SPX HYTEC

Hydraulic Power Workholding Systems

Workholding Devices

Power Sources

Control Valves

Palletized Systems

Accessories

ISO 9001 CERTIFIED

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.

Today, our commitment to provide our customers with quality products at truly competitive prices is stronger than ever. To this end, we will continue to exercise total control over the product from beginning to end. Virtually every operation from forging to precision machining, right down to the finishing touches, is under constant scrutiny. We want to be absolutely sure that when you receive our product, it's the best it can possibly be.

As a professional, you are concerned with the safety of the people using your equipment and the quality of your product. Hytec shares this concern and stands ready to support your efforts. However, Hytec cannot be responsible for injury or damage caused by improper use or application of its products or information. When you are designing a system, we strongly suggest that you select and use only Hytec products within that system. We can help you with technical information about how our components will perform together, but we will not be able to address the reliability and performance of components from other manufacturers.

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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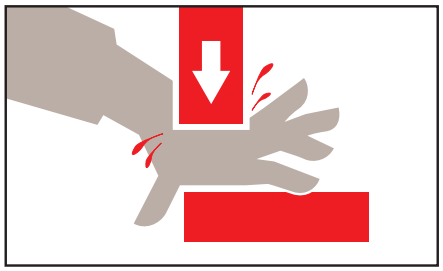
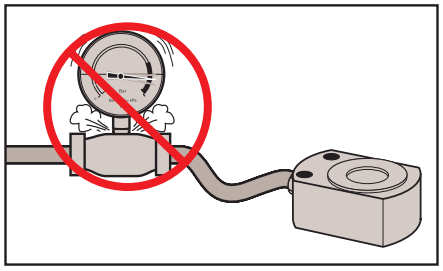
... a note on SAFETY

Safety means paying attention to the smallest details. A hastily assembled workholding system can result in a hazardous operator environment. Hydraulic workholding is not a generic technique where most anything will work nor is there one right or best answer for all situations. Each application is different and can be approached in many different ways. Because of this versatility, there is no rule-of-thumb to follow to guarantee safety. Knowledge, careful fixture design and common sense are likely the key to avoiding injuries.



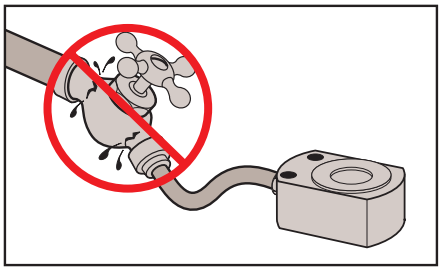
Plan your fixture installation with the operator's safety in mind. By nature, most clamping devices have pinch points. Many times the fixture can be designed to shield the operator from a pinching hazard. Often the placement of the clamping device in the fixture can minimize the gap between the clamp and the workpiece thus reducing or eliminating the pinch point. Perhaps the clamping control valve or switch can be located such that the operator cannot reach the fixture and the control at the same time. Dual palm buttons on electrically actuated systems serve the same purpose.

Don't require the operator to hold the workpiece in position during the clamping operation. Make sure that the workpiece is self supporting and self locating so that the operator's hands can be out of danger when the hydraulic system is actuated. Often a simple spring plunger is all that is necessary.

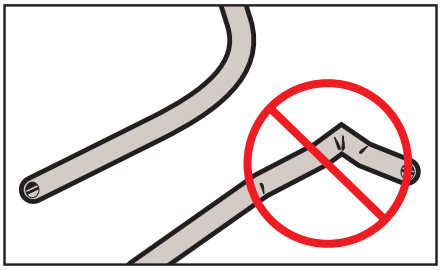


The **lowest** pressure rating of any component in the clamping system sets the **maximum** pressure rating for the entire system.

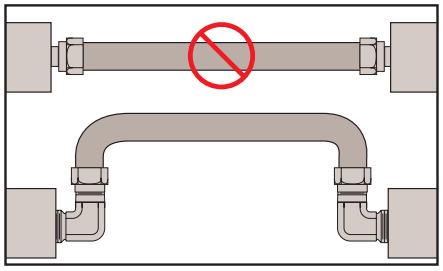
Most Hytec hydraulic workholding components are rated at 5,000 psi maximum. However, some components are rated at less than 5,000 psi. The maximum pressure is listed on each product page of this catalog. **Never exceed this rating.**



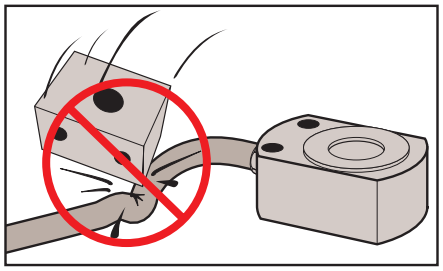
Just having a clamp that is rated at 5,000 psi is not enough. Every hose, fitting, valve, adapter and tube exposed to pressure must be rated at or above the maximum hydraulic system pressure. Most "hardware store" fittings are intended only for low pressure plumbing. Never use water pipe fittings or copper tubing and brass fittings for hydraulic service.



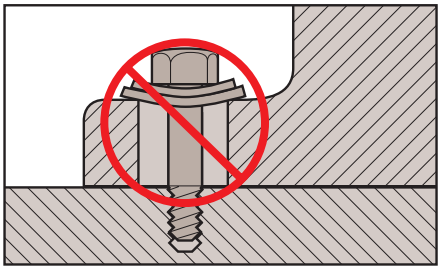
Use proper tools when bending tubing and maintain proper minimum bend radii for hoses and tubing. If a hose or tube is ever kinked, replace it. Don't risk a rupture. Fluid escaping under high pressure is dangerous. The resulting loss in pressure could release the workpiece from the fixture and cause serious injury and equipment damage by being ejected from the machine or breaking tooling.



Tubing and hoses do flex when pressurized. Allow for that movement by supporting the fluid lines away from surfaces which could abrade the surface and eventually cause damage. Avoid straight lengths of hose and tubing. A bend will allow for this deflection without putting too much stress on the line.



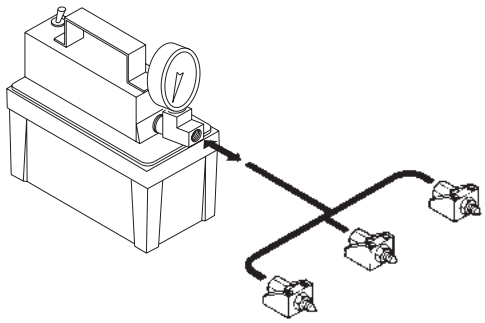
Even if proper hydraulic tubing and fittings are specified, be sure to protect them from abuse. Components damaged from abrasion or accidental dropping of a workpiece will no longer have the strength and safety originally designed.



Use proper mounting hardware when installing workholding clamps and other components. Always use the largest bolt available to fit in the mounting hole. In many cases, the recommended cap screw or thread is specified on the product page of this catalog. Sometimes the mounting hardware is included with the component. Always use supplied hardware.

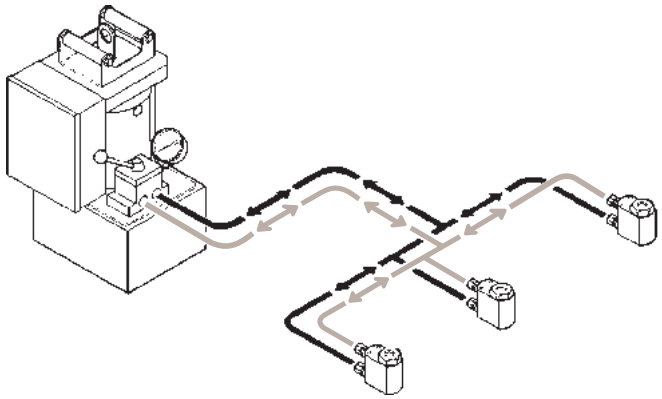
Application A

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.



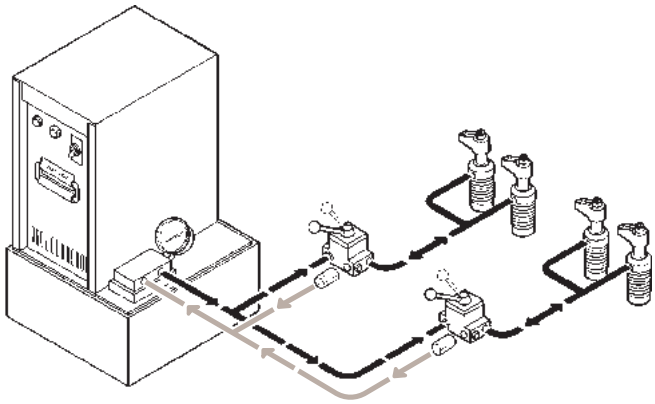
Application B

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



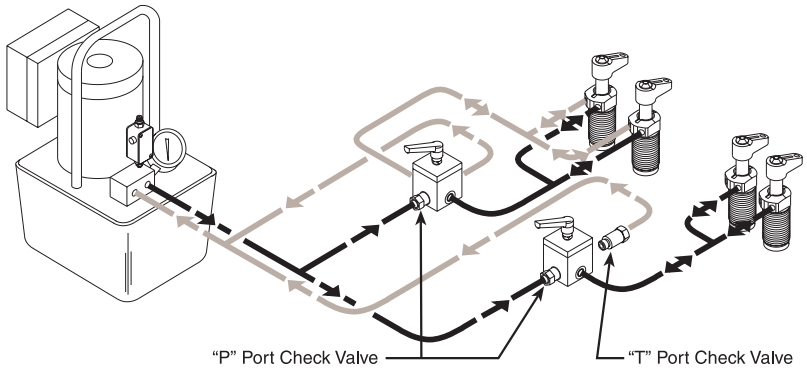
Application C

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.



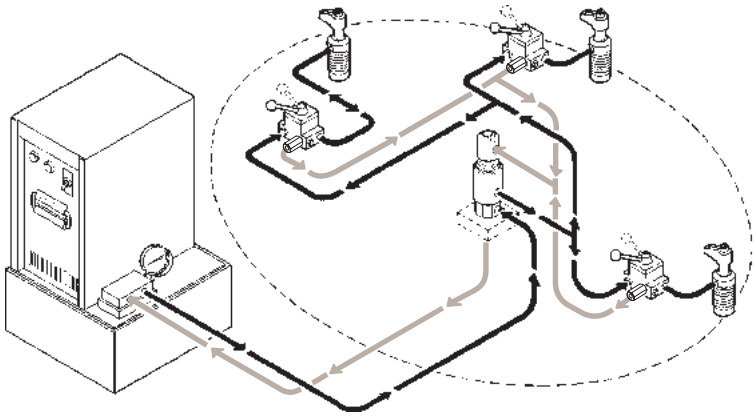
Application D

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.



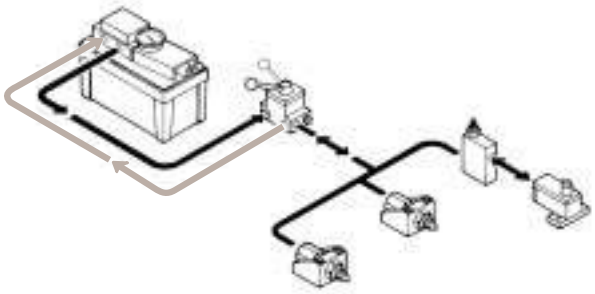
Application E

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.



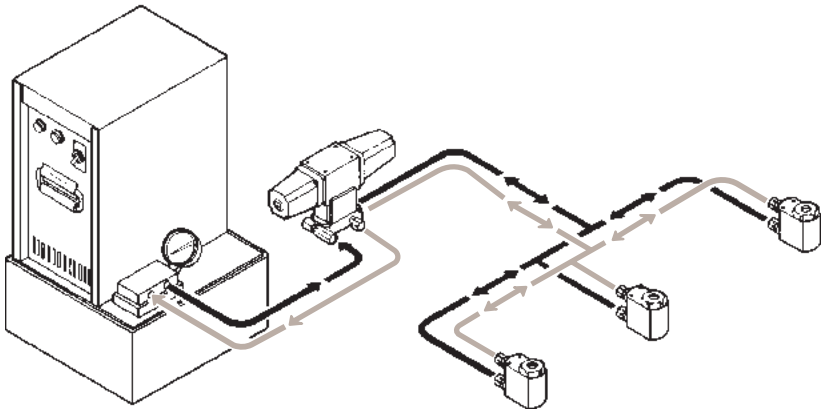
Application F

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.



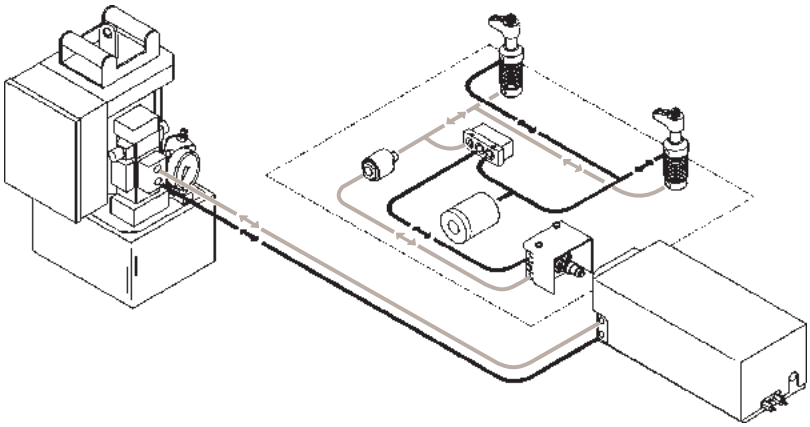
Application G

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.



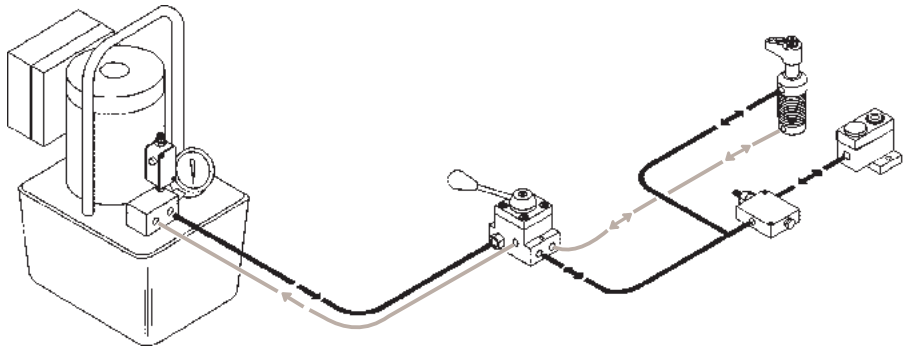
Application H

A pair of double-acting swing clamps are controlled by the Automatic Pallet Coupling System. Pallet coupling systems allow the hydraulic power source to be completely disconnected from the fixture while maintaining full clamping pressure. Components shown here include a pilot operated check valve, filter (for double-acting systems only), accumulator and pallet unit which serves as the hydraulic connection point. The check valve closes to maintain pressure on the swing clamps while the accumulator compensates for temperature changes and minor leakage. A programmable logic controller directs the actions of the power source and base unit.



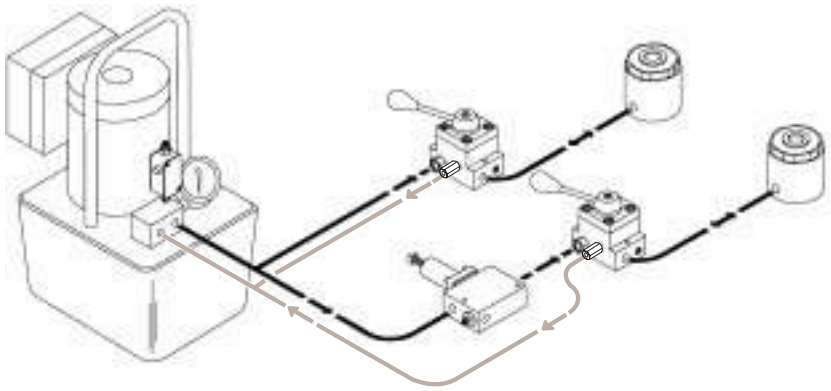
Application I

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.



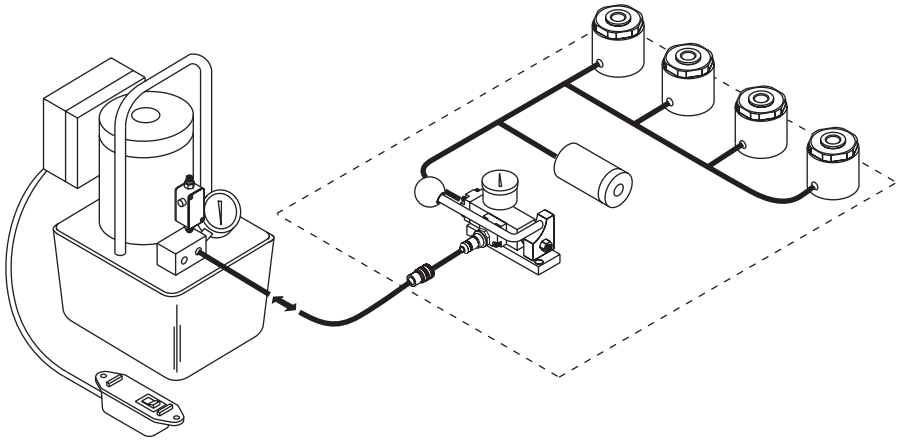
Application J

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.



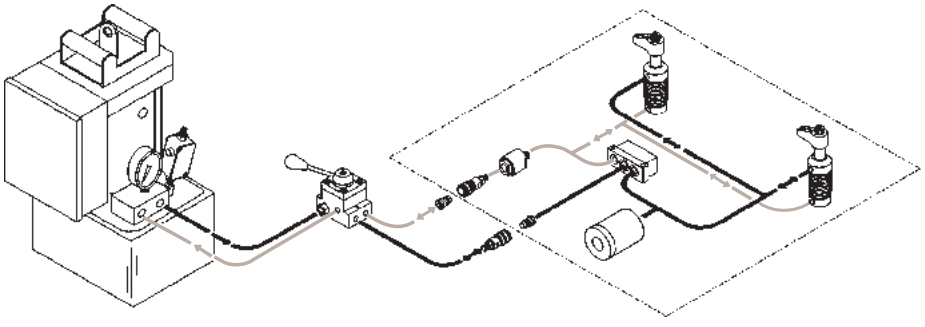
Application K

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 L

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.

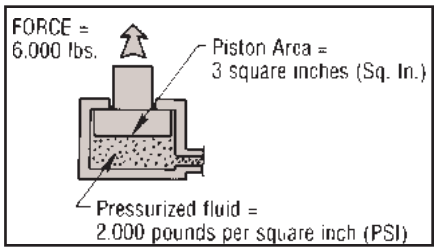
The following information will help prove that a hydraulic power clamping system can be a cost effective fixturing alternative.

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



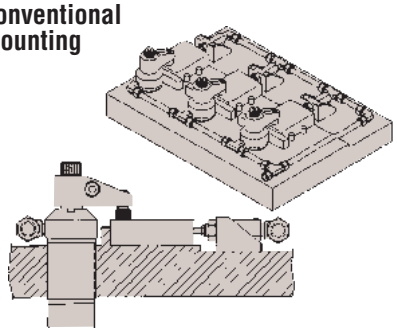
In the cylinder above, the fluid pressurized at 2000 psi is acting on the 3 sq. in. piston. As the formula says, 2000 psi times 3 sq. in. yields a force of 6000 pounds.

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.

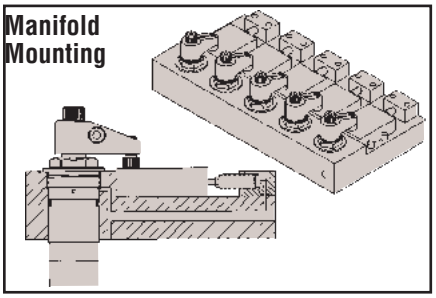
Straight thread, O-Ring boss ports per SAE J514 are common in both industrial and mobile hydraulic systems. Because this system of ports and fittings depends on a simple, replaceable o-ring for sealing instead of the interference of perfectly formed threads, the chance for leakage is greatly reduced.

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.

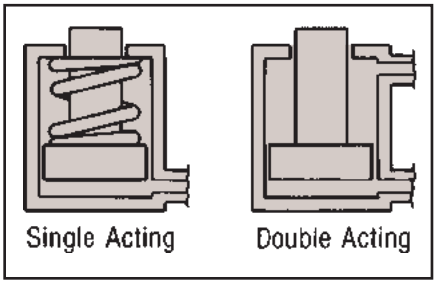
The viscosity of the hydraulic fluid used will also affect back pressure. Viscosity is affected by temperature. Contact the factory to discuss applications running below room temperature. We recommend using only Hytec fluids. Other fluids may have different viscosities or other characteristics that can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

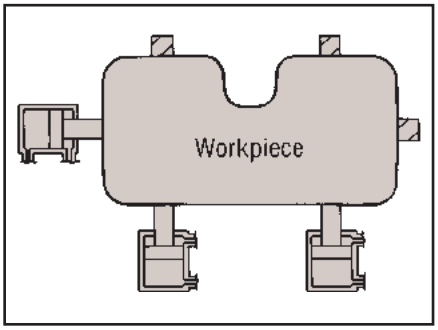
AUTOMATION

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

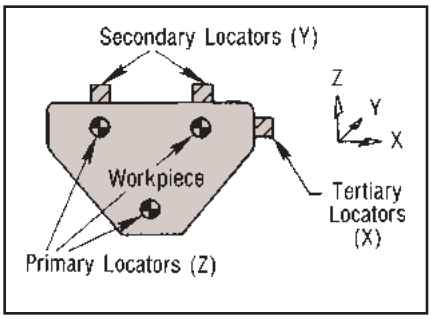
Hydraulic actuators are typically used on a fixture to perform one of two functions: positioning or clamping. Positioning actuators' primary purpose is to push the workpiece against the solid positioning stops built into the fixture. Clamping actuators hold the workpiece in position during machining.

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

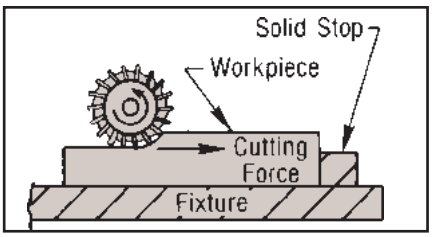
One of the most basic concepts of work-holding is referred to as the 3-2-1 locating principle. To repeatedly locate (or reference) a workpiece, it must be oriented and positioned in three planes: X, Y, and Z.



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.

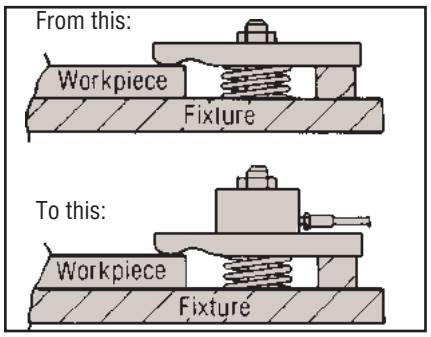
If the torque of the nut is known, the resulting tension on the bolt or stud can be easily approximated.

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

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:

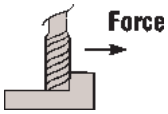
$$\text{Cutting Force (Lbs.)} = \frac{\text{HP X 24,750}}{\text{Cutting Speed (SFPM)}}$$

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



Depth of Cut (In.)
Feed per Tooth (In.)
Number of Teeth
Unit Power

___X___X___X___ X 125,950 = _____ lbs. Cutting Force

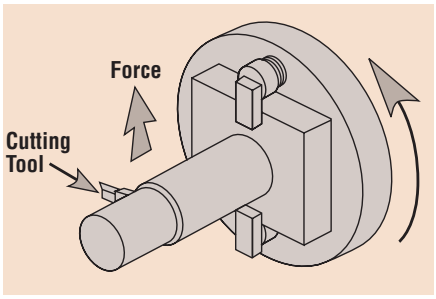
Example: a 4-flute end mill is used to machine aluminum. The cut is ½" deep and the feed per tooth is .002". From the table the unit power value is 0.4. So the cutting force transferred to the workpiece is:

.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.



Depth of Cut (In.)
Feed per Revolution (In.)
Unit Power

____X____X____X 396,000 = _____ lbs. Cutting Force

Example: Boring a hole in alloy steel heat treated to 37 Rc (unit power 1.7), with a depth of cut of .060", a feed rate of .003" inches per revolution gives a result of:

.060 X .003 X 1.7 X 396,000 = 121 lbs. Cutting Force

DRILLING

The forces involved in drilling can be separated into two distinctly different categories: thrust and torque. With the 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	–
Bronze, Sintered	–	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

The estimated clamping force is divided by the appropriate friction coefficient and then multiplied by a suitable safety factor to get an estimated total clamping force required.

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

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:

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

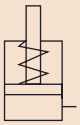
This total clamping force may now be divided by the number of clamps holding the workpiece, which equals the clamping force needed for each clamp.

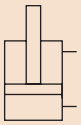
TABLE A

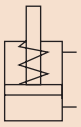
Material	Hardness Bhn	Unit Power hp/in^3/min: Turning HSS & Carbide Tools	Drilling HSS Drills	Milling HSS & Carbide Tools
STEELS Plain Carbon Alloy Steels	85-200	1.4	1.3	1.4
	35-40Rc	1.7	1.7	1.9
	40-50Rc	1.9	2.1	2.2
	50-55Rc	2.5	2.6	2.6
	55-58Rc	4.2	3.2	3.2
CAST IRONS Gray, Ductile & Malleable	110-190	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

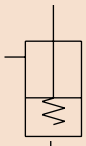
Design Information

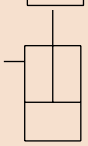
Cylinder Symbols


Cylinder, Single-Acting

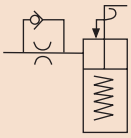

Cylinder, Double-Acting

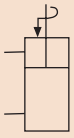

Cylinder, Single or Double-Acting

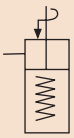

Pull Cylinder, Single-Acting, Spring Return

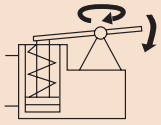

Pull Cylinder, Single-Acting

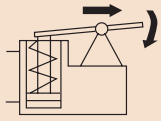
Clamp Symbols


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

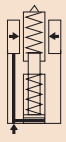

Swing/Pull Clamp, Double-Acting


Swing/Pull Clamp, Single-Acting

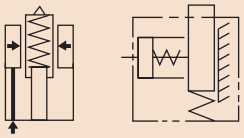

Swing Clamp, Single or Double-Acting

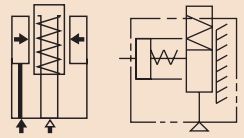

Retract Clamp, Single or Double-Acting

Work Support Symbols

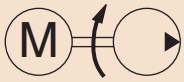

Work Support, Fluid Advance

Work Support Symbols

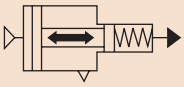

Work Support, Spring Advance

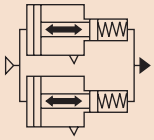

Work Support, Air Advance

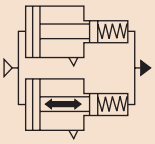
Power Source Symbols

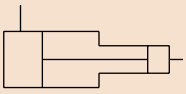


Electric/Hydraulic Pump

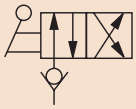

Air/Hydraulic Pump, Reciprocating

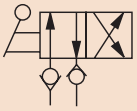

Air/Hydraulic Pump, Reciprocating 2-stage

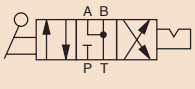

Air/Hydraulic Pump, Reciprocating
w/Air/Hydraulic Booster


Intensifier

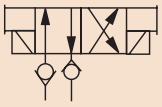
Control Valve Symbols

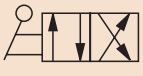

Directional Control Valve, Manual 4-Way,
2-Position w/Inlet Check Valve


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

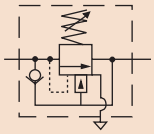


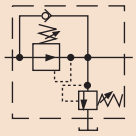
Directional Control Valve, Manual 4-Way,
3-Position Detented

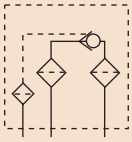

Directional Control Valve, Electric 4-Way,
2-Position w/Inlet and Outlet Check Valves
w/Manual Override

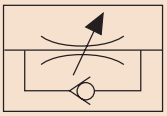

Directional Control Valve, Manual 4-Way,
2-Position

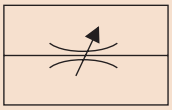
Control Valve Symbols


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

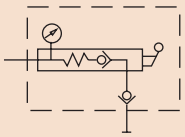

Pressure Reducing Valve, Adjustable w/Reverse Free-Flow Check Valve w/Over-Pressure Relief Valve

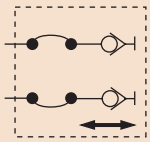

Check Valve, Pilot Operated w/Filters

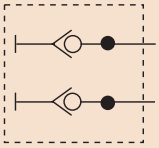

Flow Restrictor, Adjustable w/Reverse Free-Flow Check Valve

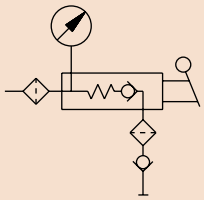

Flow Restrictor, Adjustable

Pallet Coupling Symbols


Manual Pallet Valve w/Gauge and Male Coupler

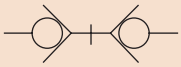

Base Unit, Automatic Pallet Coupling System


Pallet Unit


Manual Pallet Valve With Filters, Gauge and Coupler

Accessory Symbols

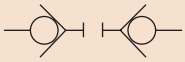

Hydraulic Coupler, Half-Male or Female


Hydraulic Coupler Set, Coupled

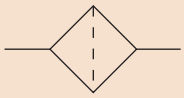
Accessory Symbols

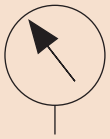

Check Valve

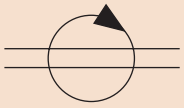

Flow Restrictor, Fitted w/Reverse Free-Flow Check Valve w/Filtered Orifice

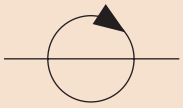

Hydraulic Coupler Set, Uncoupled

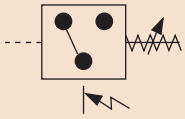

Accumulator, Gas Charged

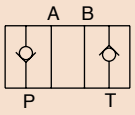

Filter


Pressure Gauge


Rotating Union, Dual Circuit


Rotating Union, Single Circuit


Pressure Switch, Adjustable



Check Valve Sub-Plate


Air Bleed Valve


Ball Valve

FREE Workholding Consultant Available to YOU!

Hytec offers you FREE workholding consultation service. Our experienced staff of manufacturing engineers and fixture designers will help you with your Hytec workholding application.

Hytec CAD Graphics Library Release 6.0

Designing fixtures has never been easier. This newly updated CAD Graphics Library is suitable for use on any compatible CAD system without creating or recreating graphic geometry. It is actually a computerized catalog of our standard clamping cylinders, clamps, work supports, valves, and pallet coupling devices.

Our designers have made sure you get a "clean" translation. They contain no text elements and all graphics are displayed in their simplest form on a single layer or level. There is even a "SCALE ME" file so you can check the scale in both English and metric after translation (where applicable). For simplicity, all file names are identical to part numbers in the Hytec catalog.

To receive your CAD Graphics Library
CALL HYTEC's Customer Service :
Tel.: 1-888-GO-HYTEC (1-888-464-9832)
or 507-455-7100
Fax: 1-800-288-7031 *or 507-455-7122*
or you can E-mail your request to:
hytec@hytec.com.

NOTE: "100002-" Library Nos. denotes 2-D Version.
"100003-" Library Nos. denotes 3-D Wireframe Version.

Graphics Library Features:

- Available in 2-D or 3-D wireframe.
- Release 6.0 contains all the latest Hytec fixture mounted components introduced with Hytec's new H-98 Catalog.
- Release 6.0 files are compressed so you are working with a limited number of diskettes.
- Release 6.0 gives you the option to access individual files without the need to download all files into your system.
- Now available in Autocad for direct usage on that system without the need for translation.

HYTEC Application Videos Available:

IVT289 - Quick Die Change
IVT293 - Hytec Applications
IVT390 - Auto Pallet Coupling Systems
IVT497 - Manual Pallet Valves
ORDER FROM CUSTOMER SERVICE

CAD GRAPHICS ORDERING INFORMATION

CAD Graphics Library No.		Format	Disk	
			Size (Inches)	Density (Bytes)
100002-ATO3HD	2-D	AutoCAD	3 ½	1.4 M High
100002-DXF3HD		DXF	3 ½	1.4 M High
100002-IGS3HD		IGES	3 ½	1.4 M High
100002-MIC3HD		MicroStation PC	3 ½	1.4 M High
100003-ATO3HD	3-D	AutoCAD	3 ½	1.4 M High
100003-DXF3HD		DXF	3 ½	1.4 M High
100003-IGS3HD		IGES	3 ½	1.4 M High
100003-MIC3HD		MicroStation PC	3 ½	1.4 M High

Power-Tech™ Surface Treatment

Power-Tech Features

- 56 Rc minimum surface hardness
- Passes ASTM B117-85 100 hour salt spray corrosion resistance tests

Benefits

- High corrosion resistance
- High wear resistance
- Anti-galling
- Retains lubricants
- Prevents bronze and other materials from sticking to surface
- Increases fatigue strength
- Increases impact strength
- Increases surface yield and tensile strength
- Improved abrasion and scratch resistance
- No appreciable dimension change

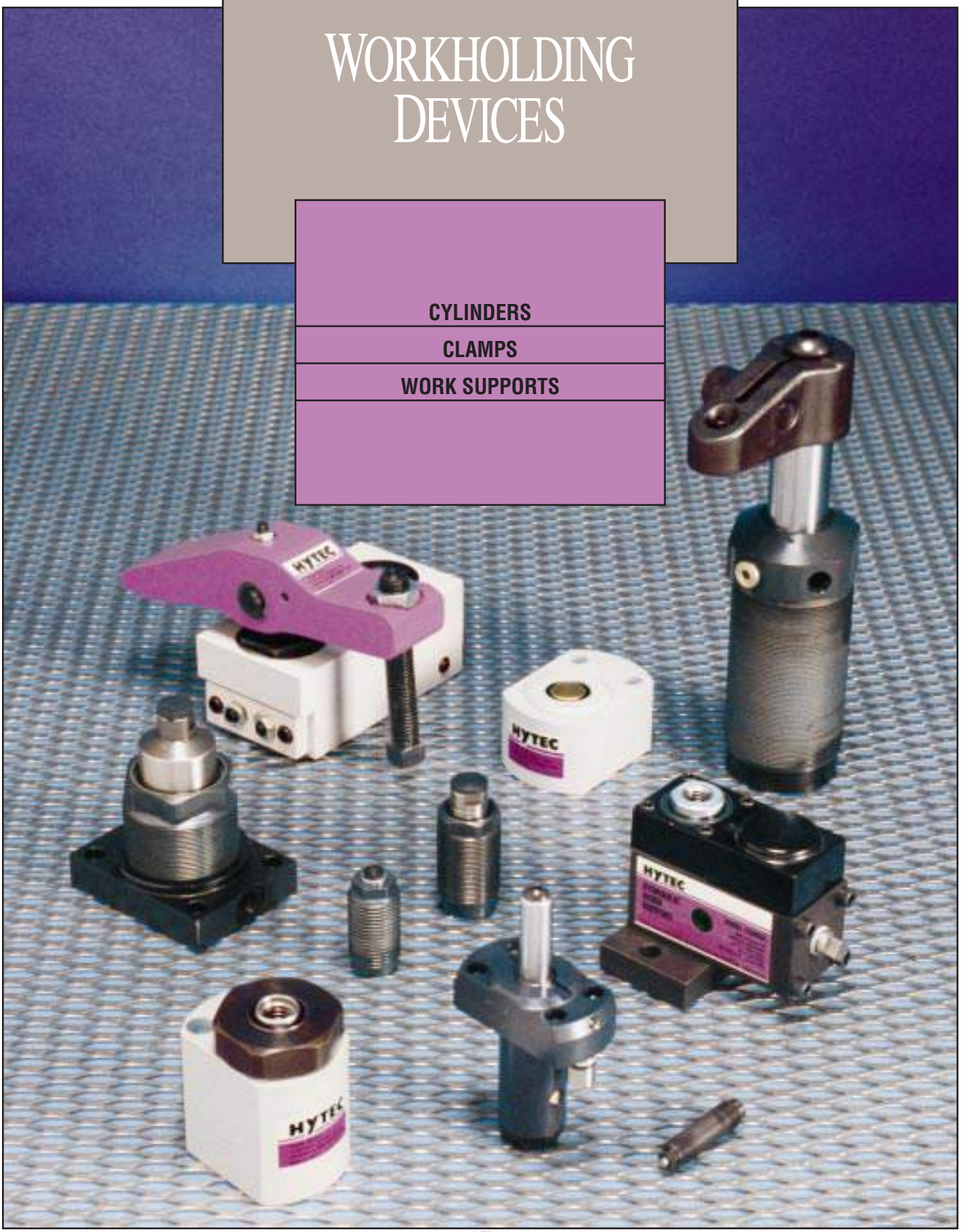
A proprietary HYTEC process for treating steel surfaces

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.

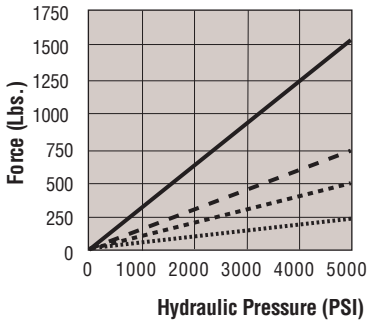
SPX HYTEC

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:

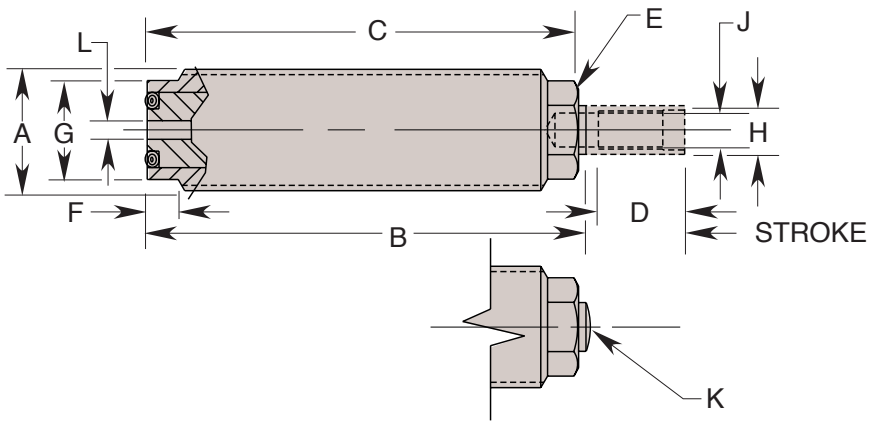
- Manifold or conventional mounting
- Heavy duty return springs
- Optional jam nuts, feeder caps and mounting brackets
- Threaded, plated piston rod
- Fine or coarse threads
- "O" ring seal included
- 100% corrosion resistant
- Single-acting
- Power-Tech treated body for long wear and corrosion resistance

Note: See page 27 for threaded inserts. See page 21 for accessories.



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.

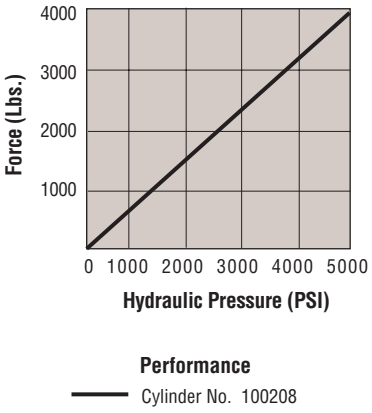
Threaded Body Cylinders

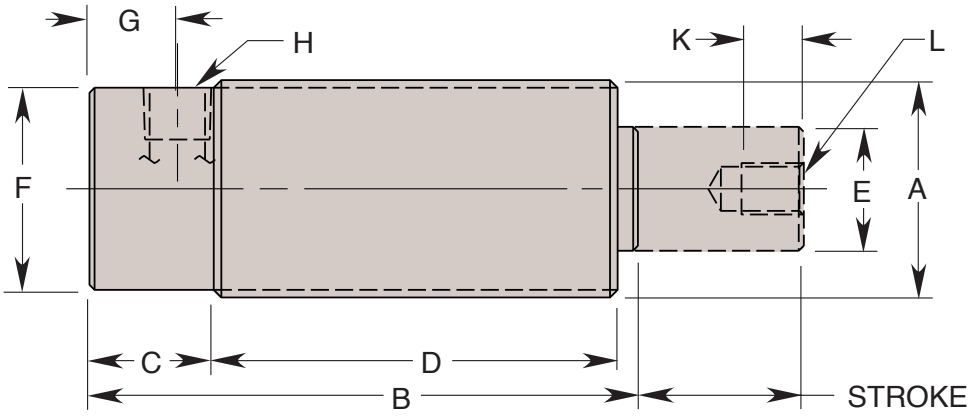
This is our highest capacity cylinder in the threaded body style. This premium grade cylinder includes a gland bearing, wiper seal, and extension style return spring. Its plated, threaded piston rod resists wear and corrosion and accepts Hytec threaded inserts or custom made attachments. It can be mounted 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 ⅛" NPT side port for making hydraulic connections.

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 27 for threaded inserts.
See page 21 for jam nut.

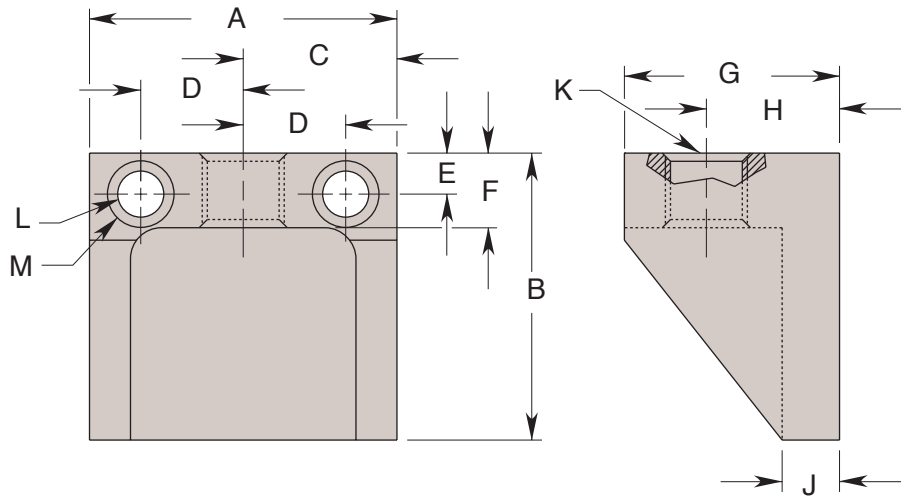




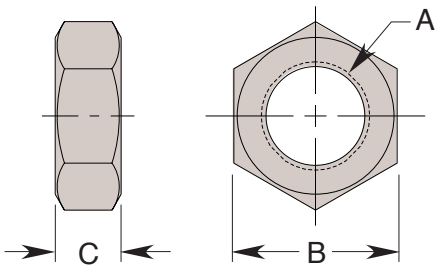
Cat. No.	Specifications				Dimensions (In Inches)									
	*Force (Lbs.)	Stroke (In.)	Eff. Area (Sq. In.)	Oil Cap. (Cu. In.)	A Thread Size	B	C	D	E Dia.	F Dia.	G	H Thread Size	K Thread Depth	L Thread Size
100208	3,927	1.000	.785	.785	1 5/16-16UN	3.312	.750	2.438	.750	1.219	.531	⅛ NPTF	.375	5/16-24 UNF

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

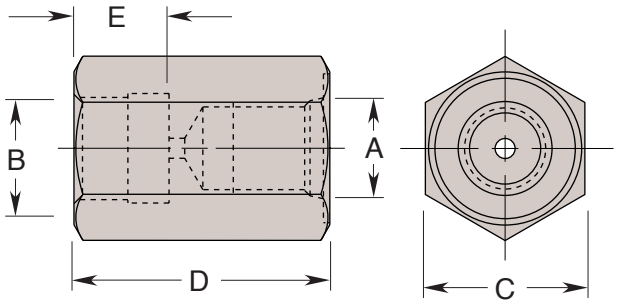
Foot Mounting Bracket



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.	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.

Cylindrical Body Cylinders

These 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 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.

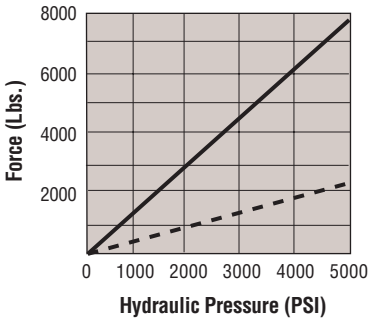
New threaded piston rods make it easier to use the cylinders in a wide variety of applications because they can now be used with Hytec threaded inserts.

Mount the cylinders by simply inserting them into a drilled hole, secure with snap rings (included) and use a feeder cap. Feeder caps have both side and end ports for plumbing variations. Or, make use of the manifold mounting option and mount directly on a flat surface. Optional mounting brackets available.

Features:

- Manifold or conventional mount
- Threaded, plated piston rod
- Double-acting
- Includes snap rings (2) and "O" ring port seals (2)

Note: See page 27 for threaded inserts.

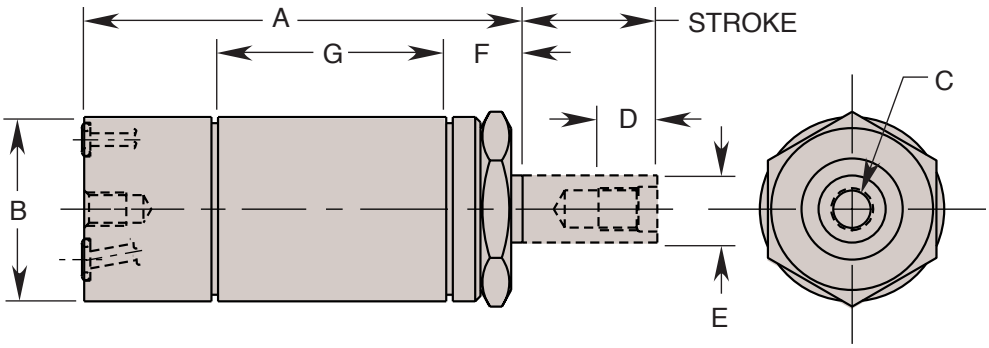


Performance

Cylinder Advance

- - - Cylinder Nos. 100043 & 100044

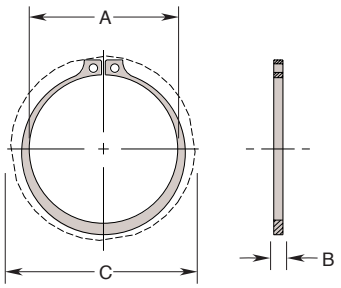
——— Cylinder Nos. 100049 & 100050



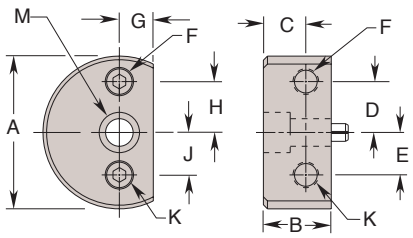
Cat. No.	Specifications							Dimensions (In Inches)							
	*Force (Lbs.)		Stroke (In.)	Eff. Area (Sq. In.)		Oil Cap. (Cu. In.)		A	B Max. Dia.	C Thread Size	D Thread Depth	E Dia.	F	G Min.
	Adv.	Ret.		Adv.	Ret.	Adv.	Ret.							
100043B	2,210	1,225	.500	.442	.245	.221	.123	2.750	1.368	5/16-24 UNF	.438	.500	.562	1.687
100044B			1.000			.442	.245	3.250						
100049B	7,425	4,415	.500	1.485	.883	.742	.442		2.247			.875	.595	2.125
100050B			1.000			1.485	.883	3.750						

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

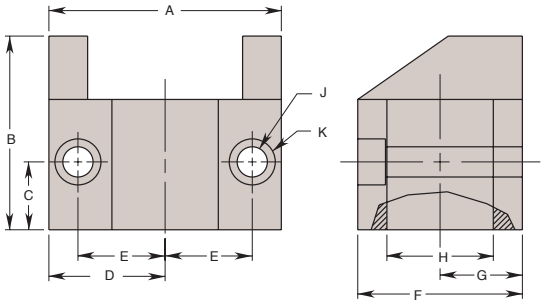
Snap Ring



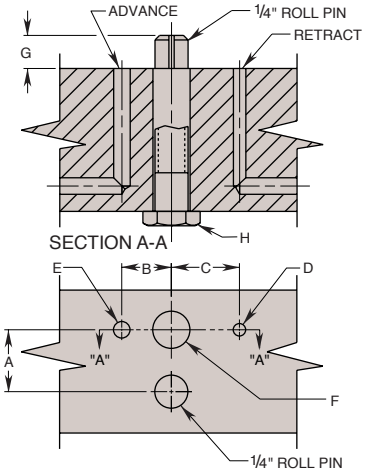
Feeder Cap



Foot Mounting Bracket



Manifold Mounting Information



FOOT MOUNTING BRACKET												
Cat. No.	Specifications	Dimensions (In Inches)										
	Used with Cat. No.	A	B	C	D	E	F	G	H Dia.	J Dia.	K Dia.	K Depth
400013	100043B 100044B	3.000	2.500	.875	1.500	1.125	2.125	1.062	1.375	.406	.600	.353
400015	100049B 100050B	4.500	3.000	1.075	2.250	1.750	3.000	1.500	2.250	.547	.812	.562

NOTE: 5,000 psi max. operating pressure

FEEDER CAPS												
Cat. No.	Dimensions (In Inches)											
	Used with Cat. No.	A Dia.	B	C	D	E	F Retract Port	G	H	J	K Advance Port	M Dia.
100163	100043B 100044B	1.438	1.000	.625	.375	.375	1/8 NPTF	.312	.438	.438	1/8 NPTF	.281
100165	100049B 100050B	2.250			.750	.625		.500	.750	.625		.406

NOTE: 5,000 psi max. operating pressure. Mounting Screw included.

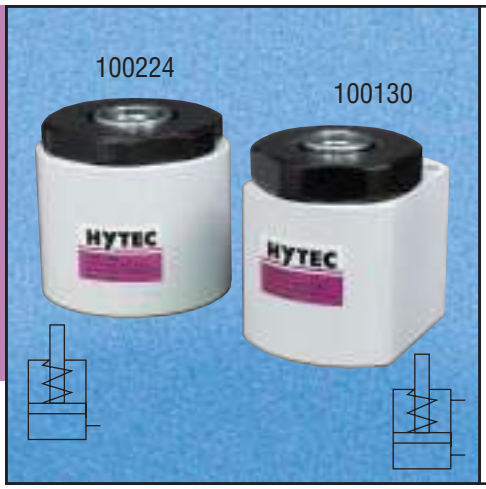
*SNAP RINGS				
Cat. No.	Dimensions (In Inches)			
	Used With Cat. No.	A Nominal Shaft Dia.	B	C Clearance Dia.
300084	100043B 100044B	1.375	.050	1.800
300086	100049B 100050B	2.250	.078	3.180

NOTE: * Two each included with each cylinder.

MANIFOLD MOUNTING INFORMATION								
Dimensions (In Inches)								
Used with Cat. No.	A	B	C	D Dia.	E Dia.	F Dia.	G	H Mounting Screw
100043B 100044B	.468	.375	.515	.094	.125	.281	.250	†1/4-20 UNC
100049B 100050B	.812	.531	.906		.250	.406		††3/8-16 UNC

NOTE: † .312 min. cylinder thread depth.
†† .437 min. cylinder thread depth.

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:

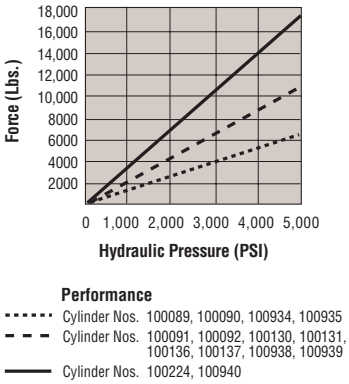
- Single- or double-acting
- Multiple mounting options
- Heavy-duty return spring
- Converts manual clamping to hydraulics
- Plated, threaded piston rods

Center-hole cylinder No. 100224 is a single- acting, spring return cylinder, designed for larger die holding and strap clamp applications. Its threaded piston accepts 1"–8 UNC studs or attachments.

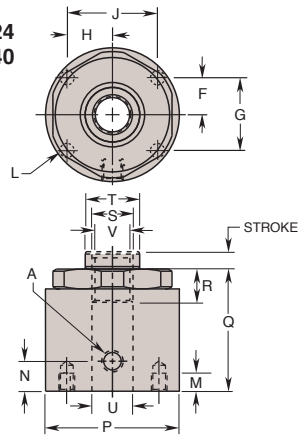
Features:

- 1"–8 UNC threaded center hole
- Single-acting, spring return
- Plated piston rod
- Heavy-duty return spring
- Converts manual clamping to hydraulics

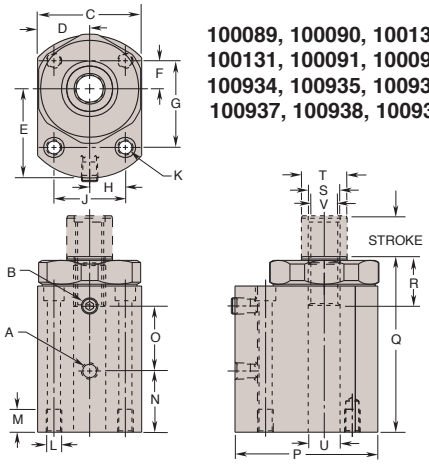
Note: See page 27 for threaded inserts.



100224
100940



100089, 100090, 100130, 100131, 100091, 100092, 100934, 100935, 100936, 100937, 100938, 100939



SAE Ports			NPT Ports			Specifications			
Cat. No.	A Adv. Port Thd. Size	B Ret. Port Thd. Size	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	100089	1/8 NPTF	1/8 NPTF	6,630	.500	1.326	.663
100935			100090				1.000		1.326
100936			100130			10,735	.500	2.147	1.074
100937			100131				1.000		2.147
100938			100091				.500		1.074
100939			100092				1.000		2.147
100940		—	100224	1/4 NPTF	–	17,120	.375	** 3.424	** 1.284

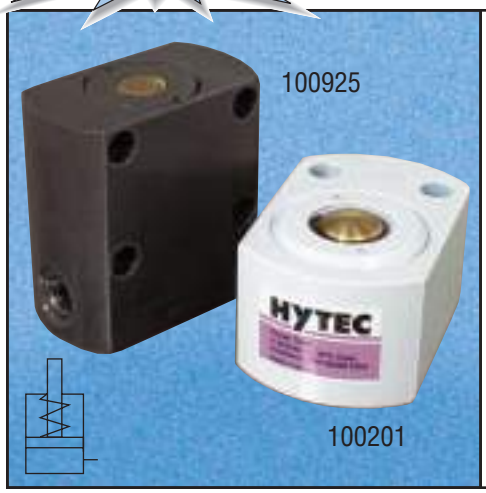
Cat. No.		Dimensions (In Inches)									
SAE Ports	NPT Ports	C	D	E	F	G	H	J	K Dia.	L Thd. Size	M Thd. Depth
100934	100089	2.000	1.000	1.750	.562	1.812	.625	1.250	.322	3/8-16UNC	.562
100935	100090										
100936	100130	2.550	1.275	2.188	.688	2.125	.875	1.750			
100937	100131										
100938	100091										
100939	100092										
100940	100224	–	–	–	.972	1.944	.972	1.944	–	1/4-20UNC	.312

Cat. No.		Dimensions (In Inches)								
SAE Ports	NPT Ports	N	O	P Dia.	Q	R Piston Thd.	S Thd. Size	T Dia.	U Dia.	V Inside Dia.
100934	100089	.938	1.000	2.812	3.203	1.000	5/8-11UNC	.750	.516	.547
100935	100090	1.438	1.500		4.203					
100936	100130	1.000	1.094	3.500	3.304	1.188	3/4-10UNC	1.125	.781	.656
100937	100131	1.500	1.594		4.304					
100938	100091	1.000	1.094		3.304	1.375	7/8-9UNC		.906	.781
100939	100092	1.500	1.594		4.304					
100940	100224	.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

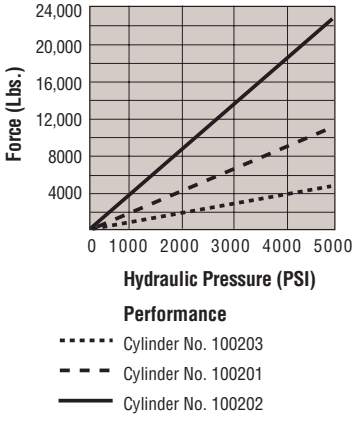


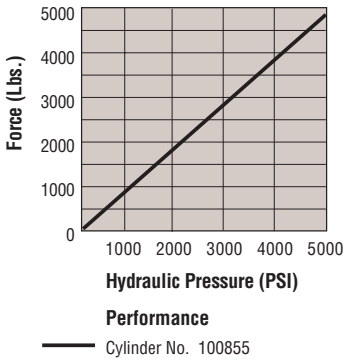
These single-acting, spring-return cylinders are designed for applications where high force and low overall height are requirements. Ideal for clamping fixtures where space is limited. The crowned piston makes them perfect for powering strap clamps, linkages or for direct contact with the workpiece. 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.

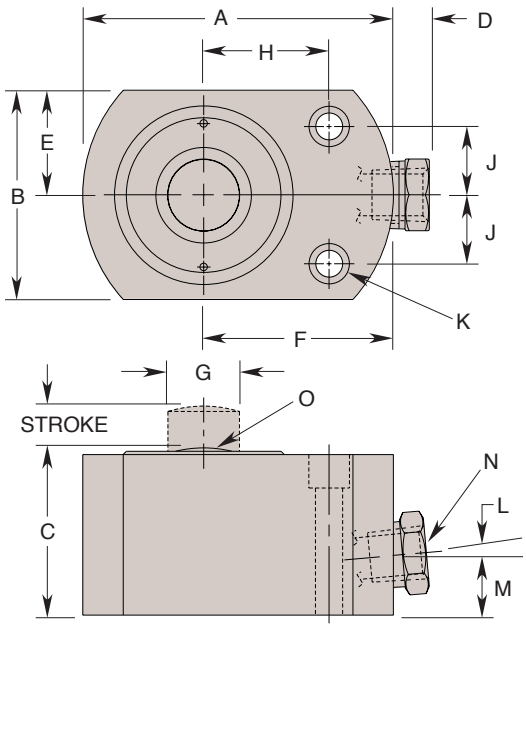
Features:

- 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

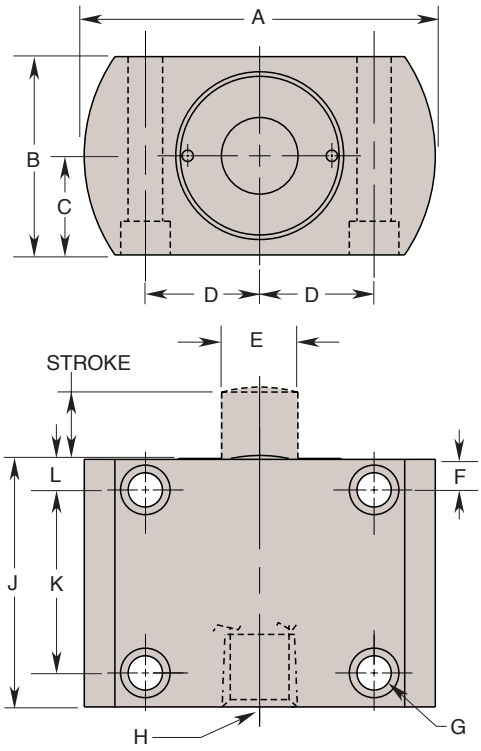




100201, 100202, 100203



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	2.030	.281	1/4NPTF	2.062	1.500	.282	–	–
100925		.875		.870						2.970			3.002			1/4NPTF	.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	¼ 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.

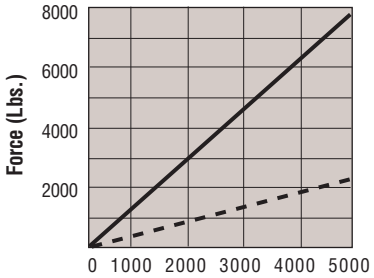
The cylinders can be mounted from top or bottom using a single cap screw and either the thru-hole on the top or the tapped hole in the bottom. A locating hole in the bottom can be used to prevent rotation when necessary.

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.

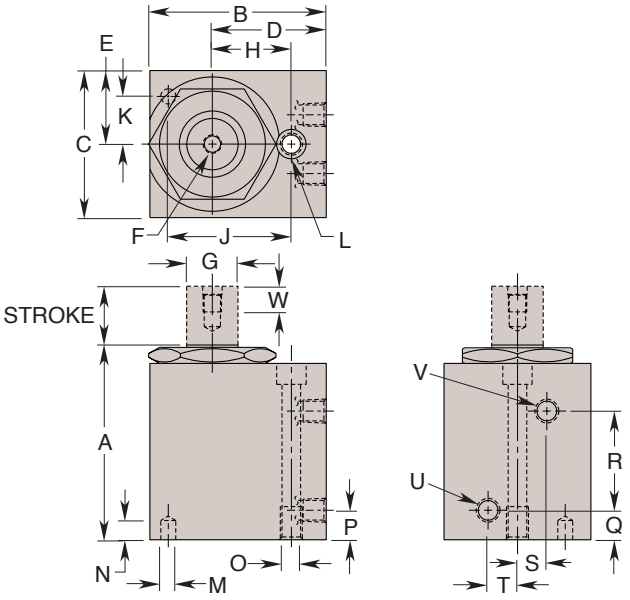
Note: See page 27 for threaded inserts.



Performance

- - - Cylinder Nos. 100055 & 100056

——— Cylinder Nos. 100061 & 100062

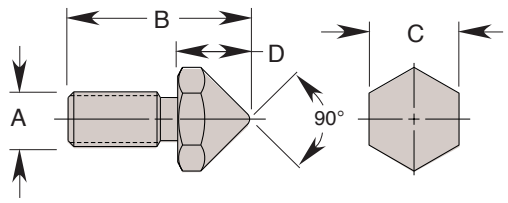


Cat. No.	Specifications							Dimensions (In Inches)													
	*Force (Lbs.)		Stroke (In.)	Eff. Area (Sq. in.)		Oil Cap. (Cu. In.)		A	B	C	D	E	F Thread Size	G Dia.	H	J	K	L Dia.	M Dia.	N	O Thread Size
	Adv.	Ret.		Adv.	Ret.		Ret.														
100055B	2210	1225	.500	.442	.245	.221	.123	2.312	2.500	1.500	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

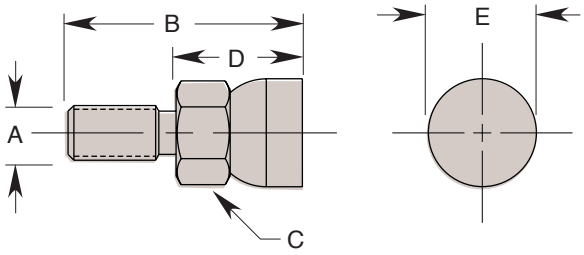
Cat. No.	Dimensions (In Inches)							
	P Min.	Q	R	S	T	U Advance Port	V Retract Port	W Thread Depth
100055B	.500	.375	1.000	.344	.344	1/8-NPTF	1/8-NPTF	.438
100056B	.500	.375	1.500	.344	.344	1/8-NPTF	1/8-NPTF	.438
100061B	.625	.500	1.188	.500	.500	1/8-NPTF	1/8-NPTF	.438
100062B	.625	.500	1.688	.500	.500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

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

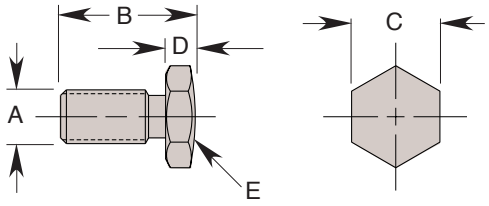
Pointed Threaded Insert
(500161, 500164)



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

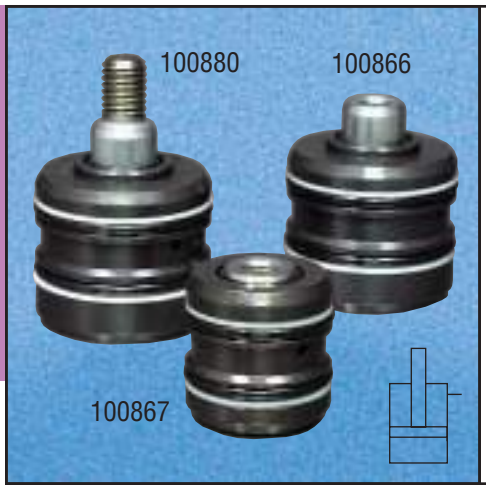
TOGGLE PAD THREADED INSERTS

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

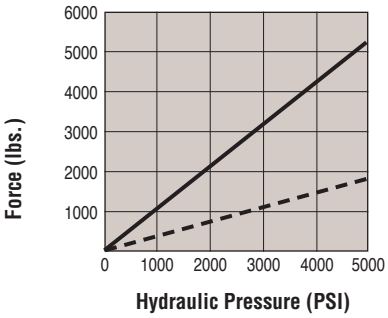


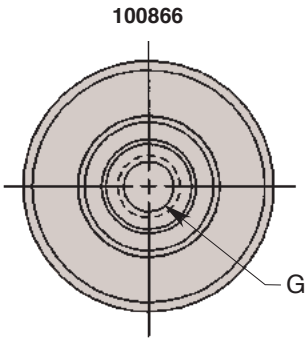
These "Pull" cylinders retract when hydraulically pressurized. They were created to permit the user to design a cylinder into a fixture while maintaining the replaceability and long life of a heat treated, corrosion resistant cylinder body. Typical applications of these cylinders include installation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

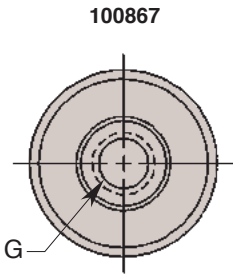
These pull cylinders were designed for cartridge mounting in a cavity supplied by the user. The required cavity is simply a cylindrical bore with a properly deburred pressure port intersecting it, providing the hydraulic fluid connection. They are for single acting systems only where the force for cylinder 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)

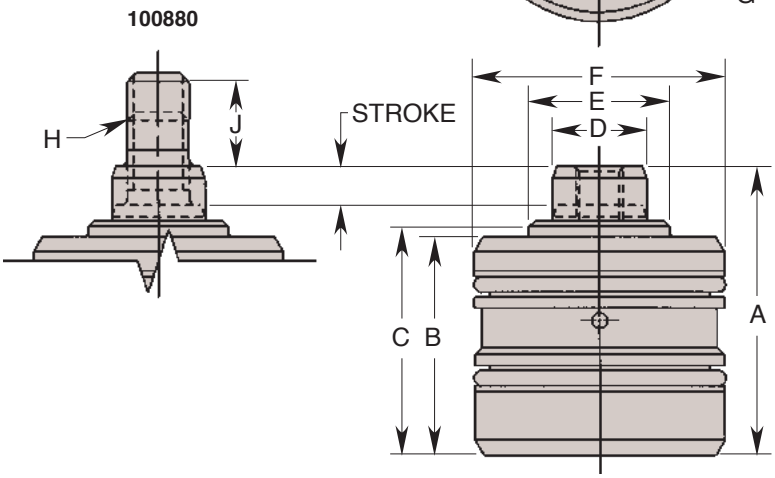
Features:

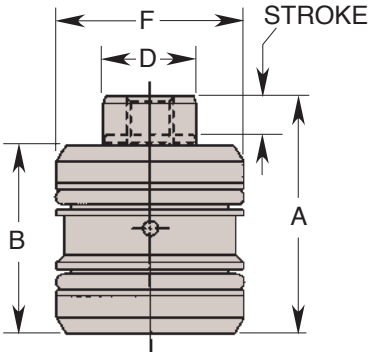
- Compact design
- Manifold mounting eliminates tubing
- Threaded, plated piston rod
- Power-Tech™ treated body for long wear and corrosion resistance
- 5,000 psi maximum pressure rate
- Rod wiper to exclude contaminants
- Single-Acting







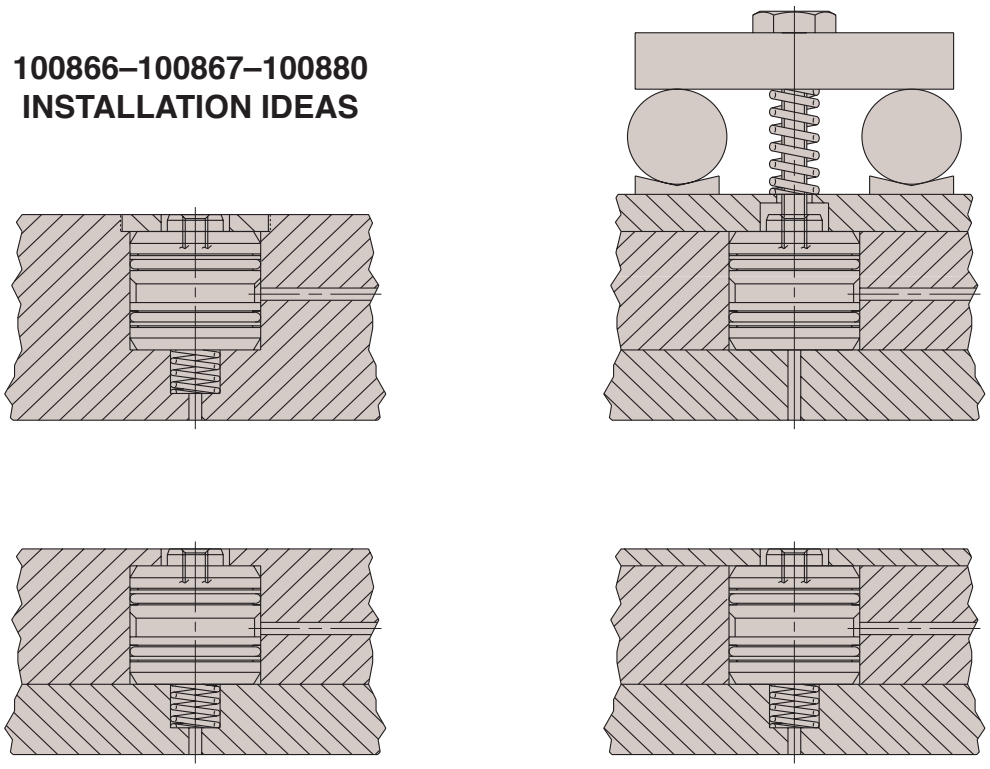




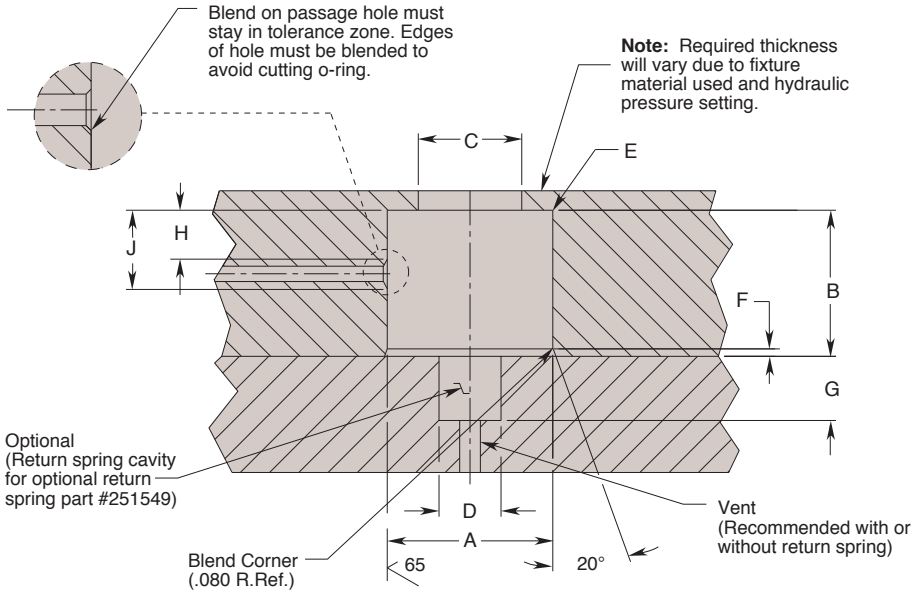
Cat. No.	Specifications				Dimensions (In Inches)									
	*Force (Lbs.)	Stroke (in.)	Eff. Area (Sq. In.)	Oil Cap. (Cu. In.)	A	B	C	D Dia.	E Dia.	F Dia.	G Thread Size	G Thread Depth	H Thread Size	J
100866	5,215	.312	1.043	.325	2.312	1.750	1.875	.750	1.125	2.000	⅜-16 UNC	.500	—	—
100867	1,740		.348	.108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

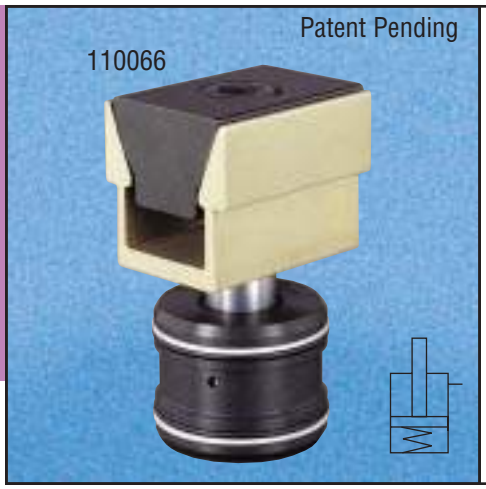


Cat. No.	Cavity Dimensions							Oil Passage Location	
	A Dia.	B Cylinder Body Cavity	C Dia.	D Dia.	E Chfr. / Rad. Max.	†F	G	*H Min.	*J Max.
100866	2.000 2.003	1.755 1.765	1.750 1.135	.744 .754	.065	.080 .100	.760 .790	.485	1.020
100867	1.500 1.503	1.500 1.510	1.250 .780					.510	.970
100880	2.000 2.003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

NEW



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.

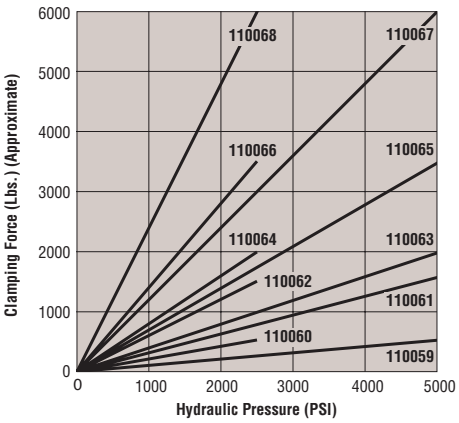
The pull cylinders are designed for cartridge mounting in a cavity supplied by the fixture builder. The required cavity is simply a cylindrical bore with a properly deburred pressure port intersecting it, providing the fluid connection. Where possible, pins inserted in the back of the piston are provided.

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.

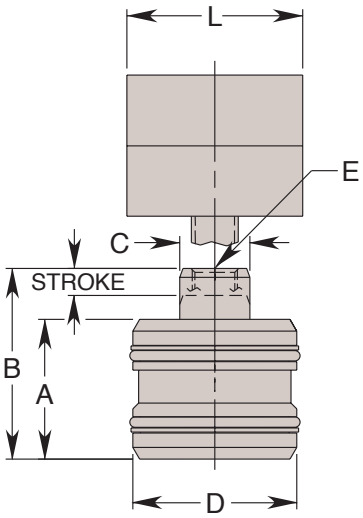
An external stop prevents over-travel of the clamp if actuated without a workpiece in place.

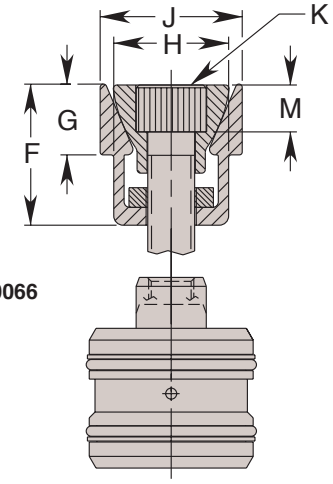
Features:

- Minimal space requirements
- Reduces repetitive motion injuires
- 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



Performance
110059 — 110068

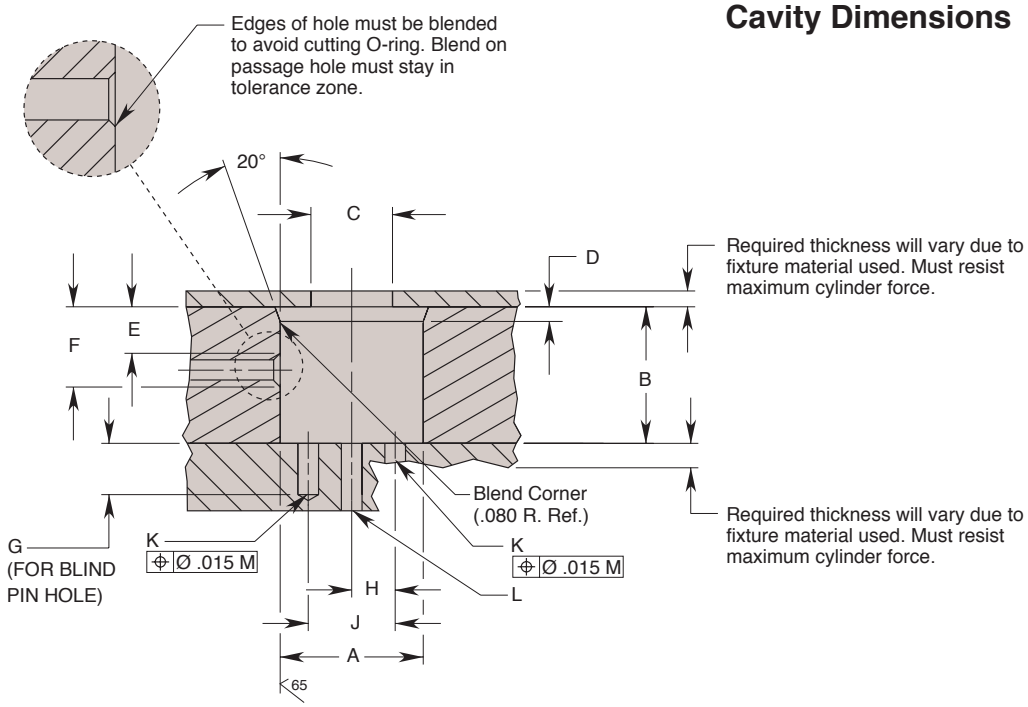




Clamp & Cylinder Assembly Cat. No.	Clamp Assembly Specifications			Cylinder Specifications			Cylinder Dimensions (In Inches)					
	Operating Pressure Max. (psi)	Holding Force Max. (Lbs.)	Clamp Spread Max.	Stroke (In.)	Eff. Area (Sq. in.)	Oil Cap. (Cu. in.)	A	B	C	D	E Piston Thread Size	E Piston Thread Depth
110059	5,000	500	.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



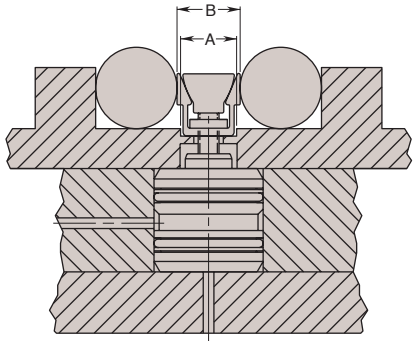
Cat. No.	Cavity Dimensions (In Inches)				Oil Passage Location (In Inches)		Cavity Dimensions (In Inches)				
	A Dia.	B Cyl. Body Length Max.	C Dia.	†D	E Min.	F Max.	G Min.	H	J	K Dia.	*L Vent Dia. Min.
110059	.812 .815	1.120 1.130	.387 .577	.125 .145	.475	.728	—	—	—	—	.125
110060	1.187 1.190		.572 .911		.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

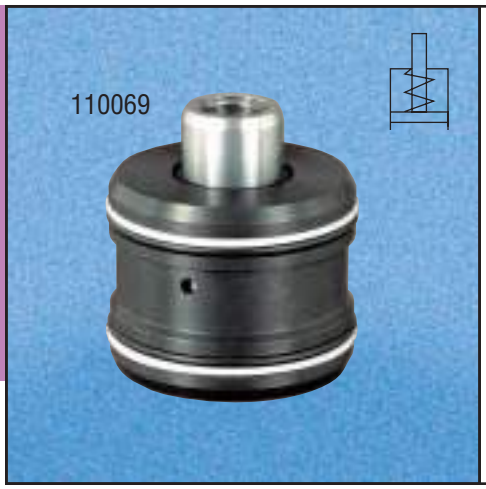
Cat. No.	Dimensions (In Inches)	
	A Groove Width	B Workpiece Spacing
500184	.440	.500
500185	.665	.750
500186	.850	1.000
500187	1.245	1.500
500188	1.655	2.000

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



Cartridge Pull Cylinders

NEW

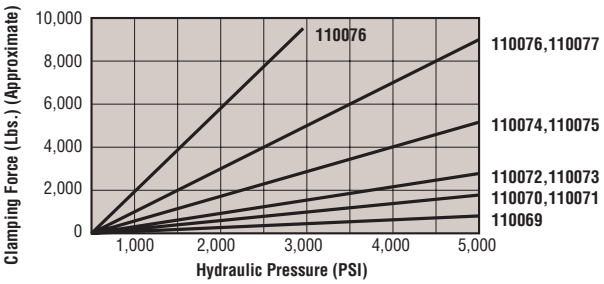


These cylinders retract when hydraulically pressurized to exert a pulling force on clamping elements or mechanisms. For straight pull applications only, they allow the user to design a cylinder into a fixture while maintaining the replaceability and long life of a heat treated, corrosion resistant cylinder 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.

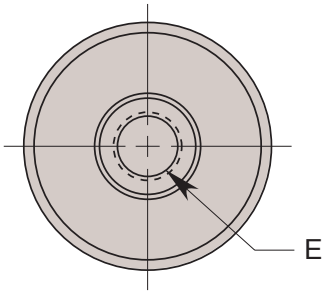
Features:

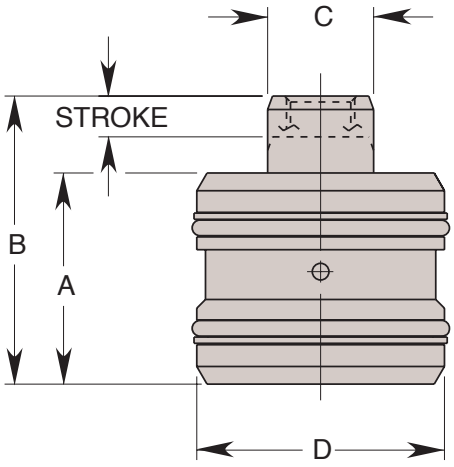
- Minimal space requirements
- 5,000 psi max.
- Rod wiper excludes contaminants
- Manifold mounting eliminates exposed tubing
- Plating & Power-Tech™ processes resist corrosion
- Single-acting, spring-return
- Return spring included
- Power-Tech™ treated body for long wear and corrosion resistance



Performance

—— 110069 — 110078

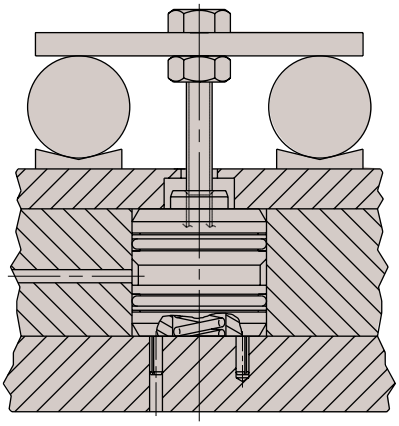


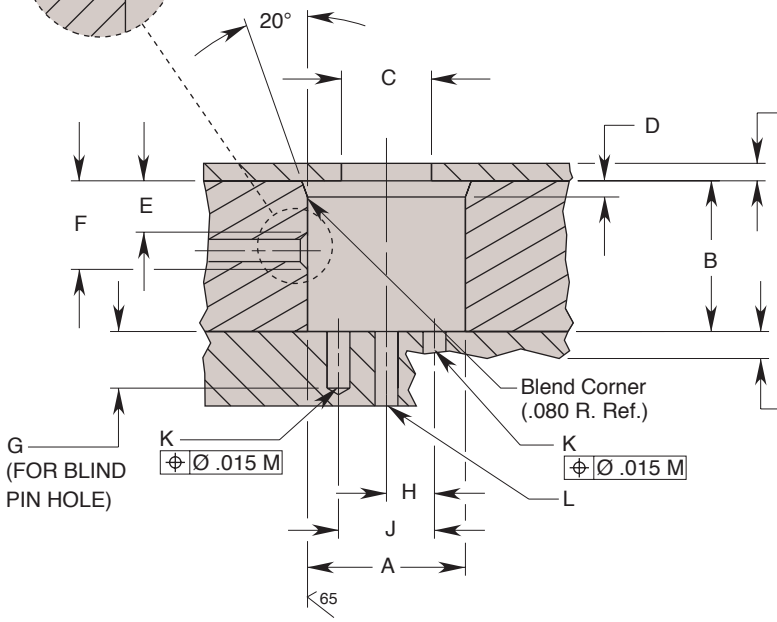


Cat. No.	Specifications				Dimensions (In Inches)					
	Force (Lbs.)	Stroke (In.)	Eff. Area (Sq. In.)	Oil Cap. (Cu. In.)	A	B	C	D	E Piston Thread Size	E Piston Thread Depth
110069	685	.123	.137	.017	1.115	1.210	.373	.810	8-32 UNC	.320
*110070	1,765		.353	.043			.560	1.185		
110071		.178		.063	1.240	1.325			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			⅝-11 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

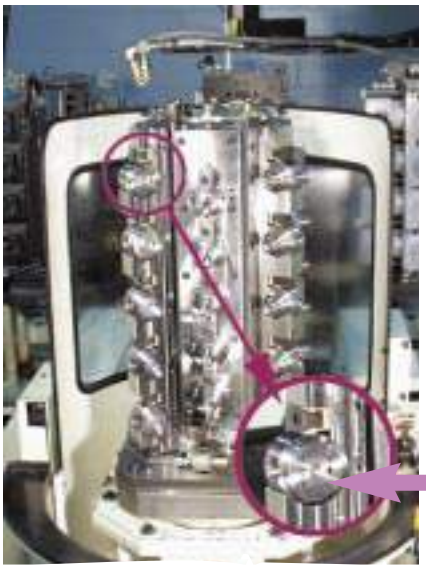




Cat. No.	Cavity Dimensions (In Inches)				Oil Passage Location (In Inches)		Cavity Dimensions (In Inches)				
	A Dia.	B Cyl. Body Cavity	C Dia.	†D	E Min.	F Max.	G Min.	H	J	K Dia.	*L Vent Dia. Min.
110069	.812 .815	1.120 1.130	.387 .577	.125 .145	.475	.728	—	—	—	—	.125
110070	1.187 1.190		.572 .911		.427	.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.

Uniforce® Hydraulic Clamp for a variety of fixturing applications



A

B

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.

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 unclamped 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. For more information refer to brochure H9103.

Swing/Pull Clamps - 365 lb. Capacity

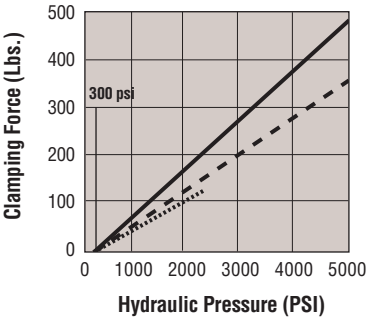
NEW

Available in both single-and double-acting models, these clamp's top port design allows easy access to plumbing connections. During clamp retraction, the cylinder rod rotates 90 degrees causing the clamping arm to swing into position. Clamping must then take place as the rod continues to retract in a straight line, pulling the arm against the workpiece.

The optional arms clamp securely to the piston rod to reduce fatigue and deflection. Arms may be easily modified or replaced with custom arms. The breather plug on single acting models may be replaced with tubing for remote venting. Special rod wiper seals and a unique drainage system channels contaminants away from the clamp. Both the single-acting and double acting models share the same outside dimensions making them completely interchangeable. Available with 90 degree left hand or right hand rotation or with guided straight pull.

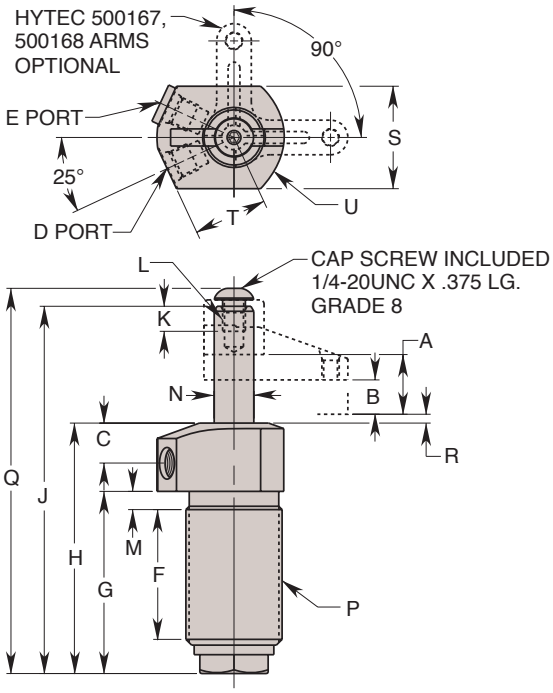
Features:

- 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	Single-Acting	LH (Counter Clockwise)	365	.098	—	.065	—	.638	.320	.480	5/16-24 UNF SAE-2	Breather Plug †5/16-24 UNF SAE-2
110002		RH (Clockwise)										
110003		Straight Pull										
110004	Double-Acting	LH (Counter Clockwise)			.248		.163					5/16-24 UNF SAE-2
110005		RH (Clockwise)										
110006		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														

Note: * With 1" arm at 5,000 psi max. operating pressure. Internal cam may be removed for an unguided straight pull. See page 53 for maximum operating speeds and rotation options.
† Do not pressurize - single acting only.
†† See page 54 for custom arm mounting.

NEW

Swing/Pull Clamps - 365 lb. Capacity

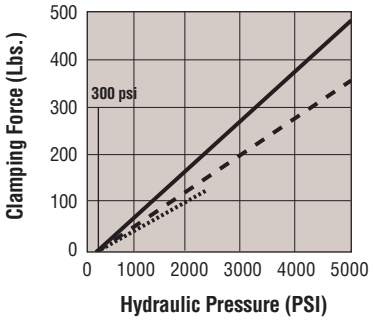
SPX HYTEC

This cartridge style swing/pull clamp shares all of the features of Hytec's other "Live Roller™" clamps. Its unique body design allows it to be manifold mounted where it will take up an absolute minimum of fixture space. Simply thread this clamp into a modified SAE O-ring port and the hydraulic connection is made for you automatically. Exposed plumbing that collect chips and large mounting flanges that take up valuable fixture space are eliminated. The mounting port can be cut with standard tooling and is simple to manufacture because the threads are at the top of the hole, not buried deep down in the bore.

Available in single-acting and double-acting versions, each with 90 degree left hand or right hand rotation or with guided straight pull.

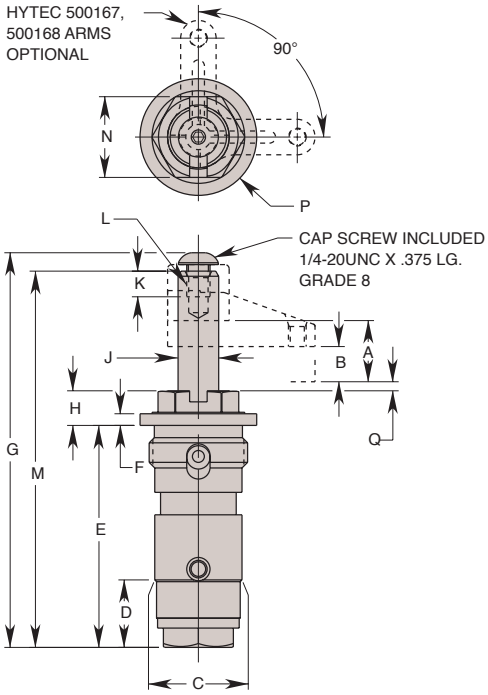
Features

- 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.

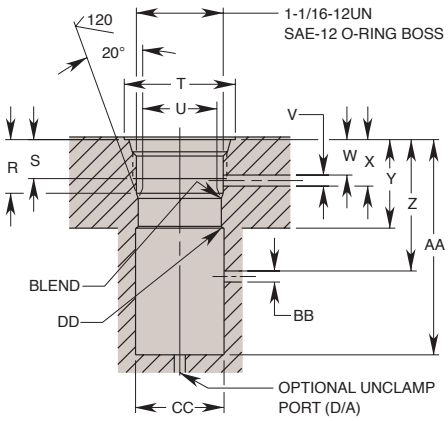


Performance

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



Cavity Detail



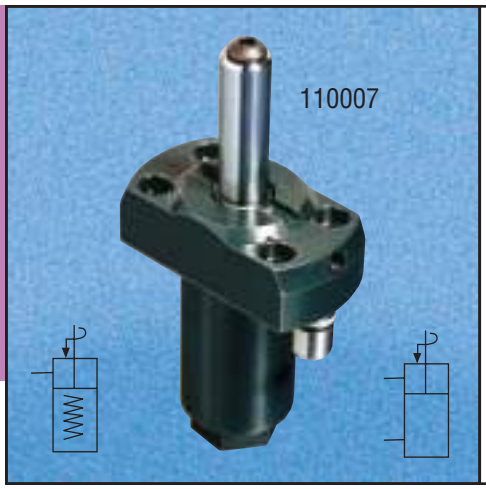
Cat. No.	Oper.	Specifications						Dimensions (In Inches)										
		Swing Direction	*Force (Lbs.)	Eff. Area (Sq. In.)		Oil Cap. (Cu. In.)		A Total Stroke	B Clamping Stroke	C Dia.	D	E	F	G	H	††J Dia.	K Min. Thd.	L Thd. Size
				Clamp	Unclamp	Clamp	Unclamp											
110013	Single-Acting	LH (Counter Clockwise)	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 54 for custom arm mounting. See page 53 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 Clamps - 365 lb. Capacity

NEW



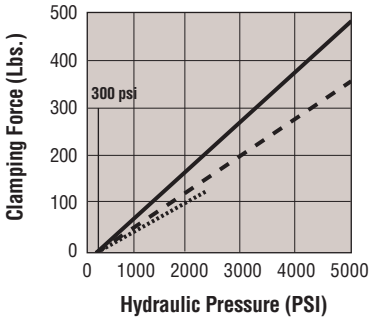
This manifold mount swing/pull clamp shares all of the features of Hytec's other "Live Roller™" clamps. Its unique body design allows simple, no-tool hydraulic connections and eliminates fittings and tubing that disrupt coolant flow and collect chips. The optional arms clamp securely to the piston rod to reduce fatigue and deflection. Arms may be easily modified or replaced with custom arms. Special rod wiper seals and a unique drainage system channels contaminants away from the clamp.

During clamp retraction, the cylinder rod rotates 90 degrees causing the clamping arm to swing into position. Clamping then must take place as the rod continues to retract in a straight line, pulling the arm against the workpiece.

Available 90 degree left hand or right hand rotation or with guided straight pull.

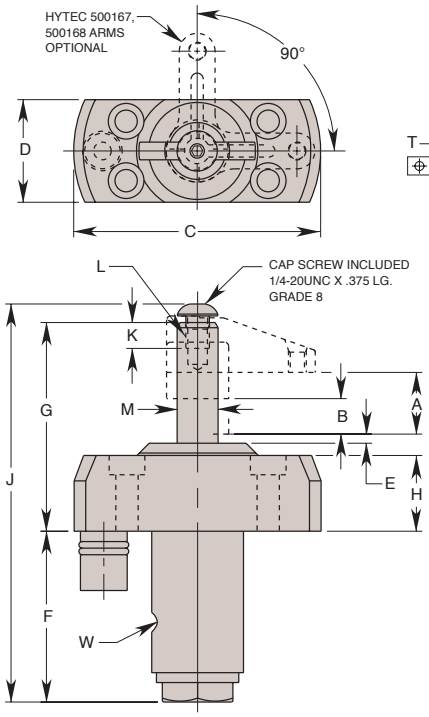
Features

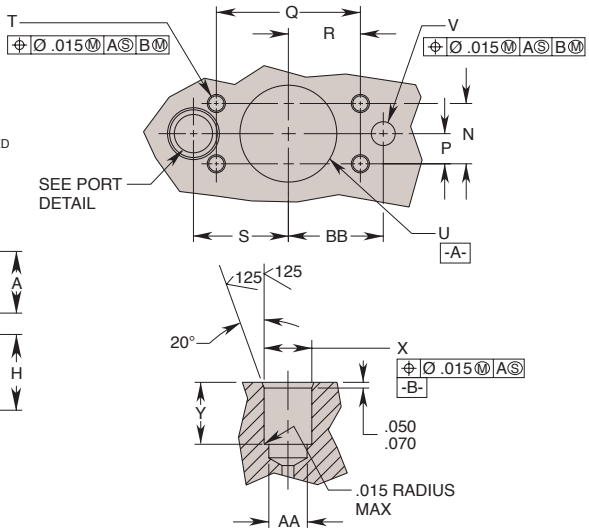
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Manifold mountable
- Unique "Live Roller" swing mechanism for increased service life
- Power-Tech™ heat treated body and hardened cam for long wear and corrosion resistance
- Single-acting
- Straight pull capacity 480 lbs. 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: 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 54 for custom arm mounting. Internal cam may be removed for an unguided straight pull.
See page 53 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 - 750 lb. Capacity

SPX HYTEC®

Available in both single and double-acting models, the clamp's top port design allows easy access to plumbing connections. The breather plug on single-acting models may be replaced with tubing for remote venting. Contaminants are channeled away from the clamp by special rod wiper seals and a unique drainage system.

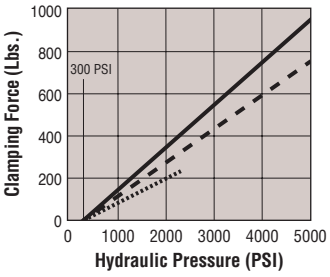
During clamp retraction, the cylinder rod rotates 90 degrees causing the clamping arm to swing into position. Clamping then takes place as the rod continues to retract in a straight line, pulling the arm against the workpiece. The optional arms clamp securely to the piston rod to reduce fatigue and deflection. Arms may be easily modified or replaced with custom arms.

Both the single and double-acting models share the same outside dimensions, making them completely interchangeable.

Available with 90 degree left or right hand rotation or with guided straight pull.

Features:

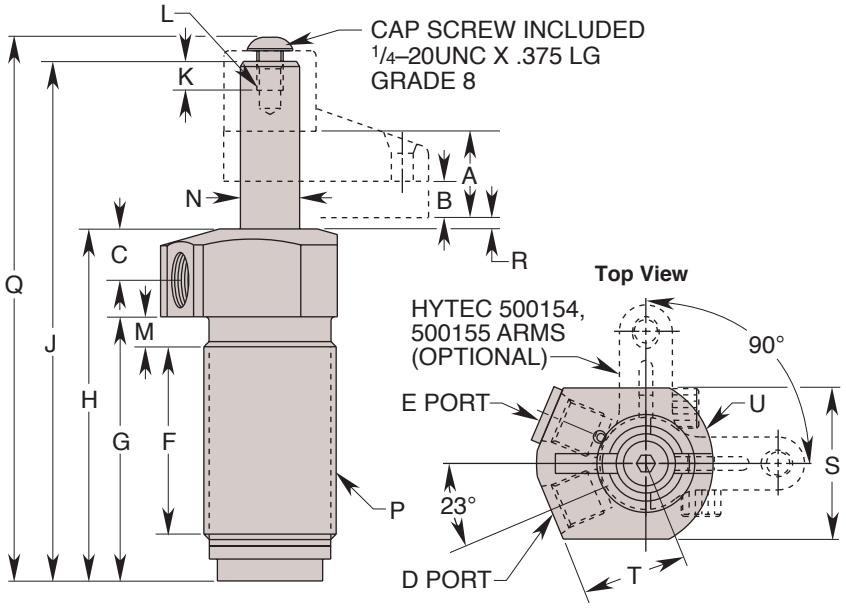
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Unique "Live Roller™" swing mechanism for increased service life
- Power-Tech™ treated body and hardened cam for long wear and corrosion resistance
- Single and double acting models are dimensionally interchangeable
- Straight pull cap. 950 lbs. at 5,000 psi max.



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

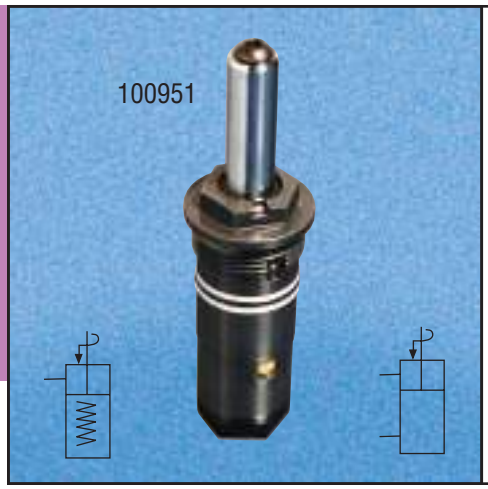


Cat. No.	Specifications							Dimensions (In Inches)					
	Oper.	Swing Direction	*Force (Lbs.)	Eff. Area (Sq. In.)		Oil Cap. (Cu. In.)		A Total Stroke	B Clamping Stroke	C	D Clamp Port	E Unclamp Port	F
				Clamp	Unclamp	Clamp	Unclamp						
100945	Single-Acting	Left Hand (Counter Clockwise)	750	.195	–	.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 54 for custom arm mounting.
Internal cam may be removed for an unguided straight pull.
See page 53 for maximum operating speeds.

Swing/Pull Clamps - 750 lb. Capacity



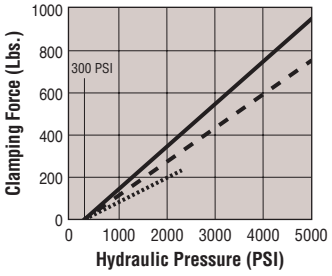
This cartridge style swing/pull clamp shares all the features of Hytec's other "Live Roller®" clamps. Its unique body design allows it to be manifold mounted where it will take up an absolute minimum of fixture space. Simply thread this clamp into a modified SAE O-ring port and the hydraulic connection is made for you automatically. This eliminates exposed plumbing that collects chips and large mounting flanges that take up valuable space.

The mounting port can be cut with modified standard tooling and is simple to manufacture because the threads are at the top of the hole, not buried deep down in the bore.

Available in single and double-acting versions, each with 90 degree left hand or right hand rotation or with guided straight pull.

Features:

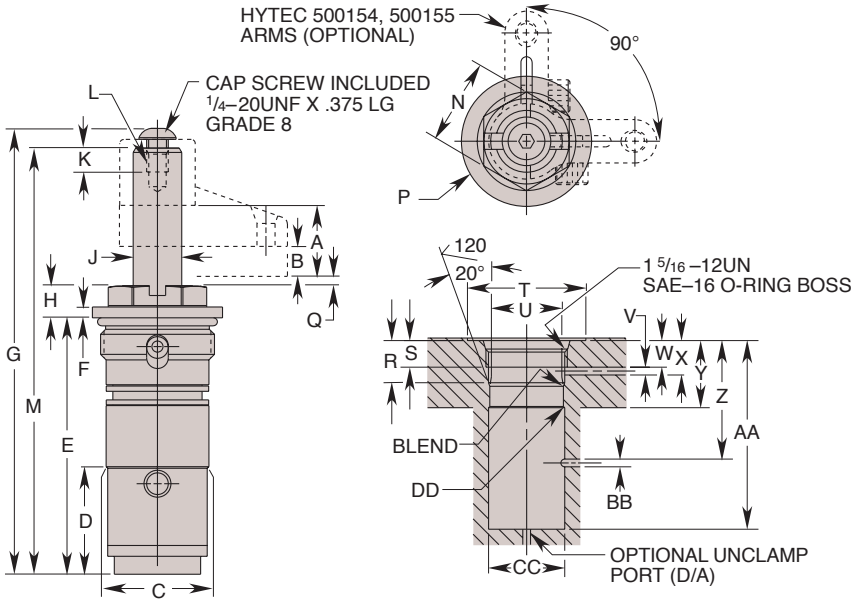
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Manifold mountable
- Unique "Live Roller" swing mechanism for increased service life
- Power-Tech™ treated body and hardened cam for long wear and corrosion resistance
- Single and double-acting models are dimensionally interchangeable.
- Straight pull capacity 950 lbs. at 5,000 psi maximum



Performance

Clamp Nos. 100951,100952, 100953, 100957, 100958, 100959

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

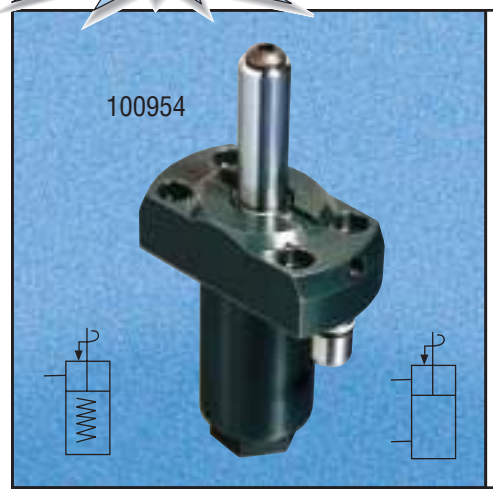
Cat. No.	Dimensions (In Inches)																		
	K Min. Thread	L Thread Size	M	N Hex.	P Dia.	Q	R	S Min. Thread	T Dia. Min.	U Dia.	V Clamp Port Dia. Min.	W Min.	X Max.	Y Min.	Z Min.	AA Min.	BB Unclamp Port Dia. Min.	CC Dia. Min.	DD Chamfer Max.
100951	.275	1/4–20UNC	4.912	1.000	1.500	.108	.665 .695	.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 54 for custom arm mounting.
Internal cam may be removed for an unguided straight pull. See operating instructions for additional port details.
See page 53 for maximum operating speeds.

Swing/Pull Clamps - 750 lb. Capacity

SPX HYTEC®

NEW

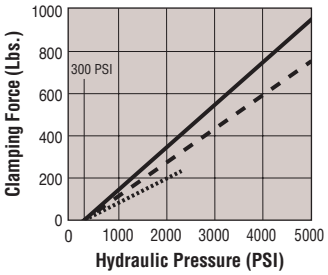


These manifold mount swing/pull clamps share all of the features of Hytec's other "Live Roller®" clamps and are available in both single- and double-acting versions. Their unique body design allow simple, no-tool hydraulic connections and eliminates fittings and tubing that disrupt coolant flow and collect chips.

During clamp retraction, the cylinder rod rotates 90 degrees causing the clamping arm to swing into position. Clamping then takes place as the rod continues to retract in a straight line, pulling the arm against the workpiece. The optional arms clamp securely to the piston rod to reduce fatique and deflection. Arms may be easily modified or replaced with custom arms. Special rod wiper and a unique drainage system channels contaminants away from the clamp. Available 90 degree left hand or right hand rotation or with guided straight pull.

Features:

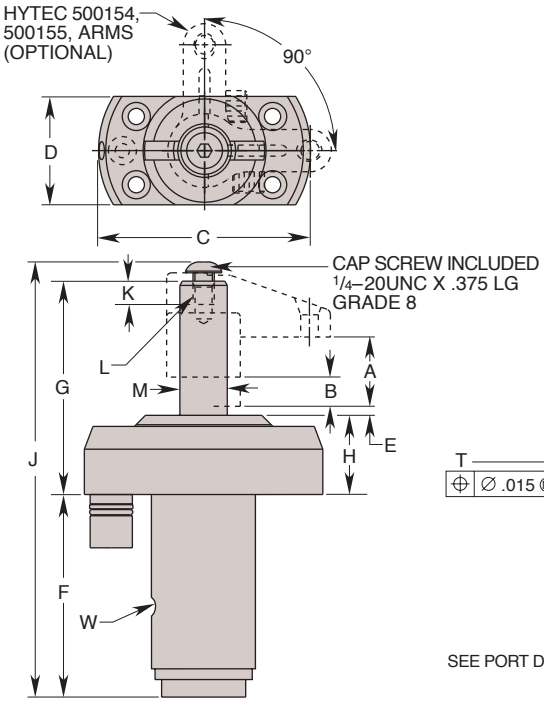
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Manifold mountable
- Unique "Live Roller" swing mechanism for increased service life
- Power-Tech™ treated body and hardened cam for long wear and corrosion resistance
- Single- or double-acting
- Straight pull capacity 950 lbs. at 5,000 psi maximum



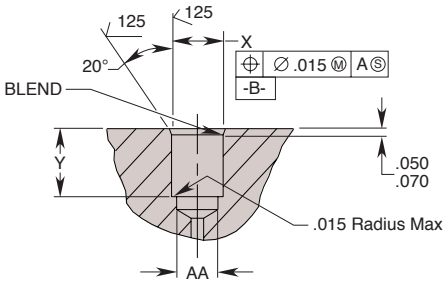
Performance

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

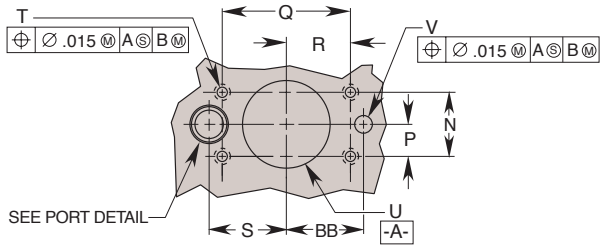
- ····· With Hytec 500155 Arm (4.25" long)
- – – – With Hytec 500154 Arm (1.25" long)
- ——— Straight Pull



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													

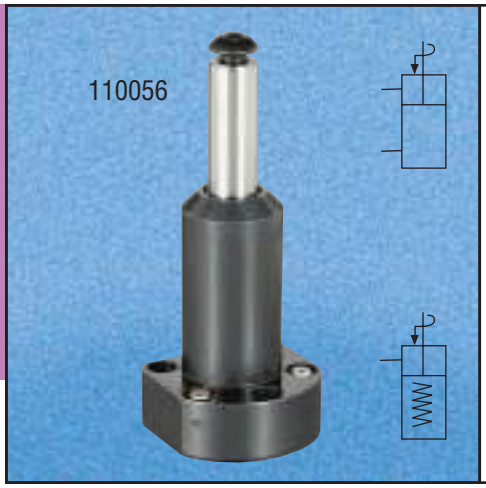
Cat. No.	Dimensions (In Inches): K Thread Min.	L Thread Size	M Dia. ††	N Mounting	P Mounting	Q Mounting	R Mounting	S Mounting	T Thread Size	U Dia.	V	W	X Dia.	Y	AA Dia. Max.	BB Mounting
100954	.275	1/4-20 UNC	.560	.906	.453	1.812	.906	1.091	10-24 UNC	1.223	–	† Vent	.500	.640	.481	–
100955																
100956										1.253			.503	.660		
100976											††† .250	–				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 54 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.

SPX HYTEC® Swing/Pull Clamps - 750 lb. Capacity

NEW



This manifold mount swing/pull clamp shares all of the features of Hytec's other "Live Roller®" clamps. Its unique body design allows simple, no-tool hydraulic connections and eliminates fittings and tubing that disrupt coolant flow and collect chips. Using a simple O-ring face seal, it is designed for flat surface mounting either on top of or extending through a fixture plate.

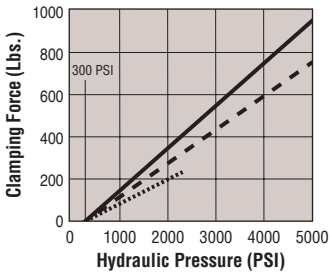
The optional arms clamp securely to the piston rod to reduce fatigue and deflection. Arms may be easily modified or replaced with custom arms. Special rod wiper seals and a unique drainage system channels contaminants away from the clamp.

During clamp retraction, the cylinder rod rotates 90 degrees causing the clamping arm to swing into position. Clamping then must take place as the rod continues to retract in a straight line, pulling the arm against the workpiece.

Available with 90 degree left hand or right hand rotation or with guided straight pull.

Features

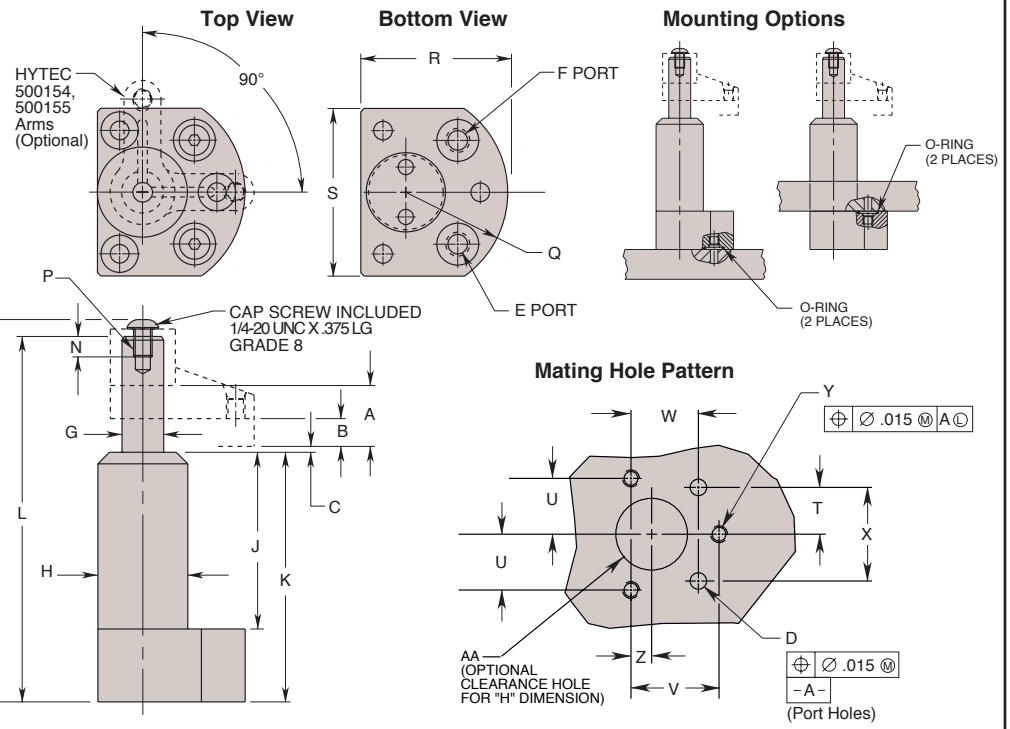
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Manifold mountable
- Unique "Live Roller" swing mechanism for increased service life
- Power-Tech® treated body and hardened cam for long wear and corrosion resistance
- Single-acting and double-acting models are dimensionally 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													

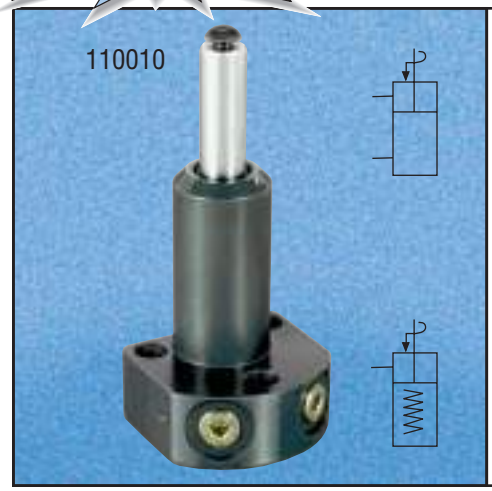
Cat. No.	Dimensions (In Inches)															
	J	K	L	M	N Thread Min.	P Thread Size	Q Radius	R	S	T	U	V	W	X	Y Thread Size	Z	AA Dia.
110056	2.379	3.359	4.912	5.138	.275	¼-20 UNC	1.375	1.995	2.250	.696	.827	1.306	1.002	1.392	¼-20 UNC	.306	1.235 1.255
110057																	
110058																	
110053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

NOTE: * With 1.25" long arm at 5,000 psi maximum operating pressure.
† Do not pressurize - single-acting only.
†† See page 54 for custom arm mounting. Internal cam may be removed for an unguided straight pull. See page 53 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.

NEW

Swing/Pull Clamps - 750 lb. Capacity

SPX HYTEC®



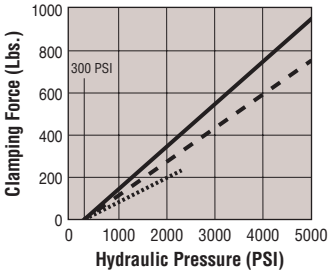
Available in both single- and double-acting models, this clamp's design allows flat-surface mounting either on top of or extending through a fixture plate. Sharing the features of other Hytec "Live Roller®" clamps, its piston rod rotates 90 degrees during clamp retraction, causing the clamping arm to swing into position. Clamping must then take place as the rod continues to retract in a straight line, pulling the arm against the workpiece.

The optional arms clamp securely to the piston rod to reduce fatigue and deflection. Arms may be easily modified or replaced with custom arms. The breather plug on single-acting models may be replaced with tubing for remote venting. Special rod wiper seals and a unique drainage system channels contaminants away from the clamp. Both the single-acting and double-acting models share the same outside dimensions making them completely interchangeable.

Available with 90 degree left hand or right hand rotation or with guided straight pull.

Features

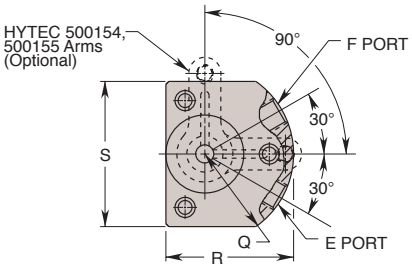
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Unique "Live Roller" swing mechanism for increased service life
- Power-Tech® treated body and hardened cam for long wear and corrosion resistance
- Single-acting and double-acting models are dimensionally interchangeable
- Straight pull capacity 950 lbs. at 5,000 psi max.

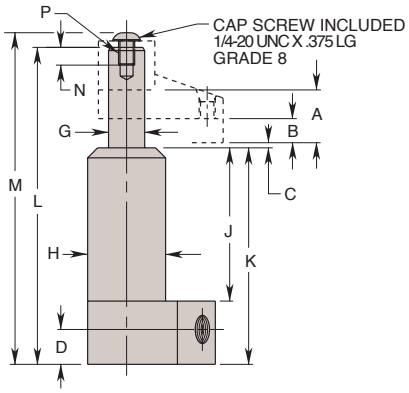


Performance

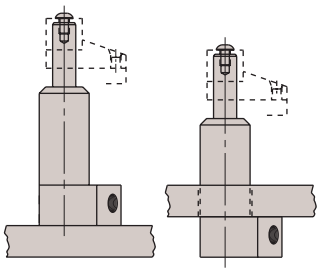
Clamp Nos. 110110, 110111, 110112, 110113, 110114, 110115

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

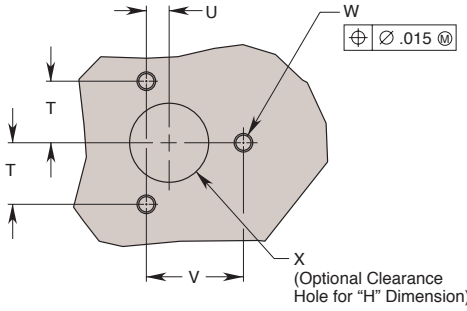




Mounting Options



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 54 for custom arm mounting.

Internal cam may be removed for an unguided straight pull.
See page 53 for maximum operating speeds.

Swing/Pull Clamps - 2,400 lb. Capacity

Available in both single and double-acting models, these clamps rotate to swing arms clear of the workpiece during machining or loading and unloading. During clamp retraction, the cylinder rod rotates 90 degrees causing the clamping arm to swing into position. Clamping then takes place as the rod continues to retract in a straight line, pulling the arm against the workpiece.

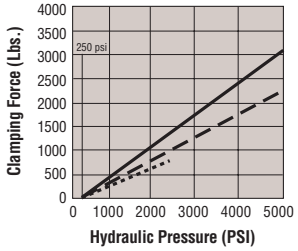
The optional arm clamps securely to the piston rod to reduce fatigue and deflection. See table for clamping performance data when using non-standard arms. (See page 53 and 54.)

Top port design allows easy access to plumbing connections. Breather on single-acting models may be replaced with tubing for remote venting. Special rod wiper seals and a unique drainage system channels contaminant's away from the clamp.

Both the single and double-acting models share the same outside dimensions, making them completely interchangeable.

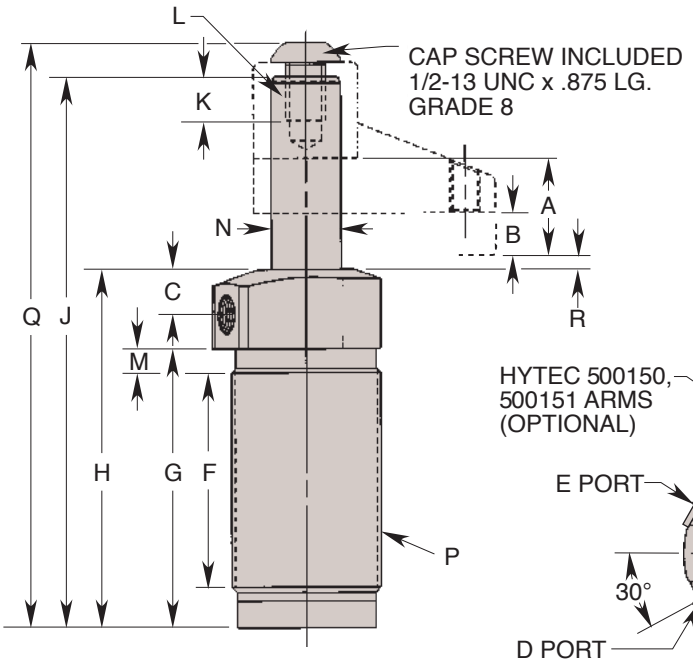
Features:

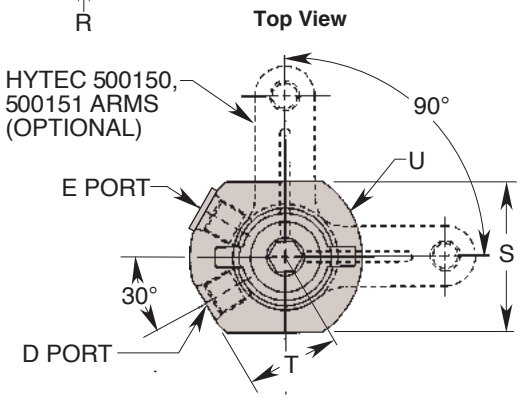
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Unique "Live Roller®" swing mechanism for increased service life
- Power-Tech™ treated body and hardened cam for long wear and corrosion resistance
- Straight pull capacity 3,144 lbs. at 5,000 psi max



Performance
Clamp Nos. 100889, 100890, 100891, 100892, 100893, 100894

- ····· With Hytec 500151 Arm (6.38" long)
- – – – With Hytec 500150 Arm (2.00" 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						
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													

The 100892, 100893 and 100894 replace our older models 100853, 100854 and 100869 from previous catalogs. While dimensionally similar, they may not be directly interchangeable in all applications. Review dimensionally before ordering.

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. See page 53 for maximum operating speeds and rotation options.
†† See page 54 for custom arm mounting.

Swing/Pull Clamps - 2,400 lb. Capacity

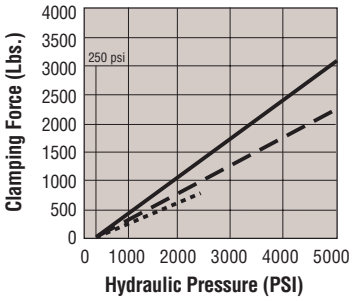
SPX HYTEC®

In addition to all the features of Hytec's latest "Live Roller®" swing/pull clamps, these clamps have a cartridge design that allows them to be manifold mounted. Simply thread this clamp into a modified SAE O-ring port and the hydraulic connection is made for you automatically. Exposed plumbing that can collect chips and take up valuable fixture space is eliminated.

The port can be cut with standard tooling and is simple to manufacture because the threads are at the top of the hole, not buried down in the bore . This design allows these clamps to work in fixture plates as thin as 1¼" thick.

Features:

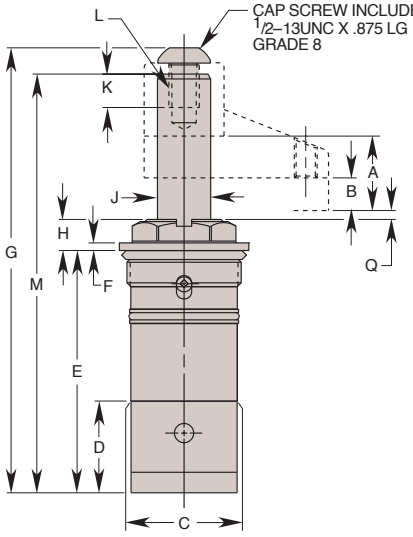
- Cartridge design eliminates exposed tubing and saves space
- Single-acting or double-acting
- Heat treated, chrome plated piston rod
- Unique "Live Roller" swing mechanism for increased service life
- Power-Tech™ treated body and hardened cam for long wear and corrosion resistance
- Clamping arms are 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)
- Uses standard SAE port tooling

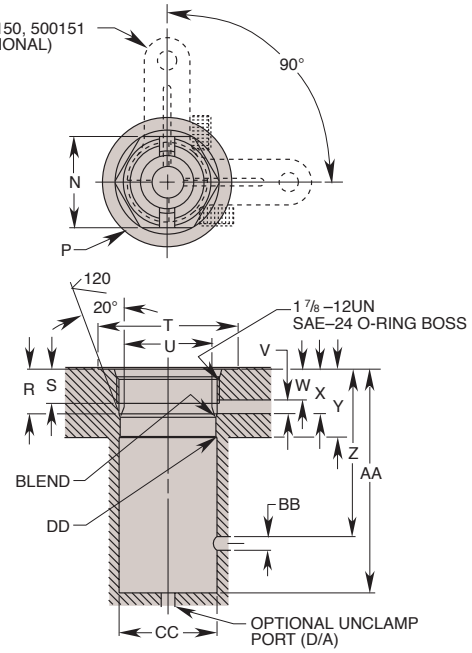


Performance

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

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





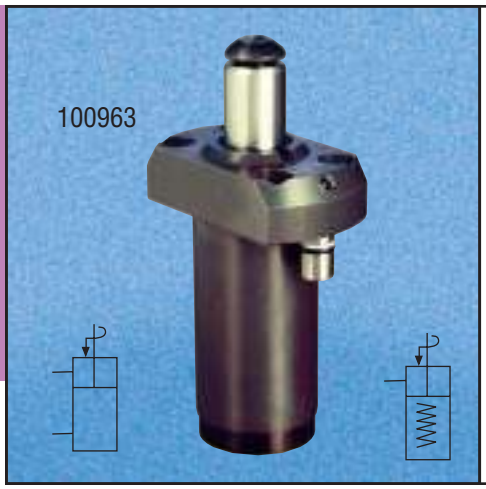
Cat. No.	Operation	Specifications: Swing Direction	*Force (Lbs.)	Eff. Area (Sq. In.) Clamp	Eff. Area (Sq. In.) Unclamp	Oil Cap. (Cu. In.) Clamp	Oil Cap. (Cu. In.) Unclamp	Dimensions (In Inches): A Total Stroke	B Clamping Stroke	C Dia.	D	E	F	G	H	††J Dia.
100859	Single-Acting	Left Hand (Counter Clockwise)	2,400	.626	–	.740	–	1.267	.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 54 for custom arm mounting.

See page 53 for maximum operating speeds and rotation options. Internal cam may be removed for an unguided straight pull. See operating instructions for additional port details.

SPX HYTEC® Swing/Pull Clamps - 2,400 lb. Capacity



These swing/pull clamps have all of the features of Hytec's "Live Roller™" design and they are manifold mountable.

During clamp retraction, the cylinder rod rotates 90 degrees causing the clamping arm to swing into position. Clamping then takes place as the rod continues to retract in a straight line, pulling the arm against the workpiece.

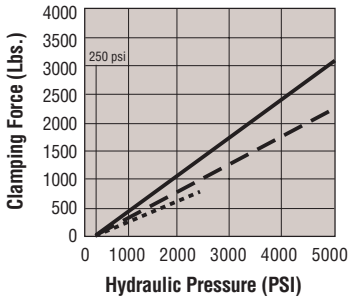
The optional arm clamps securely to the piston rod to reduce fatigue and deflection. Arms may be easily modified or replaced with custom arms.

Special rod wiper seals and drainage system channels contaminants away from the clamp.

Available with 90 degree left or right hand rotation or with guided straight pull. 30, 45 and 60 degree rotations are also available. (See page 53.)

Features:

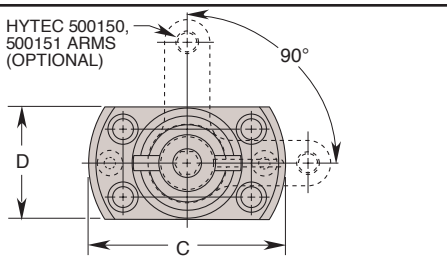
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Unique "Live Roller" swing mechanism for increased service life
- Power-Tech™ treated body and hardened cam for long wear and corrosion resistance
- Single and double-acting models
- Straight pull capacity 3,144 lbs. at 5,000 psi max.

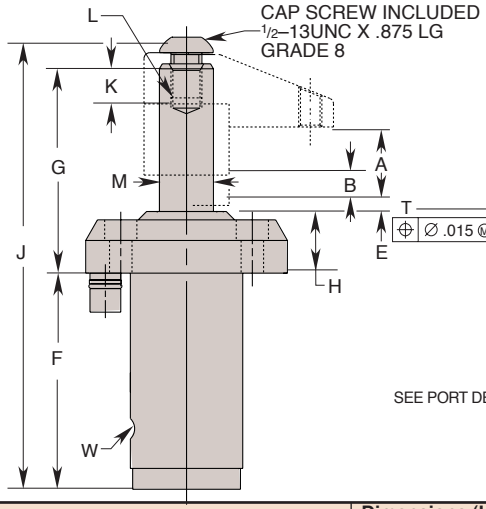


Performance

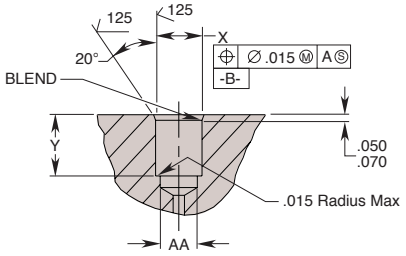
Clamp Nos. 100895, 100896, 100897, 100963, 100964, 100965

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

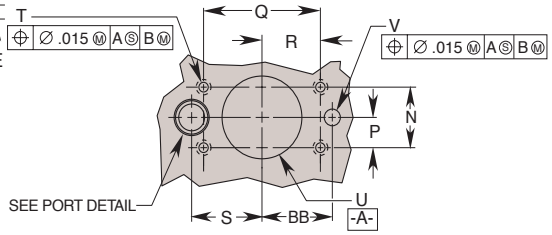




Port Detail



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	–	1.267	.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 54 for custom arm mounting.
Internal cam may be removed for an unguided straight pull.
See page 53 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 - 2,400 lb. Capacity

SPX HYTEC

These clamps rotate to swing arms clear of the workpiece for improved access during machining or loading and unloading. During clamp retraction, the cylinder rod rotates 90 degrees causing the clamping arm to swing into position. Clamping then takes place as the rod continues to retract in a straight line, pulling the arm against the workpiece.

A special rod wiper seal and drain channels helps keep contaminant's out of the clamp.

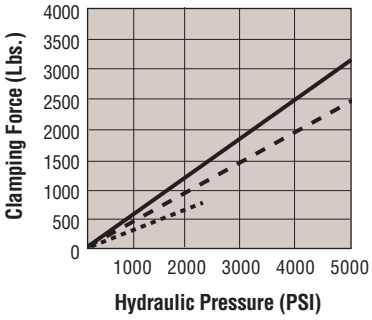
They are double acting for positive return, essential for automated systems. Right hand and left hand rotation models are available in both ½" and 1¼" stroke versions.

The optional arm clamps securely to the piston rod to reduce fatigue and deflection.

Arms may be modified or replaced with custom arms. See table for clamp performance data when using non-standard arms. (Pages 53 and 54).

Features:

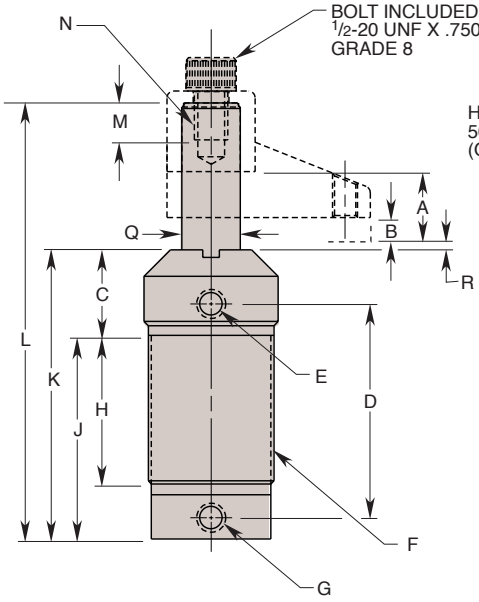
- Heat treated, chrome plated piston rod
- Unique "Live roller®" swing mechanism for increased service life
- Power-Tech™ treated body and hardened cam for long wear and corrosion resistance
- Clamping arms are adjustable anywhere within a full 360 degrees
- Straight pull capacity 3,144 lbs. at 5,000 psi.

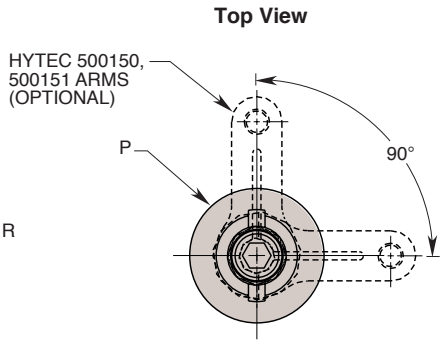


Performance

Clamp Nos. 100841, 100842, 100848, 100849, 100870, 100871

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





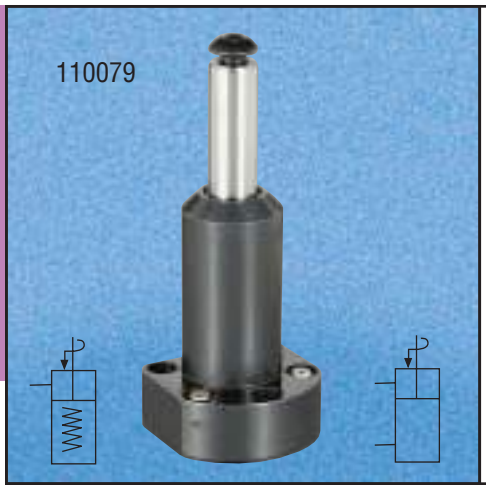
Cat. No.	Specifications						Dimensions (In Inches)					
	Swing Direction	*Force (Lbs.)	Eff. Area (Sq. In.)		Oil Cap. (Cu. In.)		A Total Stroke	B Clamping Stroke	C	D	E Clamp Port	F Thread Size
			Clamp	Unclamp	Clamp	Unclamp						
100841	Left Hand (Counter Clockwise)	2,400	.63	1.23	.74	1.46	1.174	.500	.790	3.188	⅛ NPTF	1⅞-16 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	⅛ NPTF	2.240	3.062	4.312	6.575	.550	½-20UNF	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 54 for custom arm mounting. See page 53 for maximum operating speeds and rotation options.

Swing/Pull Clamps - 2,400 lb. Capacity

NEW



This manifold mount swing/pull clamp shares all of the features of Hytec's other "Live Roller™" clamps. Its unique body design allows simple, no-tool hydraulic connections and eliminates fittings and tubing that disrupt coolant flow and collect chips. Using a simple O-ring face seal, it is designed for flat surface mounting either on top of or extending through a fixture plate.

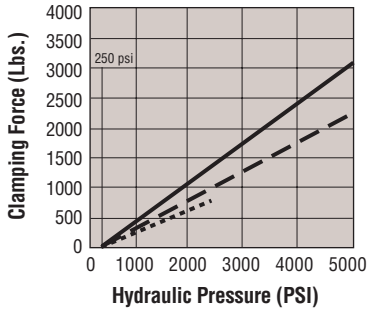
The optional arms clamp securely to the piston rod to reduce fatigue and deflection. Arms may be easily modified or replaced with custom arms. Special rod wiper seals and a unique drainage system channels contaminants away from the clamp.

During clamp retraction, the cylinder rod rotates 90 degrees causing the clamping arm to swing into position. Clamping then must take place as the rod continues to retract in a straight line, pulling the arm against the workpiece.

Available 90 degree left hand or right hand rotation or with guided straight pull.

Features:

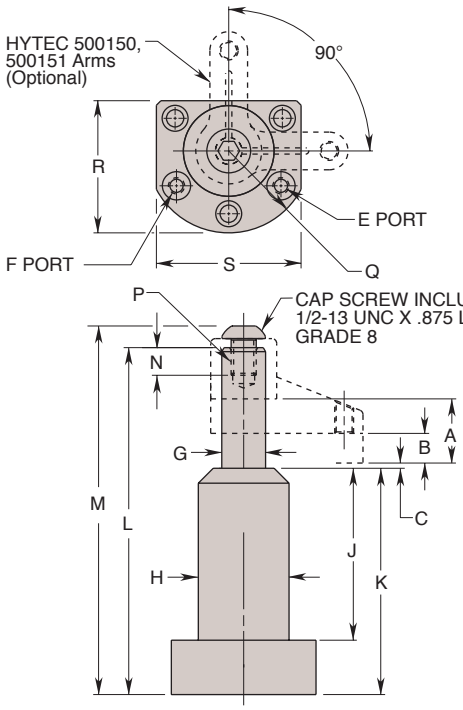
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Manifold mountable
- Unique "Live Roller" swing mechanism for increased service life
- Power-Tech™ treated body and hardened cam for long wear and corrosion resistance
- Single- and double-acting models are diimensionally interchangeable
- Straight pull cap. 3,144 lbs. at 5,000 psi max.
- Flange top or bottom mounting

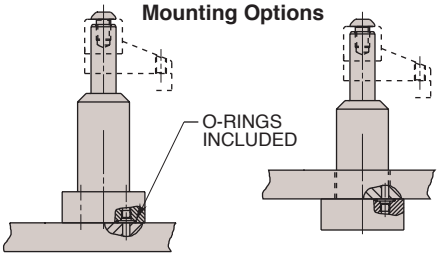


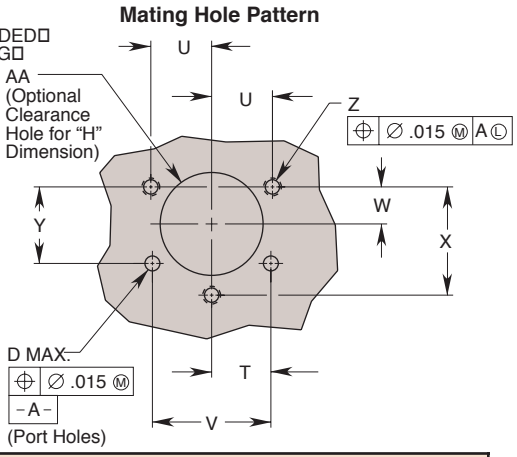
Performance

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

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







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	—	1.267	.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	5/16-18 UNC	1.830 1.850
110080																	
110081																	
110082																	
110083																	
110084																	

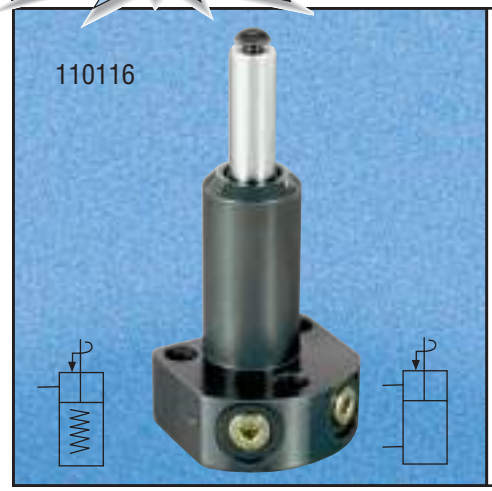
NOTE: * With 2.00" long arm at 5,000 psi max. operating pressure.
† Do not pressurize - single-acting only.
†† See page 54 for custom arm mounting.
Internal cam may be removed for an unguided straight pull.

See page 53 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.

NEW

Swing/Pull Clamps - 2,400 lb. Capacity

SPX HYTEC®

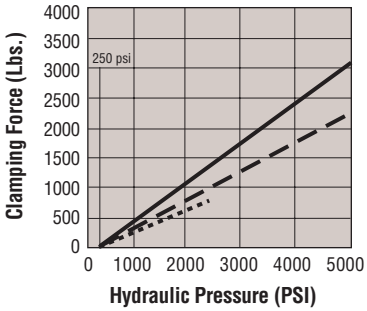


Available in both single- and double-acting models, this clamp's design allows flat-surface mounting either on top of or extending through a fixture plate. Sharing the features of other Hytec "Live-Roller™" clamps, its piston rod rotates 90 degrees during clamp retraction, causing the clamping arm to swing into position. Clamping must then take place as the rod continues to retract in a straight line, pulling the arm against the workpiece.

The optional arms clamp securely to the piston rod to reduce fatigue and deflection. Arms may be easily modified or replaced with custom arms. The breather plug on single-acting models may be replaced with tubing for remote venting. Special rod wiper seals and a unique drainage system channels contaminants away from the clamp. Both the single- and double-acting models share the same outside dimensions making them completely interchangeable. Available with 90 degree left or right hand rotation or with guided straight pull.

Features:

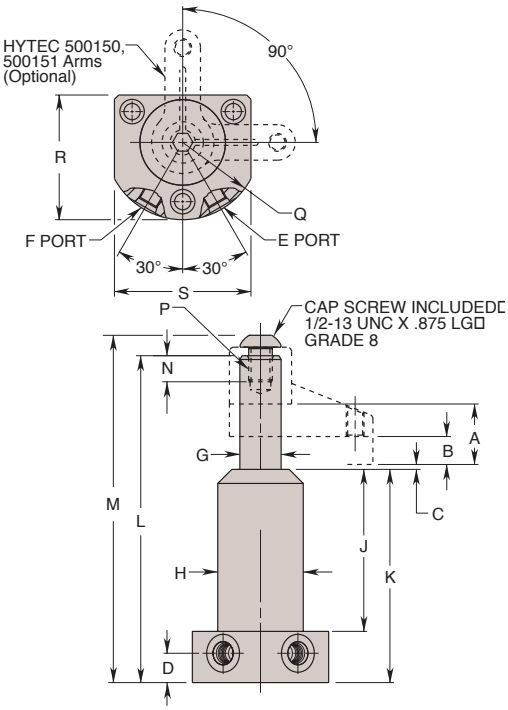
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Unique "Live-Roller" swing mechanism for increased service life
- Power-Tech™ treated body and hardened cam for long wear and corrosion resistance
- 5000 psi maximum
- Single- and double-acting models are dimensionally interchangeable
- Straight pull capacity 3,144 lbs. at 5,000 psi



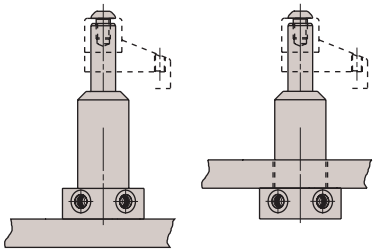
Performance

Clamp Nos. 110116, 110117, 110118, 110119, 120, 110121

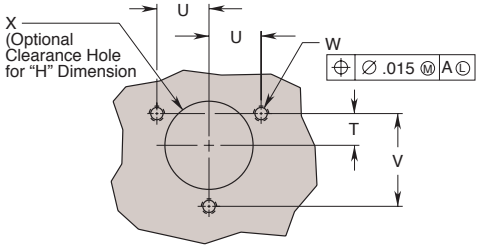
- ----- With Hytec 500151 Arm (6.38" long)
- - - - With Hytec 500150 Arm (2.00" long)
- ——— Straight Pull



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	—	1.267	.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	1/2-13 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 54 for custom arm mounting.

Internal cam may be removed for an unguided straight pull.
See page 53 for maximum operating speeds and rotation options.

Swing/Pull Clamps - 4,500 lb. Capacity

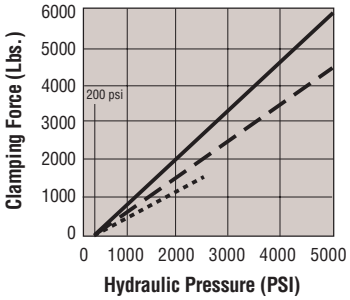
During clamp retraction, the cylinder rod rotates 90 degrees causing the clamping arm to swing into position. Clamping then takes place as the rod continues to retract in a straight line, pulling the arm against the workpiece. The optional arm clamps securely to the piston rod to reduce fatigue and deflection. Arms may be easily modified or replaced with custom arms.

Available in both single-acting and double-acting models, their top port design allows easy access to plumbing connections. Breather on single-acting models may be replaced with tubing for remote venting. Special rod wiper seals and a unique drainage system channels contaminants away from the clamp.

Both the single-acting and double-acting live-roller models share the same outside dimensions making them completely interchangeable. Available with 90 degree left or right hand rotation or with guided straight pull.

Features:

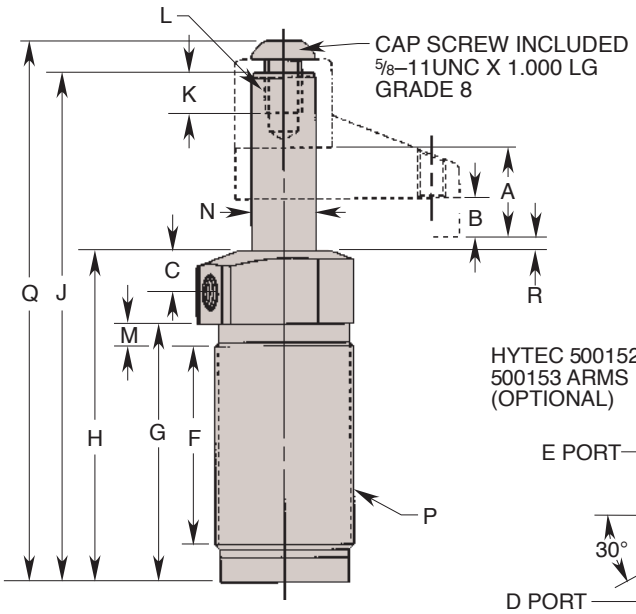
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Unique "Live roller®" swing mechanism for increased service life
- Power-Tech™ treated body and hardened cam for long wear and corrosion resistance
- Straight pull capacity 5,900 lbs. at 5,000 psi max

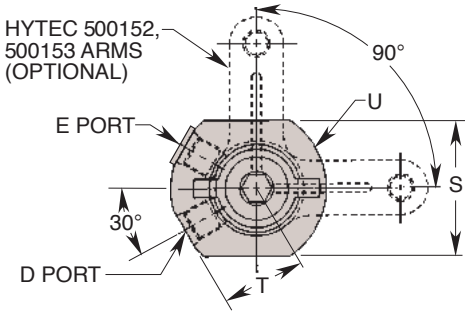


Performance

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)	4,500	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 54 for custom arm mounting.

Internal cam may be removed for an unguided straight pull.
See page 53 for maximum operating speeds.

NEW Swing/Pull Clamps - 4,500 lb. Capacity

SPX HYTEC

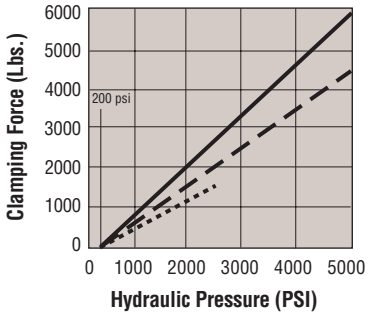
This cartridge style, live-roller, swing/pull clamp shares all of the features of Hytec's other Live Roller™ clamps. It's unique body design allows it to be manifold mounted where it will take up an absolute minimum of fixture space. Simply thread this clamp into a modified SAE O-ring port and the hydraulic connection is made for you automatically. Exposed plumbing that collect chips and large mounting flanges that take up valuable fixture space are eliminated.

The port can be cut with standard tooling and is simple to manufacture because the threads are at the top of the hole, not buried down in the bore. This design allows these clamps to be installed in fixture plates as thin as 1.584 inches thick.

Available with 90 degree left or right hand rotation or with guided straight pull.

Features:

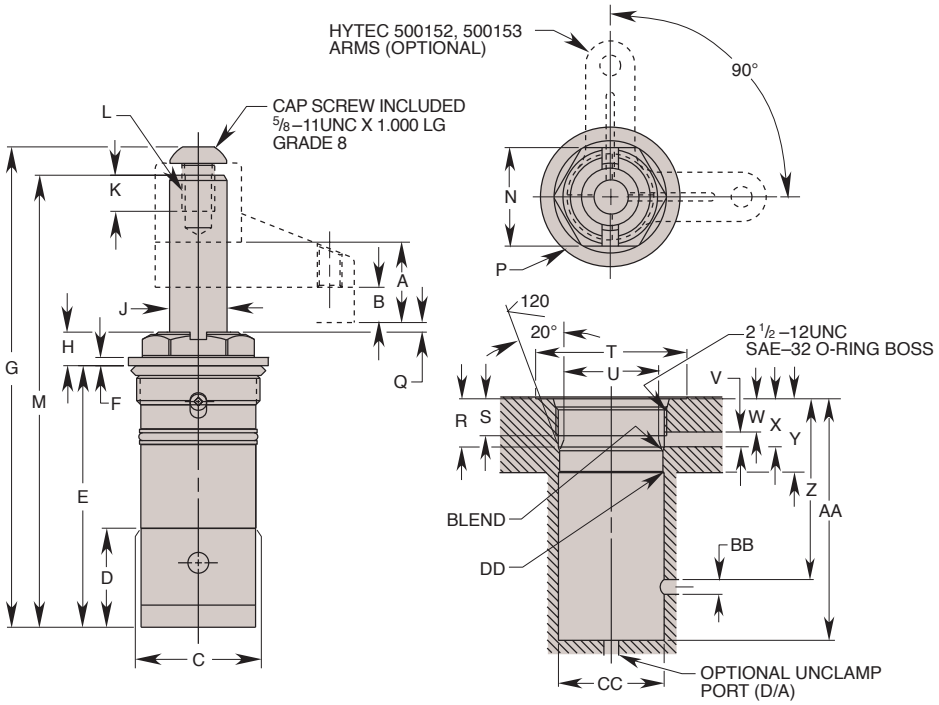
- Corrosion resistant construction
- Heat treated, chrome plated piston rod
- Unique "Live Roller" swing mechanism for increased service life
- Power Tech™ treated body and hardened cam for long wear and corrosion resistance
- Single-and double-acting
- Straight pull capacity 5,900 lbs. at 5,000 psi max



Performance

Clamp Nos. 100904, 100905, 100906

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

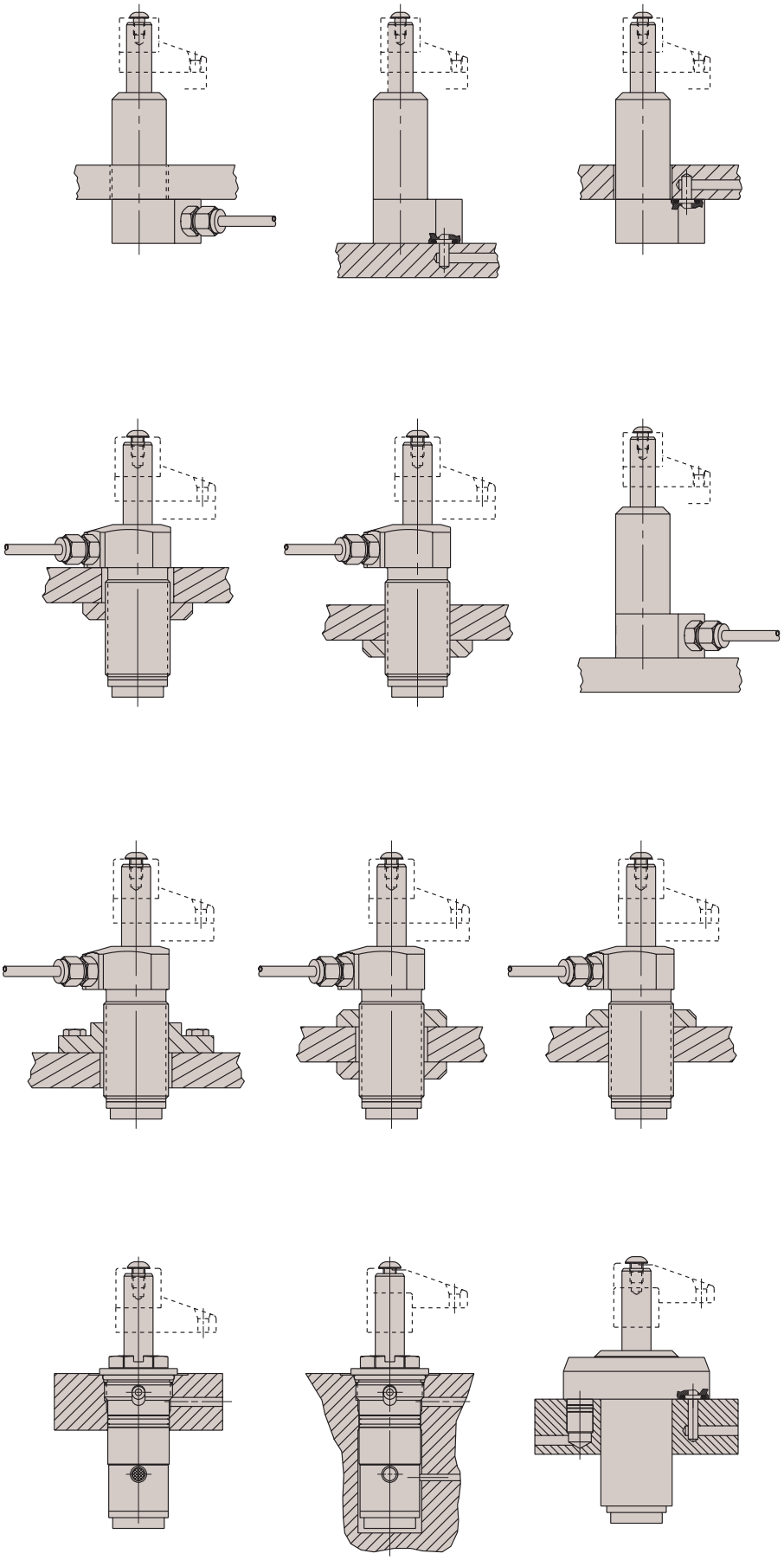


Cat. No.	Specifications							Dimensions (In Inches)									
	Oper.	Swing Direction	*Force (Lbs.)	Eff. Area (Sq. In.)		Oil Cap. (Cu. In.)		A Total Stroke	B Clamping Stroke	C Dia.	D	E	F	G	H	†† J Dia.	K Thd. Size
				Clamp	Unclamp	Clamp	Unclamp										
100904	Single-Acting	LH (Counterclockwise)	4,500	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 54 for custom arm mounting.
Internal cam may be removed for an unguided straight pull. See operating instructions for additional port details.
See page 53 for maximum operating speeds.

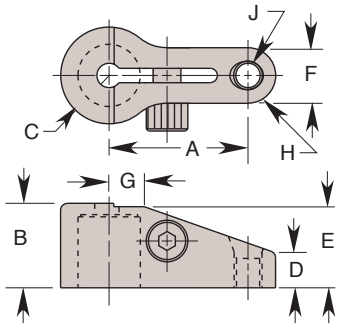
Hytec swing clamps are available in numerous mounting and porting configurations. Here are just a few examples of ways to include these clamps into your fixture designs.



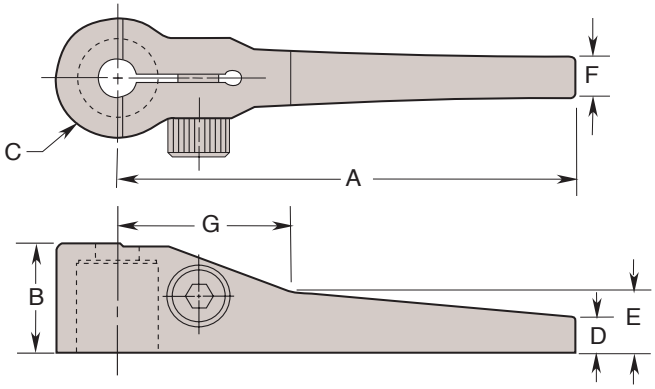
Hytec offers both short and long arms for each series of "Live-Roller™" swing/pull clamps. In each case, the short arm (often referred to as the "standard" arm) is designed to be used at pressures up to the clamp's maximum rating of 5000 psi. The long arms are designed to be used as is or easily modified 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 101 and 124 for metering valves. Contact Hytec if further design assistance is required.

Swing/Pull Clamp Arms

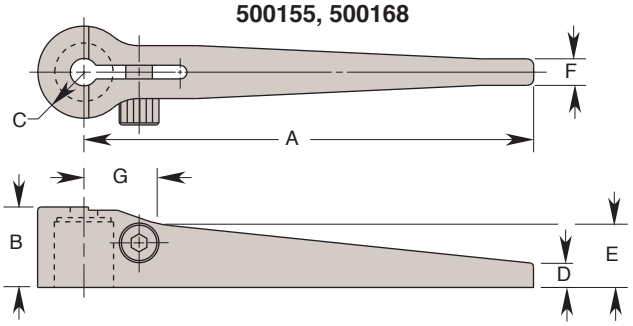
500150, 500152, 500154,500167



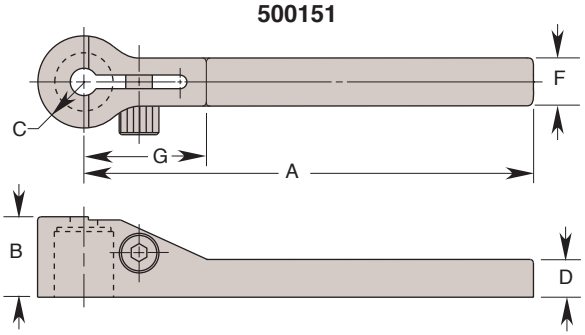
500153



500155, 500168



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	340	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	—	—
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	4,500	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 54.

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		

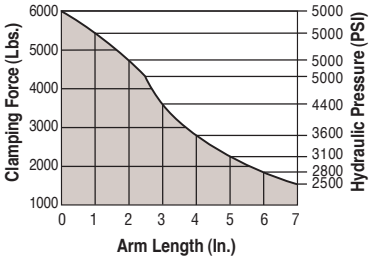
* With 2.00" long arm at 5,000 psi max. operating pressure.

Rotation Options

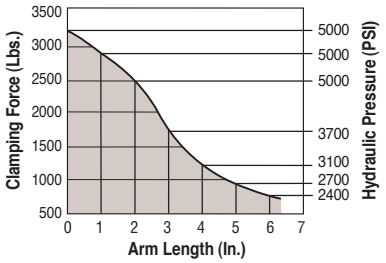
Hytec's 2,400 lbs. capacity, .500 inch clamping stroke Swing/Pull clamps can be converted to a 30, 45, or 60 degree swing by exchanging the internal cam. Order the appropriate cam from the table to the left.

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.

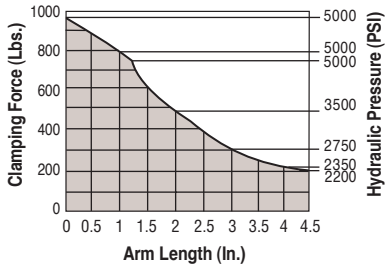
Swing/Pull Clamp Performance



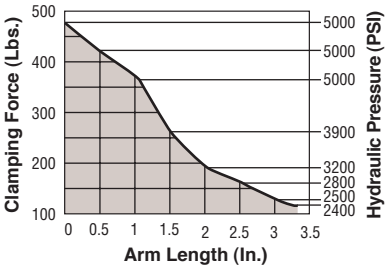
Clamp Performance
2½", 4,500 Lbs. Capacity Swing/Pull Clamps



Clamp Performance
1⅞", 2,400 Lbs. Capacity Swing/Pull Clamps



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



Clamp Performance
1¹/₁₆", 365 Lbs. Capacity Swing Pull Clamps

Chart Legend

Maximum Length / Pressure

Operating Range

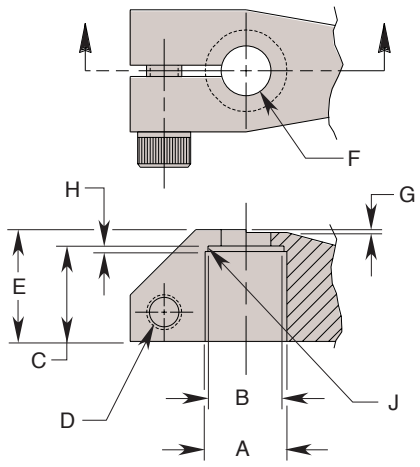
Clamps must operate at or below maximum arm length/pressure curve:

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:

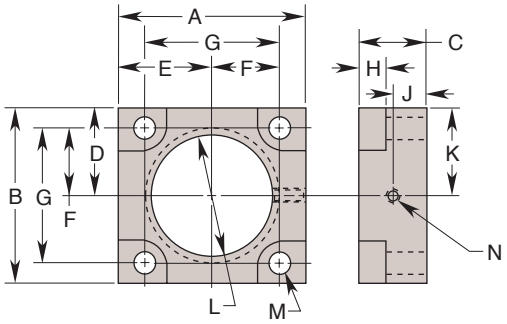
Any clamp using a modified or custom arm that is longer or heavier than Hytec's standard arms must be derated to prevent internal damage. Do not exceed the maximum speed and pressure ratings for Hytec's standard arms. For maximum hydraulic pressure and speed ratings, see the accompanying charts. Do not 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
340	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		
2,400	500150	.875 .878	.853 .878	1.030 1.010	⅜-16 UNC	1.200	.534	.060	.060	
4,500	500152	1.250 1.253	1.228 1.253	1.420 1.440	⅜-18 UNF	1.700	.659	.050	.050	

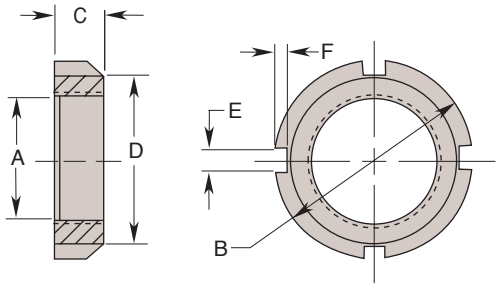
NOTE: * See charts for capacity and maximum pressure at desired arm length.
** Torque must be sufficient to secure arm to piston rod.

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



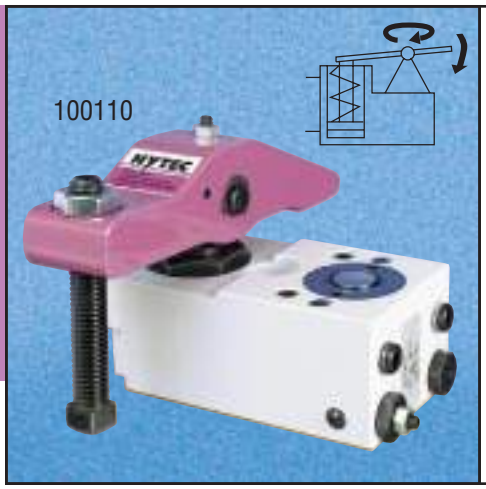
FLANGE MOUNTING BRACKETS													
Cat. No.	Dimensions (In Inches)												
	A	B	C	D	E	F	G	H	J	K	L Thread Size	M Dia.	N Thread Size
100979	1.593	1.500	.500	.750	.750	.560	1.120	.200	.250	.750	1⅛-16 UNC	.222	¼-20 UNC
100127	1.875	1.750		.875	.938	.703	1.406			.875	1¼-12 UNF	.219	
100114	2.750	2.500	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					
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		

Swing Clamps

NEW



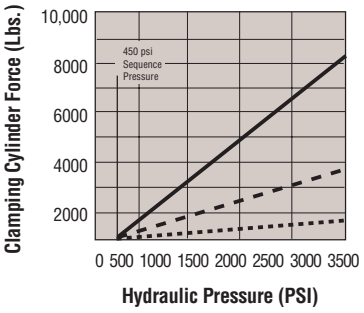
Single-screw mounting and the adjustable clamping screw make these clamps easy to reposition on the fixture to adapt to various workpiece sizes, and make set-up and adjustment faster than other methods. It also lets you clamp several workpiece sizes without changing the fixture each time. When mounted 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



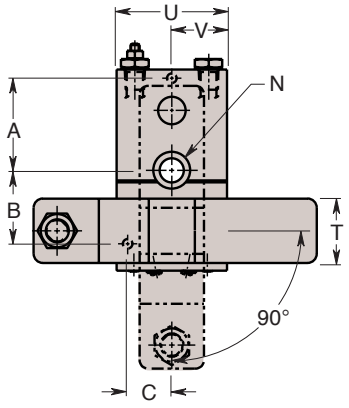
Performance

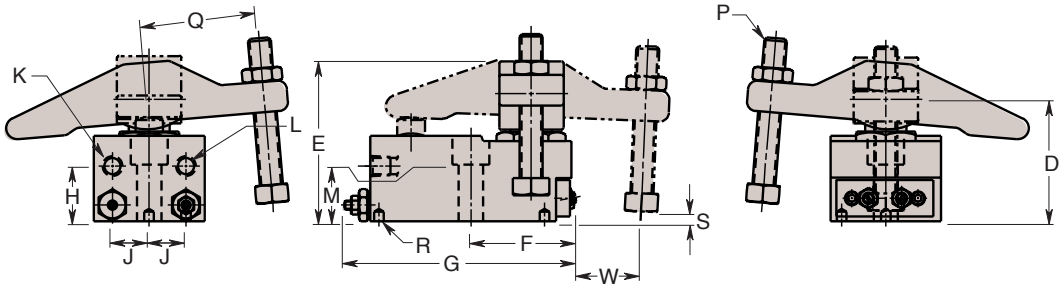
Clamp capacity 1610

Clamp capacity 3780

Clamp capacity 8295

Left Hand Swing Shown





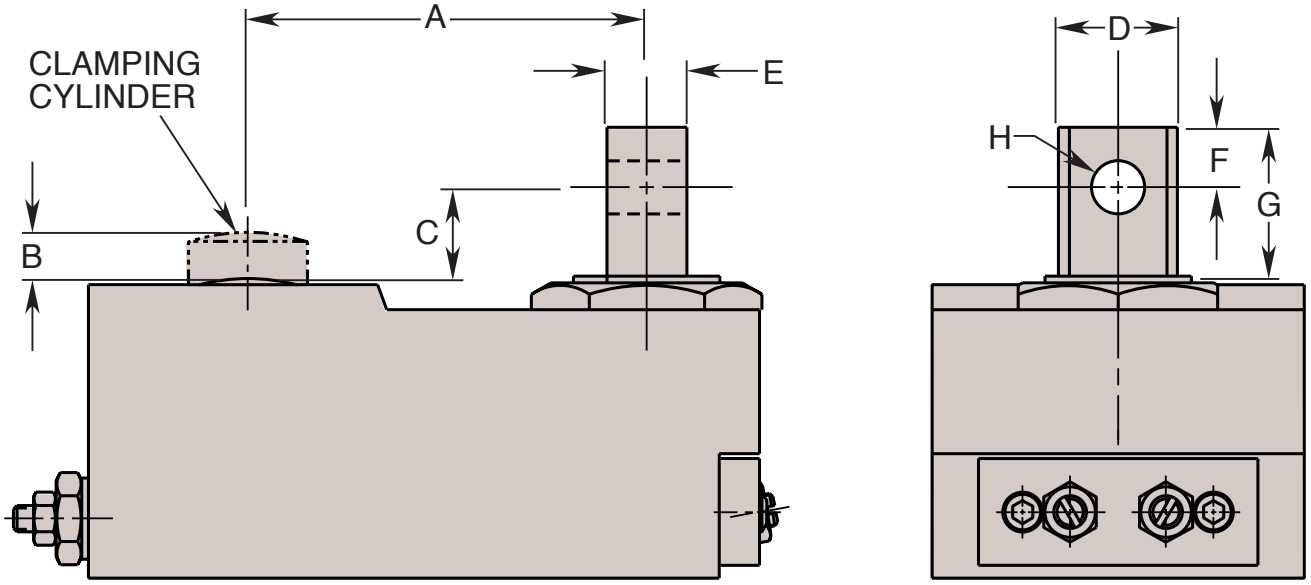
Cat. No.		Specifications								Dimensions (In Inches)							
Right Hand Swing	Left Hand Swing	*Max. Clamping Force	Oil Cap. (Cu. In.)		Min. Operating Pressure (PSI)	Max. Operating Pressure (PSI)	Max. Clamping Stroke (In.)	Max. Flow Rate (Cu. In./Min.)	Max. Swing Speed (Secs.)	A	B	C	D	E	F	G	H
			Advance	Return													
100111	100108	1610	.330	.160	500	3,500	.310	45	.250	2.060	1.938	.938	2.782	3.833	2.875	5.938	1.250
110101	110102																
100110	100107	3780	.770				.487	15	.500	2.500	2.000	1.200	3.462	4.462	3.000	6.500	1.500
110103	110104																
100109	100106	8295	1.520				.446	10	1.000	3.062	2.438	1.378	3.790	5.071	3.312	7.375	1.937
110105	110106																

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.				
100111	100108	.875	¼ NPTF	¼ NPTF	1.250	.531	½-13 UNC	2.250	.257	.250	.000	1.500	1.219	2.750	1.375	.812
110101	110102		7/16-20 UNF SAE-4	7/16-20 UNF SAE-4												
100110	100107	1.000	¼ NPTF	¼ NPTF	1.500	.656	⅝-11 UNC	3.125				2.000	1.719	3.000	1.500	1.750
110103	110104		7/16-20 UNF SAE-4	7/16-20 UNF SAE-4												
100109	100106	1.218	¼ NPTF	¼ NPTF	1.750	.781	⅞-9 UNC	3.250				2.375	2.219	3.500	1.750	1.875
110105	110106		7/16-20 UNF SAE-4	7/16-20 UNF SAE-4												

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

- 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.

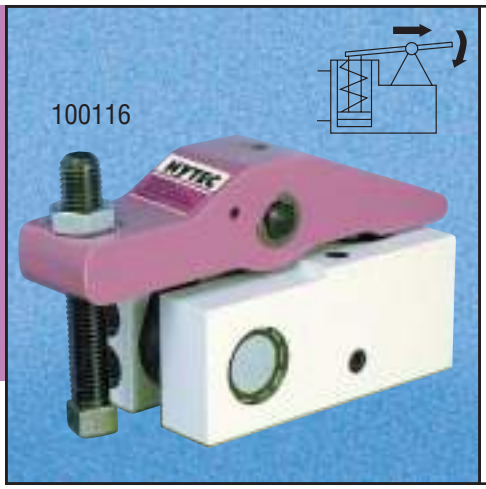


Cat. No.		Specifications	Dimensions (In Inches)							
Right Hand Swing	Left Hand Swing	*Clamping Cylinder Effective Area (Sq. In.)	A	B	C	D Dia.	E	F	G	H Dia.
100111 110101	100108 110102	.44	2.794	.375	1.344	.864	.495	.488	1.133	.437 .441
100110 110103	100107 110104	1.23	3.250	.500	1.063	1.114	.742	.562	1.472	.562 .566
100109 110105	100106 110106	2.41	3.750	.545	.930	1.364	.866	.610	1.580	.625 .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.).

Retract Clamps

NEW



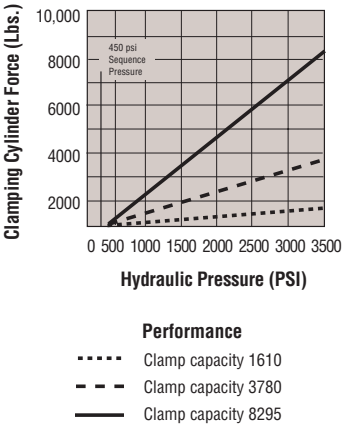
Single screw mounting and the adjustable clamping screw make these clamps easy to reposition on the fixture to adapt to various workpiece sizes, and make set up and adjustment faster than other methods. Plus, it enables you to work several piece sizes without changing the fixture each time. When mounted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

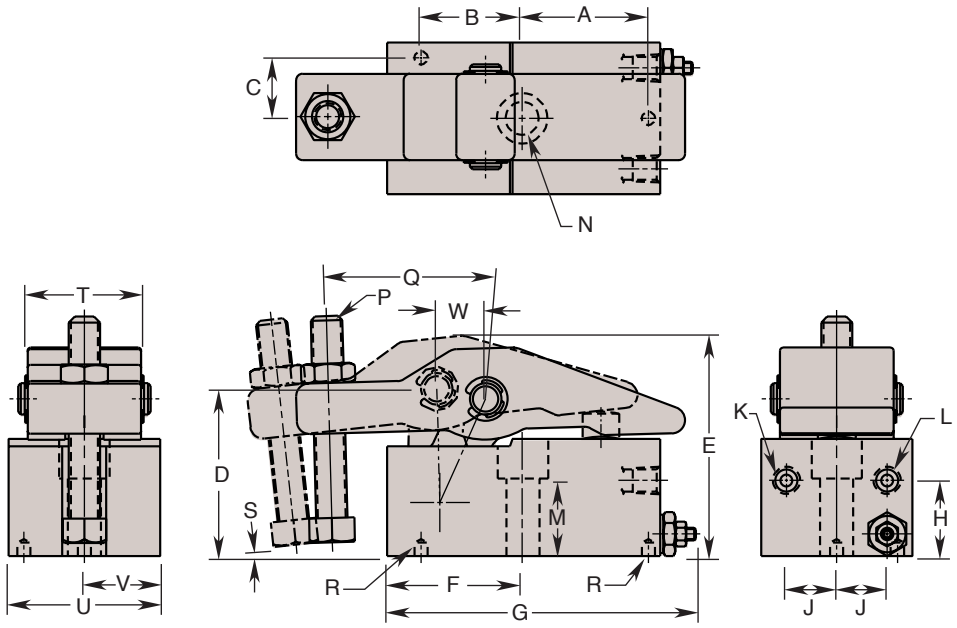
Very similar in operation to the swing clamps, with the exception of having the clamping arm move out toward the workpiece in a straight line rather than rotating 90°, making them ideal for applications where the shape of the fixture or part does not allow room for the clamp to swing.

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





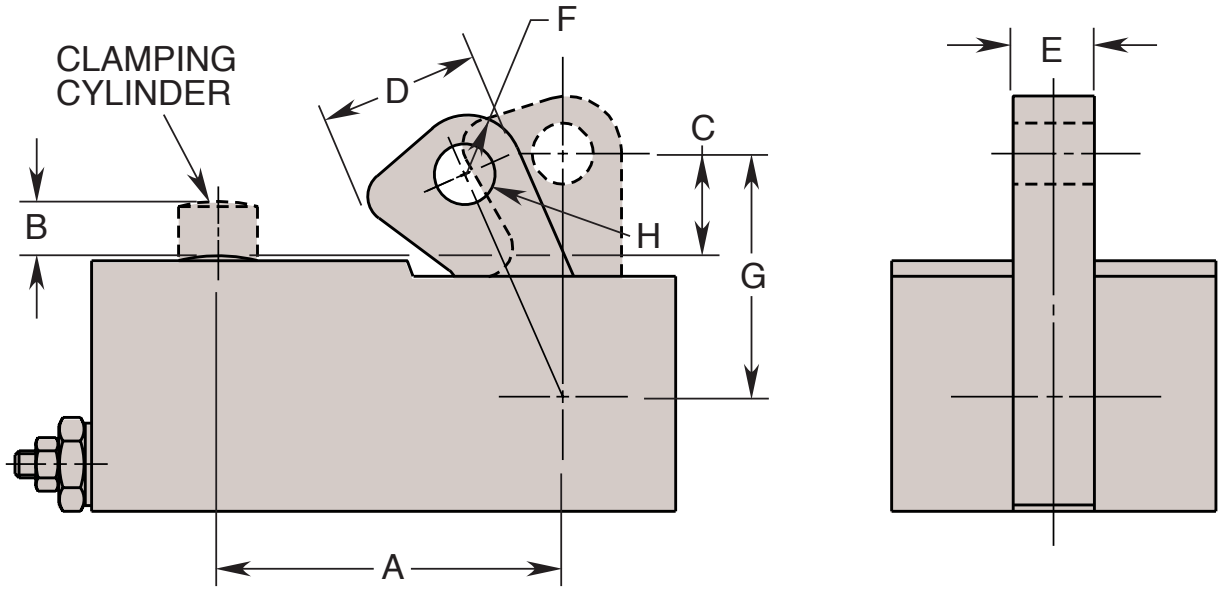
Cat. No.	Specifications								Dimensions (In Inches)								
	*Max. Clamping Force (Lbs.)	Oil Cap. (Cu. In.)		Min. Operating Pressure (PSI)	Max. Operating Pressure (PSI)	Clamping Stroke (In.)	Max. Flow Rate (Cu. In./Min.)	Max. Advance Speed (Secs.)	A	B	C	D	E	F	G	H	J
		Advance	Retract														
100117	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
110107																	
100116	3780	.670				.487			2.500	2.000	1.200	3.312	4.312	2.670	6.112	1.500	1.000
110108																	
100115	8295	1.420				.446			3.062	2.438	1.378	3.875	5.157	3.033	7.052	1.937	1.218
110109																	

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.				
100117	¼ NPTF	¼ NPTF	1.250	.531	½-13 UNC	2.250	.257	.250	.250	2.125	1.219	2.750	1.375	.625
110107	7/16-20 UNF SAE-4	7/16-20 UNF SAE-4												
100116	¼ NPTF	¼ NPTF	1.500	.656	⅝-11 UNC	3.125			.062		1.719	3.000	1.500	.986
110108	7/16-20 UNF SAE-4	7/16-20 UNF SAE-4												
100115	¼ NPTF	¼ NPTF	1.750	.781	⅞-9 UNC	3.250			.438	2.938	2.219	3.500	1.750	1.100
110109	7/16-20 UNF SAE-4	7/16-20 UNF SAE-4												

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

- 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.

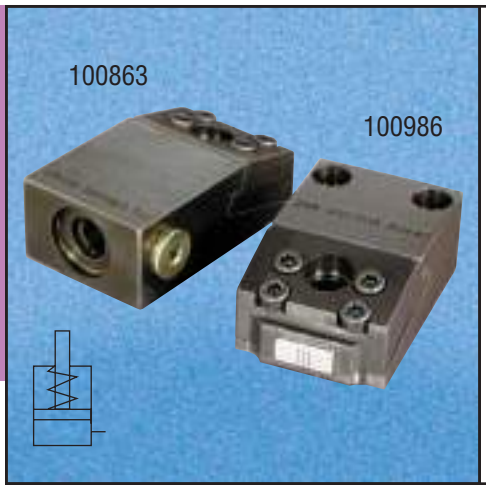


Cat. No.	Specifications	Dimensions (In Inches)							
	*Clamping Cyl. Effective Area (Sq. In.)	A	B	C	D Max.	E Max.	F Max. Radius	G	H Dia.
100117 110107	.440	2.794	.375	.798	1.425	.489	.525	1.906	.437 .439
100116 110108	1.230	3.250	.500	.930	1.612	.736	.587	2.250	.562 .564
100115 110109	2.400	3.750	.545	1.055	1.893	.869	.775	2.625	.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.).

Edge Clamps

NEW



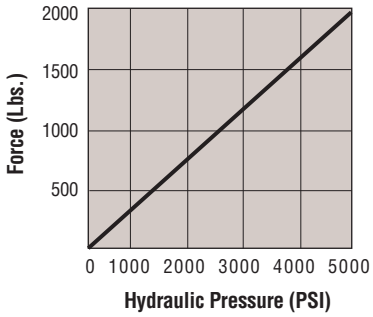
Hytec's edge clamps perform three functions: locating the workpiece, clamping horizontally against secondary locators and clamping vertically against the primary locating surface. This combined horizontal and vertical clamping force can locate and secure many parts with no other clamps being needed.

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:

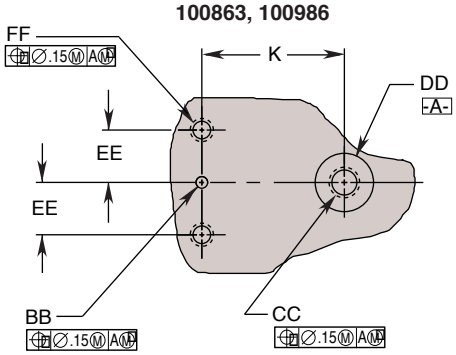
- 15 degree clamping angle
- Hardened, serrated, plated gripper
- Single-acting
- Hardened, tool steel piston
- Three pressure ports (100863)
- Compact design
- Dual, zinc plated return springs
- Conventional and manifold mount versions



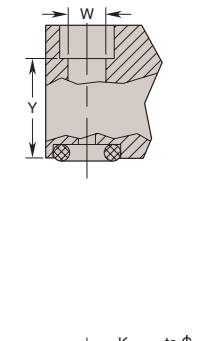
Performance

Clamp No. 100863, 100986

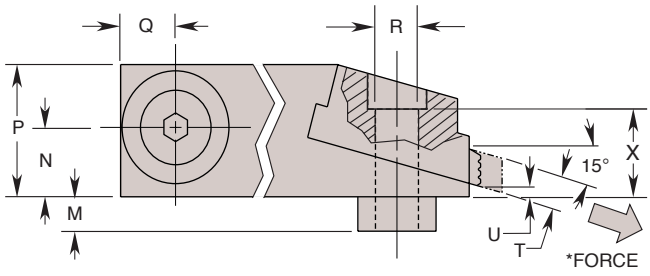
Mating Hole Pattern
100863, 100986

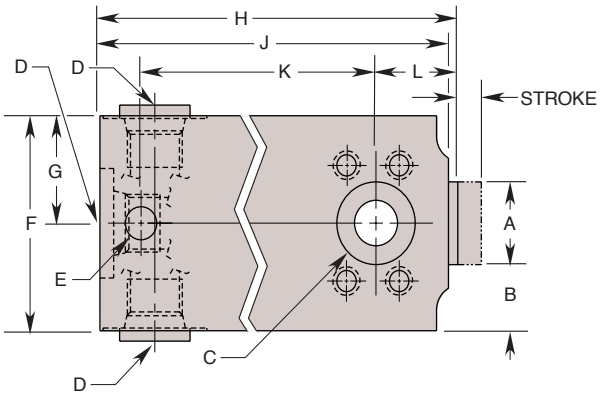


100986



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

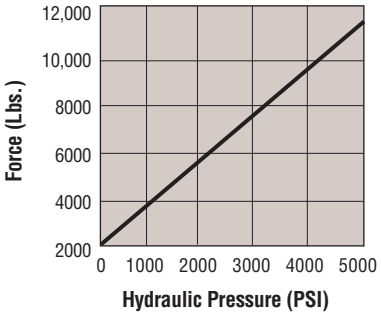
This clamp is ideal for permanent installation on presses to facilitate quick die changes or can be used in many workholding applications. Its unique design allows it to be mounted simply by using a clamp riser equal in thickness to the member being clamped. Just two ⅝, grade 8 cap screws are sufficient 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.

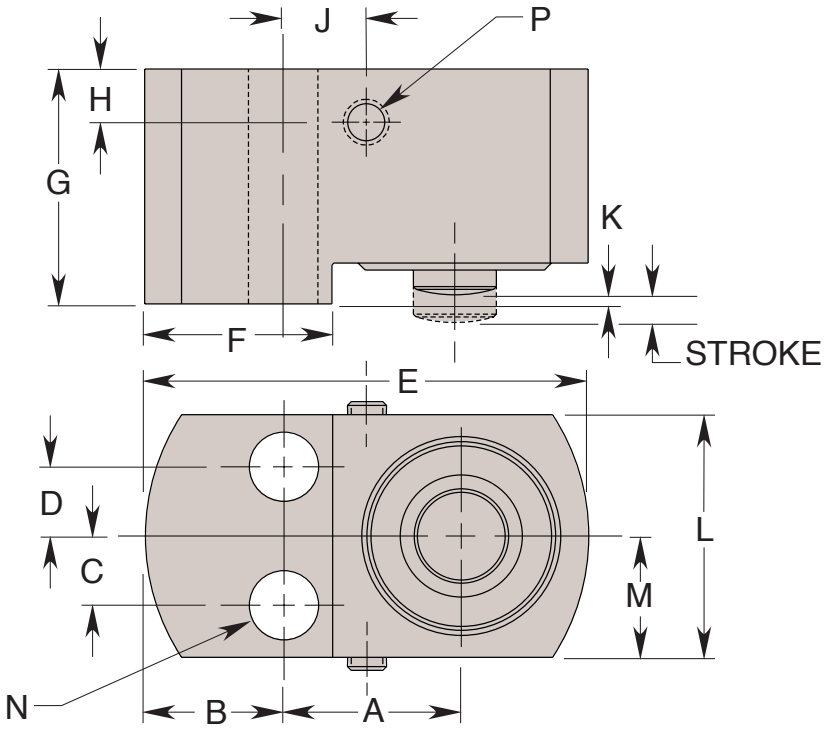
Two pressure ports make these clamps easy to chain together without the need for an extra tee fitting for each clamp.

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.)

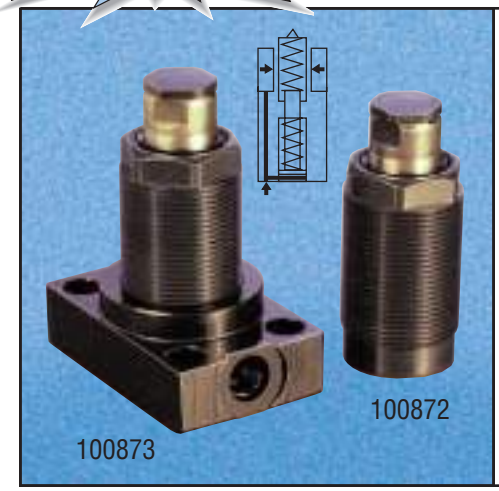
A typical operating sequence is as follows:

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.

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

SPX HYTEC



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.

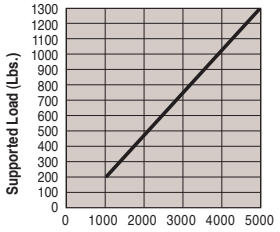
Fluid advance work supports allow the plunger to be retracted out of the way during workpiece load/unload operations. The work support provides its own internal sequencing of a piston which gently raises the plunger until it contacts the workpiece. A spring between the piston and the plunger limits the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

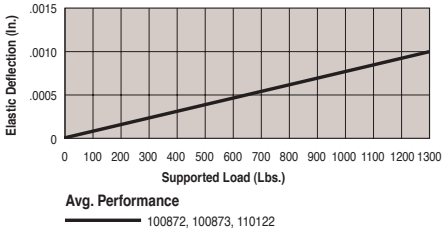
The 100872's threaded body may be compactly manifold mounted in your fixture or choose the 100873 which includes the100872 work support and a mounting base for installation on a flat surface for conventionally plumbed circuits. Both feature fully corrosion resistant construction.

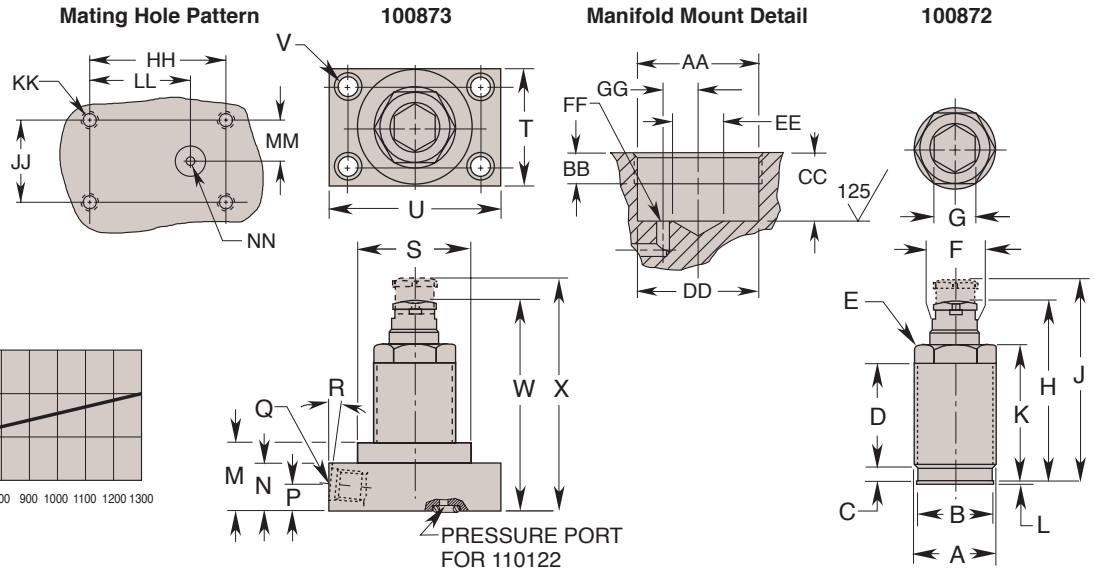
Extremely close manufacturing tolerances hold the plunger perpendicular to the workpiece and eliminates inaccuracies due to plunger movement during lock-up. After lock-up, the plunger is absolutely rigid and limits elastic deflection to .00007" per 100 lbs. of load. For base only, order number 500035.

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					—	—	—						

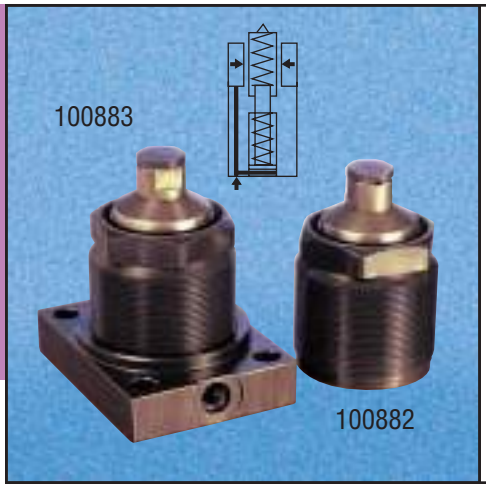
Cat. No.	Mounting Dimensions (In Inches)												
	AA Thd. Size	BB Min. Thd.	CC	DD Dia.	EE Drill Point Dia. Max.	FF Dia.	GG Max.	HH	JJ	KK Thd. Size	LL	MM	NN Pressure Port Dia. Max.
100872	1¼-16 UN	.300	.655 .675	1.182 1.196	.500	.121 .135	.343	—	—	—	—	—	—
100873	—	—	—	—	—	—	—	1.968	1.188	¼-20 UNC			
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 55.
For additional flow control valves see pages 101 & 124.
For optional accessories see page 69.

† 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.

SPX HYTEC® Fluid Adv. Work Supports-4,000 lb. Cap. NEW



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.

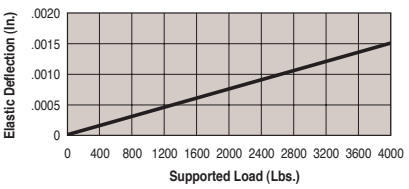
Fluid advance work supports allow the plunger to be retracted out of the way during workpiece load/unload operations. The work support provides its own internal sequencing of a piston which gently raises the plunger until it contacts the workpiece. A spring between the piston and the plunger limits the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

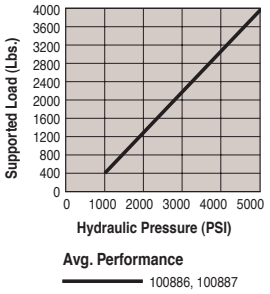
The 100882's threaded body may be compactly manifold mounted in your fixture or choose the No. 100883 which includes the 100882 work support and a mounting base for installation on a flat surface for conventionally plumbed circuits. Both feature fully corrosion resistant construction.

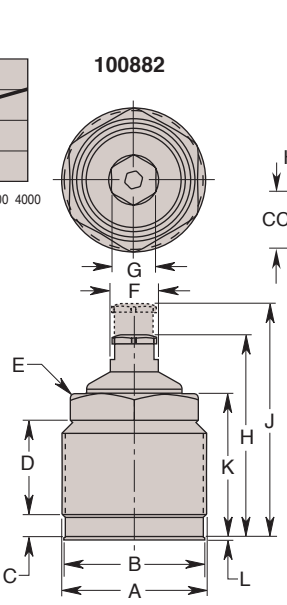
Extremely close manufacturing tolerances hold the plunger perpendicular to the workpiece and eliminate inaccuracies due to plunger movement during lock-up. After lock-up, the plunger is absolutely rigid and limits elastic deflection to .00004" per 100 lbs. of load. For base only, order number 500028.

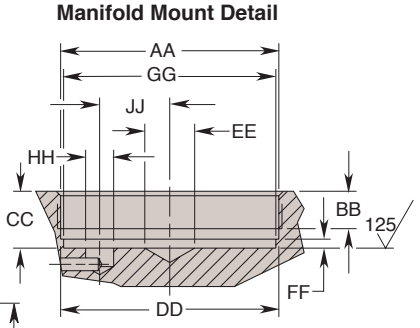
Features:

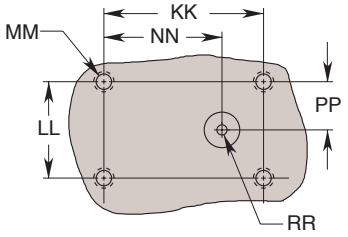
- 4,000 lbs. capacity @ 5,000 psi max.
- Fully corrosion resistant construction
- Manifold mount or conventional base mounting
- Small, filtered breather/rest button to accommodate intricate workpieces
- 1,000 psi minimum recommended pressure

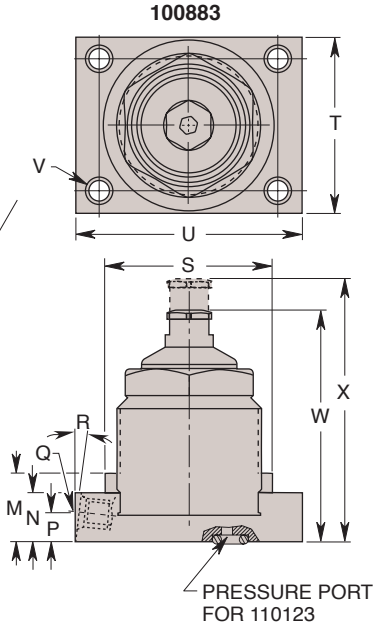












Cat. No.	Specifications					Dimensions (In Inches)									
	*Cap. (Lbs.)	Oil Cap. (Cu. In.)	Max. Flow Rate (Cu. In./Min.)	Advance System	Mounting Configuration	A	†B Seal Dia.	C	D	E Hex.	F Dia.	G Hex	Operating Range H	Operating Range J	K
100882	4,000	.12	10	Fluid	Cartridge Manifold	2¼-16 UN	2.140	.250	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			
110123													2.122	1.032	†††.126

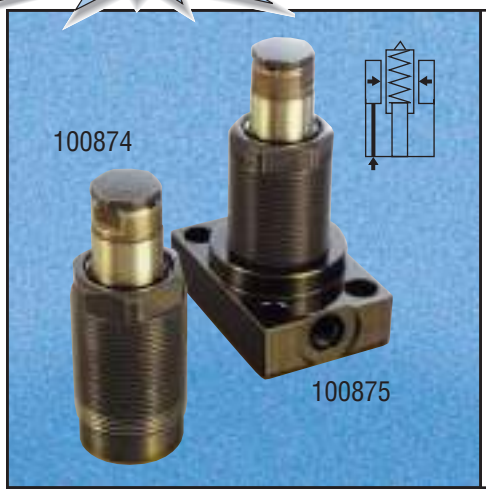
NOTE: * Based on 5,000 psi max. operating pressure
For optional jam nut see page 55
For additional flow control valves see pgs. 101 & 124.
For optional accessories see page 69.

† 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.

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

SPX HYTEC



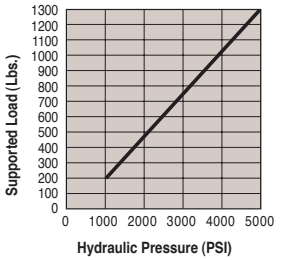
Hytec's spring advance work supports have a spring loaded plunger which contacts the workpiece as it is loaded into the fixture. The spring keeps the plunger in contact with the workpiece, allowing for variations between workpieces. To support any externally supplied loads, the sleeve surrounding the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

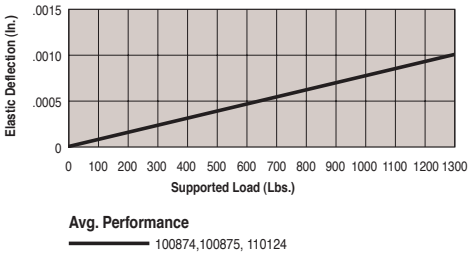
The 100874's threaded body may be compactly manifold mounted in your fixture or choose the 100875 which includes the 100874 work support and a mounting base for installation on a flat surface for conventionally plumbed circuits. Both feature fully corrosion resistant construction.

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.

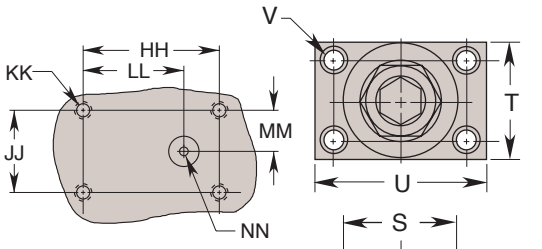
Features:

- 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

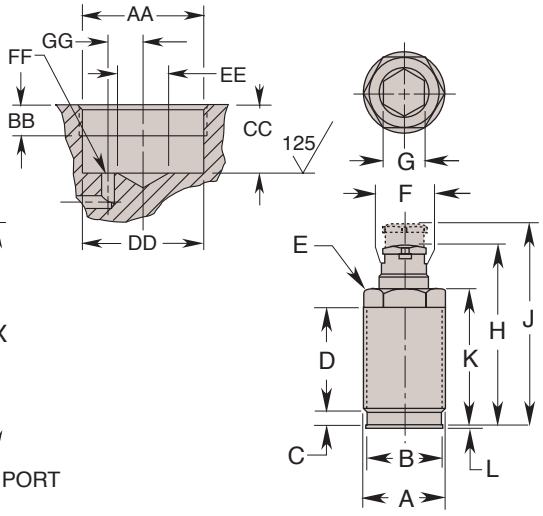




Mating Hole Pattern **100875**



Manifold Mount Detail **100874**



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		—	—	—				—	—
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
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			
110124											1.456	.594	.126

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

NOTE: *Based on 5,000 psi max. operating pressure.
For optional jam nut see page 55.
For additional flow control valves see pages 101 & 124.
For optional accessories see page 69.

† 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.

SPX HYTEC® Spring Adv. Work Supports-4,000 lb. Cap. NEW

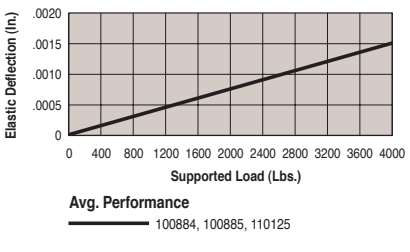
Hytec's spring advance work supports have a spring loaded plunger which contacts the workpiece as it is loaded into the fixture. The spring keeps the plunger in contact with the workpiece, allowing for variations between workpieces. To support any externally applied loads, the sleeve surrounding the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

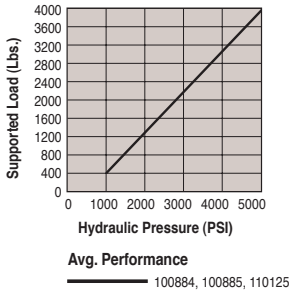
The 100884's threaded body may be compactly manifold mounted in your fixture or choose the 100885 which includes the 100884 work support and a mounting base for installation on a flat surface for conventionally plumbed circuits. Both feature fully corrosion resistant construction.

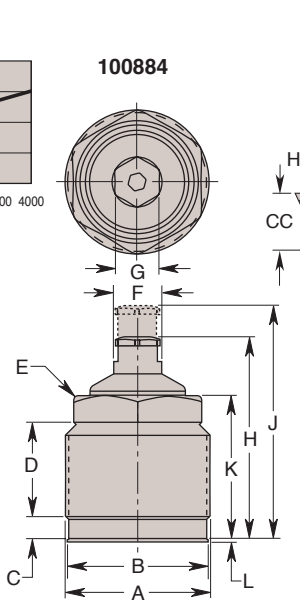
Extremely close manufacturing tolerances hold the plunger perpendicular to the workpiece and eliminate inaccuracies due to plunger movement during lock-up. After lock-up, the plunger is absolutely rigid and limits elastic deflection to .00004" per 100 lbs. of load. For base only, order number 500028.

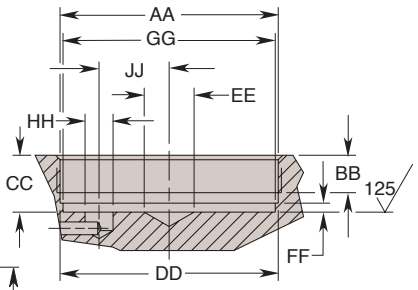
Features:

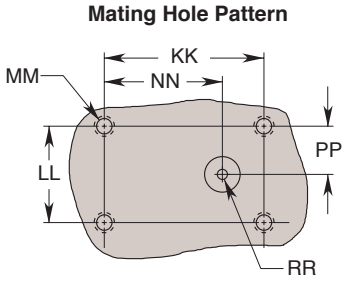
- 4,000 lbs. capacity @ 5,000 psi max.
- Fully corrosion resistant construction
- Manifold mount or conventional base mounting
- Small filtered breather/rest button to accommodate intricate workpieces
- 1,000 psi minimum recommended pressure

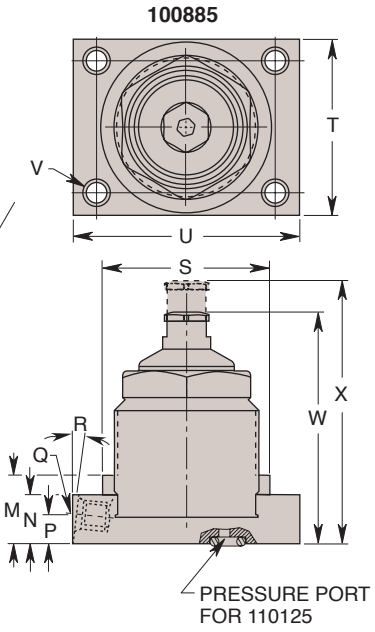












Cat. No.	Specifications				Dimensions (In Inches)									
	*Cap. (Lbs.)	Oil Cap. (Cu. In.)	Advance System	Mounting Configuration	A	†B Seal Dia.	C	D	E Hex	F Dia.	G Hex	Operating Range H	Operating Range J	K
100884	4,000	.02	Spring	Cartridge Manifold	2¼-16 UN	2.140	.250	1.625	2.000	.735	.688	3.265	3.765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

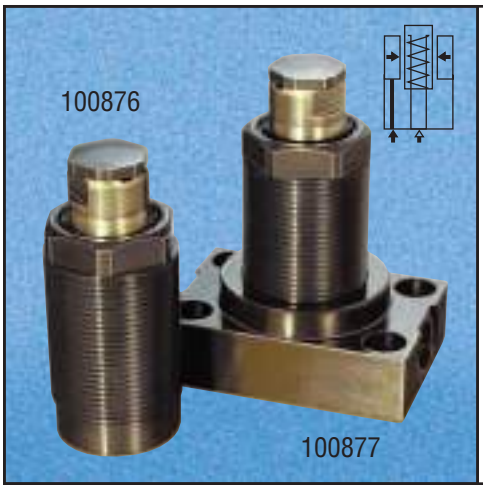
Cat. No.	Mounting Dimensions (In Inches)														
	AA Thd. Size	BB Min. Thd.	CC	DD Dia.	EE Drill Point Max.	FF	GG Dia.	HH Dia.	JJ Max.	KK	LL	MM Thd. Size	NN	PP	RR Pressure Port Dia. Max.
100884	2¼-16 UN	.380	.560 .580	2.182 2.196	.500	.080 .100	2.145 2.155	.121 .293	.700	—	—	—	—	—	—
100885	—	—	—	—	—	—	—	—	—	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 55
For additional flow control valves see pgs. 101 & 124.
For optional accessories see page 69.

† 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.

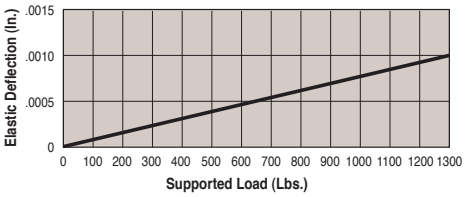
Air advance work supports allow the plunger to be retracted out of the way during workpiece load/unload operations. Applying air pressure to the work support gently raises the plunger until it contacts the workpiece. Adjusting the air pressure will vary the plunger contact force. The air pressure within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

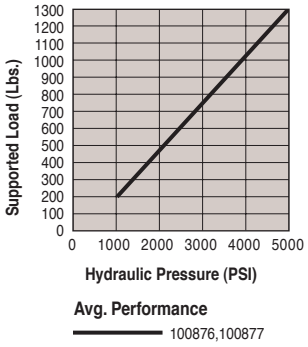
The No. 100876's threaded body may be compactly manifold mounted in your fixture or choose the No. 100877 which includes the 100876 work support and a mounting base for installation on a flat surface for conventionally plumbed circuits. Both feature fully corrosion resistant construction.

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.

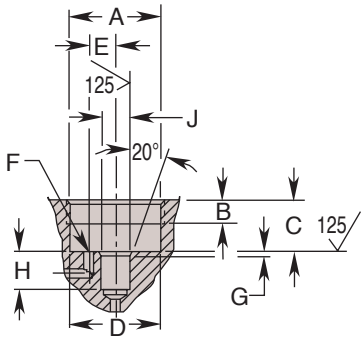
Features:

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

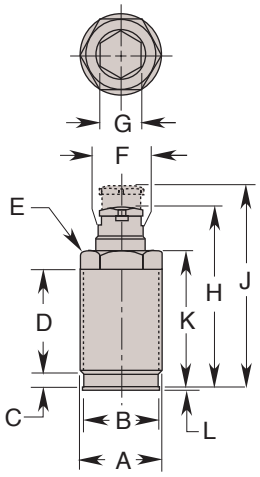




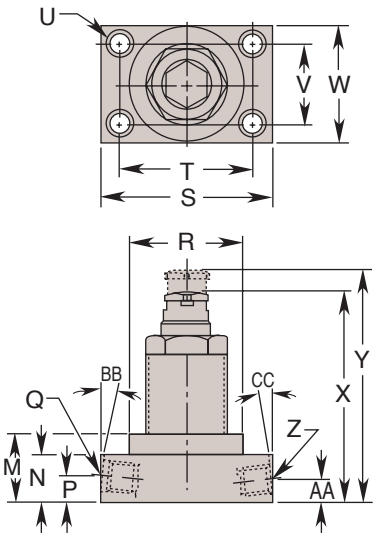
Manifold Mount Detail



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. 52) See page 69 for optional accessories.

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

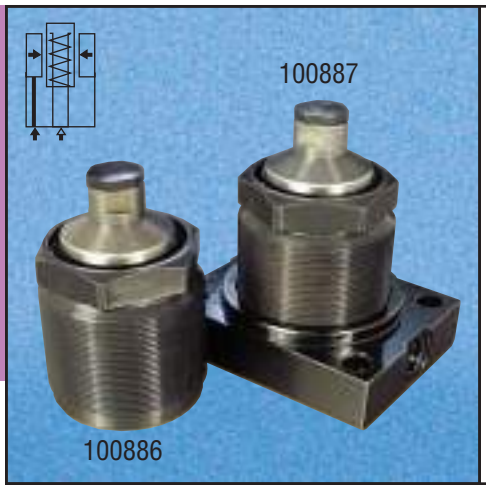
MANIFOLD MOUNT DETAIL									
Cat. No.	Cavity Dimensions				Fluid Passage Dimensions		†Air Passage Dimensions		
	A Thread Size	B Min. Thread	C	D Dia.	E	F Dia.	G	H	J Dia.
100876	1¼-16UN	.300	.665 .675	1.182 1.196	.343	.121 .135	.060	.380 .400	.375 .377

† 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.

Air Advance Work Supports - 4,000 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.

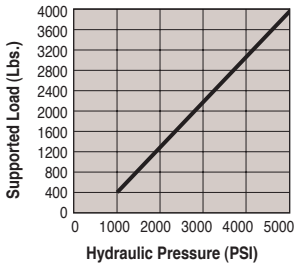
Air advance work supports allow the plunger to be retracted out of the way during workpiece load/unload operations. Applying air pressure to the work support gently raises the plunger until it contacts the workpiece. Adjusting the air pressure will vary the plunger contact force. The air pressure within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

The 100886's threaded body may be compactly manifold mounted in your fixture or choose the No. 100887 which includes the 100886 work support and a mounting base for installation on a flat surface for conventionally plumbed circuits. Both feature fully corrosion resistant construction.

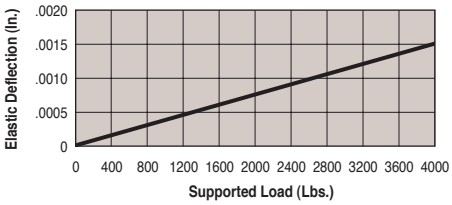
Extremely close manufacturing tolerances hold the plunger perpendicular to the workpiece and eliminate inaccuracies due to plunger movement during lock-up. After lock-up, the plunger is absolutely rigid and limits elastic deflection to .00004" per 100 lbs. of load. For base only, order number 500029.

Features:

- 4,000 lbs. capacity @ 5,000 psi max.
- Fully corrosion resistant construction
- Manifold mount or conventional base mounting
- 1,000 psi minimum recommended pressure

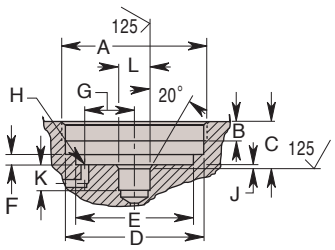


Avg. Performance
100886, 100887

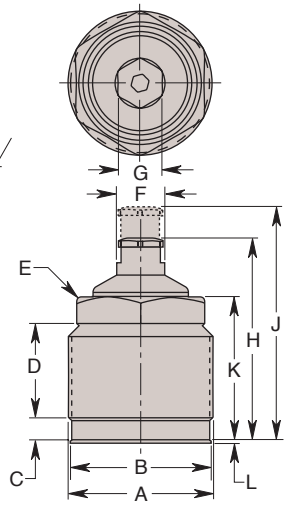


Avg. Performance
100886, 100887

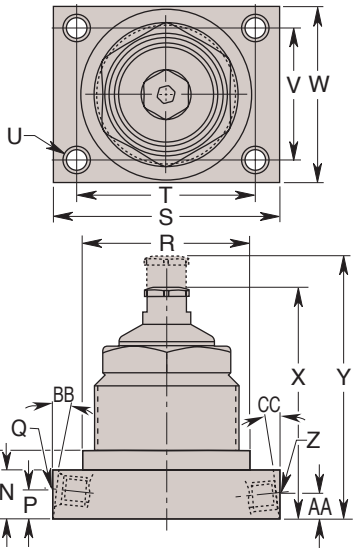
Manifold Mount Detail



100886



100887



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
100886	4,000	.02	Air	Manifold	2¼-16 UN	2.140	.250	1.625	2.000	.735	.688	3.265	3.765	2.312
100887		.02	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
100886	.040	—	—	—	—	—	—	—	—	—	—	—	—	–	–	–	–
100887		1.000	.780	.465	7/16-20 UNF SAE-4	2.688	3.562	2.844	.281	2.063	2.750	3.735	4.235	⅛ NPTF	.420	5°	5°

NOTE: * Based on 5,000 psi max. operating pressure. (Optional: Jam nut - page 55) See page 69 for optional accessories.

† 2.768 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 Dia.	F	G	H Dia.	J	K	L Dia.
100886	2¼-16UN	.380	.570	2.182 2.196	2.145 2.155	.080 .100	.781	.121 .135	.060	.460 .480	.500 .502

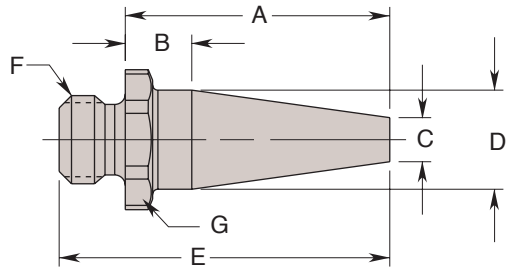
† Connector bushing supplied but not shown.

AIR ADVANCE WORK SUPPORT

Cat. No.	Approximate Plunger Extension Force	
	*Air Pressure (PSI)	Force (Lbs.)
100886 100887	15	10
	20	19
	30	30

NOTE: * Min. air press. 5 psi, max. air press. 30 psi
Minor air leakage may occur at 10 psi or above.

500176



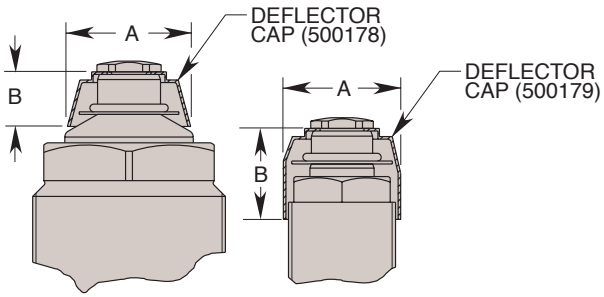
Cat. No.	Dimensions (In Inches)						
	A	B	C Dia.	D Dia.	E	F Thd. Size	G Hex
500176	1.500	.376	.250	.562	1.875	½-20 UNF	.688

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)	
	A	B
500178	1.435	.635
500179	1.410	1.060

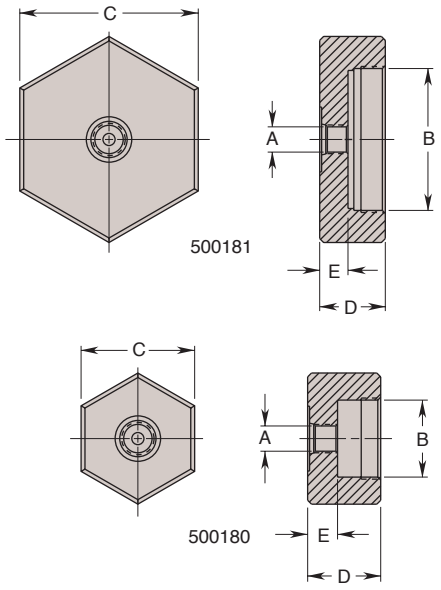
Coolant Deflector Caps

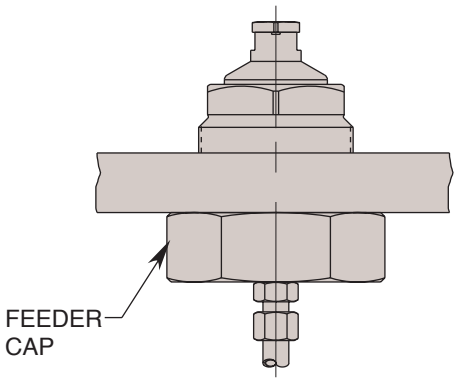
These Coolant Deflector Caps are designed to reduced exposure of the work support's breather/filter to coolant and contaminants. They are designed for applications where the work support is actuated either during or soon after exposure to coolant floods. Used in conjunction with careful aiming of coolant 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.





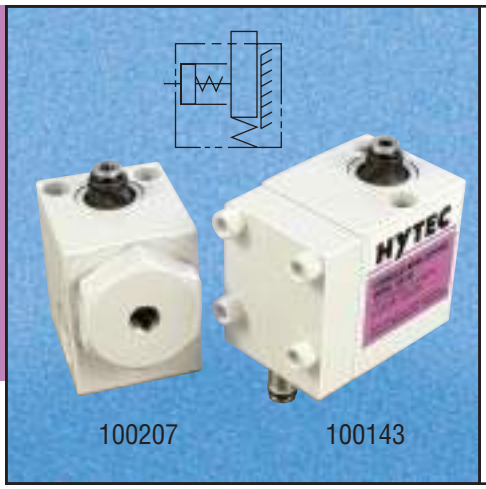
Feeder Caps

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

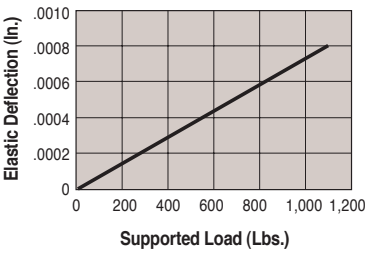


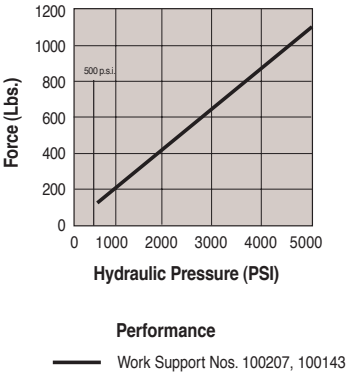
Hytec's 1,100 lb. capacity work supports use a boot attached between the body and plunger to effectively seal out contaminants. A diaphragm breather system further protects internal components, and the block style design requires only a flat surface for mounting rather than the large threaded hole needed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

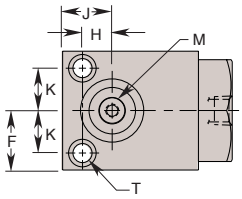
These work supports use a spring-loaded plunger to minimize deflection and vibration: As the workpiece is loaded into the fixture, it contacts the plunger, and its weight or the design of the fixture holds the plunger depressed. When the work support is hydraulically pressurized, the plunger is locked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

Features:

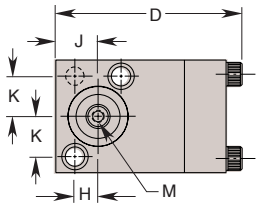
- Spring advance
- 1,100 lb. rated capacity at 5,000 psi max.
- Single-acting
- Manifold or conventionally mounted styles
- Sealed against contamination



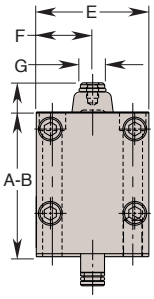


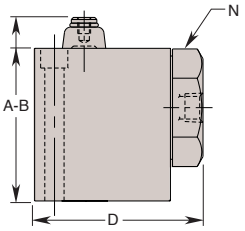


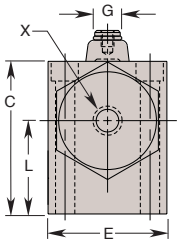
100207

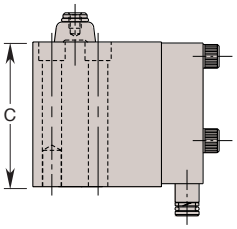


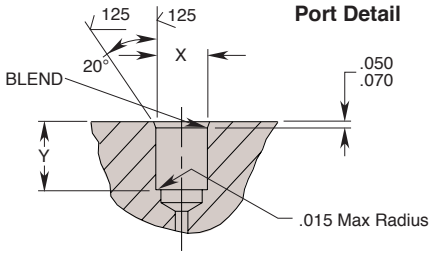
100143



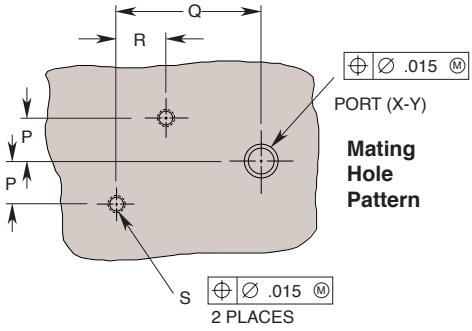








Port Detail



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		–

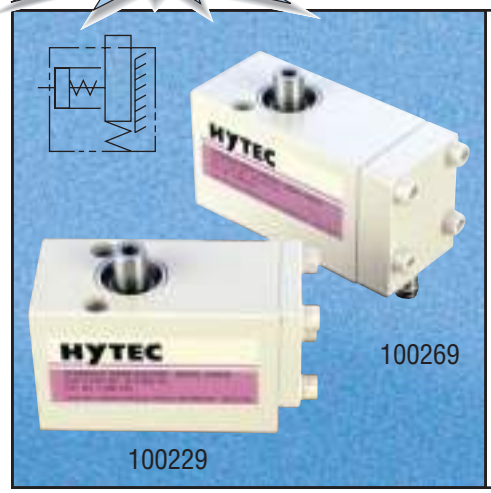
Cat. No.	Dimensions (In Inches)									
	M Thread Size	M Thread Depth	N Hex.	P Mounting	Q Mounting	R Mounting	S Thread Size	T Dia.	X Thread Size	X Dia.	Y
100207	10-24 UNC	.250	1.500	–	–	–	–	.281	⅛ NPTF	–	–
100143			–	.625	2.102	.718	¼-20UNC	–	–	.375 .377	.515 .535

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.

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

SPX HYTEC



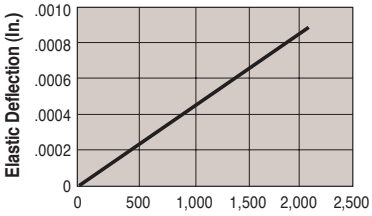
Work supports provide the stability that prevents deflection and vibration of the workpiece during machining. Automatically adjustable to varying sizes or positions of the workpieces, they are also usable as adjustable rest pads under clamps.

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.

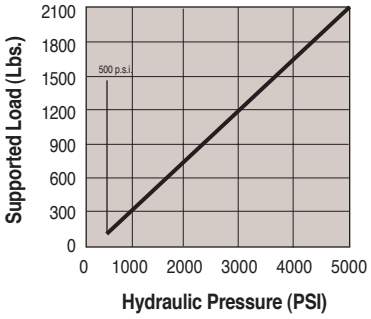
The block style design requires only a flat surface for mounting rather than the large threaded hole necessary with threaded body designs.

Features:

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

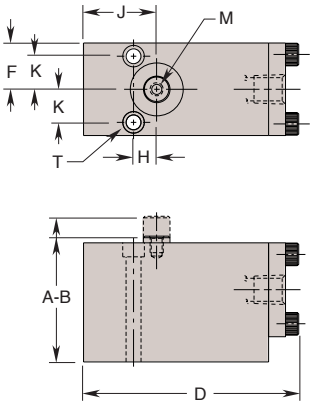


Avg. Performance
Nos. 100229, 100269

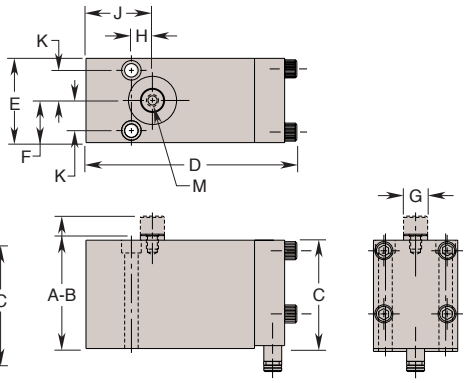


Performance
Work Support Nos. 100229, 100269

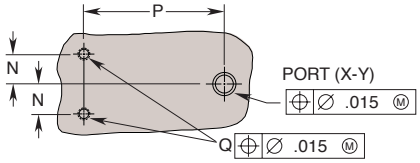
100229, 110085



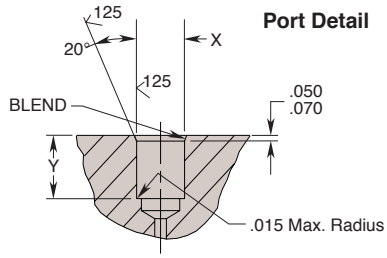
100269



Mating Hole Pattern



Port Detail

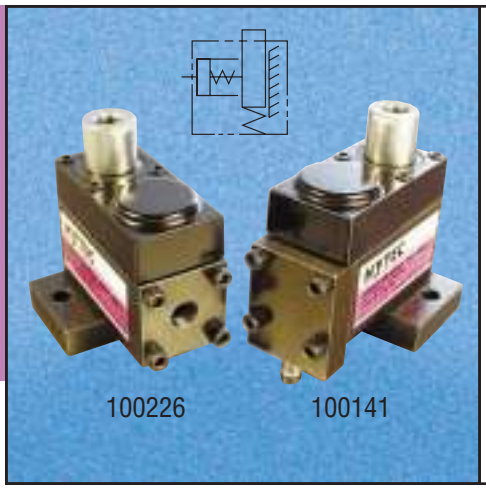


Cat. No.	Specifications				Dimensions (In Inches)									
	*Cap. (Lbs.)	Oil Cap. (Cu. In.)	Advance System	Mounting Configuration	A Retract Oper. Range	B Advance Oper. Range	C	D	E	F	G Dia.	H	J	K
100229	2,100	.100	Spring	Conventional	2.375	2.750	2.250	4.062	1.750	.875	.500	.438	1.380	.625
110085					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



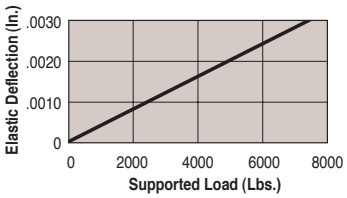
Work supports provide the stability that prevents deflection and vibration of the workpiece during machining. Automatically adjustable to varying sizes or positions of the workpieces, they are also usable as adjustable rest pads under clamps.

These 7,500 lb. work supports are available in 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.

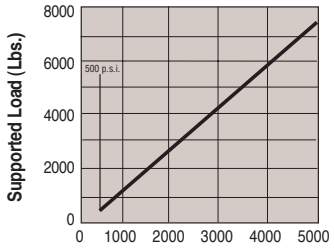
The block style design requires only a flat surface for mounting rather than the large threaded hole necessary with threaded body designs.

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

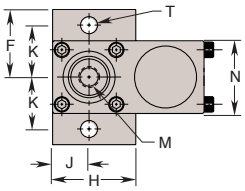
Note: See Page 27 for crowned threaded insert.



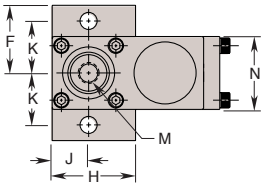
Avg. Performance
100141, 100226, 100926



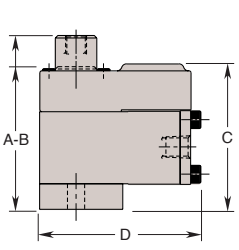
Performance
Work Support Nos. 100226, 100141, 100926

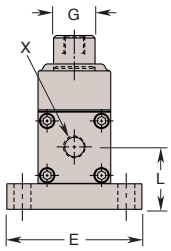


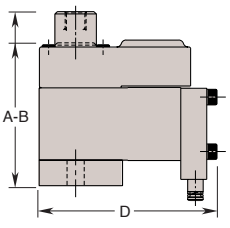
100226
100926

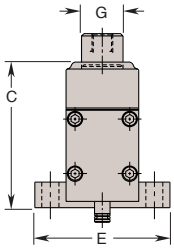


100141

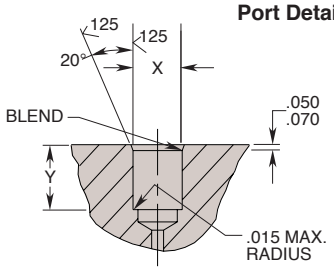


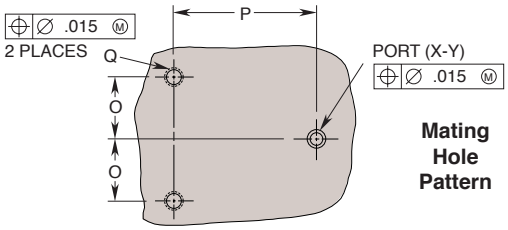






Port Detail





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							–

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	–	–
100926								7/16-20 SAE-4		
100141				1.250	2.878	⅜-16UNC	–	–	.375 .377	.515 .535

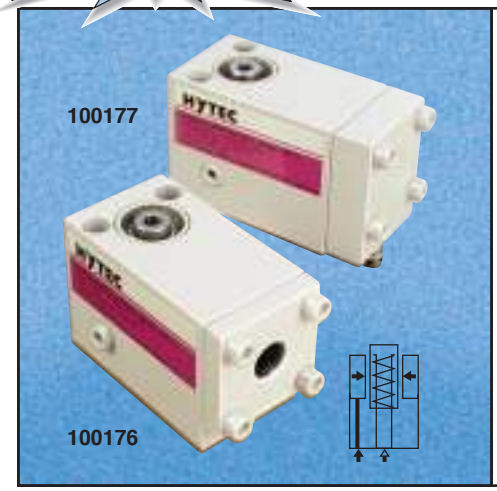
NOTE: * Based on 5,000 psi max. operating pressure.

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

NEW

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

SPX HYTEC



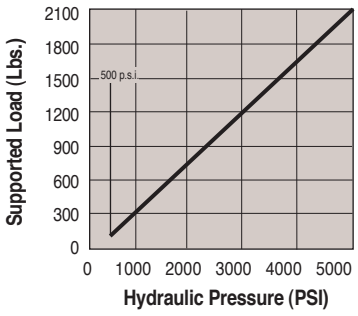
Work supports provide the stability that prevents deflection and vibration of the workpiece during machining. Automatically adjustable to varying sizes or positions of the workpieces, they are also usable as adjustable rest pads under clamps.

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.

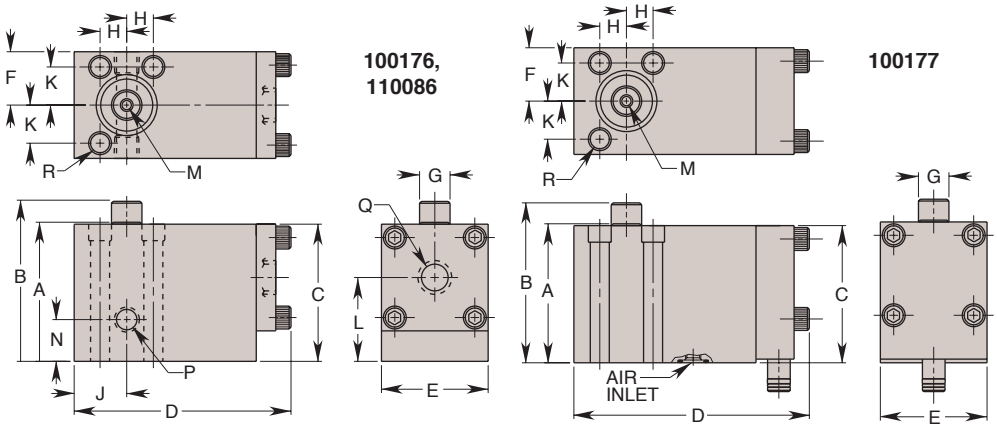
Features:

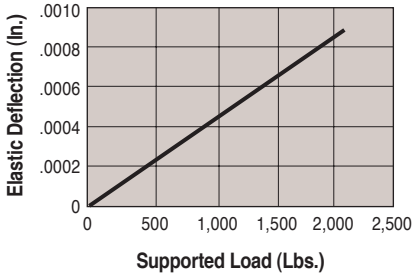
- Air advance
- 2,100 lb. rated capacity at 5,000 psi max.
- Single-acting
- Manifold or conventionally mounted styles
- Sealed against contamination



Performance

Work Support Nos. 100176, 100177

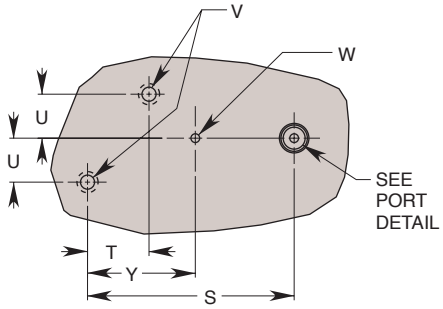




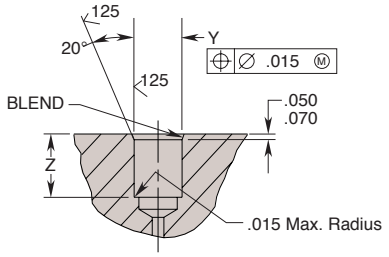
Avg. Performance

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

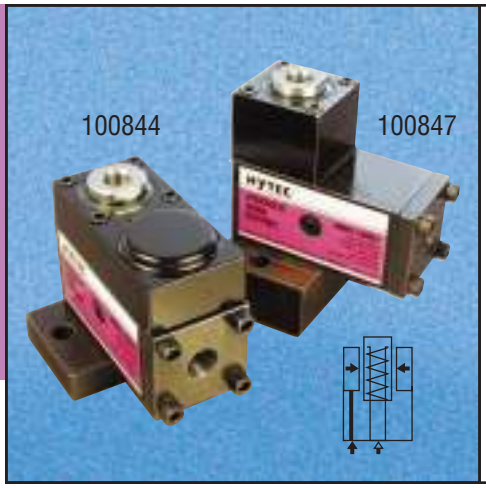
NOTE: * Based on 5,000 psi max. operating pressure.

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.

SPX HYTEC® Air Adv. Work Supports - 7,500 lb. Cap.

NEW



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.

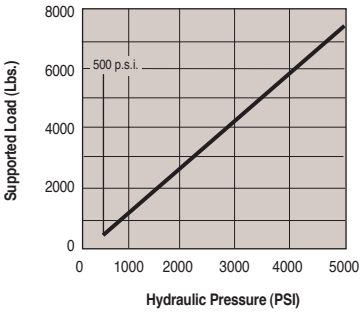
The block style design requires only a flat surface for mounting rather than the large threaded hole necessary with threaded body designs.

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:

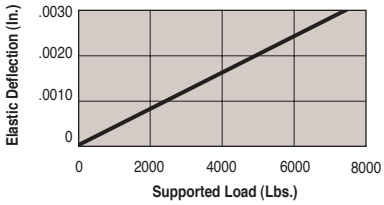
- Air advance
- 7,500 lb. rated capacity at 5,000 psi max.
- Single-acting
- Sealed against contamination
- Convenient dual air inlets allow easy connection and chaining of work supports

Note: See page 27 for crowned threaded insert. See page 125 for air inlet adapter fitting.



Avg. Performance

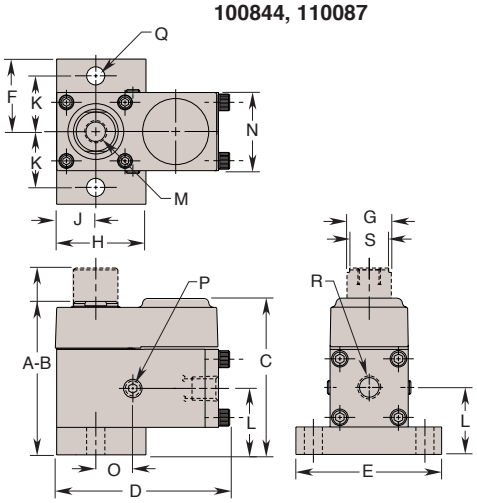
Nos. 100844, 100847



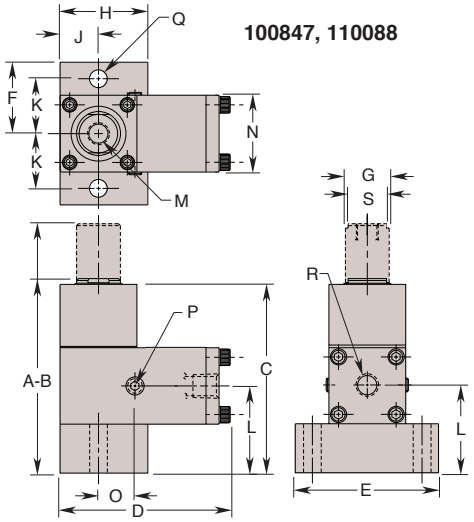
Avg. Performance

Nos. 100844, 100847

100844, 110087



100847, 110088



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	4.115	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															

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	

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

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

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

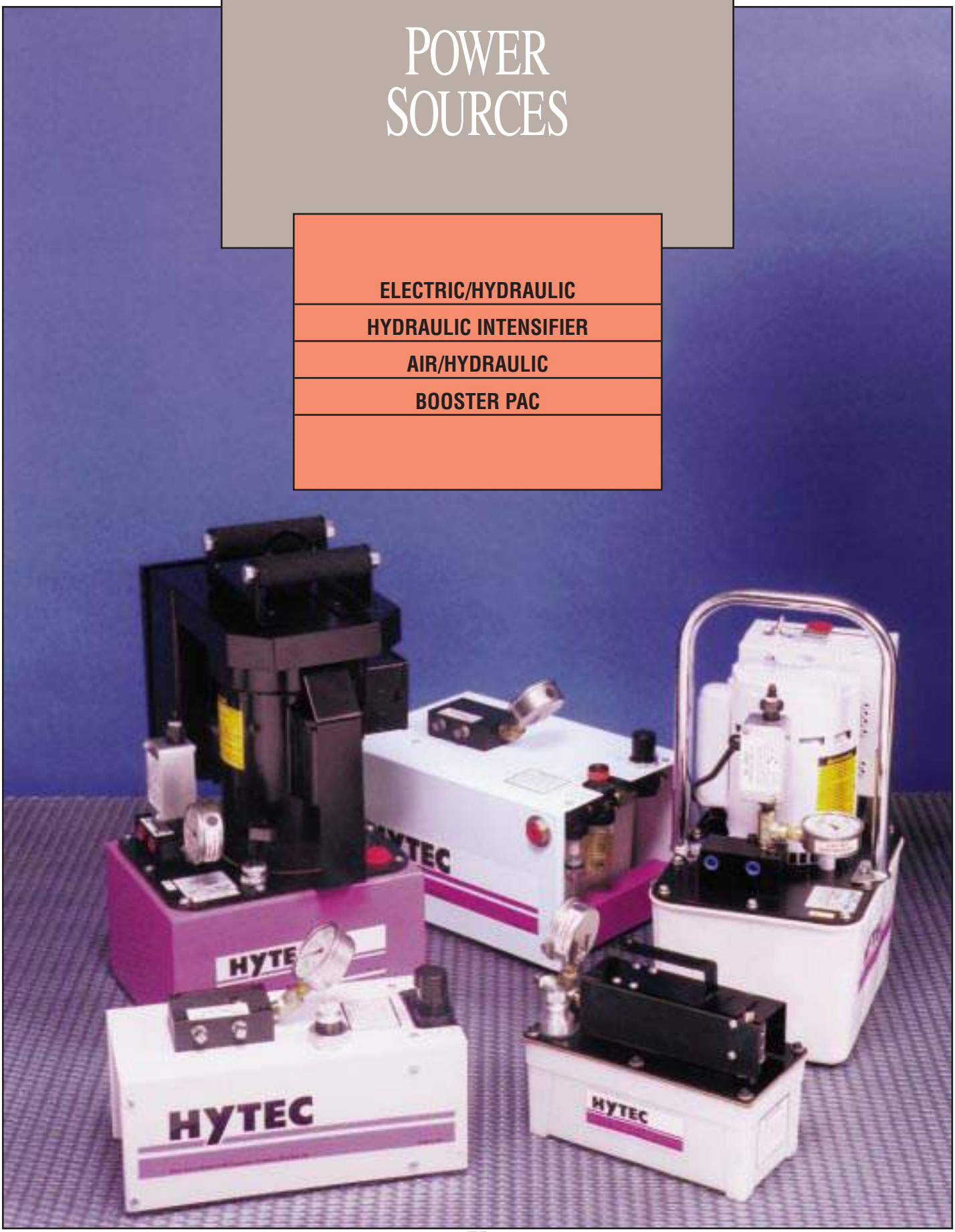
POWER SOURCES

ELECTRIC/HYDRAULIC

HYDRAULIC INTENSIFIER

AIR/HYDRAULIC

BOOSTER PAC



Power Source Information

Hytec power workholding systems use constant pressure or demand-type power sources. This means that the power source continuously supplies pressure to the circuit control valves for instantaneous response when the valves are shifted. The power source then automatically starts to maintain system pressure, but when the demand is met, shuts off to conserve energy and prevent heat build-up.

Hytec offers two basic hydraulic pump types – electric and air powered – plus an air powered booster/pump combination. Hytec also has a line of control valves for use with these pumps. The valves have virtually zero leakage and are ideally suited for constant pressure hydraulic workholding systems. **Note that valves with internal leakage (such as spool valves) are not appropriate for use with Hytec pumps and pallet valve systems.**

Electric/Hydraulic Pumps

All of Hytec's electric/hydraulic pumps are two-stage, continuous pressure (demand) pumps that contain all the necessary controls and circuitry for powering any single- or double-acting, continuous pressure workholding system. They contain a pressure switch and pressure regulator, and each is infinitely adjustable throughout the operating pressure range of 1,000 to 5,000 psi. An internal safety relief valve prevents possible damage from exceeding the maximum rated pressure.

The first stage provides high flow at low pressure to rapidly extend clamps and cylinders. The second stage piston pump builds and maintains pressure in the system at a preset level.

The pumps' electrical controls include a RUN/JOG switch. When the pump is started in the RUN mode, it automatically starts and runs any time the pressure switch indicates the need for oil. When pressure builds to the switch setting, the pump stops until the next demand for oil lowers the pressure, causing the switch to start the pump again. The pump continues to cycle in this manner without operator intervention.

In the JOG mode, useful for set up and special applications, the pump will run only when the operator activates and holds the start switch. When released, the pump will stop immediately. If the pump builds pressure to the pressure switch setting, it will also stop. The pump cannot be forced to run after the pressure switch setting has been reached in either the RUN or the JOG mode.

Pumps having thermal overload protection have an integral "electrical shut-down" circuit which prevents the pump from restarting without manual intervention after either thermal overload or electrical service interruption.

Motor electrical specifications are listed for each pump. For voltages and frequencies not listed, contact Hytec for more information

An optional fluid level temperature gauge is available. See page 136.

Air/Hydraulic Pumps

Hytec's air/hydraulic pumps are all continuous pressure, reciprocating, stall-type pumps: air pressure is simply converted to hydraulic pressure. Operated by any compressed air source, these pumps save energy by stalling when pressure is developed, and require no energy use to maintain system pressure. Single- and two-stage pumps are available.

Pumps of this type typically have much more usable oil capacity than ordinary boosters. Boosters stop after only one stroke, and if pressure is not built by the end of the stroke, or if any leakage is present, system pressure will not be maintained. Hytec air/hydraulic pumps will maintain pressure levels because they continue to reciprocate until pressure develops. Once pressure is developed, the pump stalls and maintains consistent system pressure. If additional flow is necessary for maintaining pressure, the pump will again reciprocate any time the end of its stroke is reached.

These pumps all operate within an air pressure range of 40-125 psi. Hydraulic operating pressures range from 400-5,000 psi.

Selected Hytec air/hydraulic pumps come with an air supply filter/lubricator/regulator for making hydraulic pressure adjustments. There is even a version that includes a selector valve and the circuitry required to provide control of single acting circuits without the need for additional directional control valves.

Booster-Pac

Hytec's Booster-Pac is a two-stage hydraulic power source that is a combination booster/pump having the advantages of a booster, plus the added benefit of a reciprocating pump.

The first stage is a low ratio, air/hydraulic booster, with full shop air pressure continually available to provide high flow for rapid extension of clamps and cylinders. The second stage is a stall-type reciprocating pump that builds and maintains system pressure.

Each Booster-Pac comes with an air supply filter/lubricator/regulator for making hydraulic pressure adjustments. Air regulator adjustments affect only the second stage hydraulic pump.

Operating pressure range for the Booster-Pac is from 1,560 psi at 40 psi air, to 4,875 psi at 125 psi air.

Intensifiers

Intensifiers are used in applications where an existing low pressure hydraulic source is available. They amplify low pressure to a range better suited to workholding systems.

Intensifiers use a reciprocating pumping mechanism to generate the high pressure flow so their volume is not limited as with piston style intensifiers. This allows the intensifier to compensate for any oil consumption on the high pressure side. The outlet pressure is directly proportional to the inlet pressure. High pressure adjustment is achieved by varying the inlet pressure.

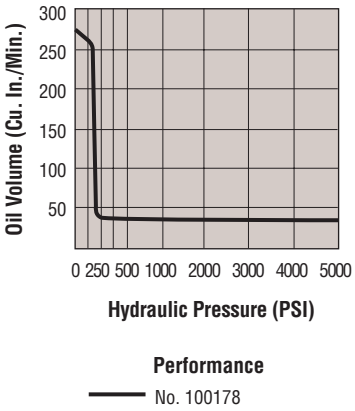
Flow from the low pressure source is directed through the intensifier to the downstream circuit. As system pressure increases, the intensifier begins to cycle and intensifies the system pressure by the ratio specified.

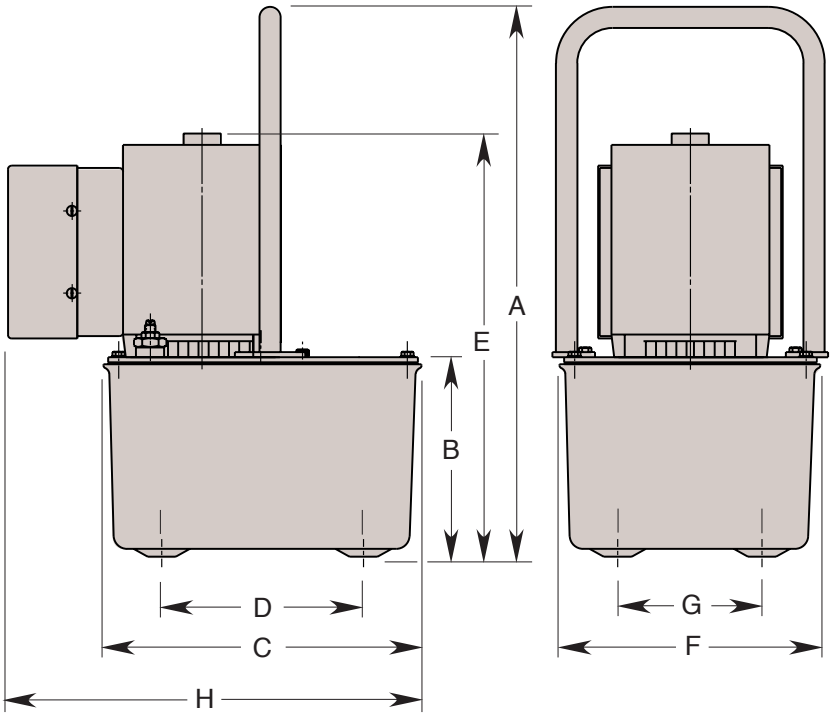
Models without a dump valve do not allow reverse flow so directional control must take place downstream in the pressure circuit. Models with the dump valve allow directional control in the low pressure supply circuit. The optional directional valve manifold block has a standard Vickers C-10-4 cavity to accept a variety of manual and solenoid valves.

This two-stage, continuous pressure (demand) pump contains all the necessary controls and circuitry for powering single- or double-acting continuous pressure workholding systems. It has a pressure switch and pressure regulator, both infinitely adjustable throughout the operating pressure range of 1,000 to 5,000 psi. An internal safety relief valve prevents damage from exceeding the maximum rated pressure. It's an economical gerotor/radial piston pump designed for remote mounted valves only. Consult Hytec for information on pump mounted valves. Shipped with 1.5 gallons of oil.

Features:

- Drip proof induction motor
- CSA approved
- Filtered filler/breather cap
- Liquid filled gauge
- Carrying handle
- Thermal overload protection
- 2-gallon, high density polyethylene reservoir
- ¼" NPTF outlet manifold
- 33 cu. in./min. oil flow at max. pressure
- 295 cu. in. usable oil





Cat. No.	Specifications			Dimensions (In Inches)							
	Electric Motor	Supply Voltage	Noise Level @ Idle/Max. Press. (dBA)	A	B	C	D	E	F	G	H
100178	½ hp; 3,450 rpm; 115/230 VAC 10/5 amps max.; 60 Hz; single phase	115 VAC	67/81	19.875	7.000	11.375	7.125	14.875	9.250	5.125	14.875
100178-230		230VAC									

NOTE: Mounting screws included (¼-10 x .875 Lg.).
An optional metal reservoir is available, see page 136.
An optional fluid level / temperature gauge is available, see page 136.

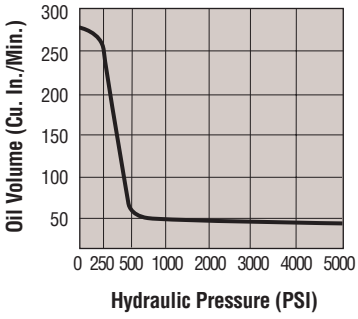
Electric/Hydraulic Pumps

These electric/hydraulic pumps are two-stage, continuous pressure (demand) pumps that contain all the necessary controls and circuitry for powering any single- or double-acting continuous pressure workholding system. They have a pressure switch and an external pressure regulator, both infinitely adjustable throughout the operating pressure range of 1,000 to 5,000 psi. An internal safety relief valve prevents damage from exceeding the maximum rated pressure.

They are gerotor/axial piston pumps with a totally enclosed fan cooled (TEFC) induction motor. The ¼" NPTF outlet manifold can be replaced by any Hytec pump-mounted valve. Shipped with two gallons of hydraulic oil.

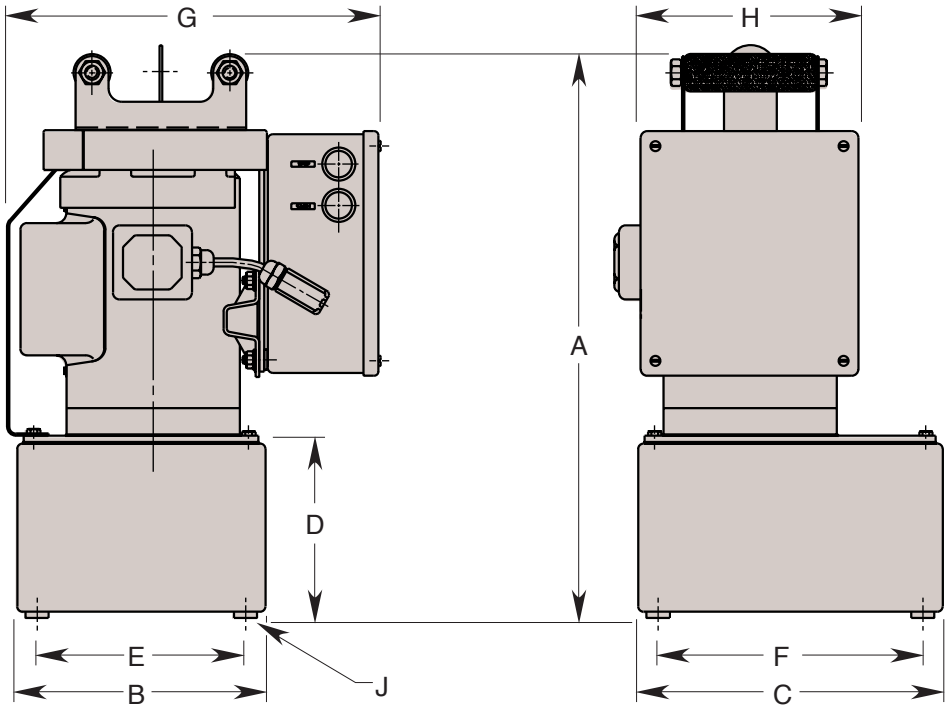
Features:

- NEMA 12 electrical enclosure and controls
- CSA approved
- Drip/chip cover
- Liquid filled gauge
- Dual carrying handles
- Thermal overload protection
- 2.5-gallon metal reservoir
- 44 cu. in./min. oil flow at max. pressure
- 590 cu. in. usable oil



Performance

Pump Nos. 100155, 100186



Cat. No.	Specifications			Dimensions (In Inches)								
	Electric Motor	Supply Voltage	Noise Level @ Idle/Max. Press. (dBA)	A	B	C	D	E	F	G	H	J Thread Size
100155	1 hp; 1,725 rpm; 230/460 VAC; 3.8/1.9 amps max.; 60 Hz; three phase	460 VAC	70	21.375	9.500	11.500	6.500	8.000	10.000	14.125	9.500	½-20 UNF
100155-230		230 VAC										
*100186	1 hp; 1,725 rpm; 115/230 VAC; 16/8 amps max.; 60 Hz; single phase	115 VAC										
100186-230		230 VAC										

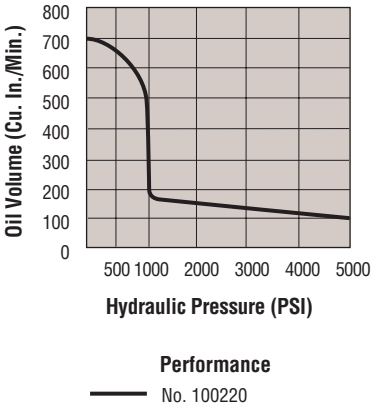
NOTE: *For field conversion to 230 VAC, order conversion kit No. 250186.
An optional fluid level / temperature gauge is available, see page 136.

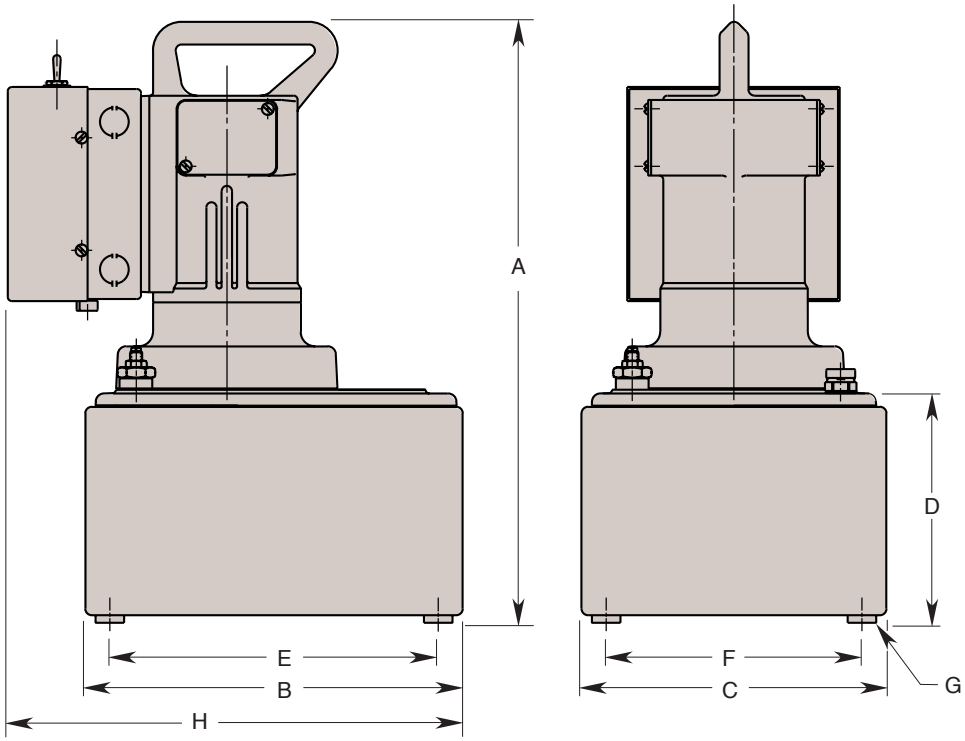
This electric/hydraulic pump is a two-stage, continuous pressure (demand) pump that contains all the necessary controls and circuitry for powering any single- or double-acting continuous pressure workholding system. It has a pressure switch and an external pressure regulator, both infinitely adjustable throughout the operating pressure range of 1,000 to 5,000 psi. An internal safety relief valve prevents damage from exceeding the maximum rated pressure.

It's a gear/axial piston pump designed for use in single or multiple station applications. Its high torque universal motor is low voltage tolerant. Includes a ¼" NPTF outlet manifold and will accept any Hytec pump-mounted valve. Shipped with two gallons of oil.

Features:

- CSA approved model available
- Drip proof universal motor
- Filtered filler/breather cap
- Liquid filled gauge
- Carrying handle
- 2.5-gallon metal reservoir
- 525 cu. in. usable oil
- Oil flow at max. pressure: 100 cu. in./min.





Cat. No.	Specifications			Dimensions (In Inches)							
	Electric Motor	Supply Voltage	Noise Level @ Idle/Max. Press. (dBA)	A	B	C	D	E	F	G Thread Size	H
100220	1⅛ hp; 12,000 rpm; 115 VAC; 25 amps max.; 50/60 Hz; single phase	115 VAC	80/85	18.250	12.500	10.500	7.000	10.000	8.000	½-20 UNF	14.000
100220-230	1⅛ hp; 12,000 rpm; 230 VAC; 14 amps max.; 50/60 Hz; single phase	230 VAC									

NOTE: An optional fluid level / temperature gauge is available, see page 136.

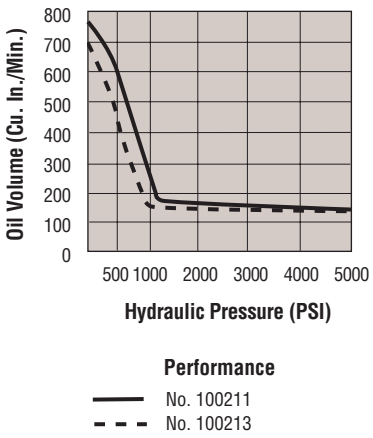
Electric/Hydraulic Pumps

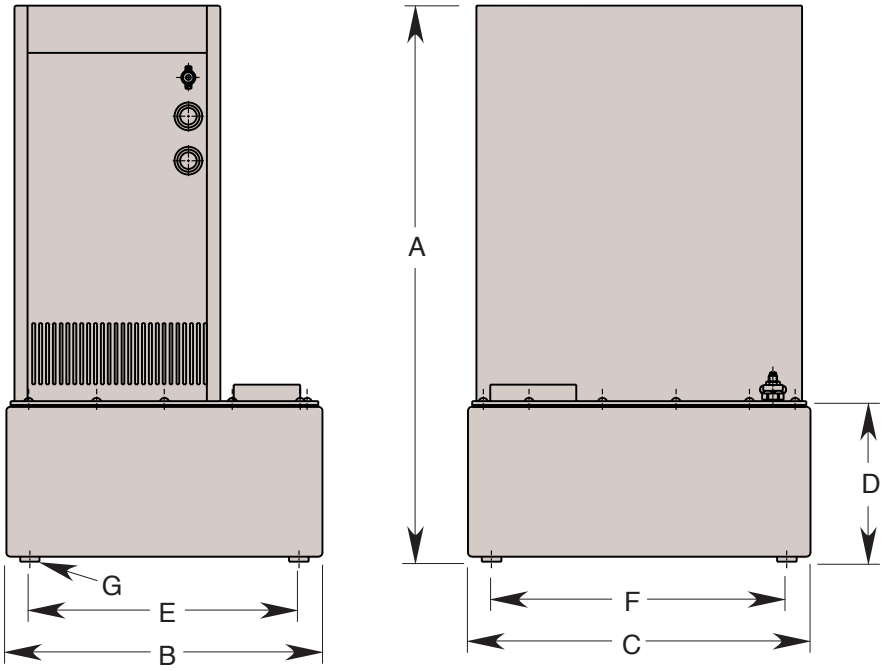
These electric/hydraulic pumps are two-stage, continuous pressure (demand) pumps that contain all the necessary controls and circuitry for powering any single- or double-acting continuous pressure workholding system. They contain a pressure switch and pressure regulator that are infinitely adjustable throughout the operating pressure range of 1,000 to 5,000 psi.

They are gerotor/axial piston pumps, ideal for use in single or multiple station applications, and include a ¼" NPTF outlet manifold and will accept any Hytec pump-mounted valve. Shipped with four gallons of oil.

Features:

- Enclosed induction motor
- Filtered filler/breather cap
- Liquid filled gauge
- Carrying handles
- Thermal overload protection
- 5.7-gallon metal reservoir
- Oil flow at max. press.: 125 cu. in./min.
- 1,250 cu. in. usable oil
- External pressure regulator
- Pressure switch





Cat. No.	Specifications			Dimensions (In Inches)						
	Electric Motor	Supply Voltage	Noise Level @ Idle/Max. Press. (dBA)	A	B	C	D	E	F	G Thread Size
100211†	2 hp; 1,725 rpm; 115/230 VAC; 27/14 amps max.; 50/60 Hz; single phase	115 VAC	74/76	25.125	14.250	15.500	7.250	12.125	13.312	½-20 UNF
100211-230†		230 VAC								
100213	2 hp; 1,725 rpm; 230/460 VAC; 6.6/3.3 amps max.; 50/60 Hz; three phase	460 VAC	73/78							
100213-230		230 VAC								

NOTE: † CSA Approved.

NEW

Hydraulic Intensifiers

SPX HYTEC

Intensifiers are used in applications where an existing low pressure hydraulic source is available. They amplify low pressure to a range better suited to workholding systems

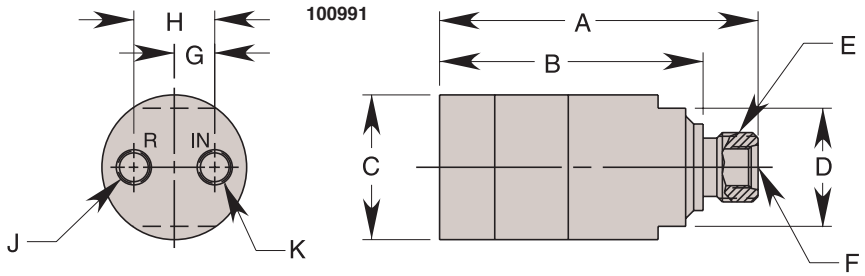
Intensifiers use a reciprocating pumping mechanism to generate the high pressure flow so their volume is not limited as with piston style intensifiers. This allows the intensifier to compensate for any oil consumption on the high pressure side. The outlet pressure is directly proportional to the inlet pressure. High pressure adjustment is achieved by varying the inlet pressure.

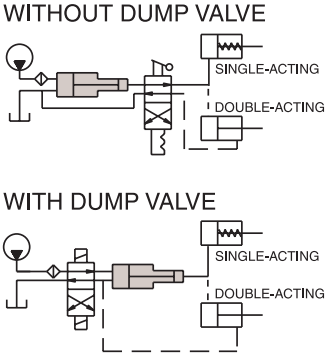
Flow from the low pressure source is directed through the intensifier to the downstream circuit. As system pressure increases, the intensifier begins to cycle and intensifies the system pressure by the ratio specified.

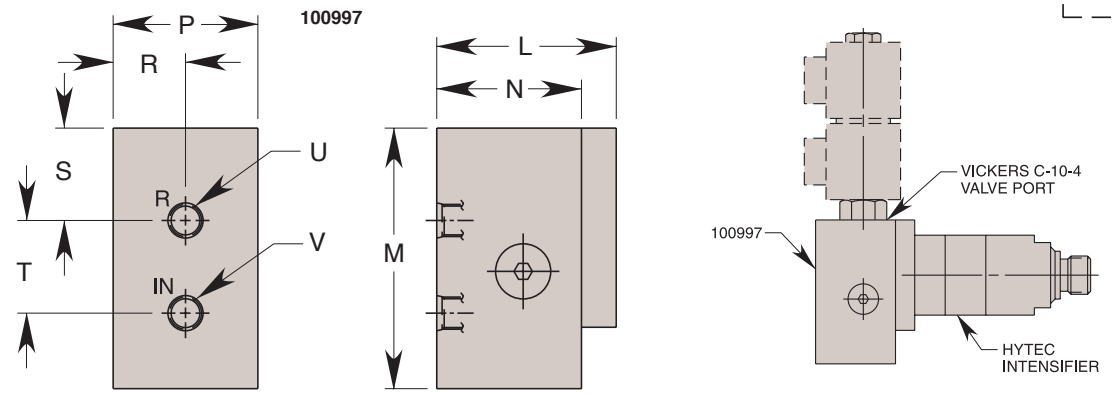
Models without a dump valve do not allow reverse flow so directional control must take place downstream in the high pressure circuit. Models with the dump valve allow directional control in the low pressure supply circuit. The optional directional valve manifold block has a standard Vickers C-10-4 cavity to accept a variety of manual and solenoid valves. Fitting No. 253288 can be used with part No. 100997. See page 127 for specs.

Features:

- 5,000 psi max.
- 3.2, 4 and 5.1 ratios available
- Optional valve manifold
- Extremely compact size







Cat No.		Specifications					Dimensions (In Inches)					
With Dump Valve	W/O Dump Valve	Pressure Intensification Ratio	Inlet Flow Max. (Cu. in./min.)	Outlet Flow Max. (Cu. in./min.)	Inlet Pressure (Cu. In./min.) Min. (psi)	Inlet Pressure (Cu. In./min.) Max. (psi)	A	B	C Dia.	D Flats	E Thread Size	F Outlet Thread Size
100991	100994	3.2 to 1	610	150	300	1,560	4.331	3.583	1.968	1.606	M24 x 1.5	9/16-18 UNF SAE-6
100992	100995	4.0 to 1	580	120		1,250						
100993	100996	5.0 to 1	550	95		1,000						

Cat No.		Dimensions (In Inches)			
With Dump Valve	W/O Dump Valve	G	H	J Return Thread Size	K Inlet Thread Size
100991	100994	.551	1.102	7/16-20 UNF SAE-4	7/16-20 UNF SAE-4
100992	100995				
100993	100996				

Cat No.	Dimensions (In Inches)								
	L	M	N	P	R	S	T	U Return Thread Size	V Inlet Thread Size
100997	2.441	3.543	1.968	1.968	.984	1.256	1.260	¼ BSPP	¼ BSPP

NOTE: Approximate inlet to outlet leakage is 1 cu. in./min. Requires 10 micron nominal filtration. Hytec filter 100919 is ideal for protecting the inlet port. M24-1.5 nut included.

IMPORTANT: Demands created by the addition of this device to an existing hydraulic system can cause fluctuations in available pressure and flow to that system. The effects of these fluctuations on the original system must be evaluated by the designer of that system.

Air/Hydraulic Pump Application Guide

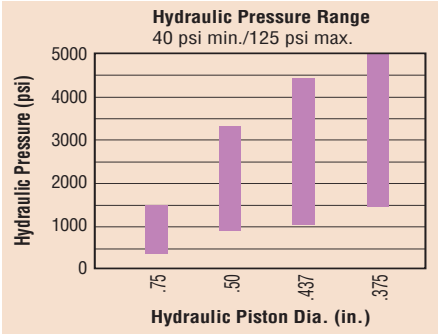
Use this guide to determine the right pump for your application.

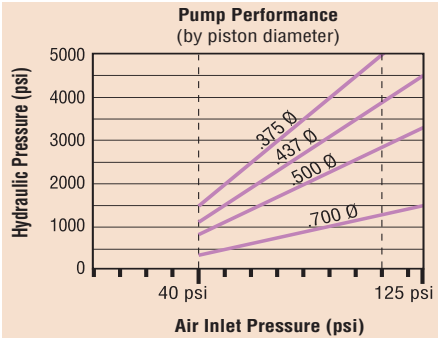
Some of Hytec's pumps can be used for many different applications – and others are intended for specific applications.

- Reciprocating piston pump mechanism available in any of four pressure ranges
- Hydraulic pressure is varied by changing air pressure at the pumps inlet
- Filtered breather and dipstick built into filler cap
- Elevated fill port keeps contaminants out of reservoir
- More usable oil capacity than ordinary boosters

Once pressure is developed, these pumps stall and then no energy is required to maintain consistent system pressure. Boosters stop after only one stroke, and if pressure is not built after that first stroke, or if leakage is present, system pressure will not be maintained. Hytec air/hydraulic pumps will maintain pressure levels because they continue to reciprocate until pressure develops. If additional flow is necessary for maintaining pressure, the pump again reciprocates to meet that demand.

All of Hytec's air/hydraulic pumps can be built in any of 4 different pressure ranges by changing the size of the pump piston. All of the most common versions are available from stock. Any other combinations can be easily assembled to order.





* Air pressures higher than 110 psi will open the pump's internal relief valve to protect the pump and the circuit. The pump will continue to reciprocate rather than stall. This will cause unnecessary wear, noise, heat and air usage.

100190

This single-stage design is the flagship of Hytec air/hydraulic pumps. Used with a hydraulic directional control valve, these pumps are ***suited for either single-acting or double-acting systems***. Primarily for use with their manifold and remote mounted valves, they are used to power systems with a single valve or as the centralized pump for systems using multiple valves. Pump mounted valves can simplify plumbing but limit the application to one circuit per pump. The built-in air filter/regulator/lubricator provides hydraulic pressure adjustment. A metal case increases durability and resists contamination.

100200

This pump style provides all of the same operational and design features of the pump style discussed above but ***provides much higher low pressure flow rates***. Under the cover are two of Hytec's reciprocating air/hydraulic pumps. Both share the same inlet and outlet ports. This two-stage design provides higher flows at lower pressures. The first stage pump receives full airline pressure. When its maximum hydraulic pressure is reached, it stalls and allows the second stage pump (usually a higher pressure version) to take over to develop system pressure. The second stage pump is controlled by the built-in air filter/regulator/lubricator.

100280

This pump style provides all of the same operational features of the single-stage pumps discussed above except that it ***makes use of a user-supplied air filter/regulator/lubricator to control pressure***. External shrouding is removed to decrease its overall size and allow mounting in tight quarters; either on or off the fixture. Primarily for use with their manifold and remote mounted valves. Pump mounted valves can simplify plumbing but limit the application to one circuit per pump. Like the pumps above, a pressure gauge and a manifold with pressure and return ports are included.

58219

This series of pumps has a ***built-in directional control valve***. Circuits using this pump require only a single line between the pump and the workholding circuit. For single-acting systems only, directional control is provided by a two-position air valve mounted on the pump. This valve can be remote mounted with two, user-supplied air lines between the valve and the pump. Supply (air) pressure is then connected to the valve. This pump is not intended for use with additional directional control valves and allows only one circuit per pump. This simple, inexpensive design eliminates the cost and clutter of a separate hydraulic directional control valve.

100279

This style of pump is designed specifically for ***use with our manual pallet valve***. It is controlled by the foot pedal. Rocking it toe-down releases hydraulic pressure. Rocking it back to the heel-down position causes the pump to start. When released, the pedal returns to a center position and the pump stops. Because the pump runs only when holding the pedal down, this style of air/hydraulic power source is not suitable for constant pressure workholding systems. Use this pump for single-acting systems where an operator is in control of the pump, hold and release functions. In addition to our manual pallet valve, this pump can be useful for non-clamping process functions like pressing or positioning.

Contact Hytec or your distributor for ordering information.

Air/Hydraulic Pumps

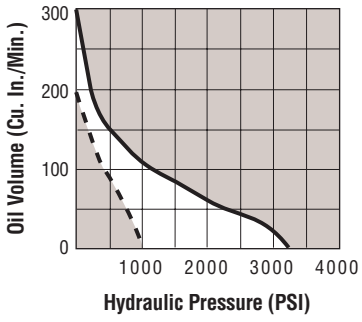
Available with all piston options, this single-stage pump is a continuous pressure, reciprocating, stall-type pump: air pressure is simply converted to hydraulic pressure. Operated by any compressed air source, this pump saves energy by stalling when pressure is developed, and requires no energy to maintain system pressure. It features single-stage operation, and can accept any Hytec pump-mounted valve. An air supply filter/lubricator/ regulator (not included) is required for making hydraulic pressure adjustments.

Features:

- Filtered fill cap with dipstick
- Liquid filled gauge
- 105 cu. in., high-density polyethylene reservoir
- ¼" NPTF outlet manifold
- ¼" NPTF air inlet port
- 98 cu. in. usable oil
- Shipped filled with oil
- Operating Pressure Range (nominal):

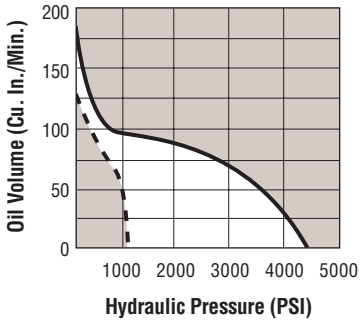
100280- 4,475 psi @ 125 psi air, max.
1,150 psi @ 40 psi air, min.
.437 dia. piston size

100987- 3,325 psi @ 125 psi air, max.
925 psi @ 40 psi air, min.
.50 dia. piston size



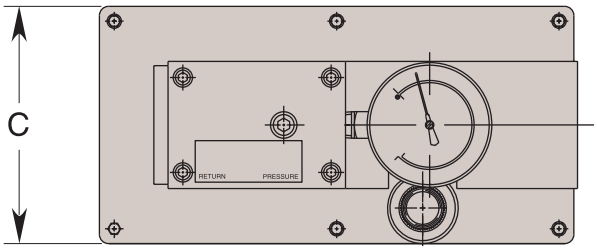
Performance

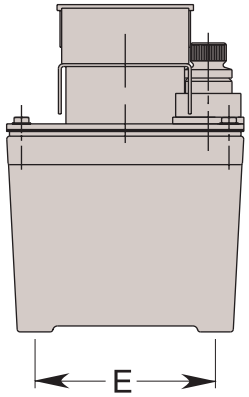
No. 100987
40 psi Air Pressure
125 psi Air Pressure

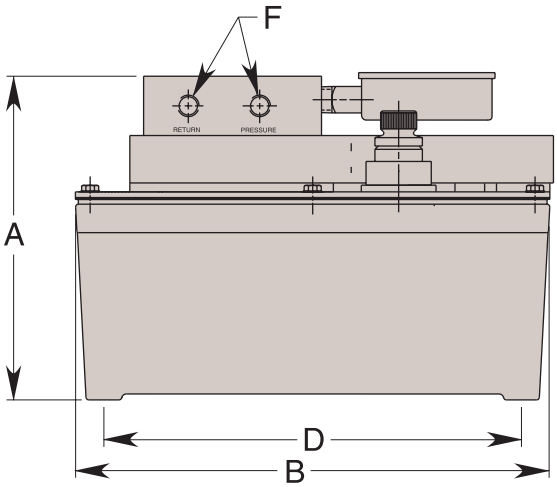


Performance

No. 100280
40 psi Air Pressure
125 psi Air Pressure





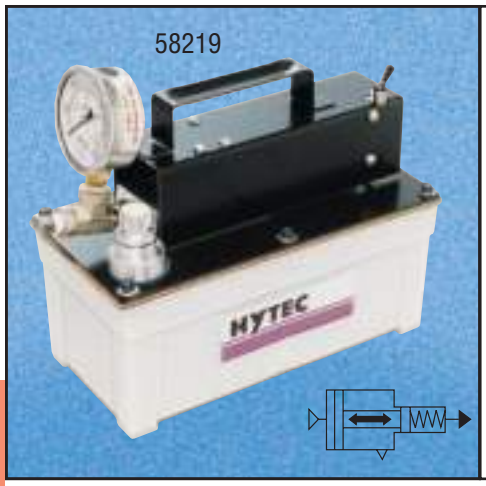


Cat. No.	Specifications			Dimensions (In Inches)					
	Piston Dia.	Operating Pressure Range		A	B	C	D	E	F Ports
		@ 125 psi Air Max.	@ 40 psi Air Min.						
100280	.437	4,475	1,150	7.000	10.000	5.000	9.000	4.000	¼ NPT
100987	.500	3,325	925						

NOTE: Mounting screws included (9-15 x 1.000 Lg.).
AIR REQUIREMENTS: 20 CFM (max.) at low hydraulic pressure decreasing to 0 CFM when pump stalls.

Air/Hydraulic Pumps

NEW

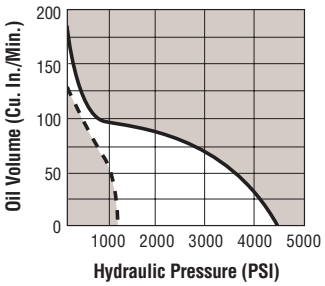


Available with all piston options, this single-stage power source is a continuous pressure, reciprocating, stall-type pump. Air pressure is simply converted to usable hydraulic pressure. Operated by any compressed air source, this pump saves energy by stalling when hydraulic pressure is developed and then requires no additional energy to maintain system pressure.

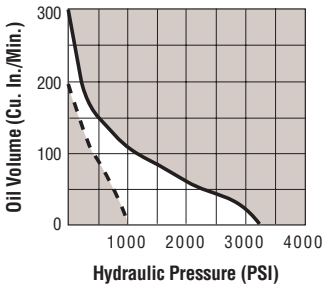
Designed for single acting systems, this pump has a built-in selector valve to choose either the pressurize or release mode. No additional valving is required. An air supply filter/regulator/lubricator (not included) is required for making pressure adjustments.

Features:

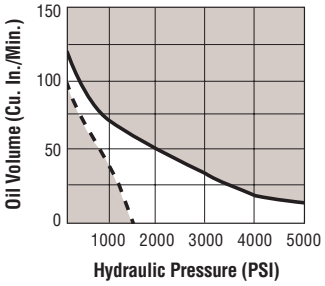
- Filtered fill cap with dipstick
- Liquid filled gauge
- 105 in³., high-density polyethylene reservoir
- ¼" NPTF outlet port
- ⅛" NPTF air inlet port
- 98 cu. in. usable oil
- Shipped filled with oil
- Carrying handle for easy portability
- Operating Pressure Range (nominal):
  100921- 5,000 psi @ 110 psi air, max.
  1,500 psi @ 40 psi air, min., .375 dia. piston size
  58219- 4,475 psi @ 125 psi air, max.
  1,150 psi @ 40 psi air, min., .437 dia. piston size
  100918- 3,325 psi @ 125 psi air, max.
  925 psi @ 40 psi air, min., .50 dia. piston size



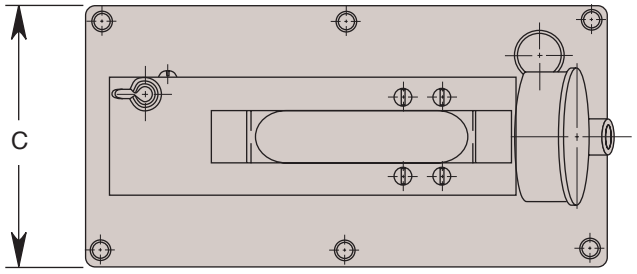
Performance
No. 58219
40 psi Air Pressure
125 psi Air Pressure

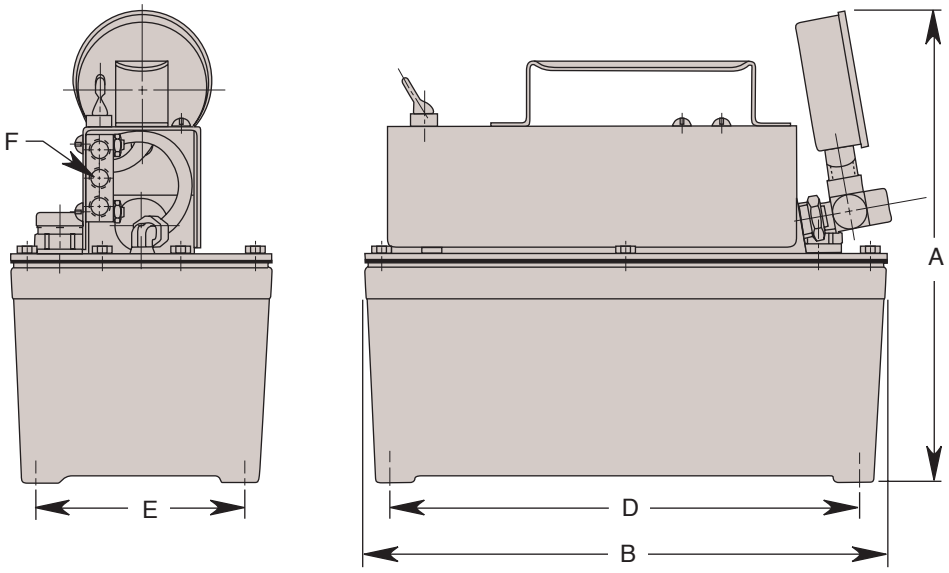


Performance
No. 100918
40 psi Air Pressure
125 psi Air Pressure



Performance
No. 100921
40 psi Air Pressure
110 psi Air Pressure





Cat. No.	Specifications			Dimensions (In Inches)					
	Piston Dia.	Operating Pressure Range		A	B	C	D	E	F Air Inlet Port
		@ 125 psi Air Max.	@ 40 psi Air Min.						
100921	.375	5,000	1,500	9.032	10.000	5.000	9.000	4.000	⅛ NPT
58219	.437	4,475	1,150						
100918	.500	3,325	925						

NOTE: Mounting screws included (9-15 x 1.000 Lg.).
AIR REQUIREMENTS: 20 CFM (max.) at low hydraulic pressure decreasing to 0 CFM when pump stalls.

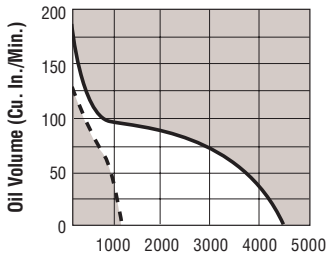
Air/Hydraulic Pumps

SPX HYTEC®

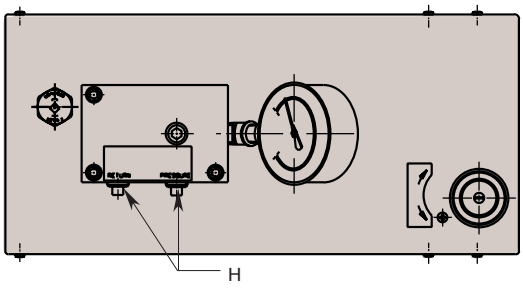
These single-stage pumps are continuous pressure, reciprocating, stall-type pumps: Air pressure is simply converted to hydraulic pressure. Operated by any compressed air source, these pumps save energy by stalling when pressure is developed, and require no energy use to maintain system pressure. They will accept any Hytec pump-mounted valve.

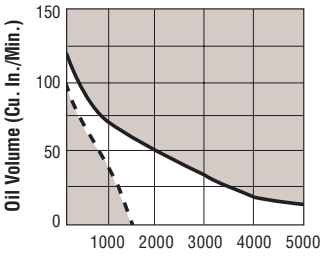
Features:

- 105 cu. in., high-density polyethylene reservoir
- Filtered fill cap with dipstick
- Liquid filled gauge
- ¼" NPTF outlet manifold
- ¼" NPTF air inlet port
- 98 cu. in usable oil
- Shipped filled with oil
- Operating Pressure Range (nominal):
  100920 – 5,000 psi @ 110 psi air, max.
  1,500 psi @ 40 psi air, min.
  .375 dia. piston size
  100190 – 4,475 psi @ 125 psi air, max.
  1,150 psi @ 40 psi air, min.
  .437 dia. piston size
  100174 – 3,325 psi @ 125 psi air, max.
  925 psi @ 40 psi air, min.
  .50 dia. piston size
  100191 – 1,500 psi @ 125 psi air, max.
  400 psi @ 40 psi air, min.
  .75 dia. piston size

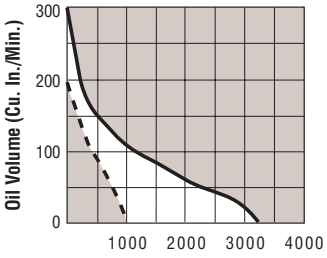


Performance
No. 100190
40 psi Air Pressure
125 psi Air Pressure

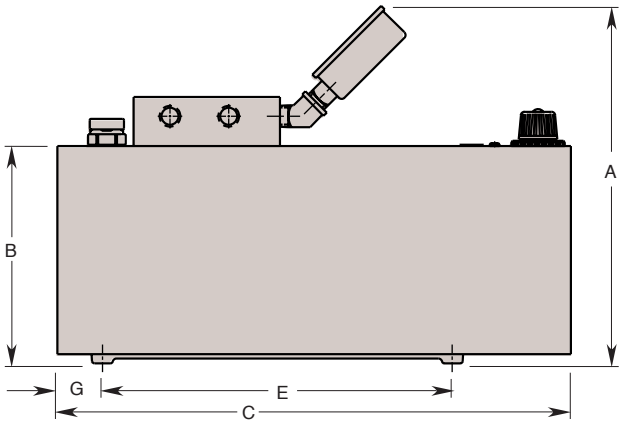


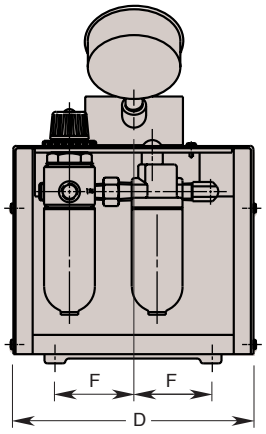


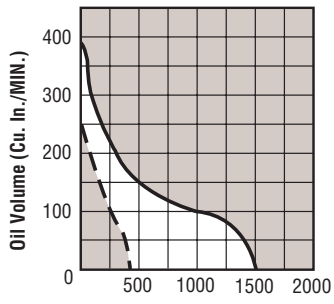
Performance
No. 100920
40 psi Air Pressure
110 psi Air Pressure



Performance
No. 100174
40 psi Air Pressure
125 psi Air Pressure







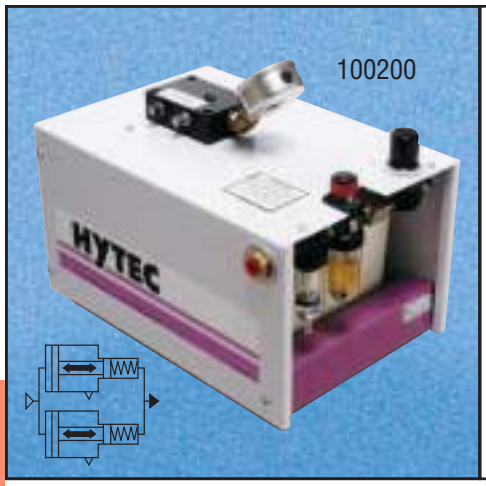
Performance
No. 100191
40 psi Air Pressure
125 psi Air Pressure

Cat. No.	Specifications			Dimensions (In Inches)							
	Piston Dia.	Operating Pressure Range @ 125 psi Air Max.	Operating Pressure Range @ 40 psi Air Min.	A	B	C	D	E	F	G	H Ports
100920	.375	*	1,500	9.500	5.500	13.062	6.125	9.000	2.000	1.250	¼ NPTF
100190	.437	4,475	1,150								
100174	.500	3,325	925								
100191	.750	1,500	400								

NOTE: Mounting screws included (9-15 x 1.000 Lg.).
AIR REQUIREMENTS: 20 CFM (max.) at low hydraulic pressure decreasing to 0 CFM when pump stalls.
* Air pressure higher than 110 psi will cause the pump to exceed its 5,000 psi maximum rating. The internal relief valve will open to protect the pump and the circuit, but the pump will continue to reciprocate rather than stall. This will cause unnecessary wear, noise, heat and air usage.

Air/Hydraulic Pumps

NEW



Available with any combination of available pistons, this pump is designed for applications where air is the preferred source of energy, this two-stage pump gives you high speed oil advance. The first stage provides high flow at low pressure for rapid advance of clamps and cylinders. The second stage builds and maintains pressure at a preset level. And because it has a manifold, it will accept any Hytec pump-mounted valve.

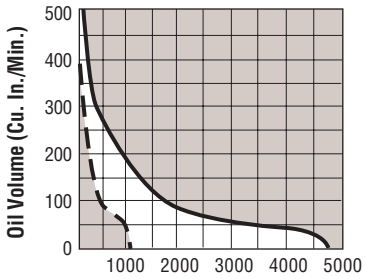
Each stage is an individual air/hydraulic pump which stalls when hydraulic pressure exceeds the air pressure times the pump ratio. Only the second stage pump is controlled by the built-in adjustable pressure regulator. The first stage is limited only by air supply pressure.

Features:

- Filtered fill cap with dipstick
- Liquid filled gauge
- 2-gal.n, high-density polyethylene reservoir
- ¼" NPTF air inlet port
- ¼" NPTF outlet manifold
- Shipped with 1.5 gallons hydraulic oil
- 425 cu. in. usable oil

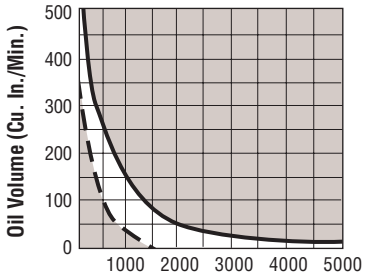
100922 - 5,000 psi @ 110 psi air, max.
1,500 psi @ 40 psi air, min.
.75 and .375 dia. piston size

100200 - 4,475 psi @ 125 psi air, max.
1,150 psi @ 40 psi air, min.
.75 and .437 dia. piston size



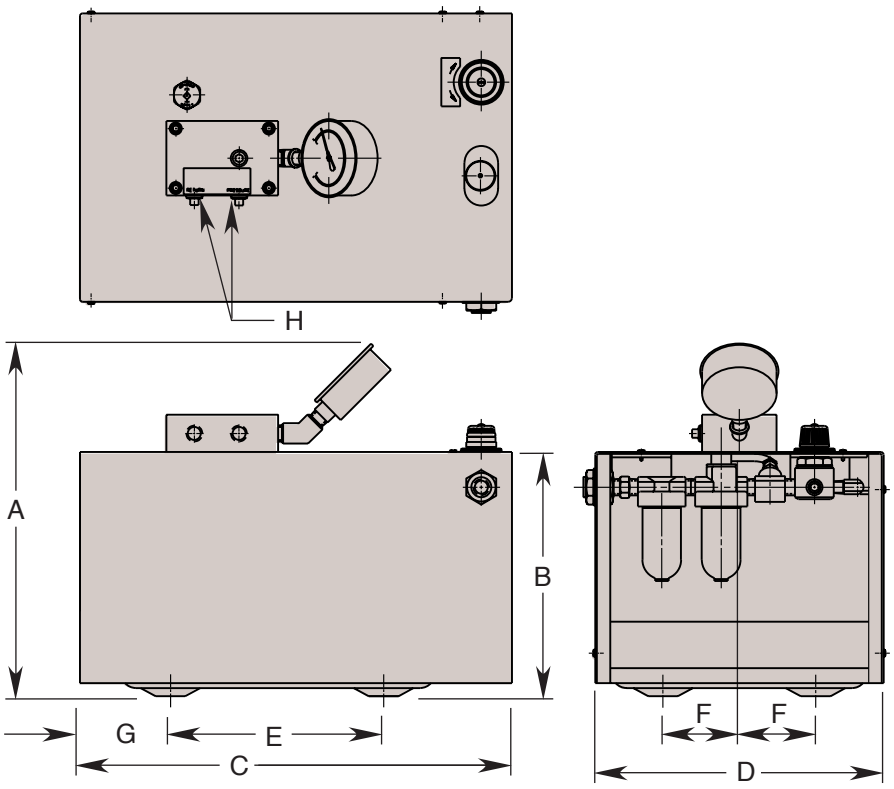
Performance

No. 100200
40 psi Air Pressure
125 psi Air Pressure



Performance

No. 100922
40 psi Air Pressure
125 psi Air Pressure



Cat. No.	Specifications			Dimensions (In Inches)							
	Piston Dia.	Operating Pressure Range @ 125 psi Air Max.	Operating Pressure Range @ 40 psi Air Min.	A	B	C	D	E	F	G	H Ports
100922	.750/.375	*	1,500	12.000	8.500	14.250	9.625	7.125	2.562	1.438	¼ NPTF
100200	.750/.437	4,475	1,150								

NOTE: Mounting screws included (¼-10 x .875 Lg.).
To properly control system pressure in low pressure applications, air supply pressure should be limited to less than 6% (125 psi max.) of desired hydraulic pressure.
AIR REQUIREMENTS: 37 CFM (max.) at low hydraulic pressure decreasing to 0 CFM when pump stalls.

* Air pressure higher than 110 psi will cause the pump to exceed its 5,000 psi maximum rating. The internal relief valve will open to protect the pump and the circuit, but the pump will continue to reciprocate rather than stall. This will cause unnecessary wear, noise, heat and air usage.

The Booster-Pac is a unique combination of an air/hydraulic booster and stall-type pump. Its usable oil capacity is 15 cu. in. maximum in the first stage. Once the hydraulic pressure in the first stage exceeds two times the air supply pressure, the second stage pump is engaged, making an additional 83 cu. in. available for building and maintaining pressure.

It includes an unregulated ⅛" NPTF air pressure outlet port used for returning double-acting components. Pressure is available at this port only in the unclamped mode.

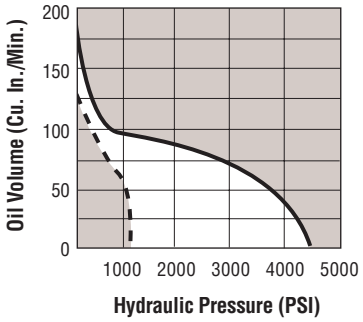
Features:

- Filtered fill cap with dipstick
- Liquid filled gauge with adjustable snubber
- 105 cu. in., high-density polyethylene reservoir
- ¼" NPTF hydraulic outlet
- ¼" NPTF air inlet port
- Shipped with .5 gallon hydraulic oil
- Pressure range:
  4,475 psi @ 125 psi air, max.
  1,150 psi @ 40 psi air, min.
- Optional remote controls, see page 135

First Stage Performance

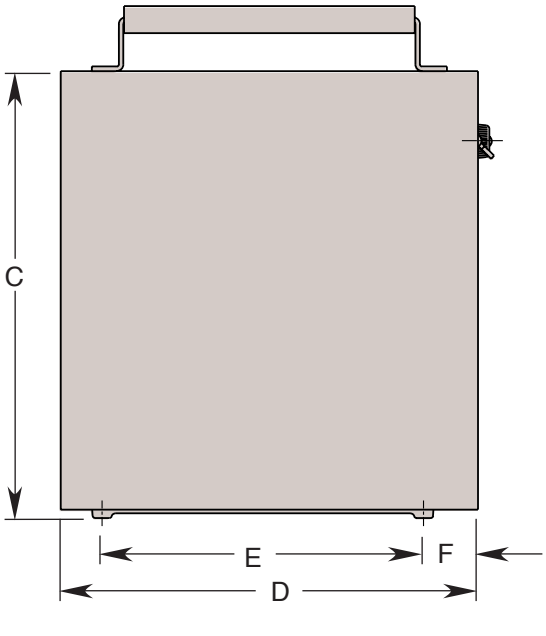
With 100 psi shop air availble, first stage oil delivery is approximately 800 cu. in./min. at 50 psi hydraulic pressure, 675 cu. in./min. at 100 psi hydraulic pressure and 125 cu. in./min. at 200 psi hydraulic pressure.

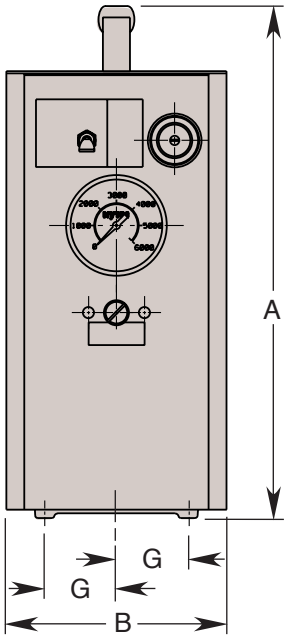
Second Stage Performance



Performance

No. 100180
40 psi Air Pressure
125 psi. Air Pressure





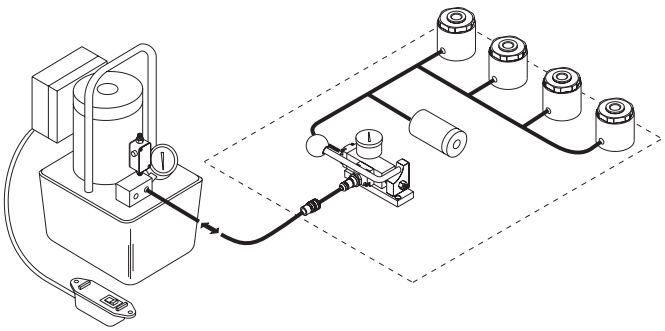
Cat. No.	Specifications			Dimensions (In Inches)						
	Piston Dia.	Operating Pressure Range		A	B	C	D	E	F	G
		@ 125 psi Air Max.	@ 40 psi Air Min.							
100180	.437	4,475	1,150	14.125	6.250	12.500	11.250	9.000	1.188	2.00

NOTE: Mounting screws included (9-15 x 1.000 Lg.).
AIR REQUIREMENTS: 20 CFM (max.) at low hydraulic pressure decreasing to 0 CFM when pump stalls.

Pallet Coupling Pumps

While Hytec has a pump applicable to most applications, not all pumps can be used in all systems. Please use the application chart below and the following pages to identify the pump that best fits your needs.

Powering a Single Acting Manual Pallet Coupling System



100179

Similar to the 100178, this economical pump has a special electrical circuit as well as an automatic dump valve. This pump is well suited for use with Hytec's manual pallet valve.

Page 108

100879, 100888

These pumps are based on Hytec's popular one horsepower, TEFC, NEMA 12, hydraulic power source. They are modified both electrically and hydraulically for use with our pallet valve.

Page 109

100212, 100221

For larger systems requiring faster flow rates, these are the highest capacity, standard Hytec pumps for our manual pallet valve.

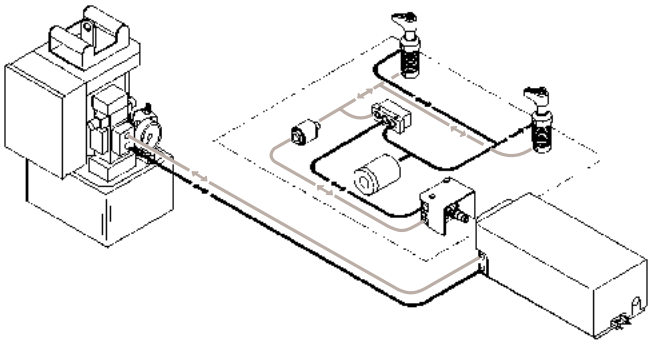
Page 110

100279

Like all of the others above, this air powered, reciprocating hydraulic pump is designed and outfitted specifically for the manual pallet valve.

Page 111

Powering an Automatic Pallet Coupling System



100140, 100840

For the small to medium sized system, these pumps are controlled by a Programmable Logic Controller (PLC). Responding from commands from the PLC, these units supply the pressure required to clamp and unclamp your pallets.

Page 119

100198, 100199

Larger systems requiring high flow rates benefit from these two horsepower, high capacity pumps. Also controlled by PLC, these power sources are outfitted to become a part of our Automatic Pallet Coupling System.

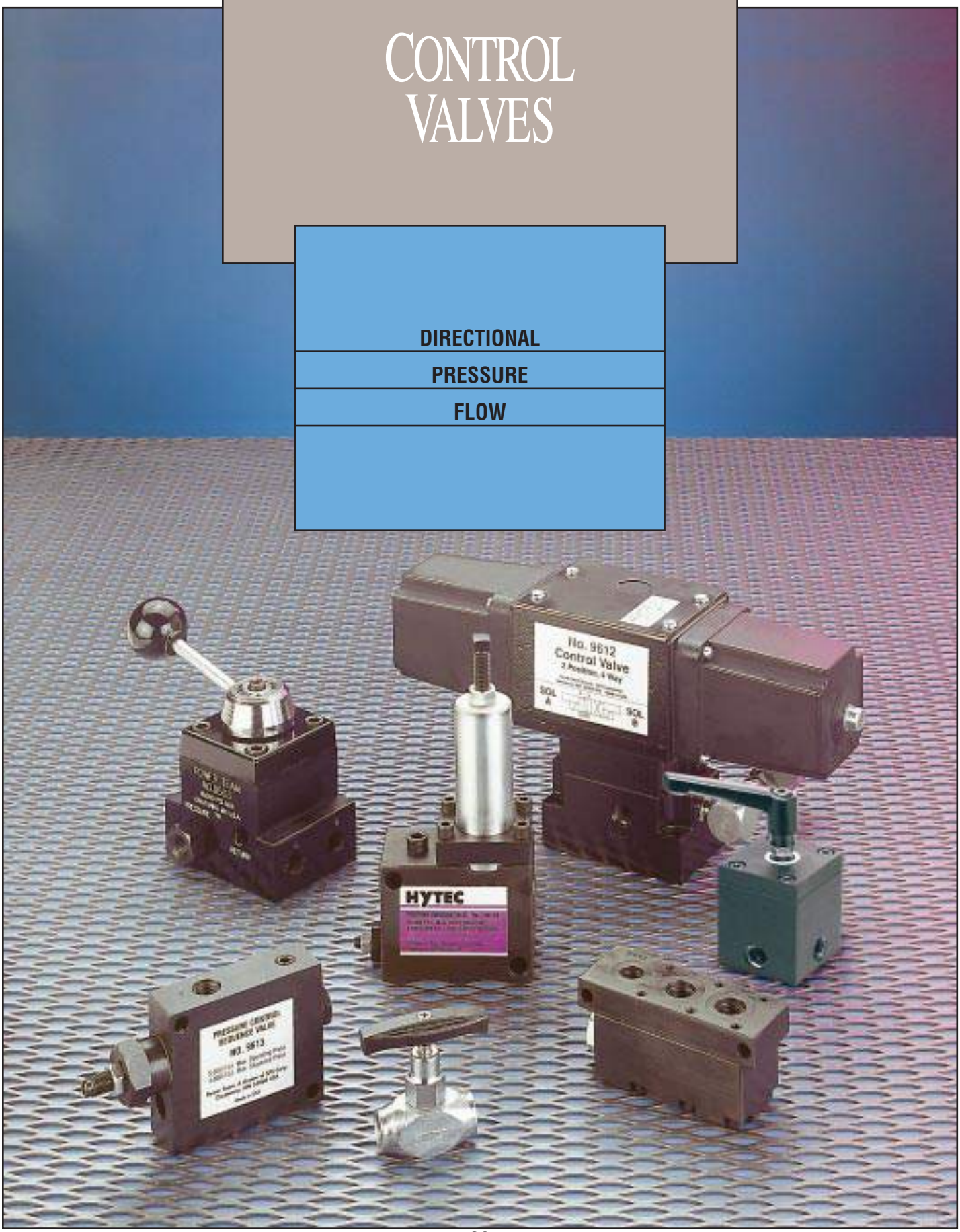
Page 120

CONTROL VALVES

DIRECTIONAL

PRESSURE

FLOW



Control Valve Information

Hytec has created a line of control valves designed and manufactured so precisely that there is virtually zero leakage, making them ideal for constant pressure hydraulic workholding systems. **Valves with internal leakage (such as spool valves) are not appropriate for use with Hytec pumps and pallet valve systems.**

Directional Control Valves

Available in many versions, each of these valves is capable of operating double or single-acting spring return systems. Mounting configurations available are pump mounted, remote mounted, and manifold mounted, and operation is either manual or through electric solenoids.

Manually operated valves are used in applications where the valves can be mounted near the operator on the fixture, pump, or any convenient location at the workstation. The electrically operated valve is ideal for systems requiring push-button simplicity or automated systems where the valve is controlled by machine logic instead of the operator. Since it's controlled by an electrical signal, it can be mounted in any convenient location and need not take up valuable fixture or workstation space.

All remote mounted directional control valves are installed by connecting the pump or pressure port (labeled "P") to the pressure source and the return or tank port (labeled "T") to the return line. The outlets or work ports (labeled "A" and "B") are connected to the component or system to be controlled.

In single-acting systems, the valves are used as 3-way valves. One port, A or B, is plugged and the other is connected to a single-acting actuator or system. In one handle position, the port to the actuator will be pressurized and the plugged port open to the reservoir. In the other handle position, the actuator will retract because that port is open to the reservoir. This pressurizes the remaining port, but since it's plugged, the pump will build pressure and shut off.

In double-acting systems, these valves act as 4-way valves: ports A and B are connected to a double-acting actuator or system. In handle position A, port A is pressurized and port B is open to the reservoir. Handle position B pressurizes port B and port A is open to the reservoir. Shifting the valve will cause the actuator to alternately extend and retract.

Selected Hytec remote mounted directional control valves include a check valve in the pressure port to maintain system pressure during periods of fluctuating supply pressure. Carefully review check valve requirements on each product selected. With pump mounted valves, the pump outlet check valve serves the same purpose.

Pressure Control Valves

Two types are available for specialized workholding systems – sequence and pressure reducing. Both are available in manifold and conventionally mounted styles.

Pressure Sequence Valves control the order of events within a hydraulic system by directing pressure into two circuits in a pressure-controlled sequence. For example, this allows clamps to be actuated before work supports are locked.

Initially, the valve is closed. Oil flows to the primary circuit until pressure reaches the valve setting. The valve then opens to deliver oil to the secondary circuit while holding pressure on the primary circuit. Once secondary and primary pressures are equal, the pressure increases uniformly in both circuits.

This valve is installed by connecting the pressure port (labeled "P") to a tee in the portion of the circuit to be actuated first. The part of the circuit to be sequenced later is connected to the outlet port (labeled "A"). The vent port must be open to atmosphere for proper operation.

Pressure Reducing Valves are designed to reduce the maximum pressure in a portion of a hydraulic circuit – the need for a separate power source for each pressure level is eliminated. The valve is open from the inlet to the outlet until a pre-selected pressure is reached, at which point the valve closes to limit pressure in the secondary circuit. Valve seats and poppets are precision ground, assuring virtually zero leakage and eliminating the need for a case drain line.

This valve is connected "in line" with the circuit requiring the reduced pressure. The inlet or pressure port (labeled "P") is on the high pressure side. The outlet or reduced pressure port (labeled "A") is connected to the lower pressure circuit. The drain or tank port (labeled "T") is connected to the power source return line if necessary. Ordinary pressure limiting valves close when their pressure setting is reached. Once closed, it will not re-open until system pressure is released. Even minor leakage in the system can not be made up. Hytec's pressure reducing valve uses a balanced poppet design which will re-open any time flow downstream is required.

Flow Control Valves

The types of flow control valves available from Hytec are: pilot operated check valve and needle-type flow restrictor valves.

Hytec's **Pilot Operated Check Valve** offers a unique poppet seal design making it ideal for pallet applications or other specialized control circuits where zero leakage is essential. It can be used in any application where pressure must be maintained in a portion of a circuit until a separate pilot signal opens the valve and allows free flow in the reverse direction.

This 5,000 psi valve is used with Hytec's Automatic Pallet Coupling System and double-acting manual pallet valve. Replaceable filter elements protect the check valve and your other system components from contamination. No disassembly of circuit plumbing is required to service the filters or check valve cartridges.

When the port labeled "INLET" is pressurized, hydraulic fluid can flow freely into the valve, leaving through the port labeled "OUTLET". Pressurized fluid at the outlet port cannot flow back into the valve unless the port labeled "PILOT" is pressurized to open the valve allowing reverse flow.

Needle Valves are multiple-turn flow restrictor valves which provide finely adjustable flow control for components or circuits requiring reduced flow rates. They are also used in some non-critical sequencing applications where restriction in part of a circuit will tend to cause the actuators in the remainder of the circuit to operate first.

Needle valves are available that:

a) restrict flow in both directions, or
b) restrict flow in one direction through the use of an internal free-flow check valve.

Valves without the free-flow check are typically used in a part of a circuit where there is flow in only one direction. They can also be used in double-acting circuits where restriction is desirable in both directions.

Valves with the reverse free-flow check are most effectively used in single-acting circuits where the actuation speed must be reduced without affecting the system return time.

Two **NEW** high pressure **Ball Valves** provide full unrestricted flow and positive shut-off of fluids. They have a 90 degree actuation and are available in SAE or NPT ports.

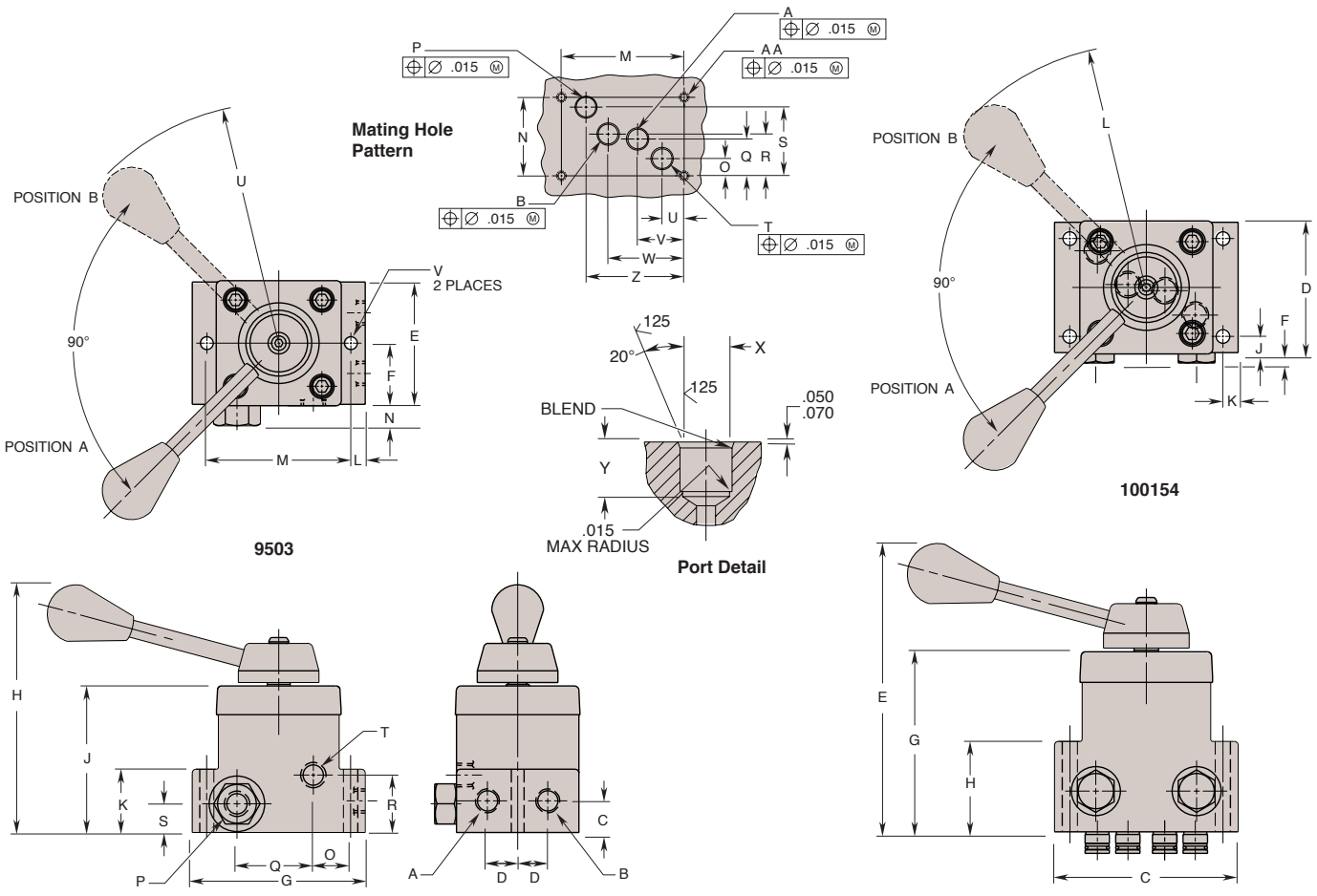
These valves are ideal for mounting directly on the machine or fixture for maximum operator convenience. They also permit the pump to be located away from the operator's workstation. Each of these valves allows several circuits to be controlled with a single pump.

Features:

- 3-way/4-way, 2-position, detented
- Manually operated
- Remote mounted
- Single- or double-acting systems
- Handle swings 90° and may be repositioned in 22.5° intervals
- Pressure port check valves

- 5,000 psi max.
- 5 gpm max.
- 500 psi max. return line pressure
- No. 9503 includes mounting hardware, ¼-20 UNC x 1.875" cap screws

Note: When using No. 9503 valve in multiple fixture applications with a single power source, Hytec recommends that check valve No. 206330 or No. 500171 be connected to the tank port to prevent return line back pressure from actuating released single-acting components, or causing pressure fluctuations in double-acting systems. Valve No. 100154 has a built-in check valve.



Cat. No.	Dimensions (In Inches)																					
	A Port	B Port	C	D	E	F	G	H	J	K	L	M	N	O	P Port	Q	R	S	T Port	U Rad.	V Dia.	
9503	¼ NPTF	¼ NPTF	.687	.656	2.660	1.330	3.750	5.420	3.188	1.375	.312	3.125	.469	.812	¼ NPTF	1.656	1.250	.625	¼ NPTF	5.031	.281	

Cat. No.	Dimensions (In Inches)																								
	A	B	C	D	E	F	G	H	J	K	L Rad.	M	N	O	P	Q	R	S	T	U	V	W	X Dia.	Y	Z	AA Thd. Size
100154	*	*	3.750	2.656	6.047	.213	3.675	1.845	.312	.312	5.032	3.125	2.000	.438	*	.938	1.063	1.750	*	.560	1.185	1.935	.500 .503	.515 .535	2.560	¼–20 UNC

NOTE: *See Port Detail drawing for ports A, B, P and T.

Remote Mounted Control Valves

NEW

These 3-way/4-way, two-position directional control valves are ideal for workholding applications. Their zero-leakage design is the right choice for constant pressure applications. Their smaller size allows you to maximize usable fixture space.

To improve operator ergonomics, you can instantly position the control lever in any of 24 positions without tools. Finer adjustments are possible by loosening a locknut. Internal stops and detents along with a shaft wiper seal provide excellent contamination resistance.

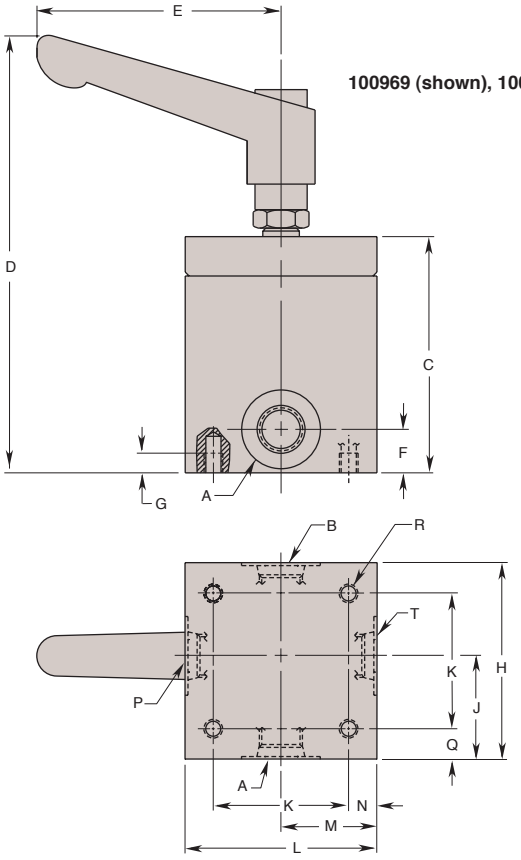
Built without check valves, these directional valves are intended **only** for systems with one valve per hydraulic pressure source.

For multiple valve applications install appropriate pressure ("P") and tank ("T") port check valves (page 93) or use our 100971 directional valve with 100974 check valve subplate. Ported subplates 100972 and 100973 or 2-station manifold 100975 can be added as appropriate.

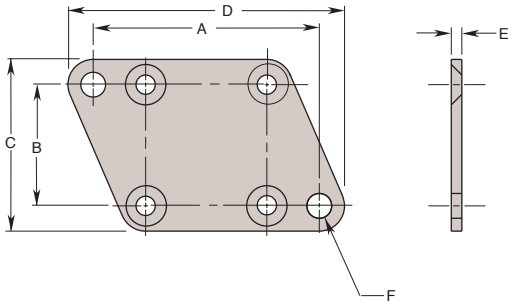
Features:

- 3-way/4-way, 2-position, detented
- Single or double acting systems
- Manually operated, 90 deg. swing
- 1500 psi max. return line pressure
- Remote mounted, SAE or NPT ports
- Infinite handle adjustment
- 5,000 psi max.
- Shaft wiper excludes contaminants
- Optional mounting bracket (No. 500175)
- Single valve applications

100969 (shown), 100970



500175



Cat. No.	Dimensions (In Inches)					
	A	B	C	D	E	F Dia.
500175	2.565	1.375	1.948	3.138	.119	.281

Note: #10-24 UNC x .375 Lg. flat head screws (4) included.

Cat. No.	Dimensions (In Inches)																
	"A" Port	"B" Port	C	D	E Rad.	F	G Min. Thread	H	J	K	L	M	N	"P"	Q	R Thread size	"T" Port
100969	7/16-20UNF SAE-4	7/16-20UNF SAE-4	2.400	4.444	2.480	.442	.375	2.000	.947	1.375	1.948	.974	.287	7/16-20UNF SAE-4	.313	10-24 UNC	7/16-20UNF SAE-4
100970	¼ NPTF	¼ NPTF												¼ NPTF			¼ NPTF

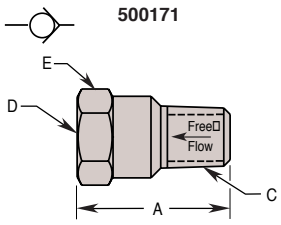
NEW

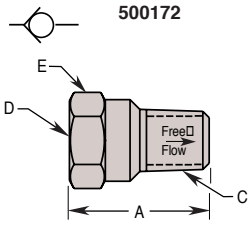
Check Valves

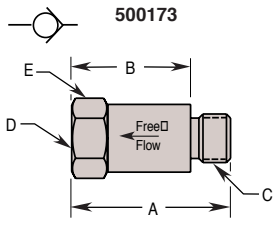
SPX HYTEC®

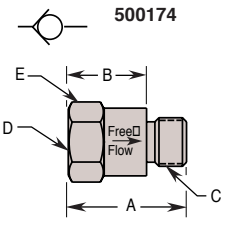
Both the ¼ NPT "T" Port Check Valve (part number 500171) and the SAE-4 (part number 500173) are recommended on single acting circuits where there is more than one directional valve per power source. These check valves are ideal for use in circuits where return line pressure fluctuations may affect released clamps. Use this anytime a return line pressure spike could cause unclamped actuators to move and affect operator safety. They are designed specifically for Hytec's No. 100969 and No. 100970 Directional Control Valves.

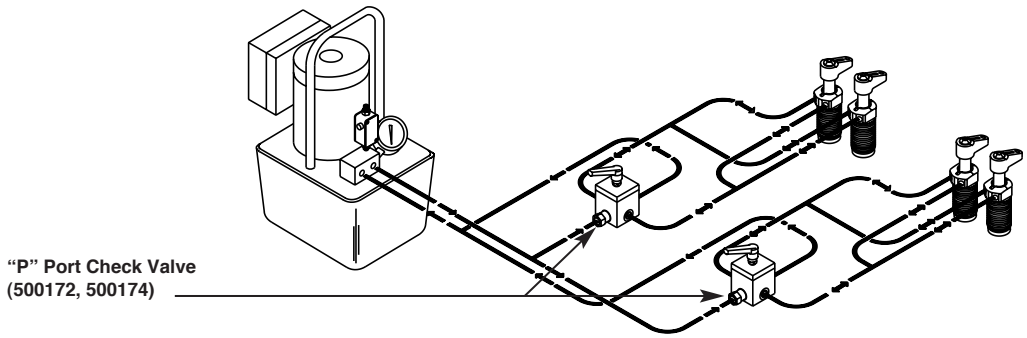
The ¼ NPT (500172) and the SAE-4 (500174) "P" port check valves are required on all single acting or double acting circuits where there is more than one directional valve per power source. These check valves prevent power source pressure fluctuations from affecting the pressure in clamped circuits. Without this check valve, shifting the directional control valve in one circuit will cause a temporary loss of clamping pressure in the other circuit.

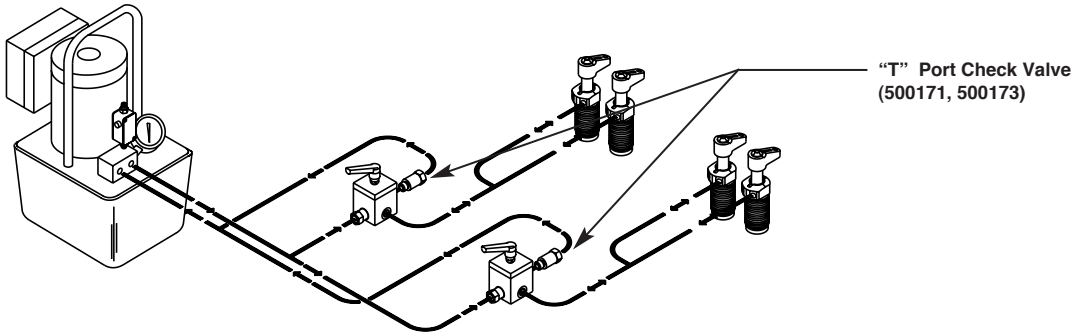












Cat. No.	Specifications			Dimensions (In Inches)				
	Check Valve Location	Cracking Pressure (psi)	Use With Directional Valve No.	A	B	C Thread Size	D Thread Size	E Hex
500171	Outlet	2	100970	1.349	–	¼ NPTF	¼ NPTF	.750
500172	Inlet			1.259				
500173	Outlet		100969	1.431	1.071	7/16-20UNF SAE-4	7/16-20UNF SAE-4	.625
500174	Inlet			1.065	.705			

SPX HYTEC® Manifold Mounted Control Valve

NEW

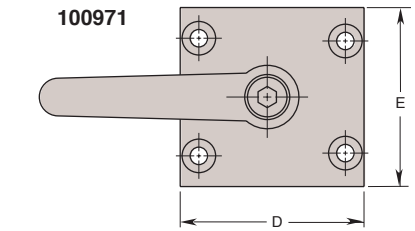
Similar to Hytec's 100969 and 100970, this 3-way/4-way, two-position directional control valve is ideal for manifold mounting on your fixture. The valve's zero-leakage design is the right choice for constant pressure applications. Its smaller size allows you to maximize usable fixture space.

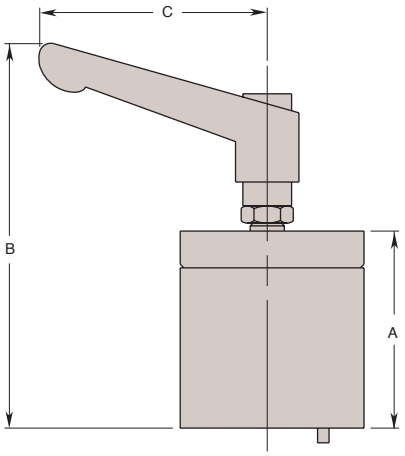
This valve is designed with a standard ANSI, DO3 mounting and port configuration. The control lever can be placed in any of 24 positions without tools. Infinite adjustments are possible by loosening a locknut. Internal stops and detents along with a shaft wiper seal provide excellent contamination resistance.

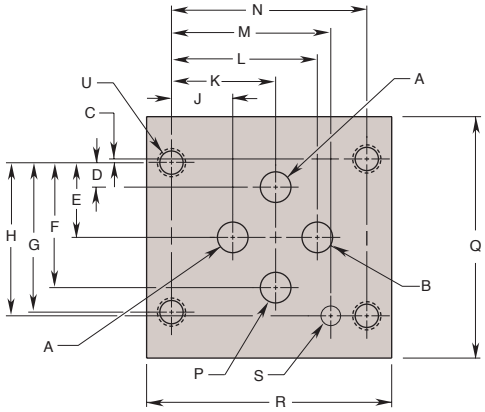
Built without check valves, this valve is intended **only** for systems with one valve per hydraulic pressure source. For multiple valve applications, simply add the 100974 check valve sub-plate. Ported subplates 100972 and 100973 or manifold 100975 can also be added as appropriate.

Features:

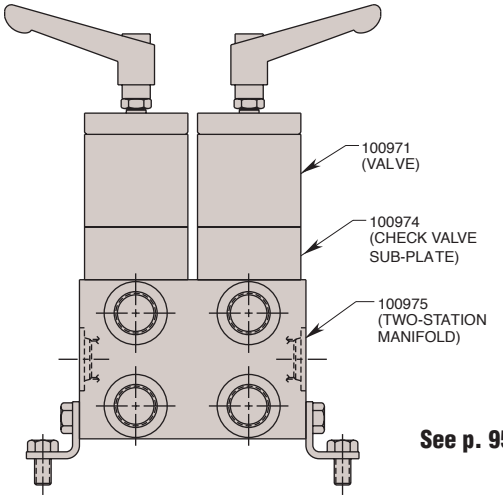
- 3-way/4-way, 2-position, detented
- ANSI, DO3 mounting configuration
- Single or double acting systems
- Manually operated, 90 deg. swing
- 1500 psi max. return line pressure
- Optional SAE or NPT ported subplates
- Infinite handle adjustment
- 5,000 psi max.
- Shaft wiper excludes contaminants
- Optional check-valve subplate

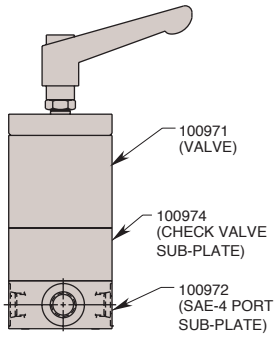






DO3 Manifold Mounting Surface





Cat. No.	Dimensions (In Inches)				
	A	B	C Rad.	D	E
100971	2.144	4.187	2.480	2.000	1.948

#10-24UNC X 2.25 Lg. Mounting screws (4) Included.

See p. 95 for sub-plates and manifolds.

DO3 Mounting Pattern	Dimensions (In Inches)																		
	"A" Port Dia. Max	"B" Port Dia. Max	C	D	E	F	G	H	J	K	L	M	N	"P" Port Dia. Max.	Q Min.	R Min.	† S Dia.	"T" Port Dia. Max.	†† U Thread Size
	.250	.250	.030	.200	.610	1.020	1.220	1.250	.500	.850	1.190	1.300	1.594	.250	1.970	2.000	.160	.250	10-24 UNC

NOTE: † Location hole to be .160 deep min.
†† Minimum thread depth .200

Single-station Sub-Plates No. 100972 and 100973

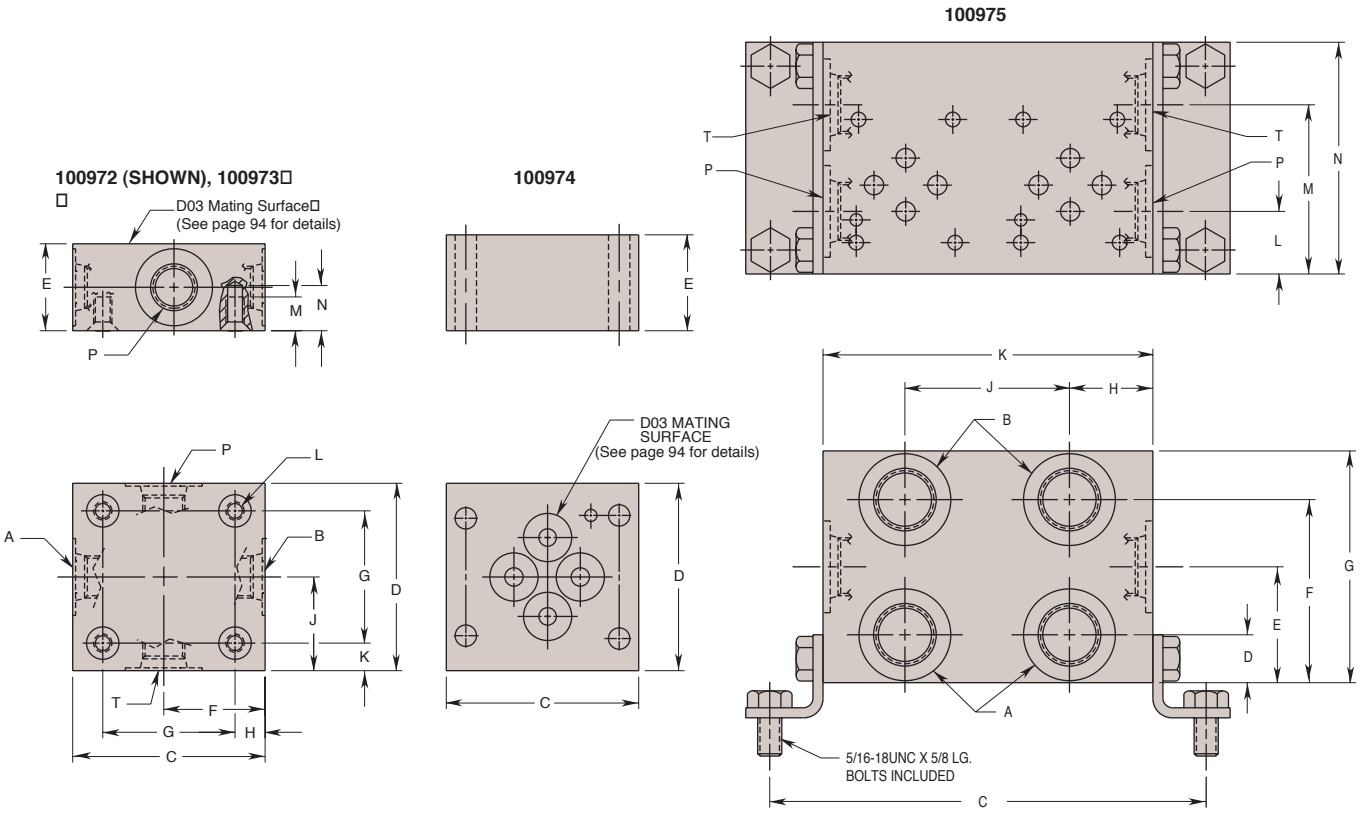
These D03 sub-plates are for use with the 100971 directional control valve and 100974 check valve sub-plate. These assemblies will provide conventionally ported, remote mounted, directional control valves for use in multiple valve systems. These sub-plates may also be used with the 100971 directional control valve only in single valve systems. (For single valve applications, consider using valves 100969 and 100970.) Optional mounting bracket (No. 500175) is available (see p. 92).

Two-Station Manifold No. 100975

This manifold provides for mounting two, 100971 directional control valves. External plumbing is reduced because both D03 mounting patterns share the same pressure and tank ports. Check valve sub-plate 100974 must also be used in workholding circuits.

Check Valve Sub-Plate No. 100974

Use this in directional control valve in applications requiring inlet and outlet checks. (Ports P and T) When two or more valves are connected to the same pressure source, these check valves prevent pressure fluctuations in one system from affecting the other. Without this check valve sub-plate, the shifting of one valve in a system can cause the loss of clamping pressure in another. This check valve sub-plate uses the same D03 mounting configuration as our 100971 directional control valve. It is simply placed underneath the valve. Mounting screws are included.



Cat. No.	Dimensions (In Inches)														
	"A" Port	"B" Port	C	D	E	F	G Mtng.	H Mtng.	J	K Mtng.	L Thread Size	M Min. Thread	N	"P" Port	"T" Port
100972	7/16-20 UNF SAE-4	7/16-20 UNF SAE-4	2.00	1.948	.904	.947	1.375	.313	.974	.287	10-24 UNC	.260	.452	7/16-20 UNF SAE-4	7/16-20 UNF SAE-4
100973	¼ NPTF	¼ NPTF												¼ NPTF	¼ NPTF
100974†	—	—			.997	—	—	—	—	—	—	—	—	—	—

NOTE: † 100974 Check Valve includes (4) #10-24 UNC x 3.25 Lg. Mounting Screws.

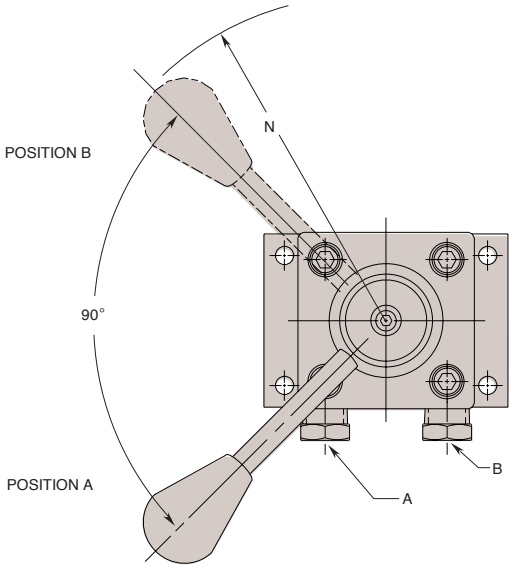
Cat. No.	Dimensions (In Inches)														
	"A" Port	"B" Port	C	D	E	F	G	H	J	K	L	M	N	"P" Port	"T" Port
100975	¾-16UNF SAE-8	¾-16UNF SAE-8	5.630	.630	1.500	2.380	3.000	1.060	2.130	4.250	.810	2.190	3.000	⅞-14UNF SAE-10	⅞-14UNF SAE-10

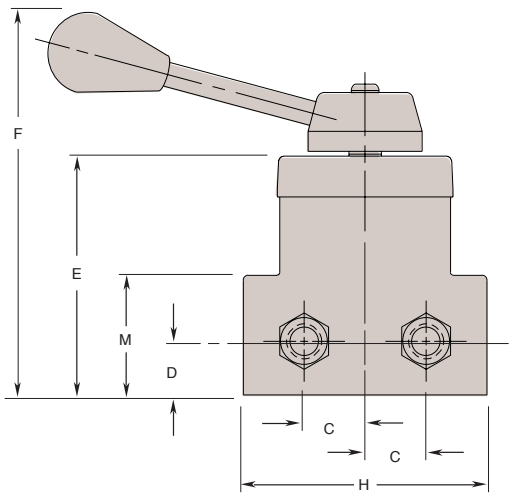
Pump Mounted Control Valve

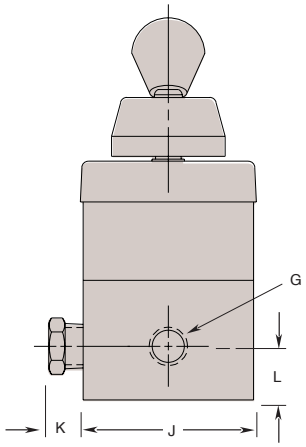
Designed to be used in applications where the pump is located near the operator with the valve mounted directly on the pump. This configuration eliminates the need for pressure and return lines between the pump and remote mounted control valves. It will replace the outlet manifold on most Hytec constant pressure pumps having that feature. (For use with Hytec No. 100178 pump, contact Hytec Technical Services.) One pump/valve combination is required for each circuit to be controlled.

Features:

- 3-way/4-way, 2-position, detented
- Manually operated
- Pump mounted
- Handle swings 90° and can be repositioned in 22.5° intervals
- Single- or double-acting systems
- ¼" NPTF reducer bushing
- Includes mounting hardware, return tube
- 5,000 psi max.
- 5 gpm max.





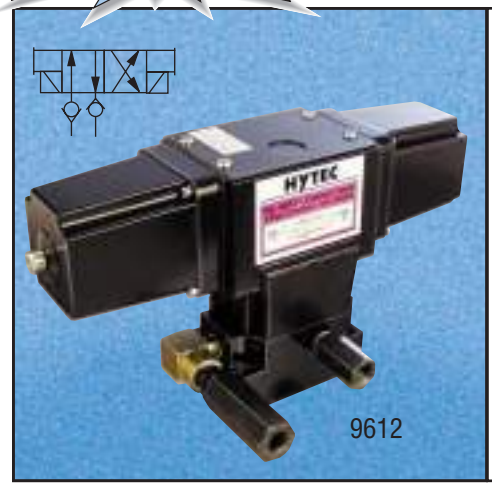


Cat. No.	Dimensions (In Inches)												
	A Port	B Port	C	D	E	F	G Gauge-Port	H	J	K	L	M	N Rad.
9504	¼ NPTF	¼ NPTF	.937	.750	3.188	5.562	¼ NPTF	3.750	2.660	.531	.812	1.437	5.031

NEW

Remote Mounted Control Valves

SPX HYTEC

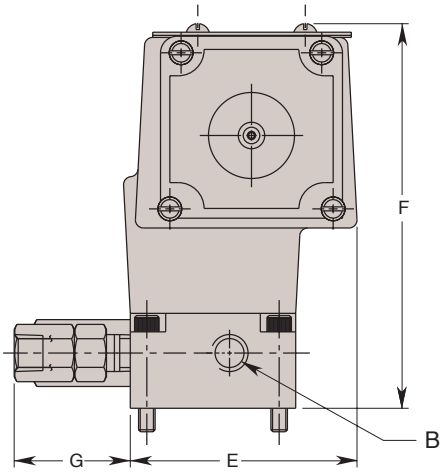


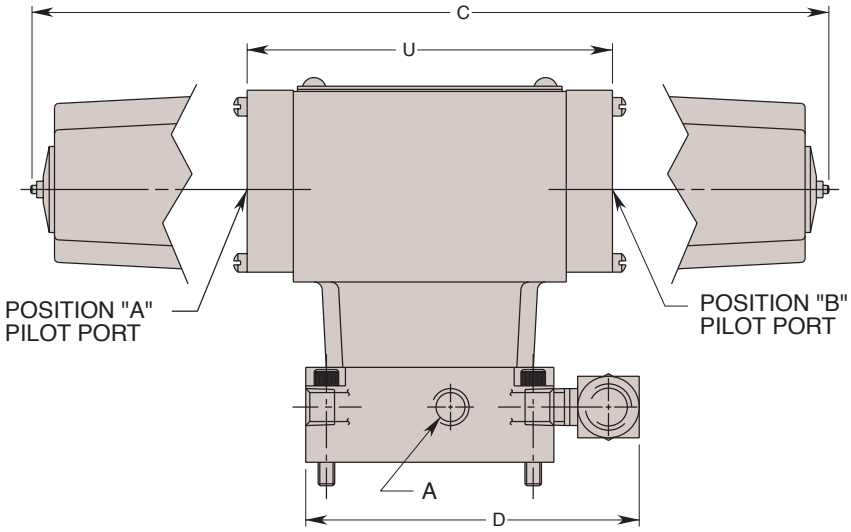
Designed for applications where the valve can be mounted remotely from the pump and where electrical operation is required.

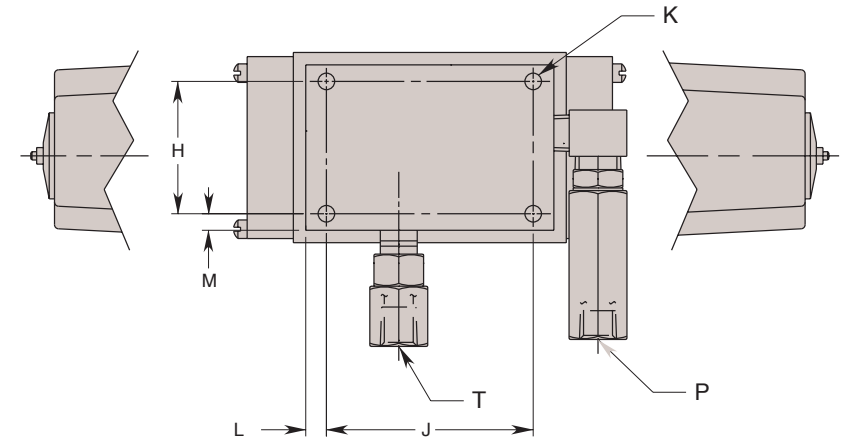
Detented action needs only a momentary signal to shift valve positions. Electrical power interruption won't cause the valve to shift and release clamping pressure or pressurize the system unexpectedly.

Features:

- 3-way/4-way, 2-position, detented
- Electrically operated; continuous duty rated
- Remote mounted
- Single- or double-acting systems
- 5,000 psi max.; 1,000 psi max. return line pressure
- 5 gpm max.
- Includes mounting hardware: ¼-20 UNC X 1.5" cap screws (4)
- Tank port check valve included to prevent return line back pressure from actuating released single-acting components, or causing pressure fluctuations in double-acting systems.

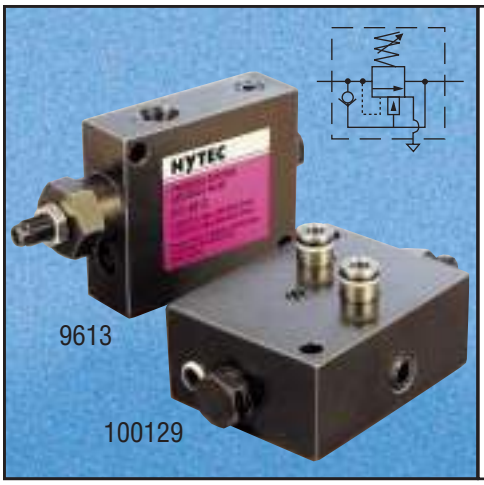






Cat. No.	Specifications	Dimensions (In Inches)																
	Actuation	"A" Port	"B" Port	Position A Pilot Port	Position B Pilot Port	C	D	E	F	G	H	J	K Dia.	L	M	"P" Port	"T" Port	U
9612	115 VAC, 50/60 Hz 5.3 Amps inrush, .6 Amps holding	¼ NPTF	¼ NPTF	—	—	12.062	5.000	3.375	5.812	2.500	2.000	3.125	.281	.312	.250	¼ NPTF	¼ NPTF	—
9573	24 VAC, 50/60 Hz 25.4 Amps inrush, 2.8 Amps holding																	
9574	230 VAC, 50/60 Hz 2.8 Amps inrush, .31 Amps holding																	
9611	50 psi min./150 psi max. air pressure			⅛ NPTF	⅛ NPTF	—												6.125

Pressure Sequence Control Valves

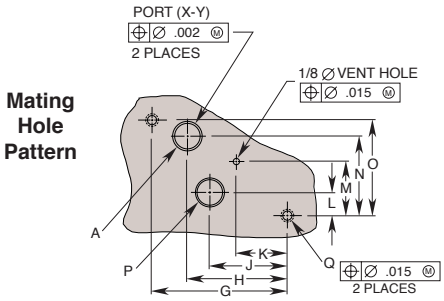


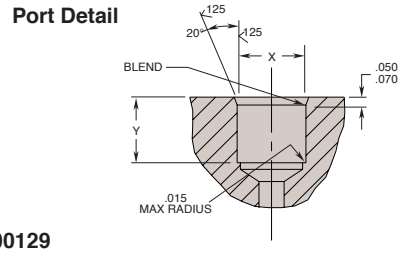
Sequence valves control the order of events within a hydraulic system by directing pressure to the two circuits in a pressure-controlled sequence. For example, this allows clamps to be actuated before work supports are locked.

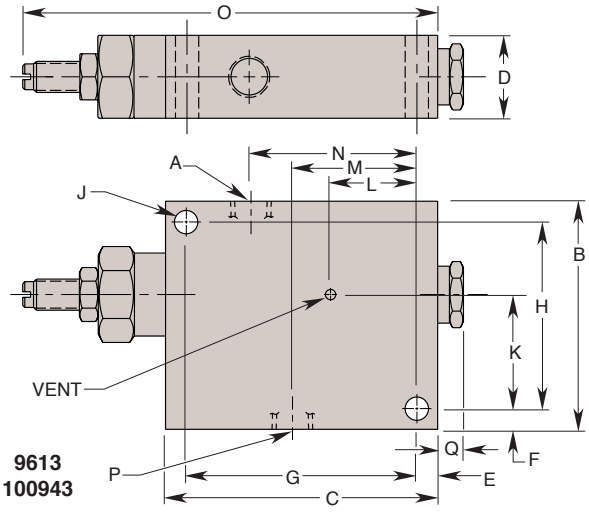
Initially, the valve is closed. Oil flows to the primary circuit until pressure reaches the valve setting. The valve then opens to deliver oil to the secondary circuit while holding pressure on the primary circuit. Once secondary and primary pressures are equal, the pressure increases uniformly in both circuits. There is no reduction of pressure available to either circuit.

Features:

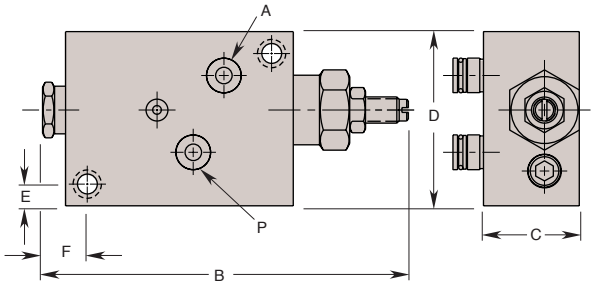
- Sequence pressure range is adjustable from 0 to 4,000 psi
- Usable with hydraulic systems operating up to 5,000 psi
- Will not reduce pressure to the secondary circuit
- Minimum operation pressure should be 120% of sequence pressure setting
- Internal check valve allows free flow in reverse direction
- Maximum flow rate 5 gpm
- Suitable for single- and double-acting circuits
- NPT, SAE or manifold mounting

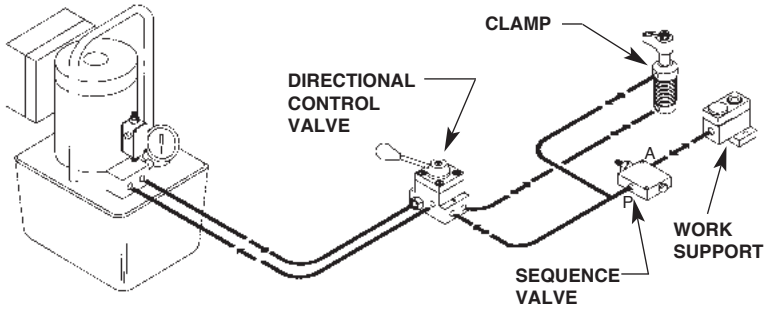






100129



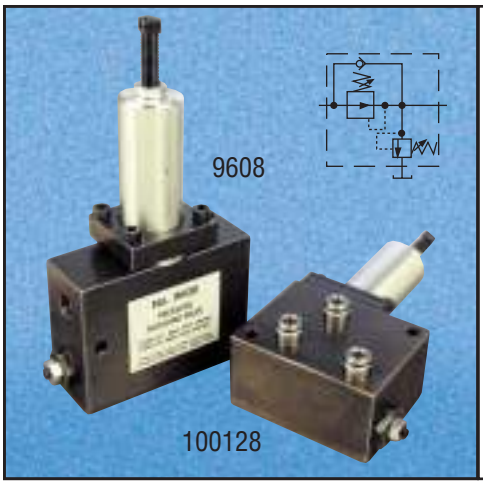


Cat. No.	Dimensions (In Inches)																	
	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q Thread Size	X Dia.	Y
100129	*	5.250	1.375	2.500	.312	.625	2.645	1.960	1.520	1.000	.456	1.063	1.560	1.875	*	¼-20 UNC	.500 .503	.515 .535

NOTE: *See Port Detail drawing for Ports A and P.

Cat. No.	Dimensions (In Inches)															
	"A" Port	B	C	D	E	F	G	H	J Dia.	K	L	M	N	O	"P" Port	Q
9613	¼ NPTF	2.750	3.281	1.000	.250	.250	2.781	2.250	.281	1.375	1.040	1.500	2.000	5.000	¼ NPTF	.312
100943	7/16-20UNF SAE-4														7/16-20UNF SAE-4	

Pressure Reducing Control Valves



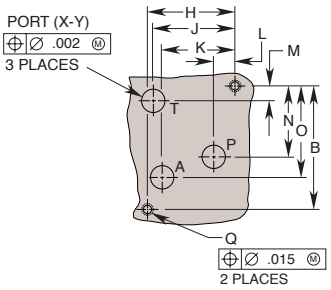
Pressure reducing valves are designed to reduce the maximum pressure in a portion of a hydraulic circuit: the valve is open from the inlet to the outlet until a pre-selected pressure is reached, at which point the valve closes to limit pressure in the secondary circuit. The need for a separate power source for each pressure level is eliminated.

Valves seats and poppets are precision ground, assuring virtually zero leakage and eliminating the need for a case drain line. The drain port (T) is used only during set up of the internal safety relief valve. This adjustable relief valve can be set to just above the reduced pressure setting so it will open only if contamination or another malfunction prevents the pressure reducing valve from closing, causing the outlet pressure to rise above the relief valve setting. The drain port should never be plugged, although it is seldom permanently plumbed into the circuit.

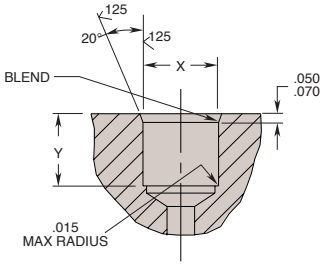
Features:

- Valves are adjustable from 1,000 to 5,000 psi outlet pressure
- Internal check valve allows free flow in reverse direction
- Maximum flow rate at 5 gpm
- NPT, SAE or manifold mount
- Automatically reopens to replenish lost pressure

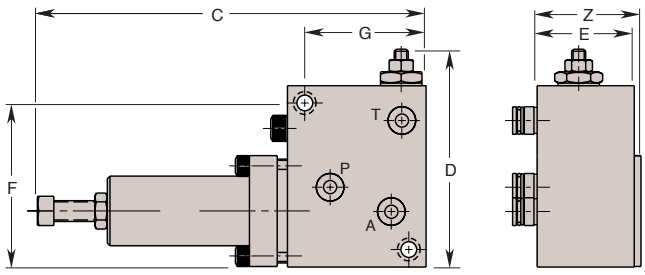
Mating Hole Pattern



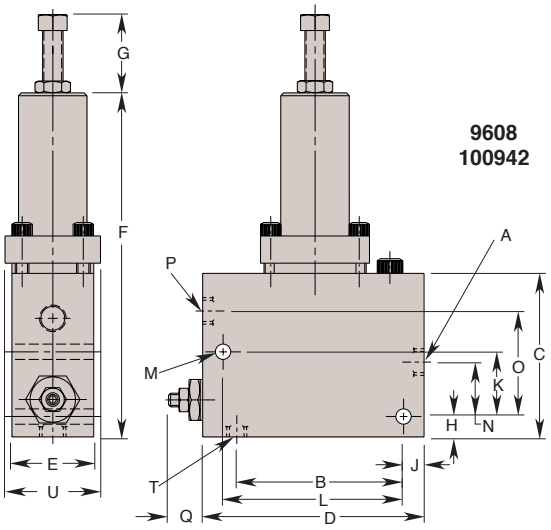
Port Detail

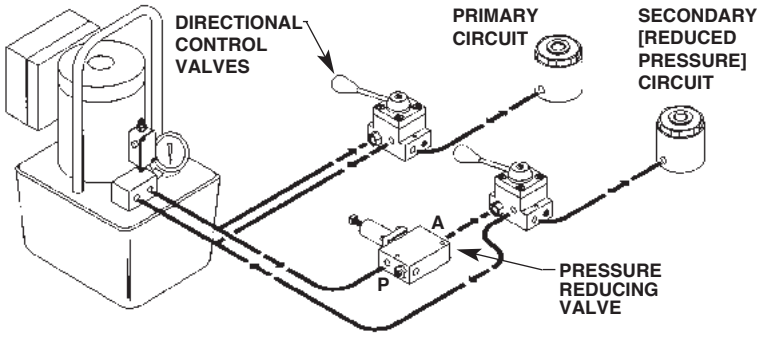


100128



9608
100942



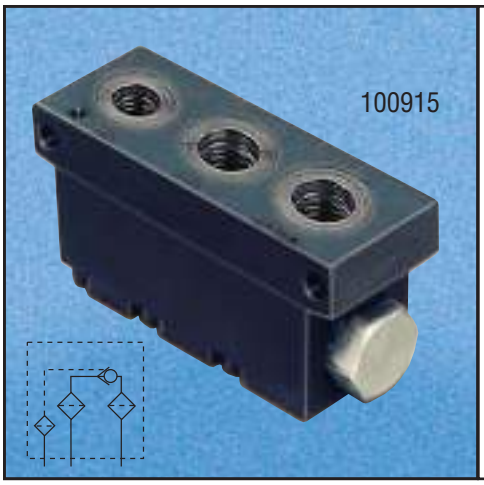


Cat. No.	Dimension (In Inches)																		
	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q Thread Size	T	X Dia.	Y	Z
100128	*	2.645	7.000	4.000	1.875	2.960	2.188	1.875	1.750	1.560	.456	.316	1.520	1.960	*	¼-20 UNC	*	.500 .503	.515 .535	1.875

NOTE: *See Port Detail drawing for ports A, P and T.

Cat. No.	Dimensions (In Inches)																	
	"A" Port	B	C	D	E	F	G	H	J	K	L	M Dia.	N	O	"P" Port	Q	"T" Port	U
9608	¼ NPTF	3.062	3.000	4.062	1.750	6.312	1.438	.375	.375	1.188	3.312	.281	1.000	1.938	¼ NPTF	.625	⅛ NPTF	1.820
100942	7/16-20UNF SAE-4														7/16-20UNF SAE-4		7/16-20UNF SAE-4	

Pilot Operated Check Valves



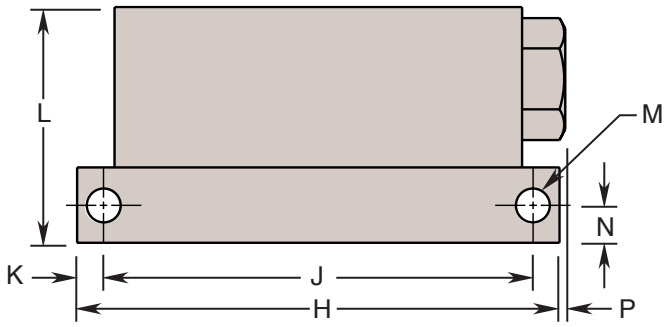
Hytec's pilot operated check valve offers a unique poppet seal design making them ideal for pallet applications or other specialized control circuits where zero leakage is essential. They can be used in any application where pressure must be maintained in a portion of a circuit until a separate pilot signal opens the valve and allows free flow in the reverse direction.

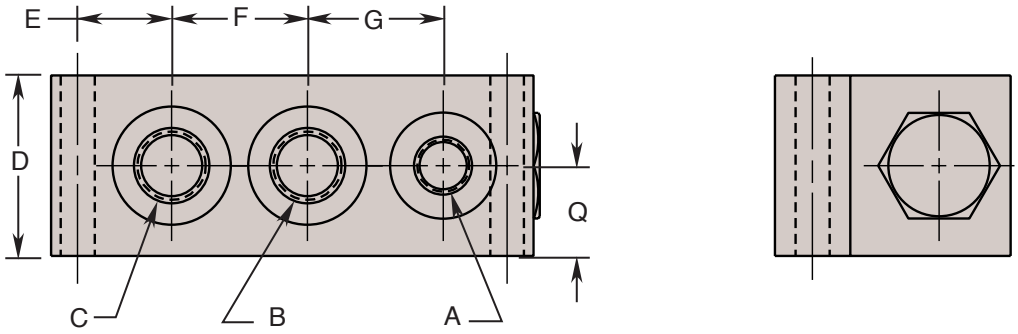
The pilot pressure required to release the valves is approximately one third of the pressure being released. The pilot piston is sealed to prevent pilot flow through the valve.

These valves are used with Hytec's Automatic Pallet Coupling System and double-acting manual pallet valve. The replaceable filter elements protect the check valve and your other system components from contamination. No disassembly of circuit plumbing is required to service the filters or the check valve cartridge. An additional filter is recommended for protection of the return side of double-acting clamping circuits.

Features:

- Replaceable, cartridge design valve
- Filters in all three ports protect the check valve and downstream components
- Filters are replaceable without disassembly of plumbing
- SAE O-rings ports
- 10 micron (25 micron absolute) filtration level
- Specially reinforced filter elements resist fatigue from pressure spikes
- 5,000 psi maximum
- No. 100915 replaces and directly interchanges with No. 100856





Cat. No.	Specifications		Dimensions (In Inches)						
	Maximum Flow (GPM)	System/ Pilot Pressure Ratio	A Pilot Port	B Inlet Port	C Outlet Port	D	E	F	G
100915	5	3:1	SAE-4 7/16-20 UNF	SAE-6 9/16-18 UNF	SAE-6 9/16-18 UNF	1.500	.781	1.125	1.125

Cat. No.	Dimension (In Inches)							
	H	J	K	L	M Dia.	N	P	Q
100915	4.000	3.562	.219	1.955	.281	.312	.050	.750

Hytec's **Needle Valves** are multiple-turn flow restrictor valves which provide finely adjustable flow control for components or circuits requiring reduced flow rates. They are also used in some non-critical sequencing applications where restriction in part of a circuit will tend to cause the actuators in the remainder of the circuit to operate first.

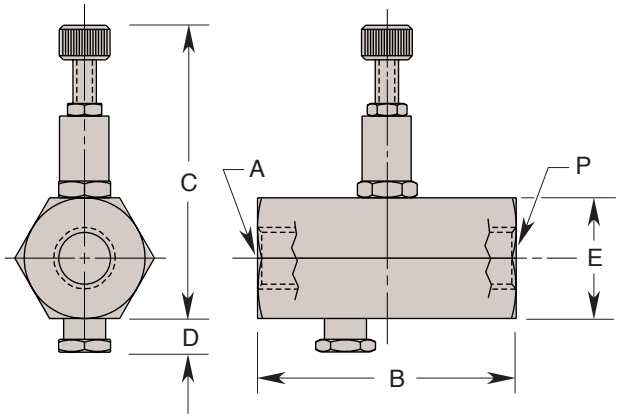
Needle valve No. 15068 has a reverse free-flow check valve built-in to allow unrestricted flow in one direction.

Needle valve No. 15066 restricts flow in both directions.

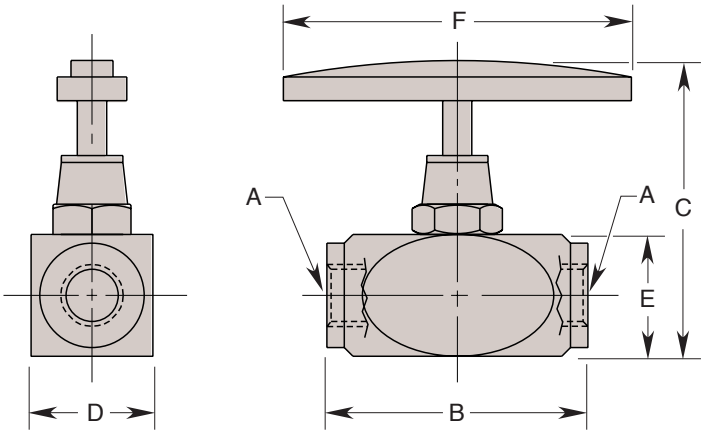
Features:

- Corrosion resistant construction
- 5,000 psi maximum

15068



15066



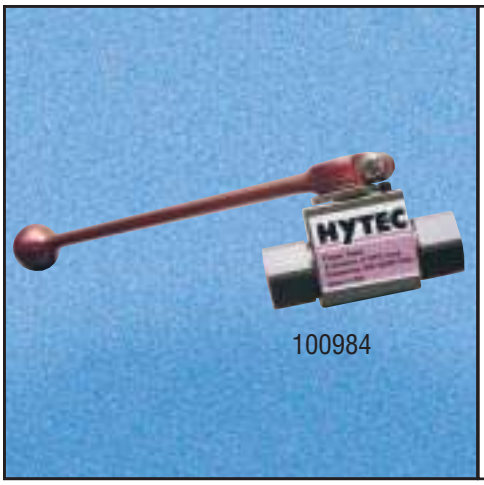
Cat. No.	Dimensions (In Inches)					
	A Port	B	C Max.	D	E Hex.	P Port
15068	¼ NPTF	2.375	2.125	.312	.875	¼ NPTF

Cat. No.	Dimensions (In Inches)					
	A Port	B	C Max.	D	E	F
15066	¼ NPTF	1.875	2.781	.875	.875	2.500

SPX HYTEC®

High Pressure Ball Valves

NEW

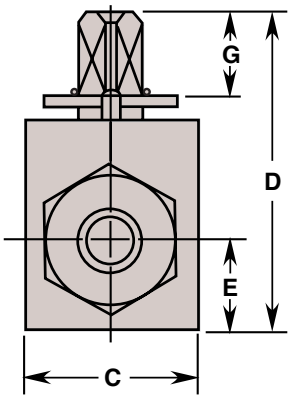


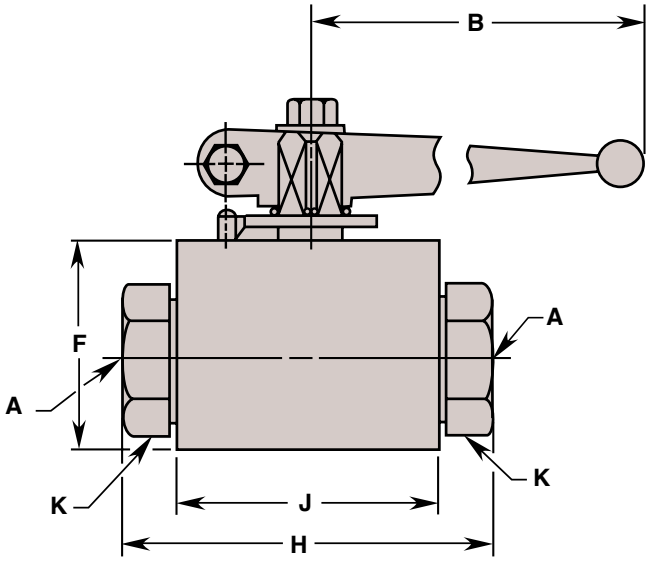
100984

These two new high pressure ball valves provide full unrestricted flow and positive shut-off of fluids under extremely rugged service conditions making them perfect for workholding applications. Based on the "floating" ball principle, this design allows the ball to turn freely between the ball seals. A positive seal is attained by fluid pressure acting on the upstream surface of the ball and producing a constant uniform contact between the downstream ball seal and ball. The ball is operated by a single spindle with a projecting square end to which the handle is attached.

Features:

- Positive stops
- 90 degree actuation
- Easy Rotating
- Designed for shifting under high differential pressures
- Handle easily modified to fit application
- 5000 psi max.
- SAE or NPT ports



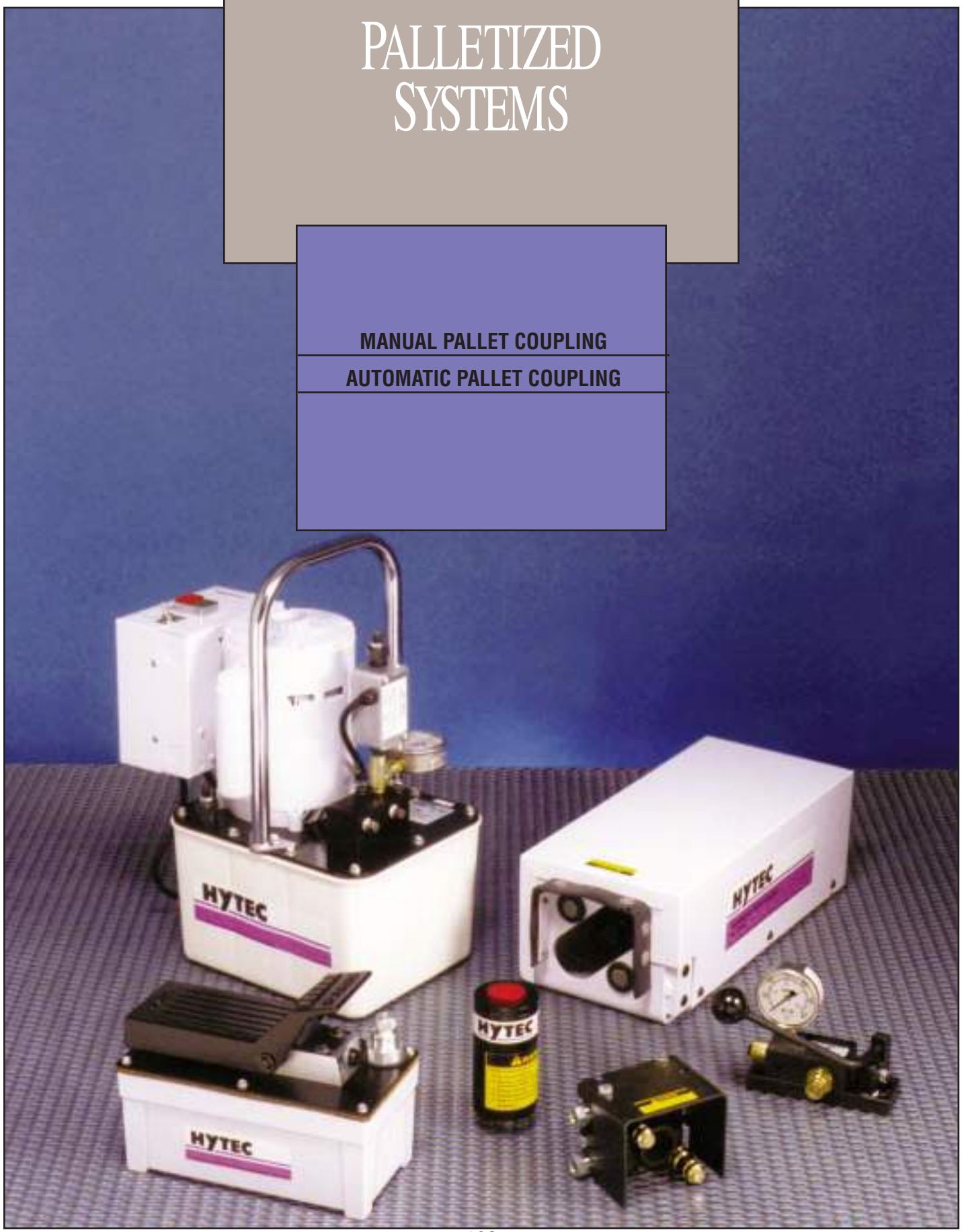


Cat. No.	Dimensions (In Inches)										
	Max PSI	A	B	C	D	E	F	G	H	J	K Hex.
100984 (NPT)	5000	1/4 NPTF	6.000	1.000	1.970	.510	1.380	.470	2.720	1.380	.750
100985 (SAE)		7/16-20 UNF SAE-4									1.000

PALLETIZED SYSTEMS

MANUAL PALLET COUPLING

AUTOMATIC PALLET COUPLING



Palletizing Information

Palletized or flexible machining centers (FMC's) are revolutionizing many aspects of metalworking. Their potential for the elimination of set up, regardless of lot size, is the very foundation of JIT programs worldwide. The application of hydraulic power workholding and its advantages to palletized machining is a Hytec breakthrough which offers exciting productivity potential.

This type of equipment is often able to shuttle the machining table, or pallet, in and out of the machine, rotate it both during machining and at the work station, invert it for washing before part removal, and even send it across the factory to a different machining cell or into storage. This concept has gained such popularity that machining centers with pallet changers are fast becoming the industry norm. During the infancy of this concept, fixture design flexibility was limited by the use of mechanical, hand operated workholding devices due to the difficulty of having an external power source continually connected. Hytec has developed systems to successfully remove the power source from the pallet and still make use of hydraulic power clamping and all of its associated advantages. Hytec offers the widest and most versatile selection of palletized system components available today.

Manual Pallet Coupling System

Single Acting

The Hytec Manual Pallet Coupling System consists of one of Hytec's specially designed valves along with one of the various pumps designed specifically for this system and single-acting components. The valve is used to maintain pressure on the pallet after the power source has been completely disconnected. This system is ideally suited to manually serviced transfer lines, palletized machining centers and rotary installations. The design of each of the valves offered makes disconnecting the power source possible. Key components include the pallet valve, an accumulator (to maintain system pressure despite temperature changes or minor leakage somewhere in the system), a hydraulic pumping unit and push-to-connect couplings. This system is designed for operating pressures up to 5,000 psi.

Double Acting

A double-acting system utilizes a pilot-operated check valve, a 4-way, 3-position remote mounted control valve, an accumulator and any standard Hytec constant pressure pump. Double acting manual pallet systems make unclamping faster and more positive. The control valve is located at the load/unload station and not on the pallet, so you only invest in one directional valve per load/unload station. Hytec's double-acting manual pallet valve system can be powered by any of our air or electrically operated constant pressure pumps.

Automatic Pallet Coupling System

The Automatic Pallet Coupling System goes a step further than our manual system. It eliminates manually operated valves, hoses, and couplers to provide push button or completely automated pallet coupling. At the heart of the system is a programmable logic controller which can be set for manual control, automatic control with robotic loading or unloading, or a combination of both. Hytec is directly involved in each application. We work with you, determine your requirements and program your system to precisely fit your needs. This system is then offered to you as a complete package. Modification of the system's actions are made with simple software changes in the programmable logic controller. Operator safety and equipment damage prevention are enhanced by the ability of the programmable logic controller to constantly monitor system status. If a malfunction is detected, the system is automatically shut down and the operator is alerted.

Hytec's Automatic Pallet Coupling System consists of the components on the following pages. These components are listed separately to allow us to mix and match them to create the best system for your application. However, the effectiveness of these components depends on our logic program which is backed by our years of experience in pallet coupling. **We do not offer these components individually as we cannot support systems that do not use our logic.**

Single-Acting Manual Pallet Coupling System

This system is ideal for manually serviced palletized machining centers, transfer lines, and rotary installations where it is impractical to have continuous connection to a power source.

The concept of this system is to attach a source of hydraulic flow only when that flow is necessary to actuate the components in the system. Once the actuators are extended, system pressure builds to a preset level. In a properly designed system with no significant internal or external leakage, no additional flow is required to maintain the system pressure. It then follows that the hydraulic power source can be disconnected with no detrimental effects on system pressure.

Designed for operating pressures up to 5,000 psi, all of Hytec's pallet coupling systems make use of our unique check valves that maintain hydraulic pressure on workholding systems and virtually eliminates leakage. Because of the check valve, the power source can be disconnected. An accumulator is all that is needed to compensate for temperature changes and minor leakage within the system.

The heart of the system is the manual pallet valve, which allows the hydraulic power source to be disconnected after the fixture has been clamped. During system pressurization, the pallet valve automatically closes, maintaining the set pressure without manual intervention. The pallet valve also easily converts from conventional to manifold mounting.

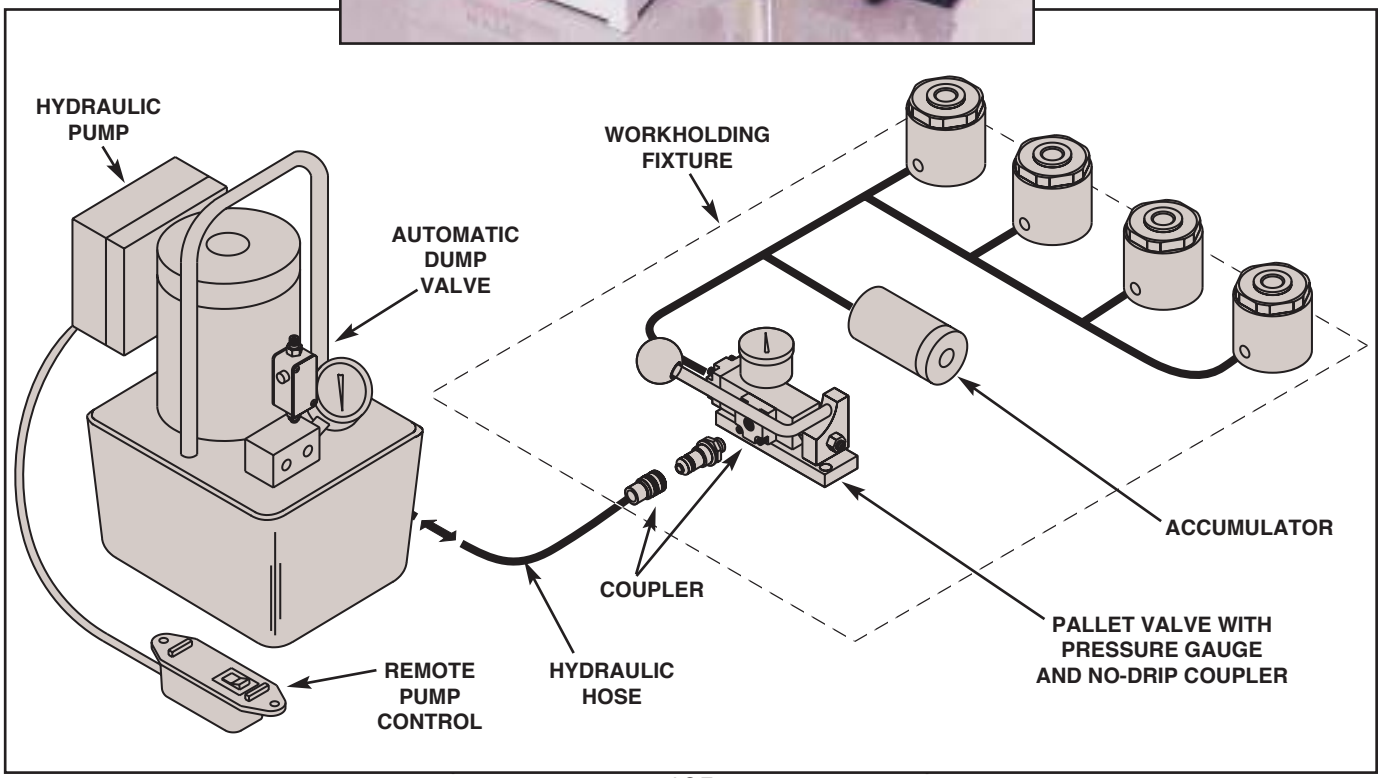
Hytec offers several specially designed pumps for servicing the system, all of which make use of the manual pallet valve's self-closing feature. After the hydraulic system is pressurized, there is no need to maintain pressure while the operator manually closes the valve. Since the Hytec valve is a true check valve, flow can enter the system easily but cannot escape until the valve is manually opened. Once the pallet valve has closed, the pump pressure can be released immediately after clamping. This releases pressure on the hose and coupler for easy, drip-free operation.

The manual pallet valve pumps are all shipped with a female coupler that mates with the coupler on the manual pallet valve. Air and electric powered versions are available.

All these features add up to a simple, two-step operation:

1. To unclamp, connect the hose and pull the release handle on the pallet valve.

2. To clamp, simply start the pump to pressurize the fixture. When the pump stops, it releases pressure at the coupler allowing disconnection of the hose.



Manual Pallet Valve

This valve allows the hydraulic power source to be disconnected after the fixture has been clamped. As the system is pressurized, the valve automatically closes to maintain pressure without manual intervention, and a liquid filled gauge lets you constantly check system pressure.

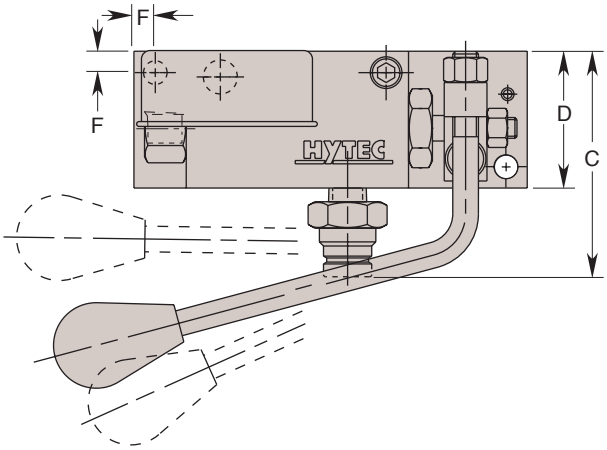
To convert from conventional to manifold mounting, simply plug the outlet and remove the screw used to block flow to the base plate port. A bushing is included to complete the connection.

Also included is the male half of a push-to-connect flat face coupler (No. 100907) for easy connection and no-drip operation. Hytec pumps designed for use with this valve all come with the mating female coupler half. Self-locking feature helps prevent release handle from actuating when coupler is not attached. For double-acting systems, use valve No. 100843 (see page 114).

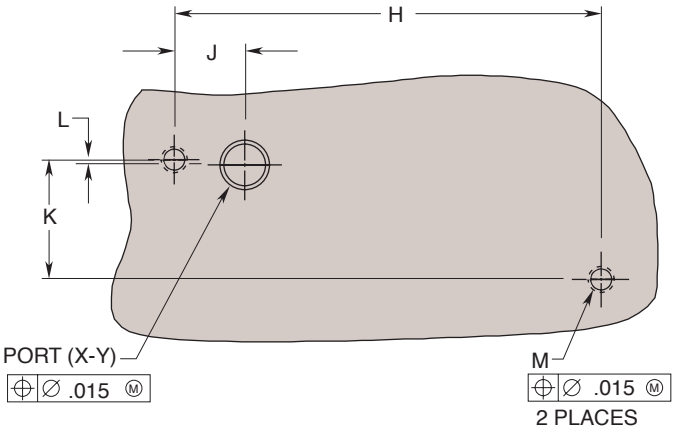
Features:

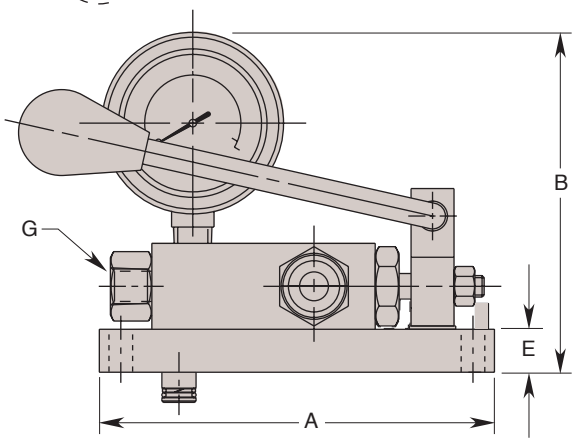
- Soft seal, self-closing valve
- Coupler protective cap
- 5,000 psi max.
- Liquid filled gauge
- Manifold or conventional mounting
- Automatic locking release handle
- Single-acting

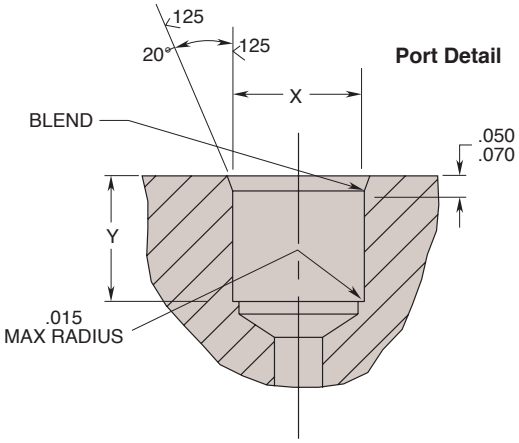
Note: Bi-directional filter No. 100857 is recommended, see page 131.



Mating Hole Pattern





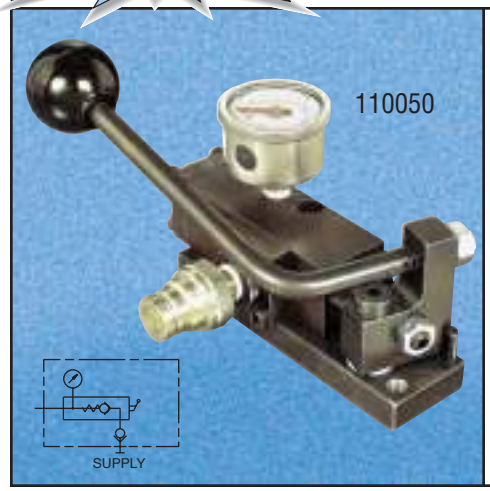


Cat. No.	Dimension (In Inches)													
	A	B	C	D	E	F	G Outlet Port	H	J	K	L	M Thread Size	X Dia.	Y
100223	5.750	4.875	3.410	2.000	.625	.312	¼ NPTF	5.125	.951	1.375	.063	5/16-18UNC	.500 .503	.515 .535

NEW

Manual Pallet Valve

SPX HYTEC



This valve allows the hydraulic pressure source to be disconnected from the pallet after the fixture has been clamped, allowing flexible machining center applications to realize the advantages of hydraulic workholding.

Hytec's newest Manual Pallet Valve has the features you should demand. Its smaller size takes up less fixture space. 10 Micron filters in both the inlet and outlet ports protect the valve from contaminants. Its self closing feature saves the operator time and effort. Versions are available for conventional plumbing or select the manifold mount model.

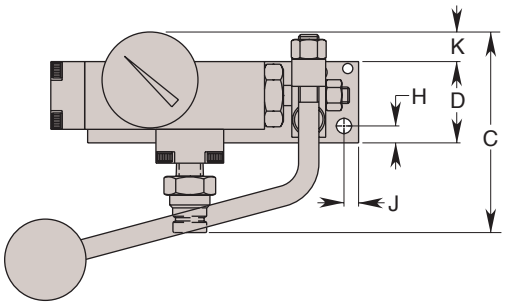
For an easy no-drip connection, our male half coupler (No. 100907) is included. Hytec pumps designed for use with this valve come with the mating coupler half. Refer to pages 108-111 for these pumps. A self-locking feature helps prevent accidental release of the valve when the coupler is not connected.

Intended for single-acting systems only. See page 113 for double-acting system applications.

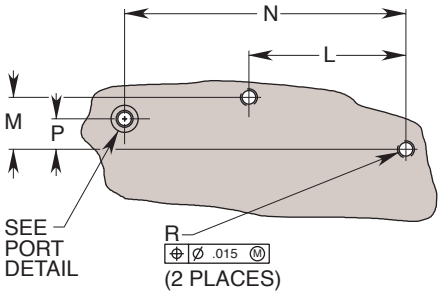
Features:

- Single-acting
- Minimal space requirements
- 5,000 psi maximum
- Inlet and outlet filtration
- Liquid filled pressure gauge
- Self-closing operation
- SAE, NPT and manifold mount versions
- Coupler protective cap

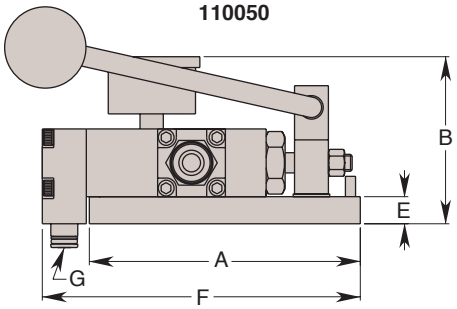
110050, 110051, 110052

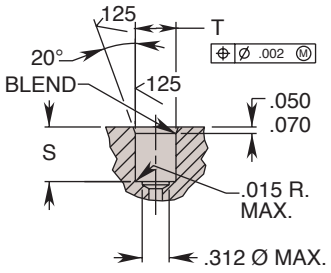


110050, 110051, 110052 Mating Hole Pattern



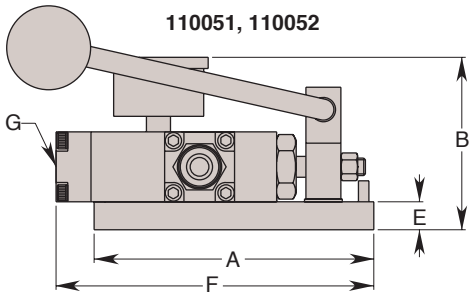
110050





Port Detail

110051, 110052



Cat. No.	Dimensions (In Inches)																
	A	B	C	D	E	F	G Outlet Port	H	J	K	L	M	N	P	R	S	T Dia.
110050	5.000	3.083	3.700	1.500	.500	5.868	Manifold Mount	.312	.270	.545	2.595	.960	5.191	.564	¼-20 UNC	.485 .505	.500 .503
110051						5.680	7/16-20 UNF SAE-4						—	—		—	—
110052							¼ NPT										

SPX HYTEC® Manual Pallet Coupling Pump

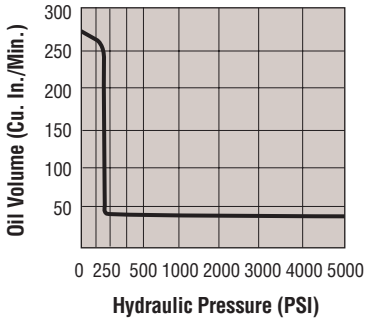
This pump has been designed specifically for use with manual pallet valve No. 100223.

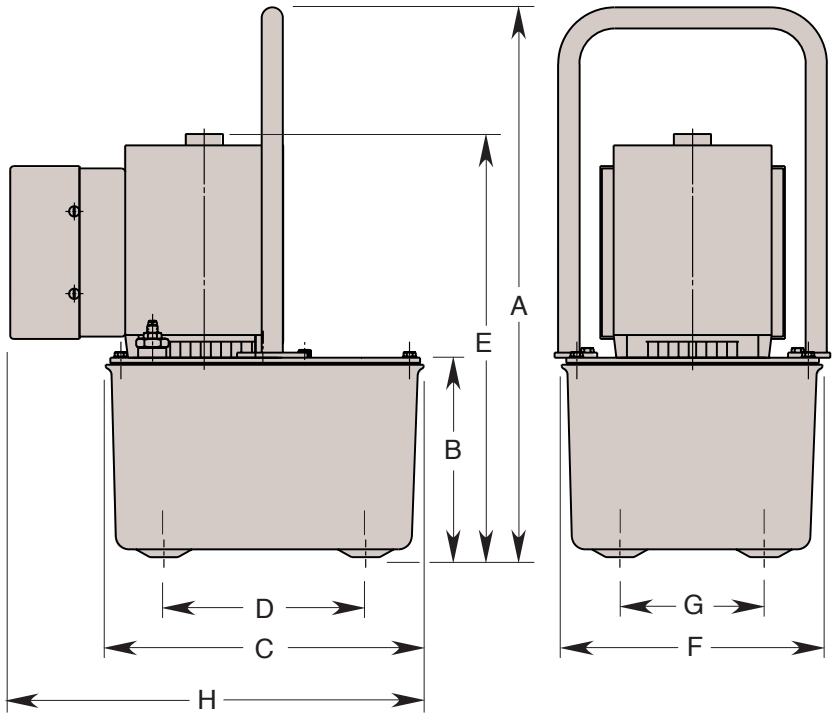
To clamp the pallet, simply start the pump using the remote hand switch. It runs until its pressure setting is reached, then stops automatically and drops pressure. The hose may now be disconnected.

Controlled by a pressure switch and external pressure regulator, this pump is adjustable from 1,000 to 5,000 psi. An internal relief valve is preset at 5,000 psi. It has thermal overload protection and integral "electrical shut-down" to prevent unintentional restarting after electrical service interruption or thermal overload.

Features:

- Drip proof induction motor
- Motor-mounted electrical enclosure
- 2-gallon plastic reservoir
- Liquid-filled gauge
- Filtered, pressure/vacuum relief fill cap
- External pressure switch and regulator
- Carrying handle
- ¼" NPTF outlet manifold
- 295 cu. in. usable oil
- Shipped with 1 gallon of oil
- Includes No. 100908 female coupler
- CSA approved
- Max. flow 33 cu. in./min. at max. pressure.

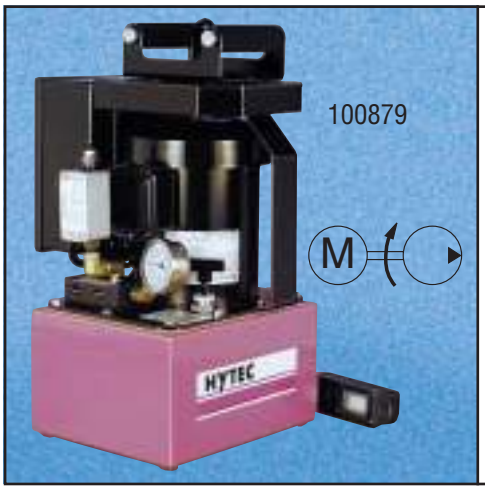




Cat. No.	Specifications			Dimensions (In Inches)							
	Electric Motor	Supply Voltage	Noise Level @ Idle/Max. Press. (dBA)	A	B	C	D	E	F	G	H
100179	½ hp; 3,450 rpm 115 VAC; 10 amps max.; 60 Hz; single phase	115 VAC	67/81	19.875	7.000	11.375	7.125	14.875	9.250	5.125	14.875
100179-230	½ hp; 3,450 rpm 230 VAC; 5 amps max.; 60 Hz; single phase	230 VAC									

NOTE: Mounting screws included (1/4-10 x .875 Lg.).
An optional metal reservoir is available, see page 136.
An optional fluid level/temperature gauge is available, see page 136.
Hose requiring 1/4" NPTF male connections not included – order separately, see page 128.

Manual Pallet Coupling Pumps



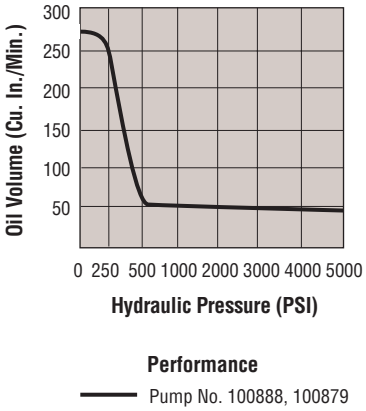
This is Hytec's popular 1 horsepower, totally enclosed-fan cooled induction motor pump, outfitted to operate Hytec's single-acting manual pallet valves.

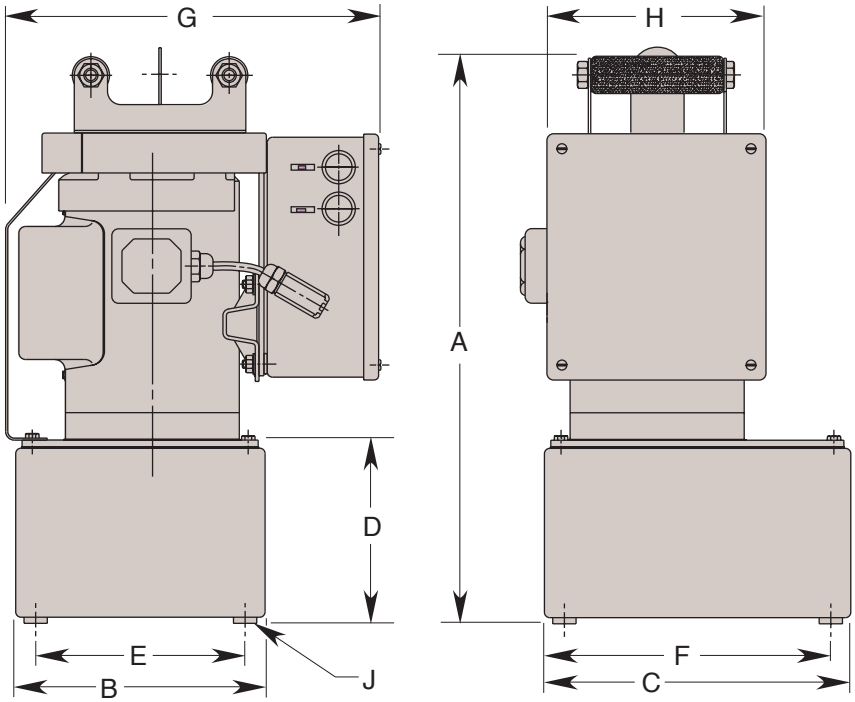
To pressurize the clamping components on the pallet, simply start the pump using the remote hand switch. It runs until its pressure setting is reached, then stops automatically and drops pressure. The coupler and hose may now be easily disconnected and later reconnected.

The output of this gerotor/axial piston pump is controlled by a pressure switch and externally adjustable pressure regulator, both adjustable from 1,000 to 5,000 psi. It is shipped with a coupler and 2 gallons of hydraulic oil. Order a hose to fit your application separately.

Features:

- NEMA 12 electrical enclosure and controls
- CSA approved
- Drip/chip cover
- Liquid filled gauge
- Dual carrying handles
- Thermal overload protection
- 2.5-gallon metal reservoir
- 44 cu. in./min. oil flow at max. pressure
- 590 cu. in. usable oil
- TEFC motor
- Filtered filler/breather cap
- Includes 100908 hydraulic coupler





Cat. No.	Specifications			Dimensions (In Inches)								
	Electric Motor	Supply Voltage	Noise Level @ Max. Press. (dBA)	A	B	C	D	E	F	G	H	J Thread Size
*100888	1 hp; 1,725 rpm; 115/230 VAC; 16/8 amps max.; 60 Hz; single phase	115 VAC	70	21.375	9.500	11.500	6.500	8.000	10.000	14.125	9.500	½-20 UNF
100888-230		230 VAC										
100879	1 hp; 1,725 rpm; 230/460 VAC; 3.8/1.9 amps max.; 60 Hz; three phase	460 VAC										
100879-230		230 VAC										

NOTE: *For field conversion to 230 VAC, order conversion kit No. 250186.
An optional fluid level/temperature gauge is available, see page 136.
Hose requiring ¼" NPTF male connections not included – order separately, see page 128.

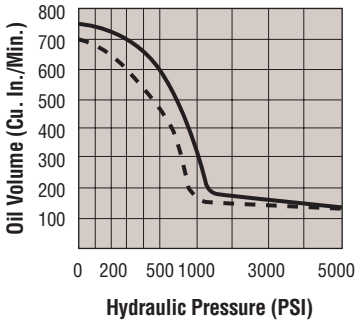
SPX HYTEC® Manual Pallet Coupling Pumps

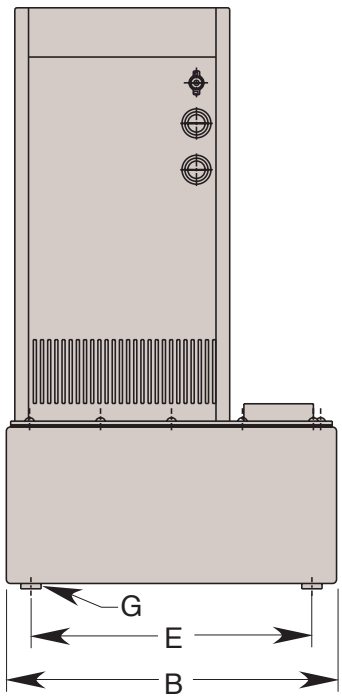
Very similar to Hytec's standard electric/hydraulic pumps, these two-stage, gerotor/axial piston pumps' electrical circuitry has been redesigned specifically to be used with Hytec's manual pallet valve.

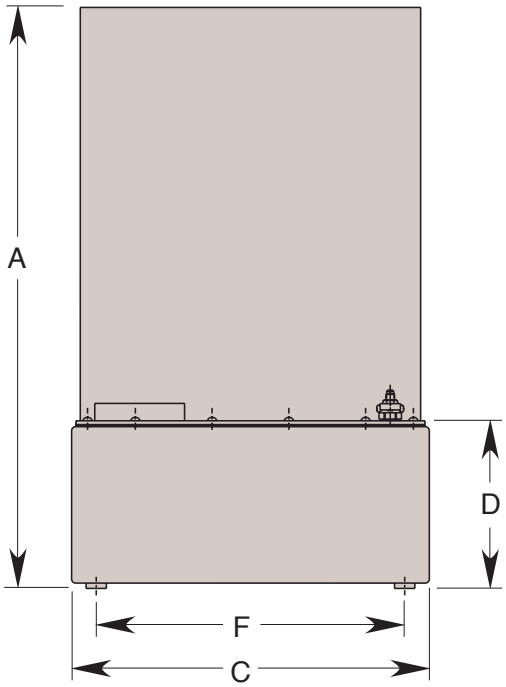
Both pumps are equipped with a dump valve for automatic pressure release on the hose and coupler. This allows coupling and uncoupling under no pressure for easy, no drip operation. Pressure range is 1,000 to 5,000 psi.

Features:

- Enclosed induction motor
- Remote hand switch with 10 ft. cord
- Includes No. 100908 female coupler
- Filtered filler/breather cap
- Liquid-filled gauge
- Carrying handles
- Pressure switch
- Pressure regulator
- Thermal overload protection
- 5.7 gallon metal reservoir
- ¼" NPTF outlet
- Shipped with 4 gallons of oil
- Oil flow: 125 cu. in./min. at max. pressure
- 1,250 cu. in. usable oil



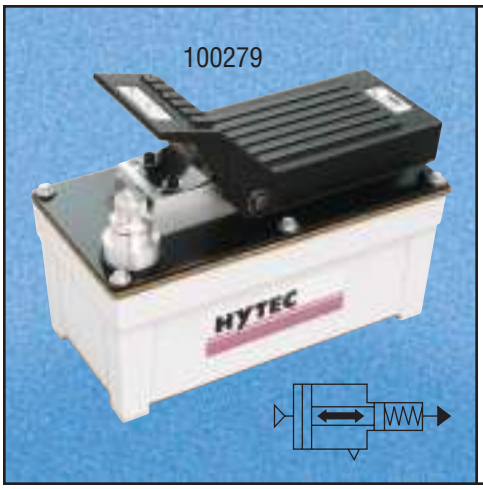




Cat. No.	Specifications			Dimensions (In Inches)						
	Electric Motors	Supply Voltage	Noise Level @ Idle/Max. Press. (dBA)	A	B	C	D	E	F	G Thread Size
††100212	2 hp; 1,725 rpm; 115/230 VAC; 27/14 amps max.; 50/60 Hz; single phase	115 VAC	74/76	25.125	14.250	15.500	7.250	12.125	13.312	½-20UNF
††100212-230		230 VAC								
100221	2 hp; 1,725 rpm; 230/460 VAC; 6.6/3.3 amps max.; 50/60 Hz; three phase	460 VAC	73/78							
100221-230		230 VAC								

NOTE: Hose requiring ¼" NPTF male connections not included–order separately, see page 128.
†† CSA Approved.
An optional fluid level/temperature gauge is available, see page 136.

Manual Pallet Coupling Pump



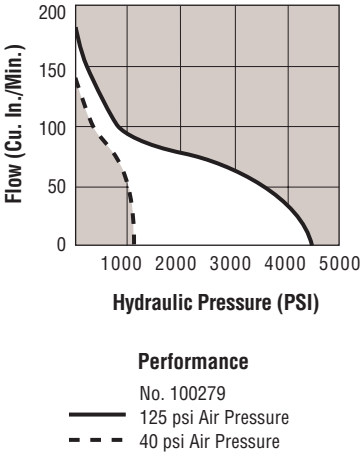
Designed specifically for use with manual pallet valves, this single-stage pump includes a 5 ft. hose and special coupler No. 100908 to mate with our manual pallet valves.

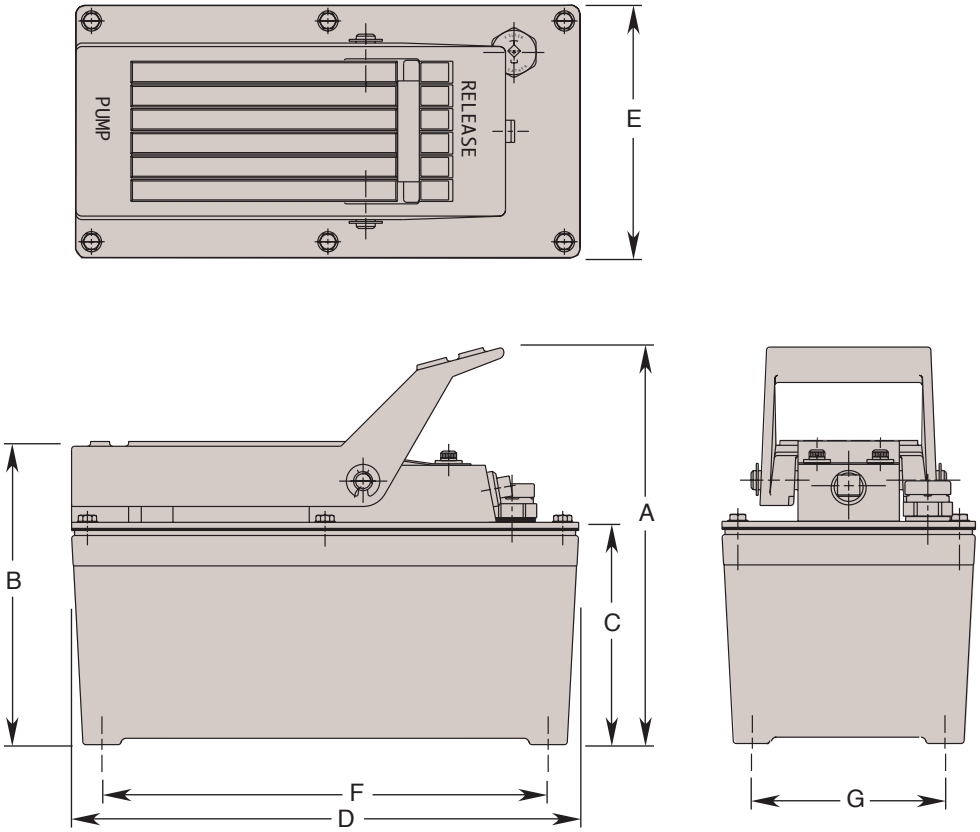
Operation is simple: connect the coupler and release the pallet valve. Change the workpiece, then press the foot pedal to start the pump and clamp the piece. Rocking the pedal forward releases pressure in the coupler while the pallet valve maintains pressure at the pallet. At this point, the coupler and hose may be disconnected.

Refer to page 82 for additional pump performance information.

Features:

- Filtered filler/breather cap with dipstick
- 105 cu. in. metal reservoir
- ⅜" NPTF outlet with ¼" NPTF reducer
- ¼" NPTF air inlet port
- Shipped with hydraulic oil
- Foot treadle control allows "hands free" operation
- Operating Pressure Range (nominal): 4,475 psi max. @ 125 psi air, max. 1,150 psi min. @ 40 psi air, min.
- 98 cu. in. usable oil





Cat. No.	Dimension (In Inches)						
	A	B	C	D	E	F	G
100279	7.750	5.875	4.250	10.000	5.000	9.000	4.000

NOTE: This pump is not for use in normal "constant pressure" applications. Requires filtered, regulated, lubricated air supply. Air requirements: 20 CFM (max.) at low hydraulic pressure decreasing to 0 CFM when pump stalls.

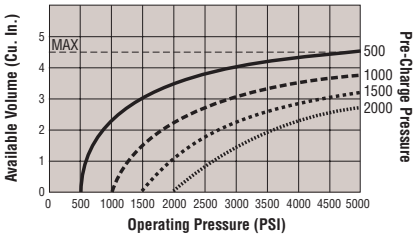
Accumulators

NEW

These accumulators are designed to store a small supply of pressurized oil, making them ideal for palletized machining workholding systems or any other system where supply pressure is disconnected temporarily. They are nitrogen charged, piston type accumulators allowing them to be mounted in any orientation. This type of accumulator has a wider operating range at any one charge pressure than any other type of accumulator. Depending on the application, they can be used at any pressure from 0-5,000 psi. Charge pressure is factory set at 1,500 psi and can be increased up to 2,000 psi. In general, a lower charge pressure will provide more total oil but a higher charge pressure will give more usable oil at a given allowable pressure drop. Refer to the performance charts to determine the best charge pressure for each application. Accumulators come in two sizes (2 & 5 cu. in.) and are available in conventional mount and the newly introduced manifold mount.

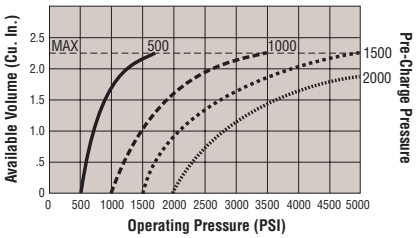
Features:

- Two sizes: 2 and 5 cu. in.
- Conventional or Manifold Mount
- Precharged to 1,500 psi
- Concealed charging valve
- SAE "O" ring fitting with ¼" NPT female adapter/restrictor valve (100222, 100138)
- Optional charging tool 500149 (See pg.125)



100983, 100222 Pre-Charge Pressure Curves

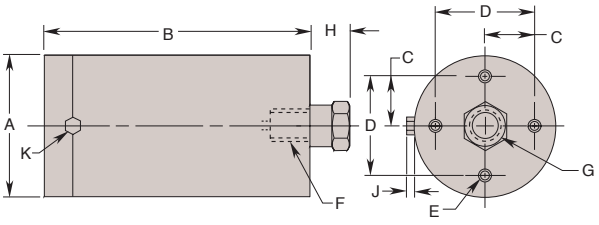
500 psi · · · · · 1500 psi (Factory Pre-charge)
1000 psi ····· 2000 psi



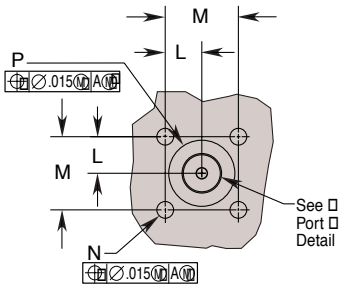
100982, 100138 Pre-Charge Pressure Curves

500 psi · · · · · 1500 psi (Factory Pre-charge)
1000 psi ····· 2000 psi

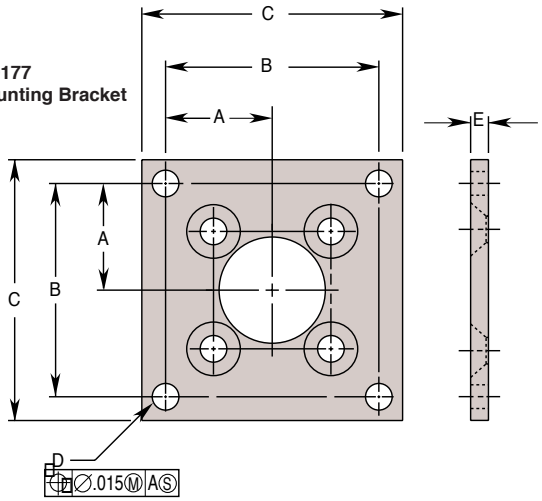
100222, 100138 (shown)

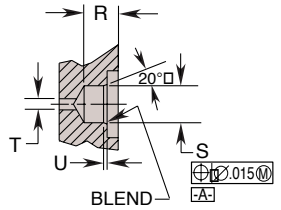


Mating Hole Pattern
100982, 100983



500177 Mounting Bracket



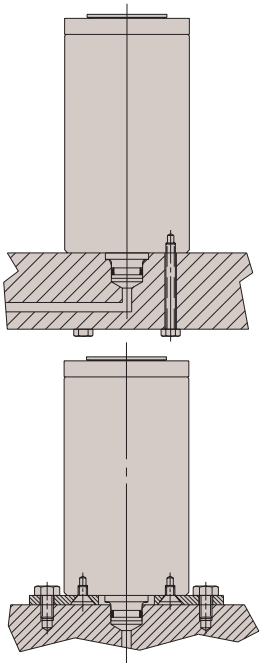


Cat. No.	Dimensions (In Inches)				
	A	B	C	D Dia.	E
500177	1.125	2.250	2.750	.285	.188

Cat. No.	Specifications		Dimensions (In Inches)										
	Mounting Configuration	Volume (Cu. In.)	A	B	C	D	E Thread Size	E Thread Depth	F Thread Size	G Thread Size	H	J	K Hex.
100138	Conventional	2	2.500	4.810	.875	1.750	10-32UNF	.200	9/16-18UNF SAE-6	¼ NPT	.698	.100	.250
100222		5		5.680									
100982	Manifold	2		4.810						–	.509		
100983		5		5.680									

Cat. No.	Mounting Option	Dimensions (In Inches)							
		L	M	N	P Dia.	P Depth	R Min.	S Dia.	T Dia. Min.	U
100982 100983	With 500177	1.125	2.250	¼-20UNC	–	–	.375	.625 .627	.188	.050 .070
100982 100983	Without 500177	.619	1.238	.280 .287	1.120 1.150	.183 .193	.563			
100138 100222	Without 500177					Thru	–	–	–	–

Accumulator Applications



Double-Acting Manual Pallet Coupling System

Hytec's double-acting manual pallet system is an affordable choice where double-acting actuators are used in palletized applications. The system uses a pilot-operated check valve, a 4-way, 3-position remote mounted control valve, an accumulator and any standard Hytec "constant pressure" pump.

Hytec's double-acting manual pallet system has many advantages. With double-acting actuators, unclamping is faster and more positive. This enables you to utilize applications requiring both pushing and pulling forces on palletized machining systems. The control valve is located at the load/unload station and not on the pallet which means you only purchase one control valve per load/unload station, not one for every pallet. Filtration to ensure leak-free operation is built-in. The pilot-operated check valve and accumulator can be located in otherwise unusable areas of the fixture. The only components that must be accessible to the operator are the two couplers allowing you to utilize more of your fixture space.

Operation

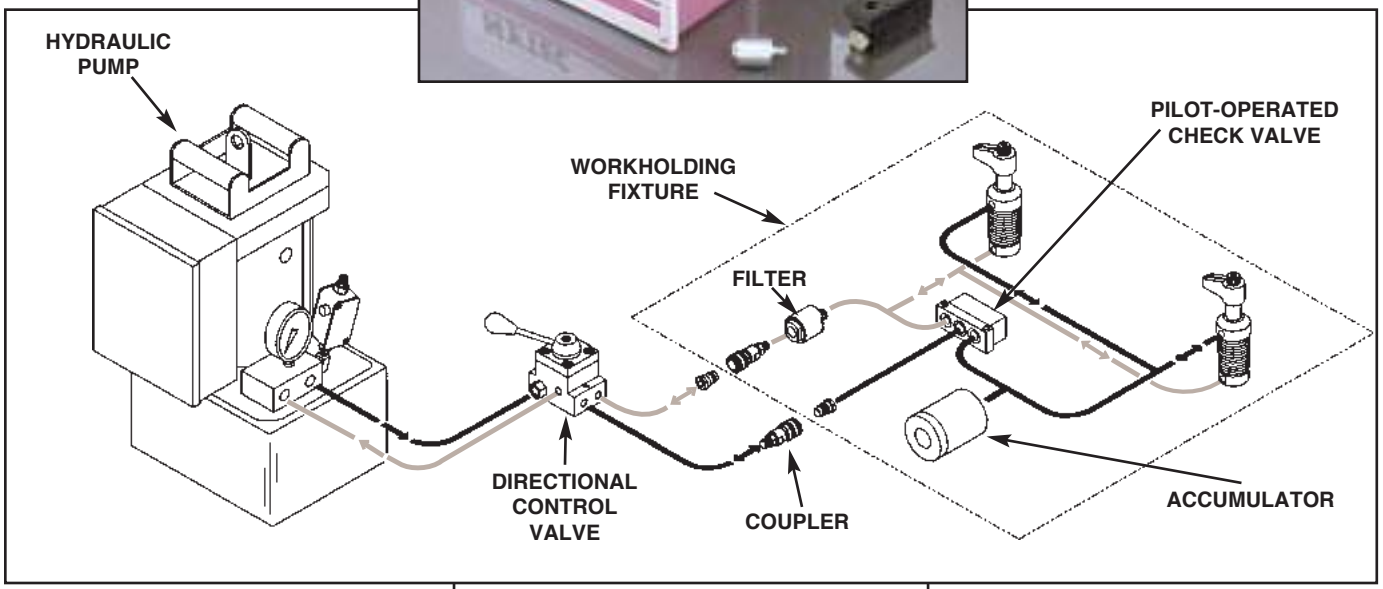
When the control valve is in the center position, inlet flow is blocked, so the pump builds pressure and automatically shuts off. However, since both hoses are connected back to tank, no pressure is on either of them - allowing for easy coupling or uncoupling.

Once coupled, when the valve is shifted to the "unclamp" position, the return ports of the double-acting components are pressurized - along with the pilot port of the specially designed pilot operated check valve.

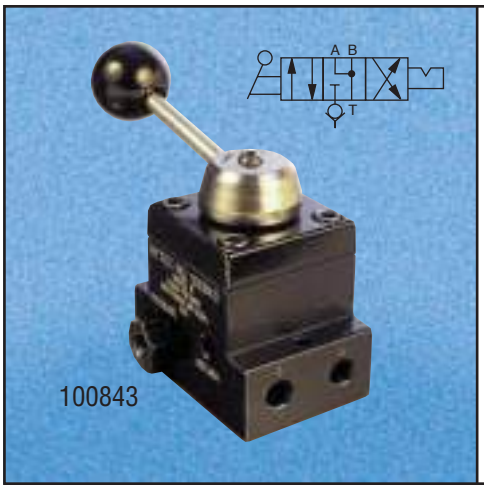
As the pressure builds, pilot pressure causes the check valve to open allowing the workholding devices to unclamp. Oil is then allowed to flow back through the check valve to the reservoir. The operator changes the workpiece and the control valve is shifted to the clamp position. Hydraulic flow passes through the check valve and causes the workholding device to clamp. Once the system is pressurized, the pump automatically shuts off. The operator then shifts the valve back to the center position, allowing pressure in both hoses to be released. The couplers can now be easily disconnected, allowing the fixture to be indexed.

The pilot-operated check valve used in this system has a unique feature in that it has a filter in all three ports to protect against contamination. If desired, another filter can be added to protect the return portion of the circuit.

This double-acting manual pallet valve system can use any of Hytec's constant pressure pumps. Pumps specifically designed for our single-acting pallet valves are not appropriate for this application.



SPX HYTEC® Remote Mounted Control Valve



This 4-way, 3-position valve has a center position that blocks the pressure (P) port and drains the two work (A and B) ports back to the tank (T) port. This configuration makes it ideal for an inexpensive double-acting manual pallet valve when used in conjunction with a Hytec pilot operated check valve and any constant pressure pump.

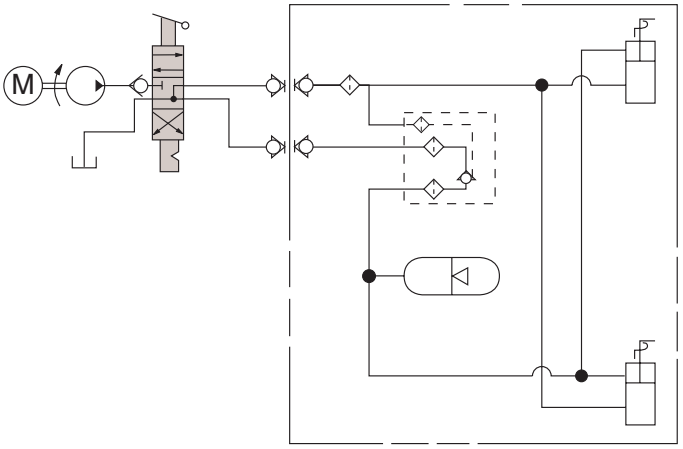
This system saves you money because the control valve is located at the load/unload station, not the pallet. This means you only purchase one control valve per load/unload station no matter how many pallets are involved. This system also frees up space on the pallet because the two couplers are the only components that must be accessible.

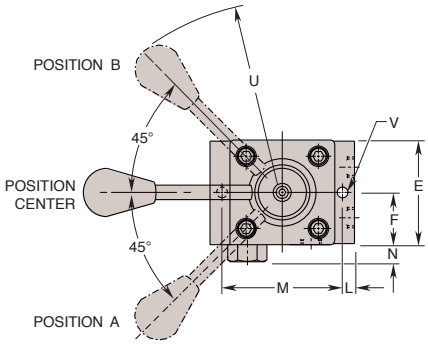
This valve is also ideal for service and troubleshooting of pallets used with the Hytec Automatic Pallet Coupling System. Use this valve to clamp and unclamp your fixtures off the machine.

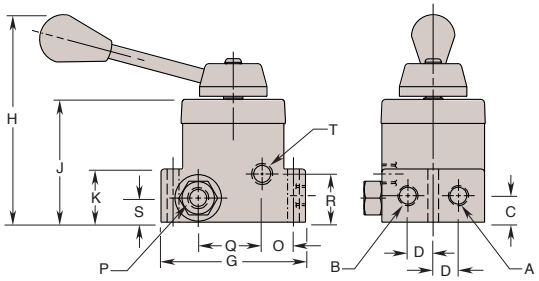
Features:

- 3-way/4-way, 3-position, detented
- Manually operated
- Remote mounted
- Handle swings 90° and may be repositioned in 22.5° intervals.
- 5,000 psi maximum
- 5 gpm
- 500 psi max. return line pressure
- Includes inlet check valve

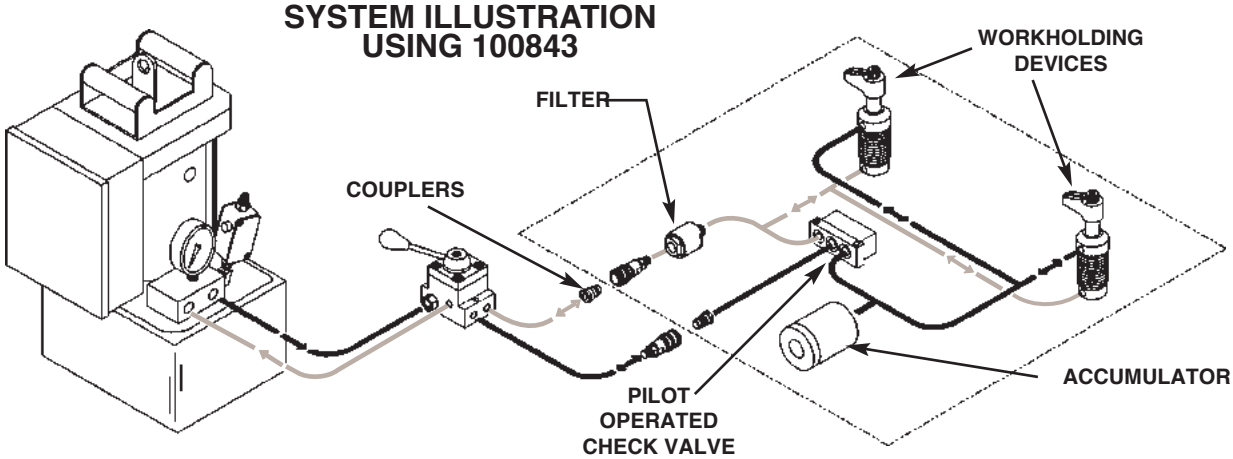
SYSTEM SCHEMATIC USING 100843







SYSTEM ILLUSTRATION USING 100843



Cat. No.	Dimensions (In Inches)																			
	A Port	B Port	C	D	E	F	G	H	J	K	L	M	N	O	P Port	Q	R	S	T Port	U Rad.	V Dia.
100843	¼ NPTF	¼ NPTF	.687	.656	2.660	1.330	3.750	5.562	3.188	1.437	.312	3.125	.469	.812	¼ NPTF	1.656	1.250	.625	¼ NPTF	5.031	.281

Automatic Pallet Coupling System

The Hytec Automatic Pallet Coupling System (APCS) uses a building block approach to create a complete customized, turnkey system to integrate hydraulic power clamping into work cells using FMS equipment. Systems are created by choosing from a wide variety of power sources, coupling components, and control systems, all of which are capable of single or double-acting operation.

The system uses a base unit at the load/unload station to hydraulically couple a specially equipped hydraulic power source to the workholding components on the pallet. The base unit and hydraulic power source are operated by a Programmable Logic Controller (PLC), which also coordinates communication with the machine tools and automated workpiece exchange system. In addition to controlling the system, the PLC constantly monitors system status. Should a malfunction be detected, an output signal is triggered immediately, shutting down the system and informing the operator.

The PLC also guards against equipment damage caused by pallet indexing while the base unit is connected to the pallet. When properly interfaced, the pallet cannot be indexed if the base unit is out of its home position.

Hytec is directly involved in each application. We work with you, determine your requirements and program our system to precisely fit your needs. This system is then offered to you as a complete package.

Hytec's Automatic Pallet Coupling System consists of the components on the following pages. These components are listed separately to allow us to mix and match them to create the best system for your application. However, the effectiveness of these components depends on our logic program which is backed by our years of experience in pallet coupling. **We do not offer these components individually as we cannot support systems that do not use our Programmable Logic Controller.**

In a manually controlled application, the system input/output (I/O) communication typically is as follows:

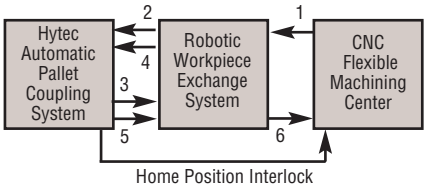
1. Pallet arrives at load/unload station. Operator sends a signal to the APCS to initiate the couple/unclamp cycle. Upon completion of this cycle, the operator changes the workpiece.
2. Operator sends a signal to the APCS to initiate the clamp/uncouple cycle. Upon completion of this cycle, the operator signals the FMC, enabling the pallet index system.

The same hardware and software may be used when using a robot to exchange the workpiece. Fixturing for robotic systems is typically set up in one of two ways:

A. The workpiece cannot be supported by the fixture and must be held by the robot during clamping.
B. The workpiece is self-supported in the fixture and doesn't need clamping before the robot releases the part.

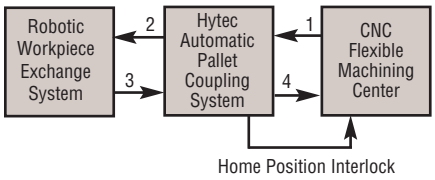
The Hytec APCS is equally well suited for either application without modification, the only difference being how the communications are routed. If the workpiece must be supported by the robot during clamping, the robot controls the sequence of operation. With the self-supported workpiece, the APCS is at the center of the system and controls the actions of the robot and FMC. I/O communications diagrams for robotic systems are as follows:

ROBOT SUPPORTED WORKPIECE



1. Pallet arrives at load/unload station. A signal is sent from the FMC to the robot to initiate the workpiece grasp cycle.
2. Upon completion of the workpiece grasp cycle, the robot sends a signal to the APCS to initiate the couple/unclamp cycle.
3. When the couple/unclamp cycle is complete, a signal is sent from the APCS to the robot to initiate the workpiece exchange.
4. After the workpiece has been exchanged, a signal is sent from the robot to the APCS to initiate the clamp/uncouple cycle.
5. When the clamp/uncouple cycle is complete, a signal is sent from the APCS to the robot to initiate the workpiece release cycle.
6. Upon completion of the workpiece release cycle, a signal is sent from the robot to the FMC to enable the pallet index system.

SELF-SUPPORTING WORKPIECE



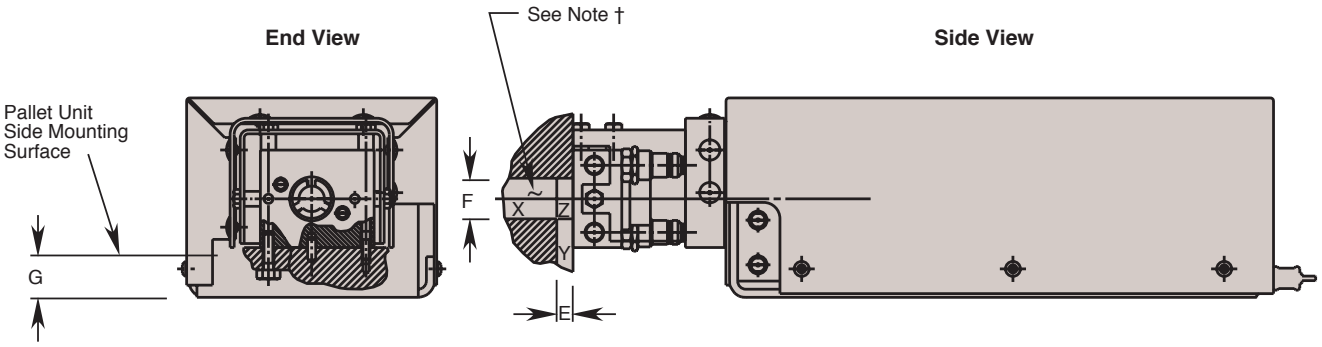
1. Pallet arrives at load/unload station. A signal is sent from the FMC to the APCS to initiate the couple/unclamp cycle.
2. Upon completion of the couple/unclamp cycle, the APCS sends a signal to the robot to initiate the workpiece exchange.
3. When the workpiece has been exchanged, a signal is sent from the robot to the APCS to initiate the clamp/uncouple cycle.
4. After the clamp/uncouple cycle is completed, a signal is sent from the APCS to the FMC to enable the pallet index system.

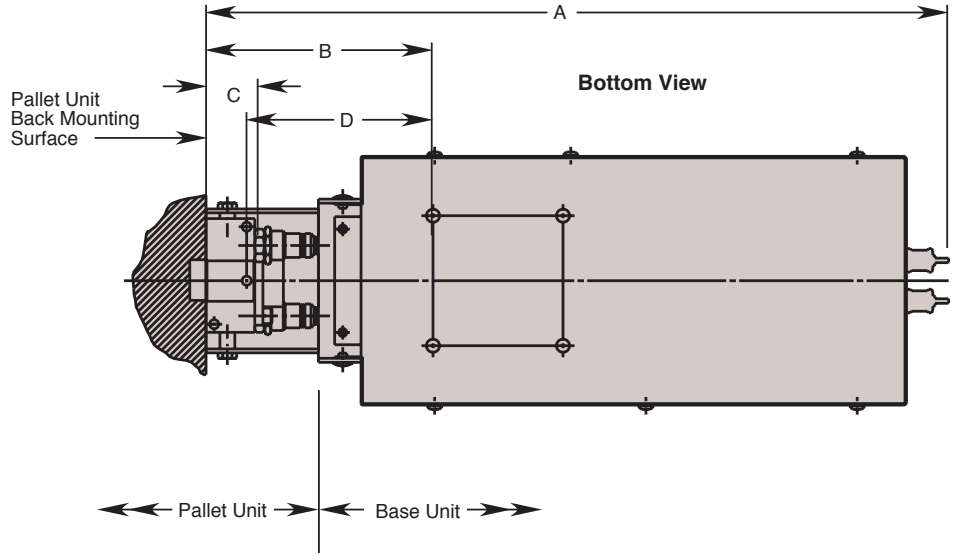
Pressure is maintained on the pallet by a soft seat, pilot operated check valve to prevent leakage. The check valve action of the pallet unit coupler further protects the system from pressure loss. An accumulator must be included in the pallet hydraulic system to maintain a constant pressure despite temperature changes and minor leakage. A gauge is also useful for visually monitoring pallet pressure. All APCS components are designed for single- or double-acting use, or a mixture of both.

IMPORTANT NOTE: **For Automatic Pallet Coupling installation instructions, order Hytec's FREE form No. 105420.**

To design a system choose components from each column in the chart below.

	Component				
	Base Unit	**Pallet Unit**	**Check Valve**	**Accumulator**	**Pump**
Cat. No.	100197	100881 100183	100915	100222 100138 100982 100983	100140 100198 100199 100840
Quantity	1 per Load/Unload Station	1 per Pallet	1 per Pallet	1 per Pallet	1 per PLC
Page No.	117	118	100	112	119, 120





Installation Dimensions (In Inches)						
A Ref.	**††B* Ref.**	**C Ref.**	**††D* Ref.**	**†E Min.**	**†F Min. Dia.**	***G Ref.**
22.812	6.983 ±.030	1.500	5.733 ±.030	.500	1.250	1.530

NOTE:* These dimensions must be adjustable for proper alignment after installation. Alignment tolerance of base unit to pallet unit is 0.040 true position (±0.015).

† Required clearance area (Z).

† Recommended coolant passages (X or Y) to allow chips to be flushed from the inside of manifold body.

†† See installation instructions form 105420.

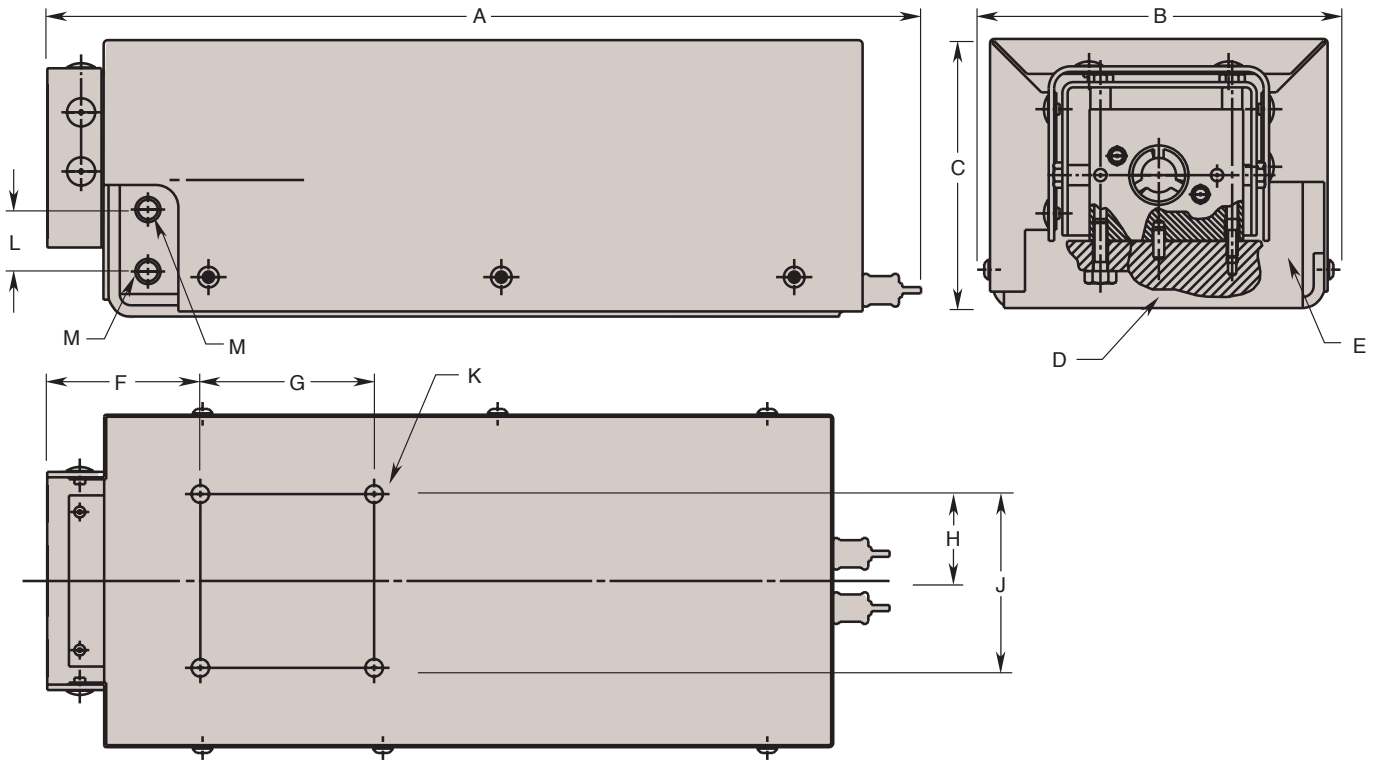
Base Unit

This air powered base unit, mountable in any orientation, provides the action necessary to couple the pallet hydraulic system to the power source. The indexing motion of the pallet is not part of the coupling process, making the Hytec system compatible with any FMC regardless of pallet indexing configuration. By using a latching mechanism that engages the pallet and then gently draws the couplers together, side loading of the pallet is minimal. Built-in sensors allow the PLC to constantly monitor the status of the coupling sequence. A metal shroud protects internal components from coolant, chips, and other debris.

Features:

- Air requirements: 70 psi regulated and filtered (drying and lubrication recommended); ⅛" NPT inlet
- Electrical requirements: all necessary power is supplied by the PLC
- Hydraulic connections: ¼" NPTF
- Pressure rating: 5,000 psi max.
- Alignment tolerance is .040" true position (± .015")

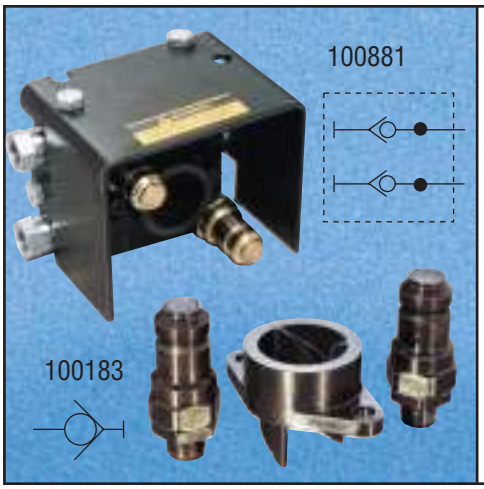
Note: Installation drawing appears on page 116. For more information on installation, order form No. 105420.



Cat. No.	Dimension (In Inches)											
	A	B	C	*D Thread Size	†E Dia.	F	G	H	J	K Dia.	L	†M Thread Size
100197	19.354	7.937	6.135	¼ NPTF	.875	3.525	4.000	2.000	4.000	.438	1.375	¼ NPTF

NOTE: * Air Supply - 70 psi lubricated, dried & filtered 3.41 scfm peak flow. 0.17 scf per clamp/unclamp cycle.
† Upper port (dimension "M") connects with lower pallet unit port (dimension "F", page 118) in this view (side view).

Pallet Units



Consisting of only the couplers and cam ring needed to mate with the base unit, the 100183 pallet unit is used in applications where space is limited, where the pallet hydraulic components are manifold mounted, or where it is desirable to build the connections into the pallet itself. This system requires user-supplied hydraulic passages from the couplers to the workholding devices.

Features:

- Includes couplers, cam ring, mounting screws, and instructions
- 5,000 psi max.

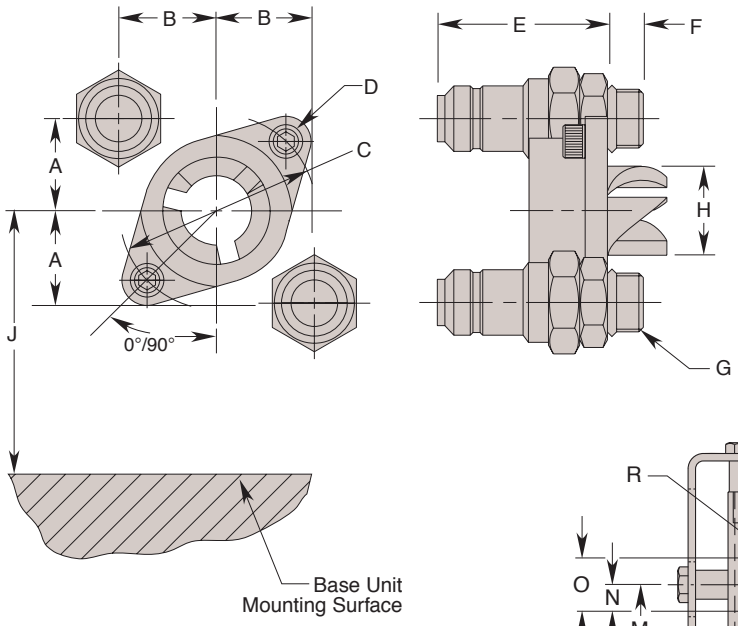
The 100881 contains a manifold block that holds the pallet half couplers and a specially designed cam ring which locks the pallet unit to the base unit, and also provides the two attachment points required for the pallet hydraulic system connection. The manifold block has mounting holes on three sides to facilitate mounting. A metal chip shield is provided that, like the manifold block, is symmetrical so that hydraulic connections can be on either side.

Features:

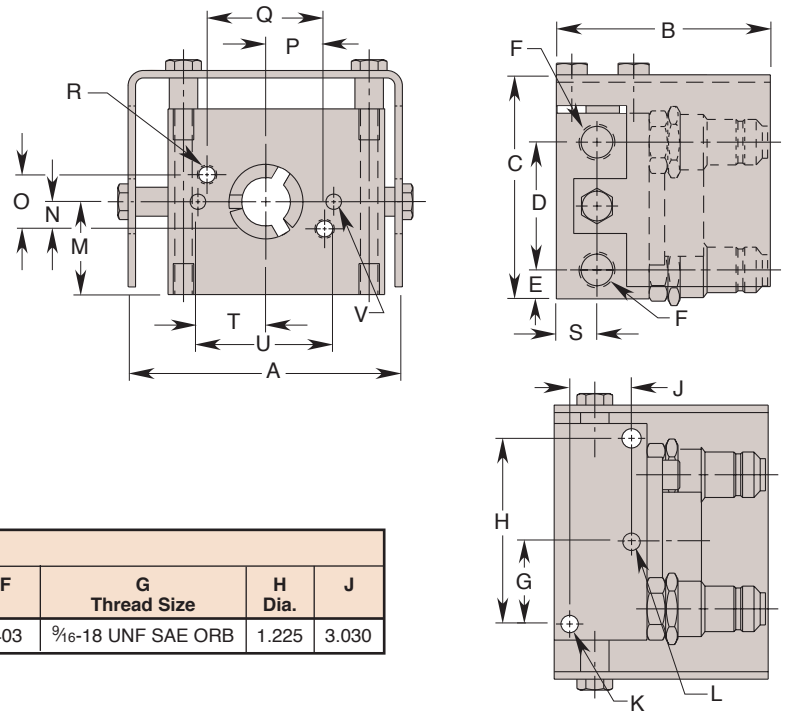
- Hydraulic ports: 9/16–18 SAE "O" ring ports; adapters to 1/4" NPTF female included
- 5,000 psi max.

Note: For installation, see drawing pg. 116. For more information on installation, order form No. 105420.

100183



100881



Cat. No.	Dimension (In Inches)								
	A	B	C Dia.	*D Mounting Screw	E	F	G Thread Size	H Dia.	J
100183	1.032	1.094	2.194	1/4-20 x .625 lg.	1.910	.403	9/16-18 UNF SAE ORB	1.225	3.030

NOTE: * Two socket head cap screws supplied.

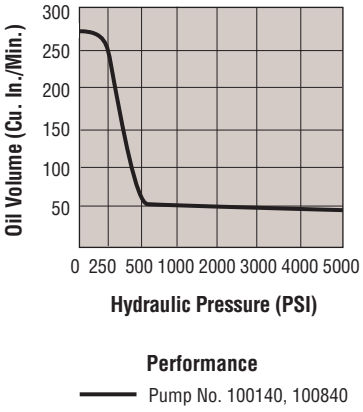
Cat. No.	Dimension (In Inches)																				
	A	B	C	D	E	**F Thread Size	G	H	J	*K Thread Size	†L Dia.	M	N	O	P	Q	*R Thread Size	S	T	U	†V Dia.
100881	4.430	3.458	3.625	2.064	.468	9/16-18 UNF SAE ORB	1.328	3.000	1.000	5/16-18 UNC	.250	1.500	.438	.875	.950	1.900	5/16-18 UNC	.656	1.328	2.656	.250

NOTE: * .260 Dia. thru hole will accept mounting screw from opposite side. Depth of threads is .500 inch.
† Locating holes.
** Lower port (dimension "F") connects to upper base unit port (dimension "M", page 117) in this view (side view).

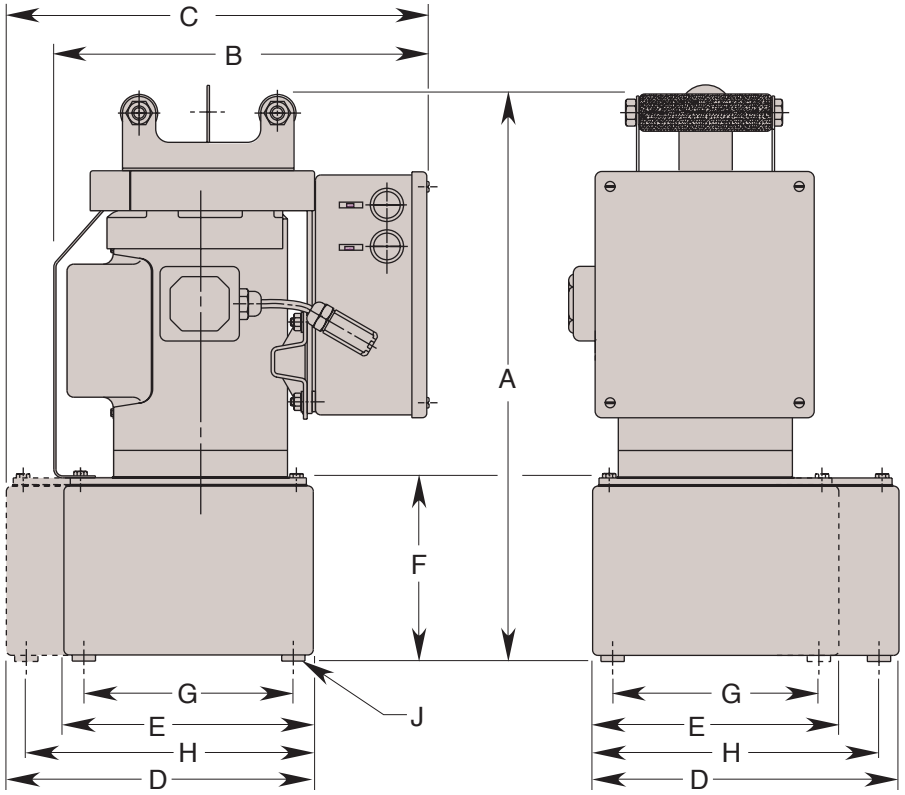
Designed specifically to be used with, and controlled by, the Automatic Pallet Coupling system, these two-stage, single and three-phase hydraulic pumps are equipped with a three-position, four-way solenoid valve. They consist of high and low pressure pump stages for rapid hydraulic operation, and are infinitely adjustable from 1,000 to 5,000 psi. A built-in internal relief valve is set at 5,000 psi. Thermal overload protection prevents damage to the motor from overheating, and an integral "electrical shut-down" feature prevents unintentional restarting of the unit after electrical service interruption or thermal overload shut-down.

Features:

- 2½-gallon reservoir
- Totally enclosed, fan cooled motor
- NEMA 12 electrical enclosure and controls
- CSA approved
- External pressure regulator
- Pressure switch
- Drip/chip cover
- Terminal strip for easy connections
- Dual carrying handles
- Liquid-filled gauge
- ¼" NPT outlet manifold
- 590 cu. in. usable oil
- Shipped with 2 gallons of oil
- 44 cu. in./min. max. pressure



100140, 100840 (use dashed lines for 100840 reservoir)



Cat. No.	Specifications			Dimensions (In Inches)								
	Electric Motor	Supply Voltage	Noise Level @ Idle/Max. Press. (dBA)	A	B	C	D	E	F	G	H	J Thread Size
*100140	1 hp; 1,750 rpm; 115/230 VAC 16/8 amps max. 60 Hz; single phase	115 VAC	70	21.375	9.500	—	11.500	6.500	8.000	10.000	14.125	½-20 UNF
100140-230		230 VAC										
100840	1 hp; 1,750 rpm; 208-230/460 VAC 3.6-3.8/1.9 amps max. 60 Hz; three phase	460 VAC			—	15.578						
100840-230		230 VAC										

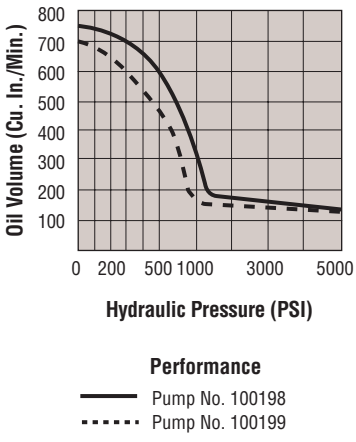
NOTE: * For field conversion to 230 VAC, order conversion kit No. 250185.
Optional fluid level/temperature gauge is available, see page 136

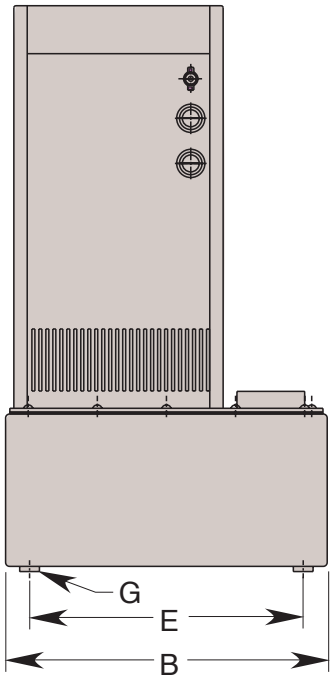
Automatic Pallet Coupling Pumps

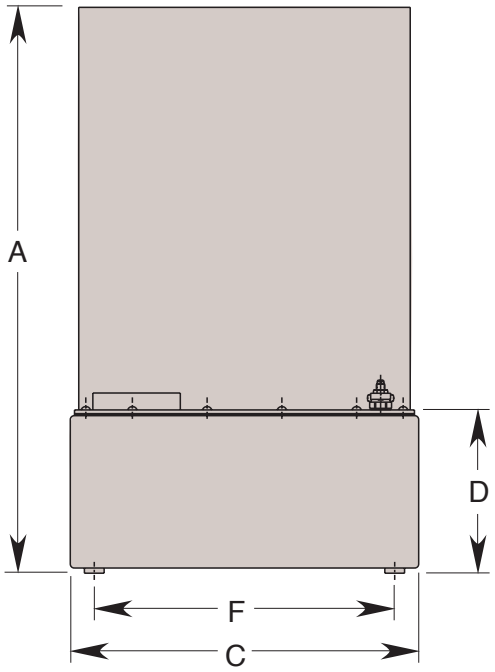
These two-stage, electric hydraulic pumps are designed exclusively for use with the APCS. Both are equipped with a three-position, four-way solenoid valve. Specially equipped with unique electrical configurations, they're controlled by the system PLC for totally automatic operation. Both pumps consist of a high and low pressure stage for rapid hydraulic operation, and the output pressure is infinitely adjustable from 1,000 to 5,000 psi. A built-in internal relief valve is factory set at 5,000 psi, and thermal overload protection prevents damage to the motor from overheating.

Features:

- Enclosed induction motor
- 5.7-gallon metal reservoir
- Oil flow: 125 cu. in./min. at max. pressure
- Shipped with 4 gallons of oil
- Filtered pressure/vacuum relief fill cap
- Liquid-filled gauge
- Carrying handles
- Pressure switch
- Pressure regulator
- ¼" NPTF outlet manifold
- 1,250 cu. in. usable oil





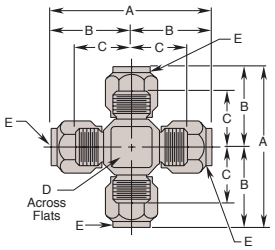


Cat. No.	Specifications			Dimensions (In Inches)						
	Electric Motor	Supply Voltage	Noise Level @ Idle/Max. Press. (dBA)	A	B	C	D	E	F	G Thread Size
*100198	2 hp; 1,750 rpm; 115/230 VAC; 27/14 amps max.; 50/60 Hz; single phase	115 VAC	74/76	25.125	14.250	15.500	7.250	12.125	13.312	½-20UNF
*100198-230		230 VAC								
100199	2 hp; 1,750 rpm; 230/460 VAC; 6.6/3.3 amps max.; 50/60 Hz; three phase	460 VAC	73/78							
100199-230		230 VAC								

NOTE: * CSA approved.
An optional fluid level/temperature gauge is available, see page 136.

ACCESSORIES

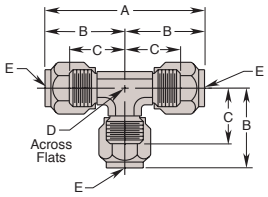
FITTINGS	PRESSURE GAUGES
HYDRAULIC FLUID	ROTATING UNIONS
HOSES & TUBING	PRESSURE SWITCH
COUPLERS	REMOTE CONTROLS
MANIFOLDS	TEMP./LEVEL GAUGE
IN-LINE FILTERS	RESERVOIRS



Cross

Compression Tube

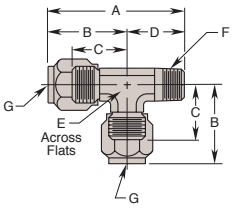
Cat. No.	Dimensions (In Inches)				
	A	B	C	D	E Tube Size
15058	2.156	1.078	.750	.750	.250
17278	2.781	1.391	.953	.844	.375



Union Tee

Compression Tube

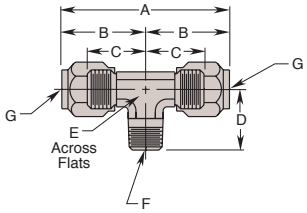
Cat. No.	Dimensions (In Inches)				
	A	B	C	D	E Tube Size
15054	2.156	1.078	.750	.438	.250
10659	2.844	1.422	.984	.625	.375



Male Run Tee

Compression Tube to NPTF

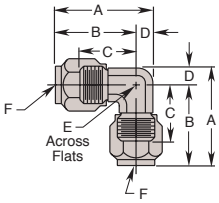
Cat. No.	Dimensions (In Inches)						
	A	B	C	D	E	F Thread Size	G Tube Size
15050	1.859	1.078	.750	.781	.438	⅛ NPTF	.250
205791	2.047	1.109	.781	.938	.500	¼ NPTF	.250
10669	2.484	1.422	.984	1.062	.625	¼ NPTF	.375



Male Branch Tee

Compression Tube to NPTF

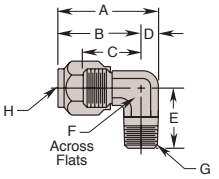
Cat. No.	Dimensions (In Inches)						
	A	B	C	D	E	F Thread Size	G Tube Size
15055	2.156	1.078	.750	.781	.438	⅛ NPTF	.250
205790	2.219	1.109	.781	.938	.500	¼ NPTF	.250
10670	2.844	1.422	.984	1.062	.625	¼ NPTF	.375



90° Male Elbow

Compression Tube

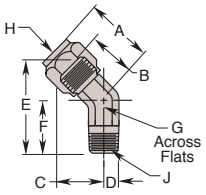
Cat. No.	Dimensions (In Inches)					
	A	B	C	D	E	F Tube Size
15059	1.297	1.078	.750	.219	.438	.250
250211	1.641	1.359	.922	.281	.562	.375



90° Male Elbow

Compression Tube to NPTF

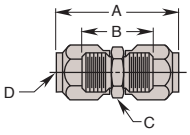
Cat. No.	Dimensions (In Inches)							
	A	B	C	D	E	F	G Thread Size	H Tube Size
15052	1.297	1.078	.750	.219	.781	.438	⅛ NPTF	.250
205792	1.484	1.203	.875	.281	1.062	.562	¼ NPTF	.250
10665	1.641	1.359	.922	.281	1.094	.562	¼ NPTF	.375



45° Male Elbow

Compression Tube to NPTF

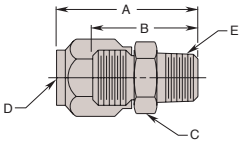
Cat. No.	Dimensions (In Inches)								
	A	B	C	D	E	F	G	H Tube Size	J Thd. Size
15053	.953	.625	.672	.281	1.359	.688	.562	.250	⅛ NPTF
10655	1.234	.797	.828	.281	1.708	.875	.562	.375	¼ NPTF



Male Union

Compression Tube

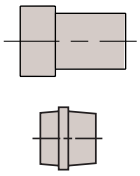
Cat. No.	Dimensions (In Inches)			
	A	B	C Hex.	D Tube Size
15060	1.562	.906	.500	.250
250212	1.875	1.000	.625	.375



Male Connector

Compression Tube to NPTF

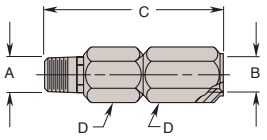
Cat. No.	Dimensions (In Inches)				
	A	B	C Hex.	D Tube Size	E Thread Size
15061	1.281	.953	.500	.250	⅛ NPTF
205793	1.484	1.156	.625	.250	¼ NPTF
10661	1.641	1.203	.625	.375	¼ NPTF



Tube Sleeve

Cat. No.	A Tube Size	Fitting Style
13031	.250	Compression
10430	.375	
253301	.250	37 Degree Flare
253302	.375	

NOTE: Hytec tube sleeves may not be compatible with other tubing materials and grades.

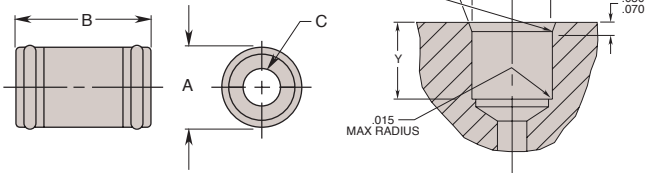


Check Valve

Cat. No.	Dimensions (In Inches)			
	A Thread Size	B Thread Size	C	D Hex.
206330	¼ NPTF	¼ NPTF	2.250	.750

NOTE: Cracking pressure - 5 psi max.

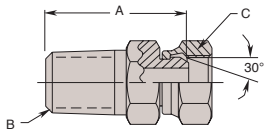
PORT DETAIL



Connector Bushing

Cat. No.	Dimensions (In Inches)				
	Bushing			Port	
	A Dia.	B	C Dia.	X Dia.	Y
*100169	.500	.844	.234	.500 .503	.515 .535

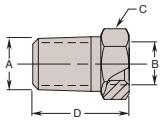
NOTE: * Box of Ten Connector Bushings.



Swivel Adapter

Caution - The female swivel end is a straight pipe thread (NPSM) with a 30° seat. All male pipe fittings that are used with these female swivel adapters must have an internal 30° seat to seal properly.

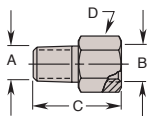
Cat. No.	Dimensions (In Inches)		
	A	B Thread Size	C Thread Size
15069	1.030	¼ NPTF	⅛ NPSM
11310	1.260	¼ NPTF	¼ NPSM



Reducer

NPTF

Cat. No.	Dimensions (In Inches)			
	A Thread Size	B Thread Size	C Hex.	D
13269	¼ NPTF	⅛ NPTF	.625	.781

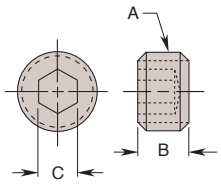


Adapter

NPTF

Cat. No.	Dimensions (In Inches)			
	A Thread Size	B Thread Size	C	D Hex.
15235	⅛ NPTF	¼ NPTF	1.140	.750
*252128	¼ NPTF	7/16 20UNF SAE-4	1.310	.688

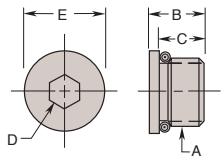
* Use with 216437 Metering Valve to control flow in ¼ NPTF actuators.



Plug

NPTF

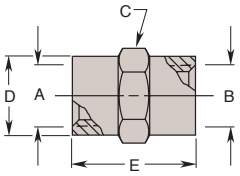
PLUGS - NPTF			
Cat. No.	Dimensions (In Inches)		
	A Thread Size	B	C Hex.
15499	⅛ NPTF	.242	.188
10479	¼ NPTF	.437	.250
16232	⅜ NPTF	.400	.312



Plug

SAE O-Ring

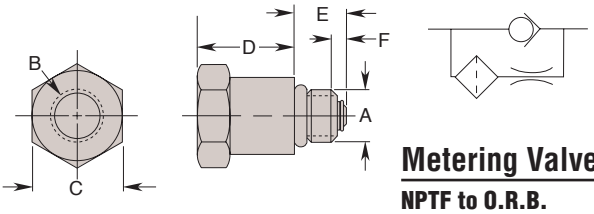
PLUGS - SAE O-RING					
Cat. No.	Dimensions (In Inches)				
	A Thread Size	B	C	D Hex.	E Dia.
250883	7/16-20UNF SAE-4	.450	.360	.188	.563
251809	9/16-18UNF SAE-6	.480	.391	.250	.688



Connector

NPTF

Cat. No.	Dimensions (In Inches)				
	A Thread Size	B Thread Size	C Hex.	D Dia.	E
12740	¼ NPTF	¼ NPTF	.750	.730	1.125

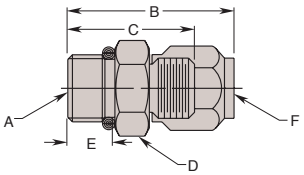


Metering Valve

NPTF to O.R.B.

Cat. No.	Dimensions (In Inches)					
	A Thread Size	B Thread Size	C Hex.	D	E	F
216437	7/16-20UNF SAE–4	¼ NPTF	.750	.700	.435	.075

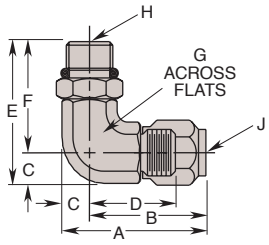
NOTE: Orifice size - .013/.017 dia.



Male Connector

O.R.B. to Compression Tube

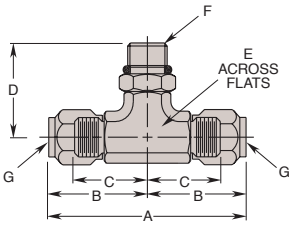
Cat. No.	Dimensions (In Inches)					
	A Thread Size	B	C	D Hex.	E	F Tube Size
250685	7/16-20 UNF SAE–4	1.203	.875	.562	.359	.250
250686	9/16-18 UNF SAE–6	1.453	1.016	.812	.391	.375



90° Male Elbow

Compression Tube to O.R.B.

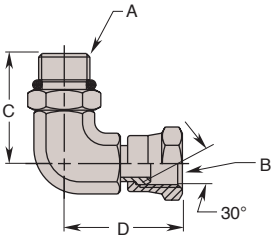
Cat. No.	Dimensions (In Inches)								
	A	B	C	D	E	F	G	H Thread Size	J Tube Size
250687	1.297	1.078	.219	.750	1.266	1.078	.438	7/16-20 UNF SAE–4	.250
250688	1.625	1.344	.281	.906	1.516	1.250	.562	9/16-18 UNF SAE–6	.375



Male Branch Tee

Compression Tube to O.R.B.

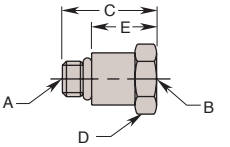
Cat. No.	Dimensions (In Inches)						
	A	B	C	D	E	F Thread Size	G Tube Size
250689	2.156	1.078	.750	1.047	.438	7/16-20 UNF SAE–4	.250



90° Swivel Adapter

Caution - The female swivel end is a straight pipe thread (NPSM) with a 30° seat. All male pipe fittings that are used with these female swivel adapters must have an internal 30° seat to seal properly.

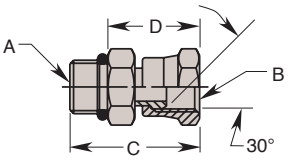
Cat. No.	Dimensions (In Inches)			
	A Thread Size	B Thread Size	C	D
250692	7/16-20 UNF SAE–4	¼ NPSM	1.120	.970
250693	9/16-18 UNF SAE–6	⅜ NPSM	1.190	.970



Male Adapter

O.R.B. to NPTF

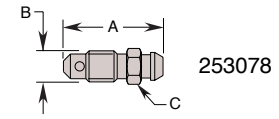
Cat. No.	Dimensions (In Inches)				
	A Thread Size	B Thread Size	C	D Hex.	E
210312	7/16-20 UNF SAE–4	¼ NPTF	1.062	.750	.710
19527	9/16-18 UNF SAE–6	¼ NPTF	1.094	.750	.705



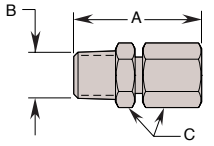
Swivel Adapter

Caution - The female swivel end is a straight pipe thread (NPSM) with a 30° seat. All male pipe fittings that are used with these female swivel adapters must have an internal 30° seat to seal properly.

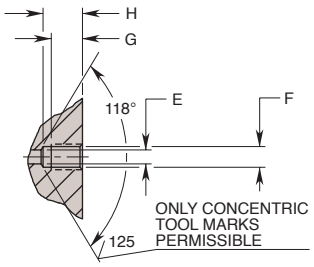
Cat. No.	Dimensions (In Inches)			
	A Thread Size	B Thread Size	C	D
250690	7/16-20 UNF SAE–4	¼ NPSM	1.320	.865
250691	9/16-18 UNF SAE–6	⅜ NPSM	1.350	1.025



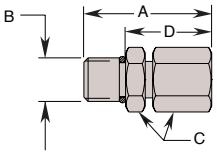
253078



110048



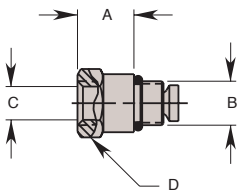
PORT DETAIL FOR 253078



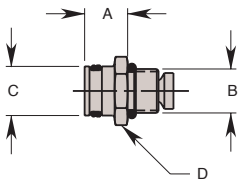
110049

Air Bleed Valves

Cat. No.	Dimensions (In Inches)							
	A	B Thread Size	C Hex	D	E Dia. Max.	F Thread Size	G Min.	H
253078	1.000	5/16-24UNF	.312	–	.177	5/16-24UNF	.350	.450 .510
110048	1.630	¼ NPTF	.562					
110049	1.440	7/16-20UNF SAE-4	–	1.080	–	–	–	–



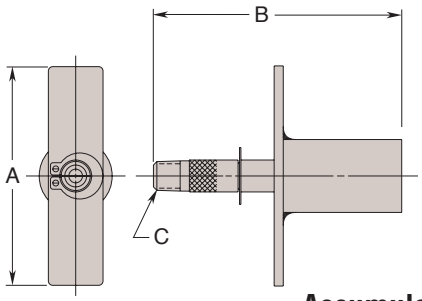
251827



252586

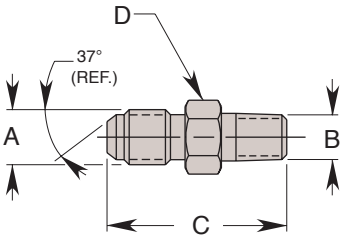
Accumulator Metering Valves

Cat. No.	Dimensions (In Inches)				
	A	B Thd. Size	C		D Hex
			Thd. Dia.	Dia.	
251827	.698	9/16-18 UNF	¼ NPT	—	.750
252586	.544		—	.624 .622	



Accumulator Charging Tool

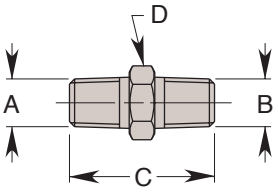
Cat. No.	Dimension (In Inches)		
	A	B	C Thread Size
500149	3.000	3.400	⅛ NPTF



Straight

37° Flared Tube to NPTF

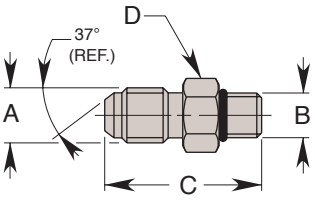
Cat. No.	Dimensions (In Inches)				
	A Thd. Size	B Thd. Size	C	D Hex	Tube Dia.
11628	9/16-18 UNF	⅜ NPTF	1.430	.750	.375
253019	7/16-20 UNF	⅛ NPTF	1.220	.500	.250
253173		¼ NPTF	1.420	.562	
253174	9/16-18 UNF		1.430	.625	.375



Straight

NPTF

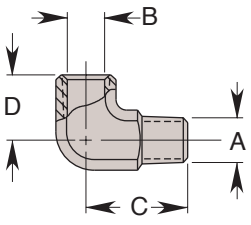
Cat. No.	Dimensions (In Inches)			
	A Thd. Size	B Thd Size	C	D Hex
10672	¼ NPTF	¼ NPTF	1.450	.625
11421	⅛ NPTF	⅛ NPTF	1.060	.437
12328	⅜ NPTF	¼ NPTF	1.360	.750
16691	¼ NPTF	⅛ NPTF	1.234	.593
215373	⅛ NPTF	1/16 NPTF	1.010	.438



Straight

37° Flared Tube to O.R.B.

Cat. No.	Dimensions (In Inches)				
	A Thd. Size	B Thd Size	C	D Hex	Tube Dia.
253020	7/16-20 UNF	7/16-20 UNF SAE-4	1.230	.562	.250
253021	9/16-18 UNF	9/16-18 UNF SAE-6	1.300	.687	.375

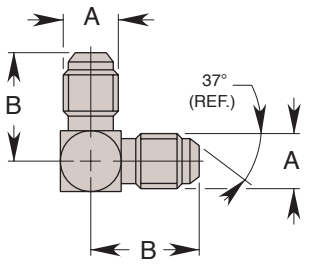


90° Elbow Adapter

NPTF

Cat. No.	Dimensions (In Inches)			
	A Thd. Size	B Thd Size	C	D
10617	¼ NPTF	¼ NPTF	1.090	.880
13229	⅛ NPTF	⅛ NPTF	.780	.660
13864		¼ NPTF		.880

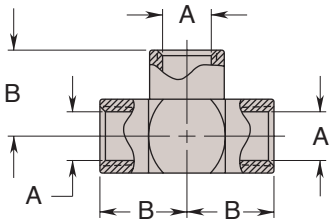
NEW



90° Male Elbow

37° Flared Tube

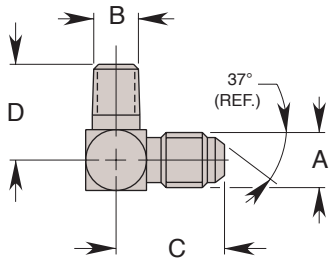
Cat. No.	Dimensions (In Inches)		
	A Thd. Size	B	Tube Dia.
253007	7/16-20 UNF	.890	.250
253008	9/16-18 UNF	1.060	.375



Female Tee

NPTF

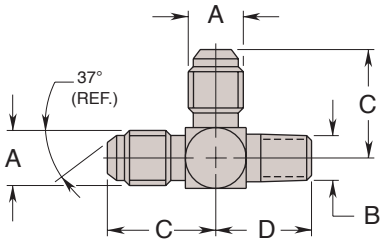
Cat. No.	Dimensions (In Inches)	
	A Thd. Size	B
252998	1/4 NPTF	.890



90° Male Elbow

37° Flared Tube to NPTF

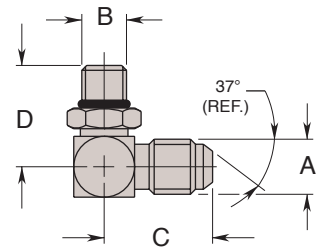
Cat. No.	Dimensions (In Inches)				
	A Thd. Size	B Thd. Size	C	D	Tube Dia.
253009	7/16-20 UNF	1/4 NPTF	1.060	1.090	.250
253010	9/16-18 UNF	3/8 NPTF	1.140	1.220	.375
253175	7/16-20 UNF	1/8 NPTF	.890	.780	.250



Male Run Tee

37° Flared Tube to NPTF

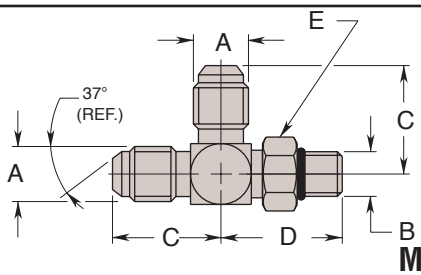
Cat. No.	Dimensions (In Inches)				
	A Thd. Size	B Thd. Size	C	D	Tube Dia.
253022	7/16-20 UNF	1/8 NPTF	.890	.780	.250
253023		1/4 NPTF	1.060	1.090	
253025	9/16-18 UNF				.375
253026		3/8 NPTF	1.140	1.220	



90° Male Elbow

37° Flared Tube to O.R.B.

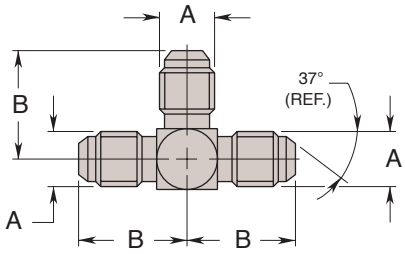
Cat. No.	Dimensions (In Inches)					
	A Thd. Size	B Thd. Size	C	D	E Hex.	Tube Dia.
250605	7/16-20 UNF	7/16-20 UNF SAE-4	.890	1.030	.562	.250
253011	9/16-18 UNF	9/16-18 UNF SAE-6	1.060	1.250	.687	.375
253012		3/4-16 UNF SAE-8	1.140	1.450	.875	
253013		7/8-14 UNF SAE-10	1.230	1.700	1.000	



Male Run Tee

37° Flared Tube to O.R.B.

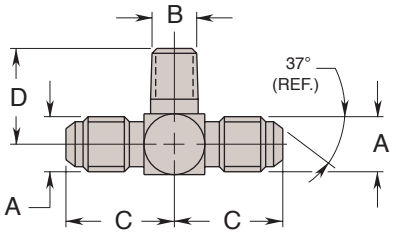
Cat. No.	Dimensions (In Inches)					
	A Thd. Size	B Thd. Size	C	D	E Hex.	Tube Dia.
253024	7/16-20 UNF	7/16-20 UNF SAE-4	.890	1.030	.562	.250
253027	9/16-18 UNF	9/16-18 UNF SAE-6	1.060	1.250	.687	.375



Male Tee

37° Flared Tube

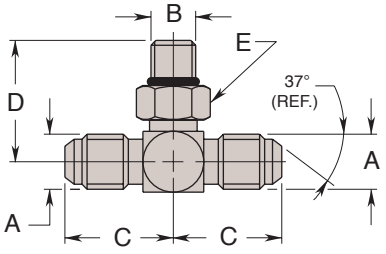
Cat. No.	Dimensions (In Inches)		
	A Thd. Size	B	Tube Dia.
252996	7/16-20 UNF	.890	.250
252997	9/16-18 UNF	1.060	.375



Male Branch Tee

37° Flared Tube to NPTF

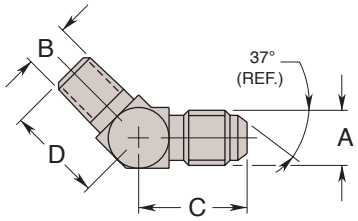
Cat. No.	Dimensions (In Inches)				
	A Thd. Size	B Thd. Size	C	D	Tube Dia.
253028	7/16-20 UNF	1/8 NPTF	.890	.780	.250
253030	9/16-18 UNF	1/4 NPTF	1.060	1.090	.375



Male Branch Tee

37° Flared Tube to O.R.B.

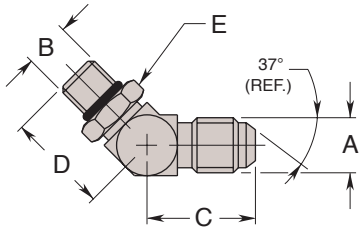
Cat. No.	Dimensions (In Inches)					
	A Thd. Size	B Thd. Size	C	D	E Hex.	Tube Dia.
253029	7/16-20 UNF	7/16-20 UNF SAE-4	.890	1.030	.562	.250
253031	9/16-18 UNF	9/16-18 UNF SAE-6	1.060	1.250	.687	.375



Male 45° Elbow

37° Flared Tube to NPTF

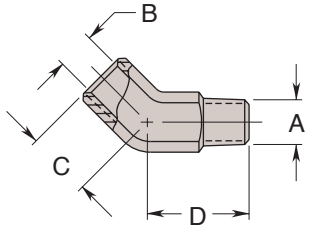
Cat. No.	Dimensions (In Inches)				
	A Thd. Size	B Thd. Size	C	D	Tube Dia.
253014	7/16-20 UNF	1/4 NPTF	.820	.860	.250
253016	9/16-18 UNF	1/4 NPTF	.840	.860	.375
253017	9/16-18 UNF	3/8 NPTF	.880	.950	.375



Male 45° Elbow

37° Flared Tube to O.R.B.

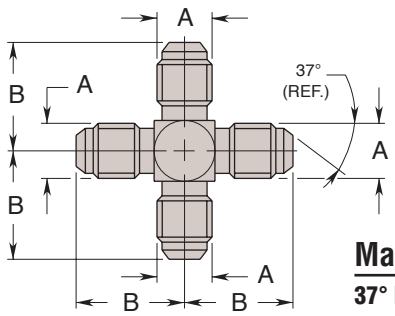
Cat. No.	Dimensions (In Inches)					
	A Thd. Size	B Thd. Size	C	D	E Hex.	Tube Dia.
253015	7/16-20 UNF	7/16-20 UNF SAE-4	.720	1.050	.562	.250
253018	9/16-18 UNF	9/16-18 UNF SAE-6	.830	1.180	.687	.375



45° Elbow Adapter

NPTF

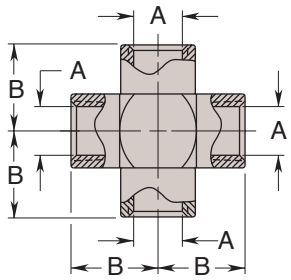
Cat. No.	Dimensions (In Inches)			
	A Thd. Size	B Thd. Size	C	D
19121	1/8 NPTF	1/8 NPTF	.470	.720
10645	1/4 NPTF	1/4 NPTF	.630	1.050



Male Cross

37° Flared Tube

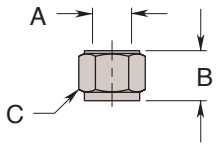
Cat. No.	Dimensions (In Inches)		
	A Thd. Size	B	Tube Dia.
252999	7/16-20 UNF	.890	.250
253000	9/16-18 UNF	1.060	.375



Female Cross

NPTF

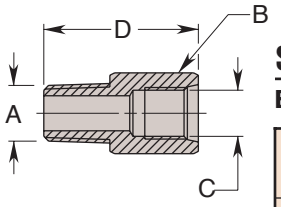
Cat. No.	Dimensions (In Inches)	
	A Thd. Size	B
253001	1/4 NPTF	.890



Nut

37° Flared Tube

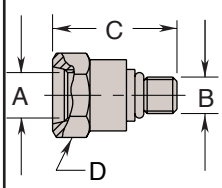
Cat. No.	Dimensions (In Inches)			
	A Thd. Size	B	C Hex.	Tube Dia.
253032	7/16-20 UNF	.610	.562	.250
253033	9/16-18 UNF	.720	.687	.375



Straight

BSPP to O.R.B.

Cat. No.	Dimensions (In Inches)			
	A Thd. Size	B Hex.	C	D
253288	1/4 BSPP	.750	7/16-20 UNF SAE-4	1.250



Straight

O.R.B.

Cat. No.	Dimensions (In Inches)			
	A Thd. Size	B Thd. Size	C	D Hex.
351816	7/16-20 UNF SAE-4	5/16-24 UNC SAE-2	1.065	.625

SPX HYTEC® Hydraulic Fluid, Hoses & Tubing

Hydraulic Fluid

For dependable performance of cylinders, clamps, valves, and pumps, these high-grade hydraulic fluids contain anti-rust, anti-foam, and anti-sludge additives. They provide maximum film protection lubricity, maximum heat transfer, and a wide operating temperature range.

Hytec's "environmentally friendly" hydraulic fluid is a biodegradable, non-toxic formulation which can withstand severe operating conditions and provide excellent anti-wear properties.

The "Flame-Out" fire resistant fluid has been approved by United States Mine Safety Health Administration under Referral Register Title 30, Part 35. All fire resistant fluids will burn if heat source is extreme, eg.: hot slabs, molten steel, etc. They will not, however, propagate the flame and are self-extinguishing in the absence of an ignition source.

The use of the fire resistant fluid does not require changing the seals in any Hytec equipment as it would when using other types of fire resistant fluids. The standard fluid need only be drained from the complete system and replaced with fire resistant hydraulic fluid.

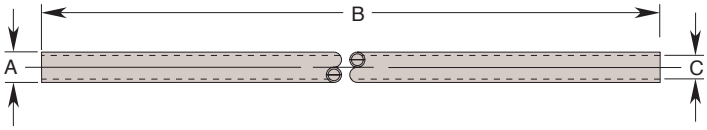
Tubing

Hytec's low carbon steel tubing conforms to SAE J525. Hytec fittings may not be compatible with other tubing materials and grades (eg. stainless steel). **DO NOT SUBSTITUTE.** Hytec tubing may not be compatible with other fittings. **DO NOT SUBSTITUTE.**

Hoses

Hytec thermoplastic hose conforms to SAE 100R8 specifications.

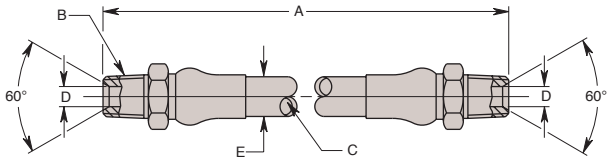
Tubing



TUBING			
Cat. No.	Dimensions (In Inches)		
	A Dia.	B (Ft.)	C Dia.
100290	.250	50	.180
9190	.375		.245

***NOTE:** Comes in 10 5-ft. pieces. 5,000 psi max.

Hose



HOSES					
Cat. No.	Dimensions (In Inches)				
	A (ft.)	B Thd. Size	C Inside Dia.	D Thru Dia.	E Outside Dia.
100281	1	¼ NPTF	.250	.141	.620
100282	2				
100283	3				
100285	5				
100286	10				
100287	15				

NOTE: 4 in. min. bend radius. 5,000 psi max.

HYDRAULIC FLUID													
Cat. No.	Description	Size	Qty.	Grade (ASTM)	Specific Gravity @60°F	Color (ASTM)	Flash Point (°F)	Fire Point (°F)	Pour Point (°F)	Viscosity SUS @ 100°F	Viscosity SUS @ 210°F	Viscosity Index (Min.)	Foam Test (ASTM)
9636	Hydraulic Oil	1 Quart	1	215	.875	2.0	400	430	-30	215	48	100	Pass
9636-12			12										
9637		1 Gallon	1										
9637-4			4										
9638		2½ Gal.	1										
9638-2			2										
9639	Flame-Out fire resistant hydraulic fluid	1 Gallon	1	220	.910	Light Amber	500	550	-15	200	55	140	
9639-4			4										
9645	"Environmentally Friendly" hydraulic fluid	1 Gallon	1	—	.922	2.0	432	—	-22	183	53	213	—
9646		2½ Gal.											

Hytec offers both an economical standard poppet type coupler and labor-saving push-to-connect flat face coupler. Both styles are rated at 5,000 psi that has ¼" NPTF connections.

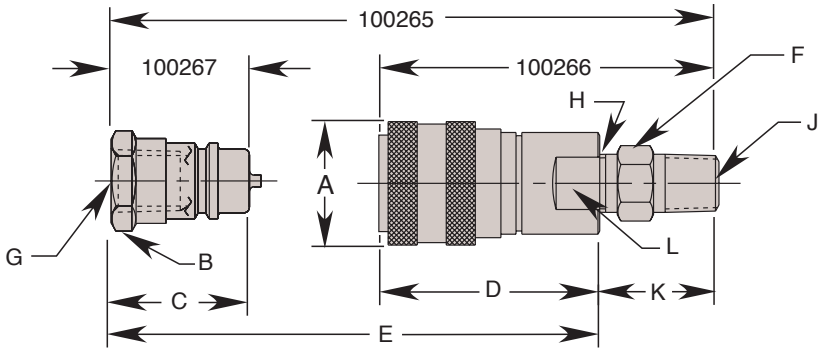
The standard coupler is recommended for lower cycle applications where two hand connections and slight spillage after disconnection is acceptable.

The push-to-connect coupler is easier to connect and keep clean, making it ideal for use in high cycle applications like pallet coupling. (This coupler is found on our manual pallet valve.) The flat face design eliminates the waste and mess associated with other types of hydraulic couplers. The coupler collar is lockable, making it even more secure in moving applications.

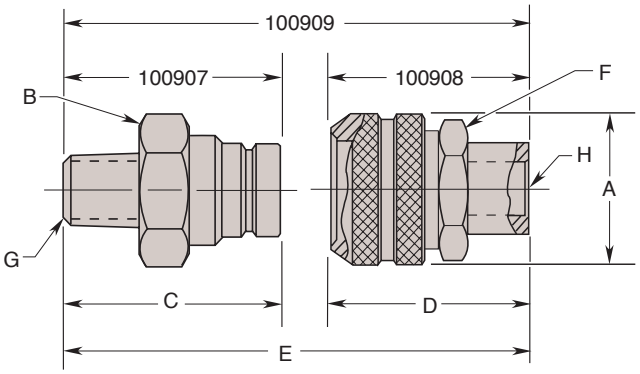
Features:

- Standard and push-to-connect versions
- ¼" NPTF connections
- 5,000 psi max. operating pressures

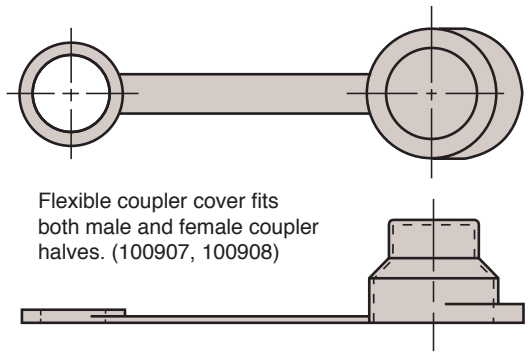
Standard



Push-to-connect



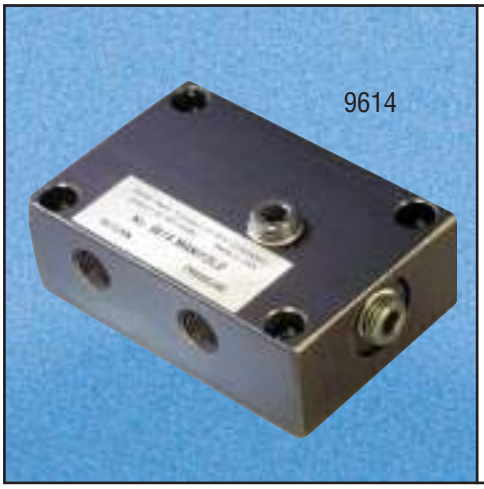
Coupler Cover - 251779



Flexible coupler cover fits both male and female coupler halves. (100907, 100908)

Cat. No.	Dimensions (In Inches)										
	A Dia.	B Hex.	C	D	E (Coupled)	F Hex.	G Thread Size	H Thread Size	J Thread Size	K	L Flats
100265	1.062	.750	1.190	1.900	2.400	.625	¼ NPTF	¼ NPTF	¼ NPTF	1.062	.750
100266					–		–				
100267	–			–	–	–	¼ NPTF		–	–	–
100907	–	1.000	1.720	–	–	–	¼ NPTF	–	–	–	–
100908	1.060	–	–	1.790	–	1.00	–	¼ NPTF			
100909		1.000	1.720		2.970		¼ NPTF				

Manifolds



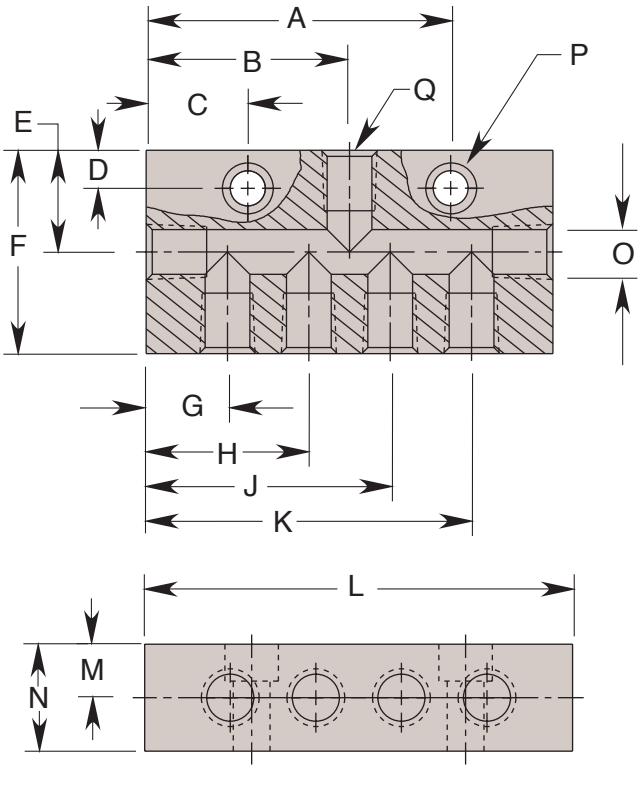
The 9614 manifold assembly comes as standard equipment on Hytec pumps No. 100186, 100280, 100190, 100200, 100174, 100220, 100211, and 100213. It provides the connection points for pressure and return lines as well as a gauge and/or pressure switch. These pumps are designed to have this manifold removed and directly replaced by our number 9504 pump-mounted control valve.

Use this manifold to convert these pumps back to manifold outlet, remote mounted valve applications. Includes manifold, reservoir return tube, mounting hardware and two ¼" NPT plugs. The 100944 is available for making SAE O-ring connections.

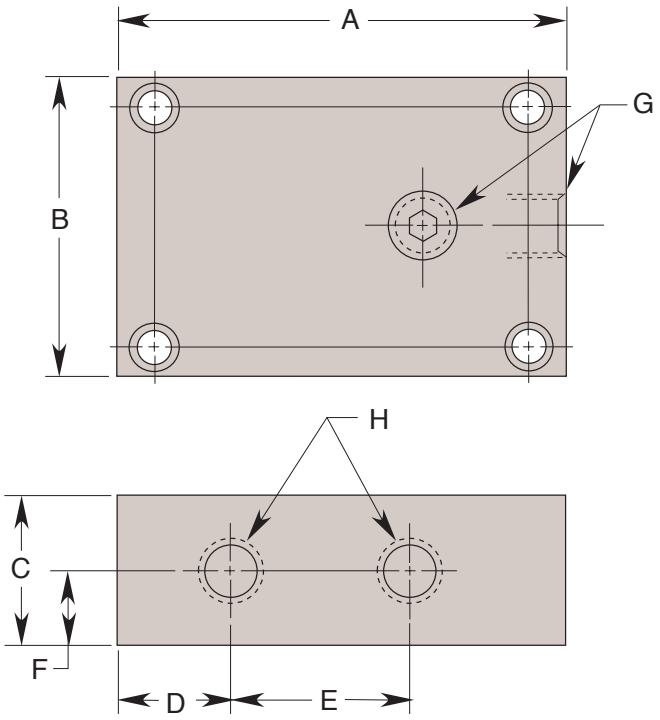
Manifold 36105 is ideal for connecting multiple actuators to a single pressure source. Used with conventional ¼" NPT fittings, the seven ports are internally connected with large diameter passages to reduce restriction. The ports on any of the four sides can be plugged if not used. Two mounting holes are provided in the manifold to secure it to the fixture or machine tool. Since there are no ports in the top or bottom mounting faces, multiple manifolds can be stacked to save space.

Manifold 100941 shares the same features but provides SAE O-ring ports.

100941
36105



100944
9614



Cat. No.	Dimension (In Inches)							
	A	B	C	D	E	F	G Thread Size	H Thread Size
9614	3.750	2.500	1.250	.938	1.500	.750	¼ NPTF	¼ NPTF
100944								9/16-18 UNF SAE-6

Cat. No.	Dimensions (In Inches)															
	A	B	C	D	E	F	G	H	J	K	L	M	N	O Thread Size (6 places)	P Dia.	Q Thread Size
36105	3.000	2.000	1.000	.375	1.000	2.000	.800	1.600	2.400	3.200	4.000	.500	1.000	¼ NPTF	.344	¼ NPTF
100941														7/16-20 UNF SAE-4		9/16-18 UNF SAE-6

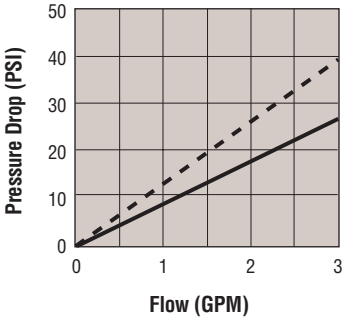
In-Line Filters

No. 100845 - This high pressure filter is intended for use in systems where there is flow in only one direction such as pressure or return lines between the power source and control valve. This in-line filter has a removable/replaceable sintered bronze element. The element is accessible without removing the filter body from the installation.

No. 100857, 100919 - These high pressure, non-bypass, in-line filters are suitable for both unidirectional and bi-directional circuits. This allows the filter to be installed in single acting or double acting circuits downstream from the control valve where the fluid flows in both directions. It's specially reinforced, stainless steel mesh filter element resists fatigue from pressure spikes. Both are ideal for use in pallet coupling circuits to protect components from contaminants introduced at the couplers. The No. 100857 is ideally suited for Hytec's No. 100223 manual pallet valve. Simply remove the coupler from the pallet valve and install this filter between the valve and coupler.

Features

- 5,000 psi maximum operating pressure
- Low pressure drop
- Removable/replaceable elements



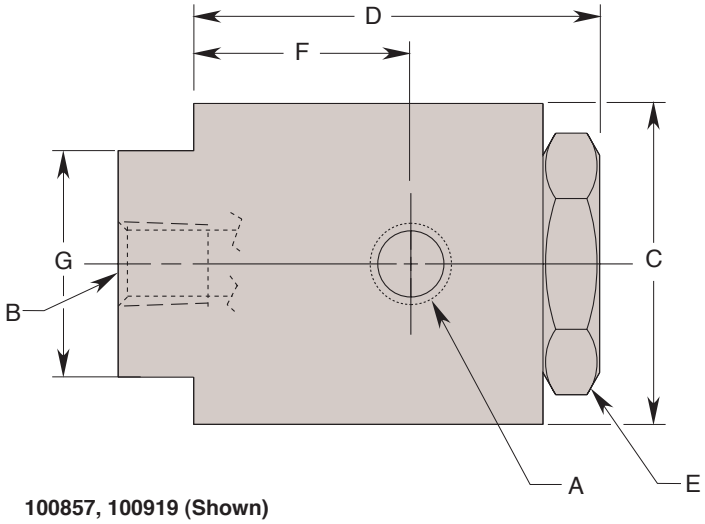
Performance

Filter No. 100857, 100919

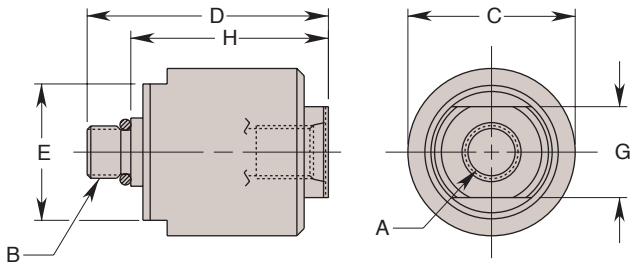
Filter No. 100845

Test Fluid: Hytec Hydraulic Oil @ 100° F (215 SUS)

100845



100857, 100919 (Shown)



Cat. No.	Specifications		Dimensions (In Inches)								
	Filtration Nominal/ Absolute	Max. Operating Pressure (PSI)	A Inlet Port	B Outlet Port	C Dia.	D	E Hex	E Flats	F	G Flats	H
100845	10/- Micron	—	¼ NPTF	¼ NPTF	2.125	3.188	1.500	—	1.938	1.500	—
100857	10/25 Micron	5,000	¼ NPTF	¼ NPTF	1.380	2.100	—	1.125	—	.750	1.630
100919	10/25 Micron	5,000	7/16-20 UNF SAE-4	7/16-20 UNF SAE-4	1.380	2.100	—	1.125	—	.750	1.630

Pressure Gauges

Hytec offers standard hydraulic pressure gauges for monitoring system pressure. All have English and metric scales for convenience.

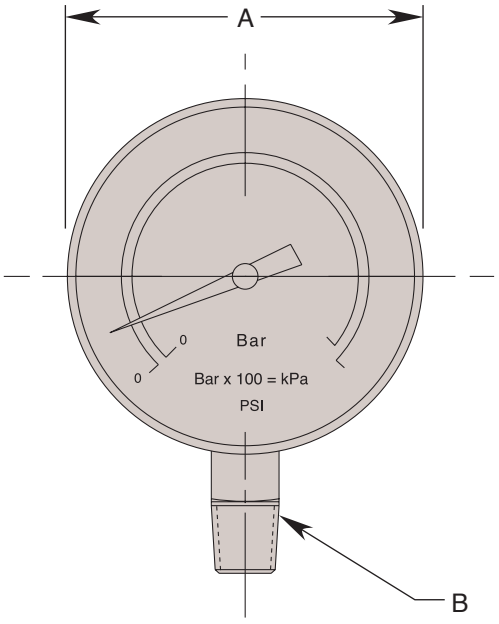
Liquid-filled gauges are recommended for high cycle or pulsating applications because the liquid tends to dampen vibration which protects the meter movement and calms "needle quiver." Dry gauges are recommended for applications where fast needle reaction is essential.

All gauges have built-in snubbers. In applications where pressure spikes are present, further snubbing may be necessary for the dry gauge.

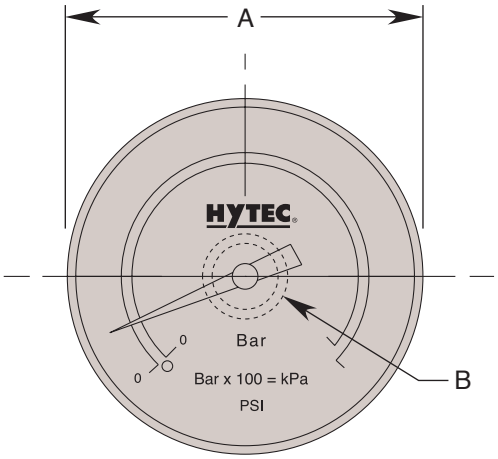
Features:

- Dual scales
- Liquid-filled or dry
- ¼" NPT brass connection, bottom and ⅛" NPT back mount

100236, 100238 & 100878



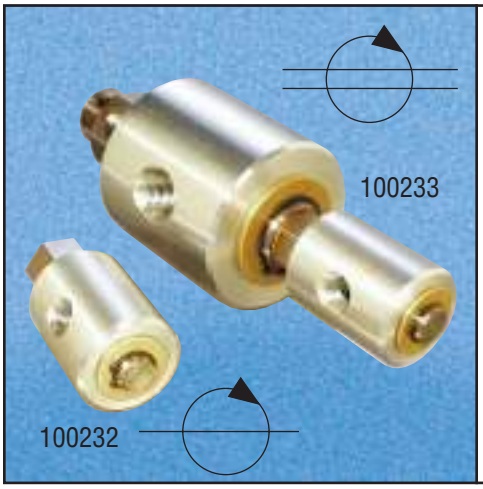
100917



Cat. No.	Specifications					Dimensions (In Inches)	
	Scale	Range	Graduations	Case	ANSI Accuracy	A	B
100236	PSI	0-6,000	100 PSI	Liquid Filled	1.6%	2.625	¼ NPT
	Bar	0-400	10 Bar				
100238	PSI	0-5,000	100 PSI	Dry	2%		
	kPa	0-35,000	1,000 kPa				
100878	PSI	0-2,000	50 PSI	Liquid Filled		2.640	
	Bar	0-140	2 Bar				
100917	PSI	0-6,000	1,000 PSI		1.6%	1.770	⅛ NPT Back Mount
	Bar	0-400	100 Bar				

Rotating Unions

SPX HYTEC



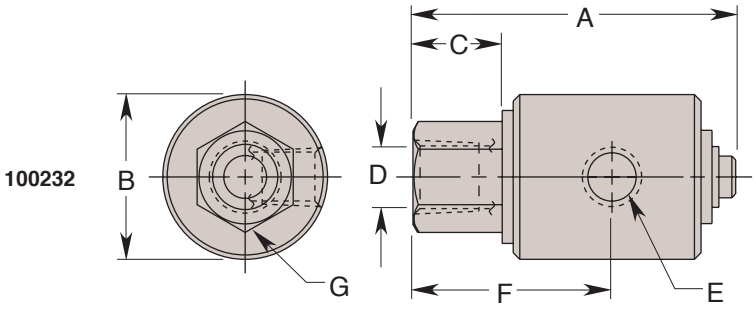
Rotating unions allow hydraulic or air power sources to be continuously connected in rotating applications allowing the use of constant pressure hydraulic workholding on lathes, boring machines, rotary transfer tables, etc. The single circuit union is used for single-acting systems. The dual circuit version is necessary for double-acting systems or for two separate single-acting circuits. The unique design of the dual circuit union eliminates the possibility of inter-passage leakage so different fluids can be used in each circuit without danger of intermixing.

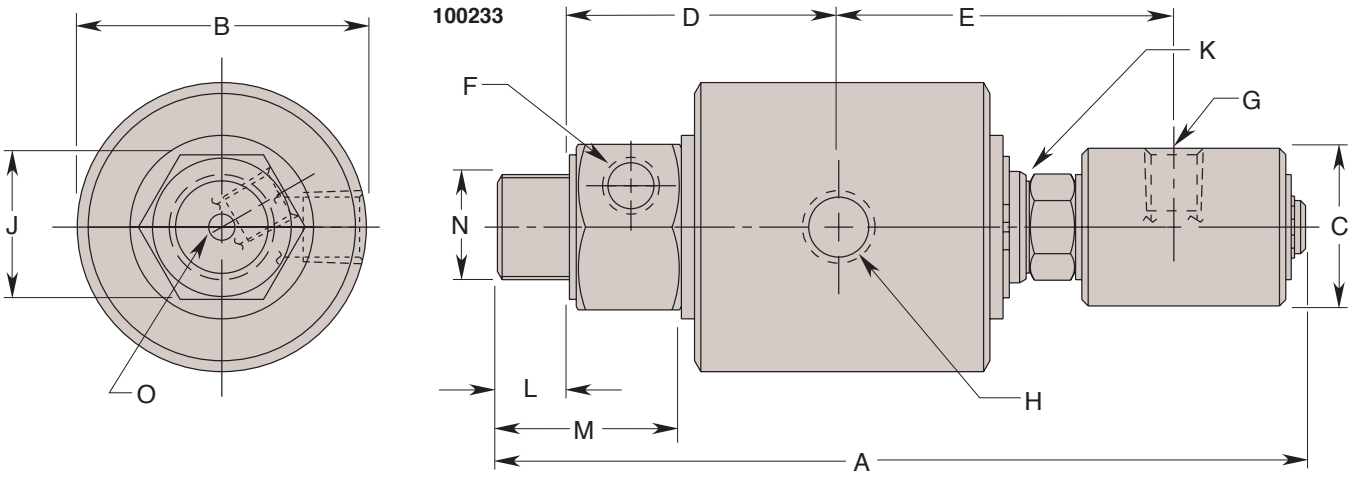
For maximum seal life, combined conditions of both maximum pressure and maximum rpm should be avoided.

Rotors are plated for wear and corrosion resistance. Both versions use a low torque, balanced seal design.

Features:

- Single and dual circuit designs
- Range 28 in. hg. to 3,000 psi max.
- 250 rpm max.
- Balanced seal design
- Low torque





Cat. No.	Specifications				Dimension (In Inches)						
	Circuits	†Max. Press. (PSI)		†Max. Speed (RPM)	A	B Dia.	C	D Thread Size	E Thread Size	F	G Hex.
		Air	Hyd.								
100232	1	150	3,000	250	2.938	1.500	.812	⅜ NPTF	¼ NPTF	1.812	.875

NOTE: † Operation at maximum pressure combined with maximum speed should be avoided.

Cat. No.	Specifications				Dimension (In Inches)													
	Circuits	†Max. Press. (PSI)		†Max. Speed (RPM)	A	B Dia.	C Dia.	D	E	F Port (Circuit A)	G Port (Circuit B)	H Port (Circuit A)	J Hex.	K Hex.	L	M	N Thread Size (Circuit B)	O Dia.
		Air	Hyd.															
*100233	2	150	3,000	250	7.688	2.750	1.500	2.562	3.188	¼ NPTF	¼ NPTF	⅜ NPTF	1.375	.875	.688	1.875	1-14 UNS	.250

NOTE: * For optimum performance, high pressure should be thru inner passage.
† Operation at maximum pressure combined with maximum speed should be avoided.

Pressure Switch

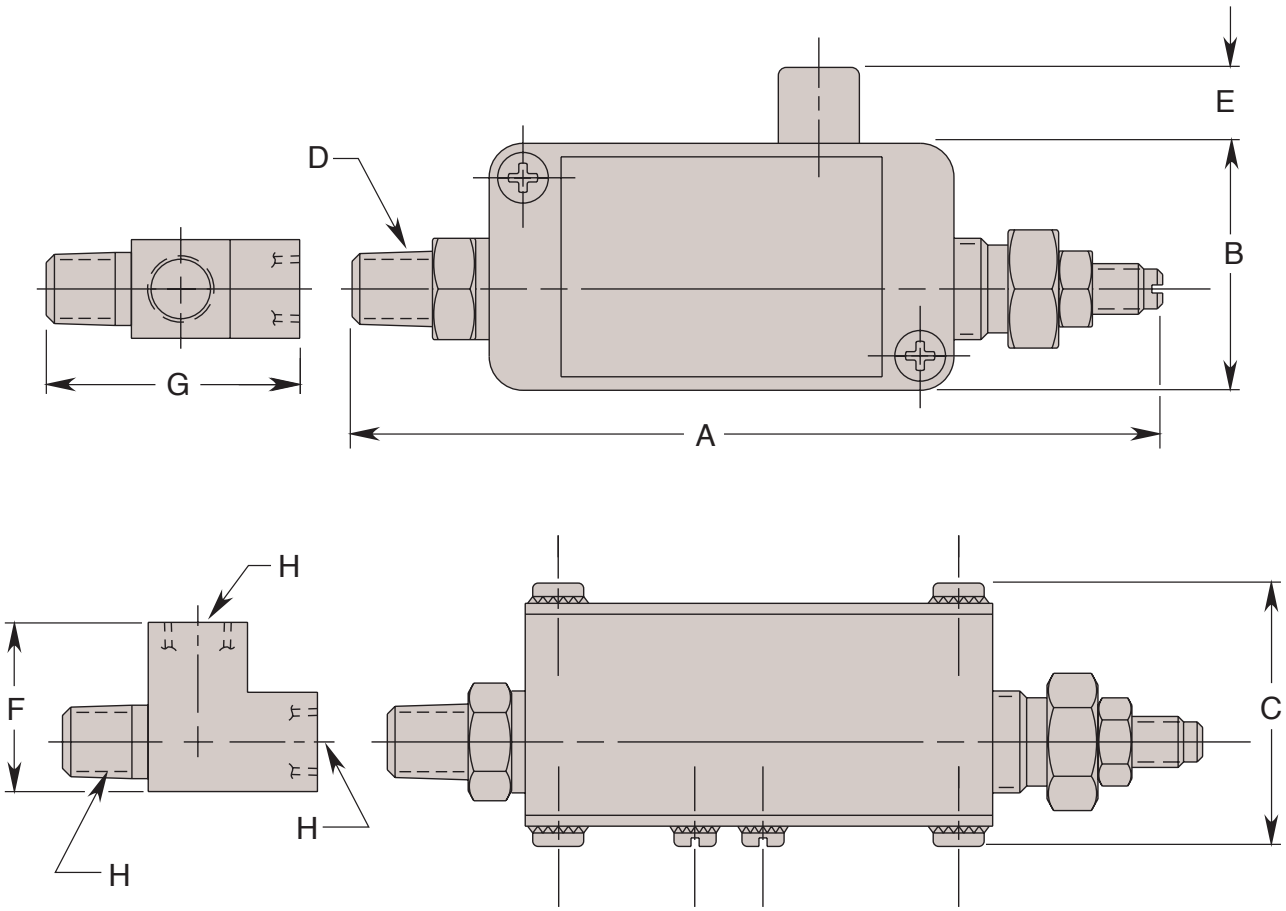
This hydraulic pressure switch is used to either control or monitor system pressure. To control system pressure the switch can be electrically wired into a pump's power circuit. At lower pressures, the switch is closed, causing the pump to run. When the pressure reaches the switch setting, the switch contacts open, stopping the pump. When system demands cause the pressure to drop 300 psi, the contacts will again close to start the pump. This switch is included with all Hytec electric pumps.

When used to monitor system pressure, the switch can be used to signal a warning light or other alarm, or can be interfaced with a machine tool to shut down a process if pressure falls below the switch setting.

Includes ¼" NPT tee for connecting to hydraulic circuit, and two feet of 18 AWG cable.

Features:

- Pressure range: 1,000 to 5,000 psi
- Differential: 200-600 psi, non-adjustable
- Contacts are normally closed – can be converted to normally open
- Contact rating: 250 VAC max.; 5 amps max.
- UL recognized
- Contacts are CSA approved



Cat. No.	Dimension (In Inches)							
	A Max.	B	C	D Thread Size	E	F	G	H Thread Size
9625	6.000	1.828	1.938	¼ NPTF	.562	1.281	1.969	¼ NPTF

Remote Hand Switch No. 202778

Ideal for use with the 9612 control valve. Includes 10 feet of 18 AWG 3-wire cable, and a sealed, CSA approved, single-pole double-throw momentary rocker switch in a glass reinforced thermoplastic enclosure.

Manual Remote Control No. 300101

This manually operated remote control can replace the self-contained manual control on the 100180 Booster-Pac. Included is a control box with rotary air valve and a 10 ft. twin air hose for connection between the remote control and the Booster-Pac. Subplate 300103 (not included) is required to use this remote control.

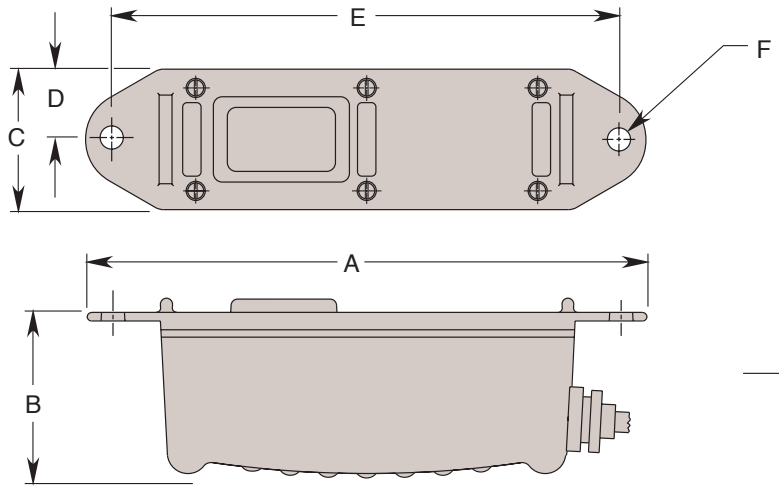
Electric Remote Control No. 300104

This electric solenoid replaces the manual control on the 100180 Booster-Pac. It allows for remote operation of the Booster-Pac in automated applications, or at a work station where the Booster-Pac is not accessible. Includes mounting block and 120 VAC solenoid valve assembly with lead wires. Electrical switches not included.

Subplate No. 300103

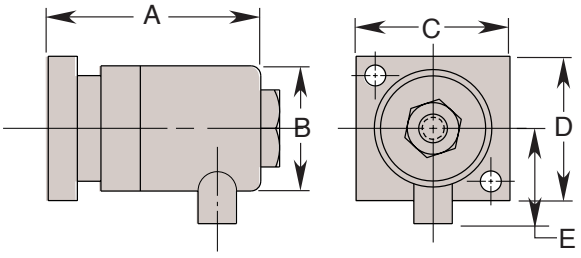
Required to attach the 300101 manual remote control hoses to the 100180 Booster-Pac. Includes subplate, "O" ring seals and mounting hardware.

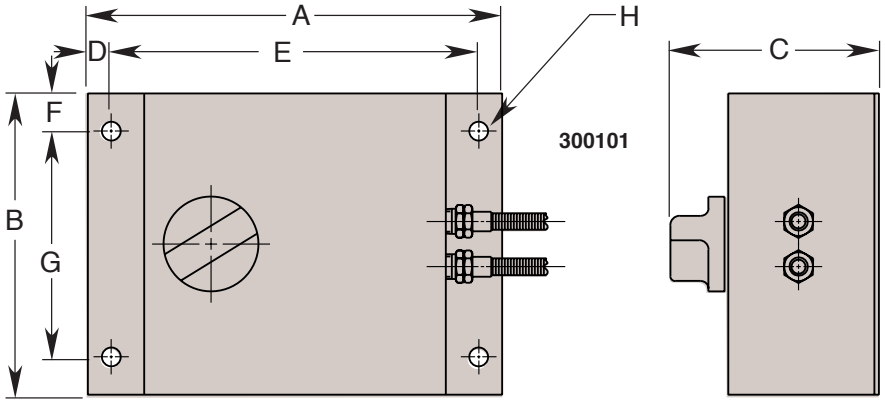
202778



NOTE: The electric solenoid remote control requires an electrical impulse to activate or release the Booster-Pac clamp control valve. The Booster-Pac will not lose clamping pressure in the event electrical power is lost. If electric power is lost while in the clamp position, pressure can be released manually.

300104





300101

Cat. No.	Dimension (In Inches)					
	A	B	C	D	E	F Dia.
202778	7.630	2.460	1.930	.965	6.880	.315

Cat. No.	Dimension (In Inches)				
	A	B Dia.	C	D	E
300104	3.062	1.625	2.000	1.875	1.375

Cat. No.	Dimension (In Inches)							
	A	B	C	D	E	F	G	H Dia.
300101	5.500	4.000	2.780	.312	4.875	.500	3.000	.250

Fluid Level/Temperature Gauge & Reservoirs

Fluid Level/Temperature Gauge No. 350431

This combination fluid level/temperature gauge allows you to visually check the level of the hydraulic fluid in your Hytec pump without opening the fill port. Its large 1¼" wide, 6⅜" high viewing area lets you see the fluid level from a distance. Built into the gauge is a dual scale thermometer that reads 32–212°F and 0-100°C. To mount, simply drill two ½" diameter holes in the reservoir and attach the gauge. This gauge is designed for use on pumps with 2.5 gal. and 5.7 gal. metal reservoirs as well as 2 gal. polyethylene reservoirs.

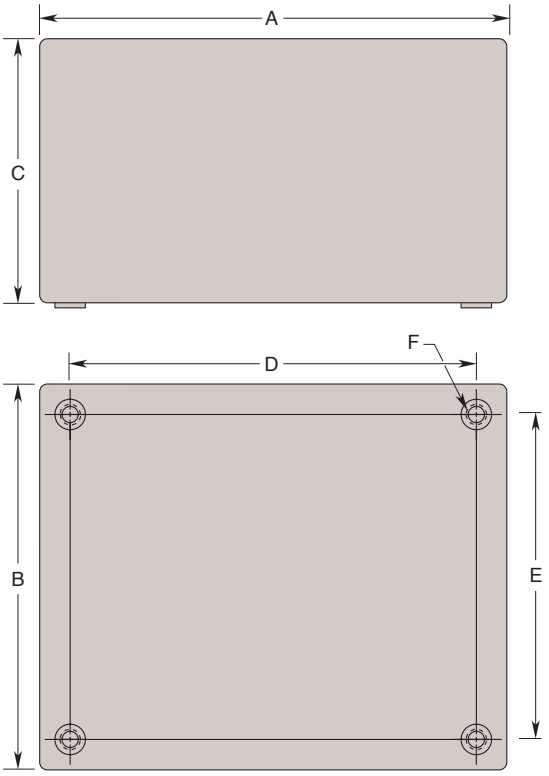
Reservoir Conversion Kit No. 213895

Includes 2.5 gallon (375 cu. in. usable) metal reservoir with a gasket and all the hardware needed to replace the plastic reservoir on pump Nos. 100178, 100179, 100178-230, 100179-230, 100922 and 100200.

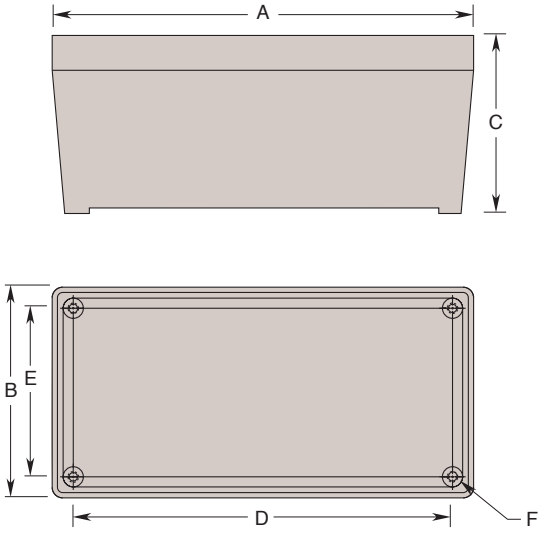
Reservoir Conversion Kit No. 213896

Includes 107 cu. in. (102 cu. in. usable) metal reservoir, plus gasket and fasteners needed to replace the plastic reservoir on pump Nos. 100280, 100190, 100180, 58219, 100921, 100918, 100174, 100191 and 100920.

213895



213896



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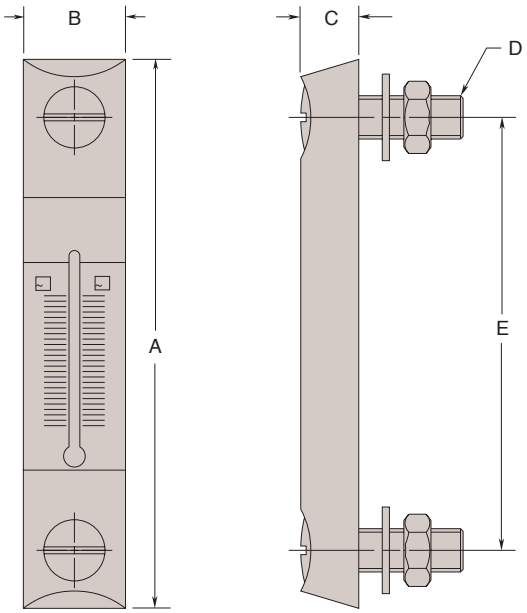


Cat. No.	Dimension (In Inches)						
	A	B	C	D	E	F Thread Size	F Thread Depth
213895	11.500	9.500	6.585	10.000	8.000	*.212 dia.	.600
213896	10.000	5.000	4.225	9.000	4.000	½-20 UNF	.600

NOTE: * Use 1/4-20 UNC self-tapping screw.

Cat. No.	Dimension (In Inches)				
	A	B	C	D Thread Size	E
350431	6.340	1.180	.670	M12 x 1.75	5.000

LIFETIME MARATHON WARRANTY

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.

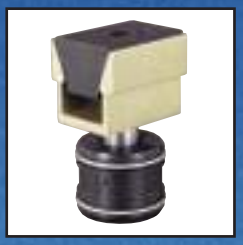
THIS WARRANTY IS EXCLUSIVE, AND HYTEC MAKES NO OTHER WARRANTY OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, WITH RESPECT TO THE PRODUCTS MANUFACTURED AND SOLD BY IT, WHETHER AS TO MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR ANY OTHER MATTER. No agent, employee or representative of Hytec has any authority to bind Hytec to any affirmation, representation, or warranty concerning Hytec products or parts, except as stated herein.

To qualify for warranty consideration, return the Hytec product, freight prepaid, to a Hytec authorized repair center or to the Hytec factory. If any product or part manufactured by Hytec is found to be defective by Hytec, in its sole judgement, Hytec will, at its option, either repair or replace such defective product or part and return it via best ground transportation, freight prepaid. THIS REMEDY SHALL BE THE EXCLUSIVE REMEDY AVAILABLE FOR ANY DEFECTS IN THE PRODUCTS OR PARTS MANUFACTURED AND SOLD BY HYTEC OR FOR DAMAGES RESULTING FROM ANY OTHER CAUSE WHATSOEVER, INCLUDING WITHOUT LIMITATION, HYTEC'S NEGLIGENCE. HYTEC SHALL NOT, IN ANY EVENT, BE LIABLE TO ANY BUYER FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES OF ANY KIND, WHETHER FOR DEFECTIVE OR NON-CONFORMING GOODS, NEGLIGENCE, ON THE BASIS OF STRICT LIABILITY, OR FOR ANY OTHER REASON.

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.

HYTEC NEW PRODUCTS

See pages noted for more details.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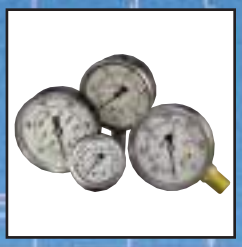
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