

PALLETIZED SYSTEMS

MANUAL 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.



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

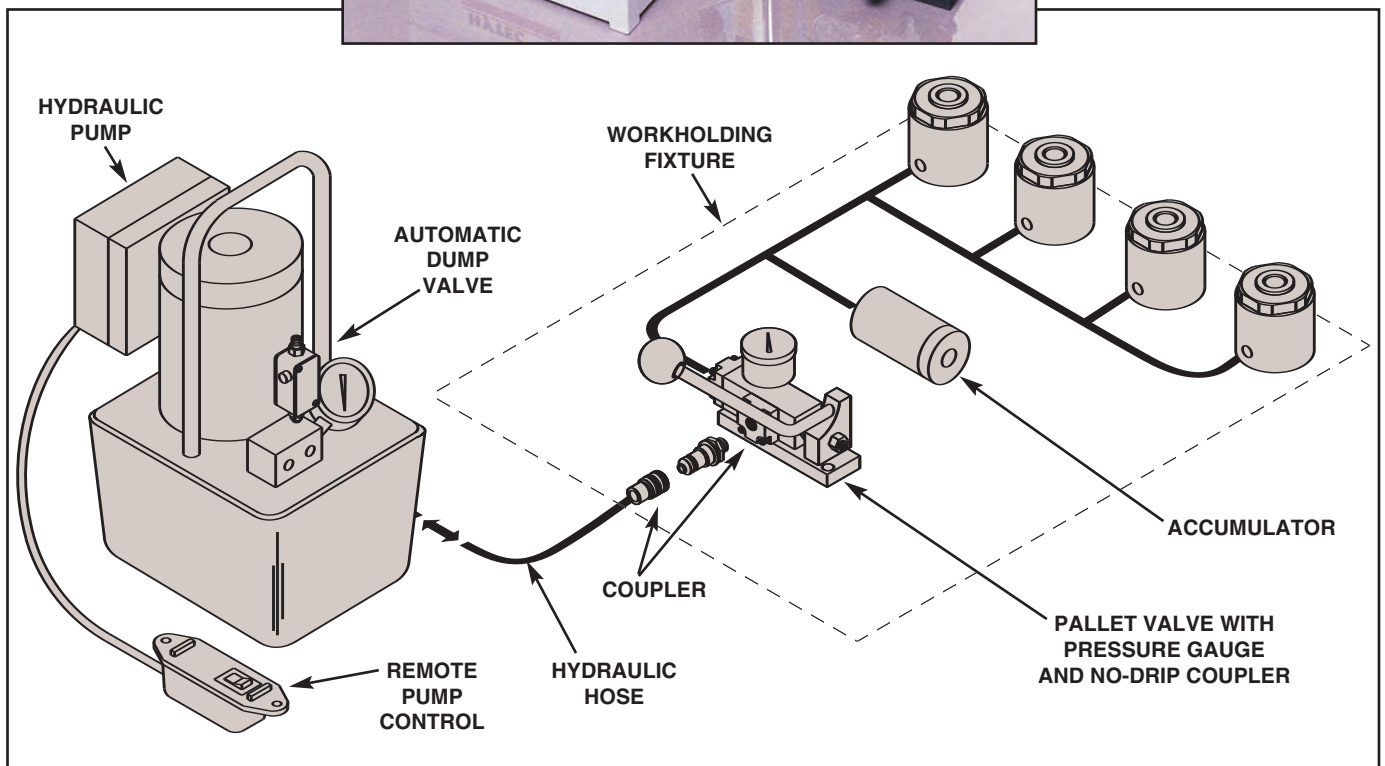
the set pressure without manual intervention. The pallet valve also easily converts from conventional to manifold mounting.

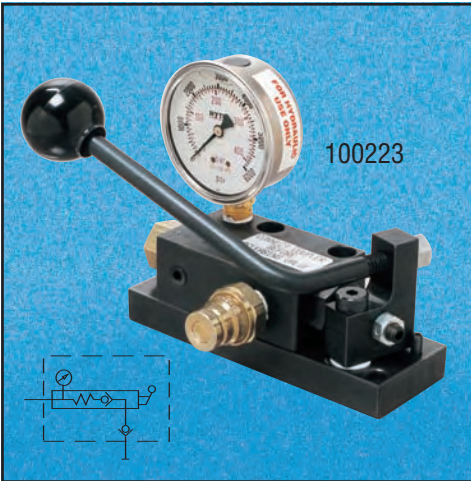
Hytec offers several specially designed pumps for servicing the system, all of which make use of the manual pallet valve's self-closing feature. After the hydraulic system is pressurized, there is no need to maintain pressure while the operator manually closes the valve. Since the Hytec valve is a true 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.





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

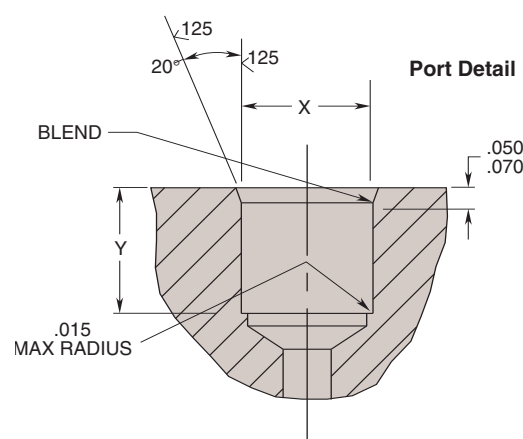
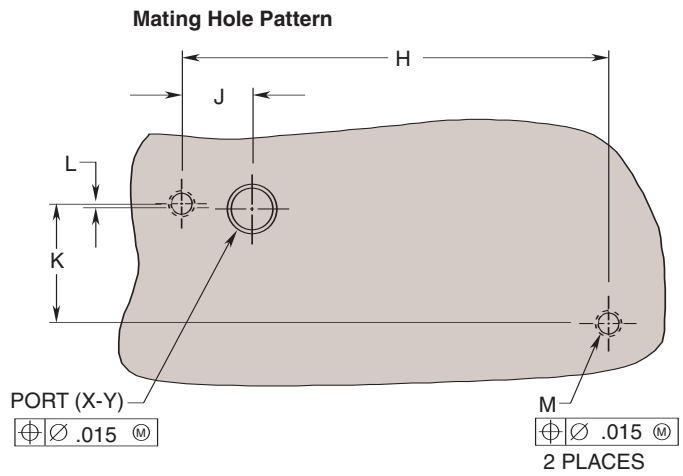
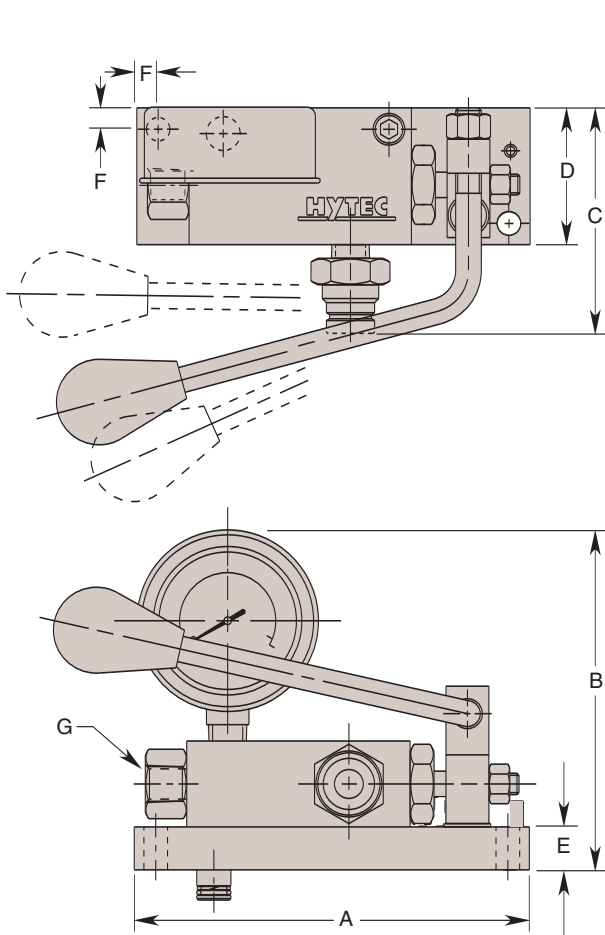
come with the mating female coupler half. Self-locking feature helps prevent release handle from actuating when coupler is not attached. For double-acting systems, use valve No. 100843 (see page 119).

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

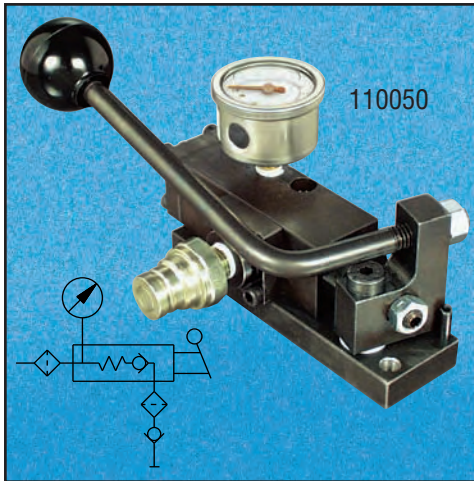
Note: Bi-directional filter No. 100857 is recommended, see page 130.

Single-Acting Palletized Systems



Note: Use PN 110050 on next page for new product design

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	⅝-18UNC	.500 .503	.515 .535



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

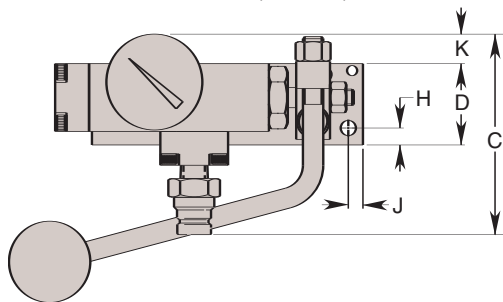
with the mating coupler half. Refer to pages 114-116 for these pumps. A self-locking feature helps prevent accidental release of the valve when the coupler is not connected.

Intended for single-acting systems only. See page 118 for double-acting system applications.

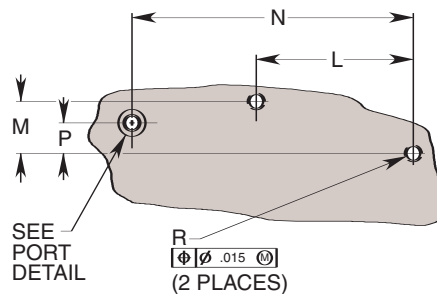
Features:

- 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

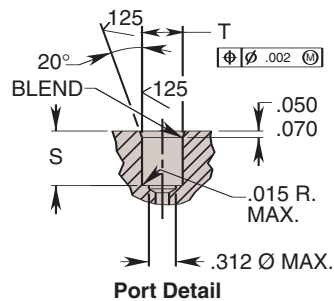
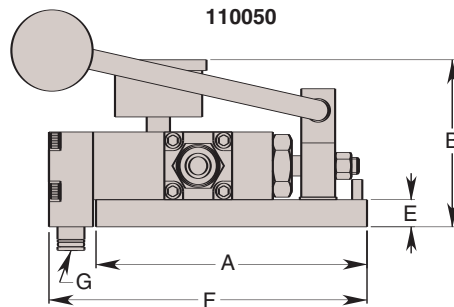
110050, 110051, 110052



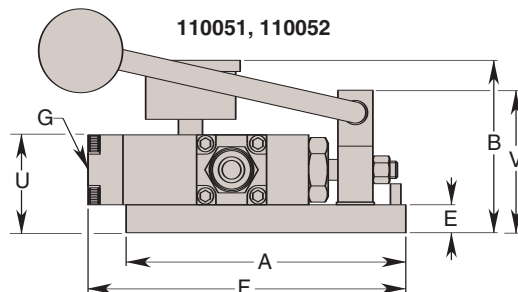
110050, 110051, 110052 Mating Hole Pattern



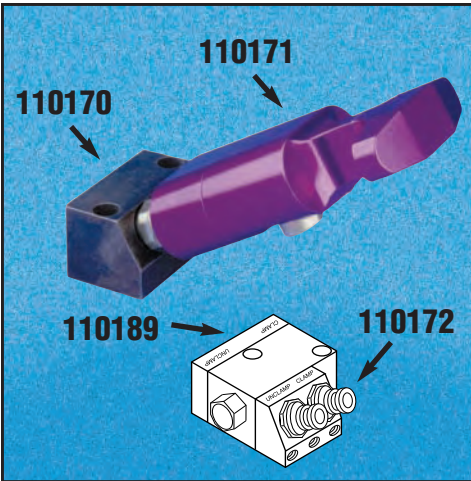
110050



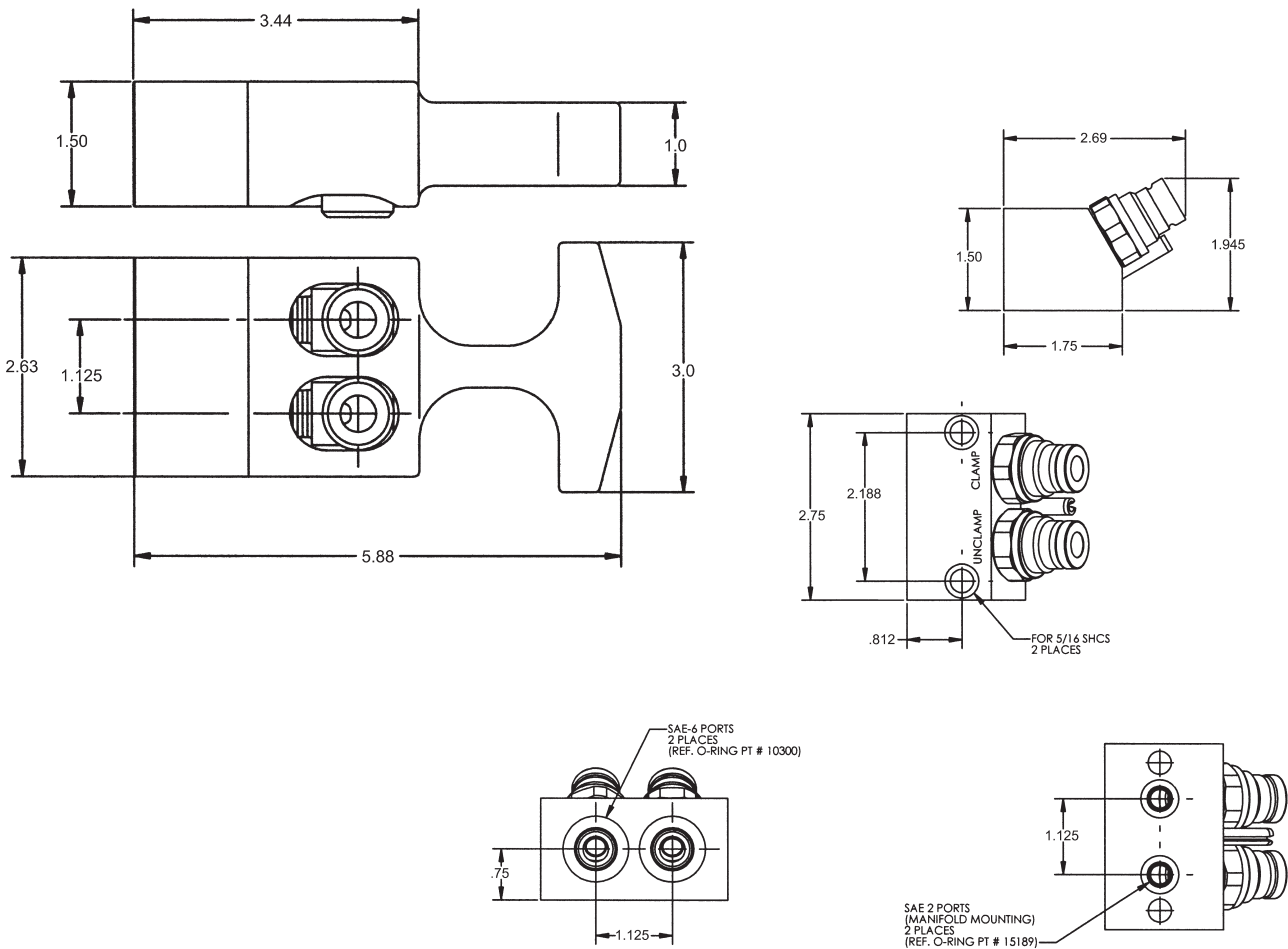
110051, 110052



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.	U	V
110050						5.868	Manifold Mount						5.191	.564		.485 .505	.500 .503	—	—
110051	5.000	3.083	3.700	1.500	.500	5.680	3/16-20 UNF SAE-4	.312	.270	.545	2.595	.960	—	—	1/2-20 UNC	—	—	1.75	2.55
110052							1/2 NPT												



- Ideal for machining tool pallets or other applications where convenient connection of hydraulic lines are desired.
- Automatically latches when pressure is present.
- Designed for double-acting hydraulic applications.
- Ergonomically designed to minimize hand fatigue.
- Precision machined lightweight aluminum construction.



Cat. No.	Product Description	Operating Pressure
110171	Handle Assembly	1,500 to 5,000 PSI
110170	Standard manifold without check valve	1,500 to 5,000 PSI
110189	Manifold with built in check valve	1,500 to 5,000 PSI
110172	Coupler, male-half (replacement)	1,500 to 5,000 PSI

Manual Pallet Coupling Pump



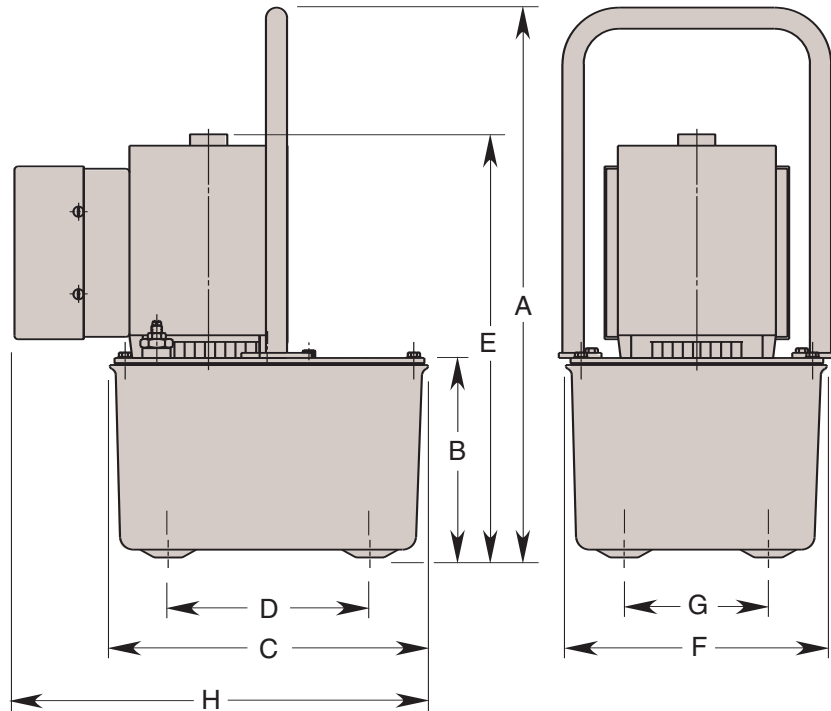
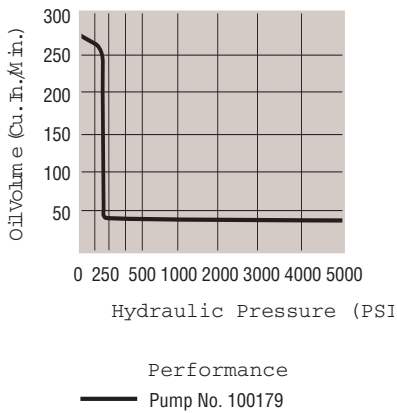
This pump has been designed specifically for use with manual pallet valve No. 100223.

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.

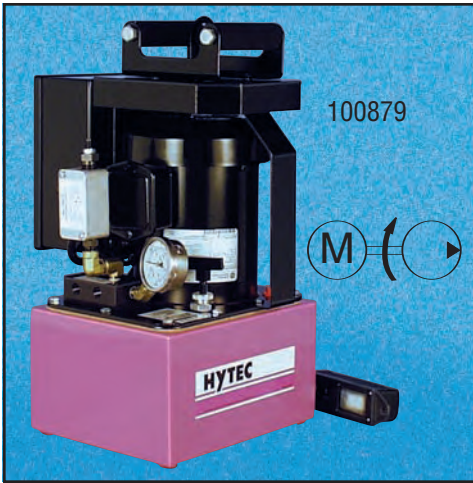
Features:

- 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
- 1/4" 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	1/2 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	1/2 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 135.
An optional fluid level/temperature gauge is available, see page 135.
Hose requiring 1/4" NPTF male connections not included – order separately, see page 127.



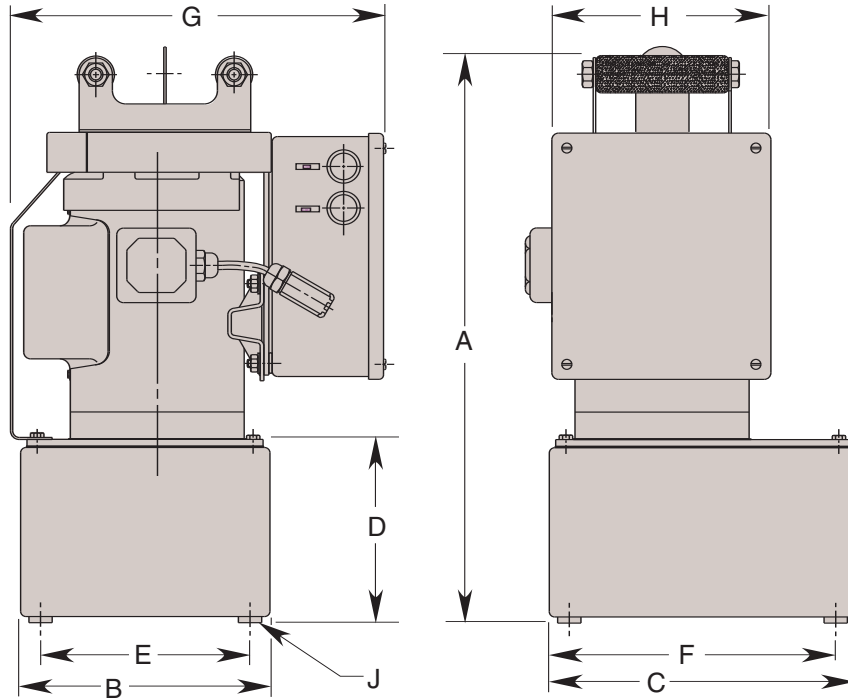
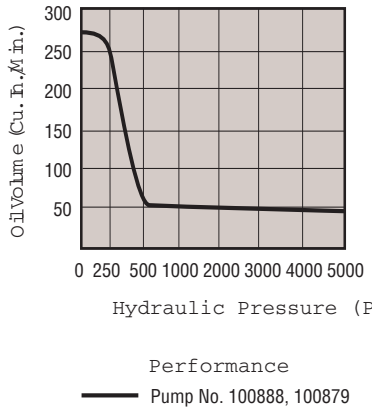
This is Hytec's popular 1 horsepower, totally enclosed-fan cooled induction motor pump, outfitted to operate Hytec's single-acting manual pallet valves.

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	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 135.
Hose requiring ¼" NPTF male connections not included – order separately, see page 127.

Manual Pallet Coupling Pump



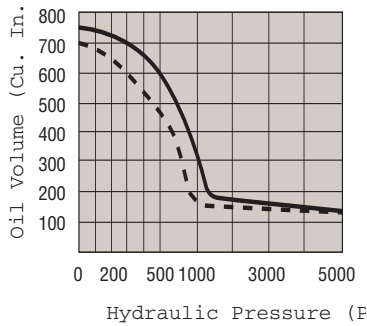
Very similar to Hytec's standard electric/hydraulic pumps, these two-stage, gerotor/axial piston pumps' electrical circuitry has been redesigned specifically to be used with Hytec's manual pallet valve.

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.

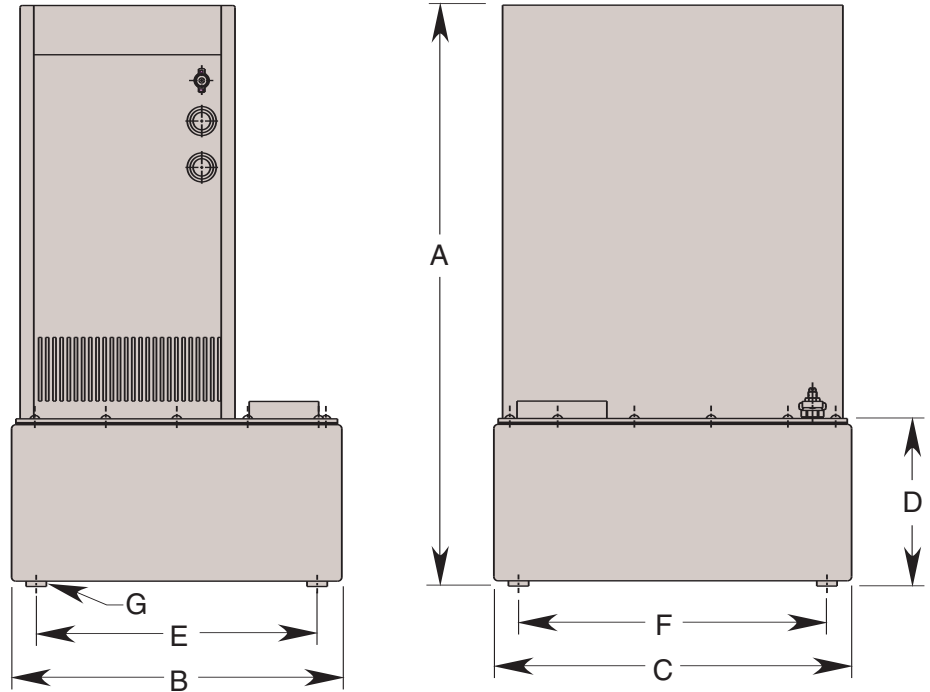
Features:

- 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
- 1/4" NPTF outlet
- Shipped with 4 gallons of oil
- Oil flow: 125 cu. in./min. at max. pressure
- 1,250 cu. in. usable oil



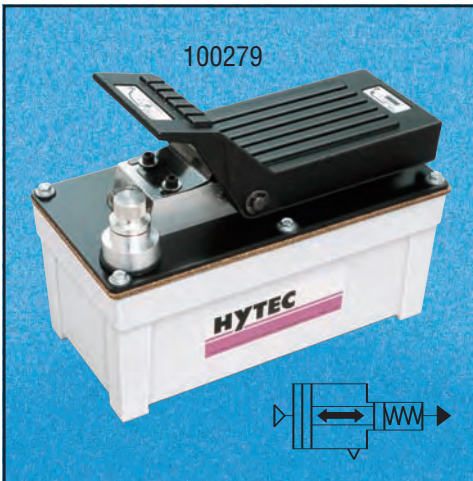
Performance
 — Pump No. 100212
 - - - Pump No. 100221



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	1/2-20UNF
††100212-230		230 VAC								
100221	460 VAC	73/78								
100221-230	230 VAC									

NOTE: Hose requiring 1/4" NPTF male connections not included—order separately, see page 127.
 †† CSA Approved.
 An optional fluid level/temperature gauge is available, see page 135.

Manual Pallet Coupling Pump



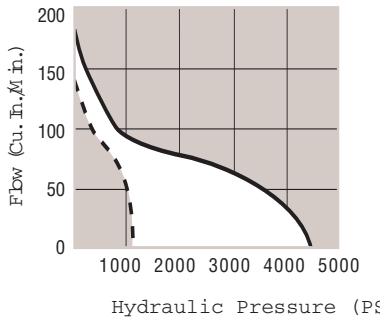
Designed specifically for use with manual pallet valves, this single-stage pump includes a 5 ft. hose and special coupler No. 100908 to mate with our manual pallet valves.

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.

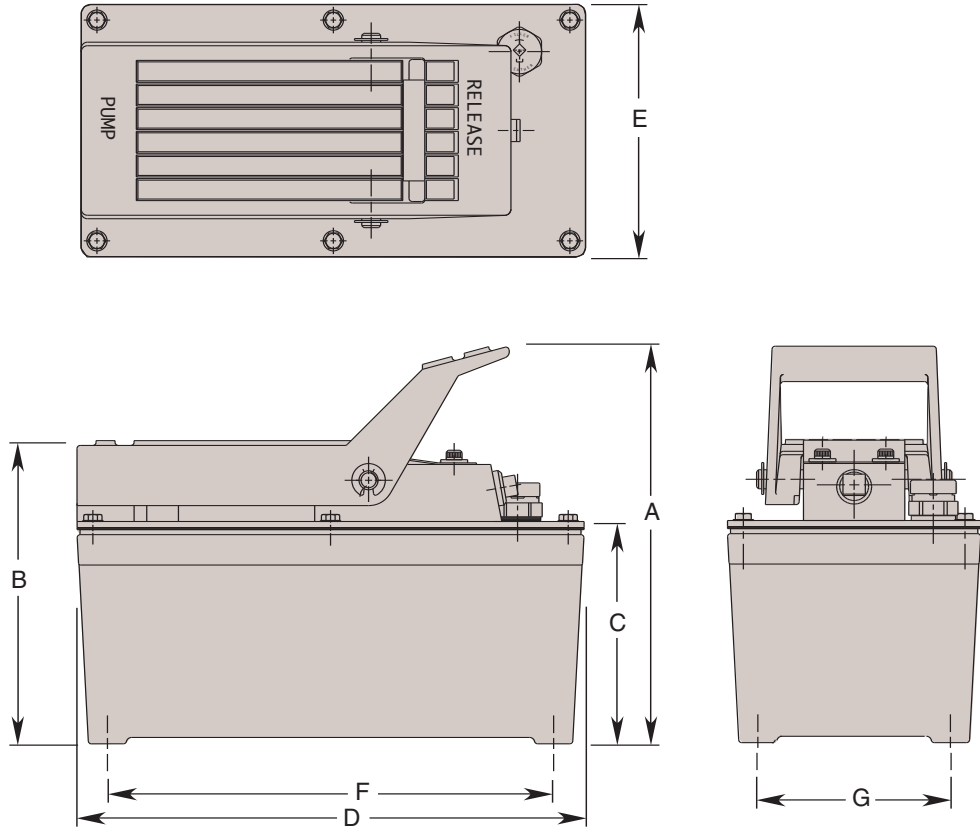
Refer to page 89 for additional pump performance information.

Features:

- Filtered filler/breather cap with dipstick
- 105 cu. in. metal reservoir
- 3/8" NPTF outlet with 1/4" NPTF reducer
- 1/4" 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



Performance
 No. 100279
 — 125 psi Air Pressure
 - - - 40 psi Air Pressure



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.

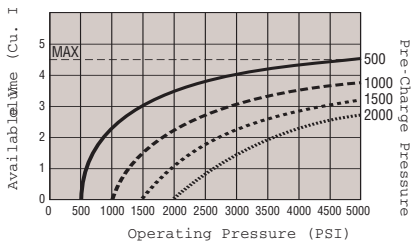


These accumulators are designed to store a small supply of pressurized oil, making them ideal for palletized machining workholding systems or any other system where supply pressure is disconnected temporarily. They are nitrogen charged, piston type accumulators allowing them to be mounted in any orientation. 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

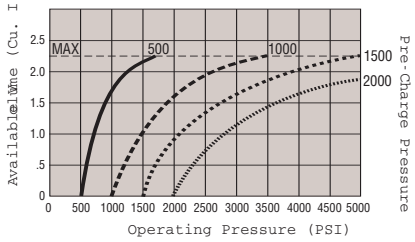
a given allowable pressure drop. Refer to the performance charts to determine the best charge pressure for each application. Accumulators come in two sizes (2 & 5 cu. in.) and are available in conventional mount and the newly introduced manifold mount.

Features:

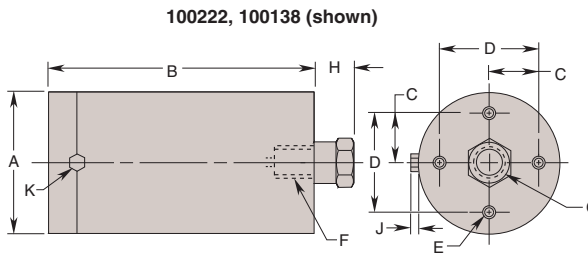
- Two sizes: 2 and 5 cu. in.
- Conventional or Manifold Mount
- Precharged to 1,500 psi
- Concealed charging valve
- SAE "O" ring fitting with 1/4" NPT female adapter/restrictor valve (100222, 100138)
- Optional charging tool 500149 (See pg.124)



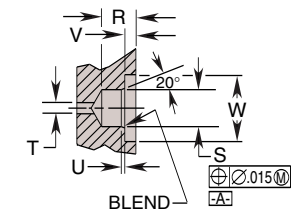
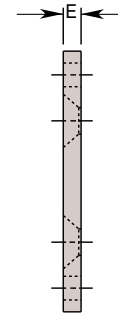
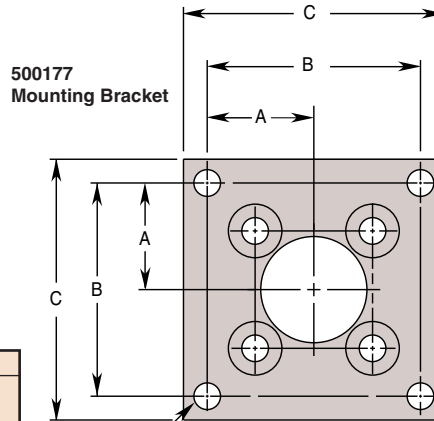
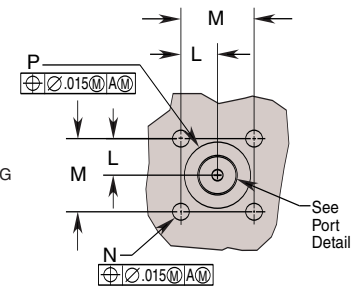
100983, 100222 Pre-Charge Pressure Curve
 — 500 psi - - - - 1500 psi (Factory Pre-charge)
 - - - - 1000 psi ······ 2000 psi



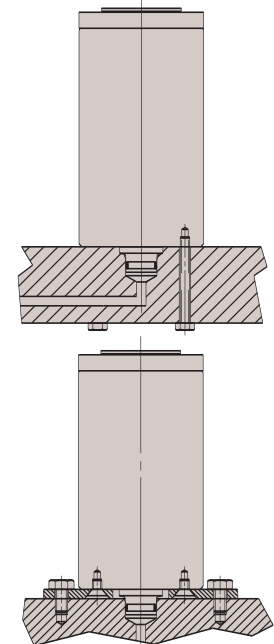
100982, 100138 Pre-Charge Pressure Curve
 — 500 psi - - - - 1500 psi (Factory Pre-charge)
 - - - - 1000 psi ······ 2000 psi



Mating Hole Pattern
100982, 100983



Accumulator Applications



Accumulators

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

Cat. No.	Specifications Mounting Configuration	Volume (Cu. In.)	Dimensions (In Inches)										
			A	B	C	D	E Thread Size	F Thread Size	G Thread Size	H	J	K Hex.	
100138	Conventional	2	2.500	4.810	.875	1.750	10-32UNF	.200	3/16"-18UNF SAE-6	1/4" NPT	.698	.100	.250
100222		5		5.680									
100982	Manifold	2	2.500	4.810	.875	1.750	10-32UNF	.200	3/16"-18UNF SAE-6	1/4" NPT	.698	.100	.250
100983		5		5.680									

Cat. No.	Mounting Option	Dimensions (In Inches)											
		L	M	N	P		R	S	T	U	V	W	
100982	With 500177	1.125	2.250	1/2"-20UNC	-	-	.375	.625	.188	.050	-	-	-
100982	Without 500177	.619	1.238	.280	1.120	.183	.193	.563	.627	.188	.070	.183	1.120
100983	Without 500177												
100138	Without 500177	.619	1.238	.287	1.150	Thru	-	-	-	-	-	-	-
100222	Without 500177												

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.

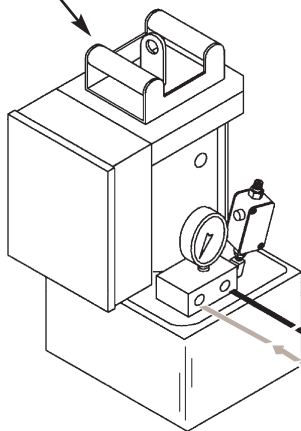
As the pressure builds, pilot pressure causes the check valve to open allowing the workholding devices to unclamp. Oil is then allowed to flow back through the check valve to the reservoir. The operator changes the workpiece and the control valve is shifted to the clamp position. Hydraulic flow passes 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.



HYDRAULIC PUMP



WORKHOLDING FIXTURE

FILTER

DIRECTIONAL CONTROL VALVE

COUPLER

PILOT-OPERATED CHECK VALVE

ACCUMULATOR



100843

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.

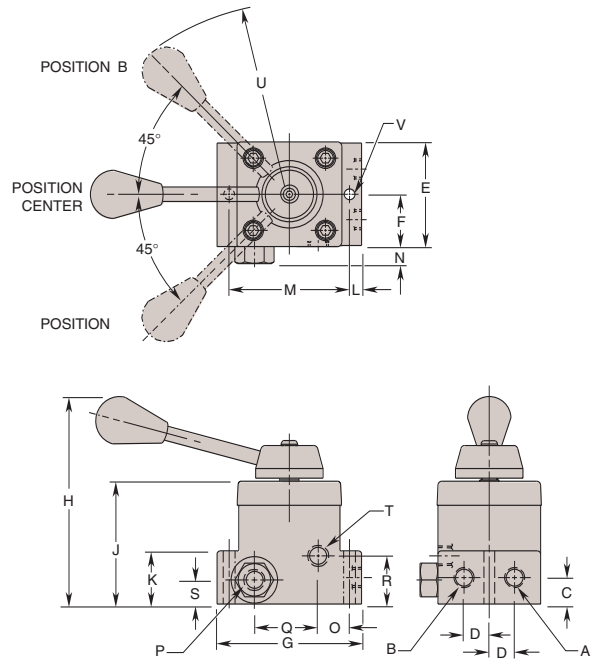
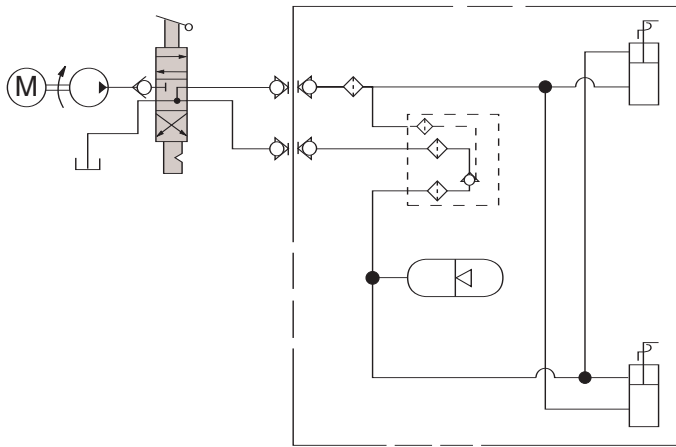
This system saves you money because the control valve is located at the load/unload station, not the pallet. This means you only purchase one control valve per load/unload station no matter how many pallets are involved. This system also frees up space on the pallet because the two couplers are the only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

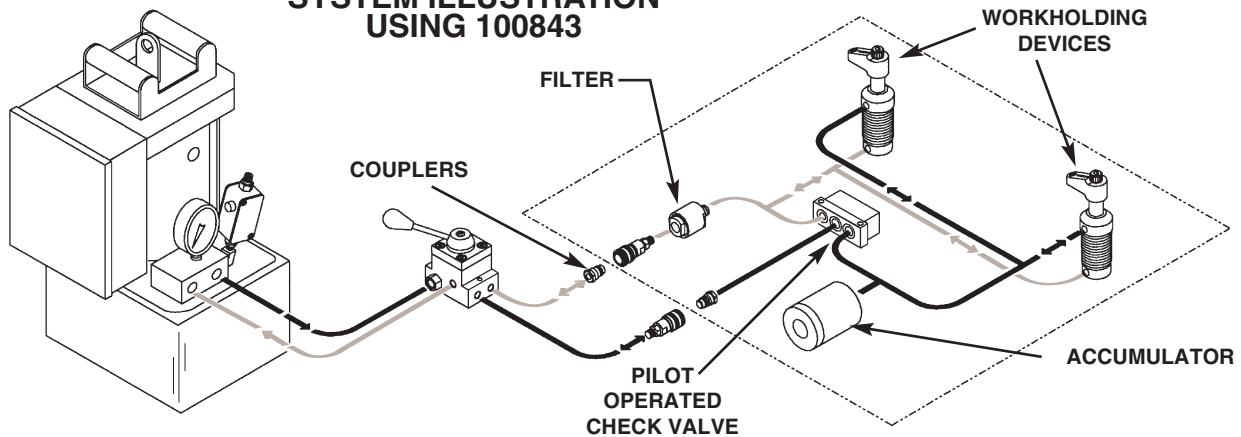
Features:

- 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