

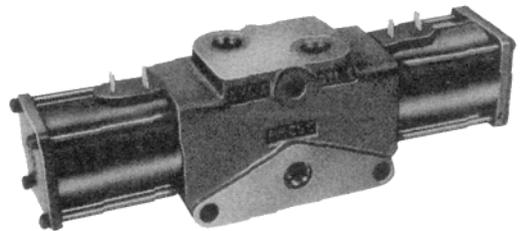
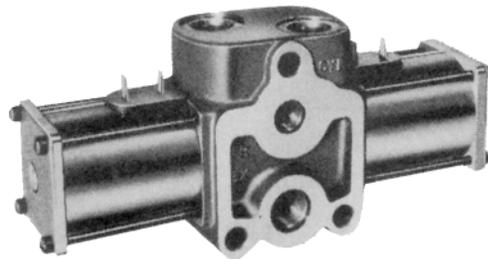


Bulletin HY14-2731-B1/US

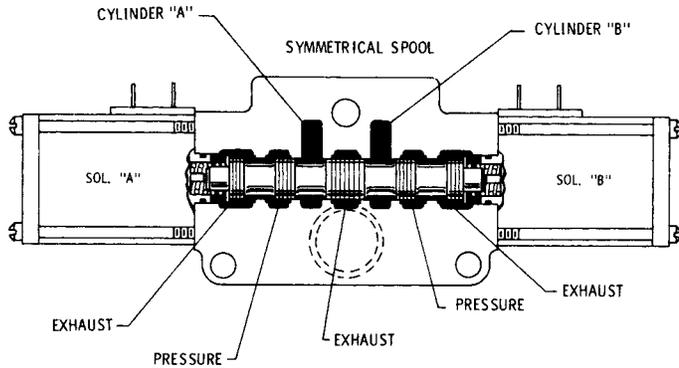
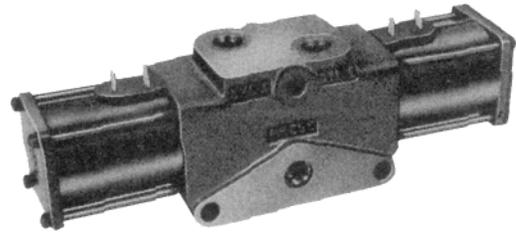
Series MD04 and MD06 Directional Control Valves

Four-Way Valves

Effective: February 1, 2004
Supersedes: Catalog No. MA-5 dated 5/89

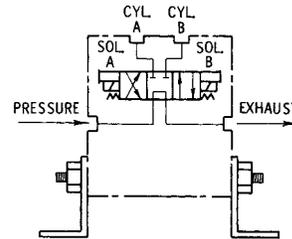


Series Circuit Valve



By positioning the valve with the cylinder ports up and the pressure port towards you, solenoid "A" and cylinder port "A" will be on the left side. When solenoid "A" is energized, flow will be from "P" to "B".

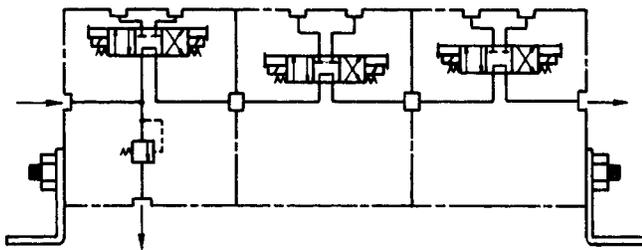
Series and Parallel 1/4" and 3/8" Solenoid Operated



Specifications

- PRESSURE RATING — 3000 psi (207 bar)
- FLOW RATING — 8 gpm (30 L/min) for 1/4" valve
12 gpm (45 L/min) for 3/8" valve
- FLUID VISCOSITY — Premium grade hydraulic fluid which matches the viscosity requirements of the pump.
- TEMPERATURE — Maximum operating temperature is 200°F (93°C).
- MOUNTING — Unrestricted
- WEIGHT (Approx.) — 10.8 lbs. (4.9 kg) for 1/4" valve
13.0 lbs. (5.9 kg) for 3/8" valve

Application



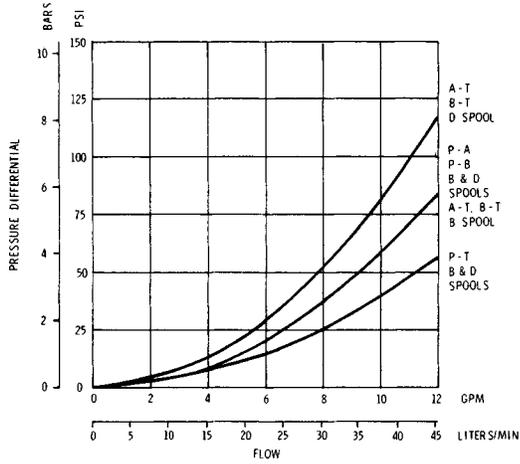
Series circuits unload the pump flow to tank when all 4-ways are in the center position. Pump flow passes through each valve making the pressure drops additive.

Series circuits have the capability, when energizing two valves, of positive motion of two functions by using exhaust flow from the upstream actuator.

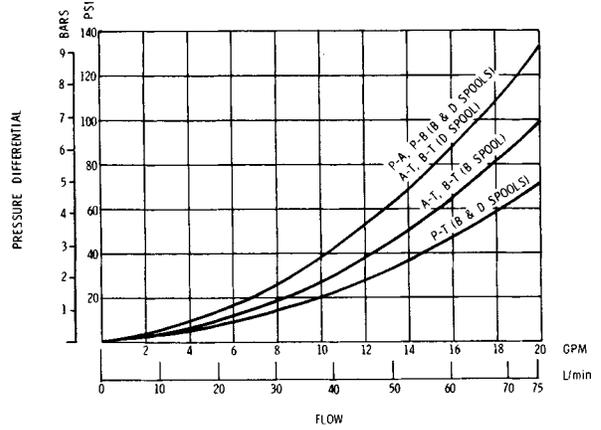
Cautions to observe when applying valves in series circuits are pressure and flow intensification from differential cylinders and the effects of back pressure on upstream functions.

Performance Data

1/4" VALVE — MD04



3/8" VALVE — MD06



NOTE: DATA TAKEN WITH OIL VISCOSITY OF 105 SUS (21.8cSt) AT 120°F (49°C).

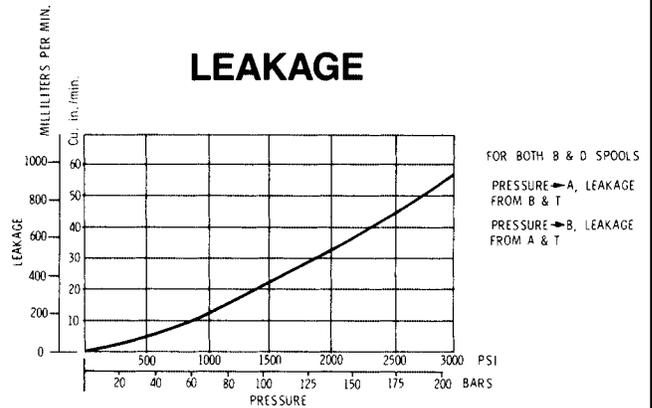
SOLENOID ELECTRICAL DATA

	1/4"		3/8"	
	Series 6 Encapsulated DC Solenoid	Series 9 Encapsulated AC Rect. Solenoid	Series 9 Encapsulated DC Solenoid	Series 9 Encapsulated AC Rect. Solenoid
Duty	Continuous	30 Min. Max. In 1 Hour*	Continuous	30 Min. Max. In 1 Hour*
Wattage @ 70°F	44	56	48	56
Wattage After 10 Min. Continuous Duty	27	33	29	33

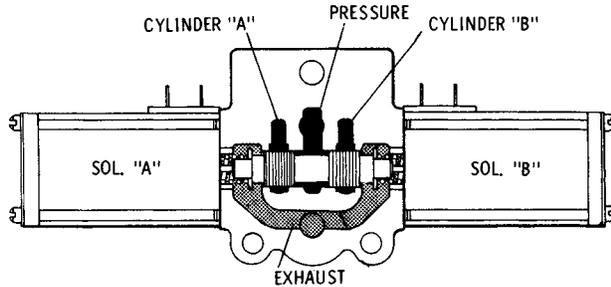
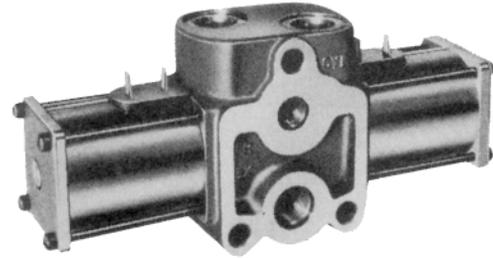
RESPONSE TIME DATA

VALVE USING D SPOOL 50 PSI (3.4 BAR) BACK PRESSURE 12 VDC	OPENING TO CYL. PORT 60 MILLISECONDS CLOSING AT CYL. PORT 30 MILLISECONDS
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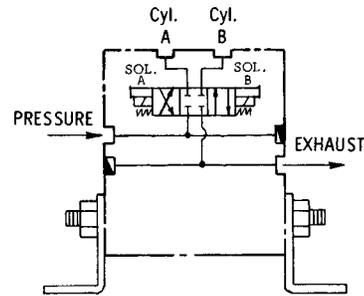
LEAKAGE



Parallel Circuit Valve



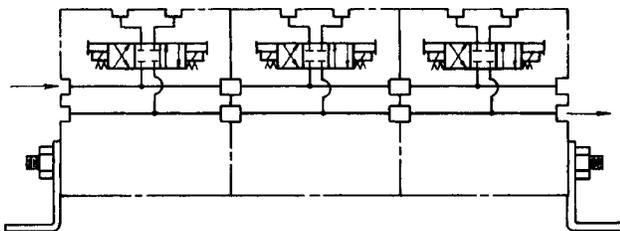
By positioning the valve with the cylinder ports up and the upstream pressure port (pressure port without the counterbore for an O-ring) towards you, solenoid "A" and cylinder port "A" will be on the left side. When solenoid "A" is energized, flow will be from "P" to "B".



Specifications

- PRESSURE RATING — 3000 psi (207 bar)
- FLOW RATING — 8 gpm (30 L/min) for 1/4" valve
12 gpm (45 L/min) for 3/8" valve
- FLUID VISCOSITY — Premium grade hydraulic fluid which matches the viscosity requirements of the pump.
- TEMPERATURE — Maximum operating temperature is 200°F (93°C).
- MOUNTING — Unrestricted
- WEIGHT (Approx.) — 9.5 lbs. (4.3 kg) for 1/4" valve
11.0 lbs. (5.0 kg) for 3/8" valve

Application



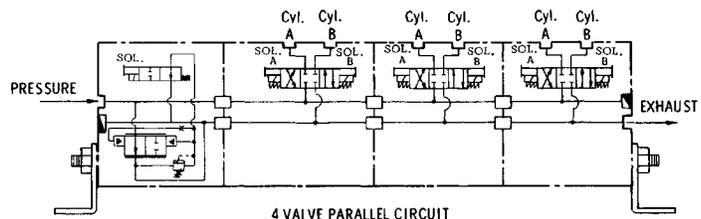
PARALLEL WITH UNLOADING RELIEF

This circuit gives the advantages of parallel with the added feature of unloading a fixed displacement pump.

The circuit incorporates a normally open solenoid operated relief to unload the pump. The solenoid on the relief valve is wired so that it is energized every time a valve is actuated and closes the vent on the relief valve.

Parallel circuits have pressure blocked in neutral and are generally used with pressure compensated pumps or some type of unloading valve.

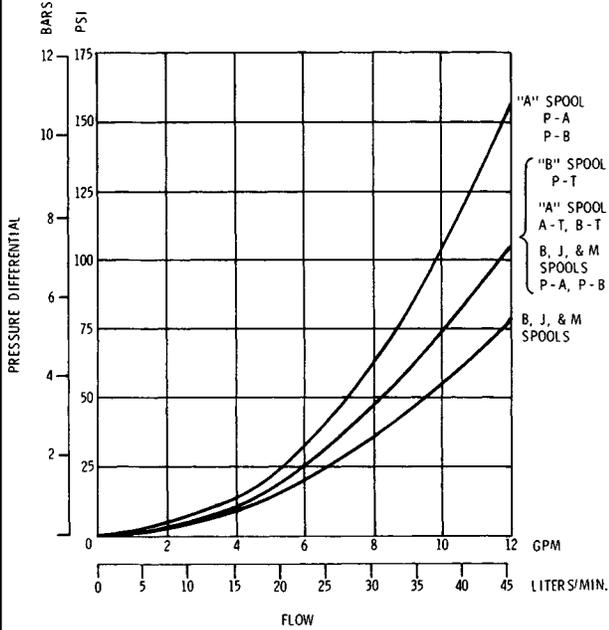
Parallel circuits do not have the problems of pressure and flow intensification but will not insure motion of more than one actuator when two valves are energized at the same time.



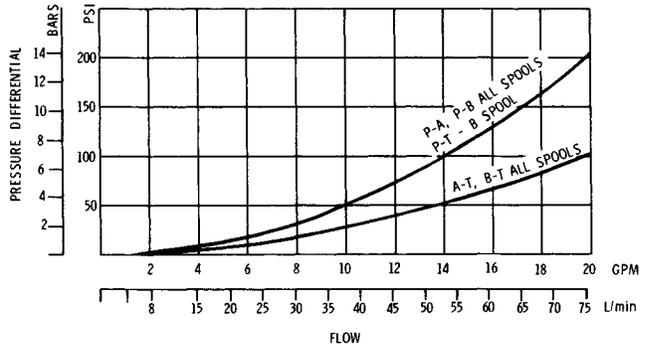
4 VALVE PARALLEL CIRCUIT

Performance Data

1/4" VALVE — MD04



3/8" VALVE — MD06



NOTE: DATA TAKEN WITH OIL VISCOSITY OF 105 SUS (21.8cSt) AT 120°F (49°C).

SOLENOID ELECTRICAL DATA

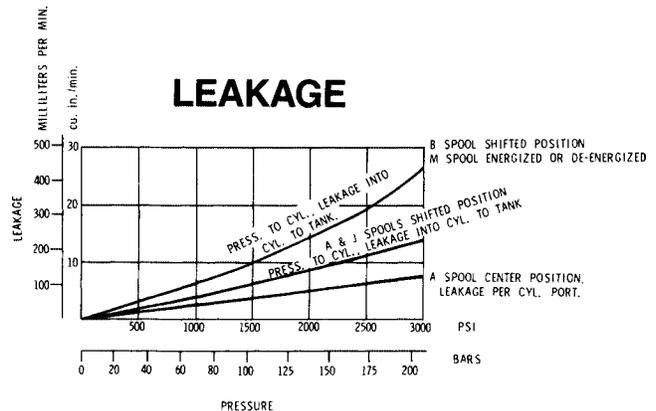
	1/4"		3/8"	
	Series 6 Encapsulated DC Solenoid	Series 9 Encapsulated AC Rect. Solenoid	Series 9 Encapsulated DC Solenoid	Series 9 Encapsulated AC Rect. Solenoid
Duty	Continuous	30 Min. Max. In 1 Hour*	Continuous	30 Min. Max. In 1 Hour*
Wattage @ 70°F	44	56	48	56
Wattage After 10 Min. Continuous Duty	27	33	29	33

RESPONSE TIME

SOLENOID ENERGIZED - 55 Milliseconds
 SOLENOID DE-ENERGIZED - 75 Milliseconds

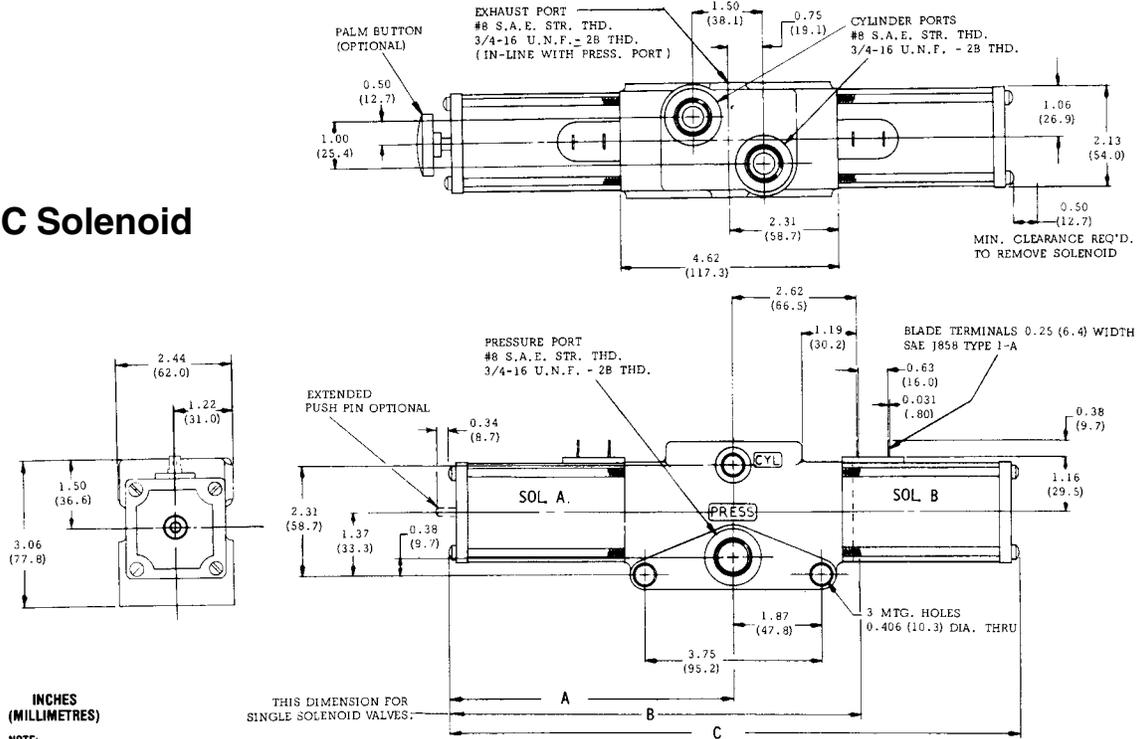
Response time is interval between initiation of electrical signal to solenoid and the appearance (or loss) of pressure in cylinder port.

LEAKAGE



Series Circuit Valve Dimensions - Individual Sections

DC Solenoid

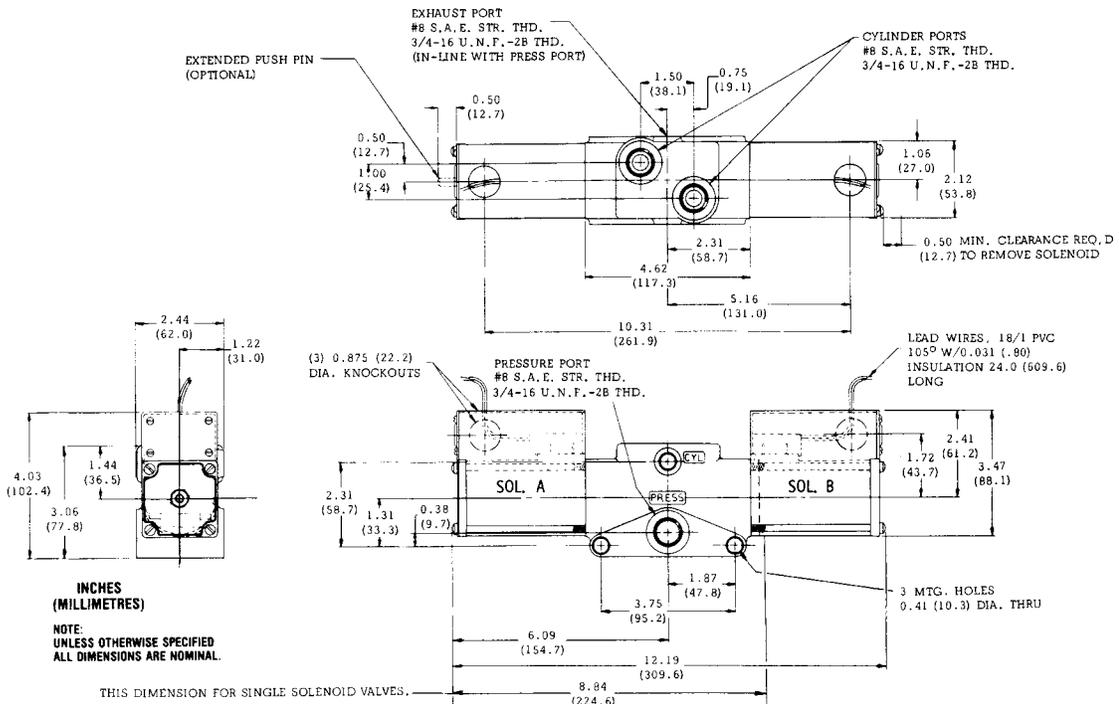


INCHES
(MILLIMETRES)

NOTE:
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ARE NOMINAL.

	A	B	C
1/4"	5.13 (130.3)	7.88 (200.0)	10.25 (260.4)
3/8"	6.09 (154.7)	8.84 (224.5)	12.19 (309.6)

AC Solenoid

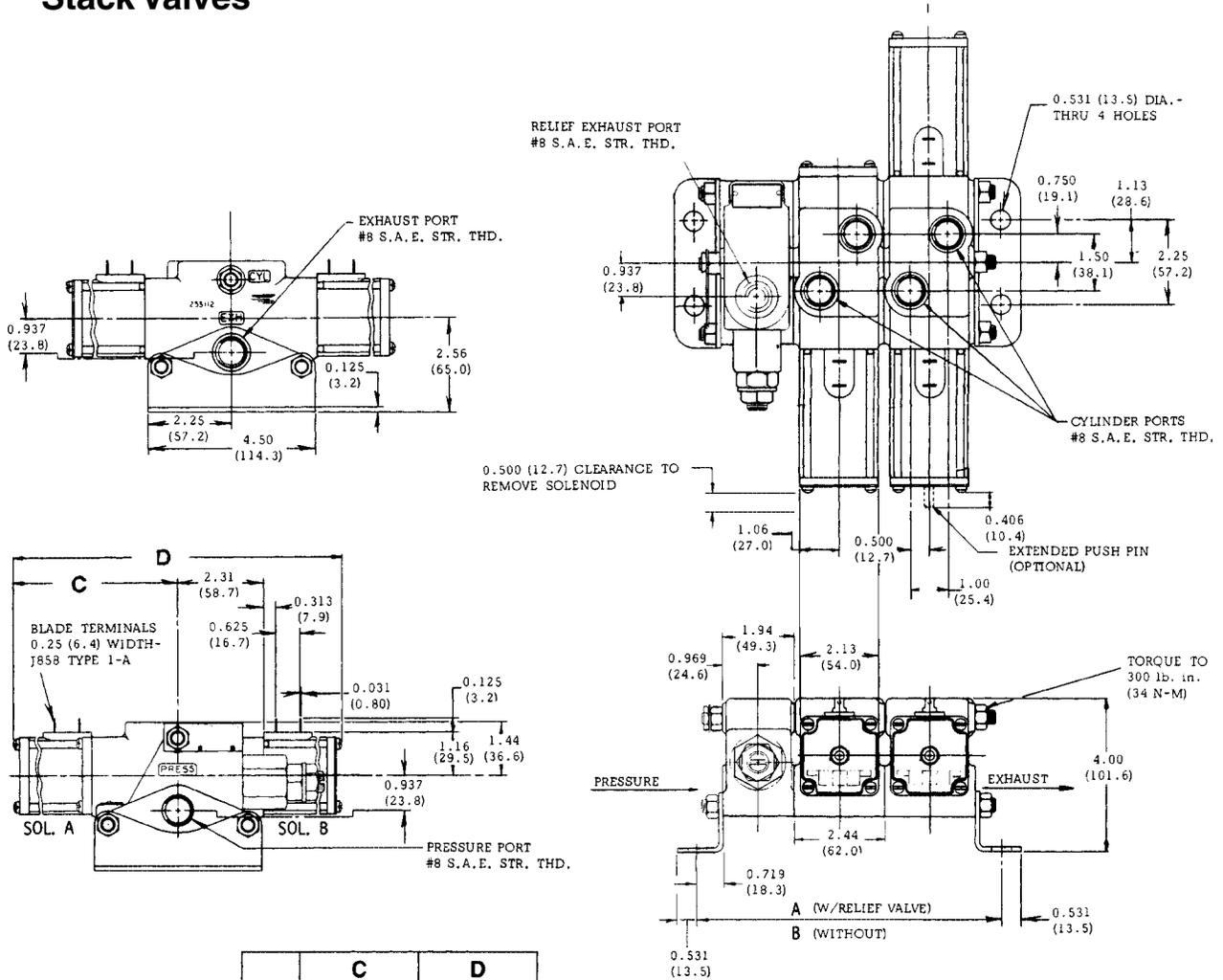


INCHES
(MILLIMETRES)

NOTE:
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ARE NOMINAL.

Series Circuit Valve Dimensions - Assemblies

Stack Valves



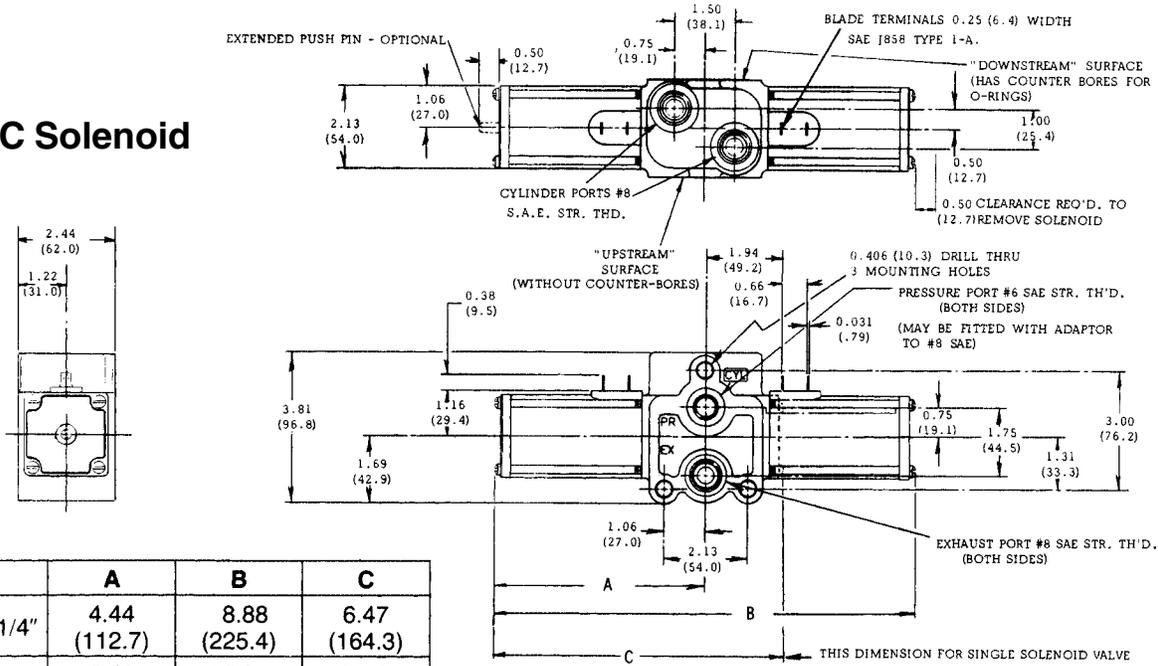
	C	D
1/4"	5.13 (130.3)	10.25 (260.4)
3/8"	6.09 (154.8)	12.19 (309.6)

INCHES
(MILLIMETRES)
NOTE:
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ARE NOMINAL.

NUMBER OF 4-WAYS									
	1	2	3	4	5	6	7	8	9
A (W/RELIEF)	5.81 (147.6)	8.25 (209.6)	10.70 (271.5)	13.13 (333.4)	15.56 (395.2)	18.00 (457.2)	20.44 (519.1)	22.88 (581.0)	25.31 (643.0)
B (WITHOUT)	3.88 (98.6)	6.31 (160.3)	8.75 (222.3)	11.19 (284.2)	13.63 (346.1)	16.06 (408.0)	18.50 (470.0)	20.94 (531.9)	23.38 (593.9)

Parallel Circuit Valve Dimensions - Individual Sections

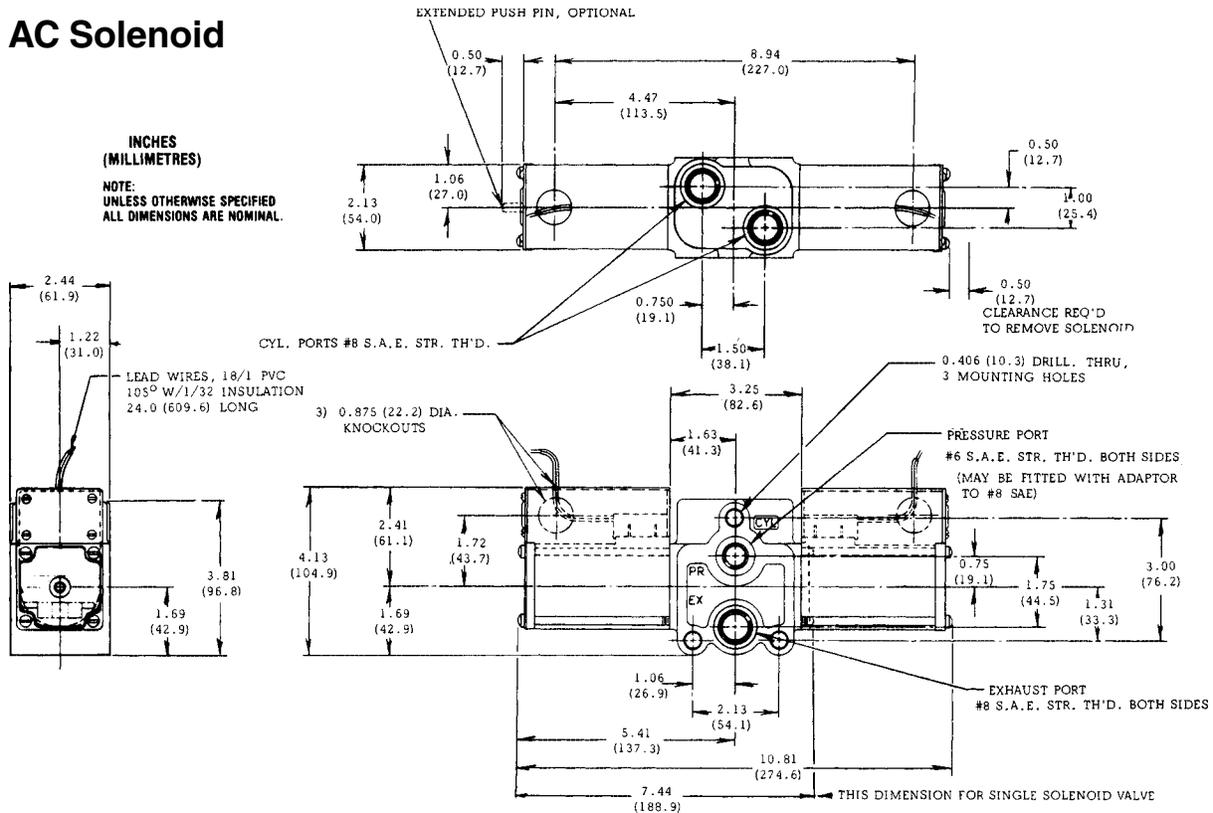
DC Solenoid



	A	B	C
1/4"	4.44 (112.7)	8.88 (225.4)	6.47 (164.3)
3/8"	5.41 (137.3)	10.81 (274.6)	7.44 (188.9)

**INCHES
(MILLIMETRES)**
NOTE:
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ARE NOMINAL.

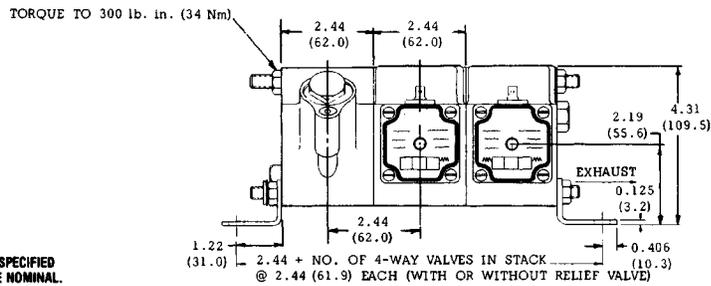
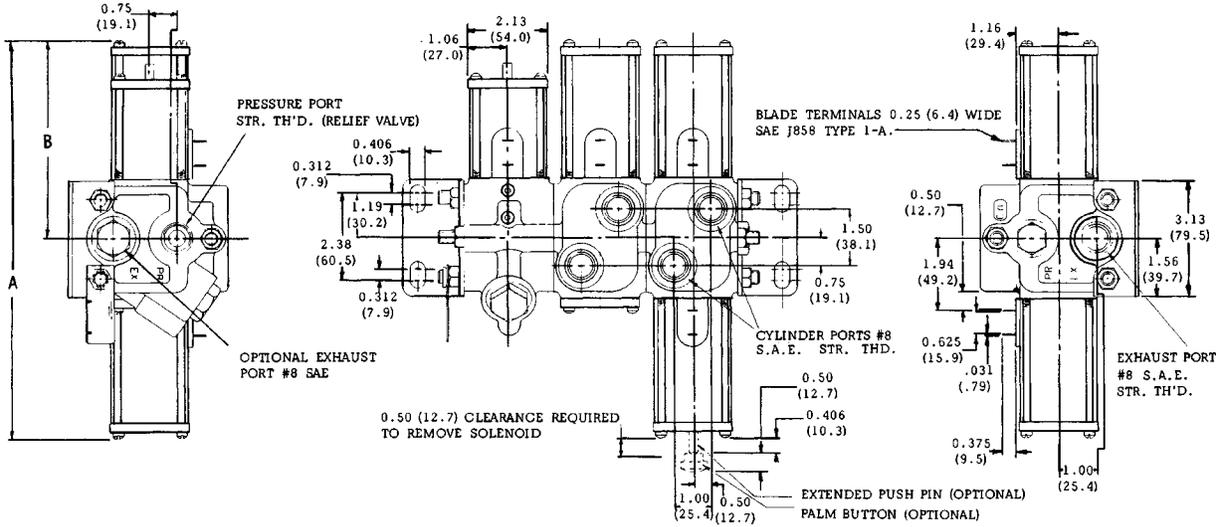
AC Solenoid



**INCHES
(MILLIMETRES)**
NOTE:
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ALL DIMENSIONS ARE NOMINAL.

Parallel Circuit Valve Dimensions - Assemblies

Stack Valves



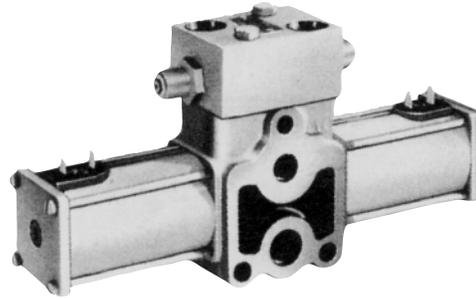
INCHES
(MILLIMETRES)
NOTE:
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ALL DIMENSIONS ARE NOMINAL.

	A	B
1/4"	8.88 (225.4)	4.44 (112.7)
3/8"	10.81 (274.6)	5.41 (137.3)

Cylinder Lock MD04/MD06 Stack-Ons

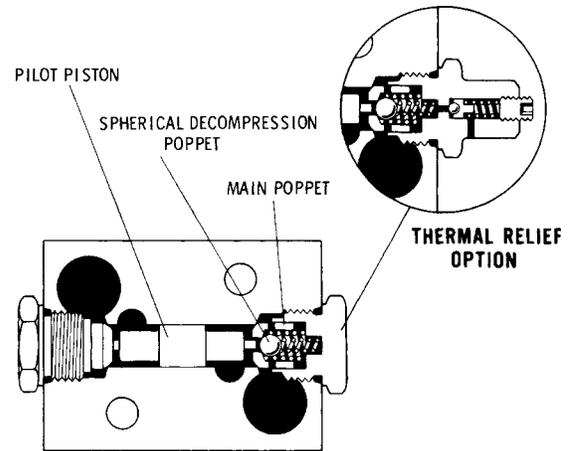
Application

The cylinder lock is used to lock a cylinder in position when the 4-way valve is centered and the normal leakage cannot be tolerated. It has a pilot operated check valve (zero leak valve) in one or both (optional) cylinder ports and is gasket mounted to the 4-way valve to reduce plumbing costs. The P.O. check allows free flow in one direction and blocks the flow in the other direction but can be piloted open to allow reverse flow. When using parallel valves, the spool used in the 4-way valve should have the cylinder ports open to tank when the spool is in the center position to insure that leakage in the 4-way valve does not pilot the checks open.



Thermal Relief Option

P.O. checks are zero leak valves. If a cylinder is locked in position and the machine is placed in the hot sun or a cold machine is brought indoors during the winter time, the trapped oil will expand and increase the pressure in the cylinder lines. To prevent damage, thermal reliefs are available to limit the pressure of the trapped oil.

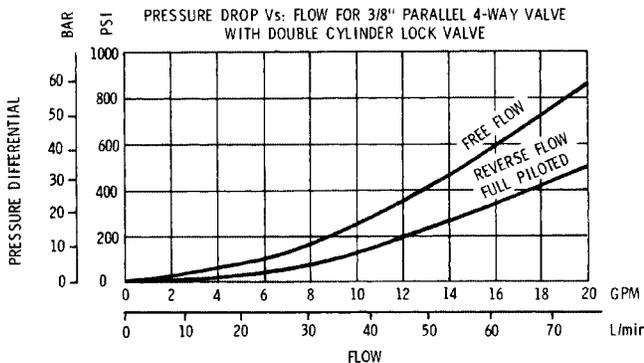


Specifications

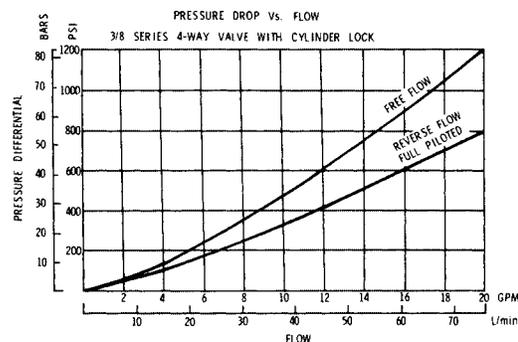
- PRESSURE RATING: 3000 psi (207 bar)
- FLOW RATING: 12 gpm (45 L/min)
- DECOMPRESSION RATIO: 8:1
- OPENING RATIO: 1:1
- LEAKAGE: Not to exceed 5 drops per minute.
- MATERIALS: All steel
- MOUNTING: Unrestricted
- WEIGHT (Approx.): 2.5 lbs. (1.1 kg)

Performance Data

Parallel 4-Way Valve with Cylinder Lock

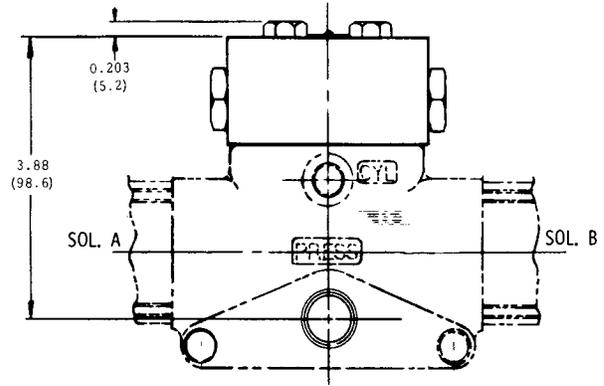
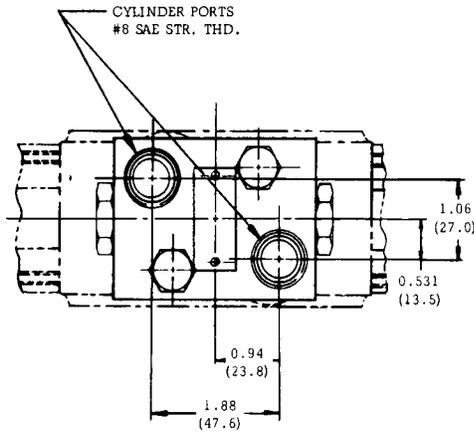


Series 4-Way Valve with Cylinder Lock

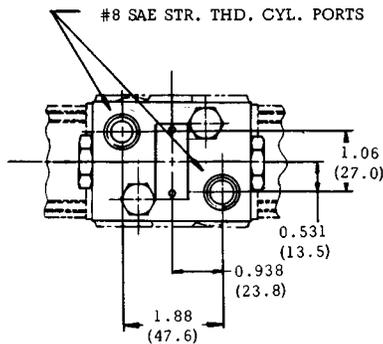


Cylinder Lock Dimensions – MD04/MD06 Stack-Ons

MD04 & MD06 SERIES CIRCUIT

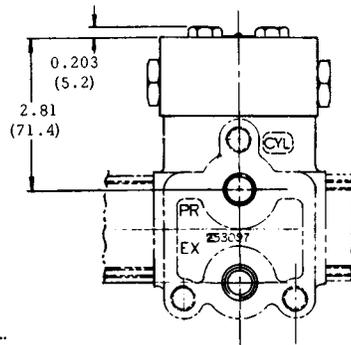


MD04 & MD06 PARALLEL CIRCUIT



INCHES
(MILLIMETRES)

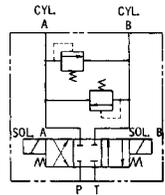
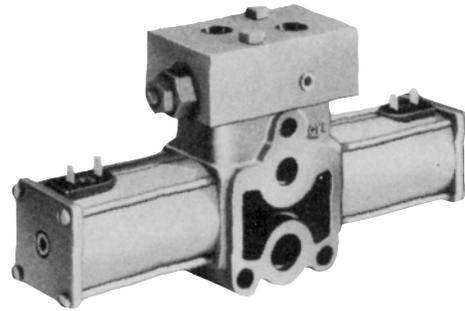
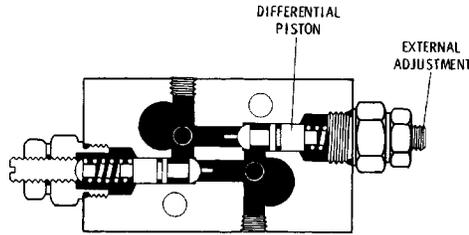
NOTE:
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ALL DIMENSIONS ARE NOMINAL.



Cylinder Port Relief MD04/MD06 Stack-Ons

Application

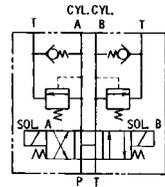
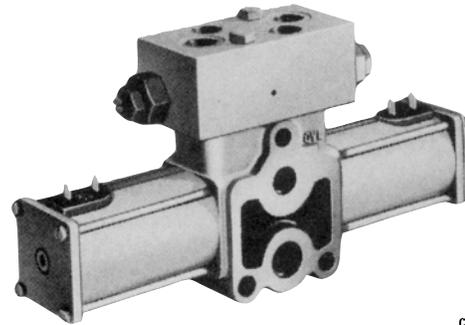
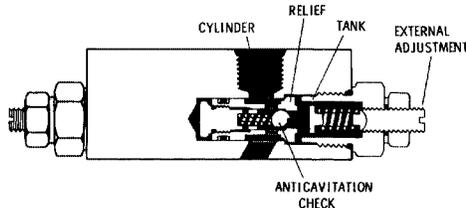
The cylinder port relief is used in motor circuits for shock protection or as a deceleration device when the 4-way valve is suddenly centered or reversed. The body is gasket mounted to the 4-way valve to reduce plumbing costs and has a differential piston relief valve in one or both (optional) cylinder ports. Because the relief valve dumps oil from one actuator line to the other, the valve should not be used with overrunning loads on differential area cylinders or cavitation will occur. It does not contain anti-cavitation checks.



Application

Cylinder Port Relief with Anticavitation Checks

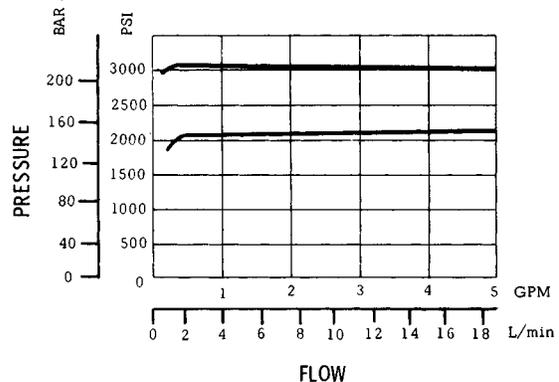
The cylinder port relief with anticavitation checks should be used when overrunning loads are encountered with differential cylinders. This valve functions the same as the one mentioned above except that each relief valve has an integral ball check and an external port for relief exhaust and anticavitation. When an overrunning load tends to cavitate the cylinder line, the ball check is unseated and oil is drawn from the external exhaust line. It is available with a relief valve in one or both (optional) cylinder ports.



Specifications

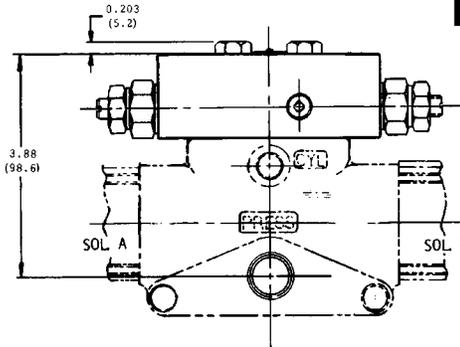
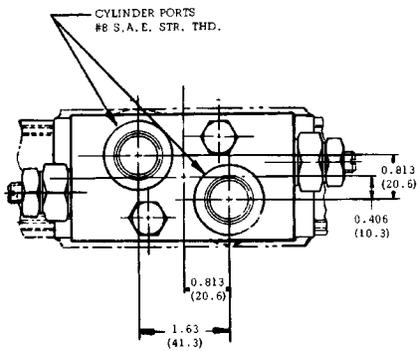
PRESSURE RATING: 3000 psi (207 bar)
 FLOW RATING: 12 gpm (45 L/min)
 MATERIAL: All steel
 MOUNTING: Unrestricted
 WEIGHT (Approx.): 3.5 lbs. (1.6 kg)

NOTE: DATA TAKEN WITH OIL VISCOSITY OF 105 SUS (21.8cSt) AT 120° (49°C).

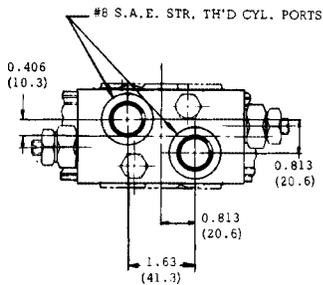


Dimensions - MD04/MD06 Stack-Ons

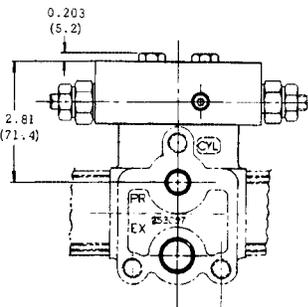
CYLINDER PORT RELIEF



**MD04 & MD06
SERIES
CIRCUIT**

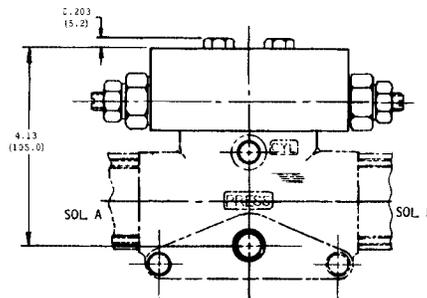
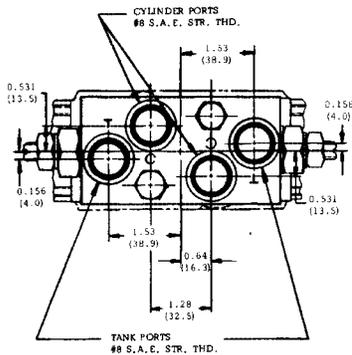


**INCHES
(MILLIMETRES)**
NOTE:
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ALL DIMENSIONS ARE NOMINAL.

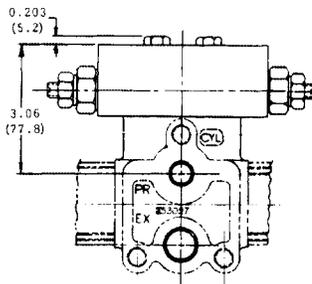
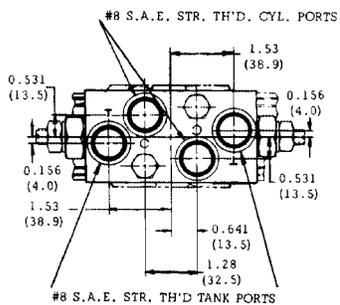


**MD04 & MD06
PARALLEL
CIRCUIT**

CYLINDER PORT RELIEF WITH ANTICAVITATION CHECKS



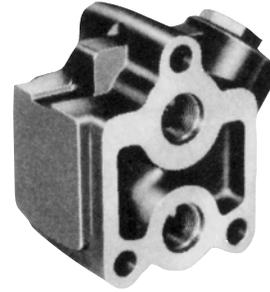
**MD04 & MD06
SERIES
CIRCUIT**



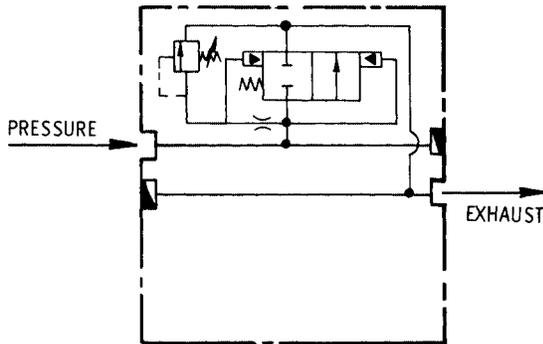
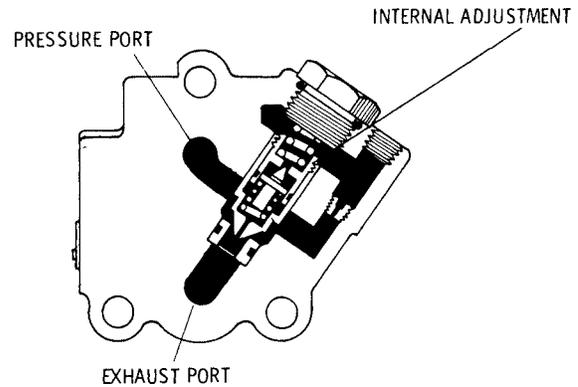
**MD04 & MD06
PARALLEL
CIRCUIT**

MD04/MD06 Parallel Circuit Stackable

Standard Relief

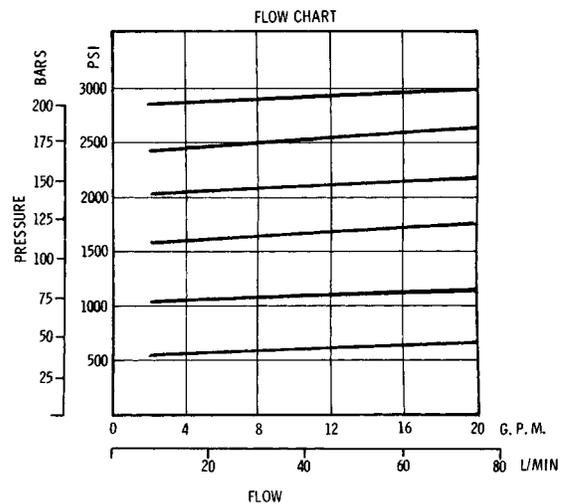


The relief valve bolts to the upstream side of the valve stack and is used to protect the pump and circuit from overpressure. It is a two-stage poppet design which gives a minimum pressure rise over the rated flow range. The ports on both sides of the body are threaded which enables the body to be plugged to either exhaust the relief externally or combine it with the exhaust of the 4-way valves. The adjustment is internal and to change the setting, the poppet must be removed and a screwdriver used to change the setting.



Specifications

- PRESSURE RATING — 3000 psi (207 bar)
- ADJUSTMENT RANGE — 500-3000 psi (35-207 bar)
- FLOW RATING — 12 gpm (45 L/min)
- STABILITY — $\pm 15\%$
- RESPONSE — .040 to .060 milliseconds (dependent on flow and psi)
- REPEATABILITY — ± 25 psi (1.7 bar)
- TEMPERATURE — Maximum oil temperature is 200°F (93°C).
- MATERIAL — Internal Parts — Steel
Body — Cast Iron
- MOUNTING — Unrestricted
- WEIGHT (Approx.) — Valve only 5.5 lbs. (2.5 kg)
Solenoid operated 7.5 lbs. (3.4 kg)

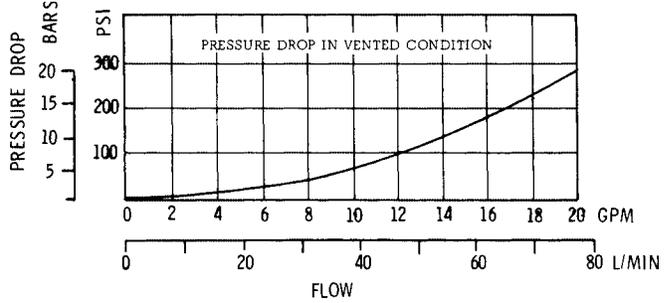
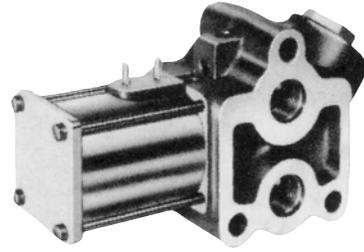


NOTE: DATA TAKEN WITH OIL VISCOSITY OF 105 SUS (21.8cSt) AT 120°F (49°C).

MD04/MD06 Parallel Circuit Stackable

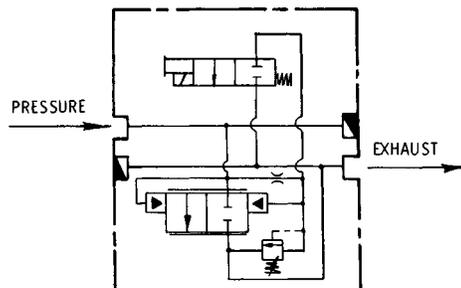
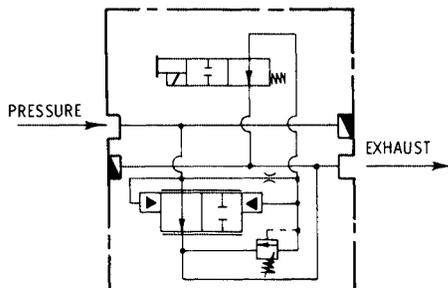
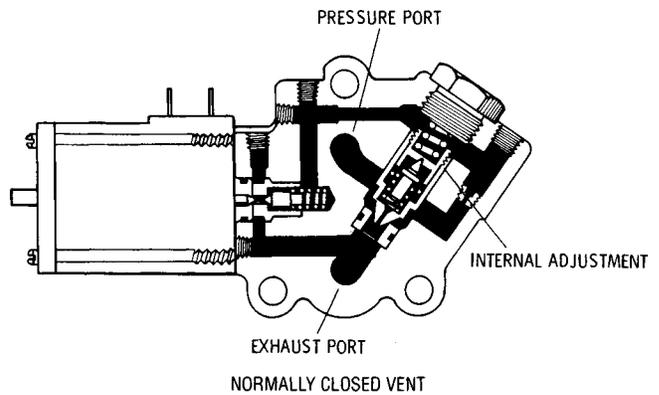
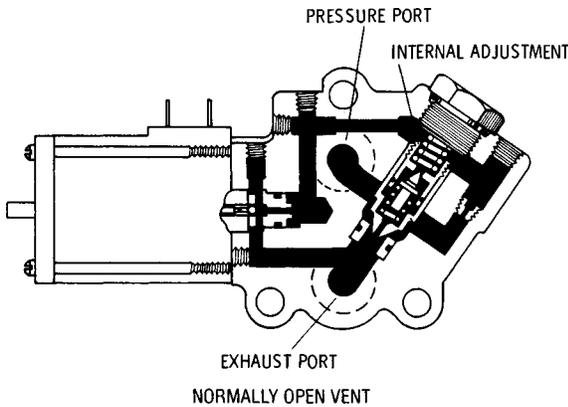
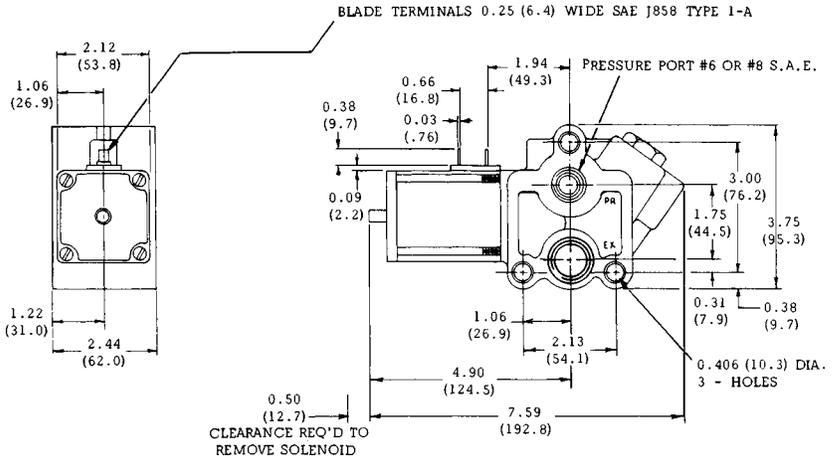
Solenoid Vented Relief

This valve is identical to the standard parallel relief except that it has a solenoid operated 2-way valve in the pilot line to vent the relief. Both normally open and normally closed valves are available. When a fixed displacement pump is used with a parallel circuit, the vent option enables the pump to unloaded when all of the 4-ways are centered. This prevents excessive heat build-up which in turn improves the circuit efficiency. Extended push pins are standard on the solenoid of this valve.

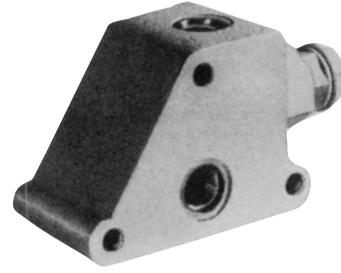


SOLENOID DATA

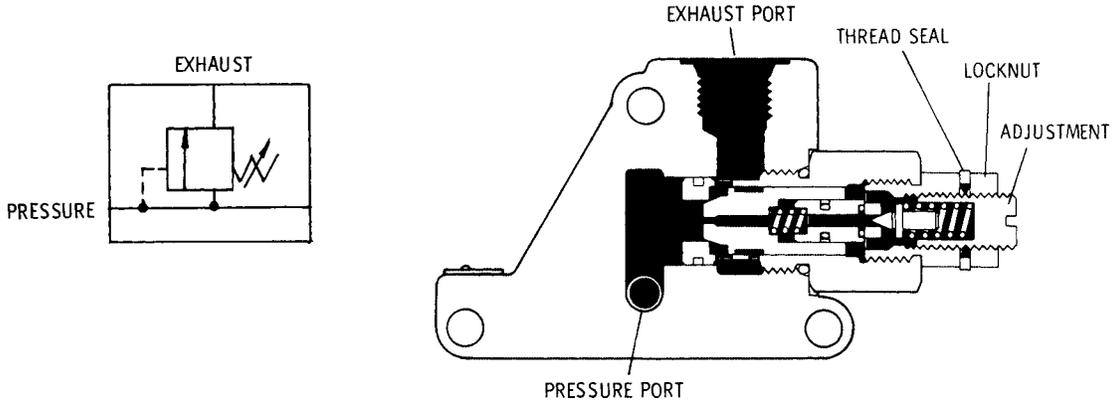
	Series 6 Encapsulated DC Solenoid
Duty	Continuous
Wattage @ 70°F	44
Wattage After 10 Min. Continuous Duty	27



MD04/MD06 Relief Valve Series Stackable

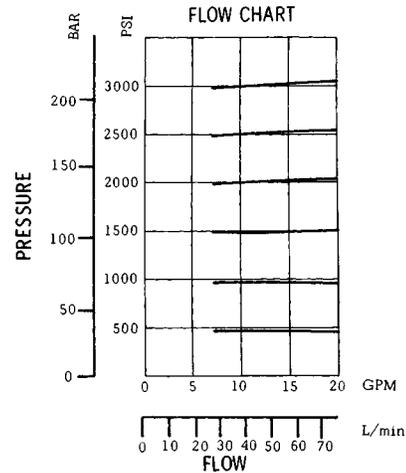


The relief valve bolts to the upstream side of the valve stack and is used to protect the pump and circuit from overpressure. It is a two-stage poppet design which gives a minimum pressure rise over the rated flow range. The relief has an external port for relief exhaust and an external adjustment.

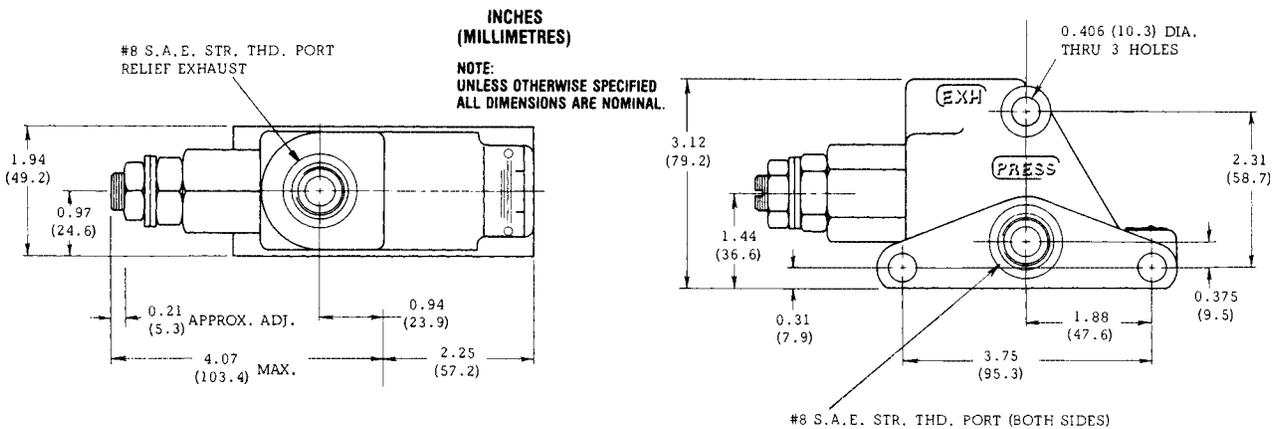


Specifications

- PRESSURE RATING — 3000 psi (207 bar)
- ADJUSTMENT RANGE — 500-3000 psi (34.5-207 bar)
- FLOW RATING — 12 gpm (45 L/min)
- RESPONSE — .030-.120 sec. (dependent on flow and psi)
- REPEATABILITY — ± 25 psi (1.7 bar)
- STABILITY — $\pm 15\%$
- TEMPERATURE — Maximum fluid temperature is 200°F (93°C)
- MOUNTING — Unrestricted
- MATERIAL — Internal parts — steel
Body — cast iron
- WEIGHT (Approx.) — 6.5 lbs. (3.0 kg)



Dimensions



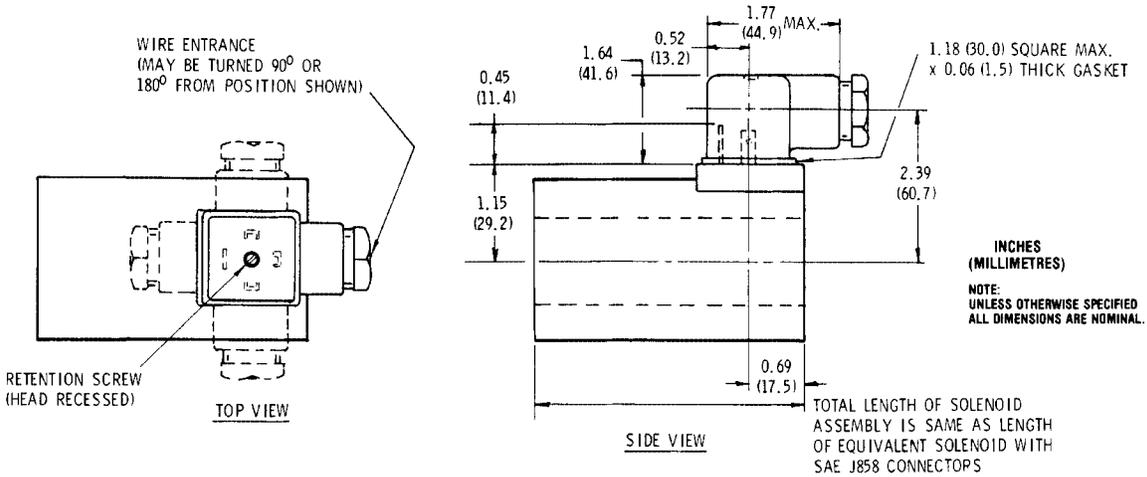
Solenoid Options - MD04/MD06

HIRSCHMANN SOLENOID -

The female connector (DIN 43650) enables quick disconnecting of the power from the solenoid. A compression fitting is used to hold the cord and the connector can be rotated in 90° intervals. The female connector is not included with the valve and must be ordered separately.

FEMALE HIRSCHMANN CONNECTOR
(MUST BE SPECIFIED SEPARATELY)

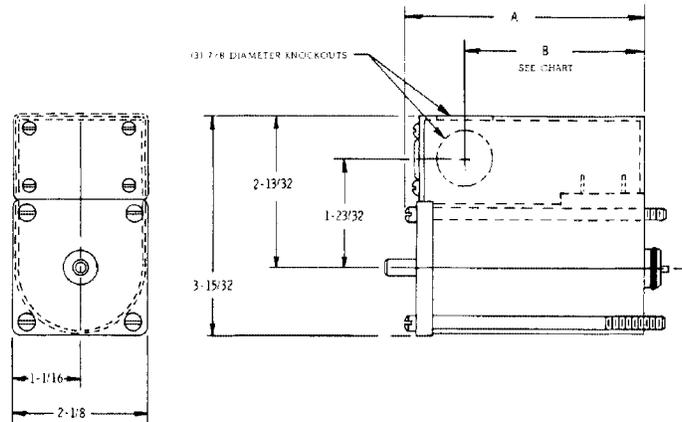
NUMBER OF SOLENOIDS	PART NUMBER
SINGLE	951923
DOUBLE	951924



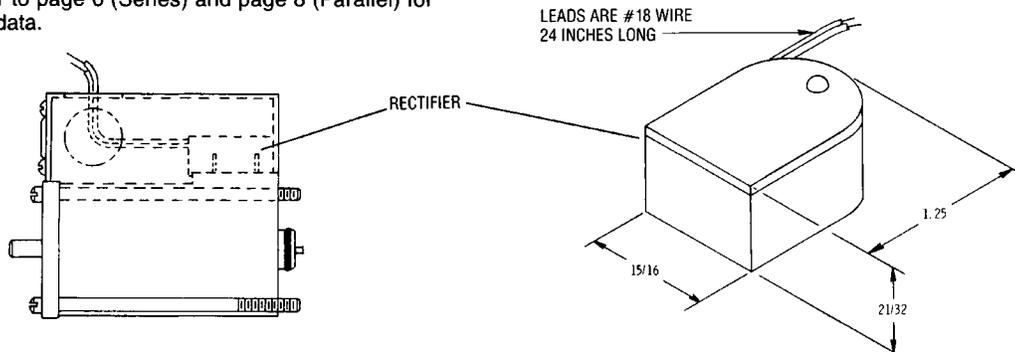
ELECTRICAL ENCLOSURE -

A sheet metal enclosure which fits around the solenoid and provides a protected wiring cavity. It has three conduit knockouts through which power can be brought into the wiring cavity.

VALVE	A	B
1/4"	2- ⁵³ / ₆₄	1- ²⁹ / ₃₂
3/8"	3- ⁴⁹ / ₆₄	2- ²⁷ / ₃₂



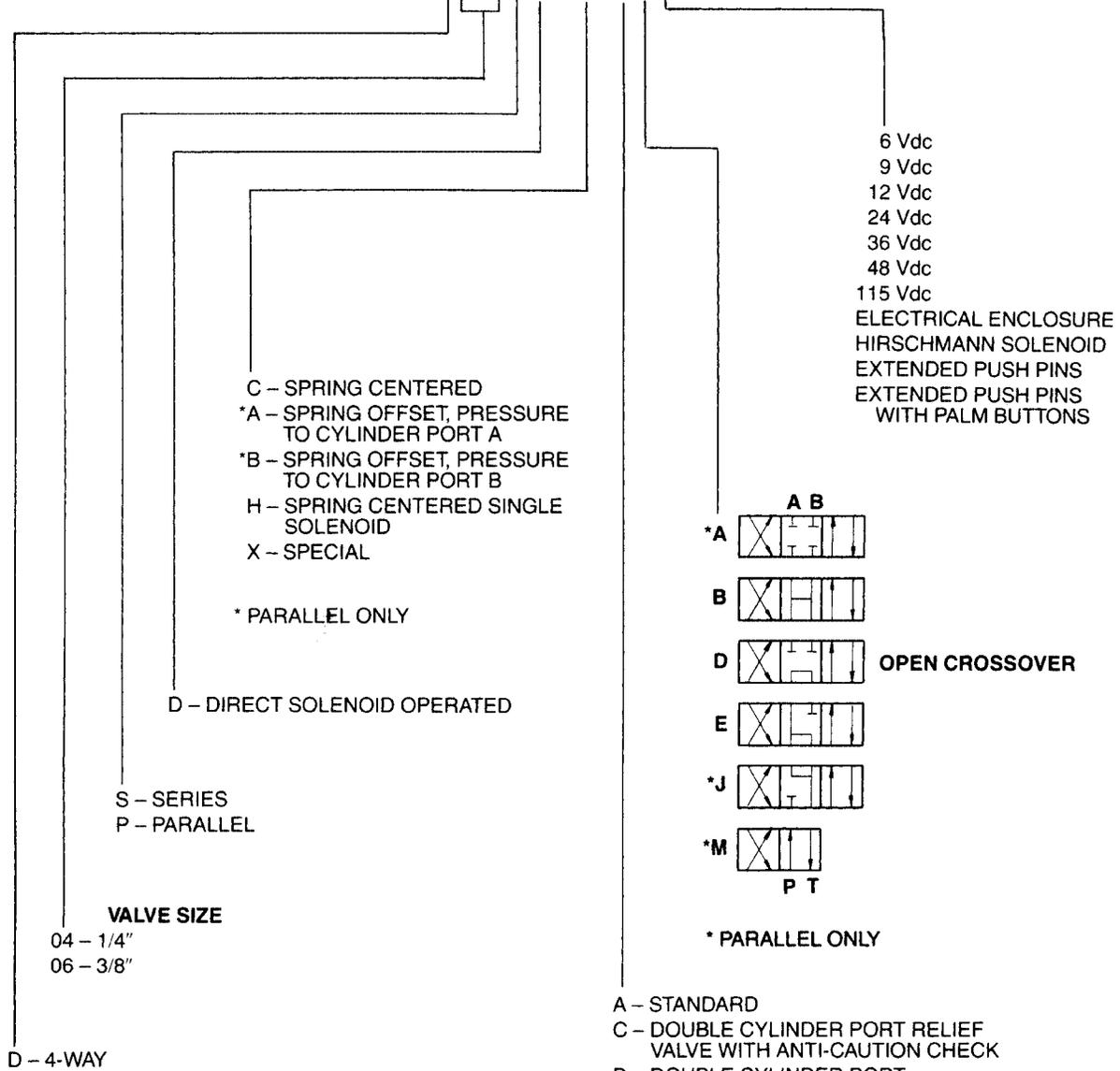
AC SOLENOID - The AC solenoid consists of a 100 Vdc coil with a rectifier cap which fits on the standard spade terminals. The rectifier cap has two wire leads which are connected to the 115 Vac power supply. The electrical enclosure described above is standard with the AC solenoid. The same solenoid is used on the 1/4" and 3/8" valves. Refer to page 6 (Series) and page 8 (Parallel) for dimensional data.



Ordering Information – MD04/MD06

4 WAY VALVE

MD04-SDNC-AB*



- A – STANDARD
- C – DOUBLE CYLINDER PORT RELIEF VALVE WITH ANTI-CAUTION CHECK
- D – DOUBLE CYLINDER PORT RELIEF VALVE
- E – SINGLE CYLINDER PORT RELIEF VALVE
- R – SINGLE CYLINDER LOCK VALVE
- S – DOUBLE CYLINDER LOCK VALVE
- T – SINGLE CYLINDER LOCK VALVE WITH THERMAL RELIEF
- U – DOUBLE CYLINDER LOCK VALVE WITH THERMAL RELIEF

Ordering Information - MR06

RELIEF VALVE

MR-06-BDN*

- B D - PARALLEL BODY - TWO STAGE SOLENOID
STACKABLE OPERATED (N.O.)
- C D - PARALLEL BODY - TWO STAGE SOLENOID
STACKABLE OPERATED (N.C.)
- J F - PARALLEL BODY - TWO STAGE
STACKABLE W/TWO EXTERNAL PORTS
-
- R F - SERIES BODY - TWO STAGE
STACKABLE W/EXTERNAL PORT
FOR RELIEF EXHAUST —
#8 SAE ONLY

06 - #8 (PRESSURE PORT IS
#6 SAE ON PARALLEL VALVES)

SPECIFY SOLENOID VOLTAGE

- 6 VDC
- 12 VDC
- 24 VDC
- 115 VOLT RECTIFIED
AC TYPE SOL
(SERIES '9')
- HIRSCHMANN SOLENOIDS
(DIN - 43650)
- COIL CONNECTOR
- GROUND LEAD WIRE
- AC ENCLOSURE ONLY
- EXTENDED MANUAL PUSH
PINS ARE STANDARD
- EXTENDED MANUAL PUSH
PINS W/PALM BUTTON
- FOR OTHER VOLTAGE SOLENOIDS
CONSULT FACTORY.

PRESSURE SETTING

- B - 250
- C - 500
- D - 750
- E - 1000
- F - 1250
- G - 1500
- H - 1750
- J - 2000
- K - 2250
- L - 2500
- M - 2750
- N - 3000

 **WARNING**

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