

Power Workholding

Power Workholding ■ Precision Vises ■ Zero Point Mounting ■ Assembly and Handling



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CARR LANE ROEMHELD MFG. CO.

OUR STORY

CARR LANE ROEMHELD MFG. CO.

In 1982 an independent joint venture was established to marry the proven product expertise of Roemheld with the marketing know-how and distribution network of Carr Lane Manufacturing. This partnership now offers to the American manufacturer the complete benefits of the finest in international power workholding combined with the best in local service and support.

After initial tests by many companies, both small and large, the word had spread confirming the quality and reliability obtained when using Roemheld Power Workholding products.

We invite you to review this catalog in depth and to call us with any questions about your applications. We at Carr Lane Roemheld welcome the opportunity to help you manufacture your quality product in the most productive way possible — with the world's most dependable workholding equipment.



Founded in 1952 in St. Louis, Missouri by Earl Walker to make standardized tooling components, Carr Lane Manufacturing has grown, through constant innovation, to become the foremost supplier to the American Machine Tool Industry. Now the most complete line available, Carr Lane Mfg. offers Jig and Fixture Components, Toggle Clamps, Hoist Rings, Alignment Pins, Drill Bushings, Spring Plungers, and Modular Fixturing. Setting the standard for American Tool Engineers, Carr Lane Manufacturing's catalog is recognized as the engineer's tooling reference.



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Drawing upon a centuries-old tradition of German craftsmanship, metalworking was already well established in Laubach, Germany when the Roemheld family began to manage operations in 1870. Development of the hydraulic workholding components began in the early 1960's and soon grew to dominate the European market.

Today, Roemheld GmbH is by far the world leader in this productivity-enhancing technology, offering a tremendous range of types and sizes of superior design and the highest quality.



SUCCESS GUARANTEED

Find out the
advantages of our
Quality Guarantee
when you work with us!

Carr Lane Roemheld knows your power workholding system needs to be of the highest quality.

That's why, if you work with us, you'll get the best system, and top quality results.

We stand behind our products, and provide you with the excellent service you need to remain competitive in today's manufacturing environment.



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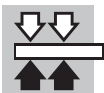
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CARR LANE ROEMHELD GUARANTEE OF QUALITY

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.



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Featured Power Workholding Items



**NC Machine Vises
with Gauge**
pages 96-97



**Robust Swing
Clamps**
pages 50-52



Lifting Units
pages 186-189



Hinge/Link Clamps
pages 25-27



Work Supports
pages 80-91



Fixture Clamps
pages 117-119



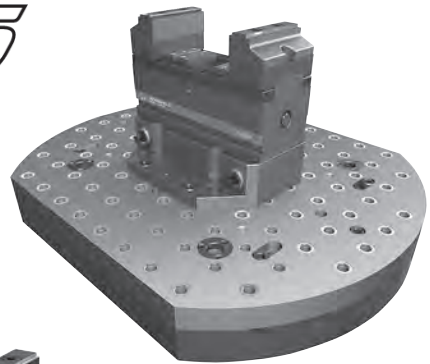
**Electro-Mechanical
Clamping Systems**
page 13



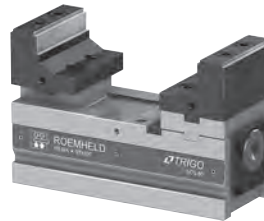
Compact Clamps
page 24



**5-Axis
Machining**
pages 103-109



**Quintus
Quick-Change Risers**
page 108



**5-Axis
Machining Vises**
pages 105-107



**5-Axis
Vise Jaws**
page 109



Bore Clamps
pages 76-77



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Contents

	Technical Information	Product Features 4-5 Design Information 6-11 Safety Precautions 12
	Clamps & Cylinders	Extending Clamps 14-27 Swing Clamps 28-52 Push Clamps 53-61 Locking Piston Clamps 62-63 Block Cylinders 64-69 Built-in Elements 70-71 Universal Cylinders 72-73 Pull Clamps 74-79
	Work Supports	Spring-Extended Work Supports 82-89 Fluid-Advanced Work Supports 81-88, 90-91 Air-Advanced Work Supports 81-88
	Vises, Concentric Clamps & Zero Point Mounting	Standard Machine Visess 94-95 Machining Center Visess 96-97 Vise Jaws and Accessories 98-99 Concentric Clamping 100-102 CL5 5-Axis Machining Visess 103-109 Mini Clamp Visess 104-106 Super Compact Clamping Vise 107 5-Axis Riser, Vise Jaws 108-109 Concentric Visess 110-111 Collet Visess 112 Zero-Point Quick Pallet Clamps 114-116 Fixture Clamps 117-119
	Power Sources	Electric Power Units 122-127 Air Power Units 128-130 Hand Pumps 131-132 Screw Pumps 133 Hydraulic Intensifiers 134-136
	Valves	Clamping Valves 137-143 Sequence Valves 145-146 Pressure-Reducing and Closing Valves 144, 147-150 Check Valves 151-152, 154 Shutoff and Pressure-Relief Valves 153 Flow-Control Valves 154
	Fittings & Accessories	Rotary Couplings and Pallet Decouplers 156-171 Accumulators 167 Pressure Switches 173 Air Accessories, Manifolds and Gauges 174 Quick Connects and Couplers 168-171 Filters, Tubing, Hoses and Fluid 176-181 Fittings, Tubing Tools 179-183 Contact Bolts 184 Lifting Devices 188-189 Pivot Jacks 190-191



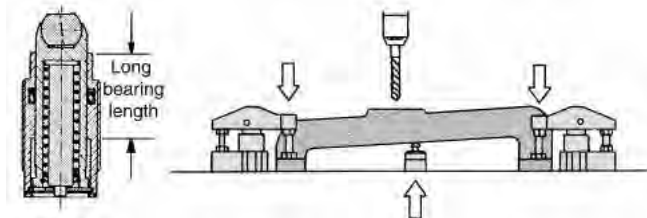
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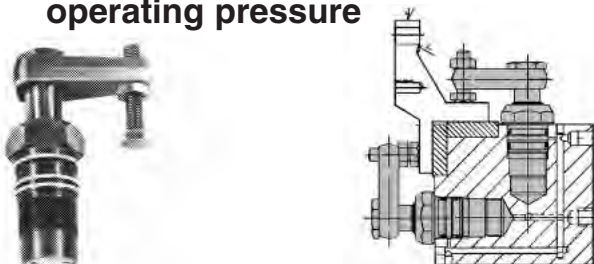
What makes Roemheld Power Workholding better than earlier hydraulic clamps?

1 Designs specifically and purely for workholding



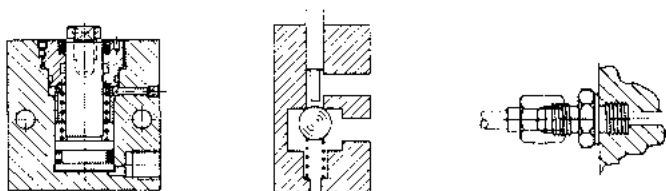
Earlier power clamping products descended from industrial jacks, pipe benders, and rams. Although these early devices (many still on the market) are fine for their original uses, they do not meet the special demands of modern workholding. For example, in a machining application, components are often 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



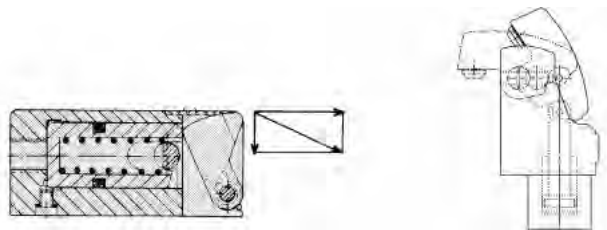
Earlier power clamps could operate at only 2000 to 3500 psi (pounds per square inch) fluid pressure. You needed large, bulky clamps with large internal cylinders to provide enough clamping force. Roemheld components are designed differently, inside and out, to fit easily on fixtures. They work comfortably 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



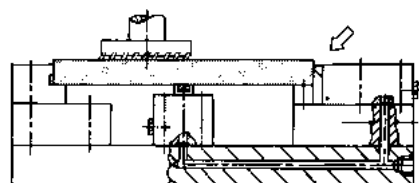
The Edge Clamps and Extending Clamps shown above are just two examples of advanced clamp designs in the Roemheld line. Both set new standards for good engineering and compact size. Our many new products and product improvements result from constant, extensive research and development. New products are 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.

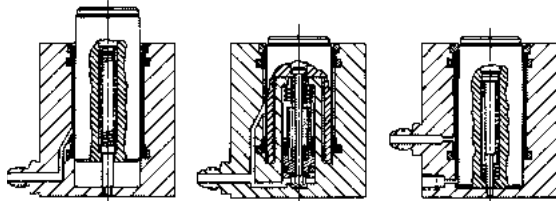


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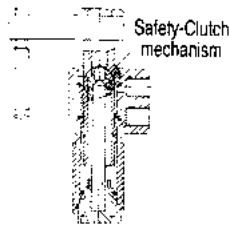
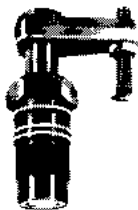
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7 Work Supports



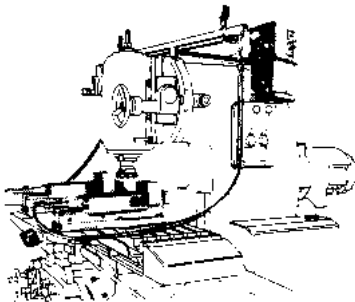
One of the most important improvements in power workholding is the work support. These components do not exert clamping force; instead, they lock off to restrain a workpiece during machining to prevent deflection and vibration. Roemheld work supports offer two major improvements: (1) drastically improved accuracy, with $\pm .0002$ 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



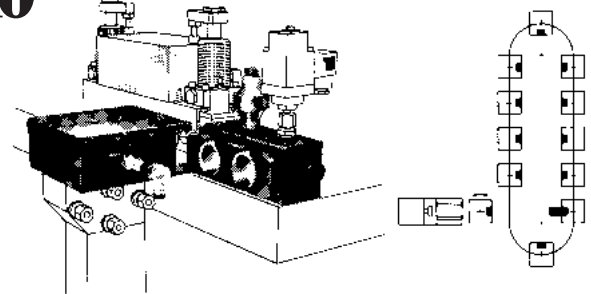
In all modesty, Roemheld Swing Clamps are by far the finest available anywhere, both in features and durability. Our proprietary safety-clutch mechanism prevents damage if the clamping arm strikes an unexpected object, such as an incorrectly loaded workpiece. The arm clutch disengages to avoid damaging 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



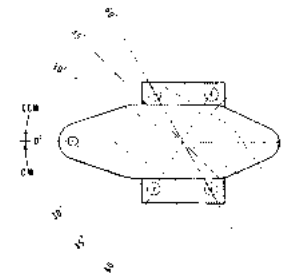
Early power-clamping systems relied either on limited-capacity air/oil intensifiers or on massive, noisy pumps for hydraulic power. Roemheld Electric and Air Power Units are totally different: they are compact, quiet power units designed especially for workholding. These turnkey units include an extremely 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



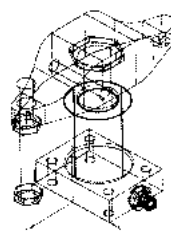
Power clamping on portable palletized fixtures is becoming quite common, yet presents some special challenges, such as maintaining full clamping pressure while the fixture is separated from its power source. We offer a wide choice of solutions, from rotary couplings, to manual pallet decouplers, to automatic 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**

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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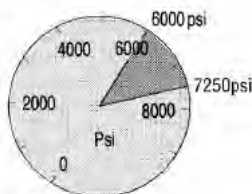
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Design Information

1. Operating Pressure

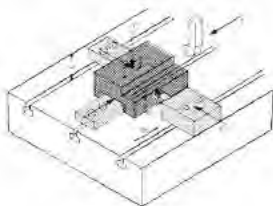
Although most Roemheld components operate comfortably and safely at up to 7250 psi, we recommend selecting a standard "design pressure" of 6000-psi for workholding fixtures. The table on each clamp's catalog page shows 6000-psi forces in bold for quick reference.



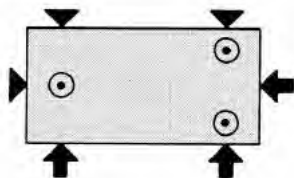
Designing at 6000 psi gives you most of the compactness benefits of high pressures, yet leaves a 25% reserve in case you find that you need additional holding force after building the fixture. Adjust up or down if necessary after checking the fixture. We recommend permanently labeling or stamping the 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

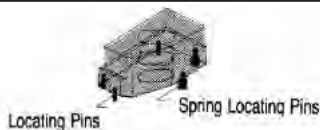
While developing your fixture concept, consider the following factors wherever possible:



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.



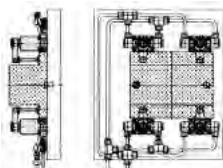
Evaluate workpiece-loading procedure and clamping sequence. Loading and clamping can be completely automatic, or involve some manual steps. To position the workpiece against locators, spring-loaded positioners (above) are often helpful. Sequence Valves are extremely useful to position hydraulically with push clamps before clamping. Total positioning force should be 30-50% of the workpiece's weight to overcome friction.



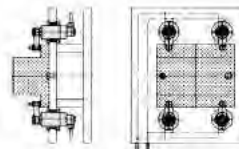
Decide how many parts you want to place on the fixture. For example, to place three workpieces on the above fixture, super-miniature Swing Clamps are necessary. With only one workpiece, just about any clamp would do.

3. Plumbing Options

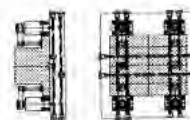
Supplying fluid to hydraulic fixtures is not merely an afterthought. Fluid supply is an integral part of fixture design. The following Swing Clamp fixtures illustrate four distinct plumbing concepts.



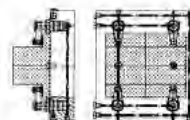
1. Tubing lines on top of fixture plate. This is the oldest, most traditional method of supplying fluid to hydraulic clamps. Before manifold mounting, using tubing was about the only option available. Advantages; less baseplate machining is required; quick build time. Disadvantages: chips are easily 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:

$$\text{Force} = \frac{\text{Power}}{\text{Velocity}}$$

$$F = \frac{P}{V}$$

$$\text{Cutting force (lbs)} = \frac{\text{Heaviest-cut horsepower} \times \text{Machine efficiency \%} \times 33,000}{\text{Cutting speed (sfpm)}}$$

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.



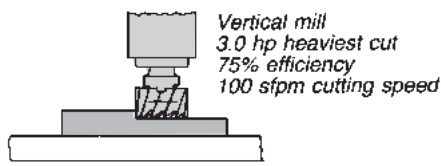
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Design Information

Example

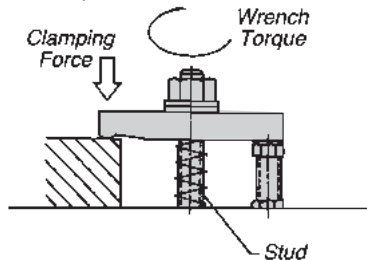


$$\text{Cutting force} = \frac{3.0 \text{ hp} \times .75 \times 33,000}{100 \text{ sfpm}} = 743 \text{ lbs}$$

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

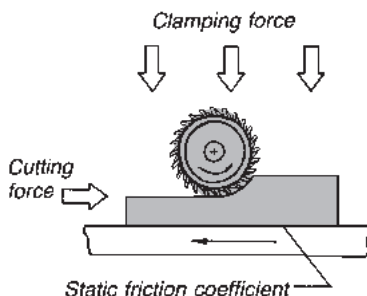
Clamping-force calculations can be quite complicated. Sometimes an approximate method is good enough. See table below for how much clamping force is available from manual clamp straps of various sizes (with a 2-to-1 clamping-force ratio) to compare with power-clamp forces.



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

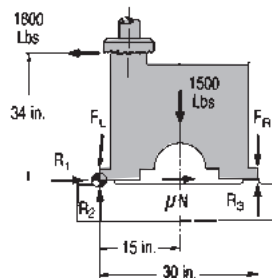
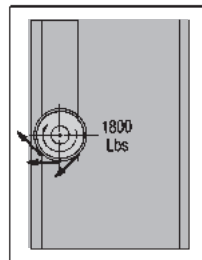


$$\text{Clamping force (lbs)} = \frac{\text{Cutting force (lbs)}}{\text{Static friction coefficient}} \times \text{Safety factor (usually 2)}$$

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 = $F_L + F_R + 1500$
- μ = 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

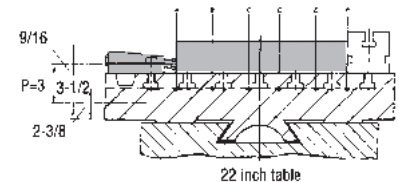
At first glance, the example above looks "statically indeterminate," i.e. there are 5 variables and only 3 equations. But for the minimum required clamping force, R_3 would be zero (workpiece barely touching) and F_L would be zero (there is no tendency to lift on the left side). Now with only 3 variables, 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.



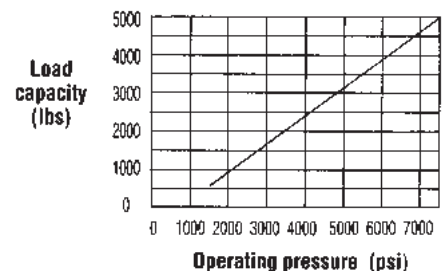
Excess force can cause fixture and machine-table distortion or even damage. Even a small hydraulic clamp can generate tremendous stresses (S). In the example above, three

$$S = P \times \left(1 + \frac{1}{1 + \frac{FL^2}{2EI}} \right)$$

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:

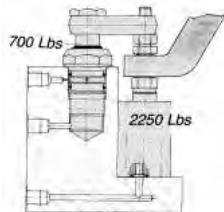


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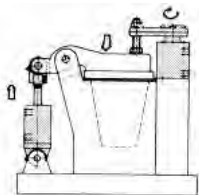
Choose enough load capacity to resist:
(1) machining forces; (2) workpiece weight;
(3) clamping forces not resisted by fixed stops.



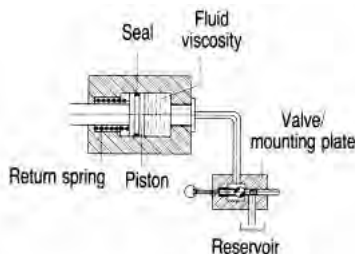
When supporting underneath a clamp, as in the example above, load capacity should be substantially greater than clamping force. Not only must the support resist static clamping force, it must resist dynamic load too (the "hammering" due to clamping-arm momentum). We recommend a load capacity of at least 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

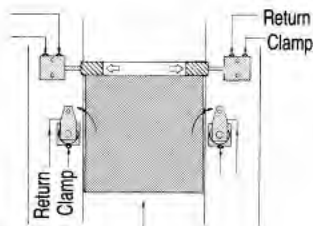
The return side of single acting elements, with a few exceptions (small work supports), require breather ports on the return side, and when used in systems with high flow or pressurized cutting fluids/coolants, great care must be taken to ensure that these fluids do not enter the return side of the clamps. 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.

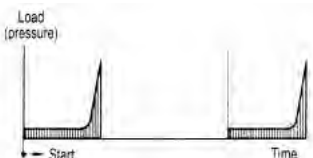


3. Machine-tool interlock. In automated systems where timing and synchronization are important, double-acting clamps are the best choice. By installing pressure switches in both clamping and return lines, a machine controller knows exact clamp status at all times.

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.

$$\text{Extend time (sec)} = \frac{\text{Maximum fluid req'd for all clamps (cu.in.)} \times \text{Portion of stroke used (usually 1/2)} \times 60}{\text{Power Unit flow rate (cu. in./min.)}}$$

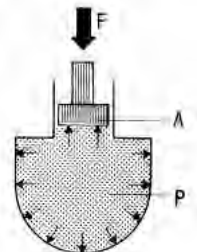
After extending, an additional volume of fluid must be pumped into the system to build pressure. This is due mainly to:

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

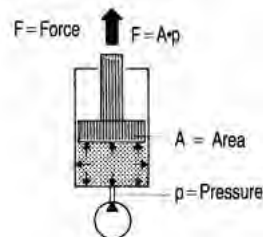
By calculating fluid required for each of the above factors, you can estimate pressure-building time. Using Sequence Valves lengthens clamping time, because each sequence step requires extending time and pressure-building time. To reduce clamping time, set Sequence-Valve trigger pressure as low as possible. With multiple Sequence Valves, set trigger-pressure differences at their minimum allowables value.

9. Other Hydraulic Considerations

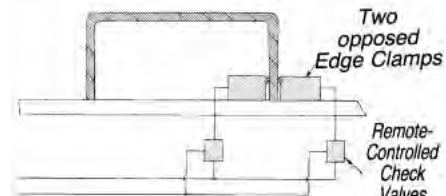
The basis of hydraulic clamping systems is "Pascal's Law", which says that if pressure is applied to a static fluid that is completely enclosed, that pressure is transmitted equally in all directions: This principle is used to transmit force to remote locations,



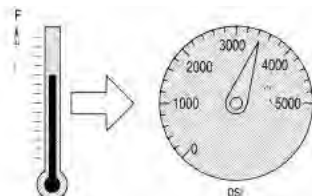
via hose, tubing, or drilled passages. When hydraulic pressure acts on a clamp's piston area, it generates external force according to the physical relationship $F = P \times A$:



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.



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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.

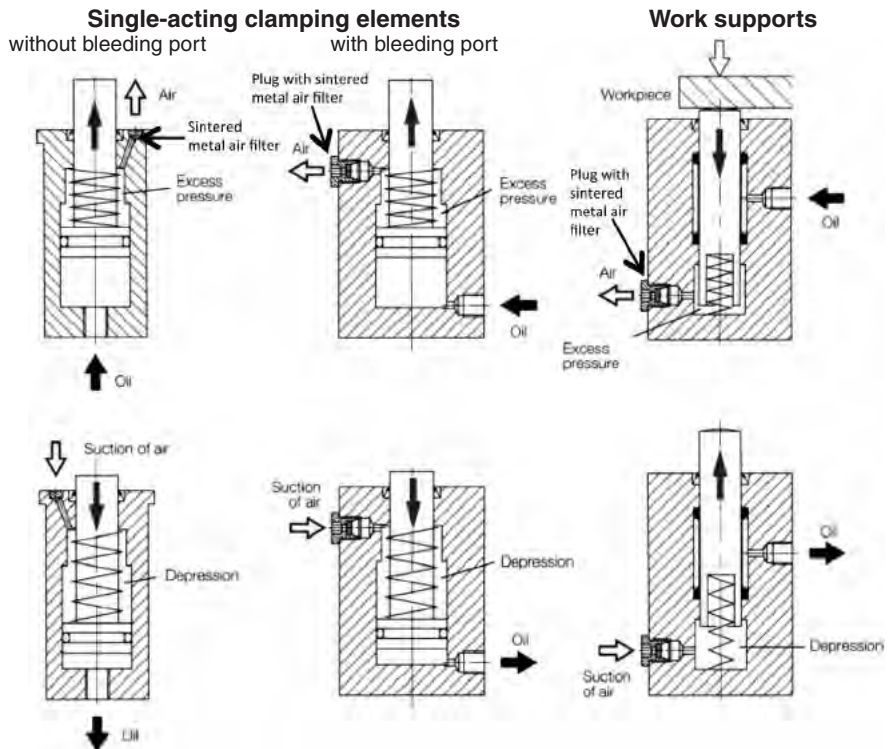
Condensation from coolants can lead to corrosion on the piston, spring or housing.

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

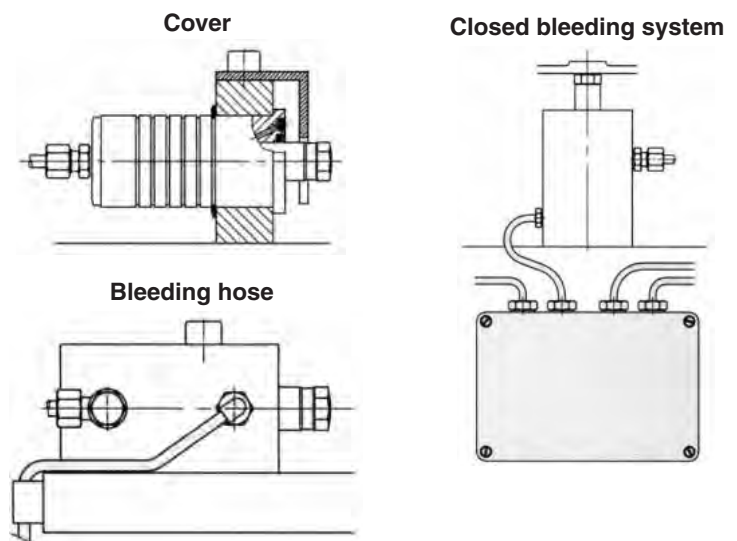
Clamping elements without bleeding port can be covered, but due to today's normal quantities of coolants this does not seem to be successful. In such applications you should use other clamping elements, preferably double-acting elements.

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.



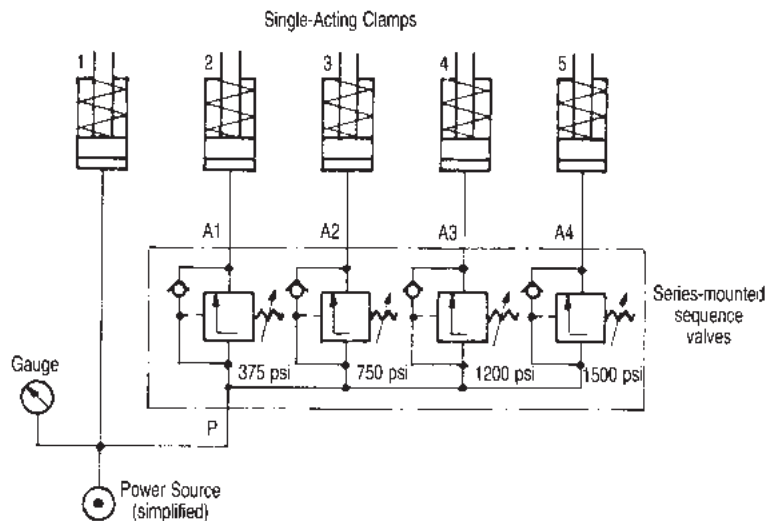
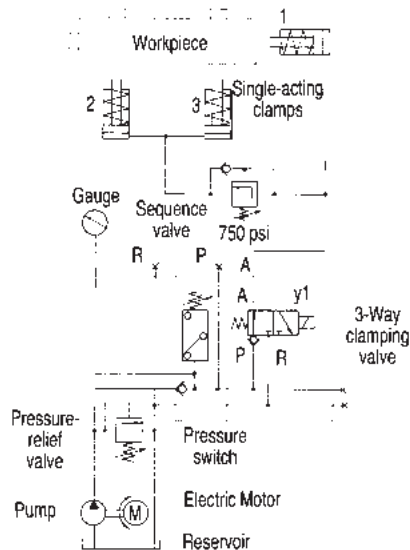
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Example Hydraulic Circuit Diagrams



Clamp & Cylinder 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	Valve Symbols	
	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)		

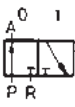

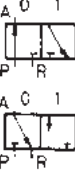

























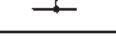














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Design Information

	<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>          		<h2>Accessory Symbols</h2>	
			<p>Operating line, pressure or return</p>
			<p>Control line, for transmitting control/pilot signals</p>
			<p>Leakage line, for carrying away fluid leakage</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>2/2 directional-control valve, normally closed on top, normally open below.</p>		<p>Quick disconnect, decoupled</p>
			<p>Rotary coupling (2 passage shown)</p>
			<p>Accumulator</p>
	<p>4/2 directional-control valve, for double-acting clamps</p>		<p>Gage</p>
	<p>Sequence valve, with unrestricted return line</p>		<p>Pressure switch</p>
	<p>Pressure-reducing valve, with unrestricted return line</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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Electric Clamps ■ E-Tec Product Family

Electro-Mechanical Clamping Systems

Application

Electro-mechanical clamping elements are ideally suited for the following situations:

- Where the application of hydraulic or pneumatic power workholding is not possible or desired.
- If the elements need to be independently controlled, adjusted or monitored.
- Where clamping force needs to be maintained even in the absence of power.
- Where additional space is available since these elements are larger than their hydraulic counterparts.

Application Examples

- Automatic manufacturing systems
- Fixtures that load the workpiece via handling systems
- Robotics
- Assembly equipment
- Test systems
- Special machines
- Clean room environments
- Food Industry
- Packaging Industry

Advantages

- Clamping achieved via wire connections as opposed to hydraulic lines
- Current is the only medium; NO OIL
- Safe low voltage of 24 VDC
- Integration into machine controls
- Independent control of each element
- Adjustable clamping force of each element
- Position monitoring already integrated
- Function control with error message feedback
- Remains mechanically clamped in the event of a power failure



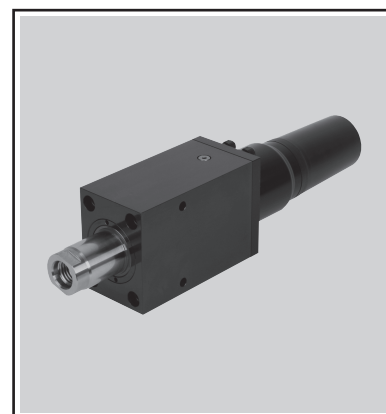
Electric swing clamp

Clamping force 1574 lbs
Clamping stroke 0.91"
Swing angle max. 180°
Data sheet B1.8310



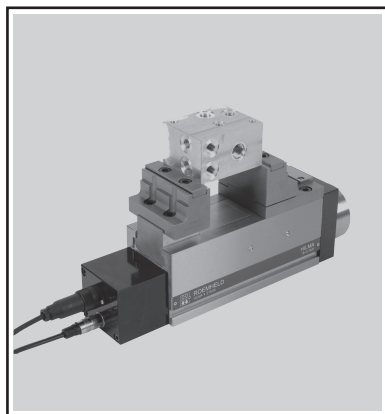
Electric work support

Support force 4496 lbs
Plunger stroke 0.79"



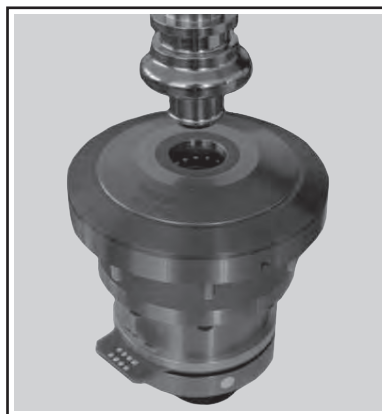
Electric block cylinder

Clamping force 2248 lbs (24VDC)
4496 lbs (48VDC)
Stroke 3.94"



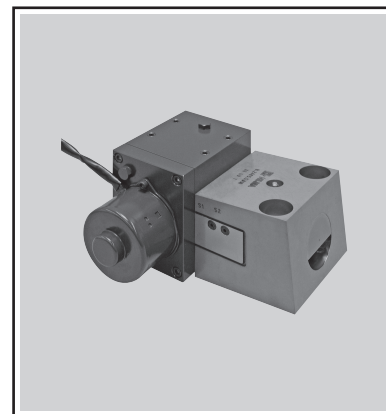
Electric machine vise

Clamping force 3372 lbs
Clamping stroke 3.78"



Electric zero-point clamp SPEEDY etc

Retention force 1574 lbs
Pull-out force 8543 lbs



Electric wedge clamp

Clamping force 14613 lbs
Clamping stroke 0.98"

Subject to change. For further details, including detailed dimensions and mounting instructions, visit www.clrh.com.

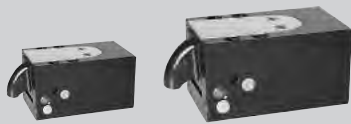


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Down-Holding Clamps



Flat Profile
pages 16-17



Block Extending Clamp
pages 18-19



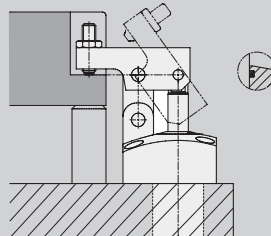
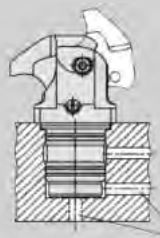
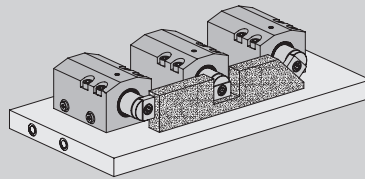
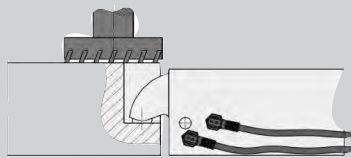
Slide Pivot Clamps
pages 20-22



Compact Clamps
page 24



Hinge/Link Clamps
pages 25-27



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.

Block Extending Clamps offer maximum free machining space. Clamping can be made in apertures or bored holes. The clamping element is hermetically sealed to the interior, and compensates transverse forces at the clamping point.

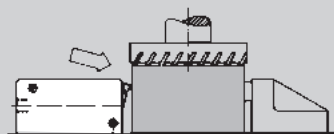
Slide Pivot Clamps provides extra reach, with a relatively small base area. The lever arm slides forward as it pivots into clamping position. The clamp's rugged design provides high force with excellent protection against flood coolant, chips, and welding spatter.

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.

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 23



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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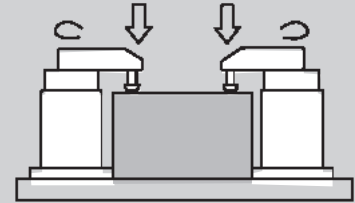
Down-Holding Clamps



pages 28-29

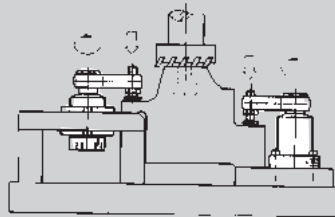
Air-Powered Swing Clamps

Ideal when only light clamping force is required. Powered by low-pressure shop air.



Flange Base

pages 30, 31, 34, 35, 38, 41, 52



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

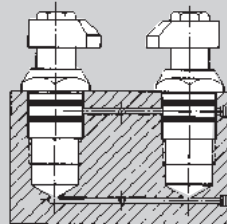
pages 34-35

All threaded swing clamp is well-suited for through-hole mounting. Fittings are underneath clamp to keep plumbing away from workpiece area.

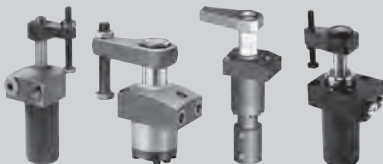


Cartridge Style

pages 30, 32, 38, 40, 42, 44, 46, 50

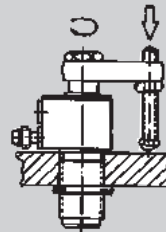


Cartridge style or threaded body swing clamp is used for manifold mounting, and is the most compact swing clamp available, especially in super-miniature size. Allows mounting without external plumbing.



Top Flange

pages 30, 32, 36-39, 44, 51



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 33, 35, 46-49



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Extending Clamps ■ **Flat Clamp** ■ B1.8231

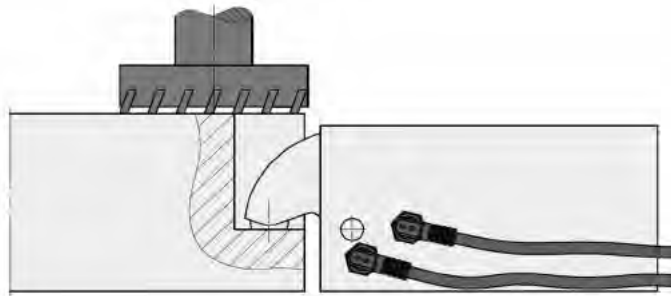
Flat Clamp ■ with optional position monitoring ■ Double Acting
Max. Operating Pressure ■ 7250 psi (500 bar)



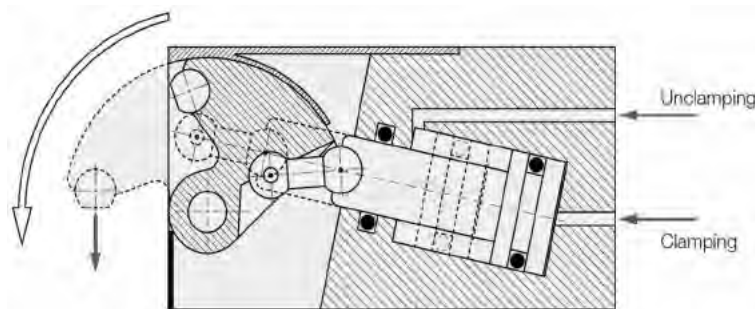
- Flat, compact design
- High protection against chips and spatter
- Large clamping stroke
- Clamping lever completely retracts
- Optional position monitoring
- Designed to resist side forces at the clamping point

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.



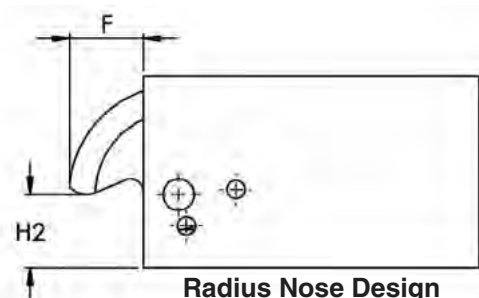
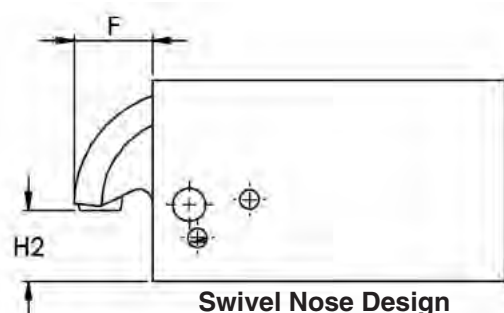
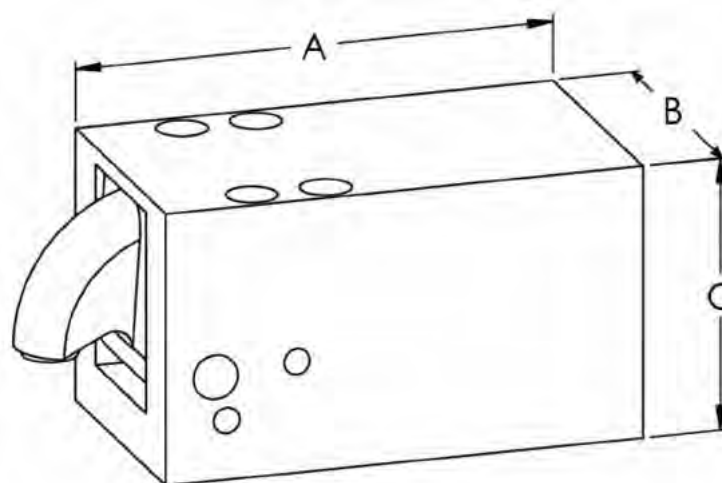
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Extending Clamps ■ **Flat Clamp** ■ B1.8231

Flat Clamp ■ with optional position monitoring ■ Double Acting
Max. Operating Pressure ■ 7250 psi (500 bar)



Swivel Pad Contact Bolt

Clamp Force (lbs)		Size 1	Size 2
	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

Clamp Force (lbs)		Size 1	Size 2
	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

Subject to change. For further details, including detailed dimensions and mounting instructions, visit www.clrh.com.



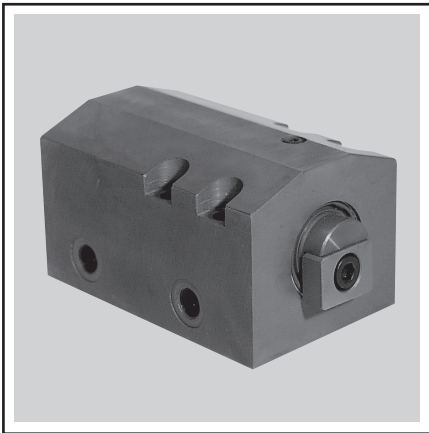
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Block Extending Clamp

2400 psi max
Double acting



- Large retention force
- Clamping in different directions
- Self-locking
- Interchangeable contact bolts (can be adapted to different workpieces)
- Transverse forces at the clamping point are compensated
- High protection against chips and coolants
- Variable installation
- Different possibilities for oil supply

APPLICATION: Due to its flat and compact design, this clamping element offers maximum free machining space. Clamping can be made in apertures or bored holes.

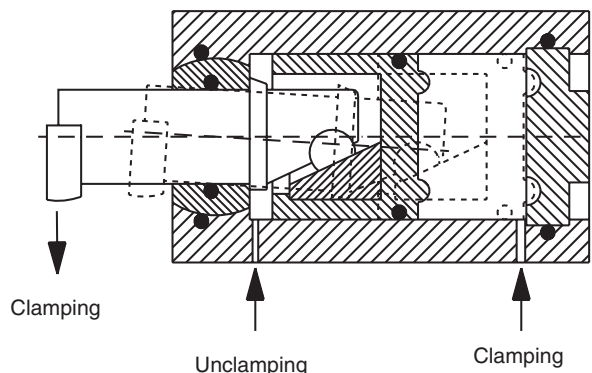
The clamping elements with self-locking are particularly suited for use on clamping fixtures on pallets which are disconnected from the power source or for clamping of molds on injection molding machines.

DESCRIPTION: The block clamp is a double-acting hydraulic clamping element which is hermetically sealed to the exterior. The element compensates transverse forces at the clamping point.

IMPORTANT NOTES: The linear motion of the clamping lever over the workpiece should not be impeded. In the case of impediment of the linear unit's transverse forces will act on the workpiece.

The protection against torsion of the clamping arm is only effective in the retracted position. In the extended position, the clamping lever may be distorted by a maximum of $\pm 8^\circ$ thus ensuring that it returns safely into its off-position.

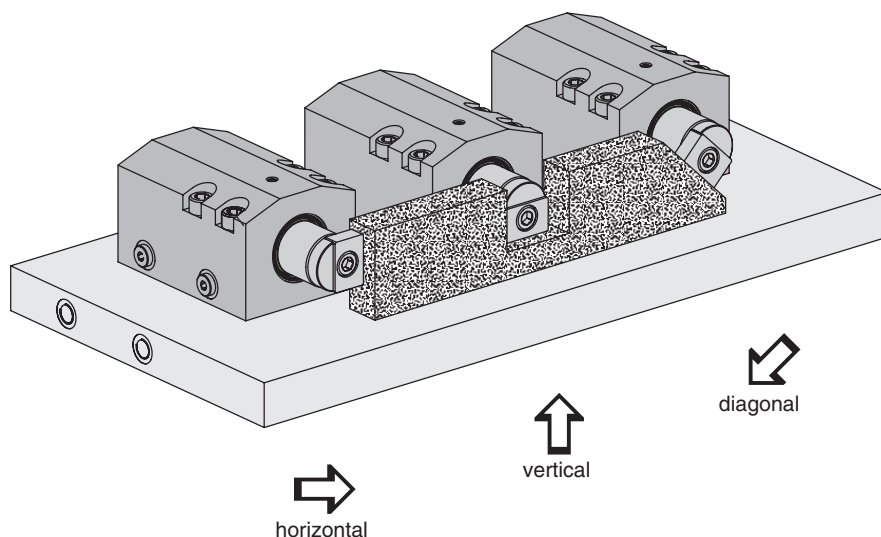
FUNCTION: The clamping cycle consists of a linear and a following swing motion. The clamping force of this element is not directly generated, but by means of a wedge. The clamping force of block clamps with self-locking will also be maintained, even if the element is separated from the pressure generator or if the oil pressure drops. This element meets high safety requirements.



Application example for different clamping directions

Versions

- with self-locking
- without self-locking



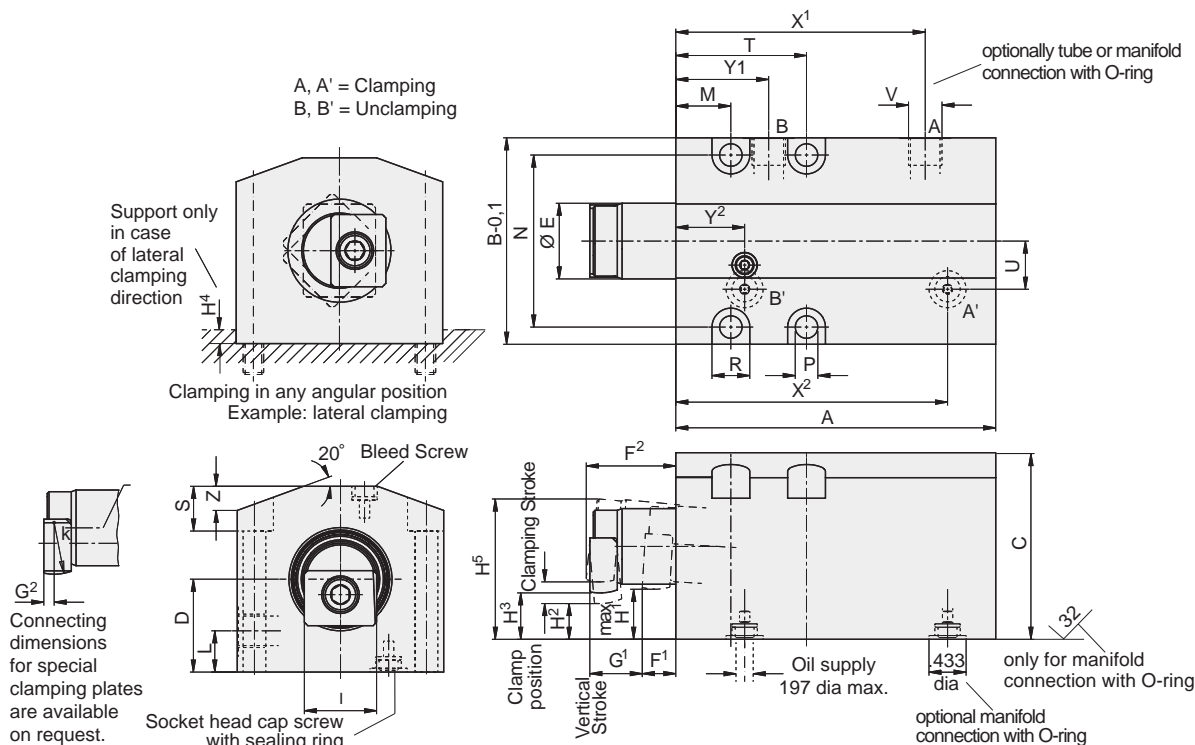
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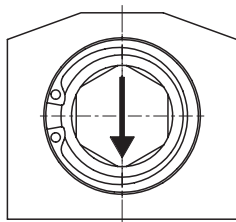
Block Extending Clamp

1500/2400 psi max
Double acting



ADJUSTMENT OF CLAMPING DIRECTION:
Clamping direction can optionally be in all directions vertically to the axis of the clamping lever. The clamping lever must be in retracted position and the cylinder cover must be rotated by the corresponding angle.

When adjusting the clamping direction at the cover, it has to be considered that the clamping direction of the contact bolt goes in the same direction.



Accessories
O-ring 8 x 1.5
Plug 1/8 BSPP
Plug 1/4 BSPP

Part-no.
CLR-3000-343-SW
CLR-3610-047-F
CLR-3300-821-F

Clamping function	without self-locking	with self-locking	without self-locking	with self-locking
Max. clamping force (lbs)	2800	1800	7200	4600
Max. operating pressure (psi)	1500	1500	2400	2400
Oil volume				
Clamping/unclamping (cu.in.)	1.8/1.4	1.8/1.4	6.2/4.7	6.2/4.7
H Clamping stroke max.	.24	.24	.31	.31
A	3.66	3.66	4.96	4.96
B	2.36	2.36	3.46	3.46
C	2.13	2.13	2.95	2.95
D	1.06	1.06	1.48	1.48
E dia	.866	.866	1.378	1.378
F1	.39	.39	.51	.51
F2	1.02	1.02	1.57	1.57
G1	.59	.59	1.02	1.02
G2	.12	.12	.12	.12
H1	.55	.55	.75	.75
H2	.43	.43	.59	.59
H3	.53	.53	.73	.73
H4	.16	.16	.24	.24
H5	1.61	1.61	2.36	2.36
I	.83	.83	1.34	1.34
K	.59	.59	.98	.98
L	.47	.47	.51	.51
M	.63	.63	.83	.83
N	1.969	1.969	2.835	2.835
P	.26	.26	.43	.43
R	.43	.43	.71	.71
S	.51	.51	.79	.79
T	1.496	1.496	2.087	2.087
U	.551	.551	.591	.591
V	1/8 BSPP	1/8 BSPP	1/4 BSPP	1/4 BSPP
X1	2.854	2.854	3.898	3.898
X2	3.110	3.110	4.252	4.252
Y1	1.063	1.063	1.457	1.457
Y2	.787	.787	1.102	1.102
Z	.28	.28	.39	.39
Part No.	CLR-1824-310A-EXD	CLR-1824-410A-EXD	CLR-1824-510A-EXD	CLR-1824-610A-EXD



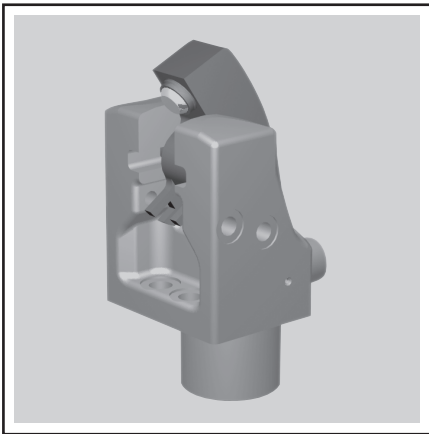
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Slide Pivot Clamp

7500 psi max
Double acting



- 3 sizes
- High clamping force
- Minimum dimensions
- High efficiency
- Minimum transverse forces act on the workpiece in the clamping area
- Increased rigidity allows compensation of transverse forces at the clamping point
- Unimpeded loading and unloading of the fixture
- Inductive or pneumatic monitoring of the clamping lever available as accessory
- Monitoring of the unclamping position and the usable clamping range is possible
- 2 different clamping levers are available
- Clamping lever can be swivelled into small recesses
- Partially immersed mounting of the body
- Oil supply alternatively via fittings or drilled channels

DESCRIPTION: In the case of the slide pivot clamp the piston force is deviated by 180° by the clamping lever and is available as clamping force with virtually no loss of efficiency. Kinematics of the slide pivot clamp allow sliding back of the clamping lever during unclamping for unimpeded insertion of the workpieces.

The clamping lever is available with smooth swivel contact bolt and in a longer version with dome-head contour.

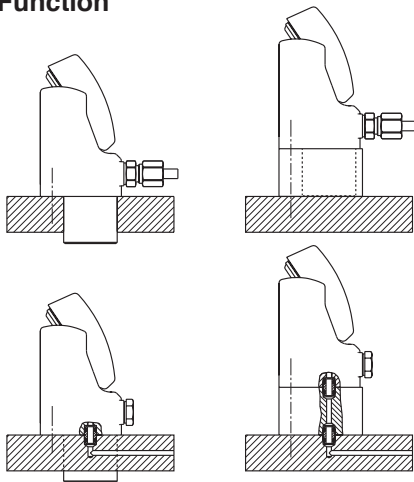
Position of the clamping lever can be monitored by inductive proximity switches or pneumatic jets.

The pivot slide clamp can be installed immersed up to the flange surface in a hole of the fixture body or via intermediate plates which are available as an accessory. For both solutions there is the possibility to supply the hydraulic oil not only by fitting connection but also via drilled channels in the fixture body.

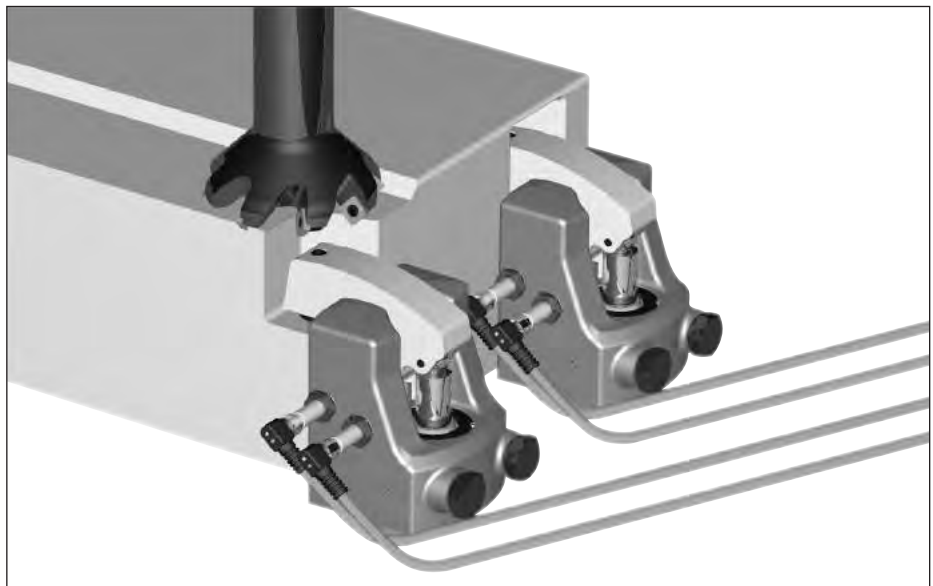
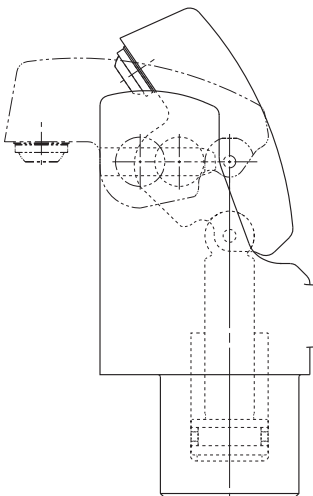
IMPORTANT NOTES: The clamping lever must not be impeded during swivelling movement. The slots of the sliding pad have to be checked from time to time with regard to contamination by swarf and cleaned, if required.

APPLICATION: The slide pivot clamp has in relation to its base a very high clamping force. The clamps are particularly suitable for clamping tasks on machines with high performance and reduced space availability on the fixture. The workpieces can be inserted from above without any impediments. A clamping recess a little bit wider than the clamping level is sufficient as clamping surface. This characteristic indicates their use for clamping or aluminum parts, which are very sensitive against deformation, with correspondingly reduced oil pressure.

Function



Installation possibilities



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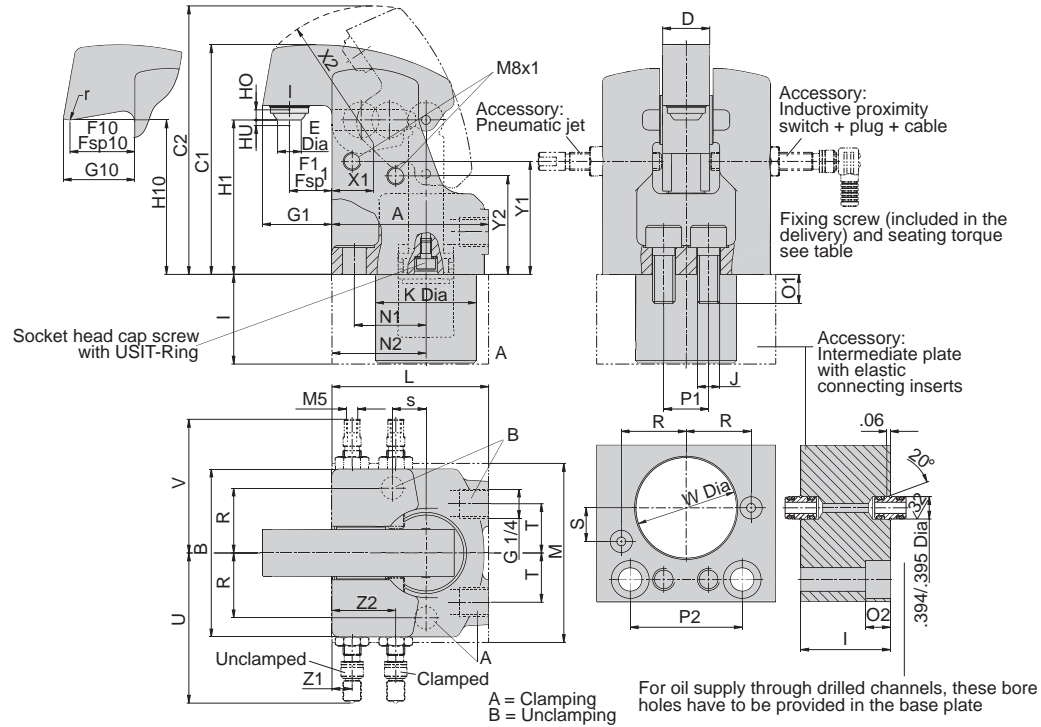
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Slide Pivot Clamp

7500 psi max
Double acting

Variant: long clamping lever



Accessories

Port Plug 1/4 BSPP	CLR-810-F
Elastic connecting insert 2 req. without intermediate plate, or 4 req. with intermediate plate	CLR-9210-132-F
Inductive proximity switch	CLR-3829-164-PM
Plug + cable	CLR-3829-099-PM
Pneumatic jet	CLR-3612-020-EXA
Lock Nut	CLR-3301-566-EXA
Intermediate plate for CLR-1824-061-EXD & CLR-1824-081-EXD	CLR-3456-384-EXA
Socket head cap screw M10x45	CLR-3300-253-EXA
Intermediate plate for CLR-1824-111-EXD & CLR-131-EXD	CLR-3456-385-EXA
Socket head cap screw M12x45	CLR-3300-765-EXA
Intermediate plate for CLR-1824-161-EXD & CLR-181-EXD	CLR-3456-386-EXA
Socket head cap screw M16x50	CLR-3300-264-EXA

	7500 psi	4700/3500	7400/5300	11600/8600
Clamping force Fsp1/Fsp10 (lbs)				
6000 psi	3700/2800	6000/4300	9300/6900	
5000 psi	3100/2300	5000/3600	7800/5700	
4000 psi	2500/1900	4000/2900	6300/4600	
3000 psi	1900/1400	3000/2200	4700/3400	
Oil volume clamping (cu. in.)	0.85	1.5	3	
Oil volume unclamping (cu. in.)	0.5	1	2	
A	2.76	3.31	3.9	
B	2.95	3.82	4.45	
C1/C2	4.06/4.72	4.72/5.57	5.91/6.89	
D	0.83	1.14	1.3	
E Dia	0.39	0.39	0.79	
F1/F10	.75/1.14	.79/1.34	.98/1.57	
G1/G10	1.22/1.26	1.42/1.46	1.73/1.77	
H1/H10	2.72	3.21	4	
HO/HU, upper/lower clamping point	.18/1	.2/1.12	.24/1.14	
I	1.57	1.57	1.57	
K Dia	1.77	2.16	2.36	
L	2.76	3.46	3.94	
M	3.15	3.94	4.72	
J, socket head cap screw/torque (ft. lbs.)	M10/64	M12/111	M16/273	
N1/N2	1.26/1.65	1.54/1.97	1.85/2.44	
O1/O2	.51/.43	.59/.51	.63/.67	
P1/P2	.787/1.969	1.181/2.250	1.102/2.835	
R	1.142/1.143	1.378/1.379	1.496/1.497	
r	0.31	0.39	0.47	
S	.591/.592	.787/.788	.787/.788	
T	0.87	1.02	1.38	
U1 approx.	3.07	3.23	3.7	
V1 approx.	2.6	2.76	2.83	
W Dia	1.772/1.776	2.165/2.169	2.362/2.366	
X1/X2	0.74/2.42	0.87/2.76	1.10/3.46	
Y1/Y2	1.99/1.73	2.32/2.24	2.87/2.68	
Z1/Z2	0.35/1.12	.35/1.30	.37/1.46	
Part No., with swivel contact bolt	CLR-1824-061-EXD	CLR-1824-111-EXD	CLR-1824-161-EXD	
Part No., with long clamping lever	CLR-1824-081-EXD	CLR-1824-131-EXD	CLR-1824-181-EXD	



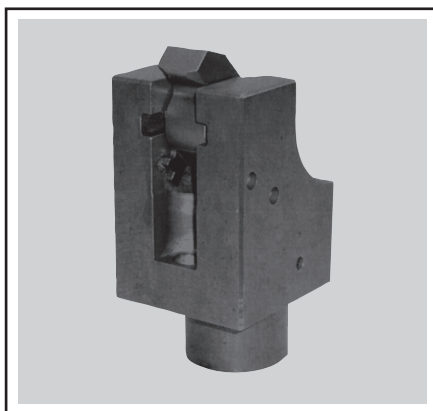
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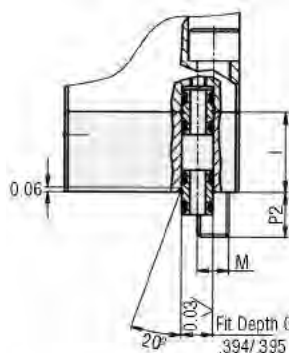
Slide Pivot Clamp

5000 psi max
Double acting

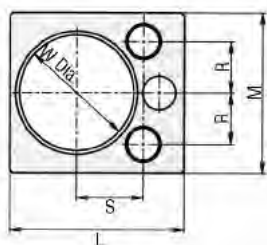


Mini

**WITH
METALLIC
WIPER**

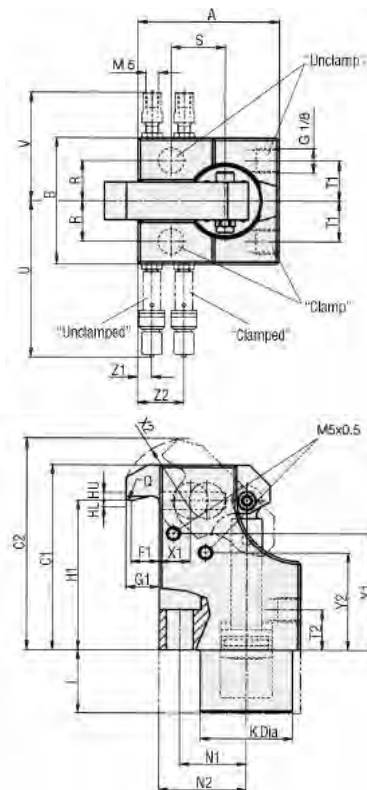
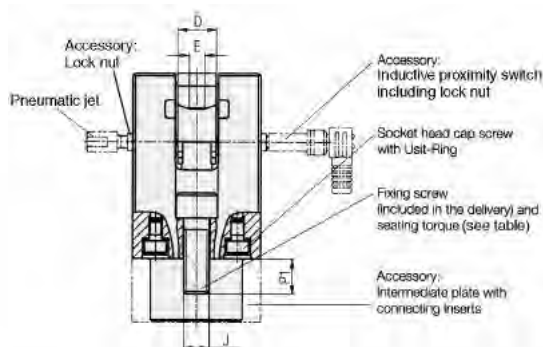


For manifold mounting,
these bore holes are
required in the base plate



Intermediate Plate and Connecting Inserts

Accessories	Part No.
Port Plug	CLR-3610-158-F
Connecting Insert 2 required per connection	CLR-9210-132-F
Inductive Proximity Switch	CLR-3829-198-PM
Plug and Cable	CLR-3829-099-PM
Pneumatic Jet	CLR-3612-033-PM
Lock Nut	CLR-3301-803-PMA
Intermediate Plate	CLR-3456-425-EXA
SHCS M10 x 55	CLR-3300-434-SCA



Clamping Force (lbs.)	5000 psi	2250
	4000 psi	1800
	3000 psi	1350
Clamping Range	0.216	
Oil Volume to clamp (cu. in.)	0.37	
Oil Volume to unclamp (cu. in.)	0.25	
A	2.165	
B	1.968	
C1	2.874	
C2	3.287	
D	0.591	
E	0.236	
F1	0.433	
G1	0.512	
H1	2.323	
HU / HL (upper/lower clamping point)	0.118 / 0.098	
I	0.984	
J Screw / seating torque (ft lbs)	M10 / 65	
K dia.	1.413	
L	2.165	
M	1.969	
N1 / N2	1.024 / 1.339	
P1 / P2	0.551 / 0.551	
Q	0.63	
R +/- 0.0008	0.6299	
S +/- 0.0008	0.8268	
T1 / T2	0.63 / 0.63	
U approx.	2.5	
V approx.	1.7	
W dia +0.004	1.418	
X1 / X2	0.472 / 1.102	
Y1 / Y2	1.811 / 1.516	
Z1 / Z2	0.217 / 0.709	
Weight (lbs)	2.7	
Part No.	CLR-1824-040-EXD	



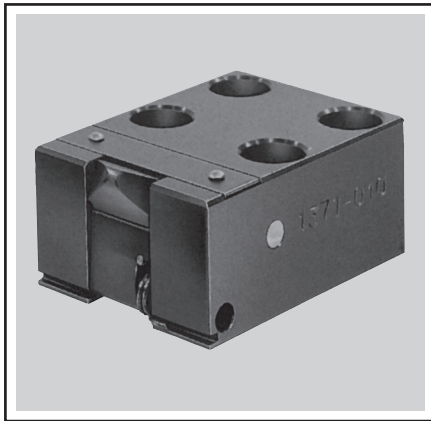
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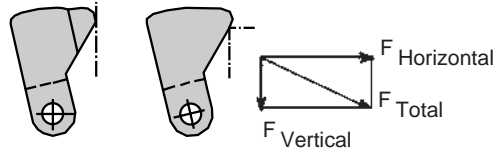
Edge Clamps

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

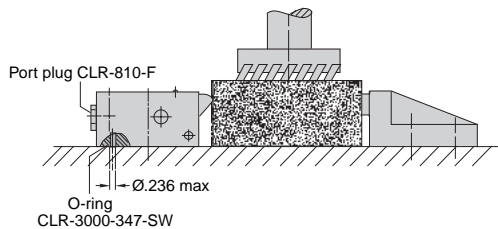
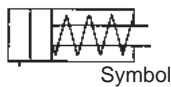


Low-profile edge clamps can be used to grip the side of a workpiece for machining clearance, or to clamp over the top edge.

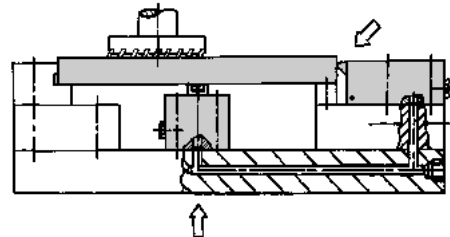
CLAMPING ACTION: Fluid pressure advances the cylinder, which in turn pivots the nose forward and down to grip side of workpiece. Spring return.

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.

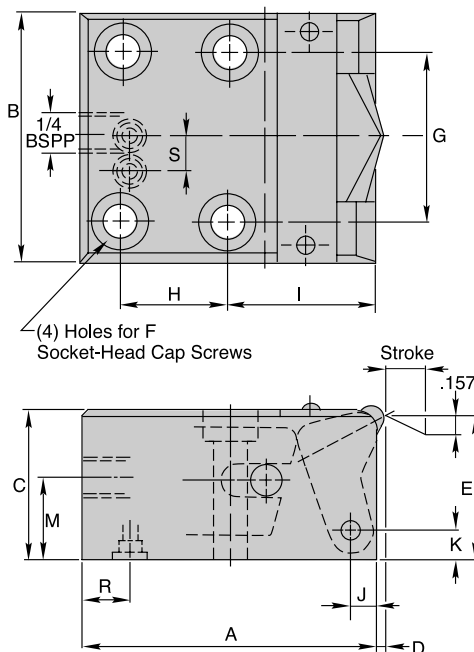
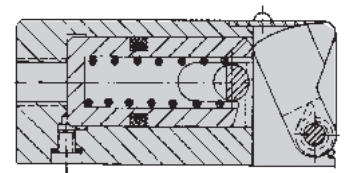
CONSTRUCTION: Internal cylinder pushes pivoting nose. Nose cover keeps out chips and debris. Body made from carbon steel, black oxide finish. Forged, alloy steel nose, hardened to RC 56-58. Nose is through-hardened so that it can be ground to suit the workpiece if desired.



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	.62
Fluid required (in. ³)	.10	.30	.62	.62
Piston Ø	16mm	25mm	36mm	36mm
Force per 1000 psi (lbs)	260	612	1223	1223
Max. operating pressure (psi)	7500	7500	7500	7500
A	2.677	3.543	3.780	3.780
B	1.97	2.36	3.15	3.15
C	1.26	1.57	1.97	1.97
D	.079	0	.079	.079
E	1.220	1.535	1.929	1.929
F	5/16 or M8	5/16 or M8	3/8 or M10	3/8 or M10
G	1.260	1.575	2.205	2.205
H	1.063	1.496	1.496	1.496
I	1.260	1.654	1.811	1.811
J	.217	.236	.315	.315
K	.236	.354	.433	.433
M	.75	.91	1.06	1.06
R	.512	.551	.630	.630
S	0	0	.551	.551
Weight (lbs)	2.0	2.5	4.6	4.6
Part No.	CLR-110-EC	CLR-310-EC	CLR-410-EC	CLR-410-EC



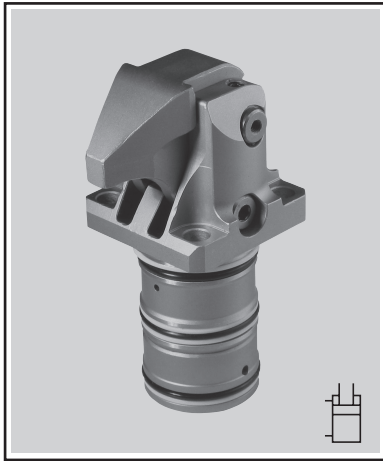
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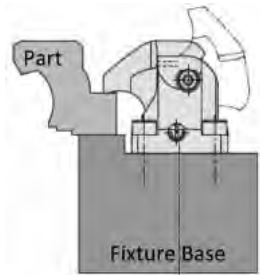
Extending Clamps ■ **Compact Clamp** ■ B1.827

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

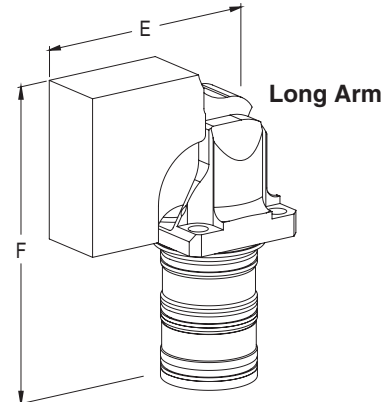
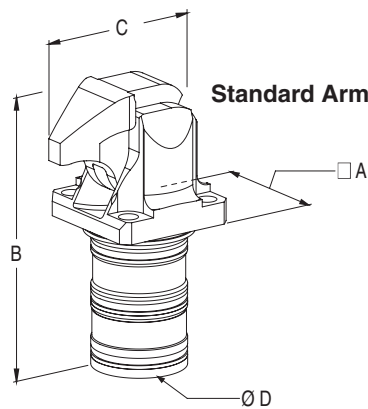
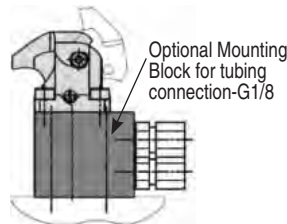
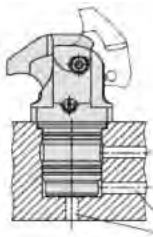
finish helps protect this clamp from chips and coolant for a long life cycle. Four Sizes, three mounting options and two arm options help the designer choose the optimal clamp for their application. The long arm can be machined to fit into pockets. The clamp for closed bore mounting does not include the lower protective cap which makes the overall height shorter.



Open Bore Mounting



Closed Bore Mounting



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-3468-834

Subject to change. For further details, including detailed dimensions and mounting instructions, visit www.clrh.com.



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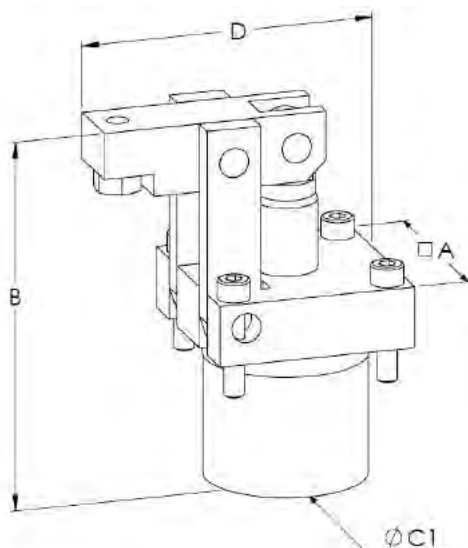
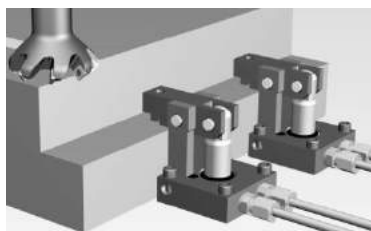
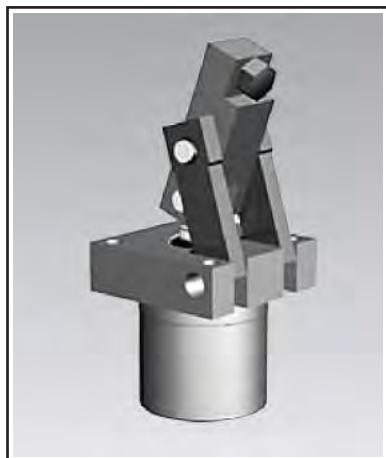
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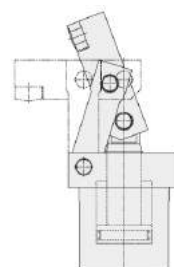
Extending Clamps ■ Hinge Clamp ■ B1.825

Hinge Clamp ■ Double Acting

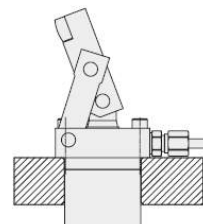
Max. Operating Pressure ■ 2900 psi (200 bar)



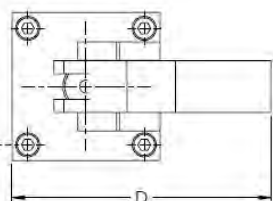
The hinge clamp is an effective clamp with high clamping force in a compact design. The arm pivots over the workpiece by means of a hinge mechanism. When retracted, the arm is behind the front plane of the clamp allowing for unobstructed top loading. It has three arm options as well as an interchangeable contact bolt on the standard version.



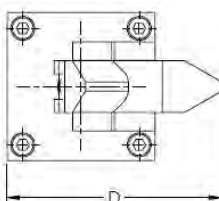
Function View



Installed View



Long Arm Design



Beveled Arm Design

Clamping force (lbs)	2900 psi	4040
	2000 psi	2790
	1000 psi	1390

Standard Arm

A	3.15
B	5.96
C1	2.56
D	4.69
Weight (lb)	7.60
Clamp with standard arm	CLR-1825-500

Beveled Arm

B	4.09
D	4.75
Clamp with beveled arm	CLR-1825-506

Long Arm

B	5.96
D	5.51
Clamp with long arm	CLR-1825-505

Accessories

Spare contact bolt	CLR-3614-073
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Subject to change. For further details, including detailed dimensions and mounting instructions, visit www.clrh.com.



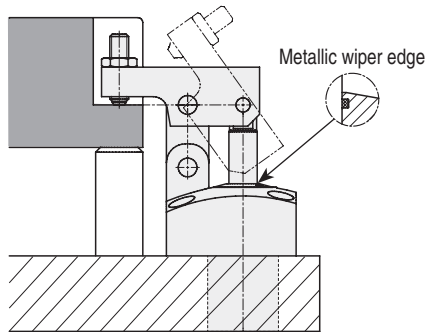
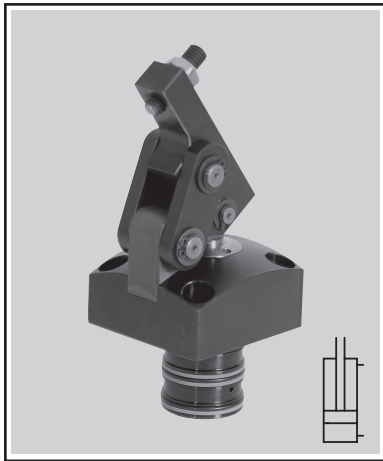
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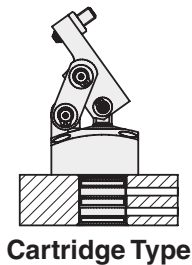
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Extending Clamps ■ **Hinge Clamp** ■ B1.8251

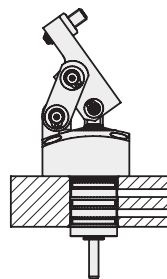
Hinge Clamp ■ with metal wiper and optional position monitoring
Double Acting ■ Max. Operating Pressure ■ 3625 psi (250 bar)



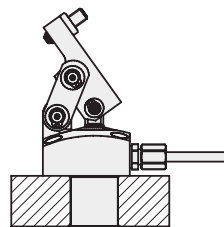
The hinge clamp family of workholding clamps offer many different variations in order to satisfy your fixturing goal. As the hydraulic piston moves upward, the hinge mechanism swivels the arm over your workpiece. The optimized design location of the pins and linkage can reduce or eliminate the transmission 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.



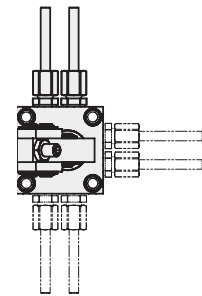
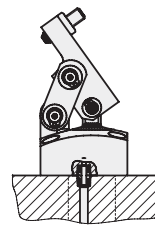
Cartridge Type



Cartridge type with extended piston for position monitoring

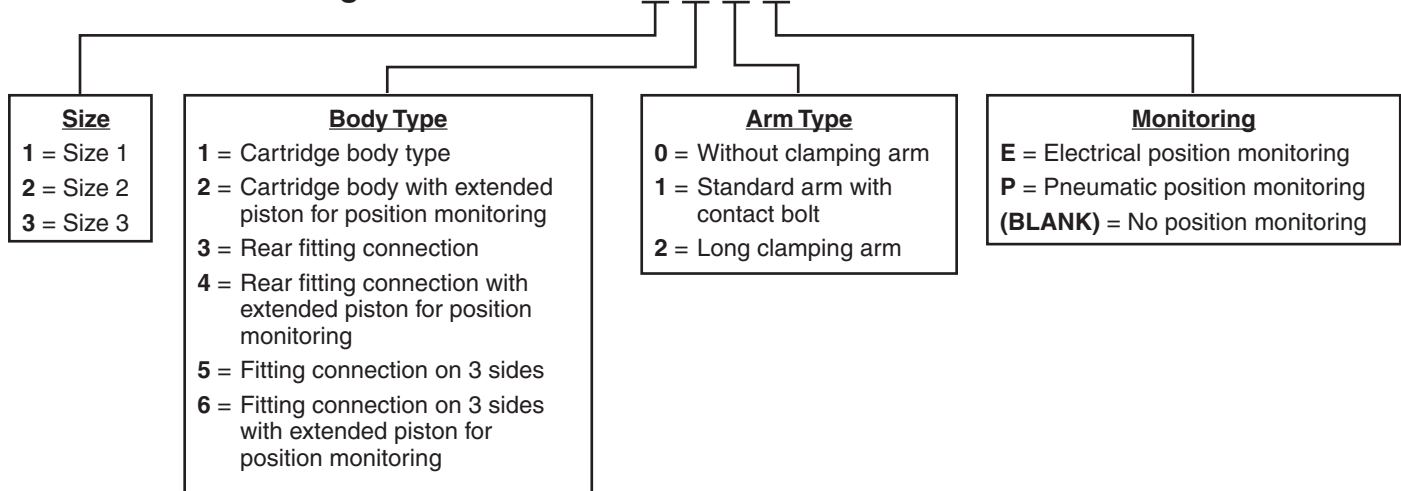


Solid body type shown with actuation via fitting connection (left) or connecting insert (right)



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.



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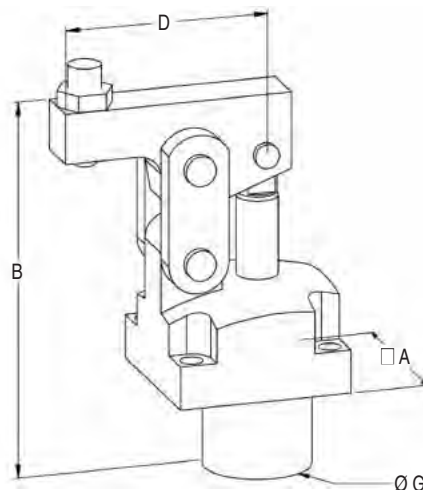
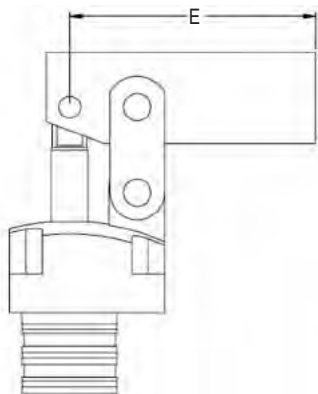
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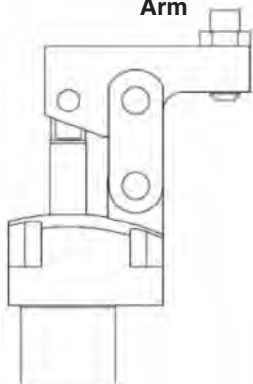
Extending Clamps ■ **Hinge Clamp** ■ B1.8251

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

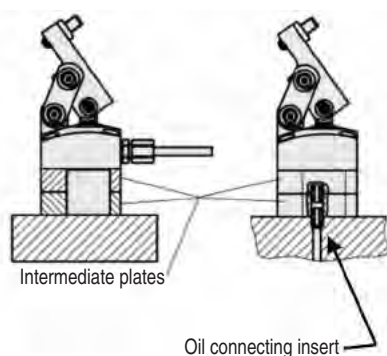
A	2.17	2.76	3.35
B	4.41	6.26	7.38
D	2.07	2.85	3.39
E	3.27	4.51	5.32
G	1.18	1.65	2.05
Weight standard version (lbs)	2.4	6.0	10.2
Part No., Clamp - Standard Arm	CLR-1825-111	CLR-1825-211	CLR-1825-311
Part No., Clamp - Long Arm	CLR-1825-112	CLR-1825-212	CLR-1825-312

Fitting connection type

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

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.



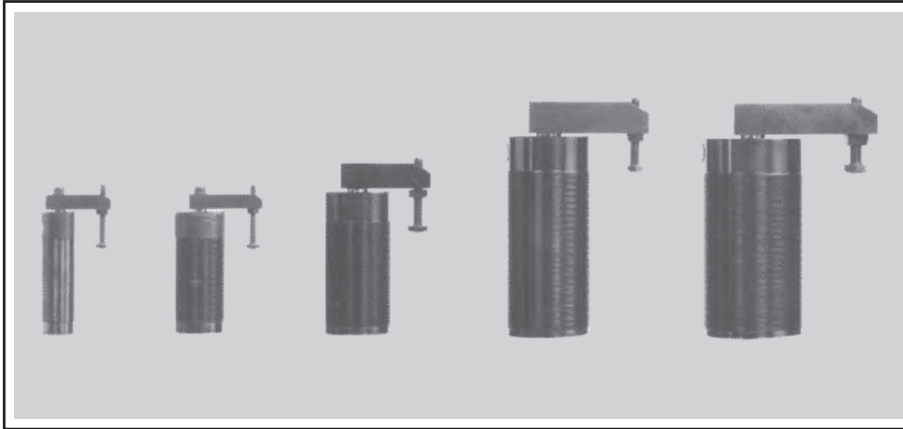
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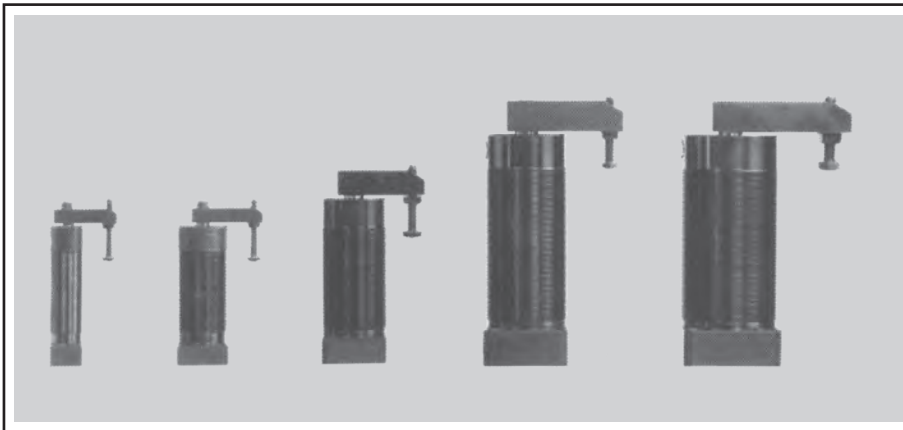
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Air-Powered Swing Clamps

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.

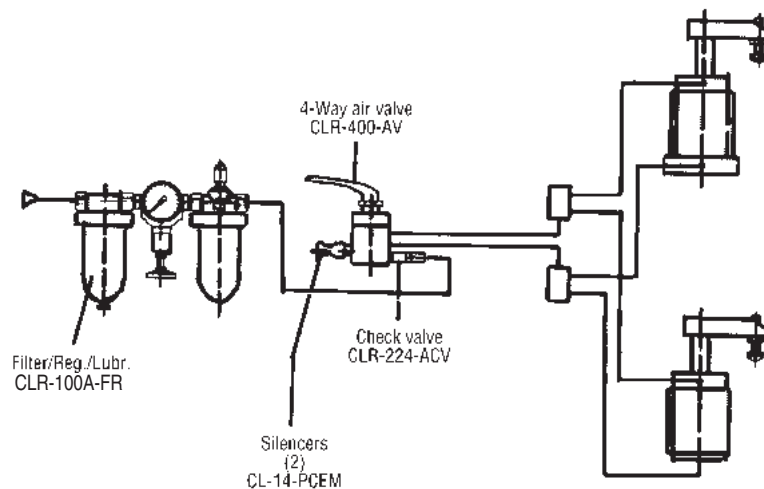
MOUNTING FLANGE BASE: Fasten base to fixture with four cap screws. Mount in any position horizontal or vertical.

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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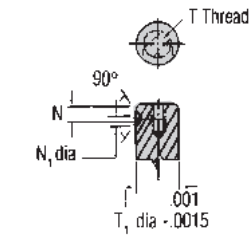
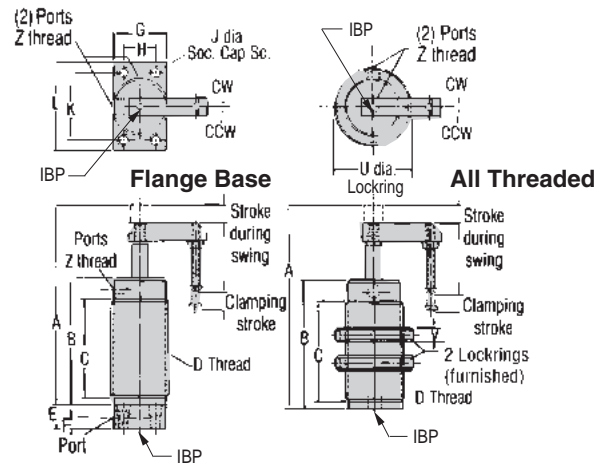
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Air-Powered Swing Clamps

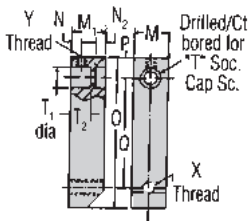
100 psi air max
Double acting only



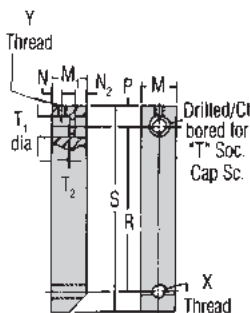
New miniature size for light-force applications where space is at a premium.



Rod Dimensions



Standard Arm



Long Arm

Maximum clamping force std. arm, at 100 psi (air)	20	41	107	167	277
Lbs	Lbs	Lbs	Lbs	Lbs	Lbs
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.



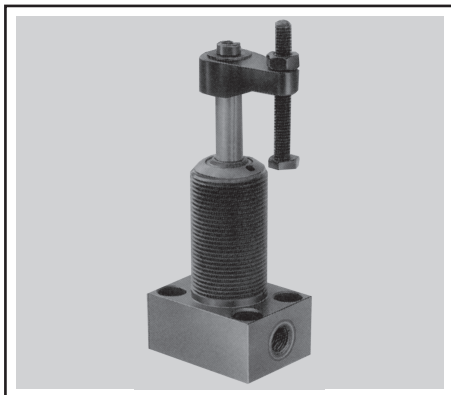
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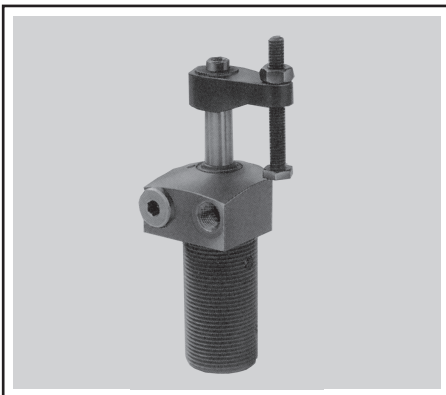
Sales — Phone (636) 386-8022 Fax (636) 386-8034
Engineering — Phone 1-800-827-2526 Web www.clrh.com

Swing Clamps

5000 psi max
Single and double acting



Flange Base



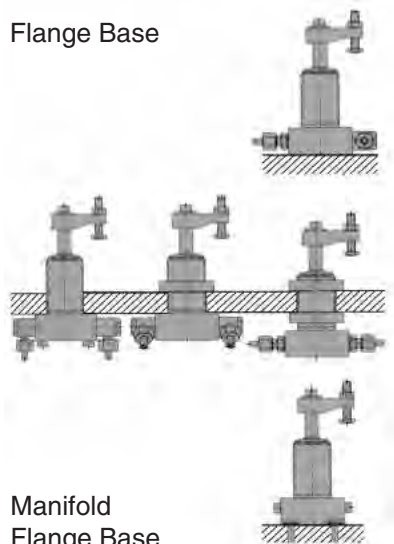
Top Flange



Cartridge Style

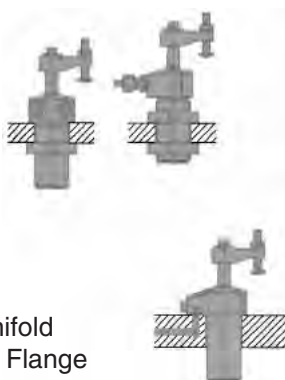
Connecting versions

Flange Base



**Manifold
Flange Base**

Top Flange

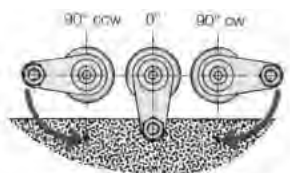


**Manifold
Top Flange**

Cartridge Style



- **Extremely small, economical swing clamp**
- **Many different models from which to chose**
- **Single-acting versions can be converted from 90° cw to 90° ccw or 0° swings**



Shipped as clockwise swing. Clamps are easily converted to counterclockwise or zero swing. Simply loosen the end cap, push the plunger past the cam and rotate to required directional cam.

CLAMPING ACTION: Fluid pressure swings arm over workpiece (.393" stroke during swing) then clamps down (.236" maximum clamping stroke). Choice of spring return (single acting) or fluid return (double acting).

SWING MOTION: This swing clamp does not have a safety clutch; therefore, the swing motion must not be restricted in any way. Adjust the contact bolt so that the clamp completes its full swing stroke and starts its clamping stroke before contacting the workpiece.

FLUID CONNECTION: 1/8" BSPP port. If fixture is powered by a high-flow-rate power source and only contains a few clamps, a Flow-Control Valve may be required.

CLAMPING ARM: Order clamping arm, screw, and washer separately. An adjustable contact bolt is furnished with the clamping arm. Arm can be mounted to start its swing from any position within 360°. When using special, clamping arms with other lengths,

the operating pressure shown in the clamping force diagram must not be exceeded. If longer clamping arms will be used, not only the operating pressure but also the flow rate have to be reduced.

DESIGN CONSIDERATIONS: The spring area of single-acting swing clamps has to be vented for proper functioning. The sintered metal air filter prevents penetration of contaminations. If there is a possibility that cutting lubricants and coolants could 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.



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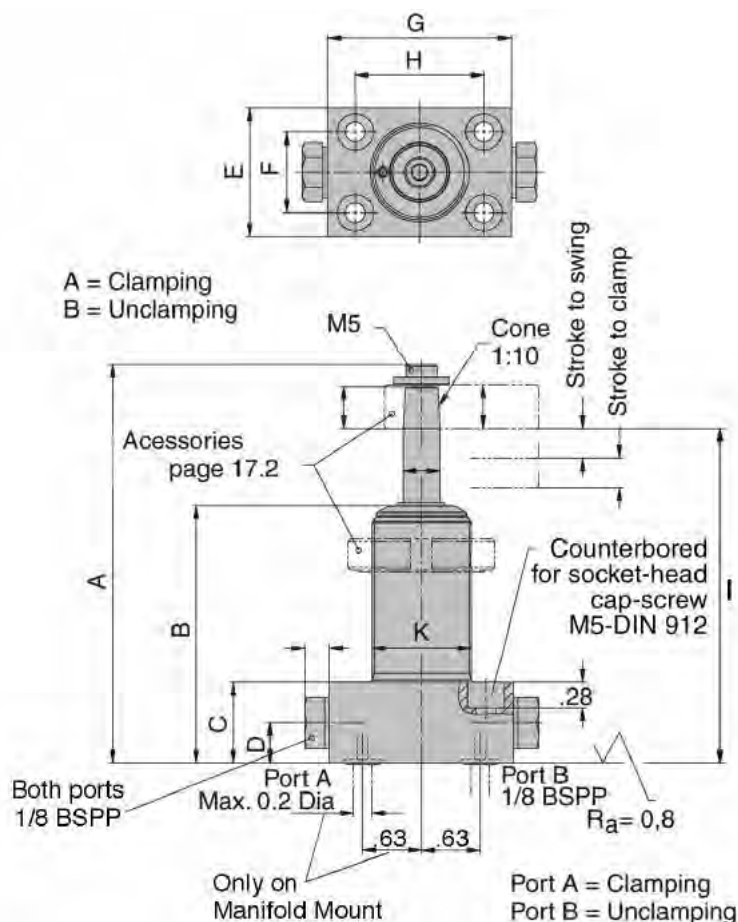
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Engineering — Phone 1-800-827-2526 Web www.clrh.com

Swing Clamps

5000 psi max
Single and double acting



Flange Base
Threaded Ports or Manifold Mount



	Flange Base		Manifold Flange Base	
	Single Acting	Double Acting	Single Acting	Double Acting
A (in.)	4.33	4.27	4.33	4.27
B (in.)	2.76	2.76	2.76	2.76
C (in.)	0.87	0.87	0.87	0.87
D (in.)	0.43	0.43	0.43	0.43
E (in.)	1.38	1.38	1.38	1.38
F (in.)	0.87	0.87	0.87	0.87
G (in.)	1.97	1.97	1.97	1.97
H (in.)	1.38	1.38	1.38	1.38
I (in.)	3.62	3.58	3.62	3.58
Swing stroke	0.39	0.31	0.39	0.31
Clamp stroke	0.24	0.31	0.24	0.31
K	M27x1.5	M27x1.5	M27x1.5	M27x1.5
Weight (lb.)	0.9	0.9	0.9	0.9

Direction and Angle of Rotation ± 2 Deg.

0 Deg.	CLR-1849-001-SC	CLR-1850-101-SCD	CLR-1849-002-SC	CLR-1850-102-SCD
90 cw	CLR-1849-011-SC	CLR-1850-111-SCD	CLR-1849-012-SC	CLR-1850-112-SCD
90 ccw	CLR-1849-021-SC	CLR-1850-121-SCD	CLR-1849-022-SC	CLR-1850-122-SCD
60 cw	CLR-1849-031-SC	CLR-1850-131-SCD	CLR-1849-032-SC	CLR-1850-132-SCD
60 ccw	CLR-1849-041-SC	CLR-1850-141-SCD	CLR-1849-042-SC	CLR-1850-142-SCD
45 cw	CLR-1849-051-SC	CLR-1850-151-SCD	CLR-1849-052-SC	CLR-1850-152-SCD
45 ccw	CLR-1849-061-SC	CLR-1850-161-SCD	CLR-1849-062-SC	CLR-1850-162-SCD

Spare O-ring (VITON) 7x1.5 CLR-3001-077-SW



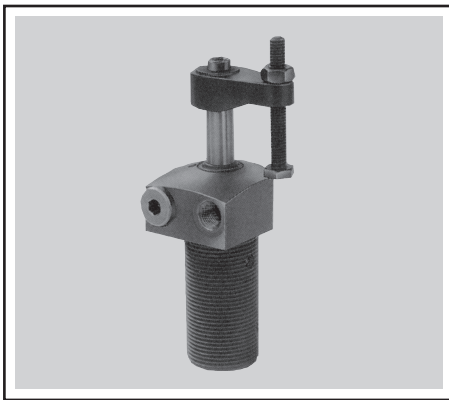
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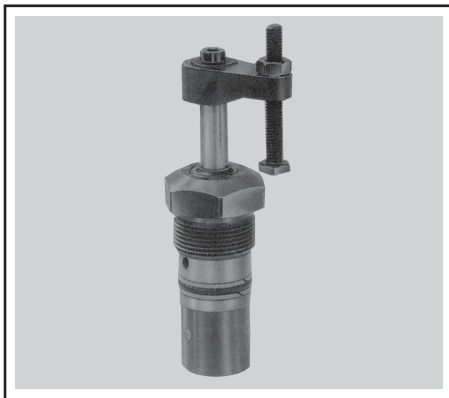
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Engineering — Phone 1-800-827-2526 Web www.clrh.com

Swing Clamps

5000 psi max
Single and double acting

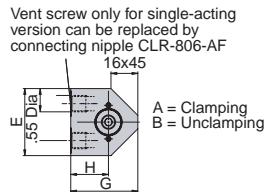


Top Flange



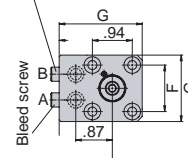
Cartridge Style

Top Flange

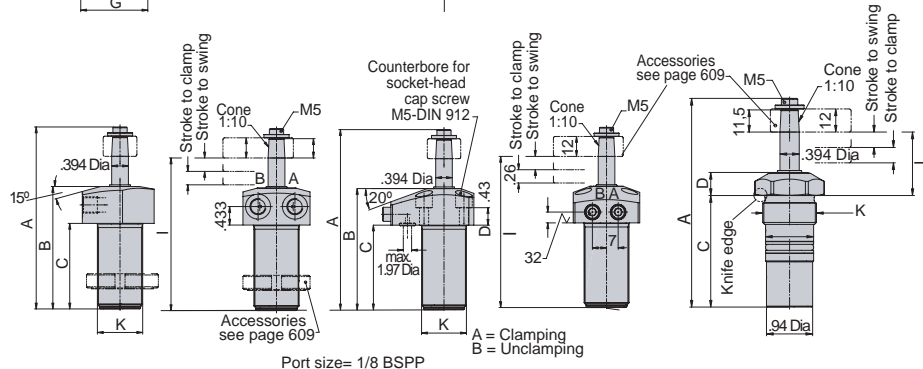
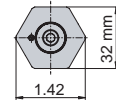


Manifold Top Flange

Only for double-acting version
In case of single-acting version, thread M5 for connecting nipple CLR-815-AF for venting of the spring area



Cartridge Style



	Top Flange (U.S.)		Top Flange (Metric)		Manifold Top Flange		Cartridge Style	
	Single Acting	Double Acting	Single Acting	Double Acting	Single Acting	Double Acting	Single Acting	Double Acting
A	4.33	4.33	4.33	4.27	4.33	4.27	4.33	4.27
B	2.87	2.87	2.87	2.87	2.87	2.87		
C	2.01	2.01	2.01	2.01	2.01	2.01	2.28	2.28
D	0.43	0.43	0.43	0.43	0.26	0.26	0.47	0.47
E	1.57	1.57	1.57	1.57	1.57	1.57		
F	0.87	0.87	0.87	0.87	1.1	1.1		
G	1.57	1.57	1.57	1.57	1.97	1.97		
H	0.89	0.89	0.89	0.89	1.26	1.26		
I	3.62	3.62	3.62	3.58	3.62	3.58	1.3	1.3
Swing stroke	0.39	0.31	0.39	0.31	0.39	0.31	0.39	0.31
Clamp stroke	0.24	0.31	0.24	0.31	0.24	0.31	0.24	0.31
K	1-1/16-16	1-1/16-16	M27x1.5	M27x1.5	1.063/1.059	M27x1.5	M28x1.5	M28x1.5
Weight (lb.)	0.9	0.9	0.9	0.9	0.9	0.9	0.6	0.6

Direction and Angle of Rotation ± 2 Deg.

0 Deg.	CLR-1849-703-SC	CLR-1850-703-SCD	CLR-1849-003-SC	CLR-1850-103-SCD	CLR-1849-004-SC	CLR-1850-104-SCD	CLR-1849-005-SC	CLR-1850-105-SCD
90 cw	CLR-1849-713-SC	CLR-1850-713-SCD	CLR-1849-013-SC	CLR-1850-113-SCD	CLR-1849-014-SC	CLR-1850-114-SCD	CLR-1849-015-SC	CLR-1850-115-SCD
90 ccw	CLR-1849-723-SC	CLR-1850-723-SCD	CLR-1849-023-SC	CLR-1850-123-SCD	CLR-1849-024-SC	CLR-1850-124-SCD	CLR-1849-025-SC	CLR-1850-125-SCD
60 cw	CLR-1849-733-SC	CLR-1850-733-SCD	CLR-1849-033-SC	CLR-1850-133-SCD	CLR-1849-034-SC	CLR-1850-134-SCD	CLR-1849-035-SC	CLR-1850-135-SCD
60 ccw	CLR-1849-743-SC	CLR-1850-743-SCD	CLR-1849-043-SC	CLR-1850-143-SCD	CLR-1849-044-SC	CLR-1850-144-SCD	CLR-1849-045-SC	CLR-1850-145-SCD
45 cw	CLR-1849-753-SC	CLR-1850-753-SCD	CLR-1849-053-SC	CLR-1850-153-SCD	CLR-1849-054-SC	CLR-1850-154-SCD	CLR-1849-055-SC	CLR-1850-155-SCD
45 ccw	CLR-1849-763-SC	CLR-1850-763-SCD	CLR-1849-063-SC	CLR-1850-163-SCD	CLR-1849-064-SC	CLR-1850-164-SCD	CLR-1849-065-SC	CLR-1850-165-SCD

Spare O-ring (VITON) 7x1.5 CLR-3001-077-SW

Note A: Single acting versions can be used as clockwise, counter-clockwise or 0 degree swing. Contact Engineering for conversion instructions.



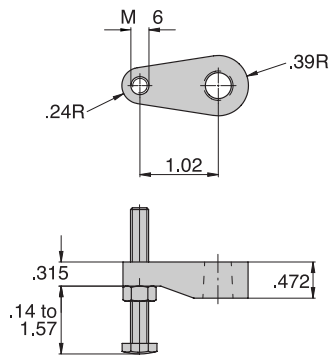
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Swing Clamps

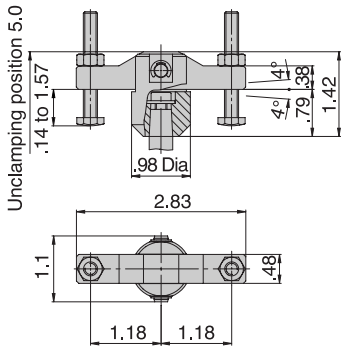
5000 psi max
Single and double acting



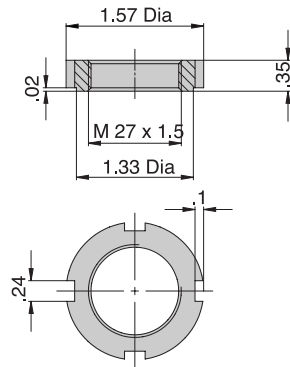
Clamping Arm
CLR-0354-057-SCA



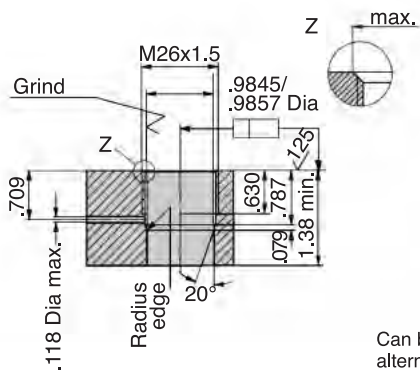
Screw
CLR-3300-209-SCA
Washer
CLR-3301-279-SCA



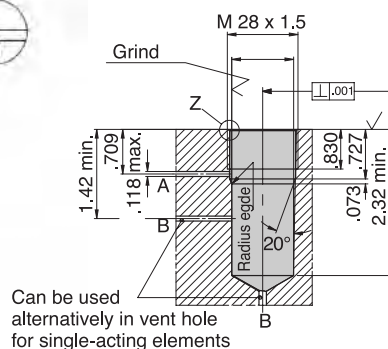
Double Clamping Arm
CLR-0354-082-SCA



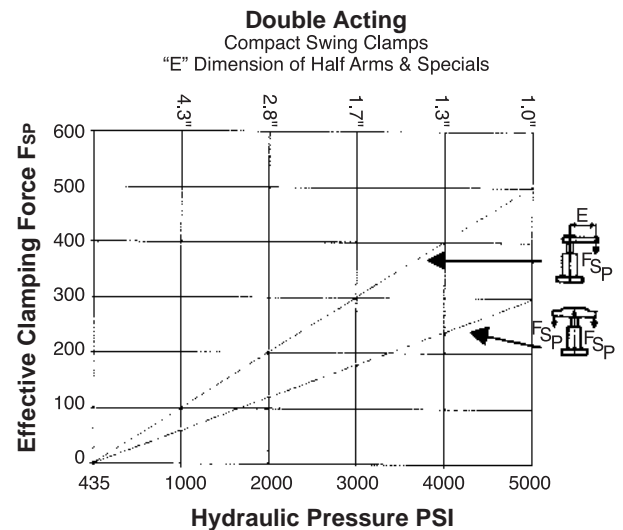
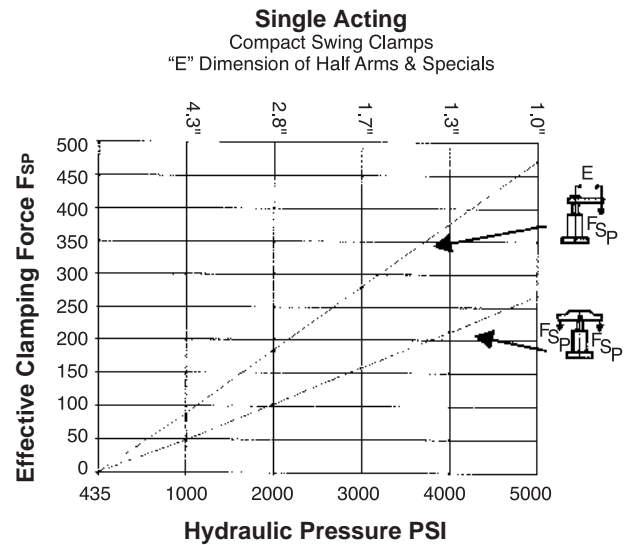
Lock Ring
CLR-3527-776-SCA (US)
CLR-3527-076-SCA (Metric)



Hole Preparation
Single Acting



Hole Preparation
Double Acting and
Single Acting with Vent Hole



Clamping force (lbs)	5000 psi	500
	4000 psi	380/400
	3000 psi	280/300
	2000 psi	190/200
	1000 psi	90/100
Standard Half Arm		
SA/DA (Lbs) Clamping Force and Special Arms see Chart		
Max pull force SA/DA (lbs)		560/590
Clamping stroke SA/DA (in.)		.24/.31
Stroke during swing SA/DA (in.)		.39/.31
Total stroke (in.)		.63
Piston dia		.55
Piston rod dia		.12
Effective Piston Area (sq.in.)	Clamping	.117
	Unclamping	.239
Oil Volume Per Stroke (cu.in.)	Clamping	.073
	Unclamping	.153
Max. Oil Flow Rate (cu.in./sec.)	Clamping	.3
	Unclamping	.6
Min. Operating Pressure (lbs)		435
Max. Operating Pressure (lbs)		5000



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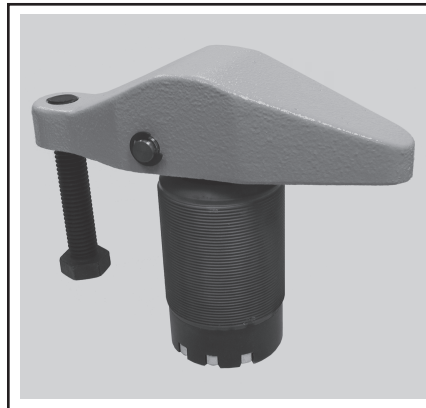
Sales — Phone (636) 386-8022 Fax (636) 386-8034
Engineering — Phone 1-800-827-2526 Web www.clrh.com

Swing Clamps

7250/3000 psi max
Single and double acting

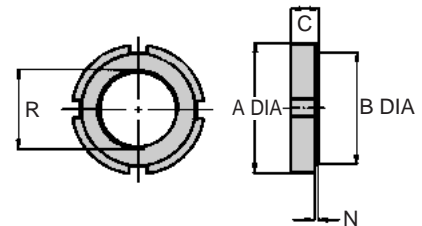


Flange Base

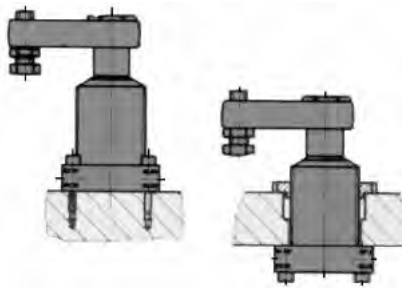


All Threaded

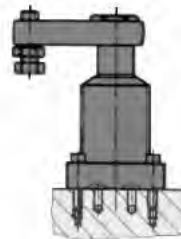
- Popular series of swing clamps that provides many plumbing options
- Unique safety clutch prevents damage if arm strikes an object during swing
- Double-acting clamps are also available with longer clamping strokes (25mm or 50mm). Please contact factory.
- Choice of four sizes (3, 5, 6, and 7 series)



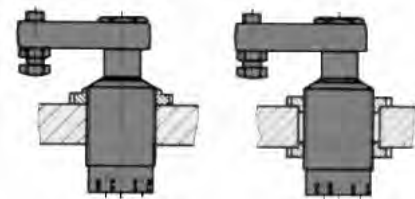
Lock Ring



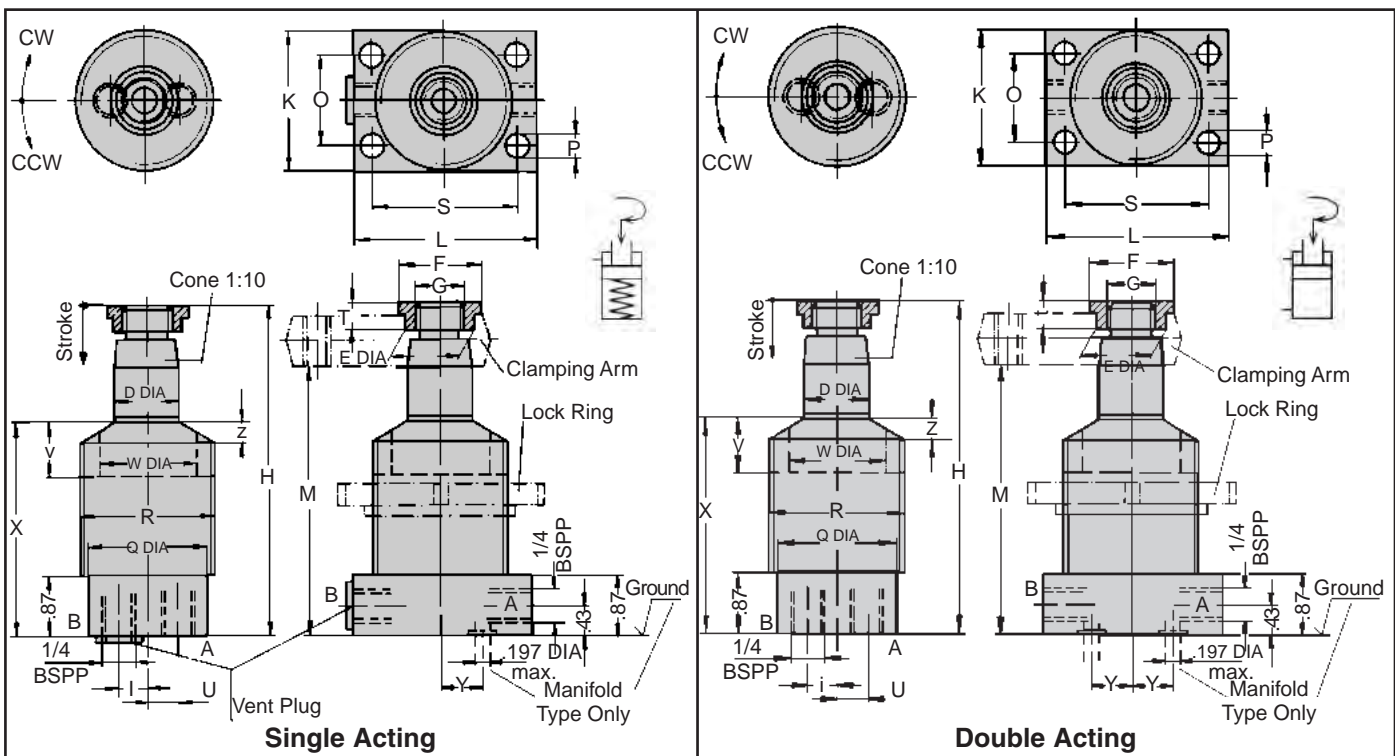
Version 1
Flange Base
Standard Fittings



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 lockings. 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.



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

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. 47-49 for special arm lengths	3000 psi	540/630	1320/1560	1700/2360	3360/3810
Clamping stroke	.43	.55	.59	.59	
Stroke during swing	.28	.32	.43	.35	
Fluid required to clamp (cu. in.)	.20	.61	1.12	1.69	
Fluid required to unclamp, DA (cu. in.)	.54	1.69	3.11	4.60	
Max. fluid flow rate (cu. in./min.)	11	36	67	101	
Min. operating pressure (psi)	450	450	450	450	
A Dia	2.68	3.54	4.53	5.12	
B Dia	2.047/2.039	2.677/2.669	3.543/3.535	3.937/3.929	
C	.47	.51	.63	.63	
D Dia	.787	1.260	1.575	1.969	
E Dia	.925	1.319	1.772	2.185	
F Dia	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	.47	.49	.75	1.00	
K	1.77	2.48	3.15	3.54	
L	2.56	3.35	3.94	4.53	
M (standard arm/half arm)	4.13/4.13	4.69/4.69	5.43/5.43	5.69/5.57	
N	.12	.16	.20	.20	
O	1.181	1.732	2.362	2.677	
P Dia	.256	.335	.531	.630	
Q Dia	1.69	2.28	3.03	3.46	
R	M45 x 1.5	M60 x 1.5	M80 x 2	M90 x 2	
S	1.969	2.559	3.150	3.543	
T	.354	.394	.433	.472	
U	.47	.77	1.04	1.34	
V	.79	.79	1.18	1.57	
W Dia	1.26	1.97	2.36	2.76	
X	3.33	3.72	4.33	4.57	
Y	.591	1.102	1.220	1.476	
Z	.20	.24	.24	.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

	Single-Acting, CW	CLR-1883-504-SC	CLR-1885-504-SC	CLR-1886-504-SC	CLR-1887-504-SC
Part No., Clamp without Arm	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.



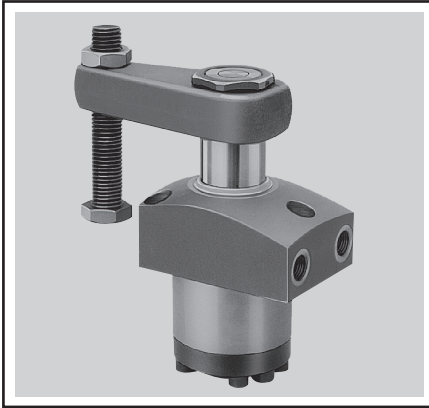
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Swing Clamps

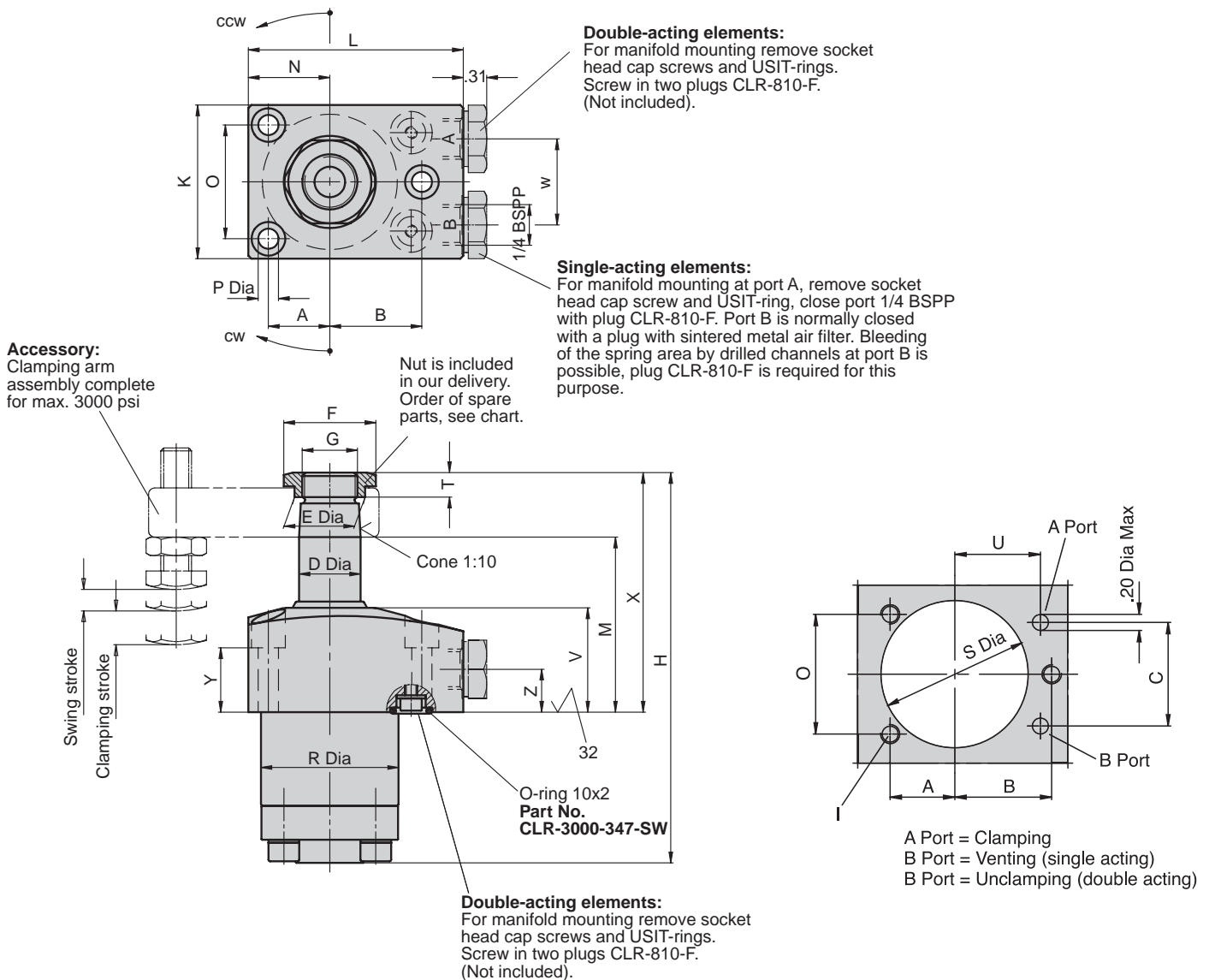
7250 psi max
Single and double acting



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.



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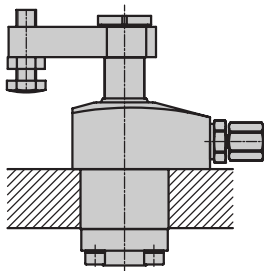
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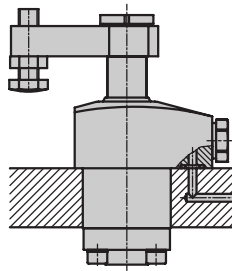
Swing Clamps

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 47-49 for arm options. Also available in 60° and 45° swing.

Clamping force (lbs)	7250 psi	1130/1125	2755/2845	4420/4495	7680/7865
standard pivoting arm	6000 psi	860/920	2200/2300	3400/3700	6000/6500
SA/DA (lbs)	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. 47-49 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.



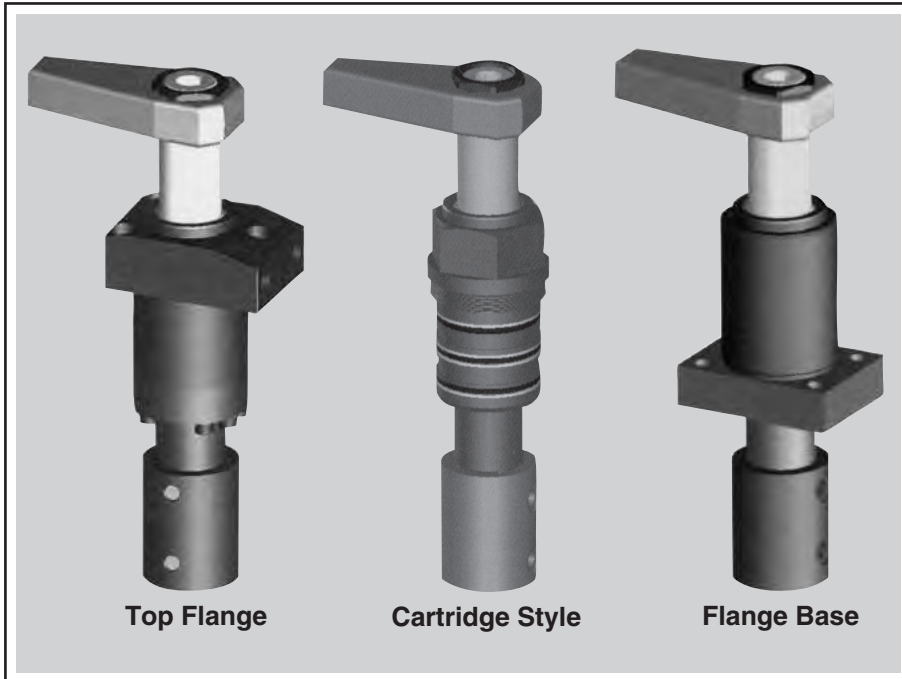
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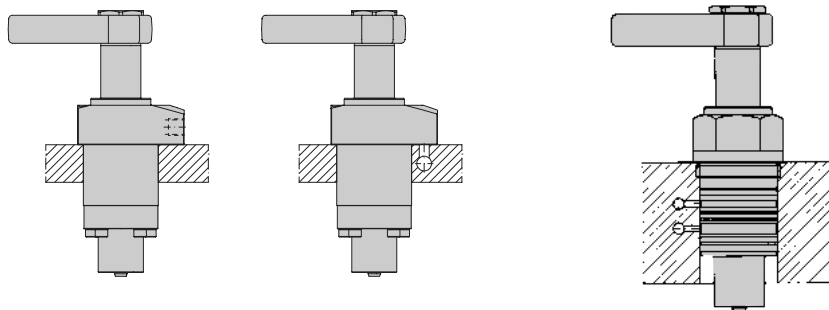
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Swing Clamps

7500 psi max
Double acting

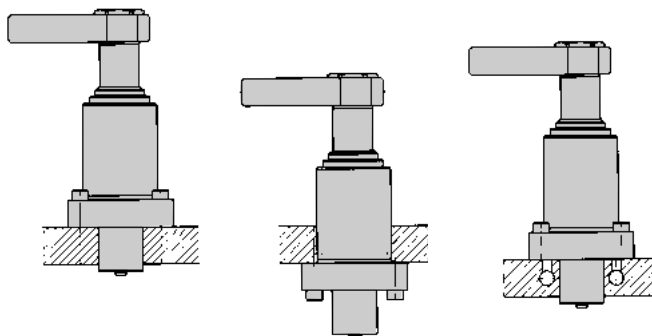


Automation Type



Top Flange

Cartridge Style



Flange Base

Due to the sturdy swing mechanism and the extended switch rod these clamps are particularly suited for:

- **Clamping fixtures with workpiece loading via handling systems**
- **Transfer lines**
- **Test systems for motors, gears, axis, etc.**
- **Automatic manufacturing systems**
- **Assembly lines**

APPLICATION: Hydraulic swing clamps are used for clamping of workpieces when it is essential to keep the clamping area free of straps and clamping components for unrestricted workpiece loading and unloading.

DESCRIPTION: This line is a further development of the proven ROEMHELD swing clamps with the aim to improve process safety in linked clamping systems. The most important characteristics are as follows:

1. Omission of the overload protection device - In the case of a slight collision with the clamping arm during loading and unloading of the fixture, the angular position of the clamping arm will be maintained. Less critical are the weight of the clamping arm or an increased swing speed.

2. Reinforced swing mechanism - The reinforced swing mechanism endures a collision of the clamping arm with the workpiece during clamping up to a pressure of 1500 psi.

3. Switch rod for position control - The helix rod protrudes through the cover and allows a pneumatic or electrical control of the piston position outside the chip area. As an accessory a pneumatic position control is available; the brass control slide being displaced in a stainless housing. The slide opens and closes bore holes, so that a pressure switch or a differential pressure switch can signal the position "Clamped" and "Unclamped". It is also possible to realize this control directly in the fixture body by means of drilled channels.

4. Wiper VITON® - Has a high chemical resistance when using aggressive cutting fluids.

5. Option: Metallic wiper - Protects the wiper VITON® against mechanical damage, e.g. by hot chips. The swing clamp body is prepared for mounting of the metallic wiper. The wiper consists of a radially floating wiping disk and a retaining disk which will be pressed onto the existing collar.

IMPORTANT NOTES: Due to the missing overload protection device, assembly and disassembly of the clamping arm has to be made carefully despite the reinforced swing mechanism. When tightening and untightening the fixing nut, the clamping arm or the hexagon socket in the piston have to be backed up. It is recommended to effect tightening and untightening in the swing area. Frequent collisions with the clamping arm in radial direction have to be avoided.

For further important notes see the next several pages.



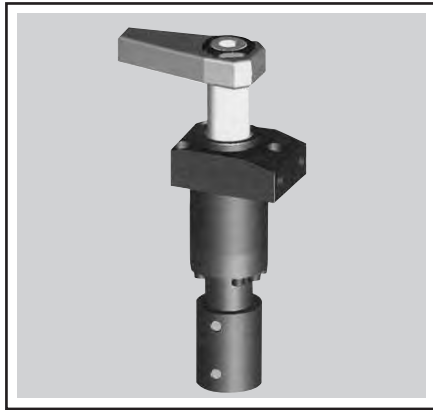
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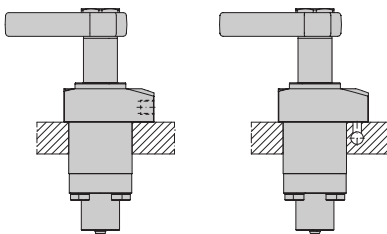
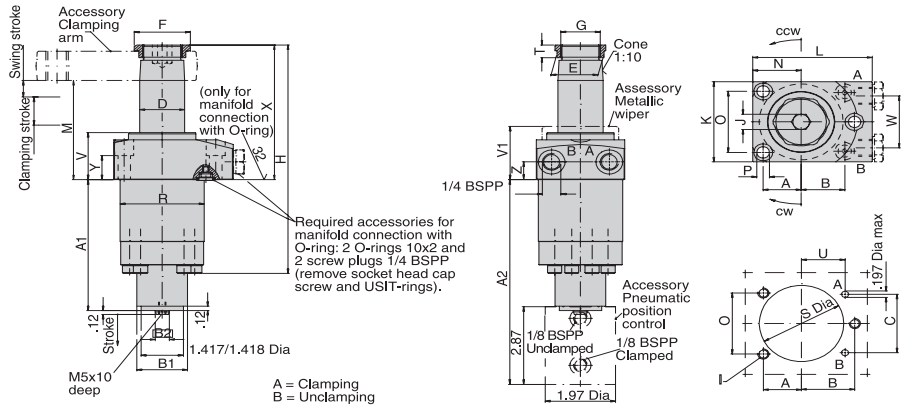
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Swing Clamps

7500 psi max
Double acting



Top Flange



Mounting Options

Clamping force (lbs) standard pivoting arm (lbs)	7500 psi	2900	4700	8100
	6000 psi	2300	3700	6500
	5000 psi	2000	3100	5500
	4000 psi	1560	2480	4340
	3000 psi	1200	1900	3300
Clamping force half arm SA/DA (lbs) See pgs. 47-49 for special arm lengths	3000 psi	1600	2400	4000
Clamping stroke	.87	.79	.79	.79
Swing stroke	.51	.63	.71	.71
Total stroke	1.38	1.42	1.50	1.50
Operating pressure to swing, min. (psi)	450	450	450	450
Max. oil flow rate (cu. in./min.)	73	132	201	201
Oil to clamp (cu. in.)	.96	1.6	2.67	2.67
Oil to return (cu. in.)	2.5	4	7	7
A	1.063	1.457	1.654	1.654
A1	4.02	4.57	5.04	5.04
A2	6.81	7.36	7.83	7.83
B	1.496	1.969	2.165	2.165
B1 Dia	1.42	1.77	1.77	1.77
B2 Dia	.394/.393	.472/.473	.472/.473	.472/.473
C	1.811	2.441	2.953	2.953
D Dia	1.256	1.575	1.969	1.969
E Dia	1.32	1.71	2.19	2.19
F	1.57	2.17	2.68	2.68
G	M28x1.5	M35x1.5	M45x1.5	M45x1.5
H	7.13	8.03	8.15	8.15
I	M8	M10	M12	M12
J	12mm	14mm	17mm	17mm
K	2.48	3.35	3.74	3.74
L	3.35	4.33	4.92	4.92
M	3.11	3.15	3.23	3.23
N	1.36	1.85	2.17	2.17
O	1.89	2.56	2.83	2.83
P Dia	.35	.43	.55	.55
R Dia	2.35	3.14	3.54	3.54
S Dia	2.36	3.15	3.55	3.55
T	.39	.43	.47	.47
U	1.220	1.575	1.772	1.772
V	1.46	1.38	1.38	1.38
V1	1.65	1.57	1.57	1.57
W	1.61	2.17	2.76	2.76
X	4.21	1.49	4.80	4.80
Y	.87	.59	.55	.55
Z	.55	.47	.47	.47
Part No., Clockwise rotation 90°	CLR-1895-303-VMH35	CLR-1896-303-VMH36	CLR-1897-303-VMH38	CLR-1897-303-VMH38
Part No., Counterclockwise rotation 90°	CLR-1895-403-VMH35	CLR-1896-403-VMH36	CLR-1897-403-VMH38	CLR-1897-403-VMH38
Part No., 0 degree	CLR-1895-443-VMH35	CLR-1896-443-VMH36	CLR-1897-443-VMH38	CLR-1897-443-VMH38

Accessories

Part No., Pneumatic position control, complete	CLR-0353-808-PM	CLR-0353-809-PM	CLR-0353-810-PM
Part No., Electrical position monitoring, without switch	CLR-0353-815-PM	CLR-0353-813-PM	CLR-0353-813-PM
Part No., Electrical position monitoring, with switch	CLR-0353-814-PM	CLR-0353-811-PM	CLR-0353-811-PM
Part No. Metallic wiper, complete	CLR-0341-100-SCA	CLR-0341-101-SCA	CLR-0341-102-SCA
O-ring for manifold mount (2 req'd)	CLR-3000-347-SW		

See pages 47-49 for arms.



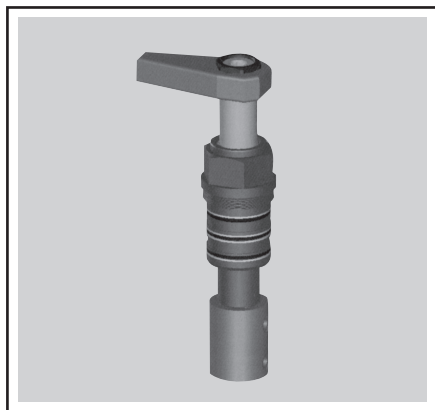
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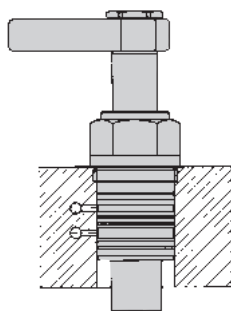
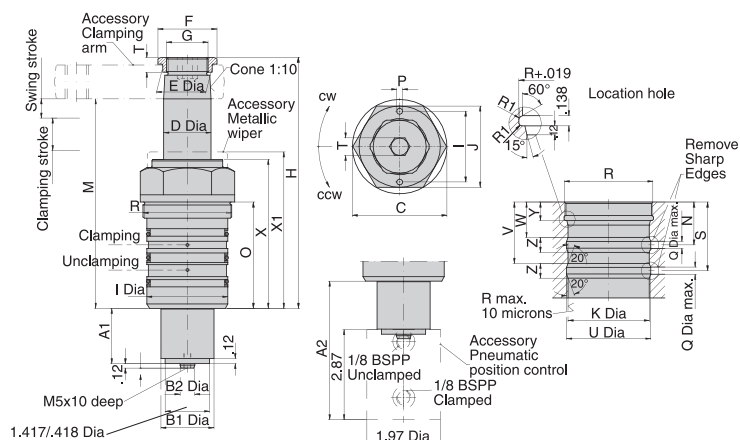
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Swing Clamps

7500 psi max
Double acting



Cartridge Style



Installation Example

Clamping force (lbs) standard pivoting arm (lbs)	7500 psi	2900	8100
	6000 psi	2300	6500
	5000 psi	2000	5500
	4000 psi	1560	4340
	3000 psi	1200	3300
Clamping force half arm SA/DA (lbs) See pgs. 47-49 for special arm lengths	3000 psi	1600	4000
Clamping stroke	.87		
Swing stroke	.51		
Total stroke	1.38		
Operating pressure to swing, min. (psi)	450		
Max. oil flow rate (cu. in./min.)	73		
Oil to clamp (cu. in.)	.96		
Oil to return (cu. in.)	2.5		
A1	1.50		
A2	4.25		
B1 Dia	1.42		
B2 Dia	.394/.393		
C Dia	2.52		
D Dia	1.26		
E Dia	1.32		
F	1.57		
G	M28x1.5		
H	6.73		
I Dia	2.165		
K Dia	2.168/2.166		
L	—		
M-1	5.63		
N	1.14		
O	2.83		
P / deep	—		
Q Dia Max.	.20		
R	M60x1.5		
S	1.83		
T	.39		
T Hex	12mm		
U Dia	2.24		
V	1.63		
W	.94		
X	3.98		
X1	4.17		
Y	.49		
Z	.39		
Part No., Clockwise rotation 90°	CLR-1895-101-VMH35	CLR-1897-101-VMH38	
Part No., Counterclockwise rotation 90°	CLR-1895-201-VMH35	CLR-1897-201-VMH38	
Part No., 0 degree	CLR-1895-241-VMH35	CLR-1897-241-VMH38	

Accessories

Part No., Pneumatic position control, complete	CLR-0353-808-PM	CLR-0353-810-PM
Part No., Electrical position monitoring, without switch	CLR-0353-815-PM	CLR-0353-813-PM
Part No., Electrical position monitoring, with switch	CLR-0353-814-PM	CLR-0353-811-PM
Part No. Metallic wiper, complete	CLR-0341-100-SCA	CLR-0341-102-SCA

See pages 47-49 for arms.

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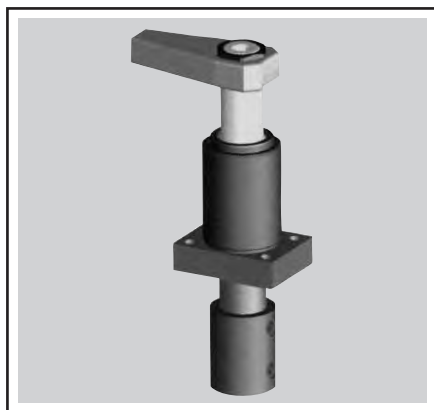
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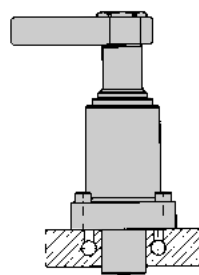
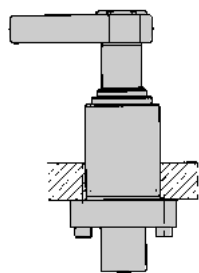
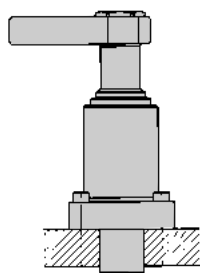
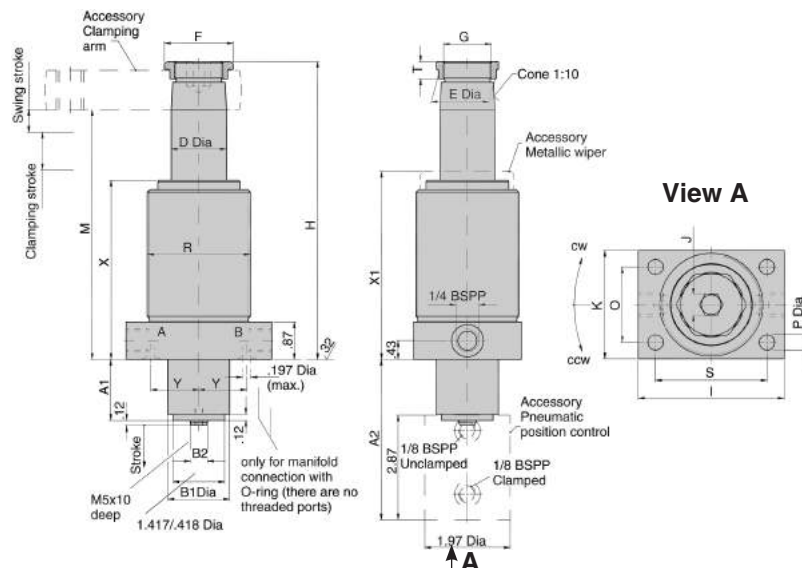
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Swing Clamps

7500 psi max
Double acting



Flange Base



Installation
Examples

Clamping force (lbs) standard pivoting arm (lbs)	7500 psi	2900	4700	8100
	6000 psi	2300	3700	6500
	5000 psi	2000	3100	5500
	4000 psi	1560	2480	4340
	3000 psi	1200	1900	3300
Clamping force half arm SA/DA (lbs) See pgs. 47-49 for special arm lengths	3000 psi	1600	2400	4000
Clamping stroke		.87	.79	.79
Swing stroke		.51	.63	.71
Total stroke		1.38	1.42	1.50
Operating pressure to swing, min. (psi)		450	450	450
Max. oil flow rate (cu.in./min.)		73	132	201
Oil to clamp (cu. in)		.96	1.6	2.67
Oil to return (cu. in)		2.5	4	7
A1		1.40	1.50	1.61
A2		4.19	4.29	4.41
B1 Dia		1.42	1.77	1.77
B2 Dia		.394/.393	.473/.472	.473/.472
D Dia		1.26	1.57	1.97
E Dia		1.32	1.71	2.19
F		1.57	2.17	2.68
G		M28x1.5	M35x1.5	M45x1.5
H		6.83	7.56	8.23
J Hex		12mm	14mm	17mm
K		2.48	3.15	3.54
L		3.35	3.94	4.53
M		5.73	6.22	6.65
O		1.73	2.36	2.68
P Dia		.33	.53	.63
R		M60x1.5	M80x2	M90x2
S		2.56	3.15	3.54
T		.39	.43	.47
X		4.07	4.45	4.88
X1		4.27	4.65	1.08
Y		1.10	1.22	1.48
Part No., threaded ports, Clockwise rotation 90°		CLR-1895-108-VMH35	CLR-1896-108-VMH36	CLR-1897-108-VMH38
Part No., threaded ports, Counterclockwise rotation 90°		CLR-1895-208-VMH35	CLR-1896-208-VMH36	CLR-1897-208-VMH38
Part No., 0 degree		CLR-1895-248-VMH35	CLR-1896-248-VMH36	CLR-1897-248-VMH38
Part No., manifold connection with O-ring, Clockwise rotation 90°		CLR-1895-508-VMH35	CLR-1896-508-VMH36	CLR-1897-508-VMH38
Part No., manifold connection with O-ring, Counterclockwise rotation 90°		CLR-1895-608-VMH35	CLR-1896-608-VMH36	CLR-1897-608-VMH38
Part No., 0 degree		CLR-1895-648-VMH35	CLR-1896-648-VMH36	CLR-1897-648-VMH38

Accessories

Part No., Pneumatic position control, complete	CLR-0353-808-PM	CLR-0353-809-PM	CLR-0353-810-PM
Part No., Electrical position monitoring, without switch	CLR-0353-815-PM	CLR-0353-813-PM	CLR-0353-813-PM
Part No., Electrical position monitoring, with switch	CLR-0353-814-PM	CLR-0353-811-PM	CLR-0353-811-PM
Part No. Metallic wiper, complete	CLR-0341-100-SCA	CLR-0341-101-SCA	CLR-0341-102-SCA

See pages 47-49 for arms.



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Swing Clamps

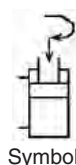
7500 psi max
Single and double acting



**Threaded Body
Compact
Single Acting**



**Threaded Body
Compact
Double Acting**



- Cartridge style for extreme compactness
- Compact size makes this swing clamp extremely useful in many applications
- Compact arm swings 90° for clear loading
- Unique safety clutch prevents damage if arm strikes an object during swing

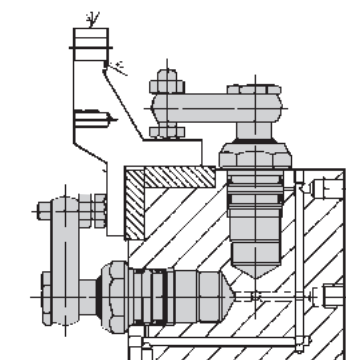
CLAMPING ACTION: Fluid pressure swings arm 90° over workpiece (.276 swing stroke) then clamps down (.276 maximum clamping stroke). Spring return lifts arm, then swings back 90° for unloading. Optional fluid-return (double-acting) version. Choose either clockwise or counterclockwise rotation to clamping position.

SAFETY CLUTCH: Even this tiny swing clamp contains our proprietary safety-clutch mechanism. If the clamping arm strikes an unexpected object, during its swing, the clutch disengages to avoid damaging the object or the clamp's helical-cam mechanism.

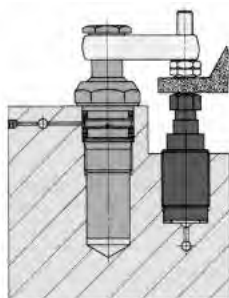
MOUNTING: Screw clamp into fixture up to the body hex. Carefully follow hole-preparation instructions in the drawings. Round the sharp edge on the upper fluid passage with a 3/16 dia. ball as shown in the Detail Z below (otherwise the lower O ring can be damaged when the clamp is screwed in). Check for burrs with finger before installing.

FLUID CONNECTION: Fluid passages must fit clamp exactly as shown in the drawings below. For proper operation of the safety-clutch mechanism, clamp may require a simple flow-control valve if fixture is powered by a high-flow-rate power source and contains only a few clamps.

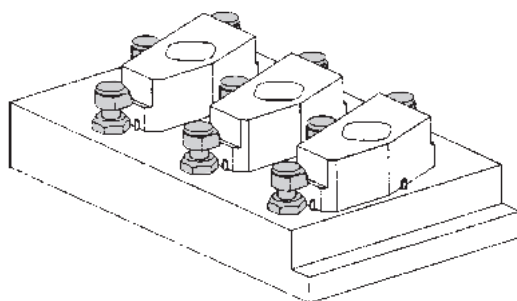
CLAMPING ARM: Forged steel clamping arm can be mounted to start its 90° swing from any position within 360°. Adjustable contact bolt furnished.



Manifold mounting allows placing these swing clamps very close together, including mounting at 90° to each other.



When clamping over a work support, these swing clamps are ideally matched with small threaded-body work supports. (1700 lbs load capacity at 6000 psi). The design rule in such applications is that work-support load capacity should be at least 2X clamping force.



This fixture has three workpieces held by nine swing clamps with short clamping arms. Short arms extend only 5/32" onto the workpiece, but are ideal for some small parts.

Clamping force (lbs)	7500 psi	880
	6000 psi	700
	5000 psi	590
	4000 psi	470
	3000 psi	350
Clamping stroke		.276
Stroke during swing		.276
Fluid required (cu. in.)		.37
Max. fluid flow rate (cu. in./min.)		5.5
Force per 1000 psi (lbs)		117
Max. operating pressure (psi)		7500
Min. operating pressure, SA/DA (psi)		750/450
Weight (lbs)		1.2
Part No., single acting, with arm	cw	CLR-111-SCH
	ccw	CLR-121-SCH
Part No., single acting, without arm	cw	CLR-1881-102-SC
	ccw	CLR-1881-202-SC
Part No., double acting, with arm	cw	CLR-111-SCDH
	ccw	CLR-121-SCDH
Part No., double acting, without arm	cw	CLR-1891-101-SCD
	ccw	CLR-1891-201-SCD
Spare O Ring (2 req'd)		CLR-3000-547-SW
Spare Backup Ring (3 req'd)		CLR-3000-548-SW



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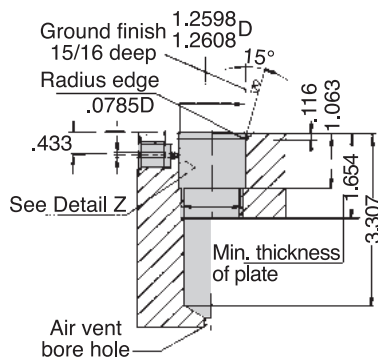
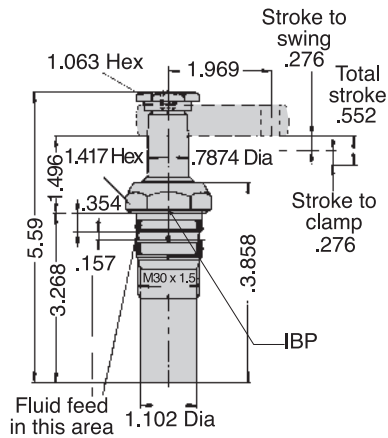
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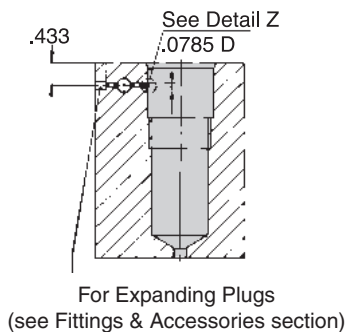
Swing Clamps

7500 psi max
Single and Double acting

Single Acting

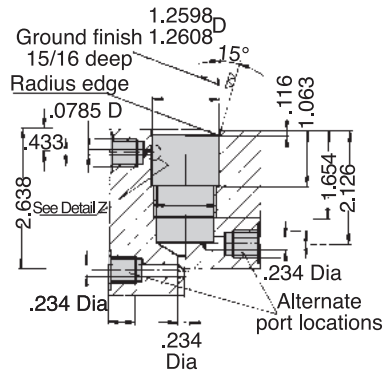
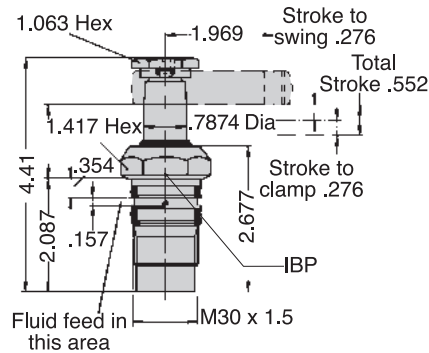


Hole Preparation Individual Mounting

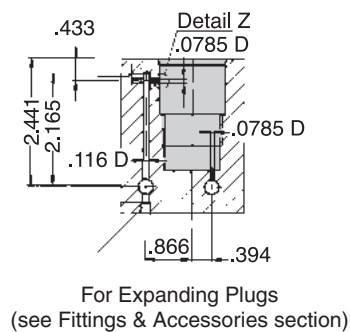


Hole Preparation Row Mounting

Double Acting

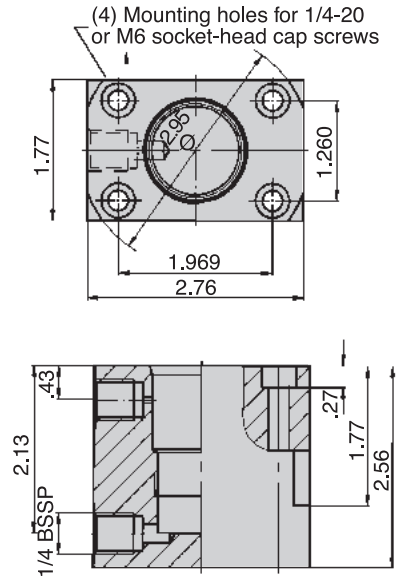


Hole Preparation Individual Mounting

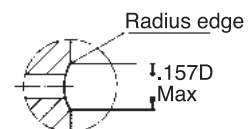


Hole Preparation Row Mounting

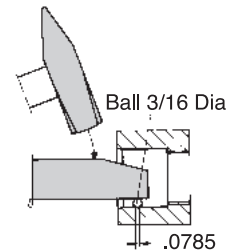
Mounting Block (Double Acting Only) CLR-3467-143-SCA



Hole Preparation Detail Z (Single & Double Acting)



Detail Z



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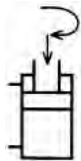
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Swing Clamps

7250/3000 max
Double acting only

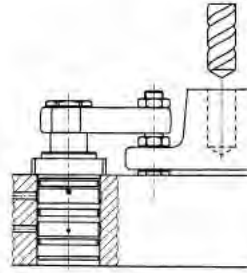


Top Flange Cartridge



- Cartridge type for extreme compactness
- Flange design reduces fixture machining
- FKM wiper standard
- Choice of 3 sizes each with 2 stroke lengths
- Unique safety clutch prevents damage if the arm strikes an object during swing

Application Example



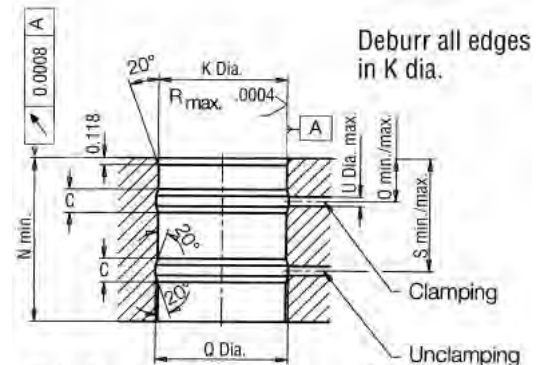
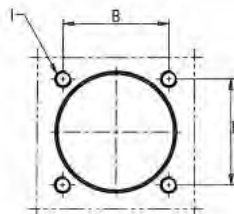
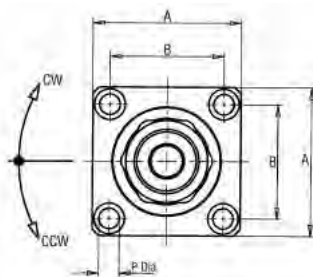
APPLICATION: Hydraulic swing clamps are used for clamping of workpieces when it is essential to keep the clamping area free of straps and clamping components for unrestricted workpiece loading and unloading.

FUNCTION: This hydraulic clamping element is a pull-type cylinder where a part of the total stroke is used to swing the piston.

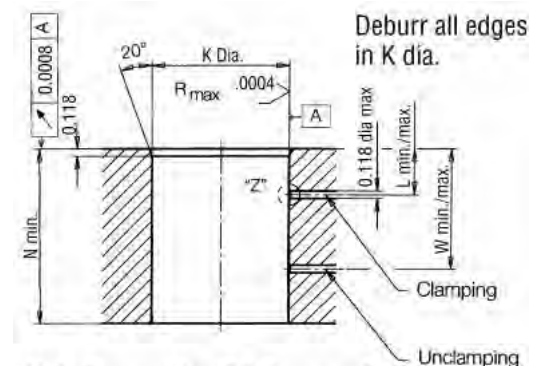
DIRECTION OF ROTATION: The units are available with clockwise and counterclockwise rotation or without rotation (0°) starting from the off position.

OVERLOAD PROTECTION DEVICE: An integrated mechanical overload protection device prevents damage to the swing mechanism when striking an object within the 90° rotation, clamping or unclamping alike, or in case of incorrect mounting of the clamping arm.

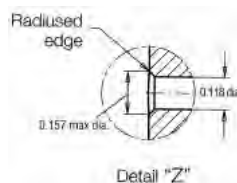
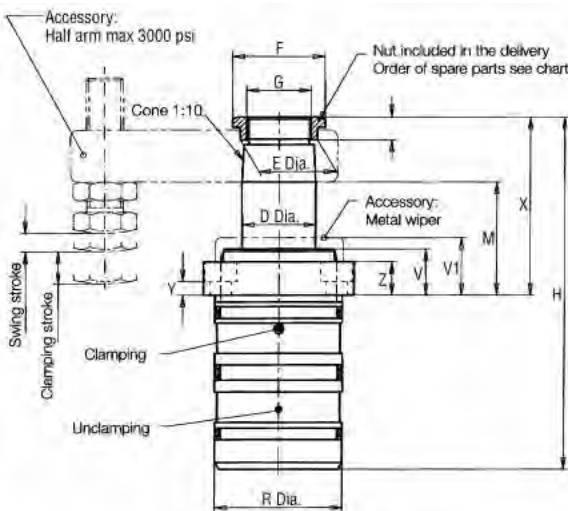
MATERIAL: By nitrating, wear is reduced and protection against corrosion increased. Piston material: high alloy steel. Cylinder body: free cutting steel.



Hole Preparation Oil Passage 0.197-0.236



Hole Preparation Oil Passage 0.118 or less



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Swing Clamps

7250/3000 max
Double acting only

Clamping Force Standard Pivoting arm (lbs)	7250 psi	1125	2875	4495	7865
	6000 psi	920	2300	3700	6500
	5000 psi	770	2000	3100	5500
	4000 psi	620	1560	2480	4340
	3000 psi	450	1200	1900	3300
Half Arm (lbs)	3000 psi	630	1560	2360	3810
	2000 psi	420	1040	1575	2540
Max flow rate (cu.in. / min.)		12	37	67	101
Max. PSI standard arm		7500	7500	7500	7500
Max. PSI half arm		3000	3000	3000	3000
Min. operating pressure		435	435	435	435
A		2.17	2.56	3.35	3.94
B		1.57	1.97	2.56	2.95
C		0.394	0.394	0.472	0.472
D Dia.		0.787	1.26	1.57	1.97
E Dia.		0.925	1.319	1.77	2.185
F		1.181	1.575	2.165	2.677
G		M18 x 1.5	M28 x 1.5	M35 x 1.5	M45 x 1.5
I		M6	M8	M10	M12
K Dia.		1.6535 / 1.6545	2.1654 / 2.1665	2.7559 / 2.7570	3.3465 / 3.3478
L min./max.		0.532 / 0.847	0.571 / 0.886	0.610 / 1.043	0.728 / 1.161
O min./max.		0.63 / 0.748	0.669 / 0.787	0.748 / 0.906	0.866 / 1.024
P Dia.		0.26	0.354	0.433	0.551
Q Dia		1.732	2.244	2.835	3.425
R Dia. (f7)		1.6535	2.1654	2.7559	3.3465
T		0.354	0.394	0.433	0.472
U Dia. Max.		0.197	0.197	0.236	0.236
V		0.709	0.787	0.945	1.102
V1		0.91	0.98	1.18	1.34
Y		0.26	0.24	0.33	0.41
Z		0.531	0.571	0.768	0.925
Weight (lbs)		2.1	4.1	7.6	10

Standard Stroke

Clamping stroke	0.43	0.55	0.59	0.59
Swing stroke	0.276	0.315	0.433	0.354
Total stroke	0.708	0.866	1.02	0.944
Fluid req. clamp (cu. in.)	0.195	0.61	1.12	1.7
Fluid req. unclamp (cu. in.)	0.54	1.7	3.1	4.6
H	4.94	5.98	6.77	7.2
M	1.693	1.929	2.362	2.441
N min.	2.362	2.598	2.835	2.992
S min./max.	1.634 / 1.752	1.831 / 1.949	1.949 / 2.106	2.047 / 2.205
W min./max.	1.54 / 1.85	1.73 / 2.05	1.79 / 2.22	1.91 / 2.34
X	2.52	3.03	3.7	4.02
Part No. Clockwise Swing	CLR-1893-102-SCD	CLR-1895-102-SCD	CLR-1896-102-SCD	CLR-1897-102-SCD
Part No. CCW Swing	CLR-1893-202-SCD	CLR-1895-202-SCD	CLR-1896-202-SCD	CLR-1897-202-SCD
Part No. Zero Swing	CLR-1893-242-SCD	CLR-1895-242-SCD	CLR-1896-242-SCD	CLR-1897-242-SCD

Long Stroke

Clamping stroke	0.98	0.984	0.984	0.984
Swing stroke	0.354	0.394	0.433	0.472
Total stroke	1.339	1.378	1.417	1.457
Fluid req. clamp (cu. in.)	0.366	0.976	1.556	2.624
Fluid req. unclamp (cu. in.)	1.037	2.685	4.332	7.08
H	6.20	7.01	7.56	8.228
M	2.323	2.441	2.756	2.953
N min.	2.992	3.11	3.228	3.504
S min./max.	1.634 / 2.382	1.831 / 2.461	1.949 / 2.5	2.047 / 2.717
W min./max.	1.54 / 2.48	1.73 / 2.56	1.791 / 2.618	1.909 / 2.854
X	3.15	3.543	4.094	4.528
Part No. Clockwise Swing	CLR-1893-302-SCD	CLR-1895-302-SCD	CLR-1896-302-SCD	CLR-1897-302-SCD
Part No. CCW Swing	CLR-1893-402-SCD	CLR-1895-402-SCD	CLR-1896-402-SCD	CLR-1897-402-SCD
Part No. Zero Swing	CLR-1893-442-SCD	CLR-1895-442-SCD	CLR-1896-442-SCD	CLR-1897-442-SCD

Accessories

Part No. Spare Nut	CLR-3527-014-SCA	CLR-3527-015-SCA	CLR-3527-048-SCA	CLR-3527-016-SCA
Part No. Metal Wiper	CLR-0341-106-SCA	CLR-0341-100-SCA	CLR-0341-101-SCA	CLR-0341-102-SCA



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Swing Clamps

7500/3000 psi max
Single and double acting



Threaded Cartridge

- Cartridge style for extreme compactness
- Arm swings 90° for clear loading
- Unique safety clutch prevents damage if arm strikes an object during swing
- Choice of three sizes

CLAMPING ACTION: Fluid pressure swings arm 90° over workpiece, then clamps down. Return fluid pressure lifts arm, then swings it back 90° for unloading. Choose either clockwise or counterclockwise rotation to clamping position.

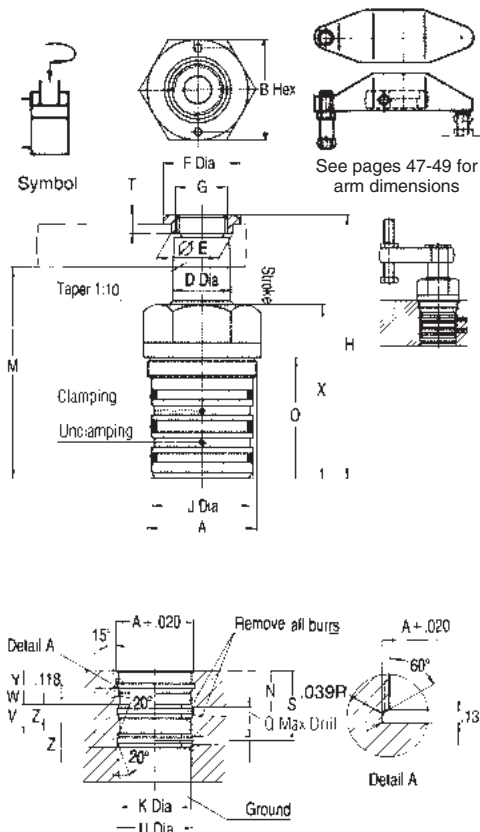
DESIGN CONSIDERATIONS: The clamping arm must go through its full extending movement to operate properly. Stopping the arm short by obstructing it could possibly cause damage. Use low operating pressure during initial setting. Be careful not to exceed maximum fluid-flow rate in the chart below (see Flow-Control Valves in valves section).

SAFETY CLUTCH: Even these compact swing clamps contain our proprietary safety-clutch mechanism. If the arm strikes an unexpected object during its swing, the clutch disengages to avoid damaging the object or the clamp's helical-cam mechanism.

MOUNTING: Screw clamp into fixture up to the body hex. Carefully follow hole-preparation instructions in the drawings below.

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.



Clamping Force Standard pivoting arm (lbs)	7500 psi	1110	2900	7880
	6000 psi	890	2400	6300
	5000 psi	740	2000	5250
	4000 psi	590	1600	4200
	3000 psi	440	1200	3150
Half Arm (lbs)	3000 psi	540	1320	3360
See Pg. 47-49 for special half arms	2000 psi	360	880	2240
Clamping stroke		0.43	0.55	0.59
Stroke during swing		.276	.315	.354
Fluid required (cu.in.)		.54	1.69	4.60
Max. fluid flow rate (cu.in./min.)		12	37	101
Max. operating pressure (psi) (std. arm)		7500	7500	7500
Max. operating pressure (psi) (half arm)		3000	3000	3000
Min. operating pressure (psi)		450	450	450
A		M45x1.5	M60x1.5	M90x2
B		1.81	2.17	3.74
D Dia		.7874	1.2598	1.9685
E Dia		.925	1.319	2.185
F Dia		1.18	1.57	2.68
G		M18x1.5	M28x1.5	M45x1.5
H		4.41	5.98	7.17
J Dia		1.6535	2.1654	3.3465
K Dia		1.6535/1.6545	2.1654/2.1665	3.3465/3.3478
M		3.58	4.88	5.59
N		.945	1.142	1.614
O		2.087	2.598	3.780
Q Dia Max		.197	.197	.236
S		1.614	1.831	2.520
T		.354	.394	.472
U Dia		1.732	2.244	3.425
V		1.457	1.634	2.323
W		.787	.945	1.417
X		2.756	3.898	4.567
Y		.413	.492	.807
Z		.315	.394	.394
Weight (lbs.)		3	6	18
Part No., Single Acting CW Swing	CLR-1883-102-SC	CLR-1885-102-SC	CLR-1887-102-SC	
Part No., Single Acting CCW Swing	CLR-1883-202-SC	CLR-1885-202-SC	CLR-1887-202-SC	
Part No., Double Acting CW Swing	CLR-1893-101-SCD	CLR-1895-101-SCD	CLR-1897-101-SCD	
Part No., Double Acting CCW Swing	CLR-1893-201-SCD	CLR-1895-201-SCD	CLR-1897-201-SCD	



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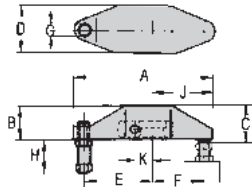
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Swing Clamp Arms

7250 psi max
Single and double acting

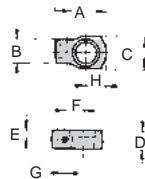
Swing Clamp Part Number	Arm Size
CLR-3XX-SC(D)	Small
CLR-5XX-SC(D)	Medium
CLR-6XX-SC(D)	Large
CLR-7XX-SC(D)	Extra Large

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



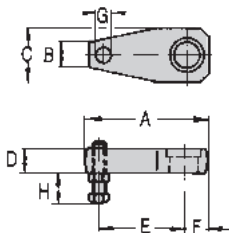
Carrier Only

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



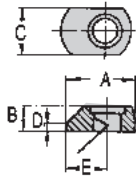
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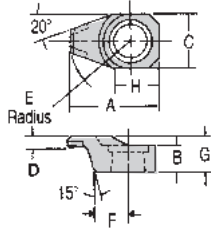
Swing Clamp Arms

7250 psi max
Single and double acting



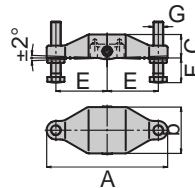
Short Arm

Size	Part no.	A	B	C	D	E
Small	CLR-3548-159-SCA	1.61	0.63	1.26	0.24	0.98
Medium	CLR-3548-165-SCA	2.4	0.91	1.89	0.24	1.46
Large	CLR-3548-304-SCA	2.99	1.1	2.36	0.43	1.77
Extra Large	CLR-3548-163-SCA	3.54	1.34	3.07	0.55	2.05



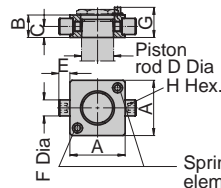
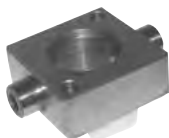
Thin Nose Arm

Size	Part no.	A	B	C	D	E	F	G	H
Small	CLR-3548-238-SCA	2.03	0.61	1.26	0.26	1.32	0.78	0.83	1.03
Medium	CLR-3548-236-SCA	2.99	0.89	1.81	0.35	1.97	0.88	1.1	1.31
Large	CLR-3548-301-SCA	3.94	1.1	2.6	0.43	2.52	1.72	1.34	1.94
Extra Large	CLR-3548-302-SCA	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	CLR-0354-131-SCA	5.43	2.32	1.12	M10	2.36	2.52
Medium	CLR-0354-132-SCA	7.72	2.95	1.5	M16	3.27	3.11
Large	CLR-0354-133-SCA	8.5	3.35	1.85	M16	3.62	3.11
Extra Large	CLR-0354-134-SCA	9.29	4.13	2.2	M20	3.94	3.86

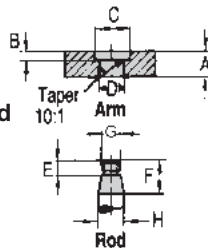


Carrier Only For Double-Arm

Size	Part no.	A	B	C	D Dia	E	F Dia	G*	H Hex
Small	CLR-0354-141-SCA	1.69	0.63	0.3	.79	0.35	0.39	0.85	M5
Medium	CLR-0354-142-SCA	2.17	0.91	0.43	1.26	0.43	0.63	1.14	M8
Large	CLR-0354-143-SCA	2.48	1.1	0.59	1.57	0.47	0.71	1.38	M8
Extra Large	CLR-0354-144-SCA	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.
Small	0.63	0.16	0.94	.7815/.7835	0.39	0.83	M18x1.5	0.79
Medium	0.91	0.2	1.34	1.2539/1.2559	0.47	1.1	M28x1.5	1.26
Large	1.1	0.2	1.81	1.5689/1.5709	0.47	1.34	M35x1.5	1.57
Extra Large	1.34	0.24	2.2	1.9626/1.9646	0.51	1.57	M45x1.5	1.97

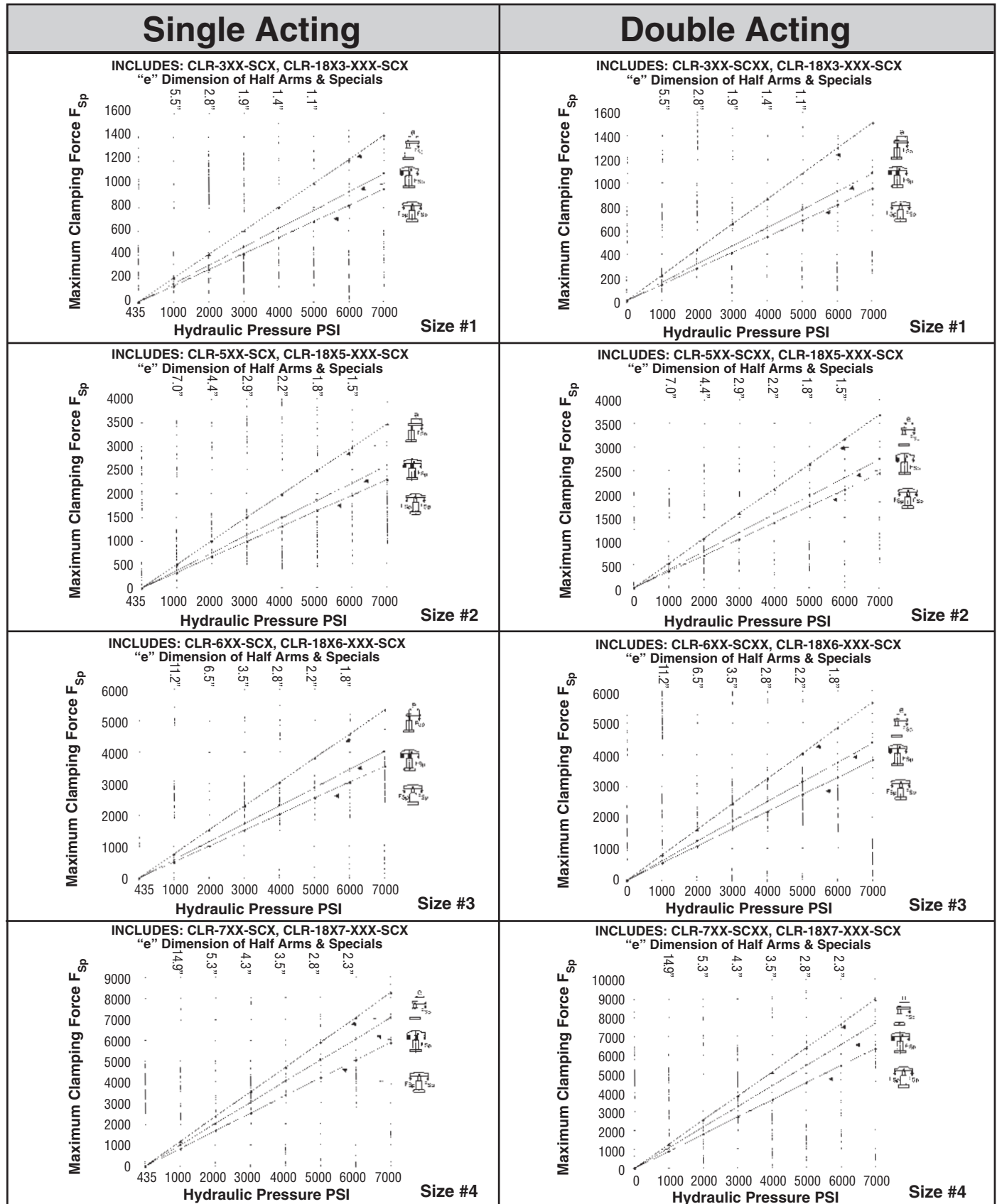


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Swing Clamp Arm Options



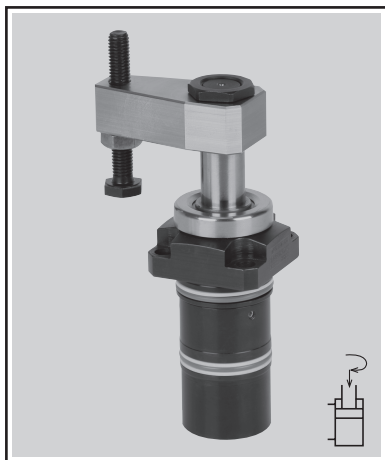
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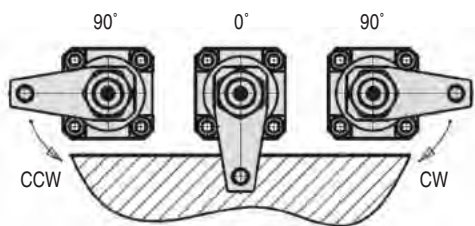
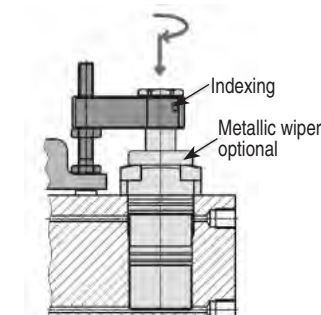
Swing Clamps ■ Robust Swing Mechanism ■ B1.852

Swing Clamps ■ Cartridge style with optional position monitoring
Double Acting ■ Max. Operating Pressure ■ 5075 psi (350 bar)



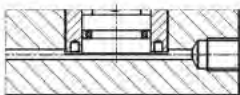
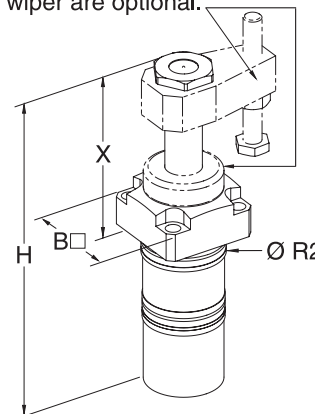
The hydraulic swing clamp is a pull type cylinder where a part of the total stroke is used to swing the piston, for when it is essential to keep the clamping area free for unrestricted workpiece loading/unloading. High clamping force at low pressures. The sturdy swing mechanism in combination with restricted flow

rate, allows larger custom arms. Special swing angle and indexing of clamp arm available. Metal wiper and pneumatic position monitoring available. Four Sizes different sizes to choose from allows the designer to select the optimal clamp for their application.



Special swing angle easily available

Clamp arm assembly and metal wiper are optional.

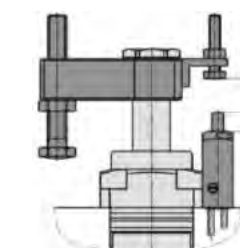


Designed without a bottom cover in order to reduce fixture depth.

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)

B	1.69	2.13	2.64	3.03
H	5.98	6.43	7.50	8.56
R2	1.42	1.73	2.17	2.56
X	3.12	3.37	4.00	4.59
Clamping Stroke	0.47	0.47	0.59	0.59
Approx. Weight (lbs)	1.98	3.07	5.07	8.05
Part No., Swing Direction 90 Degree CW	CLR-1843-F090-R23	CLR-1844-F090-R24	CLR-1845-F090-R30	CLR-1846-F090-R36
Part No., Swing Direction 90 Degree CCW	CLR-1843-F090-L23	CLR-1844-F090-L24	CLR-1845-F090-L30	CLR-1846-F090-L36
Part No., 0 Degree	CLR-1843-F000-023	CLR-1844-F000-024	CLR-1845-F000-030	CLR-1846-F000-036



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.



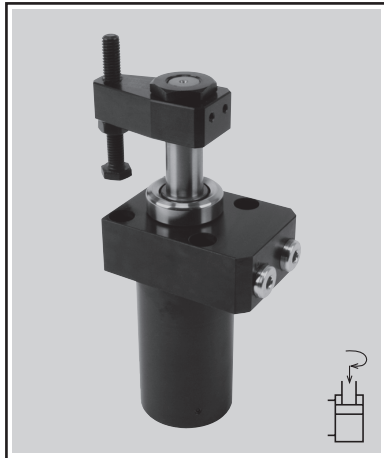
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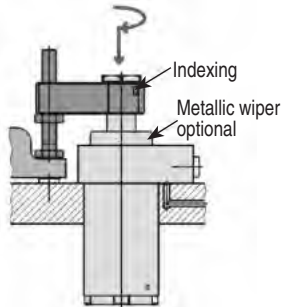
Swing Clamps ■ Robust Swing Mechanism ■ B1.853

Swing Clamps ■ Top flange type with multiple position monitoring options
Double Acting ■ Max. Operating Pressure ■ 5075 psi (350 bar)

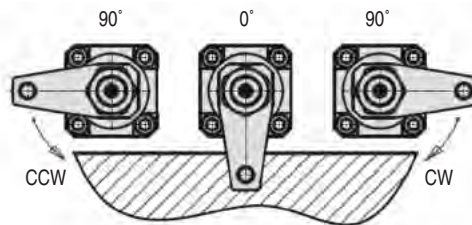


The hydraulic swing clamp is a pull type cylinder where a part of the total stroke is used to swing the piston, for when it is essential to keep the clamping area free for unrestricted workpiece loading/unloading. High clamping force at low pressures. The sturdy swing mechanism in combination with restricted 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.

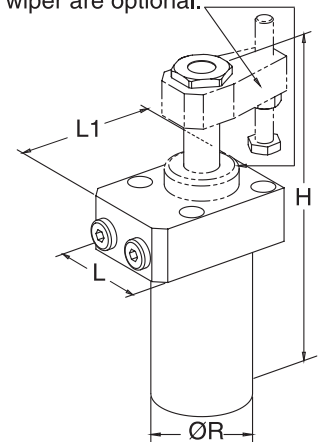


Pneumatic versions available to monitor clamp position and clamp/unclamp positions.



Special swing angle easily available

Clamp arm assembly and metal wiper are optional.

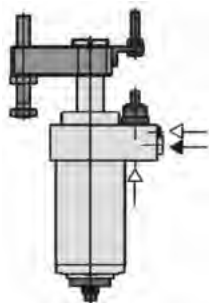


Clamping Force With Accessory Arm		Size 1	Size 2	Size 3	Size 4
Clamp Force (lbs)	5075 psi	1350	1890	3370	4945
	2000 psi	630	1010	1845	2700
	1000 psi	270	340	630	900

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.



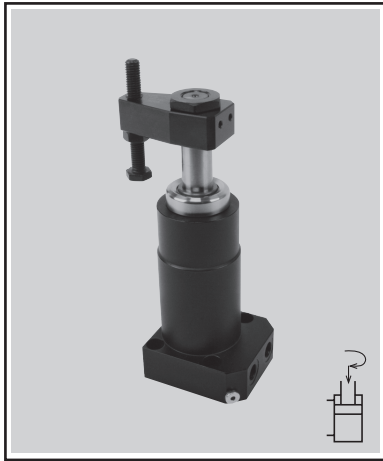
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Swing Clamps ■ Robust Swing Mechanism ■ B1.854

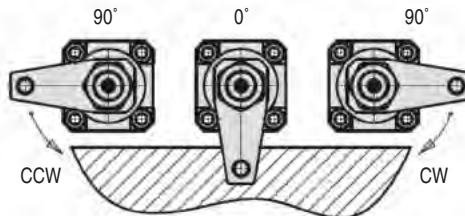
Swing Clamps ■ Flange base type with multiple position monitoring options
Double Acting ■ Max. Operating Pressure ■ 5075 psi (350 bar)



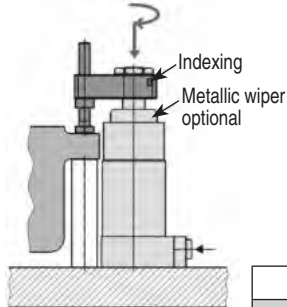
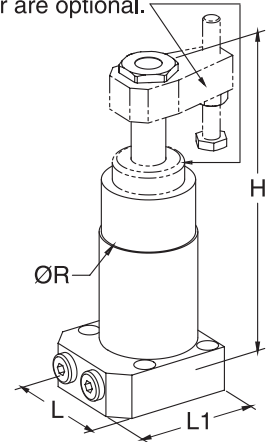
The hydraulic swing clamp is a pull type cylinder where a part of the total stroke is used to swing the piston, for when it is essential to keep the clamping area free for unrestricted workpiece loading/unloading. High clamping force at low pressures. The sturdy swing mechanism in combination with restricted 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.



Special swing angle easily available



Pneumatic versions available to monitor clamp position and clamp/unclamp positions.

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

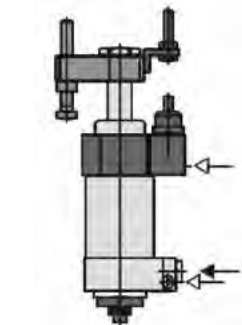
General Dimension Specifications (in inches)

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.



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Push Clamps/Cylinders



Hex Head

page 54



Double Acting

page 60



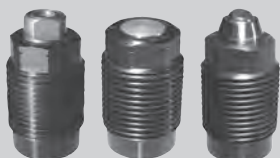
Mini

page 55



Screw-In Type Cylinder

page 61



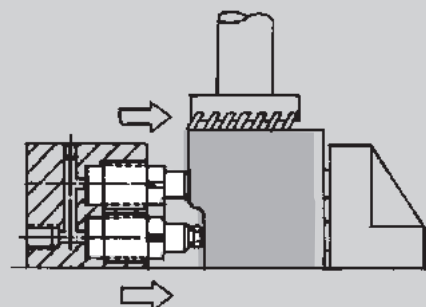
Single Acting

page 56-57



Locking Piston Cylinder

pages 62-63



Threaded-Body Push Clamps

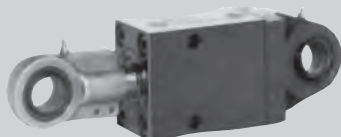
Achieve high force in a compact size. Wide variety of types and sizes. Various models offer different mounting options, such as using accessory brackets, screwing directly into fixture, or manifold mounting.

Accessories, page 59



Block Clamps

pages 64-65



Block Clamps with Bearing Eyes

page 66



Block Cylinders

pages 67-69

Block Clamps and Cylinders

Block Clamps are easy to mount horizontally or vertically on flat surfaces.

Standard Block Clamps, available single and double acting, 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).

Block Clamps with Bearing Eyes are available with spherical-bearing mounts at both ends for clevis mounting, to operate levers and linkages.

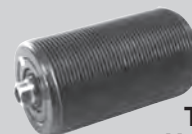
Block Cylinders have a compact design and offer diverse mounting possibilities. Available in three styles, including one with position monitoring.



Built-In Elements

Achieve space-saving installation of cylinders, with more workpieces per fixture, with these compact, flexible Built-In Elements, which allow for more machining space.

pages 70-71



Threaded-Body Universal Cylinder

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.

pages 72-73



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Threaded-Body Cylinders

7500 psi max
Single acting



Threaded Plunger



Solid Plunger

DESCRIPTION: These clamping cylinders may be threaded directly into tapped holes of the fixture.

These compact devices can be used to great advantage in fixtures where space is at a premium.

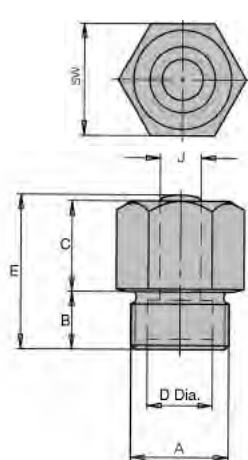
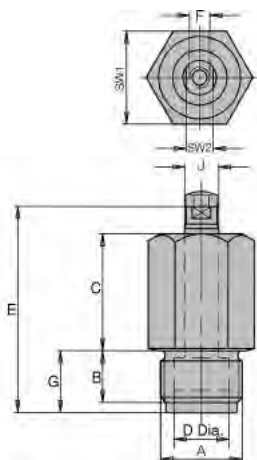
Hydraulic fluid is supplied through passages drilled into the fixture body, thus eliminating hydraulic hoses and threaded fittings.

The built-in spring returns the piston when hydraulic pressure is released.

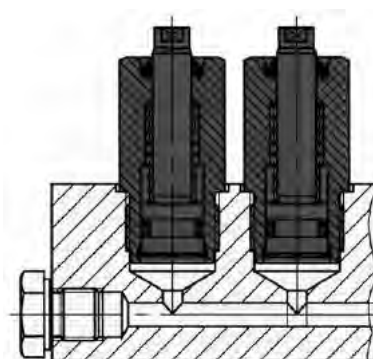
The internal threads at the piston rod end accept contact bolts.

MATERIAL: Piston material: case hardening steel, hardened. Cylinder body: free-cutting steel, black oxide.

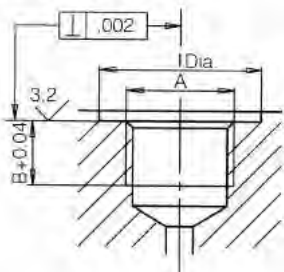
IMPORTANT NOTES: Threaded-body cylinders must not be subjected to a load in retracted position.



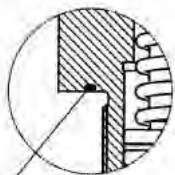
Application Example



Porting details at fixture



Sealing is attained by a knife edge at cylinder collar, requiring the sealing surface to be square to hole axis and flat.



For piston D Dia. = 1.26 the knife edge will be replaced by a Kantseal joint.

Clamping Force (lbs)	7500 psi	600	1300	2300	5700	9300
	5000 psi	400	900	1600	3800	6200
	3000 psi	200	500	900	2300	3700
Spring Return Force min.		5.6	7.2	13	34	41
Max Fluid Req. (cu. in.)		0.02	0.06	0.13	0.3	0.79
Seating Torque (ft-lbs)		59	67	82	96	148
A		M 16 X 1.5	M 20 X 1.5	M 24 X 1.5	M 36 X 1.5	M 42 X 1.5
D dia.		0.31	0.47	0.63	0.98	1.26
I dia.		0.91	1.14	1.3	1.93	2.56
J dia.		0.2	0.31	0.39	0.63	0.79
SW1		0.75	0.95	1.06	1.61	2.17
Weight (max.)		.2	0.4	0.6	1.5	2.0

Solid Plunger

Stroke +/- .02	0.16	0.16	0.24	0.47	0.63
B	0.47	0.47	0.55	0.83	0.98
C	0.55	0.55	0.83	1.3	1.57
E +/- .02	1.06	1.06	1.46	2.2	2.64
Part No.	CLR-1428-001-TB	CLR-1430-101-TB	CLR-1431-001-TB	CLR-1433-001-TB	CLR-1434-001-TB

Threaded Plunger

Stroke +/- .02	—	0.31	0.39	0.39	0.63
B	—	0.47	0.59	0.79	0.98
C	—	0.98	1.34	1.38	1.57
E +/- .02	—	1.81	2.28	2.6	2.95
F x depth	—	M 5 X 10	M 6 X 12	M 10 X 15	M 12 X 15
G	—	0.59	0.71	0.91	0.98
SW2	—	0.28	0.32	0.51	0.67
Part No.	—	CLR-1450-000-TB	CLR-1451-000-TB	CLR-1453-000-TB	CLR-1454-000-TB



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Threaded-Body Push Clamps - Mini

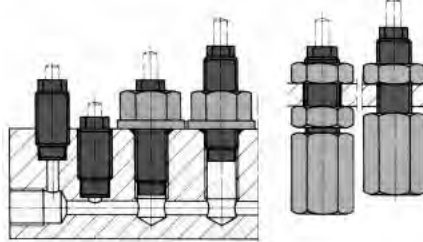
7250/2300 psi max
Single acting



**Tube Mount
(Metric Only)**

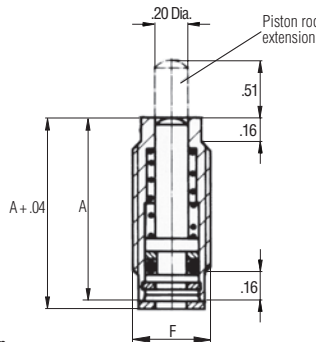
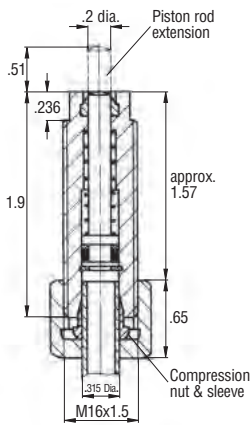
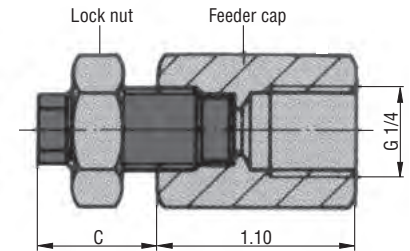
Manifold Mount

- 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.



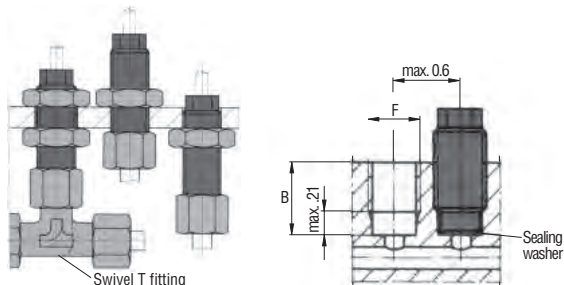
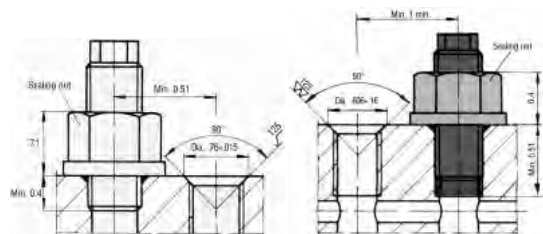
Clamping Force (lbs)	7250 psi	560	
	6000 psi	470	
	5000 psi	390	
	4000 psi	310	
	3000 psi	230	
Mounting Type		Tube Mount	Manifold Mount
Stroke		0.39	0.197 0.39
Piston dia in.		0.315	0.315 0.315
Min psi		75	75 75
Spring return force (lbs)		3.4	3.4 3.4
A		—	1.06 1.57
B min/max		—	.43 / .95 .43 / 1.46
C		—	0.67 1.18
Seating torque (lbs)		8	8 8
Weight (lbs)		0.12	0.04 0.05

Inch

F Thread	—	1/2 - 20	1/2 - 20
Part No.	—	CLR-801-TB	CLR-802-TB
Part No., Lock Nut	—	CLR-408-TBA	
Part No., Sealing Washer	—	CLR-3000-183-SW	
Part No., Sealing Nut	—	CLR-508-TBA	
Part No., Feeder Cap	—	CLR-308-TBA	
Part No., Mounting Block	—	CLR-108-TBA	

Metric

F Thread	—	M12 X 1.5	M12 X 1.5
Part No.	CLR-1459-001-TB	CLR-1458-001-TB	CLR-1458-002-TB
Part No. with ext rod	CLR-1459-011-TB	CLR-1458-011-TB	CLR-1458-012-TB
Part No., High Speed 2300 psi max	CLR-1459-101-TB	CLR-1458-101-TB	CLR-1458-102-TB
Part No., High Speed w/ ext rod 2300 psi max	CLR-1459-111-TB	CLR-1458-111-TB	CLR-1458-112-TB
Part No., Lock Nut	CLR-3300-409-TBA	CLR-3300-408-TBA	
Part No., Sealing Washer	—	CLR-3000-036-SW	
Part No., Sealing Nut	CLR-3300-407-TBA	CLR-3300-406-TBA	
Part No., Swivel T Fitting	CLR-9208-035-F	—	
Part No., Swivel Elbow	CLR-9208-036-F	—	
Part No., Compression Nut	CLR-9208-100-F	—	
Part No., Compression Sleeve	CLR-9208-101-F	—	
Part No., Feeder Cap	—	CLR-3467-064-TBA	



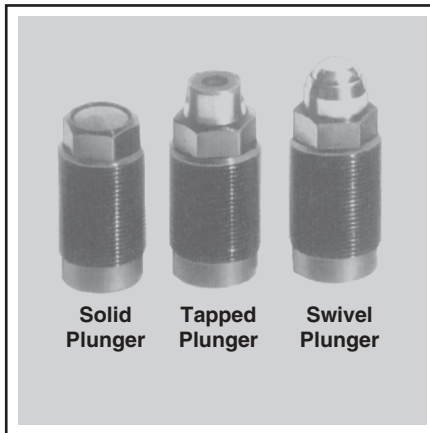
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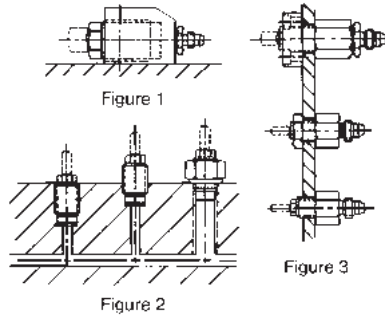
Sales — Phone (636) 386-8022 Fax (636) 386-8034
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Threaded-Body Push Clamps - Standard Wiper

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).

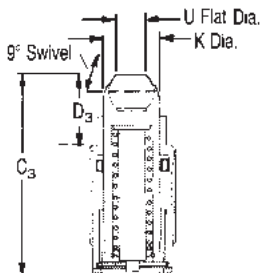
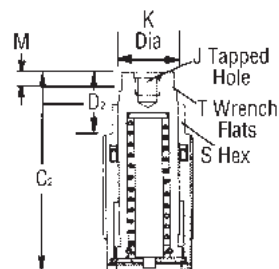
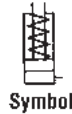
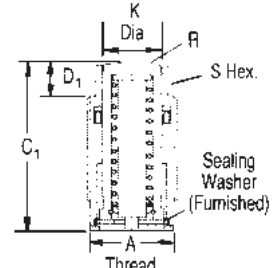
MOUNTING THROUGH FIXTURE WALL: (Figure 3) (Through a tapped or bored hole). Secure clamp using optional locknut or mounting flange (two required for bored holes). Feeder cap required for fluid connection.

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.

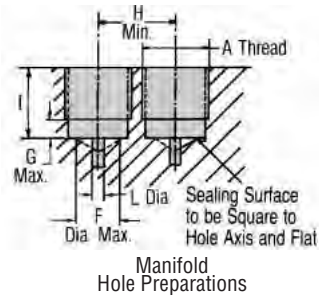
PLUNGERS: Choose solid, tapped, or swivel plunger. Tapped plunger accepts contact bolts. Swivel plunger distributes force to prevent marring. Plunger extensions available by special order.

Mounting Options

See Threaded-Body Push Clamp accessories section



See F&A section
for contact
bolts



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	
C1	1.50	1.81	2.19	2.34	3.44	
C2	1.78	2.06	2.59	2.69	3.88	
C3	1.80	2.09	2.73	2.86	—	
D1	.28	.38	.44	.53	.66	
D2	.56	.66	.81	.88	1.09	
D3	.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 sealing 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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Threaded-Body Push Clamps - Double Wiper

7500 psi max
Single acting



Double Wiper

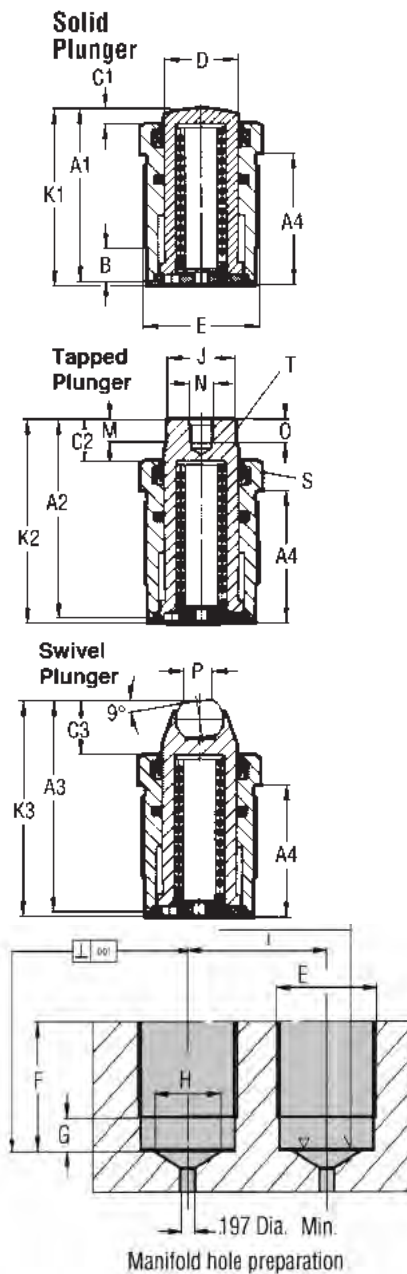
- Special double rod wiper prevents contamination from cutting fluids
- Very little mounting space required
- High force in a small size
- Positive internal stop and long plunger bearing for rugged reliability



CLAMPING ACTION: Fluid pressure advances plunger. Spring return.

CONSTRUCTION: Steel plunger, case hardened and ground. Positive stroke stop prevents over-extending the plunger. Do not load plunger in its retracted position. Carbon steel body, black oxide finish.

PLUNGERS: Choose solid, tapped, or swivel plunger. Tapped plunger distributes force to prevent marring. Plunger extensions available by special order.



Clamping force (lbs)	7500 psi	1300	2300	3600	5700	9300
	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
Piston DIA-D	.472	.630	.787	.984	1.260	
Stroke	.39	.47	.59	.63	.79	
Spring return force, min (lbs)	6.3	11.25	17.6	27.7	45	
Min. oper. pressure (psi)	150	150	150	150	150	
Fluid volume/(cu. in.)	.07	.15	.28	.48	.98	
A1	1.16	1.78	2.16	2.28	3.34	
A2	1.75	2.03	2.53	2.63	3.78	
A3	—	—	2.69	2.78	3.78	
A4	.98	1.30	1.66	1.75	2.81	
B	.28	.31	.31	.44	.47	
C1	.13	.13	.16	.19	.28	
C2	.41	.38	.53	.56	.72	
C3	.41	.44	.69	.72	.78	
F min.	.63	.78	.94	1.09	1.66	
F max.	.97	1.25	1.63	1.72	2.75	
G max.	.31	.38	.38	.44	.50	
H dia max.	.44	.63	.78	1.00	1.25	
I min.	1.19	1.34	1.56	2.03	2.44	
J dia	.44	.59	.75	.91	1.19	
K1	1.50	1.84	2.19	2.34	3.44	
K2	1.75	2.06	2.59	2.69	3.88	
K3	1.81	2.13	2.75	2.88	3.94	
M	.22	.22	.25	.28	.34	
O	.25	.25	.31	.31	.50	
P	.28	.28	.41	.41	.78	
R	.78	1.00	1.25	1.56	1.97	
S A/flats	.94	1.06	1.25	1.63	1.97	
T A/flats	.38	.50	.67	.75	.94	
Seating torque (ft. lbs)	30	37	44	59	167	
Weight (lbs)	.18	.33	.49	.84	2.14	

Inch

E Body Thread	7/8 - 14	1-1/8 - 12	1-1/4 - 16	1-1/2 - 16	1-7/8 - 16
N Plunger Thread	1/4 - 20	1/4 - 20	5/16 - 18	5/16 - 18	1/2 - 13
Part No., solid plunger	CLR-1460-702-TB	CLR-1461-702-TB	CLR-1462-702-TB	CLR-1463-702-TB	CLR-1464-702-TB
Part No., tapped plunger	CLR-1460-703-TB	CLR-1461-703-TB	CLR-1462-703-TB	CLR-1463-703-TB	CLR-1464-703-TB
Part No., swivel plunger	CLR-1460-712-TB	CLR-1461-712-TB	CLR-1462-712-TB	CLR-1463-712-TB	CLR-1464-712-TB
Part No., additional seal	CLR-3000-840-SW	CLR-3000-179-SW	CLR-3000-180-SW	CLR-3000-843-SW	CLR-3000-181-SW

Metric

E Body Thread	M22 X 1.5	M26 X 1.5	M30 X 1.5	M38 X 1.5	M48 X 1.5
N Plunger Thread	M6	M6	M8	M8	M12
Part No., solid plunger	CLR-1460-100-TB	CLR-1461-100-TB	CLR-1462-100-TB	CLR-1463-100-TB	CLR-1464-100-TB
Part No., tapped plunger	CLR-1460-101-TB	CLR-1461-101-TB	CLR-1462-101-TB	CLR-1463-101-TB	CLR-1464-101-TB
Part No., swivel plunger	CLR-1460-110-TB	CLR-1461-110-TB	CLR-1462-110-TB	CLR-1463-110-TB	CLR-1464-110-TB
Part No., additional seal	CLR-3000-840-SW	CLR-3000-841-SW	CLR-3000-842-SW	CLR-3000-843-SW	CLR-3000-527-SW



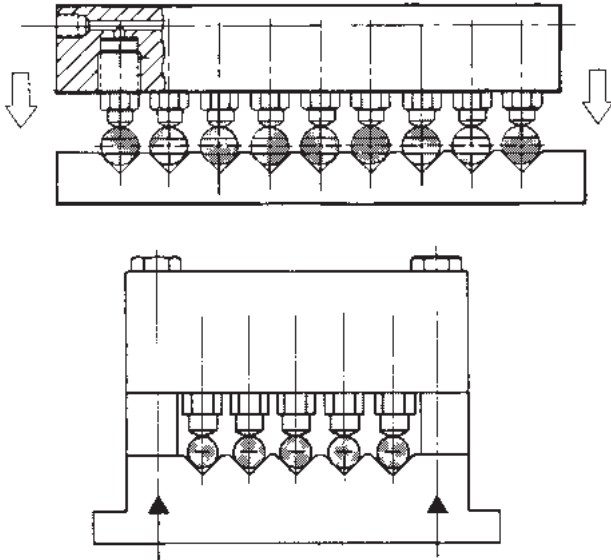
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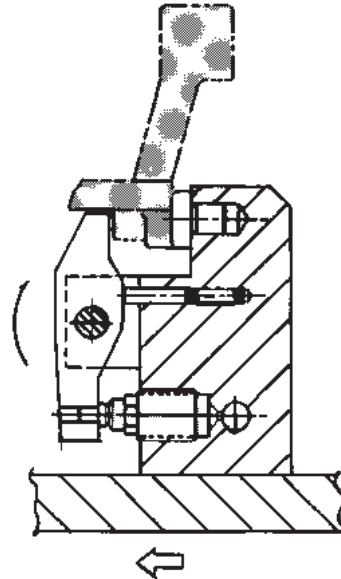
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Threaded-Body Push Clamps

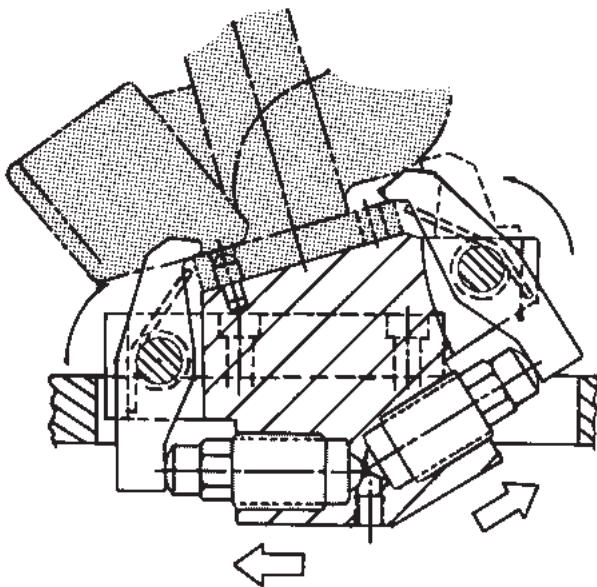
Application Examples



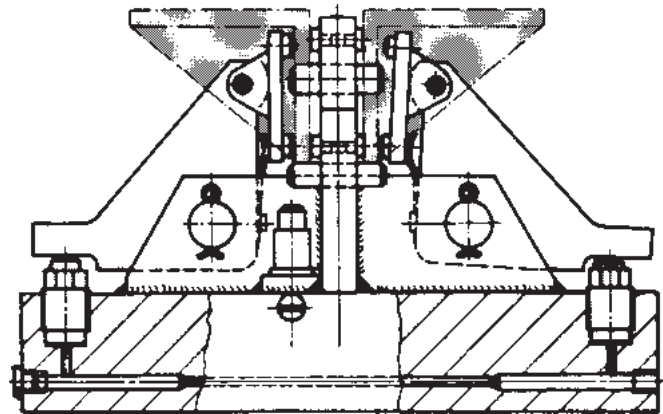
V-block fixtures allow very close workpiece spacing. Bottom example shows bridging bolt parallel to, and in the same plane as, the push clamps. This eliminates bending moments in the fixture.



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.

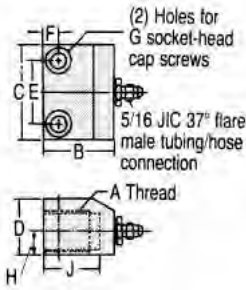


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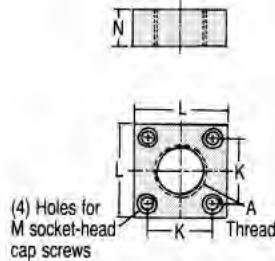
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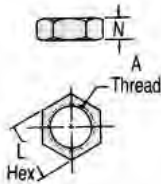
Threaded-Body Push Clamp Accessories



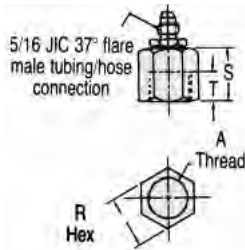
Mounting Blocks — Inch						
A	1/2-20	7/8-14	1-1/8-12	1-1/4-16	1-1/2-16	1-7/8-16
B	1.63	1.75	2.00	2.25	2.38	3.25
C	1.50	2.25	2.75	3.00	3.50	4.00
D	1.00	1.25	1.50	1.75	2.00	2.50
E	1.00	1.50	1.88	2.00	2.38	2.75
F	.31	.38	.44	.50	.56	.63
G Dia.	1/4-20	5/16-18	3/8-16	1/2-13	1/2-13	5/8-11
H	.50	.56	.75	.75	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



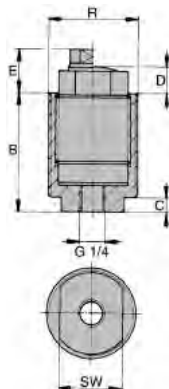
Mounting Flanges — Inch			
A	1-1/4 - 16	1-1/2 - 16	1-7/8 - 16
K	1.56	1.75	2.13
L	2.25	2.5	3.00
M	5/16 - 18	5/16 - 18	3/8 - 16
N	.88	1.00	1.25
Part No.	CLR-202-TBA	CLR-203-TBA	CLR-204-TBA



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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Threaded-Body Push Clamps

7500 psi max
Double acting



Double Acting

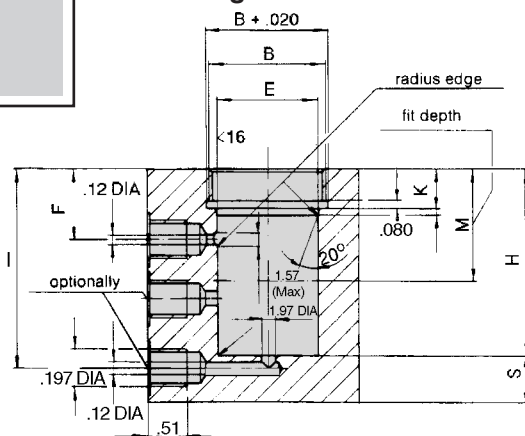
- Manifold mounting provides space saving installation in fixture body.
- Hoses and tubing are eliminated.
- Double acting for positive return.
- ** Do not use NPT fittings

CLAMPING ACTION: Double acting allows fluid pressure to advance and return the plunger, positive action return for special requirements in timing sequence.

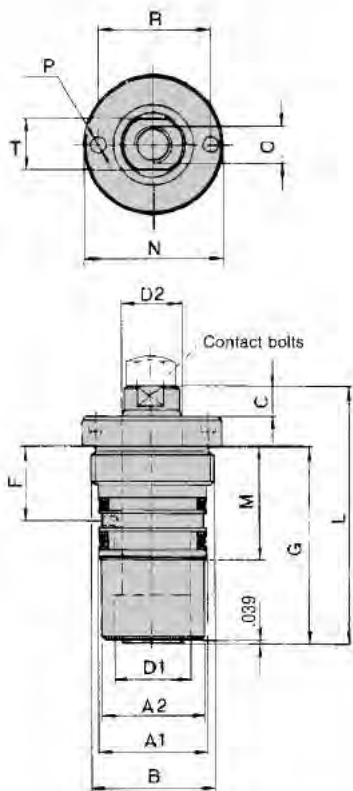
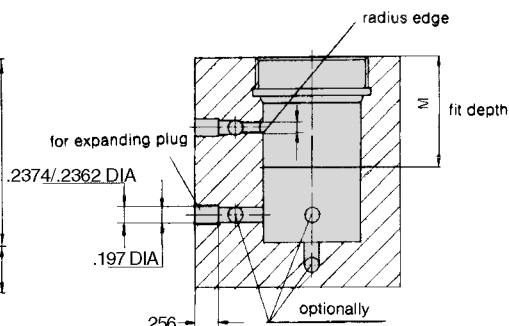
CONSTRUCTION: Steel plunger, case hardened and ground. Housing, free cutting steel, burnished, black oxide finish.

MOUNTING: Space saving manifold mounting allows a hose and tube free supply of oil.

Single connection



Series connection



Clamping force (lbs)	7500 psi	2300	3800	5700	9300
	6000 psi	1900	3000	4600	7500
	5000 psi	1600	2500	3800	6200
	4000 psi	1200	2000	3000	5000
	3000 psi	1000	1500	2300	3700
	Piston dia - D1	.630	.787	.984	1.260
	Rod dia - D2	.394	.472	.630	.787
	Stroke	.63	.79	.98	1.26
	Fluid required, advance/retract (cu. in.)	.20/.12	.38/.25	.74/.44	1.57/.96
	A1 dia	.866	1.1024	1.378	1.732
	A2 dia	.827	1.024	1.299	1.654
	C	.24	.28	.28	.39
	E dia	.8661/.8669	1.1024/1.1032	1.378/1.379	1.732/1.733
	F	.75	.79	.98	1.10
	G	1.88	2.09	2.56	2.83
	H	1.898/1.882	2.095/2.079	2.567/2.551	2.843/2.827
	I	2.09	2.44	2.83	3.43
	K	.335	.413	.531	.610
	L	2.559	2.638	3.228	3.701
	M	1.201	1.240	1.555	1.752
	N dia	1.22	1.46	1.73	2.13
	P	.098	.165	.205	.165
	R	.98	1.18	1.38	1.77
	S (min)	.315	.394	.433	.512
	T	.315	.394	.512	.669

Inch

B Thread	1-1/8-16	1-1/4-16	1-9/16-16	2-0-16
O Thread	1/4-20x3/8	5/16-18x7/16	3/8-16x9/16	1/2-13x5/8
Part No.	CLR-1471-701-TBD	CLR-1472-701-TBD	CLR-1473-701-TBD	CLR-1474-701-TBD

Metric

B Thread	M26x1.5	M32x1.5	M40x1.5	M50x1.5
O Thread	M6x12	M8x12	M10x15	M12x15
Part No.	CLR-1471-001-TBD	CLR-1472-001-TBD	CLR-1473-001-TBD	CLR-1474-001-TBD



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Screw-In Type Cylinders

7250 psi max
Single acting



Single Acting with Wiper

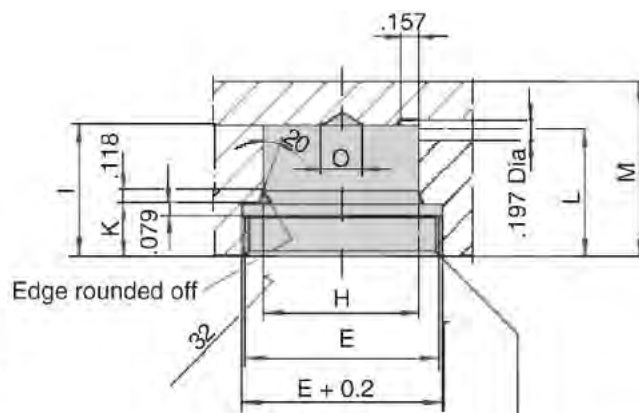
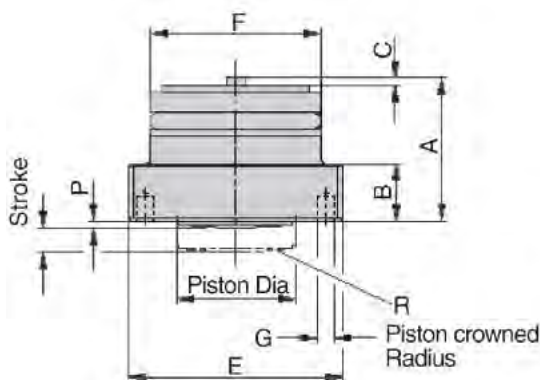
- Short-stroke, flat-profile cylinder with high clamping force
- Low build-in height
- Ideal for making custom clamping bars
- Cylinders mount flush for easy cleaning
- Manifold mounting eliminates tubing lines
- Simple design makes these cylinders suitable for many applications



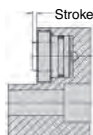
Symbol

CLAMPING ACTION: Applying fluid pressure advances the piston. Spring return.

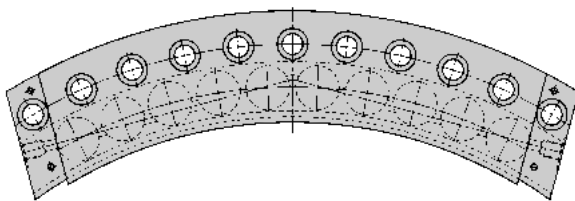
MOUNTING: Cylinders are screwed into location holes in the clamping bar. Fluid is supplied through a drilled passage, eliminating tubing lines. After installation, cylinders should be secured against rotation with a threaded pin or roll pin. Cylinders mount flush for easy cleaning.



After assembly of the cylinder, thread E is secured by means of threaded pin AM 4 x 4 DIN 913



Screw-In Type Cylinders are ideal for custom clamping bars and slideway locking. The large-diameter piston has a 5/32" stroke and exerts high clamping force (5700 lbs at 7250 psi).



Curved clamping bars for rotating tables can be easily constructed using Screw-In Type Cylinders. These cylinders can be mounted very close together.

Clamping force (lbs)	7250 psi	3530	5510	9035
	6000 psi	2900	4600	7500
	5000 psi	2400	3800	6200
	4000 psi	1900	3000	5000
	3000 psi	1500	2300	3700
Piston dia	.787	.984	1.256	
Stroke	.16	.16	.31	
Min. operating pressure (psi)	150	150	150	
Max. oil volume (cu.in.)	.1	.12	.39	
A	1.04	1.20	1.67	
B	.39	.47	.47	
C	.06	.06	.12	
E	M38x1.5	M45x1.5	M56x1.5	
F dia	1.181	1.417	1.732	
G dia	.098	.138	.157	
H dia	1.181/1.182	1.417/1.418	1.732/1.733	
I	1.02	1.18	1.54	
K	.397	.476	.476	
L	1.02	1.14	1.50	
m (min.)	1.42	1.57	1.97	
O	.32	.39	.79	
P	.02	.06	.06	
R	3.15	3.94	5.91	
Weight (lbs)	.3	.6	1.08	
Seating torque (ft-lbs)	74	185	295	
Part No.	CLR-1462-610-TB	CLR-1463-610-TB	CLR-1464-610-TB	



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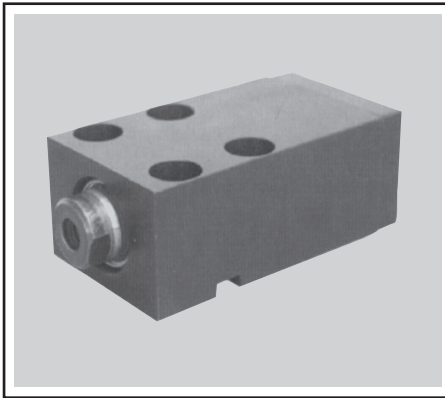
Locking Piston Cylinders ■ B1.711

Locking Piston Cylinders ■ Three body styles ■ Single acting
Operating Pressure Range ■ 1450 psi (100 bar) ■ 7250 psi (500 bar)



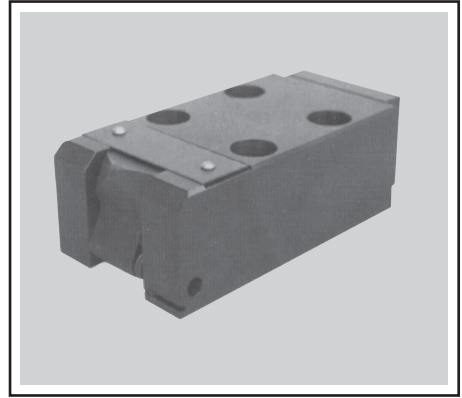
Threaded-Body Cylinder

The family of locking piston cylinders was developed for the application where the opposing force may be higher than the clamping force. The piston of these elements



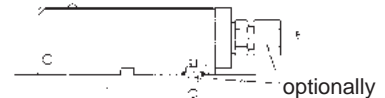
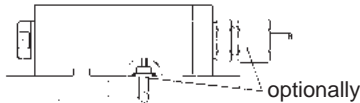
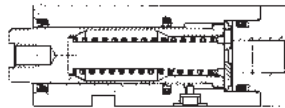
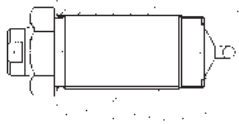
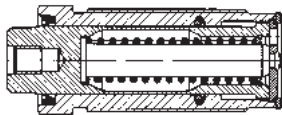
Block Cylinder

is hollow and when filled with hydraulic oil will swell against the body of the clamp. This added friction results in a retention force up to 5 times the amount of clamping force. These



Low-Block Clamping Cylinder

clamps are particularly suitable for floating clamping: when plumbed together they will offer opposing forces on a part and hold it into position despite slight variations in the part.



- “Clamping” and “Supporting” with one element
- Admissible support force up to five times the clamping force
- Clamping with minimum deformation due to relatively little clamping force, but high retention force
- Particularly suitable for “floating clamping”
- 3 variants of bodies
- Plunger design impedes penetration of fluids into the spring area
- Spacings between cylinders can be minimized when cylinders are arranged in a row
- Fixtures without tubes are possible

DESCRIPTION: Hydraulic cylinders with locking piston are single-acting plunger cylinders, similar to the design of the proven standard versions. When pressurizing the element, the piston will be expanded and locked in the cylinder body.

APPLICATIONS: Locking piston cylinders have a relatively light clamping force, but a high retention force in opposite direction. Therefore they are particularly suitable for clamping of thin-walled workpieces with minimum deformation as well as for “floating clamping.”



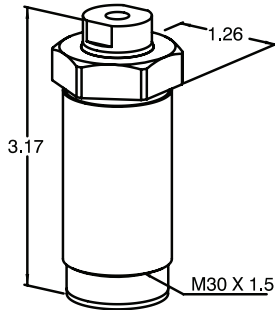
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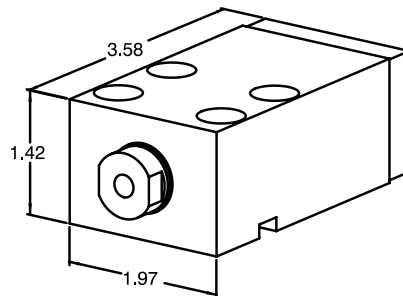
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Locking Piston Cylinders ■ B1.711

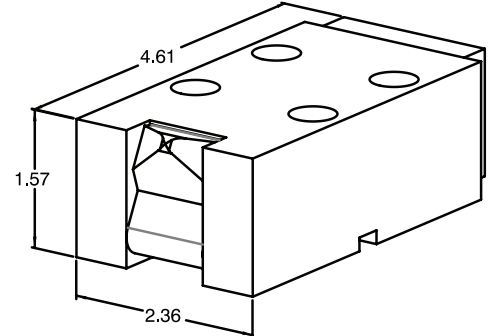
Locking Piston Cylinders ■ Three Body Styles ■ Single Acting
Operating Pressure Range ■ 1450 psi (100 bar) ■ 7250 psi (500 bar)



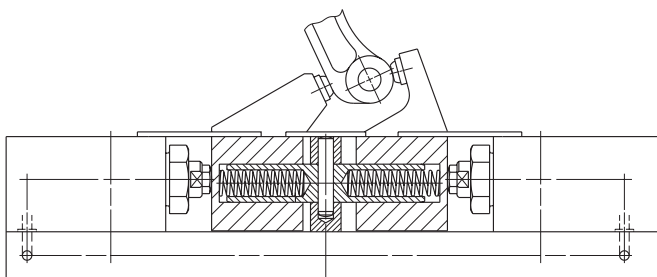
Threaded Body Type



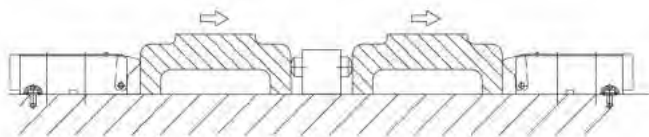
Block Cylinder Type



Edge Clamp Type



Simple collet for "floating clamping"



Clamping and supporting with minimum, deformation

Threaded Body Type

Clamping force at 1450 psi	450 lbs
Support force at 1450 psi	900 lbs
Clamping force at 7250 psi	1124 lbs
Supporting force at 7250 psi	5620 lbs
Stroke	0.39 in
Weight	0.6 lbs
Part No., Clamp	CLR-1462-847-TB
Part No., Additional Seal	CLR-3000-842-SW

Block Cylinder Type

Clamping force at 1450 psi	450 lbs
Support force at 1450 psi	900 lbs
Clamping force at 7250 psi	1124 lbs
Supporting force at 7250 psi	5620 lbs
Stroke	0.39 in
Weight	2.3 lbs
Part No., Clamp	CLR-1512-801-BC

Edge Clamp Type

Clamping force at 1450 psi	225 lbs
Support force at 1450 psi	790 lbs
Clamping force at 7250 psi	900 lbs
Supporting force at 7250 psi	6290 lbs
Stroke	0.39 in
Weight	3.9 lbs
Part No., Clamp	CLR-1372-800-EC



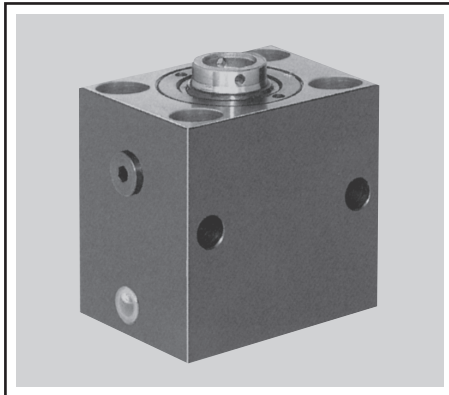
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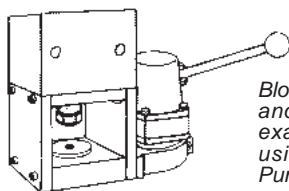
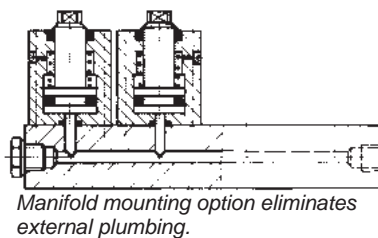
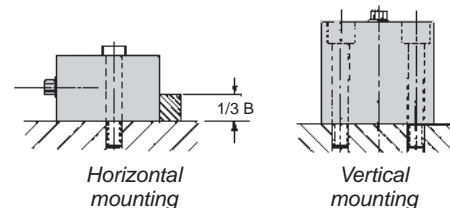
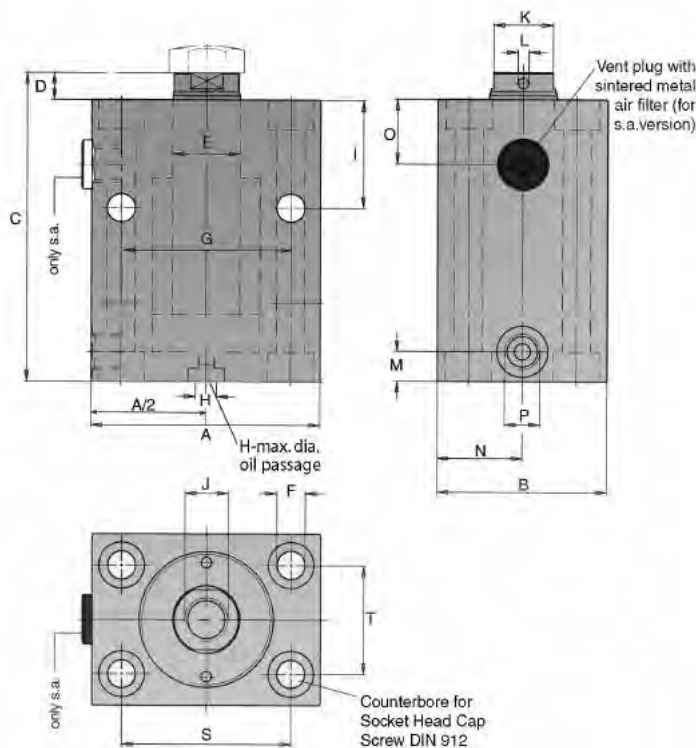
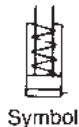
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Block Clamps

7250 psi max
Single and double acting



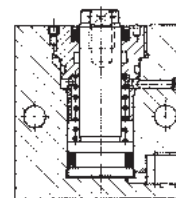
- Easy to mount on flat surfaces
- Excellent for punching and assembly operations (very high forces available)
- Mount either horizontally or vertically
- Available with short or long stroke
- Choice of eight sizes
- Do not use NPT fittings



Block Clamps are ideal for punching and assembly operations. In this example, a small press is made using a Block Clamp and Hand Pump.



For radius pointed, or swivel contact bolts, see F&A section.



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.



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Block Clamps

7250 psi max
Single and double acting

Clamping force (lbs)	7250 psi	2250	5505	9035	14120	22145	35070	56650	88125
	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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Block Clamps with Bearing Eyes

7500 psi max
Double acting only

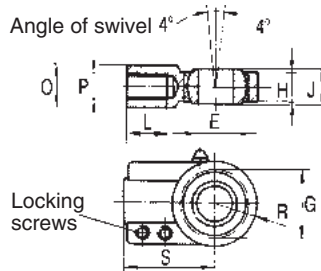


- Ideal for operating levers and linkages
- Swivel bearing mounts at both ends for clevis mounting
- Choice of four sizes
- ** Do not use NPT fittings

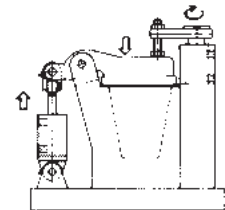
CLAMPING ACTION: Fluid pressure advances plunger. Fluid return (double acting.)

MOUNTING: Clevis mounts with a pin through each spherical bearing eye. Bearing eye must be fully seated against the piston-rod shoulder before tightening the locking screws. Two male 37° fluid connections.

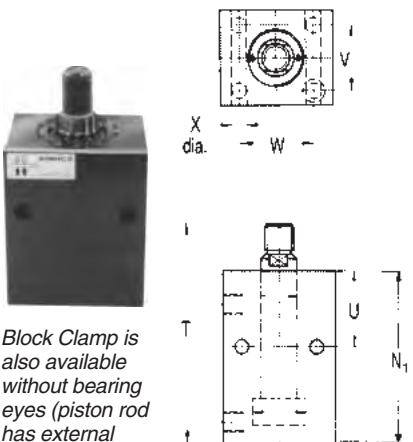
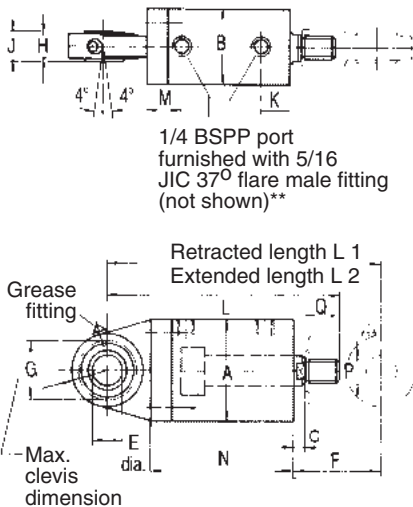
CONSTRUCTION: Steel plunger, case hardened and ground. Body made from carbon steel or nodular iron. Provide adequate lubrication for spherical bearing and pin.



Block Clamps with Bearing Eyes are excellent for operating levers and linkages.



Symbol



Block Clamp is also available without bearing eyes (piston rod has external thread).

Clamping force (lbs)	7500 psi	5700	9300	14600	22900
	6000 psi	4600	7500	11700	18300
	5000 psi	3800	6200	9700	15300
	4000 psi	3000	5000	7800	12200
	3000 psi	2300	3700	5800	9200
Pull force at 6000 psi (lbs)	2700	4560	7130	10800	
Max. push force (lbs)	5700	9350	14600	22900	
Stroke	1.969	1.969	1.969	1.969	
Fluid required to push/pull (cu. in.)	1.5 / .9	2.5 / 1.5	3.8 / 2.3	6.0 / 3.5	
Piston area (sq. in.)	.760	1.247	1.950	3.050	
Max. operating pressure (psi)	7500	7500	7500	7500	
A	2.559	2.953	3.346	3.937	
B	1.772	2.165	2.480	2.953	
C	.315	.433	.433	.433	
E dia	.6299 / .6306	.7874 / .7882	.9842 / .9850	1.2598 / 1.2608	
F	2.047	2.480	2.992	3.583	
G dia	1.260	1.575	1.969	2.441	
H	.512	.669	.827	1.063	
J	.630	.787	.984	1.260	
K	.709	.866	.945	1.063	
L	6.181	6.890	7.795	8.937	
L ₁	7.205	8.071	9.252	10.669	
L ₂	9.173	10.039	11.220	12.638	
M	.906	.906	1.142	1.299	
N	4.173	4.409	4.803	5.315	
N ₁	3.700	3.937	4.094	4.527	
O	.827	.984	1.181	1.496	
P	M14x1.5	M16x1.5	M20x1.5	M27x2	
Q	.709	.866	1.102	1.417	
R	.787	.925	1.142	1.378	
S	1.732	2.047	2.559	3.150	
T	4.724	5.236	5.630	6.378	
U	1.299	1.496	1.575	1.732	
V	1.181	1.378	1.575	1.772	
W	1.969	2.165	2.480	2.992	
X dia	.335	.413	.413	.512	
Weight (lbs)	4.4	6.2	8.2	11.9	
Part No., cylinder with bearing	CLR-1553-160-BCD	CLR-1554-160-BCD	CLR-1555-160-BCD	CLR-1556-160-BCD	
Part No., shaft bearing	CLR-3890-012-BCA	CLR-3890-017-BCA	CLR-3890-014-BCA	CLR-3890-018-BCA	
Part No., cylinder without bearing	CLR-1543-265-BCD	CLR-1544-265-BCD	CLR-1545-265-BCD	CLR-1546-265-BCD	



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Block Cylinders

7500 psi max
Double acting

Carr Lane Roemheld offers various Block Cylinders for different applications.



RM Mini Slide

The RM mini slides can be delivered with optional position monitoring.

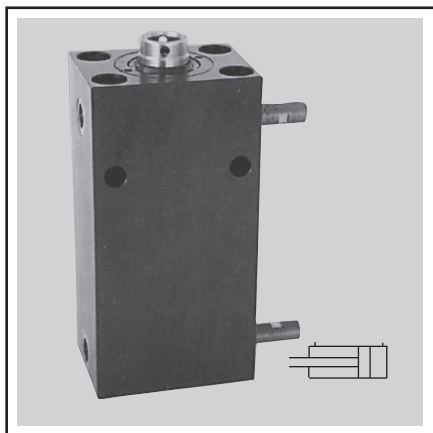
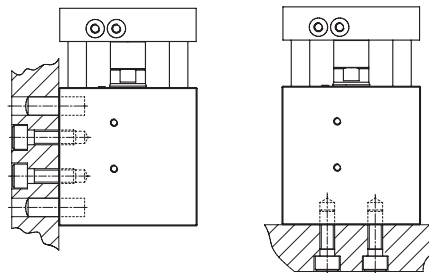
- 4 sizes each with 3 stroke lengths
- Compact block design
- 2 mounting possibilities
- 2 connecting possibilities
- Guide rods made of nitriding steel
- Safety distance against squeezing of fingers
- Optional position monitoring with limit switches or inductive sensors
- Standard VITON® seals
- Temperature range -20...+150 °C
- Maintenance free

DESCRIPTION: The RM mini slide is a compact block cylinder with 4 integrated guide rods which are also in the position to compensate side loads and movements.

Threads can be provided in the front block for mounting of the working loads or tools.

APPLICATION: This flexible product is useful for tool manufacture, mold making, metal forming, pressing, punching, deburring, perforating, power workholding, and assembly technology.

Mounting Possibilities



With Stroke End Control

- Compact design
 - Same dimensions as the block cylinders on page 65, except for total length
 - Diverse mounting possibilities
 - 3 standard stroke lengths
 - Sensors can be mounted at the right or left-hand side
 - Switching point of the sensors adjustable up to 5 mm before the final position
- ** 7500 psi max**

APPLICATION: Double-acting block cylinders with stroke end control are particularly suitable for automated installations, time and cycle-dependent clamping and unclamping.

DESCRIPTION: The stroke end control supplies the required information about the position of the piston. Control is made by pressure-proof sensors, which are fixed at the corresponding stroke end of the cylinder piston in the body.

IMPORTANT NOTES: The high-pressure resistant sensors are delivered separately for mounting at place of installation in order to avoid transport damage.

Maximum environment temperatures of the sensors +13...+260°F.

Application example

Application for pressing in of piston rods into the pistons.

To monitor the press-in depth of the piston rods, the stroke ends of the block cylinder is controlled.



Consult engineering for additional information.



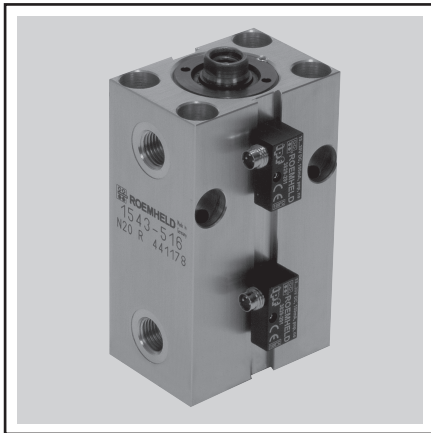
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Block Cylinders with Position Monitoring

5075 psi max
Double acting



- **Compact design**
- **Easy adjustment of switching point positions**
- **Same dimensions as the block cylinders as per data sheet B1.509, except for total length**
- **Diverse mounting possibilities**
- **Standard versions with 100 mm stroke**
- **Stainless version**

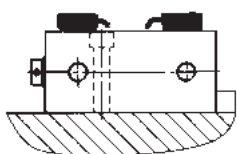
DESCRIPTION: Double-acting block cylinder with magnetic piston for position monitoring. The position monitoring supplies the required information about the position of the piston. Monitoring is made by electronic sensors which detect the magnetic field of the magnetic piston. The switching points can be

continuously adjusted by displacement of the switches in the slots.

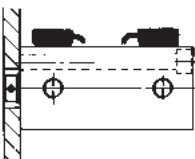
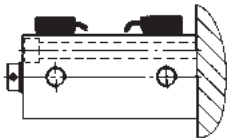
APPLICATION: Double-acting block cylinders with position monitoring are particularly suitable for automated installations and time and cycle-dependent clamping and unclamping.

IMPORTANT NOTES: Ferritic material can change the switching points due to influences on the magnetic field. Therefore a minimum distance of 1.18 in. between the magnetic sensors and the adjacent steel parts is required. Covers have to be provided to protect the cylinders against ferritic swarf. If the cylinder is installed by two screws through the horizontal bore holes, it is necessary to install an additional support at the back, if pressures of more than 2,300 psi are used. Piston material: stainless special steel, hardened. Cylinder body material: hardcoating aluminum with PTFE-coating.

Fixing possibilities



Cylinders must be backed-up for operating pressures exceeding 160 bar.



Accessory: magnetic sensors

Compared with traditional reed switches the electronic magnetic sensors offer the following advantages:

- Indifference to shock and vibration
- Bounce-free output signal
- Only one switching point
- Wear resisting
- Protection against reverse battery
- Protection against short-circuits

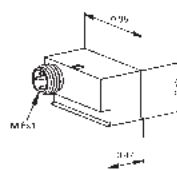
Electric connection is made as per traditional inductive proximity switches; up to four magnetic sensors can be connected in series.

Minimum distance of the switching points

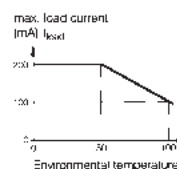
- when using one slot; 0.24 in.
- when using two slots on opposite faces; 0.12 in.

Housing material is aluminum.

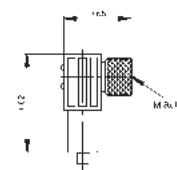
Electronic magnetic sensor



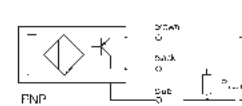
Temperature curve



Connecting cable with right angle plug



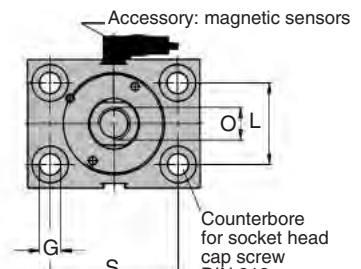
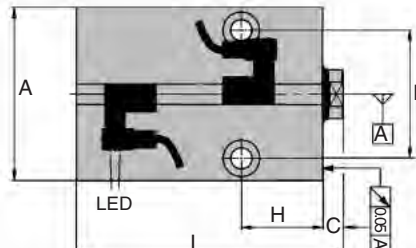
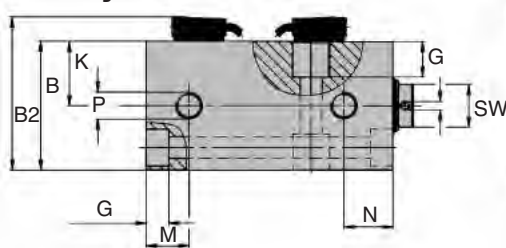
Connecting scheme



Technical data	Electronic magnetic sensor	Connecting cable with right angle plug
Voltage	10-30 V DC	10-30 V DC
Residual ripple	max. 10%	
Current consumption	<15 mA	
Voltage drop (max. load)	< 2 V	
Switching frequency	1 kHz	
Reproducibility	± 0.004	
Switching hysteresis	typ. 0.059	
Protection as per DIN 40050	IP 67	IP 67
Environmental temperature	-25°C up to +100°C	-25°C up to +90°C
Plug connection	M8-plug	M8-plug
LED	no	Voltage (green)
Cable length of cable		Function display (yellow) PUR, 5 m
Part No., PNP	CLR-3829-234-PM	CLR-3829-099-PM
Part No., NPN	CLR-3829-240-PM	CLR-3829-124-PM

*The electronic sensor is also available with npn interlock, on request.

Block Cylinder Versions with BSPP Ports



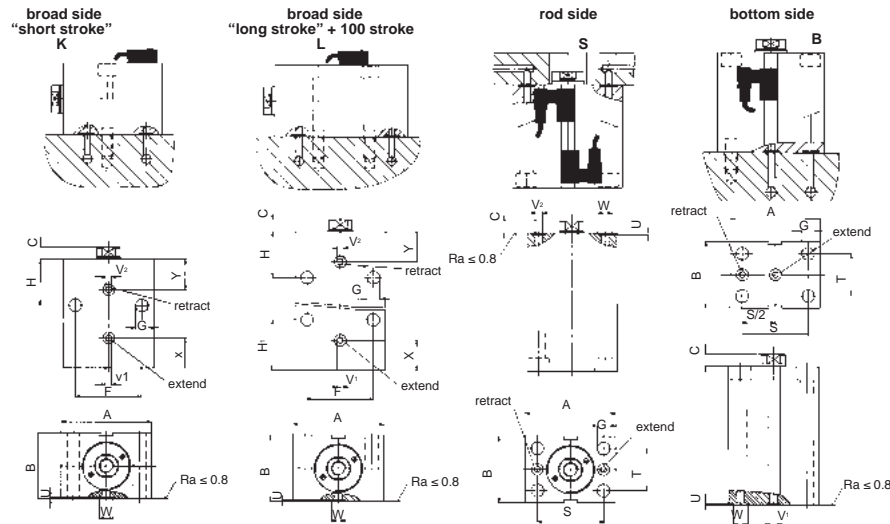
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Block Cylinder for Manifold Mounting, O-Ring Sealing

Oil supply and O-ring sealing at:



Common Dimensions

Clamping force (lbs)	5075 psi	3845	6320	9890	15445	24550
4000 psi		3000	5000	7800	12200	19300
3000 psi		2300	3700	5800	9100	14500
2000 psi		1500	2500	3900	6100	9700
Piston-Ø D (in.)		0.984	1.260	1.575	1.969	2.480
Rod-Ø D (in.)		0.630	0.787	0.984	1.260	1.575
Oil volume per 4 in. stroke for Stroke to extend (cu.in.)		0.300	0.491	0.766	1.197	1.901
Stroke to retract (cu.in.)		0.177	0.299	0.470	0.708	1.135
A (in.)		2.559	2.953	3.346	3.997	4.921
B (in.)		1.772	2.165	2.480	2.953	3.740
B+ (in.)		2.244	2.638	2.953	3.425	4.213
C (in.)		0.276	0.394	0.394	0.394	0.551
F (in.)		1.969	2.165	2.480	2.992	3.740
G (in.)		0.335	0.413	0.413	0.512	0.669
G+ at both sides (in.)		0.472	0.630	0.669	0.866	—
G+ at both sides (in.)		0.354	0.433	0.433	0.512	0.669
H (in.)		1.299	1.496	1.575	1.732	1.969
K (in.)		0.886	1.083	1.240	1.476	1.870
M (in.)		0.709	0.787	0.827	0.827	1.024
N (in.)		0.709	0.866	0.945	1.063	1.024
O x depth of thread		M10x15	M12x15	M16x25	M20x30	M27x40
P (in.)		1/4 BSPP	1/4 BSPP	1/4 BSPP	1/4 BSPP	1/2 BSPP
R (in.)		—	—	—	0.157	0.157
S (in.)		1.969	2.165	2.480	2.992	3.740
T (in.)		1.181	1.378	1.575	1.772	2.559
SW (in.)		0.512	0.669	—	—	—

Short Stroke

Stroke ± 0.039 (in.)	0.787	0.984	0.984	0.984	1.181
Total length l ± 0.039 (in.)	3.346	3.937	4.173	4.606	5.315
Weight (lbs)	1.39	2.24	3.08	4.49	8.8
Part No. (without magnetic sensors)	CLR-1543-513-BCD	CLR-1544-513-BCD	CLR-1545-513-BCD	CLR-1546-513-BCD	CLR-1547-513-BCD

Long Stroke

Stroke ± 0.039 (in.)	1.969	1.969	1.969	1.969	2.480
Total length l ± 0.039 (in.)	4.528	4.921	5.157	5.591	6.614
Weight (lbs)	1.87	2.82	4.18	6.38	11.11
Part No. (without magnetic sensors)	CLR-1543-516-BCD	CLR-1544-516-BCD	CLR-1545-516-BCD	CLR-1546-516-BCD	CLR-1547-516-BCD

100 mm Stroke

Stroke ± 0.039 (in.)	3.937	3.937	3.937	3.937	3.937
Total length l ± 0.039 (in.)	6.496	6.890	7.126	7.559	8.071
Weight (lbs)	2.64	3.98	6.60	10.12	13.68
Part No. (without magnetic sensors)	CLR-1543-519-BCD	CLR-1544-519-BCD	CLR-1545-519-BCD	CLR-1546-519-BCD	CLR-1547-519-BCD

Manifold Mounting Only

H+ (in.)	1.575	1.654	1.732	1.850	2.362
u ± 0.002 (in.)	0.043	0.043	0.059	0.059	0.051
V+ (in.)	0.157	0.197	0.236	0.236	0.315
V+ (in.)	0.157	0.177	0.177	0.236	0.236
W + 0.008 (in.)	0.386	0.425	0.543	0.543	0.622
X (in.)	0.846	0.984	1.063	1.181	1.378
Y (in.)	0.827	0.984	1.063	1.161	1.260
Dimensions O-ring (in.)	0.276x0.059	0.315x0.059	0.394x0.079	0.394x0.079	0.489x0.070
Block cylinder	CLR-1543-51X(K,L,S or B)-BCD	CLR-1544-51X(K,L,S or B)-BCD	CLR-1545-51X(K,L,S or B)-BCD	CLR-1546-51X(K,L,S or B)-BCD	CLR-1547-51X(K,L,S or B)-BCD



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Piston and Threaded Bushing, Complete with Seals

APPLICATION: Built-in elements are directly integrated in the fixture body. Such created cylinders can be used as push or pull cylinders.

Built-in elements are used on fixtures with narrow spaces, and for applications where mounted standards clamping elements limit the machining space or impede swarf flow.

DESCRIPTION: The built-in elements consist of piston and threaded bushing. The piston is inserted into the location hole of the fixture. Then the built-in bushing is screwed into the fixture body. The bushing is let-in flush to the housing. Tightening of the threaded bushing is made with a pin-type face spanner.

Sealing with minimum leakage at the piston rod is obtained by two independent sealing steps. In addition, a wiper protects against contamination. Sealing in the fit hole is made by an O-ring/back-up ring combination.

Special versions are available on request. Please contact us.

- Space-saving installation of cylinders
- More compact fixtures
- More workpieces per fixture
- More machining space
- Less sensitive to chips
- Sealing with very little leakage
- Individual adaptation possibilities

IMPORTANT NOTES: After tightening the threaded bushing it has to be secured against torsion, e.g., by means of a small threaded pin.

The tolerances for dimensions and surface roughness must not be exceeded.

Contact bolts see F&A section.

MATERIAL: Piston: casehardening steel, hardened. Built-in bushing: free-cutting steel.

SEALS: Max. cylinder temperature

Perbunan -15....+212°F

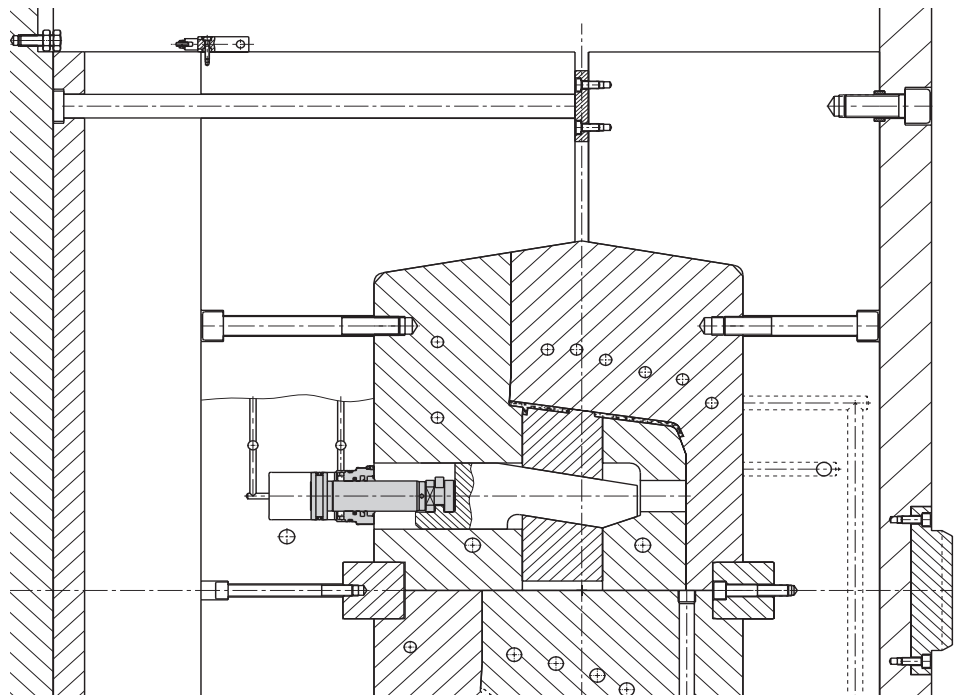
VITON® -5....+300°F

Alternatively, Perbunan or VITON® sealings can be delivered. VITON® seals are required for cylinder temperatures over 100°C and (or) fire-resistant liquids of type HSD.

Technical data and installation dimensions on request.

APPLICATION EXAMPLE: The following example shows an injection mold with one built-in element. The built-in cylinder and wedge operate the profile slide to eject the break-outs and to clear the angle ribs.

ADVANTAGE: Using built-in elements in the interior of the mold, direct control of motion cycles is possible without additional force deflection. Piping is not necessary, thus there will be very little chance of leakage.



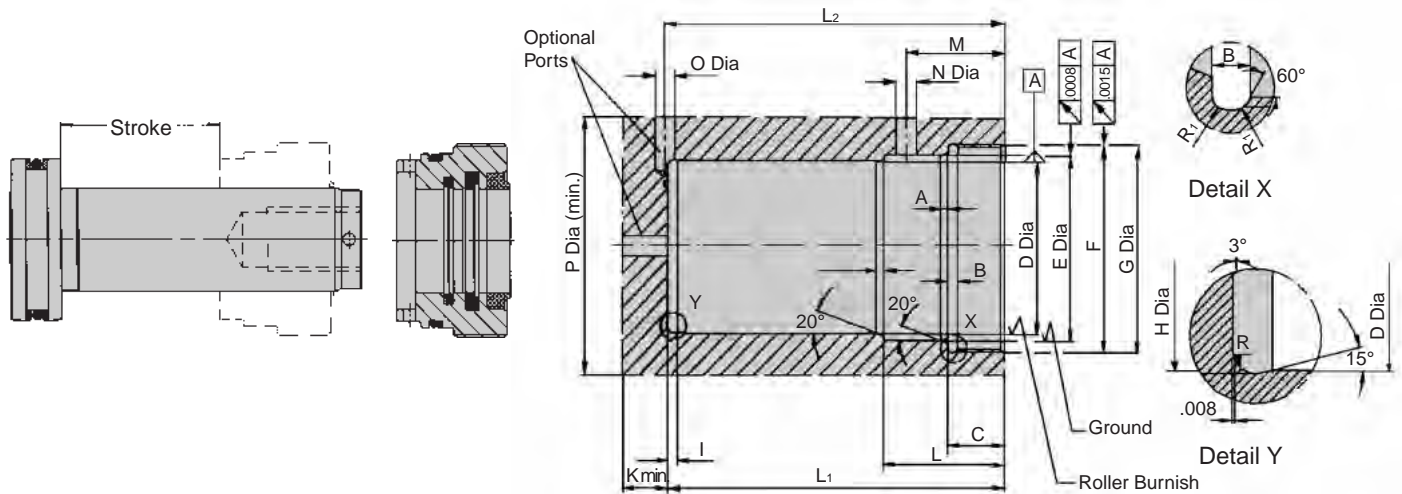
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Built-In Elements

7500 psi max
Double acting



General Dimension Specifications (in inches)

Piston and Rod Dia	Stroke	Part No., Piston, Complete		Part No., Threaded Bushing, Complete	
		Buna N	VITON®	Buna N	VITON®
.63/.39	.63	CLR-0350-110-BCA	CLR-0350-112-BCA	CLR-0154-110-BCA	CLR-0154-111-BCA
	1.97	CLR-0350-111-BCA	CLR-0350-113-BCA		
.98/.63	.79	CLR-0350-114-BCA	CLR-0350-117-BCA		
	1.97	CLR-0350-115-BCA	CLR-0350-118-BCA	CLR-0154-310-BCA	CLR-0154-311-BCA
	3.94	CLR-0350-116-BCA	CLR-0350-119-BCA		
1.26/.79	.98	CLR-0350-120-BCA	CLR-0350-123-BCA		
	1.97	CLR-0350-121-BCA	CLR-0350-005-BCA	CLR-0154-410-BCA	CLR-0154-411-BCA
	3.94	CLR-0350-122-BCA	CLR-0350-006-BCA		
1.57/.98	.98	CLR-0350-124-BCA	CLR-0350-127-BCA		
	1.97	CLR-0350-125-BCA	CLR-0350-128-BCA	CLR-0154-510-BCA	CLR-0154-511-BCA
	3.94	CLR-0350-126-BCA	CLR-0350-129-BCA		
1.97/1.26	.98	CLR-0350-130-BCA	CLR-0350-133-BCA		
	1.97	CLR-0350-131-BCA	CLR-0350-134-BCA	CLR-0154-610-BCA	CLR-0154-611-BCA
	3.94	CLR-0350-132-BCA	CLR-0350-135-BCA		
2.48/1.57	1.18	CLR-0350-136-BCA	CLR-0350-139-BCA		
	2.48	CLR-0350-137-BCA	CLR-0350-140-BCA	CLR-0154-710-BCA	CLR-0154-711-BCA
	3.94	CLR-0350-138-BCA	CLR-0350-141-BCA		
3.15/1.97	1.26	CLR-0350-142-BCA	CLR-0350-145-BCA		
	3.14	CLR-0350-143-BCA	CLR-0350-146-BCA	CLR-0154-810-BCA	CLR-0154-811-BCA
	3.94	CLR-0350-144-BCA	CLR-0350-147-BCA		
3.94/2.48	1.57	CLR-0350-148-BCA	CLR-0350-150-BCA	CLR-0154-910-BCA	CLR-0154-911-BCA
	3.94	CLR-0350-149-BCA	CLR-0350-151-BCA		

Piston Dia	.63	.98	1.26	1.57	1.97	2.48	3.15	3.94
Stroke	.63/1.97	.79/1.97/3.94	.98/1.97/3.94	.98/1.97/3.94	.98/1.97/3.94	1.18/2.48/3.94	1.26/3.14/3.94	1.57/3.94
L1	1.97/3.31	2.20/3.39/5.35	2.52/3.50/5.47	2.68/3.66/5.63	2.99/3.98/5.94	3.35/4.65/6.10	3.74/5.63/6.42	4.09/6.46
L2	1.93/3.27	2.22/3.41/5.37	2.56/3.54/5.51	2.72/3.70/5.67	3.03/4.02/5.98	3.43/4.72/6.18	3.82/5.71/6.50	4.17/6.54
A	.079	.079	.079	.079	.079	.098	.118	.118
B	.118	.118	.118	.118	.118	.118	.157	.157
C	.39	.41	.51	.59	.67	.71	.91	.94
D Dia	.6299/.6309	.9843/.9853	1.2598/1.2608	1.5748/1.5758	1.9685/1.9695	2.4803/2.4813	3.1496/3.1506	3.9370/3.9380
E Dia	.866	1.181	1.378	1.732	2.126	2.677	3.386	4.134
F	M26x1.5	M36x1.5	M40x1.5	M50x1.5	M60x1.5	M75x1.5	M95x2	M115x2
G Dia	1.043	1.437	1.594	1.988	2.382	2.972	3.756	4.547
H Dia	.650	1.004	1.280	1.594	1.988	2.512	3.181	3.969
I	.118	.118	.118	.118	.118	.157	.157	.157
J	.059	.079	.079	.079	.079	.118	.118	.118
K	.24	.31	.43	.43	.55	.67	.87	1.02
L	.89	.91	1.10	1.18	1.42	1.42	1.73	1.77
M	.81	.83	.98	1.06	1.16	1.20	1.54	1.57
N Dia	.14	.16	.18	.18	.24	.28	.31	.31
O Dia	.14	.16	.20	.24	.24	.39	.39	.39
P Dia	1.38	1.77	2.17	2.48	2.95	3.74	4.72	5.91
R	.079	.079	.079	.079	.079	.098	.098	.098



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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

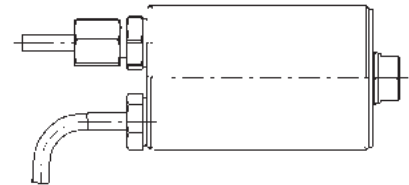
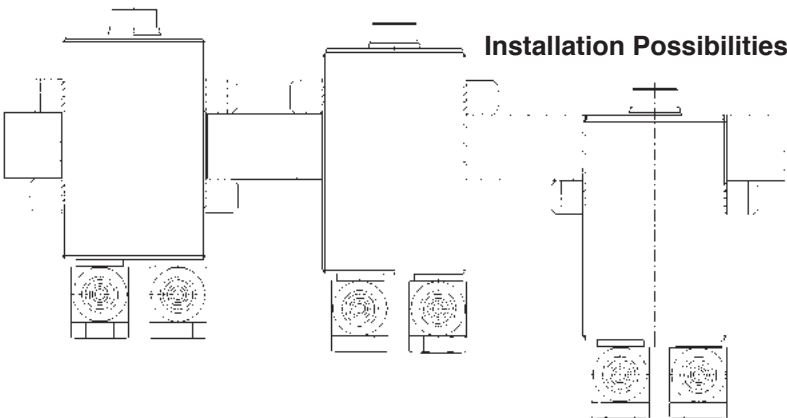
DESCRIPTION: The threaded-body universal cylinders are delivered with the same piston diameters and strokes as the well-proven block cylinders. Hydraulic connection is exclusively effected at the cylinder bottom by hydraulic tubes or hoses.

Sealing of the case-hardened piston rod is made by a tandem sealing with minimum leakage and a wiper.

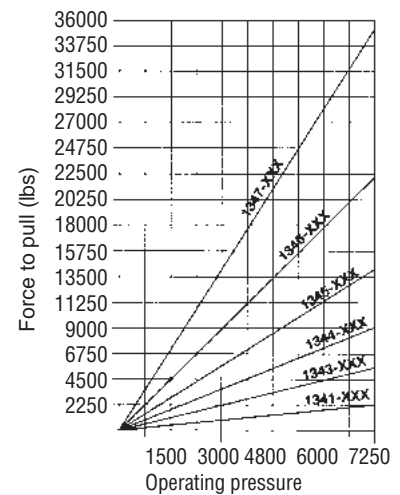
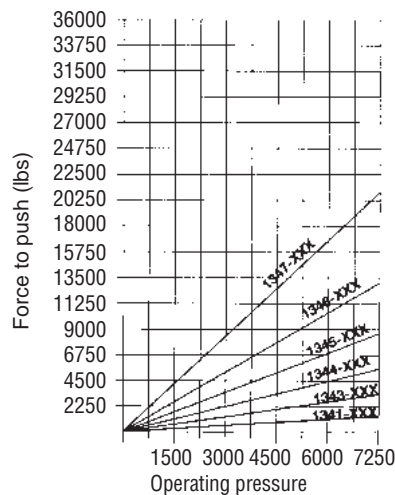
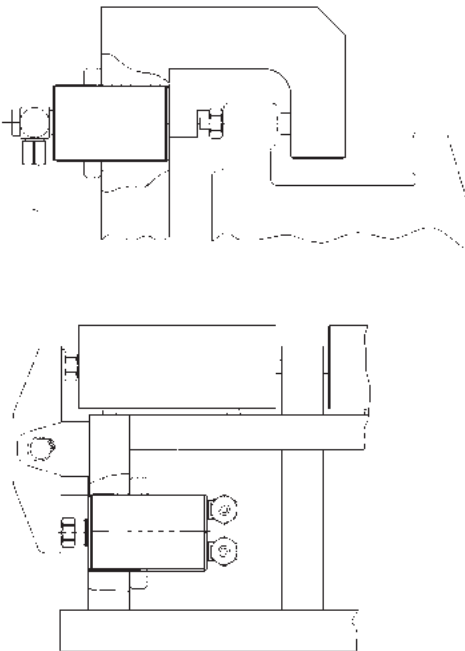
APPLICATION: The threaded-body universal cylinders can be used as clamping cylinders for workpiece clamping as well as for general motion tasks.

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.



Application examples



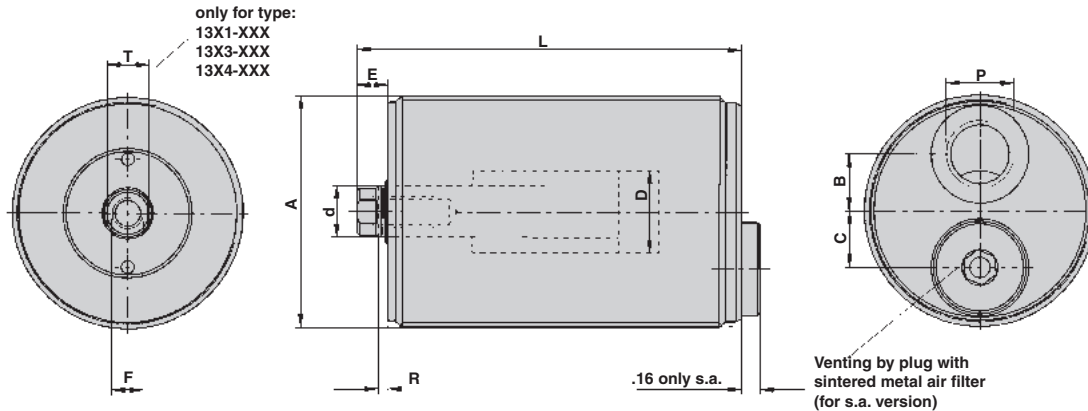
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Threaded-Body Universal Cylinder

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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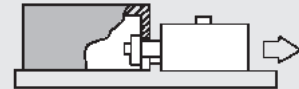
Pull Clamps



Page 75

Block Pull Clamps

Easy to mount on flat surfaces. Mounts either horizontally or vertically. Plunger is tapped, not a through hole.



Pages 76-77

Bore Clamps

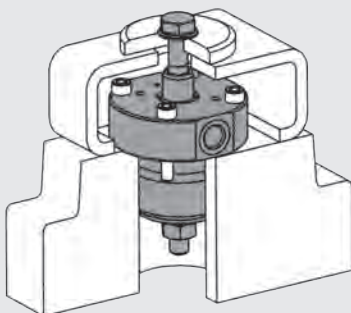
Grip and hold parts within bored holes in the part design, leaving the other surfaces of the part open for free machining on 5 sides. Available in block type, top flange type and cartridge type.



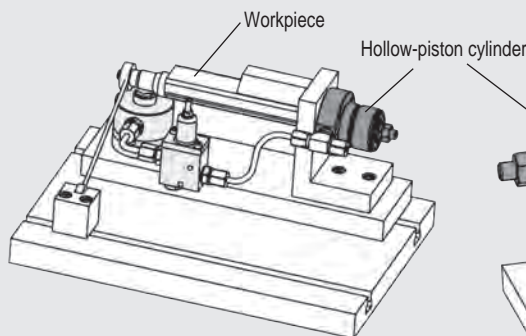
Page 78-79

Hollow-Plunger Clamps

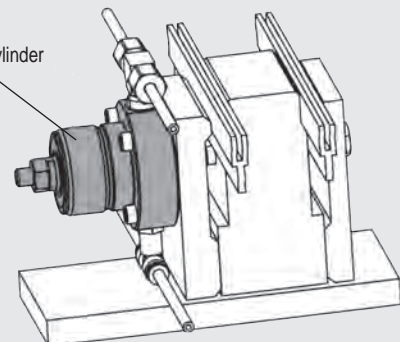
Insert stud through center hole. Quickly converts clamps straps from manual to power operation. Ideal for pulling or pushing a draw bar, and many other applications.



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.



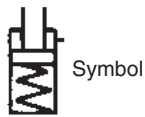
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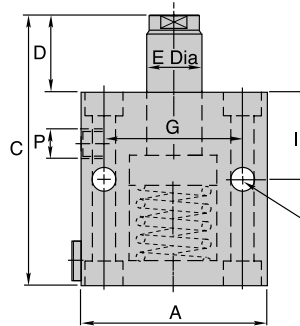
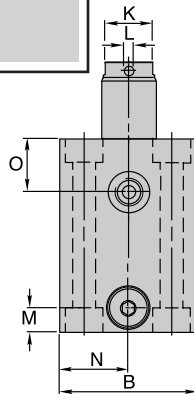
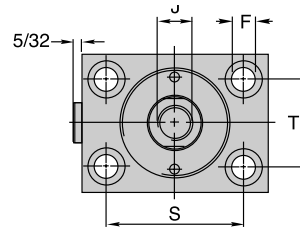
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Block Pull Clamps

7250 psi max
Single acting



- Easy to mount on flat surfaces
- New design with additional mounting holes
- Mount either horizontally or vertically
- Very high forces available
- Choice of eight sizes

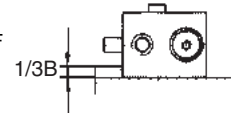


CLAMPING ACTION: Applying fluid pressure retracts the plunger. Spring return to extended position.

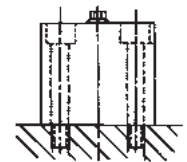
MOUNTING: Fasten with long cap screws through the block and threaded into fixture. If clamping thrust is not backed up by the fixture, a support should be provided to prevent slight screw shifting in the mounting holes. . . see example below. Support may be a rectangular strip or dowel pins (height should be at least 1/3 of B dimension).

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.

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.



Horizontal mounting



Vertical mounting

Clamping force (lbs)	7250 psi	1350	3215	5440	8520	12880	20750	34125	52830
6000 psi	1100	2600	4500	5100	10600	17100	28100	43500	
5000 psi	900	2200	3700	4300	8800	14200	23400	36200	
4000 psi	700	1700	3000	3400	7000	11400	18700	28900	
3000 psi	500	1300	2200	2500	5200	8500	14000	21600	
Stroke	.31	.31	.38	.38	.47	.47	.47	.47	.47
Fluid required (cu.in.)	.06	.14	.30	.47	.85	1.36	2.24	3.47	
Spring return force (lbs)	9	31	44	61	99	97	170	270	
Piston area (sq.in.)	.187	.443	.750	1.175	1.783	2.867	4.700	7.283	
Force per 1000 psi (lbs)	187	443	750	1175	1783	2867	4700	7283	
Max operating 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	3.06	3.56	4.31	4.75	4.94	5.75	6.44	7.31	
D	.88	1.06	1.38	1.38	1.38	1.75	1.81	2.19	
E dia	.39	.63	.79	.98	1.26	1.57	1.97	2.48	
G	1.181	1.969	2.165	2.480	2.992	3.740	4.724	6.220	
I	1.19	1.31	1.50	1.56	1.75	1.97	2.38	2.50	
K	.31	.50	.63	—	—	—	—	—	
L dia	—	—	—	.16	.16	.16	.19	.19	
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	.63	.69	.88	.94	1.06	1.19	1.56	1.56	
P	1/4 BSPP	1/4 BSPP	1/4 BSPP	1/4 BSPP	1/4 BSPP	1/2 BSPP	1/2 BSPP	1/2 BSPP	
S	1.575	1.969	2.165	2.48	2.992	3.74	4.724	6.22	
T	.866	1.181	1.378	1.575	1.772	2.559	3.150	4.252	
Weight	1.8	2.6	4.0	5.7	8.4	14.7	28.2	52.8	

Inch

F dia screw	1/4	5/16	3/8	3/8	1/2	—	—	—
J Thread	1/4-20x15/32	3/8-16x19/32	1/2-13x19/32	5/8-11x31/32	3/4-10x1-3/16	—	—	—
Part No. (US)	CLR-1571-705-BC	CLR-1573-705-BC	CLR-1574-705-BC	CLR-1575-705-BC	CLR-1576-705-BC	—	—	—

Metric

F dia screw	M6	M8	M10	M10	M12	M16	M20	M24
J Thread	M6x12	M10x15	M12x15	M16x25	M20x25	M27x40	M30x40	M42x60
Part No. (Metric)	CLR-1571-105-BC	CLR-1573-105-BC	CLR-1574-105-BC	CLR-1575-105-BC	CLR-1576-105-BC	CLR-1577-105-BC	CLR-1578-105-BC	CLR-1579-105-BC



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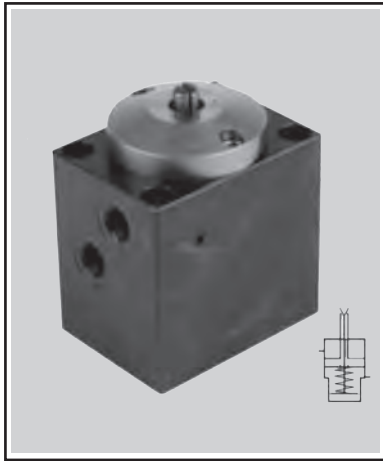
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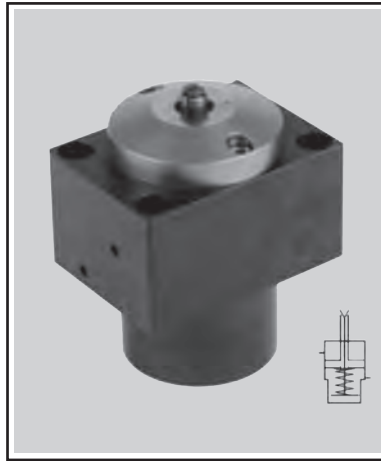
Pull Clamps ■ **Bore Clamp** ■ B1.4841, B1.4842, B1.4843

Bore Clamp ■ Three body styles, without centering function

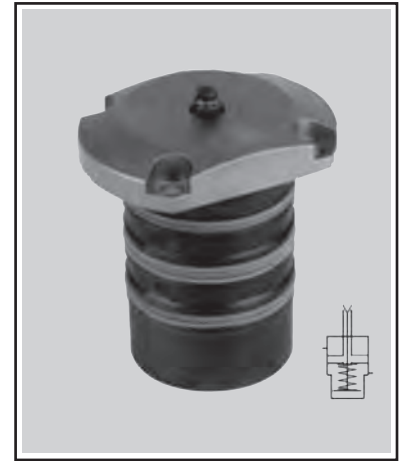
Double Acting ■ Max. Operating Pressure ■ 3625 psi (250 bar)



Block Type



Top Flange Type



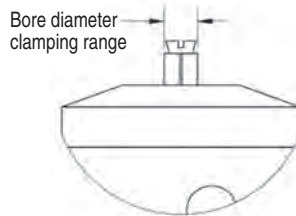
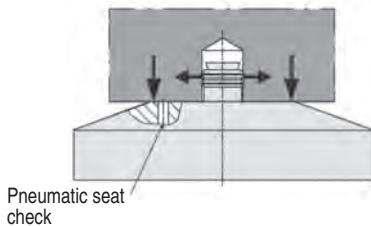
Cartridge Type

The bore clamp family of workholding clamps allow the manufacturer to grip and hold parts within bored holes in their part design. The expanding gripping bushings are designed to grip the inner wall of bored holes and then pull downward against the clamp body. The

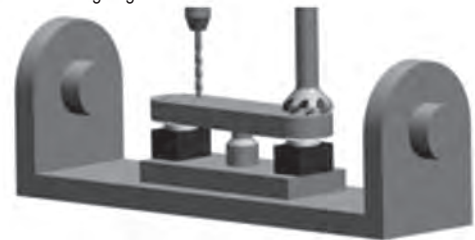
clamping bushings are designed with a special profile and penetrating points to optimize the grip and holding forces. Unfortunately these clamps are not designed to clamp and hold onto hardened surfaces. By only clamping within the holes of a part, the other surfaces

of the part are open for free machining on 5 sides. If heavy machining is required, please consider the transverse forces and supplement your design with work supports.

Function



Application example
Machining of a plate from sides on an indexing edge



Part Number Coding:

CLR-4318 - X X 1 X

Size

- 1 = Size 1
- 2 = Size 2

Body Type

- 1 = Block Style
- 2 = Flange Type
- 3 = Cartridge Type

Bore Hole Diameter-Range Letter

(SIZE 1)	(SIZE 2)
A = .307-.323	F = .445-.461
B = .327-.362	G = .465-.500
C = .366-.382	H = .504-.539
D = .386-.402	K = .543-.579
E = .406-.441	L = .583-.618
	M = .622-.657
	N = .661-.697

Example: CLR-4318-211G

Size 2 clamp, Block Style with clamping range of .465-.500

Application example
Machining from 5 sides of an oil sump



Subject to change. For further details, including detailed dimensions and mounting instructions, visit www.clrh.com.



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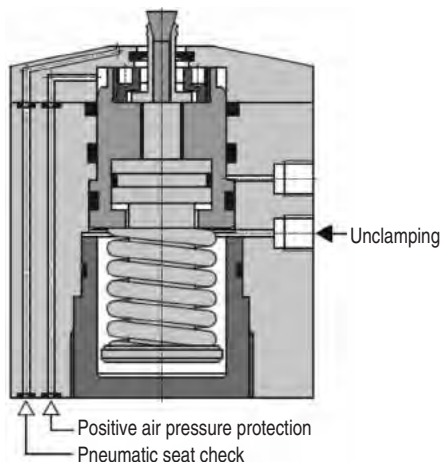
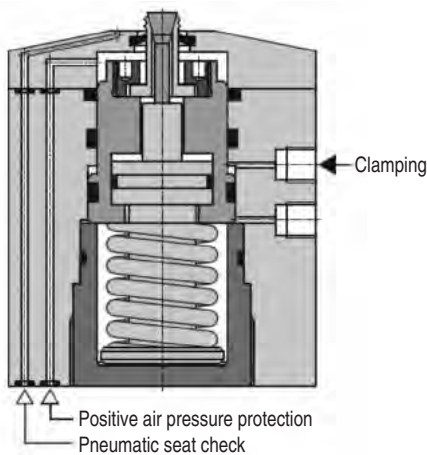
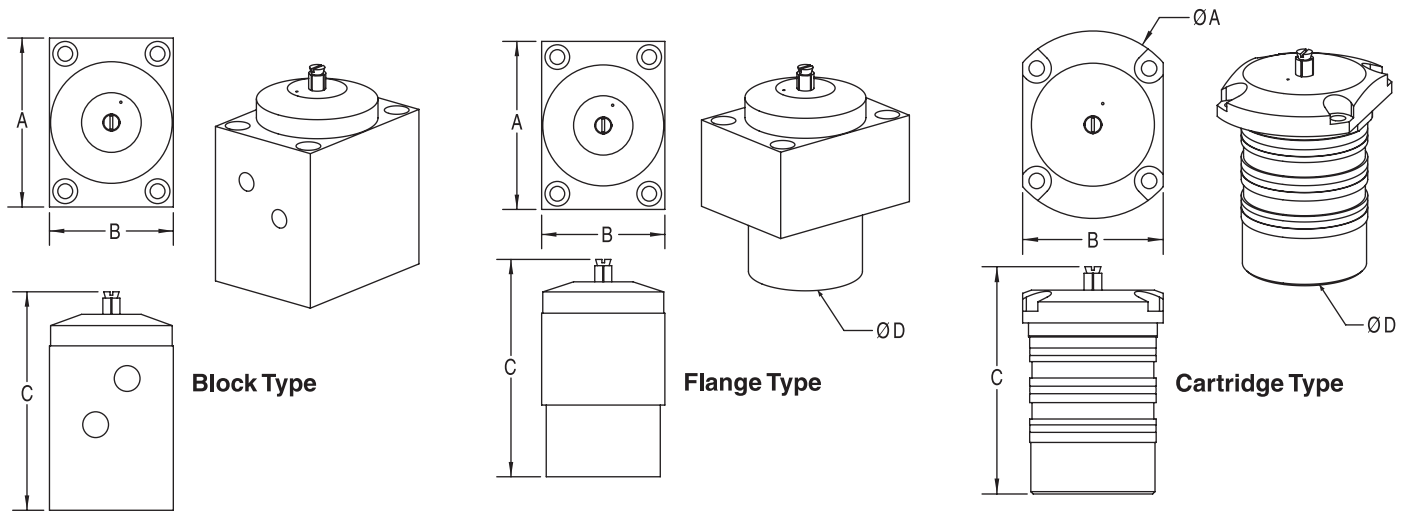
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Pull Clamps ■ **Bore Clamp** ■ B1.4841, B1.4842, B1.4843

Bore Clamp ■ Three body styles, without centering function

Double Acting ■ Max. Operating Pressure ■ 3625 psi (250 bar)



	Size 1	Size 2
Approx. Expansion Force (lbs)	2020	3150
Pull Down Force at 1450 psi (lbs)	450	875
Pull Down Force at 3625 psi (lbs)	1150	2200

Block Type

A	2.95	3.35
B	2.17	2.48
C	3.82	4.88
Weight standard version (lbs)	5.1	8.6
Part No., Clamp	CLR-4318-111X	CLR-4318-211X

Flange Type

A	2.95	3.35
B	2.17	2.48
C	3.82	4.88
D	2.00	2.28
Weight standard version (lbs)	4.0	6.4
Part No., Clamp	CLR-4318-121X	CLR-4318-221X

Cartridge Type

A	3.15	3.54
B	2.36	2.68
C	3.82	4.88
D	2.09	2.32
Weight standard version (lbs)	3.3	5.3
Part No., Clamp	CLR-4318-131X	CLR-4318-231X

Spare clamping sets are available for replacement parts and consist of the clamping bolt, clamping bushing and wiper. See prior page for size and range letter:

CLR-0431-7 0 X X

Size Range Letter

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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.

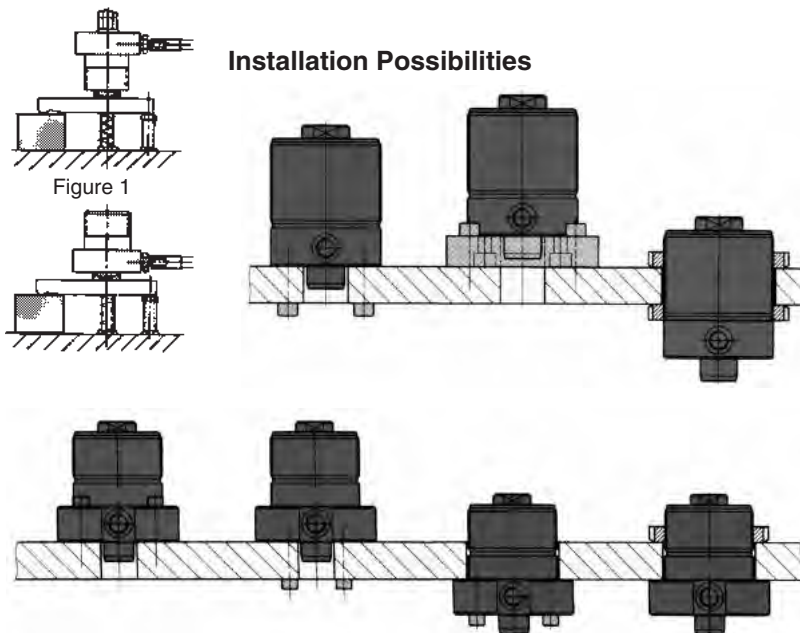
CENTER HOLE: Choose either threaded or unthreaded center hole. Threaded version is ideal for pulling/pushing a drawbar or replacing a nut on a clamp strap. Unthreaded version is useful when clamp is removed for workpiece loading.

IMPORTANT NOTES: For operating pressures exceeding 5000 psi, use a grade 8 stud or equivalent.

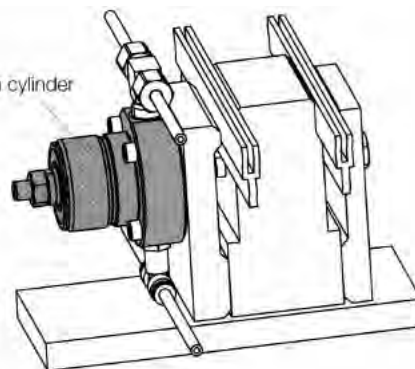
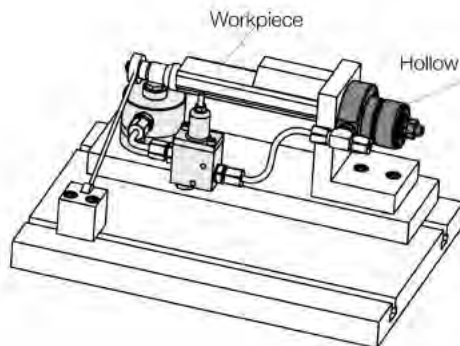
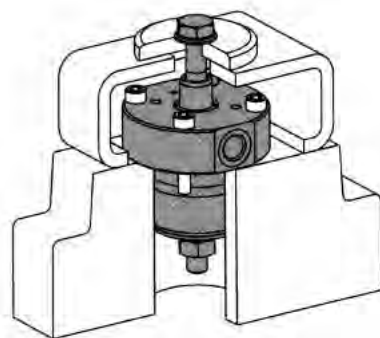
It is important to torque the lock nut used sufficiently to prevent damaging the piston threads.

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.



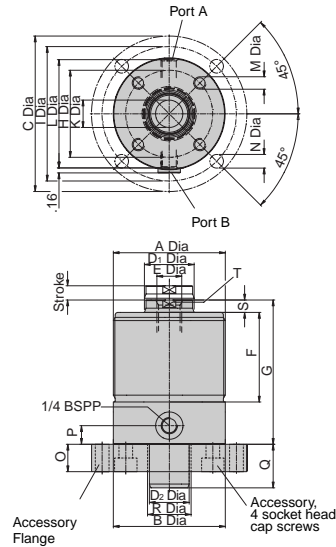
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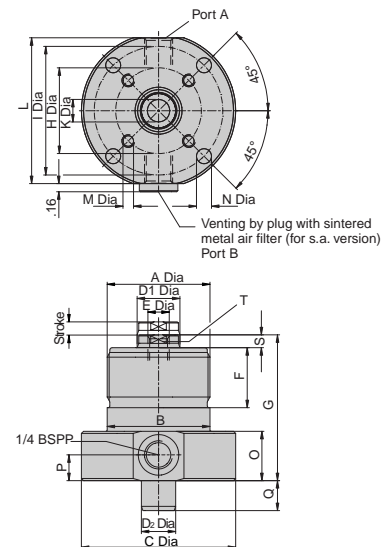
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Hollow Plunger Clamps

7250 psi max
Single and double acting



A
Clamp Stroke
B
Unclamp Stroke
Clamp force (d.a.) or
Unclamp force (s.a.)



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 ₁ Dia		.472	.787	.984	1.256	1.575	1.969
D ₂ 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



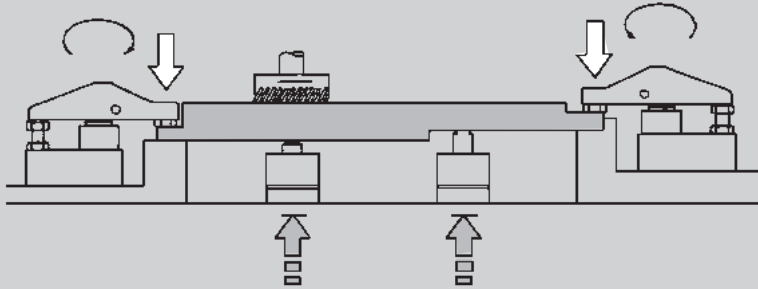
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Work Supports

7500 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:



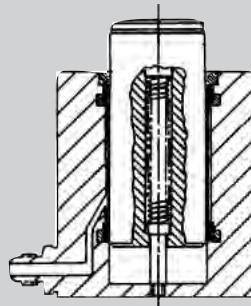
Threaded Body
pages 82-87



Block Type
page 88



Standard
page 89



Spring Extended (Plunger floats then locks)

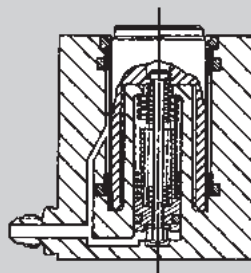
Plunger is normally extended by light spring force. Workpiece's weight depresses plunger to proper height. Applying fluid pressure locks plunger securely.



Threaded Body
pages 82-87



Standard
pages 81, 90-91



Fluid Advanced (Plunger advances then locks)

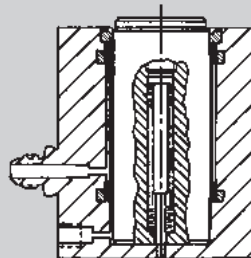
Plunger is normally retracted for clear loading/unloading. Applying fluid pressure gently advances plunger to the workpiece, then automatically locks it. Note: do not use advancing plunger to lift loads.



Threaded Body
pages 82-87



Block Type
page 88



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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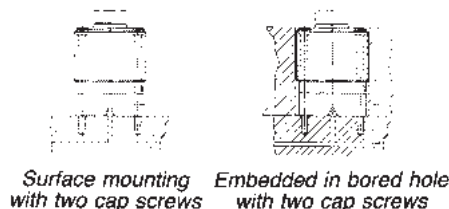
Work Supports

7500 psi max
Single acting

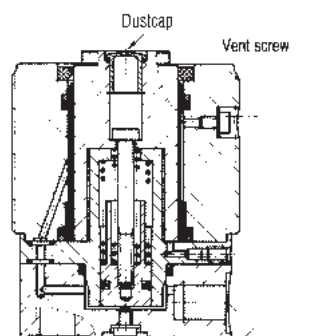


- High capacity in a compact shape
 - Versatile mounting . . . side port, bottom port, or manifold mounting
 - Support plunger held by an advanced design sliding-fit pressure sleeve
 - Sleeve holds plunger absolutely vertical, locked or unlocked
 - Height repeatability within $\pm .0002$ inches!
- **Do not use NPT fittings**

Mounting Options



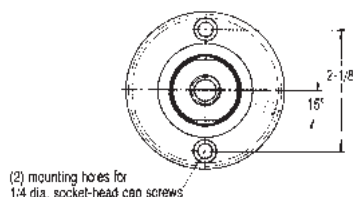
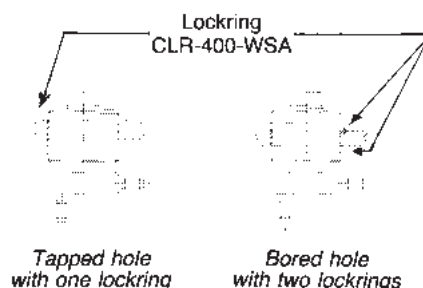
Fluid Advanced



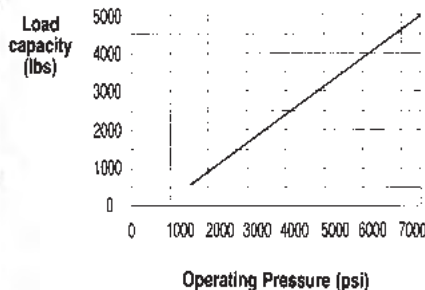
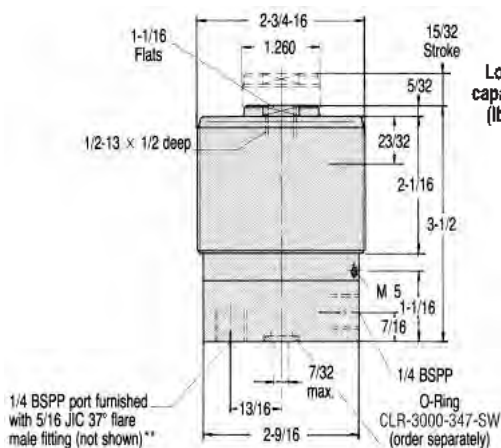
CLR-420-WS only

CLR-410-WS only

Air vent (accepts vent hose fitting CLR-805-AF)



Symbol



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 rises above 1500 psi, precision sleeve grips plunger, locking it securely. Plunger retracts again when pressure is released.

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 .00007 inches per 100 lbs. machining load.

MOUNTING: See mounting options at left. Fasten with two socket-head cap screws, or with one or two lockings. When embedding in a bored hole, hole diameter must be at least 3-1/4 inches to allow clearance for a CLR-810-F port plug on the side.

CONSTRUCTION: Steel plunger hardened and ground. Plunger held inside a honed locking sleeve (sliding fit). Carbon steel body, black oxide finish.

Load Capacity at 7500 psi	4650 Lbs
Plunger action	Fluid advanced
Max. load capacity (lbs)	4650
Stroke	.47
Fluid required (cu.in)	.15
Max. fluid flow rate (cu.in./min.)	128
Contact force, min./max. (lbs)	7/14
Max. operating pressure (psi)	7500
Min. operating pressure (psi)	1500
Weight (lbs)	4.4

Inch

N Plunger Thread	1/2-13 x 1/2 Deep
B Body Thread	2-3/4 - 16
M Mounting Screw Size	1/4 in.
Part No., Side Port or Manifold Mount	CLR-410-WS
Part No., Bottom Port	CLR-420-WS
Part No., Locking	CLR-400-WSA

Metric

N Plunger Thread	M12 x 12 Deep
B Body Thread	M68 x 2
M Mounting Screw Size	M6
Part No., Side Port or Manifold Mount	CLR-1914-010-WS
Part No., Bottom Port	CLR-1914-020-WS
Part No., Locking	CLR-3522-008-WSA



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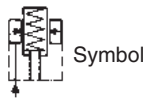
Sales — Phone (636) 386-8022 Fax (636) 386-8034
Engineering — Phone 1-800-827-2526 Web www.clrh.com

Threaded-Body Work Supports

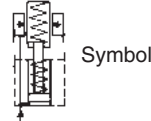
7500 psi max
Single Acting



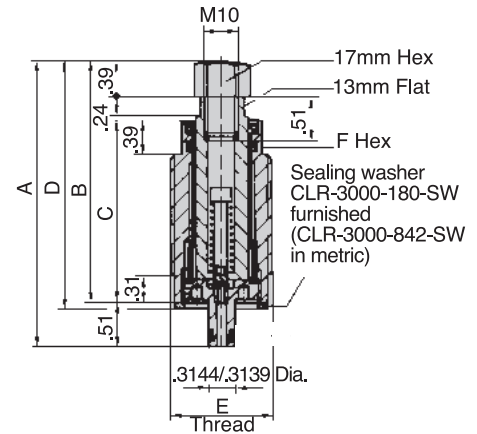
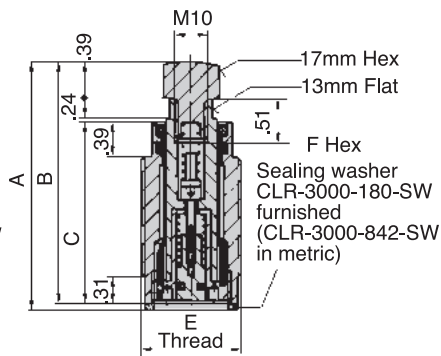
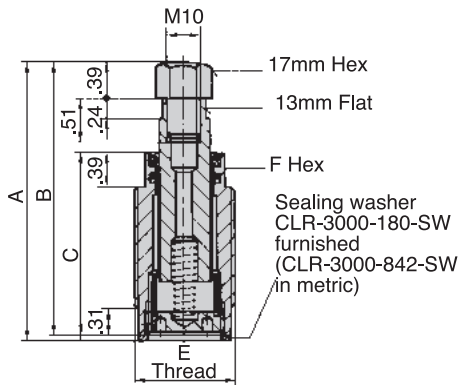
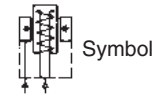
Spring Extended



Fluid Advanced



Air Advanced



Load Capacity at 7500 psi	1500 Lbs				2200 Lbs			
	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	
Stroke	.31	.31	.59	.31	.31	.31	.59	.31
Max. load capacity (lbs)	1500	1500	1500	1500	2200	2200	2200	2200
Fluid required (cu.in)	.01	.10	.10	.01	.01	.10	.18	.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
Max. operating pressure (psi)	7500	7500	7500	7500	7500	7500	7500	7500
Min. operating pressure (psi)	1500	1500	1500	1500	1500	1500	1500	1500
A	3.17	2.85	3.13	3.31	3.56	3.25	3.52	3.70
B	3.11	2.80	3.07	2.80	3.50	3.19	3.46	3.19
C	2.13	2.13	2.40	2.13	2.52	2.52	2.80	2.52
D	—	—	—	2.85	—	—	—	3.25
Weight (lbs)	.6	.6	.6	.6	.6	.6	.6	.6

Inch

E Thread	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
F Hex	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



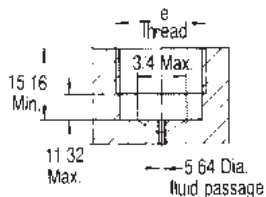
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HILMA ■ STARK

CARR LANE ROEMHELD MFG. CO.

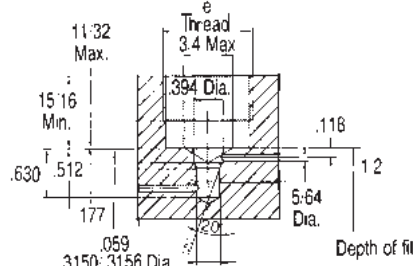
Sales — Phone (636) 386-8022 Fax (636) 386-8034
Engineering — Phone 1-800-827-2526 Web www.clrh.com

Threaded-Body Work Supports

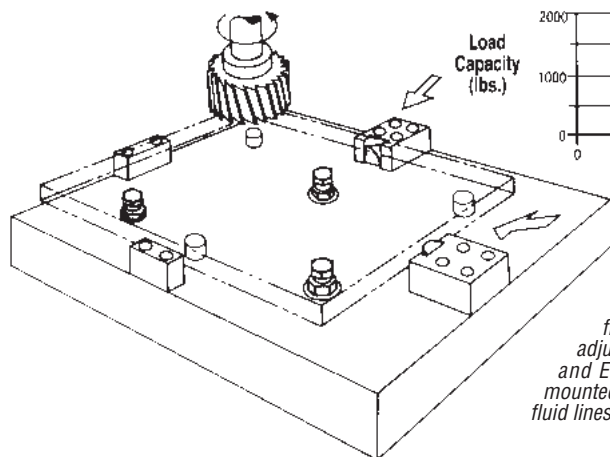
7250 psi max
Single acting



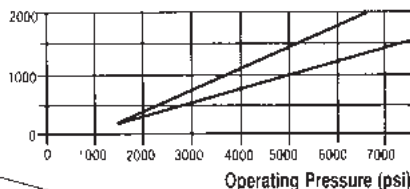
**Hole Preparation
(Spring Extended and
Fluid Advanced)**



Hole Preparation (Air Advanced)



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



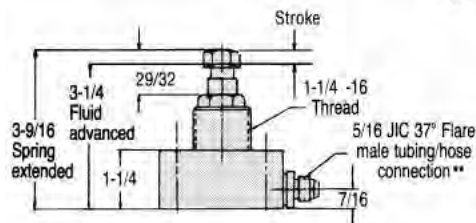
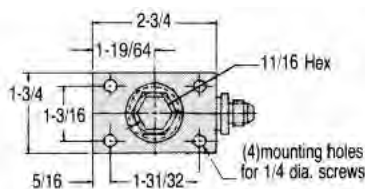
**Spring-Extended
Work Support
with Base
CLR-000-WS**



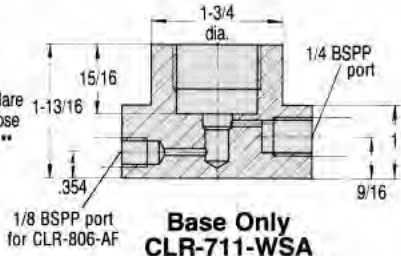
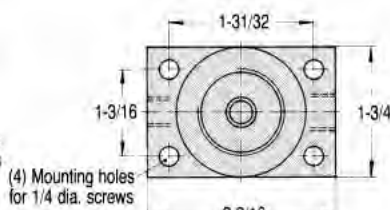
**Fluid-Advanced
Work Support
with Base
CLR-200-WS**



**Air-Advanced
Work Support
with Base
CLR-100-WS**



**Base Only
CLR-712-WSA**



**Base Only
CLR-711-WSA**

- 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 three-action 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)

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.



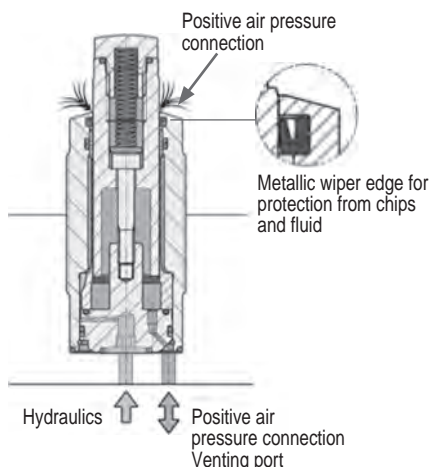
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CARR LANE ROEMHELD MFG. CO.

Sales — Phone (636) 386-8022 Fax (636) 386-8034
Engineering — Phone 1-800-827-2526 Web www.clrh.com

Work Supports ■ Threaded-Body Work Support ■ B1.943

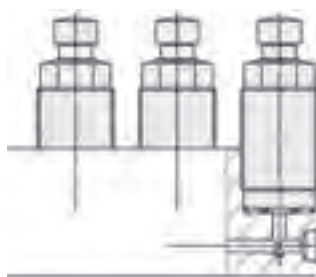
Thr. Body Work Support ■ 4 sizes ■ 3 types of function - Hydraulic, Air, Spring Single Acting ■ Max. Operating Pressure ■ 7250 psi (500 bar)



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 protection is required, the work supports can be piped to have low-pressure air blow-off from the wiper area.

Installation and connecting possibilities

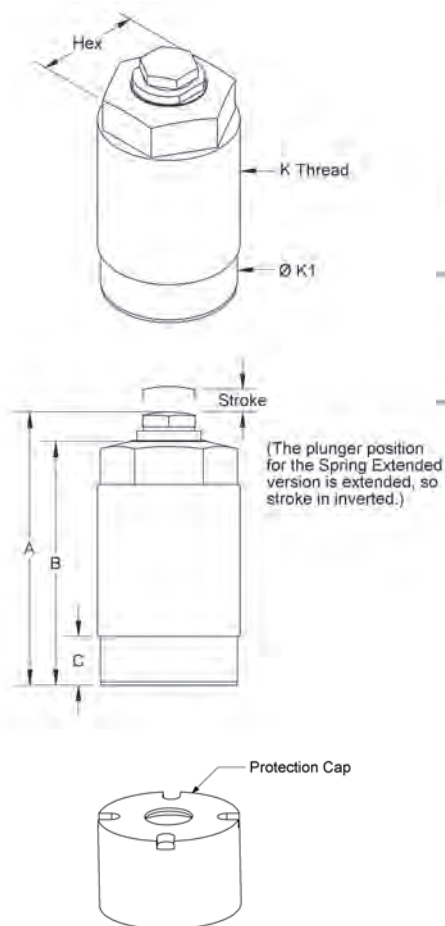
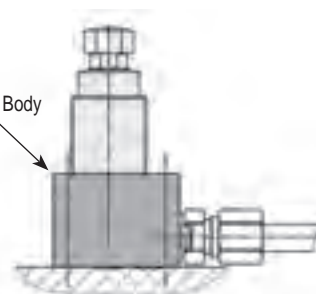
Drilled channels



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.



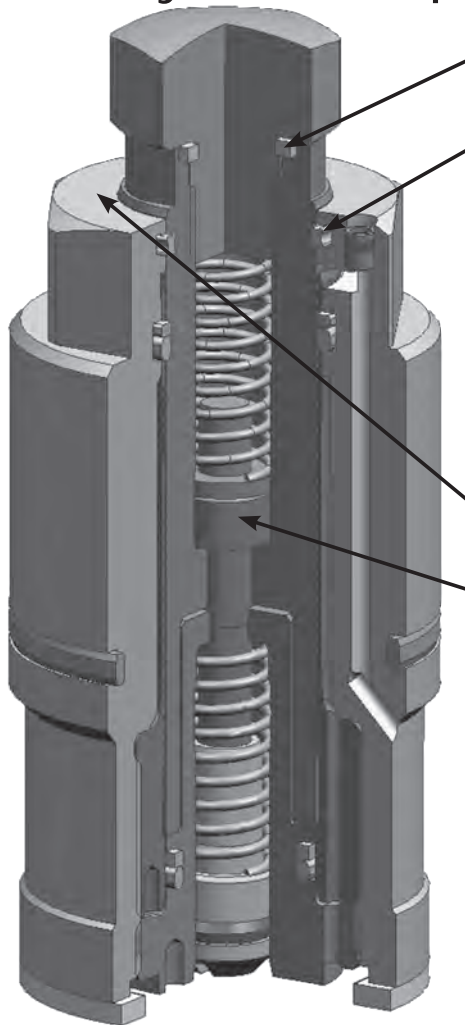
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Sales — Phone (636) 386-8022 Fax (636) 386-8034
Engineering — Phone 1-800-827-2526 Web www.clrh.com

WHY CARR LANE ROEMHELD WORK SUPPORTS?

Every Work Support Factory Tested!



- **NEW!** Contact bolt o-ring sealing available
- **NEW!** Internal quad wiper now available
- Removable sintered filter now available
- Spring advanced, fluid advanced, and air advanced available
- Compact design starting at 1" diameter
- Designed for 500,000 cycles, tested over 1,000,000 cycles at full load
- **NEW!** Metal wiper now available (viton wiper standard)
- **NEW!** Stainless steel internal parts available
- Up to 7500 psi maximum pressure for more compact clamp design
- 60 different standard sizes and styles available supporting forces from 1500 lb. to 23,000 lb.
- Double acting and locking work supports available



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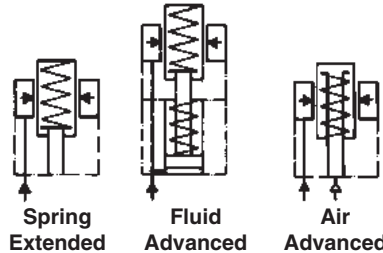
Work Supports ■ Threaded Body Style ■ B1.950

Work Supports ■ Spring advanced, Fluid advanced and Air advanced
Max. Operating Pressure ■ 7250 psi (500 bar)



Spring Extended
Fluid Advanced
Air Advanced

- State-of-the-art compact work supports with high load capacities
- Manifold mounting provides space-saving low-height installation
- Support plunger held by an advanced-design sliding-fit pressure sleeve (holds plunger absolutely vertical, locked or unlocked)
- Height adjusts automatically, with ± 0.0002 inches repeatability
- Choice of three sizes



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.

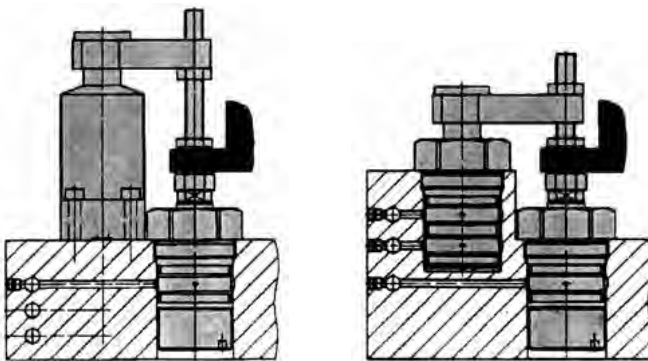
SUPPORT ACTION – Fluid advanced: Plunger is normally retracted for clear workpiece loading/unloading. Applying fluid pressure gently advances plunger to workpiece, where it contacts with light spring force. When fluid pressure is applied, precision sleeve grips plunger, locking it securely. Plunger retracts 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. When air pressure is applied, precision sleeve grips plunger, locking it securely. Plunger retracts again when air pressure is released.

ACCURACY: Height repeatability ± 0.0002 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.

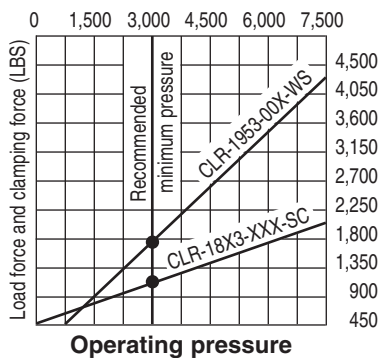
CONSTRUCTION: Steel plunger, hardened and ground. Plunger held inside a honed locking sleeve (sliding fit). Carbon steel body, black oxide finish.

Applications with Swing Clamps

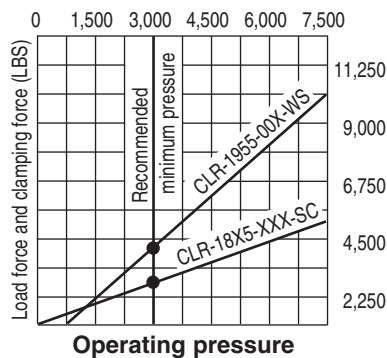


Threaded-body work supports are properly sized to match the three basic swing-clamp sizes. When supporting underneath a clamp, load capacity should be at least two times the clamping force. This allows the support to resist not only static clamping force, but also dynamic force due to clamping-arm momentum, and machining forces.

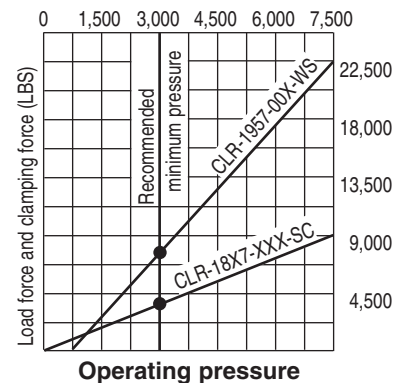
CLR-1953-XXX-WS



CLR-1955-XXX-WS



CLR-1957-XXX-WS



Subject to change. For further details, including detailed dimensions and mounting instructions, visit www.clrh.com.



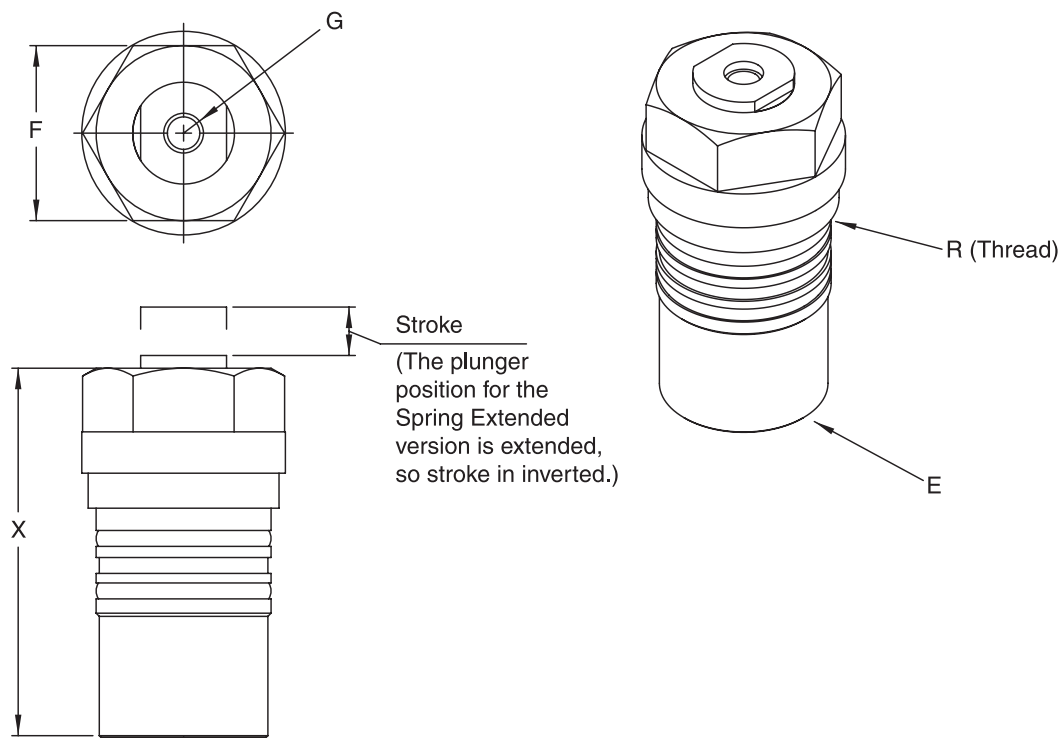
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Work Supports ■ Threaded Body Style ■ B1.950

Work Supports ■ Spring advanced, Air advanced and Fluid advanced
Max. Operating Pressure ■ 7250 psi (500 bar)



Load Capacity at 7250 psi	3900 Lbs.	9500 Lbs.	23000 Lbs.
Stroke	0.47	0.63	0.78
Plunger contact force min./max. (lbs)	3.4 / 5.6	6.8 / 13.5	11.3 / 22.5
Max oil flow (cu. in / min.)	91	128	366
E	1.63	2.09	3.27
F	1.81	2.17	3.74
X (air & spring adv. / fluid adv.)	3.03 / 3.62	3.90 / 4.57	5.75 / 6.46

Inch

G x depth of thread	1/2-13 x 1/2	1/2-13 x 1/2	5/8-11 x 5/8
R	1-3/4 - 16	2-3/8 - 16	5-3/8 - 16
Part No., Spring Extended	CLR-1953-700-WS	CLR-1955-700-WS	CLR-1957-700-WS
Part No., Fluid Advanced	CLR-1953-702-WS	CLR-1955-712-WS	CLR-1957-702-WS
Part No., Air Advanced	CLR-1953-701-WS	CLR-1955-701-WS	CLR-1957-701-WS

Metric

G x depth of thread	M12 x 12	M12 x 12	M16 x 20
R	M45 x 1.5	M60 x 1.5	M90 x 2
Part No., Spring Extended	CLR-1953-000-WS	CLR-1955-000-WS	CLR-1957-000-WS
Part No., Fluid Advanced	CLR-1953-002-WS	CLR-1955-012-WS	CLR-1957-002-WS
Part No., Air Advanced	CLR-1953-001-WS	CLR-1955-001-WS	CLR-1957-001-WS

Spare O-Ring Kits of External Seals

Part No., Seals for Spring Ext. & Fluid Adv.	CLR-0131-525	CLR-0131-527	CLR-0131-529
Part No., Seals for Air Advanced	CLR-0131-524	CLR-0131-526	CLR-0131-528

Subject to change. For further details, including detailed dimensions and mounting instructions, visit www.clrh.com.



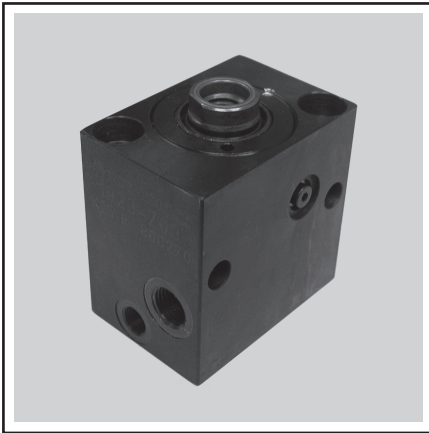
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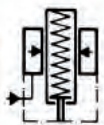
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Engineering — Phone 1-800-827-2526 Web www.clrh.com

Work Supports

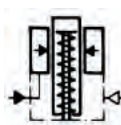
7500 psi max
Single acting



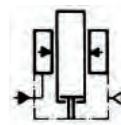
Block Style
Spring Extended or Air Advanced



Spring
Extended



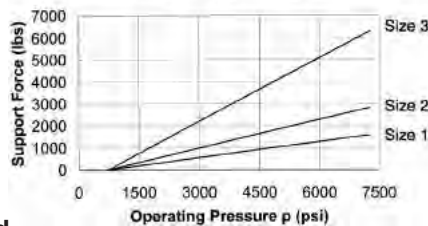
Air Advanced
Spring Return



Air Advanced
No Spring

- Easy to mount, vertically or horizontally (manifold mounting optional)
 - Height adjusts automatically
 - Support plunger held by an advanced-design sliding-fit pressure sleeve
 - Sleeve holds plunger absolutely vertical, locked or unlocked
 - Height repeatability within $\pm .0002$ inches!
 - Choice of three sizes and three types
- **Do not use NPT fittings**

Admissible load F as a function of the operating pressure p



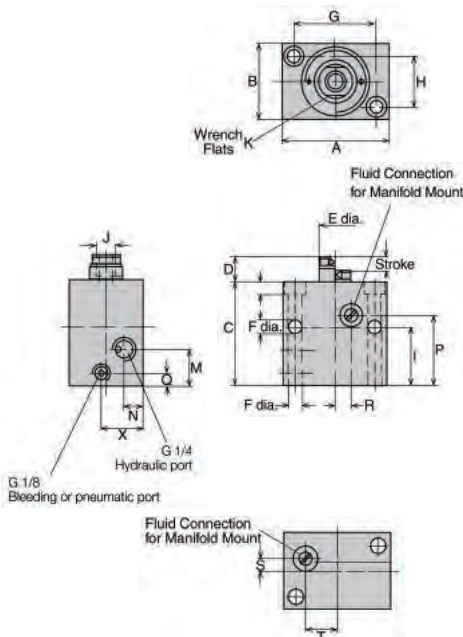
SUPPORT ACTION (SPRING EXTENDED): Plunger is normally extended by light spring force. Workpiece's weight depresses plunger to proper height. When fluid pressure is applied, precision sleeve grips plunger, locking it securely.

SUPPORT ACTION (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.

ACCURACY: Height repeatability $\pm .0002$ inches. Excellent repeatability because of (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 .00004 inches per 100 lbs machining load.

SEQUENCING: If workpiece is too light to depress plunger (spring extended) or light enough that plunger contact may lift it (air advanced), a sequence valve is recommended. Sequence valve delays locking or advancing the plunger until after the workpiece is clamped.

CONSTRUCTION: Steel plunger, hardened and ground. Plunger held inside a honed locking sleeve (sliding fit). Carbon steel body, black oxide finish. Plunger accepts contact bolts or extensions.



Support Force at 7500 psi	1600 lbs	2900 lbs	6500 lbs
Size	1	2	3
Stroke	.23	.31	.39
Spring Contact Force (min./max.)Lbs	1.8 / 2.25	3.0 / 3.8	4.3 / 5.4
Contact force per 10 psi (minus spring force)	3.1 lbs	4.9 lbs	14.9 lbs
Min. Operating Pressure (psi)	1450	1450	1450
A	2.36	2.56	3.35
B	1.38	1.77	2.48
C	2.21	2.52	3.11
D	.47	.59	.79
E dia.	.63	.79	1.38
F dia. Screw	.256	.335	.413
G	1.57	1.97	2.48
H	.866	1.181	1.575
I	1.02	1.42	1.54
K	.51	.67	1.06
M	1.5	.87	.98
N	.49	.45	.81
P	1.42	1.69	2.05
Q	.33	.32	.32
R	.276	.394	.472
S	.197	.276	.433
T	.571	.75	.98
X	.69	1.0	1.56
Weight	1.8	2.7	5.7

Inch			
J Plunger Thread	—	1/2 - 13 x 25/32	5/8 - 11 x 1-1/4
Part No., Spring Extended	—	CLR-1923-701-WS	CLR-1925-701-WS
Part No., Air Extended without spring return	—	—	—
Part No., Air Extended with spring return	—	CLR-1923-703-WS	—

Metric			
J Plunger Thread	M10 x 13	M12 x 14	M16 x 24
Part No., Spring Extended	CLR-1921-101-WS	CLR-1923-001-WS	CLR-1925-001-WS
Part No., Air Advanced without spring return	CLR-1921-102-WS	CLR-1923-002-WS	CLR-1925-002-WS
Part No., Air Extended with spring return	CLR-1921-103-WS	CLR-1923-003-WS	CLR-1925-003-WS



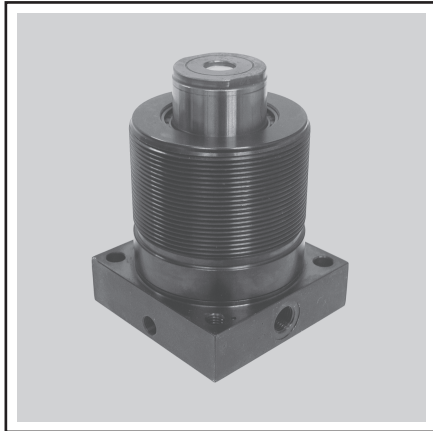
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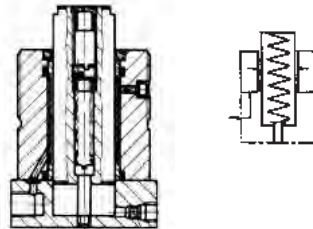
Work Supports

7500 psi max
Single acting

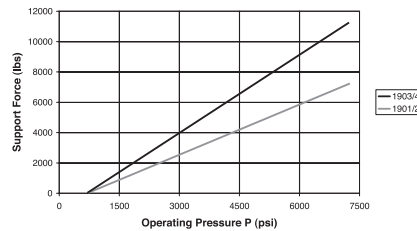
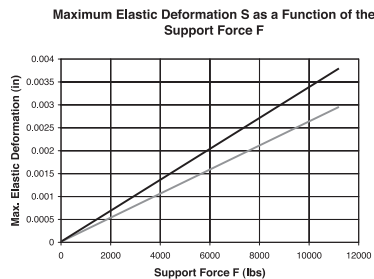


Spring Extended

- Can support over 5 tons
- Height adjusts automatically
- Support plunger held by an advanced design sliding-fit pressure sleeve
- Sleeve holds plunger absolutely vertical, locked or unlocked
- Height repeatability within $\pm .0002$ inches!
- Contact force easily adjustable from 2 to 20 lbs
- Standard metal wiper
- ** Do not use NPT fittings



Admissible Load F as a Function of the operating Pressure P



APPLICATION: Hydraulic work supports are used to provide a self-adjusting rest for the workpiece during the machining operations. They compensate the workpiece surface irregularities, also deflection and vibration under machining loads.

DESCRIPTION: The spring-loaded plunger positions itself against the workpiece with an adjustable light spring force. Hydraulic locking is made together with hydraulic clamping of the workpiece, or independently. The support plunger is provided with female thread to enable the use of threaded bolts for height adjustment. Oil supply can be supplied from the side or from below.

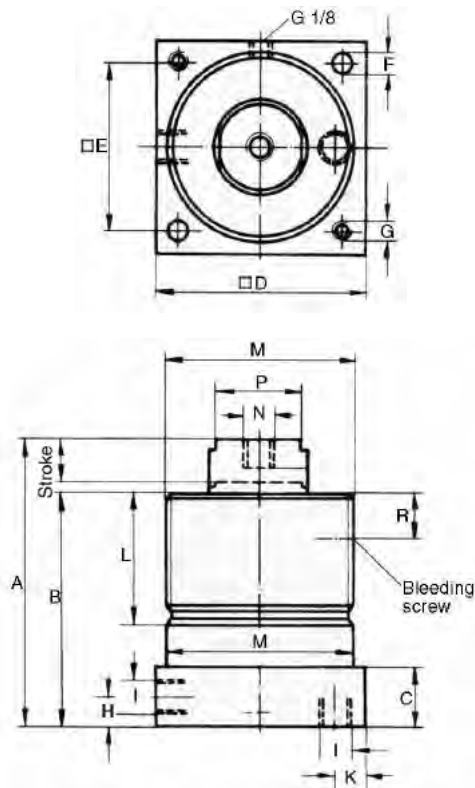
The internal parts of the work support are protected against dust and chips by a sintered metal air filter.

Recommended minimum operating pressure 1450 psi.

IMPORTANT NOTES: If there is any danger of fluids being sucked into the filter, a vent hose has to be connected. Spring force should not be used to lift workpieces.

Contact bolts and extensions with large weight can influence the functions of this component.

The plunger internal thread should always be plugged by a plastic cap or a screw-in extension to protect the element against penetration of liquids.



Load Capacity at 7500 psi	7400 Lbs	11600 Lbs
Plunger Dia.	1.26	1.57
Plunger Stroke	.63	.71
Min. Operating Pressure (psi)	1450	1450
Contact Force (lbs)	2-20	2-20
A	4.41	4.65
B	3.54	3.78
C	.95	.95
D	2.95	3.35
E	2.244	2.677
F	.27	.35
H / K	.47	.47
I	G 1/4	G 1/4
L	1.57	2.13
M dia.	M 68 x 2	M 78 x 2
P	1.06	1.42
R	.79	.71
Weight (lbs)	6	8 1/2

Inch

G	—	5/16 - 18
N	—	1/2 - 13 X 15/32
Part No., Side Port	—	CLR-1903-701-WS
Part No., Lock Nut	—	CLR-3522-007-WSA

Metric

G	M 6	M 8
N	M 12 x 12	M 12 x 12
Part No., Side Port	CLR-1901-002-WS	CLR-1903-002-WS
Part No., Bottom Port	CLR-1902-002-WS	CLR-1904-002-WS
Part No., Lock Nut	CLR-3522-008-WSA	CLR-3522-007-WSA



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Work Supports

7500 psi max
Single acting



Fluid Advanced

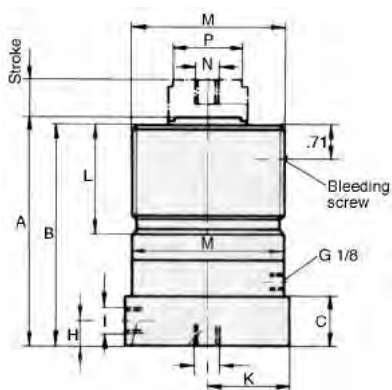
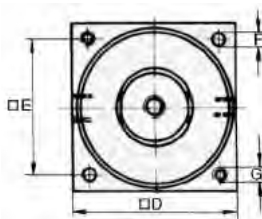
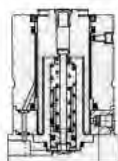
- Can support over 5 tons
- Height adjusts automatically
- Support plunger held by an advanced design sliding-fit pressure sleeve
- Sleeve holds plunger absolutely vertical, locked or unlocked
- Height repeatability within $\pm .0002$ inches!
- Standard metal wiper
- ** Do not use NPT fittings

DESCRIPTION: With the 1910 range the support plunger is retracted in home position. When pressurized the support plunger moves against the inserted workpiece by means of light force. With increasing oil pressure, the plunger locks hydraulically. After the system has been unclamped, the support plunger returns to home position. The support plunger is provided with female thread to enable the use of threaded bolts for height adjustment. Oil supply can be supplied from the side or from below. The internal parts of the work support are protected against chips and dust by a sintered metal air filter.

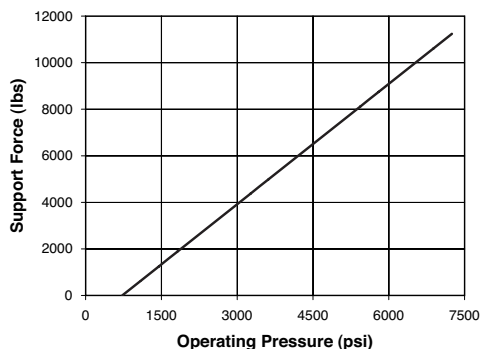
IMPORTANT NOTES: If there is any danger of fluids being sucked into the air filter, a vent hose has to be connected. Spring force should not be used to lift workpieces.

Contact bolts and extensions with large weight can influence the functions of this component.

The plunger internal thread should always be plugged by a plastic cap or a screw-in extension to protect the element against penetration of liquids.



Admissible Load F as a Function of the Operating Pressure P



Load Capacity at 7500 psi		11600 Lbs	
Port Location	Side	Bottom	
Plunger Dia.	1.57	1.57	
Plunger Stroke	.71	.71	
Min. Operating Pressure (psi)	1450	1450	
Max Flow Rate (cu. in. / min)	250	250	
Contact force (lbs.)	13.5 - 22.5	13.5 - 22.5	
A	4.53	4.74	
B	4.37	4.57	
C	.83	1.04	
D	3.35	3.35	
E	2.677	2.677	
F	.35	.35	
H	.43	—	
I	G 1/4	G 1/4	
K	—	1.67	
L	2.13	2.13	
M dia.	M 78 x 2	M 78 x 2	
P	1.42	1.42	
Weight (lbs)	10	10	

Inch

G	5/16 - 18	—
N	1/2 - 13 X 15/32	—
Part No.	CLR-1911-724	—
Part No., Lock Nut	CLR-3522-007-WSA	—

Metric

G	M 8	M 8
N	M 12 x 12	M 12 x 12
Part No.	CLR-1911-022	CLR-1912-022
Part No., Lock Nut	CLR-3522-007-WSA	

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Work Supports

7500 psi max
Double acting



**Fluid Advanced
Double Acting**

- Can support over 5 tons
- Height adjusts automatically
- Support plunger held by an advanced design sliding-fit pressure sleeve
- Sleeve holds plunger absolutely vertical, locked or unlocked
- Height repeatability within $\pm .0002$ inches!
- Standard metal wiper
- ****Do not use NPT fittings**

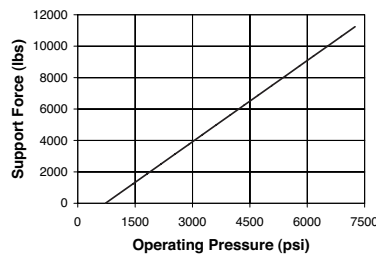
DESCRIPTION: This hydraulic work support contains a double-acting sliding cylinder. If pressurized at port "A" the piston pushes the plunger with little force against the workpiece by means of a spring. As soon as the piston has touched the internal stop, the pressure rises and thus the locking of the plunger. The plunger retracts into de-pressurized mode automatically after the pressure supply has been transferred to port "B".

If the flow rate is too high the plunger will lock before it has touched the workpiece. With type CLR-1911-006 it is possible to effect locking separately through port "K".

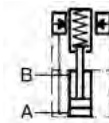
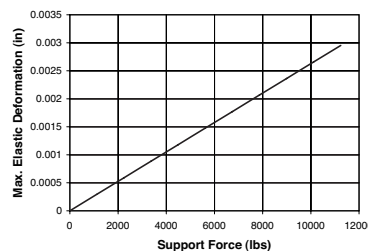
IMPORTANT NOTES: The internal part of the work support is protected against dust and chips by a sintered metal air filter. If there is any danger of fluids being sucked into the filter, a vent hose has to be connected and routed to a dry area. The contact bolt must only be removed if it is replaced by another contact bolt with 12mm thread length.

Spring force should not be used to lift workpieces. Contact bolts and extensions with large weight can influence the functions of this component.

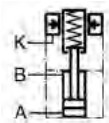
Admissible Load F as a Function of the Operating Pressure P



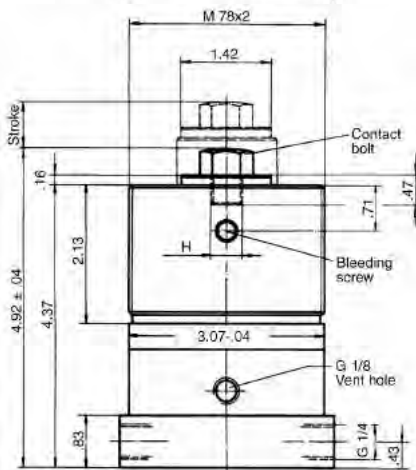
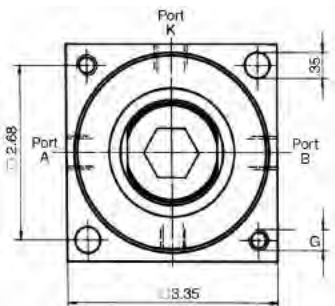
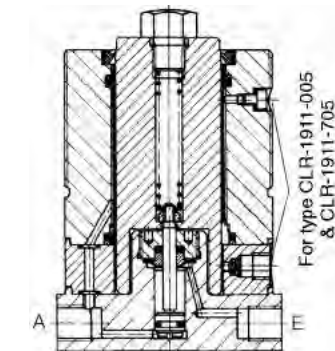
Maximum Elastic Deformation S as a Function of the Support Force F



A = Extending + locking
B = Retracting
CLR-1911-005
CLR-1911-705



A = Extending
B = Retracting
K = Locking
CLR-1911-006



Load Capacity at 7500 psi	11600 Lbs	
Support force at 2000 psi	2300 lbs	
Fluid Ports	2 (A & B)	3 (A, B & K)
Plunger Dia.	1.57	1.57
Plunger Stroke	.71	.71
Min. Operating Pressure (psi)	1500	1500
Max Flow Rate (cu. in. / min)	90	90
Contact force (lbs.)	11.25 - 22.5	11.25 - 22.5
Weight (lbs)	10	10

Inch		
G	5/16 - 18	—
H	1/2 - 13 X 15/32	—
Part No., Side Port	CLR-1911-705	—
Part No., Lock Nut	CLR-3522-007-WSA	—

Metric		
G	M 8	M 8
H	M 12 x 12	M 12 x 12
Part No., Side Port	CLR-1911-005	CLR-1911-006
Part No., Lock Nut	CLR-3522-007-WSA	

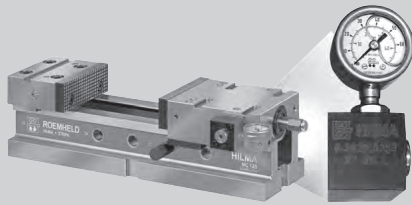


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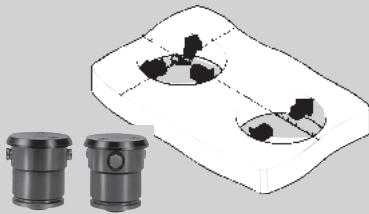
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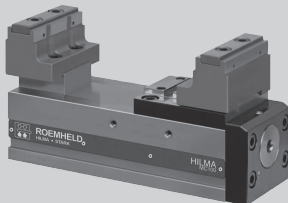
Power Vises and Concentric Clamping



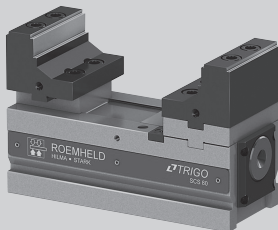
NC-Series Machining Center Vises
pages 96-97



Concentric Clamps
pages 100-102



Mini Clamp Vises
pages 105-106



Super Compact Clamps
page 107



Concentric Vises
pages 110-111

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.

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.

Concentric Clamping Elements are used to simultaneously locate and clamp on internal diameters from 1" to 10" and are ideal for precision clamping of cubic and cylindrical workpieces. 3-point elements provide primary location, centering the workpiece in two axes. 2-point elements provide secondary location, centering in one axis.

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 $\pm 0.01\text{mm}$.

Vise Jaws and Accessories

pages 98-99

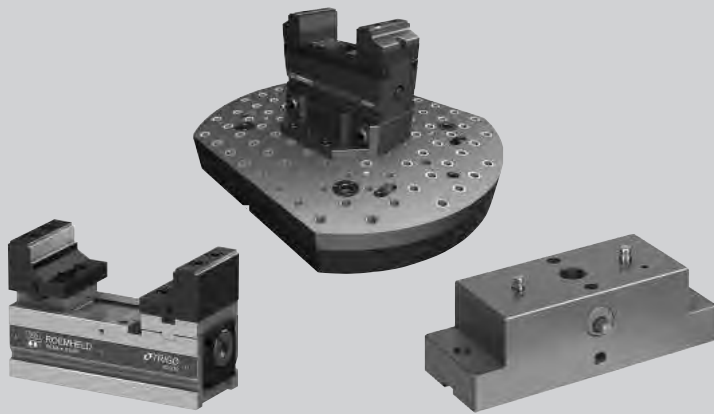


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Power Vises and Fixturing Systems



pages 103-109



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 collets. Workpiece is pulled solidly against the bottom stop for excellent height repeatability.



Single Collet Vise
page 112



Triple Collet Vise
page 112

Collet Vises

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.



pages 114-116

Zero-Point Mounting Systems

Fixturing set up time is reduced by as much as 90% with the Stark Zero Point Mounting System. This comprehensive system utilizes clamping components and insertion nipples, which provide an immediate zero point orientation, allowing faster and more accurate fixture set up and changes. Existing fixtures can be easily adapted to the system, which allows for highly accurate positioning and repeatability, fast payback, an extension of the fixture's life, and increased productivity. Several variations are available, from single parts to handy starter kits.



With Fixed Jaw
page 117



Concentric
page 118



Position Flexible
page 119

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.



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Machine Vise Pressure Gauges Provide Enhanced Precision

Problem: Machine vises have many benefits, including precision, accuracy, and repeatability. The quandary, though, can be knowing how much pressure to apply to the crank handle to generate clamping force. Depending on the equipment and set up, if too much pressure is applied, a shop may experience tool breakage and machine downtime.

Solution: A HILMA machine vise with a pressure gauge allows parts to be safely clamped ready for machining. This helps avoid clamping forces which are too low or excessive, thus enhancing process safety.

Pressure Gages Deliver Accurate Clamping Force:

Machine vises have long been a boon to manufacturing, but engineers often have had problems with knowing how much pressure to apply to the crank handle to generate clamping force. Too much clamping force results in tool breakage and machine downtime.

This was the problem at Atlas Copco Construction Tools of Essen, Germany, especially after a change of metal cutting machines. Michael Beer, equipment engineer for fixture construction at Atlas Copco, explained. "With the old equipment, parts were machined on two sides at a time, but the new system only machined them on one side. As pressure came only from one side, the workpiece moved.



"This issue occurred when machining steel forgings weighing up to 1.2 tons, which are used to produce the main components of hydraulic hammers. The largest parts are up to 900 mm long with side lengths of 490 mm. The hydraulic hammer range, which has tools



varying in length from 1000 to 1900 mm, consists of a total of 13 variants of the ›MB‹ and ›HB‹ series. Some 250 employees are involved in producing hydraulic add-ons to be used in mining, demolition, clearance and other tasks in the construction industry.

Precision clamping

As the forgings have an uneven surface, this is milled by about 15 mm. During machining, HILMA Varioline VL 160 machine vises, which have a clamping force of five tons, ensure the components are safely held in place.

Michael Beer first assumed that a defect in the clamping systems might be the reason for the tools breaking. Another issue was that some operators felt that the more you pull the crank of the machine vise, the more clamping force you generate. This however is not true and led to several cranks becoming defective and having to be replaced. Andreas Menn of Roemheld's fitter team helped Mr. Beer to identify the root cause. Mr. Menn was quick to find out that the workpiece supports with grip inserts used by Atlas Copco were the true cause for the breakage. All workpieces shifted during clamping, which meant they were not held with the full clamping force.

Safe processes

Mr. Menn suggested retrofitting the HILMA machine vises with pressure gauges, which is an option thanks to the mechanical-hydraulic power transmission of the clamps. The clamping force indication allows the required force, which can be read throughout the

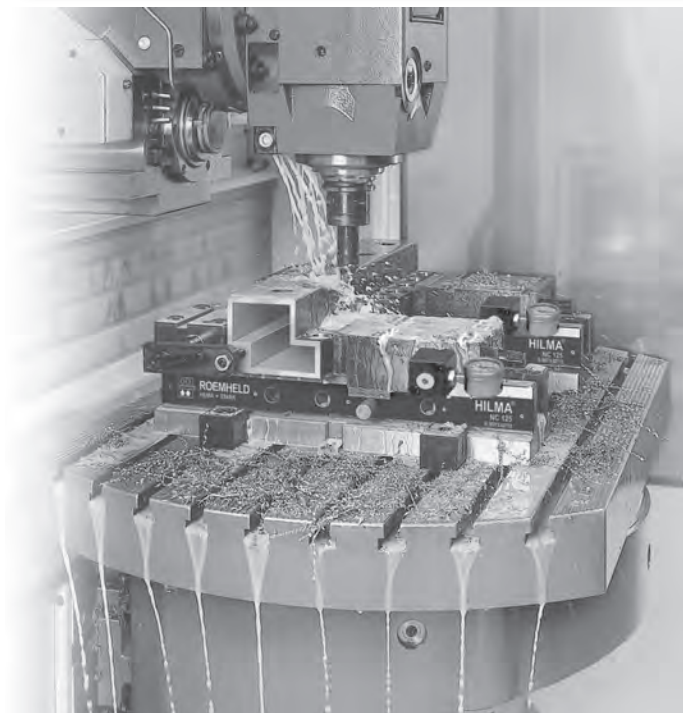
(Continued on next page)



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(Continued from previous page)

machining process, to be precisely applied. This helps avoid clamping forces which are too low or excessive, thus enhancing process safety.

For roughing, the workpiece is clamped with full force, but the clamping force can be sensitively and precisely adjusted for finishing. For repeat orders, the required clamping force can be precisely reproduced so that the unique conditions ensure production of the same high quality. If the workpiece is a housing or a similar part or if soft materials have to be clamped, the pressure gauge helps avoid deformation resulting from excessive clamping pressure.

Michael Beer was immediately struck by the benefits demonstrated by the fitter. What is more, he suggested the use of clamping jaws with specific coating. Their rough surface would clearly enhance their holding power so that the workpiece can be held safely and precisely even at a reduced clamping force. With this approach, higher machining forces may be applied during production.

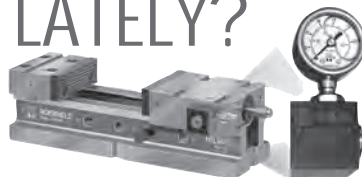
Atlas Copco had been using Hilma/Roemheld clamps for over two decades, recalls Mr. Beer: "I do know that HILMA's products are a bit more expensive, but they are better and they offer great, fast and cheap service."

Hilma machine vises are sold in a variety of models and sizes in North America by Carr Lane Roemheld Mfg. Co.

The success of HILMA machine vises with a pressure gauge was quickly apparent: Since these solutions have been in place, no tools have broken. Michael Beer is enthusiastic: "If I had known before that VL 160 with a pressure gauge costs just (\$250) or so more but offers such a great value for money, I would have ordered all the vises with this add-on upfront." The remaining four vises were retrofitted during production.

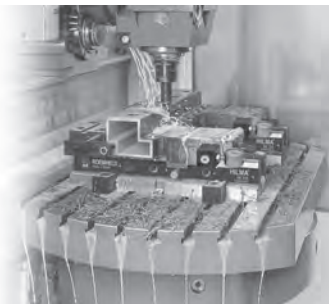
The extra cost has already paid for itself in the fact that there has been no tool breakage.

HEARD FROM YOUR VISES LATELY?



Ours Tells You How Well It's Working

Our NC vise is available with an *integrated force gauge* which tells you how much holding force is being applied to your workpiece. Minimal effort on the crank handle results in extremely high holding force because of the built-in hydraulic power of the vise. Now you'll know if your part is being held properly.



- Better clamping quality
- Correct clamping force every time
- Consistent process control
- Reduced tool breakage
- Workpiece deformation reduced
- Ideal for roughing and finishing
- Reduced operator fatigue



ROEMHELD

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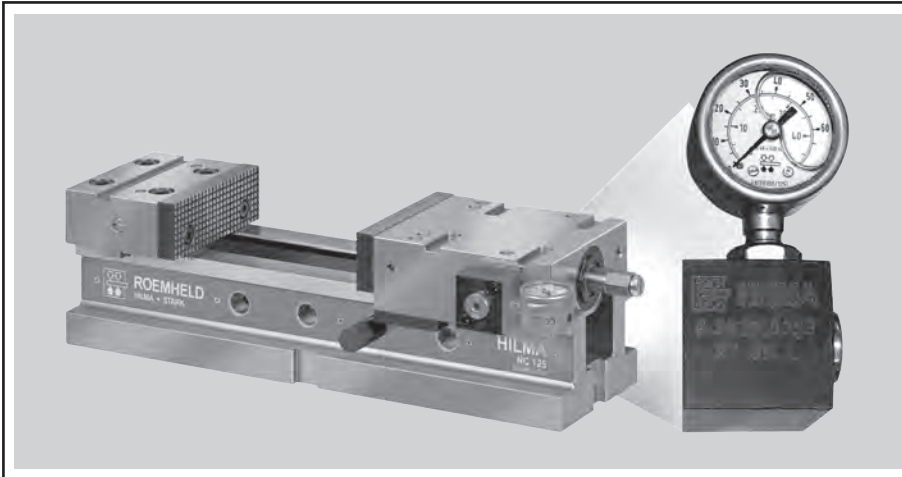
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Machining-Center Vises ■ NC Series

5075 psi max
Single acting



**NC Series Hydra-Mechanical
(shown with gauge)**

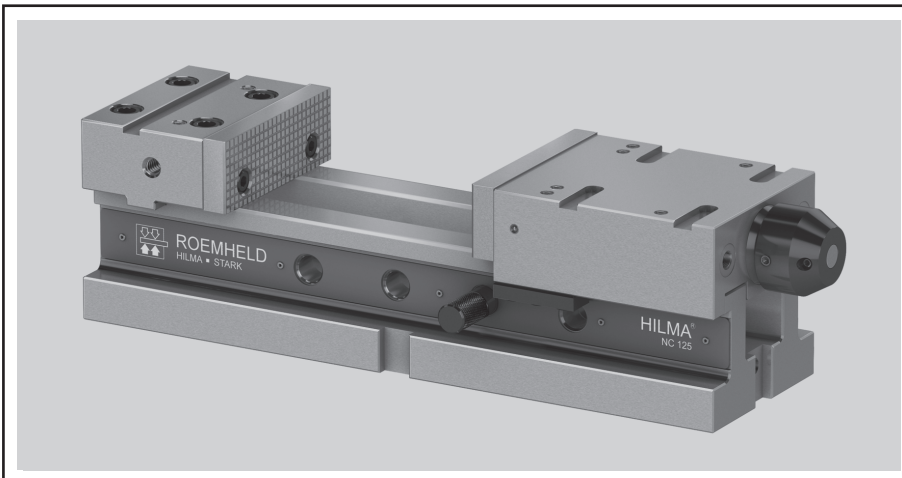
- Hydraulic version provides automatic power clamping with exact high force at the push of a button (requires external power unit)
- Hydra-mechanical version is manually operated, with final high force applied easily using hydraulic power assist
- Finest-quality construction for excellent rigidity and 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.

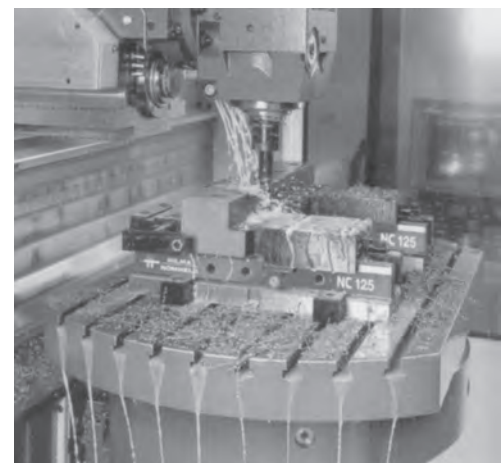
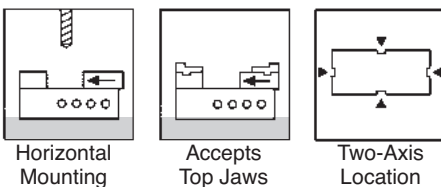
OPERATION OF HYDRA-MECHANICAL VERSION:
Turning the crank handle clockwise moves the sliding jaw mechanically toward the workpiece. Once resistance is met, further turning automatically disengages the screw spindle and gradually applies full hydraulic pressure, with relatively little effort. Turn handle 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



NC-Series vises are ideal for precision, high-production machining on all types of vertical machining centers.



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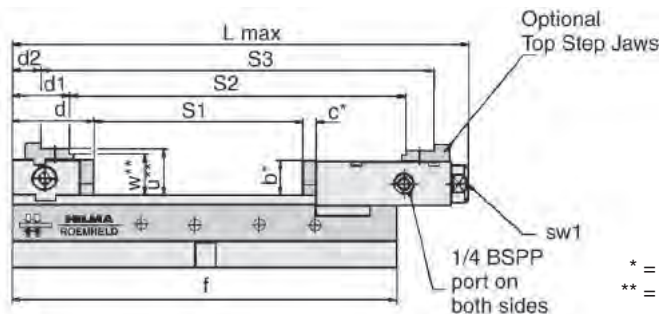
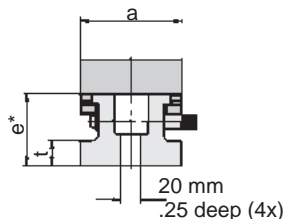
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Machining-Center Vises ■ NC Series

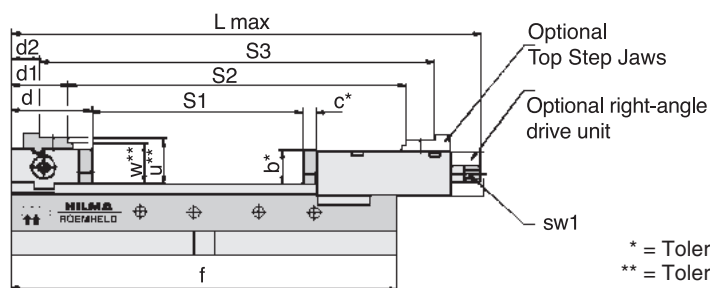
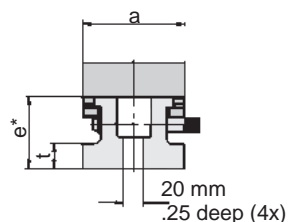
5075 psi max
Single acting

Hydraulic



* = Tolerance $\pm .0004$
** = Tolerance $\pm .0008$

Hydra-Mechanical



* = Tolerance $\pm .0004$
** = Tolerance $\pm .0008$



Force Limiting Adapter	
100mm	CLRH-9-3762-0100-VSA
125mm	CLRH-9-3762-0125-VSA
160mm	CLRH-9-3762-0160-VSA

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



**Optional Right-Angle
Drive Unit for
Hydra-Mechanical Version**

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



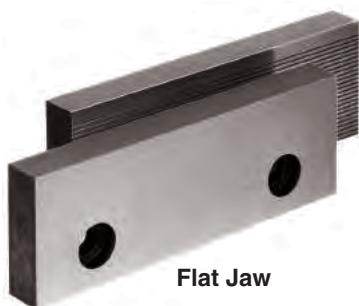
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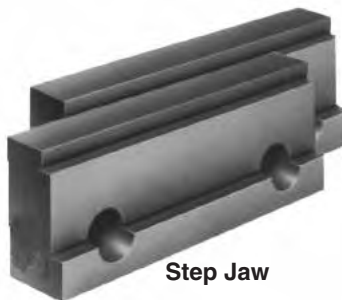
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Vise Jaws

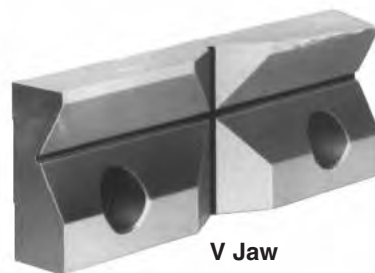
Machine Vise Jaws



Flat Jaw



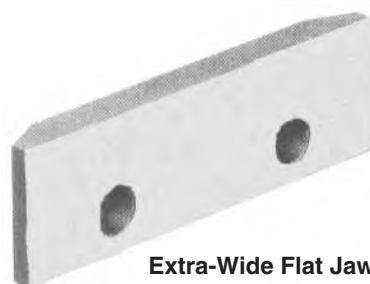
Step Jaw



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.



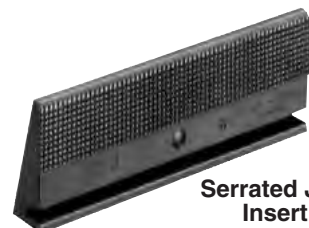
Base Jaw with Permanent Magnets



Standard Jaw Insert



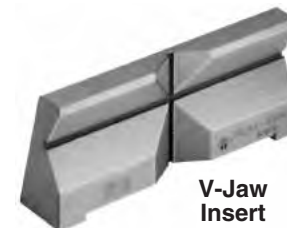
Soft Jaw Insert



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

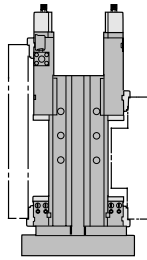


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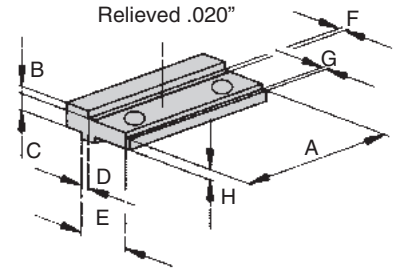
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Vise Accessories

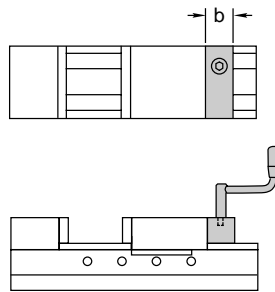


Precision step jaws that mount on top of the fixed and sliding jaws, extending jaw capacity significantly. These hardened and ground jaws are keyed to maintain excellent positional accuracy, as well as height accuracy. Note: top step jaws for sliding jaws have a wider hole spacing than those for fixed jaws. Two mounting screws are included.



Top Step Jaws

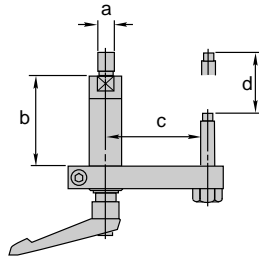
Part No. for Fixed Jaw	Part No. for Sliding Jaw	Jaw Width	A	B	C ±.0004	D ±.0004	E ±.0004	F	G	H ±.0004
CLRH-3284-02-VSA	CLRH-3284-12-VSA	100mm	3.9370		.4528	.2362	1.3386			.2559
CLRH-3284-03-VSA	CLRH-3284-13-VSA	125mm	4.9213	.197	.5512		1.5748	.197	.157	.3543
CLRH-3284-04-VSA	CLRH-3284-14-VSA	160mm	6.2992		.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

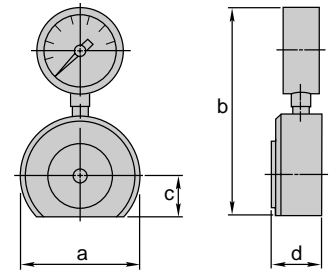
Part No.	Fits Jaw Width	Drive Hex Size	Crank Throw	b	Weight (lbs)
CLRH-3294-05-VSA	100mm	10mm	4.92	1.54	.5
CLRH-3294-06-VSA	125mm			1.69	1.0
CLRH-3294-07-VSA	160mm			1.81	2.0



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

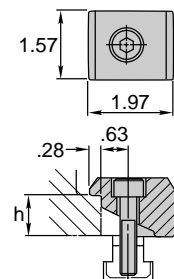
Part No.	Fits Jaw Width	a	b max	c max	d max
CLRH-3291-02-VSA	100mm and 125mm	M12	2.40	3.74	1.81
CLRH-3291-03-VSA				4.13	
CLRH-3291-04-VSA	160mm	M16	3.19	4.88	2.60



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



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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Concentric Clamping Elements

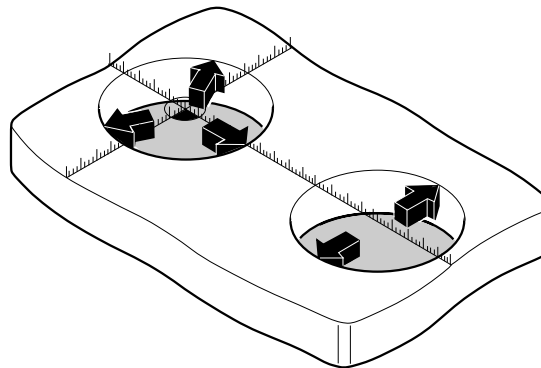
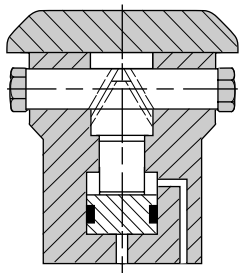
3625 psi max
Double acting only



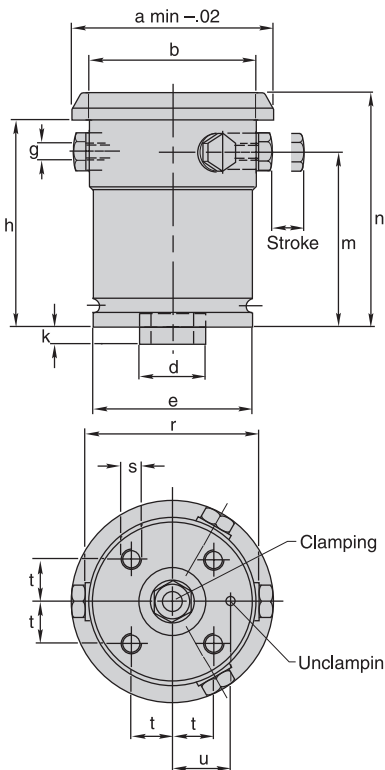
**3-Point Element
Hydraulic**



**2-Point Element
Hydraulic**



Locating and clamping on two diameters requires one 3-point element in the primary reference hole, and one 2-point element in the secondary hole.



Part No. 3-Point Element	Part No. 2-Point Element	Clamping dia a	Clamping force at 3600 psi	Stroke	b dia	d dia	e dia	g	h	k	m	n	r	s	t	u
CLR-4312-025-VS	CLR-4312-000-VS	.98-1.14	2200 lbs	.10	.94	.6302 .6298	1.772 1.768	M8	2.52	.236	2.01	2.62	—	M6	.445	.661
CLR-4312-026-VS	CLR-4312-001-VS	1.10-1.26														
CLR-4312-027-VS	CLR-4312-002-VS	1.26-1.42														
CLR-4312-075-VS	CLR-4312-050-VS	1.42-1.57														
CLR-4312-076-VS	CLR-4312-051-VS	1.54-1.69														
CLR-4312-077-VS	CLR-4312-052-VS	1.65-1.81														
CLR-4312-078-VS	CLR-4312-053-VS	1.77-1.93	1600 lbs	.12	1.77	.6302 .6298	1.772 1.768	M8	2.24	.236	1.77	2.56	1.77	M6	.445	.661
CLR-4312-079-VS	CLR-4312-054-VS	1.89-2.05														
CLR-4312-080-VS	CLR-4312-055-VS	2.01-2.17														
CLR-4312-150-VS	CLR-4312-100-VS	2.13-2.32														
CLR-4312-151-VS	CLR-4312-101-VS	2.28-2.48														
CLR-4312-152-VS	CLR-4312-102-VS	2.44-2.64														
CLR-4312-153-VS	CLR-4312-103-VS	2.64-2.83	3800 lbs	.18	2.56	.9846 .9841	2.362 2.358	M6	2.68	.236	2.20	3.03	2.56	M8	.614	.866
CLR-4312-154-VS	CLR-4312-104-VS	2.80-2.99														
CLR-4312-250-VS	CLR-4312-200-VS	2.99-3.31														
CLR-4312-251-VS	CLR-4312-201-VS	3.27-3.58														
CLR-4312-252-VS	CLR-4312-202-VS	3.54-3.86														
CLR-4312-350-VS	CLR-4312-300-VS	3.86-4.29														
CLR-4312-351-VS	CLR-4312-301-VS	4.29-4.72	6300 lbs	.24	3.35	1.2603 1.2596	2.913 2.909	M8	3.15	.236	2.52	3.58	3.35	M10	.752	1.063
CLR-4312-352-VS	CLR-4312-302-VS	4.69-5.12														
CLR-4312-450-VS	CLR-4312-400-VS	5.12-5.71														
CLR-4312-451-VS	CLR-4312-401-VS	5.55-6.14														
CLR-4312-452-VS	CLR-4312-402-VS	5.98-6.57														
CLR-4312-453-VS	CLR-4312-403-VS	6.42-6.97														
CLR-4312-550-VS	CLR-4312-500-VS	6.97-7.64	15000 lbs	.35	6.30	1.9689 1.9683	4.409 4.406	M12	3.94	.315	3.03	4.57	6.30	M16	1.142	1.614
CLR-4312-551-VS	CLR-4312-501-VS	7.52-8.19														
CLR-4312-552-VS	CLR-4312-502-VS	8.07-8.74														
CLR-4312-553-VS	CLR-4312-503-VS	8.62-9.29														
CLR-4312-554-VS	CLR-4312-504-VS	9.17-9.84														

- Combination locator and clamp, available for internal diameters from 1" to 10" (29 different sizes, each covering a small range)
- Plungers advance simultaneously for excellent repeatability of .0008 inches
- 3-point elements provide primary location, centering the workpiece in both axes
- 2-point elements provide secondary location, centering the workpiece in one axis

APPLICATIONS: For holding workpieces with cast or machined bores, where absolute centering is required regardless of hole tolerance. If the workpiece's tolerance range falls between two clamping ranges, contact bolts can be altered or replaced to change the clamping diameter.

MOUNTING: Concentric clamping elements have two fluid passages underneath. Four mounting options are available using manifold mounting, and one option for using standard 1/4 BSPP fittings. Please contact factory for more information and mounting accessories.

DESIGN CONSIDERATIONS: Concentric clamping elements are not suitable for use on turning machines.

REMARKS FOR ORDERING: The elements, except for 4312-000/-025, are supplied with short, crowned and hardened contact bolts.



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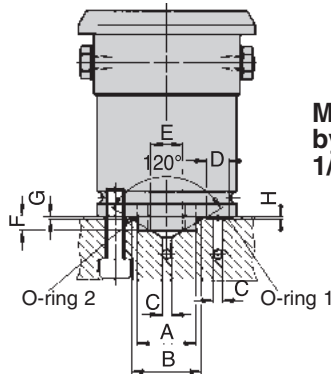
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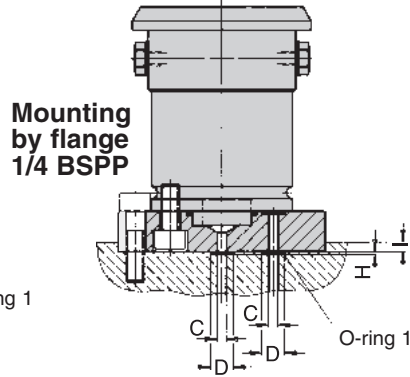
Concentric Clamping Elements

3625 psi max
Double acting only

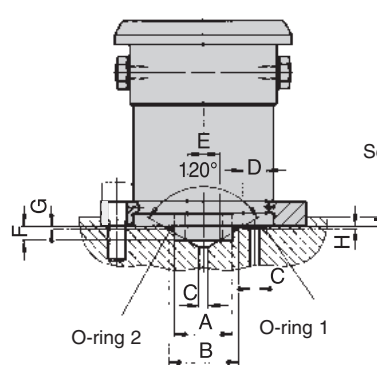
Direct Mounting



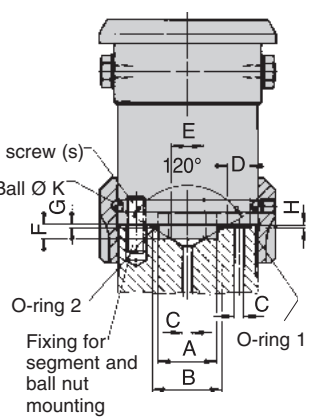
Mounting by Flange



Mounting by Segments

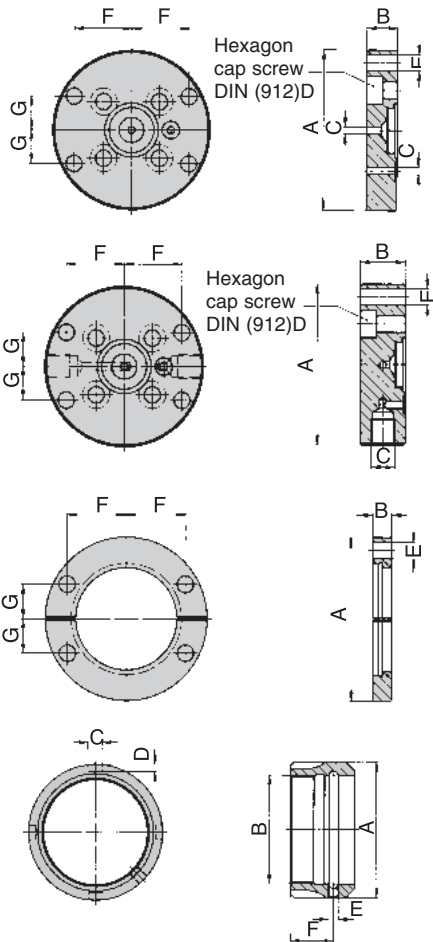


Mounting by Ball Nut



O-rings For Mounting Versions

For Elements	A _{+.0001}	B _{+.008}	C	D _{+.008}	E	F _{+.008}	G _{+.002}	H _{+.002}	K	O-ring 1 (mm)	Part No.	O-ring 2 (mm)	Part No.
CLR-4312-0XX-VSA	.630	.811	.12	.307	.315	.236	.051	.043	5mm	5x1.5	CLR-3000-340-SW	17.17x1.78	CLR-3000-663-SW
CLR-4312-1XX-VSA	.630	.811	.12	.307	.315	.236	.051	.043	5mm	5x1.5	CLR-3000-340-SW	17.17x1.78	CLR-3000-663-SW
CLR-4312-2XX-VSA	.984	1.181	.16	.386	.551	.236	.059	.043	6mm	7x1.5	CLR-3000-342-SW	26x2	CLR-3000-769-SW
CLR-4312-3XX-VSA	1.260	1.441	.20	.425	.630	.236	.051	.043	7mm	8x1.5	CLR-3000-343-SW	33.05x1.78	CLR-3001-238-SW
CLR-4312-4XX-VSA	1.575	1.835	.20	.425	.709	.276	.079	.043	9mm	8x1.5	CLR-3000-343-SW	40.95x2.62	CLR-3000-944-SW
CLR-4312-5XX-VSA	1.969	1.835	.20	.425	.984	.315	.079	.043	11mm	8x1.5	CLR-3000-343-SW	52.07x2.62	CLR-3001-124-SW



Mounting By Flange

For Elements	A	B	C	D	E DIA	F	G	Part No.
CLR-4312-0XX-VSA	2.677	.59	.12	M 6X16	.26	.953	.551	CLR-3456-033-VSA
CLR-4312-1XX-VSA	2.677	.59	.12	M 6X16	.26	.953	.551	CLR-3456-033-VSA
CLR-4312-2XX-VSA	3.465	.67	.16	M 8X20	.35	1.256	.728	CLR-3456-035-VSA
CLR-4312-3XX-VSA	4.331	.79	.20	M 10x25	.43	1.567	.906	CLR-3456-037-VSA
CLR-4312-4XX-VSA	5.118	.87	.20	M 12x25	.53	1.874	1.083	CLR-3456-038-VSA
CLR-4312-5XX-VSA	6.496	1.10	.20	M 16x30	.69	2.354	1.713	CLR-3456-039-VSA

Mounting By Flange 1/4 BSPP

For Elements	A	B	C	D	E DIA	F	G	Part No.
CLR-4312-0XX-VSA	2.677	1.18	1/4 BSPP	M 6X35	.26	.953	.551	CLR-3456-042-VSA
CLR-4312-1XX-VSA	2.677	1.18	1/4 BSPP	M 6X35	.26	.953	.551	CLR-3456-042-VSA
CLR-4312-2XX-VSA	3.465	1.18	1/4 BSPP	M 8X35	.35	1.256	.728	CLR-3456-043-VSA
CLR-4312-3XX-VSA	4.331	1.18	1/4 BSPP	M 10x35	.43	1.567	.906	CLR-3456-044-VSA
CLR-4312-4XX-VSA	5.118	1.18	1/4 BSPP	M 12x35	.53	1.894	1.083	CLR-3456-045-VSA
CLR-4312-5XX-VSA	6.496	1.18	1/4 BSPP	M 16x40	.69	2.354	1.713	CLR-3456-046-VSA

Mounting By Segments

For Elements	A	B	E DIA	F	G	Part No.
CLR-4312-0XX-VSA	2.677	.398	.26	.953	.551	CLR-3533-240-VSA
CLR-4312-1XX-VSA	2.677	.398	.26	.953	.551	CLR-3533-240-VSA
CLR-4312-2XX-VSA	3.465	.457	.35	1.256	.728	CLR-3533-241-VSA
CLR-4312-3XX-VSA	4.331	.516	.43	1.567	.906	CLR-3533-242-VSA
CLR-4312-4XX-VSA	5.118	.634	.53	1.879	1.083	CLR-3533-243-VSA
CLR-4312-5XX-VSA	6.496	.752	.69	2.354	1.713	CLR-3533-244-VSA

Mounting By Ball Nut (with Balls and Screws)

For Elements	A	B	C	D	E DIA	F	Part No.
CLR-4312-0XX-VSA	2.480	M48x1.5	.315	.138	M 6	.87	CLR-0352-762-VSA
CLR-4312-1XX-VSA	2.480	M48x1.5	.315	.138	M 6	.87	CLR-0352-762-VSA
CLR-4312-2XX-VSA	3.071	M60x1.5	.315	.138	M 8	.98	CLR-0352-763-VSA
CLR-4312-3XX-VSA	3.701	M75x2	.394	.157	M 10	1.06	CLR-0352-765-VSA



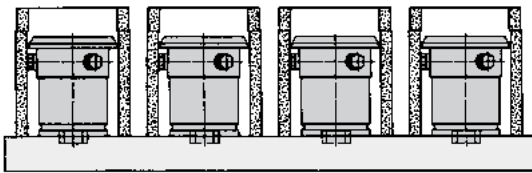
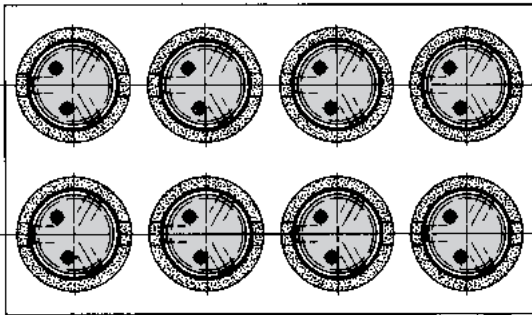
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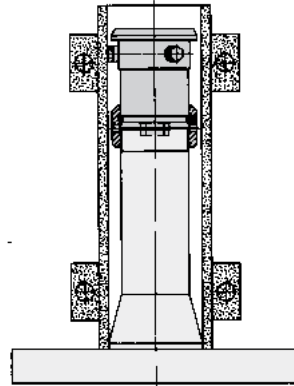
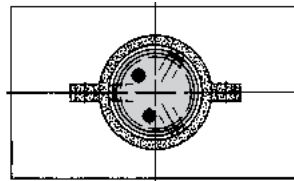
Sales — Phone (636) 386-8022 Fax (636) 386-8034
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Concentric Clamping Elements

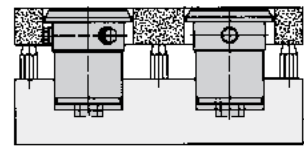
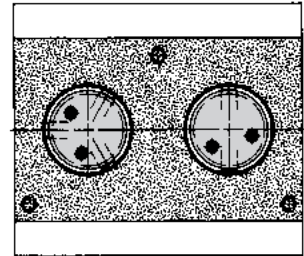
3625 psi max
Double acting only



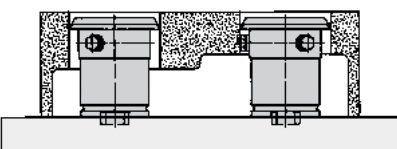
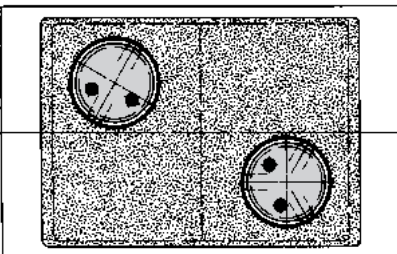
Locating and clamping on a single diameter requires one 3-point element. In this example, eight workpieces are clamped close together using eight 3-point elements.



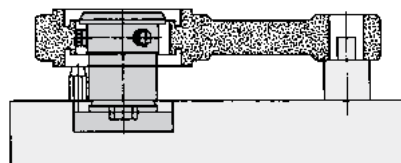
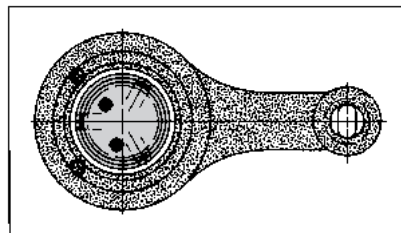
In this example, a long tubular part is centered by a fixed locator at one end, then located and clamped with a 3-point element at the other end.



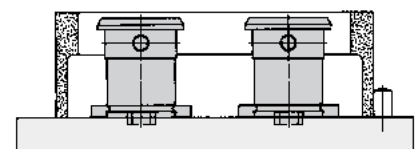
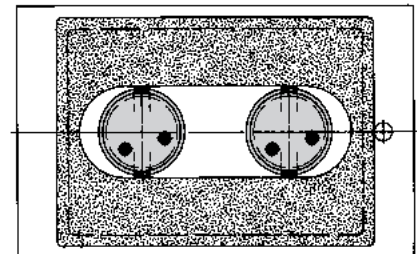
Locating and clamping on two diameters requires one 3-point element in the primary reference hole, and one 2-point element in the secondary hole. Height location in this example is by three fixed Screw Rest Pads.



When locating and clamping on two offset diameters, turn the 2-point element so that it extends perpendicular to the axis between the holes.



If one of the two holes is too small for a concentric clamping element, a fixed diamond locating pin can be used instead of the 2-point element, along with a 3-point element in the larger hole for clamping.



Locating and clamping in a slot can be accomplished using two 2-point elements, along with a locating pin for lateral location.

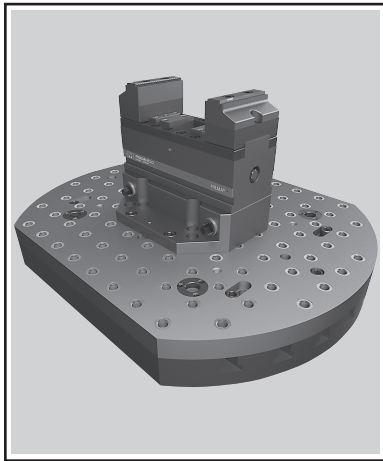


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CL5 Quick-Change Five-Axis Workholding



**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. For subplates, search CL5 in the online catalog at CarrLane.com.

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.

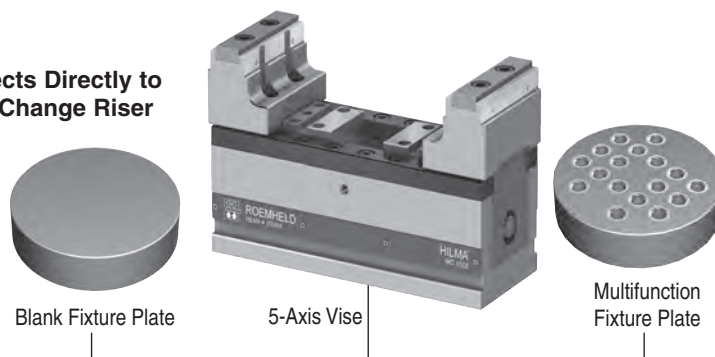
APPLICATIONS: The CL5® systems offers three primary methods of fixturing:

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.

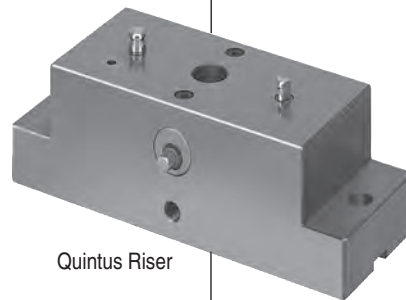
METHOD 2: Quintus Quick-Change Riser Mounted on Rotary Table. The method provides additional height for spindle clearance. It allows you to quickly and accurately mount directly on rotary tables 250mm diameter and larger.

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

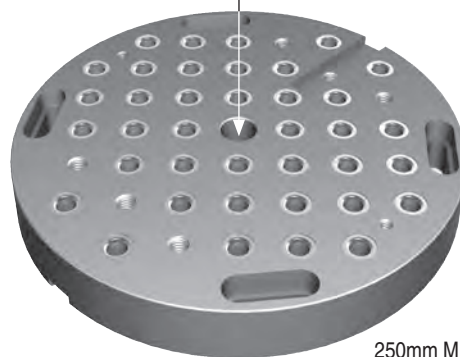


**Quintus Quick-Change Riser
Connects to Any Subplate,
No Extra Adaptors Required**



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.



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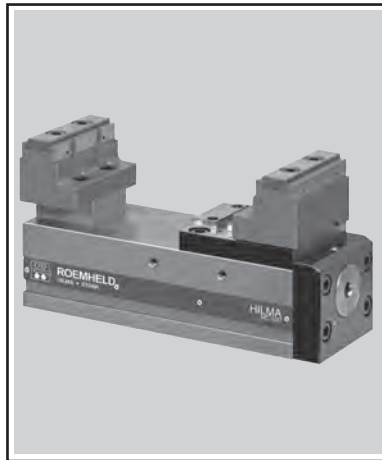
5-Axis Vise ■ Mechanical

Allows unrestricted tool access for 5-sided machining



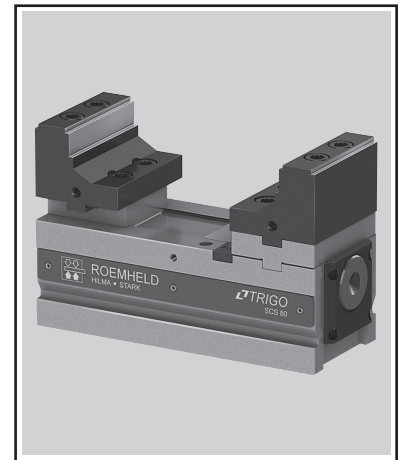
MC-Z Series Concentric Vise
INFO+: Pages 105-106

- 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 105-106

- Jaw Widths: 40, 60, and 100mm
- Conventional vise style with one fixed and one moving jaw

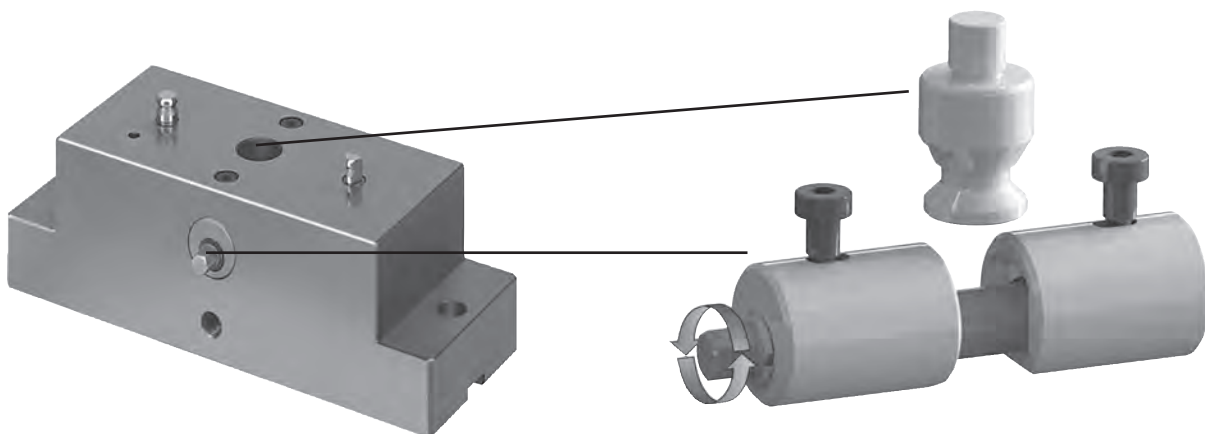


**SCS Series Mechanical Vise
Fixed Jaw**
INFO+: Pages 107

- Jaw Widths: 60 and 100mm
- Conventional vise style with one fixed and one moving jaw

Quintus Quick-Change Riser

INFO+: See page 108 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.



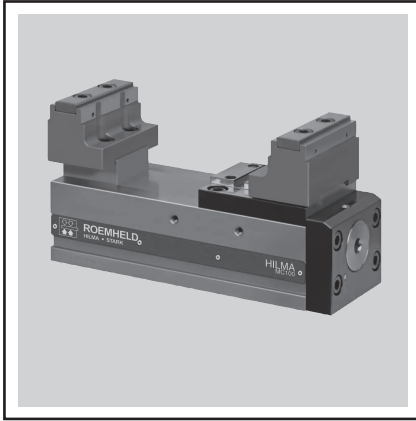
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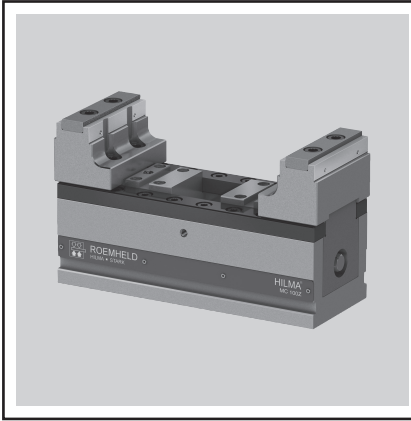
Sales — Phone (636) 386-8022 Fax (636) 386-8034
Engineering — Phone 1-800-827-2526 Web www.clrh.com

Mini Clamp Vises

3770 psi max
Mechanical and Hydraulic



MC Series
Manual or Hydraulic



MCZ Series
Manual (Concentric)

**INFO+: FOR 5-AXIS
MACHINING, USE WITH
CL5 SYSTEM, SEARCH CL5
IN THE ONLINE CATALOG AT
CARRLANE.COM!**

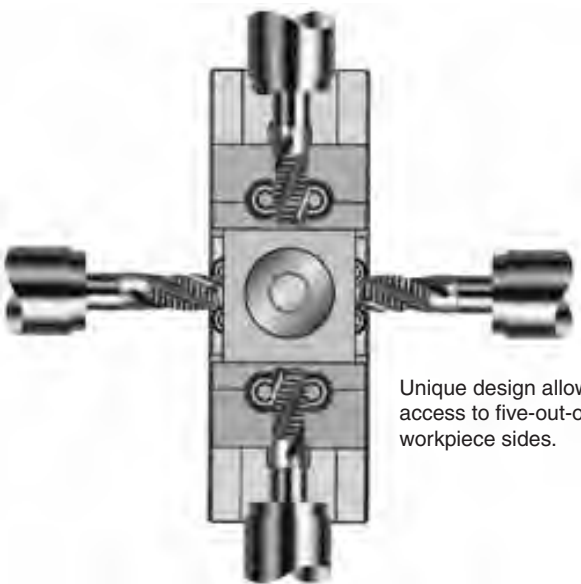
DESCRIPTION: MC-series Mini Clamp Vises are designed especially for multi-face machining with a single clamping operation. Unique design allows clear tool access to five-out-of-six workpiece sides. Ideal for machining complicated workpieces in a single clamping operation, such as in mold making. Mini-Clamp 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.



Unique design allows clear tool access to five-out-of-six workpiece sides.



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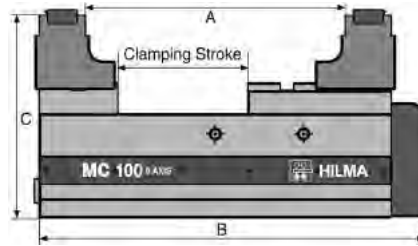
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Mini Clamp Vises

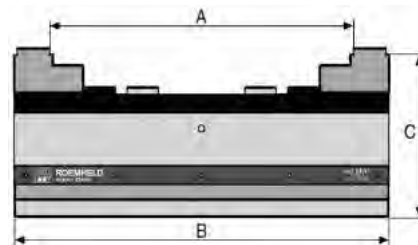
3770 psi max
Mechanical and Hydraulic

**INFO+: FOR 5-AXIS
MACHINING, USE WITH
CL5 SYSTEM, SEARCH CL5
IN THE ONLINE CATALOG AT
CARRLANE.COM!**



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	CLRH-9-3581-0102-VS	CLRH-9-3583-0112-VS	CLRH-9-3583-0212-VS	CLRH-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	CLRH-9-3581-0302-VS	CLRH-9-3583-0301-VS	CLRH-9-3585-0303-VS	CLRH-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	CLRH-9-3583-6901-VSA	—	—	—
Hardened Step Jaw, Mobile	CLRH-9-3583-6901-VSA	CLRH-9-3583-6001-VSA	CLRH-9-3585-6901-VSA	CLRH-9-3586-6901-VSA
Machinable Soft Jaw, Fixed	CLRH-9-3583-6002-VSA	—	—	—
Machinable Soft Jaw, Mobile	CLRH-9-3583-6002-VSA	CLRH-9-3583-6902-VSA	CLRH-9-3585-6902-VSA	CLRH-9-3586-6902-VSA
Torque Wrench	CLRH-9-3583-7010-VSA	CLRH-9-3583-7010-VSA	CLRH-9-3792-6610-VSA	—
Clamping Claws (4 set) M10 Screws	CLRH-9-3583-7001-VSA	CLRH-9-3583-7001-VSA	—	—
Clamping Claws (4 set) M12 Screws	CLRH-9-3583-7002-VSA	CLRH-9-3583-7002-VSA	CLRH-9-3585-7001-VSA	—
Socket Nut	CLRH-1-3124-0104-VSA	CLRH-1-3124-0021-VSA	CLRH-1-3124-0020-VSA	—

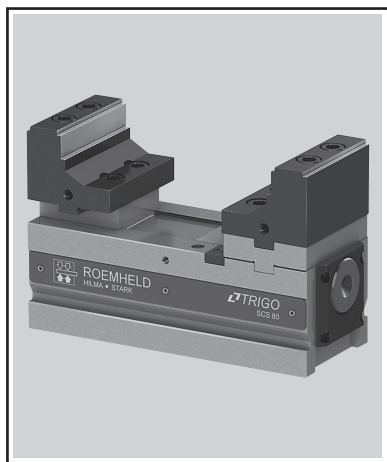


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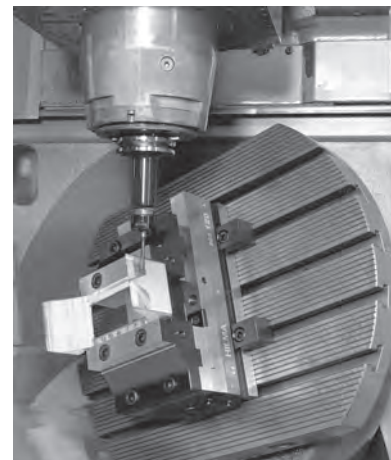
Sales — Phone (636) 386-8022 Fax (636) 386-8034
Engineering — Phone 1-800-827-2526 Web www.clrh.com

SCS Standard Vise ■ Mechanical Super Compact Clamp
Max. Clamping Force ■ 8990 lbs

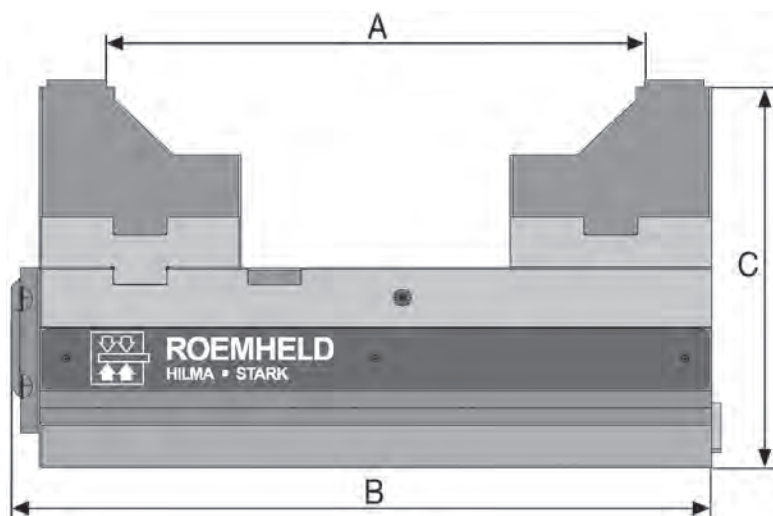
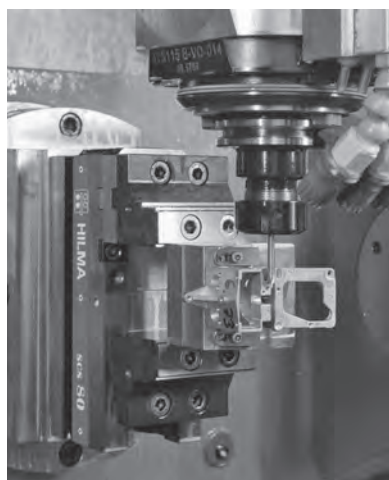


**SCS Series Mechanical Vise
Fixed Jaw**

- 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.



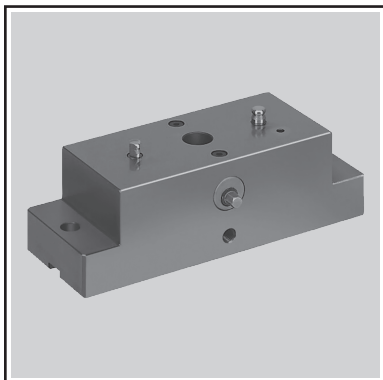
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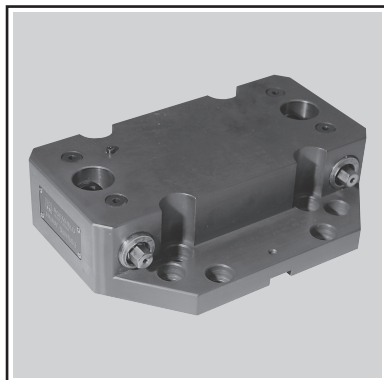
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Quick-Change Five-Axis Workholding ■ **Quintus Riser**

Quintus Riser ■ Quick-Change Riser Max. Retention Force per Clamping Pin ■ 4500 lbs



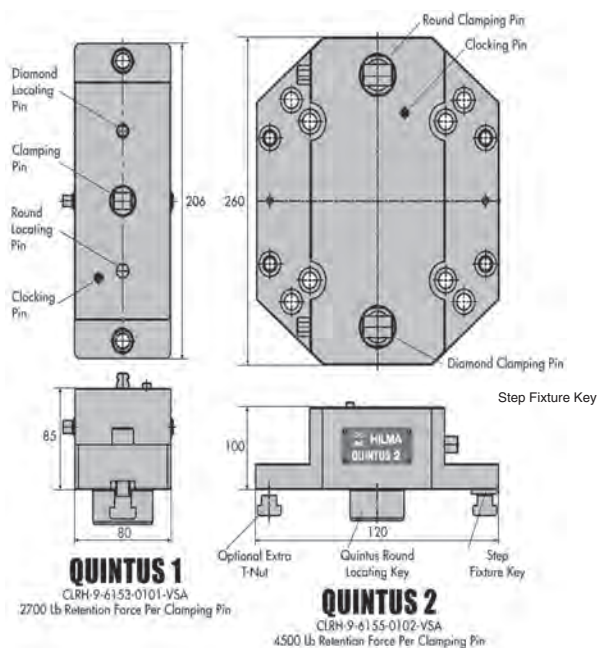
Quintus 1
Quick Change Riser



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.



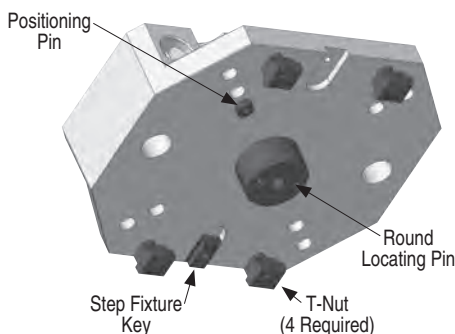
Round Locating Key
for Quintus 1, 2, 3

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



Bottom View of Quintus 2



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.



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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 103-109.

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	

Subject to change. For further details, including detailed dimensions and mounting instructions, visit www.clrh.com.



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Sales — Phone (636) 386-8022 Fax (636) 386-8034
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Concentric Vises

**2175 psi max clamp
290 psi max unclamp**



Hydraulic Concentric

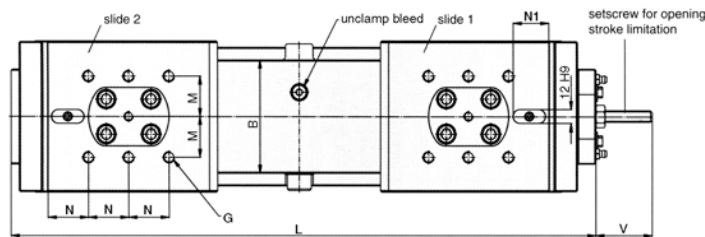
- High clamping repeatability ± 0.01 mm
- Constant length and large clamping ranges
- Any mounting position
- Possibilities for positioning and fastening customer-specific jaws
- Protection against coolant and swarf by integral wipers in the clamping slides
- Large stroke of the slide
- Limitation of 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.

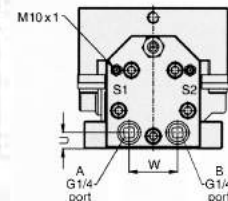
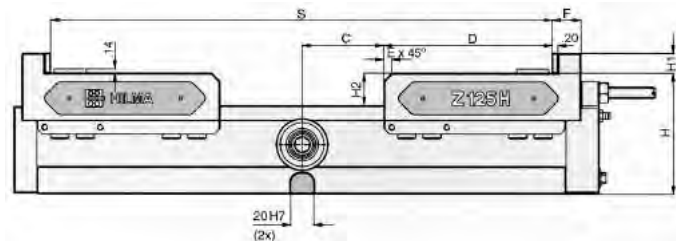
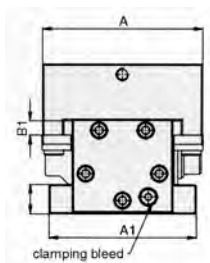
They may be used in machining centers, on machine tools and final processing machines as well as in special jigs and fixtures.

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 ₁	3.937	4.724	5.59
B	2.91	3.86	7.8
B ₁	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 ₁	0.63	0.67	0.79
H ₁	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 ₁	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.



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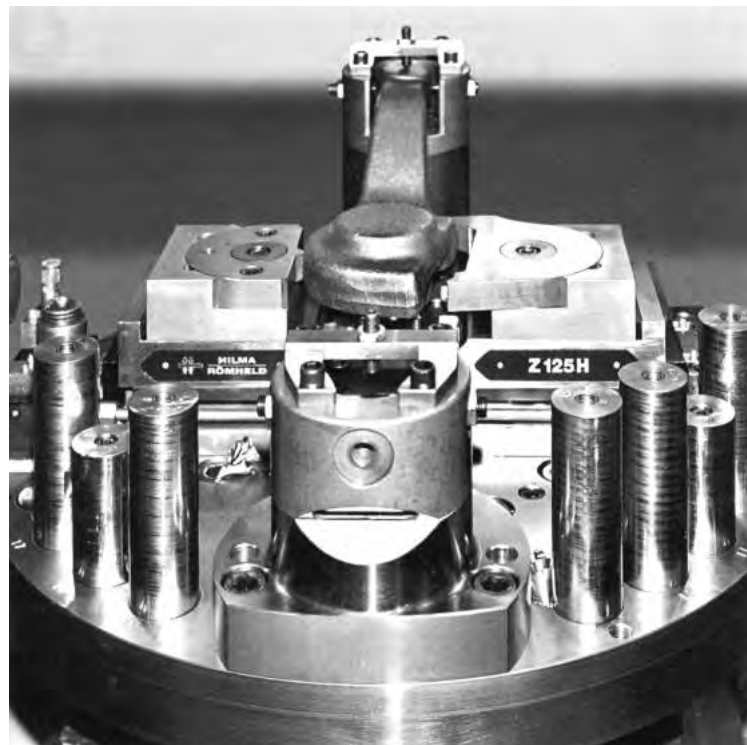
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Concentric Vises

2175 psi max to clamp
290 psi max to unclamp

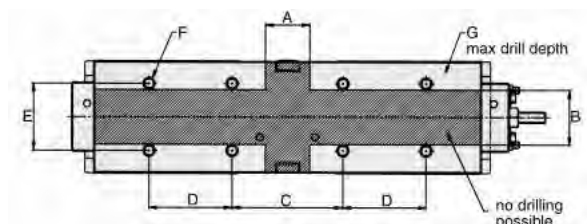


Jaws Quoted
Upon Request.

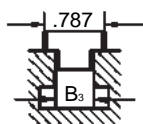


Self-centering vise, hydraulically operated

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

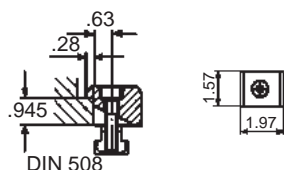


Set of tenon blocks
DIN 6323

Accessories

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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Vises ■ Collet Vises ■ H4.330

Collet Vise ■ Single Version and Triple Version

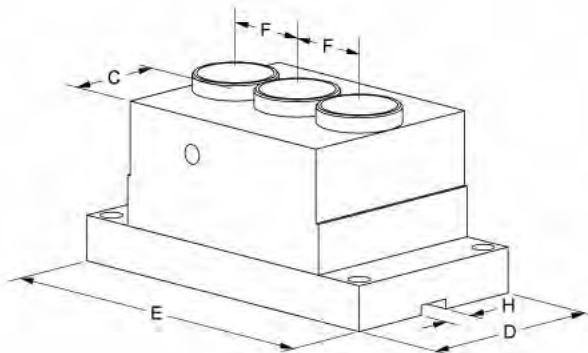
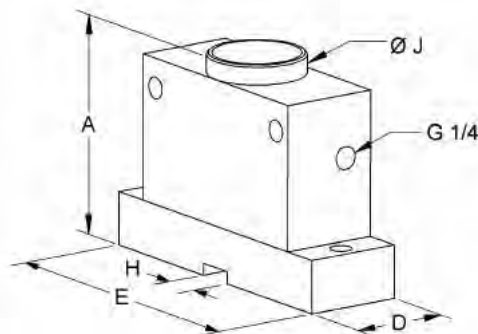
Single Acting ■ Max. Operating Pressure ■ 3625 psi (250 bar)



Single Version

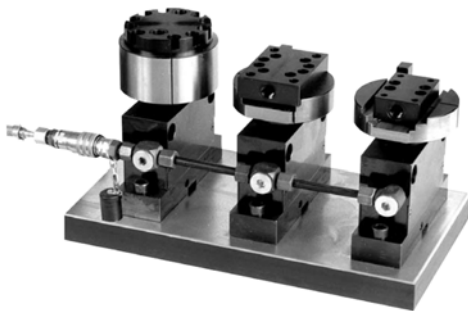


Triple Version

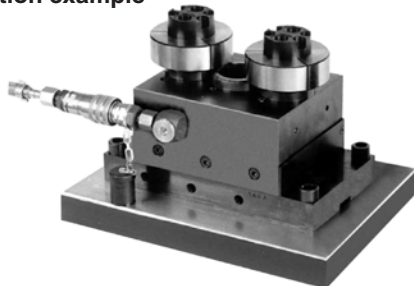


Collet Vises are designed to clamp round, square or hex-shaped workpieces using a standard 5C collet (not included). Workpieces can be clamped internally or externally depending on the choice of collet. Collet vises can easily be stacked together to clamp multiple parts in a very compact area and can be used in either a vertical or horizontal position. Inside the bore of the collet vise is a workpiece stop which can be adjusted or completely removed to allow workpieces to pass through the vise.

Application example



Application example



Collet Vise	Single	Triple
Max. clamping force, axial (lbs)	1910	1910
Max. clamping force, radial (lbs)	19110	19110
Max. operating pressure (psi)	3625	3625
Clamping range of collet (in.)	Ø 0.04 - 1.02	Ø 0.04 - 1.02
Max. oil flow rate (g/min.)	0.63	0.63
Max. oil volume/clamping stroke (in. ³)	0.12	0.35
A	4.37	4.37
C	3.15	2.36
D	1.97	4.72
E	6.30	8.66
F	N/A	1.97
H	20H7	20H7
Ø J	1.95	1.95
Weight (lb)	9.48	28.88
Part No. (collet not included)	CLR-4604-700	CLR-4604-705

Subject to change. For further details, including detailed dimensions and mounting instructions, visit www.clrh.com.

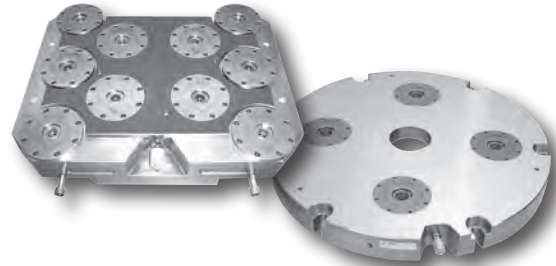


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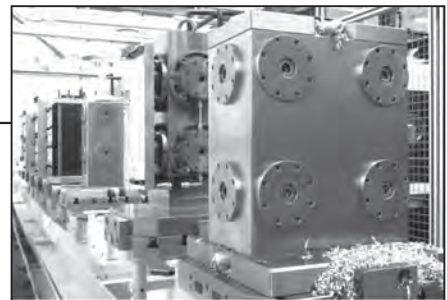
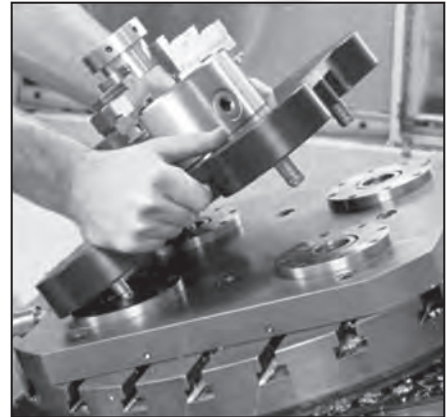
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REDUCE SET-UP AND DOWNTIME!



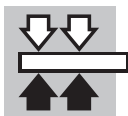
Zero Point Mounting System Means Faster And More Accurate Fixture Set Ups

This comprehensive system utilizes clamping components and insertion nipples, which provide an **immediate zero point orientation**.



- Reduce set up time by as much as 90% with zero point mounting
- Existing fixtures can be easily adapted
- Highly accurate positioning and repeatability
- Increased productivity
- Fast payback
- Set-up times slashed
- Fixture life extended

See Pages 114-116



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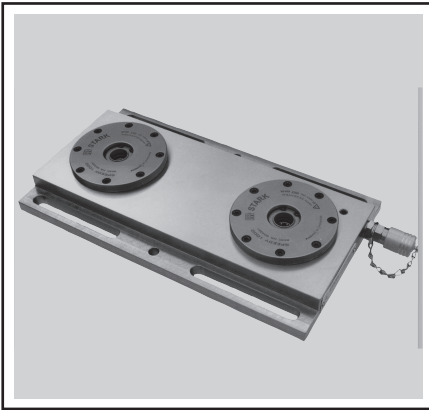
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Zero-Point Quick Change Mounting System

1160 psi max
Single acting

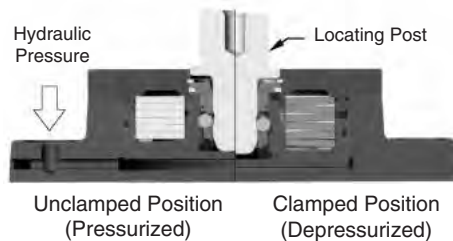


Speedy Clamping Plate

- Change fixture plates in seconds
- A low-cost entry into quick pallet change technology
- Flexible and expandable
- Can be mounted on machine table and tooling block
- Cost reduction of machine set-up
- Increased machine efficiency through external set-up



Section view of Speedy Clamping Module



Hydraulic Pressure

Locating Post

Unclamped Position
(Pressurized)

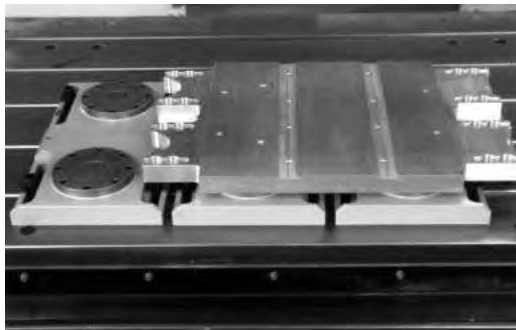
Clamped Position
(Depressurized)

DESCRIPTION: Speedy Clamping Plates are subplates for mounting on a machine table or tooling block. These plates have two clamping modules to simultaneously locate and clamp a fixture that has pull-down locating posts. Hydraulic connection is required only while changing fixtures. Applying hydraulic pressure releases locking balls in both clamping modules to allow the fixture to be changed. When hydraulic pressure is released again, belleville springs re-engage the locking balls to pull the fixture down securely into position. The pump unit can then be disconnected for machining.

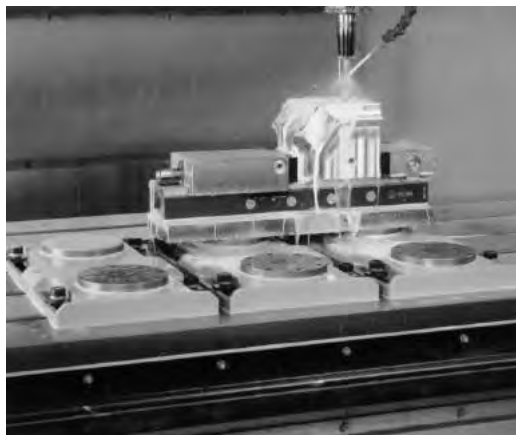
CLAMPING ACTION: Each plate clamps using spring force with hydraulic release, and will give 4,400 lbs. of clamping force (2,200 per clamp), with a repeated accuracy of <0.0004 in. Location of pallet is done by the outer diameter of the nipples. The air over oil pump is specifically designed to be used with the module plates and will exert a max. of 1160 psi. Hydraulic pressure is only required to release the pallet. The module plates have an integrated rupture plug that will protect the clamps if an incorrect power unit is used. Other types of pallet clamping options are available upon request.

EXTENSION KITS: Extension plates come with all parts needed to append your pallet change system. These plates allow you to expand your pallet size to optimize your machine space and spindle travel. By using your machine to its maximum efficiency you will increase your versatility and productivity.

See starter kits and extension kits on the next two pages.



Tooling plate mounted on two Speedy Clamping Plates.



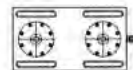
Machining-Center Vise mounted on Speedy Clamping Plates.

Module plates - Examples for multiple applications

STARTER PLATE:

Vise

Fixture

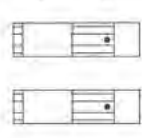
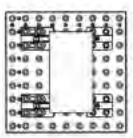
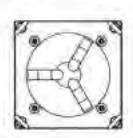
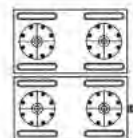


STARTER PLATE & EXTENSION KIT:

Chuck

Fixture

2 Vises

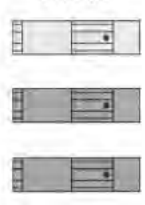
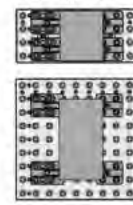
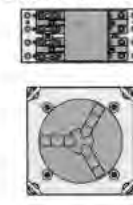
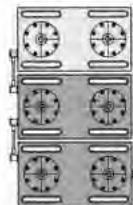


STARTER PLATE & 2 EXTENSION KITS:

Chuck & Fixture

2 Fixtures

3 Vises



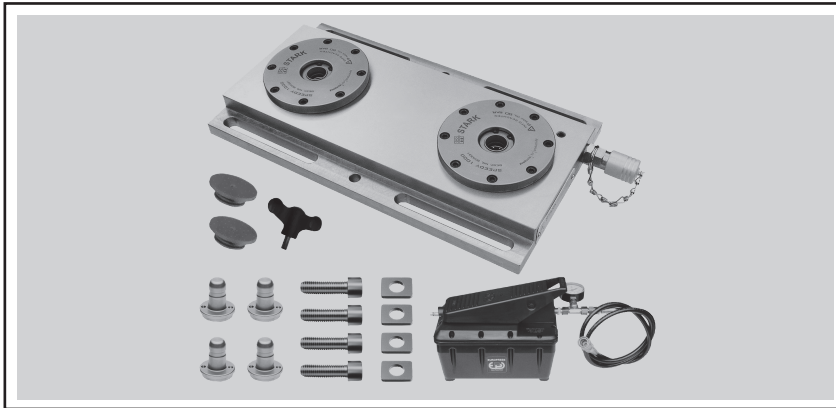
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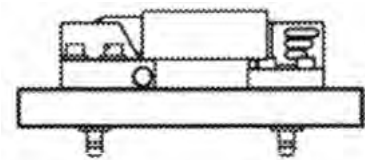
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Zero-Point Quick Change Mounting System

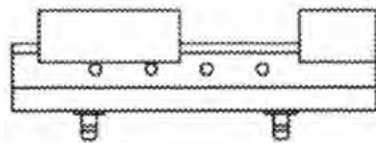
1160 psi max
Single acting



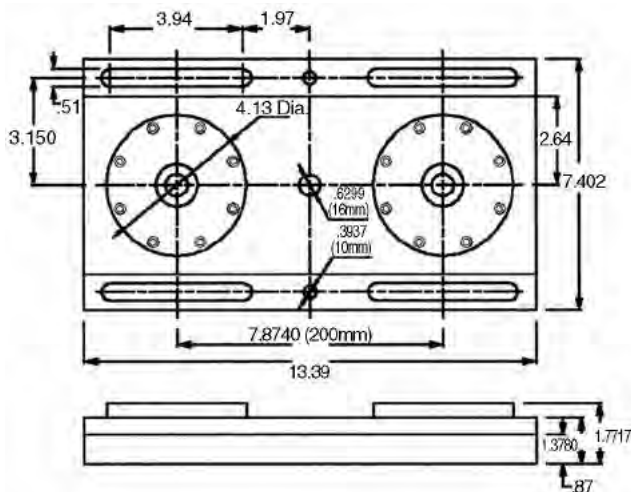
Speedy Clamping Plate Starter Kit



Fixture Plate with Locating Posts



Vise with Locating Posts



DESCRIPTION: These handy starter kits can be configured in various ways to allow you to change your fixture plate in seconds. Each plate will give 4,400 lbs. of clamping force (2,200 lbs. per clamp). Location of pallet is done by the outer diameter of the nipples. The air over oil pump is specifically designed to be used with the module plates and will exert a max of 1160 psi. Hydraulic pressure is only required to release the pallet. The module plates have an integrated rupture plug that will protect the clamps if an incorrect power unit is used. Other types of pallet clamping options are available upon request.

SIZES: Speedy Clamping Plates are available in one size, with two clamping modules spaced 200mm (7.8740") apart. Each clamping module provides 2200 lbs hold-down force.

CLAMPING ACTION: Applying fluid pressure lifts the piston in each clamping module, allowing the locking balls to release. When pressure is released, force is applied by belleville springs to re-engage the locking balls and pull the locating post downward.

ACCURACY: Repeatability of fixture location is .0004" or better.

MOUNTING: Clamping plates can be accurately positioned using the locating holes provided. Locating Keys are available as an accessory. Fasten plate using the four socket-head cap screws and square washers furnished.

HYDRAULIC POWER SOURCE: The air-operated hydraulic pump unit included with this kit provides 1160 psi (80 bar) hydraulic pressure. A Safety Rupture Plug is included with the clamping plate to protect the clamping modules if an incorrect power unit is used.

For more information, see previous page, or see the following page for Extension Kits.

Speedy Clamping Plate Starter Kits

Clamping force per module (lbs)	2200
Number of modules	2
Maximum allowable side force (lbs)	1600
Fluid required (cu. in.)	1.22
Maximum operating pressure (psi)	1160
Clamping time (sec)	2
Release time (sec)	2
Operating temperature (°F)	50-175
Repeatability	<.0004
Prepositioning	±.12
Part No.	CLRS-803-710-ZK

Kit Components

Item	Quantity	Part No.
Speedy Clamping Plate	1	CLRS-803-712-ZA
Air Pump Unit	1	CLRS-803-411-ZAP
Male Quick Disconnect	1	CLRS-804-368-ZF
Protective Plugs	2	CLRS-704-094-ZA
Plug Installation Tool	1	CLRS-704-094-01-ZA
Safety Rupture Plug	1	CLRS-803-790-ZF
Socket-Head Cap Screws	4	CLRS-931-059-ZA
Square Washers	4	CLRS-704-020-ZA
Zero-Point Locating Posts	4	CLRS-804-209-ZN



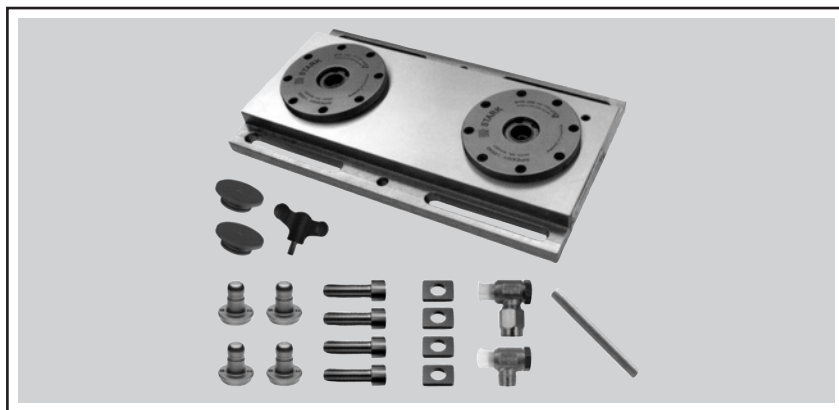
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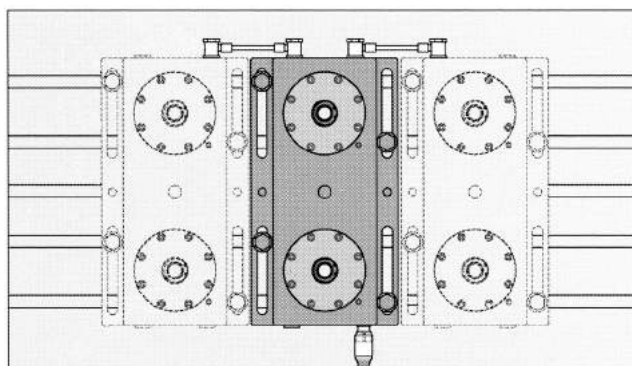
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Zero-Point Quick Change Mounting System

1160 psi max
Single acting



Speedy Clamping Plate Extension Kit



Example: One Starter Kit and two Extension Kits mounted on a machine table.

DESCRIPTION: The Extension Kit shown here is used to add on to an existing Starter Kit (no Air Pump Unit included). Extension plates come with all parts needed to append your pallet change system. These plates allow you to expand your pallet size to optimize your machine space and spindle travel. By using your machine to its maximum efficiency you will increase your versatility and productivity.

For more information, see the two previous pages.

Speedy Clamping Plate Extension Kits

Clamping force per module (lbs)	2200
Number of modules	2
Maximum allowable side force (lbs)	1600
Fluid required (cu. in.)	1.22
Maximum operating pressure (psi)	1160
Clamping time (sec)	2
Release time (sec)	2
Operating temperature (°F)	50-175
Repeatability	<.0004
Prepositioning	±.12
Part No.	CLRS-803-711-ZK

Kit Components

Item	Quantity	Part No.
Speedy Clamping Plate	1	CLRS-803-712-ZA
Swivel Connector A	1	CLRS-804-392-ZF
Swivel Connector B	1	CLRS-804-369-ZF
Tubing	1	CLRS-P00036-ZF
Protective Plugs	2	CLRS-704-094-ZA
Plug Installation Tool	1	CLRS-704-094-01-ZA
Safety Rupture Plug	1	CLRS-803-790-ZF
Socket-Head Cap Screws	4	CLRS-931-059-ZA
Square Washers	4	CLRS-704-020-ZA
Zero-Point Locating Post	4	CLRS-804-209-ZN

Accessories

 CLRS-804-209-ZN Zero Point Nipple	 CLRS-804-230-ZN Balancing Nipple	 CLRS-804-238-ZN Floating Nipple	 CLRS-804-259-ZA Spindle Installation Pin
 CLRS-804-255-ZA Torque Wrench	 CLRS-804-254-ZA Nipple Installation Key	 CLRS-804-368-ZF Male Coupling	 CLRS-803-790-ZF Safety Rupture Plug
 CLRS-803-791-ZA T-Nut M12 x 14	 CLRS-704-161-ZA Sliding Block with Pin	 CLRS-7990-547-ZA 2 Nipple Pallet Plate 15.75 x 11.81 x 1.0 Thick	 CLRS-7990-548-ZA 4 Nipple Pallet Plate 15.75 x 15.75 x 1.0 Thick



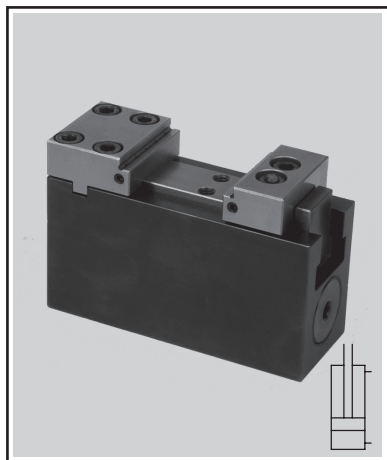
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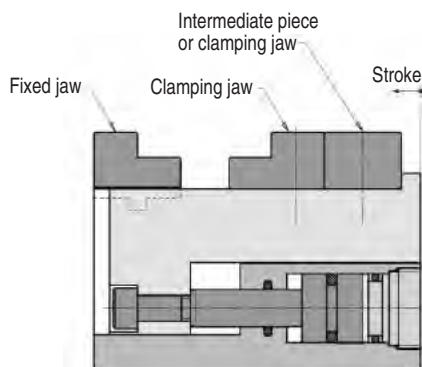
Vises ■ Fixture Clamps ■ I4.110 & I4.111

Fixture Clamps with Fixed Jaw ■ Compact vise with jaw widths 1.57" and 2.56" Double Acting ■ Max. Operating Pressure ■ 3625 psi (250 bar)

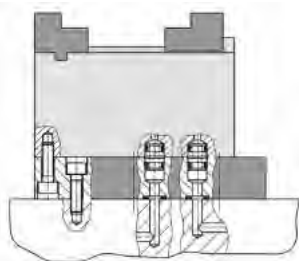


The fixed jaw fixture clamp consists of a very compact body with an integrated hydraulic cylinder that actuates the movable jaw. All threads and ports are at the bottom which allows for a very tight and space savings arrangement. If fastening from the bottom is not possible an adaptor plate for manifold

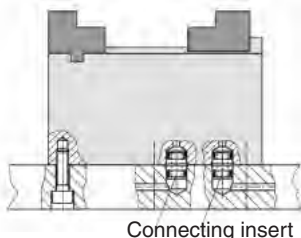
mounting or tube connection is available. Accessory blank jaws are also available that can be milled to match the workpiece contour. The fixed jaw can be equipped with a pneumatic seat control which is well suited for automation applications.



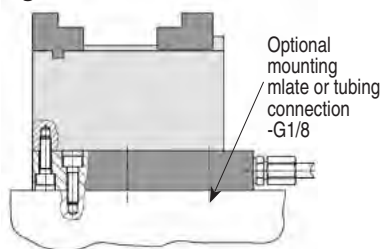
Fixing from above
with accessory adaptor plate
Drilled channels



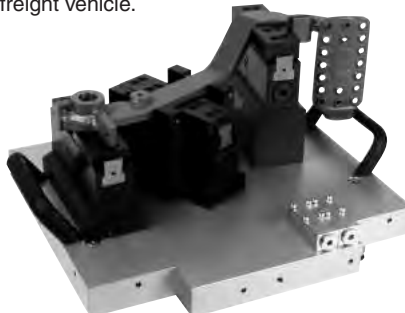
Fixing from below
Drilled channels



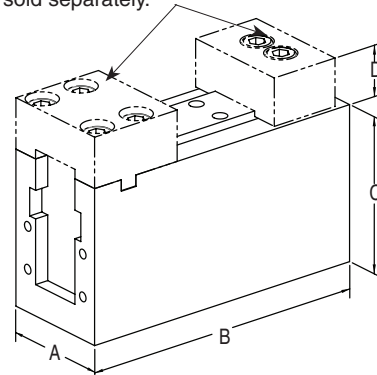
Fitting connection



Application example
Clamping fixture for a pedal of a freight vehicle.



Blank jaws and cap screws sold separately.



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.



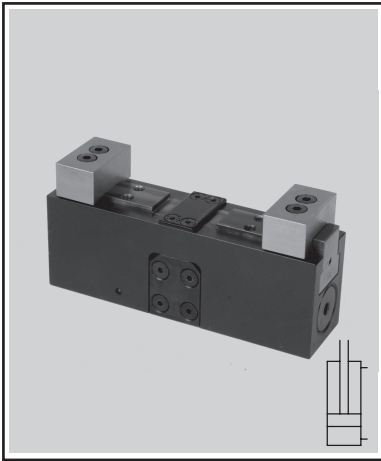
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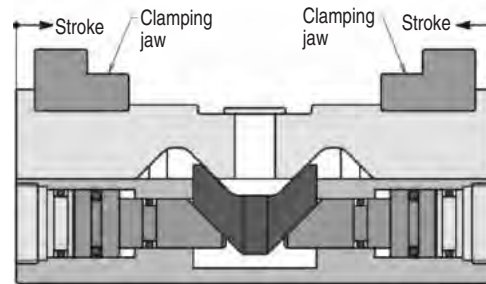
Vises ■ Fixture Clamps ■ I4.120

Fixture Clamps, Concentric ■ Compact vise with jaw widths 1.57" and 2.56" Double Acting ■ Max. Operating Pressure ■ 3625 psi (250 bar)

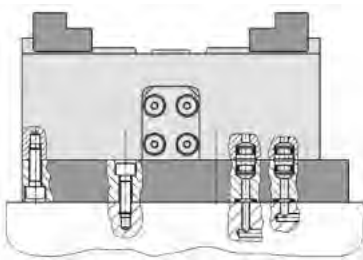


The concentric fixture clamp consists of a very compact body with two integrated hydraulic cylinders that actuate the movable jaws. The piston forces are transferred to a "V" linkage (see cut away below). The "V" linkage then pulls the jaws together in a self-centering fashion. All threads and ports are at the bottom

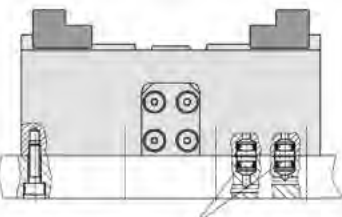
which allows for a very tight and space savings arrangement. If fastening from the bottom is not possible an adaptor plate for manifold mounting or tube connection is available. Accessory blank jaws are also available that can be milled to match the workpiece contour.



Fixing from above
with accessory adaptor plate
Drilled channels

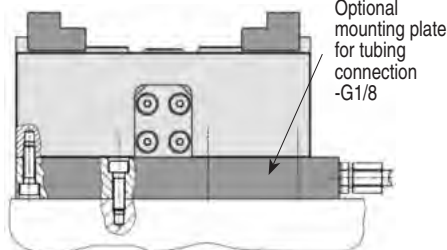


Fixing from below
Drilled channels

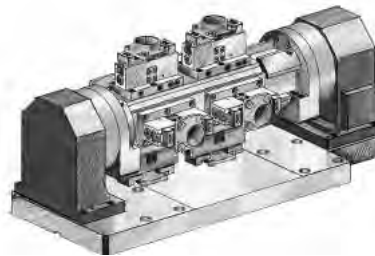


Connecting insert

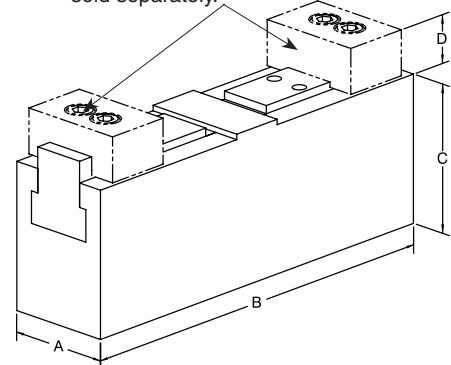
Fitting connection



Application example
Clamping fixture for a pedal of a freight vehicle.



Blank jaws and cap screws
sold separately.



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	2025
	2000 psi	1115
	1000 psi	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.



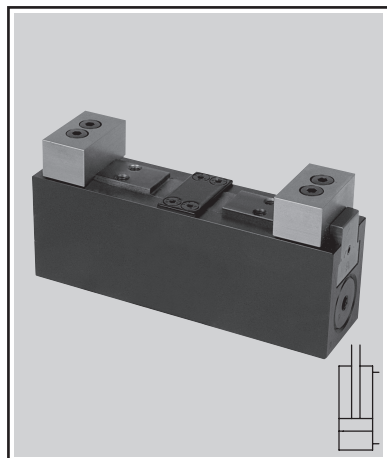
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Vises ■ Fixture Clamps ■ I4.130

Fixture Clamps, Position Flexible ■ Compact vise with jaw width 1.57"
Double Acting ■ Max. Operating Pressure ■ 3625 psi (250 bar)

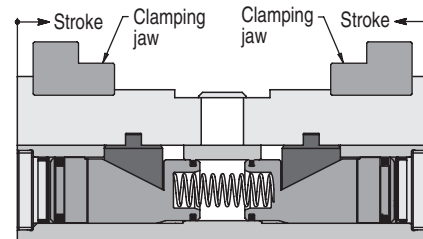
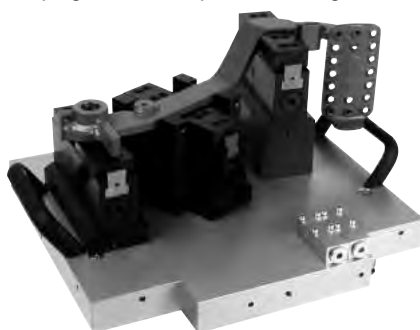


The position flexible fixture clamp consists of a very compact body with integrated hydraulic cylinders that actuate the movable jaws. The piston forces are transmitted via two channels to the clamping slides. The design allows the clamping slides to move independently of each. A minimal contact force is applied to the part until both jaws are in contact with the workpiece. At that point the pressure builds

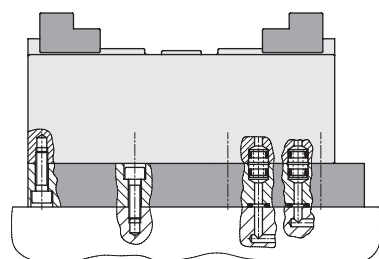
along with the clamping force. All threads and ports are at the bottom which allows for a very tight and space savings arrangement. If fastening from the bottom is not possible an adaptor plate for manifold mounting or tube connection is available. Accessory blank jaws are also available that can be milled to match the workpiece contour.

Application example

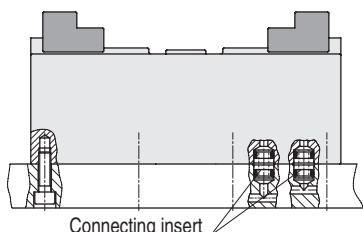
Clamping fixture for a pedal of a freight vehicle.



Fixing from above
with accessory adaptor plate
Drilled channels

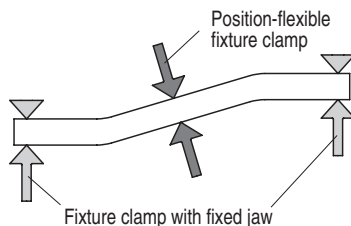


Fixing from below
Drilled channels

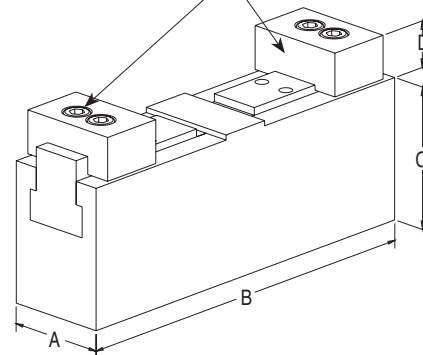


Connecting insert

Clamping principle

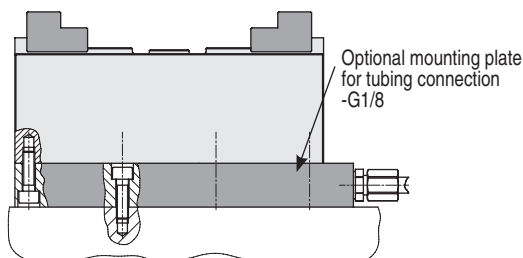


Blank jaws and cap screws
sold separately.



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

Pipe thread



Optional mounting plate
for tubing connection
-G1/8

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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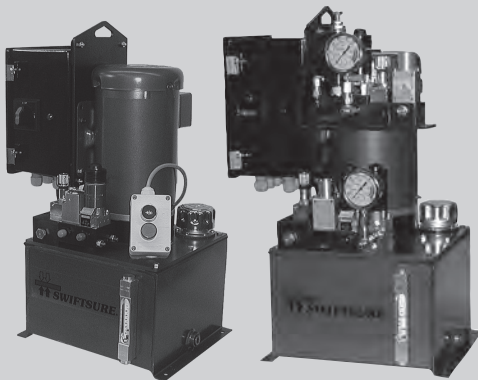
Power Sources



Compact Electric Power Units
pages 122-123

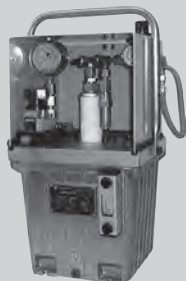
Electric Power Units

Compact Electric Power Units are compact, light weight, modular units ready for installation. Ideal for operating small and midsize clamping systems, and suitable for both single-acting and double-acting cylinders. These zero leakage systems come complete with motor, pump, oil tank, manifold block, pressure gauge, pressure switch, valves and electrical system.



Electric Power Units
pages 124-127

Standard 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 7500 psi output pressures. 120, 220, or 440 volt.



Air Power Units
pages 128-129

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 7500 psi output pressure.



Compact Air Power Units
page 130

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.

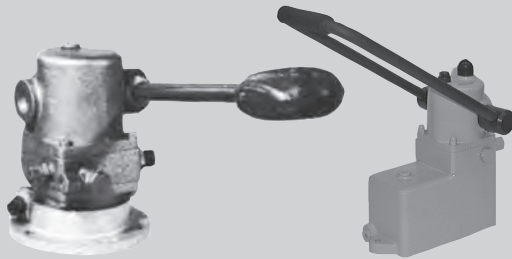


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Power Sources



Single Stage
page 131

Two Stage
page 132

Hand Pumps

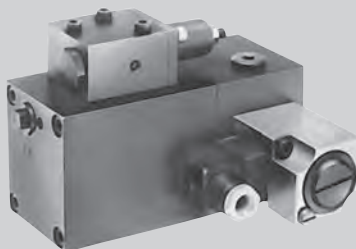
Manual power source for moderate-size factors. Compact and portable. Ideal for sensitive test fixtures. Choice of hand or foot operation.



page 133

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.



Block Style
page 134



Compact Cylinder Style
pages 135-136

Hydraulic Intensifiers

Hydraulic Intensifiers convert hydraulic pressure on the input to a higher pressure on the output. This enables the use of the comparatively low pressure of machine tool hydraulics to pressurize hydraulic clamping fixtures with a correspondingly increased input pressure.

Block style can be used for large fixtures as well as small, because clamps are initially charged by the lower input pressure, through a check valve in the piston. The high-pressure piston is only activated after the desired trigger pressure is reached.

Cylinder style is a more compact version for smaller fixtures.



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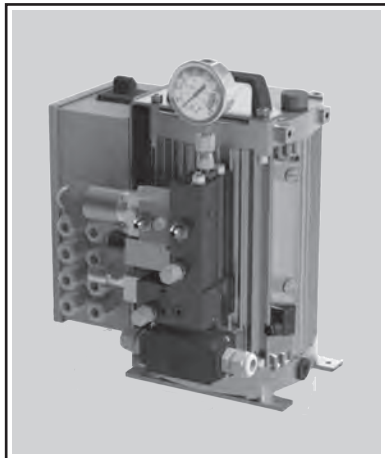
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Power Sources ■ Compact Power Units

Compact Power Units

Max. Operating Pressure ■ 7250 psi (500 bar)



Advantages

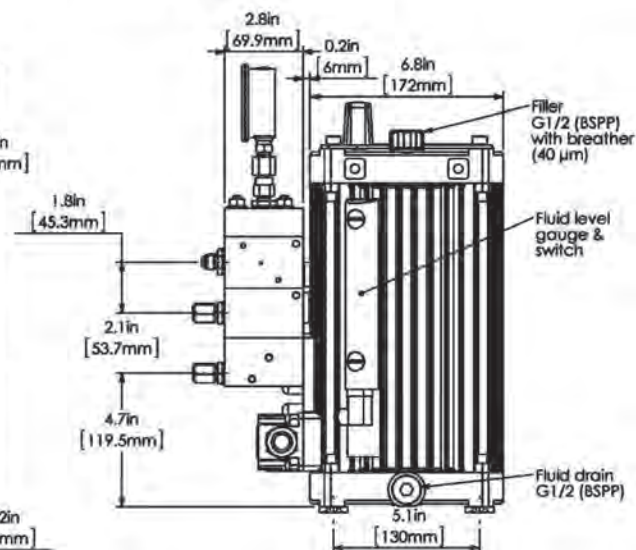
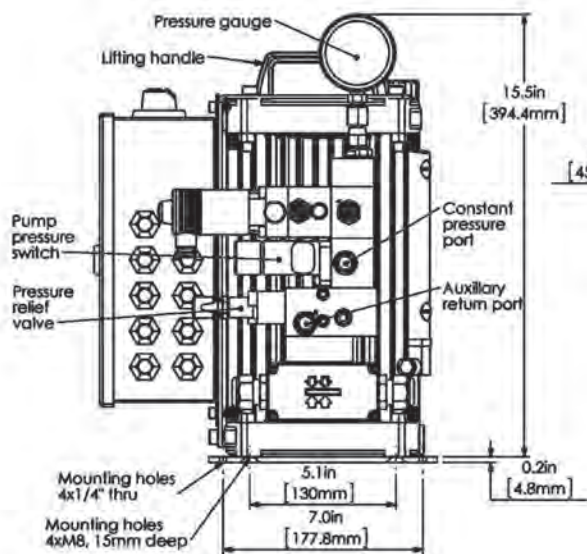
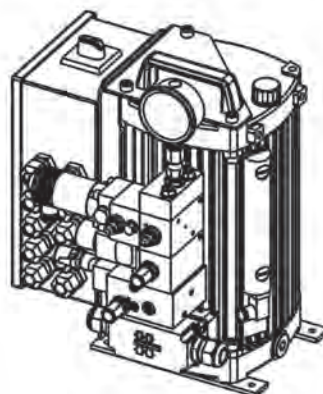
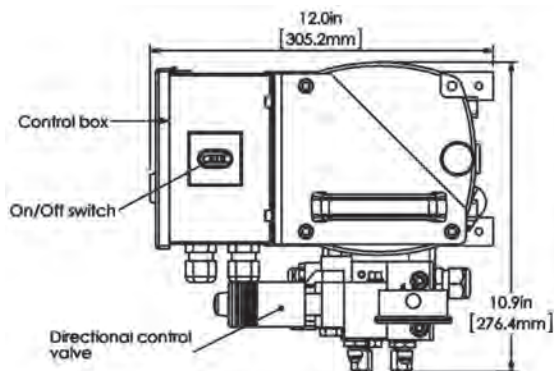
- Modular unit ready for installation
- Compact, light weight design
- Zero leak, directional valves maintain clamping pressure in case of power failure
- Highly reliable radial piston pump ensures long service life
- Fluid immersed, direct drive motor, and finned aluminum housing provides optimum efficiency
- Zero leak fittings and valves
- Sight glass for oil level control
- Oil temperature/level switch

Application

Electrically driven high-pressure hydraulic unit for operating small and midsize clamping systems. Suitable for both single-acting and double-acting cylinders. Unit operates intermittently with automatic pressure controls. The required operating pressure is preset on a pressure switch that controls the motor. When the set pressure is reached, the motor is automatically switched off. If the pressure drops 10% below the set value, the pressure switch starts the motor again.

Description

Complete with motor, pump, oil tank, manifold block, pressure gauge, pressure switch, valves and electrical system. The radial piston pump is bi-directional and fixed displacement. Zero leakage poppet type directional valves. Electrical system to US standards. The control voltage (24VDC or 120 VAC) is supplied by the customer. The oil level and temperature sensor is standard. Optional equipment includes remote control pendant and machine safety pressure switches.



Subject to change. For further details, including detailed dimensions and mounting instructions, visit www.clrh.com.



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Compact Power Units

CLR-KA-XXXXX-XXX

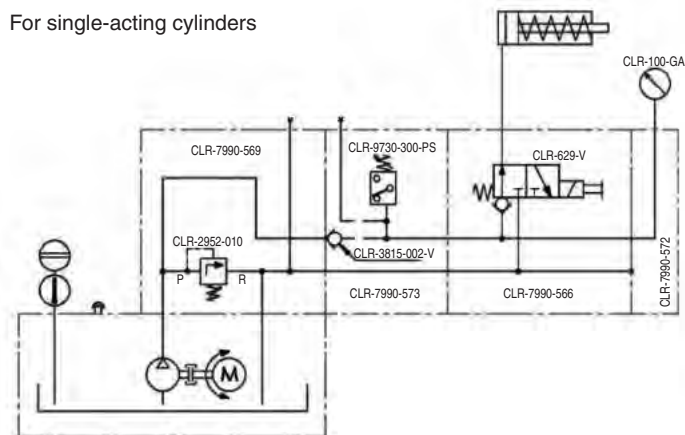
Number of double acting circuits

3 = other

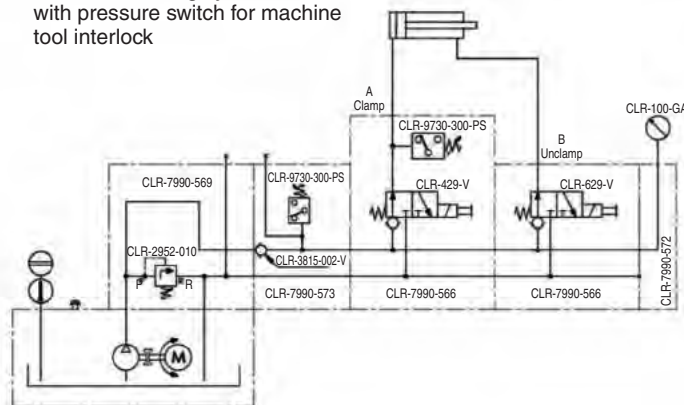
Technical Characteristics			
	120 VAC 1Ø	230 VAC 3Ø	460 VAC 3Ø
Max. pressure	295 bar (4280 psi) ¹	400 bar (5800 psi) ¹	500 bar (7250 psi) ¹
Power supply frequency	60 Hz		
Control voltage	120 VAC or 24 VDC ²		
Flow rate	1.17 L/min (71 cu.in./min) ¹	1.8 L/min (110 cu.in./min) ¹	
Usable fluid capacity	1.85 L (112 cu.in.) ¹		
Reservoir capacity	3.9 L (238 cu.in.) ¹		
Power @ max. pressure	0.5 kW (0.67 hp)	0.75 kW (1 hp)	0.9 kW (1.2 hp)
Motor amperage	9.0 amps	3.9 amps	2.1 amps
Noise level @ 1 meter (3.3 feet)	65 dBA		
Max. duty cycle	25-40 %		
Approx. weight w/ one valve & oil	27 kg / 60 lbs	25 kg / 55 lbs	

² Control voltage supplied by customer.

For single-acting cylinders



For double-acting cylinders
with pressure switch for machine
tool interlock

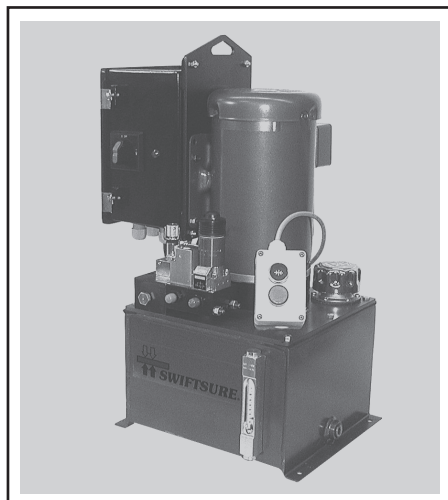


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Electric Power Units

7250/5000 psi max
Single and double acting

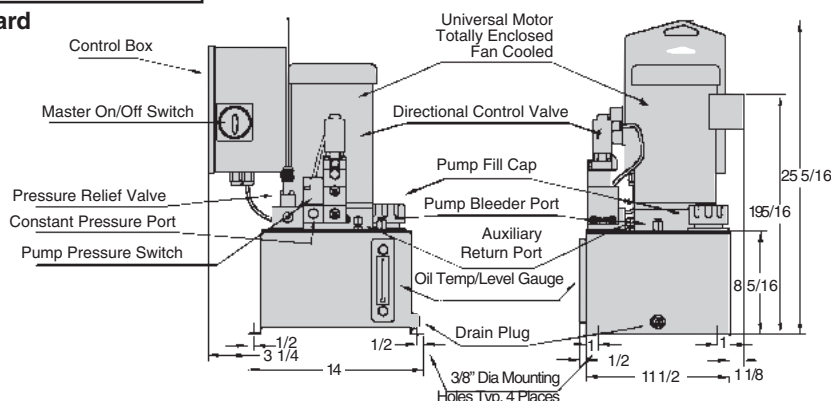


Standard

- 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	
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
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



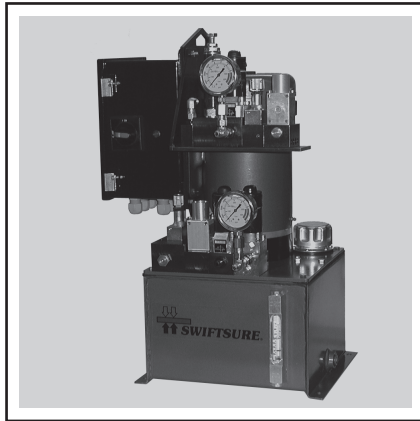
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Electric Power Units

7250/5000 psi max
Multi-Pressure in single and double acting

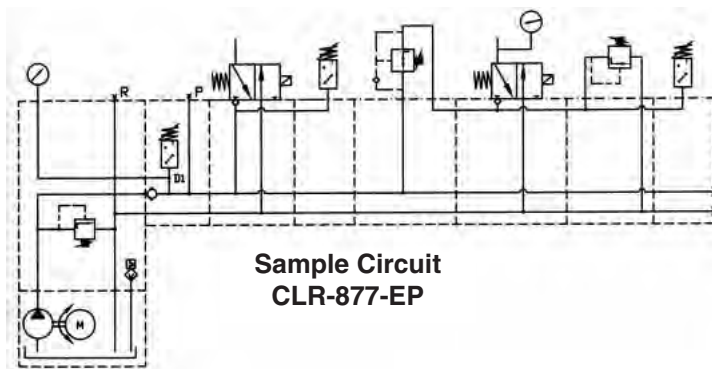


Multi-Pressure Pumps

- 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 Operating Pressure	1160-7250 psi		725-5075 psi		725-5075 psi	
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



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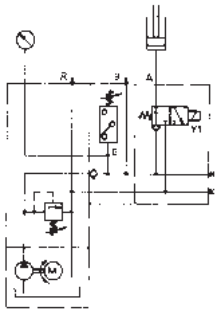
Sales — Phone (636) 386-8022 Fax (636) 386-8034
Engineering — Phone 1-800-827-2526 Web www.clrh.com

Electric Power Units

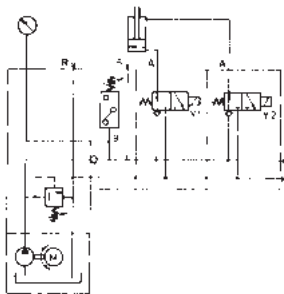
7250/5000 psi max
Single and double acting

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.

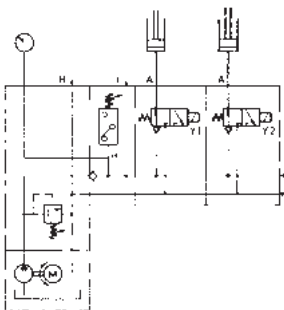
The following hydraulic-circuit diagram shows a single-acting unit.



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.

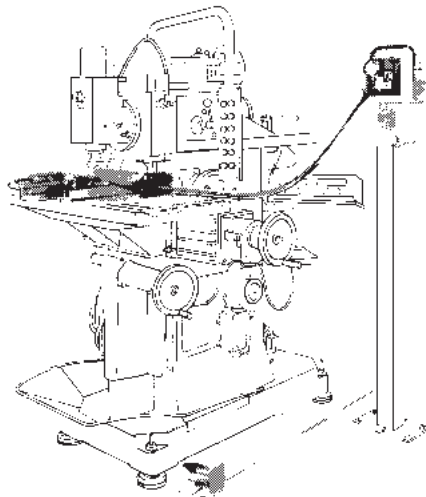


The third diagram shows a single-acting unit for two independent fixtures (shuttle machining). These units have separate clamping switches and valves for each fixture.

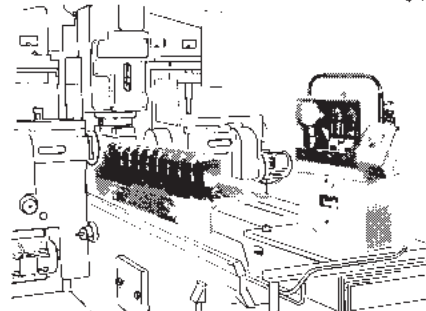
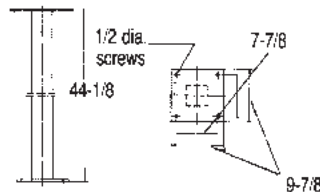


SAFETY FEATURES: Fail-safe operation in case of electrical-power failure since the solenoid-operated clamping valves are de-energized in "clamped" position. These valves are poppet type, so they provide tight zero leakage sealing. Units are also equipped with fluid-level and fluid-temperature sensors 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).



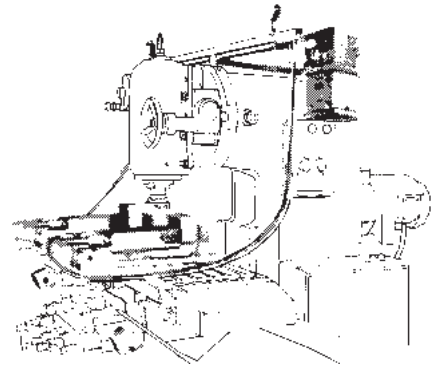
Power Unit Stand
CLR-3532-168-PUA



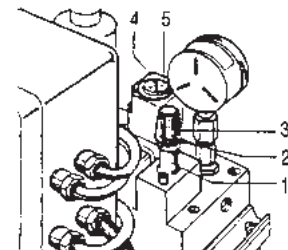
Vibration-proof mount
CLR-3141-308-PUA



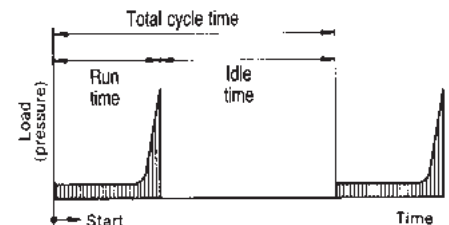
Units can also be mounted on the machine tool using an angle bracket. The photo below shows an overhead traverse bar for convenient hose arrangement. Push-button switches are installed within the operator's reach.



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.



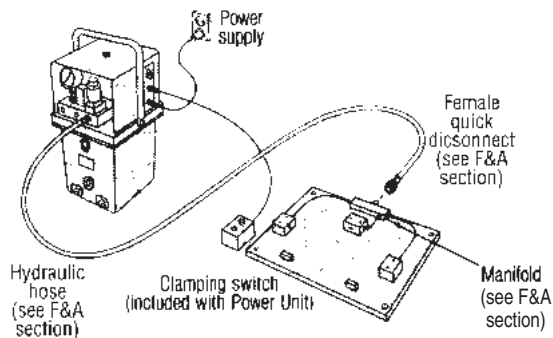
DUTY CYCLE: Electric Power Units are designed specifically and purely for work-holding, with intermittent clamping and unclamping between machining cycles (not continuous running). For most workholding applications, actual running time is a small percentage of total cycle time. The graph below shows typical pump-pressure buildup during a machining cycle.



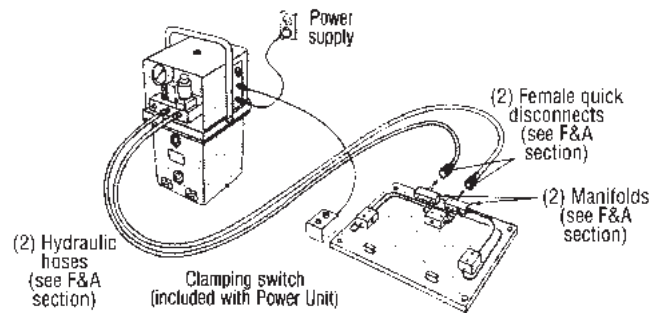
Run time must be less than 40% of total cycle time with maximum fluid level, 25% with minimum fluid level (7250-psi units). Run time must also be less than 120 seconds with maximum fluid level, 15 seconds with minimum fluid level (7250-psi units). Otherwise the fluid will overheat and the unit will shut off automatically.

Electric Power Units

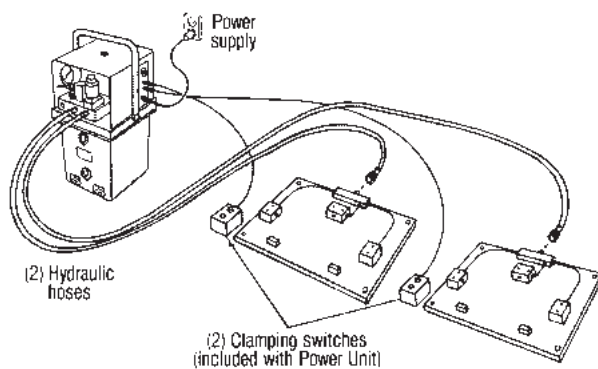
Connection Examples



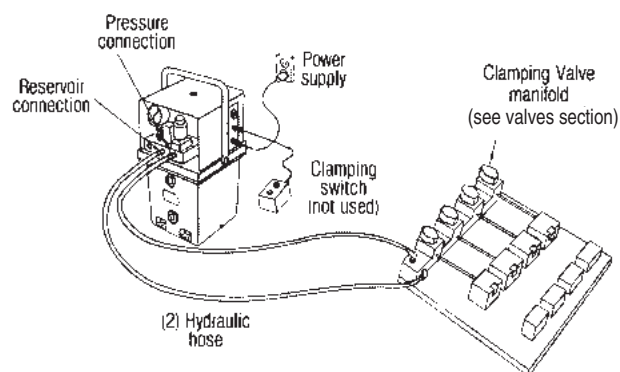
**Single Fixture
Single Acting**
(use any Electric Power Unit)



**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)



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Air Power Units

7250 psi max
Single and double acting

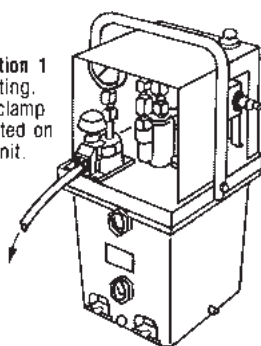


- Economical and self-contained. . . just fill with fluid
 - Up to 7250 psi from shop air pressure (only 70-psi air pressure required)
 - Tandem, reciprocating pump automatically restarts to maintain system pressure
 - Holds pressure even if air supply fails
 - Safe in hazardous locations
 - Complete turnkey unit includes clamping valve, filter/regulator/lubricator, air and hydraulic pressure gauges, muffler, and air extractor/dryer
- ** Do not use NPT fittings**

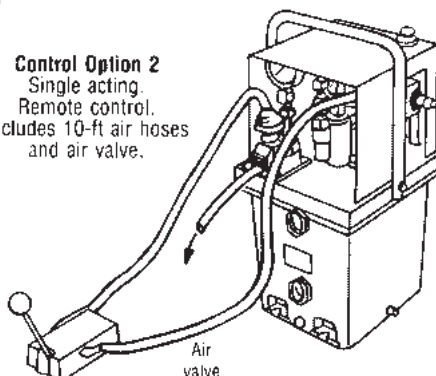
OPERATION: Unit is ready to run after you fill the reservoir with fluid (order separately, F&A section) and connect it to an air supply. Adjust the input air pressure, using the unit's air regulator, to adjust output fluid pressure (2200 to 7250-psi range). Only 70-psi air pressure is required to provide 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 working components.

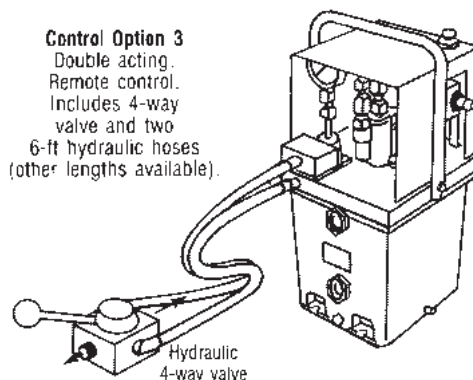
Control Option 1
Single acting.
Clamp/unclamp valve mounted on power unit.



Control Option 2
Single acting.
Remote control.
Includes 10-ft air hoses and air valve.

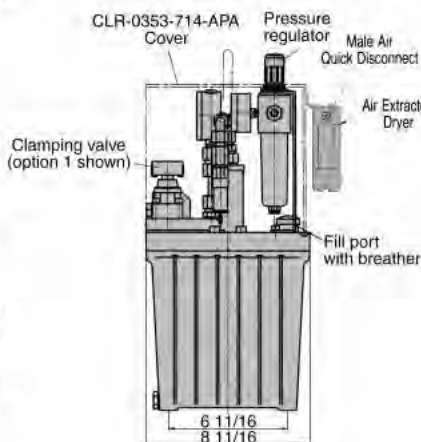
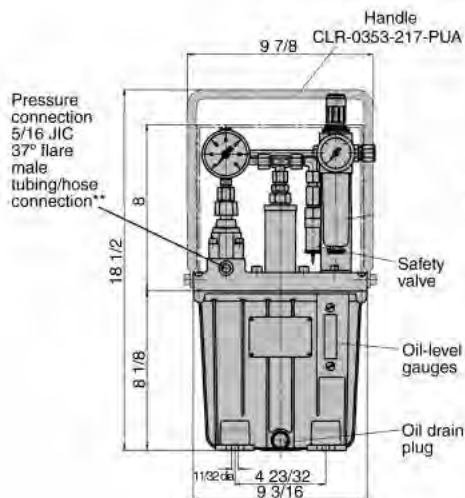


Control Option 3
Double acting.
Remote control.
Includes 4-way valve and two 6-ft hydraulic hoses (other lengths available).



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
Part No. Control option 1	CLR-100-AP
Part No. Control option 2	CLR-102-AP
Part No. Control option 3	CLR-105-AP
Part No. Pump without valves	CLR-106-AP

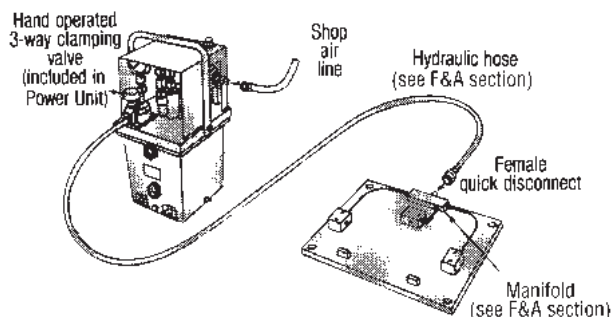


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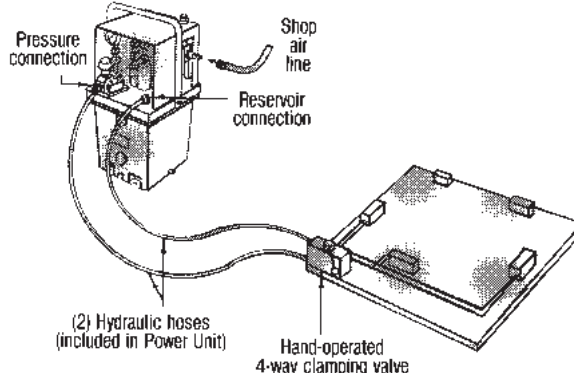
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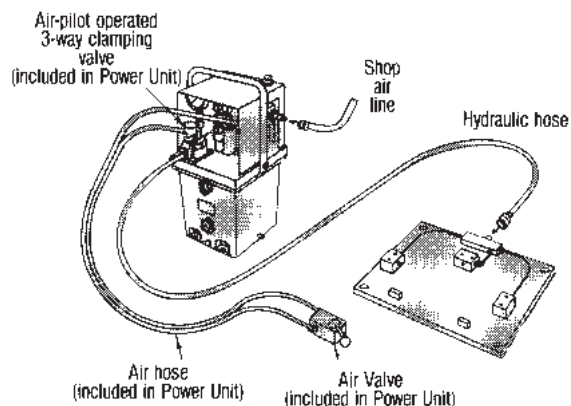
Connection Examples



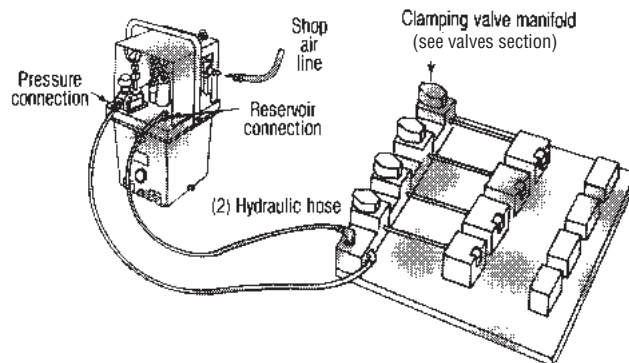
Single Fixture
Valve mounted on unit
Single Acting
CLR-100-AP



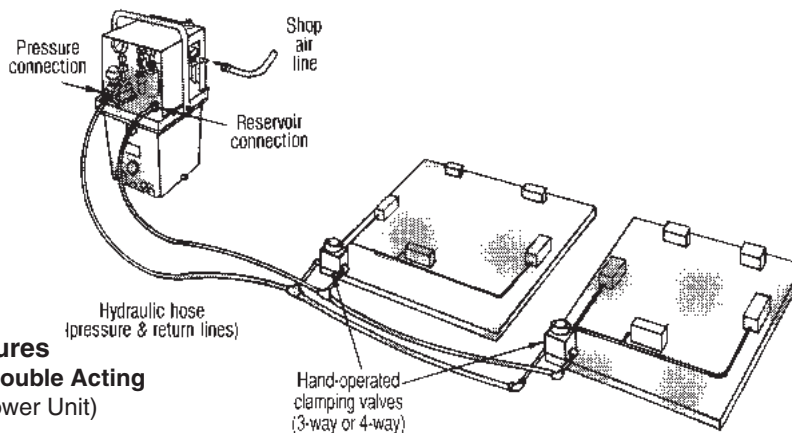
Single Fixture
Double Acting
CLR-103-AP



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)



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Air Power Units

7250 psi max
Single/double acting

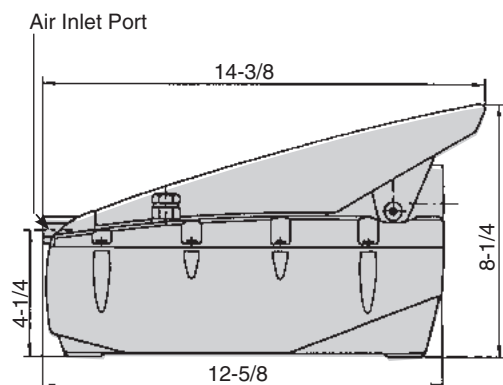


- The hydro-pneumatic pump unit can be operated with oil-free air.
- Due to suitable sound insulation only minimum working noises are obtained.
- The low starting pressure (40 psi) guarantees a quick start of the pump and short cycle time.
- The hydro-pneumatic pump unit is delivered ready for connection

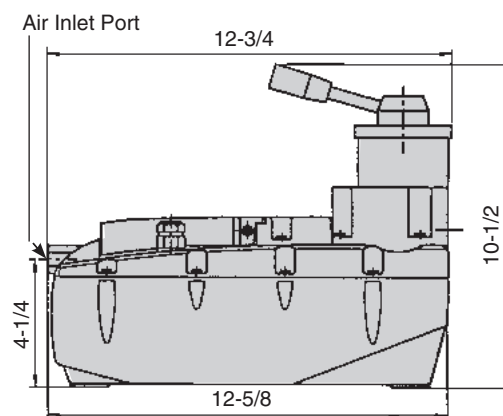
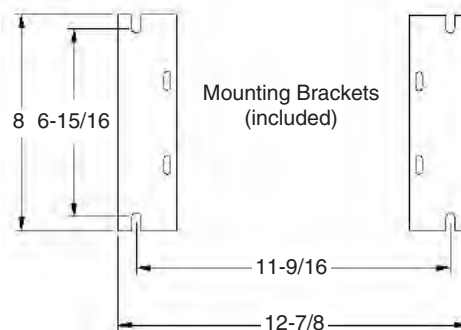
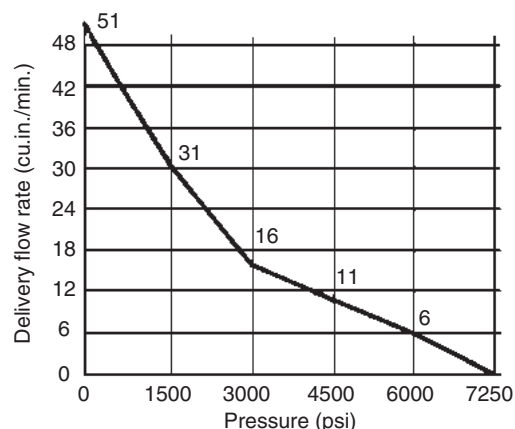
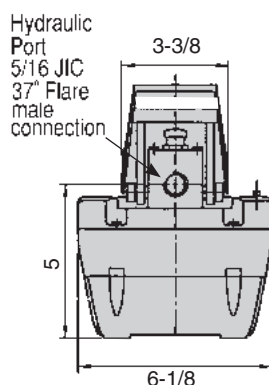
APPLICATION: The hydro-pneumatic pump unit is particularly suitable for smaller hydraulic clamping and assembly fixtures with single or double-acting hydraulic elements. As the power supplied is compressed air, it can be used without restriction in hazardous surroundings.

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.

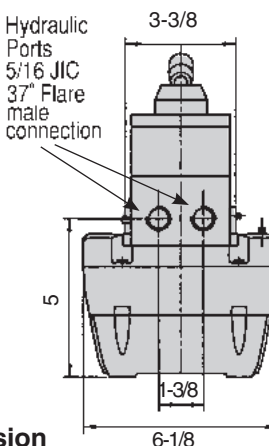
Double acting version By means of a locking device the pneumatic directional control valve (at the pneumatic side) is permanently in the opened switching position. By means of the mounted hand-operated hydraulic 4/3 directional control valve double-acting cylinders can be controlled. In the case of a pressure loss, the pneumatic pump operates automatically until the desired hydraulic pressure is realized.



Single Acting Version



Double Acting Version



Operating Pressure Range	4000-7250 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
Connecting Threads	
• Oil	G 1/4 BSPP
• Air	1/4 NPT
Weight (lbs)	14
Part No., Single Acting	CLR-200-AP
Part No., Double Acting	CLR-203-AP
Part No., Pump only - No Valves	CLR-201-AP

Fluid Recommendations see F&A section.



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Hand Pumps

7250/3000 psi max
Single acting



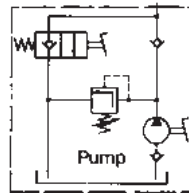
Single Stage

- Very compact
 - Pump and release with the same lever
 - Easily adjustable pressure setting
 - Choice of hand or foot operation
- ** Do not use NPT fittings**

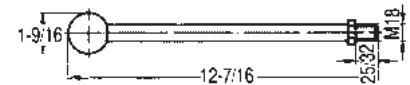
CLAMPING: Move pump lever downward to pump fluid, through a 40-degree stroke. Lever returns upward by spring force. Repeat until you reach the set pressure and the lever declutches.

UNCLAMPING: Lift pump lever 10 degrees upward against spring force to release clamping force instantly.

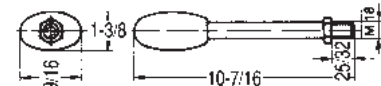
CONSTRUCTION: Totally self-contained power source. Virtually wearfree due to metallic seal on pump piston.



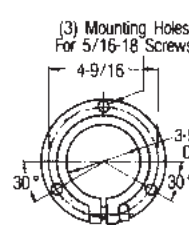
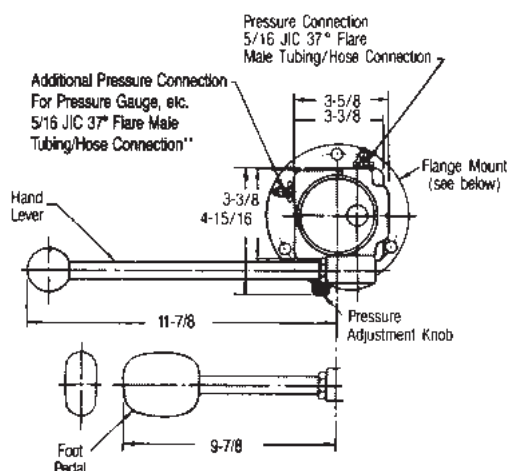
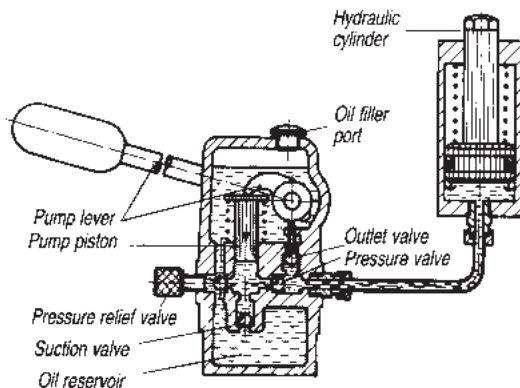
Symbol



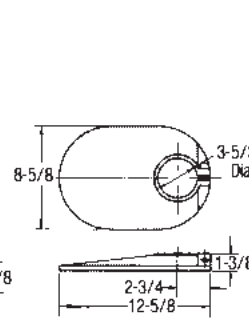
Hand Lever
CLR-003-HPA



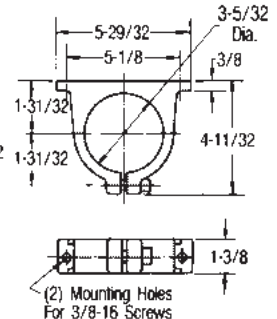
Foot Lever
CLR-002-HPA



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.



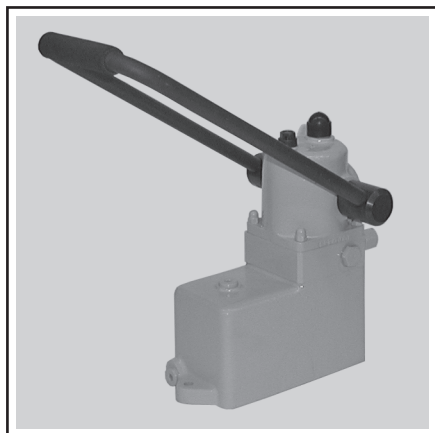
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Hand Pumps

7250 psi max
Single acting



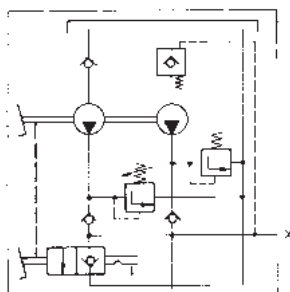
Two Stage

- Two-stage pump for faster pressurization
- Easy pressure adjustment
- Automatic switching from low 850-psi stage to high 7250-psi stage
- Pump and release with the same lever
- ** Do not use NPT fittings

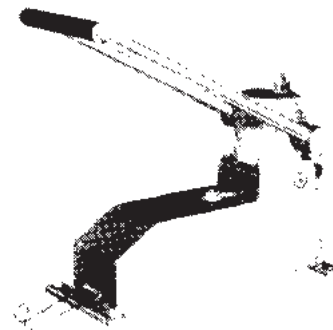
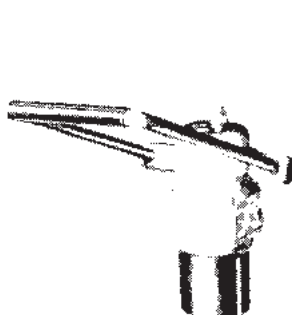
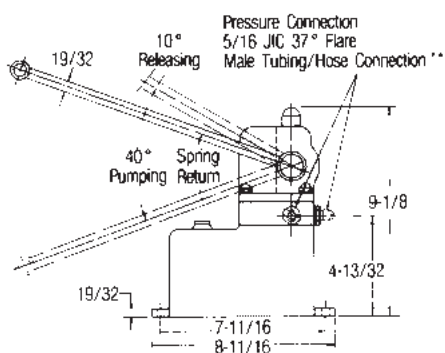
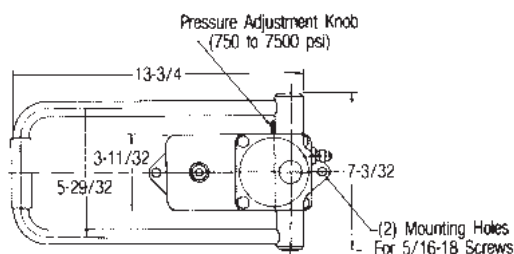
CLAMPING: Move pump lever downward to pump fluid, through a 40-degree stroke. Lever returns upward by spring force. Repeat until you reach the set pressure and the lever declutches.

UNCLAMPING: Lift pump lever 10 degrees upward against force to release clamping force instantly.

CONSTRUCTION: Totally self-contained power source. Virtually wearfree due to metallic seal on pump piston.



Symbol



Smaller and larger reservoirs are available. Please contact factory for more information.

Two Stage

Operating pressure range	0-7250 psi
Displacement per stroke up to 900 psi, Low Stage (cu. in.)	.73
Displacement per stroke up to 7250 psi, High Stage (cu. in.)	.15
Usable oil volume (cu. in.)	50
Reservoir capacity (cu. in.)	60
Relief valve adjustment range (psi)	750-7250
Weight (lbs)	30
Part No.	CLR-702-HP



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Screw Pumps

7250 psi max
Single acting



Compact Block

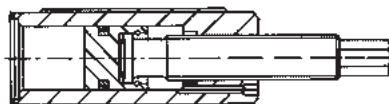
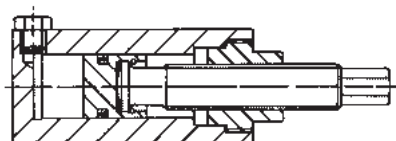


Cartridge/Manifold Mounted

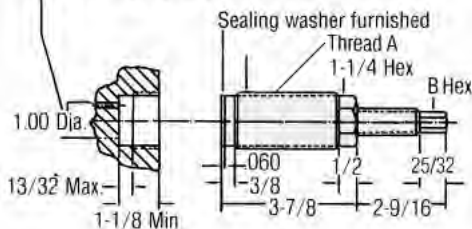
- Compact pressure source
- Ideal for rotary tables or pallets where fluids supply lines are impractical
- Excellent for holding pressure while fixture is transferred
- Can be used in multiples for more fluid capacity
- May be operated with a power torque wrench (non-impact)
- 7250 psi pressure from 38 ft-lbs torque
- ** Do not use NPT fittings

DESIGN CONSIDERATIONS:

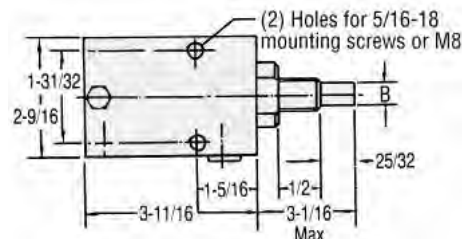
1. Include a pressure gauge in the system (see F&A section).
2. All clamps and components must be leak free, so use only Roemheld products.
3. Since fluid capacity is limited, use only on small fixtures. For best results, clamps should use only 65% of total fluid capacity. Due to limited capacity, use 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.



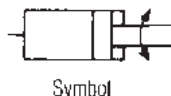
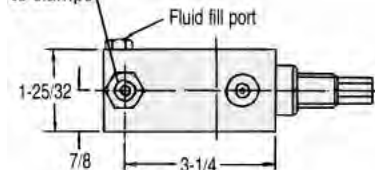
Within this diameter range, the port drilling should be located as high up as possible



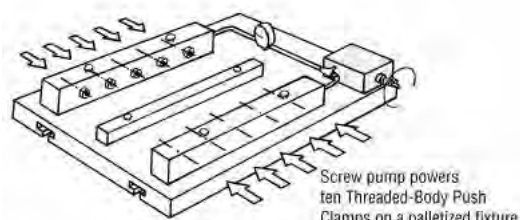
Hole Preparation for manifold mounting



G1/4 port to clamps



Symbol



Operating Pressure Range	0-7250 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
Part No., compact block	CLR-900-SP
Part No., manifold mounted	CLR-901-SP
Part No., sealing washer	CLR-3000-843-SW

METRIC

A body thread	M38 x 1.5
B Hex	SW 13
Part No., compact block	CLR-8819-001-SP
Part No., manifold mounted	CLR-8819-101-SP
Part No., sealing washer	CLR-3000-843-SW



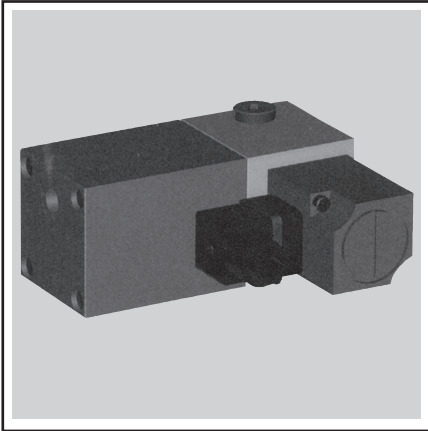
ROEMHELD
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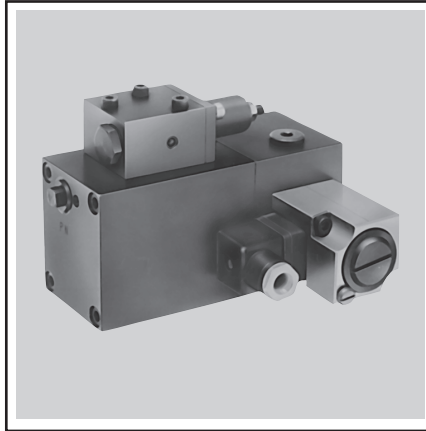
Sales — Phone (636) 386-8022 Fax (636) 386-8034
Engineering — Phone 1-800-827-2526 Web www.clrh.com

Hydraulic Intensifiers

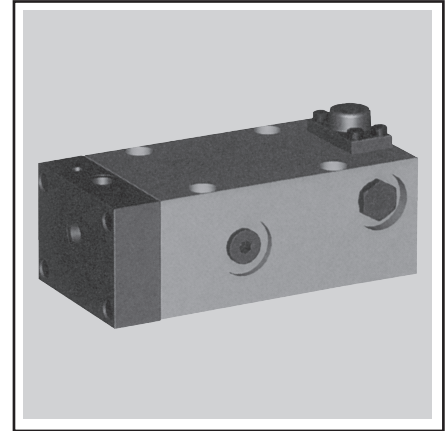
7500 psi max
Single and double acting



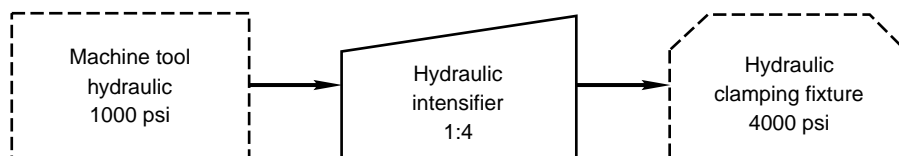
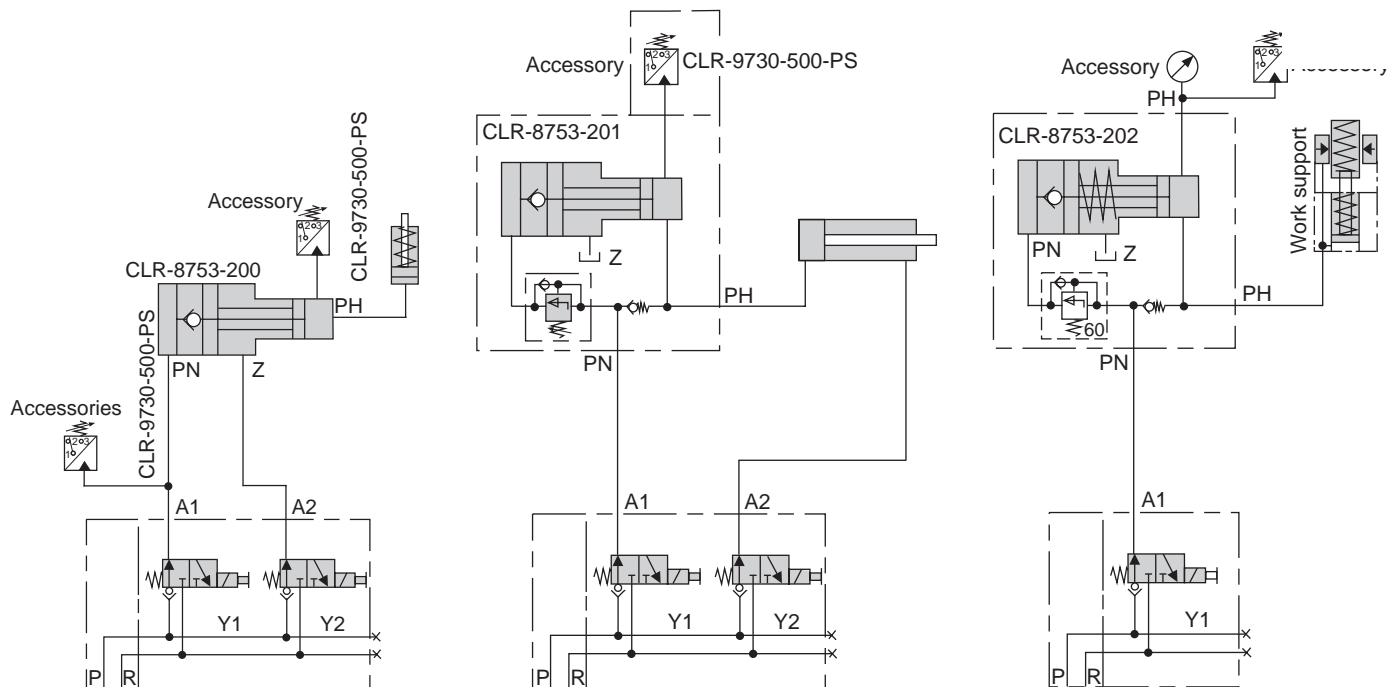
**Double-Acting Intensifier
for Single-Acting Clamps
CLR-8753-200**



**Double-Acting Intensifier
for Double-Acting Clamps
CLR-8753-201**



**Single-Acting Intensifier
for Single-Acting Clamps
CLR-8753-202**



FEATURES: Hydraulic intensifiers convert a given hydraulic pressure on the input side into a higher pressure on the output side. This allows using the comparatively low pressure of machine-tool hydraulics to pressurize a hydraulic clamping fixture with 4 times that pressure. Can be used for large fixtures as well as small, because clamps are initially charged by the lower input pressure, through a check valve in the piston. The high-pressure piston is only activated after the desired trigger pressure is reached.

Please contact engineering for additional information



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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).

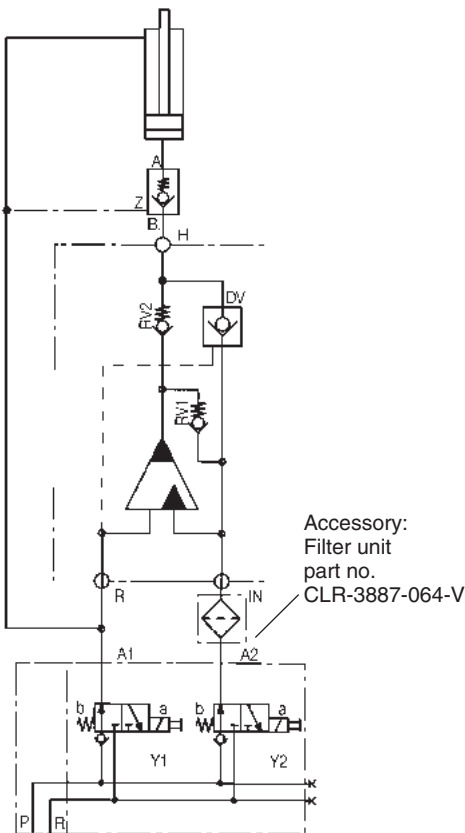
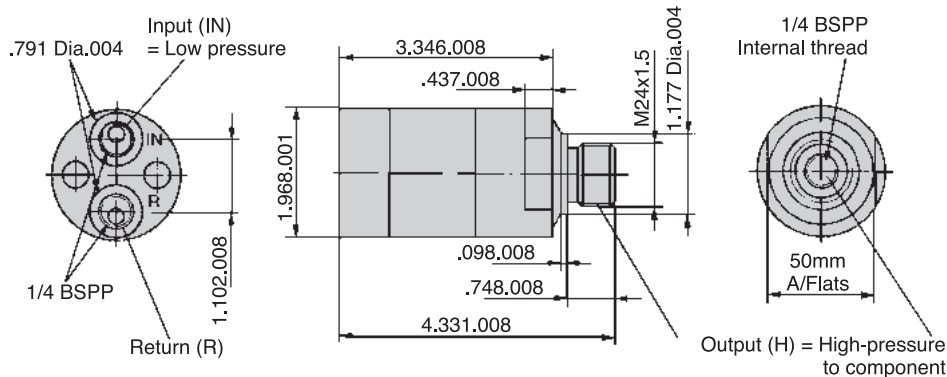
FUNCTION: the oil is supplied through input **IN** via the check valves **RV1**, **RV2**, and **DV** to the high pressure output **H** and thereby to the cylinders. In this phase the intensifier is in rapid function. According to the intensification i the max. flow rate can be up to 10 liters/min. With 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-3887-087), 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 cm³/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	1.5	2.0	3.2	4.0	5.0
Max. flow rate Low-pressure side Q_{in} (cu.in)	488	488	915	854	854
Max. flow rate, High-pressure side Q_H (cu.in)	61	48	150	120	98
Max. operating pressure Low-pressure side P_{in} psi	3000	3000	2000	1800	1500
Max. operating pressure High-pressure side P_H psi	4500	6000	7250	7250	7250
Weight (lbs)	2	2	2	2	2
Part No.	CLR-8755-015	CLR-8755-020	CLR-8755-032	CLR-8755-040	CLR-8755-050



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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 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)

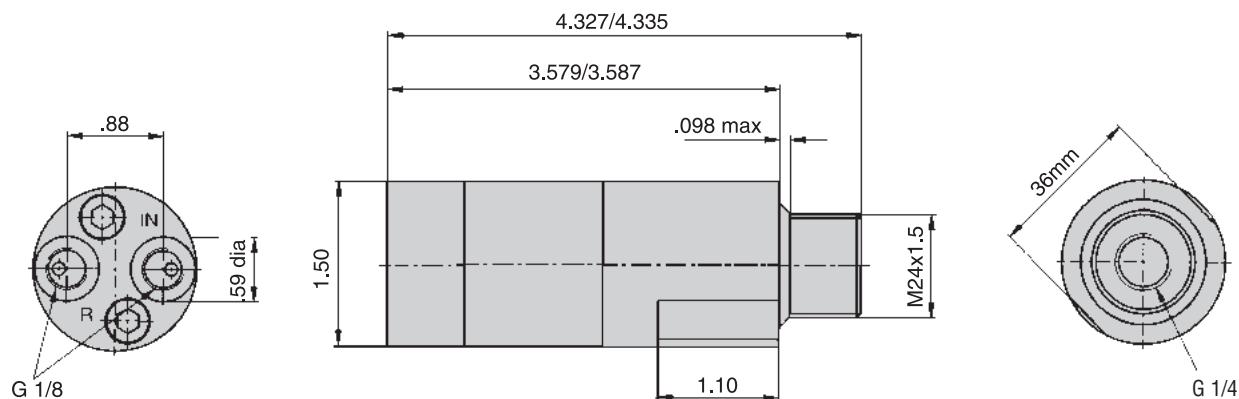
automatically functions. If the adjusted high-pressure is obtained, pulsation of the intensifier is stopped. Pulsation continues in case of dynamic application. Max. frequency of pulsation is 30 Hz.

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-3887-087), 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 cm³/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_{in} (cu.in/min)	490	490	490	490	490
Max. flow rate, High pressure side Q_H (cu.in/min)	25	25	25	25	25
Max. operating pressure Low-pressure side P_{in} psi	2250	1800	1500	1100	950
Max. operating pressure High-pressure side P_H psi	7250	7250	7250	7250	7250
Weight (lbs)	2.2	2.2	2.2	2.2	2.2
Part No.	CLR-8755-132	CLR-8755-140	CLR-8755-148	CLR-8755-162	CLR-8755-175



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Valves

Clamping Valves



**Hand-Operated
Single Acting**



**Hand-Operated
Double Acting**



**DC Solenoid
Single or Double Acting**

For clamping several workpieces from a single power source.



**Cam Roller
Single Acting**

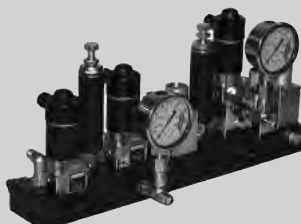


**Air/Hydraulic Pilot
Single Acting**

page 140

page 139

Valve Manifolds



Hand Valves and Solenoid Valves, for clamping several fixtures from a single power source. Options include Pressure Reduction, Pressure Relief, and Pressure Monitoring. Available in single acting, double acting, or combination, for one to four circuits. A wide variety of assembled options are pictured on pages 141 and 142.

pages 141-142

Heavy Duty Clamping Valve



page 143

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.



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Valves

Control Valves

Sequence Valves



**Manifold Mounted
Or Series Mounted**

pages 145-146

For automatic sequencing of locating, clamping, and supporting operations. Easily adjustable trigger pressure. Use in multiples for multi-step sequencing.

Pressure Control



Pressure Reducing

Available as standard, cartridge, pipe connection, or manifold mounting type.

pages 148-150



**Pressure
Closing**

page 144



**Pressure
Relief**

page 153

Shut Off



Use to hold pressure in a fixture during machining.

page 153

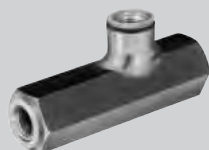
Flow Control



Use to restrict flow in one direction while allowing free return flow.

page 154

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 151-152



Inline, Cartridge Type

Allows fluid to flow in only one direction.

page 154



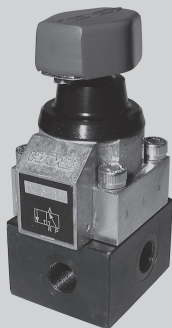
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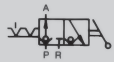
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Clamping Valves

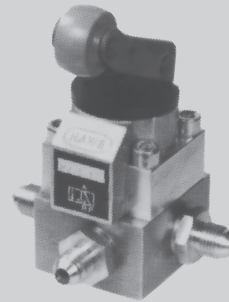
7250 psi max
Single or double acting



**Hand Operated
Single Acting
Standard Fittings**



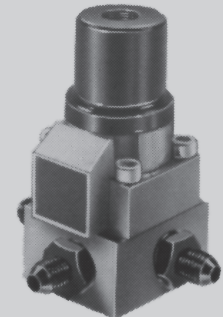
**Hand Operated
Double Acting
Standard Fittings**



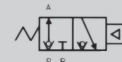
**Cam-Roller
Single Acting
Standard Fittings**



11/16 Stroke

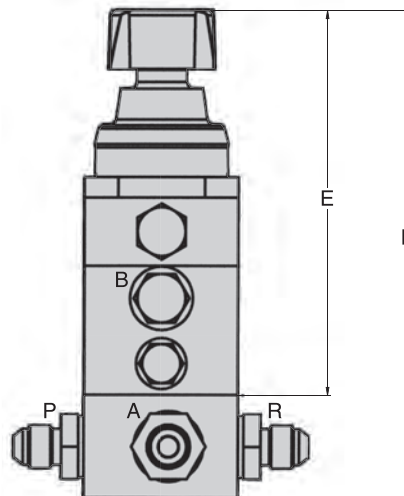
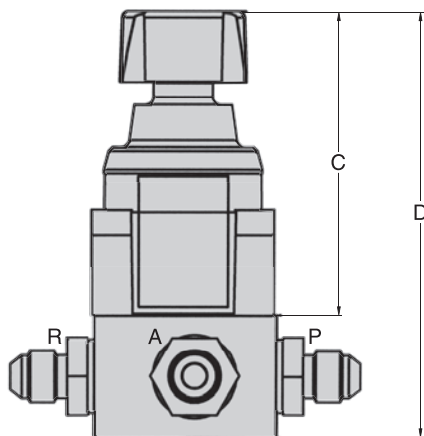


**Air/Hydraulic Pilot
Single Acting
Standard Fittings**

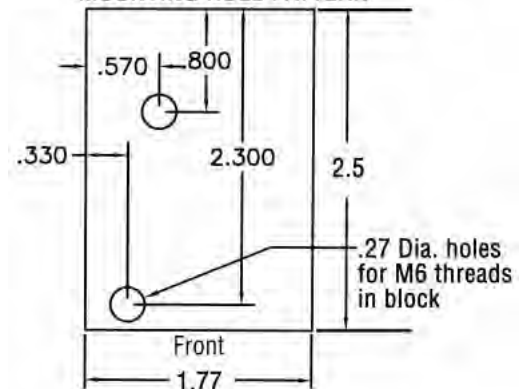


DOUBLE ACTING UNITS

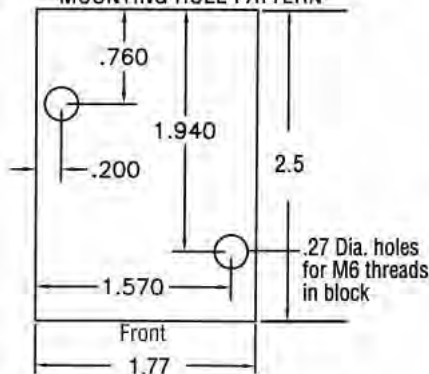
SINGLE ACTING UNITS



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
Single Acting Standard Fittings	CLR-225-V	CLR-415-V	CLR-335-V	CLR-345-V	CLR-645-V
Single Acting Manifold Mount	CLR-219-V	CLR-411-V	CLR-319-V	CLR-325-V	CLR-629-V
Double Acting Standard Fittings	CLR-4220-V	CLR-4412-V	CLR-4320-V	CLR-4326-V	CLR-4630-V
Double Acting Manifold Mount	CLR-4219-V	CLR-4411-V	CLR-4319-V	CLR-4325-V	CLR-4629-V



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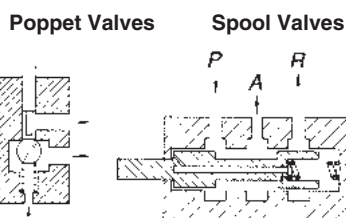
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Clamping Valves

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

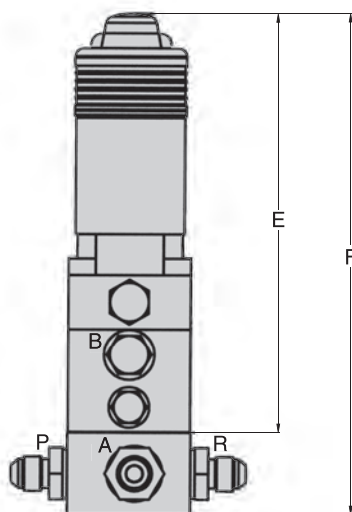
R - Return from valve to power source

A - Flow from valve to clamps and back

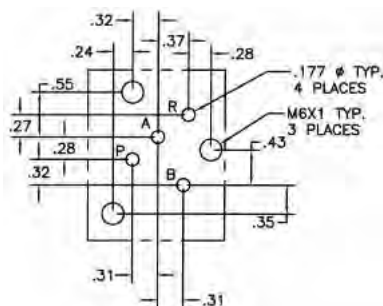
Use these valves only with the fluid types we recommend, CLR-2-FL equivalent on **INFO+** page 178). Fluid must be clean (10 micron or better nominal filtration).

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.

DOUBLE ACTING UNITS

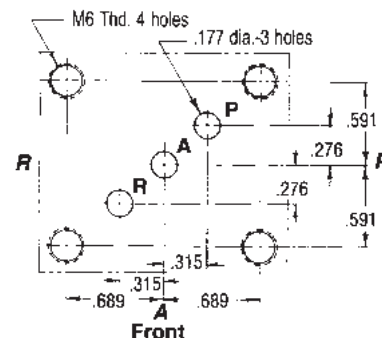


Only Roemheld offers all zero-leakage poppet valves. Others use spool valves, which always have internal leakage due to clearance between the bore and spool.



Double Acting

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
Part No., Single Acting	CLR-645-V
Part No., Double Acting	CLR-4630-V

Part no.	Type	Normal position (no signal)	Check valve	Symbol
CLR-4630-V	4-way 2-position	N/A	Yes	
CLR-645-V	3-way 2-position	Open	Yes	
CLR-32361-200-V			No	
CLR-32362-300-V		Closed	Yes	
CLR-32362-200-V			No	
CLR-32361-301-V	2-way 2-position	Closed	No	
CLR-32361-302-V		Open	No	



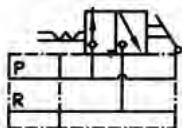
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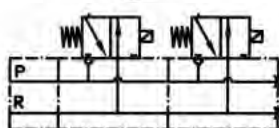
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Clamping-Valve Manifold Assemblies

7250 psi max
Single and double acting



CLR-350-V



CLR-355-V

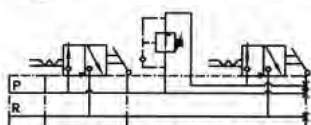
Compact valve arrangement for single and double acting clamps.

Dual and/or multiple pressures and pressure controls are available through the manifold building block design, which allows the use of Pressure Reducing Valves, Pressure Relief Valves, Sequence Valves, and Pressure Switches.

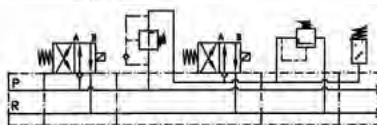
Clamp multiple circuits independently using a single power source.

Manifold Assemblies come assembled and pre-tested from the factory.

Any combination of single acting or double acting multiple circuits which are not listed below are available with any combination of pressure control valves. Please contact engineering with request.



CLR-452-V

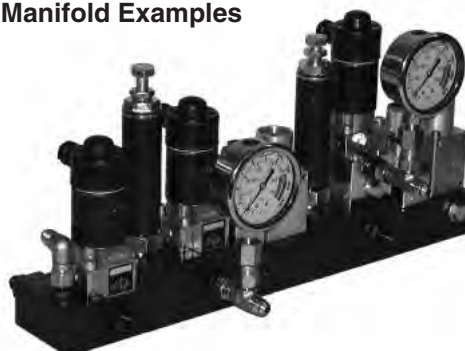


CLR-457-V

Clamping Valve Manifold Examples



4 Circuits: 2 Single Acting and 2 Double Acting with 1 Hand Valve and 3 Solenoid Valves



3 Circuits Multi-Pressure: 2 Single Acting and 1 Double Acting with Pressure Relief and Pressure Monitoring

Circuit Description	S/A Hand Operated Valve	S/A 24 Volt Solenoid Valve	D/A Hand Operated Valve	D/A 24 Volt Solenoid Valve
1 Clamping Circuit	CLR-350-V	CLR-354-V	CLR-450-V	CLR-454-V
2 Clamping Circuits	CLR-351-V	CLR-355-V	CLR-451-V	CLR-455-V
2 Clamping Circuits w/1 PRV & PG	CLR-352-V	CLR-356-V	CLR-452-V	CLR-456-V
2 Clamping Circuits w/1 PRV, RV, PS, & PG	CLR-353-V	CLR-357-V	CLR-453-V	CLR-457-V

S/A= Single Acting, D/A= Double Acting, PRV= Pressure Reducing Valve, RV= Pressure Relief Valve, PS= Pressure Switch, PG= Pressure Gauge



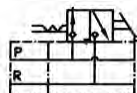
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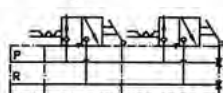
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Engineering — Phone 1-800-827-2526 Web www.clrh.com

Clamping-Valve Manifolds Assemblies

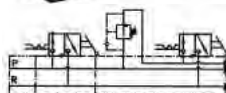
7250 psi max
Single and double acting



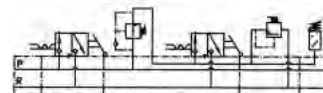
CLR-350-V
Single Acting
Hand Valve



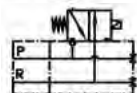
CLR-351-V
2 Single Acting
Hand Valves



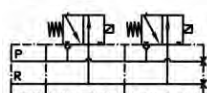
CLR-352-V
2 Single Acting Hand
Valves 1 Reduced



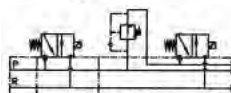
CLR-353-V
2 Single Acting Hand Valves
1 Reduced with Relief Valve &
Pressure Switch



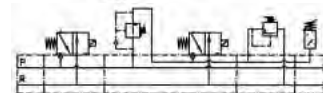
CLR-354-V
Single Acting 24 V
Solenoid Valve



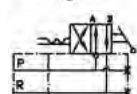
CLR-355-V
2 Single Acting 24 V
Solenoid Valves



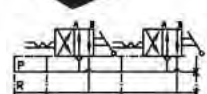
CLR-356-V
2 Single Acting 24 V
Solenoid Valves
1 Reduced



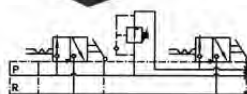
CLR-357-V
2 Single Acting 24 Volt Solenoid Valves
1 Reduced with Relief Valve &
Pressure Switch



CLR-450-V
Double Acting Hand
Valve



CLR-451-V
2 Double Acting
Hand Valves



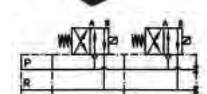
CLR-452-V
2 Double Acting
Hand Valves
1 Reduced



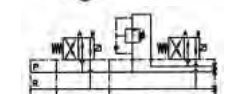
CLR-453-V
2 Double Acting Hand Valves
1 Reduced with Relief Valve &
Pressure Switch



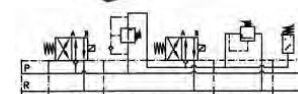
CLR-454-V
Double Acting 24 V
Solenoid Valve



CLR-455-V
2 Double Acting 24 V
Solenoid Valves



CLR-456-V
2 Double Acting 24 V
Solenoid Valves
1 Reduced



CLR-457-V
2 Double Acting 24 Volt Solenoid Valves
1 Reduced with Relief Valve &
Pressure Switch



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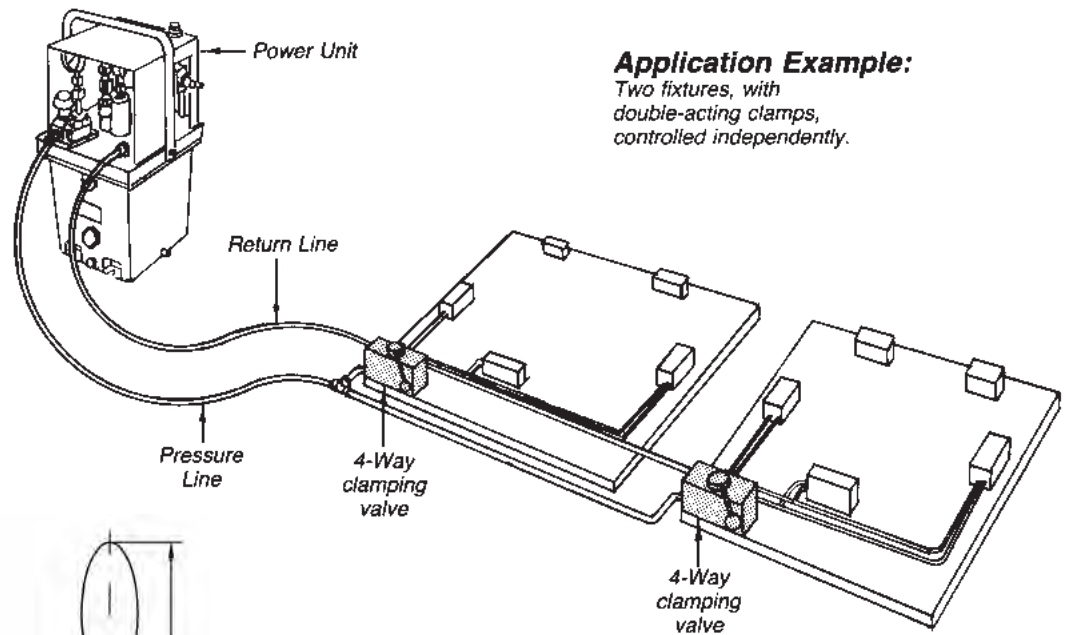
Clamping Valves (4-Way)

7250 psi max
Single and double acting



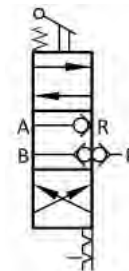
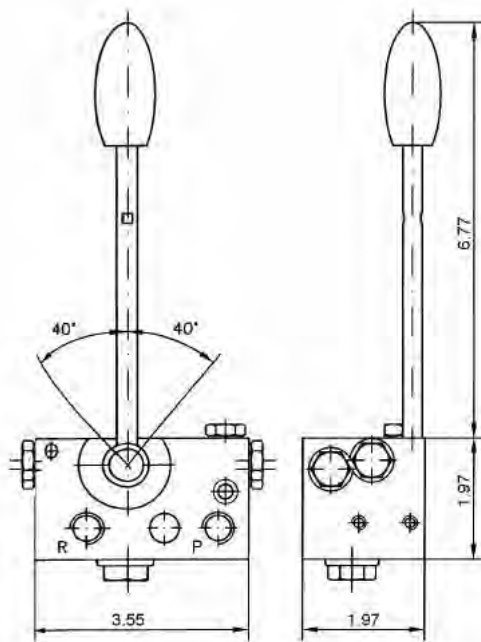
- Use to clamp several work pieces independently with a single power source
- For double-acting clamps
- Zero-leakage double-poppet design
- ** Do not use NPT fittings

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



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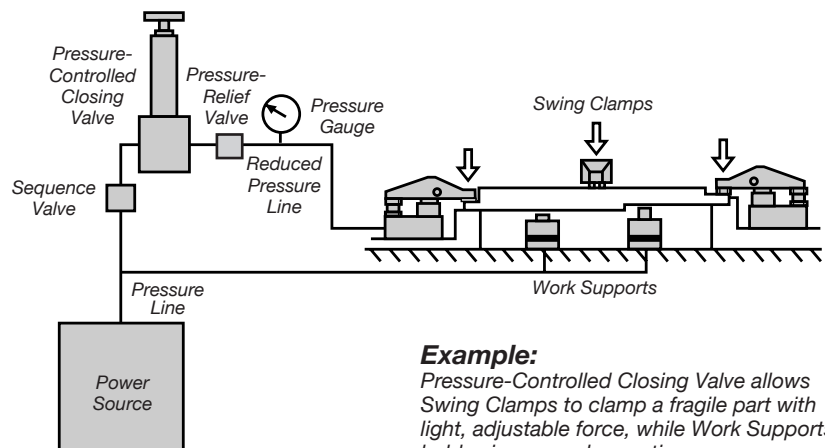
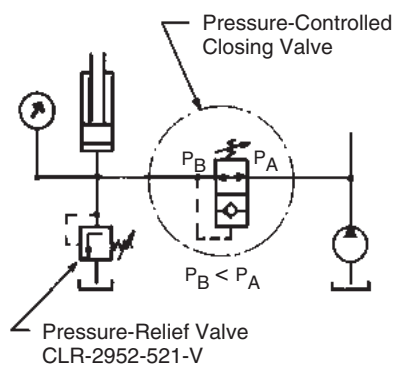
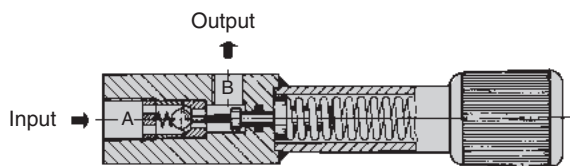
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Pressure-Controlled Closing Valves

7250 psi max

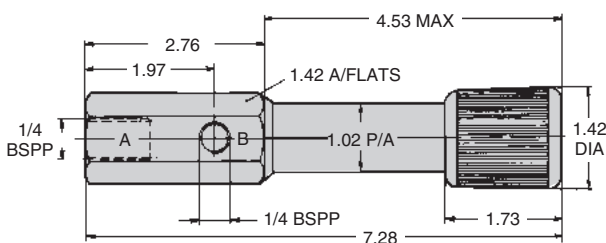


- Allows different operating pressures in two parts of a fixture
- Can be used on pallet fixtures disconnected from a power source, since no return line is needed
- Allows fine tuning the clamping force of selected components while keeping others constant
- Holds reduced pressure to exact setting, regardless of input pressure
- Zero-leakage poppet design



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



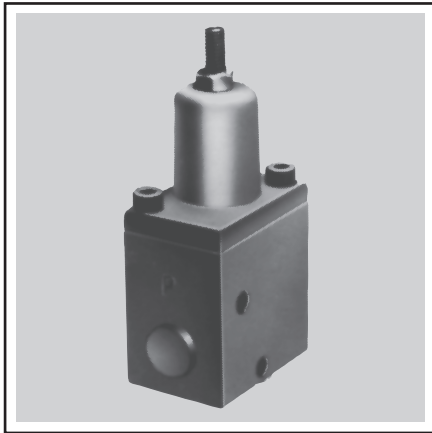
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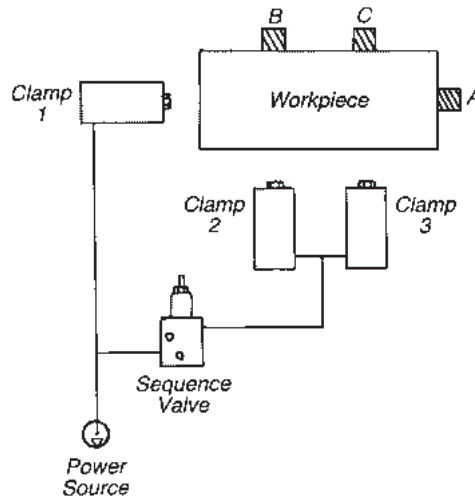
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Sequence Valves

7250 psi max



- 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.

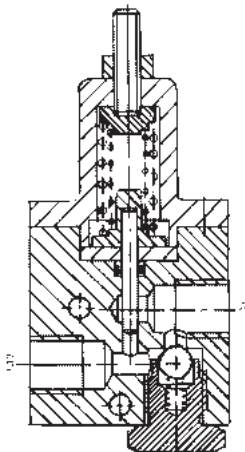
MANIFOLD MOUNTING: Fluid enters and exits through two O-ring ports fed by drilled fixture passages. Mount on a ground surface (32 Ra max.) using three #10 cap screws.

SERIES MOUNTING: Use one input valve and up to five series valves. Only one pressure connection is required, to the input valves 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.

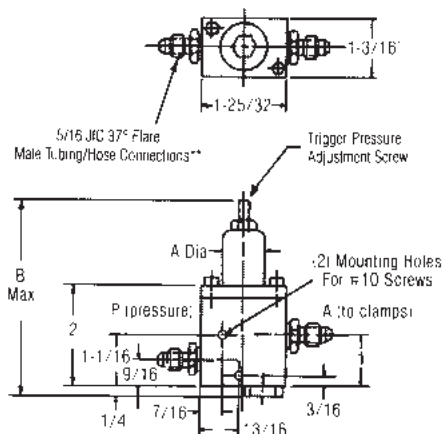
Example clamping sequence:

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.



Standard Fittings



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

Part No.	CLR-420-V	CLR-440-V
----------	-----------	-----------

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



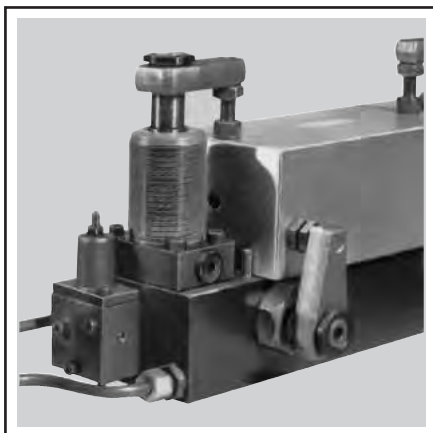
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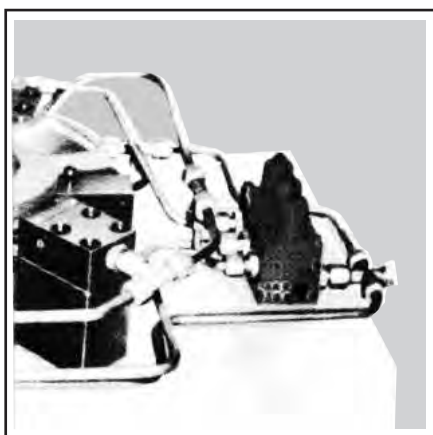
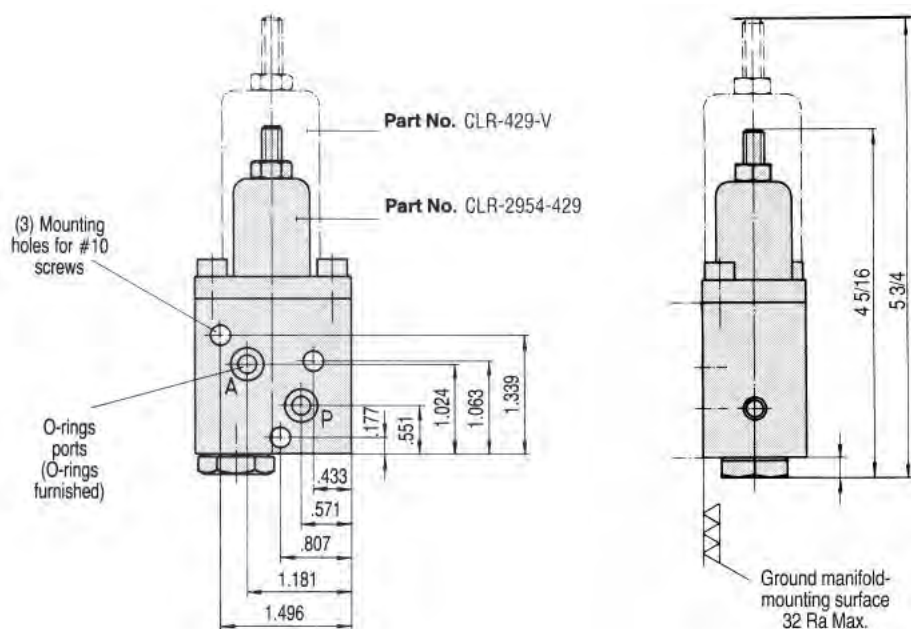
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Sequence Valves

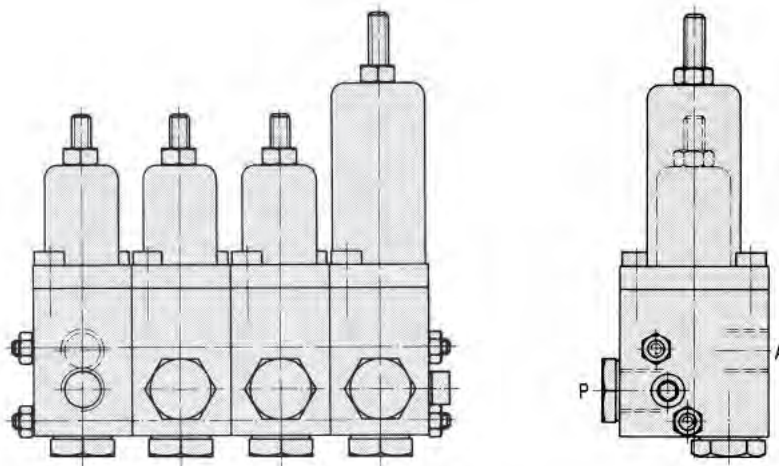
7250 psi max



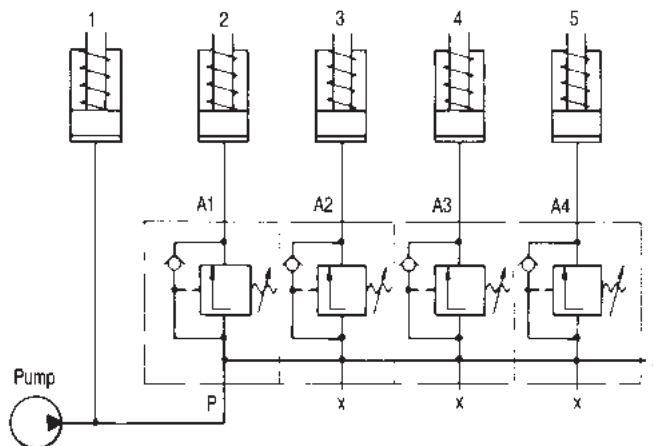
Manifold Mounted



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



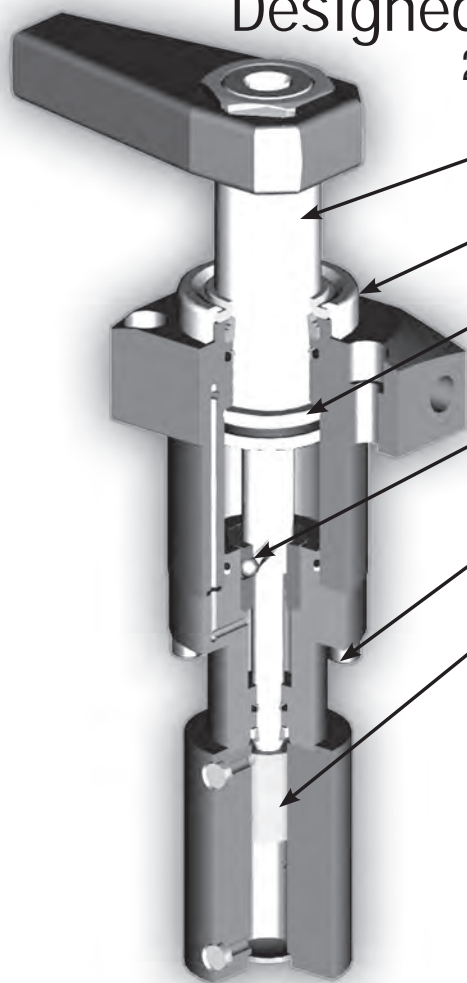
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WHY CARR LANE ROEMHELD SWING CLAMPS?

Designed for 1,000,000 cycles
2,000,000+ cycles tested at full load



- **Rod diameter 30% larger** to eliminate part deflection
- **Viton wiper is standard** (metal wiper optional)
- **Exclusive safety clutch design** available to prevent damage to part, fixture, or operator
- **Reinforced swivel mechanism** with 2 or 3 helix paths depending on size for longer life
- **Up to 7500 psi maximum pressure** for more compact clamp design
- **Position monitoring** available, either inductive or pneumatic via movable sensing bolt
- **Over 1000 different standard sizes and styles** available with clamping forces from 130 lb. to 8265 lb. stroke up to 2"
- **Special stroke and clamping forces available** upon request.

See Pages 28-52



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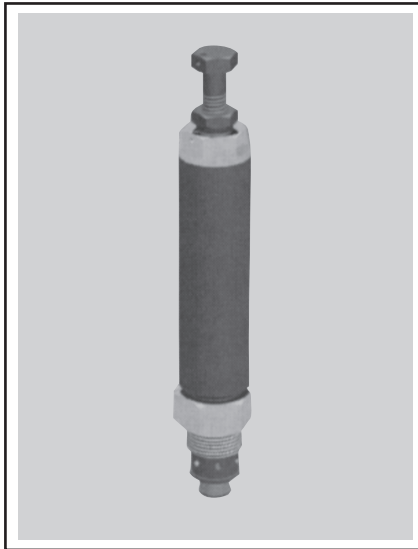


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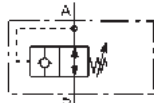
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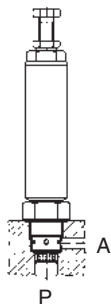
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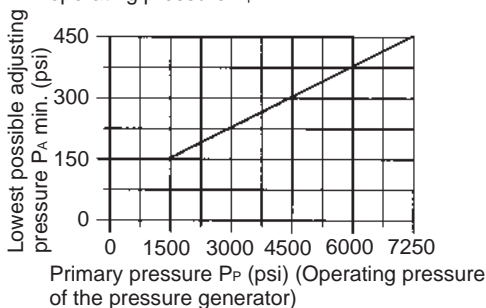
Cartridge Type



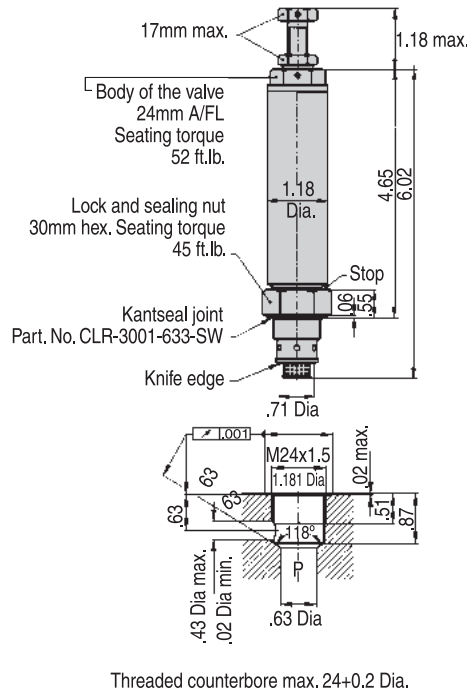
Symbol



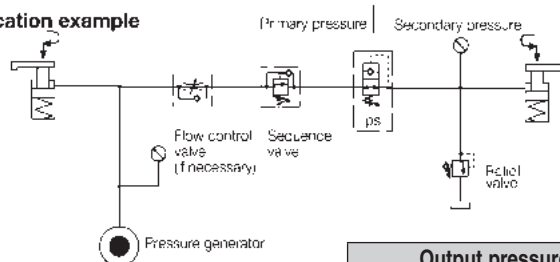
Limit curve of the lowest possible adjusting pressure $P_{A \min.}$ as a function of the operating pressure P_P



- 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



Application example



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.

MOUNTING INSTRUCTION:

1. Before screwing in, turn back lock and sealing nut up to the stop.
2. Screw in valve body and tighten by 52 ft. lb. Sealing is made metallically on the counterbore of 118°.
3. Tighten the lock and sealing nut by 45 ft. lb. Sealing is made by the Kantseal joint on the counterbore diameter of 1.181. The Kantseal joint is included.

Disassembly is made in reverse sequence.

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.)	610
Range of adjustment (psi)	435-5510
Weight, approx. (lbs)	1.5
Part No.	CLR-2953-100-V

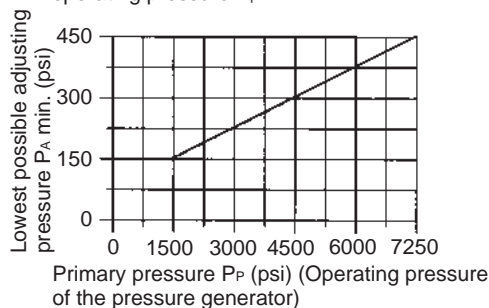
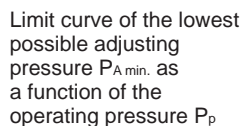


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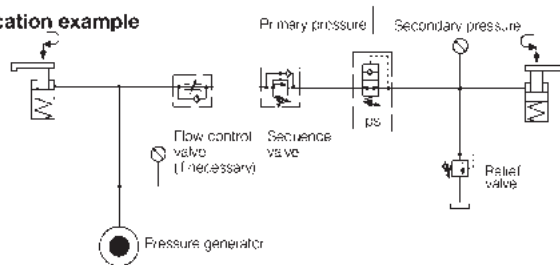
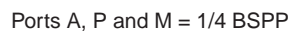
7250 psi max



- 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.



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.)	610
Range of adjustment (psi)	435-5510
Weight, approx. (lbs)	2.9
Part No.	CLB-2953-111-V

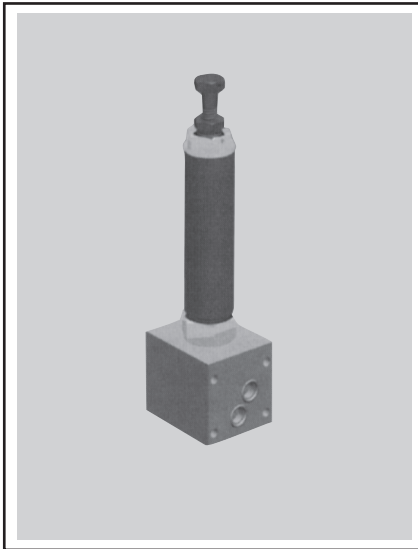


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Pressure-Reducing Valves

7250 psi max



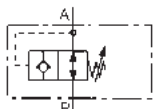
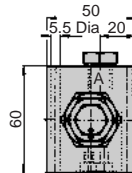
Manifold-Mounted Type

- 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

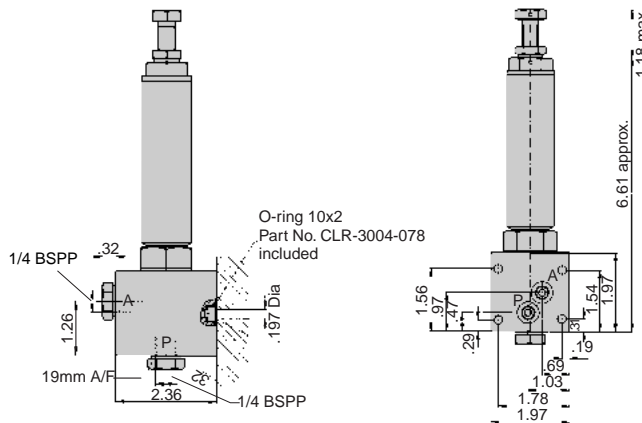
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UNIQUE FEATURES: In normal systems (connected to power source) valve performs as a true pressure reducing valve, and in Palletized (uncoupled) systems as a pressure closing valve.

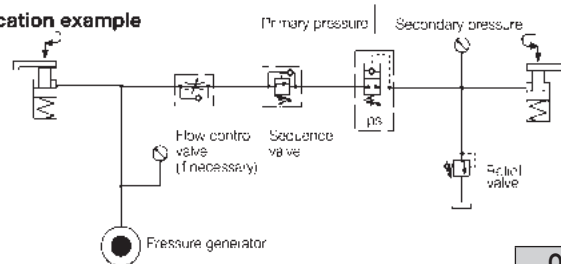
DESIGN CONSIDERATIONS: When using this valve in series with other valves (clamp/unclamp valves, sequence valves, etc.) the pressure reducing valve must be the one closest to the clamp(s) that it is protecting. When used in uncoupled systems, it is strongly recommended that a pressure relief valve be included to prevent pressure increases in the downstream (low pressure) side of the system.



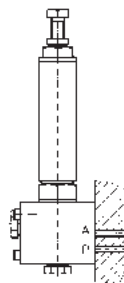
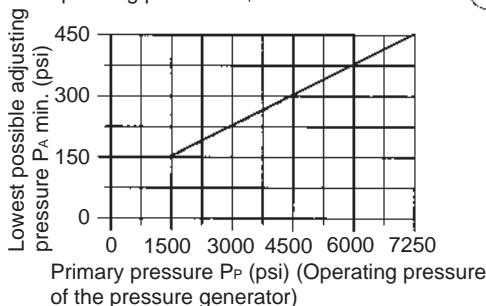
Symbol



Application example



Limit curve of the lowest possible adjusting pressure $P_{A \min.}$ 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.)	610
Range of adjustment (psi)	435-5510
Weight, approx. (lbs)	3.3
Part No.	CLR-2953-110-V



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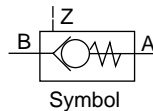
Pilot-Operated Check Valves

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)

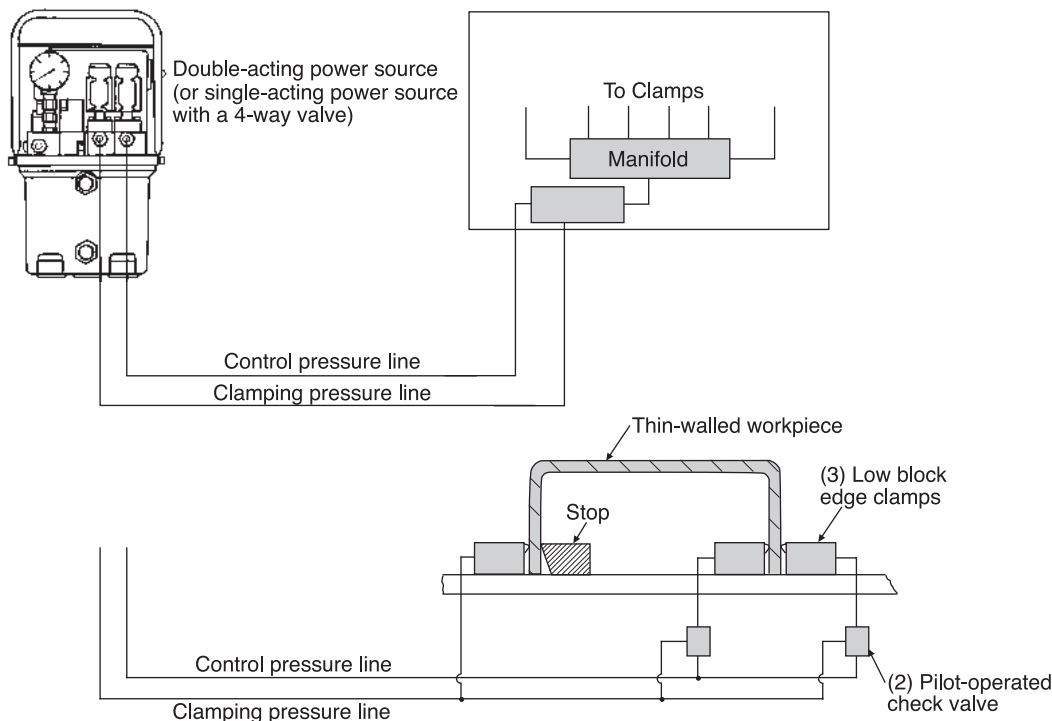


OPERATION: The flow from B → A is free. The flow from A → B is locked, but can be hydraulically unlocked by pressurizing control port Z.

CONTROL PRESSURE: To unlock the check valve for return flow, control (pilot) pressure must be greater than $(0.32 \times \text{Pressure}_A) + 175 \text{ psi}$ for the smaller valve and $(0.38 \times \text{Pressure}_A) + 175 \text{ psi}$ 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.

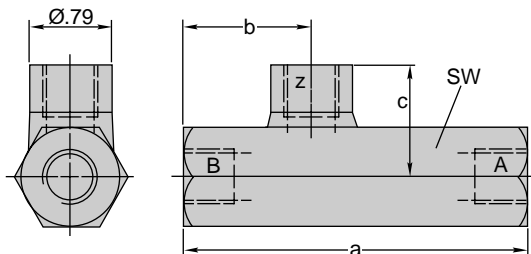


Example 1:

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



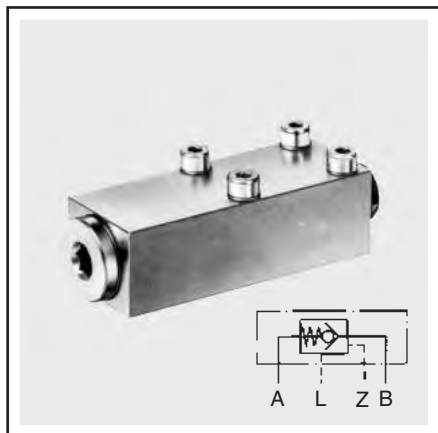
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Pilot-Operated Check Valves

7250 psi max



Manifold Mounted

- Eliminates need for hose/tube connections
- Holds clamping pressure until released by a separate pilot pressure input
- Allows only one-way flow until released
- Locks cylinders in position if fluid line breaks
- May be used to prevent workpieces from floating between opposing clamps

DESCRIPTION: These check valves are designed in accordance with DIN ISO 1219. According to this definition this type of valve is a locking valve. The flow B → A is free. The flow from A → B is locked, but it can be hydraulically unlocked by pressurizing control port Z.

APPLICATION: Locking of leakage-free hydraulic cylinders, i.e., maintaining the pressure and (or) the position, can also be used in combination with non-leakage-free directional control valves.

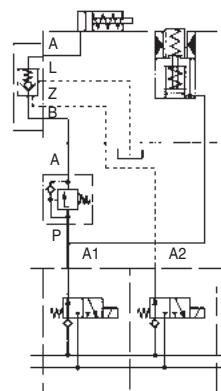
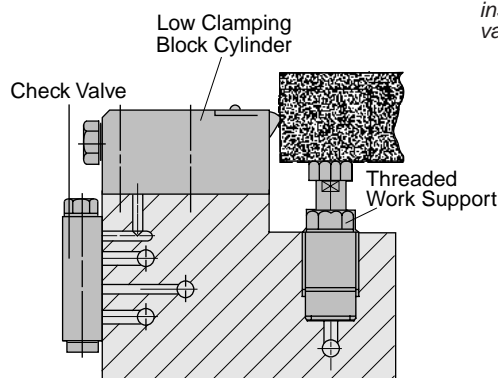
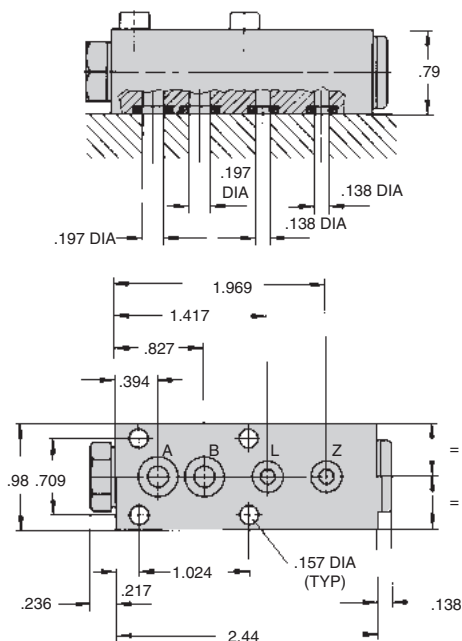
In fixtures these check valves are combined with manifold-mounted or threaded clamping elements and thus enable oil supply without lines.

Application Example:

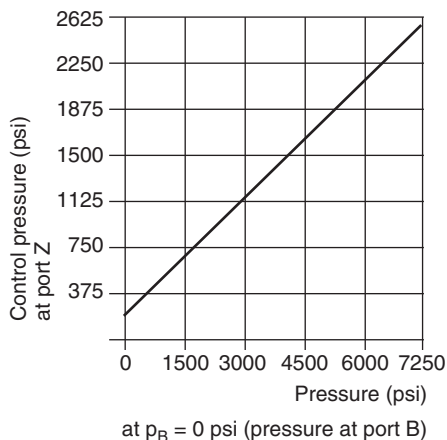
Clamping bar for multiple clamping device. In each bar there are 10 low-clamping block cylinders and threaded work supports arranged in a row.

On the opposite side there is a similar bar. This is called "floating clamping."

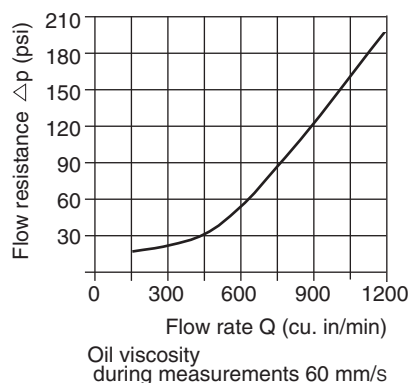
In order to avoid the cylinders giving way under the effect of the operating forces one unlockable check valve for each cylinder is installed, which is facilitated because the valves can be manifold-mounted.



Control pressure for unlocking



Δp-Q curves



Maximum operating pressure (psi)		7250
Maximum flow rate (cu. in./min.)		1200
Pilot oil volume (cu. in.)		.012
Weight (lbs.)		0.55
Part No. Spare O-Ring	A, B	CLR-3000-942-SW
	L, Z	CLR-3000-968-SW
Part No.		CLR-2951-416-V

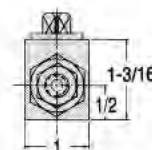
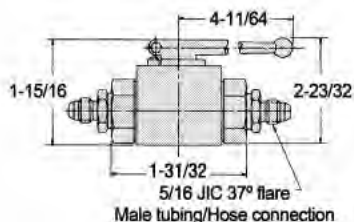


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Shutoff Valves



APPLICATIONS:

1. Shutting off unused lines in a multi-purpose fixture.
2. Holding fixture pressure temporarily while transporting with power source disconnected.

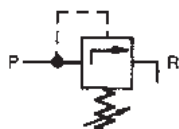
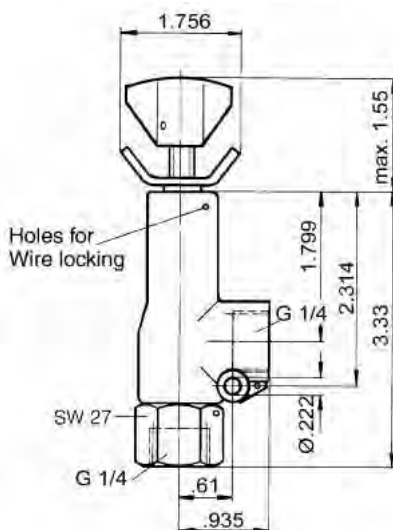
DESIGN CONSIDERATIONS: Note: a shutoff valve cannot be used to clamp and unclamp. See valves section for clamping valves.



Symbol

Max. operating pressure (psi)	7250
Mounting	In line
Lever Movement	90°
Weight (lbs)	0.7
Part No.	CLR-400-V

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
Part No.	CLR-2952-521-V

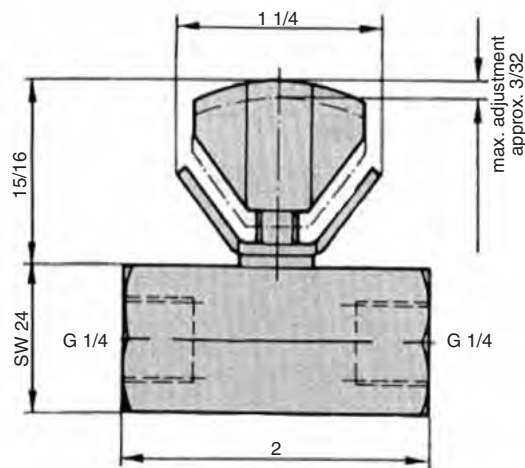


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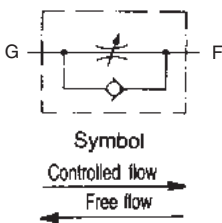
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Flow Control Valves



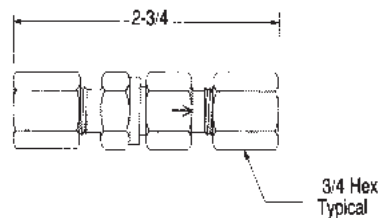
APPLICATIONS: To restrict flow from highflow-rate power sources for proper component operation (Swing Clamps, Extending Clamps, and Fluid-Advanced Work Supports for example).

OPERATION: Turn knob for precision flow control in one direction, with unrestricted free flow in the opposite.

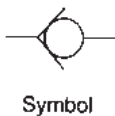


Max. operating pressure (psi)	7250
Mounting	In line
Weight (lbs)	0.7
Part No.	CLR-541-V

Check Valves



Free Flow



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
Part No.	CLR-9208-111



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Fittings & Accessories

Rotary Couplings



Single Passage (90°)
page 156



Single Passage (straight)
page 156



Two Passage
pages 157-158



Four Passage
pages 157-158

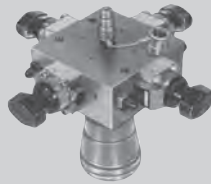


Rotary Valve Couplings
pages 159-162

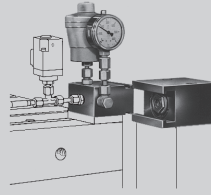
Pallet Coupling



Pallet Decouplers
pages 163-164



Pallet Decouplers for Tooling Blocks
page 165



Automatic Coupling Systems
page 166



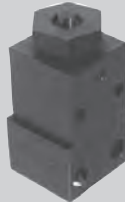
Accumulators
page 167



Threaded Coupling Elements
pages 168-171

Pressure Monitoring

Control Cylinders
page 172



Pressure Switches
page 173

Air Accessories



Filter/Regulator/Lubricators
page 174



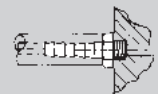
Fine Pressure Regulators
page 174



Air Flow Controls
page 174



Air Extractor/Dryers
page 174



Air Vent Fittings
page 180

Fittings, Tubing, Hose, etc.



Manifolds
page 174



Gauges
page 174



Hose
page 178



Fittings
pages 180-181



Fluid Filters
pages 176-177



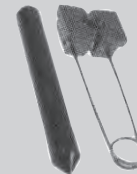
Quick Disconnects
page 175



Tubing
page 178



Fluid
page 178



Tubing Installation & Manifold Mounting
pages 179, 182-183



Contact Bolts
page 184



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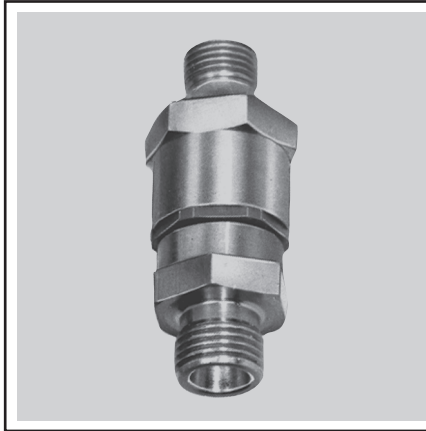
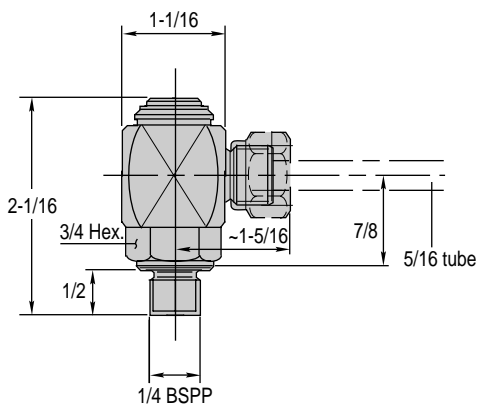
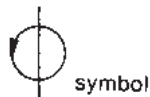
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Rotary Couplings

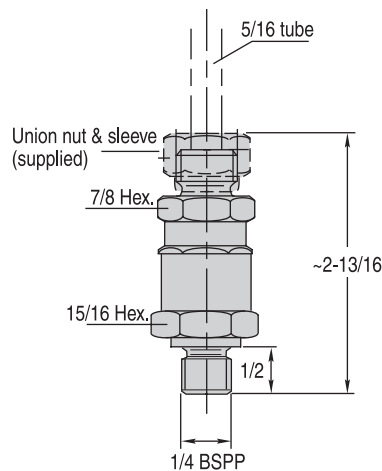
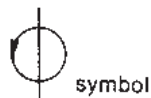
7250 psi max
Single acting



Single Passage —
Elbow

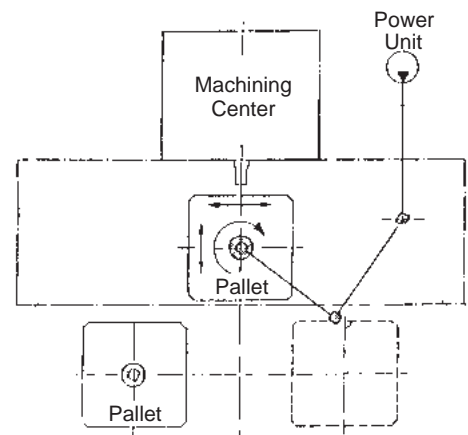


Single Passage —
Straight

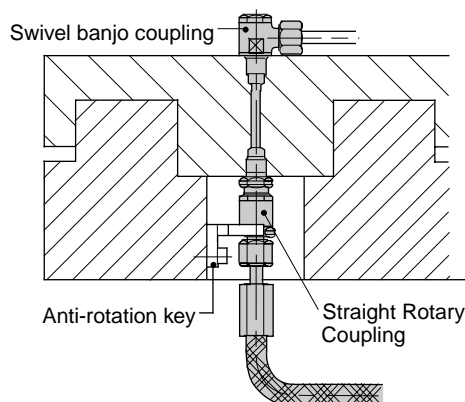
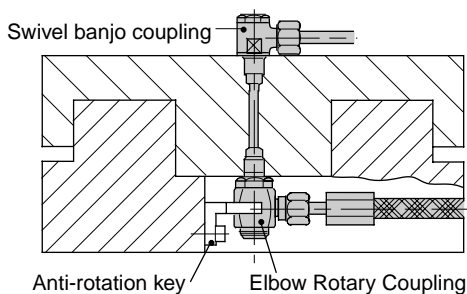


- Best choice for feeding fluid to rotating pallet changers, due to constant connection.
- Ideal for rotary index tables.
- Also good for elbow connections that regularly swing through a small arc
- Choice of elbow or straight version
- ** Do not use NPT fittings

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



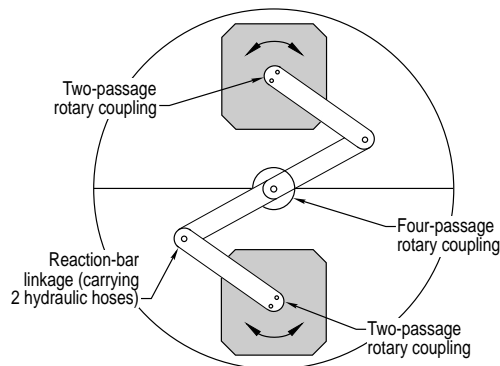
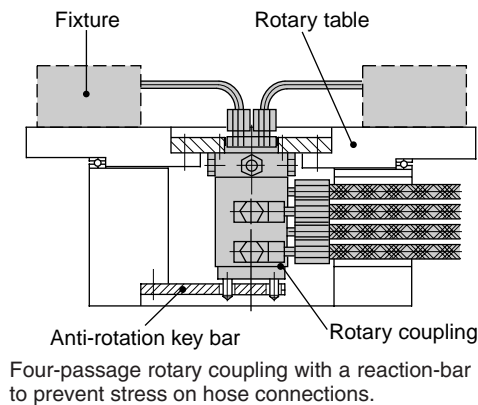
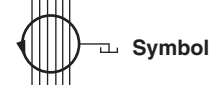
Two Passage



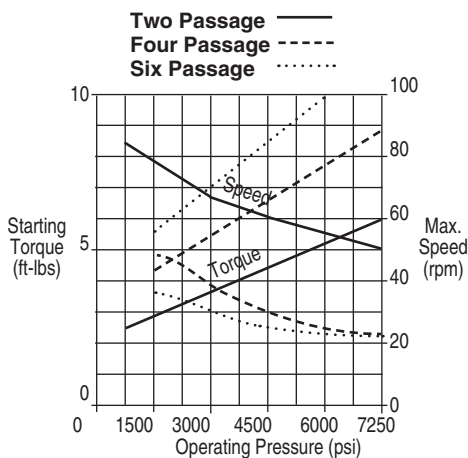
Four Passage



Six Passage



Rotary couplings are frequently used on horizontal machining centers with rotary pallet changers. A reaction-bar linkage holds the top portion of each two-passage 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

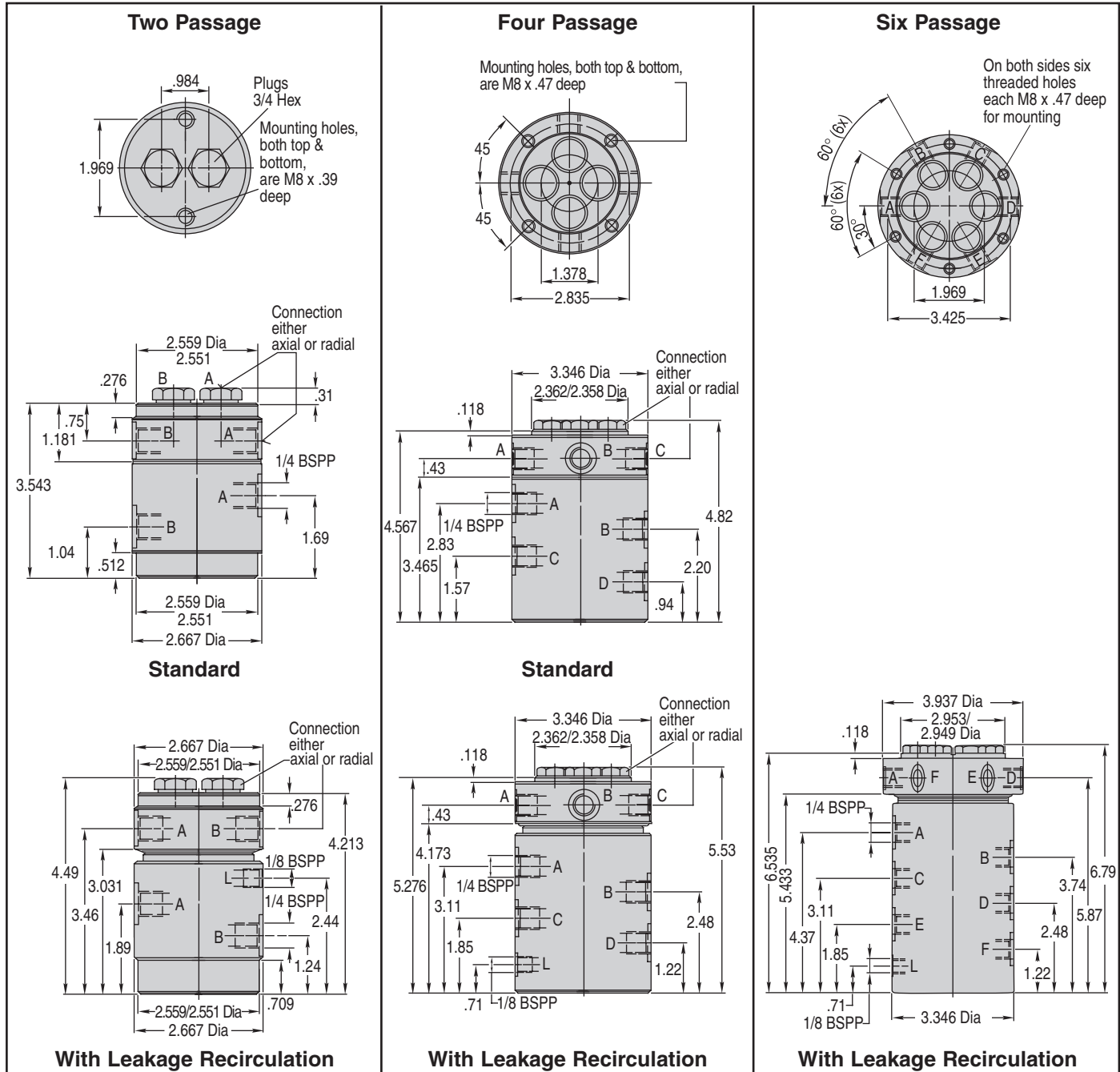
7250 psi max
Single and double acting

- **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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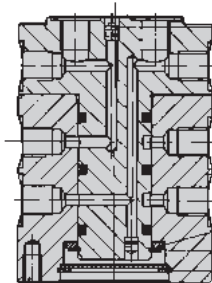
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Rotary Valve Couplings

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 reloaded 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:

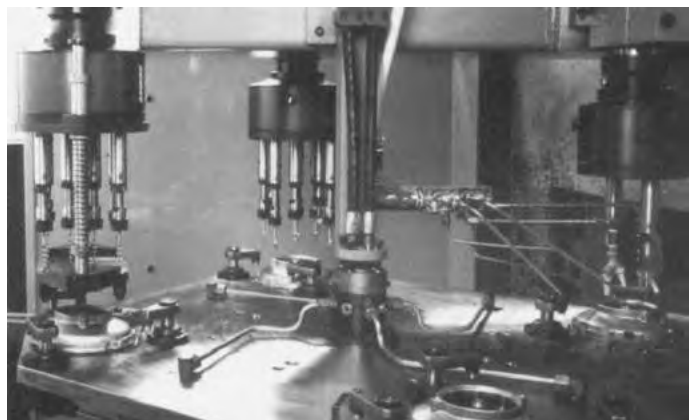
1. To use a standard Rotary Valve Coupling, the table must rotate through the same angle during each indexing movement.
2. Turning the coupling requires additional table-motor starting torque, especially when clamping automatically during indexing.
3. Maximum rotational speed is 10 RPM.
4. Use only with 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.



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.

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



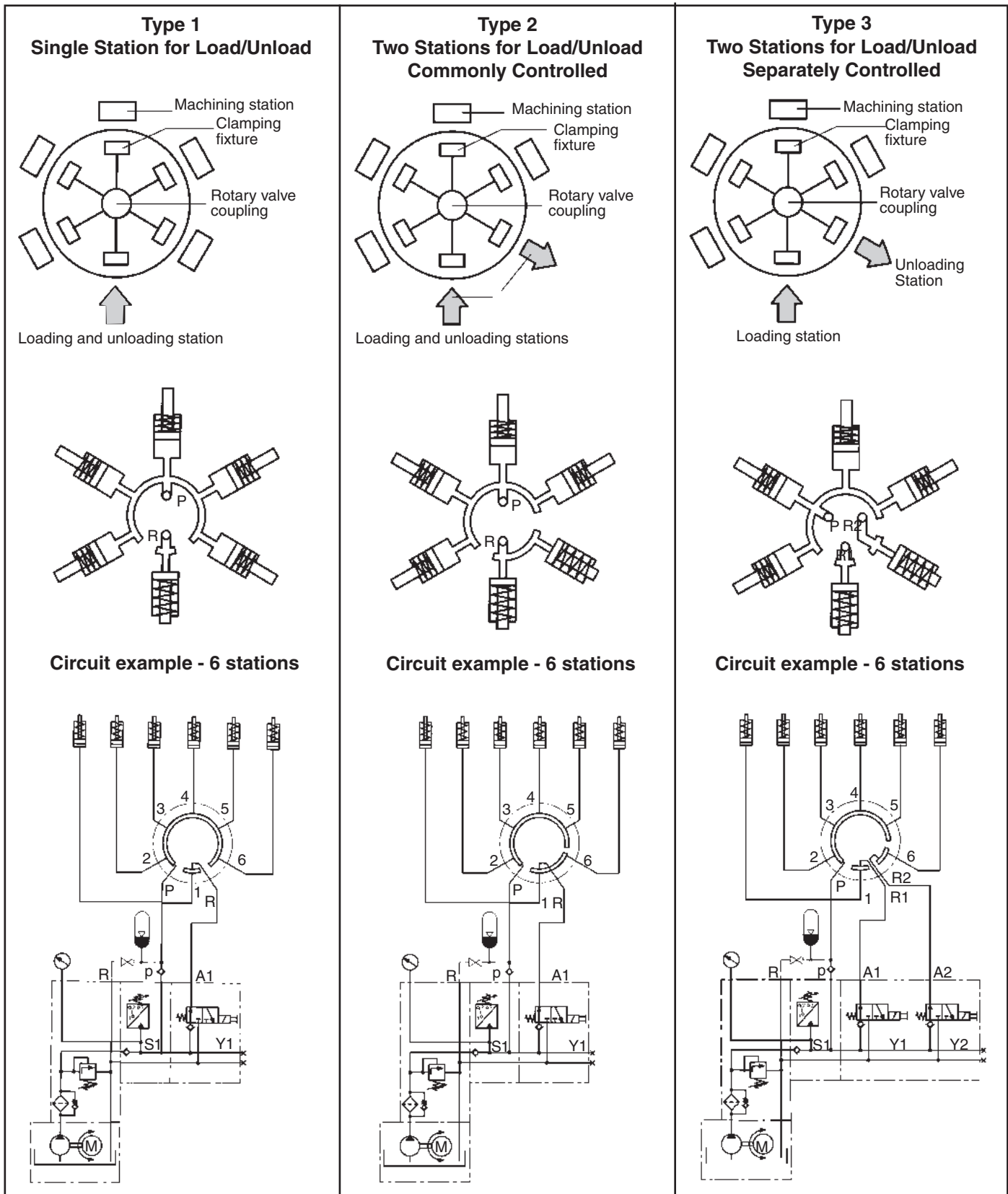
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Rotary Valve Couplings

7250 psi max
Single and double acting



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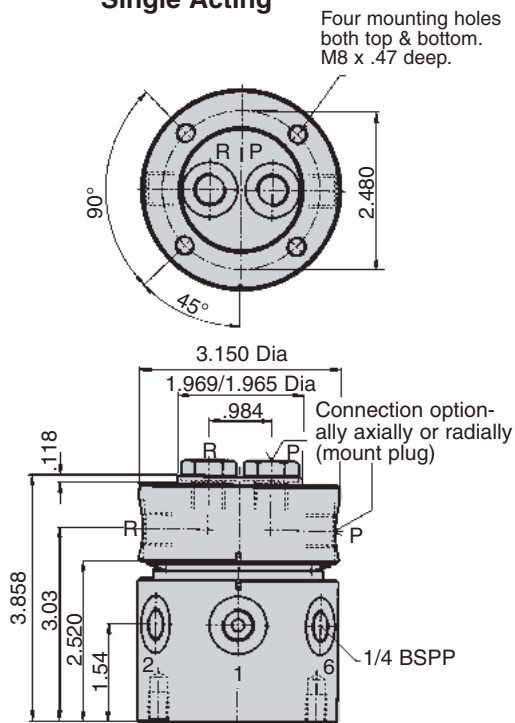
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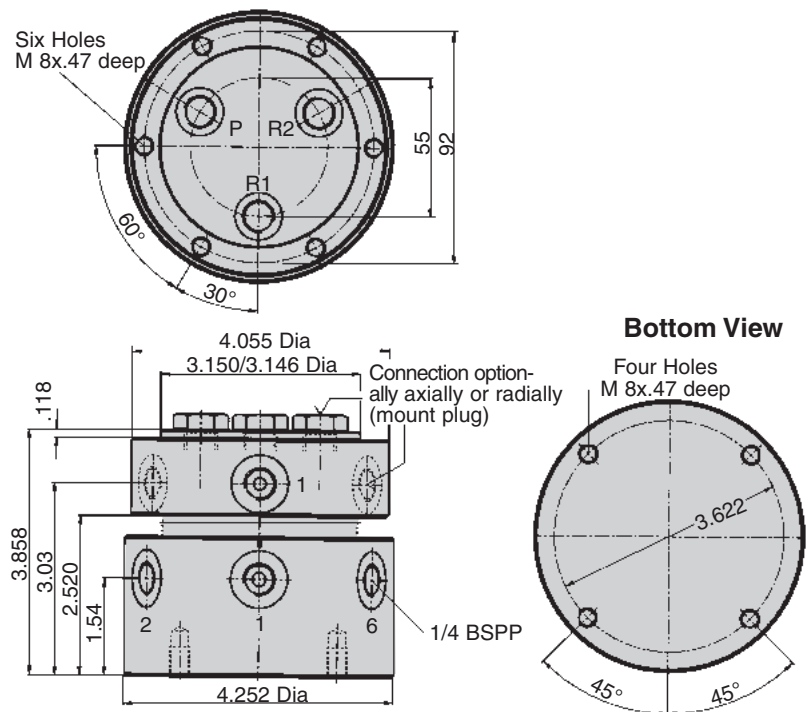
Rotary Valve Couplings

7250 psi max
Single and double acting

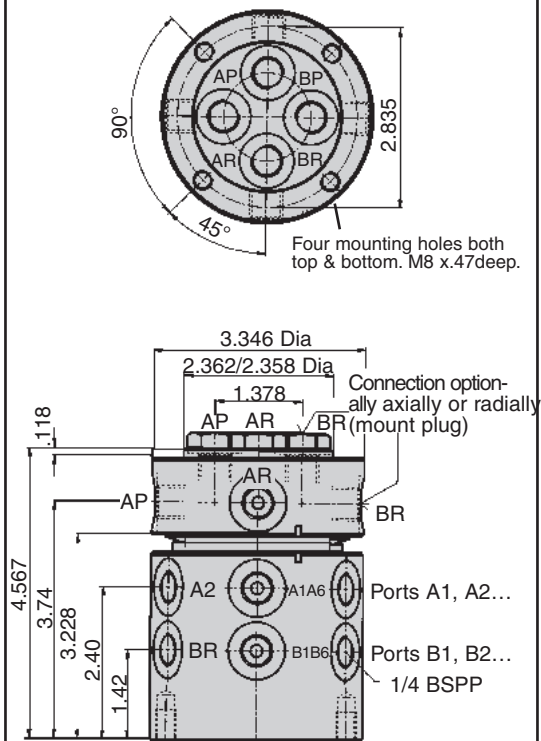
**Types 1 & 2
Single Acting**



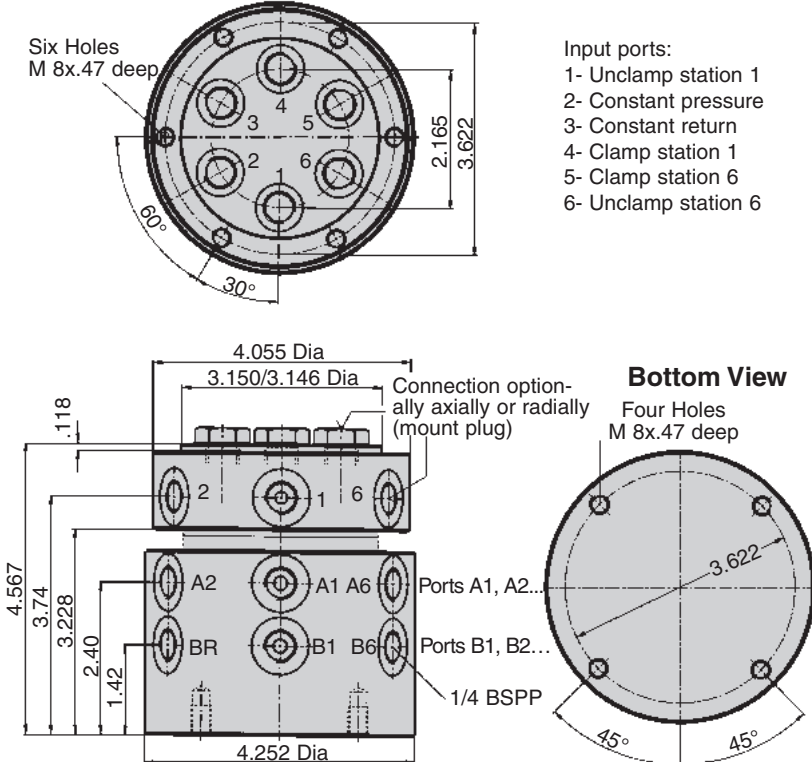
**Type 3
Single Acting**



**Types 1 & 2
Double Acting**



**Type 3
Double Acting**



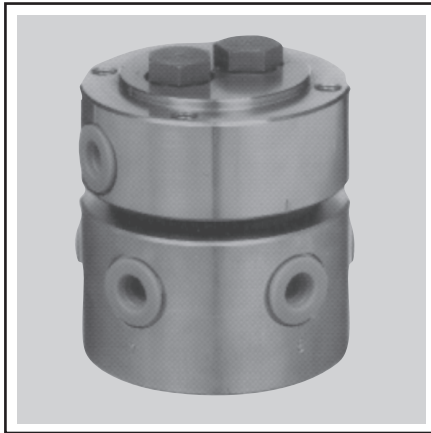
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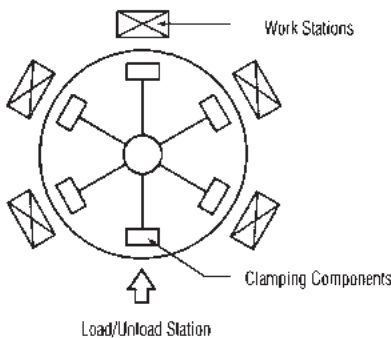
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Rotary Air Valve Couplings

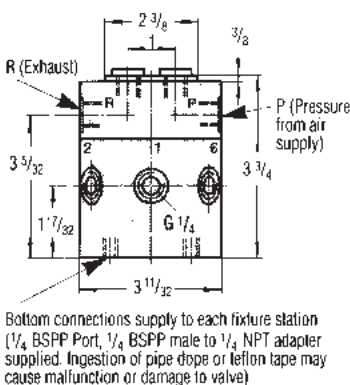
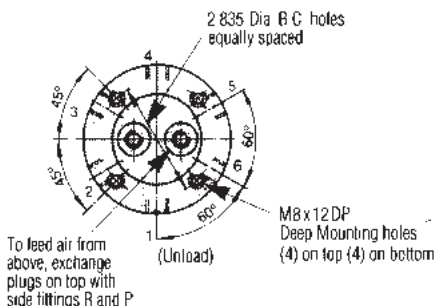
145 psi air max
Single and double acting



Single Acting



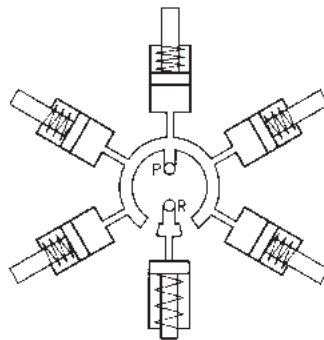
Single Acting



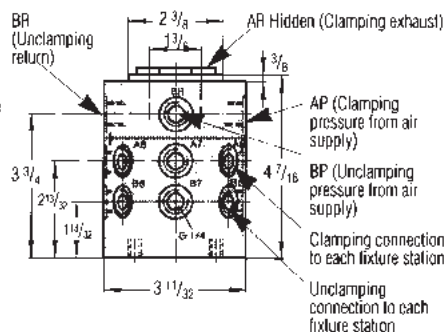
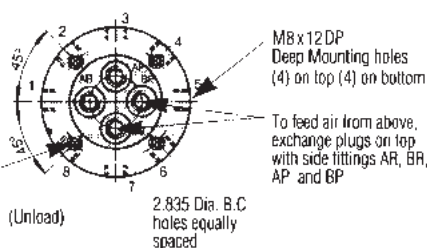
Bottom connections supply to each fixture station
(1/4 BSPP Port, 1/4 BSPP male to 1/4 NPT adapter
supplied. Ingestion of pipe dope or teflon tape may
cause malfunction or damage to valve)

- 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 reloaded automatically as the coupling rotates, or controlled by a separate clamping valve.



Double Acting



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

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



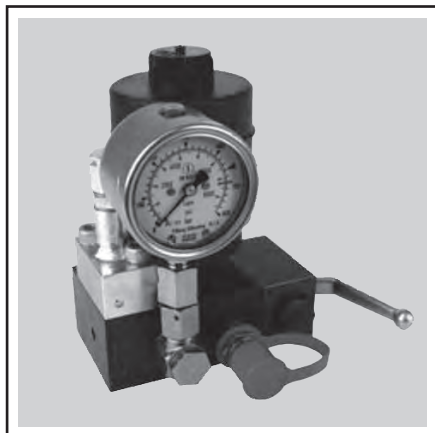
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Pallet Decouplers

7250 psi max
Single acting



Single Acting

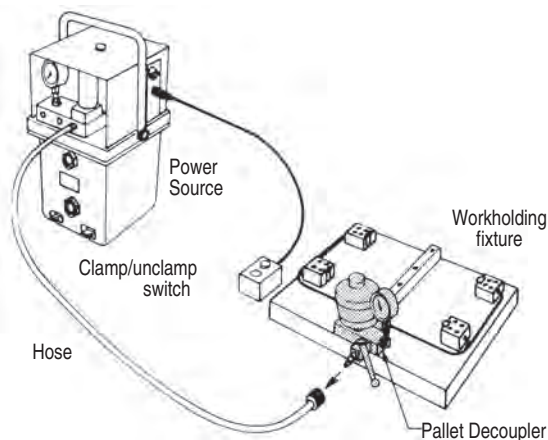
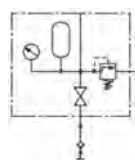
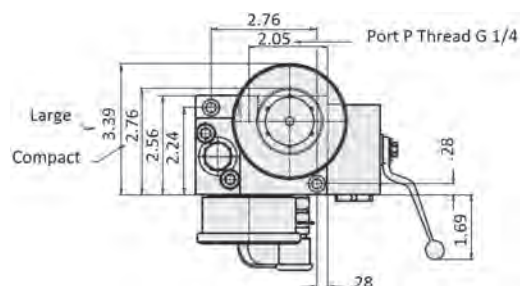
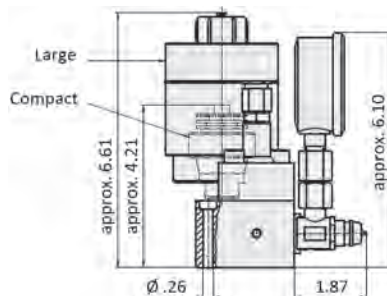
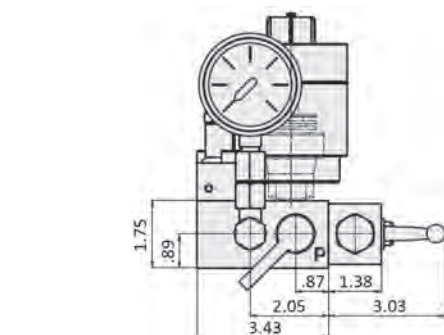
- Allows disconnecting a single-acting fixture from its power source before machining
- Compact assembly mounts easily on fixture (lay gauge flat for an even lower profile)
- Ideal for pallets and rotating fixtures where a fluid feed line is impractical
- Decoupler includes shutoff valve, quick disconnect, 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
Part No., Decoupler	CLR-9425-012-PD	CLR-9425-011-PD
Part No., Female Disconnect	CLR-9384-106-F	
Part No., Safety Support	CLR-0942-001-PDA	



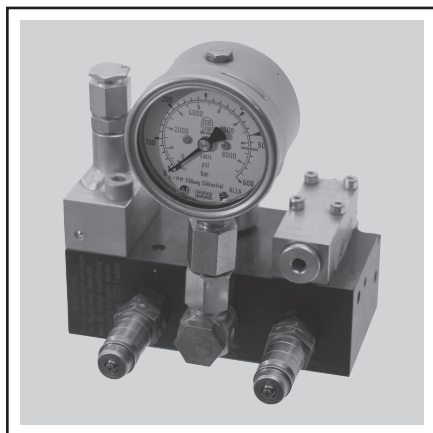
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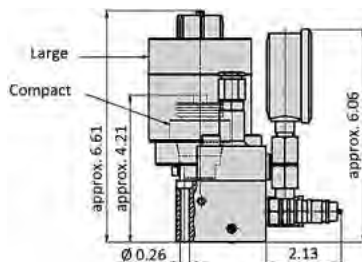
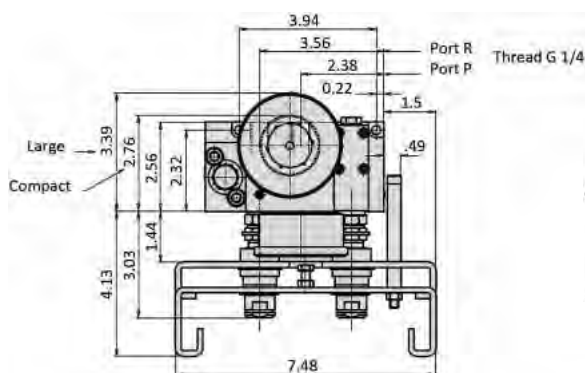
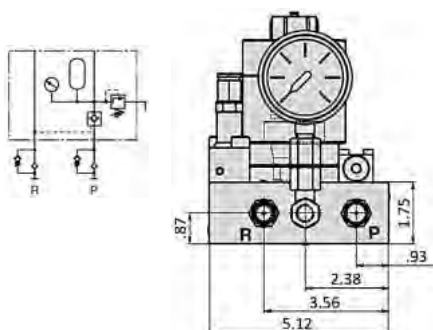
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Pallet Decouplers

7250 psi max
Single or double acting



**Single Acting or Double Acting
with Automatic Shutoff**

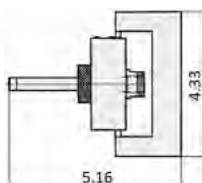


- Allows disconnecting a single-acting fixture, a double-acting fixture, or a fixture with several individual clamping valves from its power source before machining
- Automatic shutoff using a pilot-operated check valve...no manual shutoff valve required!
- Compact assembly mounts easily on fixture
- 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.

Female Disconnect Double Coupler

(order separately)



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.

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
Part No., Decoupler	CLR-9425-022-PD	CLR-9425-021-PD
Part No., Female Disconnect Double Coupler	CLR-9425-102-PDA	
Part No., Safety Support	CLR-0942-002-PDA	
Electric Power Unit, 7500 psi, 460V	CLR-939-EP	
Electric Power Unit, 7500 psi, 230V	CLR-839-EP	
Electric Power Unit, 5000 psi, 460V	CLR-940-EP	
Electric Power Unit, 5000 psi, 230V	CLR-840-EP	



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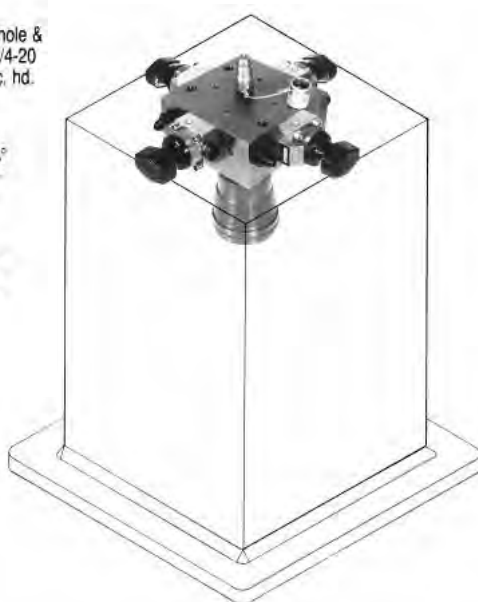
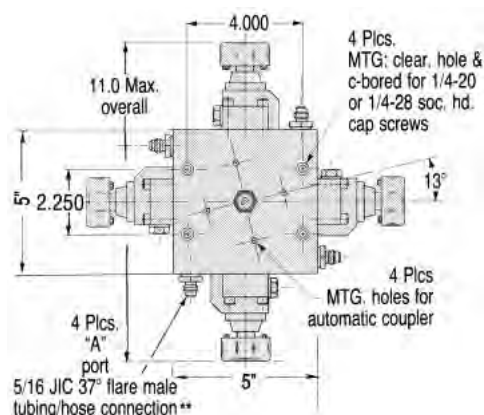
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Tooling-Block Pallet Decouplers

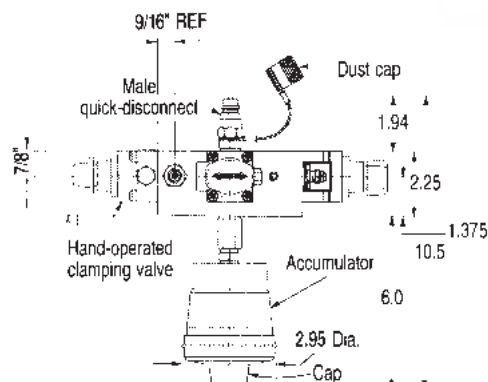
7250 psi max
Single acting



Four-Sided



Four-sided tooling block with a Pallet Decoupler mounted on top. Clamping valves control each face independently.



- **Extremely convenient fluid supply for multi-face pallets. Requires only one connection!**
- **Controls each tooling-block face independently with a 3-way clamping valve**
- **Decouples easily for machining . . . no shutoff valve required!**
- **Complete with all valves, quick disconnect, and accumulator**
- **Specials available for more than four faces, and for VTL fixtures. Please contact factory.**

****Do not use NPT fittings**

OPERATION: Requires only one fluid line from the power unit to the decoupler, due to internal hydraulic circuitry. Unload and reload using one of the two sequences below. The built-in accumulator stores fluid as the fixture is pressurized.

PROCEDURE TO UNLOAD ALL FACES THEN RELOAD ALL FACES (TWO TURNS):

1. Connect hose from power unit to the decoupler's quick disconnect (with power unit in "unclamped" position).
2. To unload first face, turn its clamping valve to "unclamped" position, then remove part. Index and repeat for all faces.
3. Switch power unit to "clamped" position.
4. Load new part on first face, then turn its clamping valve to "clamped" position. Index and repeat for all faces.
5. Switch power unit to "unclamped" position.
6. Disconnect hose and begin machining.

MOUNTING: Mount on top of tooling block, at its rotational center. Fasten with four sockethead cap screws. Bore hole in center of block to provide clearance for accumulator. Locate power unit's push-button switch near the loading area.

DESIGN CONSIDERATIONS: Use the Pallet Decoupler only with Roemheld clamps, since all components must be leakfree. The accumulator compensates for temperature change only. We recommend installing a pressure gauge on each fixture face. Important: feed hydraulic hose from directly above pallet so that the hose cannot twist more than a few degrees, especially with short hoses. **INFO+:** If necessary, install a Rotary Coupling (pages 156-157) on the hose end opposite the pallet, carefully mounted to avoid strain. Use only heavy-duty hose (see F&A section). Fluid must be clean (10 micron or better nominal filtration).

Patent pending.

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.)	6.0	8.0
Part No., Decoupler - 4 sided	CLR-401-PD	CLR-402-PD
Part No., Decoupler - 2 sided	CLR-421-PD	CLR-422-PD
Part No., Female Disconnect	CLR-202-F	

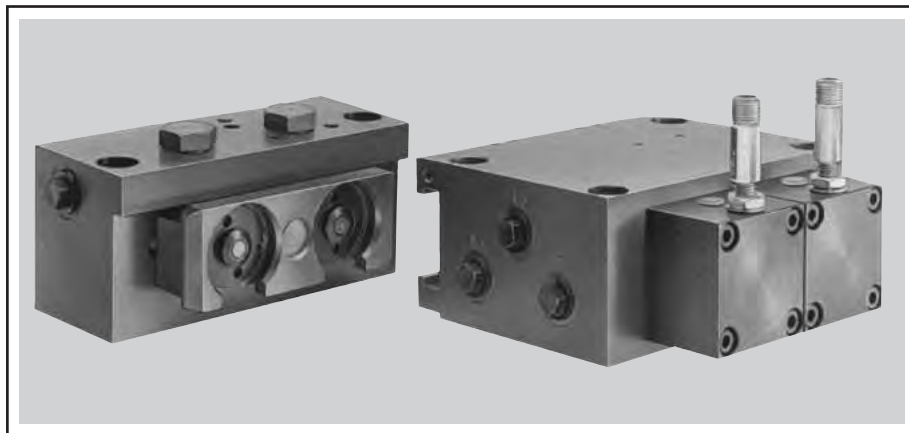


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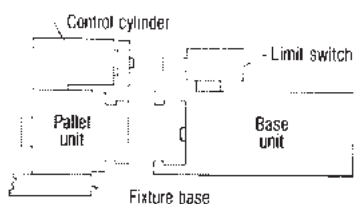
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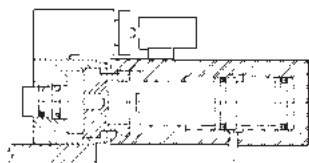
Automatic Coupling Systems ■ F9.426



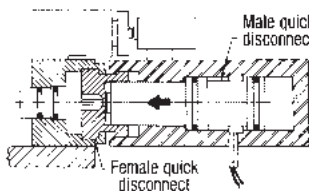
Pallet Unit and Base Unit



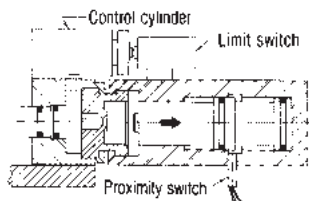
1. Units before coupling (Separated during machining operation).



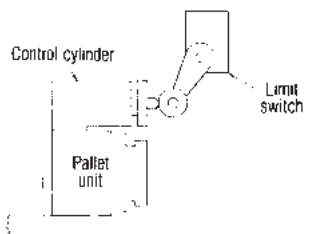
2. Slide Pallet Unit into place, ready for coupling. White indicator light indicates pallet is present.



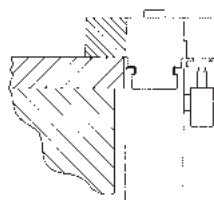
3. Press UNCLAMP button. Base unit extends male quick disconnect into female to make fluid connection. After connection, power unit automatically depressurizes fixture for unloading.



4. After loading, press CLAMP button so that power unit pressurizes fixture. Once fixture is fully pressurized (confirmed by control cylinder and external limit switch) base unit automatically retracts male quick disconnect. Internal proximity switch confirms full retraction and lights green indicator. Units are now ready to slide apart.



5. Once pallet is loaded on the machine table, a limit switch (or probe) mounted on the machine can monitor the fixture for full pressure using the control cylinder.



Units can also be mounted vertically.

- State-of-the-art turnkey automatic coupling for flexible manufacturing systems

- System consists of a Pallet Unit for each pallet, a Base Unit, and a special Electric Power Unit

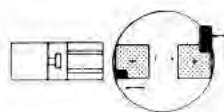
- Unit couples under full pressure for unclamping

DESIGN CONSIDERATIONS: Unit automatically compensates for axial misalignment within $\pm .028$ inches. Pallet Unit and Base Unit must line up within this range. **Since all components must be leakfree, use only with Roemheld clamps.** Also, since the fixture's fluid lines are sealed after disconnection, fluid pressure will increase if fixture temperature increases (about 80 psi per 1°F). Be careful not to exceed 7250 psi at any time during the machining cycle.

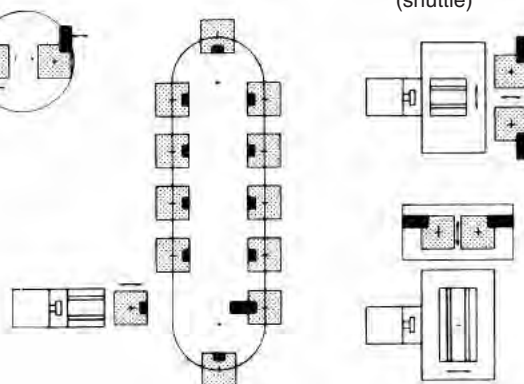
SAFETY PRECAUTIONS: Mount a control cylinder on pallet unit, install a limit switch on the machine tool to check that the control cylinder's plunger is extended, indicating proper pressure. Regularly check palletized fixtures for leaks by disconnecting the accumulator or shutting it off with a shutoff valve (CLR-400-V).

MOUNTING: Align units, then dowel in place with the holes provided. Fasten with socket-head cap screws. Mount in any position, preferably horizontal.

Single Load Station



Two Load Stations (shuttle)



Part No., Control Cylinder (4350-7250 psi)	CLR-0974-000-CC
Part No., Control Cylinder (3200-5950 psi)	CLR-0974-002-CC
Part No., Control Cylinder (1400-2300 psi)	CLR-0974-003-CC
Part No., Limit Switch	CLR-0974-001-CBA

Maximum operating pressure (psi)	7250
Minimum operating pressure (psi)	1800
Part No., Pallet Unit, single acting	CLR-4606-135-CPU
Part No., Pallet Unit, double acting	CLR-4606-235-CPU
Part No., Base Unit, single acting	CLR-4606-131-CBU
Part No., Base Unit, double acting	CLR-4606-231-CBU
Part No., Electric Power Unit	See power sources section

Subject to change. For further details, including detailed dimensions and mounting instructions, visit www.clrh.com.



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Accumulators

7250 psi max



Compact



Large

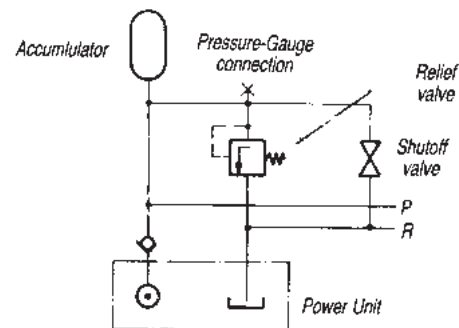
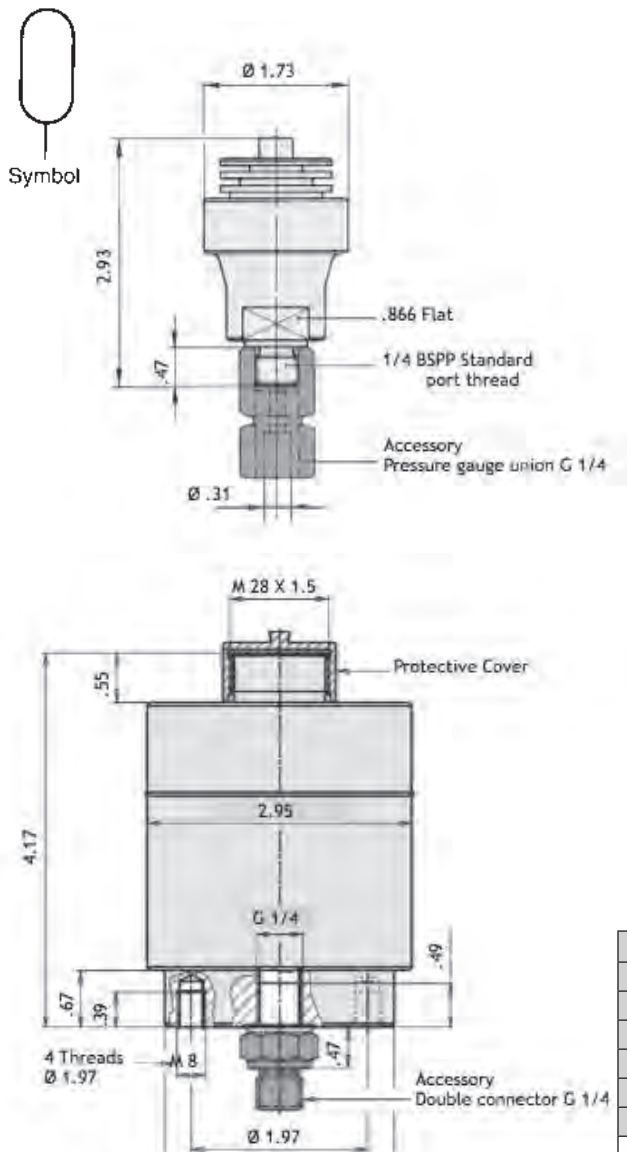
- Extremely compact accumulator, ideal for workholding applications
- Can also store fluid potential energy between working cycles
- Operates comfortably at up to 7250 psi
- Choice of large or compact size

****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



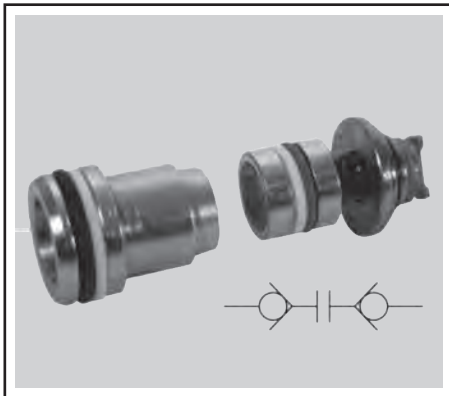
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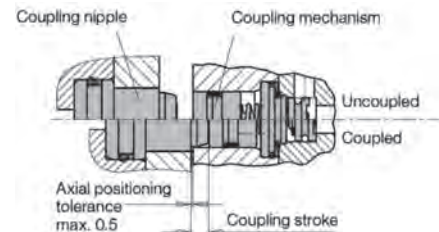
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Coupling Elements ■ Built-in & Threaded-body ■ F9.428

Coupling Elements ■ Stainless Steel, Built-in Type and Threaded Body Type
Max. Operating Pressure ■ 4351, 5076, or 7252 psi (300, 350, or 500 bar)



Coupling situation



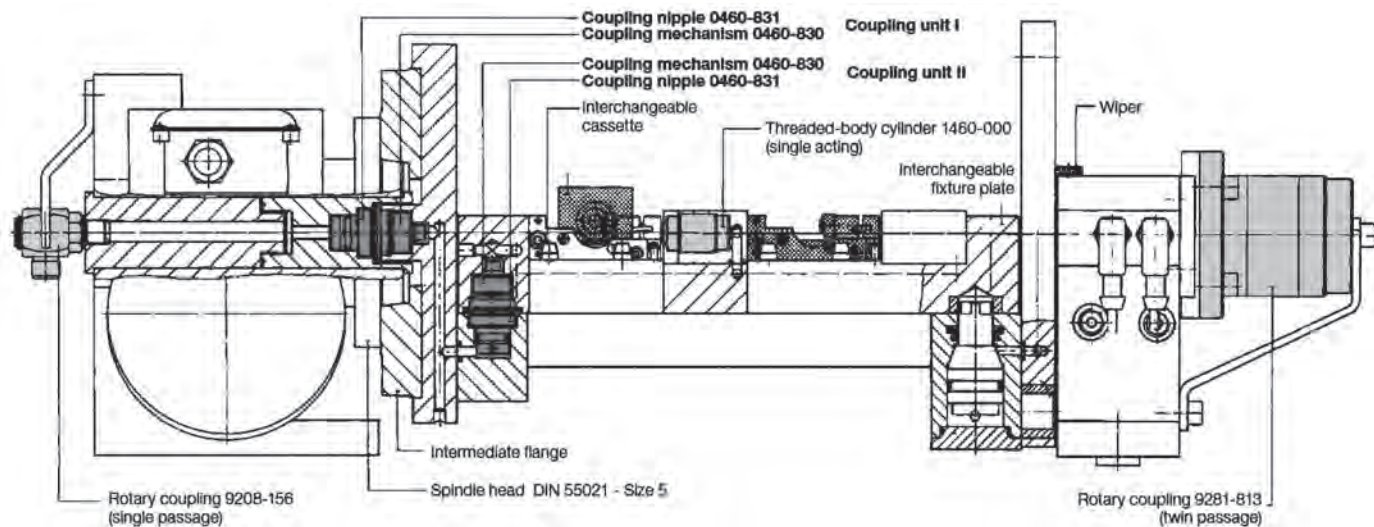
These stainless steel coupling elements allow the transfer of liquids or gases while they are coupled and are designed to maintain pressure in the uncoupled state. Some versions cannot be coupled under pressure

but there are versions available that allow coupling to occur under pressure. The built-in types are designed for mounting in between plates which allows for compact multi-coupling units like seen in data sheet F9.440. The

threaded-body types can be screwed directly into a fixture and fixture base, allowing fast and easy fixture changes.

Application example

Rotary indexing table – clamping fixture, hydraulically operated, with trunnion bearing and hydraulic positioning



General technical characteristics

Type	Threaded-body	Built-in	Threaded-body	Threaded-body with nozzle	Built-in	Threaded-body	Built-in
Nominal diameter (ND)	0.118	0.118	0.197	0.197	0.197	0.315	0.315
Max. operating pressure (psi)	5076	4351	7252	7252	4351	4351	4351
Max. flow rate (gpm)	2.11	2.11	3.17	3.17	3.17	9.25	9.25
Coupling stroke (in)	0.177	0.177	0.177	0.177	0.177	0.291	0.291
Axial coupling force at 0 psi (lbs.)	18.4	18.4	15.7	15.7	15.7	13.9	13.9
Axial positioning tolerance (in.)	0.020	0.020	0.020	0.020	0.020	0.020	0.020
Radial positioning tolerance (in.)	0.004	0.004	0.010	0.008	0.008	0.008	0.008
Radial positioning tolerance for CLR-0460-776/751 (in.)	–	–	0.020	–	–	–	–
Adm. Angular deviation (°)	1	1	1	1	1	1	1

Subject to change. For further details, including detailed dimensions and mounting instructions, visit www.clrh.com.



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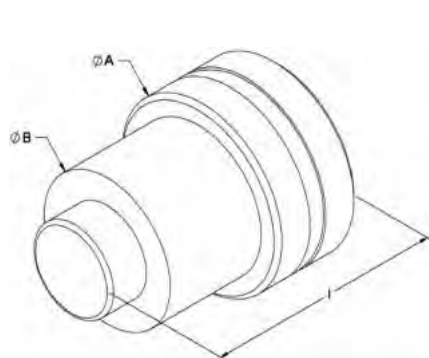
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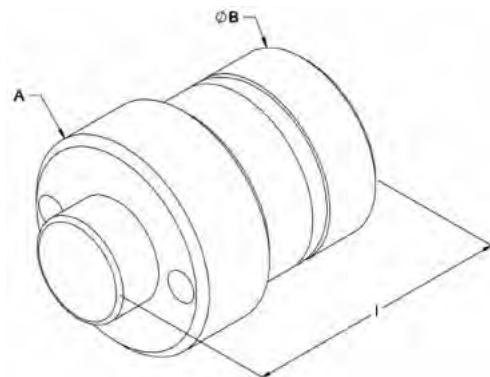
Coupling Elements ■ Built-in & Threaded-body ■ F9.428

Coupling Elements ■ Built-in type and Threaded-body type

Max. Operating Pressure ■ 4350, 5075, or 7250 psi (300, 350, or 500 bar)



Built-in nipple



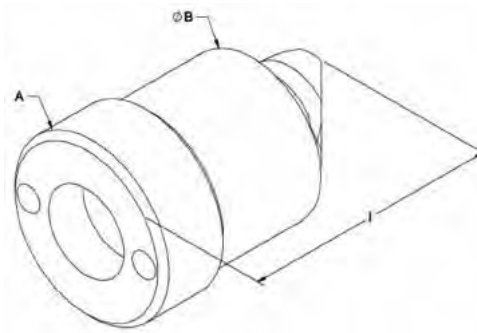
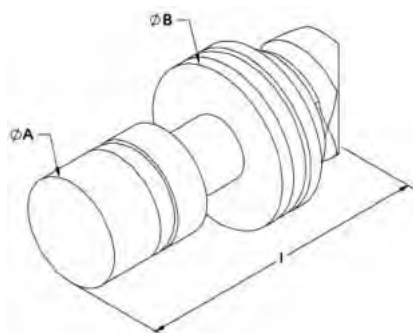
Threaded-body nipple

Coupling Nipples

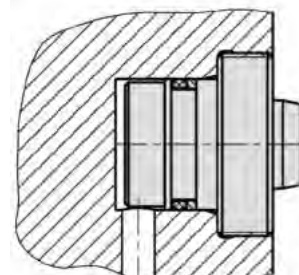
ND	3			5				8	
Type	Built-in	Threaded-body	Threaded-body with PV	Built-in	Built-in long	Threaded-body	Threaded-body with PV	Built-in	Threaded-body
A	0.787	M20x1.5	M20x1.5	0.787	0.787	M24x1.5	M24x1.5	0.945	M32x1.5
B	0.622	0.669	0.669	0.622	0.622	0.862	0.862	0.827	0.945
L	1.020	1.043	1.260	1.020	1.500	1.220	1.260	1.236	1.236

Part Number

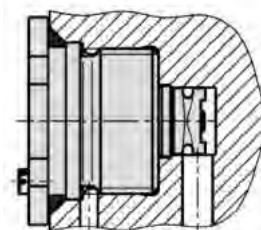
Coupling against pressure	CLR-0460-692	CLR-0460-836	-	CLR-0460-691	CLR-0460-814	CLR-0460-831	-	CLR-0460-714	CLR-0460-713
Only depressurized coupling	CLR-0460-743	CLR-0460-838	-	CLR-0460-682	CLR-0460-729	CLR-0460-751	-	CLR-0460-841	CLR-0460-772
With preloaded valve (PV)	-	-	CLR-0460-834	-	CLR-0460-837	-	CLR-0460-835	-	-
Screw-in tool	-	CLR-2010-905	CLR-2010-905	-	-	CLR-2010-904	CLR-2010-904	-	CLR-2010-903



ND 5 threaded-body type also available with integrated nozzle for air blow off



CLR-0460-703 Nipple



CLR-0460-703 Coupling Mechanism

Coupling Mechanism

ND	3		5		8	
Type	Threaded-body	Built-in	Threaded-body	Built-in	Threaded-body	Built-in
A	M20x1.5	0.394	M24x1.5	0.551	M32x1.5	0.748
B	0.709	0.591	0.807	0.748	1.063	0.945
L	1.150	1.150	1.150	1.150	1.732	1.732

Part Number

Coupling against pressure	CLR-0460-832	CLR-0460-818	CLR-0460-830	CLR-0460-656	CLR-0460-711	CLR-0460-712
Only depressurized coupling	CLR-0460-833	CLR-0460-819	CLR-0460-776	CLR-0460-659	CLR-0460-771	CLR-0460-839
Additional bushing for simple location hole	CLR-0460-884	-	CLR-0460-777	-	CLR-0460-847	-
Screw-in tool	CLR-2010-905	-	CLR-2010-904	-	CLR-2010-903	-
Sealing disk (spare part)	CLR-3001-997	CLR-3001-997	CLR-3001-999	CLR-3001-999	CLR-3001-998	CLR-3001-998
Installation tool for sealing disk			CLR-0460-873	CLR-0460-873	CLR-0460-914	CLR-0460-914

Subject to change. For further details, including detailed dimensions and mounting instructions, visit www.clrh.com.



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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.

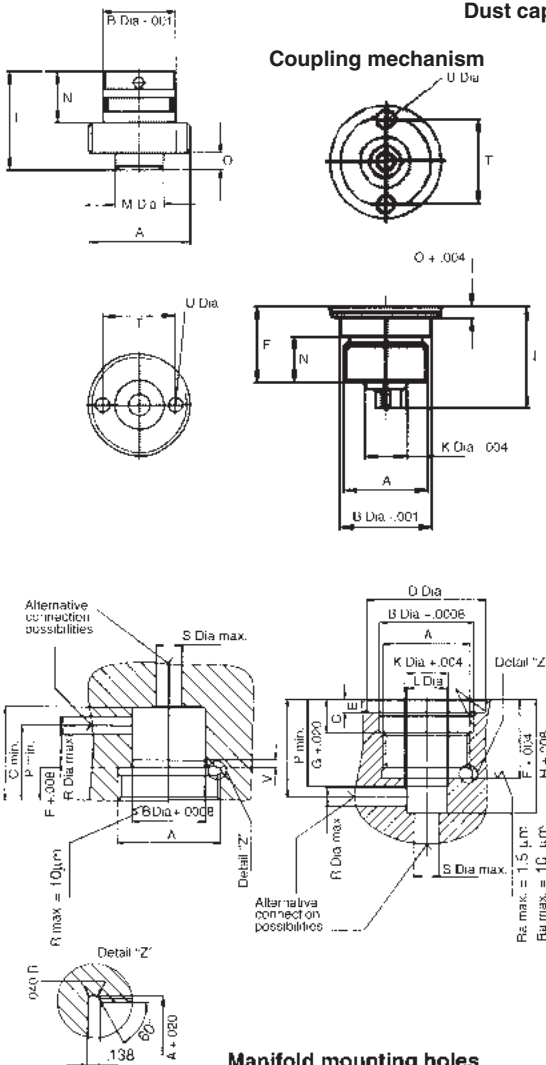
Flange-type housings are available to simplify the manufacture of the fixture mounting hole contours. In cramped conditions it is possible to make and install the flange-type housing retrospectively.

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



Manifold mounting holes

Element	Coupling mechanism	Threaded nipple	Threaded nipple with VSV	Coupling mechanism	Threaded nipple	Threaded nipple with VSV
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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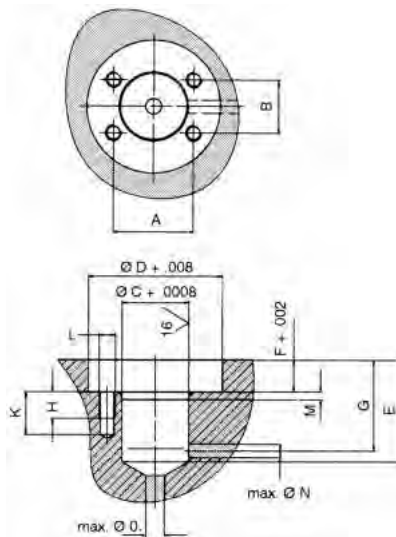
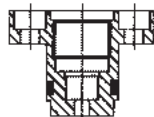
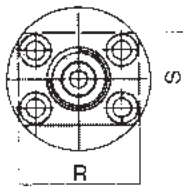
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Threaded Coupling Elements

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.

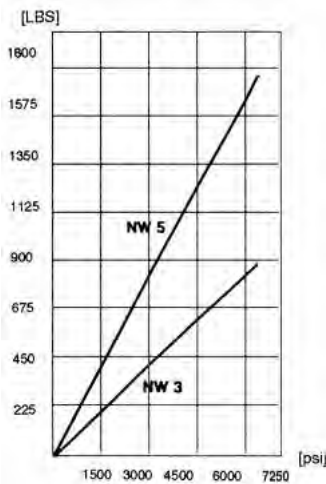
The depth dimensions are then shortened by dimension F.

In cramped installation conditions the housing can be milled according to dimensions R and S.

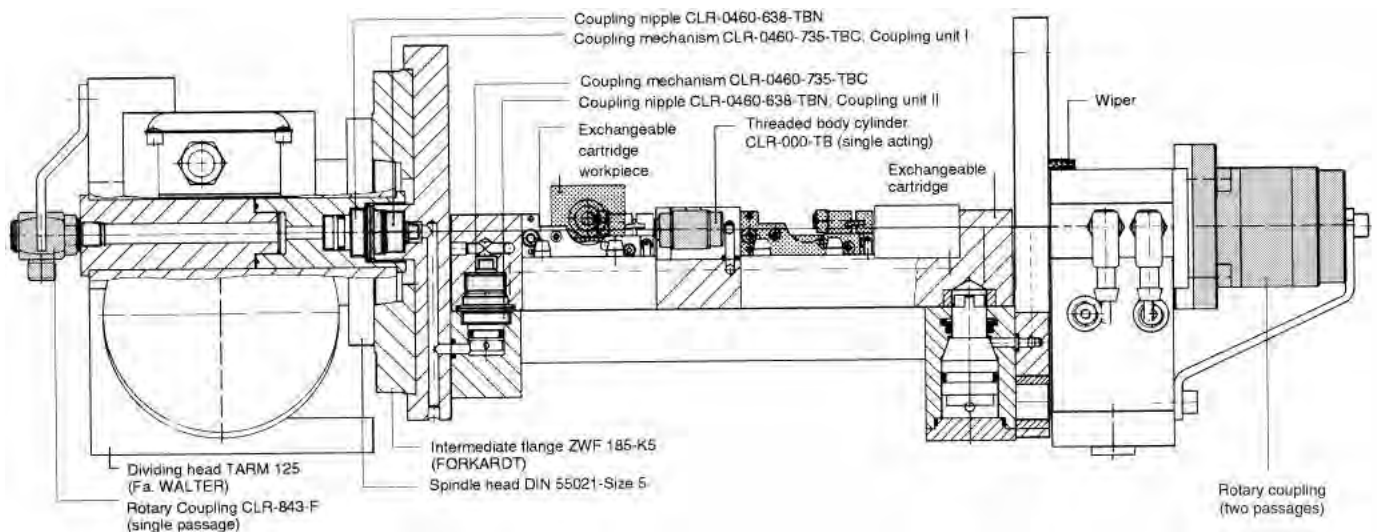
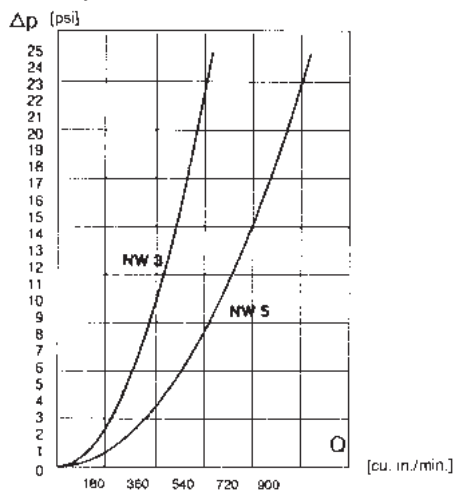
Housings for Coupling Mechanisms

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



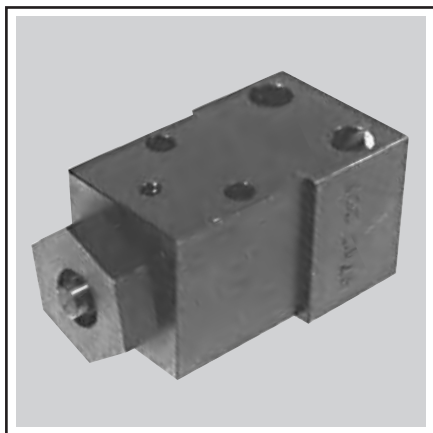
Δp -Q characteristic line for kinetic viscosity from $53 \times 10^{-6} \text{ m}^2/\text{s}$



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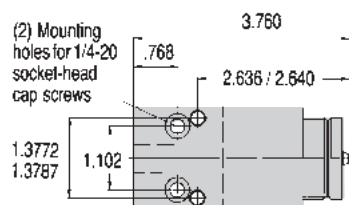


- Pressure-indicating cylinder for monitoring pressure on decoupled pallets
- Plunger extends only when you exceed the set pressure
- Choice of high, medium or low pressure-monitoring range
- Choice of standard fittings or manifold mounting

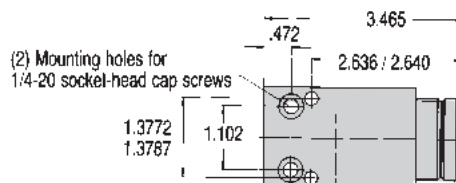
OPERATION: Unlike other clamps and cylinders, Control Cylinders do not extend immediately under low pressure. Their internal springs are calibrated to restrict plunger movement until a set pressure is reached. In fact, full plunger movement takes place entirely during a small 290 to 580 psi "switching range" (hysteresis) during which the plunger switches from fully in to fully out. By installing a limit switch fixed to the machine table, you can detect whether proper pressure is present or not.

SETTING: Select a Control Cylinder with setting range based on expected system operating pressure. Usually Control Cylinders can be set approximately 20% under full operating pressure, unless tighter control is required. For example, if maximum operating pressure will be 6000 psi, set Control Cylinder to finish retraction at 4800 psi (using either a high- or medium-range Control Cylinder). To set control pressure, turn front threaded bushing after loosening setscrew, then retighten setscrew.

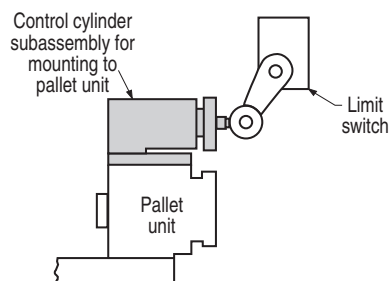
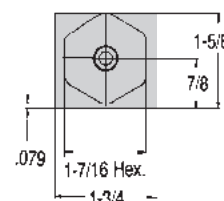
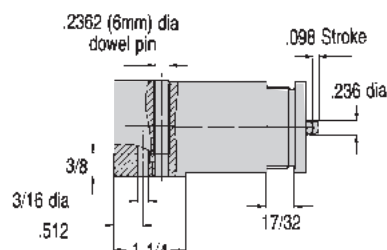
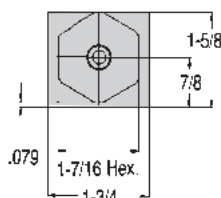
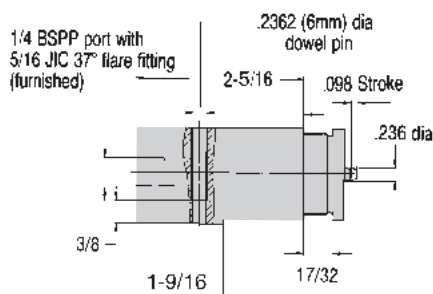
MOUNTING: Fasten with two 1/4-20 socket-head cap screws. Dowel in place with two 6mm dowel pins. To manifold mount, order O-ring CLR-3000-347-SW, and counterbore mounting surface .531 / .535 dia x .057 / .061 deep under 3/16 dia passage.



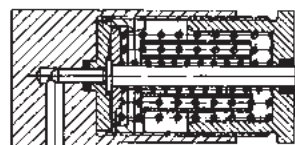
Standard Fittings



Manifold Mounting



Limit switch mounted on machine table monitors clamping pressure by sensing the extended position of the Control Cylinder's plunger. If system pressure somehow drops below the set level, the plunger would retract.



Setting range (psi)	High	Medium	Low
	4350-7250	3200-5950	1400-2300
Max. operating pressure (psi)	7250	7250	7250
Switching range (psi)	290	440	580
Stroke	.098	.098	.098
Part No., standard fittings	CLR-9740-802-CC	CLR-9740-803-CC	CLR-9740-804-CC
Part No., manifold mounted	CLR-9740-025-CC	CLR-9740-026-CC	CLR-9740-027-CC
Control Cylinder Subassembly	CLR-0974-000-CC	CLR-0974-002-CC	CLR-0974-003-CC



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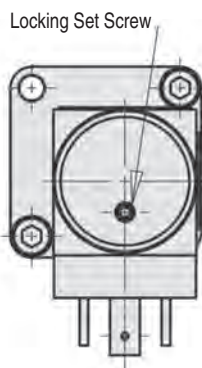
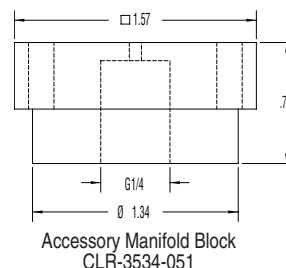
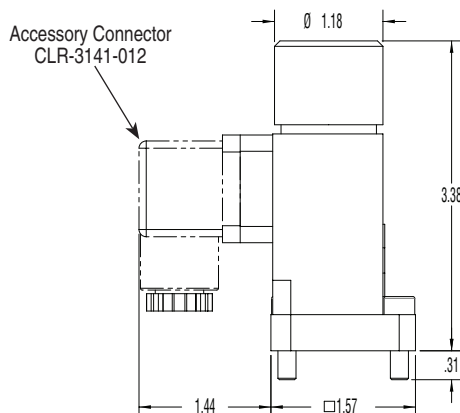
Pressure Switches ■ F9.732

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)

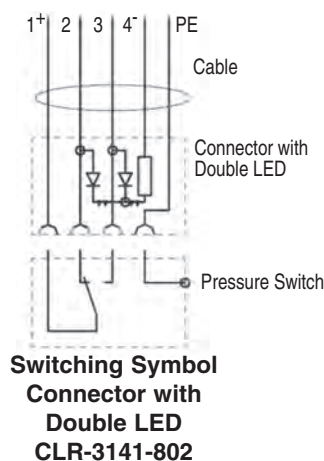


Hydra-electric pressure switches are devices which close or open electrical contacts under pressure. They are used to switch on or off pump motors, valves, machine tool interlocks or similar applications in power units, machines

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



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.

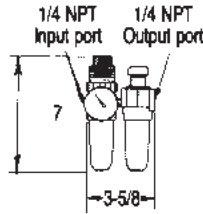


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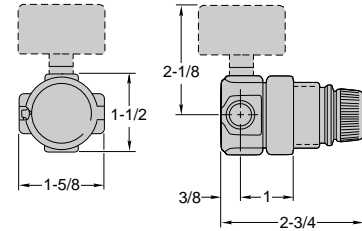
Air Filter/Regulator/Lubricator



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.

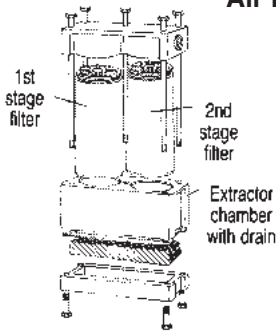
Fine Air-Pressure Regulator



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).

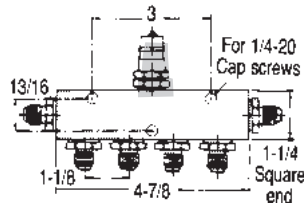
Air Flow-Control Valve



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

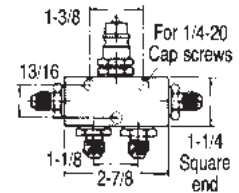
CLR-107-F

(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

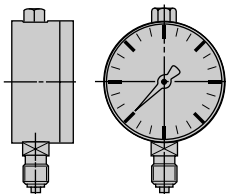
CLR-104-BP

(5) 1/4 BSPP ports, without fittings

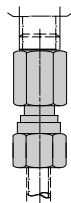
Fluid Pressure Gauges



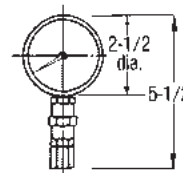
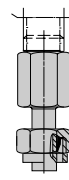
CLR-100-GA
Gauge only
without adaptor



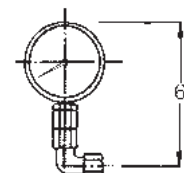
CLR-808-F
Female gauge adaptor
Compression type



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

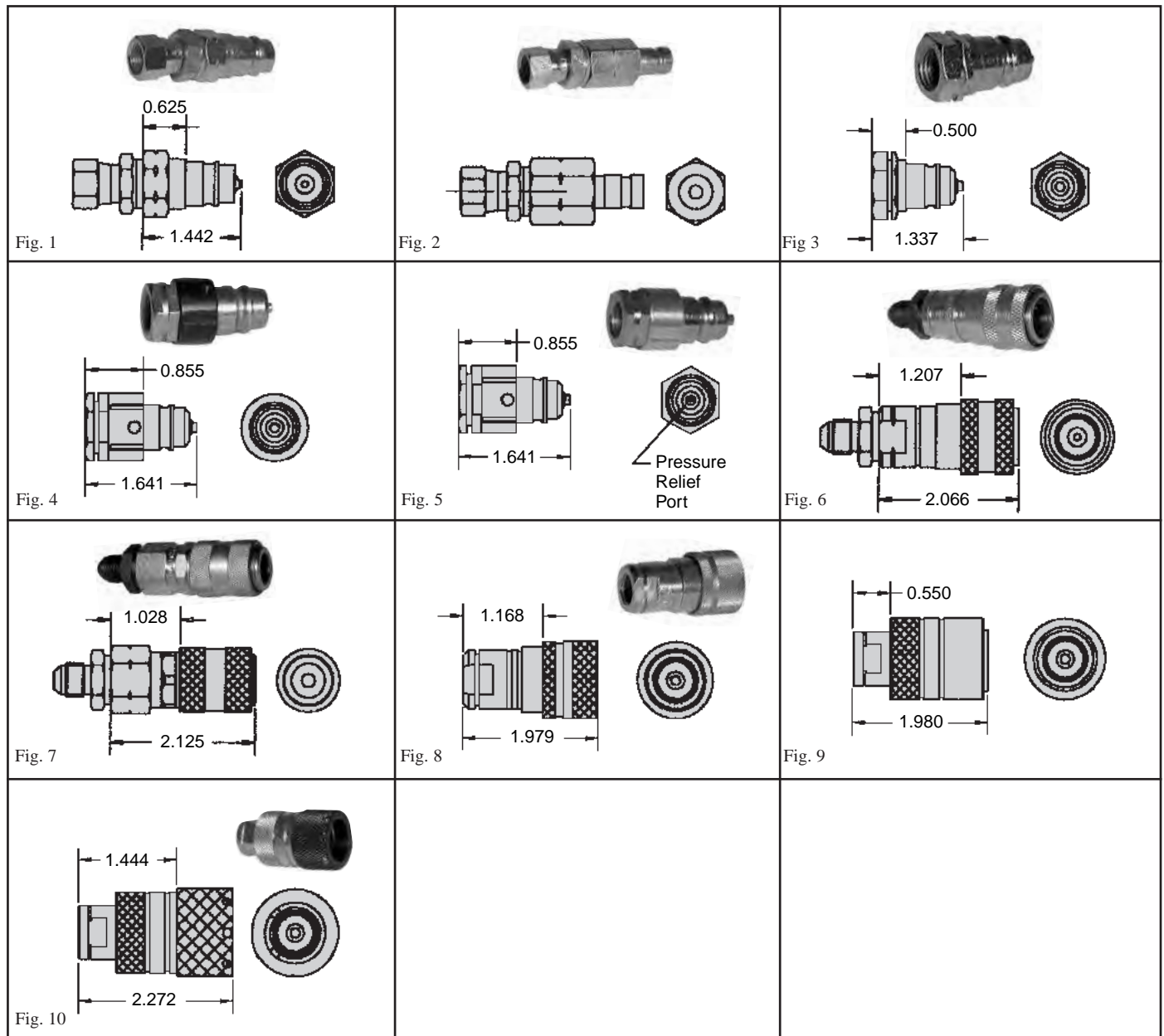


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Quick Disconnects



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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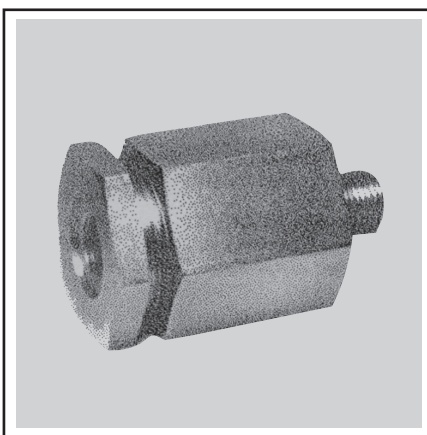
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High Pressure Inline Filters

7250/3000 psi max



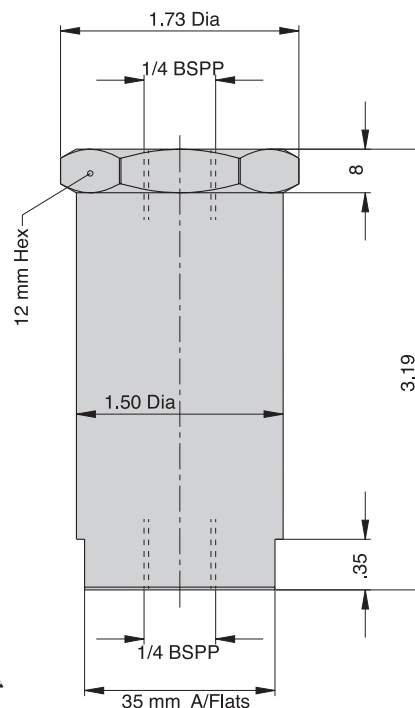
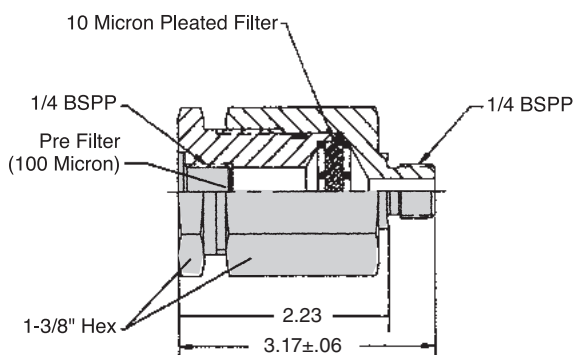
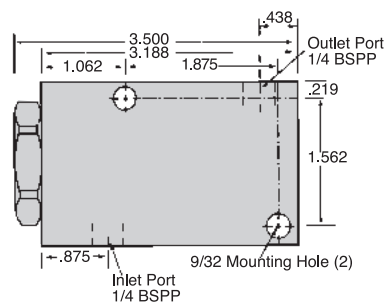
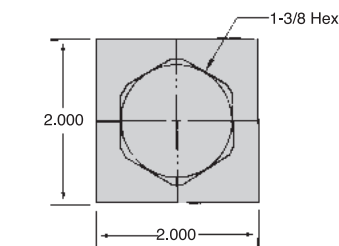
CLR-000-V



CLR-100-V



CLR-3887-087



- 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 mounting 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-3887-087
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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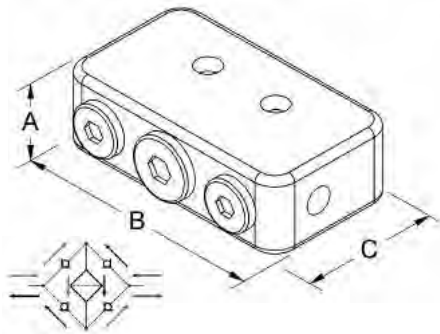
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Engineering — Phone 1-800-827-2526 Web www.clrh.com

Filters ■ High Pressure Filter ■ F9.500

Hydraulic Filters ■ Stainless steel and steel

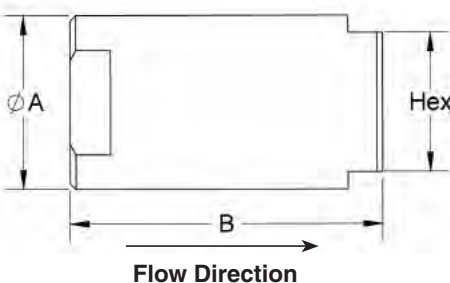
Max. Operating Pressure ■ 5075 psi (350 bar) and 7250 psi (500 bar)



- Suitable for large flow rates
- Filter insert can be cleaned
- Insert removal without dismantle
- Connections: fitting or manifold mount
- Flow direction variable
- Unique rectifier function, allows oil to be filtered going to and from pump in a single direction

Technical characteristic with rectifier function

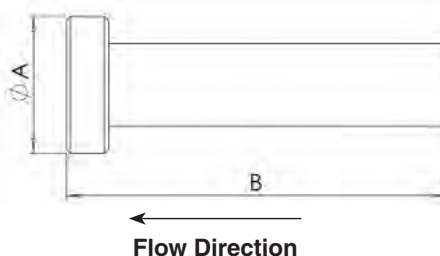
Max. operating pressure	5075 psi
Filter Capacity	10 μ
Filter material	Stainless steel
Body material	Stainless steel
A (in.)	1.18
B (in.)	4.21
C (in.)	2.36
Part No.	CLR-3887-086



- Suitable for large flow rates
- Filter insert can be cleaned
- Water option
- Replacement filter inserts available

Technical characteristic cartridge style filters

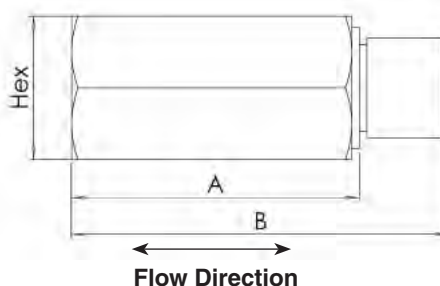
Max. operating pressure	5075 psi
Filter Capacity	10 μ
Filter material	Stainless steel
Body material	Stainless steel
Hex (in.)	0.94
\varnothing A (in.)	1.18
B (in.)	2.13
Part No.	CLR-3887-067
Part No., Compact	CLR-3887-087



- Minimal dimensions
- For installation in drilled channels and plates, thereby direct protection of the hydraulic components

Technical characteristic of plug in filters

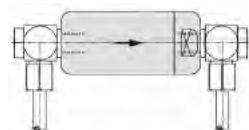
Max. operating pressure	5075 psi
Filter Capacity	10 μ
Filter material	Stainless steel
Body material	Stainless steel
\varnothing A (in.)	0.26
B (in.)	0.71
Part No.	CLR-3887-066
Part No.	CLR-3887-071



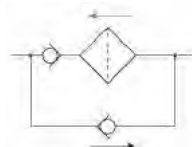
- For installation in front of couplings
- Protection against swarf
- Up to 7250 psi operating pressure
- Flow direction variable

Technical characteristic high pressure filters

Max. operating pressure	7250 psi
Filter Capacity	100 μ
Filter material	Steel
Body material	Steel, galvanized
Hex (in.)	0.75
A (in.)	1.50
B (in.)	1.97
Part No.	CLR-3887-030



Installation example for simple change of the filter



Switching example with passage and filtering in one direction

Subject to change. For further details, including detailed dimensions and mounting instructions, visit www.clrh.com.



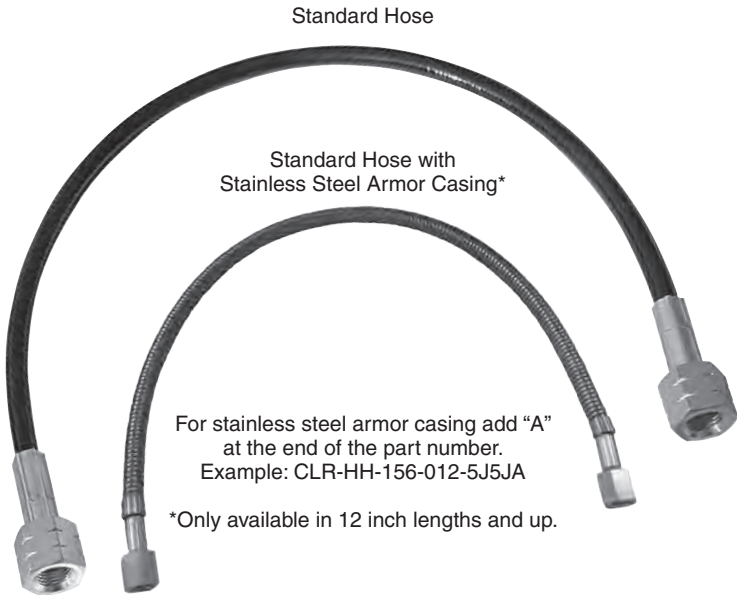
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Accessories

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

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

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.

Tubing	Heavy-Duty Hose	Hydraulic Fluid																		
																				
<p>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).</p> <p>60" CLR-60-T</p>	<p>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.</p> <p>NOTE! 10'-0" MAXIMUM RECOMMENDED LENGTH</p> <table><tr><th>JIC 37° flare</th><th>Compression Type</th></tr><tr><td>18" CLR-18-H</td><td>CLR-18-H-CC</td></tr><tr><td>24" CLR-24-H</td><td>CLR-24-H-CC</td></tr><tr><td>30" CLR-30-H</td><td>CLR-30-H-CC</td></tr><tr><td>36" CLR-36-H</td><td>CLR-36-H-CC</td></tr><tr><td>42" CLR-42-H</td><td>CLR-42-H-CC</td></tr><tr><td>48" CLR-48-H</td><td>CLR-48-H-CC</td></tr><tr><td>60" CLR-60-H</td><td>CLR-60-H-CC</td></tr><tr><td>72" CLR-72-H</td><td>CLR-72-H-CC</td></tr></table> <p>(Special lengths available)</p>	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	<p>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.</p> <p>2 gal. CLR-2-FL</p>
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																			



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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

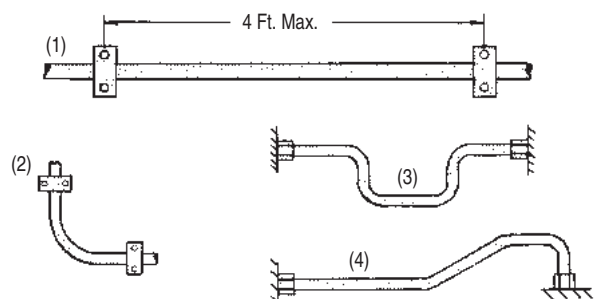
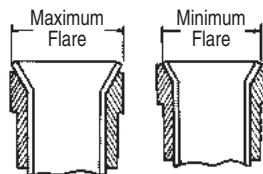
The **Roemheld** tube bender shown is a simple, effective bender we highly recommend. When bending tubing carefully avoid wrinkling, flattening or kinking the tube. Please note: complete flaring before bending.



**CLR-300-TL
Flaring Tool**

Flaring

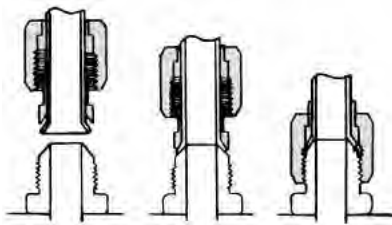
1. Place nut and sleeve over tube before flaring.
2. Place tube in flaring tool, approximately 1/8" above top of block.
3. Clamp assembled block in vise.
4. Center pin guide of flaring tool in tube.
5. Strike flaring tool 3-4 times with sharp hammer blow. Remove from block.
6. Inspect flare so that their 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.

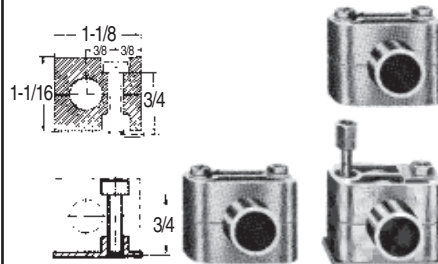
Important: Never use tubing lines as handles to lift fixtures.



Assembly

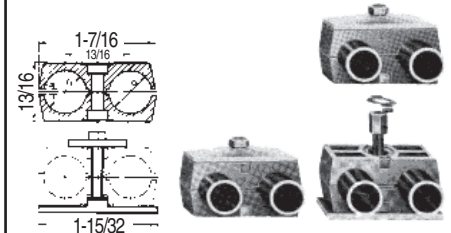
1. Slide nut and sleeve on to flared tubing end and finger tighten.
2. Finish tightening with a wrench, 1/4 to 1/2 turn.

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.



















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Fittings

Hydraulic Compression Fittings (7250 psi static)											
Port Fitting - Male			Banjo Elbow			Branch Tee			Union		
											
5/16 Tubing	G 1/4	CLR-802-F				5/16 Tubing	G 1/4	CLR-804-F	5/16 Tubing	CLR-701-F	
	G 1/8	CLR-805-F									1/4 Tubing
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 CLR-817-AF			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








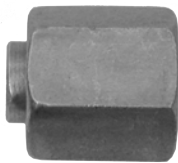

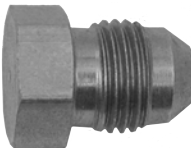






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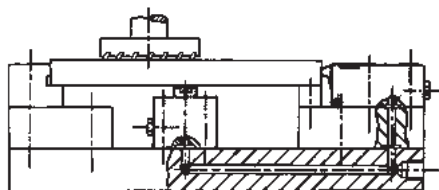
Fittings

Hydraulic 37° Flare Fittings (7250 psi static)											
Tube End			Nut Elbow			Branch Tee			Run Tee		
											
5/16 Tubing	CLR-400-F		5/16 Tubing	CLR-402-F		5/16 Tubing	CLR-403-F		5/16 Tubing	CLR-404-F	
1/4 Tubing	CLR-420-F		1/4 Tubing	CLR-422-F		1/4 Tubing	CLR-423-F		1/4 Tubing	CLR-424-F	
Union			Elbow			Tee			Cross		
 Male											
 Female (1.75 in. Flare to Flare)											
5/16 Tubing	Male	CLR-301-F	5/16 Tubing	CLR-302-F		5/16 Tubing	CLR-303-F		5/16 Tubing	CLR-304-F	
1/4 Tubing	Male	CLR-321-F	1/4 Tubing	CLR-322-F		1/4 Tubing	CLR-323-F		1/4 Tubing	CLR-324-F	
5/16 Tubing	Female	CLR-401-F	5/16 Tubing	CLR-302-F		5/16 Tubing	CLR-303-F		5/16 Tubing	CLR-304-F	
1/4 Tubing	Female	CLR-421-F	1/4 Tubing	CLR-322-F		1/4 Tubing	CLR-323-F		1/4 Tubing	CLR-324-F	
Cap			Port Fitting Female			Tube Plug			Nut 45		
											
5/16 Tubing	CLR-501-F		5/16 Tubing	CLR-813-F*		5/16 Tubing	CLR-502-F		5/16 Tubing	CLR-406-F	
1/4 Tubing	CLR-521-F		1/4 Tubing	CLR-815-F*		1/4 Tubing	CLR-522-F		1/4 Tubing	CLR-426-F	
Banjo Elbow			Port Fitting Male			Port Plug			Double Port		
											
			5/16 Tubing	G 1/4	CLR-807-F	G 1/8 Port	CLR-3610-263				
			5/16 Tubing	G 1/8	CLR-903-F	G 1/4 Port	CLR-810-F				
5/16 Tubing	CLR-814-F		1/4 Tubing	G 1/4	CLR-816-F*	G 1/2 Port	CLR-3610-000-F		G 1/4 Port	CLR-809-F	

*Max. 6600 psi.

Manifold Mounting

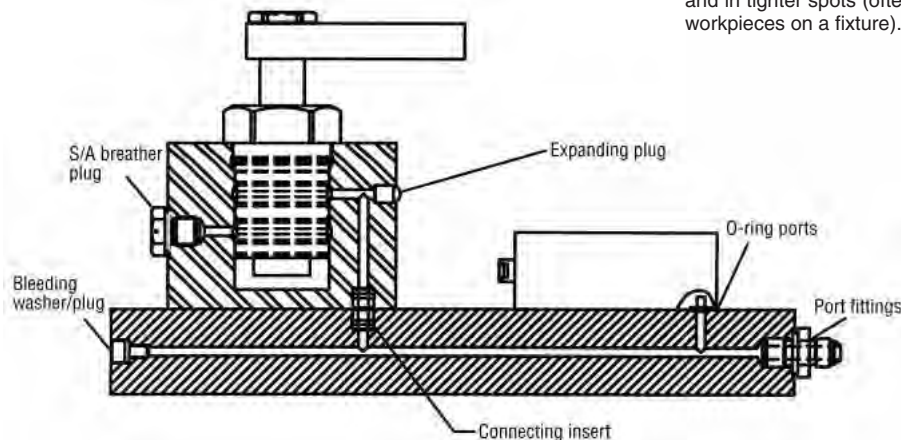
Benefits



- 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).

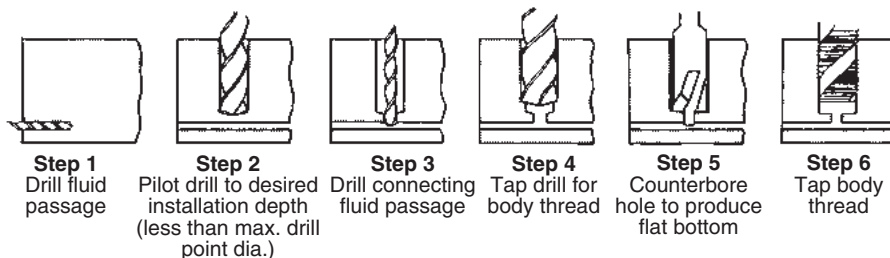


Installation Steps

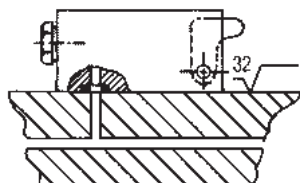
For easiest installation, we recommend the following procedure (Step 1 through 6). For proper sealing, the tapped hole's bottom must be flat, with a surface finish 125 RMS or better, and perpendicular to the hole's axis. A small drill-point is allowable (see component's catalog page for dimensions). 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



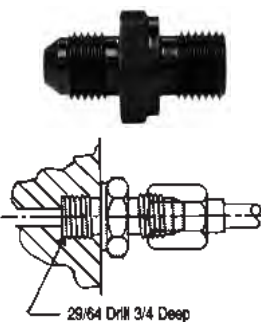
Installing Components with O-Ring Ports



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-SW and CLR-810-F port plug).

Port Fittings



1/4 BSPP THDS - 5/8 Deep

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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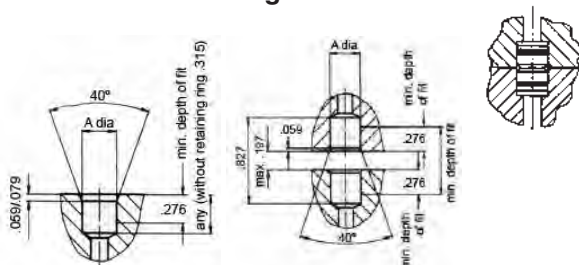
Manifold Mounting

Benefits

Connecting Plates Together

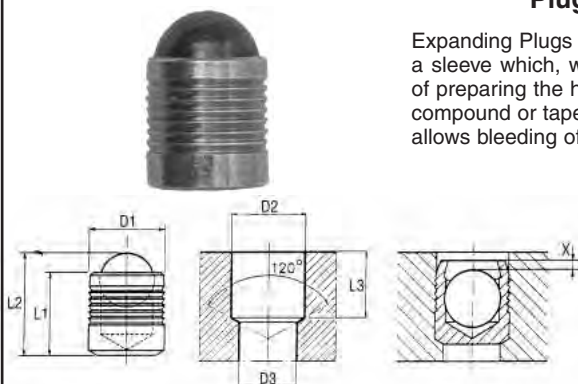


Connecting Inserts are used to provide a leak-free connection when a fluid passage goes through two separate sections of a fixture. The insert has two O-ring seals to provide leak-free sealing. Choice of two insert lengths: short (for flush connections) and long (for connections with a gap of up to .197"). 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	CLR-9210-127-F	CLR-901-F

Plugging Drilled Passages



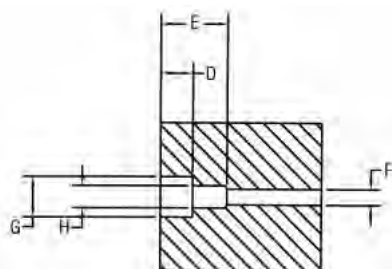
Expanding Plugs are used to plug the end of an oil channel. Each plug consists of a ball mounted into a sleeve which, when installed, expands and seals to the inner bore of the hole. Installation consists of preparing the hole, inserting the plug, and striking the ball to expand the sleeve. Do not use 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-F	CLR-3000-779
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

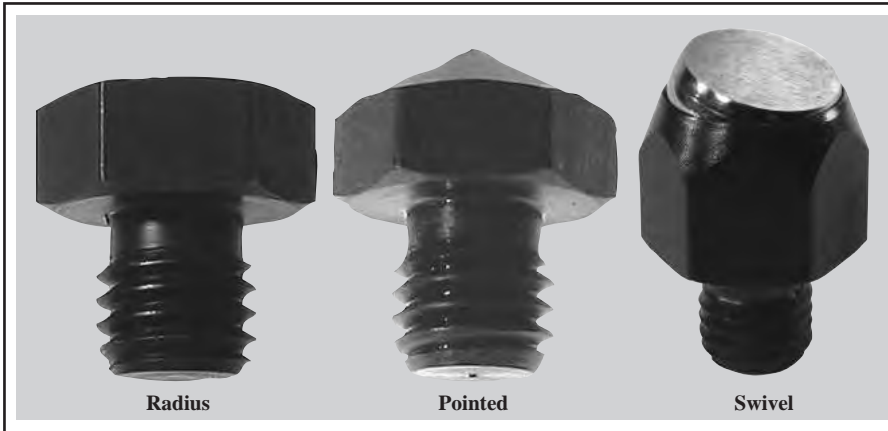


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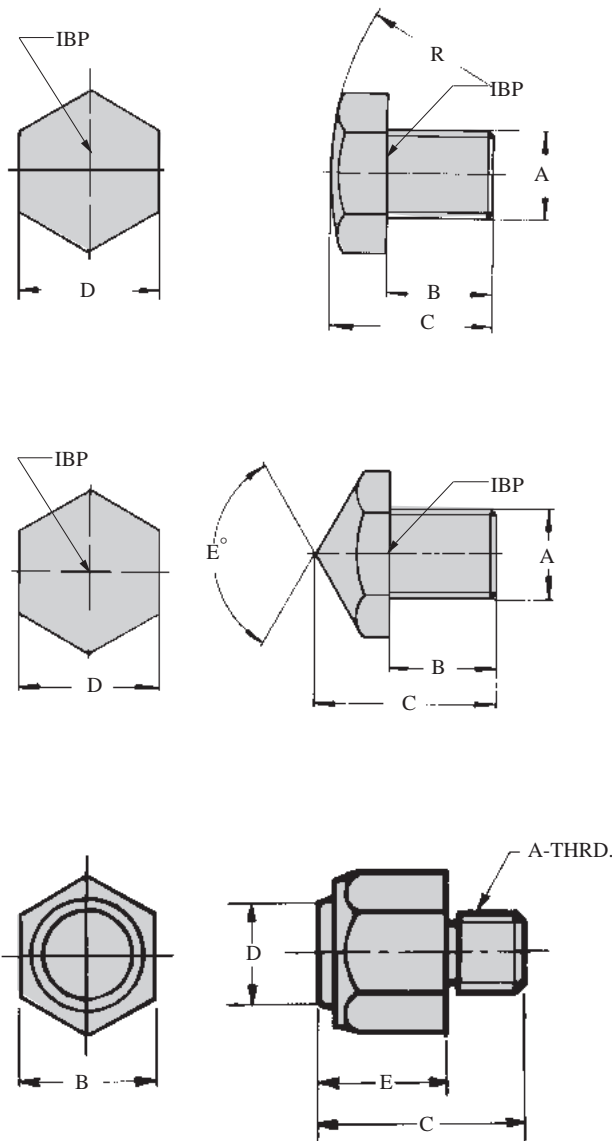
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Contact Bolts



- 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

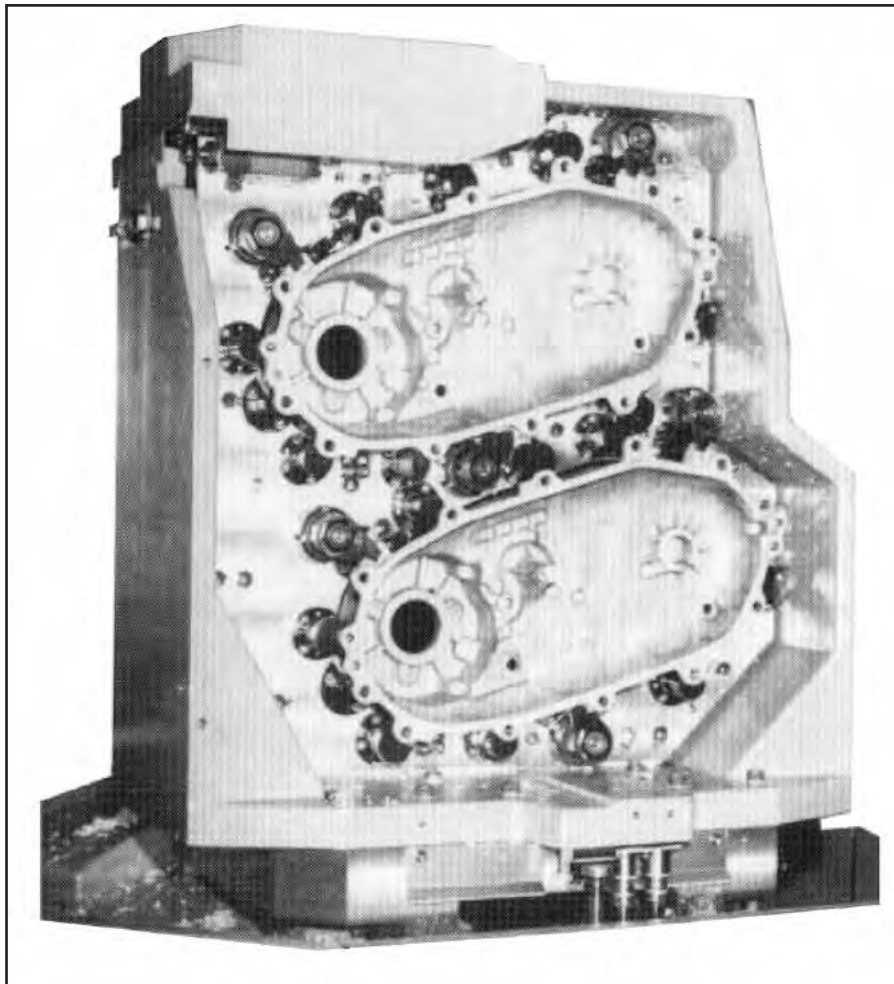


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Application Example



**Two-sided Palletized Fixture for Machining
Both Sides of an Aluminum Housing**

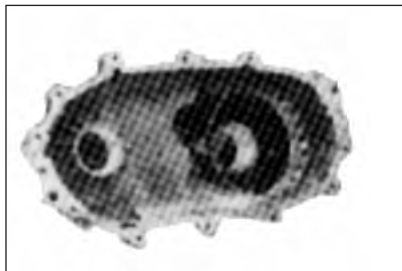
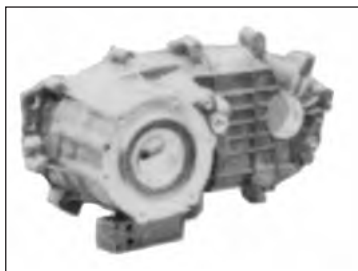


**Cartridge/Manifold-Mounted
Swing Clamps**
(See Swing Clamps section)

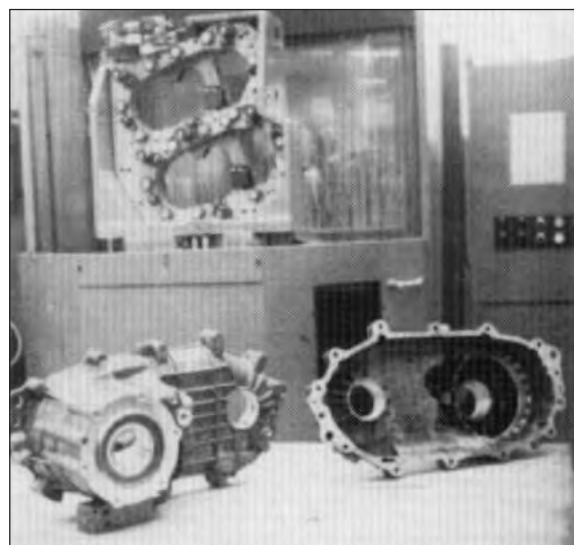


Fluid Advanced Work Supports
(See Work Supports section)

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.



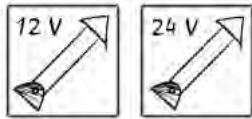
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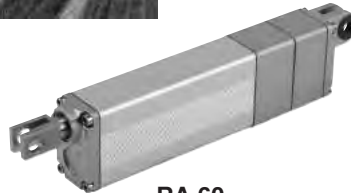
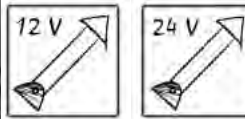
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Drive, Assembly and Handling Technology

Linear Actuators ■ Control, adjust and move with your choice of electric (12 VDC or 24 VDC) or hydraulic linear actuators.



RA 600
Data Sheet L1.101



RA 60
Data Sheet L4.201



RH 1250
Data Sheet L7.101

Modular Units ■ Combine these modules in numerous ways to meet your assembly and handling needs.



Rotating Module Horizontal Axis

Rotate your workpiece about the horizontal axis via manual, hand lever, hydromechanical or electric operation. A 4 x 90° indexable version is available. Maximum weight is 441 lbs. Data sheets: M1.101, M1.201.



Tilting Module

Tilt or swivel your workpiece from 0° to 90° via manual or electric operation. The design keeps the workpiece balanced while tilting. Special index angles are available upon request. Maximum weight is 220 lbs. Data sheet: M2.101.



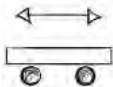
Rotating Module Vertical Axis

Rotate your workpiece about the vertical axis via manual, hydromechanical or electric operation. Standard version is indexable 4 x 90°. Special index angles available upon request. Maximum weight is 2,205 lbs. Data sheet: M3.101.



Lifting Modules

Precision lifting and lowering of your workpiece. Electric and self-contained hydraulic versions. Electric versions can be synchronized. Telescoping versions available too. Maximum weight is 220 – 2,205 lbs. Maximum stroke is 7.87" – 39.4". Data sheets: M4.101, M4.202, M4.203, M4.301, M4.401, M4.501.



Cart Modules

Heavy duty carts are designed to interface and move individual modules or modular combinations, with or without their workpiece. All carts are equipped with a parking brake. Data sheet: M5.101.



Floor Modules

Heavy duty floor modules come equipped with leveling feet and you can mount one or more individual modules on the same base. Data sheets: M6.101, M6.201.

Subject to change. For further details, including detailed dimensions and mounting instructions, visit www.clrh.com.



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Assembly and Handling Technology

Modular Units ■ Application and combination examples

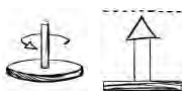
Lifting module operated by foot pedal with rotating module vertical axis



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.

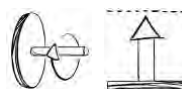


Lifting module operated by hand pendant with rotating module horizontal axis

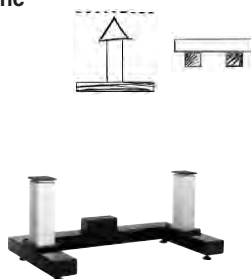


Multi-shift organizations know that every shift change also ushers in the change of each and every employee's size and ability. Modular combinations adapt to such changes and this one is composed of two modules: electric lift and horizontal-axis rotating. The electric lifting module effortlessly adjusts 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.

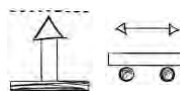
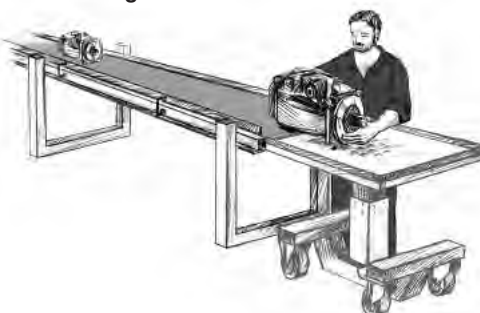


Electrically operated lifting module in sync



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 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 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.

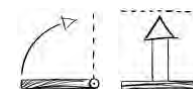


Lifting module operated by foot pedal with tilting module



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.



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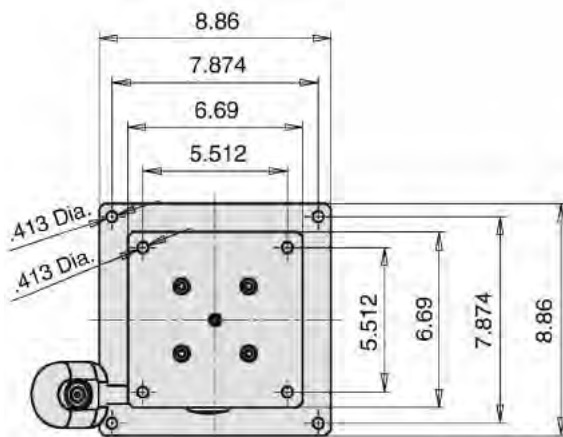
- Self-contained units for lifting and height adjustment
- Single-pedal operation for sensitive, controlled lifting
- Square column resists torsional loads
- Choice of five stroke lengths, up to 23.62 inches
- To descend the lifting unit a maximum of 10% of Fz max. load is required
- The center of gravity 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.

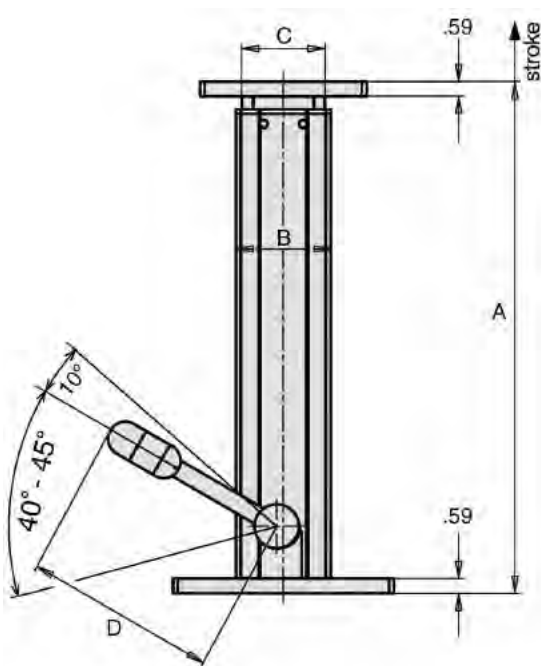
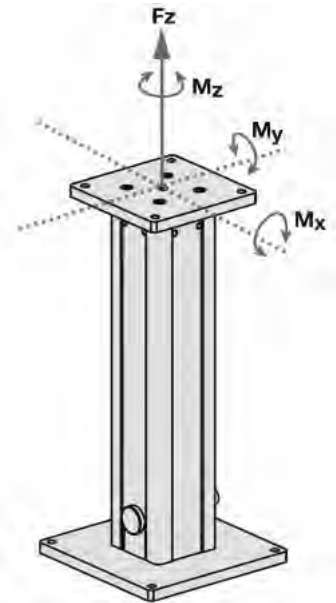
MOUNTING: Tapped holes in top and bottom plates allow attaching custom bases and tables.

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.			590 ft. lbs.	
Mz (Max. Torque Load)	37 ft. lbs.		221 ft. lbs.			295 ft. lbs.	
Part No.	CLR-8910-01-X0-H		CLR-8915-0X-X0-H			CLR-8919-06-X0-H	
	Stroke _____		Max. Lift Force _____			Stroke _____	
	2=7.87		2=450 lbs.			2=7.87	
	3=11.81		4=900 lbs.			3=11.81	
	4=15.75		6=1350 lbs.			4=15.75	
	5=19.69		Stroke _____				
	6=23.62		2=7.87				
			3=11.81				
		4=15.75					
		5=19.69					
		6=23.62					



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Lifting Units ■ Telescoping and Heavy-Duty ■ M4.202, M4.401, M4.501

Lifting Units ■ Telescoping, Single Heavy-Duty, and Dual Heavy-Duty

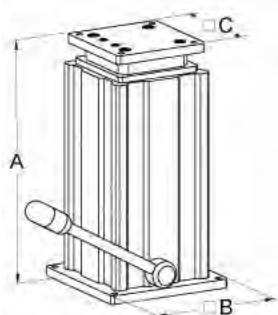


Lifting Columns can be used as lifting assistance for most any assembling challenge. Used in combination with rotating or pivoting units, your work piece can be located and positioned to optimize your employee's capabilities.

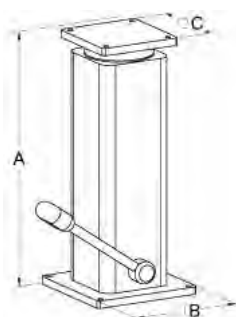
The Telescoping Units have an extra internal sleeve to offer extended stroke.

The Single Heavy-Duty model is designed with a steel base and an integrated guiding system which gives added rigidity to support increased external forces.

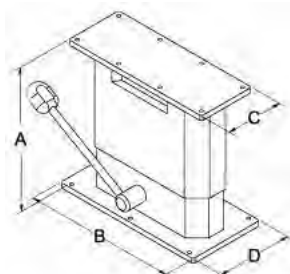
The Dual Heavy-Duty model combines two lifting units together to increase the lifting capacity as well as added rigidity from a steel base. It offers the highest rigidity when applying extreme shock and rotational forces to achieve your assembled part.



Telescoping M4.202



Heavy-Duty Single M4.401



Heavy-Duty Dual M4.501

Technical Characteristics

Part No.	Stroke (in.)	A (in.)	A + Stroke (in.)	B (in.)	C (in.)	Weight (lb)
CLR-8918-0X-30-H	11.81	16.54	28.35	8.86	6.69	33.07
CLR-8918-0X-40-H	15.75	18.50	34.25	8.86	6.69	44.09
CLR-8918-0X-60-H	23.62	24.41	48.03	8.86	6.69	55.12
CLR-8918-0X-80-H	31.5	26.38	57.88	8.86	6.69	66.14
CLR-8918-0X-100-H	39.37	30.31	69.68	8.86	6.69	77.16

Max. lifting force X = 1 for 224.81 lbf and X = 2 for 449.62 lbf.

Technical Characteristics

Part No.	Stroke (in.)	A (in.)	A + Stroke (in.)	B (in.)	C (in.)	Weight (lb)
CLR-8919-06-20-H	7.87	20.47	28.34	8.86	6.69	110.23
CLR-8919-06-30-H	11.81	24.41	36.22	8.86	6.69	121.25
CLR-8919-06-40-H	15.75	28.35	44.10	8.86	6.69	132.28

Technical Characteristics

Part No.	Stroke (in.)	A (in.)	A + Stroke (in.)	B (in.)	C (in.)	D (in.)	Weight (lb)
CLR-8914-06-20-H	7.87	16.54	24.41	17.72	6.69	8.86	209.44
CLR-8914-06-30-H	11.81	20.47	32.28	17.72	6.69	8.86	220.46
CLR-8914-06-40-H	15.75	24.41	40.16	17.72	6.69	8.86	231.49

Subject to change. For further details, including detailed dimensions and mounting instructions, visit www.clrh.com.



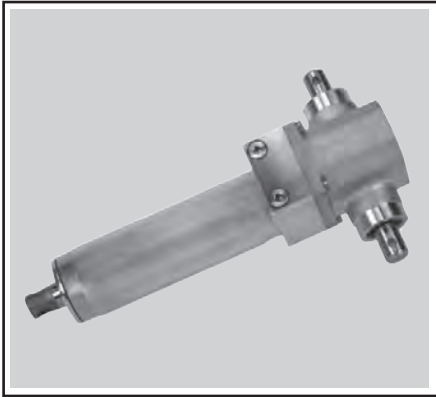
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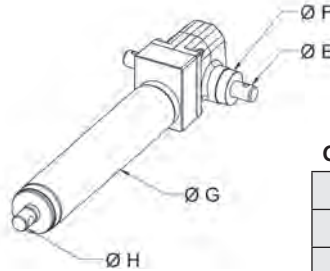
Pivoting Jacks ■ Linear Actuators RH 1250 ■ L7.101

Linear Actuators RH 1250 ■ Max. lifting force 1012 lbs. to 2810 lbs.
Stroke 3.15" to 9.84" ■ Manual-Hydraulic Version



The RH 1250 Linear Actuators are manually operated, hermetically sealed, and the power transmission is hydro-mechanical. Its compact design allows for easy integration into a multitude of applications that require linear adjustments. The pump and valve technology

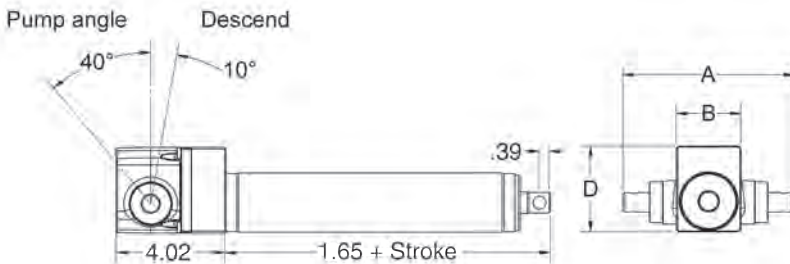
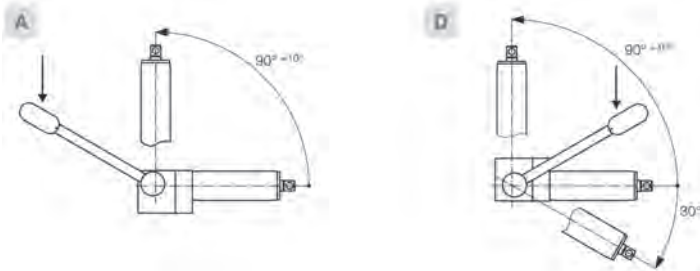
can be found in the lower section. The upper cylindrical section houses the piston and oil reservoir. Its self-contained hydraulic system results in high push forces and installation in nearly any position.



General Dimensions

A (in.)	6.30
B (in.)	2.36
D (in.)	3.15
Ø E (in.)	0.71
Ø F (in.)	1.50
Ø G (in.)	2.17
Ø H (in.)	.079*

Admissible mounting positions for operating direction



Technical Characteristics

Lifting force (lbs.)	Pump strokes (per 3.94 in.)	Required torque (lbf-ft)
1012	7 ± 1	118
1461	9 ± 1	118
2136	13 ± 1	118
2810	22 ± 1	88

v Descend (s/3.94 in.)	Release torque (lbf-ft)	Release angle (°)
4.5 ± 1	7.38	2 - 10
4.5 ± 1	8.11	2 - 10
4.5 ± 1	11.06	2 - 10
4.5 ± 1	12.54	2 - 10

Code for part numbers CLR-M8XX-XXXA-XLXX

Maximum lifting force (Push force)

04 = 1,012 lbs
06 = 1,461 lbs
09 = 2,136 lbs
12 = 2,810 lbs

Stroke

08 = 3.15 in.
14 = 5.51 in.
20 = 7.87 in.
25 = 9.84 in.

Bore hole operating shaft

1 = 90° to the plunger*
2 = 90° rotated (parallel to the plunger)
3 = without bore hole

Fixation*

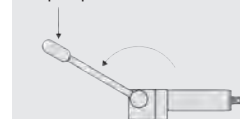
S = Standard version
G = Fork (up to 1461 lbs lifting force)
F = Flange (up to 1461 lbs lifting force)

Color

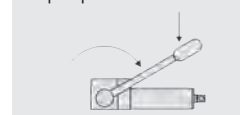
1 = Unlacquered
2 = RAL 9016 traffic white
3 = RAL 9006 white aluminum
4 = RAL 9005 black
5 = RAL 7035 light grey
6 = RAL 7038 agate grey

Operating direction

A = pump lever counterclockwise



D = pump lever clockwise



*See detailed data sheet L7.101

Subject to change. For further details, including detailed dimensions and mounting instructions, visit www.clrh.com.

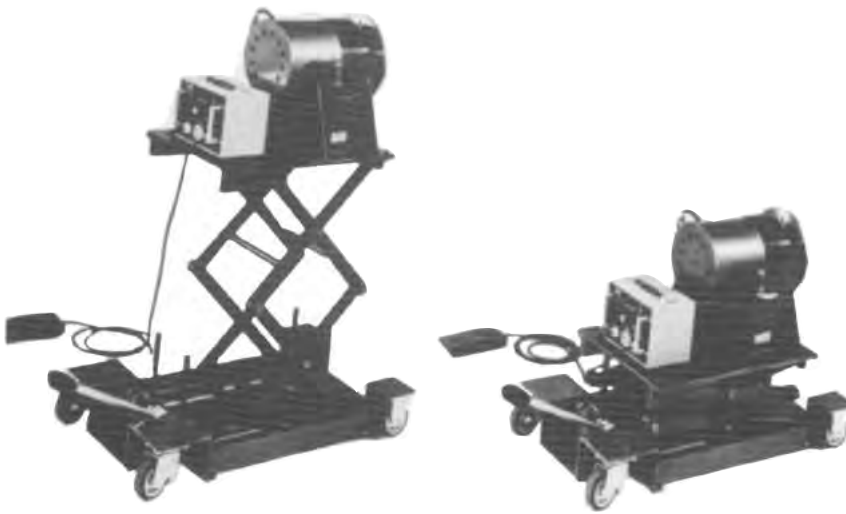


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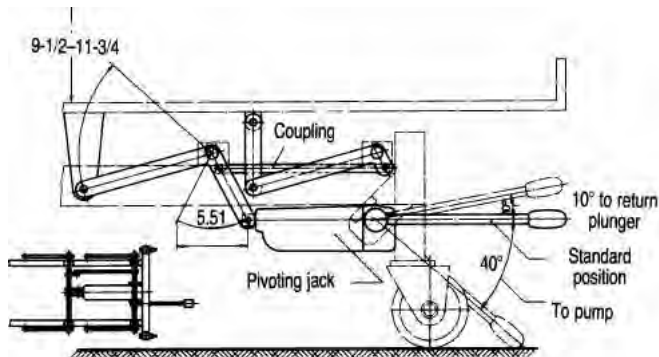
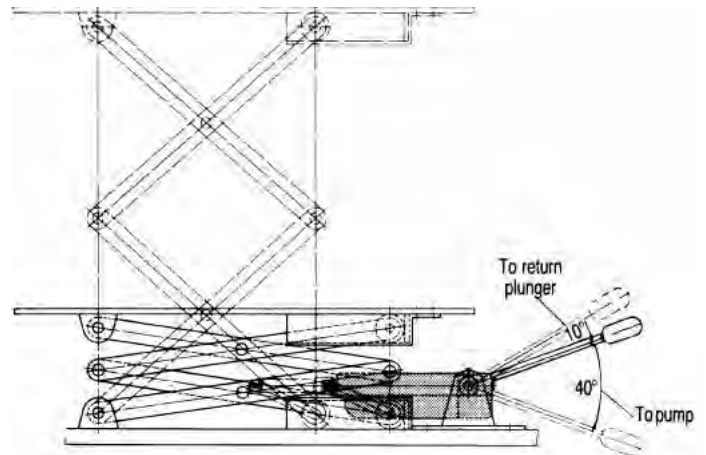
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Pivoting Jacks

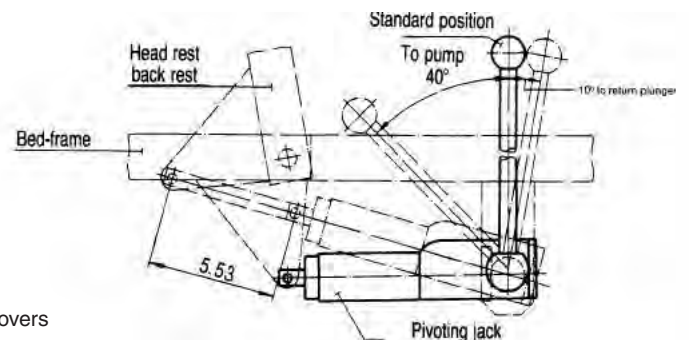


Application Example:
Portable lifting table for fixtures. Single-lever operation allows convenient raising and lowering.

Installation Example:
Scissors-Jack height adjustment



Installation Example:
Linkage height adjustment



Installation Example:
Angular adjustment of back rests or covers



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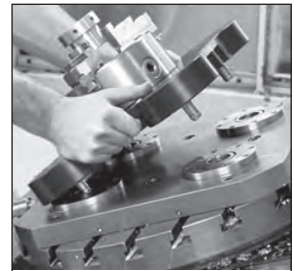
**Work
Supports**



**Compact
Clamps and
Cylinders**



**Zero Point
Mounting**

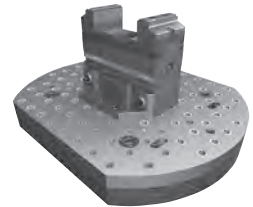


**Valves, Fittings &
Accessories**



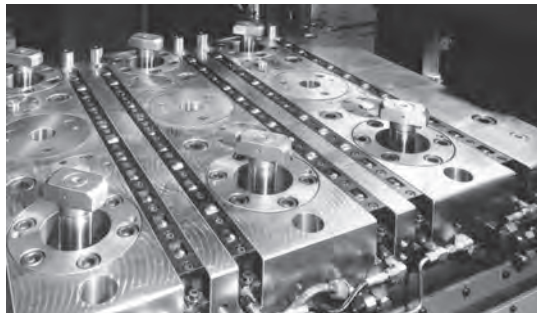
**Concentric
Clamping
Elements**

CNC Machine Vises



**5-Axis Quick-
Change Vises**

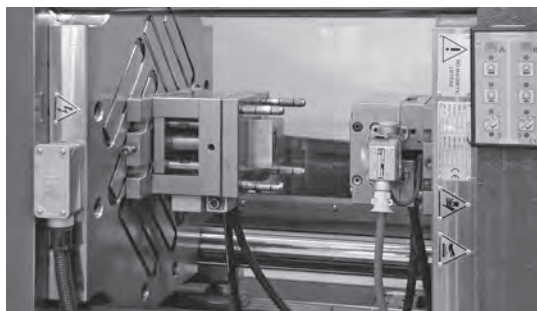
For More Information On Our Supporting Product Lines,
Visit www.clrh.com.



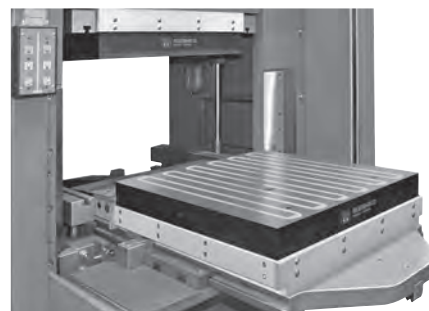
Quick Die Change



Assembly Devices



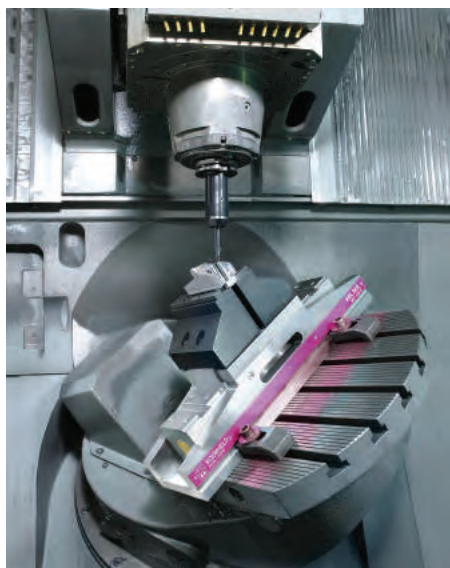
Quick Mold Change for Plastics



Quick Mold Change for Rubber

PRECISION MACHINE VISES INCREASE PRODUCTIVITY

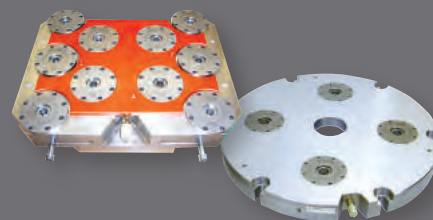
Use in Conjunction with
the Zero Point Mounting
System for Faster, More
Accurate Fixture Set Ups



For Machine Vises,
See Pages 94-111

REDUCE SET-UP AND DOWNTIME!

Zero Point Mounting System for Quick Change Fixturing



This comprehensive system utilizes clamping components and insertion nipples, which provide an immediate zero point orientation.

- Reduce set up time by as much as 90% with zero point mounting
- Existing fixtures can be easily adapted
- Highly accurate positioning and repeatability
- Increased productivity
- Fast payback
- Set-up times slashed
- Fixture life extended



For Zero Point Mounting, See Pages 114-116

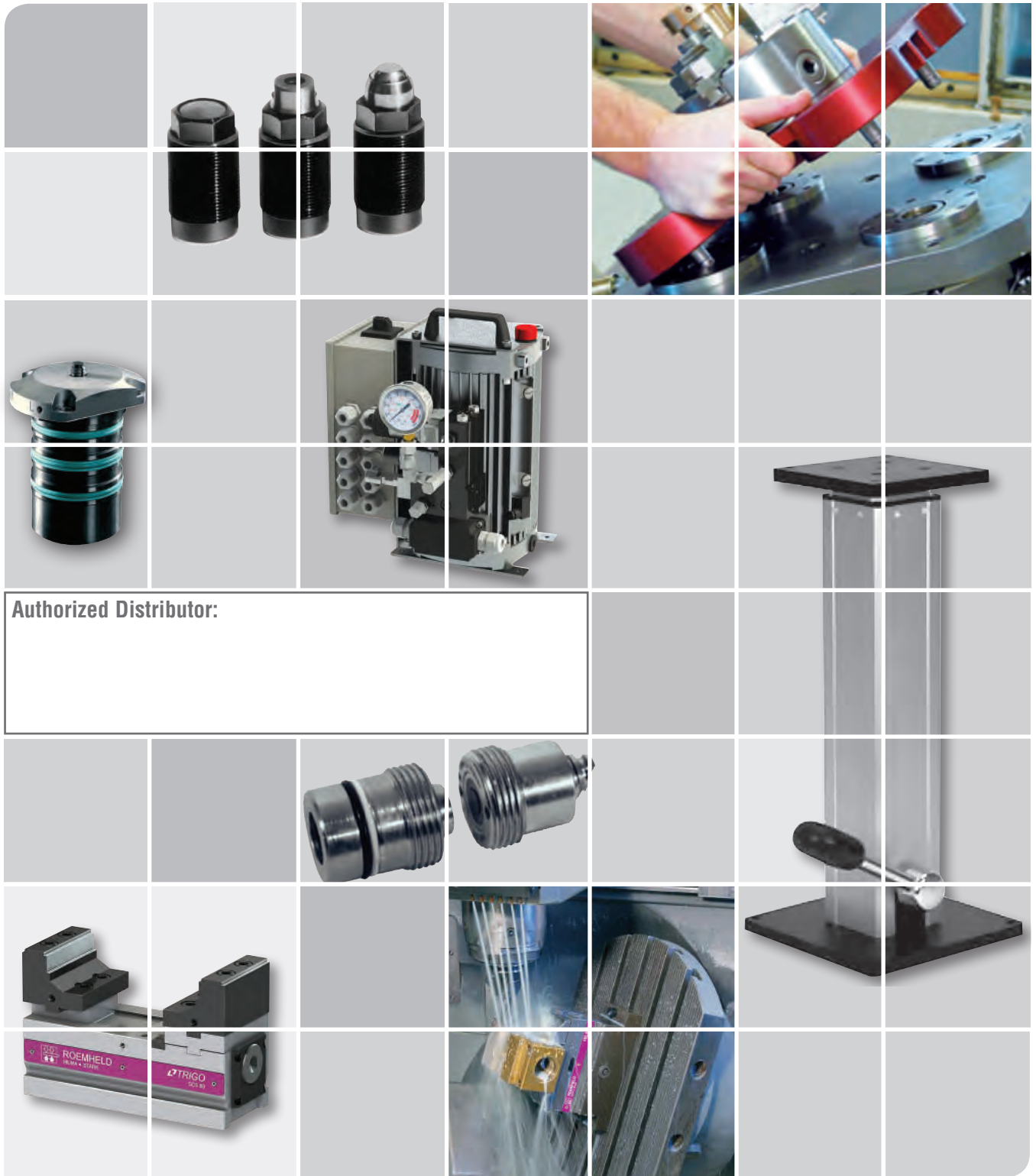


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