH			
CL-1024-SKS	#10-24											MS 51831-101	—	
CL-1032-SKS	#10-32	3/8-16	.31	.190	.332	.385	.37	3/8-16	CL-10-KST	9/32	1/8	MS 51831-201	NAS 1395C3	
CL-1420-SKS	1/4-20	7/16-14	.37	.284	.397	.447	.43	7/16-14	CL-14-KST	11/32	3/16	MS 51831-102	—	
CL-1428-SKS	1/4-28											MS 51831-202	NAS 1395C4	
CL-51618-SKS	5/16-18	1/2-13	.43	.359	.453	.510	.50	1/2-13	CL-516-KST	13/32	3/16	MS 51831-103	—	
CL-51624-SKS	5/16-24											MS 51831-203	NAS 1395C5	
CL-3816-SKS	3/8-16	9/16-12	.50	.498	.516	.572	.56	9/16-12	CL-38-KST	15/32	3/16	MS 51831-104	—	
CL-3824-SKS	3/8-24											MS 51831-204	NAS 1395C6	
CL-1213-SKS	1/2-13	3/4-16	.62	1.057	.703	.750	.69	3/4-16	CL-12-KST	21/32	3/16	—	—	
CL-1220-SKS	1/2-20											—	—	
CL-5811-SKS	5/8-11	7/8-14	.87	1.487	.828	.885	1.00	7/8-14	CL-58-KST	25/32	3/16	MS 51831-108	—	
CL-3410-SKS	3/4-10	1-1/8"-12	1.12	2.490	1.062	1.145	1.31	1-1/8"-12	CL-34-KST	31/32	5/16	MS 51831-109	—	

## HEAVY DUTY — STAINLESS STEEL INTERNAL THREAD LOCKING (INCH)

CL-1420-SKSL	1/4-20	7/16-14	.37	.197	.397	.447	.43	7/16-14	CL-14-KST	11/32	3/16	MS 51831-102L	—
CL-51618-SKSL	5/16-18	1/2-13	.43	.261	.453	.510	.50	1/2-13	CL-516-KST	13/32	3/16	MS 51831-103L	—
CL-3816-SKSL	3/8-16	9/16-12	.50	.384	.516	.572	.56	9/16-12	CL-38-KST	15/32	3/16	MS 51831-104L	—
CL-1213-SKSL	1/2-13	11/16-11NS	.68	.737	.641	.700	.75	11/16-11NS	CL-111611-KSST	19/32	3/16	MS 51831-106L	—
CL-5811-SKSL	5/8-11	7/8-14	.87	1.242	.828	.885	1.00	7/8-14	CL-58-KST	25/32	3/16	MS 51831-108L	—

## HEAVY DUTY — STAINLESS STEEL (METRIC)

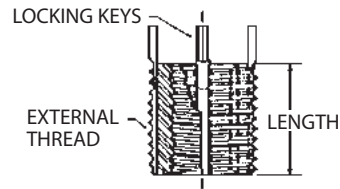
CLM-58-SKSM	M5	M10x1.25	.39	.275	8.8mm or 5	.40	.45	M10x1.25	CL-10-KST	7.5mm or 19/64	.19	—	—
CLM-61-SKSM	M6	M12x1.25	.47	.413	10.8mm or 27/64	.48	.53	M12x1.25	CL-14-KST	9.5mm or 3/8	.19	—	—
CLM-8125-SKSM	M8	M14x1.5	.55	.530	13mm or 1/2	.56	.61	M14x1.5	CL-516-KST	11.5mm or 29/64	.19	—	—
CLM-81-SKSM	M8x1												
CLM-1015-SKSM	M10	M16x1.5	.63	.729	15mm or 37/64	.64	.69	M16x1.5	CL-38-KST	13.5mm or 17/32	.19	—	—
CLM-10125-SKSM	M10x1.25												
CLM-12175-SKSM	M12	M18x1.5	.71	.820	17mm or 21/32	.72	.77	M18x1.5	CL-12-KST	15.5mm or 39/64	.19	—	—
CLM-12125-SKSM	M12x1.25												
CLM-162-SKS	M16	M22x1.5	.87	1.390	20.5mm or 13/16	.88	.96	M22x1.5	CLM-58-KSMT	17.5mm or 11/16	1/4	—	—
CLM-2025-SKS	M20	M30x2	1.18	2.750	28mm or 1-7/64	1.19	1.36	M30x2	CL-34-KST	26mm or 1-1/64	1/4	—	—
CLM-243-SKS	M24	M33x2	1.30	3.328	31mm or 1-7/32	1.31	1.48	M33x2	CLM-243-KSMT	29mm or 1-9/64	1/4	—	—

# KEY INSERTS THINWALL

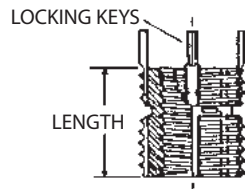
BODY: 12L15 STEEL, BLACK OXIDE FINISH, OR 303 STAINLESS STEEL.  
KEYS: 302 STAINLESS STEEL



**Thinwall —  
Steel and  
Stainless Steel**



**Thinwall —  
Stainless Steel  
Internal-Thread  
Locking**



Thinwall Key Inserts have a smaller OD thread size than standard heavy-duty inserts, ideal for tight spaces where less pull-out strength is acceptable. Key Inserts are ideal for thread reinforcement, especially when the mating stud or bolt will be removed frequently. These stainless inserts provide strong, permanent stainless steel threads in any parent material, ferrous, non-ferrous, or non-metallic. Key Inserts are also well suited for quick repair of stripped, damaged, or worn threads. Locking keys positively prevent the insert from rotating.

Stainless Key Inserts are optionally available with "Internal Thread Locking," which uses a modified internal thread to prevent the installed bolt or stud from rotating. This feature is useful for one-time, permanent installations.

See Technical Information at the beginning of this section for complete installation steps. Key Inserts are installed with standard drills and taps. Important: Use exactly the tap-drill size specified in the tables (slightly larger than the standard tap drill for that thread size). Locking keys are driven down into the parent material during installation, providing a positive mechanical lock against rotation. See tables for optional installation tools.

## THINWALL — STAINLESS STEEL (INCH)

PART NO.	INSERT DIMENSIONS				INSTALLATION DATA						REMOVAL DATA		MS EQUIVALENT	NAS EQUIVALENT
	INTERNAL THREAD	EXTERNAL THREAD	LENGTH	SHEAR ENGAGEMENT (SQ. IN.)	REQ'D TAP DRILL	C'SINK DIA	MIN. THREAD LENGTH	STANDARD TAP UN-2B	INSTALLATION TOOL PART NO.	DRILL SIZE	DRILL DEPTH			
CL-1024-TSKS	#10-24												MS 51830-105	—
CL-1032-TSKS	#10-32	5/16-18	.31	.152	.272	.323	.37	5/16-18	CL-10-KST	7/32	5/32	MS 51830-201	NAS 1394C3	
CL-1420-TSKS	1/4-20	3/8-16	.37	.237	.332	.385	.43	3/8-16	CL-14-KST	9/32	3/16	MS 51830-106	—	
CL-1428-TSKS	1/4-28											MS 51830-202	NAS 1394C4	
CL-51618-TSKS	5/16-18	7/16-14	.43	.305	.397	.447	.50	7/16-14	CL-516-KST	11/32		MS 51830-107	—	
CL-3816-TSKS	3/8-16	1/2-13	.50	.430	.453	.510	.56	1/2-13	CL-38-KST	13/32		MS 51830-108	—	
CL-1213-TSKS	1/2-13	5/8-11	.62	.718	.578	.635	.68	5/8-11	CL-12-KST	17/32		MS 51830-110	—	

## THINWALL — STAINLESS STEEL INTERNAL THREAD LOCKING (INCH)

CL-1032-TSKSL	#10-32	5/16-18	.31	.094	.272	.323	.37	5/16-18	CL-10-KST	7/32	5/32	MS 51830-201L	NAS 1394C3L
CL-1420-TSKSL	1/4-20	3/8-16	.37	.173	.332	.385	.43	3/8-16	CL-14-KST	9/32	3/16	MS 51830-106L	—
CL-51618-TSKSL	5/16-18	7/16-14	.43	.232	.397	.447	.50	7/16-14	CL-516-KST	11/32		MS 51830-107L	—
CL-3816-TSKSL	3/8-16	1/2-13	.50	.337	.453	.510	.56	1/2-13	CL-38-KST	13/32		MS 51830-108L	—
CL-1213-TSKSL	1/2-13	5/8-11	.68	.591	.578	.635	.68	5/8-11	CL-12-KST	17/32		MS 51830-110L	—

## THINWALL — STEEL (METRIC)

CLM-58-KSM	M5	M8	.32	.163	6.9mm or I	.32	.36	M8	CL-10-KST	5.5mm or 7/32	5/32	—	—
CLM-61-KSM	M6	M10x1.25	.39	.275	8.8mm or S	.40	.45	M10x1.25	CL-14-KST	7.5mm or 19/64	3/16	—	—
CLM-8125-KSM	M8	M12x1.25	.47	.413	10.8mm or 27/64	.48	.54	M12x1.25	CL-516-KST	9.5mm or 3/8		—	—
CLM-81-KSM	M8x1											—	—
CLM-1015-KSM	M10	M14x1.5	.55	.530	13mm or 1/2	.56	.62	M14x1.5	CL-38-KST	11.5mm or 29/64		—	—
CLM-10125-KSM	M10x1.25											—	—
CLM-12175-KSM	M12											—	—
CLM-12125-KSM	M12x1.25	M16x1.5	.63	.729	15mm or 37/64	.63	.69	M16x1.5	CL-12-KST	13.5mm or 17/32		—	—

## THINWALL — STAINLESS STEEL (METRIC)

CLM-58-SKS	M5	M8	.32	.163	6.9mm or I	.32	.36	M8	CL-10-KST	5.5mm or 7/32	5/32	—	—
CLM-61-SKS	M6	M10x1.25	.39	.275	8.8mm or S	.40	.45	M10x1.25	CL-14-KST	7.5mm or 19/64	3/16	—	—
CLM-8125-SKS	M8	M12x1.25	.47	.413	10.8mm or 27/64	.48	.54	M12x1.25	CL-516-KST	9.5mm or 3/8		—	—
CLM-81-SKS	M8x1											—	—
CLM-1015-SKS	M10	M14x1.5	.55	.530	13mm or 1/2	.56	.62	M14x1.5	CL-38-KST	11.5mm or 29/64		—	—
CLM-10125-SKS	M10x1.25											—	—
CLM-12175-SKS	M12											—	—
CLM-12125-SKS	M12x1.25	M16x1.5	.63	.729	15mm or 37/64	.63	.69	M16x1.5	CL-12-KST	13.5mm or 17/32		—	—

# KEY INSERTS SOLID

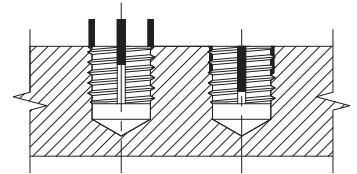
BODY: 12L15 STEEL, BLACK OXIDE FINISH, OR 303 STAINLESS STEEL.  
KEYS: 302 STAINLESS STEEL



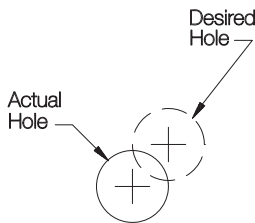
**Solid – Steel and Stainless Steel**

Solid Key Inserts are ideal for relocating a drilled or tapped hole. This threaded plug installs quickly, and the locking keys positively prevent the insert from rotating.

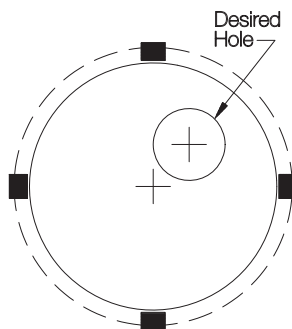
See Technical Information at the beginning of this section for complete installation steps. Key Inserts are installed with standard drills and taps. Important: Use exactly the tap-drill size specified in the tables (slightly larger than the standard tap drill for that thread size). Locking keys are driven down into the parent material during installation, providing a positive mechanical lock against rotation. See tables for optional installation tools.



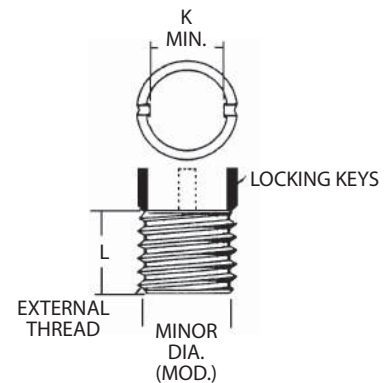
For installation tools, see table below.



**Before Repair**



**After Repair**



## SOLID – STAINLESS STEEL (INCH)

PART NO.	INSERT DIMENSIONS				INSTALLATION DATA				REMOVAL DATA		
	EXTERNAL THREAD	L	K	SHEAR ENGAGEMENT (SQ. IN.)	REQ'D TAP DRILL	C' SINK DIA +.010/-000	STANDARD TAP UN-2B	MIN. THREAD DEPTH	INSTALLATION TOOL PART NO.	DRILL SIZE	DRILL DEPTH
CL-51618-KSS	5/16-18	.31	.216	.152	I	.323	5/16-18	.37	CL-51618-KSST	7/32	1/8
CL-3816-KSS	3/8-16	.31	.285	.190	Q	.385	3/8-16	.37	CL-3816-KSST	9/32	1/8
CL-71614-KSS	7/16-14	.37	.341	.284	X	.447	7/16-14	.43	CL-71614-KSST	11/32	3/16
CL-1213-KSS	1/2-13	.43	.403	.359	29/64	.510	1/2-13	.50	CL-1213-KSST	13/32	3/16
CL-91612-KSS	9/16-12	.50	.465	.498	33/64	.572	9/16-12	.56	CL-91612-KSST	15/32	3/16
CL-5811-KSS	5/8-11	.62	.528	.717	37/64	.635	5/8-11	.68	CL-5811-KSST	17/32	3/16
CL-111611-KSS	11/16-11-NS	.68	.590	.888	41/64	.700	11/16-11-NS	.75	CL-111611-KSST	19/32	3/16
CL-131616-KSS	13/16-16	.81	.716	1.249	49/64	.822	13/16-16	.94	CL-131616-KSST	23/32	3/16
CL-7814-KSS	7/8-14	.87	.778	1.487	53/64	.885	7/8-14	1.00	CL-7814-KSST	25/32	3/16
CL-11812-KSS	1-1/8"-12	1.12	.970	2.490	1-1/16	1.145	1-1/8"-12	1.31	CL-11812-KSST	31/32	5/16
CL-11412-KSS	1-1/4"-12	1.25	1.095	3.137	1-3/16	1.270	1-1/4"-12	1.41	CL-11412-KSST	1-3/32	5/16
CL-13812-KSS	1-3/8"-12	1.37	1.220	3.838	1-5/16	1.395	1-3/8"-12	1.56	CL-13812-KSST	1-7/32	5/16

## SOLID – STEEL (METRIC)

CLM-8125-KSSM	M8	.31	.218	.154	6.9mm or I	.325	M8	.37	CLM-8125-KSST	5.5mm or 7/32	.16
CLM-10125-KSSM	M10 x 1.25	.39	.299	.209	8.8mm or S	.404	M10 x 1.25	.49	CLM-10125-KSST	7.5mm or M	.19
CLM-12125-KSSM	M12 x 1.5	.47	.368	.331	10.8mm or 27/64	.482	M12 x 1.25	.57	CLM-12125-KSST	9.5mm or 3/8	.19
CLM-1615-KSSM	M16 x 1.5	.63	.532	.728	14.75mm or 37/64	.640	M16 x 1.5	.73	CLM-1615-KSST	13.5mm or 17/32	.19
CLM-2015-KSSM	M20 x 1.5	.79	.694	1.173	18.75mm or 47/64	.797	M20 x 1.5	.89	CLM-2015-KSST	17.5mm or 11/16	.19
CLM-2415-KSSM	M24 x 1.5	.94	.815	1.757	22.5mm or 57/64	.955	M24 x 1.5	1.04	CLM-2415-KSST	19.75mm or 25/32	.25
CLM-302-KSSM	M30 x 2	1.18	1.035	2.800	28mm or 1-7/64	1.191	M30 x 2	1.36	CLM-302-KSST	25.75mm or 1-1/64	.25

# KEY INSERT ASSORTMENTS



With Key Insert Assortments, you always have the right insert and installation tool on hand for thread repairs. Each of the four assortments contains many different insert sizes and an installation tool for each size. The durable case provides convenient storage and clear organization. **INFO+**: Order individual inserts on pages 298-301 as refills.

8



## UNC COARSE

PART NO.	CONTAINS THESE INSERTS			CONTAINS THESE TOOLS
	QTY	ID THREAD	PART NO.	
CL-1-KS-C	5	#10-24	CL-1024-KS	CL-10-KST
	10	1/4-20	CL-1420-KS	CL-14-KST
	10	5/16-18	CL-51618-KS	CL-516-KST
	10	3/8-16	CL-3816-KS	CL-38-KST
	10	1/2-13	CL-1213-KS	CL-12-KST
	5	5/8-11	CL-5811-KS	CL-58-KST
	5	3/4-10	CL-3410-KS	CL-34-KST

## UNC COARSE — STAINLESS STEEL

PART NO.	CONTAINS THESE INSERTS			CONTAINS THESE TOOLS
	QTY	ID THREAD	PART NO.	
CL-1-SKS-C	5	#10-24	CL-1024-KS	CL-10-KST
	10	1/4-20	CL-1420-KS	CL-14-KST
	10	5/16-18	CL-51618-KS	CL-516-KST
	10	3/8-16	CL-3816-KS	CL-38-KST
	10	1/2-13	CL-1213-KS	CL-12-KST
	10	5/8-11	CL-5811-KS	CL-58-KST
	5	3/4-10	CL-3410-KS	CL-34-KST

## UNF FINE

PART NO.	CONTAINS THESE INSERTS			CONTAINS THESE TOOLS
	QTY	ID THREAD	PART NO.	
CL-1-KS-F	5	#10-24	CL-1032-KS	CL-10-KST
	10	1/4-20	CL-1428-KS	CL-14-KST
	10	5/16-18	CL-51624-KS	CL-516-KST
	10	3/8-16	CL-3824-KS	CL-38-KST
	10	1/2-13	CL-1220-KS	CL-12-KST
	10	5/8-11	CL-5818-KS	CL-58-KST
	5	3/4-10	CL-3416-KS	CL-34-KST

## METRIC COARSE

PART NO.	CONTAINS THESE INSERTS			CONTAINS THESE TOOLS
	QTY	ID THREAD	PART NO.	
CLM-1-KSM-C	5	M5	CLM-58-KSM	CL-10-KST
	10	M6	CLM-61-KSM	CL-14-KST
	10	M8	CLM-8125-KSM	CL-516-KST
	10	M10	CLM-1015-KSM	CL-38-KST
	10	M12	CLM-12175-KSM	CL-12-KST
	10	M16	CLM-162-KSM	CL-58-KST
	5	M20	CLM-2025-KSM	CL-34-KST

## SOLID — STAINLESS STEEL

PART NO.	CONTAINS THESE INSERTS			CONTAINS THESE TOOLS
	QTY	ID THREAD	PART NO.	
CLM-1-KSM-C	5	5/16-18	CL-51618-KSS	CL-51618-KSST
	10	3/8-16	CL-3816-KSS	CL-3816-KSST
	10	1/2-13	CL-1213-KSS	CL-1213-KSST
	10	9/16-12	CL-91612-KSS	CL-91612-KSST
	10	5/8-11	CL-5811-KSS	CL-5811-KSST
	10	7/8-14	CL-7814-KSS	CL-7814-KSST
	5	1-1/8"-12	CL-11812-KSS	CL-11812-KSST

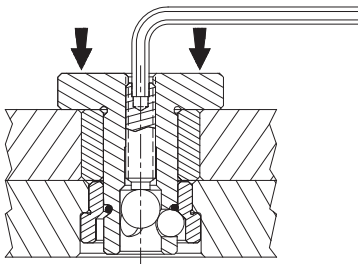


# CARR LOCK® SYSTEM

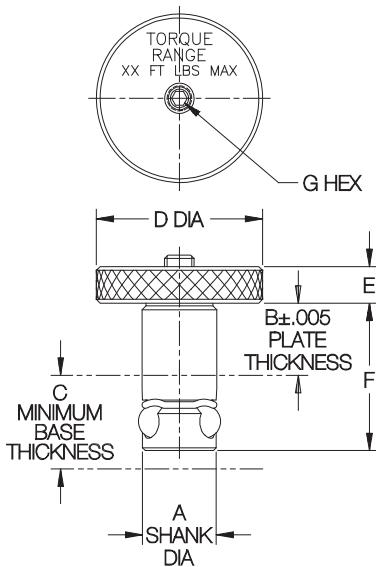
CLAMP BODY: 4340 STEEL, HEAT TREATED RC 40-45, BLACK OXIDE FINISH  
 RECEIVER BUSHINGS: 4340 STEEL, HEAT TREATED RC 50-54, BLACK OXIDE FINISH  
 LINERS: 1144 OR TOOL STEEL, HEAT TREATED RC 58-64, BLACK OXIDE FINISH



**Carr Lock® Clamp**



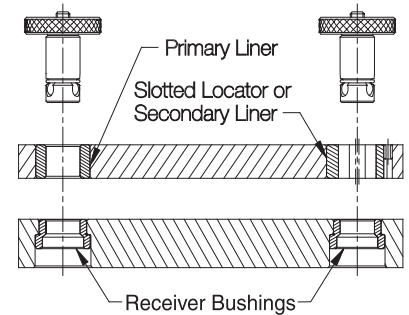
Turning the clamping screw with a hex wrench advances the large center ball, pushing the three clamping balls outward. These balls engage the angled ID of the Receiver Bushing, pulling the entire unit firmly downward.



The Carr Lock® System allows accurately locating and clamping at the same time, with just the turn of a hex wrench. Ideal for mounting quick-change tooling on a subplate. Each mount consists of three components: (1) a Carr Lock® Clamp with a precisely ground shank; (2) a Liner Bushing in the top plate; (3) a Receiver Bushing in the subplate. This compact assembly provides considerable holddown force, together with an incredible  $\pm .0005$  inches repeatability!

Each top plate should have one Carr Lock® Clamp designated as its primary reference point, and one as its secondary reference point. These two clamps should be as far apart as possible. The secondary reference point should have a relieved liner to avoid redundant location (binding). Additional Carr Lock® Clamps can be used for more clamping force, but these should be installed in clearance holes, not locating liners. Note that the same Carr Lock® Clamp fits any type of liner or a clearance hole.

Carr Lock® Clamps must be used with one of the Receiver Bushings (**INFO+**) on page 305. Plate thickness must be  $\pm .005$  inches to achieve proper clamping force. Special grip lengths for other plate thicknesses are available as specials. Do not exceed maximum screw torque shown.



## CARR LOCK® CLAMPS (INCH)

PART NO.	A SHANK DIA		B		C	D DIA	E	F	G	MAX SCREW TORQUE (FT-LBS)	MAX HOLD DOWN FORCE	SPARE PARTS KIT PART NO.*
	NOMINAL	ACTUAL	NOMINAL	ACTUAL								
CL-13-CLC-0.50	13mm	.5116	1/2	.500	.75	7/8	1/4	1.08	3/32	1	750	CL-13-CLPK-0.50
CL-13-CLC-0.75		.5111	3/4	.750				1.33				CL-13-CLPK-0.75
CL-16-CLC-0.50	16mm	.6297	1/2	.500	.75	1-1/2	5/16	1.15	1/8	2	1200	CL-16-CLPK-0.50
CL-16-CLC-0.75		.6292	3/4	.750				1.40				CL-16-CLPK-0.75
CL-20-CLC-0.75	20mm	.7872	3/4	.750	.83	1-3/4	3/8	1.53	1/8	3	3000	CL-20-CLPK-0.75
CL-20-CLC-1.00		.7867	1	1.000				1.78				CL-20-CLPK-1.00
CL-25-CLC-0.75	25mm	.9841	3/4	.750	1.00	2	3/8	1.70	5/32	7	7000	CL-25-CLPK-0.75
CL-25-CLC-1.00		.9836	1	1.000				1.95				CL-25-CLPK-1.00
CL-30-CLC-0.75	30mm	1.1809	3/4	.750	1.23	2-1/4	1/2	1.88	3/16	12	10000	CL-30-CLPK-0.75
CL-30-CLC-1.00		1.1804	1	1.000				2.13				CL-30-CLPK-1.00
CL-35-CLC-0.75	35mm	1.3778	3/4	.750	1.28	2-1/4	1/2	1.97	1/4	19	15500	CL-35-CLPK-0.75
CL-35-CLC-1.00			1	1.000				2.22				CL-35-CLPK-1.00
CL-35-CLC-1.50			1-1/2	1.500				2.72				CL-35-CLPK-1.50
CL-35-CLC-2.00			2	2.000				3.22				CL-35-CLPK-2.00
CL-50-CLC-1.00	50mm	1.9683	1	1.000	1.80	3	3/4	2.70	3/8	38	20000	CL-50-CLPK-1.00
CL-50-CLC-1.50			1-1/2	1.500				3.20				CL-50-CLPK-1.50
CL-50-CLC-2.00			2	2.000				3.70				CL-50-CLPK-2.00

## CARR LOCK® CLAMPS (METRIC)

PART NO.	SHANK DIA	ACTUAL	NOMINAL	ACTUAL	C	D DIA	E	F	G	MAX SCREW TORQUE (FT-LBS)	MAX HOLD DOWN FORCE	SPARE PARTS KIT PART NO.*
CLM-13-CLC-20	13mm	.5111	20mm	.787	.75	1.50	.315	1.36	3mm	2	1200	CLM-13-CLPK-20
CLM-16-CLC-20	16mm	.6297	20mm	.787				1.44				CLM-16-CLPK-20
CLM-16-CLC-25	16mm	.6292	25mm	.984	.83	1.77	.394	1.63	3mm	3	3000	CLM-16-CLPK-25
CLM-20-CLC-20	20mm	.7872	20mm	.787				1.56				CLM-20-CLPK-20
CLM-20-CLC-25	20mm	.7867	25mm	.984	1.00	1.97	.394	1.75	4mm	7	7000	CLM-20-CLPK-25
CLM-25-CLC-20	25mm	.9841	20mm	.787				1.73				CLM-25-CLPK-20
CLM-25-CLC-25	25mm	.9836	25mm	.984	1.93			1.93				CLM-25-CLPK-25

\* Spare Parts Kit includes screw, center ball, locking balls, and O-ring.

# CARR LOCK® SYSTEM



**Primary Liner Bushing**



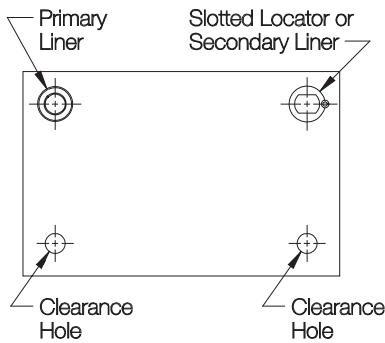
**Secondary Liner Bushing**



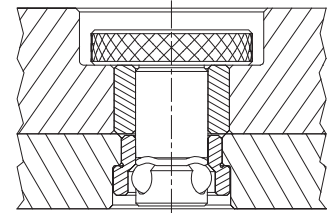
**Slotted Locator Bushing**

## LINER BUSHINGS

Each top plate should have one Primary Liner, and one Secondary Liner or Slotted Locator Bushing. Primary Liners have a tight ID (+.0002/+.0007 tolerance) for precise reference in two axes. Secondary Liners have slight ID clearance (+.0010/+.0020 tolerance) to avoid binding. Slotted Locator Bushings provide better accuracy than Secondary Liners, but take a few extra steps to install (**INFO+**: see page 31 for instructions and additional dimensions). Slotted Locators have a tight ID tolerance in one direction and full relief in the perpendicular direction (available only in 16mm, 20mm, and 25mm diameters). Note: alternatively, two Primary Liners can be used for alignment if hole locations are held to ±.0002 inches.



To mount top plates with more than two Carr Lock® Clamps, use clearance holes .015-.030 inches over nominal size for the additional holes, instead of liner bushings, to avoid redundant location. (Still use four Receiver Bushings in the subplate.)



Extra-thick top plates can be counter-bored to achieve proper clamping thickness (hold thickness to ±.005). Special-length Carr Lock® Clamps are also available, as specials.

## PRIMARY LINER BUSHINGS (INCH)

PART NO.	ID	LENGTH	OD	HOLE IN PLATE		
CL-13-CLPL-0.50	13mm	.50	.7518	.7504		
CL-13-CLPL-0.75		.75	.7514	.7509		
CL-16-CLPL-0.50	16mm	.50	1.0018	1.0004		
CL-16-CLPL-0.75		.75	1.0014	1.0009		
CL-20-CLPL-0.75	20mm	.75	1.3772	1.3758		
CL-20-CLPL-1.00		1.00	1.3768	1.3763		
CL-25-CLPL-0.75	25mm	.75	1.3772	1.3758		
CL-25-CLPL-1.00		1.00	1.3768	1.3763		
CL-30-CLPL-0.75	30mm	.75	1.7523	1.7509		
CL-30-CLPL-1.00		1.00	1.7519	1.7514		
CL-35-CLPL-0.75	35mm	.75	1.7523	1.7509		
CL-35-CLPL-1.00		1.00				
CL-35-CLPL-1.50		1.50			1.7519	1.7514
CL-35-CLPL-2.00		2.00				
CL-50-CLPL-1.00	50mm	1.00	2.5025	2.5007		
CL-50-CLPL-1.50		1.50			2.5021	2.5012
CL-50-CLPL-2.00		2.00				

## SECONDARY LINER BUSHINGS (INCH)

PART NO.	ID	LENGTH	OD	HOLE IN PLATE		
CL-13-CLSL-0.50	13mm	.50	.7518	.7504		
CL-13-CLSL-0.75		.75	.7514	.7509		
CL-16-CLSL-0.50	16mm	.50	1.0018	1.0004		
CL-16-CLSL-0.75		.75	1.0014	1.0009		
CL-20-CLSL-0.75	20mm	.75	1.3772	1.3758		
CL-20-CLSL-1.00		1.00	1.3768	1.3763		
CL-25-CLSL-0.75	25mm	.75	1.3772	1.3758		
CL-25-CLSL-1.00		1.00	1.3768	1.3763		
CL-30-CLSL-0.75	30mm	.75	1.7523	1.7509		
CL-30-CLSL-1.00		1.00	1.7519	1.7514		
CL-35-CLSL-0.75	35mm	.75	1.7523	1.7509		
CL-35-CLSL-1.00		1.00			1.7519	1.7514
CL-35-CLSL-1.50		1.50				
CL-35-CLSL-2.00		2.00				
CL-50-CLSL-1.00	50mm	1.00	2.5025	2.5007		
CL-50-CLSL-1.50		1.50			2.5021	2.5012
CL-50-CLSL-2.00		2.00				

## SLOTTED LOCATOR BUSHINGS (INCH)

PART NO.	ID	LENGTH	OD	HOLE IN PLATE
—	13mm	—	—	—
CLM-16-SLLB	16mm	.472	1.1815 1.1812	1.1806 1.1809
CLM-20-SLLB	20mm	.748	1.4177 1.4174	1.4168 1.4171
CLM-25-SLLB	25mm	.748	1.5752 1.5749	1.5743 1.5746
—	30mm	—	—	—
—	35mm	—	—	—
—	50mm	—	—	—

## (METRIC)

PART NO.	ID	LENGTH	OD	HOLE IN PLATE
CLM-13-CLPL-13	13mm	.512	19mm	.7487
CLM-13-CLPL-20		.787		.7491
CLM-16-CLPL-20	16mm	.787	25mm	.9849
CLM-16-CLPL-25		.984		.9853
CLM-20-CLPL-20	20mm	.787	35mm	1.3787
CLM-20-CLPL-25		.984		1.3791
CLM-25-CLPL-20	25mm	.787	35mm	1.3787
CLM-25-CLPL-25		.984		1.3791

## (METRIC)

PART NO.	ID	LENGTH	OD	HOLE IN PLATE
CLM-13-CLSL-13	13mm	.512	19mm	.7487
CLM-13-CLSL-20		.787		.7491
CLM-16-CLSL-20	16mm	.787	25mm	.9849
CLM-16-CLSL-25		.984		.9853
CLM-20-CLSL-20	20mm	.787	35mm	1.3787
CLM-20-CLSL-25		.984		1.3791
CLM-25-CLSL-20	25mm	.787	35mm	1.3787
CLM-25-CLSL-25		.984		1.3791

## (METRIC)

PART NO.	ID	LENGTH	OD	HOLE IN PLATE
—	13mm	—	—	—
CLM-16-SLLB	16mm	.472	30mm	1.1806 1.1809
CLM-20-SLLB	20mm	.748	36mm	1.4168 1.4171
CLM-25-SLLB	25mm	.748	40mm	1.5743 1.5746

# CARR LOCK® SYSTEM



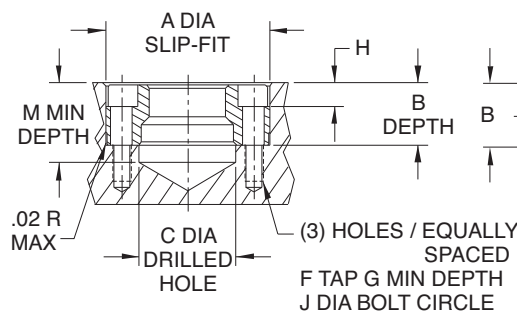
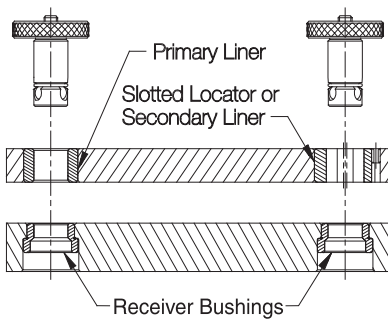
**Face-Mount Receiver Bushing**



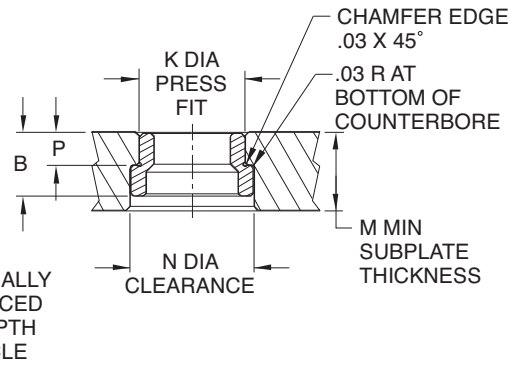
**Back-Mount Receiver Bushing**

## RECEIVER BUSHINGS

Carr Lock® Clamps must be used in conjunction with one of these Receiver Bushings. Face-Mount Receiver Bushings can be bolted into a slip-fit bored hole from above, with three Socket-Head Cap Screws (furnished). Back-Mount Receiver Bushings are more compact, but take more effort to install. Back-mount bushings are installed in the subplate from below, with a slight press fit (measure actual bushing before boring hole to provide .0005 maximum press fit, to avoid I.D. distortion). With either bushing type, the installation holes must be jig bored for accurate size and location. Installed bushings will be approximately .012" below the subplate surface.



**Face Mount Hole Dimensions**



**Back Mount Hole Dimensions**

### FACE-MOUNT RECEIVER BUSHINGS (INCH)

PART NO.	ID	A DIA		B		C	F	G	H	J DIA	M
		BUSHING	HOLE	BUSHING	HOLE						
CL-13-CLFR	13mm	1.3750	1.3750	.455	.469	.688	#8-32	.31	.180	.984	.75
		1.3746	1.3746		.471						
CL-16-CLFR	16mm	1.4370	1.4370	.455	.469	.812	#8-32	.31	.193	1.125	.75
		1.4366	1.4366		.471						
CL-20-CLFR	20mm	1.6873	1.6873	.623	.637	.812	#10-32	.38	.273	1.362	.83
		1.6869	1.6869		.639						
CL-25-CLFR	25mm	2.0623	2.0623	.785	.799	1.000	1/4-28	.50	.316	1.644	1.00
		2.0619	2.0619		.801						
CL-30-CLFR	30mm	2.2654	2.2654	.857	.871	1.188	1/4-28	.75	.316	1.876	1.23
		2.2650	2.2650		.873						
CL-35-CLFR	35mm	2.6873	2.6873	.890	.904	1.562	5/16-24	.88	.375	2.178	1.28
		2.6869	2.6869		.906						
CL-50-CLFR	50mm	3.4998	3.4998	1.225	1.239	2.156	3/8-24	1.00	.475	2.916	1.80
		3.4994	3.4994		1.241						

### (METRIC)

CLM-13-CLFR	13mm	1.3776	1.3780	.455	.468	.531	M4	.39	.177	.984	.78
		1.3772	1.3783		.470						
CLM-16-CLFR	16mm	1.4563	1.4567	.455	.468	.650	M4	.39	.177	1.142	.78
		1.4559	1.4570		.470						
CLM-20-CLFR	20mm	1.7713	1.7717	.623	.637	.807	M5	.47	.236	1.378	.78
		1.7709	1.7720		.639						
CLM-25-CLFR	25mm	2.1650	2.1654	.785	.799	1.004	M6	.59	.276	1.654	.98
		2.1646	2.1657		.801						

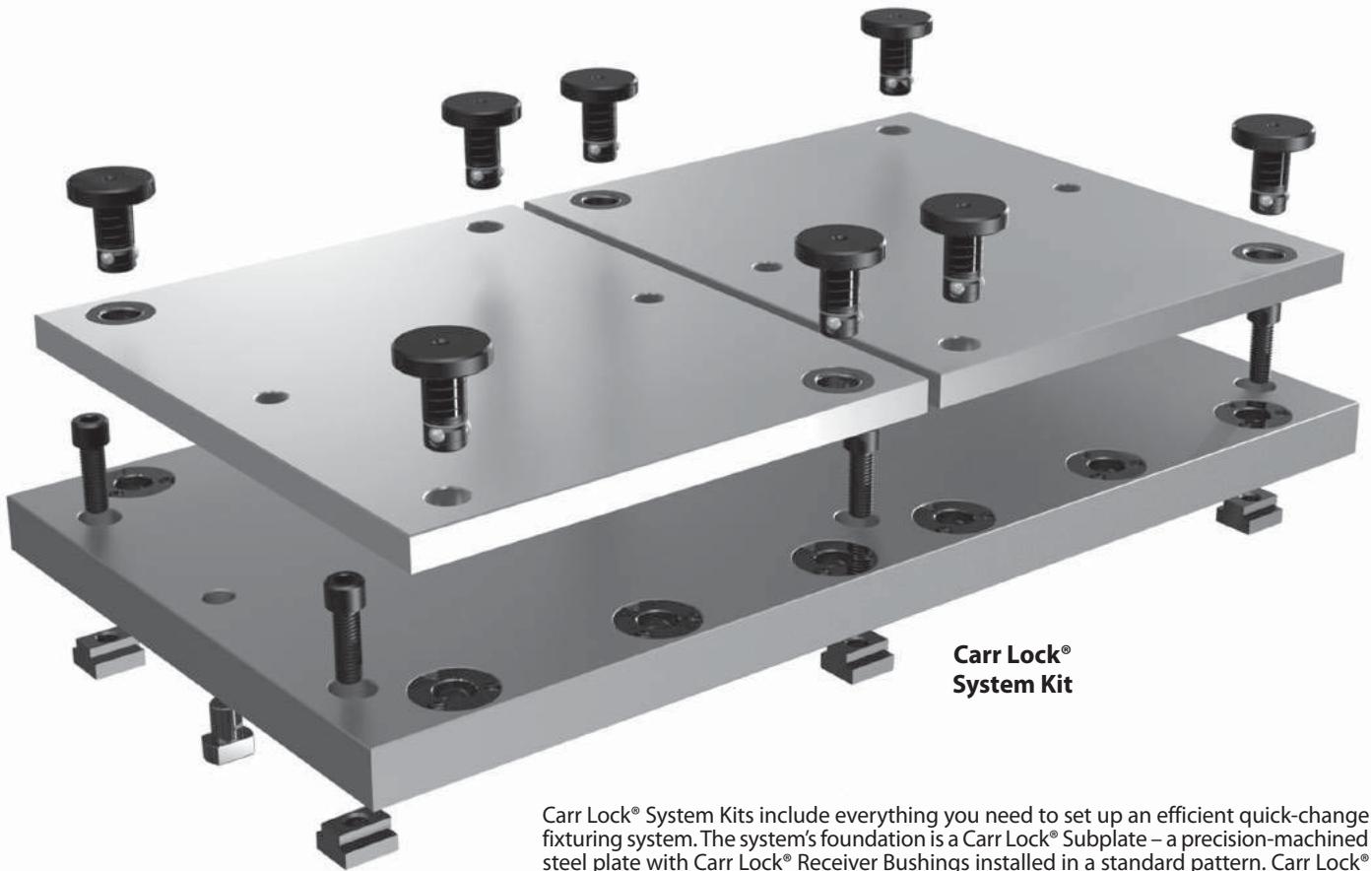
### BACK-MOUNT RECEIVER BUSHINGS (INCH)

PART NO.	ID	B	K DIA		M	N DIA		
			BUSHING	HOLE		BUSHING	HOLE	P
CL-13-CLBR	13mm	.475	1.3750	.75	.984	1.005	.995	.277
			1.3746					
CL-16-CLBR	16mm	.475	1.4370	.75	1.125	1.160	1.150	.285
			1.4366					
CL-20-CLBR	20mm	.673	1.6873	.83	1.250	1.285	1.275	.345
			1.6869					
CL-25-CLBR	25mm	.826	2.0623	1.00	1.562	1.598	1.588	.416
			2.0619					
CL-30-CLBR	30mm	.857	2.2654	1.23	1.875	1.911	1.901	.432
			2.2650					
CL-35-CLBR	35mm	.990	2.6873	1.28	2.125	2.160	2.150	.493
			2.6869					
CL-50-CLBR	50mm	1.225	3.4998	1.80	2.937	2.973	2.963	.621
			3.4994					

### (METRIC)

CLM-13-CLBR	13mm	.476	1.3776	.78	.984	1.019	1.019	.273
			1.3772					
CLM-16-CLBR	16mm	.476	1.4563	.78	1.125	1.147	1.137	.286
			1.4559					
CLM-20-CLBR	20mm	.673	1.7713	.78	1.268	1.304	1.294	.345
			1.7709					
CLM-25-CLBR	25mm	.826	2.1650	.98	1.583	1.619	1.609	.416
			2.1646					

# CARR LOCK® SYSTEM



Carr Lock® System Kits include everything you need to set up an efficient quick-change fixturing system. The system's foundation is a Carr Lock® Subplate – a precision-machined steel plate with Carr Lock® Receiver Bushings installed in a standard pattern. Carr Lock® System Kits also include one or more Carr Lock® Fixture Plates, plus all required Carr Lock® Clamps and subplate-mounting components.

The Carr Lock® System is extremely accurate. All Receiver-Bushing installation holes are located +/- .0002" from their primary reference hole. Clamping repeatability is +/- .0005", while bushing concentricity is .0002" TIR. The resulting x/y-axis repeatability of a mounted fixture plate is +/- .0028" considering all tolerance accumulation. Made in USA.

## CARR LOCK® SYSTEM KITS

PART NO. CARR LOCK® SYSTEM KIT	FOR MACHINE	KIT INCLUDES CARR LOCK® SUBPLATE		KIT INCLUDES CARR LOCK® FIXTURE PLATES		KIT INCLUDES CARR LOCK® CLAMPS	KIT INCLUDES T NUTS AND SOCKET-HEAD CAP SCREWS	KIT INCLUDES FIXTURE KEYS
CL-1214-00-CLSK	HAAS® Mini Mill	12 x 14	CL-1214-00-CLSP	12 x 14	(1) CL-1214-00-CLFP	(4) CL-20-CLC-0.75	4	2
CL-1426-00-CLSK	HAAS® VF-1	14 x 26	CL-1426-00-CLSP	12 x 14	(2) CL-1214-00-CLFP	(8) CL-20-CLC-0.75	6	2
CL-1436-00-CLSK	HAAS® VF-2	14 x 36	CL-1436-01-CLSP	14 x 14	(2) CL-1414-00-CLFP	(8) CL-20-CLC-0.75	8	2
CL-1436-01-CLSK				Jigsaw	(3) CL-1016-01-CLFP	(9) CL-20-CLC-0.75		
CL-400400-00-CLSK	Various	400 x 400mm	CL-400400-00-CLSP	400 x 400mm	(1) CL-400400-00-CLFP	(4) CL-20-CLC-0.75	6	2
CL-1626-00-CLSK	HAAS® VF-1YT	16 x 26	CL-1626-00-CLSP	12 x 14	(2) CL-1214-00-CLFP	(8) CL-20-CLC-0.75	6	2
CL-1626-01-CLSK				Jigsaw	(2) CL-1016-01-CLFP	(6) CL-20-CLC-0.75		
CL-1636-00-CLSK	HAAS® VF-2YT	16 x 36	CL-1636-01-CLSP	14 x 14	(2) CL-1414-00-CLFP	(8) CL-20-CLC-0.75	8	2
CL-1636-01-CLSK				Jigsaw	(3) CL-1016-01-CLFP	(9) CL-20-CLC-0.75		
CL-5001000-00-CLSK	Various	500 x 1000mm	CL-5001000-01-CLSP	14 x 14	(2) CL-1414-00-CLFP	(8) CL-20-CLC-0.75	8	2
CL-5001000-01-CLSK				400 x 400mm	(2) CL-400400-00-CLFP	(8) CL-20-CLC-0.75		
CL-5001000-02-CLSK				500 x 500mm	(2) CL-500500-00-CLFP	(8) CL-25-CLC-1.00		
CL-5001000-03-CLSK				Jigsaw	(4) CL-1016-01-CLFP	(12) CL-20-CLC-0.75		

HAAS® is a registered trademark of HAAS® Automation, Inc.

# CARR LOCK® SYSTEM

SUBPLATE: CARBON STEEL  
RECEIVER BUSHINGS: 4340 STEEL, HEAT TREATED RC 50-54, BLACK OXIDE FINISH

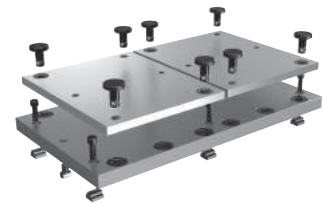
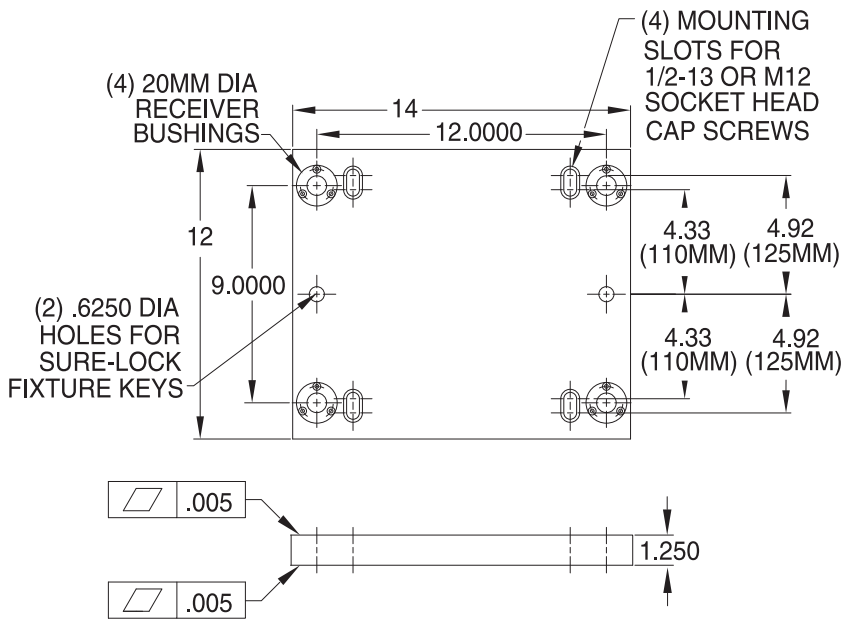


**Carr Lock® Subplate  
12 x 14  
For HAAS® Mini Mill**

Carr Lock® Subplates are precision-machined steel plates with Carr Lock® Receiver Bushings installed in a standard pattern. These subplates serve as the foundation of an efficient quick-change fixturing system. The 12 x 14 subplate shown here has (4) 20mm Face-Mount Receiver Bushings for mounting Fixture Plates.

Subplates should generally be large enough to cover most of the machine table, for maximum fixture flexibility, but should never extend beyond the machine table. For maximum quick-change benefits, subplates are usually left permanently on the machine table while only the mounted fixtures or vises are exchanged.

The Carr Lock® System is extremely accurate. All Receiver-Bushing installation holes are located +/- .0002" from their primary reference hole. Clamping repeatability is +/- .0005", while bushing concentricity is .0002" TIR. The resulting x/y-axis repeatability of a mounted fixture plate is +/- .0028" considering all tolerance accumulation. Made in USA.



## Carr Lock® System Kits

System Kits include everything you need to set up an efficient quick-change fixturing system. Kits include a Carr Lock® subplate, one or more Carr Lock® Fixture Plates, plus all required Carr Lock® Clamps and subplate-mounting components (Sure-Lock™ Fixture Keys, T Nuts, and Socket-Head Cap Screws).

## CARR LOCK® SUBPLATE

PART NO.	FOR MACHINE	SUBPLATE SIZE	SUBPLATE THICKNESS	ACCEPTS CARR LOCK® FIXTURE PLATES	REQUIRES CARR LOCK® CLAMPS
CL-1214-00-CLSP	HAAS® MINI MILL	12 X 14	(4) CL-20-CLC-0.75	(1) CL-1214-00-CLFP	(4) CL-20-CLC-0.75

## CARR LOCK® SYSTEM KIT

PART NO.	SYSTEM KIT INCLUDES					
	CARR LOCK® SUBPLATE 14 x 36	CARR LOCK® FIXTURE PLATE 14 x 14	CARR LOCK® CLAMPS 20mm	T NUTS 5/8	SOCKET-HEAD CAP SCREWS 1/2-13	SURE-LOCK™ FIXTURE KEYS 5/8
CL-1214-00-CLSK	(1) CL-1214-00-CLSP	(1) CL-1214-00-CLFP	(4) CL-20-CLC-0.75	(4) CL-2-TN	(4) CL-1/2-13X1.50-SHCS	(2) CL-6250-SLFK

# CARR LOCK® SYSTEM

SUBPLATE: CARBON STEEL  
 RECEIVER BUSHINGS: 4340 STEEL, HEAT TREATED RC 50-54, BLACK OXIDE FINISH

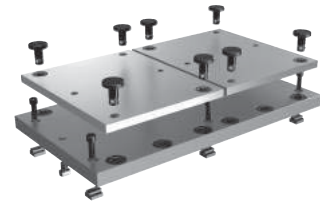
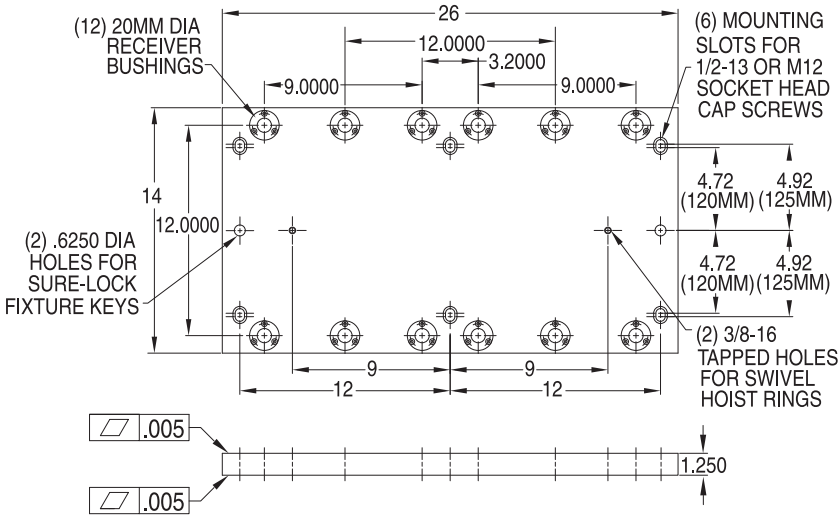


**Carr Lock® Subplate**  
**14 x 26**  
**For HAAS® VF-1**

Carr Lock® Subplates are precision-machined steel plates with Carr Lock® Receiver Bushings installed in a standard pattern. These subplates serve as the foundation of an efficient quick-change fixturing system. The 14 x 26 subplate shown here has (12) 20mm Face-Mount Receiver Bushings to allow mounting a variety of fixture plates.

Subplates should generally be large enough to cover most of the machine table, for maximum fixture flexibility, but should never extend beyond the machine table. For maximum quick-change benefits, subplates are usually left permanently on the machine table while only the mounted fixtures or vises are exchanged.

The Carr Lock® System is extremely accurate. All Receiver-Bushing installation holes are located  $\pm .0002$ " from their primary reference hole. Clamping repeatability is  $\pm .0005$ ", while bushing concentricity is  $.0002$ " TIR. The resulting x/y-axis repeatability of a mounted fixture plate is  $\pm .0028$ " considering all tolerance accumulation. Made in USA.



### Carr Lock® System Kits

System Kits include everything you need to set up an efficient quick-change fixturing system. Kits include a Carr Lock® Subplate, one or more Carr Lock® Fixture Plates, plus all required Carr Lock® Clamps and subplate-mounting components (Sure-Lock™ Fixture Keys, T Nuts, and Socket-Head Cap Screws).

### CARR LOCK® SUBPLATE

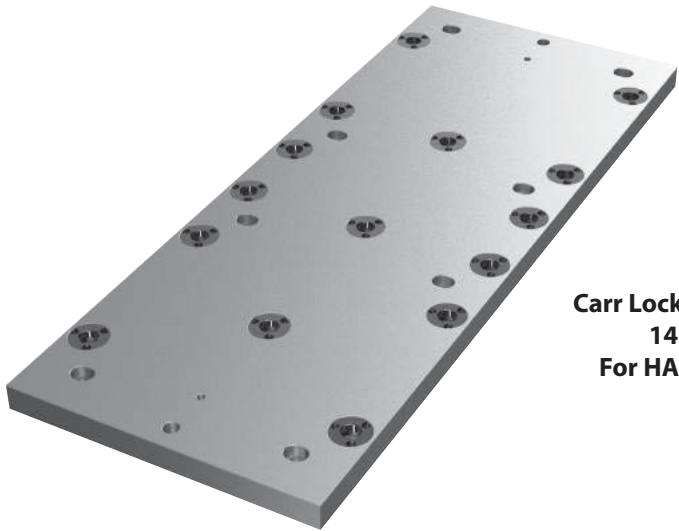
PART NO.	FOR MACHINE	SUBPLATE SIZE	SUBPLATE THICKNESS	ACCEPTS CARR LOCK® FIXTURE PLATES		REQUIRES CARR LOCK® CLAMPS
				12 X 14	(2) CL-1214-00-CLFP	(8) CL-20-CLC-0.75
CL-1426-00-CLSP	HAAS® VF-1	14 X 26	1.250	12 X 14	(1) CL-1414-00-CLFP	(4) CL-20-CLC-0.75

### CARR LOCK® SYSTEM KIT

PART NO.	SYSTEM KIT INCLUDES					
	CARR LOCK® SUBPLATE 14 x 36	CARR LOCK® FIXTURE PLATE 14 x 14	CARR LOCK® CLAMPS 20mm	T NUTS 5/8	SOCKET-HEAD CAP SCREWS 1/2-13	SURE-LOCK™ FIXTURE KEYS 5/8
CL-1426-00-CLSK	(1) CL-1426-00-CLSP	(2) CL-1214-00-CLFP	(8) CL-20-CLC-0.75	(6) CL-2-TN	(6) CL-1/2-13X1.50-SHCS	(2) CL-6250-SLFK

# CARR LOCK® SYSTEM

SUBPLATE: CARBON STEEL  
RECEIVER BUSHINGS: 4340 STEEL, HEAT TREATED RC 50-54, BLACK OXIDE FINISH

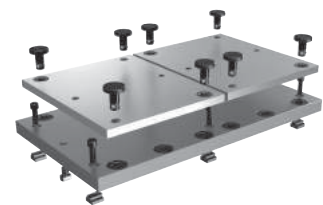
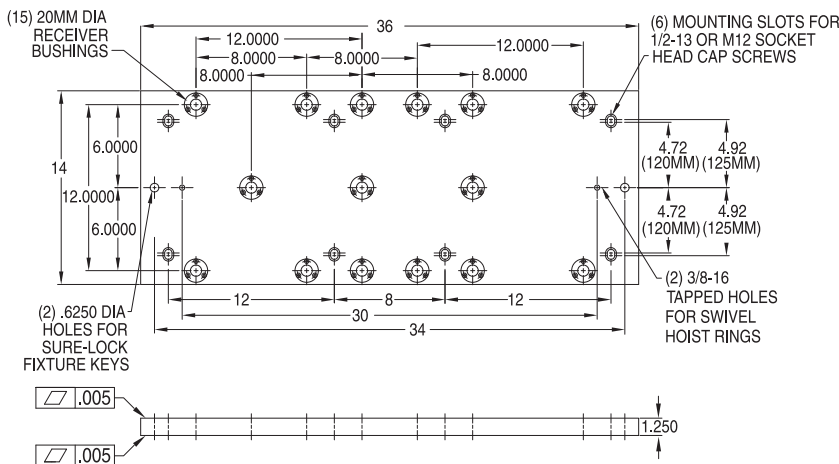


**Carr Lock® Subplate  
14 x 36  
For HAAS® VF-2**

Carr Lock® Subplates are precision-machined steel plates with Carr Lock® Receiver Bushings installed in a standard pattern. These subplates serve as the foundation of an efficient quick-change fixturing system. The 14 x 36 subplate shown here has (15) 20mm Face-Mount Receiver Bushings to allow mounting a variety of Fixture Plates and vise plates.

Subplates should generally be large enough to cover most of the machine table, for maximum fixture flexibility, but should never extend beyond the machine table. For maximum quick-change benefits, subplates are usually left permanently on the machine table while only the mounted fixtures or vises are exchanged.

The Carr Lock® System is extremely accurate. All Receiver-Bushing installation holes are located  $\pm .0002$ " from their primary reference hole. Clamping repeatability is  $\pm .0005$ "; while bushing concentricity is  $.0002$ " TIR. The resulting x/y-axis repeatability of a mounted fixture plate is  $\pm .0028$ " considering all tolerance accumulation. Made in USA.



## Carr Lock® System Kits

System Kits include everything you need to set up an efficient quick-change fixturing system. Kits include a Carr Lock® subplate, one or more Carr Lock® Fixture Plates, plus all required Carr Lock® Clamps and subplate-mounting components (Sure-Lock™ Fixture Keys, T Nuts, and Socket-Head Cap Screws).

## CARR LOCK® SUBPLATE

PART NO.	FOR MACHINE	SUBPLATE SIZE	SUBPLATE THICKNESS	ACCEPTS CARR LOCK® FIXTURE PLATES		REQUIRES CARR LOCK® CLAMPS
				14 X 14 Jigsaw	(2) CL-1414-00-CLFP (3) C-1016-0L1-CLFP	(8) CL-20-CLC-0.75 (9) CL-20-CLC-0.75
CL-1436-01-CLSP	HAAS® VF-2	14 X 36	1.250			

## CARR LOCK® SYSTEM KITS

PART NO.	SYSTEM KIT INCLUDES					
	CARR LOCK® SUBPLATE 14 x 36	CARR LOCK® FIXTURE PLATE 14 x 14	CARR LOCK® CLAMPS 20mm	T NUTS 5/8	SOCKET-HEAD CAP SCREWS 1/2-13	SURE-LOCK™ FIXTURE KEYS 5/8
CL-1436-00-CLSK	(1) CL-1436-01-CLSP	(2) CL-1414-00-CLFP	(8) CL-20-CLC-0.75	(8) CL-2-TN	(8) CL-1/2-13X1.50-SHCS	(2) CL-6250-SLFK
CL-1436-01-CLSK	(1) CL-1436-01-CLSP	(3) CL-1016-01-CLFP	(9) CL-20-CLC-0.75	(8) CL-2-TN	(8) CL-1/2-13X1.50-SHCS	(2) CL-6250-SLFK

# CARR LOCK® SYSTEM

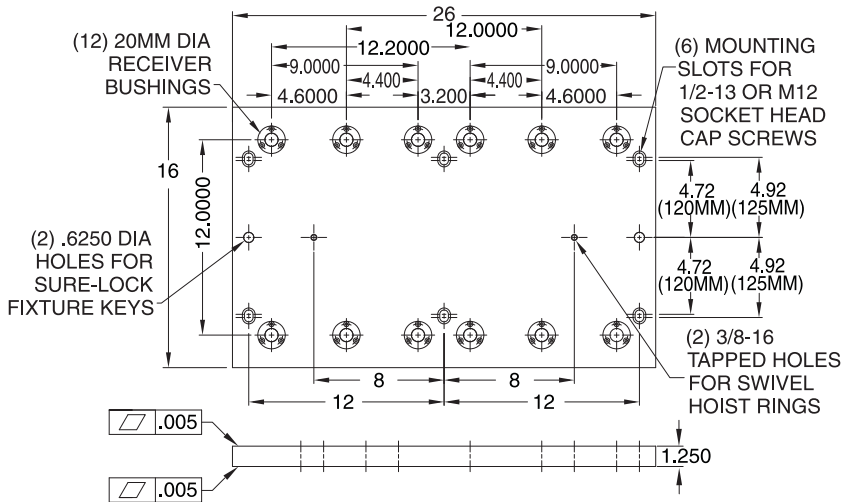
SUBPLATE: CARBON STEEL  
RECEIVER BUSHINGS: 4340 STEEL, HEAT TREATED RC 50-54, BLACK OXIDE FINISH



Version 00



Version 01



## Carr Lock® Subplates 16 x 26 For HAAS® VF-1YT

Carr Lock® Subplates are precision-machined steel plates with Carr Lock Receiver Bushings installed in a standard pattern. These subplates serve as the foundation of an efficient quick-change fixturing system. The 16 x 26 subplates shown here have either (12) or (8) 20mm Face-Mount Receiver Bushings, depending on the version, to allow mounting a variety of Fixture Plates and vise plates.

Subplates should generally be large enough to cover most of the machine table, for maximum fixture flexibility, but should never extend beyond the machine table. For maximum quick-change benefits, subplates are usually left permanently on the machine table while only the mounted fixtures or vises are exchanged.

The Carr Lock® System is extremely accurate. All Receiver-Bushing installation holes are located  $\pm .0002$ " from their primary reference hole. Clamping repeatability is  $\pm .0005$ ", while bushing concentricity is  $.0002$ " TIR. The resulting x/y-axis repeatability of a mounted fixture plate is  $\pm .0028$ " considering all tolerance accumulation. Made in USA.

### Carr Lock® System Kits

System Kits include everything you need to set up an efficient quick-change fixturing system. Kits include a Carr Lock® subplate, one or more Carr Lock® Fixture Plates, plus all required Carr Lock® Clamps and subplate-mounting components (Sure-Lock™ Fixture Keys, T Nuts, and Socket-Head Cap Screws).



### CARR LOCK® SUBPLATES

PART NO.	FOR MACHINE	SUBPLATE SIZE	SUBPLATE THICKNESS	ACCEPTS CARR LOCK® FIXTURE PLATES		REQUIRES CARR LOCK® CLAMPS
CL-1626-00-CLSP	HAAS® VF-2	16 X 26	1.250	12 X 14	(2) CL-1214-00-CLFP	(8) CL-20-CLC-0.75
				14 X 14	(1) CL-1414-00-CLFP	(4) CL-20-CLC-0.75
CL-1626-01-CLSP				400 x 400mm	(1) CL-400400-00-CLFP	(4) CL-20-CLC-0.75
				16 X 20	(1) CL-1620-00-CLFP	(4) CL-20-CLC-0.75
				Jigsaw	(2) CL-1016-01-CLFP	(6) CL-20-CLC-0.75

### CARR LOCK® SYSTEM KITS

PART NO.	SYSTEM KIT INCLUDES					
	CARR LOCK® SUBPLATES 16 x 26	CARR LOCK® FIXTURE PLATES 12 x 14	CARR LOCK® CLAMPS 20mm	T NUTS 5/8	SOCKET-HEAD CAP SCREWS 1/2-13	SURE-LOCK™ FIXTURE KEYS 5/8
CL-1626-00-CLSK	(1) CL-1626-00-CLSP	(2) CL-1214-00-CLFP	(8) CL-20-CLC-0.75	(6) CL-2-TN	(6) CL-1/2-13X1.50-SHCS	(2) CL-6250-SLFK
CL-1626-01-CLSK	(1) CL-1626-01-CLSP	(2) CL-1016-01-CLFP	(6) CL-20-CLC-0.75	(6) CL-2-TN	(6) CL-1/2-13X1.50-SHCS	(2) CL-6250-SLFK



# CARR LOCK® SYSTEM

SUBPLATE: CARBON STEEL  
RECEIVER BUSHINGS: 4340 STEEL, HEAT TREATED RC 50-54, BLACK OXIDE FINISH

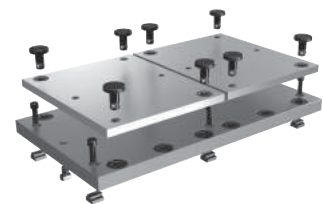
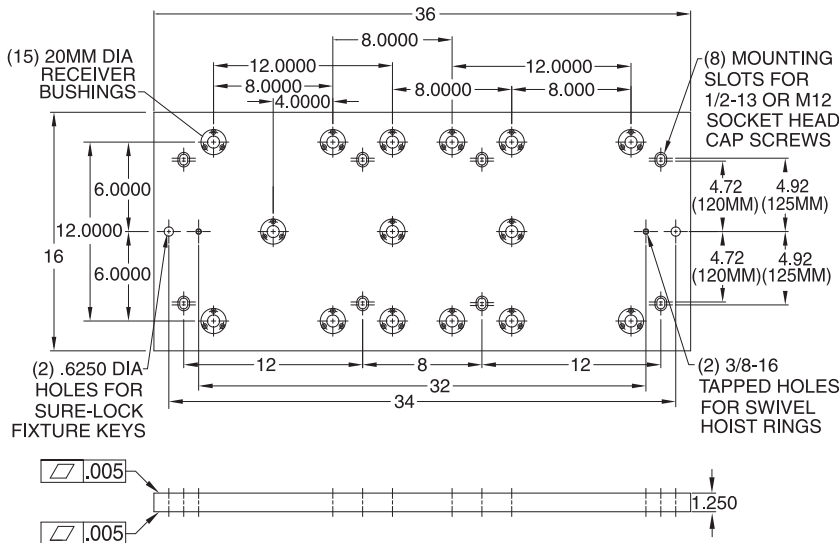


**Carr Lock® Subplate  
16 x 36  
For HAAS® VF-2YT**

Carr Lock® Subplates are precision-machined steel plates with Carr Lock® Receiver Bushings installed in a standard pattern. These subplates serve as the foundation of an efficient quick-change fixturing system. The 16 x 36 subplate shown here has (15) 20mm Face-Mount Receiver Bushings to allow mounting a variety of fixture plates and vise plates.

Subplates should generally be large enough to cover most of the machine table, for maximum fixture flexibility, but should never extend beyond the machine table. For maximum quick-change benefits, subplates are usually left permanently on the machine table while only the mounted fixtures or vises are exchanged.

The Carr Lock® System is extremely accurate. All Receiver-Bushing installation holes are located  $\pm 0.0002$ " from their primary reference hole. Clamping repeatability is  $\pm 0.0005$ ", while bushing concentricity is  $.0002$ " TIR. The resulting x/y-axis repeatability of a mounted fixture plate is  $\pm 0.0028$ " considering all tolerance accumulation. Made in USA.



**Carr Lock® System Kits**

System Kits include everything you need to set up an efficient quick-change fixturing system. Kits include a Carr Lock® subplate, one or more Carr Lock® Fixture Plates, plus all required Carr Lock® Clamps and subplate-mounting components (Sure-Lock™ Fixture Keys, T Nuts, and Socket-Head Cap Screws).

## CARR LOCK® SUBPLATES

PART NO.	FOR MACHINE	SUBPLATE SIZE	SUBPLATE THICKNESS	ACCEPTS CARR LOCK® FIXTURE PLATES		REQUIRES CARR LOCK® CLAMPS
CL-1636-01-CLSP	HAAS® VF-2YT	16 X 36	1.250	14 X 14	(2) CL-1414-00-CLFP	(8) CL-20-CLC-0.75
				400 x 400mm	(2) CL-400400-00-CLFP	(8) CL-20-CLC-0.75
				16 x 20	(1) CL-1620-00-CLFP	(4) CL-20-CLC-0.75
				Jigsaw	(3) CL-1016-01-CLFP	(9) CL-20-CLC-0.75

## CARR LOCK® SYSTEM KITS

PART NO.	SYSTEM KIT INCLUDES					
	CARR LOCK® SUBPLATE 16 x 36	CARR LOCK® FIXTURE PLATE 14 x 14	CARR LOCK® CLAMPS 20mm	T NUTS 5/8	SOCKET-HEAD CAP SCREWS 1/2-13	SURE-LOCK™ FIXTURE KEYS 5/8
CL-1636-00-CLSK	(1) CL-1636-01-CLSP	(2) CL-1414-00-CLFP	(8) CL-20-CLC-0.75	(8) CL-2-TN	(8) CL-1/2-13X1.50-SHCS	(2) CL-6250-SLFK
CL-1636-01-CLSK	(1) CL-1636-01-CLSP	(3) CL-1016-01-CLFP	(9) CL-20-CLC-0.75	(8) CL-2-TN	(8) CL-1/2-13X1.50-SHCS	(2) CL-6250-SLFK

# CARR LOCK® SYSTEM

SUBPLATE: CARBON STEEL  
 RECEIVER BUSHINGS: 4340 STEEL, HEAT TREATED RC 50-54, BLACK OXIDE FINISH

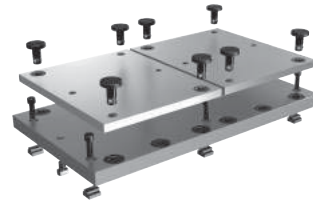
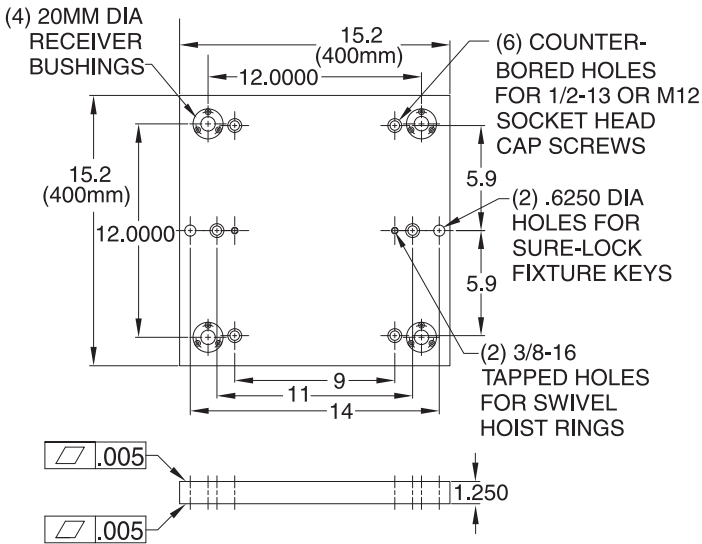


**Carr Lock® Subplate  
 400 x 400mm**

Carr Lock® Subplates are precision-machined steel plates with Carr Lock® Receiver Bushings installed in a standard pattern. These subplates serve as the foundation of an efficient quick-change fixturing system. The 400 x 400mm subplate shown here has (4) 20mm Face-Mount Receiver Bushings for mounting fixture plates.

Subplates should generally be large enough to cover most of the machine table, for maximum fixture flexibility, but should never extend beyond the machine table. For maximum quick-change benefits, subplates are usually left permanently on the machine table while only the mounted fixtures or vises are exchanged.

The Carr Lock® System is extremely accurate. All Receiver-Bushing installation holes are located  $\pm .0002$ " from their primary reference hole. Clamping repeatability is  $\pm .0005$ ", while bushing concentricity is  $.0002$ " TIR. The resulting x/y-axis repeatability of a mounted fixture plate is  $\pm .0028$ " considering all tolerance accumulation. Made in USA.



**Carr Lock® System Kits**

System Kits include everything you need to set up an efficient quick-change fixturing system. Kits include a Carr Lock® subplate, one or more Carr Lock® Fixture Plates, plus all required Carr Lock® Clamps and subplate-mounting components (Sure-Lock™ Fixture Keys, T Nuts, and Socket-Head Cap Screws).

## CARR LOCK® SUBPLATE

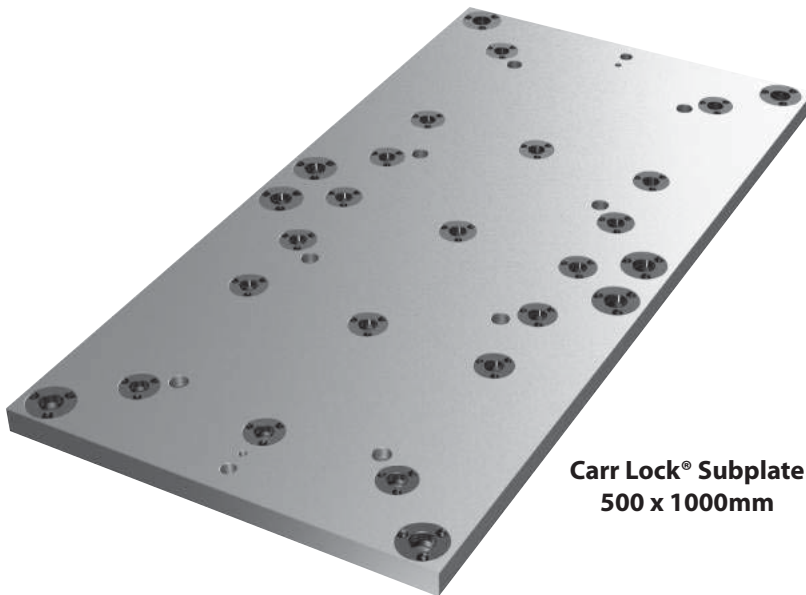
PART NO.	FOR MACHINE	SUBPLATE SIZE	SUBPLATE THICKNESS	ACCEPTS CARR LOCK® FIXTURE PLATES		REQUIRES CARR LOCK® CLAMPS
				400 x 400mm	14 X 14	(4) CL-20-CLC-0.75
CL-400400-00-CLSP	Various	400 x 400mm	1.250	(1) CL-1214-00-CLFP	(1) CL-1414-00-CLFP	(4) CL-20-CLC-0.75

## CARR LOCK® SYSTEM KIT

PART NO.	SYSTEM KIT INCLUDES					
	CARR LOCK® SUBPLATE 400 x 400mm	CARR LOCK® FIXTURE PLATE 400 x 400mm	CARR LOCK® CLAMPS 20mm	T NUTS 5/8	SOCKET-HEAD CAP SCREWS 1/2-13	SURE-LOCK™ FIXTURE KEYS 5/8
CL-400400-00-CLSK	(1) CL-400400-00-CLSP	(1) CL-400400-00-CLFP	(4) CL-20-CLC-0.75	(6) CL-2-TN	(6) CL-1/2-13X1.50-SHCS	(2) CL-6250-SLKF

# CARR LOCK® SYSTEM

SUBPLATE: CARBON STEEL  
RECEIVER BUSHINGS: 4340 STEEL, HEAT TREATED RC 50-54, BLACK OXIDE FINISH

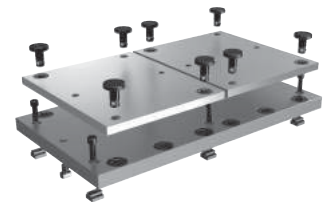
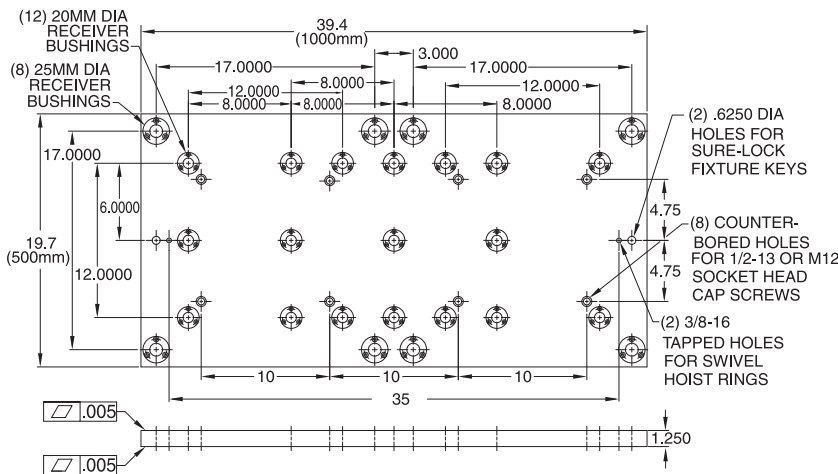


**Carr Lock® Subplate  
500 x 1000mm**

Carr Lock® Subplates are precision-machined steel plates with Carr Lock® Receiver Bushings installed in a standard pattern. These subplates serve as the foundation of an efficient quick-change fixturing system. The 500 x 1000mm subplate shown here has (18) 20mm and (8) 25mm Face-Mount Receiver Bushings to allow mounting a variety of fixture plates and vise plates.

Subplates should generally be large enough to cover most of the machine table, for maximum fixture flexibility, but should never extend beyond the machine table. For maximum quick-change benefits, subplates are usually left permanently on the machine table while only the mounted fixtures or vises are exchanged.

The Carr Lock® System is extremely accurate. All Receiver-Bushing installation holes are located  $\pm .0002$ " from their primary reference hole. Clamping repeatability is  $\pm .0005$ ", while bushing concentricity is  $.0002$ " TIR. The resulting x/y-axis repeatability of a mounted fixture plate is  $\pm .0028$ " considering all tolerance accumulation. Made in USA.



**Carr Lock® System Kits**

System Kits include everything you need to set up an efficient quick-change fixturing system. Kits include a Carr Lock® subplate, one or more Carr Lock® Fixture Plates, plus all required Carr Lock® Clamps and subplate-mounting components (Sure-Lock™ Fixture Keys, T Nuts, and Socket-Head Cap Screws).

## CARR LOCK® SUBPLATE

PART NO.	FOR MACHINE	SUBPLATE SIZE	SUBPLATE THICKNESS	ACCEPTS CARR LOCK® FIXTURE PLATES		REQUIRES CARR LOCK® CLAMPS
CL-5001000-01-CLSP	Various	500 x 1000mm	1.250	14 X 14	(2) CL-1414-00-CLFP	(8) CL-20-CLC-0.75
				400 x 400mm	(2) CL-400400-00-CLFP	(8) CL-20-CLC-0.75
				16 x 20	(1) CL-1620-00-CLFP	(4) CL-20-CLC-0.75
				500 x 500mm	(2) CL-500500-00-CLFP	(8) CL-25-CLC-1.00
				Jigsaw	(3) CL-1016-01-CLFP	(12) CL-20-CLC-0.75

## CARR LOCK® SYSTEM KITS

PART NO.	SYSTEM KIT INCLUDES					
	CARR LOCK® SUBPLATES 14 x 26	CARR LOCK® FIXTURE PLATES 12 x 14	CARR LOCK® CLAMPS 20mm	T NUTS 5/8	SOCKET-HEAD CAP SCREWS 1/2-13	SURE-LOCK™ FIXTURE KEYS 5/8
CL-5001000-00-CLSK	(1) CL-5001000-01-CLSP	(2) CL-1414-00-CLFP	(8) CL-20-CLC-0.75	(8) CL-3-TN	(8) CL-1/2-13X1.50-SHCS	(2) CL-18-SLFK
CL-5001000-01-CLSK	(1) CL-5001000-01-CLSP	(2) CL-400400-00-CLFP	(8) CL-20-CLC-0.75	(8) CL-3-TN	(8) CL-1/2-13X1.50-SHCS	(2) CL-18-SLFK
CL-5001000-02-CLSK	(1) CL-5001000-01-CLSP	(2) CL-500500-00-CLFP	(8) CL-25-CLC-1.00	(8) CL-3-TN	(8) CL-1/2-13X1.50-SHCS	(2) CL-18-SLFK
CL-5001000-03-CLSK	(1) CL-5001000-01-CLSP	(4) CL-1016-01-CLFP	(12) CL-20-CLC-0.75	(8) CL-3-TN	(8) CL-1/2-13X1.50-SHCS	(2) CL-18-SLFK

# CARR LOCK® SYSTEM

FIXTURE PLATE: MIC-6 PRECISION-MACHINED CAST ALUMINUM  
 LINER BUSHINGS: 1144 STEEL, HEAT TREATED RC 58-64, BLACK OXIDE FINISH

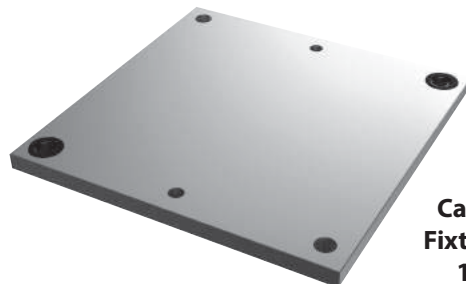
## Carr Lock® Fixture Plates

Carr Lock® Fixture Plates are precision-machined MIC-6 cast aluminum plates available in a wide range of standard sizes to use as a base for building quick-change fixtures. To fasten the Carr Lock® Fixture Plate to a subplate, begin by inserting a Carr Lock® Clamp into each of the four corner holes. Next, fully tighten the clamps one at a time – first the clamp in the primary liner bushing, then the clamp in the secondary liner bushing, then the clamps in the clearance holes. Made in USA.



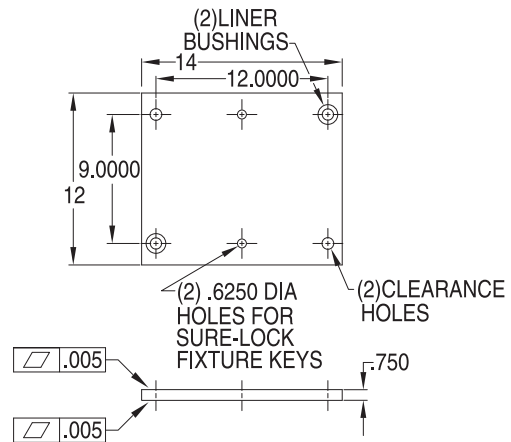
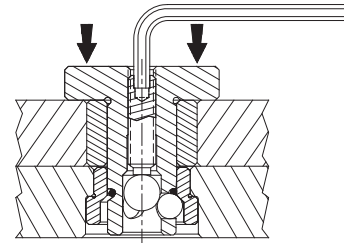
**Carr Lock®  
 Fixture Plate  
 12 x 14**

These 12 x 14 fixture plates have four 20mm mounting holes – a primary liner, a secondary liner, and two clearance holes. They also have two fixture-key holes for conventional mounting directly on a slotted machine table using Sure-Lock™ Fixture Keys.



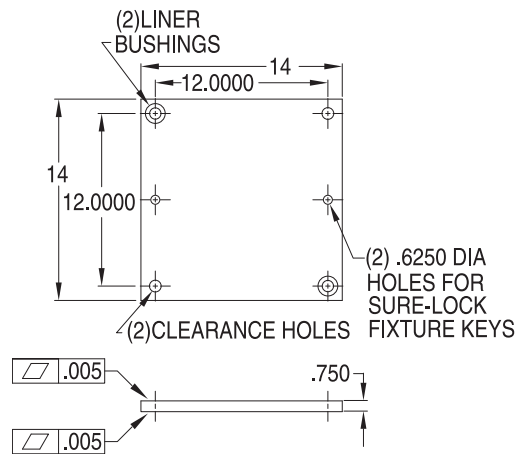
**Carr Lock®  
 Fixture Plate  
 14 x 14**

These 14 x 14 fixture plates have four 20mm mounting holes – a primary liner, a secondary liner, and two clearance holes. They also have two fixture-key holes for conventional mounting directly on a slotted machine table using Sure-Lock™ Fixture Keys.



## CARR LOCK® FIXTURE PLATE — 12 X 14

PART NO.	PLATE SIZE	PLATE THICKNESS	REQUIRES CARR LOCK® CLAMPS	CARR LOCK® CLAMP SPACING
CL-1214-00-CLFP	12 X 14	1.000	(4) CL-25-CLC-0.75	9 X 12



## CARR LOCK® FIXTURE PLATE — 14 X 14

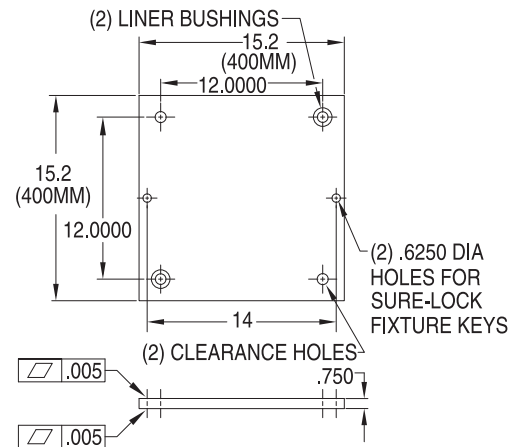
PART NO.	PLATE SIZE	PLATE THICKNESS	REQUIRES CARR LOCK® CLAMPS	CARR LOCK® CLAMP SPACING
CL-1414-00-CLFP	14 X 14	.750	(3) CL-20-CLC-0.75	12 X 12

# CARR LOCK® SYSTEM

FIXTURE PLATE: MIC-6 PRECISION-MACHINED CAST ALUMINUM  
 LINER BUSHINGS: 1144 STEEL, HEAT TREATED RC 58-64, BLACK OXIDE FINISH



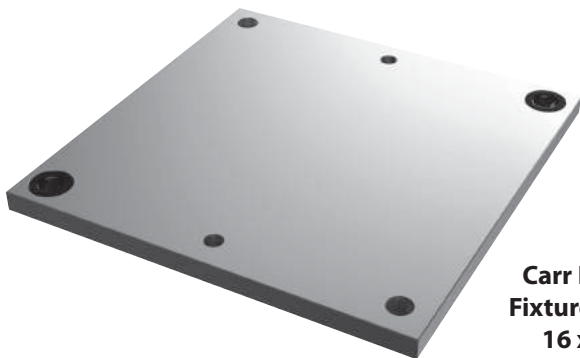
**Carr Lock®  
 Fixture Plate  
 400 x 400mm**



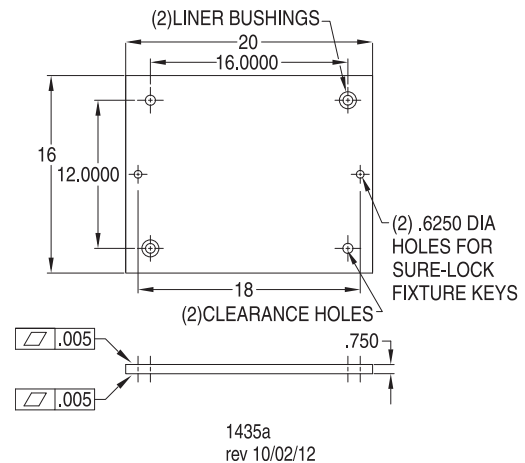
These 400 x 400mm fixture plates have four 20mm mounting holes – a primary liner, a secondary liner, and two clearance holes. They also have two fixture-key holes for conventional mounting directly on a slotted machine table using Sure-Lock™ Fixture Keys.

## CARR LOCK® FIXTURE PLATE — 400 x 400mm

PART NO.	PLATE SIZE	PLATE THICKNESS	REQUIRES CARR LOCK® CLAMPS	CARR LOCK® CLAMP SPACING
CL-400400-00-CLFP	400 x 400	.750	(4) CL-20-CLC-0.75	12 X 12



**Carr Lock®  
 Fixture Plate  
 16 x 20**



1435a  
 rev 10/02/12

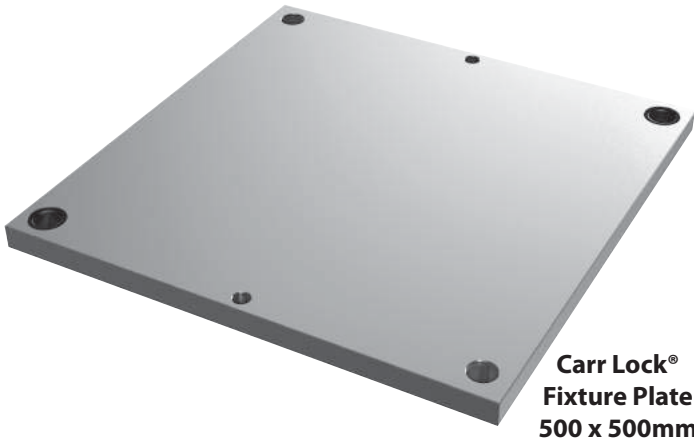
These 16 x 20 fixture plates have four 20mm mounting holes – a primary liner, a secondary liner, and two clearance holes. They also have two fixture-key holes for conventional mounting directly on a slotted machine table using Sure-Lock™ Fixture Keys.

## CARR LOCK® FIXTURE PLATE — 16 x 20

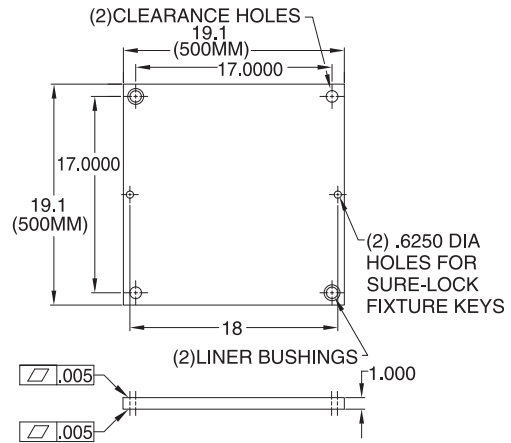
PART NO.	PLATE SIZE	PLATE THICKNESS	REQUIRES CARR LOCK® CLAMPS	CARR LOCK® CLAMP SPACING
CL-1620-00-CLFP	16 x 20	.750	(4) CL-20-CLC-0.75	12 X 16

# CARR LOCK® SYSTEM

FIXTURE PLATE: MIC-6 PRECISION-MACHINED CAST ALUMINUM  
 LINER BUSHINGS: 1144 STEEL, HEAT TREATED RC 58-64, BLACK OXIDE FINISH



**Carr Lock®  
 Fixture Plate  
 500 x 500mm**

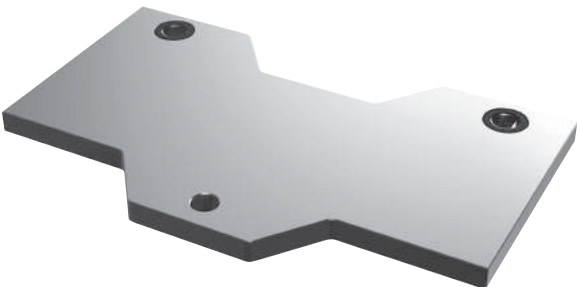


These 500 x 500mm fixture plates have four 25mm mounting holes – a primary liner, a secondary liner, and two clearance holes. They also have two fixture-key holes for conventional mounting directly on a slotted machine table using Sure-Lock™ Fixture Keys.

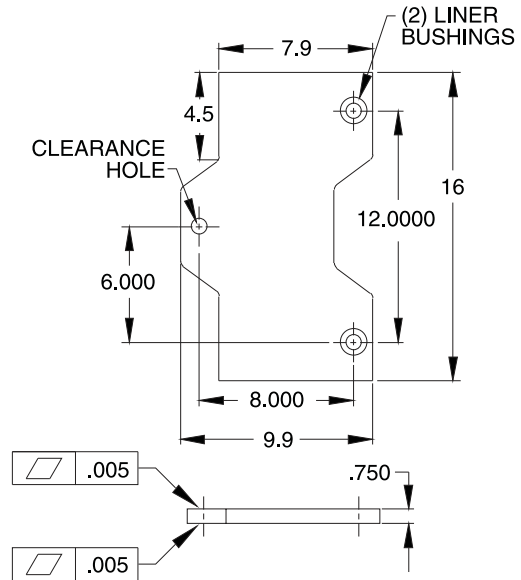
## CARR LOCK® FIXTURE PLATE — 500 x 500mm

PART NO.	PLATE SIZE	PLATE THICKNESS	REQUIRES CARR LOCK® CLAMPS	CARR LOCK® CLAMP SPACING
CL-500500-00-CLFP	500x500	1.000"	(4) CL-25-CLC-1.000	17x17

9



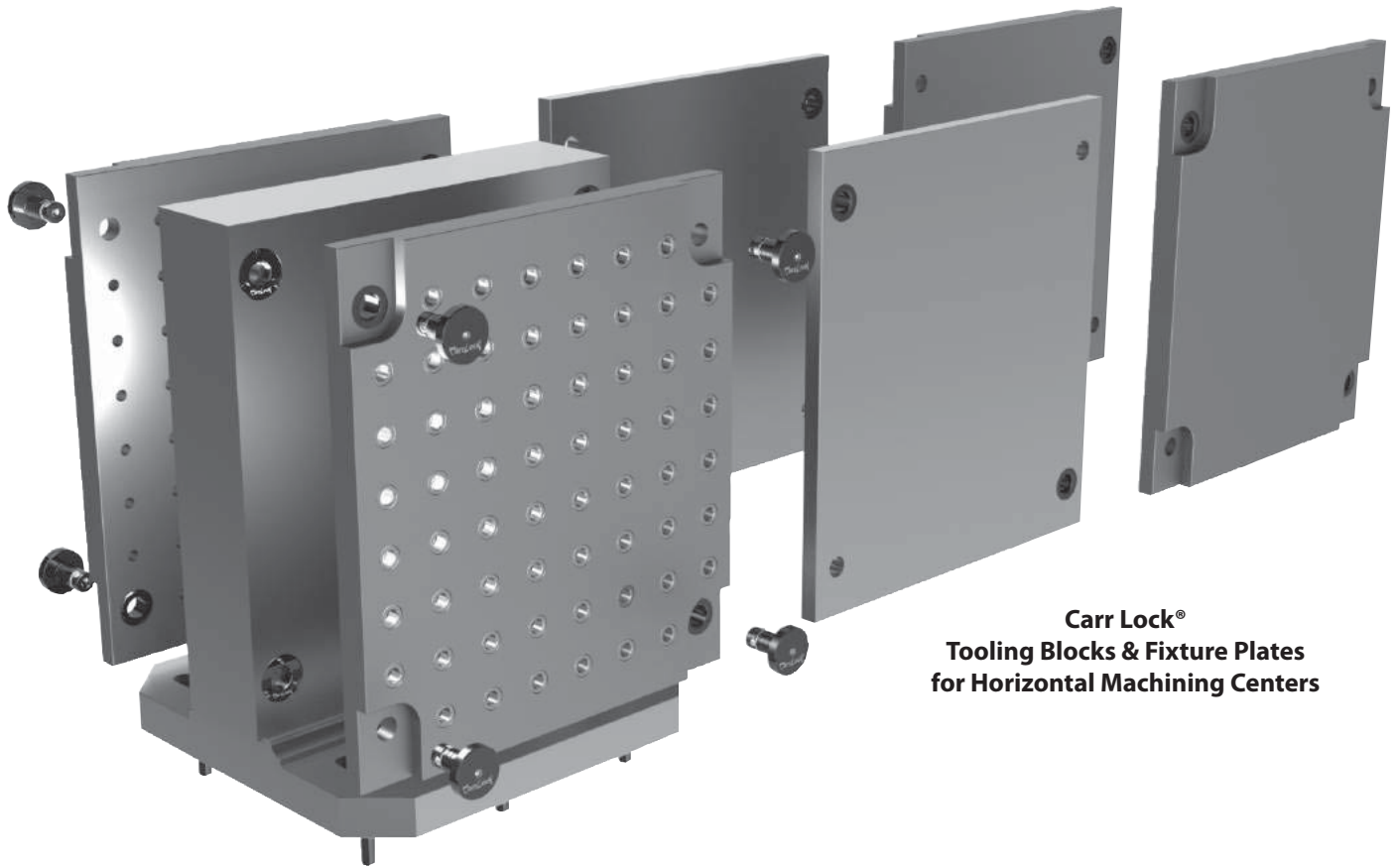
**Carr Lock®  
 Jigsaw Vise Plate  
 10 x 16**



Jigsaw Vise Plates have an interlocking design to allow mounting vises and other narrow fixtures close together. These 10 x 16 plates have three 20mm mounting holes – a primary liner, a secondary liner, and a clearance hole.

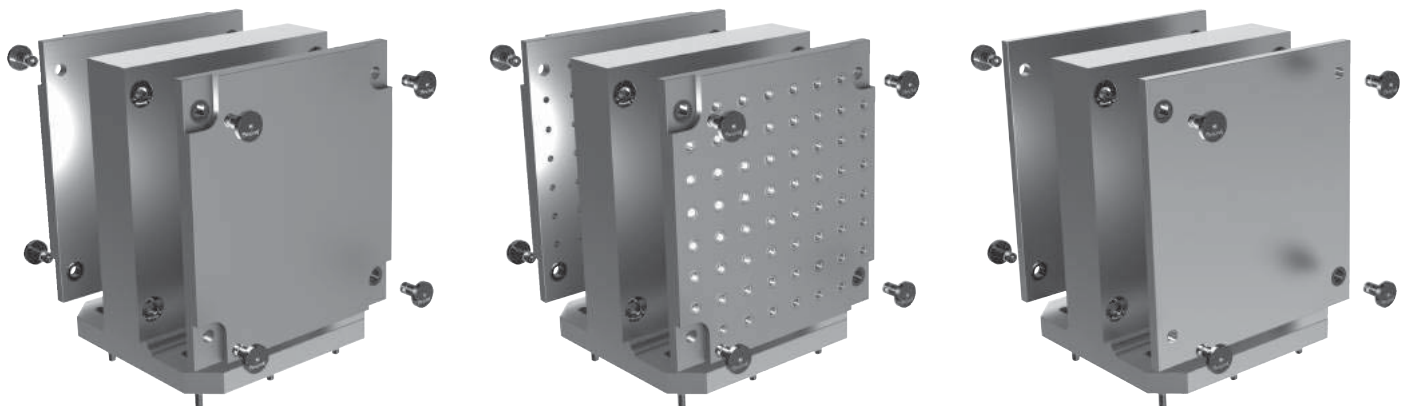
## CARR LOCK® JIGSAW VISE PLATE — 10 x 16

PART NO.	PLATE SIZE	PLATE THICKNESS	REQUIRES CARR LOCK® CLAMPS	CARR LOCK® CLAMP SPACING
CL-1016-01-CLFP	10 x 16	.750	(3) CL-20-CLC-0.75	8 x 12



**Carr Lock®  
Tooling Blocks & Fixture Plates  
for Horizontal Machining Centers**

Carr Lock® Tooling Blocks have four Receiver Bushings installed in each face for accurately mounting Carr Lock® Fixture Plates. These precision tooling blocks serve as the foundation of an efficient quick-change fixturing system for horizontal machining centers. We offer three types of blank and modular fixture plates to fit these tooling blocks, as shown below. The Carr Lock® System is extremely accurate. All Receiver-Bushing installation holes are located  $\pm 0.0002$ " from their primary reference hole. Clamping repeatability is  $\pm 0.0005$ ", while bushing concentricity is  $.0002$ " TIR. The resulting x/y-axis repeatability of a mounted fixture plate is  $\pm 0.0028$ " considering all tolerance accumulation. Carr Lock® Tooling Blocks are available to fit standard 400 and 500mm pallet sizes, with universal mounting holes to fit almost any inch or metric slot spacing. Made in USA.



**Blank Fixture Plates  
(Steel)**

**Modular Fixture Plates  
(Steel)**

**Blank Fixture/Vise Plates  
(Aluminum)**

# CARR LOCK® SYSTEM

BLOCK: A713 TENZALLOY ALUMINUM ALLOY, AGED TO T-6 CONDITION  
 RECEIVER BUSHINGS: 4340 STEEL, HEAT TREATED RC 50-54, BLACK OXIDE FINISH

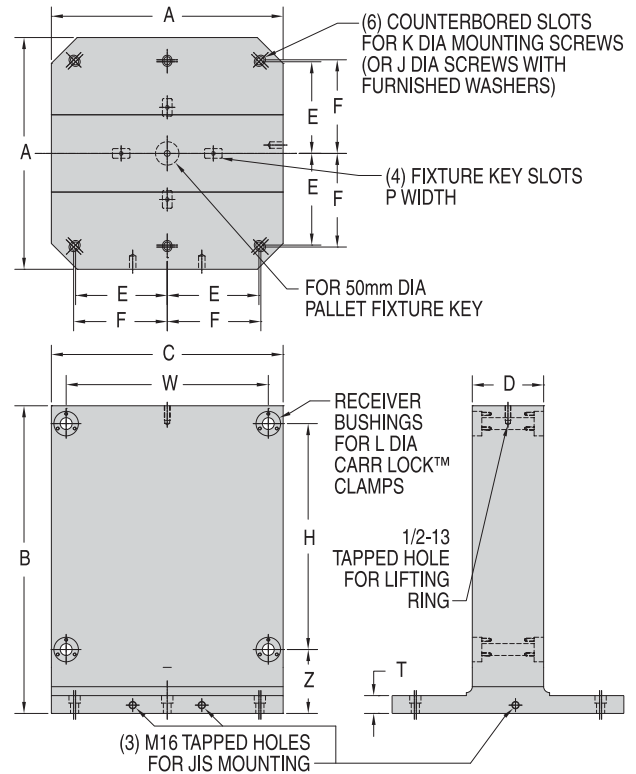


**Carr Lock®  
Two-Sided  
Tooling Blocks**

Carr Lock® Two-Sided Tooling Blocks have four Receiver Bushings installed in each face for accurately mounting Carr Lock® Fixture Plates. These precision tooling blocks serve as the foundation of an efficient quick-change fixturing system for horizontal machining centers. **INFO+:** We offer three types of blank and modular fixture plates to fit these tooling blocks, shown on page 319.

The Carr Lock® System is extremely accurate. All Receiver-Bushing installation holes are located  $\pm 0.0002$ " from their primary reference hole. Clamping repeatability is  $\pm 0.0005$ ", while bushing concentricity is  $.0002$ " TIR. The resulting x/y-axis repeatability of a mounted fixture plate is  $\pm 0.0028$ " considering all tolerance accumulation.

Carr Lock® Tooling Blocks are available to fit standard 400 and 500mm pallet sizes, with universal mounting holes to fit almost any inch or metric slot spacing. Dual mounting capability allows both JIS mounting (locating from two reference edges) and DIN mounting (locating from a center hole and radial slots) with excellent accuracy. One-piece cast aluminum alloy construction provides superior accuracy, dimensional stability, and vibration dampening. Made in USA.



## CARR LOCK® TOOLING BLOCKS

PART NO.	PALLET SIZE	A	B	C	D	E	F	H	J	K	L DIA	P	T	W	Z
CL-400400-00-TSTB	400mm	15.75	20-7/8	15.75	4.000	5.91 (150mm)	6.30 (160mm)	14.0000	1/2-13 (M12)	5/8-11 (M16)	20mm	13/16	1-1/2	14.0000	4.8750
CL-500500-00-TSTB	500mm	19.69	22	19.69	6.000	7.87 (200mm)	8.00 (203mm)	19.0000	1/2-13 (M12)	5/8-11 (M16)	25mm	13/16	1-1/2	17.0000	5.3750



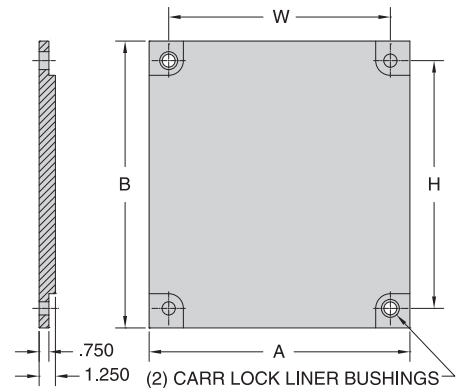
# CARR LOCK® SYSTEM

FIXTURE PLATE: CARBON STEEL OR MIC-6 CAST ALUMINUM  
LINER BUSHINGS: 1144 STEEL, HEAT TREATED RC 58-64, BLACK OXIDE FINISH



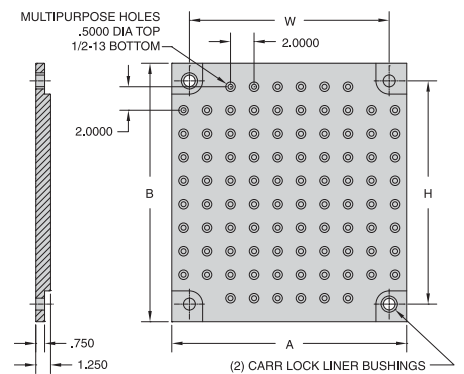
## Blank Fixture Plates (Steel)

Carr Lock® Blank Fixture Plates provide an excellent base for most dedicated fixtures. These 1.250"-thick steel plates provide sufficient depth for tapping and other machining required to mount fixture components, while also providing excellent rigidity. Each fixture plate has four mounting holes for Carr Lock® Clamps – two with liner bushings for fastening with accurate location, the other two for fastening only. Made in USA.



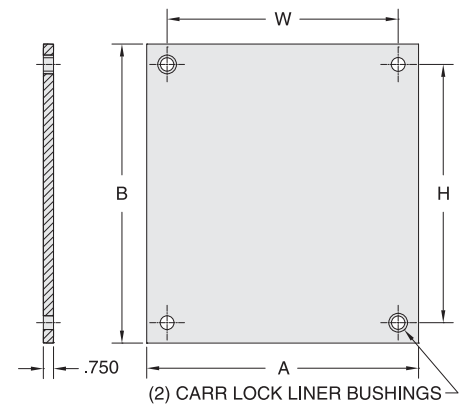
## Modular Fixture Plates (Steel)

Carr Lock® Modular Fixture Plates are identical to the Blank Fixture Plates shown above, except with added multipurpose mounting holes in a standard 2" grid pattern. Every multipurpose hole has a .5000"-diameter precision alignment bushing on top, with a 1/2-13 thread below it. Multipurpose holes accept Locating Screws (with a ground locating diameter), Socket-Head Cap Screws, clamping studs, and many other threaded components. Made in USA.



## Blank Fixture/Vise Plates (Aluminum)

Carr Lock® Blank Fixture/Vise Plates are ideal for mounting vises or existing fixtures on a Carr Lock® Tooling Block. These lightweight, .750"-thick plates are machined from MIC-6 cast aluminum alloy. Made in USA.



## CARR LOCK® FIXTURE PLATES

PLATE TYPE	PART NO.	PALLET SIZE	A	B	H	W	REQUIRES CARR LOCK® CLAMPS (4) PER PLATE	MOUNTS ON CARR LOCK® TOOLING BLOCK
BLANK FIXTURE PLATE (STEEL)	CL-410460-01-CLFP	400mm	16.25	18	14	14	CL-20-CLC-0.75	CL-400400-00-TSTB
	CL-510560-01-CLFP	500mm	20	22	19	17	CL-25-CLC-0.75	CL-500500-00-TSTB
MODULAR FIXTURE PLATE (STEEL)	CL-410460-40-CLFP	400mm	16.25	18	14	14	CL-20-CLC-0.75	CL-400400-00-TSTB
	CL-510560-40-CLFP	500mm	20	22	19	17	CL-25-CLC-0.75	CL-500500-00-TSTB
BLANK FIXTURE/VISE PLATE (ALUMINUM)	CL-410460-00-CLFP	400mm	16.25	18	14	14	CL-20-CLC-0.75	CL-400400-00-TSTB
	CL-510560-00-CLFP	500mm	20	22	19	17	CL-25-CLC-0.75	CL-500500-00-TSTB

# CARR LOCK® SYSTEM

## FIXTURE MACHINING KITS



Carr Lock® Fixture Machining Kits are extremely useful for machining a fixture using its Carr Lock® mounting holes as an absolute reference. The kit consists of four extra-long Carr Lock® Clamps, used together with four precision-height spacers, providing ample clearance underneath the fixture plate to allow through-hole machining without damaging the subplate. The kit also includes an extra four spacers to use as additional supports under large plates, all in a handy carrying case. Made in USA.

### FIXTURE MACHINING KITS

PART NO.	CARR LOCK® CLAMP DIAMETER	FOR FIXTURE-PLATE THICKNESS	SPACER HEIGHT	SPACER OD
CL-20-CLMK-0.75	20mm	.750	.500	1-3/4
CL-25-CLMK-0.75	25mm	.750	.750	2
CL-25-CLMK-1.00		1.000	.500	2

## PRESET TORQUE WRENCHES



These handy Preset Torque Wrenches are designed to tighten Carr Lock® Clamps exactly to their maximum recommended torque, ensuring that maximum hold-down force is achieved without over-tightening. The wrench body shown here is used for the first three Carr Lock® Clamp sizes – 13mm, 16mm, and 20mm – each preset to the torque recommended for that size, and with the appropriate hex key. A slightly larger wrench body is used for the 25mm size. Torque accuracy is +/-10%.

### PRESET TORQUE WRENCHES

PART NO.	FOR CARR LOCK® CLAMP DIA	PRESET TORQUE (FT-LBS)	HEX KEY SIZE	HANDLE LENGTH	HANDLE WIDTH
CL-13-CLTW	13mm	1.0	3/32	3.54	1.40
CL-16-CLTW	16mm	2.0	1/8		
CL-20-CLTW	20mm	3.0	1/8		
CL-25-CLTW	25mm	7.0	5/32	7.50	1.67

## PROTECTION PLUGS



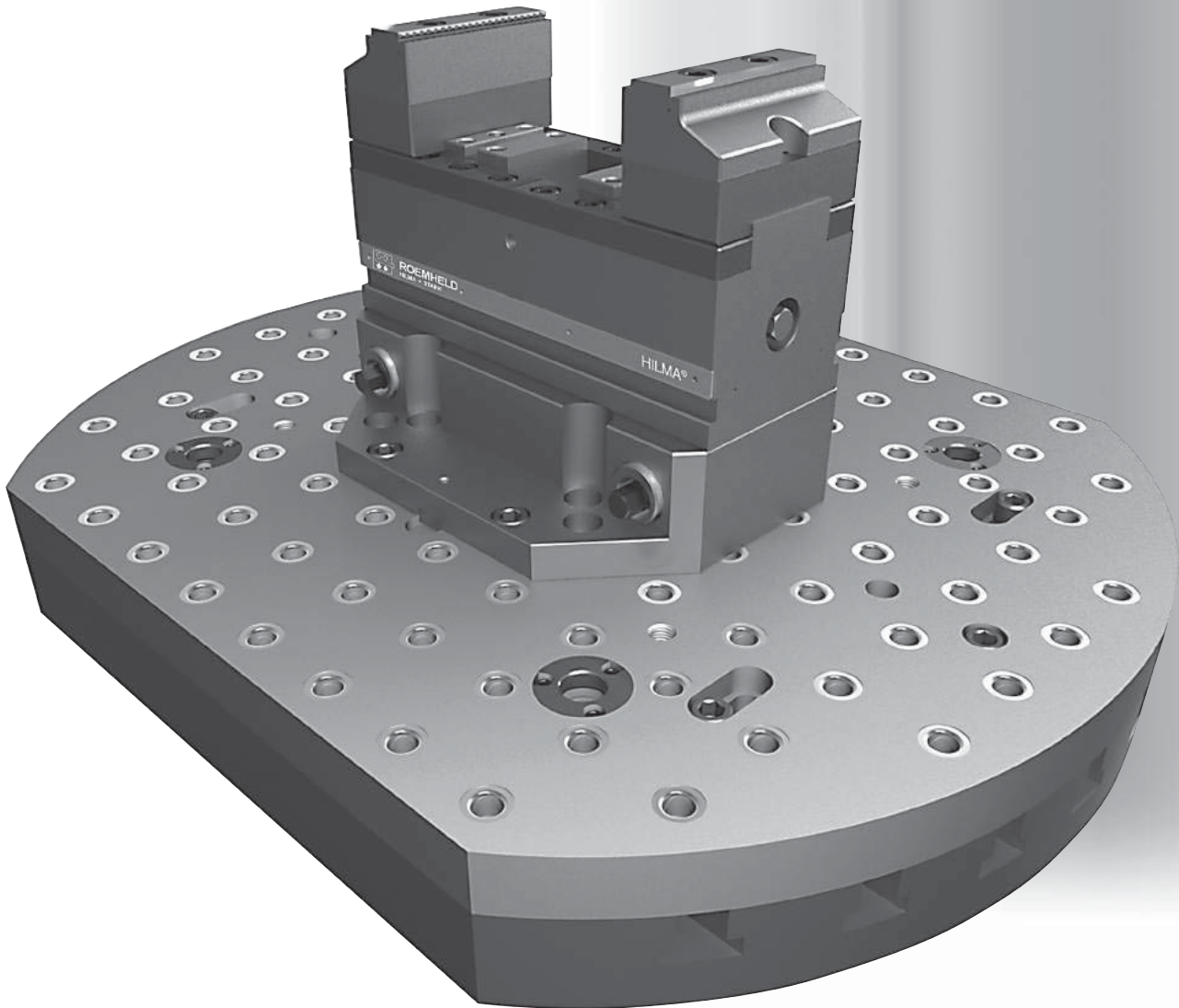
Protection plugs are extremely useful to keep chips and debris from entering unused receiver bushings in a subplate. These durable plastic plugs fit snugly in the receiver hole, yet can be easily removed.

### PROTECTION PLUGS

PART NO.	FOR CARR LOCK® RECEIVER DIA.
CL-13-CLPP	13mm
CL-16-CLPP	16mm
CL-20-CLPP	20mm
CL-25-CLPP	25mm
CL-30-CLPP	30mm

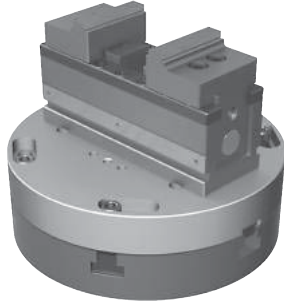


# QUICK-CHANGE 5-AXIS WORKHOLDING



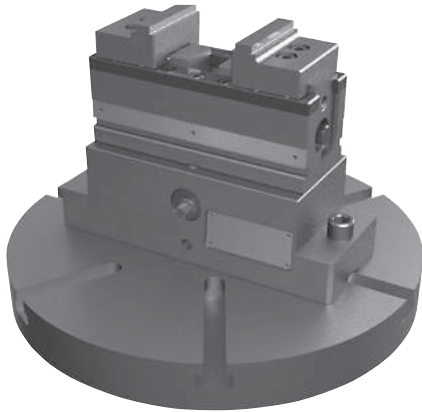
# CL5® QUICK-CHANGE 5-AXIS WORKHOLDING

## SOLUTIONS FOR ALL SIZES OF ROTARY TABLES



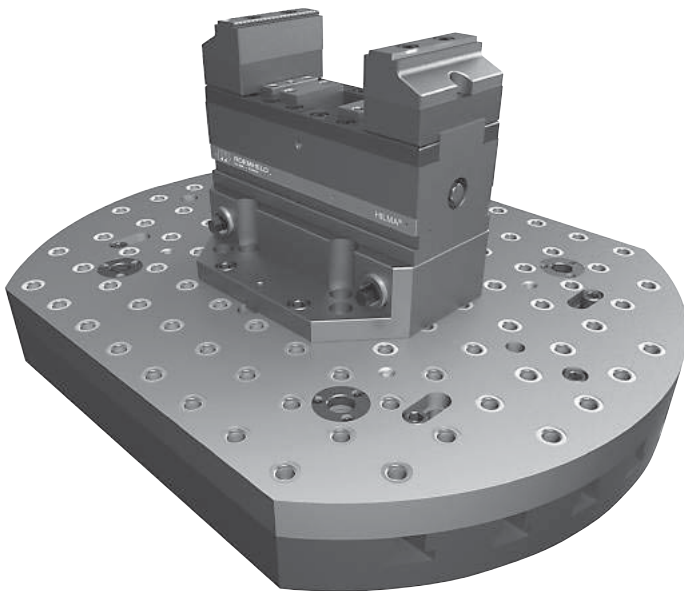
### **METHOD 1** **Fixture Plate Mounted on Rotary Table**

Method 1 is ideal for small rotary tables up to 210mm diameter, but can also be used for larger tables up to 400mm diameter. These fixture plates are accurately located and fastened directly on the rotary table. This simple, economical method allows using 5-Axis Vises, modular fixturing, or dedicated permanent fixturing.



### **METHOD 2** **Quintus Quick-Change Riser** **Mounted on Rotary Table**

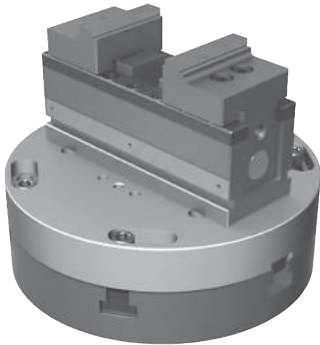
Method 2 utilizes our Quintus Quick-Change Risers to achieve full quick-change fixturing benefits on rotary tables 250mm diameter and larger. A Quintus Quick-Change Riser provides additional height for spindle clearance, and can be quickly and accurately mounted directly on the rotary table at its center.



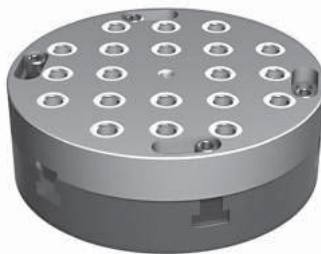
### **METHOD 3** **Subplate Mounted on Rotary Table**

Method 3 is appropriate for medium and large machine tables, achieving further quick-change benefits for the entire riser assembly. Using this method, the Quintus riser is mounted on a subplate to allow quick exchange of the riser with other fixturing.

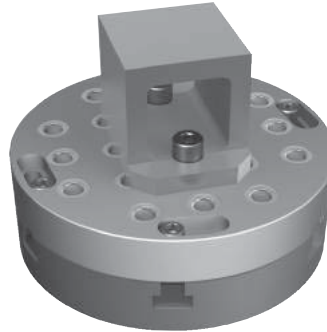
# CL5® QUICK-CHANGE 5-AXIS WORKHOLDING



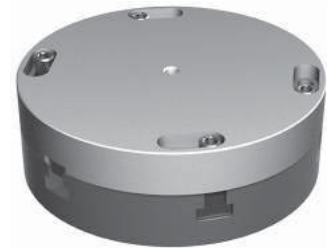
**Vise-Adaptor Fixture Plate with 5-Axis Vise**



**Modular Fixture Plate**



**Modular Fixture Plate with Riser Block**



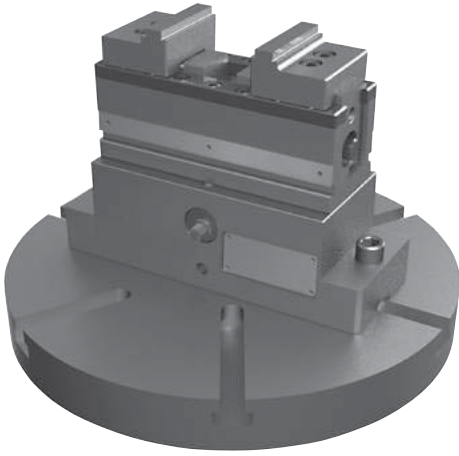
**Blank Fixture Plate**

Method 1 is ideal for small rotary tables up to 210mm diameter, but can also be used for larger tables up to 400mm diameter. These fixture plates are accurately located and fastened directly on the rotary table. This simple, economical method allows using 5-Axis Vises, modular fixturing, or dedicated permanent fixturing. **INFO+:** See pages 334-339 for fixture plates.

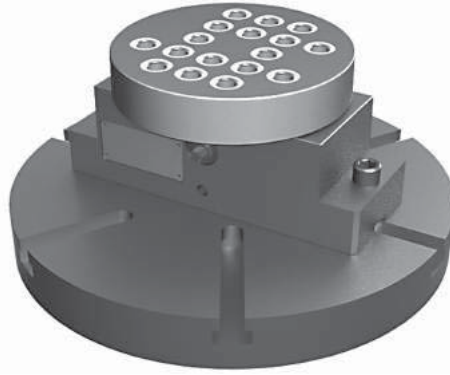
## METHOD 1 FIXTURE PLATE MOUNTED ON ROTARY TABLE

BASE OPTIONS	BASE SIZE	WORKHOLDER OPTIONS	FITS TABLE DIAMETER															
			110mm	130mm	160mm	200mm	210mm	250mm	260mm	300mm	310mm	320mm	400mm	450mm	500mm	500mm	600mm	630mm
Vise Adaptor Plate with 5-Axis Vise	130mm	MC40 , MC40Z Vises	✓	✓														
	160mm	MC40, MC40Z, MC60, MC60Z, SCS80 Vises			✓													
	210mm	MC40, MC40Z, MC60, MC60Z, SCS80 Vises				✓	✓	✓	✓									
	310mm	MC60, MC60Z, SCS80, MC100, MC100Z, SCS120 Vises								✓	✓	✓	✓					
Modular Fixture Plate	130mm	Custom	✓	✓														
	160mm			✓														
	210mm				✓	✓												
	250mm						✓	✓										
	310mm									✓	✓	✓	✓					
Modular Fixture Plate with Riser Block	130mm	Custom	✓	✓														
	160mm	Custom			✓													
	210mm	Custom				✓	✓											
	250mm	MC60, MC60Z, SCS80 Vises or Custom						✓	✓									
	310mm	MC60, MC60Z, SCS80, MC100, MC100Z, SCS120 Vises or Custom								✓	✓	✓	✓					
Blank Fixture Plate	130mm	Custom	✓	✓														
	160mm			✓														
	210mm				✓	✓												
	250mm						✓	✓										
	310mm									✓	✓	✓	✓					

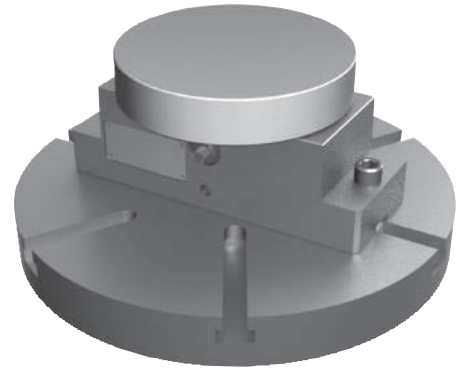
# CL5® QUICK-CHANGE 5-AXIS WORKHOLDING



**Quintus Riser  
with  
5-Axis Vise**



**Quintus Riser  
with  
Modular Fixture Plate**



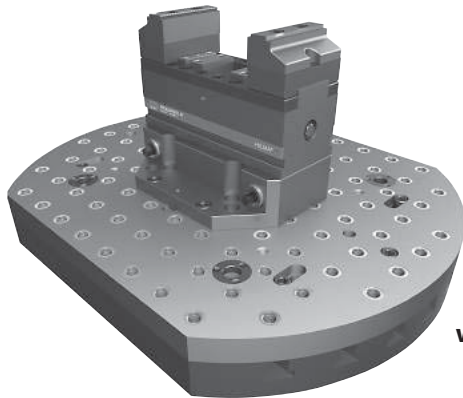
**Quintus Riser  
with  
Blank Fixture Plate**

Method 2 utilizes our Quintus Quick-Change Risers to achieve full quick-change fixturing benefits on rotary tables 250mm diameter and larger. A Quintus Quick-Change Riser provides additional height for spindle clearance, and can be quickly and accurately mounted directly on the rotary table at its center. **INFO+**: See pages 337-339 for Quintus fixture plates.

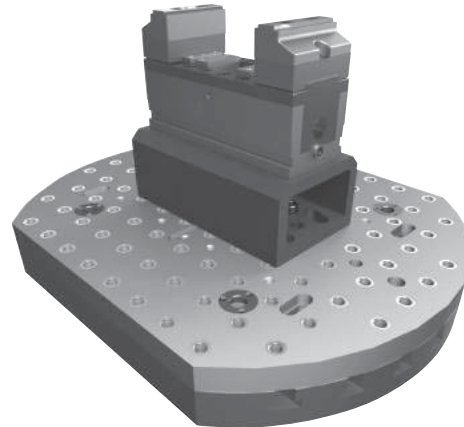
## METHOD 2 QUINTUS MOUNTED ON ROTARY TABLE

BASE OPTIONS	BASE SIZE	WORKHOLDER OPTIONS	FITS TABLE DIAMETER																
			110mm	130mm	160mm	200mm	210mm	250mm	260mm	300mm	310mm	320mm	400mm	450mm	500mm	500mm	600mm	630mm	
Quintus Riser with 5-Axis Vise	Quintus 1	MC40, MC40Z, MC60, MC60Z, SCS80 Vises						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Quintus 2	MC100, MC100Z, SCS120 Vises								✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Quintus 3	MC125Z Vise											✓	✓	✓	✓	✓	✓	
Quintus Riser with Modular Fixture Plate	Quintus 1 + 130mm	Custom						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Quintus 1 + 160mm							✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Quintus 1 + 100x250mm							✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Quintus 1 + 150x250mm							✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Quintus Riser with Blank Fixture Plate	Quintus 2 + 250mm	Custom								✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Quintus 1 + 130mm							✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Quintus 1 + 160mm							✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Quintus 1 + 100x250mm							✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Quintus Riser with Blank Fixture Plate	Quintus 1 + 150x250mm	Custom						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Quintus 2 + 250mm										✓	✓	✓	✓	✓	✓	✓	✓	

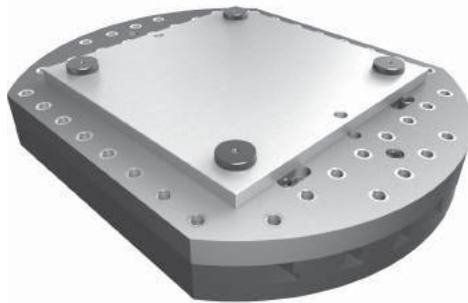
# CL5® QUICK-CHANGE 5-AXIS WORKHOLDING



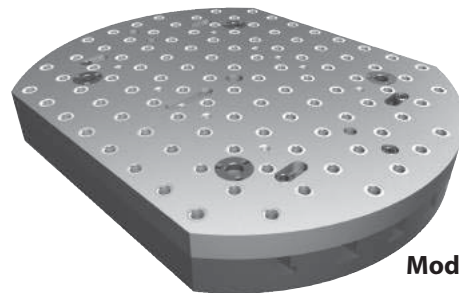
**Subplate with Quintus Riser and 5-Axis Vise**



**Subplate with Riser Block**



**Subplate with Carr Lock Fixture Plate**



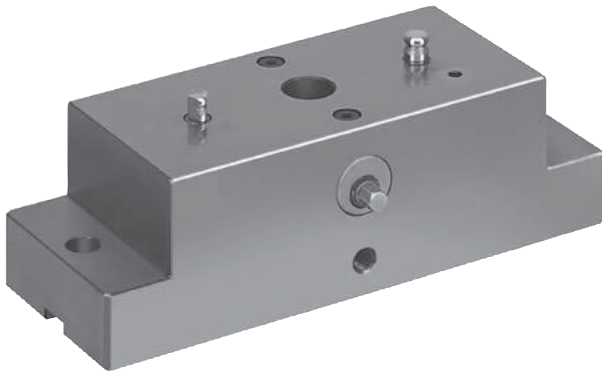
**Subplate used as Modular Fixture Plate**

Method 3 is appropriate for medium and large machine tables, achieving further quick-change benefits for the entire riser assembly. Using this method, the Quintus riser is mounted on a subplate to allow quick exchange of the riser with other fixturing. **INFO+**: See See pages 340-341 for subplates.

## METHOD 3 SUBPLATE MOUNTED ON ROTARY TABLE

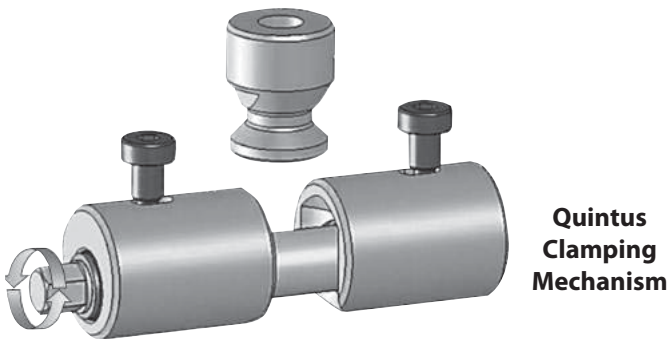
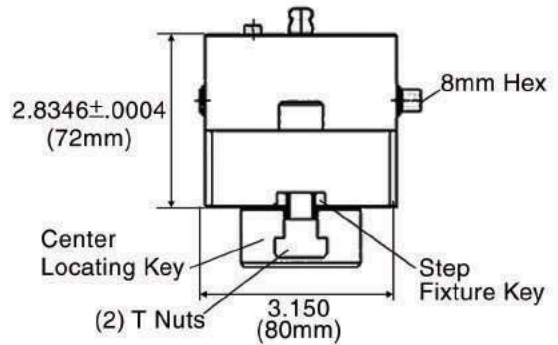
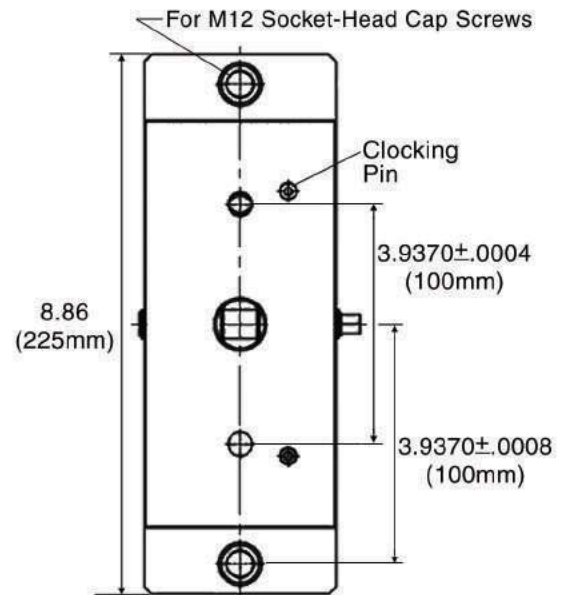
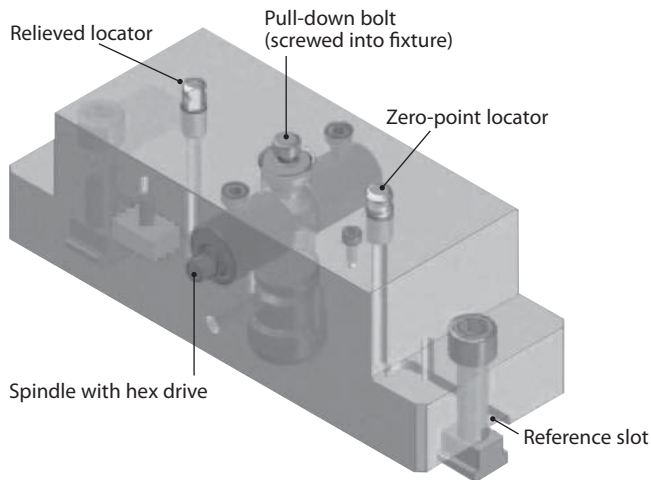
BASE OPTIONS	BASE SIZE	WORKHOLDER OPTIONS	FITS TABLE DIAMETER																
			110mm	130mm	160mm	200mm	210mm	250mm	260mm	300mm	310mm	320mm	400mm	450mm	500mm	500mm	600mm	630mm	
Subplate with Quintus Riser and 5-Axis Vise	250mm + Quintus 1	MC40, MC40Z, MC60, MC60Z, SCS80 Vises or Custom						✓	✓										
	310mm + Quintus 1	MC40, MC40Z, MC60, MC60Z, SCS80 Vises or Custom								✓	✓	✓	✓						
	310mm + Quintus 2	MC100, MC100Z, SCS120 Vises or Custom								✓	✓	✓	✓						
	630x500mm + Quintus 1	MC40, MC40Z, MC60, MC60Z, SCS80 Vises or Custom																✓	✓
	630x500mm+Quintus 2	MC100, MC100Z, SCS120 Vises or Custom																✓	✓
	630x500mm + Quintus 3	MC125Z Vise or Custom																✓	✓
Subplate with Riser Block	250mm	MC60, MC60Z, SCS80, Vises or Custom						✓	✓										
	310mm	MC60, MC60Z, SCS80, MC100, MC 100Z, SCS120 Vises or Custom								✓	✓	✓	✓						
	630x500mm	MC60, MC60Z, SCS80, MC100, MC 100Z, SCS120 Vises or Custom																✓	✓
Subplate with Carr Lock Plate	630x500mm	14x14, 400x400mm Carr Lock Fixture Plates																✓	✓
Subplate used as Modular Fixture Plate	250mm	Custom						✓	✓										
	310mm									✓	✓	✓	✓						
	630x500mm																		✓

# CL5® QUICK-CHANGE 5-AXIS WORKHOLDING



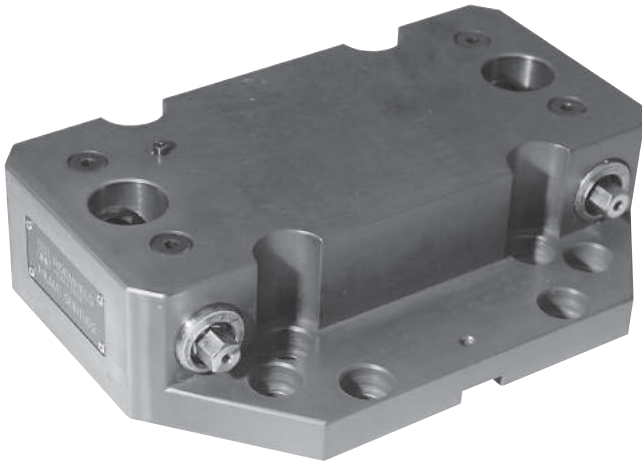
**Quintus 1  
Quick-Change Riser**  
Pull-Down Force 2700 Lbs  
CLRH-9-6153-0101-VSA

Quintus Quick-Change Risers provide accurate location and secure clamping while also providing quick-change capability and elevating the workpiece for improved spindle access – all in one compact unit. The Quintus 1 riser shown here utilizes two locating pins, a round pin for zero-point centering and a diamond pin for single-axis centering, and a single pull-down bolt that provides 2700 lbs of pull-down force.



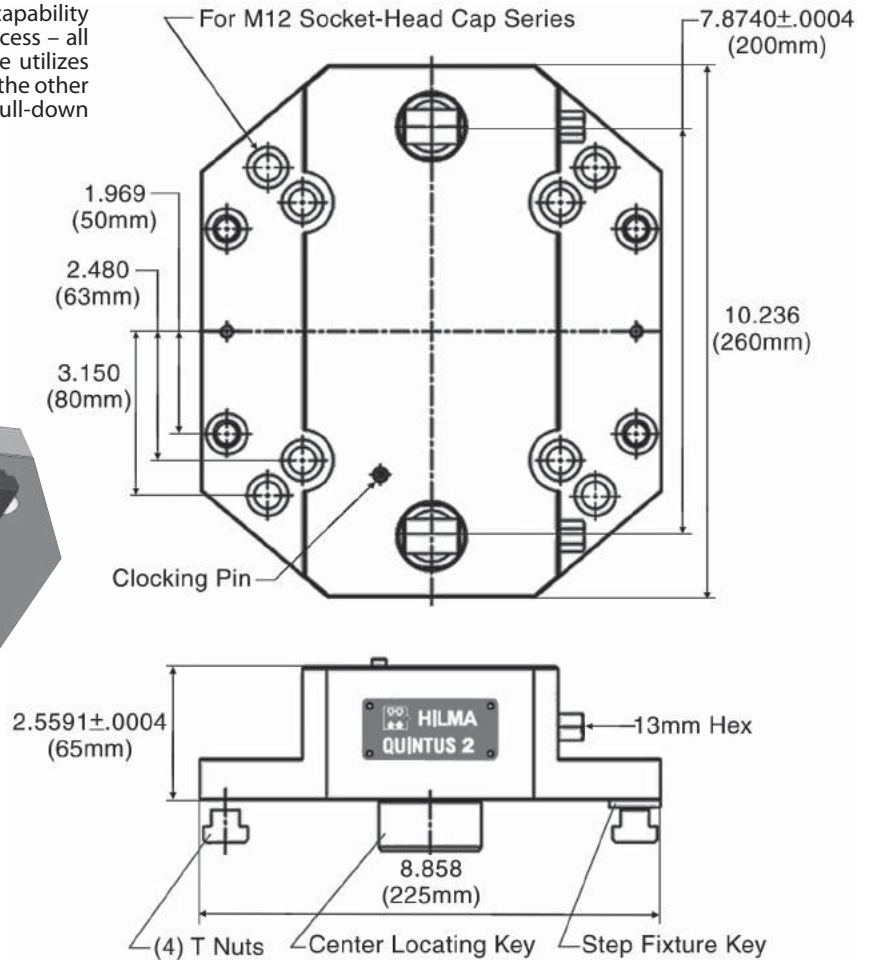
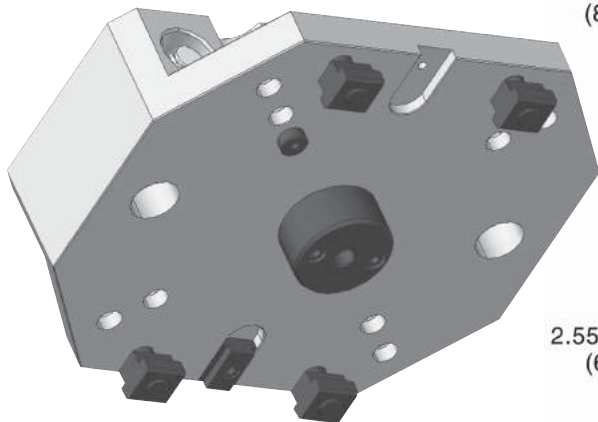


# CL5® QUICK-CHANGE 5-AXIS WORKHOLDING

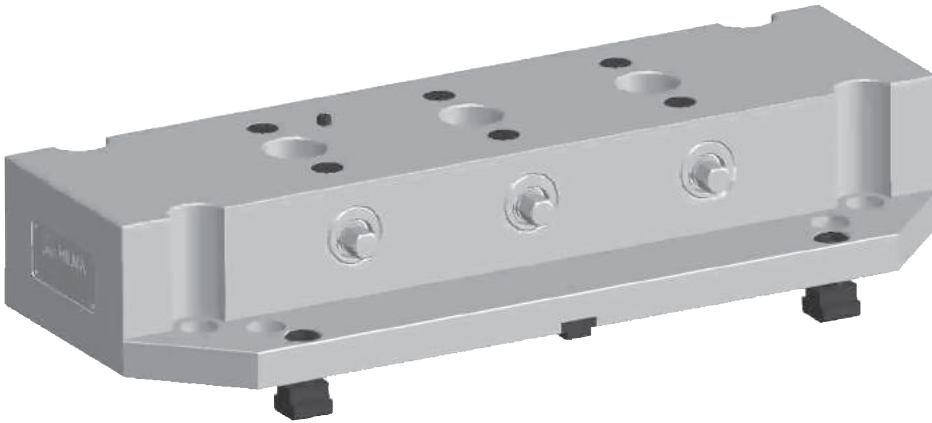


**Quintus 2**  
**Quick-Change Riser**  
 Pull-Down Force 4500 Lbs x 2  
 CLRH-9-6155-0102-VSA

Quintus Quick-Change Risers provide accurate location and secure clamping while also providing quick-change capability and elevating the workpiece for improved spindle access – all in one compact unit. The Quintus 2 riser shown here utilizes two pull-down bolts – one with zero-point centering, the other with single-axis centering – providing 2 x 4500 lbs of pull-down force.



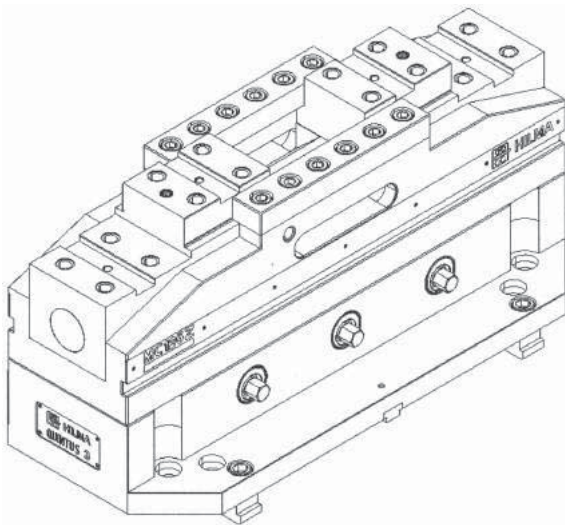
# CL5® QUICK-CHANGE 5-AXIS WORKHOLDING



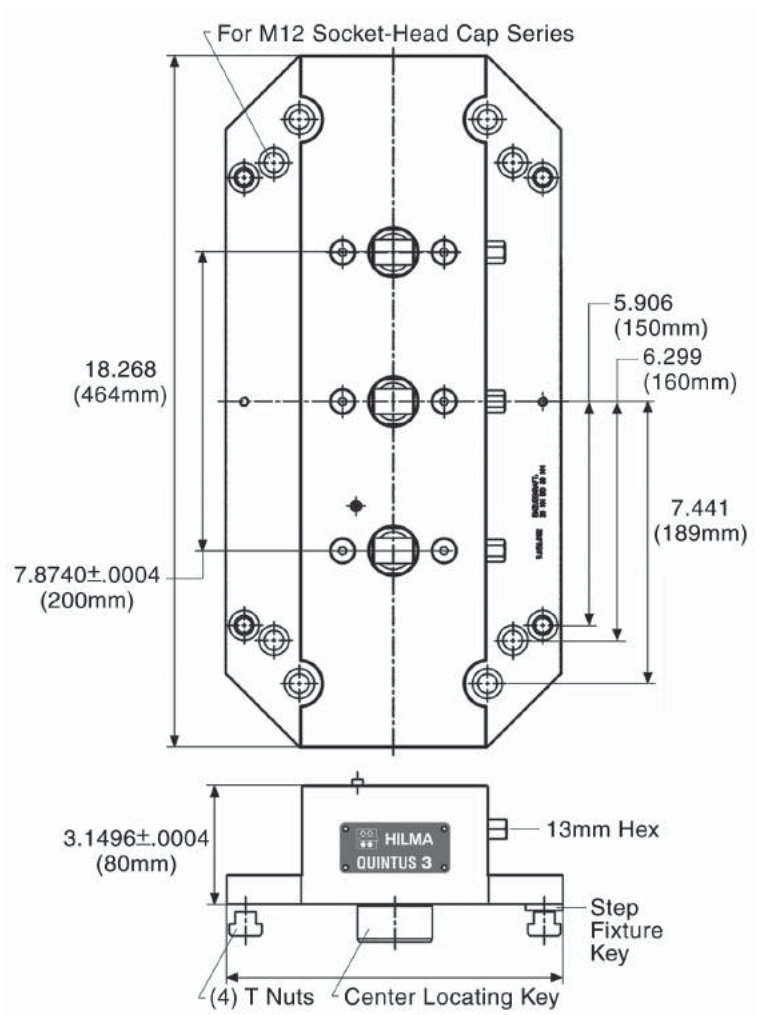
**Quintus 3  
Quick-Change Riser**  
Pull-Down Force 4500 Lbs x 3  
CLRH-9-6156-0102-VSA

Quintus Quick-Change Risers provide accurate location and secure clamping while also providing quick-change capability and elevating the workpiece for improved spindle access – all in one compact unit. The Quintus 3 riser shown here utilizes three pull-down bolts – one with zero-point centering, one with single-axis centering, and one without centering – providing 3 x 4500 lbs of pull-down force.

9



MC125Z-series 5-axis concentric vise mounted on Quintus 3 Quick-Change Riser

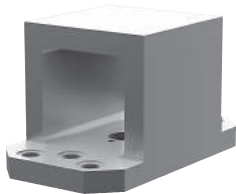


# CL5® QUICK-CHANGE 5-AXIS WORKHOLDING

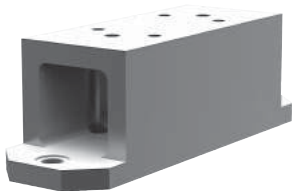
## RISER BLOCKS



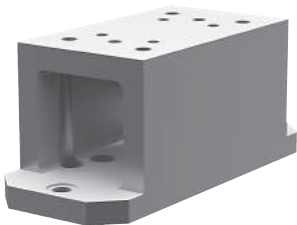
**3 x 3 x 3  
Blank**



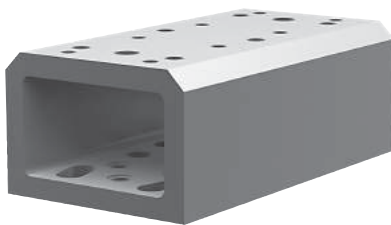
**4 x 4 x 4  
Blank**



**3 x 3 x 7  
Vise Adaptor**  
(MC60, MC60Z)

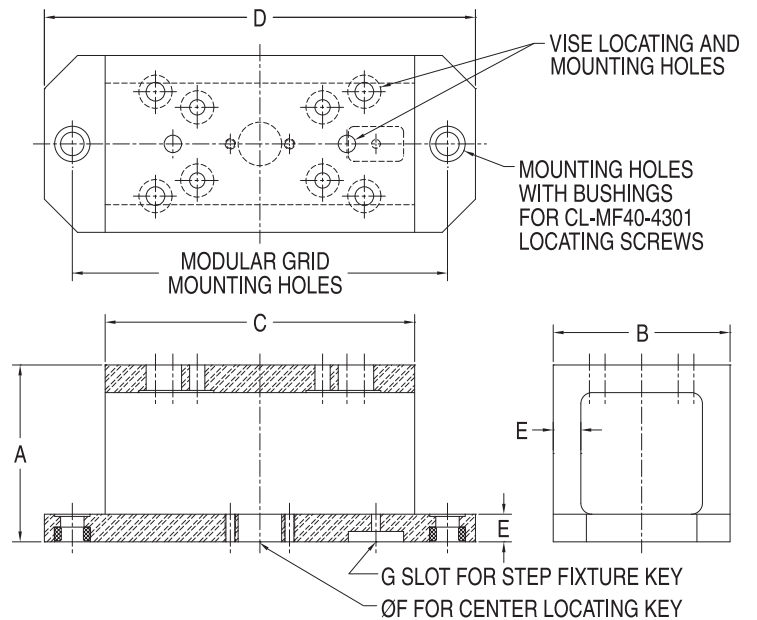


**4 x 4 x 7  
Vise Adaptor**  
(MC60, MC60Z, SCS80)



**4 x 6 x 11  
Vise Adaptor**  
(MC100, MC100Z, SCS120)

Riser Blocks provide an economical way to raise a workpiece for 5-Axis machining. These precision blocks are available blank for customization, or with locating and mounting holes for 5-Axis vises. Riser Blocks are usually mounted on a modular fixture plate, but sizes from 4x4x4 up can also be mounted directly on a rotary table.



### RISER BLOCKS – BLANK

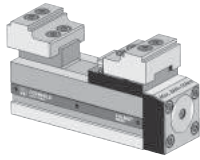
PART NO.	A	B	C	D	E	F DIA	G	MODULAR GRID MOUNTING HOLES	WORKHOLDER OPTIONS
CL-333-00-RBF	3	3	3	4.50	.50	—	—	2.8284 (2x2 diagonal)	Custom
CL-444-00-RBF	4	4	4	7.25	.62	25mm	—	2.0000 x 6.0000	

### RISER BLOCKS – VISE ADAPTOR

CL-337-02-RBF	3	3	7	9.75	.50	25mm	20mm	8.4853 (6x6 diagonal)	MC60, MC60Z Vises
CL-447-02-RBF	4	4	7	9.75	.62			8.4853 (6x6 diagonal)	MC60, MC60Z, SCS80 Vises
CL-4611-03-RBF		6	11	11	.62			2.0000 x 6.0000	MC100, MC100Z, SCS120 Vises

# CL5® QUICK-CHANGE 5-AXIS WORKHOLDING

## 5-AXIS VISES FOR MOUNTING ON QUINTUS 1

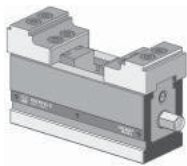


### MC40

#### Fixed-Jaw Vise

40mm wide x 110mm long  
1800 lbs clamping force

The MC40 vise is extremely compact yet quite powerful. Like all of our 5-Axis vises, this vise has optimal features to allow unrestricted tool access for multiple-side machining. The standard fixed-jaw version has one fixed jaw and one sliding jaw that clamps against it. Due to its small size, the MC40 vise uses an adaptor plate to mount on a Quintus 1 riser. **INFO+:** See pages 632-633 for more information.

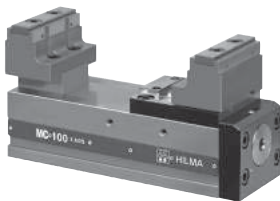


### MC40 Z

#### Concentric Vise

40mm wide x 110mm long  
1800 lbs clamping force

The Z-series version of our MC40 vise is dimensionally similar, but incorporates our precision self-centering mechanism. This concentric vise has two sliding jaws that provide clamping at the exact center of the rotary table. **INFO+:** See pages 632-633 for more information.

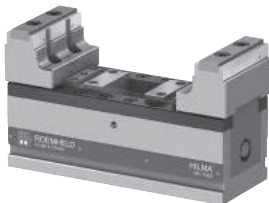


### MC60

#### Fixed-Jaw Vise

60mm wide x 170mm long  
3400 lbs clamping force

The MC60 vise is our most popular 5-Axis-vise size. Like all of our 5-Axis vises, this vise has optimal features to allow unrestricted tool access for multiple-side machining. The standard fixed-jaw version has one fixed jaw and one sliding jaw that clamps against it. **INFO+:** See pages 632-633 for more information.

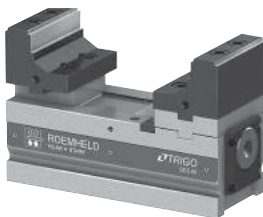


### MC60 Z

#### Concentric Vise

60mm wide x 170mm long  
3400 lbs clamping force

The Z-series version of our MC60 vise is dimensionally similar, but incorporates our precision self-centering mechanism. This concentric vise has two sliding jaws that provide clamping at the exact center of the rotary table. **INFO+:** See pages 632-633 for more information.



### SCS80

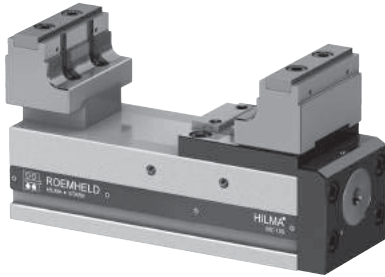
#### Fixed-Jaw Vise

80mm wide x 200mm long  
5600 lbs clamping force

SCS-series vises are slightly wider, and allow clamping higher up in the jaws with greater holding force. Like all of our 5-Axis vises, the SCS80 vise has optimal features to allow unrestricted tool access for multiple-side machining. The standard fixed-jaw design has one fixed jaw and one sliding jaw that clamps against it. **INFO+:** See page 634 for more information.

# CL5® QUICK-CHANGE 5-AXIS WORKHOLDING

## 5-AXIS VISES FOR MOUNTING ON QUINTUS 2

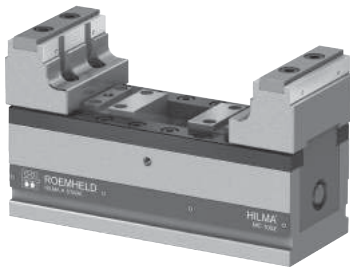


### MC100

#### Fixed-Jaw Vise

100mm wide x 260mm long  
5600 lbs clamping force

The MC100 vise handles a wide range of workpiece sizes. Like all of our 5-Axis vises, this vise has optimal features to allow unrestricted tool access for multiple-side machining. The standard fixed-jaw version has one fixed jaw and one sliding jaw that clamps against it. **INFO+**: See pages 632-633 for more information.

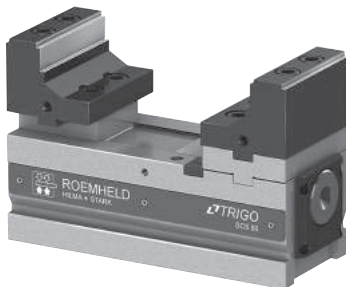


### MC100 Z

#### Concentric Vise

100mm wide x 266mm long  
5600 lbs clamping force

The Z-series version of our MC100 vise is dimensionally similar, but incorporates our precision self-centering mechanism. This concentric vise has two sliding jaws that provide clamping at the exact center of the rotary table. **INFO+**: See pages 632-633 for more information.



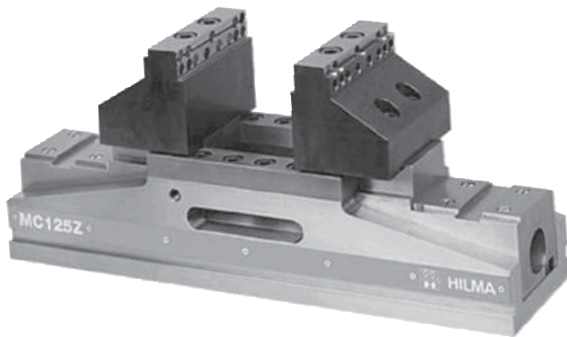
### SCS120

#### Fixed-Jaw Vise

120mm wide x 227mm long  
9000 lbs clamping force

SCS-series vises are slightly wider, and allow clamping higher up in the jaws with greater holding force. Like all of our 5-Axis vises, the SCS120 vise has optimal features to allow unrestricted tool access for multiple-side machining. The standard fixed-jaw design has one fixed jaw and one sliding jaw that clamps against it. **INFO+**: See page 634 for more information.

## 5-AXIS VISES FOR MOUNTING ON QUINTUS 3



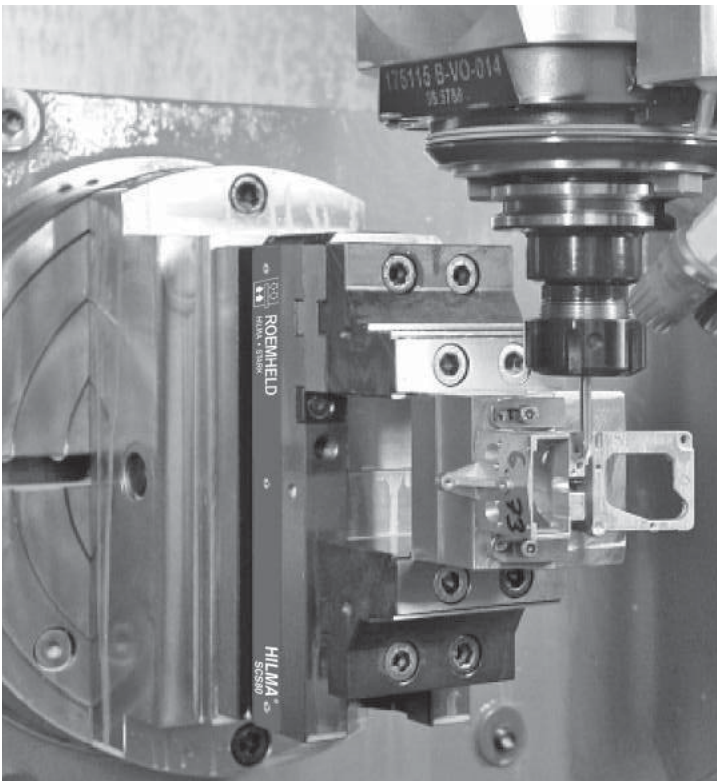
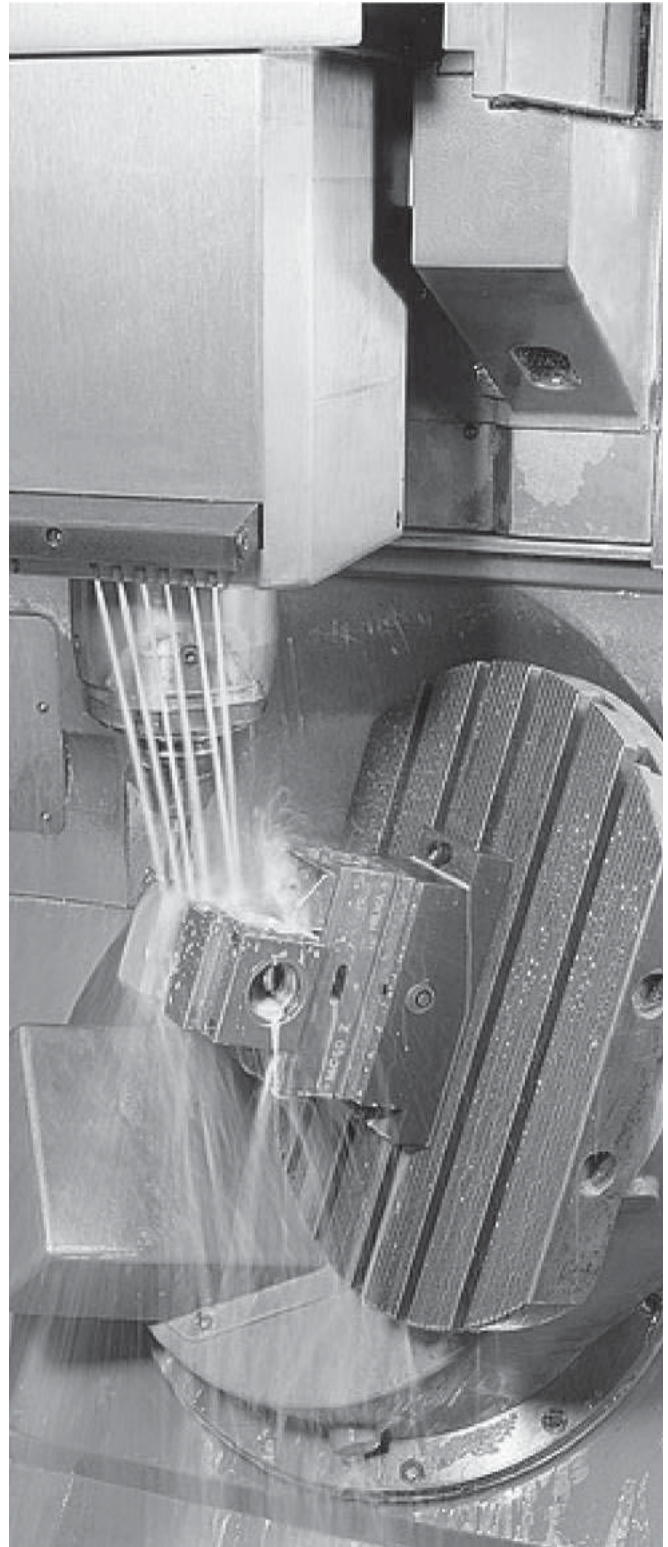
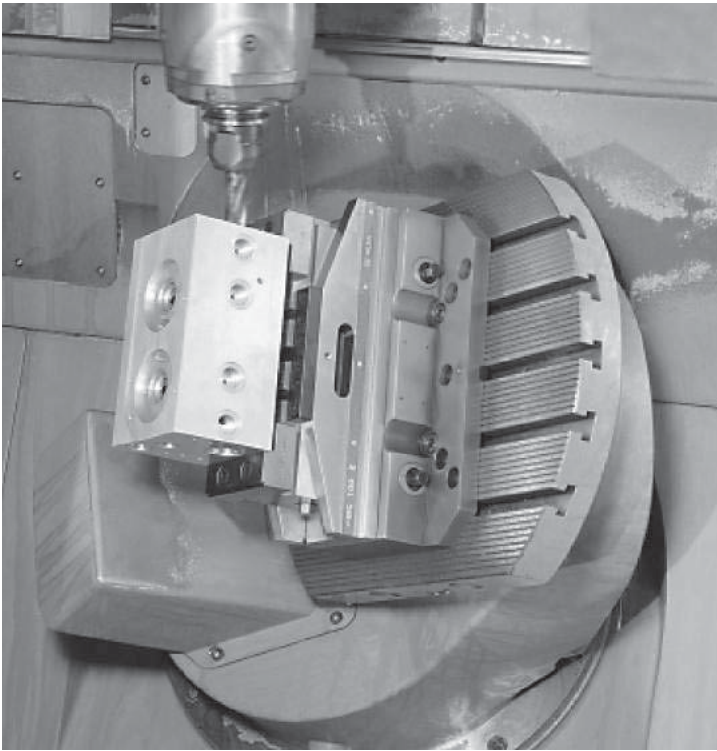
### MC125 Z

#### Concentric Vise

125mm wide x 465mm long  
7900 lbs clamping force

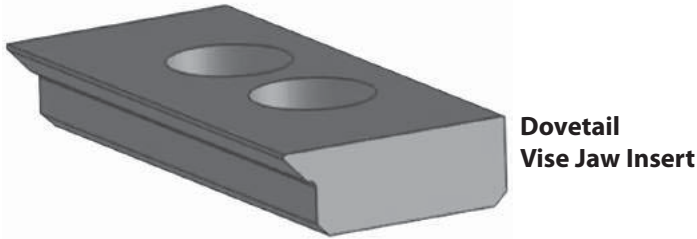
The MC125Z vise is ideal for large workpieces. Like all of our 5-Axis vises, this vise has optimal features to allow unrestricted tool access for multiple-side machining. This Z-series concentric vise incorporates our precision self-centering mechanism, with two sliding jaws that provide clamping at the exact center of the rotary table. Shown with optional tapered slides. **INFO+**: See pages 632-633 for more information.

# CL5® QUICK-CHANGE 5-AXIS WORKHOLDING

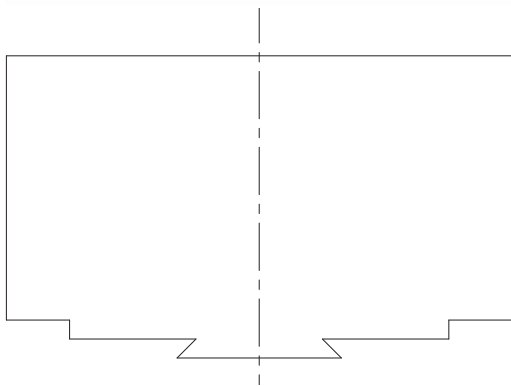
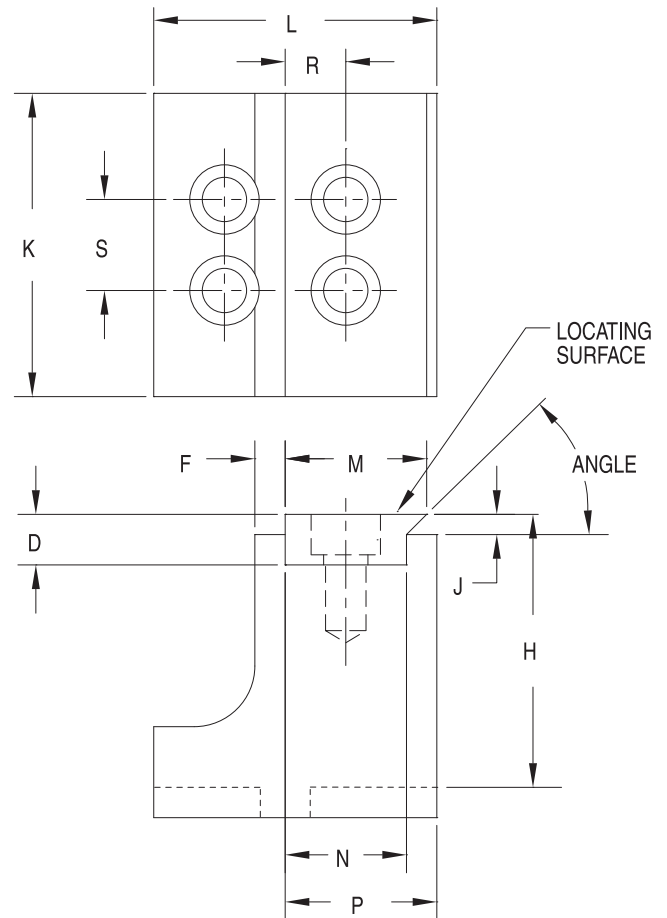
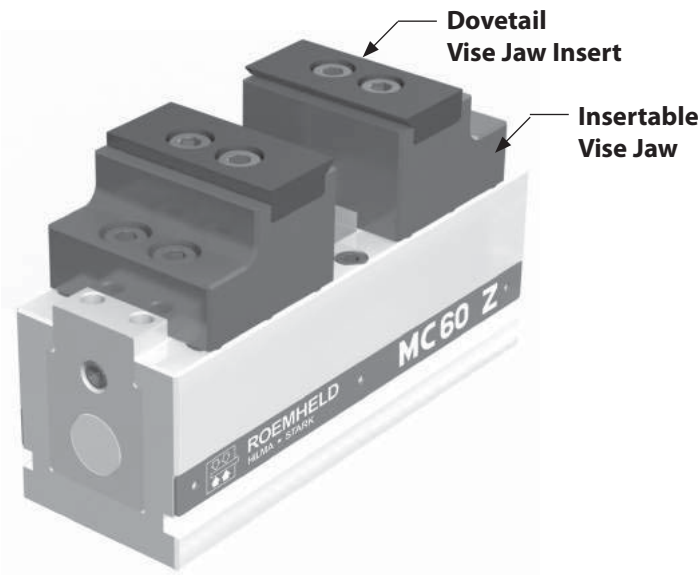


# CL5® QUICK-CHANGE 5-AXIS WORKHOLDING

## DOVETAIL VISE JAWS



Dovetail clamping requires leaving excess material at the bottom of each workpiece for machining a male dovetail. This machined dovetail extension is used to clamp on during 5-Axis work, by a mating dovetail clamp or vise jaw, then is removed in a secondary machining operation. The dovetail inserts shown here fit 60mm-wide insertable jaws on MC60 and MC60Z 5-Axis vises, with other sizes available upon request. Inserts are available for either 45-degree or 60-degree dovetails. 1018 steel, carburized-hardened, black oxide finish.



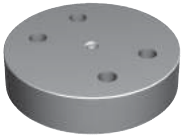
Example dovetail extension at bottom of workpiece.

### WISE JAWS AND DOVETAIL INSERTS

WISE JAW PART NO. (2 REQD)	INSERT PART NO. (2 REQD)	ANGLE	D	F	H	D	K	L	M	N	P	R	M
CLRH-9-3583-6906-VSA	CL-36-DVJI-45	45°	.394	.236	1.339	.157	2.362	2.205	1.102	.945	1.181	.472	.709
	CL-36-DVJI-60	60°							1.063				

# CL5® QUICK-CHANGE 5-AXIS WORKHOLDING

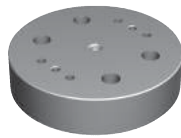
## FIXTURE PLATES FOR MOUNTING ON ROTARY TABLE



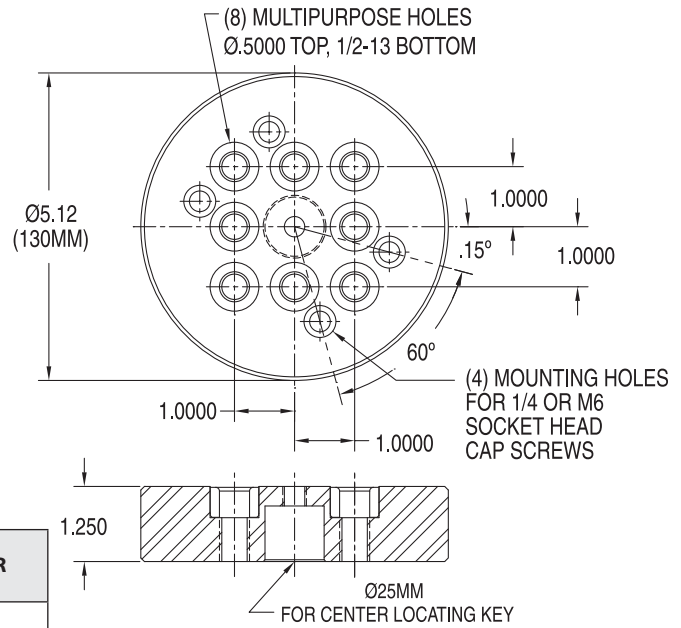
**130mm  
Blank**



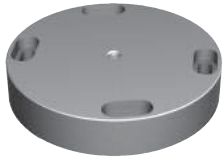
**130mm  
Modular Fixturing**



**130mm  
Vise Adaptor**



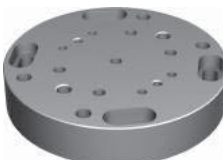
PART NO.	TYPE	PLATE DIA	FITS TABLE DIA	WORKHOLDER OPTIONS
CL-130-00-RFP	Blank	130mm	110mm	Custom
CL-130-40-RFP	Modular		130mm	Riser Block, Custom
CL-130-01-RFP	Vise Adaptor			MC40, MC40Z Vises



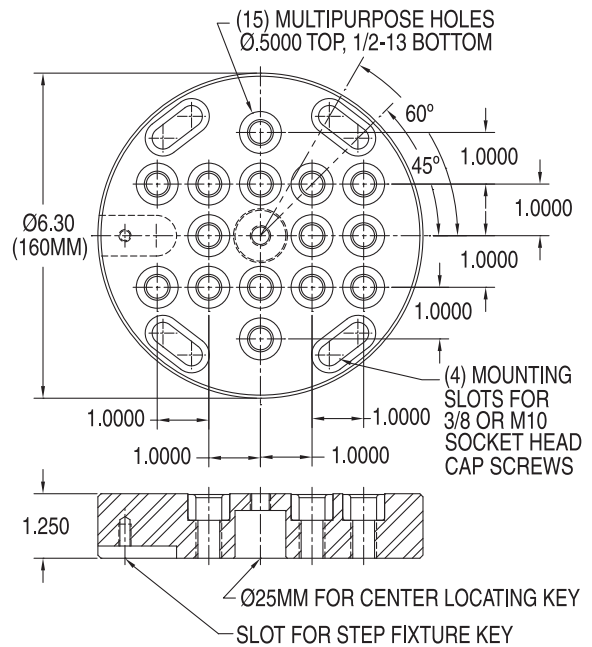
**160mm  
Blank**



**160mm  
Modular Fixturing**



**160mm  
Vise Adaptor**

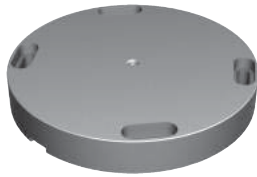


PART NO.	TYPE	PLATE DIA	FITS TABLE DIA	WORKHOLDER OPTIONS
CL-160-00-RFP	Blank	160mm	160mm	Custom
CL-160-40-RFP	Modular			Riser Block, Custom
CL-160-02-RFP	Vise Adaptor			MC40, MC40Z, MC60, MC60Z, SCS80 Vises



# CL5® QUICK-CHANGE 5-AXIS WORKHOLDING

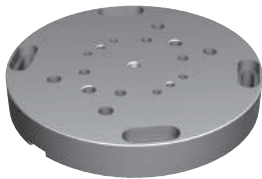
## FIXTURE PLATES FOR MOUNTING ON ROTARY TABLE



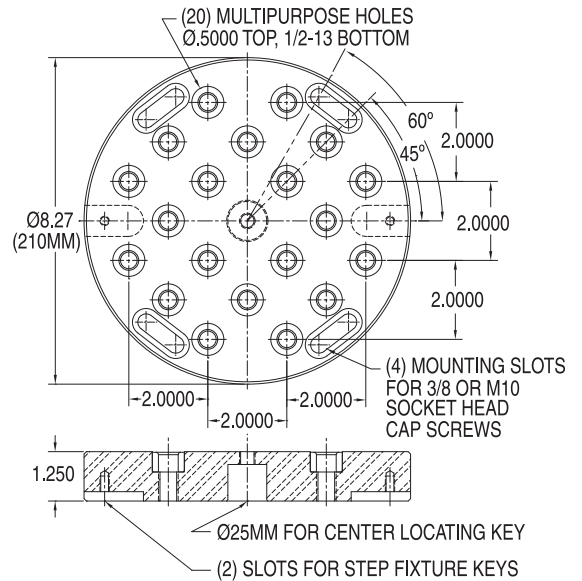
**210mm  
Blank**



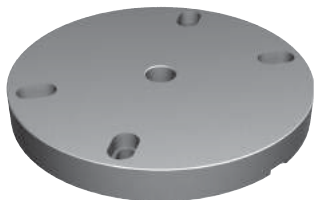
**210mm  
Modular Fixturing**



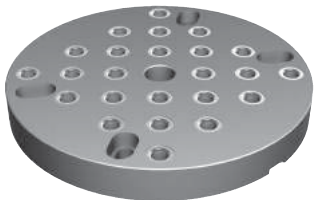
**210mm  
Vise Adaptor**



PART NO.	TYPE	PLATE DIA	FITS TABLE DIA	WORKHOLDER OPTIONS
CL-210-00-RFP	Blank	210mm	200mm 210mm	Custom
CL-210-40-RFP	Modular			Riser Block, Custom
CL-210-02-RFP	Vise Adaptor			MC40, MC40Z, MC60, MC60Z, SCS80 Vises



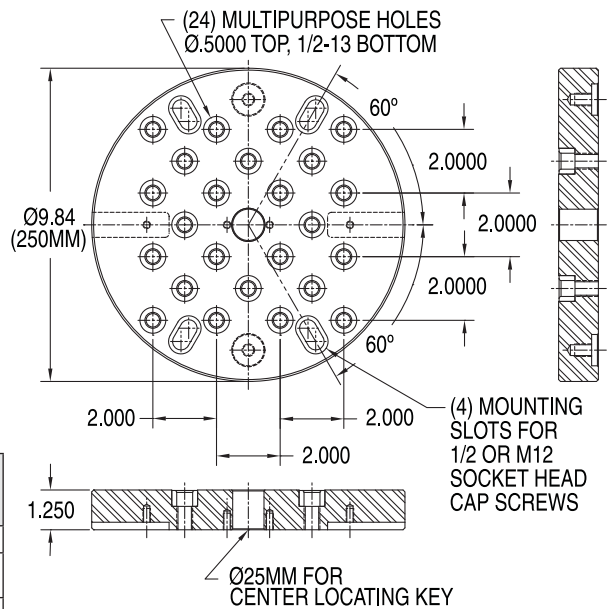
**250mm  
Blank**



**250mm  
Modular Fixturing**

Use 210mm Vise Adaptor for 250mm tables.

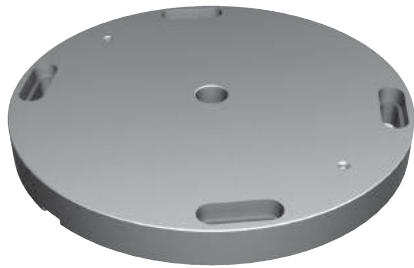
**250mm  
Vise Adaptor**



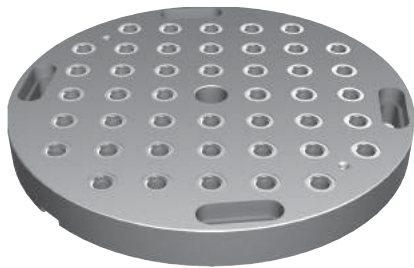
PART NO.	TYPE	PLATE DIA	MOUNTS ON	WORKHOLDER OPTIONS
CL-250-00-QRFP	Blank	250mm	250mm 260mm	Custom
CL-250-40-QRFP	Modular			Riser Block with MC60, MC60Z, SCS80 Vise or Custom
CL-210-02-RFP	Vise Adaptor	210mm		MC40, MC40Z, MC60, MC60Z, SCS80 Vises

# CL5<sup>®</sup> QUICK-CHANGE 5-AXIS WORKHOLDING

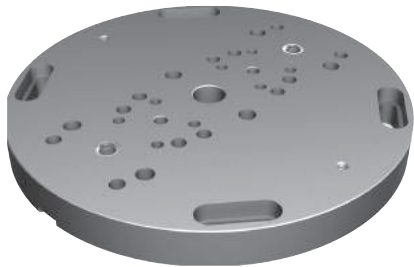
## FIXTURE PLATES FOR MOUNTING ON ROTARY TABLE



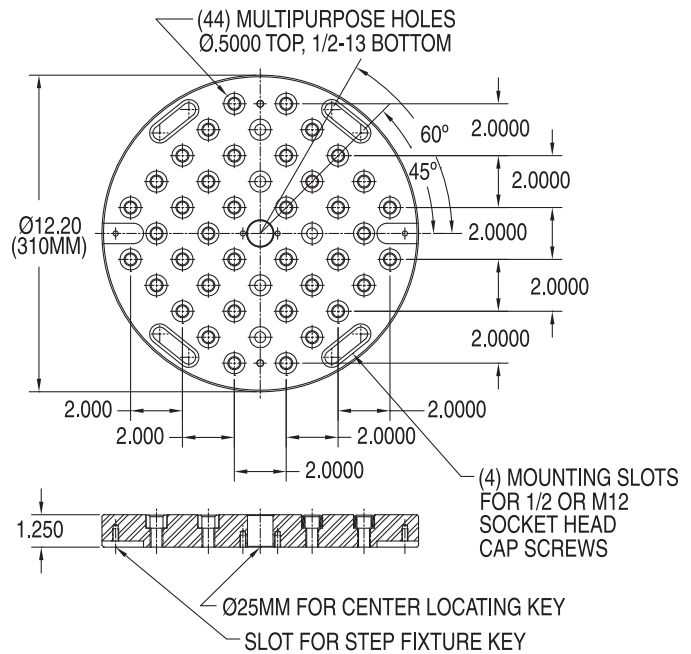
**310mm  
Blank**



**310mm  
Modular Fixturing**



**310mm  
Vise Adaptor**

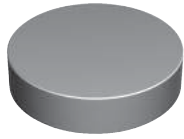


9

PART NO.	TYPE	PLATE DIA	FITS TABLE DIA	WORKHOLDER OPTIONS
CL-310-00-RFP	Blank	310mm	300mm	Custom
CL-310-40-RFP	Modular		310mm	Riser Block with MC60, MC60Z, SCS80, MC100, MC100Z, SCS120 Vise or Custom
CL-310-03-RFP	Vise Adaptor		400mm	MC60, MC60Z, SCS80, MC100, MC100Z, SCS120 Vises

# CL5® QUICK-CHANGE 5-AXIS WORKHOLDING

## FIXTURE PLATES FOR MOUNTING ON QUINTUS 1



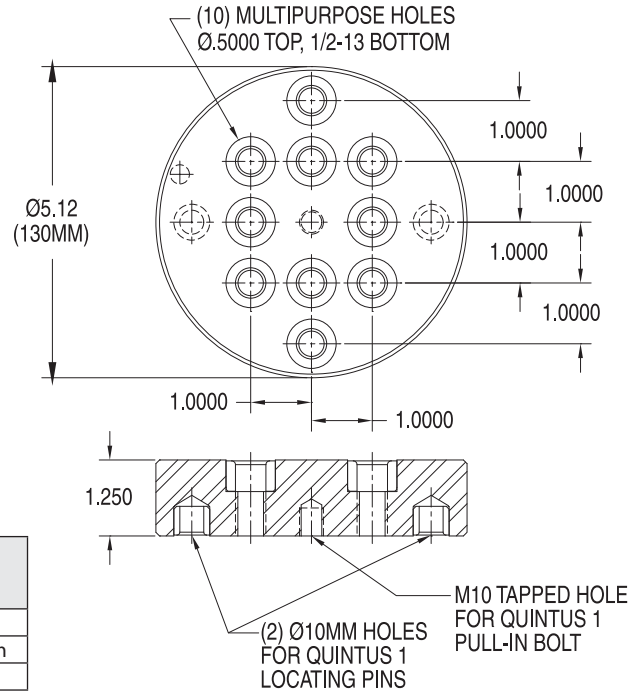
**130mm Blank**  
(Mounts on Quintus 1)



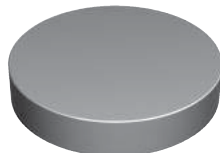
**130mm Modular Fixturing**  
(Mounts on Quintus 1)



**130mm Vise Adaptor**  
(Mounts on Quintus 1)



PART NO.	TYPE	PLATE DIA	MOUNTS ON	WORKHOLDER OPTIONS
CL-130-00-QRFP	Blank	120mm	Quintus 1	Custom
CL-130-40-QRFP	Modular			Riser Block or Custom
CL-130-01-QRFP	Vise Adaptor			MC40, MC40Z Vises



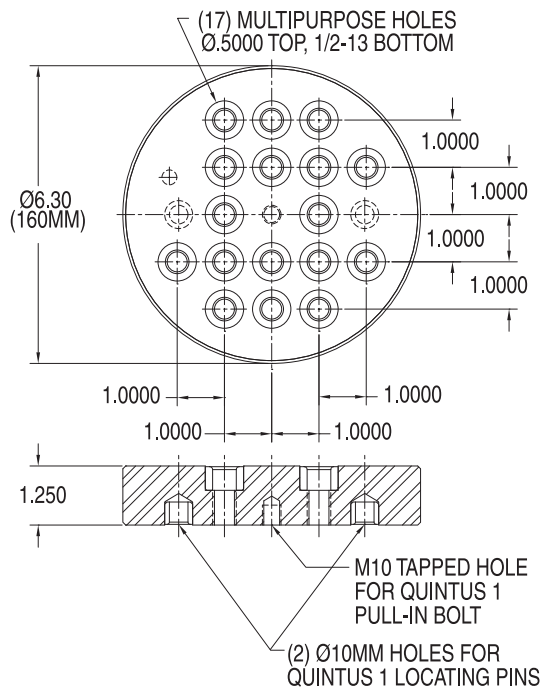
**160mm Blank**  
(Mounts on Quintus 1)



**160mm Modular Fixturing**  
(Mounts on Quintus 1)

Use 130mm Vise Adaptor.

**160mm Vise Adaptor**  
(Mounts on Quintus 1)



PART NO.	TYPE	PLATE DIA	MOUNTS ON	WORKHOLDER OPTIONS
CL-160-00-QRFP	Blank	160mm	Quintus 1	Custom
CL-160-40-QRFP	Modular			Riser Block or Custom
CL-130-01-QRFP	Vise Adaptor	130mm		MC40, MC40Z Vises

# CL5® QUICK-CHANGE 5-AXIS WORKHOLDING

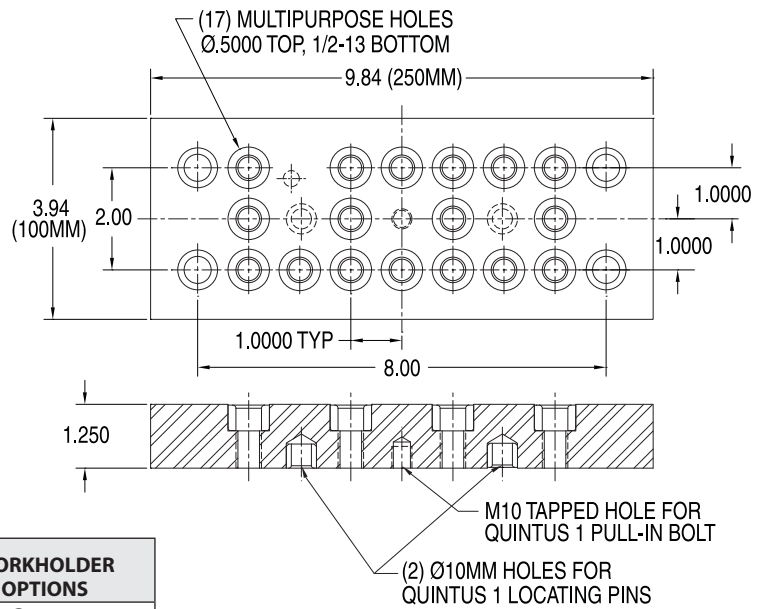
## FIXTURE PLATES FOR MOUNTING ON QUINTUS 1



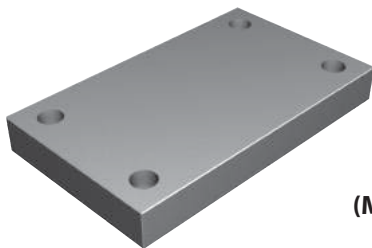
**100 x 250mm  
Blank  
(Mounts on Quintus 1)**



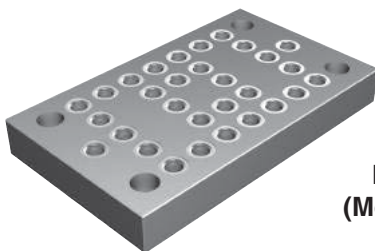
**100 x 250mm  
Modular Fixturing  
(Mounts on Quintus 1)**



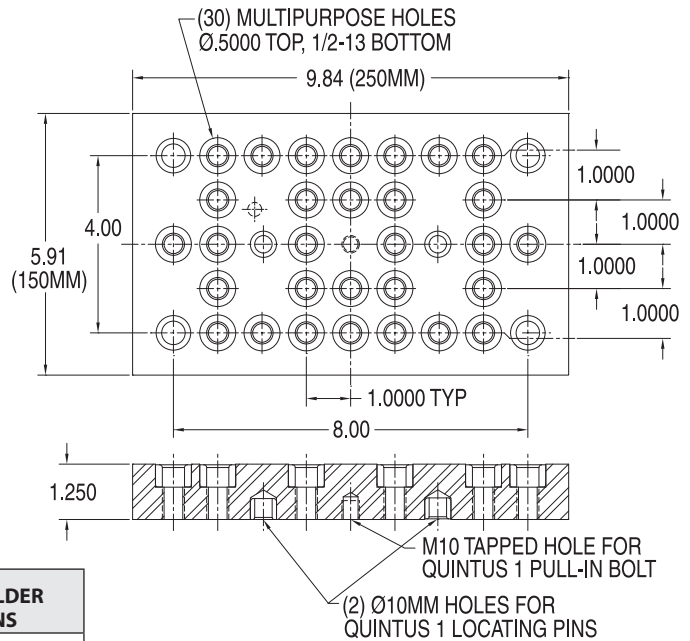
PART NO.	TYPE	PLATE SIZE	MOUNTS ON	WORKHOLDER OPTIONS
CL-100250-00-QFP	Blank	100 x 250mm	Quintus 1	Custom
CL-100250-40-QFP	Modular			Riser Block or Custom



**150 x 250mm  
Blank  
(Mounts on Quintus 1)**



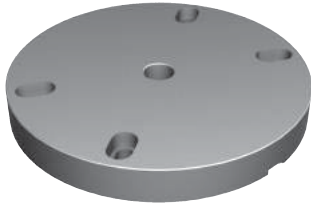
**150 x 250mm  
Modular Fixturing  
(Mounts on Quintus 1)**



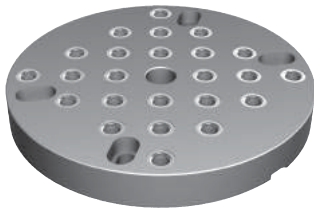
PART NO.	TYPE	PLATE SIZE	MOUNTS ON	WORKHOLDER OPTIONS
CL-150250-00-QFP	Blank	150 x 250mm	Quintus 1	Custom
CL-150250-40-QFP	Modular			Riser Block or Custom

# CL5® QUICK-CHANGE 5-AXIS WORKHOLDING

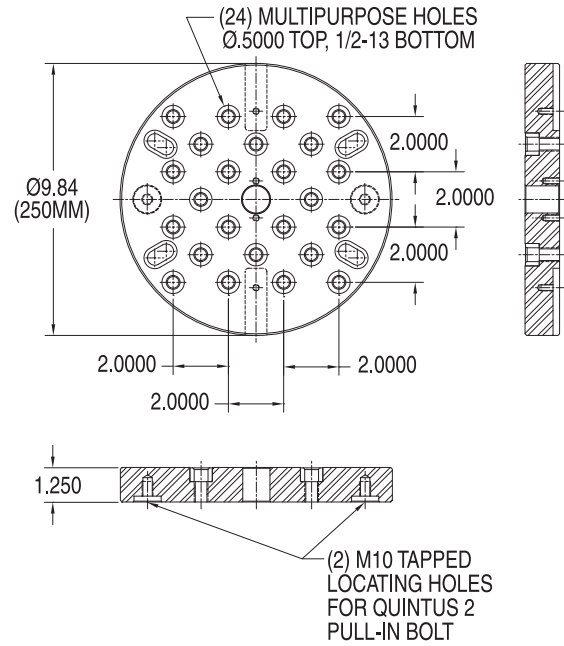
## FIXTURE PLATES FOR MOUNTING ON QUINTUS 2



**250mm  
Blank  
(Mounts on Quintus 2)**



**250mm  
Modular Fixturing  
(Mounts on Quintus 2)**



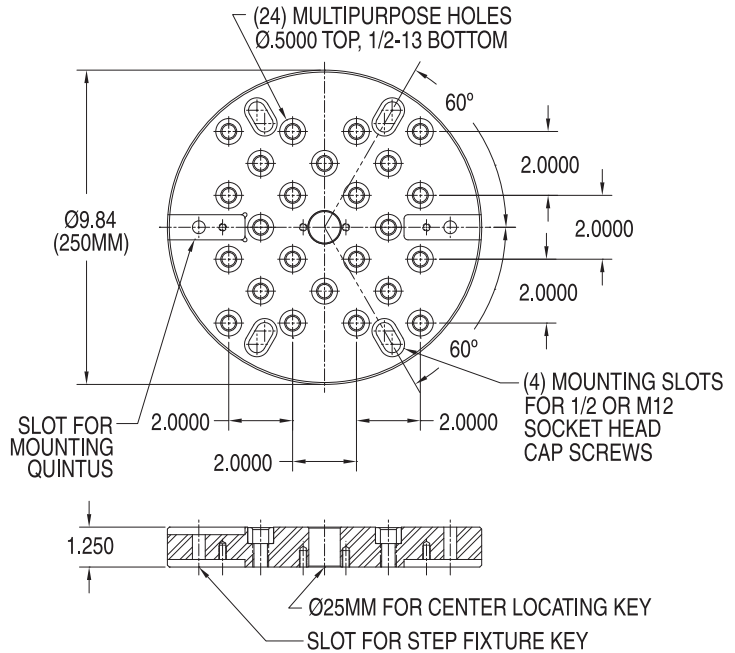
PART NO.	TYPE	PLATE DIA	MOUNTS ON	WORKHOLDER OPTIONS
CL-250-00-QRFP	Blank	250mm	Quintus 2	Custom
CL-250-40-QRFP	Modular			Riser Block or Custom

# CL5® QUICK-CHANGE 5-AXIS WORKHOLDING

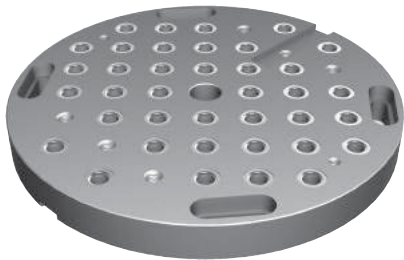
## SUBPLATES



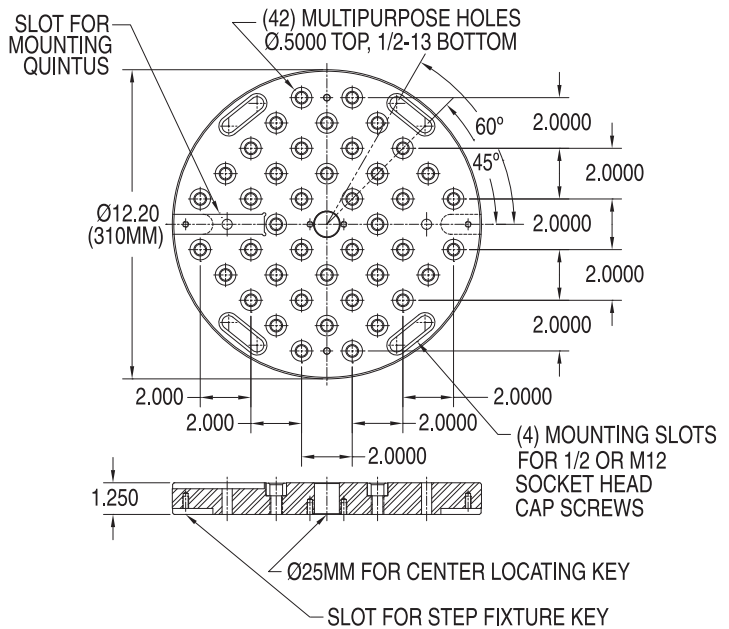
**250mm  
Quintus 1 and  
Modular Fixturing**



PART NO.	PLATE DIA	FITS TABLE DIA	WORKHOLDER OPTIONS
CL-250-41-QRFP	250mm	250mm 260mm	Quintus 1 with MC40, MC40Z, MC60, MC60Z, SCS80 Vise or Custom
			Riser Block with MC60, MC60Z, SCS80 Vise or Custom
			Modular Fixture or Custom



**310mm  
Quintus 1, 2 and  
Modular Fixturing**



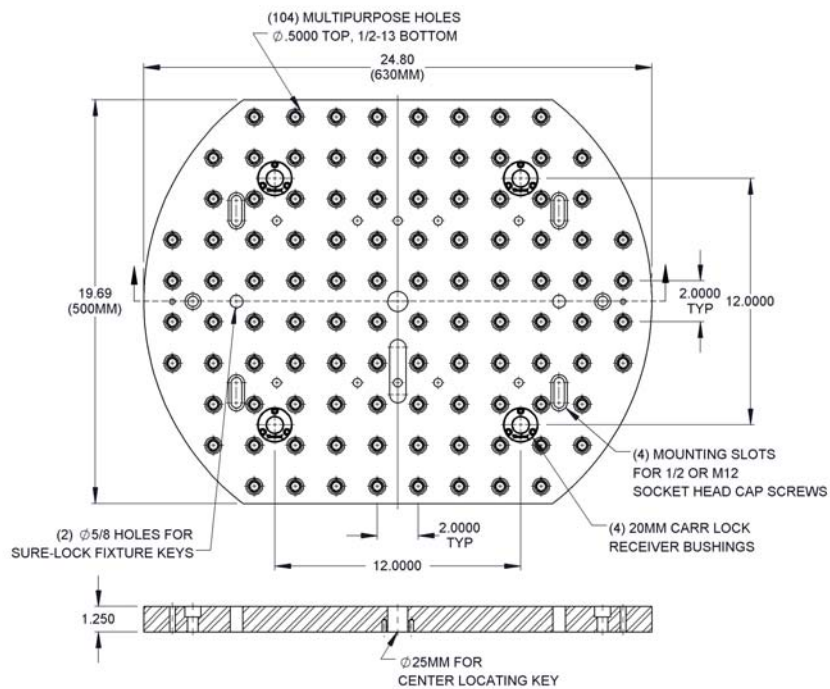
PART NO.	PLATE DIA	FITS TABLE DIA	WORKHOLDER OPTIONS
CL-310-42-RFP	310mm	300mm 310mm 320mm 400mm	Quintus 1 with MC40, MC40Z, MC60, MC60Z, SCS80 Vise or Custom
			Quintus 2 with MC100, MC100Z, SCS120 Vise or Custom
			Riser Block with MC60, MC60Z, SCS80, MC100, MC100Z, SCS120 Vise or Custom
			Modular Fixture or Custom

# CL5® QUICK-CHANGE 5-AXIS WORKHOLDING

## SUBPLATES



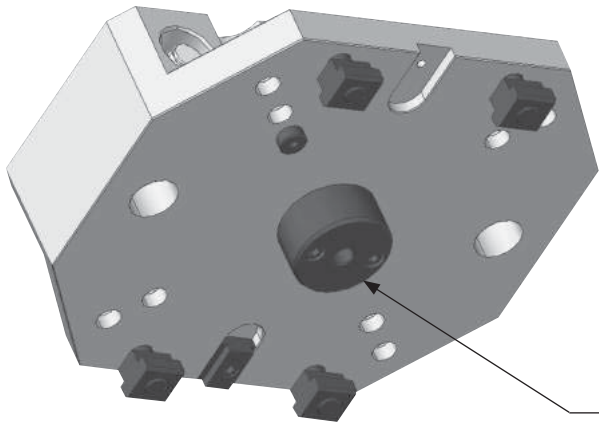
**630 x 500mm  
Quintus 1, 2, 3,  
Modular Fixturing  
and Carr Lock**



PART NO.	PLATE SIZE	FITS TABLE DIA	WORKHOLDER OPTIONS
CL-630500-43-CLRS	630 x 500mm	600mm 630 x 500mm	Quintus 1 with MC40, MC40Z, MC60, MC60Z, SCS80 Vise or Custom
			Quintus 2 with MC100, MC100Z, SCS120 Vise or Custom
			Quintus 3 with MC125Z Vise or Custom
			Riser Block with MC60, MC60Z, SCS80, MC100, MC100Z, SCS120 Vise or Custom
			Modular Fixture or Custom
			Carr Lock Fixture Plate

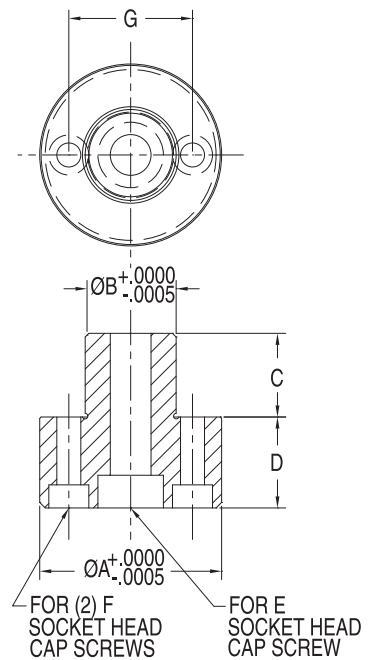
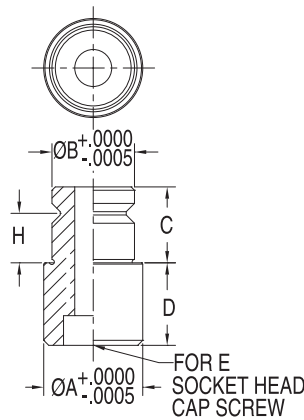
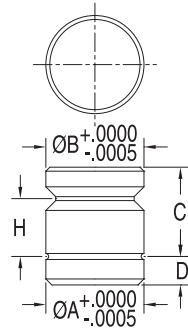
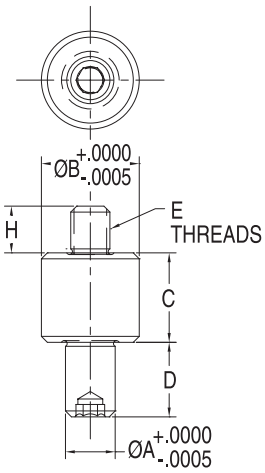
# CL5® QUICK-CHANGE 5-AXIS WORKHOLDING

## CENTER LOCATING KEYS



Center Locating Keys are used to precisely center a fixture on a rotary table. They can be used for mounting Quintus Quick-Change Risers, Riser Blocks, and Round Tooling Plates, which all have a standard 25mm center hole. All Center Locating Keys have a 25mm upper diameter and are available with a wide range of bottom diameters to fit the rotary table's center hole. 1144 steel, heat treated Rc 50-55, black oxide finish.

Center Locating Key



Type 1

Type 2

Type 3

Type 4

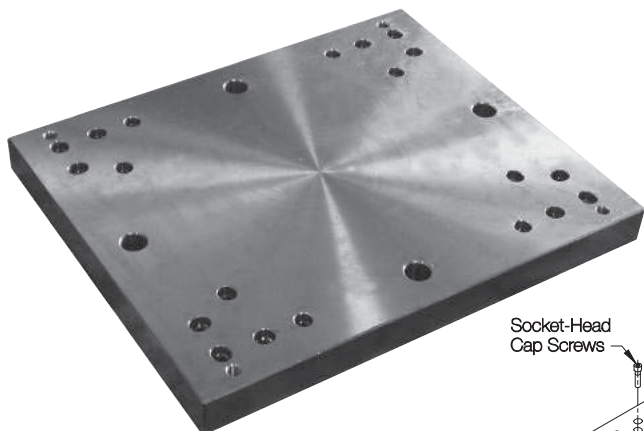
### CENTER LOCATING KEYS

PART NO.	TYPE	A DIA	B DIA	C	D	E	F	G	H	
CLM-25-CLK-5000	Type 1	.5000	9.843 (25mm)	.90	.75	M10	—	—	.47	
CLM-25-CLK-25	Type 2	.9843 (25mm)		.90	.29	—	—	—	.58	
CLM-25-CLK-30	Type 3	1.1811 (30mm)		.91	.98	M10	—	—	—	.59
CLM-25-CLK-32		1.2598 (32mm)								
CLM-25-CLK-1.5000	Type 4	1.5000		.91	.98	M10	M6	1.339	—	
CLM-25-CLK-50		1.9685 (50mm)								
CLM-25-CLK-70		2.000								
CLM-25-CLK-60		2.3622 (60mm)								
CLM-25-CLK-65		2.5591 (65mm)								
CLM-25-CLK-70		2.7559 (70mm)								
CLM-25-CLK-80		3.1496 (80mm)								
CLM-25-CLK-3.2500		3.2500								



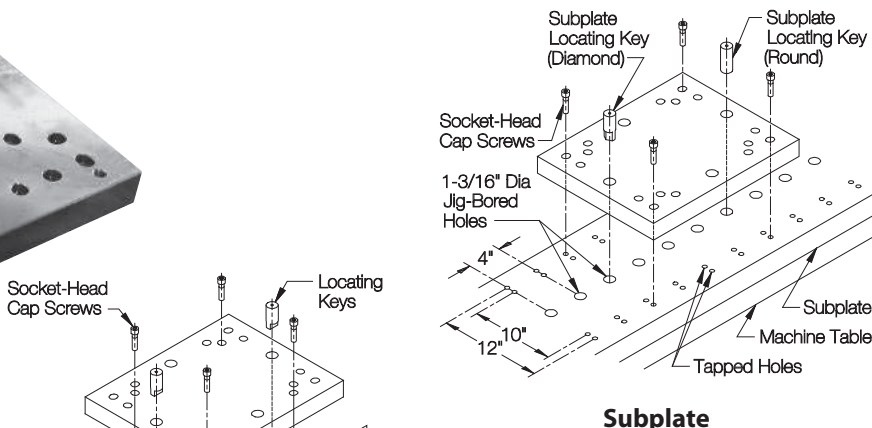
# RECTANGULAR TOOLING PLATES

GRAY CAST IRON, ASTM CLASS 40

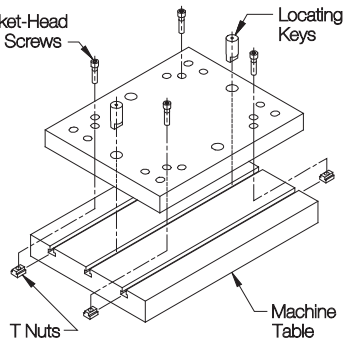


## Precision Blank

Precision blank tooling plates that are ready to mount on virtually any milling machine, reducing tooling cost and leadtime considerably. Finish ground to tight tolerances. Precision Locating-Key holes allow accurate quick-change mounting on a subplate, as well as directly on a machine table. Available in a full range of standard fixture sizes, with mounting holes to fit almost any USA or metric slot spacing. **INFO+**: See page 213 for Locating Keys and Subplate Locating Keys, and page 273 for T Nuts, to fit specific table-slot sizes.

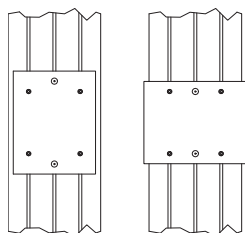
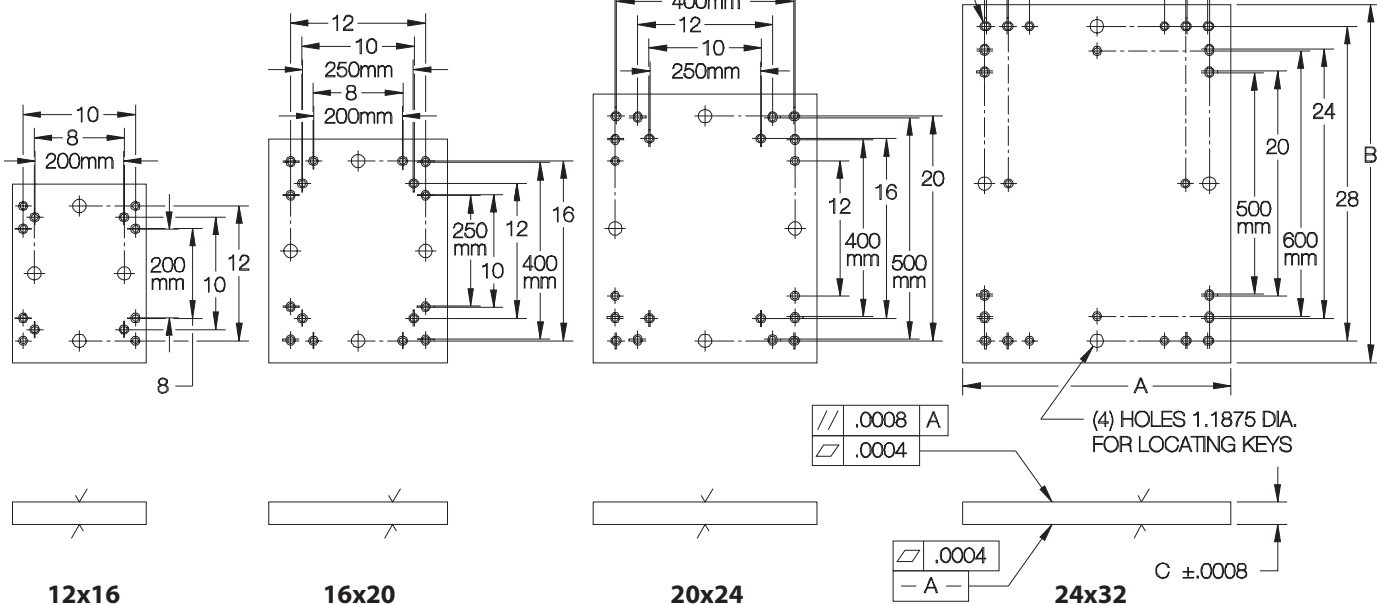


## Subplate



## T-Slotted Table

MOUNTING HOLES FOR 1/2-13 OR M12 SOCKET-HEAD CAP SCREW

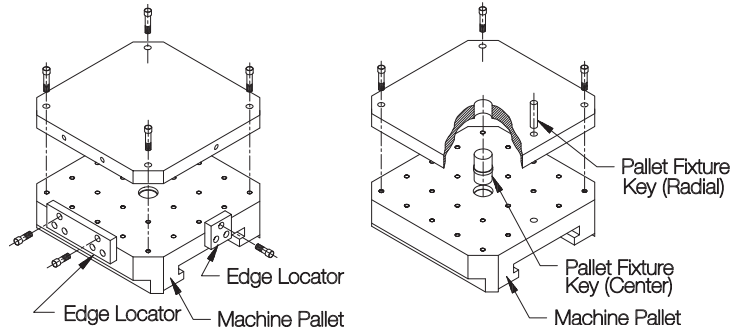


Two sets of Locating-Key holes allow mounting plates either lengthwise or widthwise on a machine table.

PART NO.	A		B		C	NO. OF MOUNTING SCREWS REQUIRED	APPROX. WEIGHT (LBS)
	NOMINAL	ACTUAL	NOMINAL	ACTUAL			
CL-BF00-0110	12	11.875	16	15.875	2.0000	4	95
CL-BF00-0111	16	15.875	20	19.875			160
CL-BF00-0112	20	19.875	24	23.875			240
CL-BF00-0113	24	23.875	32	31.875			370

# SQUARE PALLET TOOLING PLATES

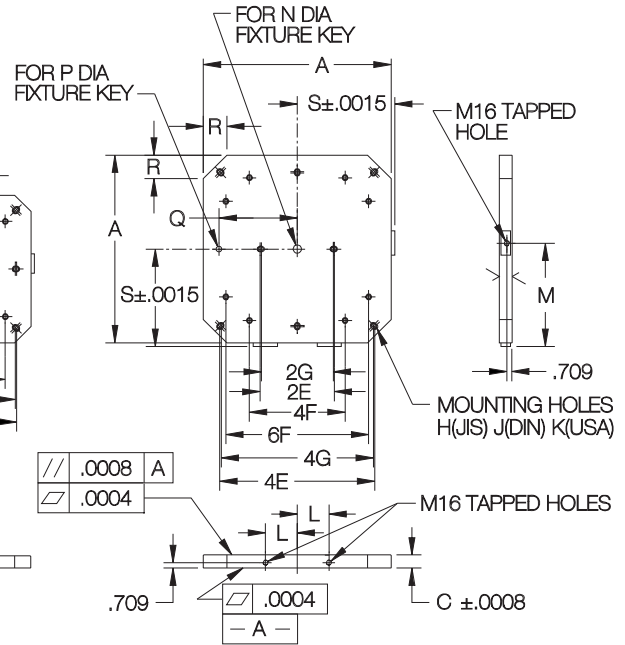
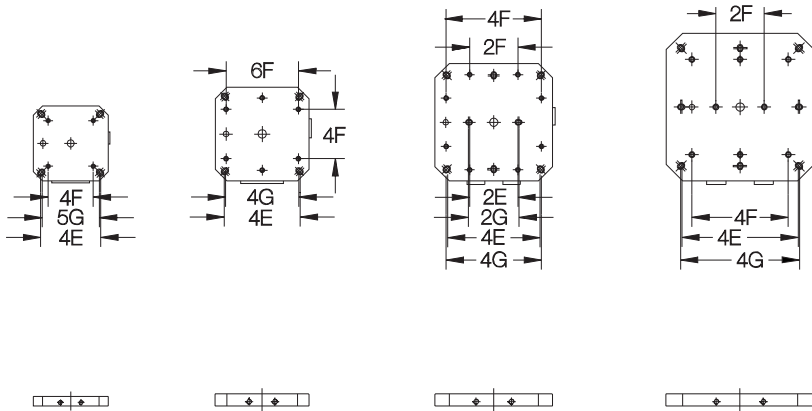
GRAY CAST IRON, ASTM CLASS 40



## Precision Blank

Precision blank tooling plates that are ready to mount on standard machining-center pallets, reducing tooling cost and leadtime considerably. Finish ground to tight tolerances. Dual mounting capability allows both JIS mounting (locating from two reference edges) and DIN mounting (locating from center and radial holes) with excellent accuracy. **INFO+**: See page 214 for the Pallet Fixture Keys used for DIN mounting.

## Dual Mounting (JIS and DIN)



300mm\*\*

400mm

500mm

630mm

800mm

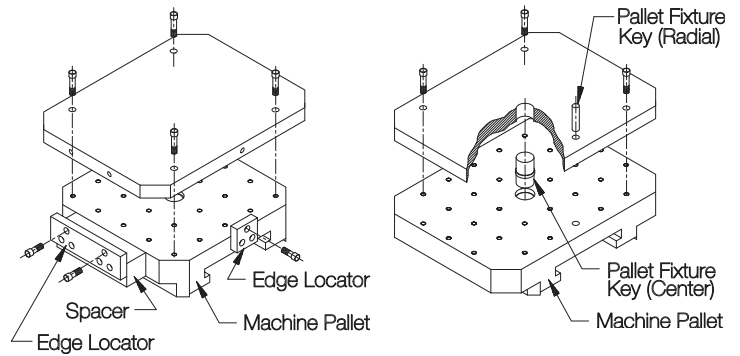
## DUAL MOUNTING

PART NO.	A		C		E (JIS)	F (DIN)	G (USA)	H (JIS)	J (DIN)	K (USA)	L	M	N DIA	P DIA	Q	R	S	APPROX. WT (LBS)
	NOMINAL	ACTUAL	NOMINAL	ACTUAL														
CL-BF00-0820	300mm	11.81	35mm	1.3780	63mm	50mm	50mm	M16	M10	5/8-11 or M16	1.969	7.283	25mm	20mm	3.9370	.79	6.2992	55
CL-BF00-0821	400mm	15.20	50mm	1.9685	80mm	50mm	3.000		M12		2.165	8.858			5.9055	1.42	7.8740	125
CL-BF00-0822	500mm	19.13	50mm	1.9685	100mm	100mm	4.000		M16		2.953	10.827			7.8740	1.81	9.8425	195
CL-BF00-0823	630mm	24.25	50mm	1.9685	125mm	100mm	5.000		M16		3.937	13.386			7.8740	2.20	12.4016	310
CL-BF00-0824	800mm	30.94	60mm	2.3622	160mm	100mm	6.000				5.315	16.732	25mm		11.8110	3.39	15.7480	595

\*\* 300mm size also fits 320mm pallets with the 10mm-thick edge pads furnished.

# RECTANGULAR PALLET TOOLING PLATES

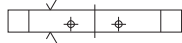
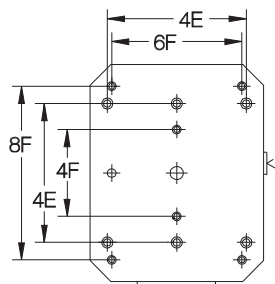
GRAY CAST IRON, ASTM CLASS 40



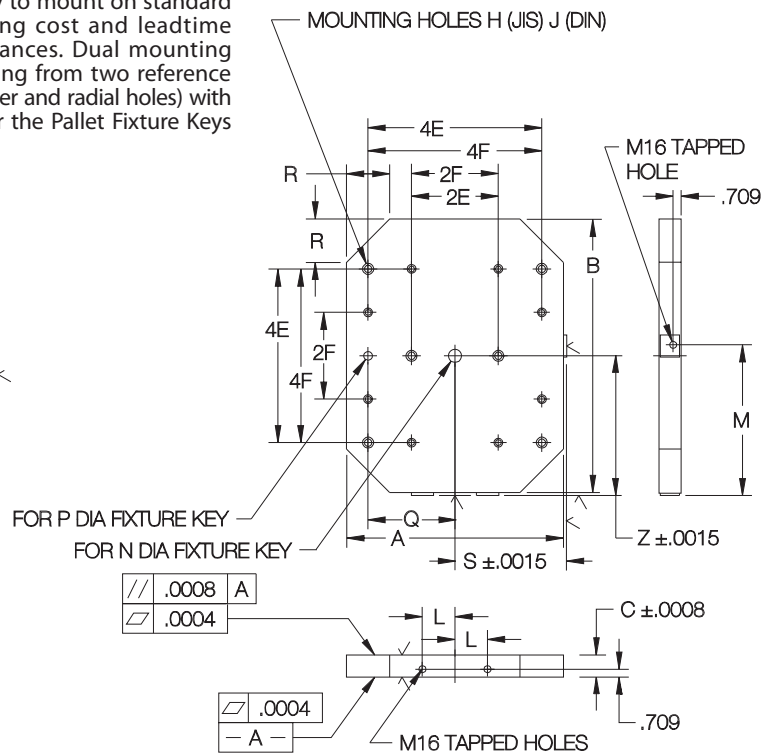
**Dual Mounting (JIS and DIN)**

## Precision Blank

Precision blank tooling plates that are ready to mount on standard machining-center pallets, reducing tooling cost and leadtime considerably. Finish ground to tight tolerances. Dual mounting capability allows both JIS mounting (locating from two reference edges) and DIN mounting (locating from center and radial holes) with excellent accuracy. **INFO+**: See page 214 for the Pallet Fixture Keys used for DIN mounting.



**400x500mm**



**500x630mm**

## DUAL MOUNTING

PART NO.	A		B		C		E (JIS)	F (DIN)	H (JIS)	J (DIN)	L	M	N DIA	P DIA	Q	R	S	Z	APPROX. WT (LBS)
	NOMINAL	ACTUAL	NOMINAL	ACTUAL	NOMINAL	ACTUAL													
CL-BF00-0871	400mm	15.20	500mm	19.13	50mm	1.9685	80mm	50mm	M16	M12	2.165	10.827	30mm	20mm	5.9055	1.42	7.8740	9.8425	160
CL-BF00-0872	500mm	19.13	630mm	24.25	50mm	1.9685	100mm	100mm	M16	M12	2.953	13.386	30mm	20mm	7.8740	3.39	9.8425	12.4016	250

# TWO-SIDED TOOLING BLOCKS

A713 TENZALOY ALUMINUM ALLOY, AGED TO T-6 CONDITION

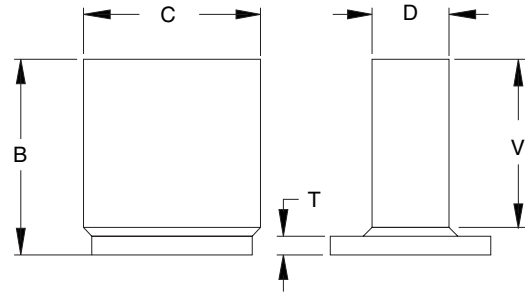
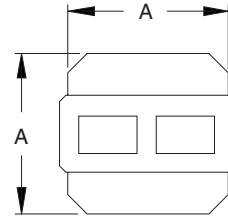


## Custom Blank

These economical custom blank tooling blocks are stocked as unmachined blank castings, then quickly machined to your specifications. One-piece cast aluminum alloy construction provides superior accuracy, dimensional stability, and vibration dampening.

When ordering "Machined Base with Mounting Holes," please specify either standard JIS mounting holes (locating from two reference edges), standard DIN mounting holes (locating from center and radial holes), or a custom mounting pattern.

If ordered with "Machined Faces," both tooling faces will be machined flat, square, and parallel to within .001" per foot. Please note: each face is machined .015" over nominal size to allow making a finish cut after mounting on your machine.



## MACHINED BASE WITH MOUNTING HOLES, AND UNMACHINED FACES

PART NO.	PALLET SIZE	A	B	C	D	T	V		
CL-D31311OF-300-BO*	300mm	11.81	11	13	3.5	1.5	9.5		
CL-D31620-400-BO*	400mm	15.75	19.5	15.7	3	1.5	18		
CL-D4820-400-BO*			19.5	8	4		18		
CL-D41218-400-BO*			18	12		16			
CL-D41620-400-BO*			20	15.7		18.5			
CL-D41624OF-400-BO*			24	22.5		22.5			
CL-D61820-400-BO*			20	18	6	18			
CL-D81620-400-BO			20	15.7	8	1.5	18		
CL-D81624-400-BO			24			2.5	25.5		
CL-D81628-400-BO			28			2.5	25.5		
CL-D41624-500-BO			500mm	19.69	24	20	4	2	22.5
CL-D62028-500-BO*	28	6			1.5	26			
CL-D81626-500-BO	26	16			2.5	23			
CL-D82024-500-BO	24	8				20			
CL-D82029-500-BO	29	19.7			1.5	25			
CL-D82035-500-BO	35	26				30			
CL-D102029-500-BO	29	20				10	26.5		
CL-D42524-630-BO*	630mm	24.80			24	24	4	1.5	22
CL-D42532-630-BO*					32	24.8	2	30	
CL-D62530-630-BO*					30	24.8	6	2	28
CL-D62835-630-BO*			35	28	33				
CL-D63638-630-BO			38	36	36.2				
CL-D82530-630-BO			30	24.8	8	1.5	28		
CL-D102530-630-BO			30	25	10	1.5	28		
CL-D102536-630-BO			36				34		
CL-D102542-630-BO			42				40		
CL-D122033-630-BO			33				20	12	1.5
CL-D103042-800-BO	800mm	31.50	42	30	10	2	39.8		

\*solid casting without center core.

## MACHINED BASE WITH MOUNTING HOLES, AND MACHINED FACES

PART NO.	PALLET SIZE	A	B	C	D (+.030)	T	V		
CL-D31311OF-300-BS*	300mm	11.81	11	13	3.500	1.5	9.5		
CL-D31620-400-BS*	400mm	15.75	19.5	15.7	3.000	1.5	18		
CL-D4820-400-BS*			19.5	8	4.000		18		
CL-D41218-400-BS*			18	12		16			
CL-D41620-400-BS*			20	15.7		18.5			
CL-D41624OF-400-BS*			24	22.5		22.5			
CL-D61820-400-BS*			20	18	6.000	18			
CL-D81620-400-BS			20	15.7	8.000	1.5	18		
CL-D81624-400-BS			24			2.5	22		
CL-D81628-400-BS			28			2.5	25.5		
CL-D41624-500-BS			500mm	19.69	24	16	4.000	2	22.5
CL-D62028-500-BS*	28	20			6.000	1.5	26		
CL-D81626-500-BS	26	16			2.5	23			
CL-D82024-500-BS	24	8.000				20			
CL-D82029-500-BS	29	19.7			1.5	25			
CL-D82035-500-BS	35	26				30			
CL-D102029-500-BS	29	19.7				10.000	26.5		
CL-D42524-630-BS*	630mm	24.80			24	24.8	4.000	1.5	22
CL-D42532-630-BS*					32	2	30		
CL-D62530-630-BS*					30	24.8	6.000	2	28
CL-D62835-630-BS*			35	28	33				
CL-D63638-630-BS			38	36	36.2				
CL-D82530-630-BS			30	24.8	8.000	1.5	28		
CL-D102530-630-BS			30	24.8	10.000	1.5	28		
CL-D102536-630-BS			36				34		
CL-D102542-630-BS			42				40		
CL-D122033-630-BS			33				20	12.000	1.5
CL-D103042-800-BS	800mm	31.50	42	30	10.000	2	39.8		

# WINDOW TOOLING BLOCKS

A713 TENZALOY ALUMINUM ALLOY, AGED TO T-6 CONDITION



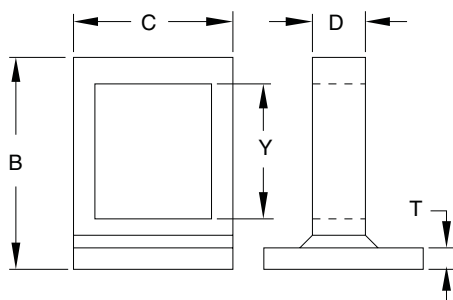
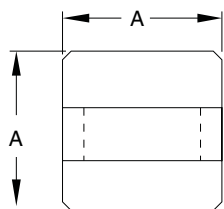
These economical custom blank tooling blocks are stocked as unmachined blank castings, then quickly machined to your specifications. One-piece cast aluminum alloy construction provides superior accuracy, dimensional stability, and vibration dampening.

When ordering "Machined Base with Mounting Holes," please specify either standard JIS mounting holes (locating from two reference edges), standard DIN mounting holes (locating from center and radial holes), or a custom mounting pattern.

If ordered with "Machined Faces," both tooling faces will be machined flat, square, and parallel to within .001" per foot. Please note: each face is machined .015" over nominal size to allow making a finish cut after mounting on your machine.

## MACHINED BASE WITH MOUNTING HOLES, AND MACHINED FACES

PART NO.	PALLET SIZE	A	B	C	D (+.030)	T	Y	WEIGHT (LBS)
CL-W31628-400-BS	400mm	15.75	28	15.7	3.000	1.5	20.5	134
CL-W41620-400-BS			20					
CL-W42026OF-500-BS	500mm	19.69	26	19.7	4.000	1.75	18.8	175
CL-W42029-500-BS			29	19.7				
CL-W42633-500-BS			33	26				
CL-W42537-630-BS	630mm	24.80	37	24.8	4.000	2	29	363
CL-W43434-630-BS			34	34				



## MACHINED BASE WITH MOUNTING HOLES, AND UNMACHINED FACES

PART NO.	PALLET SIZE	A	B	C	D	T	Y	WEIGHT (LBS)
CL-W31628-400-BO	400mm	15.75	28	15.7	3	1.5	20.5	134
CL-W41620-400-BO			20		4			
CL-W42026OF-500-BO	500mm	19.69	26	19.7	4	1.75	18.8	175
CL-W42029-500-BO			29	19.7				
CL-W42633-500-BO			33	26				
CL-W42537-630-BO	630mm	24.80	37	24.8	4	2	29	363
CL-W43434-630-BO			34	34				

# THREE-SIDED TOOLING BLOCKS

A713 TENZALOY ALUMINUM ALLOY, AGED TO T-6 CONDITION

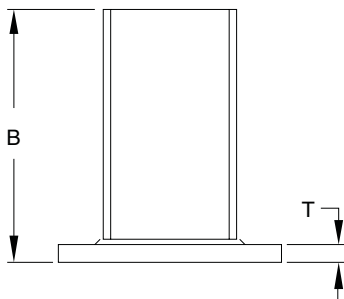
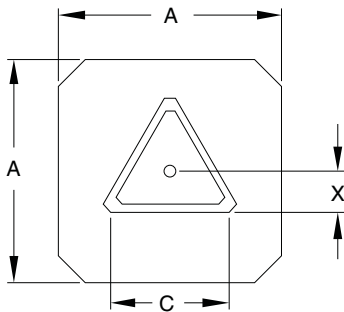


These economical custom blank tooling blocks are stocked as unmachined blank castings, then quickly machined to your specifications. One-piece cast aluminum alloy construction provides superior accuracy, dimensional stability, and vibration dampening.

When ordering "Machined Base with Mounting Holes," please specify either standard JIS mounting holes (locating from two reference edges), standard DIN mounting holes (locating from center and radial holes), or a custom mounting pattern. Please specify at time of order.

If ordered with "Machined Faces," all three tooling faces will be machined flat, square, and parallel to within .001" per foot. Please note: each face is machined .015" over nominal size to allow making a finish cut after mounting on your machine.

9



## MACHINED BASE WITH MOUNTING HOLES, AND MACHINED FACES

PART NO.	PALLET SIZE	A	B	C	T	X (+.015)	WEIGHT (LBS)
CL-T6237-400-BS	400mm	15.75	23	8	2	2.309	156
CL-T6287-400-BS			28				189
CL-T10269-500-BS	500mm	19.69	26	10	1.75	2.887	180
CL-T122611-500-BS				11.8			203
CL-T142813-630-BS	630mm	24.80	28	14.5	1.75	4.041	280

## MACHINED BASE WITH MOUNTING HOLES, AND UNMACHINED FACES

PART NO.	PALLET SIZE	A	B	C	T	X	WEIGHT (LBS)
CL-T6237-400-BO	400mm	15.75	23	8	2	2.3	156
CL-T6287-400-BO			28				189
CL-T10269-500-BO	500mm	19.69	26	10	1.75	2.8	180
CL-T122611-500-BO				11.8			203
CL-T142813-630-BO	630mm	24.80	28	14.5	1.75	4	280

# THREE-SIDED RELIEVED TOOLING BLOCKS

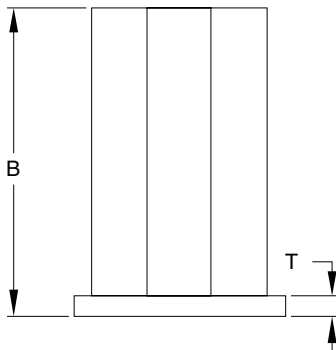
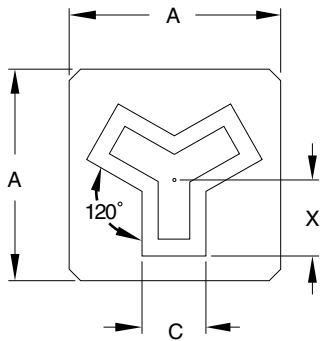
A713 TENZALOY ALUMINUM ALLOY, AGED TO T-6 CONDITION



These economical custom blank tooling blocks are stocked as unmachined blank castings, then quickly machined to your specifications. One-piece cast aluminum alloy construction provides superior accuracy, dimensional stability, and vibration dampening.

When ordering "Machined Base with Mounting Holes," please specify either standard JIS mounting holes (locating from two reference edges), standard DIN mounting holes (locating from center and radial holes), or a custom mounting pattern.

If ordered with "Machined Faces," all three tooling faces will be machined flat, square, and parallel to within .001" per foot. Please note: each face is machined .015" over nominal size to allow making a finish cut after mounting on your machine.



## MACHINED BASE WITH MOUNTING HOLES, AND MACHINED FACES

PART NO.	PALLET SIZE	A	B	C	T	X (+.015)	WEIGHT (LBS)
CL-Y5286-400-BS	400mm	15.75	28	5	1.5	6.362	338
CL-Y3286-500-BS	500mm	19.69	28	3.1	1.5	6.062	272
CL-Y6388-500-BS				6	2	7.506	332
CL-Y7289-500-BS	630mm	24.80	28	7.5	1.5	8.805	310
CL-Y6288-630-BS				6	2	7.506	402
CL-Y7289-630-BS				7.5	2	8.805	380

## MACHINED BASE WITH MOUNTING HOLES, AND UNMACHINED FACES

PART NO.	PALLET SIZE	A	B	C	T	X	WEIGHT (LBS)
CL-Y5286-400-BO	400mm	15.75	28	5	1.5	6.41	338
CL-Y3286-500-BO	500mm	19.69	28	3.1	1.5	6.06	272
CL-Y6388-500-BO				6	2	7.51	332
CL-Y7289-500-BO	630mm	24.80	28	7.5	1.5	8.80	310
CL-Y6288-630-BO				6	2	7.51	402
CL-Y7289-630-BO				7.5	2	8.80	380

# FOUR-SIDED TOOLING BLOCKS

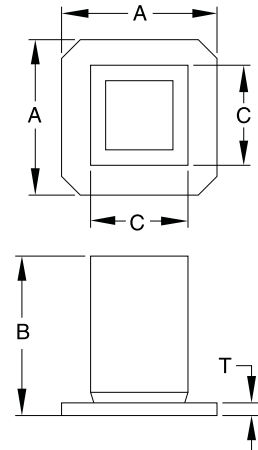
A713 TENZALOY ALUMINUM ALLOY, AGED TO T-6 CONDITION



These economical custom blank tooling blocks are stocked as unmachined blank castings, then quickly machined to your specifications. One-piece cast aluminum alloy construction provides superior accuracy, dimensional stability, and vibration dampening.

When ordering "Machined Base with Mounting Holes," please specify either standard JIS mounting holes (locating from two reference edges), standard DIN mounting holes (locating from center and radial holes), or a custom mounting pattern.

If ordered with "Machined Faces," all four tooling faces will be machined flat, square, and parallel to within .001" per foot. Please note: each face is machined .015" over nominal size to allow making a finish cut after mounting on your machine.



## MACHINED BASE WITH MOUNTING HOLES, AND MACHINED FACES

PART NO.	PALLET SIZE	A	B	C (+.030)	T			
CL-N426-400-BS	400mm	15.75	26	4.000	1.5			
CL-N518-400-BS			18	5.000				
CL-N522-400-BS			22					
CL-N618-400-BS			18	6.000				
CL-N626-400-BS			26					
CL-N818-400-BS			18	8.000				
CL-N824-400-BS			24					
CL-N828-400-BS			28					
CL-N1018-400-BS			18					
CL-N1024-400-BS			24	10.000				
CL-N1028-400-BS			28					
CL-N1218-400-BS			18	12.000				
CL-N1224-400-BS			24					
CL-N1228-400-BS			28					
CL-N828-500-BS			500mm	19.69		28	8.000	1.5
CL-N1024-500-BS						24	10.000	
CL-N1028-500-BS	28							
CL-N1034-500-BS	34	12.000						
CL-N1218-500-BS	18							
CL-N1224-500-BS	24							
CL-N1228-500-BS	28							
CL-NR1325-500-BS*	25	13.000						
CL-NR1624-500-BS*	24				16.000			
CL-NR1628-500-BS*	28							
CL-N1031-630-BS	630mm	24.80	31	10.000	1.75			
CL-N1232-630-BS			32	12.000	1.5			
CL-NR1422-630-BS*			22	14.000	1.75			
CL-NR1430-630-BS*			30					
CL-NR1624-630-BS*			24	16.000	1.5			
CL-NR1628-630-BS*			28					
CL-NR1638-630-BS*			38					
CL-NR1824-630-BS*			24			18.000	1.5	
CL-NR1828-630-BS*			28					
CL-NR1838-630-BS*			38					
CL-NR2238-630-BS*			38	22.000	2			
CL-NR2428-800-BS*			800mm	31.50	28	24.000	2	
CL-NR2438-800-BS*					38			
CL-NR2442-800-BS*					42			
CL-NR3253-1000-BS*					1000mm			39.37
CL-NR3753-1000-BS*			53	37.000		2.5		

## MACHINED BASE WITH MOUNTING HOLES, AND UNMACHINED FACES

PART NO.	PALLET SIZE	A	B	C	T			
CL-N426-400-BO	400mm	15.75	26	4	1.5			
CL-N518-400-BO			18	5				
CL-N522-400-BO			22					
CL-N618-400-BO			18	6				
CL-N626-400-BO			26					
CL-N818-400-BO			18	8				
CL-N824-400-BO			24					
CL-N828-400-BO			28					
CL-N1018-400-BO			18					
CL-N1024-400-BO			24	10				
CL-N1028-400-BO			28					
CL-N1218-400-BO			18	12				
CL-N1224-400-BO			24					
CL-N1228-400-BO			28					
CL-N828-500-BO			500mm	19.69		28	8	1.5
CL-N1024-500-BO						24	10	
CL-N1028-500-BO	28							
CL-N1034-500-BO	34	12						
CL-N1218-500-BO	18							
CL-N1224-500-BO	24							
CL-N1228-500-BO	28							
CL-NR1325-500-BO*	25	13						
CL-NR1624-500-BO*	24				16			
CL-NR1628-500-BO*	28							
CL-N1031-630-BO	630mm	24.80	31	10	1.75			
CL-N1232-630-BO			32	12	1.5			
CL-NR1422-630-BO*			22	14	1.75			
CL-NR1430-630-BO*			30					
CL-NR1624-630-BO*			24	16	1.5			
CL-NR1628-630-BO*			28					
CL-NR1638-630-BO*			38					
CL-NR1824-630-BO*			24			18	1.5	
CL-NR1828-630-BO*			28					
CL-NR1838-630-BO*			38					
CL-NR2238-630-BO*			38	22	2			
CL-NR2428-800-BO*			800mm	31.50	28	24	2	
CL-NR2438-800-BO*					38			
CL-NR2442-800-BO*					42			24
CL-NR3253-1000-BO*					1000mm			
CL-NR3753-1000-BO*			55	37		2.5		



# FOUR-SIDED ROTARY TOOLING BLOCKS

A713 TENZALOY ALUMINUM ALLOY, AGED TO T-6 CONDITION



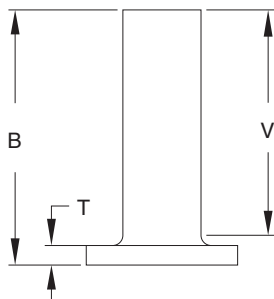
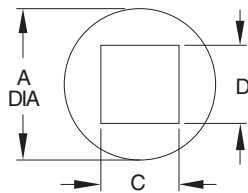
This four-sided tooling block is ideal for rotary indexers and rotary machine tables. These economical custom blank tooling blocks are stocked as unmachined blank castings, then quickly machined to your specifications. One-piece cast aluminum alloy construction provides superior accuracy, dimensional stability, and vibration dampening.

When ordering "Machined Base with Mounting Holes," please specify mounting pattern.

If ordered with "Machined Faces," all four tooling faces will be machined flat, square, and parallel to within .001" per foot. Please note: each face is machined .015" over nominal size to allow making a finish cut after mounting on your machine.

## MACHINED BASE WITH MOUNTING HOLES, AND MACHINED FACES

PART NO.	BLOCK SIZE	A DIA	B	C (+.030)	D (+.030)	T	V	WEIGHT (LBS)
CL-D3621-6RB-BS	3x6	6.5	21	3.000	6.000	1.5	18	48
CL-N412-6RB-BS	4x4	6	12	4.000	4.000	1	11	27
CL-N420-12RB-BS		12	20			1.5	18	45
CL-N428-15RB-BS		15	28			26	87	
CL-N620-12RB-BS	6x6	12	20	6.000	6.000	1.5	18	90
CL-N637-12RB-BS		12	37				34	170
CL-N675-9RB-BS		9	75				73	345



## MACHINED BASE WITH MOUNTING HOLES, AND UNMACHINED FACES

PART NO.	BLOCK SIZE	A DIA	B	C (+.030)	D (+.030)	T	V	WEIGHT (LBS)
CL-D3621-6RB-BO	3x6	6.5	21	3	6	1.5	18	48
CL-N412-6RB-BO	4x4	6	12	4	4	1	11	27
CL-N420-12RB-BO		12	20			1.5	18	45
CL-N428-15RB-BO		15	28			26	87	
CL-N620-12RB-BO	6x6	12	20	6	6	1.5	18	90
CL-N637-12RB-BO		12	37				34	170
CL-N675-9RB-BO		9	75				73	345

# FOUR-SIDED RELIEVED TOOLING BLOCKS

A713 TENZALOY ALUMINUM ALLOY, AGED TO T-6 CONDITION

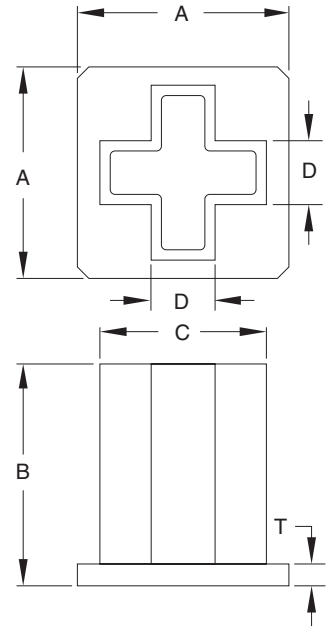


Custom Blank

These economical custom blank tooling blocks are stocked as unmachined blank castings, then quickly machined to your specifications. One-piece cast aluminum alloy construction provides superior accuracy, dimensional stability, and vibration dampening.

When ordering "Machined Base with Mounting Holes," please specify either standard JIS mounting holes (locating from two reference edges), standard DIN mounting holes (locating from center and radial holes), or a custom mounting pattern.

If ordered with "Machined Faces," both tooling faces will be machined flat, square, and parallel to within .001" per foot. Please note: each face is machined .015" over nominal size to allow making a finish cut after mounting on your machine.



## MACHINED BASE WITH MOUNTING HOLES, AND MACHINED FACES

PART NO.	PALLET SIZE	A	B	C (+.030)	D	T	WEIGHT (LBS)
CL-X4248-300-BS	300mm	11.81	24	8.000	4	1.5	151
CL-X62810-400-BS	400mm	15.75	28	10.000	6.5	1.75	270
CL-X62810-500-BS	500mm	19.69	28	10.000	6.5	2	270
CL-X42812-500-BS			28	12.000	4		313
CL-X62412-500-BS			24		225		
CL-X62812-500-BS			28		6		285
CL-X63412-500-BS			34		335		
CL-X82812-500-BS			28		12.000		8
CL-X62812-630-BS	630mm	24.80	28		12.000	6	285
CL-X83812-630-BS			38	12.000	8	423	
CL-X83620-630-BS			36	20.000		730	

## MACHINED BASE WITH MOUNTING HOLES, AND UNMACHINED FACES

PART NO.	PALLET SIZE	A	B	C	D	T	WEIGHT (LBS)
CL-X4248-300-BO	300mm	11.81	24	8	4	1.5	151
CL-X62810-400-BO	400mm	15.75	28	10	6.5	1.75	270
CL-X62810-500-BO	500mm	19.69	28	10	6.5	2	270
CL-X42812-500-BO			28	12	4		313
CL-X62412-500-BO			24		225		
CL-X62812-500-BO			28		6		285
CL-X63412-500-BO			34		335		
CL-X82812-500-BO			28		12		8
CL-X62812-630-BO	630mm	24.80	28		12	6	285
CL-X83812-630-BO			38	12	8	423	
CL-X83620-630-BO			36	20		730	

# SIX-SIDED TOOLING BLOCKS

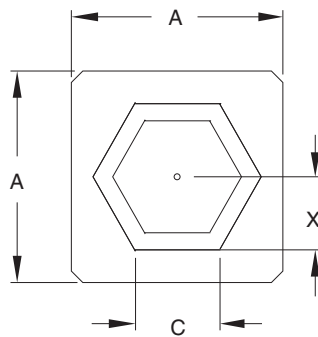
A713 TENZALOY ALUMINUM ALLOY, AGED TO T-6 CONDITION



These economical custom blank tooling blocks are stocked as unmachined blank castings, then quickly machined to your specifications. One-piece cast aluminum alloy construction provides superior accuracy, dimensional stability, and vibration dampening.

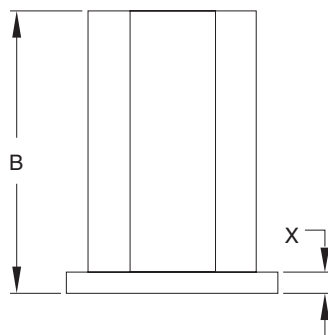
When ordering "Machined Base with Mounting Holes," please specify either standard JIS mounting holes (locating from two reference edges), standard DIN mounting holes (locating from center and radial holes), or a custom mounting pattern.

If ordered with "Machined Faces," all six tooling faces will be machined flat, square, and parallel to within .001" per foot. Please note: each face is machined .015" over nominal size to allow making a finish cut after mounting on your machine.



## MACHINED BASE WITH MOUNTING HOLES, AND MACHINED FACES (INCH SIZES)

PART NO.	PALLET SIZE	A	B	C	T	X (+.015)	WEIGHT (LBS)
CL-H4187-400-BS	400mm	15.75	18	4	1.5	3.681	76
CL-H5249-400-BS			24	5			92
CL-H82414-500-BS	500mm	19.69	24	8	1.5	6.928	220
CL-H82814-500-BS			28				255
CL-H92816-630-BS	630mm	24.80	28	16	1.75	7.794	467
CL-H165028-800-BS	800mm	31.50	50	8	2	6.928	370



## MACHINED BASE WITH MOUNTING HOLES, AND UNMACHINED FACES

PART NO.	PALLET SIZE	A	B	C	T	X	WEIGHT (LBS)
CL-H4187-400-BO	400mm	15.75	18	4	1.5	3.68	76
CL-H5249-400-BO			24	5			92
CL-H82414-500-BO	500mm	19.69	24	8	1.5	6.93	220
CL-H82814-500-BO			28				255
CL-H92816-630-BO	630mm	24.80	28	16	1.75	7.79	467
CL-H165028-800-BO	800mm	31.50	50	8	2	6.93	370

# EIGHT-SIDED TOOLING BLOCKS

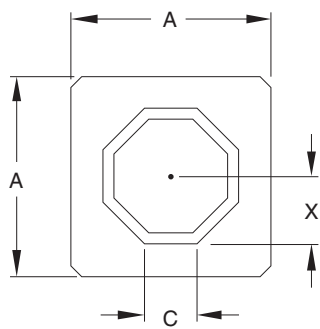
A713 TENZALOY ALUMINUM ALLOY, AGED TO T-6 CONDITION



These economical custom blank tooling blocks are stocked as unmachined blank castings, then quickly machined to your specifications. One-piece cast aluminum alloy construction provides superior accuracy, dimensional stability, and vibration dampening.

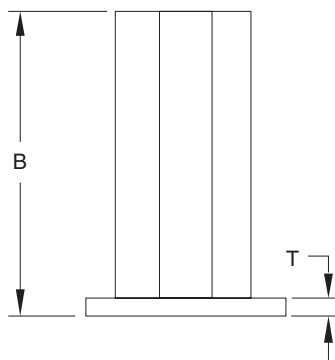
When ordering "Machined Base with Mounting Holes," please specify either standard JIS mounting holes (locating from two reference edges), standard DIN mounting holes (locating from center and radial holes), or a custom mounting pattern.

If ordered with "Machined Faces," all eight tooling faces will be machined flat, square, and parallel to within .001" per foot. Please note: each face is machined .015" over nominal size to allow making a finish cut after mounting on your machine.



## MACHINED BASE WITH MOUNTING HOLES, AND MACHINED FACES

PART NO.	PALLET SIZE	A DIA	B	C	T	X (+.015)	WEIGHT (LBS)
CL-O42011-400-BS	400mm	15.75	20	4.6	1.8	5.000	160
CL-O42811-400-BS			28		1.5		
CL-O42811-500-BS	500mm	19.69	28	4.6	1.5	5.500	145
CL-O52312-500-BS			23		5		
CL-O62416-630-BS	630mm	24.80	24	6.5	1.5	7.500	270
CL-O62816-630-BS			28				295



## MACHINED BASE WITH MOUNTING HOLES, AND UNMACHINED FACES

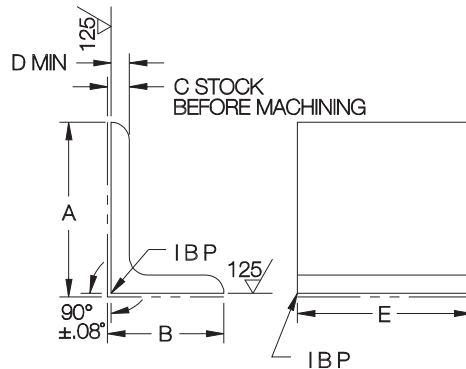
PART NO.	PALLET SIZE	A DIA	B	C	T	X	WEIGHT (LBS)
CL-O42011-400-BS	400mm	15.75	20	4.6	1.8	5	160
CL-O42811-400-BS			28		1.5	5.5	145

# ANGLE BRACKETS

STEEL: ASTM A36, BLACK OXIDE FINISH  
ALUMINUM: 6061-T6



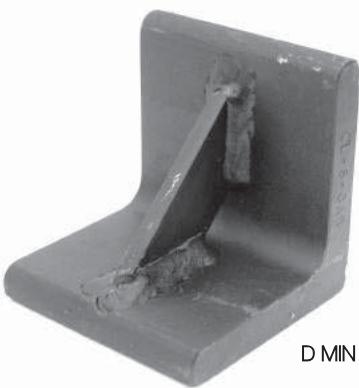
Precision setup angles machined flat and perpendicular to close tolerances. Available in steel or high-strength aluminum.



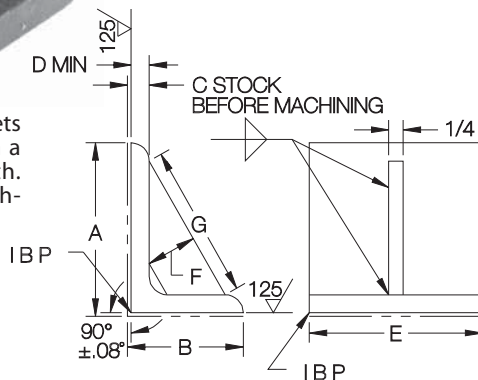
PART NO. STEEL	PART NO. ALUMINUM	A	B	C	D	E
CL-1-AB	—	2-1/2	2	1/4	7/32	1-1/2
CL-2-AB	CL-2-AB-A	2	2	3/8	5/16	2
CL-21-AB	—					3
CL-3-AB	CL-3-AB-A					4
CL-4-AB	—					6
CL-3A-AB	CL-3A-AB-A	3	2			2
CL-3B-AB	—					3
CL-22-AB	—					4
CL-5-AB	—	3	3			2
CL-6-AB	—			3		
CL-7-AB	—			4		
CL-23-AB	—	4	4	6		
CL-8-AB	—			4		
CL-9-AB	—			2		
CL-10-AB	CL-10-AB-A			3		
CL-11-AB	—	4	3	4		
CL-7A-AB	—			2		
CL-7B-AB	—			3		
CL-12-AB	CL-12-AB-A			3		
CL-13-AB	CL-13-AB-A	4	4	4		
CL-14-AB	—			5		
CL-24-AB	—			6		
CL-15-AB	CL-15-AB-A			4		
CL-16-AB	—	6	4	5		
CL-17-AB	CL-17-AB-A			6		
CL-18-AB	—			4		
CL-19-AB	—	6	6	5		
CL-20-AB	CL-20-AB-A			6		

# GUSSETED ANGLE BRACKETS

STEEL: ASTM A36, BLACK OXIDE FINISH  
ALUMINUM: 6061-T6



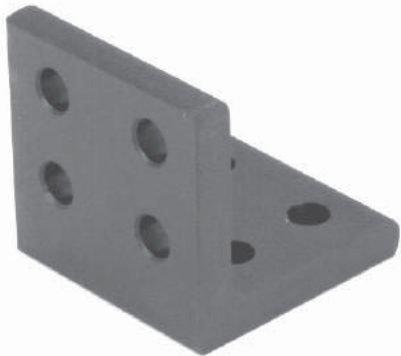
Similar to the Angle Brackets shown above, except with a gusset for added strength. Available in steel or high-strength aluminum.



PART NO. STEEL	PART NO. ALUMINUM	A	B	C	D	E	F	G
CL-3A-GAB	—	3	2	3/8	5/16	2	7/8	2-3/4
CL-3B-GAB	—					3		
CL-1-GAB	—	3	3			2		
CL-2-GAB	—					3		
CL-3-GAB	—					4		
CL-4-GAB	—					3		
CL-5-GAB	—	4	4			4		
CL-6-GAB	—					5		
CL-7-GAB	—	3	3	2				
CL-8-GAB	CL-8-GAB-A			3				
CL-9-GAB	—			4				
CL-7A-GAB	—			2				
CL-7B-GAB	—	4	3	3				
CL-10-GAB	CL-10-GAB-A			1-1/4				
CL-11-GAB	CL-11-GAB-A	4	4	3				
CL-12-GAB	—			4				
CL-13-GAB	CL-13-GAB-A	6	4	5				
CL-14-GAB	—			4				
CL-15-GAB	CL-15-GAB-A			5				
CL-16-GAB	—			6				
CL-17-GAB	—	6	6	4				
CL-18-GAB	CL-18-GAB-A			5				
CL-18-GAB	CL-18-GAB-A	6	6	5				
CL-18-GAB	CL-18-GAB-A	6	6	6				

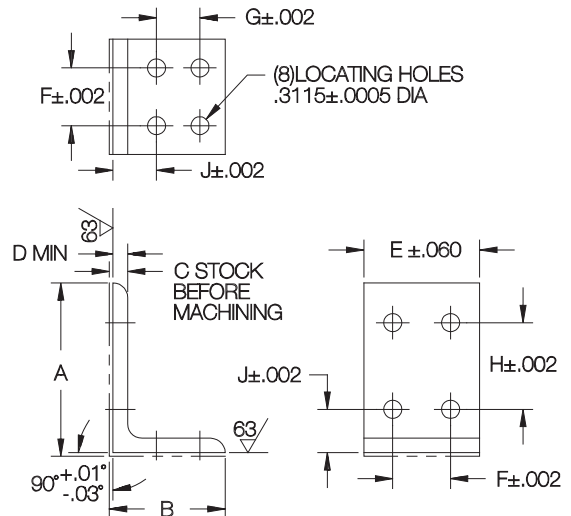
# ANGLE BRACKETS WITH LOCATING HOLES

ASTM A36 STEEL, BLACK OXIDE FINISH



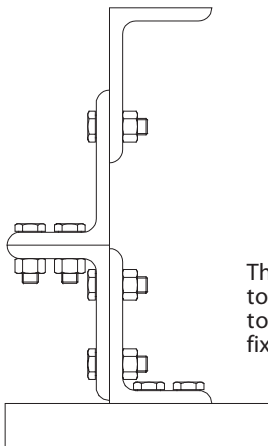
**Angle Bracket**

Extremely accurate angle brackets with precision locating holes. These angles are ideal for bolting together like an erector set to create large-scale tooling. The 90° angle and (8) locating holes are machined to close tolerances to maintain good accuracy in built-up tooling. Use with the precision locating bolts shown below.

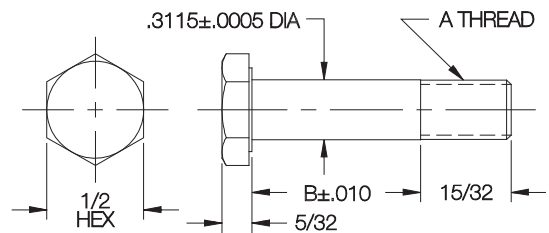


## ANGLE BRACKETS

PART NO. STEEL	A	B	C	D	E	F	G	H	J
CL-1531-ABK	2	2	3/8	1/4	2	1.000	.750	.750	
CL-1532-ABK	3	2			4	3.000	.750	1.500	.750
CL-1535-ABK	2	2	1/2	3/8	3	2.000	1.250	1.250	1.125
CL-1539-ABK	3	3					2.000	2.000	1.000
CL-1533-ABK	4	4			4	3.000	2.000	2.000	1.125
CL-15310-ABK	4	4					1.500	3.500	1.500
CL-1534-ABK	6	4			6	5.000	1.500	3.500	1.500
CL-1536-ABK	6	6					3.500	3.500	1.500
CL-1538-ABK	6	4	5/8	1/2	6	5.000	1.500	3.500	1.500
CL-1537-ABK	6	6					3.500	3.500	1.500



These high-precision angles can be bolted together to build economical large-scale tooling. Ideal for assembly and welding fixtures.



## ANGLE BRACKET LOCATING BOLTS AND HEX NUTS

PART NO. LOCATING BOLT	PART NO. HEX NUT	A	B
CL-506-ABLB	CL-5-FHN	5/16-24	.375
CL-508-ABLB			.500
CL-510-ABLB			.625
CL-512-ABLB			.750
CL-516-ABLB			1.000
CL-520-ABLB			1.250
CL-524-ABLB			1.500



**Angle Bracket Locating Bolt**



**Hex Nut**

Precision bolts for fastening angle brackets to each other, and to other tooling. Ground locating diameter provides a slight press fit when angles are bolted together. Steel.

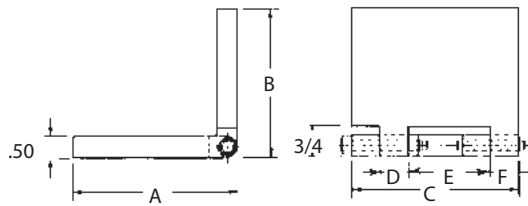
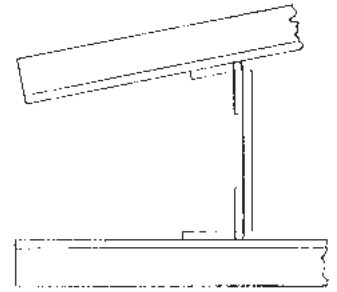
# ADJUSTABLE ANGLES

1018 STEEL, BLACK OXIDE FINISH  
PATENT NO. 3,039,570



**Plain**

Precision angle with accurately machined sides and a close-tolerance hinge. Available either plain, with tabs for welding on a gusset, or with a removable pivot pin.

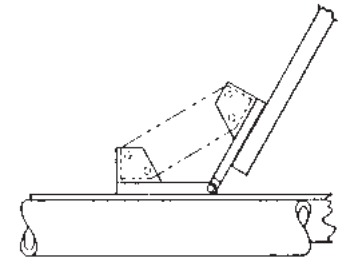
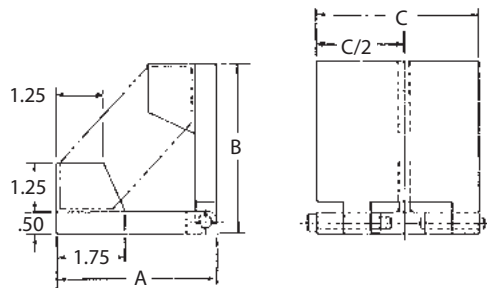


**PLAIN**

PART NO.	A	B	C	D	E	F
CL-AA-4P			3	5/8	1-1/8	5/8
CL-AA-3P	3	3	4	3/4	1-3/4	3/4
CL-AA-2P	4	3	4	3/4	1-3/4	3/4
CL-AA-1P		4				



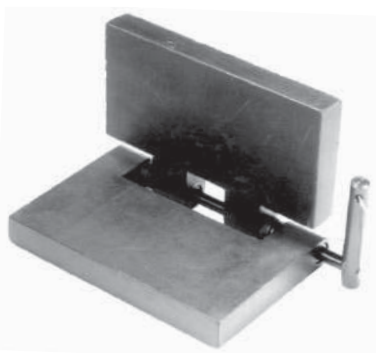
**Gusseted**



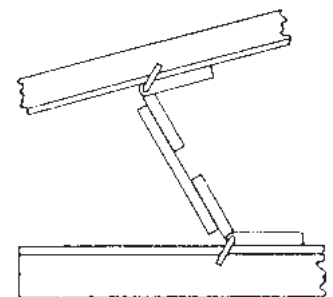
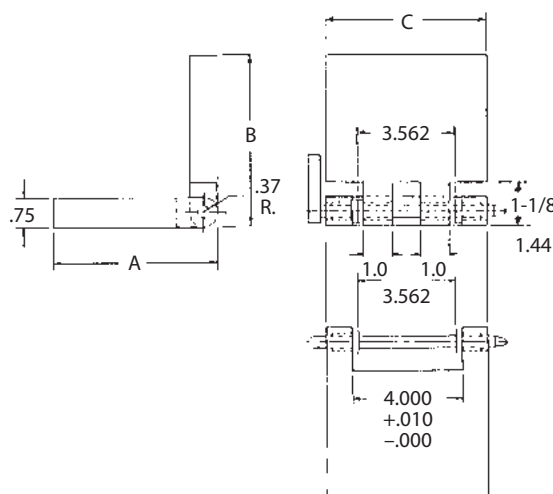
**GUSSETED**

PART NO.	A	B	C	D	E	F
CL-AA-4G	3	3	3	5/8	1-1/8	5/8
CL-AA-1G	4	4	4	3/4	1-3/4	3/4

9



**Removable Pin**



**REMOVABLE PIN**

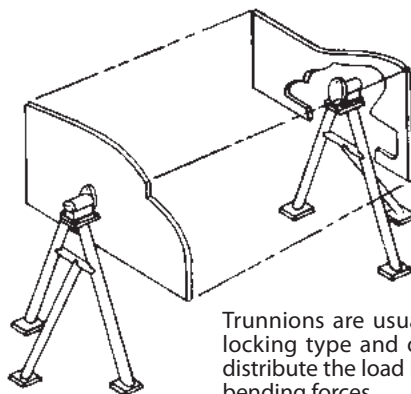
PART NO.	A	B	C
CL-AA-2R	4	4	
CL-AA-1R	6	6	6

# TRUNNIONS

ARM: TENZALOY ALUMINUM ALLOY  
 BODY: ALUMINUM WITH BRONZE BEARINGS  
 PATENT NO. 3,129,937

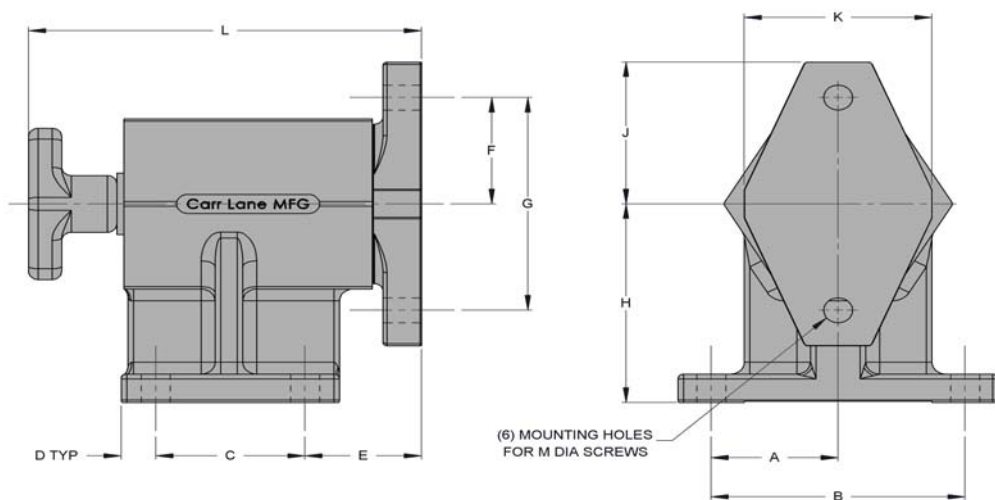


**Flanged Base  
 Locking Type**



Trunnions are usually used in pairs, one locking type and one revolving type, to distribute the load between them without bending forces.

Trunnions are rugged, precision bearing mounts for revolving fixtures. Ideal for assembly and welding fixtures, and any other applications where the part must be accessible from all sides. Usually used in pairs, one locking Trunnion and one revolving Trunnion, to distribute the load between them without bending forces. The locking version, shown here, has a friction-cone mechanism that stops the rotor at any angle by tightening the knob handle (loosen knob again to unlock). The revolving version has a free-rotating bearing at both ends of the rotor shaft, with no locking mechanism. Choice of two sizes. Made in USA.



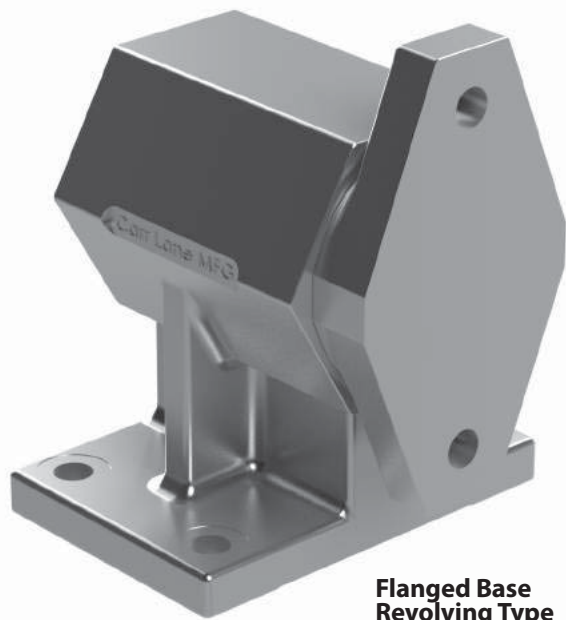
## FLANGED BASE — LOCKING TYPE

PART NO.	LOAD CAPACITY (18" from face)	A	B	C	D	E	F	G	H	J	K	L	M
CL-100-TL	1800 lbs	2	4	2-3/8	1/2	1-7/8	2	4	4	2-5/8	3-1/4	7	3/8 or M10
CL-200-TL	2500 lbs	2-7/8	5-3/4	3-3/8	3/4	2-5/8	2-13/16	5-5/8	5-1/4	3-3/4	4-1/4	9	5/8 or M16



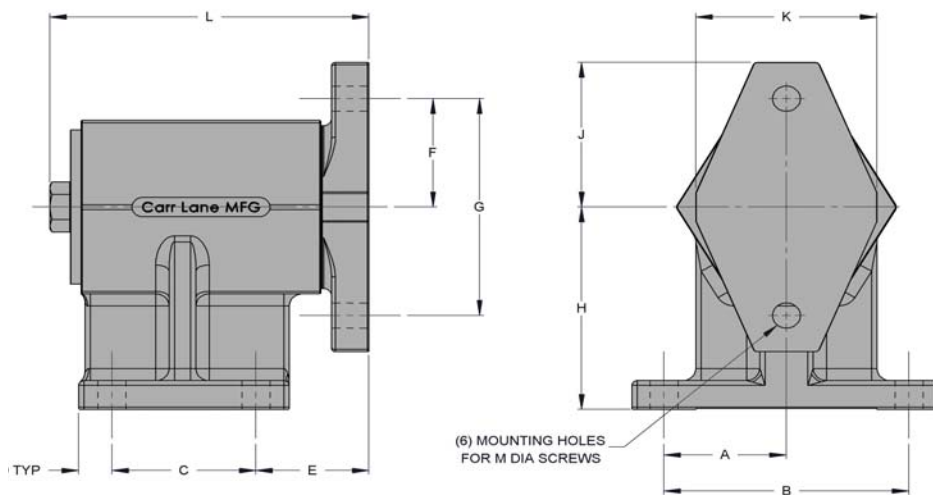
# TRUNNIONS

ARM: TENZALOY ALUMINUM ALLOY  
 BODY: ALUMINUM BRONZE BEARINGS  
 PATENT NO. 3,129,937



**Flanged Base  
 Revolving Type**

Trunnions are rugged, precision bearing mounts for revolving fixtures. Ideal for assembly and welding fixtures, and any other applications where the part must be accessible from all sides. Usually used in pairs, one locking Trunnion and one revolving Trunnion, to distribute the load between them without bending forces. The locking version has a friction-cone mechanism that stops the rotor at any angle by tightening the knob handle (loosen knob again to unlock). The revolving version, shown here, has a free-rotating bearing at both ends of the rotor shaft, with no locking mechanism. Choice of two sizes. Made in USA.

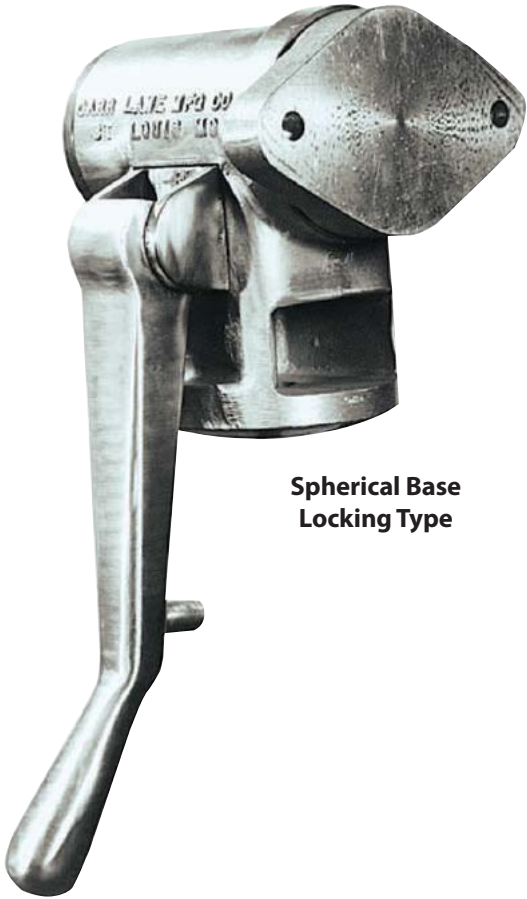


## FLANGED BASE — REVOLVING TYPE

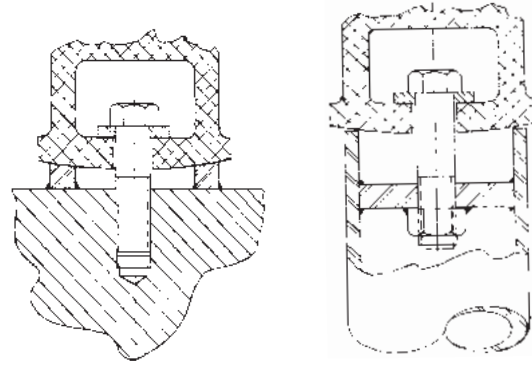
PART NO.	LOAD CAPACITY (18" from face)	A	B	C	D	E	F	G	H	J	K	L	M
CL-100-TR	1800 lbs	2	4	2-3/8	1/2	1-7/8	2	4	4	2-5/8	3-1/4	7	3/8 or M10
CL-200-TR	2500 lbs	2-7/8	5-3/4	3-3/8	3/4	2-5/8	2-13/16	5-5/8	5-1/4	3-3/4	4-1/4	9	5/8 or M16

# SPHERICAL TRUNNIONS

ARM: TENZALOY ALUMINUM ALLOY  
 BODY: ALUMINUM WITH BRONZE BEARINGS

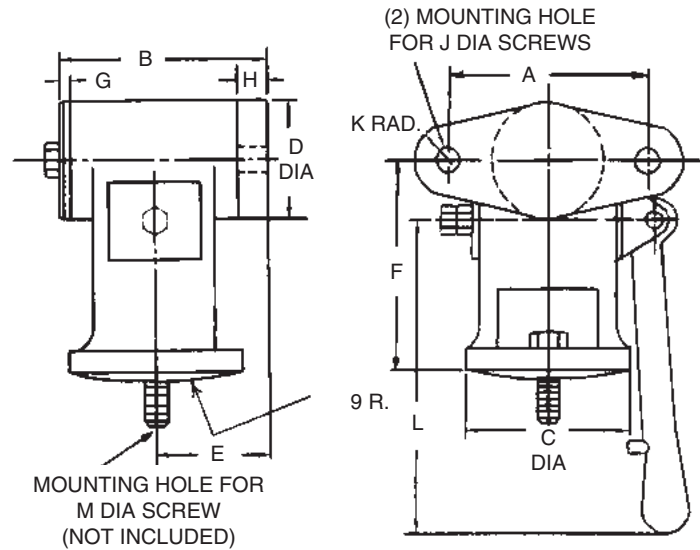


**Spherical Base  
 Locking Type**



Spherical Trunnions are ideal for mounting on pipe frames and other cylindrical bases.

9 Trunnions are rugged, precision bearing mounts for revolving fixtures. Ideal for assembly and welding fixtures, and any other applications where the part must be accessible from all sides. Spherical Trunnions are ideal for mounting on pipe frames and other cylindrical bases. These locking trunnions have a friction mechanism that stops the rotor or any angle by lowering the handle (lift handle again to unlock). Often used in pairs, to distribute the load between them without bending forces. Choice of two sizes. Made in USA.



## SPHERICAL BASE — LOCKING TYPE

PART NO.	LOAD CAPACITY (18" from face)	A	B	C DIA	D DIA	E	F	G	H	J	K	L	M
CL-5-TL	1800 lbs	4	5-1/16	3-1/2	3-1/4	2-3/4	4-3/16	5/16	13/16	3/8 or M10	9/16	9	5/8 or M16
CL-6-TL	2500 lbs	5-5/8	7	5-1/8	4-1/4	4	5-5/8	1/4	1-1/8	5/8 or M16	1	12-1/4	1 or M24

# CAST SECTIONS

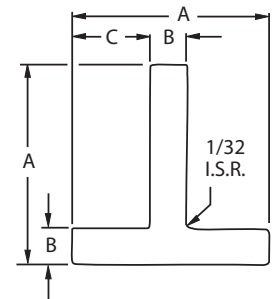
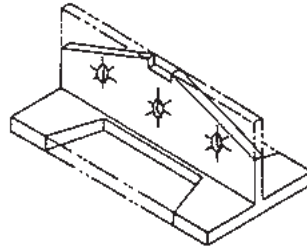
CAST IRON: ASTM CLASS 40, TENSILE STRENGTH 40,000 TO 45,000 PSI  
ALUMINUM: 352, TENSILE STRENGTH 30,000 PSI

Fast, economical way to make special fixture components. All surfaces are machined square and parallel within .005 inches per foot, except ends. Internal faces on square and rectangular sections are unfinished. All dimensions  $\pm 1/32$  (except length, which is  $-1/16$  to  $+1/8$ ).

Cast sections are available in full lengths (usually 25") or 6" lengths. Custom lengths are available as specials.



Cast Iron



## T SECTIONS — CAST IRON

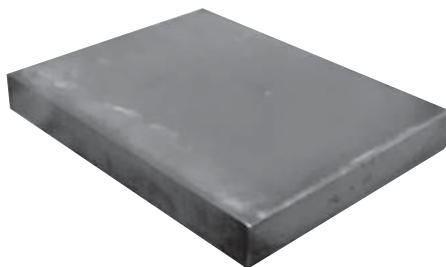
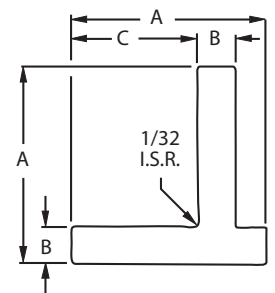
PART NO. FULL LENGTH	PART NO. 6" LENGTH	A	B	C	FULL LENGTH
CL-1-CST-25.00	CL-1-CST-6.00	3	5/8	1-3/16	25
CL-2-CST-25.00	CL-2-CST-6.00	4	3/4	1-5/8	
CL-3-CST-25.00	CL-3-CST-6.00	5		2-1/8	
CL-4-CST-25.00	CL-4-CST-6.00	6	1	2-1/2	
CL-5-CST-25.00	CL-5-CST-6.00	8	1-1/4	3-3/8	



Cast Iron

## OFFSET T SECTIONS — CAST IRON

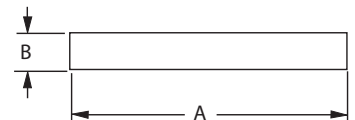
PART NO. FULL LENGTH	PART NO. 6" LENGTH	A	B	C	FULL LENGTH
CL-3-CUT-25.00	CL-3-CUT-6.00	5	3/4	1-1/4	25
CL-4-CUT-25.00	CL-4-CUT-6.00	6	1	3-1/2	
CL-5-CUT-25.00	CL-5-CUT-6.00	8	1-1/4	4-7/8	



Cast Iron

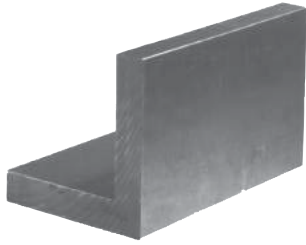
## FLAT SECTIONS — CAST IRON

PART NO. FULL LENGTH	PART NO. 6" LENGTH	A	B	FULL LENGTH
CL-4-CF-25.00	CL-4-CF-6.00	6	1	25
CL-5-CF-25.00	CL-5-CF-6.00	8	1-1/4	

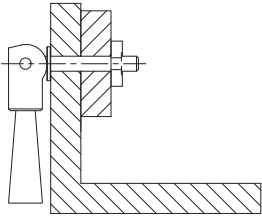


# CAST SECTIONS

SEE PAGE 361 FOR MATERIAL SPECIFICATIONS AND TOLERANCES

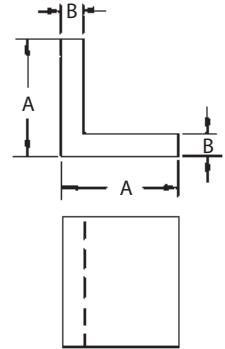


Cast Iron and Aluminum



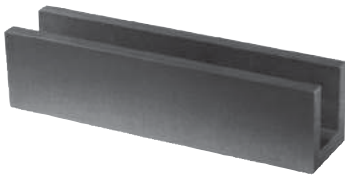
## L SECTIONS — CAST IRON

PART NO. FULL LENGTH	PART NO. 6" LENGTH	A	B	FULL LENGTH
CL-1-CSA-25.00	CL-1-CSA-6.00	3	5/8	25
CL-2-CSA-25.00	CL-2-CSA-6.00	4	3/4	
CL-3-CSA-25.00	CL-3-CSA-6.00	5		
CL-4-CSA-25.00	CL-4-CSA-6.00	6	1	
CL-5-CSA-25.00	CL-5-CSA-6.00	8	1-1/4	

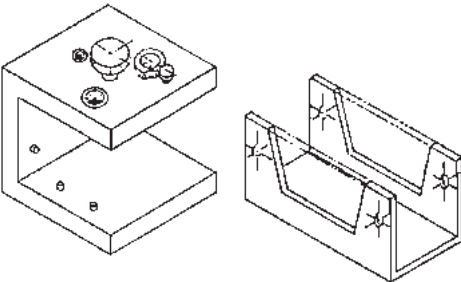


## L SECTIONS — ALUMINUM

PART NO. FULL LENGTH	PART NO. 6" LENGTH	A	B	FULL LENGTH
CL-1-CAA-25.00	CL-1-CAA-6.00	3	5/8	25
CL-2-CAA-25.00	CL-2-CAA-6.00	4	3/4	
CL-3-CAA-25.00	CL-3-CAA-6.00	5		

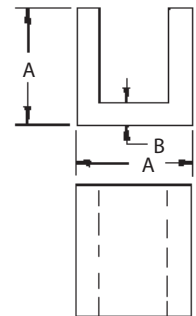


Cast Iron and Aluminum



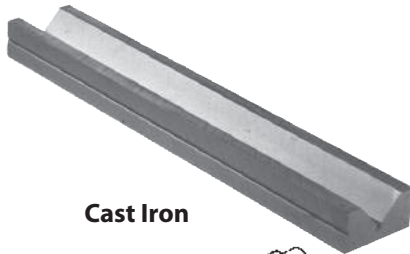
## U SECTIONS — CAST IRON

PART NO. FULL LENGTH	PART NO. 6" LENGTH	A	B	FULL LENGTH
CL-1-CSU-19.00	CL-1-CSU-6.00	1-3/4	3/8	19
CL-2-CSU-19.00	CL-2-CSU-6.00	2-1/2	1/2	
CL-3-CSU-25.00	CL-3-CSU-6.00	3	5/8	25
CL-4-CSU-25.00	CL-4-CSU-6.00	4	3/4	
CL-5-CSU-25.00	CL-5-CSU-6.00	5		
CL-6-CSU-25.00	CL-6-CSU-6.00	6	1	
CL-7-CSU-25.00	CL-7-CSU-6.00	8	1-1/4	

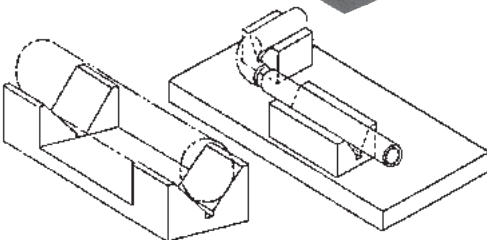


## U SECTIONS — ALUMINUM

PART NO. FULL LENGTH	PART NO. 6" LENGTH	A	B	FULL LENGTH
CL-1-CAU-25.00	CL-1-CAU-6.00	3	5/8	25
CL-2-CAU-25.00	CL-2-CAU-6.00	4	3/4	
CL-3-CAU-25.00	CL-3-CAU-6.00	5		

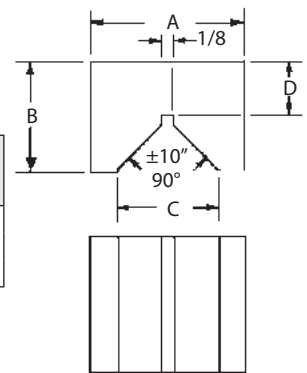


Cast Iron



## V SECTIONS — CAST IRON

PART NO. FULL LENGTH	PART NO. 6" LENGTH	A	B	C	D	FULL LENGTH
CL-1-CSV-18.00	CL-1-CSV-6.00	2	1	1-1/4	5/16	18
CL-2-CSV-18.00	CL-2-CSV-6.00	3	1-3/4	2	11/16	
CL-3-CSV-18.00	CL-3-CSV-6.00	4	2-1/2	3	7/8	

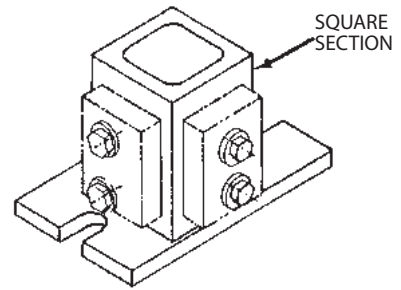


# CAST SECTIONS

SEE PAGE 361 FOR MATERIAL SPECIFICATIONS AND TOLERANCES

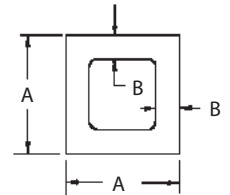


Cast Iron



## SQUARE SECTIONS — CAST IRON

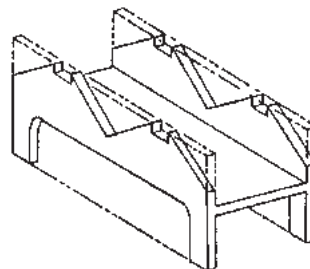
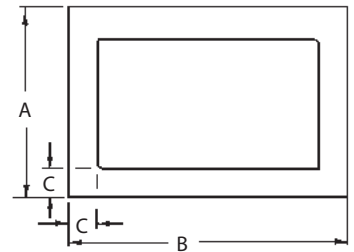
PART NO. FULL LENGTH	PART NO. 6" LENGTH	A	B	FULL LENGTH
CL-1-CSS-25.00	CL-1-CSS-6.00	3	1/2	25
CL-2-CSS-25.00	CL-2-CSS-6.00	4	5/8	
CL-3-CSS-25.00	CL-3-CSS-6.00	6	3/4	
CL-4-CSS-25.00	CL-4-CSS-6.00	8	1	



Cast Iron

## RECTANGULAR SECTIONS — CAST IRON

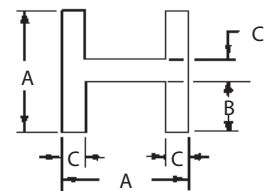
PART NO. FULL LENGTH	PART NO. 6" LENGTH	A	B	C	FULL LENGTH
CL-1-CSR-25.00	CL-1-CSR-6.00	4	6	5/8	25
CL-2-CSR-25.00	CL-2-CSR-6.00	6	8	3/4	
CL-3-CSR-25.00	CL-3-CSR-6.00	8	10	1	



Cast Iron

## H SECTIONS — CAST IRON

PART NO. FULL LENGTH	PART NO. 6" LENGTH	A	B	C	FULL LENGTH
CL-2-CSH-25.00	CL-2-CSH-6.00	4	1-5/8	3/4	25
CL-3-CSH-25.00	CL-3-CSH-6.00	5	2-1/16	7/8	
CL-4-CSH-25.00	CL-4-CSH-6.00	6	2-1/2	1	
CL-5-CSH-25.00	CL-5-CSH-6.00	8	3-3/8	1-1/4	



# TECHNICAL INFORMATION ADJUSTABLE LOCKING HUBS

## TYPES AVAILABLE



**Heavy-Duty—Stainless Steel  
Two Round Ends**  
INFO+: Page 365



**Heavy-Duty—Stainless Steel  
Two Mounting Flanges**  
INFO+: Page 366

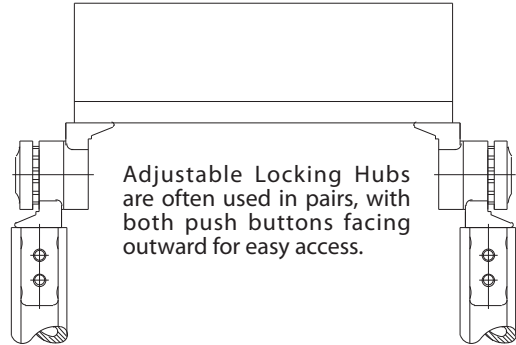


**Heavy-Duty—Stainless Steel  
Mounting Flange & Round End**  
INFO+: Page 367



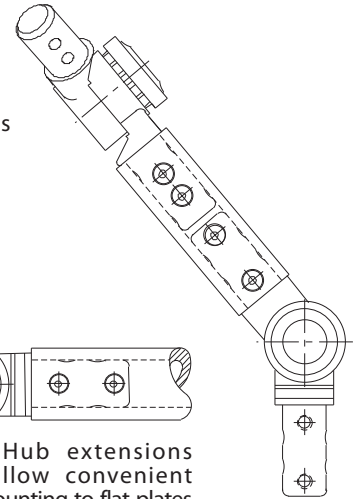
**Medium-Duty—Thermoplastic  
Two Square Ends**  
INFO+: Page 368

## APPLICATION EXAMPLES

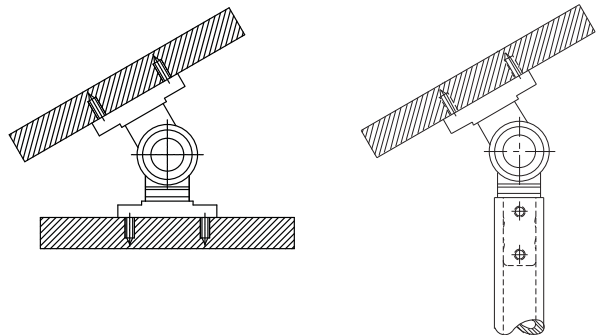


Adjustable Locking Hubs are often used in pairs, with both push buttons facing outward for easy access.

Connect two Adjustable Locking Hubs at 90° (with pipe or tubing) for full 5-Axis positioning.

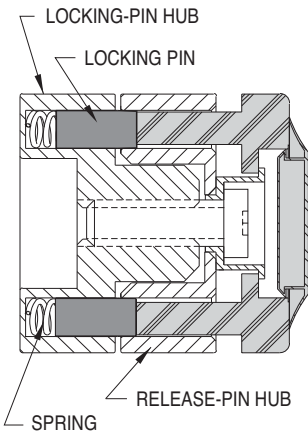


Hub extensions allow convenient mounting to flat plates and angles, as well as to pipe and tubing.



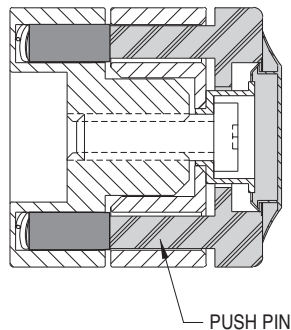
Mounting flanges are ideal for attaching Adjustable Locking Hubs to flat surfaces. Heavy-duty hubs are available with either two mounting flanges, or one mounting flange and one round end.

9



### Locked

In locked position, the locking-pin hub and release-pin hub are positively engaged by high-strength locking pins.

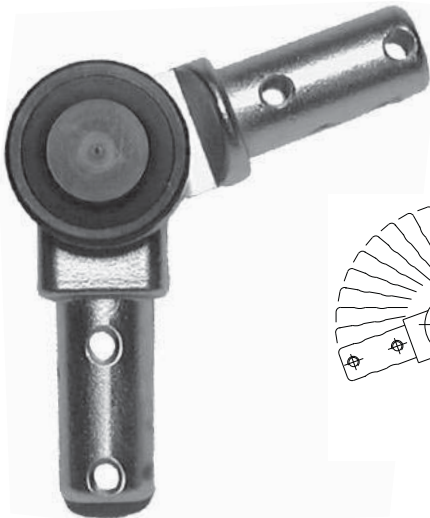


### Unlocked

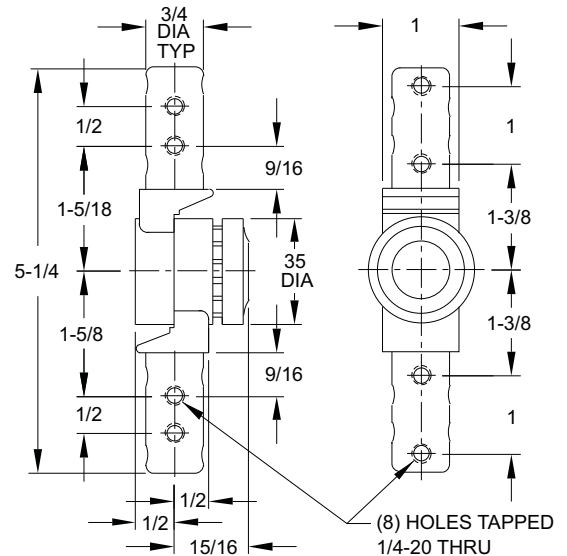
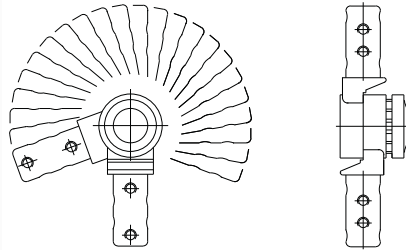
When the release button is pressed, against spring force, push pins force the locking pins to disengage. The hub is now free to rotate. After reaching the desired angle, releasing the button again allows the locking pins to extend back into locked position.

# ADJUSTABLE LOCKING HUBS

BODY: 300-SERIES STAINLESS STEEL, ELECTRO POLISHED. PINS: 416 STAINLESS STEEL, HEAT TREATED  
 RELEASE BUTTON: BLACK THERMOPLASTIC.  
 US PATENT NO. 5,586, 363 AND 5,689,999. OTHER PATENTS PENDING.



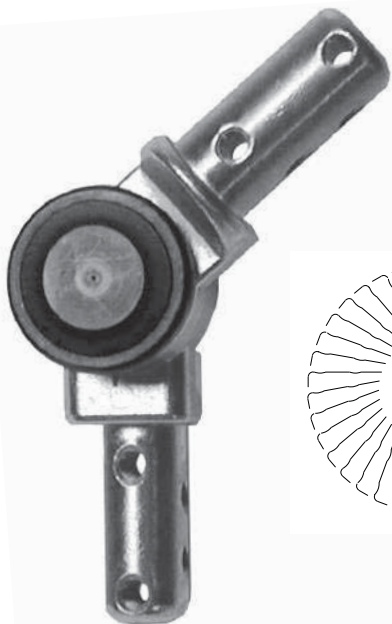
**Heavy Duty—  
Stainless Steel  
Two Round Ends  
Inline  
(220° Adjustment)**



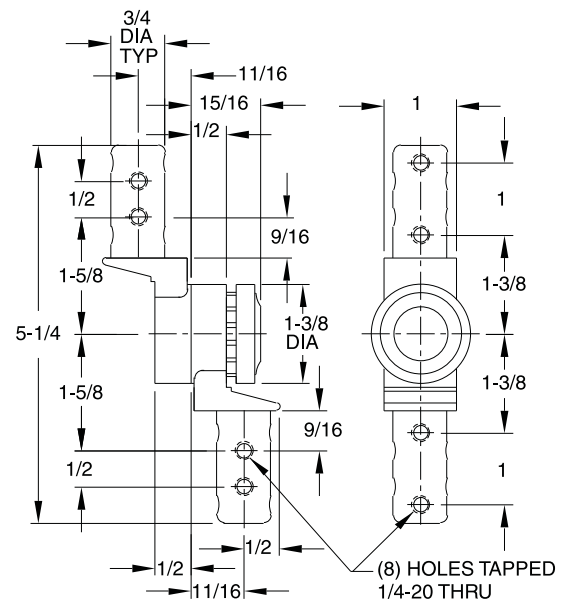
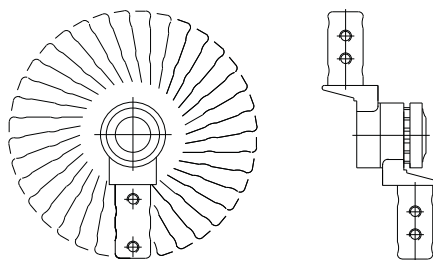
Adjustable Locking Hubs are rotary bearings that provide positive locking at any 10° increment. Once locked, the hub becomes an absolutely rigid joint, able to withstand 80 ft.-lbs. of torque (5:1 safety factor). Round Hub extensions fit 3/4" ID pipe or tubing. The tapped mounting holes can also be used to attach a plate or angle. Applications include adjustable fixtures, rotating fixtures, welding fixtures, trunnion mounting, adjustable and/or foldable handles, adjustable part trays and shelves, adjustable and/or flip-up work surfaces, positive positioning of spotlights or nozzles, and collapsible structures. Also available in alloy steel with a black finish (CL-100-ALH).

## INLINE (220° ADJUSTMENT)

PART NO.	TOTAL ADJUSTMENT RANGE	ADJUSTMENT INCREMENTS	ALLOWABLE TORQUE (FT-LB)
CL-100-ALH-S	220°	10°	80



**Heavy Duty—  
Stainless Steel  
Two Round Ends  
Offset  
(360° Rotation)**



Similar to the Locking Hub above, except hub extensions are offset to allow full 360° rotation. Offset Locking Hubs should usually be used in pairs, to avoid off-center loading on a single hub. Make sure that rotating loads are balanced and avoid any possible pinch points, in case hubs are suddenly unlocked and the load is allowed to rotate freely.

## OFFSET (360° ROTATION)

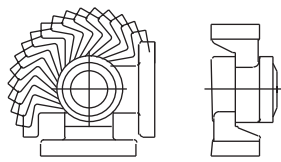
PART NO.	TOTAL ADJUSTMENT RANGE	ADJUSTMENT INCREMENTS	ALLOWABLE TORQUE (FT-LB)
CL-101-ALH-S	360°	10°	80

# ADJUSTABLE LOCKING HUBS

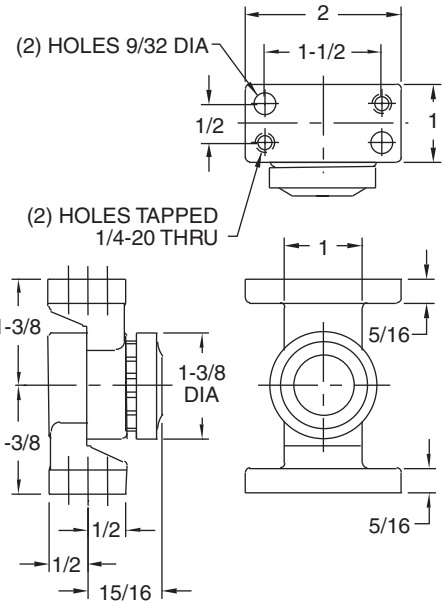
BODY: 300-SERIES STAINLESS STEEL, ELECTRO POLISHED. PINS: 416 STAINLESS STEEL, HEAT TREATED  
 RELEASE BUTTON: BLACK THERMOPLASTIC.  
 US PATENT NO. 5,586, 363 AND 5,689,999. OTHER PATENTS PENDING.



**Heavy Duty—  
 Stainless Steel  
 Two Mounting Flanges  
 Inline  
 (180° Adjustment)**



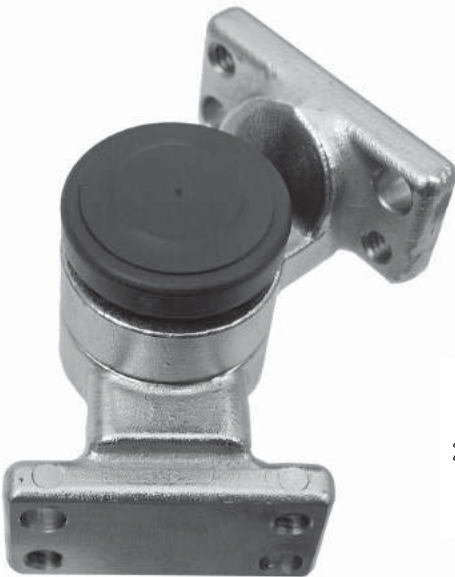
Adjustable Locking Hubs are rotary bearings that provide positive locking at any 10° increment. Once locked, the hub becomes an absolutely rigid joint, able to withstand 80 ft.-lbs. of torque (5:1 safety factor). Mounting flanges provide two mounting options: (1) two 1/4-20 tapped holes allow fastening an object to the mounting flange; (2) two 9/32 dia clearance holes for 1/4" screws allow fastening the mounting flange to a surface. Applications include adjustable fixtures, rotating fixtures, welding fixtures, trunnion mounting, adjustable and/or foldable handles, adjustable part trays and shelves, adjustable and/or flip-up work surfaces, positive positioning of spotlights or nozzles, and collapsable structures.



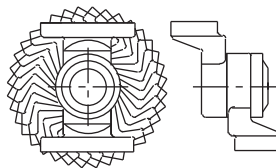
## INLINE (220° ADJUSTMENT)

PART NO.	TOTAL ADJUSTMENT RANGE	ADJUSTMENT INCREMENTS	ALLOWABLE TORQUE (FT-LB)
CL-120-ALH-S	180°	10°	80

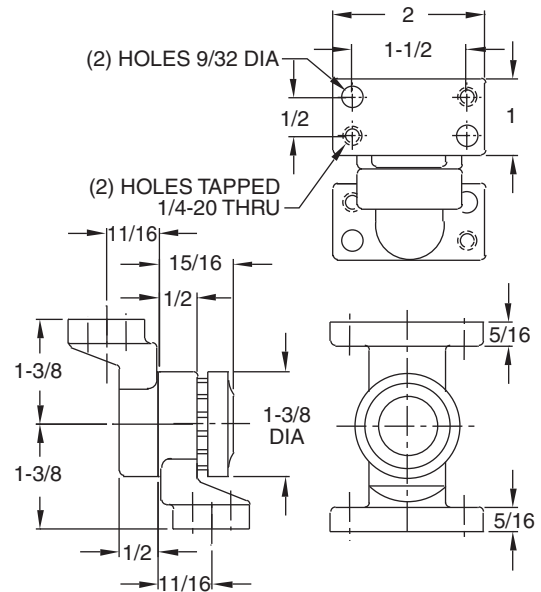
9



**Heavy Duty—  
 Stainless Steel  
 Two Mounting Flanges  
 Offset  
 (360° Rotation)**



Similar to the Locking Hub above, except hub extensions are offset to allow full 360° rotation. Offset Locking Hubs should usually be used in pairs, to avoid off-center loading on a single hub. Make sure that rotating loads are balanced and avoid any possible pinch points, in case hubs are suddenly unlocked and the load is allowed to rotate freely.



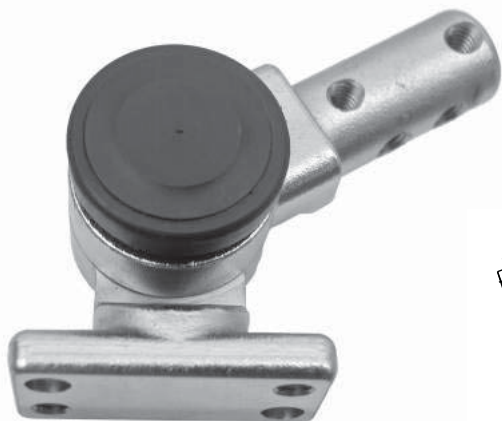
## OFFSET (360° ROTATION)

PART NO.	TOTAL ADJUSTMENT RANGE	ADJUSTMENT INCREMENTS	ALLOWABLE TORQUE (FT-LB)
CL-121-ALH-S	360°	10°	80

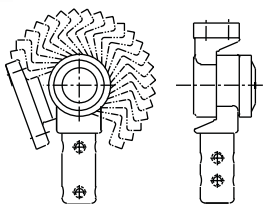


# ADJUSTABLE LOCKING HUBS

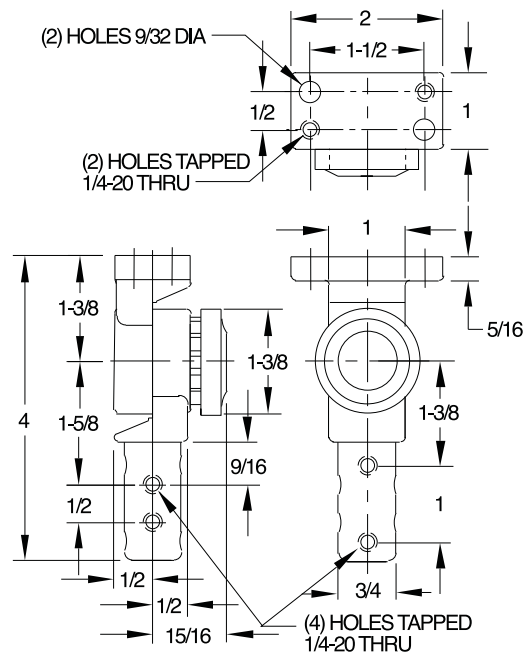
BODY: 300-SERIES STAINLESS STEEL, ELECTRO POLISHED. PINS: 416 STAINLESS STEEL, HEAT TREATED  
 RELEASE BUTTON: BLACK THERMOPLASTIC.  
 US PATENT NO. 5,586,363 AND 5,689,999. OTHER PATENTS PENDING.



**Heavy Duty—  
Stainless Steel  
Mounting Flange &  
Round End Inline  
(220° Adjustment)**



Adjustable Locking Hubs are rotary bearings that provide positive locking at any 10° increment. Once locked, the hub becomes an absolutely rigid joint, able to withstand 80 ft.-lbs. of torque (5:1 safety factor). The round hub extension fits 3/4" ID pipe or tubing. The tapped mounting holes can also be used to attach a plate or angle. The mounting flange provides two mounting options: (1) two 1/4-20 tapped holes allow fastening an object to the mounting flange; (2) two 9/32 dia clearance holes for 1/4" screws allow fastening the mounting flange to a surface. Applications include adjustable fixtures, rotating fixtures, welding fixtures, trunnion mounting, adjustable and/or foldable handles, adjustable part trays and shelves, adjustable and/or flip-up work surfaces, positive positioning of spotlights or nozzles, and collapsible structures.

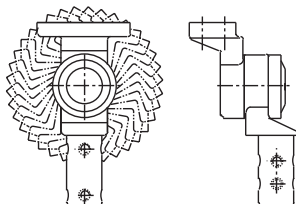


**INLINE (220° ADJUSTMENT)**

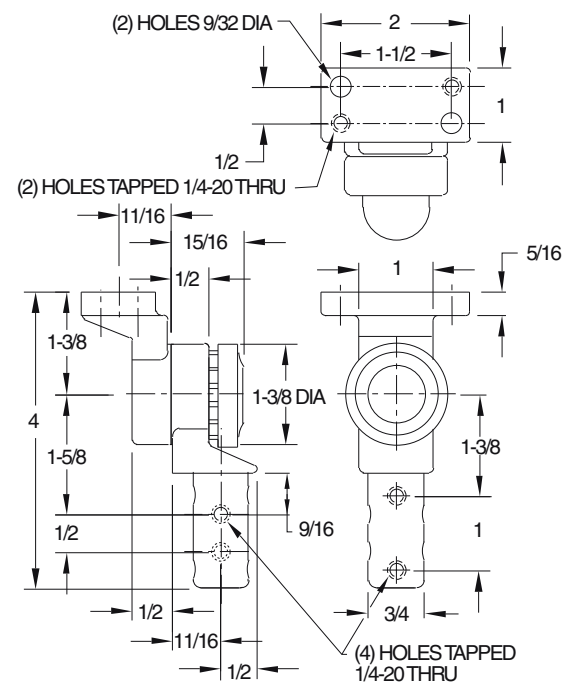
PART NO.	TOTAL ADJUSTMENT RANGE	ADJUSTMENT INCREMENTS	ALLOWABLE TORQUE (FT-LB)
CL-110-ALH-S	220°	10°	80



**Heavy Duty—  
Stainless Steel  
Mounting Flange &  
Round End Offset  
(360° Rotation)**



Similar to the Locking Hub above, except hub extensions are offset to allow full 360° rotation. Offset Locking Hubs should usually be used in pairs, to avoid off-center loading on a single hub. Make sure that rotating loads are balanced and avoid any possible pinch points, in case hubs are suddenly unlocked and the load is allowed to rotate freely.



**OFFSET (360° ROTATION)**

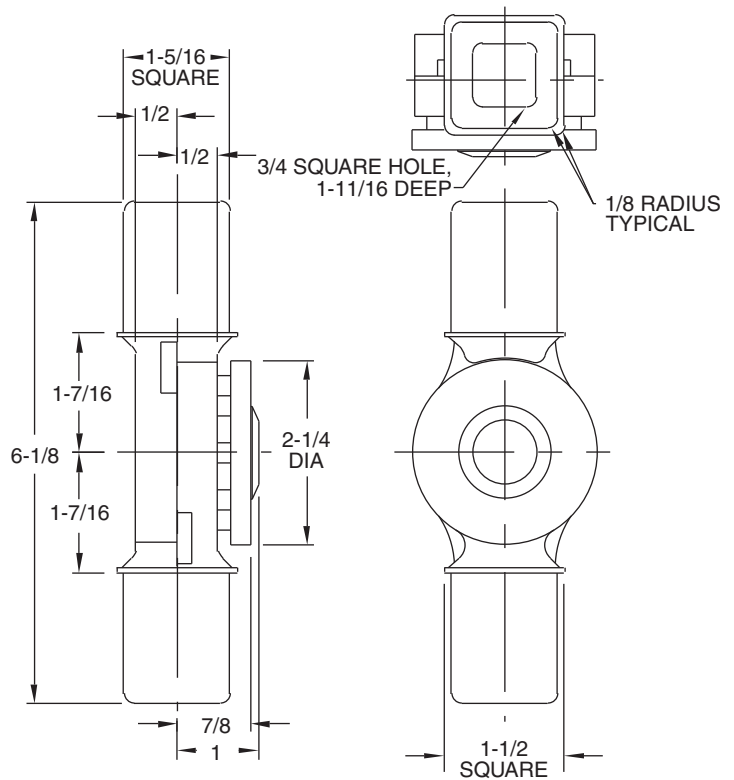
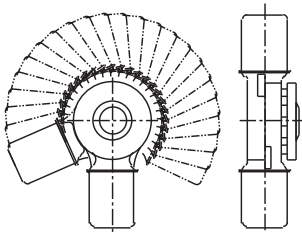
PART NO.	TOTAL ADJUSTMENT RANGE	ADJUSTMENT INCREMENTS	ALLOWABLE TORQUE (FT-LB)
CL-111-ALH-S	360°	10°	80

# ADJUSTABLE LOCKING HUBS

BLACK THERMOPLASTIC (DUPONT ZYTEL™).  
 US PATENT NO. 5,586, 363 AND 5,689,999. OTHER PATENTS PENDING.



**Medium Duty—  
 Thermoplastic  
 Two Square Ends  
 Inline  
 (220° Adjustment)**

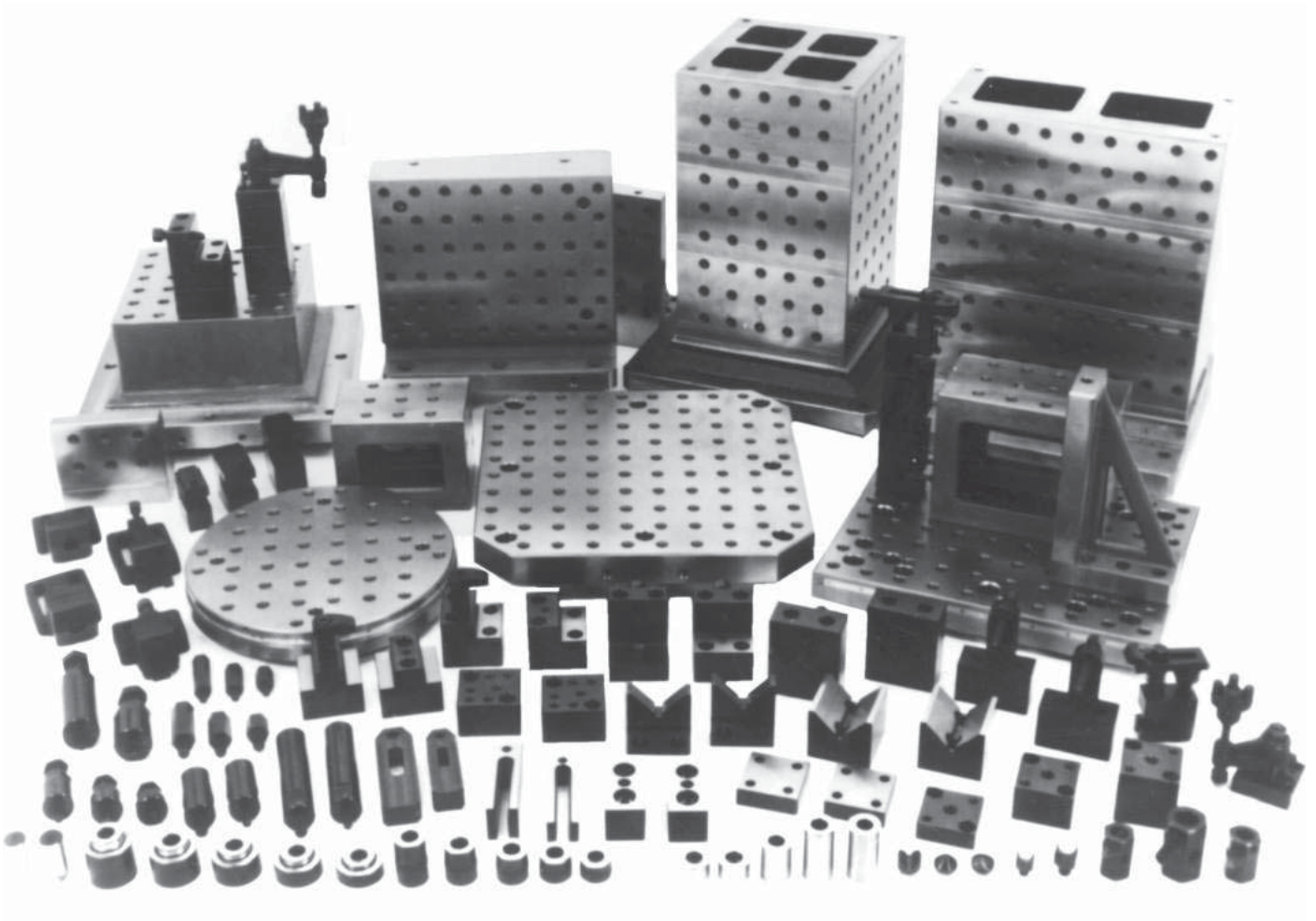


Economical-yet-rugged Locking Hub made of tough black thermoplastic. These Adjustable Locking Hubs are rotary bearings that provide positive locking at any 10° increment. Once locked, the hub becomes an absolutely rigid joint, able to withstand 33 ft.-lbs. of torque (5:1 safety factor). The square hub extensions fit 1-1/2" O.D. square tubing externally, or 3/4" O.D. square tubing or barstock internally. Hub extensions are sturdy, and can be easily modified to attach to flat surfaces. Applications include adjustable fixtures, rotating fixtures, trunnion mounting, adjustable and/or foldable handles, adjustable part trays and shelves, adjustable and/or flip-up work surfaces, positive positioning of spotlights or nozzles, and collapsible structures.

**INLINE (220° ADJUSTMENT)**

PART NO.	TOTAL ADJUSTMENT RANGE	ADJUSTMENT INCREMENTS	ALLOWABLE TORQUE (FT-LB)
CL-40-ALH-B	220°	10°	33

# MODULAR FIXTURING



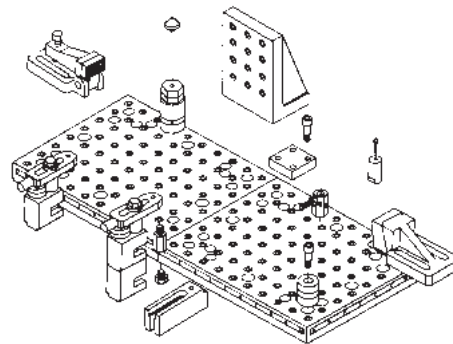
# ALPHA-NUMERIC INDEX

CS	Clamp Straps.....	408-411
FAC	Forged Adjustable Clamps .....	416
KSA	Knob Shoe Assemblies.....	420
KSJ	Knurled Screw Jacks.....	405
SA	Standard-Adjustable Spindles .....	413
SAC	Serrated Adjustable Edge Clamps .....	418-419
SFC	Serrated Fixed Edge Clamps .....	418-419
SHCS	Socket-Head Cap Screws.....	394
SHS	Swivel Head Screws.....	420
SSXX	Toolroom Starter Sets.....	377-382
SSC	Swivel Screw Clamps .....	420
TSB	Adjustable-Torque Thumb Screws .....	420
TSJ	Torque Screw Jacks .....	406
0001	Protection Plugs .....	395
0101	Precision Bushings.....	375
010X	Rectangular Tooling Plates, Regular .....	384
015X	Rectangular Tooling Plates, Extra Long .....	385
030X	Round Tooling Plates .....	383
040X	Angle Plates, Tall .....	393
045X	Angle Tooling Plates.....	389
050X	Angle Plates, Short .....	393
060X	Two-Sided Tooling Blocks.....	390
070X	Four-Sided Tooling Blocks.....	391
080X	Platform Tooling Plates .....	388
080X	Square Pallet Tooling Plates .....	386
085X	Rectangular Pallet Tooling Plates .....	387
090X	Riser Plates.....	392
100X	Pivoting Edge Clamps .....	417
110X	Downthrust Backstops.....	417
125X	Screw-Clamp Adaptors.....	420
141X	Support Riser Blocks .....	396
146X	Multipurpose Riser Blocks.....	396
15XX	Swing Clamp Assemblies .....	414
160X	Clamp Riser Blocks.....	See website
200X	High-Rise Clamps, Tapped-Nose.....	411
205X	High-Rise Clamps, Standard-Nose.....	411
210X	High-Rise Clamps, Gooseneck.....	411
220X	High-Rise Clamps, Tapped-Nose .....	411
230X	Narrow Riser Blocks.....	412
235X	Spacer Blocks.....	412
240X	Support Holders .....	412
250X	Swivel Contact Bolts .....	413
260X	Contact-Bolt Extensions .....	413
31XX	Support Cylinders .....	400
320X	Shoulder Support Cylinders.....	401
330X	Extension Supports .....	397
340X	Heavy-Duty Screw Jacks.....	405

350X	Screw-Jack Tips.....	405
360X	Halfway Extension Supports .....	398
370X	Edge Supports, Single .....	402
380X	Edge Supports, Double.....	402
390X	Spring-Stop-Button Adaptors .....	407
400X	Locating Gages .....	395
430X	Locating Bushings .....	394
430X	Locating Screws.....	394
431X	Hex-Head Cap Screws .....	395
450X	Locating Pins, Round.....	395
460X	Locating Pins, Diamond.....	395
475X	Multipurpose Extension Supports .....	398
480X	Screw Rest Pads.....	403
500X	Hook Clamps, Long-Arm.....	415
501X	Hook Clamps, Tapped Long-Arm.....	415
510X	Hook-Clamp Holders .....	415
520X	Riser Cylinders.....	399
530X	Up-Thrust Clamps .....	414
561X	Cam Edge Clamps.....	416
570X	Manual Work Supports .....	406
600X	Horizontal V Blocks.....	404
610X	Vertical V Blocks.....	403
7XXX	Height Shims .....	399

## Modular Fixturing

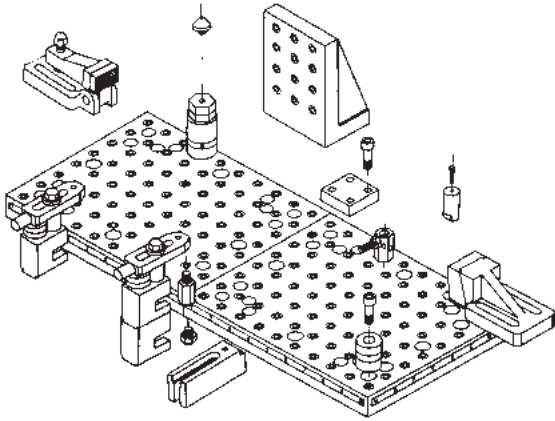
### A Versatile Solution To Your Workholding Needs



- Great for temporary fixturing: one-time jobs, short or prototype production runs, trial fixturing or while permanent fixtures are built or repaired.
- Order as components, or in handy starter sets.

**See Pages 369-420**

What exactly is modular fixturing? In many ways modular fixturing is just like permanent fixturing, except for a few key differences. First, modular fixtures can be assembled entirely from reusable off-the-shelf components, without machining. Next, many modular components are adjustable and universal. Finally, specially designed tooling plates and blocks, with a standard grid pattern, are the foundation of a good modular system.



### A VALUABLE TOOL FOR EVERY MACHINE SHOP:

Most metal-machining manufacturers have good applications for temporary fixturing every day! The leadtime and expense required to build a permanent fixture are often difficult to justify. This is especially true when production runs are small and do not repeat on a regular basis. General-purpose workholders — such as vises, chucks, and table mounted clamps — can be ready for production on short notice, but they are primarily suited for short runs of basic parts. Fortunately, there is now another alternative: modular fixturing. When a company adds modular fixturing to its options, even job-shop-type production can benefit from quality fixturing.

### GOOD APPLICATIONS FOR MODULAR FIXTURING:

Modular fixturing is an ideal answer to many workholding problems. One-time jobs, found especially in job shops, are ideal for modular fixturing; with modular fixturing, a workholder can be economically built even for a one-part run. Jobs that do not repeat on a regular basis are well suited to modular fixturing; modular fixturing permits rapid setup of short-notice production runs. Modular fixturing is also ideal for prototype parts; since prototypes are often changed or redesigned, the cost of building a permanent fixture for each new variation would be prohibitive. Replacement parts are another perfect application; modular fixturing allows a company to respond to orders as they are received, instead of shipping parts from an inventory. Trial fixturing is also an excellent application; modular workholders allow a designer to fine tune tooling ideas before a final production workholder is built. Finally, modular fixturing is valuable while permanent fixtures are built or repaired.

### THE WIDEST SELECTION OF TOOLING PLATES & BLOCKS:

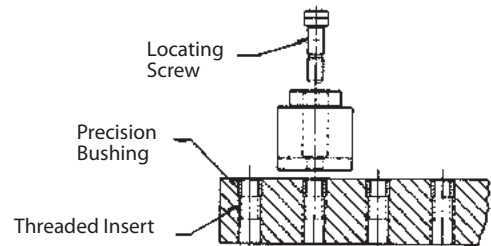
Tooling plates and blocks are the main structural elements of any modular-fixturing system. The type, style, and number of plates and blocks available determine the variety of fixtures that can be built, and also the number of machine tools that can be used. The Carr Lane Manufacturing modular system has the largest selection of tooling plates and blocks available anywhere.

### GRID HOLES VS. EARLIER T-SLOT SYSTEMS:

The two primary forms of modular systems available today are those with grid-pattern holes and earlier types with T slots to mount components. Grid holes offer many advantages over T slots. Modular systems with grid holes have greater positional accuracy and strength than those with T slots. T-slot systems permit movement along the slot, so nothing but friction holds components in place. Wherever T slots cross each other, a weak point exists.

### MULTIPURPOSE GRID HOLES OFFER MAXIMUM FLEXIBILITY:

Grid-pattern modular-fixturing systems come in two styles: those with alternating dowel holes and tapped holes and those with multipurpose holes. The alternating-hole style does not offer as many advantages as the Carr Lane Manufacturing multipurpose-hole style. Multipurpose holes have both an alignment bushing and threaded insert in the same hole. This arrangement permits each hole to serve as an alignment hole, mounting hole, or both. Multipurpose holes are laid out in a standard 1" or 2" grid pattern (depending on the size) to allow the maximum number of mounting locations.

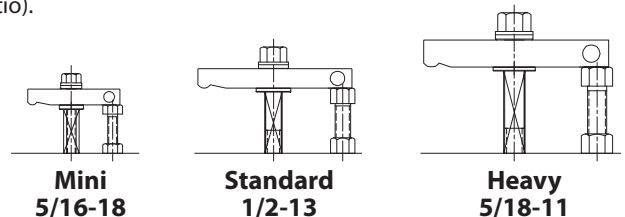


### POWER WORKHOLDING CAPABILITY:

The ability to use hydraulic power workholding is another consideration in the selection of a modular-workholding system. A modular system should treat power workholding as an integral part of the complete fixturing plan. Instead of requiring special power components, a good modular system uses standard, off-the-shelf power workholding components. Adapting standard power components to modular workholders both reduces cost and expands design options. ROEMHELD power clamps and work supports are the finest available, and work hand-in-hand with the Carr Lane Manufacturing modular system. Also, our HILMA precision hydraulic vises work perfectly with modular tooling plates and blocks.

### CHOICE OF THREE SYSTEM SIZES:

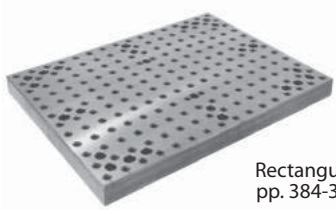
A good modular-fixturing system needs to accommodate a wide range of workpiece sizes. Only Carr Lane Manufacturing offers a full line of modular components in three system sizes. As a comparison to choose the proper system size, the table below shows typical clamping force exerted by clamp straps in each size (2-to-1 lever ratio).



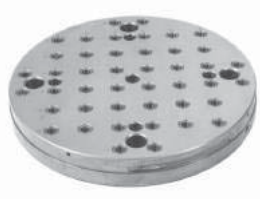
SIZE	STUD SIZE	RECOMMENDED TORQUE (FT-LBS)	CLAMPING FORCE (LBS)
MINI	5/16-18	9	900
STANDARD	1/2-13	38	2300
HEAVY	5/8-11	77	3700

# PICTORIAL INDEX

## TOOLING PLATES & BLOCKS



Rectangular  
pp. 384-385



Round  
p. 383



Square Pallet  
p. 386



Rectangular Pallet  
p. 387



Platform  
p. 388



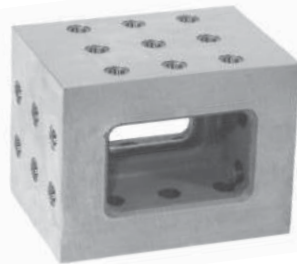
Angle  
p. 389



Two-Sided Blocks  
p. 390



Four-Sided  
Blocks  
p. 391



Riser Plates  
p. 392



Angle Plates  
p. 393

## MOUNTING ACCESSORIES



Locating Screws  
and Bushings  
p. 394



Socket-Head  
Cap Screws  
p. 394



Locating  
Gages  
p. 395



Locating  
Pins  
p. 395



Hex-Head Cap  
Screws  
p. 395



Protection  
Plugs  
p. 395

## SUPPORTS & LOCATORS



Support Riser Blocks  
p. 396



Extension Supports  
pp. 397-398



Height Shims  
p. 399



Riser Cylinders  
p. 399



Edge Supports  
p. 402



Support Cylinders  
pp. 400-401



Screw Rest Pads  
p. 403



V Blocks  
pp. 403-404



Screw Jacks  
pp. 405-406



Manual Work Supports  
p. 406



Stop-Spring-Button Adaptors  
p. 407

## CLAMPS



Slotted-Heel Clamp Straps  
p. 408



Double-End Clamp Straps  
p. 409



High-Rise Clamps  
pp. 410-412



Contact Bolts  
p. 413



Up-Thrust Clamps  
p. 414



Swing Clamp Assemblies  
p. 414



Hook Clamps  
p. 415



Forged Adjustable Clamps  
p. 416



Cam Edge Clamps  
p. 416



Pivoting Edge Clamps  
p. 417



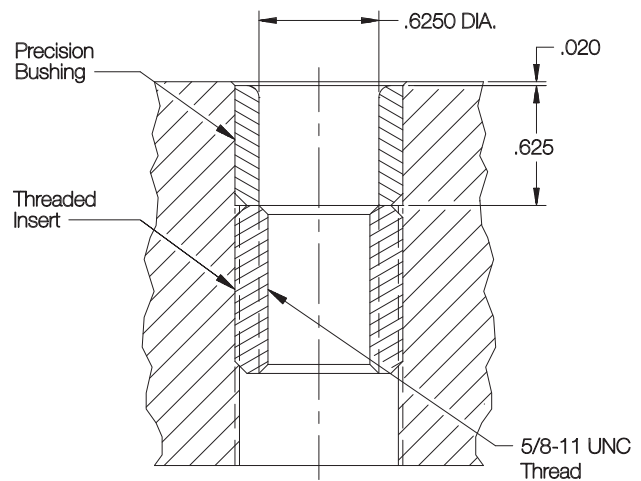
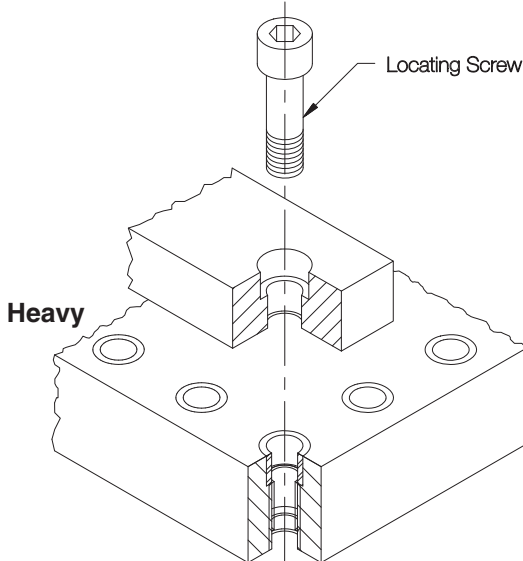
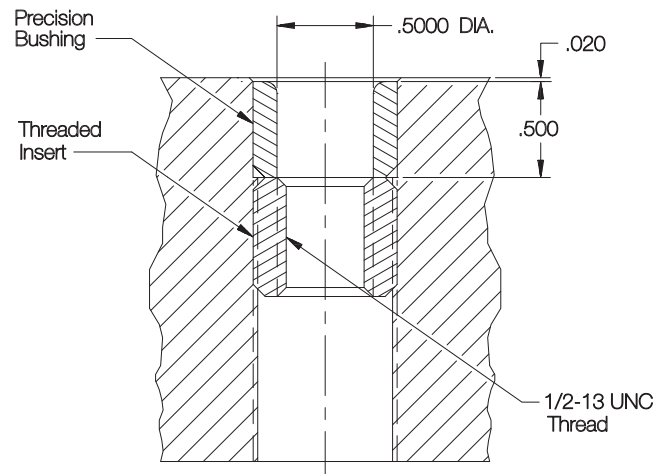
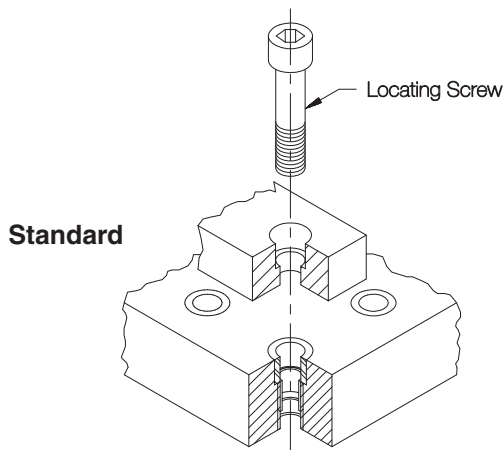
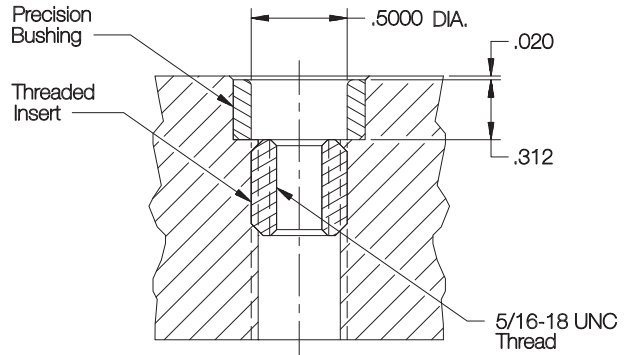
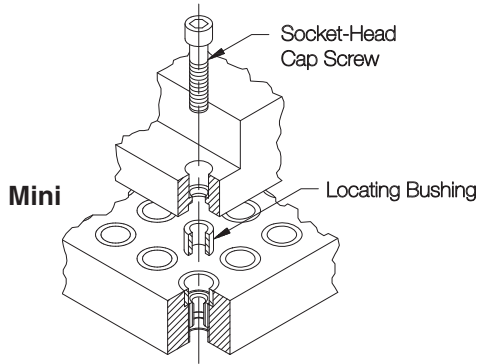
Serrated Adjustable Clamps  
pp. 418-419



Screw Clamp Adaptors  
p. 420

# TECHNICAL INFORMATION

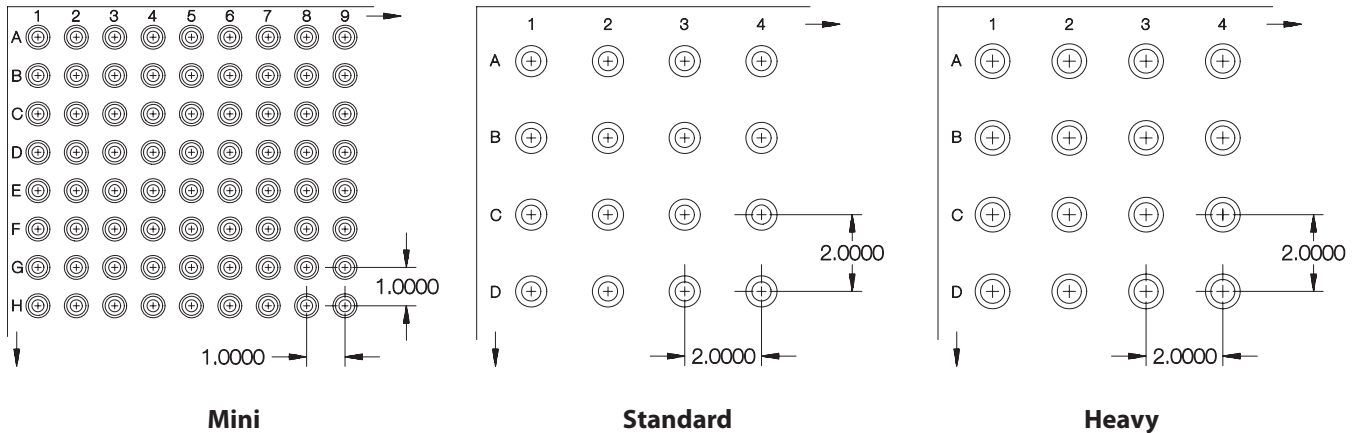
## MULTIPURPOSE HOLES



Every multipurpose hole on a tooling plate or block has a precision alignment bushing on top, with a threaded insert below it. Multipurpose holes will accept Locating Screws, Socket-Head Cap Screws, studs, and many other threaded components. The proper mounting screw for each component is listed in its table of dimensions. Locating Screws are used to locate and fasten at the same time. Note: mini-size systems use a Locating Bushing together with a Socket-Head Cap Screw for extra strength, instead of a Locating Screw.



## GRID ADDRESS SYSTEM



The grid pattern of multipurpose holes on every tooling plate and tooling block face is labelled with letters in one direction and numbers in the perpendicular direction. Tooling-block faces are numbered (counterclockwise) with Roman numerals. This allows recording the mounting-hole location of each component (e.g., A2, B3, D7, etc.) as part of permanent documentation.

Multipurpose holes are spaced within  $\pm.0008$  inches of true position on all tooling plates and blocks. The mini system is even more accurate, with all holes spaced within  $\pm.0004$  inches.

## CUSTOM TOOLING PLATES

To build your own custom tooling plates with multipurpose mounting holes, we offer precision bushings and threaded inserts separately. See hole locations and tolerances above (holes must be jig bored), and **(INFO+)** page 374 for proper counterbore depth to install bushings. The threaded insert's locking keys can be driven down by the bushing as it is pressed into the tooling plate.



**Precision Bushing**



**Key Insert**

### PRECISION BUSHINGS

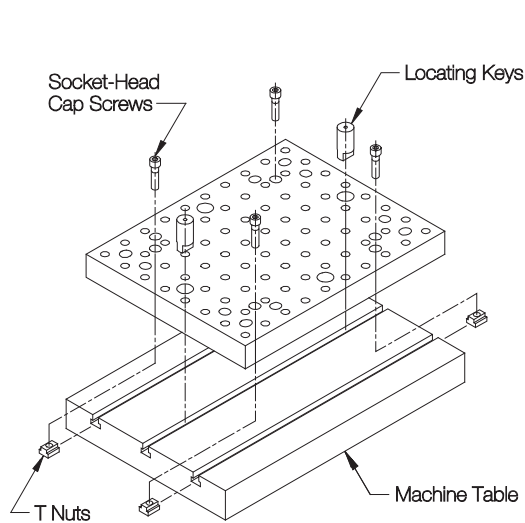
SIZE	PART NO.	ID	OD	LENGTH
MINI	CL-MF25-0101-02	.5003/.5005	.6247/.6244	.312
STANDARD	CL-MF40-0101-02	.5006/.5013	.8122/.8119	.500
HEAVY	CL-MF50-0101-02	.6256/.6263	.9060/.9056	.625

### KEY INSERTS

SIZE	PART NO.	ID	OD	LENGTH
MINI	CL-51618-KS	5/16-18	1/2-13	7/16
STANDARD	CL-1213-KS	1/2-13	3/4-16	5/8
HEAVY	CL-5811-KS	5/8-11	7/8-14	7/8

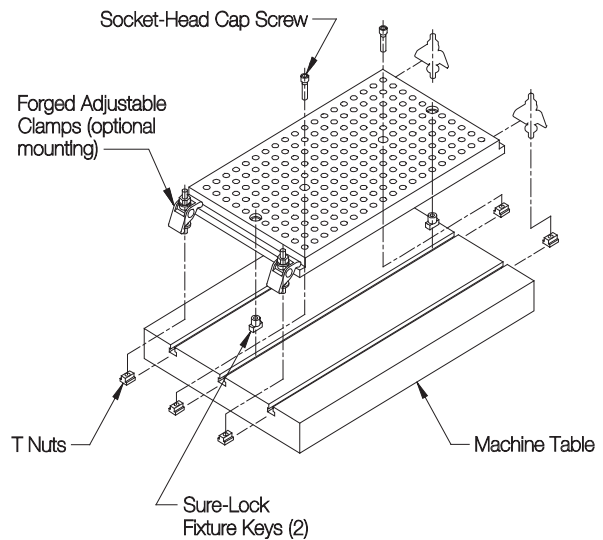
# TECHNICAL INFORMATION

## MOUNTING TOOLING PLATES ON T-SLOTTED TABLES



### Standard and Heavy

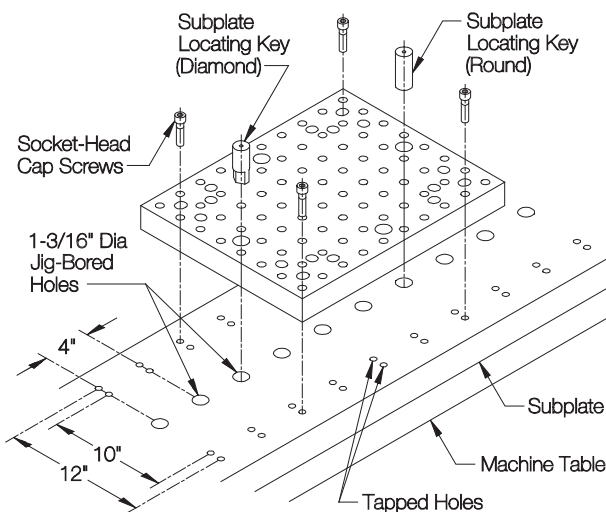
Standard and heavy Rectangular Tooling Plates are accurately located on T-slotted tables using two Locating Keys (INFO+ page 213) in the center table slot. These plates are fastened to the machine table using four or six Socket-Head Cap Screws (INFO+ page 394) and T Nuts (INFO+ page 273). Swivel Hoist Rings are recommended for lifting large tooling plates (INFO+ page 62).



### Mini Only

Mini-size Rectangular Tooling Plates are accurately located on T-slotted tables using two Sure-Lock™ Fixture Keys (INFO+ page 212) in the center table slot. These plates are normally fastened to the machine table using two or three Socket-Head Cap Screws (INFO+ page 394) and T Nuts (INFO+ page 273). Alternatively, four Forged Adjustable Clamps (INFO+ page 217) can be used for greater holding force.

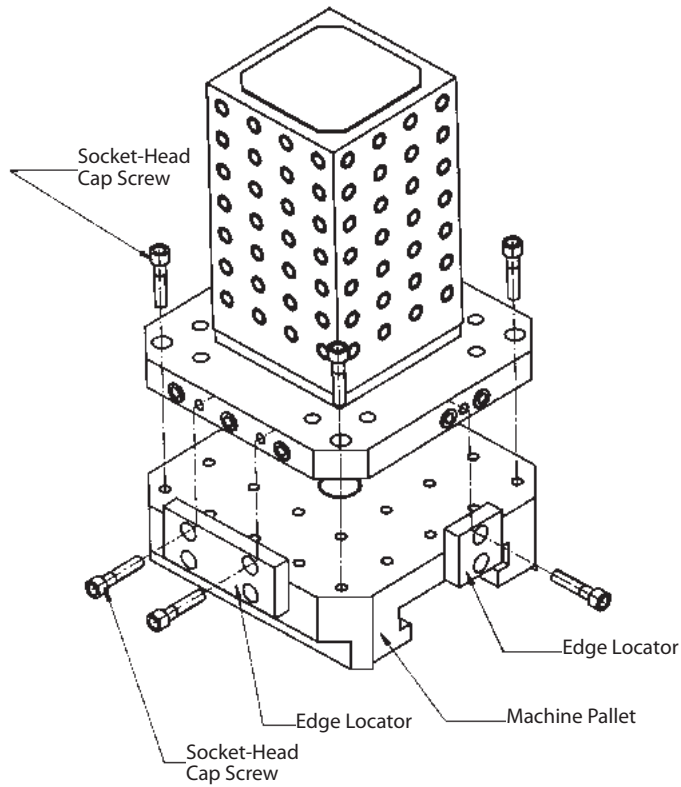
## MOUNTING TOOLING PLATES ON SUBPLATES



### Mini, Standard, and Heavy

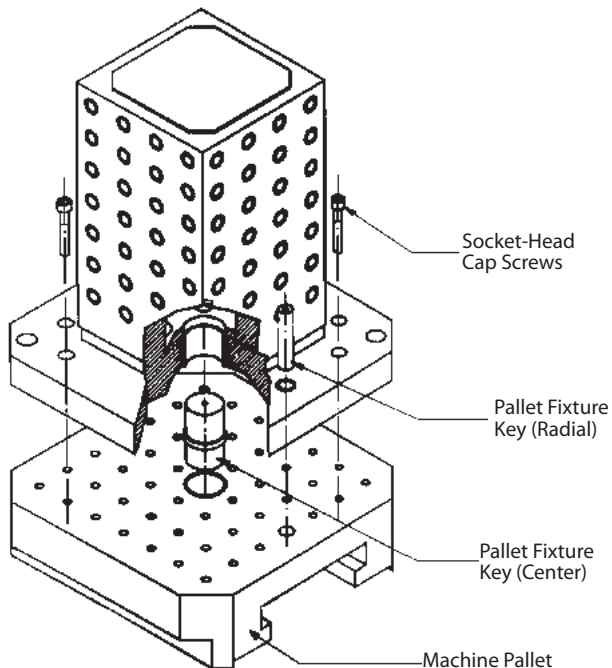
All Rectangular Tooling Plates can be mounted as quick-change fixture plates on a subplate, as well as directly on a T-slotted machine table. Instead of the Locating Keys and Sure-Lock™ Fixture Keys used above for two-axis location, Subplate Locating Keys (INFO+ page 213) are used for three-axis location. A Round Key and a Diamond (relieved) Key are used together for precise location without binding. The subplate hole pattern shown here allows mounting any size and combination of standard or heavy Rectangular Tooling Plates, either lengthwise or widthwise.

## MOUNTING TOOLING PLATES & BLOCKS ON PALLETS



### JIS Mounting

JIS-type mounting is the most common way to mount tooling plates and blocks on a machining-center pallet. Here the plate or block is located from two precisely ground reference edges at 90° to each other. The plate or block is pulled against the pallet's edge locators using three Socket-Head Cap Screws (**INFO+** page 394) and also fastened down with four to eight Socket-Head Cap Screws, depending on the size. Swivel Hoist Rings are recommended for lifting tooling blocks and large tooling plates (**INFO+** page 61).

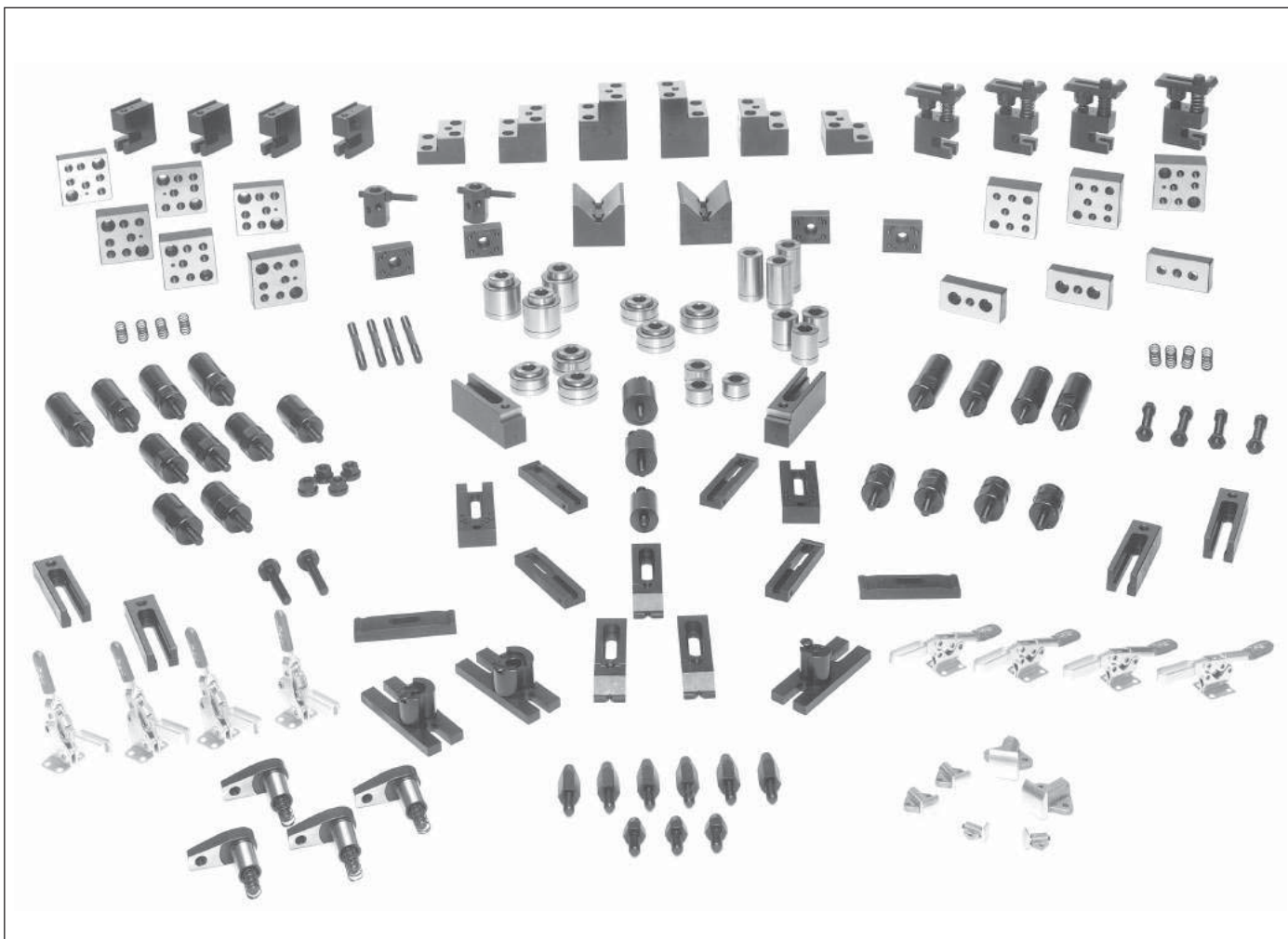


### DIN Mounting

Most of our modular tooling plates and blocks also incorporate DIN-mounting capability. Here the plate or block is located using a center hole, and oriented using a radial hole. Two Pallet Fixture Keys, a center pin and a radial pin, are required (**INFO+** page 214). The plate or block is fastened down with four to eight Socket-Head Cap Screws, depending on the size.

PALLET SIZE	PALLET CENTER-HOLE DIA	PALLET RADIAL-HOLE DIA	DISTANCE BETWEEN CENTER AND RADIAL HOLES
320mm	50mm	20mm	100mm
400mm			150mm
500mm			200mm
630mm	25mm	25mm	200mm
800mm			300mm

# TOOLROOM STARTER SETS



## BASIC STARTER SET

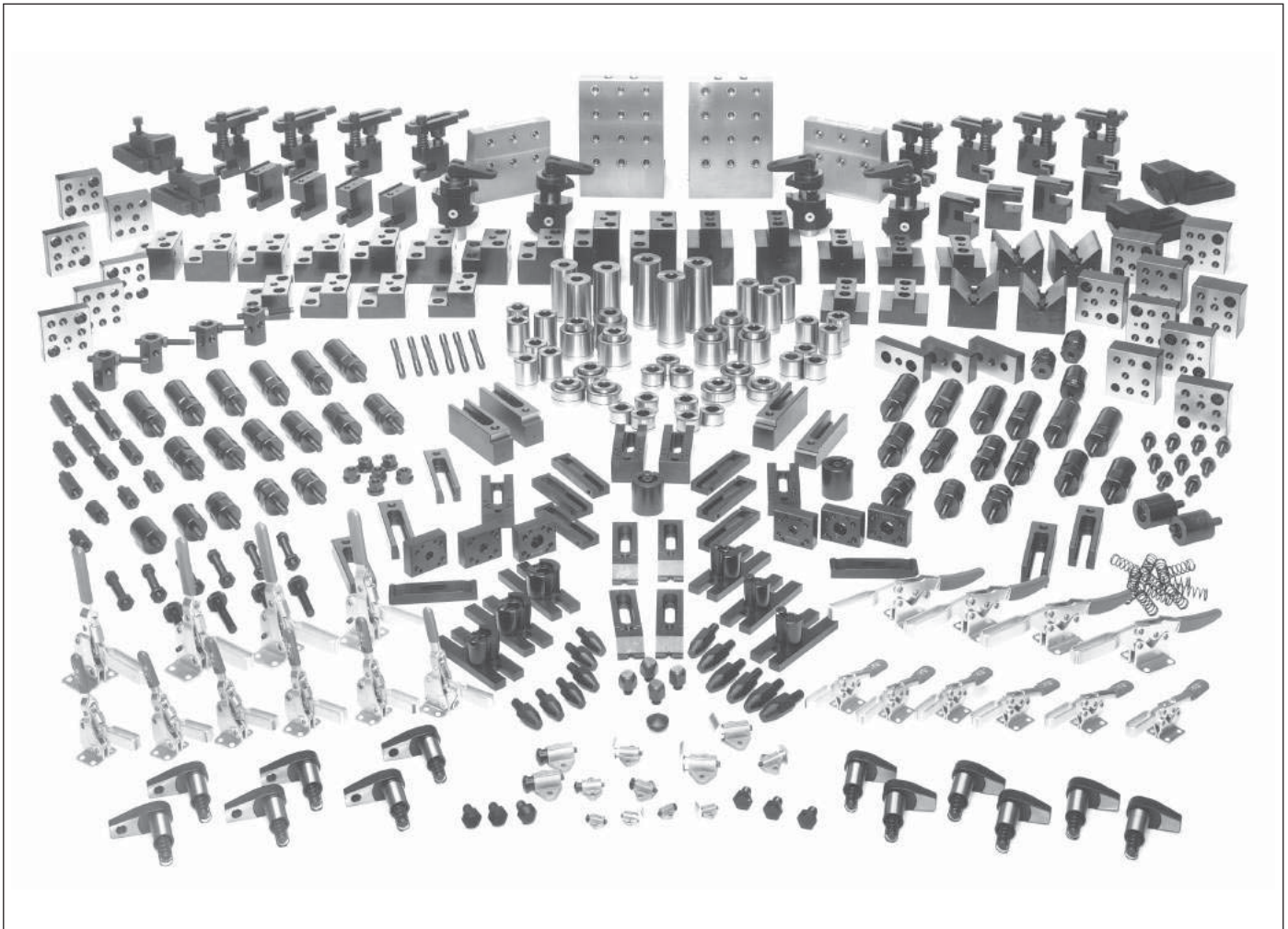
Economical starter sets to build one fixture at a time on a typical milling machine. This set includes matching sizes of our most-popular components, plus all necessary mounting screws. Order a tooling plate and Locating Keys separately to fit specific machines. **INFO+**: For a complete listing of components, see pages 380-382.

**10% OFF INDIVIDUAL  
PRICES WHEN ORDERED  
IN THESE SETS!**

## ONE-FIXTURE SETS

SIZE	NUMBER OF PART NO.	PIECES
MINI	CL-MF25-SS1B	533
STANDARD	CL-MF40-SS1B	481
HEAVY	CL-MF50-SS1B	411

# TOOLROOM STARTER SETS



## COMPLETE STARTER SET

Comprehensive starter sets that allow fixturing almost any part. The one-fixture set (shown above) is ideal for building any one fixture at a time on most milling machines and machining centers. The four-fixture set (not shown) contains enough of most components to build four identical fixtures, ideal for tooling blocks on horizontal machining centers. Order tooling plates, tooling blocks, and Locating Keys separately to fit specific machines. **INFO+** For a complete listing of components, see pages 380-382.

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0

**10% OFF INDIVIDUAL  
PRICES WHEN ORDERED  
IN THESE SETS!**














### ONE-FIXTURE SETS

SIZE	NUMBER OF PART NO.	PIECES
MINI	CL-MF25-SS1B	533
STANDARD	CL-MF40-SS1B	481
HEAVY	CL-MF50-SS1B	411









### FOUR-FIXTURE SETS

MINI	CL-MF25-SS4C	3275
STANDARD	CL-MF40-SS4C	3076
HEAVY	CL-MF50-SS4C	2428

# TOOLROOM STARTER SETS

COMPONENTS IN STARTER SET		QTY. IN SET*			
		SS1B	SS1C	SS4C	
	MINI		—	—	—
	STANDARD	CL-MF40-0511	—	2	4
		CL-MF40-0512	—	2	2
	HEAVY	CL-MF50-0501	—	2	4
CL-MF50-0502		—	2	2	
	MINI	CL-MF25-0900	—	1	1
	STANDARD	—	—	—	—
	HEAVY	—	—	—	—
	MINI	—	—	—	—
	STANDARD	CL-MF40-1001	—	2	8
	HEAVY	CL-MF50-1001	—	2	8
	MINI	—	—	—	—
	STANDARD	CL-MF40-1101	—	2	8
	HEAVY	CL-MF50-1251	—	2	8
	MINI	CL-MF25-1251	3	3	12
	STANDARD	CL-MF40-1251	3	3	12
	HEAVY	CL-MF50-1251	3	3	12
	STANDARD	CL-MF40-1411	3	4	12
		CL-MF40-1412	3	4	12
		CL-MF40-1413	3	4	12
	HEAVY	CL-MF50-1412	3	4	12
		CL-MF50-1413	3	4	12
		CL-MF50-1414	—	4	12
	MINI	CL-MF25-1461	4	8	16
		CL-MF25-1462	4	8	16
	STANDARD	CL-MF40-1462	4	8	16
		CL-MF40-1463	4	8	16
HEAVY	CL-MF50-1463	4	8	16	
	MINI	CL-MF25-2001	—	4	8
	STANDARD	CL-MF40-2001	—	4	8
	HEAVY	CL-MF50-2001	—	4	8
	MINI	CL-MF25-2051	4	4	8
	STANDARD	CL-MF25-2052	—	—	—
	HEAVY	—	—	—	—
	MINI	—	—	—	—
	STANDARD	CL-MF40-2101	4	4	8
	HEAVY	CL-MF50-2101	4	4	8
	MINI	CL-MF25-2301	4	8	8
	STANDARD	CL-MF40-2301	4	8	8
	HEAVY	CL-MF50-2301	4	8	16
	MINI	CL-MF25-2351	4	8	16
	STANDARD	CL-MF40-2351	4	8	16
	HEAVY	CL-MF50-2351	4	8	16
	MINI	CL-MF25-2502	—	4	8
	STANDARD	CL-MF40-2501	—	4	8
	HEAVY	CL-MF50-2501	—	4	8

















\* No substitutes please.

	MINI	CL-MF25-2601	—	4	8
		CL-MF25-2602	—	4	8
		CL-MF25-2603	—	4	8
	STANDARD	CL-MF40-2601	—	4	8
		CL-MF40-2602	—	4	8
		CL-MF40-2603	—	4	8
HEAVY	CL-MF50-2601	—	4	8	
	CL-MF50-2602	—	4	8	
	CL-MF50-2603	—	4	8	
	MINI	CL-MF25-3101	6	12	24
		CL-MF25-3102	—	3	12
		CL-MF25-3103	6	12	24
		CL-MF25-3105	—	3	12
		CL-MF25-3107	3	6	12
		CL-MF40-3101	3	6	12
	STANDARD	CL-MF40-3102	3	6	12
		CL-MF40-3103	3	3	12
		CL-MF40-3104	—	3	12
		CL-MF40-3105	—	3	12
		CL-MF40-3112	—	3	12
		CL-MF40-3113	—	3	12
HEAVY	CL-MF50-3101	3	6	24	
	CL-MF50-3102	3	3	12	
	CL-MF50-3104	—	3	12	
	CL-MF50-3112	3	6	24	
	CL-MF50-3114	—	3	12	
	CL-MF50-3114	—	3	12	
	MINI	CL-MF25-3200	6	12	24
		CL-MF25-3202	—	6	12
		CL-MF25-3204	—	6	12
		CL-MF25-3206	3	6	12
	STANDARD	CL-MF40-3202	3	6	12
		CL-MF40-3204	3	6	12
HEAVY	CL-MF40-3205	3	6	12	
	CL-MF50-3202	3	6	12	
		CL-MF50-3204	3	6	12
	MINI	CL-MF25-3301	2	3	12
		CL-MF25-3302	—	3	12
		CL-MF25-3303	2	3	12
		CL-MF25-3305	2	3	12
	STANDARD	CL-MF40-3300	2	3	12
		CL-MF40-3301	2	3	12
HEAVY	CL-MF40-3302	2	3	12	
	CL-MF50-3301	2	3	12	
		CL-MF50-3302	2	3	12
	MINI	—	—	—	—
	STANDARD	CL-MF40-3401	—	1	1
		CL-MF40-3402	—	1	1
		CL-MF40-3403	—	1	1
	HEAVY	CL-MF50-3401	—	1	1
		CL-MF50-3402	—	1	1
CL-MF50-3403		—	1	1	
	MINI	—	—	—	—
	STANDARD	CL-MF10-3501	—	1	1
	HEAVY	CL-MF10-3501	—	1	1
	MINI	CL-MF25-3601	4	4	16
		CL-MF25-3603	—	4	16
		CL-MF25-3605	—	4	16
STANDARD	CL-MF40-3601	3	3	12	
	HEAVY	CL-MF50-3602	4	4	16
	MINI	CL-MF25-3700	4	4	16
		CL-MF25-3702	—	4	16
	STANDARD	CL-MF40-3702	2	4	8
		CL-MF40-3704	—	4	8
		CL-MF40-3705	2	4	8
	HEAVY	CL-MF50-3702	2	4	8
CL-MF50-3704		2	4	8	

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# TOOLROOM STARTER SETS

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 Edge Supports, Double	MINI	CL-MF25-3800	2	3	12
		CL-MF25-3802	—	3	12
	STANDARD	CL-MF40-3802	—	2	4
		CL-MF40-3804	—	2	4
		CL-MF40-3805	—	2	4
	HEAVY	CL-MF50-3802	—	2	4
CL-MF50-3804		—	2	4	
CL-MF50-3808		—	—	—	
 Spring-Stop-Button Adaptors	MINI	CL-MF25-3901	2	4	16
	STANDARD	CL-MF40-3902	2	2	8
	HEAVY	CL-MF50-3902	2	2	8
 Locating Bushings	MINI	CL-MF25-4300	36	78	242
	STANDARD	—	—	—	—
	HEAVY	—	—	—	—
 Locating Screws	STANDARD	CL-MF40-4301	34	74	140
		CL-MF40-4302	12	58	172
		CL-MF40-4303	8	16	32
	HEAVY	CL-MF50-4301	20	43	116
		CL-MF50-4302	15	52	124
		CL-MF50-4303	—	3	12
 Hex-Head Cap Screws	MINI	CL-MF25-4311	4	12	24
		CL-MF25-4312	8	20	32
		CL-MF25-4313	4	8	8
	STANDARD	CL-MF40-4311	8	16	24
		CL-MF40-4312	4	8	8
		CL-MF40-4313	4	8	8
HEAVY	CL-MF50-4311	8	12	24	
	CL-MF50-4312	4	4	8	
	CL-MF50-4313	4	4	8	
 Multipurpose Extension Supports	MINI	CL-MF25-4751	2	2	8
	STANDARD	CL-MF40-4751	2	2	8
	HEAVY	CL-MF50-4751	2	2	8
 Screw Rest Pads	MINI	CL-MF25-4801	—	6	24
		CL-MF25-4803	6	12	24
		CL-MF25-4804	—	6	24
		CL-MF25-4805	6	12	24
		CL-MF25-4806	—	6	24
		CL-MF25-4807	6	12	24
	STANDARD	CL-MF40-4801	—	3	12
		CL-MF40-4803	—	3	12
		CL-MF40-4804	—	3	12
		CL-MF40-4805	3	6	12
		CL-MF40-4807	—	6	12
		CL-MF40-4808	3	6	12
	HEAVY	CL-MF50-4803	—	3	12
		CL-MF50-4804	—	3	12
		CL-MF50-4805	—	3	12
HEAVY	CL-MF50-4806	3	6	24	
	CL-MF50-4807	—	3	12	
	CL-MF50-4808	3	6	24	
	CL-MF50-5002	6	8	24	
	CL-MF25-5013	6	8	24	
	CL-MF40-5002	—	6	24	
 Hook Clamps	STANDARD	CL-MF40-5013	4	6	24
	HEAVY	CL-MF50-5002	—	6	24
		CL-MF50-5014	4	6	24
 Hook-Clamp Holders	MINI	CL-MF25-5101	6	8	24
	STANDARD	CL-MF40-5101	4	6	24
		CL-MF40-5102	4	6	24
HEAVY	CL-MF50-5101	4	6	24	
	CL-MF50-5102	4	6	24	
 Riser Cylinders	MINI	CL-MF25-5201	4	6	16
		CL-MF25-5203	4	6	16
	STANDARD	CL-MF40-5201	4	6	16
		CL-MF40-5203	—	6	6
		CL-MF40-5204	4	6	6
	HEAVY	CL-MF50-5201	4	6	16
CL-MF50-5203		—	6	6	
CL-MF50-5204		4	6	6	
 Up-Thrust Clamps	MINI	—	—	—	—
	STANDARD	CL-MF40-5301	—	4	12
	HEAVY	—	—	—	—
 Cam Edge Clamps	MINI	CL-MF25-5611	3	3	12
	STANDARD	CL-MF40-5611	3	3	12
	HEAVY	—	—	—	—
 Manual Work Supports	MINI	CL-MF25-5701	2	4	8
	STANDARD	CL-MF40-5701	1	2	8
	HEAVY	CL-MF50-5701	1	2	8
 Horizontal V Blocks	MINI	CL-MF25-6001	2	4	16
	STANDARD	CL-MF25-6002	2	4	16
		CL-MF40-6002	2	4	16
HEAVY	CL-MF50-6002	2	4	8	
	MINI	CL-MF25-7002	—	10	10
		CL-MF25-7003	—	10	10
CL-MF25-7004		—	10	10	
CL-MF25-7005		—	10	10	
CL-MF25-7010		—	10	10	
CL-MF25-7020		—	10	10	
CL-MF25-7062		—	10	10	
CL-MF25-7125	—	10	10		
STANDARD	CL-MF40-7002	—	10	10	
	CL-MF40-7003	—	10	10	
	CL-MF40-7004	—	10	10	
	CL-MF40-7005	—	10	10	
	CL-MF40-7010	—	10	10	
	CL-MF40-7020	—	10	10	
	CL-MF40-7062	—	10	10	
CL-MF40-7125	—	10	10		
HEAVY	CL-MF50-7002	—	10	10	
	CL-MF50-7003	—	10	10	
	CL-MF50-7004	—	10	10	
	CL-MF50-7005	—	10	10	
	CL-MF50-7010	—	10	10	
	CL-MF50-7020	—	10	10	
	CL-MF50-7062	—	10	10	
CL-MF50-7125	—	10	10		
 Height Shims	MINI	CL-1A-CR	8	12	32
		CL-1B-CR	8	12	32
	STANDARD	CL-4-CR	4	6	16
CL-5-CR		4	6	16	
HEAVY	CL-6-CR	4	6	16	
	CL-7-CR	4	6	16	
 Clamp Rests	MINI	CL-1A-CR	8	12	32
	STANDARD	CL-4-CR	4	6	16
		CL-5-CR	4	6	16
HEAVY	CL-6-CR	4	6	16	
	CL-7-CR	4	6	16	






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10

# TOOLROOM STARTER SETS

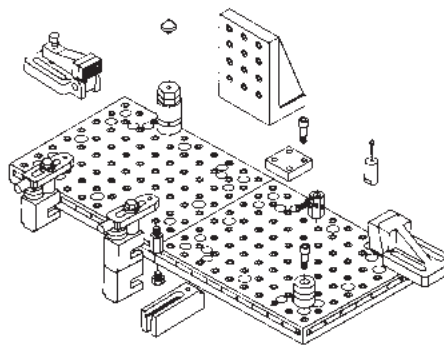
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	MINI	CL-1A-CR CL-1B-CR	8 8	12 12	32 32	
	STANDARD	CL-4-CR CL-5-CR	4 4	6 6	16 16	
		HEAVY	CL-6-CR CL-7-CR	4 4	6 6	16 16
	MINI	CL-1A-CS CL-1B-CS CL-23D-CS	8 8 2	12 12 4	32 32 8	
	STANDARD	CL-8-CS CL-10-CS CL-30-CS	4 4 2	6 6 2	16 16 8	
		HEAVY	CL-16-CS CL-18-CS CL-33-CS	4 4 2	6 6 2	16 16 8
			MINI	—	—	—
	Forged Adjustable Clamps	STANDARD	CL-8-FAC	4	4	16
		HEAVY	CL-10-FAC	4	4	16
	MINI	CL-14-FW	8	12	32	
	STANDARD	CL-2-FW	4	6	16	
	HEAVY	CL-3-FW	4	6	16	
	MINI	CL-5-JN	8	12	32	
	STANDARD	CL-8-JN	4	6	16	
	HEAVY	CL-10-JN	4	6	16	
	MINI	CL-4-KSA	3	3	12	
	STANDARD	CL-9-KSA	3	3	12	
	HEAVY	CL-11-KSA	3	3	12	
	MINI	CL-0-KSJ	2	4	8	
	STANDARD	CL-7-KSJ	2	2	8	
	HEAVY	CL-10-KSJ	2	2	8	
	MINI	CL-516212-SA	8	12	32	
	STANDARD	CL-12314-SA	4	6	24	
	HEAVY	CL-58438-SA	4	6	24	
	MINI	CL-00-SAC CL-5-SAC	— 3	4 4	12 12	
	STANDARD	CL-50-SAC CL-55-SAC	— 3	4 4	12 12	
		HEAVY	CL-90-SAC CL-95-SAC	— 3	4 4	12 12
			MINI	CL-6-32X.50-SHCS	8	16
	CL-1/4-20X.62-SHCS	16		24	64	
	CL-5/16-18X.62-SHCS	23		30	104	
CL-5/16-18X.75-SHCS	25	60		200		
CL-5/16-18X1.00-SHCS	33	58		192		
CL-5/16-18X1.12-SHCS	57	139		388		
CL-5/16-18X1.38-SHCS	34	72		216		
CL-5/16-18X1.50-SHCS	20	37		148		
CL-5/16-18X1.75-SHCS	—	4		4		
CL-5/16-18X2.00-SHCS	—	8		24		
CL-5/16-18X2.50-SHCS	4	16	40			
STANDARD	CL-6-32X.50-SHCS	4	8	32		
	CL-10-32X.50-SHCS	28	90	204		
	CL-1/4-20X.62-SHCS	16	24	64		
	CL-1/4-20X.75-SHCS	4	8	32		
	CL-5/16-18X.62-SHCS	—	16	64		
	CL-5/16-18X.75-SHCS	—	12	32		
	CL-1/2-13X1.00-SHCS	8	8	32		
	CL-1/2-13X1.25-SHCS	43	66	208		
	CL-1/2-13X1.50-SHCS	43	62	208		
	CL-1/2-13X1.75-SHCS	34	62	160		
	CL-1/2-13X2.00-SHCS	6	38	120		
	CL-1/2-13X2.25-SHCS	8	37	130		
	CL-1/2-13X2.75-SHCS	8	17	60		
CL-1/2-13X4.50-SHCS	4	8	16			
HEAVY	CL-6-32X.50-SHCS	4	8	32		
	CL-10-32X.50-SHCS	26	68	156		
	CL-1/4-20X.75-SHCS	4	8	32		
	CL-5/8-11X1.25-SHCS	26	35	108		
	CL-5/8-11X1.50-SHCS	40	59	188		
	CL-5/8-11X2.00-SHCS	63	96	288		
	CL-5/8-11X2.25-SHCS	6	16	48		
	CL-5/8-11X2.50-SHCS	10	27	92		
	CL-5/8-11X3.00-SHCS	6	26	86		
	CL-5/8-11X5.00-SHCS	4	8	16		

	MINI	CL-7A-SLP-1	—	4	16		
	STANDARD	—	—	—	—		
	HEAVY	—	—	—	—		
	MINI	CL-9-SNW	8	12	32		
	STANDARD	CL-3-SNW	4	6	16		
	HEAVY	CL-4-SNW	4	6	16		
	MINI	CL-6-SPG	16	24	64		
	STANDARD	CL-9-SPG	8	12	32		
	HEAVY	CL-11-SPG	8	12	32		
		MINI	CL-10A-SSB CL-10C-SSB	2 2	4 4	16 16	
	STANDARD	CL-10A-SSB CL-20A-SSB CL-30A-SSB CL-10C-SSB CL-20C-SSB CL-30C-SSB	— — — 2 2 2	2 2 2 2 2 2	8 8 8 8 8 8		
		HEAVY	CL-10A-SSB CL-20A-SSB CL-30A-SSB CL-10C-SSB CL-20C-SSB CL-30C-SSB	— — — 2 2 2	2 2 2 2 2 2	8 8 8 8 8 8	
			MINI	CL-5/16-18X3.00-STUD CL-5/16-18X3.50-STUD	8 8	12 12	32 32
			STANDARD	CL-1/2-13X4.00-STUD CL-1/2-13X5.50-STUD	4 4	6 6	16 16
				HEAVY	CL-5/8-11X4.50-STUD CL-5/8-11X5.50-STUD	4 4	6 6
			MINI	CL-51618-TSUN	2	4	8
	STANDARD		CL-1213-TSUN	2	2	8	
	HEAVY		CL-5811-TSUN	2	2	8	

## Modular Fixturing

A Versatile Solution To Your Workholding Needs



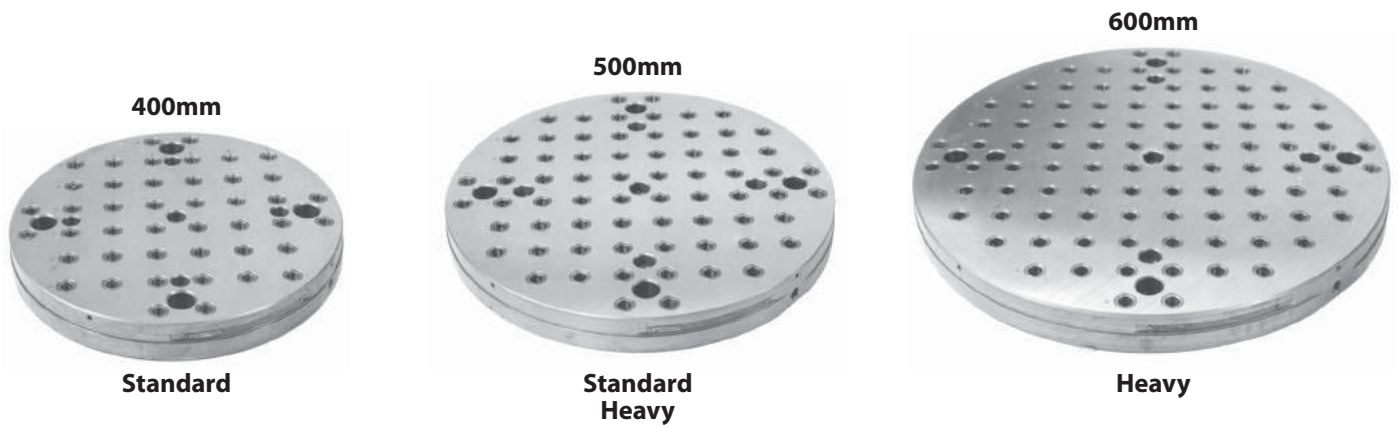
- Great for temporary fixturing: one-time jobs, short or prototype production runs, trial fixturing or while permanent fixtures are built or repaired.
- Order as components, or in handy starter sets.

See Pages 369-420

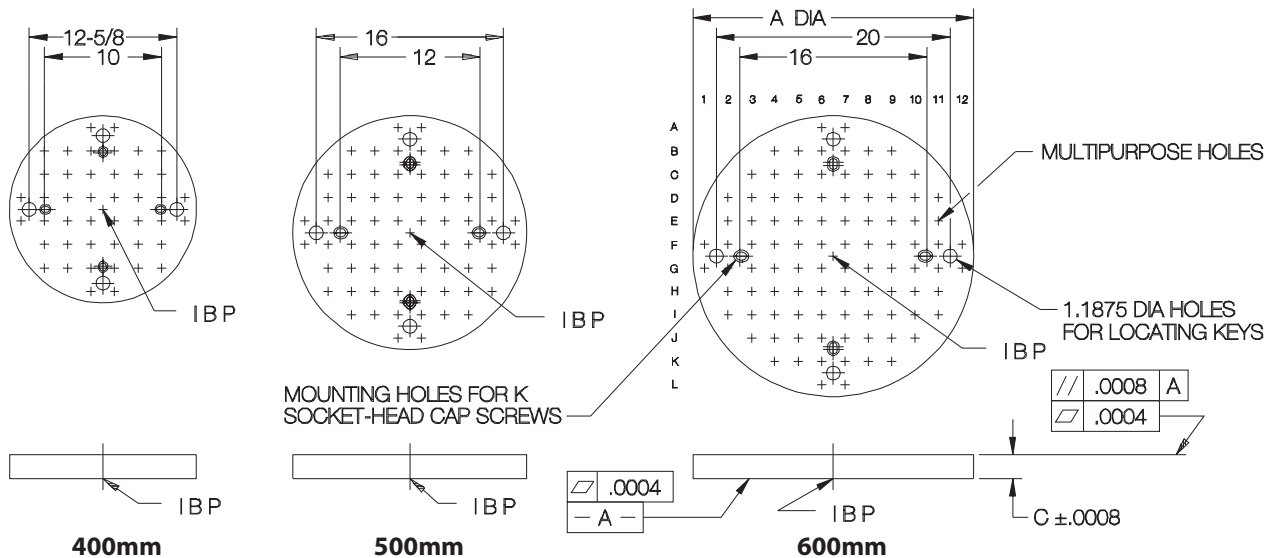
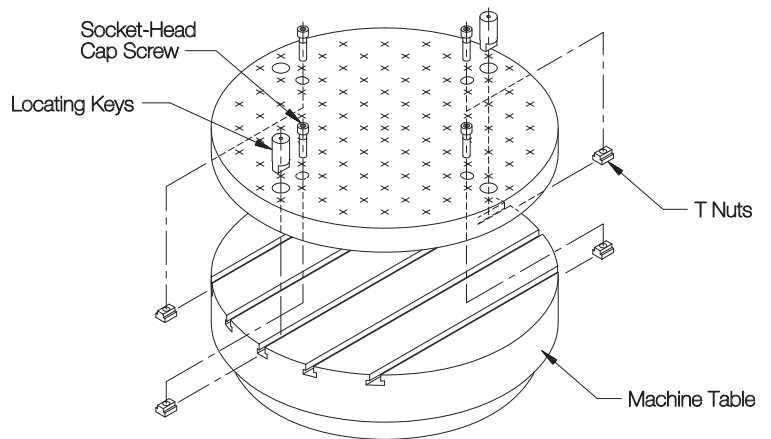


# ROUND TOOLING PLATES

GRAY CAST IRON, ASTM CLASS 40

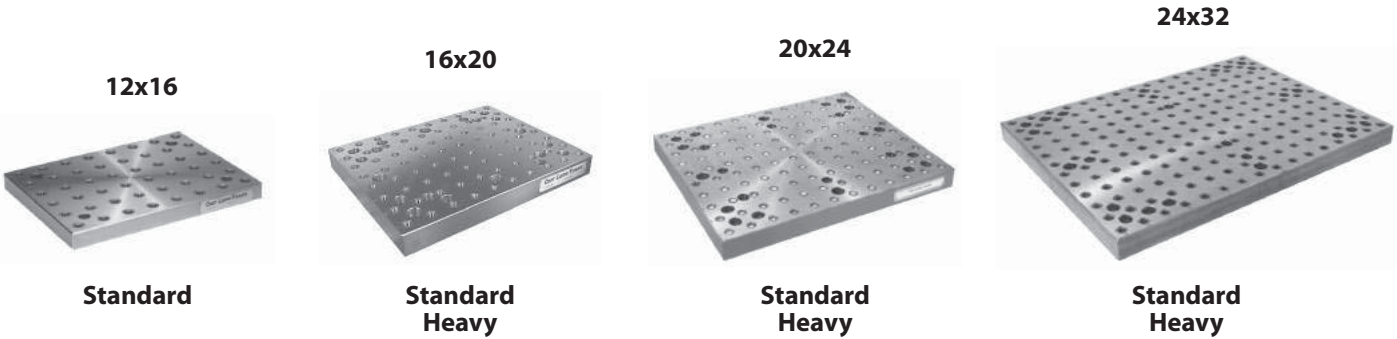


Round tooling plates are perfect for rotary or indexing machine tables. Finish ground to tight tolerances, with all multipurpose holes spaced within .0008 inches of true position. Locate on machine table using Locating Keys, like a Rectangular Tooling Plate.

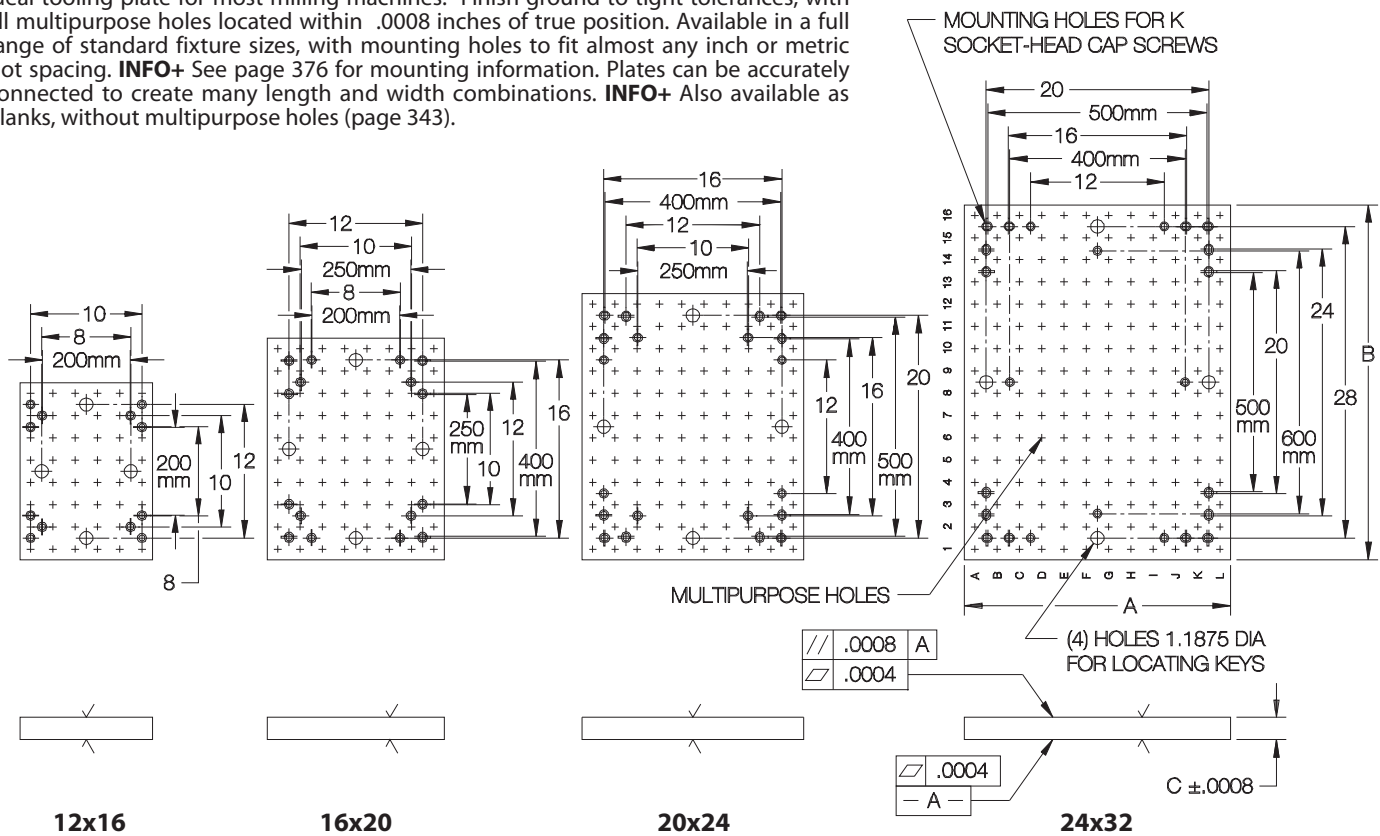


SIZE	PART NO.	MULTIPURPOSE HOLES				A DIA		C	K	APPROX WEIGHT (LBS)
		THREAD	ID	SPACING	PATTERN	NOMINAL	ACTUAL			
STANDARD	CL-MF40-0311	1/2-13	.5000	2.0000	8x8	400mm	15.75	2.0000	1/2-13 or M12	92
	CL-MF40-0312				10x10	500mm	19.69		5/8-11 or M16	145
HEAVY	CL-MF50-0312	5/8-11	.6250	2.0000	10x10	500mm	19.69	2.0000	5/8-11 or M16	141
	CL-MF50-0313				12x12	600mm	23.62			205

# RECTANGULAR TOOLING PLATES



Ideal tooling plate for most milling machines. Finish ground to tight tolerances, with all multipurpose holes located within .0008 inches of true position. Available in a full range of standard fixture sizes, with mounting holes to fit almost any inch or metric slot spacing. **INFO+** See page 376 for mounting information. Plates can be accurately connected to create many length and width combinations. **INFO+** Also available as blanks, without multipurpose holes (page 343).



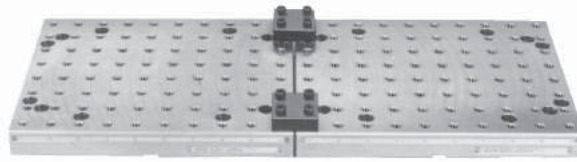
10

## REGULAR

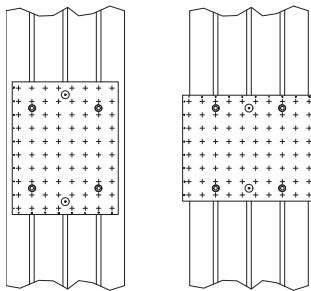
SIZE	PART NO.	MULTIPURPOSE HOLES				A		B		C	K	NO. OF MOUNTING SCREWS REQUIRED	APPROX WEIGHT (LBS)
		THREAD	ID	SPACING	PATTERN	NOMINAL	ACTUAL	NOMINAL	ACTUAL				
STANDARD	CL-MF40-0110	1/2-13	.5000	2.0000	6x8	12	11.875	16	15.875	2.0000	1/2-13 or M12	4	88
	CL-MF40-0111				8x10	16	15.875	20	19.875				145
	CL-MF40-0112				10x12	20	19.875	24	23.875				220
	CL-MF40-0113				12x16	24	23.875	32	31.875				360
HEAVY	CL-MF50-0111	5/8-11	.6250	2.0000	8x10	16	15.875	20	19.875	2.0000	5/8-11 or M16	4	140
	CL-MF50-0112				10x12	20	19.875	24	23.875				215
	CL-MF50-0113				12x16	24	23.875	32	31.875				345

# RECTANGULAR TOOLING PLATES

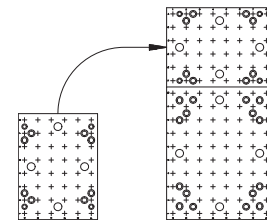
GRAY CAST IRON, ASTM CLASS 40



For large machine tables, connect two or more plates to form a single baseplate, using Locating Gages (INFO+ page 395) as shown above to maintain accuracy. Gages are removed once plates are fastened to the machine table.

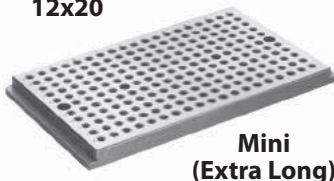


Two sets of Locating-Key holes allow mounting plates either lengthwise or widthwise on a machine table.



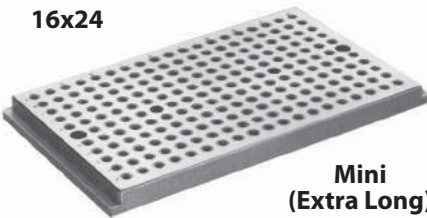
The length of each Rectangular Tooling Plate is the same as the width of the next-larger size, allowing many possible combinations by turning plates 90°.

12x20



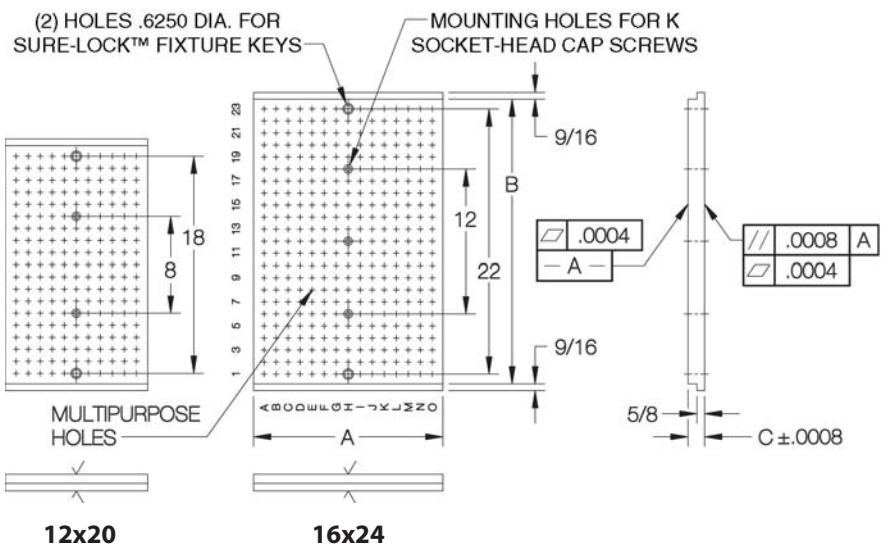
Mini  
(Extra Long)

16x24



Mini  
(Extra Long)

Extra-long Rectangular Tooling Plate that mounts lengthwise on a machine table (mini size only). Finish ground to tight tolerances, with all multipurpose holes spaced within .0004 inches of true position. INFO+: See page 376 for mounting information.

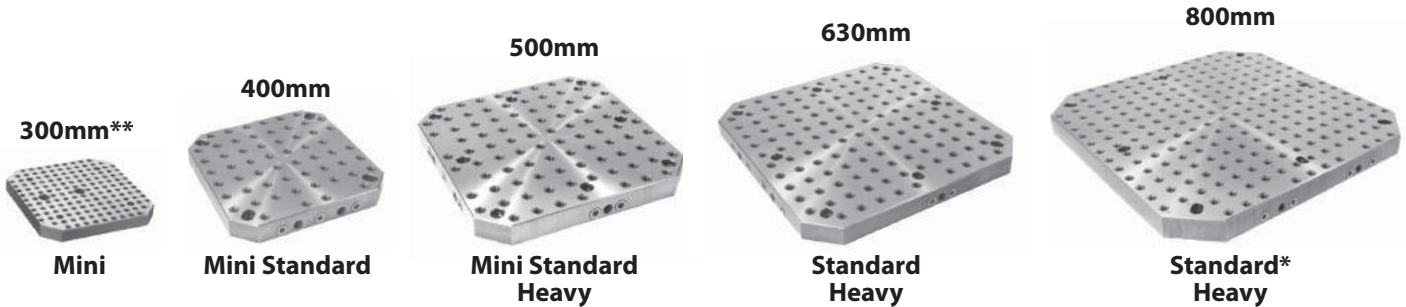


## EXTRA LONG

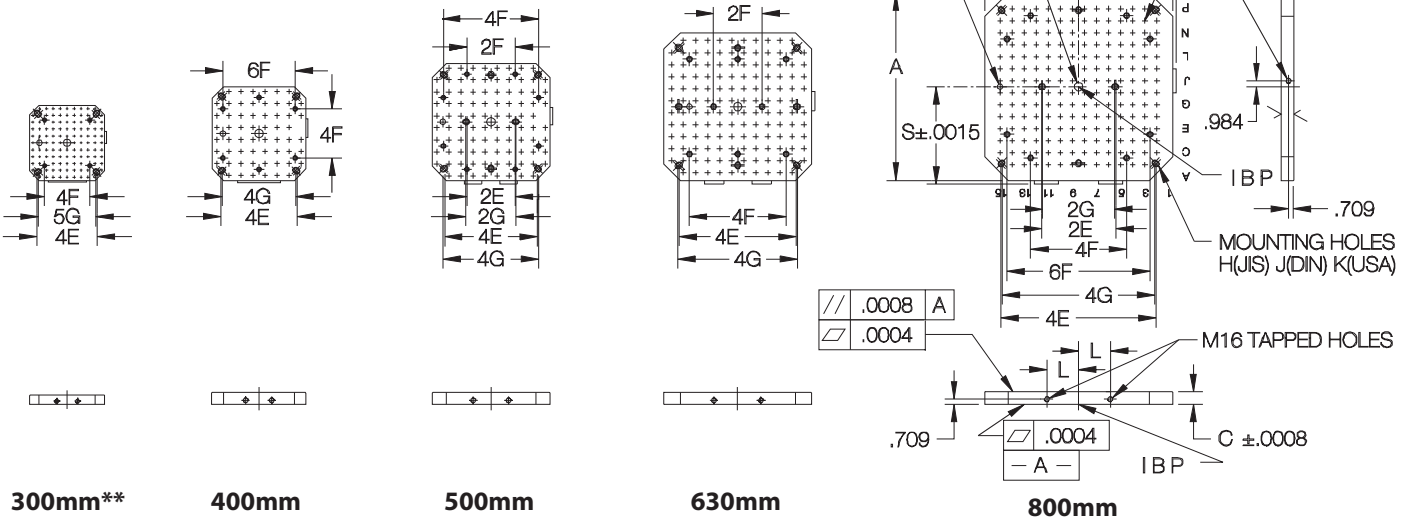
SIZE	PART NO.	MULTIPURPOSE HOLES				A		B		C	K	NO. OF MOUNTING SCREWS REQUIRED	APPROX WEIGHT (LBS)
		THREAD	ID	SPACING	PATTERN	NOMINAL	ACTUAL	NOMINAL	ACTUAL				
MINI	CL-MF25-0151	5/16-18	.5000	1.0000	11x19	12	11.875	20	19.750	1.3750	3/8-16 or M10	2	79
	CL-MF25-0152				15x23	16	15.750	24	23.625			1.5000	3

# SQUARE PALLET TOOLING PLATES

GRAY CAST IRON, ASTM CLASS 40



Ideal tooling plate for machining-center pallets. Finish ground to tight tolerances. Available in a full range of standard pallet sizes, with mounting holes to fit almost any inch or metric slot spacing. Dual mounting capability allows both JIS mounting (locating from two reference edges) and DIN mounting (locating from center and radial holes) with excellent accuracy. **INFO+:** See page 376 for mounting information. **INFO+:** Also available as blanks, without multipurpose holes (page 344).



10

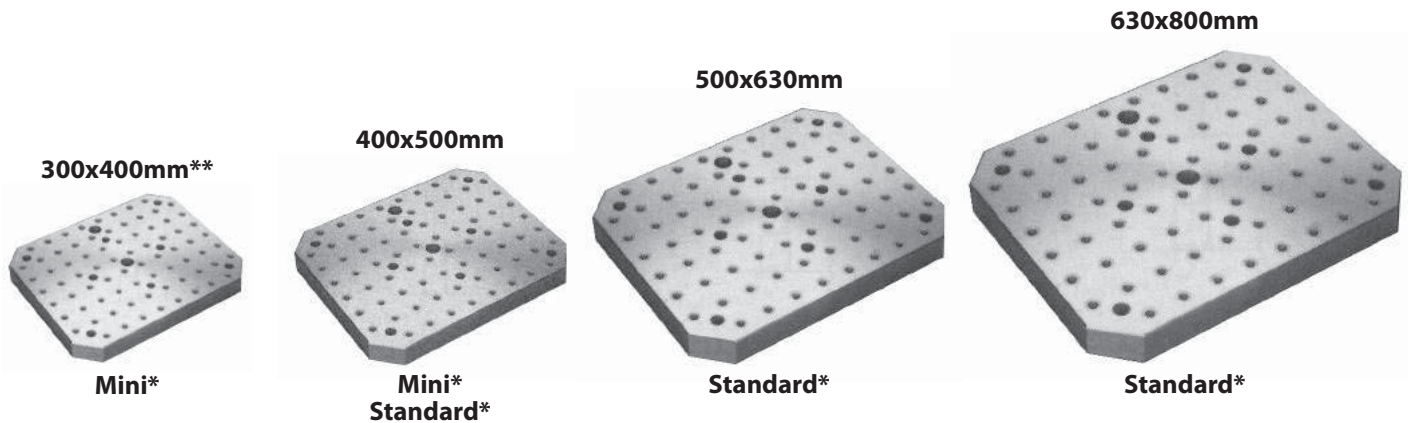
SIZE	PART NO.	MULTIPURPOSE HOLES				A		C	E (JIS)	F (DIN)	G (USA)	H (JIS)	J (DIN)	K (USA)	L	N DIA	P DIA	S	APPROX. WEIGHT (LBS)				
		THREAD	ID	SPACING	PATTERN	NOMINAL	ACTUAL																
MINI	CL-MF25-0800	5/16-18	.5000	1.0000	11x11	300mm	11.81	1.3750	63mm	50mm	50mm	M16	M10	5/8-11 or M16	25mm	20mm	6.2992	51					
	15x15				400mm	15.20	1.5000											80mm	50mm	3.000	7.8740	79	
	19x19				500mm	19.13												100mm	100mm	4.000	9.8425	130	
STANDARD	CL-MF40-0801	1/2-13	.5000	2.0000	8x8	400mm	15.20	2.0000	80mm	50mm	3.000	M16	M12	5/8-11 or M16	30mm	20mm	7.8740	115					
	CL-MF40-0802				10x10	500mm	19.13											100mm	100mm	4.000	9.8425	180	
	CL-MF40-0803				12x12	630mm	24.25											2.0000	125mm	100mm	5.000	12.4016	290
	CL-MF40-0804*				14x14	800mm	30.94											2.3750	160mm	100mm	6.000	15.7480	560
HEAVY	CL-MF50-0822	5/8-11	.6250	2.0000	10x10	500mm	19.13	2.0000	100mm	4.000	5.000	M16	M12	5/8-11 or M16	30mm	20mm	9.8425	175					
	CL-MF50-0823				12x12	630mm	24.25											2.0000	125mm	100mm	5.000	12.4016	280
	CL-MF50-0824				14x14	800mm	30.94											2.3750	160mm	100mm	6.000	15.7480	540

\* Limited-production item — please contact factory for delivery leadtime.

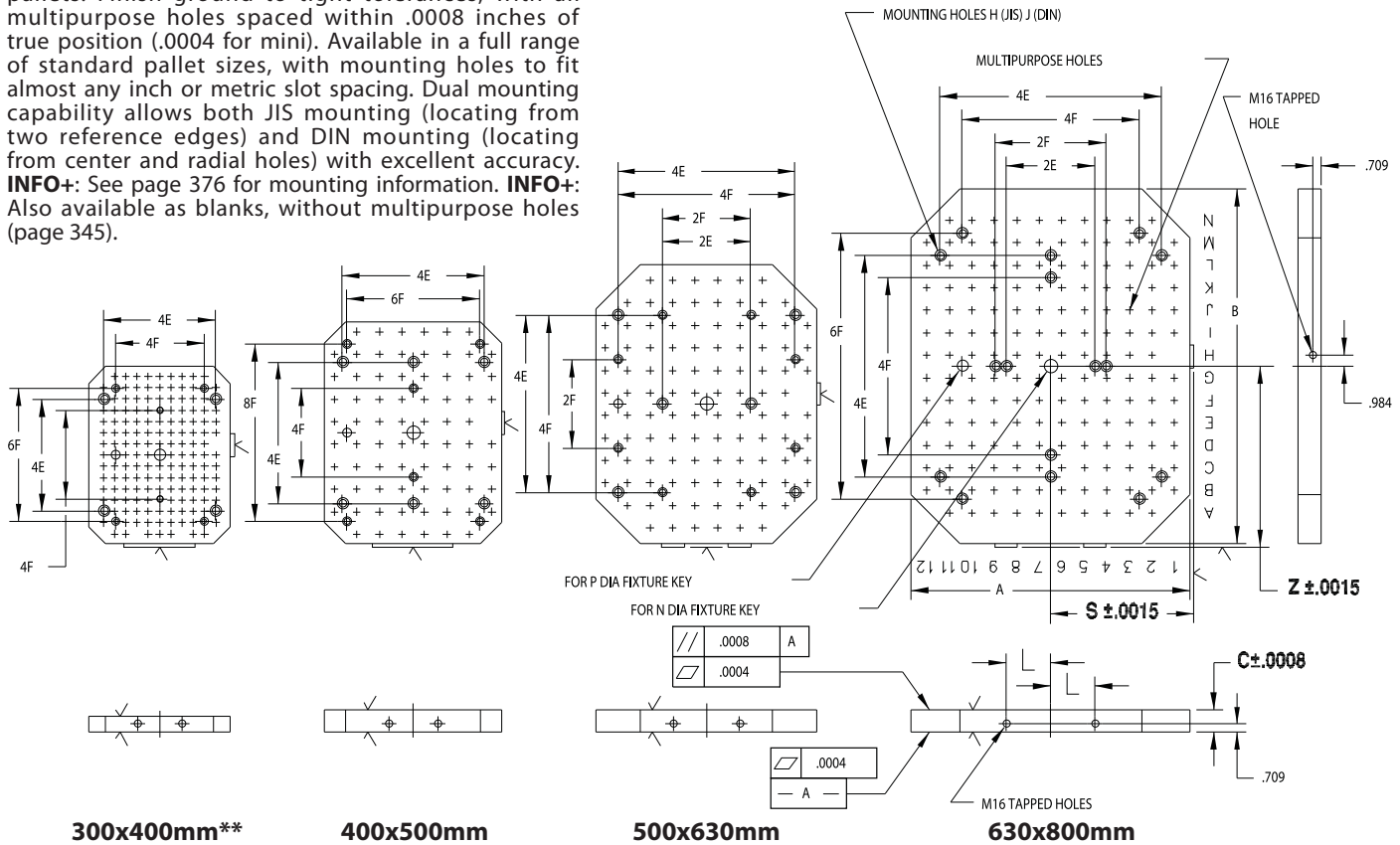
\*\* 300mm size also fits 320mm pallets with the 10mm-thick edge pads furnished.

# RECTANGULAR PALLET TOOLING PLATES

GRAY CAST IRON, ASTM CLASS 40



Tooling plate for rectangular machining-center pallets. Finish ground to tight tolerances, with all multipurpose holes spaced within .0008 inches of true position (.0004 for mini). Available in a full range of standard pallet sizes, with mounting holes to fit almost any inch or metric slot spacing. Dual mounting capability allows both JIS mounting (locating from two reference edges) and DIN mounting (locating from center and radial holes) with excellent accuracy. **INFO+**: See page 376 for mounting information. **INFO+**: Also available as blanks, without multipurpose holes (page 345).

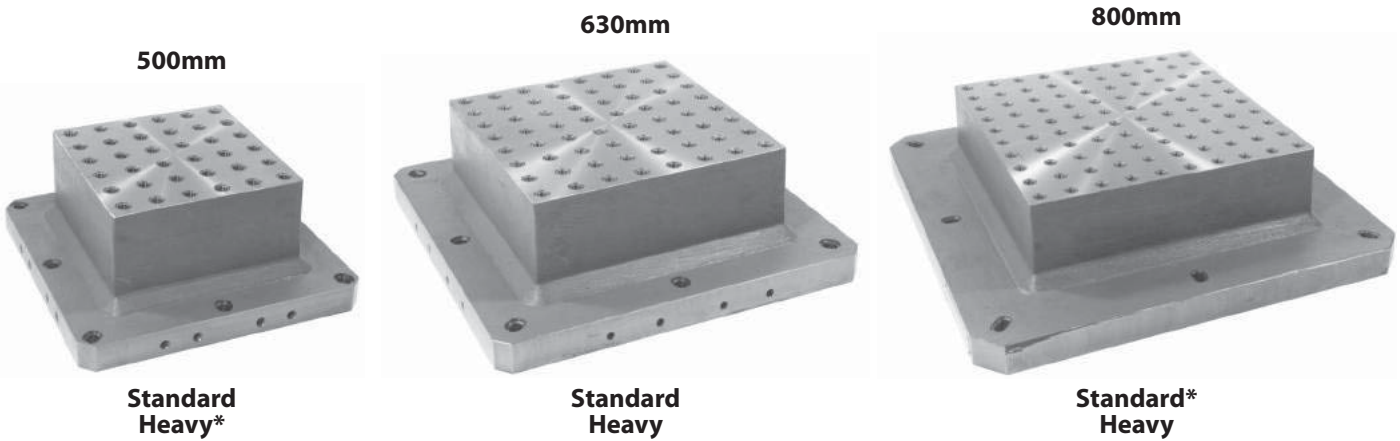


SIZE	PART NO.	MULTIPURPOSE HOLES			A		B		C	E (JIS)	F (DIN)	H (JIS)	J (DIN)	L	N DIA	P DIA	S	Z	APPROX WEIGHT (LBS)		
		THREAD	ID	SPACING	NOMINAL	ACTUAL	NOMINAL	ACTUAL													
MINI	CL-MF25-0850*	5/16-18	.5000	1.0000	11x15	300mm	11.81	400mm	15.20	1.3750	63mm	M16	M10	1.969	25mm	20mm	6.2992	7.8740	46		
	CL-MF25-0851*				15x19	400mm	15.20	500mm	19.13		1.5000		80mm				50mm	M12	2.165	7.8740	9.8425
STANDARD	CL-MF40-0851*	1/2-13	.5000	2.0000	8x10	400mm	15.20	500mm	19.13	2.0000	80mm	M16	M12	2.165	30mm	20mm	7.8740	9.8425	150		
	CL-MF40-0852*				10x12	500mm	19.13	630mm	24.25		100mm		100mm				M16	2.953	9.8425	12.4016	235
	CL-MF40-0853*				12x14	630mm	24.25	800mm	30.94		125mm		100mm				M16	3.937	12.4016	15.7480	385

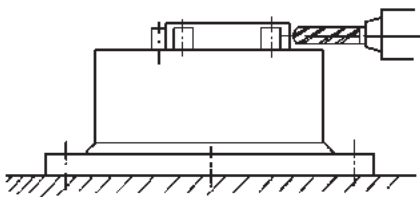
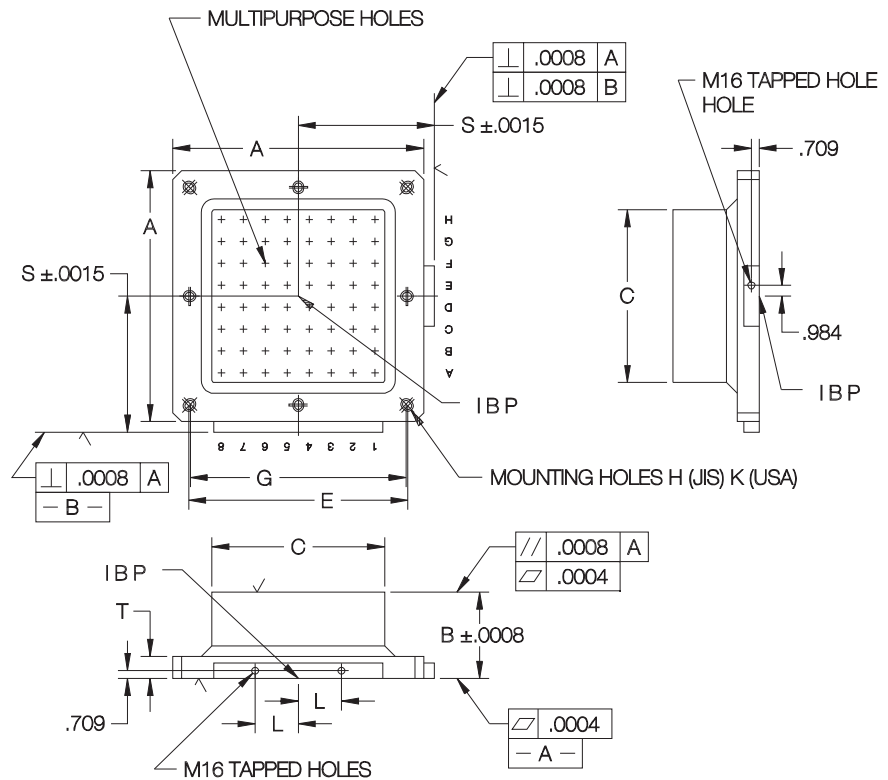
\*Limited-production item — please contact factory for delivery leadtime.  
 \*\*300mm size also fits 320mm pallets with the 10mm-thick edge pads furnished.

# PLATFORM TOOLING PLATES

GRAY CAST IRON, ASTM CLASS 45



Raised tooling plate for machining-center pallets. Allows tool access to low workpieces below minimum spindle height on horizontal machining centers. Top and bottom surfaces are finish ground to tight tolerances. All multipurpose holes are spaced within .0008 inches of true position. Available in the three largest pallet sizes, with mounting holes to fit almost any inch or metric slot spacing. Incorporates JIS mounting (locating from two reference edges). **INFO+**: See page 376 for mounting information.



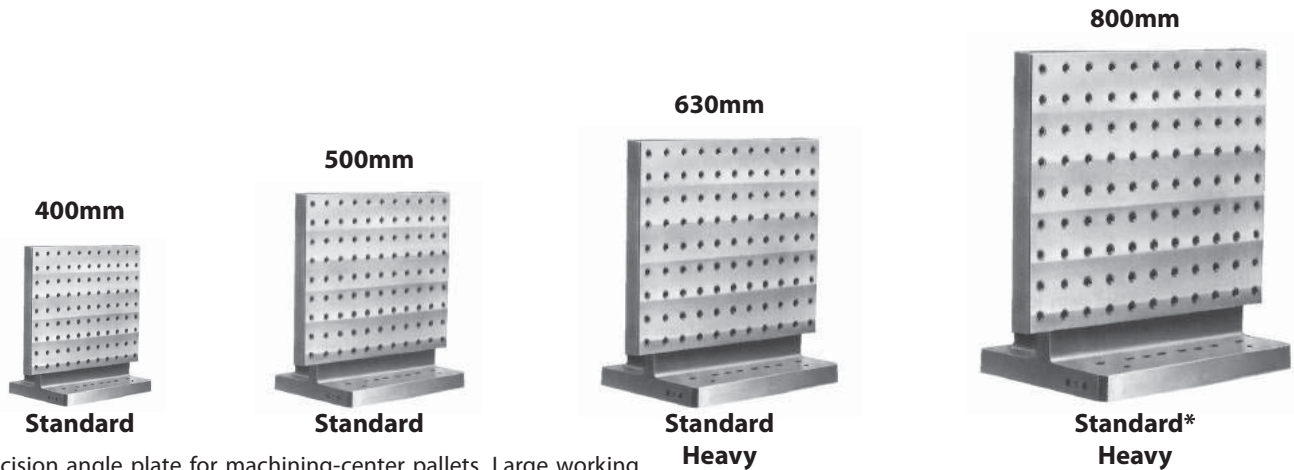
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SIZE	PART NO.	MULTIPURPOSE HOLES			A		B	C	E (JIS)	G (USA)	H (JIS)	K (USA)	L	S	T	APPROX WEIGHT (LBS)	
		THREAD	ID	SPACING	PATTERN	NOMINAL											ACTUAL
STANDARD	CL-MF40-0832	1/2-13	.5000	2.0000	6x6	500mm	17.75	7.8750	11.81	400mm	16	M16	5/8-11 or M16	2.953	9.8425	1.75	265
	CL-MF40-0833				8x8	630mm	22.88		15.75	500mm	20			3.937	12.4016	2.00	365
	CL-MF40-0834*				10x10	800mm	29.12		19.69	640mm	24			5.315	15.7480	2.19	600
HEAVY	CL-MF50-0832*	5/8-11	.6250	2.0000	6x6	500mm	17.75	7.8750	11.81	400mm	16	M16	5/8-11 or M16	2.953	9.8425	1.75	260
	CL-MF50-0833				8x8	630mm	22.88		15.75	500mm	20			3.937	12.4016	2.00	360
	CL-MF50-0834				10x10	800mm	29.12		19.69	640mm	24			5.315	15.7480	2.19	590

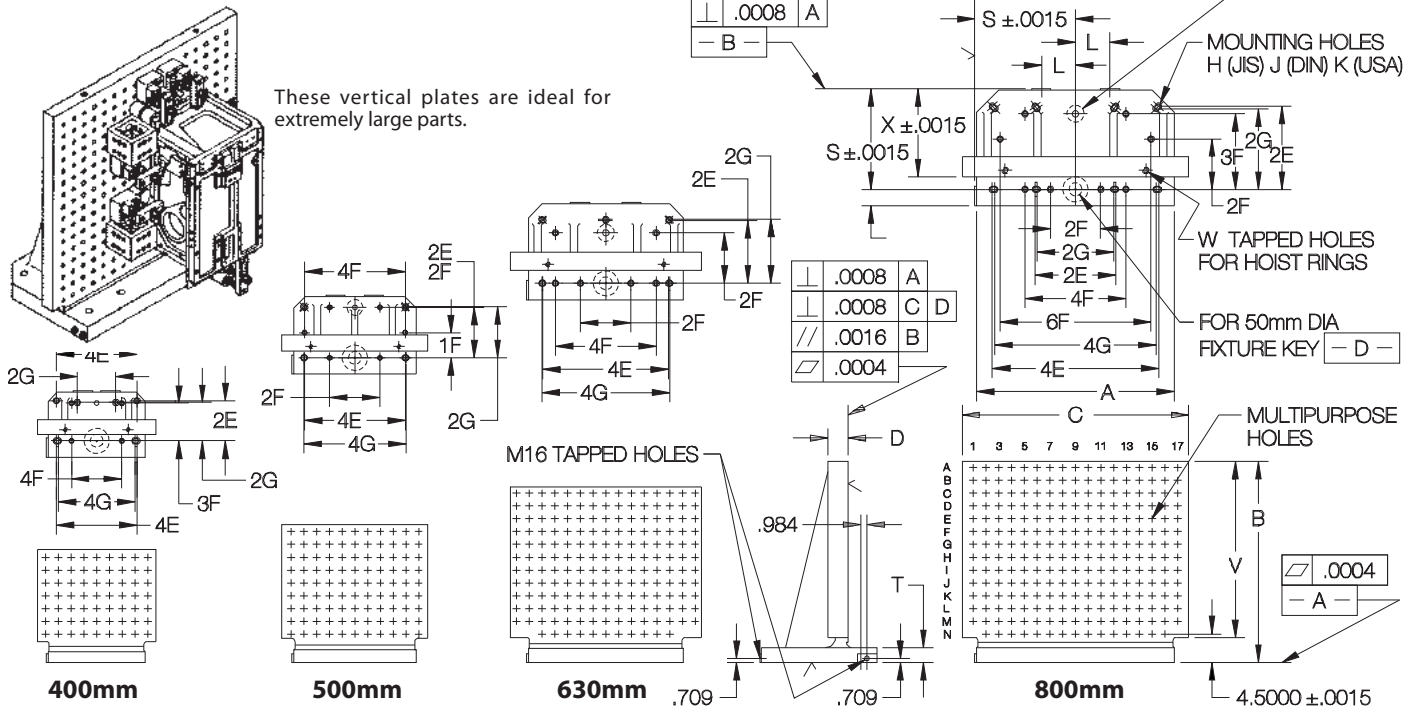
\* Limited-production item — please contact factory for delivery leadtime.

# ANGLE TOOLING PLATES

GRAY CAST IRON, ASTM CLASS 45



Precision angle plate for machining-center pallets. Large working face is accurately finish ground to tight tolerances, and qualified to the base. All multipurpose holes are spaced within .0008 inches of true position. Gussetted back provides excellent strength and rigidity while keeping weight to a minimum. One-piece cast construction provides superior accuracy, dimensional stability, and vibration dampening. Available in a full range of standard pallet sizes, with mounting holes to fit almost any inch or metric slot spacing. Dual mounting capability allows both JIS mounting (locating from two reference edges) and DIN mounting (locating from center and radial holes) with excellent accuracy. **INFO+**: See page 376 for mounting information.



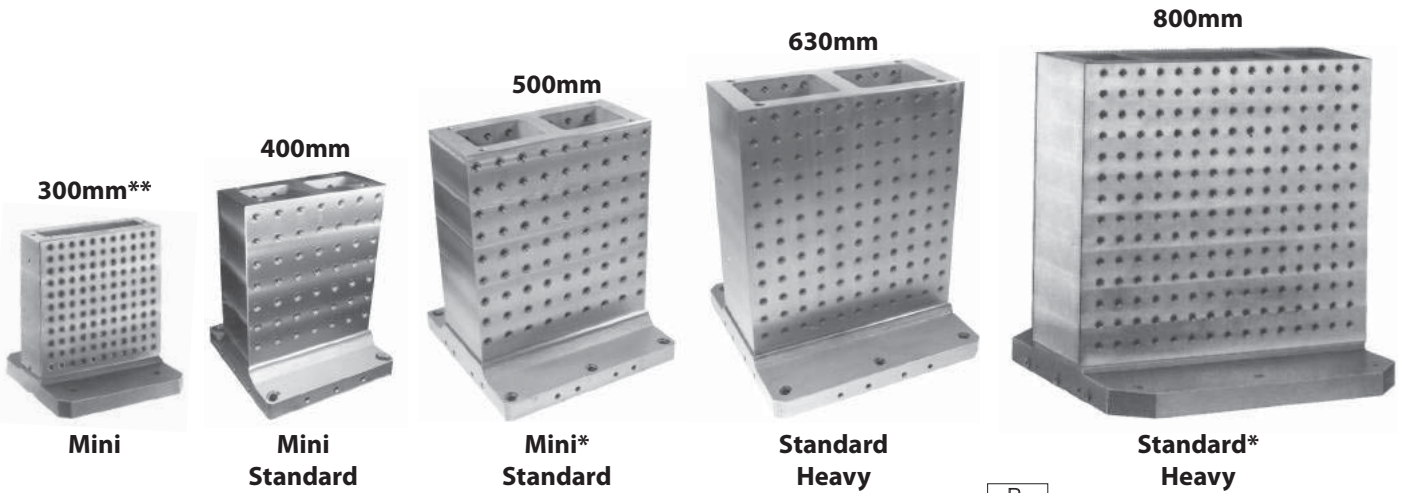
These vertical plates are ideal for extremely large parts.

SIZE	PART NO.	MULTIPURPOSE HOLES				A		B	C	D	E (JIS)	F (DIN)	G (USA)	H (JIS)	J (DIN)	K (USA)	L	P DIA	S	T	V	W	X	APPROX WEIGHT (LBS)
		THREAD	ID	SPACING	PATTERN	NOMINAL	ACTUAL																	
STANDARD	CL-MF40-0451	1/2-13	.5000	2.0000	9x7	400mm	15.20	17.72	18.50	2.36	80mm	50mm	3.000	M16	M12	5/8-11 or M16	2.165	20mm	7.8740	1.77	14.39	5/8-11	6.8898	210
	CL-MF40-0452				11x9	500mm	19.13	21.65	22.83	2.56	100mm	100mm	4.000				2.953	9.8425	1.97	17.88	8.8583	345		
	CL-MF40-0453				15x12	630mm	24.25	27.56	29.92	2.95	125mm	100mm	5.000				3.937	12.4016	2.17	23.60	3/4-10	10.4331	665	
	CL-MF40-0454*				17x14	800mm	30.94	31.50	35.43	3.15	160mm		6.000				5.315	15.7480	2.36	27.55	1-8	13.7795	1000	
HEAVY	CL-MF50-0453	5/8-11	.6250	2.0000	15x12	630mm	24.25	27.56	29.92	2.95	125mm	100mm	5.000	M16	M16	5/8-11 or M16	3.937	25mm	12.4016	2.17	23.60	3/4-10	10.4331	655
	CL-MF50-0454				17x14	800mm	30.94	31.50	35.43	3.15	160mm		6.000				5.315	15.7480	2.36	27.55	1-8	13.7795	990	

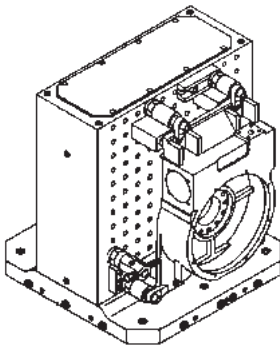
\* Limited-production item — please contact factory for delivery leadtime.

# TWO-SIDED TOOLING BLOCKS

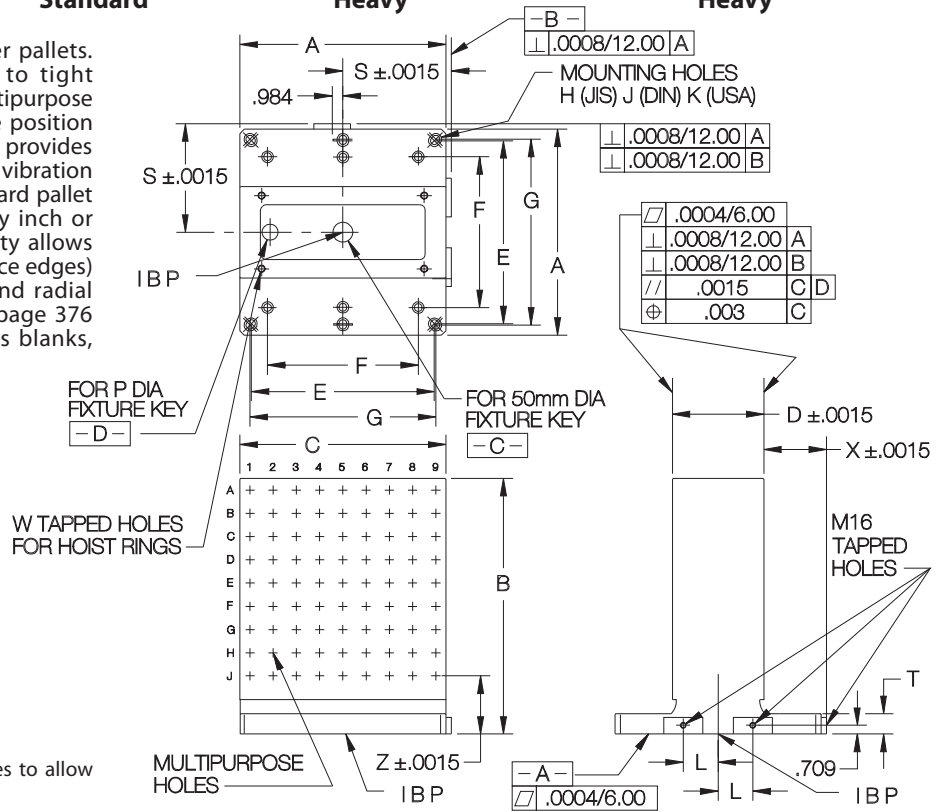
GRAY CAST IRON, ASTM CLASS 45



Precision tooling block for machining-center pallets. Both faces are accurately finish ground to tight tolerances, and qualified to the base. All multipurpose holes are spaced within .0008 inches of true position (.0004 for mini). One-piece cast construction provides superior accuracy, dimensional stability, and vibration dampening. Available in a full range of standard pallet sizes, with mounting holes to fit almost any inch or metric slot spacing. Dual mounting capability allows both JIS mounting (locating from two reference edges) and DIN mounting (locating from center and radial holes) with excellent accuracy. **INFO+**: See page 376 for mounting information. Also available as blanks, without multipurpose holes.



These tooling blocks have two identical wide faces to allow fixturing large parts.



SIZE	PART NO.	MULTIPURPOSE HOLES			A		B	C	D	E (JIS)	F (DIN)	G (USA)	H (JIS)	J (DIN)	K (USA)	L	P DIA	S	T	W	X	Z	APPROX WEIGHT (LBS)		
		THREAD	ID	SPACING	PATTERN	NOMINAL																		ACTUAL	
MINI	CL-MF25-0600	5/16-18	.5000	1.0000	11x11	300mm	11.81	13.19	11.81	3.9370	252mm	200mm	250mm	M10	5/8-11 or M16	1.969	20mm	6.2992	1.38	3/8-16	4.3307	2.7500	120		
	15x14				400mm	15.20	17.72	15.75	5.9055	320mm	200x300mm	12	M16					M12	2.165	7.8740	4.9213	4.0000	290		
	19x18				500mm	19.13	21.65	19.69	7.8740	400mm	200x400mm	16	M16					M12	2.953	9.8425	5.9055	4.0000	470		
STANDARD	CL-MF40-0611	1/2-13	.5000	2.0000	7x7	400mm	15.20	17.72	15.75	5.8750	320mm	200x300mm	12	M16	5/8-11 or M16	2.165	20mm	7.8740	1.97	5/8-11	4.9365	5.0000	340		
	9x9				500mm	19.13	21.65	19.69	7.8750	400mm	200x400mm	16	M16					M12	2.953	9.8425	5.9050	5.0000	560		
	11x11				630mm	24.25	27.56	24.80	9.8750	500mm	400mm	20	M16					M16	3.937	12.4016	2.17	3/4-10	7.4641	5.0000	1040
	15x14				800mm	30.94	31.50	31.50	11.8110	640mm	400x600mm	24	M16					M16	5.315	15.7480	2.36	1-8	9.8425	4.5000	1500
	11x11				630mm	24.25	27.56	24.80	9.8425	500mm	400mm	20	M16					M16	3.937	12.4016	2.17	3/4-10	7.4803	5.0000	1020
HEAVY	CL-MF50-0603	5/8-11	.6250	2.0000	11x11	630mm	24.25	27.56	24.80	9.8425	500mm	400mm	20	M16	5/8-11 or M16	3.937	25mm	12.4016	2.17	3/4-10	7.4803	5.0000	1020		
	15x14				800mm	30.94	31.50	31.50	11.8110	640mm	400x600mm	24	M16					M16	5.315	15.7480	2.36	1-8	9.8425	4.5000	1480

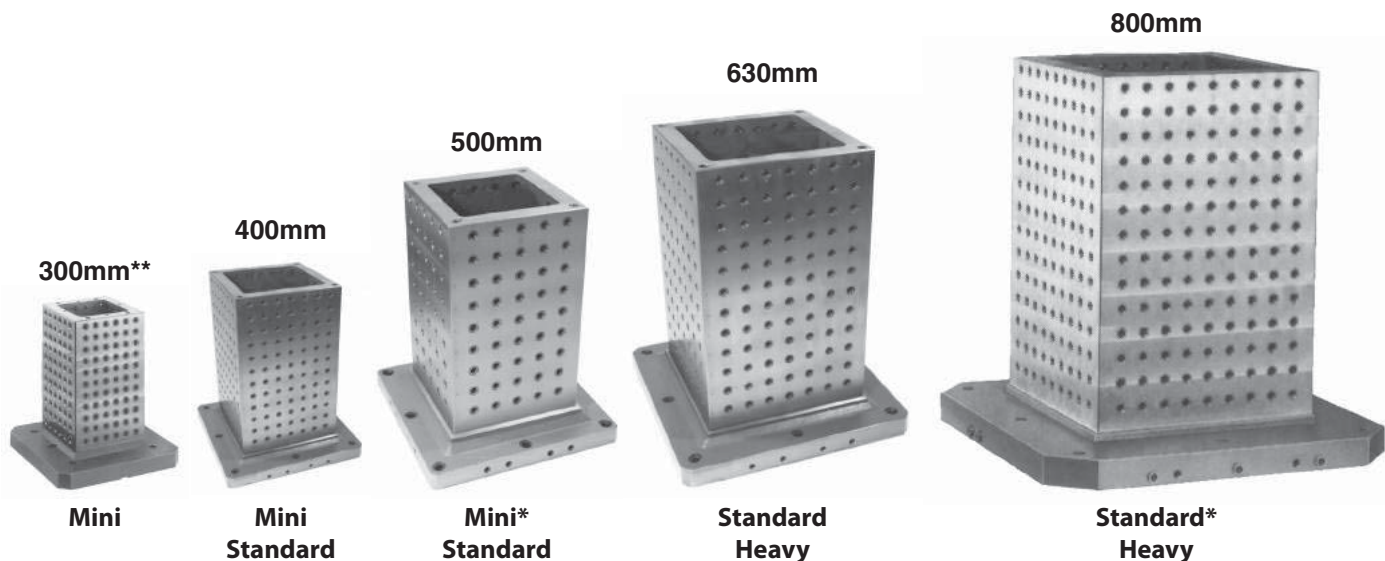
\* Limited-production item — please contact factory for delivery leadtime.

\*\* 300mm size also fits 320mm pallets with the 10mm-thick edge pads furnished.

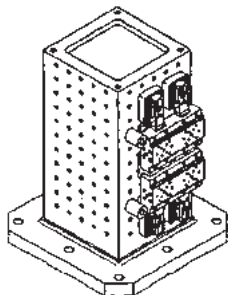


# FOUR-SIDED TOOLING BLOCKS

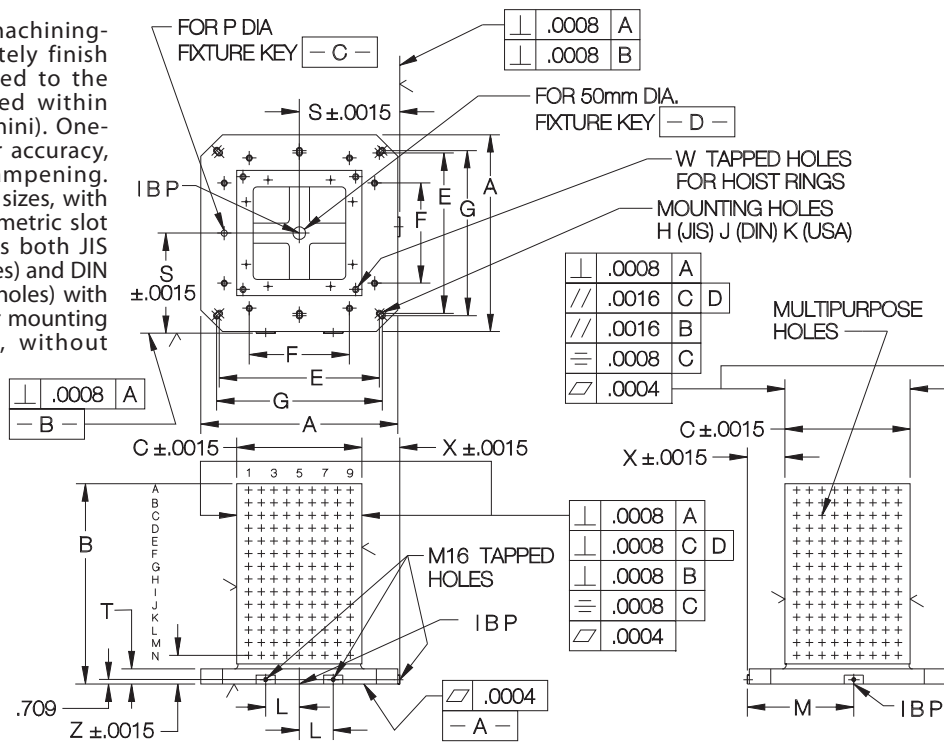
FOUR-SIDED TOOLING BLOCKS



Precision four-sided tooling block for machining-center pallets. All four faces are accurately finish ground to tight tolerances, and qualified to the base. All multipurpose holes are spaced within .0008 inches of true position (.0004 for mini). One-piece cast construction provides superior accuracy, dimensional stability, and vibration dampening. Available in a full range of standard pallet sizes, with mounting holes to fit almost any inch or metric slot spacing. Dual mounting capability allows both JIS mounting (locating from two reference edges) and DIN mounting (locating from center and radial holes) with excellent accuracy. **INFO+**: See page 376 for mounting information. Also available as blanks, without multipurpose holes.



With four identical faces, these tooling blocks are ideal for loading a large number of medium-size parts on a pallet.



SIZE	PART NO.	MULTIPURPOSE HOLES				A		B	C	E (JIS)	F (DIN)	G (USA)	H (JIS)	J (DIN)	K (USA)	L	P DIA	S	T	W	X	Z	APPROX WEIGHT (LBS)
		THREAD	ID	SPACING	PATTERN	NOMINAL	ACTUAL																
MINI	CL-MF25-0700	5/16-18	.5000	1.0000	5x11	300mm	11.81	13.19	6.8898	252mm	200mm	250mm	M10	5/8-11 or M16	1.969	20mm	6.2992	1.38	3/8-16	2.8543	2.7500	120	
	CL-MF25-0711				8x14	400mm	15.20	17.72	9.8425	320mm	200&300mm	12			2.165		7.8740	2.9528	4.0000	265			
	CL-MF25-0702*				10x18	500mm	19.13	21.65	11.8110	400mm	200&400mm	16			2.953		9.8425	3.9370	515				
STANDARD	CL-MF40-0711	1/2-13	.5000	2.0000	4x7	400mm	15.20	17.72	9.8425	320mm	200&300mm	12	M16	5/8-11 or M16	2.165	20mm	7.8740	1.97	5/8-11	2.9528	5.0000	325	
	CL-MF40-0712				5x9	500mm	19.13	21.65	11.8125	400mm	200&400mm	16			2.953		9.8425	3.9363	515				
	CL-MF40-0713				7x11	630mm	24.25	27.56	15.7500	500mm	400&600mm	20			3.937		12.4016	4.5266	875				
	CL-MF40-0714*				9x14	800mm	30.94	31.50	19.6850	640mm	400&600mm	24			5.315		15.7480	2.36	1-8	5.9055	4.5000	1380	
HEAVY	CL-MF50-0703	5/8-11	.6250	2.0000	7x11	630mm	24.25	27.56	15.7480	500mm	400&600mm	20	M16	5/8-11 or M16	3.937	25mm	12.4016	2.17	3/4-10	4.5276	5.0000	870	
	CL-MF50-0704				9x14	800mm	30.94	31.50	19.6850	640mm	400&600mm	24			5.315		15.7480	2.36	1-8	5.9055	4.5000	1350	

\* Limited-production item — please contact factory for delivery leadtime.

\*\* 300mm size also fits 320mm pallets with the 10mm-thick edge pads furnished.

# RISER PLATES

GRAY CAST IRON, ASTM CLASS 45



Mini

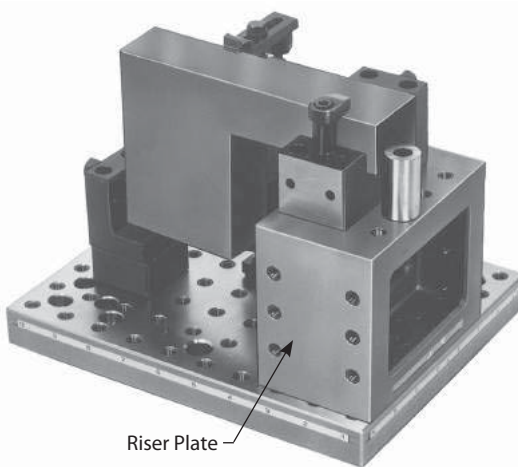
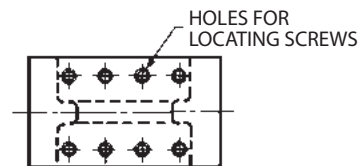
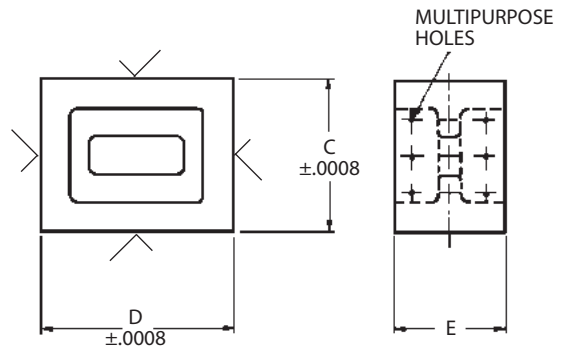
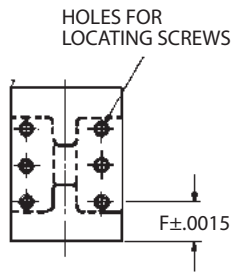
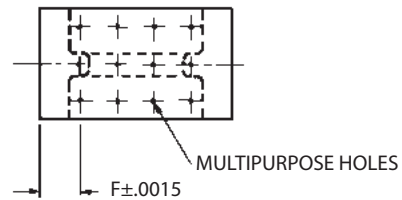


Standard Heavy



Standard Heavy

Use for raising clamps and locators up to reach a workpiece, parallel to the tooling plate. Riser Plates can be mounted either the short way or the tall way. Two sides have bushed locating-screw holes for accurately mounting the riser plate to the tooling plate. The other two sides have multipurpose holes for mounting clamps and locators.

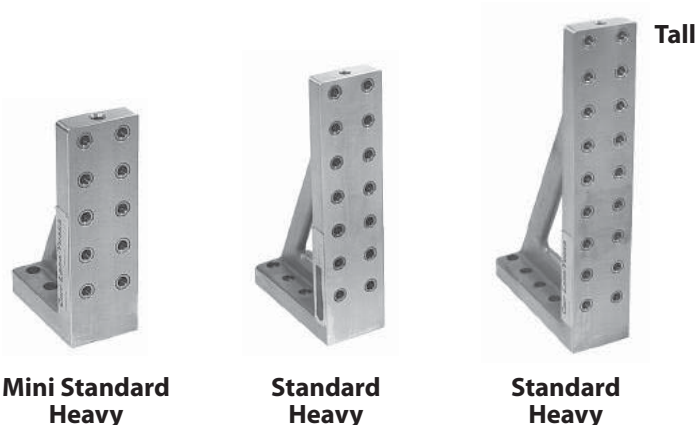


10

SIZE	PART NO.	MULTIPURPOSE HOLES				C	D	E	F	APPROX WEIGHT (LBS)	LOCATING SCREWS (2 REQD)	SOCKET-HEAD CAP SCREWS (2 REQD)
		THREAD	ID	SPACING	PATTERN							
MINI	CL-MF25-0900	5/16-18	.5000	1.0000	5x5 and 5x3	5.1250	6.1250	5-1/2	1.5625	26	CL-MF25-4300 + CL-5/16-18x1.75-SHCS	CL-5/16-18x1.75-SHCS
STANDARD	CL-MF40-0911	1/2-13	.5000	2.0000	3x3 and 3x2	6.2500	8.2500	5-7/8	2.1250	57	CL-MF40-4302	CL-1/2-13x2.25-SHCS
	CL-MF40-0912				3x4 and 3x3	8.2500	10.2500			81		
HEAVY	CL-MF50-0901	5/8-11	.6250	2.0000	3x3 and 3x2	6.2500	8.2500	5-7/8	2.1250	55	CL-MF50-4302	CL-5/8-11x3.00-SHCS
	CL-MF50-0902				3x4 and 3x3	8.2500	10.2500			79		

# ANGLE PLATES

GRAY CAST IRON, ASTM CLASS 45



Mini Standard Heavy

Standard Heavy

Standard Heavy

Tall

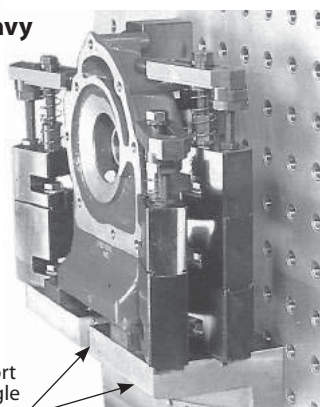


Standard Heavy

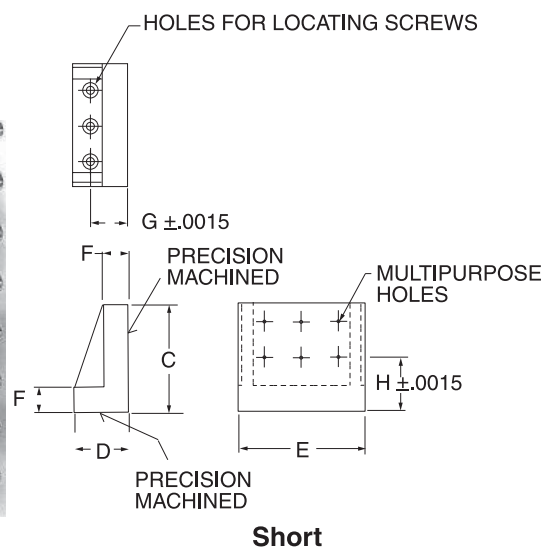
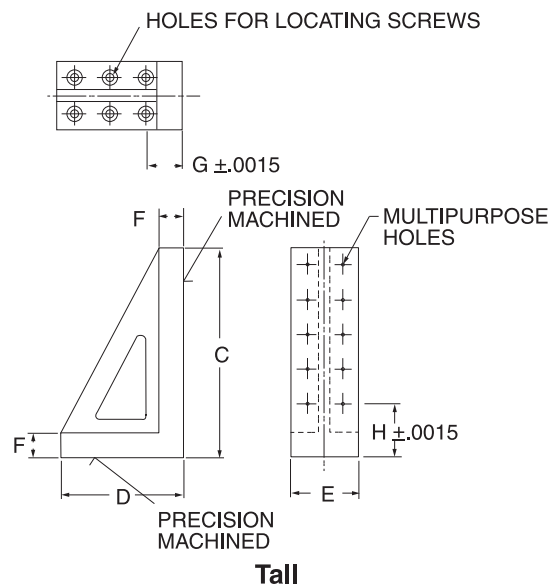
Standard Heavy

Short

Versatile way to hold workpieces, clamps or locators perpendicular to the tooling surface. Bottom has bushed locating-screw holes for accurately mounting the angle plate to the tooling plate. Vertical side has multipurpose holes for mounting clamps, locators or vertical tooling plates.



Short Angle Plates



## TALL

SIZE	PART NO.	MULTIPURPOSE HOLES				C	D	E	F	G	H	APPROX WEIGHT (LBS)	LOCATING SCREWS (2 REQD)	SOCKET-HEAD CAP SCREWS (1 TO 2 REQD)
		THREAD	ID	SPACING	PATTERN									
MINI	CL-MF25-0401	5/16-18	.5000	1.000	3x10	11-13/16	5-7/8	3-1/8	1	1.5000	1.5000	22	CL-MF25-4300 + CL-5/16-18x1.75-SHCS	CL-5/16-18x1.75-SHCS
STANDARD	CL-MF40-0411	1/2-13	.5000	2.0000	2x5	11-13/16	6-7/8	3-7/8	1-3/8	2.0000	3.0000	26	CL-MF40-4302	CL-1/2-13x2.25-SHCS
	CL-MF40-0412				2x7	15-3/4	8-13/16					37		
	CL-MF40-0413				2x9	19-11/16	10-13/16					51		
HEAVY	CL-MF50-0401	5/8-11	.6250	2.0000	2x5	11-13/16	7-1/16	3-7/8	1-9/16	2.1875	3.0000	29	CL-MF50-4302	CL-5/8-11x3.00-SHCS
	CL-MF50-0402				2x7	15-3/4	9					41		
	CL-MF50-0403				2x9	19-11/16	11					55		

## SHORT

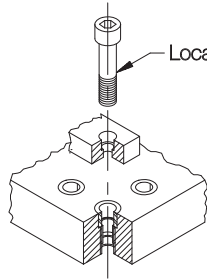
STANDARD	CL-MF40-0511	1/2-13	.5000	2.0000	3x2	5-7/8	2-15/16	6-11/16	1-3/8	2.0000	3.0000	18	CL-MF40-4302	CL-1/2-13x2.25-SHCS
	CL-MF40-0512				3x4	9-13/16	4-7/8					30		
HEAVY	CL-MF50-0501	5/8-11	.6250	2.0000	3x2	5-7/8	3-1/8	6-11/16	1-9/16	2.1875	3.0000	19	CL-MF50-4302	CL-1/2-13x2.25-SHCS
	CL-MF50-0502				3x4	9-13/16	5-1/16					35		

# LOCATING SCREWS

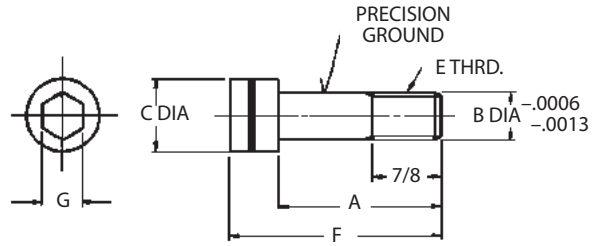
4130 STEEL, HEAT TREATED RC 33-39, BLACK OXIDE FINISH



Standard  
Heavy



Locating Screw



Locating Screws are used to mount all locators in multipurpose grid holes (standard and heavy sizes). These specially designed, precision shoulder screws accurately locate and fasten at the same time.

SIZE	PART NO.	A	B DIA	C DIA	E	F	G
STANDARD	CL-MF40-4301	1-3/4	.5000	3/4	1/2-13	2-1/4	3/8
	CL-MF40-4302	2-1/4				2-3/4	
	CL-MF40-4303	2-3/4				3-1/4	
HEAVY	CL-MF50-4301	2	.6250	15/16	5/8-11	2-5/8	1/2
	CL-MF50-4302	2-1/2				3-1/8	
	CL-MF50-4303	3				3-5/8	

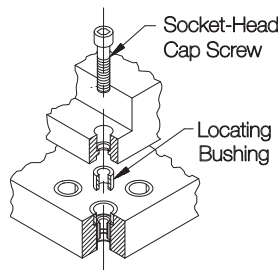
# LOCATING BUSHINGS

1144 STEEL, HEAT TREATED RC 58-64, BLACK OXIDE FINISH



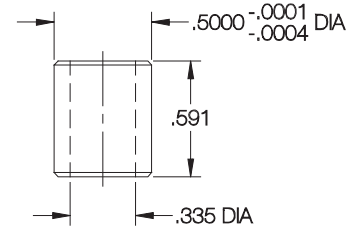
Mini

Used in mini-sized systems only. A Locating Bushing used together with a Socket-Head Cap Screw works similarly to a Locating Screw. This construction adds extra strength to mini components despite their small size.



Socket-Head Cap Screw

Locating Bushing



SIZE	PART NO.	FITS SOCKET-HEAD CAP SCREWS
MINI	CL-MF25-4300	5/16-18

# SOCKET-HEAD CAP SCREWS

GRADE 8, BLACK OXIDE FINISH



Mini  
Standard  
Heavy

Socket-Head Cap Screws (grade 8) are used for fastening components whenever precise location is not needed. **INFO+**: The starter-set listings on pages 380-382 show part numbers and quantities of screws typically used with mini, standard, and heavy systems. Metric sizes are used to fasten plates and blocks to machine pallets.

## INCH

PART NO.	THREAD SIZE	LENGTH UNDER HEAD
CL-6-32x.50-SHCS	#6-32	.50
CL-10-32x.50-SHCS	#10-32	.50
CL-10-32x1.50-SHCS		1.50
CL-1/4-20x.62-SHCS	1/4-20	.62
CL-1/4-20x.75-SHCS		.75
CL-1/4-20x1.50-SHCS		1.50
CL-1/4-20x2.00-SHCS		2.00
CL-1/4-20x2.50-SHCS		2.50
CL-5/16-18x.62-SHCS		5/16-18
CL-5/16-18x.75-SHCS	.75	
CL-5/16-18x1.00-SHCS	1.00	
CL-5/16-18x1.12-SHCS	1.12	
CL-5/16-18x1.38-SHCS	1.38	
CL-5/16-18x1.50-SHCS	1.50	
CL-5/16-18x1.75-SHCS	1.75	
CL-5/16-18x2.00-SHCS	2.00	
CL-5/16-18x2.50-SHCS	2.50	
CL-5/16-18x3.50-SHCS	3.50	
CL-3/8-16x4.00-SHCS	3/8-16	

CL-1/2-13x1.00-SHCS	1/2-13	1.00
CL-1/2-13x1.25-SHCS		1.25
CL-1/2-13x1.50-SHCS		1.50
CL-1/2-13x1.75-SHCS		1.75
CL-1/2-13x2.00-SHCS		2.00
CL-1/2-13x2.25-SHCS	5/8-11	2.25
CL-1/2-13x2.75-SHCS		2.75
CL-1/2-13x4.50-SHCS		4.50
CL-5/8-11x1.00-SHCS		1.00
CL-5/8-11x1.25-SHCS		1.25
CL-5/8-11x1.50-SHCS		1.50
CL-5/8-11x2.00-SHCS		2.00
CL-5/8-11x2.25-SHCS		2.25
CL-5/8-11x2.50-SHCS		2.50
CL-5/8-11x3.00-SHCS		3.00
CL-5/8-11x5.00-SHCS		5.00
CL-3/4-10x1.50-SHCS	3/4-10	1.50
CL-1-8x1.50-SHCS	1-8	1.50

## METRIC

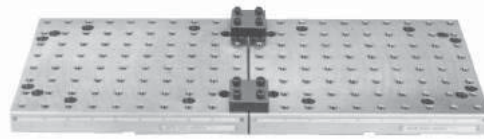
CLM-16x40-SHCS	M16	1.57
CLM-16x50-SHCS		1.97
CLM-16x65-SHCS		2.56

# LOCATING GAGES

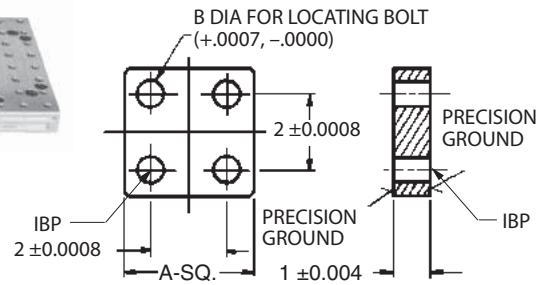
1045 STEEL, BLACK OXIDE FINISH



**Standard Heavy**



Use when connecting two tooling plates, to hold tolerances. Remove after fastening plates to machine.



SIZE	PART NO.	A	B DIA	LOCATING SCREW (4 REQ)
STANDARD	CL-MF40-4001	3-1/8	.5000	CL-MF40-4302
HEAVY	CL-MF50-4001	3-3/8	.6250	CL-MF50-4302

# LOCATING PINS

1144 STEEL, HEAT TREATED RC 50-55, BLACK OXIDE FINISH



**Round**

**Standard Heavy**



**Diamond**

Round and Diamond Locating Pins are used together to align Quick-Change Tooling Plates or vises on a modular plate or block.

## ROUND

SIZE	PART NO.	HEAD DIA	SHANK DIA
STANDARD	CL-MF40-4501	.6250	.5000
HEAVY	CL-MF50-4501	.6250	.6250

## DIAMOND

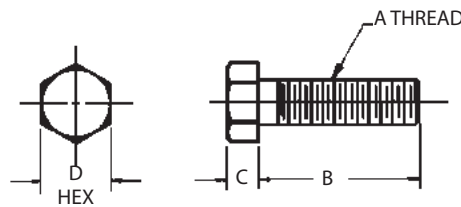
SIZE	PART NO.	HEAD DIA	SHANK DIA
STANDARD	CL-MF40-4601	.6250	.5000
HEAVY	CL-MF50-4601	.6250	.6250

# HEX-HEAD CAP SCREWS

GRADE 8, BLACK OXIDE FINISH



**Mini Standard Heavy**



Mounting screws for high-rise clamps, where access to a socket-head screw is difficult.

SIZE	PART NO.	A	B	C	D
MINI	CL-MF25-4311	5/16-18	.75	13/64	1/2
	CL-MF25-4312		1.25		
	CL-MF25-4313		1.50		
STANDARD	CL-MF40-4311	1/2-13	1.75	5/16	3/4
	CL-MF40-4312		2.75		
	CL-MF40-4313		3.00		
HEAVY	CL-MF50-4311	5/8-11	2.00	25/64	15/16
	CL-MF50-4312		3.00		
	CL-MF50-4313		3.50		

# SPARE PROTECTION PLUGS

PLASTIC



**Mini Standard Heavy**

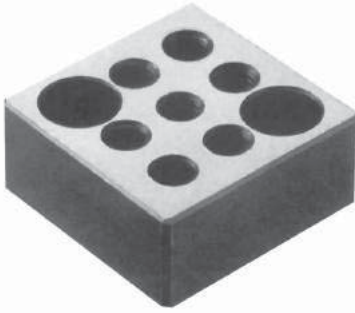
Durable screw-in plugs to keep dirt and chips out of holes that are not used for a particular setup. Note: a complete set of protection plugs is furnished with each tooling plate and block.



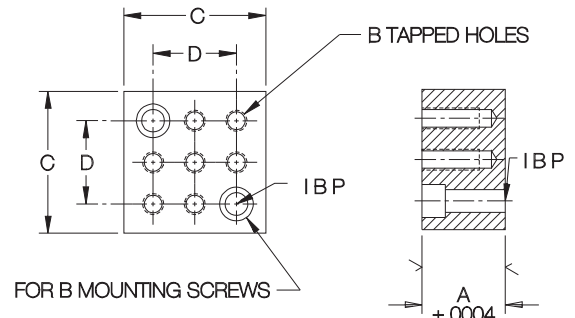
SIZE	PART NO.
MINI	CL-MF25-0001
STANDARD	CL-MF40-0001
HEAVY	CL-MF50-0001

# SUPPORT RISER BLOCKS

1045 STEEL, BLACK OXIDE FINISH



**Mini  
Standard  
Heavy**



Stackable block with precision ground top and bottom surfaces for accurate height location. Ideal for raising supports up to a workpiece. A choice of seven tapped holes allows mounting the support at any position between grid points.

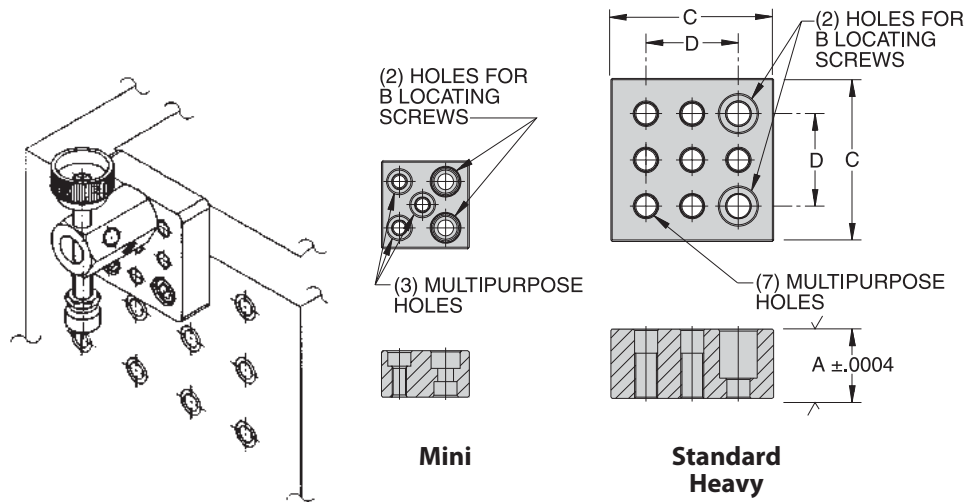
SIZE	PART NO.	A	B	C	D	SOCKET-HEAD CAP SCREW (2 REQD)
STANDARD	CL-MF40-1411	1.0000	1/2-13	3-3/8	2	CL-1/2-13x1.50-SHCS
	CL-MF40-1412	1.2500				CL-1/2-13x1.75-SHCS
	CL-MF40-1413	1.5000				CL-1/2-13x2.00-SHCS
HEAVY	CL-MF50-1412	1.2500	5/8-11	3-3/8	2	CL-5/8-11x2.00-SHCS
	CL-MF50-1413	1.5000				CL-5/8-11x2.25-SHCS
	CL-MF50-1414	2.0000				CL-5/8-11x3.00-SHCS

# MULTIPURPOSE RISER BLOCKS

1045 STEEL, BLACK OXIDE FINISH



**Mini  
Standard  
Heavy**



A stackable, precision riser block with multipurpose holes instead of plain tapped holes. This unique feature allows raising any locator that mounts with Locating Screws, including Edge Supports (**INFO+** page 402, Support Cylinders (**INFO+** pages 400-401), and V Blocks (**INFO+** pages 403-404). These blocks can also be used to extend some components beyond the edge of a tooling plate, as shown in the example.

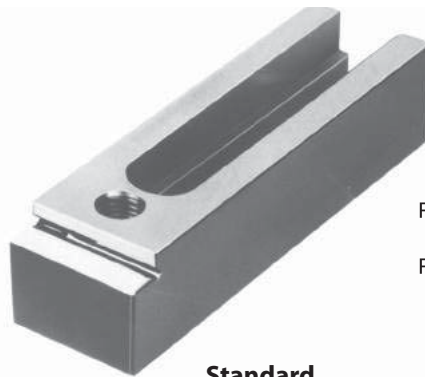
SIZE	PART NO.	MULTIPURPOSE HOLES		A	B	C	D	LOCATING SCREWS (2 REQD)
		THREAD	ID					
MINI	CL-MF25-1461	5/16-18	.5000	1.0000	5/16-18	1.98	1.0000	CL-MF25-4300+
	CL-MF25-1462			1.5000				CL-5/16-18x1.38-SHCS
STANDARD	CL-MF40-1462	1/2-13	.5000	1.5000	1/2-13	3.46	2.0000	CL-MF25-4300+
	CL-MF40-1463			2.0000				CL-5/16-18x1.38-SHCS
HEAVY	CL-MF50-1463	5/8-11	.6250	2.0000	5/8-11	3.46	2.0000	CL-MF50-4301

# EXTENSION SUPPORTS

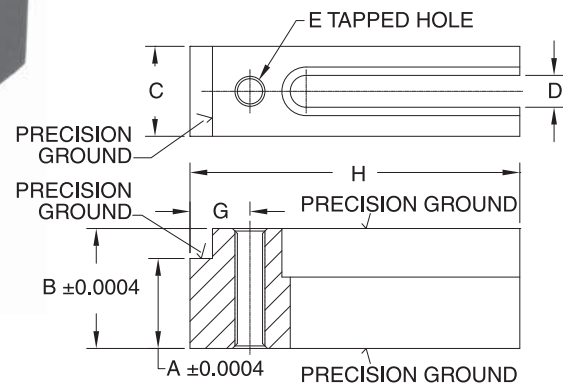
1045 STEEL, HEAT TREATED, BLACK OXIDE FINISH



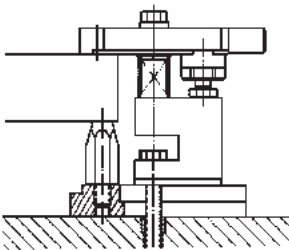
Mini



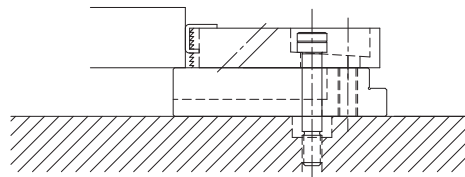
Standard Heavy



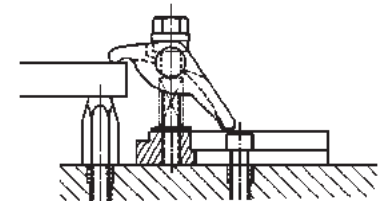
Extension Supports have a precision ground top and bottom surface for accurate height location. Standard and heavy sizes also have a precision ground step, for simultaneous height and edge location. Available in many support heights to match other types of height locators. The tapped hole is ideal for positioning components between grid points.



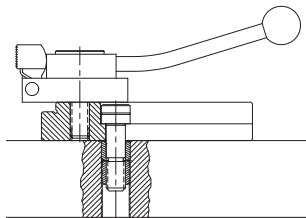
Screw Rest Pads (**INFO+** page 403) can be positioned anywhere between grid points when mounted on an Extension Support.



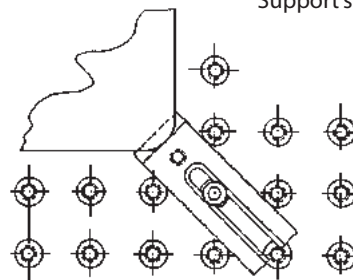
Extension Supports are a perfect height locator to mount underneath Serrated Adjustable Clamps (**INFO+** page 418).



Forged Adjustable Clamps (**INFO+** page 416) can be placed anywhere between grid points when mounted in an Extension Support's tapped hole.



Cam Edge Clamps (**INFO+** page 416) can be placed anywhere between grid points when mounted in an Extension Support's tapped hole.

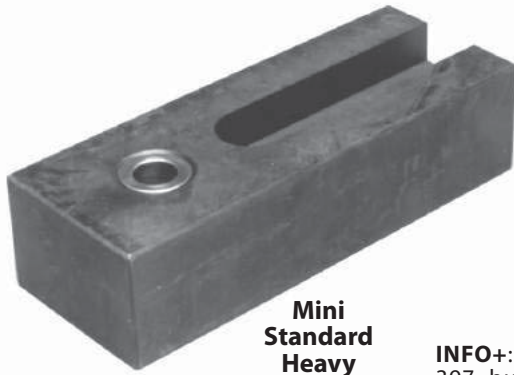


Extension Supports allow precise edge location anywhere between grid points.

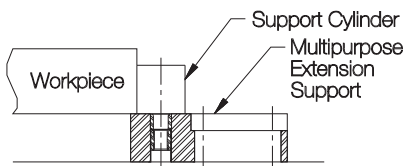
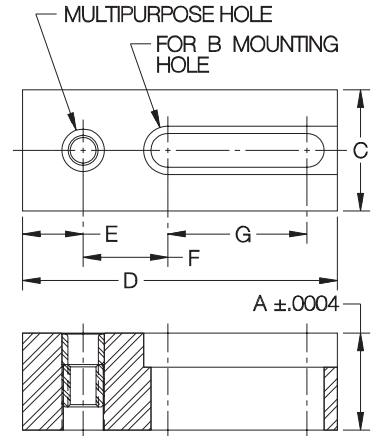
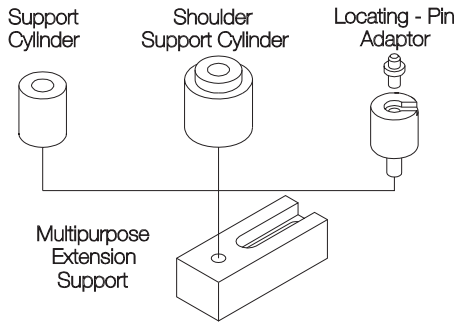
SIZE	PART NO.	A	B	C	D	E	F	G	H	SOCKET-HEAD CAP SCREW (1 REQD)
MINI	CL-MF25-3301	—	.5000	7/8	11/32	5/16-18	—	5/16	2-1/2	CL-5/16-18x1.00-SHCS
	CL-MF25-3302		.7500							
	CL-MF25-3303		1.0000							
	CL-MF25-3304		1.2500							
	CL-MF25-3305		1.5000							
	CL-MF25-3306		2.0000							
STANDARD	CL-MF40-3300	.7500	1.0000	1-1/2	17/32	1/2-13	3/8	1	5-1/2	CL-1/2-13x1.50-SHCS
	CL-MF40-3301	1.0000	1.2500							
	CL-MF40-3302	1.5000	2.0000							
HEAVY	CL-MF50-3301	1.0000	1.2500	2	21/32	5/8-11	1/2	1-1/8	5-1/2	CL-5/8-11x2.00-SHCS
	CL-MF50-3302	1.5000	2.0000							

# MULTIPURPOSE EXTENSION SUPPORTS

1018 STEEL, CASE HARDENED, BLACK OXIDE FINISH



**Mini  
Standard  
Heavy**



Can be used with a Support Cylinder for simultaneous horizontal and vertical location, using the top surface of the Multipurpose Extension Support as a height locator.

**INFO+:** Similar to the Extension Supports on page 397, but with a multipurpose hole instead of a plain tapped hole (and slightly larger). This allows attaching any fixed-position locator that mounts with a Locating Screw, enabling that locator to be used between grid points. Such locators include Support Cylinders (**INFO+** page 400) and Shoulder Support Cylinders (**INFO+** page 401). Top and bottom surfaces are precision ground for accurate height location.

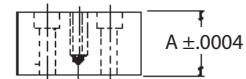
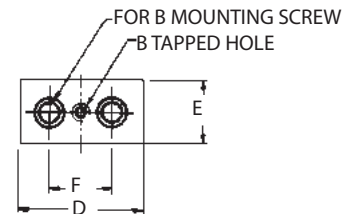
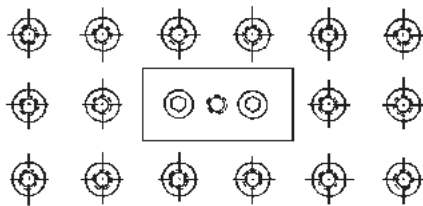
SIZE	PART NO.	MULTIPURPOSE HOLE		A	B	C	D	E	F	G	SOCKET-HEAD CAP SCREW (1 REQ)
		THREAD	ID								
MINI	CL-MF25-4751	5/16-18	.5000	1.0000	5/16-18	1-1/2	3-5/8	3/4	1	1-1/2	CL-5/16-18x1.00-SHCS
STANDARD	CL-MF40-4751	1/2-13	.5000	1.5000	1/2-13	2-1/4	6	1-1/4	1-3/8	2-7/8	CL-1/2-13x2.00-SHCS
HEAVY	CL-MF50-4751	5/8-11	.6250	2.0000	5/8-11	2-1/2	6-1/2	1-1/4	1-3/4	2-7/8	CL-5/8-11x2.50-SHCS

# HALFWAY EXTENSION SUPPORTS

1045 STEEL, HEAT TREATED, BLACK OXIDE FINISH



**Mini  
Standard  
Heavy**



Precision ground top and bottom surface for accurate height location. Ideal for positioning components exactly halfway between two multipurpose holes. Also useful as a large rest pad.

SIZE	PART NO.	A	B	D	E	F	SOCKET-HEAD CAP SCREWS (2 REQ)
MINI	CL-MF25-3601	.5000	5/16-18	2	7/8	1	CL-5/16-18x1.00-SHCS
	CL-MF25-3602	.7500					
	CL-MF25-3603	1.0000					
	CL-MF25-3604	1.2500					CL-5/16-18x1.38-SHCS
	CL-MF25-3605	1.5000					
	CL-MF25-3606	2.0000					
STANDARD	CL-MF40-3601	1.0000	1/2-13	4	2	2	CL-1/2-13x1.50-SHCS
	CL-MF40-3602	1.2500					
	CL-MF40-3603	1.5000					
HEAVY	CL-MF50-3601	1.0000	5/8-11	4	2	2	CL-5/8-11x2.00-SHCS
	CL-MF50-3602	1.2500					
	CL-MF50-3603	1.5000					



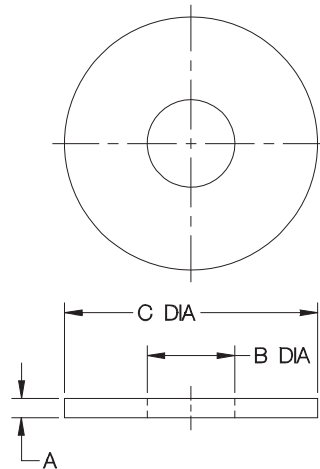
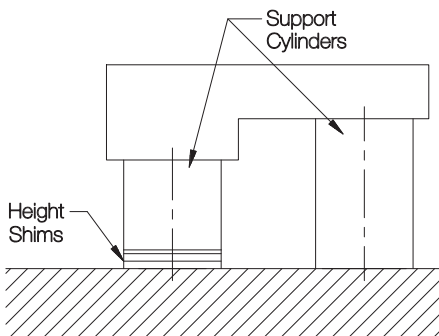
# HEIGHT SHIMS

1010 STEEL



**Mini  
Standard  
Heavy**

Precision shims that allow raising a height locator by a small, exact amount. Ideal when supporting at different levels underneath a workpiece, as in the example shown using Support Cylinders. Shims are stackable to obtain any height in .001-inch increments. Thickness tolerance is  $\pm .0003$  on .062 and .125 sizes,  $\pm 10\%$  on smaller sizes.



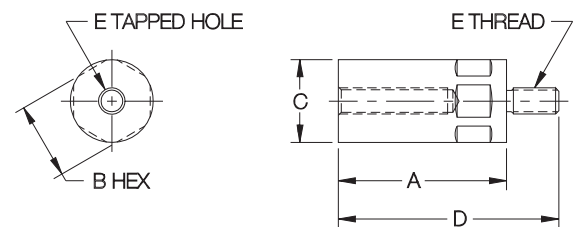
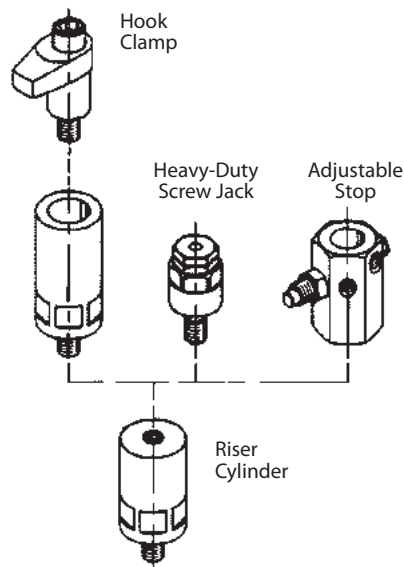
SIZE	PART NO.	A	B DIA	C DIA
MINI	CL-MF25-7002	.002	9/16	15/16
	CL-MF25-7003	.003		
	CL-MF25-7004	.004		
	CL-MF25-7005	.005		
	CL-MF25-7010	.010		
	CL-MF25-7020	.020		
	CL-MF25-7062	.062		
CL-MF25-7125	.125			
STANDARD	CL-MF40-7002	.002	9/16	1-5/8
	CL-MF40-7003	.003		
	CL-MF40-7004	.004		
	CL-MF40-7005	.005		
	CL-MF40-7010	.010		
	CL-MF40-7020	.020		
	CL-MF40-7062	.062		
CL-MF40-7125	.125			
HEAVY	CL-MF50-7002	.002	11/16	1-7/8
	CL-MF50-7003	.003		
	CL-MF50-7004	.004		
	CL-MF50-7005	.005		
	CL-MF50-7010	.010		
	CL-MF50-7020	.020		
	CL-MF50-7062	.062		
CL-MF50-7125	.125			

# RISER CYLINDERS

1045 STEEL, BLACK OXIDE FINISH



**Mini  
Standard  
Heavy**



SIZE	PART NO.	A	B	C DIA	D	E
MINI	CL-MF25-5201	1-1/4	7/8	1	2	5/16-18
	CL-MF25-5202	1-1/2			2-1/4	
	CL-MF25-5203	2			2-3/4	
STANDARD	CL-MF40-5201	2	1-7/16	1-9/16	3-1/4	1/2-13
	CL-MF40-5203	3-1/8			4-3/8	
	CL-MF40-5204	4			5-1/4	
HEAVY	CL-MF50-5201	2	1-13/16	2	3-1/4	5/8-11
	CL-MF50-5203	3-1/8			4-3/8	
	CL-MF50-5204	4			5-1/4	

Provides additional height without taking up much space. Useful with Hook Clamps (INFO+ page 415), and Heavy-Duty Screw Jacks (INFO+ page 405).

10

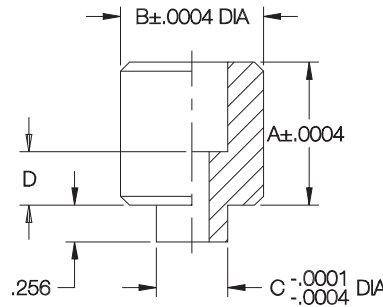
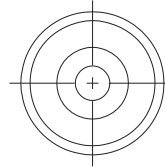
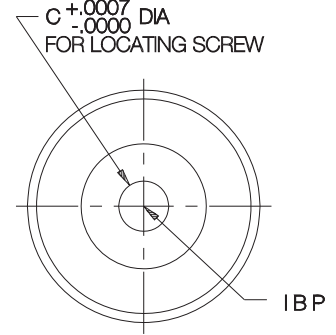
# SUPPORT CYLINDERS

1045 OR 1144 STEEL, HEAT TREATED, BLACK OXIDE FINISH

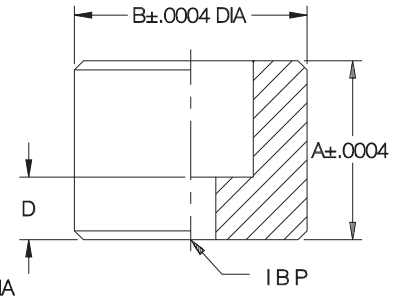


**Mini  
Standard  
Heavy**

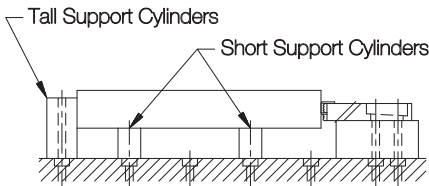
Extremely versatile precision locator that can be used either as a support or for side location. Ground on top, bottom, and outside diameter. Available in many support heights to match other types of height locators. **INFO+**: For additional height, use Multipurpose Riser Blocks (page 396). **INFO+**: To position between grid points, use a Multipurpose Extension Support (page 398).



**Mini**

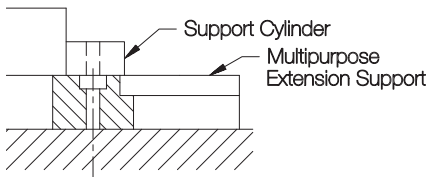


**Standard  
Heavy**

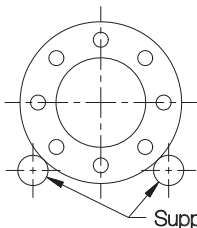


With the wide range of available heights, Support Cylinders can be used as both side locators and supports.

10



A Multipurpose Extension Support (**INFO+** page 398) can be used to mount a Support Cylinder anywhere between grid points.



Two Support Cylinders can accurately locate a large diameter, similar to using a V Block.

SIZE	PART NO.	A	B DIA	C DIA	D	LOCATING SCREW (1 REQD)	
MINI	CL-MF25-3101	.5000	1.0000	.5000	5/32	CL-5/16-18x1.00-SHCS	
	CL-MF25-3102	.7500			3/8		
	CL-MF25-3103	1.0000					
	CL-MF25-3104	1.2500					
	CL-MF25-3105	1.5000					
	CL-MF25-3106	2.0000					
STANDARD	CL-MF25-3107	2.5000	1.6250	.5000	7/16	CL-MF40-4301	
	CL-MF40-3101	1.0000					
	CL-MF40-3112	1.2500					
	CL-MF40-3113	1.5000					
	CL-MF40-3102	2.0000			2.0000	15/16	CL-MF40-4302
	CL-MF40-3114	2.5000					
	CL-MF40-3103	3.0000					
	CL-MF40-3104	4.0000					
HEAVY	CL-MF40-3105	5.0000	2.0000	.6250	9/16	CL-MF50-4301	
	CL-MF50-3112	1.2500					
	CL-MF50-3113	1.5000					
	CL-MF50-3101	2.0000			1-1/16	CL-MF50-4302	
	CL-MF50-3114	2.5000					
	CL-MF50-3102	3.0000					
	CL-MF50-3103	4.0000					
CL-MF50-3115	4.5000						
CL-MF50-3104	5.0000						

# SHOULDER SUPPORT CYLINDERS

1045 OR 1144 STEEL, HEAT TREATED, BLACK OXIDE FINISH



Mini

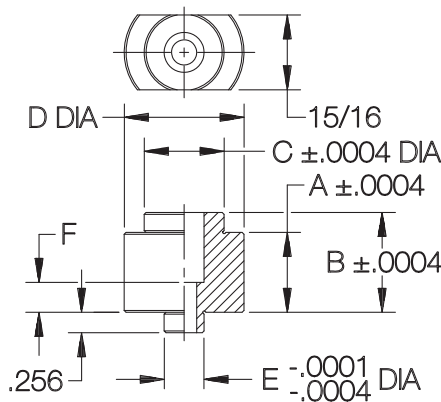


Standard Heavy

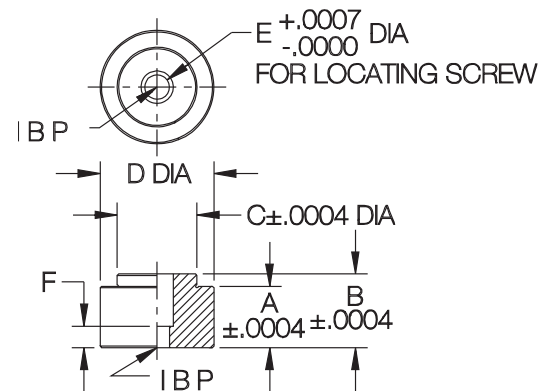
Precision edge locator with a ground shoulder for simultaneous horizontal and vertical location. Available in many support heights to match other types of height locators. **INFO+**: For additional height, use Multipurpose Riser Blocks (page 396). **INFO+**: To position between grid points, use a Multipurpose Extension Support (page 398).

The mini (5/16") version has a locating extension underneath the Shoulder Support Cylinder that fits directly into a multipurpose grid hole, taking the place of a Locating Bushing. Fasten with a Socket-Head Cap Screw (order separately).

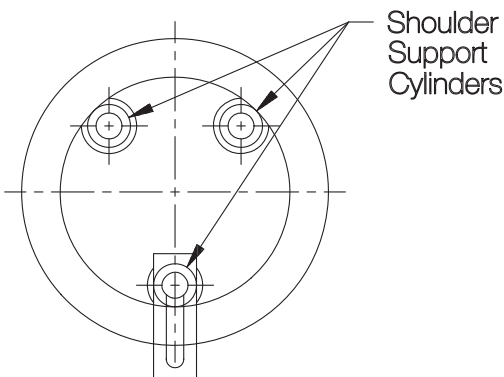
The standard (1/2") and heavy (5/8") versions are fastened with a Locating Screw (order separately).



Mini



Standard and Heavy

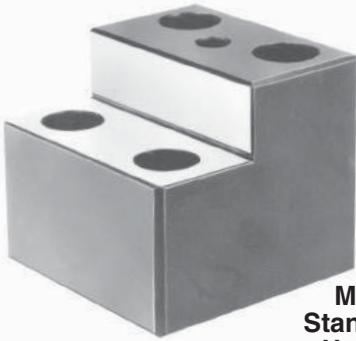


Shoulder Support Cylinders can be used to locate from internal edges, as well as external edges. Shown here, three of them locate a large bored diameter, one mounted on a Multipurpose Extension Support.

SIZE	PART NO.	A	B	C DIA	D DIA	E DIA	F	LOCATING SCREW (1 REQD)
MINI	CL-MF25-3200	.5000	.7500	1.0000	1-1/2	.5000	3/8	CL-5/16-18x1.12-SHCS
	CL-MF25-3201	.7500	1.0000					
	CL-MF25-3202	1.0000	1.2500					
	CL-MF25-3203	1.2500	1.5000					
	CL-MF25-3204	1.5000	2.0000					
	CL-MF25-3205	2.0000	2.5000					
STANDARD	CL-MF40-3201	.7500	1.0000	1.6250	2-5/16	.5000	7/16	CL-MF40-4301
	CL-MF40-3202	1.0000	1.2500					
	CL-MF40-3203	1.2500	1.5000					
	CL-MF40-3204	1.5000	2.0000					
	CL-MF40-3205	2.0000	2.5000					
	CL-MF40-3206	2.5000	3.0000					
	CL-MF40-3207	3.0000	4.0000				15/16	CL-MF40-4302
HEAVY	CL-MF50-3201	1.0000	1.2500	2.0000	2-7/8	.6250	9/16	CL-MF50-4301
	CL-MF50-3202	1.2500	1.5000					
	CL-MF50-3203	1.5000	2.0000					
	CL-MF50-3204	2.0000	2.5000					
	CL-MF50-3205	2.5000	3.0000					
	CL-MF50-3206	3.0000	4.0000					
	CL-MF50-3207	4.0000	5.0000					

# EDGE SUPPORTS

1045 STEEL, HEAT TREATED, BLACK OXIDE FINISH

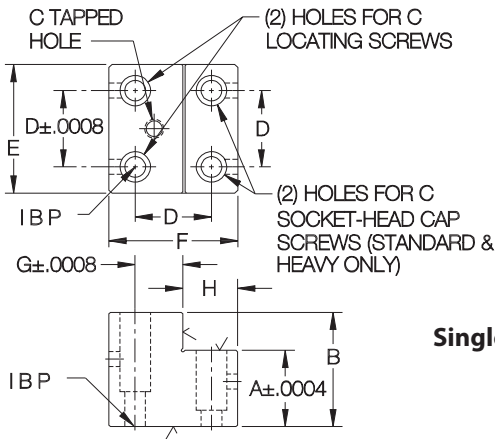


Single

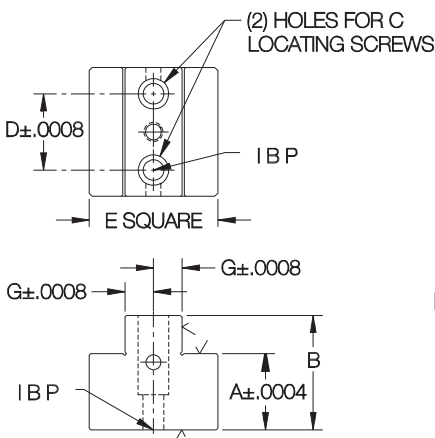
Mini  
Standard  
Heavy



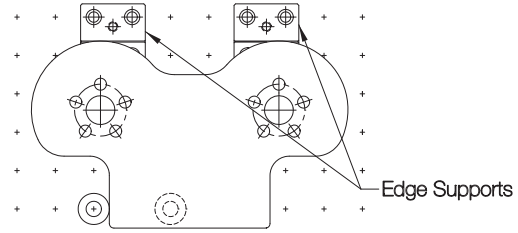
Double



Single



Double



Precision edge locator with a ground step for simultaneous horizontal and vertical location. Large contact area is ideal for supporting heavy workpieces and locating curved surfaces. Available in many support heights to match other types of height locators. For additional height, use Multipurpose Riser Blocks (**INFO+**: page 396).

## SINGLE

SIZE	PART NO.	A	B	C	D	E	F	G	H	LOCATING SCREWS (2 REQD)	SOCKET-HEAD CAP SCREWS (0 OR 2 REQD)
MINI	CL-MF25-3700	.5000	1	5/16-18	1.0000	1-3/4	1-3/8	.5000	3/8	CL-MF25-4300+ CL-5/16-18x1.50-SHCS	—
	CL-MF25-3701	.7500	1-1/4								
	CL-MF25-3702	1.0000	1-1/2								
	CL-MF25-3703	1.2500	2								
STANDARD	CL-MF40-3701	.7500	1-3/4	1/2-13	2.0000	3-3/8	3-3/8	1.2500	1-7/16	CL-MF40-4302	CL-1/2-13x1.50-SHCS
	CL-MF40-3702	1.0000	2								
	CL-MF40-3703	1.2500	2-1/4								
	CL-MF40-3704	1.5000	2-1/2								
	CL-MF40-3705	2.0000	3								
	CL-MF40-3706	2.5000	3-1/2								
	CL-MF40-3707	3.0000	4-1/2							CL-MF40-4303	CL-1/2-13x2.25-SHCS
	CL-MF40-3708	4.0000	5-1/2								
	CL-MF40-3709	5.0000	6-1/2								
HEAVY	CL-MF50-3701	1.0000	2	5/8-11	2.0000	3-3/8	3-3/8	1.2500	1-7/16	CL-MF50-4302	CL-5/8-11x2.00-SHCS
	CL-MF50-3702	1.2500	2-1/4								
	CL-MF50-3703	1.5000	2-1/2								
	CL-MF50-3704	2.0000	3								
	CL-MF50-3705	2.5000	3-1/2							CL-MF50-4303	CL-5/8-11x2.00-SHCS
	CL-MF50-3706	3.0000	4-1/2								
	CL-MF50-3707	4.0000	5-1/2								
	CL-MF50-3708	5.0000	6-1/2								

## DOUBLE

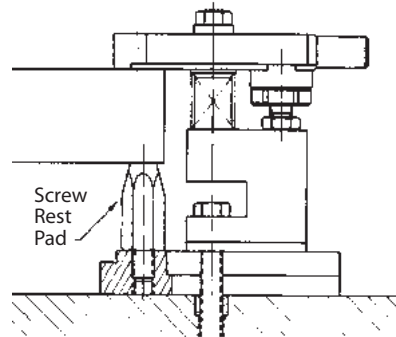
SIZE	PART NO.	A	B	C	D	E	G	LOCATING SCREWS (2 REQD)
MINI	CL-MF25-3800	.5000	1	5/16-18	1.0000	1-3/4	.5000	CL-MF25-4300+ CL-5/16-18x1.50-SHCS
	CL-MF25-3801	.7500	1-1/4					
	CL-MF25-3802	1.0000	1-1/2					
	CL-MF25-3803	1.2500	2					
STANDARD	CL-MF40-3801	.7500	1-3/4	1/2-13	2.0000	3-3/8	.7500	CL-MF40-4302
	CL-MF40-3802	1.0000	2					
	CL-MF40-3803	1.2500	2-1/4					
	CL-MF40-3804	1.5000	2-1/2					
	CL-MF40-3805	2.0000	3					
	CL-MF40-3806	2.5000	3-1/2					
	CL-MF40-3807	3.0000	4-1/2					CL-MF40-4303
	CL-MF40-3808	4.0000	5-1/2					
	CL-MF40-3809	5.0000	6-1/2					
	CL-MF50-3801	1.0000	2					
CL-MF50-3802	1.2500	2-1/4						
CL-MF50-3803	1.5000	2-1/2						
CL-MF50-3804	2.0000	3						
CL-MF50-3805	2.5000	3-1/2	CL-MF50-4303					
CL-MF50-3806	3.0000	4-1/2						
CL-MF50-3807	4.0000	5-1/2						
CL-MF50-3808	5.0000	6-1/2						

# SCREW REST PADS

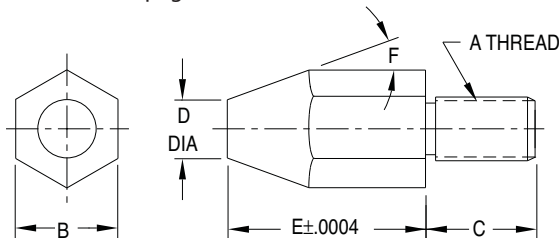
12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH



**Mini  
Standard  
Heavy**



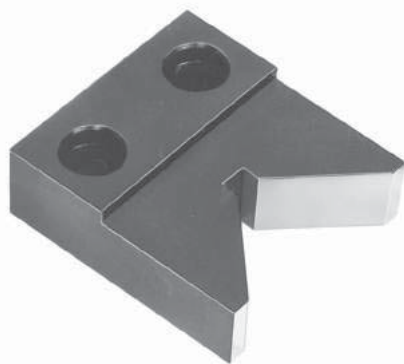
Precision height locator with a small contact area. Available in a wide range of heights, including very short sizes. This support can be installed in either a plain tapped hole or a multipurpose hole. **INFO+**: For metric sizes, see page 195.



SIZE	PART NO.	A	B	C	D DIA	E	F					
MINI	CL-MF25-4801	5/16-18	3/4	5/8	5/16	.2500	75°					
	CL-MF25-4802					.3750	60°					
	CL-MF25-4803					.5000	35°					
	CL-MF25-4804					.7500	25°					
	CL-MF25-4805					1.0000	20°					
	CL-MF25-4806					1.2500	15°					
	CL-MF25-4807					1.5000						
STANDARD	CL-MF40-4801	1/2-13	7/8	15/16	1/2	.2500	75°					
	CL-MF40-4802					.3750	60°					
	CL-MF40-4803					.5000	35°					
	CL-MF40-4804					.7500	25°					
	CL-MF40-4805					1.0000	20°					
	CL-MF40-4806					1.2500	15°					
	CL-MF40-4807					1.5000						
	CL-MF40-4808					2.0000						
	HEAVY					CL-MF50-4801	5/8-11	1	1-1/4	5/8	.2500	75°
						CL-MF50-4802					.3750	60°
CL-MF50-4803		.5000	35°									
CL-MF50-4804		.7500	25°									
CL-MF50-4805		1.0000	20°									
CL-MF50-4806		1.2500	15°									
CL-MF50-4807		1.5000										
CL-MF50-4808		2.0000										

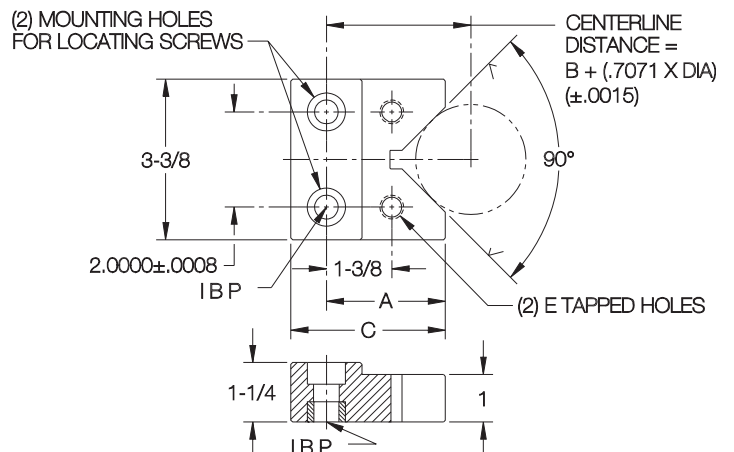
# VERTICAL V BLOCKS

1045 STEEL, HEAT TREATED, BLACK OXIDE FINISH



**Standard  
Heavy**

Ideal for mounting a cylindrical workpiece with its axis perpendicular to the tooling surface. Locating surfaces are precision ground and accurately qualified with respect to the mounting holes.

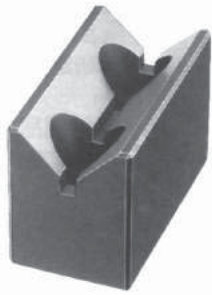


SIZE	PART NO.	WORKPIECE DIAMETER RANGE	A	B	C	E	LOCATING SCREWS (2 REQD)
STANDARD	CL-MF40-6101	9/16 to 3-1/8	2-1/2	1.3951	3-1/4	1/2-13	CL-MF40-4302
HEAVY	CL-MF50-6101	9/16 to 3-1/8	2-1/2	1.3951	3-1/4	5/8-11	CL-MF50-4302

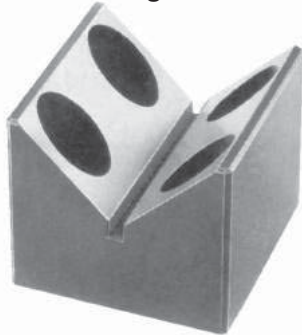
# HORIZONTAL V BLOCKS

1045 STEEL, HEAT TREATED, BLACK OXIDE FINISH

**Small V**

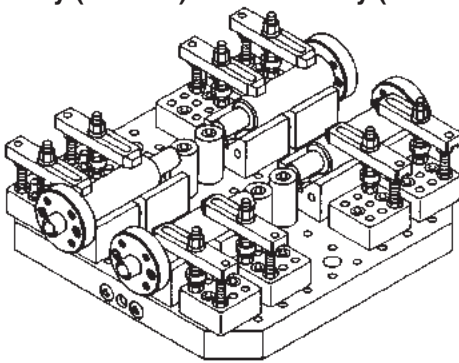


**Large V**

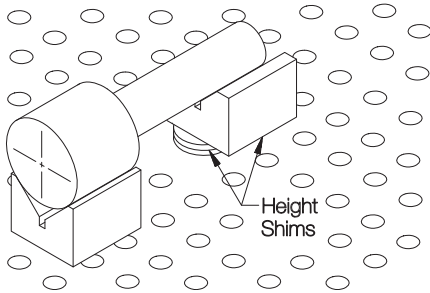


Mini (2 Holes)  
Standard (2 Holes)  
Heavy (2 Holes)

Mini (4 Holes)  
Standard (2 Holes)  
Heavy (2 Holes)

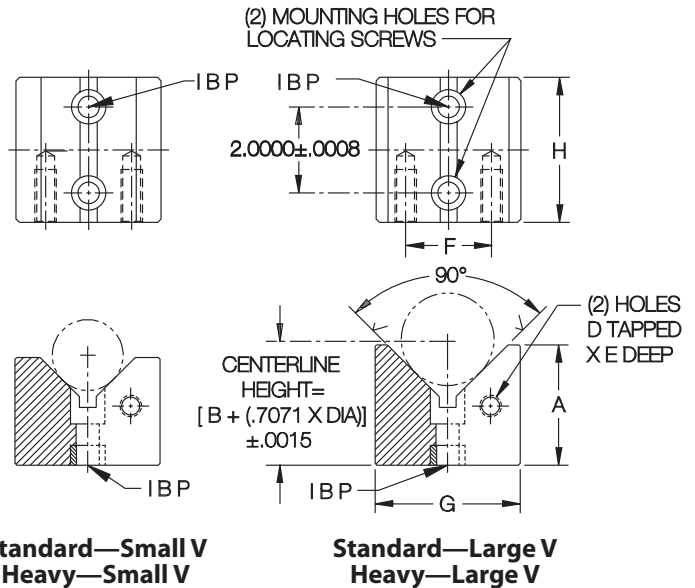
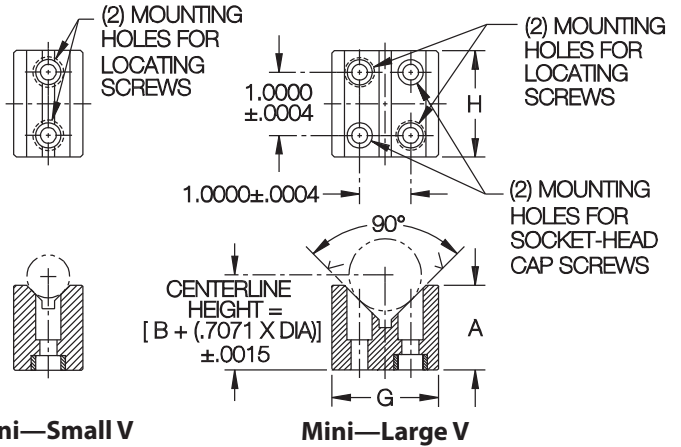


In the above example, Support Cylinders are used as end stops for shafts located in Horizontal V Blocks.



To locate a workpiece from two different diameters simultaneously, use Height Shims (INFO+ page 399) and/or Multipurpose Riser Blocks (INFO+ page 396) to raise one V block to the proper level.

Extremely versatile locator for cylindrical workpieces. Locating surface is precision ground and accurately qualified with respect to the mounting holes. Two tapped holes in the side (standard and heavy sizes only) can be used to mount end stops or clamps. Available in two types: one for small diameters, and one for larger diameters.



## SMALL V

SIZE	PART NO.	WORKPIECE DIAMETER RANGE	A	B	D	E	F	G	H	LOCATING SCREWS (2 REQD)	SOCKET-HEAD CAP SCREWS (0 OR 2 REQD)
MINI	CL-MF25-6001	3/8 to 1	1-1/4	.8750	—	—	—	1	1-3/4	CL-MF25-4300 + CL-5/16-18x1.38-SHCS	—
STANDARD	CL-MF40-6001	9/16 to 3-1/8	2-1/2	1.3951	1/2-13	1-1/8	2	3-3/8	3-3/8	CL-MF40-4302	—
HEAVY	CL-MF50-6001	9/16 to 3-1/8	2-1/2	1.3951	5/8-11	1-3/8	2	3-3/8	3-3/8	CL-MF50-4302	—

## LARGE V

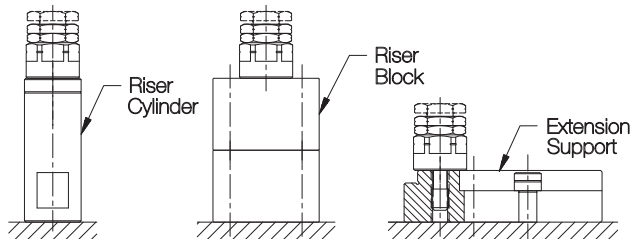
MINI	CL-MF25-6002	9/16 to 2	1-1/2	.7500	—	—	—	1-3/4	1-3/4	CL-MF25-4300 + CL-5/16-18x1.38-SHCS	CL-5/16-18x1.38-SHCS
STANDARD	CL-MF40-6002	9/16 to 4	3	1.5858	1/2-13	1-1/8	2	3-3/8	3-3/8	CL-MF40-4302	—
HEAVY	CL-MF50-6002	9/16 to 4	3	1.5858	5/8-11	1-3/8	2	3-3/8	3-3/8	CL-MF50-4302	—

# HEAVY-DUTY SCREW JACKS

JACK SCREW: 4135 STEEL, HEAT TREATED, BLACK OXIDE FINISH  
 TIP: 1144 OR 1045 STEEL, HEAT TREATED, BLACK OXIDE FINISH  
 BODY: 1045 STEEL, BLACK OXIDE FINISH



**Standard Heavy**

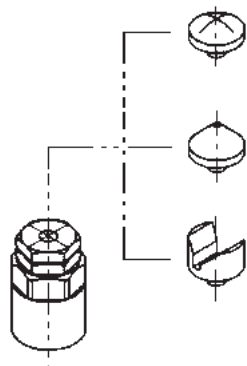


For additional height and/or mounting between grid points, use Riser Cylinders (**INFO+** page 399), Support Riser Blocks (**INFO+** page 396), or Extension Supports (**INFO+** page 397).

Heavy-duty adjustable support that accepts any of the three tips shown below. Choice of three heights in each size cover the full range of height possibilities. **INFO+**: See page 199 for additional dimensions and additional sizes.

## SCREW JACKS

SIZE	PART NO.	MOUNTING SCREW SIZE	OUTSIDE DIAMETER	RETRACTED HEIGHT	MAX SCREW TRAVEL
STANDARD	CL-MF40-3401	1/2-13	1-9/16	1-5/8	3/8
	CL-MF40-3402			2	3/4
	CL-MF40-3403			2-3/4	1-1/2
HEAVY	CL-MF50-3401	5/8-11	1-9/16	1-5/8	3/8
	CL-MF50-3402			2	3/4
	CL-MF50-3403			2-3/4	1-1/2



## SCREW-JACK TIPS

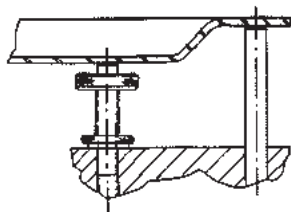
SIZE	PART NO.	TYPE	OUTSIDE DIAMETER	OVERALL TIP HEIGHT
ALL	CL-MF10-3501	RADIUS	1-3/16	3/8
	CL-MF10-3502	CONICAL		11/16
	CL-MF10-3503	V-SHAPED		11/16

# KNURLED SCREW JACKS

12L14 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH



**Mini Standard Heavy**



Knurled head allows quick, easy finger adjustment. Order Check Nut separately. **INFO+**: See page 264 for additional dimensions and sizes.

SIZE	KNURLED SCREW JACK PART NO.	CHECK NUT PART NO.	THREAD SIZE	LENGTH UNDER HEAD
MINI	CL-0-KSJ	CL-51618-TSJN	5/16-18	1-5/8
STANDARD	CL-7-KSJ	CL-1213-TSJN	1/2-13	2-1/2
HEAVY	CL-10-KSJ	CL-5811-TSJN	5/8-11	2-1/2

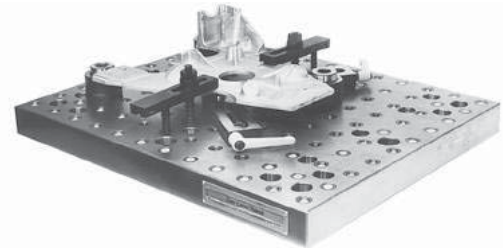
# MANUAL WORK SUPPORTS

BODY & PLUNGER: CARBON STEEL, CASE HARDENED, BLACK OXIDE FINISH  
HANDLE: ZINC DIE CASTING, ENAMEL PAINT

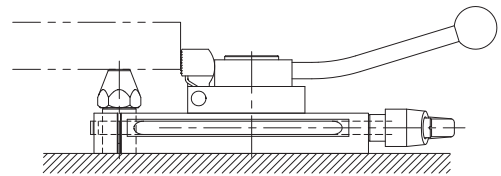


**Mini  
Standard  
Heavy**

Spring-extended manual work support with an extremely low profile. Plunger is locked at proper height by tightening handle. If desired, lock plunger in retracted position for easier loading of light parts, then release and retighten to extend and support. Adjustable handle can be reset to any convenient angle. **INFO+**: See page 197 for complete dimensions.



Ideal for supporting in hard-to-reach places, such as underneath this casting. Work supports can be positioned to allow convenient handle access.



A Screw Rest Pad (**INFO+** page 403), available from 1/4" to 2" tall, is an ideal contact bolt to use in the support plunger. For an adjustable contact screw, use a Knurled Screw Jack (**INFO+** page 405). The mounting slot allows stacking other components, such as this Cam Edge Clamp, on top of the support.

SIZE	PART NO.	TAPPED HOLE IN PLUNGER	HEIGHT WITH PLUNGER FULLY RETRACTED	MAX PLUNGER STROKE	DISTANCE FROM PLUNGER TO SLOT	SLOT LENGTH	SOCKET-HEAD CAP SCREW (1 REQ.)
MINI	CL-MF25-5701	5/16-18	.709	.118	1-1/16	1-3/8	CL-5/16-18x1.12-SHCS
STANDARD	CL-MF40-5701	1/2-13	.945	.236	1-9/16	3-9/16	CL-1/2-13x1.50-SHCS
HEAVY	CL-MF50-5701	5/8-11	1.339	.433	1-3/4	3-15/16	CL-5/8-11x2.00-SHCS

10

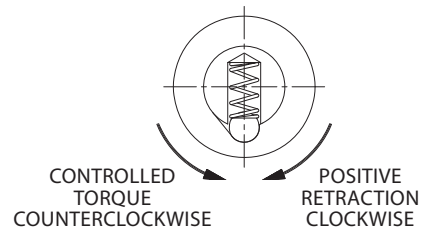
# TORQUE SCREW JACKS

12L14 STEEL, BLACK OXIDE FINISH



**Mini  
Standard  
Heavy**

A knurled-head screw jack that declutches at a preset torque. When the indicated end force is reached, the head disengages and turns freely. This eliminates the possibility of exerting excess force on thinwall parts. Knurled Check Nut is furnished. **INFO+**: See page 264 for complete dimensions and additional sizes.

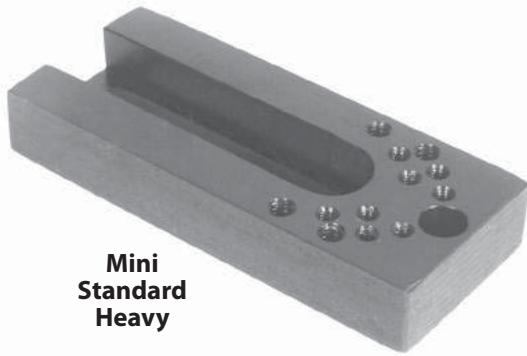


SIZE	PART NO.	THREAD SIZE	END FORCE (LBS)	LENGTH UNDER HEAD
MINI	CL-4A-TSJ	5/16-18	14-16	1-3/4
STANDARD	CL-6-TSJ	1/2-13	18-20	1-3/4
HEAVY	CL-8-TSJ	5/8-11	20-22	1-3/4



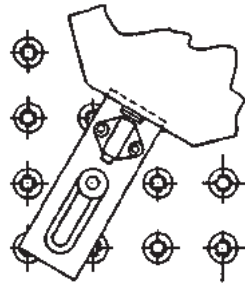
# SPRING-STOP-BUTTON ADAPTORS

CARBON STEEL, HEAT TREATED, BLACK OXIDE FINISH  
PATENT NO. 4,832,325

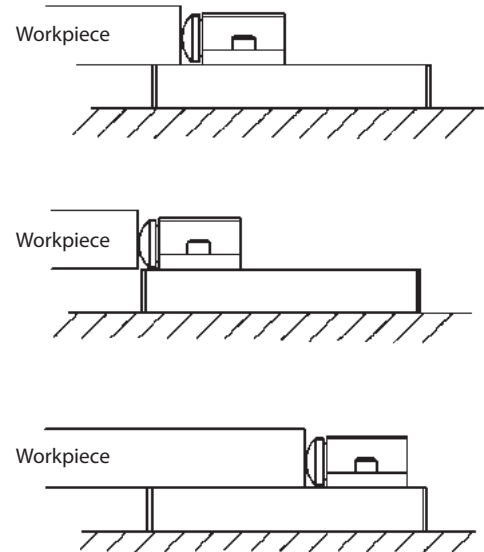


Mini  
Standard  
Heavy

Versatile adaptor for standard Spring Stop Buttons and Spring Locating Pins. Applies spring pressure to the workpiece to hold it against its locators. Fits three sizes of Spring Stop Buttons (one in mini size), both round and flat face, and two sizes of Spring Locating Pins.



## MOUNTING OPTIONS



- The adaptor can be used three ways:
1. As a height-locating point. Use rear mounting holes.
  2. Without height locating. Use front mounting holes.
  3. Reverse mounting. Use as a height-locating point with most of adaptor under workpiece.



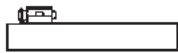
Round-Face  
Spring Stop Buttons



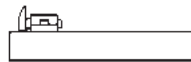
Flat-Face  
Spring Stop Buttons



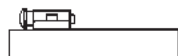
Spring  
Locating Pins



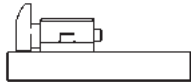
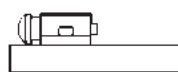
CL-30A-SSB



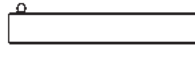
CL-10C-SSB



CL-20C-SSB



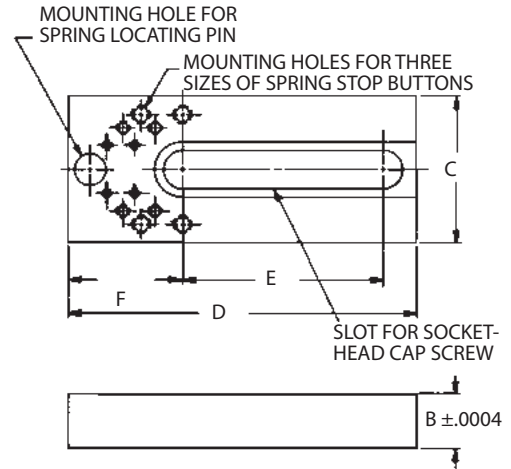
CL-30C-SSB



CL-7-SLP-1 Light  
CL-7-SLP-2 Medium  
CL-7-SLP-3 Heavy

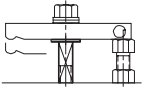


CL-7A-SLP-1 Light  
CL-7A-SLP-2 Medium  
CL-7A-SLP-3 Heavy

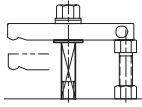


SIZE	PART NO.	FITS ROUND FACE STOP BUTTONS	FITS FLAT FACE STOP BUTTONS	FITS SPRING LOCATING PINS	B	C	D	E	F	SOCKET-HEAD CAP SCREW (1 REQD)	SOCKET-HEAD CAP SCREWS FOR SPRING STOP BUTTONS (2 REQD)		
											SMALL	MEDIUM	LARGE
MINI	CL-MF25-3901	CL-10A-SSB	CL-10C-SSB	CL-7-SLP-1	.5000	1	3	1-7/16	1-5/16	CL-5/16-18x1.00-SHCS	CL-6-32x.50-SHCS	—	—
	CL-MF40-3901	CL-10A-SSB	CL-10C-SSB		.7500	2	4-3/4	2-3/4	1-9/16	CL-1/2-13x1.25-SHCS	CL-6-32x.50-SHCS	CL-10-32x.50-SHCS	CL-1/4-20x.75-SHCS
STANDARD	CL-MF40-3902	CL-20A-SSB	CL-20C-SSB	1.0000	2					4-3/4			
	CL-MF40-3903	CL-30A-SSB	CL-30C-SSB	1.2500		CL-1/2-13x1.75-SHCS							
	CL-MF40-3904	CL-10A-SSB	CL-10C-SSB	1.5000		CL-5/8-11x1.50-SHCS							
	CL-MF50-3901	CL-20A-SSB	CL-20C-SSB	.7500		CL-5/8-11x2.00-SHCS							
HEAVY	CL-MF50-3902	CL-30A-SSB	CL-30C-SSB	1.0000	2	4-3/4	2-3/4	1-9/16	CL-5/8-11x2.00-SHCS	CL-6-32x.50-SHCS	CL-10-32x.50-SHCS	CL-1/4-20x.75-SHCS	
	CL-MF50-3903	CL-10A-SSB	CL-10C-SSB	1.2500					CL-5/8-11x2.25-SHCS				
	CL-MF50-3904	CL-20A-SSB	CL-20C-SSB	1.5000					CL-5/8-11x2.25-SHCS				
	CL-MF50-3904	CL-30A-SSB	CL-30C-SSB	1.5000					CL-5/8-11x2.25-SHCS				

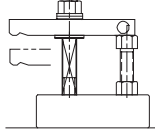
# SLOTTED-HEEL CLAMP STRAPS



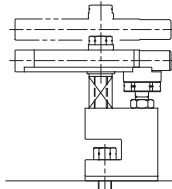
Short Clamp-Strap Assembly (see below)



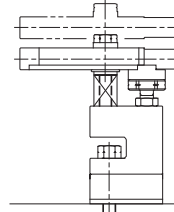
Tall Clamp-Strap Assembly (see below)



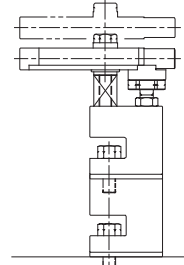
Tall Clamp-Strap Assembly - **INFO+**: on Riser Block (p. 396) or Riser Cylinders (p. 399)



High-Rise Clamp (**INFO+**: p. 410)



High-Rise Clamp on Spacer Block (**INFO+**: p. 412)

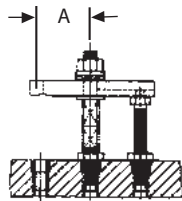


High-Rise Clamp on Narrow Riser Block (**INFO+**: p. 412)

Our most-popular clamp strap, with a slot underneath to allow sliding it straight back for clear loading. Choose from three different fastening devices, each available in a short or tall version, and two clamp-strap lengths. Order components individually (page numbers listed are in the tooling-component catalog section).



Spherical Nut & Washer



Mini  
Standard  
Heavy

## SPHERICAL NUT & WASHER (SHORT)

SIZE	CLAMPING HEIGHT RANGE	CLAMP STRAP (INFO++: p. 214)			CLAMP REST (p. 266)	CLAMP SPRINGS (p. 266)	FLAT WASHER (p. 252)	JAM NUT (p. 249)	STUD (p. 255)	SPHER. NUT & WASHER (p. 251)
		PART NO.	LENGTH	A						
MINI	0 to 1-1/16	CL-1A-CS	2-1/2	27/32	CL-1A-CR	CL-6-SPG	CL-14-FW	CL-5-JN	CL-5/16-18x3.00	CL-9-SNW
		CL-1B-CS	3	1-11/32						
STANDARD	0 to 1-3/8	CL-8-CS	5	2-1/4	CL-4-CR	CL-9-SPG	CL-2-FW	CL-8-JN	CL-1/2-13x4.00	CL-3-SNW
		CL-10-CS	6	2-3/4						
HEAVY	0 to 1-3/8	CL-16-CS	5	2-3/16	CL-6-CR	CL-11-SPG	CL-3-FW	CL-10-JN	CL-5/8-11x4.50	CL-4-SNW
		CL-18-CS	6	2-11/16						

## SPHERICAL NUT & WASHER (TALL)

SIZE	CLAMPING HEIGHT RANGE	CLAMP STRAP (INFO++: p. 214)			CLAMP REST (p. 266)	CLAMP SPRINGS (p. 266)	FLAT WASHER (p. 252)	JAM NUT (p. 249)	STUD (p. 255)	HAND KNOB (p. 79)	SPHERICAL WASHER (p. 251)
		PART NO.	LENGTH	A							
MINI	1 to 1-3/4	CL-1A-CS	2-1/2	27/32	CL-1B-CR	(2) CL-6-SPG	CL-14-FW	CL-5-JN	CL-5/16-18x3.50	CL-2-HK-2	CL-11-SW
		CL-1B-CS	3	1-11/32							
STANDARD	1-3/8 to 2-3/4	CL-8-CS	5	2-1/4	CL-5-CR	(2) CL-9-SPG	CL-2-FW	CL-8-JN	CL-1/2-13x5.50	CL-4-HK-4	CL-3-SW
		CL-10-CS	6	2-3/4							
HEAVY	1-3/8 to 2-1/2	CL-16-CS	5	2-3/16	CL-7-CR	(2) CL-11-SPG	CL-3-FW	CL-10-JN	CL-5/8-11x5.50	CL-10-HK-10	CL-4-SW
		CL-18-CS	6	2-11/16							

## HAND KNOB (SHORT)

SIZE	CLAMPING HEIGHT RANGE	CLAMP STRAP (INFO++: p. 214)			CLAMP REST (p. 266)	CLAMP SPRINGS (p. 266)	FLAT WASHER (p. 252)	JAM NUT (p. 249)	STUD (p. 255)	HAND KNOB (p. 79)	SPHERICAL WASHER (p. 251)
		PART NO.	LENGTH	A							
MINI	0 to 1-1/16	CL-1A-CS	2-1/2	27/32	CL-1A-CR	CL-6-SPG	CL-14-FW	CL-5-JN	CL-5/16-18x3.00	CL-2-HK-2	CL-11-SW
		CL-1B-CS	3	1-11/32							
STANDARD	0 to 1-3/8	CL-8-CS	5	2-1/4	CL-4-CR	CL-9-SPG	CL-2-FW	CL-8-JN	CL-1/2-13x4.00	CL-4-HK-4	CL-3-SW
		CL-10-CS	6	2-3/4							
HEAVY	0 to 1-3/8	CL-16-CS	5	2-3/16	CL-6-CR	CL-11-SPG	CL-3-FW	CL-10-JN	CL-5/8-11x4.50	CL-10-HK-10	CL-4-SW
		CL-18-CS	6	2-11/16							

## HAND KNOB (TALL)

SIZE	CLAMPING HEIGHT RANGE	CLAMP STRAP (INFO++: p. 214)			CLAMP REST (p. 266)	CLAMP SPRINGS (p. 266)	FLAT WASHER (p. 252)	JAM NUT (p. 249)	SPHERICAL WASHER (p. 251)	CAM HANDLE (p. 264)	EYE BOLT (p. 262)	CLEVIS PIN (p. 264)
		PART NO.	LENGTH	A								
MINI	1 to 1-3/4	CL-1A-CS	2-1/2	27/32	CL-1B-CR	(2) CL-6-SPG	CL-14-FW	CL-5-JN	CL-5/16-18x3.50	CL-2-HK-2	CL-11-SW	
		CL-1B-CS	3	1-11/32								
STANDARD	1-3/8 to 2-3/4	CL-8-CS	5	2-1/4	CL-5-CR	(2) CL-9-SPG	CL-2-FW	CL-8-JN	CL-1/2-13x5.50	CL-4-HK-4	CL-3-SW	
		CL-10-CS	6	2-3/4								
HEAVY	1-3/8 to 2-1/2	CL-16-CS	5	2-3/16	CL-7-CR	(2) CL-11-SPG	CL-3-FW	CL-10-JN	CL-5/8-11x5.50	CL-10-HK-10	CL-4-SW	
		CL-18-CS	6	2-11/16								

## CAM HANDLE (SHORT)

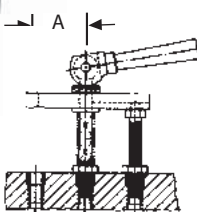
SIZE	CLAMPING HEIGHT RANGE	CLAMP STRAP (INFO++: p. 214)			CLAMP REST (p. 266)	CLAMP SPRINGS (p. 266)	FLAT WASHER (p. 252)	JAM NUT (p. 249)	SPHERICAL WASHER (p. 251)	CAM HANDLE (p. 264)	EYE BOLT (p. 262)	CLEVIS PIN (p. 264)
		PART NO.	LENGTH	A								
MINI	0 to 1-1/16	CL-1A-CS	2-1/2	27/32	CL-1A-CR	CL-6-SPG	CL-14-FW	CL-5-JN	CL-11-SW	CL-11A-CH	CL-31-EB	CL-810-CLVP
		CL-1B-CS	3	1-11/32								
STANDARD	0 to 1-3/8	CL-8-CS	5	2-1/4	CL-4-CR	CL-9-SPG	CL-2-FW	CL-8-JN	CL-3-SW	CL-13-CH	CL-50-EB	CL-1218-CLVP
		CL-10-CS	6	2-3/4								
HEAVY	0 to 1-3/8	CL-16-CS	5	2-3/16	CL-6-CR	CL-11-SPG	CL-3-FW	CL-10-JN	CL-4-SW	CL-14-CH	CL-62-EB	CL-2020-CLVP
		CL-18-CS	6	2-11/16								

## CAM HANDLE (TALL)

SIZE	CLAMPING HEIGHT RANGE	CLAMP STRAP (INFO++: p. 214)			CLAMP REST (p. 266)	CLAMP SPRINGS (p. 266)	FLAT WASHER (p. 252)	JAM NUT (p. 249)	SPHERICAL WASHER (p. 251)	CAM HANDLE (p. 264)	EYE BOLT (p. 262)	CLEVIS PIN (p. 264)
		PART NO.	LENGTH	A								
MINI	1 to 1-3/4	CL-1A-CS	2-1/2	27/32	CL-1B-CR	(2) CL-6-SPG	CL-14-FW	CL-5-JN	CL-11-SW	CL-11A-CH	CL-32-EB	CL-810-CLVP
		CL-1B-CS	3	1-11/32								
STANDARD	1-3/8 to 2-3/4	CL-8-CS	5	2-1/4	CL-5-CR	(2) CL-9-SPG	CL-2-FW	CL-8-JN	CL-3-SW	CL-13-CH	CL-51-EB	CL-1218-CLVP
		CL-10-CS	6	2-3/4								
HEAVY	1-3/8 to 2-1/2	CL-16-CS	5	2-3/16	CL-7-CR	(2) CL-11-SPG	CL-3-FW	CL-10-JN	CL-4-SW	CL-14-CH	CL-63-EB	CL-2020-CLVP
		CL-18-CS	6	2-11/16								



Cam Handle



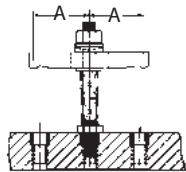
Mini  
Standard  
Heavy

# DOUBLE-END CLAMP STRAPS

A clamp-strap assembly with two clamping ends, for holding two workpieces simultaneously. Choose from three different fastening devices, each available in a short or tall version, and two clamp-strap lengths. Order components individually.



**Spherical Nut & Washer**



**Mini  
Standard  
Heavy**

## SPHERICAL NUT & WASHER (SHORT)

SIZE	CLAMPING-HEIGHT RANGE	CLAMP STRAP (INFO++: p. 222)			CLAMP SPRINGS (p. 266)	FLAT WASHER (p. 2525)	JAM NUT (p. 249)	STUD (p. 255)	SPHERICAL NUT & WASHER (p. 251)
		PART NO.	LENGTH	A					
MINI	0 to 1-1/16	CL-23C-CS	2	27/32	CL-6-SPG	CL-14-FW	CL-5-JN	CL-5/16-18x3.00	CL-9-SNW
		CL-23D-CS	3	1-11/32					
STNADARD	0 to 1-3/8	CL-28-CS	5	2-19/64	CL-9-SPG	CL-2-FW	CL-8-JN	CL-1/2-13x4.00	CL-3-SNW
		CL-30-CS	6	2-51/64					
HEAVY	0 to 1-3/8	CL-32A-CS	5	2-1/4	CL-11-SPG	CL-3-FW	CL-10-JN	CL-5/8-11x4.50	CL-4-SNW
		CL-33-CS	6	2-3/4					

## SPHERICAL NUT & WASHER (TALL)

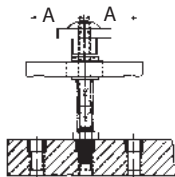
MINI	1 to 1-3/4	CL-23C-CS	2	27/32	(2) CL-6-SPG	CL-14-FW	CL-5-JN	CL-5/16-18x3.50	CL-9-SNW
		CL-23D-CS	3	1-11/32					
STNADARD	1-3/8 to 2-3/4	CL-28-CS	5	2-19/64	(2) CL-9-SPG	CL-2-FW	CL-8-JN	CL-1/2-13x5.50	CL-3-SNW
		CL-30-CS	6	2-51/64					
HEAVY	1-3/8 to 2-1/2	CL-32A-CS	5	2-1/4	(2) CL-11-SPG	CL-3-FW	CL-10-JN	CL-5/8-11x5.50	CL-4-SNW
		CL-33-CS	6	2-3/4					

## HAND KNOB (SHORT)

SIZE	CLAMPING-HEIGHT RANGE	CLAMP STRAP (INFO++: p. 222)			CLAMP SPRINGS (p. 266)	FLAT WASHER (p. 2525)	JAM NUT (p. 249)	STUD (p. 255)	HAND KNOB (p. 79)	SPHERICAL NUT & WASHER (p. 251)
		PART NO.	LENGTH	A						
MINI	0 to 1-1/16	CL-23C-CS	2	27/32	CL-6-SPG	CL-14-FW	CL-5-JN	CL-5/16-18x3.00	CL-2-HK-2	CL-11-SW
		CL-23D-CS	3	1-11/32						
STNADARD	0 to 1-3/8	CL-28-CS	5	2-19/64	CL-9-SPG	CL-2-FW	CL-8-JN	CL-1/2-13x4.00	CL-4-HK-4	CL-3-SW
		CL-30-CS	6	2-51/64						
HEAVY	0 to 1-3/8	CL-32A-CS	5	2-1/4	CL-11-SPG	CL-3-FW	CL-10-JN	CL-5/8-11x4.50	CL-10-HK-10	CL-4-SW
		CL-33-CS	6	2-3/4						



**Hand Knob**



**Mini  
Standard  
Heavy**

## HAND KNOB (TALL)

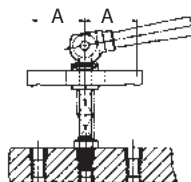
MINI	1 to 1-3/4	CL-23C-CS	2	27/32	(2) CL-6-SPG	CL-14-FW	CL-5-JN	CL-5/16-18x3.50	CL-2-HK-2	CL-11-SW
		CL-23D-CS	3	1-11/32						
STNADARD	1-3/8 to 2-3/4	CL-28-CS	5	2-19/64	(2) CL-9-SPG	CL-2-FW	CL-8-JN	CL-1/2-13x5.50	CL-4-HK-4	CL-3-SW
		CL-30-CS	6	2-51/64						
HEAVY	1-3/8 to 2-1/2	CL-32A-CS	5	2-1/4	(2) CL-11-SPG	CL-3-FW	CL-10-JN	CL-5/8-11x5.50	CL-10-HK-10	CL-4-SW
		CL-33-CS	6	2-3/4						

## CAM HANDLE (SHORT)

SIZE	CLAMPING-HEIGHT RANGE	CLAMP STRAP (INFO++: p. 222)			CLAMP SPRINGS (p. 266)	FLAT WASHER (p. 2525)	JAM NUT (p. 249)	SPHERICAL NUT & WASHER (p. 251)	CAM HANDLE (p. 264)	EYE BOLT (p. 262)	DOWEL PIN (p. 196)
		PART NO.	LENGTH	A							
MINI	0 to 1-1/16	CL-23C-CS	2	27/32	CL-6-SPG	CL-14-FW	CL-5-JN	CL-11-SW	CL-11A-CH	CL-31-EB	CL-1/4x.62-CADP
		CL-23D-CS	3	1-11/32							
STNADARD	0 to 1-3/8	CL-28-CS	5	2-19/64	CL-9-SPG	CL-2-FW	CL-8-JN	CL-3-SW	CL-13-CH	CL-50-EB	CL-3/8x1.00-CADP
		CL-30-CS	6	2-51/64							
HEAVY	0 to 1-3/8	CL-32A-CS	5	2-1/4	CL-11-SPG	CL-3-FW	CL-10-JN	CL-4-SW	CL-14-CH	CL-62-EB	CL-5/8x1.25-CADP
		CL-33-CS	6	2-3/4							



**Cam Handle**



**Mini  
Standard  
Heavy**

## SPHERICAL NUT & WASHER (TALL)

MINI	1 to 1-3/4	CL-23C-CS	2	27/32	(2) CL-6-SPG	CL-14-FW	CL-5-JN	CL-11-SW	CL-11A-CH	CL-32-EB	CL-1/4x.62-CADP
		CL-23D-CS	3	1-11/32							
STNADARD	1-3/8 to 2-3/4	CL-28-CS	5	2-19/64	(2) CL-9-SPG	CL-2-FW	CL-8-JN	CL-3-SW	CL-13-CH	CL-51-EB	CL-3/8x1.00-CADP
		CL-30-CS	6	2-51/64							
HEAVY	1-3/8 to 2-1/2	CL-32A-CS	5	2-1/4	(2) CL-11-SPG	CL-3-FW	CL-10-JN	CL-4-SW	CL-14-CH	CL-63-EB	CL-5/8x1.25-CADP
		CL-33-CS	6	2-3/4							

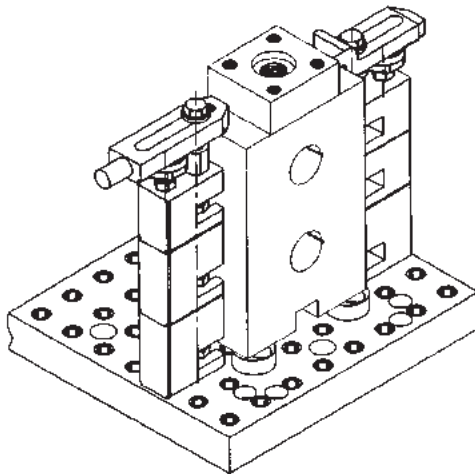
# HIGH-RISE CLAMPS



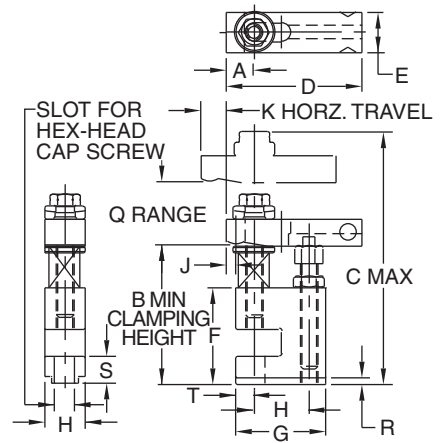
Mini  
Standard  
Heavy

Slotted  
Heel

For clamping taller workpieces. All-in-one clamp construction for quick, safe setups. Modular design allows stacking for height flexibility. Clamp Straps slide back for loading clearance. Tapped-Nose and Gooseneck Clamp Straps can be reversed to use either end for clamping. The tapped-nose end accepts a contact bolt, while the cylindrical end is ideal for clamping in horizontal holes or narrow slots. The gooseneck strap provides a low clamp profile, and can also be reversed to use the plain end as a tapered-nose clamp.



High-Rise Clamps can be stacked on Narrow Riser Blocks and Spacer Blocks (INFO+ page 412) to reach tall workpieces.



## SLOTTED HEEL HIGH-RISE CLAMPS

SIZE	PART NO.	A	B	C	D	E	F	G	H	J	K	Q	R	S	T	HEX-HEAD CAP SCREW (1 REQD)
MINI	CL-MF25-2051	1/2	1-7/8	3-3/8	2-1/2	3/4	1-7/16	1-5/8	1	5/32	1/2	1/2	3/32	3/8	1/2	CL-MF25-4312*
	CL-MF25-2052				3						1					
STANDARD	CL-MF40-2051	23/32	3-5/8	5-3/4	4	1-1/4	2-3/4	2-3/4	1-9/16	13/64	1-9/32	1	3/16	13/16	9/16	CL-MF40-4311
HEAVY	CL-MF50-2051	29/32		7-1/4	5	1-1/2	2-15/16	3-9/16	2	1/4	1-19/32				13/16	CL-MF50-4311

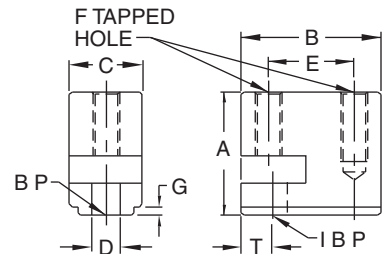
\* Use CL-MF25-4311 when mounted on a Narrow Riser Block.



Mini  
Standard  
Heavy

Adaptor  
Base

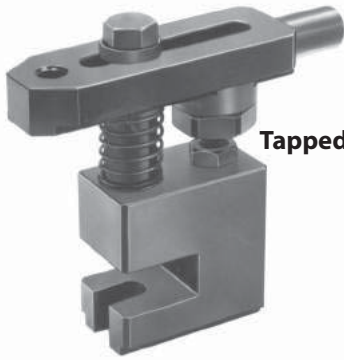
Adaptor used in the assembly above. Also allows using other types of clamp straps as high-rise clamps.



## ADAPTOR BASES

SIZE	PART NO.	A	B	C	D	E	F	G	HEX-HEAD CAP SCREW (1 REQD)
MINI	CL-MF25-1902	1-7/16	1-5/8	1	11/32	1	5/16-18	3/32	CL-MF25-4312
STANDARD	CL-MF40-1901	2-3/4	2-3/4	1-9/16	9/16	1-9/16	1/2-13	3/16	CL-MF40-4311
HEAVY	CL-MF50-1901	2-15/16	3-9/16	2	11/16	2	5/8-11	3/16	CL-MF50-4311

# HIGH-RISE CLAMPS



**Tapped Nose**

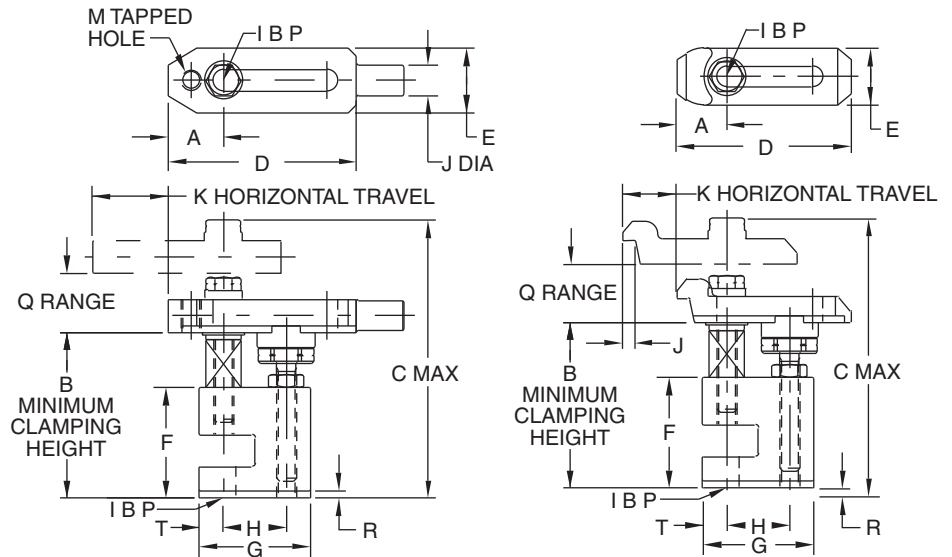
**Mini  
Standard  
Heavy**



**Gooseneck**

**Standard  
Heavy**

Tapped-Nose and Gooseneck Clamp Straps can be reversed to use either end for clamping (except mini, which has no cylindrical end). The tapped-nose end accepts a contact bolt, while the cylindrical end is ideal for clamping in horizontal holes or narrow slots. The gooseneck strap provides a low clamp profile, and can also be reversed to use the plain end as a tapered-nose clamp.

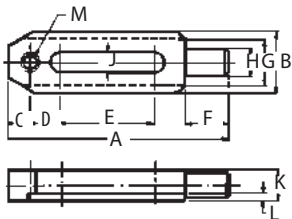


## TAPPED-NOSE HIGH-RISE CLAMPS

SIZE	PART NO.	A	B	C	D	E	F	G	H	J	K	M	Q	R	S	T	HEX-HEAD CAP SCREW (1 REQD)
MINI	CL-MF25-2001	1	1-7/8	3-3/8	3-1/2	3/4	1-7/16	1-5/8	1	—	1	5/16-18	1/2	3/32	3/8	1/2	CL-MF25-4312
STANDARD	CL-MF40-2001	1-3/8	4-1/8	6-5/8	5-7/8	1-5/8	2-3/4	2-3/4	1-9/16	3/4	1-9/16	1/2-13	1-1/4	3/16	13/16	9/16	CL-MF40-4311
HEAVY	CL-MF50-2001	1-13/16	4-3/8	7-3/8	7-1/2	2	2-15/16	3-9/16	2	1	2	5/8-11	1-3/8	3/16	13/16	13/16	CL-MF50-4311

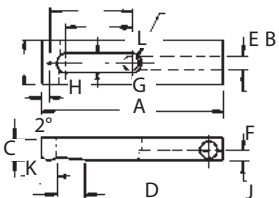
## GOOSENECK HIGH-RISE CLAMPS

STANDARD	CL-MF40-2101	1-3/4	4-3/4	6-5/8	4-5/8	1-3/8	2-3/4	2-3/4	1-9/16	9/16	1-3/8	—	1-1/4	3/16	13/16	9/16	CL-MF40-4311
HEAVY	CL-MF50-2101	2-3/8	5-3/8	7-5/8	6-1/2	2	2-15/16	3-9/16	2	11/16	2	—	1-3/8	3/16	13/16	13/16	CL-MF50-4311



## TAPPED-NOSE CLAMP STRAPS

SIZE	PART NO.	STUD SIZE	A	B	C	D	E	F	G	H DIA.	J	K	L	M
MINI	CL-MF25-2201	5/16-18	3-1/2	3/4	3/8	5/8	1	—	—	—	11/32	1/2	—	5/16-18
STANDARD	CL-MF40-2201	1/2-13	5-7/8	1-5/8	9/16	13/16	2-9/16	1-3/16	1-3/16	3/4	17/32	13/16	5/32	1/2-13
HEAVY	CL-MF50-2201	5/8-11	7-1/2	2	13/16	1	3-1/8	1-7/16	1-9/16	1	11/16	1-1/8	3/16	5/8-11

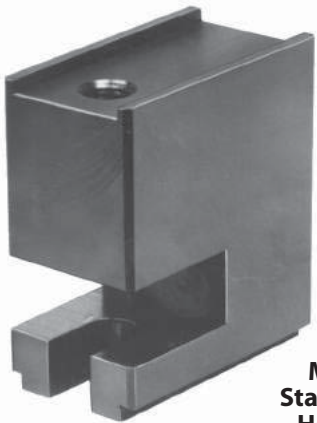


## GOOSENECK CLAMP STRAPS

SIZE	PART NO.	STUD SIZE	A	B	C	D	E	F	G	H	J	K	L
STANDARD	CL-MF40-2201	1/2-13	4-5/16	1-7/16	1-1/16	4	1-3/16	5/8	2-1/8	1-9/16	5/32	19/32	17/32
HEAVY	CL-MF50-2201	5/8-11	6-5/16	2	2	5-11/16	1-9/16	1	2-3/4	2-3/16	3/16	1	11/16

# HIGH-RISE-CLAMP ACCESSORIES

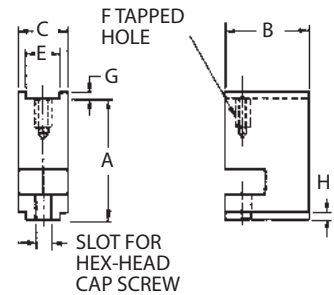
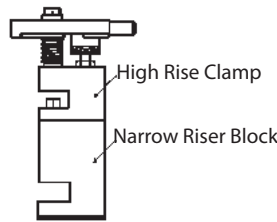
CARBON STEEL, BLACK OXIDE FINISH



**Narrow Riser Block**

**Mini  
Standard  
Heavy**

These Narrow Riser Blocks are used to raise up High-Rise Clamps to reach tall workpieces. Interlocking channels ensure that clamps and risers remain properly aligned when stacked up. Clamps and risers are fastened to the tapped hole on top of the riser block.



## NARROW RISER BLOCKS

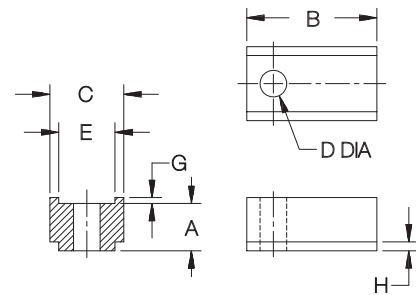
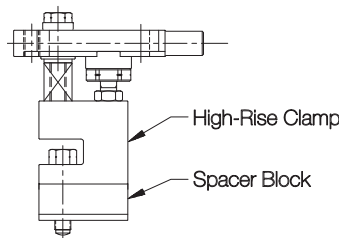
SIZE	PART NO.	A	B	C	E	F	G	H	HEX-HEAD CAP SCREW (1 REQD)
MINI	CL-MF25-2301	1	1-5/8	1	13/16	5/16-18	1/16	3/32	CL-MF25-4312
STANDARD	CL-MF40-2301	3	2-3/4	1-9/16	1-3/16	1/2-13	1/8	3/16	CL-MF40-4311
HEAVY	CL-MF50-2301	3	3-9/16	2	1-9/16	5/8-11	1/8	3/16	CL-MF50-4311



**Spacer Block**

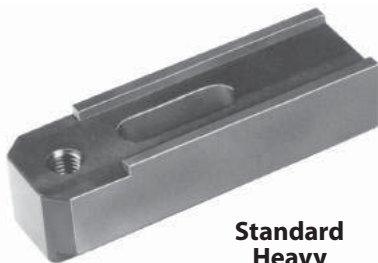
**Mini  
Standard  
Heavy**

A shorter version of the Narrow Riser Block for raising height only slightly. These blocks also have interlocking channels and can be stacked. Note: A longer hex-head cap screw is required to mount the High-Rise Clamp when using a Spacer Block.



## SPACER BLOCKS

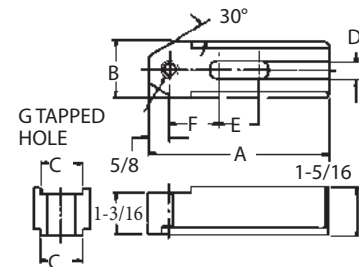
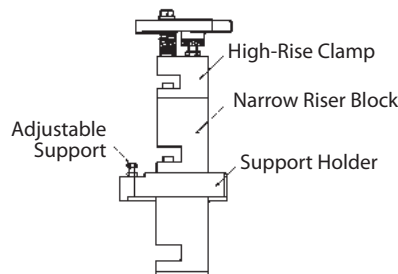
SIZE	PART NO.	A	B	C	D DIA	E	G	H
MINI	CL-MF25-2351	1/2	1-5/8	1	11/32	13/16	1/16	3/32
STANDARD	CL-MF40-2351	1	2-3/4	1-9/16	17/32	1-3/16	1/8	3/16
HEAVY	CL-MF50-2351	1	3-9/16	2	11/16	1-9/16	1/8	3/16



**Support Holder**

**Standard  
Heavy**

Support Holders allow using an adjustable support as part of a High-Rise-Clamp assembly. Slotted to allow positioning support anywhere within a range. **INFO+**: For precision height location, an Extension Support (page 397) can be used instead (always used on mini size). Note: The longest standard hex-head cap screw is required to mount High-Rise Clamps when using a Support Holder.



## SUPPORT HOLDERS

SIZE	PART NO.	A	B	C	D	E	F	G
STANDARD	CL-MF40-2401	5-1/8	1-9/16	1-3/16	17/32	1-3/16	1-3/16	1/2-13
HEAVY	CL-MF50-2401	6-3/8	2	1-9/16	11/16	1-9/16	1-3/8	5/8-11

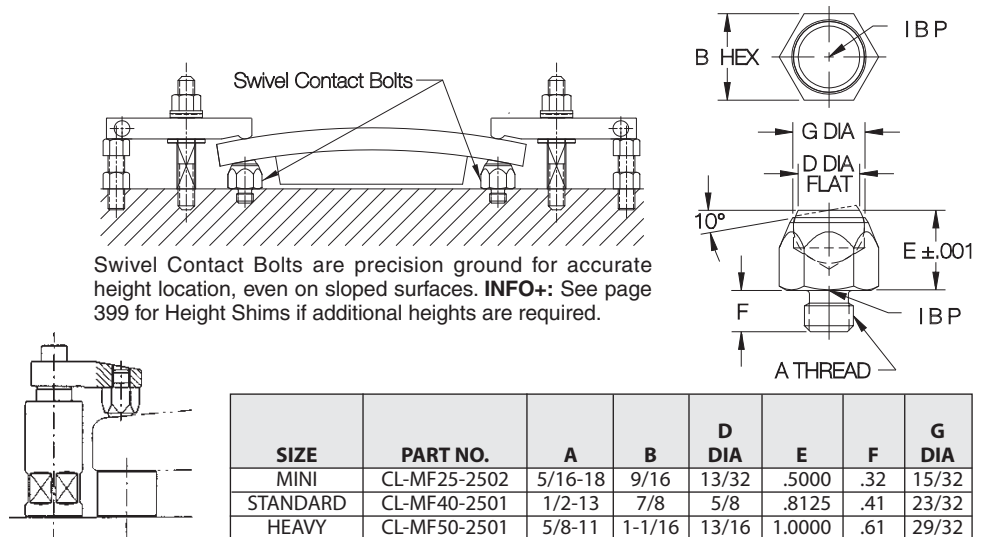
# SWIVEL CONTACT BOLTS

BALL: CHROME STEEL, HEAT TREATED RC 60-67  
 BODY: 1144 STEEL, HEAT TREATED RC 35-40, BLACK OXIDE FINISH



**Mini  
Standard  
Heavy**

Precision swivel ball that can be used as either a contact bolt or rest pad. Ideal for evenly distributing clamping pressure on sloped surfaces. **INFO+**: For additional thread sizes, see tooling-component catalog section (page 194).

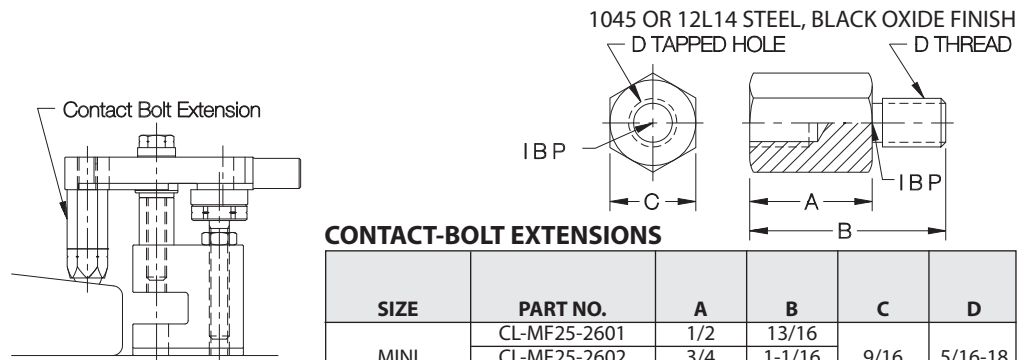


# CONTACT-BOLT EXTENSIONS



**Mini  
Standard  
Heavy**

Use with Swivel Contact Bolts to extend their length. Extensions can be stacked to increase length even further.



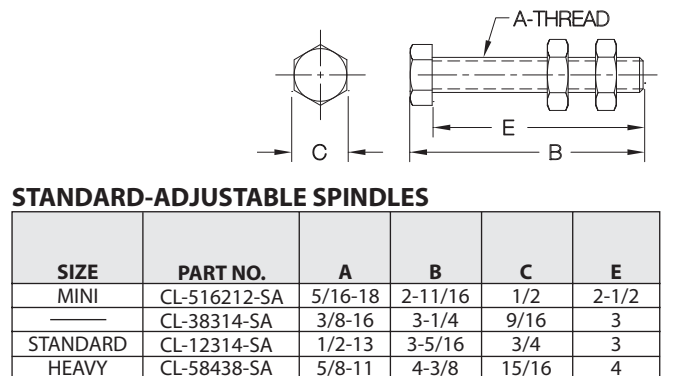
# STANDARD-ADJUSTABLE SPINDLES



**Mini  
Standard  
Heavy**

Long hex-head contact bolt. Fully threaded for maximum adjustment range.

CARBON STEEL, ZINC PLATED CLEAR CHROMATE

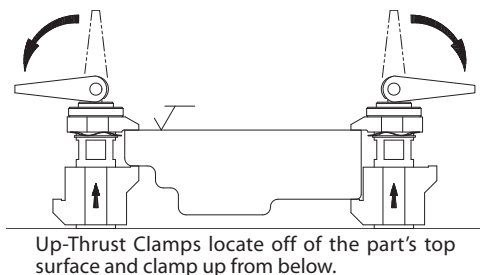


# UP-THRUST CLAMPS

STEEL, WEAR SURFACES HARDENED, BLACK OXIDE FINISH



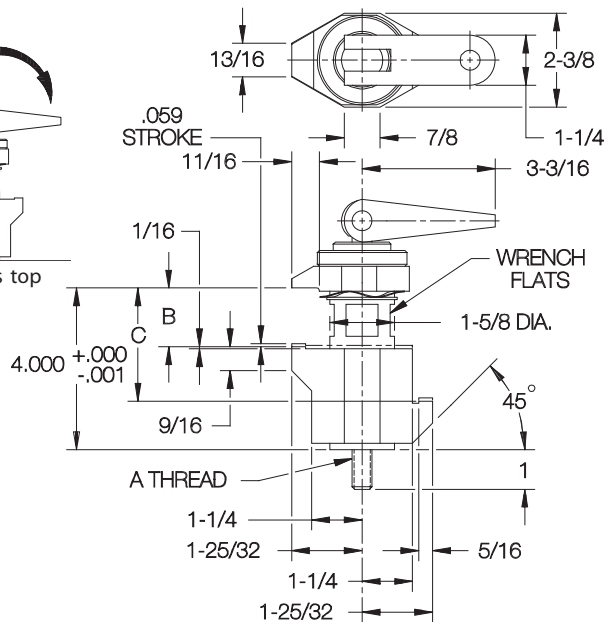
**Standard**



Up-Thrust Clamps locate off of the part's top surface and clamp up from below.

Combination clamp and locator with unique upward clamping action. Pushing down the cam handle pulls the lower jaw upward. This clamps the workpiece against the stationary upper jaw, whose bottom surface is a precision-ground locator.

The lower jaw has two clamping surfaces 180° apart, one for thinner parts, the other for thicker parts. The cam handle rotates to screw the lower jaw up or down for fine adjustment.



SIZE	PART NO.	A	B RANGE		C RANGE		MAX CLAMPING FORCE (LBS)
			MIN	MAX	MIN	MAX	
STANDARD	CL-MF40-5301	1/2-13	0	1-3/8	1-3/8	2-3/4	2200

# SWING CLAMP ASSEMBLIES

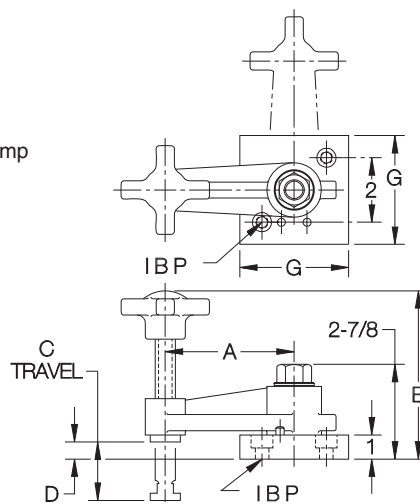
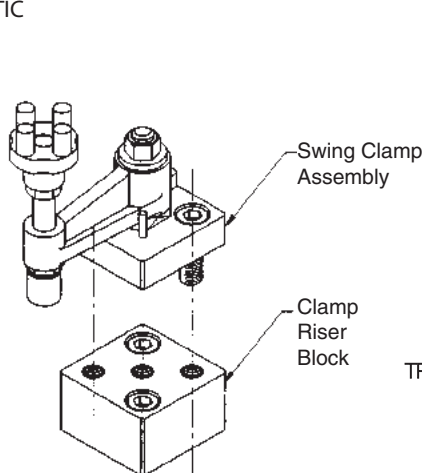
ARM: DUCTILE IRON ASTM CLASS 60-45-10, ZINC PLATED  
 KNOB: CAST ALUMINUM, BALLS: BLACK PHENOLIC PLASTIC  
 OTHER COMPONENTS: MILD STEEL, BLACK OXIDE FINISH



**Ball Handle**

**Knob Handle**

**Standard Heavy**



Long-reach swing clamp that can be hand tightened for medium clamping force. The stop pin furnished can be installed on either side for clockwise or counterclockwise rotation. **INFO+**: For additional height, use Clamp Riser Blocks (see website). **INFO+**: For additional, non-modular sizes and more complete dimensions, see pages 258-259.

## BALL HANDLE

SIZE	PART NO.	A	B	C	D	E	G	SOCKET-HEAD CAP SCREWS (2 REQD)
STANDARD	CL-MF40-1511	2-1/2	3-3/4	13/16	1/2	1/2-13	3	CL-1/2-13x1.50-SHCS
HEAVY	CL-MF50-1511	4	4-3/4	1-13/16	1/2	5/8-11	3-3/8	CL-5/8-11x2.00-SHCS

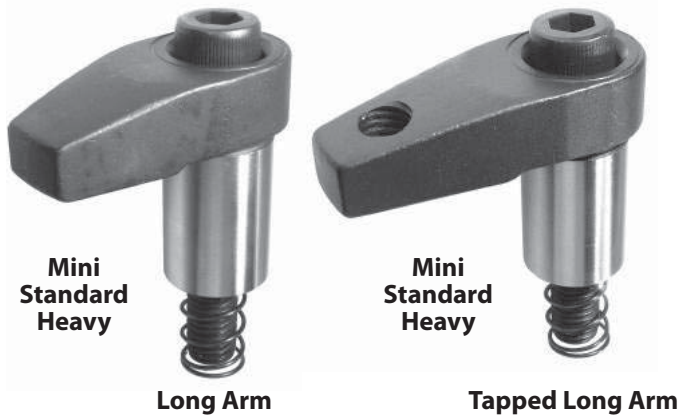
## KNOB HANDLE

STANDARD	CL-MF40-1521	2-1/2	3-3/4	13/16	1/2	1/2-13	3	CL-1/2-13x1.50-SHCS
HEAVY	CL-MF50-1521	4	4-3/4	1-13/16	1/2	5/8-11	3-3/8	CL-5/8-11x2.00-SHCS

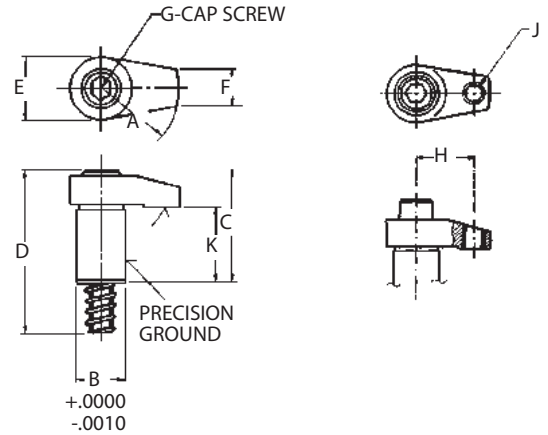


# HOOK CLAMPS

CLAMP BODY: 4135 STEEL, HEAT TREATED, BLACK OXIDE FINISH  
 HOLDER: 1045 STEEL, BLACK OXIDE FINISH

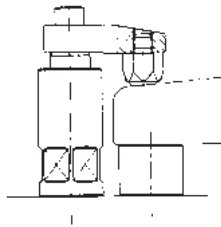


Versatile Hook Clamps available with either a plain or tapped arm. The tapped-arm version accepts a wide variety of contact bolts or adjustment spindles to increase clamping range (the tapped arm is also slightly longer). **INFO+**: For additional sizes and more complete dimensions, see pages 252-254 of tooling component catalog section.



## LONG-ARM HOOK CLAMPS

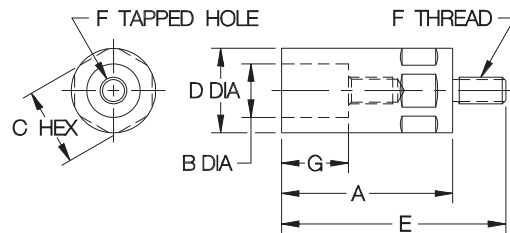
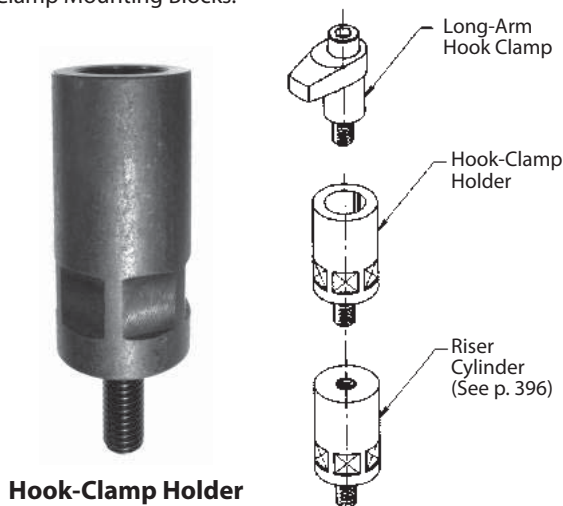
SIZE	PART NO.	A	B DIA	C	D	E	F	G	H	J	K
MINI	CL-MF25-5002	1	.7500	1-7/16	2-5/16	7/8	3/8	5/16-18x2.00	—	—	29/32
STANDARD	CL-MF40-5002	2	1.0000	2-1/2	3-1/2	1-1/4	11/16	1/2-13x3.00	—	—	1-17/32
HEAVY	CL-MF50-5002	2	1.2500	2-7/8	3-7/8	1-7/16	7/8	5/8-11x3.25	—	—	1-17/32



## TAPPED LONG-ARM HOOK CLAMPS

SIZE	PART NO.	A	B DIA	C	D	E	F	G	H	J	K
MINI	CL-MF25-5013	1-3/16	.7500	1-7/16	2-5/16	7/8	3/8	5/16-18x2.00	15/16	5/16-18	29/32
STANDARD	CL-MF40-5013	2-3/8	1.0000	2-1/2	3-1/2	1-1/4	11/16	1/2-13x3.00	1-13/16	1/2-13	1-17/32
HEAVY	CL-MF50-5014	2-3/8	1.2500	2-7/8	3-7/8	1-7/16	7/8	5/8-11x3.25	1-13/16	5/8-11	1-17/32

Hook Clamps work well in conjunction with Support Cylinders (**INFO+** page 400) or Screw Rest Pads (**INFO+** page 403) to allow clamping directly over a supported point. **INFO+**: Also see page 254 for Hook-Clamp Mounting Blocks.



## HOOK-CLAMP HOLDERS

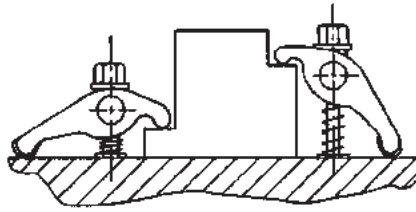
SIZE	PART NO.	F THREAD SIZE	A	B DIA	C	D DIA	E	G
MINI	CL-MF25-5101	5/16-18	2-1/4	.7500	7/8	1	3	15/16
STANDARD	CL-MF40-5101	1/2-13	3-1/8	1.0000	1-7/16	1-9/16	4-3/8	1-9/16
	CL-MF40-5102		4				5-1/4	
HEAVY	CL-MF50-5101	5/8-11	3-1/8	1.2500	1-3/4	2	4-3/8	1-9/16
	CL-MF50-5102		4				5-1/4	

# FORGED ADJUSTABLE CLAMPS

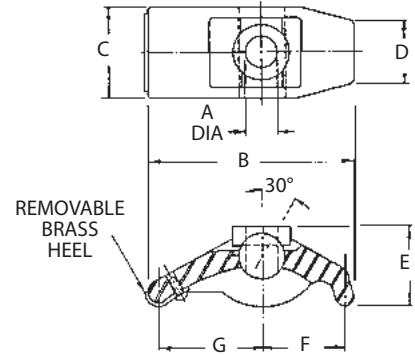
FORGED C1045 STEEL, BLACK OXIDE FINISH



**Standard Heavy**



Rugged forged steel pivot clamp with an integral heel support. Order components individually. **INFO+:** For additional sizes, see page 217.



SIZE	PART NO.				CLAMPING-HEIGHT RANGE	A	B	C	D	E	F	G
	CLAMP (p. 211)	STUD (p. 258)	FLANGE NUT (p. 252)	JAM NUT (p. 251)								
MINI	CL-6-FAC	CL-5/16-18x3.00-FTS	CL-3-FN	CL-5-JN	0 to 1-3/4	7/16	3-1/4	1-1/4	7/8	1	1-1/8	1-7/8
STANDARD	CL-8-FAC	CL-1/2-13x4.00-FTS	CL-3-FN	CL-8-JN	0 to 2-1/16	9/16	4	1-5/8	1-1/8	1-7/16	1-7/16	2-5/16
HEAVY	CL-10-FAC	CL-5/8-11x5.00-FTS	CL-4-FN	CL-10-JN	0 to 3	11/16	5-1/2	1-7/8	1-3/8	1-7/8	2	3-1/4

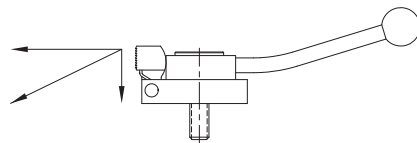
# CAM EDGE CLAMPS

BODY: STEEL, WEAR SURFACES HARDENED, BLACK OXIDE FINISH  
BALL HANDLE: BLACK PHENOLIC PLASTIC

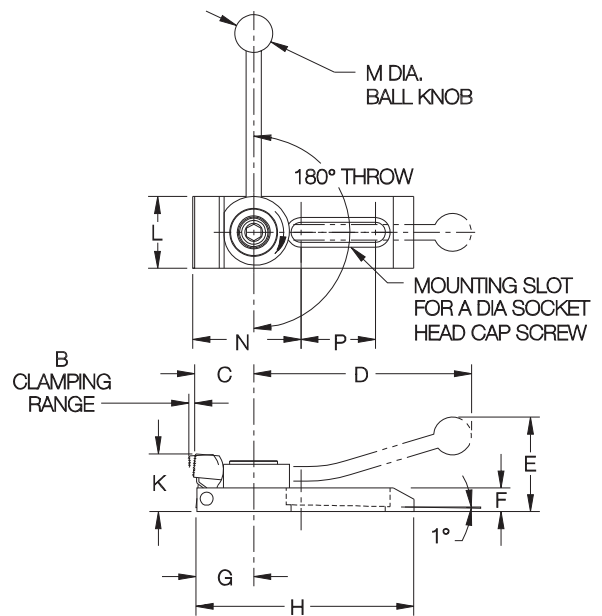


**Mini Standard**

Pivoting-nose edge clamp operated by a cam handle for fast action. Smooth spiral cam locks positively anywhere within its 180° throw. Choice of clockwise or counterclockwise handle rotation to clamp. **INFO+:** For additional models, see page 250.



Nose pivots to exert clamping force forward and downward at the same time.



SIZE	PART NO.	CLAMPING DIRECTION	A	B	C	D	E	F	G	H	K		L	M	N	P	MAX CLAMPING FORCE (LBS)		SOCKET-HEAD CAP SCREW (1 REQD)
											MIN	MAX					HORIZ	VERT	
MINI	CL-MF25-5611	CLOCKWISE	5/16-18	5/32	1-1/8	3-15/16	1-5/8	7/16	15/16	3-1/2	7/8	1	1-1/4	3/4	2	1	750	50	CL-5/16-18x1.00-SHCS
	CL-MF25-5612	CCW																	
STANDARD	CL-MF40-5611	CLOCKWISE	1/2-13	7/32	1-9/16	5-3/4	2-1/2	5/8	1-1/2	6	1-5/16	1-1/2	1-7/8	1	2-15/16	2	1500	100	CL-1/2-13x1.25-SHCS
	CL-MF40-5612	CCW																	

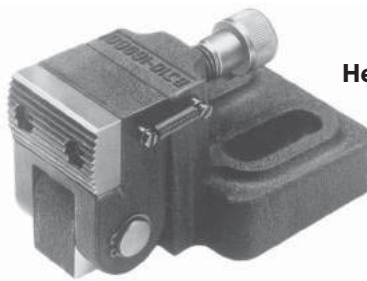
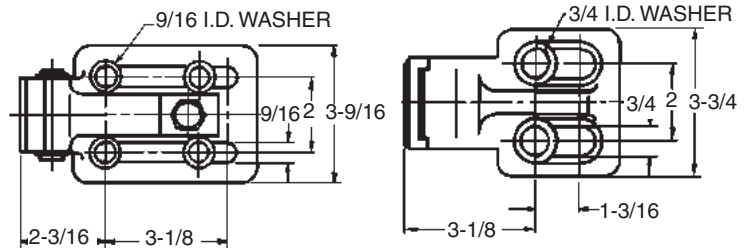
# PIVOTING EDGE CLAMPS

BODY: GRAY CAST IRON, ASTM CLASS 40, BLACK OXIDE FINISH  
 JAW: 1045 STEEL, HEAT TREATED RC 40-45, BLACK OXIDE FINISH  
 BOLT: 4135 STEEL, HEAT TREATED, BLACK OXIDE FINISH

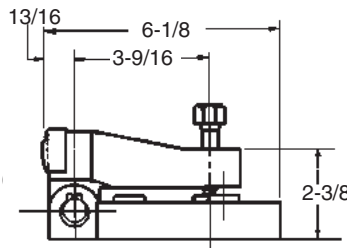
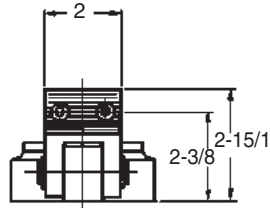


**Standard**

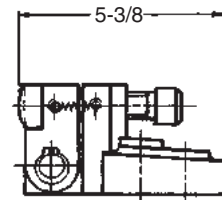
Large edge clamp that is ideal for tall workpieces. Pivoting nose pushes forward and downward simultaneously. Can be used to clamp against fixed locators, or against the Downthrust Backstops shown below. Replacement jaws are available.



**Heavy**

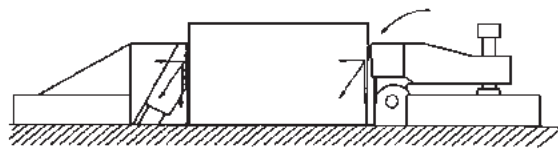


**Standard**



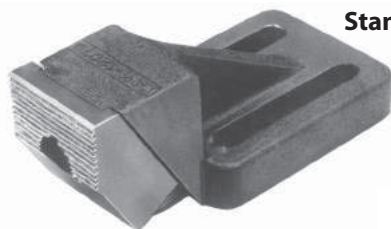
**Heavy**

**Pivoting Edge Clamps**

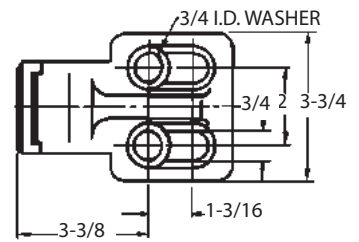
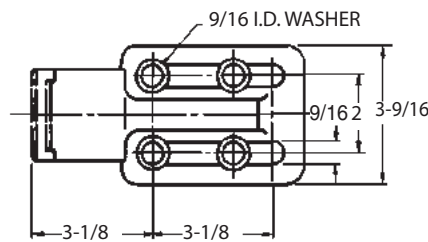


## PIVOTING EDGE CLAMPS

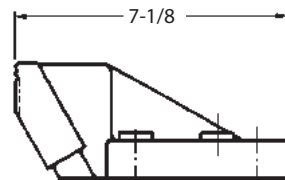
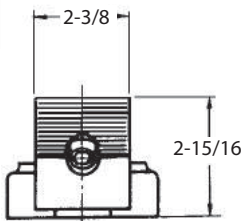
SIZE	PART NO.	MAX. CLAMPING FORCE (LBS)		SOCKET-HEAD CAP SCREWS (2 OR 4 REQD)	REPLACEMENT JAW
		HORIZ	VERT		
STANDARD	CL-MF40-1001	2000	220	(4) CL-1/2-13x2.25-SHCS	CL-MF40-1011
HEAVY	CL-MF50-1001	4200	730	(2) CL-5/8-11x3.00-SHCS	CL-MF40-1011



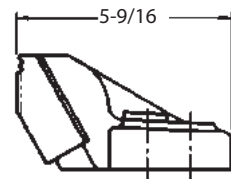
**Standard**



**Heavy**



**Standard**



**Heavy**

## Downthrust Backstops

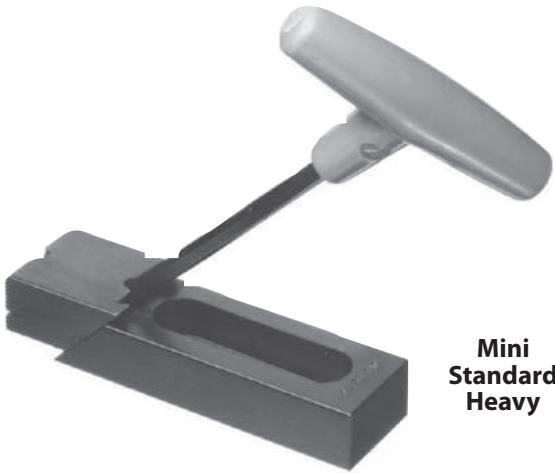
These backstops slide back and downward to provide downholding force on both sides of the workpiece when used with a matching edge clamp. Use when precise horizontal location is not necessary. Replacement jaws are available.

## DOWNTHRUST BACKSTOPS

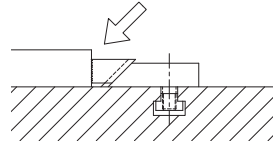
SIZE	PART NO.	SOCKET-HEAD CAP SCREWS (2 OR 4 REQD)	REPLACEMENT JAW
STANDARD	CL-MF40-1101	(4) CL-1/2-13x2.25-SHCS	CL-MF40-1111
HEAVY	CL-MF50-1101	(2) CL-5/8-11x3.00-SHCS	CL-MF40-1111

# SERRATED EDGE CLAMPS

BODY AND NOSE: 1018 STEEL, CARBURIZED-HARDENED, BLACK OXIDE FINISH  
 CLAMPING SCREW: 4140 STEEL, HEAT TREATED RC 43-45, BLACK OXIDE FINISH  
 NOSE COVER: ALUMINUM

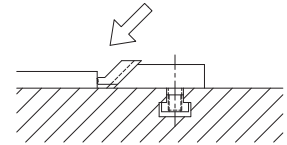


**Mini  
Standard  
Heavy**



**High Nose**

High-nose version is best for most applications. Gripping high up on the workpiece, close to the machining plane, provides maximum clamping rigidity. A removable aluminum nose cover is furnished for clamping soft or machined parts without damage.



**Low Nose**

Low-nose version is ideal for thin parts, with its extra machining clearance.

This low-profile clamp is ideal for gripping the side of a workpiece to keep the top clear for machining. Clamps both forward and down simultaneously, by tightening the socket-head screw in the sliding nose with a hex wrench. V-groove in nose is excellent for clamping round parts or corners.

## ADJUSTABLE — HIGH NOSE

SIZE	PART NO.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	MOUNTING SCREWS (1 OR 2 REQD)
MINI	CL-1-SAC	2	5/8	1	—	—	—	1/4	9/32	7/16	1/4	1-1/2	5/32	—	—	1-3/8	(1) CL-5/16-18x1.12-SHCS
	CL-5-SAC	3						1-1/4				2-1/2					
STANDARD	CL-45-SAC	4	7/8	1-1/2	—	—	—	1-1/4	1/2	5/8	5/16	3-3/16	1/4	—	—	2-1/4	(1) CL-1/2-13x1.50-SHCS
	CL-55-SAC	5-1/2						2-1/8				4-11/16				2-1/2	
	CL-65-SAC	7-1/8						3				6-5/16				2-9/16	
HEAVY	CL-75-SAC	5-1/2	1-1/4	1-3/4	—	—	—	1-3/8	5/8	3/4	5/16	4-1/2	5/16	—	—	3-9/32	(1) CL-5/8-11x2.00-SHCS
	CL-95-SAC	8-1/4						4				7-1/4				3	(2) CL-5/8-11x2.00-SHCS

## ADJUSTABLE — LOW NOSE

SIZE	PART NO.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	MOUNTING SCREWS (1 OR 2 REQD)
MINI	CL-0-SAC	2	5/8	1	—	—	—	1/4	9/32	—	1/4	1-1/2	5/32	1/8	1/8	1-3/8	(1) CL-5/16-18x1.12-SHCS
	CL-00-SAC	3						1-1/4				2-1/2					
STANDARD	CL-40-SAC	4	7/8	1-1/2	—	—	—	1-1/4	1/2	—	5/16	3-3/16	1/4	1/4	1/4	2-1/4	(1) CL-1/2-13x1.50-SHCS
	CL-50-SAC	5-1/2						2-1/8				4-11/16				2-1/2	
	CL-60-SAC	7-1/8						3				6-5/16				2-9/16	
HEAVY	CL-70-SAC	5-1/2	1-1/4	1-3/4	—	—	—	1-3/8	5/8	—	5/16	4-1/2	5/16	5/16	5/16	3-9/32	(1) CL-5/8-11x2.00-SHCS
	CL-90-SAC	8-1/4						4				7-1/4				3	(2) CL-5/8-11x2.00-SHCS

## FIXED — HIGH NOSE

MINI	CL-5-SFC	1-13/16	5/8	1	1	1-3/4	11/16	—	—	7/16	1/4	1-5/16	5/32	—	—	1-15/32	(2) CL-5/16-18x1.00-FHSS
STANDARD	CL-45-SFC	2-11/16	7/8	1-1/2	2	3	1	—	—	5/8	5/16	1-7/8	1/4	—	—	2-3/16	(2) CL-1/2-13x1.38-FHSS
HEAVY	CL-75-SFC	3-1/2	1-1/4	1-3/4	2	3-1/4	1-1/4	—	—	3/4	5/16	2-1/2	5/16	—	—	2-7/8	(2) CL-5/8-11x2.00-FHSS

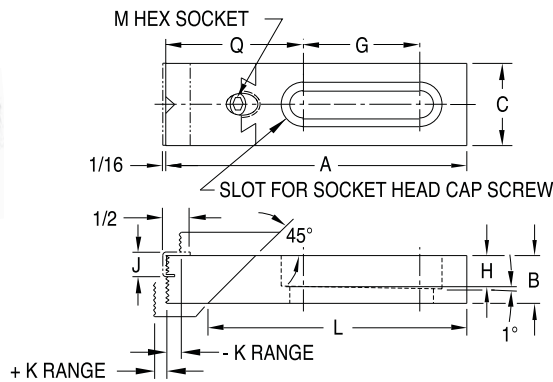
## FIXED — LOW NOSE

MINI	CL-0-SFC	1-13/16	5/8	1	1	1-3/4	11/16	—	—	7/16	1/4	1-5/16	5/32	1/8	1/8	1-15/32	(2) CL-5/16-18x1.00-FHSS
STANDARD	CL-40-SFC	2-11/16	7/8	1-1/2	2	3	1	—	—	5/8	5/16	1-7/8	1/4	1/4	1/4	2-3/16	(2) CL-1/2-13x1.38-FHSS
HEAVY	CL-70-SFC	3-1/2	1-1/4	1-3/4	2	3-1/4	1-1/4	—	—	3/4	5/16	2-1/2	5/16	5/16	5/16	2-7/8	(2) CL-5/8-11x2.00-FHSS

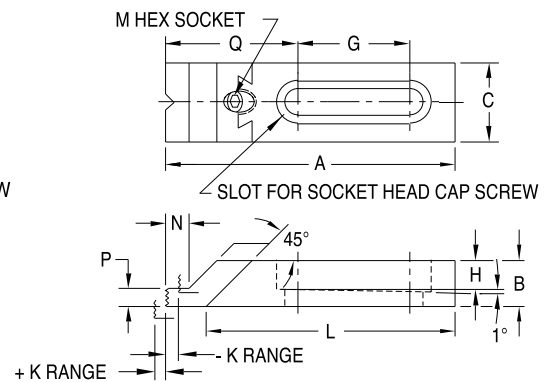
# SERRATED EDGE CLAMPS



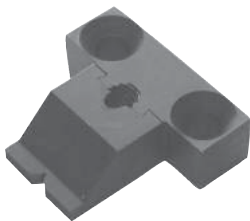
**Serrated Adjustable Edge Clamp**



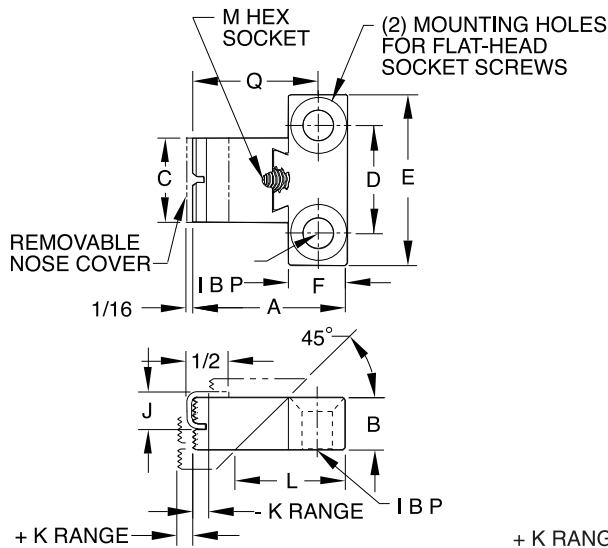
**High Nose**



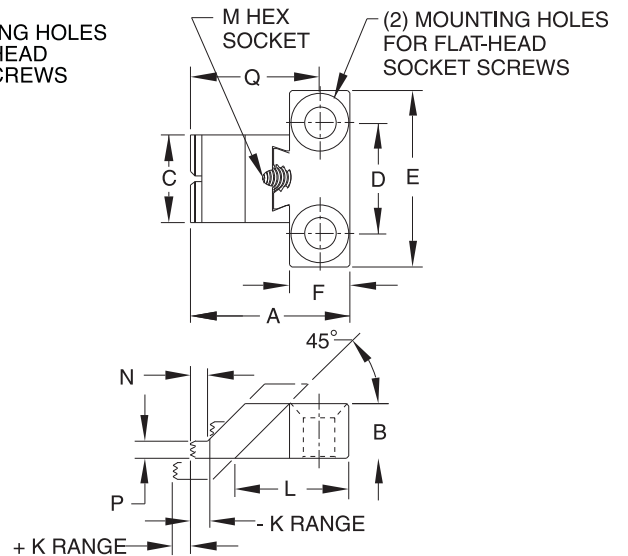
**Low Nose**



**Serrated Fixed Edge Clamp**



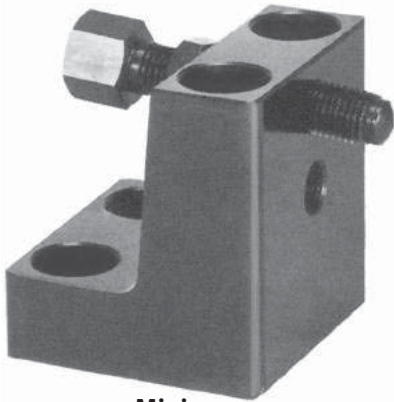
**High Nose**



**Low Nose**

# SCREW-CLAMP ADAPTORS

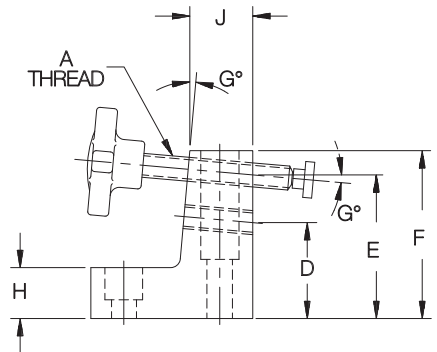
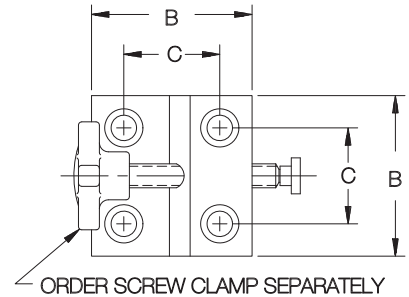
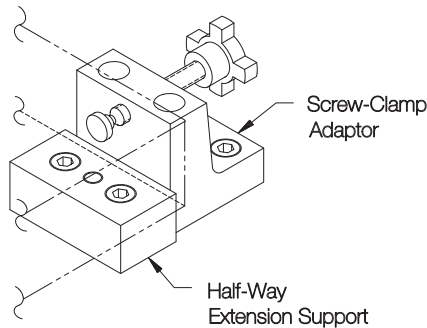
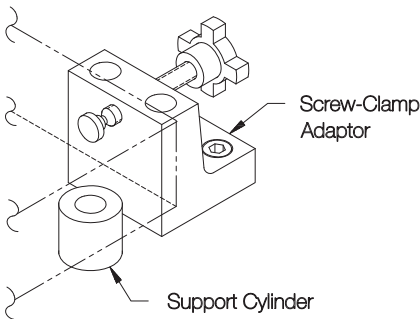
1018 STEEL, BLACK OXIDE FINISH



**Screw-Clamp Adaptor**

**Mini  
Standard  
Heavy**

Extremely useful mounting adaptor for screw clamps. Accepts any of the four types of screw clamp shown below (order separately). These screw clamps all use our patented left-hand-thread swivel feet (the ball end of the body screws into the foot for easy installation and removal). The adaptor has two tapped holes to allow installing a screw clamp at either of two heights. The tapped holes are angled slightly downward to provide some down thrust force. **INFO+**: See pages 93, 96, 97, 103 for complete dimensions and additional sizes of screw clamps.



Almost any support can be used together with a Screw Clamp Adaptor. For additional height, a Support Riser Block can be used underneath the adaptor.

## SCREW CLAMP ADAPTORS

SIZE	PART NO.	A	B	C	D	E	F	G	H	J	SOCKET-HEAD CAP SCREWS (2 EACH REQD)
MINI	CL-MF25-1251	5/16-18	1-3/4	1	1-1/4	1-3/4	2-1/4	3°	5/8	13/16	CL-5/16-18x1.12-SHCS CL-5/16-18x1.50-SHCS
STANDARD	CL-MF40-1251	1/2-13	3-3/8	2	2	3	3-5/8	5°	1-1/8	1-5/16	CL-1/2-13x1.75-SHCS CL-1/2-13x2.75-SHCS
HEAVY	CL-MF50-1251	5/8-11	3-3/8	2	2	3	3-5/8	5°	1-1/8	1-5/16	CL-5/8-11x2.00-SHCS CL-5/8-11x3.00-SHCS



**Knob Shoe Assembly**



**Swivel Screw Clamp**



**Swivel Head Screw**



**Adjustable-Torque Thumb Screw**

## KNOB SHOE ASSEMBLIES

SIZE	PART NO.	THREAD SIZE	LENGTH UNDER HEAD	HEAD HEIGHT	HEAD DIA	FOOT DIA
MINI	CL-4-KSA	5/16-18	2-1/4	3/4	1-3/4	1/2
STANDARD	CL-9-KSA	1/2-13	3-9/16	1-1/4	2-1/8	3/4
HEAVY	CL-11-KSA	5/8-11	3-5/16	1-1/2	2-3/4	15/16

## SWIVEL SCREW CLAMPS

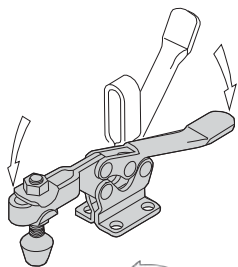
MINI	CL-27-SSC	5/16-18	2-3/32	—	—	1/2
STANDARD	CL-35-SSC	1/2-13	3-1/16	—	—	3/4
HEAVY	CL-38-SSC	5/8-11	3-3/64	—	—	15/16

## SWIVEL HEAD SCREWS

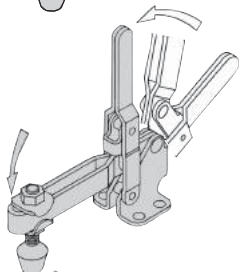
MINI	CL-22-SHS	5/16-18	2-3/32	3/8	1-1/8	1/2
STANDARD	CL-29-SHS	1/2-13	3-1/16	1/2	1-1/4	3/4
HEAVY	CL-32-SHS	5/8-11	3-3/64	1/2	1-1/4	15/16

## ADJUSTABLE-TORQUE THUMB SCREWS

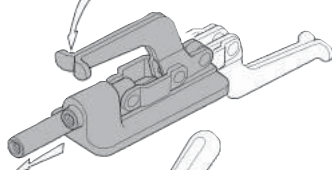
MINI	CL-527-TSB	5/16-18	2-7/8	21/32	7/8	1/2
STANDARD	CL-830-TSB	1/2-13	3-1/8	21/32	1-3/16	3/4
HEAVY	CL-1030-TSB	5/8-11	3-1/8	21/32	1-3/16	15/16



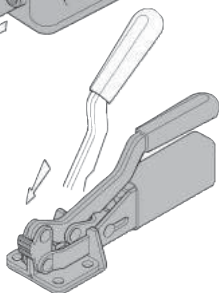
Horizontal-Handle Hold-Down Clamps .....425-434



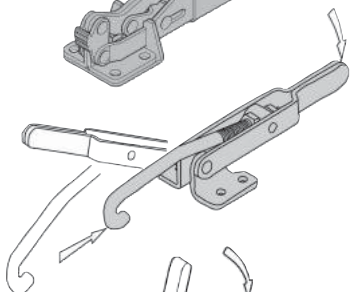
Vertical-Handle Hold-Down Clamps .....435-462



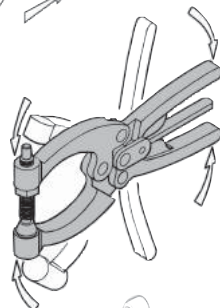
Push / Pull Clamps .....463-475



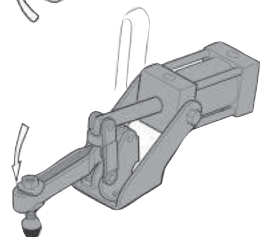
Toggle Edge Clamps .....476-477



Latch-Action Clamps .....478-485



Toggle Pliers.....486-490



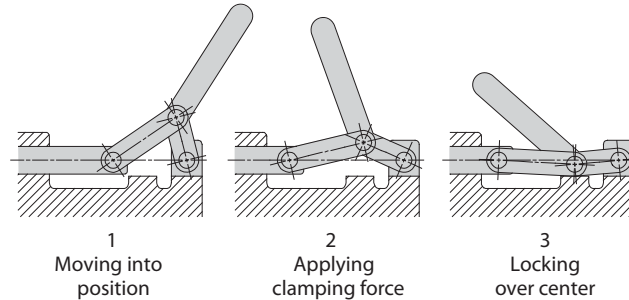
Air-Powered Clamps .....491-499

Toggle Clamp Accessories..... 500-504

# TOGGLE CLAMPS

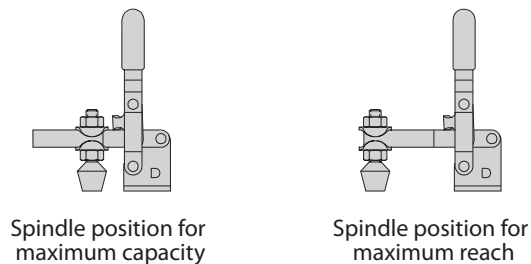
## TOGGLE-ACTION PRINCIPLES

A toggle clamp is a quick-acting mechanical linkage where two of the elements make up a toggle action. Actuating the clamp first moves it into position, then applies clamping force by compressing or stretching the linkage elements after contacting the workpiece, then positively locks it by moving the toggle action's center pivot past the centerline of the other two pivots, against a stop.



## HOLDING CAPACITY

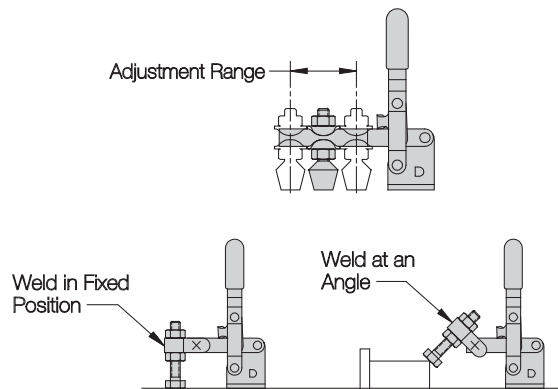
The "holding capacity" listed for each clamp refers to the maximum external force that clamp can safely resist in its locked position without incurring any permanent deformation. For hold-down clamps, holding capacity is measured with the spindle as close as possible to the handle, and will be less at the end of the clamping arm.



## ARM TYPES

Open-arm hold-down clamps offer maximum flexibility and adjustability. Two flanged washers hold the spindle in place anywhere along the arm by tightening the jam nuts.

Solid-arm hold-down clamps are easily customized to a particular application. Using the weld-on bolt retainer, you can locate the spindle permanently in one place. The solid-arm version allows mounting the spindle at an angle, or shortening the clamping arm.



## MATERIALS

### STEEL

Steel clamps are made from various types including 1008, 1010, 1018, and other fine steels. Pivot pins on most clamp models are 400-series stainless steel for extra durability. Many pivot points have hardened steel bushes for long life. Forged steel components, such as those on toggle pliers and push/pull clamps, are made from high-carbon steel. Many push/pull clamp bases are made of nodular iron for wear resistance.

### STAINLESS STEEL

Many toggle-clamp models are available in 300-series stainless steel. These corrosion-resistant clamps are useful in chemical environments, plating operations, food processing, salt-spray environments, medical equipment, electronics fixturing, EDM fixturing, and marine environments. Various stainless steel grades, including 303 and 304, are used. Clamps normally furnished with a flat-cushion spindle in the steel version are supplied with a stainless steel hex-head spindle. Other clamps are available in stainless steel as specials.

**ALL CARR LANE MANUFACTURING  
TOGGLE CLAMPS ARE PROUDLY  
MADE IN USA**



# TOGGLE CLAMPS

## TYPES

All Carr Lane Manufacturing toggle clamps are DFARS and RoHS compliant.



### HORIZONTAL HANDLE

Most popular of all toggle clamps. Clamping weights from 100 to 1,000 lbs. Comfortable finger grip. Options include automatically adjusting, low arm, and extra wide opening. **See page 425.**



### VERTICAL HANDLE

Similar to clamps above, except this version has a vertical handle. Clamping weights from 100 to 1,200 lbs. and heavy duty versions offering clamping power from 750 to 6,000 lbs. **See page 435.**



### PUSH/PULL

Push/pull clamps feature a plunger that advances and locks by moving the handle forward. Clamp can also be used for pulling instead of pushing. Clamping weights from 100 to 16,000 lbs. **See page 463.**



### EDGE

Unique clamp applies force forward and downward at the same time. Automatically adjusts for different workpiece sizes. **See page 476.**



### LATCH ACTION

Latch action options include adjustable U Bolt, Right-Angle Adjustable U Bolt, Adjustable Hook, and fixed length. **See page 478.**



### PLIERS

Forged steel provides strong clamping action. Clamping weights from 200 to 800 lbs. Includes permanently attached and Toggle Bar Clamps as options. **See page 486.**



### AIR POWERED

This clamp linkage is operated by a double-acting air cylinder instead of by hand. Provides high holding capacity and insures positive mechanical locking even if air pressure fails. **See page 491.**

## SELECTION CHART

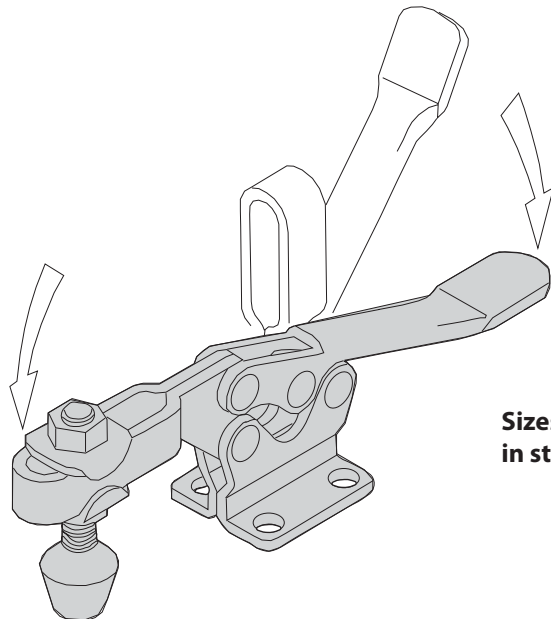
STYLE	CAPACITY									
	0-99	100-199	200-299	300-499	500-750	751-1000	1,000-1,499	1,500-1,999	2,000-5,000	5,001+
Horizontal Handle	X	X	X	X	X	X				
Heavy-Duty Horizontal Handle								X	X	X
Vertical Handle	X	X	X	X	X	X	X			
Heavy-Duty Vertical Handle						X	X	X	X	X
Vertical Handle, Cam Clamp							X			
Push/Pull		X	X	X	X	X		X	X	X
Latch				X	X		X		X	X
Pliers			X	X	X	X				
Air Powered		X	X		X	X	X		X	

# TOGGLE CLAMP CONVERSION CHART

Reference Part No.	Carr Lane Part No.	Reference Part No.	Carr Lane Part No.	Reference Part No.	Carr Lane Part No.	Reference Part No.	Carr Lane Part No.
AO-100*	CL-1000-PTC	202943*	CL-14112-SA-S	240208*	CL-38314-FC	503*	CL-320-HVTC
AO-1200*	CL-3000-PTC	205-S	CL-150-HTC	245-S	CL-600-HTC	503-B*	CL-310-HVTC
AO-200*	CL-1000-PTC	205-SB	CL-151-HTC	245-U	CL-650-HTC	503-LB*	CL-311-HVTC
AO-2000(HD)*	CL-3000-PTC	205-SL	CL-153-HTC	245943*	CL-12234-SA-S	505*	CL-520-HVTC
AO-400*	CL-2000-PTC	205-SR	CL-152-HTC	247-S	CL-750-VTC	505-B*	CL-510-HVTC
AO-800*	CL-2000-PTC	205-SSS	CL-150-HTC-S	247-SB	CL-751-VTC	505-LB*	CL-511-HVTC
C-800	CL-850-VTC	205-U	CL-250-HTC	247-U	CL-850-VTC	506*	CL-620-HVTC
GLBU1*	CL-111-HVTC	205-UB	CL-251-HTC	247-UB	CL-851-VTC	506-B*	CL-610-HVTC
GLBU1-AW-HW*	CL-101-HVTC	205-UL	CL-253-HTC	247109	CL-1213-TW	506-LB*	CL-611-HVTC
GLBU3*	CL-311-HVTC	205-UR	CL-252-HTC	247110	CL-113000-BR	507107	CL-51610-TW
GLBU3-AW-HW*	CL-301-HVTC	205-USS	CL-250-HTC-S	250*	CL-800-VTC	507206*	CL-516212-SF
GLBU5*	CL-511-HVTC	205105	CL-142000-BR	250-G	CL-800-VTC	507208	CL-516212-FC
GLBU5-AW-HW*	CL-501-HVTC	205203	CL-14112-HC	250121*	CL-113000-BR	507907	CL-51610-TW-S
GLBU6*	CL-611-HVTC	205943*	CL-83234-SA-S	250203	CL-58438-SA	509208	CL-516212-CC
GLBU6-AW-HW*	CL-601-HVTC	206-HSS*	CL-51-TC	250206*	CL-44-SSC	527208	CL-38314-FC
GU1*	CL-120-HVTC	206-SS*	CL-51-TC	258*	CL-801-VTC	548*	CL-501-HVTC
GU1-B*	CL-110-HVTC	207-L	CL-353-VTC	258-G	CL-801-VTC	578*	CL-601-HVTC
GU3*	CL-320-HVTC	207-LB*	CL-351-VTC	267	CL-950-VTC	588*	CL-601-HVTC
GU3-B*	CL-310-HVTC	207-LR*	CL-350-LVTC	267-U	CL-1050-VTC	6001-M	CLM-60-SPC
GU5*	CL-520-HVTC	207-S	CL-350-VTC	267102	CL-5811-TW	6001-MMS*	CLM-60-SPC
GU5-B*	CL-510-HVTC	207-SB	CL-351-VTC	301	CL-150-PA	601*	CL-50-SPC
GU6*	CL-620-HVTC	207-TL*	CL-352-VTC	301-SS	CL-150-PA-S	601-0*	CL-51-SPC
GU6-B*	CL-610-HVTC	207-TS	CL-352-VTC	305-U	CL-200-VTC	601-M*	CLM-50-SPC
H-100	CL-250-HTC	207-TU	CL-452-VTC	305-UR*	CL-200-LVTC	601-SS*	CL-50-SPC-S
H-200	CL-350-HTC	207-TUL*	CL-452-VTC	305-USS	CL-200-VTC-S	6015	CL-100-SPC
H-200(SS)	CL-350-HTC-S	207-U	CL-450-VTC	305203*	CL-316112-SA	6015-M	CLM-100-SPC
H-400*	CL-450-HTC	207-UB	CL-451-VTC	305208	CL-316112-CC	6015-MR	CLM-100-LSPC
H-400(B)	CL-450-HTC	207-UL	CL-453-VTC	307-U	CL-300-VTC	6015-MRSS*	CL-100-LSPC-S
H-400(SS)*	CL-450-HTC-S	207-ULB*	CL-451-VTC	307-UR*	CL-300-LVTC	6015-R	CL-100-LSPC
H-600	CL-550-HTC	207-UR*	CL-450-LVTC	307-USS	CL-300-VTC-S	6015-RSS	CL-100-LSPC-S
H-600(SS)	CL-550-HTC-S	207105	CL-518000-BR	309-U	CL-500-VTC	6015-SS	CL-100-SPC-S
LUP-1203	CL-450-PL	207203	CL-516212-SA	309-UR*	CL-500-LVTC	602	CL-150-TPC
LUP-800	CL-254-PL	207206	CL-14200-SF	309-USS	CL-500-VTC-S	602-M	CLM-150-TPC
LUP-800-2S	CL-254-PL-2	207943*	CL-516212-SA-S	311	CL-170-PA	602-SS	CL-150-TPC-S
P-1200	CL-250-PL	210-S	CL-550-VTC	317	CL-375-HTC	603*	CL-100-PC
P-1203	CL-450-PL	210-SB	CL-551-VTC	317-U	CL-475-HTC	603-M*	CLM-100-PC
P-400*	CL-50-PL	210-SR*	CL-550-LVTC	323*	CL-100-PA	603-MR	CL-100-LPC
P-400-1*	CL-50-PL	210-TS	CL-552-VTC	323-MSS*	CL-100-PA-S	603-R*	CL-100-LPC
P-400-2*	CL-50-PL-2	210-TU	CL-652-VTC	323-SS	CL-100-PA-S	604	CL-250-TPC
P-400-2S*	CL-50-PL-3	210-U	CL-650-VTC	324*	CL-110-PA	604-M	CLM-250-TPC
P-800	CL-254-PL	210-UB	CL-651-VTC	324-SS*	CL-110-PA-S	604-SS	CL-250-TPC-S
P-800-2S	CL-254-PL-2	210-UR*	CL-650-LVTC	325	CL-325-PL-S	604106	CL-250-TPCA
PCH-101	CL-250-PA	210-USS	CL-650-VTC-S	325-SS	CL-325-PL-S	605	CL-150-SPC
PCH-101(SS)	CL-250-PA-S	210114	CL-316000-BR	325203*	CL-12314-SA	605-M	CLM-150-SPC
PCH-200	CL-250-PA	210203*	CL-38314-SA	331*	CL-200-PA	607*	CL-350-SPC
PH & PL-1600	CL-250-PL	210206	CL-38314-SF	331-R*	CL-200-LPA	608	CL-200-PC
S-100	CL-251-VTC	210208	CL-38314-CC	331-R-SS*	CL-200-LPA-S	610*	CL-250-SPC
S-200*	CL-451-VTC	211208*	CL-14200-CC	331-SS*	CL-200-PA-S	610-M*	CLM-250-SPC
S-400*	CL-651-VTC	213-U*	CL-260-HTC	334*	CL-210-PA	620*	CL-275-SPC
T-100	CL-252-VTC	213-USS*	CL-260-HTC-S	334-SS*	CL-210-PA-S	620-M*	CLM-275-SPC
T-200	CL-452-VTC	213208	CL-14200-CC	341*	CL-300-PA	624	CL-350-TPC
T-400	CL-652-VTC	213943	CL-832203-SA-S	341-R*	CL-300-LPA	624-M	CLM-350-TPC
V-100	CL-250-VTC	215-S	CL-300-HTC	341-R-SS*	CL-300-LPA-S	624-SS	CL-350-TPC-S
V-100(SS)	CL-250-VTC-S	215-U	CL-350-HTC	341-SS*	CL-300-PA-S	628*	CL-276-SPC
V-1200*	CL-1050-VTC	215-UB	CL-351-HTC	344*	CL-310-PA	630	CL-350-SPC
V-200*	CL-453-VTC	215-USS	CL-350-HTC-S	344-SS*	CL-310-PA-S	630-M	CLM-350-SPC
V-200(SS)*	CL-450-VTC-S	215105*	CL-148-TW	345	CL-345-PL	630-MR*	CL-350-LPC
V-400*	CL-650-VTC	215208	CL-14200-FC	345100	CL-345-PLA	630-M	CL-350-LPC
V-400(SS)*	CL-650-VTC-S	215905*	CL-148-TW-S	351	CL-250-PA	640*	CL-450-SPC
VC-200*	CL-350-VTC	217-U*	CL-350-HTC	351-B	CL-251-PA	640-M*	CLM-450-SPC
VC-400*	CL-550-VTC	217-USS*	CL-350-HTC-S	351-R*	CL-257-PA	650	CL-650-SPC
102111	CL-3166-TW	220	CL-600-VTC	351-SS	CL-250-PA-S	650-M	CLM-650-SPC
102208	CL-832208-FC	220203	CL-12314-SA	375	CL-400-PA	7-59	CL-1000-VCC
102911	CL-3166-TW-S	220208*	CL-38314-CC	375-R	CL-400-LPA	802*	CL-500-PTC
105106	CL-832-TW	225-U	CL-450-HTC	381	CL-350-PA	803*	CL-1500-PPC
105203	CL-832203-SA	225-UB	CL-451-HTC	385	CL-500-PA	807-L*	CL-1001-PTC
105208*	CL-832208-FC	225-UR*	CL-451-HTC	385-R	CL-500-LPA	807-LH/T*	CL-1001-PTCH
105906	CL-832-TW-S	225-USS	CL-450-HTC-S	385102	CL-500-PAA	807-UL*	CL-1000-PTC
110122	CL-511000-BR	225208	CL-518208-FC	424	CL-50-PL	807-ULH/T*	CL-1000-PTCH
201	CL-150-VTC	227-U*	CL-450-HTC	424-2	CL-50-PL-2	810-S*	CL-2001-PTC
201-B	CL-151-VTC	227-USS*	CL-450-HTC-S	424208	CL-14208-SA	810-U*	CL-2000-PTC
201-SS	CL-150-VTC-S	227943*	CL-516212-SA-S	431208	CL-14100-SA	812*	CL-400-PTC
201-T	CL-152-VTC	228	CL-601-VTC	441	CL-150-PL	816*	CL-600-PPC
201208	CL-316112-FC	235-U	CL-550-HTC	441203*	CL-516212-SA	847-S*	CL-2001-PTC
201943	CL-316100-SA-S	235-UB	CL-551-HTC	462	CL-254-PL	847-U*	CL-2000-PTC
202	CL-250-VTC	235-UR*	CL-550-HTC	462-2	CL-254-PL-2	858*	CL-3000-PTC
202-B	CL-251-VTC	235-USS	CL-550-HTC-S	463	CL-454-PL	870*	CL-1011-POC
202-SS	CL-250-VTC-S	235106	CL-3811-TW	468	CL-254-PL	871*	CL-1010-POC
202-T	CL-252-VTC	235906	CL-3811-TW-S	468206*	CL-38314-SF	902*	CL-516212-SL
202-U*	CL-253-VTC	237-U*	CL-550-HTC	474	CL-454-PL	904*	CL-38314-SL
202-USS	CL-253-VTC-S	237-USS*	CL-550-HTC-S	486*	CL-550-PL		
202203*	CL-14200-SA	237943*	CL-38314-SA-S	501*	CL-120-HVTC		
202208	CL-14112-FC	240203*	CL-38314-SA	501-B*	CL-110-HVTC		

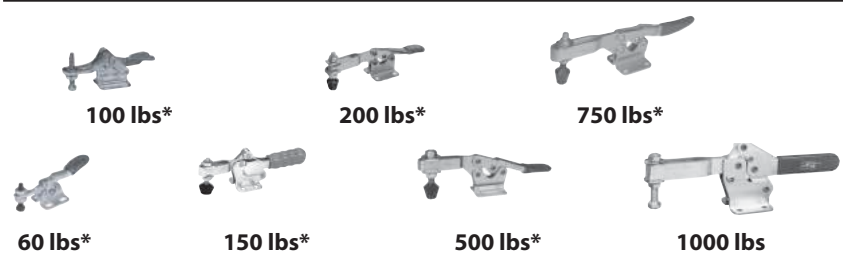
\* Functionally equivalent, but differs in some dimension and/or specification. Please check catalog before ordering.

# HORIZONTAL-HANDLE TOGGLE CLAMPS



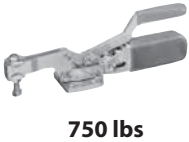
Sizes marked \* are also available in stainless steel.

All Carr Lane Manufacturing toggle clamps are DFARS and RoHS compliant.



**Standard HTC Design**  
pp. 426-431

Most-popular and widest-range series of horizontal-handle hold-down clamps. Available in seven sizes, the smaller ones with a comfortable finger grip. Most sizes are available with either a flanged base or a straight base. Choice of solid arm, or open arm for spindle adjustment.



**Automatically Adjusting**  
p. 432

Self-adjusting clamp automatically compensates for different workpiece heights without resetting the spindle. Clamping force is always consistent after setting once.



**Low-Arm TC Design**  
p. 433

Simple, classic-design horizontal-handle clamps. Available in three sizes, with either a flanged base or a straight base.

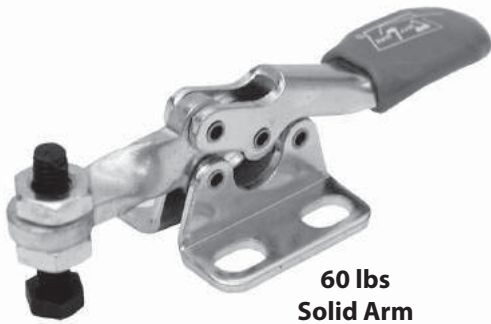


**Extra-Wide Opening**  
p. 434

Arm opens a full 185° for maximum loading clearance. Unique up-then-down handle motion. Handle locks at a 60° downward angle. Dual flanged bases allow mounting on either horizontal or vertical surfaces. Choice of solid arm, or open arm for spindle adjustment.

# HORIZONTAL-HANDLE TOGGLE CLAMPS

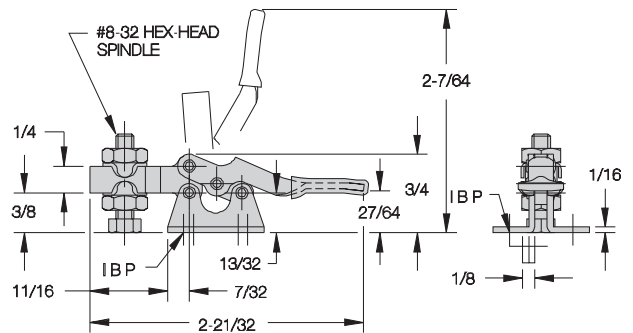
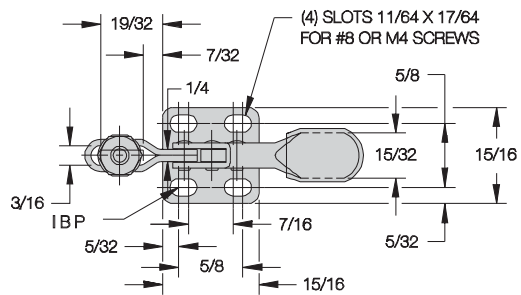
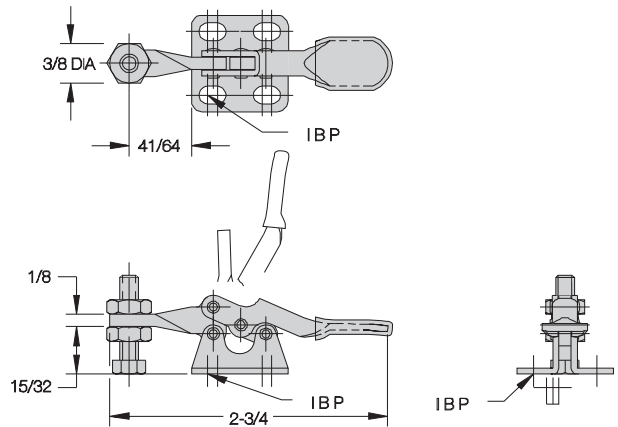
INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



**60 lbs  
Solid Arm**



**60 lbs  
Open Arm**



## CL-150-HTC CL-250-HTC

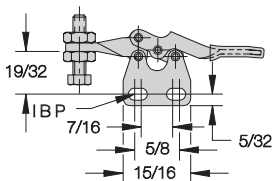
**Solid Arm, Flanged Base**

**Open Arm, Flanged Base**

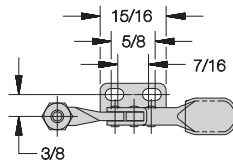
Smallest hold-down clamp available. Choose either a solid arm, or an open arm for spindle adjustment. Arm opens 90° while handle moves 80°. Supplied with #8-32 nylon hex-head spindle CL-832203-SA. Open-arm versions also include (2) CL-832-TW flanged washers. Shipping weight 0.1 lbs.

**Holding capacity:**

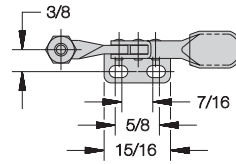
**60 lbs**



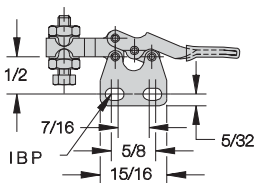
**CL-151-HTC  
Solid Arm  
Straight Base**



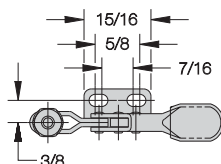
**CL-152-HTC  
Solid Arm  
Right Flange**



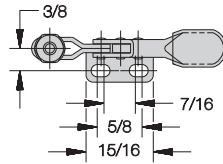
**CL-153-HTC  
Solid Arm  
Left Flange**



**CL-251-HTC  
Open Arm  
Straight Base**



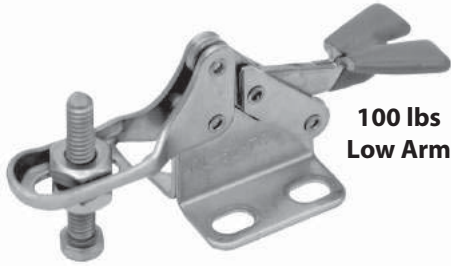
**CL-252-HTC  
Open Arm  
Right Flange**



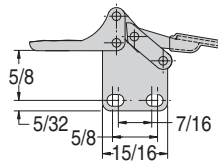
**CL-253-HTC  
Open Arm  
Left Flange**

# HORIZONTAL-HANDLE TOGGLE CLAMPS

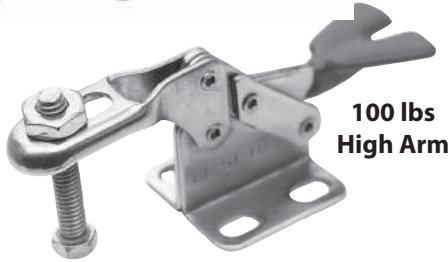
INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



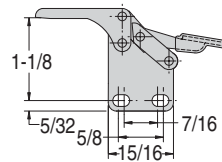
**100 lbs  
Low Arm**



**CL-52-TC  
Low Arm, Straight Base**



**100 lbs  
High Arm**



**CL-54-TC  
High Arm, Straight Base**

## CL-51-TC CL-53-TC

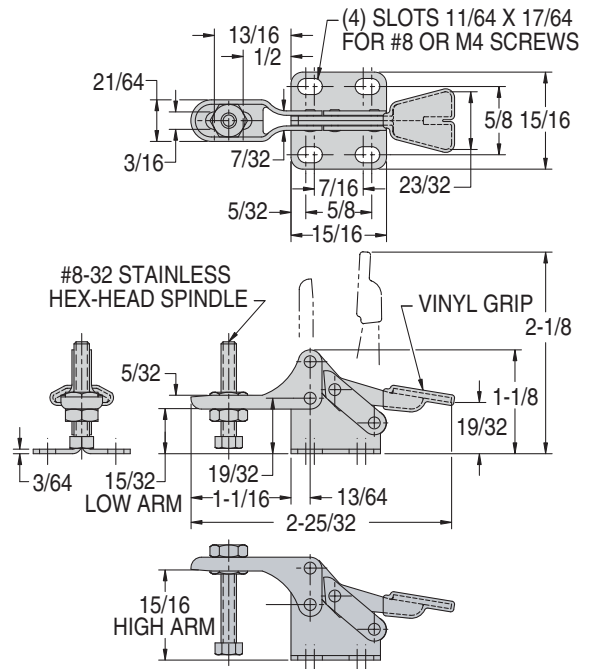
**Low Arm, Flanged Base**

**High Arm, Flanged Base**

Miniature stainless steel clamp with open arm for spindle adjustment. Perfect for electronics fixturing and other light-duty application. Arm opens 90° while handle moves 90°. Supplied with #8-32 stainless hex-head spindle CL-832203-SA-S. Shipping weight 0.1 lbs.

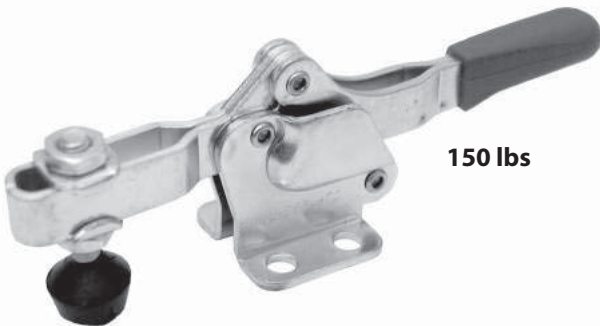
**Holding capacity:**

**100 lbs**

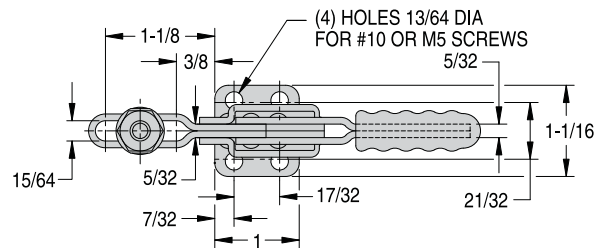


# HORIZONTAL-HANDLE TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



**150 lbs**



## CL-260-HTC

**Open Arm, Flanged Base**

An extremely powerful clamp for its small size. Open arm allows spindle adjustment. Arm opens 90° while handle moves 75°. Supplied with #10-32 flat-cushion spindle CL-316112-FC and (2) CL-3166-TW flanged washers. Shipping weight 0.2 lbs.

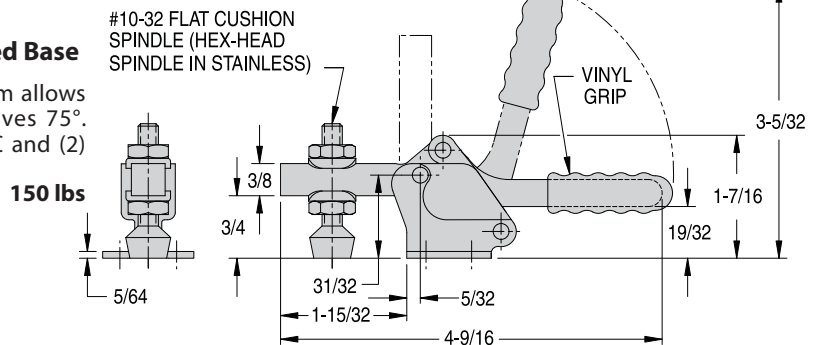
**Holding capacity:**

**150 lbs**

Also available in stainless steel ...



**CL-260-HTC-S**

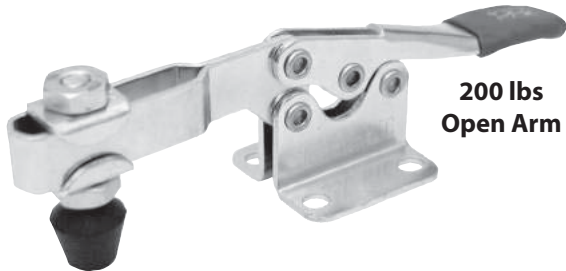


# HORIZONTAL-HANDLE TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



**200 lbs  
Solid Arm**



**200 lbs  
Open Arm**

## CL-300-HTC CL-350-HTC

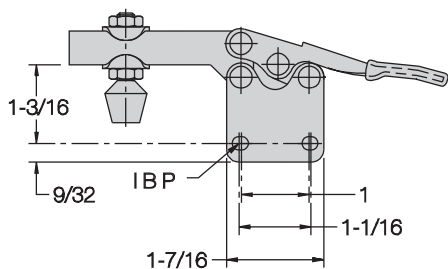
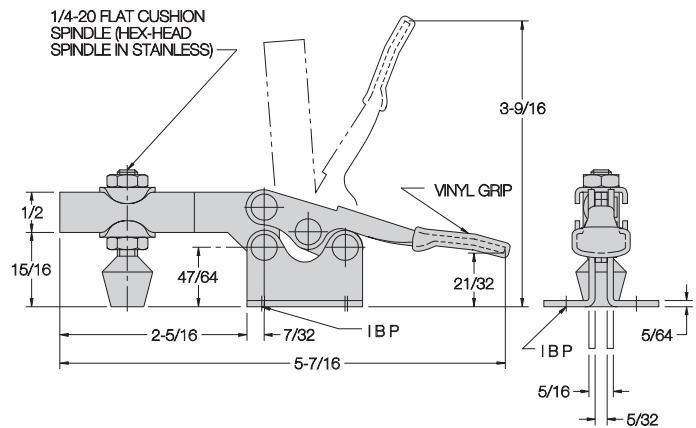
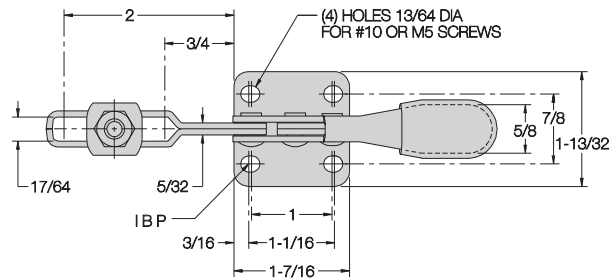
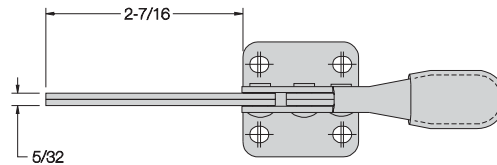
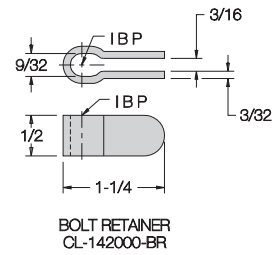
**Solid Arm, Flanged Base**

**Open Arm, Flanged Base**

Popular medium-duty clamp. Choose either a solid arm, or an open arm for spindle adjustment. Arm opens 86° while handle moves 60°. Supplied with 1/4-20 short flat-cushion spindle CL-14112-FC. Solid-arm version supplied with CL-142000-BR bolt retainer. Open-arm version supplied with (2) CL-147-TW flanged washers. Shipping weight 0.3 lbs.

**Holding capacity:**

**200 lbs**



**CL-351-HTC  
Open Arm  
Straight Base**

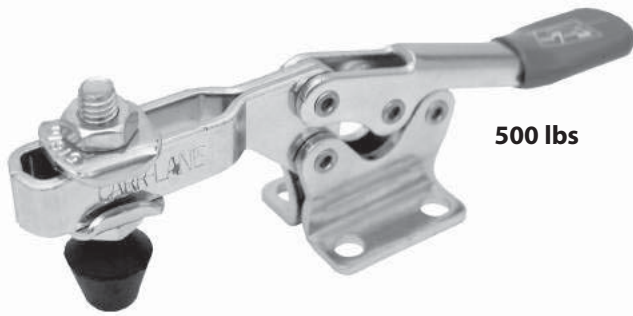
Also available in stainless steel ...



**CL-350-HTC-S**

# HORIZONTAL-HANDLE TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



500 lbs

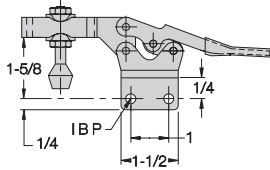
## CL-450-HTC

Open Arm, Flanged Base

Strong-yet-compact horizontal-handle clamp, with open arm for spindle adjustment. Arm opens 90° while handle moves 65°. Supplied with 5/16-18 short flat-cushion spindle CL-518208-FC and (2) CL-51610-TW flanged washers. Shipping weight 0.6 lbs.

Holding capacity:

500 lbs

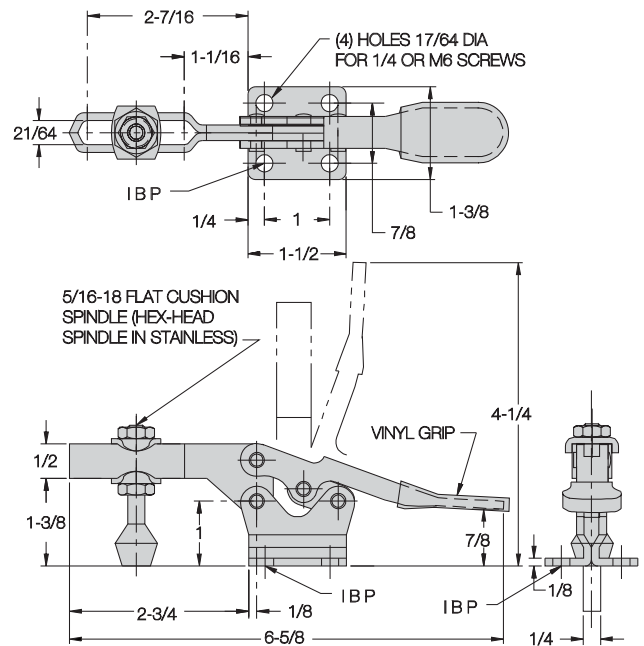


CL-451-HTC  
Straight Base

Also available in stainless steel ...

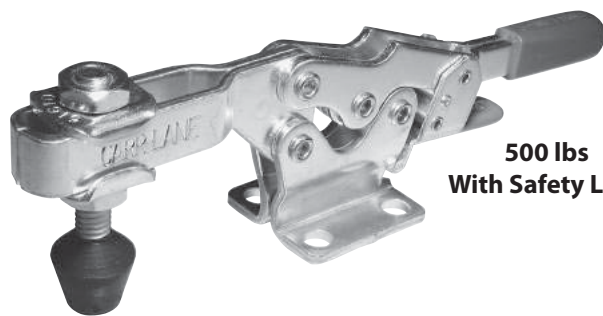


CL-450-HTC-S



# HORIZONTAL-HANDLE TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



500 lbs  
With Safety Lock

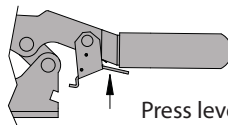
## CL-450-LHTC

Open Arm, Flange Base

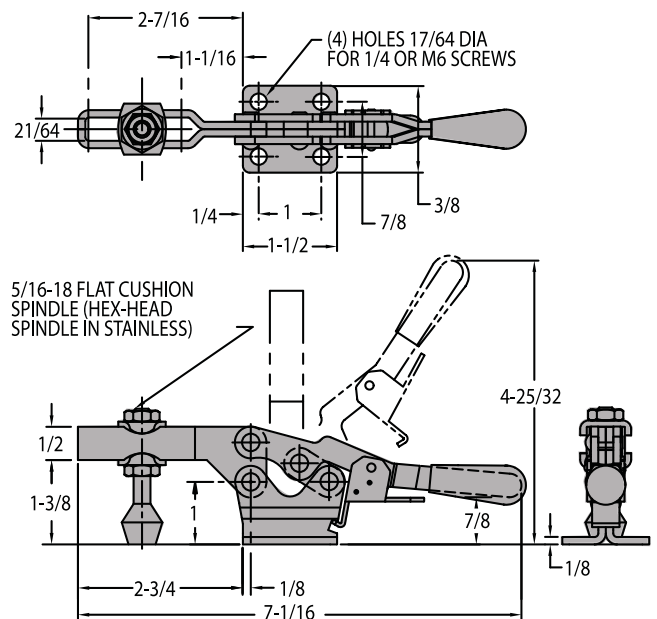
Same as the toggle clamp shown above, except with our unique safety-lock feature. This safety lock automatically engages when the clamp is closed, then remains locked until manually disengaged by pressing the lever before opening. This prevents the clamp from being accidentally opened by bumping the handle. Shipping weight 0.7 lbs.

Holding capacity:

500 lbs

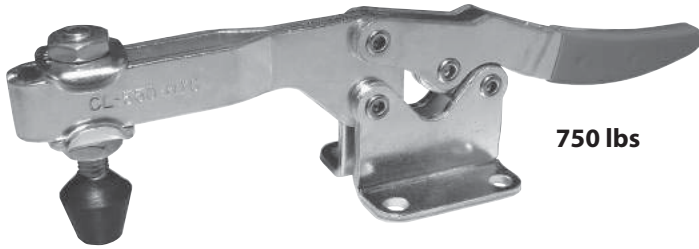


Press lever to unlock.



# HORIZONTAL-HANDLE TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



## CL-550-HTC Open Arm, Flanged Base

Heavy-duty clamp with open arm for spindle adjustment. Arm opens 90° while handle moves 55°. Supplied with 3/8-16 short flat-cushion spindle CL-38212-FC and (2) CL-3811-TW flanged washers. Shipping weight 1.5 lbs.

**Holding capacity:** 750 lbs

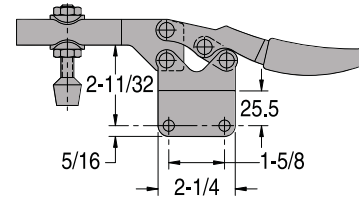
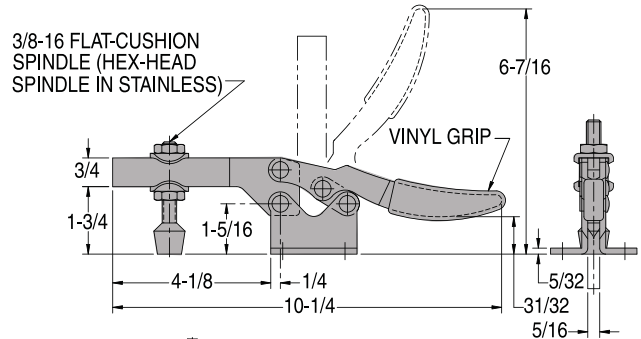
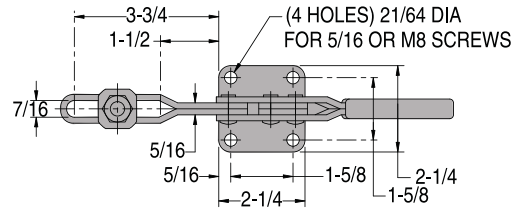
Also available in stainless steel . . .



CL-550-HTC-S



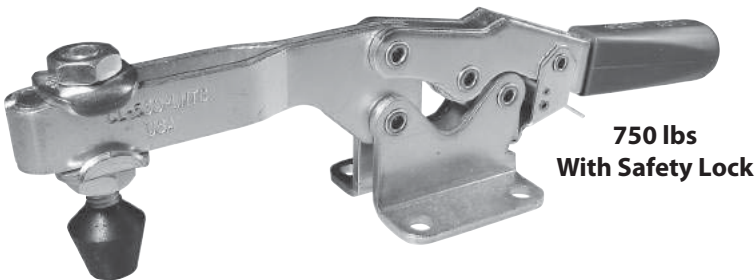
CL-551-HTC-S



CL-551-HTC  
Straight Base

# HORIZONTAL-HANDLE TOGGLE CLAMPS

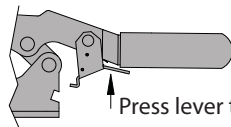
INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



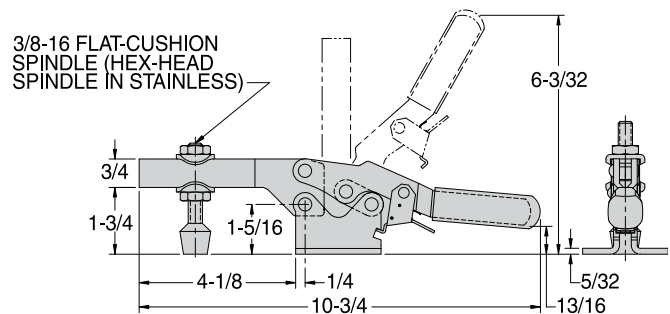
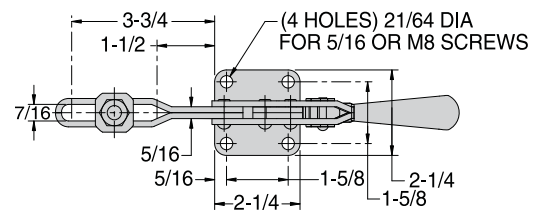
## CL-550-LHTC Open Arm, Flange Base

Same as the toggle clamp shown above, except with our unique safety-lock feature. This safety lock automatically engages when the clamp is closed, then remains locked until manually disengaged by pressing the lever before opening. This prevents the clamp from being accidentally opened by bumping the handle. Shipping weight 1.6 lbs.

**Holding capacity:** 750 lbs



Press lever to unlock.

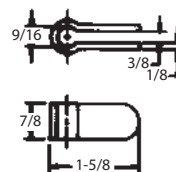
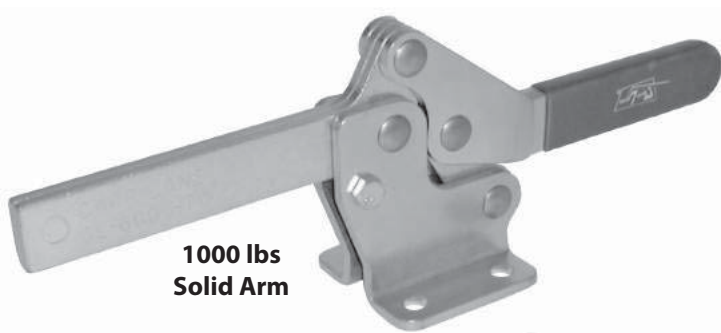


1  
1

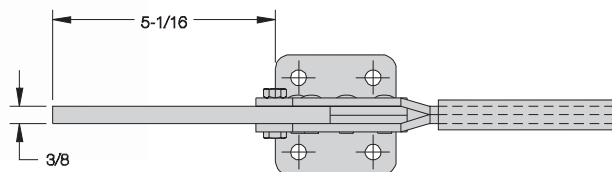
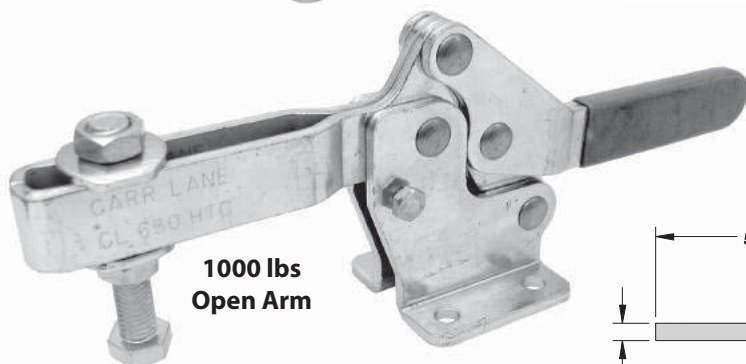


# HORIZONTAL-HANDLE TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



BOLT RETAINER  
CL-113000-BR



## CL-600-HTC CL-650-HTC

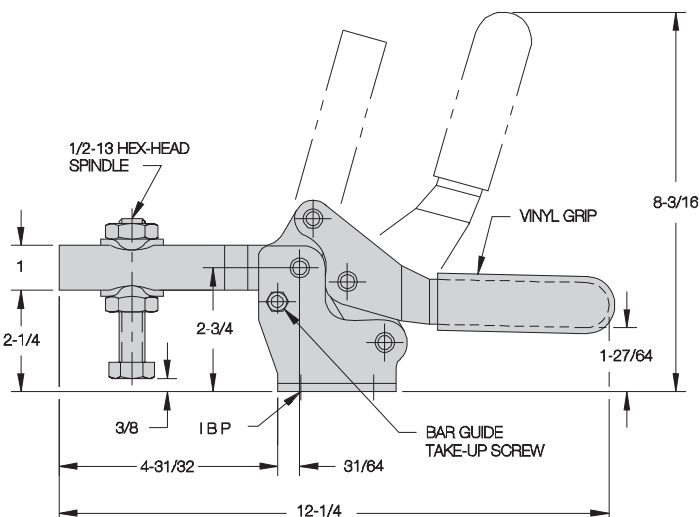
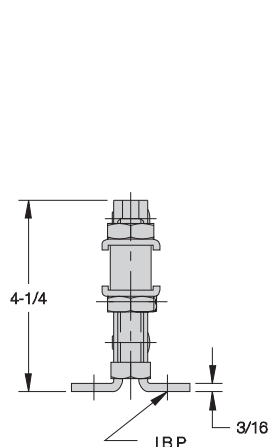
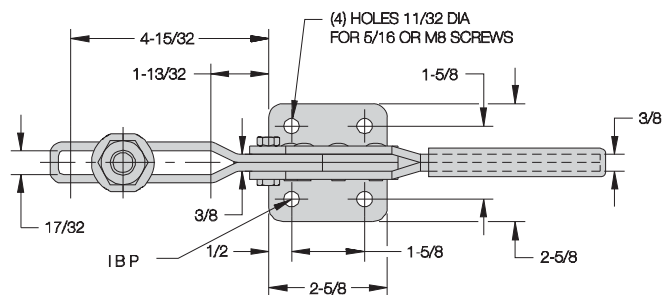
**Solid Arm, Flanged Base**

**Open Arm, Flanged Base**

Largest and strongest horizontal-handle hold-down clamp. Choose either a solid arm, or an open arm for spindle adjustment. Arm opens a wide 105° while handle moves 75°. Supplied with 1/2-13 hex-head spindle CL-12314-SA. Solid-arm version supplied with a CL-113000-BR bolt retainer. Open-arm version supplied with (2) CL-1213-TW flanged washers. Shipping weight 3.3 lbs.

**Holding capacity:**

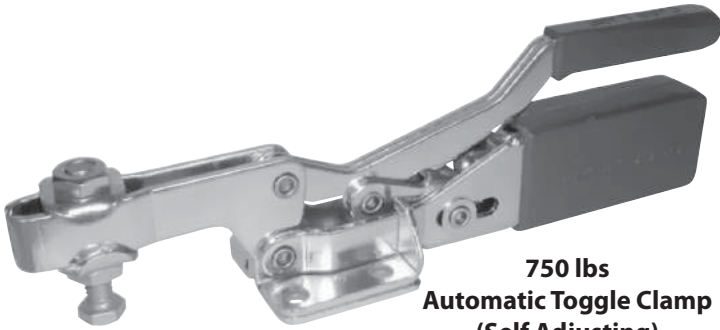
**1000 lbs**



1  
1

# HORIZONTAL-HANDLE TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



**750 lbs  
Automatic Toggle Clamp  
(Self Adjusting)**

## CL-550-AHTC

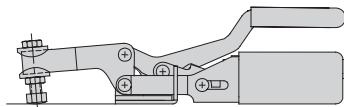
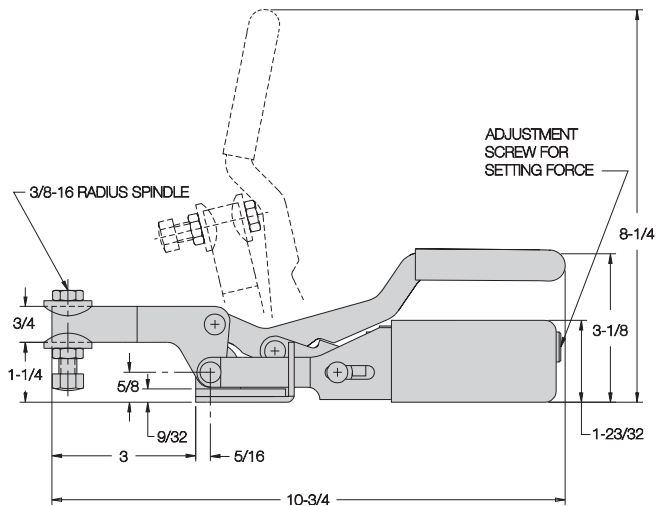
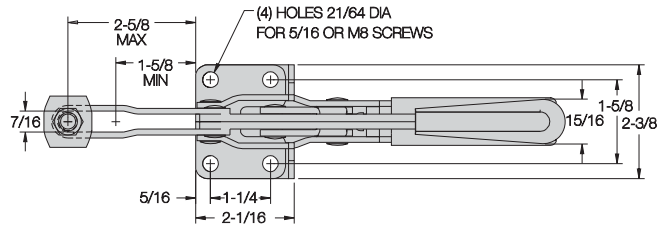
Automatically adjusts for different workpiece thicknesses! Clamps with the same, repeatable force anywhere within its 1/2" automatic-adjustment range. Perfect for welding fixtures, machining fixtures for castings, fixtures holding several part sizes within the same family, or any other application where part size can vary.

Easy to use. To set up, simply adjust the contact spindle to the average workpiece height, and set desired clamping force once. After that, operate just like a standard toggle clamp. The patented adjusting mechanism does the rest.

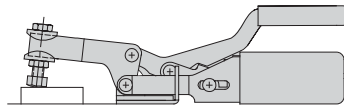
Clamping force is always consistent. The clamp's toggle action ensures that workpieces will remain clamped even under severe vibration. No additional spindle adjustment is ever needed. The clamp even compensates for wear in long production runs.

Fits in the same space, and provides the same clamping force as a standard toggle clamp. A maximum of 250 to 500 lbs clamping force (depending on spindle position) can be applied by hand. Arm opens 87° while handle moves 80°. Supplied with 3/8-16 radius spindle CL-38200-RS and (2) CL-3811-TW flanged washers. Patent no. 4,407,493. Other patents pending. Shipping weight 1.9 lbs.

**Holding capacity: 750 lbs**



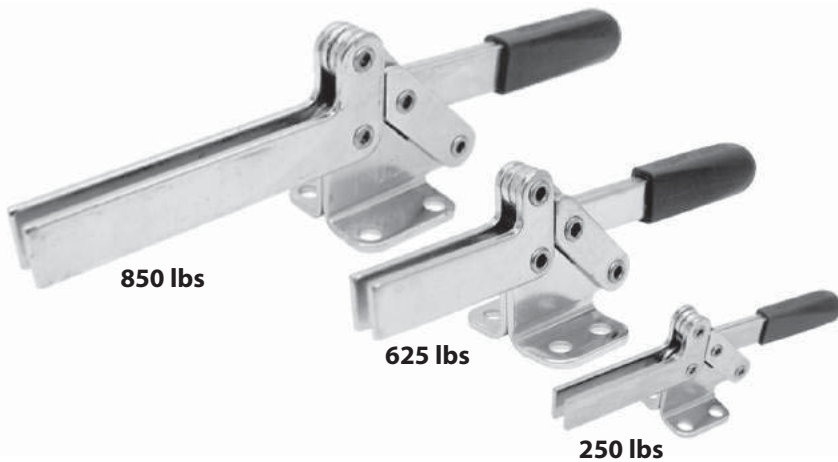
**Low Limit  
-1/4"**



**High Limit  
+1/4"**

# HORIZONTAL-HANDLE TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



Classic-design horizontal-handle clamps with open arm for spindle adjustment. Arm opens 90° while handle moves 90°. Available in three sizes.

## CL-151-TC

Open Arm, Flanged Base

Smallest-size clamp. Accepts any #10-32 spindle and (2) CL-3166-TW flanged washers. For fixed spindle location, use a 1/4-20 spindle and a CL-1458-S bolt retainer. **INFO+**: See pages 500-504 to order. Shipping weight 0.4 lbs.

**Holding capacity:**

**250 lbs**

## CL-251-TC

Open Arm, Flanged Base

Medium-size clamp. Accepts any 1/4-20 spindle and (2) CL-148-TW flanged washers. For fixed spindle location, use a CL-1458-S bolt retainer. **INFO+**: See pages 500-504 to order. Shipping weight 0.5 lbs.

**Holding capacity:**

**625 lbs**

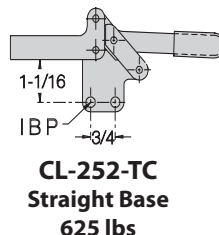
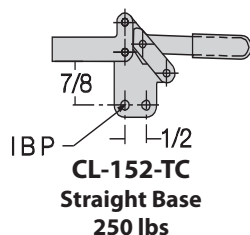
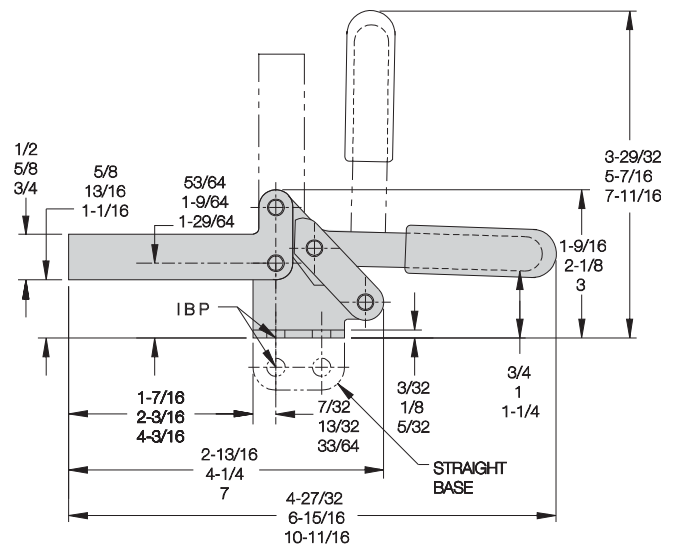
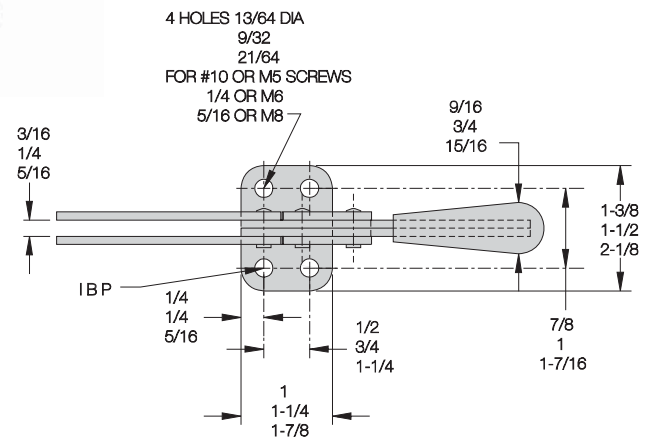
## CL-351-TC

Open Arm, Flanged Base

Largest-size clamp. Accepts any 5/16-18 spindle and (2) CL-51610-TW flanged washers. For fixed spindle location, use a CL-51658-S bolt retainer. **INFO+**: See pages 500-504 to order. Shipping weight 1.4 lbs.

**Holding capacity:**

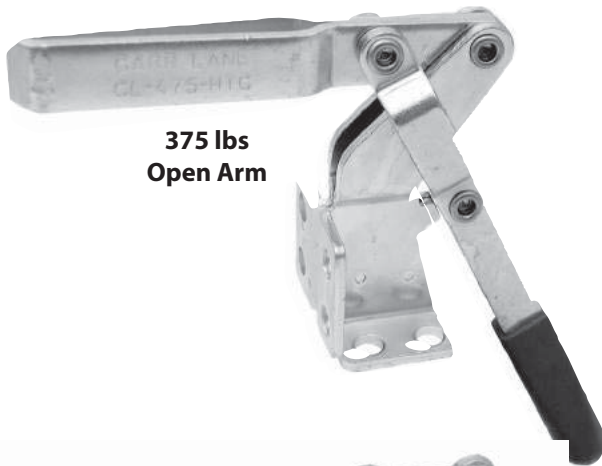
**850 lbs**



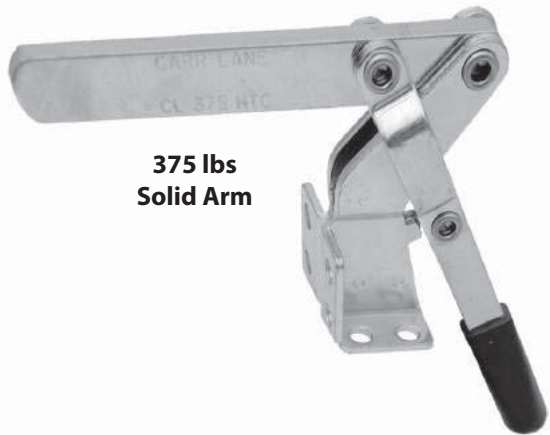
CL-151-TC (Top dimension)  
CL-251-TC (Middle dimension)  
CL-351-TC (Bottom dimension)

# HORIZONTAL-HANDLE TOGGLE CLAMPS

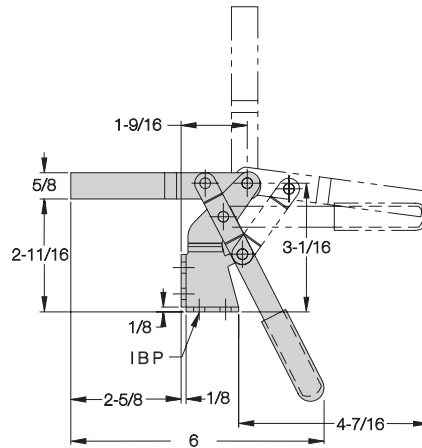
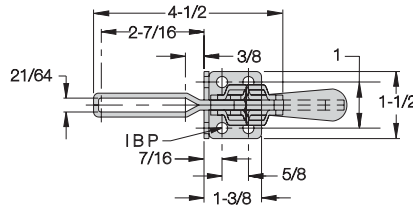
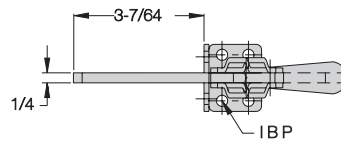
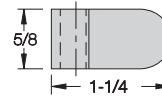
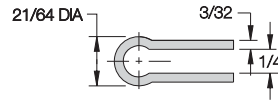
INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



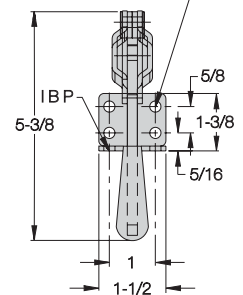
**375 lbs  
Open Arm**



**375 lbs  
Solid Arm**



(8) HOLES 17/64 DIA  
FOR 1/4 OR M6 SCREWS



## CL-375-HTC CL-475-HTC

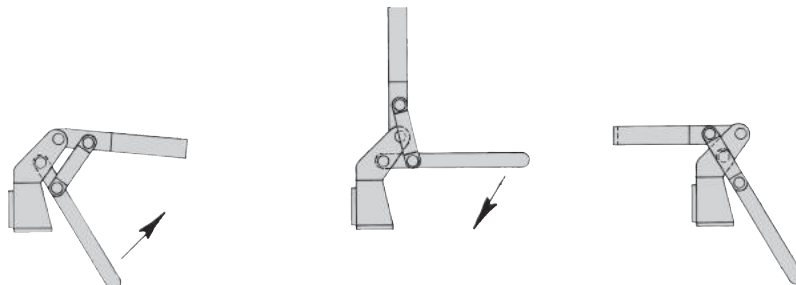
**Solid Arm**

**Open Arm**

Extra-wide-opening clamp with handle that locks at a downward angle. Unique up-then-down handle motion opens arm a full 185°. Dual flanged bases allow mounting on either horizontal or vertical surfaces. Available with a solid arm, or an open arm for spindle adjustment. Accepts all 5/16-18 spindles. **INFO+**: See pages 500-503 to order. Solid-arm version supplied with a CL-518000-BR bolt retainer. Open-arm version supplied with (2) CL-51610-TW flanged washers. Shipping weight 0.8 lbs.

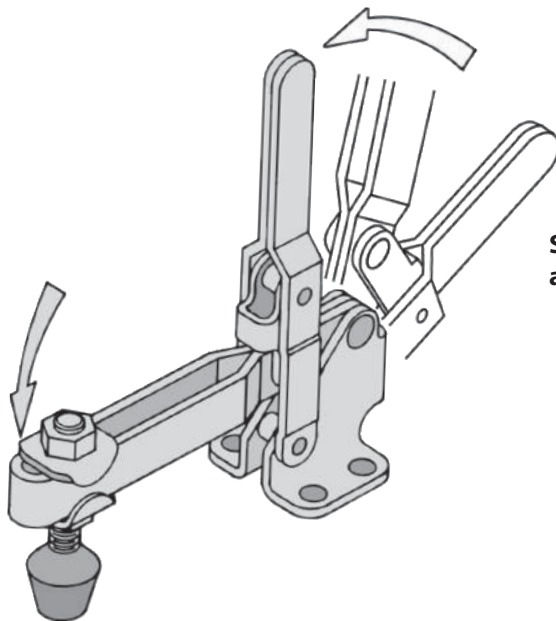
**Holding capacity:**

**375 lbs**



1  
1

# VERTICAL-HANDLE TOGGLE CLAMPS



Sizes marked \* are also available in stainless steel



100 lbs\*



200 lbs\*



500 lbs\*



750 lbs\*



1000 lbs



1200 lbs

## Wide Opening pp. 437-446

Clamping arm opens past 90° for excellent loading clearance. Most-popular and widest-range series of vertical-handle hold-down clamps. Choice of flanged or straight base, solid or open arm, and regular or T handle in most of the seven available sizes.



750 lbs



1000 lbs

## Wide Opening – Angle Arm p. 447

Clamps with arm tilted upward for increased clearance underneath. Also useful for applying clamping force at an angle. Wide-opening solid arm. Choice of flanged base or straight base. Available in two sizes.



750 lbs

## Wide Opening Automatically Adjusting p. 449

Self-adjusting clamp automatically compensates for different workpiece heights without resetting the spindle. Clamping force is always consistent. Wide opening.



750 lbs



2000 lbs



3000 lbs



6000 lbs

## Wide Opening – Heavy-Duty pp. 450-453

Heavy-duty production clamps designed for extreme durability. Available either as complete clamps or as basic mechanisms for adding custom clamping arms or handles. Choice of four sizes.

CONTINUED ON NEXT PAGE

# VERTICAL-HANDLE TOGGLE CLAMPS

CONTINUED FROM PREVIOUS PAGE



150 lbs\*



350 lbs\*



750 lbs\*

## Low Profile pp. 454-455

Extremely compact low-profile clamps with a unique finger-grip T handle. Available in three sizes.



100 lbs\*



250 lbs



625 lbs



850 lbs

## Low Arm pp. 456-457, 460

Simple, easy-opening clamps with excellent arm reach. Extends farther over workpiece than any clamp its size. Choice of flanged or straight base, and solid or open arm. Arm opens 83°. Available in seven sizes, the largest three forged.



1500 lbs



2500 lbs



5000 lbs



100 lbs\*



250 lb



625 lbs



850 lbs

## High Arm pp. 458-459, 461

Simple, easy-opening clamps with extra arm height. Choice of flanged or straight base, and solid or open arm. Arm opens 83°. Available in seven sizes, the largest three forged.



1500 lbs



2500 lbs



5000 lbs



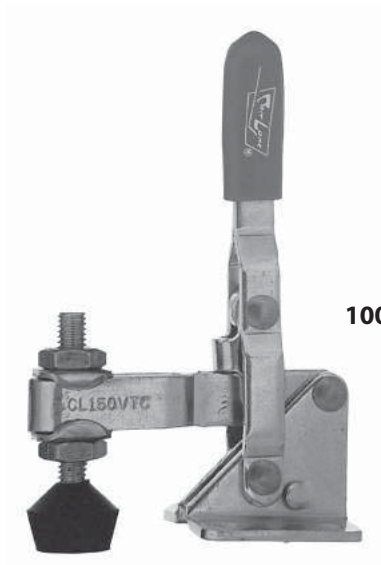
1000 lbs

## Vertical Handle Cam Clamps p. 448

Wide-opening clamp that locks by spiral-cam action rather than toggle action. Solid arm, flanged base.

# VERTICAL-HANDLE TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



100 lbs

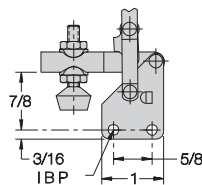
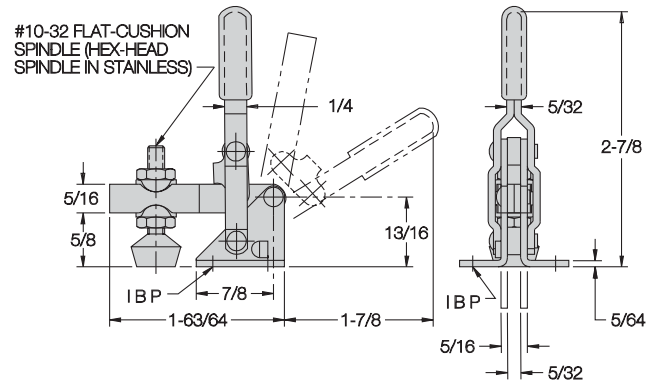
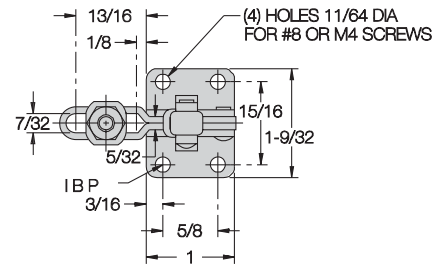
## CL-150-VTC

Open Arm, Flanged Base

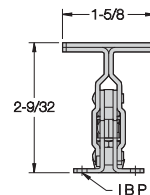
Smallest wide-opening hold-down clamp available. Open arm provides adjustable spindle location. Arm opens 100° while handle moves 56°. Supplied with #10-32 flat-cushion spindle CL-316112-FC and (2) CL-3166-TW flanged washers. Shipping weight 0.2 lbs.

Holding capacity:

100 lbs

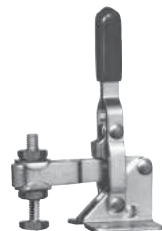


CL-151-VTC  
Straight Base



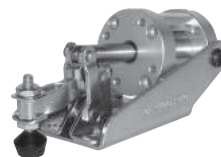
CL-152-VTC  
Flanged Base  
T Handle

Also available  
in stainless steel...



CL-150-VTC-S

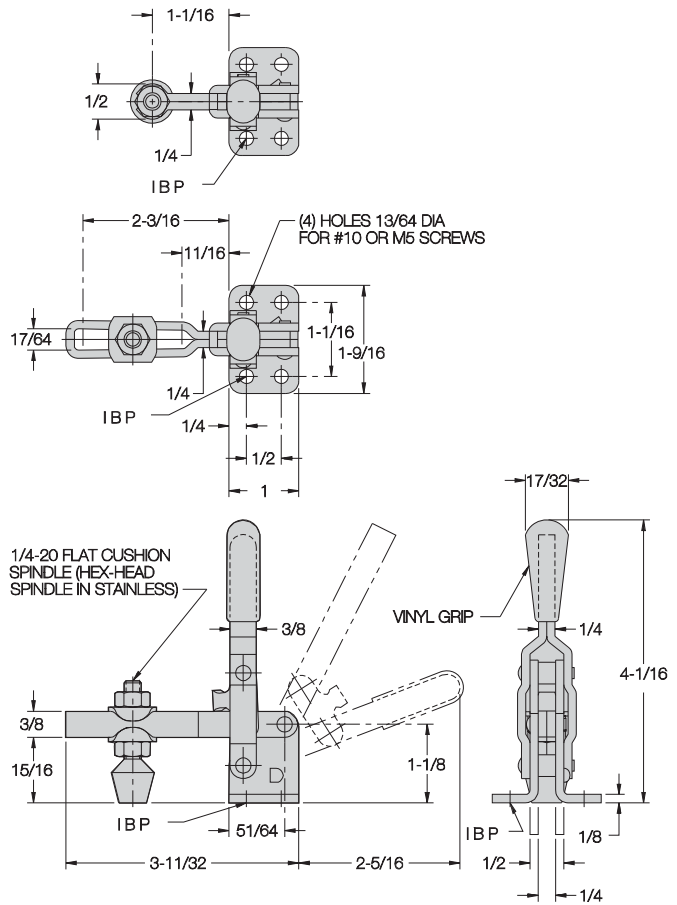
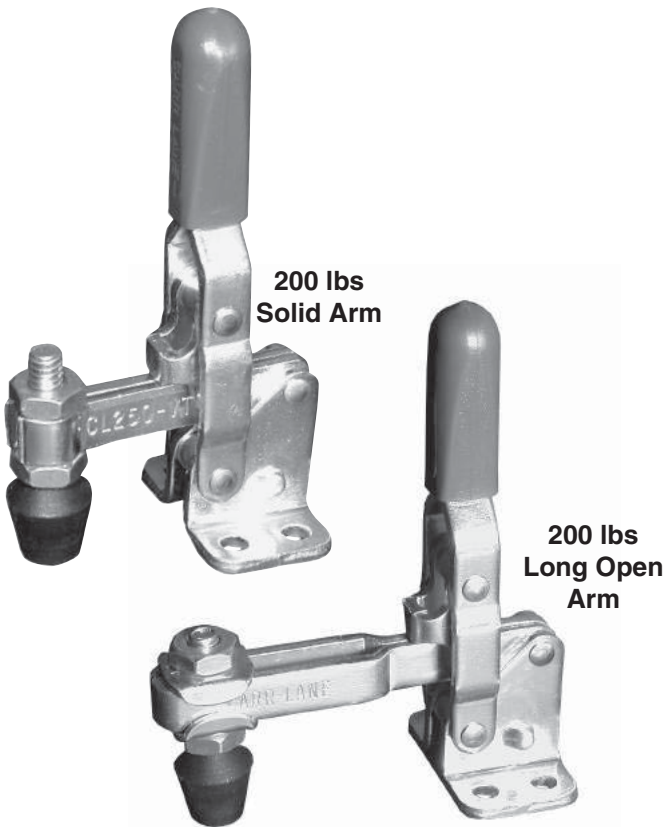
Also available  
air powered...



CL-400-PTC  
(INFO+ page 492)

# VERTICAL-HANDLE TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



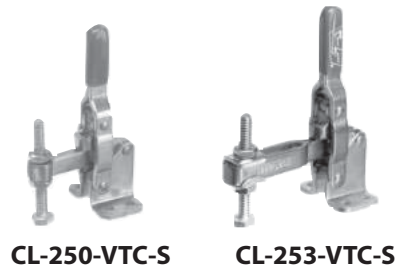
## CL-250-VTC Solid Arm, Flanged Base

## CL-253-VTC Long, Open Arm, Flanged Base

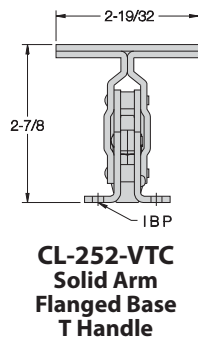
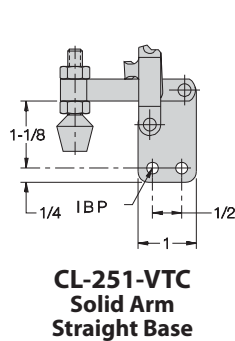
Small-yet-powerful clamp available in several configurations. Choose either a solid arm, or a long open arm for spindle adjustment. Arm opens 117° while handle moves 69°. Supplied with 1/4-20 short flat-cushion spindle CL-14112-FC. Open-arm version supplied with (2) CL-148-TW flanged washers. Shipping weight 0.4 lbs.

**Holding capacity:** 200 lbs

Also available in stainless steel ...



Also available air powered ...





# VERTICAL-HANDLE TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS

**200 lbs  
Solid Arm  
With Safety Lock**



**200 lbs  
Long Open Arm  
With Safety Lock**



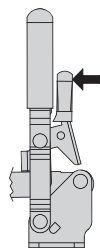
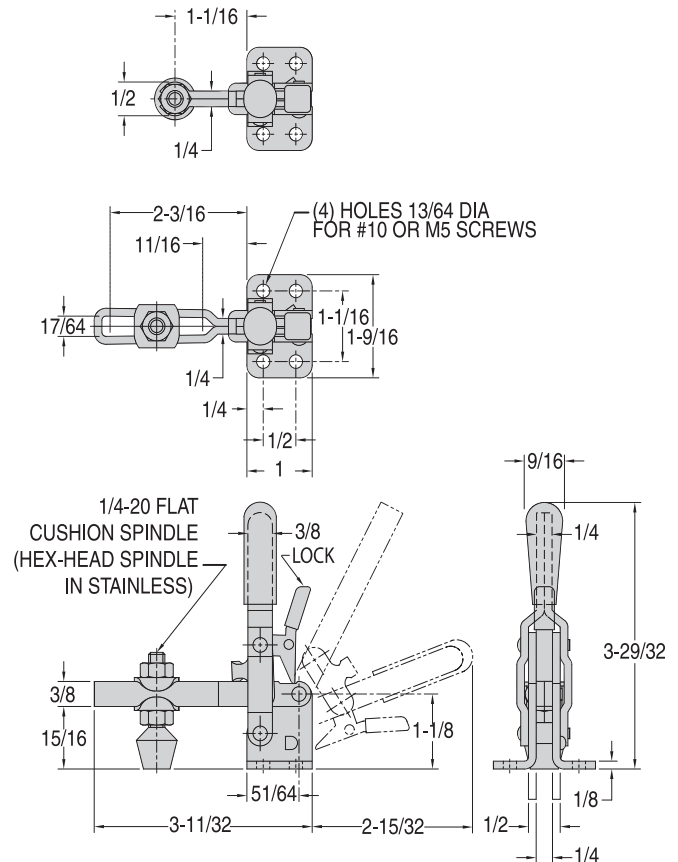
**CL-250-LVTC** Solid Arm, Flanged Base  
**CL-253-LVTC** Long, Open Arm, Flanged Base

INFO+: Same as the wide-opening toggle clamps shown on page 438, except with our unique safety-lock feature. This safety lock automatically engages when the clamp is closed, then remains locked until manually disengaged by pressing the handle. This prevents the clamp from being accidentally opened by bumping the handle.

Choose either a solid arm, or a long open arm for spindle adjustment. Arm opens 117° while handle moves 69°. Supplied with 1/4-20 short flat-cushion spindle CL-14112-FC. Open-arm version supplied with (2) CL-148-TW flanged washers. Shipping weight 0.4 lbs.

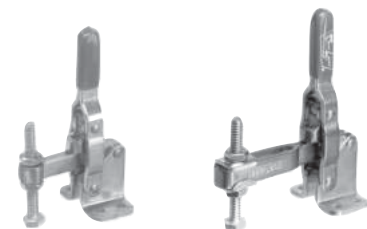
**Holding capacity:**

**200 lbs**



**Press Lever To Unlock**

Also available in stainless steel . . .



**CL-250-LVTC-S**

**CL-253-LVTC-S**

# VERTICAL-HANDLE TOGGLE CLAMPS

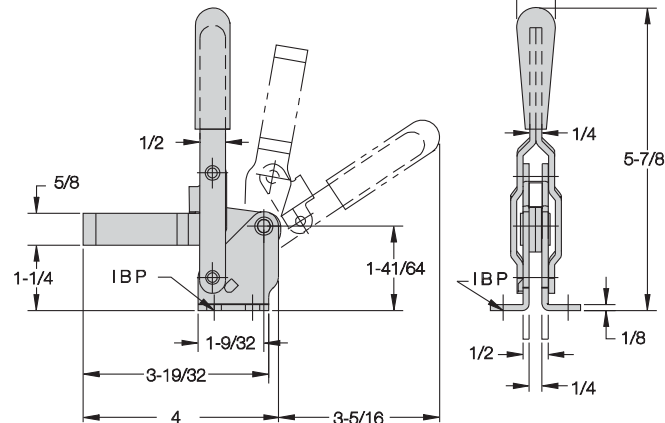
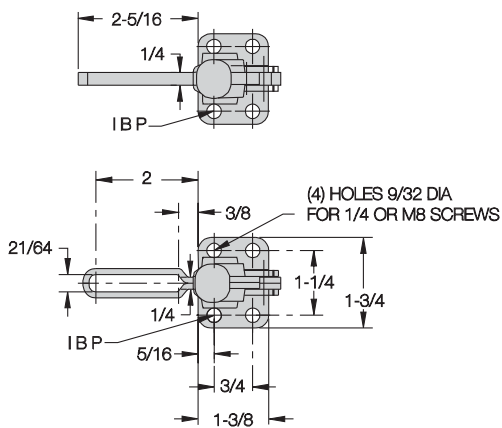
INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



**500 lbs  
Solid Arm**



**500 lbs  
Open Arm**



## CL-350-VTC CL-450-VTC

**Solid Arm, Flanged Base**

**Open Arm, Flanged Base**

Most-popular wide-opening clamp available in many configurations. Choose either a solid arm, or an open arm for spindle adjustment (extra-long arms also available). Arm opens 100° while handle moves 60°. Accepts any 5/16-18 short spindle. **INFO+**: See pages 500-503 to order. Solid-arm versions supplied with a CL-518000-BR bolt retainer. Open-arm versions supplied with (2) CL-51610-TW flanged washers. Shipping weight 0.8 lbs.

**Holding capacity:**

**500 lbs**

**Also available  
in stainless steel ...**



**CL-450-VTC-S**

**Also available  
air powered ...**

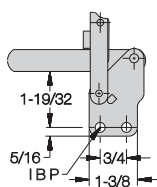


**CL-1001-PTC  
Solid Arm  
(INFO+ page 494)**

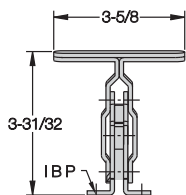


**CL-1000-PTC  
Open Arm  
(INFO+ page 494)**

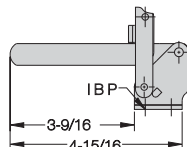
1  
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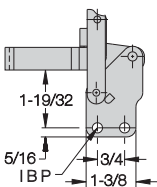
**CL-351-VTC  
Solid Arm  
Straight Base**



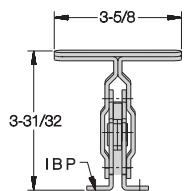
**CL-352-VTC  
Solid Arm  
Flanged Base  
T Handle**



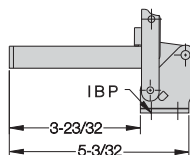
**CL-353-VTC  
Long Solid Arm  
Flanged Base**



**CL-451-VTC  
Open Arm  
Straight Base**



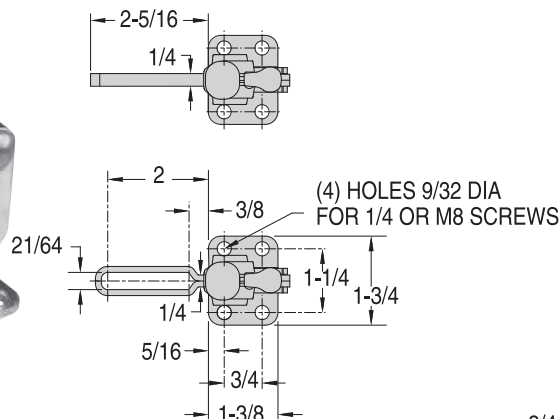
**CL-452-VTC  
Open Arm  
Flanged Base  
T Handle**



**CL-453-VTC  
Long Open Arm  
Flanged Base**

# VERTICAL-HANDLE TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



## CL-350-LVTC CL-450-LVTC

Solid Arm, Flange Base

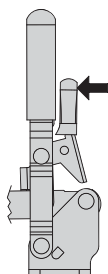
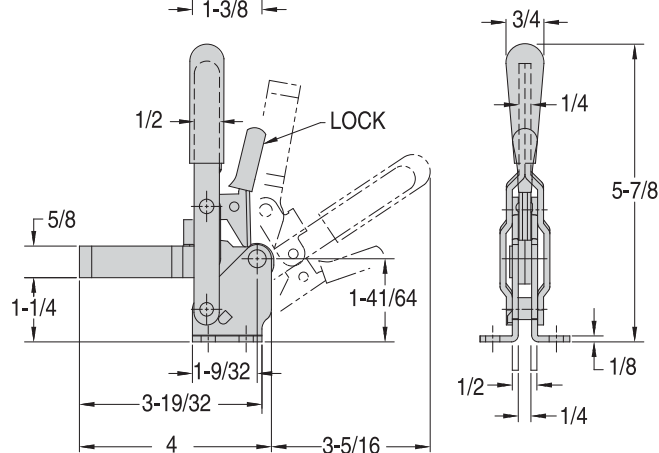
Open Arm, Flange Base

INFO+: Same as the wide-opening toggle clamps shown on page 440, except with our unique safety-lock feature. This safety lock automatically engages when the clamp is closed, then remains locked until manually disengaged by pressing the handle. This prevents the clamp from being accidentally opened by bumping the handle.

Choose either a solid arm, or an open arm for spindle adjustment. Arm opens 100° while handle moves 60°. Accepts any 5/16-18 short spindle. INFO+: See pages 500-503 to order. Solid-arm version supplied with CL-518000-BR bolt retainer. Open-arm version supplied with (2) CL-51610-TW flanged washers. Shipping weight 0.9 lbs.

Holding capacity:

500 lbs



Press Lever To Unlock

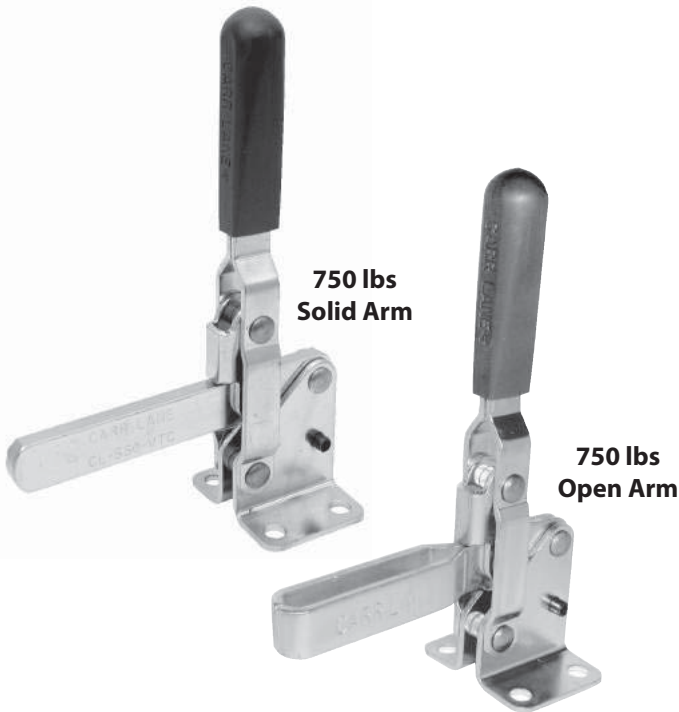
Also available  
in stainless steel . . .



CL-450-LVTC-S

# VERTICAL-HANDLE TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



## CL-550-VTC CL-650-VTC

**Solid Arm, Flange Base**

**Open Arm, Flange Base**

Larger wide-opening clamp available in several configurations. Choose either a solid arm, or an open arm for spindle adjustment. Arm opens 106° while handle moves 58°. Accepts any 3/8-16 spindle. **INFO+**: See pages 500-503 to order. Solid-arm version supplied with a CL-316000-BR bolt retainer. Open-arm version supplied with (2) CL-3811-TW flanged washers. Shipping weight 1.3 lbs.

**Holding capacity:**

**750 lbs**

Also available with patented automatic adjustment!

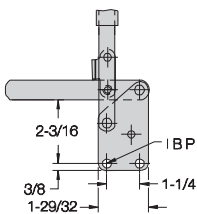
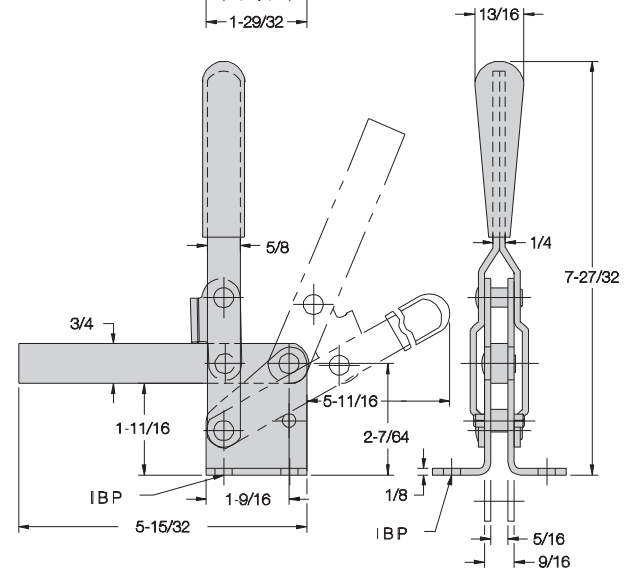
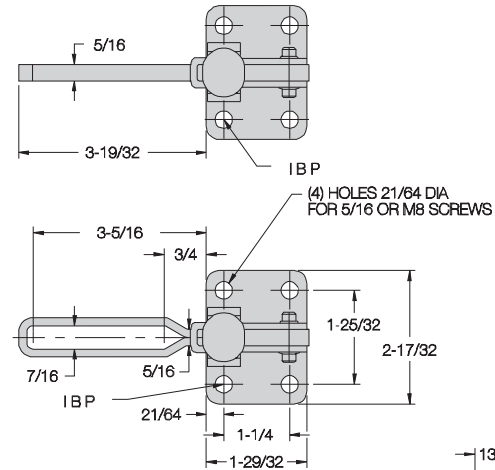
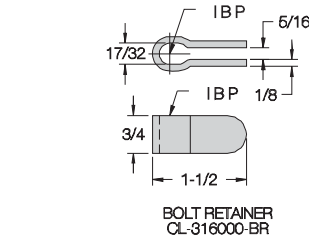
Also available in stainless steel ...



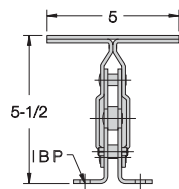
**CL-650-ATC**  
(INFO+ page 449)



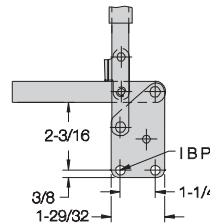
**CL-650-VTC-S**



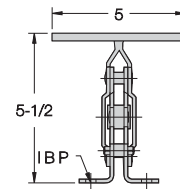
**CL-551-VTC**  
Solid Arm  
Straight Base



**CL-552-VTC**  
Solid Arm  
Flanged Base  
T Handle



**CL-651-VTC**  
Open Arm  
Straight Base



**CL-652-VTC**  
Open Arm  
Flanged Base  
T Handle

# VERTICAL-HANDLE TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



## CL-550-LVTC CL-650-LVTC

Solid Arm, Flange Base

Open Arm, Flange Base

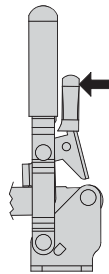
INFO+: Same as the wide-opening toggle clamps shown on page 442, except with our unique safety-lock feature. This safety lock automatically engages when the clamp is closed, then remains locked until manually disengaged by pressing the handle. This prevents the clamp from being accidentally opened by bumping the handle.

Choose either a solid arm, or an open arm for spindle adjustment. Arm opens 106° while handle moves 58°. Accepts any 3/8-16 spindle.

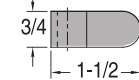
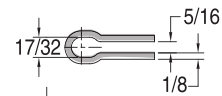
INFO+: See pages 500-503 to order. Solid-arm version supplied with CL-316000-BR bolt retainer. Open-arm version supplied with (2) CL-3811-TW flanged washers. Shipping weight 1.4 lbs.

Holding capacity:

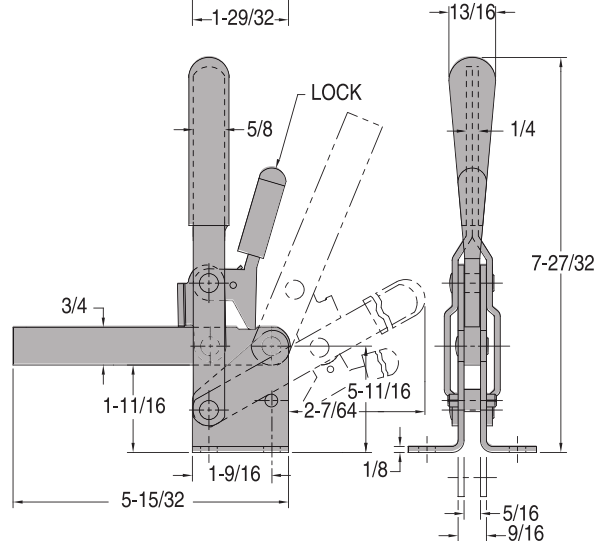
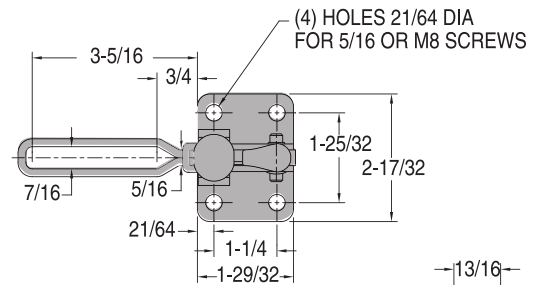
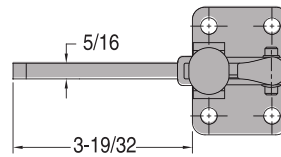
750 lbs



Press Lever To Unlock

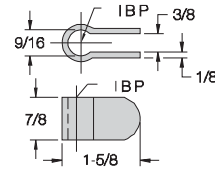
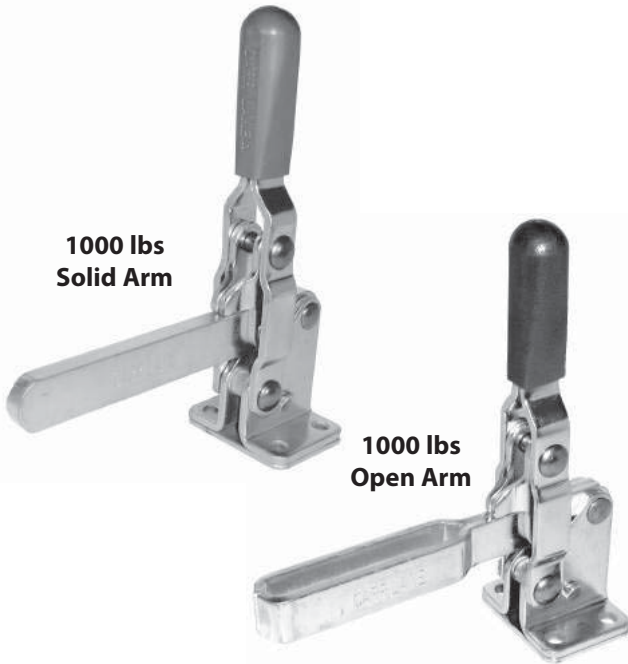


BOLT RETAINER  
CL-316000-BR

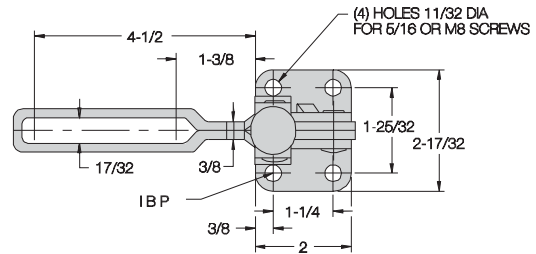
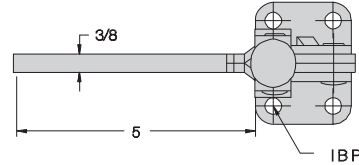


# VERTICAL-HANDLE TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



**BOLT RETAINER  
CL-113000-BR**



## CL-750-VTC CL-850-VTC

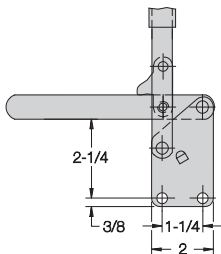
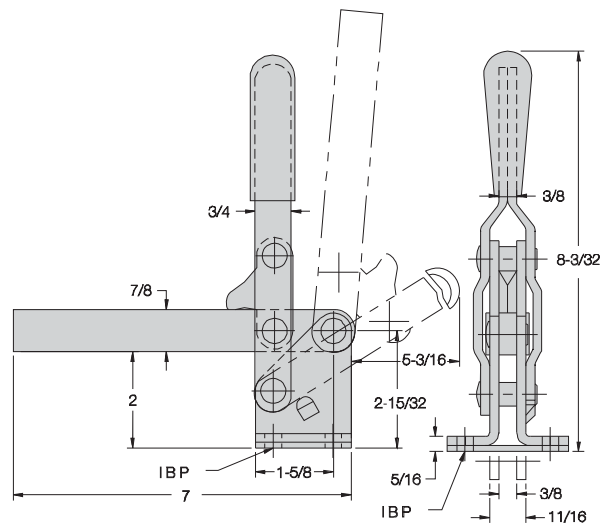
**Solid Arm, Flange Base**

**Open Arm, Flange Base**

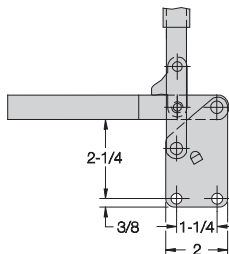
Extra-large wide-opening clamp. Choose either a solid arm, or an open arm for spindle adjustment. Arm opens 120° while handle moves 67°. Accepts any 1/2-13 spindle. **INFO+**: See pages 500-503 to order. Solid-arm version supplied with a CL-113000-BR bolt retainer. Open-arm version supplied with (2) CL-1213-TW flanged washers. Shipping weight 2.5 lbs.

**Holding capacity:**

**1000 lbs**



**CL-751-VTC  
Solid Arm  
Straight Base**



**CL-851-VTC  
Open Arm  
Straight Base**

**Also available air powered . . .**



**CL-2001-PTC  
Solid Arm  
(INFO+ 495)**



**CL-2000-PTC  
Open Arm  
(INFO+ 495)**

# VERTICAL-HANDLE TOGGLE CLAMPS

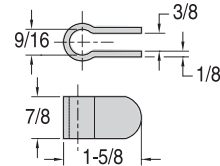
INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



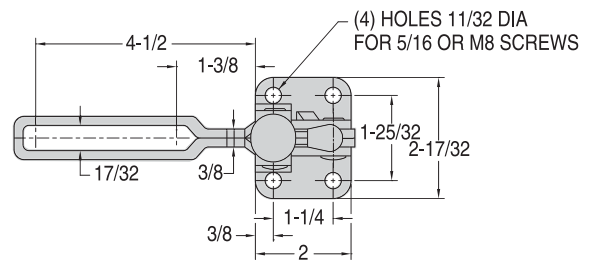
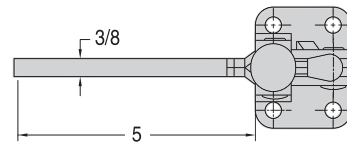
**1000 lbs  
Solid Arm  
With Safety Lock**



**1000 lbs  
Open Arm  
With Safety Lock**



CL-113000-BR



## CL-750-LVTC CL-850-LVTC

**Solid Arm, Flange Base**

**Open Arm, Flange Base**

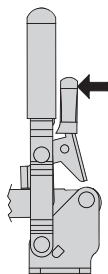
INFO+: Same as the wide-opening toggle clamps shown on page 444, except with our unique safety-lock feature. This safety lock automatically engages when the clamp is closed, then remains locked until manually disengaged by pressing the handle. This prevents the clamp from being accidentally opened by bumping the handle.

Choose either a solid arm, or an open arm for spindle adjustment. Arm opens 120° while handle moves 67°. Accepts any 1/2-13 spindle.

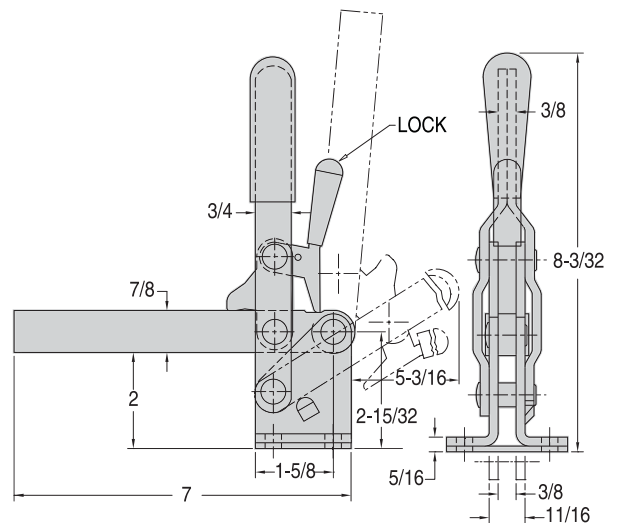
INFO+: See pages 500-503 to order. Solid-arm version supplied with CL-113000-BR bolt retainer. Open-arm version supplied with (2) CL-1213-TW flanged washers. Shipping weight 2.5 lbs.

**Holding capacity:**

**1000 lbs**



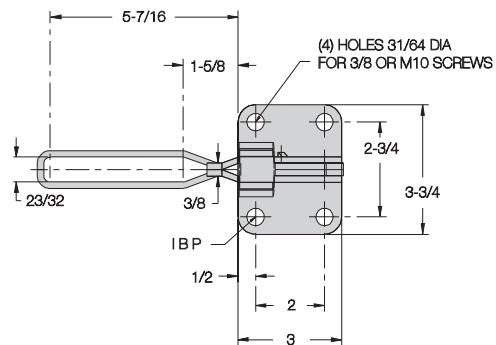
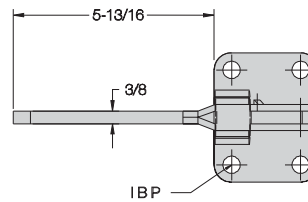
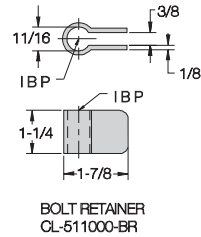
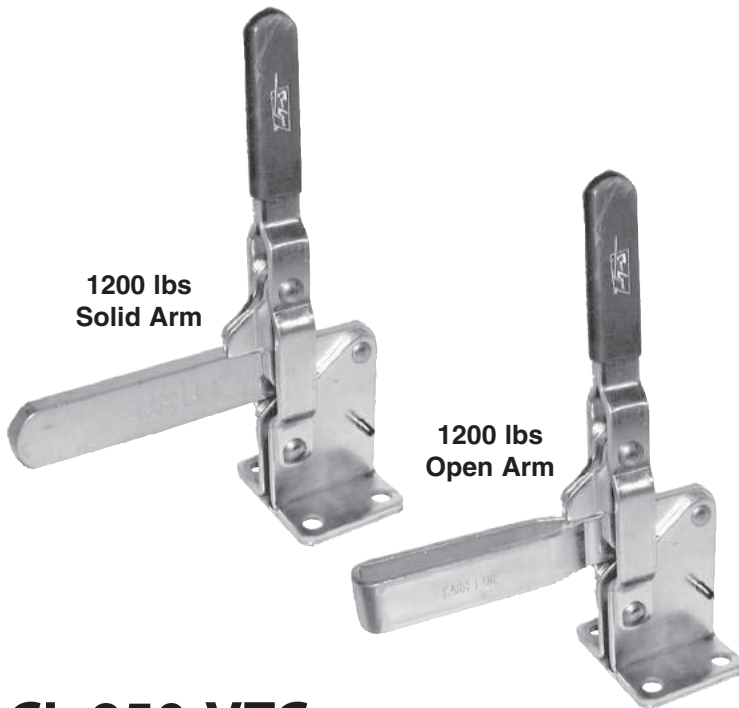
**Press Lever To Unlock**



1  
1

# VERTICAL-HANDLE TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



## CL-950-VTC CL-850-VTC

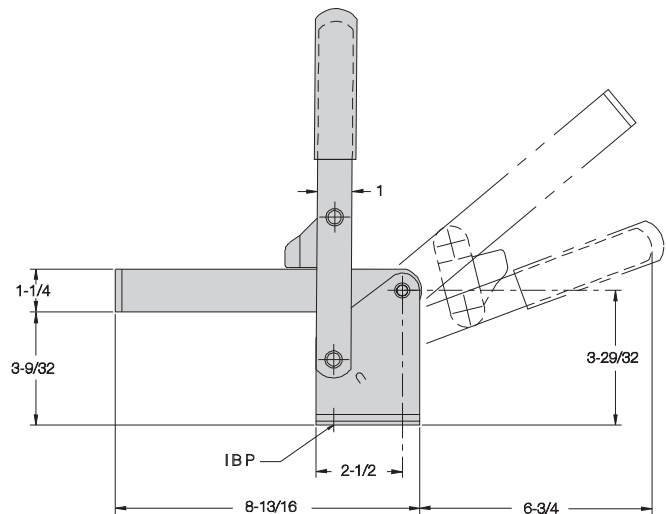
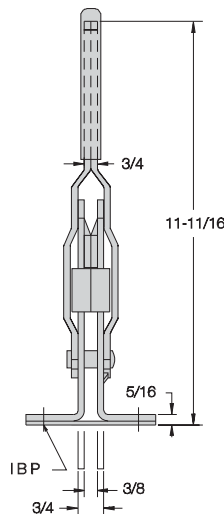
Solid Arm, Flange Base

Open Arm, Flange Base

Largest wide-opening clamp available. Choose either a solid arm, or an open arm for spindle adjustment. Arm opens 140° while handle moves 70°. Accepts any 5/8-11 spindle. **INFO+**: See pages 500-503 to order. Solid-arm version supplied with a CL-511000-BR bolt retainer. Open-arm version supplied with (2) CL-5811-TW flanged washers. Shipping weight 5.2 lbs.

Holding capacity:

1200 lbs



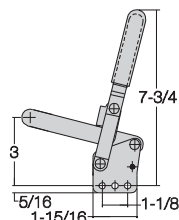


# VERTICAL-HANDLE TOGGLE CLAMPS

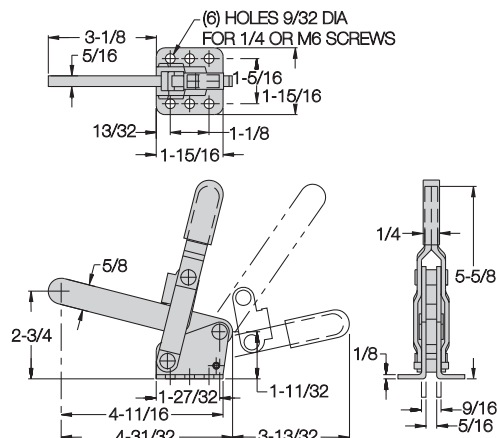
INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



750 lbs  
Angled Arm



**CL-601-VTC**  
Straight Base  
with Bracket

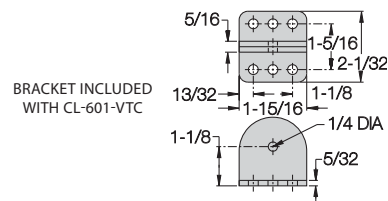


## CL-600-VTC Angled Arm, Flange Base

Angled-arm clamp provides increased clearance underneath arm. Also useful for applying clamping force at an angle. Solid arm opens 113° while handle moves 66°. Accepts any 3/8-16 spindle. **INFO+**: See pages 500-503 to order. Supplied with a CL-316000-BR bolt retainer. Straight-base version has a longer handle and includes a separate base to allow mounting at any angle. Shipping weight 1.0 to 1.5 lbs.

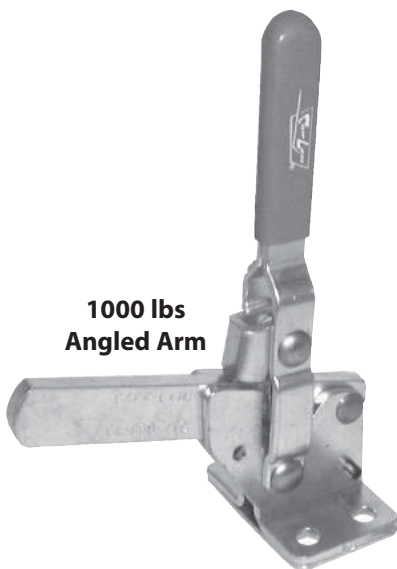
**Holding capacity:**

**750 lbs**

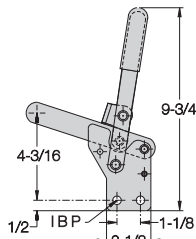


# VERTICAL-HANDLE TOGGLE CLAMPS

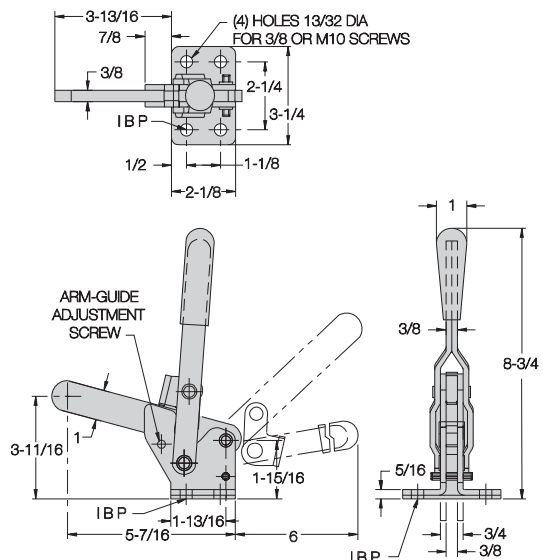
INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



1000 lbs  
Angled Arm



**CL-801-VTC**  
Straight Base  
with Bracket

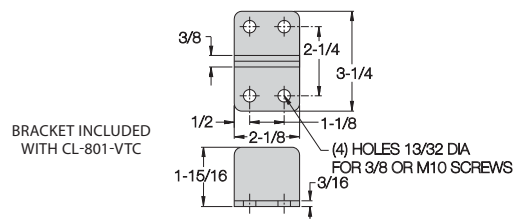


## CL-800-VTC Angled Arm, Flange Base

Larger-size angled-arm clamp. Solid arm opens 126° while handle moves 76°. Accepts any 5/8-11 spindle. **INFO+**: See pages 500-503 to order. Supplied with a CL-511000-BR bolt retainer. Straight-base version includes a separate base to allow mounting at any angle. Shipping weight 2.5 to 2.8 lbs.

**Holding capacity:**

**1000 lbs**



# VERTICAL-HANDLE CAM CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



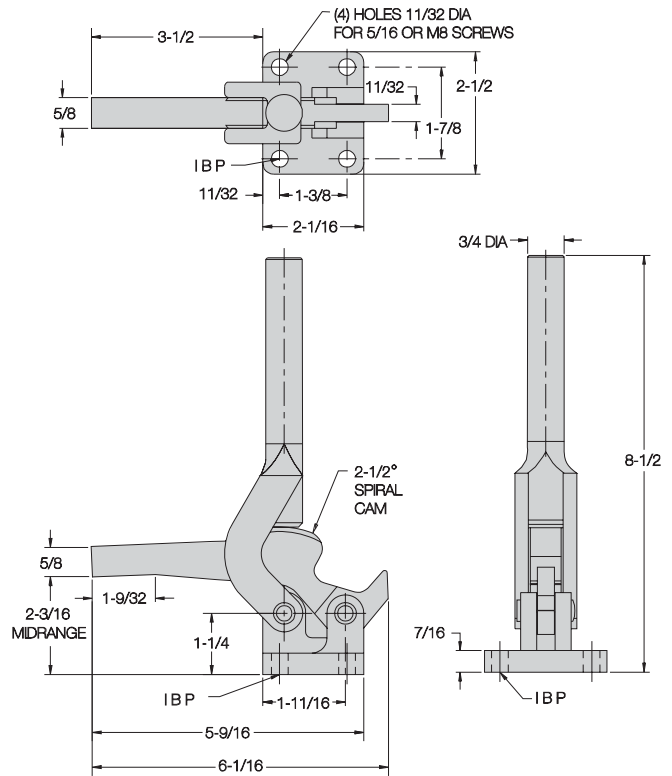
**1000 lbs  
Cam Action**

## CL-1000-VCC

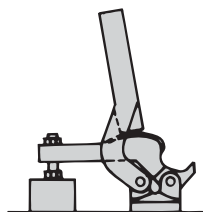
Wide-opening clamp that locks by cam action rather than toggle action. Smooth spiral cam locks securely anywhere within a 3/16-inch clamping range. Rugged cast-steel components are flame hardened at all wear points. Solid arm can be tapped to accept a spindle, or otherwise modified. Shipping weight 2.5 lbs.

**Holding capacity:**

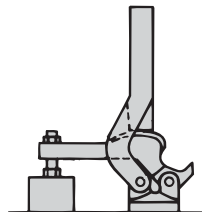
**1000 lbs**



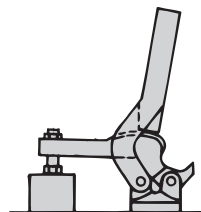
**Optional Vinyl Grip  
CL-3-HVTC-G**



**Low Limit**



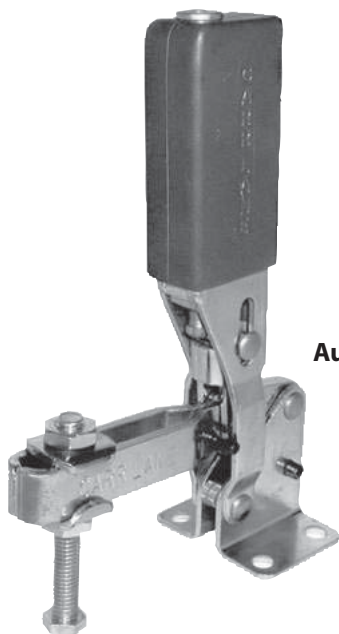
**Average Setting**



**High Limit**

# VERTICAL-HANDLE TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



**750 lbs  
Automatic Toggle Clamp  
(Self Adjusting)**

## CL-650-ATC

Automatically adjusts for different workpiece thicknesses! Clamps with the same force anywhere within its adjustment range (1-1/4"). Perfect for welding fixtures, machining fixtures for castings, fixtures holding several part sizes within the same family, or any other application where part size can vary.

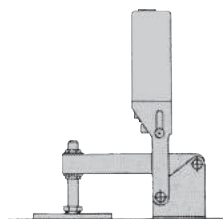
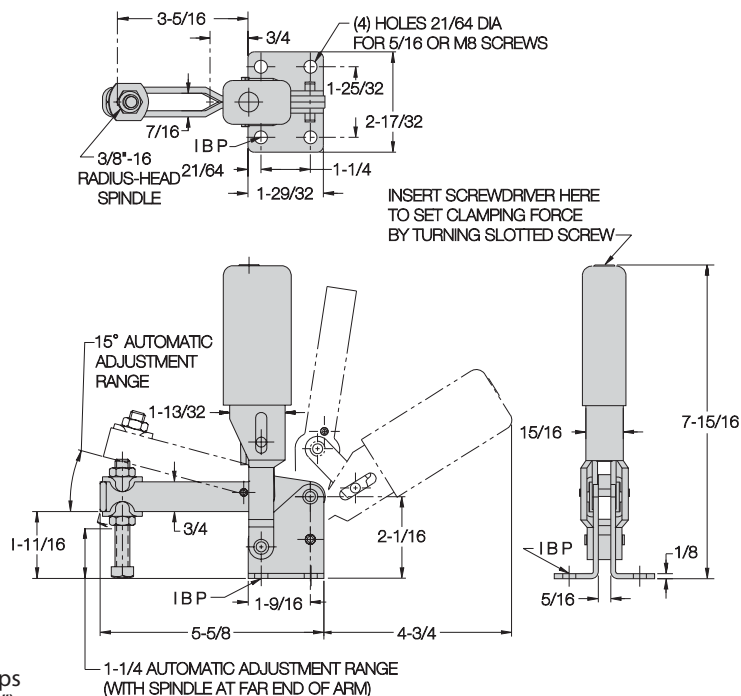
Easy to use. To set up, simply adjust the contact spindle to the average workpiece height, and set desired clamping force. After that, operate just like a standard toggle clamp. The patented adjusting mechanism does the rest.

Clamping force is always consistent. The clamp's toggle action ensures that workpieces will remain clamped even under severe vibration. No additional spindle adjustment is ever needed. The clamp even compensates for wear in long production runs.

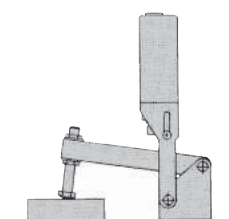
Fits in the same space, and provides the same clamping force as a standard toggle clamp. A maximum of 250 to 500 lbs clamping force (depending on spindle position) can be applied by hand. Arm opens 106° while handle moves 58°. Supplied with 3/8-16 radius spindle CL-38314-RS and (2) CL-3811-TW flanged washers. Patent no. 4,407,493. Other patents pending. Shipping weight 1.9 lbs.

**Holding capacity:**

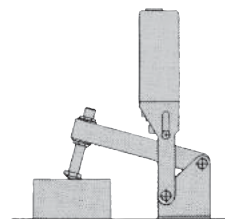
**750 lbs**



**Low Limit**



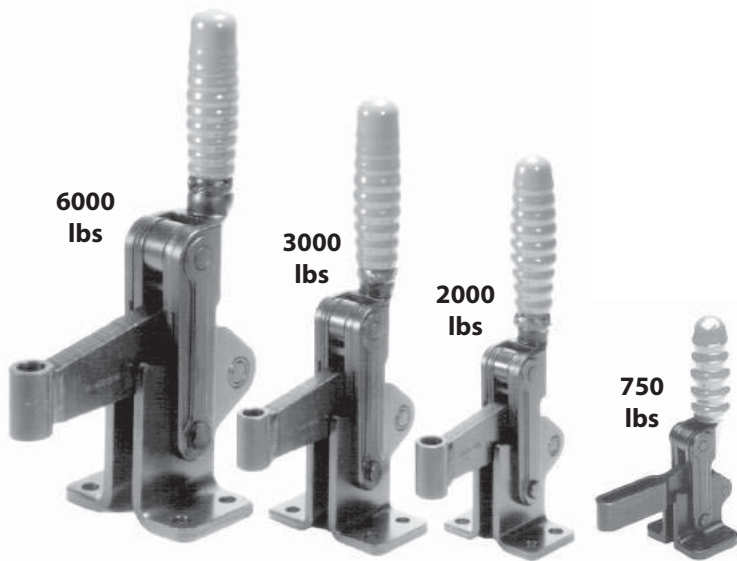
**Average Setting**



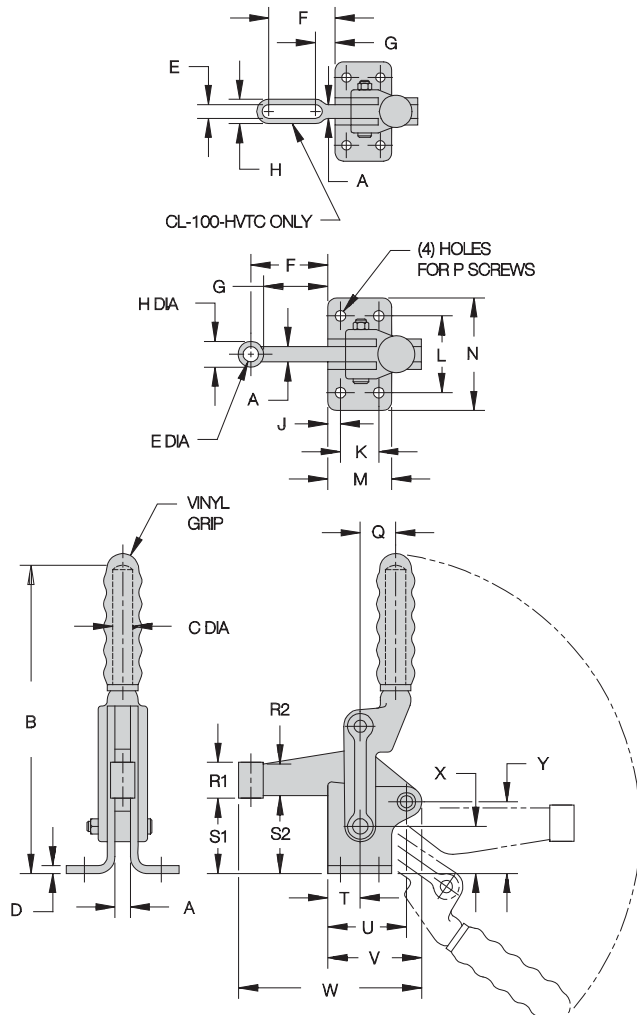
**High Limit**

# VERTICAL-HANDLE TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



Heavy-duty automotive-type production clamps designed for extreme durability. The above configuration includes a long horizontal clamping arm with an attached bolt retainer, a vertical handle with vinyl grip, and an integral flanged base (INFO+: see pages 451-453 for other versions). Precision, close-tolerance steel components throughout provide exceptionally smooth operation. Rugged alloy steel handle fork. Guided-arm feature provides positive lateral arm support. All pivot pins are hardened and ground, running in either hardened bushings or the close-tolerance holes of hardened parts. The bottom pivot is a precision bolt which can be adjusted, if desired, to fine tune the amount of free play. These clamps are built to withstand abuse. With just occasional lubrication, they will provide extremely long service life. Black oxide finish. Available in four sizes.



## CL-100-HVTC Complete Clamp, Flanged Base

Smallest of the four sizes, yet still quite powerful. Cast alloy steel base and slotted open clamping arm on this size only. Arm opens 130° while handle moves 90°. Accepts any 1/4-20 spindle. INFO+: See pages 500-503 to order. Supplied with (2) CL-148-TW flanged washers. Shipping weight 1.0 lbs.

**Holding capacity:** 750 lbs

## CL-500-HVTC Complete Clamp, Flanged Base

Solid arm opens 180° while handle moves 125°. Accepts any 1/2-13 spindle. INFO+: See pages 500-503 to order. Shipping weight 4.3 lbs.

**Holding capacity:** 3000 lbs

## CL-300-HVTC Complete Clamp, Flanged Base

Solid arm opens 180° while handle moves 120°. Accepts any 1/2-13 spindle. INFO+: See pages 500-503 to order. Shipping weight 2.8 lbs.

**Holding capacity:** 2000 lbs

## CL-602-HVTC Complete Clamp, Flanged Base

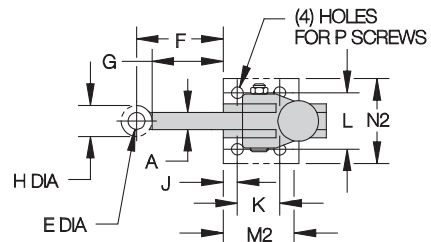
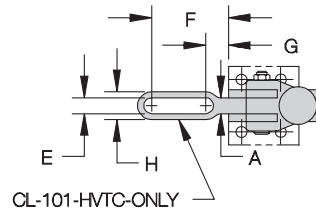
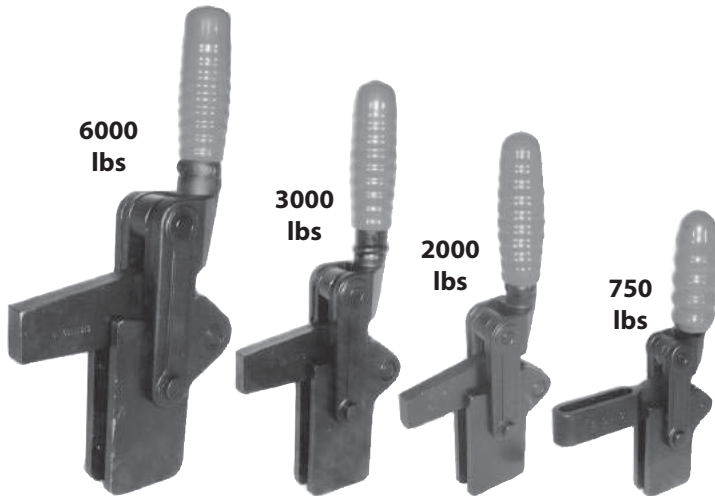
Our most-powerful hold-down toggle clamp. Solid arm opens 195° while handle moves 130°. Accepts any 5/8-11 spindle. INFO+: See pages 500-503 to order. Shipping weight 9.1 lbs.

**Holding capacity:** 6000 lbs

PART NO. COMPLETE CLAMP	A	B	C DIA	D	E	F	G	H	J	K	L	M	N	P	Q	R1	R2	S1	S2	T	U	V	W	X	Y
CL-100-HVTC	.236	4.45	.50	.197	.26	1.54	.35	.49	.236	.748	1.260	1.22	1.73	1/4 or M6	.55	.59	.59	.98	.98	.59	1.26	1.54	3.31	.51	.87
CL-300-HVTC	.394	8.46	.75	.197	.52	1.97	1.57	.75	.394	.984	1.969	1.77	2.64	5/16 or M8	.91	1.18	.87	1.89	1.89	.98	2.13	2.52	4.87	1.10	1.72
CL-500-HVTC	.472	9.84	.87	.236	.52	2.36	1.97	.75	.394	1.181	2.362	1.97	3.46	5/16 or M8	.98	1.18	1.02	2.28	2.32	.98	2.40	2.92	5.66	1.42	2.19
CL-600-HVTC	.630	11.61	.98	.315	.64	2.95	2.36	1.00	.472	1.575	2.953	2.48	4.13	3/8 or M10	1.38	1.50	1.26	2.76	2.95	1.57	3.31	3.98	7.43	1.81	2.76

# VERTICAL-HANDLE TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



Heavy-duty automotive-type production clamps designed for extreme durability. The above configuration includes a long horizontal clamping arm furnished with a bolt retainer (not welded on), a vertical handle with vinyl grip, and a straight base for plate/tongue mounting at any angle (INFO+: see pages 450, 452-453 for other versions). Precision, close-tolerance steel components throughout provide exceptionally smooth operation. Rugged alloy steel handle fork. Guided-arm feature provides positive lateral arm support. All pivot pins are hardened and ground, running in either hardened bushings or the close-tolerance holes of hardened parts. The bottom pivot is a precision bolt which can be adjusted, if desired, to fine tune the amount of free play. These clamps are built to withstand abuse. With just occasional lubrication, they will provide extremely long service life. Black oxide finish. Available in four sizes.

## CL-101-HVTC Complete Clamp, Straight Base

Smallest of the four sizes, yet still quite powerful. Cast alloy steel slotted open clamping arm on this size only. Arm opens 205° while handle moves 130°. Accepts any 1/4-20 spindle. INFO+: See pages 500-503 to order. Supplied with (2) CL-148-TW flanged washers. Shipping weight 0.9 lbs.

Holding capacity: **750 lbs**

## CL-301-HVTC Complete Clamp, Straight Base

Solid arm opens 205° while handle moves 130°. Accepts any 1/2-13 spindle. INFO+: See pages 500-503 to order. Shipping weight 2.5 lbs.

Holding capacity: **2000 lbs**

## CL-501-HVTC Complete Clamp, Straight Base

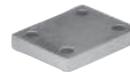
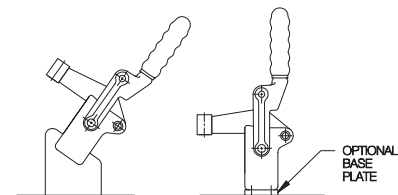
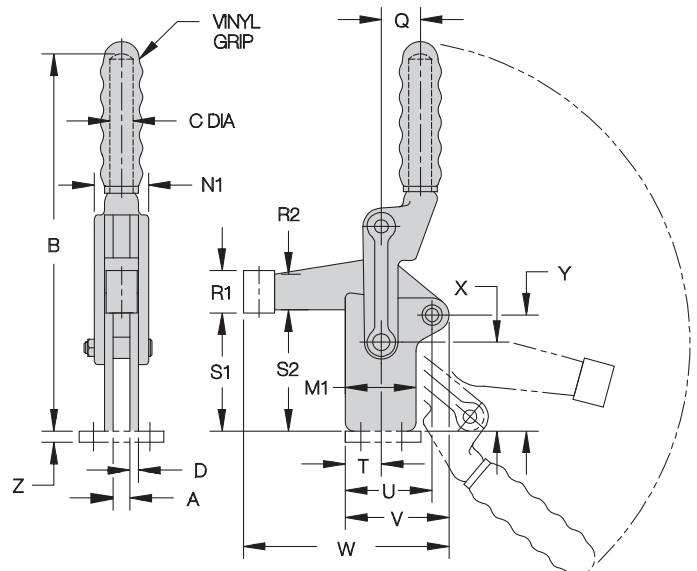
Solid arm opens 195° while handle moves 130°. Accepts any 1/2-13 spindle. INFO+: See pages 500-503 to order. Shipping weight 4.0 lbs.

Holding capacity: **3000 lbs**

## CL-601-HVTC Complete Clamp, Straight Base

Our most-powerful hold-down toggle clamp. Solid arm opens 195° while handle moves 130°. Accepts any 5/8-11 spindle. INFO+: See pages 500-503 to order. Shipping weight 8.3 lbs.

Holding capacity: **6000 lbs**



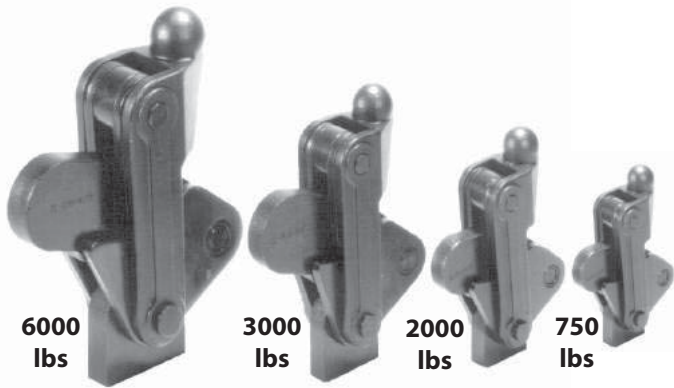
### Base Plate (order separately)

- CL-1-HVTC-P (750 lbs)
- CL-5-HVTC-P (3000 lbs)
- CL-3-HVTC-P (2000 lbs)
- CL-6-HVTC-P (6000 lbs)

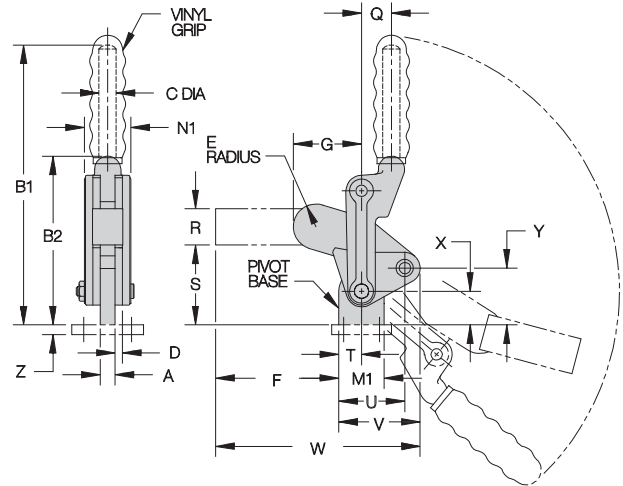
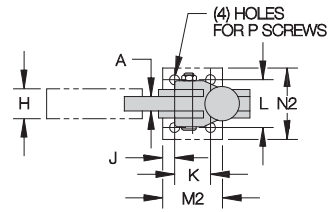
PART NO. COMPLETE CLAMP	A	B	C DIA	D	E	F	G	H	J	K	L	M1	M2	N1	N2	P	Q	R1	R2	S1	S2	T	U	V	W	X	Y	Z
CL-101-HVTC	.236	5.08	.50	.118	.26	1.54	.35	.49	.236	.748	1.260	1.06	1.10	.79	1.73	#10 or M5	.55	.59	.59	1.61	1.61	.59	1.26	1.54	3.31	1.14	1.50	.236
CL-301-HVTC	.394	9.25	.75	.197	.52	1.97	1.57	.75	.295	.984	1.378	1.77	1.57	1.26	1.97	1/4 or M6	.91	1.18	.87	2.76	2.76	.98	2.13	2.52	4.87	1.97	2.59	.315
CL-501-HVTC	.472	10.87	.87	.236	.52	2.36	1.97	.75	.394	1.181	1.575	1.97	1.97	1.50	2.36	5/16 or M8	.98	1.18	1.02	3.35	3.39	.98	2.40	2.92	5.66	2.48	3.25	.315
CL-601-HVTC	.630	12.60	.98	.315	.64	2.95	2.36	1.00	.394	1.772	1.969	2.48	2.56	1.97	2.76	5/16 or M8	1.38	1.50	1.26	3.94	4.13	1.57	3.31	3.98	7.43	2.99	3.94	.315

# VERTICAL-HANDLE TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



Heavy-duty automotive-type production clamps designed for extreme durability. The above configuration is a basic toggle mechanism onto which an arm and handle can be welded at any desired angle (INFO+: see pages 450-451, and 453 for other versions). The pivot base must be welded to both the clamp mechanism and the fixture, or the optional base plate, after setting the clamp at the proper angle. Precision, close-tolerance steel components throughout provide exceptionally smooth operation. Rugged alloy steel handle fork. Guided-arm feature provides positive lateral arm support. All pivot pins are hardened and ground, running in either hardened bushings or the close-tolerance holes of hardened parts. The bottom pivot is a precision bolt which can be adjusted, if desired, to fine tune the amount of free play. These clamps are built to withstand abuse. With just occasional lubrication, they will provide extremely long service life. Black oxide finish. Available in four sizes.



## CL-110-HVTC Basic Mechanism, Pivot Base

Smallest of the four sizes, yet still quite powerful. Arm opens 205° while handle moves 130°. Shipping weight 0.6 lbs. To order basic mechanism without the pivot base, specify part no. CL-120-HVTC.

**Holding capacity:** 750 lbs

## CL-310-HVTC Basic Mechanism, Pivot Base

Arm opens 205° while handle moves 130°. Shipping weight 1.6 lbs. To order basic mechanism without the pivot base, specify part no. CL-320-HVTC.

**Holding capacity:** 2000 lbs

## CL-510-HVTC Basic Mechanism, Pivot Base

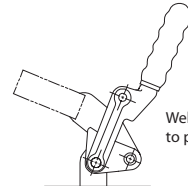
Arm opens 195° while handle moves 130°. Shipping weight 2.9 lbs. To order basic mechanism without the pivot base, specify part no. CL-520-HVTC.

**Holding capacity:** 3000 lbs

## CL-610-HVTC Basic Mechanism, Pivot Base

Our most-powerful hold-down toggle clamp. Arm opens 195° while handle moves 130°. Shipping weight 6.4 lbs. To order basic mechanism without the pivot base, specify part no. CL-620-HVTC.

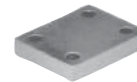
**Holding capacity:** 6000 lbs



Weld clamp mechanism to pivot base at any desired angle.



Clamping Arm (order separately)



Base Plate (order separately)



Handle (order separately)



Vinyl Grip (order separately)

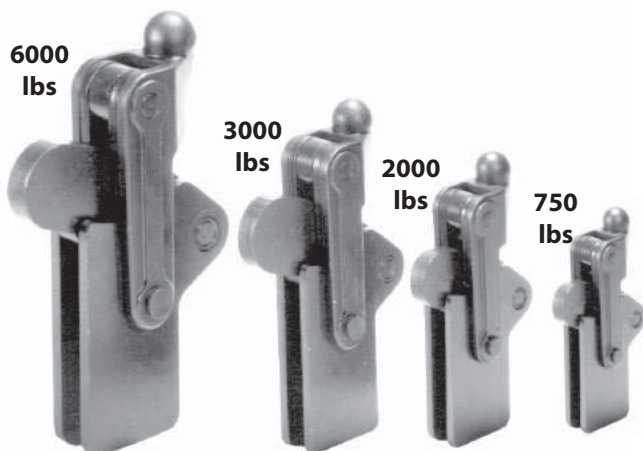
### ACCESSORIES

CLAMP SIZE	PART NO. CLAMPING ARM	PART NO. BASE PLATE	PART NO. HANDLE	PART NO. VINYL GRIP
750 lbs	CL-1-HVTC-A	CL-1-HVTC-P	CL-1-HVTC-H	CL-1-HVTC-G
2000 lbs	CL-3-HVTC-A	CL-3-HVTC-P	CL-3-HVTC-H	CL-3-HVTC-G
3000 lbs	CL-5-HVTC-A	CL-5-HVTC-P	CL-5-HVTC-H	CL-5-HVTC-G
6000 lbs	CL-6-HVTC-A	CL-6-HVTC-P	CL-6-HVTC-H	CL-6-HVTC-G

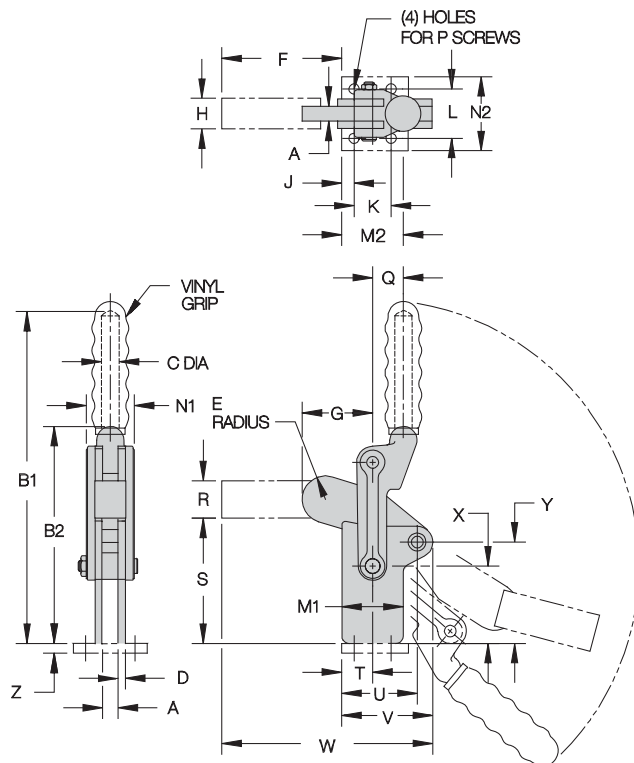
PART NO. BASIC MECHANISM	A	B1	B2	C DIA	D	E	F	G	H	J	K	L	M1	M2	N1	N2	P	Q	R	S	T	U	V	W	X	Y	Z
CL-110-HVTC	.236	4.33	2.60	.50	.118	.39	2.76	1.14	.472	.197	.709	.984	.71	1.10	.79	1.38	#10 or M5	.55	.630	.94	.35	1.02	1.30	4.06	.39	.75	.236
CL-310-HVTC	.394	8.07	4.49	.75	.197	.55	2.97	1.57	.787	.295	.984	1.378	1.14	1.57	1.26	1.97	1/4 or M6	.91	.984	1.79	.57	1.71	2.11	5.08	.79	1.41	.315
CL-510-HVTC	.472	9.49	5.47	.87	.236	.75	4.06	2.24	.984	.394	1.181	1.575	1.50	1.97	1.54	2.36	5/16 or M8	.98	1.181	2.64	.75	2.17	2.68	6.74	1.10	1.87	.315
CL-610-HVTC	.630	10.91	6.97	.98	.315	.87	5.16	2.83	1.181	.394	1.772	1.969	2.05	2.56	1.97	2.76	5/16 or M8	1.38	1.378	3.33	1.02	2.74	3.43	8.59	1.30	2.24	.315

# VERTICAL-HANDLE TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



Heavy-duty automotive-type production clamps designed for extreme durability. The above configuration is a basic toggle mechanism onto which an arm and handle can be welded at any desired angle (INFO+: see pages 450-452 for other versions). The straight base is ideal for plate/tongue mounting at any angle. Alternatively, the optional base plate can be attached to construct a tall flanged-base clamp. Precision, close-tolerance steel components throughout provide exceptionally smooth operation. Rugged alloy steel handle fork. Guided-arm feature provides positive lateral arm support. All pivot pins are hardened and ground, running in either hardened bushings or the close-tolerance holes of hardened parts. The bottom pivot is a precision bolt which can be adjusted, if desired, to fine tune the amount of free play. These clamps are built to withstand abuse. With just occasional lubrication, they will provide extremely long service life. Black oxide finish. Available in four sizes.



## CL-111-HVTC Basic Mechanism, Pivot Base

Smallest of the four sizes, yet still quite powerful. Arm opens 205° while handle moves 130°. Shipping weight 0.8 lbs.

**Holding capacity:** 750 lbs

## CL-311-HVTC Basic Mechanism, Pivot Base

Arm opens 205° while handle moves 130°. Shipping weight 1.8 lbs.

**Holding capacity:** 2000 lbs

## CL-511-HVTC Basic Mechanism, Pivot Base

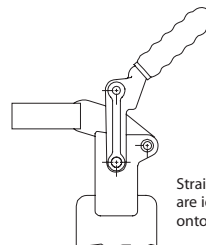
Arm opens 195° while handle moves 130°. Shipping weight 3.2 lbs.

**Holding capacity:** 3000 lbs

## CL-611-HVTC Basic Mechanism, Pivot Base

Our most-powerful hold-down toggle clamp. Arm opens 195° while handle moves 130°. Shipping weight 7.1 lbs.

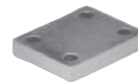
**Holding capacity:** 6000 lbs



Straight-base clamps are ideal for welding onto plates.



Clamping Arm (order separately)



Base Plate (order separately)



Handle (order separately)



Vinyl Grip (order separately)

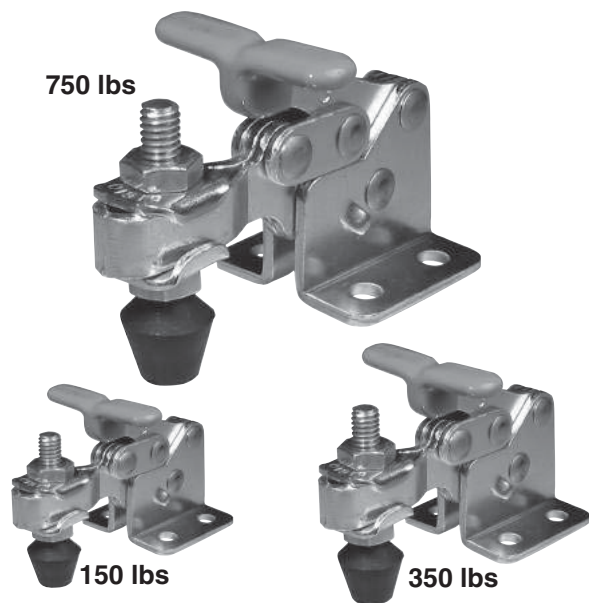
### ACCESSORIES

CLAMP SIZE	PART NO. CLAMPING ARM	PART NO. BASE PLATE	PART NO. HANDLE	PART NO. VINYL GRIP
750 lbs	CL-1-HVTC-A	CL-1-HVTC-P	CL-1-HVTC-H	CL-1-HVTC-G
2000 lbs	CL-3-HVTC-A	CL-3-HVTC-P	CL-3-HVTC-H	CL-3-HVTC-G
3000 lbs	CL-5-HVTC-A	CL-5-HVTC-P	CL-5-HVTC-H	CL-5-HVTC-G
6000 lbs	CL-6-HVTC-A	CL-6-HVTC-P	CL-6-HVTC-H	CL-6-HVTC-G

PART NO. BASIC MECHANISM	A	B1	B2	C DIA	D	E	F	G	H	J	K	L	M1	M2	N1	N2	P	Q	R	S	T	U	V	W	X	Y	Z
CL-111-HVTC	.236	5.08	3.39	.50	.118	.39	2.52	1.14	.472	.197	.709	.984	1.06	1.10	.79	1.38	#10 or M5	.55	.630	1.73	.59	1.26	1.54	4.06	1.18	1.54	.236
CL-311-HVTC	.394	9.25	5.67	.75	.197	.55	2.56	1.57	.787	.295	.984	1.378	1.77	1.57	1.26	1.97	1/4 or M6	.91	.984	2.97	.98	2.13	2.52	5.08	1.97	2.59	.315
CL-511-HVTC	.472	10.87	6.97	.87	.236	.75	3.82	2.24	.984	.394	1.181	1.575	1.97	1.97	1.50	2.36	5/16 or M8	.98	1.181	4.02	.98	2.40	2.92	6.74	2.48	3.25	.315
CL-611-HVTC	.630	12.60	8.66	.98	.315	.87	4.61	2.83	1.181	.394	1.772	1.969	2.48	2.56	1.97	2.76	5/16 or M8	1.38	1.378	5.02	1.57	3.31	3.98	8.59	2.99	3.94	.315

# VERTICAL-HANDLE TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



Hold-down toggle clamp with a unique finger-grip T handle. Extremely compact design. Open arm provides adjustable spindle location. Arm opens 92° while handle moves 175°.

## CL-200-VTC

Miniature-size T-handle clamp. Supplied with #10-32 flat-cushion spindle CL-316112-FC and (2) CL-3166-TW flanged washers. Shipping weight 0.2 lbs.

**Holding capacity:** 150 lbs

## CL-300-VTC

Medium-size T-handle clamp. Supplied with 5/16-18 flat-cushion spindle CL-518208-FC and (2) CL-51610-TW flanged washers. Shipping weight 0.6 lbs.

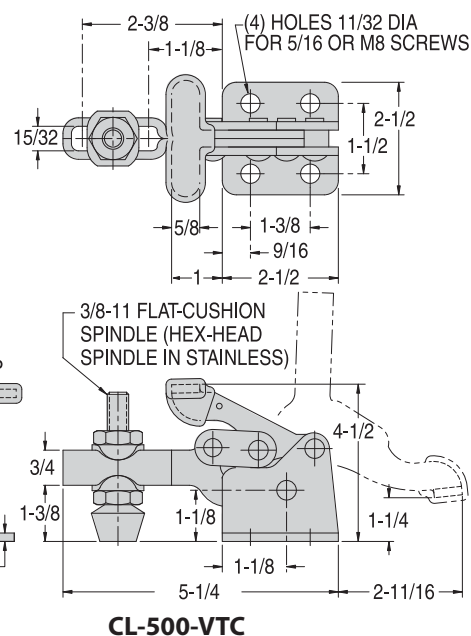
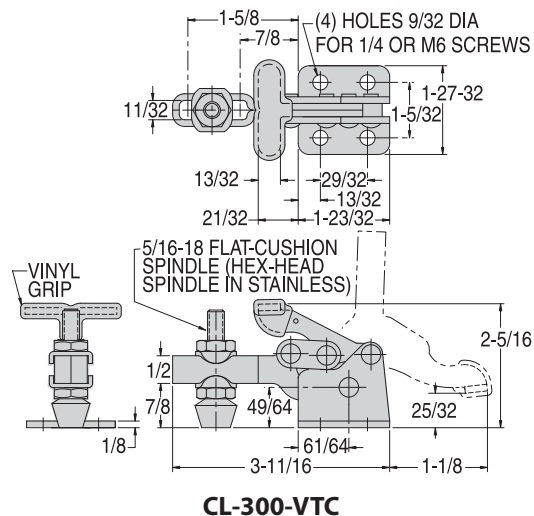
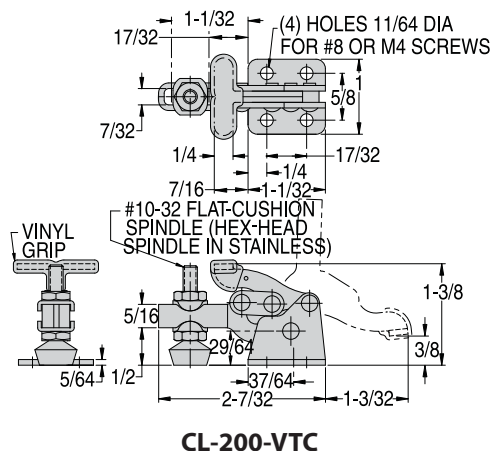
**Holding capacity:** 350 lbs

## CL-500-VTC

Large-size T-handle clamp. Supplied with 3/8-16 flat-cushion spindle CL-38212-FC and (2) CL-3811-TW flanged washers. Shipping weight 1.3 lbs.

**Holding capacity:** 750 lbs

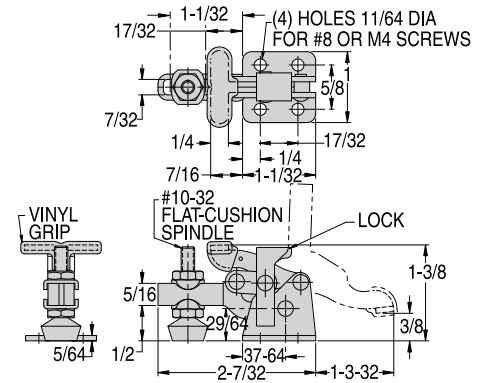
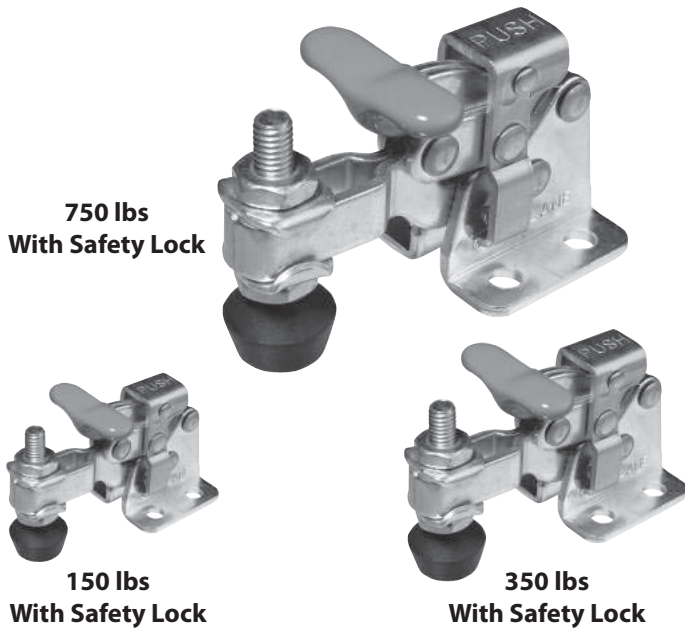
Also available in stainless steel...



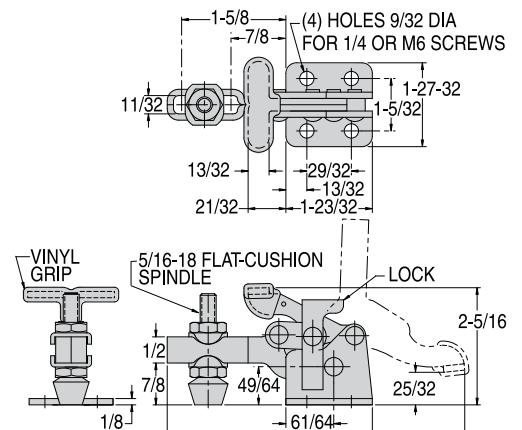


# VERTICAL-HANDLE TOGGLE CLAMPS

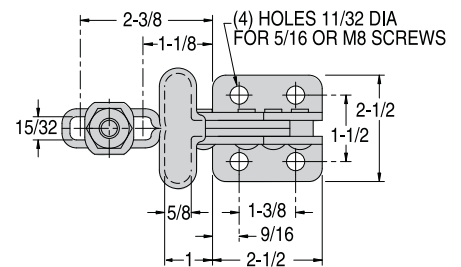
INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



**CL-200-LVTC**



**CL-300-LVTC**



**CL-500-LVTC**

**INFO+:** Same as our hold-down toggle clamps on page 454, except with our unique safety-lock feature. This safety lock automatically engages when the clamp is closed, then remains locked until manually disengaged by pressing the lever before opening. This prevents the clamp from being accidentally opened by bumping the handle. This clamp has a unique finger-grip T handle. Extremely compact design. Open arm provides adjustable spindle location. Arm opens 92° while handle moves 175°.

## CL-200-LVTC

Miniature-size T-handle clamp. Supplied with #10-32 flat-cushion spindle CL-316112-FC and (2) CL-3166-TW flanged washers. Shipping weight 0.2 lbs.

**Holding capacity:** **150 lbs**

## CL-300-LVTC

Medium-size T-handle clamp. Supplied with 5/16-18 flat-cushion spindle CL-518208-FC and (2) CL-51610-TW flanged washers. Shipping weight 0.6 lbs.

**Holding capacity:** **350 lbs**

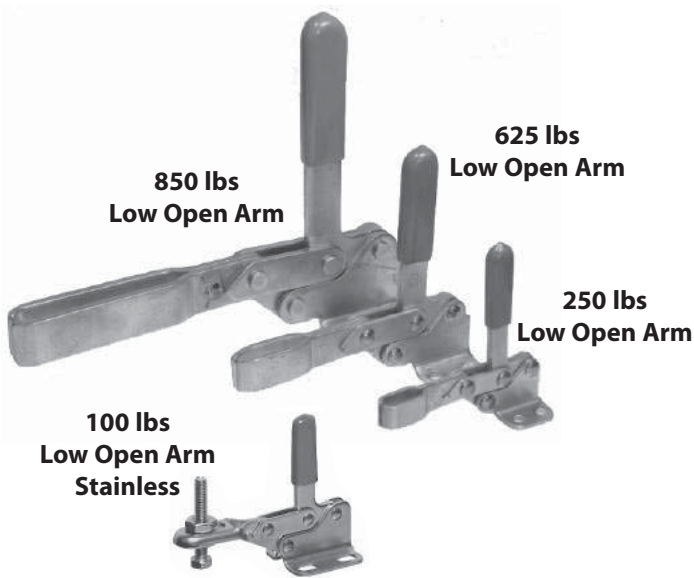
## CL-500-LVTC

Large-size T-handle clamp. Supplied with 3/8-11 flat-cushion spindle CL-38212-FC and (2) CL-3811-TW flanged washers. Shipping weight 1.3 lbs.

**Holding capacity:** **750 lbs**

# VERTICAL-HANDLE TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



Simple, easy-opening clamps with excellent arm reach, extending farther over workpiece than any other clamps their size. Open arm allows spindle adjustment (**INFO+**: see p. 457 for solid-arm version). Arm opens 83° while handle moves 83°. Available in four sizes.

## CL-11-TC Low Open Arm, Flanged Base

Miniature clamp in stainless steel. Supplied with #8-32 hex-head spindle CL-832203-SA-S. Shipping weight 0.1 lbs.

**Holding capacity:** 100 lbs

## CL-111-TC Low Open Arm, Flanged Base

Small-size clamp. Accepts any 1/4-20 spindle and (2) CL-147-TW flanged washers. **INFO+**: See pages 500-503 to order. Shipping weight 0.3 lbs.

**Holding capacity:** 250 lbs

## CL-211-TC Low Open Arm, Flanged Base

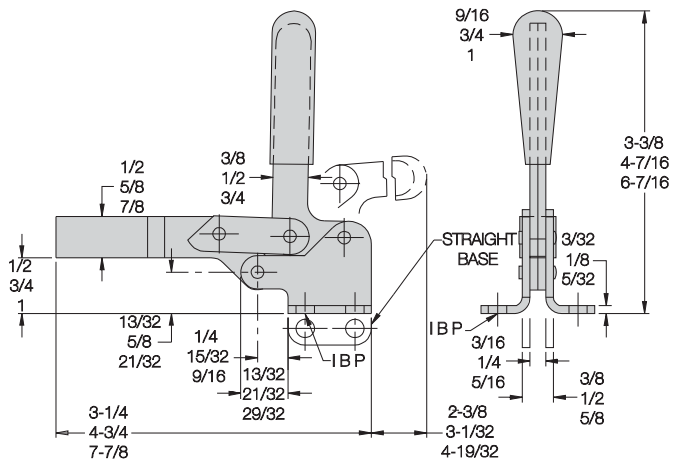
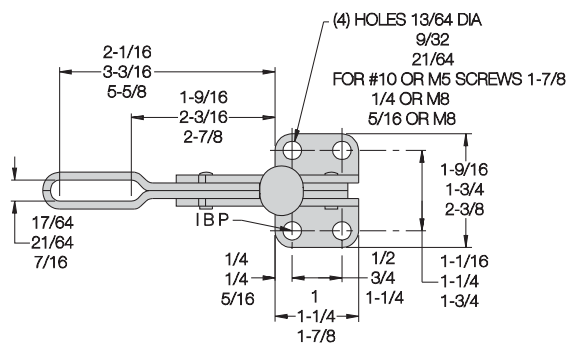
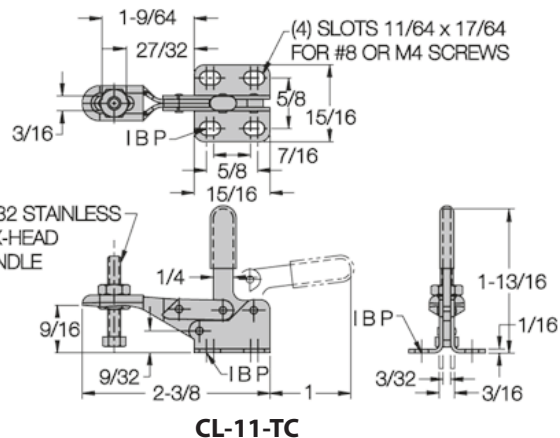
Medium-size clamp. Accepts any 5/16-18 spindle and (2) CL-51610-TW flanged washers. **INFO+**: See pages 500-503 to order. Shipping weight 0.5 lbs.

**Holding capacity:** 625 lbs

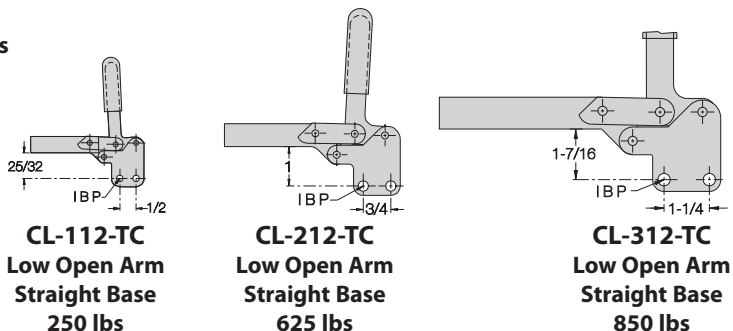
## CL-311-TC Low Open Arm, Flanged Base

Large-size clamp. Arm extends a full 6 inches over workpiece. Accepts any 3/8-16 spindle and (2) CL-3811-TW flanged washers. **INFO+**: See pages 500-503 to order. Shipping weight 1.4 lbs.

**Holding capacity:** 850 lbs



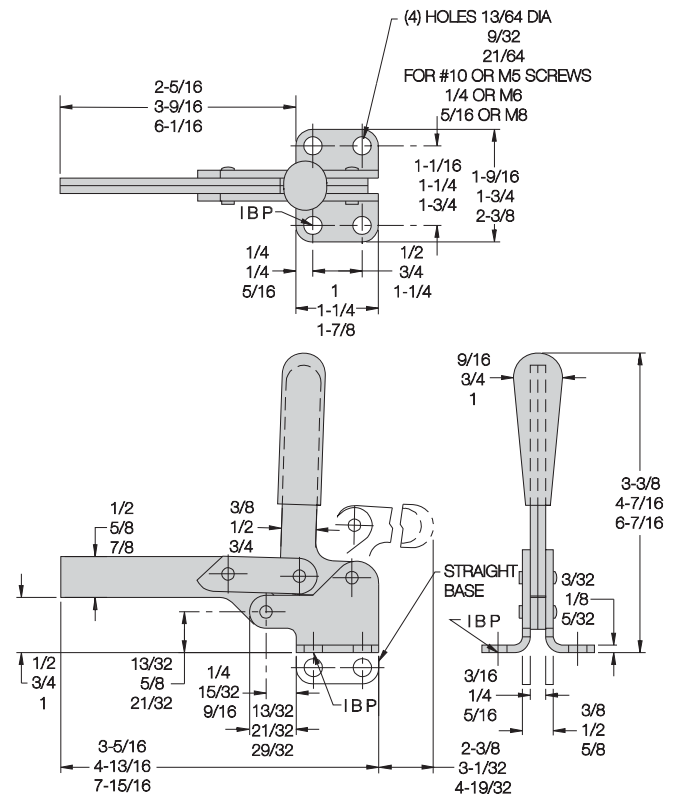
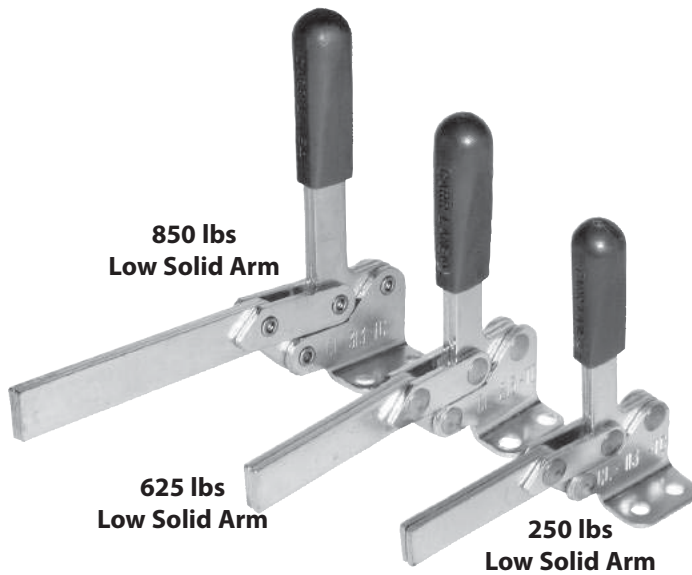
**CL-111-TC (Top dimension)**  
**CL-211-TC (Middle dimension)**  
**CL-311-TC (Bottom dimension)**



1  
1

# VERTICAL-HANDLE TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



Simple, easy-opening clamps with excellent arm reach, extending farther over workpiece than any other clamps their size. Solid arm for weld-on bolt retainers (INFO+: see p. 456 for open-arm version). Arm opens 83° while handle moves 83°. Available in three sizes.

**CL-113-TC** **Low Solid Arm, Flange Base**  
 Small-size clamp. Accepts any 1/4-20 spindle and a CL-1458-S bolt retainer. INFO+: See pages 500-503 to order. Shipping weight 0.3 lbs.  
**Holding capacity:** **250 lbs**

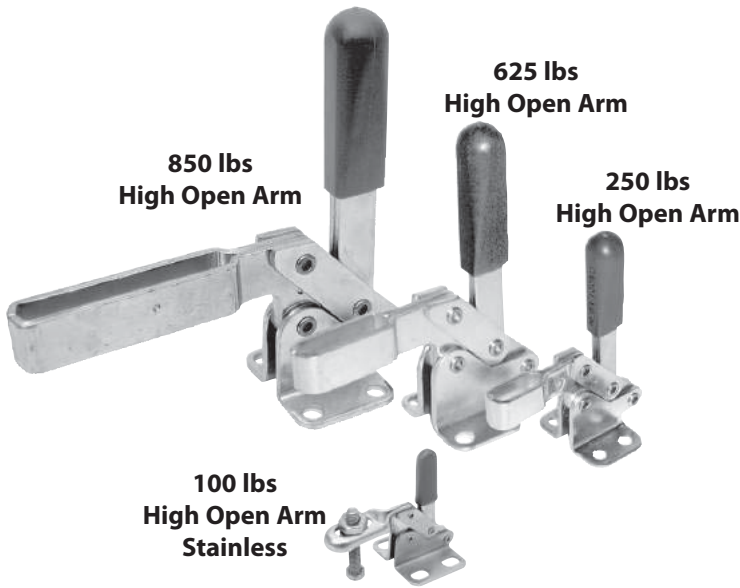
**CL-213-TC** **Low Solid Arm, Flange Base**  
 Medium-size clamp. Accepts any 5/16-18 spindle and a CL-51658-S or CL-518000-BR bolt retainer. INFO+: See pages 500-503 to order. Shipping weight 0.5 lbs.  
**Holding capacity:** **625 lbs**

**CL-313-TC** **Low Solid Arm, Flange Base**  
 Large-size clamp. Arm extends a full 6 inches over workpiece. Accepts any 3/8-16 spindle and a CL-3878-S or CL-316000-BR bolt retainer. INFO+: See pages 500-503 to order. Shipping weight 1.4 lbs.  
**Holding capacity:** **850 lbs**

**CL-113-TC (Top dimension)**  
**CL-213-TC (Middle dimension)**  
**CL-313-TC (Bottom dimension)**

# VERTICAL-HANDLE TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



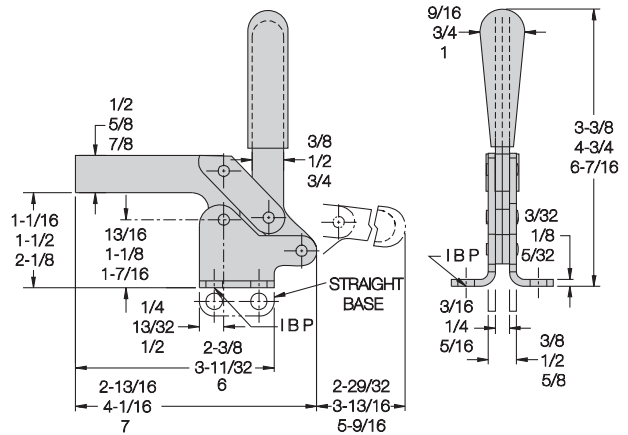
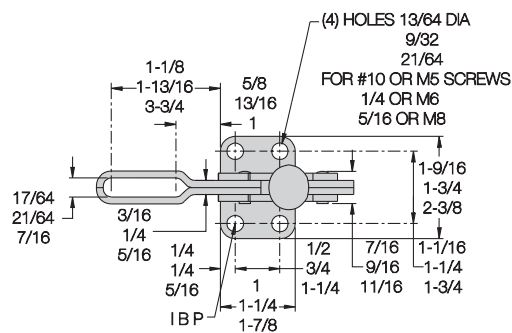
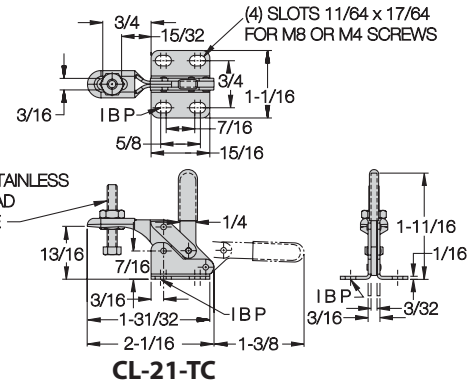
Simple, easy-opening clamps with extra arm height. Open arm allows spindle adjustment (INFO+: see p. 459 for solid-arm version). Arm opens 83° while handle moves 83°. Available in four sizes.

**CL-21-TC** High Open Arm, Flanged Base  
Miniature clamp in stainless steel. Supplied with #8-32 hex-head spindle CL-832203-SA-S. Shipping weight 0.1 lbs.  
**Holding capacity:** 100 lbs

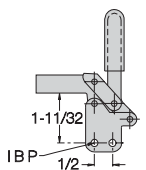
**CL-101-TC** High Open Arm, Flanged Base  
Small-size clamp. Accepts any 1/4-20 spindle and (2) CL-147-TW flanged washers. INFO+: See pages 500-503 to order. Shipping weight 0.3 lbs.  
**Holding capacity:** 250 lbs

**CL-201-TC** High Open Arm, Flanged Base  
Medium-size clamp. Accepts any 5/16-18 spindle and (2) CL-51610-TW flanged washers. INFO+: See pages 500-503 to order. Shipping weight 0.5 lbs.  
**Holding capacity:** 625 lbs

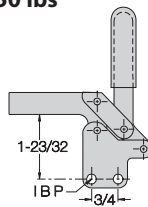
**CL-301-TC** High Open Arm, Flanged Base  
Large-size clamp. Arm extends a full 6 inches over workpiece. Accepts any 3/8-16 spindle and (2) CL-3811-TW flanged washers. INFO+: See pages 500-503 to order. Shipping weight 1.4 lbs.  
**Holding capacity:** 850 lbs



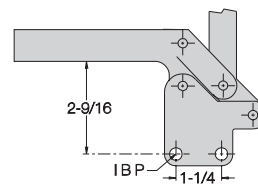
CL-101-TC (Top dimension)  
CL-201-TC (Middle dimension)  
CL-301-TC (Bottom dimension)



High Open Arm  
Straight Base  
250 lbs



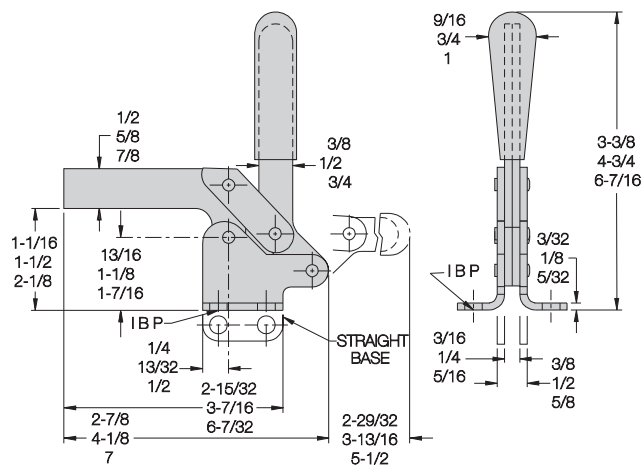
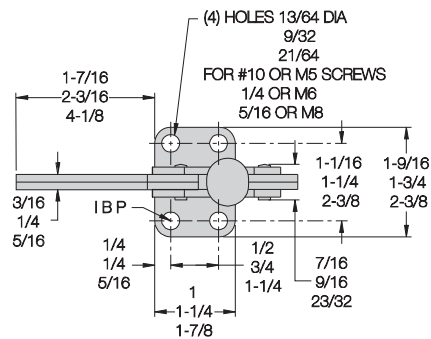
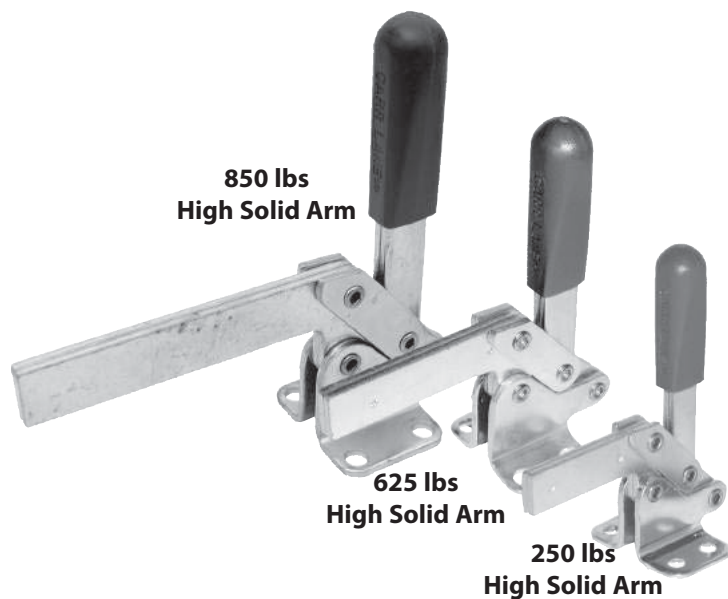
High Open Arm  
Straight Base  
625 lbs



High Open Arm  
Straight Base  
850 lbs

# VERTICAL-HANDLE TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



CL-103-TC (Top dimension)  
CL-203-TC (Middle dimension)  
CL-303-TC (Bottom dimension)

Simple, easy-opening clamps with extra arm height. Solid arm for weld-on bolt retainers (INFO+: see p. 458 for open-arm version). Arm opens 83° while handle moves 83°. Available in three sizes.

## CL-103-TC High Open Arm, Flanged Base

Small-size clamp. Accepts any 1/4-20 spindle and a CL-1458-S bolt retainer. INFO+: See pages 500-504 to order. Shipping weight 0.3 lbs.

Holding capacity: **250 lbs**

## CL-203-TC High Open Arm, Flanged Base

Medium-size clamp. Accepts any 5/16-18 spindle and a CL-51658-S or CL-518000-BR bolt retainer. INFO+: See pages 500-504 to order. Shipping weight 0.5 lbs.

Holding capacity: **625 lbs**

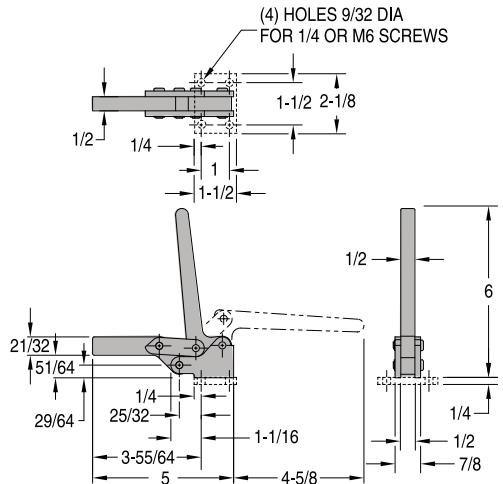
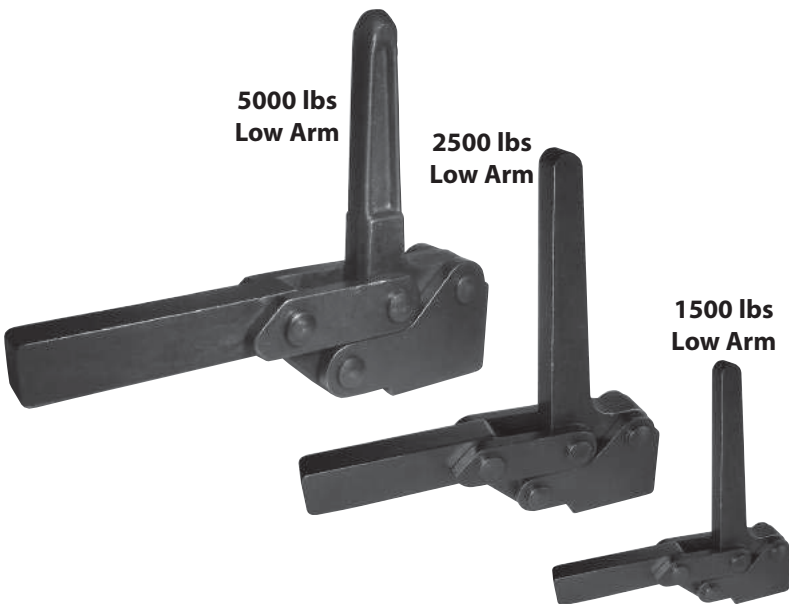
## CL-303-TC High Open Arm, Flanged Base

Large-size clamp. Accepts any 3/8-16 spindle and a CL-3878-S or CL-316000-BR bolt retainer. INFO+: See pages 500-504 to order. Shipping weight 1.4 lbs.

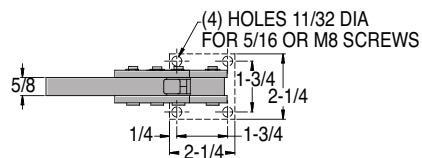
Holding capacity: **850 lbs**

# VERTICAL-HANDLE TOGGLE CLAMPS

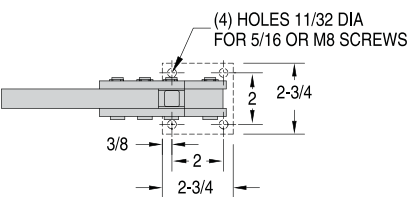
INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



**CL-45-HDC-121**



**CL-50-HDC-121**



**CL-51-HDC-121**

Compact heavy-duty clamps with forged steel handles and clamping arms, available in three sizes. Low clamping arm extends far over workpiece. Also available with other arm/handle configurations. **INFO+**: See pages 461-462. Simple, easy-opening linkage. Arm opens 83° while handle moves 83°. Weld-on flanged base is optional. To order clamp with flanged base attached, add "S" to part no. (example: CL-45-HDC-121S).

## CL-45-HDC-121

**Low Arm**

Smallest of the three sizes, yet still quite powerful. Shipping weight 2.0 lbs.

**Holding capacity:** 1500 lbs

## CL-50-HDC-121

**Low Arm**

Medium-size clamp with high strength. Shipping weight 2.5 lbs.

**Holding capacity:** 2500 lbs

## CL-51-HDC-121

**Low Arm**

Largest of the three sizes. Shipping weight 5.0 lbs.

**Holding capacity:** 5000 lbs

Available with standard flanged base attached...



Add "S" to part no.

# VERTICAL-HANDLE TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



Compact heavy-duty clamps with forged steel handles and clamping arms, available in three sizes. High clamping arm provides extra room for thick workpiece. Also available with other arm/handle configurations. **INFO+**: See pages 460 and 462. Simple, easy-opening linkage. Arm opens 83° while handle moves 83°. Weld-on flanged base is optional. To order clamp with flanged base attached, add "S" to part no. (example: CL-40-HDC-211S).

## CL-40-HDC-211

High Arm

Smallest of the three sizes, yet still quite powerful. Shipping weight 2.0 lbs.

**Holding capacity:** 1500 lbs

## CL-60-HDC-211

High Arm

Medium-size clamp with high strength. Shipping weight 2.5 lbs.

**Holding capacity:** 2500 lbs

## CL-51-HDC-121

High Arm

Largest of the three sizes. Shipping weight 5.0 lbs.

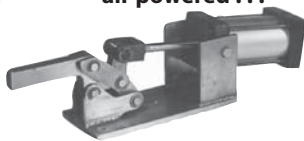
**Holding capacity:** 5000 lbs

Available with standard flanged base attached ...

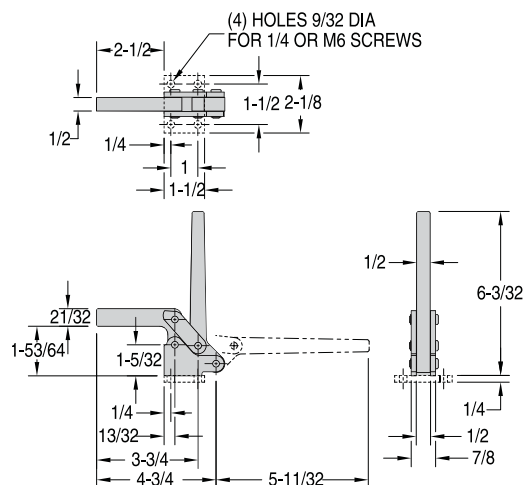


Add "S" to part no.

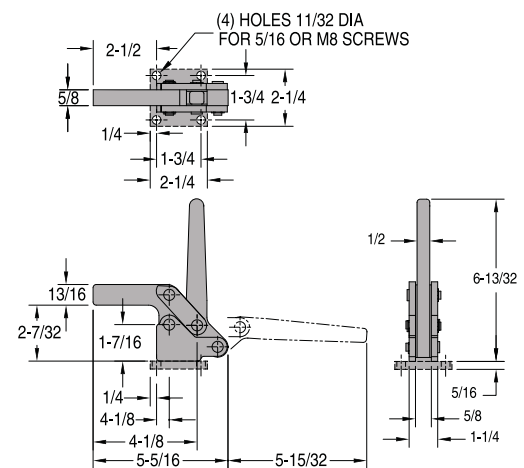
Also available air powered ...



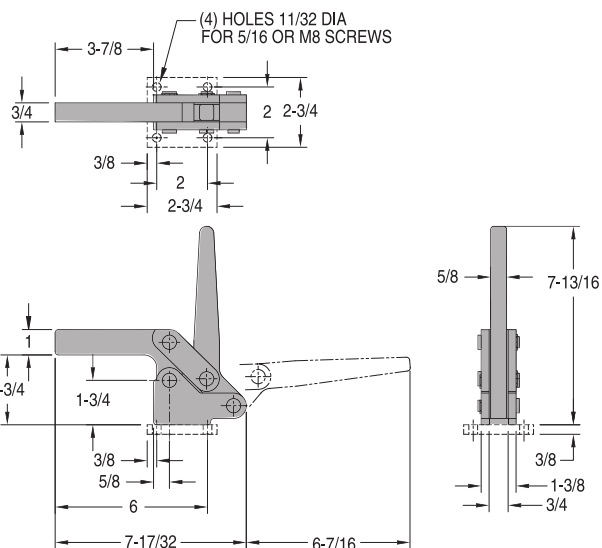
CL-3000-PTC  
(INFO+:page 496)



CL-40-HDC-211



CL-60-HDC-211



CL-61-HDC-211

# VERTICAL-HANDLE TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS

Custom heavy-duty forged clamps built to your specifications, with the same features as the clamps shown on pages 460-461 (INFO+). Available in three sizes. Choose from the 32 configurations shown below. (Top part no. is for 1500-lb clamp, middle part no. is for 2500-lb clamp, bottom part no. is for 5000-lb clamp). Simple, easy-opening linkage. Arm opens 83° while handle moves 83°. Weld-on flanged base is optional. To order clamp with flanged base attached, add "5" to part no. (example: CL-40-HDC-111S).

## CL-40/45-HDC-XXX

Smallest of the three sizes, yet still quite powerful. Shipping weight 2.0 lbs.

**Holding capacity:** 1500 lbs

## CL-50/60-HDC-XXX

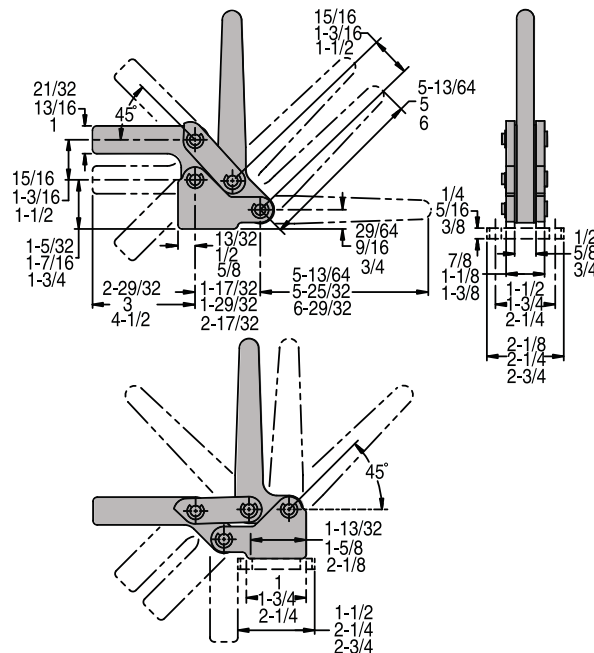
Medium-size clamp with high strength. Shipping weight 2.5 lbs.

**Holding capacity:** 2500 lbs

## CL-51/61-HDC-XXX

Largest of the three sizes. Shipping weight 5.0 lbs.

**Holding capacity:** 5000 lbs



CL-40/45-HDC-XXX (Top dimension)

CL-50/60-HDC-XXX (Middle dimension)

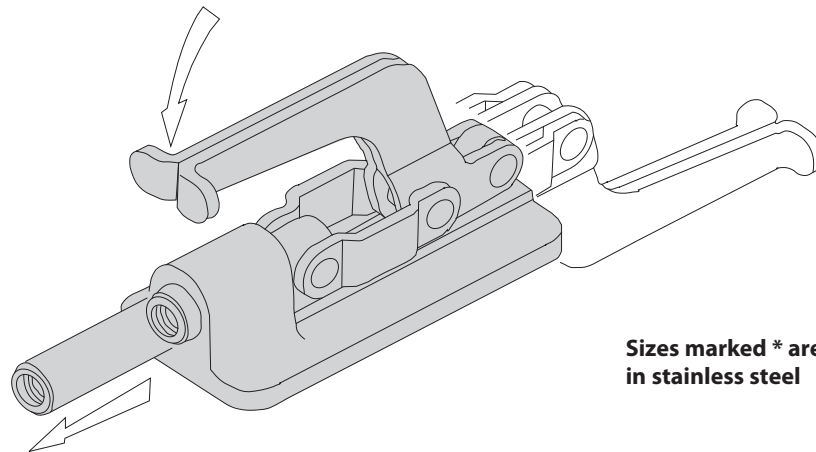
CL-51/61-HDC-XXX (Bottom dimension)

Low Arm		High Arm	
	CL-45-HDC-111 CL-50-HDC-111 CL-51-HDC-111		CL-40-HDC-111 CL-60-HDC-111 CL-61-HDC-111
	CL-45-HDC-121 CL-50-HDC-121 CL-51-HDC-121		CL-40-HDC-121 CL-60-HDC-121 CL-61-HDC-121
	CL-45-HDC-131 CL-50-HDC-131 CL-51-HDC-131		CL-40-HDC-131 CL-60-HDC-131 CL-61-HDC-131
	CL-45-HDC-141 CL-50-HDC-141 CL-51-HDC-141		CL-40-HDC-141 CL-60-HDC-141 CL-61-HDC-141
	CL-45-HDC-211 CL-50-HDC-211 CL-51-HDC-211		CL-40-HDC-211 CL-60-HDC-211 CL-61-HDC-211
	CL-45-HDC-221 CL-50-HDC-221 CL-51-HDC-221		CL-40-HDC-221 CL-60-HDC-221 CL-61-HDC-221
	CL-45-HDC-231 CL-50-HDC-231 CL-51-HDC-231		CL-40-HDC-231 CL-60-HDC-231 CL-61-HDC-231
	CL-45-HDC-241 CL-50-HDC-241 CL-51-HDC-241		CL-40-HDC-241 CL-60-HDC-241 CL-61-HDC-241

11

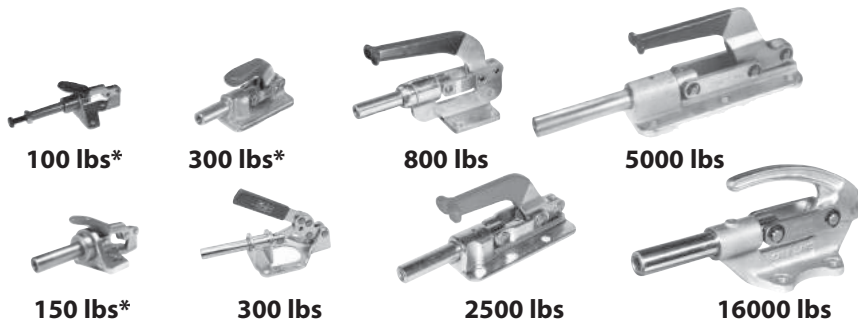


# PUSH/PULL TOGGLE CLAMPS



Sizes marked \* are also available in stainless steel

All Carr Lane Manufacturing toggle clamps are DFARS and RoHS compliant.



100 lbs\*

300 lbs\*

800 lbs

5000 lbs

150 lbs\*

300 lbs

2500 lbs

16000 lbs

## Standard SPC Design p. 464-469

Most popular series of push/pull clamps. Plunger advances and locks by moving the handle forward toward it. Clamp can also be used for pulling instead of pushing (handle locks back in downward position also). Choice of eight sizes.



600 lbs

## Horizontal Handle p. 471

Reverse-action push clamp. Plunger advances and locks by moving the handle backward into horizontal position.



500 lbs

850 lbs

1500 lbs

## PC Design pp. 472-473

Durable push/pull clamps with nodular iron bases. Plunger advances and locks by moving the handle forward toward it. Clamp can also be used for pulling instead of pushing (handle locks back in downward position also). Choice of three sizes.



200 lbs\*

300 lbs\*

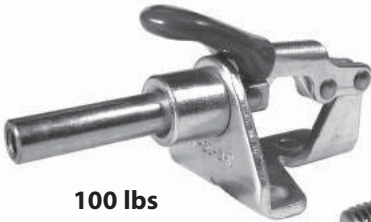
700 lbs

## Threaded Body p. 474-475

Compact push/pull clamps for mounting through panels, plates, or angle brackets. Install in a drilled or tapped hole. Plunger locks in either extended or retracted position. Rotate clamp to position handle anywhere within 360°. Choice of three sizes.

# PUSH/PULL TOGGLE CLAMPS

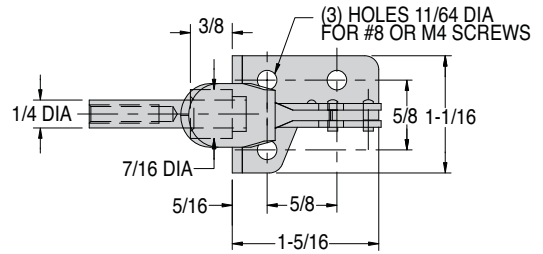
INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



**100 lbs  
Tapped Plunger**



**100 lbs  
Externally Threaded  
Plunger**



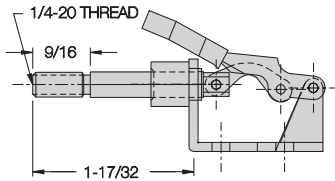
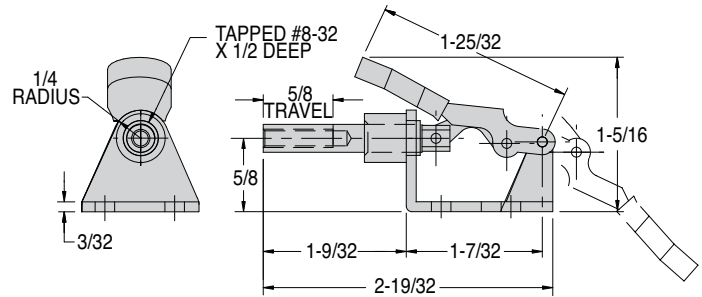
## CL-50-SPC

(Metric No. CLM-50-SPC)

Miniature plunger clamp, perfect for electronics fixturing and other light-duty applications. Locks in extended or retracted position. 5/8" plunger travel. Tapped-plunger version supplied with #8-32 nylon hex-head spindle CL-832203-SA (M4 in metric). Also available with 1/4-20 externally threaded plunger. Shipping weight 0.2 lbs.

Holding capacity:

**100 lbs**



**CL-51-SPC  
Externally Threaded  
Plunger**

Also available  
in stainless steel ...



**CL-50-SPC-S**

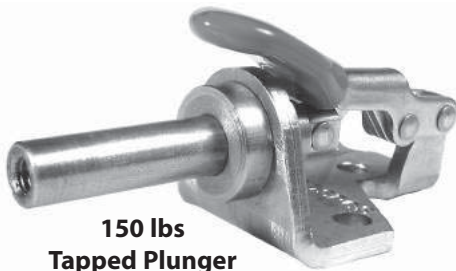
Also available  
air powered ...



**CL-600-PPC  
(INFO+ page 497)**

# PUSH/PULL TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



**150 lbs  
Tapped Plunger**

Also available  
in stainless steel ...



**CL-60-SPC-S**

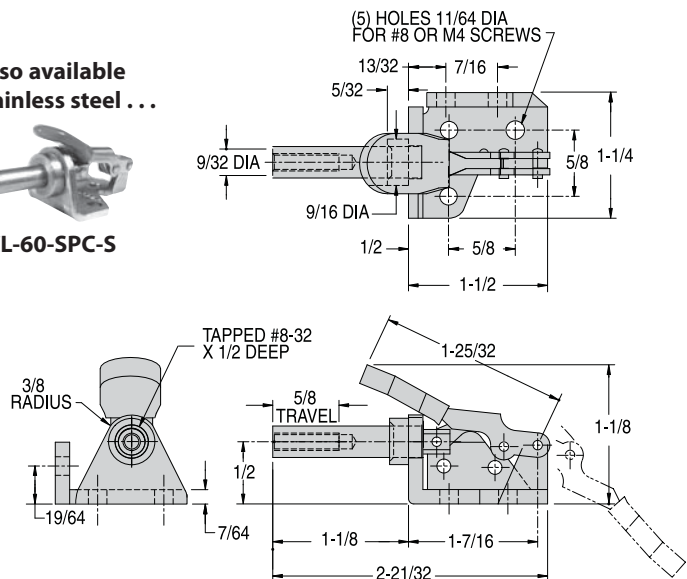
## CL-60-SPC

(Metric No. CLM-60-SPC)

Heavier-duty version of our smallest plunger clamp above. This is a powerful clamp in an extremely compact size. Unique base allows bottom or side mounting. Locks in extended or retracted position. 5/8" plunger travel. Plunger is tapped to accept any #8-32 spindle (M4 in metric). INFO+: See pages 500-503 to order. Shipping weight 0.2 lbs.

Holding capacity:

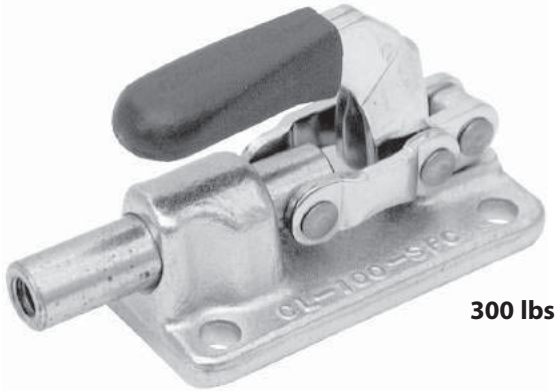
**150 lbs**



1  
1

# PUSH/PULL TOGGLE CLAMPS

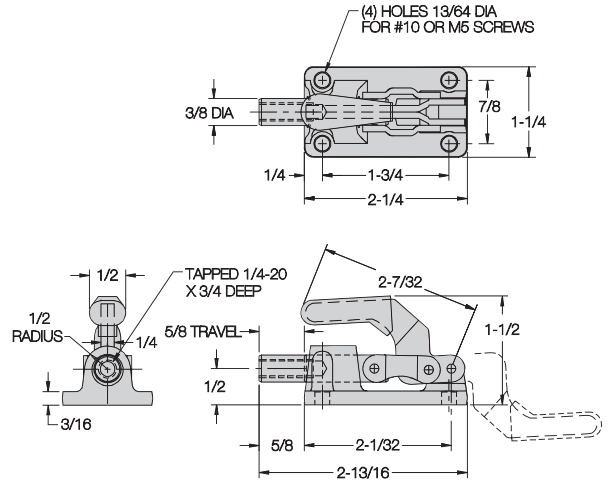
INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



300 lbs

## CL-100-SPC (Metric No. CLM-100-SPC)

Tiny, yet extremely powerful plunger clamp with a forged steel base. Requires very little mounting space due to its narrow base and compact low profile. Locks in extended or retracted position. 5/8" plunger travel. Plunger is tapped to accept any 1/4-20 spindle (M6 in metric). **INFO+**: See pages 500-503 to order. Shipping weight 0.5 lbs.  
**Holding capacity:** 300 lbs



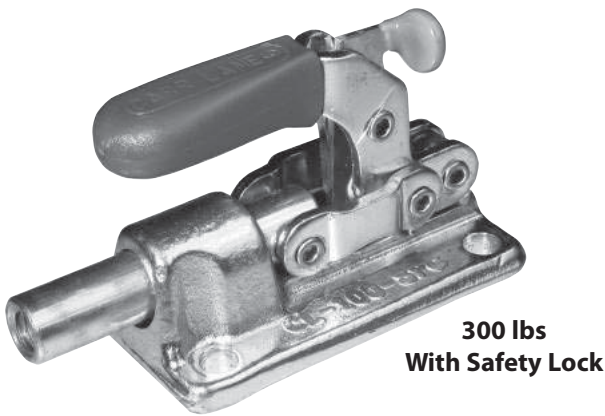
Also available  
in stainless steel . . .



CL-100-SPC-S

# PUSH/PULL TOGGLE CLAMPS

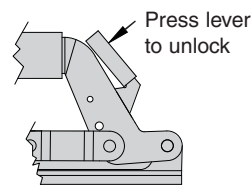
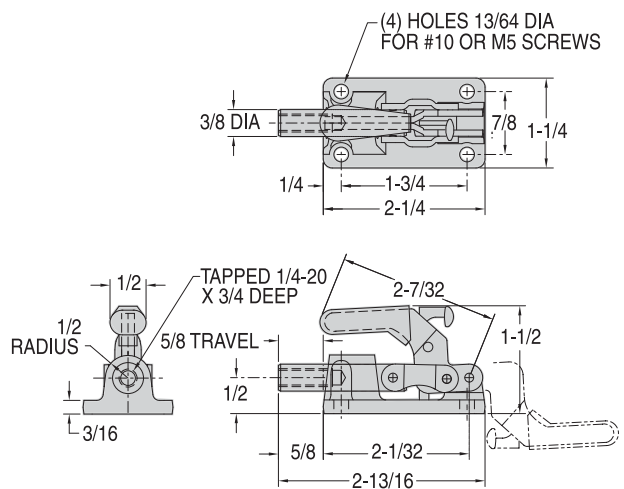
INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



300 lbs  
With Safety Lock

## CL-100-LSPC (Metric No. CLM-100-LSPC)

Same as the toggle clamp shown above, except with our unique safety-lock feature. This safety lock automatically engages when the clamp is closed, then remains locked until manually disengaged by pressing the lever before opening. This prevents the clamp from being accidentally opened by bumping the handle. Shipping weight 0.6 lbs.  
**Holding capacity:** 300 lbs



Also available  
in stainless steel . . .



CL-100-LSPC-S

# PUSH/PULL TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS

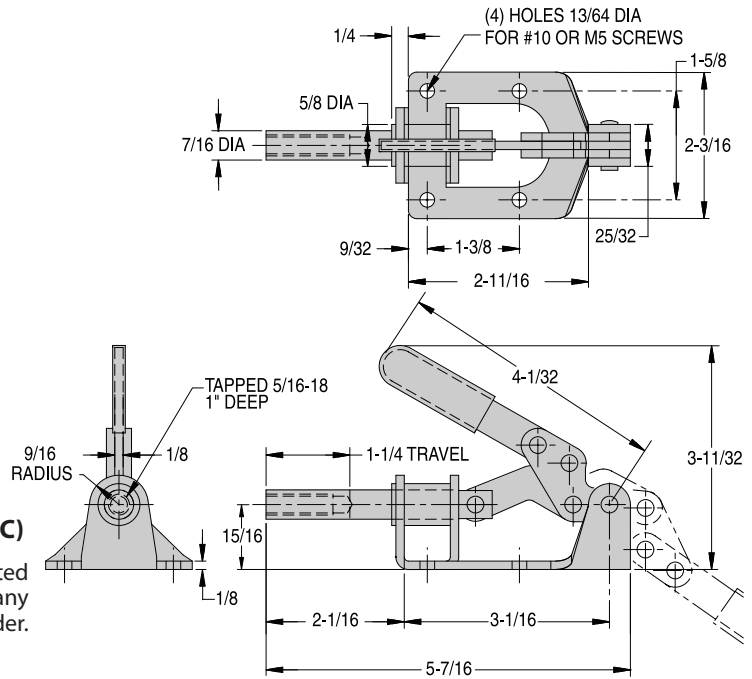


## CL-150-SPC (Metric No. CLM-150-SPC)

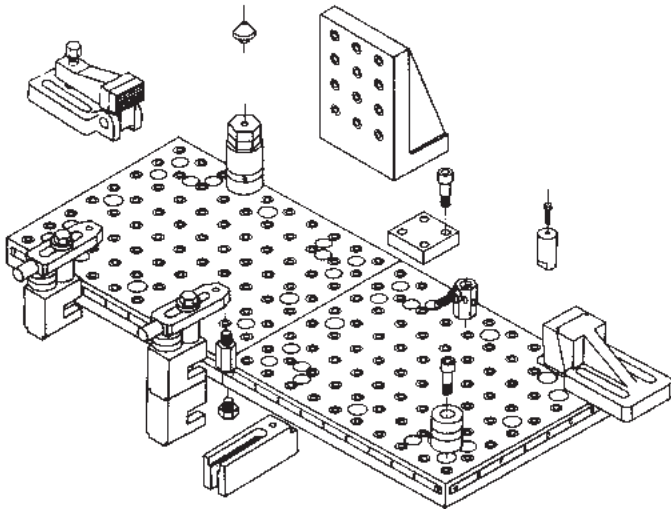
Medium-size plunger clamp that locks in extended or retracted position. 1-1/4" plunger travel. Plunger is tapped to accept any 5/16-18 spindle (M8 in metric). **INFO+**: See pages 500-503 to order. Shipping weight 0.7 lbs.

**Holding capacity:**

**300 lbs**



# Modular Fixturing



- Ideal for temporary fixturing, for one-time jobs, short or prototype production runs, trial fixturing or while permanent fixtures are built or repaired
- Available in mini, standard and heavy sizes
- Wide range of tooling plates and blocks, finish ground, with multipurpose positioning holes
- Order as components, or in handy starter sets

**See Modular Fixturing on pages 369-420**

# PUSH/PULL TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



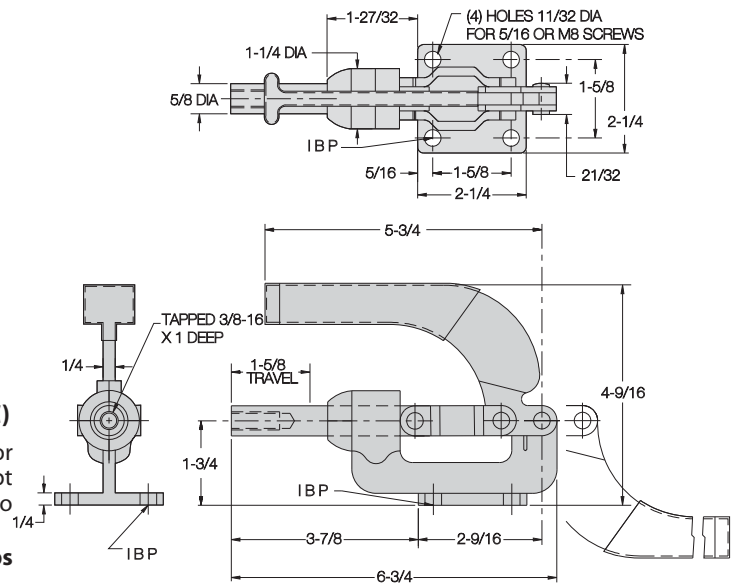
800 lbs

## CL-250-SPC (Metric No. CLM-250-SPC)

Heavier clamp with extra plunger height. Locks in extended or retracted position. 1-5/8" plunger travel. Plunger is tapped to accept any 3/8-16 spindle (M10 in metric). **INFO+**: See pages 500-503 to order. Shipping weight 1.9 lbs.

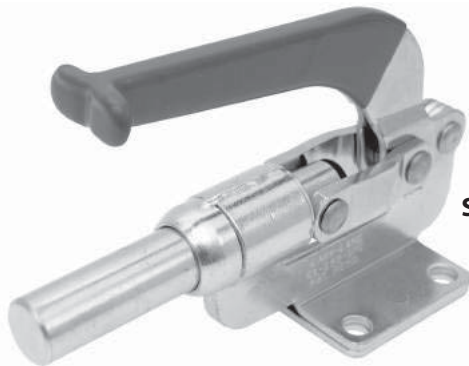
**Holding capacity:**

800 lbs



# PUSH/PULL TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



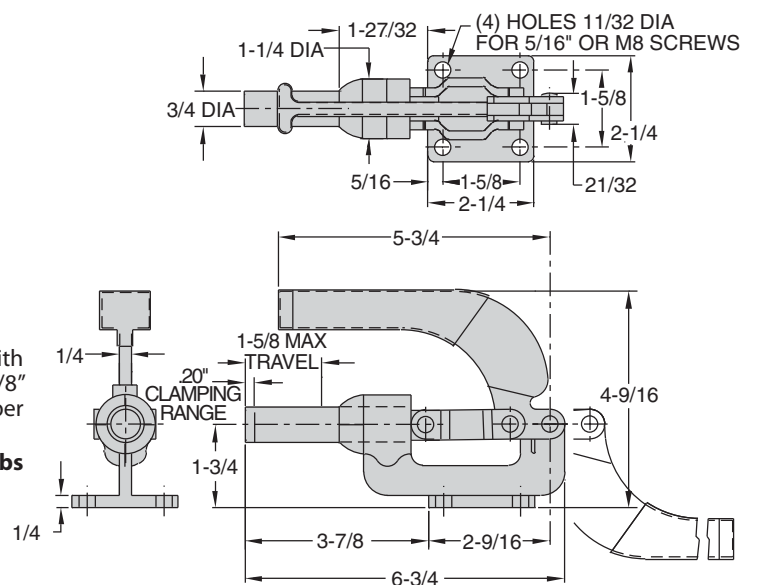
200 lbs  
Self-Adjusting  
Spring Force

## CL-255-SPC

Spring-loaded version of CL-250-SPC above. Heavier clamp with extra plunger height. Locks in extended position only. 1-5/8" maximum plunger travel with a .20" clamping range. Patent number 6,905,116. Shipping weight 1.9 lbs.

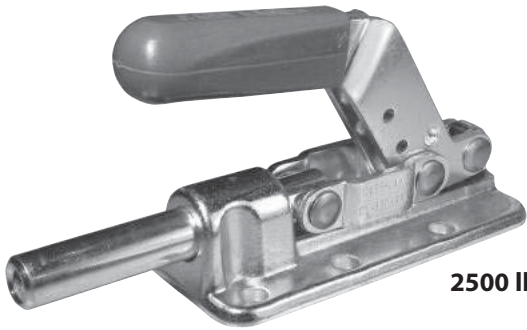
**Spring force (±10%):**

200 lbs



# PUSH/PULL TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



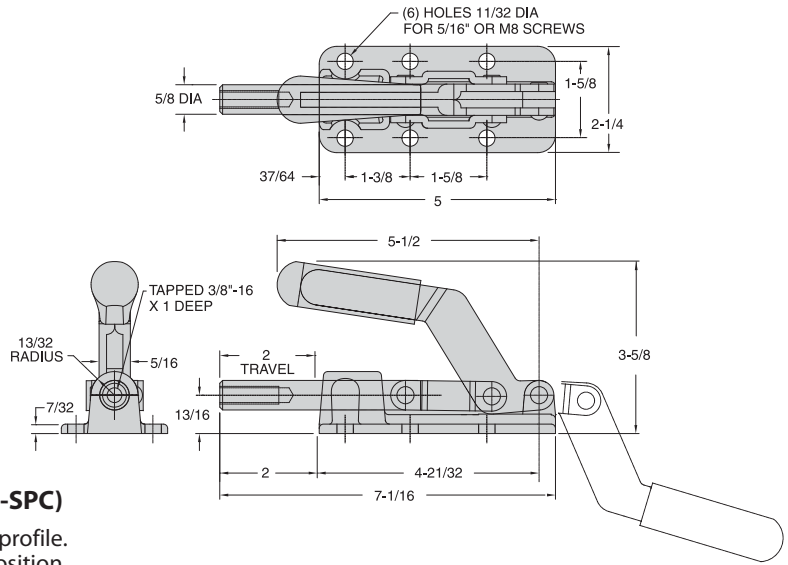
2500 lbs

## CL-350-SPC (Metric No. CLM-350-SPC)

Compact heavy-duty plunger clamp with an extremely low profile. Rugged forged steel base. Locks in extended or retracted position. 2" plunger travel. Plunger is tapped to accept any 3/8-16 spindle (M10 in metric). **INFO+**: See pages 500-503 to order. Shipping weight 2.0 lbs.

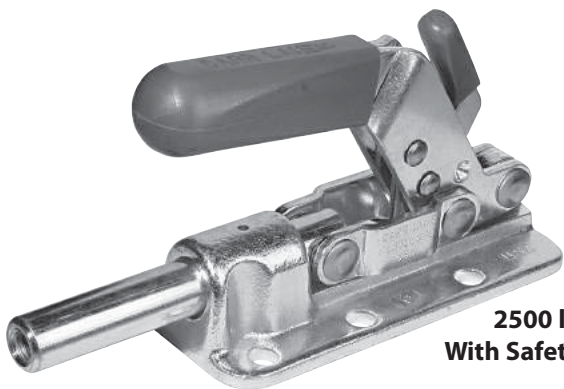
**Holding capacity:**

**2500 lbs**



# PUSH/PULL TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



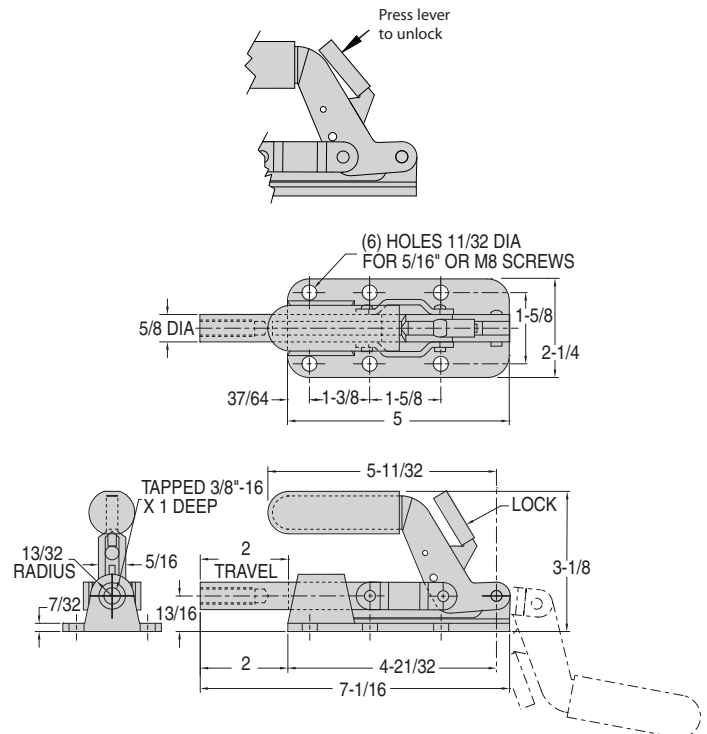
2500 lbs  
With Safety Lock

## CL-350-LSPC

Same as the toggle clamp shown above, except with our unique safety-lock feature. This safety lock automatically engages when the clamp is closed, then remains locked until manually disengaged by pressing the lever before opening. This prevents the clamp from being accidentally opened by bumping the handle. Shipping weight 2.0 lbs.

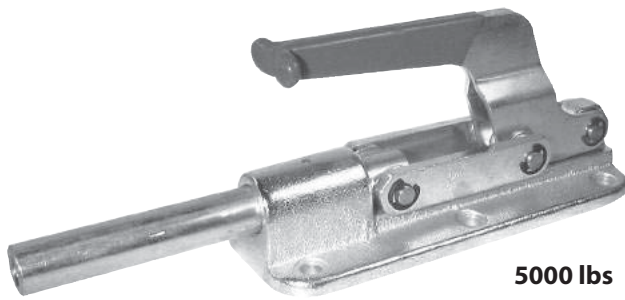
**Holding capacity:**

**2500 lbs**



# PUSH/PULL TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



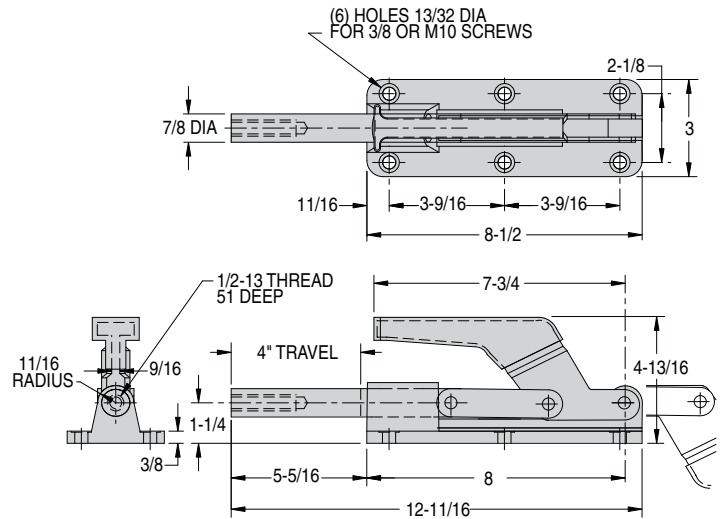
5000 lbs

## CL-450-SPC (Metric No. CLM-450-SPC)

Extra-heavy-duty clamp features a full 4" plunger travel! Rugged nodular iron base and a 7/8"-diameter plunger combine to handle the toughest clamping jobs. Locks in extended or retracted position. Plunger is tapped to accept any 1/2-13 spindle (M12 in metric). **INFO+**: See pages 500-503 to order. Shipping weight 7.0 lbs.

Holding capacity:

5000 lbs



# PUSH/PULL TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



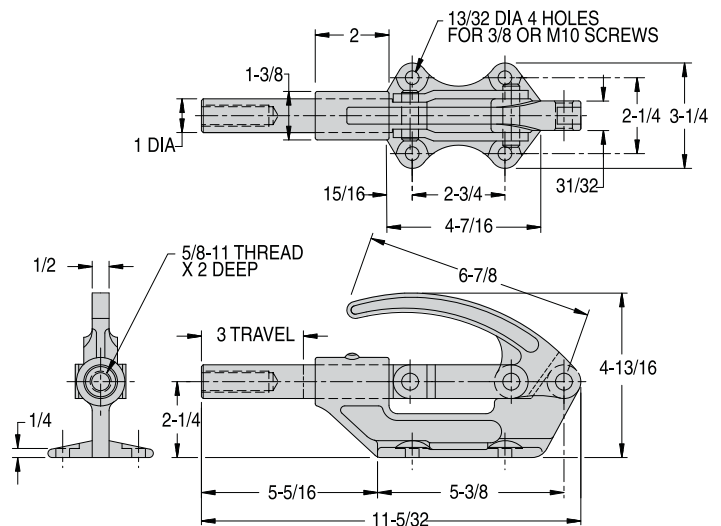
16000 lbs

## CL-650-SPC (Metric No. CLM-650-SPC)

Strongest plunger clamp available. Handle and base are made of alloy steel. Precision unit with snap-ring pivot pins to allow removing the plunger even after the clamp is mounted. Locks in extended or retracted position. 3" plunger travel. Plunger is tapped to accept any 5/8-11 spindle (M16 in metric). **INFO+**: See pages 500-503 to order. Shipping weight 5.7 lbs.

Holding capacity:

16000 lbs



# **CarrLock**<sup>®</sup>

## **SYSTEM**



### **Same great product, but with these advantages:**

- Exclusively made in the USA
- Complete interchangeability with all components of the Ball Lock<sup>®</sup> Mounting System
- Now lower price!
- Available from stock

**CarrLane**<sup>®</sup>

M A N U F A C T U R I N G C O.

**[www.carrlane.com/carrlock](http://www.carrlane.com/carrlock)**

Ball Lock<sup>®</sup> is a registered trademark of Jergens, Inc.

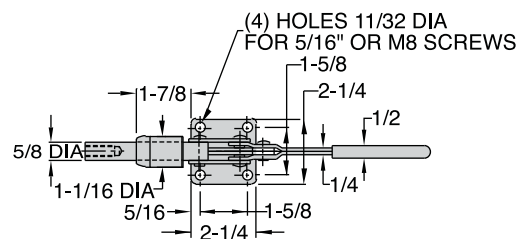
**See Pages 303-320**



# PUSH/PULL TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS

600 lbs

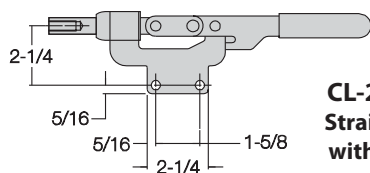


## CL-275-SPC (Metric No. CLM-275-SPC)

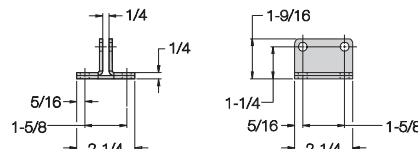
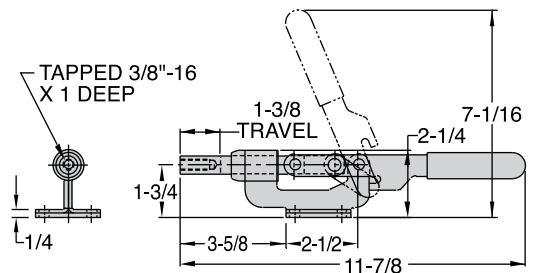
Similar to CL-250-SPC except with a horizontal handle and reverse handle action. Plunger advances and locks by moving handle backward into horizontal position. 1-3/16" plunger travel. Plunger is tapped to accept any 3/8-16 spindle (M10 in metric). **INFO+**: See pages 500-503 to order. Straight-base version supplied with separate base bracket to allow mounting clamp at an angle. Shipping weight 1.5 lbs.

**Holding capacity:**

**600 lbs**



**CL-276-SPC**  
Straight Base  
with Bracket

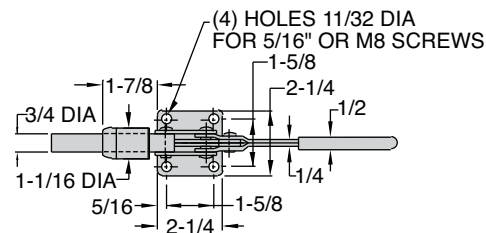


**Bracket included with CL-276-SPC**

# PUSH/PULL TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS

200 lbs Spring Force  
Self-Adjusting Plunger

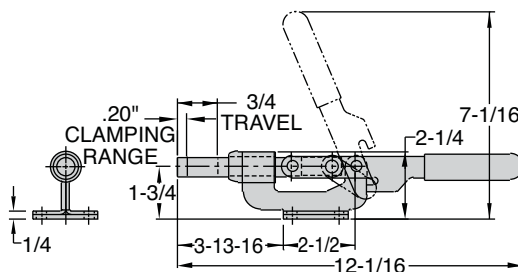


## CL-285-SPC

Self-adjusting version of CL-275-SPC above. These patented clamps automatically adjust to apply a consistent (+/-10%) spring clamping force anywhere within their .20" range. Plunger advances and locks by moving handle backward into horizontal position. 3/4" maximum plunger travel with a .20" clamping range. Patent number 6,905,116. Shipping weight 1.5 lbs.

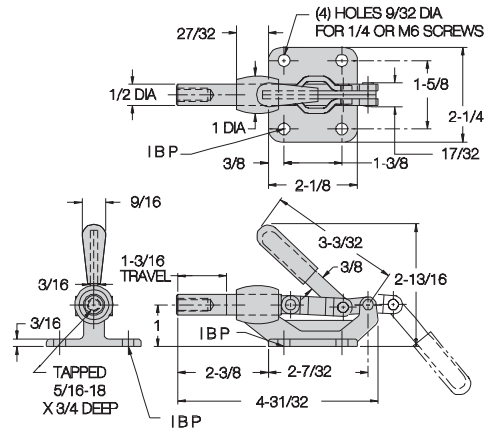
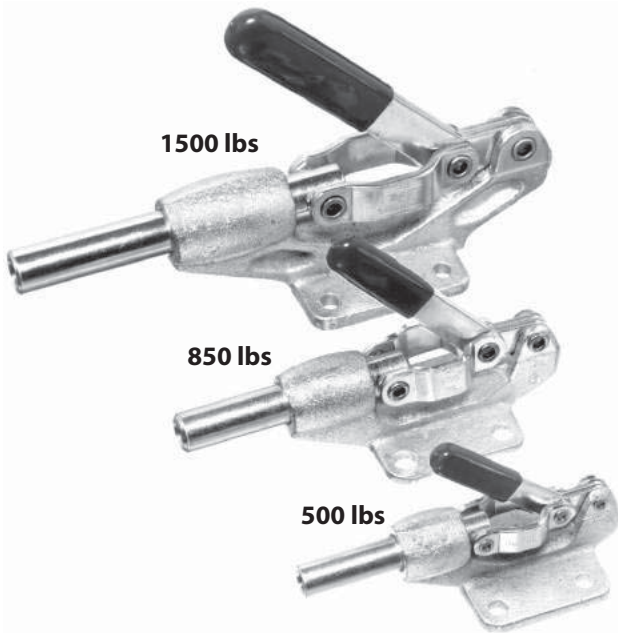
**Spring force (±10%):**

**200 lbs**

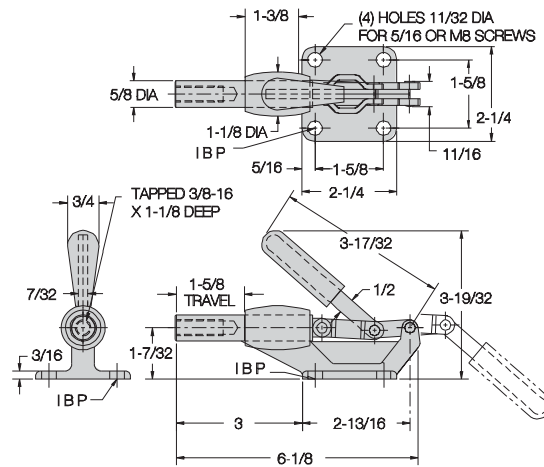


# PUSH/PULL TOGGLE CLAMPS

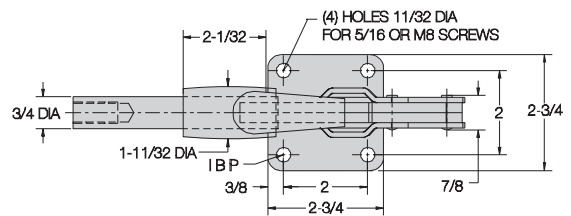
INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



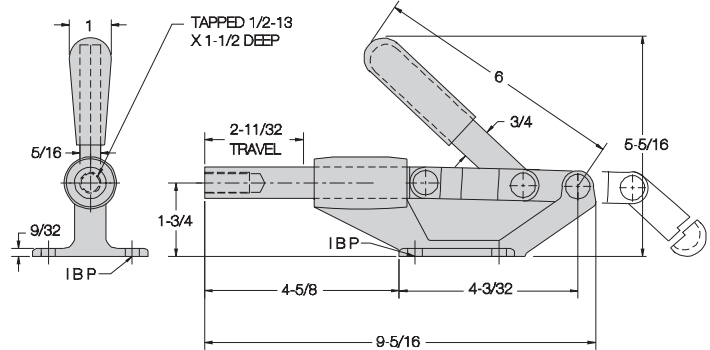
CL-100-PC



CL-200-PC



CL-300-PC



CL-1500-PPC  
850 lbs  
(INFO+ page 498)

Also available air powered . . .



Durable plunger clamp with nodular iron base. Locks in either extended or retracted position. Choice of three sizes.

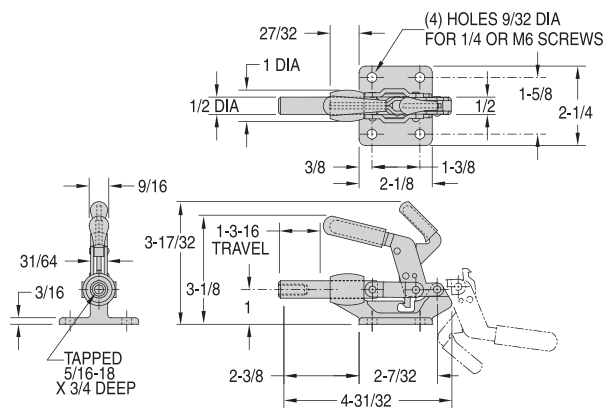
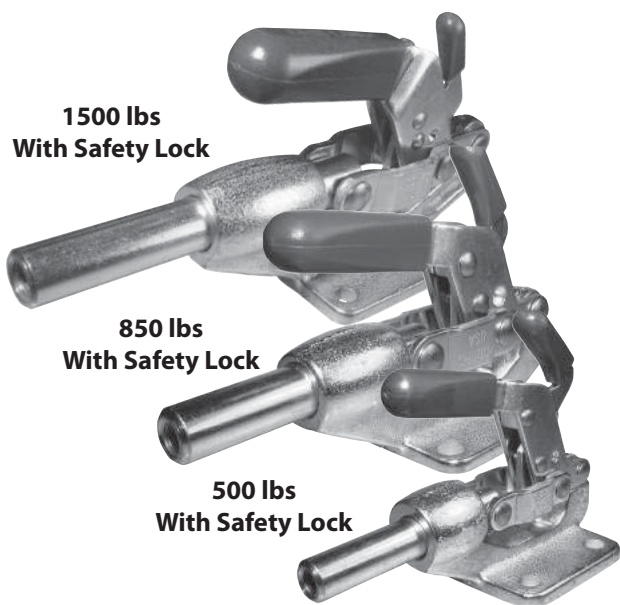
**CL-100-PC** (Metric No. CLM-100-PC)  
Small-size clamp with 1-3/16" plunger travel. Accepts any 5/16-18 spindle (M8 in metric). INFO+: See pages 500-503 to order. Shipping weight 0.9 lbs.  
**Holding capacity:** 500 lbs

**CL-200-PC** (Metric No. CLM-200-PC)  
Medium-size clamp with 1-5/8" plunger travel. Accepts any 3/8-16 spindle (M10 in metric). INFO+: See pages 500-503 to order. Shipping weight 1.4 lbs.  
**Holding capacity:** 850 lbs

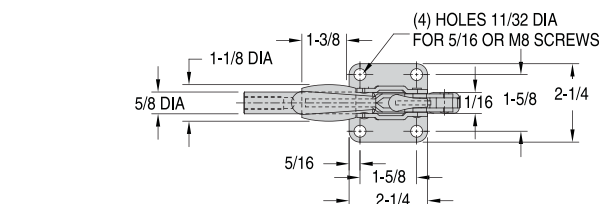
**CL-300-PC** (Metric No. CLM-300-PC)  
Large-size clamp with 2-11/32" plunger travel. Accepts any 1/2-13 spindle (M12 in metric). INFO+: See pages 500-503 to order. Shipping weight 3.2 lbs.  
**Holding capacity:** 1500 lbs

# PUSH/PULL TOGGLE CLAMPS

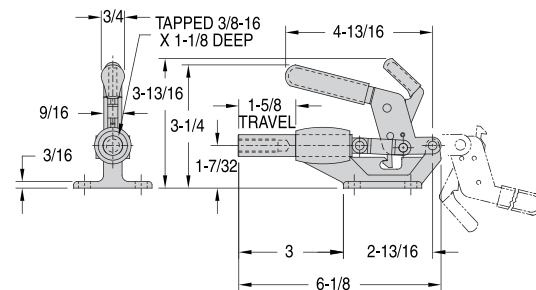
INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



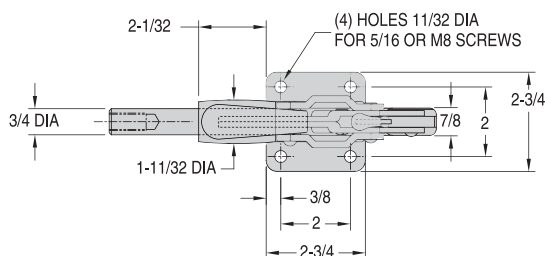
CL-100-LPC



CL-200-LPC



CL-200-LPC



CL-300-LPC

INFO+: Same as the toggle clamps shown on page 472, except with our unique safety-lock feature. This safety lock automatically engages when the clamp is closed, then remains locked until manually disengaged by pressing the lever before opening. This prevents the clamp from being accidentally opened by bumping the handle.

Durable plunger clamp with nodular iron base. Locks in extended or retracted position (safety lock functions only in extended position). Choice of three sizes.

## CL-100-LPC

Small-size clamp with 1-3/16" plunger travel. Accepts any 5/16-18 spindle. INFO+: See pages 500-503 to order. Shipping weight 0.9 lbs.

**Holding capacity:** 500 lbs

## CL-200-LPC

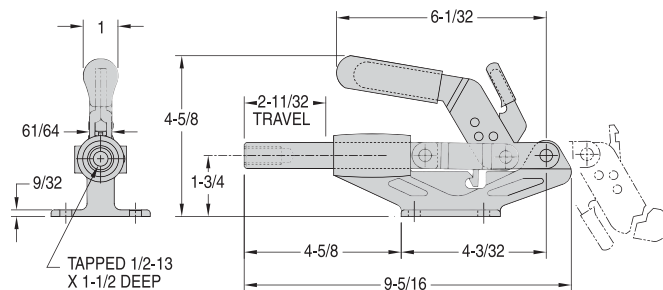
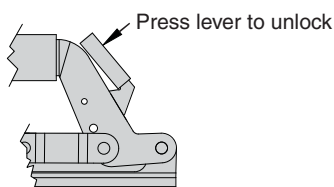
Medium-size clamp with 1-5/8" plunger travel. Accepts any 3/8-16 spindle. INFO+: See pages 500-503 to order. Shipping weight 1.4 lbs.

**Holding capacity:** 850 lbs

## CL-300-LPC

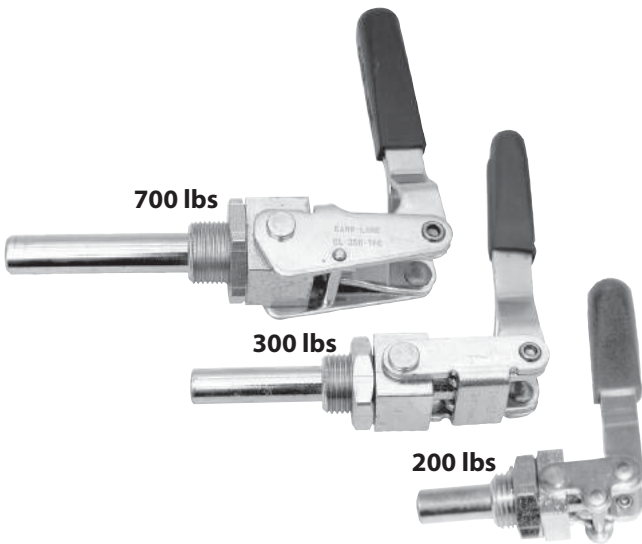
Large-size clamp with 2-11/32" plunger travel. Accepts any 1/2-13 spindle. INFO+: See pages 500-503 to order. Shipping weight 3.2 lbs.

**Holding capacity:** 1500 lbs



# PUSH/PULL TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



Compact plunger clamps for mounting through panels, plates, or angle brackets. Install in a drilled or tapped hole, securing with the locknut provided. Plunger locks in either extended or retracted position. Rotate clamp to position handle anywhere within 360°. Choice of three sizes.

## CL-150-TPC (Metric No. CLM-150-TPC)

Small-size clamp with 3/4" plunger travel. Installs in a 5/8"-diameter drilled hole, or a 5/8-18 tapped hole (M16x1.5 in metric). Accepts any 1/4-20 spindle (M6 in metric). **INFO+**: See pages 500-503 to order. Shipping weight 0.4 lbs.

**Holding capacity:** 200 lbs

## CL-250-TPC (Metric No. CLM-250-TPC)

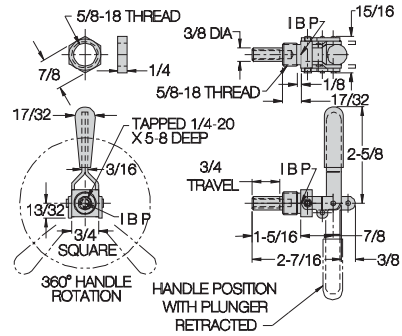
Medium-size clamp with 1-1/2" plunger travel. Installs in a 3/4"-diameter drilled hole, or a 3/4-16 tapped hole (M20x1.5 in metric). Accepts any 5/16-18 spindle (M8 in metric). **INFO+**: See pages 500-503 to order. Shipping weight 0.7 lbs.

**Holding capacity:** 300 lbs

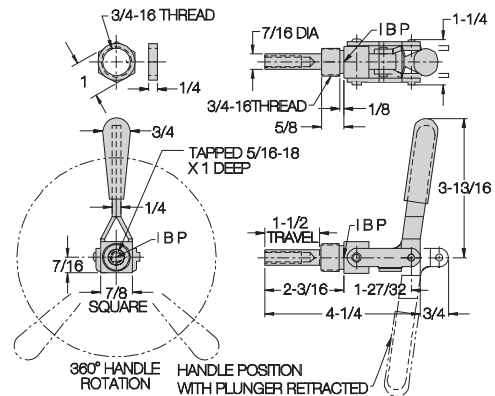
## CL-350-TPC (Metric No. CLM-350-TPC)

Large-size clamp with 2-5/8" plunger travel. Installs in a 1"-diameter drilled hole, or a 1"-14 (M27x2 in metric) tapped hole. Accepts any 3/8-16 spindle (M10 in metric). **INFO+**: See pages 500-503 to order. Shipping weight 1.5 lbs.

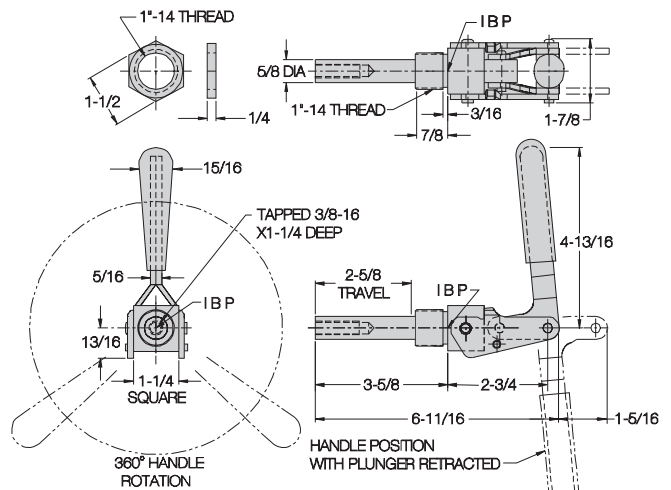
**Holding capacity:** 700 lbs



CL-150-TPC

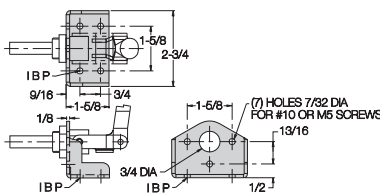


CL-250-TPC



CL-350-TPC

### Mounting Bracket for CL-250-TPC:



CL-250-TPCA

Also available in stainless steel ...



CL-150-TPC-S  
200 lbs

CL-250-TPC-S  
300 lbs

CL-350-TPC-S  
700 lbs

# PUSH/PULL TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS

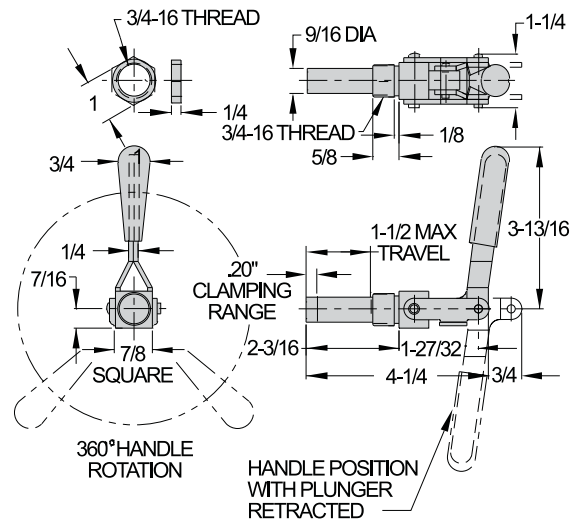
**200 lbs Spring Force  
Self-Adjusting Plunger**



**100 lbs Spring Force  
Self-Adjusting Plunger**



**INFO+:** Self-adjusting version of the clamps on page 474. These patented clamps automatically adjust to apply a consistent (+/-10%) spring clamping force anywhere within their .20" range. Compact plunger clamps for mounting through panels, plates, or angle brackets. Install in a drilled or tapped hole, securing with the locknut provided. Plunger locks only in extended position. Rotate clamp to position handle anywhere within 360°. Patent number 6,905,116. Choice of two sizes.



**CL-255-TPC**

## CL-255-TPC

Self-adjusting version of CL-250-TPC. Medium-size clamp with 1-1/2" maximum plunger travel and a .20" clamping range. Installs in a 3/4"-diameter drilled hole, or a 3/4-16 tapped hole. Shipping weight 0.7 lbs.

**Spring force (±10%):**

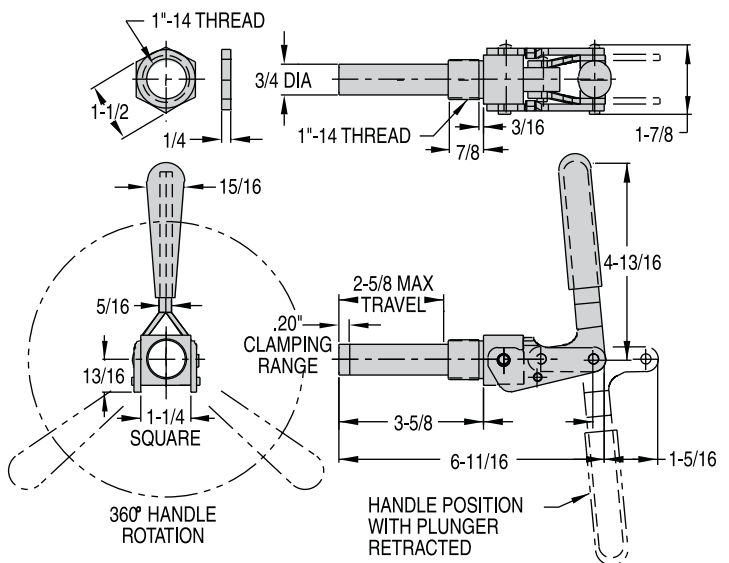
**100 lbs**

## CL-355-TPC

Self-adjusting version of CL-350-TPC. Large-size clamp with 2-5/8" maximum plunger travel and a .20" clamping range. Installs in a 1"-diameter drilled hole, or a 1"-14 tapped hole. Shipping weight 1.5 lbs.

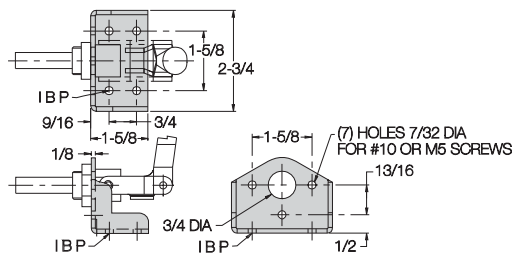
**Spring force (±10%):**

**200 lbs**



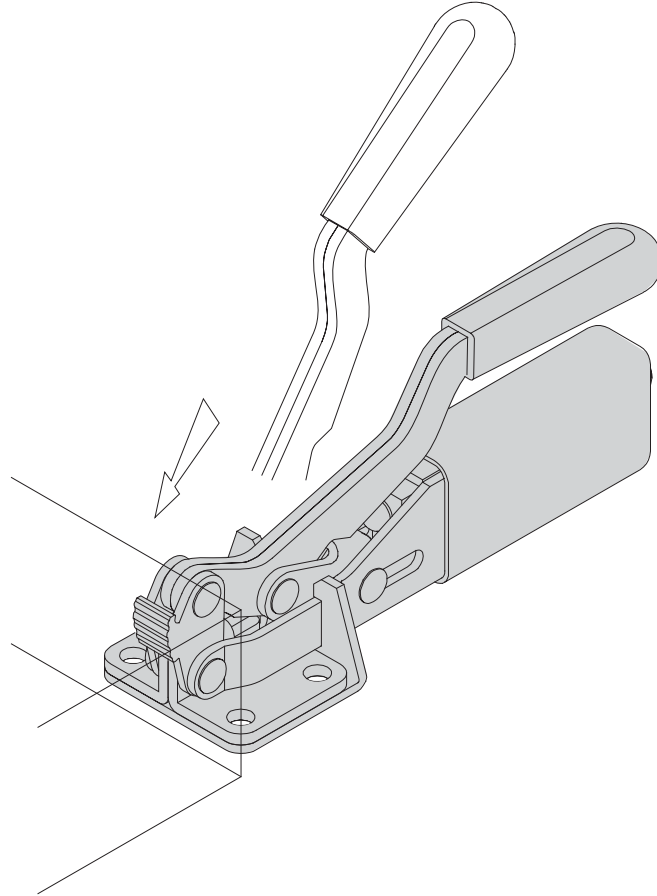
**CL-355-TPC**

**Mounting Bracket for CL-255-TPC:**



**CL-250-TPCA**

# TOGGLE EDGE CLAMPS



All Carr Lane Manufacturing toggle clamps are DFARS and RoHS compliant.



750 lbs

## Automatically Adjusting p. 477

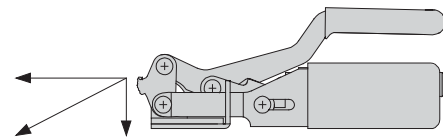
Unique Toggle Edge Clamp applies force forward and downward at the same time. This quick-acting, self-adjusting clamp automatically compensates for variations in workpiece size. Clamping force is always consistent after setting once.

# TOGGLE EDGE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



**750 lbs**  
**Automatic Toggle Clamp**  
**(Self Adjusting)**



Toggle Edge Clamps apply force forward and downward at the same time.

## CL-550-ATEC

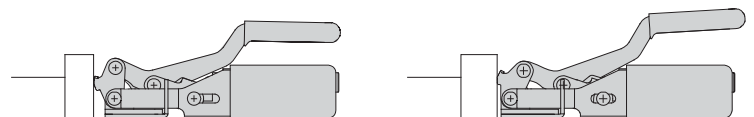
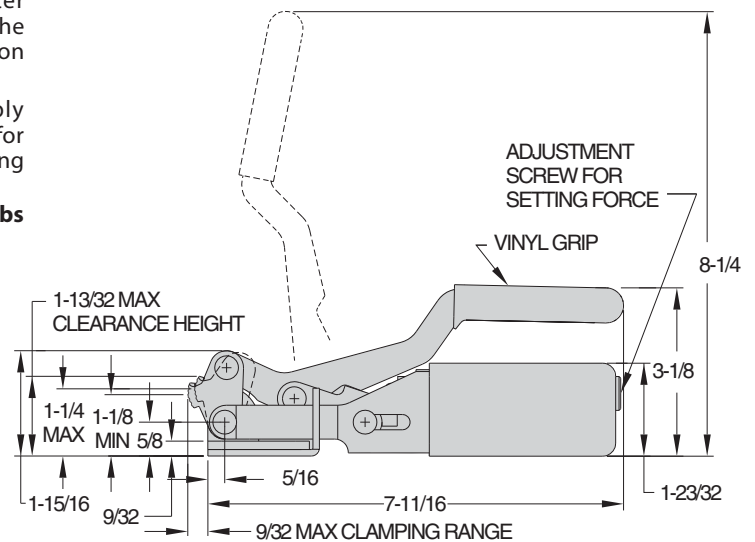
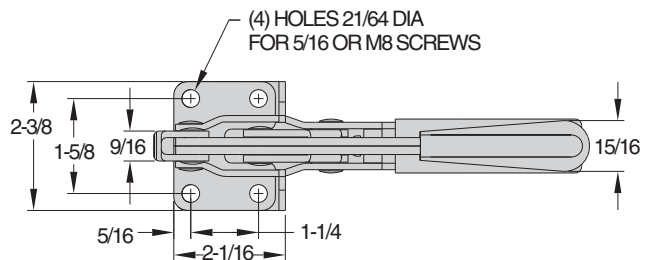
Unique Toggle Edge Clamp applies force forward and downward at the same time. Automatically adjusts for different workpiece sizes. Clamps with the same, repeatable force anywhere within its 9/32" automatic-adjustment range.

Easy to use. Simply set desired clamping force once, after mounting, then operate just like a standard toggle clamp. The patented adjusting mechanism does the rest. For mounting on T-slotted tables, see slotted adapters below.

Hardened clamping nose grips workpiece firmly to apply downthrust force. Handle moves 80° while nose pivots back for loading. Patent no. 4,407,493. Other patents pending. Shipping weight 1.8 lbs.

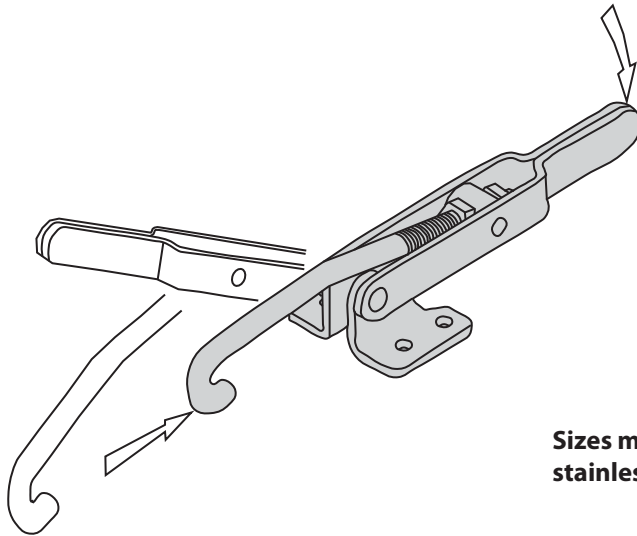
**Holding capacity:**

**750 lbs**



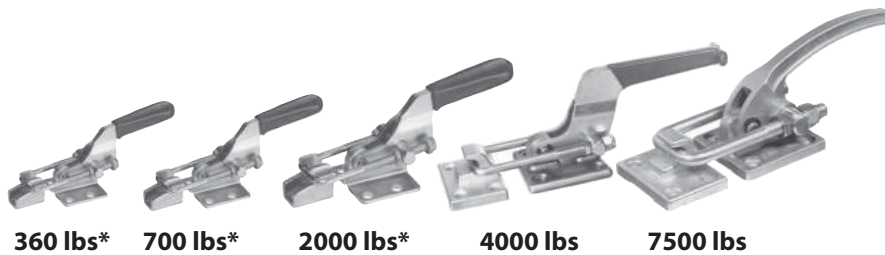
**9/32" Automatic-Adjustment Range**

# LATCH-ACTION TOGGLE CLAMPS



Sizes marked \* are also available in stainless steel

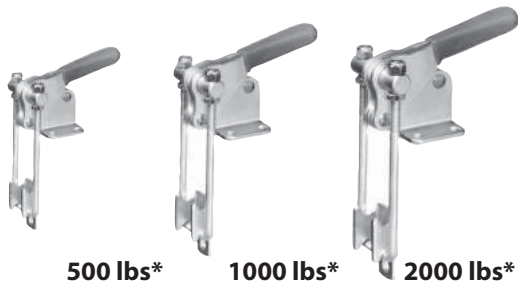
All Carr Lane Manufacturing toggle clamps are DFARS and RoHS compliant.



360 lbs\* 700 lbs\* 2000 lbs\* 4000 lbs 7500 lbs

## Adjustable U Bolt p. 480-483

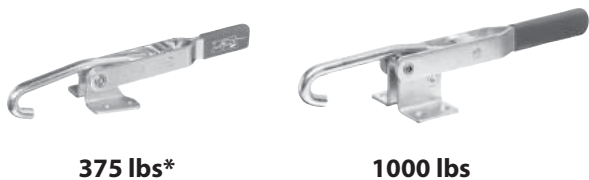
Latch-action clamp with a threaded U bolt for adjustability. Supplied with matching latch plate (smallest three sizes). Large, comfortable handle grip. Available in five sizes.



500 lbs\* 1000 lbs\* 2000 lbs\*

## Right-Angle Adjustable U Bolt p. 484

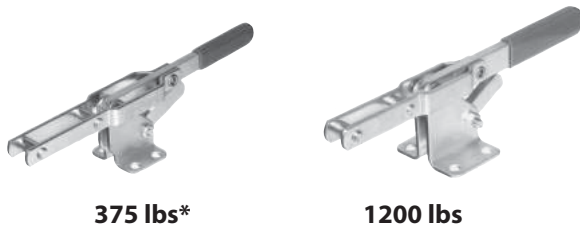
Similar to the latch clamp above, except with its pulling direction perpendicular to the base. Supplied with matching latch plate. Large, comfortable handle grip. Available in three sizes.



375 lbs\* 1000 lbs

## Adjustable Hook p. 479

Popular hook-type latch clamp. Hook is threaded at one end for easy adjustment. Base rotates 90° to allow horizontal or vertical latching. Available in two sizes.



375 lbs\* 1200 lbs

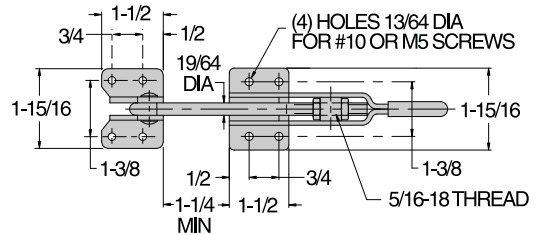
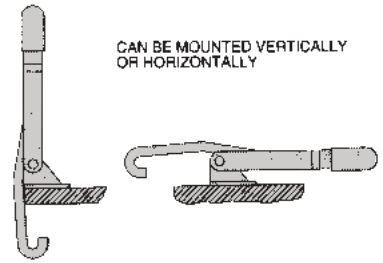
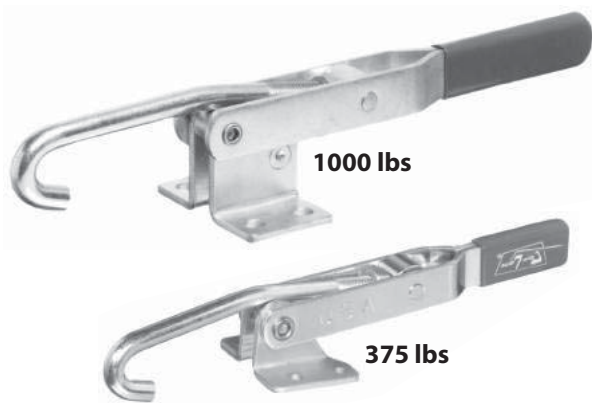
## Fixed Length p. 485

Latch clamp with fixed reach for installation where no length adjustment is required. Adjustable stop allows latching at different heights. Available in two sizes.



# LATCH-ACTION TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



Latch clamp with a versatile hook for grasping a rod or rim. Hook is threaded at one end to allow adjustment after mounting. Base pivots to allow horizontal or vertical latching. Choice of two sizes. Optional latch plate can be mounted as shown in the drawings, or reversed, for mounting flexibility.

## CL-250-PA

Medium-size latch clamp with a 4-inch drawing movement. Threaded hook allows a 5/16-inch adjustment range. Shipping weight 0.8 lbs. Order matching latch plate CL-250-PA-L separately (CL-250-PA-S-L in stainless).

**Holding capacity:**

**375 lbs**

## CL-350-PA

Large-capacity latch clamp with 6-1/8-inch drawing movement. Threaded hook allows a 3/4-inch adjustment range. Shipping weight 2.5 lbs. Order matching latch plate CL-350-PA-L separately.

**Holding capacity:**

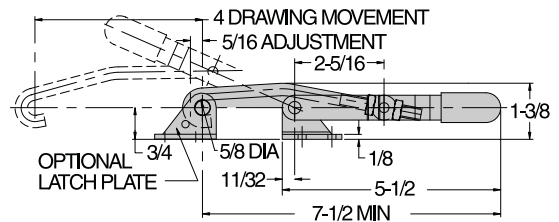
**1000 lbs**

## CL-257-PA

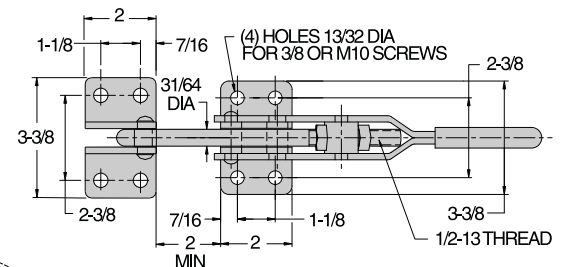
Same as CL-250-PA except with a manual safety lock. Push knob in to lock, pull knob out to unlock.

**Holding capacity:**

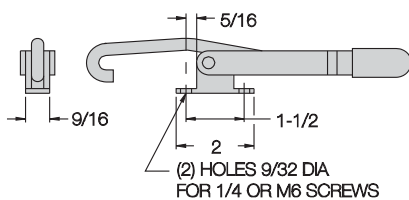
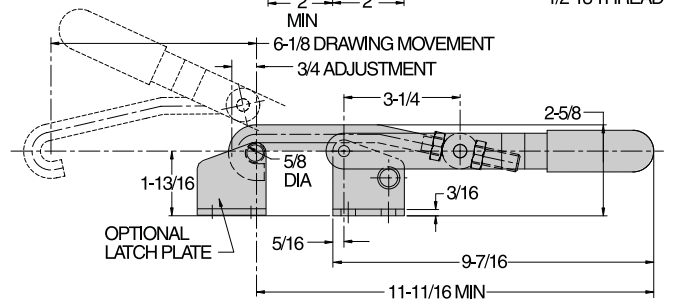
**375 lbs**



**CL-250-PA**



**CL-350-PA**



**CL-251-PA**  
Narrow Base  
375 lbs

Also available in stainless steel ...



**CL-250-PA-S**

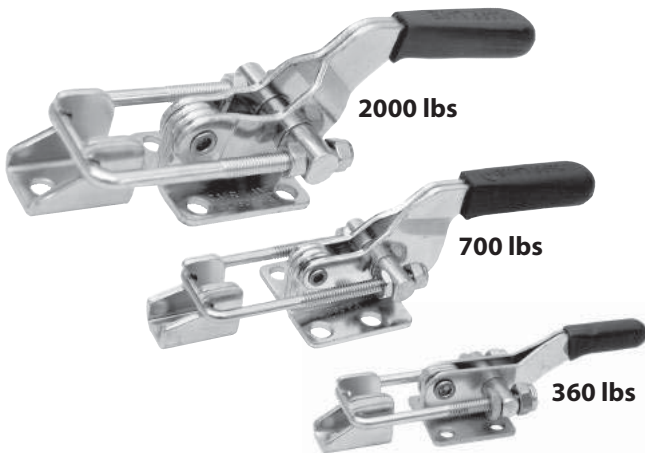
Extra hooks available ...



**CL-250-PA-HOOK**  
**CL-250-PA-S-HOOK**  
**CL-350-PA-HOOK**

# LATCH-ACTION TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



Versatile latch clamp with a threaded U bolt for adjustability. Supplied with matching latch plate. Large, comfortable handle grip. Available in three sizes (INFO+: See page 481 for two larger sizes).

## CL-100-PA

Miniature latch clamp with high holding capacity. 1-3/16-inch drawing movement. Threaded U bolt allows a 25/64-inch adjustment range. Shipping weight 0.2 lbs.

**Holding capacity:** 360 lbs

## CL-200-PA

Medium-size latch clamp with 2-inch drawing movement. Threaded U bolt allows a 3/8-inch adjustment range. Shipping weight 0.4 lbs.

**Holding capacity:** 700 lbs

## CL-300-PA

Heavy-duty latch clamp. Well-suited for applications such as plastic molding. 2-1/2-inch drawing movement. Threaded U bolt allows a 15/16-inch adjustment range. Shipping weight 1.5 lbs.

**Holding capacity:** 2000 lbs

Also available in stainless steel...



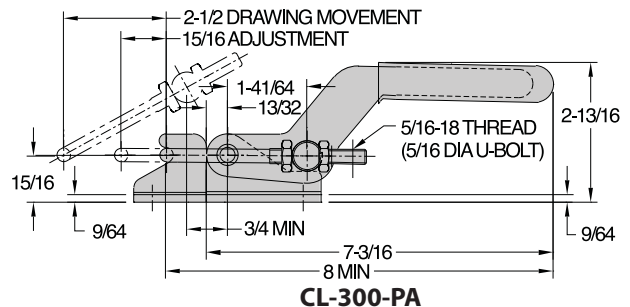
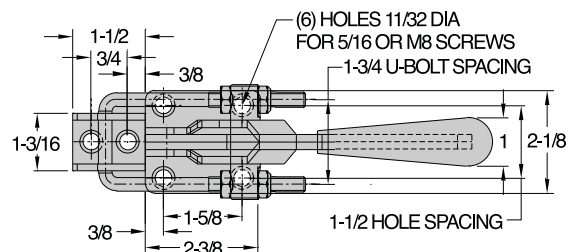
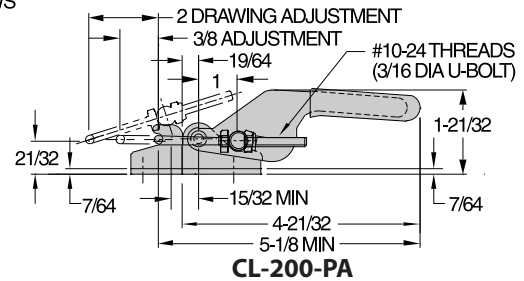
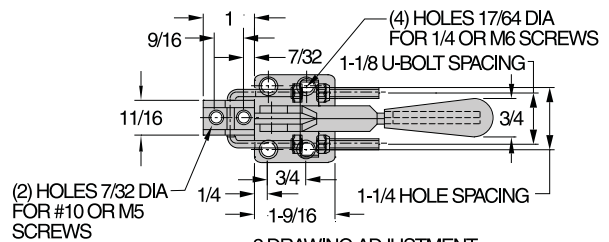
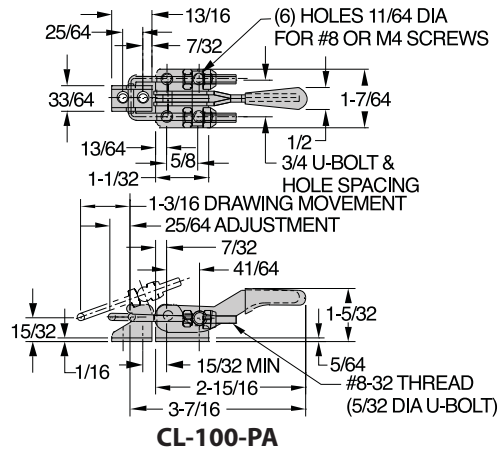
CL-100-PA-S  
360 lbs



CL-200-PA-S  
700 lbs

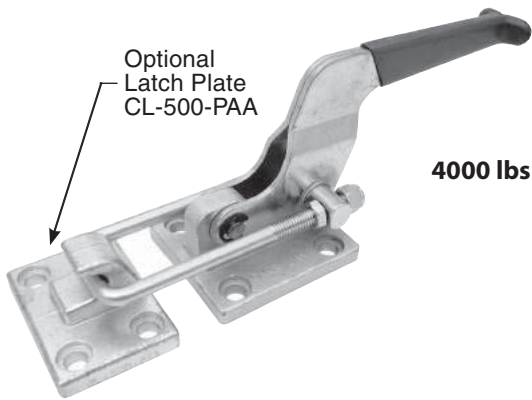


CL-300-PA-S  
2000 lbs



# LATCH-ACTION TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



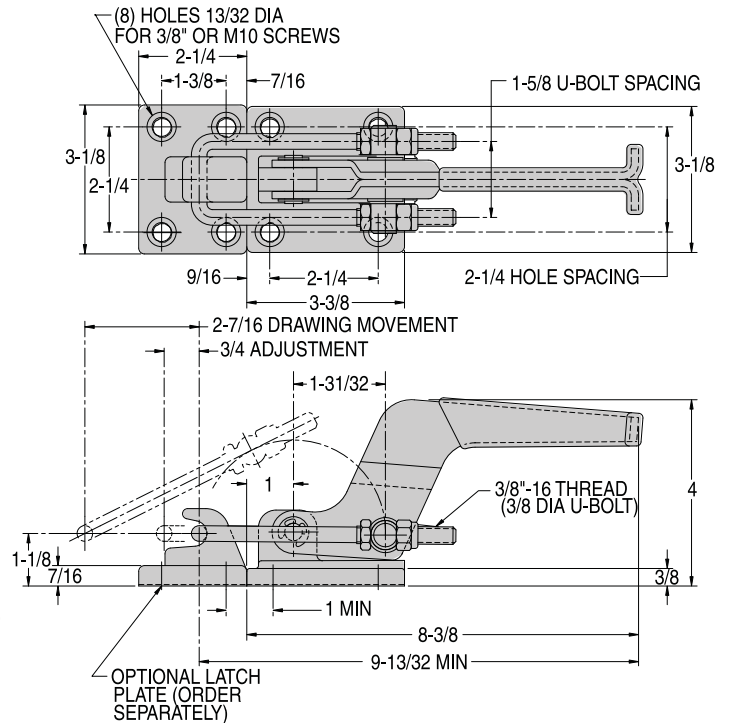
4000 lbs

## CL-400-PA

INFO+: Heavier-duty version of the latch clamps on page 480. Strong enough to resist the high expansion forces generated in polyurethane molds. Rugged alloy steel base and latch plate (order latch plate separately). Threaded U bolt allows a 3/4-inch adjustment range. 2-7/16" drawing movement. Shipping weight 2.8 lbs.

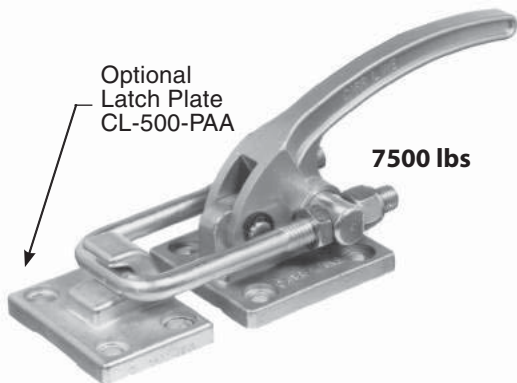
Holding capacity:

4000 lbs



# LATCH-ACTION TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



7500 lbs

## CL-500-PA

Strongest latch clamp available. Alloy steel handle provides even greater strength than the CL-400-PA above, yet with a more-compact overall size. Rugged alloy steel base and latch plate (order latch plate separately). Threaded U bolt allows a 1-1/8-inch adjustment range. 1-3/8" drawing movement. Shipping weight 3.3 lbs.

Holding capacity:

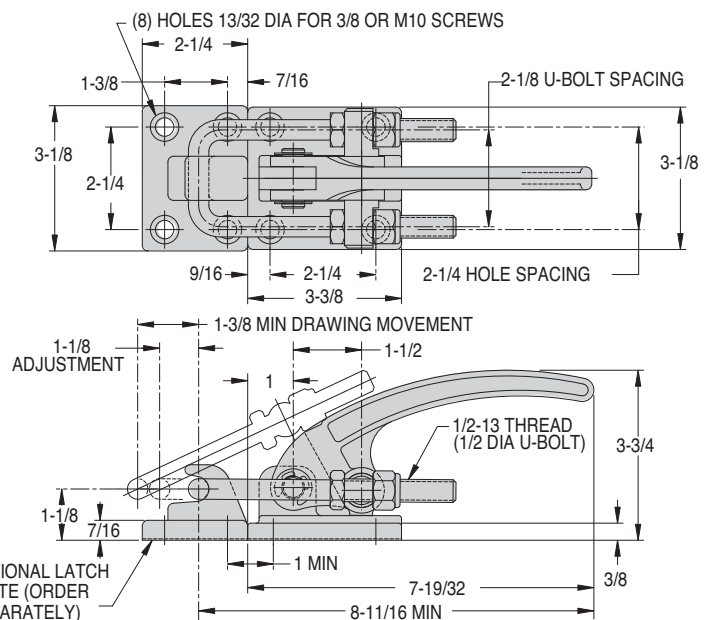
7500 lbs

Also available in stainless steel...



CL-500-PA-S (Clamp)

CL-500-PAA-S (Latch Plate)



# LATCH-ACTION TOGGLE CLAMPS

**INFO+:** SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



**INFO+:** Same as our latch clamps on page 480 except with safety-lock feature. This safety lock automatically engages when the clamp is closed, then remains locked until manually disengaged by pressing the lever before opening. This prevents the latch clamp from being accidentally opened by bumping the handle.

Versatile latch clamp with a threaded U bolt for adjustability. Supplied with matching latch plate. Large, comfortable handle grip. Available in two sizes (**INFO+:** also see page 483 for two larger sizes).

## CL-100-LPA

Miniature latch action clamp with high holding capacity. 1-3/16-inch drawing movement. Threaded U bolt allows a 25/64-inch adjustment range. Shipping weight 0.2 lbs.

**Holding capacity: 360 lbs**

## CL-200-LPA

Medium-size latch clamp with 2-inch drawing movement. Threaded U bolt allows a 3/8-inch adjustment range. Shipping weight 0.4 lbs.

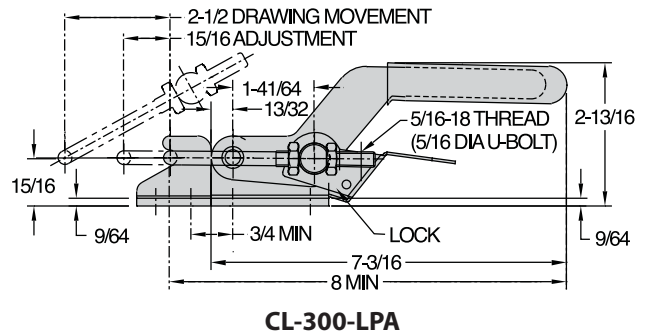
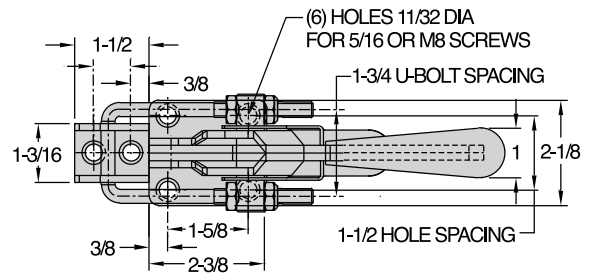
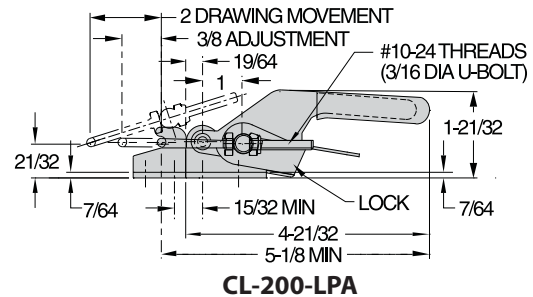
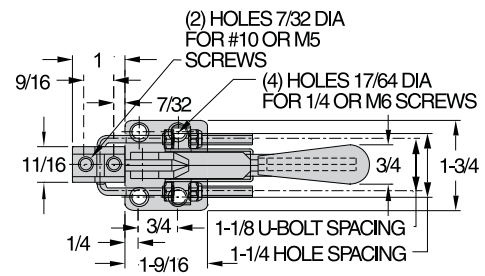
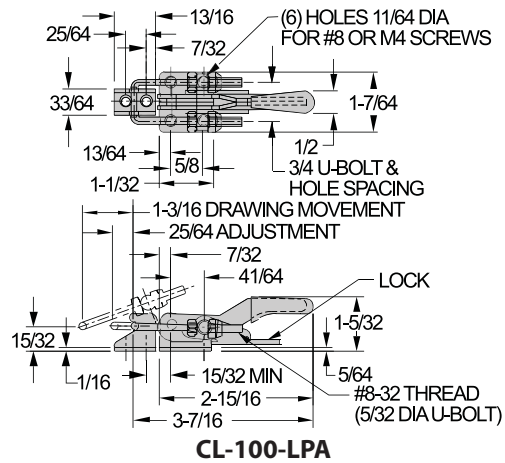
**Holding capacity: 700 lbs**

## CL-300-LPA

Heavy-duty latch clamp. Well-suited for applications such as plastic molding. 2-1/2-inch drawing movement. Threaded U bolt allows a 15/16-inch adjustment range. Shipping weight 1.5 lbs.

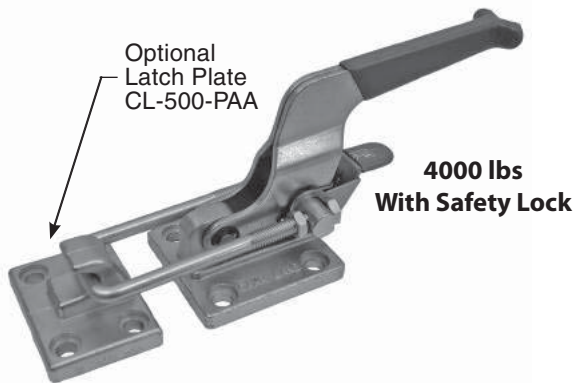
**Holding capacity: 2000 lbs**

Also available in stainless steel...



# LATCH-ACTION TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



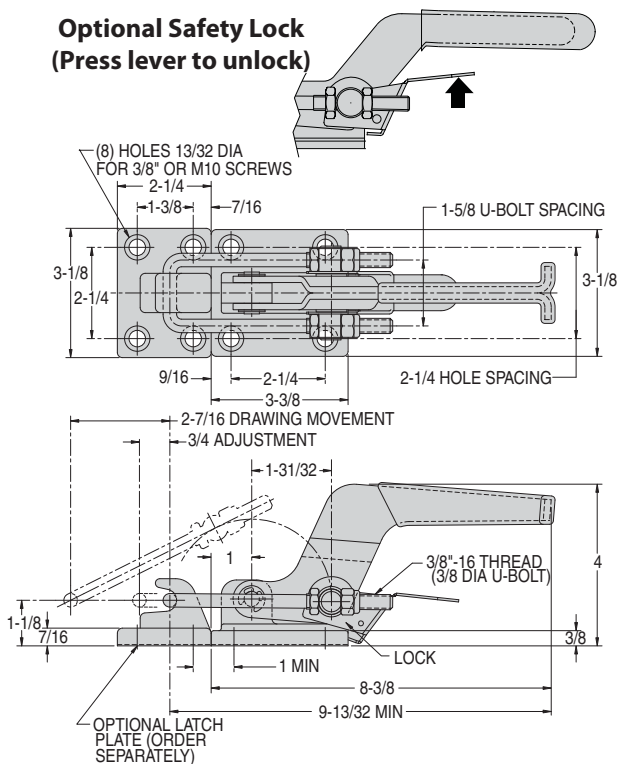
## CL-400-LPA

INFO+: Same as our latch clamps on page 481 except with our unique safety-lock feature. This safety lock automatically engages when the clamp is closed, then remains locked until manually disengaged by pressing the lever before opening. This prevents the latch clamp from being accidentally opened by bumping the handle. Rugged alloy steel base and latch plate (order latch plate separately). Threaded U bolt allows a 3/4-inch adjustment range. 2-7/16" drawing movement. Shipping weight 2.8 lbs.

Holding capacity:

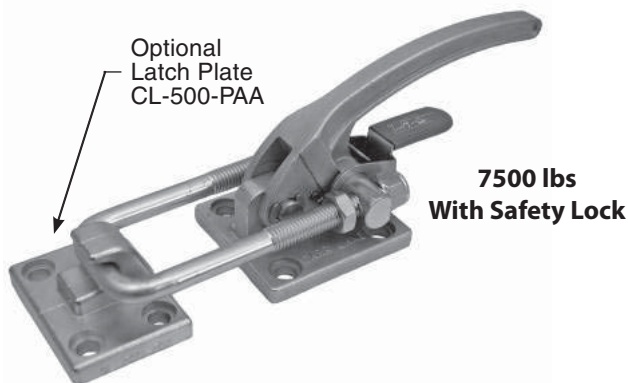
4000 lbs

Optional Safety Lock  
(Press lever to unlock)



# LATCH-ACTION TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS

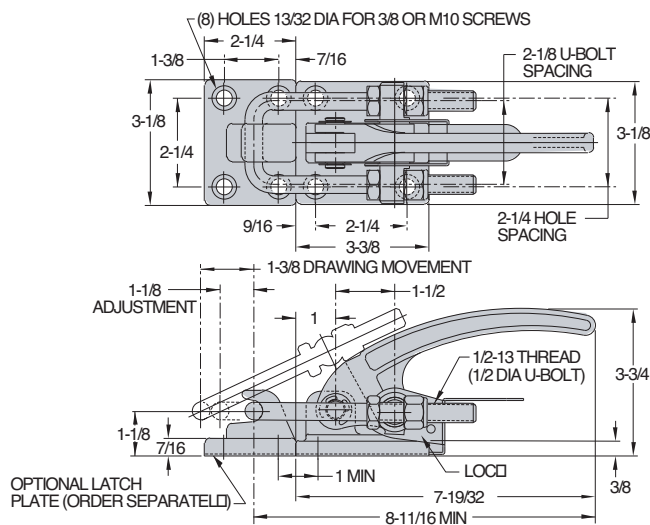


## CL-500-LPA

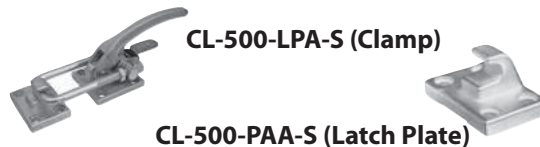
INFO+: Same as our latch clamps on page 481 except with our unique safety-lock feature. This safety lock automatically engages when the clamp is closed, then remains locked until manually disengaged by pressing the lever before opening. This prevents the latch clamp from being accidentally opened by bumping the handle. Rugged alloy steel base and latch plate (order latch plate separately). Threaded U bolt allows a 1-1/8-inch adjustment range. 1-3/8" drawing movement. Shipping weight 3.3 lbs.

Holding capacity:

7500 lbs

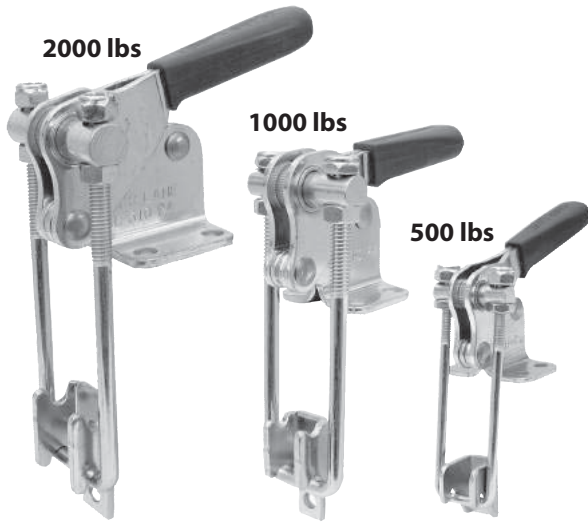


Also available in stainless steel...



# LATCH-ACTION TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



INFO+: Similar to the adjustable-U-bolt latch clamps on page 480, except with their pulling direction perpendicular to the base. Supplied with matching latch plate. Large, comfortable handle grip. Available in three sizes.

## CL-110-PA

Miniature latch clamp with high holding capacity. 1-1/2-inch drawing movement. Threaded U bolt allows a 7/16-inch adjustment range. Shipping weight 0.3 lbs.

**Holding capacity:** 500 lbs

## CL-210-PA

Medium-size latch clamp with 2-1/16-inch drawing movement. Threaded U bolt allows an 11/16-inch adjustment range. Shipping weight 0.6 lbs.

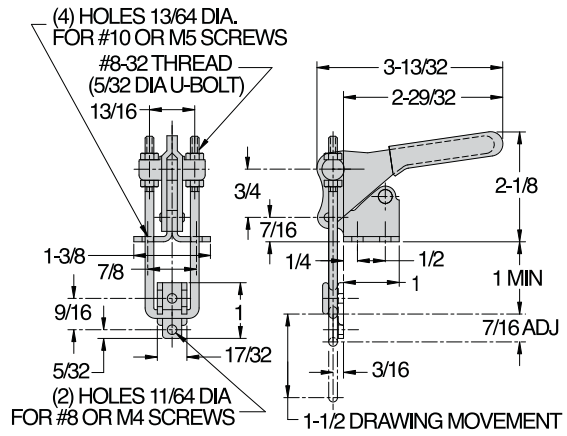
**Holding capacity:** 1000 lbs

## CL-310-PA

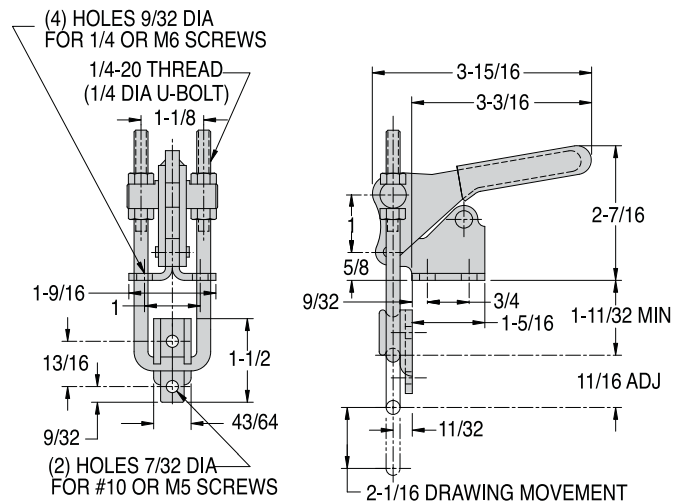
Heavy-duty latch clamp. Well-suited for applications such as plastic molding. 2-1/2-inch drawing movement. Threaded U bolt allows an 1-1/8-inch adjustment range. Shipping weight 1.4 lbs.

**Holding capacity:** 2000 lbs

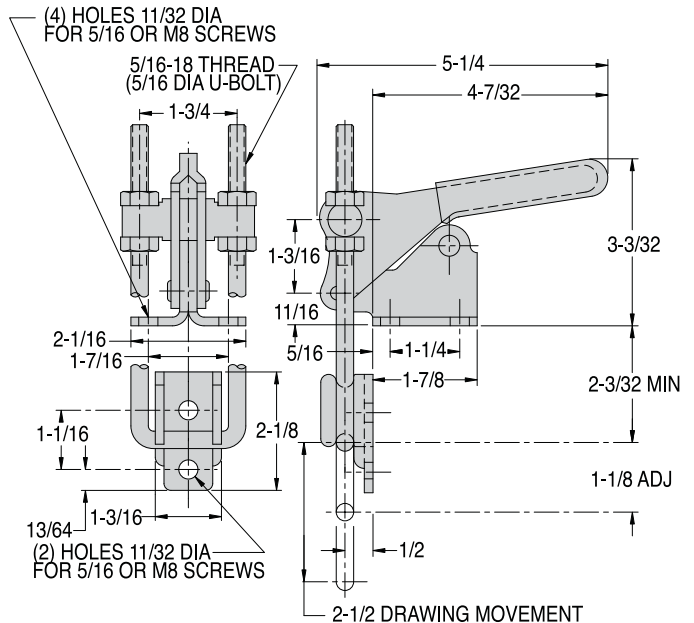
Also available in stainless steel...



CL-110-PA



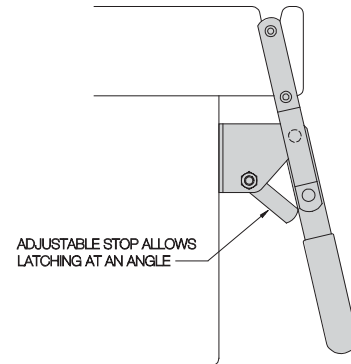
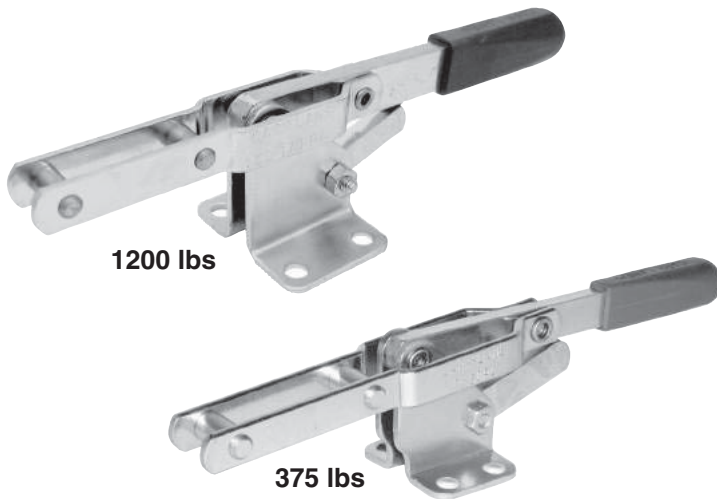
CL-210-PA



CL-310-PA

# LATCH-ACTION TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



Latch clamp with fixed reach for installation where no length adjustment is required. An adjustable stop allows latching at different angles. Available in two sizes.

## CL-150-PA

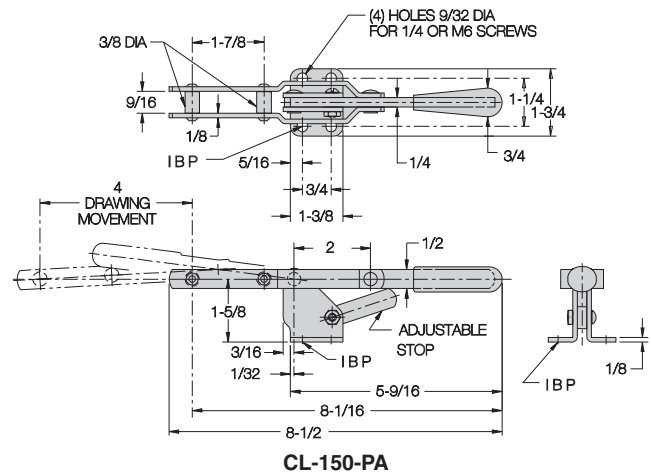
Medium-size clamp with 4-inch drawing movement. Shipping weight 0.8 lbs.

**Holding capacity:** **375 lbs**

## CL-170-PA

Larger clamp with 3-3/8-inch drawing movement. Shipping weight 1.2 lbs.

**Holding capacity:** **1200 lbs**

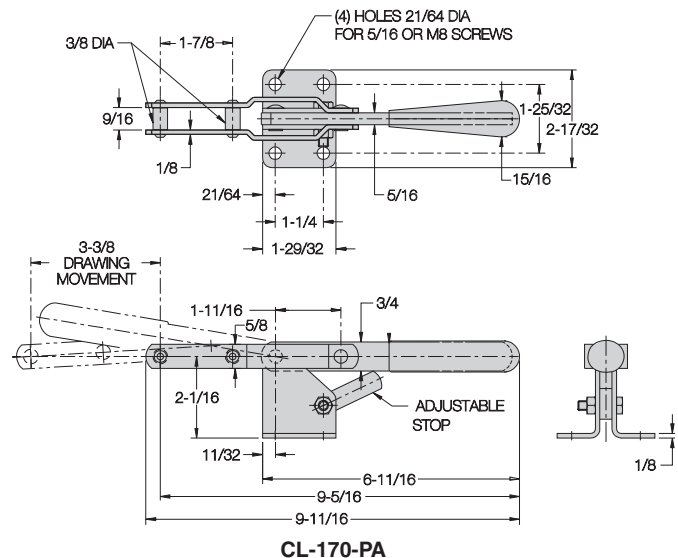


CL-150-PA

Also available in stainless steel...

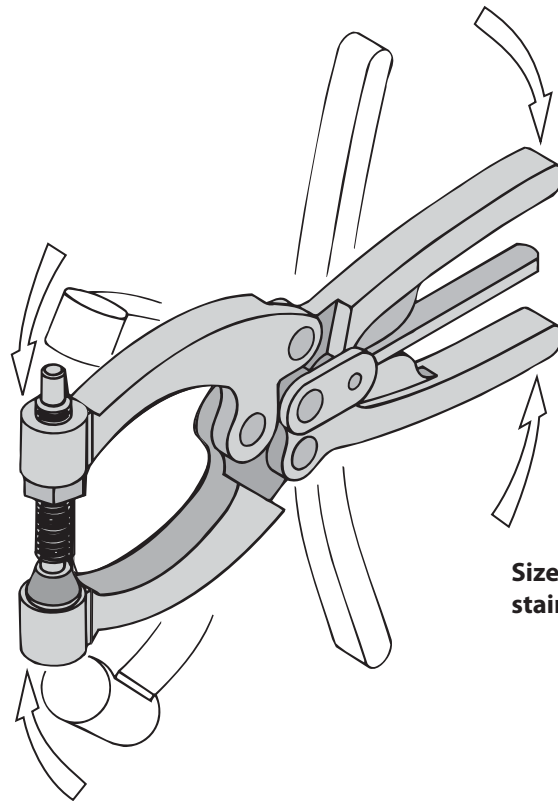


CL-150-PA-S



CL-170-PA

# TOGGLE PLIERS



Sizes marked \* are also available in stainless steel

All Carr Lane Manufacturing toggle clamps are DFARS and RoHS compliant.



## Forged Toggle Pliers

pp. 487-489

Powerful forged steel toggle pliers. Available in five sizes. Larger sizes feature a quick-release lever for easy opening.

1  
1



800 lbs\*

## Permanently Attached

p. 490

Handy weld-on/bolt-on clamp for holding down lids, covers etc. Clamping jaw opens a full 90° for extra clearance.



800 lbs

## Toggle Bar Clamps

p. 490

Multi-purpose bar clamp, with forged steel clamping jaw. Order with optional lower jaw, or attach bar by welding.



# TOGGLE PLIERS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



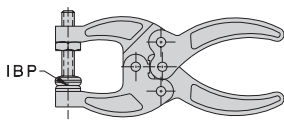
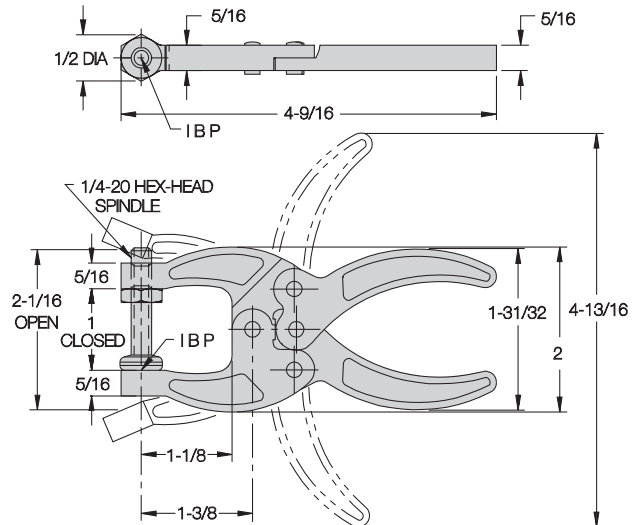
200 lbs

## CL-50-PL

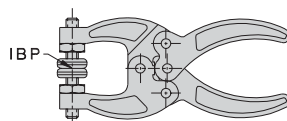
Tiny-yet-powerful toggle pliers made of forged steel. 1-inch jaw width. Supplied with 1/4-20 vinyl-coated hex-head spindle CL-14208-SA. Optionally available as CL-50-PL-2 with a bottom-jaw cushion, or as CL-50-PL-3 with (2) vinyl-coated hex-head spindles, CL-14100-SA. Shipping weight 0.4 lbs.

**Holding capacity:**

200 lbs



**CL-50-PL-2**  
Hex-Head Spindle  
and Bottom Cushion



**CL-50-PL-3**  
Dual Hex-Head Spindle

# TOGGLE PLIERS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



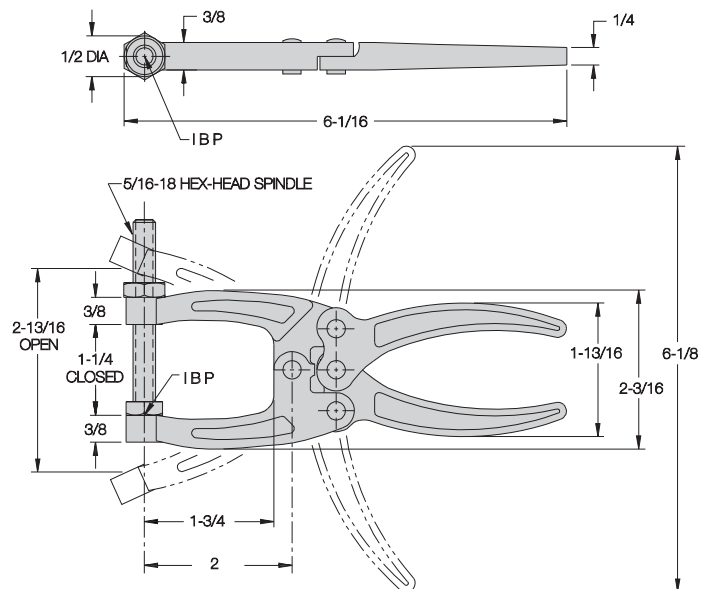
350 lbs

## CL-150-PL

Medium-size toggle pliers made of forged steel. 1-1/4-inch jaw width. Supplied with 5/16-18 hex-head spindle CL-516212-SA. Shipping weight 0.5 lbs.

**Holding capacity:**

350 lbs



# TOGGLE PLIERS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



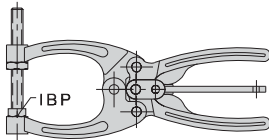
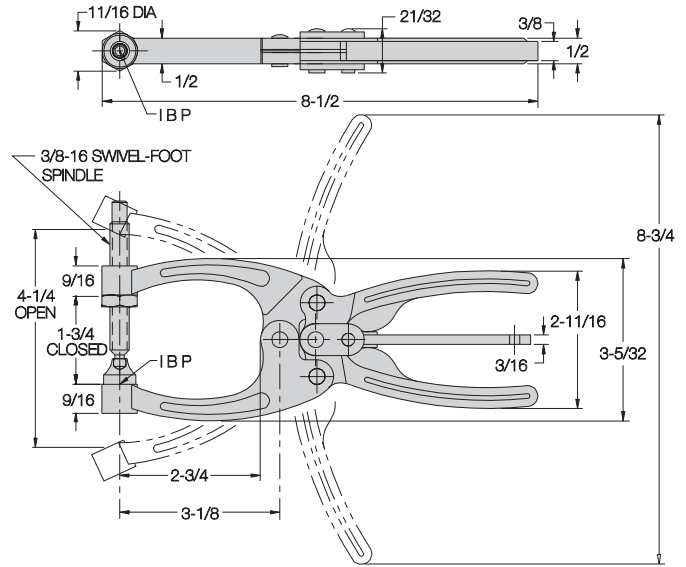
700 lbs

## CL-254-PL

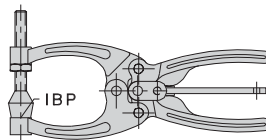
Heavy-duty toggle pliers made of forged steel. 1-3/4 inch jaw width. Two-way quick-release lever for easy opening. Supplied with 3/8-16 swivel-foot spindle CL-38314-SF. Optionally available as CL-250-PL with hex-head spindle CL-38314-SA, as CL-254-PL-2 with (2) hex-head spindles CL-38314-SA, or as CL-252-PL with flat-cushion spindle CL-38314-FC. Shipping weight 1.3 lbs.

**Holding capacity:**

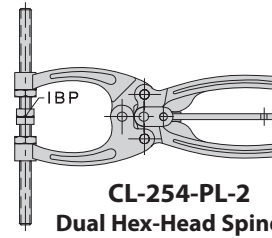
**700 Lbs**



**CL-250-PL**  
Hex-Head Spindle



**CL-252-PL**  
Flat Cushion Spindle



**CL-254-PL-2**  
Dual Hex-Head Spindle

1  
1

# TOGGLE PLIERS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



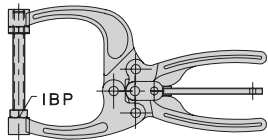
700 lbs

## CL-454-PL

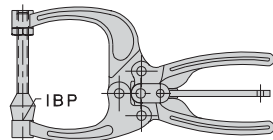
Wide-jaw heavy-duty toggle pliers made of forged steel. 3-inch jaw width. Two-way quick-release lever for easy opening. Supplied with 3/8-16 swivel-foot spindle CL-38314-SF and hex-head spindle CL-38314-SA. Optionally available as CL-450-PL with single hex-head spindle CL-38314-SA, or as CL-452-PL with a single flat-cushion spindle CL-38314-FC. Shipping weight 1.4 lbs.

**Holding capacity:**

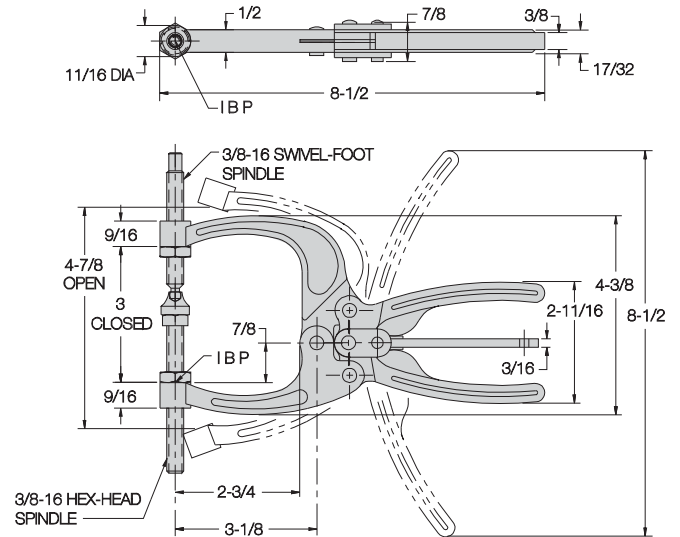
**700 lbs**



**CL-450-PL**  
Hex-Head Spindle

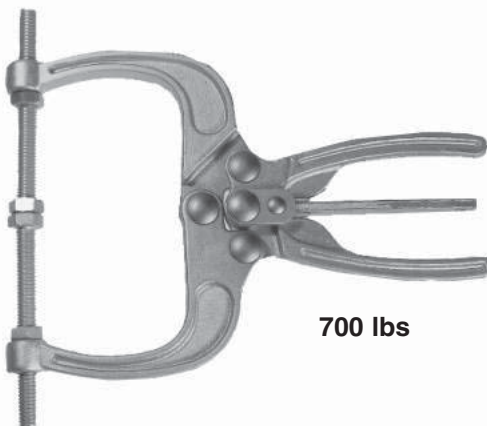


**CL-452-PL**  
Flat-Cushion Spindle



# TOGGLE PLIERS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



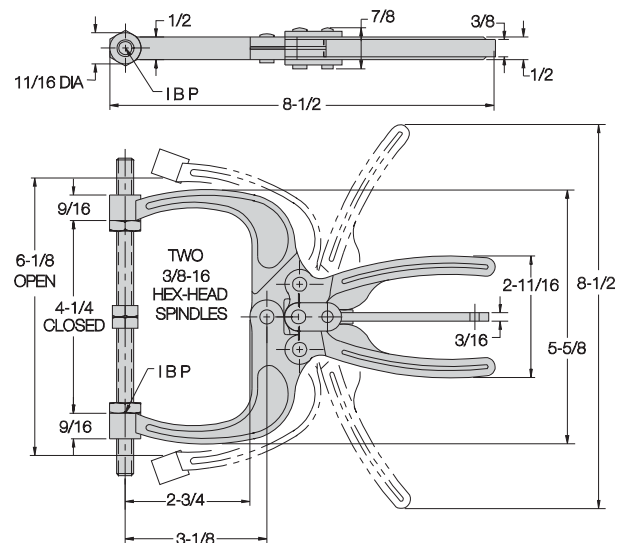
700 lbs

## CL-550-PL

Extra-wide-jaw heavy-duty toggle pliers made of forged steel. 4-1/4-inch jaw width. Two-way quick-release lever for easy opening. Supplied with (2) 3/8-16 hex-head spindles CL-38314-SA. Shipping weight 1.6 lbs.

**Holding capacity:**

**700 lbs**



# TOGGLE PLIERS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



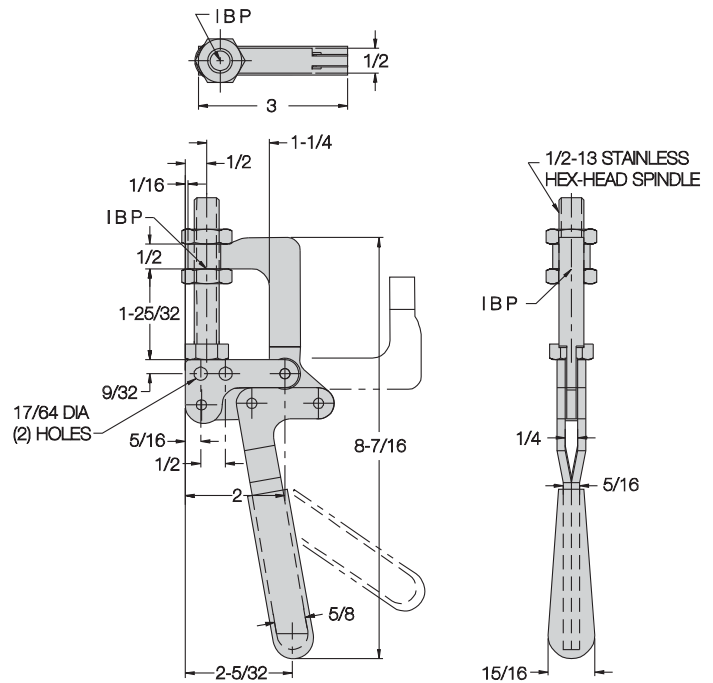
800 lbs  
Stainless

## CL-325-PL-S

Handy weld-on/bolt-on stainless steel clamp for holding down lids, covers, etc. Clamping jaw opens a full 90° for extra clearance, while handle moves 50°. Supplied with 1/2-13 stainless hex-head spindle CL-12234-SA-S. Shipping weight 1.0 lbs.

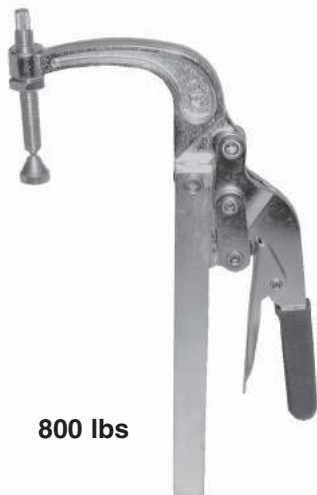
Holding capacity:

800 lbs



# TOGGLE PLIERS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



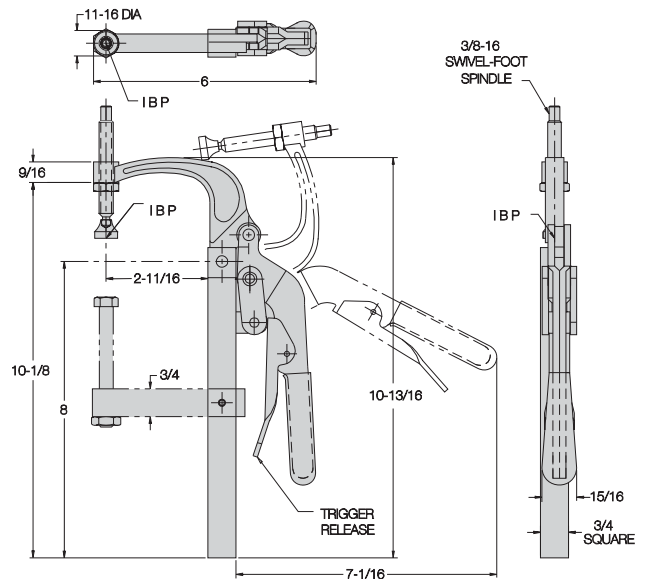
800 lbs

## CL-345-PL

Multi-purpose bar clamp with forged steel clamping jaw. Order with optional lower jaw CL-345-PLA, or attach bar by welding. Jaw opens 84° while handle moves 60°. Supplied with 3/8-16 swivel-foot spindle CL-38314-SF. Shipping weight 2.7 lbs.

Holding capacity:

800 lbs



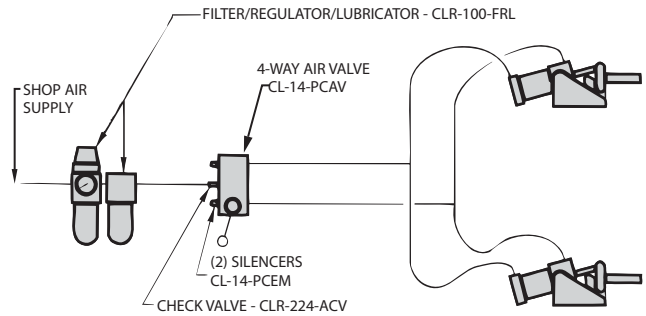
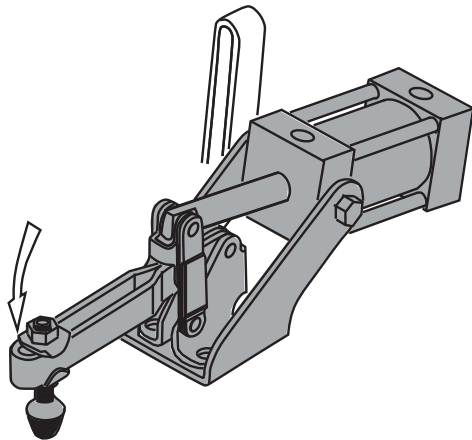
Optional lower jaw . . .



CL-345-PLA

1  
1

# AIR-POWERED CLAMPS



All Carr Lane Manufacturing toggle clamps are DFARS and RoHS compliant.



100 lbs



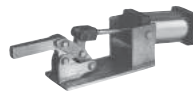
200 lbs



500 lbs



1000 lbs



5000 lbs

## Toggle Hold-Down Clamps pp. 492-496

Similar to a vertical-handle hold-down clamp, except linkage is operated by a double-acting air cylinder instead of by hand. Toggle linkage provides high holding capacity and insures positive mechanical locking even if air pressure fails.



100 lbs



850 lbs

## Toggle Push Clamps pp. 497-498

Similar to a manual plunger clamp, except linkage is operated by a double-acting air cylinder instead of by hand. Toggle linkage provides high holding capacity and insures positive mechanical locking even if air pressure fails.



14 lbs



25 lbs



66 lbs



100 lbs



165 lbs



277 lbs

## Swing Clamps pp. 595-596

Hold-down clamp with a clamping arm that rotates 90° for clear loading. Sturdy helical-cam mechanism first rotates arm, then clamps down. Double acting.



Clamping  
Valves



Check  
Valves



Exhaust  
Mufflers



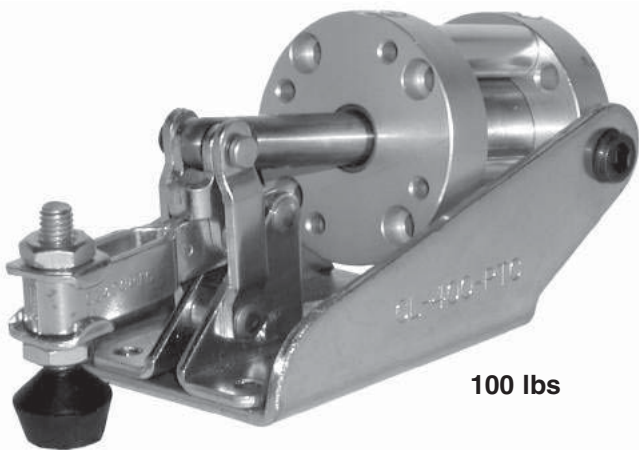
Air  
Fittings

## Air Accessories p. 499

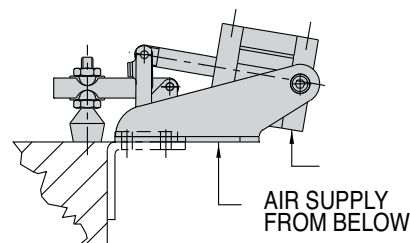
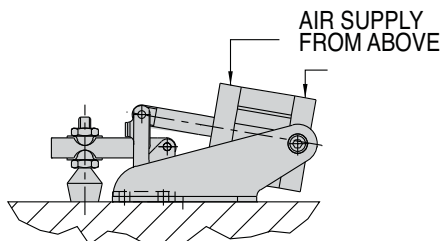
Complete selection of accessories including clamping valves, check valves, exhaust mufflers, and air fittings.

# AIR-POWERED TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



100 lbs

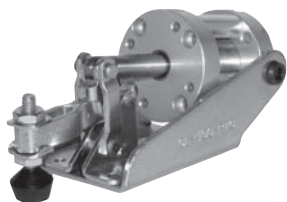


## CL-400-PTC

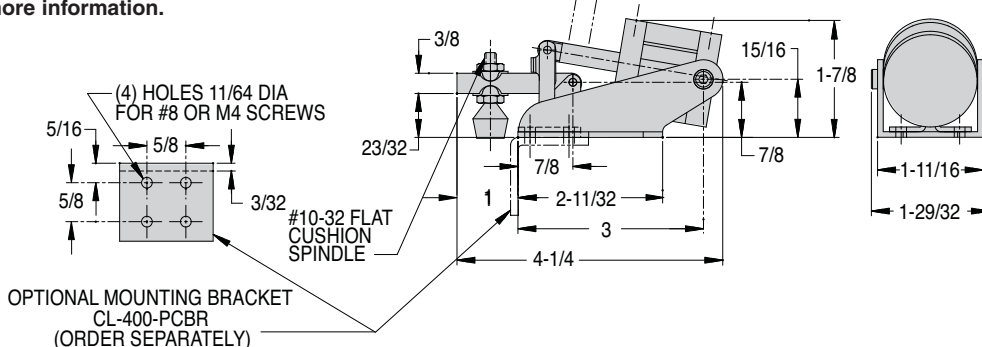
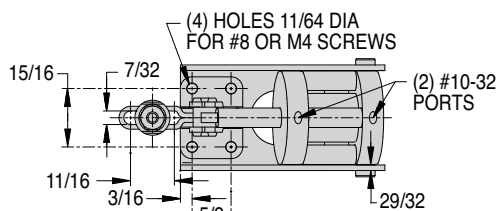
Super-compact hold-down clamp for applications where space is at a premium. Open arm allows spindle adjustment. Toggle linkage provides high holding capacity and insures positive mechanical locking even if air pressure fails. Arm opens 100°. 3/4"-bore double-acting air cylinder with #10-32 ports (**INFO+**: see page 499 to order fittings). Supplied with #10-32 flat-cushion spindle CL-316112-FC and (2) CL-3166-TW flanged washers. 100-psi maximum input air pressure. Shipping weight 0.8 lbs. An optional bracket for side mounting is also available (CL-400-PCBR).

**Holding capacity:** 100 lbs  
**Clamping force at 100 psi, at center of arm:** 100 lbs

Also available with position sensing...

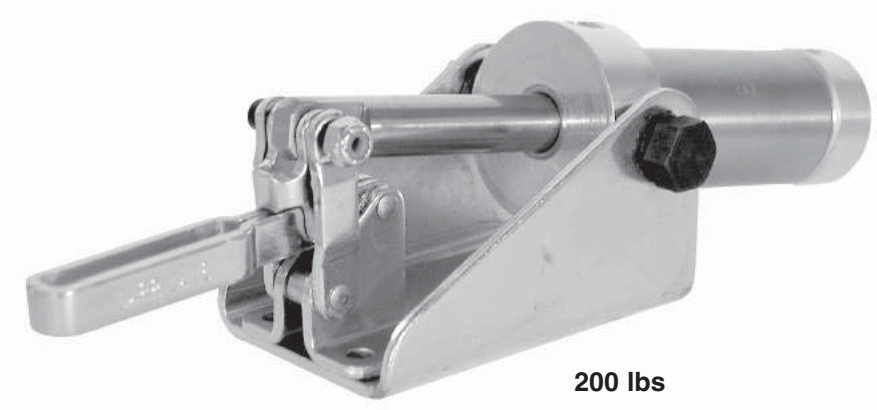


Please see our web catalog for more information.



# AIR-POWERED TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



200 lbs

## CL-500-PTC

Small-yet-powerful hold-down clamp with a long open arm. Toggle linkage provides high holding capacity and insures positive mechanical locking even if air pressure fails. Arm opens 100°. 1-1/4"-bore double-acting air cylinder with 1/8-NPT ports. Accepts any 1/4-20 short spindle and (2) CL-148-TW flanged washers. **INFO+**: See pages 500-504 to order. 100-psi maximum input air pressure. Shipping weight 2.5 lbs.

**Holding capacity:**

200 lbs

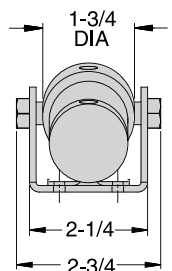
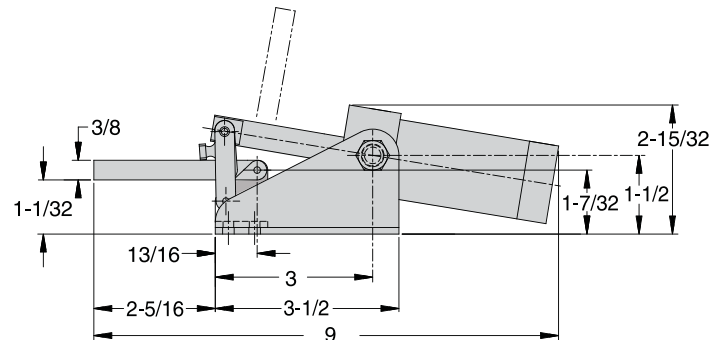
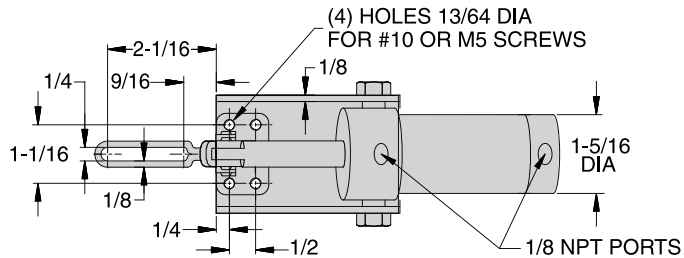
**Clamping force at 100 psi, at center of arm:**

200 lbs

Also available with position sensing:

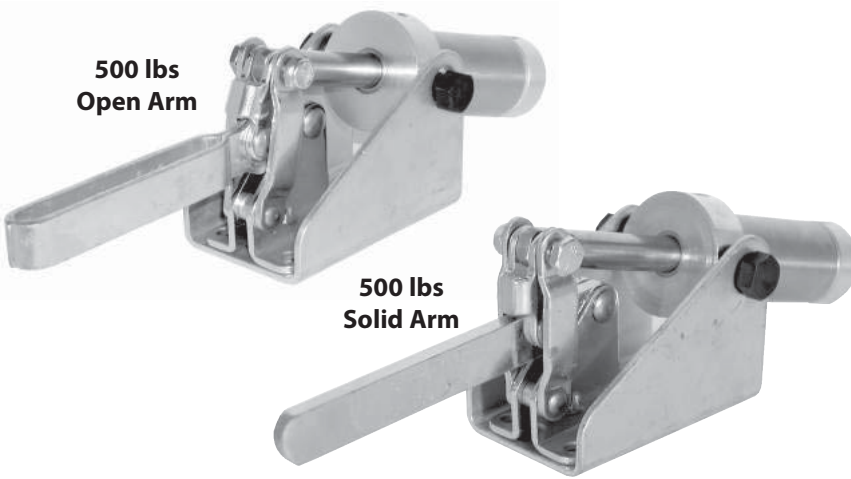


Please see our web catalog for more information.



# AIR-POWERED TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



## CL-1000-PTC CL-1001-PTC

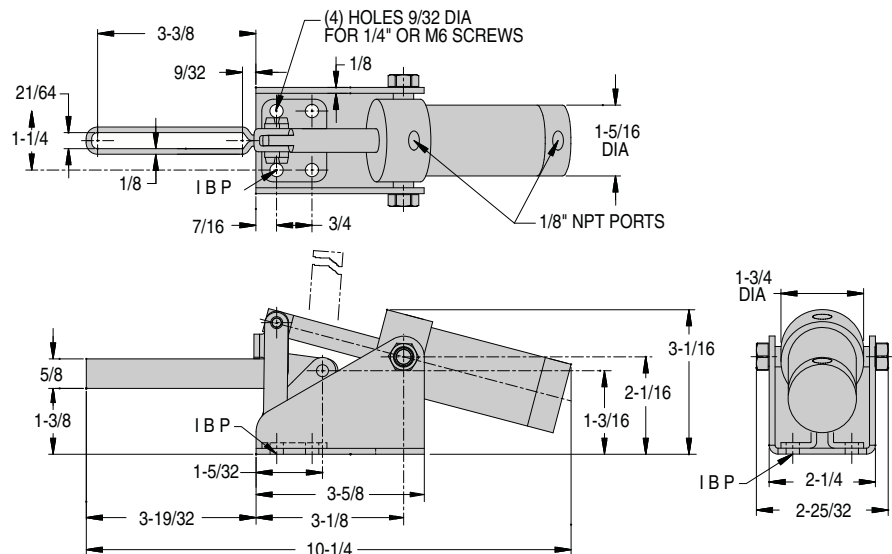
Popular medium-size hold-down clamp available with a solid arm, or an open arm for spindle adjustment. Toggle linkage provides high holding capacity and insures positive mechanical locking even if air pressure fails. Arm opens 92°. 1-1/4"-bore double-acting air cylinder with 1/8"-NPT ports. Accepts any 5/16-18 short spindle and (2) CL-51610-TW flanged washers. **INFO+**: See pages 500-504 to order. Solid-arm version accepts a CL-518000-BR bolt retainer. 100-psi maximum input air pressure. Shipping weight 3.0 lbs.

**Holding capacity:** 500 lbs  
**Clamping force at 100 psi, at center of arm:** 390 lbs

Also available with position sensing:



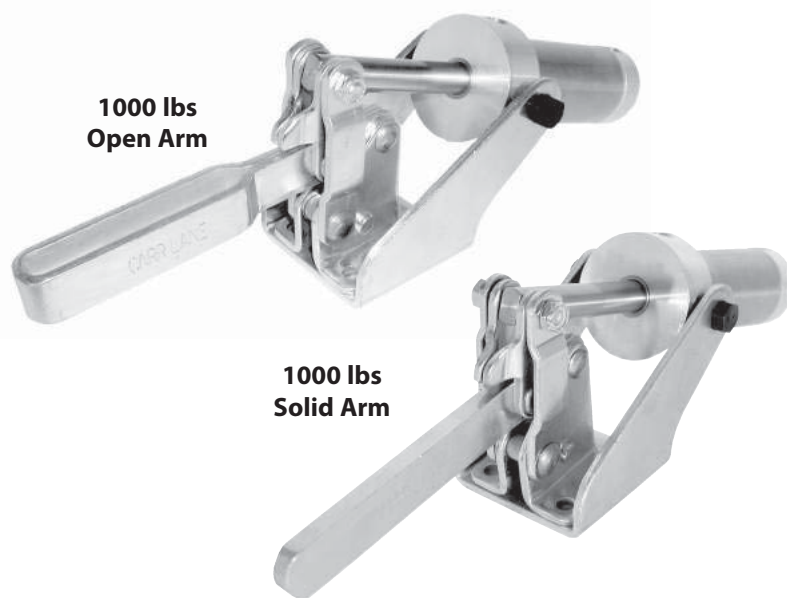
Please see our web catalog for more information.





# AIR-POWERED TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



## CL-2000-PTC CL-2001-PTC

Open Arm  
Solid Arm

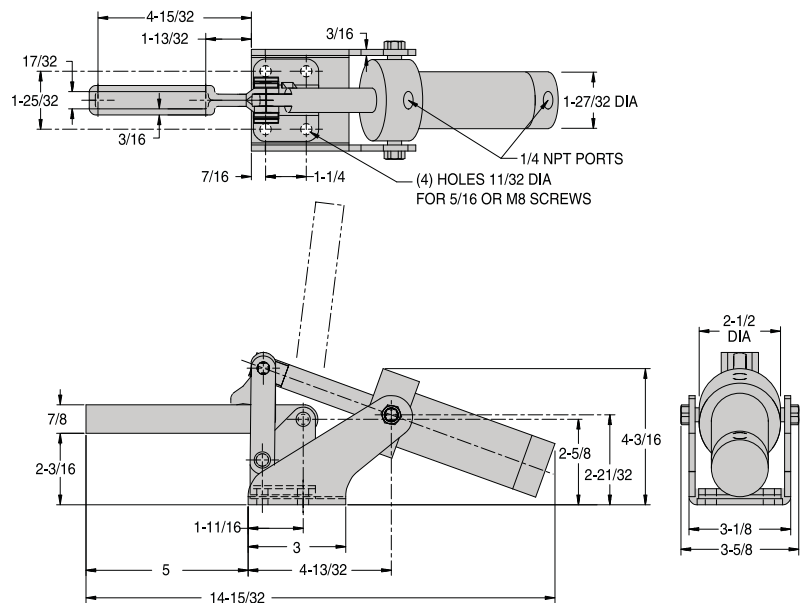
Extra-large hold-down clamp available with a solid arm, or an open arm for spindle adjustment. Toggle linkage provides high holding capacity and insures positive mechanical locking even if air pressure fails. Arm opens 83°. 1-3/4" bore double-acting air cylinder with 1/4-NPT ports. Accepts any 1/2-13 spindle and (2) CL-1213-TW flanged washers. **INFO+**: See pages 500-504 to order. Solid-arm version accepts a CL-113000-BR bolt retainer. 100 psi maximum input air pressure. Shipping weight 6.0 lbs.

**Holding capacity:** 1000 lbs  
**Clamping force at 100 psi, at center of arm** 680 lbs

Also available with position sensing:

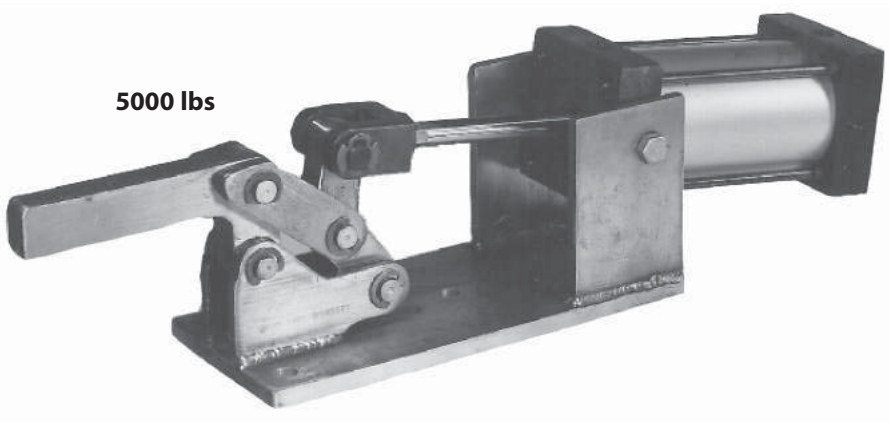


Please see our web catalog for more information.



# AIR-POWERED TOGGLE CLAMPS

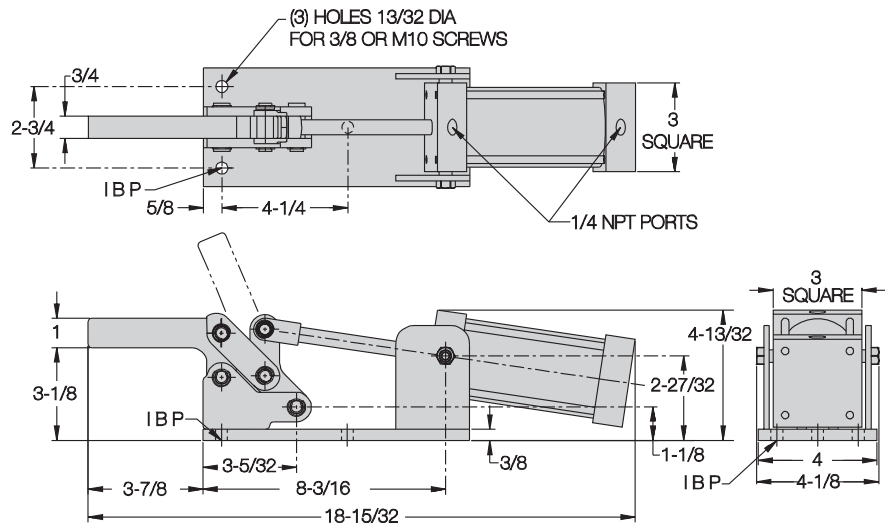
INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



## CL-3000-PTC

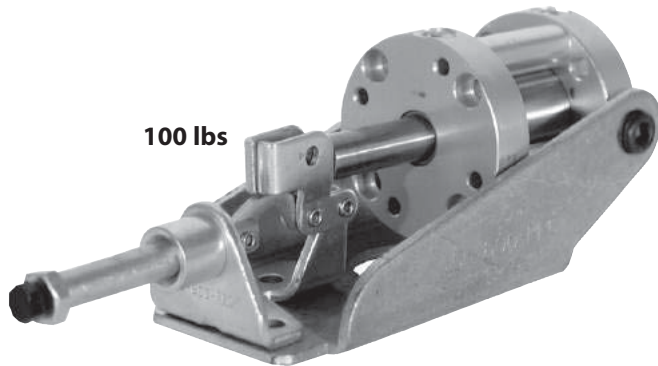
Heavy-duty hold-down clamp with a solid forged steel clamping arm. Toggle linkage provides high holding capacity and insures positive mechanical locking even if air pressure fails. Arm opens 83°. 2-1/2"-bore double-acting air cylinder with 1/4-NPT ports. 150-psi maximum input air pressure. Shipping weight 15.0 lbs.

**Holding capacity:** 5000 lbs  
**Clamping force at 100 psi, at center of arm:** 1600 lbs

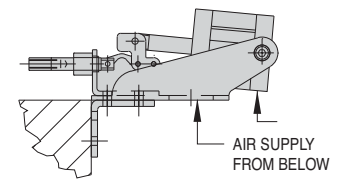
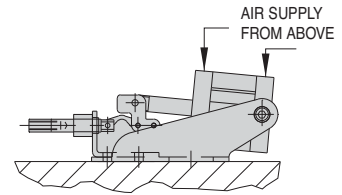


# AIR-POWERED TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



100 lbs



## CL-600-PPC

Super-compact plunger clamp. Toggle linkage provides high holding capacity and insures positive mechanical locking even if air pressure fails. 7/16" plunger travel. 3/4"-bore double-acting air cylinder with #10-32 ports (see page 501 to order fittings). Supplied with #8-32 nylon hex-head spindle CL-832203-SA. 100-psi maximum input air pressure. Shipping weight 0.8 lbs. An optional bracket for side mounting is also available (CL-400-PCBR).

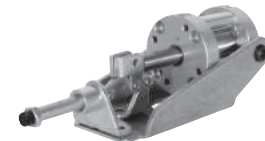
**Holding capacity:**

**100 lbs**

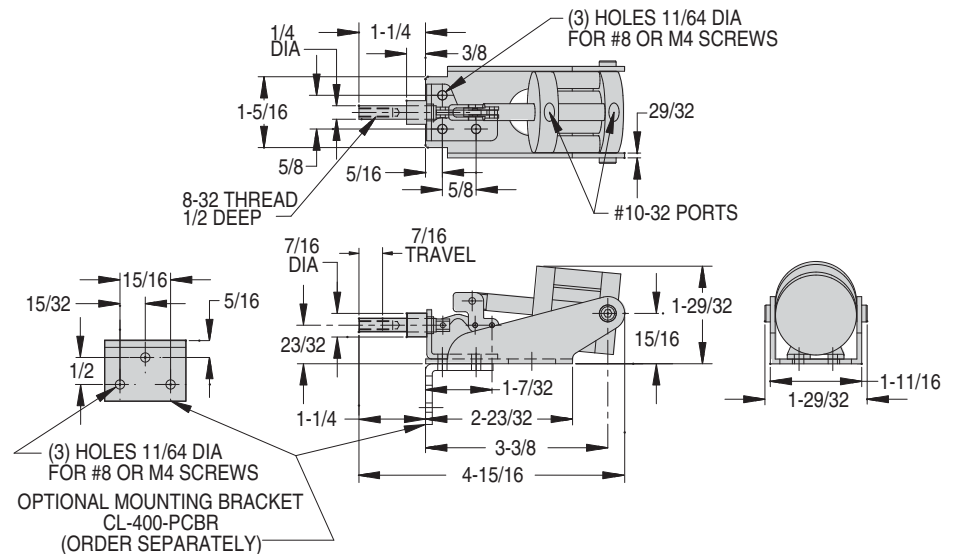
**Clamping force at 100 psi:**

**100 lbs**

Also available with position sensing...



Please see our web catalog for more information.



# AIR-POWERED TOGGLE CLAMPS

INFO+: SEE PAGE 422 FOR MATERIAL SPECIFICATIONS



## CL-1500-PPC

Larger-size plunger clamp. Toggle linkage provides high holding capacity and insures positive mechanical locking even if air pressure fails. 1" plunger travel. 1-1/4" bore double-acting air cylinder with 1/8-NPT ports. Accepts any 3/8-16 spindle. **INFO+**: See pages 500-503 to order. 100-psi maximum input air pressure. Shipping weight 3.2 lbs.

**Holding capacity:**

**850 lbs**

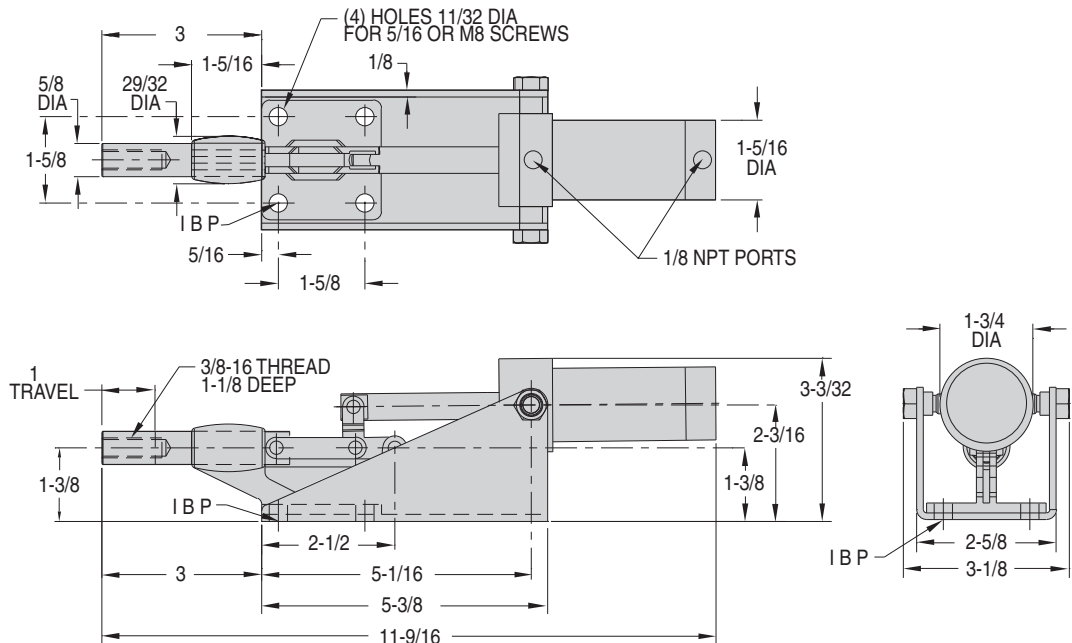
**Clamping force at 100 psi:**

**430 lbs**

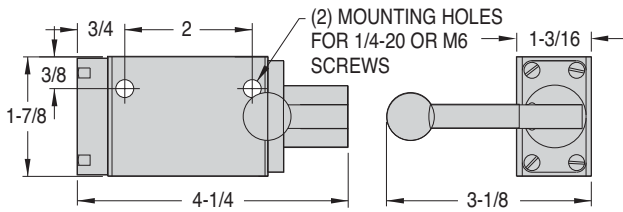
Also available with position sensing:



Please see our web catalog for more information.



# CLAMPING VALVES\*



**CL-14-PCAV**

Versatile two-position, four-way valve for simple and convenient clamp control. Five 1/4-NPT ports. 150 psi maximum pressure.

# CHECK VALVES\*



**CLR-224-ACV**

Allows air to flow in one direction only. 1/4-NPT male x 2.

# EXHAUST MUFFLERS\*



**CL-14-PCEM**

Durable, compact, sintered-bronze exhaust muffler. 1/4-NPT male.

# AIR FITTINGS\*

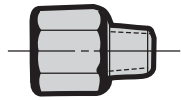
## Quick-Disconnect Coupler



**CL-14-PCQD**

Both halves, 1/4-NPT female  
**CL-14-PCQDS**  
 Female socket, 1/4-NPT female  
**CL-14-PCQDP**  
 Male plug, 1/4-NPT female  
 (Industrial Interchange)

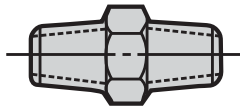
## Adapter



**CL-1014-PCA**

#10-32 female x 1/4-NPT male  
**CL-1418-PCA**  
 1/4-NPT female x 1/8-NPT male  
**CL-3814-PCA**  
 3/8-NPT female x 1/4-NPT male

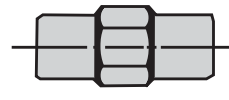
## Hex Nipple



**CL-10-PCHN**

#10-32 male x 2  
**CL-14-PCHN**  
 1/4-NPT male x 2  
**CL-38-PCHN**  
 3/8-NPT male x 2  
**CL-3814-PCHN**  
 3/8-NPT male x 1/4-NPT male

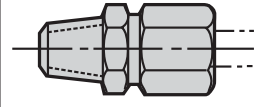
## Coupling



**CL-10-PCCP**

#10-32 female x 2  
**CL-14-PCCP**  
 1/4-NPT female x 2

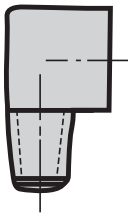
## Tubing Connector



**CL-1810-PCTC**

1/8-OD tube x #10-32 male  
**CL-14-PCTC**  
 1/4-OD tube x 1/4-NPT male  
 (Includes compression sleeve and nut)

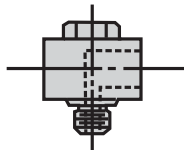
## Street Elbow



**CL-14-PCSE**

1/4-NPT  
 Female x 1/4-NPT male

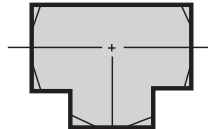
## Banjo Elbow



**CL-10-PCBE**

#10-32 female x #10-32 male

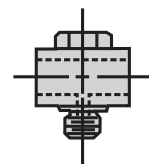
## Tee



**CL-10-PCTE**

#10-32 female x 3  
**CL-14-PCTE**  
 1/4-NPT female x 3

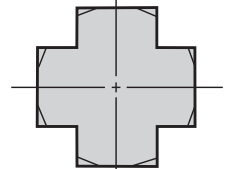
## Branch Tee



**CL-10-PCBT**

#10-32 female x 2,  
 #10-32 male

## Cross



**CL-14-PCCR**

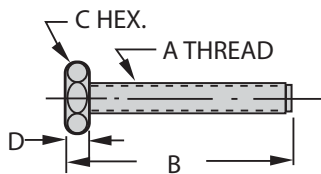
1/4-NPT female x 4

\* Do not use in high-pressure hydraulic lines.

# HEX-HEAD SPINDLES



Simple spindle design provides maximum clamping force. Fully threaded for maximum adjustment range. Assembly includes two jam nuts. Available in thread sizes from #8-32 to 5/8-11 (M4 to M16 in metric).



## STEEL (INCH)

PART NO.	A	B	C	D
CL-316112-SA	#10-32	1-3/8	5/16	1/8
CL-14112-SA	1/4-20	1-11/16	7/16	3/16
CL-14200-SA		2-3/16		
CL-516212-SA	5/16-18	2-11/16	1/2	3/16
CL-38314-SA	3/8-16	3-1/4	9/16	1/4
CL-12314-SA	1/2-13	3-5/16	3/4	5/16
CL-58438-SA	5/8-11	4-3/8	15/16	3/8

## VINYL-DIPPED STEEL (INCH)

CL-832208-FC	#8-32	1-3/16	1/4	1/8
CL-14100-SA	1/4-20	1	7/16	3/16
CL-14208-SA		1-1/2		

## STAINLESS STEEL (INCH)

CL-83234-SA-S	#8-32	7/8	1/4	1/8
CL-832203-SA-S		1-1/8		
CL-316100-SA-S	#10-32	1-1/8	5/16	1/8
CL-14112-SA-S	1/4-20	1-11/16	7/16	3/16
CL-516200-SA-S	5/16-18	1-15/16	1/2	3/16
CL-516212-SA-S		2-11/16		
CL-38212-SA-S	3/8-16	2-1/2	9/16	1/4
CL-38314-SA-S		3-1/4		
CL-12234-SA-S	1/2-13	2-13/16	3/4	5/16

## NYLON (INCH)

CL-832203-SA	#8-32	7/8	1/4	1/8
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## STEEL (METRIC)

PART NO.	A	B	C	D
CLM-530-SA	M5	1.32	8mm	.14
CLM-640-SA	M6	1.75	10mm	.18
CLM-650-SA		2.15		
CLM-850-SA	M8	2.19	13mm	.22
CLM-865-SA		2.78		
CLM-1070-SA	M10	3.03	17mm	.28
CLM-1275-SA	M12	3.27	19mm	.31
CLM-16100-SA	M16	4.33	24mm	.39

## STAINLESS STEEL (METRIC)

CLM-416-SA-S	M4	.75	7mm	.12
CLM-425-SA-S		1.10		
CLM-530-SA-S	M5	1.32	8mm	.14
CLM-640-SA-S	M6	1.75	10mm	.18
CLM-650-SA-S		2.15		
CLM-850-SA-S	M8	2.19	13mm	.22
CLM-865-SA-S		2.78		
CLM-1070-SA-S	M10	3.03	17mm	.28

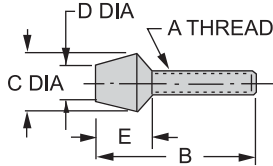
## NYLON (METRIC)

CLM-416-SA	M4	.75	7mm	.12
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# FLAT-CUSHION SPINDLES



This is the standard spindle supplied with most clamps. Molded neoprene tip provides medium clamping force with some compensation for part-size variation. Also provides scratchfree clamping. Neoprene cushion has a durometer hardness of 70 shore A, and an operating temperature range of -40°F to 220°F. Spindle is fully threaded for maximum adjustment range. Assembly includes two jam nuts.



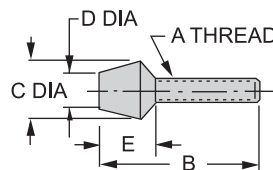
## STEEL (INCH)

PART NO.	A	B	C DIA	D DIA	E
CL-316112-FC	#10-32	1-3/8	9/16	7/16	7/16
CL-14112-FC	1/4-20	1-5/8	5/8	13/32	5/8
CL-14200-FC		2-1/8			
CL-518208-FC	5/16-18	2-1/4	3/4	1/2	3/4
CL-516212-FC		3			
CL-38212-FC	3/8-16	2-1/2	13/16	5/8	7/8
CL-38314-FC		3-1/2			

# FLAT-CUSHION SPINDLES, QUICK ADJUSTING



Same as the Flat-Cushion Spindles above, except with two knurled nuts, instead of hex jam nuts, for convenient hand tightening. Use for quick spindle adjustment in applications where high-torque tightening with a wrench is not required.



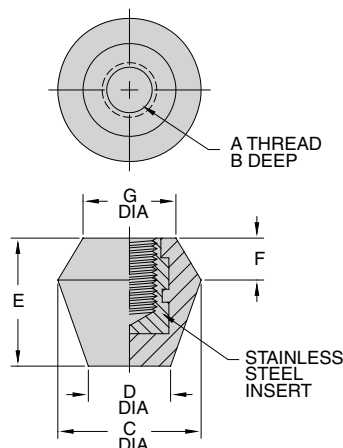
## STEEL (INCH)

PART NO.	A	B	C DIA	D DIA	E
CL-316112-FCQA	#10-32	1-3/8	9/16	7/16	7/16
CL-14112-FCQA	1/4-20	1-5/8	5/8	13/32	5/8
CL-14200-FCQA		2-1/8			
CL-518208-FCQA	5/16-18	2-1/4	3/4	1/2	3/4
CL-516212-FCQA		3			
CL-38212-FCQA	3/8-16	2-1/2	13/16	5/8	7/8
CL-38314-FCQA		3-1/2			

# POLYURETHANE FLAT CUSHIONS



Polyurethane cushions are tougher and slightly harder than standard neoprene cushions. Ideal when greater clamping force is required while still providing scratchfree clamping and some compensation for part-size variation. Molded-in stainless steel insert provides superior thread strength. Ideal for making custom-length Flat Cushion Spindles by inserting a threaded stud. Polyurethane cushion has a hardness 85 Shore A, operating temperature range -90°F to 200°F.



## STAINLESS (INCH)

PART NO.	A	B	C DIA	D DIA	E	F	G DIA
CL-1032-FCP	#10-32	.19	.56	.44	.53	.14	.32
CL-1420-FCP	1/4-20	.30	.63	.47	.63	.22	.38
CL-51618-FCP	5/16-18	.33	.75	.50	.75	.21	.46
CL-3816-FCP	3/8-16	.38	.81	.63	.88	.21	.52

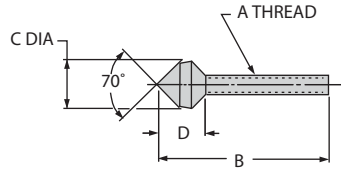
## STAINLESS (METRIC)

CLM-5-FCP	M5	.19	.56	.44	.53	.14	.32
CLM-6-FCP	M6	.24	.63	.47	.63	.22	.38
CLM-8-FCP	M8	.30	.75	.50	.75	.21	.46
CLM-10-FCP	M10	.35	.81	.63	.88	.21	.52

# CONE-CUSHION SPINDLES



Excellent for clamping into drilled holes, slots, or corners. Molded neoprene tip provides medium clamping force with some compensation for part-size variation. Also provides scratchfree clamping. Neoprene cushion has a durometer hardness of 70 shore A, and an operating temperature range of -40°F to 220°F. Spindle is fully threaded for maximum adjustment range. Assembly includes two jam nuts.



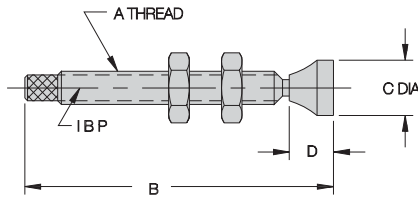
## STEEL (INCH)

PART NO.	A	B	C DIA	D
CL-316112-CC	#10-32	1-3/8	9/16	7/16
CL-14112-CC	1/4-20	1-5/8	5/8	5/8
CL-14200-CC		2-1/8		5/8
CL-516212-CC	5/16-18	3	3/4	3/4
CL-38314-CC	3/8-16	3-1/2	13/16	7/8

# SWIVEL-FOOT SPINDLES



Swivel foot provides full contact on uneven or sloped surfaces. Assembly includes two jam nuts.



## STEEL (INCH)

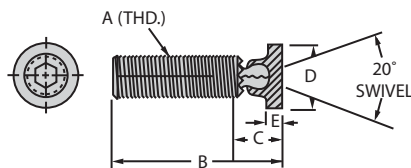
PART NO.	A	B	C DIA	D
CL-14112-SF	1/4-20	1-3/4	1/2	3/8
CL-14200-SF		2-1/4		
CL-516212-SF	5/16-18	2-3/4	9/16	7/16
CL-38314-SF	3/8-16	3-1/2	5/8	1/2

# SWIVEL SCREW CLAMPS

1  
1



Screw clamp with patented removable, interchangeable swivel foot, available in many sizes and varieties. Add "N" to part no. for Delrin foot, e.g. CL-23-SSCN. **INFO+**: See pages 99-100 for additional lengths and foot options. Order two jam nuts separately.



## STEEL (INCH)

PART NO.	JAM NUT PART NO. (2 REQD)	A	B	C	D DIA	E
CL-23-SSC	CL-4-JN	1/4-20	1-19/32	23/64	3/8	1/8
CL-27-SSC	CL-5-JN	5/16-18	2-3/32	27/64	1/2	5/32
CL-43-SSC	CL-6-JN	3/8-16	3-1/8	1/2	9/16	3/16
CL-44-SSC	CL-8-JN	1/2-13	4-1/16	17/32	3/4	3/16
CL-46-SSC	CL-10-JN	5/8-11	5-3/64	21/32	15/16	7/32

## STEEL (METRIC)

CLM-23-SSC	CLM-6-JN	M6	1.67	.36	3/8	1/8
CLM-27-SSC	CLM-8-JN	M8	2.06	.42	1/2	5/32
CLM-32-SSC	CLM-10-JN	M10	3.08	.62	9/16	3/16
CLM-36-SSC	CLM-12-JN	M12	4.00	.53	3/4	3/16
CLM-40-SSC	CLM-16-JN	M16	4.97	.66	15/16	7/32

## STAINLESS STEEL (INCH)

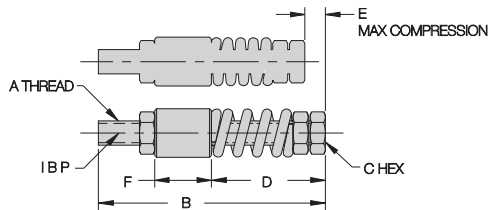
CL-23-SSC-S	CL-4-JN-S	1/4-20	1-19/32	23/64	3/8	1/8
CL-27-SSC-S	CL-5-JN-S	5/16-18	2-3/32	27/64	1/2	5/32
CL-43-SSC-S	CL-6-JN-S	3/8-16	3-1/8	1/2	9/16	3/16



# SPRING-LOADED SPINDLES



Clamps with strong spring force to compensate for varying part thicknesses. Excellent for clamping castings that vary slightly in size. To install, weld bolt retainer to clamping arm. Assembly includes two jam nuts, a die spring, and a bolt retainer.

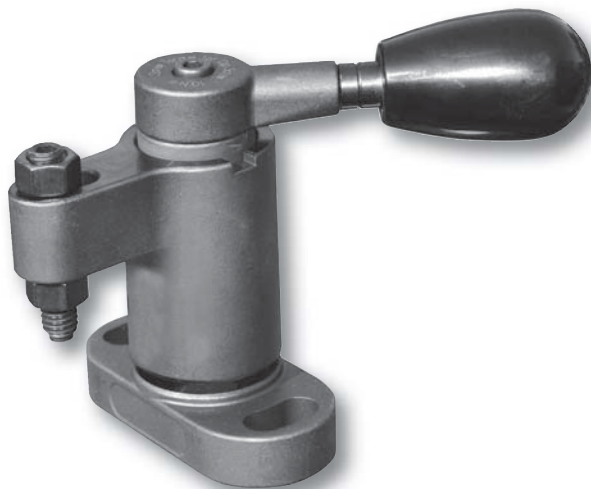


## STEEL (INCH)

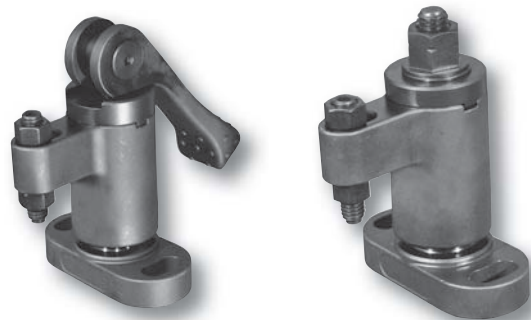
PART NO.	A	B	C	D		E	FORCE AT "E" (lbs)	F
				MIN	MAX			
CL-14200-SL	1/4-20	2-1/4	7/16	1-9/32	1-3/8	1/4	50	5/8
CL-516212-SL	5/16-18	2-3/4	1/2	1-11/16	1-7/8	1/4	100	5/8
CL-38314-SL	3/8-16	3-1/2	9/16	1-3/4	2-9/32	5/16	200	7/8

# One-Touch Swing Clamps

## Quick Acting, Simple And Cost Effective



- Simply rotate the clamp into position, then clamp down in one continuous motion
- Available in four sizes each of three styles: horizontal cam, vertical cam, or hex drive



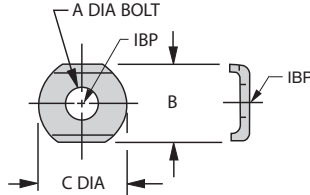
See Pages 255-257

# FLANGED WASHERS



Two flanged washers required per clamp

For open-arm clamps. Use two flanged washers to mount spindle, one above the arm and one below.



## STEEL

PART NO.	A	B	C DIA
CL-832-TW	#8-32 or M4	7/16	15/32
CL-3166-TW	#10-32 or M5	1/2	9/16
CL-147-TW	1/4-20 or M6	9/16	5/8
CL-148-TW		19/32	11/16
CL-51610-TW	5/16-18 or M8	3/4	7/8
CL-3811-TW	3/8-16 or M10	15/16	1
CL-1213-TW	1/2-13 or M12	1-5/32	1-1/4
CL-5811-TW	5/8-11 or M16	1-3/8	1-15/32

## STAINLESS STEEL

PART NO.	A	B	C DIA
CL-832-TW-S	#8-32 or M4	7/16	15/32
CL-3166-TW-S	#10-32 or M5	1/2	9/16
CL-147-TW-S	1/4-20 or M6	9/16	5/8
CL-148-TW-S		19/32	11/16
CL-51610-TW-S	5/16-18 or M8	3/4	7/8
CL-3811-TW-S	3/8-16 or M10	15/16	1

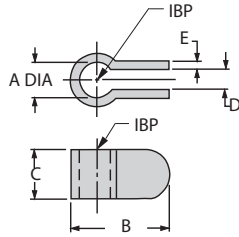
# BOLT RETAINERS



BR  
For VTC clamps



S  
For TC clamps



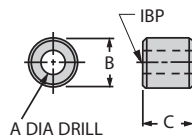
## BR (FOR HTC & VTC CLAMPS)

PART NO.	SPINDLE SIZE	A DIA	B	C	D	E
CL-142000-BR	1/4-20 or M6	9/32	1-1/4	1/2	3/16	3/32
CL-518000-BR	5/16-18 or M8	21/64	1-1/4	5/8	1/4	3/32
CL-316000-BR	3/8-16 or M10	17/32	1-1/2	3/4	5/16	1/8
CL-113000-BR	1/2-13 or M12	9/16	1-5/8	7/8	3/8	1/8
CL-511000-BR	5/8-11 or M16	11/16	1-7/8	1-1/4	3/8	1/8

## S (FOR TC CLAMPS)

PART NO.	SPINDLE SIZE	A DIA	B DIA	C
CL-1458-S	1/4-20 or M6	.257	5/8	5/8
CL-51658-S	5/16-18 or M8	.316	5/8	5/8
CL-3878-S	3/8-16 or M10	.397	3/4	7/8

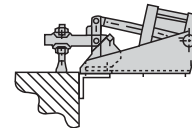
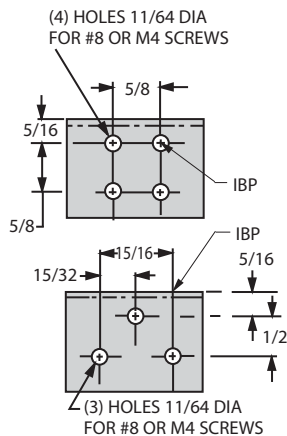
For solid-arm clamps. Weld on bolt retainer at desired arm length and spindle angle.



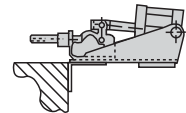
# MOUNTING BRACKETS



Handy bracket for side-mounting small clamps. One reversible bracket fits several clamps.



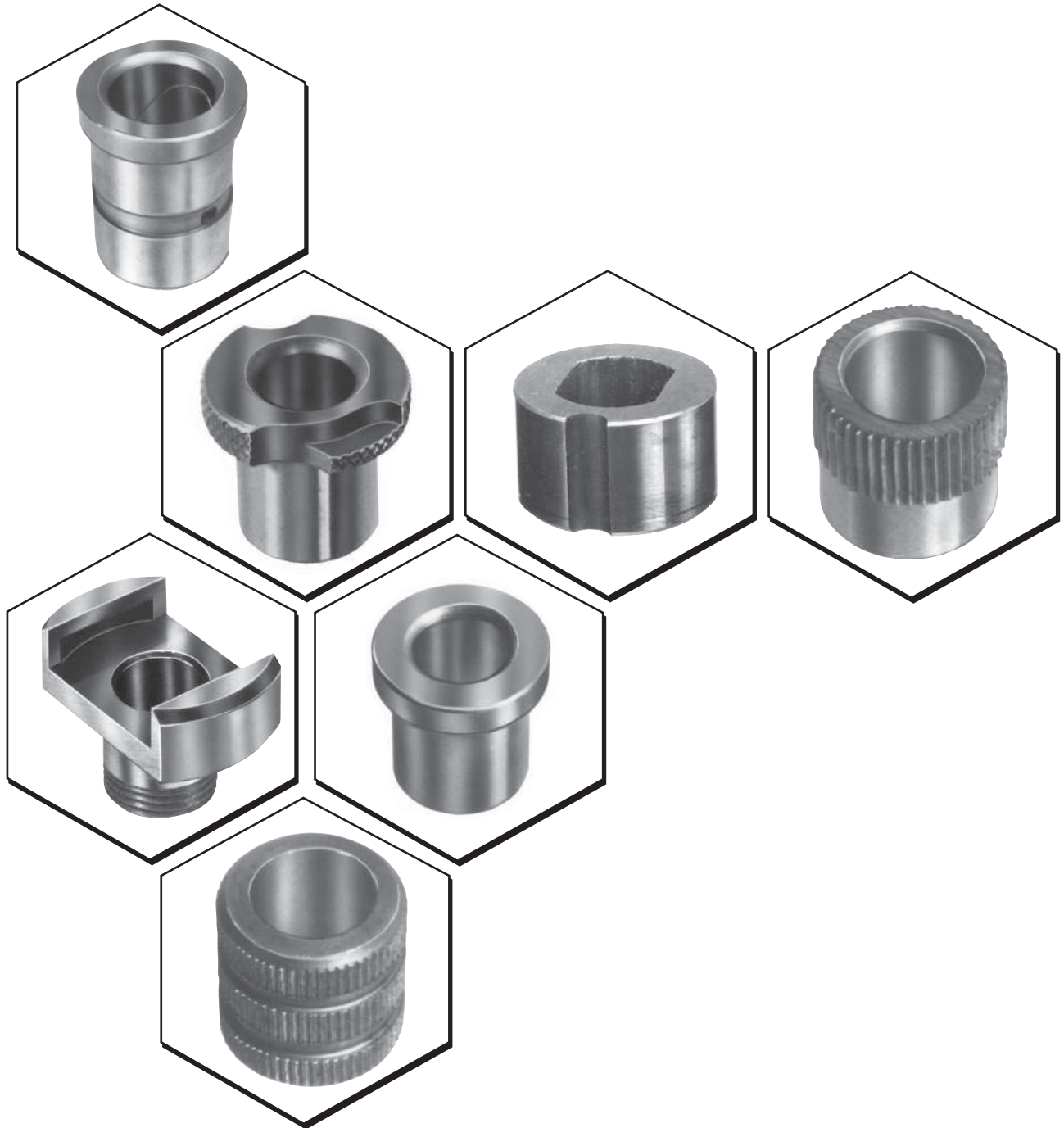
Downholding



Push/Pull

PART NO.	FITS DOWNHOLDING CLAMPS	FITS PUSH CLAMPS
CL-400-PCBR	CL-150-VTC	CL-50-SPC
	CL-400-PTC	CL-600-PPC

# PRECISION DRILL JIG BUSHINGS



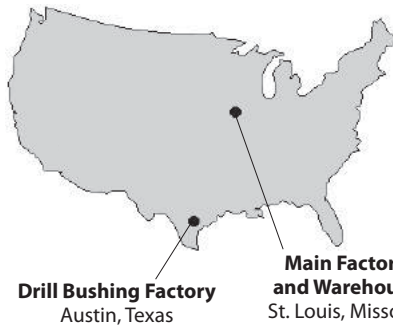
# WHAT MAKES A CARR LANE MANUFACTURING DRILL BUSHING BETTER?

## 1 TOP QUALITY



Carr Lane Manufacturing drill bushings are all precision honed and ground, the finest quality available. They exceed all ANSI drill-bushing standards. Unlike some of our competitors, we manufacture only first-quality drill bushings, never "economy grade."

## 2 FAST DELIVERY



Our nationwide network of stocking distributors, plus huge inventories at two warehouse locations, guarantees same-day shipment for standard bushings. In addition, our quick-response manufacturing capabilities allow us to ship almost all special and modified bushings in less than 10 days.






















## 3 ECONOMICAL PRICES



As you expect with all Carr Lane Manufacturing products, our drill-bushing prices are the most competitive around. Our production volumes and advanced manufacturing techniques mean excellent value for you.

# INDEX

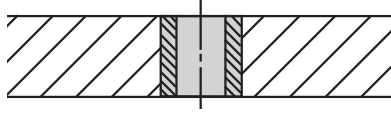
Bushing Selection ..... pp. 508-509  
 Installation and Technical Data ..... pp. 510-511  
 Counterbore Data ..... p. 512

	<b>P</b> Press Fit pp. 513-524		<b>H</b> Head Press Fit pp. 518-522		<b>SP</b> Serrated Press Fit pp. 523-524
	<b>SF</b> Slip/Fixed Renewable pp. 525-529		<b>FM</b> Flat Milled Renewable pp. 530-531		<b>L</b> Liner pp. 532-534
	<b>HL</b> Head Liner pp. 535-536		<b>UL</b> Locking Liner p. 537		Lockscrews and Clamps pp. 538-539
	<b>CH</b> Chip Breaker pp. 540-541		<b>DC</b> Directed Coolant pp. 542-543		Oil Groove pp. 544-546
	<b>DG</b> Diamond Groove pp. 547-548		<b>SG</b> Serrata Groove p. 549		<b>ULD</b> Diamond Knurl Locking Liner p. 550
	<b>EZ</b> EZ Cast p. 551		<b>TB</b> Template pp. 552-555		<b>GD</b> Gun Drill pp. 556-558
	<b>CB</b> Circuit Board (Please see our web catalog)		<b>A</b> Air Feed pp. 559-569		Air-Feed Accessories pp. 570-573

# BUSHING SELECTION

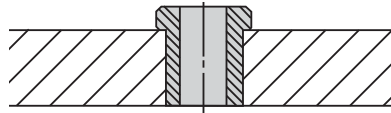
USA				METRIC			
<b>P</b> - <b>20</b> - <b>8</b> - <b>.1250</b>				<b>PM</b> - <b>8</b> - <b>12</b> - <b>4.50</b>			
Type	OD in 64ths of an inch	Length in 16ths of an inch	ID as 4-place decimal inch	Type	OD in mm	Length in mm	ID as 2-place decimal mm

## PRESS FIT:



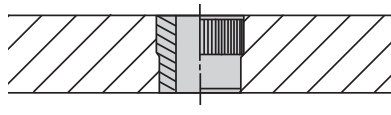
Types **P**, **PC** (carbide), and **PM** (metric). This is the most-popular and least-expensive drill bushing. P bushings are permanently pressed into the jig plate, usually flush with the top surface. They are generally used for single-step drilling or reaming operations when you do not expect to replace bushings during the tooling's lifetime. P bushings can be mounted closer together than headed bushings, but offer less resistance to heavy axial loads.

## HEAD PRESS FIT:



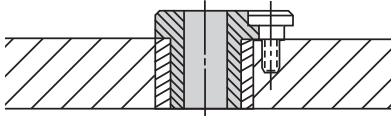
Types **H**, **HC** (carbide), and **HM** (metric). Similar to a P bushing, but with a head to resist heavy axial loads. H bushings are permanently pressed into the jig plate. They are generally used for single-step drilling or reaming operations when you do not expect to replace bushings during the tooling's lifetime. The head can be left exposed, or recessed by counterboring the installation hole. Note: The "length" listed for a USA head-press-fit bushing refers to its length under the head, while the metric version's "length" is its overall length.

## SERRATED PRESS FIT:



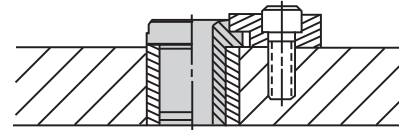
Types **SP** and **SPM** (metric). Similar to a P bushing, but with top serrations to prevent rotation in soft materials. Recommended in high-torque situations for materials such as magnesium, aluminum, masonite, or wood. Finish-ground OD ensures accurate ID location. Serrations also resist axial force to prevent pushing the bushing through the jig plate.

## SLIP/FIXED RENEWABLE:



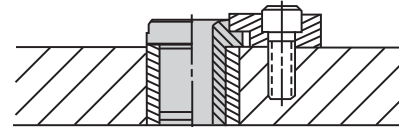
Types **SF**, **SFC** (carbide), and **SFM** (metric). Replaceable bushing generally used with a liner bushing and lockscrew. Use when you expect to replace bushings during the tooling's lifetime, or when you want to switch bushings to perform multi-step operations with the same tooling. SF bushings combine the benefits of older S-type slip-renewable and F-type fixed-renewable bushings: One side has a small recess for fixed mounting; the other has a locking recess that allows the bushing to slip down, then lock in place by rotating it. S and F types are now obsolete and combination SF bushings will be furnished at no extra charge.

## FLAT MILLED RENEWABLE:



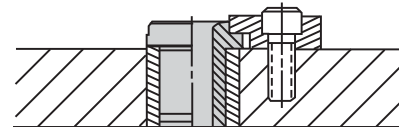
Types **FM** and **FMC** (carbide). Replaceable bushing used for extra resistance to rotational forces under harsh conditions. This bushing, generally used with a liner, has a milled locking flat to allow fastening securely with a flat clamp. FM bushings also have a standard recess on the other side to allow using a lockscrew instead.

## LINER:



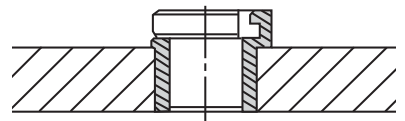
Types **L** and **PM** (metric). Liners are permanent bushings used to hold renewable drill bushings. The liner's ID has a precise sliding fit with the renewable bushing's OD. The hardened liner accurately locates the renewable bushing and protects the jig plate from wear caused by frequent bushing replacement. Note: Metric liner bushings are the same as metric press-fit bushings.

## HEAD LINER:



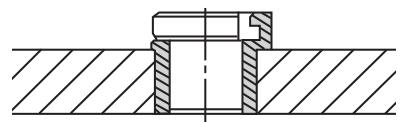
Types **HL** and **HM** (metric). Similar to an L bushing, but with a head to resist heavy axial loads. Head liners are permanent bushings used to hold renewable drill bushings. The head liner's ID has a precise sliding fit with the renewable bushing's OD. The hardened head liner accurately locates the renewable bushing and protects the jig plate from wear caused by frequent bushing replacement. Note: The "length" listed for a head liner refers to its overall length, not its length under the head. Metric head-liner bushings are the same as metric head-press-fit bushings.

## UN-A-LOK™ LINER:



Types **UL** and **ULM** (metric). Similar to an HL head liner, but incorporating a special locking tab that eliminates the need for a lockscrew. Un-A-Lok liners are permanent bushings used to hold SF renewable drill bushings (on the "slip" side only, not the "fixed" side). Although slightly more expensive than a head liner plus a lock screw, installation time is dramatically reduced.

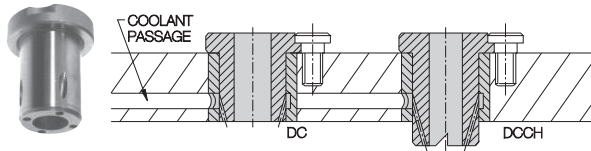
## CHIP BREAKER:



Types **CH** and **CHM** (metric). Similar to an SF renewable bushing, but with specially designed chip-breaking notches on the drill-exit end. Use to break up chips from tough, stringy materials, to reduce friction and heat buildup. Reduces bushing wear at the drill-exit end and reduces the chance of tool or workpiece damage. A chip-breaker bushing should extend beyond its liner to allow chips to escape. Chip breakers are also available on other bushing types such as P, H, and DC.

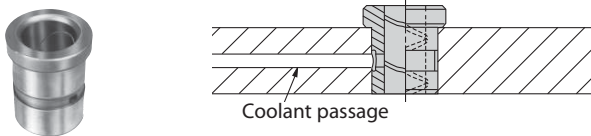
# BUSHING SELECTION

## DIRECTED COOLANT:



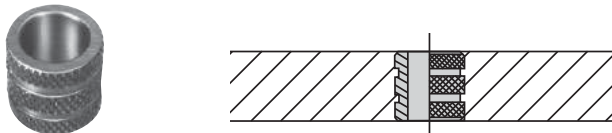
Types **DC**, **DCCH** (chip breaker), **DCL** (liner), and **DCHL** (head liner). Similar to an SF renewable bushing, but with passages to direct coolant to the cutting area. This design is particularly good for washing away chips, especially when ordered as the combination Directed Coolant Chip Breaker (DCCH). DC bushings require special liners, DCL or DCHL, to direct coolant from a drilled manifold passage to the holes in the bushing's OD wall.

## OIL GROOVE:



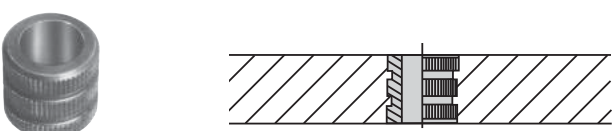
Oil grooves are available on most drill-bushing types, including P, H, and SF. Use when you need complete drill lubrication and cooling, such as when drilling hardened steel. Oil grooves are specially designed coolant passageways in the bushing's ID wall. Choose from 25 different groove styles. End wipers are also available, to keep out dirt and chips.

## DIAMOND GROOVE:



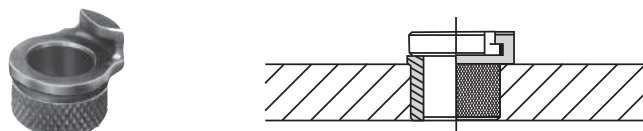
Types **DG** and **DGM** (metric). A bushing for cast-in-place or potted installation. Diamond-knurled OD provides superior holding strength against both rotational and axial forces. Since the bushing's OD is not ground, keep the ID accurately located during casting or potting to ensure accuracy in the finished tool.

## SERRATA GROOVE:



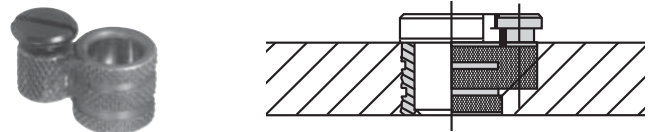
Type **SG**. Can be cast in place or potted, just as a diamond-groove bushing, or can also be pressed into an installation hole. Straight knurl provides less resistance to axial loads than the diamond knurl on a DG bushing. Since the bushing's OD is not ground, keep the ID accurately located during casting or potting to ensure accuracy in the finished tool.

## DIAMOND-KNURL UN-A-LOK™ LINER:



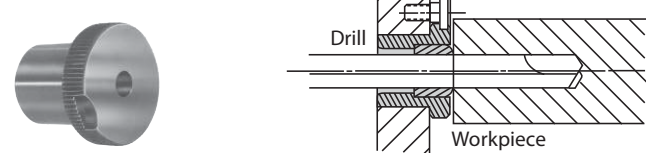
Types **ULD** and **ULDM** (metric). A liner for cast-in-place or potted installation, used to hold SF renewable drill bushings. Un-A-Lok™ liners incorporate a special locking tab that eliminates the need for a lock screw. Holds only the "slip" side of an SF bushing, not the "fixed" side. Diamond-knurled OD provides superior holding strength against both rotational and axial forces. Since the bushing's OD is not ground, keep the ID accurately located during casting or potting to ensure accuracy in the finished tool.

## EZ CAST LINER:



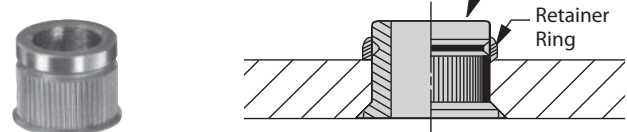
Type **EZ**. Another liner for cast-in-place or potted installation, used to hold SF renewable drill bushings. Unlike diamond-knurl unlock liners, EZ-cast liners hold either the "slip" or "fixed" side of an SF bushing, since they include an integral lock screw holder. Diamond-knurled OD provides superior holding strength against both rotational and axial forces. Since the bushing's OD is not ground, keep the ID accurately located during casting or potting to ensure accuracy in the finished tool.

## GUN DRILL:



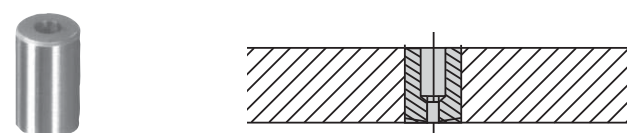
Types **GD**, **GDL** (liner), and **GDI** (insert). Drill bushings for gun-drilling machines, such as Eldorado, Drillmation, DeHoff, and Lahr. Gun drill bushings are similar to SF renewable bushings, but with the drill bearing at the bushing's head end. Depending on the gun-drilling machine, bushings are either one-piece or two-piece (a liner and an insert).

## TEMPLATE:



Type **TB**. An economical bushing designed for thin template jig plates from 1/16- to 3/8-inch thick. Bushings are held in place by a retainer ring. The OD serrations prevent the bushing from spinning. Bushings can be removed and reused by breaking the aluminum retainer ring (extra retainer rings available).

## CIRCUIT BOARD:



Types **CB** and **CBC** (carbide). Headless and head-type bushings made especially for circuit-board drilling machines. Available for Electro-Mechano, Excellon, Waco, Digital, Nationwide, Edlund, Tektronix, Leland-Gifford, Palomar, Hughes, Rapidrill, and Reliable drilling machines.

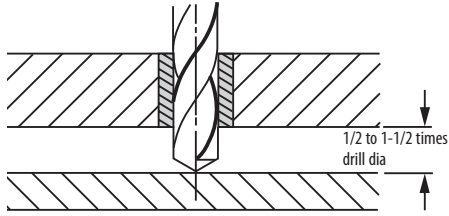
## AIR-FEED DRILL:



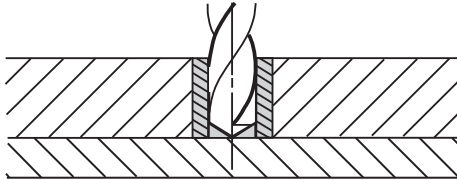
Type **A**. Drill-bushing shanks, collars, adaptors, and locking accessories for air-feed drills, tappers, and back-spotfacers. Available for all standard drill motors, including Gardner-Denver, Keller, Aro, Buckeye, Quackenbush, Desoutter, and Ingersoll-Rand.

# INSTALLATION AND TECHNICAL DATA

## RECOMMENDED CHIP CLEARANCE:

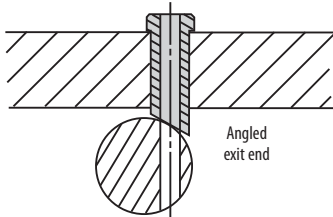


To minimize drill bending and maximize hole accuracy, mount drill bushings as close to the workpiece as possible while still allowing adequate chip clearance. The necessary clearance depends on workpiece material and chip stringiness. For example, cast iron, with fine chips requires about 1/2 times drill diameter for chip clearance. Materials that produce long, stringy chips, such as cold-rolled steel and aluminum, require at least one-drill-diameter clearance. To reduce clearance even with long, stringy chips, exit-end chip breakers are available. **INFO+**: See pages 540-541.



Direct workpiece contact is usually not recommended. Chips can escape only up through the drill's flutes, drill-bearing length is shortened by the drill point's length, and drill-withdrawal burrs can raise the jig plate. Direct contact may be necessary, though, for maximum bearing length when drilling sloped surfaces (see below). Also, reamer bushings can be mounted much closer than drill bushings, due to much finer chips, for more-accurate hole finishing.

## SLOPED WORKPIECE SURFACES:

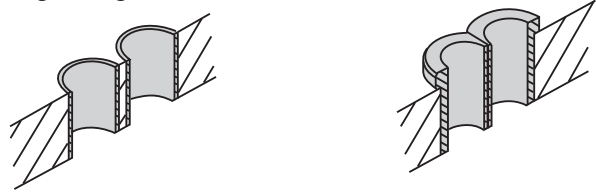


Whenever the drilling axis is not perpendicular to the workpiece surface, locate the exit end as close to the part as possible. Otherwise the drill will tend to wander. For maximum drill guiding, we recommend specifying bushings with an angle milled on the exit end, tangent to the workpiece surface at point of entry.

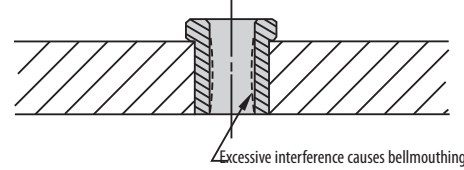
## SPECIAL BUSHINGS FOR CLOSE HOLE SPACING:

When holes are located close together, special bushings are sometimes required. Thinwall bushings, where the bushing ID is larger than the normal ID range for a given OD, are often a good solution. Holes for thinwall bushings must be very accurate and round, because these bushings are more easily distorted. For

very-close hole spacing, especially with headed bushings, specify bushings with ground flats.



## INSTALLATION-HOLE PREPARATION:



To avoid jig-plate or bushing distortion, do not use excessive interference fits on press-fit bushings. See table below for recommended hole sizes in unhardened steel or cast iron jig plates. Always prepare installation holes using a jig borer or reamer. Standard chucking reamers (with a plus tolerance) usually produce installation holes to the tolerances shown in the table. Other factors to consider are: (1) headed bushings require less interference to resist drilling thrust; (2) longer bushings in thick plates require less interference; (3) bushings with thinner walls are more prone to distortion; (4) less-ductile jig-plate materials require less interference.

### INCH

PRESS-FIT BUSHING OD		RECOMMENDED HOLE SIZE
NOM.	ACTUAL	
5/32	.1578-.1575	.1565-.1570
3/16	.1891-.1888	.1880-.1883
13/64	.2046-.2043	.2037-.2040
1/4	.2516-.2513	.2507-.2510
5/16	.3141-.3138	.3132-.3135
3/8	.3766-.3763	.3757-.3760
13/32	.4078-.4075	.4069-.4072
7/16	.4392-.4389	.4382-.4385
1/2	.5017-.5014	.5007-.5010
9/16	.5642-.5639	.5632-.5635
5/8	.6267-.6264	.6257-.6260
3/4	.7518-.7515	.7507-.7510
7/8	.8768-.8765	.8757-.8760
1	1.0018-1.0015	1.0007-1.0010
1-1/8	1.1270-1.1267	1.1257-1.1260
1-1/4	1.2520-1.2517	1.2507-1.2510
1-3/8	1.3772-1.3768	1.3757-1.3760
1-1/2	1.5021-1.5018	1.5007-1.5010
1-3/4	1.7523-1.7519	1.7507-1.7510
2-1/4	2.2525-2.2521	2.2507-2.2510
2-3/4	2.7526-2.7522	2.7507-2.7510

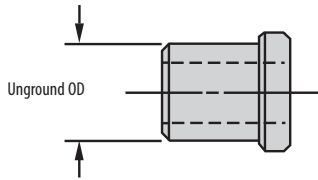
### METRIC

PRESS-FIT BUSHING OD		RECOMMENDED HOLE SIZE (H7)
NOM.	ACTUAL (±6)	
3mm	3.020-3.014mm	3.000-3.010mm
4mm	4.027-4.019mm	4.000-4.012mm
5mm	5.027-5.019mm	5.000-5.012mm
6mm	6.027-6.019mm	6.000-6.012mm
7mm	7.032-7.023mm	7.000-7.015mm
8mm	8.032-8.023mm	8.000-8.015mm
10mm	10.032-10.023mm	10.000-10.015mm
12mm	12.039-12.028mm	12.000-12.018mm
15mm	15.039-15.028mm	15.000-15.018mm
18mm	18.039-18.028mm	18.000-18.018mm
22mm	22.048-22.035mm	22.000-22.021mm
26mm	26.048-26.035mm	26.000-26.021mm
30mm	30.048-30.035mm	30.000-30.021mm
35mm	35.059-35.043mm	35.000-35.025mm
42mm	42.059-42.043mm	42.000-42.025mm
48mm	48.059-48.043mm	48.000-48.025mm
55mm	55.072-55.053mm	55.000-55.030mm
62mm	62.072-62.053mm	62.000-62.030mm
70mm	70.078-70.059mm	70.000-70.030mm
78mm	78.078-78.059mm	78.000-78.030mm
85mm	85.093-85.071mm	85.000-85.035mm
95mm	95.093-95.071mm	95.000-95.035mm
105mm	105.101-105.079mm	105.000-105.035mm
115mm	115.101-115.079mm	115.000-115.035mm
125mm	125.117-125.092mm	125.000-125.040mm



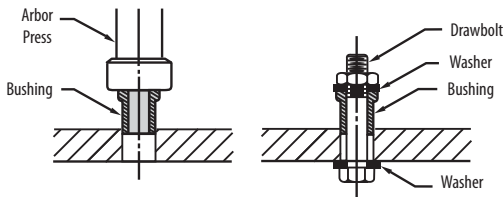
# INSTALLATION AND TECHNICAL DATA

## UNGROUND BUSHINGS AVAILABLE FOR OVERSIZE HOLES:



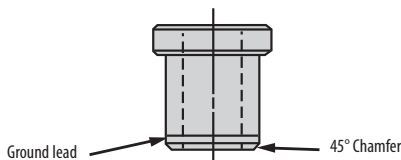
We offer bushings with unfinished ODs for custom-fitting to oversize holes. They are slightly larger than nominal diameter to provide grinding stock, .005-.020 extra, depending on the OD size (see charts under each specific bushing type). We recommend grinding on a mandrel to hold ID/OD concentricity.

## INSTALLATION PROCEDURE:



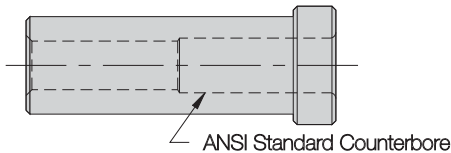
We recommend installing bushings with an arbor press whenever possible. If the bushing's OD is large enough, you can also use a drawbolt with two washers as shown above. If a hammer is the only tool available, do not strike the bushing directly or it could fracture. Use a soft-metal punch to cushion the blows. Before installing a press-fit bushing, lubricate the inside of the mounting hole and outside of the bushing with a lubricant such as lithium grease. Otherwise the bushing may score the mounting hole, and may be difficult to replace later.

## GROUND LEAD FOR EASY INSTALLATION:



All bushings feature a concentric ground lead and a 45° chamfer on the exit end to ensure perfect alignment during installation.

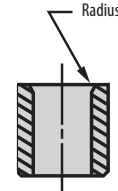
## COUNTERBORES ON LONG BUSHINGS:



Long bushings with small IDs are slightly counterbored for proper drill-bearing length and chip clearance, as specified by ANSI standards. Counterbores prevent binding and heat buildup due to excessive bearing length. See chart on page 514 for ANSI counterbore depths. Counterbore diameters are generally 1/32

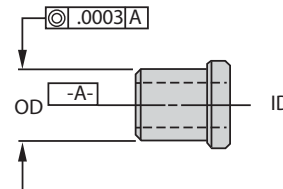
inch larger than the inside diameter, and are angled at the bottom for smooth entrance. No-counterbore bushings are available on request as specials.

## DRILL ENTRANCE RADIUS:



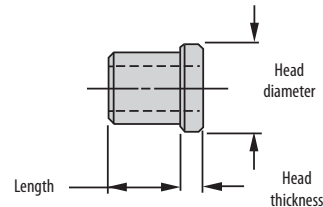
Bushings feature a blended and polished radius at the drill-entrance end for smooth drill entry and proper alignment, preventing drill wear and breakage. Radius size varies in proportion to drill size.

## CONCENTRICITY:



Bushing OD is ground concentric to the ID to within .0003 TIR for ID sizes from 1/8 inch to 1/2 inch (3mm to 12mm), unless otherwise indicated. For larger or smaller sizes, concentricity is within .0005 TIR. Unground bushings are concentric to within .006 TIR. On counterbored bushings, concentricity applies only over the drill-bearing length.

## OTHER TOLERANCES:



Any dimensions where tolerances are not specifically listed are held to +/- .010 inches on standard ANSI sizes, and +/- .015 inches on larger sizes (extended range). Special tolerances for any dimension are available on request as specials.

## MATERIAL:

Standard drill-bushing material is durable 1144 Stressproof steel, heat treated to achieve RC 62-64 ID hardness, and other high-carbon steels. Optional materials such as tungsten carbide (Grade C2 carbide with steel head), 52100 steel, A2 tool steel, D2 tool steel, M2 tool steel, 416 stainless, 440C stainless, 17-4PH stainless, 303 stainless, 660 bronze, Ampco 18 bronze, Ampco 21 bronze, Oilite, and brass are available as specials. **INFO+**: See pages 516, 521, and 528 for carbide bushings.

# COUNTERBORE DATA

## DRILL BEARING LENGTH



### TYPE P

DRILL SIZE (ID)	OD	BUSHING LENGTH											
		1/4	5/16	3/8	1/2	3/4	1	1-3/8	1-1/2	1-3/4	2-1/8	2-1/2	3
.0135 - .0291	5/32	FULL	FULL	FULL	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16
.0292 - .0519													
.0520 - .0625													
.0135 - .0291	3/16	FULL	FULL	FULL	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16
.0292 - .0519													
.0520 - .0634													
.0635 - .0995	13/64	FULL	FULL	FULL	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16
.0135 - .0291													
.0292 - .0519													
.0520 - .0634	1/4	FULL	FULL	FULL	FULL	7/16	5/8	5/8	5/8	5/8	5/8	5/8	5/8
.0635 - .0995													
.0980 - .1406													
.1250 - .1935	5/16	FULL	FULL	FULL	FULL	FULL	5/8	5/8	5/8	5/8	5/8	5/8	5/8
.1935 - .2880	3/8	FULL	FULL	FULL	FULL	FULL	5/8	5/8	5/8	5/8	5/8	5/8	5/8
.1875 - .2570	13/32	FULL	FULL	FULL	FULL	FULL	5/8	5/8	5/8	5/8	5/8	5/8	5/8
.2340 - .2900	7/16	FULL	FULL	FULL	FULL	FULL	5/8	5/8	5/8	5/8	5/8	5/8	5/8
.1875 - .3160	1/2	FULL	FULL	FULL	FULL	FULL	5/8	3/4	3/4	3/4	3/4	3/4	3/4
.3125 - .4375	5/8	FULL	FULL	FULL	FULL	FULL	FULL	FULL	FULL	FULL	FULL	FULL	1-1/2
.3125 - .5313	3/4	FULL	FULL	FULL	FULL	FULL	FULL	FULL	FULL	FULL	FULL	FULL	1-1/2



### TYPE H

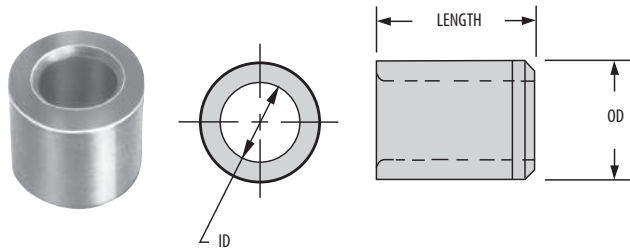
RANGE (ID)	OD	BUSHING LENGTH (UNDER HEAD)											
		1/4	5/16	3/8	1/2	3/4	1	1-3/8	1-1/2	1-3/4	2-1/8	2-1/2	3
.0135 - .0291	5/32	FULL	FULL	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16
.0292 - .0519				FULL									
.0520 - .0625				FULL									
.0135 - .0291	13/64	FULL	FULL	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16
.0292 - .0519				FULL									
.0520 - .0634				FULL									
.0635 - .0995	1/4	FULL	FULL	FULL	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16
.0980 - .1406													
.1250 - .1935													
.1935 - .2280	5/16	FULL	FULL	FULL	FULL	FULL	5/8	5/8	5/8	5/8	5/8	5/8	5/8
.1875 - .2570	3/8	FULL	FULL	FULL	FULL	FULL	5/8	5/8	5/8	5/8	5/8	5/8	5/8
.2340 - .2900	13/32	FULL	FULL	FULL	FULL	FULL	5/8	5/8	5/8	5/8	5/8	5/8	5/8
.2340 - .2900	7/16	FULL	FULL	FULL	FULL	FULL	5/8	5/8	5/8	5/8	5/8	5/8	5/8
.1875 - .3160	1/2	FULL	FULL	FULL	FULL	FULL	5/8	3/4	3/4	3/4	3/4	3/4	3/4
.3125 - .4375	5/8	FULL	FULL	FULL	FULL	FULL	FULL	FULL	FULL	FULL	FULL	FULL	1-1/2
.3125 - .5313	3/4	FULL	FULL	FULL	FULL	FULL	FULL	FULL	FULL	FULL	FULL	FULL	1-1/2



### TYPE SF & FM

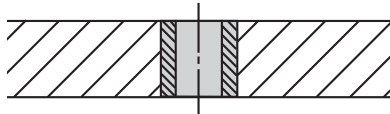
DRILL SIZE (ID)	OD	BUSHING LENGTH (UNDER HEAD)												
		1/4	5/16	3/8	1/2	3/4	1	1-3/8	1-1/2	1-3/4	2-1/8	2-1/2	3	
.0135 - .0291	3/16	1/4	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	
.0292 - .0519		FULL												
.0520 - .0634														
.0635 - .0980	1/4	FULL	5/16	3/8	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	
.0995 - .1405				3/8	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16
.0135 - .0291				1/4	FULL	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16
.0292 - .0519														
.0520 - .0634														
.0635 - .0934	5/16	FULL	FULL	3/8	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	
.0935 - .1249				FULL	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	
.1250 - .1935				FULL	FULL	5/8	5/8	5/8	5/8	5/8	5/8	5/8	5/8	5/8
.1935 - .2280	3/8	FULL	FULL	FULL	FULL	FULL	5/8	5/8	5/8	5/8	5/8	5/8	5/8	
.2340 - .2900	7/16	FULL	FULL	FULL	FULL	FULL	5/8	5/8	5/8	5/8	5/8	5/8	5/8	
.1405 - .1889	1/2	FULL	FULL	FULL	FULL	FULL	5/7	5/8	5/8	5/8	5/8	5/8	5/8	
.1890 - .3438							7/8	1	1	1	1	1	1	
.2950 - .5625	3/4	FULL	FULL	FULL	FULL	FULL	FULL	FULL	FULL	FULL	FULL	FULL	1-1/2	

# PRESS FIT BUSHINGS



## APPLICATIONS:

This is the most-popular and least-expensive drill bushing. P bushings are permanently pressed into the jig plate, usually flush with the top surface. They are generally used for single-step drilling or reaming operations when you do not expect to replace bushings during the tooling's lifetime. P bushings can be mounted closer together than headed bushings, but offer less resistance to heavy axial loads.



## ORDERING EXAMPLES:

P-20-16-.1250	Standard inch bushing, inch ID
P-20-16-.1772	Standard inch bushing, mm ID (.1772 = 4.50mm)
P-20-16U-.1250	Unground OD
P-20-16-.1250 REAMER	Reamer tolerance on ID
P-20-16-.1250 NCB	No counterbore on long bushings marked with * (no counterbore is standard on all other bushings)
PC-20-16-.1250	Carbide bushing
PM-8-12-4.50	Standard metric bushing

Standard prices apply only to bushings with a standard-drill-size ID within the stated ID range. See catalog back cover for standard drill sizes and their decimal equivalents. For prices on non-standard ID sizes, including reamer-tolerance and tap-guide bushings, please contact factory.

## STANDARD ID TOLERANCES:

From #80 to 1/4"	+ .0001/+ .0004	From .35 to 3mm	+ .002/+ .008mm
Over 1/4 to 3/4"	+ .0001/+ .0005	Over 3 to 6mm	+ .004/+ .012mm
Over 3/4 to 1-1/2"	+ .0002/+ .0006	Over 6 to 10mm	+ .005/+ .014mm
Over 1-1/2 to 2-3/4"	+ .0003/+ .0007	Over 10 to 18mm	+ .006/+ .017mm
		Over 18 to 30mm	+ .007/+ .020mm
		Over 30 to 50mm	+ .009/+ .025mm
		Over 50 to 80mm	+ .010/+ .029mm
		Over 80 to 120mm	+ .012/+ .034mm
			(G6 tolerance)

## REAMER ID TOLERANCES:

From #60 to 1/4"	+ .0005/+ .0008	From 1 to 3mm	+ .006/+ .012mm
Over 1/4 to 1"	+ .0006/+ .0010	Over 3 to 6mm	+ .010/+ .018mm
Over 1" to 1-1/2"	+ .0008/+ .0012	Over 6 to 10mm	+ .013/+ .022mm
		Over 10 to 18mm	+ .016/+ .027mm
		Over 18 to 30mm	+ .020/+ .033mm
			(F6 tolerance)

ID RANGE	OD	LENGTH	ANSI PART NO.	
<b>.0135-.0291</b> #80-#70 .35-.70mm	<b>5/32</b> .1578-.1575 (.166-.161 UNG)	1/4	P-10-4	
		5/16	P-10-5	
		3/8	P-10-6	
		*1/2	P-10-8	
<b>.0292-.0519</b> #69-3/64 .75-1.25mm		1/4	P-10-4	
		5/16	P-10-5	
		3/8	P-10-6	
		*1/2	P-10-8	
<b>.0520-.0625</b> #55-1/16 1.30-1.60mm		*3/4	P-10-12	
		1/4	P-10-4	
		5/16	P-10-5	
		3/8	P-10-6	
<b>.0520-.0634</b> #55-1/16 1.30-1.60mm	*1/2	P-10-8		
	*3/4	P-10-12		
	1/4	P-12-4		
	5/16	P-12-5		
	3/8	P-12-6		
	*1/2	P-12-8		
<b>.0635-.0995</b> #52-#39 1.65-2.50mm	*5/8	P-12-10		
	*3/4	P-12-12		
	1/4	P-12-4		
	5/16	P-12-5		
	3/8	P-12-6		
	1/2	P-12-8		
<b>.0135-.0291</b> #80-#70 .35-.70mm	<b>3/16</b> .1891-.1888 (.201-.197 UNG)	5/8	P-12-10	
		*3/4	P-12-12	
		1/4	P-13-4	
		5/16	P-13-5	
		3/8	P-13-6	
		*1/2	P-13-8	
		<b>.0292-.0519</b> #69-3/64 .75-1.30mm	1/4	P-13-4
			5/16	P-13-5
			3/8	P-13-6
			*1/2	P-13-8
		<b>.0520-.0634</b> #55-1/16 1.35mm-1.60mm	*3/4	P-13-12
			1/4	P-13-4
5/16	P-13-5			
3/8	P-13-6			
*1/2	P-13-8			
*3/4	P-13-12			
<b>.0635-.0995</b> #52-#39 1.65-2.50mm	*1	P-13-16		
	1/4	P-13-4		
	5/16	P-13-5		
	3/8	P-13-6		
	1/2	P-13-8		
	*3/4	P-13-12		
	*1	P-13-16		
	*1-3/8	P-13-22		

\* **INFO+:** Counterbored, leaving correct drill-bearing length and clearance (see page 512 for bearing length).

# PRESS FIT BUSHINGS



ID RANGE	OD	LENGTH	ANSI PART NO.
<b>.0980-.1406</b> #40-9/64 2.50-3.50mm	<b>1/4</b> .2516-.2513 (.265-.260 UNG)	1/4	P-16-4
		5/16	P-16-5
		3/8	P-16-6
		1/2	P-16-8
		5/8	P-16-10
		*3/4	P-16-12
		*1	P-16-16
		*1-3/8	P-16-22
		*1-1/2	P-16-24
		*1-3/4	P-16-28
<b>.1250-.1935</b> 1/8-#10 3.20-4.90mm	<b>5/16</b> .3141-.3138 (.327-.322 UNG)	1/4	P-20-4
		5/16	P-20-5
		3/8	P-20-6
		1/2	P-20-8
		5/8	P-20-10
		3/4	P-20-12
		*1	P-20-16
		*1-3/8	P-20-22
		*1-1/2	P-20-24
		*1-3/4	P-20-28
<b>.1935-.2280</b> #10-#1 4.90-5.80mm	<b>3/8</b> .3766-.3763 (.390-.385 UNG)	1/4	P-24-4
		5/16	P-24-5
		3/8	P-24-6
		1/2	P-24-8
		5/8	P-24-10
		3/4	P-24-12
		*1	P-24-16
<b>.1875-.2570</b> 3/16-F 4.75-6.50mm	<b>13/32</b> .4078-.4075 (.421-.416 UNG)	1/4	P-26-4
		5/16	P-26-5
		3/8	P-26-6
		1/2	P-26-8
		3/4	P-26-12
		*1	P-26-16
		*1-3/8	P-26-22
		*1-1/2	P-26-24
<b>.2340-.2900</b> A-L 5.90-7.40mm	<b>7/16</b> .4392-.4389 (.453-.448 UNG)	1/4	P-28-4
		5/16	P-28-5
		3/8	P-28-6
		1/2	P-28-8
		5/8	P-28-10
		3/4	P-28-12
		*1	P-28-16
<b>.1875-.3160</b> 3/16-O 4.75-8.00mm	<b>1/2</b> .5017-.5014 (.520-.515 UNG)	1/4	P-32-4
		5/16	P-32-5
		3/8	P-32-6
		1/2	P-32-8
		3/4	P-32-12
		*1	P-32-16
		*1-3/8	P-32-22
		*1-1/2	P-32-24
		*1-3/4	P-32-28
		*2-1/8	P-32-34

\* **INFO+**: Counterbored, leaving correct drill-bearing length and clearance (see page 512 for bearing length).

ID RANGE	OD	LENGTH	ANSI PART NO.
<b>.2950-.3438</b> M-11/32 7.50-8.75mm	<b>9/16</b> .5642-.5639 (.582-.577 UNG)	1/4	P-36-4
		5/16	P-36-5
		3/8	P-36-6
		1/2	P-36-8
		5/8	P-36-10
		3/4	P-36-12
		1	P-36-16
<b>.3125-.4375</b> 5/16-7/16 7.90-11.00mm	<b>5/8</b> .6267-.6264 (.645-.640 UNG)	1/4	P-40-4
		5/16	P-40-5
		3/8	P-40-6
		1/2	P-40-8
		5/8	P-40-10
		3/4	P-40-12
		1	P-40-16
		1-1/4	P-40-20
		1-3/8	P-40-22
		1-1/2	P-40-24
<b>.3125-.5312</b> 5/16-17/32 7.90-13.50mm	<b>3/4</b> .7518-.7515 (.770-.765 UNG)	1-3/4	P-40-28
		2-1/8	P-40-34
		1/4	P-48-4
		5/16	P-48-5
		3/8	P-48-6
		1/2	P-48-8
		5/8	P-48-10
		3/4	P-48-12
		1	P-48-16
		1-1/4	P-48-20
<b>.5000-.6562</b> 1/2-21/32 12.50-16.50mm	<b>7/8</b> .8768-.8765 (.895-.890 UNG)	1-3/8	P-48-22
		1-1/2	P-48-24
		1-3/4	P-48-28
		2-1/8	P-48-34
		*2-1/2	P-48-40
		5/16	P-56-5
		3/8	P-56-6
		1/2	P-56-8
		5/8	P-56-10
		3/4	P-56-12
1	P-56-16		
<b>.1875-.3160</b> 3/16-O 4.75-8.00mm	<b>1/2</b> .5017-.5014 (.520-.515 UNG)	1-1/4	P-56-20
		1-3/8	P-56-22
		1-1/2	P-56-24
		1-3/4	P-56-28
		2-1/8	P-56-34
		2-1/2	P-56-40

# PRESS FIT BUSHINGS



ID RANGE	OD	LENGTH	ANSI PART NO.
<b>.5000-.7656</b> 1/2-49/64 12.50-19.50mm	<b>1</b> 1.0018-1.0015 (1.020-1.015 UNG)	1/2	P-64-8
		5/8	P-64-10
		3/4	P-64-12
		1	P-64-16
		1-1/4	P-64-20
		1-3/8	P-64-22
		1-1/2	P-64-24
		1-3/4	P-64-28
		2-1/8	P-64-34
		2-1/2	P-64-40
		3	P-64-48
		<b>.7656-.8438</b> 49/64-27/32 19.50-21.50mm	<b>1-1/8</b> 1.1270-1.1267 (1.145-1.140 UNG)
5/8	P-72-10		
3/4	P-72-12		
1	P-72-16		
1-1/4	P-72-20		
1-1/2	P-72-24		
1-3/4	P-72-28		
<b>.8594-.9375</b> 55/64-15/16 22.00-24.00mm	<b>1-1/4</b> 1.2520-1.2517 (1.270-1.265 UNG)	5/8	P-80-10
		3/4	P-80-12
		1	P-80-16
		1-1/4	P-80-20
		1-1/2	P-80-24
		1-3/4	P-80-28
		2	P-80-32
<b>.6250-1.0312</b> 5/8-1-1/32 16.00-26.00mm	<b>1-3/8</b> 1.3772-1.3768 (1.395-1.390 UNG)	1/2	P-88-8
		5/8	P-88-10
		3/4	P-88-12
		1	P-88-16
		1-1/4	P-88-20
		1-3/8	P-88-22
		1-1/2	P-88-24
		1-3/4	P-88-28
		2	P-88-32
		2-1/8	P-88-34
		2-1/2	P-88-40
<b>1.0156-1.1250</b> 1-1/64-1-1/8 26.00-29.00mm	<b>1-1/2</b> 1.5021-1.5018 (1.520-1.515 UNG)	3/4	P-96-12
		1	P-96-16
		1-1/4	P-96-20
		1-1/2	P-96-24
		1-3/4	P-96-28
		2	P-96-32
		2-1/4	P-96-36

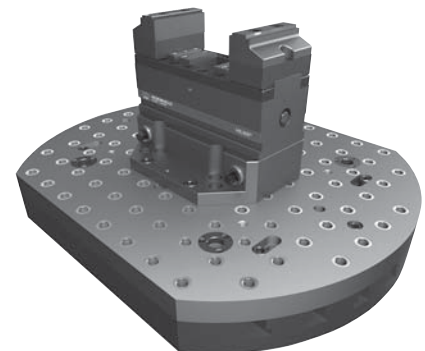
\* **INFO+**: Counterbored, leaving correct drill-bearing length and clearance (see page 512 for bearing length).

ID RANGE	OD	LENGTH	ANSI PART NO.
<b>1.0000-1.3906</b> 1-1-25/64 25.00-35.00mm	<b>1-3/4</b> 1.7523-1.7519 (1.770-1.765 UNG)	3/4	P-112-12
		1	P-112-16
		1-3/8	P-112-22
		1-1/2	P-112-24
		1-3/4	P-112-28
		2-1/8	P-112-34
		2-1/2	P-112-40
		3	P-112-48
<b>1.3750-1.7656</b> 1-3/8-1-49/64 35.00-45.00mm	<b>2-1/4</b> 2.2525-2.2521 (2.270-2.265 UNG)	1	P-144-16
		1-3/8	P-144-22
		1-1/2	P-144-24
		1-3/4	P-144-28
		2-1/8	P-144-34
		2-1/2	P-144-40
		3	P-144-48

For extended-range bushings (larger sizes) please see our web catalog.



## Quick-Change With No Adaptor Plates, Blocks Or Pallets Necessary



- Quintus fixture plates available as blank, or with multi-function holes
- German-built, extremely accurate precision vises
- Allows unrestricted tool access for multiple-side machining
- Numerous jaw types and sizes available

See Pages 321-342

# PRESS FIT BUSHINGS – CARBIDE



ID RANGE	OD	LENGTH	ANSI PART NO.
<b>.0280-.0468</b> #70-#56 .75-1.15mm	<b>5/32</b> .1578-.1575	5/16	PC-10-5
		1/2	PC-10-8
<b>.0469-.0625</b> 3/64-1/16 1.20-1.55mm	<b>5/32</b> .1578-.1575	5/16	PC-10-5
		1/2	PC-10-8
<b>.0550-.0995</b> #54-#39 1.40-2.50mm	<b>13/64</b> .2046-.2043	5/16	PC-13-5
		1/2	PC-13-8
<b>.0995-.1360</b> #39-#29 2.55-3.40mm	<b>1/4</b> .2516-.2513	5/16	PC-16-5
		1/2	PC-16-8
<b>.1285-.1875</b> #30-3/16 3.30-4.75mm	<b>5/16</b> .3141-.3138	5/16	PC-20-5
		1/2	PC-20-8
		3/4	PC-20-12
		1	PC-20-16
<b>.1875-.2500</b> 3/16-1/4 4.80-6.30mm	<b>13/32</b> .4078-.4075	5/16	PC-26-5
		1/2	PC-26-8
		3/4	PC-26-12
		1	PC-26-16
<b>.2188-.3125</b> 7/32-5/16 5.60-7.90mm	<b>1/2</b> .5017-.5014	5/16	PC-32-5
		1/2	PC-32-8
		3/4	PC-32-12
		1	PC-32-16
<b>.3125-.4219</b> 5/16-27/64 8.00-10.50mm	<b>5/8</b> .6267-.6264	1-3/8	PC-32-22
		1/2	PC-40-8
		3/4	PC-40-12
		1	PC-40-16
<b>.3750-.5000</b> 3/8-1/2 9.60-12.50mm	<b>3/4</b> .7518-.7515	1-3/8	PC-40-22
		1/2	PC-48-8
		3/4	PC-48-12
		1	PC-48-16
<b>.5000-.6250</b> 1/2-5/8 13.00-15.50mm	<b>7/8</b> .8768-.8765	1-3/8	PC-48-22
		1/2	PC-56-8
		3/4	PC-56-12
		1	PC-56-16
		1-3/8	PC-56-22
		1-3/4	PC-56-28

ID RANGE	OD	LENGTH	ANSI PART NO.
<b>.5000-.7500</b> 1/2-3/4 13.00-19.00mm	<b>1</b> 1.0018-1.0015	1/2	PC-64-8
		3/4	PC-64-12
		1	PC-64-16
		1-3/8	PC-64-22
		1-3/4	PC-64-28
		3/4	PC-88-12
		1	PC-88-16
		1-3/8	PC-88-22
<b>.7500-1.0000</b> 3/4-1 19.50-25.00mm	<b>1-3/8</b> 1.3772-1.3768	1-3/4	PC-88-28
		2-1/8	PC-88-34
		2-1/2	PC-88-40
		1	PC-112-16
<b>1.0000-1.3750</b> 1-1-3/8 26.00-34.00mm	<b>1-3/4</b> 1.7523-1.7519	1-3/8	PC-112-22
		1-3/4	PC-112-28
		2-1/8	PC-112-34
		2-1/2	PC-112-40
		3	PC-112-48
		1	PC-144-16
		1-3/8	PC-144-22
		1-3/4	PC-144-28
<b>1.3750-1.7500</b> 1-3/8-1-3/4 35.00-44.00mm	<b>2-1/4</b> 2.2525-2.2521	2-1/8	PC-144-34
		2-1/2	PC-144-40
		3	PC-144-48

## Alignment Pins

### Strength and Precision



Ball Lock Pins  
(L, T, button or  
Ring Handles)



Detent Pins

- Wide assortment of quality ball lock and detent pins for precision alignment

- In steel or stainless steel

- Wide selection of other alignment pins are available

See Pages 27-53

# PRESS FIT BUSHINGS – METRIC



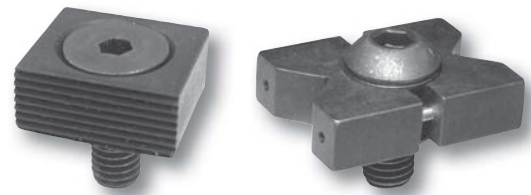
ID RANGE (G6)	OD (s6)	LENGTH	ANSI PART NO.
.35-1.00mm	4mm 4.027-4.019mm	*6mm	PM-4-6
		*9mm	PM-4-9
1.01-1.80mm	4.027-4.019mm	6mm	PM-4-6
		9mm	PM-4-9
1.81-2.60mm	5mm 5.027-5.019mm	6mm	PM-5-6
		9mm	PM-5-9
2.61-3.30mm	6mm 6.027-6.019mm	8mm	PM-6-8
		12mm	PM-6-12
		16mm	PM-6-16
3.31-4.00mm	7mm 7.032-7.023mm	8mm	PM-7-8
		12mm	PM-7-12
		16mm	PM-7-16
4.01-5.00mm	8mm 8.032-8.023mm	8mm	PM-8-8
		12mm	PM-8-12
		16mm	PM-8-16
5.01-6.00mm	10mm 10.032-10.023mm	10mm	PM-10-10
		16mm	PM-10-16
		20mm	PM-10-20
6.01-8.00mm	12mm 12.039-12.028mm	10mm	PM-12-10
		16mm	PM-12-16
		20mm	PM-12-20
8.01-10.00mm	15mm 15.039-15.028mm	12mm	PM-15-12
		20mm	PM-15-20
		25mm	PM-15-25
10.01-12.00mm	18mm 18.039-18.028mm	12mm	PM-18-12
		20mm	PM-18-20
		25mm	PM-18-25
12.01-15.00mm	22mm 22.048-22.035mm	16mm	PM-22-16
		28mm	PM-22-28
		36mm	PM-22-36
15.01-18.00mm	26mm 26.048-26.035mm	16mm	PM-26-16
		28mm	PM-26-28
		36mm	PM-26-36
18.01-22.00mm	30mm 30.048-30.035mm	20mm	PM-30-20
		36mm	PM-30-36
		45mm	PM-30-45
22.01-26.00mm	35mm 35.059-35.043mm	20mm	PM-35-20
		36mm	PM-35-36
		45mm	PM-35-45
26.01-30.00mm	42mm 42.059-42.043mm	25mm	PM-42-25
		45mm	PM-42-45
		56mm	PM-42-56
30.01-35.00mm	48mm 48.059-48.043mm	25mm	PM-48-25
		45mm	PM-48-45
		56mm	PM-48-56
35.01-42.00mm	55mm 55.072-55.053mm	30mm	PM-55-30
		56mm	PM-55-56
		67mm	PM-55-67
42.01-48.00mm	62mm 62.072-62.053mm	30mm	PM-62-30
		56mm	PM-62-56
		67mm	PM-62-67

ID RANGE (G6)	OD (s6)	LENGTH	ANSI PART NO.
48.01-55.00mm	70mm 70.078-70.059mm	30mm	PM-70-30
		56mm	PM-70-56
		67mm	PM-70-67
55.01-63.00mm	78mm 78.078-78.059mm	35mm	PM-78-35
		67mm	PM-78-67
		78mm	PM-78-78
63.01-70.00mm	85mm 85.093-85.071mm	35mm	PM-85-35
		67mm	PM-85-67
		78mm	PM-85-78
70.01-78.00mm	95mm 95.093-95.071mm	40mm	PM-95-40
		78mm	PM-95-78
		105mm	PM-95-105
78.01-85.00mm	105mm 105.101-105.079mm	40mm	PM-105-40
		78mm	PM-105-78
		105mm	PM-105-105
85.01-95.00mm	115mm 115.101-115.079mm	45mm	PM-115-45
		89mm	PM-115-89
		112mm	PM-115-112
95.01-105.00mm	125mm 125.117-125.092mm	45mm	PM-125-45
		89mm	PM-125-89
		112mm	PM-125-112

\* Small metric drill sizes through .80mm are counterbored 1.00mm diameter, with 3mm drill-bearing length.

## TINY VISE® Edge Clamps

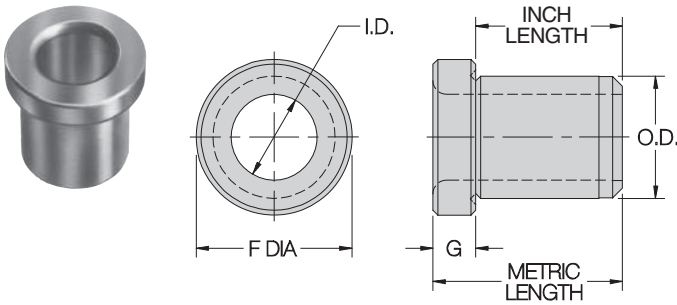
### Strong Clamping Action For Fixturing Small Parts



- Patented Tiny Vise® edge clamps grip the side of the workpiece to keep the top clear for machining
- Clamping force is applied by positive screw action with the easy turn of a hex wrench
- Only Tiny Vise® Edge Clamps truly exert down thrust force on the workpiece, to prevent it from lifting
- Four types in a wide range of sizes from #8-32 thread to 1"-8 thread with 2,500 lbs. clamping force
- Patented, more durable than similar clamps

See Pages 238-247

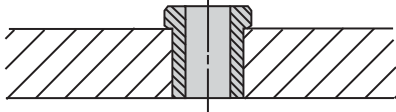
# HEAD PRESS FIT BUSHINGS



INCH			METRIC		
BODY OD	F DIA	G	BODY OD	F DIA	G
5/32	1/4	1/4	4mm	7mm	2mm
13/64	19/64	19/64	5mm	8mm	2mm
1/4	23/64	23/64	6mm	9mm	2.5mm
5/16	27/64	27/64	7mm	10mm	2.5mm
3/8	1/2	1/2	8mm	11mm	2.5mm
13/32	1/2	1/2	10mm	13mm	3mm
7/16	9/16	9/16	12mm	15mm	3mm
1/2	39/64	39/64	15mm	18mm	3mm
9/16	11/16	11/16	18mm	22mm	4mm
5/8	51/64	51/64	22mm	26mm	4mm
3/4	59/64	59/64	26mm	30mm	4mm
7/8	1-7/64	1-7/64	30mm	34mm	5mm
1	1-15/64	1-15/64	35mm	39mm	5mm
1-1/4	1-1/2	1-1/2	42mm	46mm	5mm
1-3/8	1-39/64	1-39/64	48mm	52mm	5mm
1-3/4	1-63/64	1-63/64	55mm	59mm	5mm
2-1/4	2-31/6	2-31/6	62mm	66mm	6mm
			70mm	74mm	6mm
			78mm	82mm	6mm
			85mm	90mm	6mm
			95mm	100mm	6mm
			105mm	110mm	6mm
			115mm	120mm	6mm
			125mm	130mm	6mm

## APPLICATIONS:

Similar to a P bushing, but with a head to resist heavy axial loads. H bushings are permanently pressed into the jig plate. They are generally used for single-step drilling or reaming operations when you do not expect to replace bushings during the tooling's lifetime. The head can be left exposed, or recessed by counterboring the installation hole. **Note: The "length" listed for an inch head-press-fit bushing refers to its length under the head, while the metric version's "length" is its overall length.**



## ORDERING EXAMPLES:

H-20-16-.1250 Standard inch bushing, inch ID  
 H-20-16-.1772 Standard inch bushing, mm ID  
 (.1772 = 4.50mm)

H-20-16U-.1250 Unground OD  
 H-20-16-.1250 REAMER Reamer tolerance on ID  
 H-20-16-.1250 NCB No counterbore on long bushings  
 marked with \* (no counterbore is standard on all other bushings)  
 HC-20-16-.1250 Carbide bushing  
 HM-8-12-4.50 Standard metric bushing

Standard prices apply only to bushings with a standard-drill-size ID within the stated ID range. See catalog back cover for standard drill sizes and their decimal equivalents. For prices on non-standard ID sizes, including reamer-tolerance and tap-guide bushings, please contact factory.

## STANDARD ID TOLERANCES:

From #80 to 1/4"	+0.001/+0.004	From .35 to 3mm	+0.02/+0.08mm
Over 1/4 to 3/4"	+0.001/+0.005	Over 3 to 6mm	+0.04/+0.12mm
Over 3/4 to 1-1/2"	+0.002/+0.006	Over 6 to 10mm	+0.05/+0.14mm
Over 1-1/2 to 2-3/4"	+0.003/+0.007	Over 10 to 18mm	+0.06/+0.17mm
		Over 18 to 30mm	+0.07/+0.20mm
		Over 30 to 50mm	+0.09/+0.25mm
		Over 50 to 80mm	+0.10/+0.29mm
		Over 80 to 120mm	+0.12/+0.34mm
			(G6 tolerance)

## REAMER ID TOLERANCES:

From #60 a 1/4"	+0.005/+0.008	From 1 to 3mm	+0.06/+0.12mm
Over 1/4 to 1"	+0.006/+0.010	Over 3 to 6mm	+0.10/+0.18mm
Over 1 to 1-1/2"	+0.008/+0.012	Over 6 to 10mm	+0.13/+0.22mm
		Over 10 to 18mm	+0.16/+0.27mm
		Over 18 to 30mm	+0.20/+0.33mm
			(F6 tolerance)

ID RANGE	OD	LENGTH	ANSI PART NO.
.0135-.0291 #80-#70 .35-.70mm	5/32 .1578-.1575 (.166-.161 UNG)	1/4	H-10-4
		5/16	H-10-5
		*3/8	H-10-6
		*1/2	H-10-8
.0292-.0519 #69-3/64 .75-1.25mm		1/4	H-10-4
		5/16	H-10-5
		*3/8	H-10-6
		*1/2	H-10-8
.0520-.0625 #55-1/16 1.30-1.60mm		*3/4	H-10-12
		1/4	H-10-4
		5/16	H-10-5
		3/8	H-10-6
		*1/2	H-10-8
		*3/4	H-10-12

\* **INFO+:** Counterbored, leaving correct drill-bearing length and clearance (see page 512 for bearing length).



# HEAD PRESS FIT BUSHINGS



ID RANGE	OD	LENGTH	ANSI PART NO.
<b>.0135-.0291</b> #80-#70 .35-.70mm	<b>13/64</b> .2046-.2043 (.213-.208 UNG)	1/4	H-13-4
		5/16	H-13-5
		*3/8	H-13-6
		*1/2	H-13-8
<b>.0292-.0519</b> #69-3/64 .75-1.30mm		1/4	H-13-4
		5/16	H-13-5
		*3/8	H-13-6
		*1/2	H-13-8
<b>.0520-.0634</b> #55-1/16 1.35-1.60mm		*3/4	H-13-12
		1/4	H-13-4
		5/16	H-13-5
		3/8	H-13-6
	*1/2	H-13-8	
	*3/4	H-13-12	
<b>.0635-.0995</b> #52-#39 1.65-2.50mm	*1	H-13-16	
	1/4	H-13-4	
	5/16	H-13-5	
	3/8	H-13-6	
<b>.0980-.1406</b> #40-9/64 2.50-3.50mm	*1/2	H-13-8	
	*3/4	H-13-12	
	*1	H-13-16	
	1/4	H-16-4	
	5/16	H-16-5	
	3/8	H-16-6	
	*1/2	H-16-8	
	*5/8	H-16-10	
<b>.1250-.1935</b> 1/8-#10 3.20-4.90mm	*3/4	H-16-12	
	*1	H-16-16	
	*1-3/8	H-16-22	
	*1-1/2	H-16-24	
	1/4	H-20-4	
	5/16	H-20-5	
<b>.1935-.2280</b> #10-#1 4.90-5.80mm	3/8	H-20-6	
	1/2	H-20-8	
	5/8	H-20-10	
	3/4	H-20-12	
	*1	H-20-16	
	*1-3/8	H-20-22	
	*1-1/2	H-20-24	
	1/4	H-24-4	
<b>.1875-.2570</b> 3/16-F 4.75-6.50mm	5/16	H-24-5	
	3/8	H-24-6	
	1/2	H-24-8	
	5/8	H-24-10	
	3/4	H-24-12	
	*1	H-24-16	
	1/4	H-26-4	
	5/16	H-26-5	
<b>.2340-.2900</b> A-L 5.90-7.40mm	3/8	H-26-6	
	1/2	H-26-8	
	3/4	H-26-12	
	*1	H-26-16	
	*1-3/8	H-26-22	
	*1-1/2	H-26-24	
	*1-3/4	H-26-28	

\* INFO+: Counterbored, leaving correct drill-bearing length and clearance (see page 512 for bearing length).

ID RANGE	OD	LENGTH	ANSI PART NO.
<b>.2340-.2900</b> A-L 5.90-7.40mm	<b>7/16</b> .4392-.4389 (.453-.448 UNG)	1/4	H-28-4
		5/16	H-28-5
		3/8	H-28-6
		1/2	H-28-8
		5/8	H-28-10
		3/4	H-28-12
<b>.1875-.3160</b> 3/16-O 4.75-8.00mm	<b>1/2</b> .5017-.5014 (.520-.515 UNG)	*1	H-28-16
		1/4	H-32-4
		5/16	H-32-5
		3/8	H-32-6
		1/2	H-32-8
		3/4	H-32-12
		*1	H-32-16
		*1-3/8	H-32-22
		*1-1/2	H-32-24
		*1-3/4	H-32-28
<b>.2950-.3438</b> M-11/32 7.50-8.75mm	<b>9/16</b> .5642-.5639 (.582-.577 UNG)	1/4	H-36-4
		5/16	H-36-5
		3/8	H-36-6
		1/2	H-36-8
		5/8	H-36-10
		3/4	H-36-12
<b>.3125-.4375</b> 5/16-7/16 7.90-11.00mm	<b>5/8</b> .6267-.6264 (.645-.640 UNG)	1	H-36-16
		1/4	H-40-4
		5/16	H-40-5
		3/8	H-40-6
		1/2	H-40-8
		5/8	H-40-10
		3/4	H-40-12
		1	H-40-16
		1-3/8	H-40-22
		1-1/2	H-40-24
		1-3/4	H-40-28
		2-1/8	H-40-34
<b>.3125-.5312</b> 5/16-17/32 7.90-13.50mm	<b>3/4</b> .7518-.7515 (.770-.765 UNG)	1/4	H-48-4
		5/16	H-48-5
		3/8	H-48-6
		1/2	H-48-8
		5/8	H-48-10
		3/4	H-48-12
		1	H-48-16
		1-1/4	H-48-20
		1-3/8	H-48-22
		1-1/2	H-48-24
		1-3/4	H-48-28
		2-1/8	H-48-34

# HEAD PRESS FIT BUSHINGS



ID RANGE	OD	LENGTH	ANSI PART NO.
<b>.5000-.6562</b> 1/2-21/32 12.50-16.50mm	<b>7/8</b> .8768-.8765 (.895-.890 UNG)	1/2	H-56-8
		5/8	H-56-10
		3/4	H-56-12
		1	H-56-16
		1-1/4	H-56-20
		1-3/8	H-56-22
		1-1/2	H-56-24
		1-3/4	H-56-28
		2-1/8	H-56-34
		2-1/2	H-56-40
<b>.5000-.7656</b> 1/2-49/64 12.50-19.50mm	<b>1</b> 1.0018-1.0015 (1.020-1.015 UNG)	1/2	H-64-8
		3/4	H-64-12
		1	H-64-16
		1-3/8	H-64-22
		1-1/2	H-64-24
		1-3/4	H-64-28
		2-1/8	H-64-34
		2-1/2	H-64-40
		3	H-64-48
		<b>.8594-.9375</b> 55/64-15/16 22.00-24.00mm	<b>1-1/4</b> 1.2520-1.2517 (1.270-1.265 UNG)
3/4	H-80-12		
1	H-80-16		
1-1/4	H-80-20		
1-1/2	H-80-24		
1-3/4	H-80-28		
2	H-80-32		
<b>.6250-1.0312</b> 5/8-1-1/32 16.00-26.00mm	<b>1-3/8</b> 1.3772-1.3768 (1.395-1.390 UNG)	1/2	H-88-8
		3/4	H-88-12
		1	H-88-16
		1-3/8	H-88-22
		1-1/2	H-88-24
		1-3/4	H-88-28
		2-1/8	H-88-34
		2-1/2	H-88-40
		3	H-88-48
<b>1.0000-1.3906</b> 1-1-25/64 26.00-35.00mm	<b>1-3/4</b> 1.7523-1.7519 (1.770-1.765 UNG)	3/4	H-112-12
		1	H-112-16
		1-3/8	H-112-22
		1-1/2	H-112-24
		1-3/4	H-112-28
		2-1/8	H-112-34
		2-1/2	H-112-40
<b>1.3750-1.7656</b> 1-3/8-1-49/64 35.00-45.00mm	<b>2-1/4</b> 2.2525-2.2521 (2.270-2.265 UNG)	3	H-112-48
		1	H-144-16
		1-3/8	H-144-22
		1-1/2	H-144-24
		1-3/4	H-144-28
		2-1/8	H-144-34
		2-1/2	H-144-40
3	H-144-48		

For extended-range bushings (larger sizes) please see our web catalog.

## Hoist Rings

Trusted to Move  
Your Most Important  
Materials!



Many Varieties  
Of Hoist Rings

- Swivel Hoist Rings
- Safety Hoist Rings
- Pivoting Hoist Rings
- Lifting Eyes
- Side-Pull Hoist Rings

See Pages 59-75

# HEAD PRESS FIT BUSHINGS – CARBIDE



ID RANGE	OD	LENGTH	ANSI PART NO.
<b>.0280-.0468</b> #70-#56 .75-1.15mm	<b>5/32</b> .1578-.1575	5/16	HC-10-5
		1/2	HC-10-8
<b>.0469-.0625</b> 3/64-1/16 1.20-1.55mm	<b>5/32</b> .1578-.1575	5/16	HC-10-5
		1/2	HC-10-8
<b>.0550-.0995</b> #54-#39 1.40-2.50mm	<b>13/64</b> .2046-.2043	5/16	HC-13-5
		1/2	HC-13-8
<b>.0995-.1360</b> #39-#29 2.55-3.40mm	<b>1/4</b> .2516-.2513	5/16	HC-16-5
		1/2	HC-16-8
<b>.1285-.1875</b> #30-3/16 3.30-4.75mm	<b>5/16</b> .3141-.3138	5/16	HC-20-5
		1/2	HC-20-8
		3/4	HC-20-12
		1	HC-20-16
<b>.1875-.2500</b> 3/16-1/4 4.80-6.30mm	<b>13/32</b> .4078-.4075	5/16	HC-26-5
		1/2	HC-26-8
		3/4	HC-26-12
		1	HC-26-16
<b>.2188-.3125</b> 7/32-5/16 5.60-7.90mm	<b>1/2</b> .5017-.5014	5/16	HC-32-5
		1/2	HC-32-8
		3/4	HC-32-12
		1	HC-32-16
<b>.3125-.4219</b> 5/16-27/64 8.00-10.50mm	<b>5/8</b> .6267-.6264	1-3/8	HC-32-22
		1/2	HC-40-8
		3/4	HC-40-12
		1	HC-40-16
<b>.3750-.5000</b> 3/8-1/2 9.60-12.50mm	<b>3/4</b> .7518-.7515	1-3/8	HC-40-22
		1/2	HC-48-8
		3/4	HC-48-12
		1	HC-48-16
<b>.5000-.6250</b> 1/2-5/8 13.00-15.50mm	<b>7/8</b> .8768-.8765	1-3/8	HC-48-22
		1/2	HC-56-8
		3/4	HC-56-12
		1	HC-56-16
		1-3/8	HC-56-22
		1-3/4	HC-56-28

Note: Due to manufacturing requirements, head dimensions of some carbide bushings may differ slightly from ANSI standards. Most carbide bushings have steel heads.

ID RANGE	OD	LENGTH	ANSI PART NO.
<b>.5000-.7500</b> 1/2-3/4 13.00-19.00mm	<b>1</b> 1.0018-1.0015	1/2	HC-64-8
		3/4	HC-64-12
		1	HC-64-16
		1-3/8	HC-64-22
<b>.7500-1.0000</b> 3/4-1 19.50-25.00mm	<b>1-3/8</b> 1.3772-1.3768	1-3/4	HC-64-28
		3/4	HC-88-12
		1	HC-88-16
		1-3/8	HC-88-22
<b>1.0000-1.3750</b> 1-1-3/8 26.00-34.00mm	<b>1-3/4</b> 1.7523-1.7519	1-3/4	HC-88-28
		2-1/8	HC-88-34
		2-1/2	HC-88-40
		1	HC-112-16
<b>1.3750-1.7500</b> 1-3/8-1-3/4 35.00-44.00mm	<b>2-1/4</b> 2.2525-2.2521	1-3/8	HC-112-22
		1-3/4	HC-112-28
		2	HC-112-32
		2-1/8	HC-112-34
		2-1/2	HC-112-40
		3	HC-112-48
		1	HC-144-16
		1-3/8	HC-144-22
		1-3/4	HC-144-28
		2-1/8	HC-144-34
		2-1/2	HC-144-40
		3	HC-144-48

## Toggle Clamps

**High Quality,  
Durable And  
Made in the USA!**

- A fast, easy workholding option
- Made of durable high grade steel
- Many varieties available
- Comfortable handle grip



See Pages 421-504

# HEAD PRESS FIT BUSHINGS – METRIC

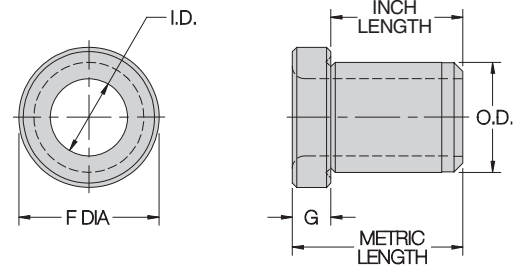


ID RANGE (G6)	OD (s6)	LENGTH	ANSI PART NO.
.35-1.00mm	4mm 4.027-4.019mm	*6mm	HM-4-6
		*9mm	HM-4-9
1.01-1.80mm	4mm 4.027-4.019mm	6mm	HM-4-6
		9mm	HM-4-9
1.81-2.60mm	5mm 5.027-5.019mm	6mm	HM-5-6
		9mm	HM-5-9
2.61-3.30mm	6mm 6.027-6.019mm	8mm	HM-6-8
		12mm	HM-6-12
		16mm	HM-6-16
3.31-4.00mm	7mm 7.032-7.023mm	8mm	HM-7-8
		12mm	HM-7-12
		16mm	HM-7-16
4.01-5.00mm	8mm 8.032-8.023mm	8mm	HM-8-8
		12mm	HM-8-12
		16mm	HM-8-16
5.01-6.00mm	10mm 10.032-10.023mm	10mm	HM-10-10
		16mm	HM-10-16
		20mm	HM-10-20
6.01-8.00mm	12mm 12.039-12.028mm	10mm	HM-12-10
		16mm	HM-12-16
		20mm	HM-12-20
8.01-10.00mm	15mm 15.039-15.028mm	12mm	HM-15-12
		20mm	HM-15-20
		25mm	HM-15-25
10.01-12.00mm	18mm 18.039-18.028mm	12mm	HM-18-12
		20mm	HM-18-20
		25mm	HM-18-25
12.01-15.00mm	22mm 22.048-22.035mm	16mm	HM-22-16
		28mm	HM-22-28
		36mm	HM-22-36
15.01-18.00mm	26mm 26.048-26.035mm	16mm	HM-26-16
		28mm	HM-26-28
		36mm	HM-26-36
18.01-22.00mm	30mm 30.048-30.035mm	20mm	HM-30-20
		36mm	HM-30-36
		45mm	HM-30-45
22.01-26.00mm	35mm 35.059-35.043mm	20mm	HM-35-20
		36mm	HM-35-36
		45mm	HM-35-45
26.01-30.00mm	42mm 42.059-42.043mm	25mm	HM-42-25
		45mm	HM-42-45
		56mm	HM-42-56
30.01-35.00mm	48mm 48.059-48.043mm	25mm	HM-48-25
		45mm	HM-48-45
		56mm	HM-48-56
35.01-42.00mm	55mm 55.072-55.053mm	30mm	HM-55-30
		56mm	HM-55-56
		67mm	HM-55-67
42.01-48.00mm	62mm 62.072-62.053mm	30mm	HM-62-30
		56mm	HM-62-56
		67mm	HM-62-67

\* **INFO+:** Counterbored, leaving correct drill-bearing length and clearance (see page 510 for bearing length).

ID RANGE (G6)	OD (s6)	LENGTH	ANSI PART NO.
48.01-55.00mm	70mm 70.078-70.059mm	30mm	HM-70-30
		56mm	HM-70-56
		67mm	HM-70-67
55.01-63.00mm	78mm 78.078-78.059mm	35mm	HM-78-35
		67mm	HM-78-67
		78mm	HM-78-78
63.01-70.00mm	85mm 85.093-85.071mm	35mm	HM-85-35
		67mm	HM-85-67
		78mm	HM-85-78
70.01-78.00mm	95mm 95.093-95.071mm	40mm	HM-95-40
		78mm	HM-95-78
		105mm	HM-95-105
78.01-85.00mm	105mm 105.101-105.079mm	40mm	HM-105-40
		78mm	HM-105-78
		105mm	HM-105-105
85.01-95.00mm	115mm 115.101-115.079mm	45mm	HM-115-45
		89mm	HM-115-89
		112mm	HM-115-112
95.01-105.00mm	125mm 125.117-125.092mm	45mm	HM-125-45
		89mm	HM-125-89
		112mm	HM-125-112

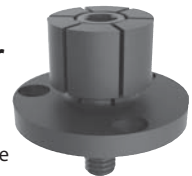
\* Small metric drill sizes through .80mm are counterbored 1.00mm diameter, with 3mm drill-bearing length.



Note: The "length" listed on this page for a metric head-press-fit bushing refers to its overall length, while the inch version's "length" is its length under the head.

## ID Clamps Provide 5-Side Machining Access

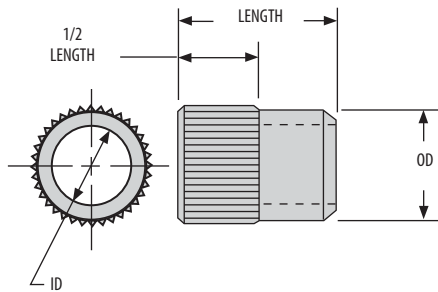
**Self-Centering, Allowing Precise Clamping on Inner Diameter of Your Part**



- Machinable to precisely fit the desired hole
- Clamp a part using an existing hole
- Allows access to five sides without any clamp interference

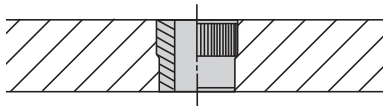
**See Pages 262-263**

# SERRATED PRESS FIT BUSHINGS



## APPLICATIONS:

Similar to a P bushing, but with top serrations to prevent rotation in soft materials. Recommended in high-torque situations for materials such as magnesium, aluminum, masonite, or wood. Finish-ground OD ensures accurate ID location. Serrations also resist axial force to prevent pushing the bushing through the jig plate.



## ORDERING EXAMPLES:

SP-26-16-.1875 Standard inch bushing, inch ID  
 SP-26-16-.1772 Standard inch bushing, mm ID (.1772 - 4.50mm)  
 SP-26-16-.1875 REAMER Reamer tolerance on ID  
 SP-26-16-.1875 NCB No counterbore on long bushings marked with \* (no counterbore is standard on all other bushings)  
 SPM-8-12-4.50 Standard metric bushing

Standard prices apply only to bushings with a standard-drill-size ID within the stated ID range. See catalog back cover for standard drill sizes and their decimal equivalents. For prices on non-standard ID sizes, including reamer-tolerance and tap-guide bushings, please contact factory.

## STANDARD ID TOLERANCES:

From #55 to 1/4"	+0.001/+0.0004	From 1 to 3mm	+0.002/+0.008mm
Over 1/4 to 3/4"	+0.001/+0.0005	Over 3 to 6mm	+0.004/+0.012mm
Over 3/4 to 1-1/2"	+0.002/+0.0006	Over 6 to 10mm	+0.005/+0.014mm
		Over 10 to 18mm	+0.006/+0.017mm
		Over 18 to 19mm	+0.007/+0.020mm (G6 tolerance)

## REAMER ID TOLERANCES:

From #60 to 1/4"	+0.0005/+0.0008	From 1 to 3mm	+0.006/+0.012mm
Over 1/4 to 1"	+0.0006/+0.0010	Over 3 to 6mm	+0.010/+0.018mm
		Over 6 to 10mm	+0.013/+0.022mm
		Over 10 to 18mm	+0.016/+0.027mm
		Over 18 to 19mm	+0.020/+0.033mm (F6 tolerance)

ID RANGE	OD	LENGTH	ANSI PART NO.
<b>.0520-.0995</b> #55-#39 1.35-2.50mm	<b>13/64</b> .2031-.2029	1/4	SP-13-4
		5/16	SP-13-5
		3/8	SP-13-6
		1/2	SP-13-8
<b>.0980-.1406</b> #40-9/64 2.50-3.50mm	<b>1/4</b> .2500-.2498	1/4	SP-16-4
		5/16	SP-16-5
		3/8	SP-16-6
		1/2	SP-16-8
<b>.1250-.1935</b> 1/8-#10 3.20-4.90mm	<b>5/16</b> .3125-.3123	1/4	SP-20-4
		5/16	SP-20-5
		3/8	SP-20-6
		1/2	SP-20-8
		3/4	SP-20-12
<b>.1562-.2570</b> 5/32-F 4.00-6.50mm	<b>13/32</b> .4062-.4060	5/16	SP-26-5
		3/8	SP-26-6
		1/2	SP-26-8
		3/4	SP-26-12
<b>.1562-.3160</b> 5/32-O 4.00-8.00mm	<b>1/2</b> .5000-.4998	*1	SP-26-16
		5/16	SP-32-5
		3/8	SP-32-6
		1/2	SP-32-8
		3/4	SP-32-12
<b>.3125-.4375</b> 5/16-7/16 7.90-11.00mm	<b>5/8</b> .6250-.6248	*1	SP-32-16
		3/8	SP-40-6
		1/2	SP-40-8
		3/4	SP-40-12
<b>.3125-.5312</b> 5/16-17/32 8.00-13.00mm	<b>3/4</b> .7500-.7498	1	SP-40-16
		3/8	SP-48-6
		1/2	SP-48-8
		3/4	SP-48-12
		1	SP-48-16
<b>.5000-.6562</b> 1/2-21/32 13.00-16.50mm	<b>7/8</b> .8750-.8748	3/8	SP-56-6
		1/2	SP-56-8
		3/4	SP-56-12
		1	SP-56-16
<b>.5000-.7656</b> 1/2-49/64 13.00-19.00mm	<b>1</b> 1.0000-.9998	1/2	SP-64-8
		3/4	SP-64-12
		1	SP-64-16
		1-3/8	SP-64-22

\* **INFO+:** Counterbored, leaving correct drill-bearing length and clearance (see page 512 for bearing length).

## Visit Our Redesigned Website

- Product Catalog
- Customer Service
- Free CAD Drawings
- Videos
- Engineering Resources

**Visit CarrLane.com**

# SERRATED PRESS FIT BUSHINGS – METRIC

ID RANGE (G6)	OD (h5)	LENGTH	ANSI PART NO.
1.00-1.80mm	5mm	6mm	SPM-5-6
		9mm	SPM-5-9
1.81-2.60mm	5.000-4.995mm	6mm	SPM-5-6
		9mm	SPM-5-9
2.61-3.30mm	6mm	8mm	SPM-6-8
		12mm	SPM-6-12
		16mm	SPM-6-16
3.31-4.00mm	7mm	8mm	SPM-7-8
		12mm	SPM-7-12
		16mm	SPM-7-16
4.01-5.00mm	8mm	8mm	SPM-8-8
		12mm	SPM-8-12
		16mm	SPM-8-16
5.01-6.00mm	10mm	10mm	SPM-10-10
		16mm	SPM-10-16
		20mm	SPM-10-20
6.01-8.00mm	12mm	10mm	SPM-12-10
		16mm	SPM-12-16
		20mm	SPM-12-20
8.01-10.00mm	15mm	12mm	SPM-15-12
		20mm	SPM-15-20
		25mm	SPM-15-25
10.01-12.00mm	18mm	12mm	SPM-18-12
		20mm	SPM-18-20
		25mm	SPM-18-25
12.01-15.00mm	22mm	16mm	SPM-22-16
		28mm	SPM-22-28
		36mm	SPM-22-36
15.01-18.00mm	26mm	16mm	SPM-26-16
		28mm	SPM-26-28
		36mm	SPM-26-36

**CarrLock**  
System for Fast Fixturing



## PROBLEM:

"We are an aerospace prototype shop making the transition from prototype to production on an important UAV project. We've developed elaborate fixturing of all shapes and sizes. We found ourselves leaving our trim fixtures set up on a large gantry style table and then having to tear everything down when a large part came along to make way for it.

This tied up one of our most valuable spindles, and dust collection was nearly impossible. Change over and setup times were totally out of control."



*Machine Operator Tyler Vaughn, of the Flying S, places a carbon trim fixture. The Carr Lock receiver bushings allow for fixtures in various configurations.*

## SOLUTION:

"I discovered that I could combine 80% of our trim fixtures into just one fixture plate using just two Carr Lock pins, with excellent locating ability and much better clamping than before.

Our setup times have gone from an average of about 25 minutes to literally 30 seconds, thus saving us hundreds of hours."

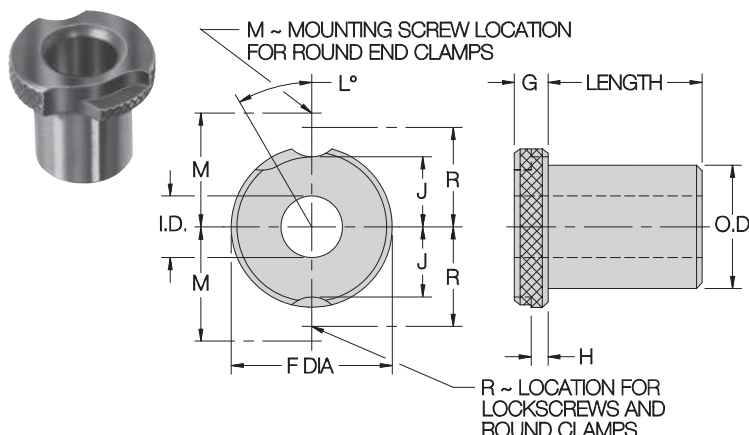
*Peter Bowman  
Production Manager/Mfg Engineer  
Flying S Inc.*

Exclusively  
Made in the  
USA

[www.carrlane.com/carrlock](http://www.carrlane.com/carrlock)

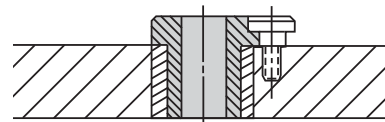
See Pages 303-320

# SLIP/FIXED RENEWABLE BUSHINGS



## APPLICATIONS:

Replaceable bushing generally used with a liner bushing and lock screw. Use when you expect to replace bushings during the tooling's lifetime, or when you want to switch bushings to perform multi-step operations with the same tooling. SF bushings combine the benefits of older S-type slip-renewable and F-type fixed-renewable bushings: One side has a small recess for fixed mounting; the other has a locking recess that allows the bushing to slip down, then lock in place by rotating it. S and F types are now obsolete and combination SF bushings will be furnished at no extra charge.



## INCH

BODY OD	F DIA	G	H	J	L	M	R	LOCK SCREW
3/16	5/16	3/16	3/32	3/32	55°		17/64	LS-0
1/4	7/16	1/4	1/8	9/64	30°		23/64	TW-2
5/16	35/64			11/64	65°	5/8	1/2	LS-1
3/8	5/8			15/64	30°		29/64	TW-2
7/16	5/8			15/64	30°		29/64	TW-2
1/2	51/64			19/64	65°	3/4	5/8	LS-1
9/16	7/8			23/64	65°		37/64	TW-2
5/8	7/8			23/64	30°		37/64	TW-2
3/4	1-3/64			27/64	50°	7/8	3/4	LS-1
7/8	1-1/4	3/8	3/16	31/64	30°		53/64	TW-7
1	1-27/64			19/32	35°	1-7/64	59/64	LS-2
1-1/4	1-5/8			43/64	30°		1-1/64	
1-3/8	1-51/64			25/32	30°	1-19/64	1-7/64	
1-1/2	1-7/8	51/64	30°		1-9/64			
1-3/4	2-19/64	3/8	3/16	1	30°	1-41/64	1-25/64	LS-3
2-1/4	2-51/64			1-1/4	25°	1-57/64	1-41/64	

## METRIC

8mm	15mm	6mm	3mm	4.5mm	65°		11.5mm	LSM-1				
10mm	18mm			6mm	65°		13mm	LSM-2				
12mm	22mm	8mm	4mm	7.5mm	60°		16mm	LSM-3 LSM-4				
15mm	26mm			9.5mm	50°		18mm					
18mm	30mm			11.5mm	50°		20mm					
22mm	34mm			13mm	35°		23.5mm					
26mm	39mm	10mm	5.5mm	15.5mm	35°		26mm	LSM-5 LSM-6				
30mm	46mm			19mm	30°		29.5mm					
35mm	52mm			22mm	30°		32.5mm					
42mm	59mm			25.5mm	30°		36mm					
48mm	66mm			12mm	7mm		28.5mm		30°		41mm	LSM-7 LSM-8
55mm	74mm						32.5mm		25°		45mm	
62mm	82mm	36.5mm	25°			49mm						
70mm	90mm	40.5mm	25°			53mm						
78mm	100mm	45.5mm	25°			58mm						
85mm	110mm	50.5mm	20°			63mm						
95mm	120mm	55.5mm	20°			68mm						
105mm	130mm	60.5mm	20°			73mm						

## ORDERING EXAMPLES:

SF-20-16-.1250 Standard inch bushing, inch ID  
 SF-20-16-.1772 Standard inch bushing, mm ID (.1772 = 4.50mm)  
 SF-20-16-.1250 REAMER Reamer tolerance on ID  
 SF-20-16-.1250 NCB No counterbore on long bushings marked with \* (no counterbore is standard on all other bushings)  
 SFC-20-16-.1250 Carbide bushing  
 SFM-8-16-4.50 Standard metric bushing

Standard prices apply only to bushings with a standard-drill-size ID within the stated ID range. See catalog back cover for standard drill sizes and their decimal equivalents. For prices on non-standard ID sizes, including reamer-tolerance and tap-guide bushings, please contact factory.

## STANDARD ID TOLERANCES:

From #80 to 1/4"	+0.001/+0.004	From .35 to 3mm	+0.02/+0.08mm
Over 1/4 to 3/4"	+0.001/+0.005	Over 3 to 6mm	+0.04/+0.12mm
Over 3/4 to 1-1/2"	+0.002/+0.006	Over 6 to 10mm	+0.05/+0.14mm
		Over 10 to 18mm	+0.06/+0.17mm
		Over 18 to 30mm	+0.07/+0.20mm
Over 1-1/2 to 2-3/4"	+0.003/+0.007	Over 30 to 50mm	+0.09/+0.25mm
		Over 50 to 80mm	+0.10/+0.29mm
		Over 80 to 120mm	+0.12/+0.34mm
			(G6 tolerance)

## REAMER ID TOLERANCES:

From #60 to 1/4"	+0.005/+0.008	From 1 to 3mm	+0.06/+0.12mm
		Over 3 to 6mm	+0.10/+0.18mm
Over 1/4 to 1"	+0.006/+0.010	Over 6 to 10mm	+0.13/+0.22mm
		Over 10 to 18mm	+0.16/+0.27mm
Over 1 to 1-1/2"	+0.008/+0.012	Over 18 to 30mm	+0.20/+0.33mm
			(F6 tolerance)

# SLIP/FIXED RENEWABLE BUSHINGS



ID RANGE	OD	LENGTH	ANSI PART NO.	LOCK SCREW
<b>.0135-.0291</b> #80-#70 .35-.70mm	<b>3/16</b> .1875-.1873	*1/4	SF-12-4	LS-0
		*5/16	SF-12-5	
		*3/8	SF-12-6	
		*1/2	SF-12-8	
		*5/8	SF-12-10	
*3/4		SF-12-12		
<b>.0292-.0519</b> #69-3/64 .75-1.25mm		1/4	SF-12-4	
		*5/16	SF-12-5	
		*3/8	SF-12-6	
		*1/2	SF-12-8	
		*5/8	SF-12-10	
<b>.0520-.0634</b> #55-1/16 1.30-1.60mm		*3/4	SF-12-12	
		1/4	SF-12-4	
		*5/16	SF-12-5	
		*3/8	SF-12-6	
	*1/2	SF-12-8		
<b>.0635-.0980</b> #52-#40 1.65-2.50mm	*5/8	SF-12-10		
	*3/4	SF-12-12		
	1/4	SF-12-4		
	*5/16	SF-12-5		
	*3/8	SF-12-6		
<b>.0995-.1405</b> #39-#28 2.55-3.50mm	*1/2	SF-12-8		
	*5/8	SF-12-10		
	*3/4	SF-12-12		
	1/4	SF-16-4		
	5/16	SF-16-5		
		*3/8	SF-16-6	TW-2
		*1/2	SF-16-8	
		*5/8	SF-16-10	
		*3/4	SF-16-12	

ID RANGE	OD	LENGTH	ANSI PART NO.	LOCK SCREW
<b>.0135-.0291</b> #80-#70 .35-.70mm	<b>5/16</b> .3125-.3123	*1/4	SF-20-4	LS-1 RC-01 RK-01 RK-10
		*5/16	SF-20-5	
		*3/8	SF-20-6	
		*1/2	SF-20-8	
		*3/4	SF-20-12	
<b>.0292-.0519</b> #69-3/64 .75-1.30mm		*5/16	SF-20-5	
		*3/8	SF-20-6	
		*1/2	SF-20-8	
		*3/4	SF-20-12	
		*5/16	SF-20-5	
<b>.0520-.0634</b> #55-1/16 1.35-1.60mm		*3/8	SF-20-6	
		*1/2	SF-20-8	
		*3/4	SF-20-12	
		5/16	SF-20-5	
		*3/8	SF-20-6	
<b>.0635-.0934</b> #52-#43 1.65-2.35mm	*1/2	SF-20-8		
	*3/4	SF-20-12		
	*1	SF-20-16		
	5/16	SF-20-5		
	3/8	SF-20-6		
<b>.0935-.1249</b> #42-#31 2.40-3.15mm	*1/2	SF-20-8		
	*3/4	SF-20-12		
	*1	SF-20-16		
	*1-3/8	SF-20-22		
	5/16	SF-20-5		
<b>.1250-.1935</b> 1/8-#10 3.20-4.90mm	3/8	SF-20-6		
	1/2	SF-20-8		
	5/8	SF-20-10		
	*3/4	SF-20-12		
	*1	SF-20-16		
<b>.1935-.2280</b> #10-#1 4.90-5.80mm	*1-3/8	SF-20-22		
	1/4	SF-24-4		
	5/16	SF-24-5		
	3/8	SF-24-6		
	1/2	SF-24-8		
<b>.2340-.2900</b> A-L 5.90-7.40mm	5/8	SF-24-10		
	3/4	SF-24-12		
	*1	SF-24-16		
	1/4	SF-28-4		
	5/16	SF-28-5		
		3/8	SF-28-6	TW-2
		1/2	SF-28-8	
		5/8	SF-28-10	
		3/4	SF-28-12	
		*1	SF-28-16	

## Our Best Resource

## Your Local Distributor

With more than 300 local distributors  
it's easy to find one near you!

ISO 9001  
CERTIFIED

Find a Distributor in the Customer Service Area  
At CarrLane.com

\* **INFO+:** Counterbored, leaving correct drill-bearing length and clearance (see page 512 for bearing length).



# SLIP/FIXED RENEWABLE BUSHINGS



ID RANGE	OD	LENGTH	ANSI PART NO.	LOCK SCREW	
<b>.1405-.1889</b> #28-3/16 3.60-4.75mm	<b>1/2</b> .5000-.4998	5/16	SF-32-5	LS-1 RC-01 RK-01 RK-10	
		3/8	SF-32-6		
		1/2	SF-32-8		
		*3/4	SF-32-12		
		*1	SF-32-16		
		*1-3/8	SF-32-22		
		*1-1/2	SF-32-24		
		*1-3/4	SF-32-28		
		5/16	SF-32-5		
		3/8	SF-32-6		
<b>.1890-.3438</b> #12-11/32 4.80-8.70mm	<b>1/2</b> .5000-.4998	1/2	SF-32-8	LS-1 RC-01 RK-01 RK-10	
		3/4	SF-32-12		
		*1	SF-32-16		
		*1-3/8	SF-32-22		
		*1-1/2	SF-32-24		
		*1-3/4	SF-32-28		
		*2-1/8	SF-32-34		
		1/4	SF-36-4		TW-2
		5/16	SF-36-5		
		3/8	SF-36-6		
1/2	SF-36-8				
5/8	SF-36-10				
3/4	SF-36-12				
1	SF-36-16				
<b>.3480-.4375</b> S-7/16 8.90-11.00mm	<b>5/8</b> .6250-.6248	3/8	SF-40-6	TW-2	
		1/2	SF-40-8		
		5/8	SF-40-10		
		3/4	SF-40-12		
		1	SF-40-16		
		1-1/4	SF-40-20		
<b>.2812-.5625</b> 9/32-9/16 7.20-14.00mm	<b>3/4</b> .7500-.7498	3/8	SF-48-6	LS-1 RC-01 RK-01 RK-11	
		1/2	SF-48-8		
		3/4	SF-48-12		
		1	SF-48-16		
		1-3/8	SF-48-22		
		1-1/2	SF-48-24		
		1-3/4	SF-48-28		
		2-1/8	SF-48-34		
		*2-1/2	SF-48-40		
		*3	SF-48-48		
<b>.5469-.6562</b> 35/64-21/32 13.50-16.50mm	<b>7/8</b> .8750-.8748	1/2	SF-56-8	TW-7	
		5/8	SF-56-10		
		3/4	SF-56-12		
		1	SF-56-16		
		1-1/4	SF-56-20		
<b>.4688-.7812</b> 15/32-25/32 12.00-19.50mm	<b>1</b> 1.0000-.9998	1-1/2	SF-64-8	LS-2 RC-02 RK-02 RK-12	
		3/4	SF-64-12		
		1	SF-64-16		
		1-3/8	SF-64-22		
		1-1/2	SF-64-24		
		1-3/4	SF-64-28		
		2-1/8	SF-64-34		
		2-1/2	SF-64-40		
		3	SF-64-48		

\* **INFO+:** Counterbored, leaving correct drill-bearing length and clearance (see page 512 for bearing length).

ID RANGE	OD	LENGTH	ANSI PART NO.	LOCK SCREW
<b>.7188-1.0625</b> 23/32-1-1/16 18.50-27.00mm	1-3/8 1.3750-1.3747	3/4	SF-88-12	LS-2 RC-02 RK-02 RK-12
		1	SF-88-16	
		1-3/8	SF-88-22	
		1-1/2	SF-88-24	
		1-3/4	SF-88-28	
		2-1/8	SF-88-34	
		2-1/2	SF-88-40	
		3	SF-88-48	
<b>.9688-1.4062</b> 31/32-1-13/32 25.00-35.00mm	1-3/4 1.7500-1.7497	3/4	SF-112-12	LS-3 RC-03 RK-03 RK-14
		1	SF-112-16	
		1-3/8	SF-112-22	
		1-1/2	SF-112-24	
		1-3/4	SF-112-28	
		2-1/8	SF-112-34	
		2-1/2	SF-112-40	
		3	SF-112-48	
<b>1.3438-1.8750</b> 1-11/32-1-7/8 35.00-47.00mm	2-1/4 2.2500-2.2496	3/4	SF-144-12	LS-3 RC-03 RK-03 RK-14
		1	SF-144-16	
		1-3/8	SF-144-22	
		1-1/2	SF-144-24	
		1-3/4	SF-144-28	
		2-1/8	SF-144-34	
		2-1/2	SF-144-40	
		3	SF-144-48	

For extended-range bushings (larger sizes) please see our web catalog.

## Alignment Pins

### Strength and Precision

- Wide assortment of quality ball lock and detent pins for precision alignment
- In steel or stainless steel
- A wide selection of other alignment pins are available



See Pages 27-53

# SLIP/FIXED RENEWABLE BUSHINGS – CARBIDE

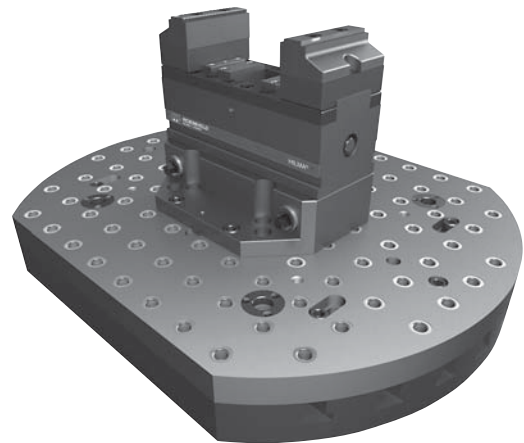


ID RANGE	OD	LENGTH	ANSI PART NO.	LOCK SCREW
<b>.0520-.0934</b> #55-#43 1.35-2.35mm	<b>5/16</b> .3125-.3123	5/16	SFC-20-5	LS-1 RC-01 RK-01 RK-10
		1/2	SFC-20-8	
		3/4	SFC-20-12	
		1	SFC-20-16	
<b>.0935-.1562</b> #42-5/32 2.40-3.90mm	<b>5/16</b> .3125-.3123	5/16	SFC-20-5	LS-1 RC-01 RK-01 RK-10
		1/2	SFC-20-8	
		3/4	SFC-20-12	
		1	SFC-20-16	
<b>.1406-.1889</b> 9/64-3/16 3.60-4.75mm	<b>1/2</b> .5000-.4998	5/16	SFC-32-5	LS-1 RC-01 RK-01 RK-10
		1/2	SFC-32-8	
		3/4	SFC-32-12	
		1	SFC-32-16	
<b>.1890-.3438</b> #12-11/32 4.80-8.70mm	<b>1/2</b> .5000-.4998	1-3/8	SFC-32-22	LS-1 RC-01 RK-01 RK-10
		5/16	SFC-32-5	
		1/2	SFC-32-8	
		3/4	SFC-32-12	
<b>.2812-.5312</b> 9/32-17/32 7.20-13.00mm	<b>3/4</b> .7500-.7498	1-3/8	SFC-32-22	LS-1 RC-01 RK-01 RK-10
		1/2	SFC-48-8	
		3/4	SFC-48-12	
		1	SFC-48-16	
<b>.4688-.7812</b> 15/32-25/32 12.00-19.50mm	<b>1</b> 1.0000-.9998	1-3/8	SFC-48-22	LS-2 RC-02 RK-02 RK-12
		1/2	SFC-64-8	
		3/4	SFC-64-12	
		1	SFC-64-16	
<b>.7188-1.0312</b> 23/32 - 1-1/32 18.50-27.00mm	<b>1-3/8</b> 1.3750-1.3747	1-3/8	SFC-64-22	LS-2 RC-02 RK-02 RK-12
		1-3/4	SFC-64-28	
		1	SFC-88-12	
		3/4	SFC-88-12	
<b>.9688-1.4062</b> 31/32 - 1-13/32 25.00-35.00mm	<b>1-3/4</b> 1.7500-1.7497	2-1/8	SFC-88-34	LS-3 RC-03 RK-03 RK-14
		2-1/2	SFC-88-40	
		1	SFC-112-16	
		1-3/8	SFC-112-22	
		1-3/4	SFC-112-28	
<b>1.3438-1.7812</b> 1-11/32 - 1-25/32 35.00-45.00mm	<b>2-1/4</b> 2.2500-2.2496	2-1/8	SFC-112-34	LS-3 RC-03 RK-03 RK-14
		2-1/2	SFC-112-40	
		1	SFC-144-16	
		1-3/8	SFC-144-22	
		1-3/4	SFC-144-28	
		2-1/8	SFC-144-34	
		2-1/2	SFC-144-40	
		3	SFC-144-48	

Note: Due to manufacturing requirements, head dimensions of some carbide bushings may differ slightly from ANSI standards. Most carbide bushings have steel heads.



## Quick-Change With No Adaptor Plates, Blocks Or Pallets Necessary



- Quintus fixture plates available as blank, or with multi-function holes
- German-built, extremely accurate precision vises
- Allows unrestricted tool access for multiple-side machining
- Numerous jaw types and sizes available

See Pages 325-346

# SLIP/FIXED RENEWABLE BUSHINGS – METRIC



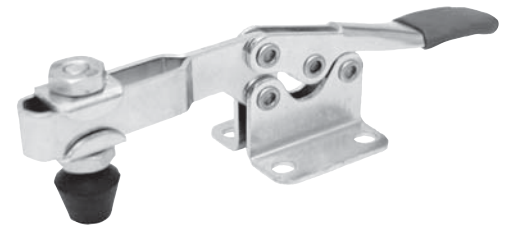
ID RANGE	OD	LENGTH	ANSI PART NO.	LOCK SCREW
.35-1.00mm	8mm 8.000-7.994mm	*10mm	SFM-8-10	LSM-1 LSM-2 RCM-1 RCM-2
1.01-1.80mm		*16mm	SFM-8-16	
1.81-4.00mm	10mm 10.000-9.994mm	10mm	SFM-8-10	
		16mm	SFM-8-16	
4.01-6.00mm	12mm 12.000-11.992mm	10mm	SFM-8-10	
		16mm	SFM-8-16	
6.01-8.00mm	15mm 15.000-14.992mm	12mm	SFM-10-12	LSM-3 LSM-4 RCM-3 RCM-4
		20mm	SFM-10-20	
8.01-10.00mm	18mm 18.000-17.992mm	25mm	SFM-10-25	
		12mm	SFM-12-12	
10.01-12.00mm	20mm 20.000-19.992mm	20mm	SFM-12-20	
		25mm	SFM-12-25	
12.01-15.00mm	22mm 22.000-21.991mm	16mm	SFM-15-16	LSM-5 LSM-6 RCM-5 RCM-6
		28mm	SFM-15-28	
15.01-18.00mm	26mm 26.000-25.991mm	36mm	SFM-15-36	
		20mm	SFM-18-16	
18.01-22.00mm	30mm 30.000-29.991mm	28mm	SFM-18-28	
		36mm	SFM-18-36	
22.01-26.00mm	35mm 35.000-34.989mm	20mm	SFM-22-20	LSM-7 LSM-8 RCM-7 RCM-8
		36mm	SFM-22-36	
26.01-30.00mm	42mm 42.000-41.989mm	45mm	SFM-22-45	
		20mm	SFM-26-20	
30.01-35.00mm	48mm 48.000-47.989mm	36mm	SFM-26-36	
		45mm	SFM-26-45	
35.01-42.00mm	55mm 55.000-54.987mm	25mm	SFM-30-25	
		45mm	SFM-30-45	
42.01-48.00mm	62mm 62.000-61.987mm	56mm	SFM-30-56	
		25mm	SFM-35-25	
		45mm	SFM-35-45	
		56mm	SFM-35-56	
		30mm	SFM-42-30	
		56mm	SFM-42-56	
		67mm	SFM-42-67	
		30mm	SFM-48-30	
		56mm	SFM-48-56	
		67mm	SFM-48-67	
		30mm	SFM-55-30	
		56mm	SFM-55-56	
		67mm	SFM-55-67	
		35mm	SFM-62-35	
		67mm	SFM-62-67	
		78mm	SFM-62-78	

ID RANGE (G6)	OD (h5)	LENGTH	ANSI PART NO.	LOCK SCREW
48.01-55.00mm	70mm 70.000-69.987mm	35mm	SFM-70-35	LSM-7 LSM-8 RCM-7 RCM-8
		67mm	SFM-70-67	
		78mm	SFM-70-78	
55.01-62.00mm	78mm 78.000-77.987mm	40mm	SFM-78-40	
		78mm	SFM-78-78	
		105mm	SFM-78-105	
62.01-70.00mm	85mm 85.000-84.985mm	40mm	SFM-85-40	
		78mm	SFM-85-78	
		105mm	SFM-85-105	
70.01-78.00mm	95mm 95.000-94.985mm	45mm	SFM-95-45	
		89mm	SFM-95-89	
		112mm	SFM-95-112	
78.01-85.00mm	105mm 105.000-104.985mm	45mm	SFM-105-45	
		89mm	SFM-105-89	
		112mm	SFM-105-112	

\* Small metric drill sizes through .80mm are counter-bored 1.00mm diameter, with 3mm drill-bearing length.

## Toggle Clamps

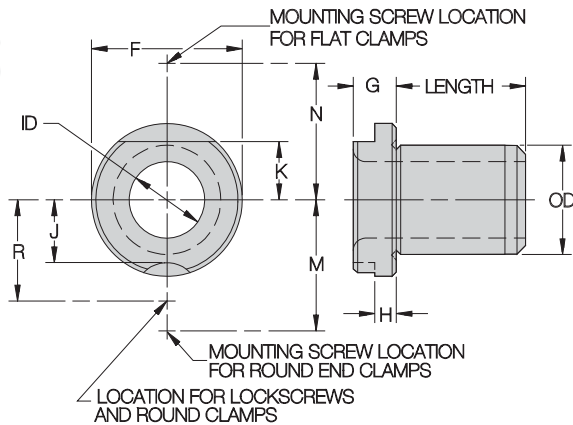
**High Quality,  
Durable And  
Made in the USA!**



- A fast, easy workholding option
- Made of durable high grade steel
- Many varieties available
- Comfortable handle grip

See Pages 421-504

# FLAT MILLED RENEWABLE BUSHINGS



## STANDARD ID TOLERANCES:

From #80 to 1/4"	+0.001/+0.004	From .35 to 3mm	+0.02/+0.08mm
Over 1/4 to 3/4"	+0.001/+0.005	Over 3 to 6mm	+0.04/+0.12mm
Over 3/4 to 1-1/2"	+0.002/+0.006	Over 6 to 10mm	+0.05/+0.14mm
Over 1-1/2 to 2-3/4"	+0.003/+0.007	Over 10 to 18mm	+0.06/+0.17mm
		Over 18 to 30mm	+0.07/+0.20mm
		Over 30 to 50mm	+0.09/+0.25mm (G6 tolerance)

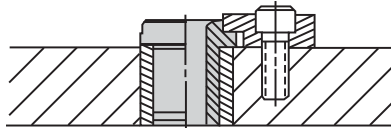
## REAMER ID TOLERANCES:

From #60 to 1/4"	+0.005/+0.008	From 1 to 3mm	+0.06/+0.12mm
Over 1/4 to 1"	+0.006/+0.010	Over 3 to 6mm	+0.10/+0.18mm
Over 1" to 1-1/2"	+0.008/+0.012	Over 6 to 10mm	+0.13/+0.22mm
		Over 10 to 18mm	+0.16/+0.27mm
		Over 18 to 30mm	+0.20/+0.33mm (F6 tolerance)

BODY OD	F	G	H	J	K	M	N	R	FLAT CLAMP	LOCK SCREW
5/16	35/64	1/4	1/8	11/64	11/64	5/8	11/16	1/2	FC-01 FC-10	LS-1
1/2	51/64			19/64	17/64	3/4	25/32	5/8		
3/4	1-3/64	3/8	3/16	27/64	25/64	7/8	57/64	3/4	FC-02 FC-12	LS-2
1	1-27/64			19/32	1/2	1-7/64	1-9/64	59/64		
1-3/8	1-51/64	3/8	3/16	25/32	11/16	1-19/54	1-21/64	1-7/64	FC-03 FC-14 FC-15	LS-3
1-3/4	2-19/64			1	7/8	1-41/64	1-33/64	1-25/64		
2-1/4	2-51/64	3/8	3/16	1-1/4	1-1/8	1-57/64	1-49/64	1-41/64		

## APPLICATIONS:

Replaceable bushing used for extra resistance to rotational forces under harsh conditions. This bushing, generally used with a liner, has a milled locking flat to allow fastening securely with a flat clamp. FM bushings also have a standard recess on the other side to allow using a lock screw instead.



## ORDERING EXAMPLES:

FM-20-16-.1250	Standard inch Bushing, inch ID
FM-20-16-.1772	Standard inch Bushing, mm ID (.1772 = 4.50mm)
FM-20-16-.1250 REAMER	Reamer Tolerance on ID
FM-20-16-.1250 NCB	No counterbore on long bushings marked with * (no counterbore is standard on all other bushings)
FMC-20-16-.1250	Carbide Bushing

Standard prices apply only to bushings with a standard-drill-size ID within the stated ID range. See catalog back cover for standard drill sizes and their decimal equivalents. For prices on non-standard ID sizes, including reamer-tolerance and tap-guide bushings, please contact factory.

ID RANGE	OD	LENGTH	ANSI PART NO.	CLAMP
.0135-.0291 #80-#70 .35-.70mm	5/16 .3125-.3123	*1/4	FM-20-4	FC-01 FC-10 LS-1 RC-01 RK-01 RK-10
		*5/16	FM-20-5	
		*3/8	FM-20-6	
		*1/2	FM-20-8	
		*3/4	FM-20-12	
*5/16		FM-20-5		
.0292-.0519 #69-3/64 .75-1.30mm		*3/8	FM-20-6	
*1/2		FM-20-8		
*3/4		FM-20-12		
*5/16		FM-20-5		
.0520-.0634 #55-1/16 1.35-1.60mm	*3/8	FM-20-6		
*1/2	FM-20-8			
*3/4	FM-20-12			
.0635-.0934 #52-#43 1.65-2.35mm	5/16	FM-20-5		
*3/8	FM-20-6			
*1/2	FM-20-8			
*3/4	FM-20-12			
*1	FM-20-16			
.0935-.1249 #42-#31 2.40-3.15mm	5/16	FM-20-5		
3/8	FM-20-6			
*1/2	FM-20-8			
*3/4	FM-20-12			
*1	FM-20-16			
*1-3/8	FM-20-22			
.1250-.1935 1/8-#10 3.20-4.90mm	5/16	FM-20-5		
3/8	FM-20-6			
1/2	FM-20-8			
5/8	FM-20-10			
*3/4	FM-20-12			
*1	FM-20-16			
*1-3/8	FM-20-22			

\* **INFO+:** Counterbored, leaving correct drill-bearing length and clearance (see page 512 for bearing length).

# FLAT MILLED RENEWABLE BUSHINGS



ID RANGE	OD	LENGTH	ANSI PART NO.	CLAMP	
<b>.1405-.1889</b> #28-3/16 3.60-4.75mm	<b>1/2</b> .5000-.4998	5/16	FM-32-5	FC-01 FC-10 RC-01 RK-01 RK-10	
		3/8	FM-32-6		
		1/2	FM-32-8		
		*3/4	FM-32-12		
		*1	FM-32-16		
		*1-3/8	FM-32-22		
		*1-1/2	FM-32-24		
		*1-3/4	FM-32-28		
		5/16	FM-32-5		
		3/8	FM-32-6		
<b>.1890-.3438</b> #12-11/32 4.80-8.70mm	<b>1/2</b> .5000-.4998	1/2	FM-32-8	FC-01 FC-10 RC-01 RK-01 RK-10	
		3/4	FM-32-12		
		*1	FM-32-16		
		*1-3/8	FM-32-22		
		*1-1/2	FM-32-24		
		*1-3/4	FM-32-28		
		*2-1/8	FM-32-34		
		3/8	FM-48-6		FC-01 FC-11 LS-1 RC-01 RK-01 RK-11
		1/2	FM-48-8		
		3/4	FM-48-12		
1	FM-48-16				
1-3/8	FM-48-22				
1-1/2	FM-48-24				
1-3/4	FM-48-28				
2-1/8	FM-48-34				
*2-1/2	FM-48-40				
*3	FM-48-48				
<b>.4688-.7812</b> 15/32-25/32 12.00-19.50mm	<b>1</b> 1.0000-.9998	1/2	FM-64-8	FC-02 FC-12 LS-2 RC-02 RK-02 RK-12	
		3/4	FM-64-12		
		1	FM-64-16		
		1-3/8	FM-64-22		
		1-1/2	FM-64-24		
		1-3/4	FM-64-28		
		2-1/8	FM-64-34		
		2-1/2	FM-64-40		
		3	FM-64-48		
		<b>.7188-1.0625</b> 23/32 - 1-1/16 18.50-27.00mm	<b>1-3/8</b> 1.3750-1.3747		3/4
1	FM-88-16				
1-3/8	FM-88-22				
1-1/2	FM-88-24				
1-3/4	FM-88-28				
2-1/8	FM-88-34				
2-1/2	FM-88-40				
3	FM-88-48				

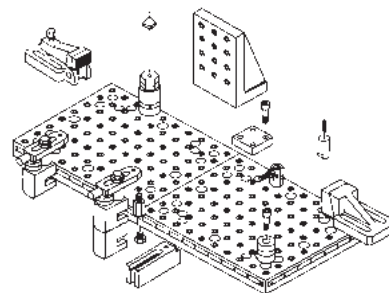
\* **INFO+**: Counterbored, leaving correct drill-bearing length and clearance (see page 512 for bearing length).

ID RANGE	OD	LENGTH	ANSI PART NO.	CLAMP
<b>.9688-1.4062</b> 31/32 - 1-13/32 25.00-35.00mm	<b>1-3/4</b> 1.7500-1.7497	3/4	FM-112-12	FC-03 FC-14 FC-15 LS-3 RC-03 RK-03 RK-14
		1	FM-112-16	
		1-3/8	FM-112-22	
		1-1/2	FM-112-24	
		1-3/4	FM-112-28	
		2-1/8	FM-112-34	
		2-1/2	FM-112-40	
		3	FM-112-48	
<b>1.3438-1.8750</b> 1-11/32 - 1-7/8 35.00-47.00mm	<b>2-1/4</b> 2.2500-2.2496	3/4	FM-144-12	FC-03 FC-14 FC-15 LS-3 RC-03 RK-03 RK-14
		1	FM-144-16	
		1-3/8	FM-144-22	
		1-1/2	FM-144-24	
		1-3/4	FM-144-28	
		2-1/8	FM-144-34	
		2-1/2	FM-144-40	
		3	FM-144-48	

For extended-range bushings (larger sizes) please see our web catalog.

## Modular Fixturing

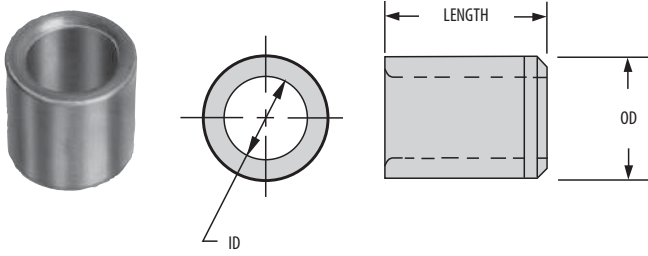
### An Ideal Answer To Many Workholding Problems



- Great for temporary fixturing: one-time jobs, short or prototype production runs, trial fixturing or while permanent fixtures are built or repaired
- Available in mini, standard and heavy sizes
- Wide range of tooling plates and blocks, finish ground, with multipurpose positioning holes
- Order as components, or in handy starter sets

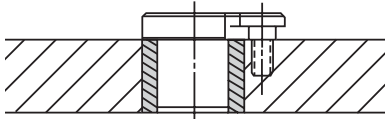
See Pages 369-420

# LINER BUSHINGS



## APPLICATIONS:

Liners are permanent bushings used to hold renewable drill bushings. The liner's ID has a precise sliding fit with the renewable bushing's OD. The hardened liner accurately locates the renewable bushing and protects the jig plate from wear caused by frequent bushing replacement. Note: Metric liner bushings are the same as metric press-fit bushings.



## ORDERING EXAMPLES:

L-32-16 Standard inch liner bushing  
 L-32-16U Unground OD  
 L-40-16-24 Standard inch liner bushing with a choice of ID in that OD size  
 PM-18-25-12.00 Standard metric liner bushing (same as metric press-fit type)

## STANDARD LINER ID TOLERANCES:

3/16 to 3/8"	+0.001/+0.004	8 to 10mm	+0.05/+0.014mm
7/16 to 5/8"	+0.002/+0.005	12 to 18mm	+0.06/+0.017mm
3/4"	+0.003/+0.006	22 to 30mm	+0.07/+0.020mm
7/8 to 1"	+0.004/+0.007	35 to 48mm	+0.09/+0.025mm
1-3/8"	+0.006/+0.010	55 to 78mm	+0.10/+0.029mm
1-3/4"	+0.008/+0.012	85 to 105mm	+0.12/+0.034mm
2-1/4"	+0.010/+0.015		(G6 tolerance)

ID	OD	LENGTH	ANSI PART NO.
3/16	5/16 .3141-.3138 (.327-.322 UNG)	1/4	L-20-4
		5/16	L-20-5
		3/8	L-20-6
		1/2	L-20-8
		5/8	L-20-10
		3/4	L-20-12
1/4	7/16 .4392-.4389 (.453-.448 UNG)	1/4	L-28-4
		5/16	L-28-5
		3/8	L-28-6
		1/2	L-28-8
		5/8	L-28-10
		3/4	L-28-12

ID	OD	LENGTH	ANSI PART NO.	
5/16	1/2 .5017-.5014 (.520-.515 UNG)	1/4	L-32-4	
		5/16	L-32-5	
		3/8	L-32-6	
		1/2	L-32-8	
		5/8	L-32-10	
		3/4	L-32-12	
	9/16 .5642-.5639 (.582-.577 UNG)	1	L-32-16	
		1-3/8	L-32-22	
		1/4	L-36-4	
		5/16	L-36-5	
		3/8	L-36-6	
		1/2	L-36-8	
3/8	5/8 .6267-.6264 (.645-.640 UNG)	5/8	L-36-10	
		3/4	L-36-12	
		1	L-36-16	
		1/4	L-40-4-24	
		5/16	L-40-5-24	
		3/8	L-40-6-24	
	7/16	5/8 .6267-.6264 (.645-.640 UNG)	1/2	L-40-8-24
			5/8	L-40-10-24
			3/4	L-40-12-24
			1	L-40-16-24
			1/4	L-40-4-28
			5/16	L-40-5-28
1/2	3/4 .7518-.7515 (.770-.765 UNG)	3/8	L-40-6-28	
		1/2	L-40-8-28	
		5/8	L-40-10-28	
		3/4	L-40-12-28	
		1	L-40-16-28	
		5/16	L-48-5	
	9/16	7/8 .8768-.8765 (.895-.890 UNG)	3/8	L-48-6
			1/2	L-48-8
			3/4	L-48-12
			1	L-48-16
			1-3/8	L-48-22
			1-1/2	L-48-24
5/8	7/8 .8768-.8765 (.895-.890 UNG)	1-3/4	L-48-28	
		2-1/8	L-48-34	
		5/16	L-56-5-36	
		3/8	L-56-6-36	
		1/2	L-56-8-36	
		5/8	L-56-10-36	
5/8	7/8 .8768-.8765 (.895-.890 UNG)	3/4	L-56-12-36	
		1	L-56-16-36	
		1-1/4	L-56-20-36	
		5/16	L-56-5-40	
		3/8	L-56-6-40	
		1/2	L-56-8-40	
5/8	7/8 .8768-.8765 (.895-.890 UNG)	5/8	L-56-10-40	
		3/4	L-56-12-40	
		1	L-56-16-40	
		1-1/4	L-56-20-40	



ID	OD	LENGTH	ANSI PART NO.
3/4	1 1.0018-1.0015 (1.020-1.015 UNG)	1/2	L-64-8
		3/4	L-64-12
		1	L-64-16
		1-3/8	L-64-22
		1-1/2	L-64-24
		1-3/4	L-64-28
		2-1/8	L-64-34
		2-1/2	L-64-40
7/8	1-1/4 1.2520-1.2517 (1.270-1.265 UNG)	3	L-64-48
		1/2	L-80-8
		5/8	L-80-10
		3/4	L-80-12
		1	L-80-16
		1-1/4	L-80-20
1	1-3/8 1.3772-1.3768 (1.395-1.390 UNG)	1-1/2	L-80-24
		1/2	L-88-8
		3/4	L-88-12
		1	L-88-16
		1-3/8	L-88-22
		1-1/2	L-88-24
		1-3/4	L-88-28
		2-1/8	L-88-34
1-3/8	1-3/4 1.7523-1.7519 (1.770-1.765 UNG)	2-1/2	L-88-40
		3	L-88-48
		3/4	L-112-12
		1	L-112-16
		1-3/8	L-112-22
		1-1/2	L-112-24
		1-3/4	L-112-28
		2-1/8	L-112-34
1-3/4	2-1/4 2.2525-2.2521 (2.270-2.265 UNG)	2-1/2	L-112-40
		3	L-112-48
		3/4	L-144-12
		1	L-144-16
		1-3/8	L-144-22
		1-1/2	L-144-24
		1-3/4	L-144-28
		2-1/8	L-144-34
2-1/4	2-1/4 2.2525-2.2521 (2.270-2.265 UNG)	2-1/2	L-144-40
		3	L-144-48
		3/4	L-176-12
		1	L-176-16
		1-3/8	L-176-22
		1-1/2	L-176-24
		1-3/4	L-176-28
		2-1/8	L-176-34
		2-1/2	L-176-40
		3	L-176-48

For extended-range bushings (larger sizes) please see our web catalog.

## Hoist Rings

### Trusted to Move Your Most Important Materials!



### Many Varieties Of Hoist Rings

- Swivel Hoist Rings
- Safety Hoist Rings
- Pivoting Hoist Rings
- Lifting Eyes
- Side-Pull Hoist Rings

See Pages 59-75

# LINER BUSHINGS – METRIC



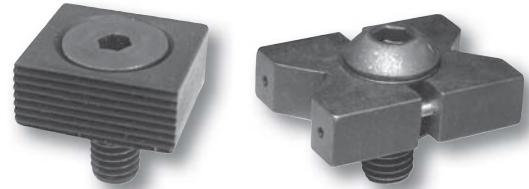
ID (G6)	OD (s6)	LENGTH	ANSI PART NO.
8mm	12mm 12.039-12.028mm	10mm	PM-12-10-8.00
		16mm	PM-12-16-8.00
10mm	15mm 15.039-15.028mm	12mm	PM-15-12-10.00
		20mm	PM-15-20-10.00
		25mm	PM-15-25-10.00
12mm	18mm 18.039-18.028mm	12mm	PM-18-12-12.00
		20mm	PM-18-20-12.00
		25mm	PM-18-25-12.00
15mm	22mm 22.048-22.035mm	16mm	PM-22-16-15.00
		28mm	PM-22-28-15.00
		36mm	PM-22-36-15.00
18mm	26mm 26.048-26.035mm	16mm	PM-26-16-18.00
		28mm	PM-26-28-18.00
		36mm	PM-26-36-18.00
22mm	30mm 30.048-30.035mm	20mm	PM-30-20-22.00
		36mm	PM-30-36-22.00
		45mm	PM-30-45-22.00
26mm	35mm 35.059-35.043mm	20mm	PM-35-20-26.00
		36mm	PM-35-36-26.00
		45mm	PM-35-45-26.00
30mm	42mm 42.059-42.043mm	25mm	PM-42-25-30.00
		45mm	PM-42-45-30.00
		56mm	PM-42-56-30.00
35mm	48mm 48.059-48.043mm	25mm	PM-48-25-35.00
		45mm	PM-48-45-35.00
		56mm	PM-48-56-35.00
42mm	55mm 55.072-55.053mm	30mm	PM-55-30-42.00
		56mm	PM-55-56-42.00
		67mm	PM-55-67-42.00
48mm	62mm 62.072-62.053mm	30mm	PM-62-30-48.00
		56mm	PM-62-56-48.00
		67mm	PM-62-67-48.00
55mm	70mm 70.078-70.059mm	30mm	PM-70-30-55.00
		56mm	PM-70-56-55.00
		67mm	PM-70-67-55.00
62mm	78mm 78.078-78.059mm	35mm	PM-78-35-62.00
		67mm	PM-78-67-62.00
		78mm	PM-78-78-62.00

ID (G6)	OD (s6)	LENGTH	ANSI PART NO.
70mm	85mm 85.093-85.071mm	35mm	PM-85-35-70.00
		67mm	PM-85-67-70.00
		78mm	PM-85-78-70.00
78mm	95mm 95.093-95.071mm	40mm	PM-95-40-78.00
		78mm	PM-95-78-78.00
		105mm	PM-95-105-78.00
85mm	105mm 105.101-105.079mm	40mm	PM-105-40-85.00
		78mm	PM-105-78-85.00
		105mm	PM-105-105-85.00
95mm	115mm 115.101-115.079mm	45mm	PM-115-45-95.00
		89mm	PM-115-89-95.00
		112mm	PM-115-112-95.00
105mm	125mm 125.117-125.092mm	45mm	PM-125-45-105.00
		89mm	PM-125-89-105.00
		112mm	PM-125-112-105.00

Note: Metric liner bushings are the same as metric press-fit bushings.

## TINY VISE Edge Clamps

### Strong Clamping Action For Fixturing Small Parts

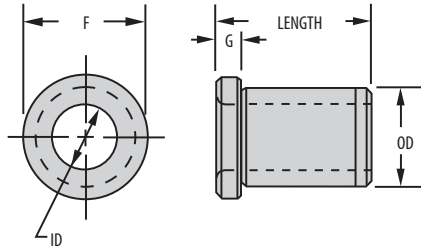


- Patented Tiny Vise® edge clamps grip the side of the workpiece to keep the top clear for machining
- Clamping force is applied by positive screw action with the easy turn of a hex wrench
- Only Tiny Vise® Edge Clamps truly exert down thrust force on the workpiece, to prevent it from lifting
- Four types in a wide range of sizes from #8-32 thread to 1"-8 thread with 2,500 lbs. clamping force
- Patented, more durable than similar clamps

See Pages 238-247



# HEAD LINER BUSHINGS



## INCH

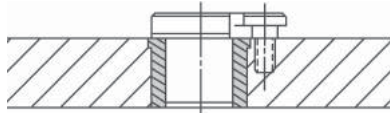
BODY OD	F DIA	G
1/2	5/8	3/32
3/4	7/8	3/32
1	1-1/8	1/8
1-3/8	1-1/2	1/8
1-3/4	1-7/8	3/16
2-1/4	2-3/8	3/16
2-3/4	2-7/8	3/16

## METRIC

BODY OD	F DIA	G
12mm	15mm	3mm
15mm	18mm	3mm
18mm	22mm	4mm
22mm	26mm	4mm
26mm	30mm	4mm
30mm	34mm	5mm
35mm	39mm	5mm
42mm	46mm	5mm
48mm	52mm	5mm
55mm	59mm	5mm
62mm	66mm	6mm
70mm	74mm	6mm
78mm	82mm	6mm
85mm	90mm	6mm
95mm	100mm	6mm
105mm	110mm	6mm
115mm	120mm	6mm
125mm	130mm	6mm

## APPLICATIONS:

Similar to an L bushing, but with a head to resist heavy axial loads. Head liners are permanent bushings used to hold renewable drill bushings. The head liner's ID has a precise sliding fit with the renewable bushing's OD. The hardened head liner accurately locates the renewable bushing and protects the jig plate from wear caused by frequent bushing replacement. Note: The "length" listed for a head liner refers to its overall length, not its length under the head. Metric head-liner bushings are the same as metric head-press-fit bushings.



## ORDERING EXAMPLES:

HL-32-16 Standard inch liner bushing  
 HL-32-16U Unground OD  
 HM-18-25-12.00 Standard metric liner bushing (same as metric press-fit type)

## STANDARD LINER ID TOLERANCES:

5/16"	+0.001/+0.004	8 to 10mm	+0.05/+0.014mm
1/2"	+0.002/+0.005	12 to 18mm	+0.06/+0.017mm
3/4"	+0.003/+0.006	22 to 30mm	+0.07/+0.020mm
1"	+0.004/+0.007	35 to 48mm	+0.09/+0.025mm
1-3/8"	+0.006/+0.010	55 to 78mm	+0.10/+0.029mm
1-3/4"	+0.008/+0.012	85 to 105mm	+0.12/+0.034mm
2-1/4"	+0.010/+0.015		(G6 tolerance)

ID RANGE	OD	LENGTH	ANSI PART NO.
5/16	1/2 .5017-.5014 (.520-.515 UNG)	5/16	HL-32-5
		3/8	HL-32-6
		1/2	HL-32-8
		3/4	HL-32-12
		1	HL-32-16
		1-3/8	HL-32-22
1/2	3/4 .7518-.7515 (.770-.765 UNG)	5/16	HL-48-5
		3/8	HL-48-6
		1/2	HL-48-8
		3/4	HL-48-12
		1	HL-48-16
		1-3/8	HL-48-22
		1-1/2	HL-48-24
3/4	1 1.0018-1.0015 (1.020-1.015 UNG)	1-3/4	HL-48-28
		2-1/8	HL-48-34
		1/2	HL-64-8
		3/4	HL-64-12
		1	HL-64-16
		1-3/8	HL-64-22
		1-1/2	HL-64-24
		1-3/4	HL-64-28
		2-1/8	HL-64-34
		2-1/2	HL-64-40
1	1-3/8 1.3772-1.3768 (1.395-1.390 UNG)	3	HL-64-48
		1/2	HL-88-8
		3/4	HL-88-12
		1	HL-88-16
		1-3/8	HL-88-22
		1-1/2	HL-88-24
		1-3/4	HL-88-28
		2-1/8	HL-88-34
1-3/8	1-3/4 1.7523-1.7519 (1.770-1.765 UNG)	2-1/2	HL-88-40
		3	HL-88-48
		3/4	HL-112-12
		1	HL-112-16
		1-3/8	HL-112-22
		1-1/2	HL-112-24
		1-3/4	HL-112-28
1-3/4	2-1/4 2.2525-2.2521 (2.270-2.265 UNG)	2-1/8	HL-112-34
		2-1/2	HL-112-40
		3	HL-112-48
		3/4	HL-144-12
		1	HL-144-16
		1-3/8	HL-144-22
		1-1/2	HL-144-24
2-1/4	2-3/4 2.7526-2.7522 (2.770-2.765 UNG)	1-3/4	HL-144-28
		2-1/8	HL-144-34
		2-1/2	HL-144-40
		3	HL-144-48
		3/4	HL-176-12
		1	HL-176-16
2-3/4		1-3/8	HL-176-22
		1-1/2	HL-176-24
		1-3/4	HL-176-28
		2-1/8	HL-176-34
		2-1/2	HL-176-40
		3	HL-176-48

# HEAD LINER BUSHINGS – METRIC



ID (G6)	OD (s6)	LENGTH	ANSI PART NO.
8mm	12mm 12.039-12.028mm	10mm	HM-12-10-8.00
		16mm	HM-12-16-8.00
10mm	15mm 15.039-15.028mm	12mm	HM-15-12-10.00
		20mm	HM-15-20-10.00
		25mm	HM-15-25-10.00
12mm	18mm 18.039-18.028mm	12mm	HM-18-12-12.00
		20mm	HM-18-20-12.00
		25mm	HM-18-25-12.00
15mm	22mm 22.048-22.035mm	16mm	HM-22-16-15.00
		28mm	HM-22-28-15.00
		36mm	HM-22-36-15.00
18mm	26mm 26.048-26.035mm	16mm	HM-26-16-18.00
		28mm	HM-26-28-18.00
		36mm	HM-26-36-18.00
22mm	30mm 30.048-30.035mm	20mm	HM-30-20-22.00
		36mm	HM-30-36-22.00
		45mm	HM-30-45-22.00
26mm	35mm 35.059-35.043mm	20mm	HM-35-20-26.00
		36mm	HM-35-36-26.00
		45mm	HM-35-45-26.00
30mm	42mm 42.059-42.043mm	25mm	HM-42-25-30.00
		45mm	HM-42-45-30.00
		56mm	HM-42-56-30.00
35mm	48mm 48.059-48.043mm	25mm	HM-48-25-35.00
		45mm	HM-48-45-35.00
		56mm	HM-48-56-35.00
42mm	55mm 55.072-55.053mm	30mm	HM-55-30-42.00
		56mm	HM-55-56-42.00
		67mm	HM-55-67-42.00
48mm	62mm 62.072-62.053mm	30mm	HM-62-30-48.00
		56mm	HM-62-56-48.00
		67mm	HM-62-67-48.00
55mm	70mm 70.078-70.059mm	30mm	HM-70-30-55.00
		56mm	HM-70-56-55.00
		67mm	HM-70-67-55.00
62mm	78mm 78.078-78.059mm	35mm	HM-78-35-62.00
		67mm	HM-78-67-62.00
		78mm	HM-78-78-62.00

ID (G6)	OD (s6)	LENGTH	ANSI PART NO.
70mm	85mm 85.093-85.071mm	35mm	HM-85-35-70.00
		67mm	HM-85-67-70.00
		78mm	HM-85-78-70.00
78mm	95mm 95.093-95.071mm	40mm	HM-95-40-78.00
		78mm	HM-95-78-78.00
		105mm	HM-95-105-78.00
85mm	105mm 105.101-105.079mm	40mm	HM-105-40-85.00
		78mm	HM-105-78-85.00
		105mm	HM-105-105-85.00
95mm	115mm 115.101-115.079mm	45mm	HM-115-45-95.00
		89mm	HM-115-89-95.00
		112mm	HM-115-112-95.00
105mm	125mm 125.117-125.092mm	45mm	HM-125-45-105.00
		89mm	HM-125-89-105.00
		112mm	HM-125-112-105.00

Note: Metric head-liner bushings are the same as metric head-press-fit bushings.

## Alignment Pins

### Strength and Precision



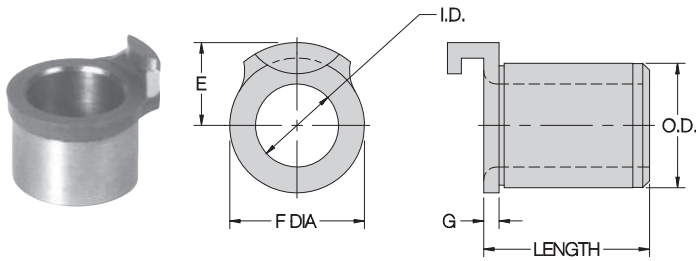
Ball Lock Pins  
(L, T, button or Ring  
Handles)

Detent Pins

- Wide assortment of quality ball lock and detent pins for precision alignment
- In steel or stainless steel
- A wide selection of other alignment pins are available

See Pages 27-53

# UN-A-LOK™ LINER BUSHINGS



## INCH

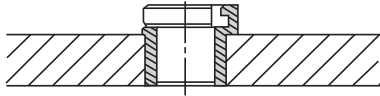
BODY OD	E	F DIA	G
5/16	1/4	.365	3/32
1/2	3/8	9/16	3/32
3/4	1/2	13/16	3/32
1	21/32	1-1/16	1/8
1-3/8	7/8	1-7/16	1/8

## METRIC

BODY OD	E	F DIA	G
12mm	9.5mm	15mm	3mm
15mm	11mm	18mm	3mm
18mm	13mm	22mm	4mm
22mm	15.5mm	26mm	4mm
26mm	17.5mm	30mm	4mm

## APPLICATIONS:

Similar to an HL head liner, but incorporating a special locking tab that eliminates the need for a lockscrew. Un-A-Lok™ liners are permanent bushings used to hold SF renewable drill bushings (on the "slip" side only, not the "fixed" side). Although slightly more expensive than a head liner plus a lockscrew, installation time is dramatically reduced. Patent no. 3,015,242 and 3,099,079.



## ORDERING EXAMPLES:

UL-20-5 Standard inch liner bushing  
 UL-20-5U Unground OD  
 ULM-12-10 Standard metric liner bushing

## STANDARD LINER ID TOLERANCES:

3/16 to 5/16"	+0.001/+0.004	8 to 10mm	+0.005/+0.014mm
1/2"	+0.002/+0.005	12 to 18mm	+0.006/+0.017mm
3/4"	+0.003/+0.006		(G6 tolerance)
1"	+0.004/+0.007		

## INCH

ID	OD	LENGTH	ANSI PART NO.
3/16	5/16 .3141-.3138 (.327-.322 UNG)	5/16	UL-20-5
		3/8	UL-20-6
		1/2	UL-20-8
		3/4	UL-20-12
5/16	1/2 .5017-.5014 (.520-.515 UNG)	3/8	UL-32-6
		1/2	UL-32-8
		3/4	UL-32-12
1/2	3/4 .7518-.7515 (.770-.765 UNG)	1/2	UL-48-8
		3/4	UL-48-12
		1	UL-48-16
3/4	1 1.0018-1.0015 (1.020-1.015 UNG)	1/2	UL-64-8
		3/4	UL-64-12
		1	UL-64-16
1	1-3/8 1.3772-1.3768 (1.395-1.390 UNG)	1/2	UL-88-8
		3/4	UL-88-12
		1	UL-88-16
		1-3/8	UL-88-22

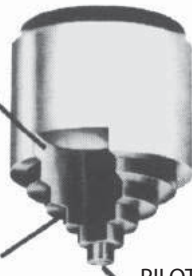
## METRIC

ID (G6)	OD (s6)	LENGTH	PART NO.
8mm	12mm 12.039-12.028mm	10mm	ULM-12-10-8.00
		16mm	ULM-12-16-8.00
10mm	15mm 15.039-15.028mm	12mm	ULM-15-12-10.00
		20mm	ULM-15-20-10.00
		25mm	ULM-15-25-10.00
12mm	18mm 18.039-18.028mm	12mm	ULM-18-12-12.00
		20mm	ULM-18-20-12.00
		25mm	ULM-18-25-12.00
15mm	22mm 22.048-22.035mm	16mm	ULM-22-16-15.00
		28mm	ULM-22-28-15.00
		36mm	ULM-22-36-15.00
18mm	26mm 26.048-26.035mm	16mm	ULM-26-16-18.00
		28mm	ULM-26-28-18.00
		36mm	ULM-26-36-18.00

## UN-A-LOK™ INSTALLATION TOOL

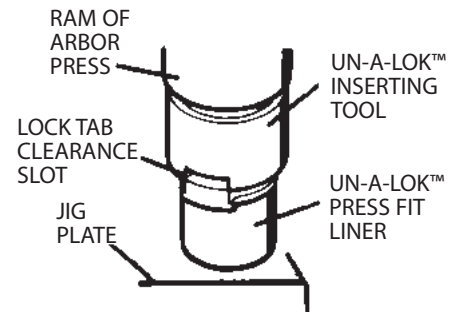
MILLED SLOT FOR LOCK TAB CLEARANCE

STEPPED SHOULDERS MATE WITH UN-A-LOK™ HEAD



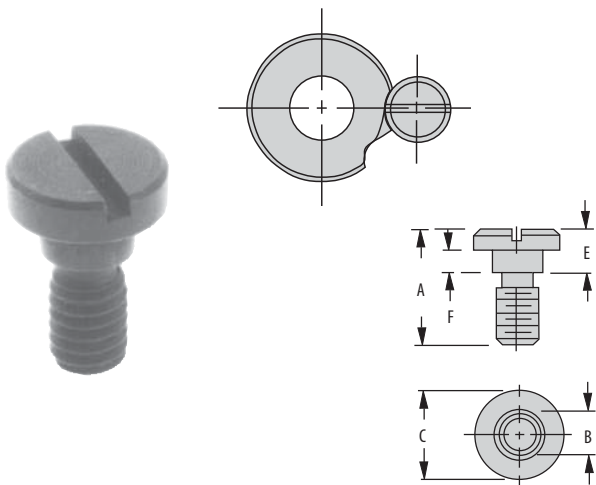
PILOT END WITH STEPPED OD'S TO FIT ALL UN-A-LOK™ ID'S

CL-1-ULT



# LOCKSCREWS AND CLAMPS

## LOCKSCREWS



\* For extended-range bushings.

The most popular locking device for renewable drill bushings. Use on either the "slip" or "fixed" side of a slip-fixed bushing. Simple, strong, compact, and economical.

## STANDARD MOUNTING (INCH)

PART NO. (PACK OF 5)	A	B DIA	C DIA	E	F	THREAD
LS-0-PACKOF5	7/16	3/16	5/16	3/16	.105/.100	#8-32
LS-1-PACKOF5	5/8	3/8	5/8	1/4	.138/.132	5/16-18
LS-2-PACKOF5	7/8			3/8	.200/.194	
LS-3-PACKOF5	1	7/16	3/4	3/8	.200/.194	3/8-16
LS-4-PACKOF5*	1-1/16			7/16	.231/.225	
LS-5-PACKOF5*	1-1/8			1/2	.263/.257	

## STANDARD MOUNTING - THINWALL (INCH)

TW-1-PACKOF5	7/16	3/16	5/16	3/16	.105/.100	#8-32
TW-2-PACKOF5	1/2	1/4	3/8	1/4	.138/.132	#10-32
TW-3-PACKOF5	11/16					
TW-4-PACKOF5	7/8	3/8	9/16	1/2	.263/.257	5/16-18
TW-5-PACKOF5	1	3/8	5/8	5/8	.325/.319	
TW-7-PACKOF5	3/4					

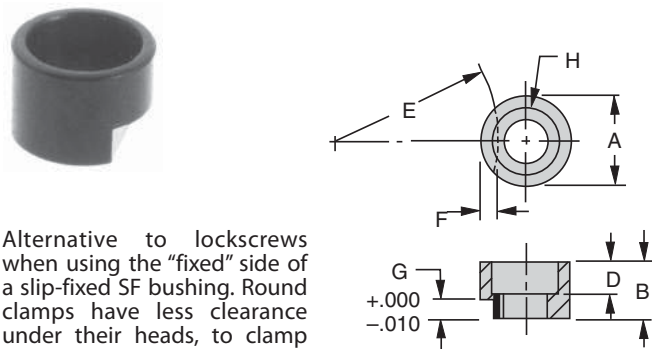
## STANDARD MOUNTING (METRIC)

LSM-1-PACKOF5	15mm	7.5mm	13mm	6mm	3.3mm	M5
LSM-3-PACKOF5	18mm	9.5mm	16mm	8mm	4.3mm	M6
LSM-5-PACKOF5	22mm	12mm	20mm	10mm	5.8mm	M8
LSM-7-PACKOF5	32mm	15mm	24mm	12mm	7.3mm	M10

## PROJECTED MOUNTING (METRIC)

LSM-2-PACKOF5	18mm	7.5mm	13mm	9mm	6.3mm	M5
LSM-4-PACKOF5	22mm	9.5mm	16mm	12mm	8.3mm	M6
LSM-6-PACKOF5	27mm	12mm	20mm	15mm	10.8mm	M8
LSM-8-PACKOF5	38mm	15mm	24mm	18mm	13.3mm	M10

## ROUND CLAMPS



\* For extended-range bushings.

Alternative to lock screws when using the "fixed" side of a slip-fixed SF bushing. Round clamps have less clearance under their heads, to clamp bushings tighter (which is why you cannot use them on the bushing's "slip" side). Use them with a Socket-Head Cap Screw.

## STANDARD MOUNTING (INCH)

PART NO.	A DIA	B	D	E	F	G	H SOCKET-HEAD CAP SCREW	REPLACES LOCK SCREW
RC-01	5/8	5/16	5/32	17/32	.109	.125	5/16-18	LS-1
RC-02		7/16	7/32	29/32	.125	.188		LS-2
RC-03	3/4	1/2	9/32	1-13/32	.156	.219	3/8-16	LS-3
RC-04*		17/32	1/4	2-1/2				LS-4
RC-05*		9/16						LS-5

## STANDARD MOUNTING (METRIC)

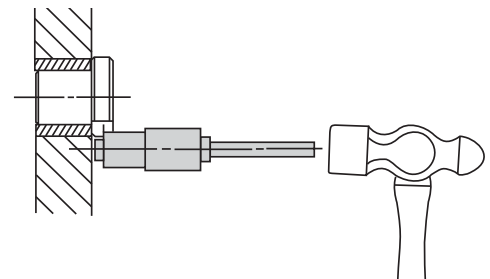
RCM-1	13mm	8mm	4mm	9.5mm	2.8mm	3mm	M5	LSM-1
RCM-3	16mm	10mm	5mm	15mm	3.3mm	4mm	M6	LSM-3
RCM-5	20mm	12mm	5mm	30mm	3.8mm	5.5mm	M8	LSM-5
RCM-7	24mm	16mm	7mm	80mm	4.5mm	7mm	M10	LSM-7

## LOCKSCREW LOCATING JIG



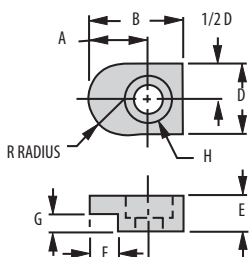
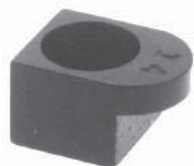
CL-1-LSLJ

A precision tool for centerpunching lock screw holes. The jig is made in two parts: a reversible centerpunch and an outer body for locating. To use, just insert the bushing and place the locating jig against the lock screw recess. Turn bushing to desired orientation, then tap centerpunch lightly. For installing lock screws LS-1, LS-2, LS-3, LS-4, LS-5, TW-5, and TW-7. Also for installing round clamps RC-01, RC-02, RC-03, RC-04, and RC-05.

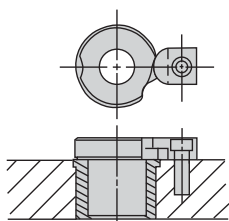


# LOCKSCREWS AND CLAMPS

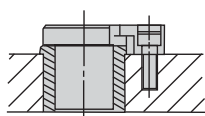
## ROUND END CLAMPS



A heavy-duty alternative to lock screws. Allows locating tapped hole farther away from bushing to avoid interference with a larger liner. Use on either the "slip" or "fixed" side of a slip-fixed renewable bushing. Available in two heights: standard for recessed liner mounting; tall for projected head-liner mounting. Use with a Socket-Head Cap Screw.



**Standard Mounting**



**Projected Mounting**

### STANDARD MOUNTING (INCH)

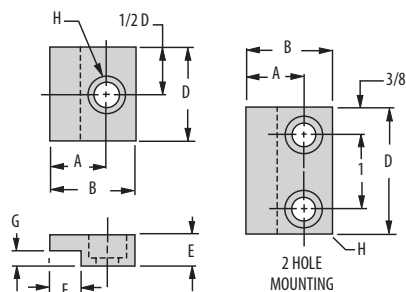
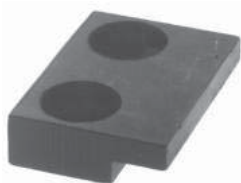
PART NO.	A	B	D	E	F	G	H SOCKET-HEAD CAP SCREW	R
RK-01	7/16	3/4	5/4	5/16	3/16	1/8	1/4-20	5/16
RK-02	1/2			3/8	1/4	3/16		
RK-03	5/8	1	3/4	3/8	5/16	3/16	5/16-18	3/8
RK-04*	11/16	1-1/8	3/4	7/16	5/16	7/32	3/8-16	3/8
RK-05*				1/2		1/4		

### PROJECTED MOUNTING (INCH)

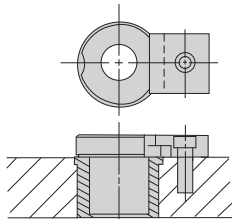
PART NO.	A	B	D	E	F	G	H SOCKET-HEAD CAP SCREW	R
RK-10	7/16	3/4	5/8	3/8	3/16	7/32	1/4-20	5/16
RK-11				1/2		1/4		
RK-12	1/2	1	3/4	1/2	5/16	5/16	3/8-16	3/8
RK-13						3/8		
RK-14	5/8	1	3/4	1/2	5/16	3/8	3/8-16	3/8

\* For extended-range bushings.

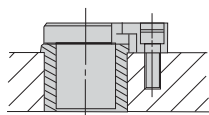
## FLAT CLAMPS



Use to lock FM-type fixed-renewable bushings which have a milled locking flat. Available in two heights: standard for recessed liner mounting; tall for projected head-liner mounting. Use with one or two Socket-Head Cap Screws.



**Standard Mounting**



**Projected Mounting**

### STANDARD MOUNTING (INCH)

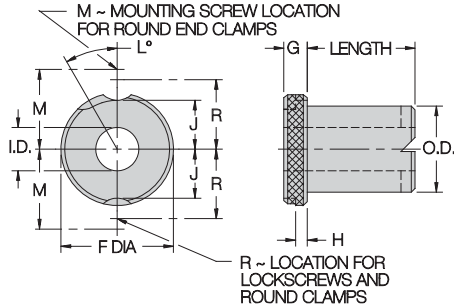
PART NO.	NO. OF HOLES	A	B	D	E	F	G	H SOCKET-HEAD CAP SCREW
FC-01	1	1/2	7/8	5/8	5/16	3/16	1/8	1/4-20
FC-02		5/8	1	1	3/8	1/4	3/16	5/16-18
FC-03		1-1/8	1	3/8	5/16			
FC-04*	1	51/64	1-11/64	1-1/4	3/8	27/64	7/32	3/8-16
FC-05*	2			1-3/4				
FC-07*	2			1-3/4	1/2			

### PROJECTED MOUNTING (INCH)

PART NO.	A	B	D	E	F	G	H SOCKET-HEAD CAP SCREW	
FC-10	1	1/2	7/8	5/8	3/8	3/16	7/32	1/4-20
FC-11							1/4	
FC-12	1	5/8	1	1	1/2	1/4	5/16	5/16-18
FC-13							3/8	

\* For extended-range bushings.

# CHIP BREAKER BUSHINGS



## INCH

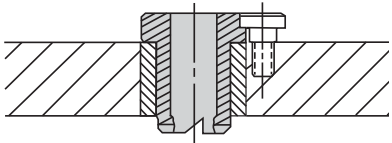
BODY OD	F	G	H	J	L	M	R	LOCK SCREW
5/16	35/64	1/4	1/8	11/64	65°	5/8	1/2	LS-1
1/2	51/64			19/64	65°	3/4	5/8	
3/4	1-3/64			27/64	50°	7/8	3/4	
1	1-27/64	3/8	3/16	19/32	35°	1-7/64	59/64	LS-2
1-3/8	1-51/64			25/32	30°	1-19/64	1-7/64	
1-3/4	2-19/64			1	30°	1-41/64	1-25/64	
2-1/4	2-51/64	3/8	3/16	1-1/4	25°	1-57/64	1-41/64	LS-3

## METRIC

8mm	15mm	6mm	3mm	4.5mm	65°	11.5mm	LSM-1
10mm	18mm			6mm	65°		13mm
12mm	22mm	8mm	4mm	7.5mm	60°	16mm	LSM-3
15mm	26mm			9.5mm	50°	18mm	LSM-4
18mm	30mm			11.5mm	50°	20mm	
22mm	34mm	10mm	5.5mm	13mm	35°	23.5mm	LSM-5 LSM-6
26mm	39mm			15.5mm	35°	26mm	
30mm	46mm			19mm	30°	29.5mm	
35mm	52mm			22mm	30°	32.5mm	
42mm	59mm			25.5mm	30°	36mm	
48mm	66mm	12mm	7mm	28.5mm	30°	41mm	LSM-7 LSM-8
55mm	74mm			32.5mm	25°	45mm	
62mm	82mm			36.5mm	25°	49mm	

## APPLICATIONS:

Similar to an SF renewable bushing, but with specially designed chip-breaking notches on the drill-exit end. Use to break up chips from tough stringy materials, to reduce friction and heat buildup. Reduces bushing wear at the drill-exit end and reduces the chance of tool or workpiece damage. A chip-breaker bushing should extend beyond its liner to allow chips to escape. Chip breakers are also available on other bushing types such as P, H, and DC (directed coolant).



## ORDERING EXAMPLES:

CH-20-16-.1250 Standard inch SF-type bushing with chip breaker, inch ID  
 CH-20-16-.1772 Standard inch SF-type bushing with chip breaker, mm ID (.1772 = 4.50mm)

CH-20-16-.1250 NCB No counterbore on long bushings marked with \* (no counterbore is standard on all other bushings)  
 CHM-10-20-4.50 Standard metric SF-type bushing with chip breaker  
 PCH-20-16-.1250 P bushing with chip breaker  
 HCH-20-16-.1250 H bushing with chip breaker  
 DCCH-20-16-.1250 Directed coolant bushing with chip breaker

## STANDARD ID TOLERANCES:

From #80 to 1/4"	+0.001/+0.004	From .35 to 3mm	+0.002/+0.008mm
Over 1/4 to 3/4"	+0.001/+0.005	Over 3 to 6mm	+0.004/+0.012mm
Over 3/4 to 1-1/2"	+0.002/+0.006	Over 6 to 10mm	+0.005/+0.014mm
Over 1-1/2 to 2-3/4"	+0.003/+0.007	Over 10 to 18mm	+0.006/+0.017mm
		Over 18 to 30mm	+0.007/+0.020mm
		Over 30 to 50mm	+0.009/+0.025mm

(G6 tolerance)

ID RANGE	OD	LENGTH	ANSI PART NO.	LOCK SCREW
.0625-.0934 1/16-#43 1.60-2.35mm	5/16	*3/4	CH-20-12	LS-1
		*1	CH-20-16	RC-01
		*1-3/8	CH-20-22	RK-01 RK-10
.0935-.1935 #42-#10 2.40-4.90mm	.3125-.3123	*3/4	CH-20-12	LS-1
		*1	CH-20-16	RC-01
		*1-3/8	CH-20-22	RK-01 RK-10
.1405-.3438 #28-11/32 3.60-8.70mm	1/2	*3/4	CH-32-12	LS-1
		*1	CH-32-16	RC-01
		*1-3/8	CH-32-22	RK-01
		*2-1/8	CH-32-34	RK-10
.2812-.5625 9/32-9/16 7.20-14.00mm	3/4	1	CH-48-16	LS-1
		1-3/8	CH-48-22	RC-01
		1-3/4	CH-48-28	RK-01
		2-1/8	CH-48-34	RK-11
.4688-.7812 15/32-25/32 11.50-19.50mm	1	1	CH-64-16	LS-2
		1-3/8	CH-64-22	RC-02
		1-3/4	CH-64-28	RK-02
		2-1/8	CH-64-34	RK-12
		2-1/2	CH-64-40	
.7188-1.0625 23/32-1-1/16 18.50-27.00mm	1-3/8	1	CH-88-16	LS-2
		1-3/8	CH-88-22	RC-02
		1-3/4	CH-88-28	RK-02
		2-1/8	CH-88-34	RK-12
		2-1/2	CH-88-40	
.9688-1.4062 31/32-1-13/32 25.00-35.00mm	1-3/4	1-3/8	CH-112-22	LS-3
		1-3/4	CH-112-28	RC-03
		2-1/8	CH-112-34	RK-03
		2-1/2	CH-112-40	RK-13
		3	CH-112-48	
1.3438-1.8750 1-11/32-1-7/8 35.00-47.00mm	2-1/4	1-3/8	CH-144-22	LS-3
		1-3/4	CH-144-28	RC-03
		2-1/8	CH-144-34	RK-03
		2-1/2	CH-144-40	RK-13
		3	CH-144-48	

\* **INFO+:** Counterbored, leaving correct drill-bearing length and clearance (see page 512 for bearing length).

# CHIP BREAKER BUSHINGS – METRIC



ID RANGE (G6)	OD (h5)	LENGTH	ANSI PART NO.	LOCK SCREW
1.00-4.00mm	8mm 8.000-7.994mm	*10mm	CHM-8-10	LSM-1 LSM-2
		*16mm	CHM-8-16	
4.01-6.00mm	10mm 10.000-9.994mm	12mm	CHM-10-12	RCM-1 RCM-2
		20mm	CHM-10-20	
		25mm	CHM-10-25	
6.01-8.00mm	12mm 12.000-11.992mm	12mm	CHM-12-12	LSM-3 LSM-4 RCM-3 RCM-4
		20mm	CHM-12-20	
		25mm	CHM-12-25	
8.01-10.00mm	15mm 15.000-14.992mm	16mm	CHM-15-16	
		28mm	CHM-15-28	
		36mm	CHM-15-36	
10.01-12.00mm	18mm 18.000-17.992mm	16mm	CHM-18-16	LSM-5 LSM-6 RCM-5 RCM-6
		28mm	CHM-18-28	
		36mm	CHM-18-36	
12.01-15.00mm	22mm 22.000-21.991mm	20mm	CHM-22-20	
		36mm	CHM-22-36	
		45mm	CHM-22-45	
15.01-18.00mm	26mm 26.000-25.991mm	20mm	CHM-26-20	LSM-7 LSM-8 RCM-7 RCM-8
		36mm	CHM-26-36	
		45mm	CHM-26-45	
18.01-22.00mm	30mm 30.000-29.991mm	25mm	CHM-30-25	
		45mm	CHM-30-45	
		56mm	CHM-30-56	
22.01-26.00mm	35mm 35.000-34.989mm	25mm	CHM-35-25	LSM-7 LSM-8 RCM-7 RCM-8
		45mm	CHM-35-45	
		56mm	CHM-35-56	
26.01-30.00mm	42mm 42.000-41.989mm	30mm	CHM-42-30	
		56mm	CHM-42-56	
		67mm	CHM-42-67	
30.01-35.00mm	48mm 48.000-47.989mm	30mm	CHM-48-30	LSM-7 LSM-8 RCM-7 RCM-8
		56mm	CHM-48-56	
		67mm	CHM-48-67	
35.01-42.00mm	55mm 55.000-54.987mm	30mm	CHM-55-30	
		56mm	CHM-55-56	
		67mm	CHM-55-67	
42.01-48.00mm	62mm 62.000-61.987mm	35mm	CHM-62-35	LSM-7 LSM-8 RCM-7 RCM-8
		67mm	CHM-62-67	
		78mm	CHM-62-78	

\* Small metric drill sizes through .80mm are counterbored 1.00mm diameter, with 3mm drill-bearing length.

## Precision All in One Shot.



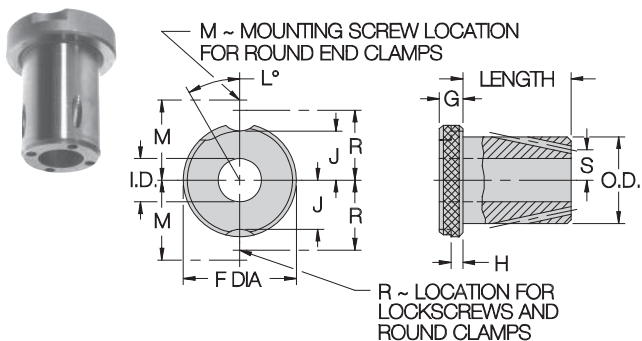
ID Clamps from Carr Lane Manufacturing clamp on the inner diameter of a part. Now you can profile around the outside of your part without running into other clamps.

- Machinable to precisely fit the desired hole
- Clamp a part using an existing hole
- Allows access to five sides without any clamp interference



See pp. 262-263

# DIRECTED COOLANT BUSHINGS



## STANDARD ID TOLERANCES:

From #80 to 1/4"	+0.001/+0.0004	From .35 to 3mm	+0.002/+0.008mm
Over 1/4 to 3/4"	+0.001/+0.0005	Over 3 to 6mm	+0.004/+0.012mm
Over 3/4 to 1-1/2"	+0.002/+0.0006	Over 6 to 10mm	+0.005/+0.014mm
Over 1-1/2 to 2-3/4"	+0.003/+0.0007	Over 10 to 18mm	+0.006/+0.017mm
		Over 18 to 30mm	+0.007/+0.020mm
		Over 30 to 50mm	+0.009/+0.025mm

## REAMER ID TOLERANCES:

From #60 to 1/4"	+0.005/+0.0008	From 1 to 3mm	+0.006/+0.012mm
Over 1/4 to 1"	+0.006/+0.0010	Over 3 to 6mm	+0.010/+0.018mm
Over 1 to 1-1/2"	+0.008/+0.0012	Over 6 to 10mm	+0.013/+0.022mm
		Over 10 to 18mm	+0.016/+0.027mm
		Over 18 to 30mm	+0.020/+0.033mm

## STANDARD LINER ID TOLERANCES:

5/16"	+0.001/+0.0004	1-3/8"	+0.006/+0.010
1/2"	+0.002/+0.0005	1-3/4"	+0.008/+0.012
3/4"	+0.003/+0.0006	2-1/4"	+0.010/+0.015
1"	+0.004/+0.0007		

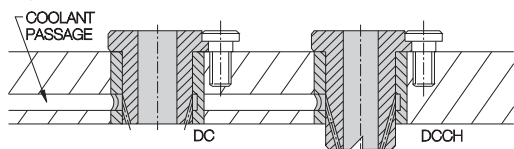
BODY OD	F DIA	G	H	J	L	M	N DIA
5/16	35/64	1/4	1/8	11/64	65°	5/8	5/8
1/2	51/64			19/64	65°	3/4	7/8
3/4	1-3/64			27/64	50°	7/8	1-1/8
1	1-27/64	3/8	3/16	19/32	35°	1-7/64	1-1/2
1-3/8	1-51/64			25/32	30°	1-19/64	1-7/8
1-3/4	2-19/64			1	30°	1-41/64	2-3/8
2-1/4	2-51/64			1-1/4	25°	1-57/64	2-7/8

BODY OD	P	Q	R	S	T DIA	U DIA	V
5/16	3/32	3/16	1/2	5/64	.067	25/64	5/32
1/2	3/32	5/16**	5/8	9/64	.093	19/32**	7/32**
3/4	1/8	5/16	3/4	17/64	.104	55/64	7/32
1	1/8	5/16	59/64	23/64	.125	1-5/32	7/32
1-3/8	3/16	7/16	1-7/64	17/32	.147	1-17/32	9/32
1-3/4	3/16		1-25/64	11/16	.173	1-31/32	
2-1/4	3/16		1-41/64	7/8	.173	2-15/32	

\*\* Q = 3/16, U = 39/64, V = 5/32 on 1/2" long liner bushings.

## APPLICATIONS:

Similar to an SF renewable bushing, but with passages to direct coolant to the cutting area. This design is particularly good for washing away chips, especially when ordered as the combination Directed Coolant Chip Breaker (DCCH). DC bushings require special liners, DCL or DCHL, to direct coolant from a drilled manifold passage to the holes in the bushing's OD wall. **INFO-:** Important note: Always order matching liner length (see page 543.)



ID RANGE	OD	LENGTH	ANSI PART NO.	LOCK SCREW
.0625-.0934 1/16-#43 1.60-2.35mm	5/16 .3125-.3123	*3/4	DC-20-12	LS-1 RC-01 RK-01
		*1	DC-20-16	RK-11
		*1-3/8	DC-20-22	RK-11
.0935-.1935 #42-#10 2.40-4.90mm	1/2 .5000-.4998	*3/4	DC-32-12	LS-1 RC-01 RK-01
		*1	DC-32-16	RK-11
		*1-3/8	DC-32-22	RK-11
1405-.3438 #28-11/32 3.60-8.70mm	3/4 .7500-.7498	*3/4	DC-32-12	LS-1 RC-01 RK-01
		*1	DC-32-16	RK-11
		*1-3/8	DC-32-22	RK-11
		*1-3/4	DC-32-28	RK-11
.2812-.5625 9/32-9/16 7.20-14.00mm	1 1.0000-.9998	1	DC-48-16	LS-1 RC-01 RK-01
		1-3/8	DC-48-22	RK-11
		1-3/4	DC-48-28	RK-11
		2-1/8	DC-48-34	RK-11
		*2-1/2	DC-48-40	RK-11
.4688-.7812 15/32-25/32 11.50-19.50mm	1-3/8 1.3750-1.3747	1	DC-64-16	LS-2 RC-02 RK-02
		1-3/8	DC-64-22	RK-12
		1-3/4	DC-64-28	RK-12
		2-1/8	DC-64-34	RK-12
		2-1/2	DC-64-40	RK-12
.7188-1.0625 23/32-1-1/16 18.50-27.00mm	1-3/4 2.2500-2.2496	1	DC-88-16	LS-2 RC-02 RK-02
		1-3/8	DC-88-22	RK-12
		1-3/4	DC-88-28	RK-12
		2-1/8	DC-88-34	RK-12
		2-1/2	DC-88-40	RK-12
.9688-1.4062 31/32-1-13/32 25.00-35.00mm	2-1/4 2.2500-2.2496	1-3/8	DC-112-22	LS-3 RC-03 RK-03
		1-3/4	DC-112-28	RK-13
		2-1/8	DC-112-34	RK-13
		2-1/2	DC-112-40	RK-13
		3	DC-112-48	RK-13
1.3438-1.8750 1-11/32-1-7/8 35.00-47.00mm	2-1/4 2.2500-2.2496	1-3/8	DC-144-22	LS-3 RC-03 RK-03
		1-3/4	DC-144-28	RK-13
		2-1/8	DC-144-34	RK-13
		2-1/2	DC-144-40	RK-13
		3	DC-144-48	RK-13

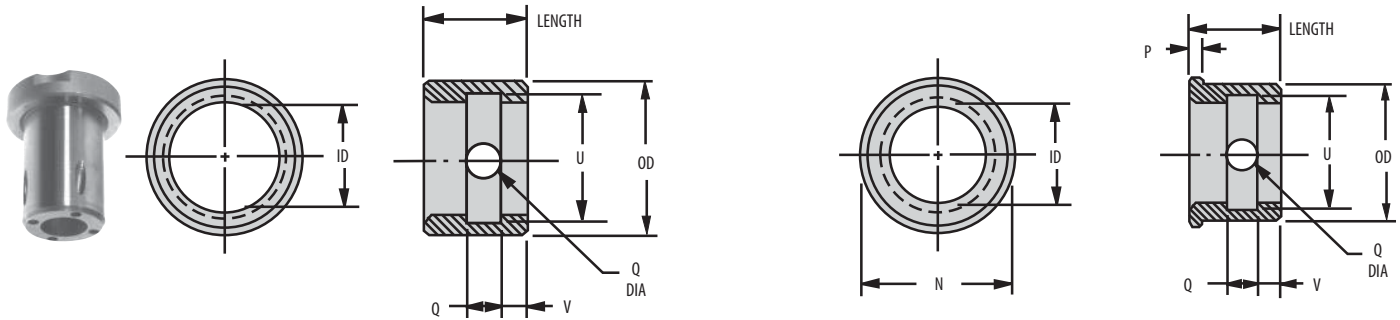
\* **INFO-:** Counterbored, leaving correct drill-bearing length and clearance (see page 512 for bearing length).

## ORDERING EXAMPLES:

DC-20-12-.1250	Standard inch directed-coolant bushing, inch ID
DCCH-20-16-.1250	Same as above, except with chip breakers (go to next length so that chip breakers extend beyond the liner)
DC-20-12-.1772	Standard inch directed-coolant bushing, mm ID (.1772 = 4.50 mm)
DC-20-12-.1250 REAMER	Reamer tolerance on ID
DC-20-12-.1250 NCB	No counterbore on long bushings marked with * (no counterbore is standard on all other bushings)
DCL-32-12	Liner for renewable bushings above
DCHL-32-12	Head liner for renewable bushings above



# DIRECTED COOLANT BUSHINGS



INFO+: See below and page 542 for dimensions.

## LINERS

ID	OD	LENGTH	PART NO.	MATCHING RENEWABLE BUSHING	
				STANDARD	CHIP BREAKER
5/16	1/2 .5017-.5014 (.520-.515 UNG)	1/2	DCL-32-8	—	DCCH-20-12
		3/4	DCL-32-12	DC-20-12	DCCH-20-16
		1	DCL-32-16	DC-20-16	DCCH-20-22
		1-3/8	DCL-32-22	DC-20-22	—
1/2	3/4 .7518-.7515 (.770-.765 UNG)	1/2	DCL-48-8	—	DCCH-32-12
		3/4	DCL-48-12	DC-32-12	DCCH-32-16
		1	DCL-48-16	DC-32-16	DCCH-32-22
		1-3/8	DCL-48-22	DC-32-22	DCCH-32-28
		1-3/4	DCL-48-28	DC-32-28	DCCH-32-34
		2-1/8	DCL-48-34	DC-32-34	—
3/4	1 1.0018-1.0015 (1.020-1.015 UNG)	3/4	DCL-64-12	—	DCCH-48-16
		1	DCL-64-16	DC-48-16	DCCH-48-22
		1-3/8	DCL-64-22	DC-48-22	DCCH-48-28
		1-3/4	DCL-64-28	DC-48-28	DCCH-48-34
		2-1/8	DCL-64-34	DC-48-34	DCCH-48-40
		2-1/2	DCL-64-40	DC-48-40	—
1	1-3/8 1.3772-1.3768 (1.395-1.390 UNG)	3/4	DCL-88-12	—	DCCH-64-16
		1	DCL-88-16	DC-64-16	DCCH-64-22
		1-3/8	DCL-88-22	DC-64-22	DCCH-64-28
		1-3/4	DCL-88-28	DC-64-28	DCCH-64-34
		2-1/8	DCL-88-34	DC-64-34	DCCH-64-40
		2-1/2	DCL-88-40	DC-64-40	DCCH-64-48
1-3/8	1-3/4 1.7523-1.7519 (1.770-1.765 UNG)	3	DCL-88-48	DC-64-48	—
		3/4	DCL-112-12	—	DCCH-88-16
		1	DCL-112-16	DC-88-16	DCCH-88-22
		1-3/8	DCL-112-22	DC-88-22	DCCH-88-28
		1-3/4	DCL-112-28	DC-88-28	DCCH-88-34
		2-1/8	DCL-112-34	DC-88-34	DCCH-88-40
1-3/4	2-1/4 2.2525-2.2521 (2.270-2.265 UNG)	2-1/2	DCL-112-40	DC-88-40	DCCH-88-48
		3	DCL-112-48	DC-88-48	—
		1	DCL-144-16	—	DCCH-112-22
		1-3/8	DCL-144-22	DC-112-22	DCCH-112-28
		1-3/4	DCL-144-28	DC-112-28	DCCH-112-34
		2-1/8	DCL-144-34	DC-112-34	DCCH-112-40
2-1/4	2-3/4 2.7526-2.7522 (2.770-2.765 UNG)	2-1/2	DCL-144-40	DC-112-40	DCCH-112-48
		3	DCL-144-48	DC-112-48	—
		1	DCL-176-16	—	DCCH-144-22
		1-3/8	DCL-176-22	DC-144-22	DCCH-144-28
		1-3/4	DCL-176-28	DC-144-28	DCCH-144-34
		2-1/8	DCL-176-34	DC-144-34	DCCH-144-40
		2-1/2	DCL-176-40	DC-144-40	DCCH-144-48
		3	DCL-176-48	DC-144-48	—

## HEAD LINERS

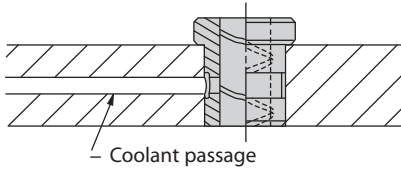
HEAD LINER PART NO.	MATCHING RENEWABLE BUSHING	
	STANDARD	CHIP BREAKER
DCHL-32-8	—	DCCH-20-12
DCHL-32-12	DC-20-12	DCCH-20-16
DCHL-32-16	DC-20-16	DCCH-20-22
DCHL-32-22	DC-20-22	—
DCHL-48-8	—	DCCH-32-12
DCHL-48-12	DC-32-12	DCCH-32-16
DCHL-48-16	DC-32-16	DCCH-32-22
DCHL-48-22	DC-32-22	DCCH-32-28
DCHL-48-28	DC-32-28	DCCH-32-34
DCHL-48-34	DC-32-34	—
DCHL-64-12	—	DCCH-48-16
DCHL-64-16	DC-48-16	DCCH-48-22
DCHL-64-22	DC-48-22	DCCH-48-28
DCHL-64-28	DC-48-28	DCCH-48-34
DCHL-64-34	DC-48-34	DCCH-48-40
DCHL-64-40	DC-48-40	—
DCHL-88-12	—	DCCH-64-16
DCHL-88-16	DC-64-16	DCCH-64-22
DCHL-88-22	DC-64-22	DCCH-64-28
DCHL-88-28	DC-64-28	DCCH-64-34
DCHL-88-34	DC-64-34	DCCH-64-40
DCHL-88-40	DC-64-40	DCCH-64-48
DCHL-88-48	DC-64-48	—
DCHL-112-12	—	DCCH-88-16
DCHL-112-16	DC-88-16	DCCH-88-22
DCHL-112-22	DC-88-22	DCCH-88-28
DCHL-112-28	DC-88-28	DCCH-88-34
DCHL-112-34	DC-88-34	DCCH-88-40
DCHL-112-40	DC-88-40	DCCH-88-48
DCHL-112-48	DC-88-48	—
DCHL-144-16	—	DCCH-112-22
DCHL-144-22	DC-112-22	DCCH-112-28
DCHL-144-28	DC-112-28	DCCH-112-34
DCHL-144-34	DC-112-34	DCCH-112-40
DCHL-144-40	DC-112-40	DCCH-112-48
DCHL-144-48	DC-112-48	—
DCHL-176-16	—	DCCH-144-22
DCHL-176-22	DC-144-22	DCCH-144-28
DCHL-176-28	DC-144-28	DCCH-144-34
DCHL-176-34	DC-144-34	DCCH-144-40
DCHL-176-40	DC-144-40	DCCH-144-48
DCHL-176-48	DC-144-48	—

# OIL GROOVE BUSHINGS



## APPLICATIONS:

Oil grooves are available on most drill-bushing types, including P, H, and SF. Use when you need complete drill lubrication and cooling, such as when drilling hardened steel. Oil grooves are specially designed coolant passageways in the bushing's ID wall. Choose from 25 different groove styles. End wipers are also available, to keep out dirt and chips.



## ORDERING EXAMPLES:

P-48-16-.5000-AJ	P bushing with AJ oil groove, inch ID
P-48-16-.4724-AJ	P bushing with AJ oil groove, mm ID (.4724 = 12.00mm)
P-48-16-.5000-AJ-AAA wiper	P bushing with AJ oil groove and AAA wiper
SF-48-16-.5000-AJ	SF bushing with AJ oil groove

## THREE GENERAL TYPES:

1. With oil hole. A single radial hole in the bushing wall allows coolant to flow from a manifold passage to the internal oil grooves. Bushing must be installed to line up the radial hole with the manifold passage.
2. With oil hole and external groove. OD groove allows coolant to flow around the bushing, then through the radial hole in the bushing's wall to the internal oil grooves. Allows installing the bushing at any orientation, and mounting bushings in series using a single manifold passage. This type is our most popular.
3. Without oil feed. No external coolant feed through a manifold passage, so all coolant enters through the top. This type is also commonly used as a bearing bushing, packed with oil or grease.

## OIL-GROOVE STYLES:

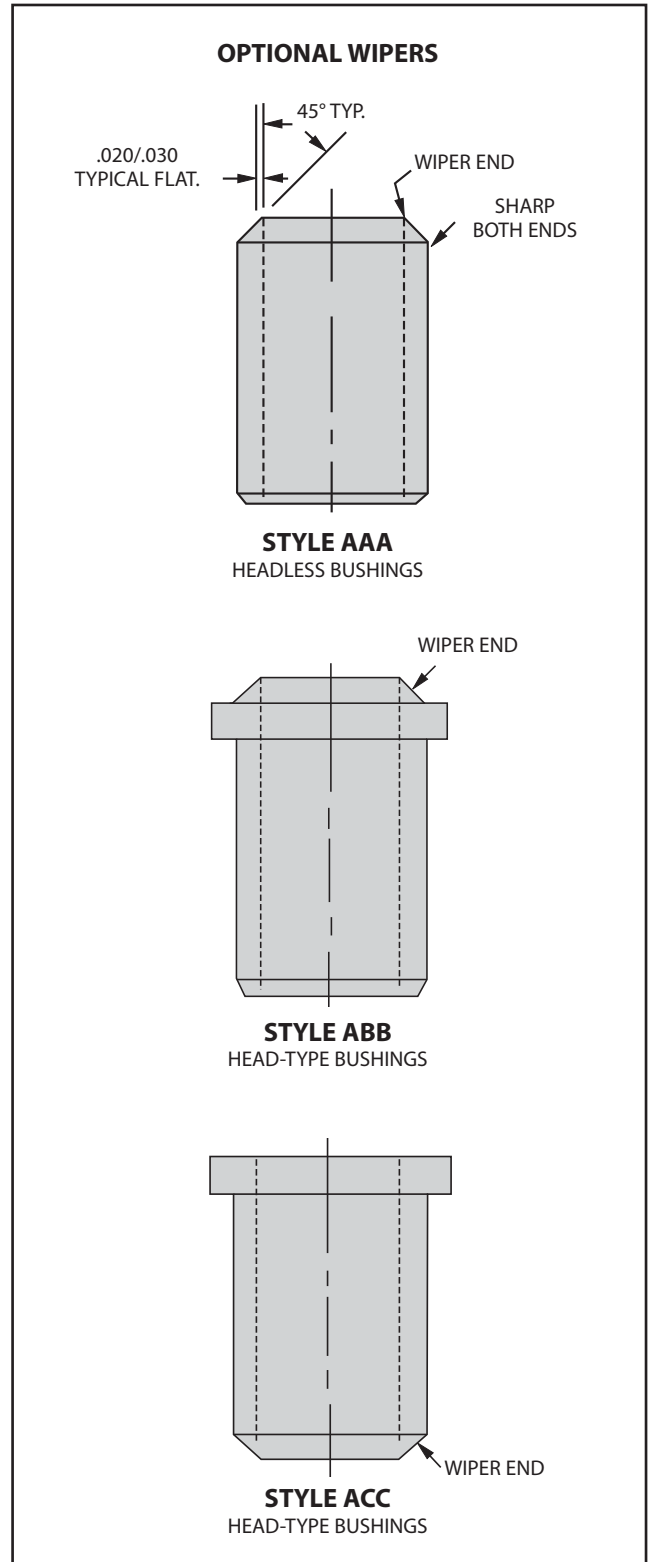
We offer a wide selection of oil-groove styles in each general type. This allows choosing a style to suit various operating conditions, lubrication requirements, and individual preferences.

## OPTIONAL WIPERS:

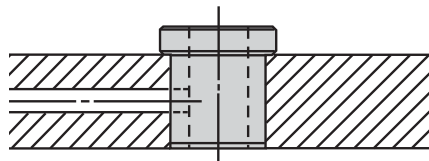
To guard against dirt and chips entering the bushing ID, order oil-groove bushings with a wiper end. Note: do not order an oil-groove style that breaks out at the wiper end (AA, AB, AG, AH, AD, or AE). Order style AAA for headless bushings (install wiper in either direction). Order style ABB or ACC for head-type bushings.

## TECHNICAL DATA:

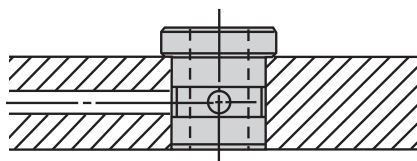
Oil-groove dimensions - 1/16" wide x 1/32" deep  
 Oil-hole dimensions - 1/4" diameter  
 External-groove dimensions - 5/16" wide x 3/64" deep  
 Allowable ID range - 1/2" to 8"  
 Allowable length range - 1/2" to 8"  
 Oil grooves stop 1/8" short of bushing end.



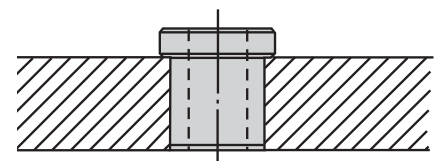
# OIL GROOVE BUSHINGS



**WITH  
OIL HOLE**



**WITH OIL HOLE &  
EXTERNAL GROOVE**



**WITHOUT  
OIL FEED**

 <b>AC</b> Helix	 <b>AA</b> Helix Open Bottom	 <b>AJ</b> Helix	 <b>AG</b> Helix Open Bottom	 <b>AF</b> Helix	 <b>AD</b> Helix Open Bottom
 <b>AB</b> Helix Open both ends	 <b>AL</b> Straight	 <b>AH</b> Helix Open both ends	 <b>AO</b> Two Holes	 <b>AE</b> Helix Open both ends	 <b>AK</b> Straight
 <b>AR</b> Loop	 <b>AU</b> Double Loop	 <b>AS</b> Loop	 <b>AV</b> Double Loop	 <b>AT</b> Loop	 <b>AW</b> Double Loop
 <b>AN</b> Figure 8	 <b>AX</b> Double Figure 8	 <b>AP</b> Figure 8	 <b>AY</b> Double Figure 8	 <b>AQ</b> Figure 8	 <b>AZ</b> Double Figure 8
				 <b>AM</b> Helix with ID groove	

# OIL GROOVE BUSHINGS



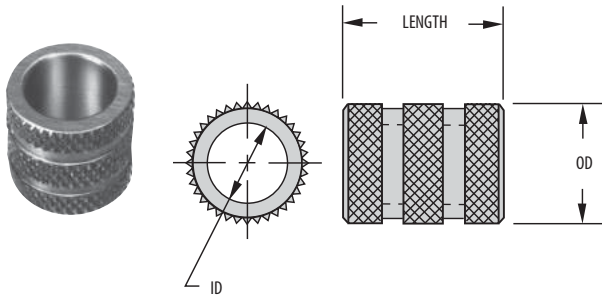
## OIL-GROOVE CONVERSION CHART

Carr Lane	Ace	Acme	American	Briney	Economy	United	Universal	Welch
Style AA	Type 1	Style 5	Style 1	Style A	Style A	Style 1A	Style A	Style A
Style AB	Type 2	Style 8	Style 2	Style B	Style B	Style 2A	Style B	Style B
Style AC	Type 3	Style 2	Style 3	Style C	Style C	Style 3A	Style C	Style C
Style AD	Type 4	Style 4	Style 4	Style D	Style D	Style 1	Style D	Style D
Style AE	Type 6	Style 7	Style 5	Style E	Style E	Style 2	Style E	Style E
Style AF	Type 5	Style 1	Style 6	Style F	Style F	Style 3	Style F	Style F
Style AG	Type 7	Style 6	Style 7	Style G	Style G	Style 1B	Style G	Style G
Style AH	Type 8	Style 9	Style 8	Style H	Style H	Style 2B	Style H	Style H
Style AJ	Type 9	Style 3	Style 9	Style J	Style J	Style 3B	Style J	Style J
Style AK	Type 10	Style 10	Style 10	Style K	Style K	Style 4	Style K	Style K
Style AL	Type 11	Style 11	Style 11	Style L	Style L	Style 4A	Style L	Style L
Style AM	Type 12	—	Style 12	Style M	Style M	Style 6	Style M	Style M
Style AN	Type 14	Style 20	Style 13	Style N	Style N	Style 7A	Style N	Style N
Style AO	Type 13	Style 12	Style 14	Style O	Style O	Style 12C	Style O	Style O
Style AP	Type 15	Style 21	Style 15	Style P	Style P	Style 7B	Style P	Style P
Style AQ	Type 16	Style 19	Style 16	Style Q	Style Q	Style 7	Style Q	Style Q
Style AR	Type 17	Style 14	Style 17	Style R	Style R	Style 9A	Style R	Style R
Style AS	Type 18	Style 15	Style 18	Style S	Style S	Style 9B	Style S	Style S
Style AJ	Type 19	Style 13	Style 19	Style T	Style T	Style 9	Style T	Style T
Style AU	Type 20	Style 17	Style 20	Style U	Style U	Style 10A	Style U	Style U
Style AV	Type 21	Style 18	Style 21	Style V	Style V	Style 10B	Style V	Style V
Style AW	Type 22	Style 16	Style 22	Style W	Style W	Style 10	Style W	Style W
Style AX	Type 23	Style 23	Style 23	Style X	Style X	Style 8A	Style X	Style X
Style AY	Type 24	Style 24	Style 24	Style Y	Style Y	Style 8B	Style Y	Style Y
Style AZ	Type 25	Style 22	Style 25	Style Z	Style Z	Style 8	Style Z	Style Z

## WIPER CONVERSION CHART

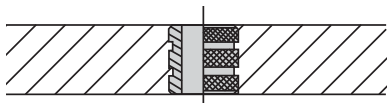
Carr Lane	Ace	Acme	American	Briney	Economy	United	Universal	Welch
Style AAA	Type WEA	Style WA	Style A	Style AA	Style AA	Style PE	Style AA	Style AA
Style ABB	Type WEB	Style WB	Style B	Style BB	Style BB	Style HW	Style BB	Style BB
Style ACC	Type WEC	Style WC	Style C	Style CC	Style CC	Style HE	Style CC	Style CC

# DIAMOND GROOVE BUSHINGS



## APPLICATIONS:

A bushing for cast-in-place or potted installation. Diamond-knurled OD provides superior holding strength against both rotational and axial forces. Since the bushing's OD is not ground, keep the ID accurately located during casting or potting to ensure accuracy in the finished tool.



## ORDERING EXAMPLES:

DG-26-16-.1875 Standard inch bushing, inch ID  
 DG-26-16-.1772 Standard inch bushing, mm ID  
 (.1772 = 4.50mm)  
 DG-26-16-.1875 REAMER Reamer tolerance on ID  
 DG-26-16-.1875 NCB No counterbore on long bushings  
 marked with \* (no counterbore is standard on all other bushings)  
 DGM-8-12-4.50 Standard metric bushing

Standard prices apply only to bushings with a standard-drill-size ID within the stated ID range. See catalog back cover for standard drill sizes and their decimal equivalents. For prices on non-standard ID sizes, including reamer-tolerance and tap-guide bushings, please contact factory.

## STANDARD ID TOLERANCES:

From #55 to 1/4"	+0.001/+0.004	From 1 to 3mm	+0.02/+0.08mm
Over 1/4 to 3/4"	+0.001/+0.005	Over 3 to 6mm	+0.04/+0.12mm
		Over 6 to 10mm	+0.05/+0.14mm
		Over 10 to 18mm	+0.06/+0.17mm
Over 3/4 to 1-1/2"	+0.002/+0.006	Over 18 to 19mm	+0.07/+0.20mm
			(G6 tolerance)

## REAMER ID TOLERANCES:

From #60 to 1/4"	+0.005/+0.008	From 1 to 3mm	+0.06/+0.12mm
		Over 3 to 6mm	+0.10/+0.18mm
		Over 6 to 10mm	+0.13/+0.22mm
Over 1/4 to 1"	+0.006/+0.010	Over 10 to 18mm	+0.16/+0.27mm
		Over 18 to 19mm	+0.20/+0.33mm
			(F6 tolerance)

ID RANGE	OD	LENGTH	ANSI PART NO.
<b>.0520-.0995</b> #55-#39 1.35-2.50mm	<b>13/64</b> .223-.213	1/4	DG-13-4
		5/16	DG-13-5
		3/8	DG-13-6
		1/2	DG-13-8
<b>.0980-.1406</b> #40-9/64 2.50-3.50mm	<b>1/4</b> .275-.260	1/4	DG-16-4
		5/16	DG-16-5
		3/8	DG-16-6
		1/2	DG-16-8
		*3/4	DG-16-12
<b>.1250-.1935</b> 1/8-#10 3.20-4.90mm	<b>5/16</b> .337-.322	1/4	DG-20-4
		5/16	DG-20-5
		3/8	DG-20-6
		1/2	DG-20-8
		3/4	DG-20-12
<b>.1562-.2570</b> 5/32-F 4.00-6.50mm	<b>13/32</b> .431-.416	*1	DG-20-16
		1/4	DG-26-4
		5/16	DG-26-5
		3/8	DG-26-6
		1/2	DG-26-8
<b>.1562-.3160</b> 5/32-O 4.00-8.00mm	<b>1/2</b> .525-.510	3/4	DG-26-12
		*1	DG-26-16
		5/16	DG-32-5
		3/8	DG-32-6
		1/2	DG-32-8
<b>.3125-.4375</b> 5/16-7/16 7.90-11.00mm	<b>5/8</b> .650-.635	3/4	DG-32-12
		*1	DG-32-16
		3/8	DG-40-6
		1/2	DG-40-8
		3/4	DG-40-12
<b>.3125-.5312</b> 5/16-17/32 8.00-13.00mm	<b>3/4</b> .775-.760	1	DG-40-16
		1-3/8	DG-40-22
		3/8	DG-48-6
		1/2	DG-48-8
		3/4	DG-48-12
<b>.5000-.6562</b> 1/2-21/32 13.00-16.50mm	<b>7/8</b> .900-.885	1	DG-48-16
		1-3/8	DG-48-22
		3/8	DG-56-6
		1/2	DG-56-8
		3/4	DG-56-12
<b>.5000-.7656</b> 1/2-49/64 13.00-19.00mm	<b>1</b> 1.035-1.010	1	DG-56-16
		1-3/8	DG-56-22
		1/2	DG-64-8
		3/4	DG-64-12
		1	DG-64-16
		1-3/8	DG-64-22
		1-1/2	DG-64-24

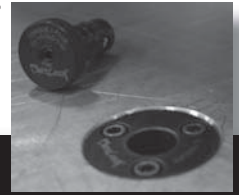
\* **INFO+**: Counterbored, leaving correct drill-bearing length and clearance (see page 512 for bearing length).

# DIAMOND GROOVE BUSHINGS – METRIC



ID RANGE (G6)	OD	LENGTH	ANSI PART NO.
1.00-1.80mm	5mm	6mm	DGM-5-6
		9mm	DGM-5-9
1.81-2.60mm	5.50-5.25mm	6mm	DGM-5-6
		9mm	DGM-5-9
2.61-3.30mm	6mm	8mm	DGM-6-8
		12mm	DGM-6-12
		16mm	DGM-6-16
3.31-4.00mm	7mm	8mm	DGM-7-8
		12mm	DGM-7-12
		16mm	DGM-7-16
4.01-5.00mm	8mm	8mm	DGM-8-8
		12mm	DGM-8-12
		16mm	DGM-8-16
5.01-6.00mm	10mm	10mm	DGM-10-10
		16mm	DGM-10-16
		20mm	DGM-10-20
6.01-8.00mm	12mm	10mm	DGM-12-10
		16mm	DGM-12-16
		20mm	DGM-12-20
8.01-10.00mm	15mm	12mm	DGM-15-12
		20mm	DGM-15-20
		25mm	DGM-15-25
10.01-12.00mm	18mm	12mm	DGM-18-12
		20mm	DGM-18-20
		25mm	DGM-18-25
12.01-15.00mm	22mm	16mm	DGM-22-16
		28mm	DGM-22-28
		36mm	DGM-22-36
15.01-18.00mm	26mm	16mm	DGM-26-16
		28mm	DGM-26-28
		36mm	DGM-26-36

## CarrLock<sup>®</sup> SYSTEM



### PROBLEM:

"We are an aerospace prototype shop making the transition from prototype to production on an important UAV project. We've developed elaborate fixturing of all shapes and sizes. We found ourselves leaving our trim fixtures set up on a large gantry style table and then having to tear everything down when a large part came along to make way for it.

This tied up one of our most valuable spindles, and dust collection was nearly impossible. Change over and setup times were totally out of control."



*Machine Operator Tyler Vaughn, of the Flying S, places a carbon trim fixture. The Carr Lock<sup>®</sup> receiver bushings allow for fixtures in various configurations.*

### SOLUTION:

"I discovered that I could combine 80% of our trim fixtures into just one fixture plate using just two Carr Lock<sup>®</sup> pins, with excellent locating ability and much better clamping than before.

Our setup times have gone from an average of about 25 minutes to literally 30 seconds, thus saving us hundreds of hours."

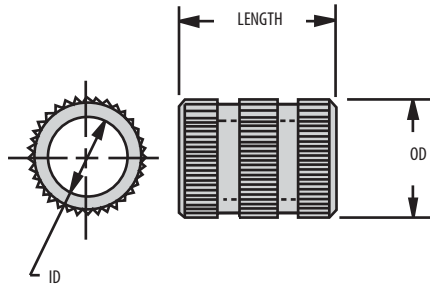
*Peter Bowman  
Production Manager/Mfg Engineer  
Flying S Inc.*

Exclusively Made  
in the USA

[www.carrlane.com/carrlock](http://www.carrlane.com/carrlock)

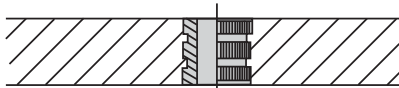
See Pages 303-320

# SERRATA GROOVE BUSHINGS



## APPLICATIONS:

Can be cast in place or potted, just as a diamond-groove bushing, or can also be pressed into an installation hole. Straight knurl provides less resistance to axial loads than the diamond knurl on a DG bushing. Since the bushing's OD is not ground, keep the ID accurately located during casting or potting to ensure accuracy in the finished tool.



## ORDERING EXAMPLES:

SG-26-16-.1875	Standard inch bushing, inch ID
SG-26-16-.1772	Standard inch bushing, mm ID (.1772 = 4.50mm)
SG-26-16-.1875 REAMER	Reamer tolerance on ID
SG-26-16-.1875 NCB	No counterbore on long bushings marked with * (no counterbore is standard on all other bushings)

Standard prices apply only to bushings with a standard-drill-size ID within the stated ID range. See catalog back cover for standard drill sizes and their decimal equivalents. For prices on non-standard ID sizes, including reamer-tolerance and tap-guide bushings, please contact factory.

## STANDARD ID TOLERANCES:

From #55 to 1/4"	+0.001/+0.004	From 1 to 3mm	+0.02/+0.08mm
Over 1/4 to 3/4"	+0.001/+0.005	Over 3 to 6mm	+0.04/+0.12mm
Over 3/4 to 1-1/2"	+0.002/+0.006	Over 6 to 10mm	+0.05/+0.14mm
Over 10 to 18mm	+0.06/+0.17mm	Over 18 to 19mm	+0.07/+0.20mm (G6 tolerance)

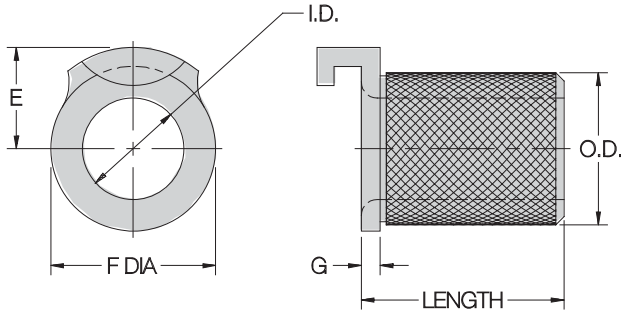
## REAMER ID TOLERANCES:

From #60 to 1/4"	+0.005/+0.008	From 1 to 3mm	+0.06/+0.12mm
Over 1/4 to 1"	+0.006/+0.010	Over 3 to 6mm	+0.10/+0.18mm
		Over 6 to 10mm	+0.13/+0.22mm
		Over 10 to 18mm	+0.16/+0.27mm
		Over 18 to 19mm	+0.20/+0.33mm (F6 tolerance)

ID RANGE	OD	LENGTH	ANSI PART NO.
<b>.0520-.0995</b> #55-#39 1.35-2.50mm	<b>13/64</b> .223-.213	1/4	SG-13-4
		5/16	SG-13-5
		3/8	SG-13-6
		1/2	SG-13-8
<b>.0980-.1406</b> #40-9/64 2.50-3.50mm	<b>1/4</b> .275-.260	1/4	SG-16-4
		5/16	SG-16-5
		3/8	SG-16-6
		1/2	SG-16-8
		*3/4	SG-16-12
<b>.1250-.1935</b> 1/8-#10 3.20-4.90mm	<b>5/16</b> .337-.322	1/4	SG-20-4
		5/16	SG-20-5
		3/8	SG-20-6
		1/2	SG-20-8
		3/4	SG-20-12
<b>.1562-.2570</b> 5/32-F 4.00-6.50mm	<b>13/32</b> .431-.416	*1	SG-20-16
		1/4	SG-26-4
		5/16	SG-26-5
		3/8	SG-26-6
		1/2	SG-26-8
<b>.1562-.3160</b> 5/32-O 4.00-8.00mm	<b>1/2</b> .525-.510	3/4	SG-26-12
		*1	SG-26-16
		5/16	SG-32-5
		3/8	SG-32-6
		1/2	SG-32-8
<b>.3125-.4375</b> 5/16-7/16 7.90-11.00mm	<b>5/8</b> .650-.635	3/4	SG-32-12
		*1	SG-32-16
		3/8	SG-40-6
		1/2	SG-40-8
		3/4	SG-40-12
<b>.3125-.5312</b> 5/16-17/32 8.00-13.00mm	<b>3/4</b> .775-.760	1	SG-40-16
		1-3/8	SG-40-22
		3/8	SG-48-6
		1/2	SG-48-8
		3/4	SG-48-12
<b>.5000-.6562</b> 1/2-21/32 13.00-16.50mm	<b>7/8</b> .900-.885	1	SG-48-16
		1-3/8	SG-48-22
		3/8	SG-56-6
		1/2	SG-56-8
		3/4	SG-56-12
<b>.5000-.7656</b> 1/2-49/64 13.00-19.00mm	<b>1</b> 1.035-1.010	1	SG-56-16
		1-3/8	SG-56-22
		1/2	SG-64-8
		3/4	SG-64-12
		1	SG-64-16
		1-3/8	SG-64-22
		1-1/2	SG-64-24

\* **INFO+:** Counterbored, leaving correct drill-bearing length and clearance (see page 512 for bearing length).

# DIAMOND-KNURL UN-A-LOK™ LINER BUSHINGS



## INCH

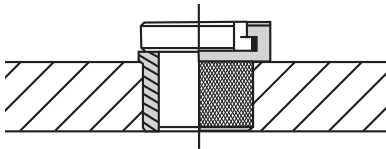
BODY OD	E	F DIA	G
5/16	1/4	.365	3/32
1/2	3/8	9/16	3/32
3/4	1/2	13/16	3/32
1	21/32	1-1/16	1/8
1-3/8	7/8	1-7/16	1/8

## METRIC

BODY OD	E	F DIA	G
12mm	9.5mm	15mm	3mm
15mm	11mm	18mm	3mm
18mm	13mm	22mm	4mm
22mm	15.5mm	26mm	4mm
26mm	17.5mm	30mm	4mm

## APPLICATIONS:

A liner for cast-in-place or potted installation, used to hold SF renewable drill bushings. Un-A-Lok™ liners incorporate a special locking tab that eliminates the need for a lockscrew. Holds only the “slip” side of an SF bushing, not the “fixed” side. Diamond-knurled OD provides superior holding strength against both rotational and axial forces. Since the bushing’s OD is not ground, keep the ID accurately located during casting or potting to ensure accuracy in the finished tool.



## ORDERING EXAMPLES:

1 ULD-20-5 Standard inch liner bushing  
 2 ULDM-12-10 Standard metric liner bushing

## STANDARD LINER ID TOLERANCES:

3/16 to 5/16"	+0.001/+0.004	8 to 10mm	+0.005/+0.014mm
1/2"	+0.002/+0.005	12 to 18mm	+0.006/+0.017mm
3/4"	+0.003/+0.006		(G6 tolerance)
1"	+0.004/+0.007		

## INCH

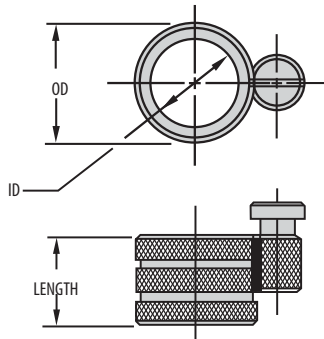
ID	OD	LENGTH	PART NO.
3/16	5/16 .342-.332	5/16	ULD-20-5
		3/8	ULD-20-6
		1/2	ULD-20-8
		3/4	ULD-20-12
5/16	1/2 .533-.523	3/8	ULD-32-6
		1/2	ULD-32-8
		3/4	ULD-32-12
1/2	3/4 .785-.775	1/2	ULD-48-8
		3/4	ULD-48-12
		1	ULD-48-16
3/4	1 1.035-1.025	1/2	ULD-64-8
		3/4	ULD-64-12
		1	ULD-64-16
1	1-3/8 1.415-1.405	1/2	ULD-88-8
		3/4	ULD-88-12
		1	ULD-88-16
		1-3/8	ULD-88-22

## METRIC

ID (G6)	OD	LENGTH	PART NO.
8mm	12mm 12.65-12.25mm	10mm	ULDM-12-10
		16mm	ULDM-12-16
10mm	15mm 15.65-15.25mm	12mm	ULDM-15-12
		20mm	ULDM-15-20
		25mm	ULDM-15-25
12mm	18mm 18.65-18.25mm	12mm	ULDM-18-12
		20mm	ULDM-18-20
		25mm	ULDM-18-25
15mm	22mm 22.65-22.25mm	16mm	ULDM-22-16
		28mm	ULDM-22-28
		36mm	ULDM-22-36
18mm	26mm 26.90-26.25mm	16mm	ULDM-26-16
		28mm	ULDM-26-28
		36mm	ULDM-26-36



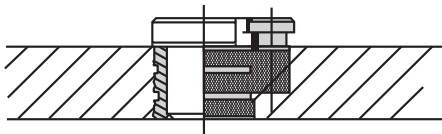
# EZ-CAST LINER BUSHINGS



## APPLICATIONS:

Another liner for cast-in-place or potted installation, used to hold SF renewable drill bushings. Unlike diamond-knurl unilock liners, EZ-cast liners hold either the "slip" or "fixed" side of an SF bushing, since they include an integral lockscrew holder. Diamond-knurled OD provides superior holding strength against both rotational and axial forces. Since the bushing's OD is not ground, keep the ID accurately located during casting or potting to ensure accuracy in the finished tool.

ID RANGE	OD	LENGTH	PART NO.
<b>5/16</b> .3126-.3129	<b>1/2</b> .525-.510	1/2	EZ-32-8
		3/4	EZ-32-12
		1	EZ-32-16
<b>1/2</b> .5002-.5005	<b>3/4</b> .775-.760	1/2	EZ-48-8
		3/4	EZ-48-12
		1	EZ-48-16
<b>3/4</b> .7503-.7506	<b>1</b> 1.035-1.010	1-3/8	EZ-48-22
		1/2	EZ-64-8
		3/4	EZ-64-12
<b>1</b> 1.0004-1.0007	<b>1-3/8</b> 1.410-1.385	1	EZ-64-16
		1-3/8	EZ-64-22
		3/4	EZ-88-12
		1	EZ-88-16
		1-3/8	EZ-88-22



## ORDERING EXAMPLE:

EZ-32-8 Standard inch liner bushing

## STANDARD LINER ID TOLERANCES:

5/16"	+0.0001/+0.0004
1/2"	+0.0002/+0.0005
3/4"	+0.0003/+0.0006
1"	+0.0004/+0.0007

**Carr Lane**  
MANUFACTURING CO.

# Hoist Rings



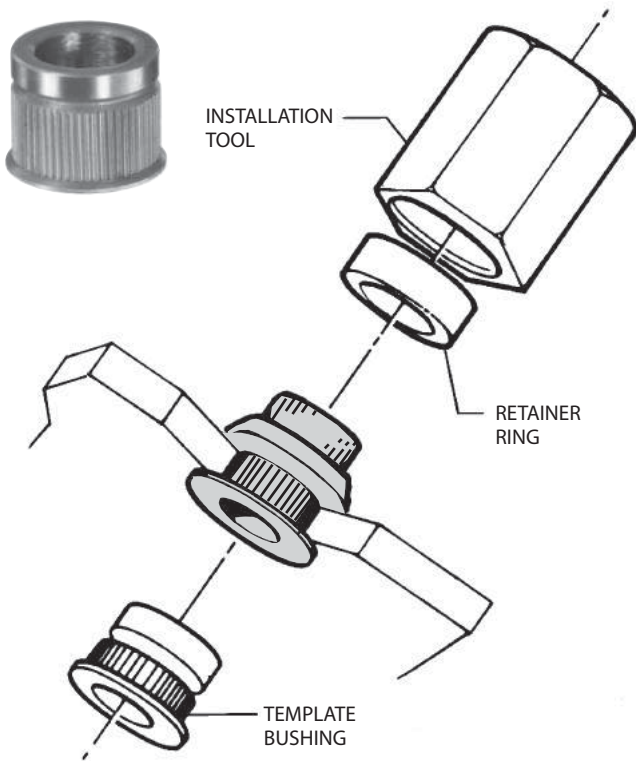
Many Varieties  
Of Hoist Rings

## Trusted to Move Your Most Important Materials.

- Swivel Hoist Rings
- Safety Hoist Rings
- Pivoting Hoist Rings
- Lifting Eyes
- Side-Pull Hoist Rings

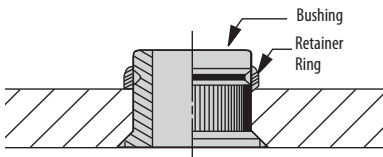
SEE PAGES 59-75

# TEMPLATE BUSHINGS



## APPLICATIONS:

An economical bushing designed for thin template jig plates from 1/16 to 3/8" thick. Bushings are held in place by a Retainer Ring (order Retainer Ring and Installation Tool separately). The OD serrations prevent the bushing from spinning. Bushings can be removed and reused by breaking the aluminum Retainer Ring (extra rings available separately).



## ORDERING EXAMPLES:

TB-24-6-4-.1250 Bushing with 1/8" ID  
 TR-10 Matching Retainer Ring for 1/16" thick template  
 TR-30 Matching Retainer Ring for 1/8" thick template

Standard prices apply only to bushings with a standard-drill-size ID within the stated ID range. See catalog back cover for standard drill sizes and their decimal equivalents. For prices on non-standard ID sizes, including reamer-tolerance and tap-guide bushings, please contact factory.

## STANDARD ID TOLERANCES:

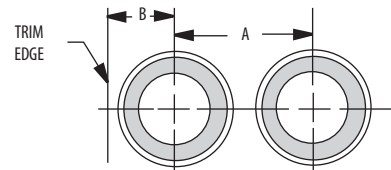
#55 to 1/2" +.0001/+0.011 | 1.30 to 12mm +.002/+0.030mm

## CONCENTRICITY:

ID concentric with OD to within .002 TIR

## INSTALLATION STEPS

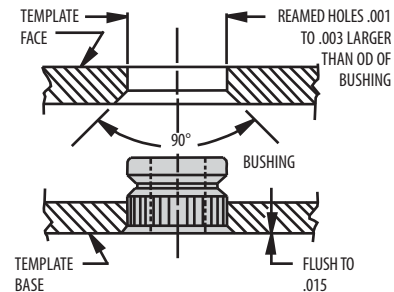
### 1. LAY OUT HOLES



When laying out holes, observe the minimum hole spacing and edge distance listed below:

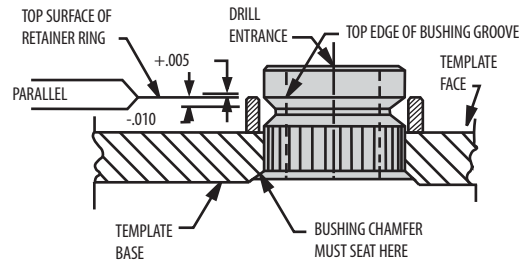
BUSHING OD	A MINIMUM	B MINIMUM
3/8	.60	.250
1/2	.73	.312
3/4	.98	.438

### 2. REAM AND COUNTERSINK



Ream hole .001 to .003 larger than bushing OD. Countersink reamed hole to allow the bushing to seat .015 below flush with surface. For best results, use a piloted countersink tool so that the countersink is concentric and free of chatter marks.

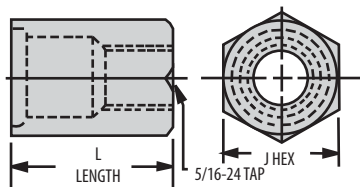
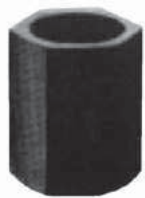
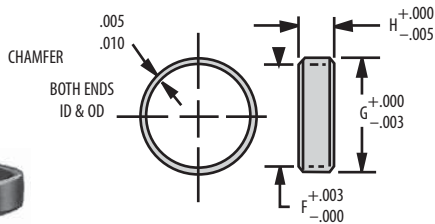
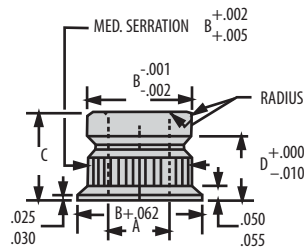
### 3. INSTALL



Install Retainer Ring with an arbor press whenever possible. The Installation Tool is also tapped for mounting on a rivet gun or other impact tool. Check that Retainer Ring top surface is within +.005 / -.010 of the bushing groove's top edge before installing.

# TEMPLATE BUSHINGS

## TEMPLATE BUSHINGS AND RETAINER RINGS



ID RANGE A	OD B	LENGTH C	GRIP D	BUSHING PART NO.	RETAINER RING PART NO.	TEMPLATE THICKNESS	
.0520-.1960 #55-#9 1.30-5.00mm	3/8	3/8	1/4	TB-24-6-4	TR-10	1/16	
					TR-20	3/32	
						TR-30	1/8
		1/2	5/16	TB-24-6-5	TR-10	1/8	
					TR-30	3/16	
			5/16	TB-24-8-5	TR-10	1/8	
					TR-30	3/16	
			3/8	TB-24-8-6	TR-10	3/16	
					TR-30	1/4	
		.1960-.3160 #9-O 5.00-8.00mm	1/2	3/8	1/4	TB-32-6-4	TR-40
					TR-50	3/32	
						TR-60	1/8
1/2	5/16			TB-32-6-5	TR-40	1/8	
					TR-60	3/16	
	5/16			TB-32-8-5	TR-40	1/8	
					TR-60	3/16	
	3/8			TB-32-8-6	TR-40	3/16	
					TR-60	1/4	
5/8	1/2			7/16	TB-32-8-7	TR-40	1/4
				TR-60	5/16		
					TR-40	5/16	
					TR-60	3/8	
	.3125-.5000 5/16-1/2 8.00-12.00mm	3/4	3/8	1/4	TB-48-6-4	TR-70	1/16
						TR-80	3/32
						TR-90	1/8
1/2			5/16	TB-48-6-5	TR-70	1/8	
					TR-90	3/16	
			5/16	TB-48-8-5	TR-70	1/8	
					TR-90	3/16	
			3/8	TB-48-8-6	TR-70	3/16	
					TR-90	1/4	
5/8			1/2	7/16	TB-48-8-7	TR-70	1/4
				TR-90	5/16		
					TR-70	5/16	
					TR-90	3/8	

### EXTRA RETAINER RINGS

PART NO.	OD B	G OD	H
TR-10	.375	.468	.205
TR-20			.173
TR-30			.142
TR-40	.500	.593	.205
TR-50			.173
TR-60			.142
TR-70	.750	.843	.205
TR-80			.173
TR-90			.142

### INSTALLATION TOOLS

PART NO.	FOR BUSHING SERIES	FOR RING SERIES	J	L	COMPLETE SET
					PART NO.
TBT-100	TB-24	TR-10,TR-20,TR-30	5/8	1	TBT-400
TBT-200	TB-32	TR-40,TR-50,TR-60	3/4	1	
TBT-300	TB-48	TR-70,TR-80,TR-90	1	1	

# THREADED TEMPLATE BUSHINGS



**Retainer Ring**



**Threaded  
Template Bushing**

**STANDARD ID TOLERANCE:**

From #55 to 1/2" +.0001/+0.015  
(ID concentric with OD to within .002" TIR)

**INSTALLATION:**

Drill hole in jig plate to nominal bushing OD (B diameter). Countersink 90° to allow bushing to seat flush to .015" below surface of plate (standard version only, not flanged version). Install and tighten Retainer Ring to secure. To make Retainer Ring installation easier, we offer a handy Socket-Type Installation Tool that fits 1/4" square drives.

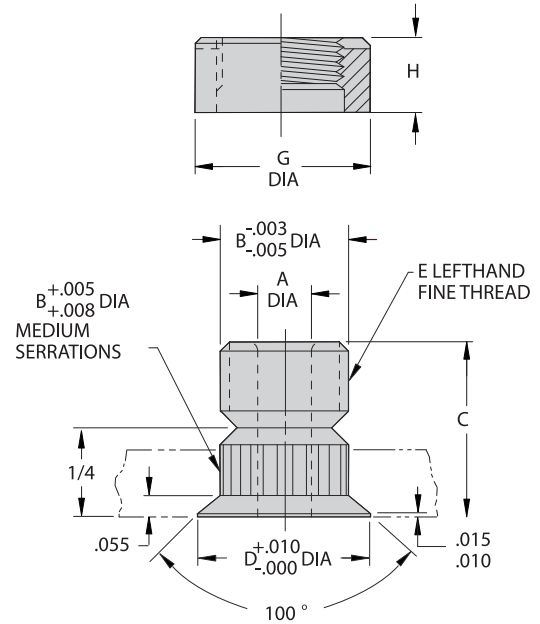
**APPLICATIONS:**

This economical bushing is designed for thin template jig plates from 3/64 to 3/8" thick. Bushings are held in place by a threaded Retainer Ring (order separately). Left-hand thread is self tightening during drilling to prevent the Retainer Ring from loosening. Flush contact of the Retainer Ring against the jig plate ensures perpendicular drill alignment. OD serrations prevent the bushing from rotating during drilling. Choose standard countersunk type for flush mounting, or flanged type for installation without countersinking the jig plate. Threaded Template Bushings can be easily removed to replace or reuse.

**ORDERING EXAMPLES:**

Available in 3/8", 1/2", 5/8", 3/4", and 1" OD sizes. Standard prices apply to standard bushings only, with any standard inch or metric ID size within the stated range.

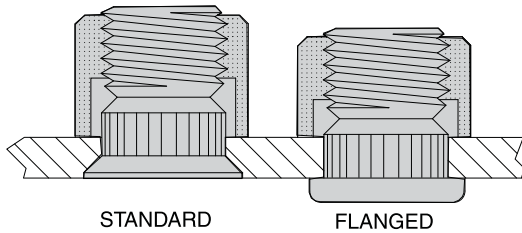
- TTB-24-.1250 Bushing with 1/8" ID
- TTR-24-3 Matching Retainer Ring for 1/4" thick template



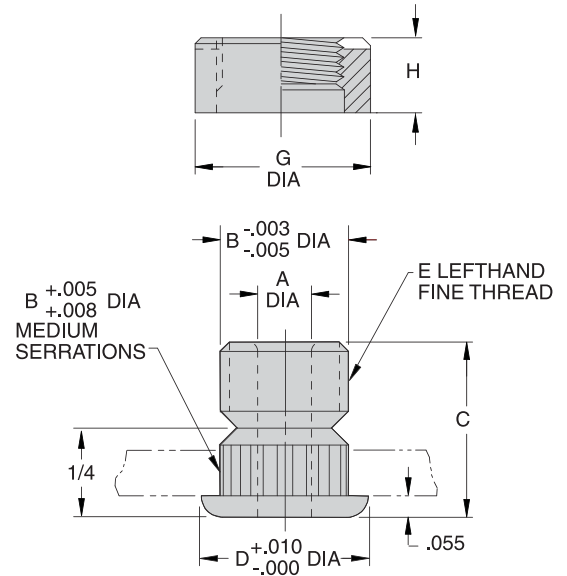
**THREADED TEMPLATE BUSHINGS — STANDARD  
(ORDER BUSHING AND RETAINER RING SEPARATELY)**

A ID RANGE	B OD	C LENGTH	D DIA	E	G DIA	H	BUSHING PART NO.	RETAINER RING PART NO.	TEMPLATE THICKNESS
.0520-.1960 #55-#9 1.30-5.00mm	3/8	1/2	.475	3/8-24 LH	1/2	3/8	TTB-24	TTR-24-6	3/64-1/8
						5/16		TTR-24-5	9/64-3/16
						3/16		TTR-24-3	13/64-3/8
.1960-.3160 #9-0 5.00-8.00mm	1/2	1/2	.600	1/2-20 LH	5/8	3/8	TTB-32	TTR-32-6	3/64-1/8
						5/16		TTR-32-5	9/64-3/16
						3/16		TTR-32-3	13/64-3/8
.3125-.4375 5/16-7/16 7.90-11.00mm	5/8	1/2	.725	5/8-18 LH	3/4	3/8	TTB-40	TTR-40-6	3/64-1/8
						5/16		TTR-40-5	9/64-3/16
						3/16		TTR-40-3	13/64-3/8
.3125-.5312 5/16-17/32 8.00-13.00mm	3/4	1/2	.850	3/4-16 LH	1	3/8	TTB-48	TTR-48-6	3/64-1/8
						5/16		TTR-48-5	9/64-3/16
						3/16		TTR-48-3	13/64-3/8
.5000-.7656 1/2-49/64 13.00-19.00mm	1	1/2	1.100	1"-14 LH	1-1/4	3/8	TTB-64	TTR-64-6	3/64-1/8
						5/16		TTR-64-5	9/64-3/16
						3/16		TTR-64-3	13/64-3/8

# THREADED TEMPLATE BUSHINGS

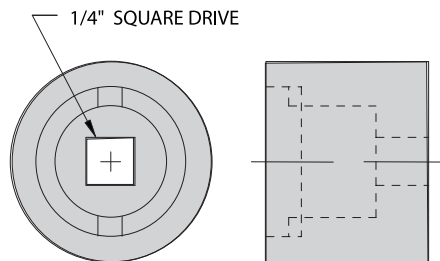


Choose standard countersunk type for flush mounting, or flanged type for installation without countersinking the jig plate.



## THREADED TEMPLATE BUSHINGS — FLANGED (ORDER BUSHING AND RETAINER RING SEPARATELY)

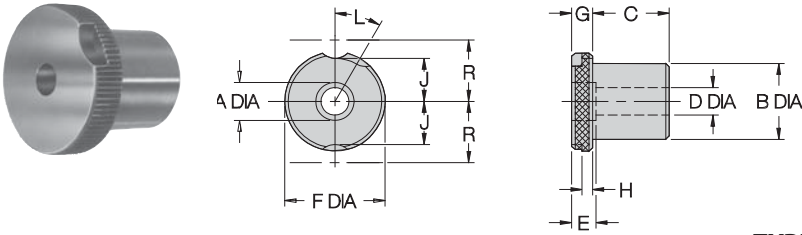
A ID RANGE	B OD	C LENGTH	D DIA	E	G DIA	H	BUSHING PART NO.	RETAINER RING PART NO.	TEMPLATE THICKNESS
.0520-.1960 #55-#9 1.30-5.00mm	3/8	1/2	.475	3/8-24 LH	1/2	3/8	TTBF-24	TTR-24-6	3/64-1/8
						5/16		TTR-24-5	9/64-3/16
						3/16		TTR-24-3	13/64-3/8
.1960-.3160 #9-0 5.00-8.00mm	1/2	1/2	.600	1/2-20 LH	5/8	3/8	TTBF-32	TTR-32-6	3/64-1/8
						5/16		TTR-32-5	9/64-3/16
						3/16		TTR-32-3	13/64-3/8
.3125-.4375 5/16-7/16 7.90-11.00mm	5/8	1/2	.725	5/8-18 LH	3/4	3/8	TTBF-40	TTR-40-6	3/64-1/8
						5/16		TTR-40-5	9/64-3/16
						3/16		TTR-40-3	13/64-3/8
.3125-.5312 5/16-17/32 8.00-13.00mm	3/4	1/2	.850	3/4-16 LH	1	3/8	TTBF-48	TTR-48-6	3/64-1/8
						5/16		TTR-48-5	9/64-3/16
						3/16		TTR-48-3	13/64-3/8
.5000-.7656 1/2-49/64 13.00-19.00mm	1	5/8	1.100	1"-14 LH	1-1/4	3/8	TTBF-64	TTR-64-6	3/64-1/8
						5/16		TTR-64-5	9/64-3/16
						3/16		TTR-64-3	13/64-3/8



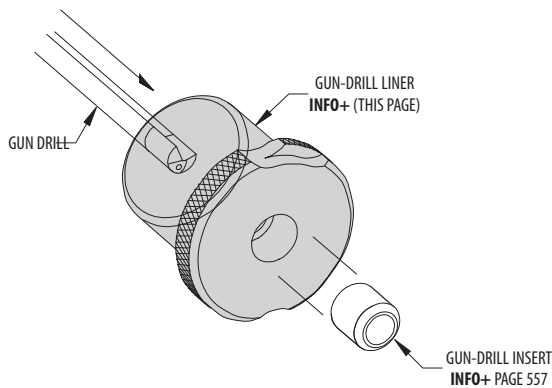
## SOCKET-TYPE INSTALLATION TOOLS

PART NO.	FOR INSTALLING RETAINER RINGS		
TTBT-24	TTR-24-3	TTR-24-5	TTR-24-6
TTBT-32	TTR-32-3	TTR-32-5	TTR-32-6
TTBT-40	TTR-40-3	TTR-40-5	TTR-40-6
TTBT-48	TTR-48-3	TTR-48-5	TTR-48-6
TTBT-64	TTR-64-3	TTR-64-5	TTR-64-6

# GUN DRILL BUSHINGS



BODY OD	E	F DIA	G	H	J	L	R	LOCK SCREW
1	7/16	1-27/64	3/8	3/16	19/32	35°	59/64	LS-2
1-3/8	7/16	1-51/64	3/8	3/16	25/32	30°	1-7/64	LS-2
1-3/4	3/4	2-19/64	3/8	3/16	1	30°	1-25/64	LS-2

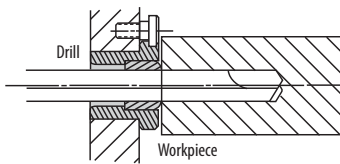


## TYPE GDL GUN-DRILL LINER

A ID	B OD	C LENGTH	D	PART NO.	LOCK SCREW
13/64	1	1	1/8	GDL-64-16-13	LS-2
1/4			5/32	GDL-64-16-16	
5/16			7/32	GDL-64-16-20	
1/2			11/32	GDL-64-16-32	
3/4			9/16	GDL-64-16-48	
13/64	1-3/8	1-3/8	1/8	GDL-88-22-13	LS-2
1/4			5/32	GDL-88-22-16	
5/16			7/32	GDL-88-22-20	
1/2			11/32	GDL-88-22-32	
3/4			9/16	GDL-88-22-48	
1	1-3/4	1-3/4	51/64	GDL-88-22-64	LS-2
13/64			1/8	GDL-112-28-13	
1/4			5/32	GDL-112-28-16	
5/16			7/32	GDL-112-28-20	
1/2			11/32	GDL-112-28-32	
3/4	9/16	GDL-112-28-48	1	51/64	GDL-112-28-64
1-3/8	1-3/64	GDL-112-28-88			

### APPLICATIONS:

These bushings are for gun-drilling machines, such as Eldorado, Drillmation, deHoff, and Lahr. Gun-drill bushings are similar to SF renewable bushings, but with the drill bearing at the bushing's head end. Depending on the gun-drilling machine, bushings are either one-piece or two-piece (a liner and an insert).



### ORDERING EXAMPLE:

GDL-112-28-20 Liner for any insert with a 5/16 OD

Standard prices apply only to bushings with a standard-drill-size ID within the stated ID range. See catalog back cover for standard drill sizes and their decimal equivalents. For prices on non-standard ID sizes, including reamer-tolerance and tap-guide bushings, please contact factory.

### STANDARD LINER ID TOLERANCES:

13/64"	+0.0014/+0.0016
1/4 to 5/16"	+0.0015/+0.0017
1/2"	+0.0016/+0.0018
3/4 to 1"	+0.0017/+0.0019
1-3/8"	+0.0021/+0.0023

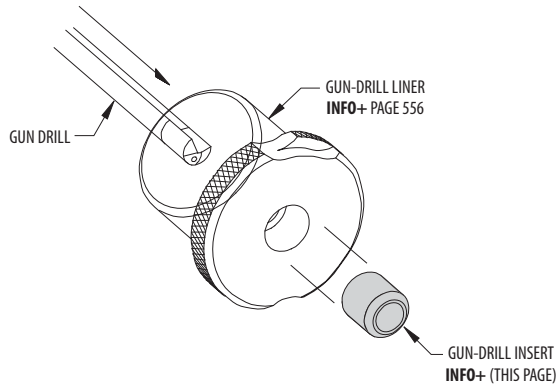
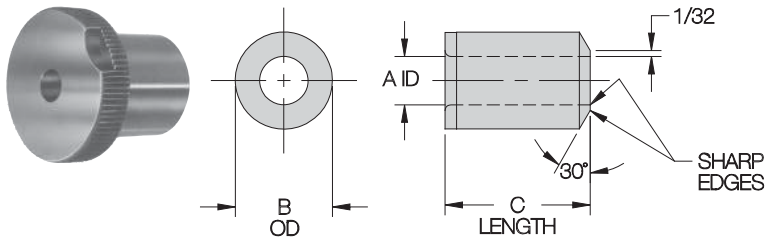
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# GUN DRILL BUSHINGS



## TYPE GDI GUN-DRILL INSERTS

A ID	B OD	C LENGTH	PART NO.	MATCHING LINER
<b>.0635-.0995</b> #52-#39 1.65-2.50mm	<b>13/64</b> .2046-.2043	1/2	GDI-13-8	GDL-64-16-13
		3/4	GDI-13-12	GDL-88-22-13
		1	GDI-13-16	GDL-112-28-13
<b>.0980-.1406</b> #40-9/64 2.50-3.50mm	<b>1/4</b> .2516-.2513	1/2	GDI-16-8	GDL-64-16-16
		3/4	GDI-16-12	GDL-88-22-16
		1	GDI-16-16	GDL-112-28-16
<b>.1250-.1935</b> 1/8-#10 3.20-4.90mm	<b>5/16</b> .3141-.3138	1/2	GDI-20-8	GDL-64-16-20
		3/4	GDI-20-12	GDL-88-22-20
		1	GDI-20-16	GDL-112-28-20
<b>.1875-.3160</b> 3/16-O 4.80-8.00mm	<b>1/2</b> .5017-.5014	1/2	GDI-32-8	GDL-64-16-32
		3/4	GDI-32-12	GDL-88-22-32
		1	GDI-32-16	GDL-112-28-32
<b>.3125-.5312</b> 5/16-17/32 8.00-13.50mm	<b>3/4</b> .7518-.7515	1/2	GDI-48-8	GDL-64-16-48
		3/4	GDI-48-12	GDL-88-22-48
		1	GDI-48-16	GDL-112-28-48
<b>.5000-.7656</b> 1/2-49/64 13.00-19.00mm	<b>1</b> 1.0018-1.0015	3/4	GDI-64-12	GDL-88-22-64
		1	GDI-64-16	GDL-112-28-64
<b>.6250-1.0312</b> 5/8-1-1/32 16.00-26.00mm	<b>1-3/8</b> 1.3772-1.3768	1	GDI-88-16	GDL-112-28-88

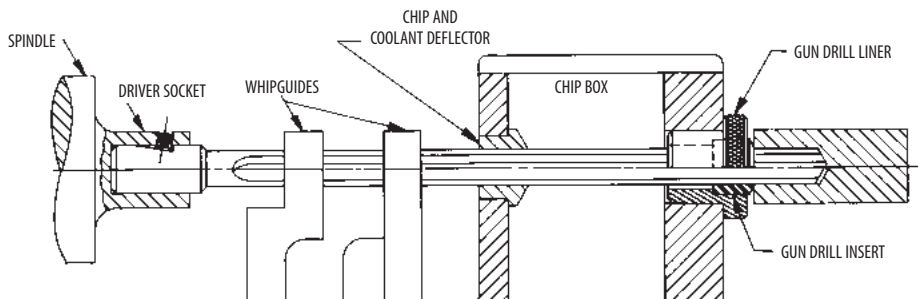
### ORDERING EXAMPLES:

- GDI-20-16-.1250      Gun-drill insert for 1-3/4" OD liner
- GDI-20-16-.1772      GDL-112-28-20, inch ID  
liners      Gun-drill insert for 1-3/4" OD
- GDL-112-28-20, mm ID  
   (.1772 = 4.50mm)

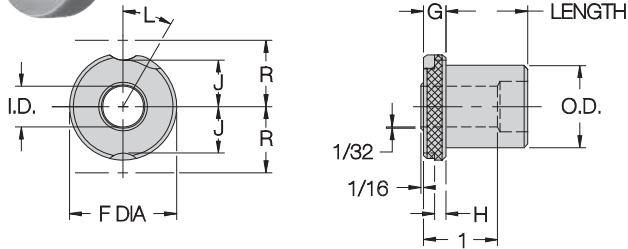
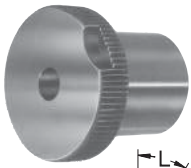
Standard prices apply only to bushings with a standard-drill-size ID within the stated ID range. See catalog back cover for standard drill sizes and their decimal equivalents. For prices on non-standard ID sizes, including reamer-tolerance and tap-guide bushings, please contact factory.

### STANDARD ID TOLERANCES:

#52 to 1-1/32"      -.0000/+0.0002 | 1.65 to 26mm      -.000/+0.005mm



# GUN DRILL BUSHINGS



BODY OD	F DIA	G	H	J	L	R
1	1-27/64	3/8	3/16	19/32	35°	59/64
1-3/8	1-51/64	3/8	3/16	25/32	30°	1-7/64

### ORDERING EXAMPLES:

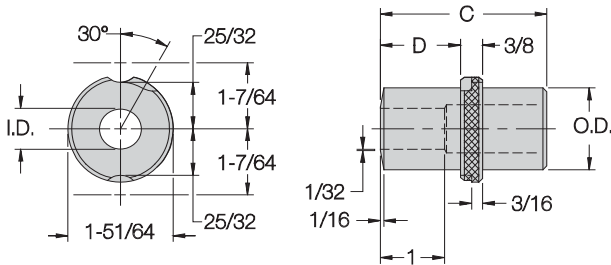
GDE-64-12-.1250 Standard gun-drill bushing, inch ID  
 GDE-64-12-.1772 Standard gun-drill bushing, mm ID (.1772 = 4.50mm)

### STANDARD ID TOLERANCES:

1/8 to 1-1/16" -.0000/+0.0002 | 3 to 27mm -.000/+0.005mm

## TYPE GDE ONE-PIECE ELDORADO TYPE

ID RANGE	OD	LENGTH	PART NO.	LOCK SCREW
.1250-.7812 1/8-25/32 3.20-19.50mm	1 1.0000-.9998	3/4	GDE-64-12	LS-2
		1	GDE-64-16	
		1-3/8	GDE-64-22	
.1250-1.0625 1/8-1-1/16 3.20-27.00mm	1-3/8 1.3750-1.3747	1	GDE-88-16	LS-2
		1-3/8	GDE-88-22	



### ORDERING EXAMPLES:

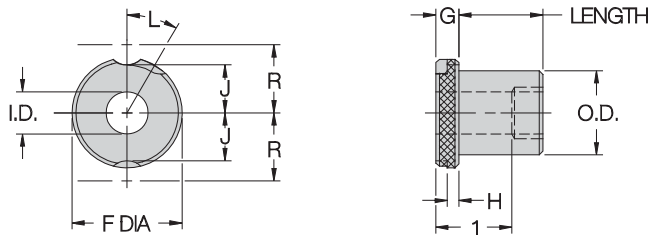
GDD-88-30-.1250 Standard gun-drill bushing, inch ID  
 GDD-88-30-.1772 Standard gun-drill bushing, mm ID (.1772 = 4.50mm)

### STANDARD ID TOLERANCES:

1/8 to 1-1/16" -.0000/+0.0002 | 3 to 27mm -.000/+0.005mm

## TYPE GDD ONE-PIECE ELDORADO DEEP TYPE

ID RANGE	OD	C LENGTH	D EXT.	PART NO.	LOCK SCREW
.1250-1.0625 1/8-1-1/16 3.20-27.00mm	1-3/8 1.3750- 1.3747	1-7/8	1/2	GDD-88-30	LS-2
		2-3/8	1	GDD-88-38	
		2-7/8	1-1/2	GDD-88-46	
		3-3/8	2	GDD-88-54	



BODY OD	F DIA	G	H	J	L	R
1	1-27/64	3/8	3/16	19/32	35°	59/64
1-3/8	1-51/64	3/8	3/16	25/32	30°	1-7/64

### ORDERING EXAMPLES:

GDH-64-12-.1250 Standard gun-drill bushing, inch ID  
 GDH-64-12-.1772 Standard gun-drill bushing, mm ID (.1772 = 4.50mm)

### STANDARD ID TOLERANCES:

1/8 to 1-1/16" -.0000/+0.0002 | 3 to 27mm -.000/+0.005mm

## TYPE GDH ONE-PIECE DEHOFF TYPE

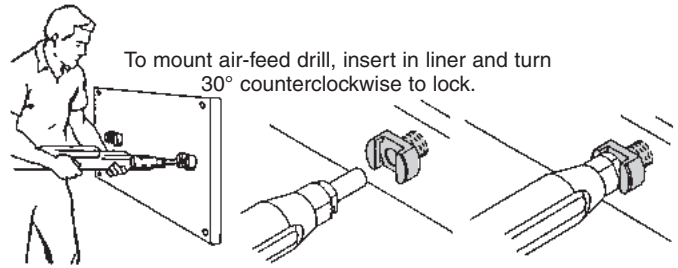
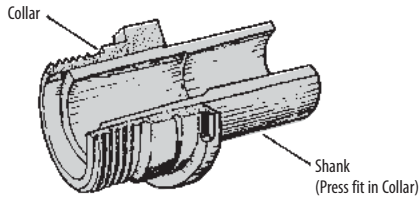
ID RANGE	OD	LENGTH	PART NO.	LOCK SCREW
.1250-.7812 1/8-25/32 3.20-19.50mm	1 1.0000-.9998	3/4	GDH-64-12	LS-2
		1	GDH-64-16	
		1-3/8	GDH-64-22	
.1250-1.0625 1/8-1-1/16 3.20-27.00mm	1-3/8 1.3750-1.3747	1	GDH-88-16	LS-2
		1-3/8	GDH-88-22	



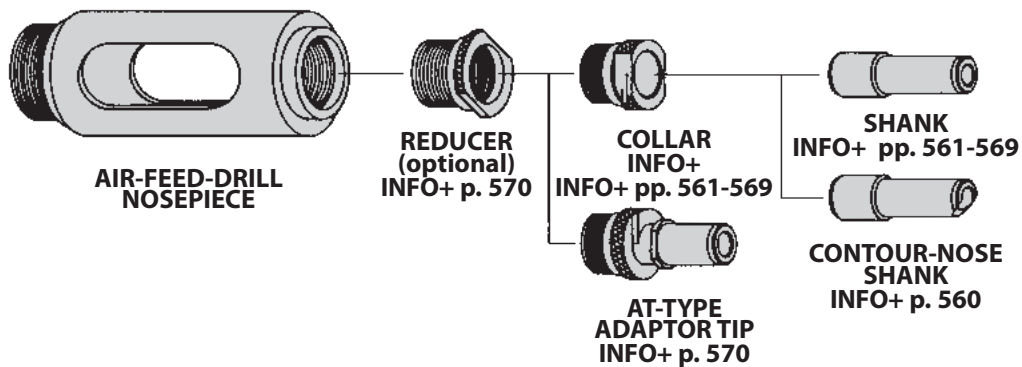
# AIR FEED BUSHINGS



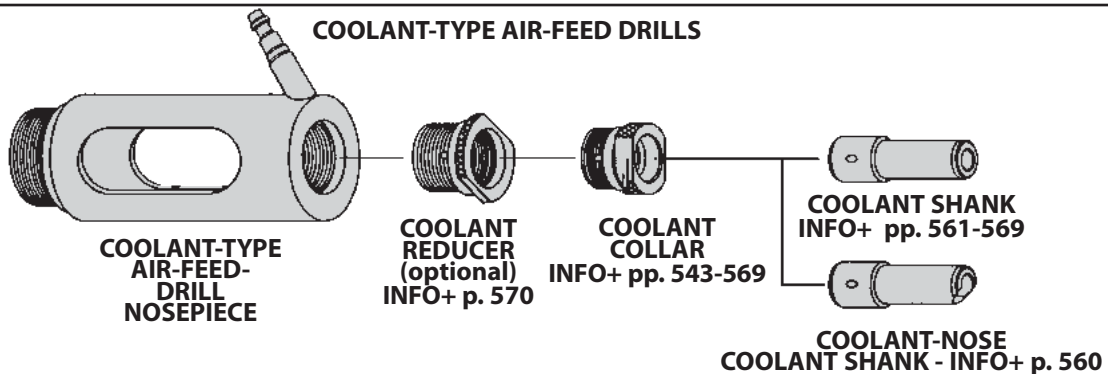
## ADAPTOR TIP ASSEMBLY



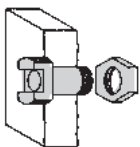
### STANDARD AIR-FEED DRILLS



### COOLANT-TYPE AIR-FEED DRILLS

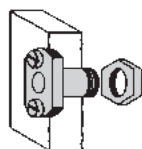


### MOUNTING OPTIONS



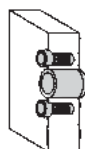
**TAPER-LOK LINERS**  
INFO+ p. 571

New-design one-piece lock liner has angular locking surfaces for superior strength. Allows very close hole spacing. Hold in place with a lock nut. Also available knurled for installing in plastic tooling.



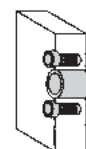
**LOCK LINERS**  
INFO+ p. 571

Conventional lock liner incorporating two lock screws. Hold in place with a lock nut.



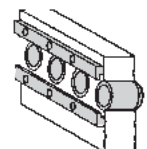
**TAPER-LOK AIR-FEED LOCKSCREWS**  
INFO+ p. 573

New-design lock screw especially for air-feed drills. Angular locking surface for superior strength. Install two lock screws and a liner directly in jig plate.



**LOCKSCREWS**  
INFO+ p. 573

Conventional-style lock screws. Install two lock screws and a liner bushing directly in jig plate.



**LOCK STRIPS**  
INFO+ p. 573

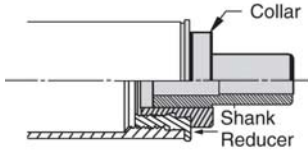
Allows the closest possible hole spacing. Use together with liner bushings.

# AIR FEED BUSHINGS



## APPLICATIONS:

Drill-bushing shanks, collars, adaptors, and locking accessories for air-feed drills, tappers, and back-spotfacers. Available for all standard drill motors, including Gardner-Denver, Keller, Aro, Buckeye, Quackenbush, Desoutter, and Ingersoll-Rand.



## CONSTRUCTION:

Adaptor-tip assemblies consist of two pieces: a locking collar and a pressed-in shank. The collar screws into the air-feed-drill nosepiece, precisely aligns the shank, and locks the drill in place by rotating 30° counter-clockwise after mounting. Shanks and collars can be ordered separately for replacement purposes.

## ORDERING EXAMPLES:

A-21101-.1250	Complete adaptor-tip assembly
21101-.1250	Shank only
21000	Collar only
A-21101-.1250-C	Complete assembly with contour nose
21101-.1250-C	Shank only, with contour nose
A-11101-.1250	Coolant-type assembly
A-11101-.1250-C	Coolant-type assembly with contour nose

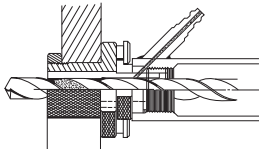
Standard prices apply only to bushings with a standard-drill-size ID within the stated ID range. See catalog back cover for standard drill sizes and their decimal equivalents. For prices on non-standard ID sizes, including reamer-tolerance and tap-guide bushings, please contact factory.

## STANDARD ID TOLERANCES:

From #70 to 1/4"	+0.001/+0.004	From 1 to 3mm	+0.02/+0.08mm
Over 1/4 to 3/4"	+0.001/+0.005	Over 3 to 6mm	+0.04/+0.12mm
Over 3/4 to 1-1/2"	+0.002/+0.006	Over 6 to 10mm	+0.05/+0.14mm
		Over 10 to 18mm	+0.06/+0.17mm
		Over 18 to 30mm	+0.07/+0.20mm

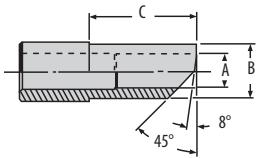
AT-Type +0.000/+0.003 Over 18 to 30mm +0.07/+0.20mm  
(INFO+: See page 513 for reamer ID tolerances.)

## OPTIONAL COOLANT TYPE:



For coolant-inducing air-feed drills. Special shanks, collars, and reducers with internal coolant passages. Contact factory for pricing.

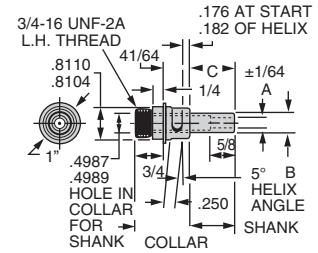
## OPTIONAL CONTOUR NOSE:



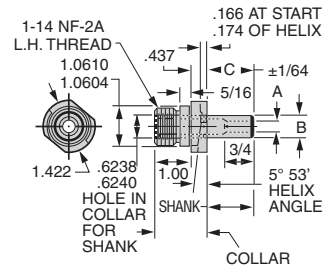
Angular-nose shank recommended for close drilling along sloped or curved surfaces. Available on standard and coolant-type shanks. To order, add "-C" suffix to part number. Contact factory for pricing.

## ADAPTOR TIP ASSEMBLIES

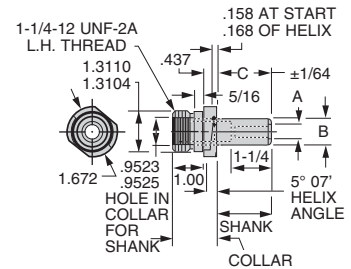
### 21000 SERIES



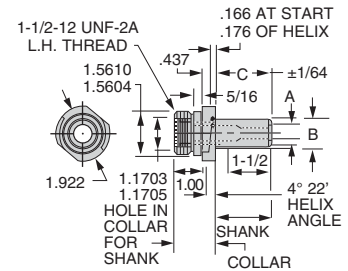
### 22000 SERIES



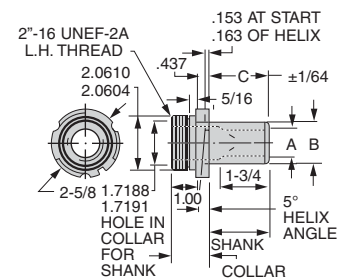
### 23000 SERIES



### 24000 SERIES



### 25000 SERIES



# AIR FEED BUSHINGS



## 21000 SERIES

A ID RANGE	B OD	C LENGTH	TIP ASSEMBLY		SHANK ONLY		COLLAR ONLY		TAPER-LOK LINER PART NO. p. 571	LOCK LINER PART NO. p. 571	LOCK NUT PART NO. p. 571	TAPER-LOK LOCKSCREW PART NO. p. 573	LOCK SCREW PART NO. p. 573	LINER PART NO. p. 573	INFO++											
			STANDARD TYPE PART NO.	COOLANT TYPE PART NO.	STANDARD TYPE PART NO.	COOLANT TYPE PART NO.	STANDARD TYPE PART NO.	COOLANT TYPE PART NO.																		
<b>.0938-.2500</b> 3/32-1/4 2.40-6.35mm	<b>3/8</b> .3748-.3745	3/8	A-21101	A-11101	21101	11101	21000	11000	TLL-16520 (Matches A-21106 tip)	A-16520 (Matches A-16500 tip)	14441	CL-11-AFL or CL-13-AFL or CL-14-AFL	16531	19936												
		1/2	A-21102	A-11102	21102	11102																				
		5/8	A-21103	A-11103	21103	11103																				
		3/4	A-21104	A-11104	21104	11104																				
		7/8	A-21105	A-11105	21105	11105																				
		1	A-21106	A-11106	21106	11106																				
		1-1/16	A-16500	A-11107	16500	11107																				
		1-1/8	A-21108	A-11108	21108	11108																				
		1-1/4	A-21110	A-11110	21110	11110																				
		1-3/8	A-21111	A-11111	21111	11111																				
		1-1/2	A-21113	A-11113	21113	11113																				
		1-5/8	A-21114	A-11114	21114	11114																				
		1-3/4	A-21115	A-11115	21115	11115																				
		1-7/8	A-21116	A-11116	21116	11116																				
		2	A-21118	A-11118	21118	11118																				
		2-1/8	A-21119	A-11119	21119	11119																				
		2-1/4	A-21120	A-11120	21120	11120																				
		2-3/8	A-21121	A-11121	21121	11121																				
		2-1/2	A-21122	A-11122	21122	11122																				
		2-3/4	A-21124	A-11124	21124	11124																				
		3	A-21125	A-11125	21125	11125																				
		3-1/4	A-21126	A-11126	21126	11126																				
		6	A-21131	A-11131	21131	11131																				
		<b>.0938-.3125</b> 3/32-5/16 2.40-7.90mm	<b>7/16</b> .4373-.4370	1/2	A-21202	A-11202										21202	11202	21000	11000	TLL-16521 (Matches A-21306 tip)	A-16521 (Matches A-16501 tip)	14442	CL-11-AFL or CL-13-AFL or CL-14-AFL	16531	19937	
				5/8	A-21203	A-11203										21203	11203									
3/4	A-21204			A-11204	21204	11204																				
7/8	A-21205			A-11205	21205	11205																				
1	A-21206			A-11206	21206	11206																				
1-1/8	A-21208			A-11208	21208	11208																				
1-1/4	A-21210			A-11210	21210	11210																				
1-3/8	A-21211			A-11211	21211	11211																				
1-1/2	A-21213			A-11213	21213	11213																				
1-5/8	A-21214			A-11214	21214	11214																				
1-3/4	A-21215			A-11215	21215	11215																				
1-7/8	A-21216			A-11216	21216	11216																				
2	A-21218			A-11218	21218	11218																				
2-1/8	A-21219			A-11219	21219	11219																				
2-1/4	A-21220			A-11220	21220	11220																				
2-3/8	A-21221			A-11221	21221	11221																				
2-1/2	A-21222			A-11222	21222	11222																				
2-3/4	A-21224			A-11224	21224	11224																				
3	A-21225			A-11225	21225	11225																				
3-1/4	A-21226			A-11226	21226	11226																				
<b>.0938-.3750</b> 3/32-3/8 2.40-9.50mm	<b>1/2</b> .4998-.4995			3/8	A-21301	A-11301	21301	11301	21000	11000	TLL-16521 (Matches A-21306 tip)	A-16521 (Matches A-16501 tip)	14442	CL-11-AFL or CL-13-AFL or CL-14-AFL	16531	19938										
				1/2	A-21302	A-11302	21302	11302																		
				5/8	A-21303	A-11303	21303	11303																		
				3/4	A-21304	A-11304	21304	11304																		
				7/8	A-21305	A-11305	21305	11305																		
		1	A-21306	A-11306	21306	11306																				
		1-1/16	A-16501	A-11307	16501	11307																				
		1-1/8	A-21308	A-11308	21308	11308																				
		1-1/4	A-21310	A-11310	21310	11310																				
		1-3/8	A-21311	A-11311	21311	11311																				
		1-1/2	A-21313	A-11313	21313	11313																				
		1-5/8	A-21314	A-11314	21314	11314																				
		1-3/4	A-21315	A-11315	21315	11315																				
		1-7/8	A-21316	A-11316	21316	11316																				
		2	A-21318	A-11318	21318	11318																				
		2-1/8	A-21319	A-11319	21319	11319																				
		2-1/4	A-21320	A-11320	21320	11320																				
		2-3/8	A-21321	A-11321	21321	11321																				
		2-1/2	A-21322	A-11322	21322	11322																				
		2-3/4	A-21324	A-11324	21324	11324																				
		3	A-21325	A-11325	21325	11325																				
		3-1/4	A-21326	A-11326	21326	11326																				
		5	A-21330	A-11330	21330	11330																				

# AIR FEED BUSHINGS



## 22000 SERIES

A ID RANGE	B OD	C LENGTH	TIP ASSEMBLY		SHANK ONLY		COLLAR ONLY		TAPER-LOK LINER PART NO. p. 571	LOCK LINER PART NO. p. 571	LOCK NUT PART NO. p. 571	TAPER-LOK LOCKSCREW PART NO. p. 573	LOCK SCREW PART NO. p. 573	LINER PART NO. p. 573		
			STANDARD TYPE PART NO.	COOLANT TYPE PART NO.	STANDARD TYPE PART NO.	COOLANT TYPE PART NO.	STANDARD TYPE PART NO.	COOLANT TYPE PART NO.								
			INFO++													
.1875-.2812 3/16-9/32 4.80-7.10mm	7/16 .4373-.4370	3/8	A-22101	A-12101	22101	12101										
		1/2	A-22102	A-12102	22102	12102										
		5/8	A-22103	A-12103	22103	12103										
		3/4	A-22104	A-12104	22104	12104										
		7/8	A-22105	A-12105	22105	12105										
		1	A-22106	A-12106	22106	12106										
		1-1/8	A-22108	A-12108	22108	12108										
		1-1/4	A-22110	A-12110	22110	12110										
		1-3/8	A-22111	A-12111	22111	12111										
		1-1/2	A-22113	A-12113	22113	12113										
		1-5/8	A-22114	A-12114	22114	12114										
		1-3/4	A-22115	A-12115	22115	12115										
		1-7/8	A-22116	A-12116	22116	12116										
		2	A-22118	A-12118	22118	12118										
		2-1/8	A-22119	A-12119	22119	12119										
		2-1/4	A-22120	A-12120	22120	12120										
		2-3/8	A-22121	A-12121	22121	12121										
		2-1/2	A-22122	A-12122	22122	12122										
		2-3/4	A-22124	A-12124	22124	12124										
		3	A-22125	A-12125	22125	12125										
		3-1/4	A-22126	A-12126	22126	12126										
		3-1/2	A-22127	A-12127	22127	12127										
		3-3/4	A-22128	A-12128	22128	12128										
		4	A-22129	A-12129	22129	12129										
		5	A-22130	A-12130	22130	12130										
		6	A-22131	A-12131	22131	12131										
		.1875-.3438 3/16-11/32 4.80-8.70mm	1/2 .4998-.4995	1/2	A-22202	A-12202	22202	12202								
				5/8	A-22203	A-12203	22203	12203								
				3/4	A-22204	A-12204	22204	12204								
				7/8	A-22205	A-12205	22205	12205								
				1	A-22206	A-12206	22206	12206	22000	12000				CL-11-AFL or CL-13-AFL or CL-14-AFL		
				1-1/8	A-22208	A-12208	22208	12208								
				1-1/4	A-22210	A-12210	22210	12210								
1-3/8	A-22211			A-12211	22211	12211										
1-1/2	A-22213			A-12213	22213	12213										
1-5/8	A-22214			A-12214	22214	12214										
1-3/4	A-22215			A-12215	22215	12215										
1-7/8	A-22216			A-12216	22216	12216										
2	A-22218			A-12218	22218	12218										
2-1/8	A-22219			A-12219	22219	12219										
2-1/4	A-22220			A-12220	22220	12220										
2-3/8	A-22221			A-12221	22221	12221										
2-1/2	A-22222			A-12222	22222	12222										
2-3/4	A-22224			A-12224	22224	12224										
3	A-22225			A-12225	22225	12225										
3-1/4	A-22226			A-12226	22226	12226										
3-1/2	A-22227			A-12227	22227	12227										
3-3/4	A-22228			A-12228	22228	12228										
4	A-22229			A-12229	22229	12229										
5	A-22230			A-12230	22230	12230										
6	A-22231			A-12231	22231	12231										
5/8	A-22303			A-12303	22303	12303										
3/4	A-22304			A-12304	22304	12304										
7/8	A-22305			A-12305	22305	12305										
1	A-22306			A-12306	22306	12306										
1-1/8	A-22308			A-12308	22308	12308										
1-1/4	A-22310			A-12310	22310	12310										
1-3/8	A-22311			A-12311	22311	12311										
1-1/2	A-22313			A-12313	22313	12313										
1-5/8	A-22314	A-12314	22314	12314												
1-3/4	A-22315	A-12315	22315	12315												
1-7/8	A-22316	A-12316	22316	12316												

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# AIR FEED BUSHINGS



## 22000 SERIES (CONT.)

A ID RANGE	B OD	C LENGTH	TIP ASSEMBLY		SHANK ONLY		COLLAR ONLY		TAPER-LOK LINER PART NO. p. 575	LOCK LINER PART NO. p. 575	LOCK NUT PART NO. p. 575	TAPER-LOK LOCKSCREW PART NO. p. 577	LOCK SCREW PART NO. p. 577	LINER PART NO. p. 577		
			STANDARD TYPE PART NO.	COOLANT TYPE PART NO.	STANDARD TYPE PART NO.	COOLANT TYPE PART NO.	STANDARD TYPE PART NO.	COOLANT TYPE PART NO.								
<b>.1875-.4062</b> 3/16-13/32 4.80-10.20mm	<b>9/16</b> .5623-.5620	2	A-22318	A-12318	22318	12318										
		2-1/8	A-22319	A-12319	22319	12319										
		2-1/4	A-22320	A-12320	22320	12320										
		2-3/8	A-22321	A-12321	22321	12321										
		2-1/2	A-22322	A-12322	22322	12322										
		2-3/4	A-22324	A-12324	22324	12324										
		3	A-22325	A-12325	22325	12325										
		3-1/4	A-22326	A-12326	22326	12326										
		3-1/2	A-22327	A-12327	22327	12327										
		3-3/4	A-22328	A-12328	22328	12328										
		4	A-22329	A-12329	22329	12329										
		5	A-22330	A-12330	22330	12330										
		6	A-22331	A-12331	22331	12331										
		<b>.1875-.4688</b> 3/16-15/32 4.80-11.80mm	<b>5/8</b> .6248-.6245	3/8	A-22401	A-12401	22401	12401								
				1/2	A-22402	A-12402	22402	12402								
				5/8	A-22403	A-12403	22403	12403								
				3/4	A-22404	A-12404	22404	12404								
				7/8	A-22405	A-12405	22405	12405								
1	A-22406			A-12406	22406	12406										
1-1/8	A-22408			A-12408	22408	12408										
1-3/16	A-16502			A-12409	16502	12409										
1-1/4	A-22410			A-12410	22410	12410										
1-3/8	A-22411			A-12411	22411	12411										
1-1/2	A-22413			A-12413	22413	12413										
1-5/8	A-22414			A-12414	22414	12414										
1-3/4	A-22415			A-12415	22415	12415										
1-7/8	A-22416			A-12416	22416	12416										
2	A-22418			A-12418	22418	12418										
2-1/8	A-22419			A-12419	22419	12419										
2-1/4	A-22420			A-12420	22420	12420										
2-3/8	A-22421			A-12421	22421	12421	22000									
2-1/2	A-22422			A-12422	22422	12422										
2-3/4	A-22424			A-12424	22424	12424										
3	A-22425			A-12425	22425	12425										
3-1/4	A-22426	A-12426	22426	12426												
3-1/2	A-22427	A-12427	22427	12427												
3-3/4	A-22428	A-12428	22428	12428												
4	A-22429	A-12429	22429	12429												
5	A-22430	A-12430	22430	12430												
6	A-22431	A-12431	22431	12431												
<b>.1875-.4688</b> 3/16-15/32 4.80-11.80mm	<b>3/4</b> .7498-.7495	3/4	A-22504	A-12504	22504	12504										
		7/8	A-22505	A-12505	22505	12505										
		1	A-22506	A-12506	22506	12506										
		1-1/8	A-22508	A-12508	22508	12508										
		1-1/4	A-22510	A-12510	22510	12510										
		1-3/8	A-22511	A-12511	22511	12511										
		1-1/2	A-22513	A-12513	22513	12513										
		1-5/8	A-22514	A-12514	22514	12514										
		1-3/4	A-22515	A-12515	22515	12515										
		1-7/8	A-22516	A-12516	22516	12516										
		2	A-22518	A-12518	22518	12518										
		2-1/8	A-22519	A-12519	22519	12519										
		2-1/4	A-22520	A-12520	22520	12520										
		2-3/8	A-22521	A-12521	22521	12521										
		2-1/2	A-22522	A-12522	22522	12522										
		2-3/4	A-22524	A-12524	22524	12524										
		3	A-22525	A-12525	22525	12525										
		3-1/4	A-22526	A-12526	22526	12526										
		3-1/2	A-22527	A-12527	22527	12527										
		3-3/4	A-22528	A-12528	22528	12528										
		4	A-22529	A-12529	22529	12529										
		5	A-22530	A-12530	22530	12530										
		6	A-22531	A-12531	22531	12531										

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INFO++

TLL-16522  
(Matches  
A-22406  
Tip)

A-16522  
(Matches  
A-16502  
Tip)

14443

CL-11-AFL  
or  
CL-13-AFL  
or  
CL-14-AFL

19939

19940

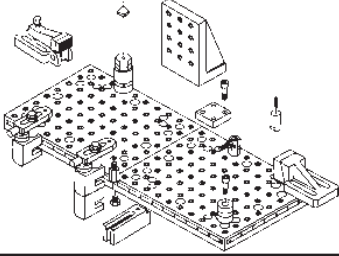
16532

19941

# AIR FEED BUSHINGS



## Modular Fixturing



- Ideal for temporary fixturing, for one-time jobs, short or prototype production runs, trial fixturing or while permanent fixtures are built or repaired
- Available in mini, standard and heavy sizes
- Wide range of tooling plates and blocks, finish ground, with multipurpose positioning holes
- Order as components, or in handy starter sets

See Modular Fixturing on pages 369-420

### 23000 SERIES

A ID RANGE	B OD	C LENGTH	TIP ASSEMBLY		SHANK ONLY		COLLAR ONLY		TAPER-LOK LINER PART NO. p. 571	LOCK LINER PART NO. p. 571	LOCK NUT PART NO. p. 571	TAPER-LOK LOCKSCREW PART NO. p. 573	LOCK SCREW PART NO. p. 573	LINER PART NO. p. 573										
			STANDARD TYPE PART NO.	COOLANT TYPE PART NO.	STANDARD TYPE PART NO.	COOLANT TYPE PART NO.	STANDARD TYPE PART NO.	COOLANT TYPE PART NO.																
<b>.2500-.5312</b> 1/4-17/32 6.30-13.50mm	<b>3/4</b> .7498-.7495	3/4	A-23104	A-13104	23104	13104	23000	13000				CL-11-AFL or CL-13-AFL or CL-14-AFL	16532	19942										
		7/8	A-23105	A-13105	23105	13105																		
		1	A-23106	A-13106	23106	13106																		
		1-1/8	A-23108	A-13108	23108	13108																		
		1-1/4	A-23110	A-13110	23110	13110																		
		1-3/8	A-23111	A-13111	23111	13111																		
		1-1/2	A-23113	A-13113	23113	13113																		
		1-5/8	A-23114	A-13114	23114	13114																		
		1-3/4	A-23115	A-13115	23115	13115																		
		1-7/8	A-23116	A-13116	23116	13116																		
		2	A-23118	A-13118	23118	13118																		
		2-1/8	A-23119	A-13119	23119	13119																		
		2-1/4	A-23120	A-13120	23120	13120																		
		2-3/8	A-23121	A-13121	23121	13121																		
		2-1/2	A-23122	A-13122	23122	13122																		
		2-3/4	A-23124	A-13124	23124	13124																		
		3	A-23125	A-13125	23125	13125																		
		3-1/4	A-23126	A-13126	23126	13126																		
		3-1/2	A-23127	A-13127	23127	13127																		
		3-3/4	A-23128	A-13128	23128	13128																		
		4	A-23129	A-13129	23129	13129																		
		5	A-23130	A-13130	23130	13130																		
		6	A-23131	A-13131	23131	13131																		
		<b>.2500-.5938</b> 1/4-19/32 6.30-15.00mm	<b>13/16</b> .8123-.8120	3/4	A-23204	A-13204									23204	13204	23000	13000				CL-11-AFL or CL-13-AFL or CL-14-AFL	16532	19943
				7/8	A-23205	A-13205									23205	13205								
				1	A-23206	A-13206									23206	13206								
1-1/8	A-23208			A-13208	23208	13208																		
1-1/4	A-23210			A-13210	23210	13210																		
1-3/8	A-23211			A-13211	23211	13211																		
1-1/2	A-23213			A-13213	23213	13213																		
1-5/8	A-23214			A-13214	23214	13214																		
1-3/4	A-23215			A-13215	23215	13215																		
1-7/8	A-23216			A-13216	23216	13216																		
2	A-23218			A-13218	23218	13218																		
2-1/8	A-23219			A-13219	23219	13219																		
2-1/4	A-23220			A-13220	23220	13220																		
2-3/8	A-23221			A-13221	23221	13221																		
2-1/2	A-23222			A-13222	23222	13222																		
2-3/4	A-23224			A-13224	23224	13224																		
3	A-23225			A-13225	23225	13225																		
3-1/4	A-23226			A-13226	23226	13226																		
3-1/2	A-23227			A-13227	23227	13227																		
3-3/4	A-23228			A-13228	23228	13228																		
4	A-23229			A-13229	23229	13229																		
5	A-23230			A-13230	23230	13230																		
6	A-23231			A-13231	23231	13231																		

INFO++

# AIR FEED BUSHINGS



## 23000 SERIES (CONT.)

A ID RANGE	B OD	C LENGTH	TIP ASSEMBLY		SHANK ONLY		COLLAR ONLY		TAPER-LOK LINER PART NO. p. 571	LOCK LINER PART NO. p. 571	LOCK NUT PART NO. p. 571	TAPER-LOK LOCKSCREW PART NO. p. 573	LOCK SCREW PART NO. p. 573	LINER PART NO. p. 573										
			STANDARD TYPE PART NO.	COOLANT TYPE PART NO.	STANDARD TYPE PART NO.	COOLANT TYPE PART NO.	STANDARD TYPE PART NO.	COOLANT TYPE PART NO.																
<b>.2500-.6562</b> 1/4-21/32 6.30-16.50mm	<b>7/8</b> .8748-.8745	3/4	A-23304	A-13304	23304	13304	23000	13000	TLL-16523 (Matches A-23310 Tip)	A-16523 (Matches A-16504 Tip)	14445			19944										
		7/8	A-23305	A-13305	23305	13305																		
		1	A-23306	A-13306	23306	13306																		
		1-1/8	A-23308	A-13308	23308	13308																		
		1-1/4	A-23310	A-13310	23310	13310																		
		1-3/8	A-23311	A-13311	23311	13311																		
		1-7/16	A-16503	A-13312	16503	13312																		
		1-1/2	A-23313	A-13313	23313	13313																		
		1-5/8	A-23314	A-13314	23314	13314																		
		1-3/4	A-23315	A-13315	23315	13315																		
		1-7/8	A-23316	A-13316	23316	13316																		
		2	A-23318	A-13318	23318	13318																		
		2-1/8	A-23319	A-13319	23319	13319																		
		2-1/4	A-23320	A-13320	23320	13320																		
		2-3/8	A-23321	A-13321	23321	13321																		
		2-1/2	A-23322	A-13322	23322	13322																		
		2-3/4	A-23324	A-13324	23324	13324																		
		3	A-23325	A-13325	23325	13325																		
		3-1/4	A-23326	A-13326	23326	13326																		
		3-1/2	A-23327	A-13327	23327	13327																		
		3-3/4	A-23328	A-13328	23328	13328																		
		4	A-23329	A-13329	23329	13329																		
		5	A-23330	A-13330	23330	13330																		
		6	A-23331	A-13331	23331	13331																		
		<b>.2500-.7188</b> 1/4-23/32 6.30-18.00mm	<b>1</b> .9998-.9995	1	A-23406	A-13406									23406	13406	23000	13000				CL-11-AFL or CL-13-AFL or CL-14-AFL	16532	19945
				1-1/8	A-23408	A-13408									23408	13408								
				1-1/4	A-23410	A-13410									23410	13410								
				1-3/8	A-23411	A-13411									23411	13411								
				1-1/2	A-23413	A-13413									23413	13413								
				1-5/8	A-23414	A-13414									23414	13414								
				1-3/4	A-23415	A-13415									23415	13415								
				1-7/8	A-23416	A-13416									23416	13416								
				2	A-23418	A-13418									23418	13418								
2-1/8	A-23419			A-13419	23419	13419																		
2-1/4	A-23420			A-13420	23420	13420																		
2-3/8	A-23421			A-13421	23421	13421																		
2-1/2	A-23422			A-13422	23422	13422																		
2-3/4	A-23424			A-13424	23424	13424																		
3	A-23425			A-13425	23425	13425																		
3-1/4	A-23426			A-13426	23426	13426																		
3-1/2	A-23427			A-13427	23427	13427																		
3-3/4	A-23428			A-13428	23428	13428																		
4	A-23429			A-13429	23429	13429																		
5	A-23430			A-13430	23430	13430																		
6	A-23431			A-13431	23431	13431																		
<b>.2500-.7188</b> 5/16-23/32 6.30-18.00mm	<b>1-1/8</b> 1.1248-1.1245			1	A-23506	A-13506	23506	13506	23000	13000	TTL-16524 (Matches A-23515 Tip)	A-16524 (Matches A-16504 Tip)	14446			19946								
				1-1/8	A-23508	A-13508	23508	13508																
				1-1/4	A-23510	A-13510	23510	13510																
				1-3/8	A-23511	A-13511	23511	13511																
				1-1/2	A-23513	A-13513	23513	13513																
				1-5/8	A-23514	A-13514	23514	13514																
				1-3/4	A-23515	A-13515	23515	13515																
				1-7/8	A-23516	A-13516	23516	13516																
				1-15/16	A-16504	A-13517	16504	13517																
				2	A-23518	A-13518	23518	13518																
				2-1/8	A-23519	A-13519	23519	13519																
				2-1/4	A-23520	A-13520	23520	13520																
		2-3/8	A-23521	A-13521	23521	13521																		
		2-1/2	A-23522	A-13522	23522	13522																		
		2-3/4	A-23524	A-13524	23524	13524																		
		3	A-23525	A-13525	23525	13525																		
		3-1/4	A-23526	A-13526	23526	13526																		
		3-1/2	A-23527	A-13527	23527	13527																		
		3-3/4	A-23528	A-13528	23528	13528																		
		4	A-23529	A-13529	23529	13529																		
		5	A-23530	A-13530	23530	13530																		
		6	A-23531	A-13531	23531	13531																		

INFO++

# AIR FEED BUSHINGS

## Quick-Acting One-Touch Swing Clamps



Manual One-Touch Clamps offer simple, cost-effective clamping and unclamping of workpieces. Simply rotate the quick-acting clamps into position, then clamp down in one continuous motion. These manual clamps come four sizes each of three styles: horizontal cam, vertical cam, or hex drive.

See Pages 255-257



### 2400 SERIES

A ID RANGE	B OD	C LENGTH	TIP ASSEMBLY		SHANK ONLY		COLLAR ONLY		TAPER-LOK LINER PART NO. p. 571	LOCK LINER PART NO. p. 571	LOCK NUT PART NO. p. 571	TAPER-LOK LOCKSCREW PART NO. p. 573	LOCK SCREW PART NO. p. 573	LINER PART NO. p. 573										
			STANDARD TYPE PART NO.	COOLANT TYPE PART NO.	STANDARD TYPE PART NO.	COOLANT TYPE PART NO.	STANDARD TYPE PART NO.	COOLANT TYPE PART NO.																
.3125-.4062 5/16-13/32 8.00-10.20mm	5/8 .6248-.6245	5/8	A-24103	A-14103	24103	14103	24000	14000				CL-11-AFL or CL-13-AFL or CL-14-AFL	16532	19947										
		3/4	A-24104	A-14104	24104	14104																		
		7/8	A-24105	A-14105	24105	14105																		
		1	A-24106	A-14106	24106	14106																		
		1-1/8	A-24108	A-14108	24108	14108																		
		1-1/4	A-24110	A-14110	24110	14110																		
		1-3/8	A-24111	A-14111	24111	14111																		
		1-1/2	A-24113	A-14113	24113	14113																		
		1-5/8	A-24114	A-14114	24114	14114																		
		1-3/4	A-24115	A-14115	24115	14115																		
		1-7/8	A-24116	A-14116	24116	14116																		
		2	A-24118	A-14118	24118	14118																		
		2-1/8	A-24119	A-14119	24119	14119																		
		2-1/4	A-24120	A-14120	24120	14120																		
		2-3/8	A-24121	A-14121	24121	14121																		
		2-1/2	A-24122	A-14122	24122	14122																		
		2-3/4	A-24124	A-14124	24124	14124																		
		3	A-24125	A-14125	24125	14125																		
		3-1/4	A-24126	A-14126	24126	14126																		
		3-1/2	A-24127	A-14127	24127	14127																		
		3-3/4	A-24128	A-14128	24128	14128																		
		4	A-24129	A-14129	24129	14129																		
		5	A-24130	A-14130	24130	14130																		
		6	A-24131	A-14131	24131	14131																		
		.3125-.5312 5/16-17/32 8.00-13.50mm	3/4 .7498-.7495	3/4	A-24304	A-14304									24304	14304	24000	14000				CL-11-AFL or CL-13-AFL or CL-14-AFL	16532	19949
				7/8	A-24305	A-14305									24305	14305								
				1	A-24306	A-14306									24306	14306								
				1-1/8	A-24308	A-14308									24308	14308								
				1-1/4	A-24310	A-14310									24310	14310								
				1-3/8	A-24311	A-14311									24311	14311								
1-1/2	A-24313			A-14313	24313	14313																		
1-5/8	A-24314			A-14314	24314	14314																		
1-3/4	A-24315			A-14315	24315	14315																		
1-7/8	A-24316			A-14316	24316	14316																		
2	A-24318			A-14318	24318	14318																		
2-1/8	A-24319			A-14319	24319	14319																		
2-1/4	A-24320			A-14320	24320	14320																		
2-3/8	A-24321			A-14321	24321	14321																		
2-1/2	A-24322			A-14322	24322	14322																		
2-3/4	A-24324			A-14324	24324	14324																		
3	A-24325			A-14325	24325	14325																		
3-1/4	A-24326			A-14326	24326	14326																		
3-1/2	A-24327			A-14327	24327	14327																		
3-3/4	A-24328			A-14328	24328	14328																		
4	A-24329			A-14329	24329	14329																		
5	A-24330			A-14330	24330	14330																		
6	A-24331			A-14331	24331	14331																		

INFO++



# AIR FEED BUSHINGS



## 24000 SERIES (CONT.)

A ID RANGE	B OD	C LENGTH	TIP ASSEMBLY		SHANK ONLY		COLLAR ONLY		TAPER-LOK LINER PART NO. p. 571	LOCK LINER PART NO. p. 571	LOCK NUT PART NO. p. 571	TAPER-LOK LOCKSCREW PART NO. p. 573	LOCK SCREW PART NO. p. 573	LINER PART NO. p. 573	INFO++		
			STANDARD TYPE PART NO.	COOLANT TYPE PART NO.	STANDARD TYPE PART NO.	COOLANT TYPE PART NO.	STANDARD TYPE PART NO.	COOLANT TYPE PART NO.									
<b>.3125-.6562</b> 5/16-21/32 8.00-16.50mm	<b>7/8</b> .8745-.8748	7/8	A-24405	A-14405	24405	14405											
		1	A-24406	A-14406	24406	14406											
		1-1/8	A-24408	A-14408	24408	14408											
		1-1/4	A-24410	A-14410	24410	14410											
		1-3/8	A-24411	A-14411	24411	14411											
		1-1/2	A-24413	A-14413	24413	14413											
		1-5/8	A-24414	A-14414	24414	14414											
		1-3/4	A-24415	A-14415	24415	14415											
		1-7/8	A-24416	A-14416	24416	14416											
		2	A-24418	A-14418	24418	14418											
		2-1/8	A-24419	A-14419	24419	14419											
		2-1/4	A-24420	A-14420	24420	14420											
		2-3/8	A-24421	A-14421	24421	14421										19950	
		2-1/2	A-24422	A-14422	24422	14422											
		2-3/4	A-24424	A-14424	24424	14424											
		3	A-24425	A-14425	24425	14425											
		3-1/4	A-24426	A-14426	24426	14426											
		3-1/2	A-24427	A-14427	24427	14427											
		3-3/4	A-24428	A-14428	24428	14428											
		4	A-24429	A-14429	24429	14429											
		5	A-24430	A-14430	24430	14430											
		6	A-24431	A-14431	24431	14431											
		<b>.3125-.7812</b> 5/16-25/32 8.00-19.50mm	<b>1</b> .9998-.9995	1	A-24506	A-14506	24506	14506									
				1-1/8	A-24508	A-14508	24508	14508									
1-1/4	A-24510			A-14510	24510	14510											
1-3/8	A-24511			A-14511	24511	14511											
1-1/2	A-24513			A-14513	24513	14513											
1-5/8	A-24514			A-14514	24514	14514											
1-3/4	A-24515			A-14515	24515	14515											
1-7/8	A-24516			A-14516	24516	14516											
2	A-24518			A-14518	24518	14518											
2-1/8	A-24519			A-14519	24519	14519											
2-1/4	A-24520			A-14520	24520	14520											
2-3/8	A-24521			A-14521	24521	14521											
2-1/2	A-24522			A-14522	24522	14522											
2-3/4	A-24524			A-14524	24524	14524											
3	A-24525			A-14525	24525	14525											
3-1/4	A-24526			A-14526	24526	14526											
3-1/2	A-24527			A-14527	24527	14527											
3-3/4	A-24528			A-14528	24528	14528											
4	A-24529			A-14529	24529	14529											
5	A-24530			A-14530	24530	14530											
6	A-24531			A-14531	24531	14531											
<b>.3125-.9062</b> 5/16-29/32 8.00-23.00mm	<b>1-1/8</b> 1.1248-1.1245			1	A-24606	A-14606	24606	14606									
				1-1/8	A-24608	A-14608	24608	14608									
				1-1/4	A-24610	A-14610	24610	14610									
		1-3/8	A-24611	A-14611	24611	14611											
		1-1/2	A-24613	A-14613	24613	14613											
		1-5/8	A-24614	A-14614	24614	14614											
		1-3/4	A-24615	A-14615	24615	14615											
		1-7/8	A-24616	A-14616	24616	14616											
		1-15/16	A-16505	A-14617	16505	14617											
		2	A-24618	A-14618	24618	14618											
		2-1/8	A-24619	A-14619	24619	14619											
		2-1/4	A-24620	A-14620	24620	14620											
		2-3/8	A-24621	A-14621	24621	14621											
		2-1/2	A-24622	A-14622	24622	14622											
		2-3/4	A-24624	A-14624	24624	14624											
		3	A-24625	A-14625	24625	14625											
		3-1/4	A-24626	A-14626	24626	14626											
		3-1/2	A-24627	A-14627	24627	14627											
		3-3/4	A-24628	A-14628	24628	14628											
		4	A-24629	A-14629	24629	14629											
		5	A-24630	A-14630	24630	14630											
		6	A-24631	A-14631	24631	14631											

# AIR FEED BUSHINGS



## 24000 SERIES (CONT.)

A ID RANGE	B OD	C LENGTH	TIP ASSEMBLY		SHANK ONLY		COLLAR ONLY		TAPER-LOK LINER PART NO. p. 571	LOCK LINER PART NO. p. 571	LOCK NUT PART NO. p. 571	TAPER-LOK LOCKSCREW PART NO. p. 573	LOCK SCREW PART NO. p. 573	LINER PART NO. p. 573										
			STANDARD TYPE PART NO.	COOLANT TYPE PART NO.	STANDARD TYPE PART NO.	COOLANT TYPE PART NO.	STANDARD TYPE PART NO.	COOLANT TYPE PART NO.																
<b>.3125-.9375</b> 5/16-15/16 8.00-23.50mm	<b>1-1/4</b> 1.2498-1.2495	1-1/4	A-24710	A-14710	24710	14710	24000	14000						19952										
		1-3/8	A-24711	A-14711	24711	14711																		
		1-1/2	A-24713	A-14713	24713	14713																		
		1-5/8	A-24714	A-14714	24714	14714																		
		1-3/4	A-24715	A-14715	24715	14715																		
		1-7/8	A-24716	A-14716	24716	14716																		
		2	A-24718	A-14718	24718	14718																		
		2-1/8	A-24719	A-14719	24719	14719																		
		2-1/4	A-24720	A-14720	24720	14720																		
		2-3/8	A-24721	A-14721	24721	14721																		
		2-1/2	A-24722	A-14722	24722	14722																		
		2-3/4	A-24724	A-14724	24724	14724																		
		3	A-24725	A-14725	24725	14725																		
		3-1/4	A-24726	A-14726	24726	14726																		
		3-1/2	A-24727	A-14727	24727	14727																		
		3-3/4	A-24728	A-14728	24728	14728																		
		4	A-24729	A-14729	24729	14729																		
		5	A-24730	A-14730	24730	14730																		
		6	A-24731	A-14731	24731	14731																		
		<b>.3125-.9375</b> 5/16-15/16 8.00-23.50mm	<b>1-1/2</b> 1.4998-1.4995	1	A-24806	A-14806									24806	14806	24000	14000	TLL-16526 (Matches A-24815 Tip)	A-16526 (Matches A-16506 Tip)	14447	CL-11-AFL or CL-13-AFL or CL-14-AFL	16532	19953
				1-3/8	A-24811	A-14811									24811	14811								
				1-1/2	A-24813	A-14813									24813	14813								
				1-5/8	A-24814	A-14814									24814	14814								
				1-3/4	A-24815	A-14815									24815	14815								
1-7/8	A-24816			A-14816	24816	14816																		
1-15/16	A-16506			A-14817	16506	14817																		
2	A-24818			A-14818	24818	14818																		
2-1/8	A-24819			A-14819	24819	14819																		
2-1/4	A-24820			A-14820	24820	14820																		
2-3/8	A-24821			A-14821	24821	14821																		
2-1/2	A-24822			A-14822	24822	14822																		
2-3/4	A-24824			A-14824	24824	14824																		
3	A-24825			A-14825	24825	14825																		
3-1/4	A-24826			A-14826	24826	14826																		
3-1/2	A-24827			A-14827	24827	14827																		
3-3/4	A-24828			A-14828	24828	14828																		
4	A-24829			A-14829	24829	14829																		
5	A-24830			A-14830	24830	14830																		
6	A-24831			A-14831	24831	14831																		

INFO++

## 25000 SERIES

<b>.3750-1.0312</b> 3/8-1-1/32 9.50-26.00mm	<b>1-1/4</b> 1.2498-1.2495	1-1/4	A-25110	A-15110	25110	15110	25000	15000				CL-12-AFL	16530	19953
		1-3/8	A-25111	A-15111	25111	15111								
		1-1/2	A-25113	A-15113	25113	15113								
		1-5/8	A-25114	A-15114	25114	15114								
		1-3/4	A-25115	A-15115	25115	15115								
		1-7/8	A-25116	A-15116	25116	15116								
		2	A-25118	A-15118	25118	15118								
		2-1/8	A-25119	A-15119	25119	15119								
		2-1/4	A-25120	A-15120	25120	15120								
		2-3/8	A-25121	A-15121	25121	15121								
		2-1/2	A-25122	A-15122	25122	15122								
		2-3/4	A-25124	A-15124	25124	15124								
		3	A-25125	A-15125	25125	15125								
		3-1/4	A-25126	A-15126	25126	15126								
		3-1/2	A-25127	A-15127	25127	15127								
		3-3/4	A-25128	A-15128	25128	15128								
		4	A-25129	A-15129	25129	15129								
		5	A-25130	A-15130	25130	15130								
		6	A-25131	A-15131	25211	15131								

1  
2

# AIR FEED BUSHINGS

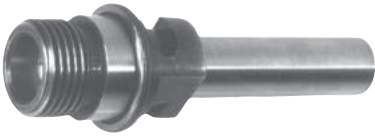


## 25000 SERIES (CONT.)

A ID RANGE	B OD	C LENGTH	TIP ASSEMBLY		SHANK ONLY		COLLAR ONLY		TAPER-LOK LINER PART NO. p. 571	LOCK LINER PART NO. p. 571	LOCK NUT PART NO. p. 571	TAPER-LOK LOCKScrew PART NO. p. 573	LOCK Screw PART NO. p. 573	LINER PART NO. p. 573										
			STANDARD TYPE PART NO.	COOLANT TYPE PART NO.	STANDARD TYPE PART NO.	COOLANT TYPE PART NO.	STANDARD TYPE PART NO.	COOLANT TYPE PART NO.																
<b>.3750-1.1562</b> 3/8-1-5/32 9.50-29.00mm	<b>1-3/8</b> 1.3748-1.3745	1-3/8	A-25211	A-15211	25213	15211	15000							19954										
		1-1/2	A-25213	A-15213	25214	15213																		
		1-5/8	A-25214	A-15214	25215	15214																		
		1-3/4	A-25215	A-15215	25216	15215																		
		1-7/8	A-25216	A-15216	25218	15216																		
		2	A-25218	A-15218	25219	15218																		
		2-1/8	A-25219	A-15219	25220	15219																		
		2-1/4	A-25220	A-15220	25221	15220																		
		2-3/8	A-25221	A-15221	25222	15221																		
		2-1/2	A-25222	A-15222	25224	15222																		
		2-3/4	A-25224	A-15224	25225	15224																		
		3	A-25225	A-15225	25226	15225																		
		3-1/4	A-25226	A-15226	25227	15226																		
		3-1/2	A-25227	A-15227	25228	15227																		
		3-3/4	A-25228	A-15228	25229	15228																		
		4	A-25229	A-15229	25230	15229																		
		5	A-25230	A-15230	25231	15230																		
		6	A-25231	A-15231	25313	15231																		
		<b>.3750-1.2812</b> 3/8-1-9/32 9.50-32.00mm	<b>1-1/2</b> 1.4998-1.4995	1-1/2	A-25313	A-15313									25314	15313	15000							19955
				1-5/8	A-25314	A-15314									25315	15314								
				1-3/4	A-25315	A-15315									25316	15315								
1-7/8	A-25316			A-15316	25318	15316																		
2	A-25318			A-15318	25319	15318																		
2-1/8	A-25319			A-15319	25320	15319																		
2-1/4	A-25320			A-15320	25321	15320																		
2-3/8	A-25321			A-15321	25322	15321																		
2-1/2	A-25322			A-15322	25324	15322																		
2-3/4	A-25324			A-15324	25325	15324																		
3	A-25325			A-15325	25326	15325																		
3-1/4	A-25326			A-15326	25327	15326																		
3-1/2	A-25327			A-15327	25328	15327																		
3-3/4	A-25328			A-15328	25329	15328																		
4	A-25329			A-15329	25330	15329																		
5	A-25330			A-15330	25331	15330																		
6	A-25331			A-15331	25415	15331																		
<b>.3750-1.4688</b> 3/8-1-15/32 9.50-37.00mm	<b>1-3/4</b> 1.7498-1.7495			1-3/4	A-25415	A-15415	25416	15415	15000							19956								
				1-7/8	A-25416	A-15416	25418	15416																
				2	A-25418	A-15418	25419	15418																
				2-1/8	A-25419	A-15419	25420	15419																
		2-1/4	A-25420	A-15420	25421	15420																		
		2-3/8	A-25421	A-15421	25422	15421																		
		2-1/2	A-25422	A-15422	25424	15422																		
		2-3/4	A-25424	A-15424	25425	15424																		
		3	A-25425	A-15425	25426	15425																		
		3-1/4	A-25426	A-15426	25427	15426																		
		3-1/2	A-25427	A-15427	25428	15427																		
		3-3/4	A-25428	A-15428	25429	15428																		
		4	A-25429	A-15429	25430	15429																		
		5	A-25430	A-15430	25431	15430																		
		6	A-25431	A-15431	25518	15431																		
		<b>.3750-1.4688</b> 3/8-1-15/32 9.50-37.00mm	<b>2</b> 1.9998-1.9995	2	A-25518	A-15518	16513	15518									15000			A-16533 (Matches A-16513 Tip)	14448			
				2-5/8	A-16513	A-15523	25524	15523																
				2-3/4	A-25524	A-15524	25525	15524																
3	A-25525			A-15525	25526	15525																		
3-1/4	A-25526			A-15526	25527	15526																		
3-1/2	A-25527			A-15527	25528	15527																		
3-3/4	A-25528			A-15528	25529	15528																		
4	A-25529			A-15529	25530	15529																		
5	A-25530			A-15530	25531	15530																		
6	A-25531			A-15531		15531																		

INFO++

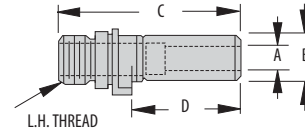
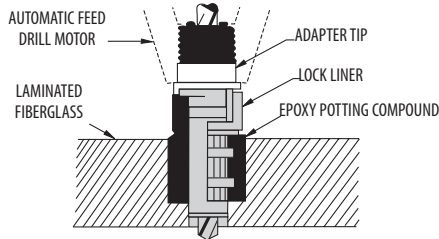
# AIR FEED BUSHINGS



## AT-TYPE ONE-PIECE ADAPTER TIPS



**ADAPTER TIP**



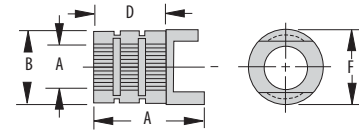
AT-series adapter tips are one-piece adapters primarily for fiberglass and plastic tooling. They are used with AT-series knurled liners, and are not compatible with any other liners or air-feed accessories. AT-series bushings are available in 3/4-16 and 1"-14 mounting-thread sizes, in a total of four OD sizes, to fit drill diameters from .1910" to .6250".

### AT-TYPE ADAPTER TIPS

PART NO.	A ID RANGE	B OD	C	D	L.H. THREAD
AT-1	.1910-.2055 #11-#5	11/32 .3437-.3435	2-7/16	1-9/16	3/4-16
AT-2	.1910-.2850 #11-9/32	7/16 .4375-.4373			
AT-3	.2810-.4130 K-Z	9/16 .5625-.5623			
AT-4	.2810-.6250 K-5/8	3/4 .7500-.7498			1-14



**LOCK LINER**



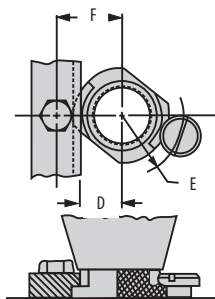
Precision knurled liner bushing for mounting air-feed drills in fiberglass or plastic tooling. AT-series knurled lock liners are designed especially for AT-series one-piece adapter tips, and are not compatible with any other liners or air-feed accessories. Press-fit AT-series liners are available as specials. Available in four sizes.

### AT-TYPE LOCK LINERS

PART NO.	A ID RANGE	B OD	C	D	F DIA
LL-1	11/32 .3440-.3443	9/16	1-3/8	7/8	11/16
LL-2	7/16 .4377-.4380	11/16			13/16
LL-3	9/16 .5627-.5630	13/16			15/16
LL-4	3/4 .7503-.7506	1			1-1/8

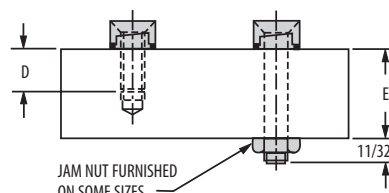
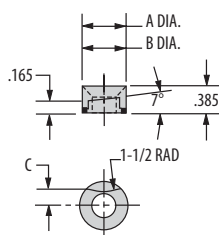
# AIR FEED BUSHINGS

## MOUNTING DIMENSIONS FOR LOCKSCREWS AND LOCK STRIPS



DIMENSION	21000 SERIES	22000 SERIES	23000 SERIES	24000 SERIES	25000 SERIES
D	.312	.609	.734	.859	—
E	.625	.922	1.047	1.172	1.562
F	.687	.984	1.109	1.234	—

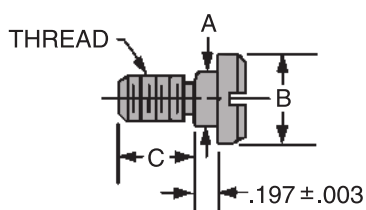
## TAPER-LOK AIR-FEED LOCKSCREWS



Angular locking surface mates perfectly with air-feed collars. Use instead of standard lock screws for greater strength . . . eliminates worn, bent, or broken lock screws caused by point contact. Serrations at bottom bite into the fixture plate to positively prevent rotation under heavy torque loads. Alloy steel mounting screws furnished. Patent No. 3,336,822.

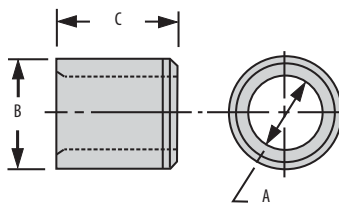
PART NO.	MOUNTING SCREW DIA.	MOUNTING SCREW	A DIA	B DIA	C	D	E	REPLACES STANDARD LOCKSCREW
CL-9-AFL	5/16	Not Furnished	5/8	19/32	3/16	—	—	—
CL-11-AFL		5/16-18x1.00				19/32	—	16531 & 16532
CL-13-AFL		5/16-18x1.50 w/Jam Nut				1-3/32	3/4	—
CL-14-AFL		5/16-18x2.00 w/Jam Nut				1-19/32	1-1/4	—
CL-10-AFL	3/8	Not Furnished	3/4	23/32	7/32	—	—	—
CL-12-AFL	3/8-16x1.00	19/32				—	16530	

## LOCKSCREWS



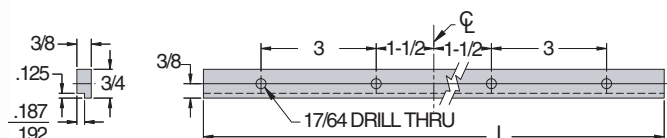
PART NO.	A DIA	B DIA	C	B THREAD
16531	3/8	5/8	5/16	5/16-18
16532			7/16	
16530	7/16	3/4	5/8	3/8-16

## LINERS



PART NO.	A ID	B OD	C LENGTH
19936	3/8		1
19937	7/16		1
19938	1/2		1
19939	9/16		1
19940	5/8		1-3/4
19947			1
19941	3/4		1-3/8
19942			1-3/4
19949			1-3/4
19943	13/16		1-3/8
19944	7/8		1-3/4
19950	1		1-3/8
19945			1-3/8
19951			1-3/4
19946	1-1/8		1-3/4
19952	1-1/4		2-1/2
19953	1-3/8		2-1/2
19954			2-1/2
19955			2-1/2
19956	1-3/4		2-1/2

## LOCK STRIPS



PART NO.	L OVERALL LENGTH	NO. OF HOLES
LSM-12	12	4
LSM-24	24	8
LSM-36	36	12

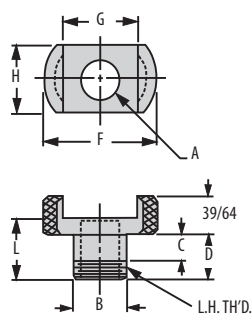
# AIR FEED BUSHINGS

## TAPER-LOK LINERS

Precision liner bushing for mounting air-feed drills through a jig plate. One-piece design has two angled locking surfaces to lock the drill motor in place, for superior strength. Milled flats allow close hole spacing. Press fit into jig plate, then fasten from behind with a Lock Nut (order separately). Optional heavy-duty type has precisely machined helical locking surfaces that mate exactly with the air-feed collar for added impact resistance. Patent no. 3,015,242. Available for 21000 through 24000 series air-feed drills (not 25000 series).



**PRESS FIT**



### PRESS FIT – STANDARD

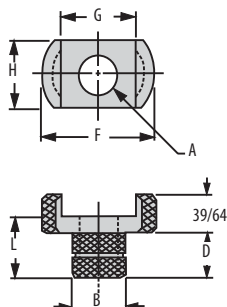
PART NO.	A DIA	B DIA	C	D	F DIA	G	H	L	L.H. THREAD	MATCHING LOCK NUT	MATCHING ADAPTOR TIP
TLL-16520	.3750	.4995	7/16	3/4	1-1/8	.625	3/4	1	1/2-20	14441	A-21106
	.3755	.4990									
TLL-16521	.5000	.7495	7/16	3/4	1-3/16	.625	7/8	1	3/4-16	14442	A-21306
	.5005	.7490									
TLL-16522	.6250	.8745	7/16	3/4	1-13/16	1.218	1-1/8	1	7/8-14	14443	A-22406
	.6255	.8740									
TLL-16523	.8750	1.2495	9/16	1	2-1/8	1.468	1-3/8	1-1/4	1-1/4-12	14445	A-23310
	.8756	1.2490									
TLL-16524	1.1252	1.4990	27/32	1-1/2	2-1/8	1.468	1-5/8	1-3/4	1-1/2-12	14446	A-23515
TLL-16525	1.1258	1.4985			2-7/16						1.718
TLL-16526	1.5002	1.9990	27/32	1-1/2	2-7/16	1.718	2-1/2	1-3/4	2"-16	14447	A-24815
	1.5008	1.9985									

### PRESS FIT – HEAVY DUTY

HLL-16520	.3750	.4995	7/16	3/4	1-1/8	.625	3/4	1	1/2-20	14441	A-21106
	.3755	.4990									
HLL-16521	.5000	.7495	7/16	3/4	1-3/16	.625	7/8	1	3/4-16	14442	A-21306
	.5005	.7490									
HLL-16522	.6250	.8745	7/16	3/4	1-13/16	1.218	1-1/8	1	7/8-14	14443	A-22406
	.6255	.8740									
HLL-16523	.8750	1.2495	9/16	1	2-1/8	1.468	1-3/8	1-1/4	1-1/4-12	14445	A-23310
	.8756	1.2490									
HLL-16524	1.1252	1.4990	27/32	1-1/2	2-1/8	1.468	1-5/8	1-3/4	1-1/2-12	14446	A-23515
HLL-16525	1.1258	1.4985			2-7/16						1.718
HLL-16526	1.5002	1.9990	27/32	1-1/2	2-7/16	1.718	2-1/2	1-3/4	2"-16	14447	A-24815
	1.5008	1.9985									



**KNURLED**



Precision knurled liner bushing for mounting air-feed drills in fiberglass or plastic tooling. One-piece design has two angled locking surfaces to lock the drill motor in place, for superior strength. Optional heavy-duty type has precisely machined helical locking surfaces that mate exactly with the air-feed collar for added impact resistance. Milled flats allow close hole spacing. Available for 21000 and 22000 series air-feed drills. Patent no. 3,015,242.

### KNURLED – STANDARD

PART NO.	A DIA	B DIA	D	F DIA	G	H	L	MATCHING ADAPTOR TIP
TLD-375	.3750	3/4	7/8	1-3/16	.625	7/8	1-1/8	A-21108
	.3755							
TLD-500	.5000	3/4	7/8	1-3/16	.625	7/8	1-1/8	A-21308
	.5005							
TLD-750	.7500	1-1/8	7/8	1-13/16	1.218	1-1/8	1-1/8	A-22508
	.7505							

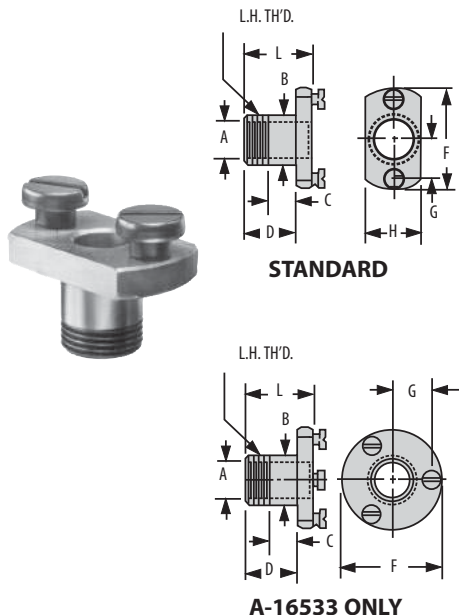
### KNURLED – HEAVY DUTY

HLD-375	.3750	3/4	7/8	1-3/16	.625	7/8	1-1/8	A-21108
	.3755							
HLD-500	.5000	3/4	7/8	1-3/16	.625	7/8	1-1/8	A-21308
	.5005							
HLD-750	.7500	1-1/8	7/8	1-13/16	1.218	1-1/8	1-1/8	A-22508
	.7505							

# AIR FEED BUSHINGS

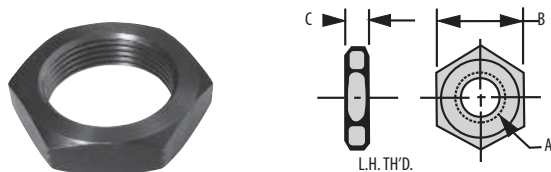
## LOCK LINERS

Precision liner bushing for mounting air-feed drills through a jig plate. The large head holds two standard Lockscrews, to lock the drill motor in place. Milled flats allow close hole spacing. Press fit into jig plate, then fasten from behind with a Lock Nut (order separately). Available for 21000 through 25000 series air-feed drills.



PART NO.	A DIA	B DIA	C	D	F DIA	G	H	L	L.H. THREAD	MATCHING LOCK NUT	MATCHING ADAPTOR TIP
.3750	.3750	.4995	7/16	3/4	1-3/4	5/8	3/4	1-1/16	1/2-20	14441	A-16500
	.3756	.4989									
.5000	.5000	.7495	7/16	3/4	1-3/4	5/8	1	1-1/16	3/4-16	14442	A-16501
	.5006	.7489									
.6250	.6250	.8745	7/16	3/4	2-7/16	59/64	1-1/8	1-3/16	7/8-14	14443	A-16502
	.6256	.8739									
.8750	.8750	1.2495	9/16	1	2-11/16	1-3/64	1-1/2	1-7/16	1-1/4-12	14445	A-16503
	.8756	1.2485									
1.1250	1.1250	1.4990	27/32	1-1/2	2-11/16	1-3/64	1-3/4	1-15/16	1-1/2-12	14446	A-16504
	1.1260	1.4980									
1.1250	1.1250	1.4990	27/32	1-1/2	3	1-11/64	1-3/4	1-15/16	1-1/2-12	14446	A-16505
	1.1260	1.4980									
1.5000	1.5000	1.9990	27/32	1-1/2	3	1-11/64	2-1/2	1-15/16	2"-16	14447	A-16506
	1.5010	1.9980									
2.0000	2.0000	2.4990	1-3/8	2	3-3/4	1-9/16	—	2-5/8	2-1/2-16	14448	A-16513
	2.0015	2.4980									

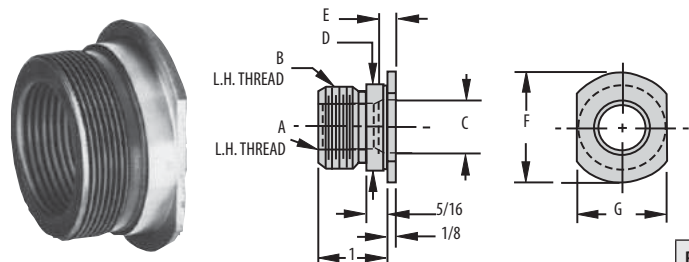
## LOCK NUTS



These fine-thread Lock Nuts fit the entire range of standard lock liners. Lock Liners press fit into the jig plate, then fasten from behind with a Lock Nut.

LOCK NUT PART NO.	A (THREAD SIZE)	B	C
14441	1/2-20	3/4	1/4
14442	3/4-16	1	1/4
14443	7/8-14	1-1/4	1/4
14445	1-1/4-12	1-3/4	3/8
14446	1-1/2-12	2	1/2
14447	2-16	2-1/2	1/2
14448	2-1/2-16	3	1/2

## REDUCERS



These Reducers allow mounting a smaller-series air-feed adaptor tip on a larger-series drill motor. Available for either standard or coolant-type air-feed drills. Available for 22000 through 25000 series air-feed drill motors. Two Reducers can be used together to step down several sizes.

PART NO. STANDARD TYPE	PART NO. COOLANT TYPE	A INSIDE THREAD	B OUTSIDE THREAD	C DIA	D DIA	E	F DIA	G*
17952	A-17952	3/4-16	1-14	.8125	1.0610-1.0604	9/32	1-3/8	1-1/16
25018	A-25018		1-1/4-12		1.3110-1.3104		1-5/8	1-5/16
25582	A-25582	1-1/4	1-1/2-12	1.0625	1.5610-1.5604	11/32	1-15/16	1-9/16
25583	A-25583		1-1/4-12		1.3110-1.3104		1-5/8	1-5/16
20132	A-20132	1-1/2-12	1-1/2-12	1.0625	1.5610-1.5604	11/32	1-15/16	1-9/16
20017	A-20017	1-1/4-12	1-1/2-12	1.3125	1.5610-1.5604	11/32	1-15/16	1-9/16
27910	A-27910	1-1/2-12	2-16	1.5625	2.0610-2.0604	11/32	2-1/2	2-1/16

\* Coolant type does not have wrench flats.

### INCH DRILL SIZES

Drill/Decimal	Drill/Decimal	Drill/Decimal
80	.0135	9/64 .1406
79	.0145	27 .1440
1/64	.0156	26 .1470
78	.0160	25 .1495
77	.0180	24 .1520
76	.0200	23 .1540
75	.0210	5/32 .1562
74	.0225	22 .1570
73	.0240	21 .1590
72	.0250	20 .1610
71	.0260	19 .1660
70	.0280	18 .1695
69	.0292	11/64 .1719
68	.0310	17 .1730
1/32	.0312	16 .1770
67	.0320	15 .1800
66	.0330	14 .1820
65	.0350	13 .1850
64	.0360	3/16 .1875
63	.0370	12 .1890
62	.0380	11 .1910
61	.0390	10 .1935
60	.0400	9 .1960
59	.0410	8 .1990
58	.0420	7 .2010
57	.0430	13/64 .2031
56	.0465	6 .2040
3/64	.0469	5 .2055
55	.0520	4 .2090
54	.0550	3 .2130
53	.0595	7/32 .2188
1/16	.0625	2 .2210
52	.0635	1 .2280
51	.0670	A .2340
50	.0700	15/64 .2344
49	.0730	B .2380
48	.0760	C .2420
5/64	.0781	D .2460
47	.0785	E .2500
46	.0810	1/4 .2500
45	.0820	F .2570
44	.0860	G .2610
43	.0890	17/64 .2656
42	.0935	H .2660
3/32	.0938	I .2720
41	.0960	J .2770
40	.0980	K .2810
39	.0995	9/32 .2812
38	.1015	L .2900
37	.1040	M .2950
36	.1065	19/64 .2969
7/64	.1094	N .3020
35	.1100	5/16 .3125
34	.1110	O .3160
33	.1130	P .3230
32	.1160	21/64 .3281
31	.1200	Q .3320
1/8	.1250	R .3390
30	.1285	11/32 .3438
29	.1360	S .3480
28	.1405	T .3580

### METRIC DRILL SIZES

Drill/Decimal	Drill/Decimal	Drill/Decimal
.35mm	.0138	3.60mm .1417
.38mm	.0150	3.70mm .1457
.40mm	.0157	3.75mm .1476
.42mm	.0165	3.80mm .1496
.45mm	.0177	3.90mm .1535
.48mm	.0189	4.00mm .1575
.50mm	.0197	4.10mm .1614
.55mm	.0217	4.20mm .1654
.60mm	.0236	4.25mm .1673
.65mm	.0256	4.30mm .1693
.70mm	.0276	4.40mm .1732
.75mm	.0295	4.50mm .1772
.80mm	.0315	4.60mm .1811
.85mm	.0335	4.70mm .1850
.90mm	.0354	4.75mm .1870
.95mm	.0374	4.80mm .1890
1.00mm	.0394	4.90mm .1929
1.05mm	.0413	5.00mm .1969
1.10mm	.0433	5.10mm .2008
1.15mm	.0453	5.20mm .2047
1.20mm	.0472	5.25mm .2067
1.25mm	.0492	5.30mm .2087
1.30mm	.0512	5.40mm .2126
1.35mm	.0531	5.50mm .2165
1.40mm	.0551	5.60mm .2205
1.45mm	.0571	5.70mm .2244
1.50mm	.0591	5.75mm .2264
1.55mm	.0610	5.80mm .2283
1.60mm	.0630	5.90mm .2323
1.65mm	.0650	6.00mm .2362
1.70mm	.0669	6.10mm .2402
1.75mm	.0689	6.20mm .2441
1.80mm	.0709	6.25mm .2461
1.85mm	.0728	6.30mm .2480
1.90mm	.0748	6.40mm .2520
1.95mm	.0768	6.50mm .2559
2.00mm	.0787	6.60mm .2598
2.05mm	.0807	6.70mm .2638
2.10mm	.0827	6.75mm .2657
2.15mm	.0846	6.80mm .2677
2.20mm	.0866	6.90mm .2717
2.25mm	.0886	7.00mm .2756
2.30mm	.0906	7.10mm .2795
2.35mm	.0925	7.20mm .2835
2.40mm	.0945	7.25mm .2854
2.45mm	.0965	7.30mm .2874
2.50mm	.0984	7.40mm .2913
2.55mm	.1004	7.50mm .2953
2.60mm	.1024	7.60mm .2992
2.65mm	.1043	7.70mm .3031
2.70mm	.1063	7.75mm .3051
2.75mm	.1083	7.80mm .3071
2.80mm	.1102	7.90mm .3110
2.90mm	.1142	8.00mm .3150
3.00mm	.1181	8.10mm .3189
3.10mm	.1220	8.20mm .3228
3.20mm	.1260	8.25mm .3248
3.25mm	.1280	8.30mm .3268
3.30mm	.1299	8.40mm .3307
3.40mm	.1339	8.50mm .3346
3.50mm	.1378	8.60mm .3386

### TAP GUIDE SIZES

(Priced as specials)

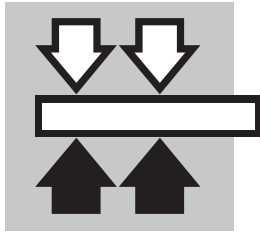
Tap Size*	Tap Guide Nominal ID Size	Tap Drill Size**
#0-80	.0616	3/64
#2-56	.0883	#50
#2-64	.0880	#50
#4-40	.1152	#43
#4-48	.1147	#42
#5-40	.1282	#38
#5-44	.1280(3.25mm)	#37
#6-32	.1421	#36
#6-40	.1412	#33
#8-32	.1681	#29
#8-36	.1676	#29
#10-24	.1954	#25
#10-32	.1941	#21
1/4-20	.2565	#7
1/4-28	.2546	#3
5/16-18	.3197	F
5/16-24	.3179	I
3/8-16	.3831	5/16
3/8-24	.3804	Q
7/16-14	.4468	U
7/16-20	.4440	25/64
1/2-13	.5100	27/64
1/2-20	.5065	29/64
9/16-12	.5733	31/64
9/16-18	.5697	33/64
5/8-11	.6368	17/32
5/8-18	.6322	37/64
3/4-10	.7630	21/32
3/4-16	.7581	11/16
7/8-9	.8894	49/64
7/8-14	.8843	13/16
1-8	1.0162	7/8
1-14	1.0093	15/16

METRIC		
M1.6x0.35	.0651	1.25mm or #55
M2x0.4	.0810 (#46)	1.60mm or #52
M2.5x0.45	.1008	2.05mm or #46
M3x0.5	.1207	2.50mm or #39
M3.5x0.6	.1407	2.90mm or #32
M4x0.7	.1613	3.30mm or #30
M5x0.8	.2010 (#7)	4.20mm or #19
M6x1	.2410	5.00mm or #8
M8x1.25	.3214	6.80mm or H
M8x1	.3197	7.00mm or J
M10x1.5	.4009	8.50mm or R
M10x1.25	.4002	8.80mm or 11/32
M12x1.75	.4805	10.20mm or 13/32
M12x1.25	.4789	10.80mm or 27/64
M14x2	.5600	12.00mm or 15/32
M14x1.5	.5584	12.50mm or 1/2
M16x2	.6387	14.00mm or 35/64
M16x1.5	.6372	14.50mm or 37/64
M18x2.5	.7191	15.50mm or 39/64
M18x1.5	.7159	16.50mm or 21/32
M20x2.5	.7978	17.50mm or 11/16
M20x1.5	.7946	18.50mm or 47/64
M22x2.5	.8765	19.50mm or 49/64
M22x1.5	.8734	20.50mm or 13/16
M24x3	.9583	21.00mm or 53/64
M24x2	.9537	22.00mm or 7/8

\* Coarse series shown in bold. Pitch callout not required on metric coarse series.  
\*\* Closest size for 75% theoretical thread.



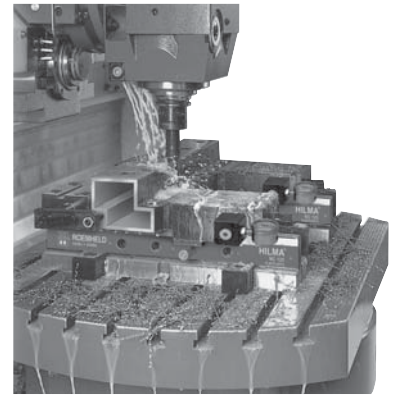
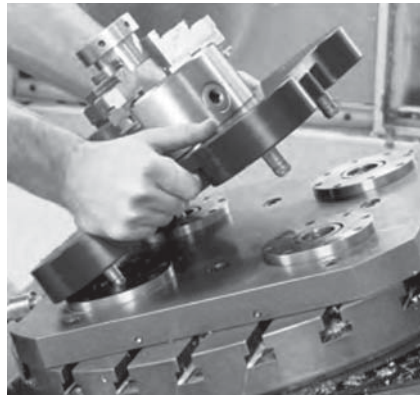
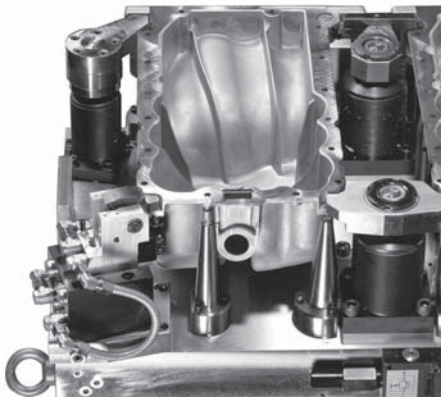


# ROEMHELD

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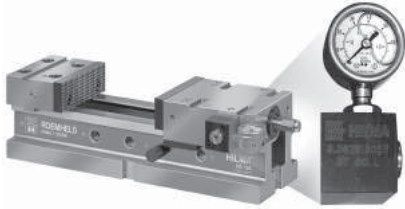
***CARR LANE ROEMHELD MFG. CO.***

**Power Workholding For CNC Machining**



Power Workholding  
Precision Vises  
Zero Point Mounting  
Assembly and Handling

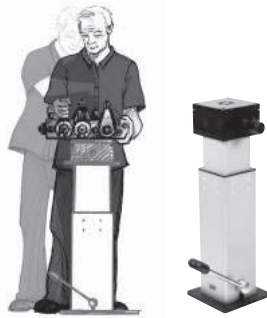
# Featured Power Workholding Items



**NC Machine Vises with Gauge**  
pages 626-627



**Robust Swing Clamps**  
pages 605-606



**Lifting Units**  
page 693-694



**Fixture Clamps**  
pages 652-654



**Work Supports**  
page 619-622



**Hinge/Link Clamps**  
pages 593-594

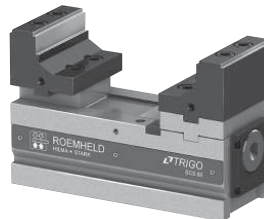
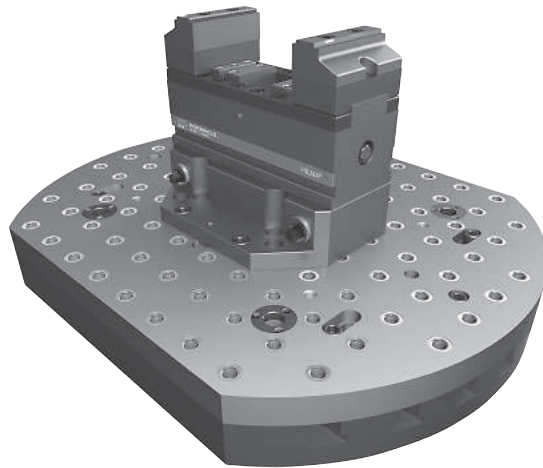


**Compact Clamps**  
page 592



## 5-Axis Machining

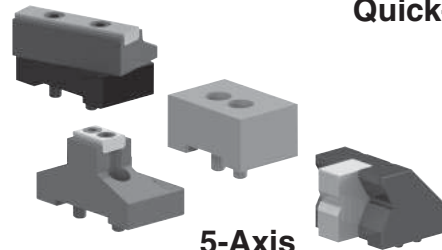
pages 630-636



**5-Axis Machining Vises**  
page 631-634



**Quintus Quick-Change Riser**  
page 635



**5-Axis Vise Jaws**  
page 636



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# Contents

	<b>Technical Information</b>	Product Features ..... 578-579 Design Information..... 580-585 Safety Precautions ..... 586
	<b>Clamps &amp; Cylinders</b>	Extending Clamps ..... 587-594 Swing Clamps ..... 595-606 Push Clamps..... 607-611 Block Cylinders ..... 612-613 Universal Cylinders..... 614-615 Pull Clamps..... 616-618
	<b>Work Supports</b>	Spring-Extended Work Supports ..... 620-622 Fluid-Advanced Work Supports..... 620-622 Air-Advanced Work Supports ..... 620-622
	<b>Machine Vises, Concentric Clamps &amp; Zero Point Mounting</b>	Standard Machine Vises ..... 625 Machining Center Vises..... 626-627 Vise Jaws and Accessories ..... 628-629 CL5® 5-Axis Machining Vises ..... 630-636 Mini Clamp Vises..... 631-633 Super Compact Clamping Vise..... 634 5-Axis Riser, Vise Jaws ..... 635-636 Concentric Vises ..... 637-638 Collet Vises ..... 639 Fixture Clamps ..... 640-642
	<b>Power Sources</b>	Electric Power Units..... 645-648 Air Power Units..... 649-651 Hand Pumps ..... 652 Screw Pumps..... 653 Hydraulic Intensifiers ..... 654-655
	<b>Valves</b>	Clamping Valves..... 656-660 Sequence Valves ..... 662-663 Pressure-Reducing and Closing Valves ..... 661, 664-666 Check Valves ..... 665, 667 Shutoff and Pressure-Relief Valves ..... 666 Flow-Control Valves..... 667
	<b>Fittings &amp; Accessories</b>	Rotary Couplings and Pallet Decouplers..... 669-680 Accumulators..... 678 Quick Connects and Couplers..... 679-680 Pressure Switches ..... 681 Air Accessories, Manifolds and Gauges..... 682 Filters, Tubing, Hoses and Fluid..... 684-688 Fittings, Tubing Tools..... 686-690 Contact Bolts ..... 691 Lifting Devices..... 693



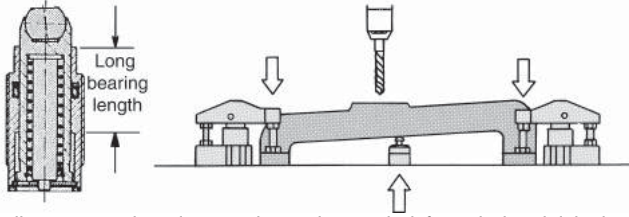
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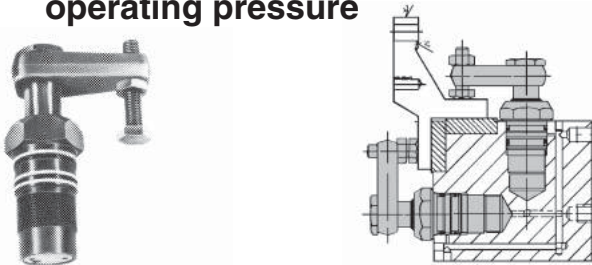
# What makes Roemheld Power Workholding better than earlier hydraulic clamps?

## 1 Designs specifically and purely for workholding



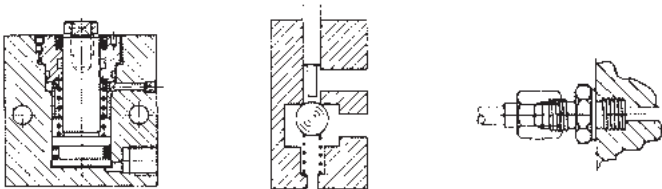
Earlier power clamping products descended from industrial jacks, pipe benders, and rams. Although these early devices (many still on the market) are fine for their original uses, they do not meet the special demands of modern workholding. For example, in a machining application, components are often subject to side loading due to cutting forces, not simply axial loads. This condition requires totally different engineering to provide sufficient bearing lengths for durability. As another example, workholding components are frequently exposed to coolant, chips, dirt, and grit, so clamps must include effective wipers and vent filters. Also, industrial cylinders converted to clamps are usually too bulky to fit easily on fixtures.

## 2 Compactness, with 7250-psi operating pressure



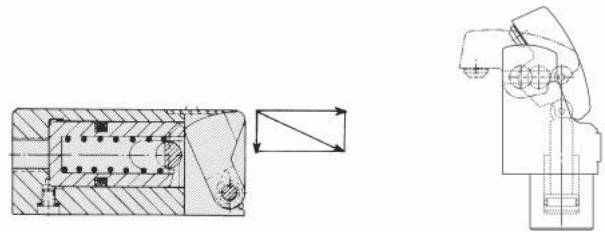
Earlier power clamps could operate at only 2000 to 3500 psi (pounds per square inch) fluid pressure. You needed large, bulky clamps with large internal cylinders to provide enough clamping force. Roemheld components are designed differently, inside and out, to fit easily on fixtures. They work comfortably even at 7250 psi, letting you use much smaller clamps to get the same clamping force. Compact Roemheld clamps open up new fixturing possibilities: you can now place clamps in tighter spots than before, and with the extra space, you can put more workpieces on a fixture (for example, six parts per cycle instead of only 4).

## 3 Zero-leakage sealing technology



Another feature unique to Roemheld power workholding is leak-free hydraulic sealing. Zero leakage is always important for safe clamping, and is absolutely vital on portable palletized fixtures. Maintaining pressure in a closed, disconnected system requires that *all* components – clamps, valves, and fittings – be leak-free. This calls for drastic changes in sealing techniques: cylinder seals are different, poppet valves (not leaky spool valves) are used whenever possible, and all fittings use metal-to-metal sealing (straight BSPP pipe threads with knife-edge sealing, instead of leak-prone tapered pipe threads).

## 4 State-of-the-art product development



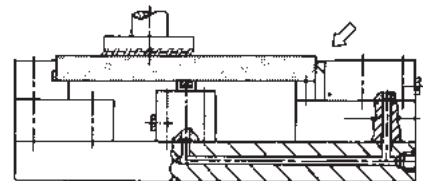
The Edge Clamps and Extending Clamps shown above are just two examples of advanced clamp designs in the Roemheld line. Both set new standards for good engineering and compact size. Our many new products and product improvements result from constant, extensive research and development. New products are field tested and proven, often for years, before they are ever offered for sale.

## 5 Extensive clamp sizes that follow a logical progression



Roemheld offers a vast selection of clamp sizes and varieties, to match your requirements exactly. In fact, we offer *several times* as many catalog models as our closest competitor (with much better stock too)! Just as important, our clamp sizes follow a logical progression of clamping forces, so you can usually find a clamp that is just the right size.

## 6 Manifold mounting



Our Roemheld line pioneered the ever-increasing use of manifold mounting: supplying fluid to clamps through passages drilled in the fixture, rather than through tubing or hoses. Manifold mounting, which requires specially designed clamps, allows designing totally “clean” fixtures without chip traps. Also, manifold mounting lets you put clamps closer together and in tighter spots, often letting you put more workpieces on a fixture.

1  
3

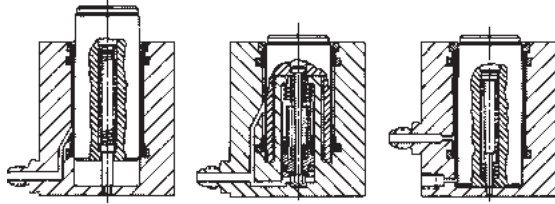


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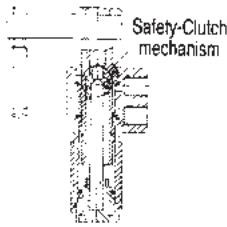
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## 7 Work Supports



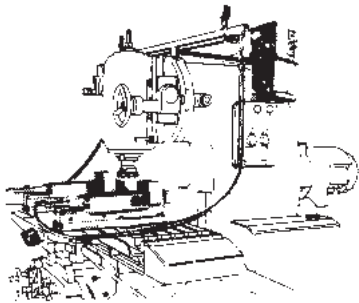
One of the most important improvements in power workholding is the work support. These components do not exert clamping force; instead, they lock off to restrain a workpiece during machining to prevent deflection and vibration. Roemheld work supports offer two major improvements: (1) drastically improved accuracy, with +/- .0002 inches repeatability, and (2) fluid-advanced and air-advanced supports. Fluid- and air-advanced versions offer significant advantages over conventional spring-loaded work supports. A spring-loaded support relies on a workpiece's weight to depress its support plunger to the proper height. While fluid pressure is off, the plunger remains in a raised position on the machine and can hamper loading and unloading. A fluid-advanced work support's plunger, on the other hand, is retracted when fluid pressure is off. Applying pressure first raises the plunger gently to the workpiece, then automatically locks it at the correct height. When pressure is released, the plunger retracts again for clear loading.

## 8 Swing Clamps



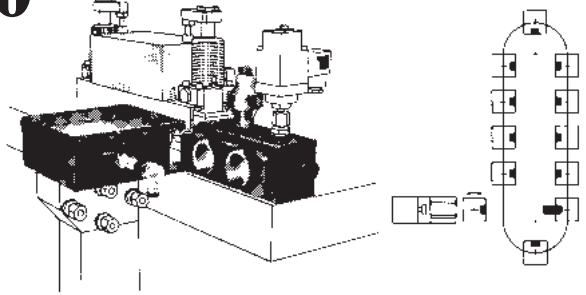
In all modesty, Roemheld Swing Clamps are by far the finest available anywhere, both in features and durability. Our proprietary safety-clutch mechanism prevents damage if the clamping arm strikes an unexpected object, such as an incorrectly loaded workpiece. The arm clutch disengages to avoid damaging the object or the clamp's helical-cam mechanism. In addition, our swing clamps incorporate a fast, totally dependable spring return, unlike our competitors'. We offer many varieties and sizes of swing clamps, including super-miniature and manifold-mounted versions.

## 9 Power Units for Workholding



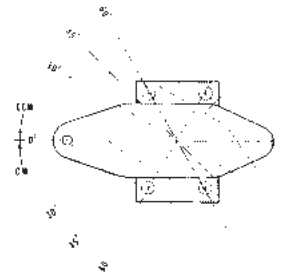
Early power-clamping systems relied either on limited-capacity air/oil intensifiers or on massive, noisy pumps for hydraulic power. Roemheld Electric and Air Power Units are totally different: they are compact, quiet power units designed especially for workholding. These turnkey units include an extremely durable pump, large fluid reservoir, clamping valves, switches, gauges, and numerous safety devices. Workholding power units are becoming a standard accessory on milling machines and machining centers.

## 10 Pallet Coupling Systems



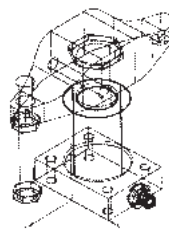
Power clamping on portable palletized fixtures is becoming quite common, yet presents some special challenges, such as maintaining full clamping pressure while the fixture is separated from its power source. We offer a wide choice of solutions, from rotary couplings, to manual pallet decouplers, to automatic coupling systems with programmable controllers.

## 11 Specials



Because many tough clamping problems require modified or totally special components, we offer full specials-engineering capabilities. Our research and development staff can quickly design products to meet your special requirements. And unlike our competitors, we are a full-capability manufacturer, from start to finish, so lead times are always reasonable.

## 12 Engineering and Service Support



Drawing Files Available at  
[www.carrlane.com](http://www.carrlane.com)

The combined resources of Carr Lane Roemheld Mfg. Co., Carr Lane Mfg. Co, and Roemheld GmbH bring you the world's finest technical support. Our capabilities include:

- (1) Field engineers and regional managers helping our fine authorized distributors give you on-site assistance nationwide.
- (2) Extensive CAD/CAM capabilities, both inhouse and for customer use, including a complete CAD library of catalog items available for users.
- (3) A large stock of catalog items, plus quick-response manufacturing capabilities.
- (4) Quality products that rarely need service, unlike those of our competitors, who regularly sell replacement parts and need repair stations throughout the country.



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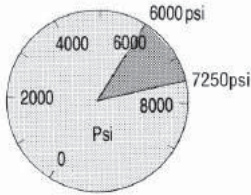
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# Design Information

## 1. Operating Pressure

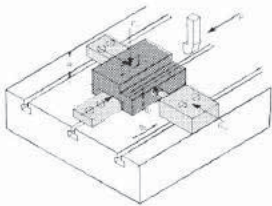
Although most Roemheld components operate comfortably and safely at up to 7250 psi, we recommend selecting a standard "design pressure" of 6000-psi for workholding fixtures. The table on each clamp's catalog page shows 6000-psi forces in bold for quick reference.



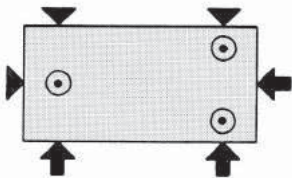
Designing at 6000 psi gives you most of the compactness benefits of high pressures, yet leaves a 25% reserve in case you find that you need additional holding force after building the fixture. Adjust up or down if necessary after checking the fixture. We recommend permanently labeling or stamping the fixture with the chosen operating pressure, for future reference. Operating at low pressures is somewhat a waste of our components' capabilities, but may occasionally be desirable with delicate workpieces. Whenever possible, stay with high pressures and use smaller clamps for better economy and minimum size. Minimum operating pressure is generally 1500 psi using an Electric Power Unit, or 2200 psi using an Air Power Unit. Work supports require at least 1500 psi. Please note, a few products in this catalog are limited to pressures lower than 7250 psi. To use these components in full-pressure systems, see Pressure Reducing Valves.

## 2. Machining Operations and Fixture Layout

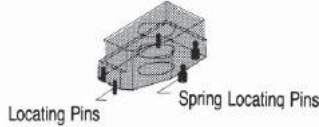
While developing your fixture concept, consider the following factors wherever possible:



Use positive stops to resist machining forces, rather than relying just on clamp forces. With well-placed locators, you can use smaller clamps.



Choose clamping points that are backed up by solid stops or rests to resist clamping forces. Clamping forces can distort a workpiece unless counteracted by firm supports.



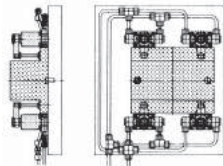
Evaluate workpiece-loading procedure and clamping sequence. Loading and clamping can be completely automatic, or involve some manual steps. To position the workpiece against locators, spring-loaded positioners (above) are often helpful. Sequence Valves are extremely useful to position hydraulically with push clamps before clamping. Total positioning force should be 30-50% of the workpiece's weight to overcome friction.



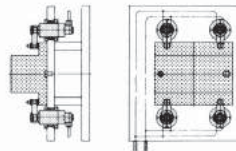
Decide how many parts you want to place on the fixture. For example, to place three workpieces on the above fixture, super-miniature Swing Clamps are necessary. With only one workpiece, just about any clamp would do.

## 3. Plumbing Options

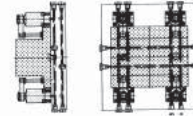
Supplying fluid to hydraulic fixtures is not merely an afterthought. Fluid supply is an integral part of fixture design. The following Swing Clamp fixtures illustrate four distinct plumbing concepts.



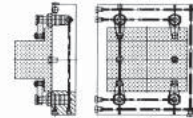
1. Tubing lines on top of fixture plate. This is the oldest, most traditional method of supplying fluid to hydraulic clamps. Before manifold mounting, using tubing was about the only option available. Advantages: less baseplate machining is required; quick build time. Disadvantages: chips are easily trapped in tubing lines; a large base-plate area is required; exposed tubing is subject to damage.



2. Tubing lines underneath fixture plate. Running tubing lines below the working area is an improvement on option 1. Advantages: no chip traps in working area; more freedom to position clamps with tubing out of the way. Disadvantages: a large base-plate area is still required; more complicated fixture construction.



3. Manifold mounting, with O-ring ports. This option uses passages drilled in the fixture to feed fluid directly to O-ring ports underneath the clamps. Advantages: more compact fixture size; no chip traps in working area; most economical construction. Disadvantages: gundrilling is sometimes required; less freedom to mount clamps in odd positions.



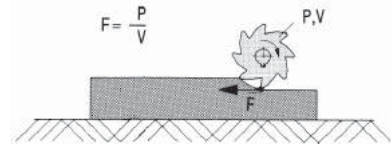
4. Cartridge-type manifold mounting. Similar to option 3, except clamps are embedded in specially prepared, tapped mounting holes. Advantages: most compact fixture size; great freedom to position clamps in tight places; no chip traps in working area. Disadvantages: gundrilling is sometimes required; a thicker base plate is usually required (this is also an advantage because it makes the fixture more rigid).

## 4. Cutting Forces

An important step in most fixture designs is looking at the planned machining operations to estimate cutting forces on the workpiece, both magnitude and direction. Your "estimate" can be a rough guess based on experience, or a calculation based on machining data. One simple formula for force magnitude is based on the physical relationship:

$$Force = \frac{Power}{Velocity}$$

$$F = \frac{P}{V}$$



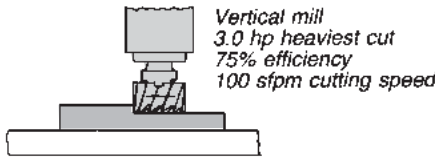
$$Cutting\ force\ (lbs) = \frac{Heaviest-cut\ horsepower \times Machine\ efficiency\ \% \times 33,000}{Cutting\ speed\ (sfpm)}$$

Please note: heaviest-cut horsepower is not total machine horsepower, rather it is the maximum horsepower actually used during the machining cycle. Typical machine efficiency is roughly 75%. (.75). The number 33,000 is a units-conversion factor.

The above formula only calculates force magnitude, not direction. Cutting force can have X, Y, and/or Z components. Force direction (and magnitude) can vary drastically from the beginning, to the middle, to end of the cut.

# Design Information

## Example

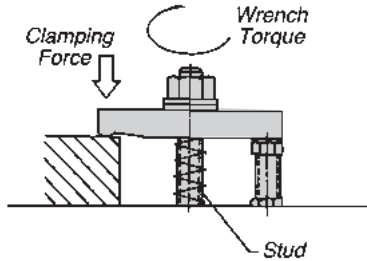


$$\begin{aligned} \text{Cutting force} &= \frac{3.0 \text{ hp} \times .75 \times 33,000}{100 \text{ sfpm}} \\ &= 743 \text{ lbs} \end{aligned}$$

Intuitively, force direction is virtually all horizontal. In this example (negligible z-axis component). Direction varies between the x and y axes as the cut progresses.

## 5. Clamp Forces / Sizes

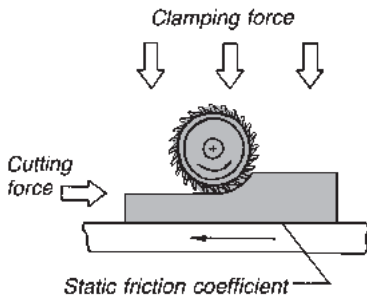
Clamping-force calculations can be quite complicated. Sometimes an approximate method is good enough. See table below for how much clamping force is available from manual clamp straps of various sizes (with a 2-to-1 clamping-force ratio) to compare with power-clamp forces.



Stud Size	Recommended Torque* (ft-lbs)	Clamping Force (lbs)
1/4-20	4	500
5/16-18	9	900
3/8-16	16	1300
1/2-13	38	2300
5/8-11	77	3700
3/4-10	138	5500

\* Clean, dry clamping stud torqued to approximately 33% of its 100,000 psi yield strength (2:1 lever ratio).

You can also calculate required clamping forces based on calculated cutting force. A simplified example appears below, with cutting force entirely horizontal, and no workpiece stops

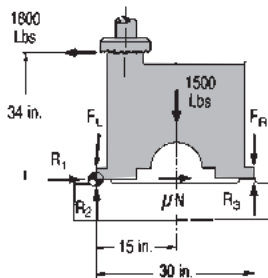
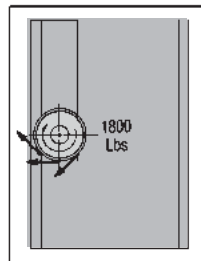


$$\begin{aligned} \text{Clamping force (lbs)} &= \frac{\text{Cutting force (lbs)}}{\text{Static friction coefficient}} \times \text{Safety factor (usually 2)} \end{aligned}$$

Contact surfaces	Friction coefficient (Dry)	Friction coefficient (Lubricated)
Steel on steel	.15	.12
Steel on cast iron	.19	.10
Cast iron on cast iron	.30	.19

(frictional force resists the entire cutting force). With workpiece stops and multi-direction forces, calculations become much more complicated. To simplify somewhat, determine the worst-case force situation intuitively, then treat the calculation as a two-dimensional static-mechanics problem (using a free-body diagram). In the example below, cutting force is already known to be 1800 lbs from previous calculations. The workpiece weighs 1500 lbs. Unknown forces are:

- $F_R$  = Total force from all clamps on right side
- $F_L$  = Total force from all clamps on left side
- $R_1$  = Horizontal reaction force from fixed stop
- $R_2$  = Vertical reaction force from fixed stop
- $R_3$  = Vertical reaction force on right side
- $N$  = Normal force =  $F_L + F_R + 1500$
- $\mu$  = Coefficient of friction = .19



The equations below solve for unknown forces assuming that for a static condition:

- The sum of forces in the x direction must equal zero
- The sum of forces in the y direction must equal zero
- The sum of moments about any point must equal zero

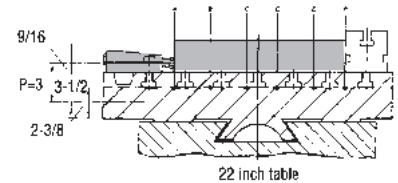
At first glance, the example above looks "statically indeterminate," i.e. there are 5 variables and only 3 equations. But for the minimum required clamping force,  $R_3$  would be zero (workpiece barely touching) and  $F_L$  would be zero (there is no tendency to lift on the left side). Now with only 3 variables, we can solve:

$$\begin{aligned} \sum F_x &= 0 \\ &= -1800 + R_1 + (.19)(1500 + F_R) \\ \sum F_y &= 0 \\ &= R_2 - 1500 - F_R \\ \sum M_o &= 0 \\ &= (34)(1800) - (15)(1500) - (30)(F_R) \end{aligned}$$

Solving for the variables,

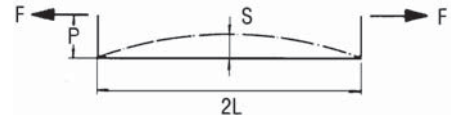
$$\begin{aligned} F_R &= 1290 \text{ lbs} \\ R_1 &= 1270 \text{ lbs} \\ R_2 &= 2790 \text{ lbs} \end{aligned}$$

In other words, the combined force from all clamps on the right side must be greater than 1290 lbs. We recommend a 2-to-1 safety factor (2580 lbs). Even though  $F_L$  (the combined force from all clamps on the left side) equals zero, a small clamping force may be desirable to prevent vibration. Too much clamping force can be as bad as too little.



Excess force can cause fixture and machine-table distortion or even damage. Even a small hydraulic clamp can generate tremendous stresses (S). In the example above, three

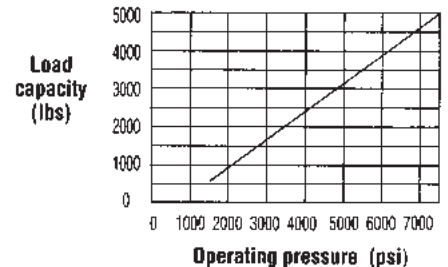
$$S = P \times \left( \frac{1 - \frac{1}{1 + \frac{FL^2}{2EI}}}{1 + \frac{FL^2}{2EI}} \right)$$



4560-lb Edge Clamps cause some machine-table bending. Using static beam-binding calculations, maximum distortion, at point D, is about .0006 inches (probably acceptable). However, if the clamping point were higher off the machine table (P dimension), distortion would be much greater. Higher clamps would require adding an intermediate fixture plate to increase table rigidity.

## 6. Work Supporting

Unlike clamps, work supports do not actually exert force on a workpiece. After adjusting to the part, work supports essentially become fixed supports or rests. A work support's load capacity increases proportionally as fluid pressure rises:

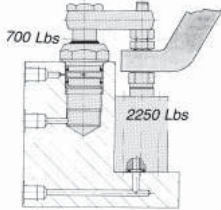


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# Design Information

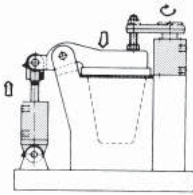
Choose enough load capacity to resist: (1) machining forces; (2) workpiece weight; (3) clamping forces not resisted by fixed stops.



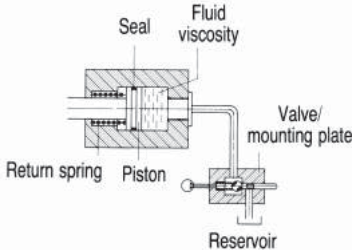
When supporting underneath a clamp, as in the example above, load capacity should be substantially greater than clamping force. Not only must the support resist static clamping force, it must resist dynamic load too (the "hammering" due to clamping-arm momentum). We recommend a load capacity of at least 2 times the clamping force. Another factor when clamping over a work support is that the clamp may build up force faster than the support builds up load capacity. To avoid this, use a sequence valve to delay clamping until load capacity builds up.

## 7. Single Acting vs. Double Acting

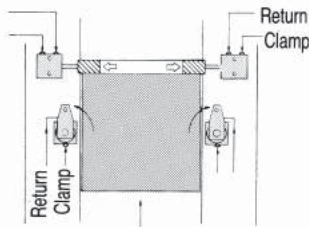
The return side of single acting elements, with a few exceptions (small work supports), require breather ports on the return side, and when used in systems with high flow or pressurized cutting fluids/coolants, great care must be taken to ensure that these fluids do not enter the return side of the clamps. It is highly recommended that double acting elements be used in such systems, thus eliminating the problem, and resultant machine down time. Double acting clamps should also be used in systems having an automatic load/unload, so that all functions can easily be coordinated.



1. Moving linkages or retracting heavy loads. For a quick, positive return when weight is too heavy for spring return.



2. Large fixtures with long tubing runs or flow restrictions. Return speed is adversely affected by: (1) pressure drop in tubing and hoses; (2) pressure drop in valves; (3) high fluid viscosity, especially at lower temperatures; (4) frictional force at piston seals, especially when clamped for an extended time, which displaces the fluid film on cylinder walls.

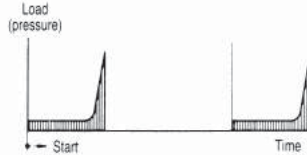


3. Machine-tool interlock. In automated systems where timing and synchronization are important, double-acting clamps are the best choice. By installing pressure switches in both clamping and return lines, a machine controller knows exact clamp status at all times.

## 8. Clamping Time

Hydraulic clamping is usually fast, but not instantaneous. To estimate clamping time, consider the two phases of clamping:

1. Extending time, under low-pressure free flow
2. Pressure-building time



Extending time is fairly easy to calculate, knowing fluid required by each clamp and the power units flow rate, using the formula below. One obvious way to reduce clamping time is to set clamps as close to the workpiece as possible, to use as little stroke as possible.

$$\text{Extend time (sec)} = \frac{\text{Maximum fluid req'd for all clamps (cu.in.)} \times \text{Portion of stroke used (usually 1/2)} \times 60}{\text{Power Unit flow rate (cu. in./min.)}}$$

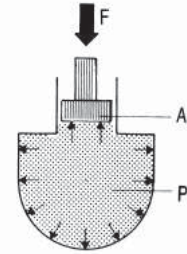
After extending, an additional volume of fluid must be pumped into the system to build pressure. This is due mainly to:

1. Compressibility of the hydraulic fluid (add about 4% of total system volume to build to 7250 psi)
2. Volume expansion of hydraulic hoses (.066 cu.in. per foot)
3. Charging an accumulator, if used

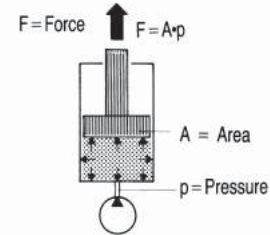
By calculating fluid required for each of the above factors, you can estimate pressure-building time. Using Sequence Valves lengthens clamping time, because each sequence step requires extending time and pressure-building time. To reduce clamping time, set Sequence-Valve trigger pressure as low as possible. With multiple Sequence Valves, set trigger-pressure differences at their minimum allowables value.

## 9. Other Hydraulic Considerations

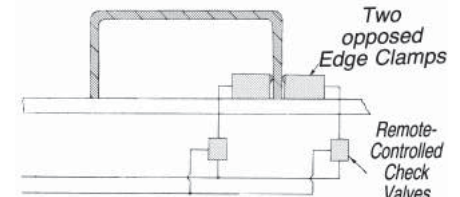
The basis of hydraulic clamping systems is "Pascal's Law", which says that if pressure is applied to a static fluid that is completely enclosed, that pressure is transmitted equally in all directions: This principle is used to transmit force to remote locations,



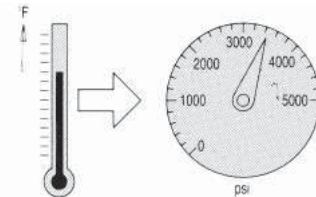
via hose, tubing, or drilled passages. When hydraulic pressure acts on a clamp's piston area, it generates external force according to the physical relationship  $F = P \times A$ :



Clamping with hydraulics causes some strange effects not occurring with manual clamps. One such phenomenon is fluid shifting between equal-force opposing clamps.



In the example above, the two opposed clamps allow the workpiece to float between them. Pushing on one clamp encounters no resistance because fluid just shifts to the opposing clamp (if the check valves were not present). Do not let equal-force clamps oppose each other without Remote-Controlled Check Valves.



Another strange effect is pressure change due to temperature change of a closed system. In fact, pressure changes about 80 psi per 1° F! Be careful of excessive temperature changes, especially increases. Use a Pressure-Relief Valve for safety.

## 10. Hydraulic Symbols and Circuit Diagrams

Hydraulic symbols and diagrams are a useful "shorthand" method of describing how a clamping circuit works without detailed drawings. The following pages show two circuit examples, and a summary listing of hydraulic symbols.



## Design Information

### Bleeding of the Spring Area ■ A0.110

#### Introduction

Due to increased use of coolants and cutting fluids in machining, there is an increased possibility that these fluids may penetrate into the spring areas of single acting cylinders and work supports. Many fluids can cause corrosion, which can lead to malfunction and possible failure.

#### Why bleeding is necessary

If not vented, excess pressure or vacuum in the spring area changes the spring forces which may lead to malfunctions.

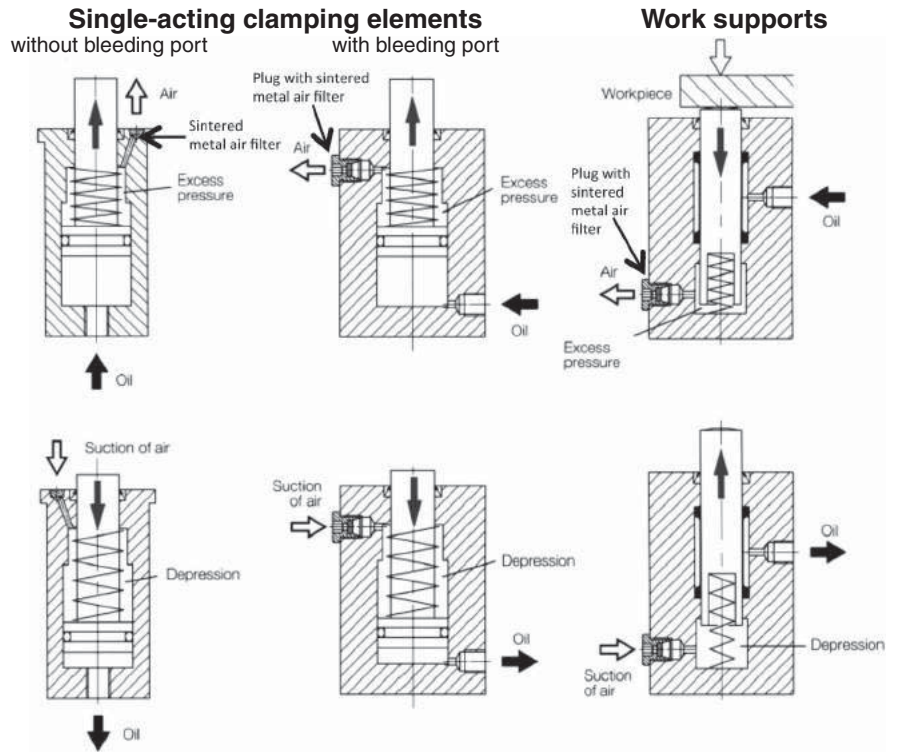
Condensation from coolants can lead to corrosion on the piston, spring or housing.

Leakage of hydraulic seals must drain properly to avoid malfunctions.

Using sintered metal filters minimizes dust and chips.

Liquids are the real problem because they can be drawn through the air filter. This can cause the spring area to be reduced. Malfunctions can occur due to this excess pressure or vacuum.

#### Catalog elements with bleeding of the spring area



### Venting of Spring Air ■ A0.110

#### Cover

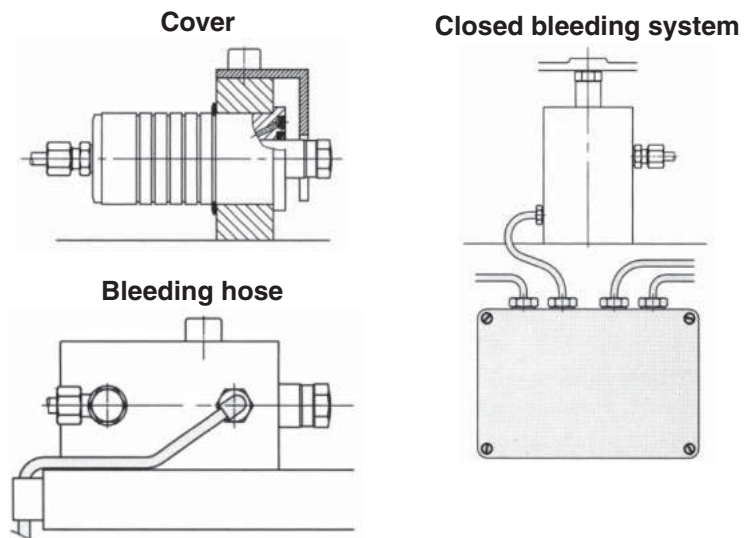
Clamping elements without bleeding port can be covered, but due to today's normal quantities of coolants this does not seem to be successful. In such applications you should use other clamping elements, preferably double-acting elements.

#### Bleeding hose

Connection of a bleeding hose is preferred and the opening is to be displaced to a point where no liquid can penetrate.

#### Closed bleeding system

Connecting the breather port to an external area can increase the spring area volume. By doing this, the amount of additional pressure or vacuum generated is minimal. This serves a dual purpose in allowing the spring area to be vented as well as protection from aggressive coolants. A good solution is to use sealed electrical wiring boxes with connecting threads. **The volume of this additional area should be ten times the stroke volume of all connected elements.**



Subject to change. For further details, including detailed dimensions and mounting instructions, visit [www.clrh.com](http://www.clrh.com).



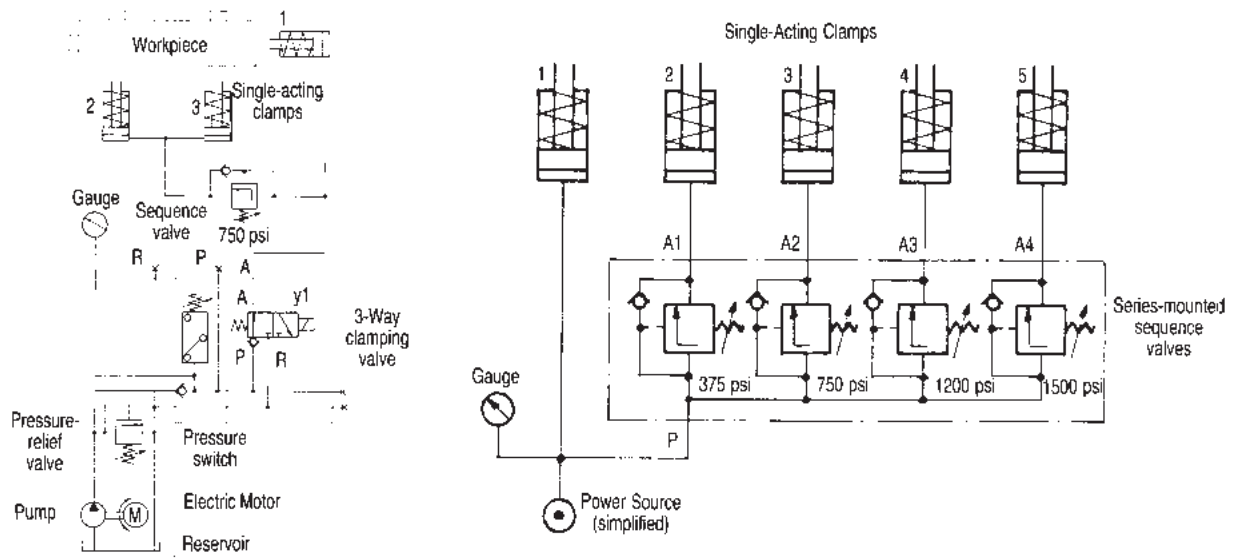
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# Design Information

## Example Hydraulic Circuit Diagrams



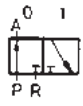







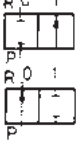



























Clamp & Cylinder Symbols		Valve Symbols	
	Push clamp or cylinder, single acting		Electric Power unit, consisting of a fluid reservoir, pump, electric motor, pressure-relief valve, pressure switch, clamping valve, and gauge.
	Push clamp or cylinder, double acting		Electric motor, showing direction of rotation
	Pull clamp, single acting		Constant displacement pump
	Swing clamp, single acting		Variable displacement pump
	Swing clamp, double acting		Fluid reservoir
	Extending clamp, single acting		Fluid filter
	Extending clamp, double acting	<b>Valve Symbols</b>	
	Work support, spring extended		3/2 directional-control valve (3-way, 2-position), complete symbol with solenoid operator and spring return (normally open)
	Work support, fluid advanced		Boxes showing valve positions (two). For valves with spring return, the neutral position is shown at left (0).
	Work support, air advanced		Inlet and outlet connections are drawn at the neutral-position box, and are designed by capital letters: P = Inlet pressure from pump A, B, C... = Operating connections R, S, T = Outlet return (tank) L = Leakage line Z, Y, Z = Control Lines
Power Source Symbols			
	Power source (simplified)		

13



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# Design Information

	<p>Flow lines and directions are shown in each valve-position box. Lines show flow path, arrows show flow direction. Shutoffs are designated by capped-off lines inside the box.</p>		<p>Check valve</p>
	<p>Valves can be normally open, as shown on top (clamped in neutral position), or normally closed, as shown on bottom (unclamped in neutral position)</p>		<p>Remote-controlled check valve (pilot operated)</p>
			<p>Shutoff valve</p>
			<p>Pressure-relief valve</p>
			<p>Flow control valve, with unrestricted return line</p>
	<p>Valve operators are shown outside the boxes</p> <p>Solenoid operated</p> <p>Spring operated (or returned)</p> <p>Manually operated</p> <p>Detent position</p> <p>Lever operated</p> <p>Foot-pedal operated</p> <p>Push-button operated</p> <p>Cam-roller operated</p> <p>Plunger operated</p> <p>Air-pilot operated</p>	<h2>Accessory Symbols</h2>	
	<p>2/2 directional-control valve, normally closed on top, normally open below.</p>		<p>Operating line, pressure or return</p>
	<p>4/2 directional-control valve, for double-acting clamps</p>		<p>Control line, for transmitting control/pilot signals</p>
	<p>Sequence valve, with unrestricted return line</p>		<p>Leakage line, for carrying away fluid leakage</p>
	<p>Pressure-reducing valve, with unrestricted return line</p>		<p>Flexible line, such as hydraulic hose</p>
			<p>Line connection</p>
			<p>Line crossing, without connection</p>
			<p>Pressure-connection point, such as a port</p>
			<p>Bleeding point</p>
			<p>Quick disconnect, coupled</p>
			<p>Quick disconnect, decoupled</p>
			<p>Accumulator</p>
			<p>Gage</p>
			<p>Pressure switch</p>
			<p>Air filter/regulator/lubricator</p>



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# Recommended Precautions For The Designer, Builder & Operator



## IMPORTANT: READ THIS SHEET CAREFULLY BEFORE OPERATING.

Roemheld power workholding components are high quality products, engineered and manufactured to give you long, dependable and safe performance. For proper and safe operation, please follow all instructions on this sheet. Save these instructions for future reference.

**SERVICE NOTE:** Most Roemheld components are 100% individually tested for proper operation before leaving the factory. Please recheck these instructions if your new unit does not work properly. Should any component ever need service, please contact the factory. Do not disassemble the unit yourself — many are not user serviceable. Roemheld components incorporate advanced sealing technologies that eliminate the need for routine seal replacement.

**TUBING:** Use only *steel* tubing as specified in the Roemheld catalog: Seamless steel tubing, C1010, cold drawn, fully annealed, 5/16 OD, .065 wall thickness (Certified to 37,500 psi burst). Follow all tubing installation guidelines. We highly recommend the CLR-300-TL flaring tool to effectively flare this heavy-walled tubing.

**HOSES:** Use only hydraulic hoses as specified in the Roemheld catalog: 1/4 ID hydraulic hose, 25,520 psi min. burst pressure, (2) female swivel-nut ends, 5/16 JIC 37° flare.

**FLUID CONNECTIONS:** Connect fluid lines to the 5/16 JIC 37° flare male connection on each clamp (two for double-acting clamps). This fitting accepts either 5/16 OD 37° flared tubing, or a hydraulic hose with 5/16 JIC 37° swivel nuts (female) at each end. **Do not screw NPT pipe fittings into Roemheld components, or use NPT fittings anywhere in a workholding system.** Roemheld fittings are 5/16 JIC 37°. These fittings offer a positive metal-to-metal seal. **Do not use teflon tape or sealant.** Do not use fitting sizes other than 5/16. This size is ideal for workholding fixtures. Smaller tube sizes have poor flow rates. Larger tube sizes are not readily available with sufficient wall thickness for high pressure operation, and are difficult to flare. Never use brass fittings.

**OPERATING PRESSURE:** Do not operate components above their maximum allowable fluid pressure stated in the Roemheld catalog (7250 psi for most components). Always use a gauge to monitor fluid pressure. Locate pressure gauge where the machine operator can easily read it. Often, placing it directly on the machining fixture is best. All Roemheld Electric and Air Power units include a fluid-pressure gauge.

**ADDITIONAL SAFETY PRECAUTIONS:** If losing fluid pressure (due to a cut hose, etc.) would pose any danger to the operator, install a pressure switch, or other pressure-monitoring device, to monitor system pressure. This switch electrically signals the machine tool to shut down if fluid pressure is inadequate.

**COMPONENT COMPATIBILITY:** Do not mix non-Roemheld components into a Roemheld power-workholding circuit. Other brands are not leakfree, and their performance may be unpredictable.

**HYDRAULIC FLUID:** Always use absolutely clean, fresh hydraulic fluid. Fill the fluid under absolutely clean conditions. **Almost all service problems are caused by dirty, contaminated fluid. Fluid must be clean to 10 micron or better nominal filtration.** Use only the following DIN 51524, HLP, ISO Grade fluids to preserve your warranty:

Oil Temp. [°C]	Designation [as per DIN 51524]	Application
10-40	HLP 22	Power units with poppet valves or single acting circuits
15-50	HLP 32	Mechanical pumps or double acting circuits

See also CLR-000-V, high pressure in-line filter.

**BLEEDING AIR:** Usually components will bleed trapped air automatically when you clamp and unclamp them several times. If manual bleeding is still necessary, bleed at an elevated tube or hose connection, farthest from the power source. With the clamps actuated (system pressurized) slightly loosen the connection. After fluid seeps out for a few seconds, retighten. Repeat at other connections if necessary. After bleeding, unclamp (depressurize system) and refill the power sources fluid reservoir.

**CAUTION: ALWAYS KEEP HANDS CLEAR OF POWER CLAMPS DURING OPERATION. THESE COMPONENTS EXERT VERY HIGH FORCES AND CAN CAUSE SERIOUS INJURY. DISCONNECT POWER SOURCE BEFORE CONNECTING, DISCONNECTING, ADJUSTING, OR OTHERWISE HANDLING COMPONENTS.**

**FLOW CONTROL:** When using Swing Clamps, Extending Clamps, or Fluid-Advanced Work Supports with a high-flow-rate power source, make sure the fluid flow rate to each component is under the maximum stated in the catalog. Otherwise the components may not activate properly. See the Roemheld catalog for flow control valves.

**FLOOD COOLANT:** Work Supports and Swing Clamps have air vents protected by sintered-metal filters. These vents could draw in coolant if the components are submerged. To prevent this, attach an air vent tube via the tapped hole provided (see each component's catalog page for air-vent-fitting part numbers).

**PRESS-TOOL CLAMPING:** Clamping die sets on presses require different components and safety devices than found in our Roemheld Power Workholding catalog. Contact factory for press-tool clamping systems.

**MOUNTING:** Carefully follow mounting instructions as shown in the Roemheld catalog for each component.

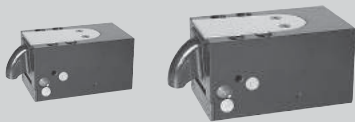


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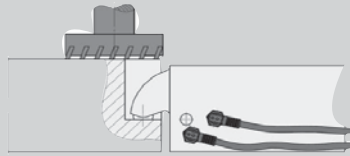
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# Down-Holding Clamps



**Flat Profile**  
pages 589-590



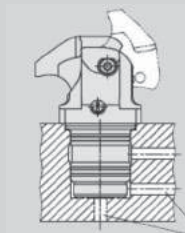
## Extending Clamps

Arm extends forward to clamp, then retracts again for clear loading when unclamped. Ideal for clamping in narrow recesses.

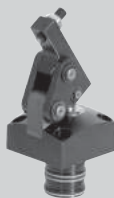
**Flat Profile** Clamps extend in a smooth, continuous radial motion. The arm retracts fully for loading. Choice of swivel-pad arm or spherical-nose arm. **Compact** Clamps have a sturdy lever mechanism that pivots into clamping position. These clamps are extremely compact both in footprint and overall height. The clamping lever pivots a full 90° for clear loading even when using custom long clamping levers. Ideal for clamping in narrow recesses.



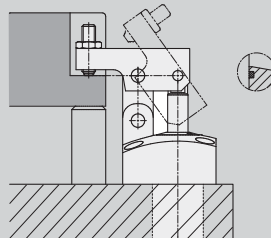
**Compact Clamps**  
page 592



**Compact** Clamps have a metallic wiper edge, and are especially suited for applications where space is limited. Two different clamping levers are available, which can be machined to adapt to your workpiece, then swiveled into small recesses for unimpeded loading and unloading. Four different sizes of the clamp are available, each with a short or long clamping arm.



**Hinge/Link Clamps**  
pages 593-594



**Hinge or Link** Clamps are ideal in narrow recesses, and have a fully retractable arm for clear loading from above. Hinge clamps are ideal for manifold mounting, and are available in more than 100 variations.

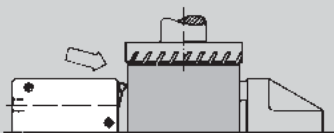


**Low Profile**  
page 591

## Edge Clamps

Nose advances to grip side of workpiece. Clamping thrust is both forward and down. Ideal when clamping from above would interfere with machining.

**Low profile** edge clamp sits below cutter path yet still clamps high on workpiece...important for solid, vibration-free clamping.



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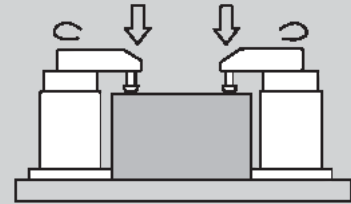
# Down-Holding Clamps



pages 595-596

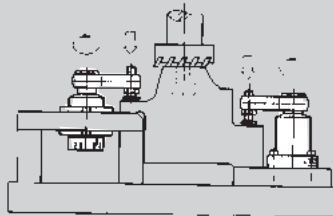
## Air-Powered Swing Clamps

Ideal when only light clamping force is required. Powered by low-pressure shop air.



## Flange Base

pages 597, 610, 598, 606



## Swing Clamps

Arm swings 90 degrees then clamps down. Ideal when you need maximum reach and clearance for loading/unloading. Proprietary safety-clutch mechanism prevents damage if the clamping arm strikes an unexpected object during its swing.

**Flange base** swing clamp is good for taller workpieces. Very popular because it takes up little area on the fixture. Mount either on top of fixture or through fixture plate.



## All Threaded

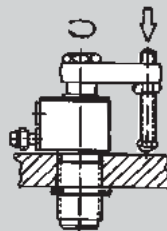
pages 597-598

**All threaded** swing clamp is well-suited for through-hole mounting. Fittings are underneath clamp to keep plumbing away from workpiece area.



## Top Flange

pages 599-600, 605



**Top Flange** swing clamp has high-level fittings. Mounts in a tapped or bored hole, with plumbing running above the fixture plate or using manifold mounting.

**Swing Clamp Arms** pages 598, 602-604



## Extending Clamps ■ **Flat Clamp** ■ B1.8231

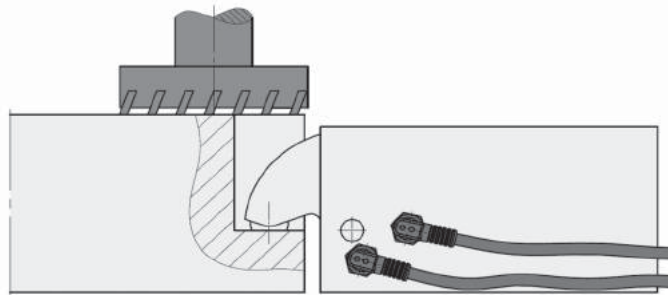
**Flat Clamp** ■ with optional position monitoring ■ Double Acting  
Max. Operating Pressure ■ 7250 psi (500 bar)



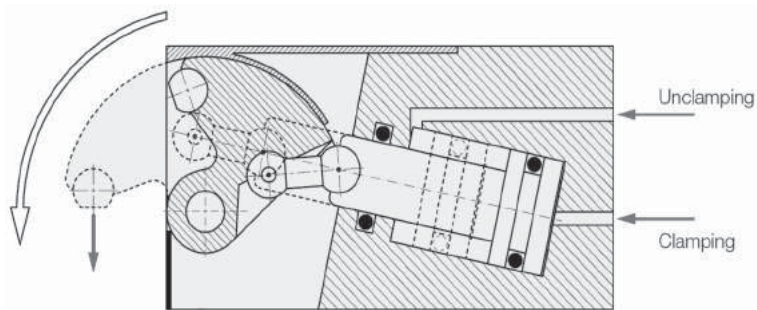
- Flat, compact design
- High protection against chips and spatter
- Large clamping stroke
- Clamping lever completely retracts
- Optional position monitoring
- Designed to resist side forces at the clamping point

The flat clamp is a double-acting hydraulic clamping element available in two sizes with two lever options. Oil can be supplied via fitting connection or manifold mounted. The clamping lever is connected to the piston by a connecting rod and retracts completely within the body of the clamp allowing for vertical part loading.

**IMPORTANT NOTES:** When mounted vertically, it is recommended to remove the cover plate to allow for coolant and chip drainage. Other notes can be found in A 0.100.



**These extending clamps have an extremely low profile for excellent machining clearance.**



**Cutaway view of Swivel Nose Model**

Subject to change. For further details, including detailed dimensions and mounting instructions, visit [www.clrh.com](http://www.clrh.com).



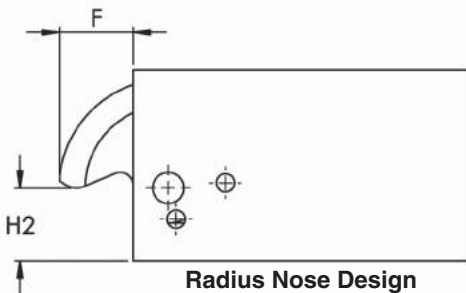
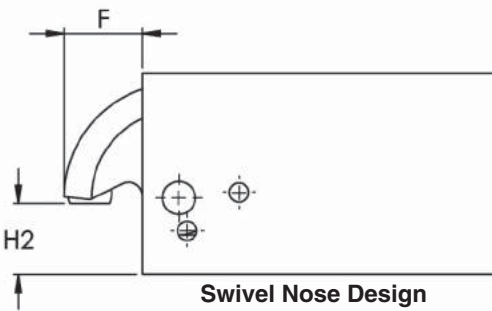
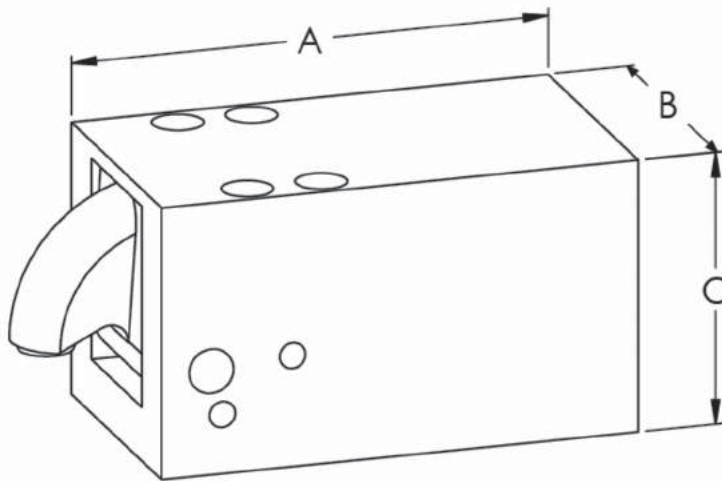
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# Extending Clamps ■ Flat Clamp ■ B1.8231

**Flat Clamp** ■ with optional position monitoring ■ Double Acting  
 Max. Operating Pressure ■ 7250 psi (500 bar)



### Swivel Pad Contact Bolt

		Size 1	Size 2
Clamp Force (lbs)	7250 psi	3050	4940
	4000 psi	1680	2720
	2000 psi	840	1360
A		4.27	5.08
B		2.36	2.95
C		2.30	2.89
F		0.94	1.12
H2 (min.)		0.75	0.96
Weight (lbs)		5.0	9.5
Part No., Clamp		CLR-1824-202	CLR-1824-262

### Radius Nose Contact Bolt

		Size 1	Size 2
Clamp Force (lbs)	7250 psi	2760	4780
	4000 psi	1520	2640
	2000 psi	760	1320
H2 (min.)		0.71	0.87
Part No., Clamp		CLR-1824-201	CLR-1824-261

### Accessories

Part No., Screw Plug G 1/4	CLR-3610-006
Part No., Plug Connection NW5	CLR-9210-132
Part No., Inductive Prox Switch	CLR-3829-098
Part No., Rt Angle Plug for Switch	CLR-3829-099

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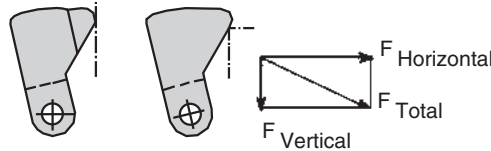
# Edge Clamps

**7250 psi max**  
Single acting



**Low Profile**

- Grips side of workpiece . . . pushes forward and down
- Ideal when clamping from above is difficult
- Down-holding force is 1/3 of total clamping force
- Sits low yet clamps high . . . just below the cutter path to reduce vibration
- Choice of three sizes

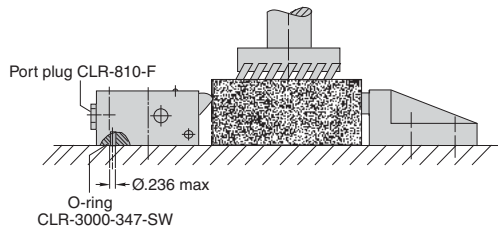
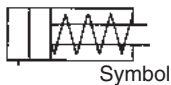


Low-profile edge clamps can be used to grip the side of a workpiece for machining clearance, or to clamp over the top edge.

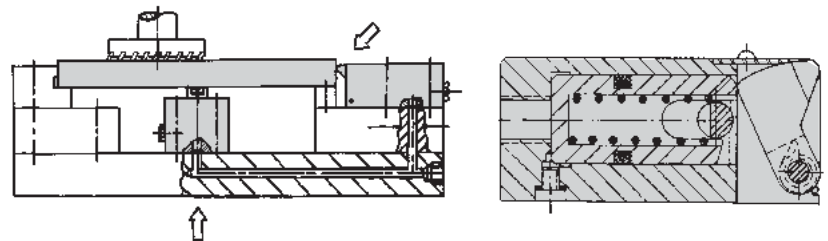
**CLAMPING ACTION:** Fluid pressure advances the cylinder, which in turn pivots the nose forward and down to grip side of workpiece. Spring return.

**MOUNTING:** Fasten with four socket-head cap screws. 1/4 BSPP connection. Same unit may be mounted without external plumbing lines. To manifold mount, order CLR-3000-347-SW O-ring and CLR-810-F port plug.

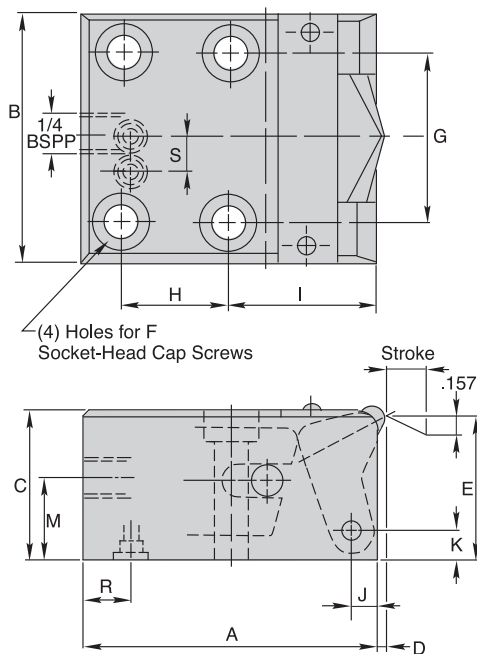
**CONSTRUCTION:** Internal cylinder pushes pivoting nose. Nose cover keeps out chips and debris. Body made from carbon steel, black oxide finish. Forged, alloy steel nose, hardened to RC 56-58. Nose is through-hardened so that it can be ground to suit the workpiece if desired.



Low-profile edge clamps can be mounted low, yet clamp up high, just below the cutter path to reduce vibration. Edge clamps can be manifold mounted on a flat surface by unplugging the bottom port and installing o-ring CLR-3000-347-SW, then plugging the 1/4 BSPP port with a CLR-810-F port plug.



Edge clamp used with a block-type work support, both components manifold mounted for easy chip removal.



Clamping force (lbs)	7250 psi	1910	4495	8990
	6000 psi	1600	3700	7400
	5000 psi	1300	3100	6200
	4000 psi	1100	2500	5000
	3000 psi	790	1900	3700
Clamping stroke	.31	.39	.39	
Fluid required (in. <sup>3</sup> )	.10	.30	.62	
Piston Ø	16mm	25mm	36mm	
Force per 1000 psi (lbs)	260	612	1223	
Max. operating pressure (psi)	7500	7500	7500	
A	2.677	3.543	3.780	
B	1.97	2.36	3.15	
C	1.26	1.57	1.97	
D	.079	0	.079	
E	1.220	1.535	1.929	
F	5/16 or M8	5/16 or M8	3/8 or M10	
G	1.260	1.575	2.205	
H	1.063	1.496	1.496	
I	1.260	1.654	1.811	
J	.217	.236	.315	
K	.236	.354	.433	
M	.75	.91	1.06	
R	.512	.551	.630	
S	0	0	.551	
Weight (lbs)	2.0	2.5	4.6	
Part No.	CLR-110-EC	CLR-310-EC	CLR-410-EC	



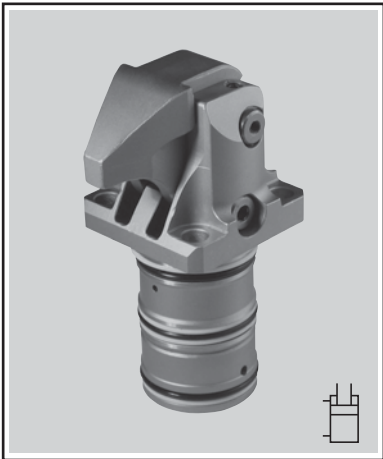
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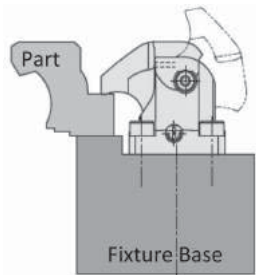
# Extending Clamps ■ Compact Clamp ■ B1.827

**Compact Clamp** ■ Cartridge type with pneumatic clamping monitoring  
 Double Acting ■ Max. Operating Pressure ■ 3625 psi (250 bar)

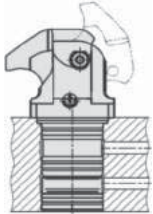


The compact clamp pivots over the workpiece, then clamps in a downward stroke without applying any side load to the part like similar clamps. When retracted, the arm is behind the front plane of the clamp allowing for unobstructed top loading. It has a small footprint with large clamping force. Metal wiper on piston rod and nitrated finish helps protect

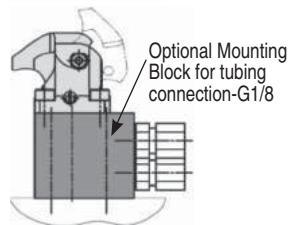
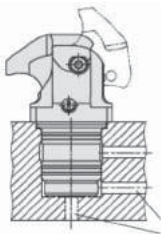
this clamp from chips and coolant for a long life cycle. Four Sizes, three mounting options and two arm options help the designer choose the optimal clamp for their application. The long arm can be machined to fit into pockets. The clamp for closed bore mounting does not include the lower protective cap which makes the overall height shorter.



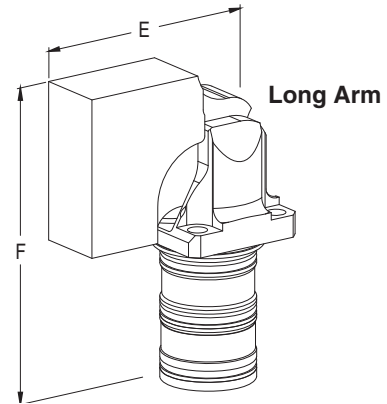
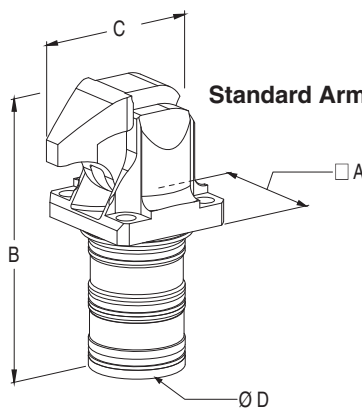
Open Bore Mounting



Closed Bore Mounting



Optional Mounting Block for tubing connection-G1/8



Clamp Force (lbs)		Size 1	Size 2	Size 3	Size 4	
		3625 psi	560	900	1680	2360
		2000 psi	310	495	930	1300
	1000 psi	150	245	465	650	

### Open Bore Mounting

A	1.34	1.65	1.89	2.17
B	3.03	3.33	3.90	4.15
C	1.73	1.93	2.38	2.52
Ø D	0.98	1.26	1.57	1.77
E	2.19	3.19	3.60	3.74
F	3.38	3.60	3.90	4.15
Weight standard version	0.60	1.06	1.87	2.31
Part No., Clamp - Standard Arm	CLR-1801-110	CLR-1802-110	CLR-1803-110	CLR-1804-110
Part No., Clamp - Long Arm	CLR-1801-130	CLR-1802-130	CLR-1803-130	CLR-1804-130

### Closed Bore Mounting

B	2.73	2.97	3.58	3.77
F	3.09	3.24	3.59	3.77
Weight standard version	0.53	0.93	1.68	2.03
Part No., Clamp - Standard Arm	CLR-1801-111	CLR-1802-111	CLR-1803-111	CLR-1804-111
Part No., Clamp - Long Arm	CLR-1801-131	CLR-1802-131	CLR-1803-131	CLR-1804-131

### Accessories

Part No., Spare Standard Arm	CLR-3548-821	CLR-3548-822	CLR-3548-823	CLR-3548-824
Part No., Spare Long Arm	CLR-3548-1121	CLR-3548-1122	CLR-3548-1123	CLR-3548-1124
Part No., Mounting Block	CLR-3468-381	CLR-3468-382	CLR-3468-383	CLR-3468-384

Subject to change. For further details, including detailed dimensions and mounting instructions, visit [www.clrh.com](http://www.clrh.com).



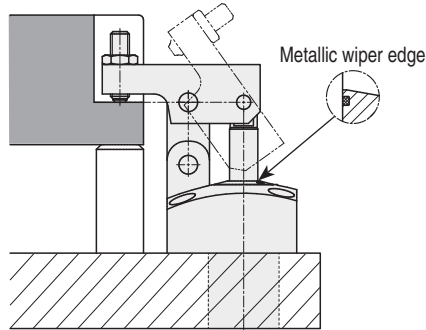
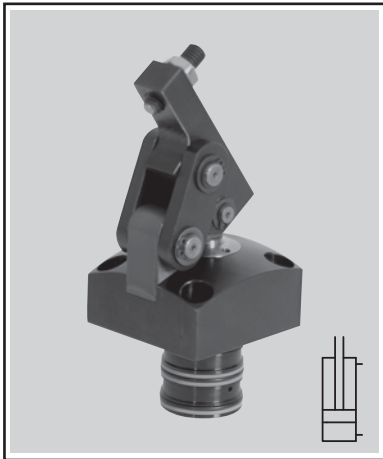
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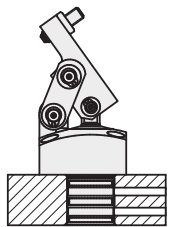
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# Extending Clamps ■ Hinge Clamp ■ B1.8251

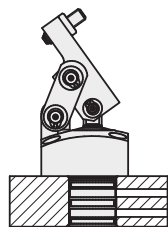
**Hinge Clamp** ■ with metal wiper and optional position monitoring  
**Double Acting** ■ Max. Operating Pressure ■ 3625 psi (250 bar)



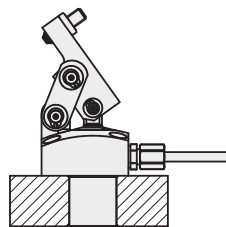
The hinge clamp family of workholding clamps offer many different variations in order to satisfy your fixturing goal. As the hydraulic piston moves upward, the hinge mechanism swivels the arm over your workpiece. The optimized design location of the pins and linkage can reduce or eliminate the transmission of side loading into your part. When retracted, the standard arm is behind the front plane of the clamp allowing for unobstructed top loading. It has a small footprint with large clamping force and FKM seals are standard. Metal wiper on piston rod and contoured top surface provides excellent protection from chips and coolant drainage for a long life cycle. Three sizes, three mounting options, and two arm options help the designer choose the optimal clamp for their application. The long arm can be machined to fit into pockets.



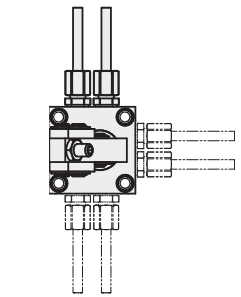
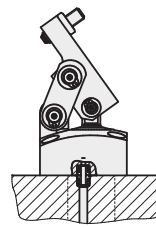
Cartridge Type



Cartridge type with extended piston for position monitoring

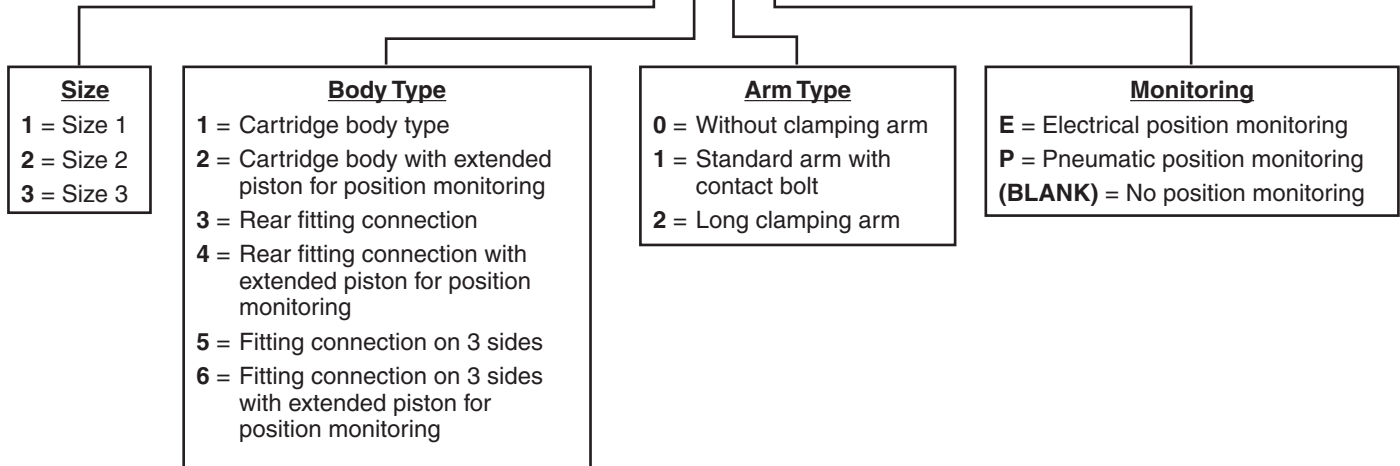


Solid body type shown with actuation via fitting connection (left) or connecting insert (right)



Fitting connections on three sides

Part Number Coding: CLR-1825-X X X X



Example: CLR-1825-231 = Size 2 clamp with rear fitting connection, standard arm and no monitoring.

Subject to change. For further details, including detailed dimensions and mounting instructions, visit [www.clrh.com](http://www.clrh.com).



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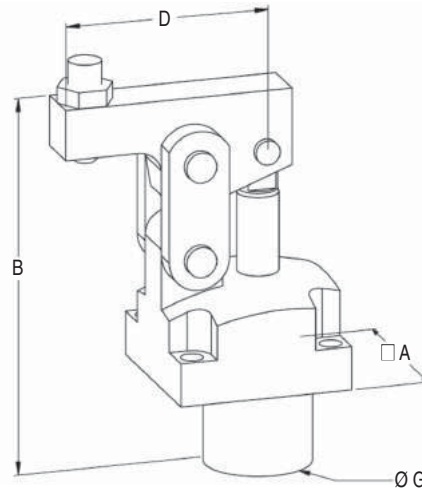
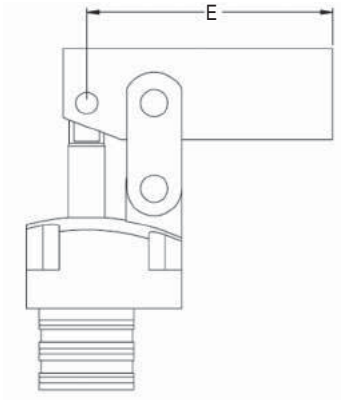
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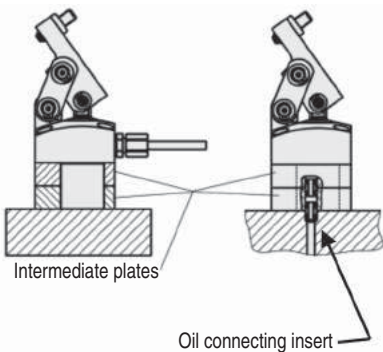
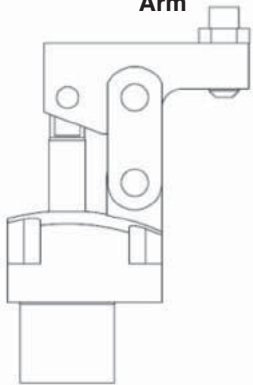
# Extending Clamps ■ Hinge Clamp ■ B1.8251

**Hinge Clamp** ■ with metal wiper and optional position monitoring  
**Double Acting** ■ Max. Operating Pressure ■ 3625 psi (250 bar)

Cartridge Body Style With Long Arm



Solid Body Type With Standard Arm



		Size 1	Size 2	Size 3
Clamping Force (lbs)	3625 psi	890	2240	3190
	2000 psi	490	1240	1760
	1000 psi	240	620	880

Cartridge type

	Size 1	Size 2	Size 3
A	2.17	2.76	3.35
B	4.41	6.26	7.38
D	2.07	2.85	3.39
E	3.27	4.51	5.32
G	1.18	1.65	2.05
Weight standard version (lbs)	2.4	6.0	10.2
Part No., Clamp - Standard Arm	CLR-1825-111	CLR-1825-211	CLR-1825-311
Part No., Clamp - Long Arm	CLR-1825-112	CLR-1825-212	CLR-1825-312

Fitting connection type

	Size 1	Size 2	Size 3
Part No., Clamp - Standard Arm	CLR-1825-131	CLR-1825-231	CLR-1825-331
Part No., Clamp - Long Arm	CLR-1825-132	CLR-1825-232	CLR-1825-332

Accessories

	Size 1	Size 2	Size 3
Part No., Intermediate Plate	CLR-3456-449	CLR-3456-468	CLR-3456-489
Part No., Oil Connecting Insert	CLR-9210-145	CLR-9210-145	CLR-9210-145

Subject to change. For further details, including detailed dimensions and mounting instructions, visit [www.clrh.com](http://www.clrh.com).



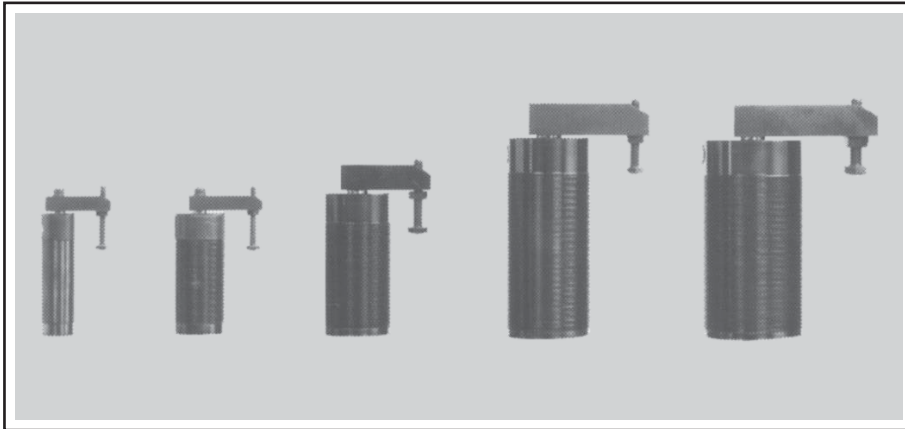
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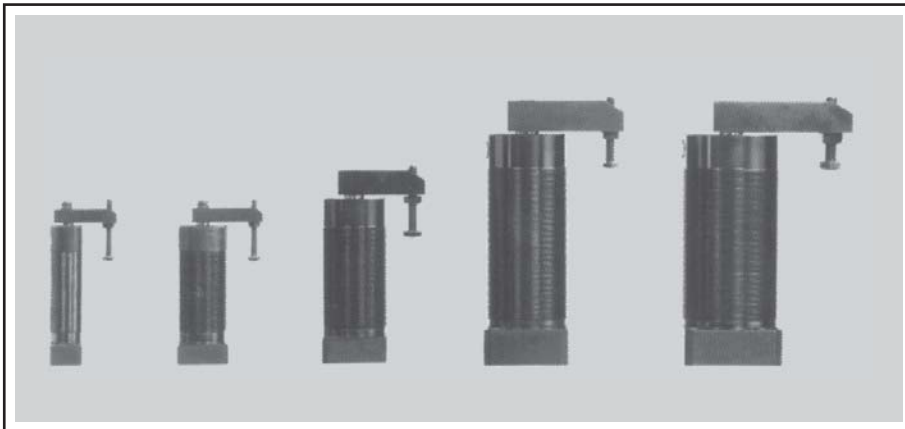
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# Air-Powered Swing Clamps

**100 psi air max**  
Double acting only



**All Threaded**



**Flange Base**

- Use when light clamping force is desired
- Operates by air...no hydraulic power source needed
- Available with standard or long arm
- Double acting...clamp and return by air pressure
- Choice of five sizes

**CLAMPING ACTION:** Applying air pressure to upper port swings clamping arm 90° over the workpiece, then clamps down.

**Note:** Arm also moves down while swinging (see chart for stroke during swing). To unclamp, switch air pressure to the lower port. Choose part number for clockwise or counterclockwise rotation into clamping position.

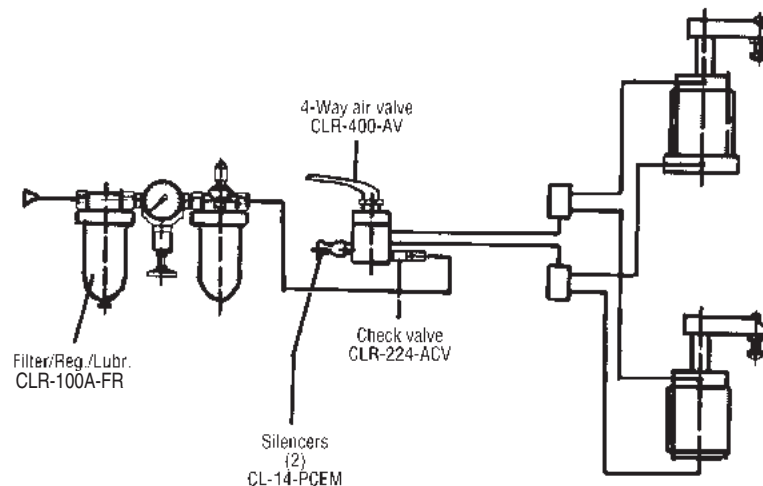
**MOUNTING FLANGE BASE:** Fasten base to fixture with four cap screws. Mount in any position horizontal or vertical.

**MOUNTING, ALL THREADED:** Mount in a bored hole, using the two locknuts furnished.

**DESIGN CONSIDERATIONS:** Do not use with hydraulic fluid, or above 100 psi (87 psi with long arm). Use an air check valve between the air supply and the 4-way air valve and clamps, and periodically check for leaks. Any leaks there would cause clamping pressure loss if the shop air supply fails. To ensure long clamp life, we recommend installing an Air Extractor/Dryer before the Filter/Regulator/Lubricator.

**CLAMP ARM:** Flange-base type can be mounted to start its 90° swing from any of four positions, 90° apart. All threaded type can be mounted to start its 90° swing from any position. Standard-length arm is furnished with clamp. Order long arm separately. Adjustable contact bolt furnished.

**NOTE:** These air clamps do not have safety clutch like hydraulic swing clamps.



**Connection Example**



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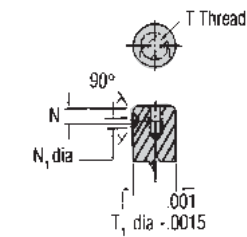
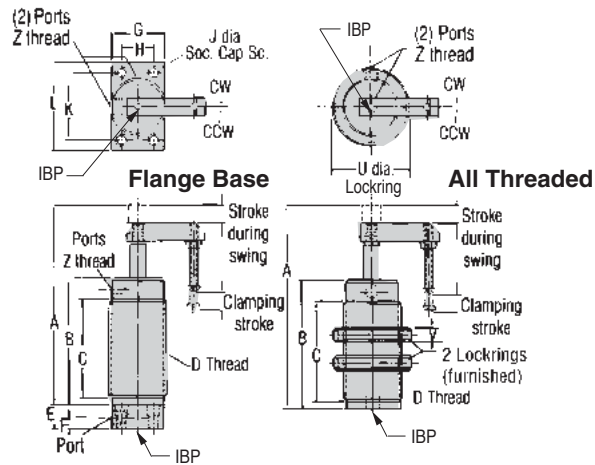
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# Air-Powered Swing Clamps

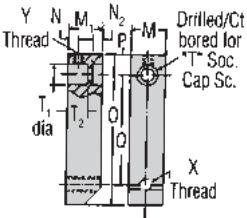
100 psi air max  
Double acting only



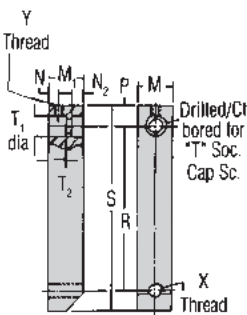
New miniature size for light-force applications where space is at a premium.



Rod Dimensions



Standard Arm



Long Arm

Maximum clamping force std. arm, at 100 psi (air)	20	41	107	167	277
Max. air pressure, std. arm (psi)	100	100	100	100	100
Max. air pressure, long arm (psi)	87	87	87	87	87
Minimum air pressure (psi)	58	58	58	58	58
Clamping stroke	9/32	9/32	13/32	19/32	19/32
Stroke during swing	9/32	9/32	5/16	21/32	21/32
A, flanged/all threaded	3-27/32 3-25/32	3-27/32 3-25/32	4-1/2	6-9/16	6-9/16
B, flanged/all threaded	2-23/32 2-5/8	2-23/32 2-5/8	3-3/16	4-1/2	4-1/2
C	1-7/8	1-7/8	2-3/8	3-17/32	3-17/32
D	M20x1.0	M30x1.5	M40x1.5	M50x1.5	M60x1.5
E	15/32	15/32	5/8	7/8	7/8
F	3/16	3/16	3/8	1/2	1/2
G	3/4	1-3/16	1-1/2	1-31/32	2-1/4
H	—	.669	.906	1.181	1.575
J dia	1/4	1/4	1/4	5/16	5/16
K	1.378	1.693	1.969	2.362	2.598
L	1-31/32	2-3/8	2-9/16	3-5/32	3-11/32
M	15/32	15/32	19/32	3/4	3/4
M1	11/32	11/32	19/32	3/4	3/4
N	.138	.138	.138	.157	.157
N1	.138	.138	.138	.157	.157
N2	—	—	.236	.275	.275
O	1-15/32	1-21/32	2-1/16	2-3/4	3-5/16
P	9/32	9/32	13/32	15/32	15/32
Q	1	1-3/16	1-3/8	2	2-3/8
R	1-9/16	1-31/32	2-5/32	2-15/16	3-9/16
S	2-1/16	2-7/16	2-27/32	3-3/4	4-1/2
T	M4x10*	M4x10*	M5x10	M6x14	M6x14
T1 dia	.315	.315	.472	.591	.591
T2	.276	.276	.276	.315	.315
U dia	1-3/8	1-3/4	2-3/8	2-3/4	3-5/32
V	3/8	3/8	3/8	15/32	19/32
X	M4x0.7	M4x0.7	M6	M6	M8
Y	M3x0.5	M3x0.5	M4x0.7	M4x0.7	M4x0.7
Z	#10-32	#10-32	#10-32	1/8 NPT	1/8 NPT
Wt., flanged/all threaded (lbs)	1.0/0.8	1.2/0.9	1.8/1.1	4.0/2.8	5.3/3.7
Part no., flanged base CW	CLR-1872-104-ASC	CLR-1873-104-ASC	CLR-1874-104-ASC	CLR-1875-104-ASC	CLR-1876-104-ASC
Part no., flanged base CCW	CLR-1872-204-ASC	CLR-1873-204-ASC	CLR-1874-204-ASC	CLR-1875-204-ASC	CLR-1876-204-ASC
Part no., all threaded CW	CLR-1872-304-ASC	CLR-1873-304-ASC	CLR-1874-304-ASC	CLR-1875-304-ASC	CLR-1876-304-ASC
Part no., all threaded CCW	CLR-1872-404-ASC	CLR-1873-404-ASC	CLR-1874-404-ASC	CLR-1875-404-ASC	CLR-1876-404-ASC
Spare clamping arm, STD	CLR-0187-201-ASCA	CLR-0187-301-ASCA	CLR-0187-401-ASCA	CLR-0187-501-ASCA	CLR-0187-601-ASCA
Spare clamping arm, long	CLR-0187-202-ASCA	CLR-0187-302-ASCA	CLR-0187-402-ASCA	CLR-0187-502-ASCA	CLR-0187-602-ASCA
Spare locking	CLR-200-ASCA	CLR-300-ASCA	CLR-400-ASCA	CLR-500-ASCA	CLR-600-ASCA

\*Arm not counterbored (for capscrew). To avoid damage, clamps must take at least one full second to clamp.



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# Swing Clamps

7250/3000 psi max  
Single and double acting

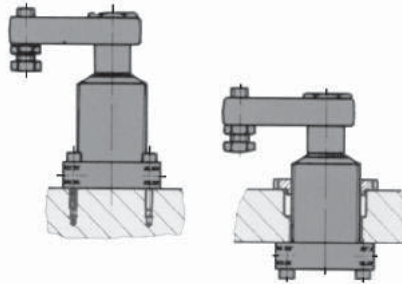
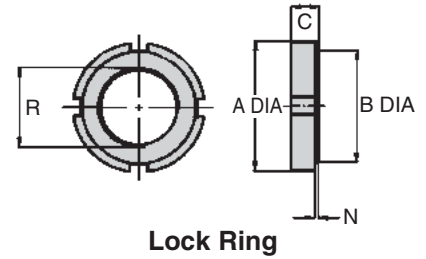


Flange Base

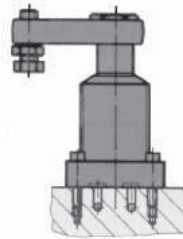


All Threaded

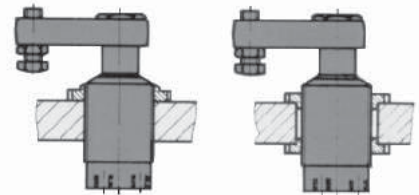
- Popular series of swing clamps that provides many plumbing options
- Unique safety clutch prevents damage if arm strikes an object during swing
- Double-acting clamps are also available with longer clamping strokes (25mm or 50mm). Please contact factory.
- Choice of four sizes (3, 5, 6, and 7 series)



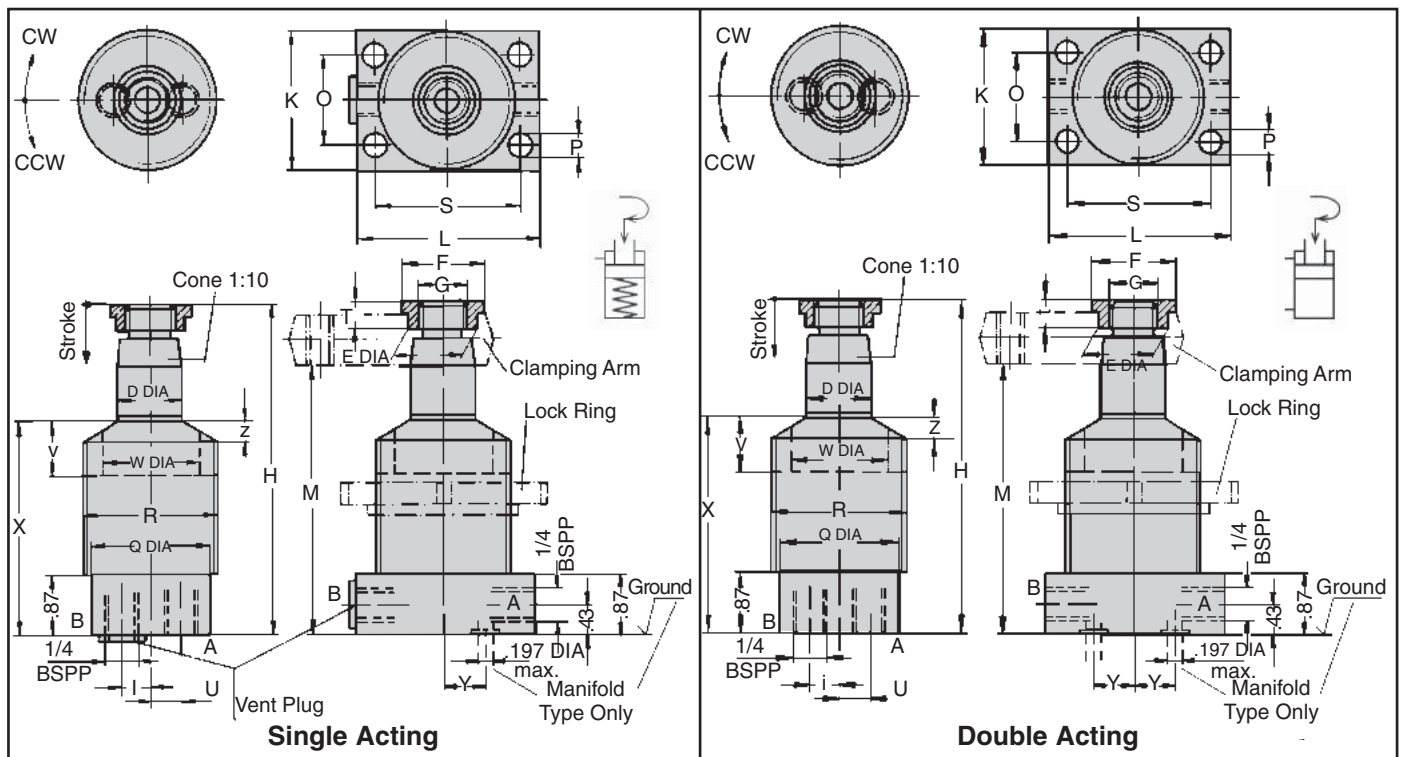
Version 1  
Flange Base  
Standard Fittings



Version 2  
Flange Base  
Manifold Mounted



Version 3  
All Threaded  
Standard Fittings



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# Swing Clamps

**7250/3000 psi max**  
Single and double acting

**CLAMPING ACTION:** Fluid pressure swings arm 90° over workpiece then clamps down. Spring return lifts arm then swings in back 90° for loading/unloading. Optional fluid return version (double-acting). Choose either clockwise or counterclockwise rotation to clamping position.

**MOUNTING:** Choose from many possible mounting methods: (1) Fasten to top of fixture plate with four capscrews inserted through flange base from above; (2) Mount through a hole in the fixture plate, fastening with four capscrews inserted through flange base from below; (3) Mount through a bored hole and secure with two lockrings. Mount in any position, horizontal or vertical. Standard clamping arm requires a rear support.

**DESIGN CONSIDERATIONS:** The clamping arm must go through its full swing to operate properly. Stopping the arm short by obstructing it could possibly cause damage. Use low operating pressure during initial setting. May require a simple flow-control valve if fixture contains only a few clamps and is powered by a high-flow-rate power source. See power source pages to check. Cycle time must be at least one second.

**STANDARD CLAMPING ARM:** Rugged nodular iron arm pivots on a forged steel carrier. Arm can be mounted to start its 90° swing from any position within 360°. Contact bolt furnished.

**OPTIONAL HALF ARM:** Forged steel, furnished with contact bolt. Whenever possible, use standard clamping arms, with rear supports, for best mechanical leverage and full clamping force. Half arms are more compact and useful when there is no room for a rear support, but the maximum clamping force is greatly reduced. Half arms cause bending in the piston rods. This bending lowers the allowable maximum fluid pressure to 3000 psi. Exceeding 3000 psi can cause internal damage and decrease service life considerably. Arm extensions will further reduce the allowable operating pressure (inversely proportional to arm length.) To order Swing Clamps with half arms instead of standard arms, add an "H" to the part no.

**FLUID CONNECTION:** Male 37° tubing/hose connection (two with double-acting clamps). Do not use NPT fittings.

**CONSTRUCTION:** Sturdy helical-cam mechanism first rotates arm, then clamps. Integral safety clutch. Unit sealed to keep out dirt and chips.

Clamping force (lbs) standard pivoting arm SA/DA (lbs)	7250 psi	1065/1080	2810/2845	4120/4495	7305/7490
	6000 psi	860/920	2200/2300	3400/3700	6000/6500
	5000 psi	710/770	1800/2000	2800/3100	4900/5500
	4000 psi	580/620	1480/1560	2340/2480	4030/4340
	3000 psi	400/450	960/1200	1600/1900	2800/3300
Clamping force half arm SA/DA (lbs) See pgs. 622-623 for special arm lengths	3000 psi	540/630	1320/1560	1700/2360	3360/3810
Clamping stroke	.43	.55	.59	.59	.59
Stroke during swing	.28	.32	.43	.35	.35
Fluid required to clamp (cu. in.)	.20	.61	1.12	1.69	1.69
Fluid required to unclamp, DA (cu. in.)	.54	1.69	3.11	4.60	4.60
Max. fluid flow rate (cu. in./min.)	11	36	67	101	101
Min. operating pressure (psi)	450	450	450	450	450
A Dia	2.68	3.54	4.53	5.12	5.12
B Dia	2.047/2.039	2.677/2.669	3.543/3.535	3.937/3.929	3.937/3.929
C	.47	.51	.63	.63	.63
D Dia	.787	1.260	1.575	1.969	1.969
E Dia	.925	1.319	1.772	2.185	2.185
F Dia	1.18	1.57	2.17	2.68	2.68
G	M18 x 1.5	M28 x 1.5	M35 x 1.5	M45 x 1.5	M45 x 1.5
H	4.98	5.81	6.77	7.17	7.17
I	.47	.49	.75	1.00	1.00
K	1.77	2.48	3.15	3.54	3.54
L	2.56	3.35	3.94	4.53	4.53
M (standard arm/half arm)	4.13/4.13	4.69/4.69	5.43/5.43	5.69/5.67	5.69/5.67
N	.12	.16	.20	.20	.20
O	1.181	1.732	2.362	2.677	2.677
P Dia	.256	.335	.531	.630	.630
Q Dia	1.69	2.28	3.03	3.46	3.46
R	M45 x 1.5	M60 x 1.5	M80 x 2	M90 x 2	M90 x 2
S	1.969	2.559	3.150	3.543	3.543
T	.354	.394	.433	.472	.472
U	.47	.77	1.04	1.34	1.34
V	.79	.79	1.18	1.57	1.57
W Dia	1.26	1.97	2.36	2.76	2.76
X	3.33	3.72	4.33	4.57	4.57
Y	.591	1.102	1.220	1.476	1.476
Z	.20	.24	.24	.35	.35
Part No., Lock Ring		CLR-300-SCA	CLR-500-SCA	CLR-600-SCA	CLR-700-SCA
Part No., Standard Pivoting Arm		CLR-302-SCA	CLR-502-SCA	CLR-602-SCA	CLR-702-SCA
Part No., Half Arm		CLR-301-SCA	CLR-501-SCA	CLR-601-SCA	CLR-701-SCA

## Flange Base – Standard Fittings

Part No., Clamp without Arm	Single-Acting, CW	CLR-1883-104-SC	CLR-1885-104-SC	CLR-1886-104-SC	CLR-1887-104-SC
	Single-Acting, CCW	CLR-1883-204-SC	CLR-1885-204-SC	CLR-1886-204-SC	CLR-1887-204-SC
Double-Acting, CW	CLR-1893-104-SCD	CLR-1895-104-SCD	CLR-1896-104-SCD	CLR-1897-104-SCD	
Double-Acting, CCW	CLR-1893-204-SCD	CLR-1895-204-SCD	CLR-1896-204-SCD	CLR-1897-204-SCD	
Part No., Clamp with Standard Arm	Single-Acting, CW	CLR-314-SC	CLR-514-SC	CLR-614-SC	CLR-714-SC
	Single-Acting, CCW	CLR-324-SC	CLR-524-SC	CLR-624-SC	CLR-724-SC
	Double-Acting, CW	CLR-314-SCD	CLR-514-SCD	CLR-614-SCD	CLR-714-SCD
	Double-Acting, CCW	CLR-324-SCD	CLR-524-SCD	CLR-624-SCD	CLR-724-SCD

## Flange Base – Manifold Mounted

Part No., Clamp without Arm	Single-Acting, CW	CLR-1883-504-SC	CLR-1885-504-SC	CLR-1886-504-SC	CLR-1887-504-SC
	Single-Acting, CCW	CLR-1883-604-SC	CLR-1885-604-SC	CLR-1886-604-SC	CLR-1887-604-SC
Double-Acting, CW	CLR-1893-504-SCD	CLR-1895-504-SCD	CLR-1896-504-SCD	CLR-1897-504-SCD	
Double-Acting, CCW	CLR-1893-604-SCD	CLR-1895-604-SCD	CLR-1896-604-SCD	CLR-1897-604-SCD	
Part No., Clamp with Standard Arm	Single-Acting, CW	CLR-354-SC	CLR-554-SC	CLR-654-SC	CLR-754-SC
	Single-Acting, CCW	CLR-364-SC	CLR-564-SC	CLR-664-SC	CLR-764-SC
	Double-Acting, CW	CLR-354-SCD	CLR-554-SCD	CLR-654-SCD	CLR-754-SCD
	Double-Acting, CCW	CLR-364-SCD	CLR-564-SCD	CLR-664-SCD	CLR-764-SCD

## All Threaded – Standard Fittings

Part No., Clamp without Arm	Single-Acting, CW	CLR-1883-304-SC	CLR-1885-304-SC	CLR-1886-304-SC	CLR-1887-304-SC
	Single-Acting, CCW	CLR-1883-404-SC	CLR-1885-404-SC	CLR-1886-404-SC	CLR-1887-404-SC
Double-Acting, CW	CLR-1893-304-SCD	CLR-1895-304-SCD	CLR-1896-304-SCD	CLR-1897-304-SCD	
Double-Acting, CCW	CLR-1893-404-SCD	CLR-1895-404-SCD	CLR-1896-404-SCD	CLR-1897-404-SCD	
Part No., Clamp with Standard Arm	Single-Acting, CW	CLR-334-SC	CLR-534-SC	CLR-634-SC	CLR-734-SC
	Single-Acting, CCW	CLR-344-SC	CLR-544-SC	CLR-644-SC	CLR-744-SC
	Double-Acting, CW	CLR-334-SCD	CLR-534-SCD	CLR-634-SCD	CLR-734-SCD
	Double-Acting, CCW	CLR-344-SCD	CLR-544-SCD	CLR-644-SCD	CLR-744-SCD

\* Single-acting clamp with standard pivoting arm.



3000 psi maximum

### Optional Half Arm

To order a Swing Clamp with a half arm instead of a standard pivoting arm, add on "H" to the part no. Example:

CLR-314-SC Standard Arm  
CLR-314-SCH Half Arm



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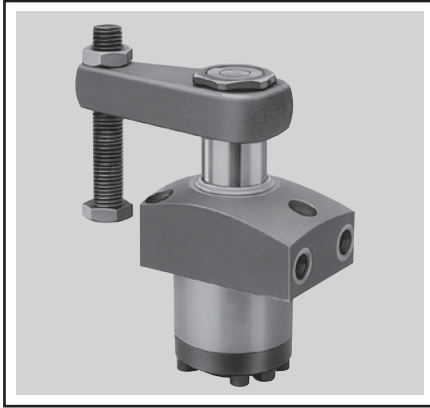
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# Swing Clamps

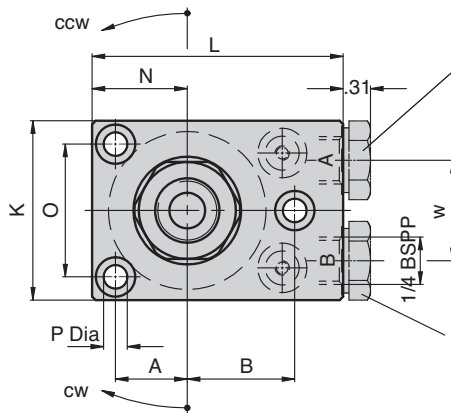
**7250 psi max**  
Single and double acting



**Top Flange**

**CLAMPING ACTION:** Fluid pressure swings arm 90° over workpiece then clamps down. Spring return lifts arm then swings it back 90° for loading/unloading. Optional fluid return version (double-acting). Choose either clockwise or counterclockwise rotation to clamping position.

**DESIGN CONSIDERATIONS:** The clamping arm must go through its full swing to operate properly. Stopping the arm short by obstructing it could possibly cause damage. Use low operating pressure during initial setting. May require a simple flow-control valve if fixture contains only a few clamps and is powered by a high-flow-rate power source. See power source pages to check. Swing cycle time must be at least one second.

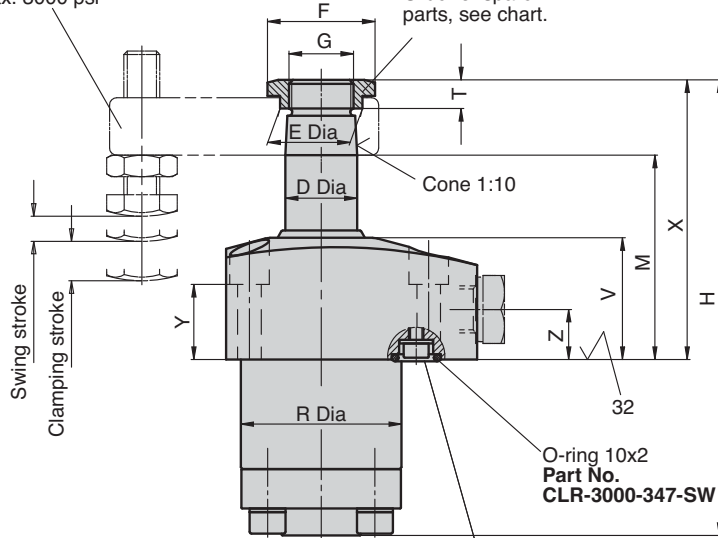


**Double-acting elements:**  
For manifold mounting remove socket head cap screws and USIT-rings. Screw in two plugs CLR-810-F. (Not included).

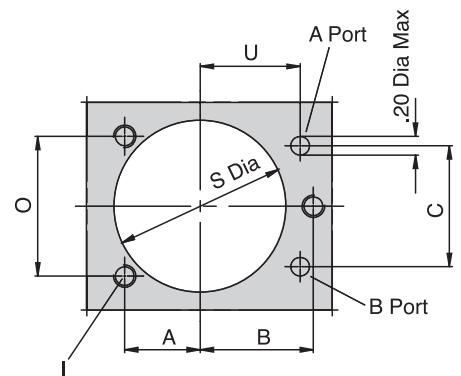
**Single-acting elements:**  
For manifold mounting at port A, remove socket head cap screw and USIT-ring, close port 1/4 BSPP with plug CLR-810-F. Port B is normally closed with a plug with sintered metal air filter. Bleeding of the spring area by drilled channels at port B is possible, plug CLR-810-F is required for this purpose.

**Accessory:**  
Clamping arm assembly complete for max. 3000 psi

Nut is included in our delivery. Order of spare parts, see chart.



**Double-acting elements:**  
For manifold mounting remove socket head cap screws and USIT-rings. Screw in two plugs CLR-810-F. (Not included).



A Port = Clamping  
B Port = Venting (single acting)  
B Port = Unclamping (double acting)



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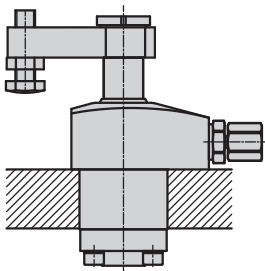
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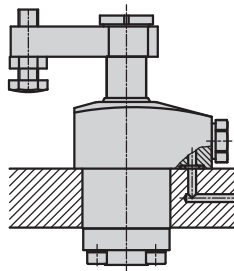
# Swing Clamps

**7250 psi max**  
Single and double acting

Connecting possibilities



Tube connection



Top Flange with O-ring  
sealing for manifold mounting

**FLUID CONNECTION:** 1/4 BSPP Port fittings with optional manifold mounting.

**CONSTRUCTION:** Sturdy helical-cam mechanism first rotates arm, then clamps. Integral safety clutch. Unit sealed to keep out dirt and chips.

**INFO+:** See pages 602-603 for arm options. Also available in 60° and 45° swing.

Clamping force (lbs) standard pivoting arm SA/DA (lbs)	7250 psi	1130/1125	2755/2845	4420/4495	7680/7865
	6000 psi	860/920	2200/2300	3400/3700	6000/6500
5000 psi	710/770	1800/2000	2800/3100	4900/5500	
4000 psi	580/620	1480/1560	2340/2480	4030/4340	
3000 psi	400/450	960/1200	1600/1900	2800/3300	
Clamping force half arm SA/DA (lbs) See pgs. 622-623 for special arm lengths	3000 psi	540/630	1320/1560	1700/2360	3360/3810
Clamping stroke		.43	.55	.59	.59
Swing stroke		.28	.31	.43	.35
Total stroke		.71	.86	1.02	.94
Operating pressure to swing min. (psi)		450	450	450	450
Max. oil flow rate (cu.in)		11	36	67	101
Oil to clamp (cu.in.)		.20	.61	1.12	1.69
Oil to return (cu.in.)		.54	1.69	3.11	4.58
D Dia		.787	1.260	1.575	1.969
A		.787	1.063	1.457	1.654
B		1.181	1.496	1.969	2.165
C		1.260	1.811	2.441	2.953
E Dia		.93	1.32	1.77	2.19
F		1.18	1.57	2.17	2.68
G		M18 x 1.5	M28 x 1.5	M35 x 1.5	M45 x 1.5
H		4.98	5.81	6.77	7.17
I		M6	M8	M10	M12
K		1.97	2.48	3.35	3.74
L		2.76	3.35	4.33	4.92
M		2.22	2.60	2.76	2.72
N		1.04	1.36	1.85	2.17
O		1.457	1.890	2.559	2.835
P Dia		.26	.35	.43	.55
R Dia		1.76	2.35	3.14	3.54
S Dia		1.79	2.38	3.17	3.56
T		.35	.39	.43	.47
U		1.043	1.220	1.575	1.772
V		1.34	1.57	1.57	1.57
W		1.10	1.61	2.17	2.76
X		3.07	3.70	4.09	4.29
Y		.83	.87	.59	.55
Z		.55	.55	.47	.47

## Single Acting

Part No., Clockwise rotation	CLR-1883-103-SC	CLR-1885-103-SC	CLR-1886-103-SC	CLR-1887-103-SC
Part No., Counterclockwise rotation	CLR-1883-203-SC	CLR-1885-203-SC	CLR-1886-203-SC	CLR-1887-203-SC
Part No., 0 degree	CLR-1883-243-SC	CLR-1885-243-SC	CLR-1886-243-SC	CLR-1887-243-SC

## Double Acting \*\*

Part No., Clockwise rotation	CLR-1893-103-SCD	CLR-1895-103-SCD	CLR-1896-103-SCD	CLR-1897-103-SCD
Part No., Counterclockwise rotation	CLR-1893-203-SCD	CLR-1895-203-SCD	CLR-1896-203-SCD	CLR-1897-203-SCD
Part No., 0 degree	CLR-1893-243-SCD	CLR-1895-243-SCD	CLR-1896-243-SCD	CLR-1897-243-SCD

\*\* Longer stroke versions available - Consult Engineering.

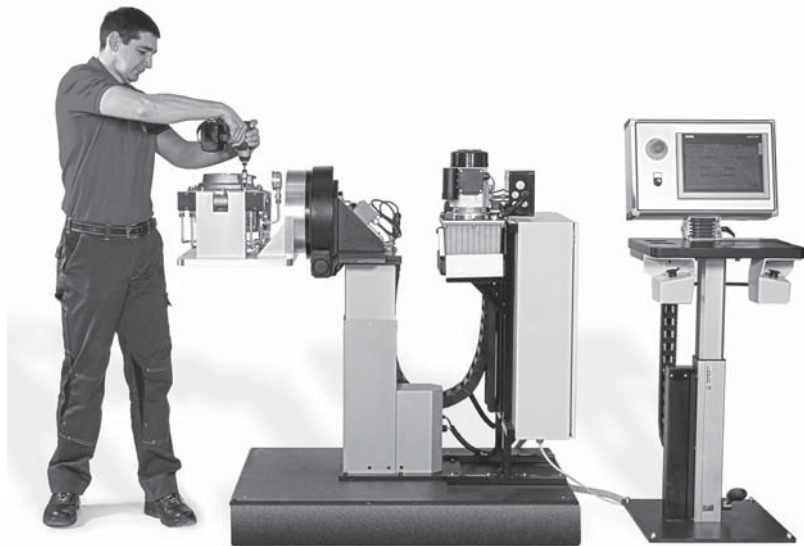


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- Easily move your assembly to optimal position to increase productivity and reduce fatigue
- Preset positions for long runs or adjustable locations for flexibility

See Pages 693-694

# Increase Productivity With Power Workholding



Power Workholding allows you to quickly clamp, position or support workpieces on CNC machines

- Reduce load time
- Reduce operator fatigue
- Increase quality and safety



Work Supports



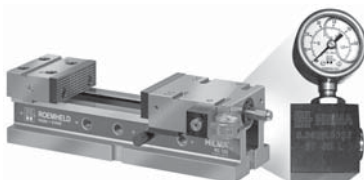
Compact Clamps



Swing Clamps



Fixture Clamps



CNC Machine Vises



Extending Clamps



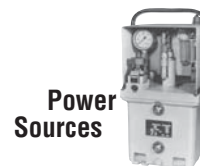
Hinge/Link Clamps



Quintus Quick-Change Riser



Valves, Fittings & Accessories



Power Sources

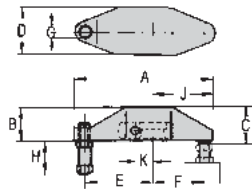
See Pages 575-695

# Swing Clamp Arms

**7250 psi max**  
Single and double acting

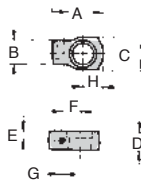
Swing Clamp Part Number	Arm Size
CLR-3XX-SC(D)	Small
CLR-5XX-SC(D)	Medium
CLR-6XX-SC(D)	Large
CLR-7XX-SC(D)	Extra Large

Swing Clamp Part Number	Arm Size
CLR-18X3-XXX-SC(D)	Small
CLR-18X5-XXX-SC(D)	Medium
CLR-18X6-XXX-SC(D)	Large
CLR-18X7-XXX-SC(D)	Extra Large



**Standard Arm (Includes Carrier & Contact Bolt)**

Size	Part No.	A	B	C	D	E	F	G	H	J	K
Small	CLR-0354-000-SCA	4.8	1.18	1.24	1.73	2.36	1.77	M10	.16-2.5	2.09	.57
Medium	CLR-0354-002-SCA	7.28	1.77	1.85	2.3	3.27	2.95	M16	.35-3.13	3.43	.88
Large	CLR-0354-041-SCA	8	2.13	2.22	3.23	3.62	3.23	M16	.35-3.75	3.74	1.1
Extra Large	CLR-0354-004-SCA	8.78	2.32	2.42	3.86	3.94	3.54	M20	.47-4.13	4.33	1.3



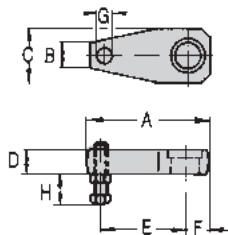
**Carrier Only**

Size	Part No.	A	B	C	D	E	F	G Dia.	H
Small	CLR-3542-093-SCA	1.81	1.02	1.26	0.63	0.33	0.57	.3150	0.63
Medium	CLR-3542-094-SCA	2.32	1.26	1.57	0.91	0.39	0.83	.3937	0.87
Large	CLR-3542-132-SCA	3.23	1.75	2.28	1.1	0.43	1.1	.4724	1.34
Extra Large	CLR-3542-096-SCA	3.54	2.2	2.68	1.34	0.51	1.3	.5512	1.42



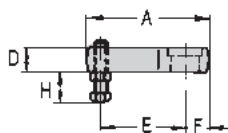
**Untapped Half Arm**

Size	Part No.	A	B	C	D	F
Small	CLR-3921-016-SCA	2.95	.63	1.26	.63	.63
Medium	CLR-3921-017-SCA	4.53	0.87	1.89	0.91	0.98
Large	CLR-3921-021-SCA	5.51	1.1	2.36	1.1	1.18
Extra Large	CLR-3921-018-SCA	7.01	1.57	3.07	1.34	1.57



**Tapped Half Arm (Includes Contact Bolt)**

Size	Part No.	A	B	C	D	E	F	G	H
Small	CLR-0354-001-SCA	2.95	0.63	1.26	0.63	1.97	0.63	M10	.24-2.52
Medium	CLR-0354-003-SCA	4.53	0.87	1.89	0.91	2.95	0.98	M16	.36-3.11
Large	CLR-0354-042-SCA	5.51	1.1	2.36	1.1	3.74	1.18	M16	.36-3.11
Extra Large	CLR-0354-005-SCA	7.01	1.57	3.07	1.34	4.72	1.57	M20	.48-3.86



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3



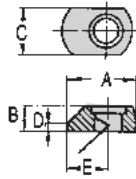
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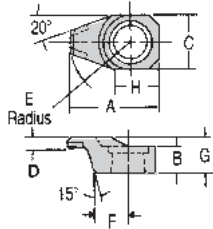
# Swing Clamp Arms

**7250 psi max**  
Single and double acting



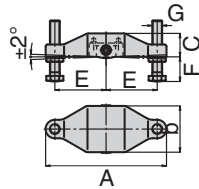
## Short Arm

Size	Part no.	A	B	C	D	E
Small	<b>CLR-3548-159-SCA</b>	1.61	0.63	1.26	0.24	0.98
Medium	<b>CLR-3548-165-SCA</b>	2.4	0.91	1.89	0.24	1.46
Large	<b>CLR-3548-304-SCA</b>	2.99	1.1	2.36	0.43	1.77
Extra Large	<b>CLR-3548-163-SCA</b>	3.54	1.34	3.07	0.55	2.05



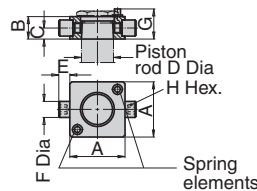
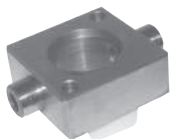
## Thin Nose Arm

Size	Part no.	A	B	C	D	E	F	G	H
Small	<b>CLR-3548-238-SCA</b>	2.03	0.61	1.26	0.26	1.32	0.78	0.83	1.03
Medium	<b>CLR-3548-236-SCA</b>	2.99	0.89	1.81	0.35	1.97	0.88	1.1	1.31
Large	<b>CLR-3548-301-SCA</b>	3.94	1.1	2.6	0.43	2.52	1.72	1.34	1.94
Extra Large	<b>CLR-3548-302-SCA</b>	4.84	1.34	2.95	0.51	3.25	1.84	1.57	2.13



## Double Arm (Includes Carrier & Contact Bolts)

Size	Part no.	A	B	C	D	E	F Max.
Small	<b>CLR-0354-131-SCA</b>	5.43	2.32	1.12	M10	2.36	2.52
Medium	<b>CLR-0354-132-SCA</b>	7.72	2.95	1.5	M16	3.27	3.11
Large	<b>CLR-0354-133-SCA</b>	8.5	3.35	1.85	M16	3.62	3.11
Extra Large	<b>CLR-0354-134-SCA</b>	9.29	4.13	2.2	M20	3.94	3.86

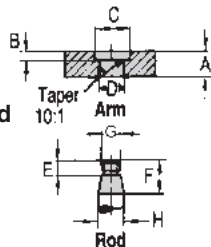


## Carrier Only For Double-Arm

Size	Part no.	A	B	C	D Dia	E	F Dia	G*	H Hex
Small	<b>CLR-0354-141-SCA</b>	1.69	0.63	0.3	.79	0.35	0.39	0.85	M5
Medium	<b>CLR-0354-142-SCA</b>	2.17	0.91	0.43	1.26	0.43	0.63	1.14	M8
Large	<b>CLR-0354-143-SCA</b>	2.48	1.1	0.59	1.57	0.47	0.71	1.38	M8
Extra Large	<b>CLR-0354-144-SCA</b>	3.03	1.34	0.67	1.97	0.59	0.79	1.61	M8

\*Stop for spring elements

Dimensions for  
Customer Manufactured  
Arms



## Customer Manufactured Arm

Clamp Size	A	B	C Dia.	D Dia (10:1 taper)	E	F	G	H Dia.
<b>Small</b>	0.63	0.16	0.94	.7815/.7835	0.39	0.83	M18x1.5	0.79
<b>Medium</b>	0.91	0.2	1.34	1.2539/1.2559	0.47	1.1	M28x1.5	1.26
<b>Large</b>	1.1	0.2	1.81	1.5689/1.5709	0.47	1.34	M35x1.5	1.57
<b>Extra Large</b>	1.34	0.24	2.2	1.9626/1.9646	0.51	1.57	M45x1.5	1.97

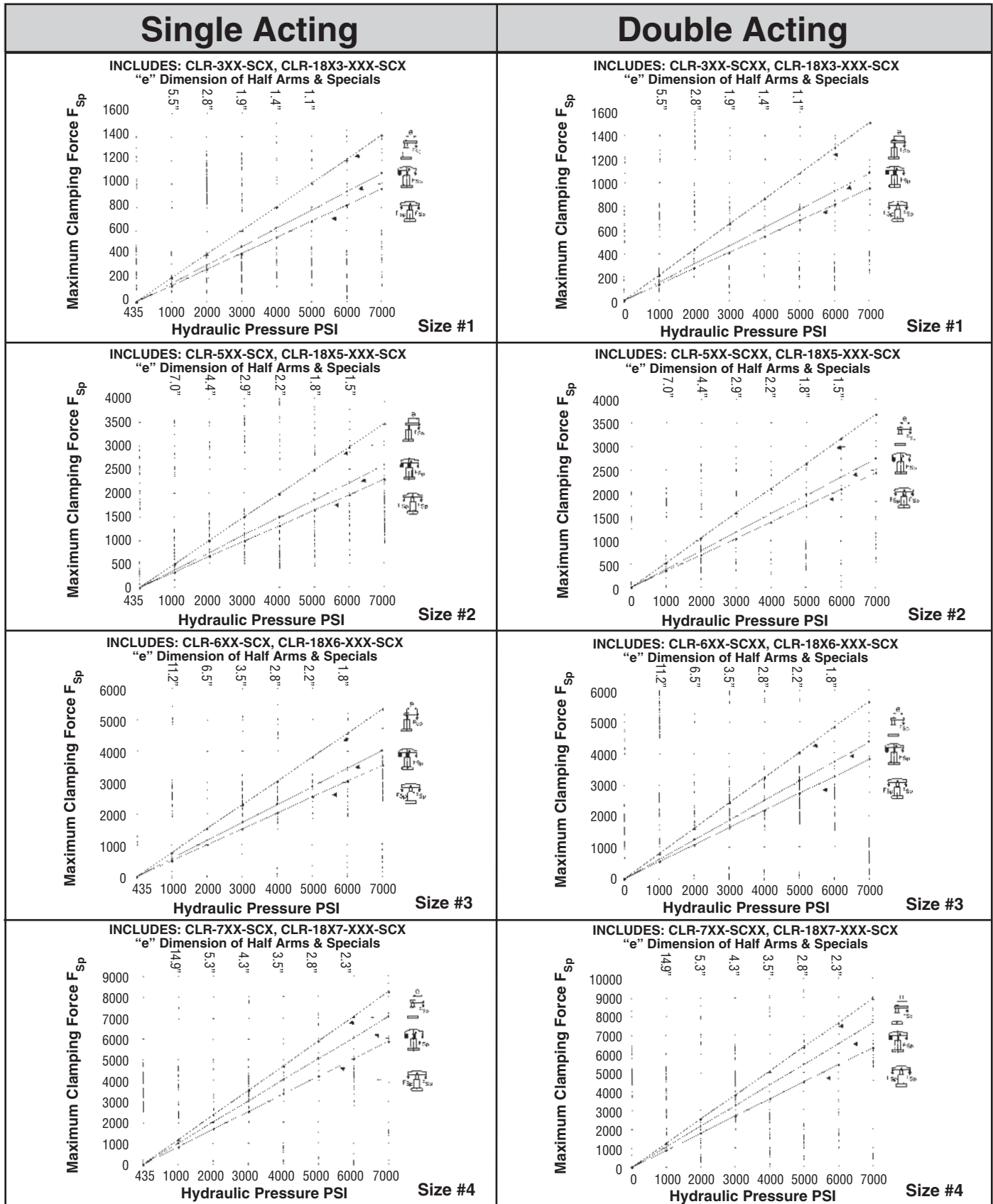


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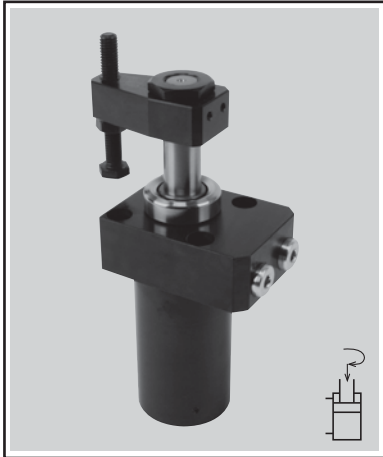
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# Swing Clamp Arm Options



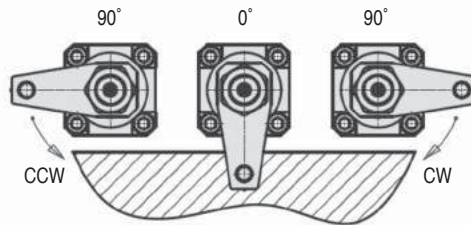
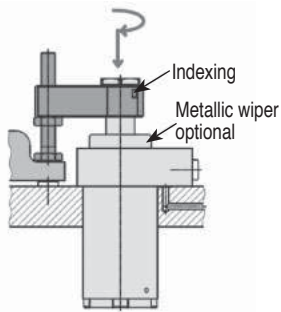
# Swing Clamps ■ Robust Swing Mechanism ■ B1.853

**Swing Clamps** ■ Top flange type with multiple position monitoring options  
**Double Acting** ■ Max. Operating Pressure ■ 5075 psi (350 bar)



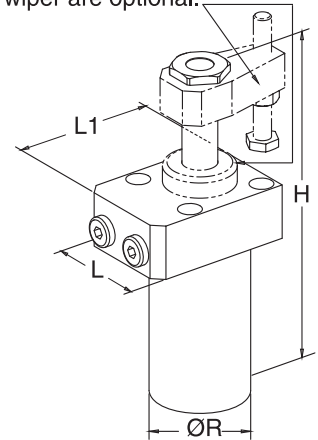
The hydraulic swing clamp is a pull type cylinder where a part of the total stroke is used to swing the piston, for when it is essential to keep the clamping area free for unrestricted workpiece loading/unloading. High clamping force at low pressures. The sturdy swing mechanism in combination with restricted

flow rate, allows larger custom arms. Special swing angle and indexing of clamp arm available. Special swing angle and indexing of clamp arm available. Multiple pneumatic and electric position monitoring available. Metallic wiper option. Four sizes allow the designer to choose the optimal clamp for their application.



Special swing angle easily available

Clamp arm assembly and metal wiper are optional.



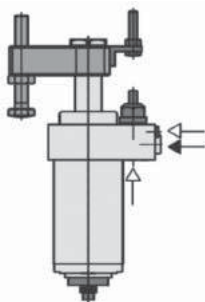
Pneumatic versions available to monitor clamp position and clamp/unclamp positions.

Clamping Force With Accessory Arm		Size 1	Size 2	Size 3	Size 4
Clamp Force (lbs)	5075 psi	1350	1890	3370	4945
	2000 psi	630	1010	1845	2700
	1000 psi	270	340	630	900

### General Dimension specifications (in inches)

L	1.97	2.44	2.95	3.46
L1	2.76	3.19	3.74	4.13
H	6.39	6.92	8.06	9.20
R Diameter	1.77	2.05	2.36	2.99
Clamping Stroke	0.47	0.47	0.59	0.59
Approx. Weight (Lbs)	3.75	5.07	8.60	13.23
Part No., Swing Direction 90 Degree CW	CLR-1843-X090-R23	CLR-1844-X090-R24	CLR-1845-X090-R30	CLR-1846-X090-R36
Part No., Swing Direction 90 Degree CCW	CLR-1843-X090-L23	CLR-1844-X090-L24	CLR-1845-X090-L30	CLR-1846-X090-L36
Part No., Swing Direction 90 Degree CCW	CLR-1843-X000-023	CLR-1844-X000-024	CLR-1845-X000-030	CLR-1846-X000-036

X= Needs Letter Designation For Position Monitoring Style Desired (See Roemheld Data Sheet B1.853)



Switch rod version available for electric and pneumatic position monitoring.

### Accessories

Part No., Clamp Arm With Contact Bolt	CLR-0354-152	CLR-0354-153	CLR-0354-154	CLR-0354-155
Part No., Complete Arm With Angle Bracket	CLR-0354-156	CLR-0354-157	CLR-0354-158	CLR-0354-159
Part No., Untapped Clamp Arm	CLR-3548-660	CLR-3548-661	CLR-3548-803	CLR-3548-804
Part No., Angle Bracket Complete	CLR-0184-003	CLR-0184-004	CLR-0184-005	CLR-0184-005
Part No., Metallic Wiper	CLR-0341-104	CLR-0341-107	CLR-0341-105	CLR-0341-100

Subject to change. For further details, including detailed dimensions and mounting instructions, visit [www.clrh.com](http://www.clrh.com).



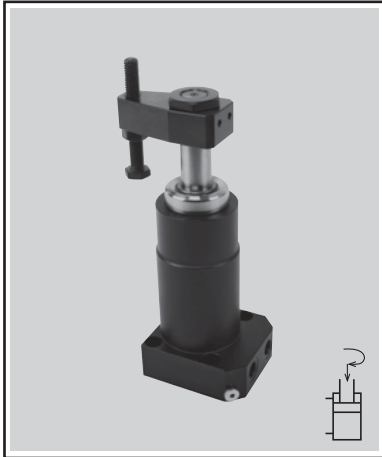
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# Swing Clamps ■ Robust Swing Mechanism ■ B1.854

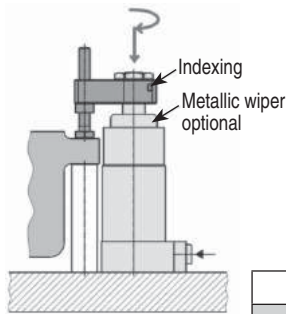
**Swing Clamps** ■ Flange base type with multiple position monitoring options  
**Double Acting** ■ Max. Operating Pressure ■ 5075 psi (350 bar)



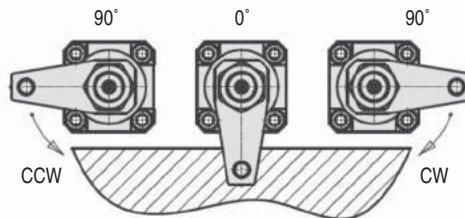
The hydraulic swing clamp is a pull type cylinder where a part of the total stroke is used to swing the piston, for when it is essential to keep the clamping area free for unrestricted workpiece loading/unloading. High clamping force at low pressures. The sturdy swing mechanism in combination with restricted flow

rate, allows larger custom arms. Special swing angle and indexing of clamp arm available. Multiple pneumatic and electric position monitoring available. Metallic wiper option. Four sizes allow the designer to choose the optimal clamp for their application.

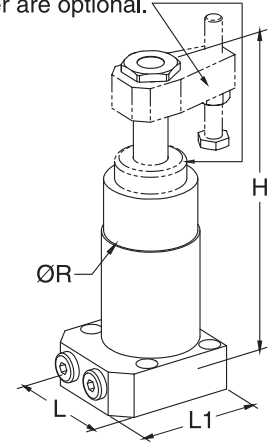
Clamp arm assembly and metal wiper are optional.



Pneumatic versions available to monitor clamp position and clamp/unclamp positions.



Special swing angle easily available



Clamping Force - Accessory Arm		Size 1	Size 2	Size 3	Size 4
Clamp Force (lbs)	5075 psi	1350	1890	3370	4945
	2000 psi	630	1010	1845	2700
	1000 psi	270	340	630	900

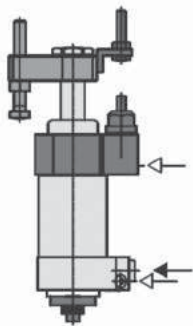
### General Dimension Specifications (in inches)

L	2.17	2.48	3.03	3.35
L1	2.36	2.60	2.95	3.54
H	6.39	6.92	8.06	9.20
R Diameter	1.77	2.05	2.36	2.99
Clamping Stroke	0.47	0.47	0.59	0.59
Approx. Weight (lbs.)	3.75	5.07	7.50	12.57
Part No., Swing Direction 90 Degree CW	CLR-1843-X090-R23	CLR-1844-X090-R24	CLR-1845-X090-R30	CLR-1846-X090-R36
Part No., Swing Direction 90 Degree CCW	CLR-1843-X090-L23	CLR-1844-X090-L24	CLR-1845-X090-L30	CLR-1846-X090-L36
Part No., Swing Direction 90 Degree CCW	CLR-1843-X000-023	CLR-1844-X000-024	CLR-1845-X000-030	CLR-1846-X000-036

X= Needs Letter Designation For Position Monitoring Style Desired (See Roemheld Data Sheet B1.854)

### Accessories

Part No., Clamp Arm With Contact Bolt	CLR-0354-152	CLR-0354-153	CLR-0354-154	CLR-0354-155
Part No., Complete Arm With Angle Bracket	CLR-0354-167	CLR-0354-168	CLR-0354-158	CLR-0354-169
Part No., Untapped Clamp Arm	CLR-3548-660	CLR-3548-661	CLR-3548-803	CLR-3548-804
Part No., Angle Bracket Complete	CLR-0184-006	CLR-0184-007	CLR-0184-005	CLR-0184-008
Part No., Metallic Wiper	CLR-0341-104	CLR-0341-107	CLR-0341-105	CLR-0341-100



Switch rod version available for electric and pneumatic position monitoring.

Subject to change. For further details, including detailed dimensions and mounting instructions, visit [www.clrh.com](http://www.clrh.com).



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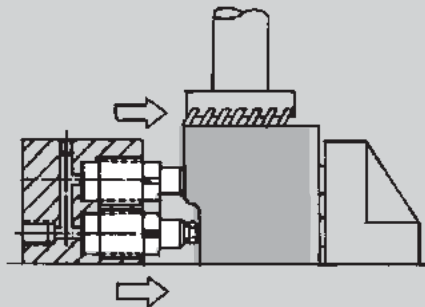
# Push Clamps/Cylinders



**Mini**  
page 608



**Single Acting**  
page 609



## Threaded-Body Push Clamps

Achieve high force in a compact size. Wide variety of types and sizes. Various models offer different mounting options, such as using accessory brackets, screwing directly into fixture, or manifold mounting.

**Accessories**, page 611



**Block Clamps**  
pages 612-613

## Block Clamps

Block Clamps are easy to mount horizontally or vertically on flat surfaces.

Available single and double acting, Block Clamps are excellent for punching and assembly operations, with high forces available. Wide range of sizes. Large sizes are often used for presswork applications (up to 180 tons).



**Threaded-Body  
Universal Cylinders**  
pages 614-615

## Threaded-Body Universal Cylinders

Achieve space-saving mounting in fixture walls with this universal cylinder, in a wide range of sizes. Alternatively single acting with spring return or double acting.



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# Threaded-Body Push Clamps - Mini

7250/2300 psi max  
Single acting



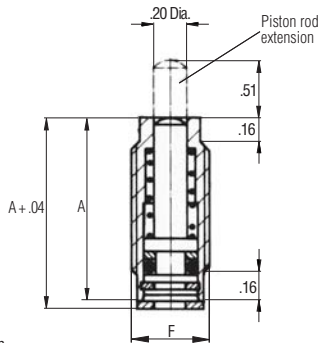
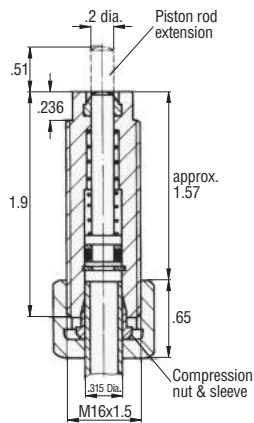
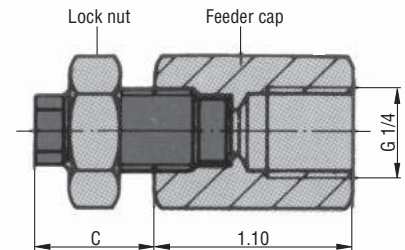
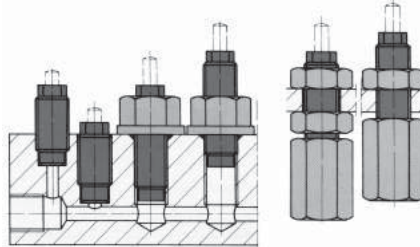
- Can be mounted very close together
  - High force in a small size
  - Mount using accessory brackets or screw directly into fixture
  - Positive stroke stop and long plunger guide for superior reliability
  - Choice of five sizes
- \*\*Do not use NPT fittings

DESCRIPTION: These threaded body cylinders are particularly suitable for clamping of smaller workpieces in multiple clamping fixtures. Sealing is made by connecting directly to compression nut or by the included sealing washer. Multiple mounting options allow versatility when designing your fixture. Offered as flush mount piston or extended piston. High-speed cylinders are offered at a lower max. pressure.

IMPORTANT NOTES: These cylinders may not be subjected to load in the retracted position. The tube connection model has no stop for the tube, so it cannot be used for pre-mount of the compression sleeve. Please protect cylinders from chips and coolant.

**Tube Mount  
(Metric Only)**

**Manifold Mount**



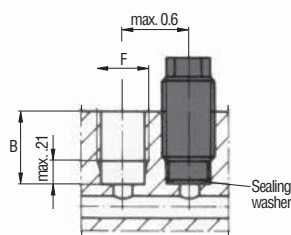
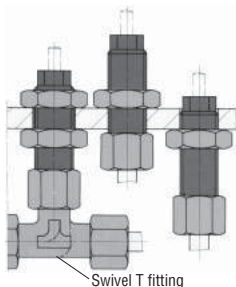
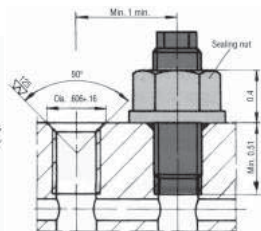
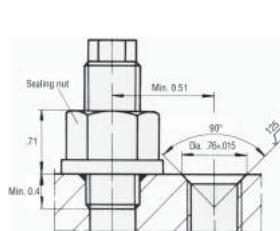
<b>Clamping Force (lbs)</b>	7250 psi	560	
	6000 psi	470	
	5000 psi	390	
	4000 psi	310	
	3000 psi	230	
<b>Mounting Type</b>	<b>Tube Mount</b>	<b>Manifold Mount</b>	
Stroke	0.39	0.197	0.39
Piston dia in.	0.315	0.315	0.315
Min psi	75	75	75
Spring return force (lbs)	3.4	3.4	3.4
A	—	1.06	1.57
B min/max	—	.43 / .95	.43 / 1.46
C	—	0.67	1.18
Seating torque (lbs)	8	8	8
Weight (lbs)	0.12	0.04	0.05

## Inch

<b>F Thread</b>	—	1/2 - 20	1/2 - 20
<b>Part No.</b>	—	CLR-801-TB	CLR-802-TB
<b>Part No., Lock Nut</b>	—	CLR-408-TBA	
<b>Part No., Sealing Washer</b>	—	CLR-3000-183-SW	
<b>Part No., Sealing Nut</b>	—	CLR-508-TBA	
<b>Part No., Feeder Cap</b>	—	CLR-308-TBA	
<b>Part No., Mounting Block</b>	—	CLR-108-TBA	

## Metric

<b>F Thread</b>	—	M12 X 1.5	M12 X 1.5
<b>Part No.</b>	CLR-1459-001-TB	CLR-1458-001-TB	CLR-1458-002-TB
<b>Part No. with ext rod</b>	CLR-1459-011-TB	CLR-1458-011-TB	CLR-1458-012-TB
<b>Part No., High Speed 2300 psi max</b>	CLR-1459-101-TB	CLR-1458-101-TB	CLR-1458-102-TB
<b>Part No., High Speed w/ ext rod 2300 psi max</b>	CLR-1459-111-TB	CLR-1458-111-TB	CLR-1458-112-TB
<b>Part No., Lock Nut</b>	CLR-3300-409-TBA	CLR-3300-408-TBA	
<b>Part No., Sealing Washer</b>	—	CLR-3000-036-SW	
<b>Part No., Sealing Nut</b>	CLR-3300-407-TBA	CLR-3300-406-TBA	
<b>Part No., Swivel T Fitting</b>	CLR-9208-035-F	—	
<b>Part No., Swivel Elbow</b>	CLR-9208-036-F	—	
<b>Part No., Compression Nut</b>	CLR-9208-100-F	—	
<b>Part No., Compression Sleeve</b>	CLR-9208-101-F	—	
<b>Part No., Feeder Cap</b>	—	CLR-3467-064-TBA	



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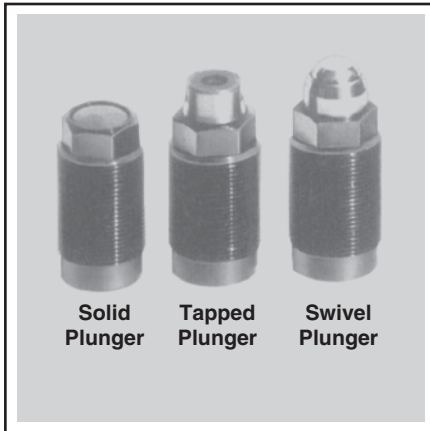
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# Threaded-Body Push Clamps - Standard Wiper

7250 psi max  
Single acting



- Can be mounted very close together
- High force in a small size
- Mount using accessory brackets or screw directly into fixture
- Positive stroke stop and long plunger guide for superior reliability
- Choice of five sizes
- \*\*Do not use NPT fittings

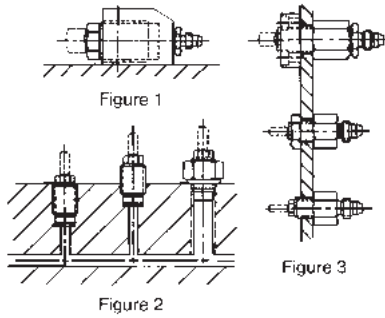
**MOUNTING ON FIXTURE BASE:** (Figure 1) Fasten mounting block to fixture. Screw clamp into block. (See table below for recommended seating torque. Sealing washer provided). Block has male 37° fluid connection.

**MANIFOLD MOUNTING:** (Figure 2) Screw clamp into tapped hole prepared as shown below. Supply fluid through passages drilled in fixture. Smallest size may be mounted with optional sealing nut. (Part no. CLR-508-TBA, 7/8 Hex. x. 46 thick).

**MOUNTING THROUGH FIXTURE WALL:** (Figure 3) (Through a tapped or bored hole). Secure clamp using optional locknut or mounting flange (two required for bored holes). Feeder cap required for fluid connection.

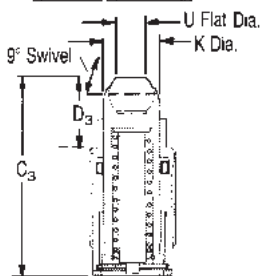
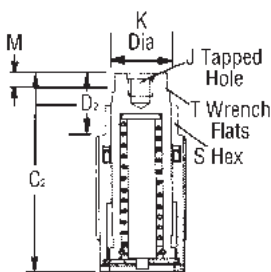
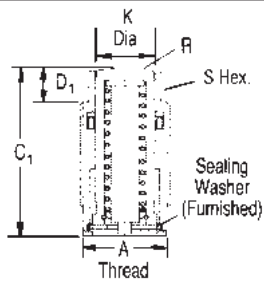
**CONSTRUCTION:** Steel plunger, case-hardened and ground. Positive stroke stop prevents over-extending the plunger. Long plunger guide provides support against side loads. Do not load plunger in its retracted position. Carbon steel body, black oxide finish.

**PLUNGERS:** Choose solid, tapped, or swivel plunger. Tapped plunger accepts contact bolts. Swivel plunger distributes force to prevent marring. Plunger extensions available by special order.

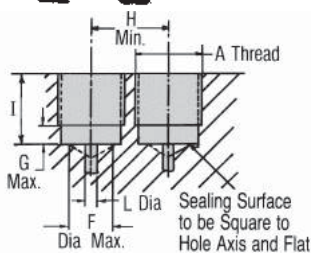


## Mounting Options

See Threaded-Body Push Clamp accessories section



See F&A section for contact bolts



Manifold Hole Preparations

Clamping force (lbs)	7250 psi	1280	2270	3530	5530	8990
	6000 psi	1100	1900	2900	4500	7400
	5000 psi	900	1600	2400	3800	6200
	4000 psi	700	1200	1900	3000	5000
	3000 psi	500	900	1400	2300	3700
Max. clamping force (lbs)	1310	2340	3650	5700	9350	
Stroke	.38	.47	.59	.63	.78	
Fluid req'd (cu. in.)	.069	.147	.228	.479	.981	
Piston area (sq. in.)	.175	.312	.487	.760	1.247	
Force per 1000 psi (lbs)	175	312	487	760	1247	
Max. oper. pressure (psi)	7500	7500	7500	7500	7500	
A	7/8-14	1-1/8-12	1-1/4-16	1-1/2-16	1-7/8-16	
C <sub>1</sub>	1.50	1.81	2.19	2.34	3.44	
C <sub>2</sub>	1.78	2.06	2.59	2.69	3.88	
C <sub>3</sub>	1.80	2.09	2.73	2.86	—	
D <sub>1</sub>	.28	.38	.44	.53	.66	
D <sub>2</sub>	.56	.66	.81	.88	1.09	
D <sub>3</sub>	.56	.69	.97	1.05	—	
F dia	.47	.63	.78	1.00	1.25	
G	.31	.34	.34	.44	.50	
H	1.00	1.19	1.38	1.69	2.16	
I min.	.63	.78	.97	1.13	1.66	
I max.	1.53	1.41	1.75	1.81	2.75	
J	1/4-20x1/4	1/4-20x1/4	5/16-18x5/16	5/16-18x5/16	1/2-13x1/2	
K dia	.47	.63	.78	1.00	1.25	
L dia	.19	.19	.19	.19	.19	
M	.22	.22	.25	.28	.34	
R	.75	1.00	1.25	1.56	2.00	
S	.69	.94	1.69	1.25	1.69	
T	.38	.50	.63	.75	.94	
U	.28	.28	.41	.41	—	
Seating torque (ft-lbs)	29	36	43	58	163	
Weight (lbs)	.18	.33	.48	.48	2.13	
Part No., solid plunger	CLR-000-TB	CLR-100-TB	CLR-200-TB	CLR-300-TB	CLR-400-TB	
Part No., tapped plunger	CLR-001-TB	CLR-101-TB	CLR-201-TB	CLR-301-TB	CLR-401-TB	
Part No., swivel plunger	CLR-010-TB	CLR-110-TB	CLR-210-TB	CLR-310-TB	—	
Spare seating washer	CLR-3000-840-SW	CLR-3000-179-SW	CLR-3000-180-SW	CLR-3000-843-SW	CLR-3000-181-SW	



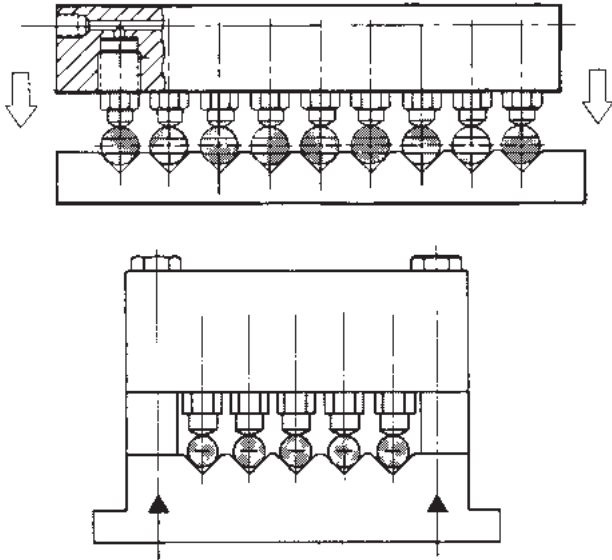
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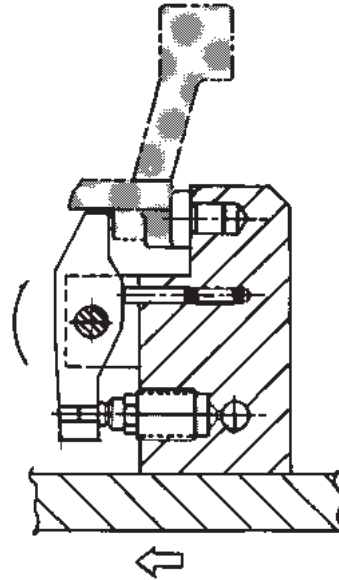
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# Threaded-Body Push Clamps

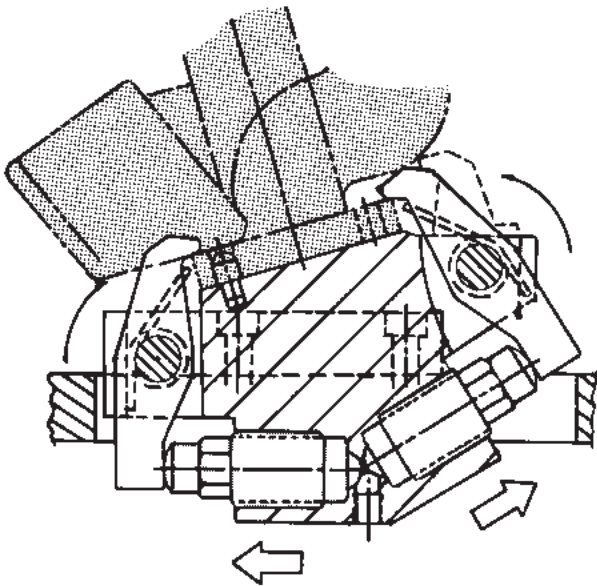
## Application Examples



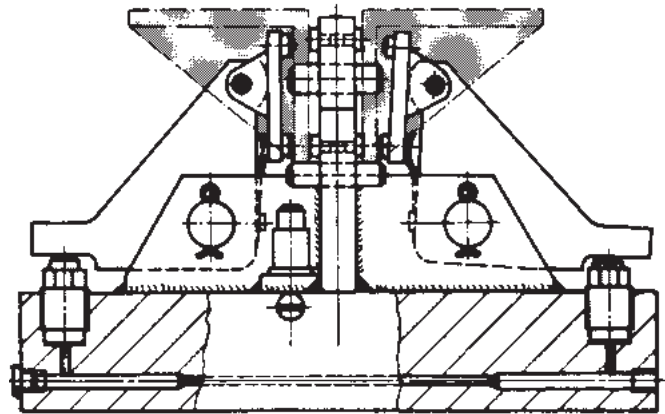
V-block fixtures allow very close workpiece spacing. Bottom example shows bridging bolt parallel to, and in the same plane as, the push clamps. This eliminates bending moments in the fixture.



Custom clamping unit made using a pivoting lever with a return spring. By altering the lever ratio, you can make workpiece contact greater or less than clamp force.



Twin clamping levers hold an exhaust manifold under extreme space limitations. Clamps are almost totally clear of workpiece area.



Pivoting levers clamp two angle brackets against a central locator. Each lever also has a pivoting contact pad to distribute clamping force evenly.

1  
3

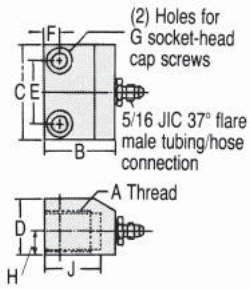
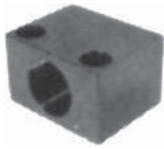


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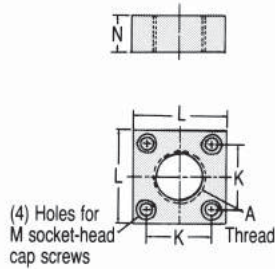
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# Threaded-Body Push Clamp Accessories



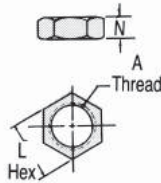
## Mounting Blocks — Inch

A	1/2-20	7/8-14	1-1/8-12	1-1/4-16	1-1/2-16	1-7/8-16
B	1.63	1.75	2.00	2.25	2.38	3.25
C	1.50	2.25	2.75	3.00	3.50	4.00
D	1.00	1.25	1.50	1.75	2.00	2.50
E	1.00	1.50	1.88	2.00	2.38	2.75
F	.31	.38	.44	.50	.56	.63
G Dia.	1/4-20	5/16-18	3/8-16	1/2-13	1/2-13	5/8-11
H	.50	.56	.75	.75	1.00	1.25
J	.94	1.53	1.41	1.75	1.81	2.75
Part No.	CLR-108-TBA	CLR-100-TBA	CLR-101-TBA	CLR-102-TBA	CLR-103-TBA	CLR-104-TBA



## Mounting Flanges — Inch

A	1-1/4 - 16	1-1/2 - 16	1-7/8 - 16
K	1.56	1.75	2.13
L	2.25	2.5	3.00
M	5/16 - 18	5/16 - 18	3/8 - 16
N	.88	1.00	1.25
Part No.	CLR-202-TBA	CLR-203-TBA	CLR-204-TBA

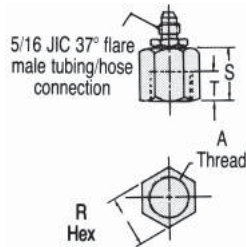


## Jam Nuts — Inch

A	1/2 - 20	7/8 - 14	1-1/8 - 12
L	.75	1.94	1.69
N	.31	.50	.63
Part No.	CLR-408-TBA	CLR-400-TBA	CLR-401-TBA

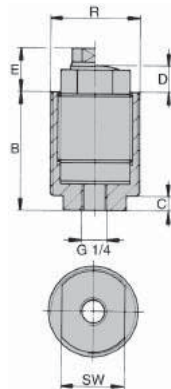
## Jam Nuts — Metric

A	M 28 X 1.5	M 32 X 1.5	M 38 X 1.5	M 45 X 1.5	M 60 X 1.5
L	50	62	58	68	90
N	10	11	11	12	13
Part No.	CLR-3301-423-TBA	CLR-3301-019-TBA	CLR-3300-088-TBA	CLR-3300-326-TBA	CLR-3300-411-TBA



## Feeder Caps — Inch

A	1/2-20	7/8-14	1-1/8-12	1-1/4-16	1-1/2-16	1-7/8-16
R	.75	1.13	1.38	1.50	1.75	2.13
S	.63	1.13	1.25	1.44	1.63	2.25
T	.44	.63	.78	.97	1.13	1.66
Part No.	CLR-308-TBA	CLR-300-TBA	CLR-301-TBA	CLR-302-TBA	CLR-303-TBA	CLR-304-TBA



## Feeder Caps — Metric

Fits	CLR-1460-0XX-TB	CLR-1461-0XX-TB	CLR-1462-0XX-TB	CLR-1463-0XX-TB	CLR-1464-0XX-TB
A	M 22 X 1.5	M 26 X 1.5	M 30 X 1.5	M 38 X 1.5	M 48 X 1.5
B	44	49	58	59	85
C	7	7	7	7	8
D	7	10	11	13.5	17
E	14	16.5	20.5	22.5	28
R	M 28 X 1.5	M 32 X 1.5	M 38 X 1.5	M 45 X 1.5	M 60 X 1.5
SW	22	24	27	32	41
Part No.	CLR-3467-084-TBA	CLR-3467-085-TBA	CLR-3467-086-TBA	CLR-3467-087-TBA	CLR-3467-093-TBA



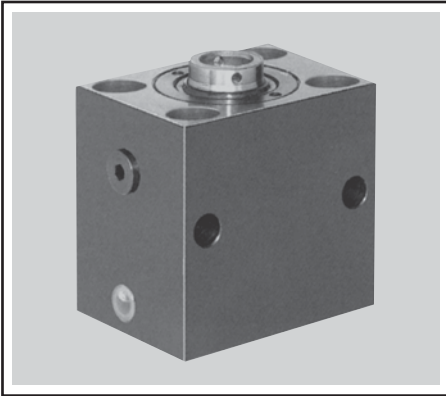
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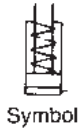
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# Block Clamps

**7250 psi max**  
Single and double acting



- Easy to mount on flat surfaces
- Excellent for punching and assembly operations (very high forces available)
- Mount either horizontally or vertically
- Available with short or long stroke
- Choice of eight sizes
- Do not use NPT fittings



**CLAMPING ACTION:** Fluid pressure advances plunger. Spring return. Optional fluid-return version (double-acting).

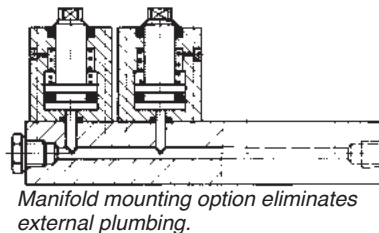
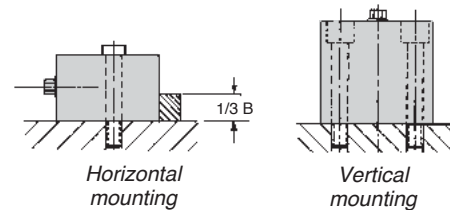
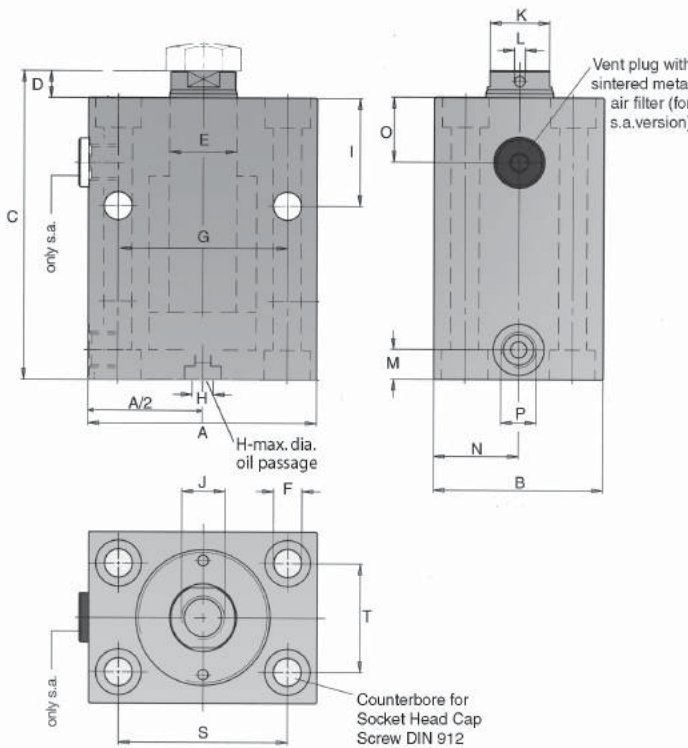
**STROKE LENGTH:** Short-stroke version is more compact. Choose it whenever possible. Longer strokes than listed below are available in all sizes...please contact factory.

**MOUNTING:** Either fasten with long cap screws through the block and threaded into fixture, or tap holes in block to accept screws. See below for locations to drill additional holes if desired. If clamping thrust is not backed up by the fixture, a support should be provided to prevent slight screw shifting in the mounting holes...see example below. Support may be a rectangular strip or dowel pins (height should be at least 1/3 of B dimension). Male 37° fluid connection (two with double-acting clamps).

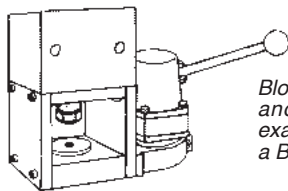
**CONSTRUCTION:** Steel plunger, case hardened and ground. Body made from carbon steel, or nodular iron in larger sizes. Spring-return versions have a sintered-metal vent filter to keep out dirt. If flood coolant could enter through the vent, replace vent filter with a CLR-815-AF air-vent fitting.

**ACCESSORIES:** Contact bolts for plunger recommended...see F&A section.

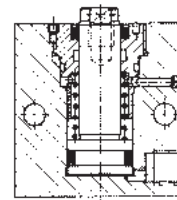
**OPTIONAL VITON SEALS:** For high-temperature applications (up to 300°F maximum) we offer viton seals as an option in all sizes. Please contact factory for more information.



For radius pointed, or swivel contact bolts, see F&A section.



Block Clamps are ideal for punching and assembly operations. In this example, a small press is made using a Block Clamp and Hand Pump.



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# Block Clamps

**7250 psi max**  
Single and double acting

Clamping force (lbs)	7250 psi	<b>2250</b>	<b>5505</b>	<b>9035</b>	<b>14120</b>	<b>22145</b>	<b>35070</b>	<b>56650</b>	<b>88125</b>
	6000 psi	1900	4600	7500	11700	18300	29000	46900	72900
	5000 psi	1600	3800	6200	9700	15300	24200	39100	60800
	4000 psi	1200	3000	5000	7800	12200	19300	31300	48600
	3000 psi	900	2300	3700	5800	9200	14500	23400	36500
Piston Area (sq. in.)	.312	.760	1.247	1.950	3.050	4.833	7.791	12.150	
Max. Oper. Pressure (psi)	7500	7500	7500	7500	7500	7500	7500	7500	
A	2.38	2.56	2.97	3.34	3.94	4.94	6.31	7.88	
B	1.38	1.75	2.19	2.50	2.94	3.75	4.75	5.94	
C short stroke	2.44	2.81	3.34	3.50	3.94	4.56	5.19	5.69	
C long stroke	3.81	4.00	4.34	4.50	4.94	5.88	7.06	8.06	
D	.22	.28	.38	.38	.38	.56	.56	.59	
E dia.	.39	.63	.79	.98	1.26	1.57	1.97	2.48	
F dia. screw	1/4	5/16	3/8	3/8	7/16	5/8	3/4	7/8	
G	1.181	1.969	2.165	2.480	2.992	3.740	4.724	6.220	
H dia.	.19	.19	.19	.19	.19	.31	.31	.31	
I	1.19	1.31	1.50	1.56	1.75	1.97	2.38	2.50	
J	1/4-20 x15/32	3/8-16 x19/32	1/2-13 x19/32	5/8-11 x31/32	3/4-10 x1-3/16	1-8 x1-9/16	M30x40	M42x60	
K	.31	.50	.63	—	—	—	—	—	
L dia.	—	—	—	.16	.16	.16	.19	.22	
M	.44	.44	.44	.44	.50	.66	.81	1.00	
N	.69	.88	1.09	1.25	1.47	1.88	2.38	2.94	
O	.66	.72	.88	.94	1.06	1.03	1.31	1.38	
P-Port size	G1/4	G1/4	G1/4	G1/4	G1/4	G1/2	G1/2	G1/2	
S	1.575	1.969	2.165	2.480	2.992	3.740	4.724	6.220	
T	.866	1.181	1.378	1.575	1.772	2.559	3.150	4.252	
Weight, short stroke (lbs.)	1.8	2.6	4.0	5.7	8.4	14.7	28.2	52.8	
Weight, long stroke (lbs.)	1.9	4.2	5.9	7.9	11.6	21.5	43.6	81.4	

## Single Acting — Inch

Stroke, short	.31	.31	.38	.38	.47	.47	.47	.47
Stroke, long	.78	.78	.78	.78	.78	1.0	1.25	1.25
Fluid reqd., short (cu. in.)	.10	.24	.48	.73	1.37	2.26	3.68	5.75
Fluid reqd., long (cu. in.)	.23	.57	.94	1.46	2.29	4.83	9.81	15.34
Spring return force (lbs)	11	31	44	61	92	97	170	270
Part No. short stroke w/ fittings	CLR-100-BC	CLR-300-BC	CLR-400-BC	CLR-500-BC	CLR-600-BC	CLR-700-BC	—	—
Part No. long stroke w/ fittings	CLR-120-BC	CLR-320-BC	CLR-420-BC	CLR-520-BC	CLR-620-BC	CLR-730-BC	—	—
Part No. short stroke, Manifold Mount	CLR-1511-705B-BC	CLR-1513-705B-BC	CLR-1514-705B-BC	CLR-1515-705B-BC	CLR-1516-705B-BC	CLR-1517-705B-BC	—	—

## Single Acting — Metric

J X Depth of thread	M6 X 12	M10 X 15	M12 X 15	M16 X 25	M20 X 30	M27 X 40	M30 X 40	M42 X 60
Part No. Short Stroke w/ fittings	CLR-1511-005-BC	CLR-1513-005-BC	CLR-1514-105-BC	CLR-1515-005-BC	CLR-1516-005-BC	CLR-1517-005-BC	CLR-1518-005-BC	CLR-1519-005-BC
Part No. Long Stroke w/ fittings	CLR-1511-025-BC	CLR-1513-025-BC	CLR-1514-125-BC	CLR-1515-025-BC	CLR-1516-025-BC	CLR-1517-035-BC	CLR-1518-045-BC	CLR-1519-045-BC
Part No. short stroke, Manifold Mount	CLR-1511-005B-BC	CLR-1513-005B-BC	CLR-1514-105B-BC	CLR-1515-005B-BC	CLR-1516-005B-BC	CLR-1517-005B-BC	CLR-1518-005B-BCD	CLR-1519-705B-BCD

## Double Acting — Inch

Stroke, short	0.63	.78	1.00	1.00	1.00	1.19	1.25	1.56
Stroke, long	2.0	2.00	2.00	2.00	2.00	2.50	3.13	3.94
Fluid reqd., short (cu. in.)	.20	.57	1.25	1.95	3.05	5.74	9.81	19.17
Fluid reqd., long (cu. in.)	.62	1.52	2.50	3.90	6.10	12.08	24.54	47.93
Return piston area	.190	.448	.759	1.187	1.796	2.882	4.748	7.342
Part No. short stroke w/ fittings	CLR-100-BCD	CLR-300-BCD	CLR-400-BCD	CLR-500-BCD	CLR-600-BCD	CLR-700-BCD	—	—
Part No. long stroke w/ fittings	CLR-160-BCD	CLR-360-BCD	CLR-460-BCD	CLR-560-BCD	CLR-660-BCD	CLR-770-BCD	—	—

## Double Acting — Metric

J x Depth of Thread	M6 x 12	M10 x 15	M12 x 15	M16 x 25	M20 x 30	M27 x 40	M30 x 40	M42 x 60
Part No. Short Stroke w/ fittings	CLR-1541-105-BCD	CLR-1543-105-BCD	CLR-1544-105-BCD	CLR-1545-105-BCD	CLR-1546-105-BCD	CLR-1547-105-BCD	CLR-1548-105-BCD	CLR-1549-105-BCD
Part No. Long Stroke w/ fittings	CLR-1541-165-BCD	CLR-1543-165-BCD	CLR-1544-165-BCD	CLR-1545-165-BCD	CLR-1546-165-BCD	CLR-1547-175-BCD	CLR-1548-185-BCD	CLR-1549-195-BCD

Larger sizes and strokes available (metric only).



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# Threaded-Body Universal Cylinder

**7250 psi max**  
Single and double acting



- 6 piston diameters from 16 up to 63mm
- 3 different strokes per size
- Sealing with very little leakage
- Alternatively single acting with spring return or double acting
- Ports 1/4 BSPP at the cylinder bottom
- Axial regulation due to external thread
- Lock nuts as per DIN 1804 can be used
- Space-saving mounting in fixture walls
- Piston rod with internal thread for fixing of different contact bolts

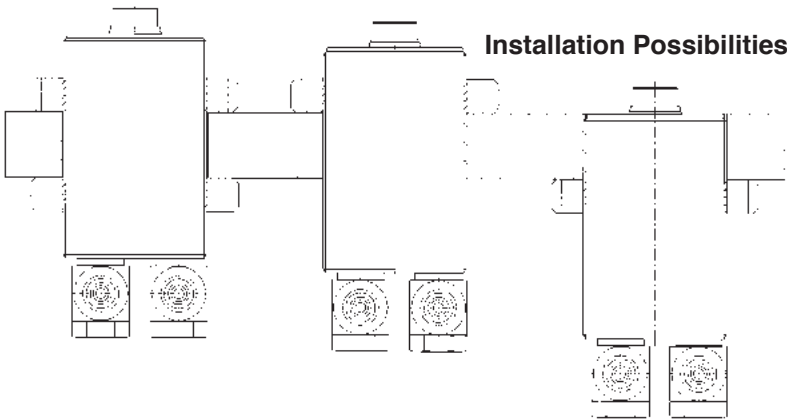
**DESCRIPTION:** The threaded-body universal cylinders are delivered with the same piston diameters and strokes as the well-proven block cylinders. Hydraulic connection is exclusively effected at the cylinder bottom by hydraulic tubes or hoses.

Sealing of the case-hardened piston rod is made by a tandem sealing with minimum leakage and a wiper.

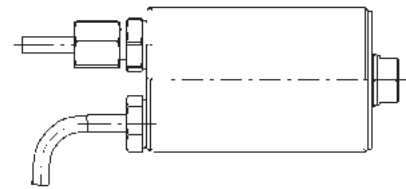
**APPLICATION:** The threaded-body universal cylinders can be used as clamping cylinders for workpiece clamping as well as for general motion tasks.

For temperatures exceeding 100°C a version with VITON® seals is available. Fixing is made in cross holes with 2 lock nuts or in threaded holes with 1 lock nut. The lock nuts allow exact positioning of the cylinder in axial direction.

**BLEEDING OF THE SPRING AREA FOR SINGLE-ACTING VERSIONS:** If there is a possibility that aggressive cutting lubricants and coolants penetrate through the sintered metal air filter into the cylinder's interior, a vent hose has to be connected and be placed in a protected position, see accessories.

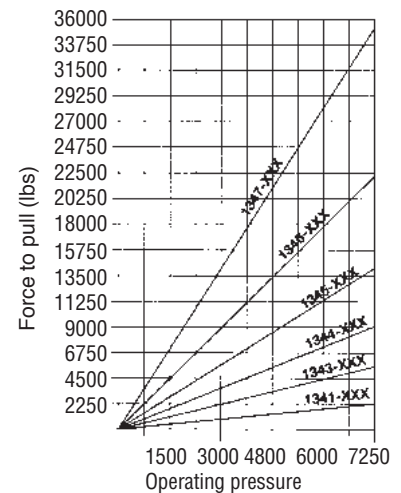
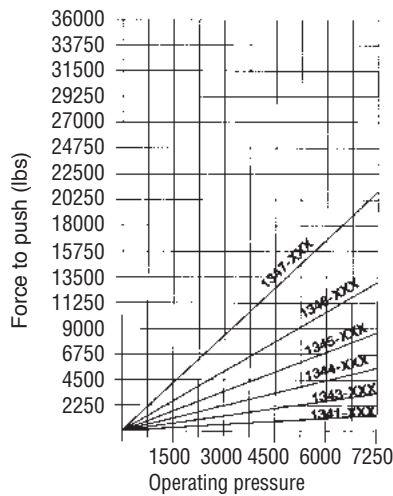
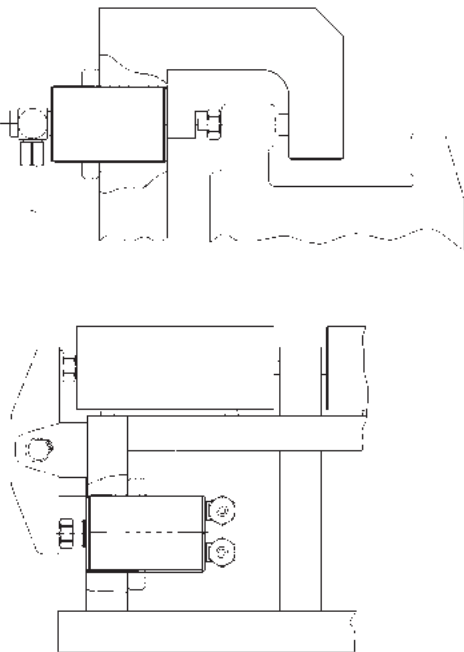


**Installation Possibilities**



For this purpose the sintered metal air filter has to be exchanged by an insertion nipple fitting, or a corresponding male connector, see accessories.

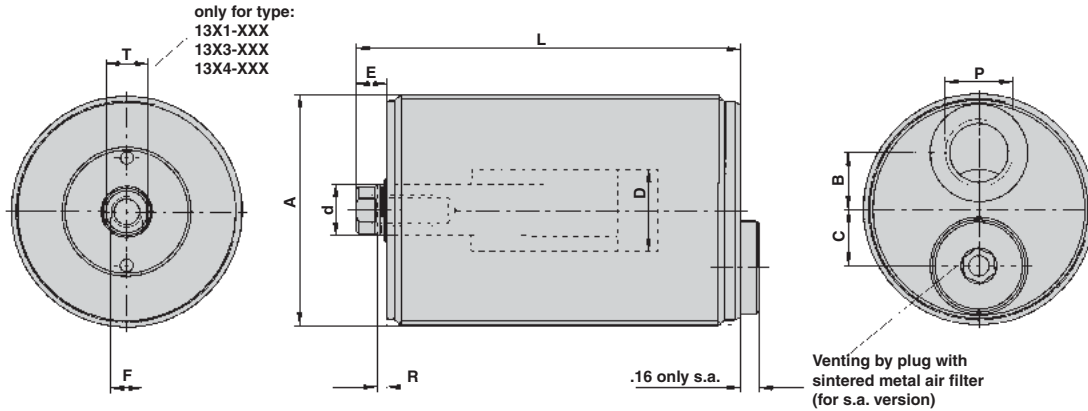
## Application examples





# Threaded-Body Universal Cylinder

7250 psi max  
Single and double acting



Clamping force (lbs)	7250 psi	2250	5510	9035	14120	22145	35070
	6000 psi	1900	4600	7500	11700	18400	29100
	5000 psi	1600	3800	6300	9800	15300	24200
	4000 psi	1300	3100	5000	7800	12300	19400
	3000 psi	1000	2300	3800	5900	9200	14600
Piston Dia. D	.630	.984	1.260	1.575	1.969	2.480	
Rod Dia. d	.394	.630	.787	.984	1.260	1.575	
Spring return force, min. (lbs)	11	32	44	61	92	97	
Oil Volume in Cubic Inches for each .39 inch of stroke	Stroke to Extend	.12	.3	.5	.8	1.21	2
	Stroke to Retract	.07	.18	.30	.5	.71	1.1
A	M45X1.5	M48x1.5	M55x1.5	M65x1.5	M75x1.5	M90x2	
B	.43	.53	.51	.65	.83	1.10	
C	.43	.53	.67	.85	1.06	1.32	
F	M6X12	M10x15	M12x15	M16x25	M20x30	M27x40	
E	.24 (.28)*	.28	.39	.39	.39	.55	
P	1/4 BSPP	1/4 BSPP	1/4 BSPP	1/4 BSPP	1/4 BSPP	1/4 BSPP	
R	—	—	—	.16	.16	.16	
T	8mm	13mm	17mm	—	—	—	

## Single Acting, with Spring Return

Stroke, short	.31	.31	.39	.39	.47	.47
Total length l	2.95	3.31	3.78	3.90	4.29	4.80
Weight (lbs)	1.5	2	3	4.3	6.3	10
Part No.	CLR-1311-005-TB	CLR-1313-005-TB	CLR-1314-105-TB	CLR-1315-005-TB	CLR-1316-005-TB	CLR-1317-005-TB

Stroke, long	.79	.79	.79	.79	.79	.98
Total length l	4.33	4.49	4.76	4.88	5.28	6.10
Weight (lbs)	2.5	2.8	4	5.6	8	13
Part No.	CLR-1311-025-TB	CLR-1313-025-TB	CLR-1314-125-TB	CLR-1315-025-TB	CLR-1316-025-TB	CLR-1317-035-TB

## Double Acting

Stroke, short	.63	.79	.98	.98	.98	1.18
Total length l	2.95	3.31	3.78	3.90	4.29	4.80
Weight (lbs)	1.5	2	3	4	6	9.4
Part No.	CLR-1341-105-TBD	CLR-1343-105-TBD	CLR-1344-105-TBD	CLR-1345-105-TBD	CLR-1346-105-TBD	CLR-1347-105-TBD

Stroke, medium	1.97	1.97	1.97	1.97	1.97	2.48
Total length l	4.33	4.49	4.76	4.88	5.28	6.10
Weight (lbs)	2.4	2.7	3.6	5.2	7.5	12
Part No.	CLR-1341-165-TBD	CLR-1343-165-TBD	CLR-1344-165-TBD	CLR-1345-165-TBD	CLR-1346-165-TBD	CLR-1347-175-TBD

Stroke, long	3.94	3.94	3.94	3.94	3.94	3.94
Total length l	6.42	6.46	6.73	6.85	7.24	7.56
Weight (lbs)	3.7	4	5.2	7.4	10.3	14.8
Part No.	CLR-1341-195-TBD	CLR-1343-195-TBD	CLR-1344-195-TBD	CLR-1345-195-TBD	CLR-1346-195-TBD	CLR-1347-195-TBD

## Accessories

Part No. lock nut	CLR-3300-326-TBA	CLR-24-HCA	CLR-3300-992-TBA	CLR-3301-661-TBA	CLR-73-HCA	CLR-3300-412-TBA
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\* Only for CLR-1311-025-TB and CLR-1341-165-TBD, -195-TBD



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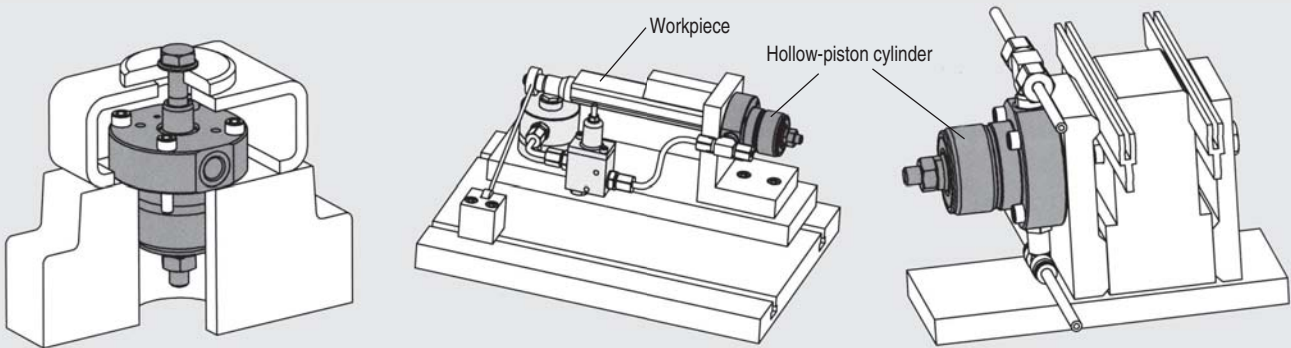
# Pull Clamps

## Hollow-Plunger Clamps



Insert stud through center hole. Quickly converts clamps straps from manual to power operation. Ideal for pulling or pushing a draw bar, and many other applications.

Page 617-618



Use in combination with push-pull bolt and "C"-washer to clamp workpieces with center holes.

In a machine table, the workpiece can be supported by a work support after clamping with a hollow-piston cylinder in combination with a sequence valve.

Use for a milling fixture, in conjunction with hollow piston cylinders.



# Hollow-Plunger Clamps

**7250 psi max**  
Single and double acting



- Quickly converts clamp straps from manual to power operation
- Accepts stud through hollow plunger
- May be used either to pull or to push
- Useful for transmitting force to a remote location via a rod
- Choice of six sizes
- \*\*Do not use NPT fittings

**DESCRIPTION:** The piston of this cylinder is provided with a through hole or internal thread. In connection with a standard tie rod and C-washer combination, a variety of applications are possible.

The thread in the piston can be drilled out, if required. If the hollow-piston cylinder is mounted onto movable parts, e.g. clamps, the oil has to be supplied through a high-pressure hose.

**CLAMPING ACTION:** Fluid pressure pushes up plunger, pulling up a clamping stud inserted through center hole. Spring or fluid return.

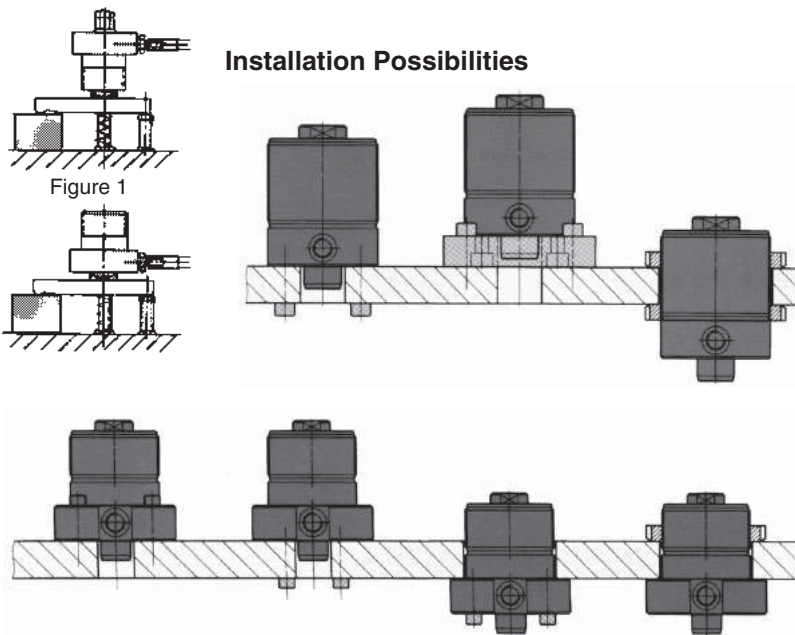
**CENTER HOLE:** Choose either threaded or unthreaded center hole. Threaded version is ideal for pulling/pushing a drawbar or replacing a nut on a clamp strap. Unthreaded version is useful when clamp is removed for workpiece loading.

**IMPORTANT NOTES:** For operating pressures exceeding 5000 psi, use a grade 8 stud or equivalent.

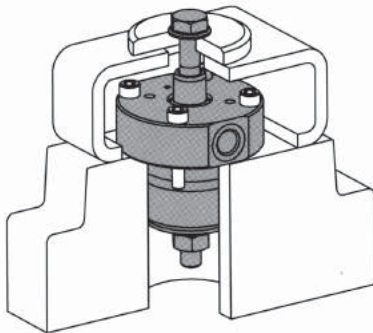
It is important to torque the lock nut used sufficiently to prevent damaging the piston threads.

Penetration of aggressive cutting lubricants and coolants through the sintered metal air filter into the cylinder's interior should be avoided by appropriate arrangement or covering.

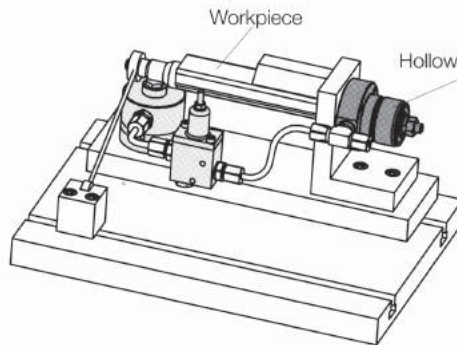
## Installation Possibilities



## Application Examples

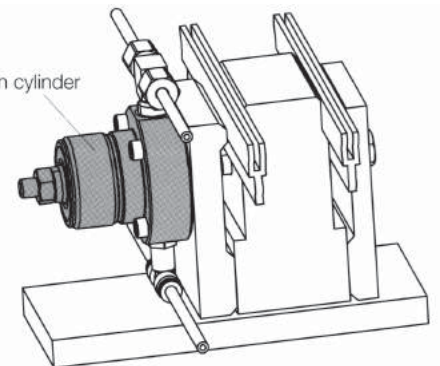


Hollow-piston cylinders in combination with push-pull bolt and "C"-washer can be used efficiently in many cases to clamp workpieces with center holes.



In the shown machine table, the workpiece is supported by means of a work support after clamping with a hollow-piston cylinder in combination with a sequence valve.

The savings in workpiece exchange time, compared to a mechanical clamping system amounts to 58%.



This clamping fixture is for milling operation on a light extruded rail. Workholding by means of hollow-piston cylinders in individual clamping stations mounted on a base plate. Positioning and support of the rail is effected with two longitudinal members matching the cross section of the rail.



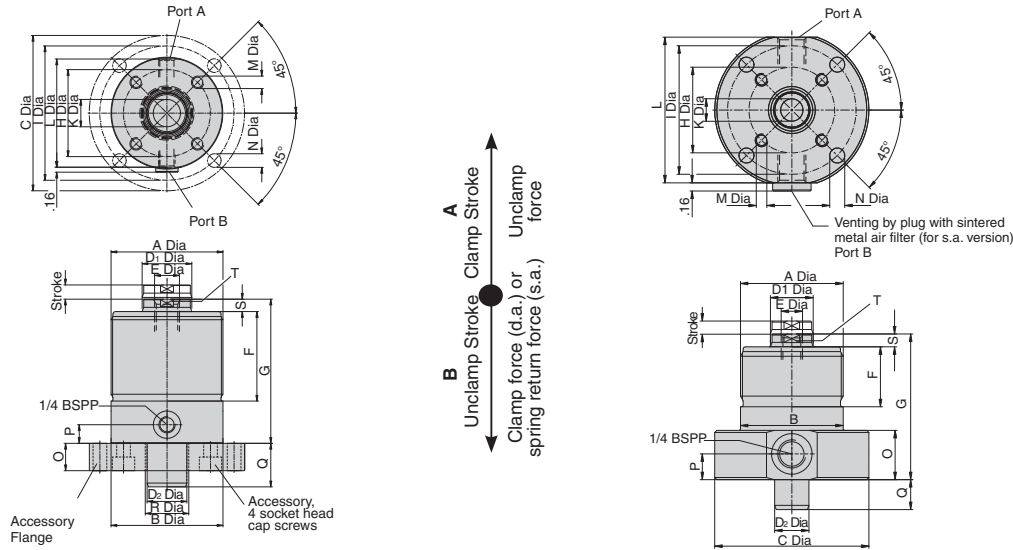
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# Hollow Plunger Clamps

**7250 psi max**  
Single and double acting



Clamping Force/ Unclamping Force	7250 psi	2250	6745	10565	16545	25990	42375
	6000 psi	1900/1900	5600/4500	8800/7100	13700/10800	21600/17400	35100/28500
	5000 psi	1600/1600	4700/3800	7300/5900	11500/9000	18000/14500	29300/23800
	4000 psi	1300/1300	3800/3000	5900/4800	9200/7200	14400/11600	23400/19000
	3000 psi	1000/1000	2800/2300	4400/3600	6900/5400	10800/8700	17600/14300
Spring return force (s.a.)		20	45	61	86	106	214
Piston area-clamp (sq.in.)		.3	.93	1.46	2.28	3.56	5.84
Piston area-unclamp (sq.in.)		.3	.76	1.19	1.80	2.88	4.74
Oil volume clamp		.25	1.17	2.30	4.50	8.83	18.4
Oil volume unclamp		.25	.96	1.87	3.54	7.14	15.93
A Dia		M40x1.5	M48x1.5	M60x1.5	M75x1.5	M90x2	M120x2
B Dia		1.57	1.89	2.36	2.95	3.54	4.72
C Dia		2.56	2.83	3.35	4.13	4.92	6.30
D <sub>1</sub> Dia		.472	.787	.984	1.256	1.575	1.969
D <sub>2</sub> Dia		.472	.623	.787	.984	1.256	1.575
E Dia x depth of thread		M6x8	M10x12	M12x15	M16x20	M20x25	M24x30
F		1.18	1.10	1.34	2.36	2.83	3.94
G		2.28	2.68	3.15	3.70	4.57	5.39
H Dia		1.181	1.575	1.969	2.362	2.756	3.858
I Dia		2.05	2.36	2.83	3.54	4.25	5.51
K Dia		.26	.41	.49	.65	.83	.98
L		2.36	2.68	3.23	2.83	3.43	4.61
M Dia x depth of thread		M6x8	M6x8	M6x10	M8x10	M10x14	M12x15
N Dia		.27	.27	.27	.35	.43	.53
O		.91	.91	.91	.79	.87	.98
P		.47	.47	.47	.47	.59	.59
Q		.47	.55	.75	.91	1.38	1.69
R Dia		—	—	—	1.102	1.378	1.693
S		.20	.24	.28	.35	.39	.39
T A/Flats		10mm	17mm	22mm	27mm	36mm	46mm
Weight (lbs)		1.8	2.6	4	4.9	9.7	2.14

## Single Acting With Spring Return

Stroke	.24	.31	.39	.47	.63	.79
Part No.	CLR-1752-004-HC	CLR-1754-004-HC	CLR-1755-004-HC	CLR-1756-004-HC	CLR-1757-004-HC	CLR-1758-004-HC

## Double Acting

Stroke	.39	.47	.63	.79	1.26	1.57
Part No.	CLR-1752-023-HCD	CLR-1754-023-HCD	CLR-1755-023-HCD	CLR-1756-023-HCD	CLR-1757-023-HCD	CLR-1758-023-HCD

## Flange Base

Part No.	—	—	—	CLR-3456-310-HCA	CLR-3456-313-HCA	CLR-3456-312-HCA
Part No., cap screw	—	—	—	CLR-3300-237-HCA	CLR-3300-277-HCA	CLR-3300-054-HCA
Part No., lock ring	CLR-99-HCA	CLR-24-HCA	CLR-11-HCA	CLR-73-HCA	CLR-12-HCA	CLR-34-HCA



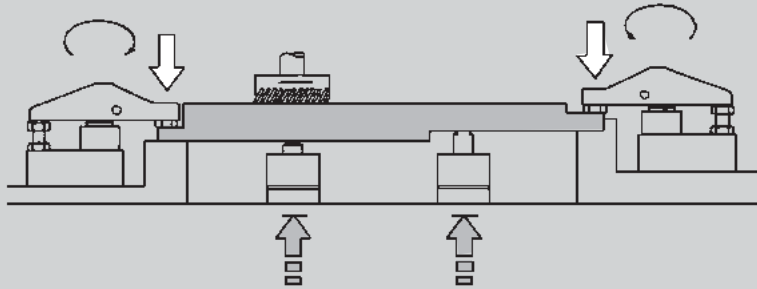
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# Work Supports

**7250 psi max**  
Single and double acting

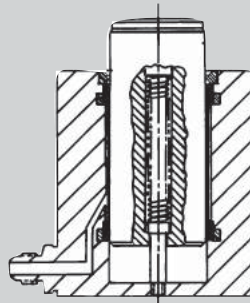


Automatically adjusts to proper height for supporting workpiece. Prevents deflection and vibration due to machining forces. May also be used underneath clamps to back up clamping force. More accurate, more consistent, and much faster than screw jacks.

Precision sleeve around support plunger holds it absolutely vertical while unlocked, then locks it securely when fluid pressure is applied. Plunger remains perfectly stationary during locking. Far better accuracy and repeatability than earlier segmented-collet or sandwiched-plate work supports. Choice of three actions:



**Threaded Body**  
pages 620-621

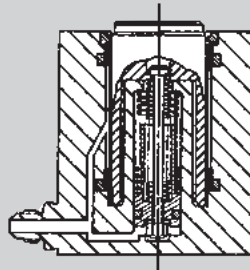


### Spring Extended (Plunger floats then locks)

Plunger is normally extended by light spring force. Workpiece's weight depresses plunger to proper height. Applying fluid pressure locks plunger securely.



**Threaded Body**  
pages 620-622

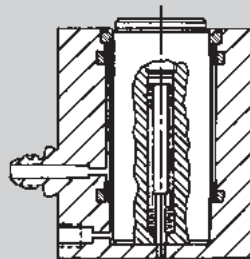


### Fluid Advanced (Plunger advances then locks)

Plunger is normally retracted for clear loading/unloading. Applying fluid pressure gently advances plunger to the workpiece, then automatically locks it. Note: do not use advancing plunger to lift loads.



**Threaded Body**  
pages 620-622



### Air Advanced/Extended (Plunger floats or advances by air pressure)

Plunger is normally retracted for clear loading/unloading. Applying air pressure advances plunger to the workpiece. This allows fine tuning contact pressure using a simple air regulator. Contact force may be as light as a few ounces. Applying fluid pressure locks plunger securely.



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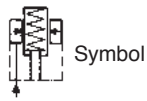
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# Threaded-Body Work Supports

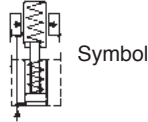
7250 psi max  
Single Acting



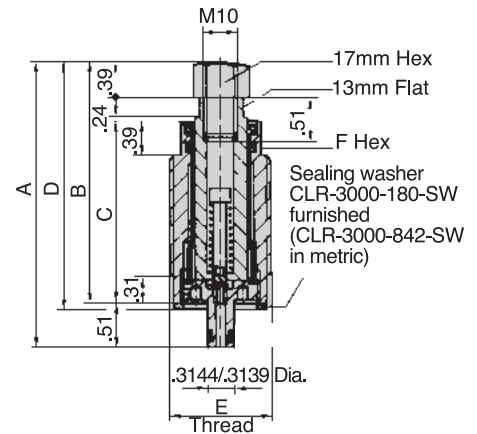
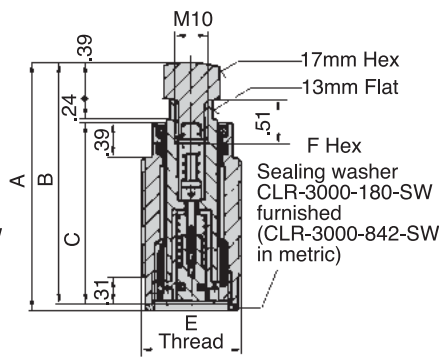
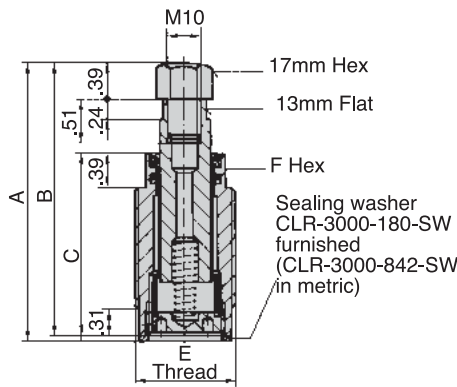
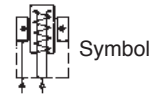
Spring Extended



Fluid Advanced



Air Advanced



Load Capacity at 7250 psi	1460 Lbs				2135 Lbs				
	Spring Extended	Fluid Advanced	Air Advanced	Spring Extended	Fluid Advanced	Air Advanced	Spring Extended	Fluid Advanced	Air Advanced
Plunger action	Spring Extended	Fluid Advanced	Air Advanced	Spring Extended	Fluid Advanced	Air Advanced	Spring Extended	Fluid Advanced	Air Advanced
Stroke	.31	.31	.59	.31	.31	.59	.31	.31	.31
Max. load capacity (lbs)	1460	1460	1460	1460	2135	2135	2135	2135	2135
Fluid required (cu.in)	.01	.10	.10	.01	.10	.18	.01	.01	.01
Max. fluid flow rate (cu.in./min.)	—	100	100	—	100	100	—	—	—
Contact force, min/max (lbs)	1.8 to 3.0	2.2 to 5.2	2.2 to 5.2	See text	1.8 to 3.0	2.2 to 5.2	2.2 to 5.2	See text	See text
Max. operating pressure (psi)	7250	7250	7250	7250	7250	7250	7250	7250	7250
Min. operating pressure (psi)	1460	1460	1460	1460	1460	1460	1460	1460	1460
A	3.17	2.85	3.13	3.31	3.56	3.25	3.52	3.70	3.70
B	3.11	2.80	3.07	2.80	3.50	3.19	3.46	3.19	3.19
C	2.13	2.13	2.40	2.13	2.52	2.52	2.80	2.52	2.52
D	—	—	—	2.85	—	—	—	—	3.25
Weight (lbs)	.6	.6	.6	.6	.6	.6	.6	.6	.6

## INCH

E Thread	1-1/4-16	1-1/4-16	—	1-1/4-16	—	—	—	1-1/4-16	—
F Hex	1.06	1.06	—	1.06	—	—	—	—	—
Part No., Work Support only	CLR-001-WS	CLR-201-WS	—	CLR-101-WS	—	—	—	—	—
Part No., Base only	CLR-712-WSA	CLR-712-WSA	—	CLR-711-WSA	—	—	—	—	—
Part No., Work Support with Base	CLR-000-WS	CLR-200-WS	—	CLR-100-WS	—	—	—	—	—

## METRIC

E Thread	M30x1.5	M30x1.5	M30x1.5	M30x1.5	M30x1.5	M30x1.5	M30x1.5	M30x1.5	M30x1.5
F Hex	24mm	24mm	24mm	24mm	24mm	24mm	24mm	24mm	24mm
Part No., Work Support only	CLR-1940-000-WS	CLR-1942-000-WS	CLR-1942-005-WS	CLR-1941-000-WS	CLR-1940-010-WS	CLR-1942-010-WS	CLR-1942-015-WS	CLR-1941-010-WS	CLR-1941-010-WS



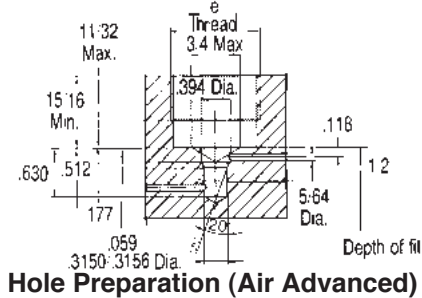
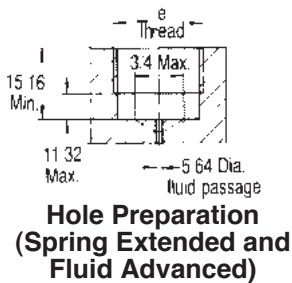
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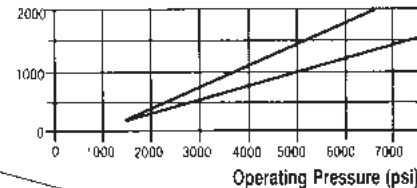
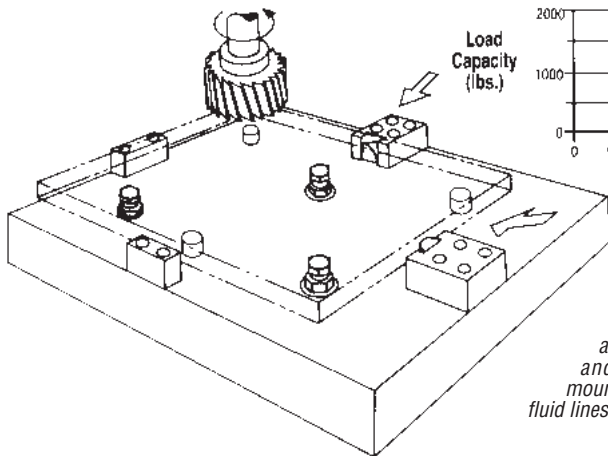
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# Threaded-Body Work Supports

7250 psi max  
Single acting



- Amazingly compact threaded body work support, only 1-1/4 inches in diameter!
- Height adjusts automatically with repeatability with  $\pm .0002$  inches
- Choice of two sizes in each of threeaction types, plus a long-stroke fluid-advanced model (1700 lbs)
- Support plunger held by an advanced design, sliding-fit pressure sleeve (holds plunger absolutely vertical, locked or unlocked)



*Example:  
Workpiece supported by three  
fixed rest buttons and three self-  
adjusting Work Supports. Supports  
and Edge Clamps are all manifold  
mounted, so the fixture has no exposed  
fluid lines to trap chips.*

## OPTIONAL BASE



**SUPPORT ACTION (SPRING EXTENDED):**  
Plunger is normally extended by light spring force. Workpiece's weight depresses plunger to proper height. When fluid pressure is applied, precision sleeve grips plunger, locking it securely.

**SUPPORT ACTION (FLUID ADVANCED):**  
Plunger is normally retracted for clear workpiece loading/unloading. Applying fluid pressure gently advances plunger to workpiece, where it contacts with light spring force. When fluid pressure is applied, precision sleeve grips plunger, locking it securely. Plunger retracts again when pressure is released.

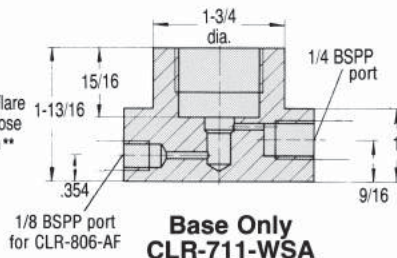
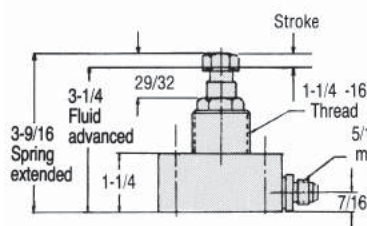
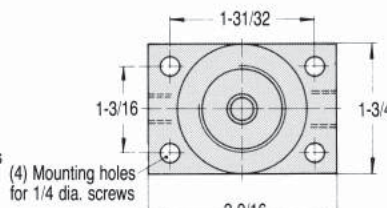
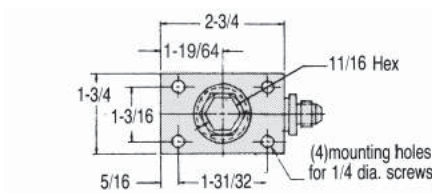
**SUPPORT ACTION (AIR ADVANCED):**  
Plunger is normally retracted for clear workpiece loading/unloading. Applying air pressure gently advances plunger to workpiece. A simple 3-way air valve, fine pressure regulator, and air dryer are required. Fine tune contact pressure using regulator. When fluid pressure is applied, precision sleeve grips plunger, locking it securely. Plunger retracts again when air pressure is released. Air-advanced version is also available without spring return for extremely sensitive contact-force adjustment (part no CLR-7990-284-WS without base, CLR-110-WS with base).

**ACCURACY:** Height repeatability  $\pm .0002$  inches. Excellent repeatability because (1) sliding fit sleeve keeps plunger absolutely vertical while unlocked, avoiding inaccuracy due to locking a tilted plunger, and (2) locking force is entirely radial, so plunger stays absolutely stationary during locking. Elastic deflection of plunger is only  $.00016$  inches per 100 lbs. machining load.

**MOUNTING:** Screw work support into a tapped hole prepared as shown below. Hole bottom must be perpendicular to the hole's axis. with a 125 RMS maximum surface finish. Minimum seating torque 50 ft.-lbs. Supply fluid through passages drilled in the fixture.

**SEQUENCING:** If workpiece is too light to depress plunger (spring extended) or light enough that plunger contact may lift it (fluid advanced), a sequence valve is recommended. Sequence valve delays locking or advancing the plunger until after the workplace is clamped.

**CONSTRUCTION:** Steel plunger, hardened and ground. Plunger held inside a honed locking sleeve (sliding fit). Carbon steel body, black oxide finish. Hardened contact bolt furnished.



**Base Only  
CLR-712-WSA**

**Base Only  
CLR-711-WSA**



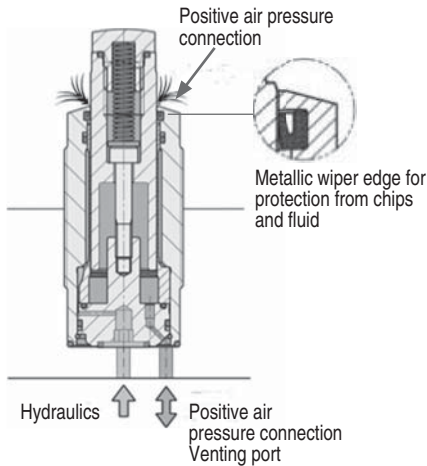
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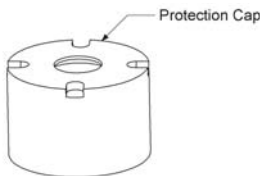
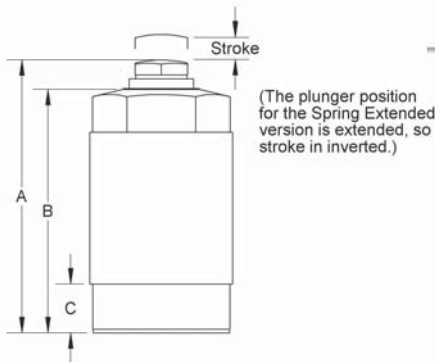
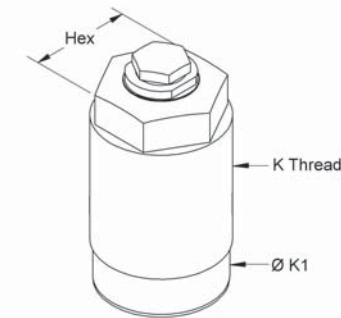
Sales — Phone (314) 647-6200 Fax (314) 647-5736  
Engineering — Phone 1-800-827-2526 Web [www.clrh.com](http://www.clrh.com)

# Work Supports ■ Threaded-Body Work Support ■ B1.943

**Thr. Body Work Support ■ 4 sizes ■ 3 types of function - Hydraulic, Air, Spring Single Acting ■ Max. Operating Pressure ■ 7250 psi (500 bar)**

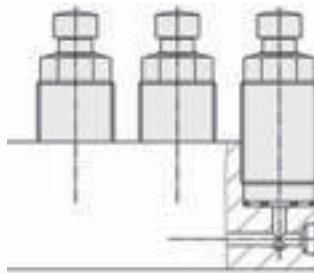


Work Supports are used to provide a self-adjusting rest of workpieces to minimize vibration and deflection from machining forces. This family of products provides multiple mounting options and four sizes within each of the three actuation types (Spring, Air, or Oil Extended). They are designed with an integrated metallix wiper edge backed up by a FKM wiper to provide excellent resistance to chips and fluid. If additional portection is required, the work supports can be piped to have low-pressure air blow-off from the wiper area.

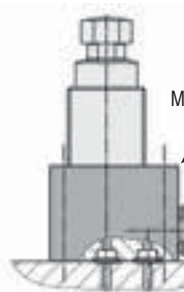


### Installation and connecting possibilities

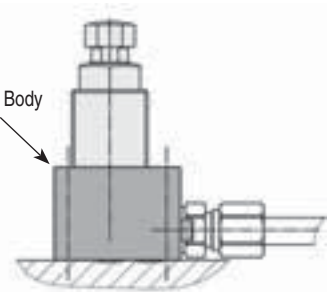
#### Drilled channels



#### O-Ring connection



#### Tube connection



Load Capacity at 7250 psi (lbs)	1460	3370	5285	9440
Stroke (in.)	0.31	0.39	0.39	0.63
A (in.)	2.97	3.39	3.54	4.53
B (in.)	2.32	2.85	3.07	4.04
C (in.)	0.33	0.69	0.81	0.81
K Thread	M30 x 1.5	M36 x 1.5	M48 x 1.5	M60 x 1.5
Ø K1 (in.)	1.12	1.35	1.83	2.30
Hex (in.)	0.94	1.81	1.61	1.97
Weight (lbs)	0.66	1.10	1.98	4.19
Part No., Spring Extended	CLR-1940-300	CLR-1940-400	CLR-1940-501	CLR-1940-601
Part No., Air Advanced	CLR-1941-300	CLR-1941-400	CLR-1941-501	CLR-1941-601
Part No., Fluid Advanced	CLR-1942-300	CLR-1942-400	CLR-1942-501	CLR-1942-601

#### Accessories

Part No., Mounting Body	CLR-0346-815	CLR-0346-816	CLR-0346-817	CLR-0346-818
Part No., Protection Cap (splash guard)	CLR-3546-110	CLR-3546-111	CLR-3546-112	CLR-3546-113

The Protection Cap can be installed between the contact bolt and plunger to protect the wiper area from high pressure coolant and chips.

Subject to change. For further details, including detailed dimensions and mounting instructions, visit [www.clrh.com](http://www.clrh.com).



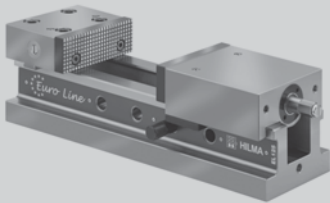
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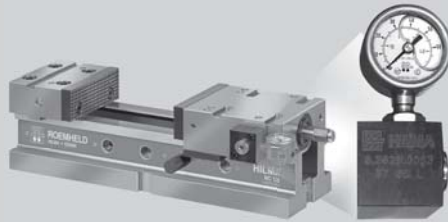
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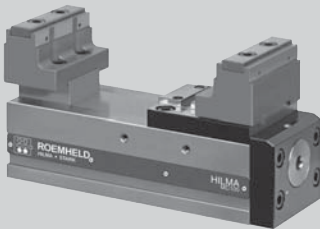
# Power Vises and Concentric Clamping



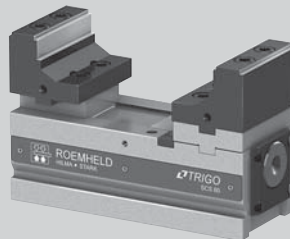
**EL-Series Hydromechanical Vises**  
pages 625



**NC-Series Machining Center Vises**  
pages 626-627



**Mini Clamp Vises**  
pages 632-633



**Super Compact Clamps**  
page 634



**Concentric Vises**  
pages 637

## Power Machine Vises

Carr Lane Roemheld has a wide variety of machine vises for your applications, made of the finest quality construction for excellent rigidity and durability. More varieties can be found in the Machining Vises section at [clrh.com](http://clrh.com).

**Hydromechanical Vises** — EL-series Vises are ideal for conventional machine tools in combination with the optional swivel base. Manually operated, with final high force applied easily using hydraulic power assist.

**Machining Center Vises** — NC-series Vises, available with or without gauge, are available in both hydraulic and hydromechanical versions. The hydraulic version provides automatic power clamping with exact high force at the push of a button. The hydromechanical version is manually operated, with final high force applied easily using hydraulic power assist.

**Mini Clamp Vises** (MC series) are designed especially for multi-face machining with a single clamping operation. Unique design allows clear tool access to five-out-of-six workpiece sides. Ideal for machining complicated workpieces in a single clamping operation, such as in mold making. Mini-Clamp Vises are small, but have a large holding capacity.

**Super Compact Clamps** (SCS series) offer new machining and manufacturing technologies, with its short base and easy movement of the fixed jaw. The clamp is ideally suited for 5-sided machining, is affordably priced, and is well suited for short, standard tools.

**Concentric Vises** offer quick, accurate clamping of odd-sized workpieces. These vises may be used in machining centers, on machine tools and final processing machines as well as in special jigs and fixtures. These self-centering vises position and clamp workpieces precisely on a defined symmetrical axis, allowing for any contours, and have a high clamping repeatability of  $\pm 0.01$ mm.

## Vise Jaws and Accessories

pages 628-629

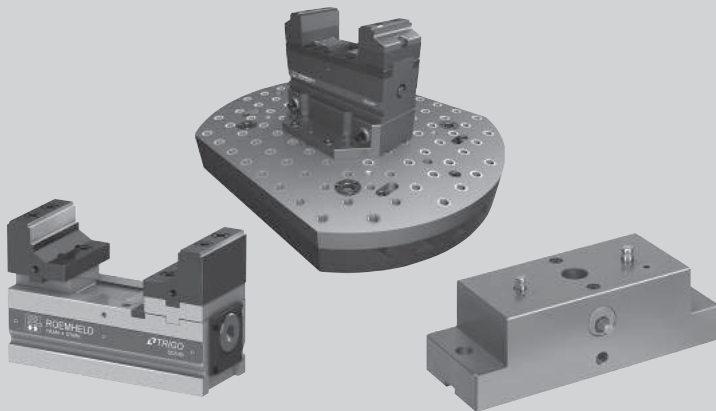


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# Power Vises and Fixturing Systems



## CL5® Quick-Change Five-Axis Workholding

pages 630-636



## Quick-Change Five-Axis Workholding

Accurate and versatile fixture for round, square, and hex-shaped workpieces. Mounts vertically or horizontally, and uses standard 5C collets. Advanced workpiece-release mechanism for flawless operation. Far better accuracy and repeatability than competitive collet vises. Workpiece is pulled solidly against the bottom stop for excellent height repeatability.



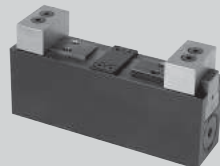
## With Fixed Jaw

page 640



## Concentric

page 641



## Position Flexible

page 642

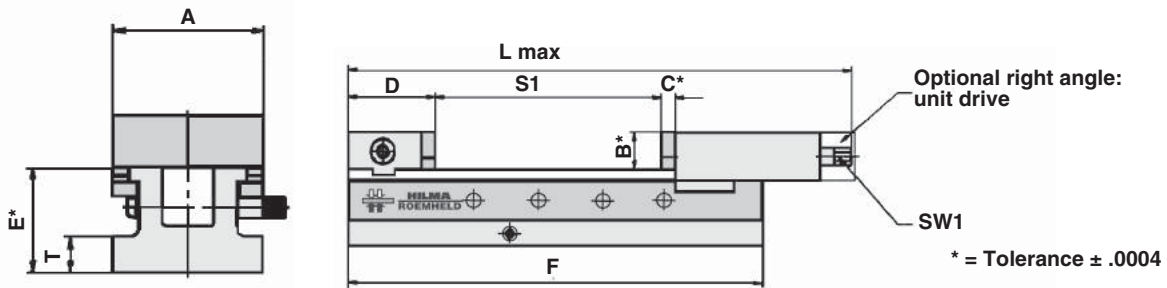
## Fixture Clamps

Fixture clamps consist of a very compact body with integrated hydraulic cylinders that actuate the movable jaw. All threads and ports are at the bottom which allows for a very tight and space savings arrangement. Accessory blank jaws are also available that can be milled to match the workpiece contour.



# Standard Machine Vises

5075 psi max  
Single acting



Angular Drive and Force Limiting Adapter (6 levels) offered as accessories.



Right Angle Drive	
100mm	CLRH-3294-05-VSA
125mm	CLRH-3294-06-VSA
160mm	CLRH-3294-07-VSA

Force Limiting Adapter	
100mm	CLRH-9-3762-0100-VSA
125mm	CLRH-9-3762-0125-VSA
160mm	CLRH-9-3762-0160-VSA

## Hydra-Mechanical Vises

Jaw Width	100mm	125mm	160mm	160mm (Long)
Max. clamping force (lbs)	5600	9000	11000	11000
Max. cranking force (lbs)	11	17	21	21
Crank throw	3.15	3.94	4.92	4.92
A	3.937	4.921	6.299	6.299
B	1.3386	1.7717	2.1260	2.1260
C	0.5118	0.5906	0.7087	0.7087
D	3.1496	3.9370	4.7244	4.7244
E	2.7559	2.2283	3.7402	3.7402
F	14.96	16.93	21.65	29.53
L max	18.27	20.71	26.93	34.80
S1	8.07	8.86	12.17	20.04
SW1	14mm	17mm	19mm	19mm
T	.94	1.06	1.06	1.06
Weight (lbs)	41	69	129	165
Part No., Vise	CLRH-3022-1113-VS	CLRH-3023-1113-VS	CLRH-3024-1113-VS	CLRH-3024-1313-VS



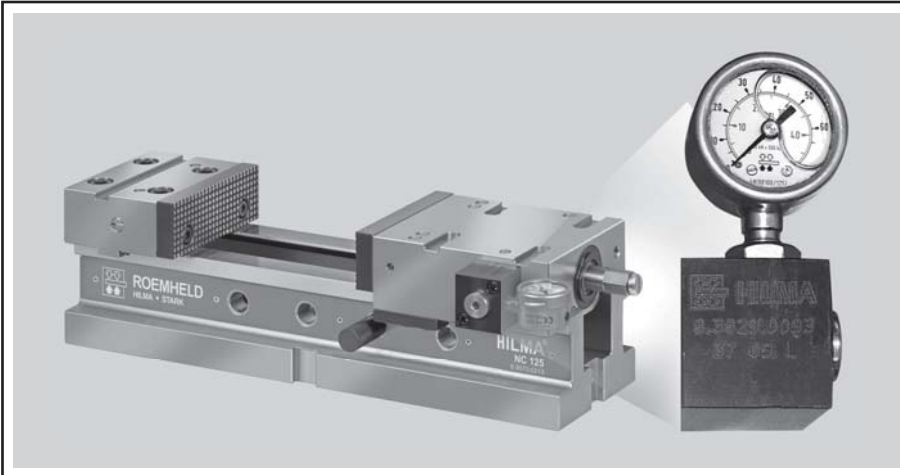
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# Machining-Center Vises

5075 psi max  
Single acting



**NC Series Hydra-Mechanical  
(shown with gauge)**

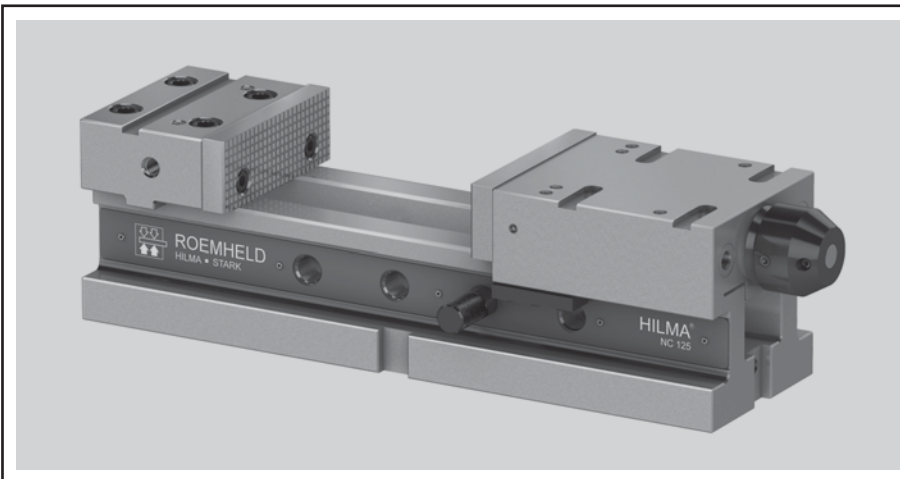
- Hydraulic version provides automatic power clamping with exact high force at the push of a button (requires external power unit)
- Hydra-mechanical version is manually operated, with final high force applied easily using hydraulic power assist
- Finest-quality construction for excellent rigidity and durability
- Choice of three sizes

**OPERATION OF HYDRAULIC VERSION:**  
To set up initially, adjust jaw opening to the workpiece using the removable crank handle. When fluid pressure is applied by actuating the external power unit, the sliding jaw moves through its power stroke to apply full clamping force (.276" maximum stroke for safety). Unclamping is by positive spring return.

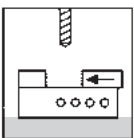
**OPERATION OF HYDRA-MECHANICAL VERSION:**  
Turning the crank handle clockwise moves the sliding jaw mechanically toward the workpiece. Once resistance is met, further turning automatically disengages the screw spindle and gradually applies full hydraulic pressure, with relatively little effort. Turn handle counterclockwise to unclamp.

**MOUNTING:** Vises are all slotted underneath for 20mm fixture keys, to provide accurate mounting on T-slotted machine tables. Use two Step Fixture Keys to adapt to a specific table-slot size (see tooling-component catalog section). A hardened steel pin fits into any of the adjustment holes on each side of the guide rails, to provide quick coarse adjustment of jaw opening.

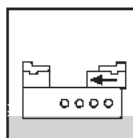
**ACCESSORIES:** A crank handle is furnished with each vise. Optional right-angle-drive units (hydra-mechanical version only) are highly recommended if vises are mounted vertically.



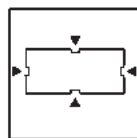
**NC Series Hydraulic**



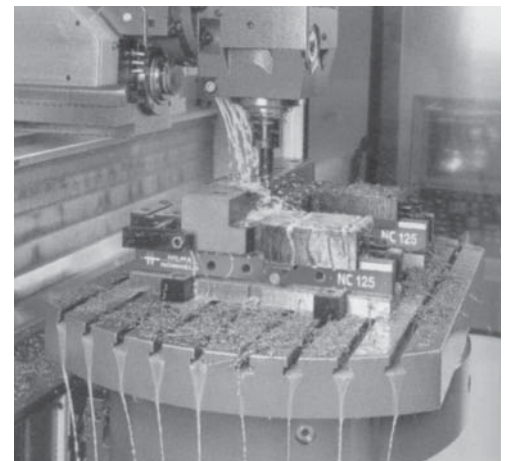
Horizontal Mounting



Accepts Top Jaws



Two-Axis Location



NC-Series vises are ideal for precision, high-production machining on all types of vertical machining centers.



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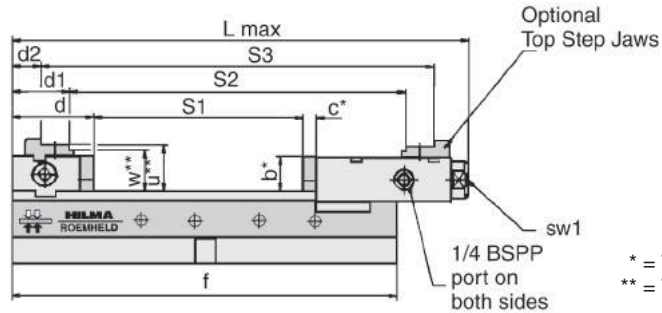
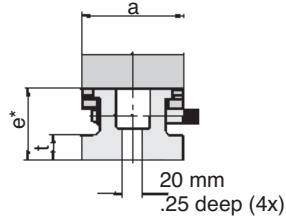
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# Machining-Center Vises

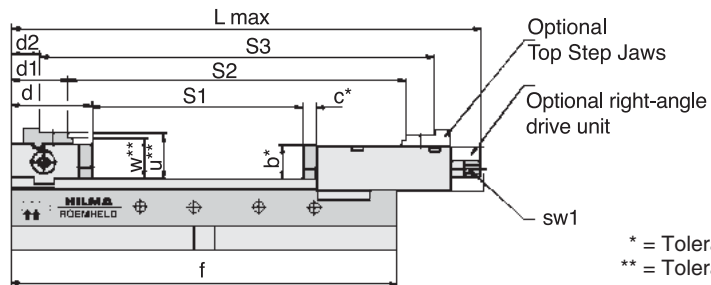
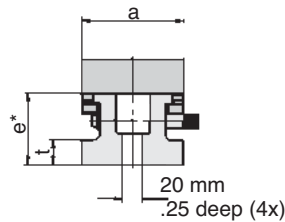
5075 psi max  
Single acting

## Hydraulic



\* = Tolerance ± .0004  
\*\* = Tolerance ± .0008

## Hydra-Mechanical



\* = Tolerance ± .0004  
\*\* = Tolerance ± .0008

Jaw Width	100mm	125mm	160mm
a	3.937	4.921	6.299
b	1.3386	1.7717	2.1260
c	.5118	.5906	.7087
d	3.1496	3.9370	4.7244
d1	2.2047	2.7165	2.8346
d2	1.1024	1.3780	1.4567
e	2.7559	3.2283	3.7402
f	14.96	16.93	21.65
t	.94	1.06	1.06
u	1.7717	2.2835	2.7559
w	1.5748	2.0866	2.5591
Weight (lbs)	41	69	129

### Hydraulic Vises

Max. clamping force (lbs)	5620	8990	14160
Power stroke	.197	.197	.276
Max. operating pressure (psi)	5000	5000	5000
Fluid required (cu.in.)	.31	.43	.85
L max	17.95	20.39	26.57
S1	8.23	8.98	12.36
S2	13.15	14.41	20
S3	15.35	17.09	22.76
sw1	8mm	8mm	10mm
Part No., Vise	CLRH-3082-02-VS	CLRH-3083-02-VS	CLRH-3084-02-VS

### Hydra-Mechanical Vises

Max. clamping force (lbs)	5620	8990	11240
Max. cranking force required (lbs)	11	17	21
crank throw	3.15	3.94	4.92
L max	18.27	20.71	26.93
S1	8.07	8.86	12.17
S2	12.99	14.29	19.80
S3	15.20	16.97	22.56
sw1	14mm	17mm	19mm
Part No., Vise	CLRH-3072-02-VS	CLRH-3073-02-VS	CLRH-3074-02-VS
Part No., Right-Angle Drive Unit	CLRH-3294-05-VSA	CLRH-3294-06-VSA	CLRH-3294-07-VSA
Part No., Vise with Gauge	CLRH-9-3072-0215-VS	CLRH-9-3073-0215-VS	CLRH-9-3074-0215-VS



Optional Right-Angle  
Drive Unit for  
Hydra-Mechanical Version



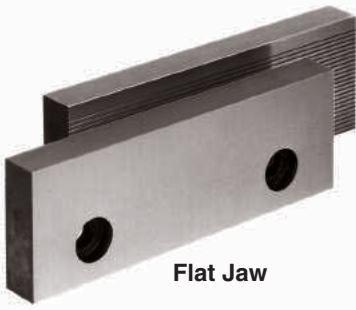
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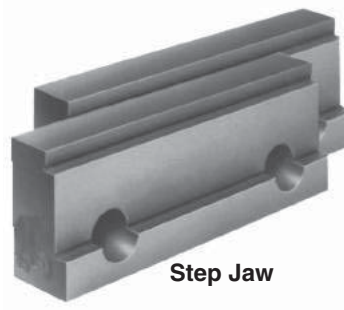
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# Vise Jaws

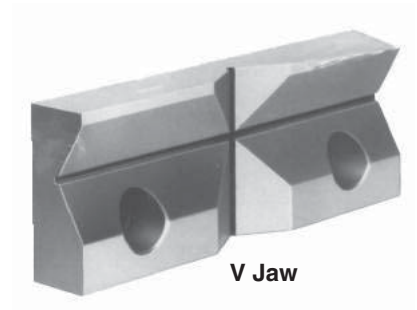
## Machine Vise Jaws



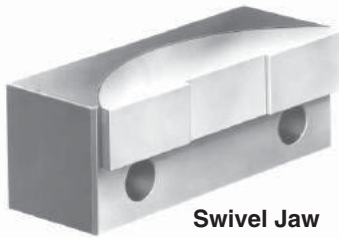
Flat Jaw



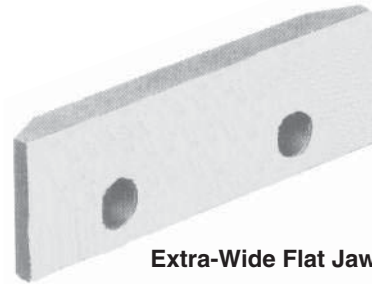
Step Jaw



V Jaw



Swivel Jaw

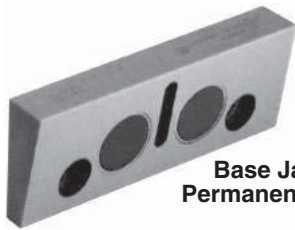


Extra-Wide Flat Jaw

Jaw Type (Single Jaw)	100mm Vise	125mm Vise	160mm Vise
Part No., Standard Flat Jaw	CLRH-5-2058-1003-VSA	CLRH-5-2058-1004-VSA	CLRH-5-2058-1005-VSA
Part No., Soft Flat Jaw	CLRH-5-2055-0097-VSA	CLRH-5-2055-0098-VSA	CLRH-5-2055-0099-VSA
Part No., Extra Wide Flat Jaw	CLRH-5-2058-1025-VSA	CLRH-5-2058-1026-VSA	CLRH-5-2058-1027-VSA
Part No., V Jaw	CLRH-5-3030-0002-VSA	CLRH-5-3030-0003-VSA	CLRH-5-3030-0004-VSA
Part No., Swivel Jaw	CLRH-3711-02-VSA	CLRH-3711-03-VSA	CLRH-3711-04-VSA
Part No., Step Jaw	CLRH-5-2082-0001-VSA	CLRH-5-2082-0002-VSA	CLRH-5-2082-0003-VSA

## Quick-Insert – System Jaws

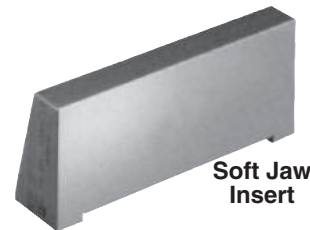
Base jaws are screwed to the fixed jaw and to the slide. Inserts, kept in place by two permanent magnets, can be changed in a few seconds.



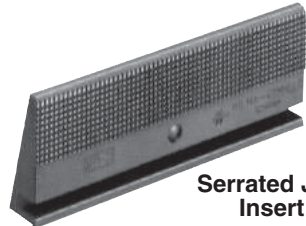
Base Jaw with Permanent Magnets



Standard Jaw Insert



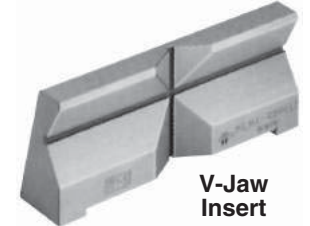
Soft Jaw Insert



Serrated Jaw Insert



Step Jaw Insert



V-Jaw Insert

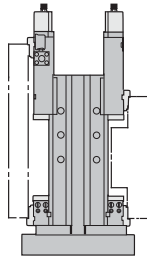
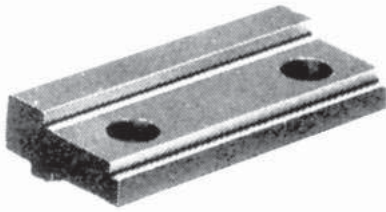
Jaw Type (Single Jaw)	100mm Vise	125mm Vise	160mm Vise
Part No., Magnetic Base Jaw	CLRH-3771-02-VSA	CLRH-3771-03-VSA	CLRH-3771-04-VSA
Part No., Standard Jaw Insert	CLRH-3771-12-VSA	CLRH-3771-13-VSA	CLRH-3771-14-VSA
Part No., Soft Jaw Insert	CLRH-3771-72-VSA	CLRH-3771-73-VSA	CLRH-3771-74-VSA
Part No., Serrated Jaw Insert	CLRH-3771-22-VSA	CLRH-3771-23-VSA	CLRH-3771-24-VSA
Part No., Step Jaw Insert	CLRH-3771-42-VSA	CLRH-3771-43-VSA	CLRH-3771-44-VSA
Part No., V Jaw Insert	CLRH-3771-52-VSA	CLRH-3771-53-VSA	CLRH-3771-54-VSA



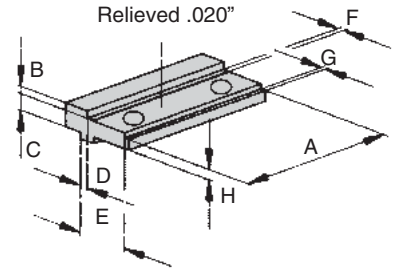
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# Vise Accessories

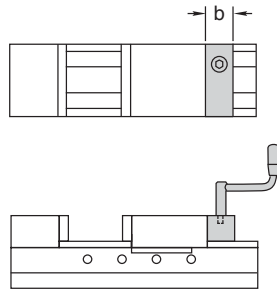


Precision step jaws that mount on top of the fixed and sliding jaws, extending jaw capacity significantly. These hardened and ground jaws are keyed to maintain excellent positional accuracy, as well as height accuracy. Note: top step jaws for sliding jaws have a wider hole spacing than those for fixed jaws. Two mounting screws are included.



## Top Step Jaws

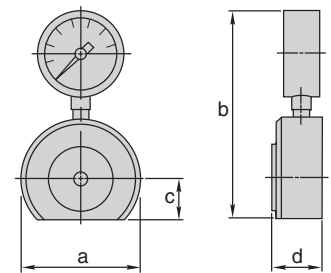
Part No. for Fixed Jaw	Part No. for Sliding Jaw	Jaw Width	A	B	C ±.0004	D ±.0004	E ±.0004	F	G	H ±.0004
CLRH-3284-02-VSA	CLRH-3284-12-VSA	100mm	3.9370		.4528	.2362	1.3386			.2559
CLRH-3284-03-VSA	CLRH-3284-13-VSA	125mm	4.9213	.197	.5512		1.5748	.197	.157	.3543
CLRH-3284-04-VSA	CLRH-3284-14-VSA	160mm	6.2992		.6693	.3150	1.6929			.4724



Extremely useful accessory for hydra-mechanical vises. Recommended when cranking from the end is difficult, especially when vises are mounted vertically.

## Right-Angle Drive Units

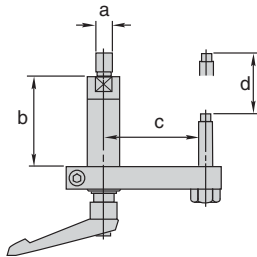
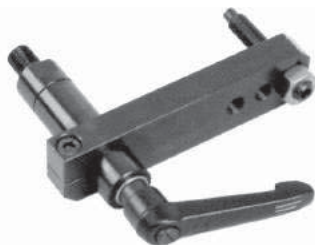
Part No.	Fits Jaw Width	Drive Hex Size	Crank Throw	b	Weight (lbs)
CLRH-3294-05-VSA	100mm	10mm	4.92	1.54	.5
CLRH-3294-06-VSA	125mm			1.69	1.0
CLRH-3294-07-VSA	160mm			1.81	2.0



Handy gauge for measuring clamping force in hydraulic or mechanical clamping systems. Flat side allows easier positioning in-line with the clamping force, especially for vises. Choice of two force ranges.

## Force Gauges (Load Cells)

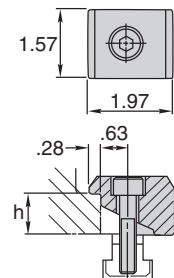
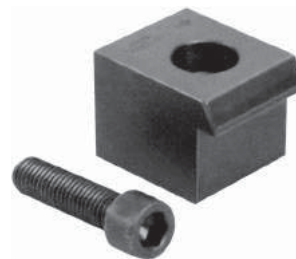
Part No.	Indicating Range	a dia	b	c	d
CLRH-2-9501-0001-VSA	0-60 kN (0-13,500 lbs)	3.46	5.91	1.14	1.46
CLRH-2-9501-0002-VSA	0-100 kN (0-22,500 lbs)	5.43	7.87	2.13	1.57



A precision workpiece stop that mounts into either side of the vise body. Reposition swing arm on the shaft by loosening the socket-head cap screw. Can be used as a swing-away stop, with the rapid-locking handle.

## Adjustable Side Stops

Part No.	Fits Jaw Width	a	b max	c max	d max
CLRH-3291-02-VSA	100mm and 125mm	M12	2.40	3.74	1.81
CLRH-3291-03-VSA				4.13	
CLRH-3291-04-VSA	160mm	M16	3.19	4.88	2.60



Set of four clamps with screws, for mounting one vise.

## Vise Clamps

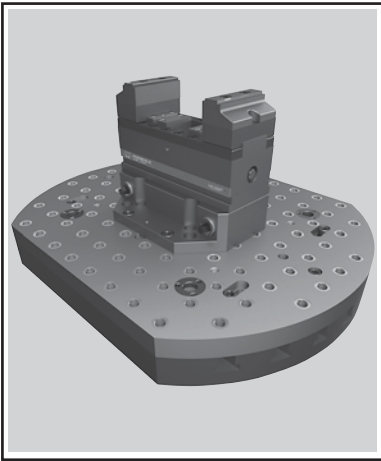
Part No.	Fits Jaw Width	h	Socket-Head cap screws (furnished)
CLRH-9-3777-2011-VSA	100mm	.94	M12x45mm long
CLRH-9-3777-3011-VSA	125mm and 160mm	1.06	M12x45mm long
CLRH-9-3777-3021-VSA			M16x50mm long



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**Subplate Mounted  
On a Rotary Table**

- **Designed specifically for 5-axis machining**
- **Also suitable for standard machining**
- **INFO+: Use in conjunction with the vises and jaws in the next few pages, as well as the subplates on pages 321-342**

**DESCRIPTION:** The CL5® quick-change, 5-Axis workholding system consists of three components: a subplate, a riser, and top tooling made up of a vise or a fixture plate. The subplate transforms a T-slot table into a modular fixturing plate, allowing flexible and easy clamping and locating of other tooling and/or fixtures. Designed to get the part up from the machine table, the Quintus quick-change riser allows 5-side part access. The Quintus combines the riser, quick-change capability and precise location in one piece.

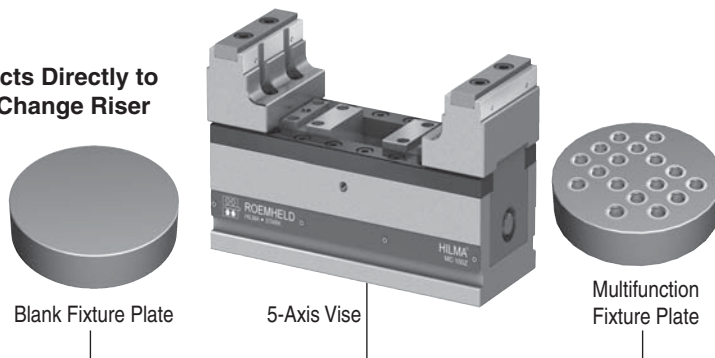
**APPLICATIONS:** The CL5® systems offers three primary methods of fixturing:

**METHOD 1:** Fixture Plate Mounted on a Rotary Table. This method is ideal for small rotary tables up to 210mm diameter. Fixture plates are accurately located and fastened directly to the rotary table.

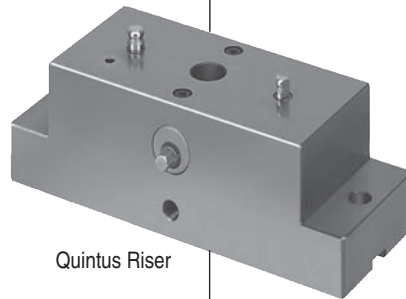
**METHOD 2:** Quintus Quick-Change Riser Mounted on Rotary Table. The method provides additional height for spindle clearance. It allows you to quickly and accurately mount directly on rotary tables 250mm diameter and larger.

**METHOD 3:** Subplate Mounted on Rotary Table. This method is appropriate for all machines. The Quintus riser is mounted on a subplate to allow quick exchange of the riser with other fixturing.

**Top Tooling Connects Directly to the Quintus Quick-Change Riser**



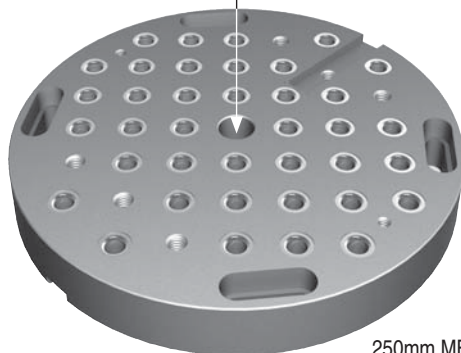
**Quintus Quick-Change Riser Connects to Any Subplate, No Extra Adaptors Required**



Quintus Riser

**Use Subplate Alone or With Risers and Plates**

**INFO+:** See Subplates pages 321-342



250mm MF Subplate

Subject to change. For further details, including detailed dimensions and mounting instructions, visit [www.clrh.com](http://www.clrh.com).



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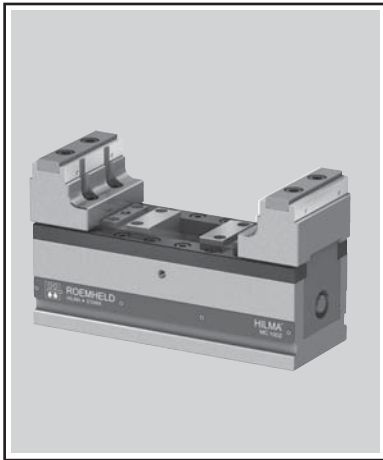
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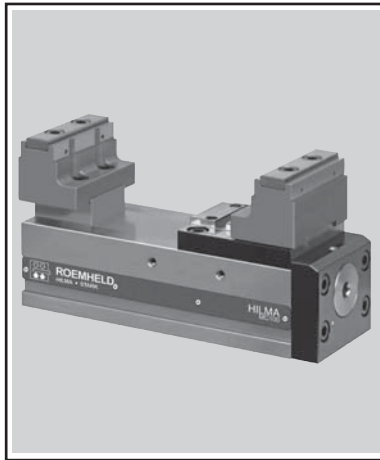
**5-Axis Vise ■ Mechanical**

Allows unrestricted tool access for 5-sided machining



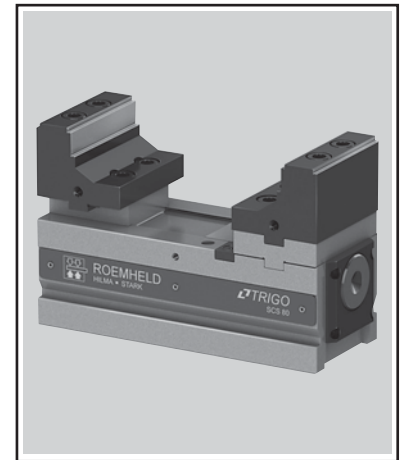
**MC-Z Series Concentric Vise**  
INFO+: Pages 632-633

- Jaw Widths: 40, 60, 100 and 125mm
- Two moving jaws that provide exact centering of the workpiece



**MC Series Mechanical Vise Fixed Jaw**  
INFO+: Pages 632-633

- Jaw Widths: 40, 60, and 100mm
- Conventional vise style with one fixed and one moving jaw

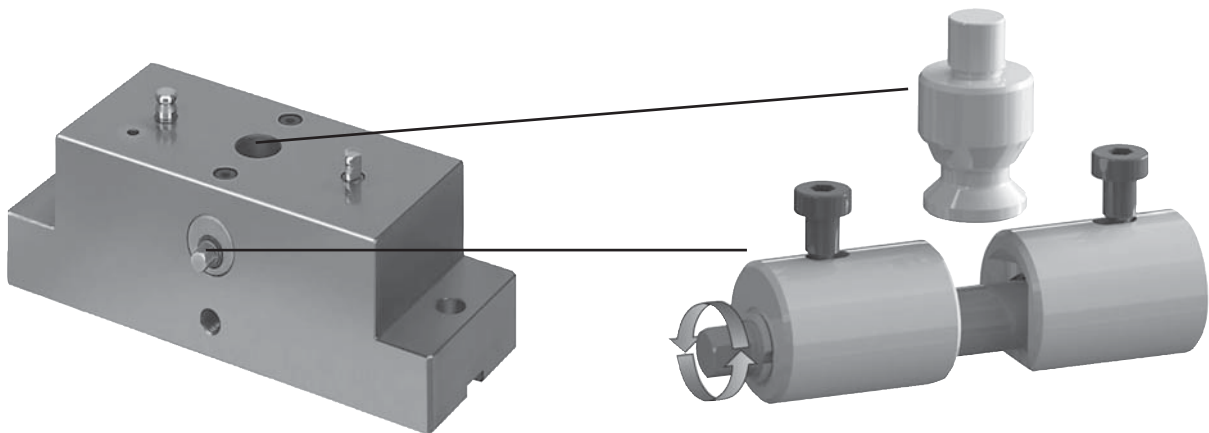


**SCS Series Mechanical Vise Fixed Jaw**  
INFO+: Pages 634

- Jaw Widths: 60 and 100mm
- Conventional vise style with one fixed and one moving jaw

**Quintus Quick-Change Riser**

INFO+: See page 635 for more details



**Quintus Clamping Mechanism**

**Quintus Clamping Mechanism**

Subject to change. For further details, including detailed dimensions and mounting instructions, visit [www.clrh.com](http://www.clrh.com).



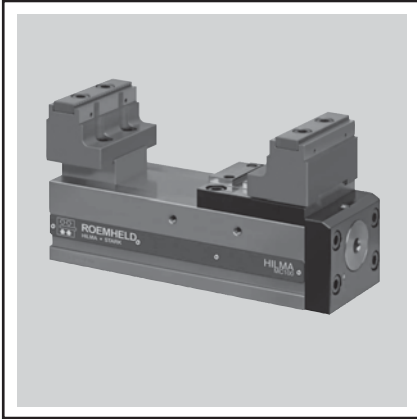
**ROEMHELD**  
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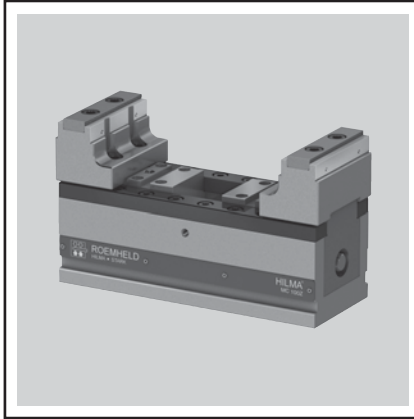
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# Mini Clamp Vises

**3770 psi max**  
Mechanical and Hydraulic



**MC Series**  
Manual or Hydraulic



**MCZ Series**  
Manual (Concentric)

**DESCRIPTION:** MC-series Mini Clamp Vises are designed especially for multi-face machining with a single clamping operation. Unique design allows clear tool access to five-out-of-six workpiece sides. Ideal for machining complicated workpieces in a single clamping operation, such as in mold making. Mini-Clamp Vises are small, but have a large holding capacity. Finest-quality construction for excellent rigidity and durability.

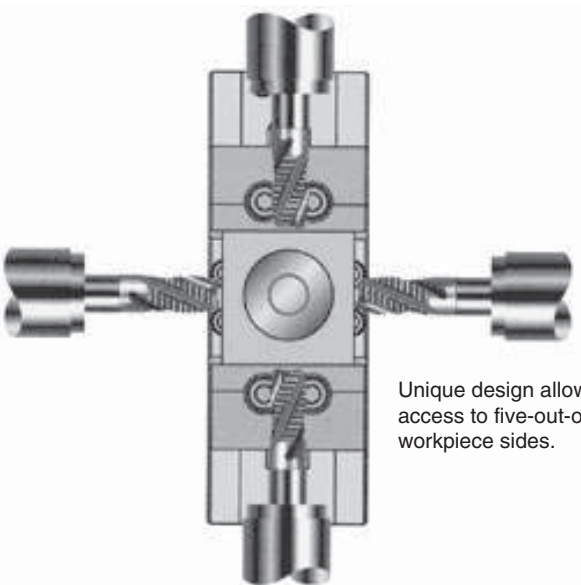
**OPERATION OF MANUAL VERSION:** Turn torque wrench clockwise to clamp, counterclockwise to unclamp.

**OPERATION OF HYDRAULIC VERSION:** During initial setup, adjust jaw opening to the workpiece using a socket wrench. When fluid pressure is applied by actuating the external power unit, the sliding jaw moves through its power stroke to apply full clamping force. Unclamping is by positive spring return.

**MANUAL VERSION AVAILABLE IN ONE SIZE:** 60mm jaw width and a maximum clamping force of 3370 Lbs.

**CONCENTRIC VERSION AVAILABLE IN THREE SIZES:** (Manual Operation only) Jaw widths of 60mm, 100mm, and 125mm. Clamping forces up to 7800 lbs for largest size.

**INFO+: FOR 5-AXIS MACHINING, USE WITH CL5 SYSTEM, PAGES 321-342 AND 630-636!**



Unique design allows clear tool access to five-out-of-six workpiece sides.



1  
3



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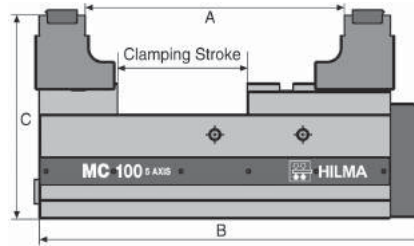
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# Mini Clamp Visers

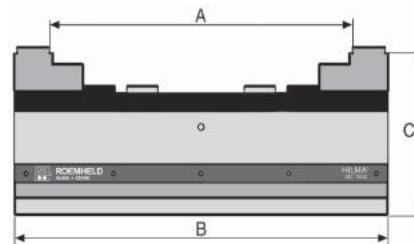
3770 psi max  
Mechanical and Hydraulic

**INFO+ FOR 5-AXIS  
MACHINING, USE WITH  
CL5 SYSTEM, PAGES 321-342  
AND 630-636!**



### MC Series

Operation	Manual	Manual	Hydraulic	Manual
Jaw Width (mm)	MC 40	MC 60	MC 60H	MC 100
	40	60	60	100
Max. clamping force (lbs)	1800	3370	3370	5620
Max. torque required (ft-lbs) / Max. operating pressure (psi)	11 ft-lbs	19 ft-lbs	3771 psi	45 ft-lbs
Clamping stroke / Power stroke (mm)	30	44	44 / 4	96
A (mm-max)	79	150	150	204
B (mm)	110	187	204	285
C (mm)	64	88	88	154
Weight without jaws (lbs)	4	11	12.1	44
Part No., Vise	CLR-9-3581-0102-VS	CLR-9-3583-0112-VS	CLR-9-3583-0212-VS	CLR-9-3585-0113-VS



### M-Z Series - Concentric

Operation	Manual	Manual	Manual	Manual
Jaw Width (mm)	MC 40Z	MC 60Z	MC 100Z	MC 125Z
	40	60	100	125
Max. clamping force (lbs)	1800	3370	5620	7870
Max. clamping torque required (ft-lbs)	17	37	59	148
Clamping stroke (mm)	20	30	73	75
A (mm-max)	79	91	204	400
B (mm)	110	170	260	465
C (mm)	64	88	154	160
Weight without jaws (lbs)	3.1	8.4	39.3	108
Part No., Vise	CLR-9-3581-0302-VS	CLR-9-3583-0301-VS	CLR-9-3585-0303-VS	CLR-9-3586-0304-VS

Vises shown with optional jaws sold separately. Mounting by clamping claws or threaded holes in the bottom of vise. Contact engineering for hole pattern.

### Vise Accessories

Accessory Type	Part No., MC 60 Series	Part No., MC 60 Z Series	Part No., MC 100 Z Series	Part No., MC 125 Z Series
Hardened Step Jaw, Fixed	CLR-9-3583-6901-VSA	—	—	—
Hardened Step Jaw, Mobile	CLR-9-3583-6901-VSA	CLR-9-3583-6001-VSA	CLR-9-3585-6901-VSA	CLR-9-3586-6901-VSA
Machinable Soft Jaw, Fixed	CLR-9-3583-6002-VSA	—	—	—
Machinable Soft Jaw, Mobile	CLR-9-3583-6002-VSA	CLR-9-3583-6902-VSA	CLR-9-3585-6902-VSA	CLR-9-3586-6902-VSA
Torque Wrench	CLR-9-3583-7010-VSA	CLR-9-3583-7010-VSA	CLR-9-3792-6610-VSA	—
Clamping Claws (4 set) M10 Screws	CLR-9-3583-7001-VSA	CLR-9-3583-7001-VSA	—	—
Clamping Claws (4 set) M12 Screws	CLR-9-3583-7002-VSA	CLR-9-3583-7002-VSA	CLR-9-3585-7001-VSA	—
Socket Nut	CLR-1-3124-0104-VSA	CLR-1-3124-0021-VSA	CLR-1-3124-0020-VSA	—

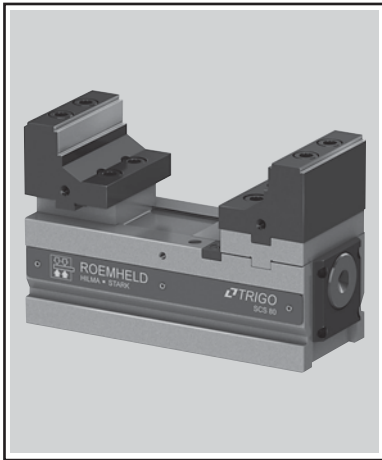


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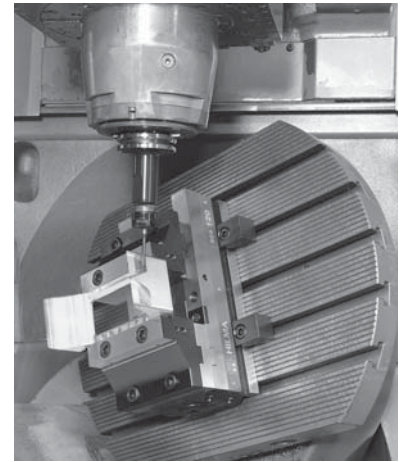
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**SCS Standard Vise ■ Mechanical**  
**Max. Clamping Force ■ 8990 lbs**

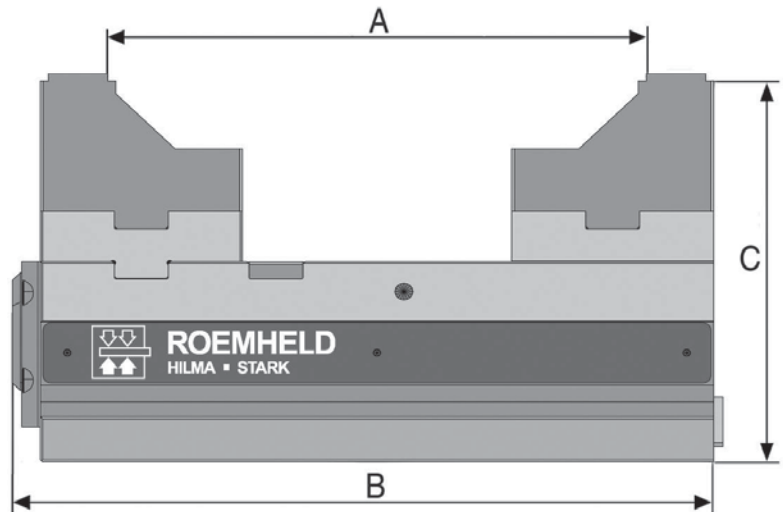
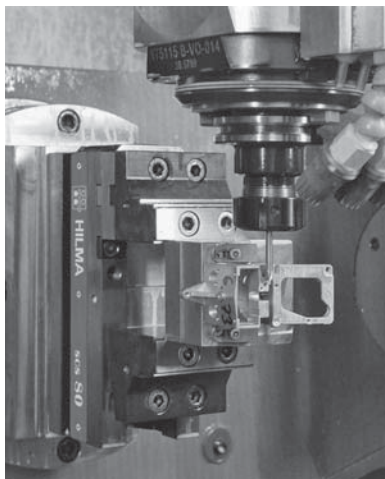


**SCS Series Mechanical Vise  
 Fixed Jaw**

- For multi-face machining with a single clamping operation
- Most economical choice for larger workpieces
- Jaw widths from 80mm to 120mm
- Conventional vise style with one fixed and one moving jaw
- Allows unrestricted tool access for multiple-side machining
- One-piece machined cast-iron base



**Example of 5-axis machining**



TYPE	PART NO.	CLAMPING FORCE (lb)	WEIGHT (lb)	JAW TRAVEL	mm		
					A	B	C
Part No., SCS 80M	CLRH-9-3672-0121-VS	5620	19	80	155	206	145
Part No., SCS 120M	CLRH-9-3673-0121-VS	8990	40	100	200	260	152

Subject to change. For further details, including detailed dimensions and mounting instructions, visit [www.clrh.com](http://www.clrh.com).

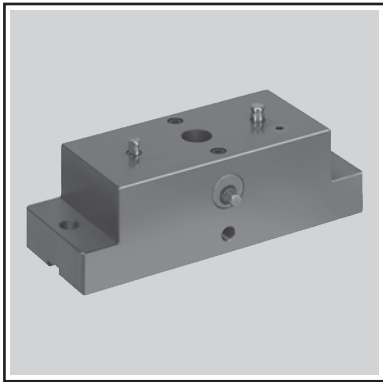


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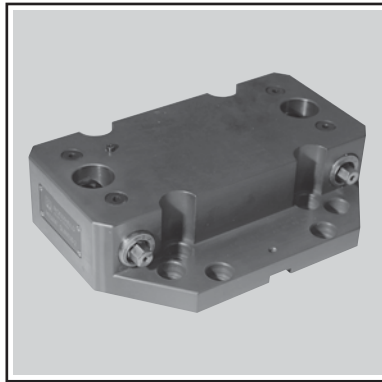
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**Quintus Riser ■ Quick-Change Riser**  
 Max. Retention Force per Clamping Pin ■ 4500 lbs



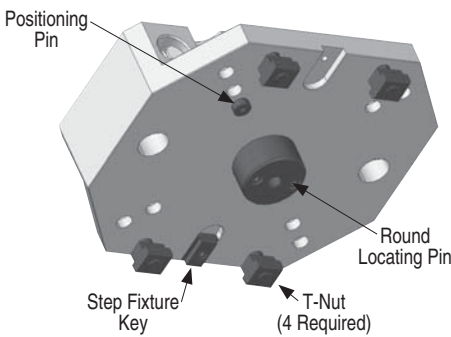
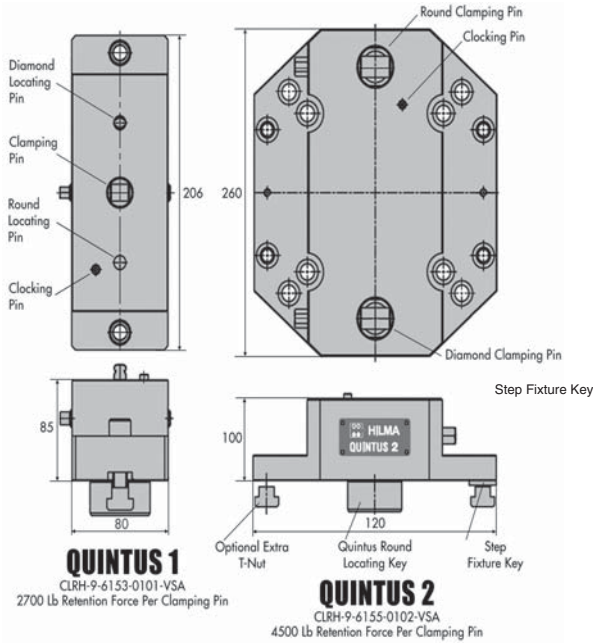
**Quintus 1**  
**Quick Change Riser**



**Quintus 2**  
**Quick Change Riser**

- Vises and fixture plates mount directly onto the Quintus Quick-Change Riser
- Two sizes
- Extremely accurate

The CL5® quick-change, 5-Axis workholding system consists of three components: a subplate, a riser, and top tooling made up of a vise or a fixture plate. The subplate transforms a T-slot table into a modular fixturing plate, allowing flexible and easy clamping and locating of other tooling and/or fixtures. Designed to get the part up from the machine table, the Quintus quick-change riser allows 5-side part access. The Quintus combines the riser, quick-change capability and precise location in one piece.



**Bottom View of Quintus 2**

**Round Locating Key**  
 for Quintus 1, 2, 3

PART NO.	Ømm	L1 / L2
CLRH-9-6153-5001-VSA	D 30 g6	15/38
CLRH-9-6153-5002-VSA	D 32 g6	15/38
CLRH-9-6153-5003-VSA	D 50 g6	25/48
CLRH-9-6153-5009-VSA	D 50 g6	18/41



**Step Fixture Key**  
 CLM-6x16-SHCS screw required

PART NO.	FIXTURE SLOT	TABLE SLOT
CLRH-9-6153-5004-VSA	20mm	14mm
CL-20-SFK-16	20mm	16mm
CL-20-SFK-18	20mm	18mm
CLM-20-FK	20mm	20mm



**Quintus Pin Sets**

PART NO.	INCLUDES
CLRH-9-3920-0201-VSA	QUINTUS 1 - w/o Centering
CLRH-9-3920-0202-VSA	QUINTUS 2 - Round & Diamond Pin
CLRH-9-3920-0203-VSA	QUINTUS 3



**Positioning Pin**  
 for Quintus 2. 1 piece

PART NO.	Ømm
CLRH-9-3920-0102-VSA	10/14 h6



**T-Nut**

with screw (set of 4)

PART NO.	T-SLOT (mm)
CLRH-9-6153-5005-VSA	M12x30mm 14



Subject to change. For further details, including detailed dimensions and mounting instructions, visit [www.clrh.com](http://www.clrh.com).



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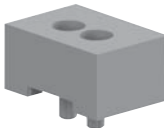

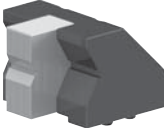




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# Quick-Change Five-Axis Workholding ■ **Vise Jaws**

**INFO+:** The jaws on this page are designed to be used with the 5-axis machining vises on pages 630-635.

Please add “CLRH-” before each part number, and -VSA at end.  
 Example of part number format: CLRH-9-3XXX-XXXX-VSA

			MC40	MC40Z	MC60	MC60Z	SCS80	MC100	MC100Z	SCS120	MC125Z	
	Soft Jaw	Machinable soft jaw	Movable Jaw	9-3581-6902	9-3583-6902	9-3583-6902	9-3583-6902	9-3972-1201	9-3585-6902	9-3585-6902	9-3973-1201	9-3586-6902
			Fixed jaw	9-3581-6902		9-3583-6902		-	9-3585-6902		-	
			Aluminum	-	-	-	-	9-3972-1202	-		9-3973-1202	-
	Step Jaw	Reversible step jaw, 2 steps, hardened	Movable Jaw	9-3581-6901	9-3581-6901	9-3583-6901	9-3583-6901		9-3585-6901	9-3585-6901		9-3586-6911
			Fixed jaw	9-3581-6901	-	9-3583-6901	-		9-3585-6901	-		-
	Vee Jaw	Vee jaw with removable insert for increased part range	-	-	-	9-3583-6905	-	-	9-3585-6905	-	-	-
	Step Jaw w/ Insert	Interchangeable standard insert, one side serrated, one side smooth. May be replaced with custom inserts	Wide			9-3583-6906	9-3583-6906		9-3585-6906	9-3585-6906		9-3586-6906
			Medium	-	-	9-3583-6907	9-3583-6907	-	9-3585-6907	9-3585-6907	-	9-3586-6907
			Narrow (pictured)			-	-		9-3585-6910	9-3585-6910		9-3586-6910
	Pendulum Jaw	With Insert, for compensating non-parallel clamping surfaces	-	-	-	-	-	-	9-3585-6904	-	9-3586-6904	
	Step Jaw Solid	Reversible step jaw, 2 steps, hardened, smooth grip edge	Narrow					9-3972-1001			9-3973-1001	
			Medium	-	-	-	-	9-3972-1002	-	-	9-3973-1002	-
			Wide					9-3972-1003			9-3973-1003	
	High Grip Jaw	Special grip reversible step jaw, hardened, serrated grip edge	Narrow					9-3972-1101			9-3973-1101	
			Medium	-	-	-	-	9-3972-1102	-	-	9-3973-1102	-
			Wide					9-3972-1103			9-3973-1103	

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# Concentric Vises

**2175 psi max clamp**  
**290 psi max unclamp**



**Hydraulic Concentric**

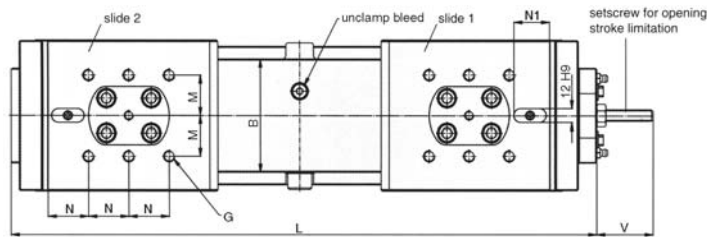
- High clamping repeatability  $\pm 0.01$  mm
- Constant length and large clamping ranges
- Any mounting position
- Possibilities for positioning and fastening customer-specific jaws
- Protection against coolant and swarf by integral wipers in the clamping slides
- Large stroke of the slide
- Limitation of the opening stroke by an adjustable set screw
- An additional pilot-controlled check valve can be fitted to the 'clamping' port

DESCRIPTION: Self-centering vises position and clamp workpieces exactly on a defined symmetrical axis, taking account of their contours.

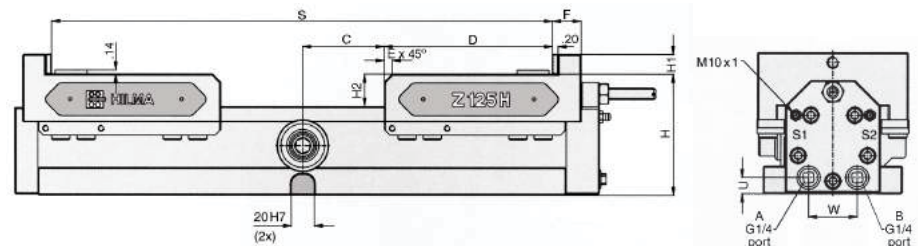
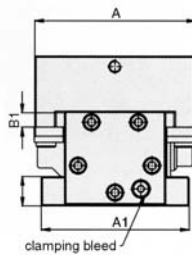
They may be used in machining centers, on machine tools and final processing machines as well as in special jigs and fixtures.

Hydraulic clamping and unclamping is powered by an external pressure transmitter with a double-acting circuit.

The adjustable synchronizing device ensures high centering precision.



Connections:  
Port A - clamping  
Port B - unclamping  
S1 - oil lubrication slide 1  
S2 - oil lubrication slide 2



Includes:

- Fitting key, positioning and mounting holes for standard and special jaws
- Keyway across the length for positioning
- Clamping edge for claws
- Lubrication nipples and connections, respectively, for central lubrication.
- Oil ports 1/4 BSPP, A - clamping, B - unclamping

INSTALLATION (EXAMPLE) For hydraulic oil supply, pump units working intermittently are preferred. In the clamped position, the directional valves are idle, and the operating pressure is maintained by an integral check valve.

Two pressure switches (pump control and machine safety) monitor the adjusted operating pressure.

Clamping and unclamping can be controlled by hand-operated valves, by selector or foot-operated switch or, fully automatic, by signals.

**Do not exceed 300 psi on unclamp circuit. Recommended power unit CLR-886-EP.**

Jaw Width (A)	100mm 3.937"	125mm 4.921"	160mm 6.299"
Max. clamping force (lbs)	3595	5620	8990
Power stroke/slide (in.)	0.87	1.38	1.77
Max. operating pressure (psi)	2175/290	2175/290	2175/290
Fluid required (cu.in.)	3.7	8.4	17
A	3.937	4.921	6.299
A <sub>1</sub>	3.937	4.724	5.59
B	2.91	3.86	7.8
B <sub>1</sub>	0.39	0.51	0.59
C	1.69	2.8	2.95
D	4.53	5.79	7.28
E	0.28	0.28	0.39
F	0.98	0.98	1.18
G	M8x12	M10x15	M12x18
H	3.74	4.13	4.92
H <sub>1</sub>	0.63	0.67	0.79
H <sub>1</sub>	1.02	1.1	1.34
L	15.35	19.69	23.62
M	1.18	1.38	1.57
N	0.98	1.38	1.97
N <sub>1</sub>	0.98	1.26	1.26
S	12.44	17.17	20.47
U	0.51	0.55	0.63
V	1.30	1.93	2.36
W	1.42	1.65	1.81
Weight (lbs)	49	86	150
Part No.	CLRH-9-3542-0101-VS	CLRH-9-3543-0101-VS	CLRH-9-3544-0101-VS
Part No. with Proximity Switches	CLRH-9-3542-0201-VS	CLRH-9-3543-0201-VS	CLRH-9-3544-0201-VS

Subject to change. For further details, including detailed dimensions and mounting instructions, visit [www.clrh.com](http://www.clrh.com).



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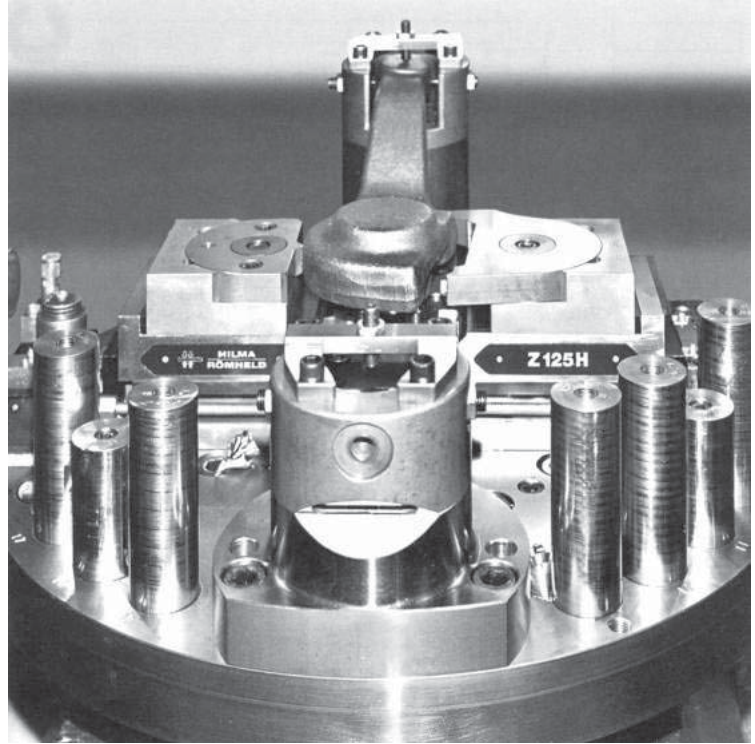
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Engineering — Phone 1-800-827-2526 Web [www.clrh.com](http://www.clrh.com)

# Concentric Vises

2175 psi max to clamp  
290 psi max to unclamp

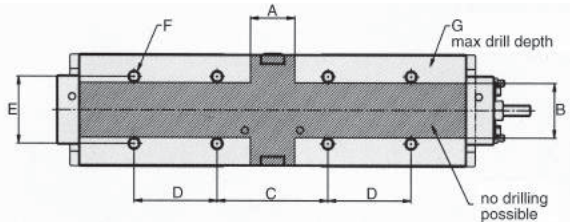


Jaws Quoted  
Upon Request.



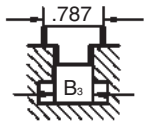
Self-centering vise, hydraulically operated

## Drill template for customized fastening



Type	A	B	C	D	E	F	G
Z 100 H	1.58	1.93	3.94	2.95	2.36	M10x15	.78
Z 125 H	1.78	2.17	6.46	3.27	2.68	M12x20	.86
Z 160 H	2.17	2.37	6.30	4.72	3.15	M12x20	.86

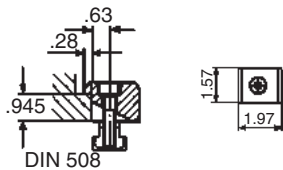
## Accessories



Set of tenon blocks  
DIN 6323

Part No.	Slot in the machine bed
CLRH-3917-4121-VSA	14h6 (B3)
CLRH-3917-4141-VSA	18h6 (B3)

1 set = 2 blocks



Set of clamping claws with  
screws M12x45

Part No.	For safe clamping on the machine bed
CLRH-3777-2011-VSA	1 set = 4 claws



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# INNOVATIVE CLAMPING SOLUTIONS

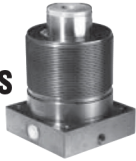
## Power Workholding For CNC Machining

The highest quality power workholding systems to help you remain competitive in today's manufacturing environment.



Swing Clamps

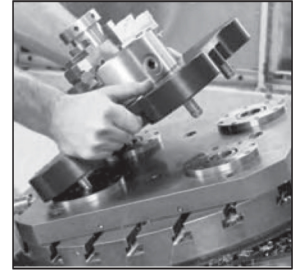
Work Supports



Compact Clamps and Cylinders



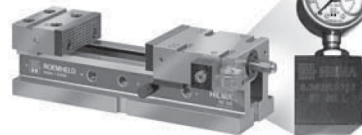
Zero Point Mounting



Power Sources



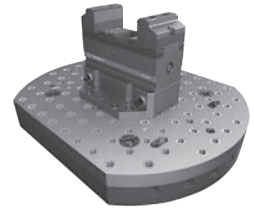
CNC Machine Vises



Valves, Fittings & Accessories

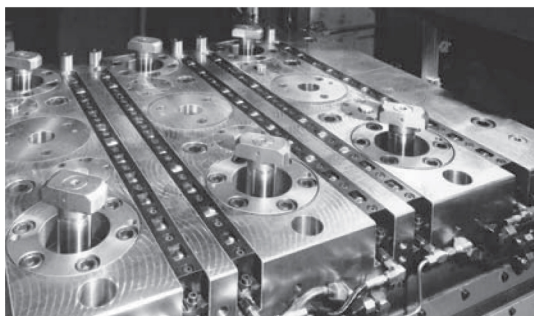


Concentric Clamping Elements

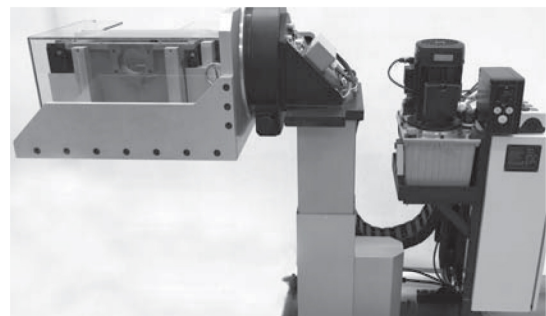


5-Axis Quick-Change Vises

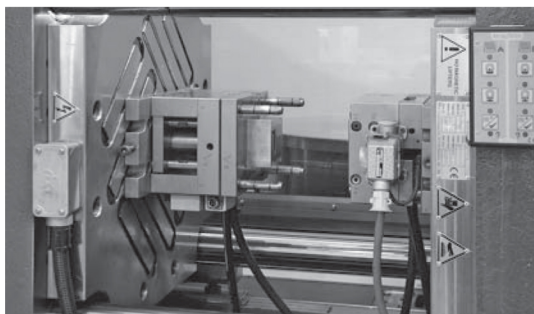
For More Information On Our Supporting Product Lines,  
Visit [www.clrh.com](http://www.clrh.com).



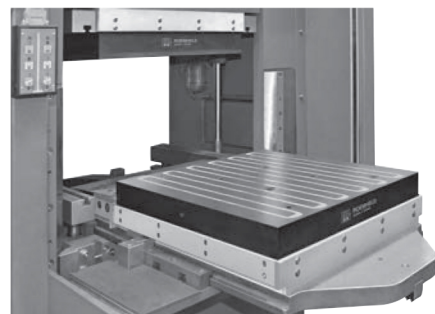
Quick Die Change



Assembly & Handling Technology



Quick Mold Change for Plastics



Quick Mold Change for Rubber



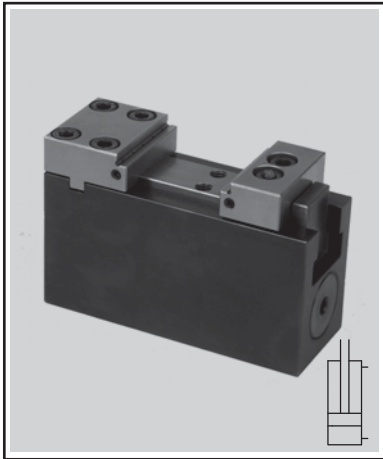
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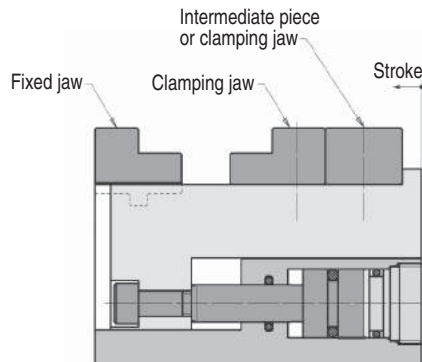
# Vises ■ Fixture Clamps ■ I4.110 & I4.111

## Fixture Clamps with Fixed Jaw ■ Compact vise with jaw widths 1.57" and 2.56" Double Acting ■ Max. Operating Pressure ■ 3625 psi (250 bar)

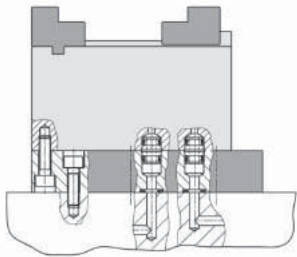


The fixed jaw fixture clamp consists of a very compact body with an integrated hydraulic cylinder that actuates the movable jaw. All threads and ports are at the bottom which allows for a very tight and space savings arrangement. If fastening from the bottom is not possible an adaptor plate for manifold

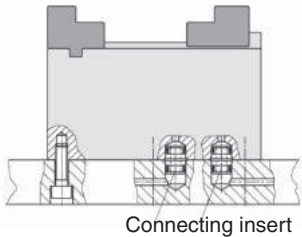
mounting or tube connection is available. Accessory blank jaws are also available that can be milled to match the workpiece contour. The fixed jaw can be equipped with a pneumatic seat control which is well suited for automation applications.



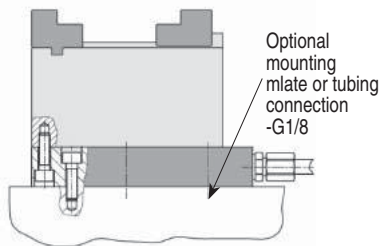
**Fixing from above**  
with accessory adaptor plate  
**Drilled channels**



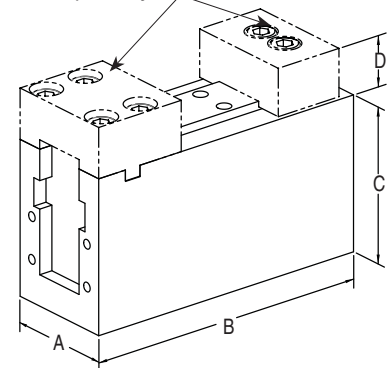
**Fixing from below**  
**Drilled channels**



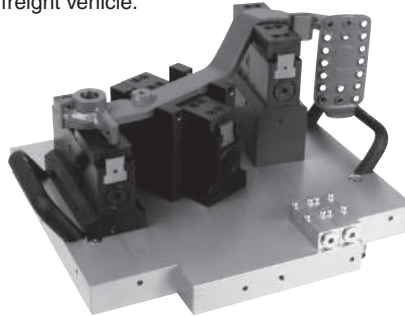
**Fitting connection**



Blank jaws and cap screws sold separately.



**Application example**  
Clamping fixture for a pedal of a freight vehicle.



Jaw Width (in.)		1.57		2.56	
Stroke (in.)		0.20	1.18	0.20	1.77
Clamp Force (lbs)	3625 psi	2135	2135	3370	3370
	2000 psi	1180	1180	1860	1860
	1000 psi	600	600	930	930
A (in.)		1.57	1.57	2.56	2.56
B (in.)		4.13	6.10	6.30	9.45
C (in.)		2.17	2.17	2.56	2.56
D (in.)		0.71	0.71	1.06	1.06
Weight (lbs.)		3.66	4.94	11.13	15.43
Part No.		CLR-4413-001	CLR-4413-031	CLR-4413-101	CLR-4413-131

### Accessories

Part No., Adapter Mounting Plate	CLR-0441-300	CLR-0441-303	CLR-0441-310	CLR-0441-313
Part No., Blank Clamping Jaw	CLR-3548-070	CLR-3548-070	CLR-3548-080	CLR-3548-080
Part No., Blank Fixed Jaw	CLR-3548-071	CLR-3548-071	CLR-3548-081	CLR-3548-081
Part No., Jaw Screws	CLR-3301-107	CLR-3301-107	CLR-3300-700	CLR-3300-700

Subject to change. For further details, including detailed dimensions and mounting instructions, visit [www.clrh.com](http://www.clrh.com).



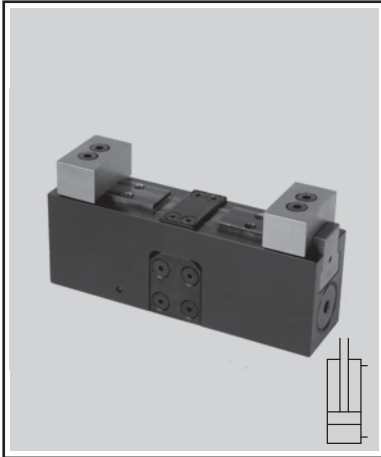
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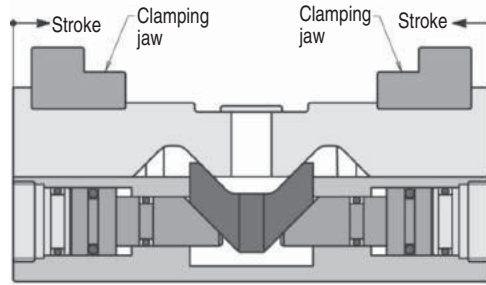
# Vises ■ Fixture Clamps ■ I4.120

## Fixture Clamps, Concentric ■ Compact vise with jaw widths 1.57" and 2.56" Double Acting ■ Max. Operating Pressure ■ 3625 psi (250 bar)

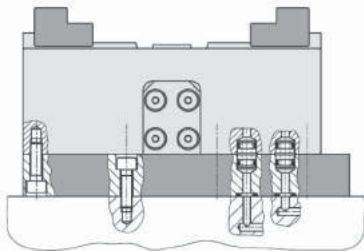


The concentric fixture clamp consists of a very compact body with two integrated hydraulic cylinders that actuate the movable jaws. The piston forces are transferred to a "V" linkage (see cut away below). The "V" linkage then pulls the jaws together in a self-centering fashion. All threads and ports are at the bottom

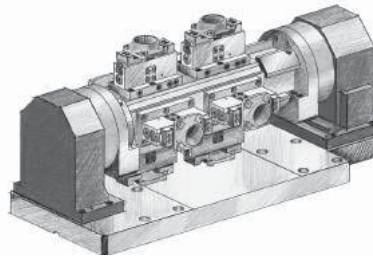
which allows for a very tight and space savings arrangement. If fastening from the bottom is not possible an adaptor plate for manifold mounting or tube connection is available. Accessory blank jaws are also available that can be milled to match the workpiece contour.



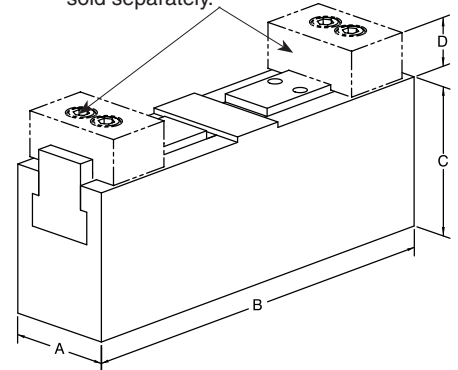
**Fixing from above**  
with accessory adaptor plate  
**Drilled channels**



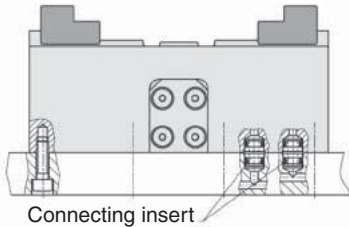
**Application example**  
Clamping fixture for a pedal of a freight vehicle.



Blank jaws and cap screws sold separately.

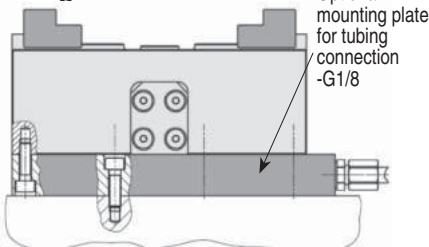


**Fixing from below**  
**Drilled channels**



Connecting insert

**Fitting connection**



Optional mounting plate for tubing connection -G1/8

Jaw Width (in.)		1.57	2.56
Stroke per Jaw (in.)		0.20	0.31
Repeatability +/-		0.0008	0.0008
Clamp Force per Jaw (lbs)	3625 psi	1460	2025
	2000 psi	805	1115
	1000 psi	405	560
A (in.)		1.57	2.56
B (in.)		6.10	7.87
C (in.)		2.17	2.56
D (in.)		0.71	1.10
Weight (lbs.)		5.29	13.23
Part No.		CLR-4413-051	CLR-4413-151

### Accessories

Part No., Adapter Mounting Plate	CLR-0441-305	CLR-0441-315
Part No., Blank Clamping Jaw	CLR-3548-070	CLR-3548-080
Part No., Jaw Screws	CLR-3301-107	CLR-3300-625

Subject to change. For further details, including detailed dimensions and mounting instructions, visit [www.clrh.com](http://www.clrh.com).



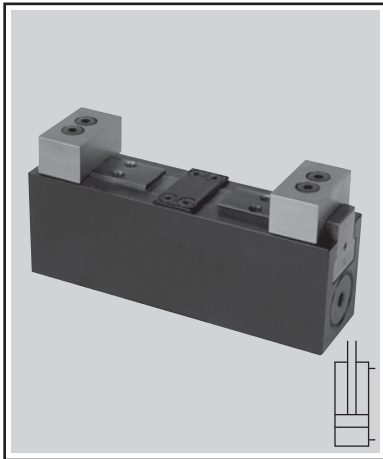
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# Vises ■ Fixture Clamps ■ I4.130

**Fixture Clamps, Position Flexible ■ Compact vise with jaw width 1.57"**  
**Double Acting ■ Max. Operating Pressure ■ 3625 psi (250 bar)**

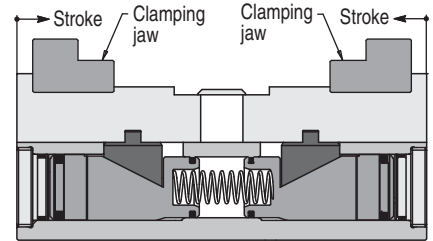
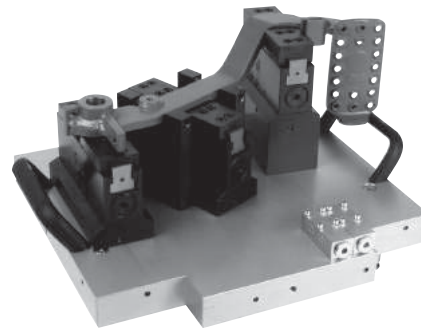


The position flexible fixture clamp consists of a very compact body with integrated hydraulic cylinders that actuate the movable jaws. The piston forces are transmitted via two channels to the clamping slides. The design allows the clamping slides to move independently of each. A minimal contact force is applied to the part until both jaws are in contact with the workpiece. At that point the pressure builds

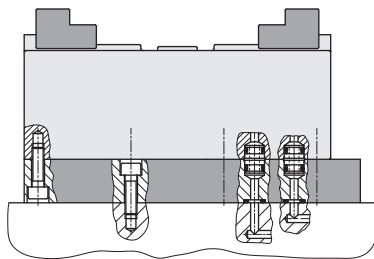
along with the clamping force. All threads and ports are at the bottom which allows for a very tight and space savings arrangement. If fastening from the bottom is not possible an adaptor plate for manifold mounting or tube connection is available. Accessory blank jaws are also available that can be milled to match the workpiece contour.

### Application example

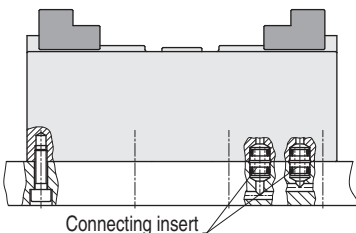
Clamping fixture for a pedal of a freight vehicle.



**Fixing from above**  
with accessory adaptor plate  
**Drilled channels**

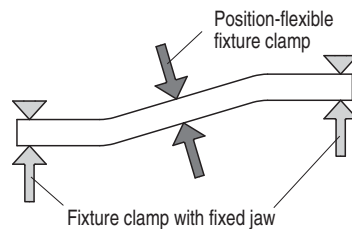


**Fixing from below**  
**Drilled channels**

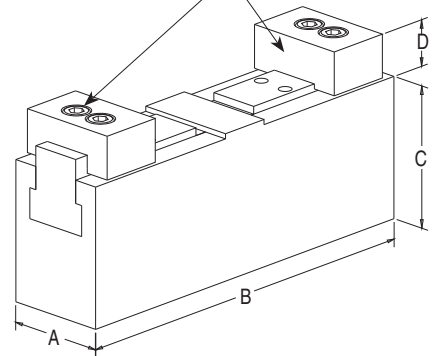


Connecting insert

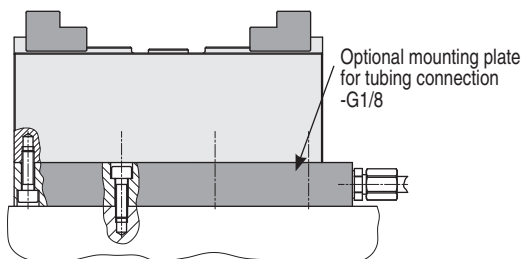
### Clamping principle



Blank jaws and cap screws sold separately.



### Pipe thread



Optional mounting plate  
for tubing connection  
-G1/8

Jaw Width (in.)	1.57	
Stroke per Jaw (in.)	0.31	
Clamp Force per Jaw (lbs)	3625 psi	1800
	2000 psi	990
	1000 psi	495
A (in.)	1.57	
B (in.)	6.10	
C (in.)	2.17	
D (in.)	0.71	
Weight (lbs.)	5.51	
Part No.	CLR-4413-080	

### Accessories

Part No., Adapter Mounting Plate	CLR-0441-305
Part No., Blank Clamping Jaw	CLR-3548-070
Part No., Jaw Screws	CLR-3301-107

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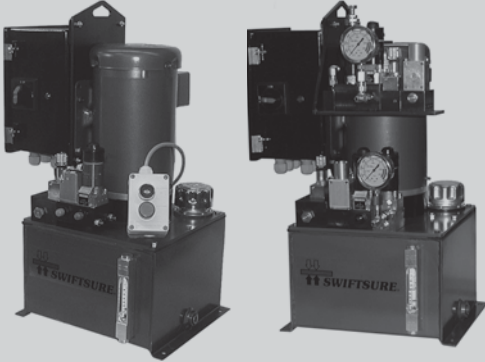


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# Power Sources



**Electric Power Units**  
pages 645-648

## Electric Power Units

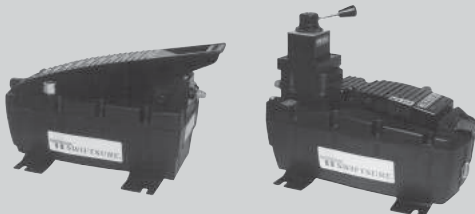
**Electric Power Units** are the best power source for most uses. Complete, compact, quiet, and fully automatic. Include pump, reservoir, switches, valves, gauge, and numerous safety devices. Extremely long life. Enough fluid capacity for virtually any fixture. Up to 7250 psi output pressures. 120, 220, or 440 volt.



**Air Power Units**  
pages 649-650

## Air Power Units

Economical power source, driven by shop air pressure, includes pump, reservoir, valves, gauges, air filter, muffler, and air extractor/dryer. Very quiet. Ideal for hazardous locations. Enough fluid capacity for virtually any fixture. Up to 7250 psi output pressure.



**Compact Air Power Units**  
page 651

**Compact Air Power Units** are ideal for smaller hydraulic clamping and assembly fixtures with single or double-acting hydraulic elements. Ordinary shop air is all that is required to drive these units.

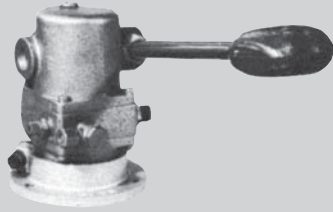


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# Power Sources



**Single Stage Pumps**  
pages 652

## Hand Pumps

Manual power source for moderate-size factors. Compact and portable. Ideal for sensitive test fixtures. Choice of hand or foot operation.



**Screw Pumps**  
pages 653

## Screw Pumps

Small enough to mount directly on fixture. Operate manually or with a power torque wrench. Ideal for rotary index tables and palletized fixtures where a feed line is impractical.



**Compact Hydraulic Intensifiers**  
pages 654-655

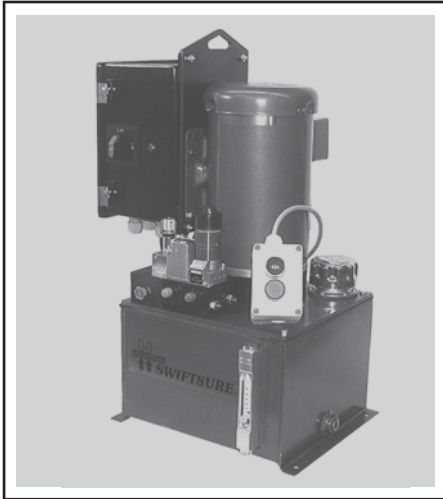
## Hydraulic Intensifiers

Hydraulic Intensifiers convert hydraulic pressure on the input to a higher pressure on the output. This compact cylinder style intensifier enables the use of the comparatively low pressure of machine tool hydraulics to pressurize hydraulic clamping fixtures with a correspondingly increased input pressure.



# Electric Power Units

**7250/5000 psi max**  
Single and double acting

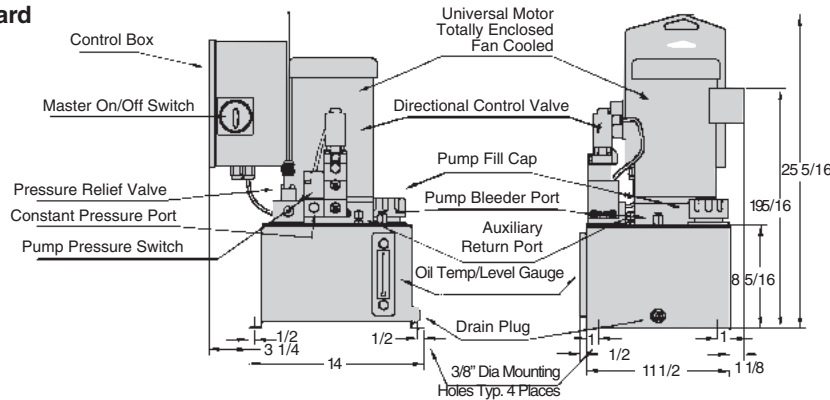


**Standard**

- Complete power unit with electrical and hydraulic controls
- Totally enclosed fan cooled single and three phase universal motors
- Thermal overload relay with automatic reset when normal conditions return
- Remote clamp-unclamp push button switch(s)
- Pressure adjustable from 1500 to maximum
- Quiet long life radial piston pump
- Filler breather with inlet screen
- Leak free fittings and poppet valves

**SETUP AND OPERATION:** Connect to fused electrical supply, fill with clean, approved hydraulic fluid and connect to fixture. Mount push button clamping switch near the operator (two furnished with shuttle machine units). Push one button to clamp and unclamp.

**OPERATING PRINCIPLES:** The heart of the unit is a precision, long-life radial-piston pump controlled upon pressure demand by the integral pressure switch. This switch is adjustable, to give you precise and repeatable clamping forces. Automatic pressure control is assured, because the pump restarts if pressure drops. Clamping pressure is assured even with an electrical power failure since the solenoid valves are mechanically held in the clamped position - and only need power to unclamp. The poppet design of these valves means positive, leakage-free sealing.



Adjustable operating pressure	1160-7250		725-5075		725-5075	
	460 volts 3 Phase 60Hz	230 volts 3 Phase 60Hz	230 volts 1 Phase 60Hz	115 volts 1 Phase 60Hz	460 volts 3 Phase 60Hz	230 volts 3 Phase 60Hz
Flow rate (cu.in/min)	66	66	66	66	106	106
Usable fluid capacity (cu.in)	400	400	400	400	400	400
Reservoir capacity (cu.in.)	690	690	690	690	690	690
Motor horsepower	1.5	1.5	1.0	1.0	1.5	1.5
Motor amperage	2.1	4.2	6.4	12.8	2.1	4.2
Noise level @ 3 ft.(dBA)	75	75	75	75	75	75
Max. uninterrupted running time (sec.)	15-120	15-120	15-120	15-120	15-120	15-120
Max. % of cycle pump should operate	25-40%	25-40%	25-40%	25-40%	25-40%	25-40%
Weight (lbs.)	110	110	110	110	110	110
Part No. Basic Pump (No Controls or Valves)	CLR-9301-EP	CLR-8301-EP	CLR-93011-EP	CLR-83011-EP	CLR-9302-EP	CLR-8302-EP
Part No. Single Acting System	CLR-931-EP	CLR-831-EP	CLR-9321-EP	CLR-8321-EP	CLR-932-EP	CLR-832-EP
Part No. Double Acting System	CLR-933-EP	CLR-833-EP	CLR-9341-EP	CLR-8341-EP	CLR-934-EP	CLR-834-EP
2 Independent S/A systems (shuttle machining)	CLR-935-EP	CLR-835-EP	CLR-9361-EP	CLR-8361-EP	CLR-936-EP	CLR-836-EP
2 Independent D/A systems (shuttle machining)	CLR-937-EP	CLR-837-EP	CLR-9381-EP	CLR-8381-EP	CLR-938-EP	CLR-838-EP
Manual Decoupling System Double Acting	CLR-939-EP	CLR-839-EP	CLR-9401-EP	CLR-8401-EP	CLR-940-EP	CLR-840-EP
Auto Decoupling System S/A Customer control	CLR-941-EP	CLR-841-EP	CLR-9421-EP	CLR-8421-EP	CLR-942-EP	CLR-842-EP
Auto Decoupling System D/A Customer control	CLR-943-EP	CLR-843-EP	CLR-9441-EP	CLR-8441-EP	CLR-944-EP	CLR-844-EP

All Pump Systems contain Controls and Valve packages ready to go. No add on packages required. Fluid Recommendations are in F&A section. SPECIALS AVAILABLE, CONSULT ENGINEERING 1-800-827-2526



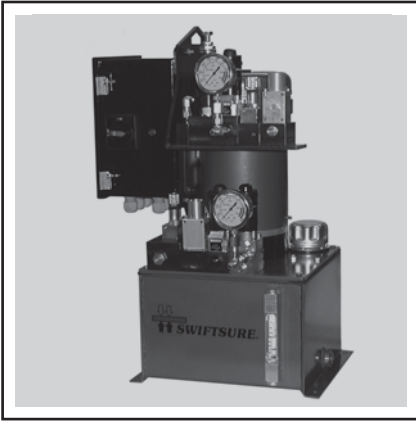
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# Electric Power Units

**7250/5000 psi max**  
Multi-Pressure in single and double acting

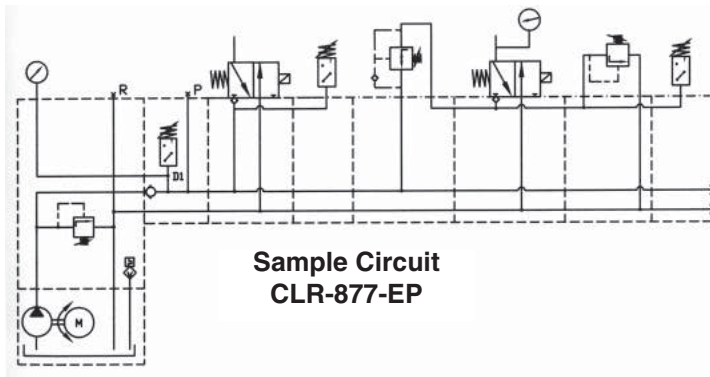


**Multi-Pressure Pumps**

- Complete power unit with electrical and hydraulic controls
- Enclosed fan-cooled single or three phase motor with thermal protection
- Combination temperature/ level switch for pump protection
- Remote clamp-unclamp push button switch(es)
- Pressure adjustable from minimum to maximum as shown in pump chart
- Quiet long life radial piston pump
- Filler breather with inlet screen
- Leak free fittings and poppet valves
- Additional pressure gauges provided for reduced pressure circuits

**SET-UP SUMMARY:** Connect to fused electrical supply, fill with oil, and connect to fixture. Prime pump and adjust to desired pressure. Mount push button switch(es) near the operator. Push one button to clamp and unclamp. For complete set-up instructions, see operating manual.

**OPERATING PRINCIPLES:** The heart of the unit is a precision, long-life radial-piston pump controlled upon pressure demand by the integral pressure switch. This switch is adjustable, to give you precise and repeatable clamping forces. The secondary pressure is controlled by a poppet style pressure reducing valve. This secondary low pressure circuit is adjustable between 450 and 5500 psi. Automatic pressure control is assured, because the pump restarts if pressure drops. Clamping pressure is assured even with an electrical power failure since the solenoid valves are mechanically held in the clamped position - and only need power to unclamp. The poppet design of these valves means positive, leakage-free sealing.



**Sample Circuit  
CLR-877-EP**

Adjustable Primary Operating Pressure	1160-7250 psi		725-5075 psi		725-5075 psi	
	460 volts 3 Phase 60Hz	230 volts 3 Phase 60Hz	230 volts 1 Phase 60Hz	115 volts 1 Phase 60Hz	460 volts 3 Phase 60Hz	230 volts 3 Phase 60Hz
Power Supply	460 volts 3 Phase 60Hz	230 volts 3 Phase 60Hz	230 volts 1 Phase 60Hz	115 volts 1 Phase 60Hz	460 volts 3 Phase 60Hz	230 volts 3 Phase 60Hz
Flow rate (cu.in./min.)	66	66	66	66	106	106
Usable fluid capacity (cu.in.)	400	400	400	400	400	400
Reservoir capacity (cu.in.)	690	690	690	690	690	690
Motor horsepower	1.5	1.5	1.0	1.0	1.5	1.5
Motor amperage	2.1	4.2	6.4	12.8	2.1	4.2
Nose level @ 3ft. (dBA)	75	75	75	75	75	75
Max. uninterrupted running time (sec.)	15-120	15-120	15-120	15-120	15-120	15-120
Max. % of cycle pump should operate	25-40%	25-40%	25-40%	25-40%	25-40%	25-40%
Two S/A Circuits, One Reduced W/One Pendent	CLR-951-EP	CLR-851-EP	CLR-9521-EP	CLR-8521-EP	CLR-952-EP	CLR-852-EP
Two D/A Circuits, One Reduced W/One Pendent	CLR-953-EP	CLR-853-EP	CLR-9541-EP	CLR-8541-EP	CLR-954-EP	CLR-854-EP
Two S/A Circuits, One Reduced W/Two Pendants	CLR-955-EP	CLR-855-EP	CLR-9561-EP	CLR-8561-EP	CLR-956-EP	CLR-856-EP
Two D/A Circuits, One Reduced W/Two Pendants	CLR-957-EP	CLR-857-EP	CLR-9581-EP	CLR-8581-EP	CLR-958-EP	CLR-858-EP
Two S/A Circuits, One Reduced W/One Pendent & Two Pressure Switches	CLR-959-EP	CLR-859-EP	CLR-9601-EP	CLR-8601-EP	CLR-960-EP	CLR-860-EP
Two D/A Circuits, One Reduced W/One Pendent & Two Pressure Switches	CLR-971-EP	CLR-871-EP	CLR-9721-EP	CLR-8721-EP	CLR-972-EP	CLR-872-EP
Two S/A Circuits, One Reduced W/Two Pendants & Two Pressure Switches	CLR-973-EP	CLR-873-EP	CLR-9741-EP	CLR-8741-EP	CLR-974-EP	CLR-874-EP
Two D/A Circuits, One Reduced W/Two Pendants & Two Pressure Switches	CLR-975-EP	CLR-875-EP	CLR-9761-EP	CLR-8761-EP	CLR-976-EP	CLR-876-EP
Two S/A Circuits, One Reduced W/One Pendent, Two Pressure Switches & One Pressure Relief Valve	CLR-977-EP	CLR-877-EP	CLR-9781-EP	CLR-8781-EP	CLR-978-EP	CLR-878-EP
Two D/A Circuits, One Reduced W/One Pendent, Two Pressure Switches & One Pressure Relief Valve	CLR-979-EP	CLR-879-EP	CLR-9801-EP	CLR-8801-EP	CLR-980-EP	CLR-880-EP
Two S/A Circuits, One Reduced W/Two Pendants, Two Pressure Switches & One Pressure Relief Valve	CLR-981-EP	CLR-881-EP	CLR-9821-EP	CLR-8821-EP	CLR-982-EP	CLR-882-EP
Two D/A Circuits, One Reduced W/Two Pendants, Two Pressure Switches & One Pressure Relief Valve	CLR-983-EP	CLR-883-EP	CLR-9841-EP	CLR-8841-EP	CLR-984-EP	CLR-884-EP

1  
3



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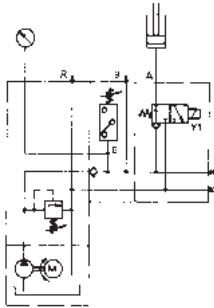


# Electric Power Units

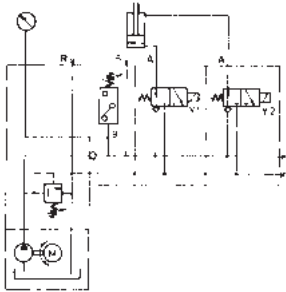
**7250/5000 psi max**  
Single and double acting

**CONTROL OPTIONS:** Electric Power Units are offered with three standard hydraulic/electrical-control options: (1) Single acting, (2) Double acting, (3) Single acting for two independent fixtures.

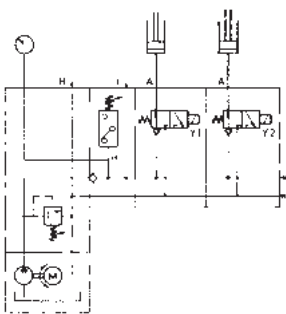
The following hydraulic-circuit diagram shows a single-acting unit.



The diagram below shows a double-acting unit. Double-acting units can be used as single acting units simply by capping the return pressure connection, with a CLR-501-F cap fitting.

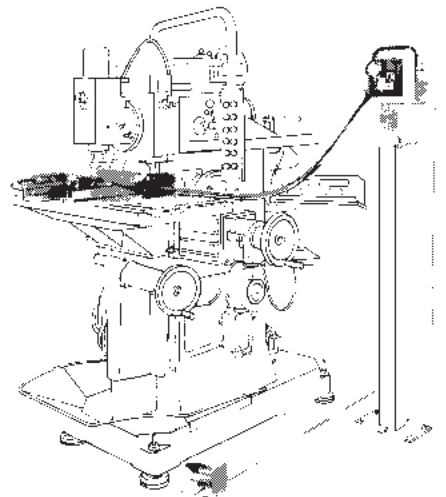


The third diagram shows a single-acting unit for two independent fixtures (shuttle machining). These units have separate clamping switches and valves for each fixture.

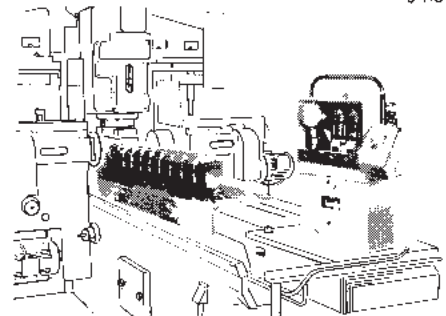
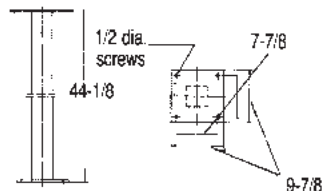


**SAFETY FEATURES:** Fail-safe operation in case of electrical-power failure since the solenoid-operated clamping valves are de-energized in "clamped" position. These valves are poppet type, so they provide tight zero leakage sealing. Units are also equipped with fluid-level and fluid-temperature sensors to protect power units from abuse. If fluid level drops below a minimum level or fluid temperature exceeds 140° F, the unit shuts off and lights an LED. When fluid is replenished or temperature drops, the unit resets itself automatically.

**MOUNTING:** Mount unit upright, preferably above fixture level to keep unit clean. We offer an attractive, economical power-unit stand (below) that bolts to the floor. For mounting directly on machine-tool tables, we offer a vibration-proof mount (also below).



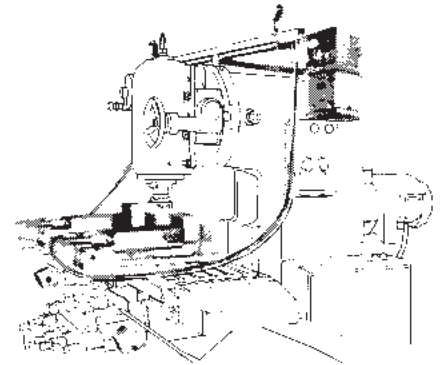
**Power Unit Stand**  
CLR-3532-168-PUA



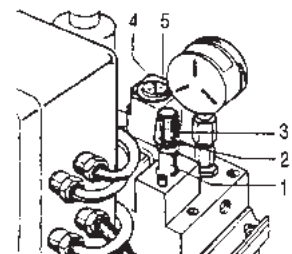
**Vibration-proof mount**  
CLR-3141-308-PUA



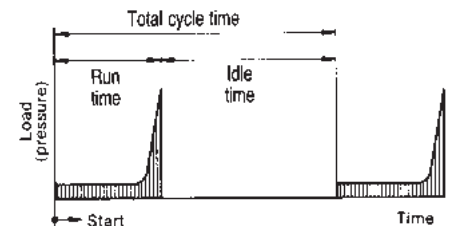
Units can also be mounted on the machine tool using an angle bracket. The photo below shows an overhead traverse bar for convenient hose arrangement. Push-button switches are installed within the operator's reach.



**PRESSURE SETTING:** Set system pressure by adjusting the setting screw (5) on the unit's pressure switch (4) in combination with the knurled knob (3) on the unit's pressure-relief valve (1). Basically, the pressure switch establishes the minimum system pressure (10% drop below setting) and the pressure-relief valve establishes the maximum in case of over pressurization.



**DUTY CYCLE:** Electric Power Units are designed specifically and purely for workholding, with intermittent clamping and unclamping between machining cycles (not continuous running). For most workholding applications, actual running time is a small percentage of total cycle time. The graph below shows typical pump-pressure buildup during a machining cycle.



Run time must be less than 40% of total cycle time with maximum fluid level, 25% with minimum fluid level (7250-psi units). Run time must also be less than 120 seconds with maximum fluid level, 15 seconds with minimum fluid level (7250-psi units). Otherwise the fluid will overheat and the unit will shut off automatically.



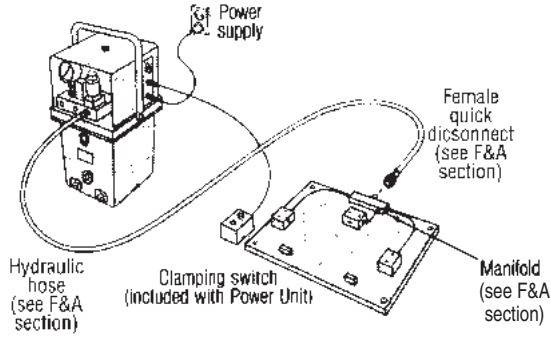
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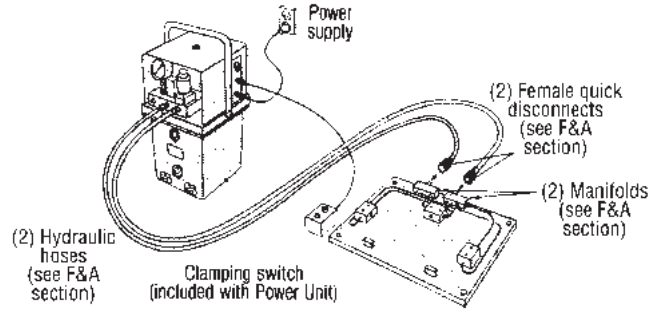
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# Electric Power Units

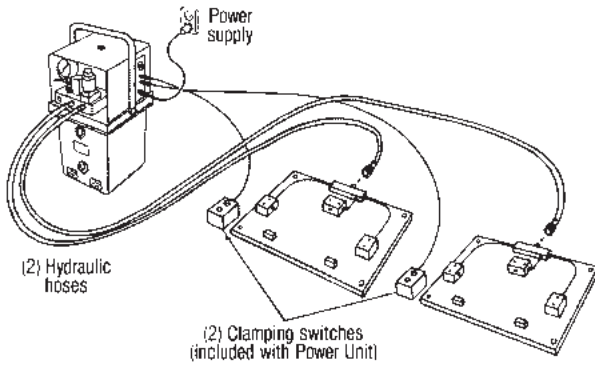
## Connection Examples



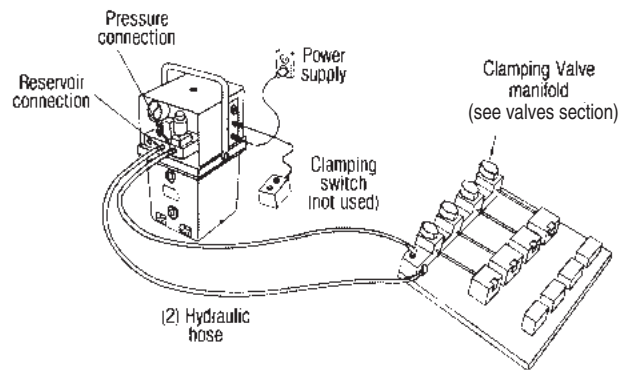
**Single Fixture  
Single Acting**  
(use any Electric Power Unit)



**Single Fixture  
Double Acting**  
(use CLR-933-EP or CLR-833-EP)



**Two Fixtures  
Single Acting**  
(use CLR-935-EP or CLR-835-EP)



**Multiple Parts Clamped Independently  
Single Acting or Double Acting**  
(use any Electric Power Unit)



# Air Power Units

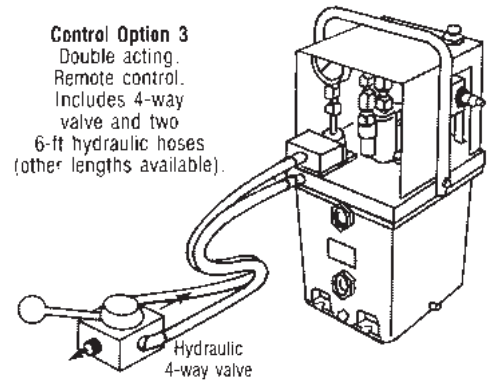
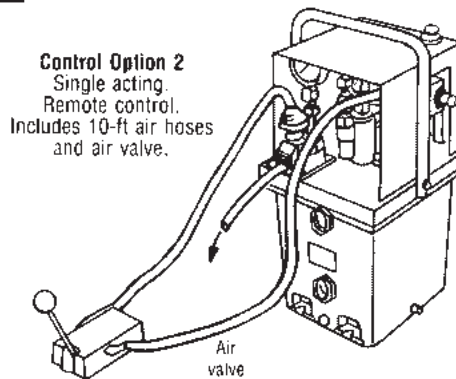
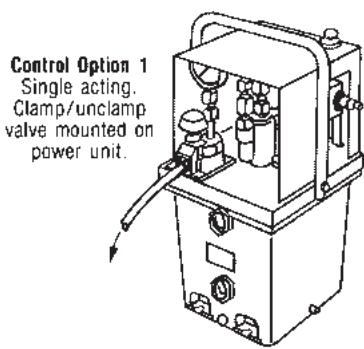
**7250 psi max**  
Single and double acting



- Economical and self-contained. . .just fill with fluid
  - Up to 7250 psi from shop air pressure (only 70-psi air pressure required)
  - Tandem, reciprocating pump automatically restarts to maintain system pressure
  - Holds pressure even if air supply fails
  - Safe in hazardous locations
  - Complete turnkey unit includes clamping valve, filter/regulator/lubricator, air and hydraulic pressure gauges, muffler, and air extractor/dryer
- \*\* Do not use NPT fittings**

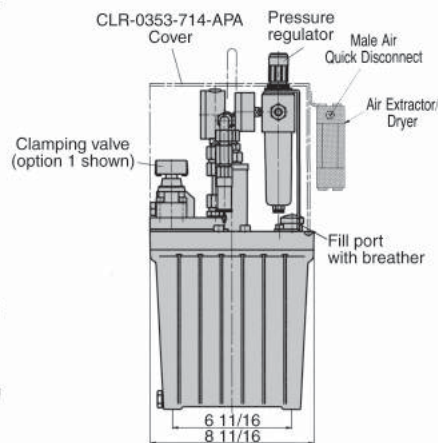
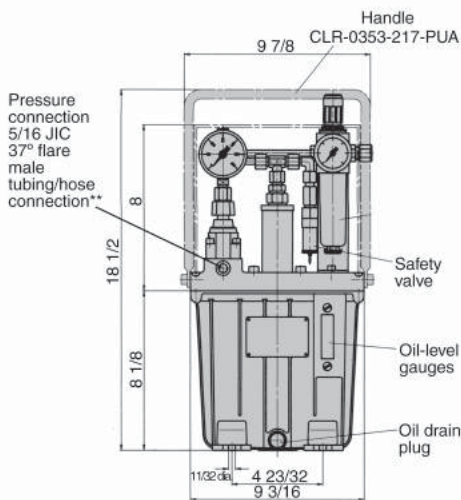
**OPERATION:** Unit is ready to run after you fill the reservoir with fluid (order separately, F&A section) and connect it to an air supply. Adjust the input air pressure, using the unit's air regulator, to adjust output fluid pressure (2200 to 7250-psi range). Only 70-psi air pressure is required to provide 7250-psi fluid pressure.

**FLOW CONTROL:** When using these power units in small circuits containing a Swing Clamp, Extending Clamp, or fluid-advanced Work Support, a simple flow control valve may be necessary. If clamps do not cycle properly, install flow control valve anywhere along the fluid lines to control flow to any or all workholding components.



Power Unit Stand  
CLR-3532-168-PUA  
available upon request

Input Air Pressure (psi)	Output Fluid Pressure (psi)											
	Free flow		1500		3000		4500		6000		7250	
	Flow Rate cu. in./min.	Input Air Vol. CFM	Flow Rate cu. in./min.	Input Air Vol. CFM	Flow Rate cu. in./min.	Input Air Vol. CFM	Flow Rate cu. in./min.	Input Air Vol. CFM	Flow Rate cu. in./min.	Input Air Vol. CFM	Flow Rate cu. in./min.	Input Air Vol. CFM
30	74	23	46	14	8	4	—	—	—	—	—	—
40	82	29	62	22	35	13	—	—	—	—	—	—
50	88	37	69	30	50	20	24	10	—	—	—	—
60	91	43	75	36	60	28	38	18	8	5	—	—
70 and higher	94	48	80	42	68	35	50	27	27	15	5	3



Fluid Recommendations see F&A section.

Operating pressure range	2350-7250 psi
Intensification Ratio	108:1
Flow Rate (cu. in./min.)	see table
Min. input air pressure (psi)	14.5
Usable fluid capacity (cu. in.)	150
Reservoir capacity (cu. in.)	260
Noise level at 3 ft. (dBA)	76
Weight (lbs)	50
<b>Part No.</b> Control option 1	<b>CLR-100-AP</b>
<b>Part No.</b> Control option 2	<b>CLR-102-AP</b>
<b>Part No.</b> Control option 3	<b>CLR-105-AP</b>
<b>Part No.</b> Pump without valves	<b>CLR-106-AP</b>

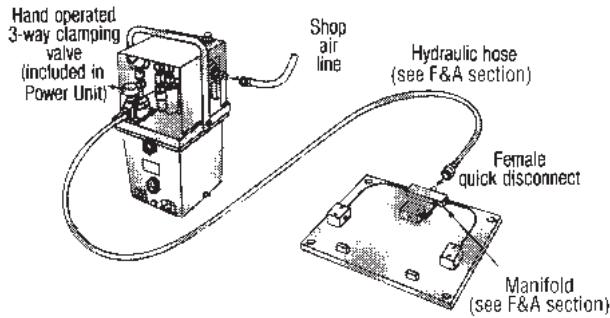


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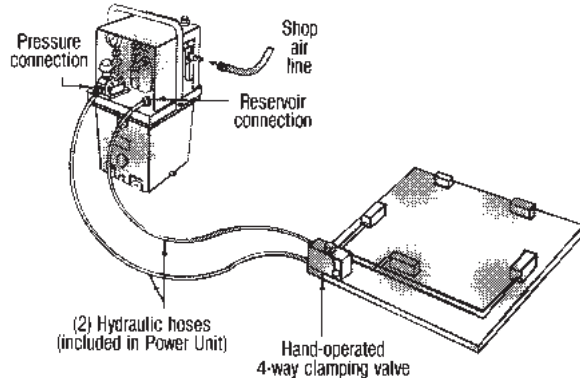
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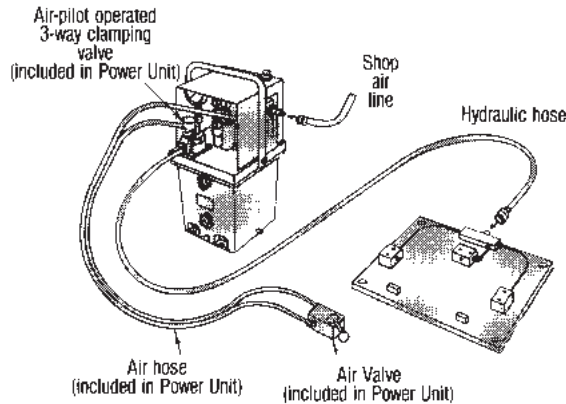
## Connection Examples



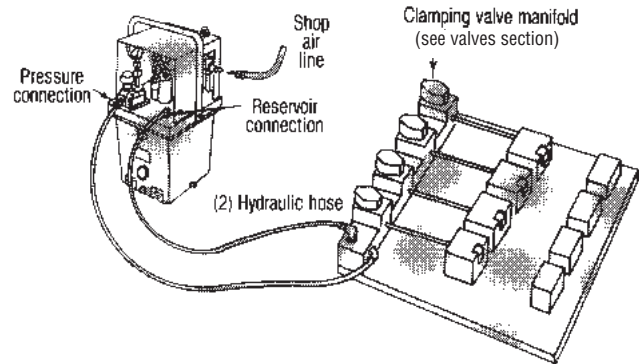
**Single Fixture**  
Valve mounted on unit  
Single Acting  
CLR-100-AP



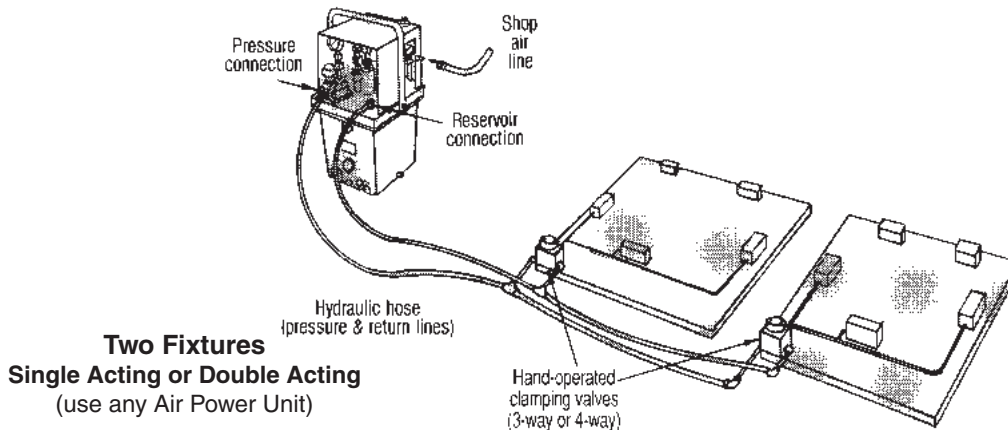
**Single Fixture**  
Double Acting  
CLR-103-AP



**Single Fixture**  
Remote Valve  
Single Acting  
CLR-102-AP



**Multiple Parts Clamped Independently**  
Single Acting or Double Acting  
(Use any Air Power Unit)

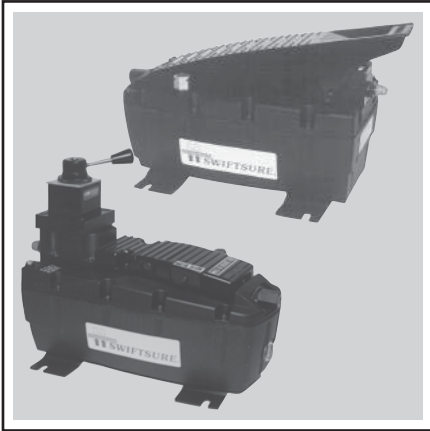


**Two Fixtures**  
Single Acting or Double Acting  
(use any Air Power Unit)



# Air Power Units

**7250 psi max**  
Single/double acting

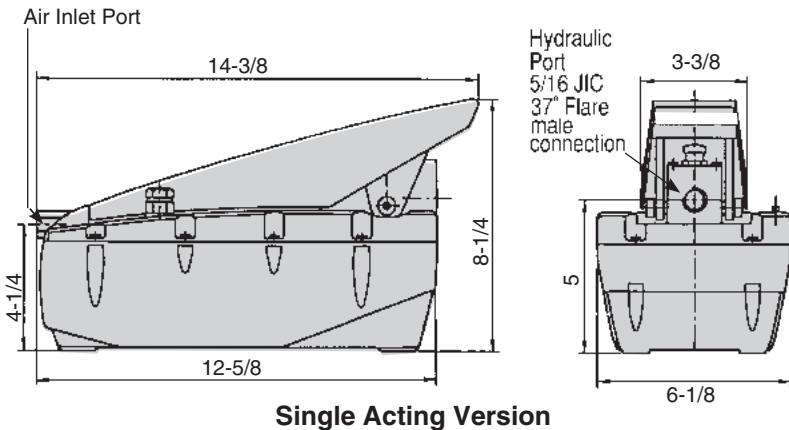


- The hydro-pneumatic pump unit can be operated with oil-free air.
- Due to suitable sound insulation only minimum working noises are obtained.
- The low starting pressure (40 psi) guarantees a quick start of the pump and short cycle time.
- The hydro-pneumatic pump unit is delivered ready for connection

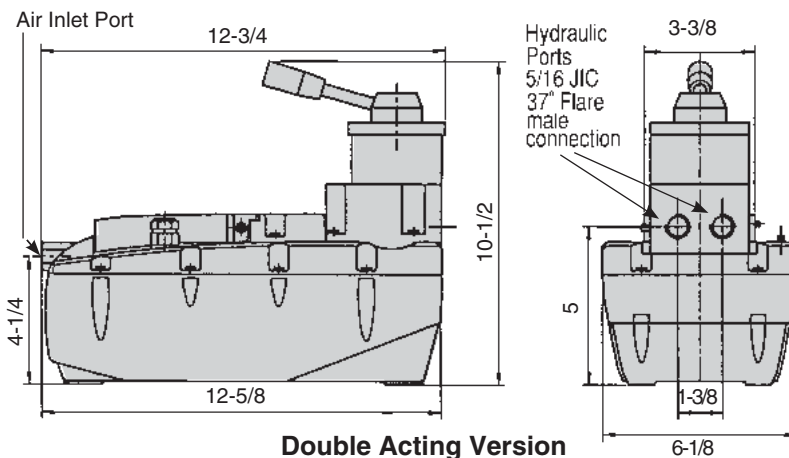
**APPLICATION:** The hydro-pneumatic pump unit is particularly suitable for smaller hydraulic clamping and assembly fixtures with single or double-acting hydraulic elements. As the power supplied is compressed air, it can be used without restriction in hazardous surroundings.

**OPERATION: Single acting version** The single-acting hydro-pneumatic pump unit is manually operated. By operating the pedal the fixture will be clamped or unclamped. The pump delivers oil as long as necessary to achieve the desired hydraulic operating pressure. The air pressure is adjusted by a pneumatic service unit and maintained by an integrated check valve.

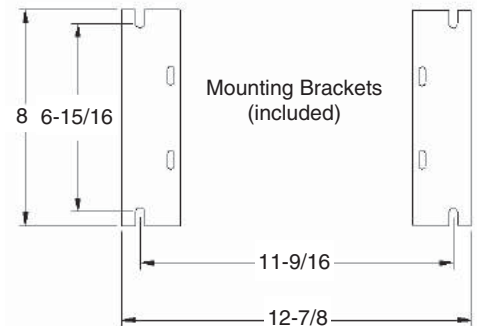
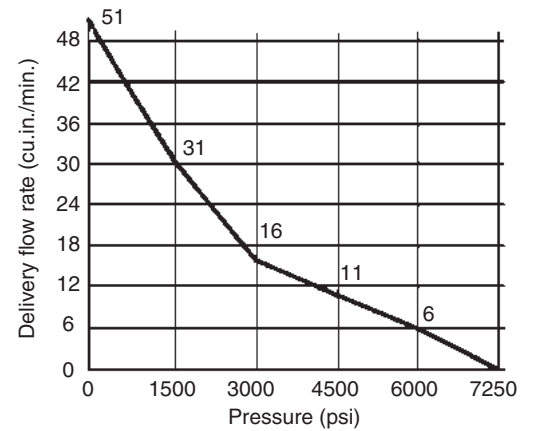
**Double acting version** By means of a locking device the pneumatic directional control valve (at the pneumatic side) is permanently in the opened switching position. By means of the mounted hand-operated hydraulic 4/3 directional control valve double-acting cylinders can be controlled. In the case of a pressure loss, the pneumatic pump operates automatically until the desired hydraulic pressure is realized.



**Single Acting Version**



**Double Acting Version**



<b>Operating Pressure Range</b>	<b>4000-7250</b> psi
Intensification Ratio	100:1
Flow Rate (cu.in./min.)	see graph
Min. input air pressure (psi)	40
Usable fluid capacity (cu.in.) Horiz/Vert	125/90
Reservoir capacity (cu.in.) Horiz/Vert	150/135
<b>Connecting Threads</b>	
• Oil	G 1/4 BSPP
• Air	1/4 NPT
Weight (lbs)	14
<b>Part No., Single Acting</b>	<b>CLR-200-AP</b>
<b>Part No., Double Acting</b>	<b>CLR-203-AP</b>
<b>Part No., Pump only - No Valves</b>	<b>CLR-201-AP</b>

Fluid Recommendations see F&A section.



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# Hand Pumps

7250/3000 psi max  
Single acting



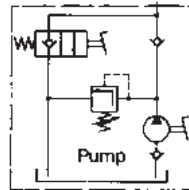
Single Stage

- Very compact
  - Pump and release with the same lever
  - Easily adjustable pressure setting
  - Choice of hand or foot operation
- \*\* Do not use NPT fittings

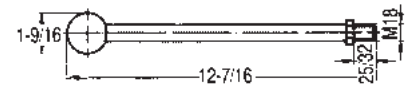
**CLAMPING:** Move pump lever downward to pump fluid, through a 40-degree stroke. Lever returns upward by spring force. Repeat until you reach the set pressure and the lever declutches.

**UNCLAMPING:** Lift pump lever 10 degrees upward against spring force to release clamping force instantly.

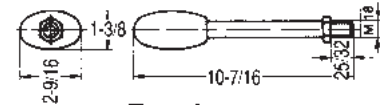
**CONSTRUCTION:** Totally self-contained power source. Virtually wearfree due to metallic seal on pump piston.



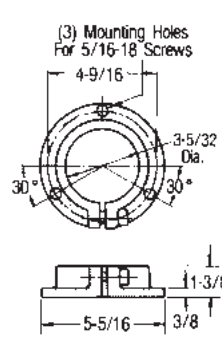
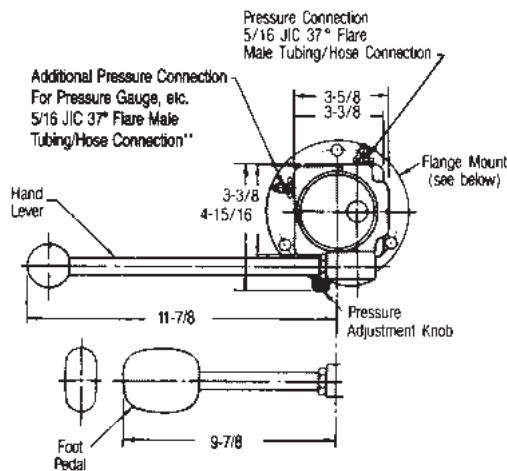
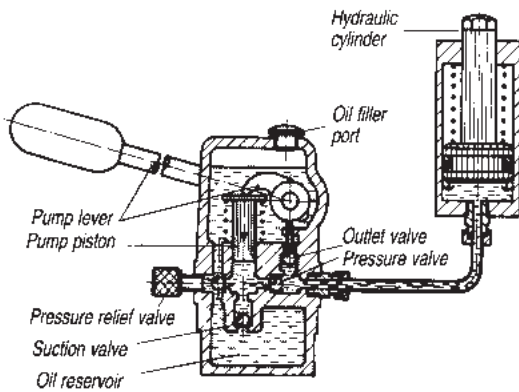
Symbol



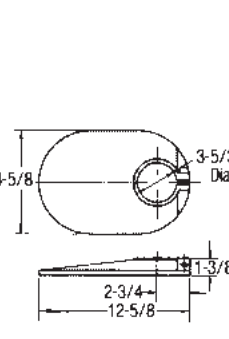
Hand Lever  
CLR-003-HPA



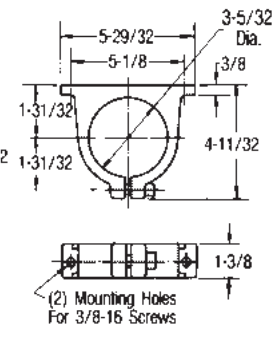
Foot Lever  
CLR-002-HPA



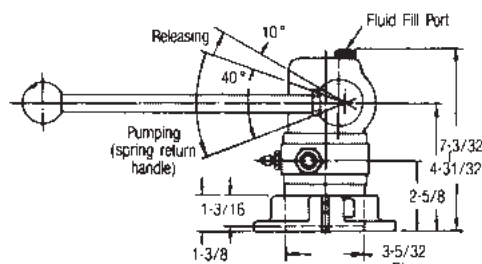
Flange  
CLR-303-HPA



Weighted Base  
CLR-301-HPA



Bracket  
CLR-302-HPA



Operating pressure range	0-7250 psi	0-3000 psi
Displacement per stroke (cu.in.)	.12	.24
Usable oil volume (cu.in.)	9	9
Reservoir capacity (cu.in.)	18	18
Relief valve adjustment range (psi)	150-7250	150-3000
Weight (lbs)	16-27	16-27
Part No. with flange and hand lever	CLR-601-HP	CLR-401-HP
Part No. with flange and foot lever	CLR-602-HP	CLR-402-HP
Part No. with base and hand lever	CLR-603-HP	CLR-403-HP
Part No. with base and foot lever	CLR-604-HP	CLR-404-HP
Part No. with bracket and hand lever	CLR-605-HP	CLR-405-HP
Part No. with bracket and foot lever	CLR-606-HP	CLR-406-HP
Part No., pump only	CLR-600-HP	CLR-400-HP

Fluid Recommendations see F&A section.



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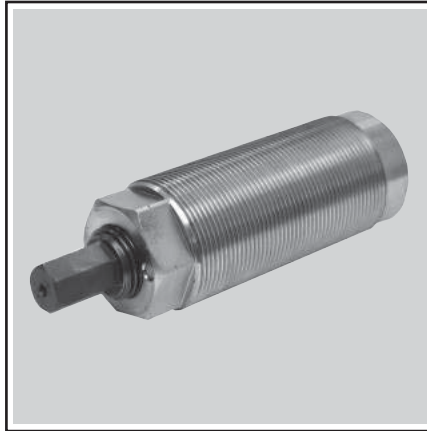
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# Screw Pumps

7250 psi max  
Single acting



**Compact Block**

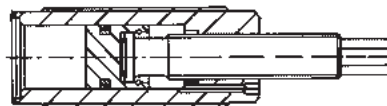
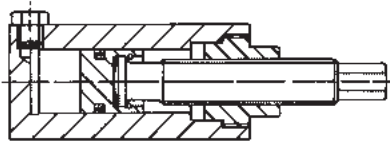


**Cartridge/Manifold Mounted**

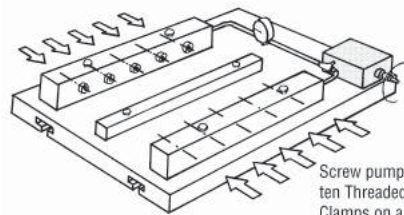
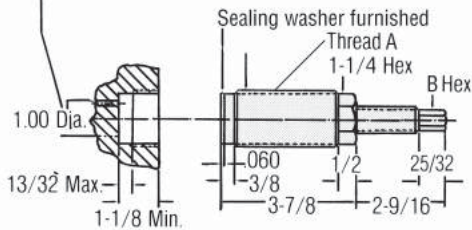
- Compact pressure source
- Ideal for rotary tables or pallets where fluids supply lines are impractical
- Excellent for holding pressure while fixture is transferred
- Can be used in multiples for more fluid capacity
- May be operated with a power torque wrench (non-impact)
- 7250 psi pressure from 38 ft-lbs torque
- \*\* Do not use NPT fittings

**DESIGN CONSIDERATIONS:**

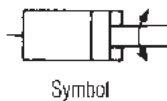
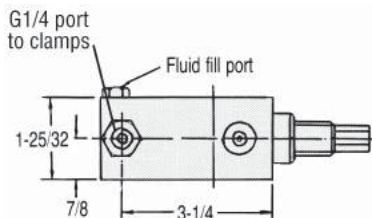
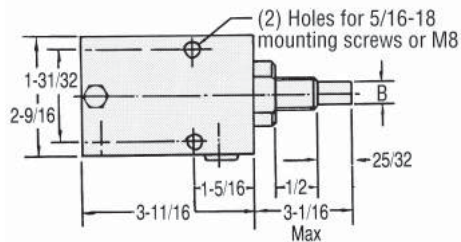
1. Include a pressure gauge in the system (see F&A section).
2. All clamps and components must be leak free, so use only Roemheld products.
3. Since fluid capacity is limited, use only on small fixtures. For best results, clamps should use only 65% of total fluid capacity. Due to limited capacity, use only with smallest accumulator CLR-9606-102-PDA.
4. Systems must be bled carefully and designed to avoid air pockets. Include a separate fill plug on the cartridge mounted version, at the highest point in the system.
5. Mount block-type Screw Pump only horizontally with fluid fill port up.
6. For safety on palletized fixtures, use a control cylinder (F&A section) with a position sensor on the machine.



Within this diameter range, the port drilling should be located as high up as possible



**Hole Preparation for manifold mounting**



<b>Operating Pressure Range</b>	<b>0-7250</b> psi
Total fluid capacity (cu. in.)	1.28
Fluid displacement per revolution (cu. in.)	.06
Installation torque, manifold mounting (ft. lbs.)	58
Weight (lbs)	4.0

**INCH**

A body thread	1-1/2- 16
B Hex	1/2
<b>Part No., compact block</b>	<b>CLR-900-SP</b>
<b>Part No., manifold mounted</b>	<b>CLR-901-SP</b>
<b>Part No., sealing washer</b>	<b>CLR-3000-843-SW</b>

**METRIC**

A body thread	M38 x 1.5
B Hex	SW 13
<b>Part No., compact block</b>	<b>CLR-8819-001-SP</b>
<b>Part No., manifold mounted</b>	<b>CLR-8819-101-SP</b>
<b>Part No., sealing washer</b>	<b>CLR-3000-843-SW</b>



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# Hydraulic Intensifier

7250 psi max



**APPLICATION:** The hydraulic intensifier converts a hydraulic pressure on the primary side (input) into a higher pressure on the secondary side (output).

This enables the use of the comparatively low pressure of machine tool hydraulics to pressurize a hydraulic cylinder with a correspondingly increased intensification ratio.

**DESCRIPTION:** The construction of the hydraulic intensifier corresponds to the principle of pressurizing areas of different sizes. Regulation of the high pressure at the secondary side is made by regulation of the low pressure side and is directly proportional.

First the intensifier delivers a high flow rate at a low pressure (displacement of the cylinders), with increasing counterpressure the intensifier switches automatically to pressure intensification. For unclamping, the cylinder is directly controlled with the low-pressure of the primary side (see example below).

**FUNCTION:** the oil is supplied through input **IN** via the check valves **RV1**, **RV2**, and **DV** to the high pressure output **H** and thereby to the cylinders. In this phase the intensifier is in rapid function. According to the intensification *i* the max. flow rate can be up to 10 liters/min. With increasing pressure in the cylinder the oscillating pump unit **OP** (pulsation) automatically functions. If the adjusted high-pressure is obtained, pulsation of the intensifier is stopped. Pulsation continues in case of dynamic application. Max. frequency of pulsation is 30 Hz.

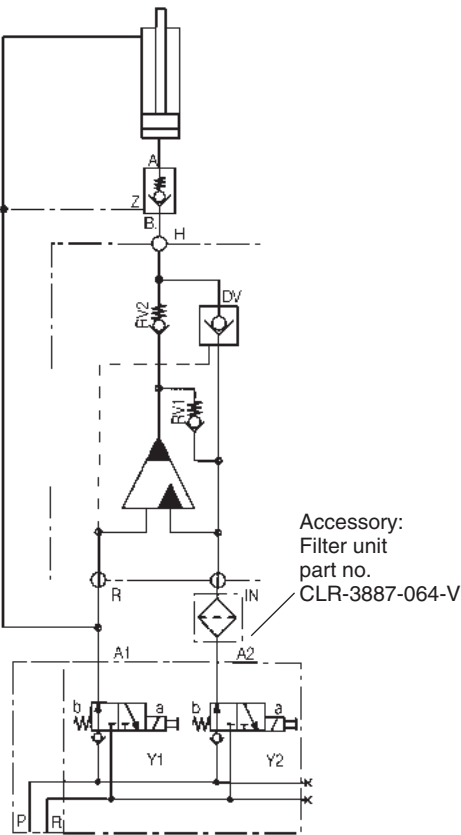
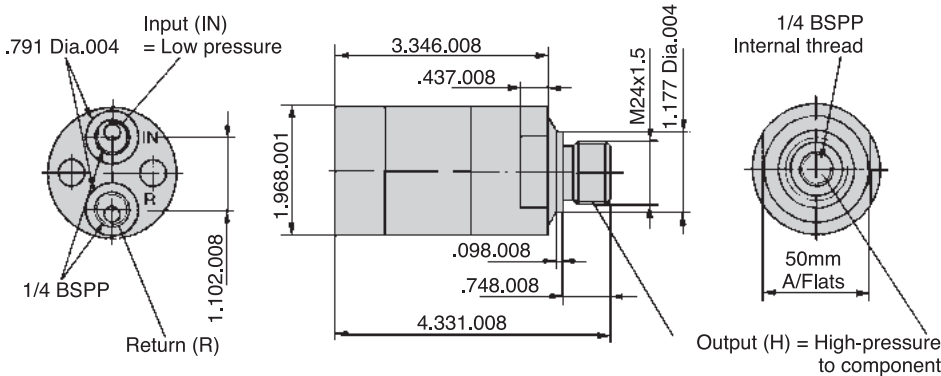
To retract the cylinder, the internal check valve **DV** is controlled via port **R** and thereby free return through the intensifier is guaranteed.

**IMPORTANT NOTES:** The hydraulic oil must be perfectly filtered with particles not larger than nominally 10 micron. This is the reason why we offer a filter unit (part no. CLR-3887-064-V), which can be directly integrated in the tubing of the low-pressure side. If the intensifier will be used on uncoupled systems (no connection to the pressure generator) a pilot-controlled check valve should be mounted at the high-pressure side (consider min. control pressure for opening). For pilot-operated check valve, see valves section.

When designing an installation, pay attention that there can be leakage between the ports **IN** and **R** of the high-pressure intensifier.

**Leakage rate approx. 50 cm<sup>3</sup>/min.** When using the intensifier in uncoupled systems there will be a pressure increase in the unclamping line due to the leakage.

— Please contact us.



Accessory:  
Filter unit  
part no.  
CLR-3887-064-V

Intensification Ratio	1.5	2.0	3.2	4.0	5.0
Max. flow rate Low-pressure side Q <sub>m</sub> (cu.in)	488	488	915	854	854
Max. flow rate, High-pressure side Q <sub>H</sub> (cu.in)	61	48	150	120	98
Max. operating pressure Low-pressure side P <sub>m</sub> psi	3000	3000	2000	1800	1500
Max. operating pressure High-pressure side P <sub>H</sub> psi	4500	6000	7250	7250	7250
Weight (lbs)	2	2	2	2	2
<b>Part No.</b>	<b>CLR-8755-015</b>	<b>CLR-8755-020</b>	<b>CLR-8755-032</b>	<b>CLR-8755-040</b>	<b>CLR-8755-050</b>



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# Hydraulic Intensifier

7250 psi max



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This enables the use of the comparatively low pressure of machine tool hydraulics to pressurize a hydraulic cylinder with a correspondingly increased intensification ratio.

**DESCRIPTION:** The construction of the hydraulic intensifier corresponds to the principle of pressurizing areas of different sizes. Regulation of the high pressure at the secondary side is made by regulation of the low pressure side and is directly proportional.

First the intensifier delivers a high flow rate at a low pressure (displacement of the cylinders), with increasing counterpressure the intensifier switches automatically to pressure intensification. For unclamping, the cylinder is directly controlled with the low-pressure of the primary side (see example on page previous page).

**FUNCTION:** the oil is supplied through input **IN** via the check valves **RV1**, **RV2**, and **DV** to the high pressure output **H** and thereby to the cylinders. In this phase the intensifier is in rapid function. According to the intensification **i** the max. flow rate can be up to 10 liters/min. With increasing pressure in the cylinder the oscillating pump unit **OP** (pulsation)

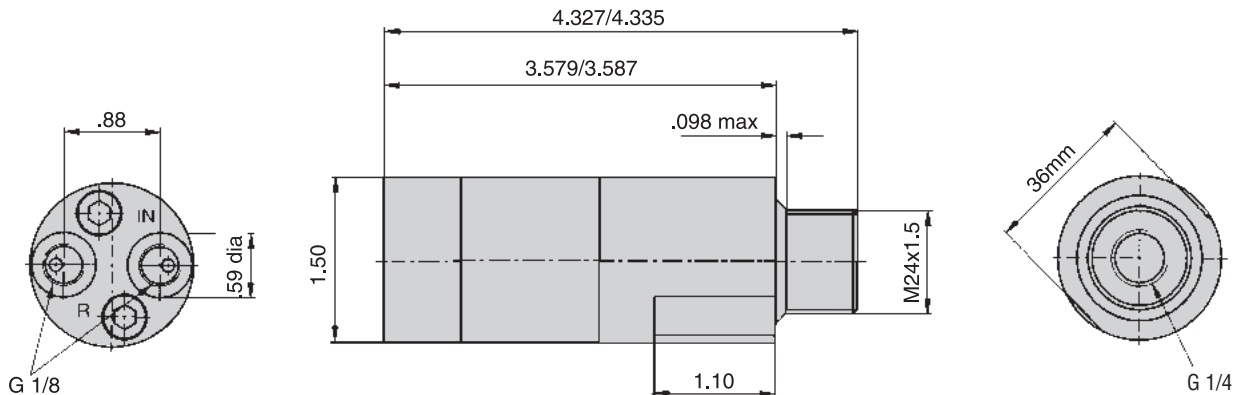
automatically functions. If the adjusted high-pressure is obtained, pulsation of the intensifier is stopped. Pulsation continues in case of dynamic application. Max. frequency of pulsation is 30 Hz.

To retract the cylinder, the internal check valve **DV** is controlled via port **R** and thereby free return through the intensifier is guaranteed.

**IMPORTANT NOTES:** The hydraulic oil must be perfectly filtered with particles not larger than nominally 10 micron. This is the reason why we offer a filter unit (part no. CLR-3887-064-V), which can be directly integrated in the tubing of the low-pressure side. If the intensifier will be used on uncoupled systems (no connection to the pressure generator) a pilot-controlled check valve should be mounted at the high-pressure side (consider min. control pressure for opening). For pilot-operated check valve, see valves section.

When designing an installation, pay attention that there can be leakage between the ports **IN** and **R** of the high-pressure intensifier.

**Leakage rate approx. 50 cm<sup>3</sup>/min.** When using the intensifier in uncoupled systems there will be a pressure increase in the unclamping line due to the leakage. — Please contact us.



Intensification Ratio	3.2	4.0	4.8	6.2	7.5
Max. flow rate Low-pressure side Q <sup>IN</sup> (cu.in/min)	490	490	490	490	490
Max. flow rate, High pressure side Q <sup>H</sup> (cu.in/min)	25	25	25	25	25
Max. operating pressure Low-pressure side P <sup>IN</sup> psi	2250	1800	1500	1100	950
Max. operating pressure High-pressure side P <sup>H</sup> psi	7250	7250	7250	7250	7250
Weight (lbs)	2.2	2.2	2.2	2.2	2.2
<b>Part No.</b>	<b>CLR-8755-132</b>	<b>CLR-8755-140</b>	<b>CLR-8755-148</b>	<b>CLR-8755-162</b>	<b>CLR-8755-175</b>



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# Valves

## Clamping Valves



**Hand-Operated  
Single Acting**



**Hand-Operated  
Double Acting**

For clamping several workpieces from a single power source.



**Cam Roller  
Single Acting**



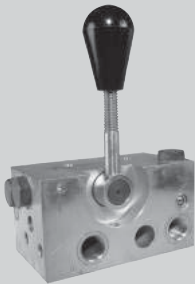
**Air/Hydraulic Pilot  
Single Acting**

page 658



**DC Solenoid  
Single or Double Acting**

page 659



page 660

### Heavy Duty Clamping Valve

Poppet style 4-way clamping valve can be used for single acting or double acting. Great for clamping several workpieces independently with a single power source. Heavy duty for extra-long life.



# Valves

## Control Valves

### Sequence Valves



**Manifold Mounted  
Or Series Mounted**

pages 662-663

For automatic sequencing of locating, clamping, and supporting operations. Easily adjustable trigger pressure. Use in multiples for multi-step sequencing.

### Pressure Control



**Pressure Closing**

page 661



**Pressure Reducing**

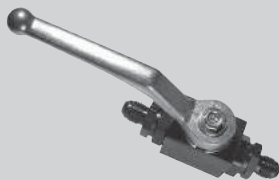
page 664



**Pressure Relief**

page 666

### Shut Off



Use to hold pressure in a fixture during machining.

page 666

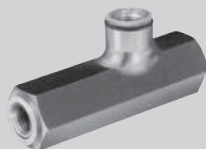
### Flow Control



Use to restrict flow in one direction while allowing free return flow.

page 667

### Check Valves



**Pilot-Operated**

Check valve that permits only one-way flow until released by a pilot fluid line. Available inline or manifold mounted.

pages 665



**Inline, Cartridge Type**

Allows fluid to flow in only one direction.

page 667



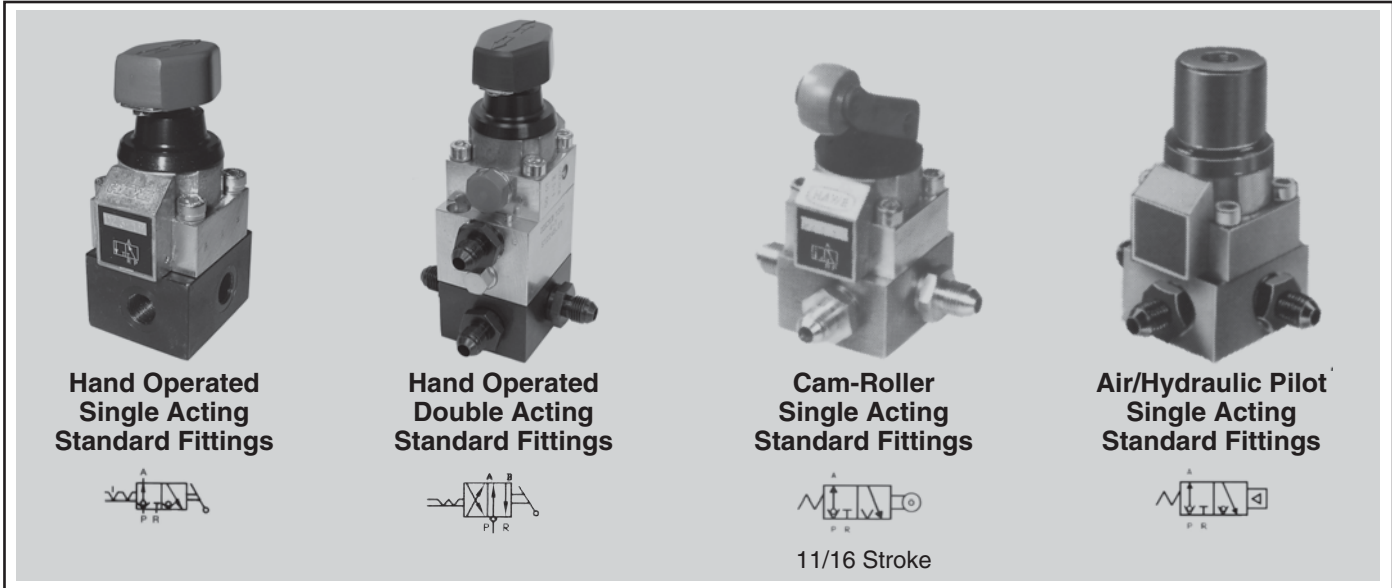
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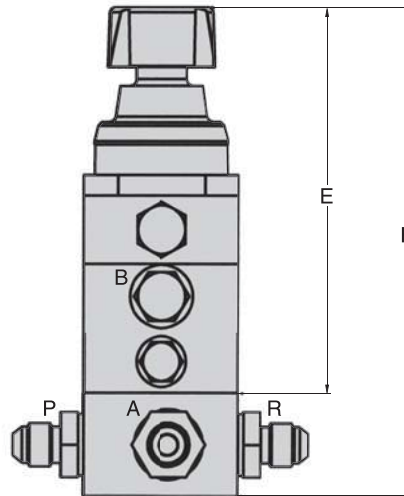
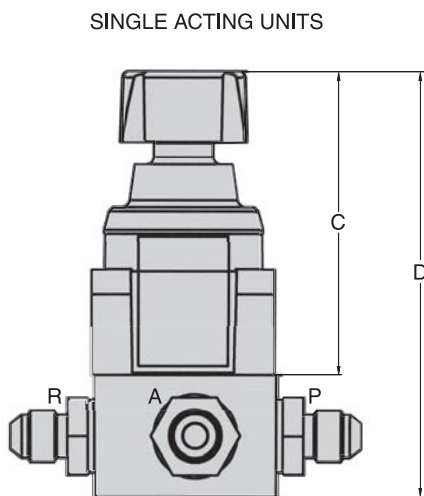
# Clamping Valves

7250 psi max  
Single or double acting

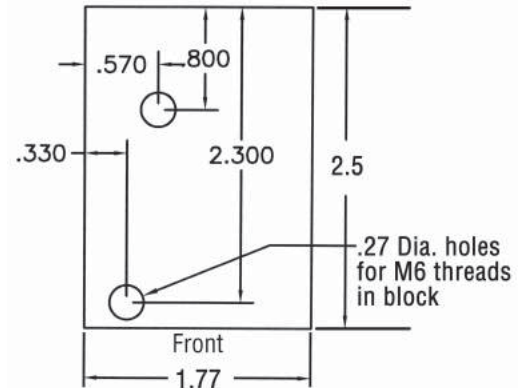


## DOUBLE ACTING UNITS

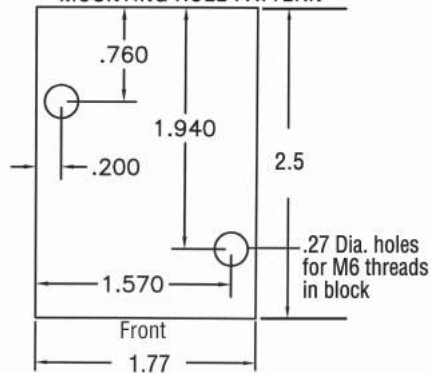
### SINGLE ACTING UNITS



### DOUBLE ACTING - STANDARD FITTINGS MOUNTING HOLE PATTERN



### SINGLE ACTING - STANDARD FITTINGS MOUNTING HOLE PATTERN



Type	Hand Operated	Cam Operated	Air Pilot	Hydraulic Pilot	24V DC Solenoid
C	4.13	4.34	2.81	2.81	5.63
D	5.63	5.84	4.31	4.31	7.13
E	5.51	5.72	4.19	4.19	7.01
F	7.01	7.22	5.69	5.69	8.51
<b>Single Acting Standard Fittings</b>	<b>CLR-225-V</b>	<b>CLR-415-V</b>	<b>CLR-335-V</b>	<b>CLR-345-V</b>	<b>CLR-645-V</b>
<b>Single Acting Manifold Mount</b>	<b>CLR-219-V</b>	<b>CLR-411-V</b>	<b>CLR-319-V</b>	<b>CLR-325-V</b>	<b>CLR-629-V</b>
<b>Double Acting Standard Fittings</b>	<b>CLR-4220-V</b>	<b>CLR-4412-V</b>	<b>CLR-4320-V</b>	<b>CLR-4326-V</b>	<b>CLR-4630-V</b>
<b>Double Acting Manifold Mount</b>	<b>CLR-4219-V</b>	<b>CLR-4411-V</b>	<b>CLR-4319-V</b>	<b>CLR-4325-V</b>	<b>CLR-4629-V</b>



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# Clamping Valves

**7250 psi max**  
Single or double acting



- Use to clamp several workpieces independently with a single power source
- For single-acting or double-acting clamps
- Zero-leakage poppet design with built-in check valve
- Extremely compact
- All electrical coils are continuous duty rated
- \*\* Do not use NPT fittings

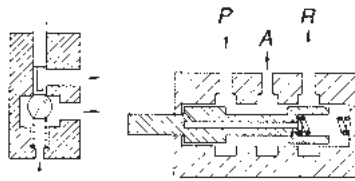
**DESIGN CONSIDERATIONS:** Port connections and flow directions must be exactly as shown on the drawings. Otherwise the valves will not function correctly.

- P - Pressure into valve from power
- R - Return from valve to power source
- A - Flow from valve to clamps and back

Use these valves only with the fluid types we recommend, CLR-2-FL equivalent on **INFO+** page 685). Fluid must be clean (10 micron or better nominal filtration).

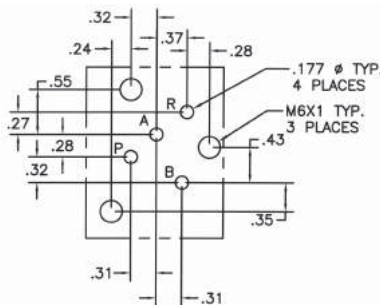
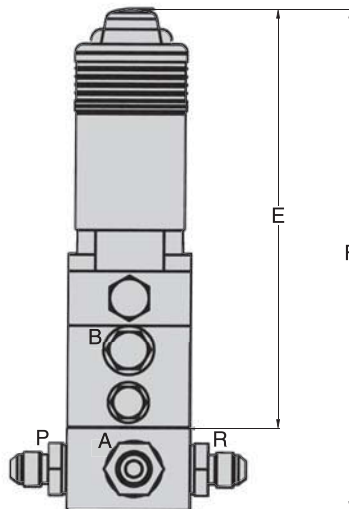
**SOLENOID OPERATED:** Clamp and unclamp automatically using electrical signals from a machine-tool controller. Operate clamps all at once, or individually using one valve per clamp. Stays clamped even if electric power fails, since solenoid is de-energized in the clamped position. 24 Volts DC (+5/-10% allowable voltage deviation). 2000 cycles/hour maximum. 20 watts power consumption. 120, 220, and 440 volt AC valve also available.

**Poppet Valves      Spool Valves**



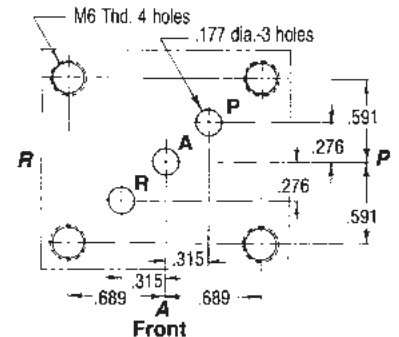
Only Roemheld offers all zero-leakage poppet valves. Others use spool valves, which always have internal leakage due to clearance between the bore and spool.

**DOUBLE ACTING UNITS**



**Double Acting**

Mounting-hole pattern for manifold mounting. Grind surface flat, 32 Ra max. Order valves without base.



**Single Acting**

## Standard DC Solenoid Valve

Type	Solenoid operated
Max. operating pressure (psi)	7250
Max. inrush draw (watts)	20
Max. flow rate (cu. in./min.)	490
Voltage (+5%/-10%)	24 VDC
Make time (milliseconds)	100
Break time (milliseconds)	50
Max. cycles per hour	2000
Weight (lbs)	1.5
<b>Part No., Single Acting</b>	<b>CLR-645-V</b>
<b>Part No., Double Acting</b>	<b>CLR-4630-V</b>

Part no.	Type	Normal position (no signal)	Check valve	Symbol
<b>CLR-4630-V</b>	4-way 2-position	N/A	Yes	
<b>CLR-645-V</b>	3-way 2-position	Open	Yes	
<b>CLR-32361-200-V</b>			No	
<b>CLR-32362-300-V</b>		Closed	Yes	
<b>CLR-32362-200-V</b>	2-way 2-position	Closed	No	
<b>CLR-32361-301-V</b>			No	
<b>CLR-32361-302-V</b>		Open	No	



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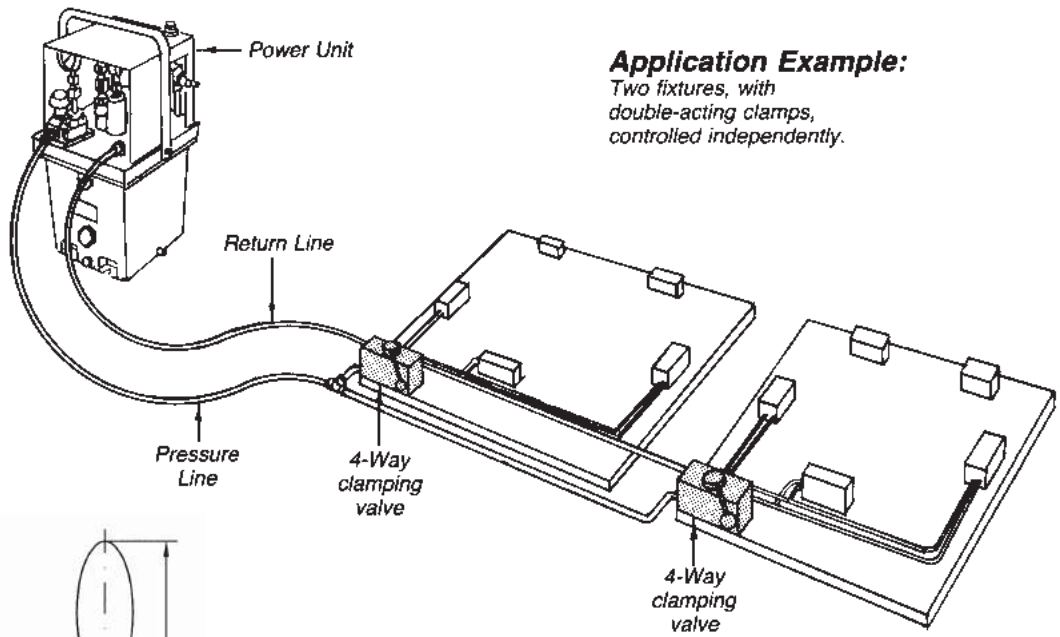
# Clamping Valves (4-Way)

**7250 psi max**  
Single and double acting



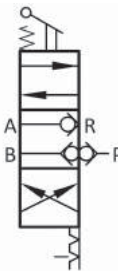
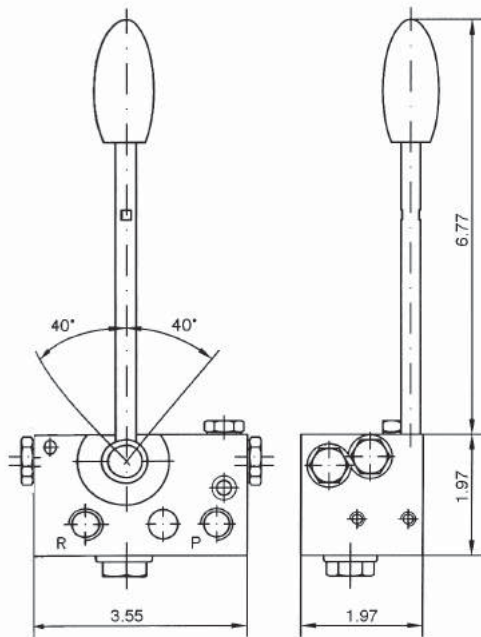
- Use to clamp several work pieces independently with a single power source
  - For double-acting clamps
  - Zero-leakage double-poppet design
- \*\* Do not use NPT fittings

Heavy-duty for extra-long life. Unique double-poppet design for zero leakage. To use with single-acting clamps, use Port Plug CLR-810-F on Port B. Internal check valves ensure fail-safe clamping.



**Application Example:**

Two fixtures, with double-acting clamps, controlled independently.



Max. Oper. Pressure (psi)	7250
Max. Flow Rate (cu. in./min.)	730
Direction of Flow	See Drawing
Port Size	G1/4
Weight (lbs)	2.5
Part No.	CLR-302-V

1  
3



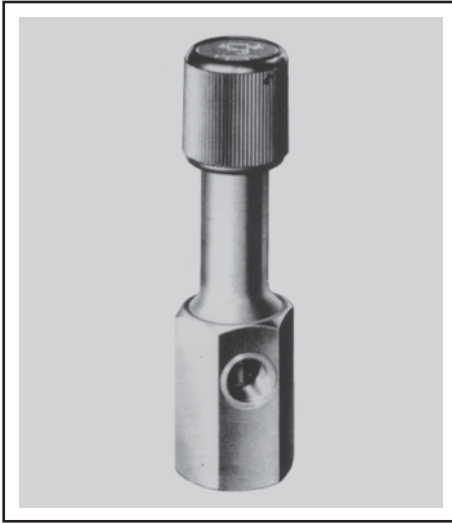
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# Pressure-Controlled Closing Valves

7250 psi max



- Allows different operating pressures in two parts of a fixture
- Can be used on pallet fixtures disconnected from a power source, since no return line is needed
- Allows fine tuning the clamping force of selected components while keeping others constant
- Holds reduced pressure to exact setting, regardless of input pressure
- Zero-leakage poppet design

**OPERATION:** Adjust downstream pressure using knob on top of valve. The valve shuts off downstream fluid flow as soon as system exceeds the set pressure.

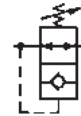
**MOUNTING:** In line. Fittings furnished with valve provide 5/16" JIC 37° flare connections.

**DESIGN CONSIDERATIONS:** After closing, the oil pressure on the secondary side B is not regulated. There can be the following consequences:

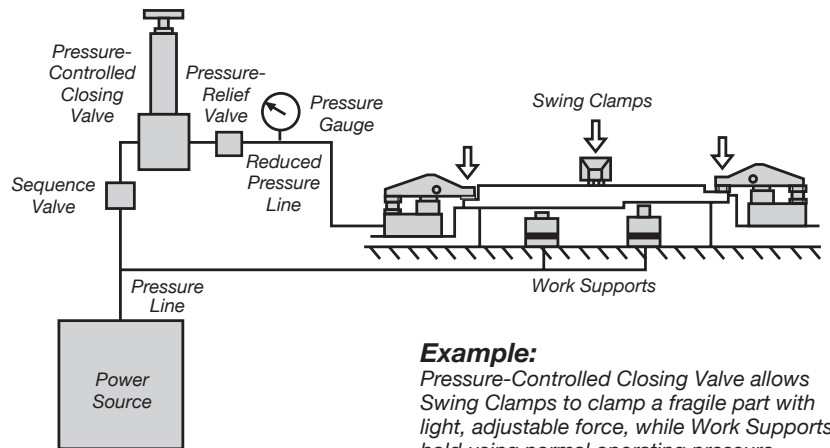
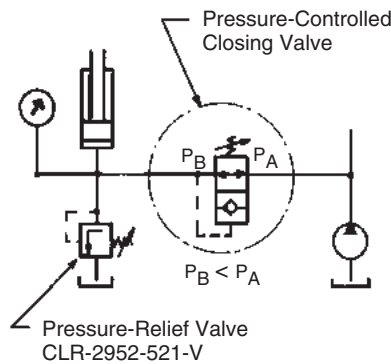
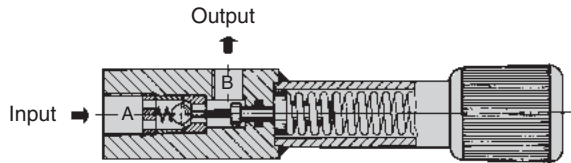
1. Pressure drop if there are leakages or if clamping elements are used which are not leakage free.
2. Pressure increases if there is an increase in temperature or if contamination has gotten in the valve seat and damaged it.

Therefore, it is highly recommended to install a pressure relief valve (CLR-2952-521-V) on the secondary side as a safety measure against pressure increase. By means of a pressure gauge the adjusted pressure can be monitored.

When using this valve in series with other valves (clamp/unclamp valves, sequence valves, etc.), pressure closing valve must be closest to clamps. Please contact factory if pilot operated check valves are to be used on clamps.

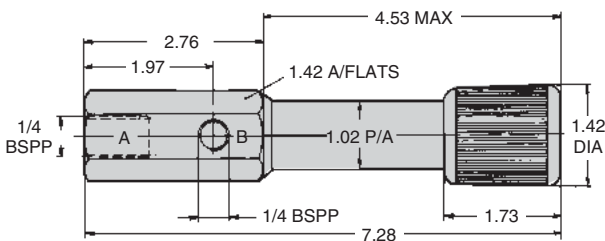


Symbol



**Example:**

Pressure-Controlled Closing Valve allows Swing Clamps to clamp a fragile part with light, adjustable force, while Work Supports hold using normal operating pressure.



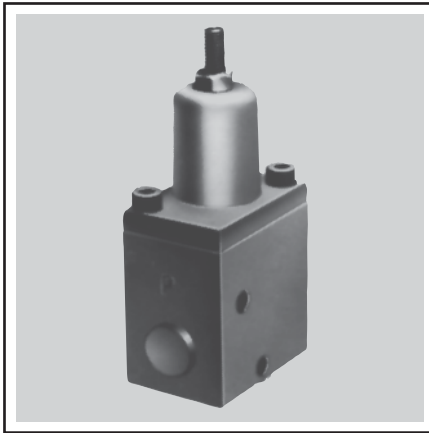
Reduced-pressure adjustment range (psi)	High	Medium	Low
	2900-7250	870-3190	435-1800
Max. operating pressure, input (psi)	7250	7250	7250
Repeatability (+/- psi)	150	150	150
Max. fluid flow rate (cu. in./min.)	730	730	730
Part No.	CLR-2953-002-V	CLR-2953-003-V	CLR-2953-001-V



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- Use to automatically sequence positioning, clamping, and supporting
- Easily adjustable trigger pressure
- Use in multiples for multi-step sequencing

\*\* Do not use NPT fittings

**DESIGN CONSIDERATIONS:** Choose normal pressure-adjustment-range valves instead of low-range valves whenever possible. Normal range models offer a wider adjustment range, especially when used with an Air Power Unit. For multi-stage sequencing, set trigger pressures in steps of at least 750 psi (normal range) or 375 psi (low range).

**STANDARD FITTINGS:** Mount in line. Fasten with two #10 cap screws if desired.

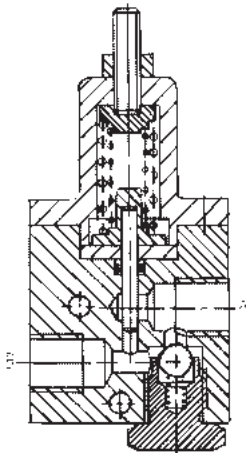
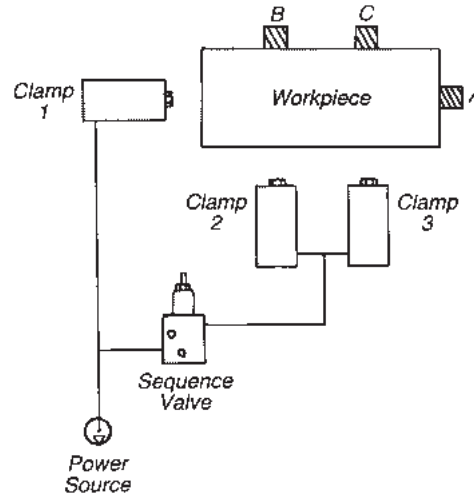
**MANIFOLD MOUNTING:** Fluid enters and exits through two O-ring ports fed by drilled fixture passages. Mount on a ground surface (32 Ra max.) using three #10 cap screws.

**SERIES MOUNTING:** Use one input valve and up to five series valves. Only one pressure connection is required, to the input valve's P port. The other valves are connected by an internal passage, sealed with an O-ring between each valve. All required plugs, O-rings, and nuts are furnished.

Example clamping sequence:

Workpiece to be positioned and clamped sequentially. Sequence valve set for 1500 psi trigger pressure.

1. When clamps are actuated, clamp 1 pushes workpiece against stop A.
2. As soon as pressure reaches 1500 psi, sequence valve opens.
3. Clamps 2 and 3 simultaneously push workpiece against stops B and C.
4. Fluid pressure rises uniformly in all clamps.



Trigger pressure adjustment range (psi)	Low Range	Normal Range
	150 to 2200	1500 to 6500
Max. operating pressure (psi)	7250	7250
Pressure change per turn (psi)	220	440
Maximum flow	490 cu. in./min.	490 cu. in./min.
A Dia.	7/8	1-3/32
B	4-5/16	5-3/4
Weight (lbs)	1.1	1.4

### Standard Fittings

### Standard Fittings

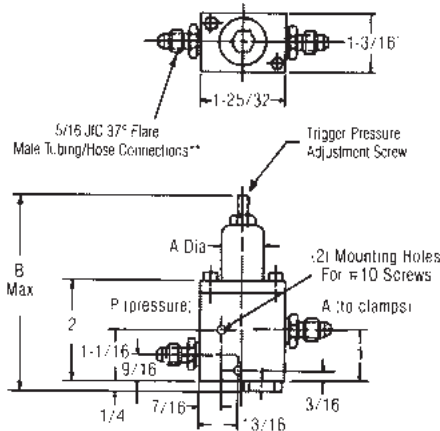
Part No.	CLR-420-V	CLR-440-V
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### Manifold Mounted

Part No.	CLR-429-V	CLR-449-V
Part No., Spare O-Ring	CLR-3000-342-SW	CLR-3000-342-SW

### Series Mounted

Part No., Input Valve	CLR-2954-427-V	CLR-2954-441-V
Part No., Series Valve	CLR-2954-428-V	CLR-2954-442-V
Part No., Connecting Bolt, 2 Valves	CLR-3619-029-VA	CLR-3619-029-VA
Part No., Connecting Bolt, 3 Valves	CLR-3619-031-VA	CLR-3619-031-VA
Part No., Connecting Bolt, 4 Valves	CLR-3619-032-VA	CLR-3619-032-VA
Part No., Connecting Bolt, 5 Valves	CLR-3619-033-VA	CLR-3619-033-VA
Part No., Connecting Bolt, 6 Valves	CLR-3619-034-VA	CLR-3619-034-VA



1  
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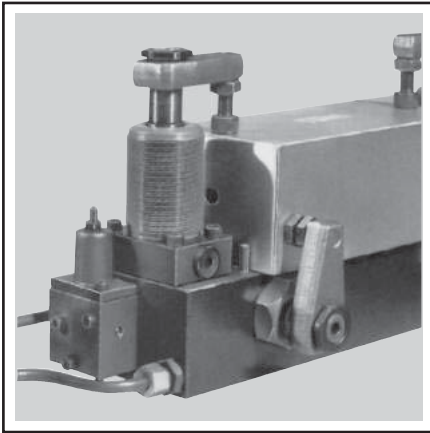
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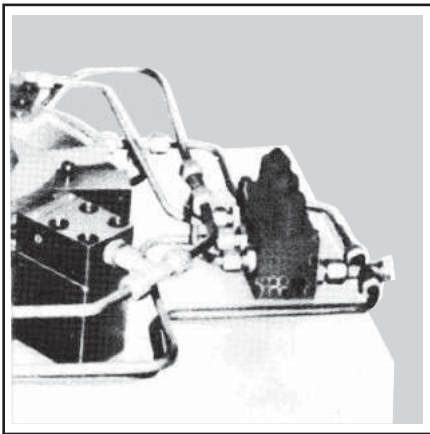
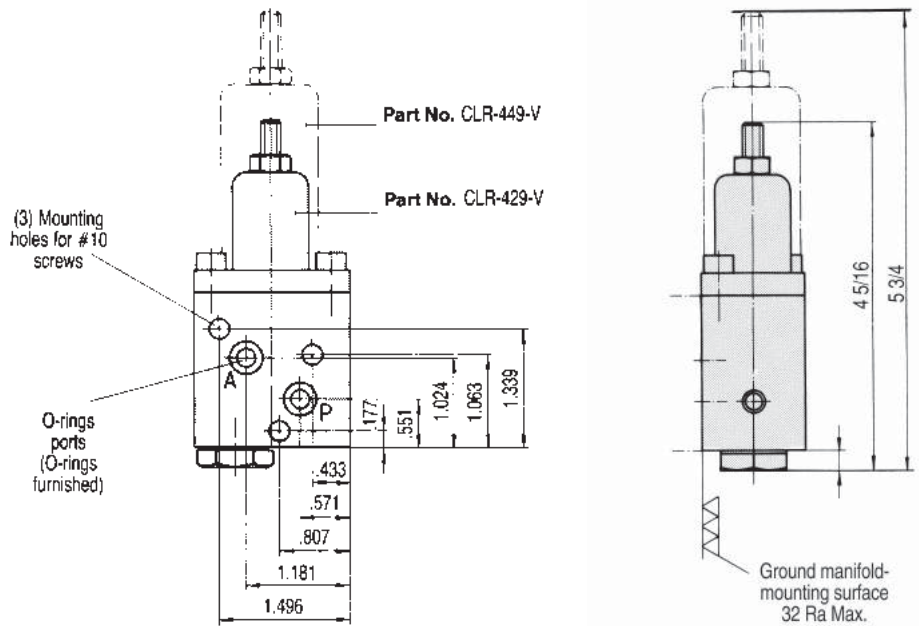


# Sequence Valves

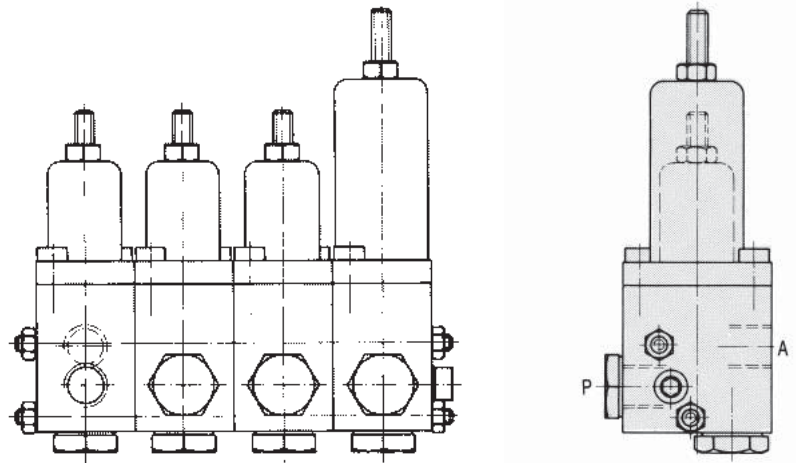
7250 psi max



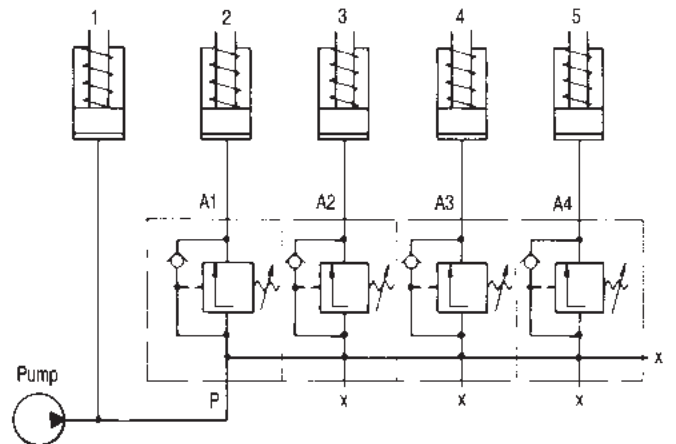
Manifold Mounted



Series Mounted



Hydraulic Diagram



Ordering Example:  
Series combination of three low-range sequence valves and one normal-range sequence valve:

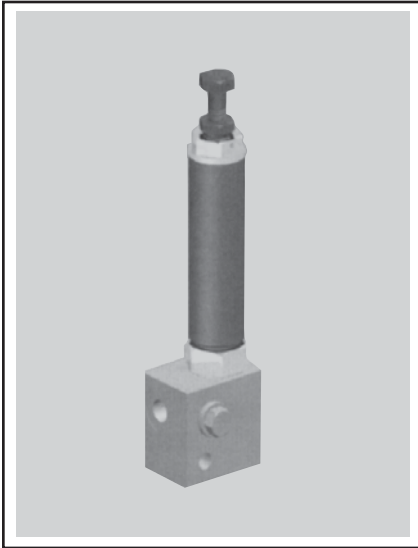
- (1) CLR-2954-427-V      Input Valve
- (2) CLR-2954-428-V      Series Valve
- (1) CLR-2954-442-V      Series Valve
- (2) CLR-3619-032-VA    Connecting bolts



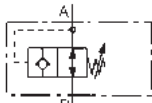
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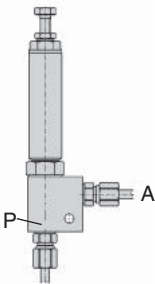
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Pipe Connection Type



Symbol

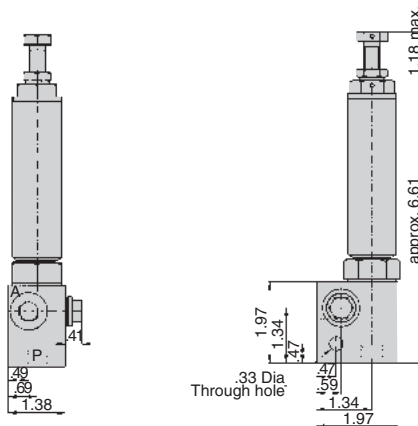


- Allows operating a single clamp, or group of clamps, at a lower pressure than the rest of the fixture.
- Great new design that can be used on pallet fixtures disconnected from a power source, since no return line is needed
- Allows fine tuning of the clamping force for selected components while keeping others at full pressure
- Holds reduced pressure to exact setting, regardless of input pressure
- Zero leakage poppet design

**OPERATION:** Adjust the downstream pressure using the adjusting screw on top of valve. The valve shuts off downstream fluid flow as soon as the system pressure equals the set pressure. As long as the system is connected to the power source, the valve will open again, if additional fluid is required to maintain the downstream pressure. Valve is also ideal for use on palletized (uncoupled) systems.

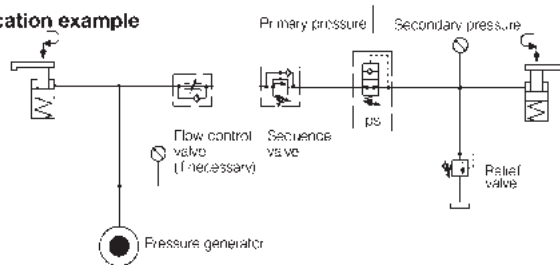
**UNIQUE FEATURES:** In normal systems (connected to power source) valve performs as a true pressure reducing valve, and in Palletized (uncoupled) systems as a pressure closing valve.

**DESIGN CONSIDERATIONS:** When using this valve in series with other valves (clamp/unclamp valves, sequence valves, etc.) the pressure reducing valve must be the one closest to the clamp(s) that it is protecting. When used in uncoupled systems, it is strongly recommended that a pressure relief valve be included to prevent pressure increases in the downstream (low pressure) side of the system.

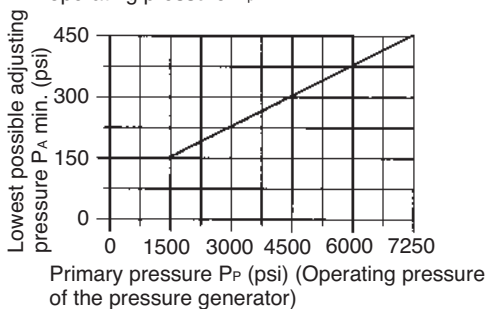


Ports A, P and M = 1/4 BSPP

**Application example**



Limit curve of the lowest possible adjusting pressure  $P_{A \text{ min.}}$  as a function of the operating pressure  $P_P$



Output pressure setting range (psi)	450 to 5500
Valve Type	Poppet
Max. operating pressure (psi)	7250
Output repeatability (psi)	±75
Max. hysteresis to re-open (psi)	375
Approx. pressure change per rotation (psi)	580
Max. fluid flow rate (cu.in./min.)	600
Range of adjustment (psi)	435-5510
Weight, approx. (lbs)	2.9
<b>Part No.</b>	<b>CLR-2953-111-V</b>



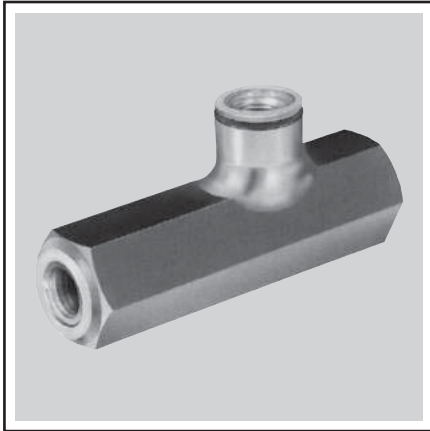
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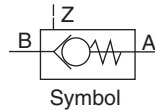
# Pilot-Operated Check Valves

7250 psi max



**In-Line Mounted**

- Holds clamping pressure until released by a separate pilot pressure line
- Allows only one-way flow until released
- Excellent safety device if fluid line to fixture may become damaged
- May be used to prevent workpieces from floating between opposing clamps
- Spring-loaded ball-seat valve (leakage free)

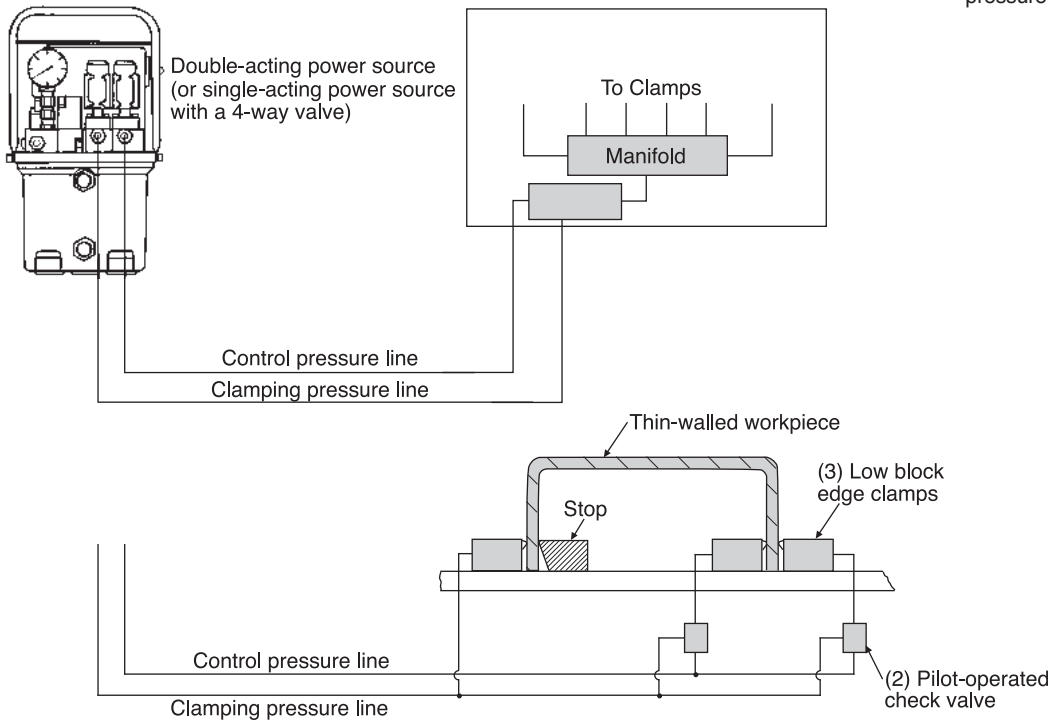


**OPERATION:** The flow from B → A is free. The flow from A → B is locked, but can be hydraulically unlocked by pressurizing control port Z.

**CONTROL PRESSURE:** To unlock the check valve for return flow, control (pilot) pressure must be greater than  $(0.32 \times \text{Pressure}_A) + 175$  psi for the smaller valve and  $(0.38 \times \text{Pressure}_A) + 175$  psi for the larger size.

**MOUNTING:** In-line mounting with tubing connectors. Control port Z is 1/4 BSPP. Ports A & B are 1/4 BSPP on the smaller size, 1/2 BSPP on the larger size. To reduce 1/2 BSPP to 1/4 BSPP, order adaptor CLR-3613-015-F.

**DESIGN CONSIDERATIONS:** This pilot-operated check valve is not suitable for locking of double-acting swing clamps (pull-type cylinders). Due to the unfavorable surface ratio of these elements, the control pressure is not sufficient for unlocking and dangerous pressure intensification can occur.

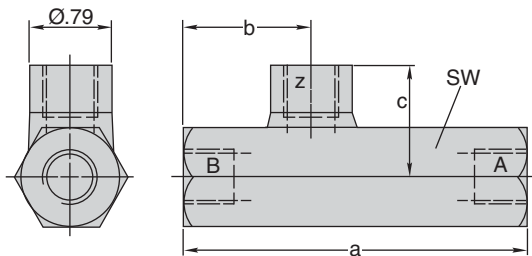


**Example 1:**

Workpieces remain clamped even if fluid line between power source and fixture becomes damaged.

**Example 2:**

Two opposing clamps (on right side) allow the workpiece to float between them to avoid distorting it. Without check valves, the workpiece would remain unstable since either clamp could retract or extend further by shifting fluid to the other. Check valves lock the clamps in their settled position by allowing only one-way flow.



Max. flow rate (cu. in./min.)	920	3360
Max. operating pressure (psi)	7250	7250
Control fluid volume (cu. in.)	.01	.02
Port size, A & B	1/4 BSPP	1/2 BSPP
Port Size, Z	1/4 BSPP	1/4 BSPP
a	3.31	3.94
b	1.24	1.44
c	1.06	1.22
SW	24mm	32mm
Weight (lbs)	.9	1.3
Part No.	CLR-2951-417-V	CLR-2951-501-V

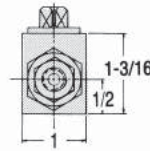
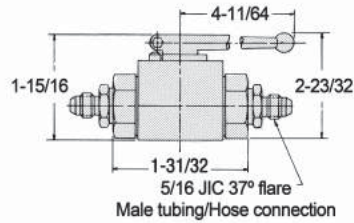
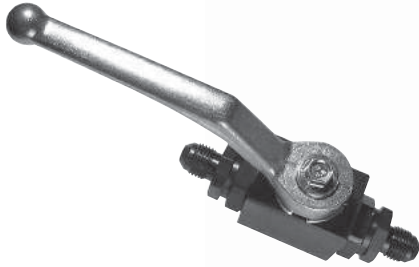


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## Shutoff Valves



**APPLICATIONS:**

1. Shutting off unused lines in a multi-purpose fixture.
2. Holding fixture pressure temporarily while transporting with power source disconnected.

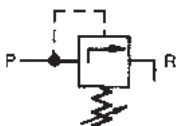
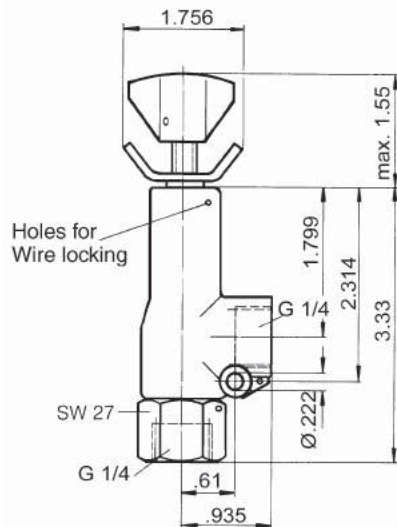
**DESIGN CONSIDERATIONS:** Note: a shutoff valve cannot be used to clamp and unclamp. See valves section for clamping valves.



Symbol

Max. operating pressure (psi)	7250
Mounting	In line
Lever Movement	90°
Weight (lbs)	0.7
<b>Part No.</b>	<b>CLR-400-V</b>

## Relief Valves



Symbol

**APPLICATIONS:** To protect hydraulic circuits from unexpected pressure increases, such as when the temperature of a closed system increases beyond maximum operating pressure.  
**CONSTRUCTION:** Poppet-type valve, directly controlled.

Max. operating pressure (psi)	7250
Adjustment range (psi)	450-7250
Mounting	In line
Weight (lbs)	3.3
<b>Part No.</b>	<b>CLR-2952-521-V</b>

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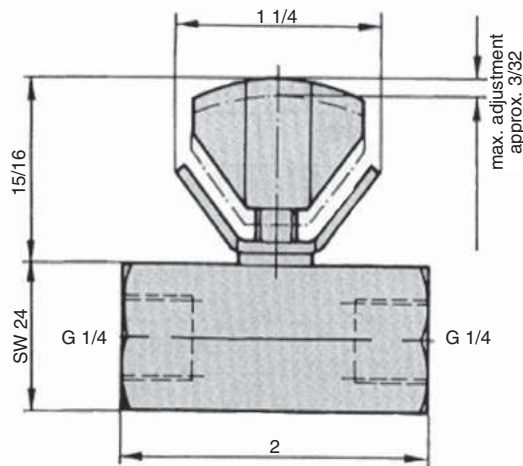


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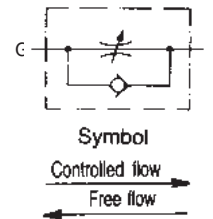
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## Flow Control Valves



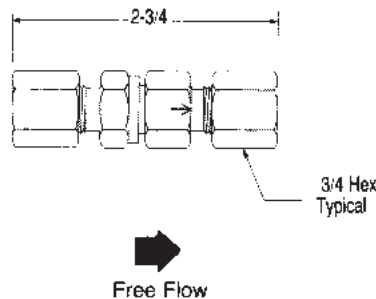
**APPLICATIONS:** To restrict flow from highflow-rate power sources for proper component operation (Swing Clamps, Extending Clamps, and Fluid-Advanced Work Supports for example).

**OPERATION:** Turn knob for precision flow control in one direction, with unrestricted free flow in the opposite.

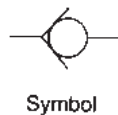


Max. operating pressure (psi)	7250
Mounting	In line
Weight (lbs)	0.7
<b>Part No.</b>	<b>CLR-541-V</b>

## Check Valves



**APPLICATION:** Simple flow restrictor. Allows fluid to flow in only one direction (see arrow).



Cartridge-type check valves are also available. Please contact factory for more information.

Max. operating pressure (psi)	7250
Mounting	In line
Weight (lbs)	0.3
<b>Part No.</b>	<b>CLR-9208-111</b>






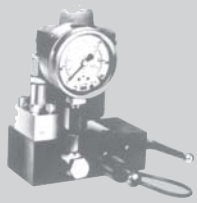


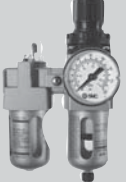



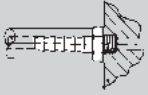






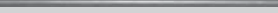

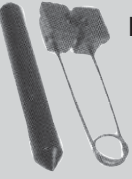



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# Fittings & Accessories

<b>Rotary Couplings</b>				
				
<b>Single Passage (90°)</b> page 669	<b>Single Passage (straight)</b> page 669	<b>Two Passage</b> pages 670-671	<b>Four Passage</b> pages 670-671	<b>Rotary Valve Couplings</b> pages 672-675
<b>Pallet Coupling</b>				
				
<b>Pallet Decouplers</b> pages 676-677		<b>Accumulators</b> page 678		
<b>Pressure Monitoring</b>				
				
		<b>Pressure Switches</b> page 681		
<b>Air Accessories</b>				
				
<b>Filter/Regulator/Lubricators</b> page 682	<b>Fine Pressure Regulators</b> page 682	<b>Air Flow Controls</b> page 682	<b>Air Extractor/Dryers</b> page 682	<b>Air Vent Fittings</b> page 687
<b>Fittings, Tubing, Hose, etc.</b>				
				
<b>Manifolds</b> page 682	<b>Gauges</b> page 682	<b>Hose</b> page 685	<b>Fittings</b> pages 687-688	<b>Fluid Filters</b> pages 684
				
<b>Quick Disconnects</b> page 683	<b>Tubing</b> page 685	<b>Fluid</b> page 685	<b>Tubing Installation &amp; Manifold Mounting</b> pages 686, 689-690	<b>Contact Bolts</b> page 691

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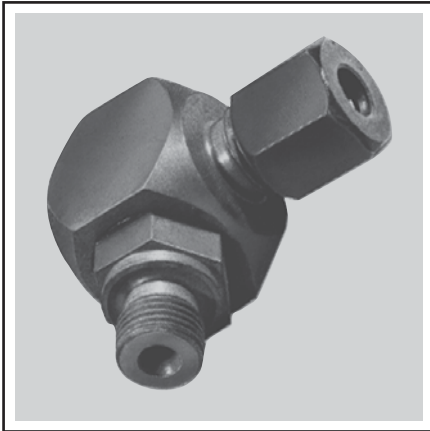
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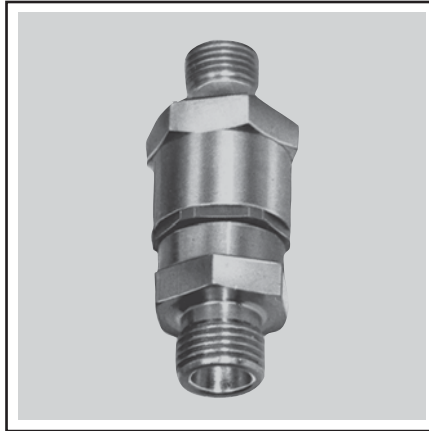
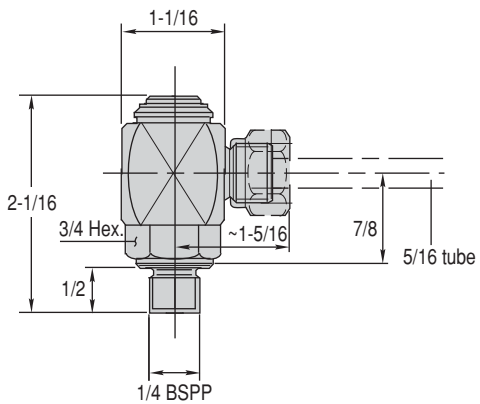
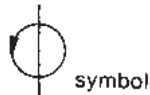
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# Rotary Couplings

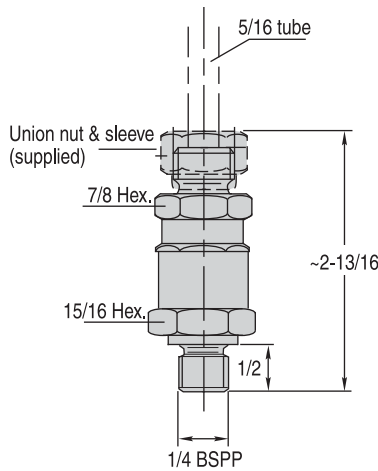
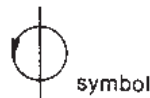
7250 psi max  
Single acting



Single Passage —  
Elbow

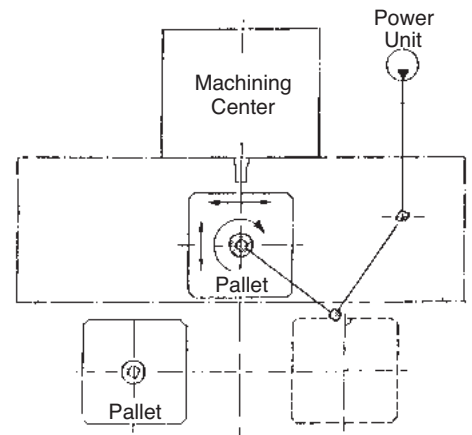


Single Passage —  
Straight

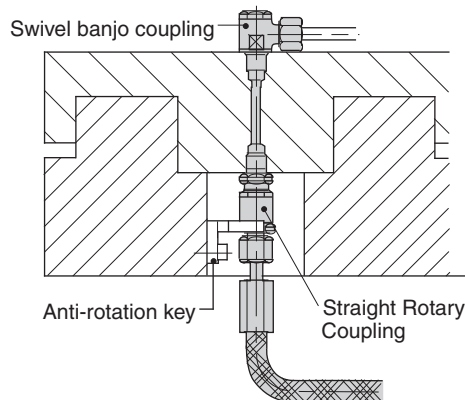
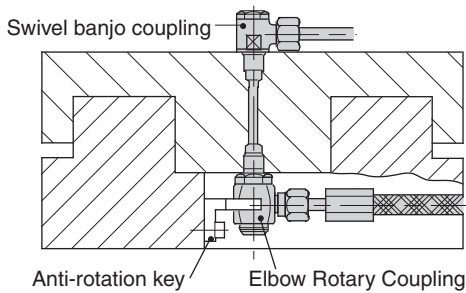


- Best choice for feeding fluid to rotating pallet changers, due to constant connection.
- Ideal for rotary index tables.
- Also good for elbow connections that regularly swing through a small arc
- Choice of elbow or straight version
- \*\* Do not use NPT fittings

MOUNTING: Mount at rotational center to prevent side loading. Screw into standard 1/4 BSPP port.



Machining-center pallet changer with continuous fluid feed using Rotary Couplings.



Number of passages	1
Operating pressure range (psi)	145 - 7250
Maximum rotational speed (RPM)	10
Max. seating torque (ft-lbs)	44
Starting torque at 7500 psi (ft-lbs)	1.0
Part No., Elbow	CLR-843-F
Part No., Straight	CLR-845-F



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# Rotary Couplings

7250 psi max  
Single and double acting



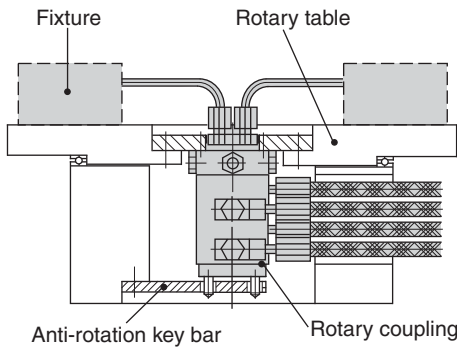
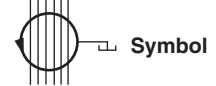
Two Passage



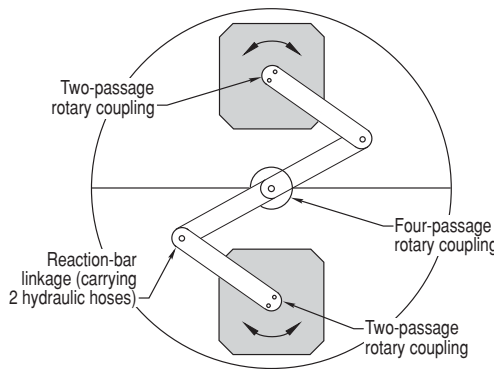
Four Passage



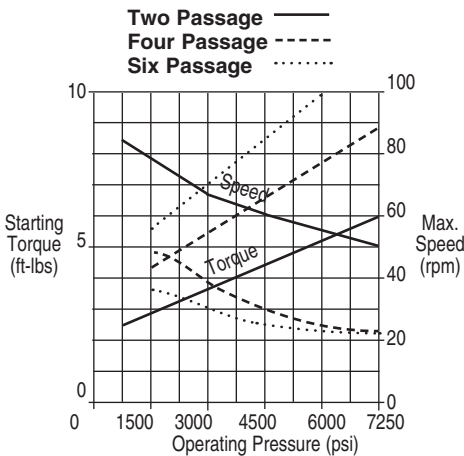
Six Passage



Four-pass rotary coupling with a reaction-bar linkage to prevent stress on hose connections.



Rotary couplings are frequently used on horizontal machining centers with rotary pallet changers. A reaction-bar linkage holds the top portion of each two-pass rotary coupling stationary while the bottom portion revolves freely. Couplings are not designed to carry load. Side load will cause excessive, uneven wear resulting in failure.



Number of passages	2	4	6
Max. flow rate (cu. in./min.)	493	493	493

Standard			
Leakage rate (cu. in./hr.)	.02	.04	—
Weight (lbs)	5.3	10.1	—
Part No., 150-7250 psi	CLR-9281-136-F	CLR-9284-036	—

With Leakage Recirculation			
Weight (lbs)	6.1	12.1	15.9
Part No., 150-7250 psi	CLR-9281-135	CLR-9284-135	CLR-9286-135



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# Rotary Couplings

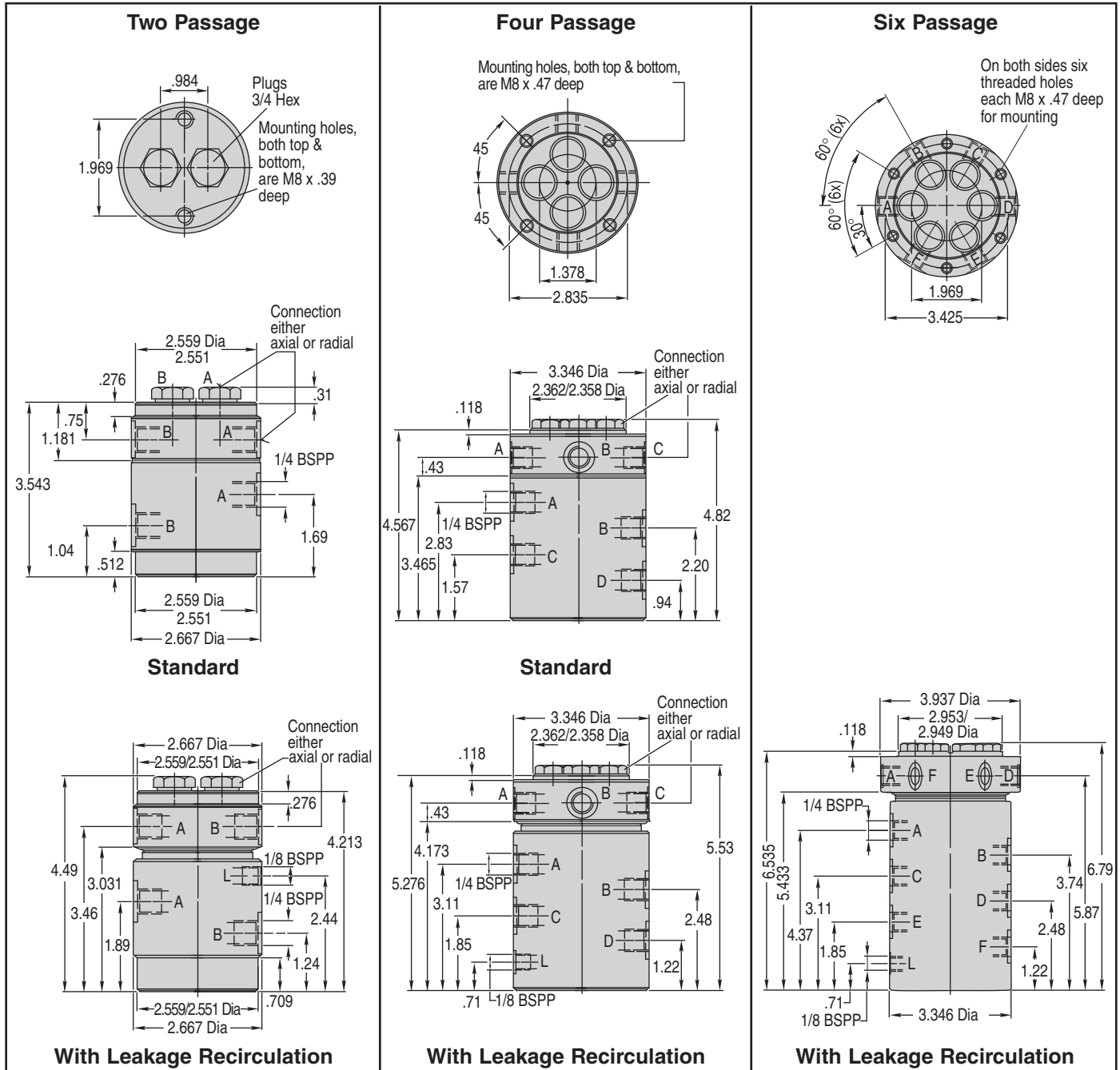
**7250 psi max**  
Single and double acting

- **Best choice for feeding fluid to rotating pallet changers, due to constant connection.**
- **Ideal for rotary index tables.**
- **Can also be used for double-acting clamps.**
- **Choice of two, four, or six independent passages.**
- **Specials are readily available. Please contact factory.**

**OPERATION:** Each passage is supplied separately. This allows independent operation of two, four, or six (depending on model) sets of spring-return (single-acting) clamps.

**MOUNTING:** Either the top or bottom can be mounted by screws through the supplied holes. Do not hard mount both sides. Use anti-rotational key on one side.

**DESIGN CONSIDERATIONS:** The fluid pressure in the rotary coupling will add to the table's starting torque requirement and affect the maximum table operating speed. Please check the graph on the previous page. Fluid must be clean (10 micron or better nominal filtration). Couplings can not be side-loaded. Any weight applied will shorten the life of the unit.



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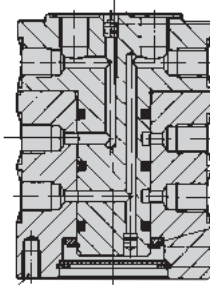
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# Rotary Valve Couplings

**7250 psi max**  
Single and double acting



- For rotary index tables with an independent load/unload station
- Unload and reload while all other stations remain clamped
- Unclamps automatically at load station, or via a clamping valve
- Available from stock for rotary tables with 2 through 8 stations



**OPERATION:** One half of the Rotary Valve Coupling rotates with the index table, while the other half remains stationary. Each time the table and coupling index, a new station automatically becomes the load/unload station. The coupling supplies fluid to the loading station separately from all other stations. The loading station can be either unclamped and reclamped automatically as the coupling rotates, or controlled by a separate clamping valve.

**CLAMPING MANUALLY:** The loading station can be clamped and unclamped manually (or by a machine controller's electrical signal) using a 3-way valve mounted off the rotating table. This insures that a new workpiece will not move during indexing, before it is securely clamped. See valves section for hand-, cam- or air pilot-operated valves. Double-acting clamps require a 4 way valve.

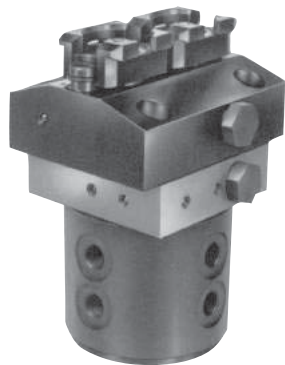
**CLAMPING AUTOMATICALLY:** To automatically unclamp and reclamp the load station as the coupling rotates, connect the coupling's return line R directly to the power source's reservoir (no pressure). To avoid any pressure drop as the table indexes, the power source's fluid flow rate (cu.in./min.) should be at least 240 times the fluid required at any one clamping station (cu.in.). Otherwise an accumulator must be installed on the pressure line from the power source.

**DESIGN CONSIDERATIONS:**

1. To use a standard Rotary Valve Coupling, the table must rotate through the same angle during each indexing movement.
2. Turning the coupling requires additional table-motor starting torque, especially when clamping automatically during indexing.
3. Maximum rotational speed is 10 RPM.
4. Use only with the following hydraulic fluids: those listed in F&A section. To use any other hydraulic fluid, check with factory first. Fluid must be clean (10 micron or better nominal filtration).
5. Do not turn coupling while dry, even before installation. Fill unused ports with fluid before capping off (e.g. when using an 8-station coupling for 4 stations).
6. Use only 1/4 BSPP fittings. Fitting-installation torque must be 28-35 ft.lbs.
7. Couplings can not carry load. Especially side load which will cause excessive, uneven wear.
8. With the load station unclamped, there is a small return-line leakage rate. Always install an accumulator, especially above 3000 psi.

**MOUNTING:** Firmly fasten either the top or bottom half of the coupling using the tapped mounting holes provided. Use a floating reaction bar to prevent the other half from rotating. Mount at the center of rotation, either above, below, or on the rotary table.

**SPECIALS:** For additional stations or special features, please contact factory.



Rotary Valve Couplings are also available for use with automatic coupling systems, for loading multi-sided tooling blocks. Please contact factory for information.

Type of clamps	Single Acting	Double Acting
Max. operating pressure (psi)	7250	7250

**Type 1 — Single Station for Load/Unload**

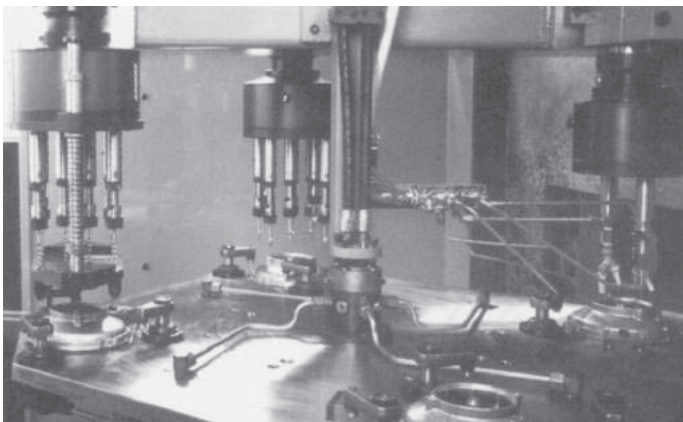
Part No., 5 station	CLR-9295-001-V	CLR-9295-002-V
Part No., 6 Station (also 2 & 3)	CLR-9296-001-V	CLR-9296-002-V
Part No., 8 Station (also 4)	CLR-9298-001-V	CLR-9298-002-V
Part No., 10 Station	CLR-9290-001-V	CLR-9290-002-V

**Type 2 — Two Stations for Load/Unload Commonly Controlled**

Part No., 6 station (also 2 & 3)	CLR-9296-011-V	CLR-9296-012-V
Part No., 8 Station (also 4)	CLR-9298-011-V	CLR-9298-012-V
Part No., 10 Station (also 5)	CLR-9290-011-V	CLR-9290-012-V

**Type 3 — Two Stations for Load/Unload Separately Controlled**

Part No., 6 station (also 2 & 3)	CLR-9296-101-V	CLR-9296-102-V
Part No., 8 Station (also 4)	CLR-9298-101-V	CLR-9298-102-V
Part No., 10 Station (also 5)	CLR-9290-101-V	CLR-9290-102-V



This application shows a multiple-spindle machine with four stations, for machining aluminum covers. An 8-station rotary valve coupling is at the center, with its four unused ports plugged.

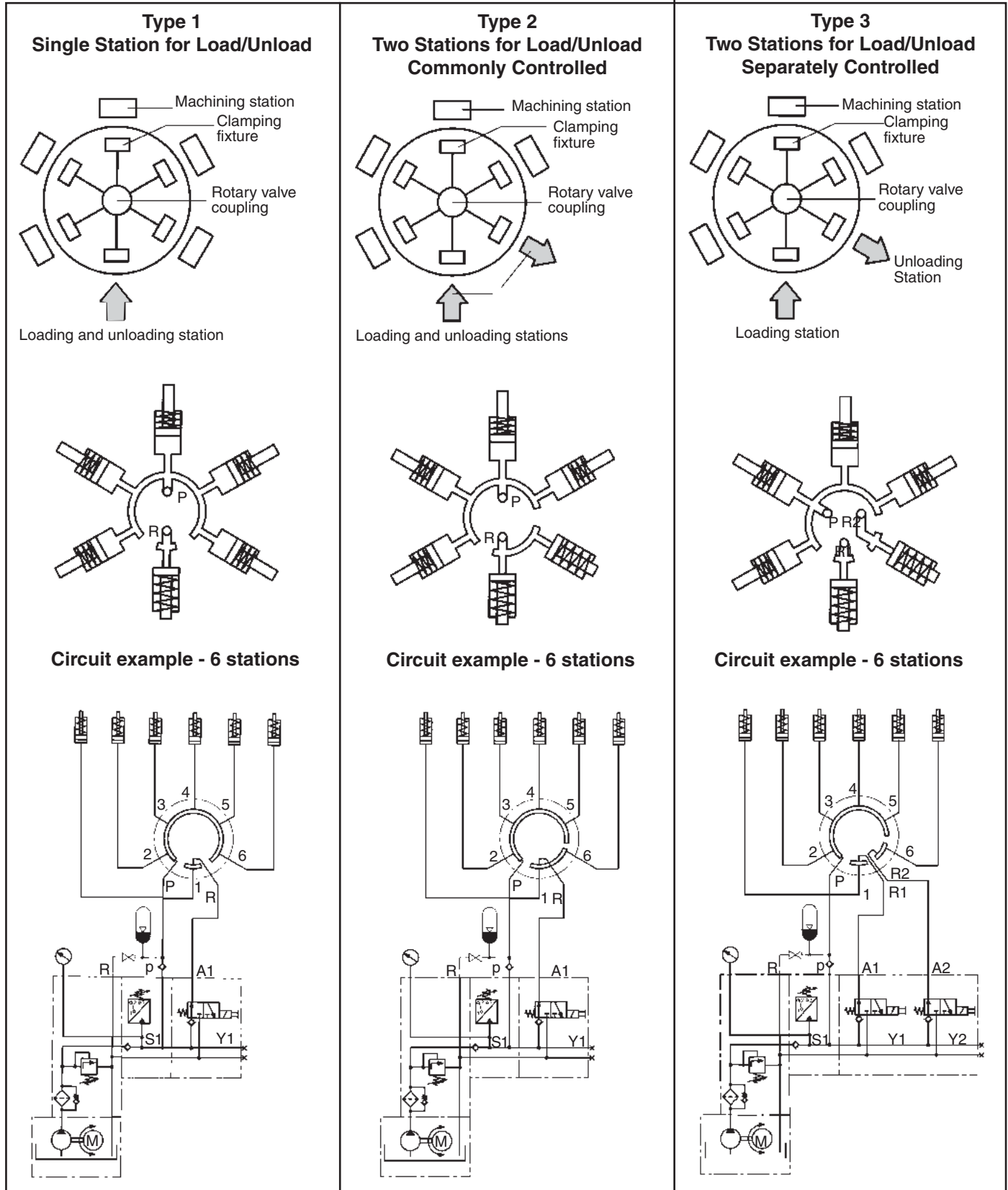


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# Rotary Valve Couplings

7250 psi max  
Single and double acting



1  
3



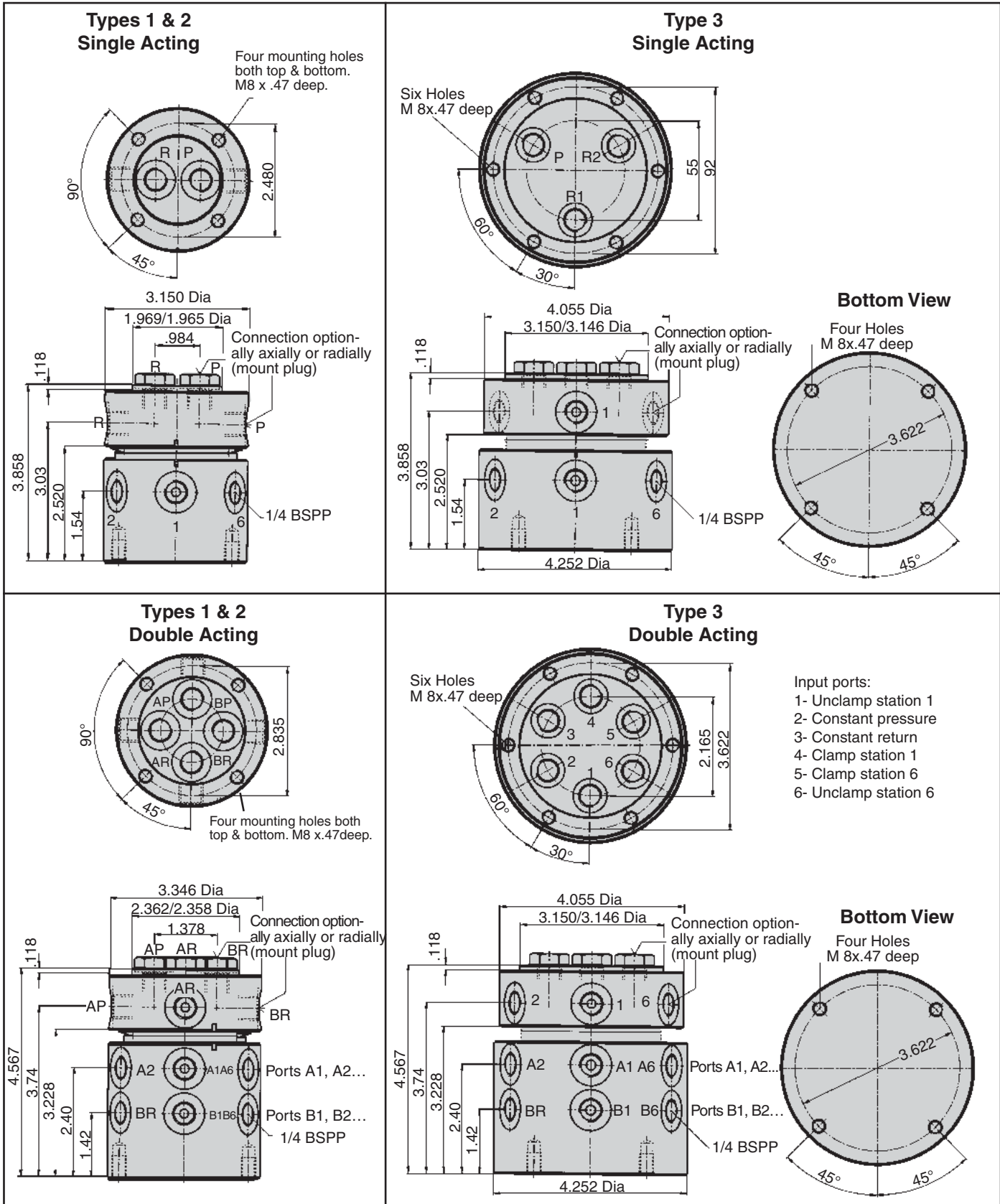
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# Rotary Valve Couplings

7250 psi max  
Single and double acting



1  
3



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# Rotary Air Valve Couplings

**145 psi air max**  
Single and double acting



**Single Acting**

- For rotary index tables with an independent load/unload station
- Unload and reload while all other stations remain clamped
- Unclamps automatically at load station, or via a clamping valve
- Available from stock for rotary tables with 2 through 10 stations

**OPERATION:** One half of the Rotary Valve Coupling rotates with the index table, while the other half remains stationary. Each time the table and coupling index, a new station automatically becomes the load/unload station. The coupling supplies loading station separately from all other stations. The loading station can be either unclamped and reclamped automatically as the coupling rotates, or controlled by a separate clamping valve.

**DESIGN CONSIDERATIONS:**

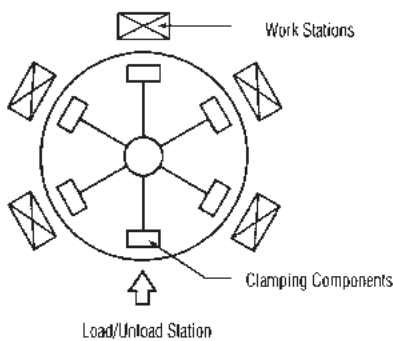
1. To use a standard Rotary Valve Coupling, workpiece must be unloaded and reloaded at the same station. Also, the table must rotate through the same angle during each indexing movement.
2. Turning the coupling requires additional table-motor starting torque, especially when clamping automatically during indexing.
3. Maximum rotational speed is 10 RPM.
4. Although couplings are well sealed, an external cover may be necessary to protect the coupling's siding surfaces against extreme dirt and grit.

**CLAMPING BY CONTROL VALVE:** The loading station can be clamped and unclamped manually (or by a machine controller's electrical signal) using a 3-way valve mounted off the rotating table. This insures that a new workpiece will not move during indexing, before it is securely clamped. Double-acting clamps require a 4-way valve.

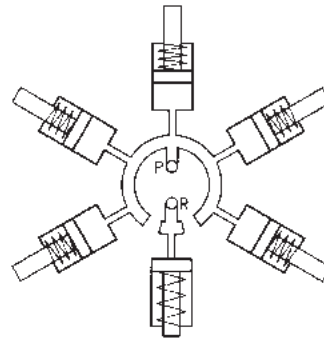
**MOUNTING:** Firmly fasten either the top or bottom half of the coupling using the tapped mounting holes provided. Use a floating reaction bar to prevent the other half from rotating. Mount at the center of rotation, either above, below, or on the rotary table.

**SPECIALS:** For additional stations or special features, please contact factory. Possibilities include:

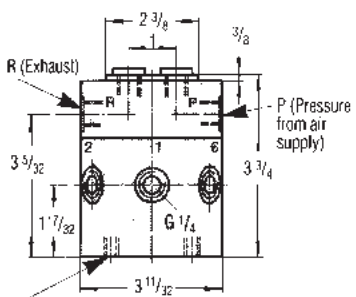
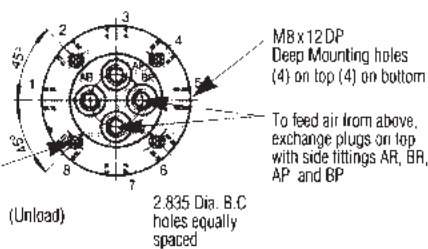
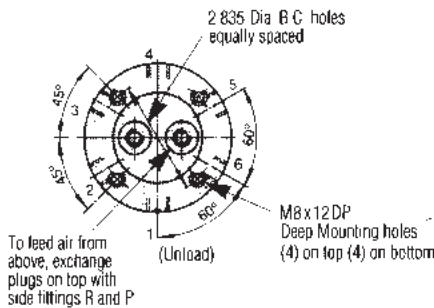
1. Any number of stations
2. Multiple load stations (2 or more)
  - Controlled independently or together
  - Side by side, opposite, or at any other orientation



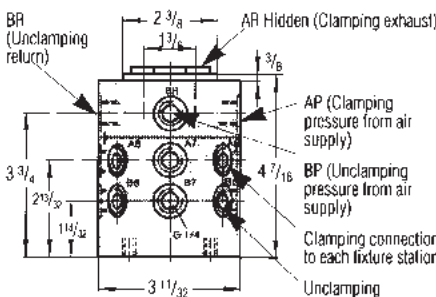
**Single Acting**



**Double Acting**



Bottom connections supply to each fixture station (1/4 BSPP Port, 1/4 BSPP male to 1/4 NPT adapter supplied. Ingestion of pipe dope or teflon tape may cause malfunction or damage to valve)



Type Clamp	Single-Acting	Double-Acting
Max. Operating Pressure (psi)	145	145
Part No., 5 Station	CLR-9295-601-V	CLR-9295-602-V
Part No., 2, 3, 6 Station	CLR-9296-601-V	CLR-9296-602-V
Part No., 7 Station	CLR-9297-601-V	CLR-9297-602-V
Part No., 4, 8 Station	CLR-9298-601-V	CLR-9298-602-V



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# Pallet Decouplers

**7250 psi max**  
Single acting



**Single Acting**

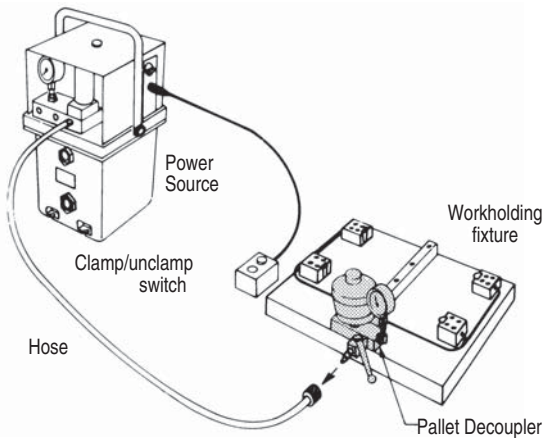
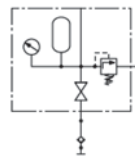
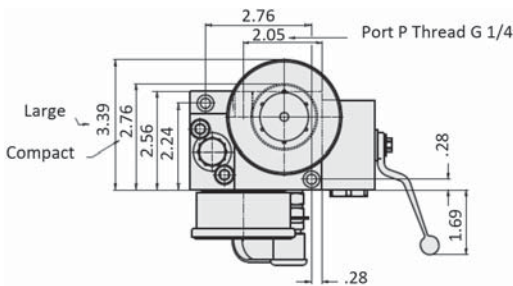
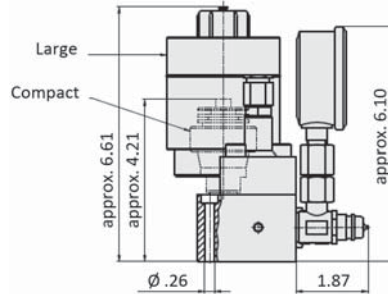
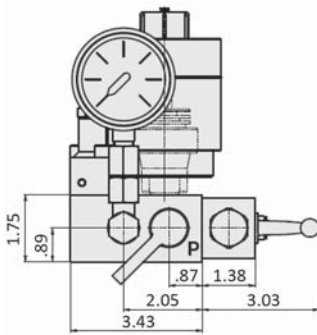
- Allows disconnecting a single-acting fixture from its power source before machining
- Compact assembly mounts easily on fixture (lay gauge flat for an even lower profile)
- Ideal for pallets and rotating fixtures where a fluid feed line is impractical
- Decoupler includes shutoff valve, quick disconnect, accumulator, pressure gauge, and pressure-relief valve
- Do not use NPT fittings

**POWER UNIT:** Any standard single-acting power unit can be used with this pallet decoupler.

**OPERATION:**

1. Remove protective cap from male quick disconnect on decoupler. Clean coupling components if necessary.
2. Connect hydraulic hose, with female quick disconnect, to the pallet decoupler. The power unit should be in unclamped mode (depressurized) before connection.
3. Open shutoff valve on decoupler to unclamp fixture.
4. After unloading and reloading fixture, actuate power unit to clamp.
5. After pressure gauge shows proper clamping pressure, close shutoff valve on decoupler.
6. Switch power unit to unclamped mode.
7. Disconnect hose and replace protective cap on male quick disconnect. Hose can be connected to optional safety support while not in use.

**SAFETY FEATURES:** Pallet decouplers include an accumulator to compensate for pressure changes due to temperature variations. Important: use pallet decouplers only with Roemheld components, because all system components must be zero leakage. These decouplers are equipped with a pressure-relief valve to protect the fixture and the accumulator from extreme temperature increases. An optional safety support with a limit switch can be used to hold the hydraulic hose after uncoupling, to ensure that the fixture is disconnected before moving.



Accumulator Size	Compact	Large
Maximum operating pressure (psi)	7250	7250
Minimum operating pressure (psi)	1800	1800
Accumulator volume at 7250 psi (cu. in.)	0.6	3.4
Accumulator volume at 1800 psi (cu. in.)	0.16	0.9
Accumulator gas preload (psi)	1450	1450
Weight (lbs)	8.4	12.7
<b>Part No., Decoupler</b>	<b>CLR-9425-012-PD</b>	<b>CLR-9425-011-PD</b>
<b>Part No., Female Disconnect</b>	<b>CLR-9384-106-F</b>	
<b>Part No., Safety Support</b>	<b>CLR-0942-001-PDA</b>	

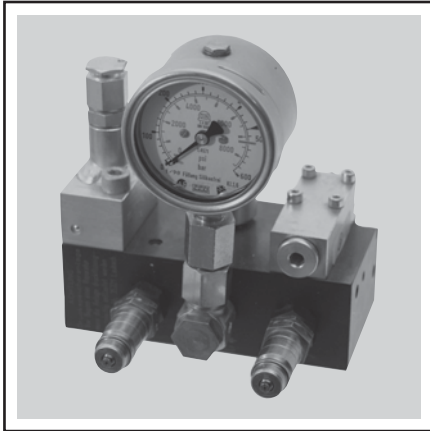


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# Pallet Decouplers

**7250 psi max**  
Single or double acting



**Single Acting or Double Acting with Automatic Shutoff**

- Allows disconnecting a single-acting fixture, a double-acting fixture, or a fixture with several individual clamping valves from its power source before machining
- Automatic shutoff using a pilot-operated check valve...no manual shutoff valve required!
- Compact assembly mounts easily on fixture
- Ideal for pallets and rotating fixtures where a fluid feed line is impractical
- Decoupler includes pilot-operated check valve, quick disconnects, accumulator, pressure gauge, and pressure-relief valve

**POWER UNIT:** A double-acting power unit with a four-button control switch (B1, B2, B3, B4) is required to use this pallet decoupler for either a single-acting fixture or a double-acting fixture. The power unit provides automatic shutoff capability, via the decoupler's pilot-operated check valve, and allows depressurizing both pressure hoses simultaneously for uncoupling. See table below for power-unit part number. This pallet decoupler can also be used where clamping is controlled by individual clamping valves on the fixture (3-way valves for single acting or 4-way valves for double acting). In that application, one constant-pressure hose and one return hose are connected to the decoupler, so any standard single-acting power unit can be used.

**OPERATING SEQUENCE FOR UNCLAMPING/CLAMPING:**

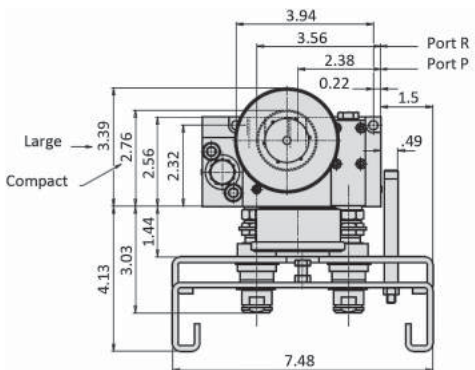
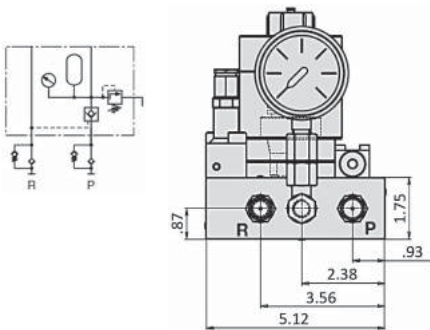
- A) SINGLE-ACTING CYLINDERS**  
Operating sequence for **unclamping** with coupling for single-acting cylinders:
- 1) Remove dust cap and clean coupling parts, if necessary.
  - 2) Connect coupler of quick-disconnect coupling in depressurized mode.
  - 3) Open high-pressure shut-off valve.

- Operating sequence for **clamping** with coupling unit for double-acting cylinders.
- 1) Coupler of quick-disconnect coupling is coupled and high-pressure shut-off valve is opened.
  - 2) Actuate power unit until pressure gauge shows required clamping pressure.
  - 3) Shut high-pressure shut-off valve.
  - 4) Set pressure generator to unclamping position.
  - 5) Disconnect coupler of quick-disconnect coupling and put into a safety support, if necessary.
  - 6) Attach dust cap to coupling nipple and coupler.

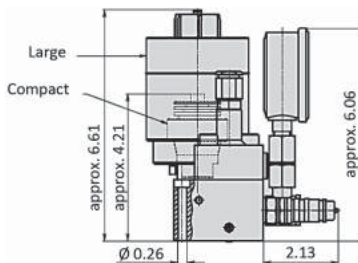
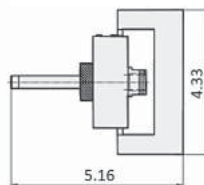
- B) DOUBLE-ACTING CYLINDERS**  
Operating sequence for **unclamping** with coupling unit for double-acting cylinders:
- 1) Remove dust cap and clean coupling parts, if necessary.
  - 2) Connect multi-coupler in depressurized mode: For the purpose switch selector switch to "couple."
  - 3) Switch selector switch to "unclamp."

- Operating sequence for **clamping** with coupling unit for double-acting cylinders.
- 1) Multi-coupler is coupled.
  - 2) Switch selector switch to "clamp." After pressure build up, the green lamp is signaled.
  - 3) Set multi-coupler to depressurized mode: For the purpose switch selector switch to "couple."
  - 4) Disconnect multi-coupler and put it into a safety support, if necessary.
  - 5) Attach dust cap to coupling nipple and coupler.

**SAFETY FEATURES:** Pallet decouplers include an accumulator to compensate for pressure changes due to temperature variations. Important: use pallet decouplers only with Roemheld components, because all system components must be zero leakage. These decouplers are equipped with a pressure-relief valve to protect the fixture and the accumulator from extreme temperature increases. An optional safety support with a limit switch can be used to hold the double coupler after uncoupling, to ensure that the fixture is disconnected before moving.



**Female Disconnect Double Coupler**  
(order separately)



Accumulator Size	Compact	Large
Maximum operating pressure (psi)	7250	7250
Minimum operating pressure (psi)	1800	1800
Accumulator volume at 7250 psi (cu. in.)	0.6	3.4
Accumulator volume at 1800 psi (cu. in.)	0.16	0.9
Accumulator gas preload (psi)	1450	1450
Weight (lbs)	9.6	13.5
<b>Part No., Decoupler</b>	<b>CLR-9425-022-PD</b>	<b>CLR-9425-021-PD</b>
<b>Part No., Female Disconnect Double Coupler</b>	<b>CLR-9425-102-PDA</b>	
<b>Part No., Safety Support</b>	<b>CLR-0942-002-PDA</b>	
<b>Electric Power Unit, 7500 psi, 460V</b>	<b>CLR-939-EP</b>	
<b>Electric Power Unit, 7500 psi, 230V</b>	<b>CLR-839-EP</b>	
<b>Electric Power Unit, 5000 psi, 460V</b>	<b>CLR-940-EP</b>	
<b>Electric Power Unit, 5000 psi, 230V</b>	<b>CLR-840-EP</b>	



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**Compact**



**Large**

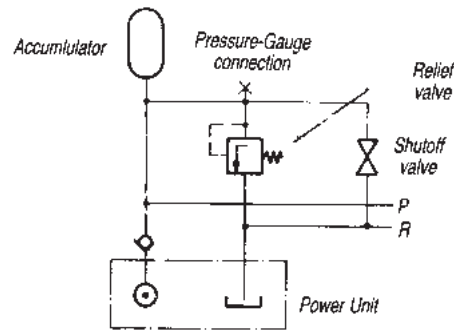
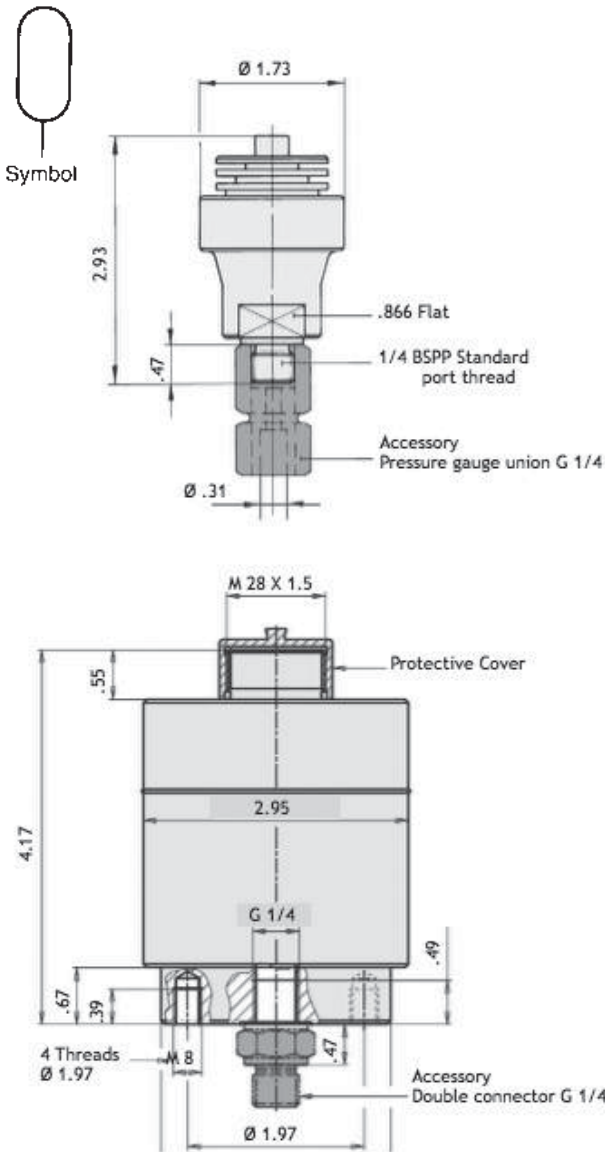
- Extremely compact accumulator, ideal for workholding applications
- Can also store fluid potential energy between working cycles
- Operates comfortably at up to 7250 psi
- Choice of large or compact size

**\*\*Do not use NPT fittings**

**SPECIFICATIONS:** Nitrogen-filled diaphragm type accumulator. Allowable operating temperature 15 to 175° F. Install in any position, horizontal or vertical.

**DESIGN CONSIDERATIONS:**

1. Use only with Roemheld components because all system components should be leakfree.
2. Since a fixture's fluid lines are sealed after disconnection from the power source, fluid pressure will actually increase if fixture temperature increases. This increase can be quite substantial: about 80 psi per 1°F. Be careful not to exceed 7250 psi at any time during the machining cycle. Always install a pressure gauge in the closed system.
3. If the possibility of exceeding 7250 psi exists, install a Relief Valve (see valves section) in the system.
4. Shield accumulator if the possibility of accidental damage exists.



Example:  
Accumulator circuit with all safety devices installed.

Size	Compact	Large
Maximum operating pressure (psi)	7250	7250
Minimum operating pressure (psi)	1800	1800
Accumulator volume at 7250 psi (cu. in.)	.60	3.4
Accumulator volume at 1800 psi (cu. in.)	.16	.9
Accumulator gas preload (psi)	1450	1450
Weight (lbs)	0.7	5.0
Part No.	CLR-9606-102-PDA	CLR-500-PDA



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# Threaded Coupling Elements

7250 psi max



Manifold Mounted

- Very compact coupling units
- Flush mounting in uncoupled mode
- Ideal for pallet coupling with vertical guided connection
- Optional return line relief
- Two sizes with and without coupling against pressure

Depending on the version, the coupling elements can either be coupled in energized mode, or de-energized mode only. The operating mode depends on the type of sealing elements which are used and can be taken from the table below.

The max. positioning tolerances in axial and radial direction are indicated in the table below.

**The sealing areas at the side of the coupling elements have to be cleansed before coupling, to ensure the tightness in coupled mode. We recommend to wash the elements and finally clean them with compressed air. Dust caps should be used as far as possible.**

APPLICATION: Compared to other coupling elements the threaded coupling elements are very compact devices.

If the slide movement of the workpiece carrier is to be used or if a fixture is to be used or if a fixture is to be connected to the base plate without lines, the threaded nipple and the coupling mechanisms can be directly screwed into the parts which are to be connected. The coupling mechanisms have the advantage that they are flush-faced in uncoupled mode.

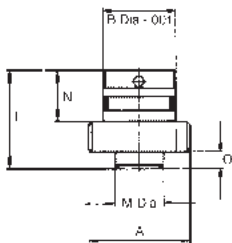
Flange-type housings are available to simplify the manufacture of the fixture mounting hole contours. In cramped conditions it is possible to make and install the flange-type housing retrospectively.

The fixture bodies which are to take up the coupling parts have to be guided .125 in. parallel before they are coupled.

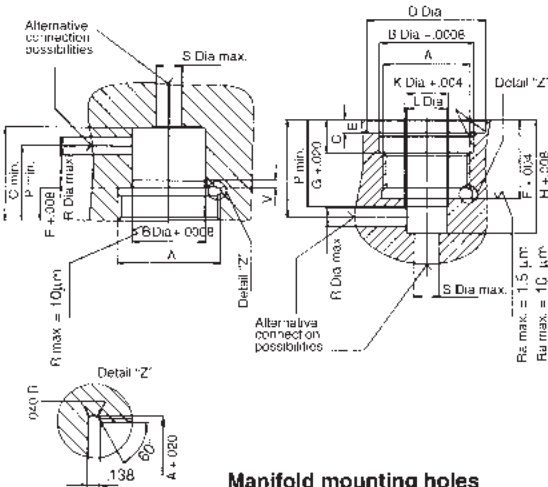
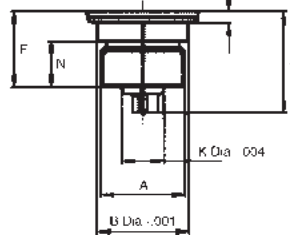
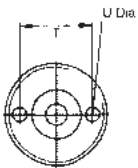
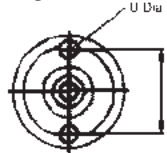
The axial forces which arise during the pressure build-up in coupled mode (see diagram) have to be absorbed outside the coupling parts.

The threaded nipples, which are installed into the tank lines, are equipped with a pre-loaded valve (VSV). The pre-loaded valve limits a possible pressure build-up in the return line, caused by internal leakage in the hydraulic clamping elements, to approx. 75 psi. In coupled mode the pre-loaded valve is not effective.

Threaded nipple



Coupling mechanism



Manifold mounting holes

Element	Coupling mechanism	Threaded nipple	Threaded nipple with VSV	Coupling mechanism		Threaded nipple with VSV
				Threaded nipple	Threaded nipple	
Nominal ID		3mm		5mm		
p. max./min.	7250/450	7250/450	7250/450	7250/450	7250/450	7250/450
A	M20x1.5	M24x1.5	M24x1.5	M24x1.5	M28x1	M28x1
B Dia	.8661	.7874	.7874	1.0236	.7874	.7874
C	.138	1.063	1.181	.354	.945	1.181
D Dia	—	—	—	1.280	—	—
E	—	—	—	.138	—	—
F	.846	.394	.394	.846	.335	.335
G	.925	—	—	.925	—	—
H	1.22	—	—	1.22	—	—
I	1.15	1.16	1.34	1.15	1.06	1.280
K Dia	.472	—	—	.472	—	—
L Dia	.441	—	—	.441	—	—
M Dia	—	.59	.268	—	.531	.531
N	.73	.65	.65	.51	.55	.77
O	—	.177	.177	.126	.177	.177
P	1.10	.827	.98	1.10	.81	.81
R Dia	.197	.197	.197	.197	.197	.197
S Dia	.276	.276	.276	.276	.276	.276
T	.630	.670	.670	.945	.787	.787
U Dia	.138	.138	.138	.197	.157	.157
V	—	2x15°	2x15°	1x15°	2x15°	2x15°
max position tolerance (axial)	+0.020	+0.020	+0.020	+0.020	+0.020	+0.020
max position tolerance (radial)	+/-0.004	+/-0.004	+/-0.004	+/-0.008	+/-0.008	+/-0.008

Can be coupled with or without pressure

Part No.	CLR-0460-725-TBC	CLR-0460-727-TBN	-	CLR-0460-735-TBC	CLR-0460-638-TBN	-
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Can only be coupled without pressure

Part No.	CLR-0460-730-TBC	CLR-0460-731-TBN	CLR-0460-728-TBN	CLR-0460-736-TBC	CLR-0460-740-TBN	CLR-0460-637-TBN
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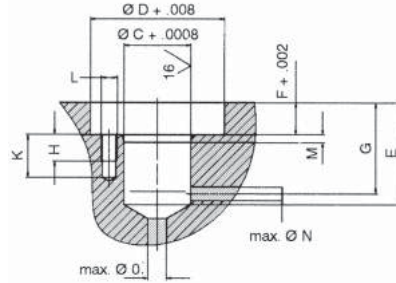
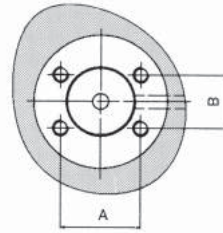
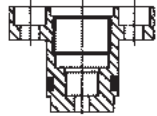
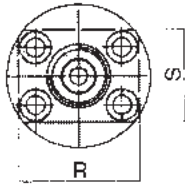
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# Threaded Coupling Elements

## Optional Housing for Coupling Mechanism



## Mounting dimensions

If it is not required that the housing is flush-fitting with the pallet, the D dia. can be omitted.

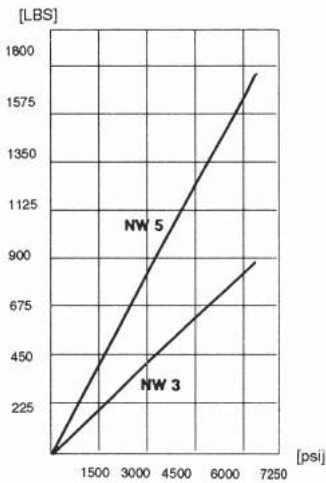
The depth dimensions are then shortened by dimension F.

In cramped installation conditions the housing can be milled according to dimensions R and S.

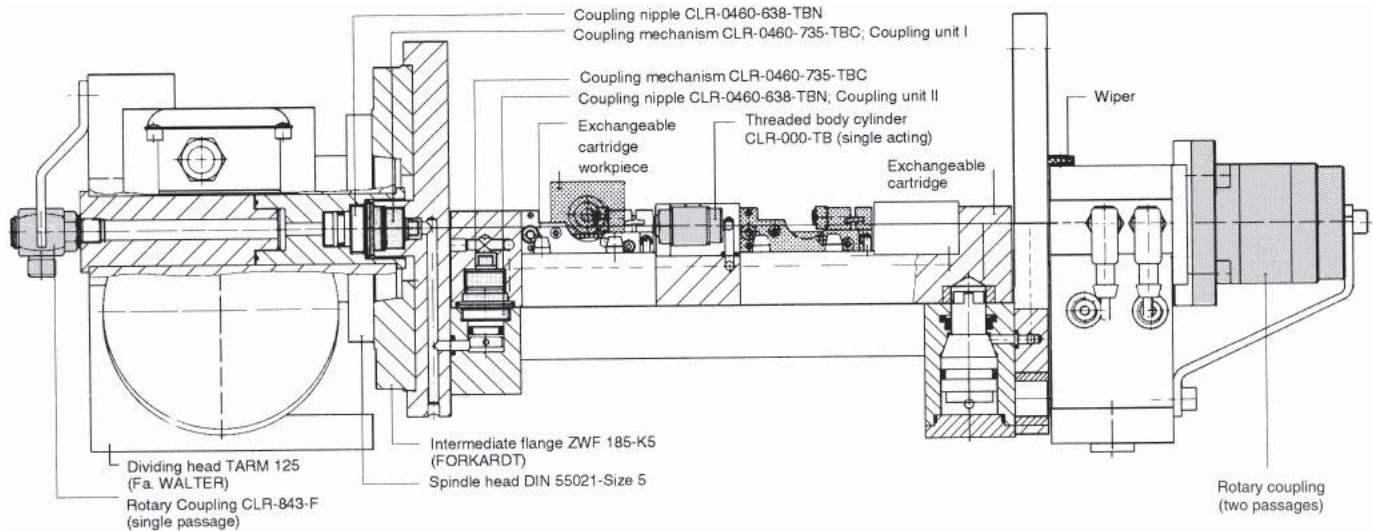
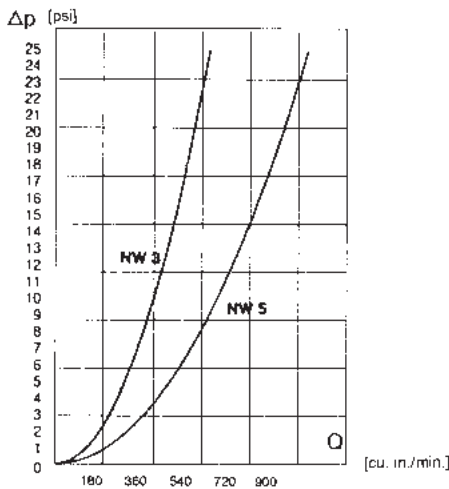
## Housings for Coupling Mechanisms

Useable for	CLR-0460-725-TBC	CLR-0460-735-TBC
A	1.181	1.693
B	.787	.906
C Dia	0.9843	1.2598
D Dia	1.9685	2.5591
E	1.50	1.50
F	0.472	0.591
G min.	1.34	1.38
H	0.39	0.47
K	0.63	0.71
L	1/4-20	5/16-18
M	0.12x15°	0.12x15°
N Dia max.	0.197	0.24
P Dia	0.28	0.28
R	1.65	2.36
S	1.26	1.57
Part no.	CLR-0460-655-TBCH	CLR-0460-654-TBCH

## Coupling force



## $\Delta p$ -Q characteristic line for kinetic viscosity from $53 \times 10^{-6} \text{m}^2/\text{s}$



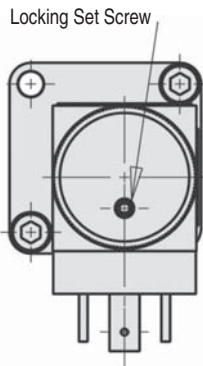
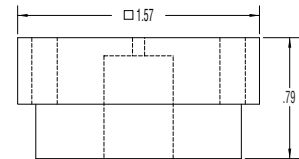
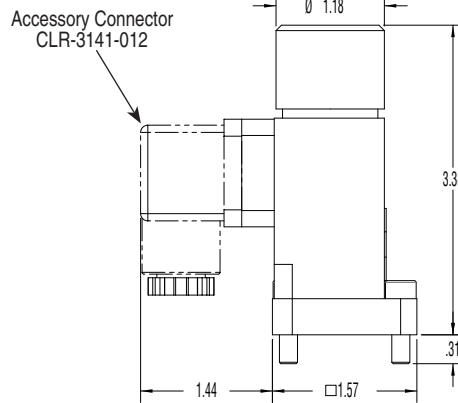
# Pressure Switches ■ F9.732

## Pressure Switches ■ Hydra-electrical signal converter ■ Pressure adjustment ranges ■ 75-1885 psi, 725-5075 psi & 725-7975 psi (5-130 bar, 50-350 bar & 50-550 bar)

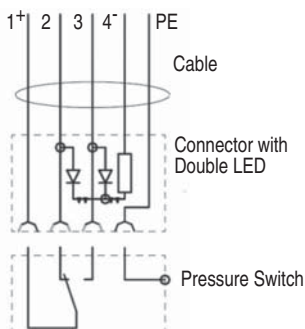


Hydra-electric pressure switches are devices which close or open electrical contacts under pressure. They are used to switch on or off pump motors, valves, machine tool interlocks or similar applications in power units, machines

and installations. The switching point can be adjusted to the desired hydraulic pressure via a knurled knob. The knob can be looked in placed by tightening a set screw. The installed microswitch is a change-over switch which can be connected as break or make contact. The electrical connector can be index 4 x 90°.



Contact Layout



Switching Symbol Connector with Double LED CLR-3141-802

Hydraulic characteristics			
Pressure adjustment range	725 - 7975 psi	725 - 5075 psi	75 - 1885 psi
Hysteresis	8 - 12% at 7250 - 3625 psi	8 - 12% at 4350 - 1450 psi	8 - 12% at 1450 - 435 psi
Part No., (switch only)	CLR-9730-500	CLR-9730-501	CLR-9730-502
Part No., (switch + CLR-3141-012 DIN connector)	CLR-9730-500-PS	CLR-9730-501-PS	CLR-9730-502-PS

Electrical characteristics	
Connection	DIN 43650 connector, form A
Switching element	Change-over switch
Max. load	4A at 250VAC; max 3.0A at 28VDC; min. 5mA
Code class (ED 60529)	IP 65

Technical characteristics	
Operating fluid	Hydraulic oil HLP 22, 32 and 46
Fluid temperature	max. 176 °F
Fluid connection	Manifold mounting or G1/4 with manifold block
Environmental temp.	-50 °F - 176 °F
Max. operating pressure	8700 psi
Vibration resistance	10 g (10 - 2000 Hz)
Shock resistance	30 g
Material	Housing: zinc diecasting Adjusting knob: aluminum (powder coated)
Seals	FKM
Weight	0.72 lbs
Mounting position	Any

Accessories	
Part No., Manifold block	CLR-3534-051
Part No., Connector DIN 43650, 4 x 90° indexable	CLR-3141-012
Part No., Connector with 1.97' cable	CLR-3141-928
Part No., Connector with 8.2' cable	CLR-3141-818
Part No., Connector with double LED and 9.84' cable	CLR-3141-802
Part No., Spare FKM O-ring	CLR-3001-147

Subject to change. For further details, including detailed dimensions and mounting instructions, visit [www.clrh.com](http://www.clrh.com).

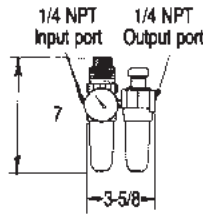


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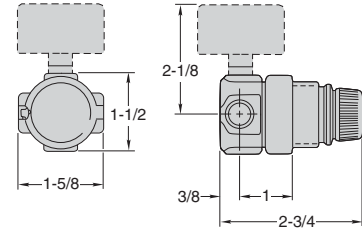
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## Air Filter/Regulator/Lubricator



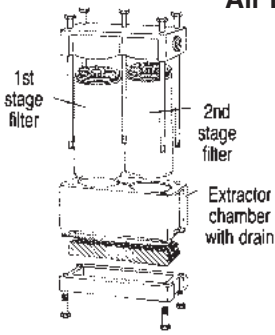
**CLR-100-FRL**  
Recommended for all incoming air-pressure lines (included with air power unit). Filter removes solid contaminants and water from the air supply. Lubricator provides an oil mist to lubricate the system. Regulator is essential to control input air pressure, and thereby control output fluid pressure.

## Fine Air-Pressure Regulator



**CLR-200-FR**  
Miniature regulator for adjusting air pressure between 1 and 10 psi (30 psi gauge). Use with air-advanced work supports to finely adjust contact force. 1/4 NPT ports.

## Air Extractor/Dryer



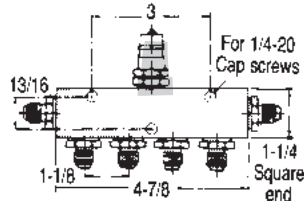
**CLR-105F-AED**  
Effective extractor/dryer that removes air moisture and dirt to increase the life of air-powered components. Replace or clean 1st-stage filter yearly (part no. CLR-401-AEDA, black) Replace 2nd-stage filter every 4-6 months (part no. CLR-403-AEDA, red).

## Air Flow-Control Valve



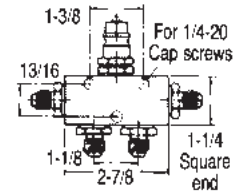
**CLR-100-AFC**  
Simple valve to reduce air flow rates and reduce clamping speed. Release air pressure to adjust setting.

## Fluid 6-Port Manifolds



**CLR-106-F**  
(6) Male 37° fittings (1) Male quick disconnect  
**CLR-107-F**  
(7) Male 37° fittings  
**CLR-106-BP**  
(7) 1/4 BSPP ports, without fittings

## Fluid 4-Port Manifolds

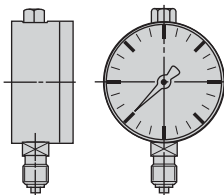


**CLR-104-F**  
(4) Male 37° fittings (1) Male quick disconnect  
**CLR-105-F**  
(5) Male 37° fittings  
**CLR-104-BP**  
(5) 1/4 BSPP ports, without fittings

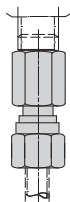
## Fluid Pressure Gauges



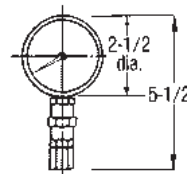
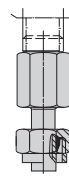
**CLR-100-GA**  
Gauge only without adaptor



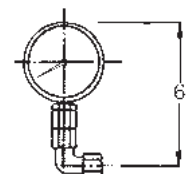
**CLR-808-F**  
Female gauge adaptor  
Compression type



**CLR-9208-041-F**  
Male gauge adaptor  
Compression type

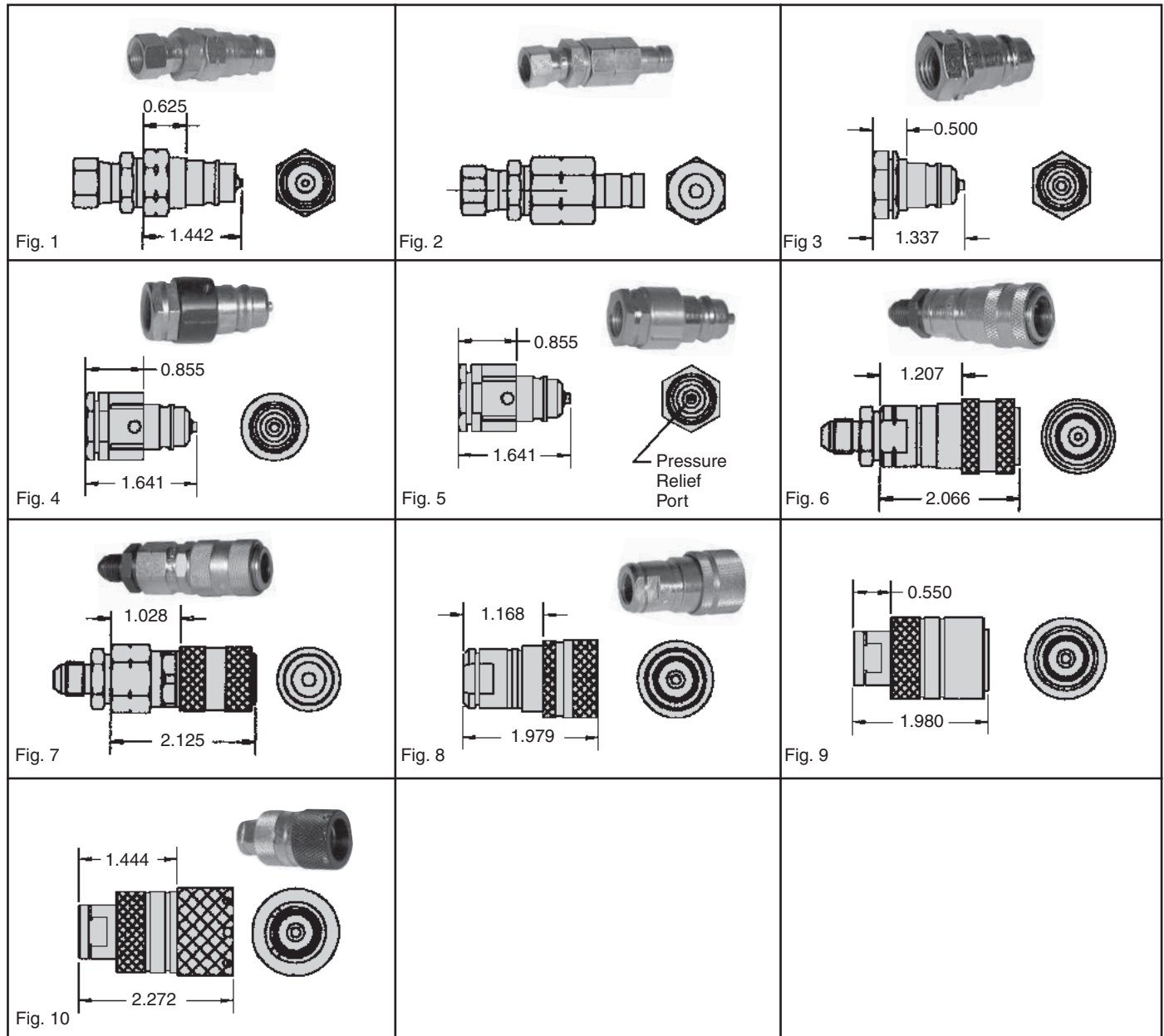


**CLR-101-GA**  
Gauge with  
Female 37° fitting



**CLR-102-GA**  
Gauge with Elbow  
Female 37° fitting

# Quick Disconnects



Part No.	Figure	Comments	Compatibility
CLR-200-F	Fig #1	Standard Nipple	Fig #6
CLR-202-F	Fig #6	Pull Coupler Sleeve Back Insert On Nipple and Release. Reverse Action To Uncouple.	Fig #1
CLR-220-F	Fig #2	Non-Spill Nipple	Fig #7
CLR-222-F	Fig #7	Coupling - Hold Stem of Coupler and Push, To Uncouple Pull Back Sleeve.	Fig #2
CLR-9384-206-F	Fig #3	Heavy Duty Nipple	Fig #9
CLR-9384-100-F	Fig #8	Pull Coupler Sleeve Back Insert on Nipple and Release. Reverse Action To Uncouple.	Fig #3
CLR-9384-106-F	Fig #9	Push Coupler Sleeve on Nipple and Release. Reverse Action To Uncouple.	Fig #3
CLR-9384-7x7-F	Fig #4	* Color Coded Nipple with Alignment Pin Slots	Fig #10
CLR-9384-7x6-F	Fig #10	* Match Color and Alignment Pins. Pull Coupler Sleeve Back Insert on Nipple & Release. Reverse Action to Uncouple.	Fig #4 & 5
CLR-9384-727-F	Fig #5	White Coded Nipple with Alignment Pin Slots & VSV Valve	Fig #10

\* Reference "X" in part number: 1 = Black, 2 = White, 3 = Red, 4 = Yellow, 5 = Green, 6 = Blue



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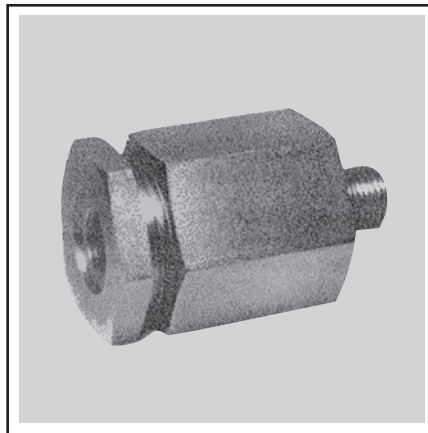
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# High Pressure Inline Filters

7250/3000 psi max



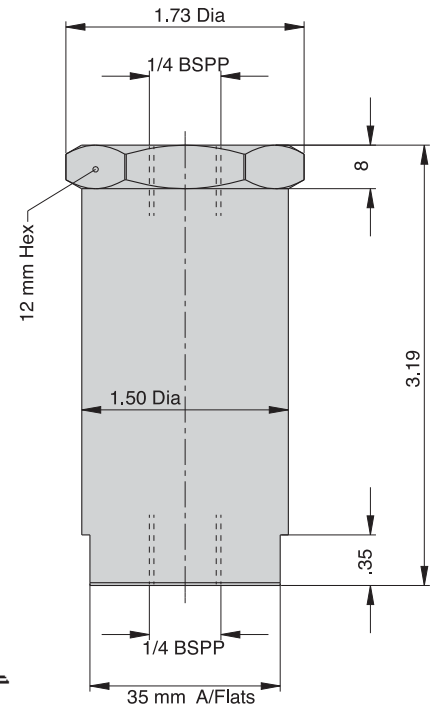
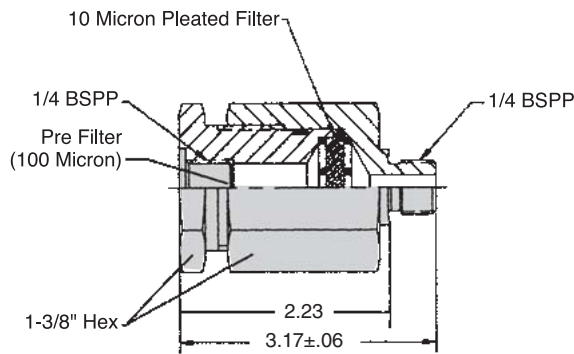
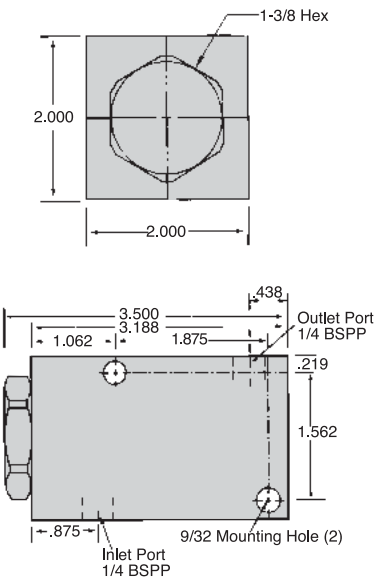
CLR-000-V



CLR-100-V



CLR-3887-064-V



- Replaceable filter elements
- Simple and compact in design
- Easy to install on any new or existing system
- Do not use NPT fittings

**OPERATION:** Install the filter in the output line of the pump to provide filtration of the oil entering the system. The oil passes through the filter assembly from inlet port to outlet port.

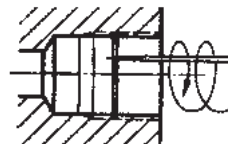
**CAUTION:** Do not attempt to replace filter element with pressure in system.

Recommended mouting position is with filter body vertical, plug on the bottom. This mounting position allows contaminated filter elements to be changed without removing existing piping or tubing. Simply remove the end plug, spring, and spring retainer to get at the filter element.

**CAUTION:** Mounting position other than as recommended...remove entire filter assembly for servicing.



Pre Filter (100 micron)



Pre Filter Installations

Max. Oper. Pressure (psi)	7250	7250	5000
Filter Rating (Nom. Filtration)	10 microns	10 microns	10 microns
Typical Flow Rate (cu. in./min.)	120*	230	120
Direction of Flow	Either direction	Either direction	Either direction
Material (Body)	Steel	Steel	Steel
Weight (lbs)	3	.75	1
Part No.	CLR-000-V	CLR-100-V	CLR-3887-064-V
Part No. of Filter Element	CLR-001-FIL	CLR-100-FIL	CLR-3887-061-FIL
Part No. of Pre-Filter	—	CLR-3887-009-FIL	—

\*AP 35 psi across filter

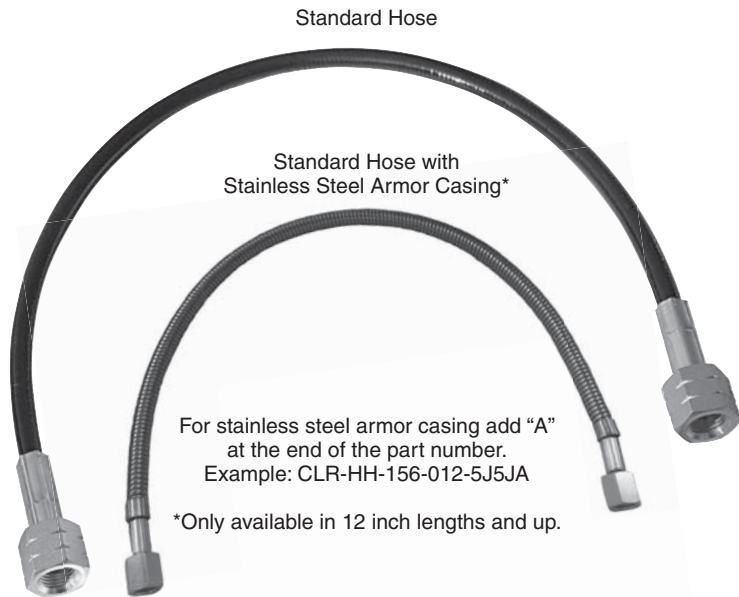


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# Accessories

## Fixture Hose



Small-Diameter high-pressure hose perfect for workholding applications. Abrasion and chemical resistant outer cover with seamless nylon inner sleeve reinforced with synthetic yarn. Other lengths and diameters available upon request.

Nominal ID	0.156 in
Nominal OD	0.34 in
Min. bend radius	1.6 in
Burst pressure	25,520 psi
Temperature range	-40 to +150°F

For stainless steel armor casing add "A" at the end of the part number.  
Example: CLR-HH-156-012-5J5JA

\*Only available in 12 inch lengths and up.

Length	End Type
	#5 JIC
Part No., 9 inch	CLR-HH-156-009-5J5J
Part No., 12 inch	CLR-HH-156-012-5J5J
Part No., 15 inch	CLR-HH-156-015-5J5J
Part No., 18 inch	CLR-HH-156-018-5J5J
Part No., 24 inch	CLR-HH-156-024-5J5J

### Tubing



Seamless heavy-wall tubing. C1010 steel, cold drawn, fully annealed. 5/16" OD, .065" wall thickness, 22,800 psi burst pressure. Do not use any other type of tubing. See next page for installation guidelines and tools (CLR-300-TL flaring tool is strongly recommended).

60" CLR-60-T

### Heavy-Duty Hose



High-pressure hydraulic hose. 1/4" inside diameter. Reinforced with four plies of high-tensile wire, for remarkably little expansion under pressure. Fluid required due to expansion is only .066 cu. in. per foot at 7500 psi. 5" minimum bend radius. Two female ends, 5/16 JIC 37° flare, or straight tube ends for use with compression fittings.

NOTE! 10'-0" MAXIMUM RECOMMENDED LENGTH

	JIC 37° flare	Compression Type
18"	CLR-18-H	CLR-18-H-CC
24"	CLR-24-H	CLR-24-H-CC
30"	CLR-30-H	CLR-30-H-CC
36"	CLR-36-H	CLR-36-H-CC
42"	CLR-42-H	CLR-42-H-CC
48"	CLR-48-H	CLR-48-H-CC
60"	CLR-60-H	CLR-60-H-CC
72"	CLR-72-H	CLR-72-H-CC

(Special lengths available)

### Hydraulic Fluid



As per DIN 51524, HLP. Contains special additives for proper lubrication and corrosion protection. Use only SWIFTSURE fluid or an exact equivalent HLP 22: Shell Tellus® 22, Mobil DTE 22, or Chevron Hydraulic Oil AW ISO 22. **Fluid must be clean (10 micron or better nominal filtration) See also high pressure in-line filters.**

2 gal. CLR-2-FL



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# Tubing Installation



**CLR-100-TL  
Tubing Cutter**

**Cutting**

1. Use only steel tubing as specified on the previous page.
2. Cut tubing with a tubing cutter or hacksaw.
3. File or sand tubing end square. End must be square to achieve a proper flare.



**CLR-200-TL  
Deburring Tool**

**Deburring and Cleaning**

1. Deburr both ID and OD with deburring tool.
2. Clean with solvent to remove chips, dirt and rust-preventative coating. Blow clean with an air line.



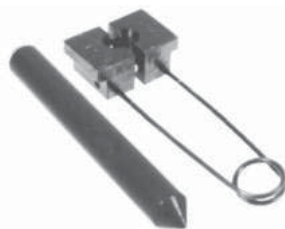
**CLR-400-TL  
Tubing Bender**

**Bending**

Tools required:

- Tube bender (3/4" radius)
- Vise

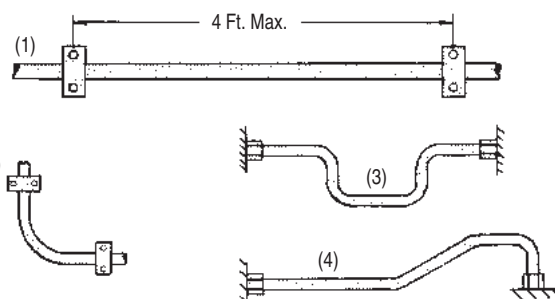
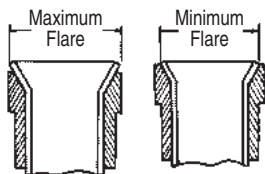
The **Roemheld** tube bender shown is a simple, effective bender we highly recommend. When bending tubing carefully avoid wrinkling, flattening or kinking the tube. Please note: complete flaring before bending.



**CLR-300-TL  
Flaring Tool**

**Flaring**

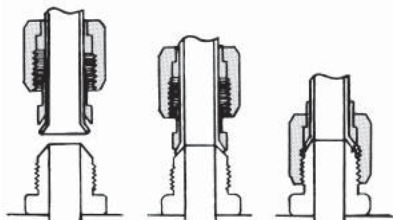
1. Place nut and sleeve over tube before flaring.
2. Place tube in flaring tool, approximately 1/8" above top of block.
3. Clamp assembled block in vise.
4. Center pin guide of flaring tool in tube.
5. Strike flaring tool 3-4 times with sharp hammer blow. Remove from block.
6. Inspect flare so that their outside diameters extend beyond the inner lip of the sleeve, but not beyond the sleeve's OD.



**Installation**

We recommend using tubing clamps as this will increase the life of the installation. Tubing clamps should be less than four feet apart (Figure 1) and bends should be supported also (Figure 2). Use bends as shown in Figures 3 and 4 instead of straight-line connections to prevent stressing the tubing.

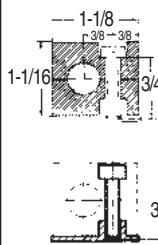
**Important: Never use tubing lines as handles to lift fixtures.**



**Assembly**

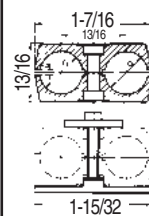
1. Slide nut and sleeve on to flared tubing end and finger tighten.
2. Finish tightening with a wrench, 1/4 to 1/2 turn.

**Note: Do not over torque.**



**Single Tube  
Regular and Stack Mounting**

- CLR-3300-892-TA Single clamp
- CLR-3300-600-TA Single mounting plate
- CLR-3300-225-TA Mounting screw
- CLR-3300-604-TA Stack-mounting screw
- CLR-3300-335-TA Stack-mounting clip



**Twin Tubes  
Regular and Stack Mounting**

- CLR-3300-891-TA Twin clamp
- CLR-3300-607-TA Twin mounting plate
- CLR-3300-609-TA Washer
- CLR-3300-225-TA Mounting screw
- CLR-3300-613-TA Stack-mounting screw
- CLR-3300-615-TA Stack-mounting clip

Subject to change. For further details, including detailed dimensions and mounting instructions, visit [www.clrh.com](http://www.clrh.com).



















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# Fittings

Hydraulic Compression Fittings (7500 psi static)											
Port Fitting - Male		Banjo Elbow			Branch Tee			Union			
											
5/16 Tubing	G 1/4	CLR-802-F									
	G 1/8	CLR-805-F									
1/4 Tubing	G 1/4	CLR-806-F	5/16 Tubing	G 1/4	CLR-803-F	5/16 Tubing	G 1/4	CLR-804-F	5/16 Tubing	CLR-701-F	
	G 1/8	CLR-826-F	1/4 Tubing	G 1/4	CLR-823-F**	1/4 Tubing	G 1/4	CLR-824-F	1/4 Tubing	CLR-721-F	
Elbow		Tee			Cross			Stand Pipe Union			
											
5/16 Tubing	CLR-702-F		5/16 Tubing	CLR-703-F		5/16 Tubing	CLR-704-F		5/16 Tubing G 1/4 CLR-9208-018-F		
1/4 Tubing	CLR-722-F*		1/4 Tubing	CLR-723-F*		1/4 Tubing	CLR-724-F*				
Nut		Sleeve			Tube Adaptor			Port Reducer			
											
5/16 Tubing	CLR-800-F		5/16 Tube	CLR-801-F		1/4 tube to 5/16 tube	CLR-606-F		G1/4 to G1/8	CLR-3613-003-F	
1/4 Tubing	CLR-820-F		1/4 Tube	CLR-821-F					G1/2 to G1/4	CLR-3613-015-F	
Air-Vent Fittings 250 psi air											
Barbed for 3/16 ID Hose		Barbed for 1/4 ID Hose			Vent Fitting			Vent Fitting - Metal Filter			
											
M5 Port	CLR-805-AF		M5 Port	CLR-3890-091-AF		G1/4 Port			G1/8 Port	CLR-0361-012-F	
G1/4 Port	CLR-815-AF		G1/8 Port	CLR-806-AF					G1/4 Port	CLR-0361-000-F	
		G1/4 Port	CLR-3890-093-AF		G1/2 Port				CLR-0361-006-F		

\*Max 6600 psi

\*\*Max 6000 psi




















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# Fittings

Hydraulic 37° Flare Fittings (7250 psi static)										
<b>Tube End</b>		<b>Nut Elbow</b>			<b>Branch Tee</b>			<b>Run Tee</b>		
										
5/16 Tubing	<b>CLR-400-F</b>	5/16 Tubing	<b>CLR-402-F</b>		5/16 Tubing	<b>CLR-403-F</b>		5/16 Tubing	<b>CLR-404-F</b>	
1/4 Tubing	<b>CLR-420-F</b>	1/4 Tubing	<b>CLR-422-F</b>		1/4 Tubing	<b>CLR-423-F</b>		1/4 Tubing	<b>CLR-424-F</b>	
<b>Union</b>		<b>Elbow</b>			<b>Tee</b>			<b>Cross</b>		
										
Male										
										
Female (1.75 in. Flare to Flare)										
5/16 Tubing	Male	<b>CLR-301-F</b>		5/16 Tubing	<b>CLR-302-F</b>		5/16 Tubing	<b>CLR-304-F</b>		
1/4 Tubing	Male	<b>CLR-321-F</b>		1/4 Tubing	<b>CLR-322-F</b>		1/4 Tubing	<b>CLR-324-F</b>		
5/16 Tubing	Female	<b>CLR-401-F</b>		5/16 Tubing	<b>CLR-303-F</b>		5/16 Tubing	<b>CLR-304-F</b>		
1/4 Tubing	Female	<b>CLR-421-F</b>		1/4 Tubing	<b>CLR-323-F</b>		1/4 Tubing	<b>CLR-324-F</b>		
<b>Cap</b>		<b>Port Fitting Female</b>			<b>Tube Plug</b>			<b>Nut 45</b>		
										
5/16 Tubing	<b>CLR-501-F</b>	5/16 Tubing	<b>CLR-813-F*</b>		5/16 Tubing	<b>CLR-502-F</b>		5/16 Tubing	<b>CLR-406-F</b>	
1/4 Tubing	<b>CLR-521-F</b>	1/4 Tubing	<b>CLR-815-F*</b>		1/4 Tubing	<b>CLR-522-F</b>		1/4 Tubing	<b>CLR-426-F</b>	
<b>Banjo Elbow</b>		<b>Port Fitting Male</b>			<b>Port Plug</b>			<b>Double Port</b>		
										
		5/16 Tubing	G 1/4	<b>CLR-807-F</b>	G 1/8 Port	<b>CLR-3610-263</b>				
		5/16 Tubing	G 1/8	<b>CLR-903-F</b>	G 1/4 Port	<b>CLR-810-F</b>				
5/16 Tubing	<b>CLR-814-F</b>	1/4 Tubing	G 1/4	<b>CLR-816-F*</b>	G 1/2 Port	<b>CLR-3610-000-F</b>		G 1/4 Port	<b>CLR-809-F</b>	

\*Max. 6600 psi.

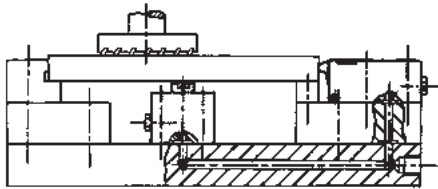


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# Manifold Mounting

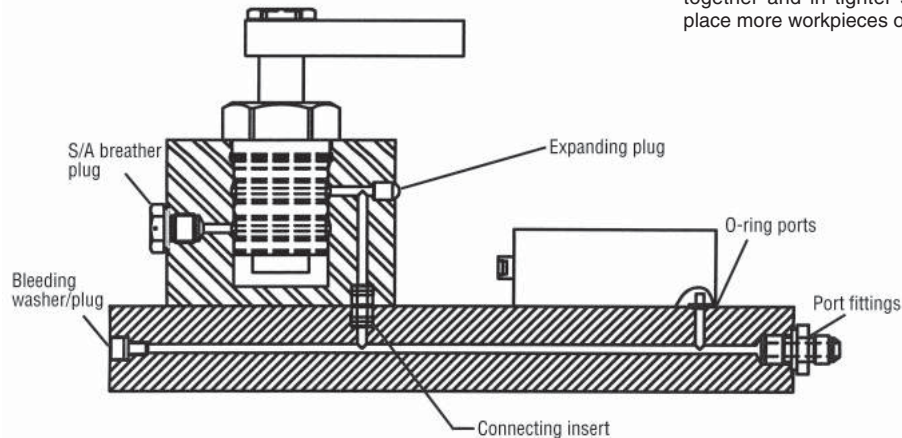
## Benefits



- Eliminates tubing or hoses from working area
- Very close mounting of clamps
- Only one fluid feed line
- No traps for chips due to "clean" design
- Do not use NPT fittings

Many Roemheld components can be manifold mounted... powered directly through fluid passages drilled in a fixture. This unique mounting capability eliminates tubing and hoses in the working area, for clean fixtures without chip traps. Even fluid passages longer than your drilling capacity are possible by drilling shorter passages in separate blocks, then connecting them using connecting inserts.

Perhaps most important, manifold mounting lets you put clamps and work supports closer together and in tighter spots (often letting you place more workpieces on a fixture).

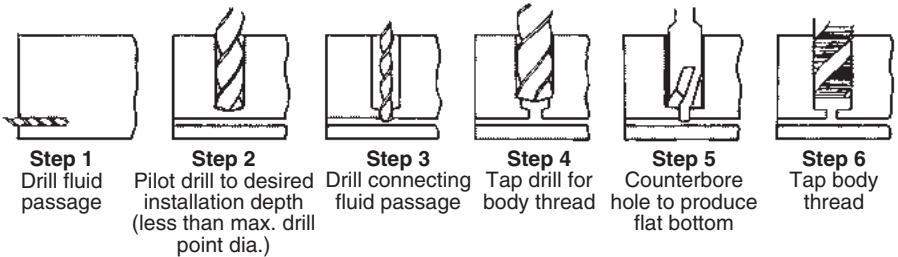


## Installation Steps

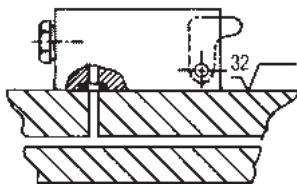
For easiest installation, we recommend the following procedure (Step 1 through 6). For proper sealing, the tapped hole's bottom must be flat, with a surface finish 125 RMS or better, and perpendicular to the hole's axis. A small drill-point is allowable (see component's catalog page for dimensions). A delrin sealing washer for the hole bottom is furnished with each component. **Do not use sealing compound or teflon tape.** Part numbers to order bottoming taps:

- 1-1/4 — 16 CLR-512-TL
- 1-1/2 — 16 CLR-515-TL
- 1-7/8 — 16 CLR-518-TL

### Installing Threaded Body Components



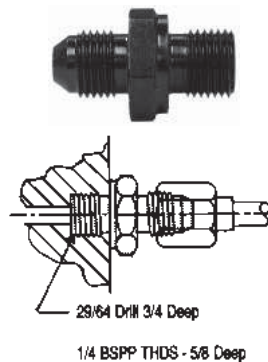
### Installing Components with O-Ring Ports



Mounting surface should be ground flat with a 32 RMS or better surface finish, so that the O-ring seals properly. Torque mounting screws evenly. **Do not use sealing compound or teflon tape.**

Order Extending Clamps, Swing Clamps, and Sequence Valves by a different part number for manifold mounting (O-rings are included, and no port plugs are needed). Edge Clamps and Block Work Supports are easily converted to manifold mounting (order o-ring CLR-3000-343 and CLR-810-F port plug).

### Port Fittings



CLR-807-F  
1/4 BSPP Port Fitting  
Standard port fitting found in virtually all Roemheld components. To use for custom manifolds, order special bottoming tap for installation, part number CLR-514-TL. Drill, tap (5/8-inch minimum depth) and spotface. **Do not use sealing compound or teflon tape.**

CLR-902-F  
1/2-20 Port Fitting  
Port fitting for custom manifolds. Install using a standard 1/2-20 tap. Drill, tap (5/8-inch minimum depth) and spotface. **Do not use sealing compound or teflon tape.**



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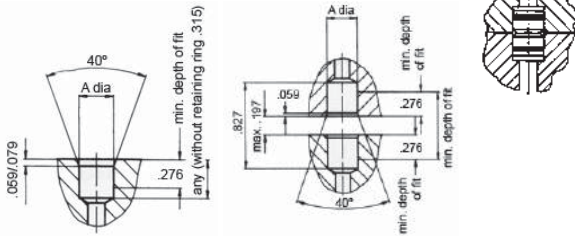
# Manifold Mounting

## Benefits

### Connecting Plates Together

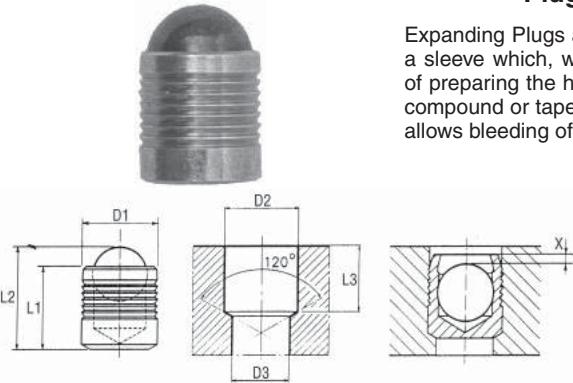


Connecting Inserts are used to provide a leak-free connection when a fluid passage goes through two separate sections of a fixture. The insert has two O-ring seals to provide leak-free sealing. Choice of two insert lengths: short (for flush connections) and long (for connections with a gap of up to .197"). Do not use sealing compound or teflon tape. Made from steel, with FKM O-rings. **For removable plates consider flush faced coupling elements CLR-0460-735-TBC and CLR-0460-638-TBN.**



Type	Short	Long-Metric	Long-USA
Max. operating pressure	7250 psi	7250 psi	7250 psi
A dia.	.3937/.3943	.3937/.3943	.3750/.3756
Insert length	.551	.748	.748
Max. misalignment of holes	.002	.004	.004
Part No.	CLR-9210-132-F	CLR-9210-127-F	CLR-901-F

### Plugging Drilled Passages



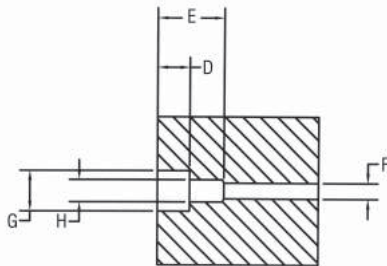
Expanding Plugs are used to plug the end of an oil channel. Each plug consists of a ball mounted into a sleeve which, when installed, expands and seals to the inner bore of the hole. Installation consists of preparing the hole, inserting the plug, and striking the ball to expand the sleeve. Do not use sealing compound or tape. Please consider using bleed screws instead of expanding plugs in some holes. This allows bleeding of the drilled channels.

Size	1	2	3
D1	.236	.315	.394
D2 +0.004, -0.0	.236	.315	.394
D3 max.	.208	.291	.37
L1	.256	.335	.433
L2	.339	.461	.598
L3 min.	.248	.327	.425
X +/-0.008	.016	.012	.016
Part No.	CLR-916-F	CLR-906-F	CLR-926-F
Installation Tool for Expanding Plug	CLR-HT-MBM-060	CLR-HT-MBM-080	CLR-HT-MBM-100

### Hydraulic Bleeding



Some drilled oil passages should have the ability to be opened for fixture bleeding. By using a sealing washer and plug, air in oil passages can be released. This is only recommended for small holes. Larger holes should be prepared to accept larger threaded plugs like CLR-810-F.



Size	1	2
D	.197	.276
E	.404	.67
F	.16	.24
G	.325	.441
H	M4	M6
Part No., Washer	CLR-3001-713-SW	CLR-3000-779-SW
Part No., Bolt	CLR-3300-357-F	CLR-3300-223-F

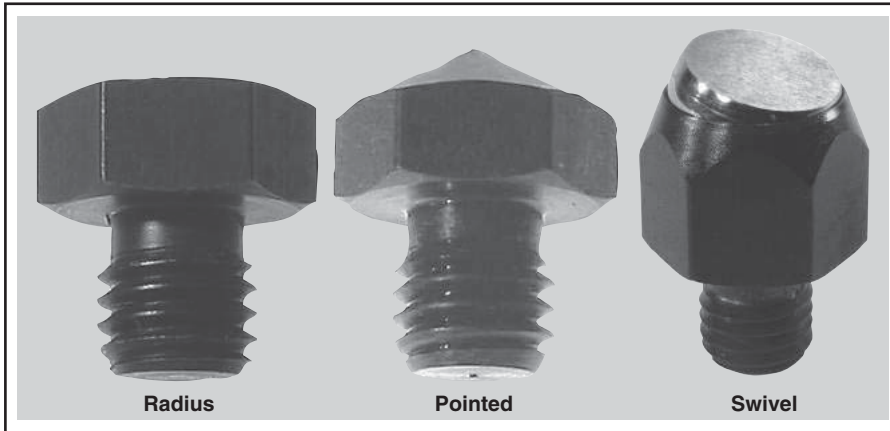
### Air Venting - Single Acting Elements



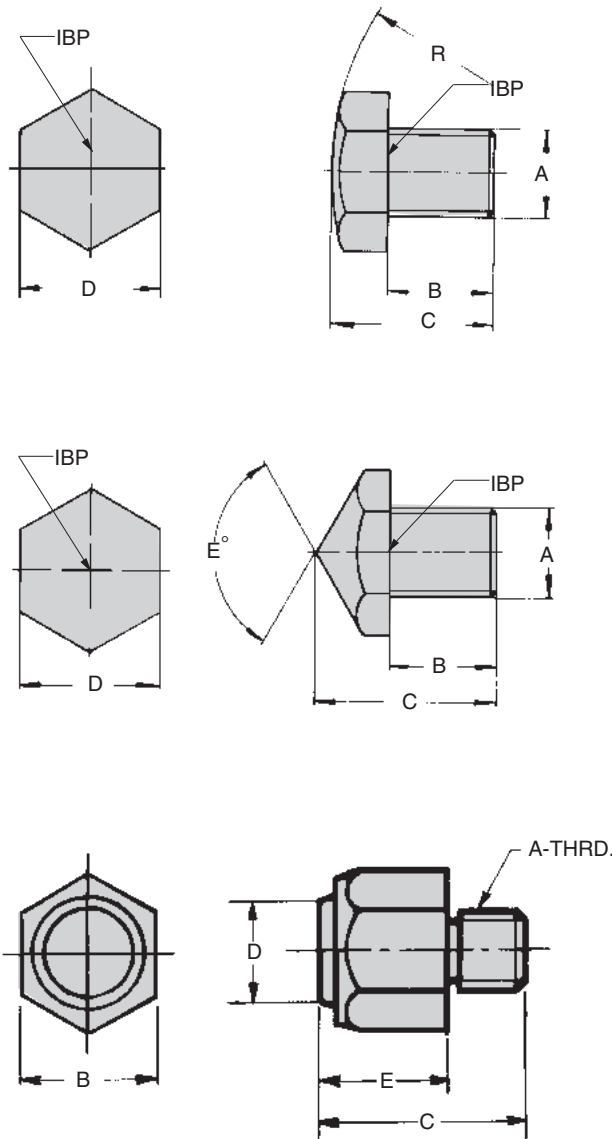
When using Single Acting cylinders or work supports, it is important to vent the spring volume to a clean environment. If this is not done, coolant and chips can be sucked into the element during the return stroke.

Port size	G 1/8	G 1/4	G 1/2
Part No., Filter Plug	CLR-0361-012-F	CLR-0361-000-F	CLR-0361-006-F

# Contact Bolts



- Radius contact bolt for most applications
- Pointed contact bolt for clamping in holes, and point clamping
- Swivel contact bolt distributes clamping force to prevent marring
- 1144 steel, hardened 50-60 RC



## Radius

Part No.	A	B	C	D Hex	R Radius
CLR-401-CB	1/4-20	1/4	3/8	7/16	25/32
CLR-400-CB		3/8	25/32		
CLR-404-CB	5/16-18	5/16	1/2	1/2	1
CLR-402-CB		3/8	25/32		
CLR-403-CB	3/8-16	1/2	7/8	9/16	1-3/8
CLR-405-CB	1/2-13	1/2	7/8	3/4	1-3/4
CLR-406-CB	5/8-11	25/32	1-3/16	15/16	2-3/8
CLR-408-CB	3/4-10	1	1-3/8	1-1/8	2-3/8
CLR-409-CB	1-8	1-3/16	1-27/32	1-1/2	3-15/16
CLR-3614-027-CB	M5	.35	.75	8mm	.79
CLR-3614-039-CB*	M6	.24	.37	10mm	.79
CLR-3614-016-CB		.39	.79		
CLR-3614-038-CB*	M8	.31	.51	13mm	.98
CLR-3614-001-CB		.39	.79		
CLR-3614-002-CB	M10	.47	.87	17mm	1.38
CLR-3614-028-CB	M12	.47	.87	19mm	1.77
CLR-3614-015-CB	M20	.98	1.38	30mm	2.36
CLR-3614-018-CB	M30	1.38	2.13	46mm	3.94
CLR-3614-019-CB	M42	1.77	2.80	65mm	5.51
CLR-3614-020-CB	M48	2.36	3.54	75mm	9.84

\* These sizes are not heat treated.

## Pointed

Part No.	A	B	C	D Hex	E°
CLR-413-CB	1/4-20	1/4	3/4	7/16	90
CLR-414-CB	3/8-16	1/2	1-1/16	9/16	90
CLR-415-CB	1/2-13	1/2	1	3/4	120
CLR-416-CB	5/8-11	25/32	1-3/8	15/16	120
CLR-417-CB	3/4-10	1	1-9/16	1-1/8	120
CLR-418-CB	1-8	1-3/16	1-31/32	1-1/2	120
CLR-3614-033-CB	M5	.35	.63	8mm	120°
CLR-3614-068-CB	M6	.24	.71	10mm	90°
CLR-3614-032-CB		.39	.87		
CLR-3614-069-CB	M8	.31	.87	13mm	90°
CLR-3614-021-CB	M10	.47	1.06	17mm	90°

## Swivel

Part No.	A Dia	B Hex	C	D Dia	E
CLR-420-CB	5/16-18	9/16	.82	13/32	1/2
CLR-421-CB	3/8-16	13/16	1.29	19/32	13/16
CLR-422-CB	1/2-13	7/8	1.23	5/8	13/16
CLR-423-CB	5/8-11	1-1/16	1.61	13/16	1
CLR-3614-228-CB	M6	11mm	21mm	7.2mm	13mm
CLR-3614-072-CB	M8	11mm	21mm	7.2mm	13mm
CLR-3614-073-CB	M10	17mm	28mm	10.5mm	18mm
CLR-3614-074-CB	M12	17mm	30mm	10.5mm	18mm

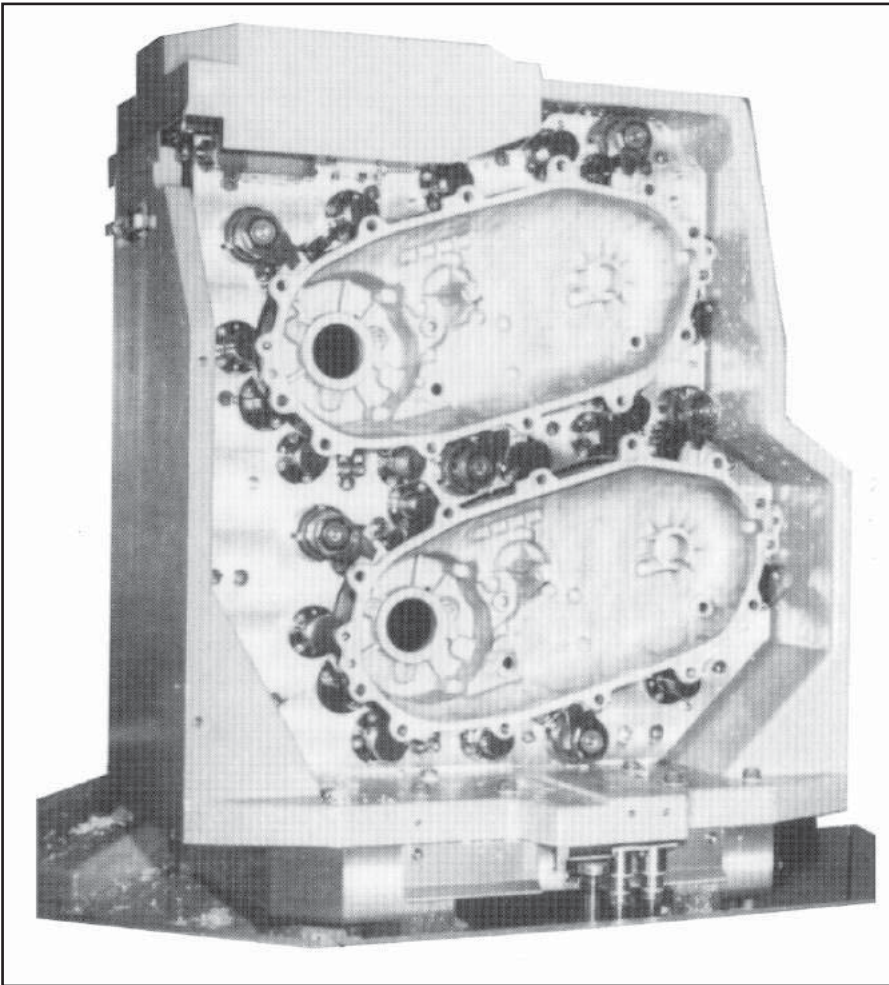


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# Application Example



**Two-sided Palletized Fixture for Machining Both Sides of an Aluminum Housing**

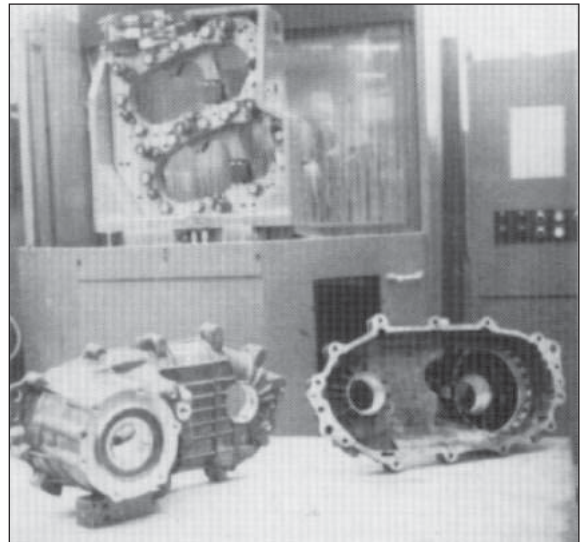
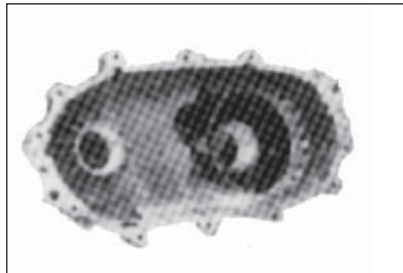
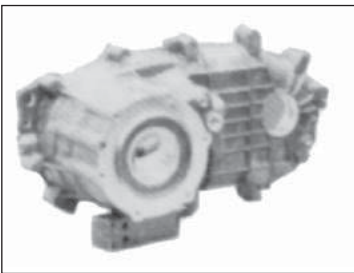


**Cartridge/Manifold-Mounted Swing Clamps**  
(See Swing Clamps section)



**Fluid Advanced Work Supports**  
(See Work Supports section)

Palletized fixture holds two aluminum castings, allowing complete machining of both sides with only one setup. The fixture uses manifold-mounted Swing Clamps and Work Supports. Fluid is supplied through passages in the vertical fixture plate, so the fixture is free of tubing lines.



Both faces of the workpiece (above) are machined with one setup. Vertical fixture plate has cutouts (see photo at right) to allow access from both sides. Product designers integrated special clamping areas into the casting for easier fixturing.

1  
3



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# Assembly and Handling Technology

## Modular Units ■ Application and combination examples

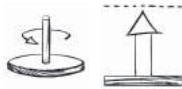
### Lifting module operated by foot pedal with rotating module vertical axis



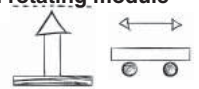
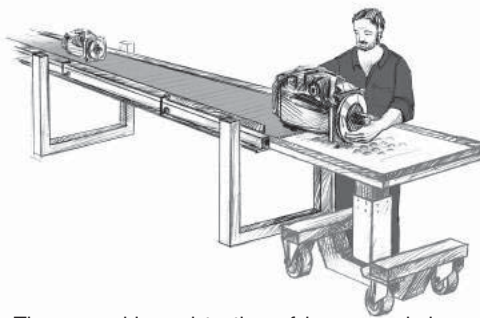
Here a complex hydraulic subassembly requires access to 5 sides during the installation of its components.

The employee can rotate the workpiece 360° in both directions about the vertical axis of this rotating module. Now the employee can select the most ergonomic position via manual or electric operation. Model versions with indexing are available too; standard index angles are 45°, 60°, 90°, 120°.

The appropriate working height is adjusted by the foot pedal of the self-contained hydraulic lifting module.



### Lifting module operated by hand pendant with rotating module horizontal axis



The assembly and testing of heavy workpieces such as axial piston machines is carried out at many stations. Transfer from station to station is made easy by fastening a tabletop plate to a hydraulic lift module that is mounted on top of a cart module.

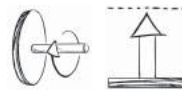
Applying the brake on the cart module locks the unit in place. The operator can easily raise or lower the tabletop by pumping the foot pedal of the hydraulic lifting module.

### Lifting module operated by hand pendant with rotating module horizontal axis



Multi-shift organizations know that every shift change also ushers in the change of each and every employee's size and ability. Modular combinations adapt to such changes and this one is composed of two modules: electric lift and horizontal-axis rotating. The electric lifting module effortlessly adjusts to an employee's height via a hand

or foot push-button pendant. The horizontal-axis rotating module does just what its name implies; it spins a workpiece about its horizontal axis. It has 360° of rotation in both directions. Push or pull your workpiece to rotate the version without indexing or automatically index to your next position using the hand-lever or foot-pedal versions.



### Lifting module operated by foot pedal with tilting module and rotating module vertical axis



Optimum assembly of car seats requires the ability to quickly and easily move the seat into different positions. This modular combination allows the employee to raise, lower, rotate and tilt the seat. The tilting module is equipped with a pneumatic balancer that counteracts almost all of the tilting torques. This means very little force is required of the employee to tilt heavy objects.

### Electrically operated lifting module in sync



Assembly of truck axles is carried out by two employees at the same time. Components are installed and fastened from above as well as from both ends. The working height is adjusted via a foot pendant that controls two synchronized electric lifting modules. The synchronized lifts guarantee a level work surface throughout the entire stroke. The lifting modules are mounted to a floor module to improve stability.

### Lifting module operated by foot pedal with tilting module



Here the employee is carrying out the final assembly of an electric motor followed by a series of tests.

The working height is adjusted by the foot pedal of the hydraulic lifting module. The tilting module mounted on top of the lifting module allows the employee to tilt the motor back and forth by 90°. The integrated pneumatic-counterbalance feature makes tilting the motor a nearly effortless task.

Subject to change. For further details, including detailed dimensions and mounting instructions, visit [www.clrh.com](http://www.clrh.com).



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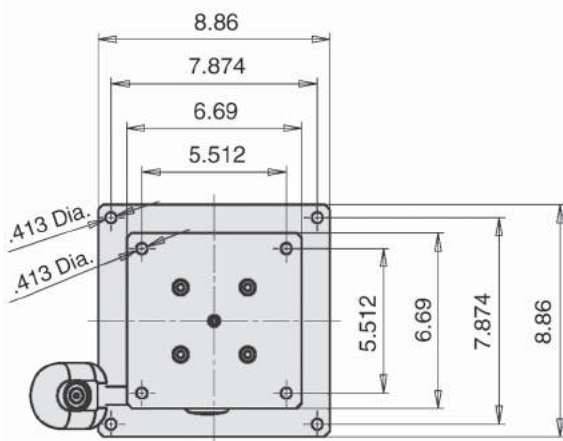
- Self-contained units for lifting and height adjustment
- Single-pedal operation for sensitive, controlled lifting
- Square column resists torsional loads
- Choice of five stroke lengths, up to 23.62 inches
- To decend the lifting unit a maximum of 10% of Fz max. load is required
- The center of gravity should be within the traverse of the mounting bolts

**OPERATION:** Raise and lower unit using the same lever. Pump foot lever down 45 degrees to raise platform. To lower unit, lift lever 10 degrees to release pressure.

**PRESSURE RELIEF:** If pumping continues after reaching full height extension, pressure relieves automatically and returns fluid to the reservoir.

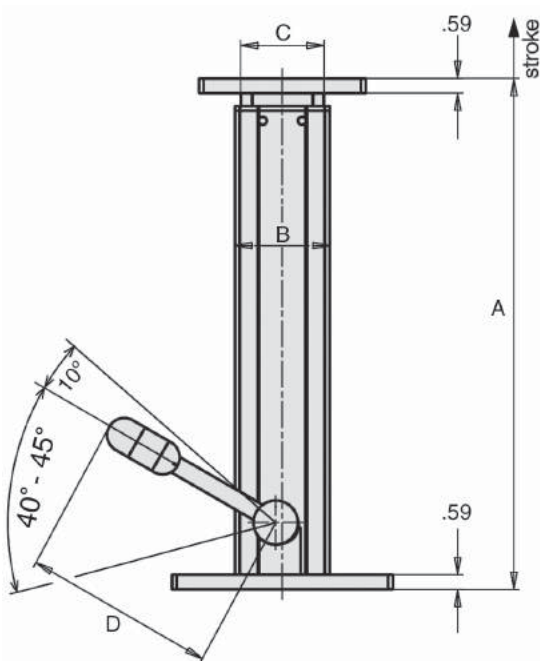
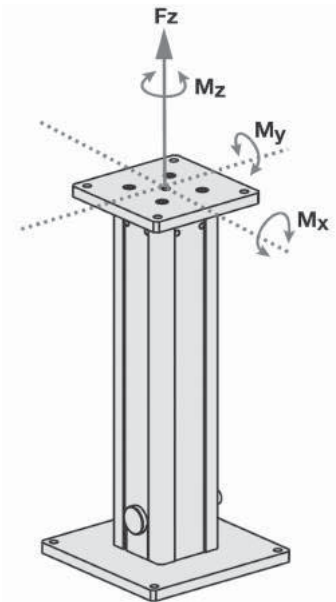
**MOUNTING:** Tapped holes in top and bottom plates allow attaching custom bases and tables.

**CONSTRUCTION:** Square column is made from anodized aluminum. Top and bottom mounting plates are black anodized aluminum. The operating lever is steel with bright zinc plating, with a molded plastic foot pedal.



**MAXIMUM TORQUE LOAD:** In the case of eccentric loads, it is recommended to compensate these by counterweights. In off-position the indicated maximum torques may occur.

The forces and torques have to be considered by the operator. During the lifting motion only 50% of the maximum values are admitted.



Fz lifting capacity with centered load	225 lbs	450 lbs	900 lbs	1350 lbs	1350 lbs	
Pump motions per 3.94 in. of stroke	8	8	8	10	10	
Fully Extended Height Stroke + A	Stroke	A	Stroke	A	Stroke	A
	7.87	16.54	7.87	16.54	7.87	20.47
	11.81	20.47	11.81	20.47	11.81	24.41
	15.75	24.41	15.75	24.41	15.75	28.35
	19.69	28.35	19.69	28.35	NA	NA
23.62	32.28	23.62	32.28	NA	NA	
B Sq	3.82		5.91		5.91	
C Sq	3.35		5.24		NA	
D	7.7		11.7		11.3	
Mx/y (Max. Torque Load)	74 ft. lbs.		369 ft. lbs.		5.90 ft. lbs.	
Mz (Max. Torque Load)	37 ft. lbs.		221 ft. lbs.		2.95 ft. lbs.	
Part No.	CLR-8910-01-X0-H		CLR-8915-0X-X0-H		CLR-8919-06-X0-H	
	Stroke	Max. Lift Force	Stroke		Stroke	
	2=7.87	2=450 lbs.	2=7.87		2=7.87	
	3=11.81	4=900 lbs.	3=11.81		3=11.81	
	4=15.75	6=1350 lbs.	4=15.75		4=15.75	
	5=19.69		5=19.69			
	6=23.62		6=23.62			

13



**ROEMHELD**  
HILMA ■ STARK

**CARR LANE ROEMHELD MFG. CO.**

Sales — Phone (314) 647-6200 Fax (314) 647-5736  
Engineering — Phone 1-800-827-2526 Web [www.clrh.com](http://www.clrh.com)



## ***CARR LANE ROEMHELD GUARANTEE OF QUALITY***

*Carr Lane Roemheld components are carefully designed, manufactured, inspected, and individually tested prior to shipment. In the unlikely case you find a defect in materials or workmanship within 6 months after receipt, we will promptly repair or replace the component, in accordance with our Limited Warranty below. Our liability is limited to replacement of the part and this warranty does not apply to altered or misapplied products.*

### **Limited Warranty**

Seller warrants that the product described herein will be free from defects in material and workmanship. If any failure to conform to this warranty be found within six (6) months, from date of receipt of the product by Buyer, and Seller is given immediate notification thereof, Seller, upon being satisfied of the existence of such nonconformity, will correct the same by replacement of the defective product or making suitable repairs. If the Seller is unable to correct such nonconformity by replacement of the product or making suitable repairs, whether due to the nature of such nonconformity, the use made by the Buyer of the product, or for any other reason, it will return to Buyer the price set forth herein, or where appropriate, the unit price for such number or quantity of products as shall have such nonconformity which Seller is unable to correct, upon Seller's receipt of the nonconforming product f.o.b. its plant; provided, however, no product shall be returned to Seller without its express written consent; and provided further that such receipt of any nonconforming product will not be required where it is no longer possible for Buyer to return the same to Seller. In no event shall Seller be liable to Buyer, either directly or by way of contribution or indemnity, for direct, special, incidental or consequential damages such as, but not limited to, property damage, loss of profit, damages based on loss of use of the product, or damages for cover, whether the claim for any such damages be based on warranty, express or implied, contract, tort, or otherwise. THE FOREGOING IS SELLER'S SOLE WARRANTY WITH RESPECT TO THE PRODUCT. SELLER MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.



# Find Us Online!

# www.carrlane.com

The screenshot shows the Carr Lane Manufacturing Co. website homepage. At the top, there are social media icons (Twitter, YouTube, Facebook, LinkedIn) and a link to 'Add to Favorites'. On the right, there is a 'Distributor Login' link. The Carr Lane logo is on the left, with contact information: phone number 314-647-6200 and email info@carrlane.com. Three main navigation buttons are in the top right: 'PRICING & AVAILABILITY', 'SEARCH CAD DRAWINGS', and 'COMPARE PRODUCTS'. A large banner features a 3D rendering of a CarrLock System component, with the text 'Go Lean With CarrLock System' and 'Changeability from job to job in seconds. Exclusively Made In The USA'. Below the banner is a navigation bar with links: 'PRODUCT CATALOG', 'ENGINEERING RESOURCES', 'CUSTOMER SERVICE', 'ABOUT CARR LANE', and 'HOME'. The main content area has a heading 'Carr Lane Manufacturing - Your Source For Tooling Components' followed by a paragraph about the company's global recognition and product range. Below this is a 'FIND A DISTRIBUTOR' button. Three columns feature images of staff and their roles: 'Engineering Resources' (a man at a computer), 'Manufacturing Resources' (a man in a factory setting), and 'Purchasing' (a woman at a computer). Each column has a short description of the service. To the right, there is an image of the Carr Lane product catalog and a 'VIEW ONLINE CATALOG' button.

**Carr Lane Manufacturing - Your Source For Tooling Components**

Carr Lane Manufacturing is recognized as a world leader for standard tooling components used by virtually every industry around the globe.

Known primarily for jig & fixture components, Carr Lane Manufacturing offers more than 100,000 products including quick change tooling plates & accessories, hoist rings, toggle clamps, handles, knobs, ball & spring plungers, threaded inserts, clamp straps, drill bushings, alignment pins, fixture bases, & power workholding devices. We proudly make the majority of what we sell at our two American plants located in St. Louis, MO, and Austin, TX.

*With world headquarters located in St. Louis, Missouri, USA, Carr Lane Manufacturing provides a selective distributor network that is made up of the very best industrial distributors in the US and around the world. Through our vast distributor network, our customers receive the very best in personalized service, product expertise and support, as well as on-site problem solving and product education.*

**FIND A DISTRIBUTOR**

**Engineering Resources**  
Free, downloadable CAD drawings are available through our online catalog.

**Manufacturing Resources**  
Carr Lane Manufacturing provides you with savings through standardized parts.

**Purchasing**  
Thanks to our vast inventory, Carr Lane Manufacturing proudly ships over 90% of our orders the same day!\*

**VIEW ONLINE CATALOG**



## Our Promise Of Quality

We are committed to being the world's preferred source of standard tooling components by meeting and surpassing our customers' expectations for top quality and excellent service every day.

ISO 9001  
CERTIFIED



INCH DRILL SIZES		
Drill/Decimal	Drill/Decimal	Drill/Decimal
80 .0135	9/64 .1406	23/64 .3594
79 .0145	27 .1440	U .3680
1/64 .0156	26 .1470	<b>3/8 .3750</b>
78 .0160	25 .1495	V .3770
77 .0180	24 .1520	W .3860
76 .0200	23 .1540	25/64 .3906
75 .0210	5/32 .1562	X .3970
74 .0225	22 .1570	Y .4040
73 .0240	21 .1590	13/32 .4062
72 .0250	20 .1610	Z .4130
71 .0260	19 .1660	27/64 .4219
70 .0280	18 .1695	<b>7/16 .4375</b>
69 .0292	11/64 .1719	29/64 .4531
68 .0310	17 .1730	15/32 .4688
1/32 .0312	16 .1770	31/64 .4844
67 .0320	15 .1800	<b>1/2 .5000</b>
66 .0330	14 .1820	33/64 .5156
65 .0350	13 .1850	17/32 .5312
64 .0360	<b>3/16 .1875</b>	35/64 .5469
63 .0370	12 .1890	<b>9/16 .5625</b>
62 .0380	11 .1910	37/64 .5781
61 .0390	10 .1935	19/32 .5938
60 .0400	9 .1960	39/64 .6094
59 .0410	8 .1990	<b>5/8 .6250</b>
58 .0420	7 .2010	41/64 .6406
57 .0430	13/64 .2031	21/32 .6562
56 .0465	6 .2040	43/64 .6719
3/64 .0469	5 .2055	<b>11/16 .6875</b>
55 .0520	4 .2090	45/64 .7031
54 .0550	3 .2130	23/32 .7188
53 .0595	7/32 .2188	47/64 .7344
<b>1/16 .0625</b>	2 .2210	<b>3/4 .7500</b>
52 .0635	1 .2280	49/64 .7656
51 .0670	A .2340	25/32 .7812
50 .0700	15/64 .2344	51/64 .7969
49 .0730	B .2380	<b>13/16 .8125</b>
48 .0760	C .2420	53/64 .8281
5/64 .0781	D .2460	27/32 .8438
47 .0785	E .2500	55/64 .8594
46 .0810	<b>1/4 .2500</b>	<b>7/8 .8750</b>
45 .0820	F .2570	57/64 .8906
44 .0860	G .2610	29/32 .9062
43 .0890	17/64 .2656	59/64 .9219
42 .0935	H .2660	<b>15/16 .9375</b>
3/32 .0938	I .2720	61/64 .9531
41 .0960	J .2770	31/32 .9688
40 .0980	K .2810	63/64 .9844
39 .0995	9/32 .2812	<b>1 .10000</b>
38 .1015	L .2900	
37 .1040	M .2950	+64th
36 .1065	19/64 .2969	increments up
7/64 .1094	N .3020	to 1-7/8"
35 .1100	<b>5/16 .3125</b>	
34 .1110	O .3160	+32nd
33 .1130	P .3230	increments up
32 .1160	21/64 .3281	to 2-1/4"
31 .1200	Q .3320	
<b>1/8 .1250</b>	R .3390	+16th
30 .1285	11/32 .3438	increments up
29 .1360	S .3480	to 4-1/4"
28 .1405	T .3580	

METRIC DRILL SIZES		
Drill/Decimal	Drill/Decimal	Drill/Decimal
.35mm .0138	3.60mm .1417	8.70mm .3425
.38mm .0150	3.70mm .1457	8.75mm .3445
.40mm .0157	3.75mm .1476	8.80mm .3465
.42mm .0165	3.80mm .1496	8.90mm .3504
.45mm .0177	3.90mm .1535	<b>9.00mm .3543</b>
.48mm .0189	<b>4.00mm .1575</b>	9.10mm .3583
.50mm .0197	4.10mm .1614	9.20mm .3622
.55mm .0217	4.20mm .1654	9.25mm .3642
.60mm .0236	4.25mm .1673	9.30mm .3661
.65mm .0256	4.30mm .1693	9.40mm .3701
.70mm .0276	4.40mm .1732	9.50mm .3740
.75mm .0295	4.50mm .1772	9.60mm .3780
.80mm .0315	4.60mm .1811	9.70mm .3819
.85mm .0335	4.70mm .1850	9.75mm .3839
.90mm .0354	4.75mm .1870	9.80mm .3858
.95mm .0374	4.80mm .1890	9.90mm .3898
<b>1.00mm .0394</b>	4.90mm .1929	<b>10.00mm .3937</b>
1.05mm .0413	<b>5.00mm .1969</b>	10.20mm .4016
1.10mm .0433	5.10mm .2008	10.50mm .4134
1.15mm .0453	5.20mm .2047	10.80mm .4252
1.20mm .0472	5.25mm .2067	<b>11.00mm.4331</b>
1.25mm .0492	5.30mm .2087	11.20mm .4409
1.30mm .0512	5.40mm .2126	11.50mm .4528
1.35mm .0531	5.50mm .2165	11.80mm .4646
1.40mm .0551	5.60mm .2205	<b>12.00mm .4724</b>
1.45mm .0571	5.70mm .2244	12.20mm .4803
1.50mm .0591	5.75mm .2264	12.50mm .4921
1.55mm .0610	5.80mm .2283	<b>13.00mm .5118</b>
1.60mm .0630	5.90mm .2323	13.50mm .5315
1.65mm .0650	<b>6.00mm .2362</b>	<b>14.00mm .5512</b>
1.70mm .0669	6.10mm .2402	14.50mm .5709
1.75mm .0689	6.20mm .2441	<b>15.00mm .5906</b>
1.80mm .0709	6.25mm .2461	15.50mm .6102
1.85mm .0728	6.30mm .2480	<b>16.00mm .6299</b>
1.90mm .0748	6.40mm .2520	16.50mm .6496
1.95mm .0768	6.50mm .2559	<b>17.00mm .6693</b>
<b>2.00mm .0787</b>	6.60mm .2598	17.50mm .6890
2.05mm .0807	6.70mm .2638	<b>18.00mm .7087</b>
2.10mm .0827	6.75mm .2657	18.50mm .7283
2.15mm .0846	6.80mm .2677	<b>19.00mm .7480</b>
2.20mm .0866	6.90mm .2717	19.50mm .7677
2.25mm .0886	<b>7.00mm .2756</b>	<b>20.00mm .7874</b>
2.30mm .0906	7.10mm .2795	20.50mm .8071
2.35mm .0925	7.20mm .2835	<b>21.00mm .8268</b>
2.40mm .0945	7.25mm .2854	21.50mm .8465
2.45mm .0965	7.30mm .2874	<b>22.00mm .8661</b>
2.50mm .0984	7.40mm .2913	22.50mm .8858
2.55mm .1004	7.50mm .2953	<b>23.00mm .9055</b>
2.60mm .1024	7.60mm .2992	23.50mm .9252
2.65mm .1043	7.70mm .3031	<b>24.00mm .9449</b>
2.70mm .1063	7.75mm .3051	24.50mm .9646
2.75mm .1083	7.80mm .3071	<b>25.00mm.9843</b>
2.80mm .1102	7.90mm .3110	
2.90mm .1142	<b>8.00mm .3150</b>	+1.00mm
<b>3.00mm .1181</b>	8.10mm .3189	increments
3.10mm .1220	8.20mm .3228	up to 48mm
3.20mm .1260	8.25mm .3248	
3.25mm .1280	8.30mm .3268	+5.00mm
3.30mm .1299	8.40mm .3307	increments
3.40mm .1339	8.50mm .3346	from 50mm
3.50mm .1378	8.60mm .3386	up to 105mm

TAP GUIDE SIZES (Priced as specials)		
Tap Size*	Tap Guide Nominal ID Size	Tap Drill Size**
#0-80	.0616	3/64
<b>#2-56</b>	.0883	#50
#2-64	.0880	#50
<b>#4-40</b>	.1152	#43
#4-48	.1147	#42
<b>#5-40</b>	.1282	#38
#5-44	.1280	#37
<b>#6-32</b>	.1421	#36
#6-40	.1412	#33
<b>#8-32</b>	.1681	#29
#8-36	.1676	#29
<b>#10-24</b>	.1954	#25
#10-32	.1941	#21
<b>1/4-20</b>	.2565	#7
1/4-28	.2546	#3
<b>5/16-18</b>	.3197	F
5/16-24	.3179	I
<b>3/8-16</b>	.3831	5/16
3/8-24	.3804	Q
<b>7/16-14</b>	.4468	U
7/16-20	.4440	25/64
<b>1/2-13</b>	.5100	27/64
1/2-20	.5065	29/64
<b>9/16-12</b>	.5733	31/64
9/16-18	.5697	33/64
<b>5/8-11</b>	.6368	17/32
5/8-18	.6322	37/64
<b>3/4-10</b>	.7630	21/32
3/4-16	.7581	11/16
<b>7/8-9</b>	.8894	49/64
7/8-14	.8843	13/16
<b>1-8</b>	1.0162	7/8
1-14	1.0093	15/16

METRIC		
Tap Size*	Tap Guide Nominal ID Size	Tap Drill Size**
<b>M1.6x0.35</b>	.0651	1.25mm or #55
<b>M2x0.4</b>	.0810	1.60mm or #52
<b>M2.5x0.45</b>	.1008	2.05mm or #46
<b>M3x0.5</b>	.1207	2.50mm or #39
<b>M3.5x0.6</b>	.1407	2.90mm or #32
<b>M4x0.7</b>	.1613	3.30mm or #30
<b>M5x0.8</b>	.2010	4.20mm or #19
<b>M6x1</b>	.2410	5.00mm or #8
<b>M8x1.25</b>	.3214	6.80mm or H
M8x1	.3197	7.00mm or J
<b>M10x1.5</b>	.4009	8.50mm or R
M10x1.25	.4002	8.80mm or 11/32
<b>M12x1.75</b>	.4805	10.20mm or 13/32
M12x1.25	.4789	10.80mm or 27/64
<b>M14x2</b>	.5600	12.00mm or 15/32
M14x1.5	.5584	12.50mm or 1/2
<b>M16x2</b>	.6387	14.00mm or 35/64
M16x1.5	.6372	14.50mm or 37/64
<b>M18x2.5</b>	.7191	15.50mm or 39/64
M18x1.5	.7159	16.50mm or 21/32
<b>M20x2.5</b>	.7978	17.50mm or 11/16
M20x1.5	.7946	18.50mm or 47/64
<b>M22x2.5</b>	.8765	19.50mm or 49/64
M22x1.5	.8734	20.50mm or 13/16
<b>M24x3</b>	.9583	21.00mm or 53/64
M24x2	.9537	22.00mm or 7/8

\* Coarse series shown in bold. Pitch callout not required on metric coarse series.  
\*\* Closest size for 75% theoretical thread.



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