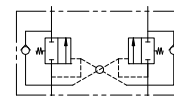
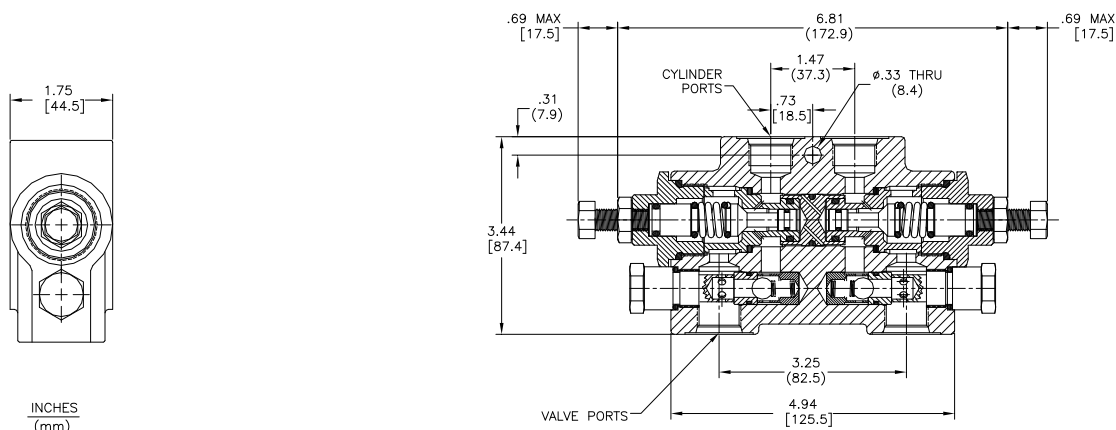


D-601 DOUBLE PILOT OPERATED LOCK VALVES



METRO MACHINE & ENGINEERING 952-259-3623



The D-601 Lock Valve is designed to lock a cylinder or part of a circuit while a directional control valve is in the neutral position, specifically for applications where directional control valve leakage could adversely affect the performance of the system. In addition, this lock valve also has built in integral reliefs for thermal or excess pressure shocks on the locked part of a circuit.

With the directional control valve in the neutral position, flow from both ends of a cylinder is locked by the D-601 Lock Valve. When the directional control valve is activated, flow is directed to one side of the valve unseating the ball check on that side. This allows pilot pressure to open the poppet on the opposite side of the valve and allow flow to return to tank. The pilot pressure required to unlock the load is approximately 20% of the difference between the internal relief setting and the load induced pressure.

1. Prevents load from dropping faster than fluid is supplied to the actuator by the pump.
2. Locks actuator in selected position when no motion is desired.
3. Relieves excess pressure on system caused by load or thermal expansion.
4. Provides an emergency manual release for lowering load in case of power failure.
5. Requires less power when load is being raised or lowered.
6. Permits smooth movement and eliminates actuator chatter or cavitations.
7. Prevents load drifting due to directional valve leakage.

SPECIFICATIONS

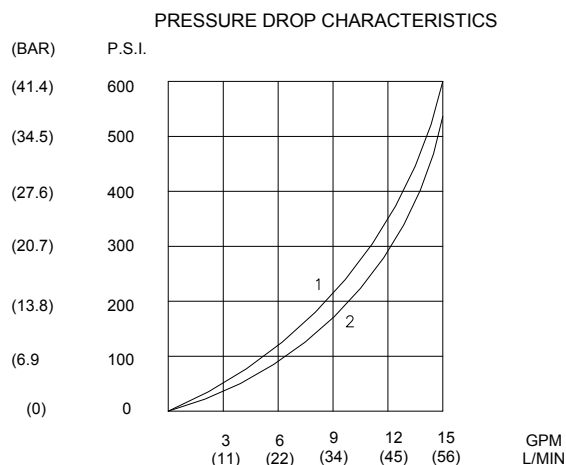
Flow Capacity	Pressure Rating	Temperature Range	Weight
See Performance Graph	2500 PSI	-22° to + 194° F -30° to + 90° C	3 lbs 4 oz (1.47 kg)

APPLICATION

A pilot operated check valve (lock valve) should be incorporated in every loader, outrigger, back-hoe, work platforms.

ORDERING INSTRUCTIONS

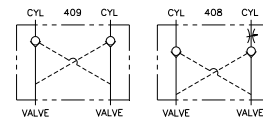
D-601	08
Model Number	Port Size
D-601	08 - 3/4 16 #8 SAE



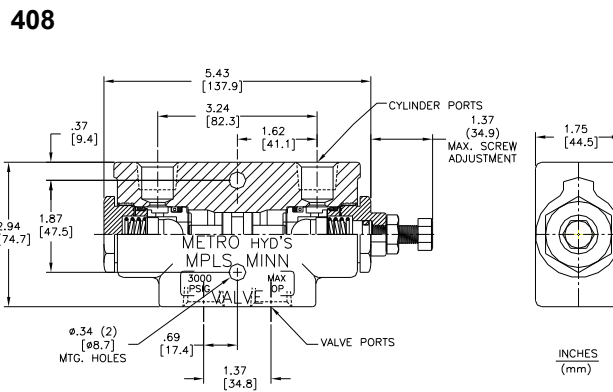
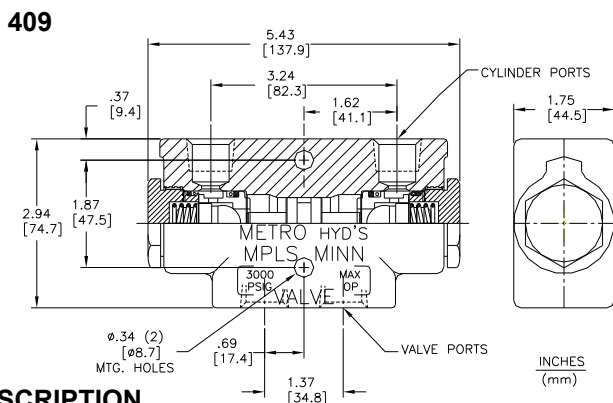
1. Valve Port to Cylinder Port
2. Cylinder Port to Valve Port

407, 408, 409— DOUBLE LOCK VALVE

411, 412— SINGLE LOCK VALVE



METRO MACHINE & ENGINEERING 952-259-3623



DESCRIPTION

The Double Lock valves are designed to lock a cylinder or part of a circuit while a directional control valve is in the neutral position. Designed for applications where directional control valve leakage could adversely affect the performance of the system.

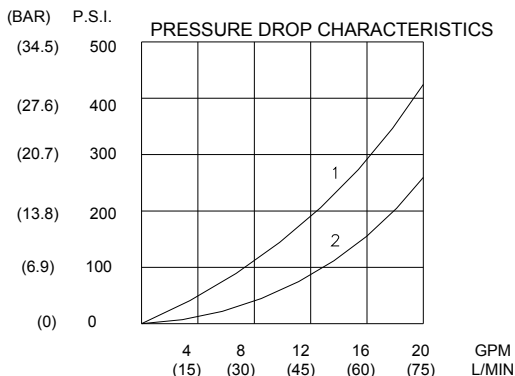
OPERATION

With the directional control valve in the neutral position, flow from both ends of a cylinder is blocked, locking the cylinder piston in position by the Double Lock Valve. When the directional control valve is shifted to direct flow to one side of the cylinder, pressure opens the check ball and simultaneously moves the piston over to the opposite side of the valve opening this check ball allowing free flow return to the directional control valve. The 407 lock valve has two adjustable flow controls, and the 408 has one adjustable flow control which, by adjusting in or out, changes the pressure drop in the valves. This in most cases, smoothes our pulsations and eliminates valve chatter.

Single Lock Valves are also available. The 411 single lock is non-adjustable and the 412 single lock is adjustable.

SPECIFICATIONS

Flow Capacity	Pressure Rating	Temperature Range	Weight
See Performance Graph	3000 PSI (207 Bar)	-22° to + 194° F -30° to + 90° C	407 2 lbs. 8 oz. (1.09 kg.)
			408 2 lbs. 6 oz. (1.07 kg.)
			409 2 lbs. 4 oz. (1.02 kg.)
			411 2 lbs. 1 oz. (1.00 kg.)
			412 2 lbs. 3 oz. (1.01 kg.)



1. Valve Port to Cylinder Port
2. Cylinder Port to Valve Port

APPLICATION

Typical applications are loaders, outriggers, back hoes, cranes, fork lifts, work platforms, hydraulic winches, land planes, wing lifts, gauge wheels or any application where loads must be held in neutral position.

A 4-way control valve is required for all lock valve circuits, including single-acting cylinders, in order to apply unlocking pressure to the pilot circuit. The position pilot ratio is 3:1.

The amount of pressure required in the pilot circuit of the valve to unlock a single-acting cylinder is 30% of the locked pressure.

The amount of pressure required in the pilot circuit of the valve to unlock a single-acting cylinder is a function of cylinder areas and trapped pressure.

When the base end of the cylinder is locked use this formula for calculating the unlocking pressure.

$$\text{Unlocking pressure} = 3 - \frac{\text{Pressure on the rod end} \times \text{Cylinder area} - \text{Rod area}}{\text{Cylinder area}}$$

When the rod end of the cylinder is locked use this formula.

$$\text{Unlocking pressure} = 3 - \frac{\text{Pressure on the base end}}{\text{Cylinder area}}$$

CAUTION: Note that when the rod end of a double-acting cylinder is locked, if the rod diameter exceeds approximately .75 times the cylinder diameter, unlocking pressure becomes excessive.

ORDERING INSTRUCTIONS

Model Number	Port Size
407 Double	02= 1/4 -18 NPT
408 Double	03= 3/8 -18 NPT
409 Double	04= 1/2 -14 NPT
411 Single	05= 3/4 -14 NPT
412 Single	06= 9/16 -18 #6 SAE
	08= 3/4 -16 #8 SAE
	10= 7/8 -14 #10 SAE