HYTEC

Hydraulic Power Workholding Systems

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Quality products at competitive prices make Hytec the hydraulic power workholding brand you can depend on!.....*And we can prove it.*

- Precisely controlled clamping forces...proven reliability of component systems
- Continuous pressure, stall-type systems increase safety
- Reduced vibration of workpiece and tooling for increased quality
- Faster feeds and speeds...longer tool life
- Reduced scrap and rework
- Faster load/unload cycles
- Fully automated systems capability
- Fully adaptable to multi-station hydraulic clamping applications
- Designed for simple installation in your present or planned fixtures
- Improved ergonomics

Hytec is ready to help you set up hydraulic power workholding systems to fit your specific applications. With the Hytec CAD Graphics Library, Tracing Template Kits, Free Seminars, and Technical Advisors available to answer your questions, you have the support you need.

To serve our customers, Hytec has a policy of continuous product improvement. While all technical data in this catalog is believed to be correct at the time of printing, we cannot be liable for errors and omissions or product changes.

Contact our Technical Services Workholding Specialists for assistance in the application of Hytec products in your particular situation.

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All Hytec products and parts, with the exception noted below, are warranted against defects in materials and workmanship for the life of the product or part.

Hytec's warranty is expressly limited to persons who purchase Hytec's products or parts for the resale or use in the ordinary course of the buyer's business. This warranty does not cover any product or part that has been abused, worn out, heated, ground or otherwise altered, used for a purpose other than that for which it was intended, or used in a manner inconsistent with any instructions regarding its use.

Hytec's electronic products are warranted against defects in material and workmanship for one year. All electric motors are separately warranted by their manufacturer under the conditions stated in the separated warranty.

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The purpose of this exclusive remedy shall be to provide the buyer with repair or replacement of products or parts manufactured by Hytec found to be defective in materials or workmanship or negligently manufactured. This exclusive remedy shall not be deemed to have failed of its essential purpose so long as Hytec is willing and able to replace said defective products or parts in the prescribed manner.

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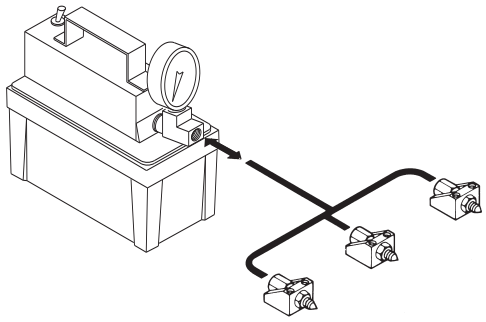
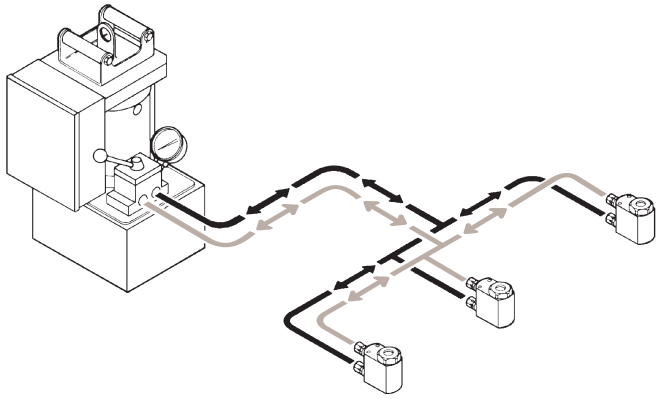
Application A

Among the simplest systems, single-acting spring return actuators can be operated with a single pressure line from this 58219 air/hydraulic pump or any Hytec constant pressure pump with a 9504 pump-mounted valve.



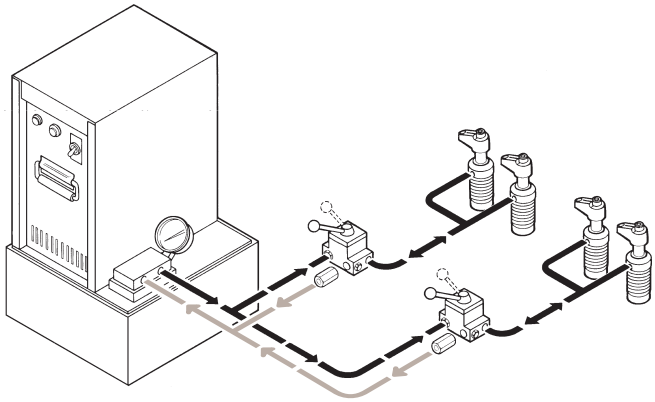
Application B

Multiple double-acting actuators can be operated simultaneously, powered by a pump with a 9504 pump-mounted manual control valve.



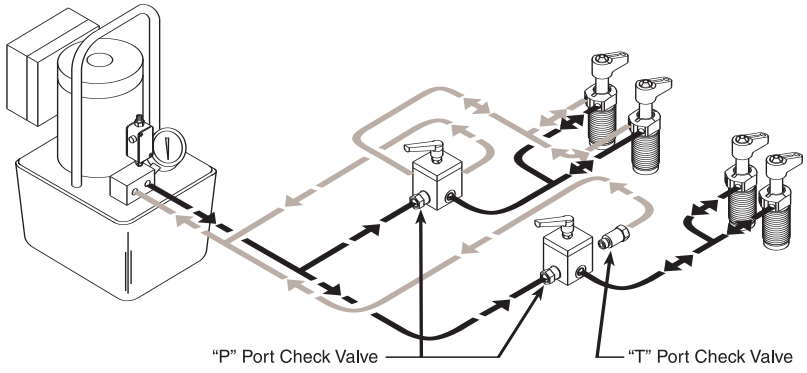
Application C

Two pairs of single-acting actuators are independently operated by 9503 remote mounted control valves and powered by one pump. Check valves prevent return line pressure fluctuations from affecting released clamps. Pressure port “P” check valves are built into the 9503 control valve.



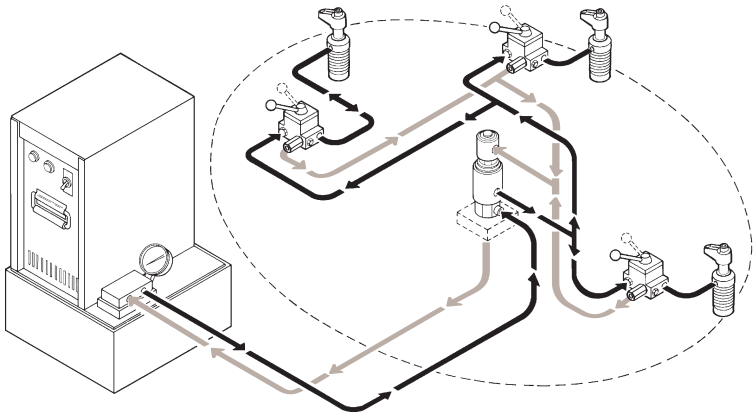
Application D

Similar to Application C, one pair of single-acting actuators and one pair of double-acting actuators are independently controlled by 100969 directional control valves. When using more than one directional valve in one circuit, “P” port check valves 500174 are required to prevent loss of clamping pressure in one circuit while actuating another. “T” port check valves 500173 should be used in single-acting circuits where return line pressure fluctuations may affect released clamps.



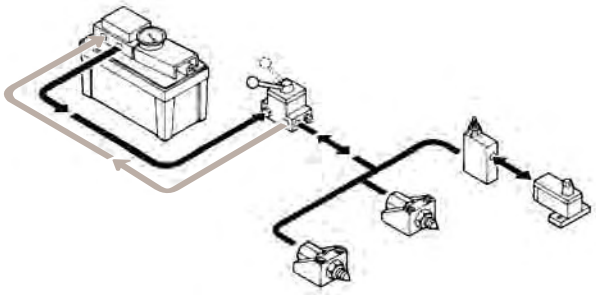
Application E

Rotating unions are used to connect pressure and return lines on applications where fixture rotation does not allow fixed plumbing. Here, three single-acting actuators are independently operated by three, 9503 remote mounted control valves. Each valve is connected to the rotating union which in turn, is connected to a single pump.



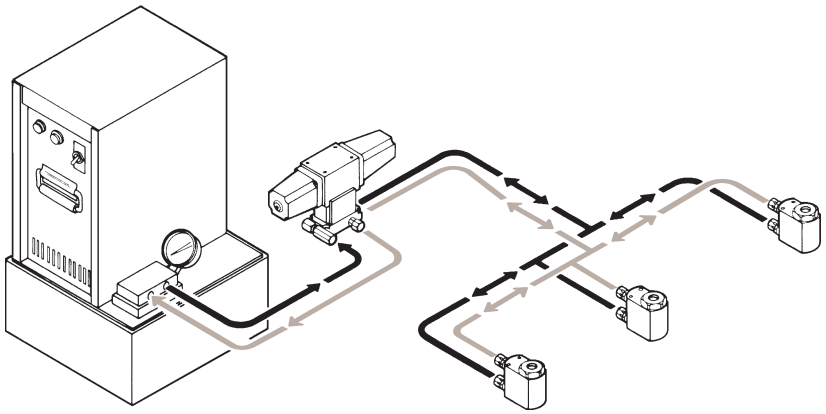
Application F

Two single-acting actuators operate simultaneously, controlled by a 9503 remote manual valve. A sequence valve insures that the workpiece is clamped before the work support is locked.



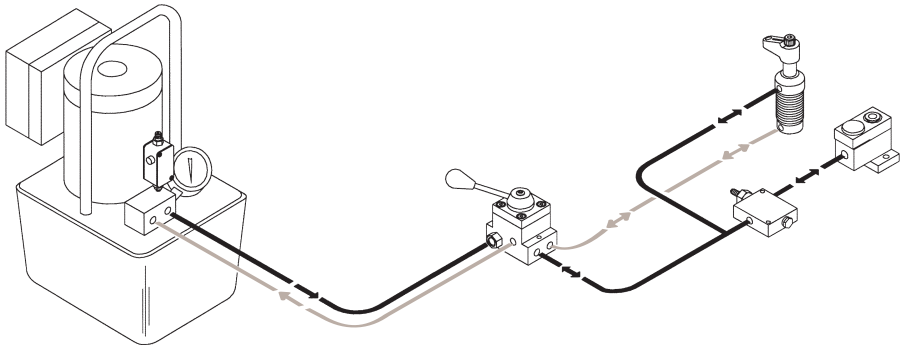
Application G

Similar to Application B, the three actuators are operated by a remote mounted control valve. This type of valve allows the pump to be located away from the workstation. The valve can be manually operated or, as shown, a 9612 electrically operated remote control valve is used. This valve can be used to give the operator push-button convenience or fully automated control by the machine tool.



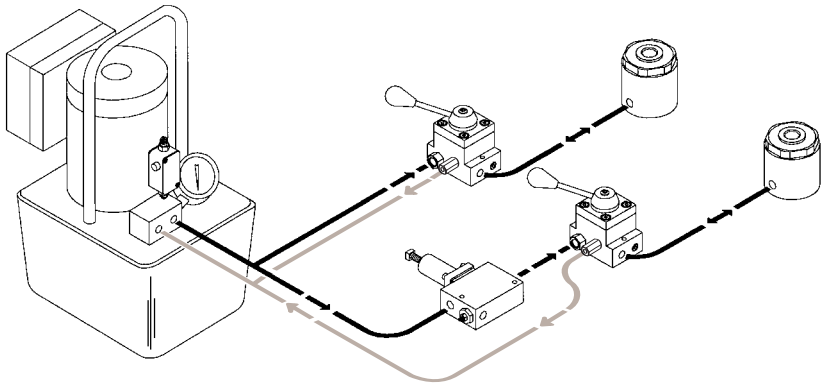
Application H

Similar to Application F, a double-acting swing clamp is actuated before sequencing a work support. When released, the work support drains back through the sequence valve's internal check valve.



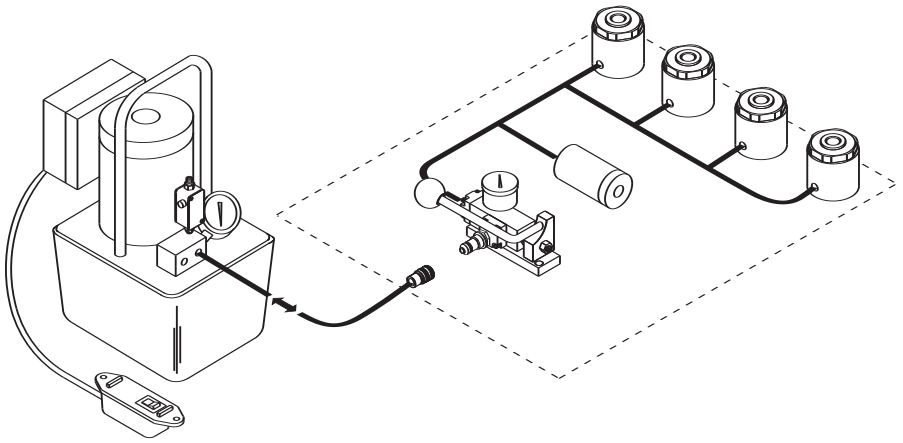
Application I

Like application C, two single-acting systems are independently operated by remote mounted control valves. Here the pressure reducing valve allows each system to have its own maximum pressure. The cylinder on the left operates at the pressure of the power source and the one on the right can be set at a lower pressure by adjusting the pressure reducing valve.



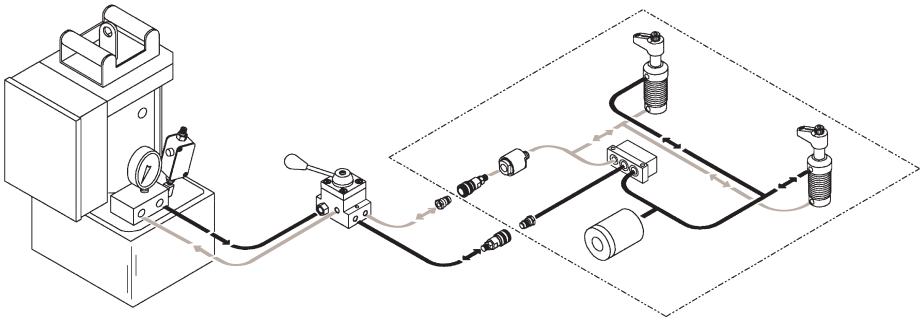
Application J

Hytec's Manual Pallet Valve is the simplest way to disconnect the power source from a pressurized pallet. For use only with single-acting actuators, it provides an automatic, leak free shut-off. An accumulator makes up for temperature changes and minor leakage. Built-in filtration protects this valve from contamination.



Application K

For pallets using double-acting actuators, Hytec's double-acting pallet valve system uses a pilot-operated check valve to maintain pressure on the pallet. The three position directional valve (100843) mounts at the operators workstation instead of the pallet. Any of Hytec's standard, constant pressure pumps operate the system. An accumulator makes up for temperature change and minor leakage.



PLANNING

The most important and cost effective part of the fixture design process is planning. All facets of the project should be considered, and questions answered before fixture designing begins.

- How many operations are required?
- What machine will be used?
- What is the expected cycle time?
- How many parts will be run? How often?
- How fast must the workpiece be changed?

The answers to questions like these will help determine the relative cost/benefit of the clamping system chosen for the fixture.

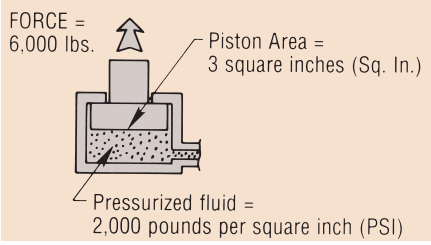
The following information will help prove that a hydraulic power clamping system can be a cost effective fixturing alternative.

HYDRAULIC FORCE

A basic principle of hydraulics states that pressure applied to a confined fluid is transmitted equally in all directions. This principle allows the transmission of pressure through tubes and hoses to remotely located actuators where that pressure is converted to usable force.

The simplicity of hydraulic power clamping can be summed up in one small equation:

FORCE = Pressure X Area



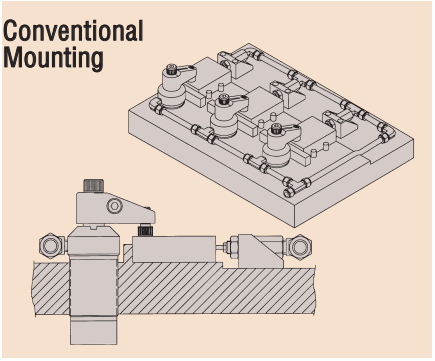
In the cylinder above, the fluid pressurized at 2000 psi is acting on the 3 sq. in. piston. As the formula says, 2000 psi times 3 sq. in. yields a force of 6000 pounds.

This same concept applies to all hydraulic actuators.

PLUMBING OPTIONS

The method used to route the pressure to the actuators on the fixture should be determined early in the planning stages. The plumbing is an essential part of the fixture and should never be left as an afterthought. There are two basic plumbing methods; conventional and manifold mount.

Conventional Mounting



Conventionally mounted components have threaded ports which accept fittings for tubing and hoses. Many different types of fittings are available, giving you several options for customizing your design. Since most of these components are commonly available, conventional mounting will typically be the lower cost option.

The threaded ports are usually one of two designs, NPT tapered pipe threads or SAE O-Ring boss.

NPT tapered pipe threads depend on the interference of the mating thread forms. This thread form has been in use for general plumbing applications for many years. Consequently there is a wide selection of fittings available for even the most unique applications. However, the thread form is the same whether the application is a household water supply or a high pressure hydraulic workholding system. It is important to specify only fittings that are rated for the maximum pressure to be seen in your application. The plastic, copper and iron pipe fittings are not acceptable alternatives.

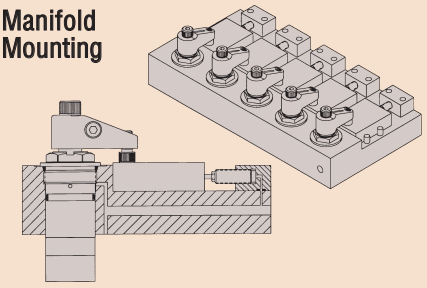
Straight thread, O-Ring boss ports per SAE J514 are common in both industrial and mobile hydraulic systems. Because this system of ports and fittings depends on a simple, replaceable o-ring for sealing instead of the interference of perfectly formed threads, the chance for leakage is greatly reduced.

Systems can be disassembled and reassembled numerous times with no additional make-up required. Fittings will always be in the exact same place and elbows will always point in the right direction. There is never the need to over or under-tighten elbows to properly align them in your system.

Pipe sealants and teflon tapes that can contaminate your system are not required. The torque needed to properly tighten these fittings is less, too.

All of Hytec's newest products have the SAE ports and a line of fittings and adapters is available in our catalog. In addition, we have made many of our other products (originally designed with NPT threads) available with SAE ports. Where available, this is noted on the product description page.

Manifold Mounting



Manifold mounted components eliminate the need for external fittings, tubing, and hoses because the fluid passages are machined directly into the fixture. Securing the workholding component to the fixture automatically makes the hydraulic connection.

Manifold mounting:

- Provides no-tool hydraulic connections
- Saves valuable fixture space
- Eliminates tubes, hoses, or fittings that disrupt coolant flow and collect chips
- Simplifies post-machining fixture cleaning
- Reduces assembly and maintenance time
- Improves performance
- Means fewer hydraulic connections resulting in fewer potential leak points
- Results in a cleaner, more professional looking fixture

PLUMBING SIZING

When designing and assembling your hydraulic system, keep in mind that your choices of size and length of plumbing lines can significantly change the performance of your fixture. The back-pressure created by fittings, tubing and hoses can slow the operation of your system, especially single-acting systems. Larger diameter plumbing runs with a minimum number of bends and fittings will reduce this back pressure.

When sizing hydraulic lines, make sure you look at the inside diameter. 1⁄4" hose is not the same as 1⁄4" tubing. Hose is specified by its inside diameter. Hydraulic tubing is usually specified by the outside diameter. 1⁄4"O.D., .035" wall tubing has an inside diameter of .180", a flow carrying capacity of only 50% of that of the hose.

Single acting clamps can develop only a limited amount of pressure to force hydraulic fluid out of the clamp and allow it to retract. When the return fluid from multiple clamps must share the same hydraulic line, back pressure can easily become excessive and slow the clamp's retraction.

When connecting multiple clamps, you can use either a "daisy chain" or "home run" configuration. In a daisy chain, you use a tee at each clamp and run tubing from the first clamp to the second and then to the third and then the fourth, etc. When using a home run configuration, you begin at a manifold and run hydraulic lines all the way from the manifold to each clamp.

The daisy chain method uses less tubing so it might appear that this would minimize back pressure. However in the daisy chain, the fluid from all of the clamps must pass through a single hydraulic line. In the home run, while there may be longer runs, each line only has to accommodate flow from one clamp.

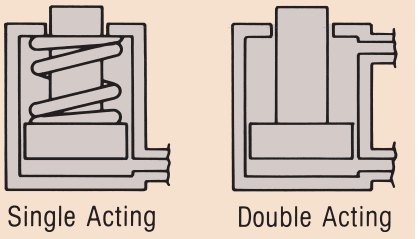
The viscosity of the hydraulic fluid used will also affect back pressure. Viscosity is affected by temperature. Contact the factory to discuss applications running below room temperature. We recommend using only Hytec fluids. Other fluids may have different viscosities or other characteristics that can adversely affect system operation.

SINGLE- vs. DOUBLE-ACTING

Another decision to be made early in the planning stage is whether to use single- or double-acting components.

Single-acting components are typically actuated using hydraulic pressure. When released, the pressure is removed and the actuator is returned by a spring which forces the hydraulic fluid back into the pump reservoir. This type of system is usually the most cost effective because each actuator needs only one pressure source connection for operation. Single-acting actuators should be vented to clean atmosphere whenever appropriate. Remember, double the plumbing for double-acting systems. This does, however, use more valuable fixture space and adds to the cost.

Nevertheless, there are good reasons to use double-acting systems. The larger and/or more complex the circuit design, the greater the potential for return restrictions which will slow the return of the single-acting actuators. Double-acting actuators are ideal



for applications which require both pushing and pulling or returning clamps with heavy, custom designed attachments. They work well for powering linkages which require fast actuation in both directions. Double-acting clamps are often used in automated systems where coordinating the action of the clamp with that of the rest of the system requires fast, positive, predictable cycle times. By installing pressure switches in both the pressure and return lines, the status of the clamp can constantly be monitored.

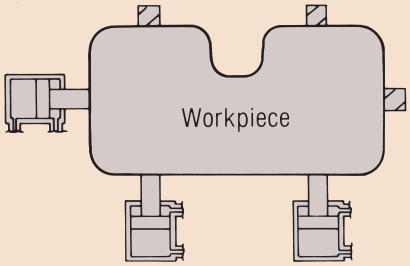
AUTOMATION

Hydraulic power clamping provides varying degrees of automation. During the planning stage, the method of actuating the fixture must be considered. The simplest systems use manually operated valves where the operator turns a handle to clamp and unclamp the fixture. In totally automated systems, the machine tool itself can be programmed to control the clamping and unclamping functions through the use of electric solenoid valves.

POSITIONING vs. CLAMPING

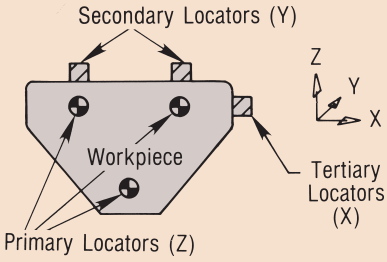
Hydraulic actuators are typically used on a fixture to perform one of two functions: positioning or clamping. Positioning actuators' primary purpose is to push the workpiece against the solid positioning stops built into the fixture. Clamping actuators hold the workpiece in position during machining.

With a properly designed fixture, all the operator needs to do is to place the workpiece into the fixture. The positioning actuators (typically cylinders) will move and correctly orient the workpiece against the stops, and hold it there while the clamps are sequenced, thus securing the part to resist machining forces. While clamps are always needed to hold the part, positioning actuators are sometimes optional depending on the workpiece, fixture design, and the level of operator involvement.



3-2-1 LOCATING PRINCIPLE

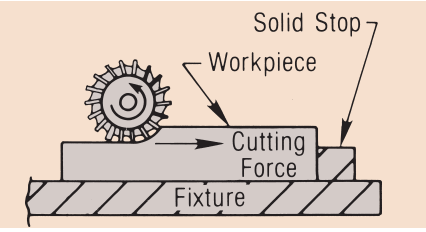
One of the most basic concepts of work-holding is referred to as the 3-2-1 locating principle. To repeatedly locate (or reference) a workpiece, it must be oriented and positioned in three planes: X, Y, and Z.



Thinking of a typical fixture where the workpiece is loaded and gravity holds it in place during clamping, start with the Z axis. Knowing that three points define a plane, it follows that any rigid object in the fixture is technically being supported at only three points regardless of shape. With the part supported in this manner, the workpiece is prevented from moving in the Z direction, but is still free to rotate or slide in the X and Y directions. To prevent rotation and position the workpiece in the Y direction, two stops are used. With the part contacting three stops in the Z axis, and two stops in the Y axis, the only direction the part can move is in the X direction. A single stop is all that is needed to prevent this motion. Always use three locators as the primary (Z) locators, two secondary (Y) locators, and one tertiary (X) locator; thus the name 3-2-1 principle. In rigid parts, these are the only solid stops required to locate the part. Any more are a duplication and can affect repeatability from one part to the next.

RESISTING FORCES – STOPS vs. CLAMPS

When designing the solid stops for a fixture, it is usually best to locate them so that they directly resist the machining forces.



If the cutting tool forces are resisted by solid stops, the workholding clamps need only hold the part in position and can typically be much smaller, saving money and valuable fixture space.

TORQUE vs. TENSION

A user's first introduction to hydraulic power workholding is often the replacement of the nut on a typical strap clamp with a center hole cylinder.

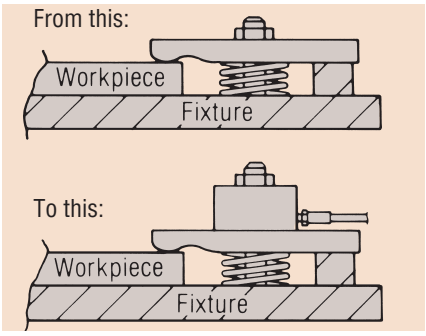
If the torque of the nut is known, the resulting tension on the bolt or stud can be easily approximated.

$$\frac{\text{Torque (In. Lbs.)}}{\text{Nominal thd. size (In.) X .12}} = \text{Tension (Lbs.)}$$

For example, a ½-13 UNC nut is torqued to 300 inch pounds. The resulting approximate tension would be:

$$\frac{300}{.5 \text{ X } .12} = 5000 \text{ lbs. Tension}$$

The most accurate way to determine that the hydraulic power clamping system is exactly duplicating the mechanical system is to place the center hole cylinder over the stud or bolt and replace the nut loosely over the cylinder. Use the hydraulic system to partially extend the cylinder until it contacts the nut. Use a torque wrench to torque the nut to its original value while monitoring the system pressure gauge. When the nut is properly torqued, the gauge will indicate the exact system pressure setting for this application.



OPERATING PRESSURES

Most Hytec workholding components are rated at 5000 psi. When designing, it is a good rule of thumb to choose components for your fixture that will give you the forces you need at a pressure of about 3000 psi. This gives you plenty of latitude to adjust the system pressure both up and down when fine tuning the fixture on the machine tool. Operating at lower pressures, while sometimes necessary, does not make the most efficient use of these components. Higher pressures allow the use of smaller components, saving cost and fixture space.

DESIGN STROKE LENGTH

Clamps and cylinders should never be designed into a fixture at their rated full stroke. Always use something less than full stroke to make sure that all tolerances and variations in the workpiece, workholding device and fixture can be accepted, insuring that the workpiece is properly clamped.

VOLUME CALCULATIONS

The total volume required to actuate a circuit should be checked to make sure that the power source chosen has enough usable fluid capacity. The fluid volume required to fully actuate each clamp and cylinder is listed in the charts on each product page. By totaling this value for each component, you know the maximum fluid volume that could possibly be used in this fixture. Even the smallest Hytec pumps have enough fluid volume for most applications.

Since the fixture is designed to use less than the full stroke of the actuators, the actual fluid volume will be less. If it becomes necessary to get an exact figure, it can be easily calculated using the following formula:

Effective Area (Sq. In.) X Stroke (In.) = Fluid Capacity (Cu. In.)

The effective area of the actuators (from product chart) multiplied by the stroke used (not total stroke) will result in the fluid volume. For example, if a cylinder has an effective area of 2 square inches, and an actual stroke of 3 inches, its fluid volume will be 2 x 3 or 6 cubic inches. (For easy reference, 231 cubic inches = 1 gallon.)

SYSTEM CARE AND MAINTENANCE

The single most important factor in determining the life of a properly designed system is the effort taken to keep the fluid clean.

System Flushing

During assembly, make sure all fluid-carrying components are flushed with clean solvent and blown dry. Hydraulic tubing is particularly notorious for the amount of contaminant's found inside. If not removed, this debris will quickly damage seals and score precision-fit metal parts. The contamination will also clog passages in pumps and control valves.

After fixture assembly, the entire system should be flushed to remove any contamination created during assembly. Use only hydraulic fluid for this procedure. Solvents may become trapped in the system, contaminating the fluid.

Once the fluid in the system is clean, be sure to keep it that way by changing the fluid on a regular basis and making sure that extreme care is taken whenever the system is disconnected or disassembled so that new contaminant's are not introduced.

System Bleeding

Air trapped in the hydraulic system is the most common cause of erratic operation and slow return times. The most common way to bleed a system is to pressurize the circuit and carefully loosen a fitting just enough to let fluid escape. The trapped air will usually be flushed out with the fluid. With conventionally mounted components, the fittings required for connection provide ideal bleeding locations. Since manifold mounting eliminates external fittings and lines, the fixture designer/builder no longer gets bleeding points by default and must now consciously plan for system bleeding.

As workholding hydraulic systems become more sophisticated, compact and automated, proper bleeding becomes increasingly important. Air trapped in the system is most often revealed by the slow retraction of single acting (spring return) components. To understand why, picture the following example:

- Single acting actuators - return springs develop 15 psi
- Flow required to clamp - 1 cubic inch
- System pressure - 3000 psi

Return time for this application is dictated by the time it takes to force 1 cubic inch of fluid through all of the return line restrictions at 15 psi.

Take the same example with 1 cubic inch of air (at atmospheric pressure) trapped anywhere in the system:

When pressurized, this "bubble" compresses and becomes 200 times smaller or .005 cubic inch. This means that .995 cubic inch of oil must be pumped into the system just to compress the bubble. Now when the clamps are released, 1.995 cubic inches of fluid must leave the system - nearly double that of the same system without air.

CALCULATING MACHINING FORCES

To help you choose the right cylinders, clamps, and work supports, it is important to know how much clamping or supporting force is necessary.

There are numerous ways to calculate the approximate forces that the cutting tool places on the workpiece. **Please note that the results of these calculations are estimates and must never replace experience, common sense, and caution.** In addition, these results indicate only the magnitude of the force, not the direction. Depending on the specific application, the direction of the force may vary significantly from the beginning to the end of the cut.

MILLING, TURNING, AND BORING

A rough estimate of cutting tool force—if the horsepower required to make the cut is known—is the result of the following equation:

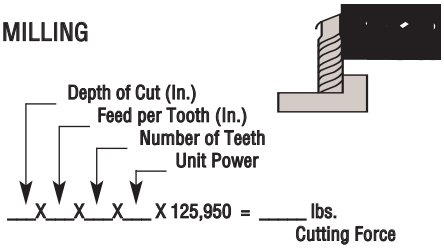
$$\text{Cutting Force (Lbs.)} = \frac{\text{HP X 24,750}}{\text{Cutting Speed (SFPM)}}$$

For example, an operation is expected to take 5 horsepower with a cutting speed of 150 surface feet per minute.

$$\frac{5 \text{ X } 24{,}750}{150} = 825 \text{ lbs. Cutting Force}$$

Where horsepower is not yet known, a value called unit power comes into play. Unit power is the horsepower required to remove one cubic inch of material in one minute. (Refer to Table A.)

MILLING



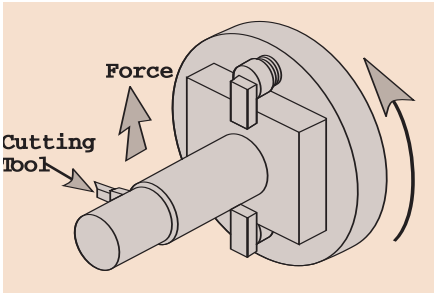
Example: a 4-flute end mill is used to machine aluminum. The cut is ½" deep and the feed per tooth is .002". From the table the unit power value is 0.4. So the cutting force transferred to the workpiece is:

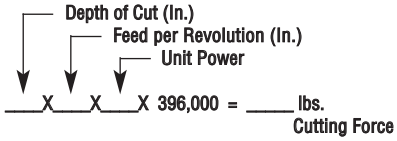
.5 X .002 X 4 X .4 X 125,950 = 202 lbs. Cutting Force

Note that this calculation assumes a full width cut. Applications using less than the full cut may reduce the calculated force by the percentage of the full cut being taken.

TURNING AND BORING

A similar calculation applies to turning and boring. Note that the cutting force is usually perpendicular to the cutting tool but since the tool or workpiece is rotating, the direction of the force relative to the work piece is constantly changing.





number of drill styles available, the thrust varies tremendously. Torque is somewhat less variable and can be estimated as shown:

Feed (IPR) X (Drill Dia.)^2 X Unit Power X 49,500 = Drilling Torque (In. Lbs.)

For example, drilling a ¾" diameter hole in magnesium (unit power .2) with a feed rate of .010" per revolution gives a result of:

.010 X .75^2 X .2 X 49,500 = 56 in. lbs.

FRICTION COEFFICIENT

Now that an estimate of the amount of cutter force being transferred to the workpiece is available, we must determine how much clamping force is necessary to resist the cutter force. This depends on the amount of friction between the workpiece and the fixture, commonly referred to as the friction coefficient.

Typically, if an object is lying on a surface, the amount of force required to slide it sideways will be considerably less than the weight of the object. It follows then that when clamping a workpiece to resist machining forces, the clamping force will need to be much higher than the machining force. The following chart shows approximate friction coefficients:

Static Friction Coefficients for Steel on Various Materials

Material	Friction Coefficient	
	Clean	Lubricated
Brass	0.35	0.19
Bronze	–	0.16
Bronze, Aluminum	0.45	–
Bronze, Phosphor	0.35	0.1
Bronze, Sintered	0.5	0.13
Carbon, Hard	0.14	0.11-0.14
Copper-Lead Alloy	0.22	–
Graphite	0.10	0.10
Iron, Cast	0.40	0.21
Steel	0.80	0.16
Tungsten Carbide	0.4-0.6	0.1-0.2

mping force is divided
riction coefficient and
suitable safety factor
total clamping force

$$\frac{\text{Machining Force (Lbs.)}}{\text{Friction Coefficient}} \text{ X Safety Factor} = \text{Total Clamping Force (Lbs.)}$$

Example: A steel workpiece on steel rest buttons is being machined using coolant. The estimated machining force is 300 lbs. From the table the friction coefficient for steel on steel (lubricated) is .16. After choosing an appropriate safety factor (usually about 2), the estimated total clamping force would be:

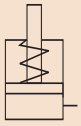
$$\frac{300}{.16} \text{ X } 2 = 3750 \text{ lbs. Total Clamping Force}$$

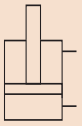
This total clamping force may now be divided by the number of clamps holding the workpiece, which equals the clamping force needed for each clamp.

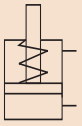
TABLE A		Unit Power hp/in^3/min		
		Turning	Drilling	Milling
Material	Hardness Bhn	HSS & Carbide Tools	HSS Drills	HSS & Carbide Tools
STEELS Plain Carbon Alloy Steels	85-200	1.4	1.3	1.4
	35-40Rc	1.7	1.7	1.9
	40-50Rc	1.9	2.1	2.2
	50-55Rc	2.5	2.6	2.6
	55-58Rc	4.2	3.2	3.2
CAST IRONS Gray, Ductile & Malleable	110-190	0.9	1.2	0.8
	190-320	1.7	2.0	1.4
STAINLESS STEELS	135-275	1.6	1.4	1.7
	30-45Rc	1.7	1.5	1.9
TITANIUM	250-375	1.5	1.4	1.4
NICKEL ALLOYS	80-360	2.5	2.2	2.4
ALUMINUM ALLOYS	30-150 500kg	0.3	0.2	0.4
MAGNESIUM ALLOYS	40-90 500kg	0.2	0.2	0.2
COPPER ALLOYS	10-80Rb	0.8	0.6	0.8
	80-100Rb	1.2	1.0	1.2

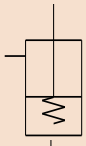
Design Information

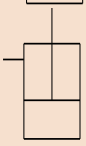
Cylinder Symbols


Cylinder, Single-Acting

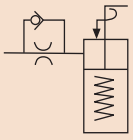

Cylinder, Double-Acting

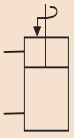

Cylinder, Single or Double-Acting

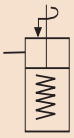

Pull Cylinder, Single-Acting, Spring Return

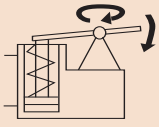

Pull Cylinder, Single-Acting

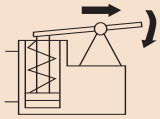
Clamp Symbols


Swing/Pull Clamp, Single-Acting w/Flow Restrictor Valve

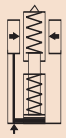

Swing/Pull Clamp, Double-Acting


Swing/Pull Clamp, Single-Acting

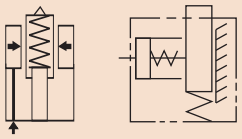

Swing Clamp, Single or Double-Acting

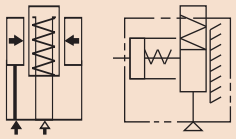

Retract Clamp, Single or Double-Acting

Work Support Symbols


Work Support, Fluid Advance

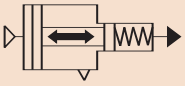
Work Support Symbols

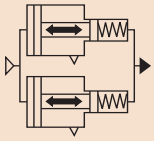

Work Support, Spring Advance

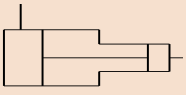

Work Support, Air Advance

Power Source Symbols

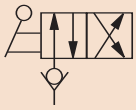
Electric/Hydraulic Pump

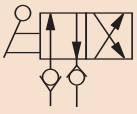

Air/Hydraulic Pump, Reciprocating

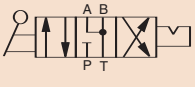

Air/Hydraulic Pump, Reciprocating 2-stage


Intensifier

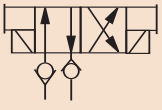
Control Valve Symbols

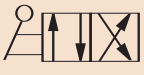

Directional Control Valve, Manual 4-Way, 2-Position w/Inlet Check Valve


Directional Control Valve, Manual 4-Way, 2-Position w/Inlet and Outlet Check Valves

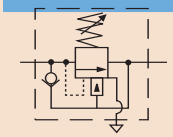


Directional Control Valve, Manual 4-Way, 3-Position Detented

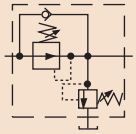

Directional Control Valve, Electric 4-Way, 2-Position w/Inlet and Outlet Check Valves w/Manual Override


Directional Control Valve, Manual 4-Way, 2-Position

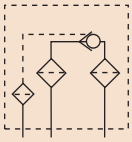
Control Valve Symbols



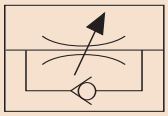
Pressure Sequence Valve, Adjustable w/Reverse Free-Flow Check Valve



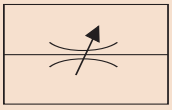
Pressure Reducing Valve, Adjustable w/Reverse Free-Flow Check Valve w/Over-Pressure Relief Valve



Check Valve, Pilot Operated w/Filters

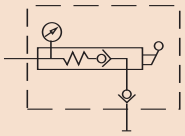


Flow Restrictor, Adjustable w/Reverse Free-Flow Check Valve

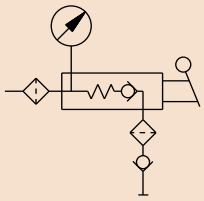


Flow Restrictor, Adjustable

Pallet Coupling Symbols



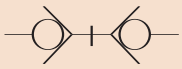
Manual Pallet Valve w/Gauge and Male Coupler



Manual Pallet Valve With Filters, Gauge and Coupler

Accessory Symbols

Hydraulic Coupler, Half-Male or Female

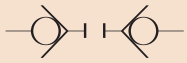


Hydraulic Coupler Set, Coupled

Accessory Symbols

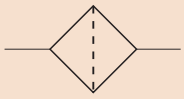
Check Valve

Flow Restrictor, Fitted w/Reverse Free-Flow Check Valve w/Filtered Orifice

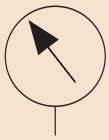


Hydraulic Coupler Set, Uncoupled

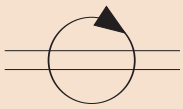
Accumulator, Gas Charged



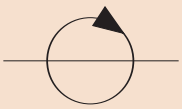
Filter



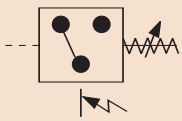
Pressure Gauge



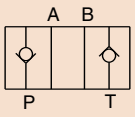
Rotating Union, Dual Circuit



Rotating Union, Single Circuit



Pressure Switch, Adjustable



Check Valve Sub-Plate

Air Bleed Valve

Ball Valve

HYTEC

Conversion Formulas

SI* Conversion Formulas

APPROXIMATE CONVERSION				
MULTIPLY SI* UNIT	BY CONV FACTOR	TO GET OR MULTIPLY NON-SI UNIT	BY CONV FACTOR	TO GET SI* UNIT
LENGTH				
millimeter (mm) (1 inch = 25.4 mm exactly)	X 0.03937	= inch	X 25.4	= mm
centimeter (cm) 10 mm	X 0.3937	= inch	X 2.54	= cm
meter (m) 1000 mm	X 3.28	= foot	X 0.305	= m
meter (m)	X 1.09	= yard	X 0.914	= m
kilometer (km) 1000 m	X 0.62	= mile	X 1.61	= km
AREA				
millimeter^2 (mm^2)	X 0.00155	= inch^2	X 645	= mm^2
centimeter^2 (cm^2)	X 0.155	= inch^2	X 6.45	= cm^2
meter^2 (m^2)	X 10.8	= foot^2	X 0.0929	= m^2
meter^2 (m^2)	X 1.2	= yard^2	X 0.836	= m^2
hectare (ha) 10,000 m^2	X 2.47	= acre	X 0.405	= ha
kilometer^2 (km^2)	X 0.39	= mile^2	X 2.59	= km^2
VOLUME				
centimeter^3 (cm^3)	X 0.061	= inch^3	X 16.4	= cm^3
liter (l)	X 61	= inch^3	X 0.016	= l
milliliter (ml) 1 cm^3)	X 0.034	= oz-liq	X 29.6	= ml (1 ml =
liter (l) 1000 ml	X 1.06	= quart	X 0.946	= l
liter (l)	X 0.26	= gallon	X 3.79	= l
meter^3 (m^3) 1000 l	X 1.3	= yard^3	X 0.76	= m^3
MASS				
gram (g)	X 0.035	= ounce	X 28.3	= g
kilogram (kg) 1000 g	X 2.2	= pound	X 0.454	= kg
metric ton (t) 1000 kg	X 1.1	= ton (short)	X 0.907	= t

APPROXIMATE CONVERSION				
MULTIPLY SI* UNIT	BY CONV FACTOR	TO GET OR MULTIPLY NON-SI UNIT	BY CONV FACTOR	TO GET SI* UNIT
FORCE (N = kg • m/s^2)				
newton (N)	X 0.225	= pound	X 4.45	= N
kilonewton (kN)	X 225	= pound	X 0.00445	= kN
TORQUE				
newton meter (N•m)	X 8.9	= lb. in.	X 0.113	= N•m
newton meter (N•m)	X 0.74	= lb. ft.	X 1.36	= N•m
PRESSURE (Pa = N/m^2)				
kilopascal (kPa)	X 4.0	= in. H_2O	X 0.249	= kPa
kilopascal (kPa)	X 0.30	= in. Hg	X 3.38	= kPa
kilopascal (kPa)	X 0.145	= p.s.i.	X 6.89	= kPa
megapascal (MPa)	X 145	= p.s.i.	X 0.00689	= MPa
Bar	X 14.5	= p.s.i.	X .0689	= Bar
POWER (w = J/s)				
kilowatt (kw)	X 1.34	= hp	X 0.746	= kw
kilowatt (kw)	X 0.948	= Btu/s	X 1.055	= kw
watt (w)	X 0.74	= ft. lb/s	X 1.36	= w
TEMPERATURE				
°C = (°F - 32) ÷ 1.8	°F = (°C X 1.8) + 32			
FLOW				
cu. cm./min.	X .061	= cu. in/min.	X 16.4	= cu. cm./min.
liters/min.	X .2642	= GPM	X 3.785	= liters/min.

* System International (Modern Metric System)

Decimal & Millimeter Equivalents

	DECIMALS	MILLIMETERS
1/64	.015625	— 0.397
1/32	.03125	— 0.794
3/64	.046875	— 1.191
1/16	.0625	— 1.588
5/64	.078125	— 1.984
3/32	.09375	— 2.381
7/64	.109375	— 2.778
1/8	.1250	— 3.175
9/64	.140625	— 3.572
5/32	.15625	— 3.969
11/64	.171875	— 4.366
3/16	.1875	— 4.763
13/64	.203125	— 5.159
7/32	.21875	— 5.556
15/64	.234375	— 5.953
1/4	.2500	— 6.350
17/64	.265625	— 6.747
9/32	.28125	— 7.144
19/64	.296875	— 7.541
5/16	.3125	— 7.938
21/64	.328125	— 8.334
11/32	.34375	— 8.731

	DECIMALS	MILLIMETERS
23/64	.359375	— 9.128
3/8	.3750	— 9.525
25/64	.390625	— 9.922
13/32	.40625	— 10.319
27/64	.421875	— 10.716
7/16	.4375	— 11.113
29/64	.453125	— 11.509
15/32	.46875	— 11.906
31/64	.484375	— 12.303
1/2	.5000	— 12.700
33/64	.515625	— 13.097
17/32	.53125	— 13.494
35/64	.546875	— 13.891
9/16	.5625	— 14.288
37/64	.578125	— 14.684
19/32	.59375	— 15.081
39/64	.609375	— 15.478
5/8	.6250	— 15.875
41/64	.640625	— 16.272
21/32	.65625	— 16.669
43/64	.671875	— 17.066
11/16	.6875	— 17.463

	DECIMALS	MILLIMETERS
45/64	.703125	— 17.859
23/32	.71875	— 18.256
47/64	.734375	— 18.653
3/4	.7500	— 19.050
49/64	.765625	— 19.447
25/32	.78125	— 19.844
51/64	.796875	— 20.241
13/16	.8125	— 20.638
53/64	.828125	— 21.034
27/32	.84375	— 21.431
55/64	.859375	— 21.828
7/8	.8750	— 22.225
57/64	.890625	— 22.622
29/32	.90625	— 23.019
59/64	.921875	— 23.416
15/16	.9375	— 23.813
61/64	.953125	— 24.209
31/32	.96875	— 24.606
63/64	.984375	— 25.003
1	1.000	— 25.400

1 mm = .03937"
.001" = .0254 mm

WORKHOLDING DEVICES

CYLINDERS

CLAMPS

WORK SUPPORTS

CYLINDERS

Hytec's wide variety of reliable, versatile cylinder styles makes choosing the one that's right for your job easier than ever before.

Threaded Body Cylinders

These cylinders are designed specifically to get the highest clamping force in the smallest area. Their compact size allows them to be mounted very close together or close to other components on the fixture.

Threaded body cylinders are single-acting, spring-return, and because of their versatility, can be outfitted for a wide variety of applications. Available in either Unified National Coarse or Fine threads, they're ideal for manifold mounting, but can also be used with external plumbing connections when fitted with a feeder cap. Mounting brackets and jam nuts are also available. The threaded pistons accept optional Hytec pointed or crowned threaded inserts, flat faced toggle pads, or custom designed attachments.

Cylindrical Body Cylinders

Compared to other mounting methods, these cylinders take up much less fixture space thanks to the snap ring method of securing them to the fixture.

They are double-acting only and do not contain return springs, making them perfect for applications where rapid, positive return is essential, or where both pushing and pulling forces are necessary.

Cylinder control can be simplified in certain applications by supplying one side of the cylinder with a constant air pressure source to control the return force. The other port can then be pressurized or released hydraulically as if it were a single-acting component.

New threaded piston rods make it easy to use these cylinders in a variety of applications because they can be used with Hytec threaded inserts or custom designed attachments.

Mount the cylinders by simply inserting them into a drilled hole and securing with snap rings (included). For conventionally mounted applications, the optional feeder caps have both side and end ports for plumbing variations. Or, use the manifold mounting option and mount directly on a flat surface. Optional mounting brackets are also available.

Center Hole Cylinders

One of the most common uses for this cylinder is to convert a strap clamp from manual to power operation. The nut used to create the clamping force is replaced by the center-hole cylinder, threaded right onto the stud and secured with the same nut. When the cylinder is extended, the studs tension creates clamping force just as when the nut was torqued.

Center-hole cylinders can be used as single or double-acting workholding devices. The piston return spring cavity is sealed, ported, and plugged with a breather, making it ready for use in single-acting operations. Remove the breather and connect a hydraulic or air line, and the cylinder is converted for double-acting operation.

Mounting can be done several ways: use the thru-holes for top mounting, use the tapped holes in the bottom for mounting from underneath, or secure with a single stud or rod through the center. The pistons are threaded to accept the optional crowned threaded inserts, used when the cylinder contacts the work directly.

Piston force is equal whether it's being extended or retracted, so these cylinders are ideal for pushing and pulling applications and will accept any user-designed pushing or pulling attachment. A double-acting cylinder can handle heavy attachments when a single-acting one won't.

Low Profile Cylinders

These single-acting, spring-return cylinders are designed for uses where high force and low overall height are requirements – the largest is only 2" high – making them ideal for clamping fixtures where space is limited. The crowned piston rods make them ideal for powering toggle clamps, levers, and linkages, or for directly contacting and clamping the workpiece. Cylinder bodies are specially heat treated for exceptional wear and corrosion resistance. Each cylinder has a built-in heavy-duty spring for fast return, and case hardened piston for long service life. Also you may choose from base mounted or side mounted versions.

Cartridge Pull Cylinders

Hytec's "Pull" cylinders retract when hydraulically pressurized. They were created to permit the user to design a cylinder into a fixture while maintaining the replaceability and long life of a heat treated, corrosion resistant cylinder body. Typical applications of these cylinders include installation behind fixture plates or buried in tombstones where they can supply clamping force without taking up valuable fixture space.

These pull cylinders were designed for cartridge mounting in a cavity supplied by the user. The required cavity is simply a cylindrical bore with a properly deburred pressure port intersecting it, providing the hydraulic fluid connection.

Paired with Uniforce® clamps, these cylinders will provide consistent clamping forces while taking a minimum of fixture space.

Block Style Cylinders

Hytec's block style cylinders are double-acting only and do not contain return springs, making them perfect for applications where rapid positive return is essential or where both pushing and pulling forces are required.

Now, more applications are possible thanks to the new threaded piston rods. Hytec threaded inserts or any custom-designed attachments may be used.

The simplest to mount – from either top or bottom – these cylinders require only a flat surface with a bolt hole. A locating hole in the bottom can be used to prevent rotation when necessary.

Cylinder control can be simplified in certain applications by supplying one side of the cylinder with a constant air pressure source to supply the return force. The other port of the cylinder can then be pressurized and released as if it were single-acting.

NOTE: For longest service life, all single acting cylinder applications should be designed to use 75% (or less) of the available stroke.

Threaded Body Cylinders

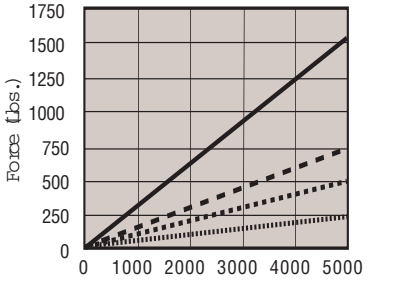
SPX HYTEC

Our most versatile cylinder style, these threaded body cylinders are single-acting, spring-return, and can be outfitted for a wide variety of applications. Available in either Unified National Coarse or Fine threads, they're ideal for manifold mounting, but can also be used for external plumbing connections when fitted with a feeder cap. Mounting brackets and jam nuts can be specified for added mounting versatility. The threaded pistons will accept optional Hytec pointed or crowned threaded inserts, flat faced toggle pads, or you can custom design your own attachments. These cylinders should always be used with a threaded insert to prevent damage to the workpiece and the cylinder.

Features:

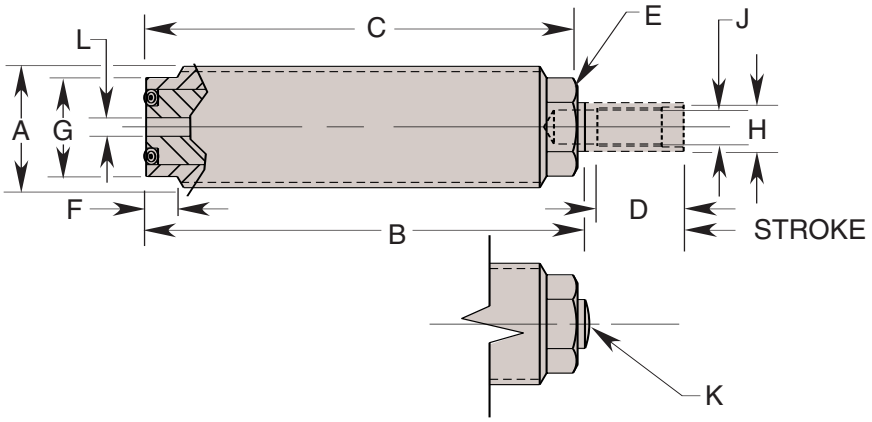
- Manifold or conventional mounting
- Heavy duty return springs
- Optional jam nuts, feeder caps and mounting brackets
- Threaded, plated piston rod
- Fine or coarse threads
- "O" ring seal included
- 100% corrosion resistant
- Single-acting
- Power-Tech treated body for long wear and corrosion resistance

Note: See page 23 for threaded inserts.



Performance

- Cylinder Nos. 100064, 100065 100156, 100157
- Cylinder Nos. 100139 100148,100159,100166
- Cylinder Nos. 100167, 100153 100149, 100171
- Cylinder Nos. 100172, 100173



Fine Thd. Body Cyls.		Coarse Thd. Body Cyls.		Specifications				Dimensions (In Inches)									
Cat. No.	A Thread Size	Cat. No.	A Thread Size	*Force (Lbs.)	Stroke (In.)	Eff. Area (Sq. in.)	Oil Cap. (Cu. in.)	B	C	D Thd. Depth	E Hex.	F	G Dia.	H Dia.	J Thread Size	K Radius	L Dia.
100156	½-20 UNF	100064	½-13 UNC	245	.250	.049	.012	1.636	1.568	—	.312	.156	.399	.156	—	.375	.062
100157		100065			.500		.024	2.042	1.974								
100159	⅝-18 UNF	100139	⅝-11 UNC	550	.250	.110	.027	1.655	1.625	.438	.438		.502	.250	10-32 UNF	—	.094
100166		100148			.500		.055	2.225	2.187								
100167	¾-16 UNF	100149	¾-10 UNC	750		.150	.075	1.756	1.718		.531	.187	.615	.300			.125
100171		100153			1.000		.150	2.475	2.437								
100172	1-12 UNF	—	—	1535	.500	.307	.153	2.005	1.937	.500	.750		.875	.500	⅝-24 UNF		.187
100173		—			1.000		.307	2.629	2.562								

NOTE: * Based on 5,000 psi max. operating pressure.

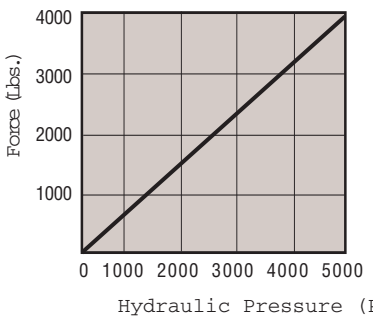
Threaded Body Cylinders

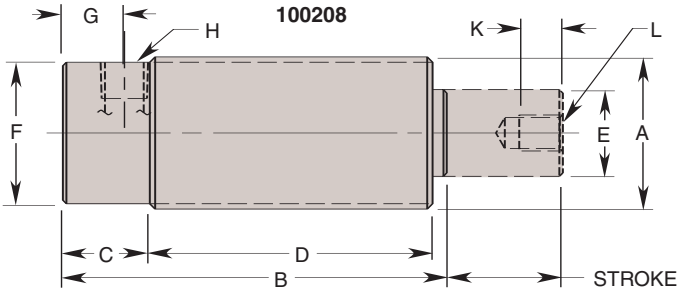
This is our highest capacity cylinder in the threaded body style. This premium grade cylinder includes a gland bearing, wiper seal, and extension style return spring. Its plated, threaded piston rod resists wear and corrosion and accepts Hytec threaded inserts or custom made attachments. The 100208 can be mounted by threading it into a tapped hole in the fixture or by inserting it into a drilled hole and locking it on both sides using two hex jam nuts (optional). This conventionally mounted 1" stroke, single-acting cylinder has a 1/8" NPT side port for making hydraulic connections. Like our smaller, threaded body cylinders, the 110132 is intended for manifold mounting and requires only a flat-bottom hole for installation.

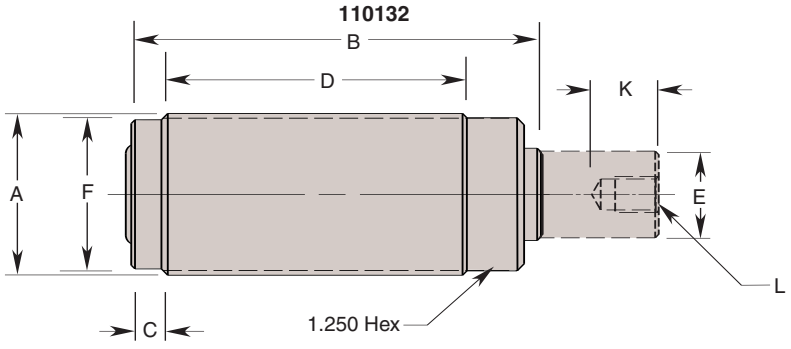
Features:

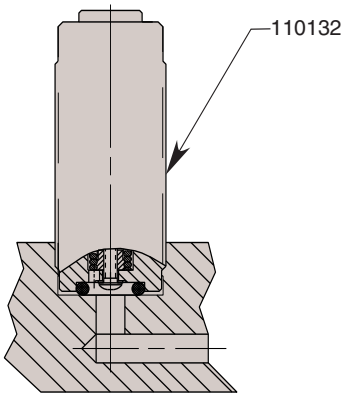
- Threaded body design
- Single-acting
- Threaded, plated piston rod
- Optional hex jam nut
- Rod wiper seal in gland bearing
- Power-Tech™ treated body for long wear and corrosion resistance

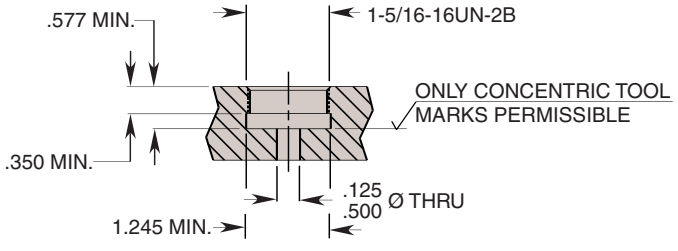
Note: See page 23 for threaded inserts.
See page 19 for jam nut.









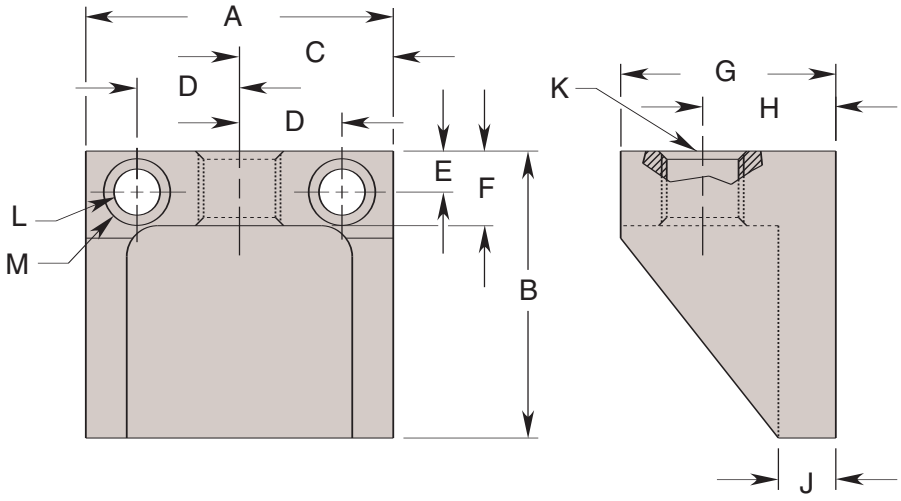


Mounting Cavity (110132)

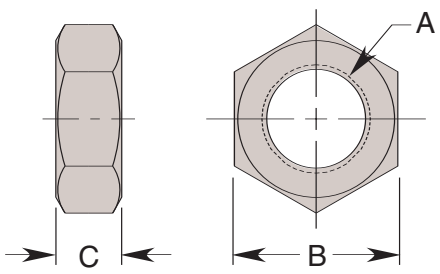
Cat. No.	Specifications				Dimensions (In Inches)									
	*Force (Lbs.)	Stroke (In.)	Eff. Area (Sq. In.)	Oil Cap. (Cu. In.)	A Thread Size	B	C	D	E Dia.	F Dia.	G	H Thread Size	K Thread Depth	L Thread Size
100208	3,927	1.000	.785	.785	1 5/16-16UN	3.312	.750	2.438	.750	1.210	.531	1/8 NPTF	.375	5/16-24 UNF
110132							.250				–	–		

NOTE: *Based on 5,000 psi max. operating pressure.

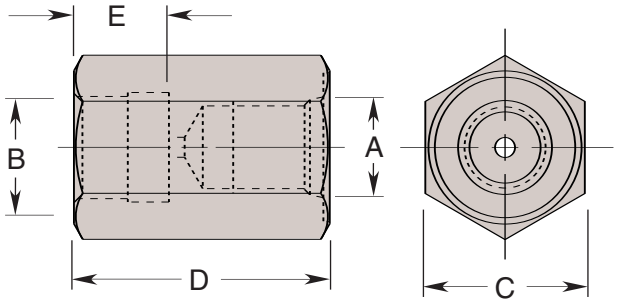
Foot Mounting Bracket



Jam Nut



Feeder Cap



FOOT MOUNTING BRACKETS

Cat. No.	Dimensions (In Inches)												
	A	B	C	D	E	F	G	H	J	K Thread Size	L Dia.	M Dia.	M Depth
400000	1.875	1.750	.938	.625	.250	.455	1.312	.812	.350	½-13 UNC	.281	.410	.218
400001	2.000	1.875	1.000		.312	.562	1.625	.938	.312	⅝-11 UNC	.359	.504	.406
400002		2.000		.656	.344	.687	1.687	1.062	.375	¾-10 UNC	.422	.598	.343
400003	2.500	2.500	1.250	.812	.375	.750	2.000	1.182		1-12 UNF			

JAM NUTS

Cat. No.	Dimensions (In Inches)		
	A Thread Size	B Hex.	C
10391	½-13UNC	.750	.312
10390	½-20UNF	.750	.312
10395	⅝-11UNC	.938	.375
10394	⅝-18UNF	.938	.375
10397	¾-10UNC	1.125	.422
10396	¾-16UNF	1.125	.422
201029	1-12UNF	1.500	.562
216207	1 5⁄16-16UN	2.000	.719

FEEDER CAPS

SAE Ports		NPT Ports		Dimensions (In Inches)			
Cat. No.	A Thread Size	Cat. No.	A Thread Size	B Thread Size	C Hex.	D	E
100927	7⁄16-20UNF SAE-4	500097	⅛-NTPF	½-20UNF	0.750	1.200	0.437
100928		500100		½-13UNC			
100929		500098	¼-NTPF	⅝-18UNF	0.875	1.390	0.500
100930		500101		⅝-11UNC			
100931		500099		¾-16UNF	1.000		
100932		500102		¾-10UNC			
100933		500103		1-12UNF	1.250		

NOTE: 5,000 psi max. operating pressure.

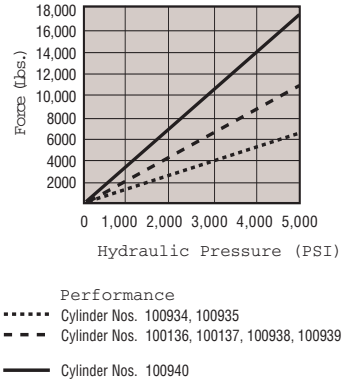
Center Hole Cylinders

Our center-hole cylinders can be used as single- or double-acting workholding devices.

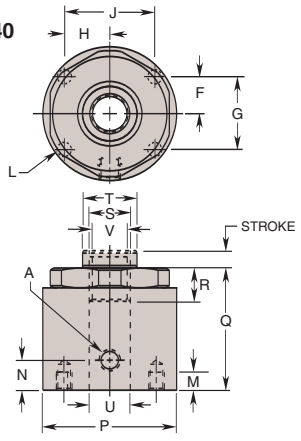
Mounting can be done in any of several ways: use the thru-holes for mounting from the top, use the tapped holes in the bottom for mounting from underneath, or secure with a single stud or rod through the center. The pistons are threaded to accept the optional crowned threaded inserts, used when the cylinder contacts the work directly.

Features:

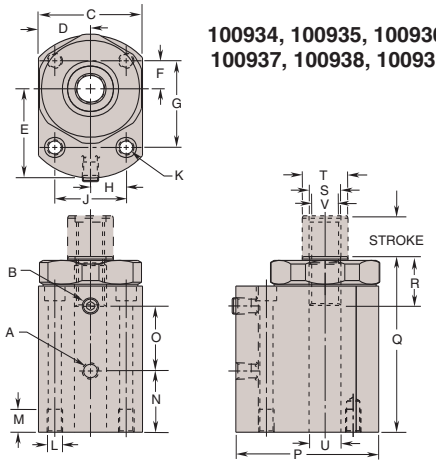
- Single- or double-acting
- Multiple mounting options
- Heavy-duty return spring
- Converts manual clamping to hydraulics
- Plated, threaded piston rods



100940



100934, 100935, 100936, 100937, 100938, 100939



SAE Ports			Specifications			
Cat. No.	A Adv. Port Thd. Size	B Ret. Port Thd. Size	* Force (Lbs.)	Stroke (In.)	Extend and Retract Eff. Area (Sq. In.)	Extend and Retract Oil Cap. (Cu. In.)
100934	7/16-20UNF SAE-4	7/16-20UNF SAE-4	6,630	.500	1.326	.663
100935				1.000		1.326
100936			10,735	.500	2.147	1.074
100937				1.000		2.147
100938				.500		1.074
100939				1.000		2.147
100940		—	17,120	.375	** 3.424	** 1.284

Cat. No.	Dimensions (In Inches)									
SAE Ports	C	D	E	F	G	H	J	K Dia.	L Thd. Size	M Thd. Depth
100934	2.000	1.000	1.750	.562	1.812	.625	1.250	.322	3/8-16UNC	.562
100935										
100936	2.550	1.275	2.188	.688	2.125	.875	1.750			
100937										
100938										
100939										
100940	–	–	–	.972	1.944	.972	1.944	–	1/4-20UNC	.312

Cat. No.	Dimensions (In Inches)								
SAE Ports	N	O	P Dia.	Q	R Piston Thd.	S Thd. Size	T Dia.	U Dia.	V Inside Dia.
100934	.938	1.000	2.812	3.203	1.000	5/8-11UNC	.750	.516	.547
100935	1.438	1.500		4.203					
100936	1.000	1.094	3.500	3.304	1.188	3/4-10UNC	1.125	.781	.656
100937	1.500	1.594		4.304					
100938	1.000	1.094		3.304	1.375	7/8-9UNC		.906	.781
100939	1.500	1.594		4.304					
100940	.756	–	3.370	3.140	1.275	1-8UNC	1.375	1.031	.875

NOTE: * Based on 5,000 psi max. operating pressure ** Extend Only

Low Profile Cylinders

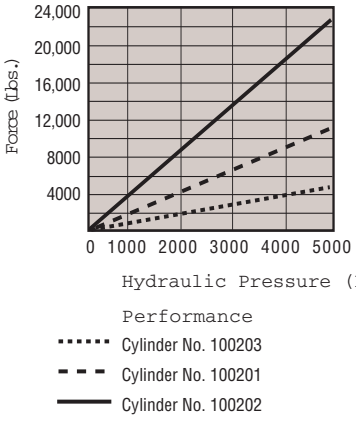
SPX HYTEC

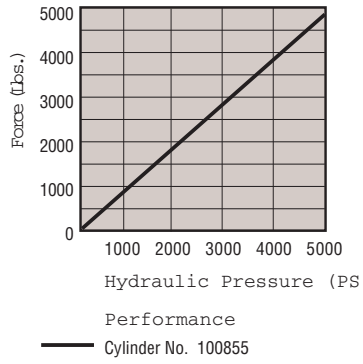
These single-acting, spring-return cylinders are designed for applications where high force and low overall height are requirements. Ideal for clamping fixtures where space is limited. The crowned piston makes them perfect for powering strap clamps, linkages or for direct contact with the workpiece. Cylinder bodies are heat treated using a special process for exceptional wear and corrosion resistance. Three sizes to choose from – the largest being only 2" high – with maximum forces ranging from 4,920 lbs. to 22,150 lbs. Each cylinder has a built-in heavy-duty spring for fast return, and case hardened piston for long service life.

The 100855 and 100925 use the same rugged design with different mounting options. Designed for side mounting, four grade 8 mounting screws can easily resist the force of the clamp so no additional stops or clamp mounting structure is necessary.

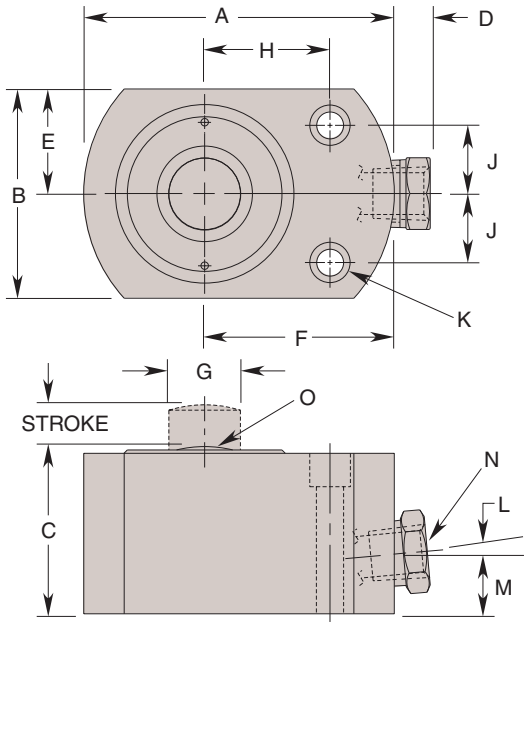
Features:

- Low overall height
- Bronze plated piston
- Piston rod wiper seal
- Heavy-duty return spring
- Heat treated and plated cylinder body
- Single-acting
- Power-Tech™ treated body for long wear and corrosion resistance

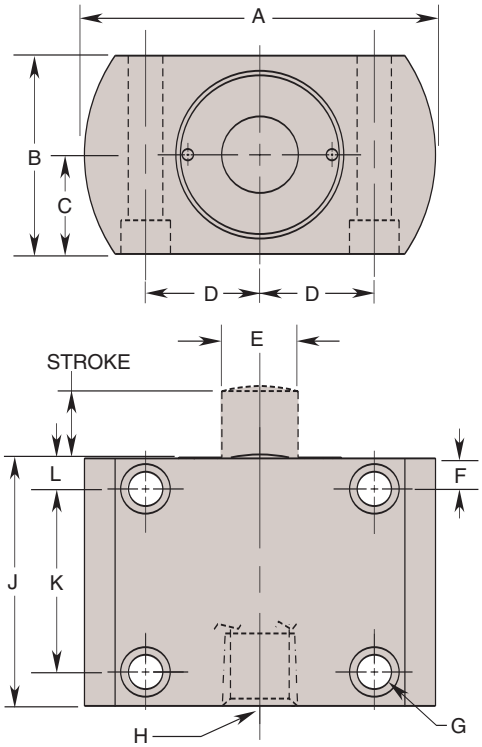




100201, 100202, 100203



100855, 100925



Cat. No.	Specifications				Dimensions (In Inches)												
	*Force (Lbs.)	Stroke (In.)	Eff. Area (Sq. In.)	Oil Cap.	A	B	C	D	E	F	G	H	J	K	L	M	N
100855	4,920	.562	.994	.620	2.875	1.625	.812	.937	.625	.250	.281	1/4 NPTF	2.062	1.500	.282	–	–
100925		.875		.870						.250			3.002			1/4 NPTF	.550

NOTE: * Based on 5,000 psi max. operating pressure.

Cat. No.	Specifications				Dimensions (In Inches)													
	*Force (Lbs.)	Stroke (In.)	Eff. Area (Sq. In.)	Oil Cap. (Cu. In.)	A Dia.	B	C	D	E	F	G Dia.	H	J	K Dia.	L Port Angle	M	N Thread Size	O Radius
100203	4,920	.562	.994	.62	2.562	1.635	1.667	.375	.812	1.750	.625	1.000	.562	.219	0°	.770	1/4 NPTF	1.150
100201	11,180	.437	2.236	1.00	3.250	2.190	1.750		1.095	1.985	.750	1.312	.718	.281	5°	.630		1.250
100202	22,150		4.430	2.00	4.000	3.000	2.000		1.500	2.270	1.125	1.560	.968	.406				1.280

NOTE: *Based on 5,000 psi max. operating pressure.

Block Style Cylinders

Hytec's block style cylinders are double-acting only and do not contain return springs, making them perfect for applications where rapid positive return is essential or where both pushing and pulling forces are required.

Now, more applications are possible thanks to the new threaded piston rods. Hytec threaded inserts or any custom-designed attachments may be used.

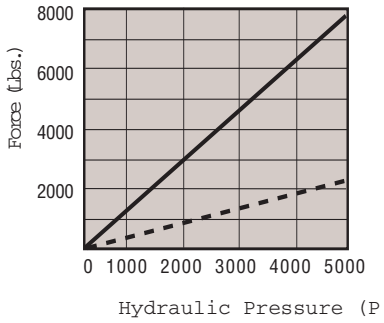
The cylinders can be mounted from top or bottom using a single cap screw and either the thru-hole on the top or the tapped hole in the bottom. A locating hole in the bottom can be used to prevent rotation when necessary.

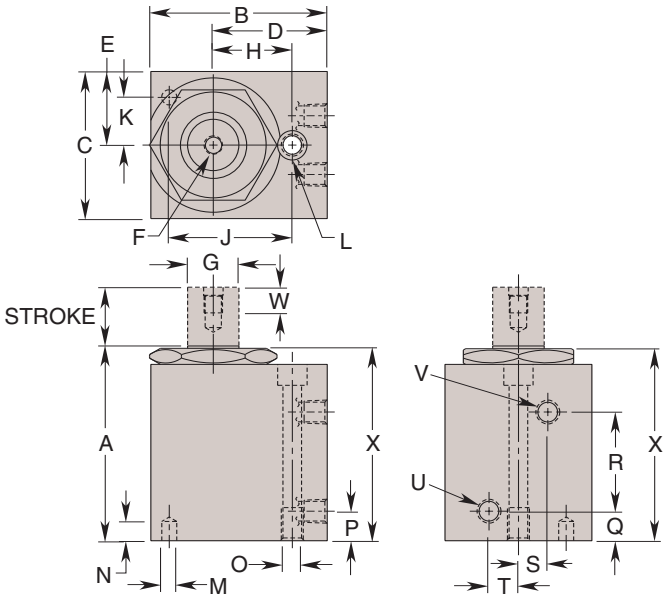
Cylinder control can be simplified in certain applications by supplying one side of the cylinder with a constant air pressure source to supply the return force. The other port of the cylinder can then be pressurized and released as if it were single-acting.

Features:

- Threaded, plated piston rod
- Double-acting
- Single screw mounting
- Piston threads withstand full retract forces.

Note: See page 23 for threaded inserts.



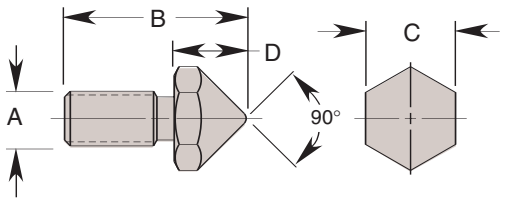


Cat. No.	Specifications							Dimensions (In Inches)														
	*Force (Lbs.)		Stroke (In.)	Eff. Area (Sq. in.)		Oil Cap. (Cu. In.)		A	B	C	D	E	F Thread Size	G Dia.	H	J	K	L Dia.	M Dia.	N	O Thread Size
	Adv.	Ret.		Adv.	Ret.		Ret.														
100055B	2210	1225	.500	.442	.245	.221	.123	2.312	2.500	1.500	1.844	.750	5/16-24 UNF	.500	1.094	1.490	.500	.257	.257	.328	5/16-18 UNC
100056B	2210	1225	1.000	.442	.245	.442	.245	2.812	2.500	1.500	1.844	.750	5/16-24 UNF	.500	1.094	1.490	.500	.257	.257	.328	5/16-18 UNC
100061B	7425	4415	.500	1.485	.883	.742	.442	2.812	3.000	2.500	1.938	1.250	5/16-24 UNF	.875	1.344	2.094	.812	.312	.257	.328	3/8-16 UNC
100062B	7425	4415	1.000	1.485	.883	1.485	.883	3.312	3.000	2.500	1.938	1.250	5/16-24 UNF	.875	1.344	2.094	.812	.312	.257	.328	3/8-16 UNC

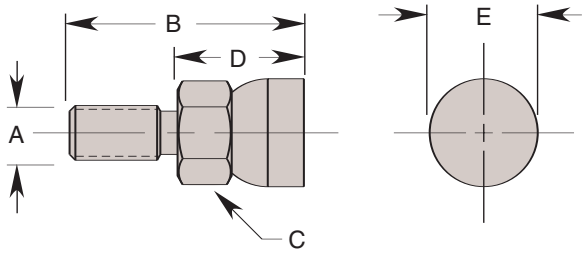
Cat. No.	Dimensions (In Inches)								
	P Min.	Q	R	S	T	U Advance Port	V Retract Port	W Thread Depth	X (REF)
100055B	.500	.375	1.000	.344	.344	1/8-NPTF	1/8-NPTF	.438	2.23
100056B	.500	.375	1.500	.344	.344	1/8-NPTF	1/8-NPTF	.438	2.73
100061B	.625	.500	1.188	.500	.500	1/8-NPTF	1/8-NPTF	.438	2.76
100062B	.625	.500	1.688	.500	.500	1/8-NPTF	1/8-NPTF	.438	3.26

NOTE: * Based on 5,000 psi max. operating pressure

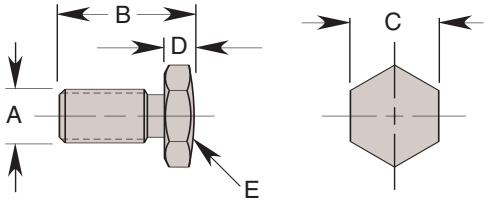
Pointed Threaded Insert
(500161, 500164)



Toggle Pad Threaded Insert
(500162, 500165)



Crowned Threaded Insert
(500160, 500163, 201884)

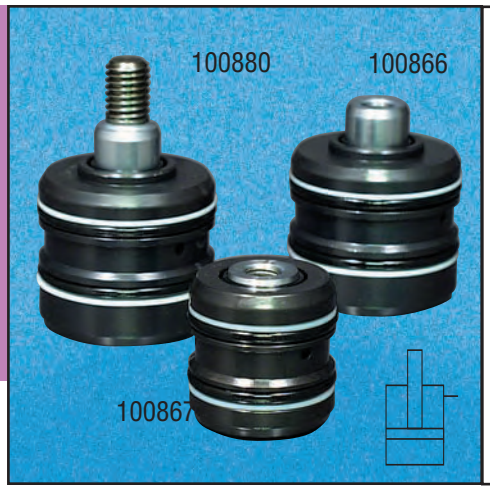


POINTED THREADED INSERTS					
Cat. No.	Dimensions (In Inches)				
	Used With Cat. No.	A Thread Size	B	C Hex.	D
500161	100139, 100148, 100149, 100153, 100159, 100166, 100167, 100171	10-32 UNF	.630	.312	.250
500164	100172, 100173, 100208, 100043B, 100044B, 100049B, 100050B, 100055B, 100056B, 100061B, 100062B	5/16-24 UNF	.630	.375	.250

TOGGLE PAD THREADED INSERTS						
Cat. No.	Dimensions (In Inches)					
	Used With Cat. No.	A Thread Size	B	C Hex.	D	E Dia.
500162	100139, 100148, 100149, 100153, 100159, 100166, 100167, 100171	10-32 UNF	.812	.312	.438	.375
500165	100172, 100173, 100208, 100043B, 100044B, 100049B, 100050B, 100055B, 100056B, 100061B, 100062B	5/16-24 UNF	1.156	.563	.750	.688

CROWNED THREADED INSERTS						
Cat. No.	Dimensions (In Inches)					
	Used With Cat. No.	A Thread Size	B	C Hex.	D	E Radius
500160	100139, 100148, 100149, 100153, 100159, 100166, 100167, 100171	10-32 UNF	.480	.312	.100	.875
500163	100172, 100173, 100208, 100043B, 100044B, 100049B, 100050B, 100055B, 100056B, 100061B, 100062B	5/16-24 UNF	.480	.375	.100	.875
201884	100226, 100141, 100844, 100847, 100926	1/2-13 UNC	1.315	.750	.190	1.500

Cartridge Pull Cylinders

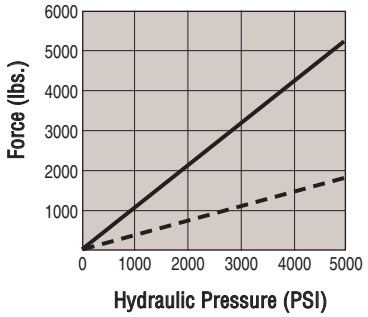


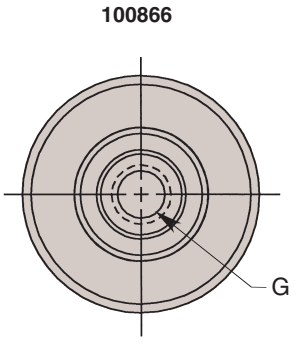
These "Pull" cylinders retract when hydraulically pressurized. They were created to permit the user to design a cylinder into a fixture while maintaining the replaceability and long life of a heat treated, corrosion resistant cylinder body. Typical applications of these cylinders include installation behind fixture plates or buried in tombstones where they can supply clamping force without taking up valuable fixture space.

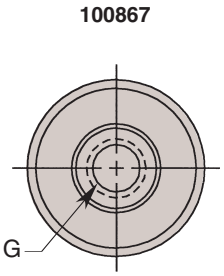
These pull cylinders were designed for cartridge mounting in a cavity supplied by the user. The required cavity is simply a cylindrical bore with a properly deburred pressure port intersecting it, providing the hydraulic fluid connection. They are for single acting systems only where the force for cylinder return (extension) is supplied manually or through a spring designed into the application by the user. A return spring that can be built into the application is available.
(No. 251549 Order Separately)

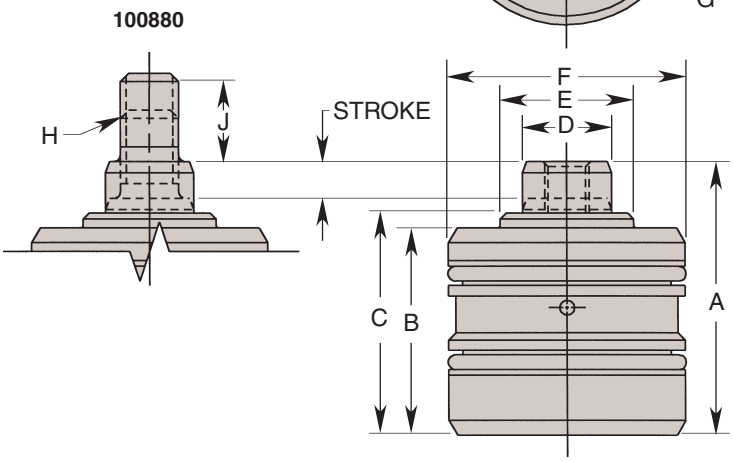
Features:

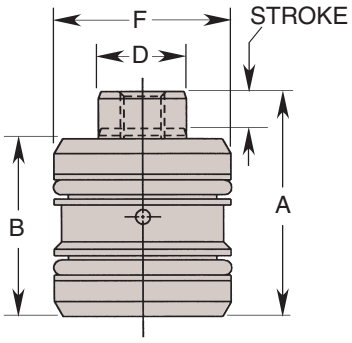
- Compact design
- Manifold mounting eliminates tubing
- Threaded, plated piston rod
- Power-Tech™ treated body for long wear and corrosion resistance
- 5,000 psi maximum pressure rate
- Rod wiper to exclude contaminants
- Single-Acting







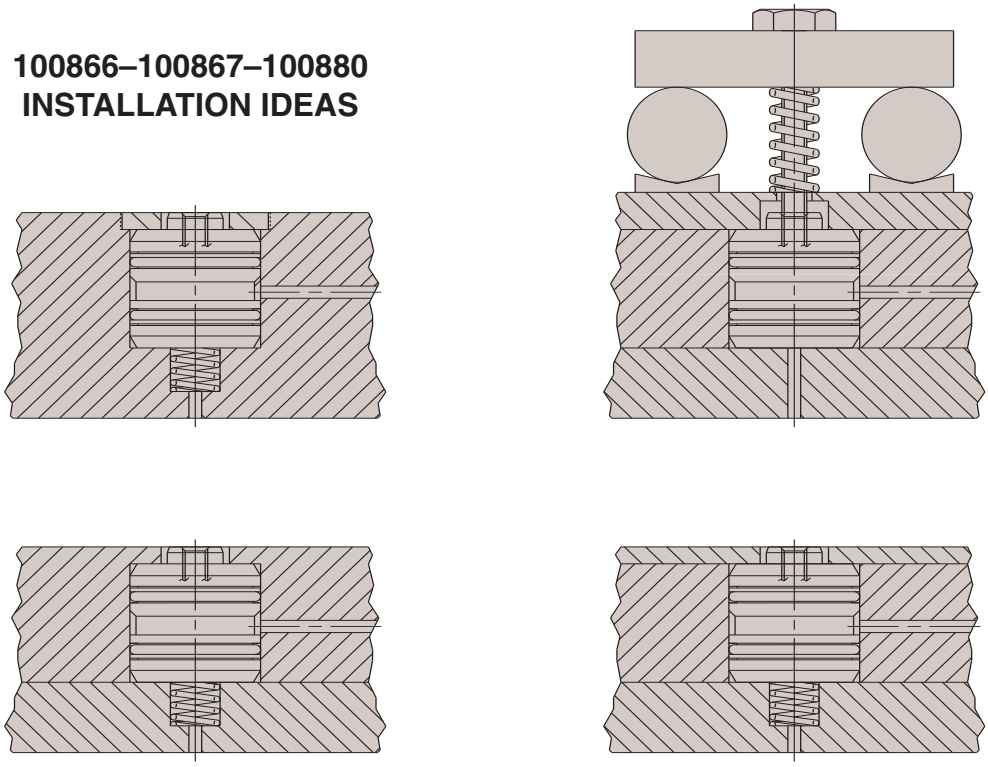




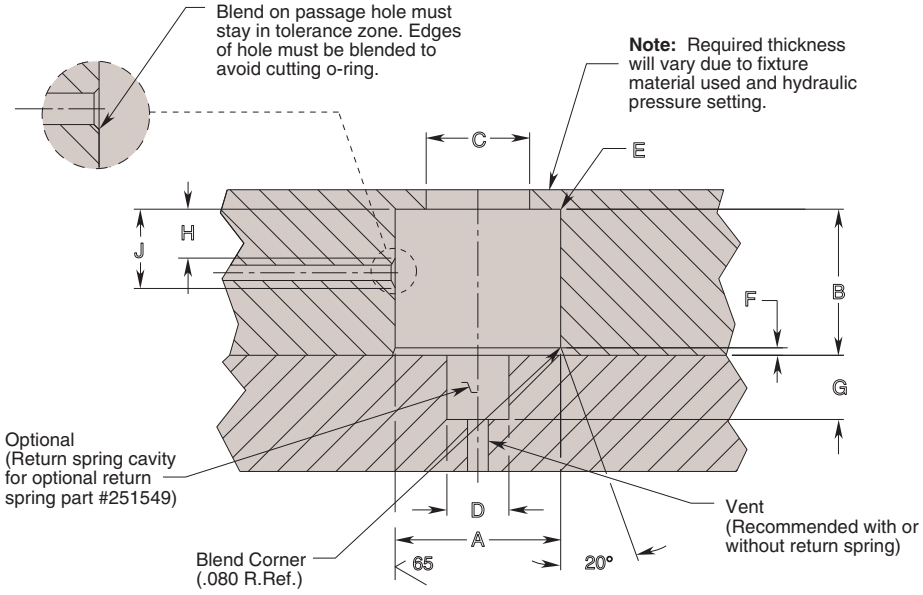
Cat. No.	Specifications				Dimensions (In Inches)								
	*Force (Lbs.)	Stroke (in.)	Eff. Area (Sq. In.)	Oil Cap. (Cu. In.)	A	B	C	D Dia.	E Dia.	F Dia.	G Thread Size	G Thread Depth	H Thread Size	J
100866	5,215	.312	1.043	.325	2.312	1.750	1.875	.750	1.125	2.000	⅜-16 UNC	.500	—	—
100867	1,740		.348	.108	1.902	1.500	—	.750	—	1.500			—	—
100880	5,215		1.043	.325	2.312	1.750	1.875	.750	1.125	2.000	—	—	½-13 UNC	.750

Note: * Based on 5,000 psi max. operating pressure.

100866–100867–100880 INSTALLATION IDEAS



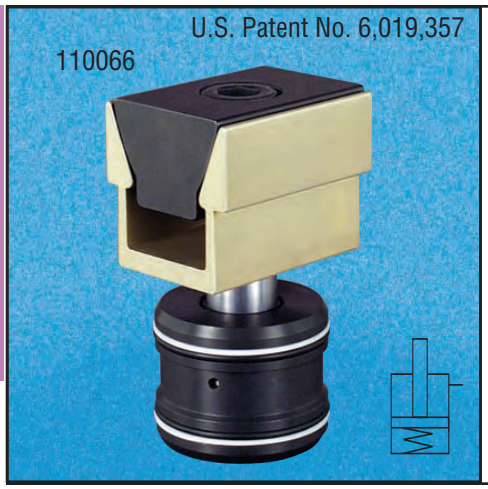
MOUNTING CAVITY



Cat. No.	Cavity Dimensions							Oil Passage Location	
	A Dia.	B Cylinder Body Cavity	C Dia.	D Dia.	E Chfr. / Rad. Max.	†F	G	*H Min.	*J Max.
100866	2.000 2.003	1.755 1.765	1.750 1.135	.744 .754	.065	.080 .100	.760 .790	.485	1.020
100867	1.500 1.503	1.500 1.510	1.250 .780					.510	.970
100880	2.000 2.003	1.755 1.765	1.750 1.135					.485	1.020

* Tolerance zone for blended oil passage hole. Tolerance zone does not allow any up and down motion of cylinder body.
† Chamfer to be located at end of bore "A" from which the cylinder will be assembled.

Uniforce® Hydraulic Clamp



These clamps are a combination of Mitee-Bite® Products Uniforce® Clamp and Hytec's cartridge pull cylinders. Two pull cylinders are offered to power each of five of the most popular Uniforce clamps. One will create the force necessary to achieve the clamp's rated force at 5,000 psi hydraulic pressure. The other powers the clamp to its maximum rating at only 2,500 psi. This allows the efficient use of these clamps in lower pressure systems however, ***never exceed the maximum pressure rating*** of the clamp/cylinder assembly.

The pull cylinders are designed for cartridge mounting in a cavity supplied by the fixture builder. The required cavity is simply a cylindrical bore with a properly deburred pressure port intersecting it, providing the fluid connection. Where possible, pins inserted in the back of the piston are provided.

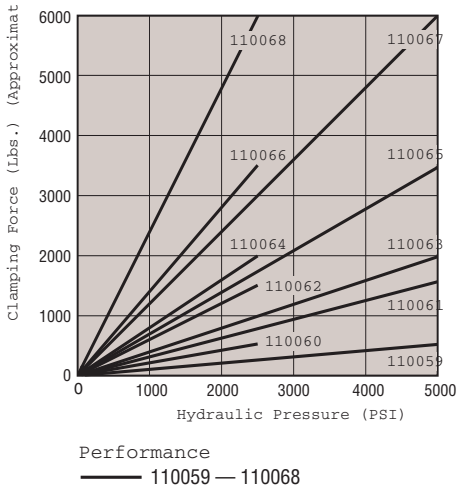
These pins can be guided by holes drilled in the sub-plate to prevent cylinder rotation when adjustments are made. A breather hole should always be provided and may be combined with the pin holes where appropriate.

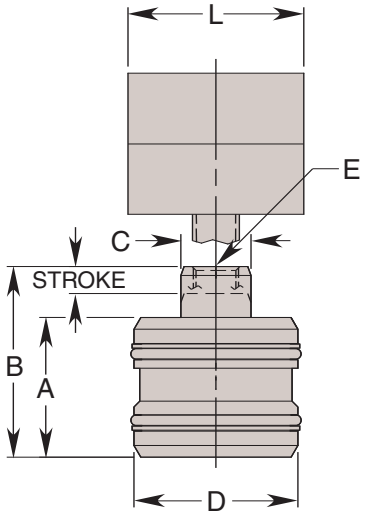
An external stop prevents over-travel of the clamp if actuated without a workpiece in place.

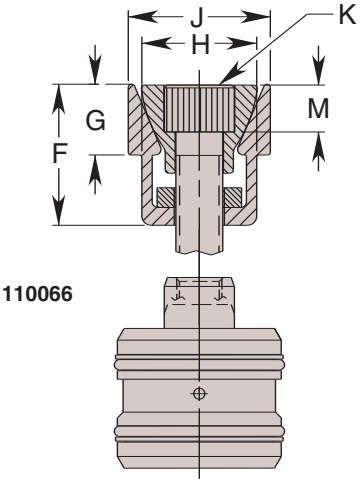
Features:

- Minimal space requirements
- Reduces repetitive motion injuries
- 5,000 psi and 2,500 psi max. versions
- Cylinders require no additional fixture space
- Rod wiper excludes contaminants
- Plating & Power-Tech™ processes resist corrosion
- Single-acting, spring return

Mitee-Bite and Uniforce are registered trademarks of Mitee-Bite Products Company.



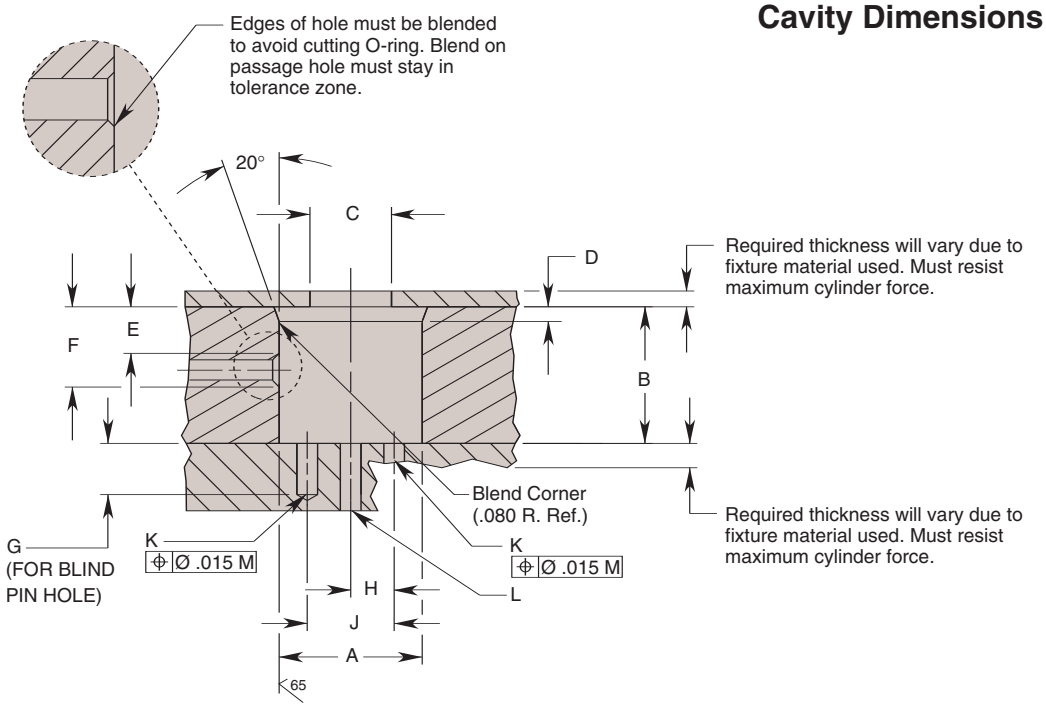




Clamp & Cylinder Assembly Cat. No.	Clamp Assembly Specifications			Cylinder Specifications			Cylinder Dimensions (In Inches)					
	Operating Pressure Max. (psi)	Holding Force Max. (Lbs.)	Clamp Spread Max.	Stroke (In.)	Eff. Area (Sq. in.)	Oil Cap. (Cu. in.)	A	B	C	D	E Piston Thread Size	E Piston Thread Depth
110059	5,000	290	.565	.123	.137	.017	1.115	1.210	.373	.810	8-32 UNC	.320
110060	2,500				.353	.043			.560	1.185		
110061	5,000	1,500	.830	.178		.063	1.240	1.325			¼-20 UNC	.375
110062	2,500				.537	.096		1.417		1.309		
110063	5,000	2,000	1.120								5/16-18 UNC	.470
110064	2,500				1.042	.185	1.365	1.470	.748	1.748		
110065	5,000	3,500	1.650								½-13 UNC	.500
110066	2,500			.288	1.802	.519	1.490	1.605	.873	2.123		
110067	5,000	6,000	2.175					1.690			⅝-11 UNC	.625
110068	2,500				3.542	1.020	1.615	2.000	1.059	2.873		

Clamp & Cylinder Assembly Cat. No.	Uniforce Clamp Dimensions (In Inches)								Uniforce Clamp (only) Cat. No.
	F	G	H	J	K Cap Screw Thd. Size	K Cap Screw Length	L	M C'Bore Depth	
110059	.575	.220	.410	.485	8-32 UNC	.625	.625	.165	500184
110060									
110061	.790	.375	.635	.735	¼-20 UNC	.875	.940	.255	500185
110062									
110063	1.090	.500	.820	.980	5/16-18 UNC	1.250	1.250	.310	500186
110064									
110065	1.590	.750	1.215	1.470	½-13 UNC	2.000	1.875	.510	500187
110066									
110067	2.090	1.000	1.625	1.960	⅝-11 UNC	2.500	2.500	.625	500188
110068									

110059 — 110068 Cavity Dimensions



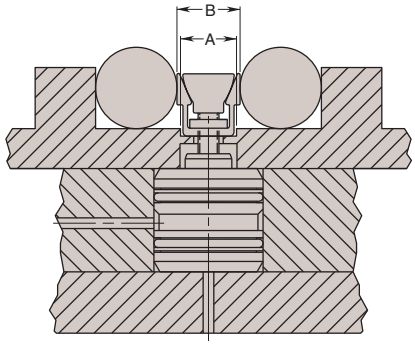
Cat. No.	Cavity Dimensions (In Inches)				Oil Passage Location (In Inches)		Cavity Dimensions (In Inches)				
	A Dia.	B Cyl. Body Length Max.	C Dia.	†D	E Min.	F Max.	G Min.	H	J	K Dia.	*L Vent Dia. Min.
110059	.812 .815	1.120 1.130	.387 .577	.125 .145	.475	.728	—	—	—	—	.125
110060	1.187 1.190		.572 .911		.427	.710					
110061		1.245 1.255			.437	.787					
110062	1.312 1.315		.572 1.000		.476	.734					
110063											
110064	1.750 1.753	1.370 1.380	.760 1.437		.531	.819					
110065											
110066	2.125 2.128	1.495 1.505	.885 1.812		.526	.943	.510	.550	1.100	.270 .280	
110067											
110068	2.875 2.878	1.620 1.630	1.074 2.500			1.001	.650	.785	1.570		

Note: * Cavity must be vented
† Chamfer to be located at end of bore "A" from which the cylinder will be assembled.

500184 — 500188 Application Chart

Cat. No.	Dimensions (In Inches)	
	A Groove Width	B Workpiece Spacing
500184	.440	.500
500185	.665	.750
500186	.850	1.000
500187	1.245	1.500
500188	1.655	2.000

Note: Groove "A" is recommended to maintain clamp orientation.



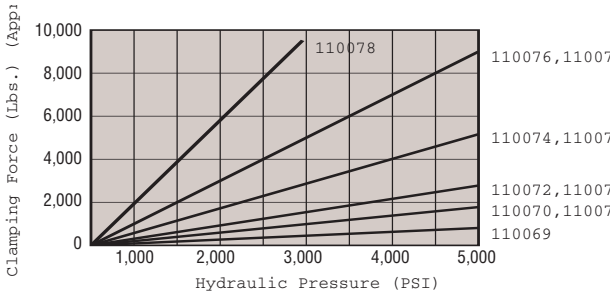
Cartridge Pull Cylinders

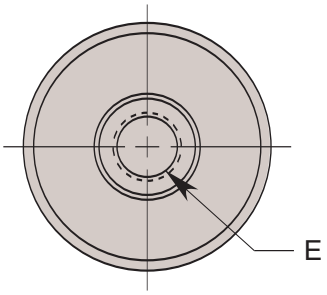
These cylinders retract when hydraulically pressurized to exert a pulling force on clamping elements or mechanisms. For straight pull applications only, they allow the user to design a cylinder into a fixture while maintaining the replaceability and long life of a heat treated, corrosion resistant cylinder body. Designed for single-acting systems only, the cylinder's return spring is built into the piston and requires no additional fixture space.

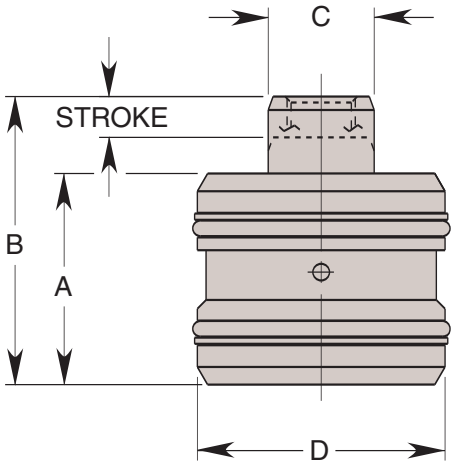
The pull cylinders are designed for cartridge mounting in a cavity supplied by the fixture builder. The required cavity is simply a cylindrical bore with a properly deburred pressure port intersecting it, providing the fluid connection. The depth of the bore matches nominal plate thickness so the cylinder can be easily "sandwiched" between two plates if desired. Where possible, pins inserted in the back of the piston are provided. These pins are guided by holes drilled in the sub-plate and will prevent cylinder rotation when adjustments are made. A breather hole should always be provided and may be combined with the pin holes where appropriate.

Features:

- Minimal space requirements
- 5,000 psi max.
- Rod wiper excludes contaminants
- Manifold mounting eliminates exposed tubing
- Plating & Power-Tech™ processes resist corrosion
- Single-acting, spring-return
- Return spring included
- Power-Tech™ treated body for long wear and corrosion resistance



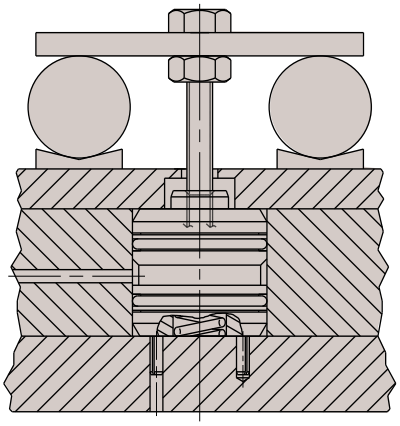


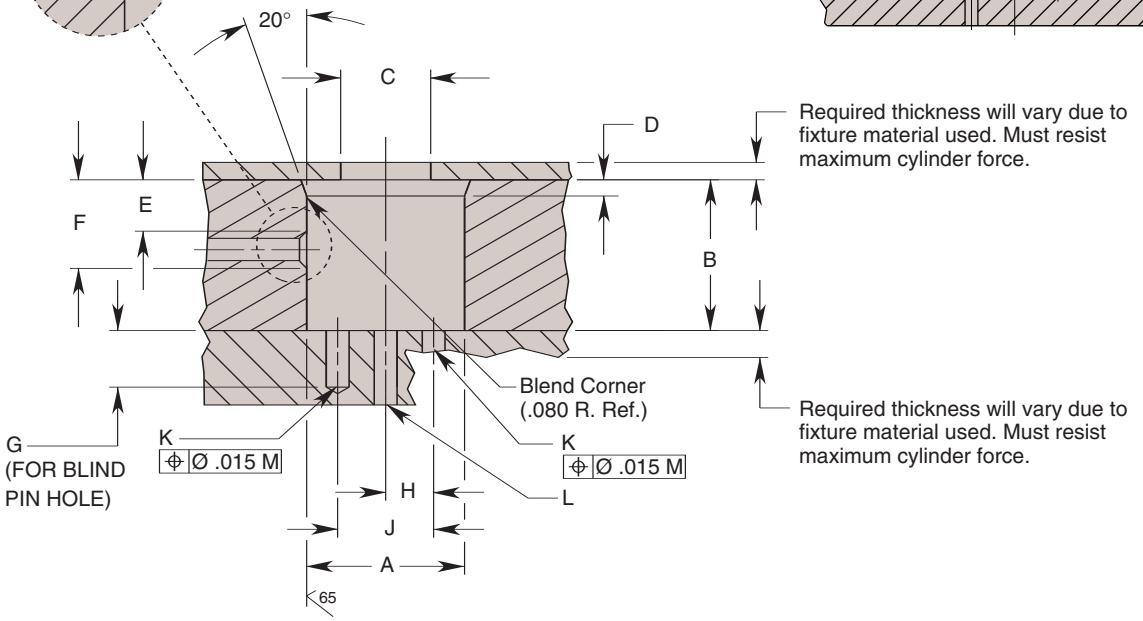


Cat. No.	Specifications				Dimensions (In Inches)					
	Force (Lbs.)	Stroke (In.)	Eff. Area (Sq. In.)	Oil Cap. (Cu. In.)	A	B	C	D	E Piston Thread	
									Size	Depth
110069	685	.123	.137	.017	1.115	1.210	.373	.810	8-32 UNC	.320
***110070**	1,765		.353	.043			.560	1.185		
110071		.178		.063	1.240	1.325			¼-20 UNC	.375
***110072**	2,685		.537	.096		1.417		1.309		
110073									5⁄16-18 UNC	.470
***110074**	5,210		1.042	.185	1.365	1.470	.748	1.748		
110075									½-13 UNC	.500
***110076**	9,010	.288	1.802	.519	1.490	1.605	.873	2.123		
110077						1.690			5⁄8-11 UNC	.625
***110078**	17,710		3.542	1.020	1.615	2.000	1.059	2.873		

* Intended for lower pressure applications. Operation above 2,500 psi may limit the cycle life of the cylinder and attaching fastener.

110069 — 110078
Cavity Dimensions

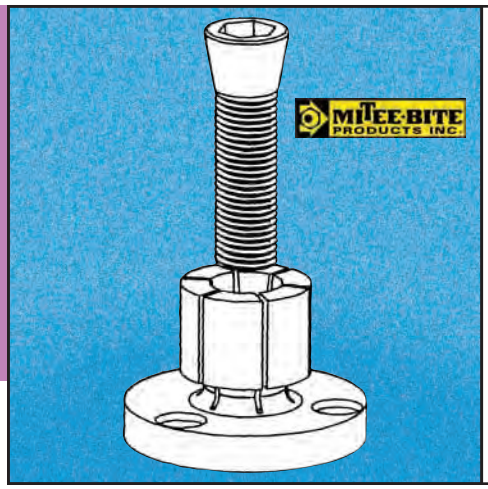




Cat. No.	Cavity Dimensions (In Inches)				Oil Passage Location (In Inches)		Cavity Dimensions (In Inches)				
	A Dia.	B Cyl. Body Cavity	C Dia.	†D	E Min.	F Max.	G Min.	H	J	K Dia.	*L Vent Dia. Min.
110069	.812 .815	1.120 1.130	.387 .577	.125 .145	.475	.728	—	—	—	—	.125
110070	1.187 1.190		.572 .911		.427	.710					
110071		1.245 1.255			.437	.787					
110072	1.312 1.315		.572 1.000		.476	.734					
110073											
110074	1.750 1.753	1.370 1.380	.760 1.437		.531	.819					
110075											
110076	2.125 2.128	1.495 1.505	.885 1.812		.526	.943	.510	.550	1.100	.270 .280	
110077											
110078	2.875 2.878	1.620 1.630	1.074 2.500			1.001	.650	.785	1.570		

† Chamfer to be located at end of bore "A" from which the cylinder will be assembled.

Tapered Screw Expanded Clamp



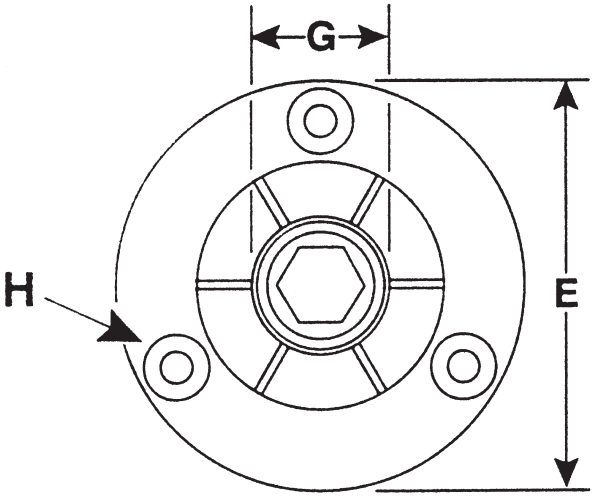
Machining and Installation

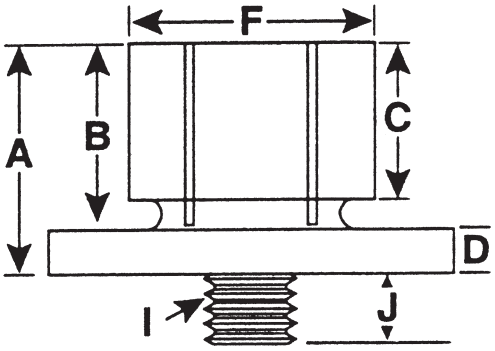
Expand clamp approximately .005 over relaxed diameter and machine to fit workpiece bore, either on lathe or mill.

If machining the clamp on a lathe use the nut provided, on the back of the clamp, to tighten the tapered screw. This nut is used only to machine the clamp.

Machine a pocket, in the fixture, for the close tolerance "E" dimension and drill and tap mounting holes per "H" column. Drill and tap a hole from the "I" column in the center of the pocket for the tapered screw.

A recessed dowel pin may be installed into the flange for additional rigidity if required.

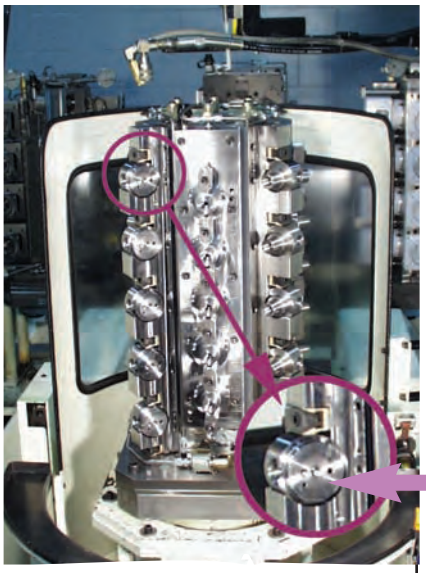




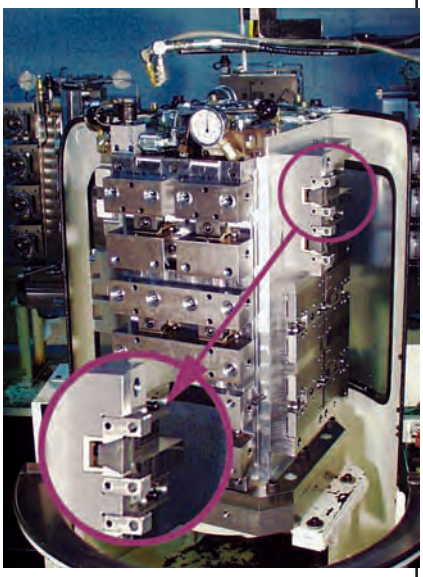
Part Number	Model Number	A	B	C	D	+.000 E -.002	F	G†	H*	I	J
110200	#0	.86	.63	.59	.23	1.170	.49	.28	6-32 on .825 BHC	8-32	.30
110201	#1	.98	.75	.59	.23	1.240	.56	.48	6-32 on .910 BHC	1/4-20	.50
110202	#2	.98	.75	.59	.23	1.476	.79	.53	6-32 on 1.140 BHC	5/16-18	.56
110203	#3	1.13	.88	.69	.25	1.968	1.06	.71	8-32 on 1.550 BHC	3/8-16	.71
110204	#4	1.25	1.0	.81	.25	2.205	1.39	.90	8-32 on 1.790 BHC	1/2-13	.71
110205	#5	1.56	1.25	1.06	.31	2.736	1.65	1.15	10-32 on 2.200 BHC	5/8-11	.79
110206	#6	1.56	1.25	1.06	.31	2.972	2.03	1.15	10-32 on 2.515 BHC	5/8-11	.79
110207	#7	1.79	1.48	1.27	.31	4.232	3.06	1.15	1/4-20 on 3.646 BHC	5/8-11	.79

G† - Minimum diameter the "F" dimension can be machined or turned down to.
H* - (3) Mounting Screws Included.
This product is a registered trademark of Mitee-Bite.

Uniforce® Hydraulic Clamp for a variety of fixturing applications



A



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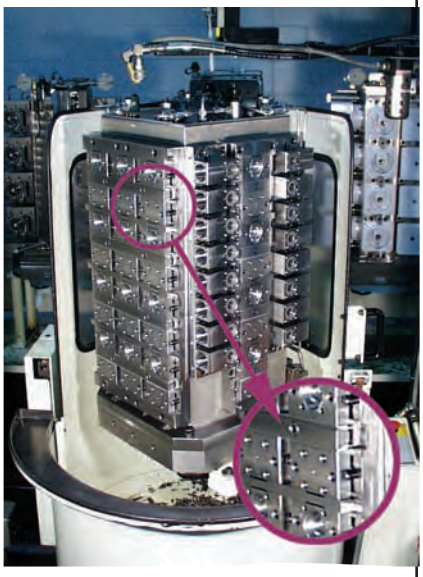
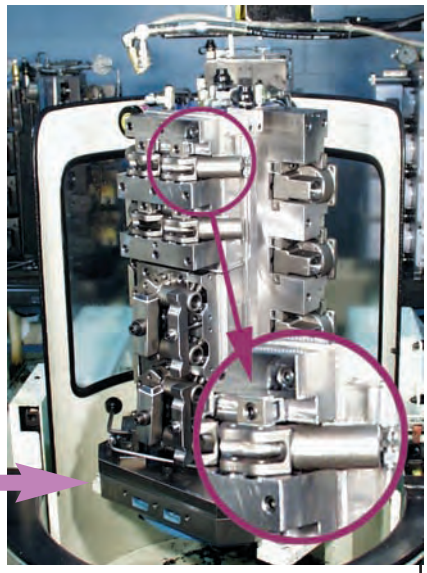
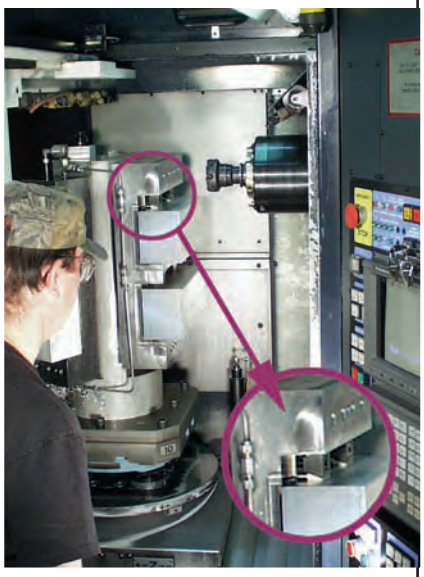


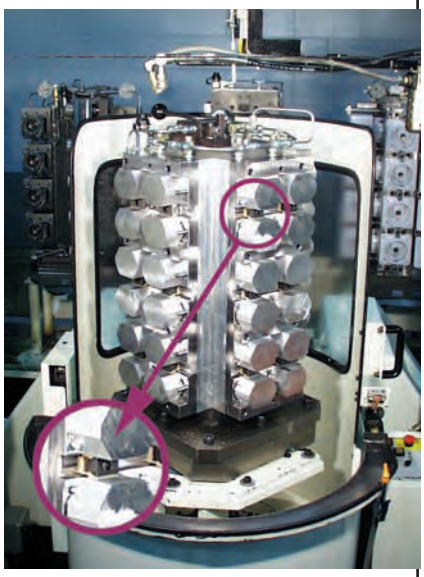
C



D



E



F

The Uniforce Hydraulic Clamp can be the foundation for clamping a wide variety of workpieces:

A. For more than just rectangular workpieces, the Uniforce hydraulic clamp can be equally effective for clamping round workpieces.

B. Often, a single Uniforce hydraulic clamp is all that is necessary to securely hold a workpiece. Or, several clamps can be positioned along the length of the part.

C. The hydraulic actuation of this clamp requires no additional space. Fixture density is not compromised because the hydraulic pull cylinder is buried below the workpieces. The Uniforce clamping elements can be purchased as bar stock and then customized to meet special length requirements.

D. Applications can include castings as well as bar-stock and extrusions. The clamp will accommodate slight imperfections and draft angles.

E. Five clamp sizes, each available in two different pressure ratings are available to fit a wide range of workpiece proportions.

F. The Uniforce Hydraulic Clamp can clamp two workpieces as easily as one. The same clamping force is exerted on workpiece whether clamping one or two.

CLAMPS

Hytec's workholding devices include many types of hydraulic clamps that will handle most clamping applications. All of our hydraulic clamps are ideal for applications where it is necessary for the clamping actuator to be moved away from the workpiece. They perform the same function as clamping cylinders, but their ability to swing or retract out of the way of cutters, plus the advantage of quick and easy part loading or unloading, makes them the perfect choice for the jobs with special workholding needs.

Swing/Pull Clamps

Both the swinging and clamping functions are performed by a single actuator: as the clamp's cylinder is retracted, the rod rotates, causing the clamping arm to swing into position. Clamping then takes place as the cylinder continues to retract, pulling the arm against the workpiece.

Hytec features a family of "live roller" swing clamps. With this design, the swing mechanism uses a wide roller that follows a cam throughout the clamp's stroke to provide the rotation. The heat-treated roller and cam provide increased service life in the toughest applications. Swings of 0° (straight pull) and 90° (both right and left hand) are available. 30°, 45° and 60° rotations are available in some sizes.

Hytec offers a wide range of mounting and plumbing options. Body styles include: threaded body, cartridge and manifold mount. With the threaded body, double-acting options, choose from top and bottom ports or both ports at the top in the 2,400 lb. capacity clamps.

Single-acting and double-acting versions are available. In double-acting, there is a choice of clamping stroke lengths in some sizes.

Arms clamp securely to the piston rod to minimize deflection. Choose from a standard length arm or an easily modified long arm to best fit your application.

Rotation is specified by looking "down" at the piston rod end of the clamp. Clockwise rotation is designated as right hand rotation and counter-clockwise, left hand.

Swing Clamps

Two separate actuators are used to perform the clamping function. First, a cylinder is used to swing the clamping arm 90° into position over the workpiece. Then a second cylinder is sequenced to pivot the clamping arm into contact with the workpiece and hold it in place.

An internal sequence valve controls and coordinates both the swinging and clamping actions. When hydraulic pressure is applied to the advance port, a piston causes the clamping arm to swing into the clamped position. As pressure goes above 450 psi, the sequence valve opens, causing the clamping piston to extend, which causes the clamping arm to pivot and clamp the workpiece.

When pressure is released, the single-acting clamping cylinder's return spring retracts the clamping cylinder. At the same time, a return spring in the swing mechanism moves the clamping arm back to its unclamped position. The swing mechanism is single- or double-acting, and can be assisted with hydraulic or shop air pressure to return the clamping arm.

Retract Clamps

Very similar in operation to the swing clamps, with the exception of having the clamping arm move out toward the workpiece in a straight line rather than rotating 90°, making them ideal for applications where the shape of the fixture or part does not allow room for the clamp to swing.

An internal sequence valve controls and coordinates the retracting and clamping actions. When hydraulic pressure is applied to the advance port, a piston causes the clamping arm to extend into the clamped position. As pressure increases above 450 psi the sequence valve opens, causing the clamping piston to extend, which in turn causes the clamping arm to pivot and clamp the workpiece.

When pressure is released, the single-acting clamping cylinder's return spring retracts the clamping cylinder. At the same time, a return spring moves the clamping arm back to its un-clamped position. The retract mechanism is single- or double-acting and can be assisted with hydraulic or shop air pressure to return the clamping arm.

Edge Clamp

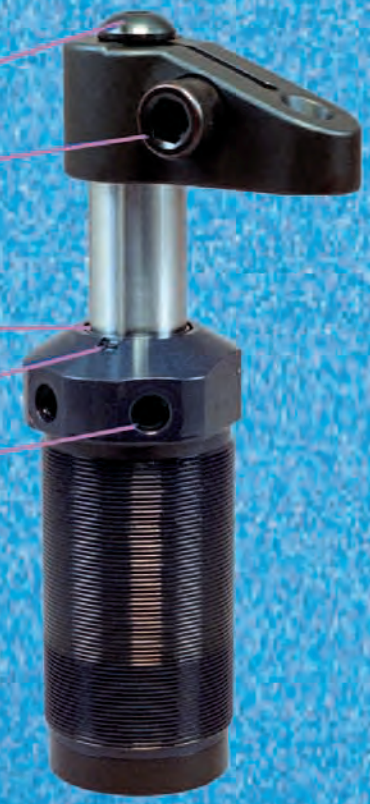
Hytec's edge clamp performs three functions: locating the workpiece, clamping horizontally against secondary locators and clamping vertically against the primary locating surface. This combined horizontal and vertical clamping force can locate and secure many parts with no other clamps being needed.

Die Clamp

Originally designed for die clamping, this clamp's unique mounting arrangement allows it to be used in a variety of workholding applications too. Just use a riser block the same thickness as the workpiece.

SPX HYTEC®

Hytec's Live-Roller Swing Clamp Design



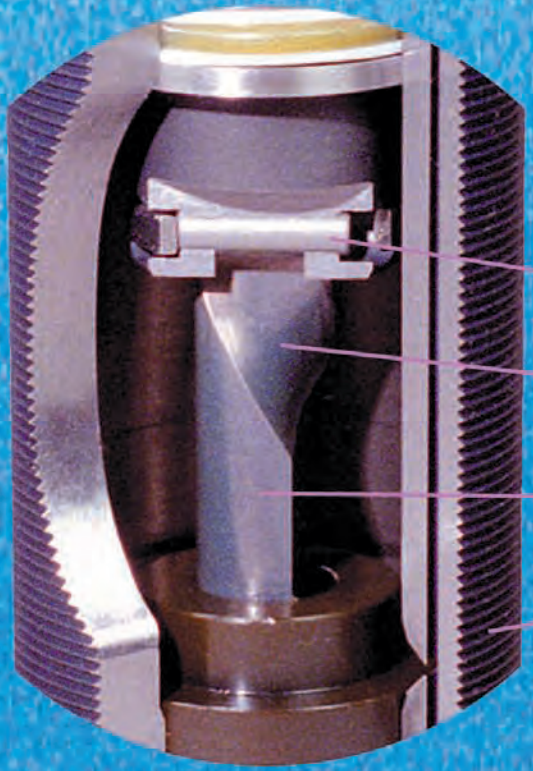
LOW PROFILE, BUTTON HEAD CAP SCREW
ALLOWS EASIER ASSEMBLY AND DISASSEMBLY

ARM CLAMPS TO PISTON ROD
MINIMIZIES DEFLECTION

RECESSED WIPER SEAL
RESISTS CONTAMINATION

DRAIN CHANNELS
CHANNELS CONTAMINANTS AWAY FROM SEAL

TOP PORT DESIGN
SIMPLIFIES PLUMBING AND VENTING



UNIQUE "LIVE-ROLLER" DESIGN
ABSORBS LOAD OVER ENTIRE LENGTH

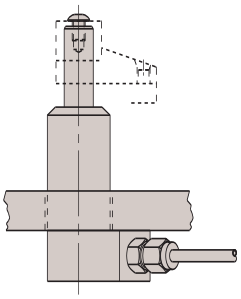
MULTIPLE ROTATION OPTIONS
ADDS DESIGN VERSATILITY

HEAT TREATED CAM
INCREASES STRENGTH

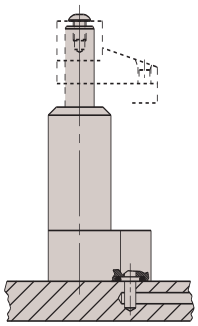
100% CORROSION RESISTANT
INCREASES UPTIME

ISO 9001 CERTIFIED

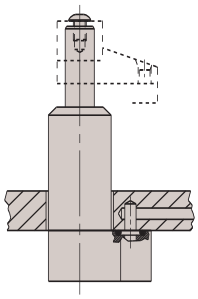
Hytec swing clamps are available in numerous mounting and porting configurations. Here are just a few examples of ways to include these clamps into your fixture designs.



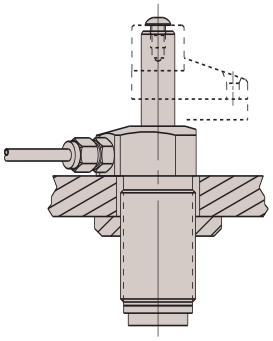
Lower Flange
Conventional Plumb



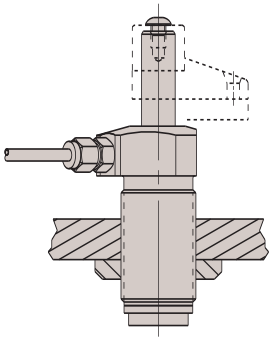
Lower Flange
Manifold Mount



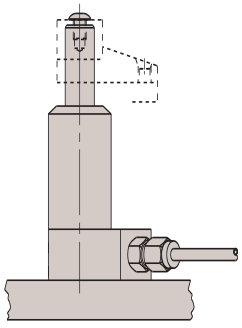
Lower Flange
Manifold Mount



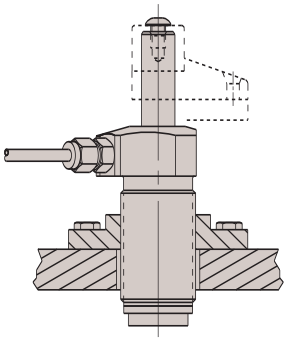
Threaded Body
with Jam Nut



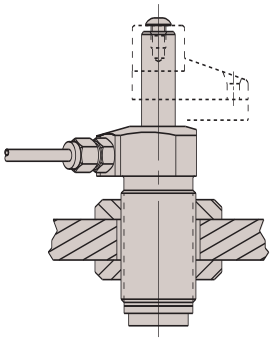
Threaded Body
with Jam Nut



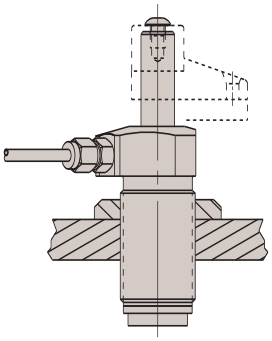
Lower Flange
Conventional Plumb



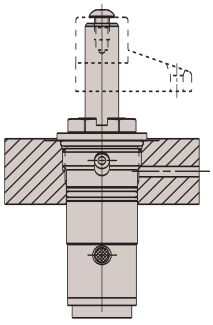
Threaded Body
With Mounting Bracket



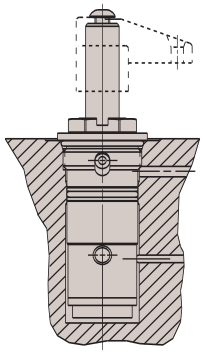
Threaded Body
With Jam Nut



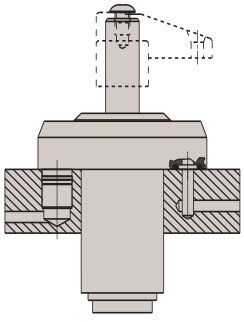
Threaded Body
With Jam Nut



Cartridge Style
Single Acting



Cartridge Style
Double Acting

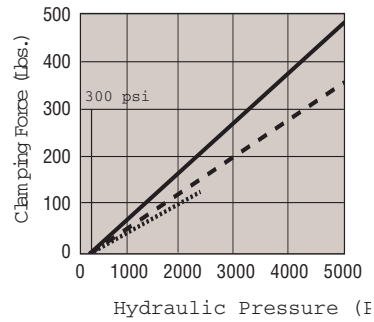


Upper Flange
Double Acting

Swing/Pull Clamps - Threaded Body Style - 365 lbs.

Features:

- Full thread provides wide range of precise height adjustment
- Simple installation/removal
- "Live Roller" design provides industry's most reliable swing/pull mechanism
  - o Piston/Cam combination provides solid path for clamping action
  - o Typical ball and groove mechanism has higher potential for clogging and for damage from mis-aligned work pieces
- Available in single and double acting versions
- Special rod wiper seal protects internal clamp components
- Unique drainage system channels contaminants away from clamp
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Unique "Live Roller™" swing mechanism for increased service life
- Power-Tech™ treated body and hardened cam for long wear and corrosion resistance
- 5,000 psi max.
- Straight pull capacity 480 lbs. at 5,000 psi max.

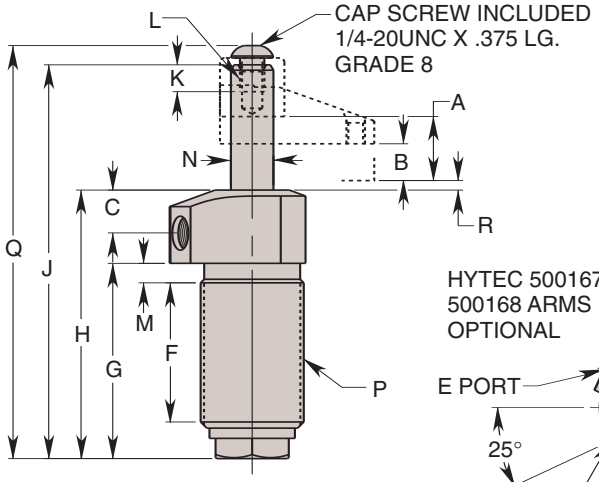


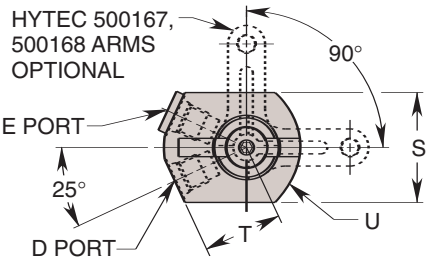
Performance

With Hytec No. 500168 (3.25" long)

With Hytec No. 500167 (1.06" long)

Straight Pull





Cat. No.		Oper.	Specifications						Dimensions (In Inches)				
			Swing Direction	*Force (Lbs.)	Eff. Area (Sq. In.)		Oil Cap. (Cu. In.)		A Total Stroke	B Clamping Strokes	C	D Clamp Port	E Unclamp Port
					Clamp	Unclamp	Clamp	Unclamp					
110001	110129	Single-Acting	LH (Counter Clockwise)	365	.098	—	.065	—	.638	.320	.480	5/16-24 UNF SAE-2	Breather Plug †3/16-24 UNF SAE-2
110002	110130		RH (Clockwise)										
110003	110131		Straight Pull										
110004	110126	Double-Acting	LH (Counter Clockwise)			.248		.163					5/16-24 UNF SAE-2
110005	110127		RH (Clockwise)										
110006	110128		Straight Pull										

Cat. No.	Dimensions (In Inches)													
	F	G	H	J	K Thread Min.	L Thread Size	M	††N Dia.	P Thread Size	Q	R	S	T	U Radius
110001	1.418	2.000	2.750	4.032	.275	¼-20 UNC	.200	.435	1 1/16-16 UN	4.229	.096	1.126	.810	.750
110002														
110003														
110004														
110005														
110006														
110126														
110127														
110128									1 1/8-16 UN			1.186		
110129														
110130														
110131														

Note: * With 1" arm at 5,000 psi max. operating pressure. Internal cam may be removed for an unguided straight pull. See page 58 for maximum operating speeds and rotation options.

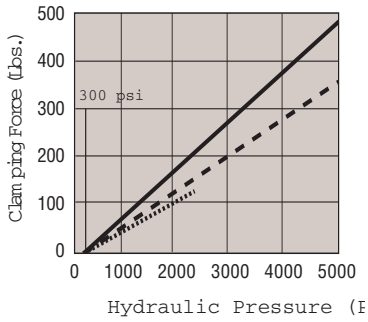
† Do not pressurize - single acting only.

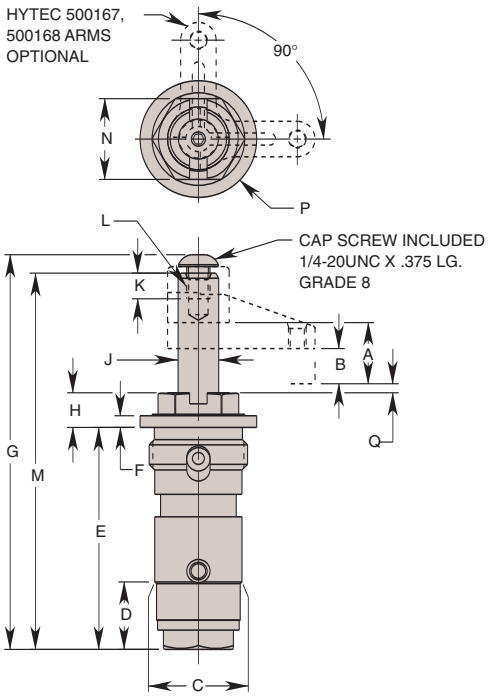
†† See page 59 for custom arm mounting.

Swing/Pull Clamps - Cartridge Style - 365 lbs.

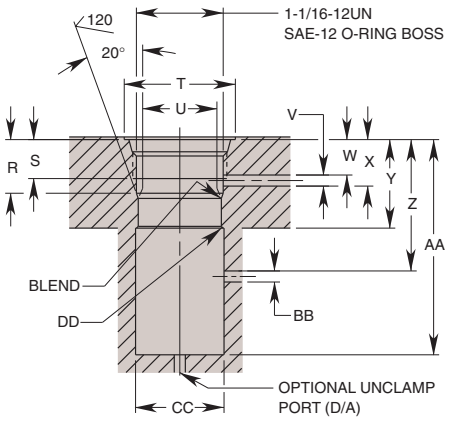
Features

- Small footprint minimizes acreage on fixture
- Low profile reduces overall fixture height
- Manifold mounting eliminates exposed plumbing, reducing chip build-up on fixture
- "Live Roller" design provides industry's most reliable swing/pull mechanism
  - o Piston/Cam combination provides solid path for clamping action
  - o Typical ball and groove mechanism has higher potential for clogging and for damage from mis-aligned work pieces
- Simple cavity design enables faster fixture building
- Available in single and double acting versions
- Special rod wiper seal protects internal clamp components
- Unique drainage system channels contaminants away from clamp
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Manifold mountable
- Unique "Live Roller" swing mechanism for increased service life
- Power-Tech™ heat treated body and hardened cam for long wear and corrosion resistance
- Single-acting and double-acting models
- Straight pull capacity 480 lbs. at 5,000 psi max.





Cavity Detail



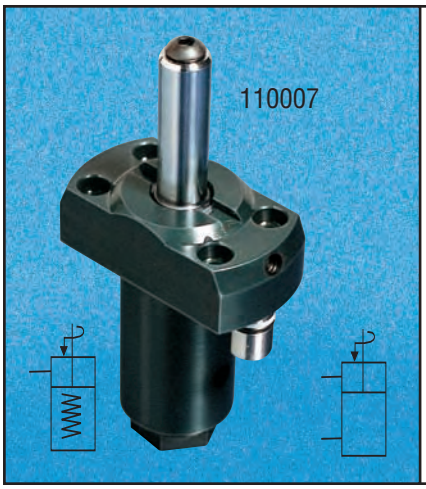
Cat. No.	Oper.	Specifications						Dimensions (In Inches)									
		Swing Direction	*Force (Lbs.)	Eff. Area (Sq. In.)		Oil Cap. (Cu. In.)		A Total Stroke	B Clamping Stroke	C Dia.	D	E	F	G	H	††J Dia.	K Min. Thd.	L Thd. Size
				Clamp	Unclamp	Clamp	Unclamp											
110013	Single-Acting	LH (Counter Clockwise)	365	.098	—	.065	—	.638	.320	.935	.723	2.379	.125	4.229	.371	.435	.275	¼-20 UNC
110014		RH (Clockwise)																
110015		Straight Pull																
110016	Double-Acting	LH (Counter Clockwise)			.248		.163											
110017		RH (Clockwise)																
110018		Straight Pull																

Cat. No.	Dimensions (In Inches)				Mounting Dimensions (In Inches)												
	M	N Hex	P Dia.	Q	R	S Min. Thd.	T Dia. Min.	U Dia.	V Clamp Port Dia. Min.	W Min.	X Max.	Y Min.	Z Min.	AA Min.	BB Unclamp Port Dia. Min.	CC Dia. Min.	DD Chamfer Max.
110013	4.032	.875	1.250	.096	.596 .616	.440	1.255	.937 .940	.125	.400	.596	1.000	—	2.431	†Vent	1.000	.020
110014																	
110015																	
110016																	
110017												—	1.547		.125		
110018																	

Note: * With 1.00" arm at 5,000 psi max. operating pressure.
† Do not pressurize - single acting only. Cavity must be vented.
†† See page 59 for custom arm mounting. See page 58 for maximum operating speeds and rotation options.
Internal cam may be removed for an unguided straight pull. See operating instructions for additional port details.

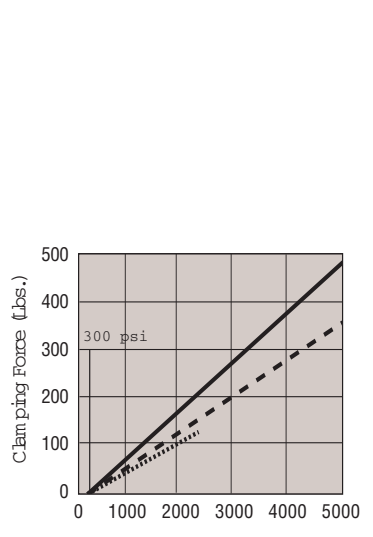
Swing/Pull Clamp - Manifold Mount – Upper Flange Style - 365lbs.

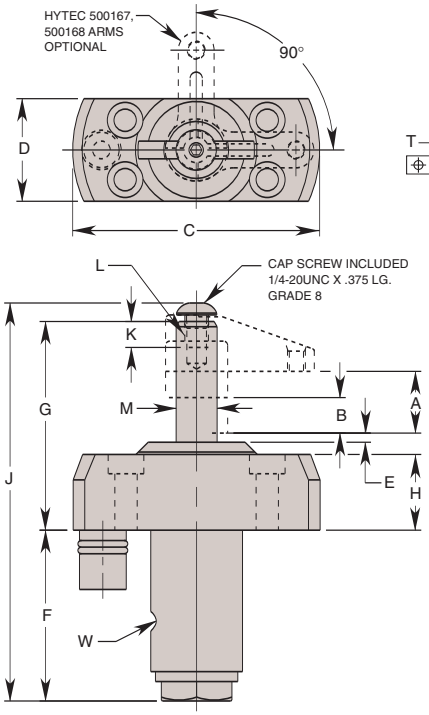
SPX HYTEC

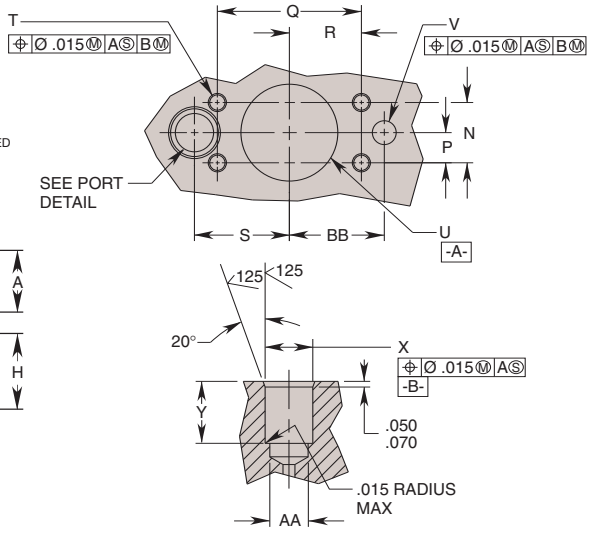


Features

- Unique connector bushing provides positive mating with fixture, reducing the potential for leakage or weeping.
- Simple cavity design eliminates need for threaded holes in mating surfaces
- Manifold design eliminates external plumbing and reduces fixture height
- "Live Roller" design provides industry's most reliable swing/pull mechanism
  - o Piston/Cam combination provides solid path for clamping action
  - o Typical ball and groove mechanism has higher potential for clogging and for damage from mis-aligned work pieces
- Available in single and double acting versions
- Special rod wiper seal protects internal clamp components
- Unique drainage system channels contaminants away from clamp
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Manifold mountable
- Unique "Live Roller" swing mechanism for increased service life
- Power-Tech™ heat treated body and hardened cam for long wear and corrosion resistance
- Single- and double-acting models are dimensionally interchangeable
- Straight pull capacity 480 lbs. at 5,000 psi max.







Cat. No.	Oper.	Specifications: Swing Direction	*Force (Lbs.)	Eff. Area (Sq. In.): Clamp	Eff. Area (Sq. In.): Unclamp	Oil Cap. (Cu. In.): Clamp	Oil Cap. (Cu. In.): Unclamp	Dimensions (In Inches): A Total Stroke	B Clamping Stroke	C Dia.	D	E	F	G	H	J	K Min. Thd.	L Thd. Size
110007	Single-Acting	LH (Counter Clockwise)	365	.098	—	.065	—	.638	.320	2.624	1.090	.096	1.815	2.217	.805	4.229	.275	¼-20 UNC
110008		RH (Clockwise)																
110009		Straight Pull																
110010	Double-Acting	LH (Counter Clockwise)			.248		.163											
110011		RH (Clockwise)																
110012		Straight Pull																

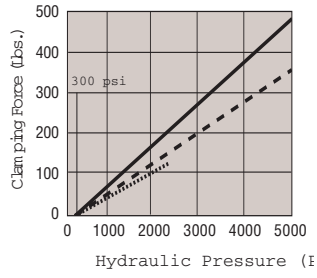
Cat. No.	Dimensions (In Inches): M Dia.	N Mtng.	P Mtng.	Q Mtng.	R Mtng.	S Mtng.	T Thd. Size	U Dia.	V	W	X Dia.	Y	AA Dia. Max.	BB Mtng.
110007	††.435	.632	.316	1.510	.755	.995	10-24 UNC	1.000 1.030	—	†Vent	.500 .503	.640 .660	.481	—
110008														
110009														
110010									††† .250	—				.995
110011														
110012														

Note: * With 1.00" arm at 5,000 psi max. operating pressure.
† Do not pressurize - single acting only.
†† See page 59 for custom arm mounting.
Internal cam may be removed for an unguided straight pull.
See page 58 for maximum operating speeds and rotation options.
††† Surface finish to be 63. Finish of 125 acceptable with concentric tool marks only. Finish area to be .500 DIA. min. centered on .250 DIA. port hole. See operating instructions for additional port details.

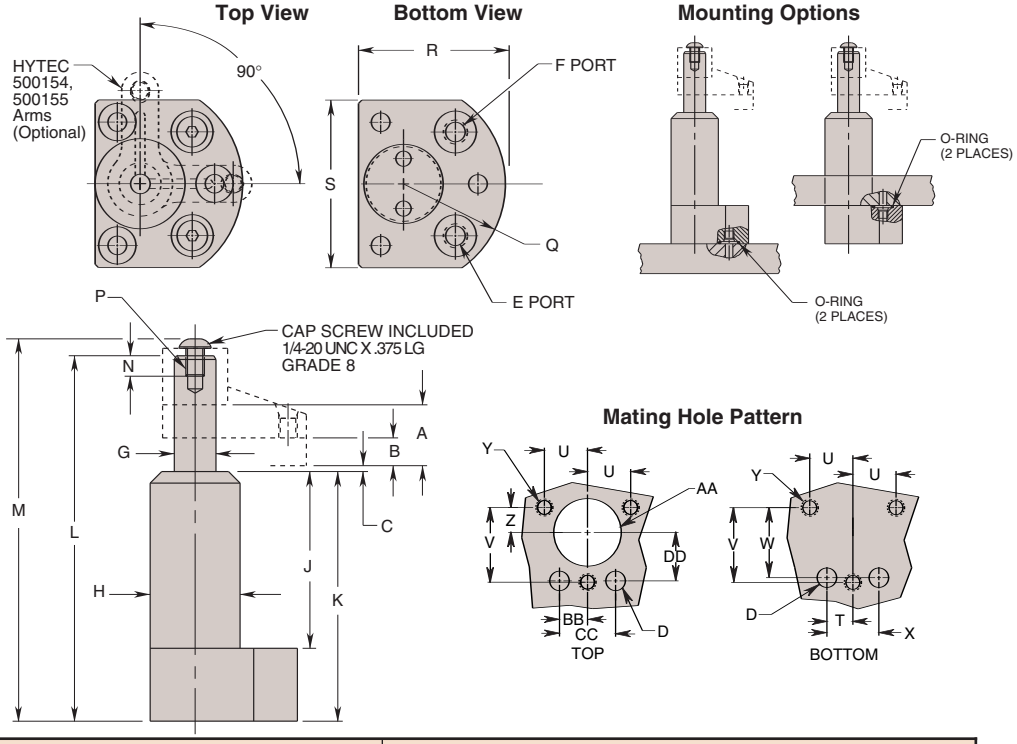
Swing/Pull Clamp - Manifold Mount – Lower Flange Style - 365 lbs.

Features

- Manifold design eliminates external plumbing and reduces fixture height
- "Live Roller" design provides industry's most reliable swing/pull mechanism
  - o Piston/Cam combination provides solid path for clamping action
  - o Typical ball and groove mechanism has higher potential for clogging and for damage from mis-aligned work pieces
- Available in single and double acting versions
- Special rod wiper seal protects internal clamp components
- Unique drainage system channels
- contaminants away from clamp
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Manifold mountable
- Unique "Live Roller" swing mechanism for increased service life
- Power-Tech® treated body and hardened cam for long wear and corrosion resistance
- Single-acting and double-acting models are dimensionally interchangeable
- Straight pull capacity 480 lbs. at 5,000 psi max.
- Flange top or bottom mounting



Performance
- With Hytec No. 500168 (3.25" long)
- With Hytec No. 500167 (1.06" long)
- Straight Pull



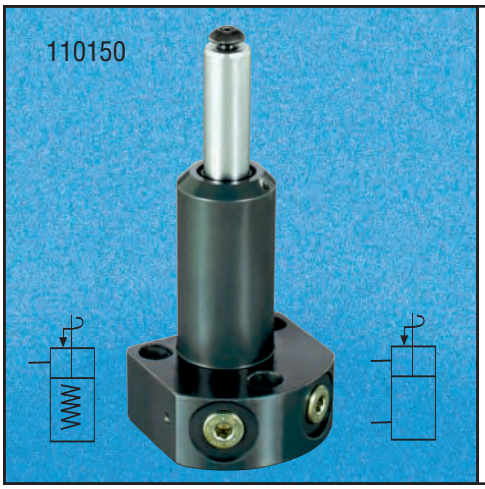
Cat. No.	Specifications							Dimensions (In Inches)							
	Oper.	Swing Direction	*Force (Lbs.)	Eff. Area (Sq. In.)		Oil Cap. (Cu. In.)		A Total Stroke	B Clamping Stroke	C	†††D Port Dia.	E Clamp Port	F Unclamp Port	††G Dia.	H Dia.
				Clamp	Unclamp	Clamp	Unclamp								
110144	Single-Acting	LH (Counterclockwise)	365	.098	—	.065	—	.638	.320	.096	.309 Max.	5/16-24 UNF SAE-2	Breather Plug †5/16-24 UNF SAE-2	.435	1.070
110145		RH (Clockwise)													
110146		Straight Pull													
110147	Double-Acting	LH (Counterclockwise)			.248		.163						5/16-24 UNF SAE-2		
110148		RH (Clockwise)													
110149		Straight Pull													

Cat. No.	Dimensions (In Inches)																			
	J	K	L	M	N Thread Min.	P Thread Size	Q Radius	R	S	T	U	V	W	X	Y Thread Size	Z	AA Dia.	BB	CC	DD
110144	1.800	2.780	4.045	4.302	.275	¼-20 UNC	1.250	1.870	1.770	.412	.684	1.185	1.110	.824	10-24 UNC	.395	1.095 1.125	.445	.890	.770
110145																				
110146																				
110147																				
110148																				
110149																				

NOTE: * With 1.00" long arm at 5,000 psi maximum operating pressure.
† Do not pressurize - single-acting only.
†† See page 59 of H05 for custom arm mounting. Internal cam may be removed for an unguided straight pull. See page 58 of H05 for maximum operating speeds.
††† Surface finish to be 63. Finish of 125 acceptable with concentric tool marks only. Finish area to be .525 DIA. min. centered on .309 DIA. port hole. See operating instructions for additional port details.

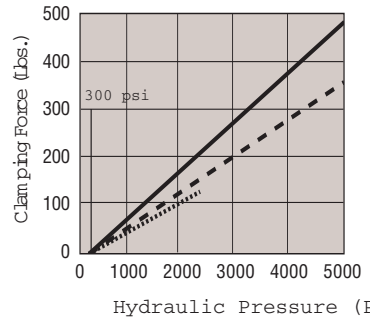
Swing/Pull Clamp - Surface Mount – Externally Plumbed - Lower Flange Style - 365 lbs.

SPX HYTEC®



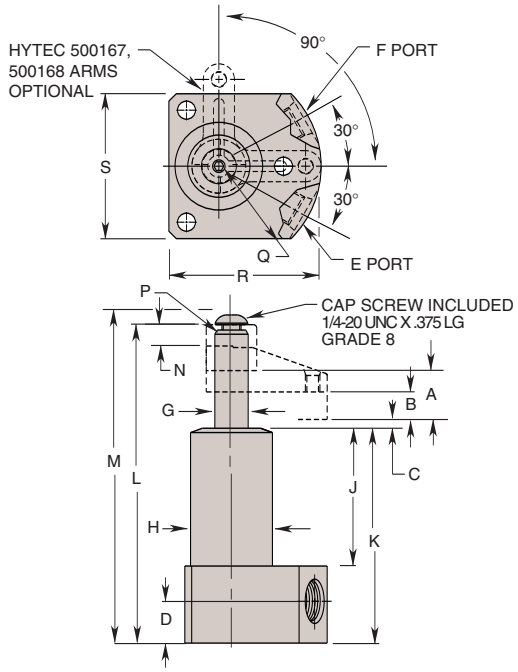
Features

- External plumbing eliminates need to gun drill additional ports in fixture
- Can be inserted from above or below fixture plate
  - o Top mounting provides extra height to accommodate large work pieces
  - o Top mounting does not require drilling of large fixture hole
- Special rod wiper seal protects internal clamp components
- Corrosion reisitant construction
- Heat treated, chrome plated piston rod
- Power-Tech® treated body and hardened cam for long wear and corrosion resistance

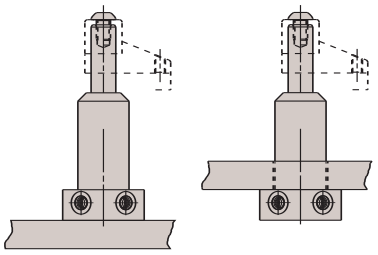


Performance

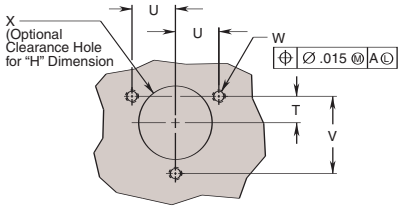
- With Hytec No. 500168 (3.25" long)
- With Hytec No. 500167 (1.06" long)
- Straight Pull



Mounting Options



Mating Hole Pattern



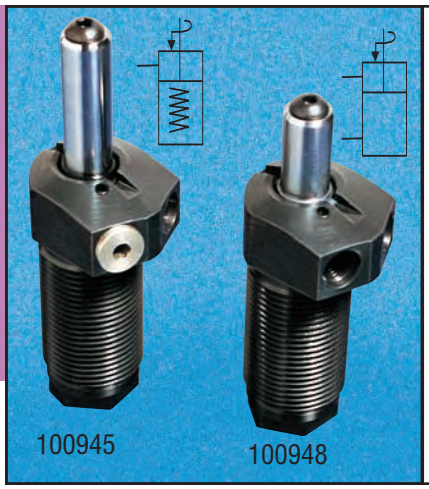
Cat. No.	Specifications							Dimensions (In Inches)							
	Oper.	Swing Direction	*Force (Lbs.)	Eff. Area (Sq. In.)		Oil Cap. (Cu. In.)		A Total Stroke	B Clamping Stroke	C	D	E Clamp Port	F Unclamp Port	††G Dia.	H Dia.
				Clamp	Unclamp	Clamp	Unclamp								
110150	Single-Acting	LH (Counterclockwise)	365	.098	—	.065	—	.638	.320	.096	.540	7/16-20 UNF SAE-4	Breather Plug 7/16-20 UNF †SAE-4	.435	1.070
110151		RH (Clockwise)													
110152		Straight Pull													
110153	Double-Acting	LH (Counterclockwise)			.248		.163						7/16-20 UNF SAE-4		
110154		RH (Clockwise)													
110155		Straight Pull													

Cat. No.	Dimensions (In Inches)													
	J	K	L	M	N Thread Min.	P Thread Size	Q Radius	R	S	T	U	V	W Thread Size	X Dia.
110150	1.800	2.780	4.045	4.302	.275	¼-20 UNC	1.250	1.870	1.770	.395	.684	1.185	10-24 UNC	1.095 1.125
110151														
110152														
110153														
110154														
110155														

NOTE: * With 1.00" long arm at 5,000 psi max. operating pressure.
† Do not pressurize - single-acting only.
†† See page 59 of H05 for custom arm mounting.

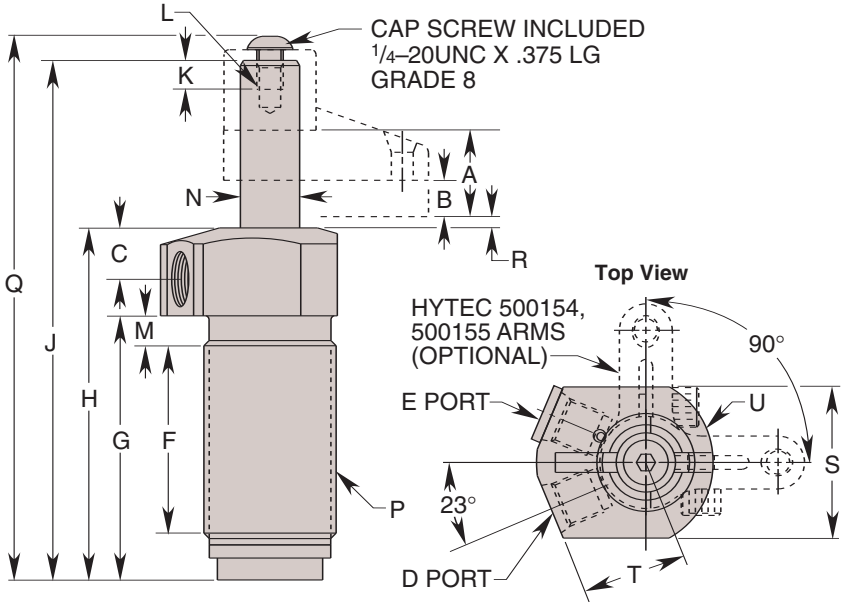
Internal cam may be removed for an unguided straight pull.
See page 58 of H05 for maximum operating speeds and rotation options.

Swing/Pull Clamps - Threaded Body Style - 750 lbs.



Features:

- Full thread provides wide range of precise height adjustment
- Simple installation/removal
- "Live Roller" design provides industry's most reliable swing/pull mechanism
  - o Piston/Cam combination provides solid path for clamping action
  - o Typical ball and groove mechanism has higher potential for clogging and for damage from mis-aligned work pieces
- Available in single and double acting versions
- Special rod wiper seal protects internal clamp components
- Unique drainage system channels contaminants away from clamp
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Unique "Live Roller™" swing mechanism for increased service life
- Power-Tech™ treated body and hardened cam for long wear and corrosion resistance
- Single and double acting models are dimensionally interchangeable
- Straight pull cap. 950 lbs. at 5,000 psi max (without arms).



Cat. No.	Specifications							Dimensions (In Inches)					
	Oper.	Swing Direction	*Force (Lbs.)	Eff. Area (Sq. In.)		Oil Cap. (Cu. In.)		A Total Stroke	B Clamping Stroke	C	D Clamp Port	E Unclamp Port	F
				Clamp	Unclamp	Clamp	Unclamp						
100945	Single-Acting	Left Hand (Counter Clockwise)	750	.195	–	.160	–	.818	.345	.492	7/16–20UNF SAE-4	Breather Plug 7/16–20UNF SAE-4†	1.770
100946		Right Hand (Clockwise)											
100947		Straight Pull											
100948	Double-Acting	Left Hand (Counter Clockwise)			.441		.360					7/16–20UNF SAE-4	
100949		Right Hand (Clockwise)											
100950		Straight Pull											

Cat. No.	Dimensions (In Inches)												
	G	H	J	K Thread Min.	L Thread Size	M	††N Dia.	P Thread Size	Q	R	S	T	U Radius
100945	2.497	3.327	4.912	.275	1/4–20UNC	.283	.560	1 1/4–12UNF	5.139	.108	1.428	.995	.823
100946													
100947													
100948													
100949													
100950													

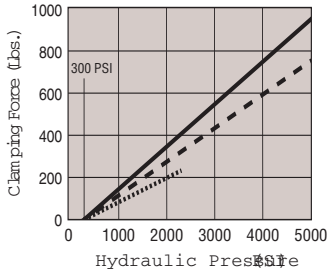
NOTE: * With 1.25" long arm at 5,000 psi maximum operating pressure.
† Do not pressurize – single-acting only.
†† See page 59 for custom arm mounting.
Internal cam may be removed for an unguided straight pull.
See page 58 for maximum operating speeds.

Swing/Pull Clamps - Cartridge Style - 750 lbs.

SPX HYTEC

Features:

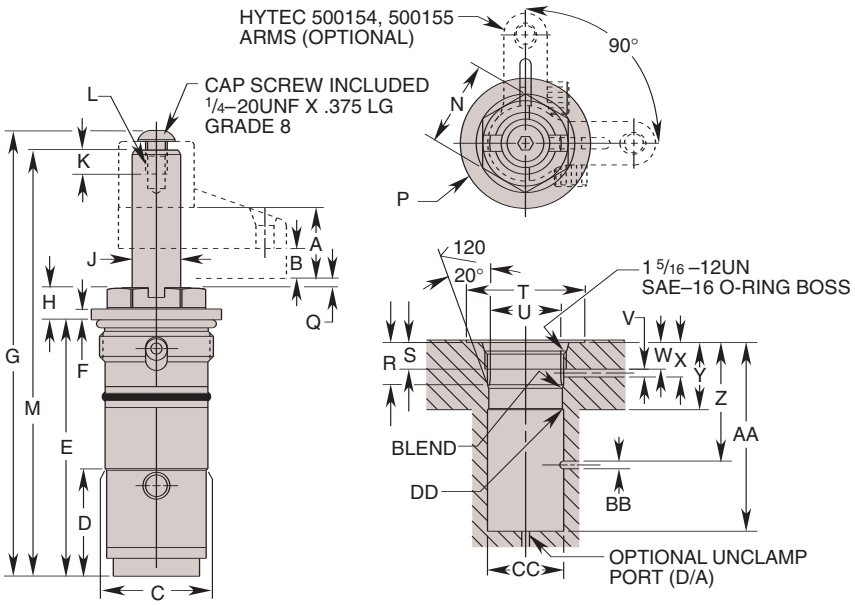
- Small footprint minimizes acreage on fixture
- Low profile reduces overall fixture height
- Manifold mounting eliminates exposed plumbing, reducing chip build-up on fixture
- "Live Roller" design provides industry's most reliable swing/pull mechanism
  - o Piston/Cam combination provides solid path for clamping action
  - o Typical ball and groove mechanism has higher potential for clogging and for damage from mis-aligned work pieces
- Simple cavity design enables faster fixture building
- Available in single and double acting versions
- Special rod wiper seal protects internal clamp components
- Unique drainage system channels contaminants away from clamp
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Manifold mountable
- Unique "Live Roller" swing mechanism for increased service life
- Power-Tech™ treated body and hardened cam for long wear and corrosion resistance
- Single and double-acting models are dimensionally interchangeable.
- Straight pull capacity 950 lbs. at 5,000 psi maximum



Performance

Clamp Nos.100945, 100946, 100947, 100948, 100949, 100950

With Hytec 500155 Arm (4.25" long)
With Hytec 500154 Arm (1.25" long)
Straight Pull Force Without Arms

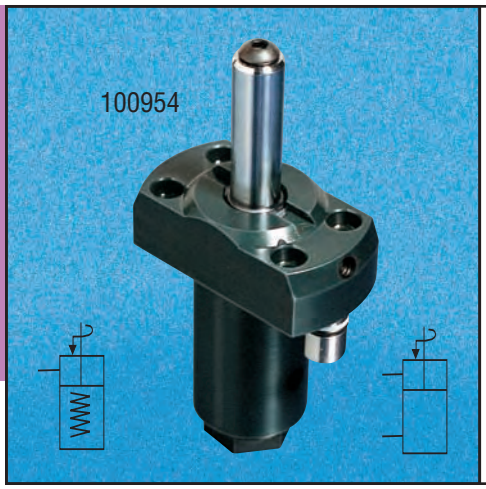


Cat. No.	Oper.	Specifications						Dimensions (In Inches)							
		Swing Direction	*Force (Lbs.)	Eff. Area (Sq. In.)		Oil Cap. (Cu. In.)		A Total Stroke	B Clamping Stroke	C Dia.	D	E	F	G	H	††J Dia.
				Clamp	Unclamp	Clamp	Unclamp									
100951	Single-Acting	Left Hand (Counter Clockwise)	750	.195	–	.160	–	.818	.345	1.185	1.245	2.956	.125	5.139	.371	.560
100952		Right Hand (Clockwise)														
100953		Straight Pull														
100957	Double-Acting	Left Hand (Counter Clockwise)			.441		.360									
100958		Right Hand (Clockwise)														
100959		Straight Pull														

Cat. No.	Dimensions (In Inches)																		
	K Min. Thread	L Thread Size	M	N Hex.	P Dia.	Q	R	S Min. Thread	T Dia. Min.	U Dia.	V Clamp Port Dia. Min.	W Min.	X Max.	Y Min.	Z Min.	AA Min.	BB Unclamp Port Dia. Min.	CC Dia. Min.	DD Chamfer Max.
100951	.275	1/4–20UNC	4.912	1.000	1.500	.108	.665 .695	.430	1.560	1.187 1.190	.125	.430	.604	1.063	–	3.044	†Vent	1.187	.020
100952																			
100953																			
100957														–	1.912		.125		
100958																			
100959																			

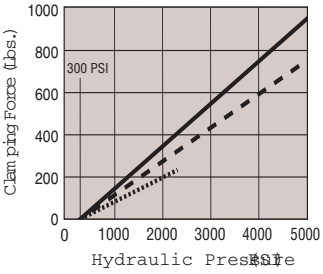
Note: * With 1.25" long arm at 5,000 psi max. operating pressure.
† Do not pressurize - single-acting only. Cavity must be vented.
†† See page 59 for custom arm mounting.
Internal cam may be removed for an unguided straight pull. See operating instructions for additional port details.
See page 58 for maximum operating speeds.

SPX HYTEC® Swing/Pull Clamp - Manifold Mount – Upper Flange Style - 750lbs.



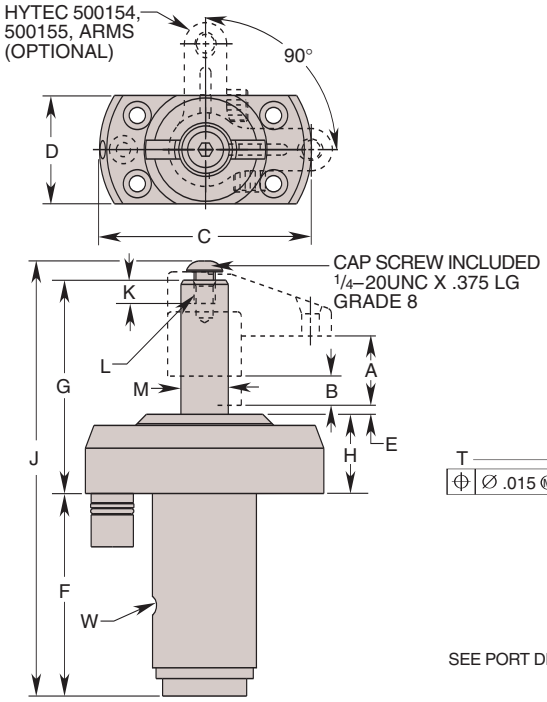
Features

- Unique connector bushing provides positive mating with fixture, reducing the potential for leakage or weeping.
- Simple cavity design eliminates need for threaded holes in mating surfaces
- Manifold design eliminates external plumbing and reduces fixture height
- "Live Roller" design provides industry's most reliable swing/pull mechanism
  - o Piston/Cam combination provides solid path for clamping action
  - o Typical ball and groove mechanism has higher potential for clogging and for damage from mis-aligned work pieces
- Available in single and double acting versions
- Special rod wiper seal protects internal clamp components
- Unique drainage system channels contaminants away from clamp
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Manifold mountable
- Unique "Live Roller" swing mechanism for increased service life
- Power-Tech™ treated body and hardened cam for long wear and corrosion resistance
- Single- or double-acting
- Straight pull capacity 950 lbs. at 5,000 psi maximum

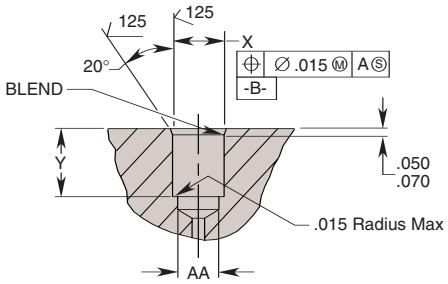


Performance
Clamp Nos.100954, 100955, 100956, 100976, 100977, 100978

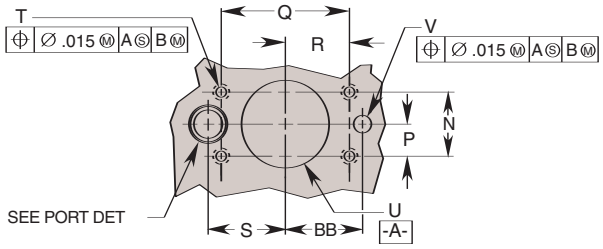
- ····· With Hytec 500155 Arm (4.25" long)
- – – With Hytec 500154 Arm (1.25" long)
- ——— Straight Pull



Port Detail



Mating Hole Pattern



Cat. No.	Oper.	Specifications: Swing Direction	*Force (Lbs.)	Eff. Area (Sq.In.): Clamp	Eff. Area (Sq.In.): Unclamp	Oil Cap. (Cu. In.)	Dimensions (In Inches): A Total Stroke	B Clamping Stroke	C Dia.	D	E	F	G	H	J
100954	Single-Acting	Left Hand (Counter Clockwise)	750	.195	—	.160	.818	.345	2.817	1.440	.108	2.392	2.520	.935	5.139
100955		Right Hand (Clockwise)													
100956		Straight Pull													
100976	Double-Acting	Left Hand (Counter Clockwise)			.441										
100977		Right Hand (Clockwise)													
100978		Straight Pull													

Cat. No.	Dimensions (In Inches): K Thread Min.	L Thread Size	M Dia. ††	N Mounting	P Mounting	Q Mounting	R Mounting	S Mounting	T Thread Size	U Dia.	V	W	X Dia.	Y	AA Dia. Max.	BB Mounting
100954	.275	1/4-20 UNC	.560	.906	.453	1.812	.906	1.091	10-24 UNC	1.223	–	† Vent	.500	.640	.481	–
100955																
100956										1.253						
100976											††† .250	–	.503	.660		1.091
100977																
100978																

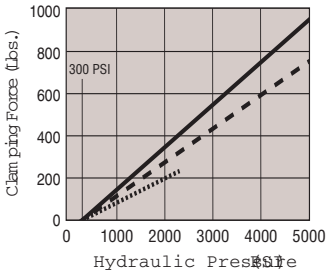
NOTE: * With 1.25" long arm at 5,000 psi maximum operating pressure.
† Do not pressurize - single-acting only.
†† See page 59 for custom arm mounting. Internal cam may be removed for an unguided straight pull
††† Surface finish to be 63. Finish of 125 acceptable with concentric tool marks only. Finish area to be .500 Dia. min. centered on .250 Dia. port hole. See operating instructions for additional details.

Swing/Pull Clamp - Manifold Mount – Lower Flange Style - 750 lbs.

SPX HYTEC®

Features

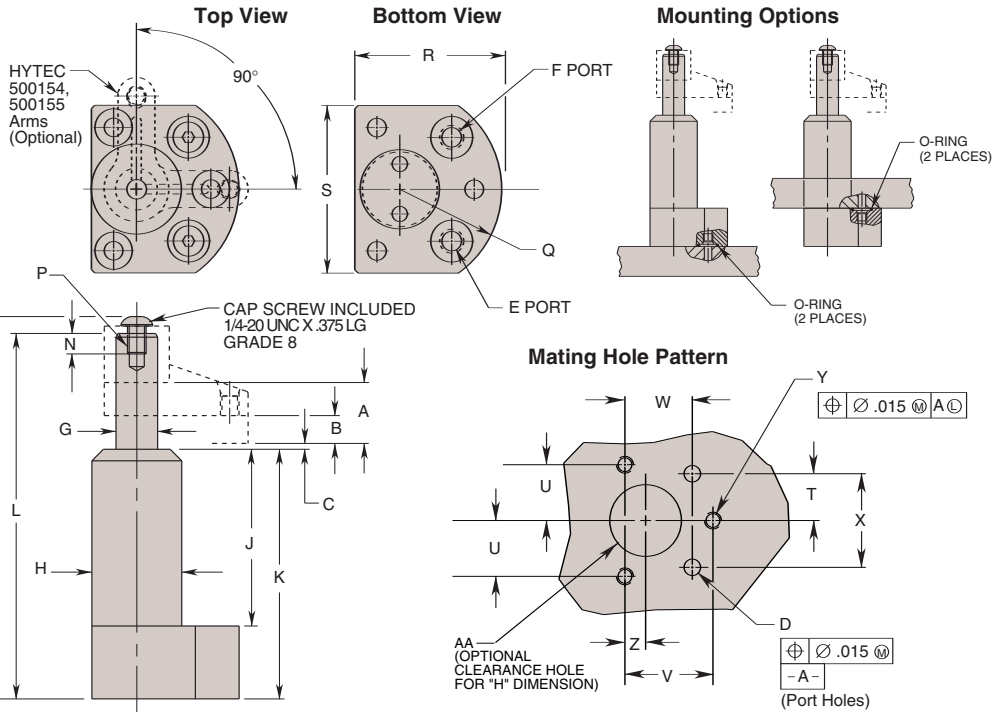
- Manifold design eliminates external plumbing and reduces fixture height
- "Live Roller" design provides industry's most reliable swing/pull mechanism
  - o Piston/Cam combination provides solid path for clamping action
  - o Typical ball and groove mechanism has higher potential for clogging and for damage from mis-aligned work pieces
- Available in single and double acting versions
- Special rod wiper seal protects internal clamp components
- Unique drainage system channels
- contaminants away from clamp
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Manifold mountable
- Unique "Live Roller" swing mechanism for increased service life
- Power-Tech® treated body and hardened cam for long wear and corrosion resistance
- Single-acting and double-acting models are dimensionally interchangeable
- Straight pull capacity 950 lbs. at 5,000 psi max.
- Flange top or bottom mounting



Performance

Clamp Nos.110053, 110054, 110055, 110056, 110057, 110058

- With Hytec 500155 Arm (4.25" long)
- With Hytec 500154 Arm (1.25" long)
- Straight Pull



Cat. No.	Specifications							Dimensions (In Inches)							
	Oper.	Swing Direction	*Force (Lbs.)	Eff. Area (Sq. In.)		Oil Cap. (Cu. In.)		A Total Stroke	B Clamping Stroke	C	†††D Port Dia.	E Clamp Port	F Unclamp Port	††G Dia.	H Dia.
				Clamp	Unclamp	Clamp	Unclamp								
110056	Single-Acting	LH (Counterclockwise)	750	.195	—	.160	—	.818	.345	.108	.309 Max.	SAE O-Ring	†Vent	.560	1.210
110057		RH (Clockwise)													
110058		Straight Pull													
110053	Double-Acting	LH (Counterclockwise)			.441		.360						SAE O-Ring		
110054		RH (Clockwise)													
110055		Straight Pull													

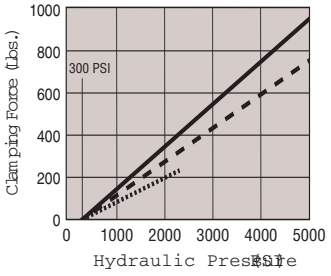
Cat. No.	Dimensions (In Inches)															
	J	K	L	M	N Thread Min.	P Thread Size	Q Radius	R	S	T	U	V	W	X	Y Thread Size	Z	AA Dia.
110056	2.379	3.359	4.912	5.138	.275	¼-20 UNC	1.375	1.995	2.250	.696	.827	1.306	1.002	1.392	¼-20 UNC	.306	1.235 1.255
110057																	
110058																	
110053																	
110054																	
110055																	

NOTE: * With 1.25" long arm at 5,000 psi maximum operating pressure.
† Do not pressurize - single-acting only.
†† See page 59 for custom arm mounting. Internal cam may be removed for an unguided straight pull. See page 58 for maximum operating speeds.
††† Surface finish to be 63. Finish of 125 acceptable with concentric tool marks only. Finish area to be .525 DIA. min. centered on .309 DIA. port hole. See operating instructions for additional port details.

Swing/Pull Clamp - Surface Mount – Externally Plumbed - Lower Flange Style - 750 lbs.

Features

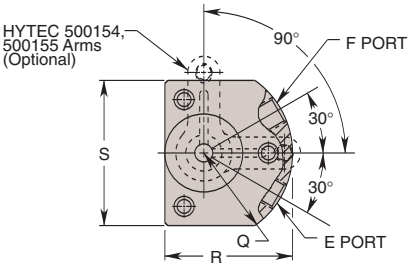
- External plumbing eliminates need to gun drill additional ports in fixture
- Can be inserted from above or below fixture plate
  - o Top mounting provides extra height to accommodate large work pieces
  - o Top mounting does not require drilling of large fixture hole
- Special rod wiper seal protects internal clamp components
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Unique “Live Roller” swing mechanism for increased service life
- Power-Tech® treated body and hardened cam for long wear and corrosion resistance
- Single-acting and double-acting models are dimensionally interchangeable
- Straight pull capacity 950 lbs. at 5,000 psi max.

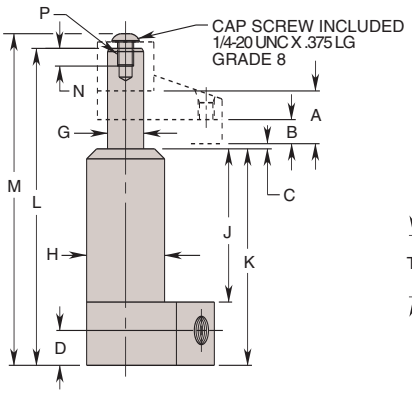


Performance

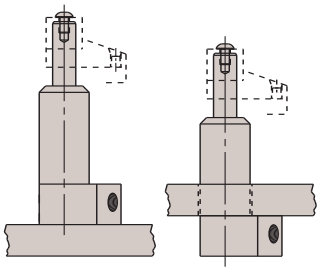
Clamp Nos. 110110, 110111, 110112, 110113, 110114, 110115

With Hytec 500155 Arm (4.25" long)
With Hytec 500154 Arm (1.25" long)
Straight Pull

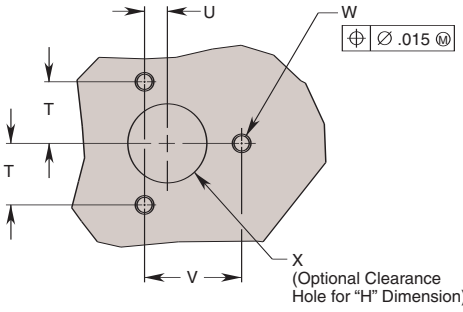




Mounting Options



Mating Hole Pattern



Cat. No.	Specifications							Dimensions (In Inches)					
	Oper.	Swing Direction	*Force (Lbs.)	Eff. Area (Sq. In.)		Oil Cap. (Cu. In.)		A Total Stroke	B Clamping Stroke	C	D	E Clamp Port	F Unclamp Port
				Clamp	Unclamp	Clamp	Unclamp						
110110	Single-Acting	LH (Counterclockwise)	750	.195	—	.160	—	.818	.345	.108	.540	7/16-20 UNF SAE-4	†Breather Plug 7/16-20 UNF SAE-4
110111		RH (Clockwise)											
110112		Straight Pull											
110113	Double-Acting	LH (Counterclockwise)			.441		.360						7/16-20 UNF SAE-4
110114		RH (Clockwise)											
110115		Straight Pull											

Cat. No.	Dimensions (In Inches)														
	††G Dia.	H Dia.	J	K	L	M	N Thread Min.	P Thread Size	Q Radius	R	S	T	U	V	W Thread Size	X Dia.
110110	.560	1.210	2.379	3.359	4.912	5.138	.275	¼-20 UNC	1.375	1.995	2.250	.827	.306	1.306	¼-20 UNC	1.235 1.255
110111																
110112																
110113																
110114																
110115																

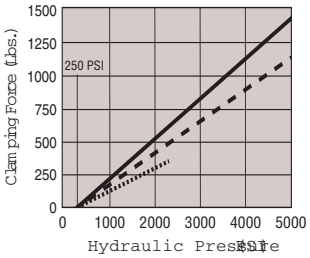
NOTE: * With 1.25” long arm at 5,000 psi maximum operating pressure.
† Do not pressurize - single-acting only.
†† See page 59 for custom arm mounting.

Internal cam may be removed for an unguided straight pull.
See page 58 for maximum operating speeds.

Swing/Pull Clamps - Threaded Body Style - 1200 lbs.

Features:

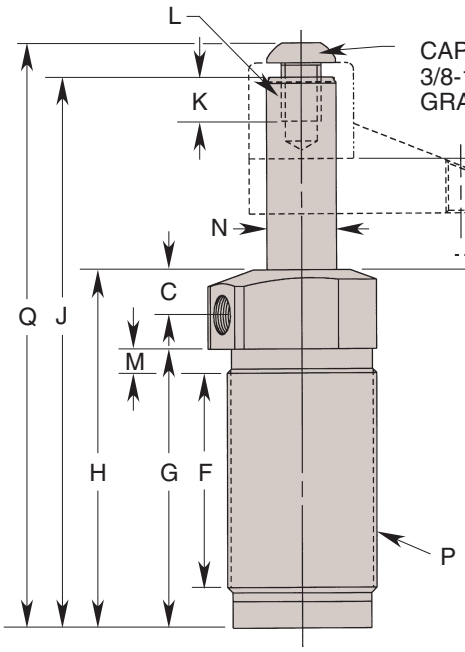
- Full thread provides wide range of precise height adjustment
- Simple installation/removal
- "Live Roller" design provides industry's most reliable swing/pull mechanism
  - o Piston/Cam combination provides solid path for clamping action
  - o Typical ball and groove mechanism has higher potential for clogging and for damage from mis-aligned work pieces
- Available in single and double acting versions
- Special rod wiper seal protects internal clamp components
- Unique drainage system channels contaminants away from clamp
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Unique "Live Roller®" swing mechanism for increased service life
- Power-Tech™ treated body and hardened cam for long wear and corrosion resistance
- Straight pull capacity 1,472 lbs. at 5,000 psi max

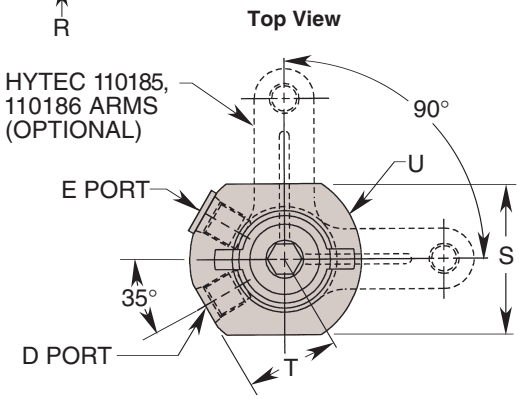


Performance

Clamp Nos.110173, 110174, 110175, 110176, 110177, 110178

- With Hytec 110186 Arm (5.375" long)
- With Hytec 110185 Arm (1.50" long)
- Straight Pull Force Without Arms



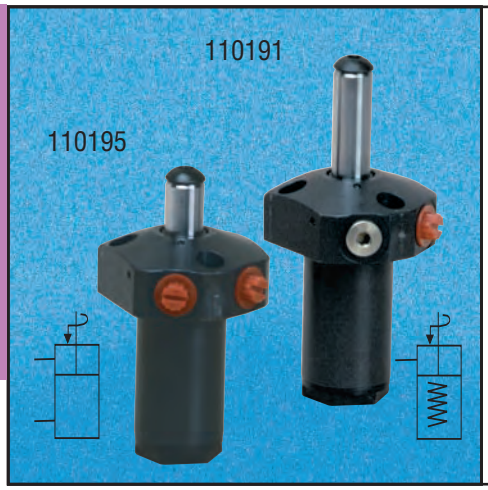


Cat. No.	Specifications							Dimensions (In Inches)					
	Oper.	Swing Direction	*Force (Lbs.)	Eff. Area (Sq. In.)		Oil Cap. (Cu. In.)		A Total Stroke	B Clamping Stroke	C	D Clamp Port	E Unclamp Port	F
				Clamp	Unclamp	Clamp	Unclamp						
110173	Single-Acting	Left Hand (Counter Clockwise)	1,200	.294	–	.260	–	.873	.336	.632	7/16-20UNF SAE-4	Breather Plug 7/16-20UNF SAE-4†	1.937
110174		Right Hand (Clockwise)											
110175		Straight Pull											
110176	Double-Acting	Left Hand (Counter Clockwise)			.601		.530					7/16-20UNF SAE-4	
110177		Right Hand (Clockwise)											
110178		Straight Pull											

Cat. No.	Dimensions (In Inches)												
	G	H	J	K Thread Min.	L Thread Size	M	N Dia. ††	P Thread Size	Q	R	S	T	U Radius
110173	2.525	3.625	5.310	.275	3/8-16UNC	.225	.625	1-1/2-16UNF	5.610	.104	1.500	1.050	.940
110174													
110175													
110176													
110177													
110178													

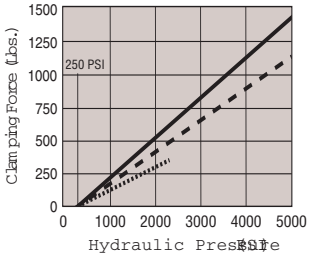
NOTE: † Do not pressurize - single-acting only. *With 1.5" arm at 5,000 psi max. operating pressure. Internal cam may be removed for an unguided straight pull. See page 58 for maximum operating speeds and rotation options.
†† See page 59 for custom arm mounting.

Swing/Pull Clamp - Manifold Mount – Upper Flange Style - 1200 lbs.



Features

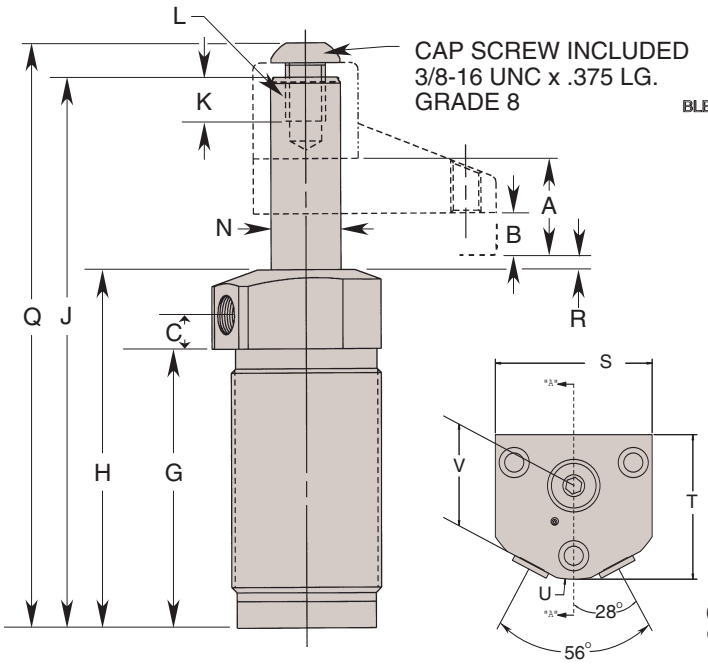
- Unique connector bushing provides positive mating with fixture, reducing the potential for leakage or weeping.
- Simple cavity design eliminates need for threaded holes in mating surfaces
- Manifold design eliminates external plumbing and reduces fixture height
- "Live Roller" design provides industry's most reliable swing/pull mechanism
  - o Piston/Cam combination provides solid path for clamping action
  - o Typical ball and groove mechanism has higher potential for clogging and for damage from mis-aligned work pieces
- Available in single and double acting versions
- Special rod wiper seal protects internal clamp components
- Unique drainage system channels contaminants away from clamp
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Unique "Live Roller®" swing mechanism for increased service life
- Power-Tech™ treated body and hardened cam for long wear and corrosion resistance
- Straight pull capacity 1,472 lbs. at 5,000 psi max



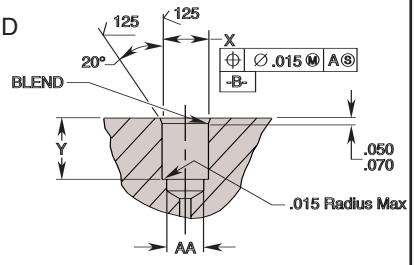
Performance

Clamp Nos.110191, 110192, 110193, 110194, 110195, 110196

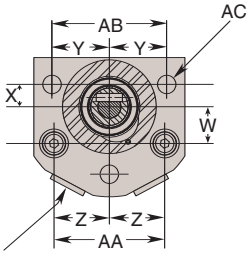
- With Hytec 110186 Arm (5.375" long)
- With Hytec 110185 Arm (1.50" long)
- Straight Pull Force Without Arms



Port Detail



Top View



(STD. .437-20UNG-2B O-RING BOSS PLUG) (2 PLACES)

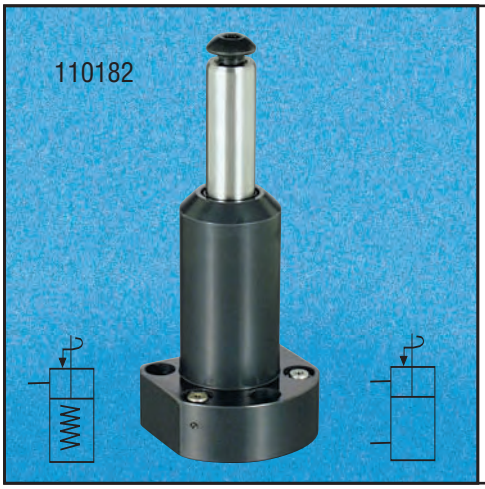
Cat. No.	Specifications							Dimensions (In Inches)				
	Oper.	Swing Direction	*Force (Lbs.)	Eff. Area (Sq. In.)		Oil Cap. (Cu. In.)		A Total Stroke	B Clamping Stroke	C	D Clamp Port	E Unclamp Port
				Clamp	Unclamp	Clamp	Unclamp					
110191	Single-Acting	Left Hand (Counter Clockwise)	1,200	.294	–	.260	–	.873	.336	.441	7/16-20UNF SAE-4	Breather Plug 7/16-20UNF SAE-4†
110192		Right Hand (Clockwise)										
110193		Straight Pull										
110194	Double-Acting	Left Hand (Counter Clockwise)			.601		.530					7/16-20UNF SAE-4
110195		Right Hand (Clockwise)										
110196		Straight Pull										

Cat. No.	Dimensions (In Inches)																		
	G	H	J	K Thread Min.	L Thread Size	N Dia. ††	Q	R	S	T	U Radius	V	W	X	Y	Z	AA	AB	AC
110191	2.550	3.625	5.310	.275	3/8-16UNC	.625	5.610	.104	2.305	2.125	1.375	1.302	.560	.340	.875	.845	1.690	1.750	.283
110192																			
110193																			
110194																			
110195																			
110196																			

NOTE: † Do not pressurize - single-acting only. *With 1.5" arm at 5,000 psi max. operating pressure. Internal cam may be removed for an unguided straight pull. See page 58 for maximum operating speeds and rotation options.
†† See page 59 for custom arm mounting.

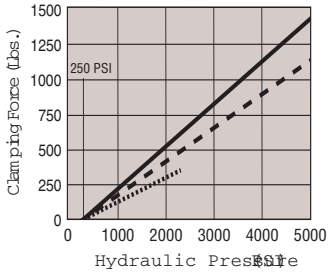
Swing/Pull Clamp - Surface Mount – Manifold Mount – Lower Flange Style – 1200 lbs.

HYTEC



Features

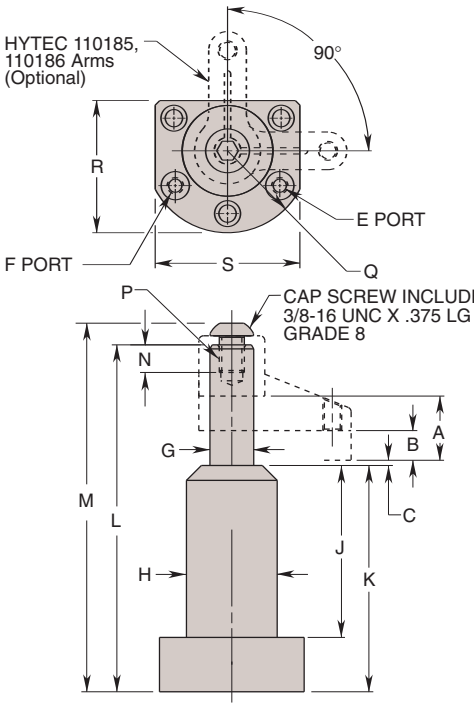
- Simple cavity design eliminates need for threaded holes in mating surfaces
- Manifold design eliminates external plumbing and reduces fixture height
- "Live Roller" design provides industry's most reliable swing/pull mechanism
  - o Piston/Cam combination provides solid path for clamping action
  - o Typical ball and groove mechanism has higher potential for clogging and for damage from mis-aligned work pieces
- Available in single and double acting versions
- Special rod wiper seal protects internal clamp components
- Unique drainage system channels contaminants away from clamp
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Manifold mountable
- Unique "Live Roller" swing mechanism for increased service life
- Power-Tech™ treated body and hardened cam for long wear and corrosion resistance
- Single- and double-acting models are dimensionally interchangeable
- Straight pull cap. 1,472 lbs. at 5,000 psi max.
- Flange top or bottom mounting

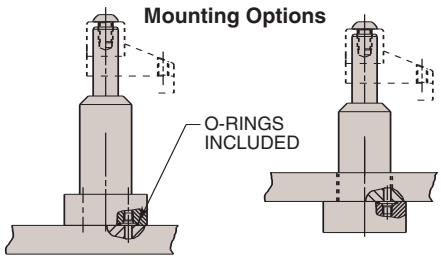


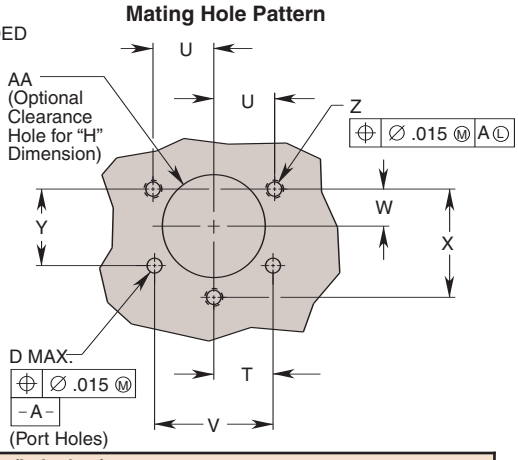
Performance

Clamp Nos. 110179, 110180, 110181, 110182, 110183, 110184

- With Hytec 110186 Arm (5.375" long)
- With Hytec 110185 Arm (1.50" long)
- Straight Pull Force Without Arms







Cat. No.	Specifications							Dimensions (In Inches)							
	Oper.	Swing Direction	*Force (Lbs.)	Eff. Area (Sq. In.)		Oil Cap. (Cu. In.)		A Total Stroke	B Clamping Stroke	C	†††D Port Dia.	E Clamp Port	F Unclamp Port	††G Dia.	H Dia.
				Clamp	Unclamp	Clamp	Unclamp								
110179	Single-Acting	LH (Counter Clockwise)	1,200	.294	—	.260	—	.873	.336	.104	.130 Max.	SAE O-Ring	†Vent	.625	1.43
110180		RH (Clockwise)													
110181		Straight Pull													
110182	Double-Acting	LH (Counter Clockwise)			.601		.530						SAE O-Ring		
110183		RH (Clockwise)													
110184		Straight Pull													

Cat. No.	Dimensions (In Inches)															
	J	K	L	M	N Thread Min.	*P Thread Size	Q Radius	R	S	T	U	V	W	X	Y	Z Thread Size	AA Dia.
110179	3.419	4.504	5.310	5.610	.375	⅜-16 UNC	1.375	2.125	2.310	.845	.875	1.690	.344	1.032	.906	¼-20 UNC	1.466 1.486
110180																	
110181																	
110182																	
110183																	
110184																	

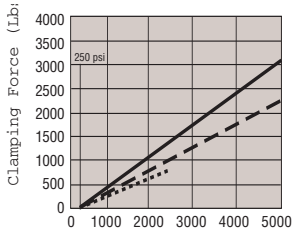
NOTE: * With 1.5" long arm at 5,000 psi max. operating pressure.
† Do not pressurize - single-acting only.
†† See page 59 for custom arm mounting.
Internal cam may be removed for an unguided straight pull.

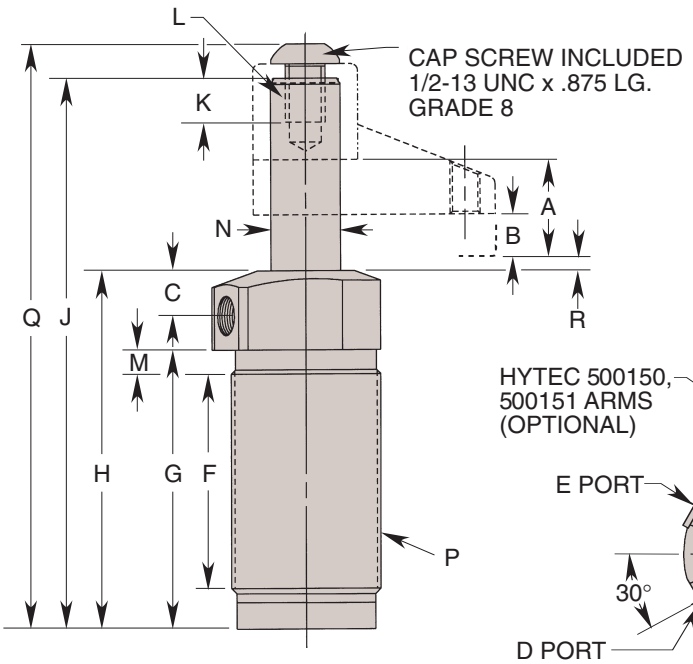
See page 58 for maximum operating speeds and rotation options.
††† Surface finish to be 63. Finish of 125 acceptable with concentric tool marks only. Finish area to be .525 DIA. min. centered on .130 ø port hole. See operating instructions for additional port details.

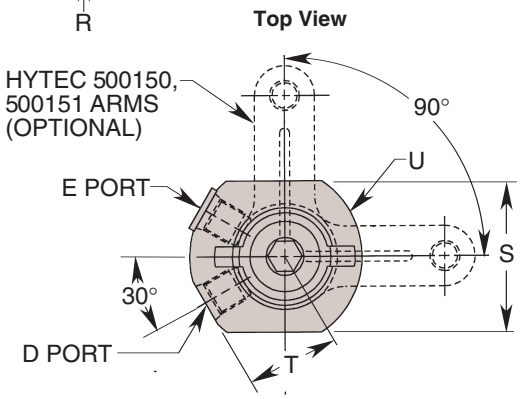
Swing/Pull Clamps - Threaded Body Style - 2400 lbs.

Features:

- Full thread provides wide range of precise height adjustment
- Simple installation/removal
- "Live Roller" design provides industry's most reliable swing/pull mechanism
  - o Piston/Cam combination provides solid path for clamping action
  - o Typical ball and groove mechanism has higher potential for clogging and for damage from mis-aligned work pieces
- Available in single and double acting versions
- Special rod wiper seal protects internal clamp components
- Unique drainage system channels contaminants away from clamp
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Unique "Live Roller®" swing mechanism for increased service life
- Power-Tech™ treated body and hardened cam for long wear and corrosion resistance
- Straight pull capacity 3,144 lbs. at 5,000 psi max







Cat. No.	Specifications							Dimensions (In Inches)					
	Oper.	Swing Direction	*Force (Lbs.)	Eff. Area (Sq. In.)		Oil Cap. (Cu. In.)		A Total Stroke	B Clamping Stroke	C	D Clamp Port	E Unclamp Port	F
				Clamp	Unclamp	Clamp	Unclamp						
100892	Single-Acting	Left Hand (Counter Clockwise)	2,400	.626	–	.740	–	1.267	.490	.632	7/16-20UNF SAE-4	Breather Plug 7/16-20UNF SAE-4†	2.797
100893		Right Hand (Clockwise)											
100894		Straight Pull											
100889	Double-Acting	Left Hand (Counter Clockwise)			1.227		1.460					7/16-20UNF SAE-4	
100890		Right Hand (Clockwise)											
100891		Straight Pull											

Cat. No.	Dimensions (In Inches)												
	G	H	J	K Thread Min.	L Thread Size	M	N Dia. ††	P Thread Size	Q	R	S	T	U Radius
100892	3.494	4.486	6.871	.550	½-13UNC	.285	.875	1-⅞-16UN	7.311	.104	1.875	1.150	1.125
100893													
100894													
100889													
100890													
100891													

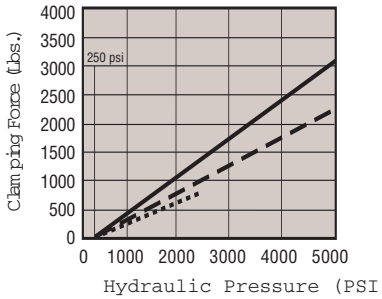
NOTE: † Do not pressurize - single-acting only. *With 2" arm at 5,000 psi max. operating pressure. Internal cam may be removed for an unguided straight pull.

Swing/Pull Clamps - Cartridge Style - 2400 lbs.

SPX HYTEC

Features:

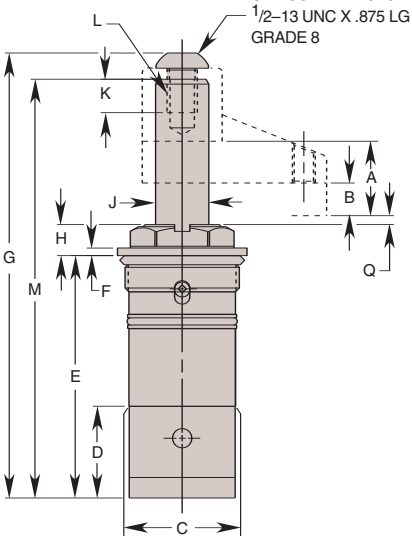
- Small footprint minimizes acreage on fixture
- Low profile reduces overall fixture height
- Manifold mounting eliminates exposed plumbing, reducing chip build-up on fixture
- "Live Roller" design provides industry's most reliable swing/pull mechanism
  - o Piston/Cam combination provides solid path for clamping action
  - o Typical ball and groove mechanism has higher potential for clogging and for damage from mis-aligned work pieces
- Simple cavity design enables faster fixture building
- Available in single and double acting versions
- Special rod wiper seal protects internal clamp components
- Unique drainage system channels contaminants away from clamp
- Cartridge design eliminates exposed tubing and saves space
- Single-acting or double-acting
- Heat treated, chrome plated piston rod
- Unique "Live Roller" swing mechanism for increased service life
- Power-Tech™ treated body and hardened cam for long wear and corrosion resistance
- Clamping arms are adjustable within a full 360 degrees
- Straight pull capacity 3,144 lbs. at 5,000 psi max.
- Heavy duty, corrosion resistant return spring (single-acting)

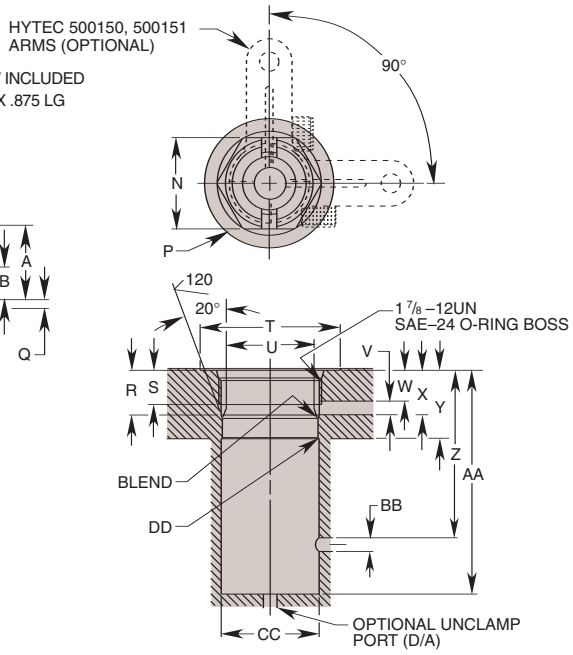


Performance

Clamp Nos. 100859, 100860, 100868, 100960, 100961, 100962

- ····· With Hytec 500151 Arm (6.38" long)
- - - - With Hytec 500150 Arm (2.00" long)
- ——— Straight Pull





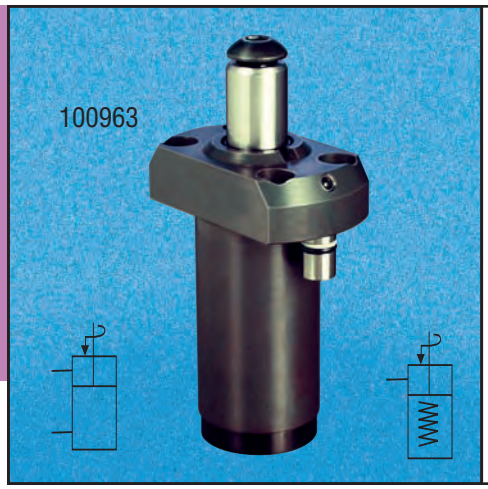
Cat. No.	Operation	Specifications						Dimensions (In Inches)								
		Swing Direction	*Force (Lbs.)	Eff. Area (Sq. In.)		Oil Cap. (Cu. In.)		A Total Stroke	B Clamping Stroke	C Dia.	D	E	F	G	H	††J Dia.
				Clamp	Unclamp	Clamp	Unclamp									
100859	Single-Acting	Left Hand (Counter Clockwise)	2,400	.626	–	.740	–	1.163	.490	1.747	1.506	3.976	.150	7.311	.510	.875
100860		Right Hand (Clockwise)														
100868		Straight Pull														
100960	Double-Acting	Left Hand (Counter Clockwise)			1.227		1.460									
100961		Right Hand (Clockwise)														
100962		Straight Pull														

Cat. No.	Dimensions (In Inches)																		
	K Thread Min.	L Thread Size	M	N Hex.	P Dia.	Q	R	S Thread Min.	T Dia. Min.	U Dia.	V Clamp Port Dia. Min.	W Min.	X Max.	Y Min.	Z Min.	AA Min.	BB Unclamp Port Dia. Min.	CC Dia. Min.	DD Chamfer Max.
100859	.550	½–13UNC	6.871	1.750	2.125	.104	.801	.560	2.185	1.750	.125	.562	.812	1.250	–	4.031	†Vent	1.750	.020
100860																			
100868							.831			1.753									
100960														–	3.006		.125		
100961																			
100962																			

NOTE: * With 2.00" long arm at 5,000 psi max. operating pressure.
† Do not pressurize - single-acting only. Cavity must be vented.
†† See page 59 for custom arm mounting.

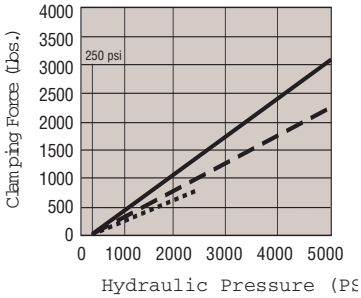
See page 58 for maximum operating speeds and rotation options. Internal cam may be removed for an unguided straight pull. See operating instructions for additional port details.

Swing/Pull Clamp - Manifold Mount - Upper Flange Style - 2400lbs.



Features

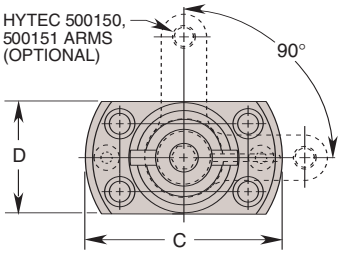
- Unique connector bushing provides positive mating with fixture, reducing the potential for leakage or weeping.
- Simple cavity design eliminates need for threaded holes in mating surfaces
- Manifold design eliminates external plumbing and reduces fixture height
- "Live Roller" design provides industry's most reliable swing/pull mechanism
  - o Piston/Cam combination provides solid path for clamping action
  - o Typical ball and groove mechanism has higher potential for clogging and for damage from mis-aligned work pieces
- Available in single and double acting versions
- Special rod wiper seal protects internal clamp components
- Unique drainage system channels contaminants away from clamp
- Heat treated, chrome plated piston rod
- Unique "Live Roller" swing mechanism for increased service life
- Power-Tech™ treated body and hardened cam for long wear and corrosion resistance
- Single and double-acting models
- Straight pull capacity 3,144 lbs. at 5,000 psi max.

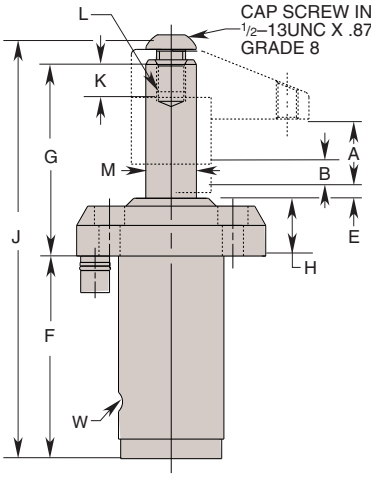


Performance

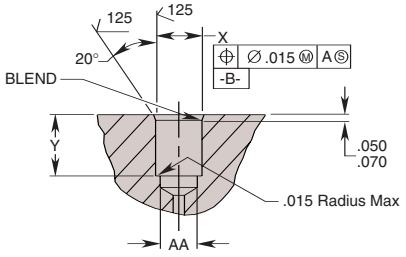
Clamp Nos. 100895, 100896, 100897, 100963, 100964, 100965

- ····· With Hytec 500151 Arm (6.38" long)
- - - - With Hytec 500150 Arm (2.00" long)
- ——— Straight Pull

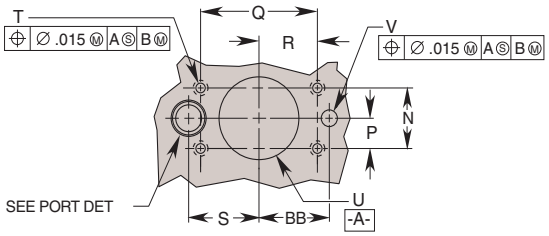




Port Detail



Mating Hole Pattern



Cat. No.	Oper.	Specifications: Swing Direction	*Force (Lbs.)	Eff. Area (Sq. In.): Clamp	Eff. Area (Sq. In.): Unclamp	Oil Cap. (Cu. In.): Clamp	Oil Cap. (Cu. In.): Unclamp	Dimensions (In Inches): A Total Stroke	B Clamping Stroke	C Dia.	D	E	F	G	H	J
100895	Single-Acting	Left Hand (Counter Clockwise)	2,400	.626	–	.740	–	1.163	.490	3.257	1.860	.104	3.491	3.380	.995	7.311
100896		Right Hand (Clockwise)														
100897		Straight Pull														
100963	Double-Acting	Left Hand (Counter Clockwise)			1.227		1.460									
100964		Right Hand (Clockwise)														
100965		Straight Pull														

Cat. No.	Dimensions (In Inches): K Thread Min.	L Thread Size	†† M Dia.	N Mounting	P Mounting	Q Mounting	R Mounting	S Mounting	T Thread Size	U Dia.	V Unclamp Port Dia. Max.	W	X Dia.	Y	AA Dia. Max.	BB Mounting
100895	.550	½-13 UNC	.875	1.125	.562	2.125	1.062	1.311	5/16-18 UNC	1.840	–	†Vent	.500	.640	.481	–
100896																
100897																
100963										1.870	†††.250	–	.503	.660		1.311
100964																
100965																

NOTE: * With 2.00" long arm at 5,000 psi max. operating pressure.
† Do not pressurize - single-acting only.
†† See page 59 for custom arm mounting.
Internal cam may be removed for an unguided straight pull.

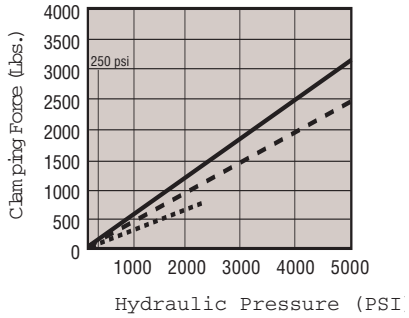
See page 58 for maximum operating speeds and rotation options.
††† Surface finish to be 63. Finish of 125 acceptable with concentric tool marks only. Finish area to be .500 DIA. min. centered on .250 DIA. port hole. See operating instructions for additional port details.

Swing/Pull Clamps - Threaded Body Style - 2400 lbs.

SPX HYTEC

Features:

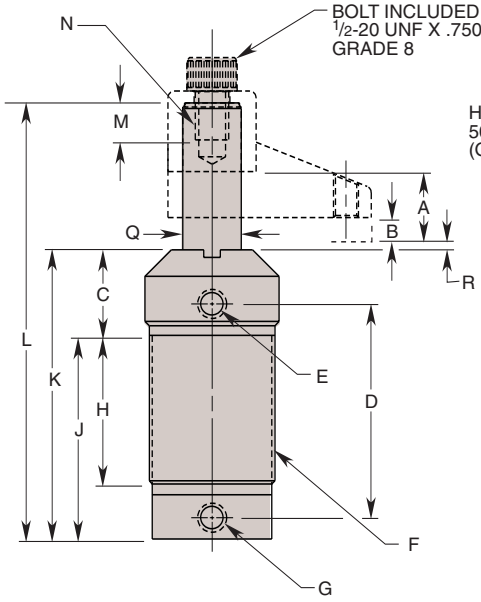
- Full thread provides wide range of precise height adjustment
- Simple installation/removal
- "Live Roller" design provides industry's most reliable swing/pull mechanism
  - o Piston/Cam combination provides solid path for clamping action
  - o Typical ball and groove mechanism has higher potential for clogging and for damage from mis-aligned work pieces
- Available in single and double acting versions
- Special rod wiper seal protects internal clamp components
- Unique drainage system channels contaminants away from clamp
- Heat treated, chrome plated piston rod
- Unique "Live roller®" swing mechanism for increased service life
- Power-Tech™ treated body and hardened cam for long wear and corrosion resistance
- Clamping arms are adjustable anywhere within a full 360 degrees
- Straight pull capacity 3,144 lbs. at 5,000 psi.

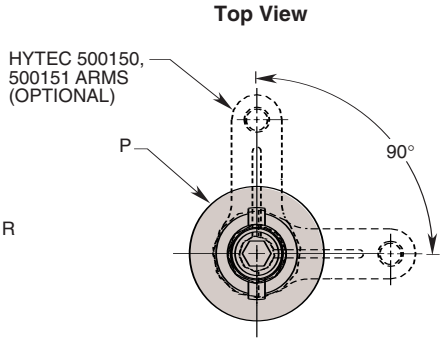


Performance

ClampNos.100841, 100842, 100848, 100849, 100870, 100871

- With Hytec 500151 Arm (6.38" long)
- With Hytec 500150 Arm (2.00" long)
- Straight Pull





Cat. No.	Specifications						Dimensions (In Inches)					
	Swing Direction	*Force (Lbs.)	Eff. Area (Sq. In.)		Oil Cap. (Cu. In.)		A Total Stroke	B Clamping Stroke	C	D	E Clamp Port	F Thread Size
			Clamp	Unclamp	Clamp	Unclamp						
100841	Left Hand (Counter Clockwise)	2,400	.63	1.23	.74	1.46	1.163	.500	1.252	3.188	1/8 NPTF	1 7/8 - 16 UN
100842	Right Hand (Clockwise)											
100870	Straight Pull											
100848	Left Hand (Counter Clockwise)				1.21	2.36	1.938	1.250		4.688		
100849	Right Hand (Clockwise)											
100871	Straight Pull											

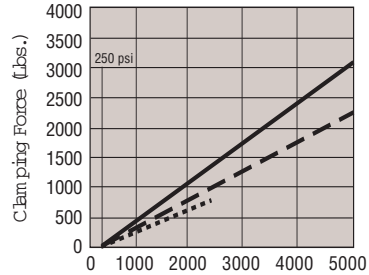
Cat. No.	Dimensions (In Inches)									
	G Unclamp Port	H	J	K	L	M Thread Min.	N Thread Size	P Dia.	†Q Dia.	R
100841	1/8 NPTF	2.240	3.062	4.312	6.575	.550	1/2 - 20UNF	2.000	.875	.061
100842										
100870										
100848		3.740	4.562	5.812	8.810					
100849										
100871										

NOTE: * With 2" arm at 5,000 psi max. operating pressure. Internal cam may be removed for an unguided straight pull.
† See page 59 for custom arm mounting.
See page 58 for maximum operating speeds and rotation options.

SPX HYTEC® Swing/Pull Clamp - Manifold Mount - Lower Flange Style - 2400 lbs.

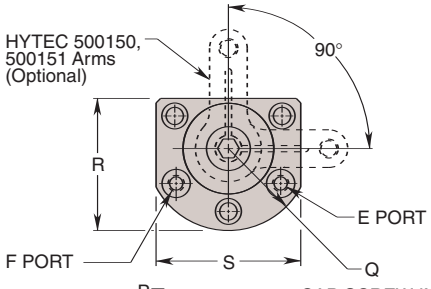
Features:

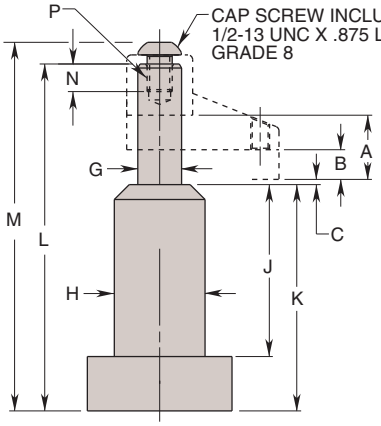
- Manifold design eliminates external plumbing and reduces fixture height
- "Live Roller" design provides industry's most reliable swing/pull mechanism
  - o Piston/Cam combination provides solid path for clamping action
  - o Typical ball and groove mechanism has higher potential for clogging and for damage from mis-aligned work pieces
- Available in single and double acting versions
- Special rod wiper seal protects internal clamp components
- Unique drainage system channels
- contaminants away from clamp
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Manifold mountable
- Unique "Live Roller" swing mechanism for increased service life
- Power-Tech™ treated body and hardened cam for long wear and corrosion resistance
- Single- and double-acting models are dimensionally interchangeable
- Straight pull cap. 3,144 lbs. at 5,000 psi max.
- Flange top or bottom mounting



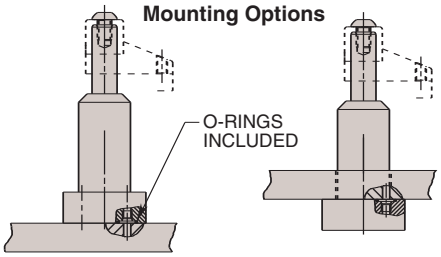
Performance
Clamp Nos. 110079, 110080, 110081, 110082, 110083, 110084

- With Hytec 500151 Arm (6.38" long)
- With Hytec 500150 Arm (2.00" long)
- Straight Pull

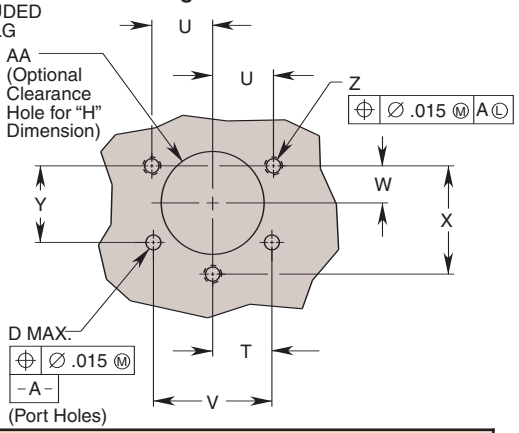




Mounting Options



Mating Hole Pattern



Cat. No.	Specifications							Dimensions (In Inches)							
	Oper.	Swing Direction	*Force (Lbs.)	Eff. Area (Sq. In.)		Oil Cap. (Cu. In.)		A Total Stroke	B Clamping Stroke	C	†††D Port Dia.	E Clamp Port	F Unclamp Port	††G Dia.	H Dia.
				Clamp	Unclamp	Clamp	Unclamp								
110079	Single-Acting	LH (Counter Clockwise)	2,400	.626	—	.740	—	1.163	.490	.104	.309 Max.	SAE O-Ring	†Vent	.875	1.807
110080		RH (Clockwise)													
110081		Straight Pull													
110082	Double-Acting	LH (Counter Clockwise)			1.227		1.460						SAE O-Ring		
110083		RH (Clockwise)													
110084		Straight Pull													

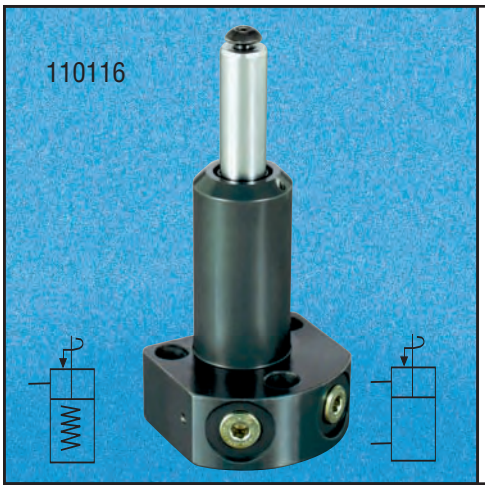
Cat. No.	Dimensions (In Inches)															
	J	K	L	M	N Thread Min.	*P Thread Size	Q Radius	R	S	T	U	V	W	X	Y	Z Thread Size	AA Dia.
110079	3.419	4.504	6.905	7.335	.550	½-13 UNC	1.630	2.630	2.880	1.024	1.082	2.048	.625	1.875	1.342	⅝-18 UNC	1.830 1.850
110080																	
110081																	
110082																	
110083																	
110084																	

NOTE: * With 2.00" long arm at 5,000 psi max. operating pressure.
† Do not pressurize - single-acting only.
†† See page 59 for custom arm mounting.
Internal cam may be removed for an unguided straight pull.

See page 58 for maximum operating speeds and rotation options.
††† Surface finish to be 63. Finish of 125 acceptable with concentric tool marks only. Finish area to be .525 DIA. min. centered on .309 DIA. port hole. See operating instructions for additional port details.

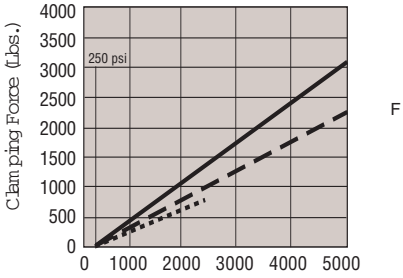
Swing/Pull Clamp - Surface Mount - Externally Plumbed - Lower Flange Style - 2400 lbs.

SPX HYTEC



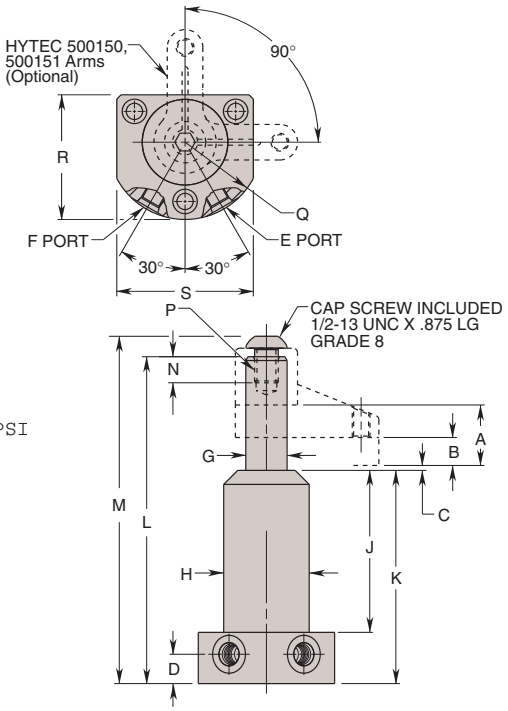
Features:

- External plumbing eliminates need to gun drill additional ports in fixture
- Can be inserted from above or below fixture plate
  - o Top mounting provides extra height to accommodate large work pieces
  - o Top mounting does not require drilling of large fixture hole
- Special rod wiper seal protects internal clamp components
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Unique "Live-Roller" swing mechanism for increased service life
- Power-Tech™ treated body and hardened cam for long wear and corrosion resistance
- 5000 psi maximum
- Single- and double-acting models are dimensionally interchangeable
- Straight pull capacity 3,144 lbs. at 5,000 psi

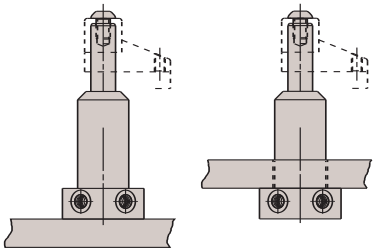


Performance
Clamp Nos. 110116, 110117, 110118, 110119, 110120, 110121

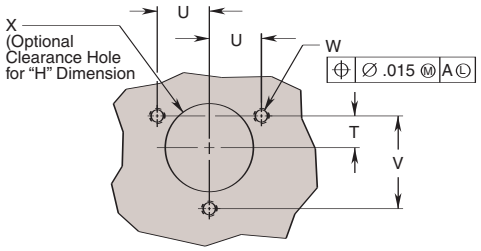
- ····· With Hytec 500151 Arm (6.38" long)
- - - - With Hytec 500150 Arm (2.00" long)
- ——— Straight Pull



Mounting Options



Mating Hole Pattern



Cat. No.	Specifications							Dimensions (In Inches)							
	Oper.	Swing Direction	*Force (Lbs.)	Eff. Area (Sq. In.)		Oil Cap. (Cu. In.)		A Total Stroke	B Clamping Stroke	C	D	E Clamp Port	F Unclamp Port	††G Dia.	H Dia.
				Clamp	Unclamp	Clamp	Unclamp								
110116	Single-Acting	LH (Counterclockwise)	2,400	.626	—	.740	—	1.163	.490	.104	.620	7/16-20 UNF	Breather Plug 7/16-20 UNF †SAE-4	.875	1.807
110117		RH (Clockwise)													
110118		Straight Pull													
110119	Double-Acting	LH (Counterclockwise)			1.227		1.460						7/16-20 UNF		
110120		RH (Clockwise)													
110121		Straight Pull													

Cat. No.	Dimensions (In Inches)													
	J	K	L	M	N Thread Min.	**P Thread Size	Q Radius	R	S	T	U	V	W Thread Size	X Dia.
110116	3.419	4.504	6.905	7.335	.550	½-13 UNC	1.630	2.630	2.880	.625	1.082	1.875	5/16-18 UNC	1.830 1.850
110117														
110118														
110119														
110120														
110121														

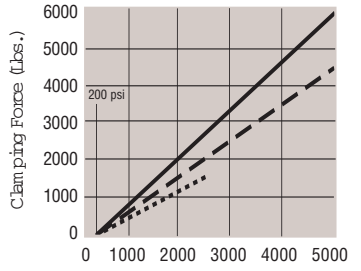
NOTE: * With 2.00" long arm at 5,000 psi max. operating pressure.
† Do not pressurize - single-acting only.
†† See page 59 for custom arm mounting.

Internal cam may be removed for an unguided straight pull.
See page 58 for maximum operating speeds and rotation options.

Swing/Pull Clamps - Threaded Body Style - 5000 lbs.

Features:

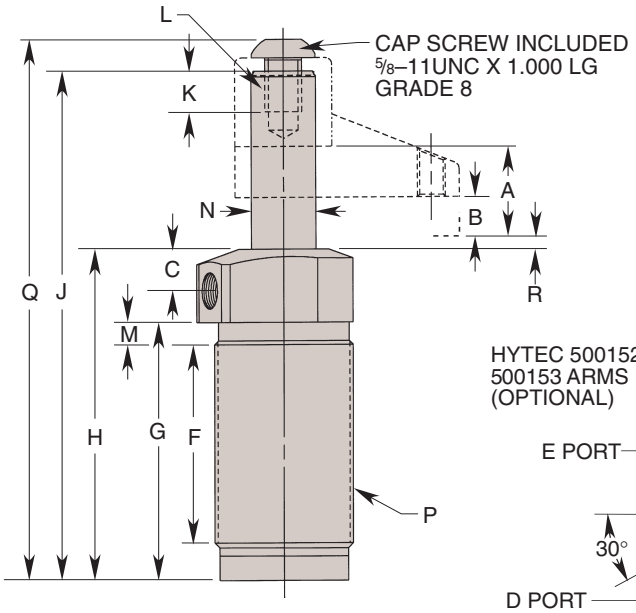
- Full thread provides wide range of precise height adjustment
- Simple installation/removal
- "Live Roller" design provides industry's most reliable swing/pull mechanism
  - o Piston/Cam combination provides solid path for clamping action
  - o Typical ball and groove mechanism has higher potential for clogging and for damage from mis-aligned work pieces
- Available in single and double acting versions
- Special rod wiper seal protects internal clamp components
- Unique drainage system channels contaminants away from clamp
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Unique "Live roller®" swing mechanism for increased service life
- Power-Tech™ treated body and hardened cam for long wear and corrosion resistance
- Straight pull capacity 5,900 lbs. at 5,000 psi max

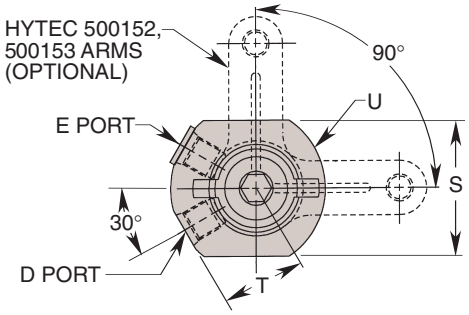


Performance

Clamp Nos. 100901, 100902, 100903, 100898, 100899, 100900

- ····· With Hytec 500153 Arm (6.96" long)
- - - - With Hytec 500152 Arm (2.50" long)
- ——— Straight Pull





Cat. No.	Specifications							Dimensions (In Inches)					
	Oper.	Swing Direction	*Force (Lbs.)	Eff. Area (Sq. In.)		Oil Cap. (Cu. In.)		A Total Stroke	B Clamping Stroke	C	D Clamp Port	E Unclamp Port	F
				Clamp	Unclamp	Clamp	Unclamp						
100901	Single-Acting	Left Hand (Counter Clockwise)	5,000	1.178	–	1.914	–	1.625	.600	.804	7/16-20UNF SAE-4	Breather Plug 7/16-20UNF SAE-4 †	3.822
100902		Right Hand (Clockwise)											
100903		Straight Pull											
100898	Double-Acting	Left Hand (Counter Clockwise)			2.405		3.908					7/16-20UNF SAE-4	
100899		Right Hand (Clockwise)											
100900		Straight Pull											

Cat. No.	Dimensions (In Inches)												
	G	H	J	K Thread Min.	L Thread Size	M	††N Dia.	P Thread Size	Q	R	S	T	U Radius
100901	4.686	5.880	9.265	.690	5/8-11UNC	.250	1.248	2 1/2-16UN	9.856	.330	2.500	1.420	1.375
100902													
100903													
100898													
100899													
100900													

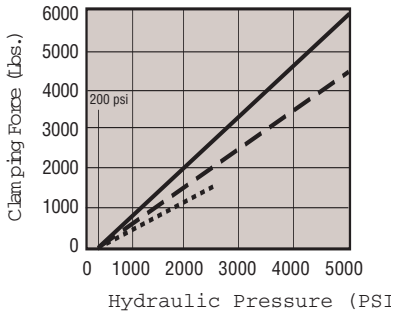
NOTE: * With 2.50" long arm at 5,000 psi max. operating pressure.
† Do not pressurize - single-acting only.
†† See page 59 for custom arm mounting.

Internal cam may be removed for an unguided straight pull.
See page 58 for maximum operating speeds.

Swing/Pull Clamps - Cartridge Style - 5000 lbs.

Features:

- Small footprint minimizes acreage on fixture
- Low profile reduces overall fixture height
- Manifold mounting eliminates exposed plumbing, reducing chip build-up on fixture
- "Live Roller" design provides industry's most reliable swing/pull mechanism
  - o Piston/Cam combination provides solid path for clamping action
  - o Typical ball and groove mechanism has higher potential for clogging and for damage from mis-aligned work pieces
- Simple cavity design enables faster fixture building
- Available in single and double acting versions
- Special rod wiper seal protects internal clamp components
- Unique drainage system channels contaminants away from clamp
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Unique "Live Roller" swing mechanism for increased service life
- Power Tech™ treated body and hardened cam for long wear and corrosion resistance
- Single-and double-acting
- Straight pull capacity 5,900 lbs. at 5,000 psi max



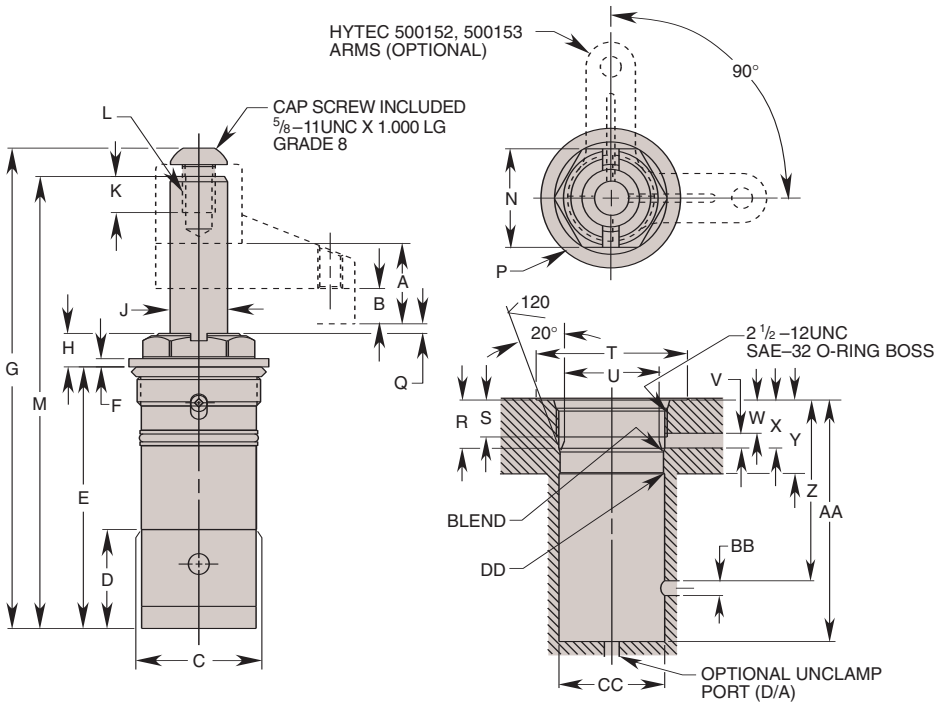
Performance

Clamp Nos. 100904, 100905, 100906

With Hytec 500153 Arm (7.00" long)

With Hytec 500152 Arm (2.50" long)

Straight Pull

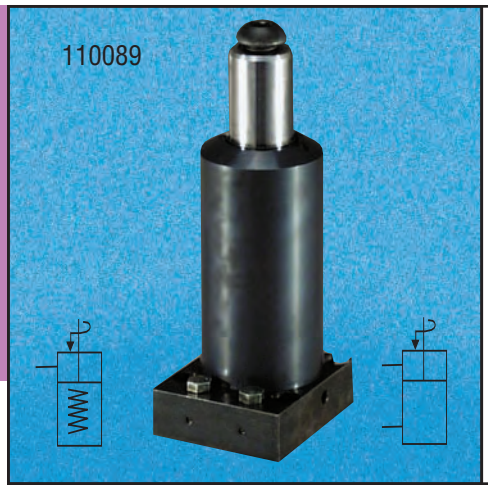


Cat. No.	Specifications							Dimensions (In Inches)									
	Oper.	Swing Direction	*Force (Lbs.)	Eff. Area (Sq. In.)		Oil Cap. (Cu. In.)		A Total Stroke	B Clamping Stroke	C Dia.	D	E	F	G	H	†† J Dia.	K Thd. Size
				Clamp	Unclamp	Clamp	Unclamp										
100904	Single-Acting	LH (Counterclockwise)	5,000	1.178	—	1.914	—	1.625	.600	2.372	2.162	5.340	.160	9.856	.540	1.248	.740
100905		RH (Clockwise)															
100906		Straight Pull															
100988	Double-Acting	LH (Counterclockwise)			2.405		3.908										
100989		RH (Clockwise)															
100990		Straight Pull															

Cat. No.	Dimensions (In Inches)					Mounting Dimensions (In Inches)											
	L Thd. Size	M	N Hex.	P Dia.	Q	R	S Min. Thd.	T Dia. Min.	U Dia.	V Clamp Port Dia. Min.	W Min.	X Max.	Y Min.	Z Min.	† AA Min.	BB Unclamp Port Dia. Min.	CC Dia. Min.	DD Chamfer Max.
100904	5/8-11UNC	9.265	2.125	2.750	.330	1.136 1.166	.870	2.810	2.375 2.378	.125	.870	1.136	1.584	—	5.378	*Vent	2.374	.020
100905																		
100906																		
100988													—	4.138		.125		
100989																		
100990																		

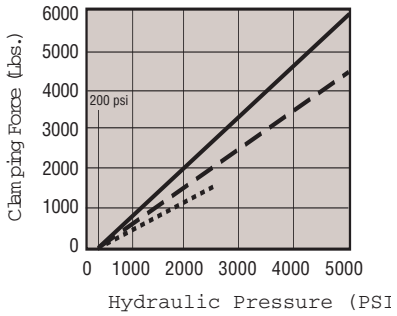
NOTE: * With 2.50" long arm at 5,000 psi max. operating pressure.
† Cavity must be vented.
†† See page 59 for custom arm mounting.
Internal cam may be removed for an unguided straight pull. See operating instructions for additional port details.
See page 58 for maximum operating speeds.

Swing/Pull Clamp - Manifold Mount - Lower Flange Style - 5000 lbs.



Features:

- Manifold design eliminates external plumbing and reduces fixture height
- "Live Roller" design provides industry's most reliable swing/pull mechanism
  - o Piston/Cam combination provides solid path for clamping action
  - o Typical ball and groove mechanism has higher potential for clogging and for damage from mis-aligned work pieces
- Available in single and double acting versions
- Special rod wiper seal protects internal clamp components
- Unique drainage system channels
- contaminants away from clamp
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Manifold mountable
- Unique "Live Roller" swing mechanism for increased service life
- Power-Tech™ treated body and hardened cam for long wear and corrosion resistance
- Single- and double-acting models are dimensionally interchangeable



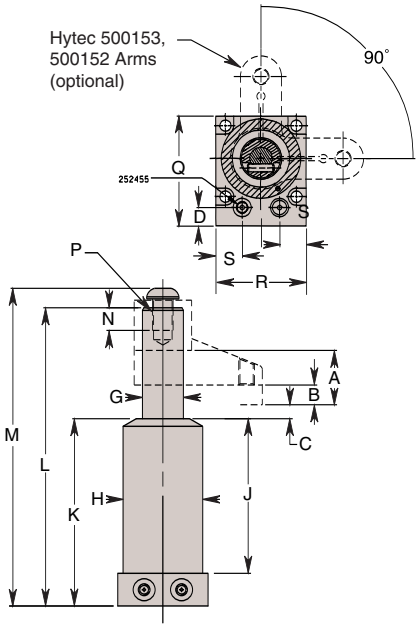
Performance

ClampNos.100904, 100905, 100906

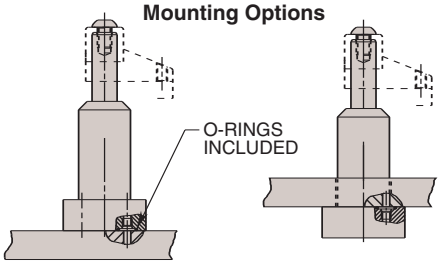
With Hytec 500153 Arm (7.00" long)

With Hytec 500152 Arm (2.50" long)

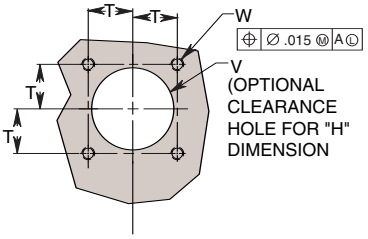
Straight Pull



Mounting Options



Mating Hole Pattern



Cat. No.	Specifications							Dimensions (In Inches)							
	Oper.	Swing Direction	*Force (Lbs.)	Eff. Area (Sq. In.)		Oil Cap. (Cu. In.)		A Total Stroke	B Clamping Stroke	C	D Port Dia.	E Clamp Port	F Unclamp Port	††G Dia.	H Dia.
				Clamp	Unclamp	Clamp	Unclamp								
110089	Single-Acting	LH (Counterclockwise)	5,000	1.178	—	1.914	—	1.625	.600	.330	.340 MAX.	7/16-20UNF SAE-4	Breather Plug 7/16-20UNF SAE-4†	1.248	2.425
110090		RH (Clockwise)													
110091		Straight Pull													
110092	Double-Acting	LH (Counterclockwise)			2.405		3.908						7/16-20UNF SAE-4		
110093		RH (Clockwise)													
110094		Straight Pull													

Cat. No.	Dimensions (In Inches)												
	J	K	L	M	N Thread Min.	P Thread Size	Q	R	S	T	U	V Dia.	W Thread Size
110089	4.737	5.917	9.297	9.887	.690	5/8-11 UNC	3.305	2.750	.570	1.085	.408	2.442 2.462	5/8-18 UNC
110090													
110091													
110092		5.730	9.110	9.700									
110093													
110094													

NOTE: * With 2.50" long arm at 5,000 psi max. operating pressure.
† Do not pressurize - single-acting only.
†† See page 59 for custom arm mounting.

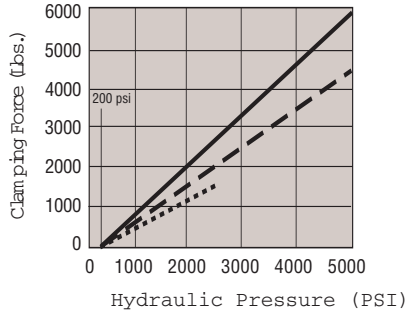
Internal cam may be removed for an unguided straight pull.
See page 58 for maximum operating speeds and rotation options.

Swing/Pull Clamp - Surface Mount - Externally Plumbed - Lower Flange Style - 5000 lbs.

SPX HYTEC®

Features:

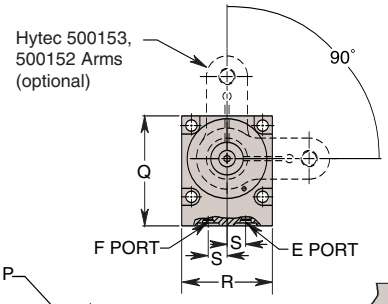
- External plumbing eliminates need to gun drill additional ports in fixture
- Can be inserted from above or below fixture plate
  - o Top mounting provides extra height to accommodate large work pieces
  - o Top mounting does not require drilling of large fixture hole
- Special rod wiper seal protects internal clamp components
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Power-Tech® treated body and hardened cam for long wear and corrosion resistance

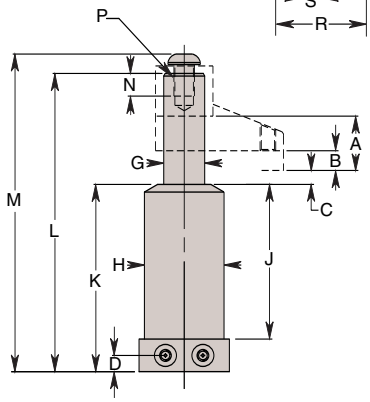


Performance

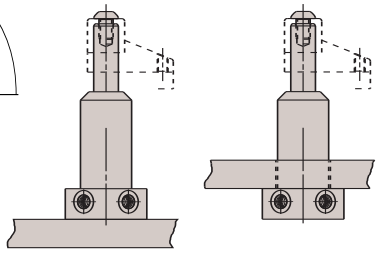
ClampNos.110095, 110096, 110097
110098, 110099, 110100

With Hytec 500153 Arm (7.00" long)
With Hytec 500152 Arm (2.50" long)
Straight Pull

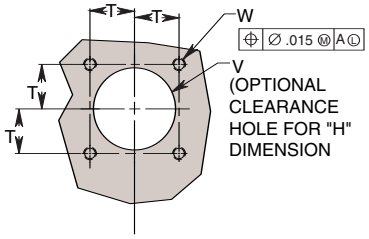




Mounting Options



Mating Hole Pattern



Cat. No.	Specifications							Dimensions (In Inches)							
	Oper.	Swing Direction	*Force (Lbs.)	Eff. Area (Sq. In.)		Oil Cap. (Cu. In.)		A Total Stroke	B Clamping Stroke	C	D	E Clamp Port	F Unclamp Port	††G Dia.	H Dia.
				Clamp	Unclamp	Clamp	Unclamp								
110095	Single-Acting	LH (Counterclockwise)	5,000	1.178	—	1.914	—	1.625	.600	.330	.500	7/16-20 UNF SAE-4	†Breather Plug 7/16-20 UNF SAE-4	1.248	2.425
110096		RH (Clockwise)													
110097		Straight Pull													
110098	Double-Acting	LH (Counterclockwise)			2.405		3.908						7/16-20 UNF SAE-4		
110099		RH (Clockwise)													
110100		Straight Pull													

Cat. No.	Dimensions (In Inches)											
	J	K	L	M	N Thread Min.	P Thread Size	Q Radius	R	S	T	V Dia.	W Thread Size
110095	4.737	5.917	9.297	9.887	.690	5/8-11 UNC	3.305	2.750	.570	1.085	2.442 2.462	5/8-18 UNC
110096												
110097												
110098		5.730	9.110	9.700								
110099												
110100												

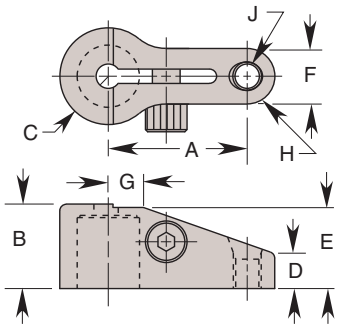
NOTE: * With 2.50" long arm at 5,000 psi max. operating pressure.
† Do not pressurize - single-acting only.
†† See page 59 for custom arm mounting.

Internal cam may be removed for an unguided straight pull.
See page 58 for maximum operating speeds and rotation options.

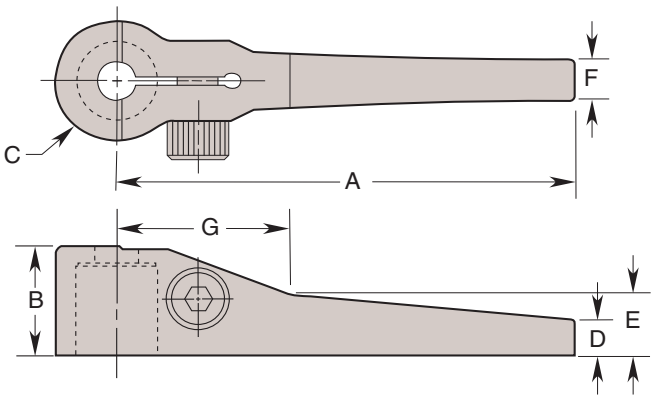
Hytec offers both short and long arms for each series of "Live-Roller™" swing/pull clamps. In each case, the short arm (often referred to as the "standard" arm) is designed to be used at pressures up to the clamp's maximum rating of 5000 psi. The long arms are designed to be used as is or easily modified for your applications that require a longer reach. When using the long arms, maximum hydraulic pressure and flow must be reduced. See the accompanying charts. Do not use meter-out circuitry for controlling double-acting clamp speeds. See pages 105 and 123 for metering valves. Contact Hytec if further design assistance is required.

Swing/Pull Clamp Arms

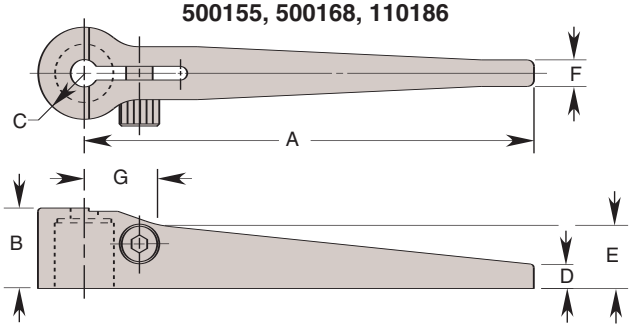
500150, 500152, 500154, 500167, 110185



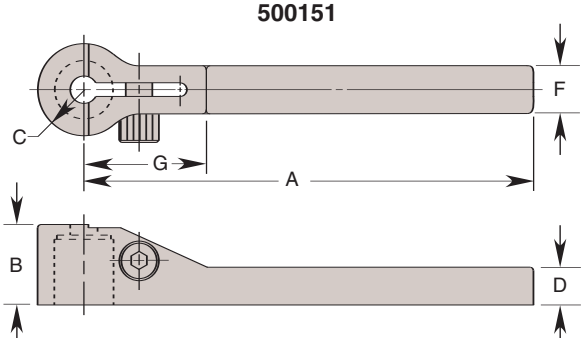
500153



500155, 500168, 110186



500151



Cat. No.	Specifications						Dimensions (In Inches)								
	Clamp Rating (Lbs.)	Clamp Force with Arm (Max. Lbs.)	Operating Pressure (Max. PSI)	Max. Flow Rate (Cu. In./Min.)	Max. Clamping Speed (Sec.)	Weight (Oz.)	A	B	C Radius	D	E	F	G	H Radius	J Thread Size
500167	365	340	5,000	15	.3	1	1.060	.600	.330	.234	.575	.380	.275	.190	10-24 UNC
500168		*125	*2,450	8	.5	2	3.250			.171		.225	.937	—	—
500154	750	750	5,000	25	.4	2	1.250	.760	.435	.314	.730	.500	.319	.250	¼-20 UNC
500155		*220	*2,150	12	.8	4	4.250			.228	.598	.250	.694	—	—
110185	1,200	1,200	5,000	34	.45	3.2	1.500	.830	.500	.365	.800	.624	.354	.312	5/16-16-18UNC
110186		*335	*2,058	17	.9	6.8	5.375			.312	.800	.250	1.312	—	—
500150	2,400	2,400	5,000	100	.5	8	2.000	1.200	.688	.475	1.140	.750	.540	.375	⅜-16 UNC
500151		*720	2,350	50	1	17	6.375			.615	—		2.000	—	—
500152	5,000	4,500	5,000	250	.5	25	2.500	1.700	.930	.750	1.650	1.250	.743	.625	½-13 UNC
500153		*1,540	*2,500	125	1	33	6.964			.559	.973	.650	2.500	—	—

* Maximum values at supplied lengths. If arm is shortened, see charts on page 59.

Cat. No.	Specifications			
	Rotation Angle Degrees	Rotation Direction	Clamp Capacity (Lbs.)	Clamping Stroke
350912	30	Right Hand	2,400	.500
350915		Left Hand		
350913	45	Right Hand		
350916		Left Hand		
350914	60	Right Hand		
350917		Left Hand		

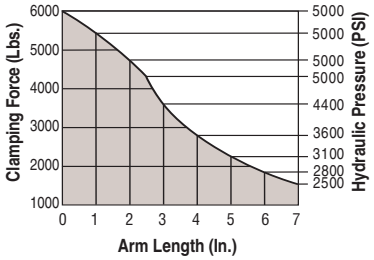
* With 2.00" long arm at 5,000 psi max. operating pressure.

Rotation Options

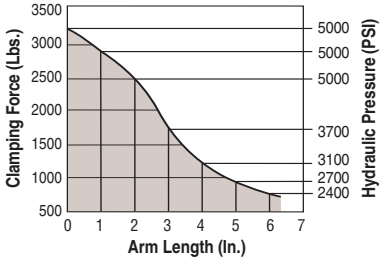
Hytec's 2,400 lbs. capacity, .500 inch clamping stroke Swing/Pull clamps can be converted to a 30, 45, or 60 degree swing by exchanging the internal cam. Order the appropriate cam from the table to the left.

All of Hytec's 2,400 lbs. capacity, .500 inch clamping stroke Swing/Pull clamps are also available from the factory with 30, 45, and 60 degree swing options. Contact Hytec for ordering information.

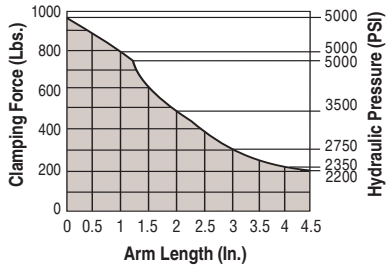
Swing/Pull Clamp Performance



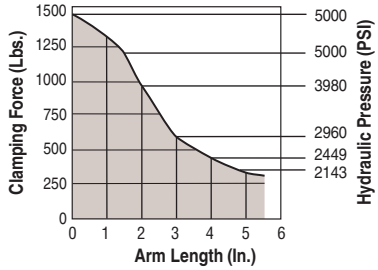
Clamp Performance
2½", 5,000 Lbs. Capacity Swing/Pull Clamps



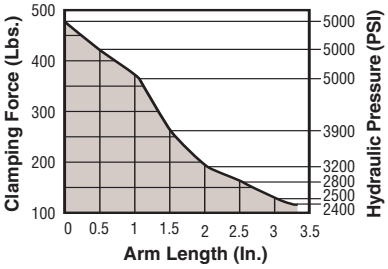
Clamp Performance
1 7/8", 2,400 Lbs. Capacity Swing/Pull Clamps



Clamp Performance
1¼", 750 Lbs. Capacity Swing/Pull Clamps



Clamp Performance
1½", 1,200 Lbs. Capacity Swing/Pull Clamps



Clamp Performance
1 1/16", 365 Lbs. Capacity Swing Pull Clamps

Chart Legend

Maximum Length / Pressure

Operating Range

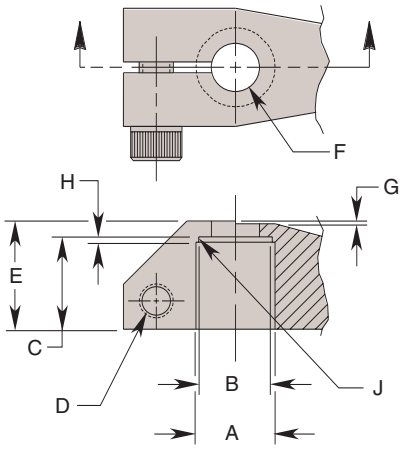
Clamps must operate at or below maximum arm length/pressure curve:

To approximate clamping force with any arm at less than maximum pressure:

FORCE = P x A x [1-(P/M x .23)]

P = Hyd. system operating pressure (PSI)
A = Clamp effective area (sq. in.)
M = Max. rated pressure of chosen arm length (PSI)

Custom Arm Mounting Dimensions for Swing/Pull Clamps



Custom built arms of any length must clamp to the swing/pull clamp's piston rod in a manner similar to the Hytec arms or some derating of the clamp will be necessary. The design feature allowing the arm to be clamped to the piston rod is recommended for all applications of single and double arms. See the accompanying chart for design details. In applications where there is no bending stress being transferred into the piston rod (like push/pull linkages and equalizing double arms), this design detail may be eliminated. In these applications, the clamp's full capacity (referred to as "straight pull" capacity) is available.

IMPORTANT:

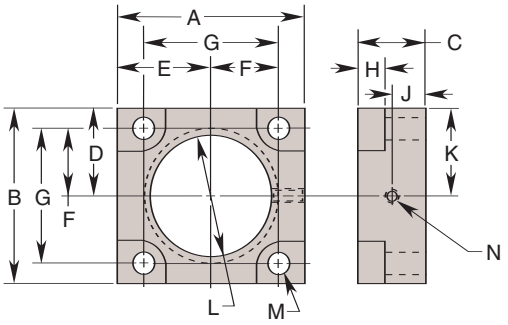
Any clamp using a modified or custom arm that is longer or heavier than Hytec's standard arms must be derated to prevent internal damage. Do not exceed the maximum speed and pressure ratings for Hytec's standard arms. For maximum hydraulic pressure and speed ratings, see the accompanying charts. Do not use meter-out circuitry for controlling double-acting clamp speeds. Contact Hytec if further design assistance is required.

SWING / PULL CLAMP CUSTOM ARM MOUNTING DIMENSIONS

Specifications		Dimensions (In Inches)								
*Clamp Rating (Lbs.)	Standard Arm Cat. No.	A Dia.	B Dia.	C	**D Thread Size	E	F Dia.	G	H Max.	J Radius
365	500167	.437 .439	.415 .439	.520 .540	¼-20 UNC	.600	.270	.025	.020	.005 .020
750	500154	.562 .564	.540 .564	.650 .670		.760		.030		
1200	110185	.625 .627	.602 .627	.700 .720	5/16-18 UNC	.830	.387	.030		
2,400	500150	.875 .878	.853 .878	1.030 1.010	⅜-16 UNC	1.200	.534	.060	.060	
5,000	500152	1.250 1.253	1.228 1.253	1.420 1.440	⅝-18 UNF	1.700	.659	.050	.050	

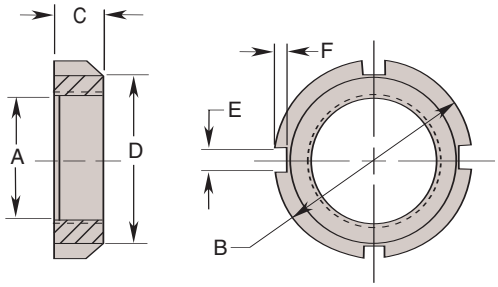
NOTE: * See charts for capacity and maximum pressure at desired arm length.
** Torque must be sufficient to secure arm to piston rod.

Flange Mounting Bracket



Hytec's flange mounting brackets allow you to secure your swing/pull clamps in two ways. You may use the setscrew and nylon thread protector ball (supplied) or simply lock the clamp using an optional jam nut.

Jam Nut



FLANGE MOUNTING BRACKETS													
Cat. No.	Dimensions (In Inches)												
	A	B	C	D	E	F	G	H	J	K	L Thread Size	M Dia.	N Thread Size
100979	1.593	1.500	.500	.750	.750	.560	1.120	.200	.250	.750	1⅛-16 UNC	.222	¼-20 UNC
100127	1.875	1.750		.875	.938	.703	1.406			.875	1¼-12 UNF	.219	
110187	2.062	2.000	.750	1.000	1.031	.780	1.560	.210	.375	1.000	1½-16 UN	.281	
100114	2.750	2.500	1.000	1.250	1.375	1.000	2.000	.265	.500	1.250	1⅞-16 UN	.281	
100914	3.500	3.250	1.250	1.625	1.750	1.250	2.500	.500	.625	1.625	2½-16 UN	.406	

NOTE: Includes locking set screw and nylon ball to protect clamp threads.

JAM NUTS						
Cat. No.	Dimensions (In Inches)					
	A Thread Size	B Dia.	C	D	E	F
100980	1⅛-16 UN	1.500	.310	—	.240	.100
100916	1¼-12 UNF	2.000	.500	1.688	.250	.138
100910	1¼-16 UN					
110188	1½-16 UN	2.250		1.938		
100911	1⅞-16 UN	2.750		2.438	.312	
100912	2¼-16 UN	3.250	.625	2.875		.169
100913	2½-16 UN	3.500		3.125		

SPX HYTEC

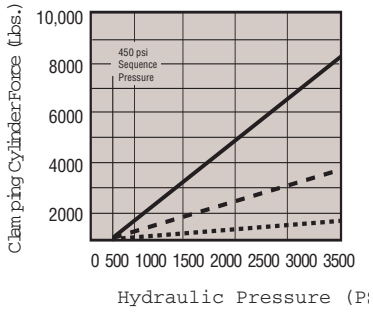
Single-screw mounting and the adjustable clamping screw make these clamps easy to reposition on the fixture to adapt to various workpiece sizes, and make set-up and adjustment faster than other methods. It also lets you clamp several workpiece sizes without changing the fixture each time. When mounted on a T-slot machine table, the need for fixtures is often eliminated.

Two separate actuators are used to perform the clamping function. First, a cylinder is used to swing the clamping arm 90° into position over the workpiece. Then a second cylinder is sequenced to pivot the clamping arm into contact with the workpiece and hold it in place.

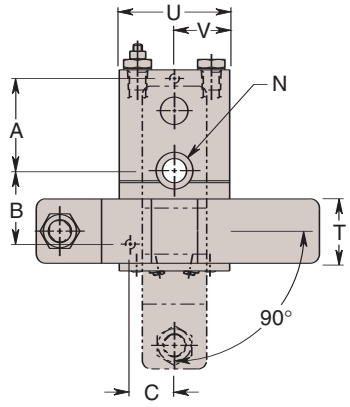
Twelve clamps are available with maximum clamping forces of up to 8,295 lbs.: six with right hand and six with left hand swing. Minimum operating pressure is 500 psi, maximum is 3,500 psi.

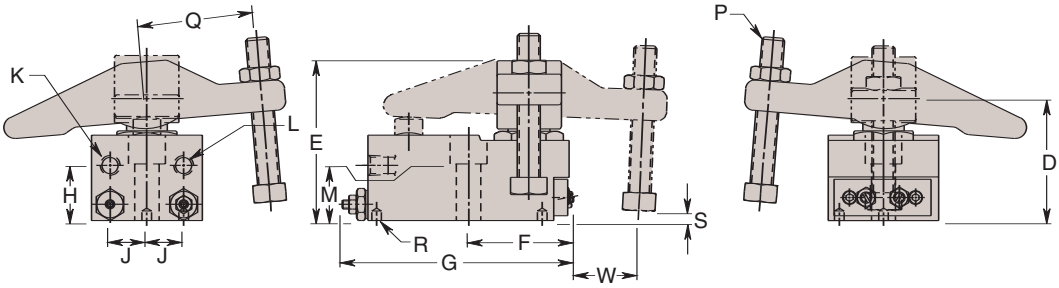
Features:

- Single or double-acting (see page 35)
- Single screw mounting
- Internal sequence valve
- Adjustable clamping screw
- T-slot mountable
- SAE and NPT ported versions



Left Hand Swing Shown





Cat. No.		Specifications								Dimensions (In Inches)							
Right Hand Swing	Left Hand Swing	*Max. Clamping Force	Oil Cap. (Cu. In.)		Min. Operating Pressure (PSI)	Max. Operating Pressure (PSI)	Max. Clamping Stroke (In.)	Max. Flow Rate (Cu. In./Min.)	Max. Swing Speed (Secs.)	A	B	C	D	E	F	G	H
			Advance	Return													
110101	110102	1610	.330	.160	500	3,500	.310	45	.250	2.060	1.938	.938	2.782	3.833	2.875	5.938	1.250
110103	110104	3780	.770				.487	15	.500	2.500	2.000	1.200	3.462	4.462	3.000	6.500	1.500
110105	110106	8295	1.520				.446	10	1.000	3.062	2.438	1.378	3.790	5.071	3.312	7.375	1.937

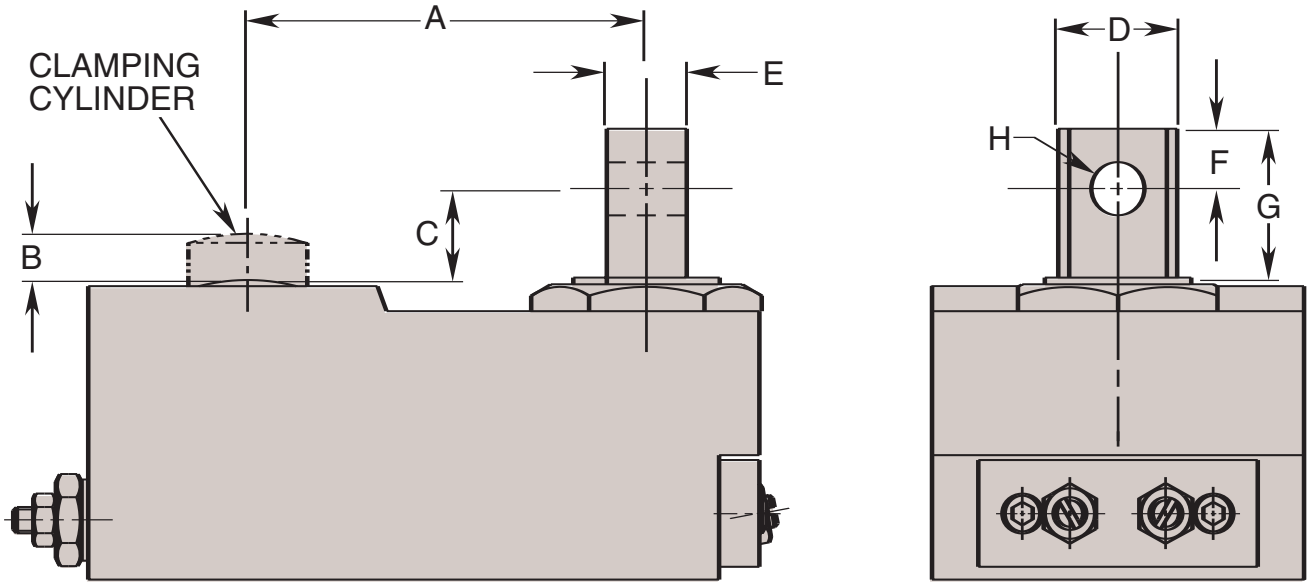
Cat. No.		Dimensions (In Inches)														
Right Hand Swing	Left Hand Swing	J	**K Retract Port	**L Advance Port	M	N Dia.	P Clamping Screw	Q	R		S Adjust. Range		T	U	V	W
									Dia.	Depth	Min.	Max.				
110101	110102	.875	7/16-20 UNF SAE-4	7/16-20 UNF SAE-4	1.250	.531	1/2-13 UNC	2.250	.257	.250	.000	1.500	1.219	2.750	1.375	.812
110103	110104	1.000	7/16-20 UNF SAE-4	7/16-20 UNF SAE-4	1.500	.656	5/8-11 UNC	3.125				2.000	1.719	3.000	1.500	1.750
110105	110106	1.218	7/16-20 UNF SAE-4	7/16-20 UNF SAE-4	1.750	.781	7/8-9 UNC	3.250				2.375	2.219	3.500	1.750	1.875

NOTE: * At 3,500 psi maximum operating pressure.
** Advance and Retract Ports reversed on Right Hand Swing Clamps.

Swing Clamp Modification Information

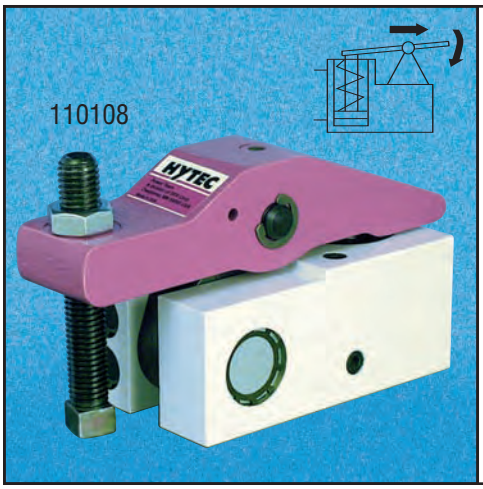
- Standard arm may be customized for use in specific applications.
- Standard clamping arm is 1045 steel heat treated to 38 Rc max.
- Modified/custom-designed clamping arms must be spring biased or counterweighted so that the arm pivots away from the workpiece.
- Arms must be stopped such that they do not pivot below the retracted height of the clamping cylinder.

Note: Modified arms may not have the same workpiece clamping force as standard clamps. Clamping force may be calculated by using the dimensions and cylinder force data below. Any clamp using a modified or custom arm that is longer or heavier than the standard arm, must have its flow restricted to prevent internal damage.



Cat. No.		Specifications	Dimensions (In Inches)							
Right Hand Swing	Left Hand Swing	*Clamping Cylinder Effective Area (Sq. In.)	A	B	C	D Dia.	E	F	G	H Dia.
110101	110102	.44	2.794	.375	1.344	.864	.495	.488	1.133	.441
110103	110104	1.23	3.250	.500	1.063	1.114	.742	.562	1.472	.566
110105	110106	2.41	3.750	.545	.930	1.364	.866	.610	1.580	.629

NOTE: * Sequence Pressure 450 psi must be subtracted from System Operating Pressure when calculating Clamping Cylinder Force. [System Operating Pressure (PSI) – 450 psi] X Effective Area (Sq. In.) = Clamping Cylinder Force (Lbs.).



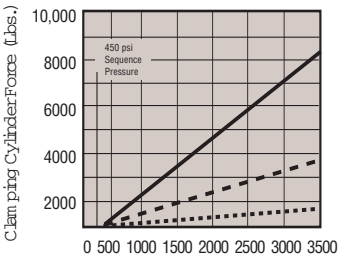
Single screw mounting and the adjustable clamping screw make these clamps easy to reposition on the fixture to adapt to various workpiece sizes, and make set up and adjustment faster than other methods. Plus, it enables you to work several piece sizes without changing the fixture each time. When mounted on a T-slot machine table, the need for fixtures is often eliminated.

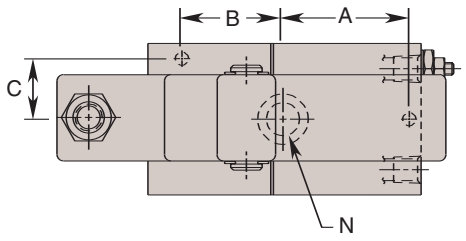
Very similar in operation to the swing clamps, with the exception of having the clamping arm move out toward the workpiece in a straight line rather than rotating 90°, making them ideal for applications where the shape of the fixture or part does not allow room for the clamp to swing.

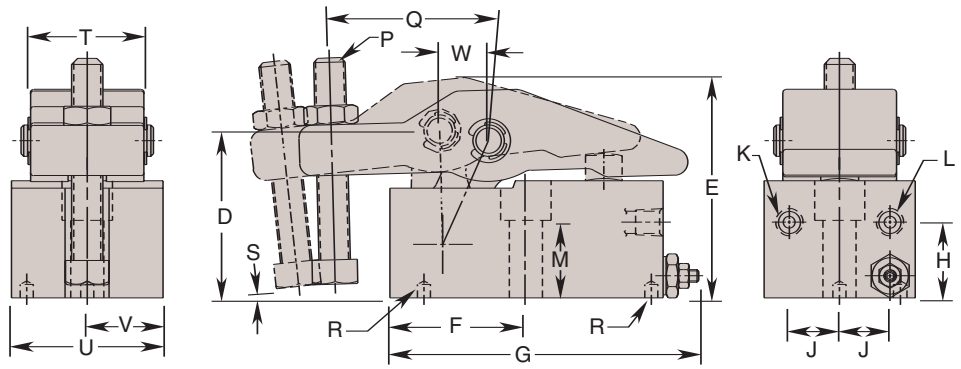
These clamps are available with maximum clamping forces of up to 8,295 lbs.: Minimum operating pressure is 500 psi, maximum is 3,500 psi.

Features:

- Single or double-acting (see page 35)
- Single screw mounting
- Internal sequence valve
- Adjustable clamping screw
- T-slot mountable
- SAE and NPT ported versions







Cat. No.	Specifications								Dimensions (In Inches)								
	*Max. Clamping Force (Lbs.)	Oil Cap. (Cu. In.)		Min. Operating Pressure (PSI)	Max. Operating Pressure (PSI)	Clamping Stroke (In.)	Max. Flow Rate (Cu. In./Min.)	Max. Advance Speed (Secs.)	A	B	C	D	E	F	G	H	J
		Advance	Retract														
110107	1610	.230	.060	500	3,500	.310	15	.500	2.060	1.940	.938	2.843	3.852	2.456	5.563	1.250	.875
110108	3780	.670				.487			2.500	2.000	1.200	3.312	4.312	2.670	6.112	1.500	1.000
110109	8295	1.420				.446			3.062	2.438	1.378	3.875	5.157	3.033	7.052	1.937	1.218

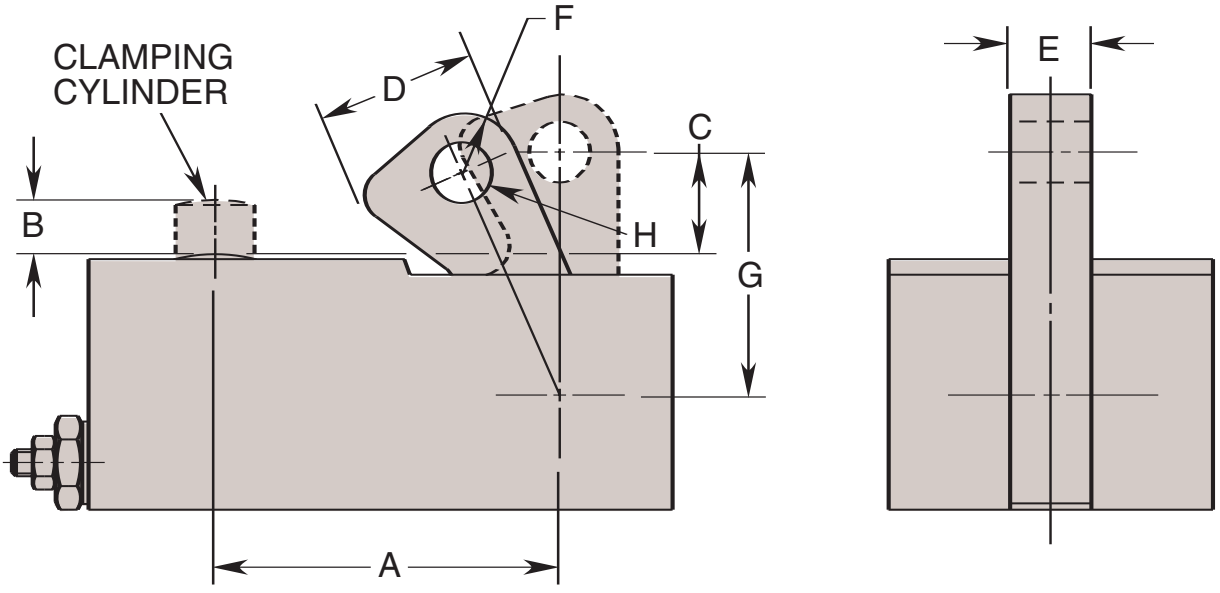
Cat. No.	Dimensions (In Inches)													
	*K Retract Port	*L Advance Port	M	N Dia.	P Clamping Screw	Q	R		S Adjustment Range		T	U	V	W Reach
							Dia.	Depth	Min.	Max.				
110107	7/16-20 UNF SAE-4	7/16-20 UNF SAE-4	1.250	.531	1/2-13 UNC	2.250	.257	.250	.250	2.125	1.219	2.750	1.375	.625
110108	7/16-20 UNF SAE-4	7/16-20 UNF SAE-4	1.500	.656	5/8-11 UNC	3.125			.062		1.719	3.000	1.500	.986
110109	7/16-20 UNF SAE-4	7/16-20 UNF SAE-4	1.750	.781	7/8-9 UNC	3.250			.438	2.938	2.219	3.500	1.750	1.100

NOTE: * At 3,500 psi max. operating pressure.

Retract Clamp Modification Information

- Standard arm may be customized for use in specific applications.
- Standard clamping arm is 1045 steel heat treated to 38 Rc max.
- Modified/custom-designed clamping arms must be spring biased or counterweighted so that the arm pivots away from the workpiece.

NOTE: Modified arms may not have the same workpiece clamping force as standard clamps. Clamping force may be calculated by using the dimensions and cylinder force data below. Any clamp using a modified or custom arm that is heavier than the standard arm, must have its flow restricted to prevent internal damage.



Cat. No.	Specifications	Dimensions (In Inches)							
	*Clamping Cyl. Effective Area (Sq. In.)	A	B	C	D Max.	E Max.	F Max. Radius	G	H Dia.
110107	.440	2.794	.375	.798	1.425	.489	.525	1.906	.439
110108	1.230	3.250	.500	.930	1.612	.736	.587	2.250	.564
110109	2.400	3.750	.545	1.055	1.893	.869	.775	2.625	.627

NOTE: * Sequence Pressure 450 psi must be subtracted from System Operating Pressure when calculating Clamping Cylinder Force. [System Operating Pressure (PSI)–450 psi] X Effective Area (Sq. In.) = Clamping Cylinder Force (Lbs.).

SPX HYTEC

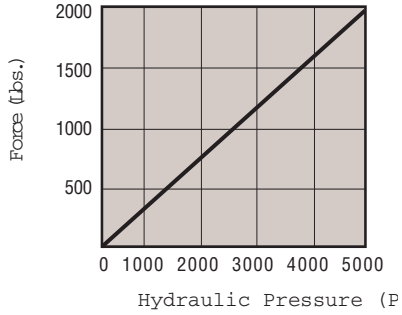
Hytec's edge clamps perform three functions: locating the workpiece, clamping horizontally against secondary locators and clamping vertically against the primary locating surface. This combined horizontal and vertical clamping force can locate and secure many parts with no other clamps being needed.

These clamps are extremely compact relative to their clamping force and are available in either conventionally or manifold mounted versions. At only 1 inch tall, their low profile design allows them to remain below most workpieces for unrestricted machining access to a part's top surface.

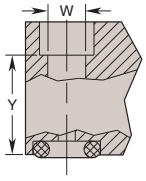
The 100986 clamp is compactly designed for manifold mounting. The 100863 clamp has three pressure ports for convenient installation and easy chaining of multiple clamps. A generous .188" stroke compensates for workpiece variations. Includes removable mounting/ locating bushing.

Features:

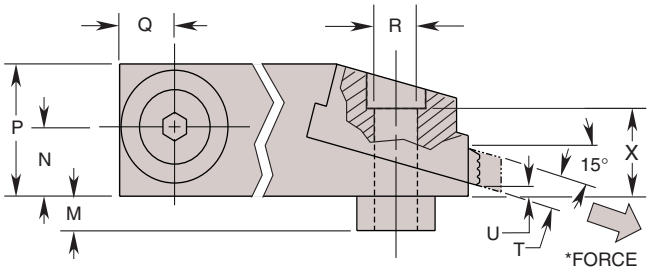
- 15 degree clamping angle
- Hardened, serrated, plated gripper
- Single-acting
- Hardened, tool steel piston
- Three pressure ports (100863)
- Compact design
- Dual, zinc plated return springs
- Conventional and manifold mount versions

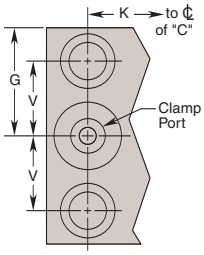


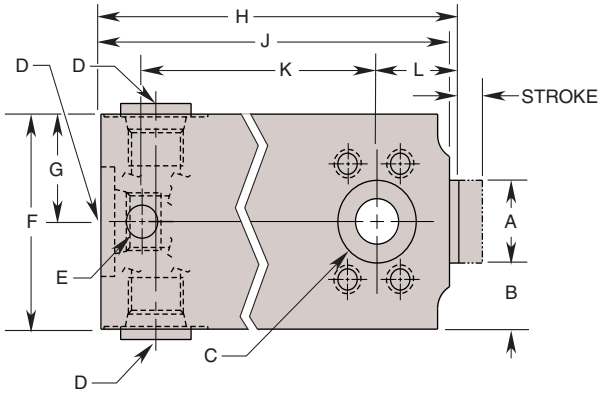
100986



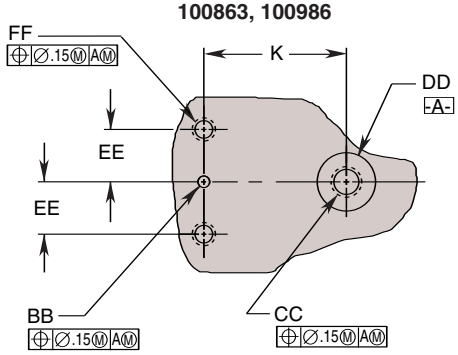
100863, 100986







Mating Hole Pattern
100863, 100986

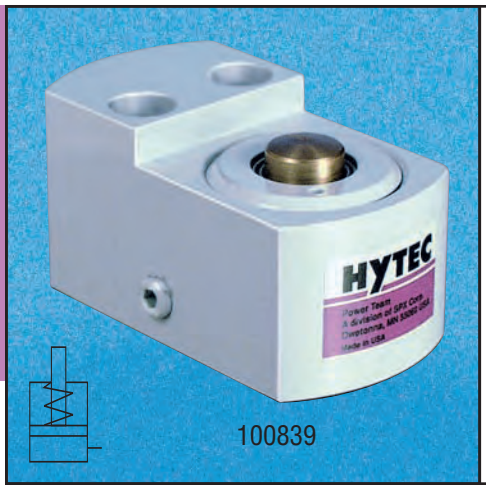


Cat. No.	Specifications				Dimensions (In Inches)												
	*Force (Lbs.)	Stroke (In.)	Eff. Area (Sq. In.)	Oil Cap. (Cu. In.)	A	B	C Dia.	D Thread Size	E Dia.	E Depth	F	G	H	J	K	L	M
100863	2,000	.188	.422	.080	.625	.500	.624 .621	7/16-20 UNF SAE-4	.250	.175	1.625	.812	2.856	2.780	1.875	.653	.240
100986								—	–	–			2.490	2.414	1.530		

Cat. No.	Dimensions (In Inches)															
	N	P	Q	R Dia.	T	U	V	W	X	Y	BB Dia. Port	BB Dia. Locator	CC Thread Size	DD Dia.	DD Depth	EE	FF Thread Size
100863	.525	1.000	.483	.344	.250	.090	–	–	.750	–	–	‡ .250	†† 5/16-18 UNC	.626	.250	–	–
100986	–		–				.562	.285		.750	†.121 .135	–				.562	††† 1/4-20 UNC

NOTE: * Based on 5,000 PSI max. operating pressure
† Surface finish to be 63. Concentric tool marks only. Finish area to be .500 Ø min. centered on .135 Ø max. hole.
†† .312 min thread engagement required.
††† .250 min thread engagement required.
‡ Optional locating hardware not included

Die Clamp



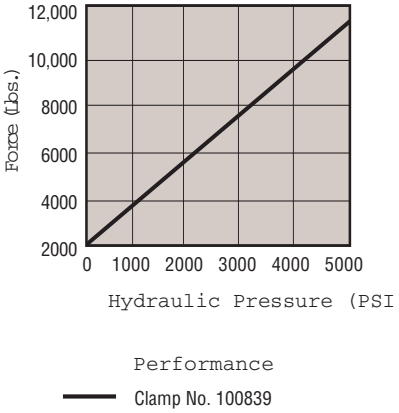
This clamp is ideal for permanent installation on presses to facilitate quick die changes or can be used in many workholding applications. Its unique design allows it to be mounted simply by using a clamp riser equal in thickness to the member being clamped. Just two ⅝, grade 8 cap screws are sufficient to mount the clamp and resist its 11,180 lbs. maximum clamping force. For proper clamp support and minimum deflection, design the riser so that it contacts the entire clamp mounting surface.

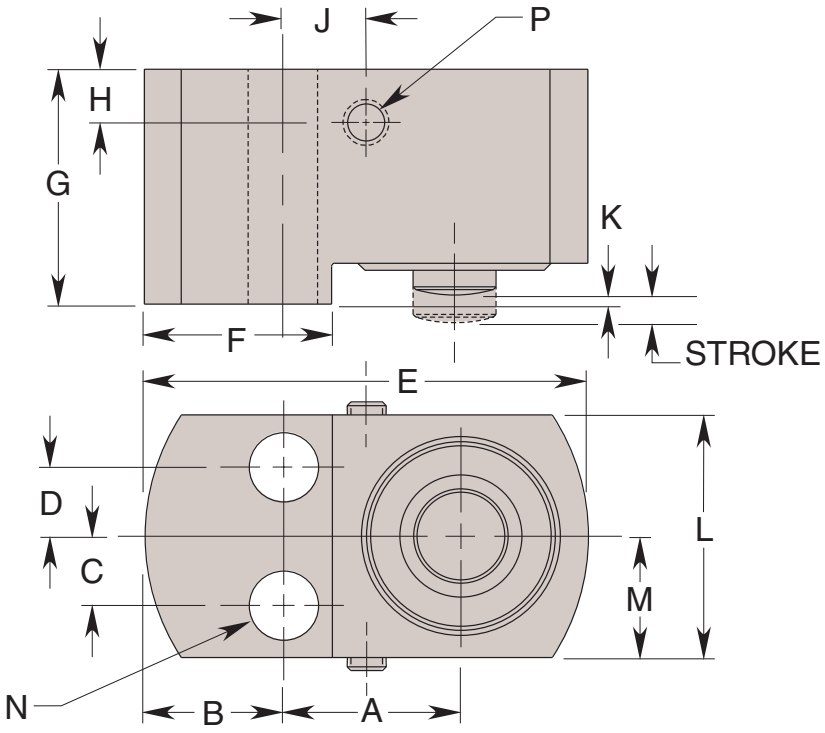
Two pressure ports make these clamps easy to chain together without the need for an extra tee fitting for each clamp.

The clamp features a low overall height, heat treated body bronze plated piston and a piston rod wiper seal to keep contaminant's out. Intended for use in 5,000 psi maximum systems, this single acting, spring return clamp has a .250 inch stroke.

Features:

- Bronze plated piston and piston rod
- Heat treated, corrosion resistant body
- Rod wiper seal





Cat. No.	Specifications				Dimensions (In Inches)													
	*Force (Lbs.)	Stroke (In.)	Eff. Area (Sq. In.)	Oil Cap. (Cu. In.)	A	B	C	D	E Dia.	F	G	H	J	K	L	M	N Dia.	P Port Thread Size
100839	11,180	.250	2.236	.56	1.600	1.250	.625	.625	4.000	1.690	2.125	.480	.750	.050	2.190	1.095	.656	⅛ NPTF

NOTE: * Based on 5,000 psi max. operating pressure.
Use of this product may require modifications of or attachments to the dies to be clamped.
This work should be performed only by persons qualified to insure system safety.

WORK SUPPORTS

Hytec offers two designs of work supports: Block style and Threaded Body style. Both styles have the features that give them numerous advantages over typical makeshift supporting methods. Fixturing is faster, more accurate, and more consistent because shimming and screw jacks are totally unnecessary. Any manual intervention is completely eliminated.

All of Hytec's work support models provide the stability that prevents deflection and vibration of the workpiece during machining. Automatically adjusting to varying sizes or locations of the workpiece, they can also be used as adjustable rest pads under clamps.

All Hytec work supports are rated at 5,000 psi maximum. Minimum pressures vary with the style.

A work support is typically used with a sequence valve in the hydraulic system, although it is not always required.

When used to prevent vibration/deflection of the workpiece, the clamps in the system are usually actuated first to position the part. The work support is then sequenced to lock the plunger in place.

When used as a support under a clamp, the work support must be actuated first to lock its plunger in position. The clamps are then sequenced to secure the workpiece.

Block Style Work Supports

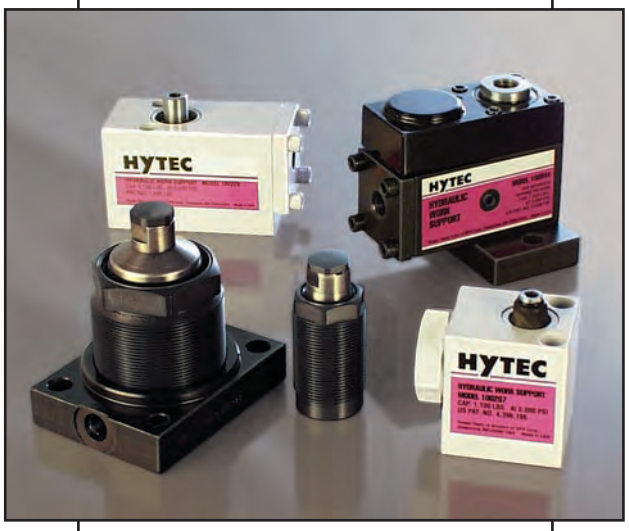
Spring and Air Advance

The block style work supports use a built-in hydraulic cylinder and internal mechanisms to lock the plunger that contacts the workpiece. They are particularly well suited to applications with lower hydraulic pressures. A 500 psi minimum system pressure will yield consistent supporting. The spring advance versions feature a unique diaphragm breather system to allow the plunger to be cycled in and out without changing the work support's internal pressure. This means that when the plunger extends, a vacuum will not be developed internally, so there is no tendency for coolant or contaminant's to be drawn inside.

Threaded Body Work Supports

Fluid, Spring, and Air Advance

These work supports also use a plunger that extends to contact the workpiece. To support any externally supplied loads, the sleeve surrounding the plunger grips the plunger and holds it, regardless of where it is in its stroke. Extremely close manufacturing tolerances hold the plunger perpendicular to the workpiece and eliminate inaccuracies due to plunger movement during lock-up. Made of 100% corrosion resistant materials, this accuracy is easily maintained throughout the life of the work support.



This simple, co-axial design minimizes the number of moving parts and makes these work supports very compact. They are easily threaded into your fixture or can be surface mounted using the available base.

Filtered breathers, where required, keep solid contaminant's out of the work support. No external breather lines are necessary.

Fluid Advance/Single Acting

This fluid advanced work support allows the plunger to be retracted out of the way during workpiece load/unload operations. With no hydraulic pressure applied, a spring retracts the plunger into the work support body. The work support provides its own internal sequencing of a piston which raises the plunger until it contacts the workpiece. Maximum flow rates must be observed to ensure proper sequencing. A spring between the piston and the plunger limits the workpiece contact force. The full force generated by this piston cannot be transmitted to the plunger.

As pressure builds, the automatic sequencing action causes the sleeve to grip the plunger and provide the locking action.

A typical operating sequence is as follows:

1. Plunger normally retracted by spring.
2. Hydraulic pressure extends small cylinder causing spring loaded plunger to advance.
3. When plunger contacts the workpiece, the spring begins to compress as the cylinder continues to extend.
4. When the cylinder reaches the end of its stroke, pressure builds high enough to cause the sleeve to grip the plunger.
5. Removal of hydraulic pressure releases the sleeves grip on the plunger and an internal return spring retracts the plunger away from the workpiece.

Spring Advance/Single Acting

Spring advance work supports are the simplest version of hydraulic work supports. As the workpiece is loaded into the fixture, the plunger contacts it, and the weight of the workpiece or the design of the fixture holds the plunger depressed until the work support is hydraulically locked. The typical operation sequence is as follows:

1. Plunger normally extended by spring.
2. Workpiece forces plunger down to supporting position.
3. Hydraulic pressure locks plunger.
4. Removal of hyd. pressure releases plunger.

Air Advance/Single Acting

Air advance work supports may be specified in applications where:

A. The workpiece is loaded from the side and the extended plunger from a spring advance work support would be in the way.

B. The workpiece is not heavy enough to depress a spring advance work support plunger.

C. The plunger contact force must be precisely adjusted and controlled. Adjusting the air supply pressure will vary the workpiece contact force.

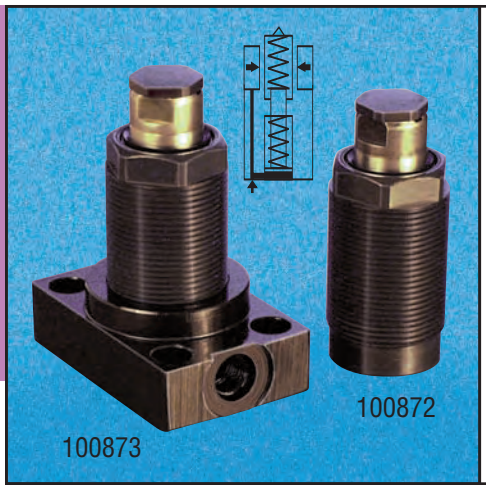
D. Fine contaminants or heavy coolant floods are present. (Especially during work support actuation.)

A typical operating sequence is as follows:

1. Plunger normally retracted by spring.
2. Air pressure applied under plunger overcomes retracting spring force and extends plunger to workpiece.
3. Hydraulic pressure is then sequenced to lock plunger.
4. Air and hydraulic pressure must both be removed for plunger retraction.

As an added benefit of air advance work supports, pressurized air in the work support body prevents coolant or other contaminants from entering, eliminating the need for breathers, diaphragms, etc. For longest service life, always release the air pressure before releasing hydraulic pressure.

Fluid Adv. Work Supports - 1,300 lb. Cap.



Hytec's fluid advance work supports have a spring loaded plunger which hydraulically extends to contact the workpiece. To support any externally applied loads, the sleeve surrounding the plunger grips the plunger and holds it in place.

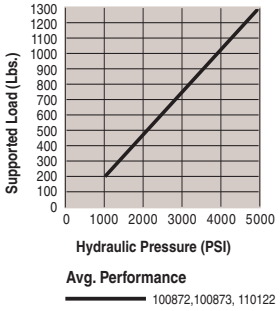
Fluid advance work supports allow the plunger to be retracted out of the way during workpiece load/unload operations. The work support provides its own internal sequencing of a piston which gently raises the plunger until it contacts the workpiece. A spring between the piston and the plunger limits the workpiece contact force.

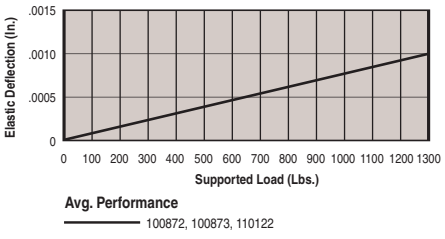
The 100872's threaded body may be compactly manifold mounted in your fixture or choose the 100873 which includes the100872 work support and a mounting base for installation on a flat surface for conventionally plumbed circuits. Both feature fully corrosion resistant construction.

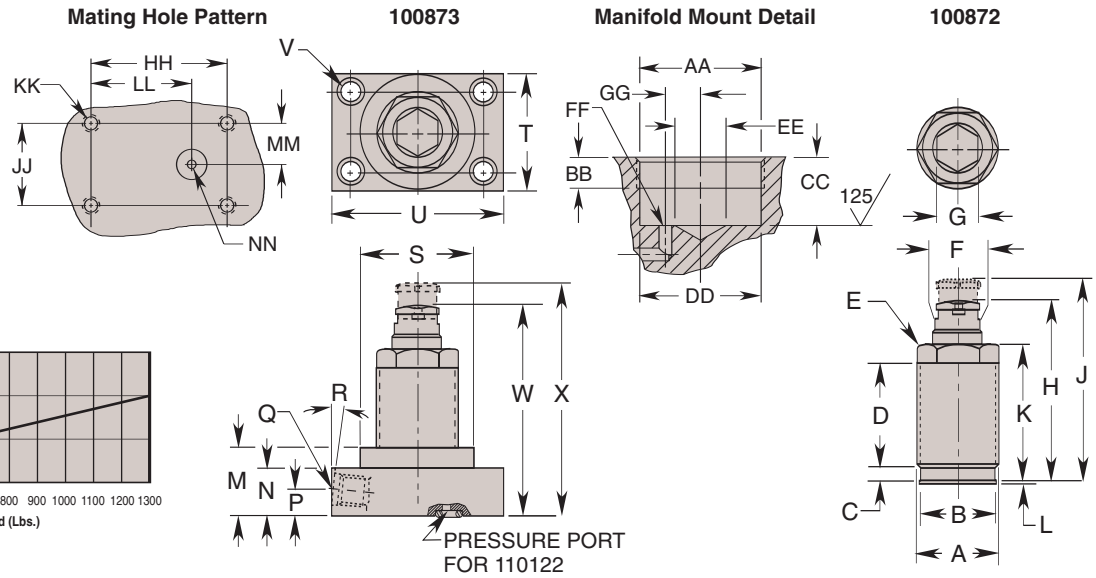
Extremely close manufacturing tolerances hold the plunger perpendicular to the workpiece and eliminates inaccuracies due to plunger movement during lock-up. After lock-up, the plunger is absolutely rigid and limits elastic deflection to .00007" per 100 lbs. of load. For base only, order number 500035.

Features:

- 1,300 lbs. capacity @ 5,000 psi max.
- Fully corrosion resistant construction
- Manifold or conventional base mounting
- Filtered breather/rest button
- 1,000 psi minimum recommended pressure







Cat. No.	Specifications					Dimensions (In Inches)								
	*Cap. (Lbs.)	Oil Cap. (Cu.. In.)	Max. Flow Rate (Cu. In./Min.)	Advance System	Mounting Configuration	A	†B Seal Dia.	C	D	E Hex.	F Dia.	G Hex.	Operating Range H	Operating Range J
100872	1,300	.04	47	Fluid	Cartridge Manifold	1¼-16 UN	1.171	.334	1.531	1.125	.735	.688	2.850	3.162
100873					Base Conventional		—	—	—				—	—
110122					Base Manifold									

Cat. No.	Dimensions (In Inches)												
	K	L Seal	M	N	P	Q Pressure Port Thd. Size	R Port Angle	††S Dia.	T	U	V Dia.	Operating Range W Retracted	Operating Range X Advanced
100872	2.180	.040	—	—	—	—	—	—	—	—	—	—	—
100873	—	—	1.000	.700	.385	7/16-20 UNF SAE-4	5°	1.688	1.750	2.562	.281	3.162	3.474
110122					—	—	—						

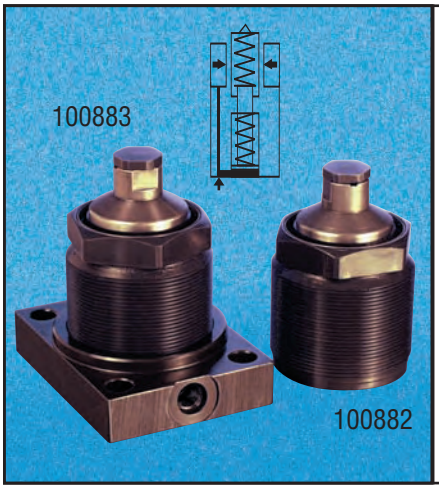
Cat. No.	Mounting Dimensions (In Inches)												
	AA Thd. Size	BB Min. Thd.	CC	DD Dia.	EE Drill Point Dia. Max.	FF Dia.	GG Max.	HH	JJ	KK Thd. Size	LL	MM	NN Pressure Port Dia. Max.
100872	1¼-16 UN	.300	.655 .675	1.182 1.196	.500	.121 .135	.343	—	—	—	—	—	—
100873	—	—	—	—	—	—	—	1.968	1.188	¼-20 UNC			
110122											1.456	.594	†††.126

FLUID ADVANCE WORK SUPPORT		
Cat. No.	Approximate Forces Required To Depress Plunger (Lbs.)	
	Fully Extended	Fully Depressed
100872 100873	2.3	2.9

NOTE: *Based on 5,000 psi max. operating pressure.
For optional jam nut see page 60.
For additional flow control valves see pages 105 & 123.
For optional accessories see page 73.

† Seal included.
†† 1.768 dia. min. clearance required.
††† Surface finish to be 63. Finish of 125 acceptable with concentric tool marks only. Finish area to be .438 dia. min. centered on .126 dia. port hole. See operating instructions for additional details.

Fluid Adv. Work Supports-4,000 lb. Cap.



Hytec's fluid advance work supports have a spring loaded plunger which hydraulically extends to contact the workpiece. To support any externally applied loads, the sleeve surrounding the plunger grips the plunger and holds it in place.

Fluid advance work supports allow the plunger to be retracted out of the way during workpiece load/unload operations. The work support provides its own internal sequencing of a piston which gently raises the plunger until it contacts the workpiece. A spring between the piston and the plunger limits the workpiece contact force.

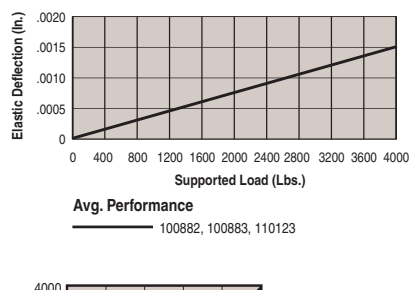
The 100882's threaded body may be compactly manifold mounted in your fixture or choose the No. 100883 which includes the 100882 work support and a mounting base for installation on a flat surface for conventionally plumbed circuits.

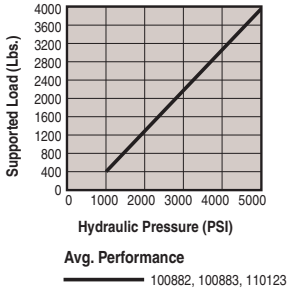
Both feature fully corrosion resistant construction.

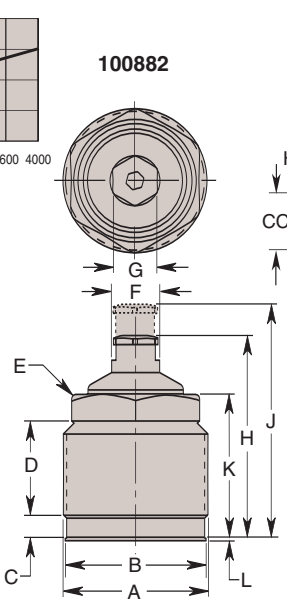
Extremely close manufacturing tolerances hold the plunger perpendicular to the workpiece and eliminate inaccuracies due to plunger movement during lock-up. After lock-up, the plunger is absolutely rigid and limits elastic deflection to .00004" per 100 lbs. of load. For base only, order number 500028 for conventional mounting, and 421728 for manifold mounting.

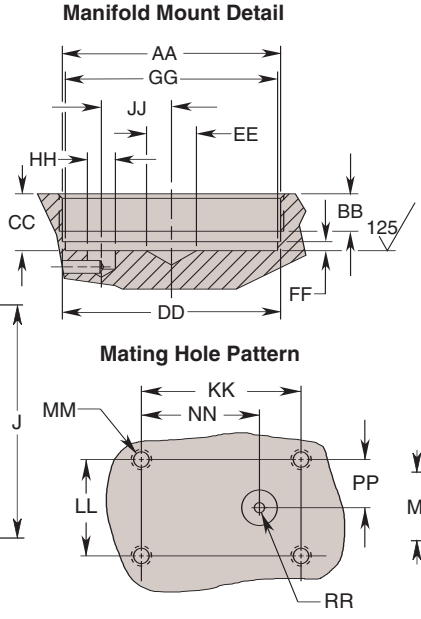
Features:

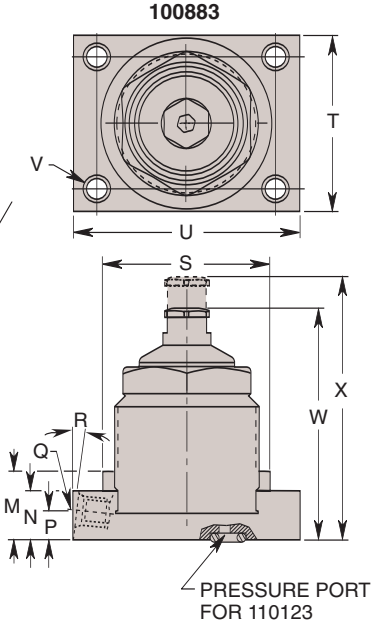
- 4,000 lbs. capacity @ 5,000 psi max.
- Fully corrosion resistant construction
- Manifold mount or conventional base mounting
- Small, filtered breather/rest button to accommodate intricate workpieces
- 1,000 psi minimum recommended pressure











Cat. No.	Specifications					Dimensions (In Inches)									
	*Cap. (Lbs.)	Oil Cap. (Cu. In.)	Max. Flow Rate (Cu. In./Min.)	Advance System	Mounting Configuration	A	†B Seal Dia.	C	D	E Hex.	F Dia.	G Hex	Operating Range H	Operating Range J	K
100882	4,000	.12	10	Fluid	Cartridge Manifold	2¼-16 UN	2.140	.250	1.625	2.000	.735	.688	3.265	3.765	2.312
100883					Base Conventional		—	—	—				—	—	—
110123					Base Manifold										

Cat. No.	Dimensions (In Inches)											
	L Seal	M	N	P	Q Press. Port Thd. Size	R Port Angle	††S Dia.	T	U	V	Operating range W Retracted	Operating range X Advanced
100882	.040	—	—	—	—	—	—	—	—	—	—	—
100883	—	.945	.735	.420	7/16-20 UNF SAE-4	5°	2.688	2.750	3.562	.281	3.680	4.180
110123				—	—	—						

FLUID ADVANCE WORK SUPPORT		
Cat. No.	Approximate Forces Required To Depress Plunger (Lbs.)	
	Fully Extended	Fully Depressed
100882 100883	4	8

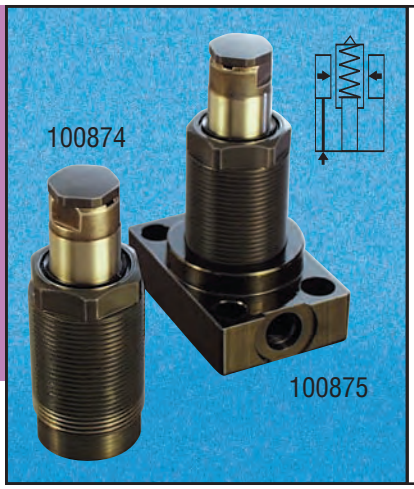
Cat. No.	Mounting Dimensions (In Inches)														
	AA Thd. Size	BB Min. Thd.	CC	DD Dia.	EE Dril Point Max.	FF	GG Dia.	HH Dia.	JJ Max.	KK	LL	MM Thd. Size	NN	PP	RR Pressure Port Dia. Max.
100882	2¼-16 UN	.380	.560 .580	2.182 2.196	.500	.080 .100	2.145 2.155	.121 .293	.700	—	—	—	—	—	—
100883	—	—	—	—	—	—	—	—	—	2.843	2.063	¼-20 UNC	2.122	1.032	†††.126
110123															

NOTE: * Based on 5,000 psi max. operating pressure
For optional jam nut see page 60
For additional flow control valves see pgs. 105 & 123.
For optional accessories see page 73.

† Seal included.
†† 2.768 dia. min. clearance required.

††† Surface finish to be 63. Finish of 125 acceptable with concentric tool marks only. Finish area to be .438 dia. min. centered on .126 dia. port hole. See operating instructions for additional port details.

Spring Adv. Work Supports-1,300 lb. Cap.



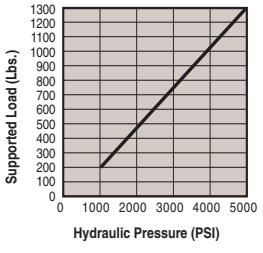
Hytec's spring advance work supports have a spring loaded plunger which contacts the workpiece as it is loaded into the fixture. The spring keeps the plunger in contact with the workpiece, allowing for variations between workpieces. To support any externally supplied loads, the sleeve surrounding the poppet grips the plunger and holds it in place.

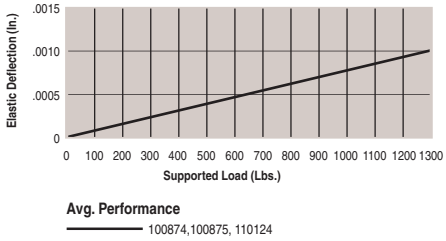
The 100874 and 110124's threaded body may be compactly manifold mounted in your fixture or choose the 100875 or metric version 110134 which includes the 100874 work support and a mounting base for installation on a flat surface for conventionally plumbed circuits. Both feature fully corrosion resistant construction.

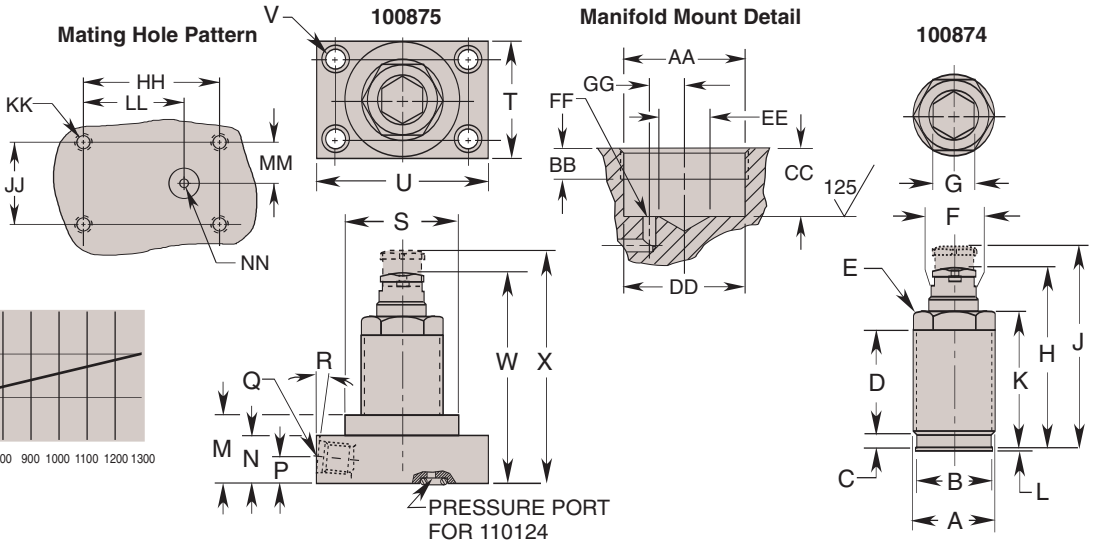
Extremely close manufacturing tolerances hold the plunger perpendicular to the workpiece and eliminates inaccuracies due to plunger movement during lock-up. After lock-up, the plunger is absolutely rigid and limits elastic deflection to .00007" per 100 lbs. of load. For base only, order number 500035 for conventional mounting, and 421727 for manifold mounting.

Features:

- 1,300 lbs. capacity @ 5,000 psi max.
- Fully corrosion resistant construction
- Manifold mount or conventional base mounting
- Filtered breather/rest button
- 1,000 psi minimum recommended pressure







Cat. No.	Specifications				Dimensions (In Inches)								
	*Cap. (Lbs.)	Oil Cap. (Cu. In.)	Advance System	Mounting Configuration	A	†B Seal Dia.	C	D	E Hex.	F Dia.	G Hex.	Operating Range H	Operating Range J
100874	1,300	.01	Spring	Cartridge Manifold	1¼-16 UN	1.171	.334	1.531	1.125	.735	.688	2.850	3.162
100875				Base Conventional		—	—	—				—	—
110134													
110124				Base Manifold									

Cat. No.	Dimensions (In Inches)												
	K	L Seal	M	N	P	Q Pressure Port Thd. Size	R Port Angle	††S Dia.	T	U	V Dia.	Operating Range W Retracted	Operating Range X Advanced
100874	2.180	.040	—	—	—	—	—	—	—	—	—	—	—
100875	—	—	1.000	.700	.385	7/16-20 UNF SAE-4	5°	1.688	1.750	2.562	.281	3.162	3.474
110134						**M12 x 1.5 6H							
110124					—	—	—						

Cat. No.	Mounting Dimensions (In Inches)												
	AA Thd. Size	BB Min. Thd.	CC	DD Dia.	EE Drill Port Max.	FF Dia.	GG Max.	HH	JJ	KK Thd. Size	LL	MM	†††NN Pressure Port Dia. Max.
100874	1¼-16 UN	.300	.655 .675	1.182 1.196	.500	.121 .135	.343	—	—	—	—	—	—
100875	—	—	—	—	—	—	—	1.968	1.188	¼-20 UNC			
110134													
110124											1.456	.594	.126

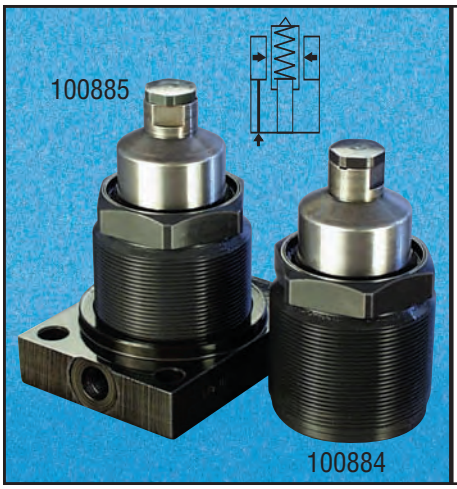
SPRING ADVANCE WORK SUPPORT		
Cat. No.	Approximate Forces Required To Depress Plunger (Lbs.)	
	Fully Extended	Fully Depressed
100874 100875 110134 110124	2.3	2.9

NOTE: *Based on 5,000 psi max. operating pressure.
**Per ISO 6149-1
For optional jam nut see page 60.
For additional flow control valves see pages 105 & 123.

For optional accessories see page 73.
† Seal included.
†† 1.768 dia. min. clearance required.

††† Surface finish to be 63. Finish of 125 acceptable with concentric tool marks only.
Finish area to be .438 dia. min. centered on .126 dia. port hole.
See operating instructions for additional details.

Spring Adv. Work Supports-4,000 lb. Cap.

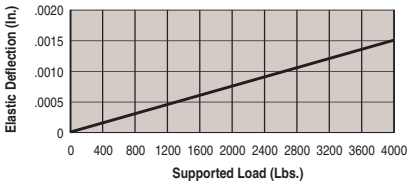


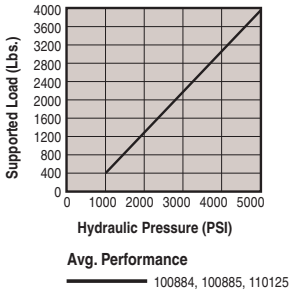
Hytec's spring advance work supports have a spring loaded plunger which contacts the workpiece as it is loaded into the fixture. The spring keeps the plunger in contact with the workpiece, allowing for variations between workpieces. To support any externally applied loads, the sleeve surrounding the plunger grips the plunger and holds it in place.

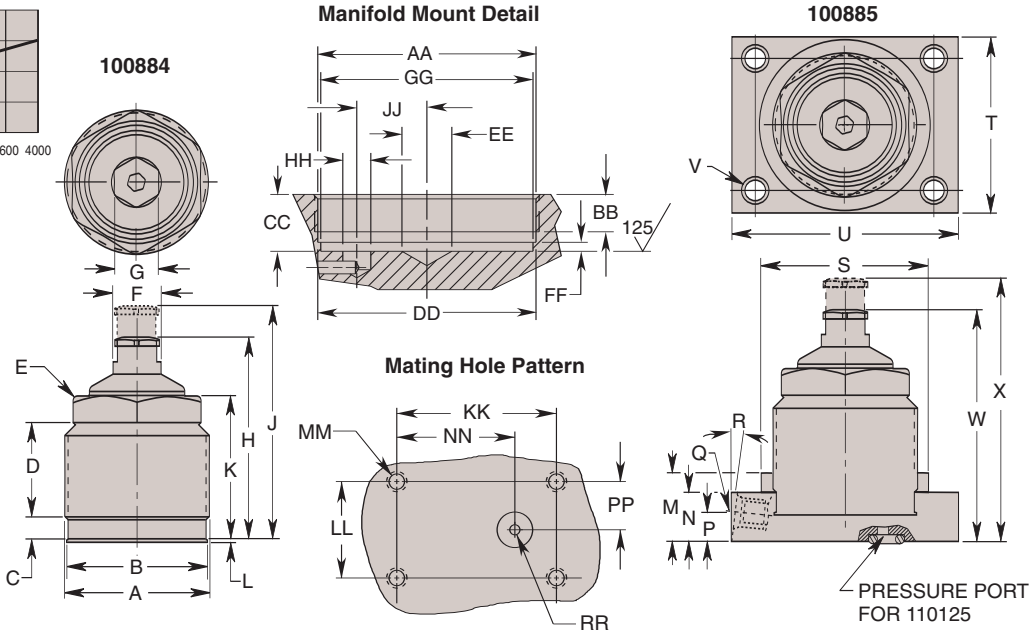
The 100884's threaded body may be compactly manifold mounted in your fixture or choose the 100885 which includes the 100884 work support and a mounting base for installation on a flat surface for conventionally plumbed circuits. Both feature fully corrosion resistant construction. Extremely close manufacturing tolerances hold the plunger perpendicular to the workpiece and eliminate inaccuracies due to plunger movement during lock-up. After lock-up, the plunger is absolutely rigid and limits elastic deflection to .00004" per 100 lbs. of load. For base only, order number 500028 for conventional mounting, and 421728 for manifold mounting.

Features:

- 4,000 lbs. capacity @ 5,000 psi max.
- Fully corrosion resistant construction
- Manifold mount or conventional base mounting
- Small filtered breather/rest button to accommodate intricate workpieces
- 1,000 psi minimum recommended pressure







Cat. No.	Specifications				Dimensions (In Inches)									
	*Cap. (Lbs.)	Oil Cap. (Cu. In.)	Advance System	Mounting Configuration	A	†B Seal Dia.	C	D	E Hex	F Dia.	G Hex	Operating Range H	Operating Range J	K
100884	4,000	.02	Spring	Cartridge Manifold	2¼-16 UN	2.140	.250	1.625	2.000	.735	.688	3.265	3.765	2.312
100885				Base Conventional		—	—	—				—	—	—
110125				Base Manifold										

Cat. No.	Dimensions (In Inches)											
	L Seal	M	N	P	Q Pressure Port Thd. Size	R Port Angle	††S Dia.	T	U	V Dia.	Operating Range W Retracted	Operating Range X Advanced
100884	.040	—	—	—	—	—	—	—	—	—	—	—
100885	—	.945	.735	.420	7/16-20 UNF SAE-4	5°	2.688	2.750	3.562	.281	3.680	4.180
110125				—	—	—						

SPRING ADVANCE WORK SUPPORT		
Cat. No.	Approximate Forces Required To Depress Plunger (Lbs.)	
	Fully Extended	Fully Depressed
100884 100885	4	8

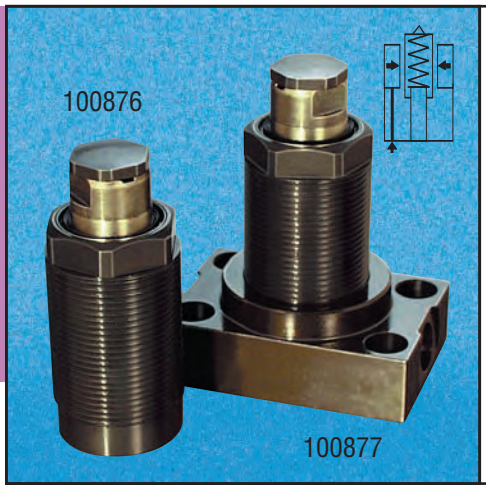
Cat. No.	Mounting Dimensions (In Inches)													
	AA Thd. Size	BB Min. Thd.	CC	DD Dia.	EE Drill Point Max.	FF	GG Dia.	HH Dia.	JJ Max.	KK	LL	MM Thd. Size	NN	PP	RR Pressure Port Dia. Max.
100884	2¼-16 UN	.380	.560 .580	2.182 2.196	.500	.080 .100	2.145 2.155	.121 .293	.700	—	—	—	—	—	—
100885	—	—	—	—	—	—	—	—	—	2.843	2.063	¼-20 UNC	2.122	1.032	†††.126
110125															

NOTE: * Based on 5,000 psi max. operating pressure
For optional jam nut see page 60
For additional flow control valves see pgs. 105 & 123.
For optional accessories see page 73.

† Seal included.
†† 2.768 dia. min. clearance required.

††† Surface finish to be 63. Finish of 125 acceptable with concentric tool marks only. Finish area to be .438 dia. min. centered on .126 dia. port hole. See operating instructions for additional port details.

Air Advance Work Supports - 1,300 lb. Capacity



Hytec's air advance work supports have a spring return plunger which uses air pressure to extend it to contact the workpiece. To support any externally applied loads, the sleeve surrounding the plunger grips the plunger and holds it in place.

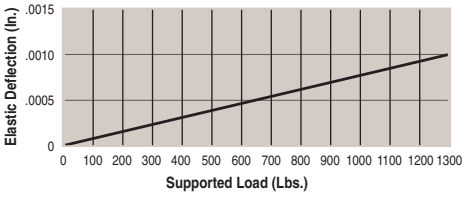
Air advance work supports allow the plunger to be retracted out of the way during workpiece load/unload operations. Applying air pressure to the work support gently raises the plunger until it contacts the workpiece. Adjusting the air pressure will vary the plunger contact force. The air pressure within the work support also serves to keep contaminants out.

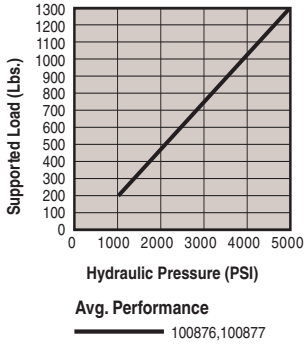
The No. 100876's threaded body may be compactly manifold mounted in your fixture or choose the No. 100877 which includes the 100876 work support and a mounting base for installation on a flat surface for conventionally plumbed circuits. Both feature fully corrosion resistant construction.

Extremely close manufacturing tolerances hold the plunger perpendicular to the workpiece and eliminates inaccuracies due to plunger movement during lock-up. After lock-up, the plunger is absolutely rigid and limits elastic deflection to .00007" per 100 lbs. of load. For base only, order number 500036.

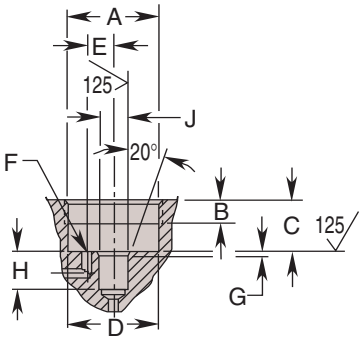
Features:

- 1,300 lbs. capacity @ 5,000 psi max.
- Fully corrosion resistant construction
- Manifold mount or conventional base mounting
- 1,000 psi minimum recommended pressure

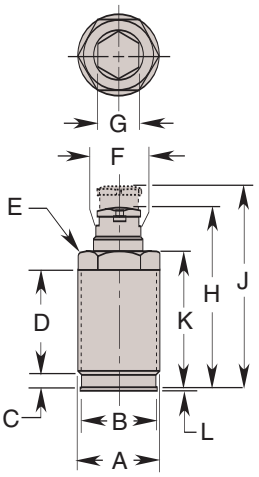




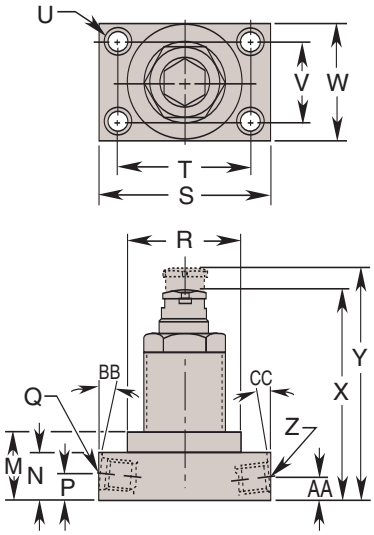
Manifold Mount Detail



100876



100877



Cat. No.	Specifications				Dimensions (In Inches)									
	*Cap. (Lbs.)	Oil Cap. (Cu. In.)	Advance System	Mounting	A Thread Size	††B Seal Dia.	C	D	E Hex	F Dia.	G Hex	Operating Range H Retracted	Operating Range J Advanced	K
100876	1,300	.01	Air	Manifold	1¼-16 UN	1.171	.334	1.531	1.125	.735	.688	2.850	3.162	2.180
100877		.01	Air	Base								—	—	

Cat. No.	Dimensions (In Inches)																
	L Seal	M	N	P	Q Thread Size	†R Dia.	S	T	U Dia.	V	W	Operating Range X Retracted	Operating Range Y Advanced	Z Thread Size	AA	BB Port Angle	CC Port Angle
100876	.040	—	—	—	—	—	—	—	—	—	—	—	—	–	–	–	–
100877		1.000	.700	.385	7/16-20 UNF SAE-4	1.688	2.562	1.968	.281	1.188	1.750	3.162	3.474	⅛ NPTF	.330	5°	5°

NOTE: * Based on 5,000 psi max. operating pressure. (Optional: Jam nut - pg. 59)
See page 73 for optional accessories.

† 1.768 dia. min. clearance required.
†† Seal Included.

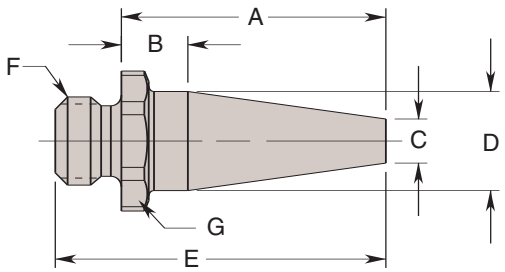
MANIFOLD MOUNT DETAIL									
Cat. No.	Cavity Dimensions				Fluid Passage Dimensions		†Air Passage Dimensions		
	A Thread Size	B Min. Thread	C	D Dia.	E	F Dia.	G	H	J Dia.
100876	1¼-16UN	.300	.665 .675	1.182 1.196	.343	.121 .135	.060	.380 .400	.375 .377

† Connector bushing supplied but not shown.

AIR ADVANCE WORK SUPPORT		
Cat. No.	Approximate Plunger Extension Force	
	*Air Pressure (PSI)	Force (Lbs.)
100876 100877	15	1.4
	20**	3.7
	30	5.9

NOTE: * Min. air press. 15 psi, max. air press. 30 psi
** Minor air leakage may occur at or above this pressure.

500176



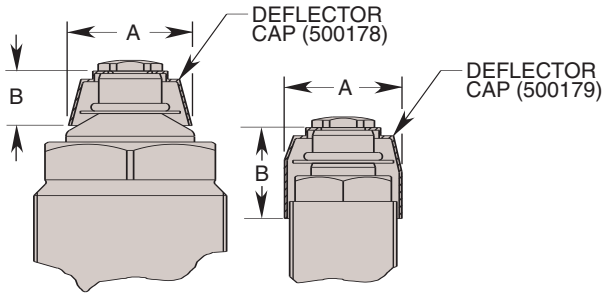
Cat. No.	Dimensions (In Inches)						
	A	B	C Dia.	D Dia.	E	F Thd. Size	G Hex
500176	1.500	.376	.250	.562	1.875	½-20 UNF	.688
500176	1.500	.376	.250	.562	1.875	½-20 UNF	.688

Rest Button

This Rest Button is designed to extend the reach of all Hytec threaded body work supports. All of Hytec's fluid-advanced and air-advanced threaded body work supports must be able to "breathe" air for proper operation. Proper filtration as it breathes is also critical for maximum service life. This button contains the same filtered breather port as the standard rest button. It is easily modified above the hex to fit your exact requirements. Its tapered design minimizes weight and off-center loading.

- Fits 1,300 and 4,000 lb, Work Supports
- Built-in filter element
- Provides 1.375"additional reach beyond standard button
- Easily modified for your application

Additional end effectors will add weight and may affect performance. If neither the standard nor the optional 500176 rest buttons are appropriate for your application, contact Hytec for more design information.



Cat. No.	Dimensions (In Inches)		Work Support Capacity
	A	B	
500178	1.435	.635	4,000 lbs.
500179	1.410	1.060	1,300 lbs.

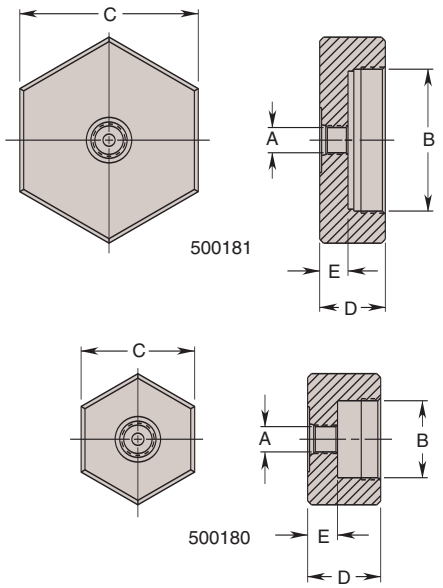
Coolant Deflector Caps

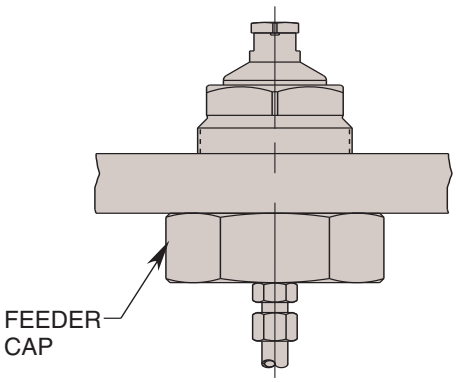
These Coolant Deflector Caps are designed to reduced exposure of the work support's breather/filter to coolant and contaminants. They are designed for applications where the work support is actuated either during or soon after exposure to coolant floods. Used in conjunction with careful aiming of coolant jets, they can prevent the breather port from filling with coolant that is later drawn inside the work support as it is actuated.

The caps are assembled between the work support plunger and the rest button and serve as an "umbrella" for the breather port. (This increases the height of the assembled work support by .030")

The caps are designed for vertical-up and horizontal applications where coolant jets are not directly aimed at the gap between the cap and work support plunger.

These caps are not appropriate for submerged or vertical-down applications.





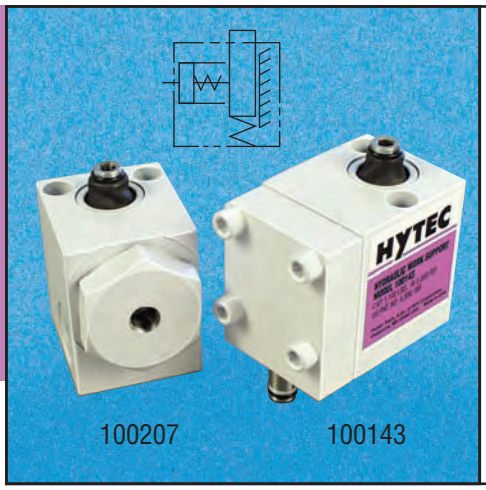
Feeder Caps

These Feeder Caps are designed to allow bulkhead mounting Hytec's fluid advanced and spring advanced threaded body work supports. Bulkhead mounting allows the work support to be mounted in a threaded hole in a plate. The feeder cap connects the work support to the hydraulic system via a SAE-4 port. The feeder cap saves space over the standard base and provides a connection at the end of the work support. The work support should be locked to the bulkhead plate using a jam nut or by the feeder cap itself.

Cat. No.	Work Support Cap. (Lbs.)	Use With
500180	1,300	100872, 100874
500181	4,000	100882, 100884

Cat. No.	Dimensions (In Inches)				
	A	B	C Hex	D	E
500180	7/16-20 UNF SAE-4	1¼-16	1.750	1.125	.460
500181		2¼-16	2.750	1.010	.435

Spring Advance Work Supports-1,100 lb. Capacity

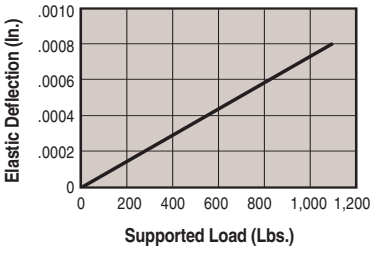


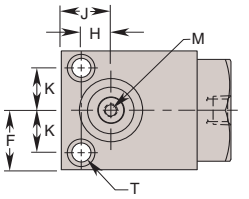
Hytec's 1,100 lb. capacity work supports use a boot attached between the body and plunger to effectively seal out contaminants. A diaphragm breather system further protects internal components, and the block style design requires only a flat surface for mounting rather than the large threaded hole needed with threaded body designs. Two mounting styles are available for plumbing convenience: manifold and conventional mount.

These work supports use a spring-loaded plunger to minimize deflection and vibration: As the workpiece is loaded into the fixture, it contacts the plunger, and its weight or the design of the fixture holds the plunger depressed. When the work support is hydraulically pressurized, the plunger is locked into position.

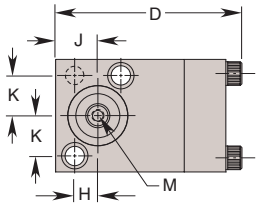
Features:

- Spring advance
- 1,100 lb. rated capacity at 5,000 psi max.
- Single-acting
- Manifold or conventionally mounted styles
- Sealed against contamination

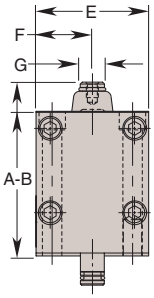


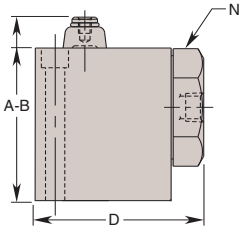


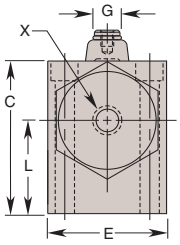
100207

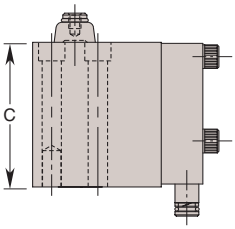


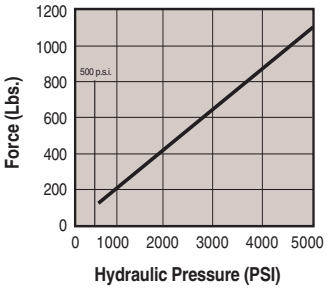
100143

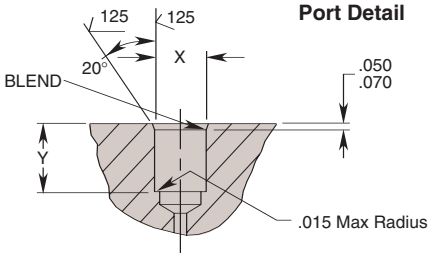




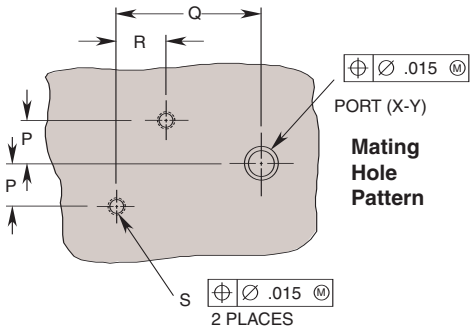








Port Detail



Mating Hole Pattern

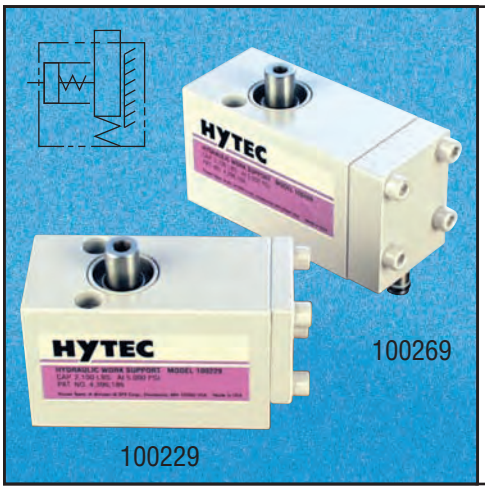
Cat. No.	Specifications				Dimensions (In Inches)										
	*Cap. (Lbs.)	Oil Cap. (Cu. In.)	Advance System	Mounting	A Retract Oper. Range	B Advance Oper. Range	C	D	E	F	G Dia.	H	J	K	L
100207	1,100	.07	Spring	Conventional	2.375	2.670	2.250	2.500	1.750	.875	.375	.438	.730	.625	1.375
100143				Manifold				2.895				.359	.655		–

Cat. No.	Dimensions (In Inches)									
	M Thread Size	M Thread Depth	N Hex.	P Mounting	Q Mounting	R Mounting	S Thread Size	T Dia.	X Thread Size	X Dia.	Y
100207	10-24 UNC	.250	1.500	–	–	–	–	.281	⅛ NPTF	–	–
100143			–	.625	2.102	.718	¼-20UNC	–	–	.375 .377	.515 .535

SPRING ADVANCE WORK SUPPORTS			
Cat. No.	Approximate Forces Required to Depress Plunger (Lbs.)		
	Fully Extended	Extended 50%	Fully Depressed
100207 100143	1.0	1.4	1.8

NOTE: * Based on 5,000 psi max . operating pressure.

Spring Adv. Work Supports-2,100 lb. Cap.



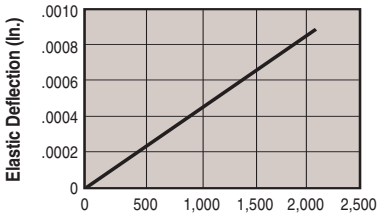
Work supports provide the stability that prevents deflection and vibration of the workpiece during machining. Automatically adjustable to varying sizes or positions of the workpieces, they are also usable as adjustable rest pads under clamps.

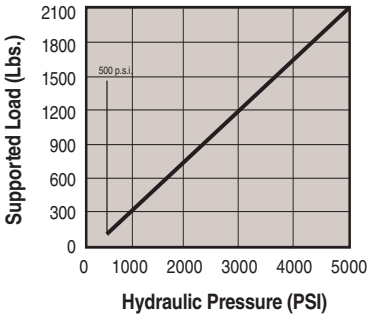
These 2,100 lb. work supports are available in three different spring advanced models with either conventional or manifold mounting. All use plunger seals to protect against contamination. The spring advance models use Hytec's diaphragm breather system.

The block style design requires only a flat surface for mounting rather than the large threaded hole necessary with threaded body designs.

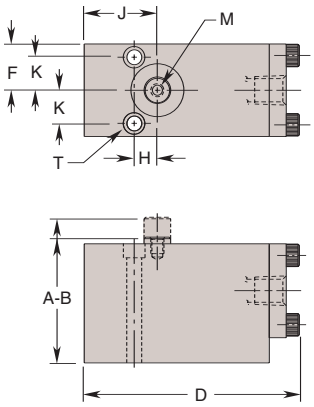
Features:

- Spring advance models
- 2,100 lb. rated capacity at 5,000 psi max.
- Single-acting
- Manifold or conventionally mounted styles
- Sealed against contamination

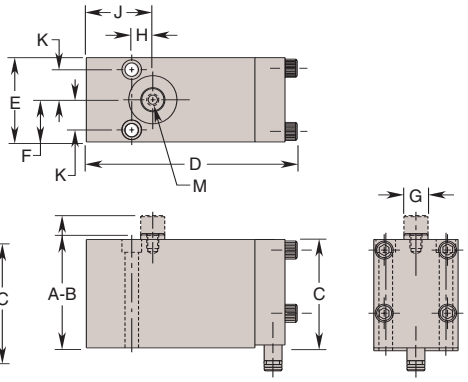




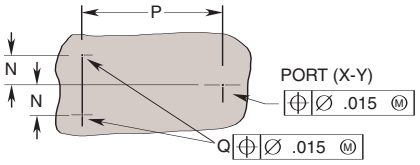
100229, 110085



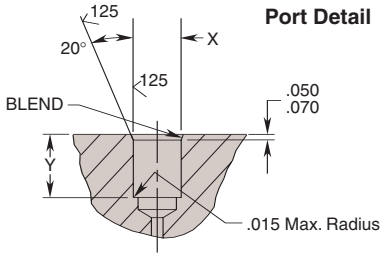
100269



Mating Hole Pattern



Port Detail

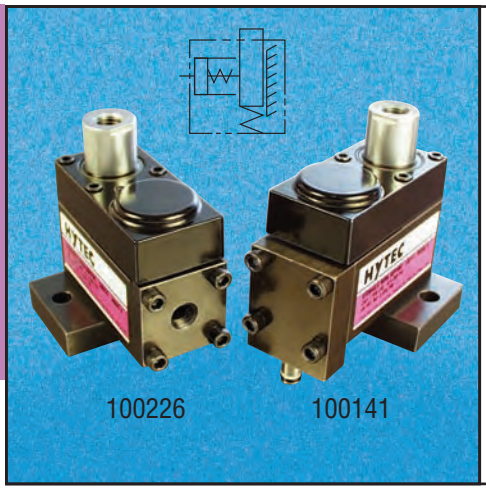


Cat. No.	Specifications				Dimensions (In Inches)									
	*Cap. (Lbs.)	Oil Cap. (Cu. In.)	Advance System	Mounting Configuration	A Retract Oper. Range	B Advance Oper. Range	C	D	E	F	G Dia.	H	J	K
100229	2,100	.100	Spring	Conventional	2.375	2.750	2.250	4.062	1.750	.875	.500	.438	1.380	.625
110085														
100269				Manifold				4.375						

Cat. No.	Dimensions (In Inches)									
	L	M Thread Size	M Thread Depth	N Mtng	P Mtng	Q Thread Size	T Dia.	X Thd. Size	X Dia.	Y
100229	1.375	¼-20 UNC	.312	—	—	—	.281	¼ NPTF	—	—
110085								7/16-20 UNF SAE-4		
100269	—			.625	2.937	¼-20 UNC	—	—	.375 .377	.515 .535

SPRING ADVANCE WORK SUPPORTS			
Cat. No.	Approximate Forces Required to Depress Plunger (Lbs.)		
	Fully Extended	Extended 50%	Fully Depressed
100229 100269	1.0	2.0	3.0

SPX HYTEC® Spring Advance Work Supports - 7,500 lb. Capacity



Work supports provide the stability that prevents deflection and vibration of the workpiece during machining. Automatically adjustable to varying sizes or positions of the workpieces, they are also usable as adjustable rest pads under clamps.

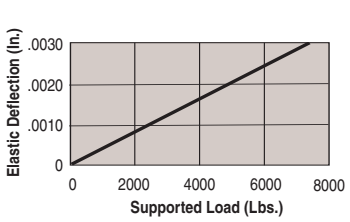
These 7,500 lb. work supports are available in four different spring advanced models with either conventional or manifold mounting. All use plunger seals to protect against contamination. The spring advance models use Hytec's diaphragm breather system.

The block style design requires only a flat surface for mounting rather than the large threaded hole necessary with threaded body designs.

Features:

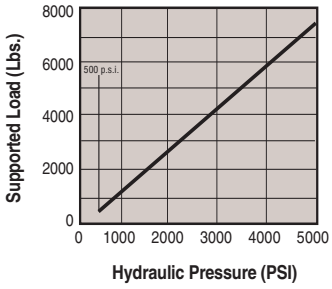
- Spring advance models
- 7,500 lb. rated capacity at 5,000 psi max.
- Single-acting
- Manifold or conventionally mounted styles
- Sealed against contamination

Note: See Page 23 for crowned threaded insert.



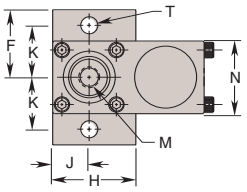
Avg. Performance

100141, 100226, 100926

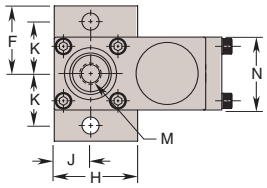


Performance

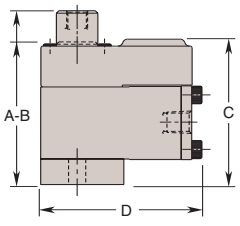
Work Support Nos.

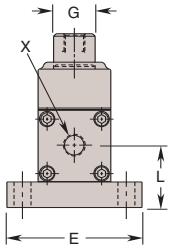


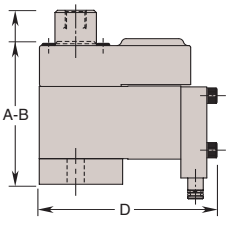
100226
100926
100998

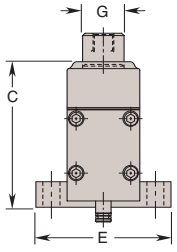


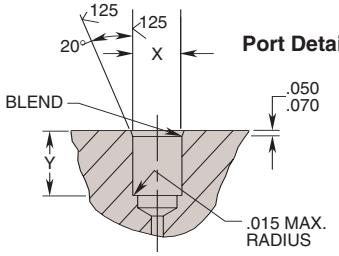
100141



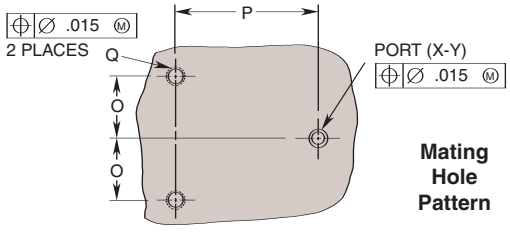








Port Detail



Mating Hole Pattern

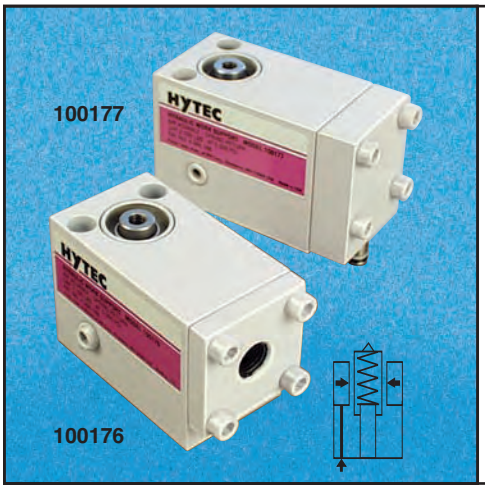
Cat. No.	Specifications				Dimensions (In Inches)									
	*Cap. (Lbs.)	Oil Cap. (Cu. In.)	Advance System	Mounting	A Retract Oper. Range	B Advance Oper. Range	C	D	E	F	G Dia.	H	J	K	L
100226	7,500	.25	Spring	Conventional	3.435	4.185	3.500	3.875	3.250	1.625	1.000	2.000	.875	1.250	1.500
100926															
100141				Manifold				4.250							–
100998				Conventional				3.875							1.500

Cat. No.	Dimensions (In Inches)									
	M Thread		N	O Mounting	P Mounting	Q Thread Size	T Dia.	X		Y
	Size	Depth						Thread Size	Dia.	
100226	½-13UNC	.875	1.750	–	–	–	.406	¼ NPTF / 7/16-20 SAE-4	–	–
100926										
100141				1.250	2.878	⅜-16UNC	–	–	.375 / .377	.515 / .535
100998	**M12x1.5 6H	.866		–	–	–	.406	**M12x1.5 6H	–	–

SPRING ADVANCE WORK SUPPORTS			
Cat. No.	Approximate Forces Required to Depress Plunger (Lbs.)		
	Fully Extended	Extended 50%	Fully Depressed
100226 100926 100141 100998	5.0	7.0	9.0

NOTE: * Based on 5,000 psi max. operating pressure.
**Per ISO 6149-1.

Air Adv. Work Supports - 2,100 lb. Cap.



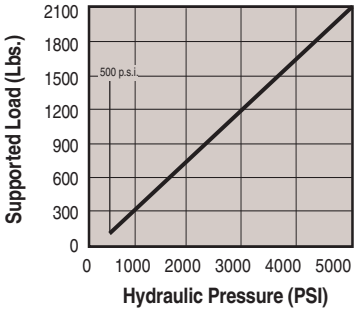
Work supports provide the stability that prevents deflection and vibration of the workpiece during machining. Automatically adjustable to varying sizes or positions of the workpieces, they are also usable as adjustable rest pads under clamps.

These 2,100 lb. air advanced work supports are available in three different models with either conventional or manifold mounting. All use plunger seals to protect against contamination.

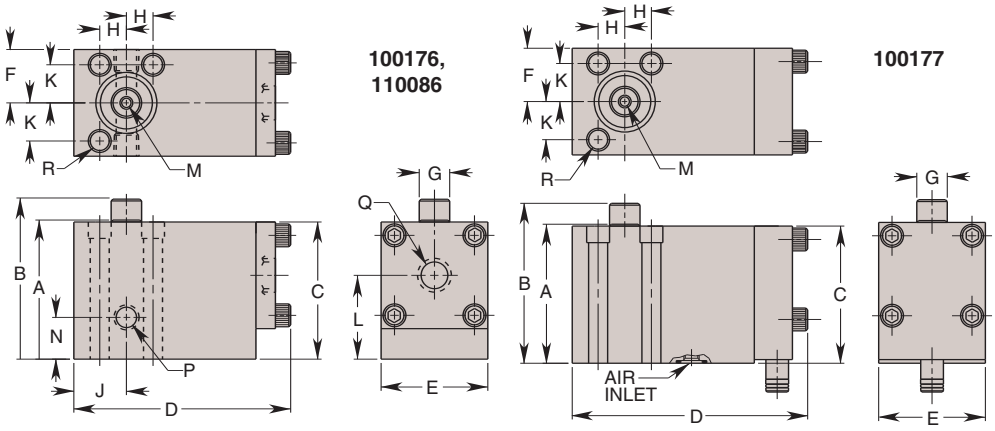
The block style design requires only a flat surface for mounting rather than the large threaded hole necessary with threaded body designs.

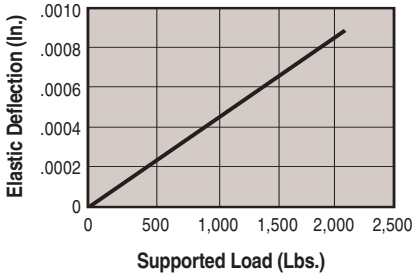
Features:

- Air advance
- 2,100 lb. rated capacity at 5,000 psi max.
- Single-acting
- Manifold or conventionally mounted styles
- Sealed against contamination



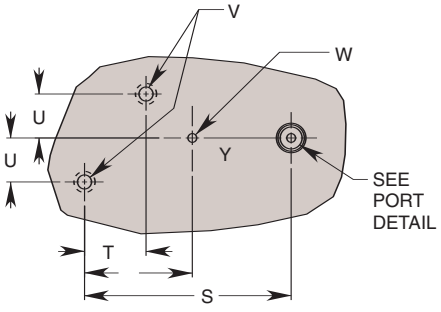
Performance
Work Support Nos. 100176, 100177



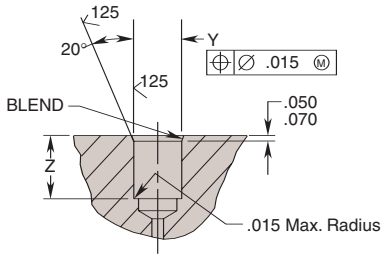


Avg. Performance
Nos. 100176, 100177

Mating Hole Pattern



Port Detail



Cat. No.	Specifications				Dimensions (In Inches)										
	*Cap. (Lbs.)	Oil Cap. (Cu. In.)	Advance System	Mounting Configuration	A Retract Oper. Range	B Advance Oper. Range	C	D	E	F	G Dia.	H	J	K	L
100176	2,100	.100	Air	Conventional	2.250	2.625	2.250	3.542	1.750	.875	.500	.438	.875	.625	1.375
110086															
100177				Manifold				3.862							—

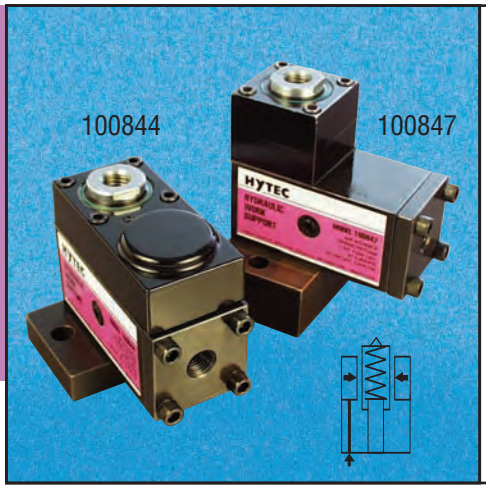
Cat. No.	Dimensions (In Inches)						Mounting Dimensions (In Inches)						
	M Thread Size	M Thread Depth	N	P Air Inlet Port	Q Port	R Dia.	S	T	U	V Thread Size	W Dia. Air Inlet	X	Y Dia. Mtng.
100176	¼-20 UNC	.312	.685	⅛ NPTF	¼ NPTF	.281	—	—	—	—	—	—	—
110086					7/16-20 UNF SAE-4								
100177			—	—	—		2.937	.876	.625	¼-20 UNC	.125	.515 .535	.375 .377

NOTE: * Based on 5,000 psi max. operating pressure.

AIR ADVANCE WORK SUPPORTS		
Cat. No.	Approximate Plunger Extension Force	
	*Air Press. (PSI)	Force (Lbs.)
100176 100177 110086	30	2.2
	40	4.5
	50	7.1

NOTE: * Min. air pressure 25 psi, max. air pressure 50 psi.

Air Adv. Work Supports - 7,500 lb. Cap.



Similar in operation to our other air advance work supports, Hytec's 7,500 lb. work supports' unique interlocking pin design gives more holding capacity than other units of similar size.

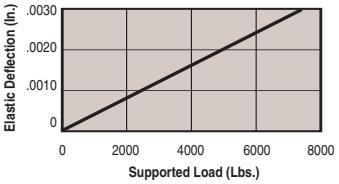
The block style design requires only a flat surface for mounting rather than the large threaded hole necessary with threaded body designs.

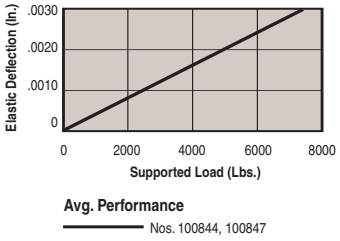
Air advance work supports may be specified in applications whenever the workpiece is loaded from the side and the extended plunger from a spring advance work support would be in the way, or the workpiece is not heavy enough to depress a spring advance work support plunger, or the plunger contact force must be precisely adjusted and controlled. Adjusting the air supply pressure will vary the workpiece contact force.

Features:

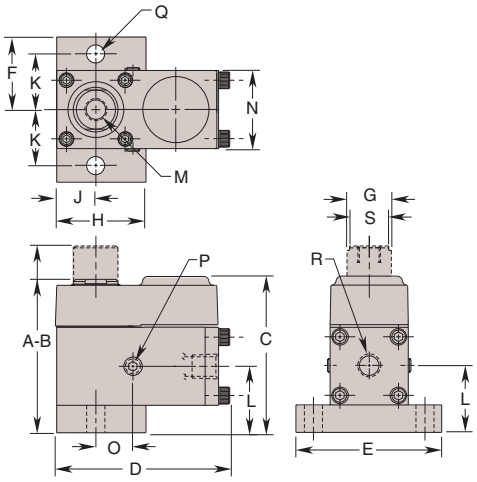
- Air advance
- 7,500 lb. rated capacity at 5,000 psi max.
- Single-acting
- Sealed against contamination
- Convenient dual air inlets allow easy connection and chaining of work supports

Note: See page 23 for crowned threaded insert. See page 124 for air inlet adapter fitting.

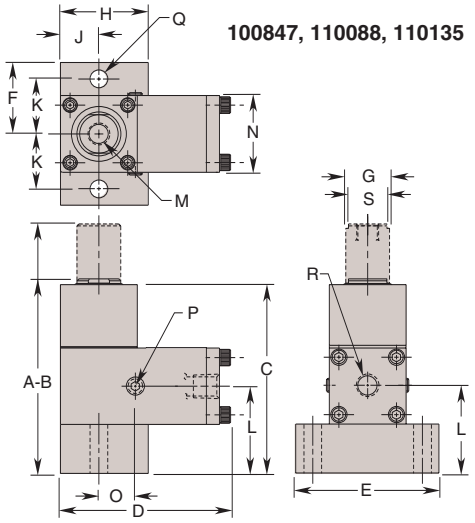




100844, 110087, 110136



100847, 110088, 110135



Cat. No.	Specifications				Dimensions (In Inches)										
	*Cap. (Lbs.)	Oil Cap. (Cu. In.)	Advance System	Mounting Configuration	A Retract Oper. Range	B Advance Oper. Range	C	D	E	F	G Dia.	H	J	K	L
100844	7,500	.250	Air	Conventional	3.435	4.185	3.500	3.875	3.250	1.625	1.000	2.000	.875	1.250	1.500
110087															
100847					4.435	5.615	4.227								2.000
110088															
110135															
110136					3.435	4.115	3.500								1.500

Cat. No.	Dimensions (In Inches)							
	M Thread		N	O	P Air Inlet Port	Q Dia.	R Port	S Flats
	Size	Depth						
100844	½-13 UNC	.625	1.750	.830	⅛ NPTF	.406	¼ NPTF	.875
110087							7/16-20 UNF SAE-4	
100847							¼ NPTF	
110088							7/16-20 UNF SAE-4	
110135	*** M12x1.5 6H	.580			**G 1/8-28		***M12x1.5 6H	
110136								

NOTE: * Based on 5,000 psi max. operating pressure. **Per ISO 1179. ***Per ISO 6149-1.

AIR ADVANCE WORK SUPPORTS		
Cat. No.	Approximate Plunger Extension Force	
	*Air Pressure (PSI)	Force (Lbs.)
100844 100847	30	8.0
110087 110088	70	33.0
110135 110136	100	49.0

NOTE: * Min. air pressure 25 psi, max. air pressure 100 psi.