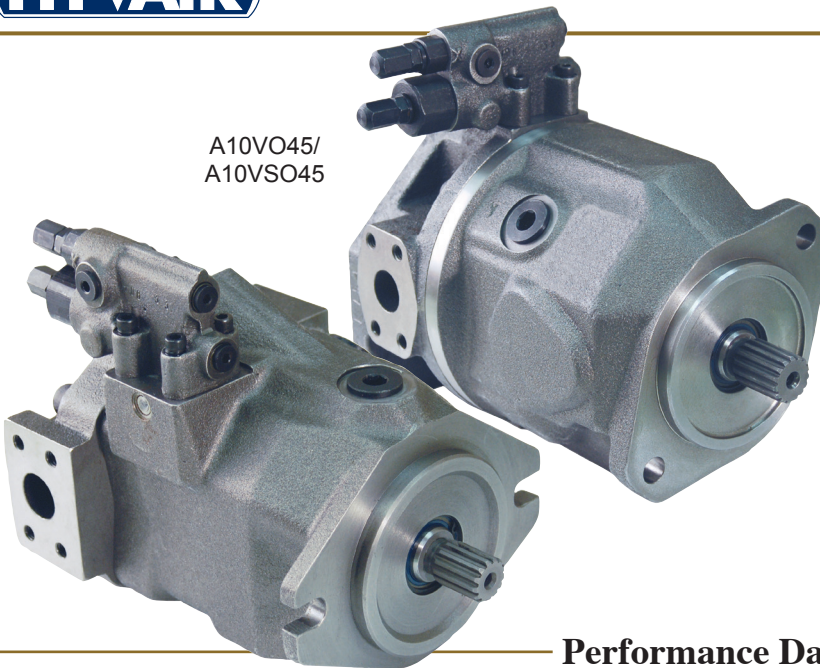


A10VO45/  
A10VSO45



### Specifications

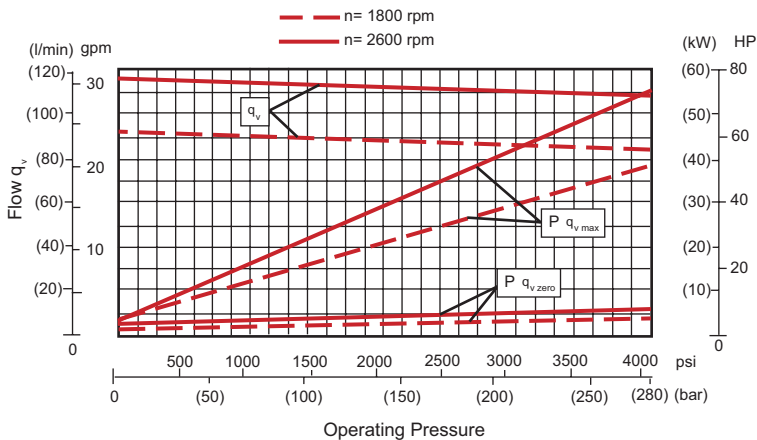
#### A10VO45/ A10VSO45 Inline (Series 52) & 45° (Series 31)

<b>Working Pressure</b>	4000 psi
<b>Maximum Pressure</b>	5000 psi
<b>Maximum Speed</b>	2600 rpm
<b>Displacement per rev</b>	2.75 cu-in (45.0 cc)
<b>Flow @ 1800 rpm</b>	21.4 gpm (81 lpm)
<b>Maximum Torque</b>	200 Nm (1770 in/lbs)
<b>Weight</b>	46.3 lbs (21 kgs)

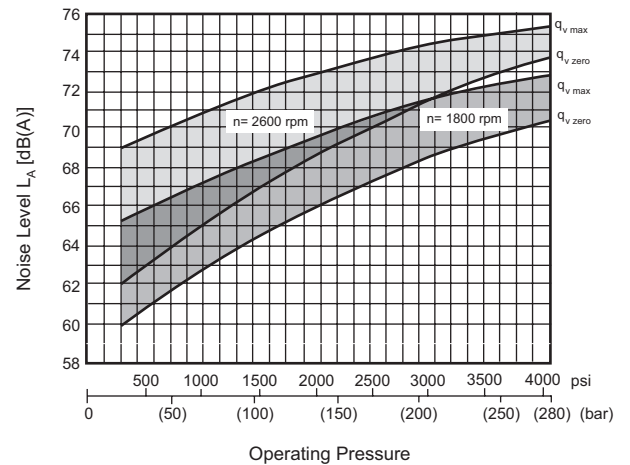
### Performance Data

Typical performance curves based on ISO VG32 Oil @ 122°F, (50°C)

#### Pressure vs. Flow



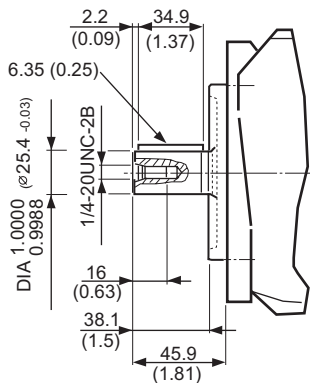
#### Noise Level



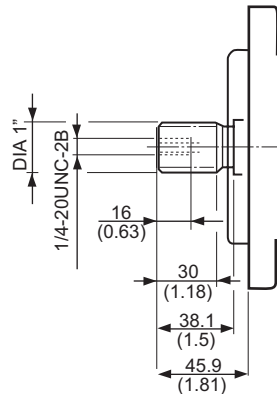
### Shaft Ends

Units: mm (inches)

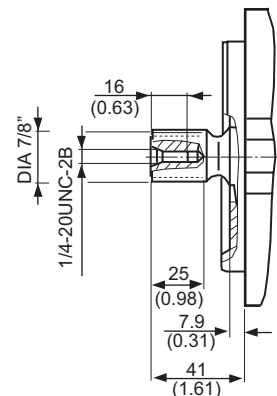
**K** Straight Keyed Shaft 1" dia.  
SAE BB 1.375" long w/ 1/4" key



**S** Splined Shaft 1" dia.  
SAE BB 15T (16/32 DP)



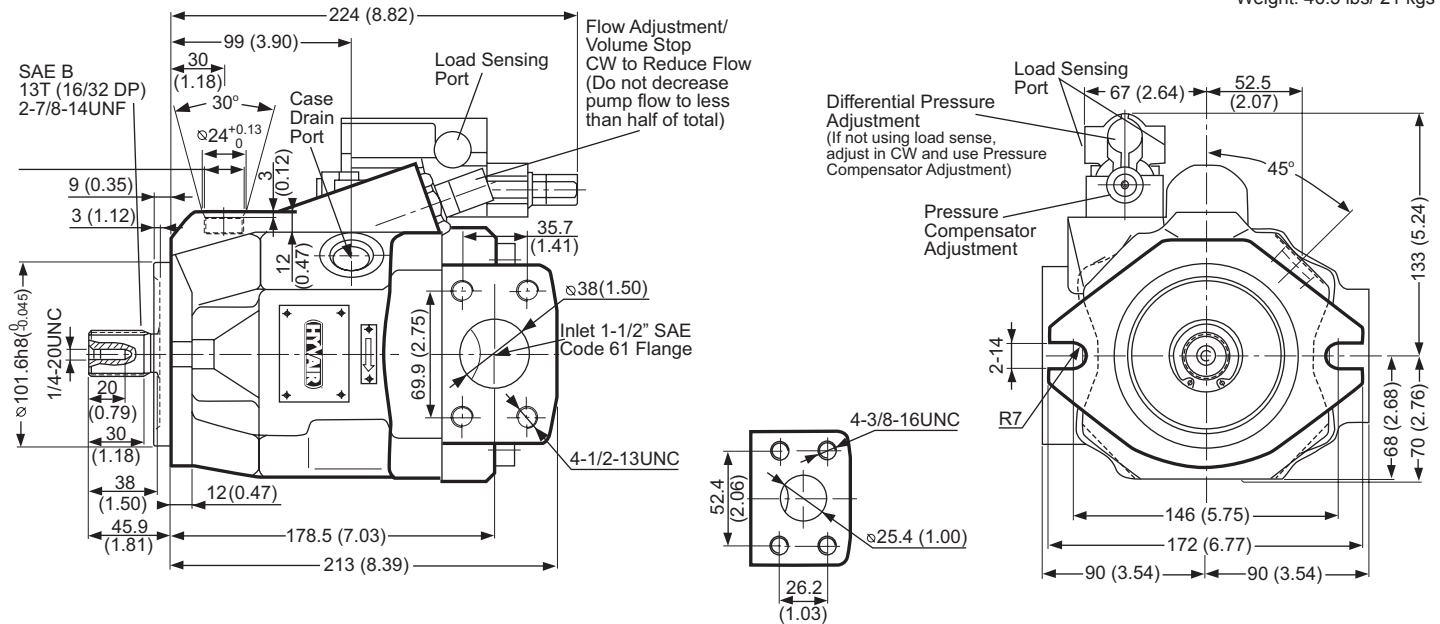
**U** Splined Shaft 7/8" dia.  
SAE B 13T (16/32 DP)



### Dimensional Data

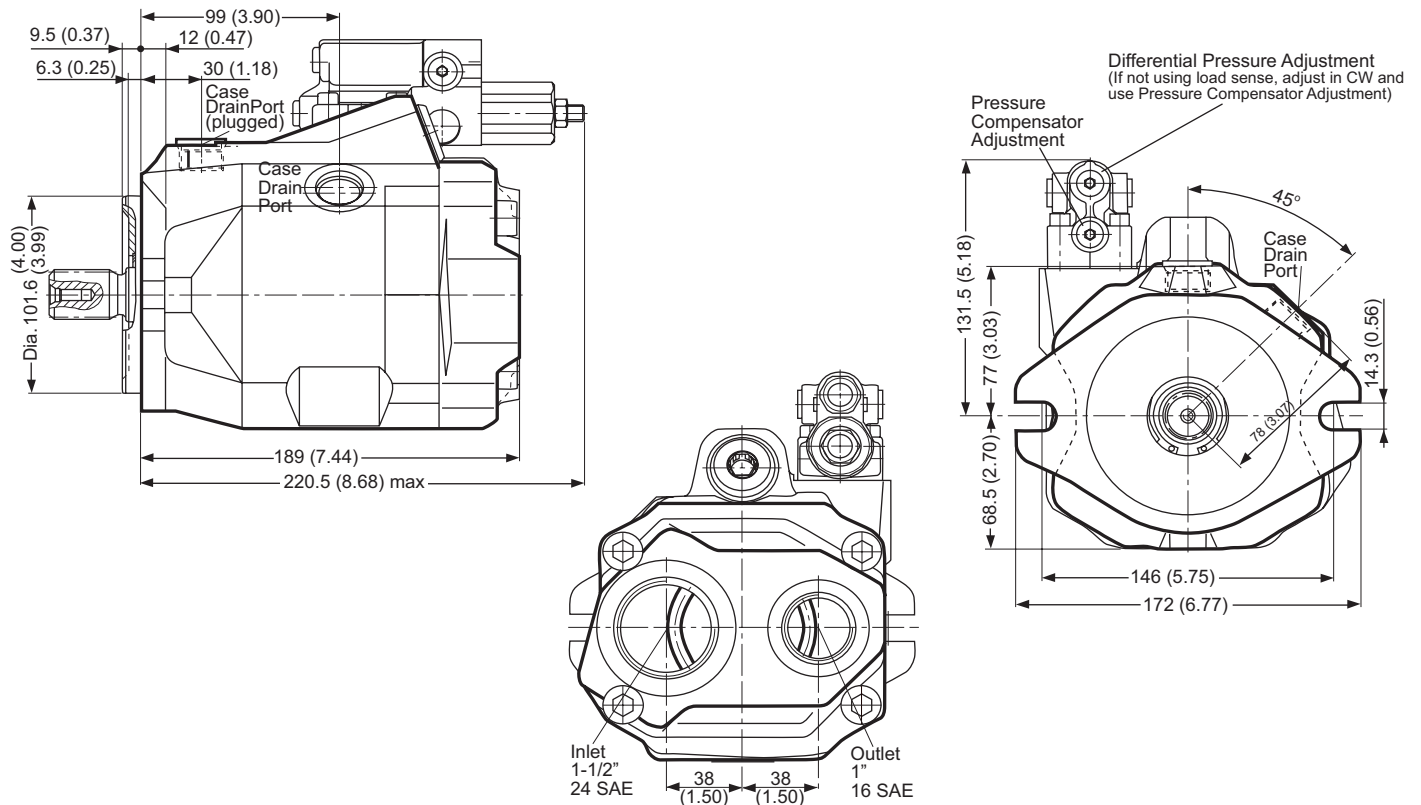
#### A10VSO45DFR/52R-PUC62-N00 - (PCP21-4K-2BS-2)

Units: mm (inches)  
Weight: 46.3 lbs/ 21 kgs



#### A10VSO45DFR/52R-PKC64-N00 - (PCP21-4K-2BBK-3)

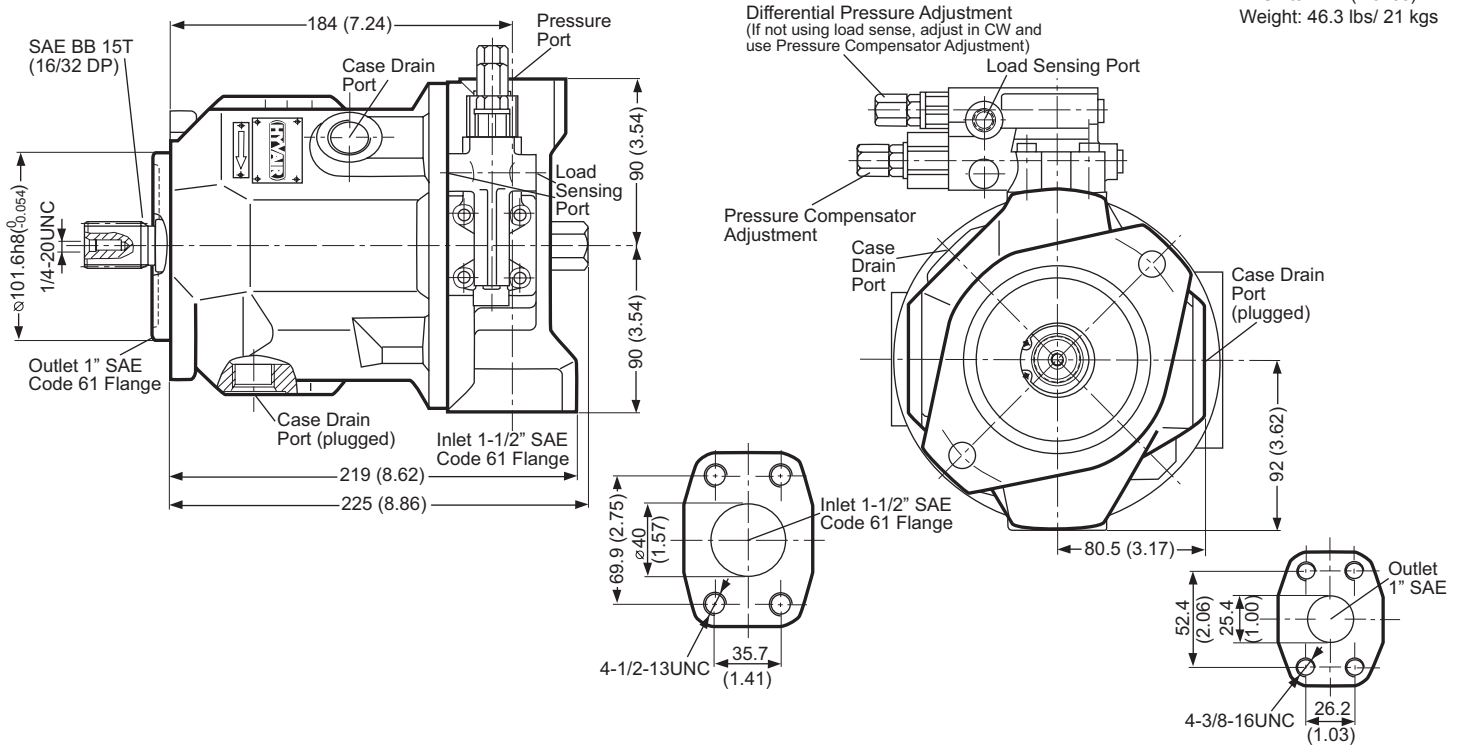
Units: mm (inches)  
Weight: 46.3 lbs/ 21 kgs



### Dimensional Data

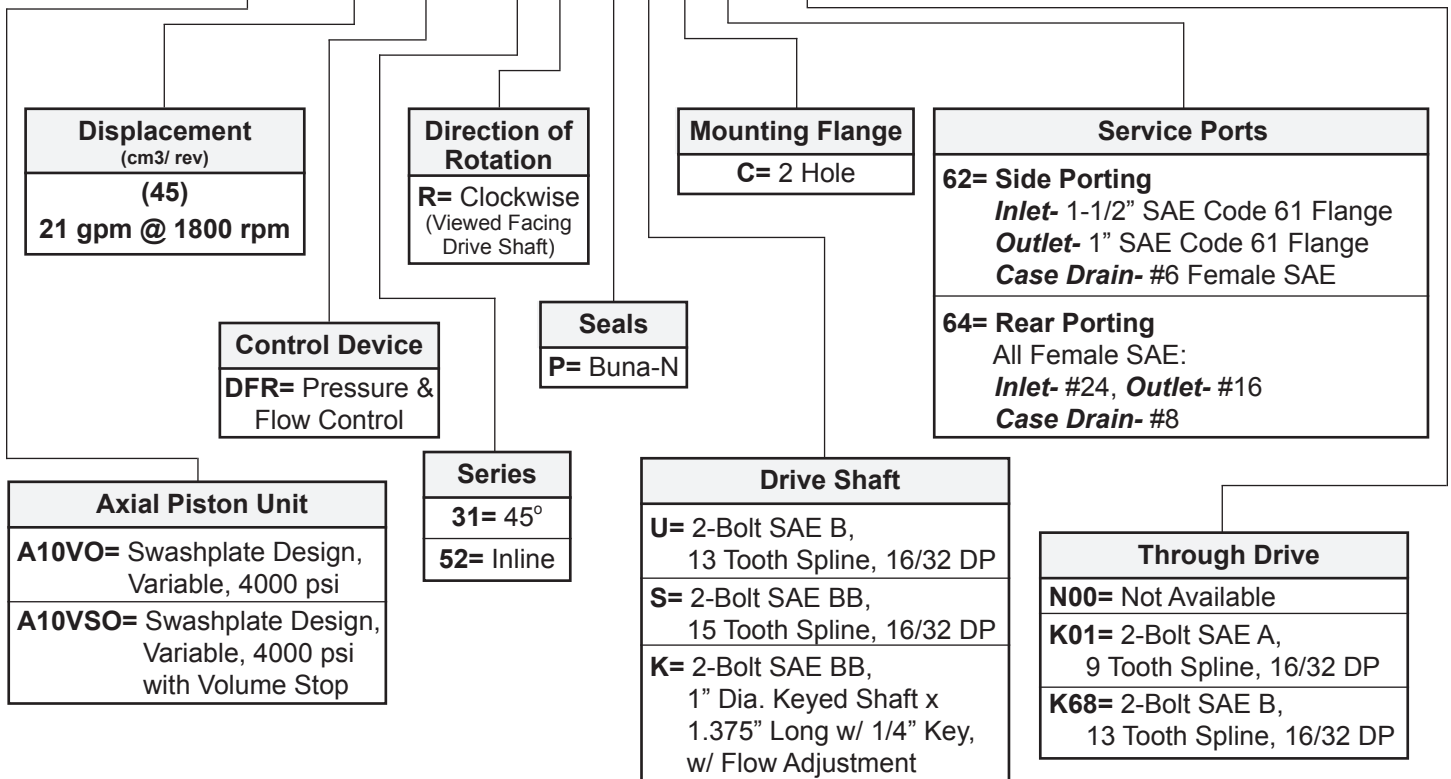
#### A10VO45DFR/31R-PSC62-K01 - (PCP21-4K-2BBS-2AS-2) (Rear SAE A Drive)

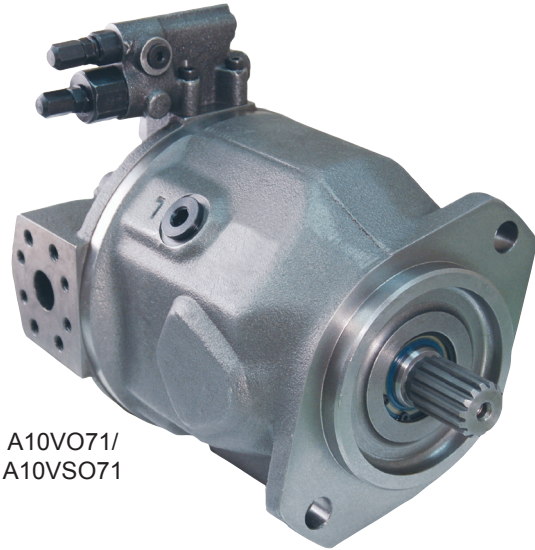
Units: mm (inches)  
Weight: 46.3 lbs/ 21 kgs



### Ordering Information

#### A10VSO 45 DFR - 52 R - P U C 62 - N00





A10V071/  
A10VSO71

### Specifications

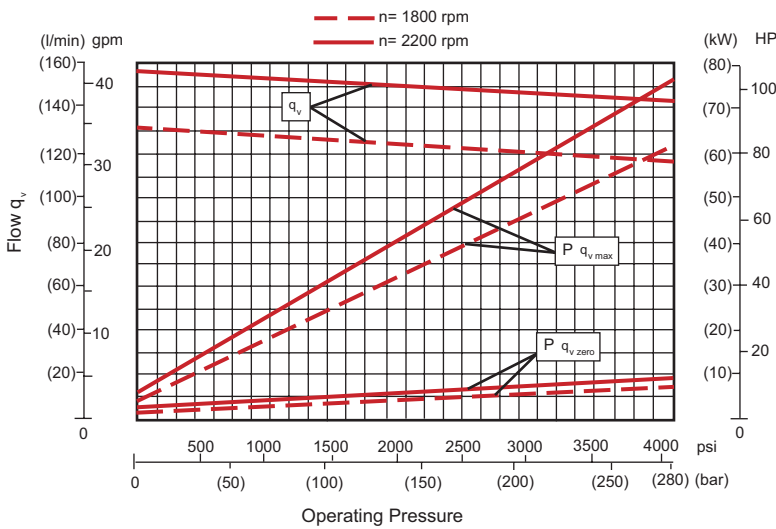
#### A10V071/ A10VSO71 45° (Series 31)

<b>Working Pressure</b>	4000 psi
<b>Maximum Pressure</b>	5000 psi
<b>Maximum Speed</b>	2200 rpm
<b>Displacement per rev</b>	4.33 cu-in (71.0 cc)
<b>Flow @ 1800 rpm</b>	33.8 gpm (128 lpm)
<b>Maximum Torque</b>	316 Nm (2797 in/lbs)
<b>Weight</b>	72.8 lbs (33 kgs)

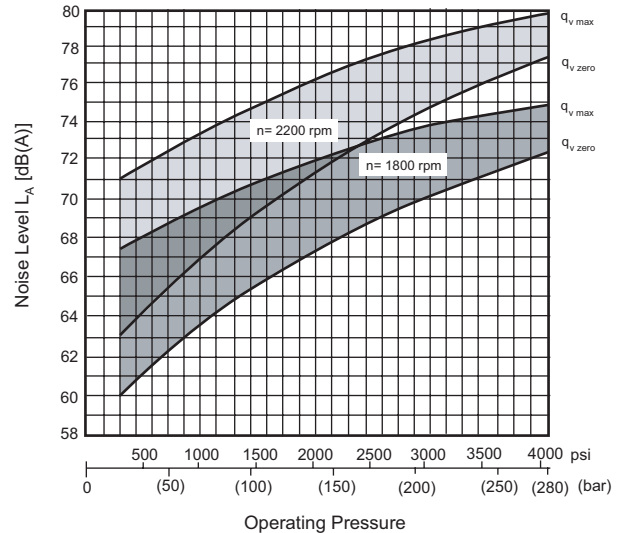
### Performance Data

Typical performance curves based on ISO VG32 Oil @ 122°F, (50°C)

#### Pressure vs. Flow



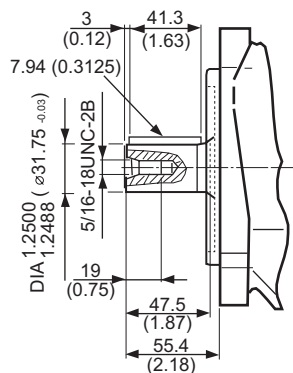
#### Noise Level



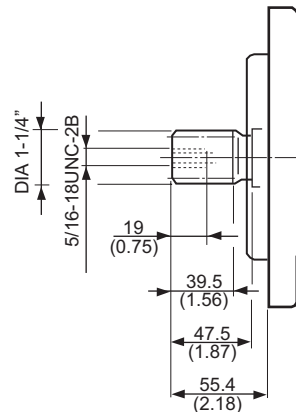
### Shaft Ends

Units: mm (inches)

**K** Straight Keyed Shaft 1-1/4" dia.  
SAE C 1.625" long w/ 5/16" key



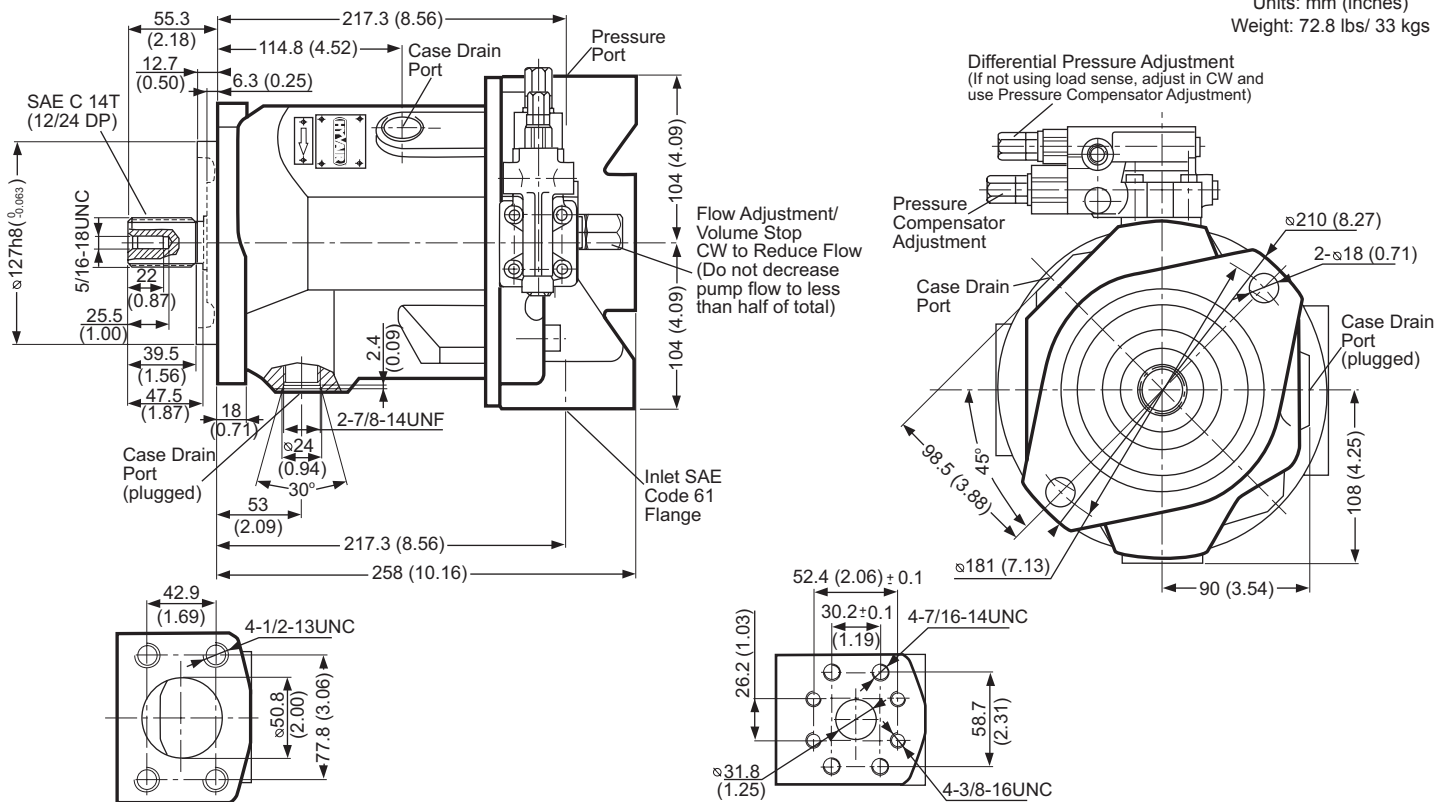
**S** Splined Shaft 1-1/4" dia.  
SAE C 14T (12/24 DP)



### Dimensional Data

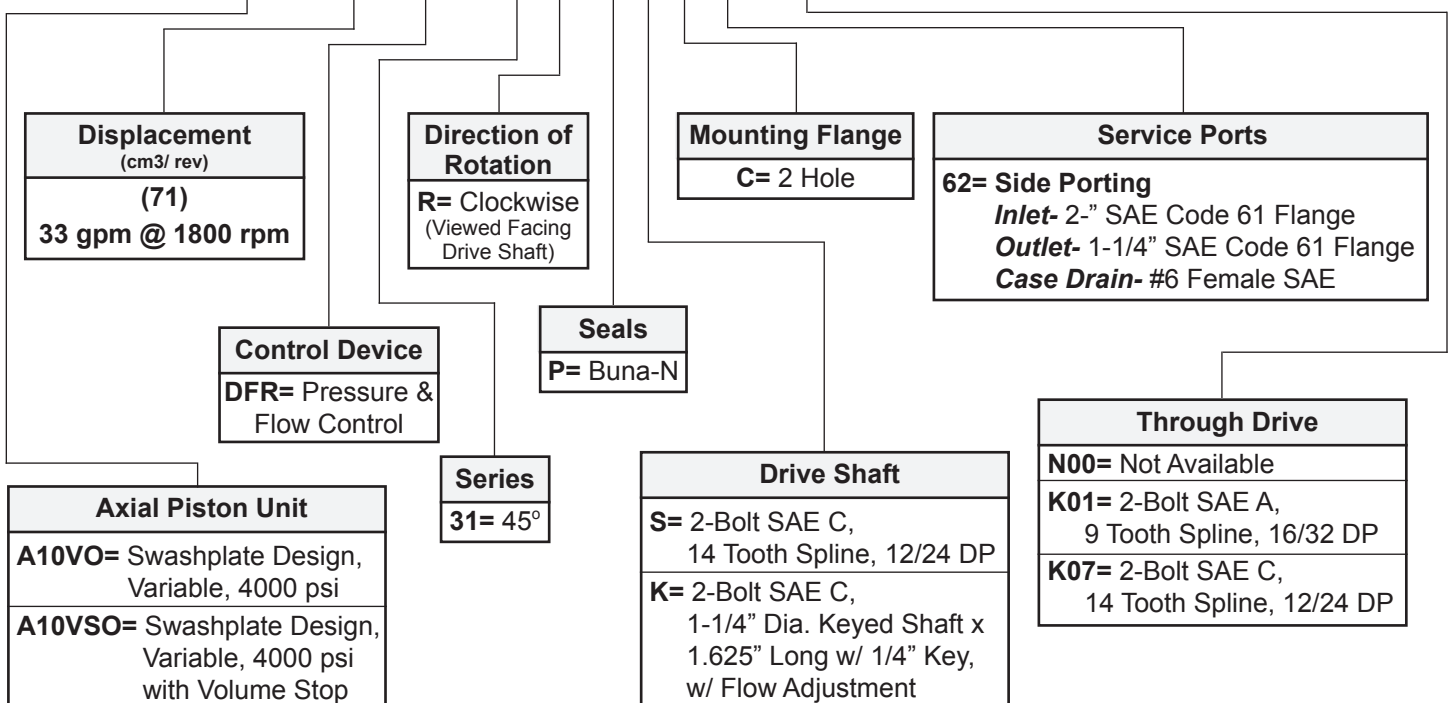
#### A10VSO71DFR/31R-PSC62-N00 - (PCP33-4K-2CS-2)

Units: mm (inches)  
Weight: 72.8 lbs/ 33 kgs



### Ordering Information

#### A10VSO 71 DFR - 31 R - P K C 62 - N00





A10VSO100

### Specifications

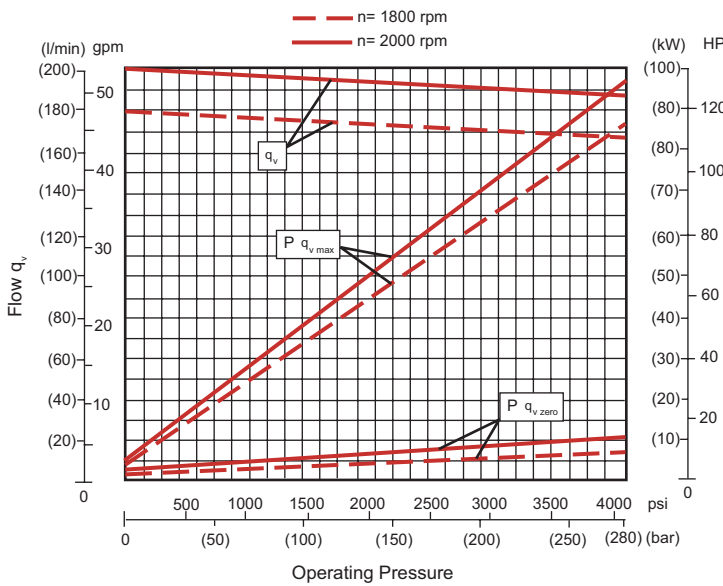
#### A10VSO100 90° (Series 31)

<b>Working Pressure</b>	4000 psi
<b>Maximum Pressure</b>	5000 psi
<b>Maximum Speed</b>	2000 rpm
<b>Displacement per rev</b>	6.10 cu-in (100.0 cc)
<b>Flow @ 1800 rpm</b>	47.5 gpm (180 lpm)
<b>Maximum Torque</b>	445 Nm (3939 in/lbs)
<b>Weight</b>	99.2 lbs (45 kgs)

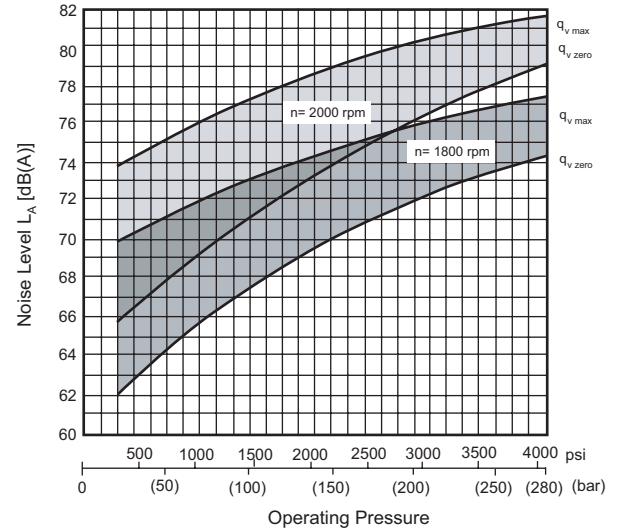
### Performance Data

Typical performance curves based on ISO VG32 Oil @ 122°F, (50°C)

#### Pressure vs. Flow



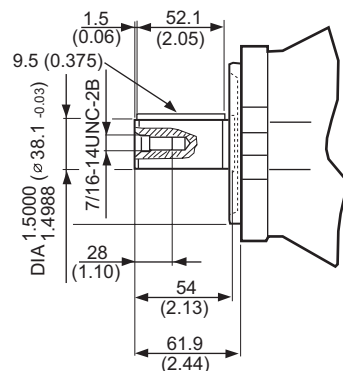
#### Noise Level



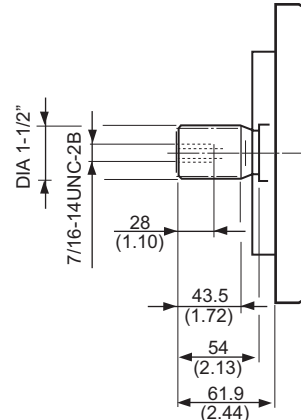
### Shaft Ends

Units: mm (inches)

**K** Straight Keyed Shaft 1-1/2" dia.  
SAE CC 2.05" long w/ 3/8" key



**S** Splined Shaft 1-1/2" dia.  
SAE CC 17T (12/24 DP)







INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS

**A SERIES**

## Pneumatic Actuated Ball Valves





## Standard Features

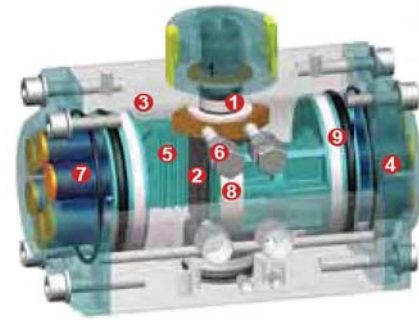
**1 Indicator** A position indicator with Namur mounting is standard on all pneumatic actuators for mounting accessories.

**2 Pinion** The hardened alloy steel pinion is precision ground and nickel plated (over 15um) in order to reduce friction, provide maximum wear resistance.

**3 Actuator Body** The aluminum extrusion is hard anodized (over 30um) to protect against wear and corrosion while reducing piston friction to the absolute minimum. Other options such as Nickel, Ceramic, PTFE, Polyester coated are available.

**4 End Caps** Epoxy coated (over 80um) die cast aluminum end caps provide maximum resistance against potentially corrosive elements.

**5 Pistons** The precisely-balanced and hard anodized treatment (over 30um) die cast aluminum pistons are fitted with high quality rings and guides. The twin rack and piston design creates a constant torque output on all actuators.



**6 Travel Adjustment** The standard adjustment is  $\pm 5^\circ$  in both the open and closed positions through easily accessible external adjustment bolts.

**7 High Performance Springs** The high tensile steel springs Epoxy coated for corrosion resistance and longer service. The pre-loaded springs can be safely and rapidly disassembled.

**8 Bearings and Guides** The highly durable compound material provides high trust stability with minimum friction and long life.

**9 O-Rings** NBR O-rings provide trouble-free operation at standard temperature ranges.

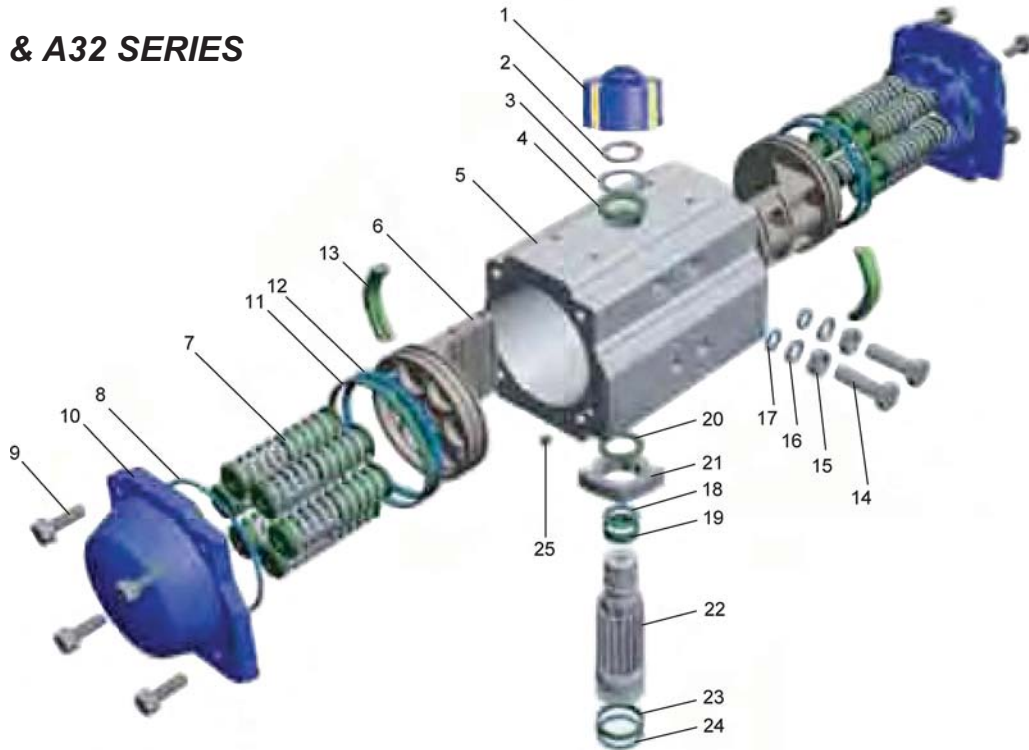
## Specifications

### Standard Operating Conditions

- **Pressure Ranges**.....Double Acting - 29 psig (2 bar) to 116 psig (8 bar)  
Spring Return - 44 psig (3 bar) to 116 psig (8 bar)
- **Temp. Ranges**.....-4° to 176°F (-20° to 80°C)
- **Operating Media**.....Filtered dry or lubricated air for non-corrosive gas, water or light hydraulic oil. The maximum particle size must not exceed 30 microns.
- **Stroke Adjustment**....0° and 90° with standard adjustment  $\pm 5^\circ$ .
- **Lubrication**.....All moving parts are factory lubricated for the entire life cycle of actuator.
- **Construction**.....Twin piston rack & pinion actuator design, suitable for indoor & outdoor installation.
- **Connections**.....Bottom drilling complies with ISO 5211/DIN 3337 to match valve. Interface for solenoid valve, shaft top end and top drilling for assembling accessories are in accordance with VDI/ VDE-3845, NAMUR standard.
- **Inspection** .....Every actuator is hydraulically tested, certified and guaranteed for a minimum of 1,000,000 cycles.

**Parts List**

**A16, A20 & A32 SERIES**

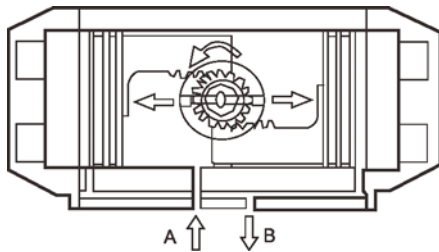


Item	Description	Material	Protection	Qty
1	Indicator	Plastic		1
2	Spring Clip	Stainless Steel		1
3	Thrust Washer (Pinion)	Stainless Steel		1
4	Thrust Bearing (Pinion)	Nylon 66		1
5	Actuator Body	Extruded Aluminum Alloy	Hard Anodized (over 30um)	1
6	Piston	Die Cast Aluminum Alloy	Hard Anodized (over 30um)	2
7	Spring (Cartridge)	High Performance Spring Steel	Epoxy Coated	8 or 10
8	End Cap Seals	NBR		2
9	End Cap Bolts	Stainless Steel		8
10	End Cap	Die Cast Aluminum	Epoxy Coated (over 80um)	2
11	Piston Bearing	Nylon 66		2
12	Piston Seal	NBR		2
13	Piston Guide	Nylon 66		2
14	Stroke Bolt	Stainless Steel		2
15	Stroke Bolt Retaining Nut	Stainless Steel		2
16	Stroke Bolt Washer	Stainless Steel		2
17	Stroke Bolt O-Ring	NBR		2
18	O-Ring (Top Pinion)	NBR		1
19	Bearing (Top Pinion)	Nylon 66		1
20	Thrust Bearing (Pinion)	Nylon 66		1
21	Stroke Cam	Stainless Steel		1
22	Pinion	Alloy Steel	Nickel Plated (over 15um)	1
23	Bearing (Lower Pinion)	Nylon 66		1
24	O-Ring (Lower Pinion)	NBR		1
25	Plug	NBR		2

**Operating Principles**

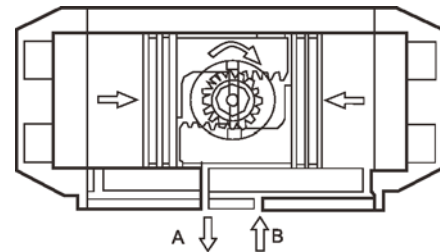
**DOUBLE ACTING**

**CCW Counter-Clockwise**



Air to port A forces the pistons outward, causing the piston to turn counter-clockwise while air is being exhausted from port B.

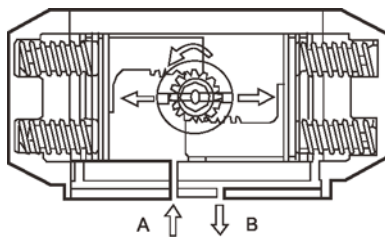
**CW Clockwise**



Air to port B forces the pistons inward, causing the piston to turn clockwise while air is being exhausted from port A.

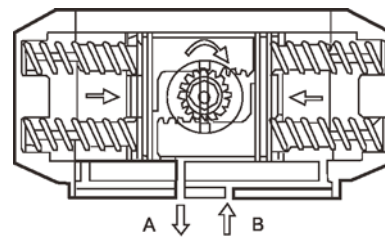
**SPRING RETURN**

**CCW Counter-Clockwise**



Air to port A forces the pistons outward, causing the springs to compress. The pinion turns counter-clockwise while air is being exhausted through port B.

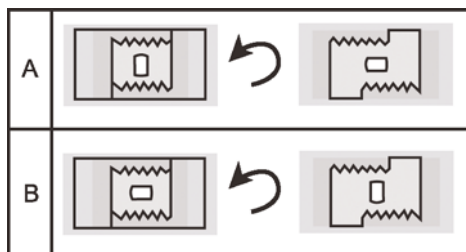
**CW Clockwise**



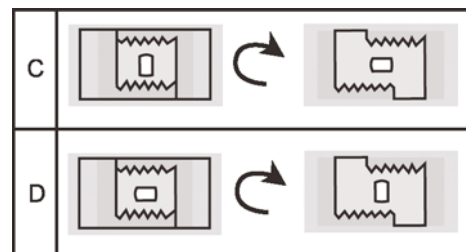
Loss of air pressure through port A allows the stored energy in the springs to force the pistons inward. The pinion turns clockwise while air is being exhausted through port A.

**MOUNTING VARIATIONS**

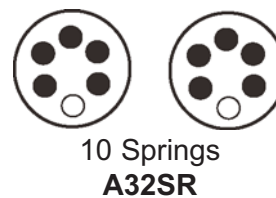
**CCW Counter-Clockwise**



**CW Clockwise**

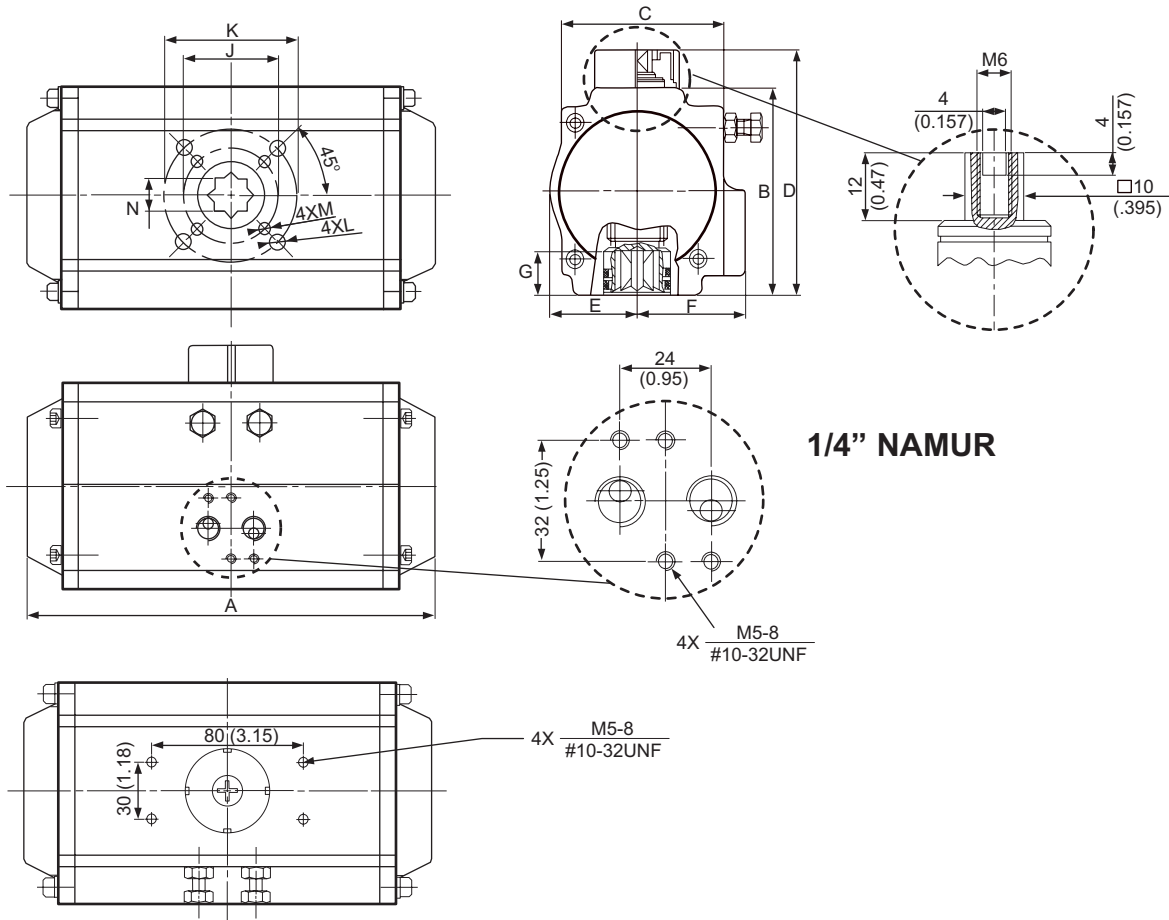


**SPRING ARRANGEMENT**



## Dimensional Data

Units: mm (inches)



MODEL	ISO5211 MTG. SIZE	A	B	C	D	E	F	G	N	J (dia)	K (dia)	L	M	Air Connection
A16 SR	F03 & F05	161 (6.34)	72 (2.83)	60 (2.36)	97.5 (3.84)	30 (1.18)	41.5 (1.63)	14 (0.55)	11 (0.43)	36 (1.42)	50 (1.97)	M6x10 1/4"-20UNC	M5x7.5 #10-32UNF	1/8" or 1/4" std.
A20 SR	F05 & F07	187 (7.36)	88 (3.46)	69 (2.72)	113 (4.45)	36 (1.42)	47 (1.85)	18 (0.71)	14 (0.55)	50 (1.97)	70 (2.76)	M8x13 5/16"-20UNC	M6x10 1/4"-20UNC	1/8" or 1/4" std.
A32 SR	F05 & F07	206 (8.11)	100 (3.94)	80 (3.15)	126 (4.96)	42 (1.65)	53 (2.09)	20 (0.79)	14 (0.55)	50 (1.97)	70 (2.76)	M8x13 5/16"-20UNC	M6x10 1/4"-20UNC	1/8" or 1/4" std.

## Technical Data

### AIR CONSUMPTION- Air Volume Opening & Closing

MODEL	Air Volume @ opening liter/ (cu. in.)	Air Volume @ closing liter/ (cu. in.)
A16 SR	0.09 (5.49)	0.12 (7.32)
A20 SR	0.14 (8.54)	0.20 (12.20)
A32 SR	0.21 (12.81)	0.30 (18.30)

### WEIGHT/ OPENING & CLOSING TIME

MODEL	A16		A20		A32	
	DA	SR	DA	SR	DA	SR
Screw Stroke adj. for 1" adj need	1/5 turn		1/5 turn		1/5 turn	
Opening Time (Sec.)	0.20	0.25	0.25	0.30	0.30	0.35
Closing Time (Sec.)	0.25	0.30	0.30	0.35	0.40	0.50
Approximate Weight kg (lbs)	1.0(2.2)	1.0(2.2)	1.6(3.5)	1.8(4.0)	2.6(5.7)	3.1(6.8)

## Torque Ratings

### DOUBLE ACTING

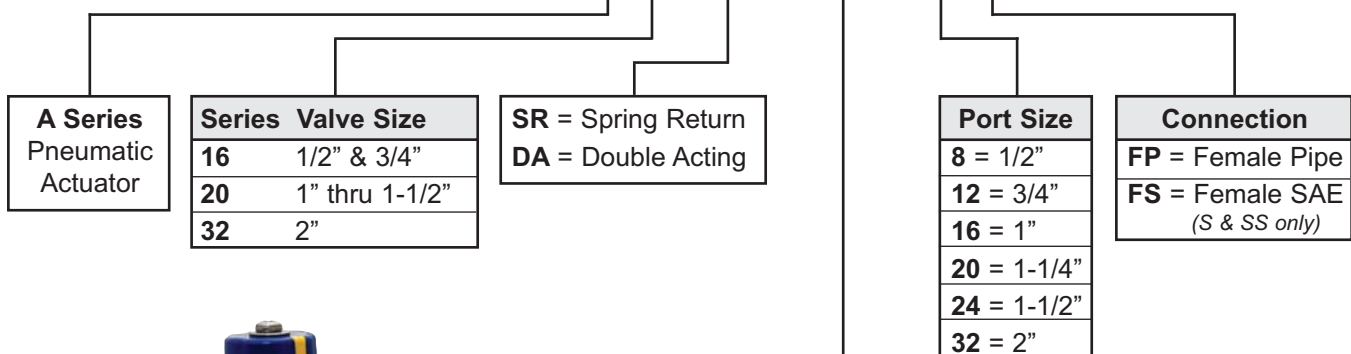
DOUBLE ACTING TORQUE RATINGS IN (in/ lbs)								
Supply Pressure	40psi	50psi	60psi	70psi	80psi	90psi	100psi	115psi
<b>MODEL</b>								
<b>A16 DA</b>	100	125	149	174	199	224	249	286
<b>A20 DA</b>	180	225	269	314	359	404	449	516
<b>A32 DA</b>	290	363	435	508	580	653	725	834

### SPRING RETURN

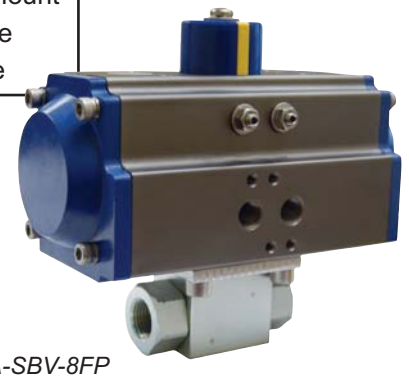
SPRING RETURN TORQUE RATINGS IN (in/ lbs)																
Supply Pressure	40psi		50psi		60psi		70psi		80psi		90psi		100psi		Spring Torque	
<b>MODEL</b>	0° Start	90° End	0° Start	90° End	0° Start	90° End	0° Start	90° End	0° Start	90° End	0° Start	90° End	0° Start	90° End	0° Start	90° End
<b>A16 SR</b>			69	37	93	61	118	86							56	88
<b>A20 SR</b>			125	72	169	116	214	161							100	153
<b>A32 SR</b>					244	175	318	248	390	320	462	393	535	465	190	260

## Ordering Information

**A 20 - SR - D2BV - 24 FP**



**D2** = 2 Pc SS Ball Valve, ISO5211 Mount  
**D3** = 3 Pc SS Ball Valve, ISO5211 Mount  
**B2** = 2 Pc Brass Ball Valve, ISO5211 Mount  
**B3** = 3 Pc Brass Ball Valve, ISO5211 Mount  
**S** = 3 Pc High Pressure Steel Ball Valve  
**SS** = 3 Pc High Pressure SS Ball Valve



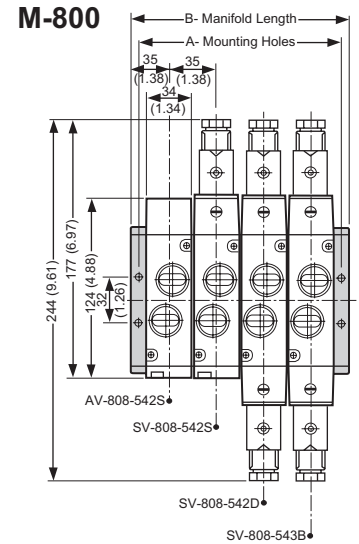
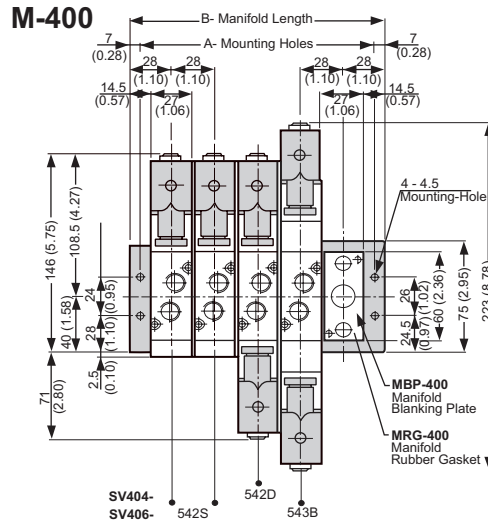
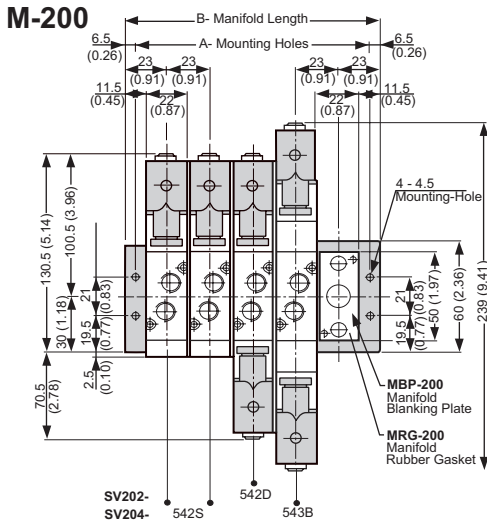
# MANIFOLDS

200, 400 & 800 SERIES



## Dimensional Data

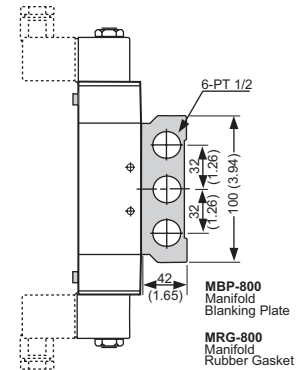
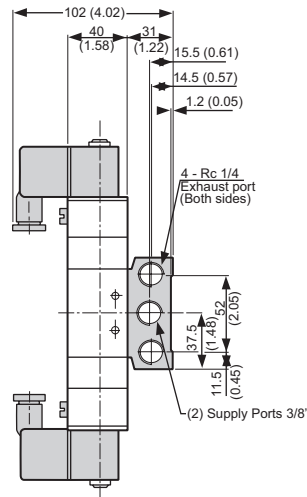
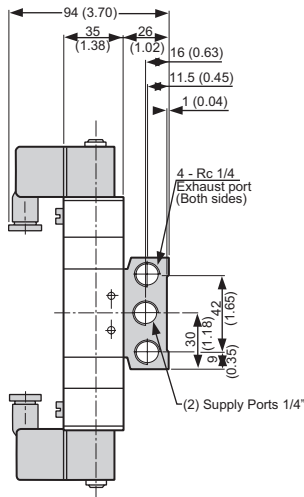
Units: mm/ (Inch)



	Number of Stations									
	1	2	3	4	5	6	7	8	9	10
Dim A	34	57	80	103	126	149	172	195	218	241
Dim B	46	69	92	115	138	161	184	207	230	253

	Number of Stations									
	1	2	3	4	5	6	7	8	9	10
Dim A	42	70	98	126	154	182	210	238	266	294
Dim B	54	82	110	138	166	194	222	250	278	306

	Number of Stations							
	1	2	3	4	5	6	7	8
Dim A	49	84	119	154	189	224	259	294
Dim B	63	98	133	168	203	238	273	308



## Ordering Information

### M - 400 - 4S

Code	Description	Model	# Stations
M	Manifold	200	1-10 available
		400	
		800	

**Manifold Blanking Plate**  
MBP- 200, 400 & 800 Series

**Manifold Rubber Gasket**  
MRG- 200, 400 & 800 Series





INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS

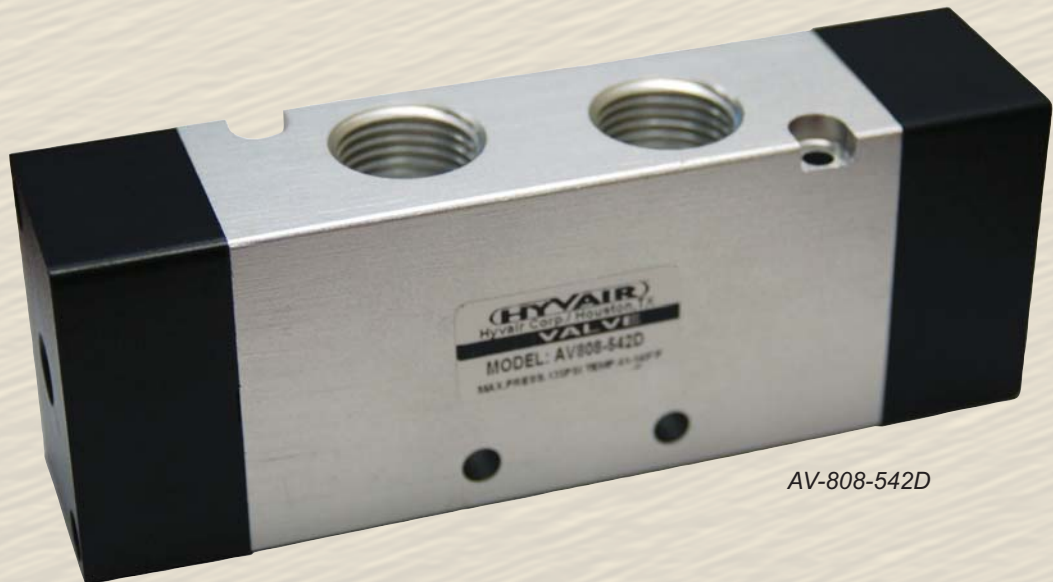


**AV SERIES**

## Air Piloted Valves



AV-406-542S



AV-808-542D



# AV Series

## Air Piloted Valves

### Features

- Available: 1/8", 1/4", 3/8" and 1/2" ports
- All 4-way valves may be manifold mounted
- U-cup type seals allow low shifting pressures and avoid sticking
- Anodized aluminum spools
- Same base valve also available as SV series, solenoid valve
- Dual porting available in 200/ 400 series



### Specifications

- **Media:** Air (No other gases or liquids)
- **Operation:** Direct Air Pilot
- **Operation Temperature Range:** 41°-140°F (5°-60°C)
- **Max. Pressure:** 135 psig (9.3 bar)
- **Working Pressure:** 20 - 100 psig (1.4 - 6.9 bar)
- **Flows:**

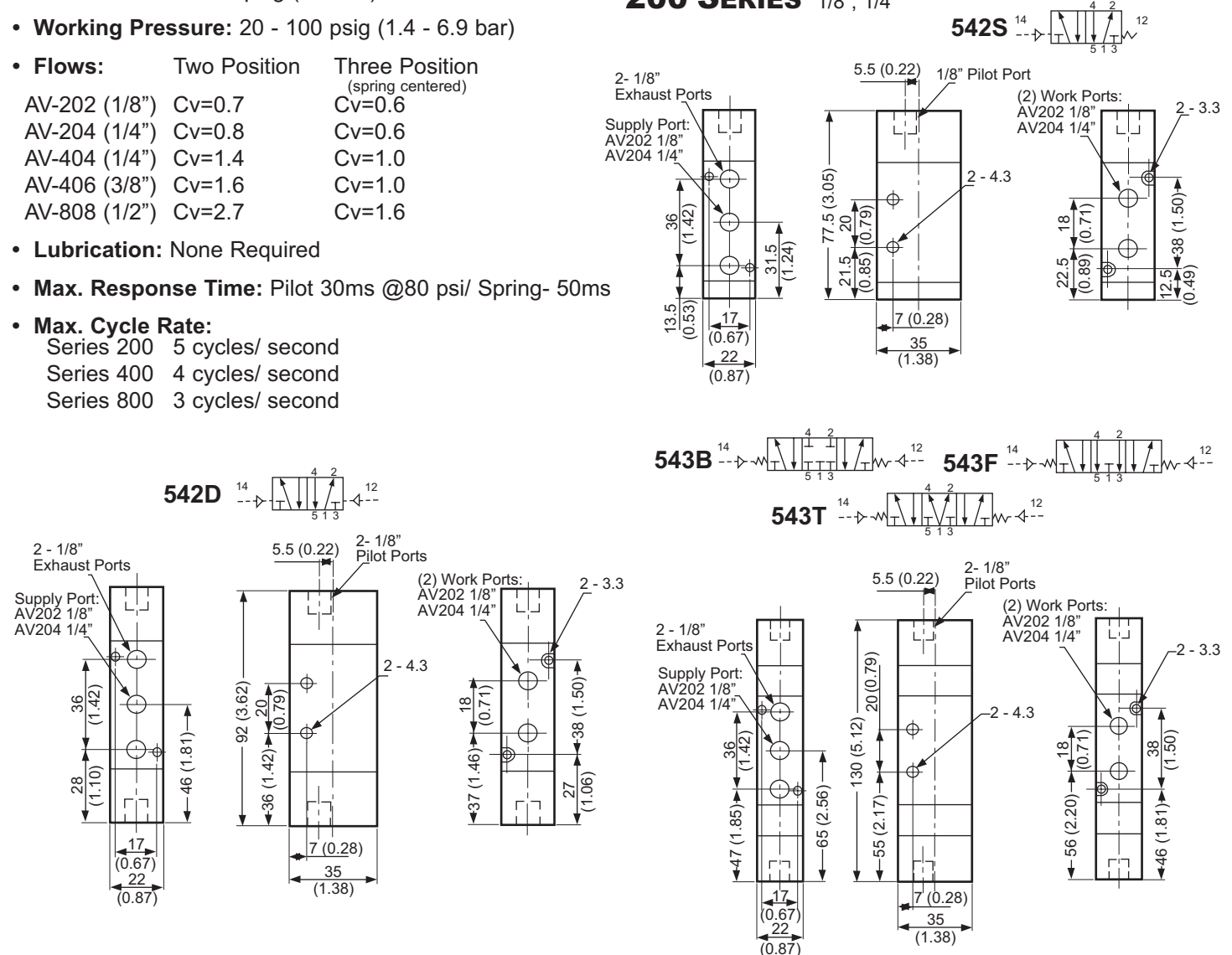
	Two Position	Three Position (spring centered)
AV-202 (1/8")	Cv=0.7	Cv=0.6
AV-204 (1/4")	Cv=0.8	Cv=0.6
AV-404 (1/4")	Cv=1.4	Cv=1.0
AV-406 (3/8")	Cv=1.6	Cv=1.0
AV-808 (1/2")	Cv=2.7	Cv=1.6
- **Lubrication:** None Required
- **Max. Response Time:** Pilot 30ms @80 psi/ Spring- 50ms
- **Max. Cycle Rate:**

Series 200	5 cycles/ second
Series 400	4 cycles/ second
Series 800	3 cycles/ second

### Dimensional Data

Units: mm/ (Inch)

#### 200 SERIES 1/8", 1/4"

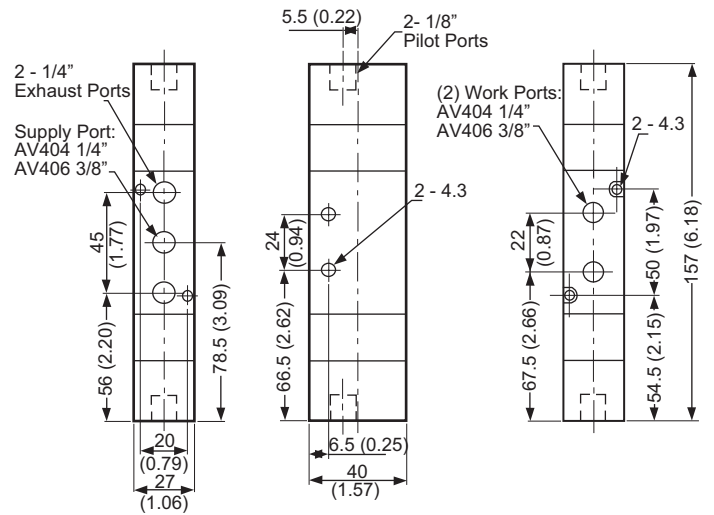
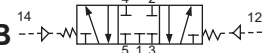
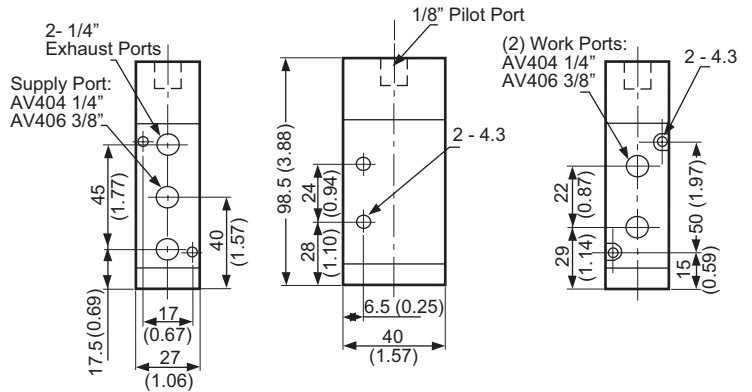
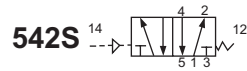
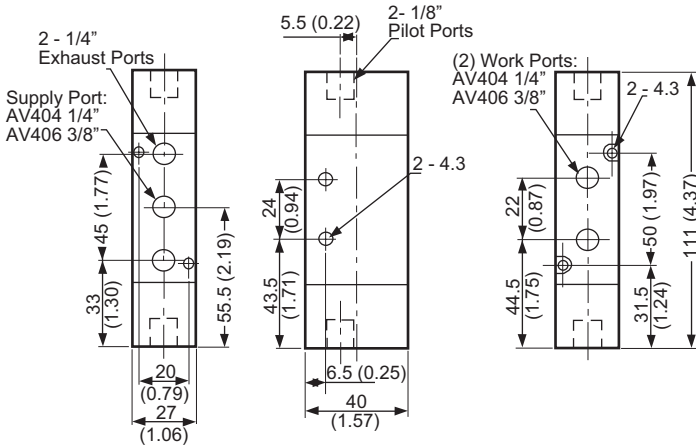
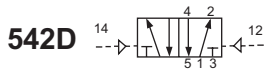




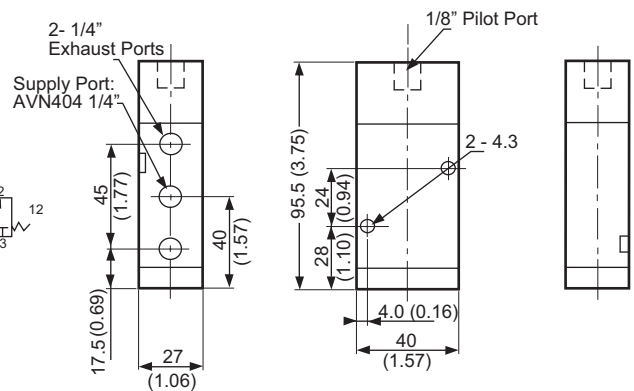
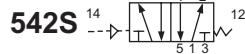
## Dimensional Data

Units: mm/ (Inch)

### 400 SERIES 1/4", 3/8"



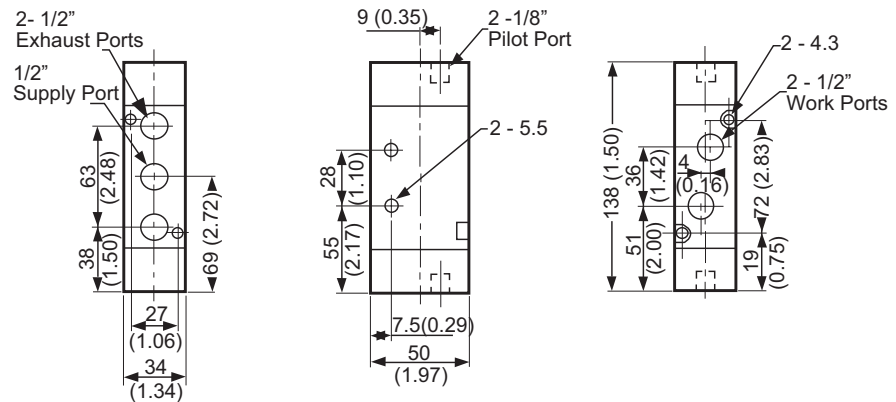
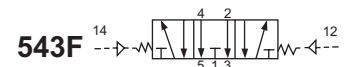
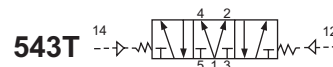
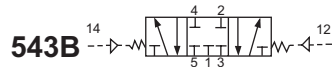
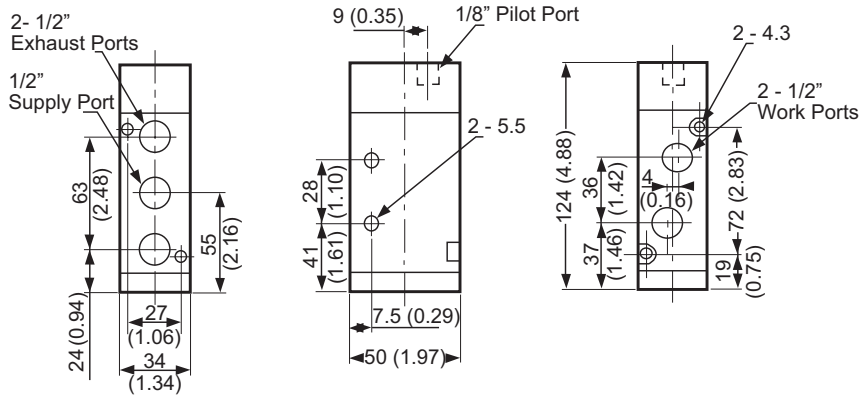
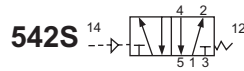
### 400 SERIES NAMUR 1/4"



## Dimensional Data

Units: mm/ (Inch)

### 800 SERIES 1/2"



## Ordering Information

### AV - 404 - 542S

<b>AV Series</b> Air Piloted Valves <b>AVN Series</b> Air Piloted Valves Namur Mount	<b>202</b>	1/8" Ports	<b>542S</b> 5 Port, 4 Way, 2 Pos. Spring Return (Single Pilot) <b>542D</b> 5 Port, 4 Way, 2 Pos. Detented (Double Pilot) <b>543B</b> 5 Port, 4 Way, 3 Pos. Spring Centered (Double Pilot) All Ports Blocked
	<b>204</b>	1/4" Ports (1/8" Exhaust)	
	<b>404</b>	1/4" Ports	
	<b>406</b>	3/8" Ports (1/4" Exhaust)	
	<b>808</b>	1/2" Ports	

See dimensional information for other 543 spools available.



INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS



## APS SERIES

### Air Pump Shut Off Valves



APS-D2BV-24FP

## A20SR Standard Features

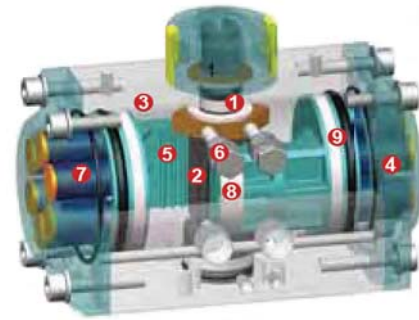
**1 Indicator** A position indicator with Namur mounting is standard on all pneumatic actuators for mounting accessories.

**2 Pinion** The hardened alloy steel pinion is precision ground and nickel plated (over 15um) in order to reduce friction, provide maximum wear resistance.

**3 Actuator Body** The aluminum extrusion is hard anodized (over 30um) to protect against wear and corrosion while reducing piston friction to the absolute minimum. Other options such as Nickel, Ceramic, PTFE, Polyester coated are available.

**4 End Caps** Epoxy coated (over 80um) die cast aluminum end caps provide maximum resistance against potentially corrosive elements.

**5 Pistons** The precisely-balanced and hard anodized treatment (over 30um) die cast aluminum pistons are fitted with high quality rings and guides. The twin rack and piston design creates a constant torque output on all actuators.



**6 Travel Adjustment** The standard adjustment is  $\pm 5^\circ$  in both the open and closed positions through easily accessible external adjustment bolts.

**7 High Performance Springs** The high tensile steel springs Epoxy coated for corrosion resistance and longer service. The pre-loaded springs can be safely and rapidly disassembled.

**8 Bearings and Guides** The highly durable compound material provides high trust stability with minimum friction and long life.

**9 O-Rings** NBR O-rings provide trouble-free operation at standard temperature ranges.

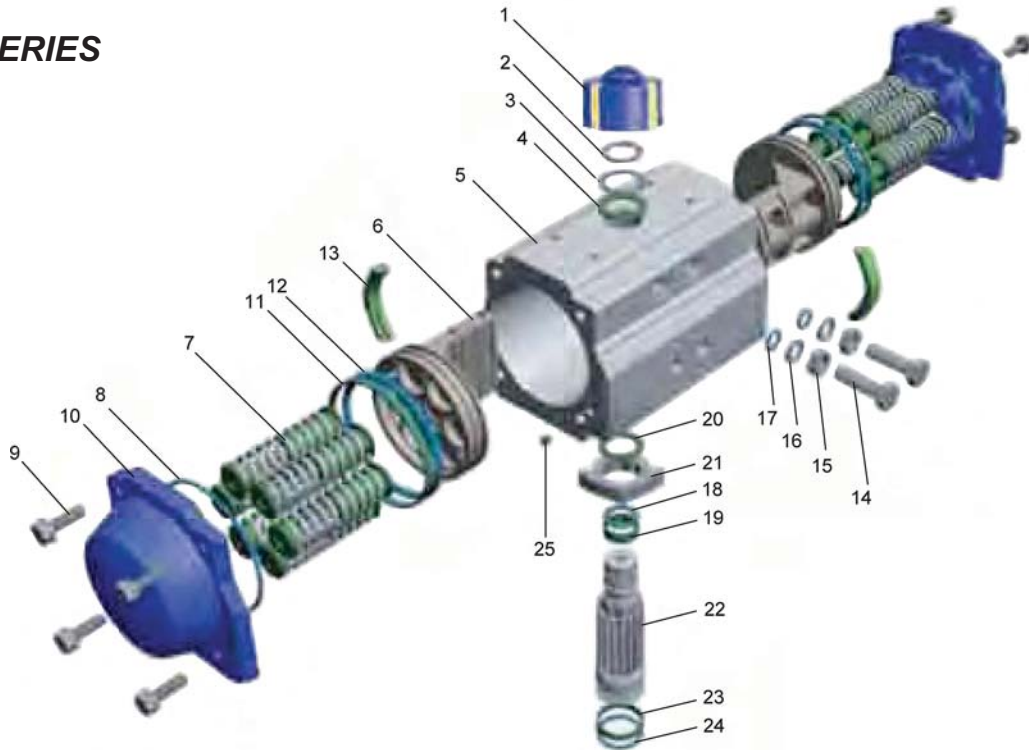
## A20SR Specifications

### Standard Operating Conditions

- **Pressure Ranges**.....Double Acting - 29 psig (2 bar) to 116 psig (8 bar)  
Spring Return - 44 psig (3 bar) to 116 psig (8 bar)
- **Temp. Ranges**.....-4° to 176°F (-20° to 80°C)
- **Operating Media**.....Filtered dry or lubricated air for non-corrosive gas, water or light hydraulic oil. The maximum particle size must not exceed 30 microns.
- **Stroke Adjustment**....0° and 90° with standard adjustment  $\pm 5^\circ$ .
- **Lubrication**.....All moving parts are factory lubricated for the entire life cycle of actuator.
- **Construction**.....Twin piston rack & pinion actuator design, suitable for indoor & outdoor installation.
- **Connections**.....Bottom drilling complies with ISO 5211/DIN 3337 to match valve. Interface for solenoid valve, shaft top end and top drilling for assembling accessories are in accordance with VDI/ VDE-3845, NAMUR standard.
- **Inspection** .....Every actuator is hydraulically tested, certified and guaranteed for a minimum of 1,000,000 cycles.

**Parts List**

**A20SR SERIES**

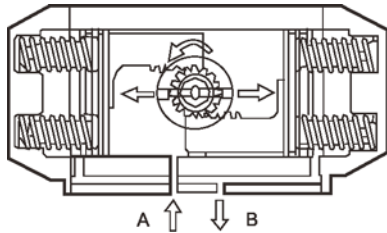


Item	Description	Material	Protection	Qty
1	Indicator	Plastic		1
2	Spring Clip	Stainless Steel		1
3	Thrust Washer (Pinion)	Stainless Steel		1
4	Thrust Bearing (Pinion)	Nylon 66		1
5	Actuator Body	Extruded Aluminum Alloy	Hard Anodized (over 30um)	1
6	Piston	Die Cast Aluminum Alloy	Hard Anodized (over 30um)	2
7	Spring (Cartridge)	High Performance Spring Steel	Epoxy Coated	8 or 10
8	End Cap Seals	NBR		2
9	End Cap Bolts	Stainless Steel		8
10	End Cap	Die Cast Aluminum	Epoxy Coated (over 80um)	2
11	Piston Bearing	Nylon 66		2
12	Piston Seal	NBR		2
13	Piston Guide	Nylon 66		2
14	Stroke Bolt	Stainless Steel		2
15	Stroke Bolt Retaining Nut	Stainless Steel		2
16	Stroke Bolt Washer	Stainless Steel		2
17	Stroke Bolt O-Ring	NBR		2
18	O-Ring (Top Pinion)	NBR		1
19	Bearing (Top Pinion)	Nylon 66		1
20	Thrust Bearing (Pinion)	Nylon 66		1
21	Stroke Cam	Stainless Steel		1
22	Pinion	Alloy Steel	Nickel Plated (over 15um)	1
23	Bearing (Lower Pinion)	Nylon 66		1
24	O-Ring (Lower Pinion)	NBR		1
25	Plug	NBR		2

**Operating Principles**

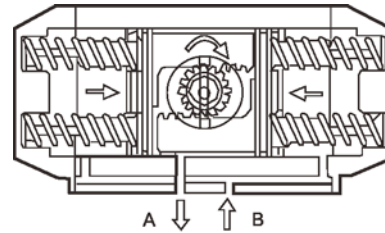
**SPRING RETURN**

**CCW Counter-Clockwise**



Air to port A forces the pistons outward, causing the springs to compress. The pinion turns counter-clockwise while air is being exhausted through port B.

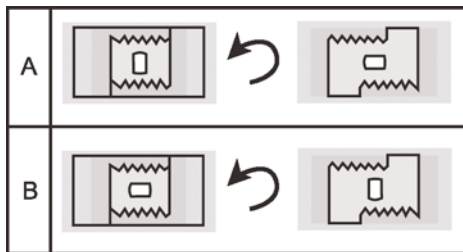
**CW Clockwise**



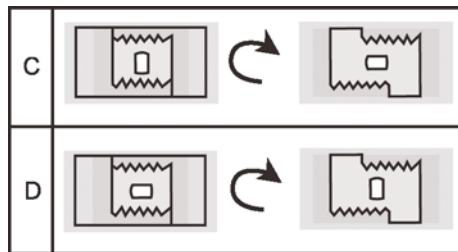
Loss of air pressure through port A allows the stored energy in the springs to force the pistons inward. The pinion turns clockwise while air is being exhausted through port A.

**MOUNTING VARIATIONS**

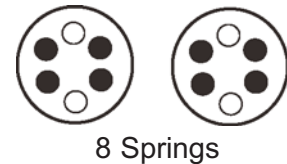
**CCW Counter-Clockwise**



**CW Clockwise**



**SPRING ARRANGEMENT**



**Technical Data**

**AIR CONSUMPTION- Air Volume Opening & Closing**

MODEL	Air Volume @ opening liter/ (cu. in.)	Air Volume @ closing liter/ (cu. in.)
A20 SR	0.14 (8.54)	0.20 (12.20)

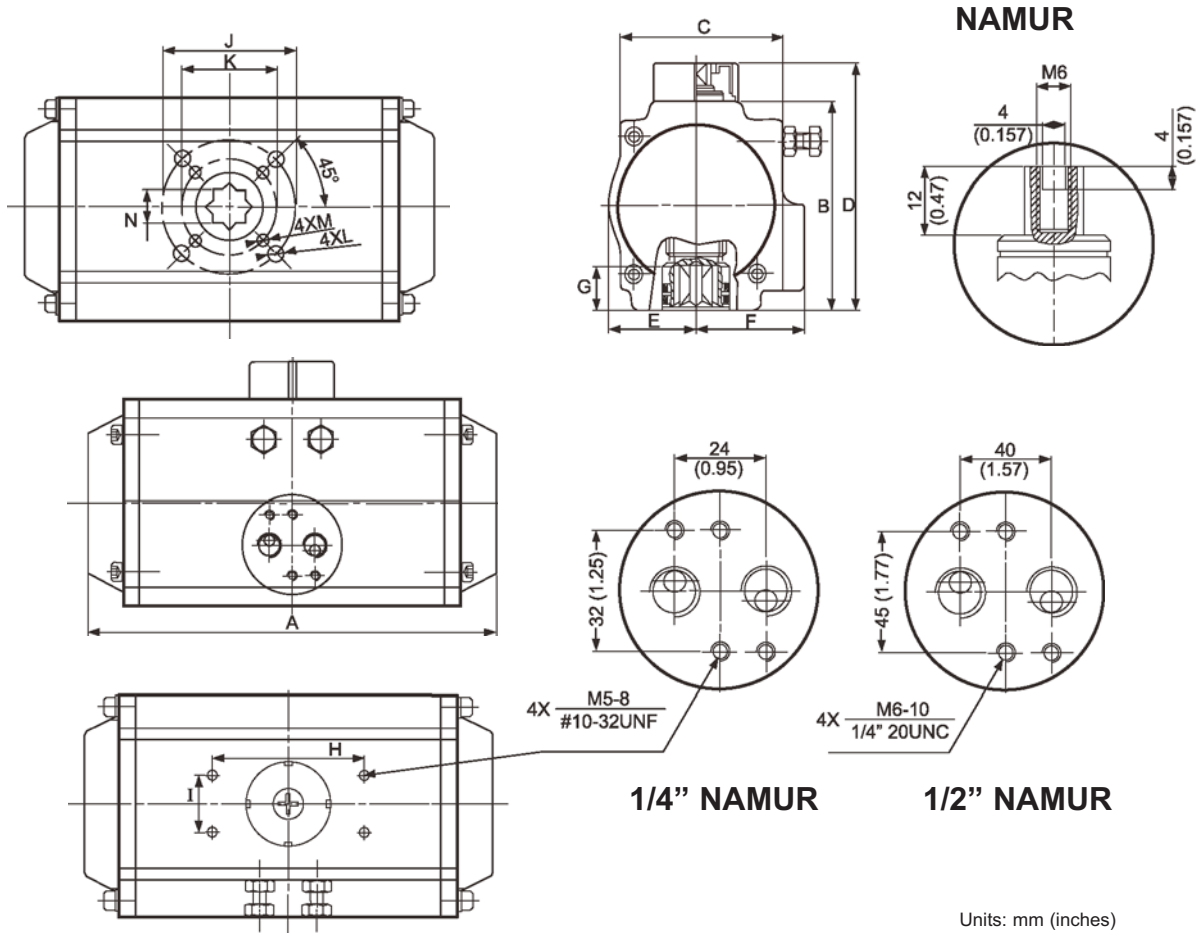
**WEIGHT/ OPENING & CLOSING TIME**

MODEL	A20SR
Screw Stroke adj. for 1" adj need	1/5 turn
Opening Time (Sec.)	0.30
Closing Time (Sec.)	0.35
Approximate Weight kg (lbs)	1.8 (4.0)

**TORQUE RATINGS**

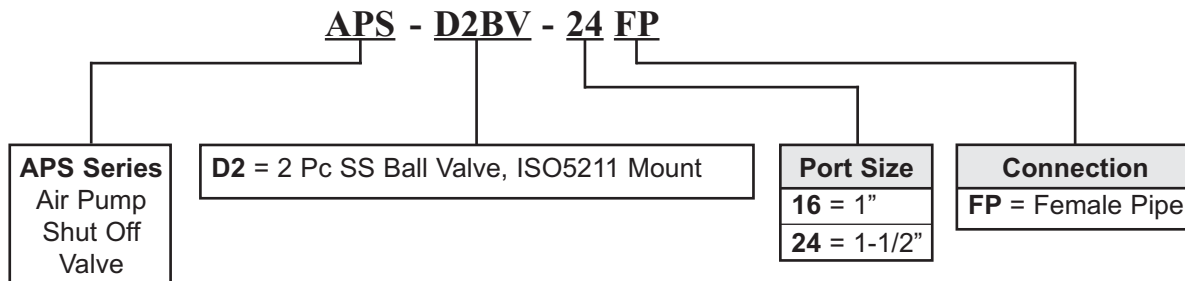
SPRING RETURN TORQUE RATINGS IN (in/ lbs)																	
Supply Pressure	40psi		50psi		60psi		70psi		80psi		90psi		100psi		Spring Torque		
	0° Start	90° End	0° Start	90° End	0° Start	90° End	0° Start	90° End	0° Start	90° End	0° Start	90° End	0° Start	90° End	0° Start	90° End	
MODEL																	
A20 SR			125	72	169	116	214	161							100	153	

## Dimensional Data



MODEL	A	B	C	D	E	F	G	H	I	N	A120*	A180*	J	K	L	M	Air Connection
A20 SR	174 (6.86)	88 (3.46)	72 (2.83)	108 (4.25)	36 (1.42)	47 (1.85)	18 (0.71)	80 (3.15)	30 (1.18)	14 (0.55)	216 (8.50)	266 (10.47)	F07	F05	M8x13 5/16"-20UNC	M6x10 1/4"-20UNC	1/8" or 1/4" std.

## Ordering Information



**D2BV - 2 Piece Stainless Steel Ball Valves**

**FEATURES/ SPECIFICATIONS**

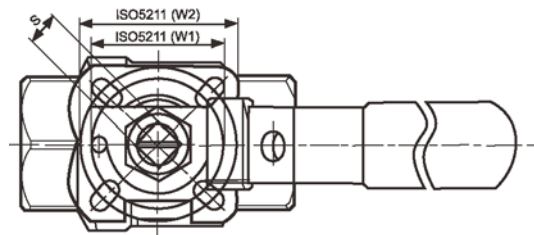
- 2 Piece, Full Ported Design
- 1/2" thru 2" Female NPT
- ISO5211 Direct Mounting Pad
- 1000 psi maximum
- Anti-Blowout Stem - Weep Hole
- Adjustable Vee Style Stem Packing
- Oil, Water, Air and General Chemical Service
- Temperature Rating: -20 to 350°F, (-25 to 175°C)



**D2BV-24FP**

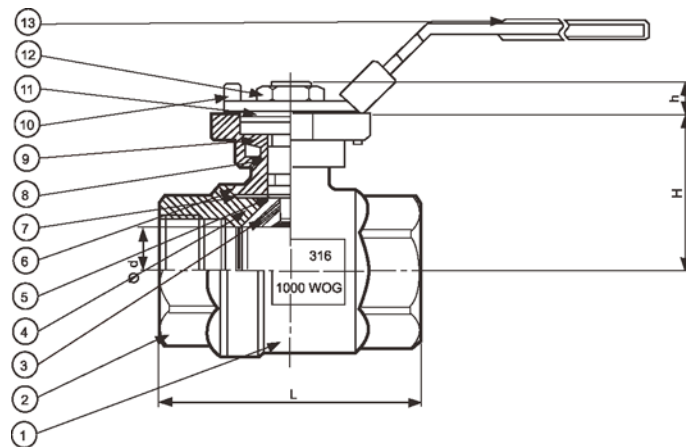
**Dimensional Data**

Units: mm (inches)



**MATERIALS**

1. Body- ASTM A351 GR. CF8M
2. Cap- ASTM A351 GR. CF8M
3. Ball- ASTM A351 GR. CF8M
4. Stem- ASTM A276 GR. 316
5. Seat- PTFE
6. Gasket- PTFE
7. Thrust Washer- PTFE
8. Packing- PTFE
9. Gland- 304SS
10. Handle- 304SS
11. Spring Washer- 304SS
12. Handle Nut- 304SS
13. Handle Sleeve- Vinyl



SIZE	Model	Ø d	L	H	h	S	W1	W2	ISO5211	Wt kg(lb)
1/2"	D2-BV-8FP-V2	15.0(0.59)	60 (2.36)	38 (1.50)	7 (0.28)	9 (0.35)	36 (1.42)	42 (1.65)	F03/ F04	
3/4"	D2-BV-12FP-V2	20.0(0.79)	70 (2.75)	42.4(1.67)	9 (0.35)	9 (0.35)	36 (1.42)	42 (1.65)	F03/ F04	
1"	D2-BV-16FP-V2	25.0(0.98)	82 (3.23)	48.5(1.91)	12 (0.47)	11 (0.43)	42 (1.65)	50 (1.97)	F04/ F05	
1-1/4"	D2-BV-20FP-V2	32.0(1.26)	96 (3.78)	54 (2.13)	12 (0.47)	11 (0.43)	42 (1.65)	50 (1.97)	F04/ F05	
1-1/2"	D2-BV-24FP-V2	38.0(1.50)	112 (4.41)	66 (2.60)	16 (0.63)	14 (0.55)	50 (1.97)	70 (2.75)	F05/ F07	
2"	D2-BV-32FP-V2	50.0(1.97)	126 (4.96)	74 (2.91)	16 (0.63)	14 (0.55)	50 (1.97)	70 (2.75)	F05/ F07	



**PS30M - Pressure Switch**

**STANDARD FEATURES**

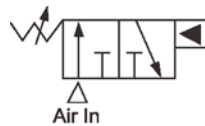
- Hydraulic Input - Pneumatic Output
- Stainless Wetted Parts
- Anodized Aluminum Body
- For Pilot Circuits Only
- CV = .15
- 5 to 10% Dead Band

**OPERATING PRESSURE**

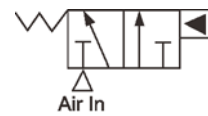
- Air Pressure: 150 psi
- Hydraulic Pressure: 150 - 3000 psi



PS30M-3K-NC



Normally Open

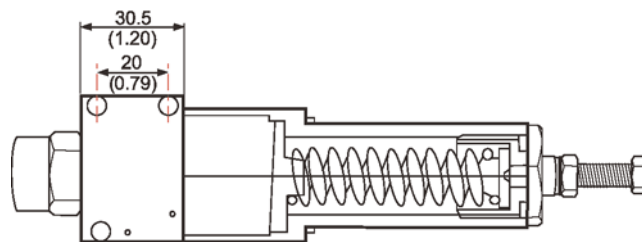
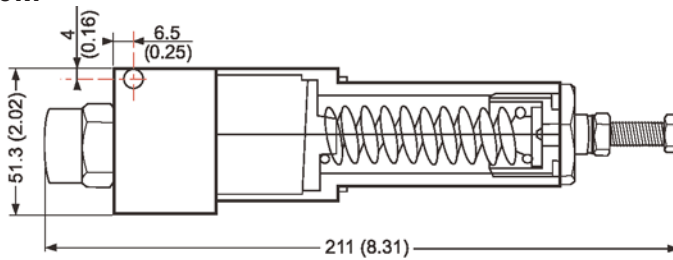


Normally Closed

**Dimensional Data**

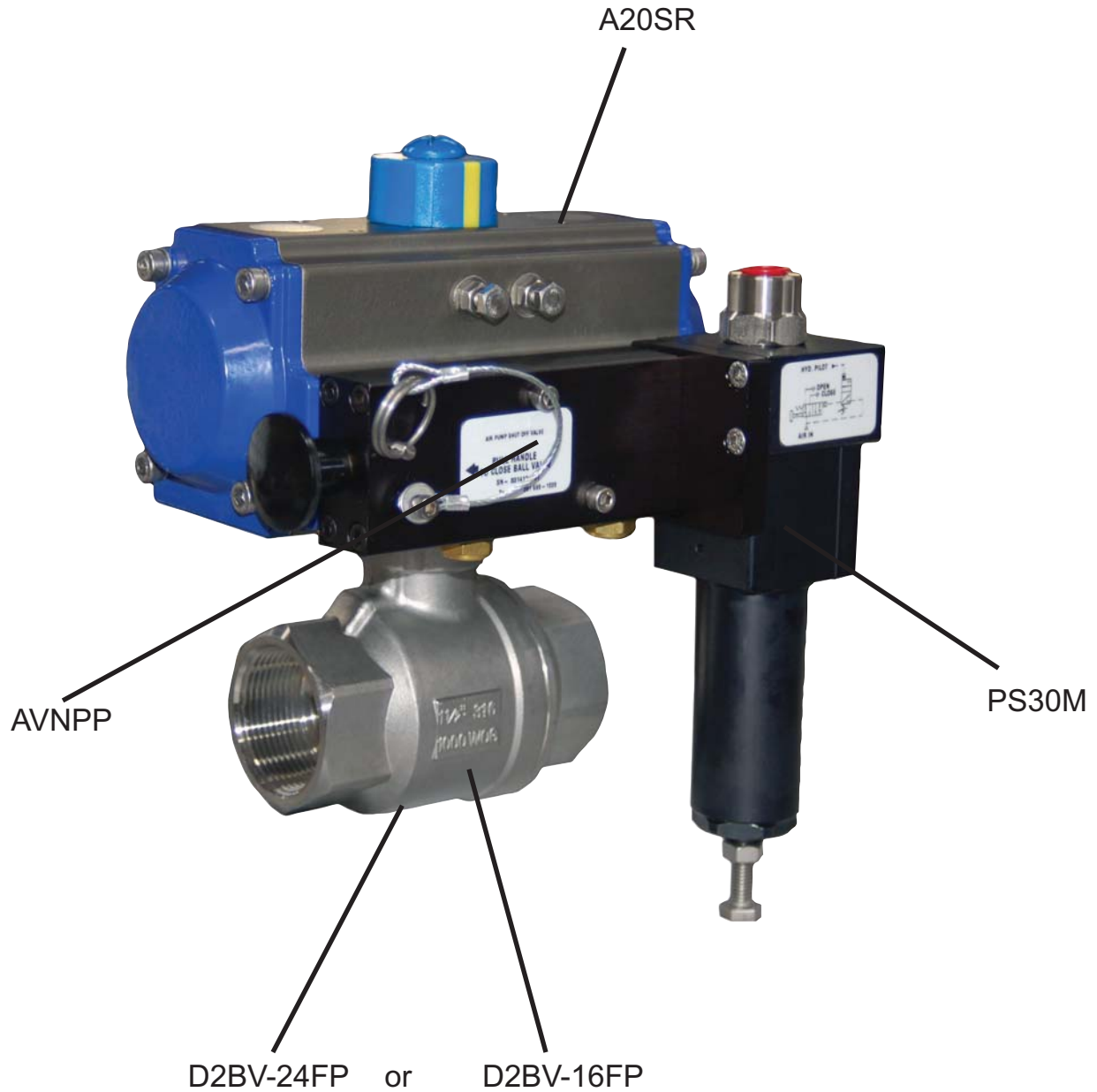
Units: mm (inches)

**PS30M**



Parts Identification

APS-D2BV-24FP





INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS

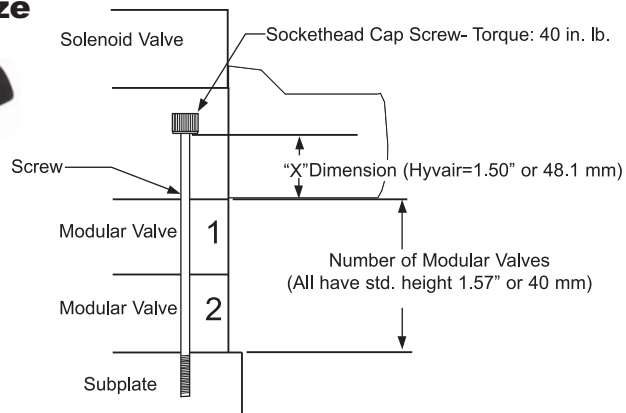
***B SERIES***

## **Bolt Kits**

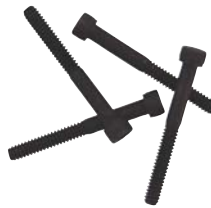


## D03 Size

Torque sockethead cap screw  
40 in-lbs for D03



Solenoid Valve	"X" Dimension
Hyvair	1.50"
Vickers/40	1.56"
Parker	1.50"
Double A (Vickers)	1.56"
Continental	0.625"
Racine	0.87"
Rexroth	1.26"

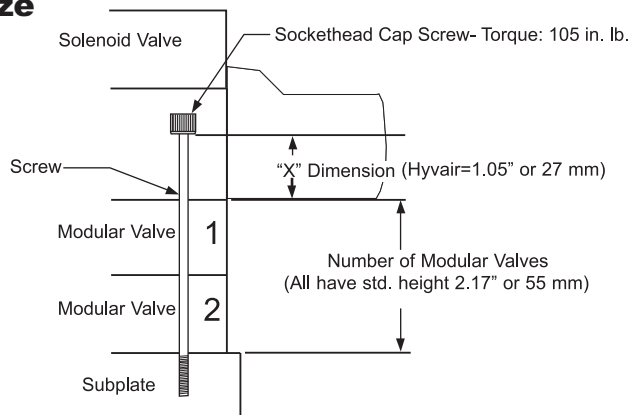


The "X" Dimension was accurate as of the publication of this catalog.  
Verify in the applicable manufacturers literature.

Bolt Kit Ordering Information:	
Part Number	Valving
BD03-H0	Solenoid valve- no modular valves use qty. (4) 10-24 SHCS X 1.75" (no lockwashers)
BD03-H1	Solenoid valve w/1 modular valve use qty. (4) 10-24 SHCS X 3.50" (with lockwashers)
BD03-H2	Solenoid valve w/2 modular valves (5.0" Long)
BD03-H3	Solenoid valve w/3 modular valves (6.6" Long)
BD03-H4	Solenoid valve w/4 modular valves (8.2" Long)
BD03-H5	Solenoid valve w/5 modular valves (9.7" Long)

## D05 Size

Torque sockethead cap screw  
105 in-lbs for D05



Solenoid Valve	"X" Dimension
Hyvair	1.05"
Vickers/40	1.05"
Parker	1.91"
Double A (Vickers)	1.05"
Continental	1.31"
Racine	1.38"
Rexroth	1.18"



The "X" Dimension was accurate as of the publication of this catalog.  
Verify in the applicable manufacturers literature.

Bolt Kit Ordering Information:	
Part Number	Valving
BD05-H0	Solenoid valve- no modular valves use qty. (4) 1/4-20 SHCS X 1.5" (with lockwashers)
BD05-H1	Solenoid valve w/1 modular valve (3.6" Long)
BD05-H2	Solenoid valve w/2 modular valves (5.8" Long)
BD05-H3	Solenoid valve w/3 modular valves (8.0" Long)
BD05-H4	Solenoid valve w/4 modular valves (10.2" Long)
BD05-H5	Solenoid valve w/5 modular valves (12.4" Long)

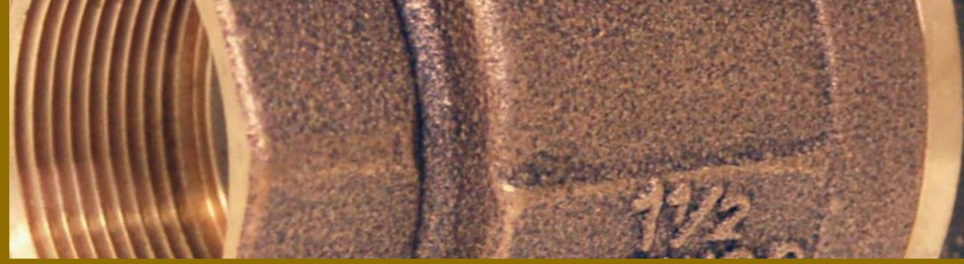
Torque sockethead cap screw  
550 in-lbs for D08

## D08 Size

Use only sockethead cap screws (1/2-13 thread) x effective bolt length- Qty (6) required/ valve.  
We recommend 0.75" projection minimum into subplate and torque of 500-600 in-lbs. Hyvair "X" dimension= 1.25" (32mm).  
Add 3.35" (85mm) for each additional Hyvair D08 modular valve.



INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS



## B2 SERIES

### Brass Ball Valves- ISO5211 2 Piece



B2BV-12-FP-V2



B2BV-8-FP-V2



B2BV-24-FP

B2BV-24-FP

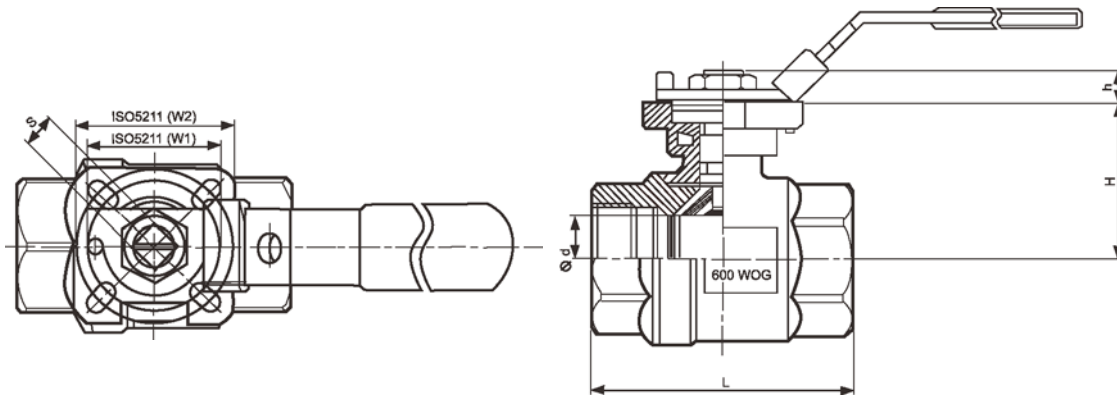


**Specifications**

- 1/2" thru 2" Female NPT
- 2 Piece, Full Ported Design
- ISO5211 Direct Mounting Pad
- 600 psi Maximum
- Oil, Water and Air Service

**Dimensional Data**

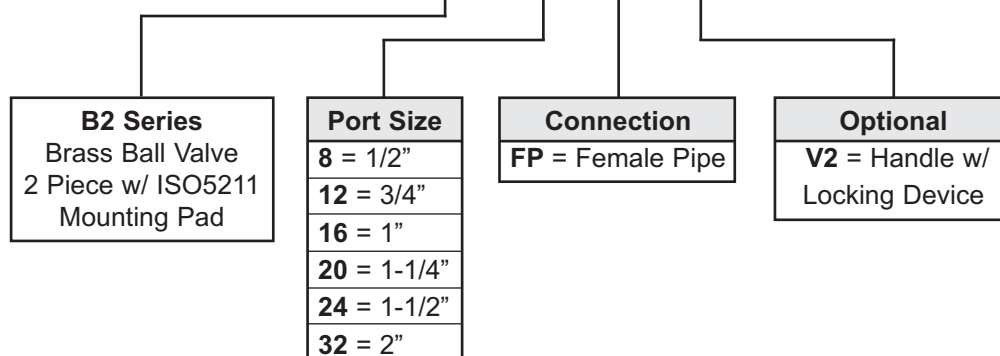
Units: mm (inches)



SIZE	Model	Ø d	L	H	h	S	W1	W2	ISO5211	Wt kg (lb)
1/2"	B2-BV-8FP-V2	15.0(0.59)	60 (2.36)	38 (1.50)	7 (0.28)	9 (0.35)	36 (1.42)	42 (1.65)	F03/ F04	
3/4"	B2-BV-12FP-V2	20.0(0.79)	70 (2.75)	42.4(1.67)	9 (0.35)	9 (0.35)	36 (1.42)	42 (1.65)	F03/ F04	
1"	B2-BV-16FP-V2	25.0(0.98)	82 (3.23)	48.5(1.91)	12 (0.47)	11 (0.43)	42 (1.65)	50 (1.97)	F04/ F05	
1-1/4"	B2-BV-20FP-V2	32.0(1.26)	96 (3.78)	54 (2.13)	12 (0.47)	11 (0.43)	42 (1.65)	50 (1.97)	F04/ F05	
1-1/2"	B2-BV-24FP-V2	38.0(1.50)	112 (4.41)	66 (2.60)	16 (0.63)	14 (0.55)	50 (1.97)	70 (2.75)	F05/ F07	
2"	B2-BV-32FP-V2	50.0(1.97)	126 (4.96)	74 (2.91)	16 (0.63)	14 (0.55)	50 (1.97)	70 (2.75)	F05/ F07	

**Ordering Information**

**B2BV - 12 - FP - V2**



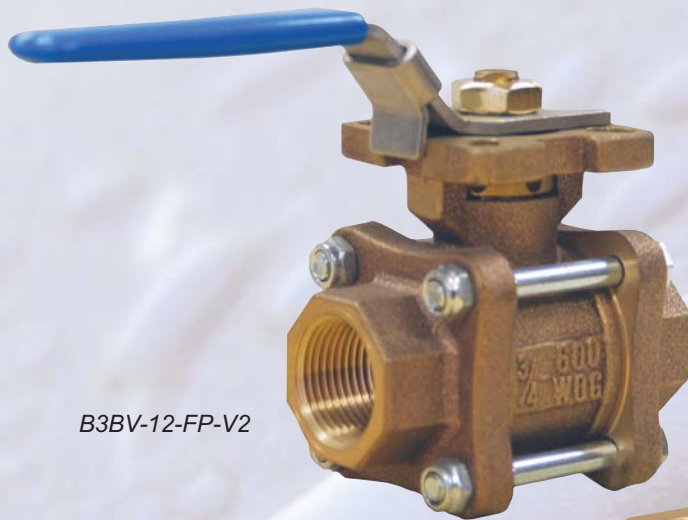


INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS



## B3 SERIES

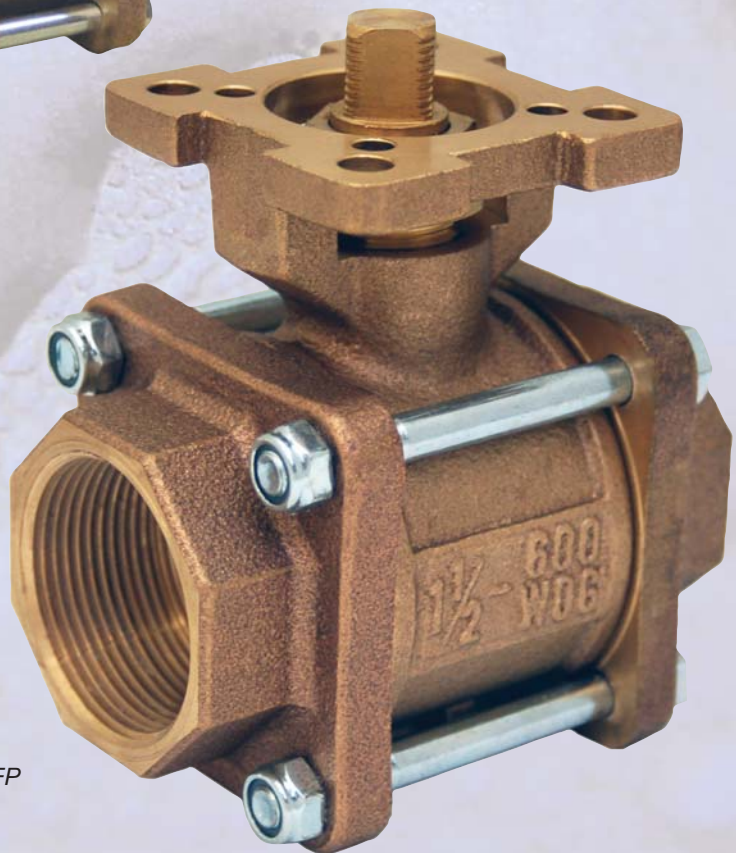
### Brass Ball Valves- ISO5211 3 Piece



B3BV-12-FP-V2



B3BV-8-FP-V2



B3BV-24-FP

**Specifications**

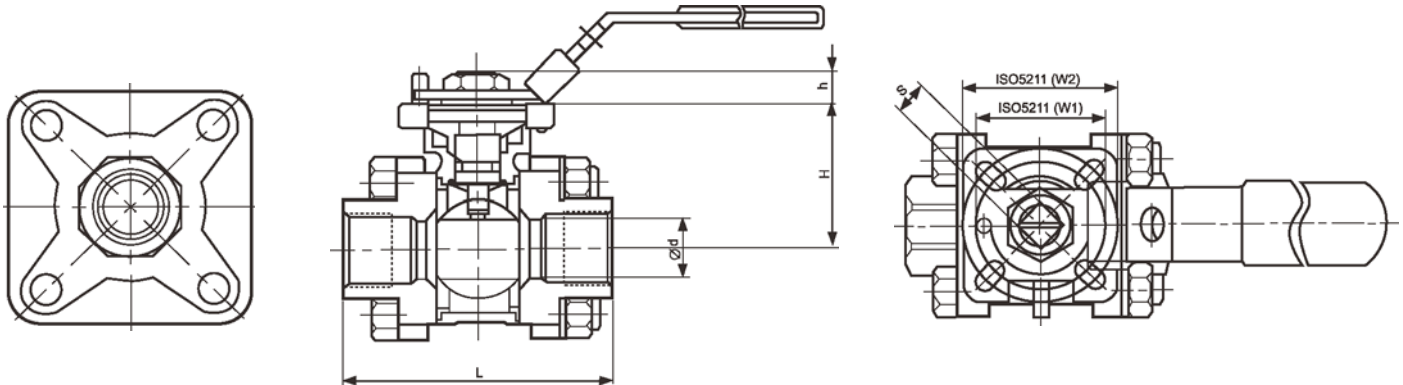
- 1/2" thru 2" Female NPT
- 3 Piece, Full Ported Design
- ISO5211 Direct Mounting Pad
- 600 psi Maximum
- Oil, Water and Air Service

**B3BV-24-FP**



**Dimensional Data**

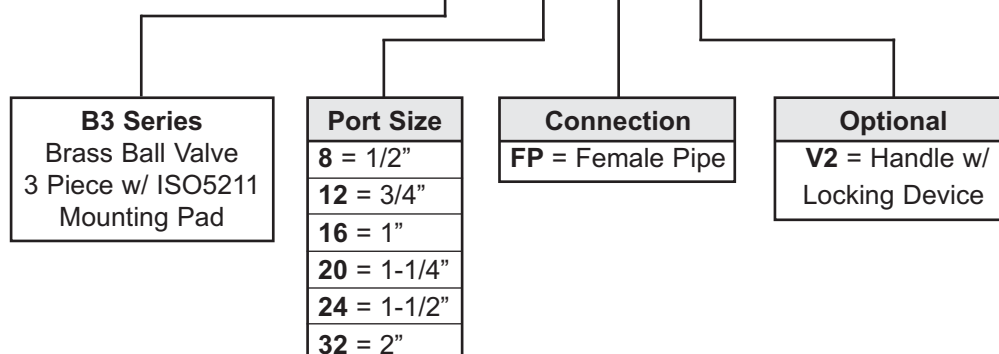
Units: mm (inches)



SIZE	Model	∅ d	L	H	h	S	W1	W2	ISO5211	Wt kg (lb)
1/2"	B3-BV-8FP-V2	15.0(0.59)	65.5(2.58)	38 (1.50)	7 (0.28)	9 (0.35)	36 (1.42)	42 (1.65)	F03/ F04	
3/4"	B3-BV-12FP-V2	20.0(0.79)	77.6(3.06)	42.4(1.67)	9 (0.35)	9 (0.35)	36 (1.42)	42 (1.65)	F03/ F04	
1"	B3-BV-16FP-V2	25.0(0.98)	83.5(3.29)	48.5(1.91)	12 (0.47)	11 (0.43)	42 (1.65)	50 (1.97)	F04/ F05	
1-1/4"	B3-BV-20FP-V2	32.0(1.26)	102.5(4.04)	54 (2.13)	12 (0.47)	11 (0.43)	42 (1.65)	50 (1.97)	F04/ F05	
1-1/2"	B3-BV-24FP-V2	40.0(1.58)	117.6(4.63)	66 (2.60)	16 (0.63)	14 (0.55)	50 (1.97)	70 (2.75)	F05/ F07	
2"	B3-BV-32FP-V2	50.0(1.97)	130.2(5.13)	74 (2.91)	16 (0.63)	14 (0.55)	50 (1.97)	70 (2.75)	F05/ F07	

**Ordering Information**

**B3BV - 12 - FP - V2**





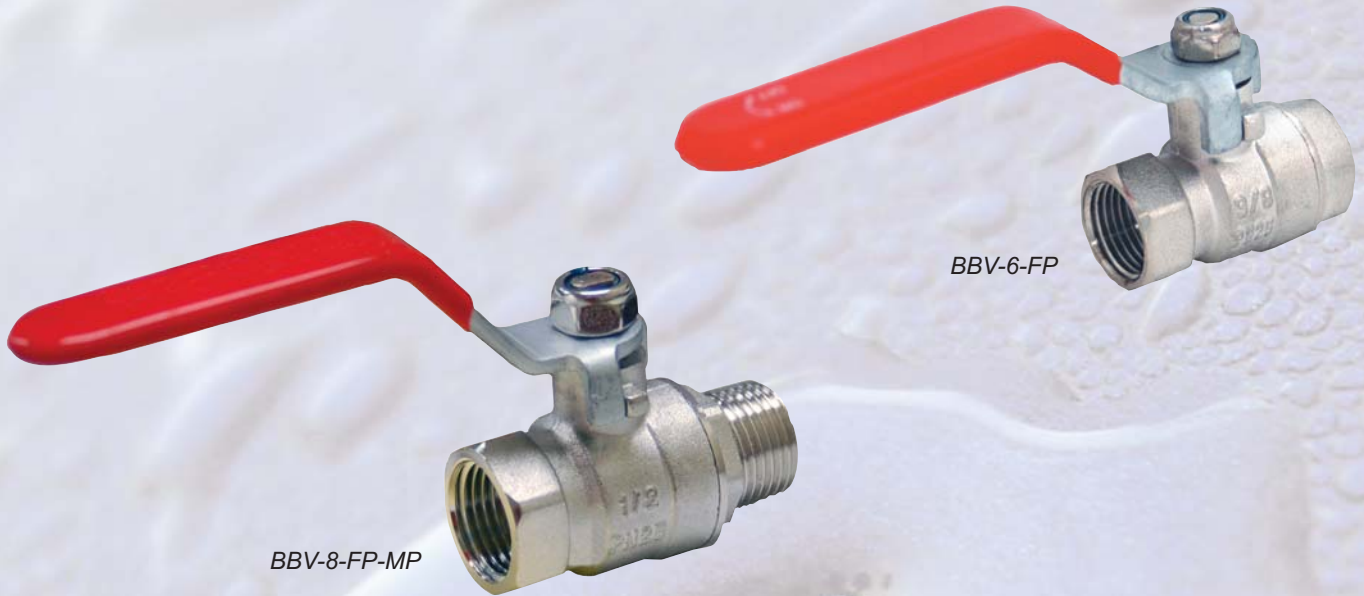


INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS



## B SERIES

### Brass Ball Valves



BBV-8-FP-MP

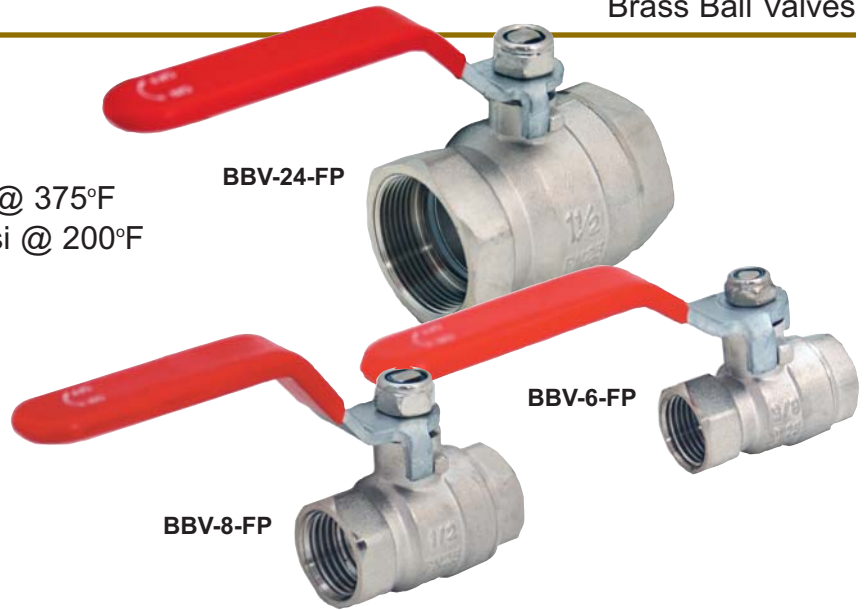
BBV-6-FP



BBV-24-FP

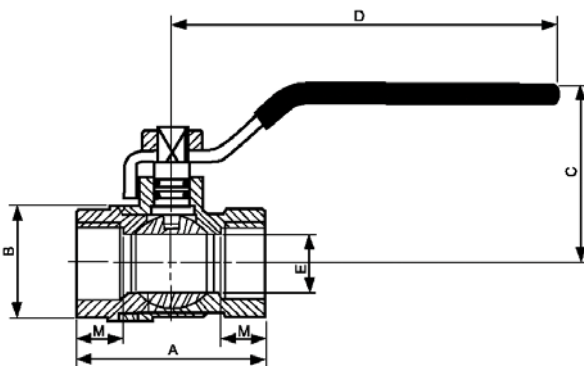
### Specifications

- 1/4" thru 4" NPT
- Pressure Ratings:  
 1/4" thru 2": 600 psi @ 100°F, 100 psi @ 375°F  
 2-1/2" thru 4": 400 psi @ 100°F, 100 psi @ 200°F
- Materials:  
 Body - Brass  
 Bonnet - Brass  
 Ball Seat - PTFE  
 Ball - Brass  
 Stem - Brass  
 O Ring - NBR  
 Handle - Steel  
 Nut - Steel



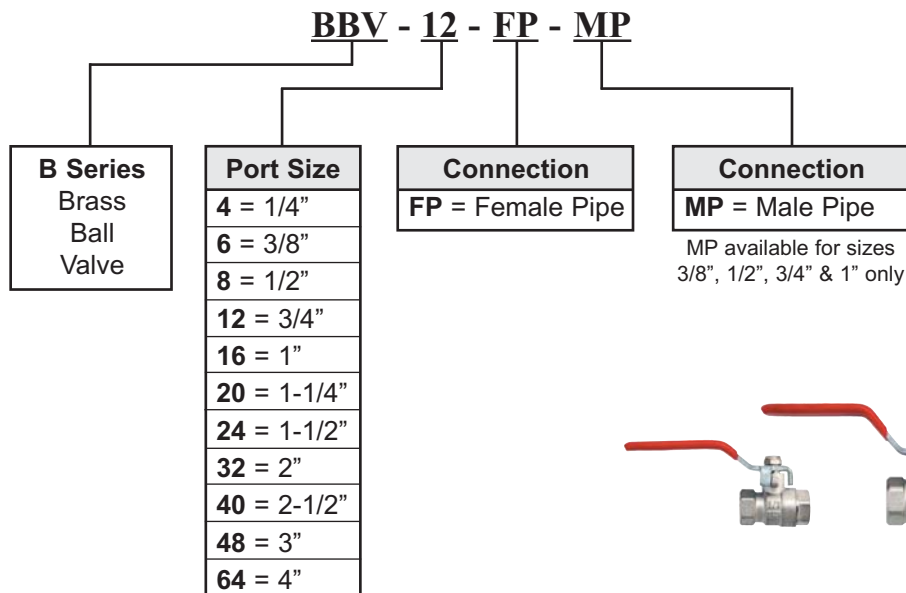
### Dimensional Data

Units: mm (inches)



SIZE (NPT)	Model	A	B	C	D	E	M
1/4" female	BBV-4FP	40.3(1.58)	23(0.90)	39.4(1.55)	85(3.35)	9(0.35)	8.5(0.33)
3/8" female	BBV-6FP	40.3(1.58)	23(0.90)	39.4(1.55)	85(3.35)	9(0.35)	8.5(0.33)
3/8" female x male	BBV-6FP-6MP	54(2.13)	24(0.94)	43(1.69)	88(3.46)	9.8(0.39)	12(0.47)
1/2" female	BBV-8FP	48.5(1.91)	29.5(1.16)	47.5(1.87)	98(3.86)	14.8(0.58)	10.8(0.42)
1/2" female x male	BBV-8FP-8MP	57.4(2.26)	27.5(1.08)	55(2.17)	95(3.74)	13.6(0.54)	18(0.71)
3/4" female	BBV-12FP	54.6(2.15)	35.5(1.40)	51(2.00)	98(3.86)	19(0.75)	11(0.43)
3/4" female x male	BBV-12FP-12MP	68.5(2.70)	32(1.26)	58(2.28)	95(3.74)	19(0.75)	17(0.67)
1" female	BBV-16FP	64(2.52)	42.7(1.68)	61(2.40)	123(4.84)	24(0.94)	13.5(0.53)
1" female x male	BBV-16FP-16MP	83(3.27)	38(1.50)	61(2.40)	126(4.96)	24(0.94)	18(0.71)
1-1/4" female	BBV-20FP	76(2.99)	53(2.08)	72.5(2.85)	142(5.59)	30.2(1.19)	15(0.59)
1-1/2" female	BBV-24FP	87(3.42)	63(2.48)	77.5(3.05)	142(5.59)	37(1.45)	16.5(0.65)
2" female	BBV-32FP	97(3.82)	79(3.11)	86(3.38)	165(6.49)	47(1.85)	16.5(0.65)
2-1/2" female	BBV-40FP	132(5.19)	103(4.05)	115.5(4.55)	225(8.86)	62(2.44)	24(0.94)
3" female	BBV-48FP	152.4(6.0)	121(4.76)	124(4.88)	225(8.86)	74(2.91)	26.5(1.04)
4" female	BBV-64FP	179(7.04)	145(5.71)	135.5(5.33)	250(9.84)	90(3.54)	30(1.18)

### Ordering Information





INDUSTRIAL FLUID POWER COMPONENTS  
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## C6 SERIES

### Stainless Steel Check Valves

C6-8FP-D4



C6-4FP-D4

## Standard Features

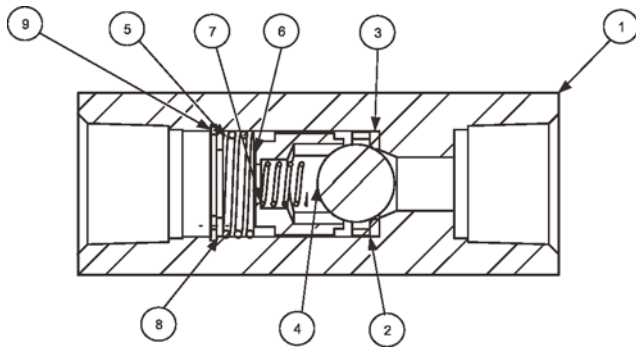
- Dual Seat Design
- 1/4", 3/8", 1/2", 9/16"-18, 3/4" and 1" ports
- 10,000 thru 15,000 psi maximum
- Reinforced Teflon Seat



C6-8FP-D4

C6-4FP-D4

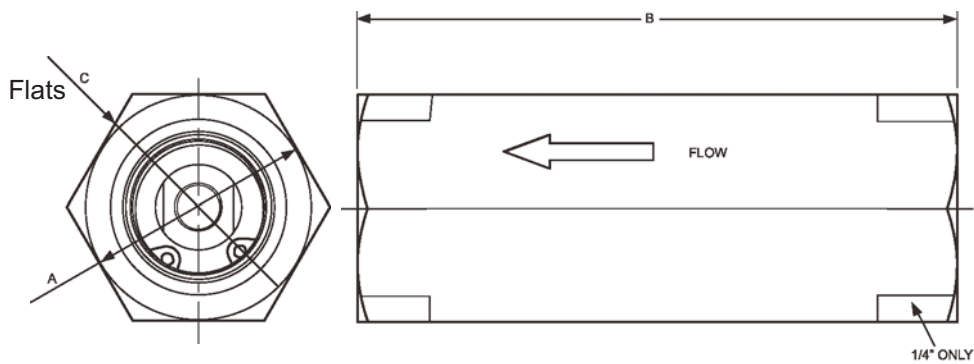
## STANDARD MATERIAL SPECIFICATIONS



	Description	Material
1	BODY	316SS CW
2	RING	316SS CW
3	SOFT SEAT	30% GTFE
4	BALL	440C
5	SNAP RING	PH 15-7 MO
6	BALL RETAINER	316SS CW
7	PILOT SPRING	302SS
8	SPRING RETAINER	316SS CW
9	MAIN SPRING	302SS

## Dimensional Data

Units: mm (inches)



Max. Press.	Port Size	Model	CV	A	B	C (Flats)
15,000 psi	9/16"-18	C6-9MA-D4	1.25	34.8 (1.37)	89.0 (3.50)	
	1/4"	C6-4FP-D4	1.25	22.4 (0.88)	76.2 (3.00)	25.4 (1.00)
	3/8"	C6-6FP-D4	1.25	25.4 (1.00)	69.9 (2.75)	
	1/2"	C6-8FP-D4	2.16	30.0 (1.18)	79.2 (3.12)	
10,000 psi	3/4"	C6-12FP-D4	4.00	35.1 (1.38)	82.6 (3.25)	
	1"	C6-16FP-D4	5.00	44.5 (1.75)	108.0 (4.25)	

## Ordering Information

**C6 - 4 - FP - D 4**

**C6** = C6 Series Check Valve  
**C6FA** = C6 Series Check Valve  
 (Medium Pressure- 9/16-18)

Port Size
4 = 1/4"
6 = 3/8"
8 = 1/2"
9 = 9/16"-18
12 = 3/4"
16 = 1"

Connection
<b>FP</b> = Female Pipe
<b>MA</b> = Male Aminco Autoclave Female

**D** = 316 Stainless Steel

**4** = Reinforced  
Teflon Seat



**C6-9MA-D4**



**C6-16FP-D4**



INDUSTRIAL FLUID POWER COMPONENTS  
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## C20 SERIES

### Steel Check Valves

C20-8FP-7



C20-12FP-7

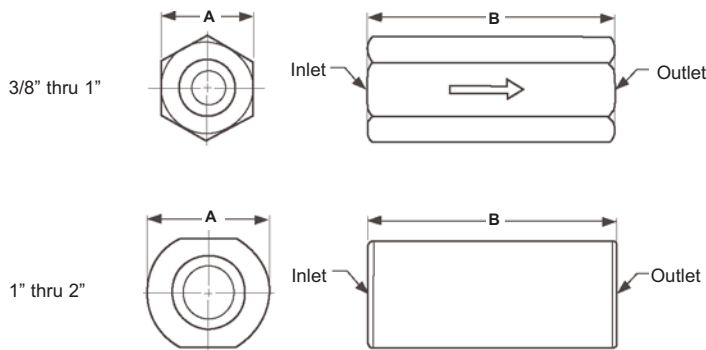


## Specifications

1. 3/8" thru 2" NPT or SAE ports
2. 3000 psi (210 Bar) maximum pressure
3. 7 psi cracking pressure standard
4. 70 psi cracking pressure available 1" thru 2"
5. Recommended for petroleum based fluids- ISO VG32-68
6. Recommended filtration- 10 micron
7. Cold starts: 250 SUS maximum viscosity
8. **Maximum Temperature:** 180°F, (82.2°C) or at minimum fluid viscosity of 80 SUS



## Dimensional Data



Size	A	B	Weight
3/8"	1	2.76	.66
1/2"	1.14	3.23	1.1
3/4"	1.75	3.60	1.8
1"	2.01	4.41	2.2
1" (C20L)	2.01	5.41	2.7
1-1/4"	2.28	5.20	4.7
1-1/2"	2.52	5.51	7.2
2"	3.15	6.14	11.0

Units: Inches/ lbs

## Ordering Information

### C20 - 12FP - FP - 7

Style
<b>C20</b> = Standard
<b>C20L</b> = 1" extra nose length for up stream tapping
<b>C20LL</b> = 1" extra nose length for up stream plus 1" extra butt length for down stream tapping

Only size 16 available code L at this time.  
Size 20 also available soon.

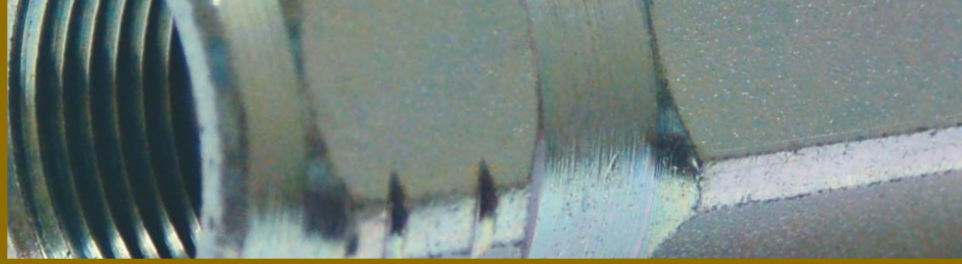
Size
<b>6</b> = 3/8"
<b>8</b> = 1/2"
<b>12</b> = 3/4"
<b>16</b> = 1"
<b>20</b> = 1-1/4"
<b>24</b> = 1-1/2"
<b>32</b> = 2"

Connection
<b>FP</b> = Female Pipe
<b>FS</b> = Female SAE

Function
<b>omit</b> = Not Applicable
<b>7</b> = 7 psi cracking
<b>70</b> = 70 psi cracking (@1 gpm)



INDUSTRIAL FLUID POWER COMPONENTS  
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**C30 SERIES**

## Steel Check Valves



C30-12FP-70



### Specifications

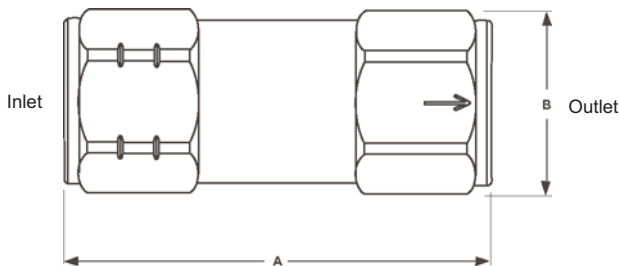
1. 1/4" thru 2" NPT ports
  2. Maximum pressure based on size- see below
  3. 70 psi cracking pressure standard
  4. 7 psi cracking pressure available
  5. Recommended for petroleum based fluids- ISO VG32-68
  6. Recommended filtration- 10 micron
  7. Cold starts: 250 SUS maximum viscosity
  8. **Maximum Temperature:** 180°F, (82.2°C) or at minimum fluid viscosity of 80 SUS
- Soft-seat design typically used for lower flow applications



C30-12FP-70

Nominal Size	Description	Working Pressure	70 psi Cracking Model Codes	7 psi Cracking Model Codes
1/4"	Check valve- 1/4"	10,000 psi	C30-4FP-70	C30-4FP-7
3/8"	Check valve- 3/8"	10,000 psi	C30-6FP-70	C30-6FP-7
1/2"	Check valve- 1/2"	7000 psi	C30-8FP-70	C30-8FP-7
3/4"	Check valve- 3/4"	7000 psi	C30-12FP-70	C30-12FP-7
1"	Check valve- 1"	7000 psi	C30-16FP-70	C30-16FP-7
1-1/4"	Check valve- 1-1/4"	4000 psi	C30-20FP-70	C30-20FP-7
1-1/2"	Check valve- 1-1/2"	4000 psi	C30-24FP-70	C30-24FP-7
2"	Check valve- 2"	4000 psi	C30-32FP-70	C30-32FP-7

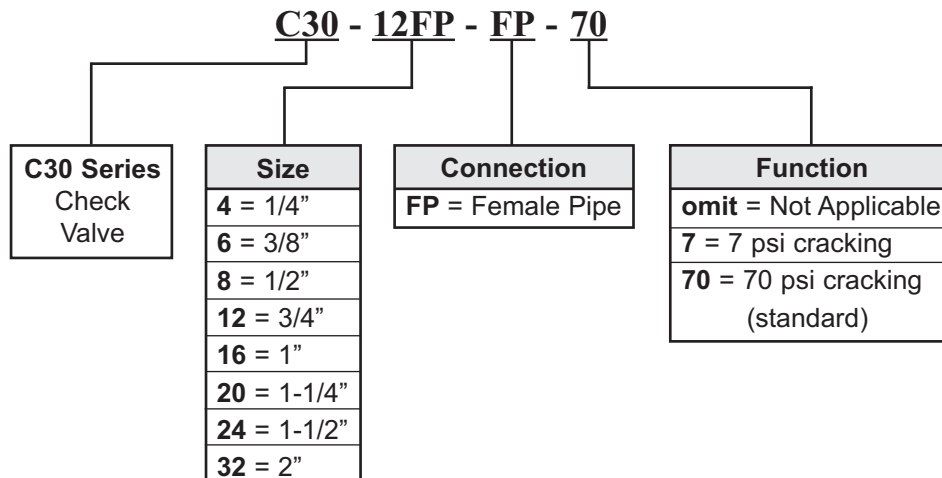
### Dimensional Data



Size	A	B	Weight (kg/ lb)
1/4"	49.8(1.96)	18.8(0.74)	0.18 (0.40)
3/8"	59.9(2.36)	22.9(0.90)	0.34 (0.75)
1/2"	70.1(2.76)	26.9(1.06)	0.70 (1.55)
3/4"	85.9(3.38)	35.1(1.38)	1.09 (2.40)
1"	99.8(3.93)	40.9(1.61)	2.63 (5.80)
1-1/4"	130.1(5.12)	54.9(2.16)	2.84 (6.25)
1-1/2"	134.9(5.31)	65.0(2.56)	3.81 (8.40)
2"	150.1(5.91)	74.9(2.95)	5.76 (12.70)

Units: mm/ (inches)

### Ordering Information





INDUSTRIAL FLUID POWER COMPONENTS  
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**CF SERIES**

## Canister, Spin-On Filters



CFE12-10MNPE



# CF Series Canister, Spin-On Filters

## Features

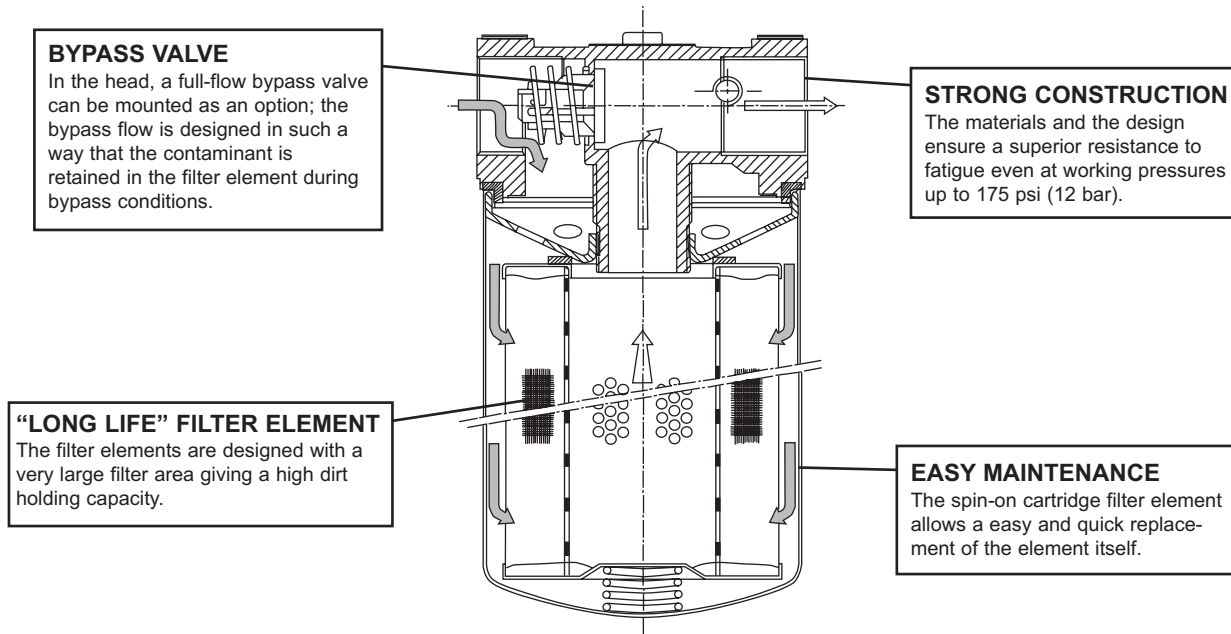
- **Easy Filer Replacement:** Line Mounted Filter With Disposable Spin-On Canisters
- **Universal Filter Head:** Filter Heads are Designed to Accept Both American and European Canister Threads
- **Water Removal:** In Addition to Contaminate Removable Elements, Both Water and Particulate Removable Canisters are Available



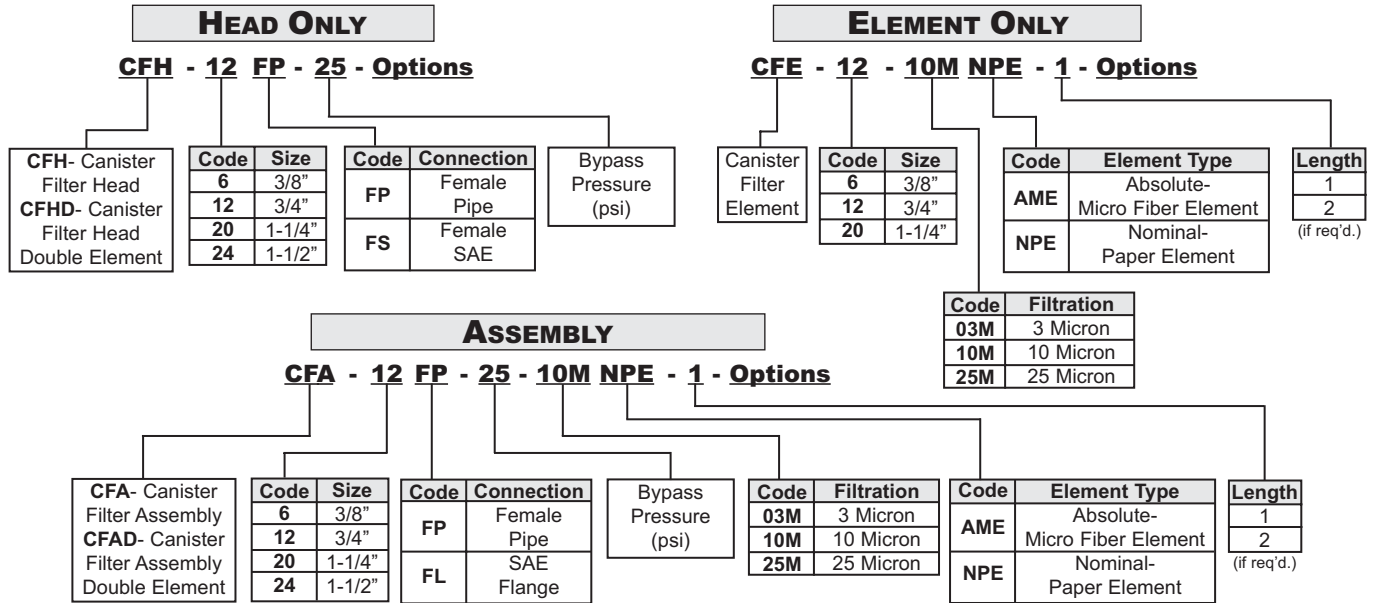
## Specifications

<b>Maximum Pressures</b>	Filter Head	175 psi (12 bar) Minimum Burst with 25 psi By-pass Valve*
	Element	60 psi Differential Collapse
<b>Temperature</b>	-15° F to +230° F (Viscosities Permitting)	
<b>Recommended Fluids</b>	Petroleum Based Fluids- ISO VG32-68, Phosphate Ester, Most Vegetable Oils, Water Based Fluids to 40% Water	
<b>Materials</b>	Filter Head	Aluminum
	Filter Element	Absolute- Inorganic Microfiber Nominal- Resin Treated Paper

\*CFE6 has 25 psi bypass in the canister element



**Ordering Information**



<b>ASSEMBLY</b>	
Visual Indicator	Model # HYV-1, 0-25 psi green/26-50 psi red, 1/8" npt center back mount gauge
Pressure Switch	Model # PS-NO-21, Normally Open- Preset @ 21 psi (increasing) Model # PS-NC-21, Normally Closed- Preset @ 21 psi (increasing) (220 VAC max., 0.5A- resistive, 0.25A- inductive, 100VA- switching power)
Water Removal	Add -WR Suffix to Element or Assembly Part Number, Water Capacity: CFE12-WR= 4.1oz max., CFE20-1-WR= 8.4oz max., CFE20-2-WR= 15.0oz max.



HYV-1 Filter Indicator Gauge

**Flow Ratings/ Common Models**

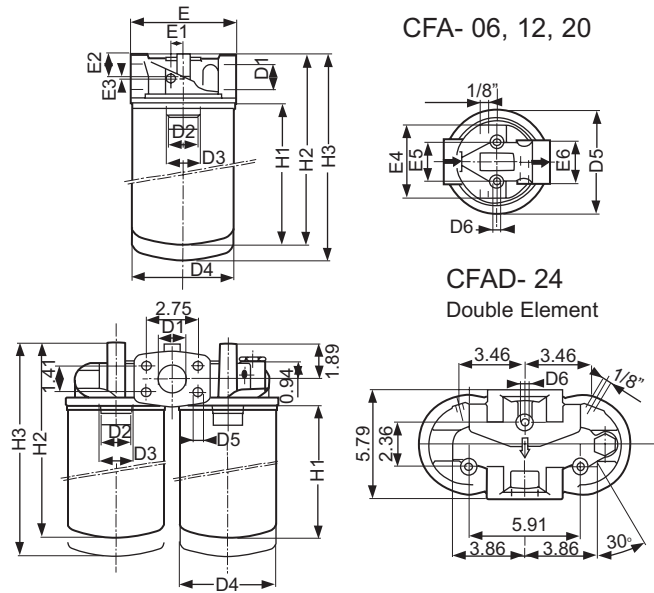
Thread	Model Number (Head Only)	Filter Rating (microns) □ > 75 Abs./ □ > 2 Nom.	Model Number (Element Only)	Flow* (□P= 5psi)
3/8" NPT	CFH-6FP <sup>†</sup>	10□ Nominal	CFE6-10MNPE	3.5
3/4" NPT	CFH-12FP-25	3□ Absolute	CFE12-03MAME	6
		10□ Absolute	CFE12-10MAME	10
		10□ Nominal	CFE12-10MNPE	12
		10□ Nom./ Water Removal	CFE12-10MNPE-WR	12
		25□ Nominal	CFE12-25MNPE	12
1-1/4" NPT	CFH-20FP-25	3□ Absolute	CFE20-03MAME-1	36
		10□ Absolute	CFE20-10MAME-1	50
		10□ Nominal	CFE20-10MNPE-1	44
		10□ Nom./ Water Removal	CFE20-10MNPE-1-WR	44
		3□ Absolute	CFE20-03MAME-2	46
		10□ Absolute	CFE20-10MAME-2	57
		10□ Nominal	CFE20-10MNPE-2	48
		10□ Nom./ Water Removal	CFE20-10MNPE-2-WR	48
#24 SAE Flange	CFHD-24FL-25 (Two elements required)	3□ Absolute	CFE20-03MAME-1	60
		10□ Absolute	CFE20-10MAME-1	72
		10□ Nominal	CFE20-10MNPE-1	65
		10□ Nom./ Water Removal	CFE20-10MNPE-1-WR	65
1-1/2" NPT	CFHD-24FP-25 (Two elements required)	3□ Absolute	CFE20-03MAME-2	71
		10□ Absolute	CFE20-10MAME-2	79
		10□ Nominal	CFE20-10MNPE-2	69
		10□ Nom./ Water Removal	CFE20-10MNPE-2-WR	69

\*Element GPM with viscosity of 150 SUS, Specific Gravity of .88 (ISO 32 Oil at 100° F).

<sup>†</sup>Not available with by-pass/ CFE6 has 25 psi bypass in the canister element

## Dimensional Data

Canister Filter Assembly



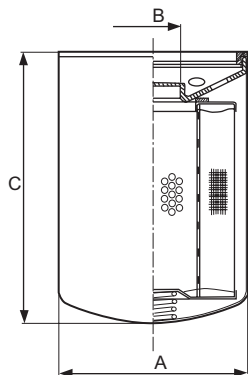
CFA- 06, 12, 20

CFAD- 24  
Double Element

Model Number (Assy- Length)	D1	D2	D3 (Optional thd.)	D4	D5	D6	E	E5	H1	H2	H3	Weight (lbs.)
CFA-6FP	3/8" NPT	3/4"-16 UNF	None	3.0	3.05	1/4"-20 UNC	3.06	1.50	3.50	4.60	5.00	1.0
CFA-12FP	3/4" NPT	1"-12 UNF	None	3.78	3.78	1/4"-20 UNC	3.75	1.50	5.75	7.40	8.19	2.5
CFA-20FP-1	1-1/4" NPT	1-1/2"-16 UN	1-1/4" BSP	5.08	5.28	5/16"-18 UNC	5.25	1.97	6.93	9.49	10.67	3.2
CFA-20FP-2	1-1/4" NPT	1-1/2"-16 UN	1-1/4" BSP	5.08	N/A	5/16"-18 UNC	N/A	N/A	10.71	13.19	14.37	4.0
CFAD-24FL-1	#24 SAE FLG.†	1-1/2"-16 UN	1-1/4" BSP	5.08	N/A	3/8"-16 UNC	N/A	N/A	6.93	10.31	11.68	8.5
CFAD-24FL-2	#24 SAE FLG.†	1-1/2"-16 UN	1-1/4" BSP	5.08	N/A	3/8"-16 UNC	N/A	N/A	10.71	14.06	15.43	10.1
CFAD-24FP-1	1-1/2" NPT	1-1/2"-16 UN	1-1/4" BSP	5.08	N/A	3/8"-16 UNC	N/A	N/A	6.93	10.31	11.68	8.5
CFAD-24FP-2	1-1/2" NPT	1-1/2"-16 UN	1-1/4" BSP	5.08	1/2-13	N/A	N/A	N/A	10.71	14.06	15.43	10.1

†Code 61, 3000 PSI SAE Flange

Units: Inches



Canister Filter Elements

Model Number (Element- Length)	A	B	C	Nominal Filter Area (Sq. In.)	Absolute Filter Area (Sq. In.)
CFE-6	3.05	3/4"-16 UNF	3.50	75	N/A
CFE-12	3.80	1"-12 UNF	5.75	512	331
CFE-20-1	5.08	1-1/2"-16 UN	6.93	768	615
CFE-20-2	5.08	1-1/2"-16 UN	10.71	1364	1091

Units: Inches



INDUSTRIAL FLUID POWER COMPONENTS  
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**L SERIES**

## Cartridge Valves



## Overview



## Specifications

VALVE	MODEL	TYPE	OPERATING PRESSURE	CAVITY	FLOW PATH	FLOW RATING (GPM) ΔP=75psi
SOLENOID	LSV2-08-2NCP	Poppet, 2 Way, 2 Position	3625 psi	08-2	2	5
	LSV2-08-2NCS	Spool, 2 Way, 2 Position	3000 psi	08-2	2	4
	LSV2-08-2NOP	Poppet, 2 Way, 2 Position	3625 psi	08-2	2	6
	LSV2-08-3	Spool, 3 Way, 2 Position	3000 psi	08-3	3	3
	LSV2-10-3	Spool, 3 Way, 2 Position	3000 psi	10-3	3	4
CHECK	LCV-08-P	Direct Acting, Poppet	3625 psi	08-2	2	5
	LCV-10-P	Direct Acting, Poppet	3625 psi	10-2	2	11
	LPC-10	Pilot to Open, Poppet	3625 psi	10-3	3	5
	LDPC-08	Dual Pilot-Operated	3000 psi	08-4	4	4
NEEDLE	LNV-08	Adjustable	3625 psi	08-2	2	4
SHUT OFF	LS-08	Adjustable	3625 psi	08-2	2	12
FLOW CONTROL	LFC-08	Adjustable	3625 psi	08-2	2	8
	LPFR-10	Regulator, Pressure-Compensated	3625 psi	10-3	3	
RELIEF	LRV-08	Adjustable, Direct Acting	3915 psi	08-2	2	4
	LBRV2-10	Adj., Direct Bi-Directional-Cross Port	3480 psi	10-2	2	
	LPSRV2-08	Adj., Pilot Op., Sliding Spool	5075 psi	08-2	2	
	LPSRV-10	Adjustable, Pilot Operated	5075 psi	10-2	2	
SHUTTLE	LSLV-08/10	Ball	3480 psi	10-3	3	4
PRESSURE REDUCING/RELIEVING	LDPR-10	Direct Acting	3000 psi	10-3	3	6
COUNTERBALANCE	LCB-CA-H		3100 psi		3	8

### Solenoid Valves

2 Way, 2 Position, Spool/ Poppet Type - 08 Cavity



### Specifications

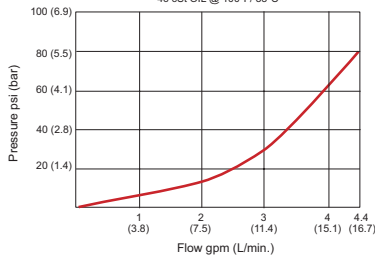
- Operating Pressure:** 3000-4000 psi (207-275 Bar)
- Temperature:** -30°F - +250°F (-35°C - +120°C)
- Coil Rating:** Continuous from 85% to 100% of rated voltage
- Fluids:** Mineral based fluids. For other fluid compatibility consult factory.
- Recommended Filtration:** ISO 16/12
- Body Material:** Anodized 6061T6 aluminum alloy rated at 3000 psi (207 Bar)

### Features

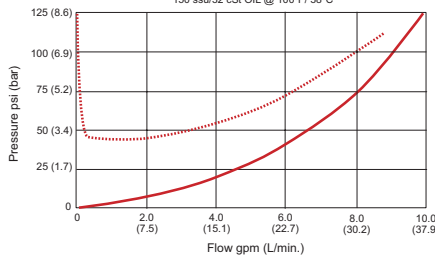
- Continuous Duty Solenoid
- Efficient Wet-Armature Construction
- Optional Coil Voltages and Terminations
- Industry Common Cavity
- Compact Size

### Pressure Drop Curves

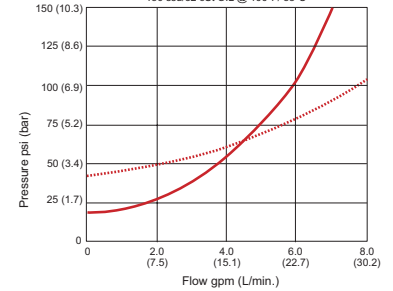
**LSV2-08-2NCS** Energized  
46 cSt OIL @ 100°F/ 38°C



**LSV2-08-2NOP** 2 To 1 — 1 To 2 .....  
150 ssu/32 cSt OIL @ 100°F/ 38°C



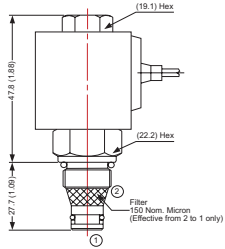
**LSV2-08-2NCP** 2 To 1 — 1 To 2 .....  
150 ssu/32 cSt OIL @ 100°F/ 38°C



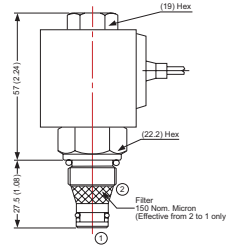
### Dimensional Data

Units: mm (inch)

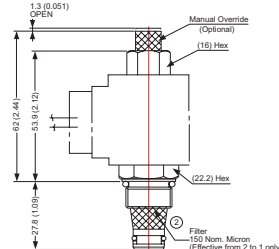
**LSV2-08-2NCS**



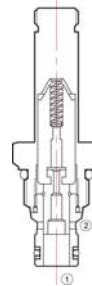
**LSV2-08-2NOP**



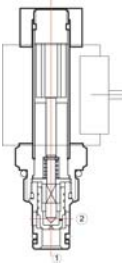
**LSV2-08-2NCP**



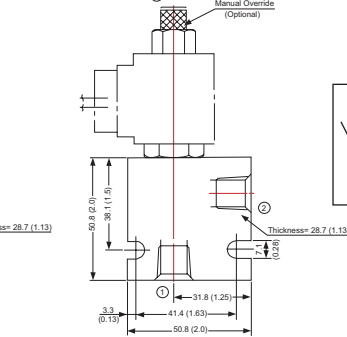
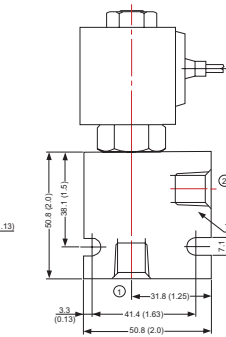
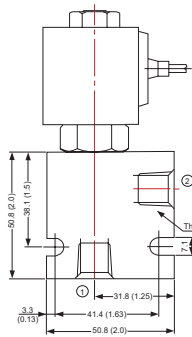
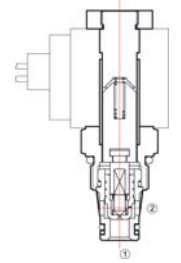
**LSV2-08-2NCS**



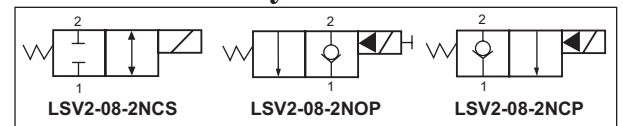
**LSV2-08-2NOP**



**LSV2-08-2NCP**

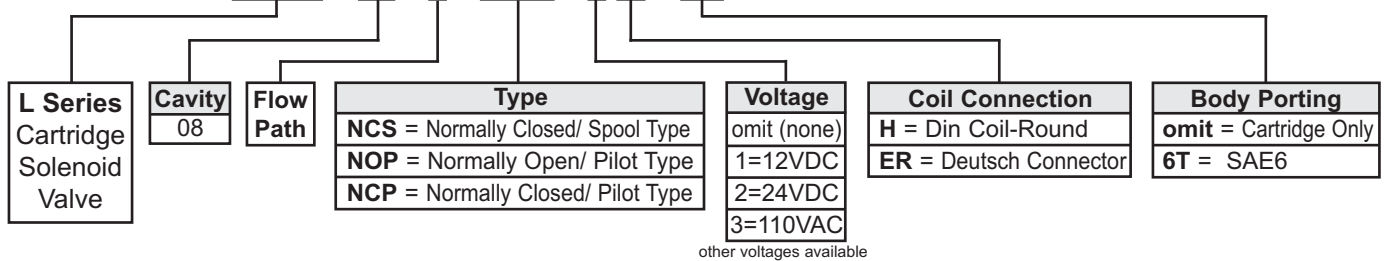


### Symbols



### Ordering Information

**LSV2 - 08 - 2 - NCS - 3 H - 6T**





### Solenoid Valves

2 Way, 2 Position, Spool/ Poppet Type - 10 Cavity



### Specifications

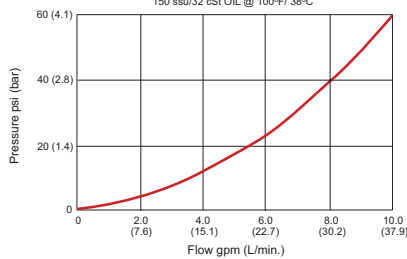
- Max. Operating Pressure:** 4350 psi (300 Bar)
- Temperature:** -30°F - +250°F (-35°C - +120°C)
- Coil Rating:** Continuous from 85% to 100% of rated voltage
- Fluids:** Mineral based fluids. For other fluid compatibility consult factory.
- Recommended Filtration:** ISO 16/12
- Body Material:** Anodized 6061T6 aluminum alloy rated at 3000 psi (207 Bar)

### Features

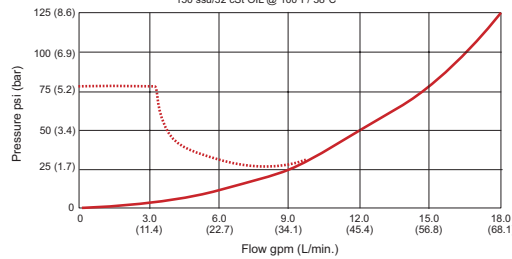
- Continuous Duty Solenoid
- Efficient Wet-Armature Construction
- Optional Coil Voltages and Terminations
- Industry Common Cavity
- Compact Size

### Pressure Drop Curves

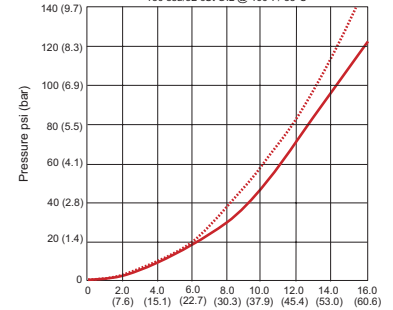
**LSV2-10-2NCS** 2 To 1 or 1 To 2 (Energized)  
150 ssu/32 cSt OIL @ 100°F/ 38°C



**LSV2-10-2NOP** 2 To 1 — 1 To 2 .....  
150 ssu/32 cSt OIL @ 100°F/ 38°C

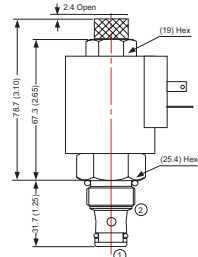


**LSV2-10-2NCP** 2 To 1 — 1 To 2 .....  
150 ssu/32 cSt OIL @ 100°F/ 38°C

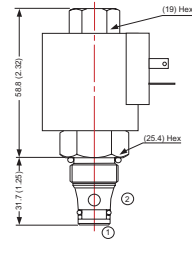


### Units: mm (inch) Dimensional Data

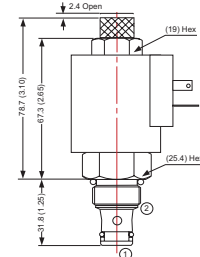
**LSV2-10-2NCS**



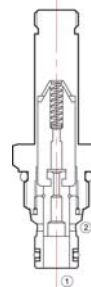
**LSV2-10-2NOP**



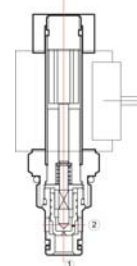
**LSV2-10-2NCP**



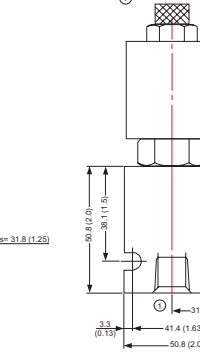
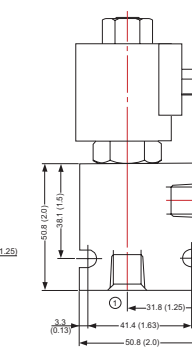
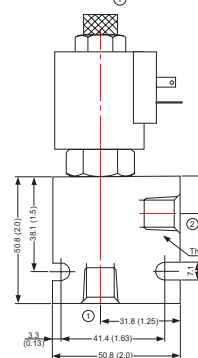
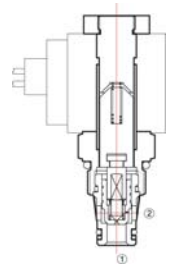
**LSV2-10-2NCS**



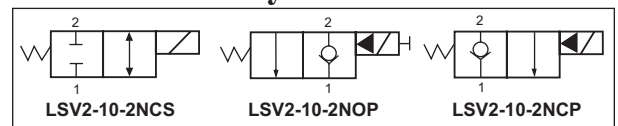
**LSV2-10-2NOP**



**LSV2-10-2NCP**

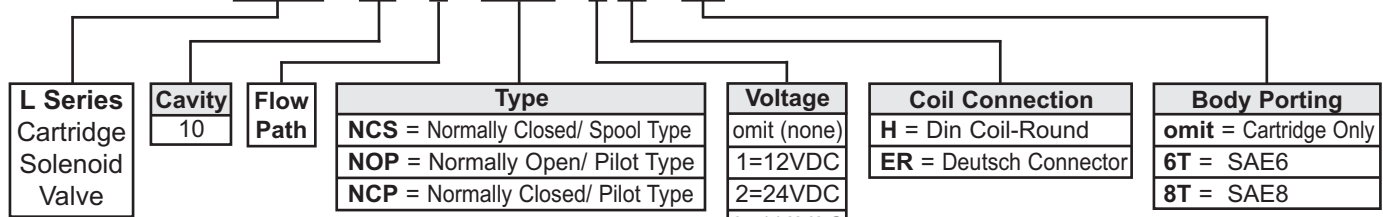


### Symbols



### Ordering Information

**LSV2 - 10 - 2 - NCS - 3 H - 6T**



other voltages available

### Solenoid Valves

3 Way, 2 Position, Spool Type - 08 or 10 Cavity

### Specifications

- Operating Pressure:** 3000 psi (207 Bar)
- Temperature:** -30°F - +250°F (-35°C - +120°C)
- Coil Rating:** Continuous from 85% to 100% of rated voltage
- Fluids:** Mineral based fluids. For other fluid compatibility consult factory.
- Recommended Filtration:** ISO 16/12
- Body Material:** Anodized 6061T6 aluminum alloy rated at 3000 psi (207 Bar)

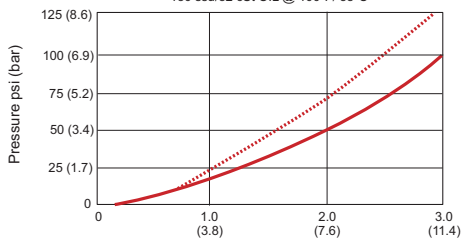
### Features

- Continuous Duty Solenoid
- Efficient Wet-Armature Construction
- Optional Coil Voltages and Terminations
- Manual Override Option
- Industry Common Cavity
- Compact Size

### Pressure Drop Curves

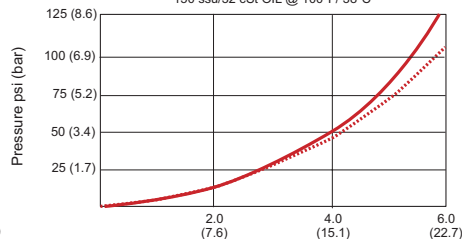
LSV2-08-3

3 To 1 (Energized) .....  
2 To 1 (De-Energized) ———  
150 ssu/32 cSt OIL @ 100°F/ 38°C



LSV2-10-3

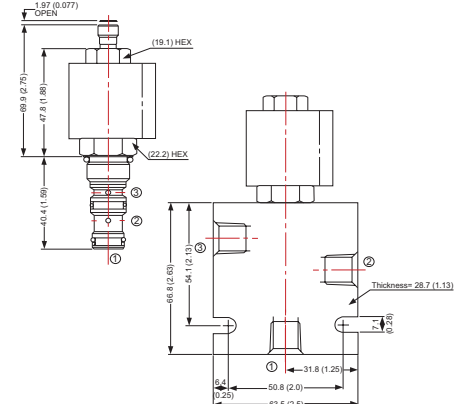
3 To 1 (Energized) ———  
2 To 1 (De-Energized) .....  
150 ssu/32 cSt OIL @ 100°F/ 38°C



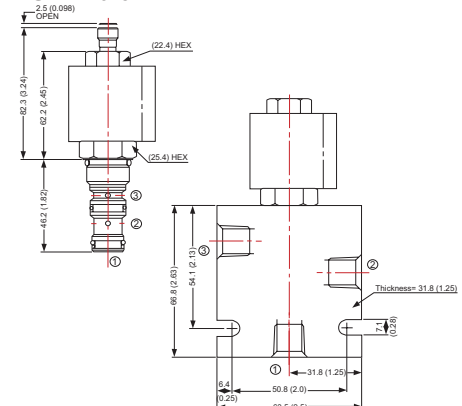
### Dimensional Data

Units: mm (inch)

LSV2-08-3



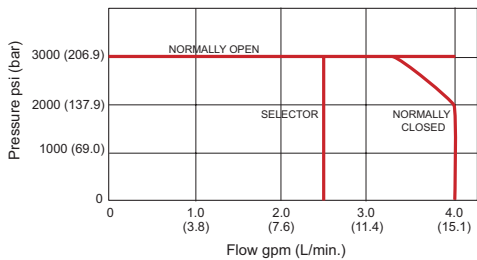
LSV2-10-3



### Performance Characteristics

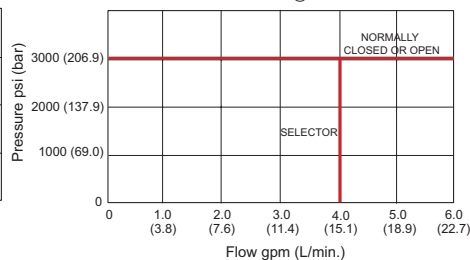
LSV2-08-3

150 ssu/32 cSt OIL @ 100°F/ 38°C

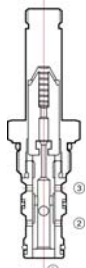


LSV2-10-3

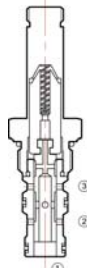
150 ssu/32 cSt OIL @ 100°F/ 38°C



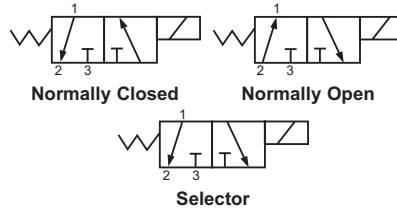
LSV2-08-3



LSV2-10-3

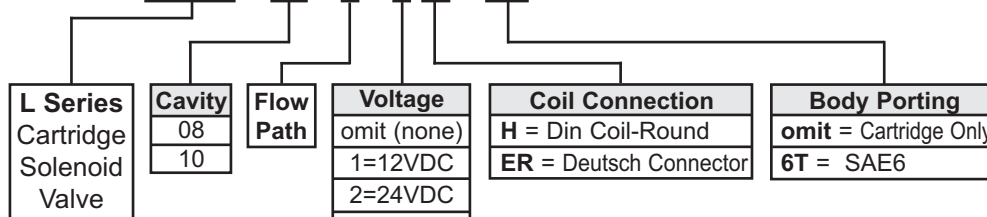


### Symbols



### Ordering Information

LSV2 - 10 - 3 - 3 H - 6T



other voltages available

### Check Valves

SAE6 & SAE8



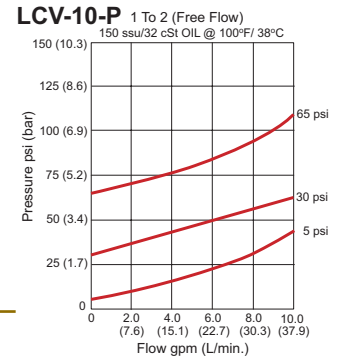
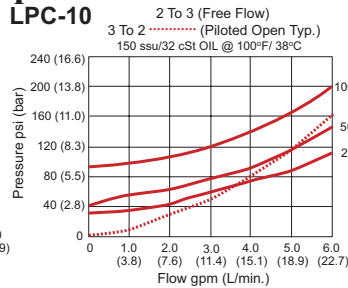
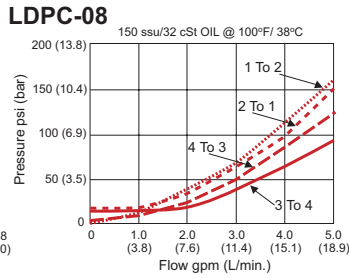
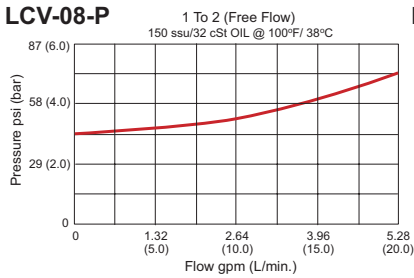
### Specifications

- Operating Pressure:** 3000-3625 psi (207-250 Bar)
- Temperature:** -30°F - +250°F (-35°C - +120°C)
- Fluids:** Mineral based fluids. For other fluid compatibility consult factory.
- Recommended Critical Application:** ISO 16/12  
**Filtration:** Non-Critical Application: ISO 19/15
- Body Material:** Anodized 6061T6 aluminum alloy rated at 3000 psi (207 Bar)

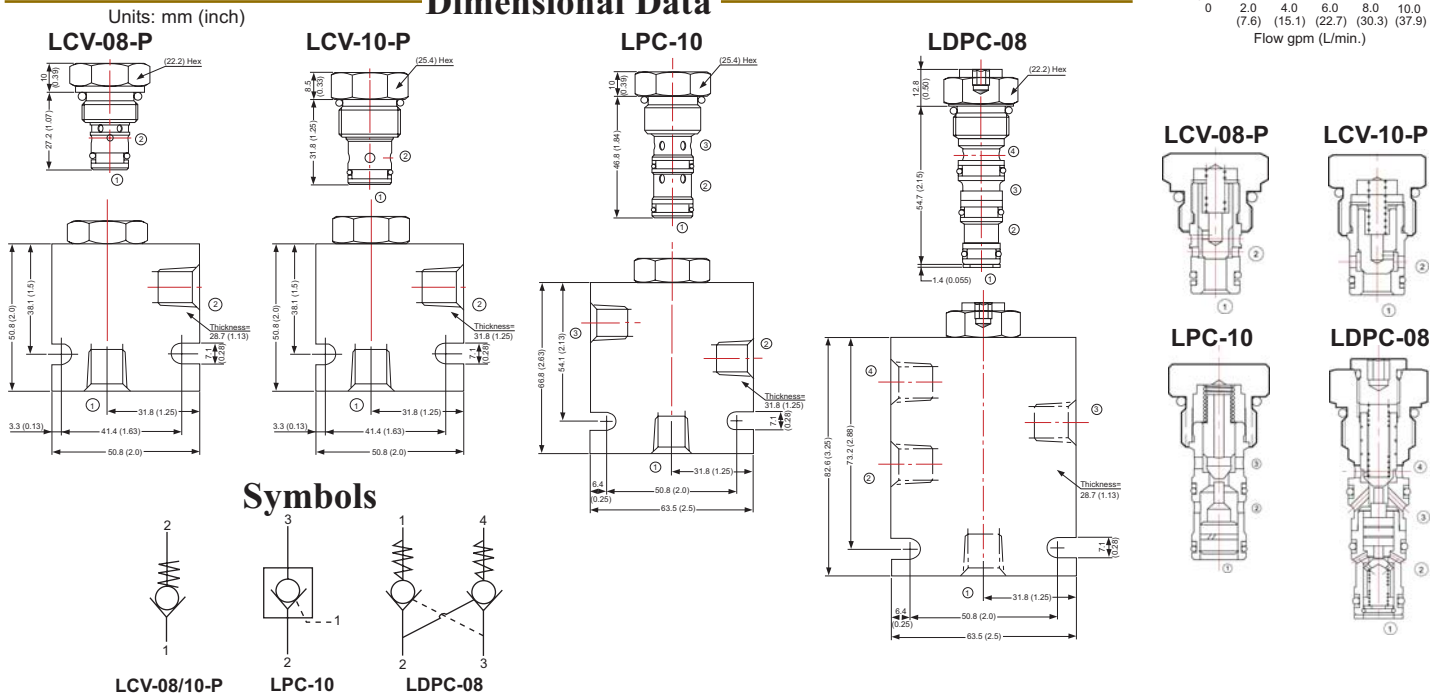
### Features

- Hardened Poppet and Seat for Long Life
- Low Leakage
- Industry Common Cavity
- Compact Size

### Pressure Drop Curves



### Dimensional Data



### Ordering Information

**LCV - 08 - P - 10 - 6T**

Type	Cavity	Poppet Type	Function	Body Porting
LCV = Direct-Acting/ Poppet Type	08		4 = 4 psi cracking	omit = Cartridge Only
LPC = Pilot to Open/ Poppet Type	10		10 = 10 psi cracking	6T = SAE6
LDPC = Dual Pilot Operated			50 = 50 psi cracking	8T = SAE8

### Flow Control Valves

SAE6 & SAE8



### Specifications

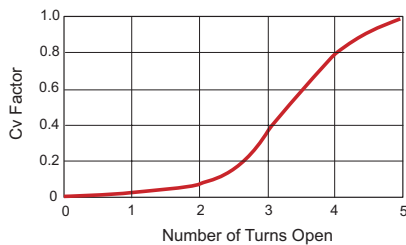
- Operating Pressure:** 3625 psi (250 Bar)
- Temperature:** -22°F - +250°F (-30°C - +120°C)
- Fluids:** Mineral based fluids. For other fluid compatibility consult factory.
- Recommended Filtration:** Critical Application: ISO 16/12 Non-Critical Application: ISO 19/15
- Body Material:** Anodized 6061T6 aluminum alloy rated at 3000 psi (207 Bar)

### Features

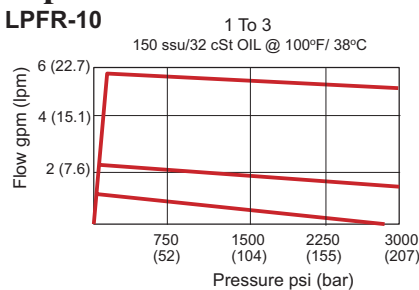
- Hardened Seat for Long Life
- Industry Common Cavity
- Compact Size

### Pressure Drop Curves

**LFC-08**

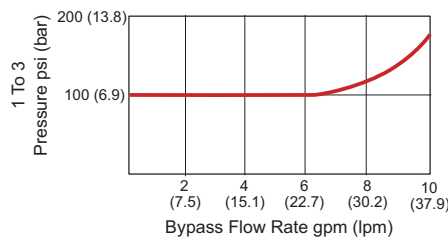


**LPFR-10**



$$\text{FLOW IN GPM} = \frac{C_v \sqrt{P_1 - P_2}}{G_f}$$

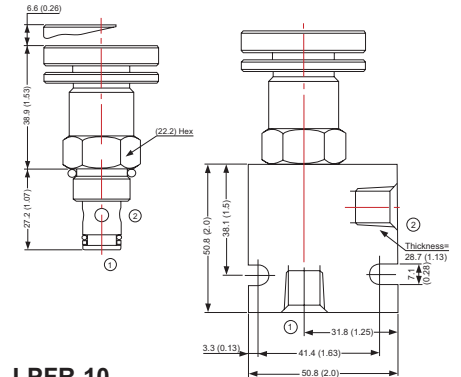
Cv=Flow Coefficient  
P1=Inlet Pressure (psi)  
P2=Outlet Pressure (psi)  
Gf=specific gravity of medium at operating temperature in F.



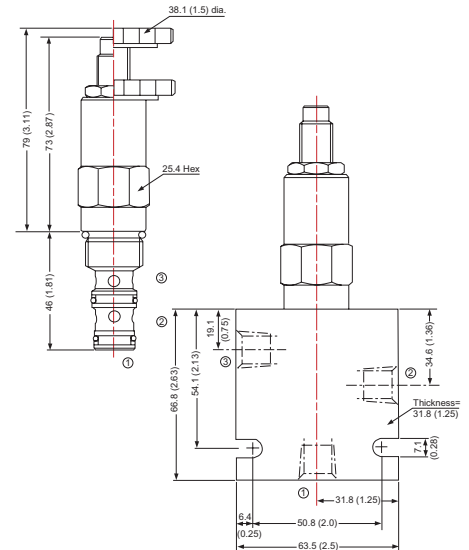
### Dimensional Data

Units: mm (inch)

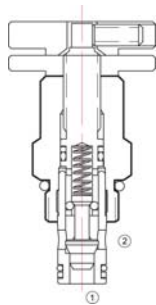
**LFC-08**



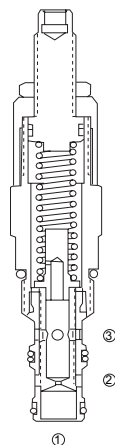
**LPFR-10**



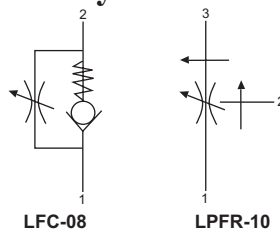
**LFC-08**



**LPFR-10**



### Symbols



### Ordering Information

**LFC - 08 - K - 6T**

<b>Type</b>	<b>Cavity</b>	<b>1-1/2" Dia. Knob</b>	<b>Body Porting</b>
LFC = Adjustable, Flow Control Valve	08		omit = Cartridge Only
LPFR = Regulator, Pressure Compensated Flow Control Valve	10		6T = SAE6
			8T = SAE8

### Needle, Shut Off, Shuttle Valves

SAE6 & SAE8



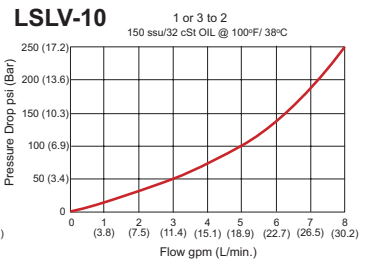
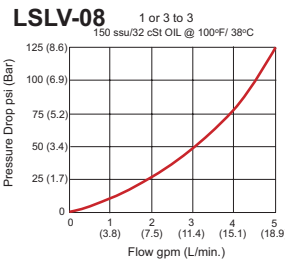
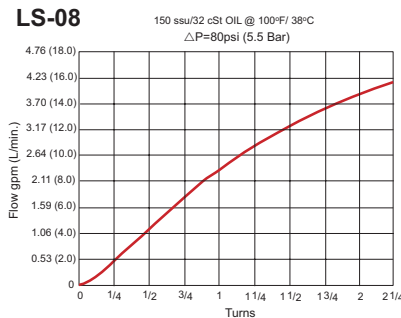
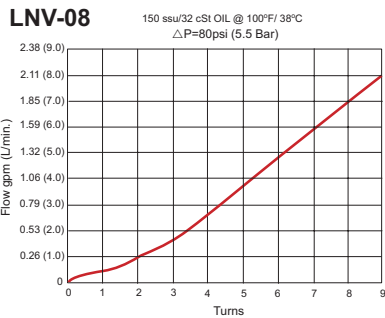
### Specifications

- Operating Pressure:** 3000 psi (207 Bar)
- Temperature:** -15°F - +250°F (-26°C - +120°C)
- Fluids:** Mineral based fluids. For other fluid compatibility consult factory.
- Recommended Filtration:** Critical Application: ISO 16/12  
Non-Critical Application: ISO 19/15
- Body Material:** Anodized 6061T6 aluminum alloy rated at 3000 psi (207 Bar)

### Features

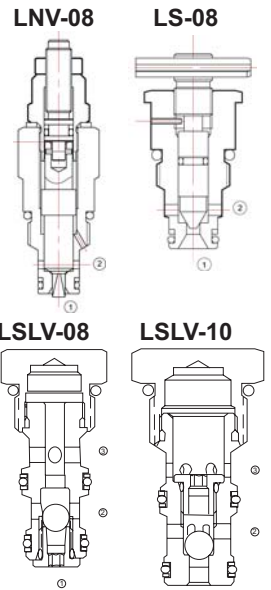
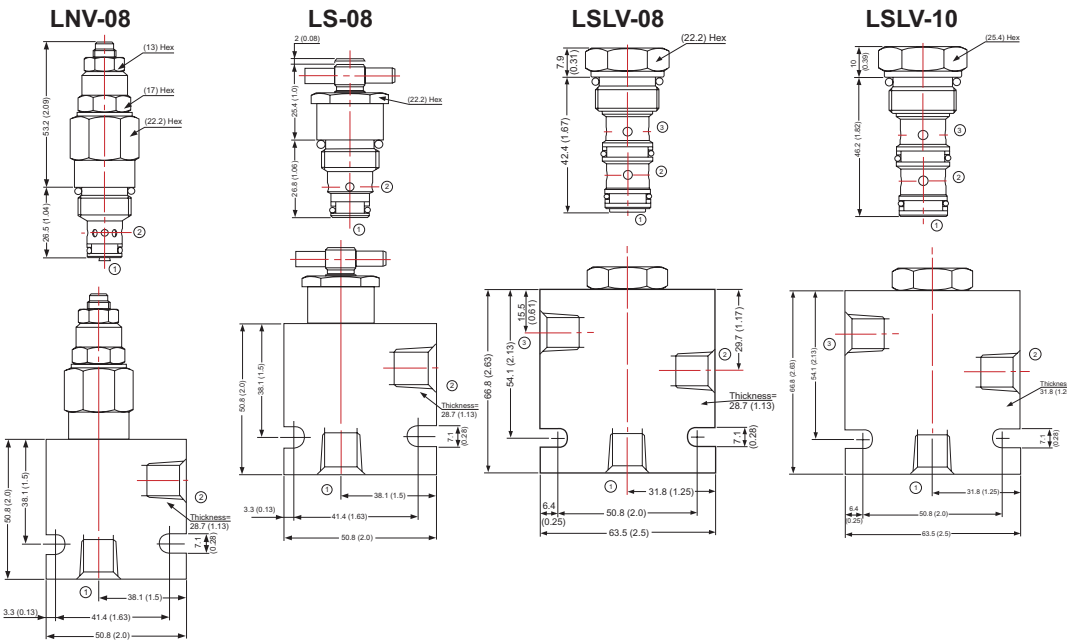
- Hardened Seat for Long Life
- Low Leakage
- Industry Common Cavity
- Compact Size

### Pressure Drop Curves/ Flow Characteristics

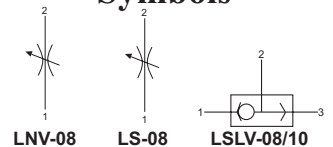


### Dimensional Data

Units: mm (inch)



### Symbols



### Ordering Information

**LNV - 08 - 6T**

Type	Cavity	Body Porting
LNV = Adjustable, Needle Valve	08	omit = Cartridge Only
LS = Adjustable, Shut Off Valve	10	6T = SAE6
LSLV = Ball Type, Shuttle Valve		8T = SAE8

### Relief Valves

SAE6 & SAE8



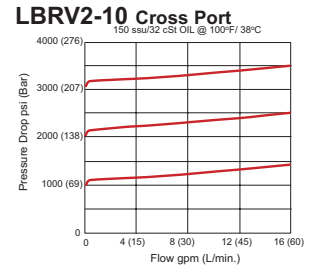
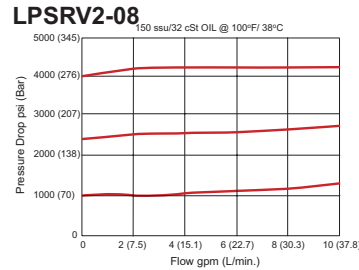
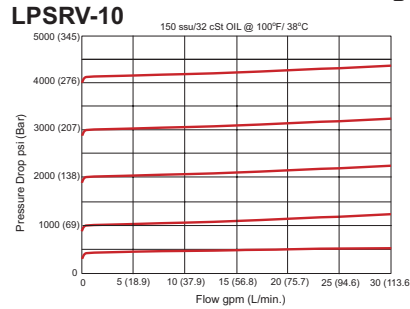
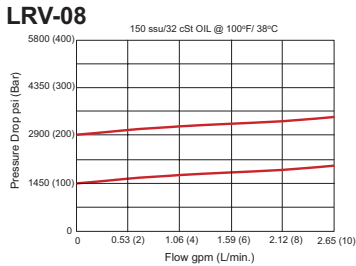
### Specifications

- Operating Pressure:** 3000 psi (207 Bar)
- Temperature:** -30°F - +250°F (-35°C - +120°C)
- Fluids:** Mineral based fluids. For other fluid compatibility consult factory.
- Recommended Filtration:** ISO 19/15
- Body Material:** Anodized 6061T6 aluminum alloy rated at 3000 psi (207 Bar)

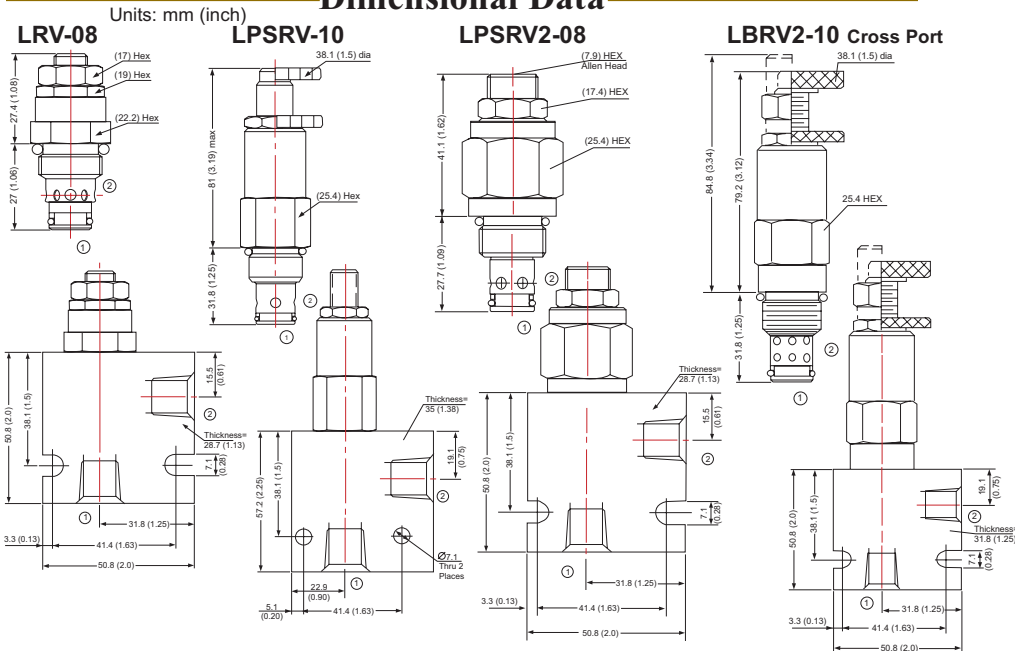
### Features

- Rapid Response to Pressure Surges
- Hardened Parts for Long Life
- Adjustment May be Locked in Place
- Industry Common Cavity
- Compact Size

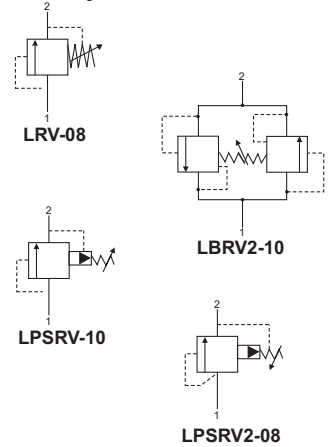
### Pressure Drop Curves



### Dimensional Data



### Symbols



### Ordering Information

#### LPSRV - 10 - 50 - 8T

Type	Cavity	PSI Range	Body Porting
LRV = Adjustable, Direct-Acting	08	20 = Adj. 300 - 2000	omit = Cartridge Only
LBRV2 = Adjustable, Direct Bi-Directional-Cross Port	10	24 = Adj. 200 - 2400	6T = SAE6
LPSRV2 = Adj., Pilot Op. Sliding Spool		30 = Adj. 400 - 3000	8T = SAE8
LPSRV = Adjustable, Pilot Operated		36 = Adj. 1150 - 3600	
		50 = Adj. 600 - 5000	



### Counterbalance Valves

SAE6 & SAE8



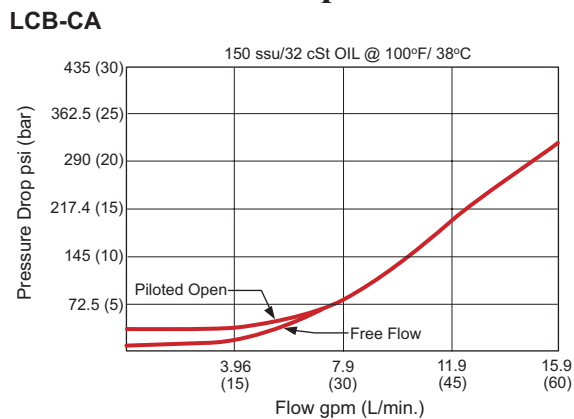
#### Specifications

- Load Holding Pressure:** 3100 psi (215 Bar)
- Temperature:** -30°F - +250°F (-35°C - +120°C)
- Fluids:** Mineral based fluids. For other fluid compatibility consult factory.
- Body Material:** Anodized 6061T6 aluminum alloy rated at 3000 psi (207 Bar)

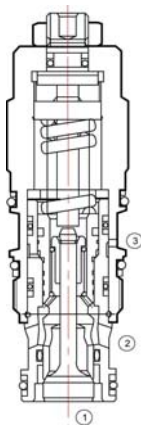
#### Features

- Counterbalance Valves Should be Set at Least 1.3x the Maximum Load Induced Pressure
- Turn Adjustment Clockwise to Decrease Setting and Release Load
- Backpressure at Port 2 Adds to the Effective Relief Setting at a Ratio of: 1 + the Pilot x the Backpressure

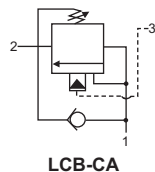
#### Pressure Drop Curves



**LCB-CA**

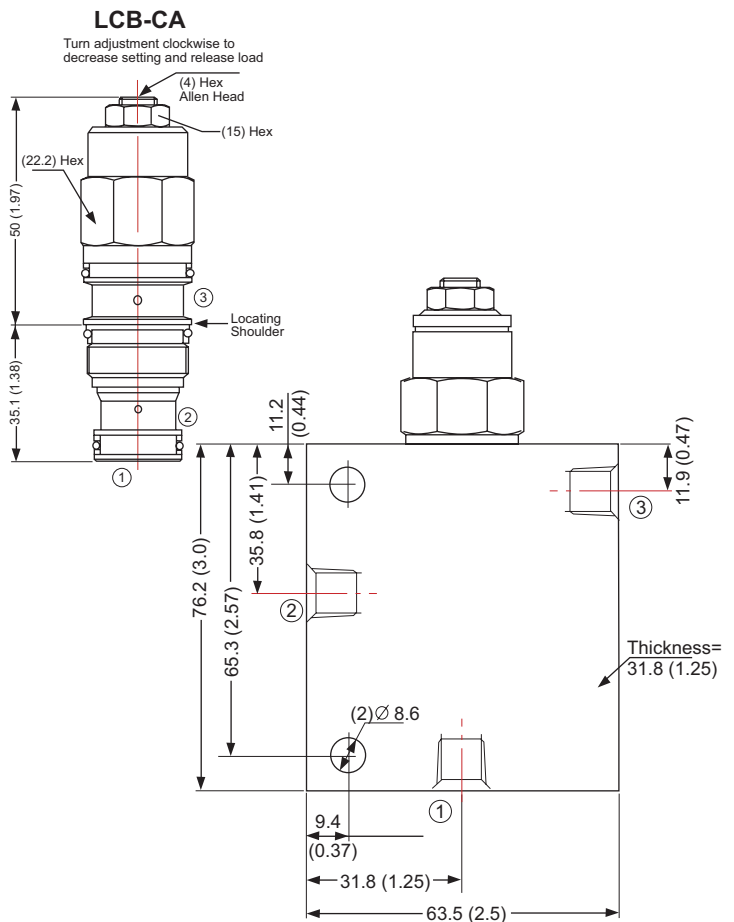


#### Symbols



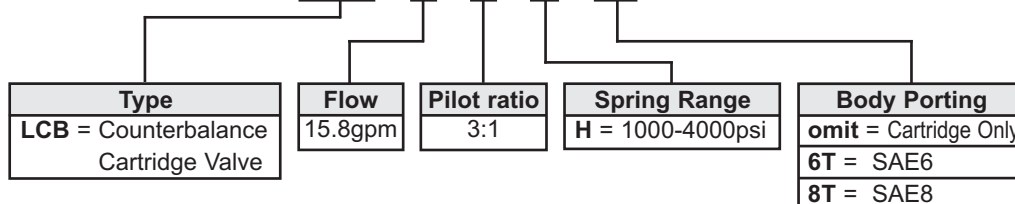
#### Dimensional Data

Units: mm (inch)



#### Ordering Information

**LCB - C - A - H - 6T**







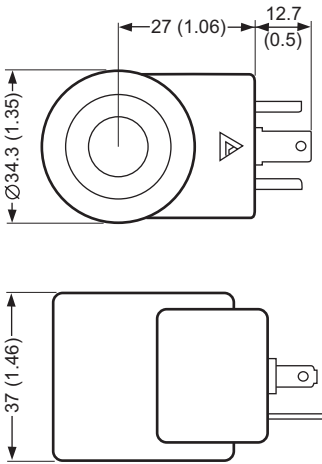
**Solenoid Coils**

SIZE 08 & 10

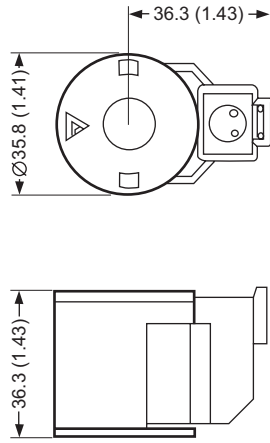
**Dimensional Data**

Units: mm (inch)

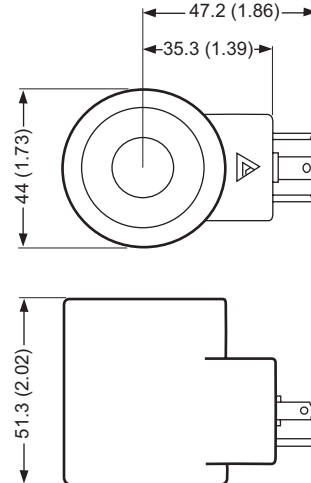
**LC2-08-C-\*H**



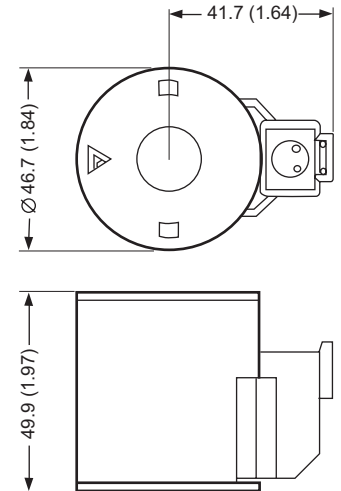
**LC2-08-C-\*ER**



**LC2-10-C-\*H**

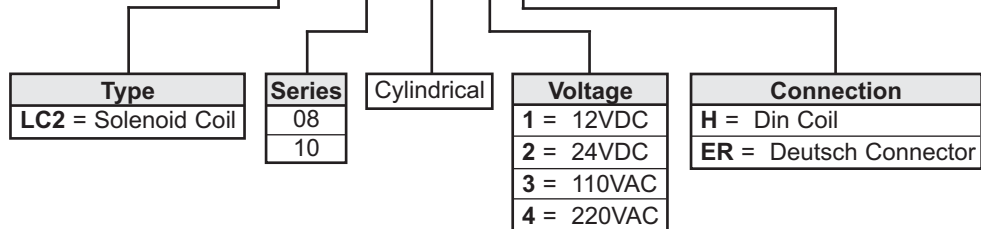


**LC2-10-C-\*ER**



**Ordering Information**

**LC2 - 08 - C - 2 H**



**LC2-08-C-3H**



INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS



## **CMM SERIES**

### **Male NPT Steel Check Valves**



CMM-375



CMM-250

## Specifications

1. 1/4" & 3/8" NPT (Male) ports
2. 3000 psi (210 Bar) maximum pressure
3. 7 or 3 psi cracking pressure
4. **Temperature Range:** -20°F to +400°F
5. **CV Factor:** .5 or .8
6. Zinc-plated and sealed with clear chromate for double corrosion protection

### 7. Materials:

*Body* - 12L14 Steel

*Ball* - Stainless Steel

*Retainer* - Steel

*Spring* - Stainless Steel

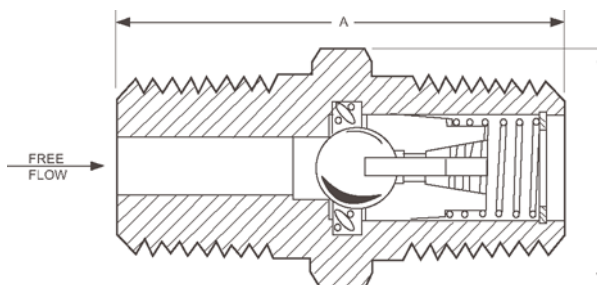


Model	Body Material	Seal	Port Size (NPT) Male	CV	Cracking Pressure (psi)	Maximum Pressure (psi)
CMM250S	Steel	Metal	1/4"	.5	7	3000
CMM250S-L		Viton				
CMM375S		Metal	3/8"	.8	3	

## Dimensional Data

Port Size (NPT) Male	A	B	Orifice Diameter
1/4"	29.4 (1.156)	14.3 (0.563)	4.8 (0.188)
3/8"	34.9 (1.375)	17.5 (0.688)	6.35 (0.25)

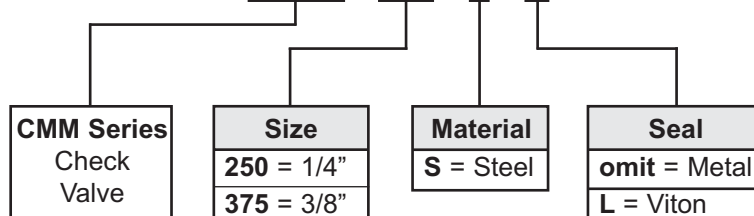
Units: mm/ (Inch)



Actual Size

## Ordering Information

**CMM - 250 - S - L**





INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS



## D03 SERIES 35

### Solenoid Operated Directional Valves



D03SD-2B-115A-35



D03SDS-2H-12D-35



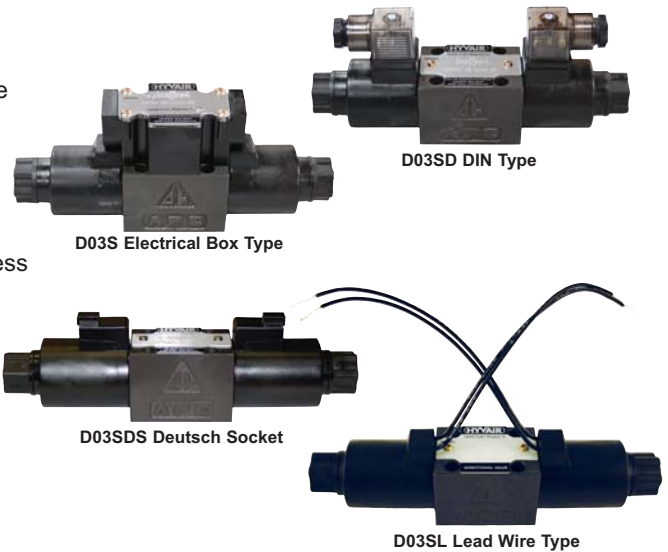
D03S-2B-115A-35

**Features**

- **High Flow/ High Pressure:** Up to 25 gpm / 5000 psi working pressure\*.
- **Oil Immersed, Quiet Solenoid Design:** Moving core immersed in hydraulic oil provides quiet operation.
- **High Tank Port Pressure:** Up to 3000 psi tank port back pressure (Check each spool type for max. allowable).
- **Twin Tank Line Design:** Upper and lower tank line channels (Double Loop) greatly reduces pressure drop.
- **Wiring:** Electrical box with indicator lights and terminal strip connection standard. DIN connector provided standard on DIN style coils. (Connectors may optionally be supplied with lights.) Deutsch socket and lead wire also available.
- **Hydraulic/ Electric Shockless:** Valve coils available electric shockless (rectified)- reducing voltages spikes, extending relay contact life, and providing even quieter operation. Spool shifting time is increased up to four times by metering the oil in the core tube. Option F (Electrical Box version only)
- **Maintenance:** Indicator lamps to diagnose connection; Plug-in coils provide easy changing without disturbing wiring.
- **High Reliability:** Valve designed to last 30 million spool shifts under proper use.
- **Bolt Kit included with valve standard**

\*Some spools rated less- check max. pressures and flows chart

**Series 35  
High Flow/ High Pressure Directional Valves**



**Specifications**

Model	Standard type	Hydraulic Shockless type	
		Max. operating pressure psi (MPa)	Max. flow l/min (gpm)
	1A8	5000 (35)	30 (7.9)
	1A8R		
	3A8		
	1A	21.1 (80)	50 (13.5)
	1AR		
	3A	26.4 (100)	
	1AY		
	1ARY	17.1 (65)	
	3AY		
	5B	26.4 (100)	

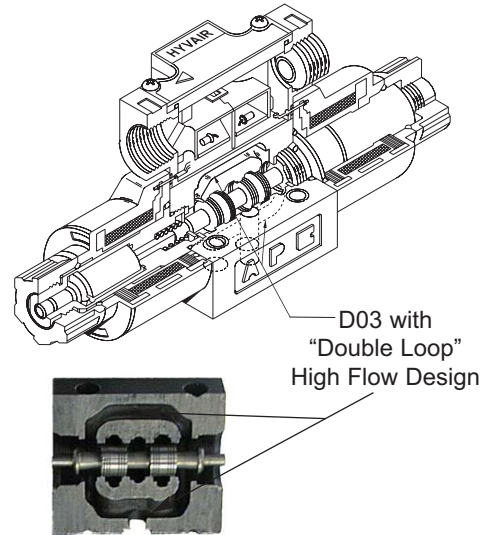
Model	Standard type	Hydraulic Shockless type	
		Max. operating pressure psi (MPa)	Max. flow l/min (gpm)
	5BR	5000 (35)	26.4 (100)
	2J		
	2B		
	2T		
	2K1		
	2F1		
	2K		
	2F		
	2H		
	2C		
	2C5		
			AC: 65 (17.1) DC: 80 (21.1)
			10.6 (40)

**Note:** The maximum flow capacity is shown here. The maximum flow of each valve differs depending on pressure. See HP (Pressure-Flow curve for each model).

**Specifications**

		AC solenoid		DC solenoid	
		AC	Built-in rectifier	RAC	DC
Max. operating pressure	P, A, B ports	5070 psi Note: Less for some valve types such as hyd. shockless and tandem spool (35 Mpa)			
Maximum permissible back pressure	T port	3040 psi (35:21 MPa)			
Changeover frequency (cycles/min)	Standard type	300	120	300	
	Shockless type	—		120	
Mounting Surface	Nfpa, (ISO)	T3.5.1.MR1-D03, (4401-03)			
Internal Leakage*	cu-in/min, (ml/min)	0.18, (3)			
Mass lbs (kg)	Double solenoids	4 (1.8)	4.4 (2.0)		
	Single solenoid	3.1 (1.4)	3.3 (1.5)		
Recommended operating conditions	Operating temperature range	-4 ~ 158 °F (-20 ~ 70 °C)			
	Operating viscosity	80 ~ 1400 SUS (15 ~ 300 mm <sup>2</sup> /s)			
	Viscosity index	90 or above			
	Filtration	25 μm or less			

 \* @3000psi Viscosity of hydraulic fluid: 150SUS (32mm<sup>2</sup>/s)

**Internal Structure**

**Symbols**


### Common 115 VAC Models

D03	Symbol	D03	Symbol
D03S-1A-115A-35		D03S-2H-115A-35	
D03S-1AY-115A-35		D03S-2K-115A-35	
D03S-2B-115A-35		D03S-2T-115A-35	
D03S-2C-115A-35		D03S-3A-115A-35	
D03S-2F-115A-35			

### Common Configurations

#### Electrical Box



#### Din Coil



### Example of Code "R" Reversed (symbols shown in simplified form)



**D03SD-2B**  
(standard)



**D03SD-2BR**  
(no change to DIN coil valve, electrical box flipped for opposite coil markings)



**D03SD-1A**  
(standard)



**D03SD-1AR**  
(coil supplied reversed from normal position & spool reversed)



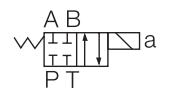
(symbol shown blocked during valve transition only)



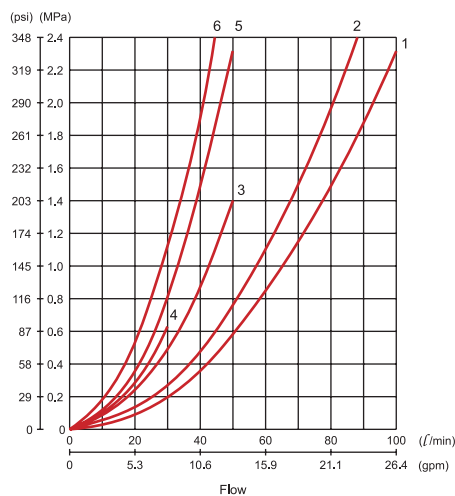
**D03SD-5B**  
(standard)



**D03SD-5BR**  
(right or "b" coil side of valve provided)



### Pressure Drop Curves



Model	Valve spool type	P→A	P→B	A→T	B→T	P→T
D03 SERIES	1A8, 1A8R, 3A8	4	4	—	—	—
	1A, 1AR	2	2	2	2	—
	3A	2	2	2	2	—
	1AY, 1AYR, 3AY	1	1	1	1	—
	2H	1	1	1	1	1
	5B, 5BR, 2B, 2F	2	2	2	2	—
	2K, 2K1	2	2	1	2	—
	2J	1	2	2	2	—
	2F	2	2	1	1	—
	2C	6	6	5	5	3
	2C5	1	6	2	5	3
	2T	1	1	2	2	—

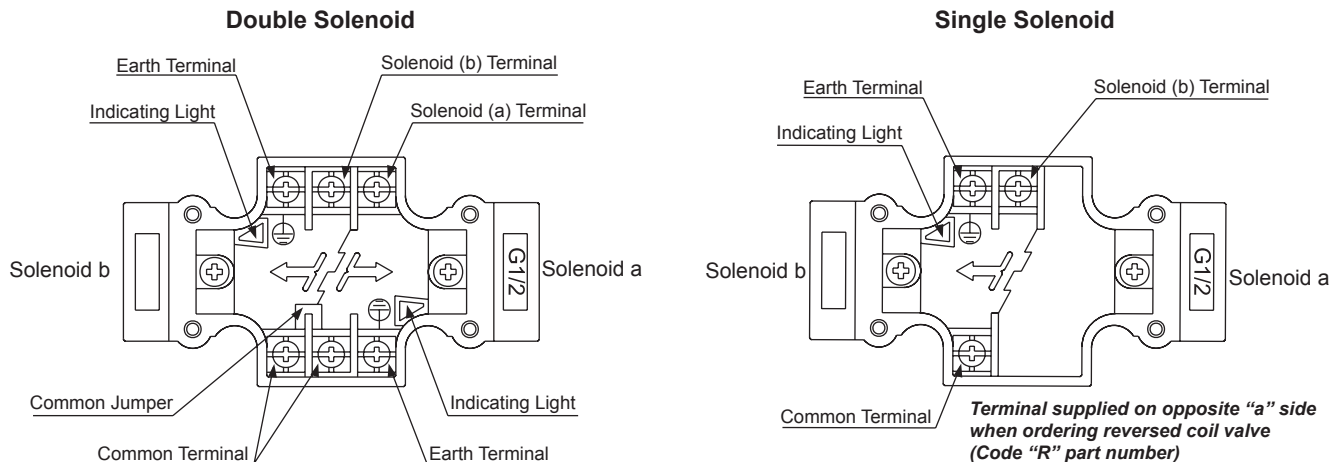
Viscosity of hydraulic fluid 150 SUS {32 mm /s<sup>2</sup>}



## Electrical Information

<b>D03</b>	<b>Solenoid Coil Specifications</b>											
Solenoid Voltage	115V-AC		230V-AC			115V-RAC (rectified)		230V-RAC (rectified)		12V-DC	24V-DC	
Coil Model D03S (Elect. Box)	2BH-C1/C3		2BH-C2/C4			2BF-R1/R3		2BF-R2/R4		2BF-D1	2BF-D2	
Coil Model D03SD (DIN)	2AH-C1/C3		2AH-C2/C4			2AF-R1/R3		2AF-R2/R4		2AF-D1	2AF-D2	
Applied Voltage	AC110		AC120		AC220		AC240		AC110		AC120	
Frequency (Hz)	50	60	60	50	60	60	50 / 60		50 / 60			
Starting Current (A)	2.2	2.0	2.2	1.1	1.0	1.0						
Holding Current (A)	0.54	0.41	0.47	0.25	0.19	0.23	0.31	0.32	0.15	0.16	2.5	1.25
Holding Power (W)	25	22	28	25	22	28	30	32	30	32	30	30
Permissible Voltage Range (V)	80-120		180-240			80-130		180-250		10.8-13.2		21.6-26.4
Insulation Resistance (M $\Omega$ )	100 or above (500V)											

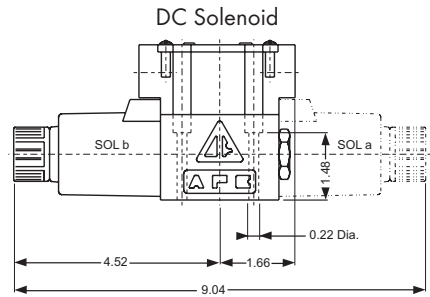
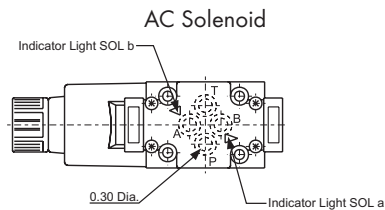
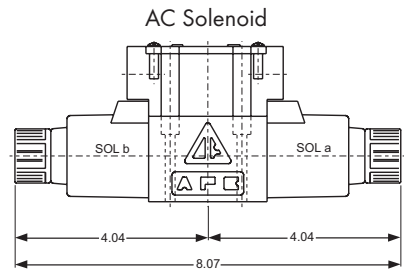
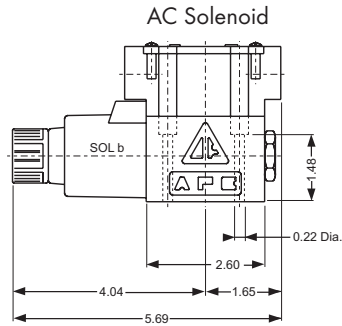
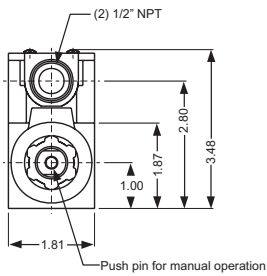
## Electrical Box Wiring


**Notes:**

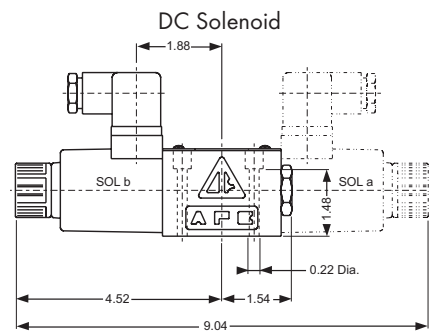
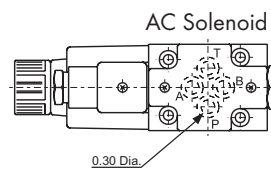
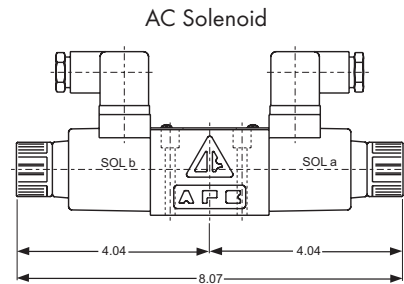
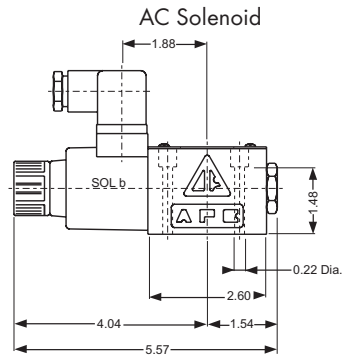
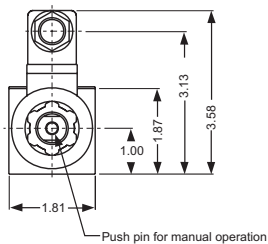
- DIN Coils manufactured to accept standard 3 pin DIN 43 650 and ISO 4400 connectors.
- AC Coils are rated for both 50/60Hz (rewiring not required)
- DC coils are not polarity sensitive
- Rectifier is supplied: in the electrical box- D03S, in the coil (internal)- D03SD
- Hydraulic shockless AC valves are always supplied with rectifier.
- Hydraulic shockless valves will not operate as shockless until the tank line has become filled with oil- occurs automatically after the first few cycles. Mounting valve below the reservoir oil level or using check valve ensures that the tank line remains filled.
- Do not supply electrical power to the AC coils unless the coil is mounted on the valve.
- Do not exceed voltage specifications shown above.
- Electrical power should be maintained on detented valves (spool code 3A). Detent only maintains start-up position of the valve.

**Dimensional Data**
**Electrical Box Type  
D03S  
D03SF**

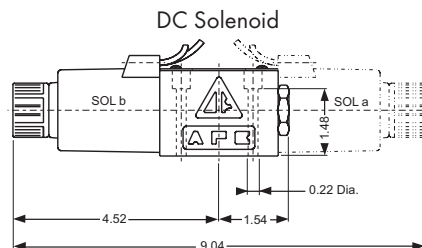
Units: Inches  
 Mounting: (4) 10-24 SHCS x 1-3/4"  
 Torque 40-45 in-lbs

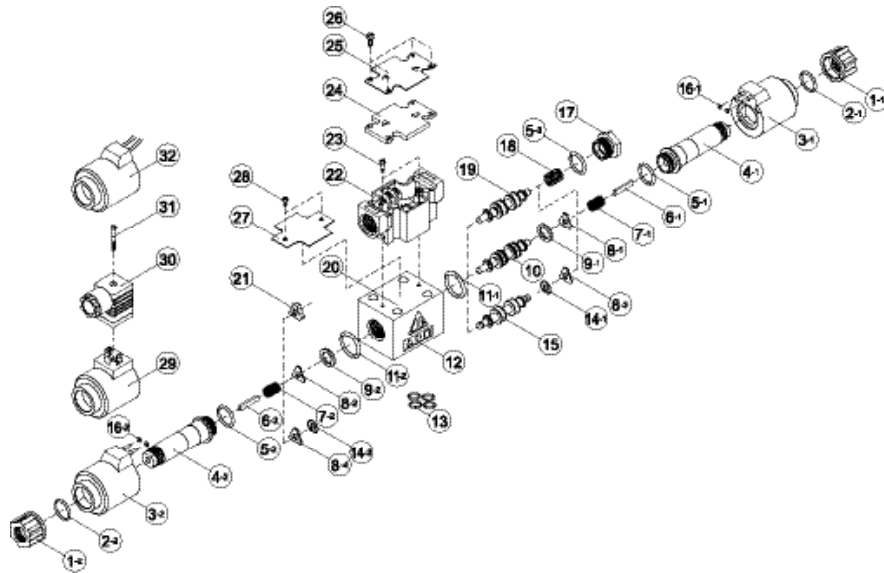

**DIN Type  
D03SD**

Units: Inches  
 Mounting: (4) 10-24 SHCS x 1-3/4"  
 Torque 40-45 in-lbs

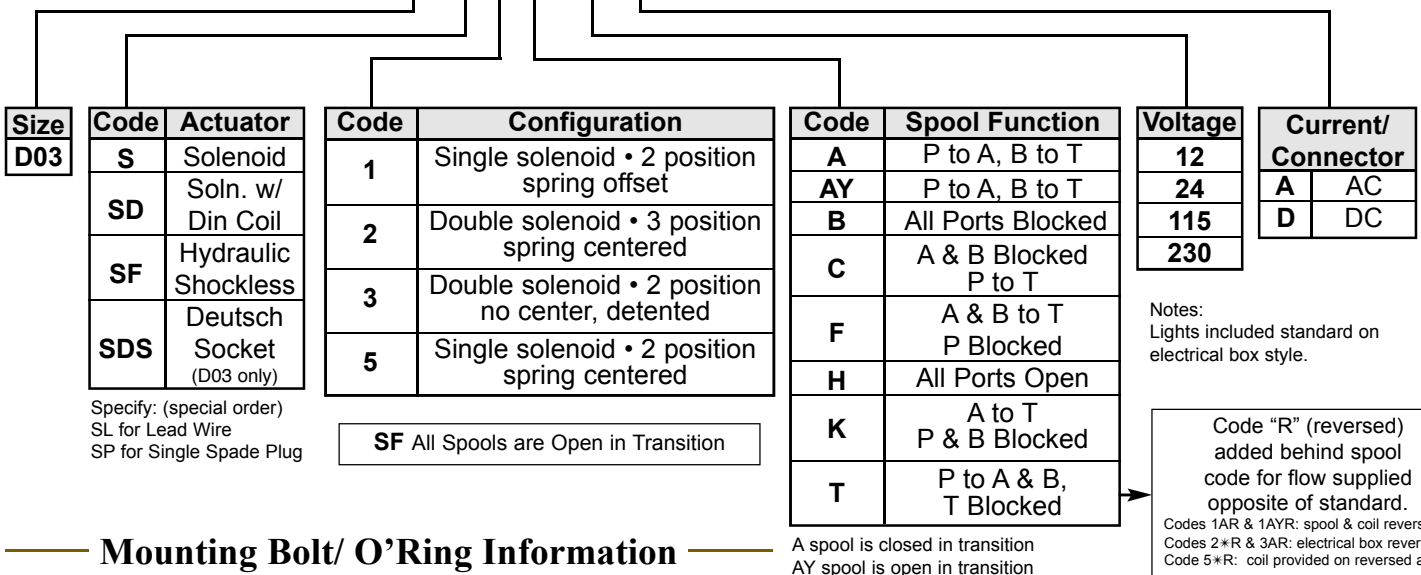

**Lead Wire Type  
D03SL**

Units: Inches  
 Mounting: (4) 10-24 SHCS x 1-3/4"  
 Torque 40-45 in-lbs



**Parts Breakdown D03S/ D03SD/ D03SL Series 35**

**Parts Breakdown D03S/ D03SD/ D03SL Series 35**

1) Solenoid Nut	9) Washer	17) Hex Plug	25) Nameplate (Elect. Box)
2) O-Ring	10) Spool (3 position)	18) Spring	26) Screw
3) Coil For Elect. Box Type)	11) O-Ring	19) Spool (2 pos. single coil)	27) Nameplate (Non-Box Type)
4) Armature (Core Tube)	12) Body	20) Body	28) Screw
5) O-Ring	13) O-Ring	21) Retainer	29) Coil (For DIN Type)
6) Push Pin	14) Concave Pin	22) Electrical Box	30) Connector
7) Spring	15) Spool (2 position detent)	23) Screw	31) Screw
8) Retainer	16) O-Ring	24) Acrylic Cover	32) Coil (For Lead Wire Type)

**Ordering Information**
**D03 S-2 B-115 A-35**

**Mounting Bolt/ O'Ring Information**

Size	Thread US Metric	Torque in-lbs/ (Nm)	O'Ring
<b>D03</b>	10 - 24 UNC	40 - 45 (4.5 - 5.1)	9mm I.D. x 2mm C.S.

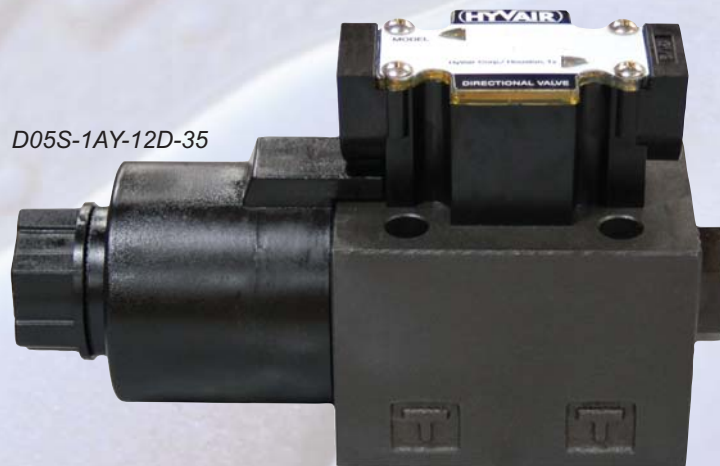
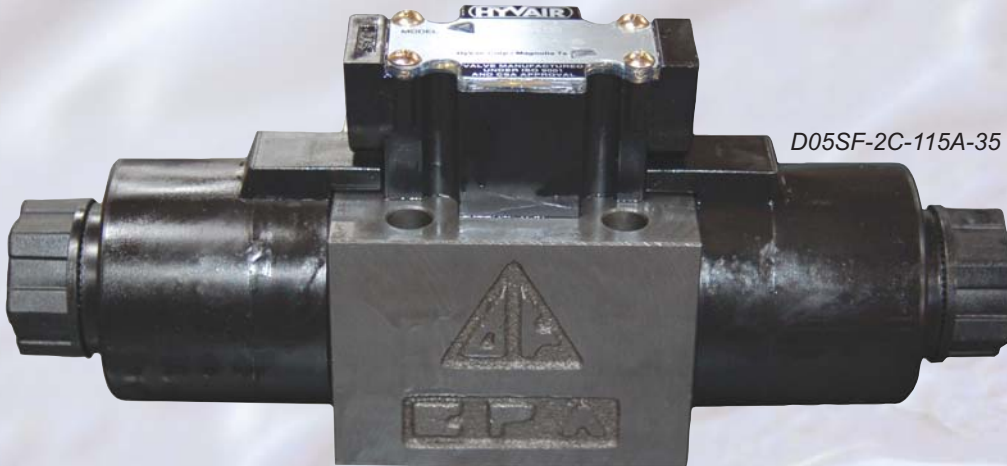


INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS



## D05 SERIES 35

### Solenoid Operated Directional Valves



**Features**

- **High Flow/ High Pressure:** Up to 40 gpm / 5000 psi working pressure\*.
- **Oil Immersed, Quiet Solenoid Design:** Moving core immersed in hydraulic oil provides quiet operation.
- **High Tank Port Pressure:** Up to 3000 psi tank port back pressure (Check each spool type for max. allowable).
- **Twin Tank Line Design:** Upper and lower tank line channels (Double Loop) greatly reduces pressure drop.
- **Wiring:** Electrical box with indicator lights and terminal strip connection standard. DIN connector provided standard on DIN style coils. (Connectors may optionally be supplied with lights.) Lead wire also available.
- **Hydraulic/ Electric Shockless:** Valve coils available electric shockless (rectified)- reducing voltages spikes, extending relay contact life, and providing even quieter operation. Spool shifting time is increased up to four times by metering the oil in the core tube. Option F (Electrical Box version only)
- **Maintenance:** Indicator lamps to diagnose connection; Plug-in coils provide easy changing without disturbing wiring.
- **High Reliability:** Valve designed to last 30 million spool shifts under proper use.
- **Bolt Kit included with valve standard**

\*Some spools rated less- check max. pressures and flows chart

Series 35  
High Flow/ High Pressure Directional Valves



D05SD DIN Type



D05S Electrical Box Type

**Specifications**

Model		Standard type				Hydraulic Shockless type	
		AC		DC & Rectified			
Symbol	Valve spool type	Max. operating pressure psi (Mpa)	Max. flow gpm (liters/min)	Max. operating pressure psi (Mpa)	Max. flow gpm (liters/min)	Max. operating pressure psi (Mpa)	Max. flow gpm (liters/min)
	1A8	5000 (35)	10.6 (40)	5000 (35)	22.5 (85)	3600 (25)	34.3 (130)
	1A8R		22.5 (35)				
	3A8	5000 (35)	34.1 (130)	5000 (35)	42.3 (160)	3600 (25)	34.3 (130)
	1A						
	1AR	5000 (35)	34.1 (130)	5000 (35)	42.3 (160)	3600 (25)	34.3 (130)
	3A						
	1AY	5000 (35)	34.1 (130)	5000 (35)	42.3 (160)	3600 (25)	34.3 (130)
	1ARY						
	3AY	5000 (35)	34.1 (130)	5000 (35)	42.3 (160)	3600 (25)	34.3 (130)
	5B						

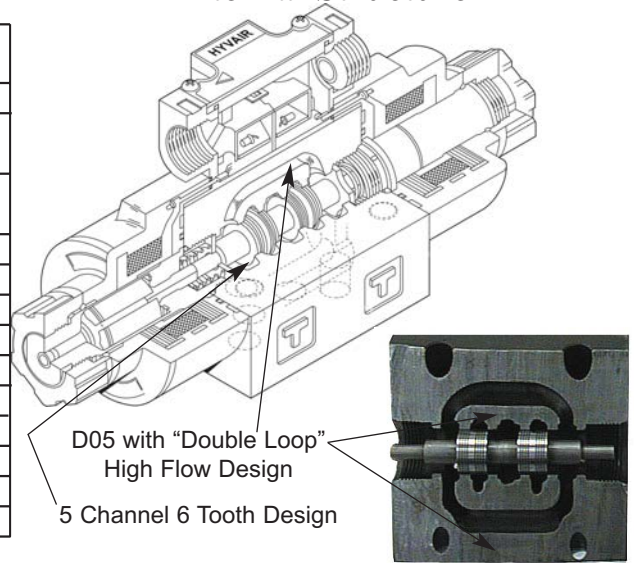
**Note:** The maximum flow capacity is shown here. The maximum flow of each valve differs depending on pressure. See HP (Pressure-Flow) curve for each model.

Model		Standard type				Hydraulic Shockless type	
		AC		DC & Rectified			
Symbol	Valve spool type	Max. operating pressure psi (Mpa)	Max. flow gpm (liters/min)	Max. operating pressure psi (Mpa)	Max. flow gpm (liters/min)	Max. operating pressure psi (Mpa)	Max. flow gpm (liters/min)
	5BR	5000 (35)	34.1 (130)	5000 (35)	42.3 (160)	3600 (25)	34.3 (130)
	2J						
	2B						
	2T						
	2K1						
	2F1						
	2K						
	2F						
	2H						
	2C						
	2C5						

**Specifications**

		DC solenoid		
		AC solenoid	Built-in rectifier	
		AC	RAC	DC
Max. operating pressure	P, A, B ports	5070 psi Note: Less for some valve types such (35 Mpa) as hyd. shockless and tandem spool		
Maximum permissible back pressure	T port	2320 psi (16 MPa)		
Changeover frequency (cycles/min)	Standard type	300	120	240
	Shockless type	—		120
Mounting Surface	Nfpa, (ISO)	T3.5.1.MR1-D05, (4401-05)		
Internal Leakage*	cu-in/min, (ml/min)	0.22, (3.5)		
Mass lbs (kg)	Double solenoids	9.2 (4.2)	11 (5.0)-35	
	Single solenoid	7.9 (3.6)	8.6 (3.9)-35	
Recommended operating conditions	Operating temperature range	41 ~ 140° F (5 ~ 60 °C)		
	Operating viscosity	80 ~ 1400 SUS (15 ~ 300 mm /s <sup>2</sup> )		
	Viscosity index	90 or above		
	Filtration	25 μm or less		

 \* @3000psi Viscosity of hydraulic fluid: 150SUS (32mm<sup>2</sup>/s)

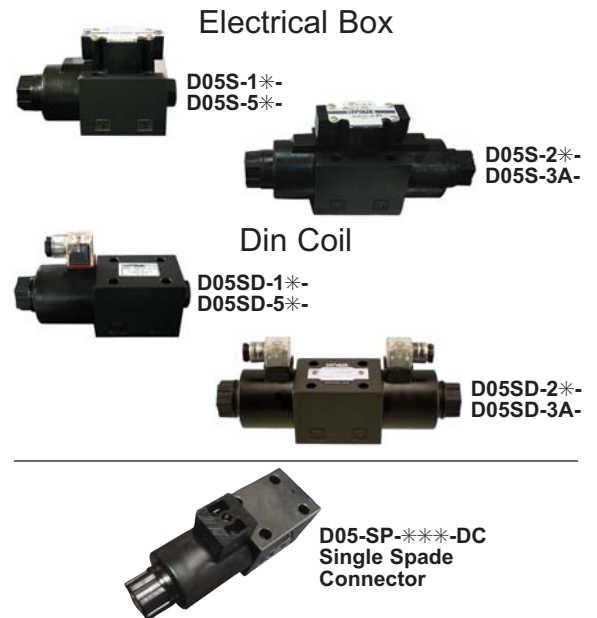
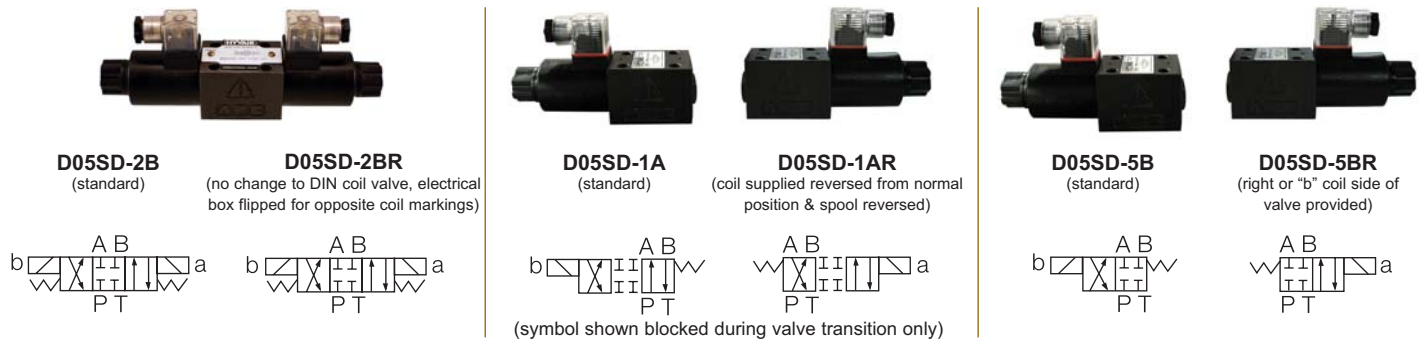
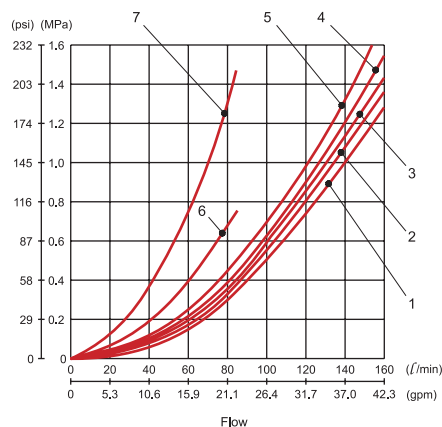
**Internal Structure**

**Symbols**

2H PT	5H PT	5HR PT
2B PT	5B PT	5BR PT
2K PT	5K PT	5KR PT
2F PT	5F PT	5FR PT
2T PT	5T PT	5TR PT
2C5 PT	5C5 PT	5C5R PT
2C PT	5C PT	5CR PT
2C25 PT	5C25 PT	5C25R PT
2C10 PT	5C10 PT	5C10R PT
2F1 PT	5F1 PT	5FR1 PT
2J PT	5J PT	5JR PT

1AY PT	PT 1AYR
1A PT	PT 1AR
1A8 PT	PT 1A8R
1A12 PT	PT 1A12R
1B2A PT	PT 1B2AR
1H2A PT	PT 1H2AR
3AY PT	PT 3A8
3A PT	

**Common 115 VAC Models**
**Common Configurations**

D05	Symbol	D05	Symbol
D05S-1A-115A-35	<b>A</b>	D05S-2H-115A-35	<b>H</b>
D05S-1AY-115A-35	<b>AY</b>	D05S-2K-115A-35	<b>K</b>
D05S-2B-115A-35	<b>B</b>	D05S-2T-115A-35	<b>T</b>
D05S-2C-115A-35	<b>C</b>	D05S-3A-115A-35	<b>A</b>
D05S-2F-115A-35	<b>F</b>		


**Example of Code "R" Reversed** (symbols shown in simplified form - D03 valves pictured)

**Pressure Drop Curves**


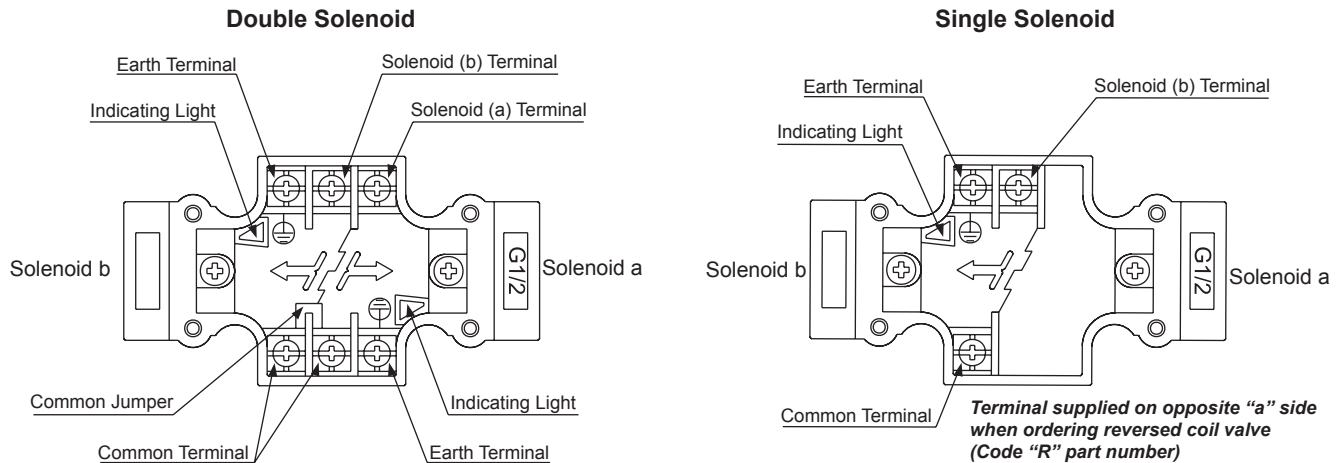
Model	Valve spool type	P→A	P→B	A→T	B→T	P→T
D05 SERIES	1A8, 1A8R, 3A8	5	5	—	—	—
	5B	—	3	3	—	—
	5BR	3	—	—	3	—
	1A, 1AR, 3A	3	3	4	4	—
	1AY, 1AYR	1	1	4	4	—
	3AY	2	2	1	1	—
	2K	3	3	1	3	—
	2J	1	3	3	3	—
	2H	1	1	1	1	1
	2B, 2K1, 2F1	3	3	3	3	—
	2F	3	3	1	1	—
	2C	7	7	7	7	6
	2C5	1	7	1	7	6
	2T	1	1	3	3	—

 Viscosity of hydraulic fluid 150 SUS {32 mm /s<sup>2</sup>}

## Electrical Information

<b>D05</b>	<b>Solenoid Coil Specifications</b>											
Solenoid Voltage	115V-AC			230V-AC			115V-RAC (rectified)		230V-RAC (rectified)		12V-DC	24V-DC
Coil Model D05S (Elect. Box)	3BH-C1/C3			3BH-C2/C4			3EB-R1/R3		3EB-R2/R4		3EB-D1	3EB-D2
Coil Model D05SD (DIN)	3AH-C1/C3			3AH-C2/C4			3EA-R1/R3		3EA-R2/R4		3EA-D1	3EA-D2
Applied Voltage	AC110		AC120	AC220		AC240	AC110	AC120	AC220	AC240	DC12	DC24
Frequency (Hz)	50	60	60	50	60	60	50 / 60		50 / 60			
Starting Current (A)	5.5	4.6	5.0	2.7	2.3	2.5						
Holding Current (A)	1.1	0.86	1.0	0.52	0.42	0.48	0.46	0.49	0.22	0.24	3.0	1.5
Holding Power (W)	36	34	42	36	34	32	31	34	30	33	31	36
Permissible Voltage Range (V)	80-120			180-240			80-130		180-250		10.8-13.2	21.6-26.4
Insulation Resistance (M $\Omega$ )	100 or above (500V)											

## Electrical Box Wiring



**Notes:**

- DIN Coils manufactured to accept standard 3 pin DIN 43 650 and ISO 4400 connectors.
- AC Coils are rated for both 50/60Hz (rewiring not required)
- DC coils are not polarity sensitive
- Rectifier is supplied: in the electrical box- D05S, in the coil (internal)- D05SD
- Hydraulic shockless AC valves are always supplied with rectifier.
- Hydraulic shockless valves will not operate as shockless until the tank line has become filled with oil- occurs automatically after the first few cycles. Mounting valve below the reservoir oil level or using check valve ensures that the tank line remains filled.
- Do not supply electrical power to the AC coils unless the coil is mounted on the valve.
- Do not exceed voltage specifications shown above.
- Electrical power should be maintained on detented valves (spool code 3A). Detent only maintains start-up position of the valve.



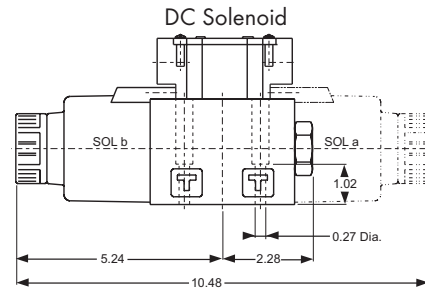
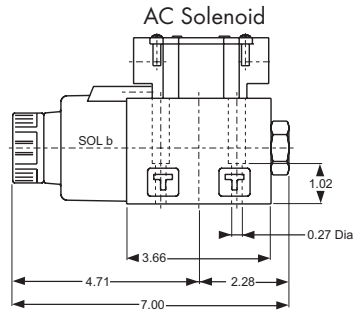
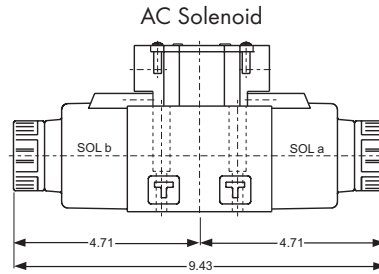
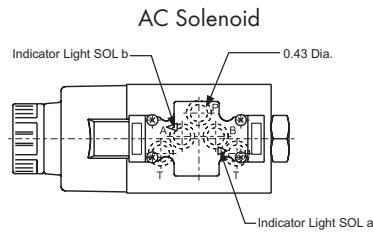
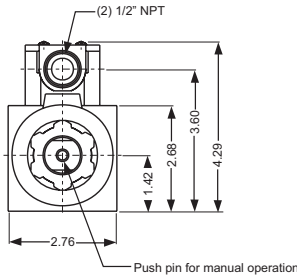
**Dimensional Data**

**Electrical Box Type**

**D05S  
D05SF**

Units: Inches

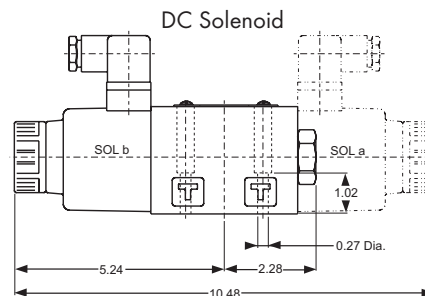
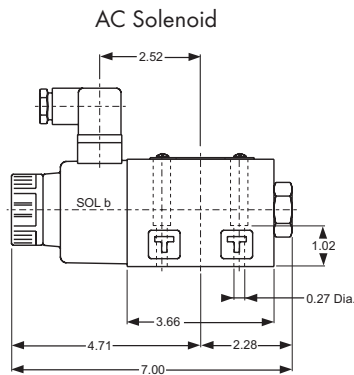
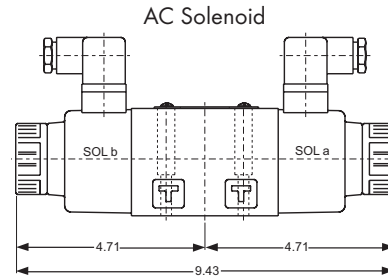
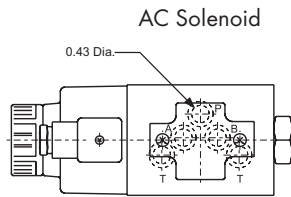
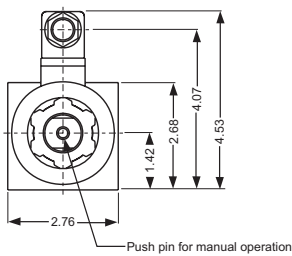
Mounting: (4) 1/4-20 SHCS x 1-1/2"  
Torque 105-110 in-lbs



**DIN Type  
D05SD**

Units: Inches

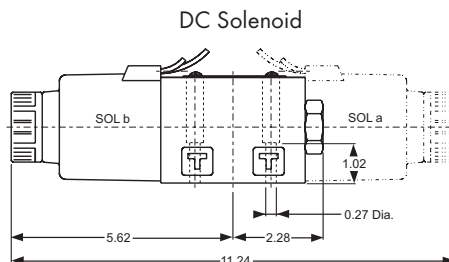
Mounting: (4) 1/4-20 SHCS x 1-1/2"  
Torque 105-110 in-lbs

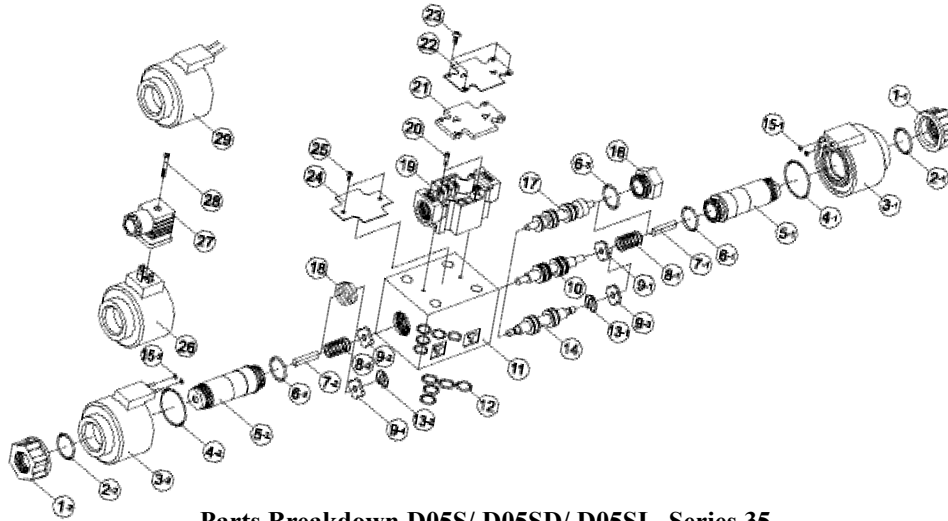


**Lead Wire Type  
D05SL**

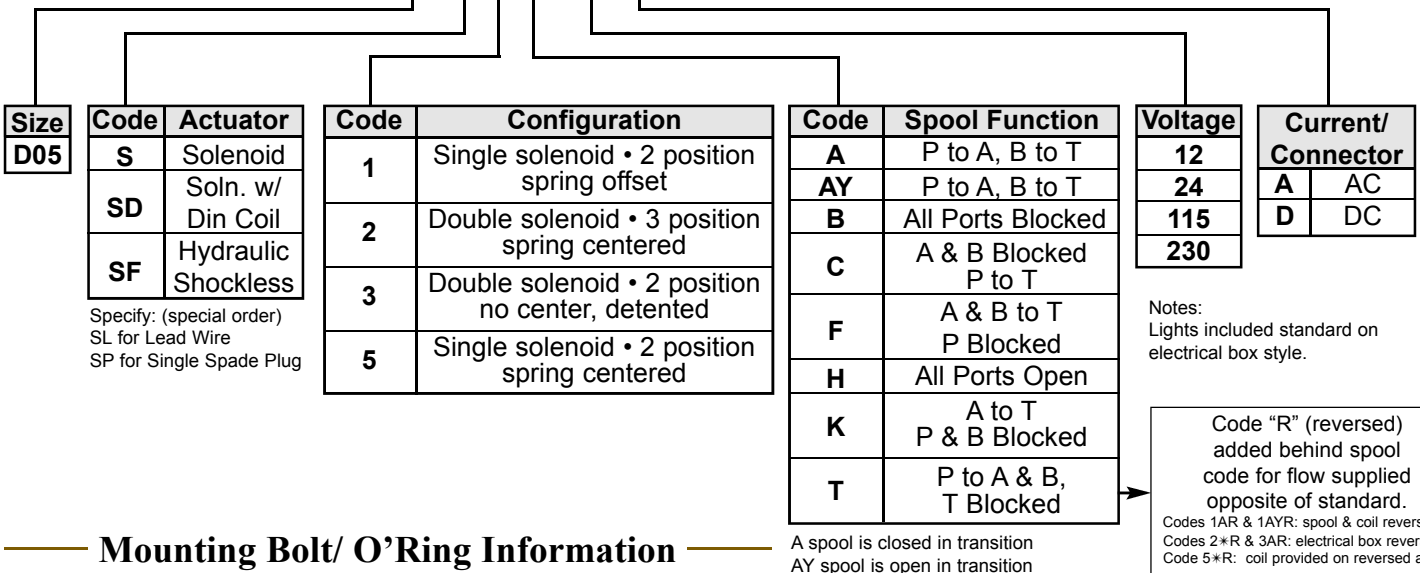
Units: Inches

Mounting: (4) 1/4-20 SHCS x 1-1/2"  
Torque 105-110 in-lbs



**Parts Breakdown D05S/ D05SD/ D05SL Series 35**

**Parts Breakdown D05S/ D05SD/ D05SL Series 35**

1) Solenoid Magnet	9) Retainer	17) Spool (2 pos. single coil)	25) Screw
2) O-Ring	10) Spool (3 position)	18) Retainer	26) Coil (For DIN Type)
3) Coil (For Elect. Box Type)	11) Body	19) Joint Box	27) Connector
4) O-Ring	12) O-Ring	20) Joint Box Screw	28) Screw
5) Armature (Core Tube)	13) Concave Pin	21) Acrylic Cover	29) Coil (For Lead Wire Type)
6) O-Ring	14) Spool (2 position detent)	22) Nameplate	
7) Push Pin	15) O-Ring	23) Screw	
8) Spring	16) Hex Plug	24) Nameplate (Non-Box Type)	

**Ordering Information**
**D05 S-2 B-115 A-35**

**Mounting Bolt/ O'Ring Information**

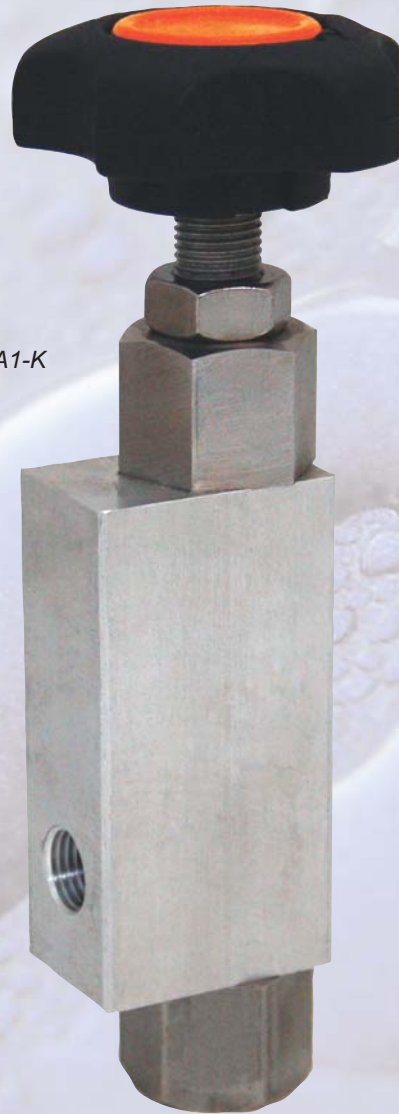
Size	Thread US Metric	Torque in-lbs/ (Nm)	O'Ring
<b>D05</b>	1/4 - 20 UNC	105 - 110 (11.9 - 12.4)	11.8mm I.D. x 2.4mm C.S.



INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS

***DR SERIES***

**Direct Acting Relief Valves - Aluminum Body**



*DR3H-6-2-4FP-4A1-K*



### DR Series Direct Acting Relief Valves

Anodized Aluminum Body  
 Cap, Stem, Knob- 316SS  
 Spring 18-8SS  
 Plastic Knob Available

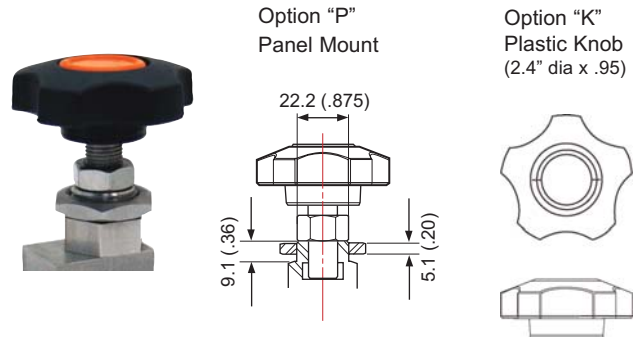
### Common Models

	2 GPM Max. Low Leakage Direct Acting	6 GPM Max. Sliding Poppet- Differential Area Relief- 5/32" Orifice Direct Acting
3000 psi max	1/4" NPT DR3H-6-2-4FP-4A1 (1/8" Orifice)	1/4" NPT DR11-2.5-4FP-6A1  3/8" NPT DR11-2.5-6FP-6A1
4500 psi max	1/4" NPT DR3H-6-2-4FP-5A1 (1/8" Orifice)	1/4" NPT DR11-2.5-4FP-7A1  3/8" NPT DR11-2.5-6FP-7A1

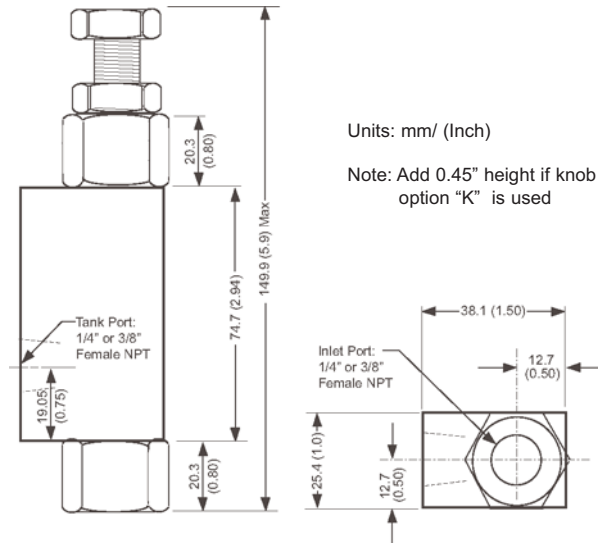
- For best results use valve at 1/2 of the maximum set pressure.
- 2 GPM valve (1/8" orifice) is well suited for control of pilot vents.

Maximum Set Pressure- 3/8" Valve Body						
ORIFICE SIZE						
	1.5 (3/32")	2 (1/8")	3 (3/16)	4 (1/4")	6 (3/8")	
SPRING	-1	570	325	150	80	70
	-2	1,250	750	330	180	80
	-3	2,550	1,500	670	360	160
	-4	5,100	2,950	1,330	730	330
	-5	10,400	6,050	2,700	1,450	650
	-6	21,000	12,500	5,440	3,000	1,300
	-7	30,000	18,750	8,330	4,600	2,000

Select spring with a maximum pressure 2 times the required pressure



### Dimensional Data



Units: mm/ (Inch)

Note: Add 0.45" height if knob option "K" is used

## Ordering Information

### DR1H - 6 - 2 - 4FP - 6FP - 5A1 - Options

1= Buna, 2= Viton

Style	Size	Orifice (dia.)	Port Size (Inlet)	Spring
<b>DR1H</b> = Non-Guided, Excellent Re-seat (90%), Low Flows- 3/32" & 1/8" orifices only, 12,000 psi max., 2 gpm max.	<b>6</b> = 3/8"	<b>1.5</b> = 3/32" <b>2</b> = 1/8" <b>4</b> = 1/4" <b>6</b> = 3/8" <b>8</b> = 1/2" <b>10</b> = 5/8"	<b>4FP</b> = 1/4" <b>6FP</b> = 3/8" <b>4FA</b> = 9/16"-18 Aminco	<b>1</b> <b>2</b> <b>3</b> <b>4</b> <b>5</b> <b>6</b>
<b>DR3H</b> = Externally Guided, Quiet All pressure/ flow ranges (all orifices and springs shown above)				
<b>DR10H</b> = Short Body-Economical, Non-Guided, Good Re-seat (85%), Low Flows 1/8" orifice only, 12,500 psi max., 1 gpm max.				
	<b>OPTIONS</b> Option "P" - Panel Mounting (Std. for 3/8" valve)  Option "K" - Plastic Knob (2.4" dia x .95)		<b>Port Size (Outlet)</b> <b>4FP</b> = 1/4" <b>6FP</b> = 3/8" <b>4FA</b> = 9/16"-18 Aminco	Omit if same as the inlet



INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS



**FW1022 SERIES**

## Direct Acting Relief Valves



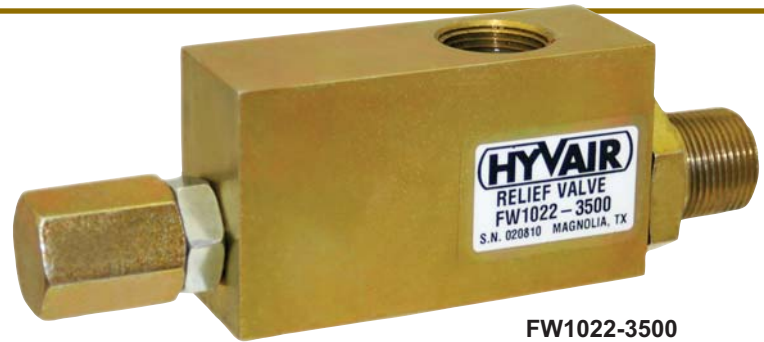
FW1022-3500



# FW1022 Series Direct Acting Relief Valves

## Standard Material

- Steel Body, Cap, Stem, Bonnet Cap, Adjustment Screw & Guide
- 440C SS Poppet & Seat
- Chrome Vanadium Spring



FW1022-3500

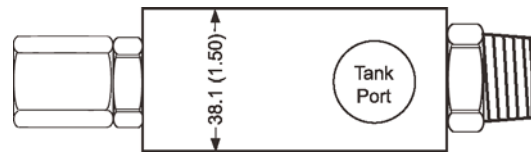
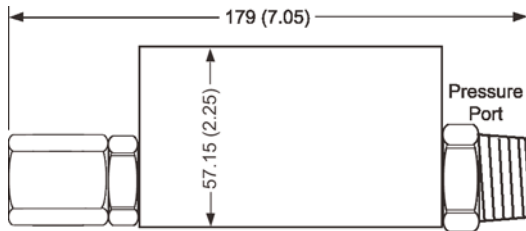
## Operating Pressure

- Valve Supplied Set at: 500 psi thru 6500 psi  
(Pressures Set at flow 1 gpm)

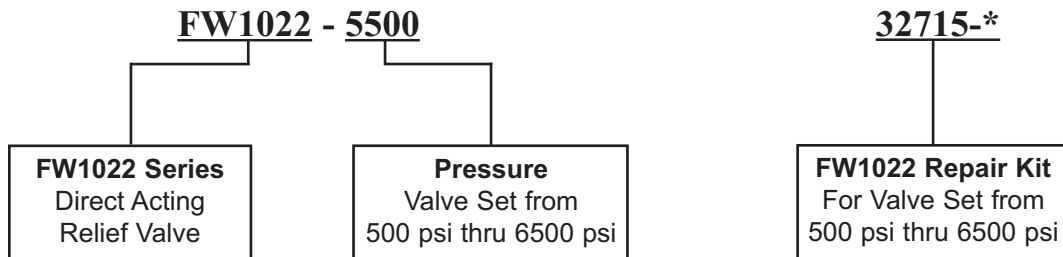
Inlet: 3/4" Male NPT  
Outlet: 3/4" NPT Female NPT

## Dimensional Data

Units: mm (inches)



## Ordering Information



*Emergency Relief Valve:  
Chatters upon opening to alert operator.  
This valve must be plumbed directly back to tank.*



INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS

***DR SERIES***

**Direct Acting Relief Valves - Stainless Steel Body**



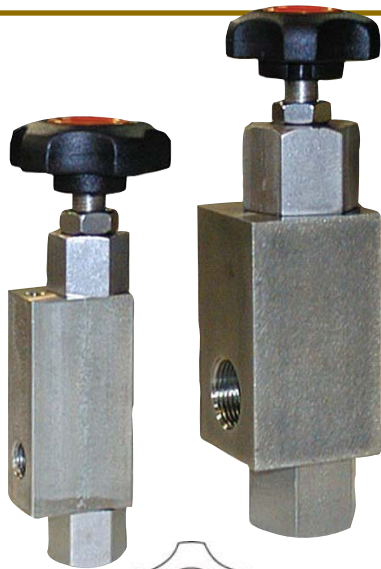
*DR3H-6-4-4FP-2D1-PK*

### DR Series Direct Acting Relief Valves 316SS

Body, Cap, Stem,  
Knob, Guide  
316SS

\*Poppet, Seat  
440C SS

Spring 18-8SS

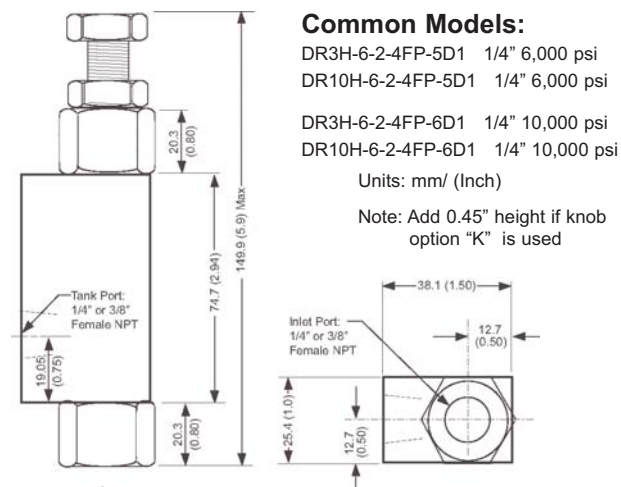
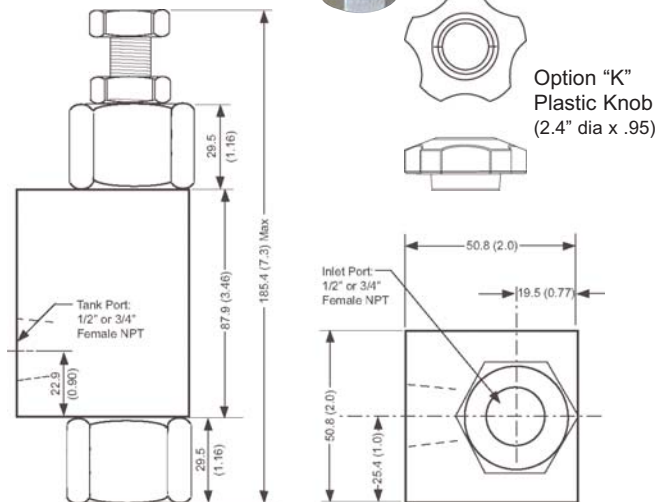


Maximum Set Pressure- 3/8" Valve Body						
ORIFICE SIZE						
	1.5 (3/32")	2 (1/8")	3 (3/16)	4 (1/4")	6 (3/8")	
SPRING	-1	570	325	150	80	70
	-2	1,250	750	330	180	80
	-3	2,550	1,500	670	360	160
	-4	5,100	2,950	1,330	730	330
	-5	10,400	6,050	2,700	1,450	650
	-6	21,000	12,500	5,440	3,000	1,300
	-7	30,000	18,750	8,330	4,600	2,000

Select spring with a maximum pressure 2 times the required pressure

Maximum Set Pressure- 3/4" Valve Body								
ORIFICE SIZE								
	1.5 (3/32")	2 (1/8")	3 (3/16)	4 (1/4")	6 (3/8")	8 (1/2")	10 (5/8")	
SPRING	-1	1,140	670	300	160	70	40	26
	-2	2,290	1,330	590	330	150	80	52
	-3	4,710	2,750	1,220	670	300	170	110
	-4	9,430	5,500	2,440	1,350	600	340	215
	-5	20,857	12,170	5,410	2,980	1,330	750	475
	-6	45,140	26,330	11,700	6,450	2,870	1,610	1,030
	-7	58,000	33,830	15,040	8,290	3,690	2,070	1,320

Select spring with a maximum pressure 2 times the required pressure



## Ordering Information

### DR1H - 6 - 2 - 4FP - 6FP - 5D1 - Options

1= Buna  
2= Viton

Style
<b>DR1H</b> = Non-Guided, Excellent Re-seat (90%), Low Flows- 3/32" & 1/8" orifices only, 12,000 psi max., 2 gpm max.
<b>DR2H</b> = Internal Guided, High Flows- 3/8" orifice only, 8gpm max., 2000 psi max., totally 316SS (Poppet & Seat supplied 316SS)
<b>DR3H</b> = Externally Guided, Quiet, All pressure/ flow ranges (all orifices and springs shown above)
<b>DR5H</b> = Externally Guided, Excellent Re-seat (90%), High Pressure 30,000 psi max., Low Flows- 3/32" & 1/8" orifices only, 2 gpm max.
<b>DR10H</b> = Short Body-Economical, Non-Guided, Good Re-seat (85%), Low Flows 1/8" orifice only, 12,500 psi max., 1 gpm max.

Size
6 = 3/8"
12 = 3/4"

Orifice (dia.)
1.5 = 3/32"
2 = 1/8"
4 = 1/4"
6 = 3/8"
8 = 1/2"
10 = 5/8"

Port Size (Inlet)
4FP = 1/4"
6FP = 3/8"
8FP = 1/2"
12FP = 3/4"
4FA = 9/16"-18 Aminco

Spring
1
2
3
4
5
6

**OPTIONS**  
Option "P" - Panel Mounting (Std. for 3/8" valve)  
Option "K" - Plastic Knob (2.4" dia x .95)

Port Size (Outlet)
4FP = 1/4"
6FP = 3/8"
8FP = 1/2"
12FP = 3/4"
4FA = 9/16"-18 Aminco

Omit if same as the inlet





# **DRC & MVP Series**

Power Amplifiers



MVP



DRC

**GENERAL FEATURES**

**STANDARD FEATURES**

- Easily configured using software or hand held interface
- LED indication of power, output current and fault status
- Compact DIN-rail mount housing
- Multiple modes for single and dual coil applications
- Input options include -10V to 10V, 0 to 20mA
- Programmable enable input
- All input and output limits are independently adjustable
- Adjustable current limited output with short circuit protection
- +10 and -10 volt references for potentiometer/ joystick controls
- Adjustable ramp up and ramp down rates
- Selectable dither frequency up to 1000 Hz
- Microprocessor controlled for consistent, reliable performance



Shown: DRC4-V-12

**GENERAL SPECIFICATIONS**

**STANDARD WORKING CONDITIONS**

- Supply Voltage.....9 to 32 VDC
- Supply Current..... $I_{sol} + 50 \text{ mA}$
- Output Current.....DRC\*-V-12 = 1.2A max.  
DRC\*-V-25 = 2.5A max.
- Solenoid Resistance..... $2 \Omega \text{ min.}$
- Reference Voltages.....+10V, -10V @ 20 mA
- Dither Settings.....30, 50, 75, 100, 125, 150, 175, 200,  
225, 250, 275, 300, 1000 Hz
- Analog Input Range.....DRC\*-V-\* = -10V to 10V
- Analog Input Impedance.....DRC\*-V-\* =  $38k\Omega$
- Operating Temperature Range..... $-4^{\circ}\text{F}$  to  $158^{\circ}\text{F}$  ( $-20^{\circ}$  to  $70^{\circ}\text{C}$ )
- Enclosure.....Polyamide
- Dimensions.....mm = 17.5 W x 114.5 H x 109.4 D  
inches = 0.69 W x 4.50 H x 4.30 D

**PHYSICAL DESCRIPTION**

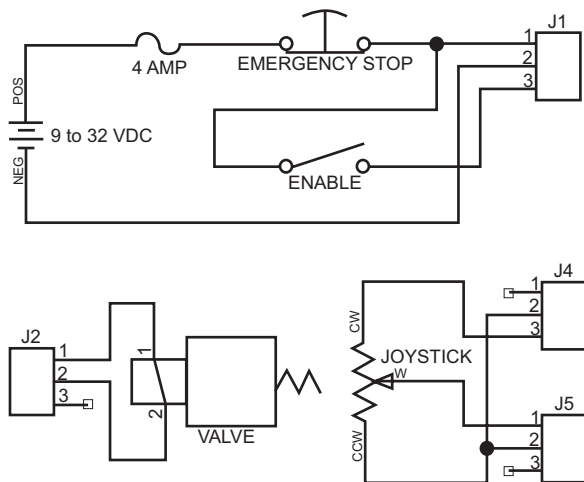
The DRC is shown at the right. There are five indicator lamps labeled PWR and OUT1 through OUT4 (for the four channel controller). The PWR lamp will light green whenever power is applied to the unit and is within the specified voltage range. Under normal operation the OUTx lights will provide an indication of the current being supplied to the solenoid output for a given channel. The lights will be yellow and the brightness will vary with the output current. In the case of a fault the light will flash red with a flash code corresponding to the type of fault for that channel.

Communication with the DRC takes place through the USB port. The port allows for configuration and monitoring of the operating parameters.

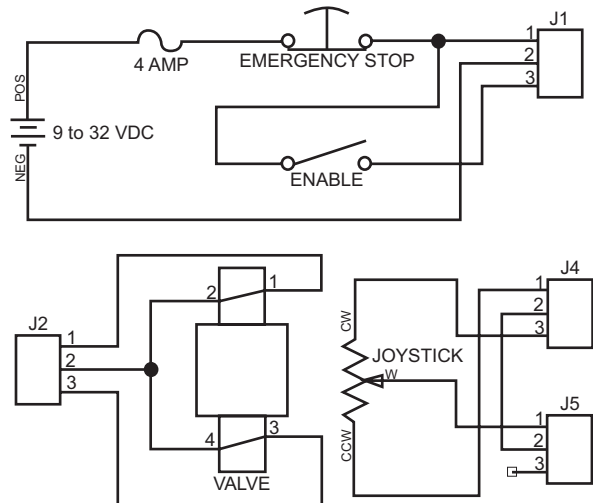
Note: When connected to a PC, the DR controller will be recognized as a USB device with or without power applied to the controller. However, to configure the controller it must be powered.


**APPLICATIONS**
**DRC1- V-\* (Single Solenoid Joystick Control)**

The DRC can be controlled with a joystick or potentiometer as shown. The recommended potentiometer value is 10kΩ. Mode 1 may be used rather than Mode 2 if the enable is not used. Dither and Output settings will vary depending on the valve and application.


**DRC2- V-\* (Double Solenoid Joystick)**

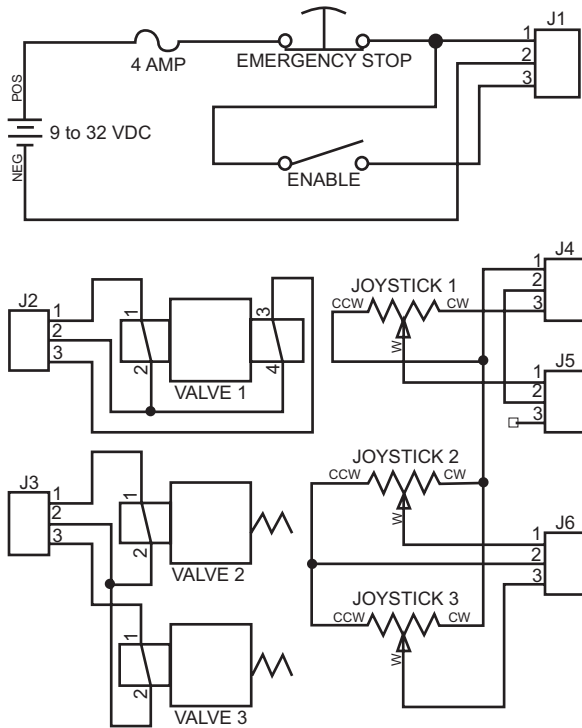
The DRC can be setup to drive a double solenoid valve using one command as shown in the following diagram. If enable is not used, C1 Mode should be set to 1 and C2 Mode to 3. The minimum and maximum input parameters for the two channels must be set such that both outputs will not be active with the same input signal. The settings do not have to be the same or mirrored between the two channels as shown in the example though in many cases they will be. Dither and Output settings will vary depending on the valve and application.



**APPLICATIONS** continued

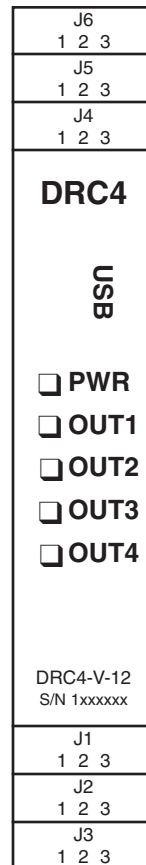
**DRC4- V-\* (Double/ Single/ Single Solenoid)**

The following example shows a DRC setup to drive a double solenoid valve and 2 single solenoid valves using three joysticks for command inputs. Dither and Output settings will vary depending on the valves and the application.



**WIRING**

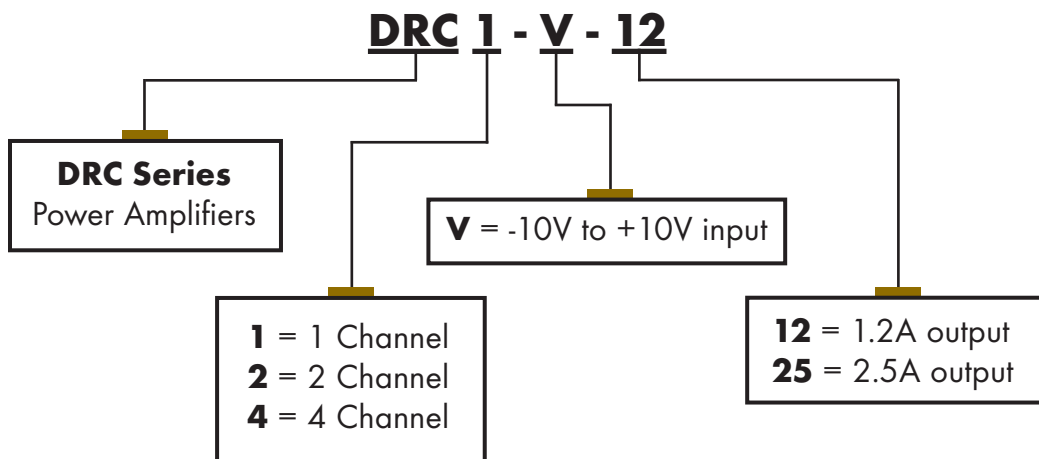
Terminal functions are listed in the table below.



Terminal	Function
J1-1	+V Supply
J1-2	Supply Common
J1-3	Enable Input
J2-1	Output Ch. 1
J2-2	Common
J2-3	Output Ch. 2
J3-1	Output Ch. 3
J3-2	Common
J3-3	Output Ch. 4
J4-1	-10V Reference
J4-2	Common
J4-3	+10V Reference
J5-1	Command Input Ch. 1
J5-2	Common
J5-3	Command Input Ch. 2
J6-1	Command Input Ch. 3
J6-2	Common
J6-3	Command Input Ch.4

**ORDERING INFORMATION**

**ORDERING EXAMPLE**



**GENERAL FEATURES**

**STANDARD FEATURES**

- Easily configured using software or hand held interface
- LED indication of status and output current
- Permanently sealed, standard DIN 43650 Form A connector body
- Selectable dither frequency up to 300 Hz
- Adjustable current limited output with short circuit protection
- 5 volt reference for potentiometer/ joystick controls
- Multiple modes for analog or 2-speed control
- Programmable enable input
- All input and output limits are independently adjustable
- Adjustable ramp up and ramp down times
- Pre-wired 18 AWG PVC cable
- Microprocessor controlled for consistent, reliable performance



Shown: MVP-C1V-12A-15F



**GENERAL SPECIFICATIONS**

**STANDARD WORKING CONDITIONS**

- Supply Voltage.....9 to 28 VDC
- Supply Current..... $I_{sol} + 20 \text{ mA}$
- Output Current.....MVP-C1V-12A = 1.2A max.  
MVP-C1V-25A = 2.5A max.
- Solenoid Resistance..... $2\Omega \text{ min.}$
- Reference Voltages.....+5V @ 2 mA
- Dither Settings.....Off, 30, 33, 38, 43, 50, 60, 75, 100,  
150, 300 Hz
- Analog Input Range.....MVP-C1V = 0 to 10V
- Analog Input Impedance..... $20k\Omega$
- Operating Temperature Range..... $-4^{\circ}\text{F}$  to  $158^{\circ}\text{F}$  ( $-20^{\circ}$  to  $70^{\circ}\text{C}$ )
- Enclosure.....Glass filled Nylon

**PHYSICAL DESCRIPTION**

The MVP is shown at the right. There are two indicator lamps labeled STATUS and OUTPUT. The STATUS lamp will light green whenever power is applied to the unit and is within the specified voltage range. The STATUS light will flash red when a fault has occurred. The type of fault is indicated by the number of successive flashes. It will continue to flash until the command signal has been removed to clear the fault. The yellow lamp labeled OUTPUT provides an indication of the current being supplied to the solenoid outputs.



Communication with the MVP takes place through an infrared interface port. The port allows for configuration and monitoring of the operating parameters. The infrared adapter clips onto the MVP aligning with the notches in the sides.

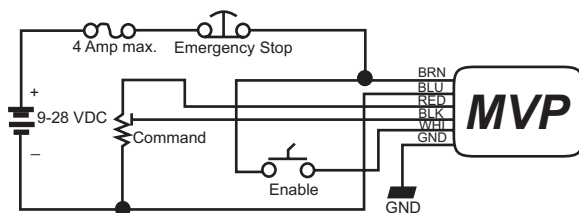
**WIRING**

Wire functions are listed in the table below. Following the table are wiring examples for various modes of operation.

Terminal	Function
BROWN	+V Supply
BLUE	Supply Common
BLACK	Command Input
WHITE	Enable Input
RED	+5V Reference*
GRN/YEL	Connector Ground

**Single Solenoid Joystick Control**

The MVP can be controlled with a joystick or potentiometer as shown. This configuration uses Mode 3 with the Enable signal or Mode 1 with no Enable line.

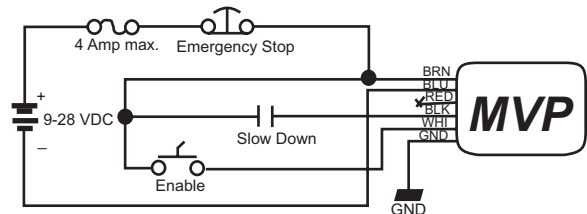


**Single Solenoid 2-Speed Control**

The MVP can be configured for 2-speed mode as shown. In this arrangement the Enable signal allows minimum output and the Command signal allows maximum output. This configuration corresponds to Mode 5.

**Single Solenoid 2-Speed Control**

The MVP can be configured for 2-speed mode as shown. In this arrangement the Enable signal allows maximum output and the Command signal limits output to the minimum setting. This configuration corresponds to Mode 6.

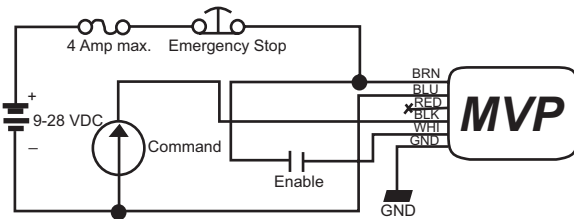


**\* NOTE: If the +5V Reference is not used it must be isolated to prevent shorting to other wires. Failure to do so can result in damage to the controller.**

**WIRING** continued

**Single Solenoid PLC Control**

The MVP can be controlled with PLC as shown. This configuration uses Mode 3 with the Enable signal or Mode 1 with no Enable line.

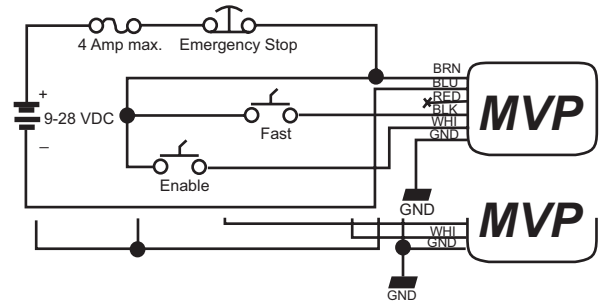
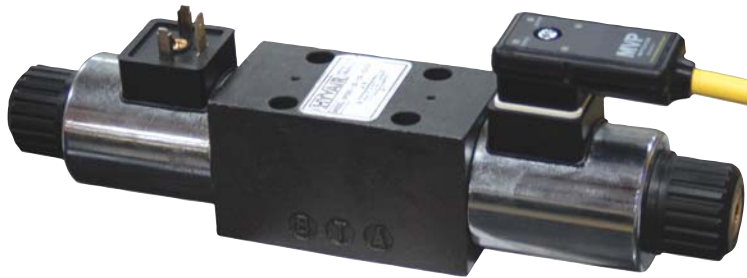


**Double Solenoid**

Two MVPs can be driven by one signal for double solenoid operation as shown in the following diagram. One should be set to Mode 1 or 3 while the other is set Mode 2 or 4. The minimum input parameters for the two should be set such that both units will not be active with the same input signal.

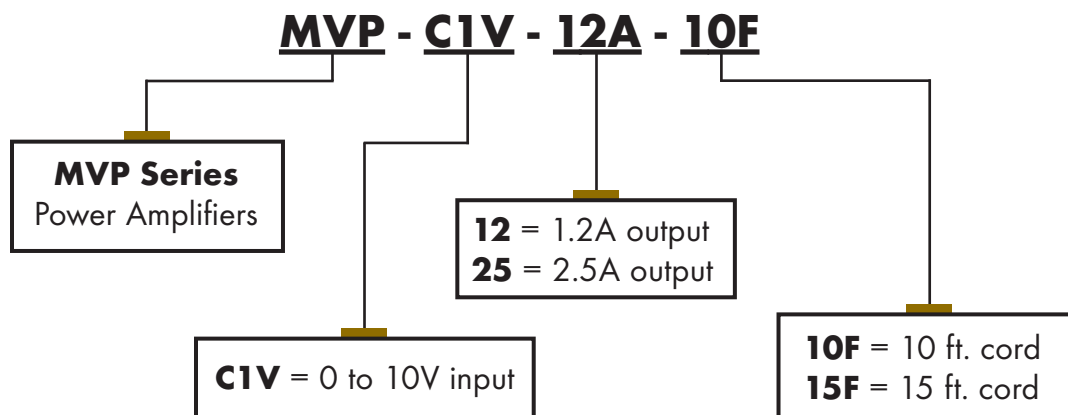
**\*NOTE: Loss of Command signal in his configuration will result in maximum output to one solenoid. Care must be taken to avoid injury or damage in the event of a signal failure!**

Two MVPs can be driven by one signal for double solenoid operation as shown in the following diagram. This configuration uses a selector switch to determine which solenoid is activate and a single potentiometer to determine output level. This configuration corresponds to Mode 1 or Mode 3.



**ORDERING INFORMATION**

**ORDERING EXAMPLE**





INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS

## ***E12 & E16 SERIES***

### **Electric Actuated Ball Valves**



*E12-DKBV-8FP-12D*



*E16-DKBV-16FP-110A*



## Standard Features

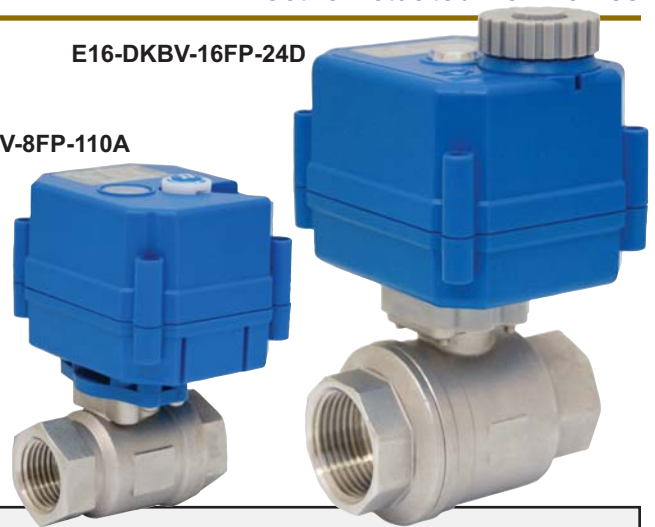
- 12/ 24VDC & 110VAC Voltage Available
- Double Acting
- Manual Override is Safe and Easy
- Mini Dimension Suited for Small Equipment
- Long Service Life- 70,000 - 100,000 Cycles
- Low Working Current
- Patented Technology- Floating Seal Structure
- For Indoor Use Only

## Applications

- HVAC
- Water Treatment Industry
- Chemical Process
- Pharmaceutical Equipment
- Cleaning Equipment

E16-DKVB-16FP-24D

E12-DKVB-8FP-110A



## Notes

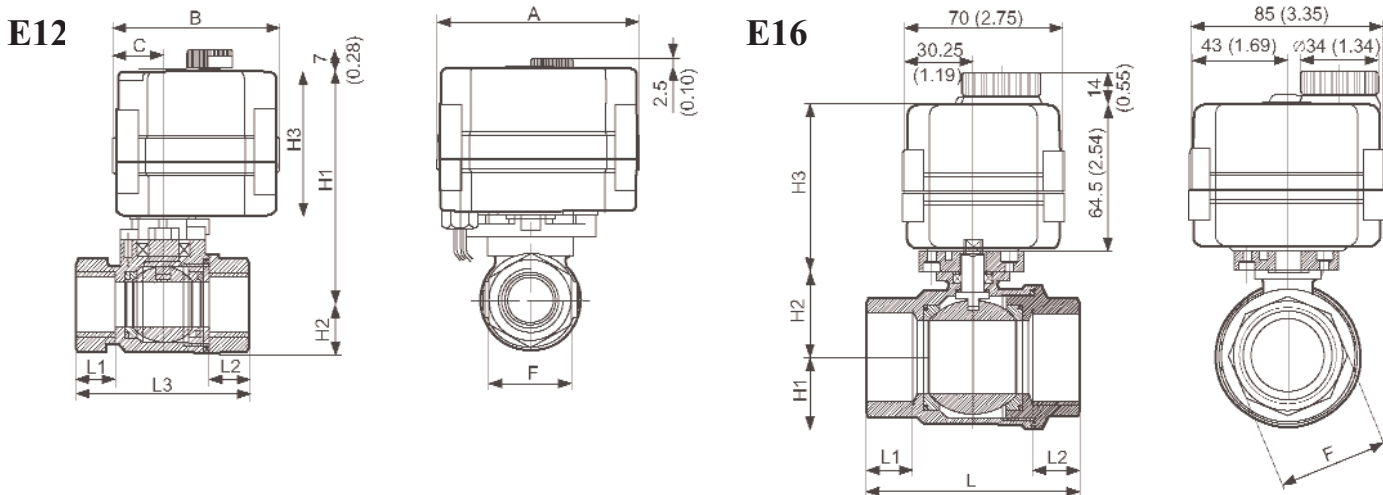
Once opened or closed, the actuator **DOES NOT** continue to draw power due to an internal cutoff.

If a power loss occurs the valve will remain in its current position. The actuator is **NOT** spring return.

Actuator should be mounted vertically, as shown below. Especially in cases with vibration.

## Dimensional Data

Units: mm (inches)



E12	SIZE	L1/L2	L3	F	A	B	C	H3	H2	H1	Wt kg (lb)
	1/2"	13 (0.51)	57 (2.24)	27 (1.06)	66.5 (2.62)	54.5 (2.15)	16.3 (0.64)	48 (1.89)	16.5 (0.65)	77 (3.03)	0.37 (0.82)
	3/4"	16 (0.63)	70 (2.75)	32 (1.26)	66.5 (2.62)	54.5 (2.15)	16.3 (0.64)	48 (1.89)	21.5 (0.85)	81 (3.19)	0.52 (1.15)

E16	SIZE	F	H1	H2	H3	L1/L2	L	Wt kg (lb)
	1"	38 (1.50)	26.7 (1.05)	33.5 (1.32)	73 (2.87)	18 (0.71)	80 (3.15)	1.0 (2.20)
	1-1/4"	48 (1.89)	31.5 (1.24)	37.5 (1.48)	73 (2.87)	20.2 (0.80)	93 (3.66)	1.4 (3.09)

## Technical Data

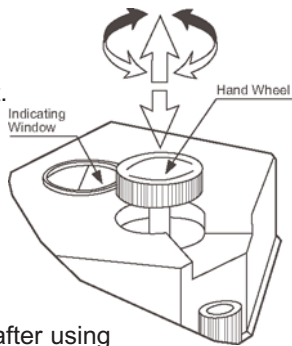
Series	Control	Max. Torque	Operating Time	Working Voltage	Input Power	Max. Pressure	Medium Temp.	Ambient Temp.
E12	On/ Off	2Nm (17.7 in/lbs)	5 - 7S	12/ 24VDC &	4 Watts Max.	1.6 Mpa (232 psi)	0°C to 100°C (32°F to 212°F)	-20°C to 45°C (-4°F to 113°F)
				110VAC	5 Watts Max.			
E16		10Nm (88.5 in/lbs)	7 - 10S	12/ 24VDC &	20 Watts Max.			
				110VAC				

IP67 Enclosure Duty Cycle: 10%

## Manual Override

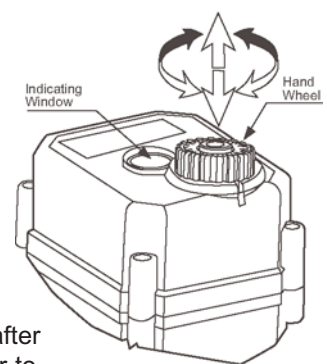
### E12

- 1- Manual override is only permitted when power is cut.
- 2- Lift the hand-wheel, and turn it left or right until the valve is in place.
- 3- When the line on the indicator is horizontal, the valve is on; when vertical, the valve is off.
- 4- Press down hand-wheel after using manual override in order to work properly when power is supplied.



### E16

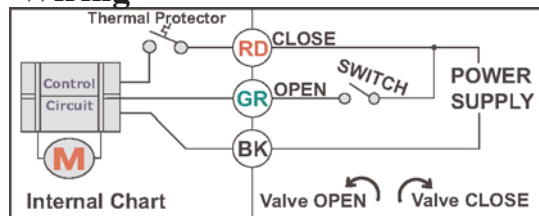
- 1- Manual override is only permitted when power is cut.
- 2- Press down the center button, and turn it left or right until the valve is in place.
- 3- When the line on the indicator is horizontal, the valve is on; when vertical, the valve is off.
- 4- Press down center button after using manual override in order to work properly when power is supplied.



## Main Components

Part	Material
Actuator Housing	ABS
Valve Body	Stainless Steel
Valve Ball	Stainless Steel
Stem	Stainless Steel
Ball Seat	PTFE
Seal	EPDM

## Wiring

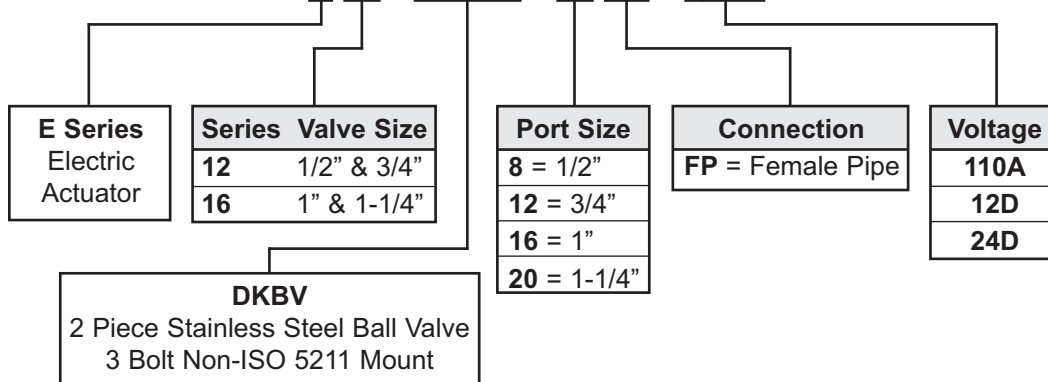


### Instructions:

- If Switch is closed, the valve will open.
- If Switch is opened, the valve will close.

## Ordering Information

### E 12 - DKBV - 12 FP - 110A





INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS

## ***E24 & E32 SERIES***

### **Electric Actuated Ball Valves**



*E24-D3BV-24FP-12D*



*E32-D3BV-32FP-110A*



# E24 & E32 Series Electric Actuated Ball Valves

## Standard Features

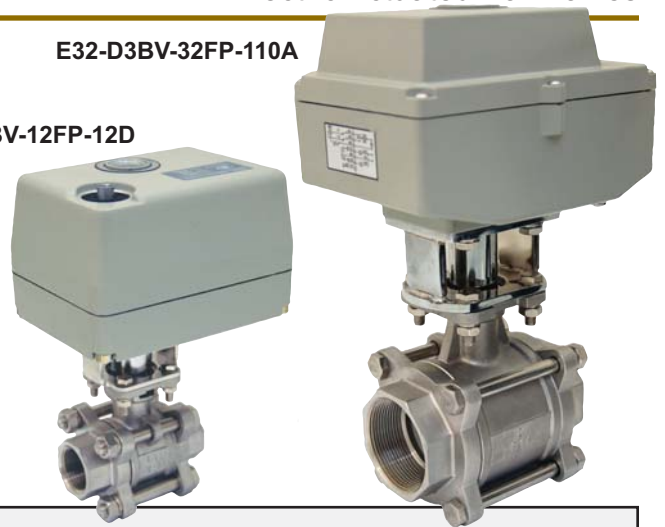
- 12/ 24VDC & 110VAC Voltage Available
- Double Acting
- Manual Override is Safe and Easy
- Visual Position Indicator On Top Standard
- Metal Core, Reliable Quality and Excellent Torque
- IP67 Enclosure
- For Use With Ball Valves Sizes 1/2" thru 2"

## Applications

- Water Treatment Industry
- Process Control
- Industrial Automation
- Pharmaceutical Equipment
- Cleaning Equipment

E32-D3BV-32FP-110A

E24-D3BV-12FP-12D



## Notes

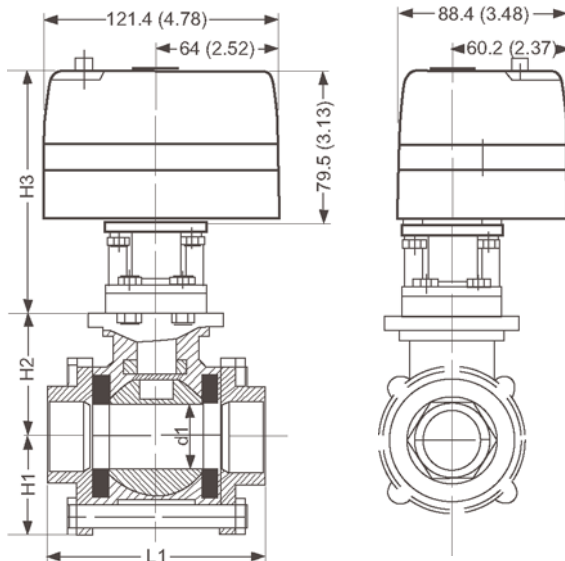
Once opened or closed, the actuator **DOES NOT** continue to draw power due to an internal cutoff.

If a power loss occurs the valve will remain in its current position. The actuator is **NOT** spring return.

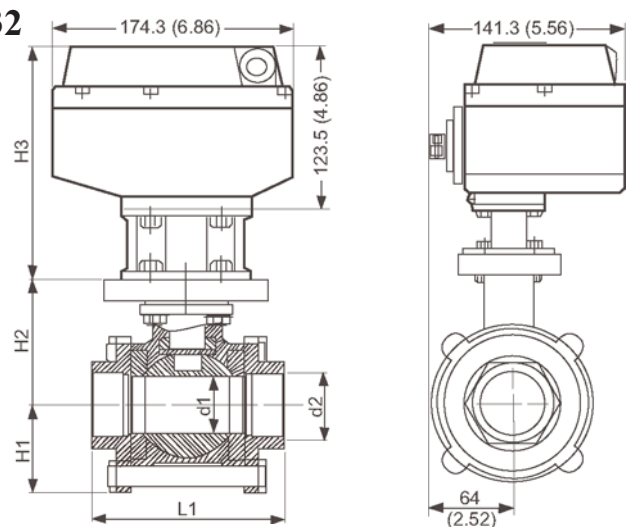
## Dimensional Data

Units: mm (inches)

### E24



### E32



E24	SIZE	H1	H2	H3	L1	d1	Wt kg (lb)
	1/2"	22.5 (0.89)	42 (1.65)	114.5 (4.50)	72 (2.83)	15 (0.59)	1.9 (4.19)
	3/4"	22.5 (0.89)	48 (1.89)	114.5 (4.50)	80 (3.15)	20 (0.78)	2.1 (4.63)
	1"	30.0 (1.18)	55 (2.17)	114.5 (4.50)	85 (3.35)	25 (0.98)	2.5 (5.51)
	1-1/4"	36.5 (1.44)	60 (2.36)	114.5 (4.50)	105 (4.13)	32 (1.26)	3.1 (6.83)
	1-1/2"	40.0 (1.57)	70 (2.75)	114.5 (4.50)	113 (4.45)	38 (1.50)	3.8 (8.38)

E32	SIZE	H1	H2	H3	L1	d1	Wt kg (lb)
	2"	46.5 (1.83)	85 (3.35)	173.5 (6.83)	132 (5.20)	50 (1.97)	7.4 (16.31)
	2-1/2"	61.5 (2.42)	109 (4.29)	173.5 (6.83)	170 (6.69)	65 (2.56)	11.4 (25.13)
	3"	69.0 (2.72)	118 (4.65)	173.5 (6.83)	186 (7.32)	76 (2.99)	14.8 (32.62)
	4"	110.0 (4.33)	120 (4.72)	173.5 (6.83)	220 (8.66)	94 (3.70)	25.7 (56.65)

### Technical Data

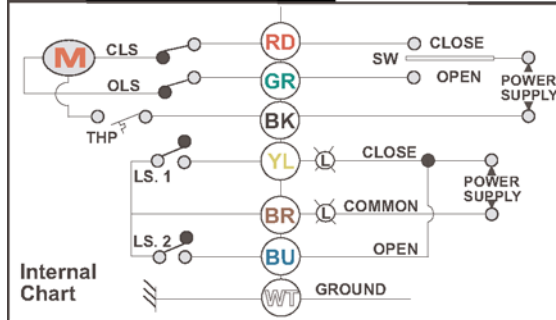
Series	Control	Max. Torque	Operating Time	Working Voltage	Input Power	Max. Pressure	Medium Temp.	Ambient Temp.
<b>E24</b>	On/ Off	40Nm (354 in/lbs)	10S	12/ 24VDC & 110VAC	40 Watts Max.	6.0 Mpa (870 psi)	0°C to 100°C (32°F to 212°F)	-20°C to 45°C (-4°F to 113°F)
<b>E32</b>		300Nm (2654 in/lbs)	25S	24VDC & 110VAC	220 Watts Max.			

IP67 Enclosure Duty Cycle: 10%

### Main Components

Part	Material
Actuator Housing	Die-cast Aluminum
Coupling	Die-cast Metal
Bracket	Stainless, Carbon Steel
Valve Body	Stainless Steel
Valve Ball	Stainless Steel
Stem	Stainless Steel
Ball Seat	PTFE
Seal	EPDM

### Wiring



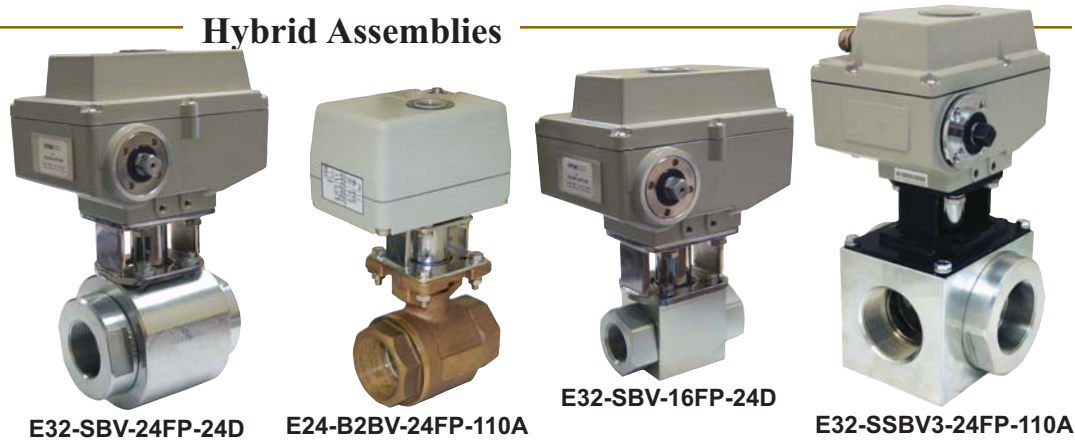
### Instructions:

- If Power is connected with GR, the valve will open and keep on. At this time, LS.1 is opened, giving signal of opening totally.
- If Power is connected with RD, the valve will close and keep off. At this time, LS.2 is opened, giving signal of closing.

### Hybrid Assemblies

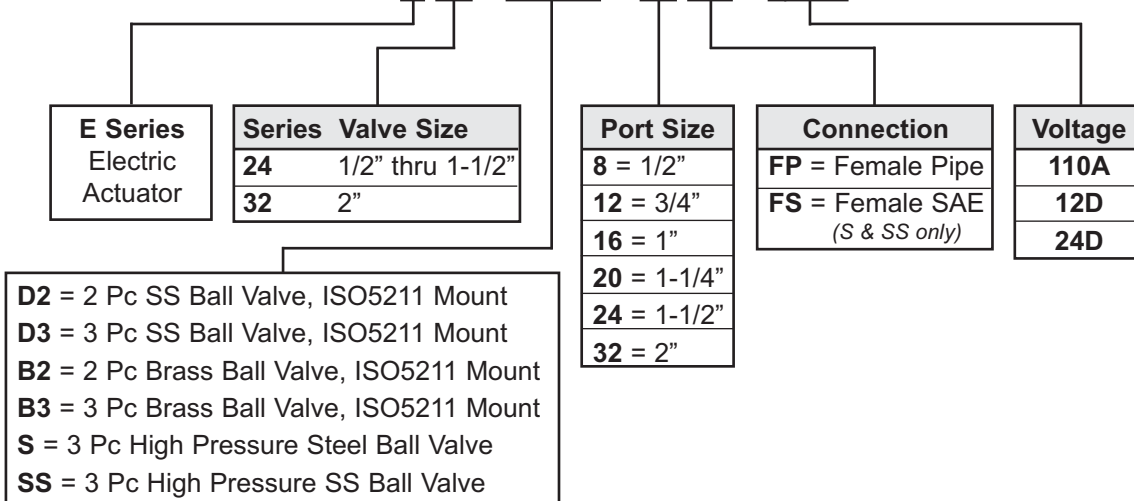
E24 & E32 actuators can be mounted to 2 or 3 Way High Pressure Steel (3/4" - 2") or Stainless Steel (3/4" - 2") Ball Valves.

Please contact for more information.



### Ordering Information

#### E 24 - B2BV - 24 FP - 110A



# FILTRATION

## FILTER CART



Air Powered Filter Cart



### Features

- Multiple Filtration Levels:** Filters may be connected or bypassed depending on operation.
- Guaranteed Non-Bypass:** Air driven 1:1 ratio diaphragm pump is regulated to 30 psi maximum. Air pump stops pumping if the filter becomes clogged.
- Particulate Removal Filter:** Large spin on element removes large particulate from 3 to 10 micron, depending on element selected.
- Water Removal Filter:** In addition to removing as much as 1-1/4 gallon of water, the water removal filter also removes fine particulates, filtering to one micron.

### Specifications

<b>Maximum Flows</b>	Spin On Filter	5 gpm
	Water Removal Filter	1.5 gpm
<b>Temperature</b>	50° F to +150° F (Viscosities Permitting)	
<b>Recommended Fluids</b>	Petroleum Based Fluids- ISO VG32-68, Most Vegetable Oils	

Also included with unit: Suction Quick Disconnect Plug, (1) Return Quick Disconnect Plug (2) 1/2" Quick Disconnect Plugs w/ 1/2" NPT Pipe Nipples.

Unit comes supplied with filters Qty. 1/ Each:  
CFE20-10MNPE-1, ZZ84000

### Flow Data

Pump Size	Cart Model Number	Filter Rating (microns)	Model Number (Element Only)	Maximum Flow*
1/2"	YC11001	3µ Absolute	CFE20-03MAME-1	4
		10µ Absolute	CFE20-10MAME-1	5
		10µ Nominal	CFE20-10MNPE-1	5
		1µ Fine/ Water Removal	ZZ8400	1.5

\*GPM with viscosity of 150 SUS, Specific Gravity of .88 (ISO 32 Oil at 100° F).

### Available Canister Filters

Thread	Model Number (Head Only)	Filter Rating (microns) □ > 75 Abs./ □ > 2 Nom.	Model Number (Element Only)	Element Flow* (□P= 5psi)
1-1/4" NPT	CFH-20FP-25	3µ Absolute	CFE20-03MAME-1	36
		10µ Absolute	CFE20-10MAME-1	50
		10µ Nominal	CFE20-10MNPE-1	44
		10µ Nom./ Water Removal	CFE20-10MNPE-1-WR	44
		3µ Absolute	CFE20-03MAME-2	46
		10µ Absolute	CFE20-10MAME-2	57
		10µ Nominal	CFE20-10MNPE-2	48





INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS

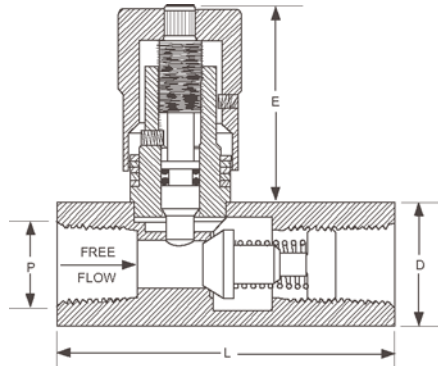
# FC20 SERIES

## Flow Control Valves



### Specifications

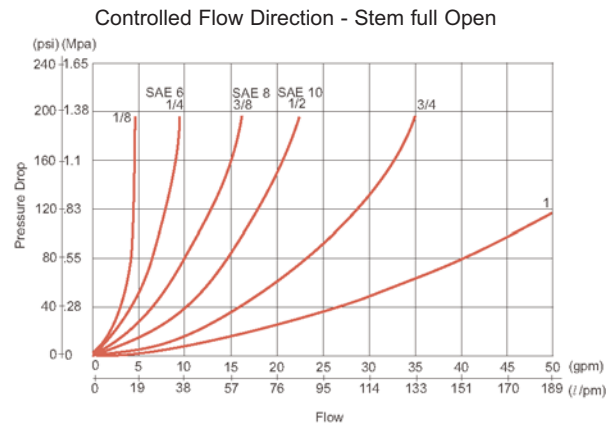
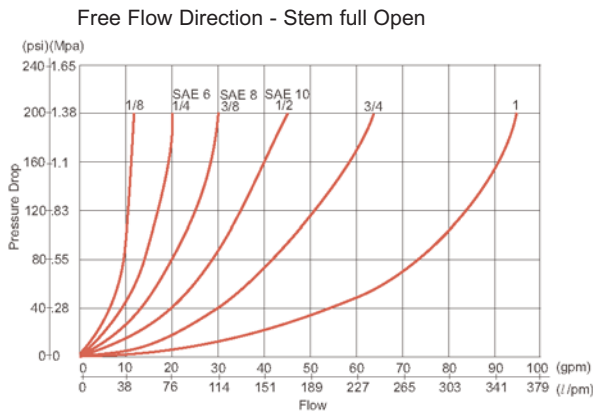
1. 1/4" thru 1" NPT ports
2. 5000 psi maximum- steel body
3. 2 psi check valve cracking pressure
4. Recommended for petroleum based fluids- ISO VG32-68
5. **Maximum Temperature:** 400°F, (200°C) or at minimum fluid viscosity of 80 SUS



FC20 Series Flow Control Valves with Color Bands

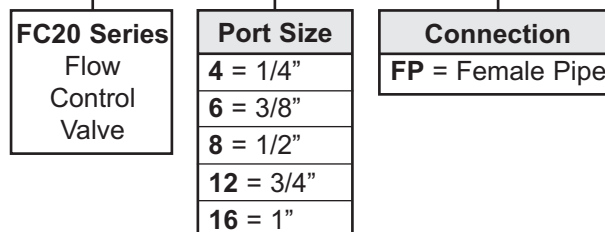
SIZE (P)	Model	D (Square)	L	E (Max.)	CV (controlled)	CV (free flow)
1/4"	FC20-4FP	13/16"	2-5/8"	1-3/8"	0.47	1.47
3/8"	FC20-6FP	1"	2-3/4"	1-23/32"	0.72	2.95
1/2"	FC20-8FP	1-1/8"	3-7/16"	2-1/4"	1.07	4.50
3/4"	FC20-12FP	1-1/2"	3-7/8"	2-15/32"	1.71	5.41
1"	FC20-16 FP	2"	5"	3-7/8"	2.45	5.90

### Typical Pressure Drop Curves



### Ordering Information

#### FC20 - 12 - FP





A-406

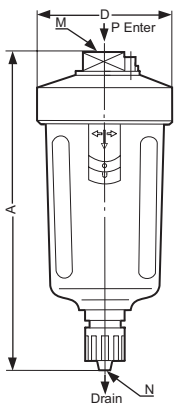


### Specifications

1. **Maximum Supply Pressure:** 220 psi (15.2 bar)
2. **Maximum Operating Pressure:** 145 psi (10.0 bar)
3. **Ambient & Media Temperature:** 41 - 140°F (5 - 60°C)
4. **Pressure Range:** A204: 25-145 psi A406 & A808: 15-150 psi
5. **Enter Size:** A204: 1/4" NPT A406: 3/8" NPT A808: 1/2" NPT
6. **Drain Port:** A204: 1/8" NPT A406 & A808: Pipe inner diameter (.236)
7. **Drain Type:** N.O.
8. **Manual Drain:** A204: Without A406 & A808: With  
*Standard with Metal Bowl Guard*

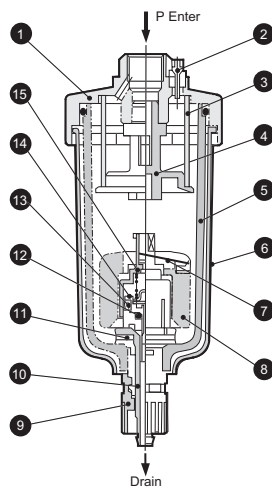
### Dimensional Data

Units: mm/ (Inch)



Model	A	D	MC	NC
<b>A204</b>	158.0 (6.22)	55.1 (2.17)	1/4" NPT	1/8" NPT
<b>A406</b>	169.9 (6.69)	71.9 (2.83)	3/8" NPT	6mm (Pipe inner dia.)
<b>A808</b>	169.9 (6.69)	71.9 (2.83)	1/2" NPT	6mm (PU)

### Parts Breakdown



- Reliable maintenance free operation
- Fine stainless wire mesh inlet strainer with large surface area removes contaminants
- Internal strainer can be cleaned and reused
- All internal components are corrosion resistant materials
- Bayonet locking device permits quick "tool free" disassembly
- Long and trouble free service life

No.	Component	Material
1	Body	Aluminum Die Casting
2	Relief Needle	Brass
3	Strainer	Stainless Steel Wire Mesh
4	Strainer Seat	POM
5	Bowl Assembly	Polycarbonate
6	Bowl Guard	Cold Rolled Plate
7	Lever	Stainless Steel
8	Float	Formed PU
9	Drain Knob	POM
10	Drain Pipe	POM
11	Seal	Rubber-Plastic Composite
12	O-Ring	Buna-N
13	V-Ring	Buna-N
14	Piston	POM
15	Float Seat	POM

### Ordering Information

#### A - 400

Code	Description	Model	Port Size
A	Auto-Drain	204	1/4"
		406	3/8"
		808	1/2"

All auto-drains must ship pre-installed in bowls.



Air Filter Pressure Regulators- BSeries

### Specifications

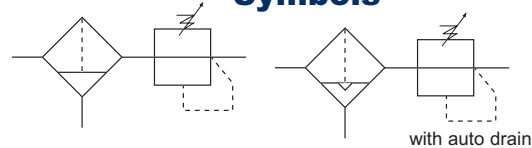
1. **Maximum Supply Pressure:** 220 psi (15.2 bar)
2. **Maximum Operating Pressure:** 145 psi (10.0 bar)
3. **Ambient & Media Temperature:** 41 - 140°F (5 - 60°C)
4. **Filtration\*:** 25  $\mu$ m
5. **Bowl Material\*\*\*:** Polycarbonate
6. **Metal Bowl Guard\*\*\*\*:** Zinc
7. **Regulating Range\*\*:** 5 - 120 psi (0.4 - 8.3 bar)
8. **Regulator Construction:** Relieving Type

\*5 micron filter element

\*\* Low Pressure Regulating Range: 5-35 psi

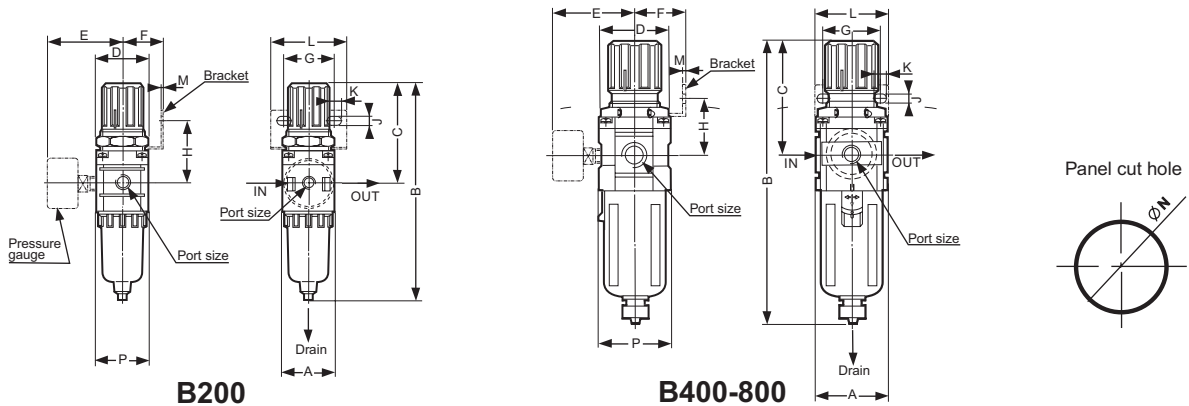
\*\*\* Metal Bowl is available on all series \*\*\*\*No guard on B200

### Symbols



### Dimensional Data

Units: mm/ (Inch)



Model	Port Size NPT	A	B	C	D	E	F	G	H	J	K	L	M	N	P	w/ Auto Drain B
B200	1/8" - 1/4"	39.9 (1.57)	164.6 (6.48)	78.0 (3.07)	40.1 (1.57)	56.9 (2.24)	30.0 (1.18)	34.0 (1.34)	45.0 (1.77)	5.3 (0.21)	15.5 (0.61)	55.1 (2.17)	2.3 (0.09)	33.5 (1.32)	39.9 (1.57)	198.4 (7.81)
B400	1/4" - 3/8"	53.1 (2.09)	211.1 (8.31)	92.5 (3.64)	53.1 (2.09)	60.7 (2.39)	40.9 (1.61)	40.1 (1.57)	46.0 (1.81)	6.6 (0.26)	7.9 (0.31)	52.6 (2.07)	2.3 (0.09)	42.4 (1.67)	55.9 (2.20)	248.9 (9.80)
B800	1/2"	70.1 (2.76)	261.9 (10.31)	112.0 (4.41)	70.1 (2.76)	69.6 (2.74)	50.0 (1.97)	54.1 (2.13)	54.1 (2.13)	8.4 (0.33)	10.4 (0.41)	70.1 (2.76)	2.3 (0.09)	52.6 (2.07)	72.9 (2.87)	301.5 (11.87)
B1600	3/4" - 1"	74.9 (2.95)	267.0 (10.51)	114.0 (4.49)	70.1 (2.76)	75.4 (2.97)	50.0 (1.97)	54.1 (2.13)	55.9 (2.20)	8.4 (0.33)	10.4 (0.41)	70.1 (2.76)	2.3 (0.09)	52.6 (2.07)	72.9 (2.87)	306.1 (12.05)

### Ordering Information

**B - 406 - A** - Other Options

Code	Description
B	Filter/Regulator Combo

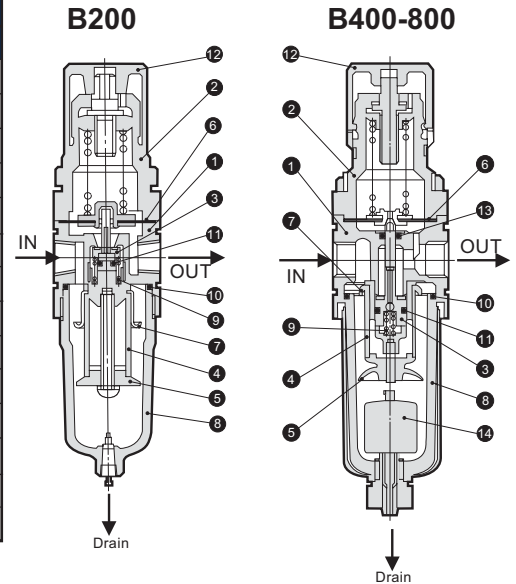
Model	Port Size
202	1/8"
204	1/4"
404	1/4"
406	3/8"
808	1/2"
1612	3/4"
1616	1"

Code	Option
omit	none
A	Auto Drain
G	Gauge

\*5 micron filter element.  
 \*\*Low Pressure Regulating Range: 5-35 psi.

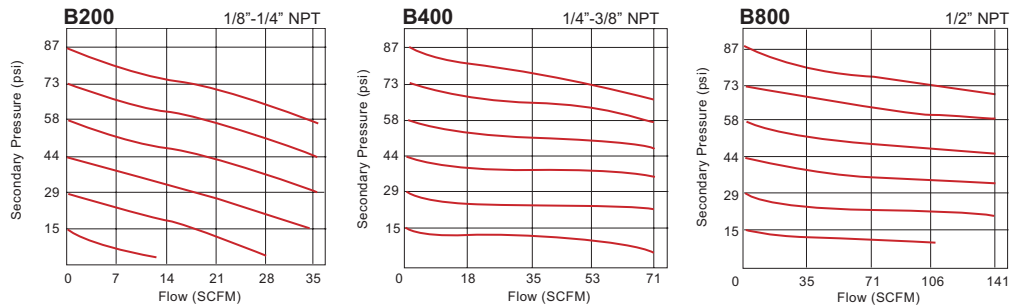
### Parts Breakdown & Construction Material

No.	Name	Material		
		B200	B400	B800
1	Body	Zinc Die Casting	Aluminum Die Casting	
2	Bonnet	Reinforced Nylon		Aluminum Die Casting
3	Valve Assem.	Brass & Buna-N		
4	Filter Element	Bronze		
5	Baffle	ABS		
6	Diaphragm Assem.	Buna-N		
7	Deflector	ABS		
8	Bowl Assem.	Polycarbonate (With Zinc Bowl Guard)		
9	Valve Spring	Stainless Steel		
10	Case O-Ring	Buna-N		
11	Valve O-Ring	Buna-N		
12	Knob	Reinforced Nylon		
13	O-Ring	Buna-N		
14	Float	Formed PU		



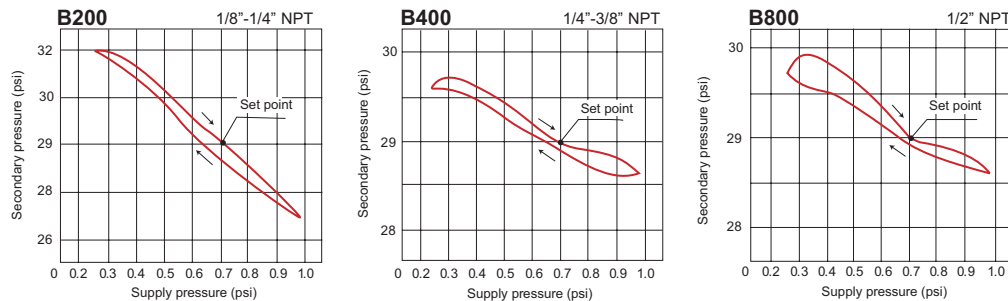
### Flow Data

Supply Pressure=100 psi



### Pressure Data

Supply Pressure=100 psi Secondary Pressure = 29 psi Flow Rate = .7 SCFM



ASSEMBLED INTO ONE  
COMBINATION  
UNIT



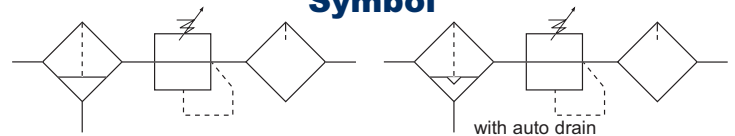
FRL-1616

### Specifications

1. **Maximum Supply Pressure:** 220 psi (15.2 bar)
2. **Maximum Operating Pressure:** 145 psi (10.0 bar)
3. **Ambient & Media Temperature:** 41 - 140°F (5 - 60°C)
4. **Filtration:** 25  $\mu$ m
5. **Recommended Oil:** 5-10 Weight Hydraulic Oil
6. **Bowl Material:** Polycarbonate
7. **Metal Bowl Guard\*:** Zinc
8. **Regulating Range:** 5 - 120 psi (0.4 - 8.3 bar)
9. **Regulator Construction:** Relieving Type

\*No Guard on FRL200.

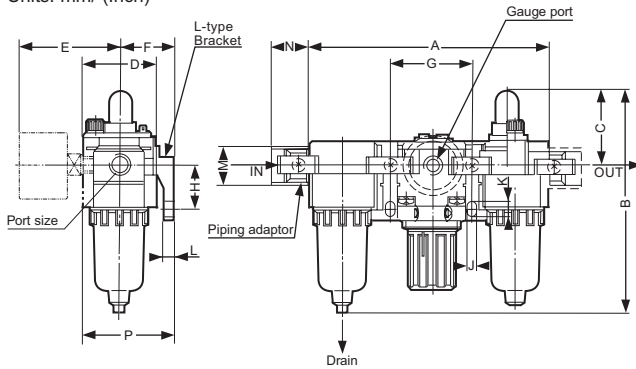
### Symbol



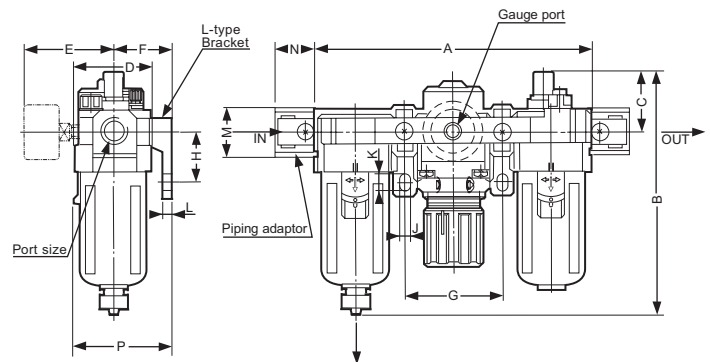
Filter, Regulator & Lubricator Components- FRL Series  
Fully assembled and complete with "L" Type Mounting Brackets (2)

### Dimensional Data

Units: mm/ (Inch)



FRL200



FRL400-1600

Model	Port Size NPT	A	B	C	D	E	F	G	H	J	K	L	M	N	P	w/ Auto Drain B
FRL200	1/8" - 1/4"	140.0 (5.51)	125.0 (4.92)	38.1 (1.50)	40.1 (1.57)	56.9 (2.24)	30.0 (1.18)	50.0 (1.97)	23.9 (0.94)	5.6 (0.22)	8.4 (0.33)	5.1 (0.20)	22.1 (0.87)	23.1 (0.91)	50.0 (1.97)	159.0 (6.26)
FRL400	1/4" - 3/8"	180.9 (7.12)	156.5 (6.16)	38.1 (1.50)	53.1 (2.09)	60.7 (2.39)	40.9 (1.61)	64.0 (2.52)	35.1 (1.38)	7.1 (0.28)	10.9 (0.43)	7.1 (0.28)	34.1 (1.35)	25.9 (1.02)	70.6 (2.78)	194.6 (7.66)
FRL800	1/2"	238.0 (9.37)	191.5 (7.54)	40.9 (1.61)	70.1 (2.76)	65.5 (2.58)	50.0 (1.97)	84.1 (3.31)	39.9 (1.57)	8.9 (0.35)	13.0 (0.51)	7.1 (0.28)	42.2 (1.66)	33.0 (1.30)	87.9 (3.46)	230.4 (9.07)
FRL1600	1"	300.0 (11.81)	271.5 (10.69)	48.0 (1.89)	89.9 (3.54)	75.4 (2.97)	70.1 (2.76)	104.9 (4.13)	50.0 (1.97)	11.9 (0.47)	16.0 (0.63)	9.9 (0.39)	55.1 (2.17)	39.9 (1.57)	115.1 (4.53)	310.4 (12.22)

### Ordering Information

#### FRL - 808 - GA

Code	Description	Model	Port Size	Code	Option
FRL	Filter- Regulator- Lubricator	202	1/8"	omit	none
		204	1/4"	A	Auto Drain
		404	1/4"	G	Gauge
		406	3/8"		
		808	1/2"		
		1612	3/4"		
		1616	1"		

WITH LUBRICATOR  
COMBINATION SETS

BL-1612

BL-808



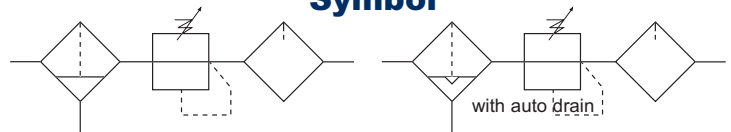
**Modular Filter Regulator Components- BL Series**  
Fully assembled and complete with "T" Type Mounting Bracket

### Specifications

1. **Maximum Supply Pressure:** 220 psi (15.2 bar)
2. **Maximum Operating Pressure:** 145 psi (10.0 bar)
3. **Ambient & Media Temperature:** 41 - 140°F (5 - 60°C)
4. **Filtration:** 25  $\mu$ m
5. **Recommended Oil:** 5-10 Weight Hydraulic Oil
6. **Bowl Material:** Polycarbonate
7. **Metal Bowl Guard\*:** Zinc
8. **Regulating Range:** 5 - 120 psi (0.4 - 8.3 bar)
9. **Regulator Construction:** Relieving Type

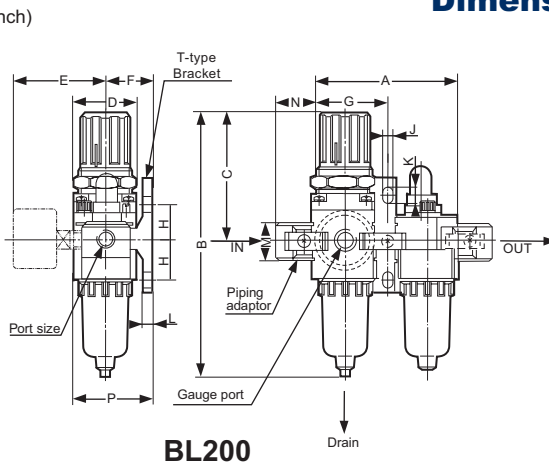
\*No Guard on BL200.

### Symbol

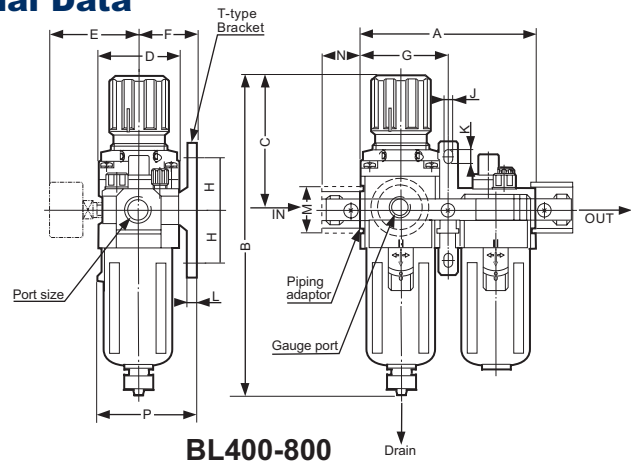


### Dimensional Data

Units: mm/ (Inch)



**BL200**



**BL400-800**

Model	Port Size NPT	A	B	C	D	E	F	G	H	J	K	L	M	N	P	w/ Auto Drain B
BL200	1/8" - 1/4"	89.9 (3.54)	164.6 (6.48)	78.0 (3.07)	40.1 (1.57)	56.9 (2.24)	30.0 (1.18)	45.2 (1.78)	23.9 (0.94)	5.6 (0.22)	8.4 (0.33)	5.1 (0.20)	22.1 (0.87)	23.1 (0.91)	50.0 (1.97)	198.4 (7.81)
BL400	1/4" - 3/8"	117.1 (4.61)	211.1 (8.31)	92.5 (3.64)	53.1 (2.09)	60.7 (2.39)	40.9 (1.61)	58.4 (2.30)	35.1 (1.38)	7.1 (0.28)	10.9 (0.43)	7.1 (0.28)	34.1 (1.35)	25.9 (1.02)	70.6 (2.78)	248.9 (9.80)
BL808	1/2"	153.9 (6.06)	261.9 (10.31)	112.0 (4.41)	70.1 (2.76)	69.6 (2.74)	50.0 (1.97)	77.0 (3.03)	39.9 (1.57)	8.9 (0.35)	13.0 (0.51)	7.1 (0.28)	42.2 (1.66)	33.0 (1.30)	87.9 (3.46)	310.4 (12.22)
BL1600	3/4" - 1"	164.1 (6.46)	267.0 (10.51)	114.1 (4.49)	70.1 (2.76)	75.4 (2.97)	50.0 (1.97)	82.0 (3.23)	39.9 (1.57)	8.9 (0.35)	13.0 (0.51)	7.1 (0.28)	46.2 (1.82)	36.1 (1.42)	87.9 (3.46)	306.1 (12.05)

### Ordering Information

**BL - 406 - GA** - Other Options

Code	Description
BL	Filter/Regulator Combo-Lubricator

Model	Port Size
202	1/8"
204	1/4"
404	1/4"
406	3/8"
808	1/2"
1612	3/4"
1616	1"

Code	Option
omit	none
A	Auto Drain
G	Gauge

Assembled Combination Units are not available with optional filter element, non-standard pressure range or metal bowls.

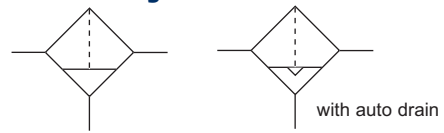


Modular Air Filters- FSeries

### Specifications

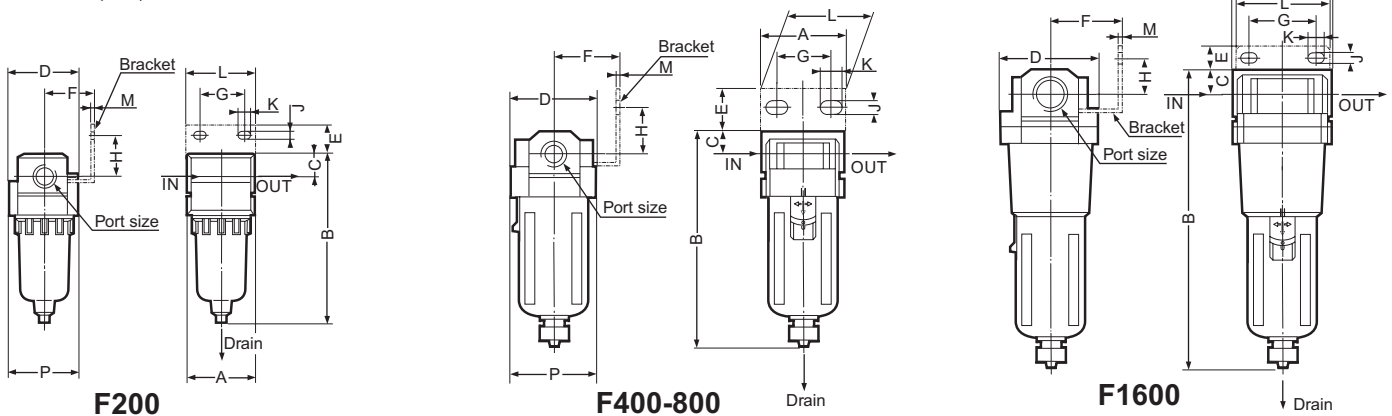
1. **Maximum Supply Pressure:** 220 psi (15.2 bar)
  2. **Maximum Operating Pressure:** 145 psi (10.0 bar)
  3. **Ambient & Media Temperature:** 41 - 140°F (5 - 60°C)
  4. **Filtration\*:** 25  $\mu$ m
  5. **Bowl Material\*\*:** Polycarbonate
  6. **Metal Bowl Guard\*\*\*:** Zinc
- \*5 micron filter element or 50 micron filter element.  
 \*\*Metal Bowl is available on all series.  
 \*\*\*No Guard on F200.

### Symbols



### Dimensional Data

Units: mm/ (Inch)



Model	Port Size NPT	A	B	C	D	E	F	G	H	J	K	L	M	P	w/ Auto Drain
															N.O. (B)
F200	1/8" - 1/4"	40.1 (1.58)	97.5 (3.84)	10.9 (0.43)	40.1 (1.57)	17.0 (0.67)	30.0 (1.18)	26.9 (1.06)	22.1 (0.87)	5.3 (0.21)	8.4 (0.33)	40.1 (1.57)	2.3 (0.09)	39.9 (1.57)	131.6 (5.18)
F400	1/4" - 3/8"	53.1 (2.09)	132.6 (5.22)	14.0 (0.55)	53.1 (2.09)	16.0 (0.63)	40.9 (1.61)	40.1 (1.57)	23.1 (0.91)	6.6 (0.26)	7.9 (0.31)	53.1 (2.09)	2.3 (0.09)	55.9 (2.20)	170.4 (6.71)
F800	1/2"	70.1 (2.76)	168.4 (6.63)	18.0 (0.71)	70.1 (2.76)	17.0 (0.67)	50.0 (1.97)	54.1 (2.13)	25.9 (1.02)	8.4 (0.33)	10.4 (0.41)	70.1 (2.76)	2.3 (0.09)	72.9 (2.87)	207.5 (8.17)
F1600	3/4" - 1"	89.9 (3.54)	247.4 (9.74)	23.9 (0.94)	89.9 (3.54)	23.1 (0.91)	70.1 (2.76)	66.0 (2.60)	35.1 (1.38)	10.9 (0.43)	13.0 (0.51)	89.9 (3.54)	3.3 (0.13)	89.9 (3.54)	286.5 (11.28)

### Ordering Information

F - 202 - A - Other Options

Code	Description
F	Filter

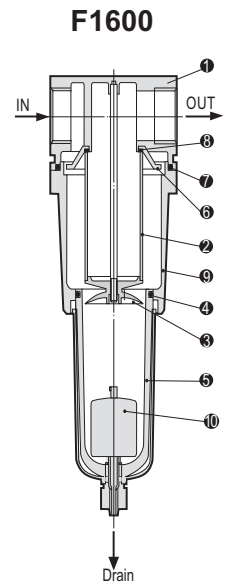
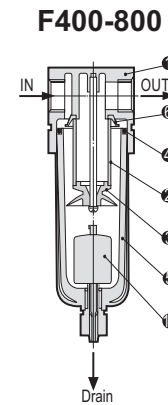
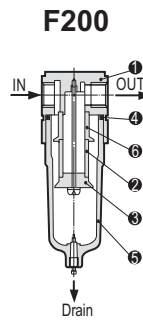
Model	Port Size
202	1/8"
204	1/4"
404	1/4"
406	3/8"
808	1/2"
1612	3/4"
1616	1"

Code	Option
omit	none
A	Auto Drain

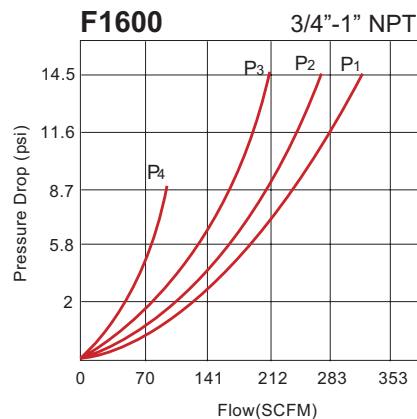
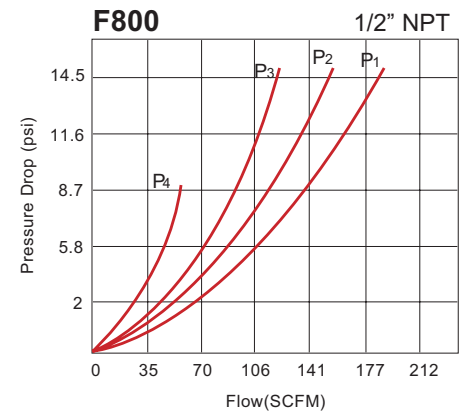
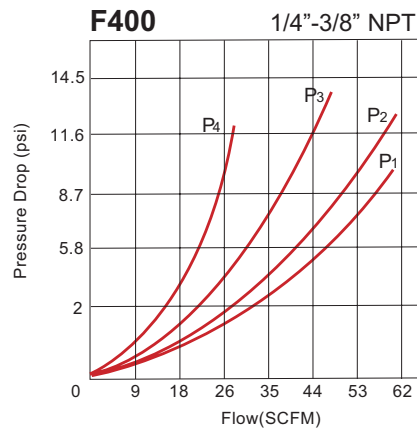
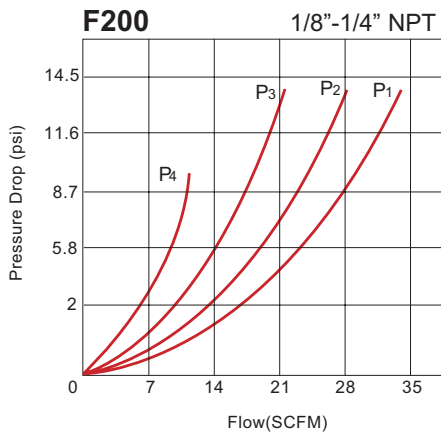
\*5 micron filter element or 50 micron filter element.  
 \*\*Metal Bowl is available on all series.

### Parts Breakdown & Construction Material

No.	Name	Material
1	Body	Aluminum Die Casting
2	Filter Element	Bronze
3	Baffle	ABS
4	O-Ring	Buna-N
5	Bowl Assembly	Polycarbonate (With Zinc Bowl Guard)
6	Deflector	ABS
7	O-Ring	Buna-N
8	Packing	Buna-N
9	Housing	Aluminum Die Casting
10	Float	Formed PU



### Flow Data



P1 = 100 psi  
 P2 = 75 psi  
 P3 = 45 psi  
 P4 = 15 psi



Modular Air Line Lubricators- LSeries

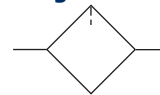
### Specifications

1. **Maximum Supply Pressure:** 220 psi (15.2 bar)
2. **Maximum Operating Pressure:** 145 psi (10.0 bar)
3. **Ambient & Media Temperature:** 41 - 140°F (5 - 60°C)
4. **Recommended Oil:** 5-10 Weight Hydraulic Oil
5. **Bowl Material\*:** Polycarbonate
6. **Metal Bowl Guard\*\*:** Zinc

\*Metal Bowl is available on all series.

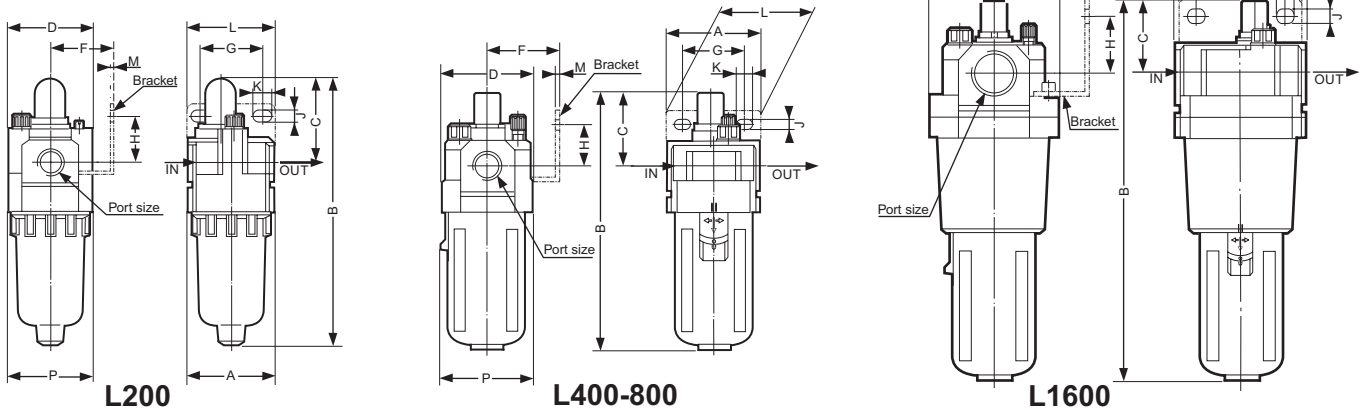
\*\*No Guard on L200.

### Symbol



### Dimensional Data

Units: mm/ (Inch)



Model	Port Size NPT	A	B	C	D	F	G	H	J	K	L	M	P
L200	1/8" - 1/4"	39.9 (1.57)	121.9 (4.80)	38.1 (1.50)	39.9 (1.57)	30.0 (1.18)	26.9 (1.06)	22.1 (0.87)	5.3 (0.21)	8.4 (0.33)	39.9 (1.57)	2.3 (0.09)	39.9 (1.57)
L400	1/4" - 3/8"	53.3 (2.10)	142.0 (5.59)	38.1 (1.50)	53.3 (2.10)	40.9 (1.61)	40.1 (1.57)	23.1 (0.91)	6.6 (0.26)	7.9 (0.31)	53.1 (2.09)	2.3 (0.09)	55.9 (2.20)
L800	1/2"	70.1 (2.76)	177.0 (6.97)	40.9 (1.61)	70.1 (2.76)	50.0 (1.97)	54.1 (2.13)	25.9 (1.02)	8.4 (0.33)	10.4 (0.41)	70.1 (2.76)	2.3 (0.09)	72.9 (2.87)
L1600	3/4" - 1"	89.9 (3.54)	254.0 (10.00)	45.0 (1.77)	89.9 (3.54)	70.1 (2.76)	66.0 (2.60)	35.1 (1.38)	10.9 (0.43)	13.0 (0.51)	89.9 (3.54)	3.3 (0.13)	89.9 (3.54)

### Ordering Information

L - 204 - Other Options

Code	Description
L	Lubricator

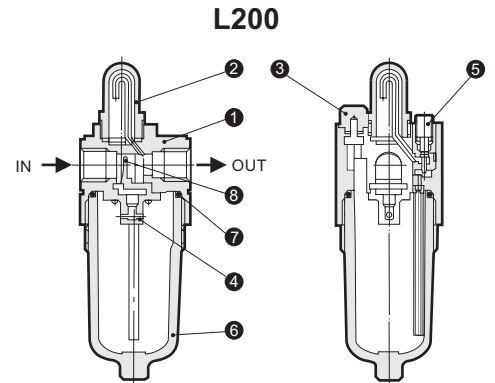
Model	Port Size
202	1/8"
204	1/4"
404	1/4"
406	3/8"
808	1/2"
1612	3/4"
1616	1"

\*Metal Bowl is available on all series.

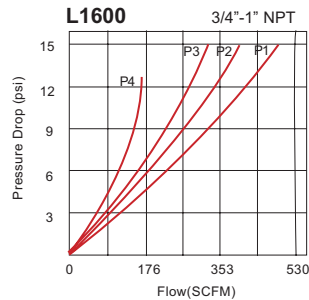
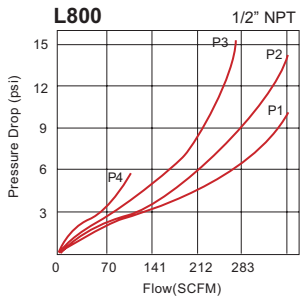
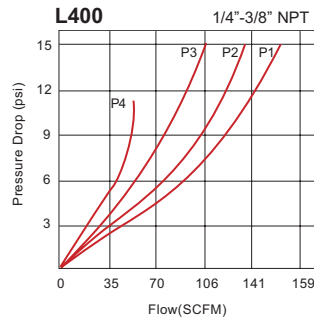
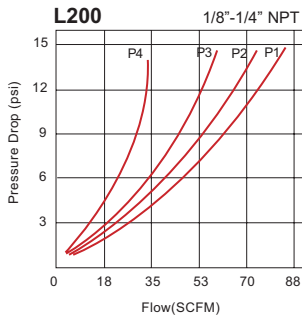


### Parts Breakdown & Construction Material

No.	Name	Material		
		L200	L400/ 800	L1600
1	Body	Zinc Die Casting	Aluminum Die Casting	
2	Sight Dome Assem.	Polycarbonate		
3	Plug Assem.	POM (Black)		
4	Retainer Assem.	ABS		
5	Adj. Screw Assem.	ABS		
6	Bowl Assem.	Polycarbonate (With Zinc Bowl Guard)		
7	Bowl O-Ring	Buna-N		
8	Flow Guide	ABS		
9	Housing O-Ring	Buna-N		
10	Housing	---	Aluminum Die Casting	

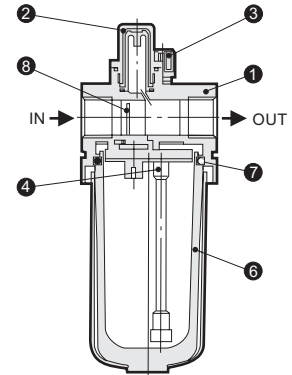


### Flow Data

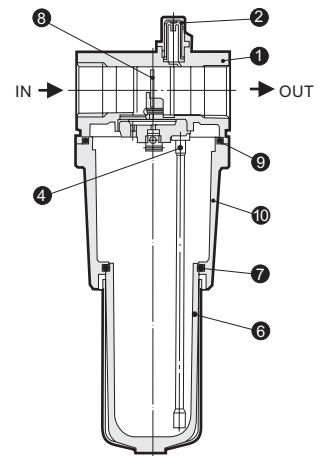


P1 = 100 psi  
 P2 = 75 psi  
 P3 = 45 psi  
 P4 = 15 psi

L400-800



L1600



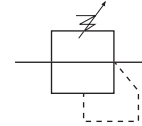


Modular Air Pressure Regulators- RSeries

### Specifications

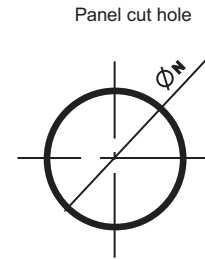
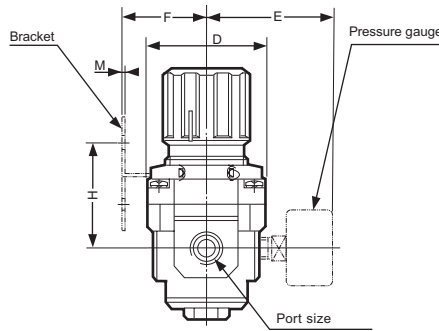
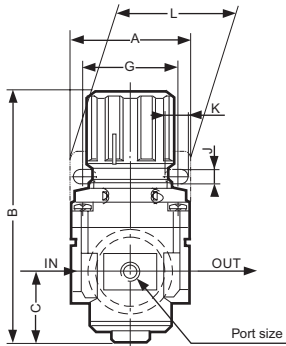
1. **Maximum Supply Pressure:** 220 psi (15.2 bar)
2. **Maximum Operating Pressure:** 145 psi (10.0 bar)
3. **Regulating Range\*:** 5 - 120 psi (0.4 - 8.3 bar)
4. **Ambient & Media Temperature:** 41 - 140°F (5 - 60°C)
5. **Construction:** Relieving Type
6. **\*Low Pressure Regulating Range:** 5-35 psi

### Symbol



### Dimensional Data

Units: mm/ (Inch)



Model	Port Size NPT	A	B	C	D	E	F	G	H	J	K	L	M	N
R200	1/8" - 1/4"	39.9 (1.57)	95.0 (3.74)	17.0 (0.67)	39.9 (1.57)	56.9 (2.24)	30.0 (1.18)	34.0 (1.34)	45.0 (1.77)	5.3 (0.21)	15.5 (0.61)	55.1 (2.17)	2.3 (0.09)	33.5 (1.32)
R400	1/4" - 3/8"	53.3 (2.10)	127.5 (5.02)	35.1 (1.38)	53.3 (2.10)	60.7 (2.39)	40.9 (1.61)	40.1 (1.57)	46.0 (1.81)	6.6 (0.26)	7.9 (0.31)	53.1 (2.09)	2.3 (0.09)	42.4 (1.67)
R800	1/2"	70.1 (2.76)	149.6 (5.89)	37.6 (1.48)	70.1 (2.76)	65.5 (2.58)	50.0 (1.97)	54.1 (2.13)	54.1 (2.13)	8.4 (0.33)	10.4 (0.41)	70.1 (2.76)	2.3 (0.09)	52.6 (2.07)
R1600	3/4" - 1"	89.9 (3.54)	167.9 (6.61)	48.0 (1.89)	89.9 (3.54)	75.4 (2.97)	70.1 (2.76)	66.0 (2.60)	65.8 (2.59)	10.9 (0.43)	13.0 (0.51)	89.9 (3.54)	3.3 (0.13)	52.6 (2.07)

### Ordering Information

**R - 406 - G** - Other Options

Code	Description
R	Regulator

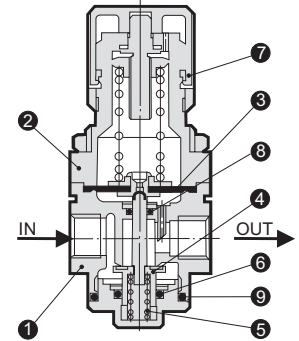
Model	Port Size
202	1/8"
204	1/4"
404	1/4"
406	3/8"
808	1/2"
1612	3/4"
1616	1"

Code	Option
omit	none
G	Gauge

\*Low Pressure Regulating Range: 5-35 psi

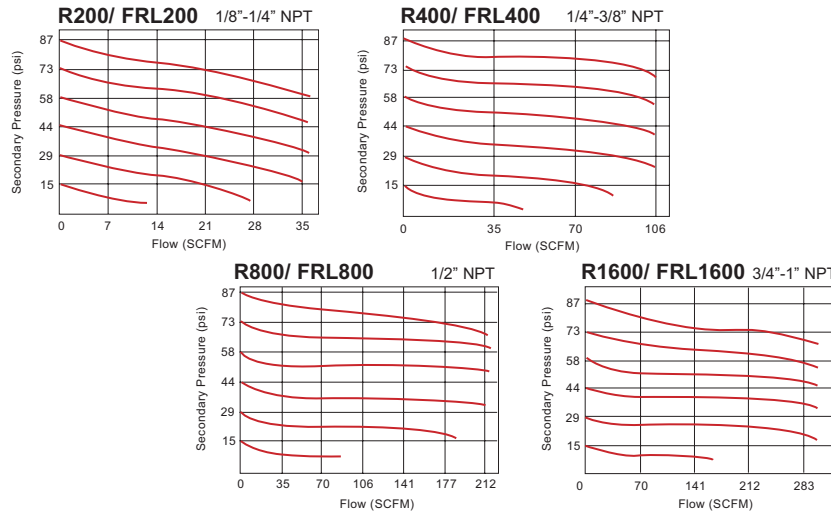
### Parts Breakdown & Construction Material

No.	Name	Material		
		R200 / FRL200	R400 / FRL400	R800, 1600 / FRL800, 1600
1	Body	Zinc Die Casting	Aluminum Die Casting	
2	Bonnet	Reinforced Nylon		Aluminum Die Casting
3	Diaphragm Assembly	Buna-N		
4	Valve Assembly	Brass & Buna-N		
5	Valve Spring	Stainless Steel		
6	Valve O-Ring	Buna-N		
7	Knob	Reinforced Nylon		
8	O-Ring	Buna-N		
9	O-Ring	Buna-N		



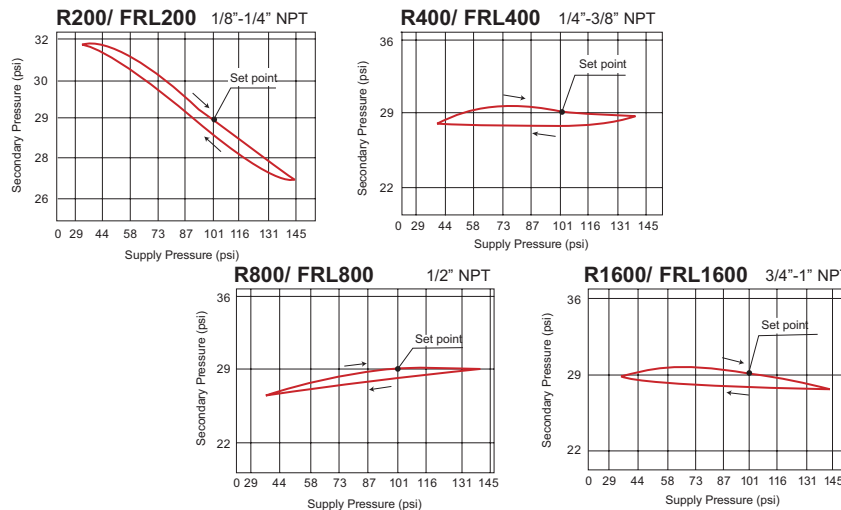
### Flow Data

Supply Pressure=100 psi



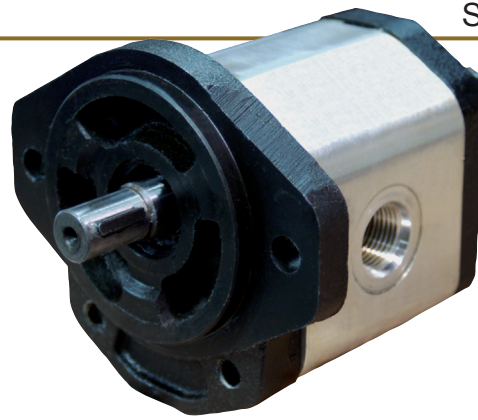
### Pressure Data

Supply Pressure=100 psi Secondary Pressure = 29 psi Flow Rate = .7 SCFM



### Features

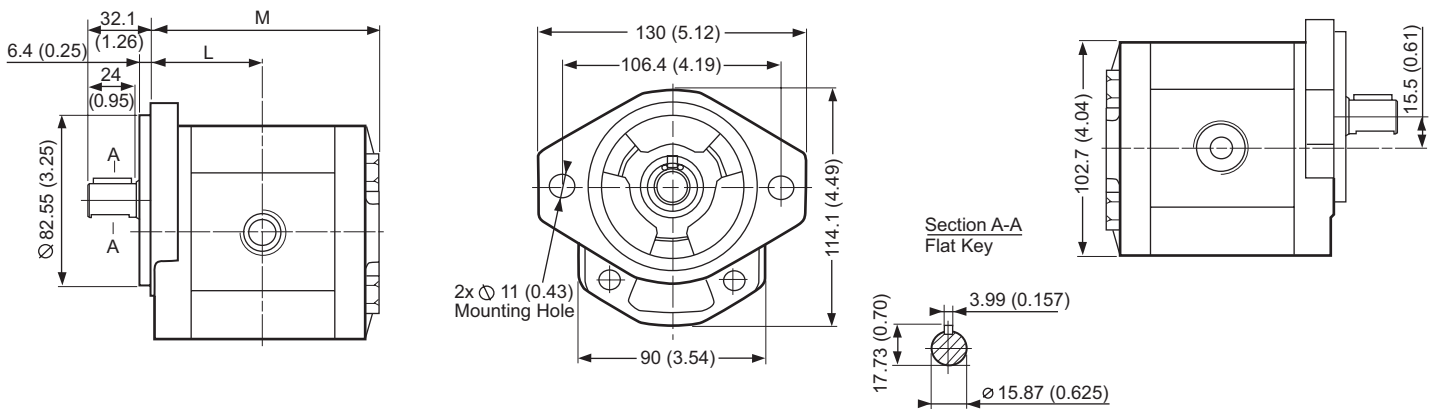
- Simple Compact Design
- High Mechanical and Volumetric Efficiency
- Low Noise Levels During Pump Operation
- Cast Iron Flange and Rear Cover
- Aluminum Alloy Body
- Hardened Steel Gears



G8.5-2AK-3

### Dimensional Data

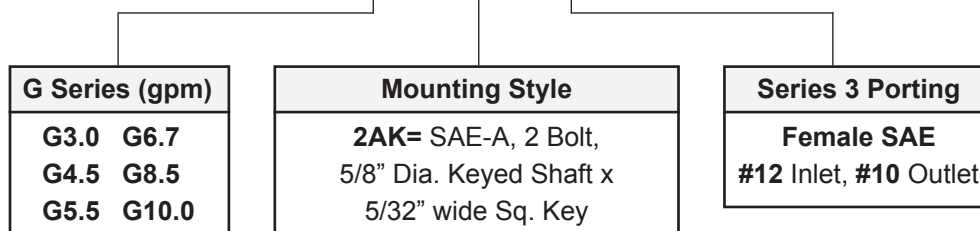
Units: mm (inches)



Model	Displacement		Pressure <sup>psi</sup> (mpa)		RPM		Dimensions <sup>mm</sup> (inch)		Port SAE
	ml/r.	cu.in/r.	Continuous	Max.	Rated	Max.	L	M	
G3.0-2AK-3	7.0	0.428	2900 (20)	4000 (28)	2000	4000	47.7 (1.878)	97.4 (3.835)	In #12 1 <sup>1</sup> / <sub>16</sub> - 12 Out #10 7 <sup>8</sup> / <sub>8</sub> - 14
G4.5-2AK-3	9.6	0.584					49.6 (1.953)	101.3 (3.988)	
G5.5-2AK-3	11.5	0.701					51.3 (2.020)	104.6 (4.118)	
G6.7-2AK-3	14.0	0.857					53.4 (2.102)	108.9 (4.287)	
G8.5-2AK-3	17.8	1.050					56.4 (2.220)	114.9 (4.524)	
G10.0-2AK-3	21.0	1.285	2600(18)	2900(20)	2200	59.1 (2.327)	120.3 (4.736)		

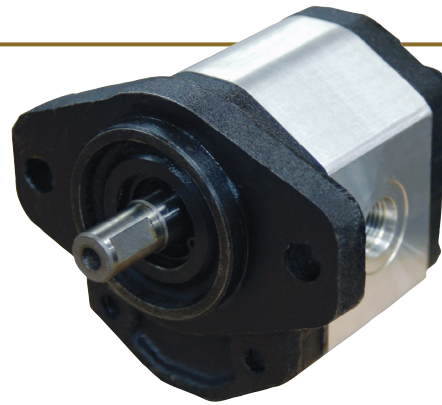
### Ordering Information

#### G8.5 - 2AK - 3



### Features

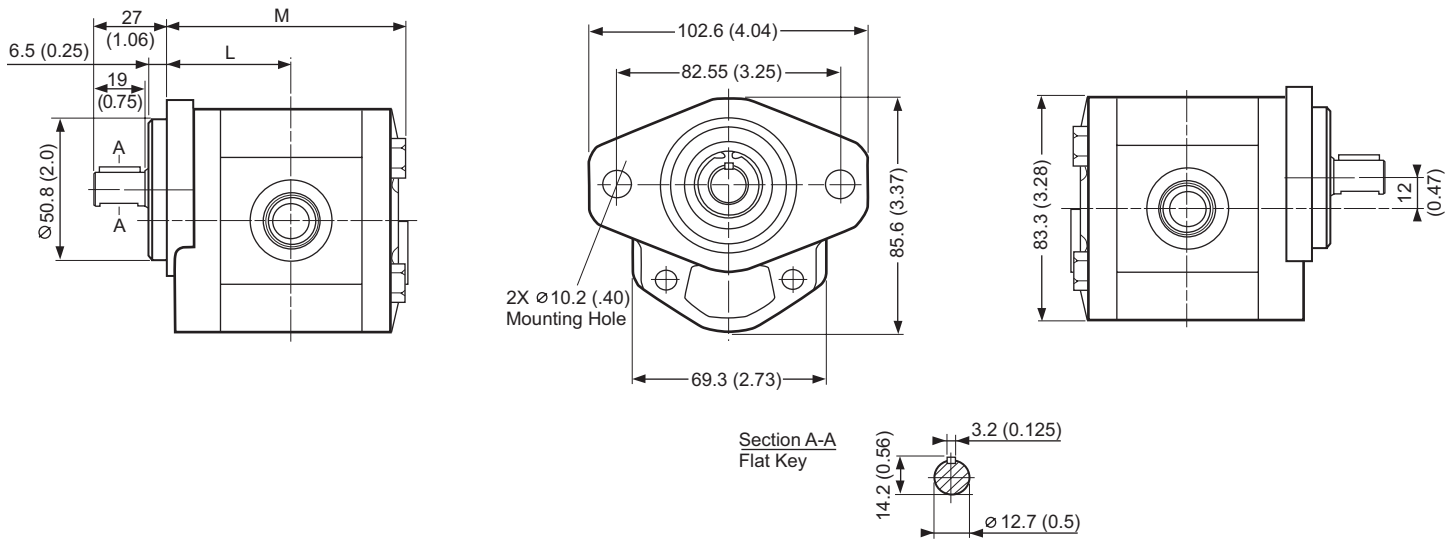
- Simple Compact Design
- High Mechanical and Volumetric Efficiency
- Low Noise Levels During Pump Operation
- Cast Iron Flange and Rear Cover
- Aluminum Alloy Body
- Hardened Steel Gears



G.9-2AAK-3

### Dimensional Data

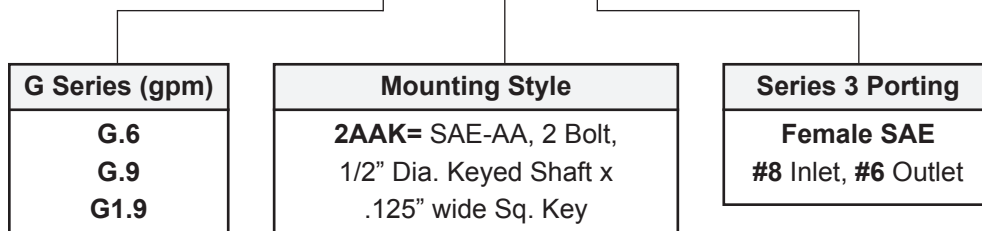
Units: mm (inches)



Model	Displacement		Pressure <sup>psi</sup> (mpa)		RPM		Dimensions <sup>mm</sup> (inch)		Port
	ml/r.	cu.in/r.	Continuous	Max.	Rated	Max.	L	M	SAE
G.6-2AAK-3	1.4	0.083	2900 (20)	4000 (28)	2000	4000	42 (1.654)	80.3 (3.161)	In #8 <sup>3</sup> / <sub>4</sub> - 16 Out #6 <sup>9</sup> / <sub>16</sub> - 18
G.9-2AAK-3	2.0	0.125					43 (1.693)	82.3 (3.240)	
G1.9-2AAK-3	4.1	0.250					46 (1.811)	88.3 (3.476)	

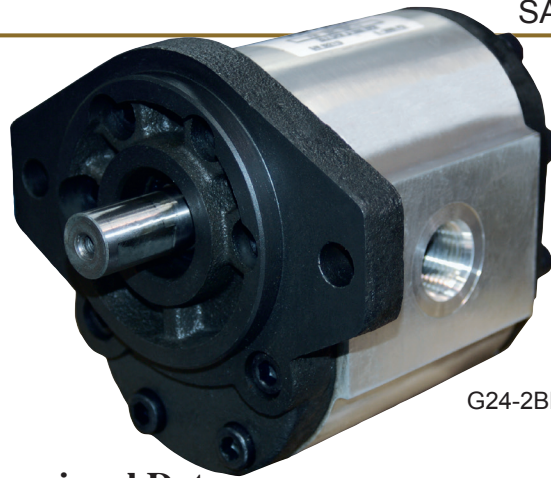
### Ordering Information

#### G1.9 - 2AAK - 3



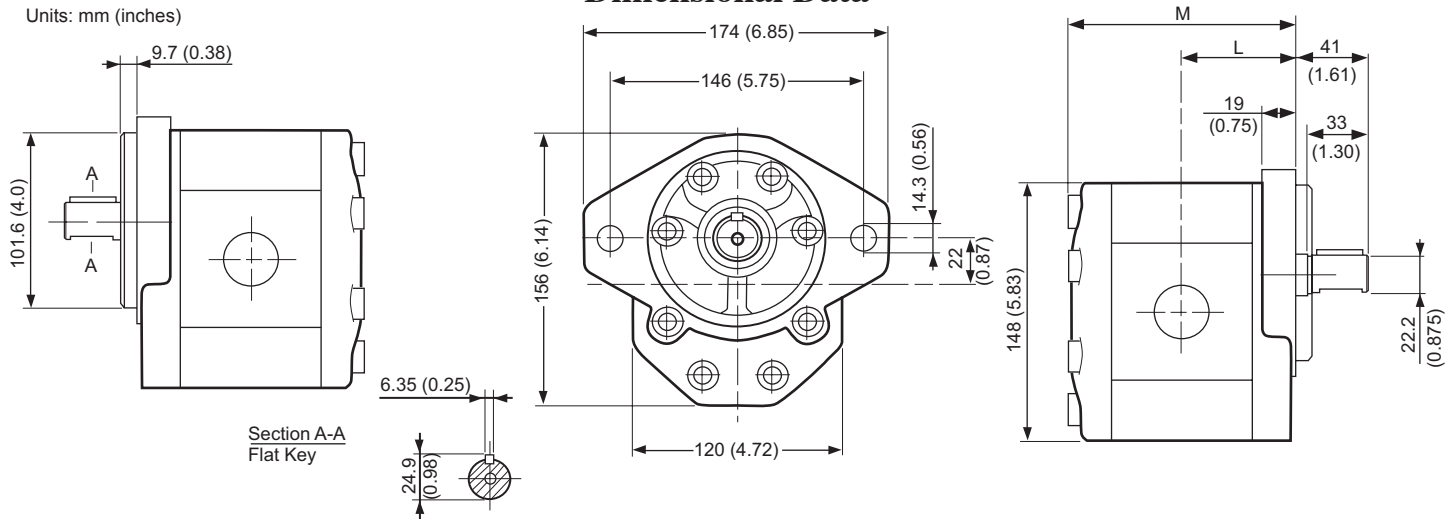
### Features

- Simple Compact Design
- High Mechanical and Volumetric Efficiency
- Low Noise Levels During Pump Operation
- Cast Iron Flange and Rear Cover
- Aluminum Alloy Body
- Hardened Steel Gears



G24-2BK-3

### Dimensional Data



Model	Displacement		Pressure <small>psi (mpa)</small>		RPM Range	Dimensions <small>mm (inch)</small>		Port SAE
	ml/r.	cu.in/r.	Continuous	Max.		L	M	
G16-2BK-3	33.0	2.01	3300 (23)	3915 (27)	3300	69.5 (2.736)	139.5 (5.492)	In
G18-2BK-3	39.0	2.38	3190 (22)	3770 (26)		71.5 (2.815)	143.5 (5.650)	
G20-2BK-3	44.0	2.69	3000 (21)	3625 (25)		73 (2.874)	146.5 (5.768)	#16 <sup>5</sup> / <sub>16</sub> - 12
G24-2BK-3	52.0	3.17	2900 (20)	3335 (23)		76 (2.992)	152.5 (6.004)	
G29-2BK-3	61.0	3.72	2755 (19)	3190 (22)	79 (3.110)	158.5 (6.240)	Out	
G33-2.5K-2BK-3	71.0	4.33	2465 (17)	2900 (20)	82.5 (3.248)	165.5 (6.516)		#24 <sup>17</sup> / <sub>8</sub> - 12
G37-2.3K-2BK-3	78.0	4.76	2320 (16)	2755 (19)	85 (3.347)	170.5 (6.713)	#20 <sup>15</sup> / <sub>8</sub> - 12	
G41-3K-2BK-3	87.0	5.31	2030 (14)	2465 (17)	88 (3.465)	176.5 (6.949)		

### Ordering Information

#### G24 - 2BK - 3

<b>G Series (gpm)</b> <b>G16 G24 G37</b> <b>G18 G29 G41</b> <b>G20 G33</b>	<b>Mounting Style</b> <b>2BK= SAE-B, 2 Bolt,</b> <b>7/8" Dia. Keyed Shaft x</b> <b>1/4" wide Sq. Key</b>	<b>Series 3 Porting</b> <b>Female SAE</b> <b>#20 Inlet, #16 Outlet</b> <b>#24 Inlet, #20 Outlet</b>
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## Features

- General Purpose Motors
- Maximum Oil Temp.: 180°F (82°C)
- Seven precision machined rollers provide rolling contact support. Rollers reduce friction for increased efficiency & extended motor life.

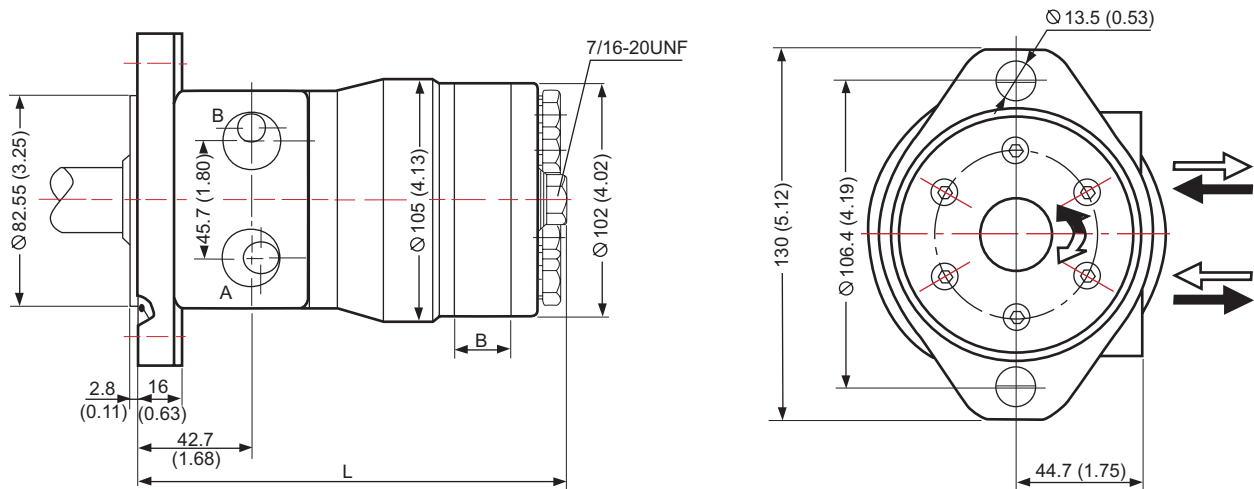


## Technical Data

TYPE		HMS050	HMS080	HMS160	HMS200	HMS250	HMS400
Displacement: in <sup>3</sup> ./ rev.		3.15	4.91	9.80	12.25	15.41	24.52
Maximum Speed: rpm	cont.	775	750	375	300	240	160
Maximum Torque: in/ lbs	cont.	823	1345	2743	3266	3363	3363
	int.	1044	1673	3346	3983	4160	4160
Maximum Pressure: psi	cont.	2031	2031	2031	2031	1595	1015
	int.	2538	2538	2538	2538	2031	1305
Maximum Flow: gpm	cont.	10.6	15.9	15.9	15.9	15.9	16.0
Maximum Output: hp	cont.	9	13	13	11	8	5
Weight: lbs (kgs)		14 (6.35)	15 (6.80)	17 (7.71)	18 (8.17)	19 (8.62)	24 (10.89)

## Dimensional Data

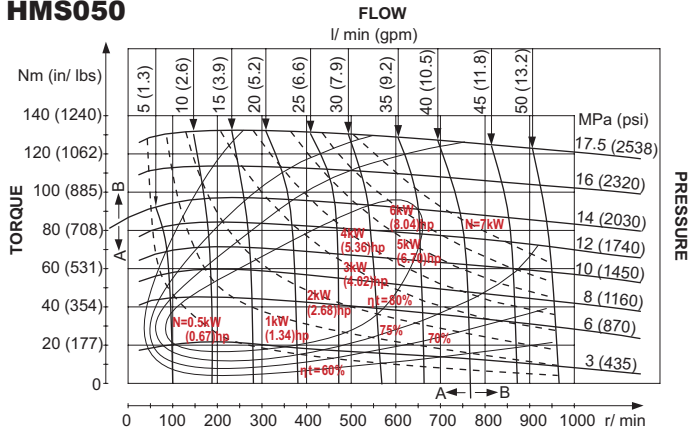
Units: mm (inches)



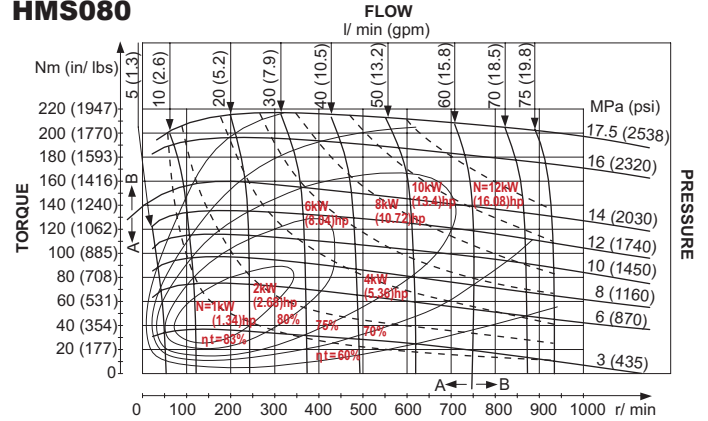
TYPE	HMS 050	HMS 080	HMS 160	HMS 200	HMS 250	HMS 400
L	149.1 (5.87)	153.9 (6.06)	167.9 (6.61)	175.0 (6.89)	183.9 (7.24)	210.1 (8.27)
B	8.9 (0.35)	14.0 (0.55)	27.9 (1.10)	35.1 (1.38)	43.9 (1.73)	70.1 (2.76)

## Performance Curves

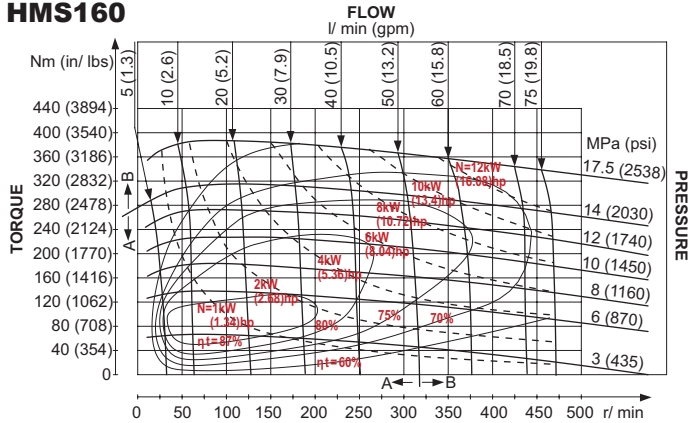
**HMS050**



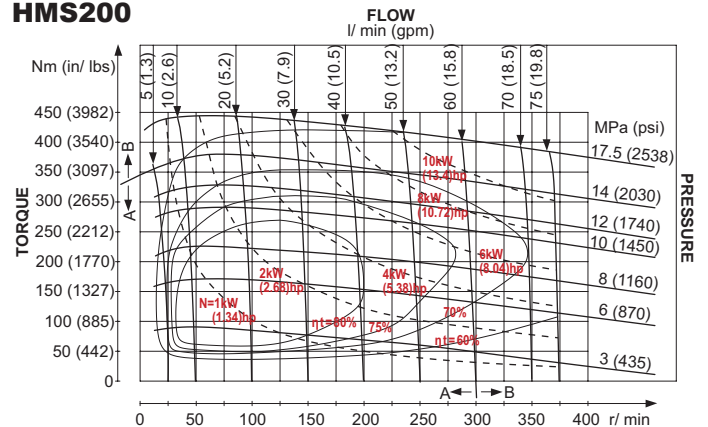
**HMS080**



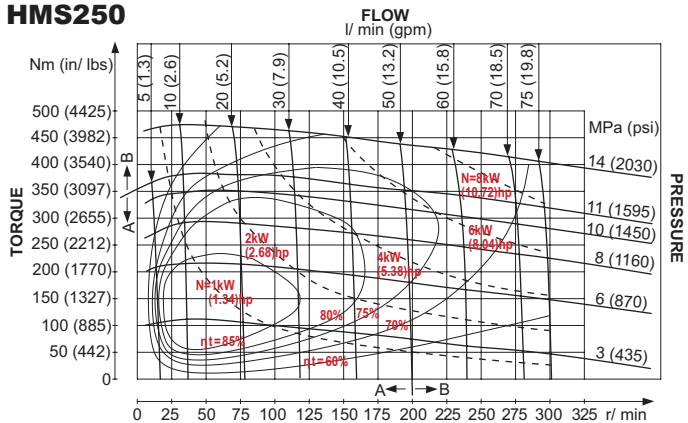
**HMS160**



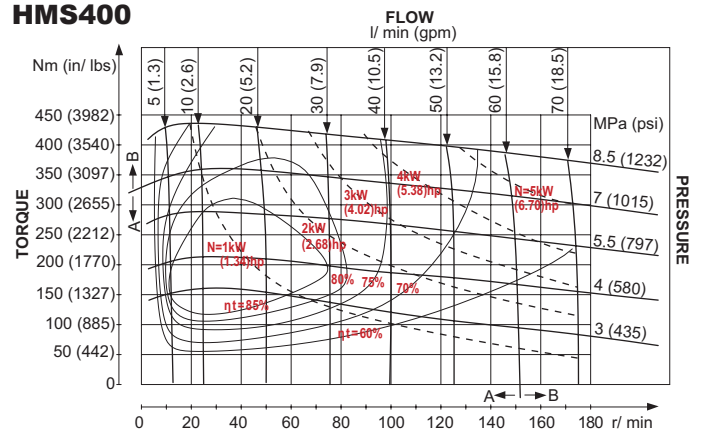
**HMS200**



**HMS250**



**HMS400**



## Ordering Information

### HMS - 050 - B2 K S

**HMS Series**  
Orbital  
Hydraulic  
Motor

**Displacement**  
(in<sup>3</sup>/rev.)

**050 200**  
**080 250**  
**160 400**

**Mounting Flange**

**B2=** SAE-A, 2 Bolt,  
Pilot 3.25"

**B4=** SAE-A, 4 Bolt,  
Pilot 1.75"

**Shaft**

**K=** 1" Straight Key  
x 1/4" Key

**S=** 1" Splined  
SAE 6B

**Port**

**S=** 7/8-14 UNF  
O-Ring

**P=** 1/2-14 NPTF

### STOCK MOTORS

- HMS - 050 - B4KP
- HMS - 050 - B2KS
- HMS - 080 - B2KP
- HMS - 160 - B2KP
- HMS - 160 - B4KS
- HMS - 200 - B2KS
- HMS - 250 - B2KP
- HMS - 400 - B2SS



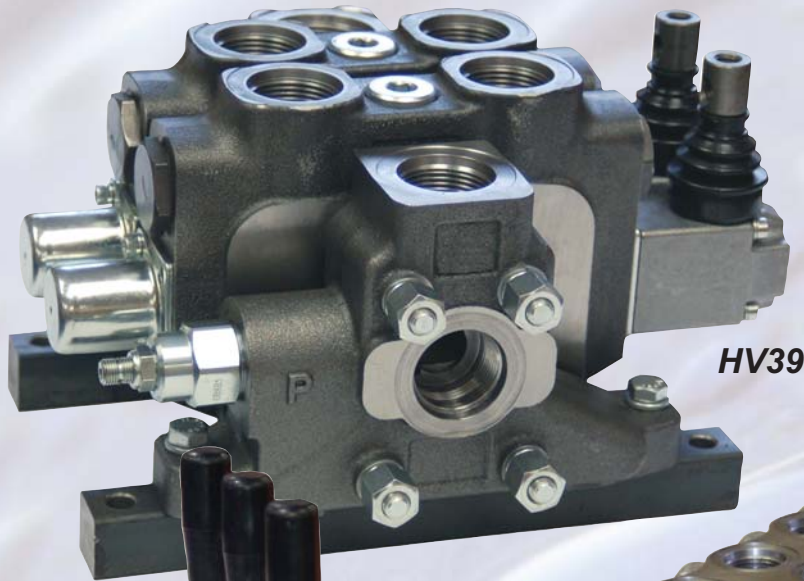


INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS



## HV SERIES

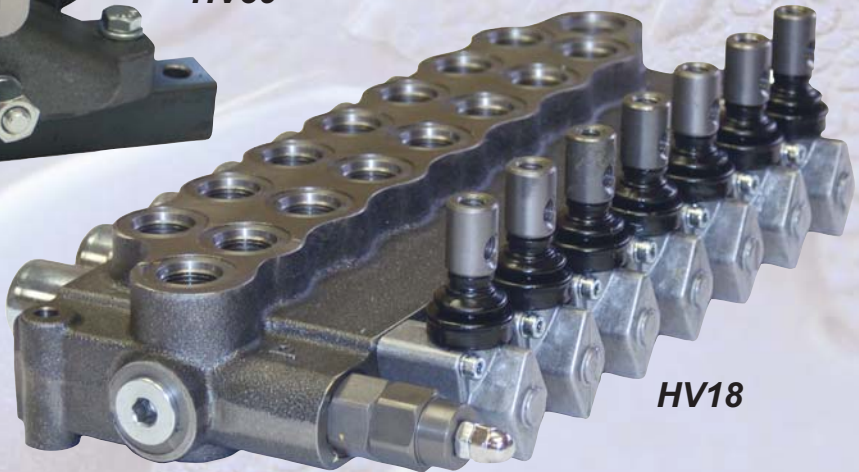
### Manual/ Proportional Directional Valves



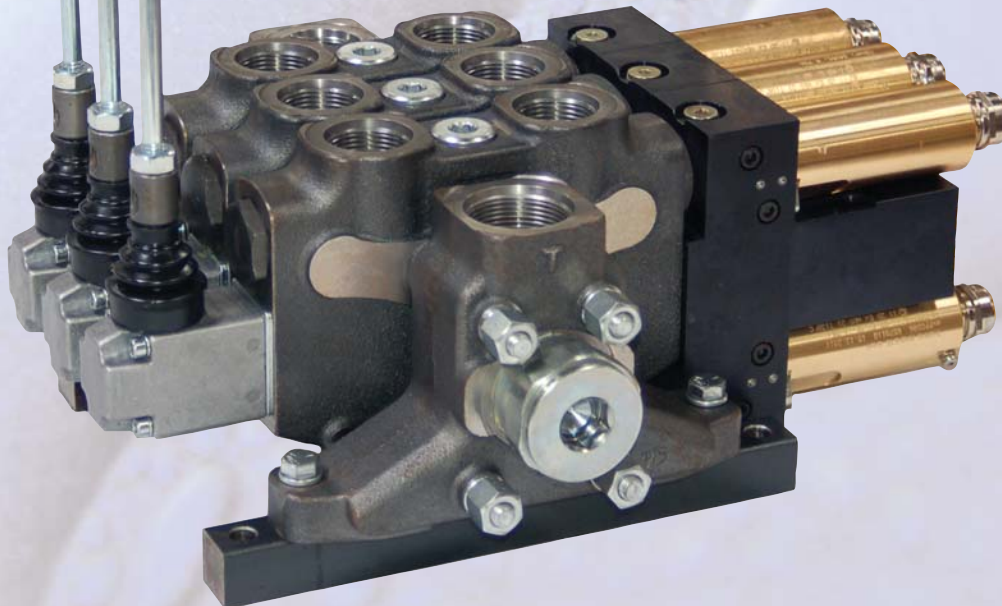
**HV39**



**HV9**



**HV18**



**EPHV39**  
Lever Actuated  
with Optional  
Proportional  
Control

## General Features

### Standard Material Specifications

- High Strength Cast Iron
- Spools are Hard Chrome Plated
- Steel Spring Caps
- Aluminum Lever Caps
- NBR Seals

### Standard Features

- 1/2" Single Spool Monoblock Valve
- Adjustable Relief Valve (500-5000 psi)
- Housed Knuckle Joint
- Parallel Circuit
- Single - Double Action



HV9-2C-8FS

HV9 Series is a single spool 9.25 gpm (35 lpm) capacity monoblock valve. Typical applications are: power packs, small cranes, agricultural machines and tractors.

## General Specifications

### Standard Working Conditions

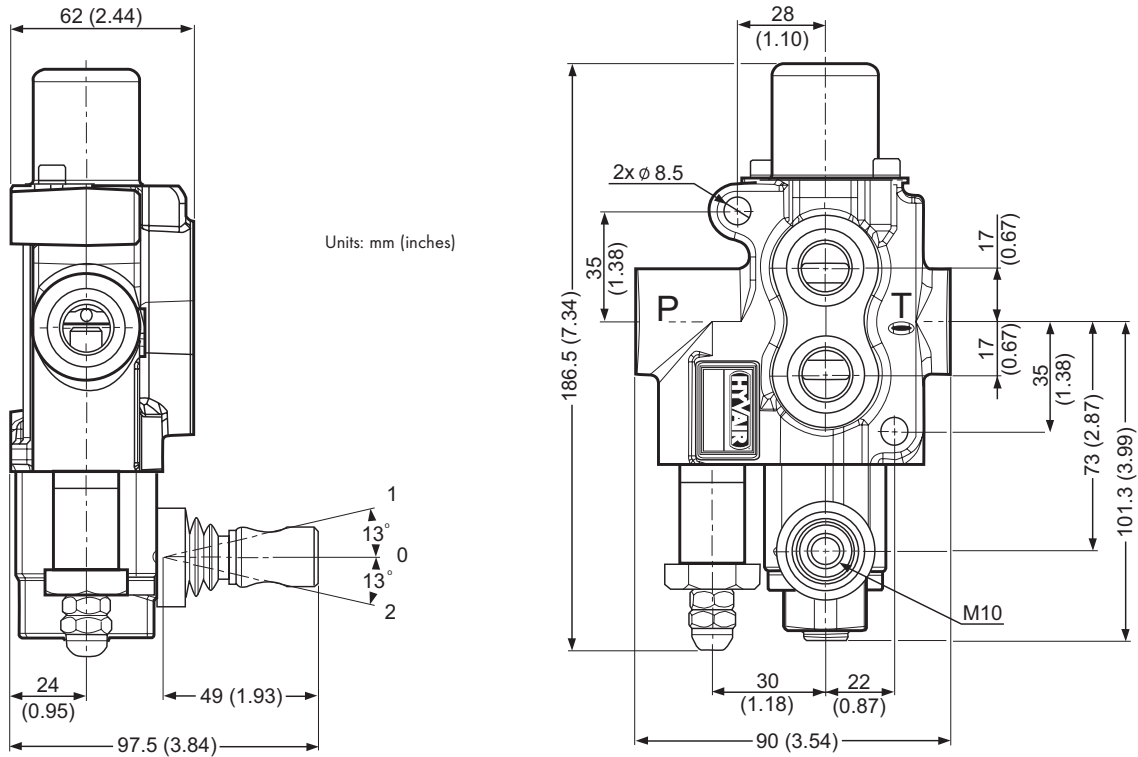
- Flow Rate.....9.25 gpm (35 lpm)
- Maximum Operating Pressure.....5000 psi (350 Bar)
- Maximum Back Pressure.....435 psi (30 Bar)
- Recommended Fluid Temperature Range.....-4° to 176°F (-20° to 80°C)
- Ambient Temperature Range.....-31° to 140°F (-35° to 60°C)
- Recommended Oil Viscosity Range.....32 cSt
- Internal Leakage (at 1450 psi (100 Bar); 32 cSt, 104°F (40°C)).....4 to 9 cc/ min
- Recommended Oil Filtering..... $\beta$  10 > 75
- Maximum Contamination Level.....Class 9 (NAS 1638)  
19/16 (ISO 4406)

### Technical Specifications

- Number of Spools.....1
- Weight.....5.3 lbs (2.4 kg)

## Dimensional Data

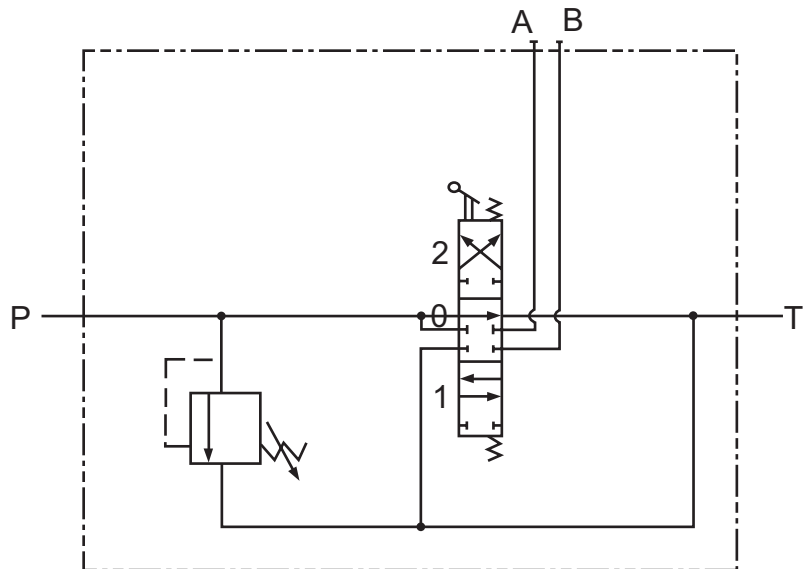
Units: mm (inches)



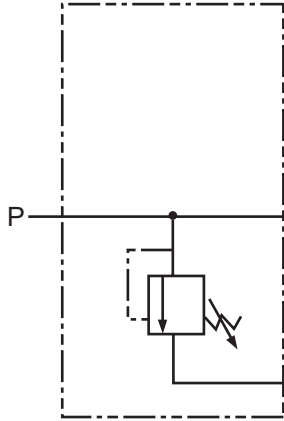
## Hydraulic Circuit

### Parallel Circuit

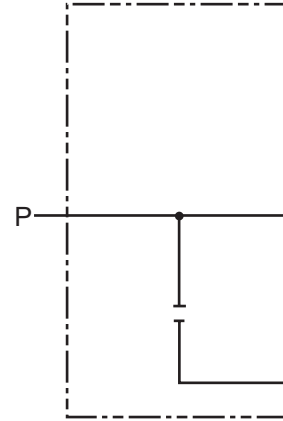
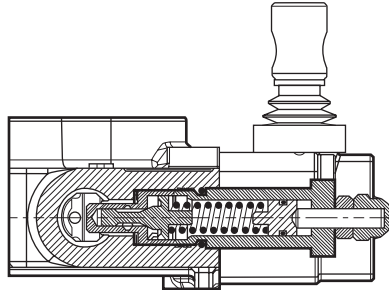
When the spool is operated, it intercepts the switch gallery by diverting the flow of oil to service port A or B. If two or more spools are actuated at the same time, the oil will power the service port that has the lower load by selecting the path with the least resistance; by throttling the spools, the flow of oil can be divided between two or more service ports.



### Main Relief Valve

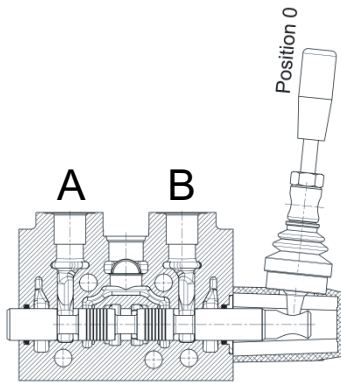


Inlet with Main Relief Valve



Inlet without Main Relief Valve

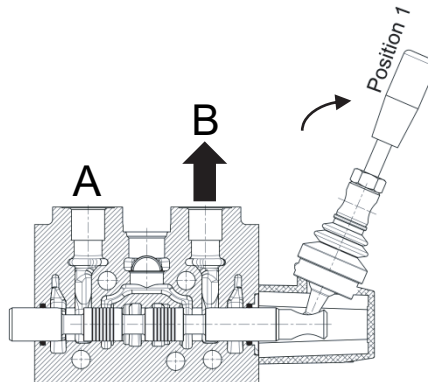
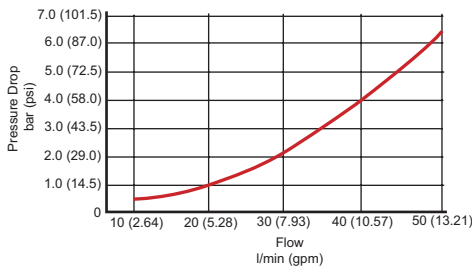
### Spool Control Position/ Pressure Drop Curves



Spool-neutral position:  
**POSITION 0**



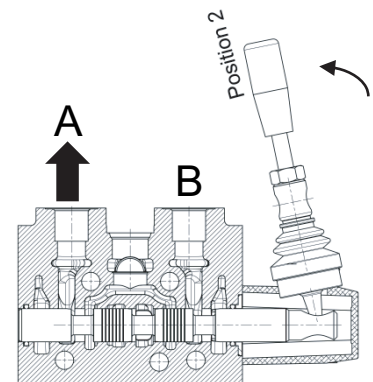
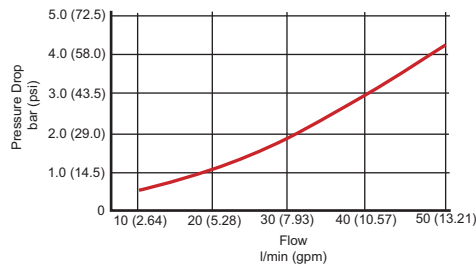
**P - T**



Spool-out position:  
**POSITION 1**



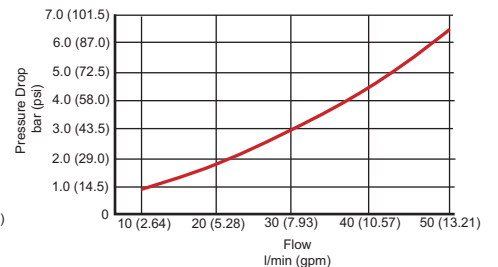
**P - A/B**



Spool-in position:  
**POSITION 2**

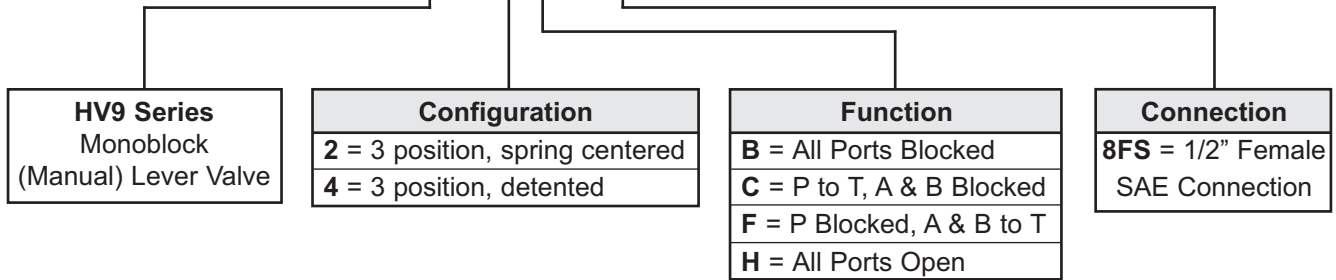


**A/B - T**



## Ordering Information

**HV9 - 2 C - 8FS**



Options
<b>HVHANDLE</b> = Handle
<b>HV9-DK</b> = Detent Kit



Units: mm (inches)





INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS



## HV SERIES

### Manual/ Proportional Directional Valves



**HV39**



**HV9**



**HV18**



**EPHV39**  
Lever Actuated  
with Optional  
Proportional  
Control

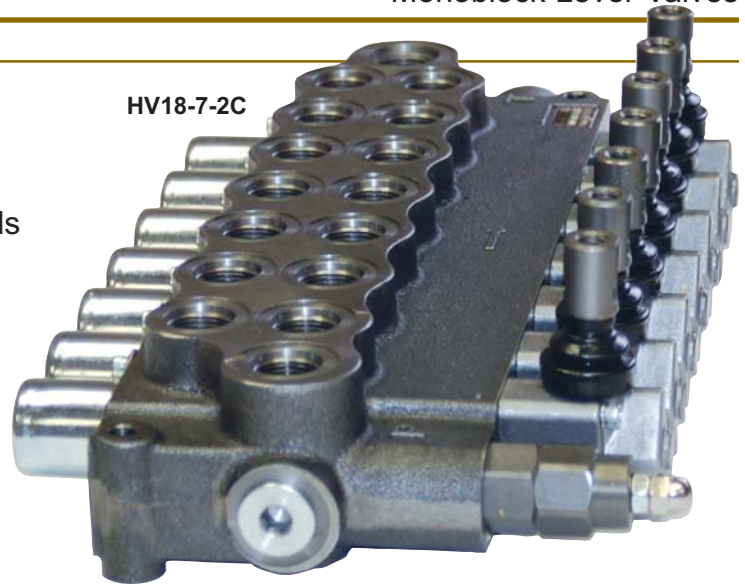
## General Features

### Standard Material Specifications

- High Strength Cast Iron
- Hard Chrome Plated Interchangeable Spools
- Steel Spring Caps
- Aluminum Lever Caps
- NBR Seals

### Standard Features

- 3/4" 1 to 7 Spool Monoblock Valve
- Adjustable Relief Valve (500-5000 psi)
- Housed Knuckle Joint
- Parallel Circuit
- Double Action
- Load Hold Check Valve



HV18 Series is a 18.5 gpm (70 lpm) monoblock valve available up to seven spools. Having the capacity of 18.5 gpm HV18 Series valves are used in larger machines and bigger pumps. Typical applications are: hydraulic presses, garbage and tipping trucks, hydraulic platforms, front-end loaders etc.

## General Specifications

### Standard Working Conditions

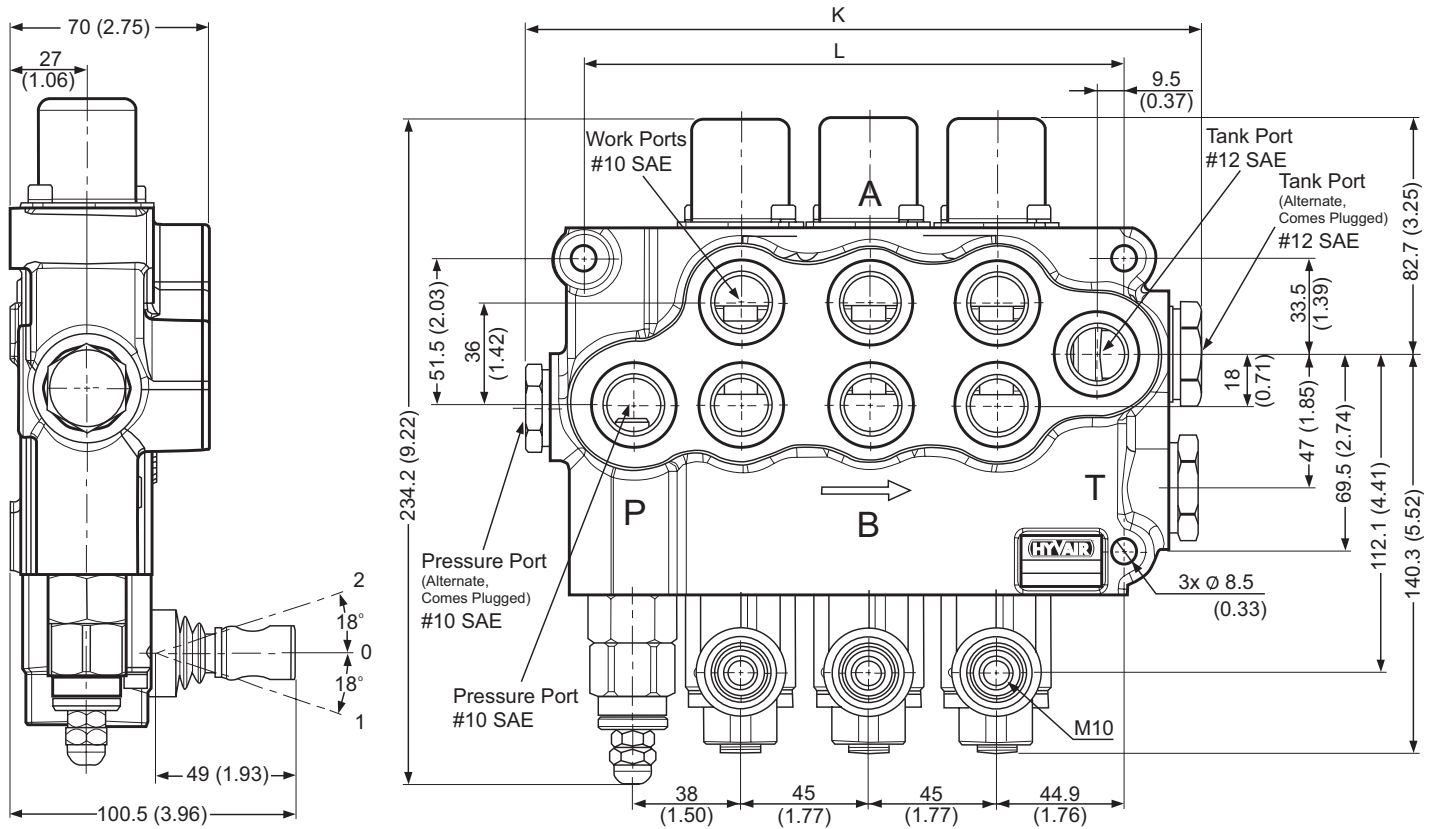
- Flow Rate.....18.5 gpm (70 lpm)
- Maximum Operating Pressure.....5000 psi (350 Bar)
- Maximum Back Pressure.....435 psi (30 Bar)
- Recommended Fluid Temperature Range.....-4° to 176°F (-20° to 80°C)
- Ambient Temperature Range.....-31° to 140°F (-35° to 60°C)
- Recommended Oil Viscosity Range..... 10 cSt to 75 cSt
- Internal Leakage (at 1450 psi (100 Bar); 32 cSt, 104°F (40°C)).....4 to 9 cc/ min
- Recommended Oil Filtering.....β 10 > 75
- Maximum Contamination Level.....Class 9 (NAS 1638)  
19/16 (ISO 4406)

### Technical Specifications

- Number of Spools.....1 - 7
- Weight.....Varies by number of spools selected (see following page)

## Dimensional Data

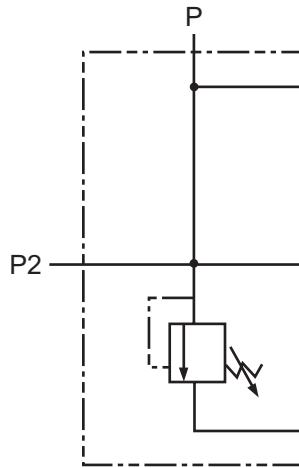
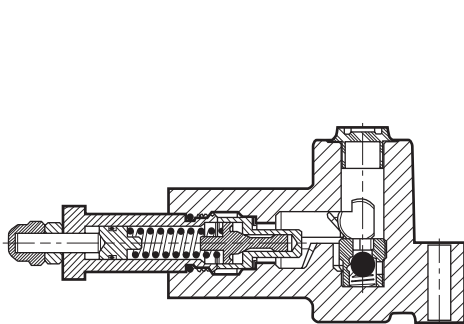
Units: mm (inches)



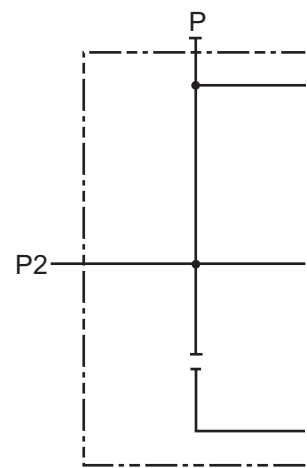
Type	L mm (inch)	K mm (inch)	Weight kg (lbs)
HV18 - 1	100 (3.94)	147.5 (5.81)	5.65 (12.4)
HV18 - 2	145 (5.71)	192.5 (7.58)	8.25 (18.2)
HV18 - 3	190 (7.48)	237.5 (9.35)	10.85 (23.9)
HV18 - 4	235 (9.25)	282.5 (11.12)	13.45 (29.6)
HV18 - 5	280 (11.02)	327.5 (12.89)	16.05 (35.3)
HV18 - 6	325 (12.80)	372.5 (14.67)	18.65 (41.0)
HV18 - 7	370 (14.57)	417.5 (16.44)	21.25 (46.5)



**Main Relief Valve**



Inlet with Main Relief Valve

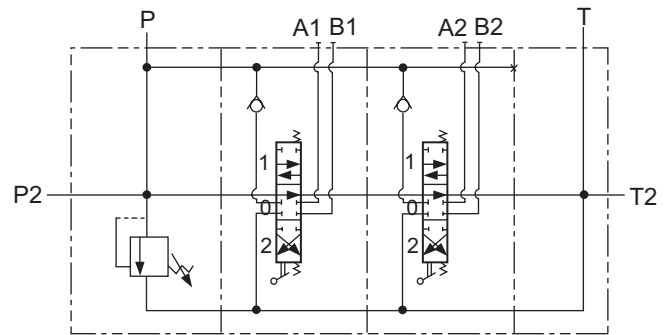


Inlet without Main Relief Valve

**Hydraulic Circuit**

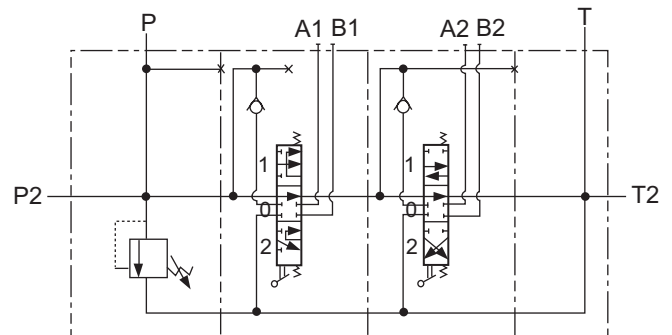
**Parallel Circuit**

When the spool is operated, it intercepts the switch gallery by diverting the flow of oil to service port A or B. If two or more spools are actuated at the same time, the oil will power the service port that has the lower load by selecting the path with the least resistance; by throttling the spools, the flow of oil can be divided between two or more service ports.

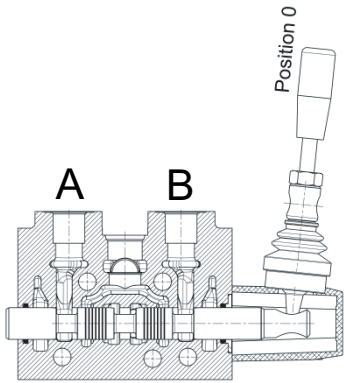


**Series Circuit**

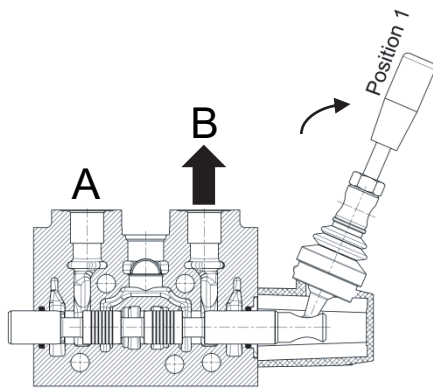
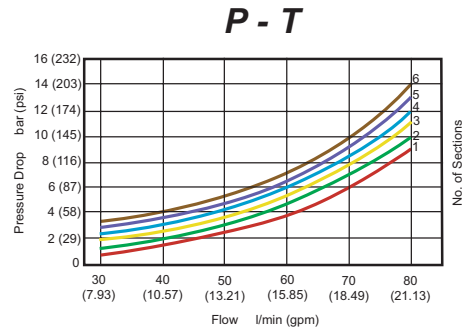
When the spool is operated, it intercepts the switch gallery by diverting the flow of oil to service port A or B. The oil that flows back from the actuator is carried to the switch gallery thus making it available to the service ports downstream from the series section. The pressure drop downstream is added to the pressure drop of the section itself.



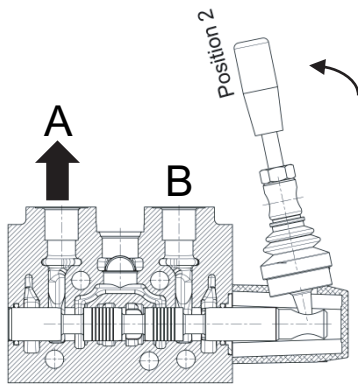
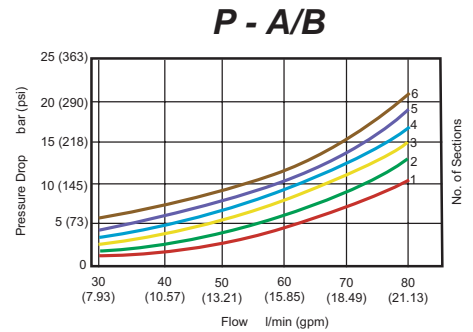
### Spool Control Position/ Pressure Drop Curves



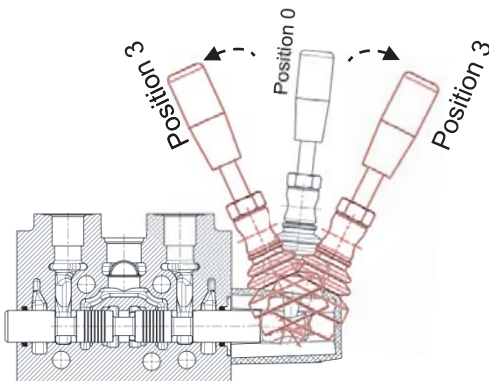
Spool-neutral position:  
**POSITION 0**



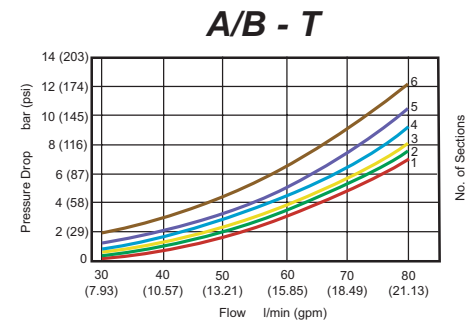
Spool-out position:  
**POSITION 1**



Spool-in position:  
**POSITION 2**

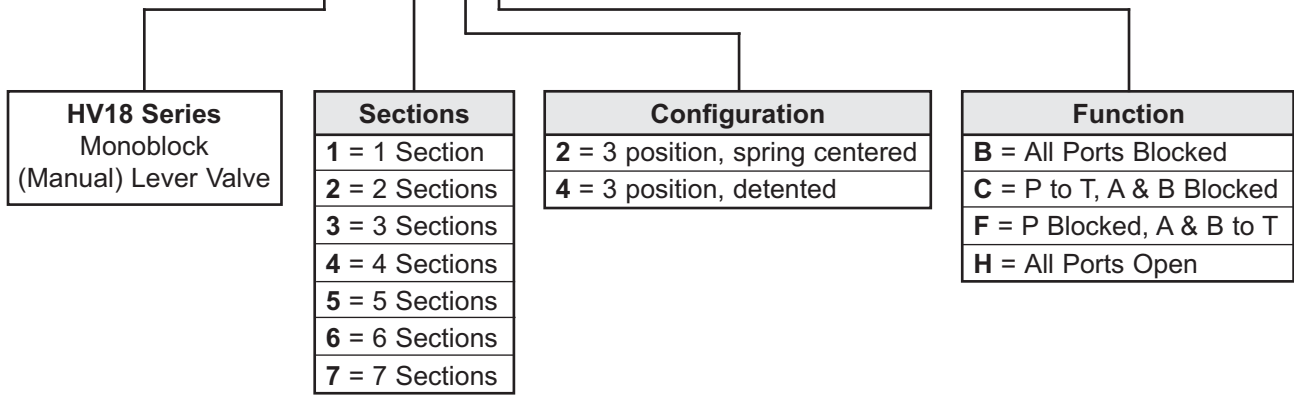


4 positions and 4th position  
can be spool-in or spool-out  
position optionally:  
**POSITION 3**



**Ordering Information**

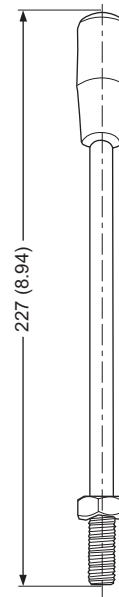
**HV18 - 4 - 2 C**



Options
HVHANDLE = Handle
HV18-DK = Detent Kit
HV18-PB = Power Beyond Sleeve
HV18-CCP = Closed Center Plug
HV18-IN-POR = Inlet Relief- Pilot Operated Relief



Units: mm (inches)





INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS



## HV SERIES

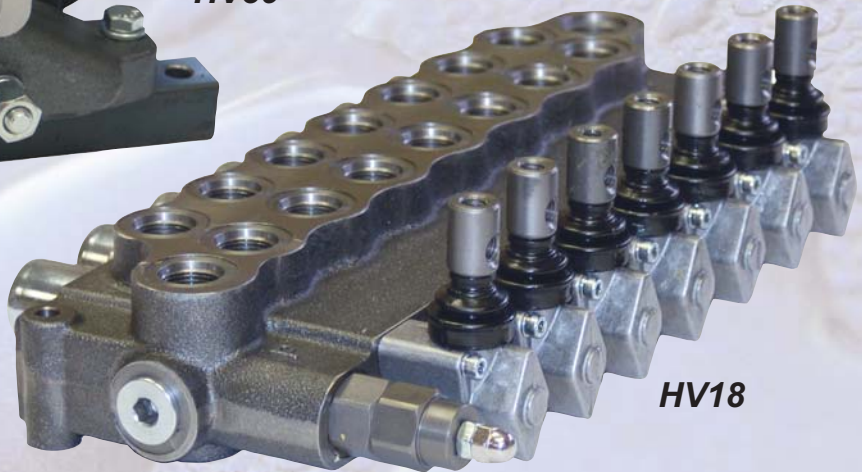
### Manual/ Proportional Directional Valves



**HV39**



**HV9**



**HV18**



**EPHV39**  
Lever Actuated  
with Optional  
Proportional  
Control

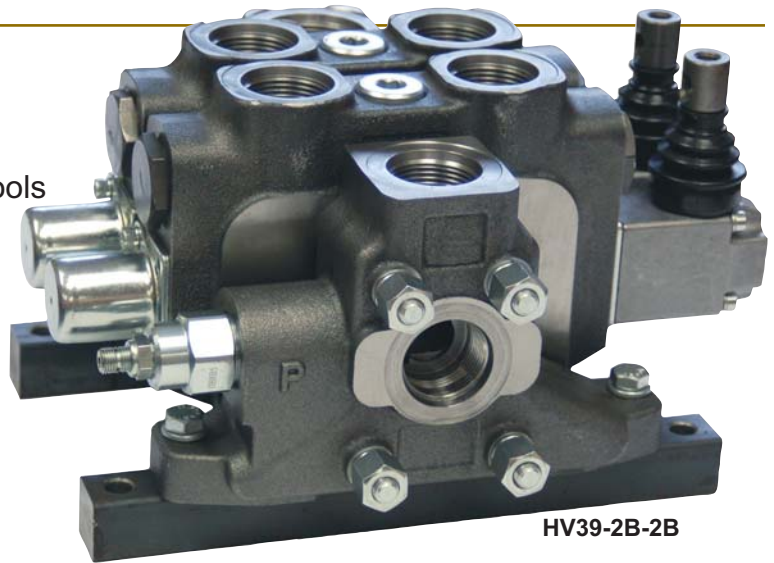
## General Features

### Standard Material Specifications

- High Strength Cast Iron
- Hard Chrome Plated Interchangeable Spools
- Steel Spring Caps
- Aluminum Lever Caps
- NBR Seals

### Standard Features

- 1" 1 to 8 Spool Monoblock Valve
- Adjustable Relief Valve (500-5000 psi)
- Housed Knuckle Joints
- Parallel Circuit
- Double Action
- Load Hold Check Valve in Each Section



HV39 is the largest valve in the HV Series with capacity of 39.6 gpm (150 lpm) flow rate and available up to eight spools. The HV39 Series serves as an ideal control device for applications such as: wheel loaders, back hoes, garbage trucks, roll-off trucks, hydraulic presses, mining machinery etc.

## General Specifications

### Standard Working Conditions

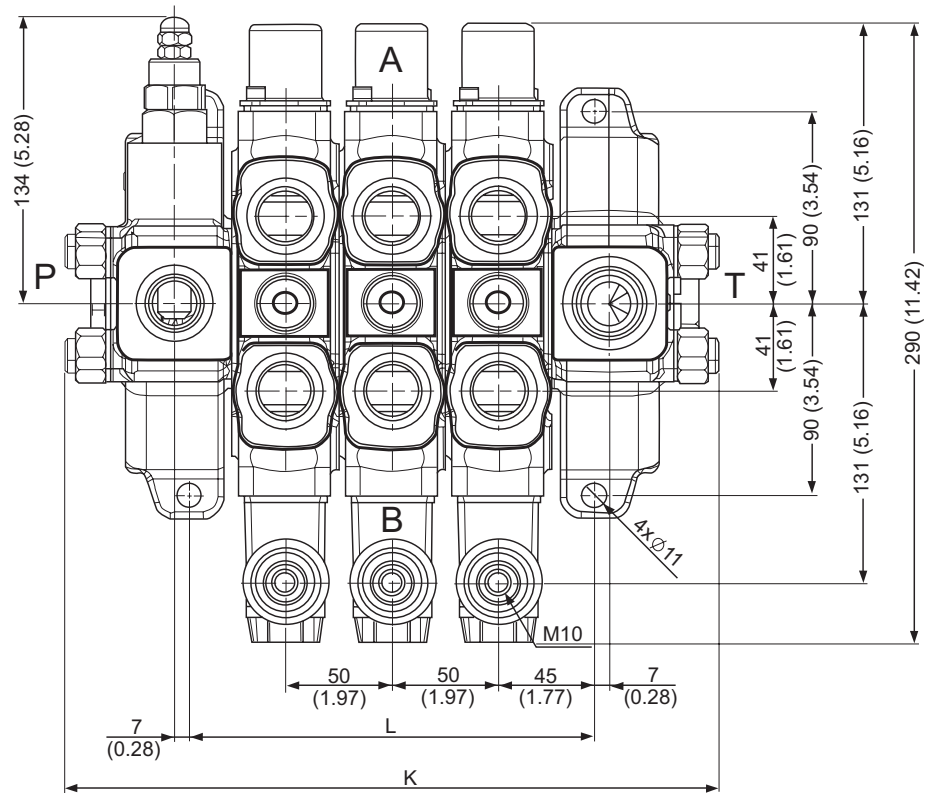
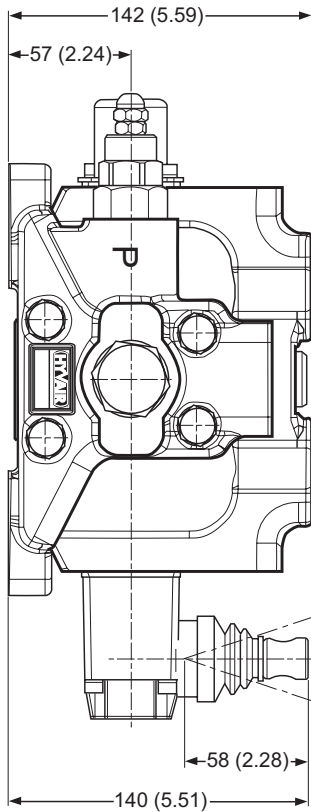
- Flow Rate.....39.6 gpm (150 lpm)
- Maximum Operating Pressure.....4640 psi (320 Bar)
- Maximum Back Pressure.....435 psi (30 Bar)
- Recommended Fluid Temperature Range.....-4° to 176°F (-20° to 80°C)
- Ambient Temperature Range.....-31° to 140°F (-35° to 60°C)
- Recommended Oil Viscosity Range.....10 cSt to 75 cSt
- Internal Leakage (at 1450 psi (100 Bar); 32 cSt, 104°F (40°C)).....4 to 9 cc/ min
- Recommended Oil Filtering.....β 10 > 75
- Tie Rod Tightening Torque.....30 Nm (265.5 in/ lbs)
- Maximum Contamination Level.....Class 9 (NAS 1638)  
19/16 (ISO 4406)

### Technical Specifications

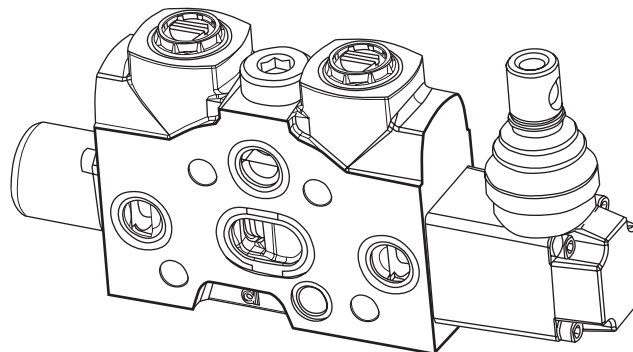
- Number of Spools.....1 - 8
- Weight.....Varies by number of spools selected (see following page)

### Dimensional Data

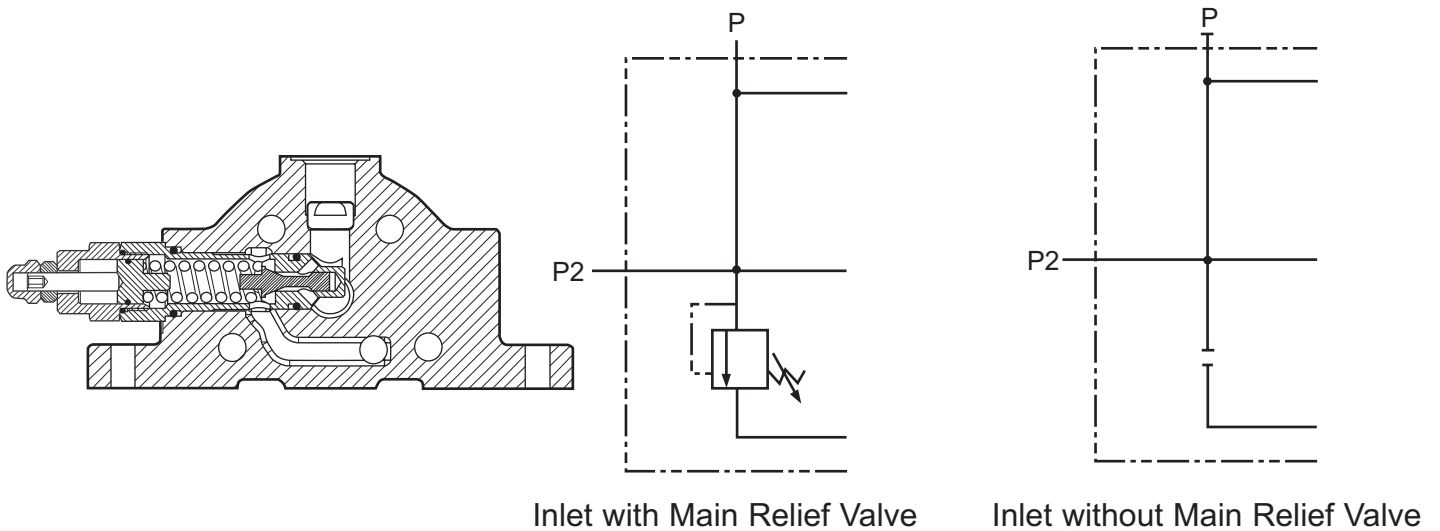
Units: mm (inches)



Type	L mm (inch)	K mm (inch)	Weight kg (lbs)
<b>HV39 - 1</b>	114 (4.49)	206 (8.11)	14.9 (32.8)
<b>HV39 - 2</b>	164 (6.46)	256 (10.08)	21.8 (48.0)
<b>HV39 - 3</b>	214 (8.43)	306 (12.05)	28.3 (62.3)
<b>HV39 - 4</b>	264 (10.39)	356 (14.02)	34.8 (76.6)
<b>HV39 - 5</b>	314 (12.36)	406 (15.98)	41.3 (90.9)
<b>HV39 - 6</b>	364 (14.33)	456 (17.95)	47.8 (105.2)
<b>HV39 - 7</b>	414 (16.30)	506 (19.92)	54.3 (119.5)
<b>HV39 - 8</b>	464 (18.27)	556 (21.89)	60.8 (133.8)



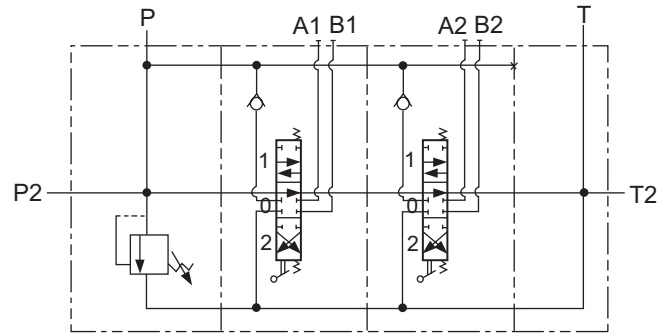
**Main Relief Valve**



**Hydraulic Circuit**

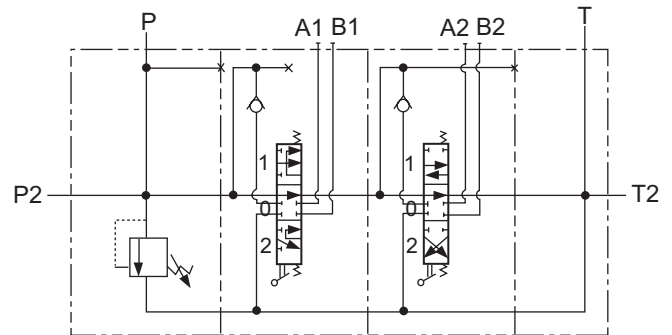
**Parallel Circuit**

When the spool is operated, it intercepts the switch gallery by diverting the flow of oil to service port A or B. If two or more spools are actuated at the same time, the oil will power the service port that has the lower load by selecting the path with the least resistance; by throttling the spools, the flow of oil can be divided between two or more service ports.

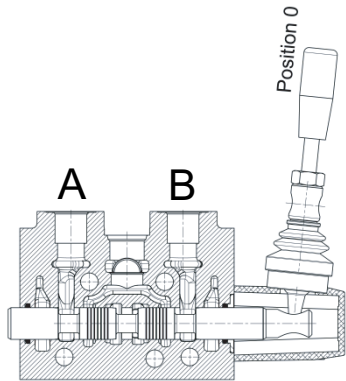


**Series Circuit**

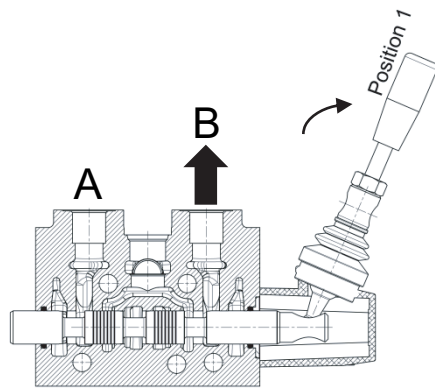
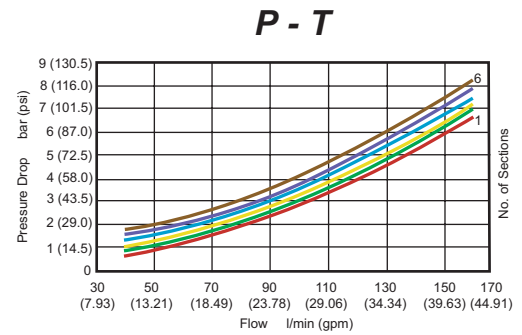
When the spool is operated, it intercepts the switch gallery by diverting the flow of oil to service port A or B. The oil that flows back from the actuator is carried to the switch gallery thus making it available to the service ports downstream from the series section. The pressure drop downstream is added to the pressure drop of the section itself.



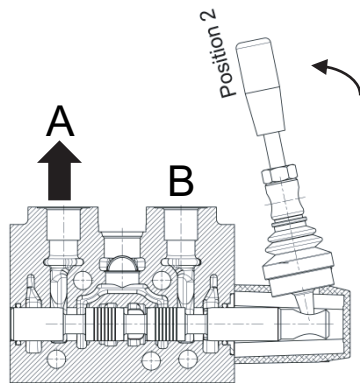
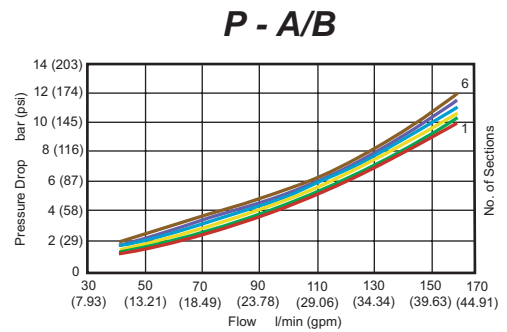
### Spool Control Position/ Pressure Drop Curves



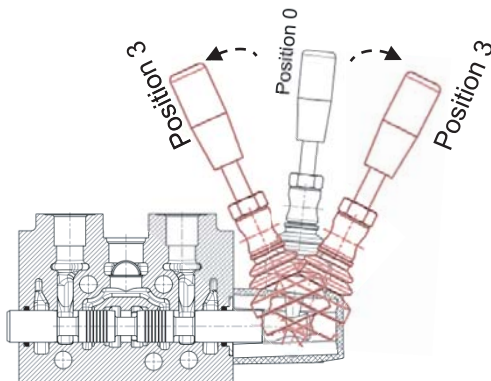
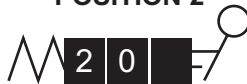
Spool-neutral position:  
**POSITION 0**



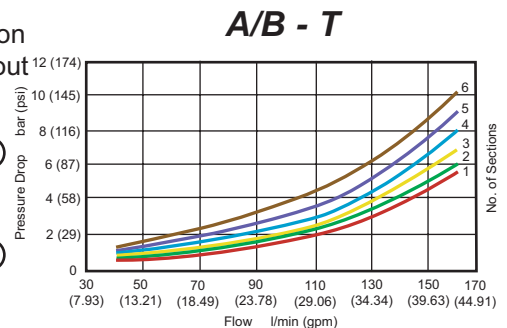
Spool-out position:  
**POSITION 1**



Spool-in position:  
**POSITION 2**

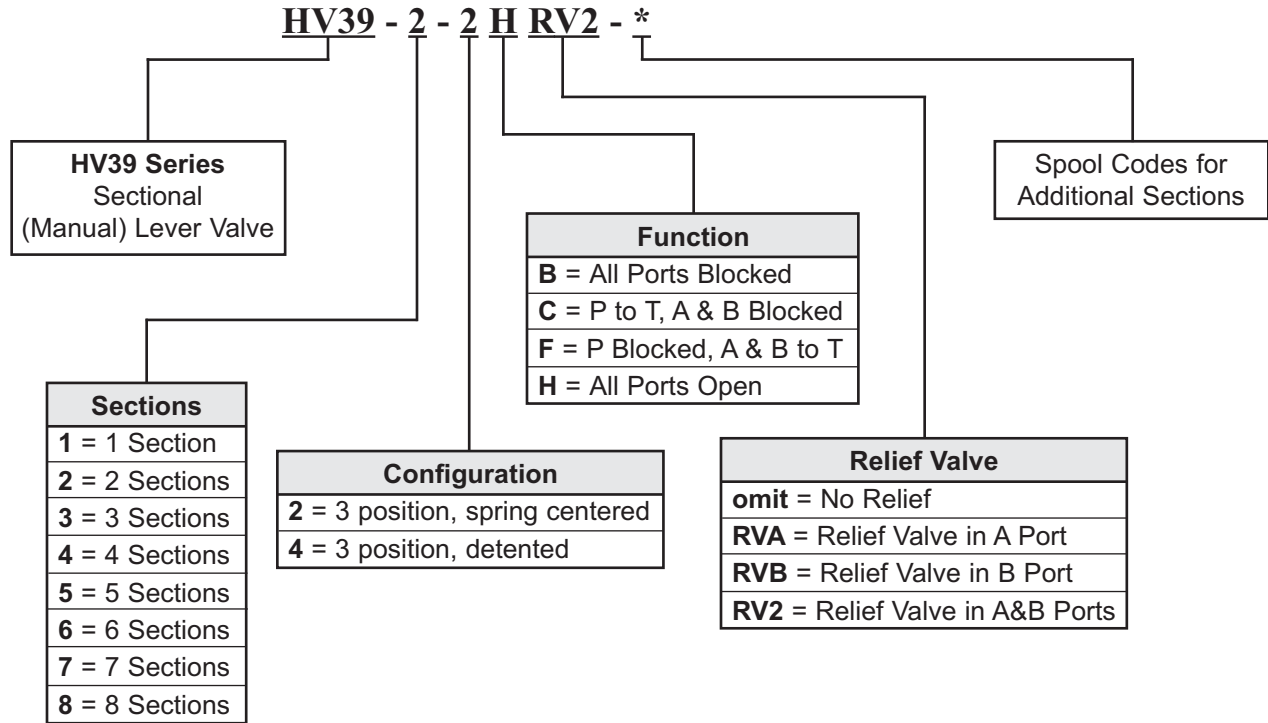


4 positions and 4th position  
can be spool-in or spool-out  
position optionally:  
**POSITION 3**





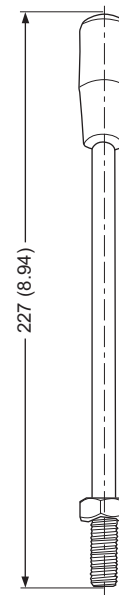
## Ordering Information



Options
<b>HVHANDLE</b> = Handle
<b>HV39-DK</b> = Detent Kit
<b>HV39-PB</b> = Power Beyond Sleeve
<b>HV39-CCP</b> = Closed Center Plug
<b>HV39-WP-DRV</b> = Work Port Direct Acting Relief Valve
<b>HV39-WP-ACV</b> = Work Port Anti Cavitation Valve
<b>HV39-INLET</b> = Inlet
<b>HV39-OUTLET</b> = Outlet
<b>HV39-IN-PLG</b> = Inlet Relief Plug
<b>HV39-IN-POR</b> = Inlet Relief- Pilot Operated Relief
<b>HV39-TC1, 2 &amp; 3</b> = Tie Rod Kit (1-3 Spools)
<b>HV39-TC4, 5 &amp; 6</b> = Tie Rod Kit (4-6 Spools)
<b>HV39-TC7 &amp; 8</b> = Tie Rod Kit (7 & 8 Spools)



Units: mm (inches)





INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS



## ***MD03 & MD05 SERIES***

### **Hyvair Standard Manifolds**



*MD03-2S-6AB-8PT*



*MD05-4S-8AB-12PT*

## Features

1. **Intelligent Design:** Manifolds share same end mounting dimensions allowing manifolds to be joined together.
2. **Space Savings:** Manifold mounted circuits greatly reduce space requirements from in line mounted valves.
3. **Multiple Port Sizes:** Eliminates adapter fittings.

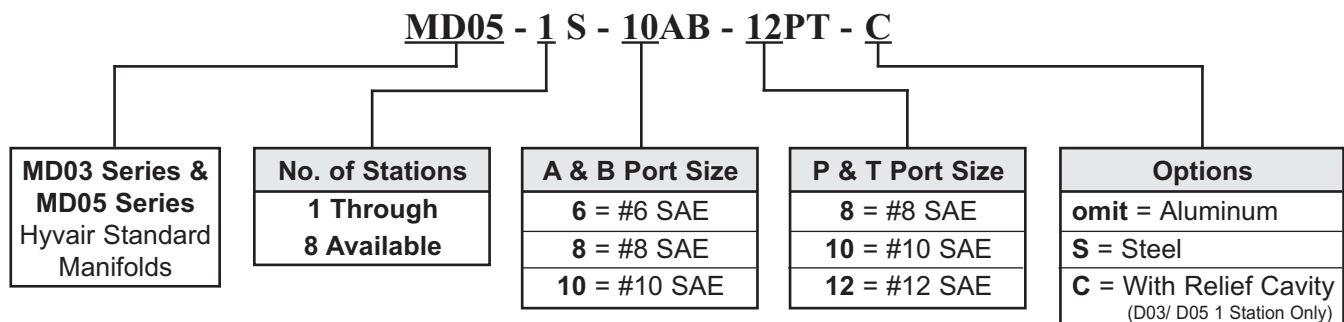


**1 Station Manifolds with Relief**

## Specifications

Size	D03	D05	
<b>Mounting Surfaces: General Patterns</b>			
<b>Model Number</b>	Std. A&B Ports	MD03-*S-6AB-8PT	MD05-*S-8AB-12PT
	Big A&B Ports	MD03-*S-8AB-10PT	MD05-*S-10AB-12PT
	Steel	MD03-*S-8AB-12PT-S	MD05-*S-10AB-12PT-S
<b>Mounting Surface</b>	NFPA	T3.5.1.MR1-F1984-03	T3.5.1.MR1-F1984-D05
	ISO	ISO 4401-03	ISO 4401-05
<b>Nominal Flow Rates</b>	5 gpm (19 lpm)	12 gpm (45 lpm)	
<b>Material</b>	Aluminum or Steel		
<b>Maximum Pressure</b>	Aluminum 3000 psi (210 bar) Steel 5000 psi (350 bar)		
<b>Recommended Fluids</b>	Petroleum Based Fluids- ISO VG32-68, Phosphate Ester, Most Vegetable Oils, Water Based Fluids to 40% Water		

## Ordering Information





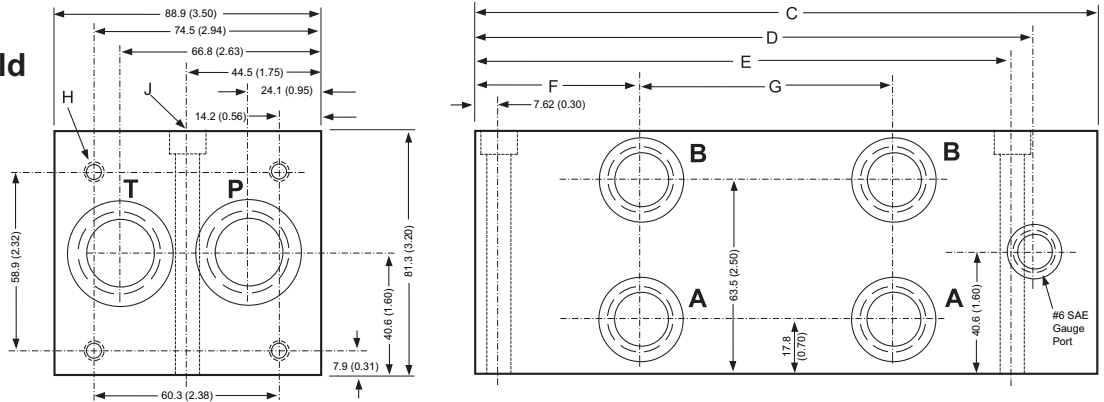
# MD03 & MD05 Series

Hyvair Standard Manifolds- Parallel Circuit

## Dimensional Data

Units: mm/ (Inch)

### MD03 & MD05 Manifold



Model	No. of Stations	A & B Ports	P & T Ports	C	D	E	F	G	H	J
MD03-1S-6AB-8PT	1			105 (4.14)	85 (3.34)	64 (2.50)				
MD03-2S-6AB-8PT	2			160 (6.27)	139 (5.47)	118 (4.63)				
MD03-3S-6AB-8PT	3			213 (8.40)	193 (7.60)	172 (6.76)				
MD03-4S-6AB-8PT	4	#6 SAE, (9/16-18)	#8SAE (3/4-16)	267 (10.53)	248 (9.73)	226 (8.89)	38.6 (1.52)	54.1 (2.13)	5/16-18 UNC	Accepts 5/16- 18 SHCS X 3.25" Min. Length
MD03-5S-6AB-8PT	5			322 (12.66)	301 (11.86)	280 (11.02)				
MD03-6S-6AB-8PT	6			376 (14.79)	356 (14.00)	334 (13.15)				
MD03-7S-6AB-8PT	7			430 (16.92)	409 (16.12)	388 (15.28)				
MD03-8S-6AB-8PT	8			484 (19.05)	464 (18.25)	442 (17.41)				
MD03-1S-8AB-10PT-C	1			112 (4.41)	85 (3.34)	72 (2.83)				
MD03-1S-8AB-10PT	1			105 (4.14)	85 (3.34)	64 (2.50)				
MD03-2S-8AB-10PT	2			160 (6.27)	139 (5.47)	118 (4.63)				
MD03-3S-8AB-10PT	3			213 (8.40)	193 (7.60)	172 (6.76)				
MD03-4S-8AB-10PT	4	#8SAE (3/4-16)	#10 SAE (7/8-14)	267 (10.53)	248 (9.73)	226 (8.89)	38.6 (1.52)	54.1 (2.13)	5/16-18 UNC	Accepts 5/16- 18 SHCS X 3.25" Min. Length
MD03-5S-8AB-10PT	5			322 (12.66)	301 (11.86)	280 (11.02)				
MD03-6S-8AB-10PT	6			376 (14.79)	356 (14.00)	334 (13.15)				
MD03-7S-8AB-10PT	7			430 (16.92)	409 (16.12)	388 (15.28)				
MD03-8S-8AB-10PT	8			484 (19.05)	464 (18.25)	442 (17.41)				
MD03-1S-8AB-12PT-S	1			105 (4.14)	85 (3.34)	64 (2.50)				
MD03-2S-8AB-12PT-S	2			160 (6.27)	139 (5.47)	118 (4.63)				
MD03-3S-8AB-12PT-S	3			213 (8.40)	193 (7.60)	172 (6.76)				
MD03-4S-8AB-12PT-S	4	#8SAE (3/4-16)	#12 SAE (1-1/16-12)	267 (10.53)	248 (9.73)	226 (8.89)	38.6 (1.52)	54.1 (2.13)	5/16-18 UNC	Accepts 5/16- 18 SHCS X 3.25" Min. Length
MD03-5S-8AB-12PT-S	5			322 (12.66)	301 (11.86)	280 (11.02)				
MD03-6S-8AB-12PT-S	6			376 (14.79)	356 (14.00)	334 (13.15)				
MD03-7S-8AB-12PT-S	7			430 (16.92)	409 (16.12)	388 (15.28)				
MD03-8S-8AB-12PT-S	8			484 (19.05)	464 (18.25)	442 (17.41)				
MD05-1S-8AB-12PT	1			126 (4.95)	103 (4.05)	98 (3.85)				
MD05-2S-8AB-12PT	2			208 (8.20)	185 (7.30)	180 (7.10)				
MD05-3S-8AB-12PT	3			291 (11.45)	268 (10.55)	263 (10.35)				
MD05-4S-8AB-12PT	4	#8SAE (3/4-16)	#12 SAE (1-1/16-12)	373 (14.70)	351 (13.80)	345 (13.60)	54.6 (2.15)	82.6 (3.25)	5/16-18 UNC	Accepts 5/16- 18 SHCS X 3.25" Min. Length
MD05-5S-8AB-12PT	5			456 (17.95)	433 (17.05)	428 (16.85)				
MD05-6S-8AB-12PT	6			538 (21.10)	516 (20.30)	511 (20.10)				
MD05-8S-8AB-12PT	8			704 (27.70)	681 (26.80)	676 (26.60)				
MD05-1S-10AB-12PT-C	1			150 (5.90)	103 (4.05)	91 (3.58)				
MD05-1S-10AB-12PT	1			126 (4.95)	103 (4.05)	98 (3.85)				
MD05-2S-10AB-12PT	2			208 (8.20)	185 (7.30)	180 (7.10)				
MD05-3S-10AB-12PT	3			291 (11.45)	268 (10.55)	263 (10.35)				
MD05-4S-10AB-12PT	4	#10 SAE (7/8-14)	#12 SAE (1-1/16-12)	373 (14.70)	351 (13.80)	345 (13.60)	54.6 (2.15)	82.6 (3.25)	5/16-18 UNC	Accepts 5/16- 18 SHCS X 3.25" Min. Length
MD05-5S-10AB-12PT	5			456 (17.95)	433 (17.05)	428 (16.85)				
MD05-6S-10AB-12PT	6			538 (21.10)	516 (20.30)	511 (20.10)				
MD05-1S-10AB-12PT-S	1			126 (4.95)	103 (4.05)	98 (3.85)				
MD05-2S-10AB-12PT-S	2			208 (8.20)	185 (7.30)	180 (7.10)				
MD05-3S-10AB-12PT-S	3			291 (11.45)	268 (10.55)	263 (10.35)				
MD05-4S-10AB-12PT-S	4	#10 SAE (7/8-14)	#12 SAE (1-1/16-12)	373 (14.70)	351 (13.80)	345 (13.60)	54.6 (2.15)	82.6 (3.25)	5/16-18 UNC	Accepts 5/16- 18 SHCS X 3.25" Min. Length
MD05-5S-10AB-12PT-S	5			456 (17.95)	433 (17.05)	428 (16.85)				
MD05-6S-10AB-12PT-S	6			538 (21.10)	516 (20.30)	511 (20.10)				



INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS



## AD03 & AD05 SERIES

### Industry Standard Manifolds



AD03-P-03-2SC



AD05-P-03-2SC

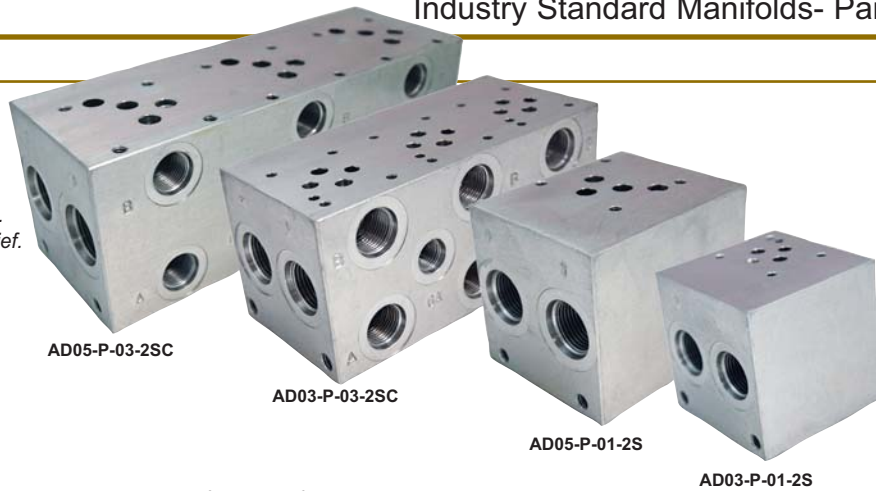


# AD03 & AD05 Series

Industry Standard Manifolds- Parallel Circuit

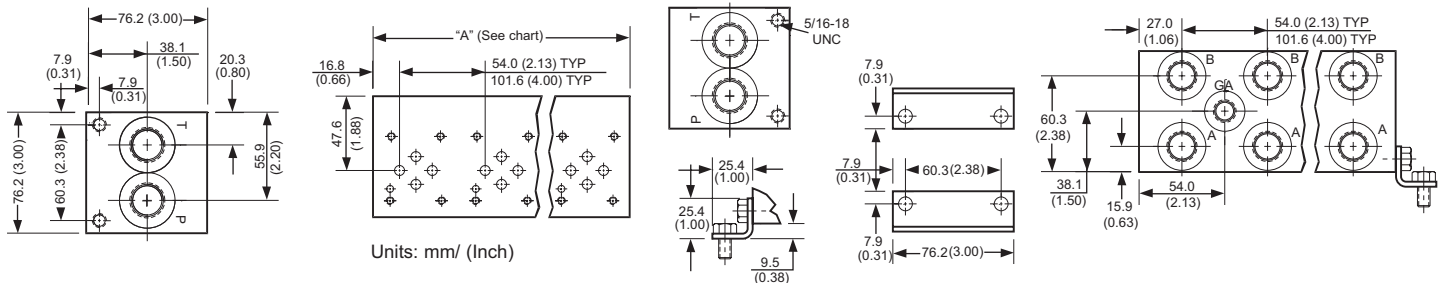
## Features

1. Aluminum Manifolds
2. Parallel Circuit
3. SAE Port with Relief Cavity  
*Relief Cavity Not Available for 1 Station.  
See Hyvair Standard 1 Station with Relief.*



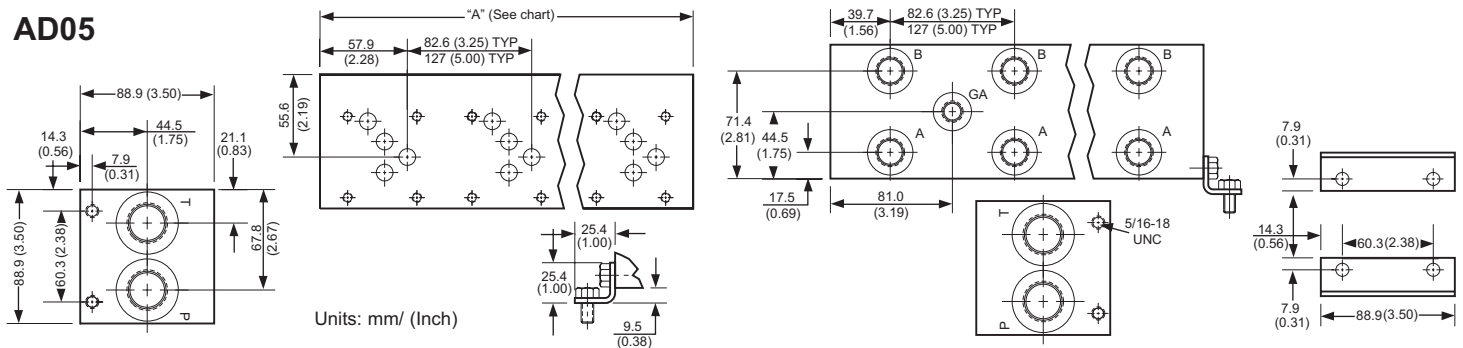
## Dimensional Data

### AD03



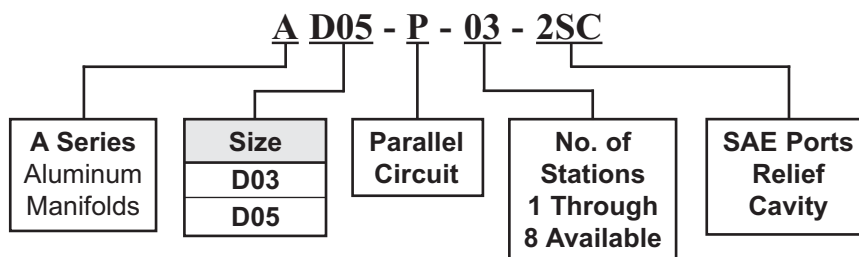
No. of Stations	01	02	03	04	05	06	07	08
"A" Length	54 (2.13)	108 (4.25)	162.1 (6.38)	215.9 (8.50)	270 (10.63)	323.9 (12.75)	378 (14.88)	431.8 (17.0)
Approx. Weight kg (lb)	1 (3)	2 (4)	3 (6)	4 (8)	4 (9)	5 (11)	5 (12)	6 (14)

### AD05



No. of Stations	01	02	03	04	05	06	07	08
"A" Length	82.6 (3.25)	165.1 (6.50)	247.7 (9.75)	330.2 (13.00)	412.8 (16.25)	495.3 (19.50)	577.9 (22.75)	660.4 (26.0)
Approx. Weight kg (lb)	2 (4)	4 (8)	5 (11)	7 (14)	8 (17)	10 (21)	11 (24)	12 (27)

## Ordering Information



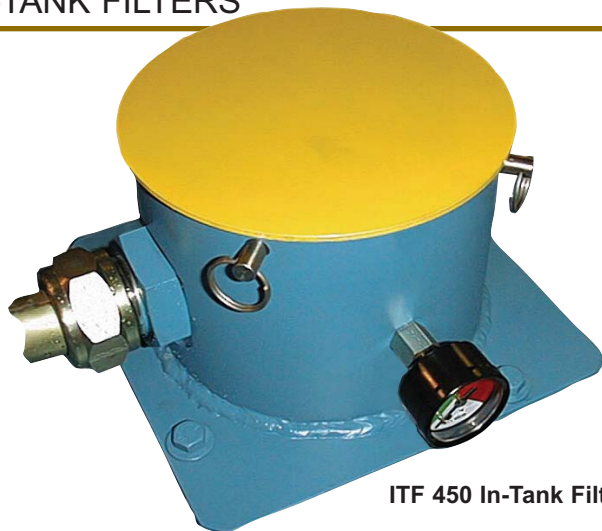
*Relief Cavity Not Available for 1 Station.  
See Hyvair Standard 1 Station with Relief.*

# FILTRATION

## IN-TANK FILTERS



1-1/4" thru 2"



ITF 450 In-Tank Filter

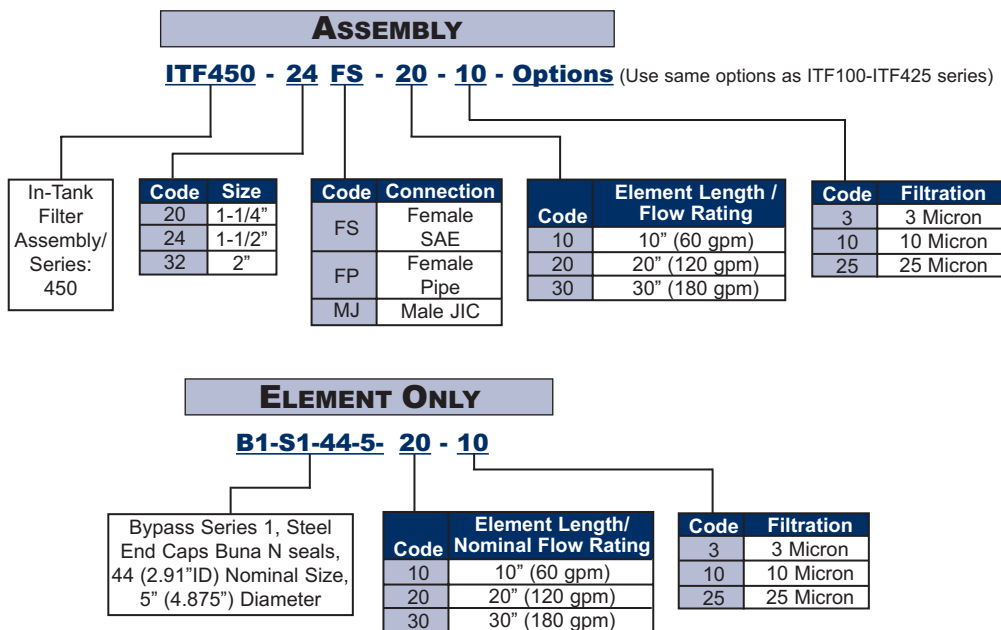
### Features

- Easy Filter Replacement:** Elements replaced without disrupting plumbing, no tools required for changing elements.
- No Line Drainage:** In tank filter system reduces wasted oil.
- Less Waste:** Only the element must be discarded.  
**Full Flow By-pass:** Large reusable bypass check can full flow without excessive pressure drop.  
**Multiple Ports:** Two return connections, #24 female
- SAE, supplied standard but NPT and JIC connections may also be supplied. Two #6 female SAE gauge/ pressure switch ports supplied standard.

### Specifications

<b>Maximum Pressures</b>	Filter Head	400 psi (28 bar) Minimum Burst
	Element	150 psi Differential Collapse w/ 50 psi Reusable Bypass Valve
<b>Temperature</b>	-15° F to +230° F (Viscosities Permitting)	
<b>Recommended Fluids</b>	Petroleum Based Fluids- ISO VG32-68, Phosphate Ester, Most Vegetable Oils, Water Based Fluids to 40% Water	
<b>Materials</b>	Filter Housing	Steel
	Filter Element	Absolute- Inorganic Microfiber w/ Support

### Ordering Information



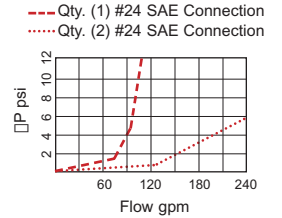
### FlowRatings/ Common Models

Thread	Model Number	Filter Rating (microns) □ > 75	Model Number (Element Only)	Element Flow* (□P= 5 psi)	Normal Tank Size
(2) Female #24 SAE Ports  (1-7/8"-12)	ITF450-24FS-10-3	3□ Absolute	10-3	30	100+ gallons
	ITF450-24FS-10-10	10□ Absolute	10-10	70	
	ITF450-24FS-10-25	25□ Absolute	10-25	100	
	ITF450-24FS-20-3	3□ Absolute	20-3	95	
	ITF450-24FS-20-10	10□ Absolute	20-10	160	
	ITF450-24FS-20-25	25□ Absolute	20-25	190	
	ITF450-24FS-30-3	3□ Absolute	30-3	130	
	ITF450-24FS-30-10	10□ Absolute	30-10	240	
	ITF450-24FS-30-25	25□ Absolute	30-25	270	

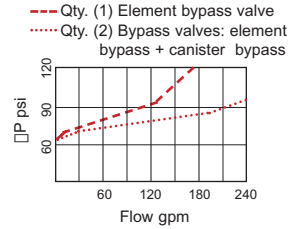
\*Element GPM with viscosity of 150 SUS, Specific Gravity of .88 (ISO 32 Oil at 100° F).  
Housing rating with (2) #24 SAE connections: 160 GPM @ □P= 10 psi  
Total pressure drop= □P Housing + □P Element

1-1/4" thru 2"

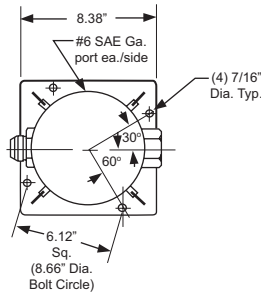
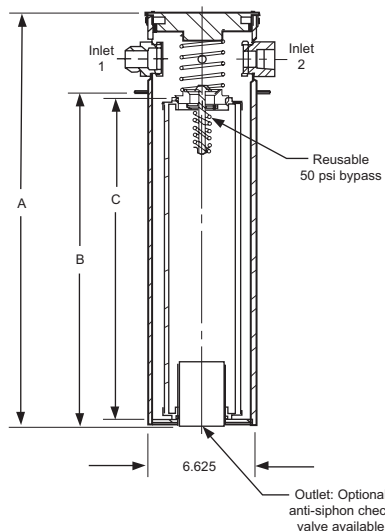
□P Housing\*



□P Bypass Valve\*



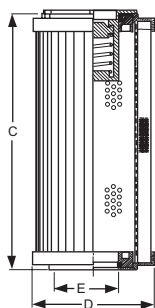
### Dimensional Data



ITF450 In Tank Filter

Filter - Length	A	B (Insert Length)	C
F450-10	15.75	10.75	10
F450-20	25.75	20.75	20
F450-30	35.75	30.75	30

Units: Inches



ITF450 In Tank Filter Elements

Element -Length	C	D	E	Absolute Filter Area (Sq. In.)
B1-S1-44-5-10	10	4.875	2.91	1230
B1-S1-44-5-20	20	4.875	2.91	2460
B1-S1-44-5-30	30	4.875	2.91	3690

Units: Inches







INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS



***ITF SERIES***

## **In-Tank Filters**



ITF425-24FS

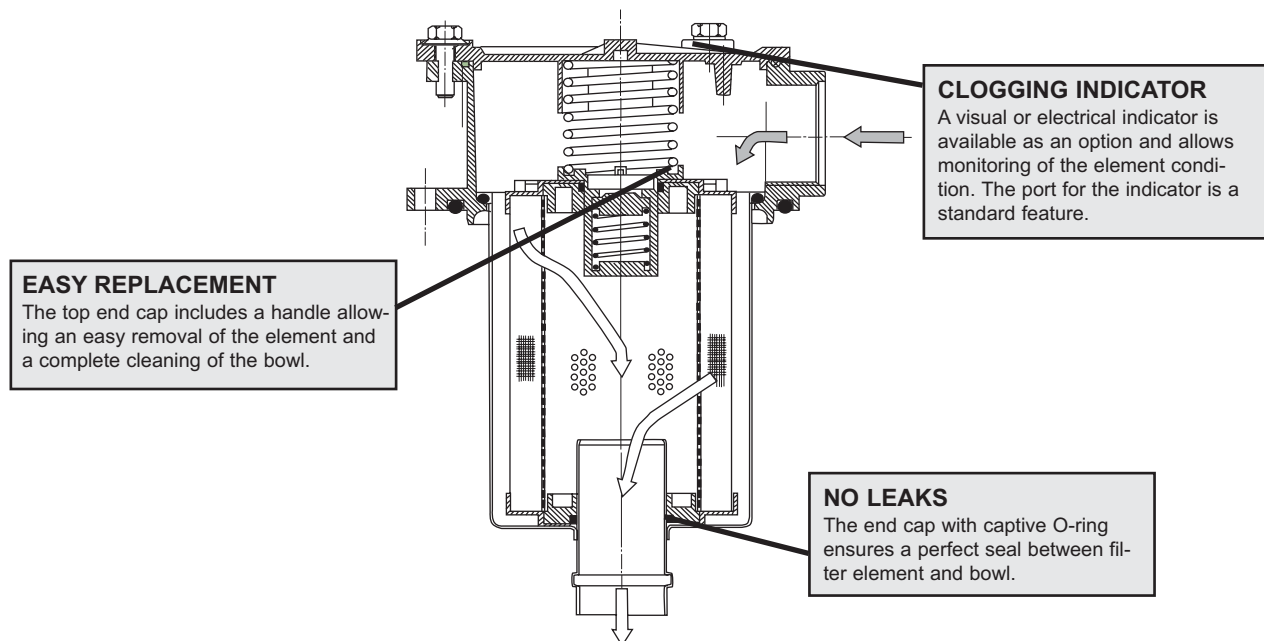
## Features

- **Easy Filer Replacement:**  
Elements Replaced Without Disrupting Plumbing
- **No Line Drainage:** In Tank Filter System Reduces Wasted Oil
- **Top Removable Bowl:**  
Filter Bowl Can Be Removed From the Top to Clean any Contaminates When Replacing Elements
- **Less Waste:** Only the Element Must Be Discarded



## Specifications

<b>Maximum Pressures</b>	Filter Head	145 psi (10 bar) Minimum Burst with 25 psi By-pass Valve
	Element	Absolute- 145 psi Differential Collapse Nominal- 45 psi Differential Collapse
<b>Temperature</b>	-15° F to +230° F (Viscosities Permitting)	
<b>Recommended Fluids</b>	Petroleum Based Fluids- ISO VG32-68, Phosphate Ester, Most Vegetable Oils, Water Based Fluids to 40% Water	
<b>Materials</b>	Filter Housing	Aluminum
	Filter Element	Absolute- Inorganic Microfiber w/ Support Nominal- Resin Impregnated Paper



**Ordering Information**

**ELEMENT ONLY**

**F250 - 10M NPE**

For In-Tank Filter/ Series: 100, 200, 250, 400, 425

Code	Filtration
03M	3 Micron
10M	10 Micron
25M	25 Micron

Code	Element Type
AME	Absolute-Micro Fiber Element
NPE	Nominal-Paper Element

**ASSEMBLY**

**ITF250 - 16 FS - 10M NPE - Options**

In-Tank Filter Assembly/ Series: 100, 200, 250, 400, 425

Code	Size
8	1/2"
12	3/4"
16	1"
20	1-1/4"
24	1-1/2"

Code	Connection
FS	Female SAE
FP	Female Pipe

Code	Filtration
03M	3 Micron
10M	10 Micron
25M	25 Micron

Code	Element Type
AME	Absolute-Micro Fiber Element
NPE	Nominal-Paper Element

**OPTIONAL EQUIPMENT**

Visual Indicator Model # HYV-1, 0-25 psi green/26-50 psi red, 1/8" npt center back mount gauge

Pressure Switch Model # PS-NO-21, Normally Open- Preset @ 21 psi (increasing)  
Model # PS-NC-21, Normally Closed- Preset @ 21 psi (increasing)  
(220 VAC max., 0.5A- resistive, 0.25A- inductive, 100VA- switching power)



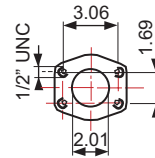
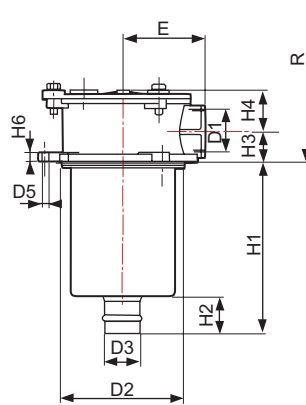
HYV-1 Filter Indicator Gauge

**Flow Ratings/ Common Models**

Thread	Model Number (10 Micron Nominal Assembly)	Filter Rating (microns) □ > 75 Abs./ □ > 2 Nom.	Model Number (Element Only)	Flow* (ΔP= 5psi)	Normal Tank Size
#8 SAE (3/4"-16)	ITF100-8FS-10MNPE	3□ Absolute	F100-03MAME	4.8	3, 5 & 10 gallon
		10□ Absolute	F100-10MAME	5.5	
		10□ Nominal	F100-10MNPE	7.9	
#12 SAE (1-1/16"-12)	ITF200-12FS-10MNPE	3□ Absolute	F200-03MAME	13.2	20 gallon
		10□ Absolute	F200-10MAME	16.0	
		10□ Nominal	F200-10MNPE	22.5	
#16 SAE (1-5/16"-12)	ITF250-16FS-10MNPE	3□ Absolute	F250-03MAME	17.2	35 gallon
		10□ Absolute	F250-10MAME	24.0	
		10□ Nominal	F250-10MNPE	34.3	
#24 SAE (1-7/8"-12)	ITF400-24FS-10MNPE	3□ Absolute	F400-03MAME	63.4	N/A
		10□ Absolute	F400-10MAME	71.0	
		10□ Nominal	F400-10MNPE	103.0	
	ITF425-24FS-10MNPE	3□ Absolute	F425-03MAME	74.0	
		10□ Absolute	F425-10MAME	82.0	
		10□ Nominal	F425-10MNPE	113.6	

\*Element GPM with viscosity of 150 SUS, Specific Gravity of .88 (ISO 32 Oil at 100° F).

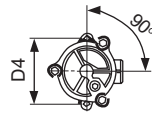
### Dimensional Data



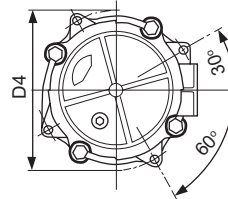
F425-32FL  
Optional 2" Flange

In-Tank Filter  
Assembly

ITF- 400, 425



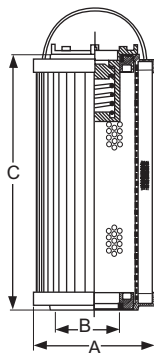
ITF- 100, 200, 250



Units: Inches

Model Number	D1	D2	D3	D4	D5	E	H1	H2	H3	H4	H6	"R" Removal Clearance	Weight (lbs.)
ITF100-8FS	#8 SAE	2.60	0.94	3.54	0.26	1.97	3.15	0.98	0.87	1.30	0.35	4.72	1.0
ITF200-12FS	#12 SAE	3.50	1.06	4.53	0.35	2.64	5.79	1.18	1.10	1.85	0.39	7.48	2.0
ITF250-16FS	#16 SAE	3.50	1.57	4.53	0.35	2.64	8.78	1.18	1.10	1.85	0.39	10.63	2.3
ITF400-24FS	#24 SAE	6.83	2.50	8.66	0.41	4.53	9.45	1.97	1.69	2.40	0.51	11.81	7.6
ITF425-24FS	#24 SAE	6.83	2.50	8.66	0.41	4.53	11.22	1.97	1.81	2.40	0.51	13.39	8.7

### ITF In Tank Filter Elements



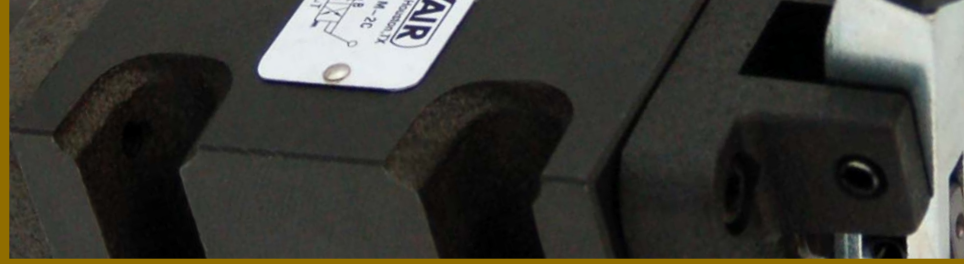
Element Model Number	A	B	C	Nominal Filter Area (Sq. In.)	Absolute Filter Area (Sq. In.)
F100	2.05	0.94	2.76	58	48
F200	2.76	1.10	5.12	248	155
F250	2.76	1.57	8.27	413	257
F300*	3.90	1.57	8.31	663	589
F400	5.12	2.48	7.87	1010	959
F425	5.12	2.48	9.88	1294	1229

\*Now obsolete but elements available.

Units: Inches



INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS



## D03 & D05 SERIES

### Lever Actuated Valves





# D03 & D05 Series Lever Actuated Valves

## Features

- High Pressure, High Flow:** 7 gpm (D03) and 12 gpm (D05) at 3000 psi working pressure
- High Reliability:** Valve designed to last 30 million spool shifts under proper use

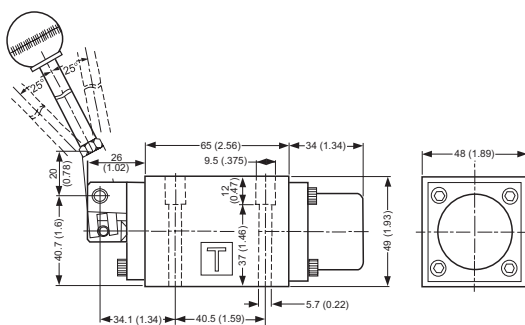


## Specifications

Size		D03	D05
Nominal Flow Rates	@ 3000 psi	7 gpm (27 lpm)	12 gpm (46 lpm)
	@ 1000 psi	10 gpm (38 lpm)	18 gpm (68 lpm)
Maximum Operating Pressure	P, A, B, Ports	3000 psi (210 bar)	
	T Port- Including Surges	1000 psi (140 bar)	
Internal Leakage	@ 3000 psi	0.18 cu-in/ min (3 ml/ min)	0.22 cu-in/ min (3.5 ml/ min)
Mounting Surface	NFPA	T3.5.1.MR1-D03	T3.5.1.MR1-D05
	ISO	ISO 4401- 03	ISO 4401- 05
Weight		2.9 lbs (1.3 kg)	8.8 lbs (4 kg)
Operating Conditions	Working Temperature	40- 160 F (5- 70 C)	
	Operating Viscosity	80- 300 SUS (17- 65 cSt)	
	Max. Start-up Viscosity	1500 SUS (315 cSt)	
	Filtration	25 micron or less, (ISO 18/15)	
	Recommended Fluids	Petroleum Based Fluids- ISO VG32-68	

## Dimensional/ Mounting Data

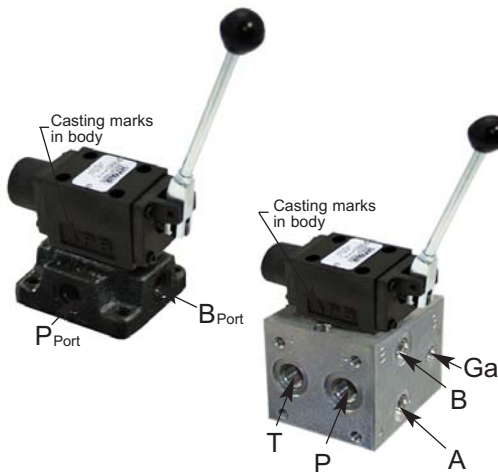
### Series D03M



Units: mm/ (Inch)

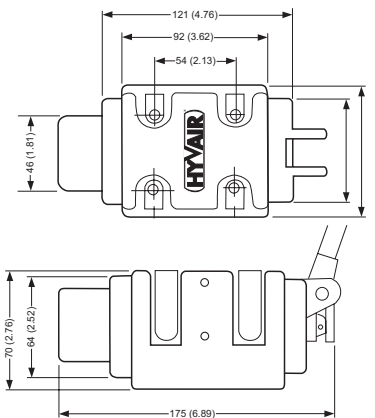
Note: Use (4) 10-24 SHCS X 1-3/4" mounting screws

(Handle Length= 5.5")



D03 Mounting Orientation

### Series D05M



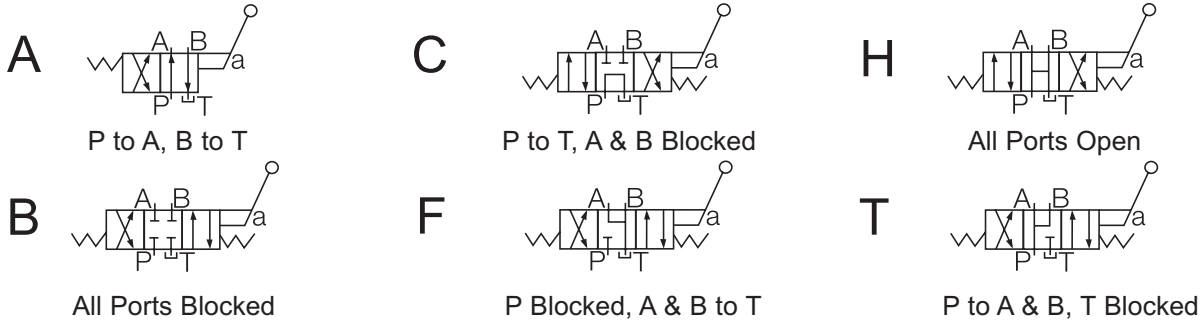
Units: mm/ (Inch)

Note: Use (4) 1/4-20 SHCS X 1-1/2" mounting screws

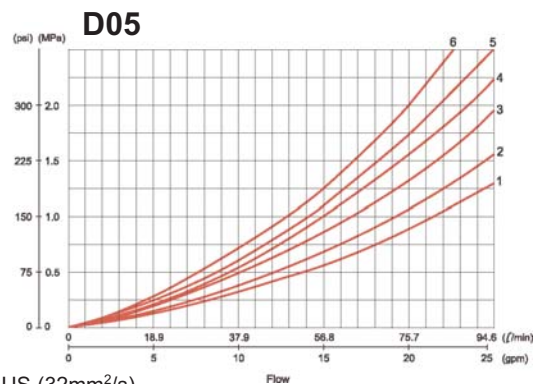
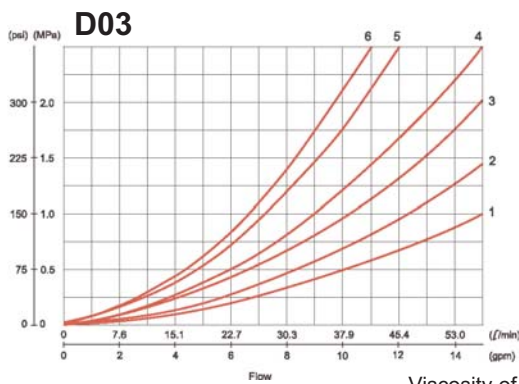
(Handle Length= 7.5")

### Spool Codes

The following examples represent most common valve spools, many other configurations are available.  
 (Left side of symbol is when handle is pushed, right side of symbol is handle pulled. (Symbols shown with springs, 2 & 3 position detented valves available))



### Typical Pressure Drop Curves



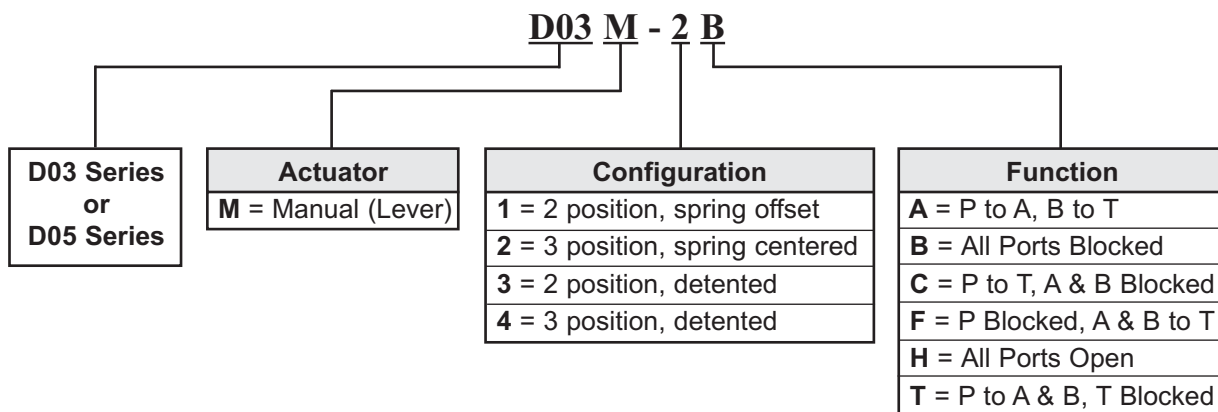
Viscosity of hydraulic fluid: 150SUS (32mm<sup>2</sup>/s)

Spool Code	Flow Curve Number				
	Spool Shifted		Spool Centered		
	P→A	P→B	A→T	B→T	P→T
A	2	2	2	2	-
B	2	2	2	2	-
C	6	5	4	4	4
F	2	3	1	1	-
H	1	1	1	1	2
T	2	2	2	2	-

Approximate pressure drop for different specific gravity fluid:  
 $\Delta P (\text{other fluid}) = \Delta P (\text{from graph}) \times SG (\text{other fluid})$   
 0.87

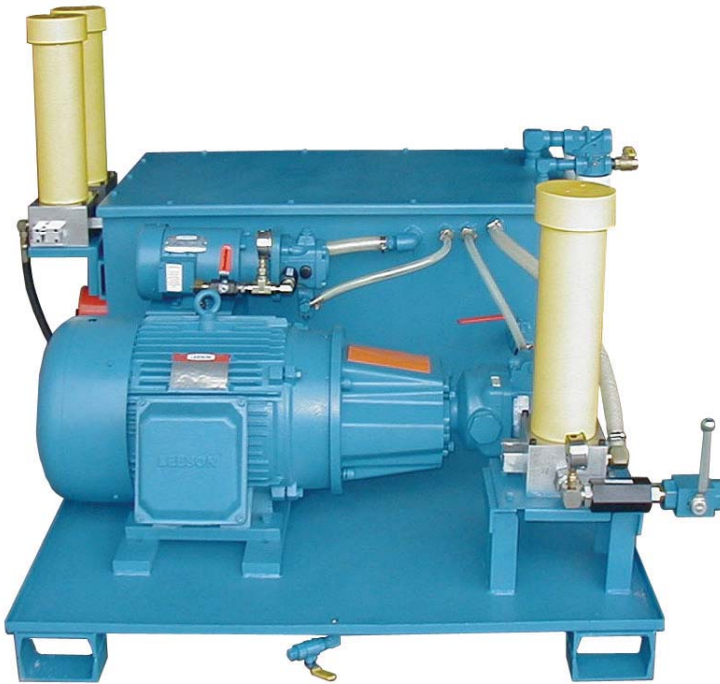
Fluid Viscosities	SUS	75	100	150	200	250	300	350
	cSt	14.5	20.5	32	43	54	65	86
Multiplier		0.93	1.00	1.11	1.19	1.26	1.32	1.41

### Ordering Information



# HYDRAULIC POWER UNITS

## L STYLE TANK



LT100 "L" Tank

### Features

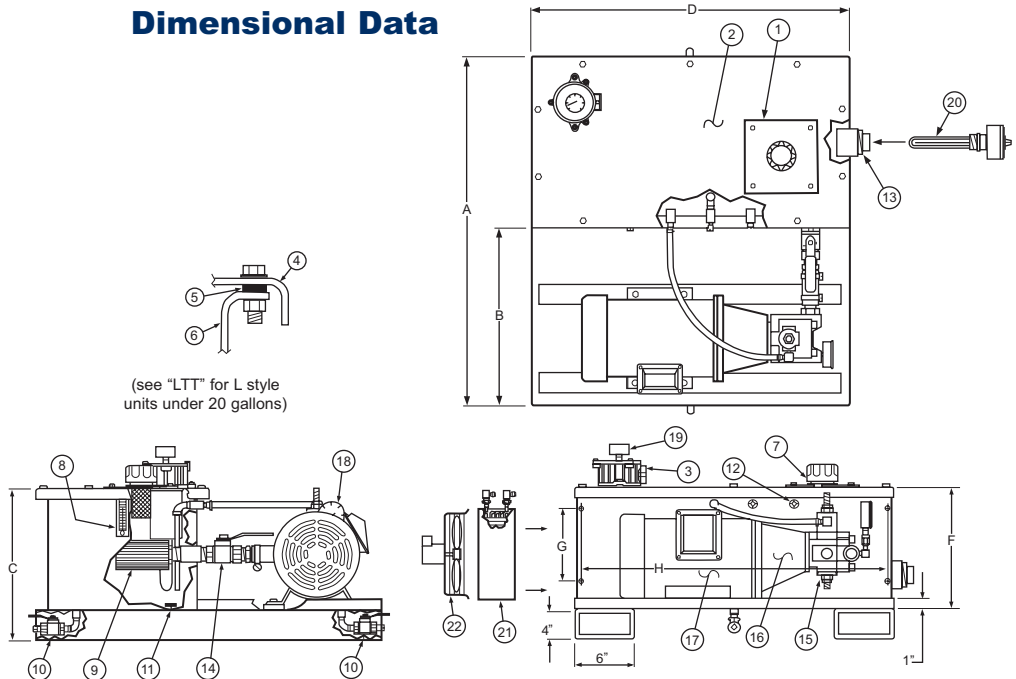
LT Series

- Lower Profile:** Unit can be mounted under work tables, conveyors, etc. Easy access to pump and motor.
- Flooded Suction:** Longer pump life; pump always stays primed. No pump rusting during shut-down periods. Air bleed valves are not required.
- Easy Reservoir Draining:** Pump not required for draining. Drain ball valve provided.
- Self Flushing:** System flushes any material in suction line when a pump is replaced.
- Color Code Identification:** Allows for easy identification of items.
- In-Tank Filter System:** Provides easy element replacement without line drainage.
- Convenient Suction Strainer Maintenance:** Clean out access cover allows replacement of suction strainer without draining reservoir.
- Removable Top Plate:** Removable top allows for easy reservoir cleaning. No leaky end bells that make access for cleaning difficult.
- Integral Drip Pan:** Pump/ motor mounting area serves as drip pan- drain ball valve included standard.

#### ITEM IDENTIFICATION:

- CLEAN-OUT COVER (YELLOW)
- VALVE MOUNTING AREA
- RETURN FILTER (YELLOW)
- TANK LID
- RUBBERIZED GASKET
- TANK BODY
- FILLER/ BREATHER
- SIGHT & TEMPERATURE GAUGE
- SUCTION STRAINER WITH BYPASS VALVE
- 1/2" NPT DRAIN BALL VALVE WITH PLUG
- MAGNETS (1 PER 5 GALLONS)
- (3) RETURN COUPLINGS STANDARD
- 2" NPT HEATER COUPLING (OPTIONAL)
- SUCTION BALL VALVE
- PUMP
- PUMP MOTOR ADAPTER (ORANGE)
- ELECTRIC MOTOR
- PRESSURE GAUGE WITH SNUBBER
- FILTER INDICATOR GAUGE (OPTIONAL)
- HEATER (OPTIONAL)
- HEAT EXCHANGER (OPTIONAL)
- COOLING FAN (OPTIONAL)
- PAINT (OPTIONAL)**  
 COLOR CODES:  
 BLUE- UNIT COLOR PAINT  
 ORANGE- DANGER  
 YELLOW- MAINTENANCE  
 GRAY- ELECTRICAL

### Dimensional Data



Model Number	Reservoir Capacity	Dimensions (Inches)								Std. Return Filter (10 $\mu$ )	Maximum Horsepower
		A	B	C	D	E	F	G	H		
LT20	20 Gallon	35.0	17.5	15.4	32.0	12.0	12.0	8	30.6	ITF200-8FS-10MNPE	5
LT35	35 Gallon	45.0	22.5	17.5	36.5	13.5	13.5	8	35.3	ITF200-12FS-10MNPE	15
LT70	70 Gallon	51.6	26.3	20.5	46.5	16.5	16.5	8	45.3	ITF250-12FS-10MNPE	50
LT100	100 Gallon	51.6	26.3	26.0	46.5	22.0	22.0	8	45.3	ITF425-24FS-10MNPE	100
LT150	150 Gallon	51.6	26.3	38.0	46.5	33.0	34.0	8	45.3	ITF450-24FS-20-10	100
LT200	200 Gallon	72.0	36.0	38.0	48.5	37.5	34.0			ITF450-24FS-30-10	150
LT500	500 Gallon	92.6	46.3	41.5	71.0	37.5	37.0			ITF450-24FS-30-10	150



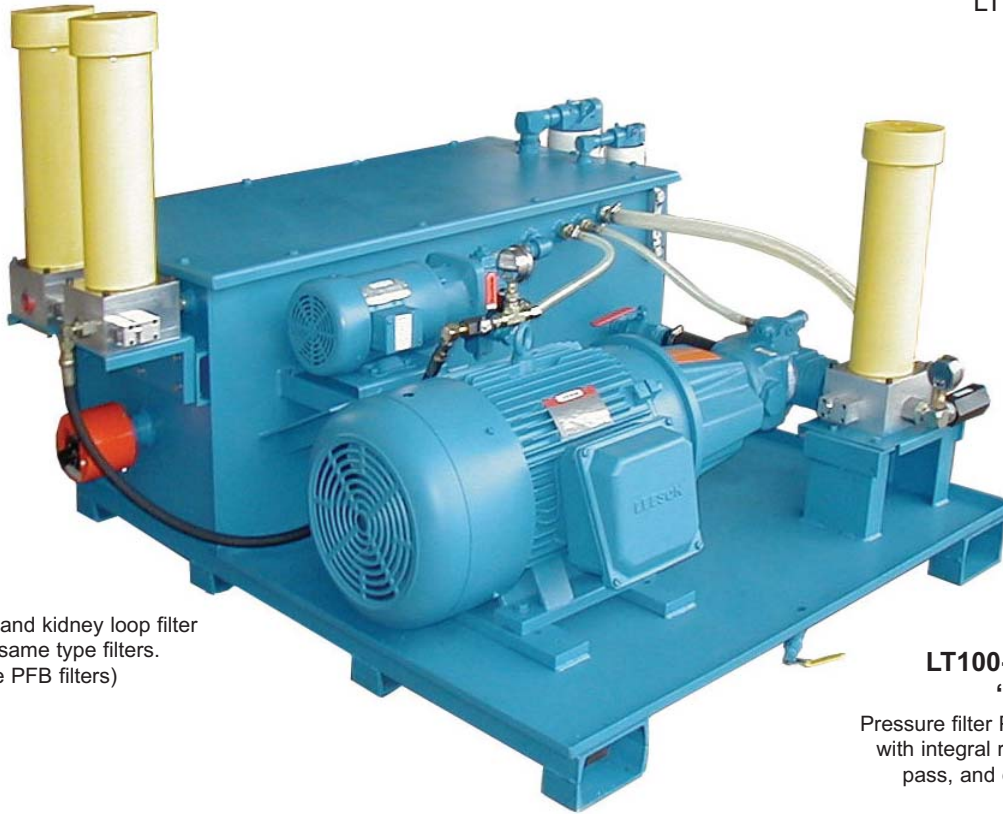


# HYDRAULIC POWER UNITS

L STYLE TANK



LT & LTT Series

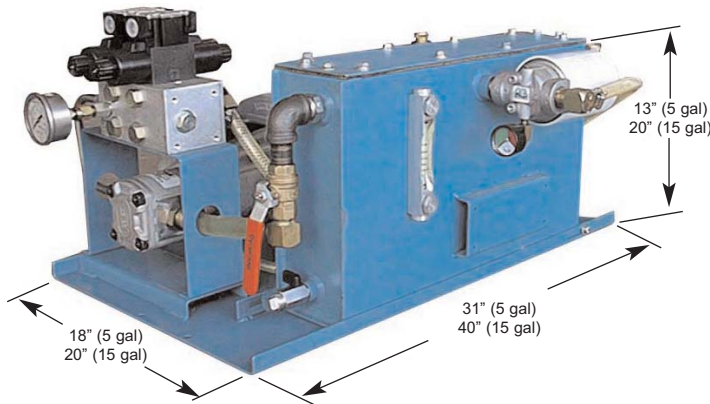


Return filter and kidney loop filter utilizing same type filters. (see PFB filters)

**LT100-40HP-PCP30**

**"L" Tank:**

Pressure filter PFB100-20FS-18.6-3-D1 with integral relief, integral 70 psi by pass, and differential indicator:



18" (5 gal)  
20" (15 gal)

31" (5 gal)  
40" (15 gal)

13" (5 gal)  
20" (15 gal)

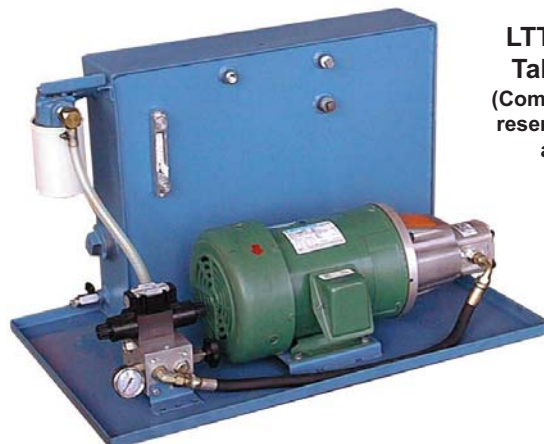


**LTT "L" Tank Tall**

**LTT5, 5 gallon tank dimensions:  
5" w x 21" l x 12.8" h**

**LTT15, 15 gallon tank dimensions:  
7" w x 32" l x 17.8" h**

**LTT "L" Tank  
Tall- Welded  
(Completely sealed  
reservoir versions  
available)**





INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS



**MD03M SERIES**

## Miniature Manifolds



*MD03M-4S-6AB-6PT*

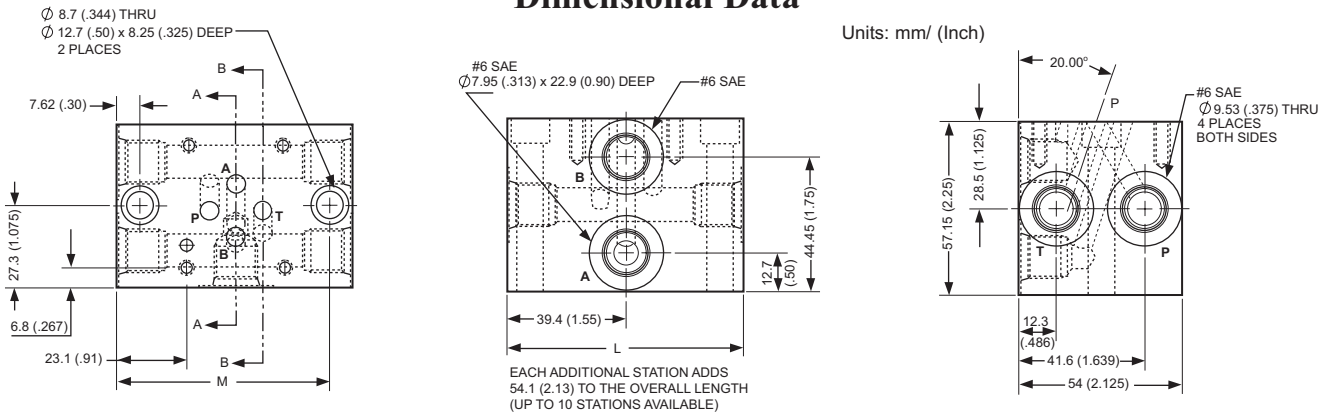
## Specifications

<b>Mounting Surface:</b> <b>General Pattern</b>	
<b>Model Number</b>	MD03M-TS-6AB-6PT
<b>Mounting Surface</b>	NFPA T3.5.1.MR1-F1984-03 ISO ISO 4401-03
<b>Nominal Flow Rates</b>	5 gpm (19 lpm)
<b>Material</b>	Nickel Plated Steel
<b>Maximum Pressure</b>	3000 psi (210 bar)
<b>Recommended Fluids</b>	Petroleum Based Fluids- ISO VG32-68, Phosphate Ester, Most Vegetable Oils, Water Based Fluids to 40% Water



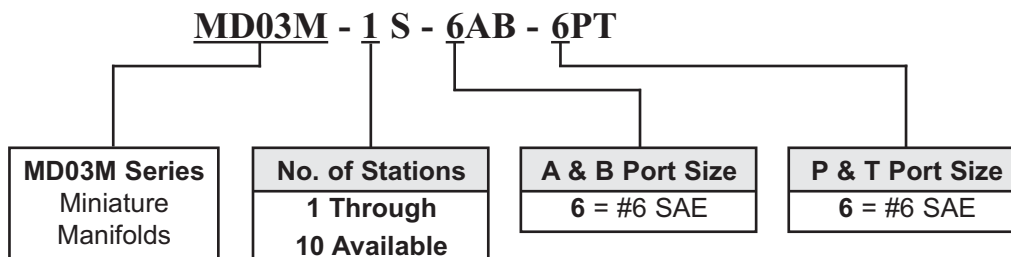
**MD03M-4S-6AB-6PT**

## Dimensional Data



Model	No. of Stations	L	M	A & B Ports	P & T Ports
MD03M-1S-6AB-6PT	1	78.0 (3.07)	70.4 (2.77)	#6 SAE, (9/16-18)	#6 SAE, (9/16-18)
MD03M-2S-6AB-6PT	2	132.1 (5.20)	124.5 (4.90)		
MD03M-3S-6AB-6PT	3	186.2 (7.33)	178.6 (7.03)		
MD03M-4S-6AB-6PT	4	240.3 (9.46)	232.7 (9.16)		
MD03M-5S-6AB-6PT	5	294.4 (11.59)	286.8 (11.29)		
MD03M-6S-6AB-6PT	6	348.5 (13.72)	340.9 (13.42)		
MD03M-7S-6AB-6PT	7	402.6 (15.85)	395.0 (15.55)		
MD03M-8S-6AB-6PT	8	456.7 (17.98)	449.1 (17.68)		
MD03M-9S-6AB-6PT	9	510.8 (20.11)	503.2 (19.81)		
MD03M-10S-6AB-6PT	10	564.9 (22.24)	557.3 (21.94)		

## Ordering Information

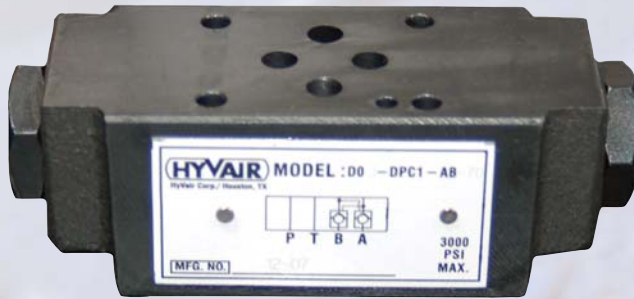




INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS

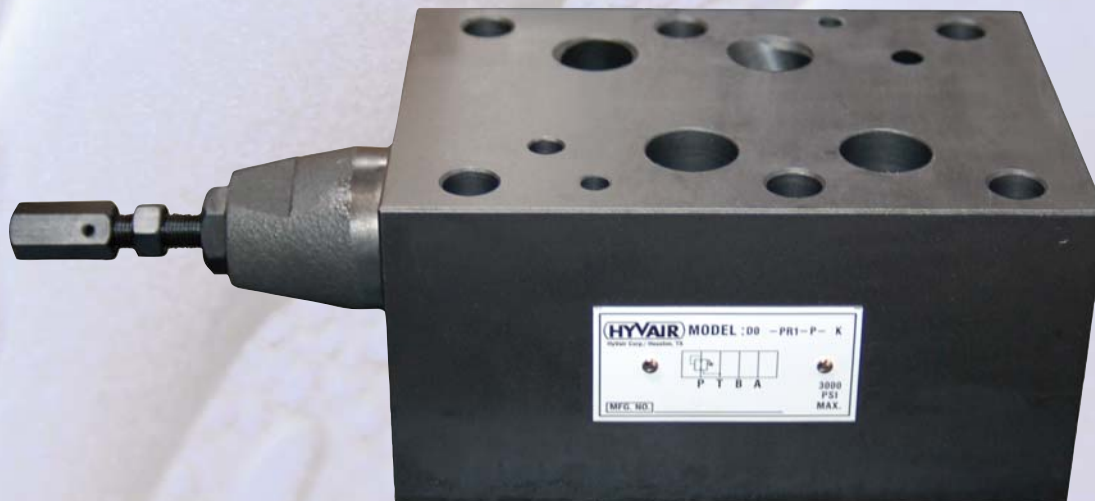
# D03, D05 & D08 SERIES

## Modular/ Stackable Valves



D03-DPC1-AB70

D05-SQ1-B-1K



D08-PR1-P-3K

## Features

- Rugged Steel Body Designs:** Designed for high cycle and quick response applications
- Uniform Height:** Valve body thickness is the same for each series and provides a clean, neat uniform appearance. This also reduces the number of bolt kits.
- Better Performance:** Modular valving eliminates leaky connections, reduces plumbing costs and places controls together.
- Space Savings:** Manifold mounted control circuits greatly reduce space requirements from conventional line mounted valves.
- Adjustment:** Hand knobs with locknuts provided standard- tools are not required for adjustments.

D08-DPC1-AB



D05-POR1-PT

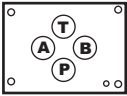
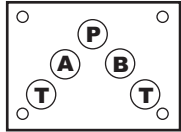
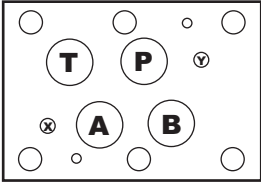
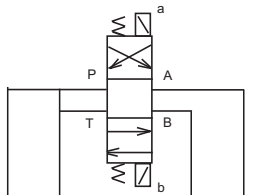

















D03-FC1-AB-MO

## Specifications

Size	D03	D05	D08
Mounting Surfaces: General Patterns			
Mounting Surface	NFPA T3.5.1.MR1-D03	T3.5.1.MR1-D05	T3.5.1.MR1-D08
	ISO ISO 4401-03	ISO 4401-05	ISO 4401-08
Nominal Flow Rates*	5 gpm (19 lpm)	12 gpm (45 lpm)	50 gpm (190 lpm) 35 gpm (130 lpm) for PR1 & DPC1
Maximum Pressure	3000 psi (210 bar)		
Operating Conditions	Working Temperature	40- 160° F (5- 70°C)	
	Operating Viscosity	80- 300 SUS (17- 65 cSt)	
	Max. Start-up Viscosity	1500 SUS (315 cSt)	
	Filtration	25 micron or less, (ISO 18/15)	
	Recommended Fluids	Petroleum Based Fluids- ISO VG32-68, Most Vegetable Oils	

## Common Models

 <p><b>D03 Series</b></p>	 <p><b>D05 Series</b></p>	 <p><b>D08 Series</b></p>	<p><b>Function</b></p>	
D03-PR1-B-*K	D05-PR1-B-*K	N/A	Pressure Reducing B Port	
D03-SPC1-B-70	D05-SPC1-B-70	N/A	Single Pilot Check B Port	
D03-SPC1-A-70	D05-SPC1-A-70	N/A	Single Pilot Check A Port	
D03-DPC1-AB-70	D05-DPC1-AB-70	D08-DPC1-AB-70	Double Pilot Check A & B Ports	
D03-POR1-ABBA-*K	D05-POR1-ABBA-*K	N/A	Double P.O. Relief B to A & A to b (Cross Port)	
D03-SQ1-B-*K	D05-SQ1-B-*K	N/A	Sequence Valve B Port	
D03-SQ1-A-*K	D05-SQ1-A-*K	N/A	Sequence Valve A Port	
D03-POR1-BT-*K	D05-POR1-BT-*K	N/A	Pilot Operated Relief B to T Port	
D03-POR1-AT-*K	D05-POR1-AT-*K	N/A	Pilot Operated Relief A to T Port	
D03-POR1-ATBT-*K	D05-POR1-ATBT-*K	N/A	Double P.O. Relief A to T & B to T	
D03-FC1-AB-MO	D05-FC1-AB-MO	D08-FC1-AB-MO	MeterOut Flow Control A & B Ports	
D03-N1-P	D05-N1-P	D08-NC1-P (w/ Check)	Needle Valve P Port	
D03-PR1-P-*K (6 gpm max.)	D05-PR1-P-*K (12 gpm max.)	D08-PR1-P-*K	Pressure Reducing P Port	
D03-C1-P-7	D05-C1-P-7	D08-NC1-P (w/needle valve)	Check Valve P Port	
D03-POR1-PT-*K	D05-POR1-PT-*K	D08-POR1-PT-*K	Pilot Operated Relief P to T Port	
SD03- MD03-	SD05- MD05-	SD08- MD08-	Subplate/ Manifold	

\*= 1K (120-1000 psi) or -3K (500-3000 psi) adjustment



## Ordering Information

**D03 - PR 1 - P - 1K - H**

Size	Function	Design Code	Location/ Flow Path	Function
D03	<b>C</b> = Check		<b>A</b> = A port	<b>omit</b> = Not Applicable
D05	<b>CB</b> = Counter Balance		<b>B</b> = B port	<b>7</b> = 7 psi cracking
D08	<b>DPC</b> = Double Pilot Check		<b>AB</b> = A and B	<b>70</b> = 70 psi cracking
	<b>DR</b> = Direct Acting Relief		<b>P</b> = P port	<b>.5K</b> = Adj. 50-500
	<b>EFC</b> = Elect-Prop. Flow Control		<b>T</b> = T port	<b>1K</b> = Adj. 120-1000
	<b>FC</b> = Flow Control		<b>PT</b> = P to T port	<b>3K</b> = Adj. 500-3000
	<b>N</b> = Needle Valve		<b>AT</b> = A to T port	<b>MI</b> = Meter in
	<b>NC</b> = Needle w/ Check		<b>BT</b> = B to T port	<b>MO</b> = Meter out
	<b>PCFC</b> = Press Comp F. C.		<b>ATBT</b> = A to T and B to T port	
	<b>POR</b> = Pilot Operated Relief		<b>ABBA</b> = A to B and B to A	
	<b>PR</b> = Press Reducing			
	<b>SQ</b> = Sequence			
	<b>SPC</b> = Single Pilot Check			

D03-N1-P

Hex Adjuster:

(Hex size) 9/16" U.S.  
14 mm Metric

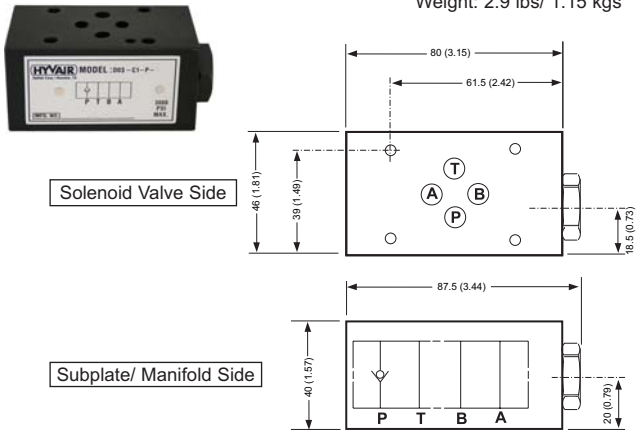


Shown with optional hex adjustment.

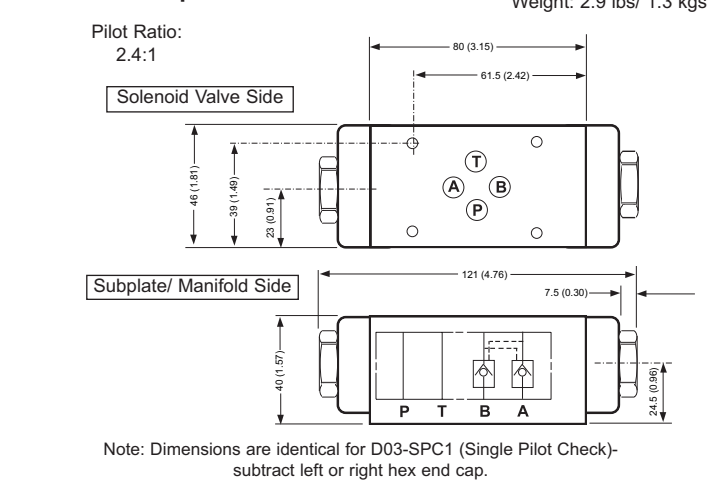
Hex Adjuster  
(No Knob)

## Dimensional Data

### Series D03-C1-P Check Valve



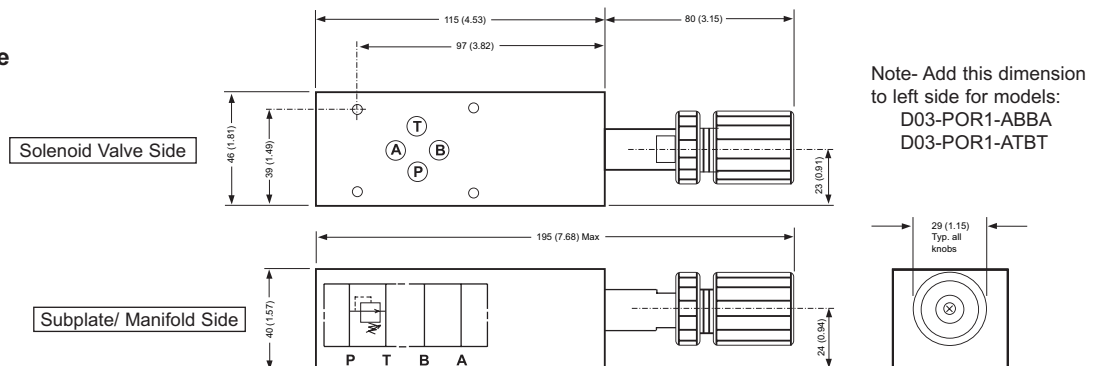
### Series D03-DPC1-AB-70 Double Pilot Operated Check Valve



### Series D03-POR1-PT Pilot Operated Relief Valve

Note- Dimensions are identical for:  
D03-POR1-AT  
D03-POR1-BT

Units: mm/ (Inch)  
Weight: 3.5 lbs/ 1.6 kgs



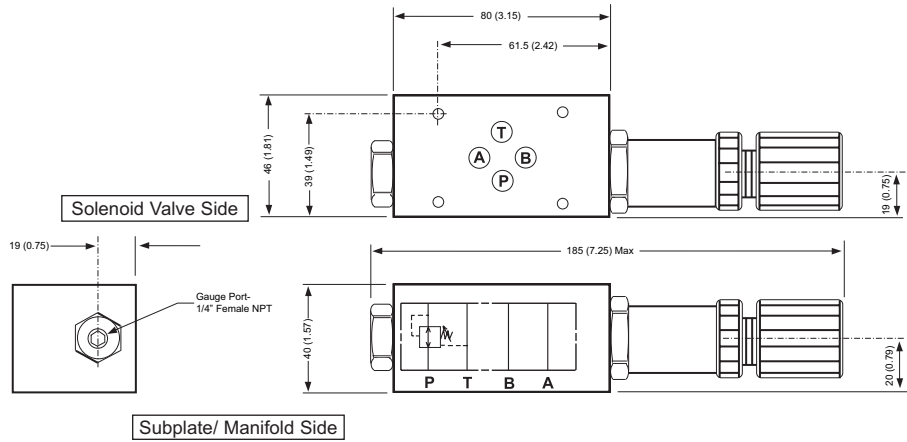
### Dimensional Data

#### Series D03-PR1-P Pressure Reducing Valve

Note- Dimensions are identical for:  
D03-PR1-A  
D03-PR1-B



Units: mm/ (Inch)  
Weight: 2.9 lbs/ 1.3 kgs

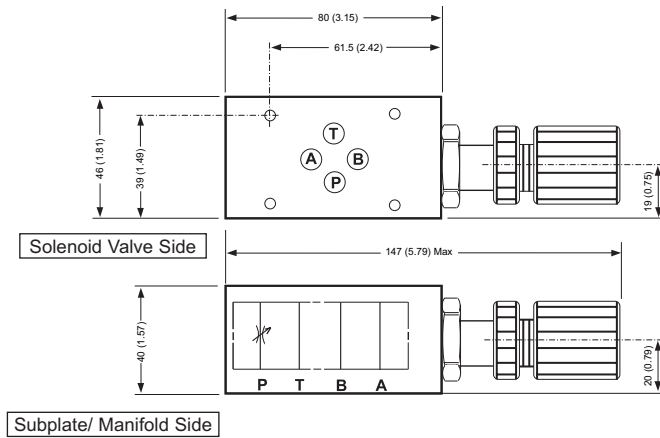


#### Series D03-N1-P Needle Valve



Shown with standard hand knob.

Units: mm/ (Inch)  
Weight: 2.42 lbs/ 1.1 kgs

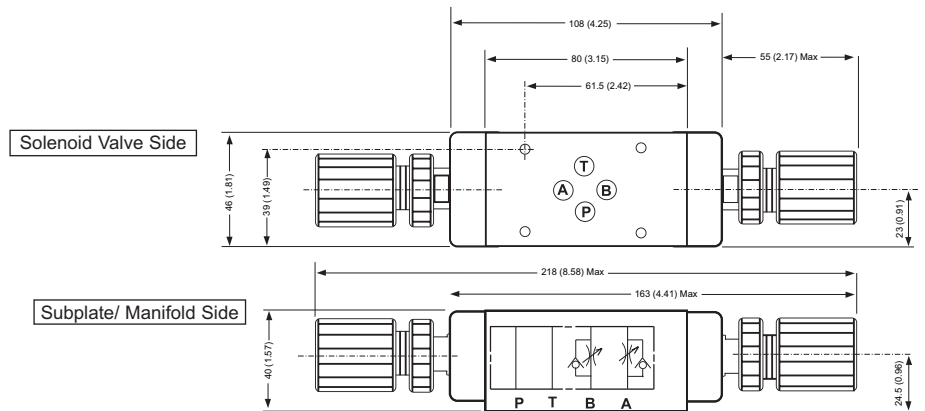


#### Series D03-FC1-AB-MO Flow Control

Note- Dimensions are identical for:  
D03-FC1-AB-MI



Units: mm/ (Inch)  
Weight: 2.8 lbs/ 1.25 kgs



Note: Dimensions are identical for single flow control valve- subtract left or right adjusting knob dimension.

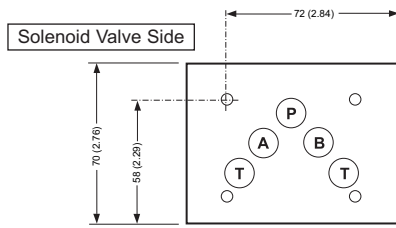




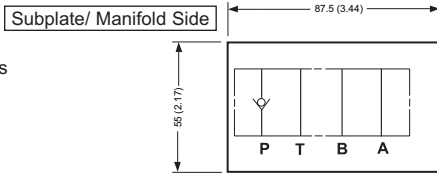
# D03, D05 & D08 Series Modular/ Stackable Valves

## Dimensional Data

### Series D05-C1-P Check Valve



Units: mm/ (Inch)  
Weight: 5.28 lbs/ 2.4 kgs

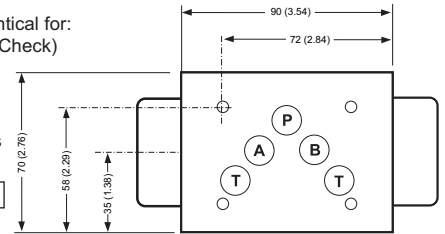


### Series D05-DPC1-AB-70 Double Pilot Operated Check Valve

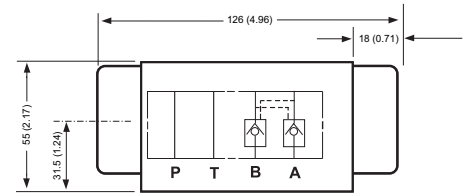
Note- Dimensions are identical for:  
D05-SPC1 (Single Pilot Check)

Units: mm/ (Inch)  
Weight: 7.48 lbs/ 3.4 kgs

Solenoid Valve Side



Subplate/ Manifold Side



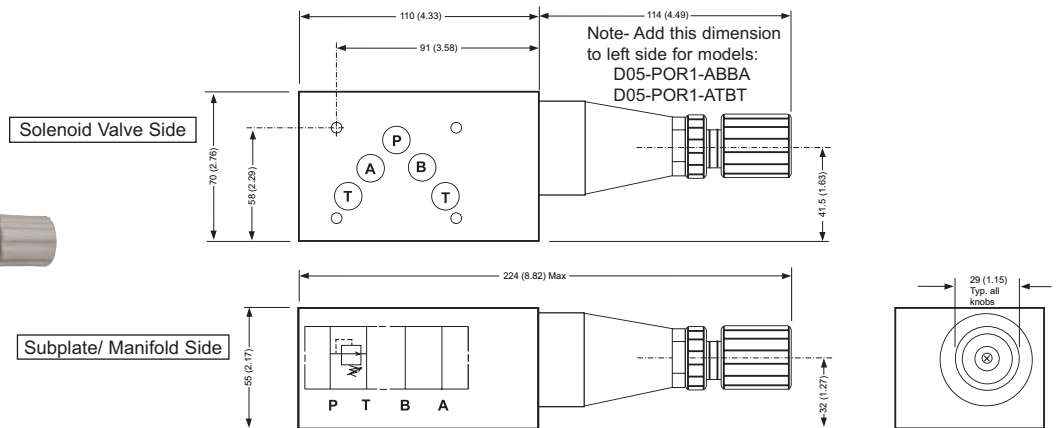
Pilot Ratios:  
16.7:1 1st stage  
27: 2nd stage

### Series D05-POR1-PT Pilot Operated Relief Valve

Note- Dimensions are identical for:  
D05-POR1-AT  
D05-POR1-BT



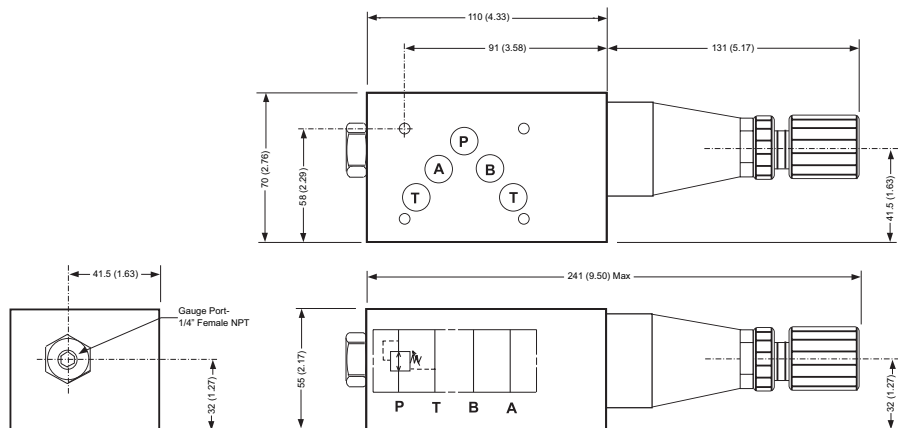
Units: mm/ (Inch)  
Weight: 7.7 lbs/ 3.5 kgs



### Series D05-PR1-P Pressure Reducing Valve

Note- Dimensions are identical for:  
D05-PR1-A

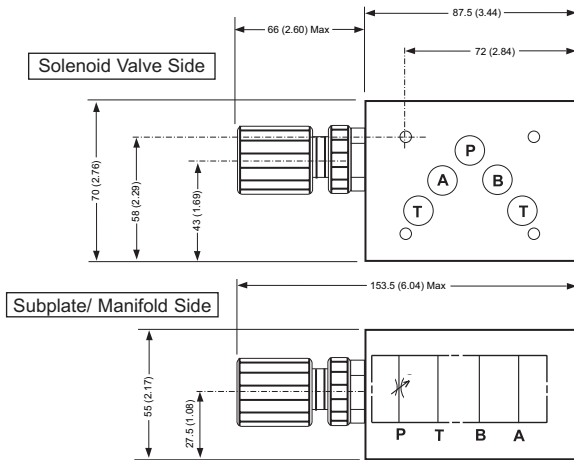
Units: mm/ (Inch)  
Weight: 7.7 lbs/ 3.5 kgs



### Dimensional Data

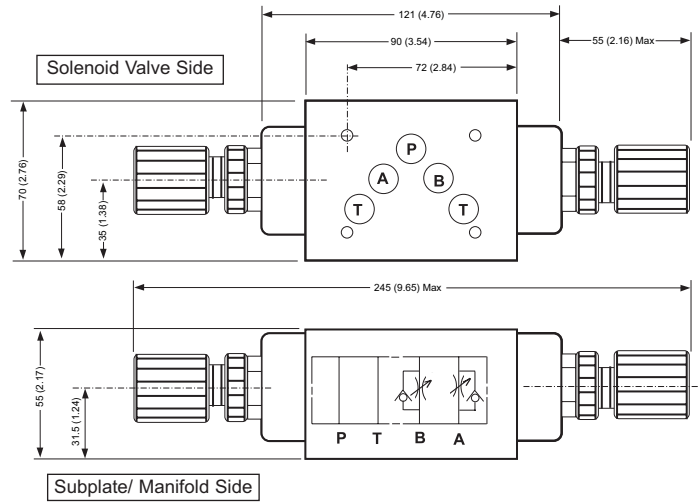
**Series D05-N1-P**  
Needle Valve

Units: mm/ (Inch)  
Weight: 6.2 lbs/ 2.8 kgs



**Series D05-FC1-AB-MO**  
Flow Control

Units: mm/ (Inch)  
Weight: 7.7 lbs/ 3.5 kgs

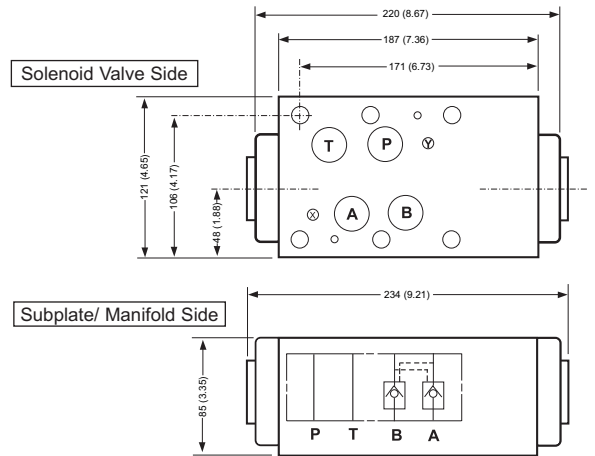


Note: Dimensions are identical for single flow control- subtract left or right adjusting knob dimension.

**Series D08-DPC1-AB-70**  
Double Pilot Operated Check Valve

**Series D08-C1-P**  
Check Valve

Units: mm/ (Inch)  
Weight: 27.5 lbs/ 12.5 kgs



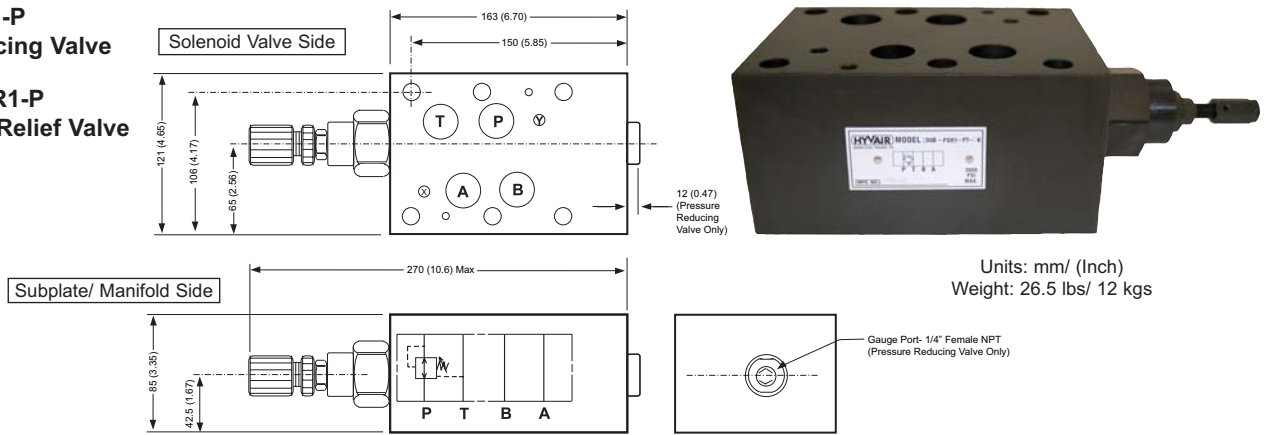


# D03, D05 & D08 Series Modular/ Stackable Valves

## Dimensional Data

**Series D08-PR1-P**  
Pressure Reducing Valve

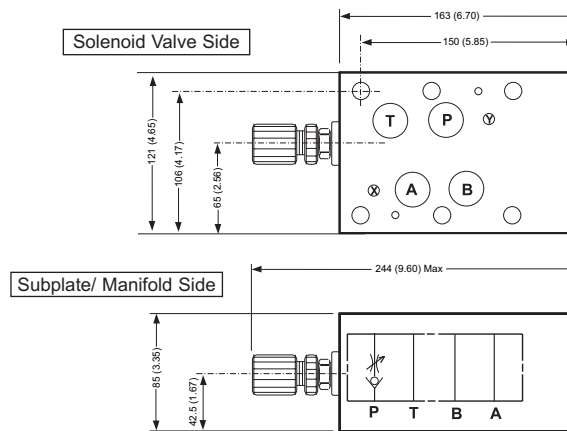
**Series D08-POR1-P**  
Pilot Operated Relief Valve



**Series D08-NC1-P**  
Needle Valve w/ Check



Units: mm/ (Inch)  
Weight: 24.2 lbs/ 11 kgs

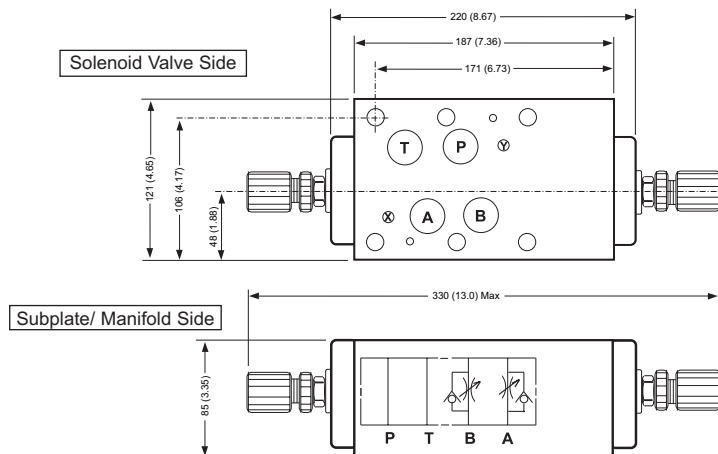


**Series D08-FC1-AB-MO**  
Flow Control



Units: mm/ (Inch)  
Weight: 24.4 lbs/ 12.2 kgs

Note: Dimensions are identical for single flow control or needle valve- subtract left or right adjusting knob dimension.





INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS



## ***FFG & MFA SERIES***

### **Needle Valves**



*MFA-2002-T*



*FFG-2002-T*



# FFG & MFA Series Needle Valves

## Specifications

- 1/4" thru 1" NPT ports
- 5000 psi maximum- carbon steel body
- Temperature Range: -40°F to +500°F
- CV Factor: .66 thru 5.22
- Zinc-plated for double corrosion protection
- Materials:**

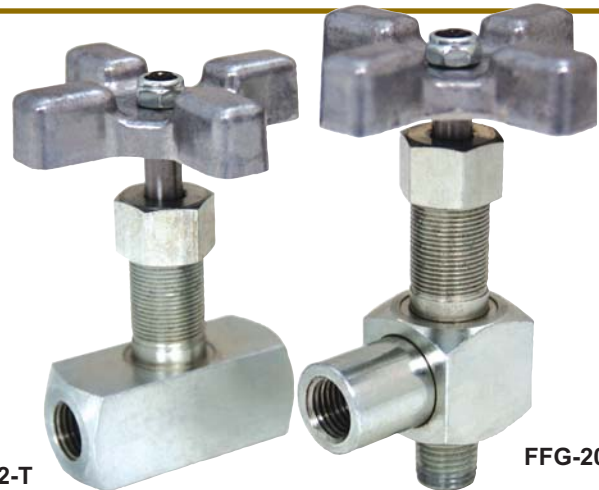
*Body* - 12L14 Carbon Steel

*Stem* - 303 Stainless Steel

*Bonnet Nut* - Carbon Steel

*Handle* - Aluminum

*Stem Packing* - Teflon

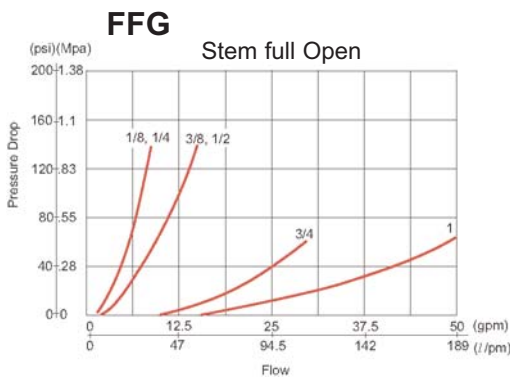


MFA-2002-T

FFG-2002-T

## Pressure Drop Curves

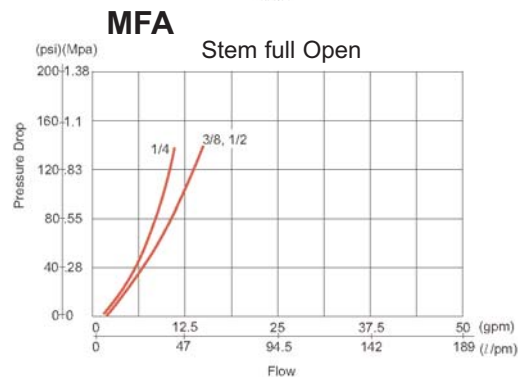
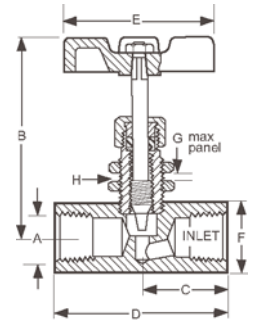
## Pressure Drop Curves



### FFG

A (NPT) Female	B (Max.)	C	D	E	F (Sq.)	G	H (Dia.)	Orifice (Dia.)	CV
1/8"	3 1/2"	3 1/32"	1 15/16"	2 1/2"	7/8"	3/8"	5/8"	7/32"	.66
1/4"		1 1/32"	2 1/16"						
3/8"	3 5/8"	1 7/16"	2 3/4"	1 1/8"	3/8"	3/4"	7/32"	.70	
1/2"		1 7/16"	2 3/4"						
3/4"	5 3/16"	1 13/16"	3 5/8"	4 1/4"	1 1/2"	7/8"	1 1/2"	9/16"	3.90
1"	5 5/16"	2 1/32"	4 1/16"	4 1/4"	2"	7/8"	1 1/2"	9/16"	5.22

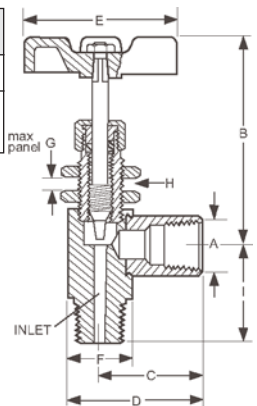
Units: Inches



### MFA

A (NPT) Female	B (Max.)	C	D	E	F (Sq.)	G	H (Dia.)	I	Orifice (Dia.)	CV
1/4"	3 1/2"	1 9/32"	1 25/32"	2 1/2"	1"	3/8"	5/8"	1 1/16"	7/32"	.92
3/8"	3 5/8"	1 17/32"	2 5/32"		1 1/4"			1 3/4"		
1/2"	3 5/8"	1 17/32"	2 5/32"	1 1/4"	1 1/4"	3/8"	3/4"	1 3/4"	7/32"	1.10

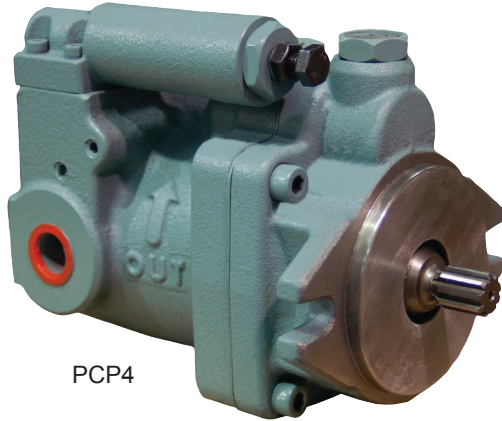
Units: Inches



## Ordering Information

### FFG - 2002 - T - A

Style	SIZE	Material	Handle Size	Panel Mounting Kits
FFG = Needle Valve	2001 = 1/8"	T = Carbon Steel	omit = 2-1/2"	<b>Valve Size</b> <b>Kit Number</b>
MFA = Right Angle-Needle Valve	2002 = 1/4"		A = 4-1/4"	1/8" to 1/4"      KIT2002S
	2003 = 3/8"			3/8" to 1/2"      KIT2004S
	2004 = 1/2"			3/4" to 1"      KIT2005S
	2006 = 3/4"			
	2008 = 1"			



PCP4

### Specifications

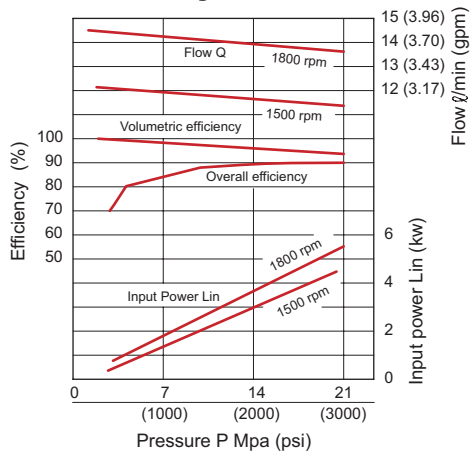
**PCP4** 1800 rpm, 3.8 gpm (at no load), 3000 psi max

Model	Pressure Range (psi)	Displacement per rev.	Flow @1800 rpm	Weight
PCP4-.5K-2AK-3	143-500	0.49 cu-in 8.0 cc	3.8 gpm (14.4 lpm)	17.0 lbs 7.7 kgs
PCP4-1K-2AK-3	286-1000			
PCP4-2K-2AK-3	500-2000			
PCP4-3K-2AK-3	500-3000			

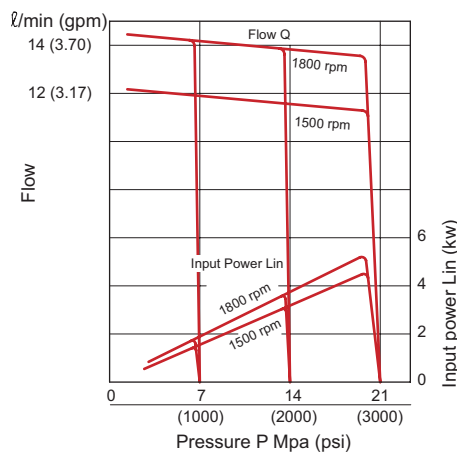
### Performance Data

Typical performance curves based on ISO VG32 Oil @ 120°F, (49°C)

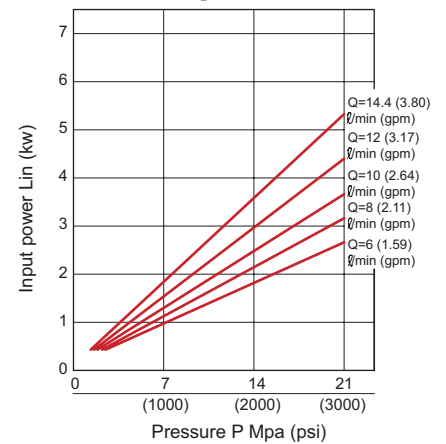
#### Efficiency Curves



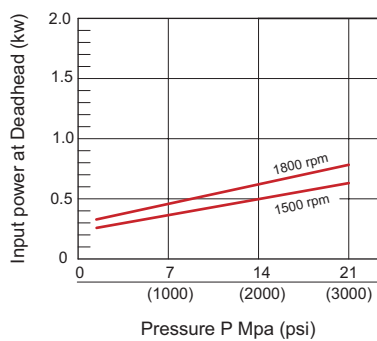
#### Pressure vs Flow



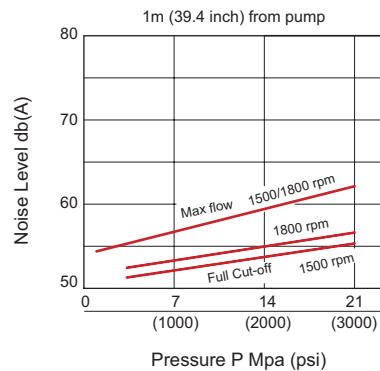
#### Power Input



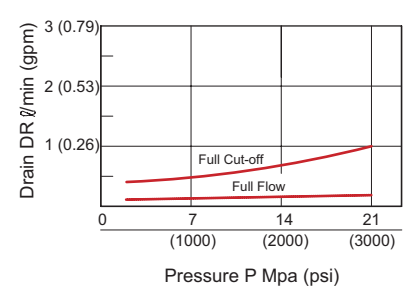
#### Deadhead Power



#### Noise Level



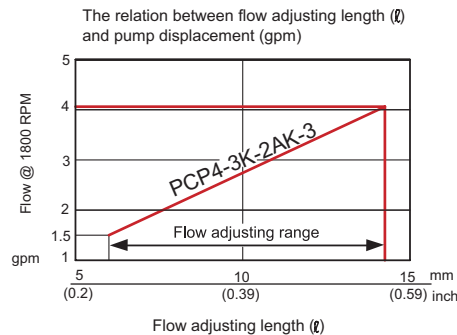
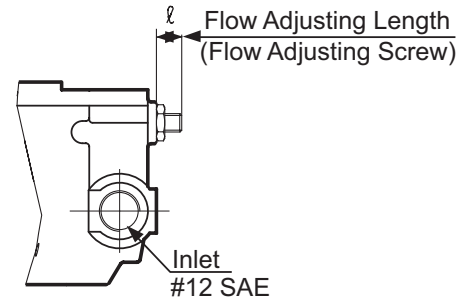
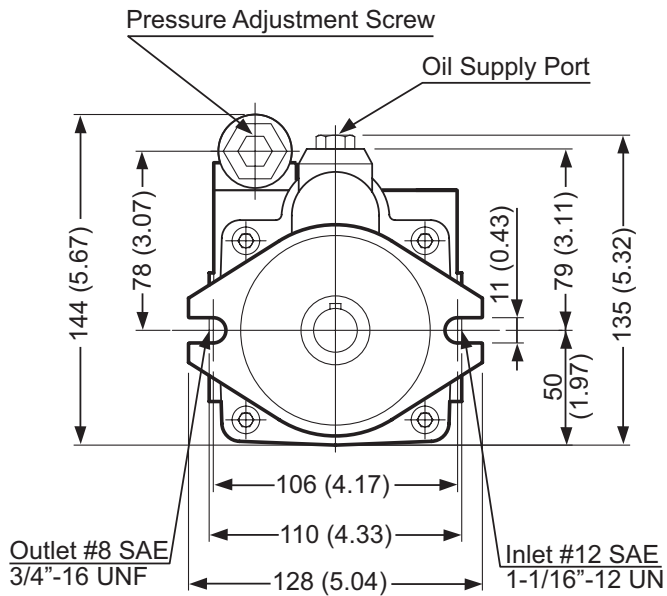
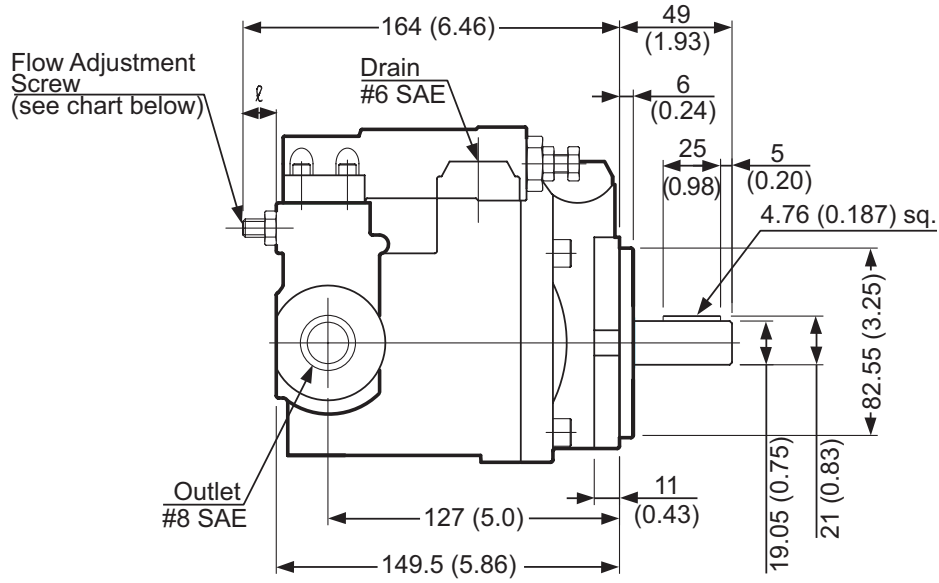
#### Drain Curve



**Dimensional Data**

**PCP4-3K-2AK-3**

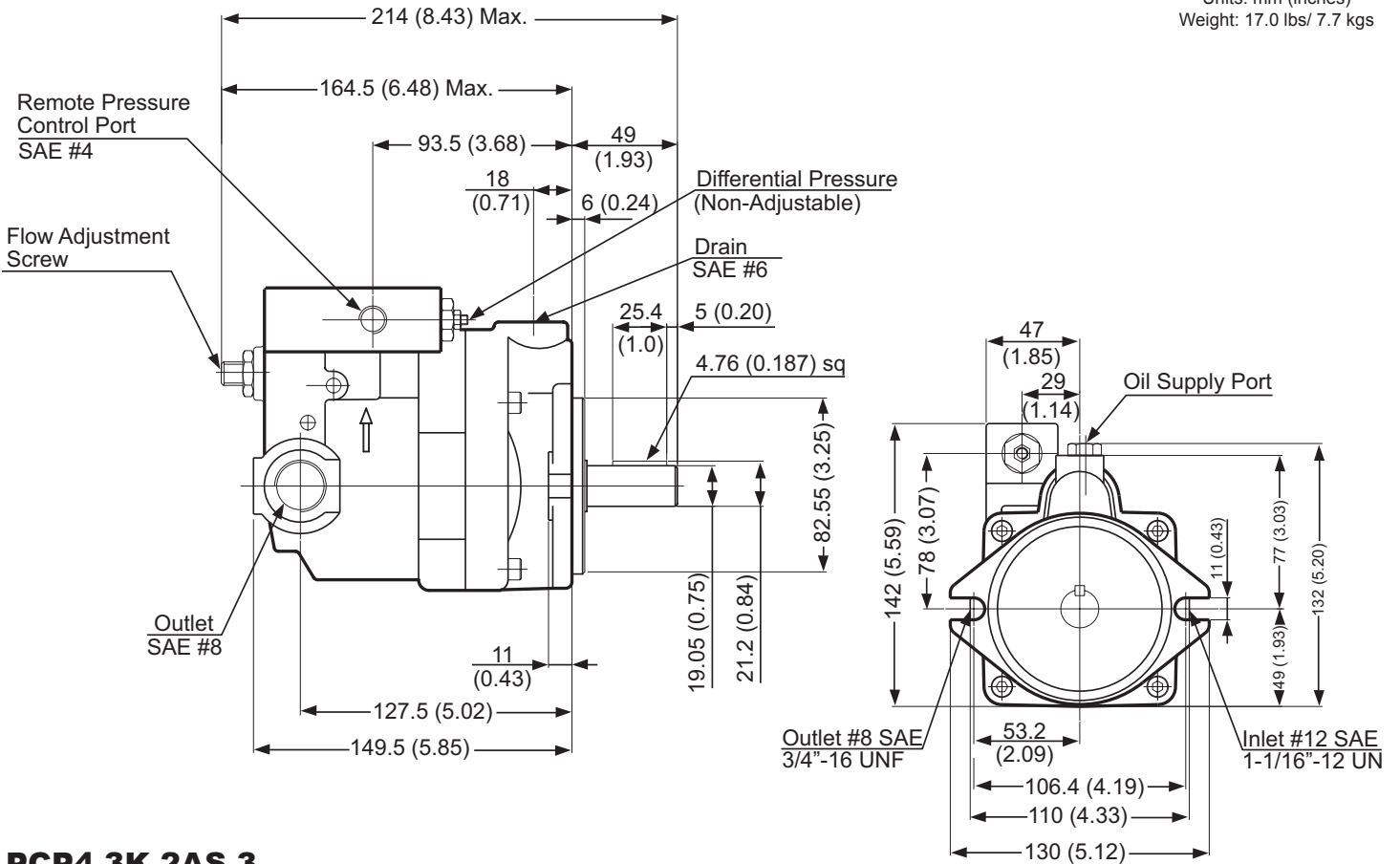
Units: mm (inches)  
Weight: 17.0 lbs/ 7.7 kgs



### Dimensional Data

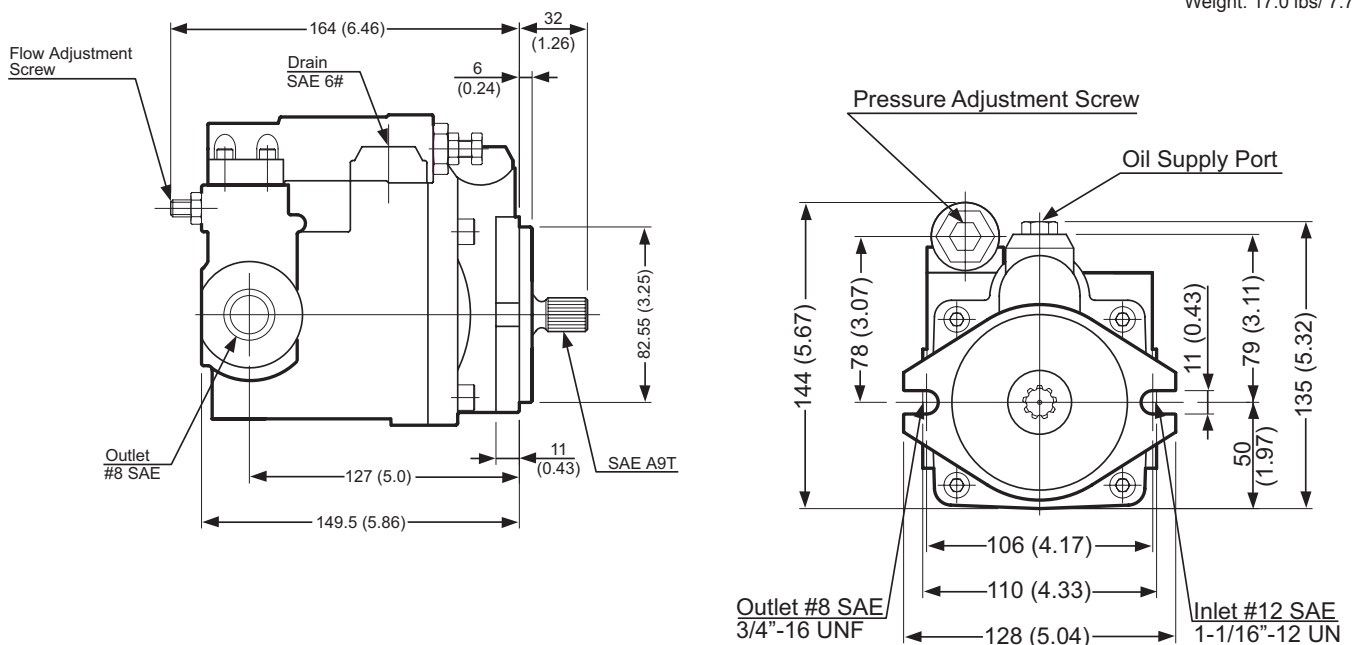
#### PCP4-3K-2AK-3-RC

Units: mm (inches)  
Weight: 17.0 lbs/ 7.7 kgs



#### PCP4-3K-2AS-3

Units: mm (inches)  
Weight: 17.0 lbs/ 7.7 kgs

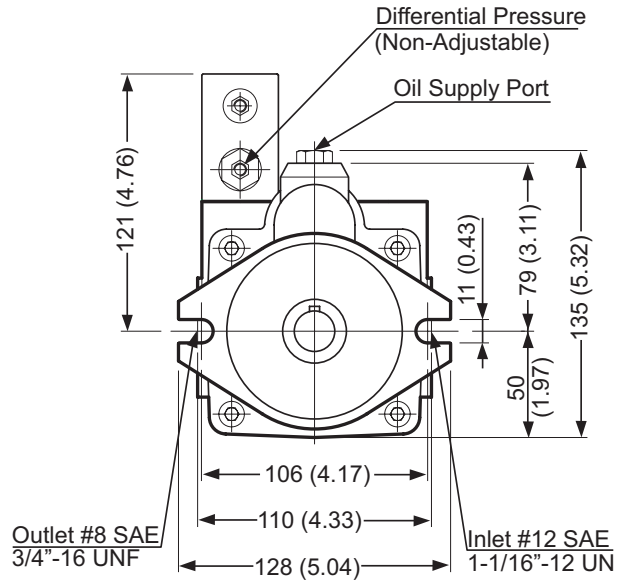
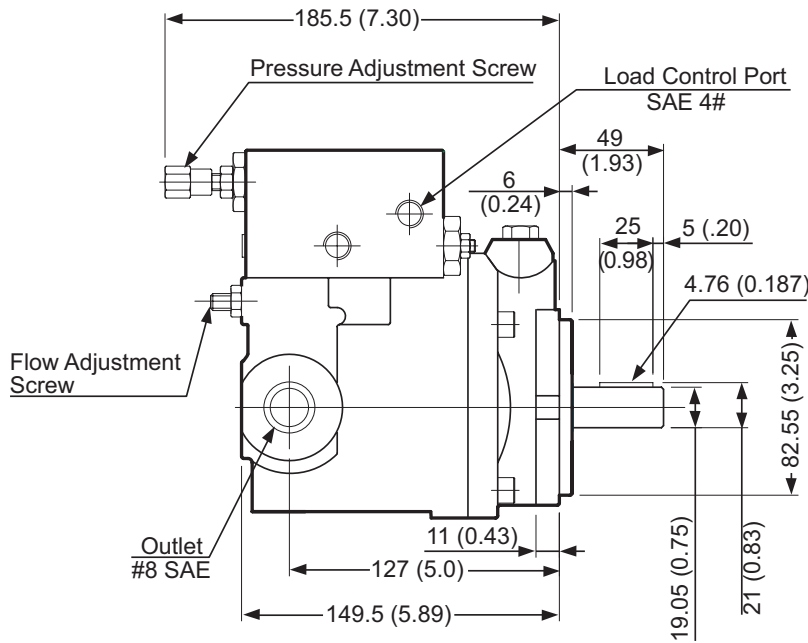




**Dimensional Data**

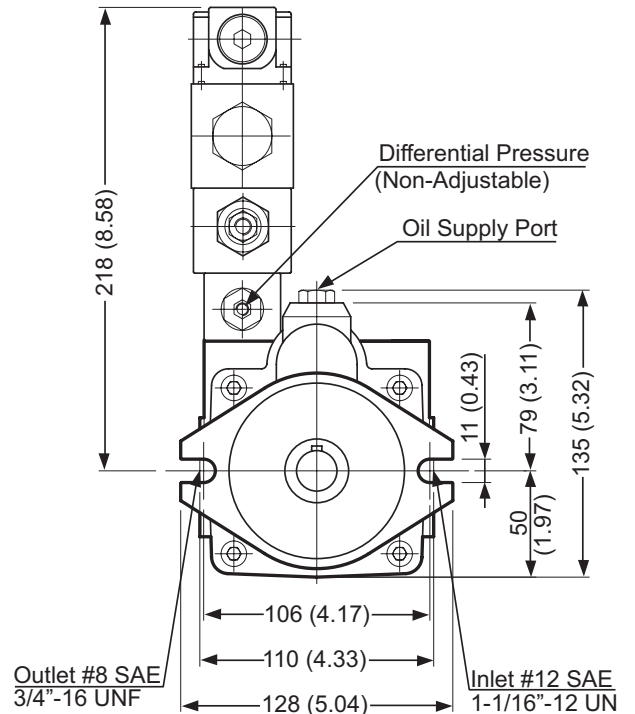
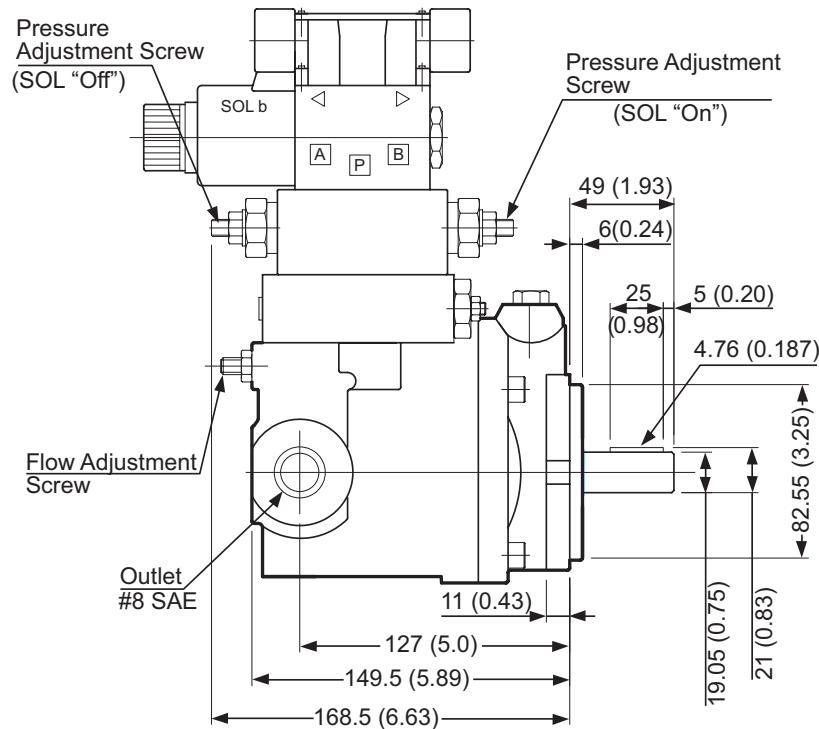
**PCP4-3K-2AK-3-LS**

Units: mm (inches)  
Weight: 18.1 lbs/ 8.2 kgs



**PCP4-3K-2AK-3-2PSO**

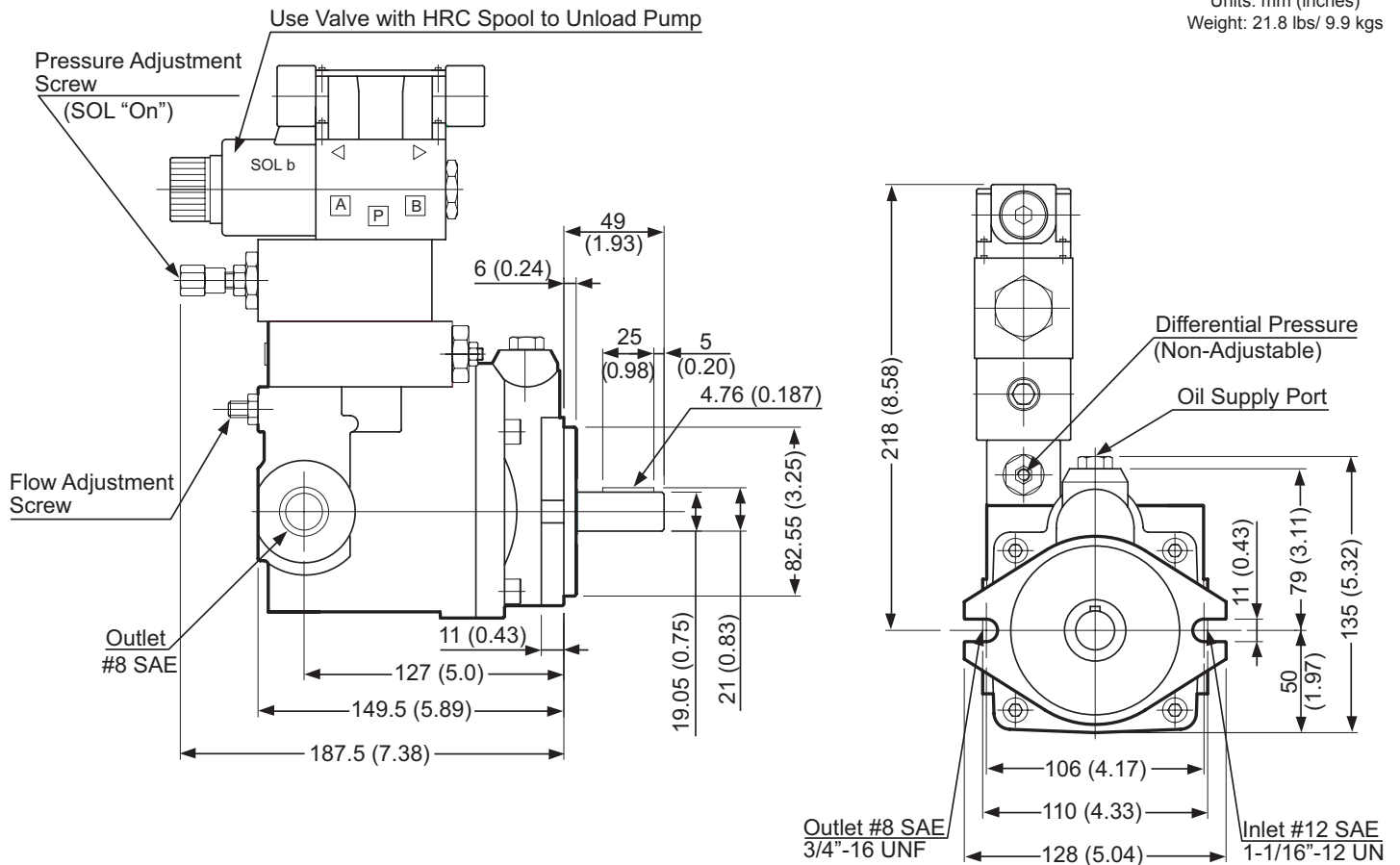
Units: mm (inches)  
Weight: 25.1 lbs/ 11.4 kgs



### Dimensional Data

#### PCP4-3K-2AK-3-SO

Units: mm (inches)  
Weight: 21.8 lbs/ 9.9 kgs

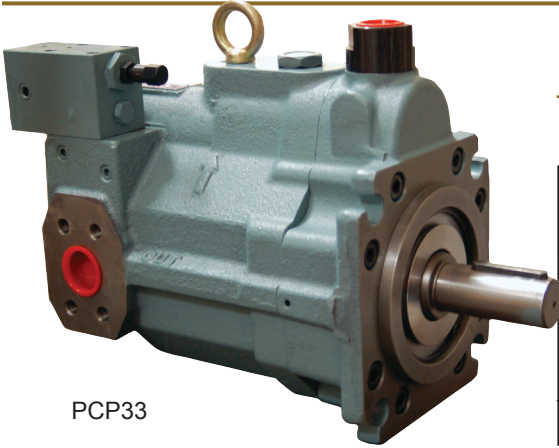


### Ordering Information

#### PCP4 - 3K - 2AK - 3 - SO

Note: Available right hand rotation (only)- viewed facing pump shaft

Size (GPM)	Pressure Range	Mounting Style	Series 3 Porting	Control Type
4	.5K= 143-500 psi 1K= 286-1000 psi 2K= 500-2000 psi 3K= 500-3000 psi	2AK= 2 Bolt, SAE A, 3/4" Dia. Keyed Shaft x 1.67" Long w/ 3/16" Key w/ Flow Adj. 2AS= 2 Bolt, SAE A, 9 Tooth Spline, 16/32 DP	All Female SAE: #12 Inlet, #8 Outlet #6 Case Drain	omit= Standard RC= Remote Compensator LS= Load Sensing 2PSO= Dual Pressure Solenoid SO= Single Pressure Solenoid



PCP33

### Specifications

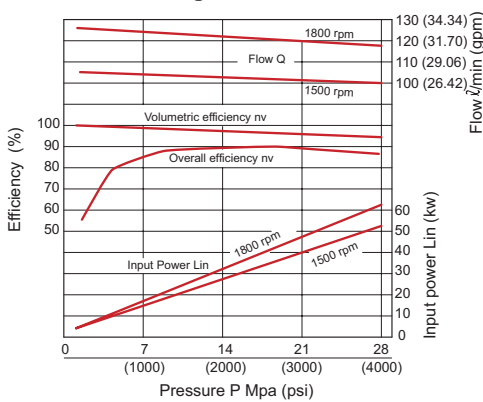
**PCP33** 1800 rpm, 33.2 gpm (at no load), 3000 psi max

Model	Pressure Range (psi)	Displacement per rev.	Flow @1800 rpm	Weight
PCP33-.5K-4CK-2	143-500	4.27 cu-in 70.0 cc	33.2 gpm (125.7 lpm)	81.7 lbs 37.0 kgs
PCP33-1K-4CK-2	286-1000			
PCP33-2K-4CK-2	500-2000			
PCP33-3K-4CK-2	500-3000			

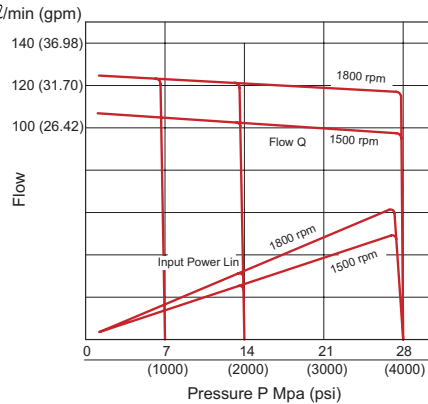
### Performance Data

Typical performance curves based on ISO VG32 Oil @ 120°F, (49°C)

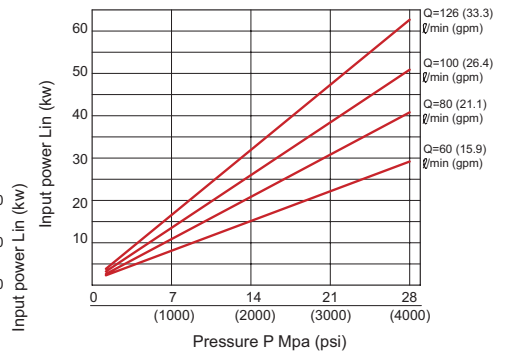
#### Efficiency Curves



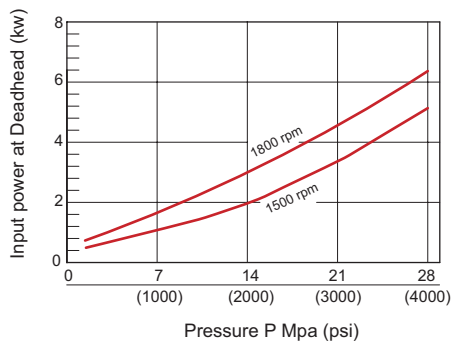
#### Pressure vs Flow



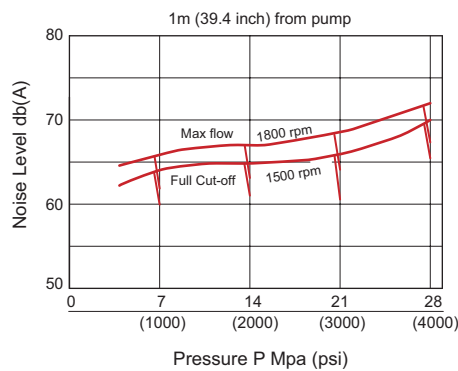
#### Power Input



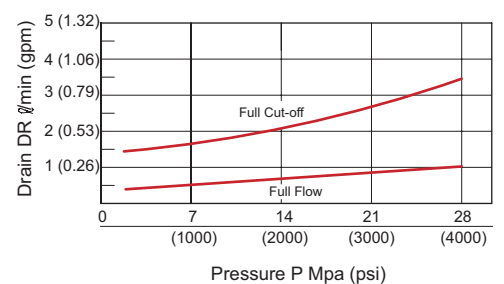
#### Deadhead Power



#### Noise Level

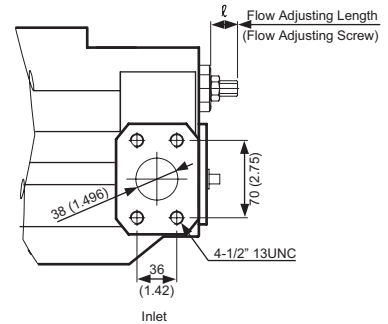
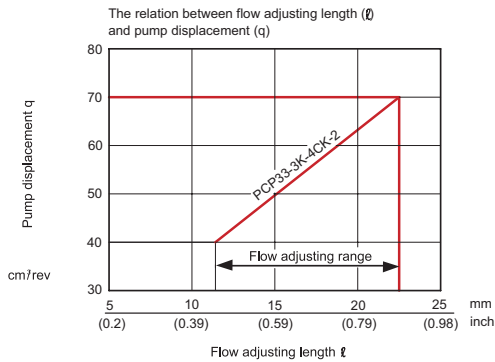
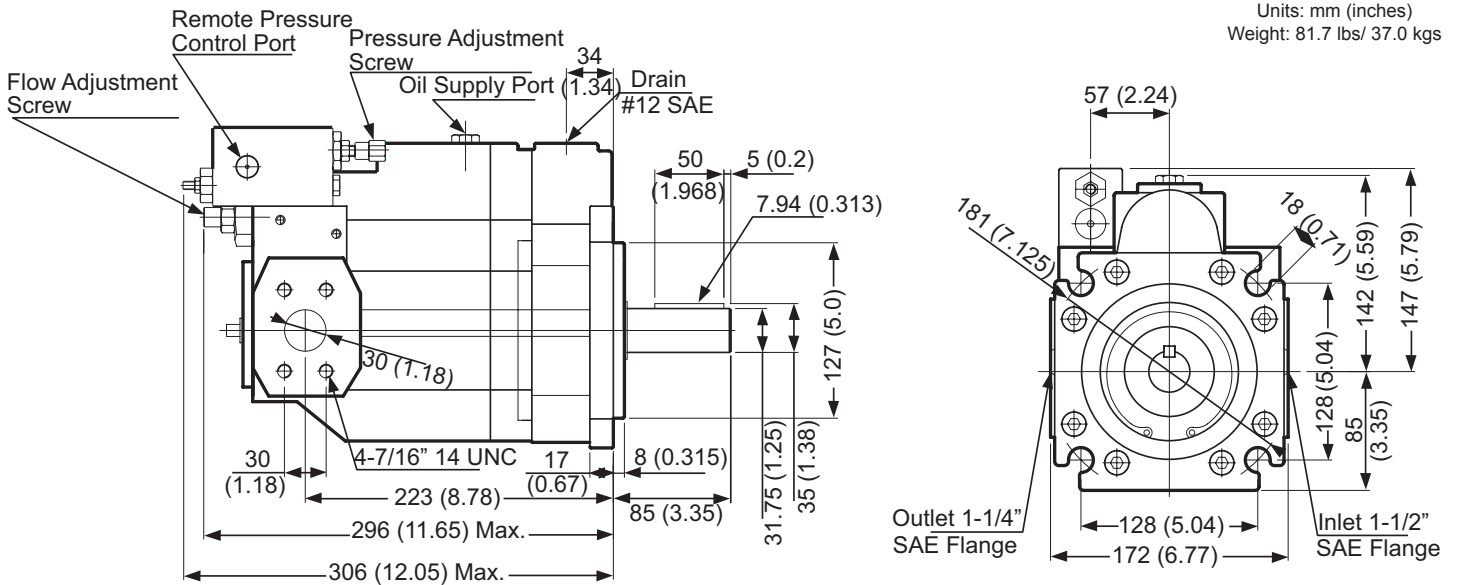


#### Drain Curve

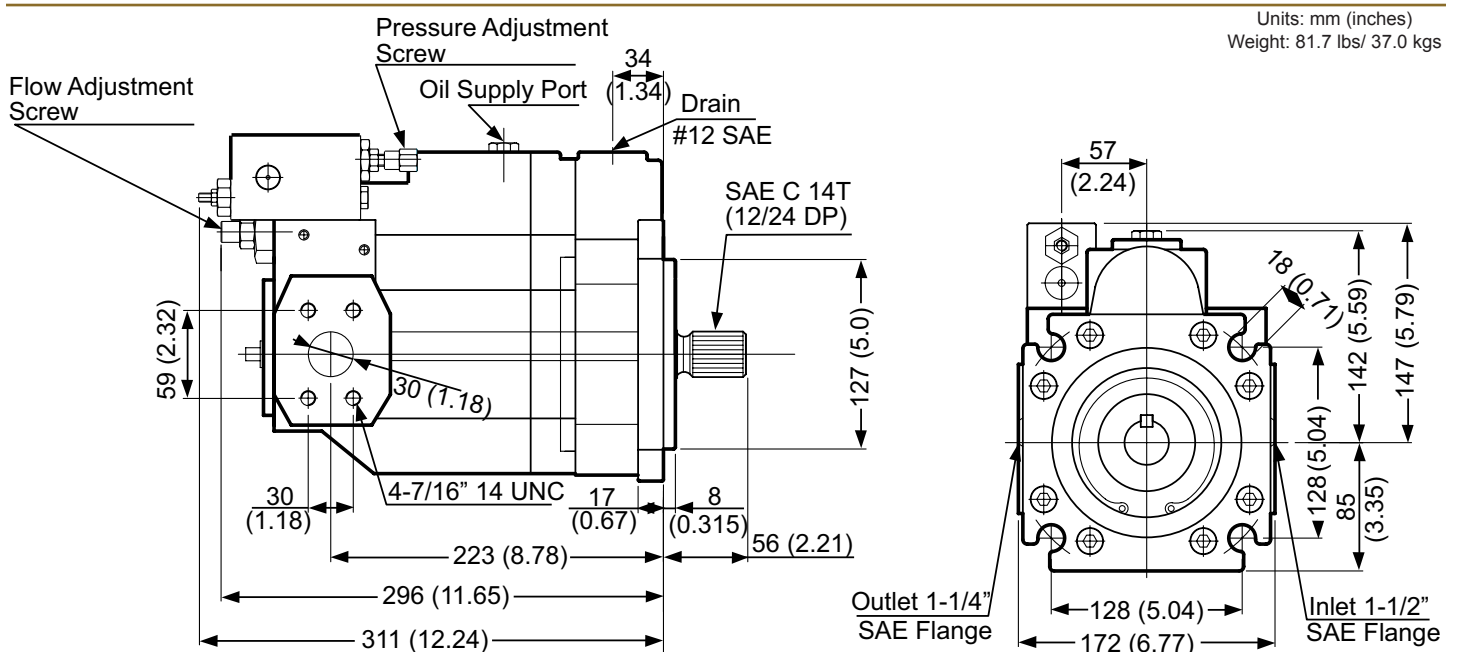


### Dimensional Data

#### PCP33-3K-4CK-2



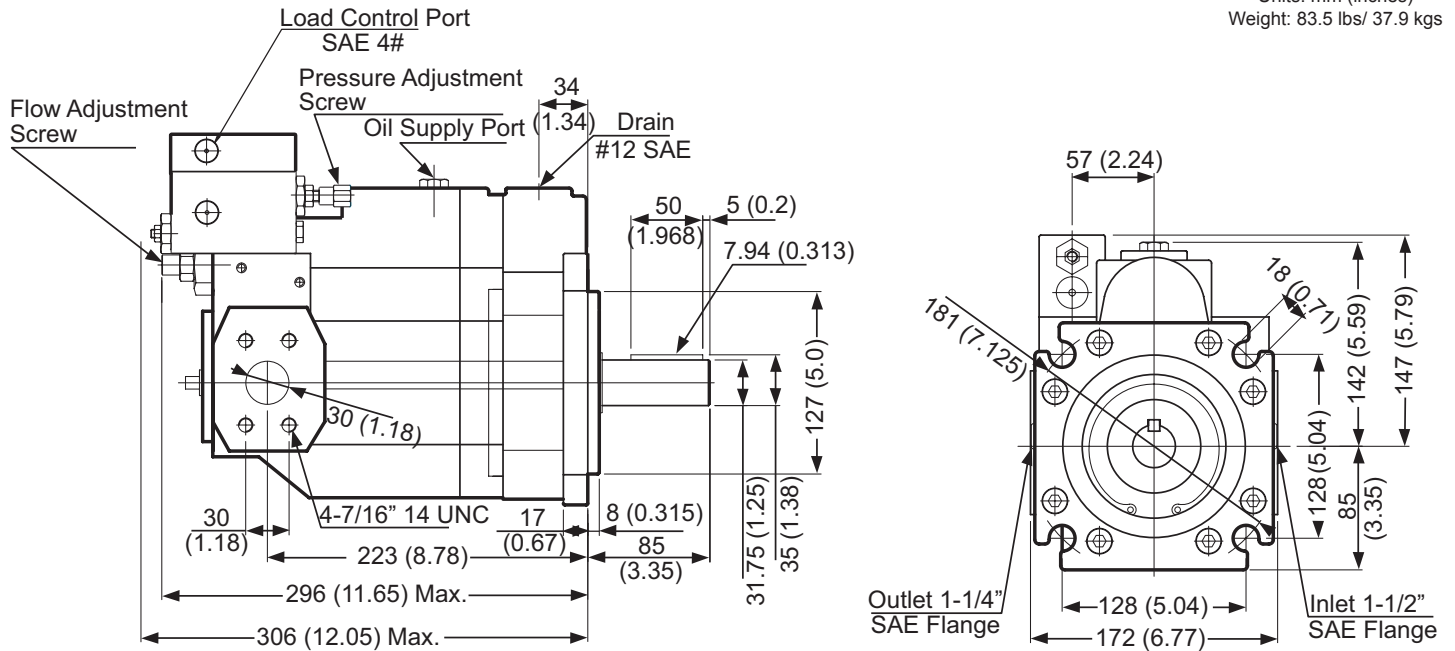
#### PCP33-3K-4CK-4CS-2



### Dimensional Data

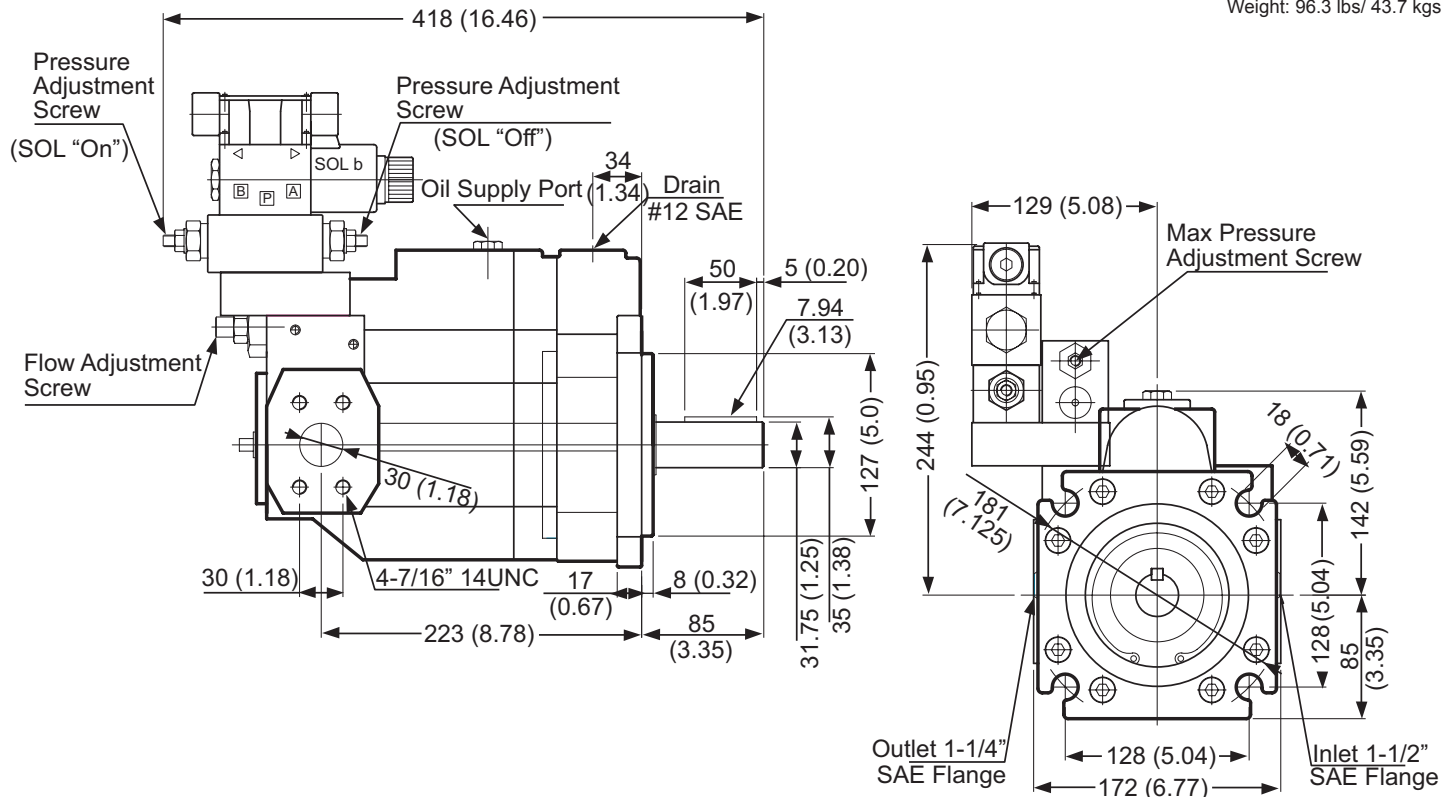
#### PCP33-3K-4CK-2-LS

Units: mm (inches)  
Weight: 83.5 lbs/ 37.9 kgs



#### PCP33-3K-4CK-2-2PSO

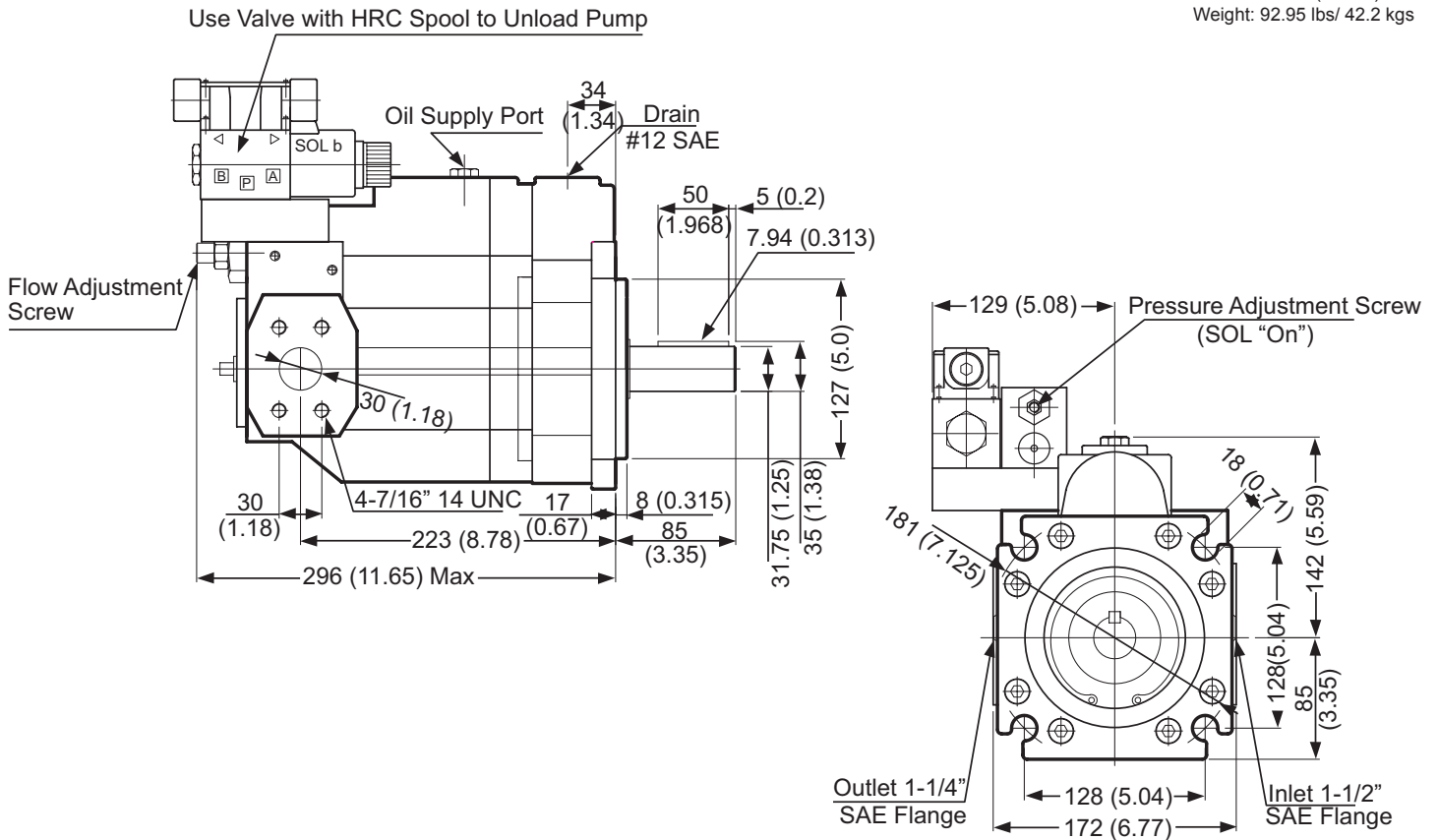
Units: mm (inches)  
Weight: 96.3 lbs/ 43.7 kgs



**Dimensional Data**

**PCP33-3K-4CK-2-SO**

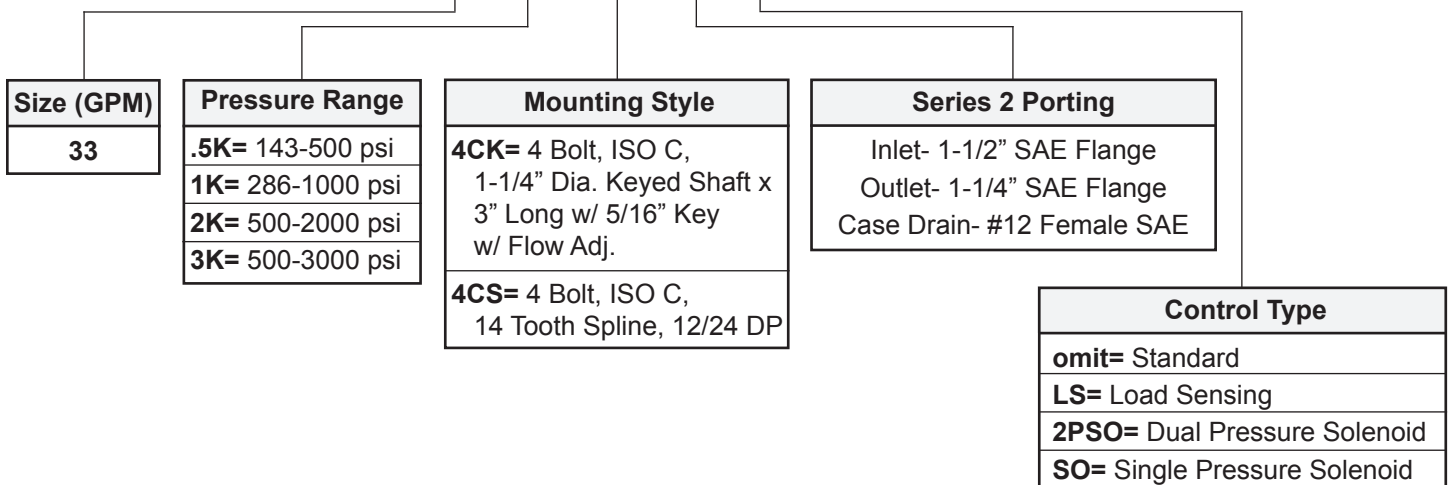
Units: mm (inches)  
Weight: 92.95 lbs/ 42.2 kgs

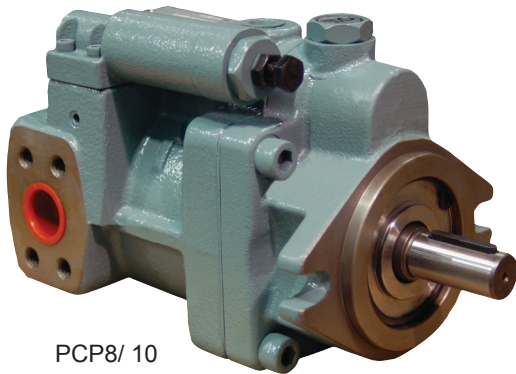


**Ordering Information**

**PCP33 - 3K - 4CK - 2 - LS**

Note: Available right hand rotation (only)- viewed facing pump shaft





PCP8/ 10

### Specifications

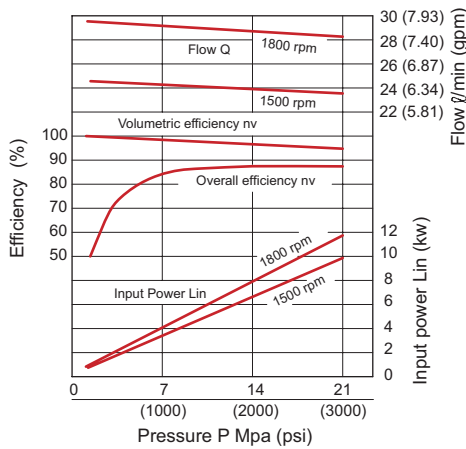
**PCP8** 1800 rpm, 7.8 gpm (at no load), 3000 psi max

Model	Pressure Range (psi)	Displacement per rev.	Flow @1800 rpm	Weight
PCP8-.5K-2AK-2	143-500	1.01 cu-in 16.5 cc	7.8 gpm (29.7 lpm)	23.0 lbs 10.5 kgs
PCP8-1K-2AK-2	286-1000			
PCP8-2K-2AK-2	500-2000			
PCP8-3K-2AK-2	500-3000			

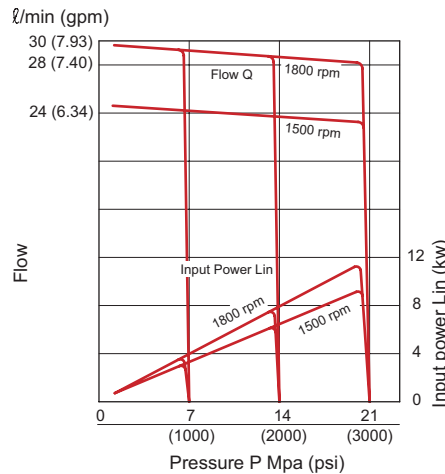
### Performance Data

Typical performance curves based on ISO VG32 Oil @ 120°F, (49°C)

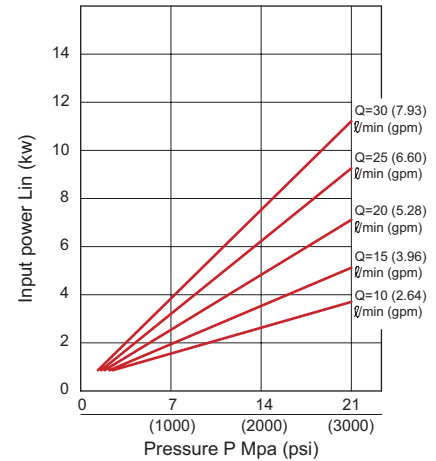
#### Efficiency Curves



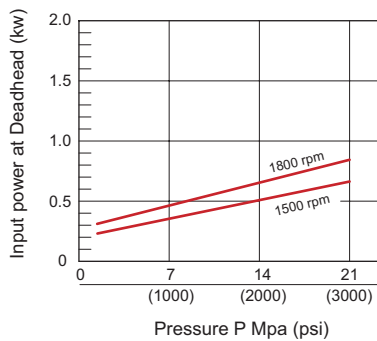
#### Pressure vs Flow



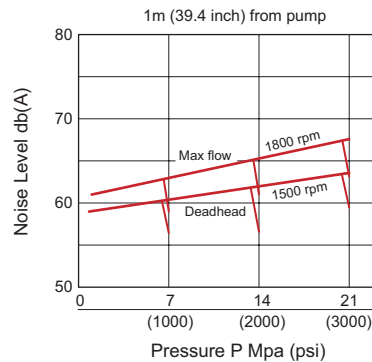
#### Power Input



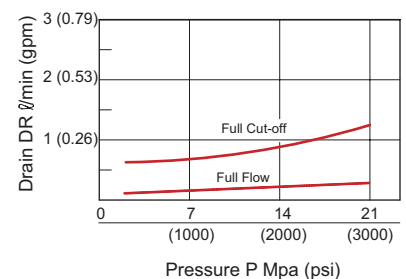
#### Deadhead Power



#### Noise Level



#### Drain Curve



### Specifications

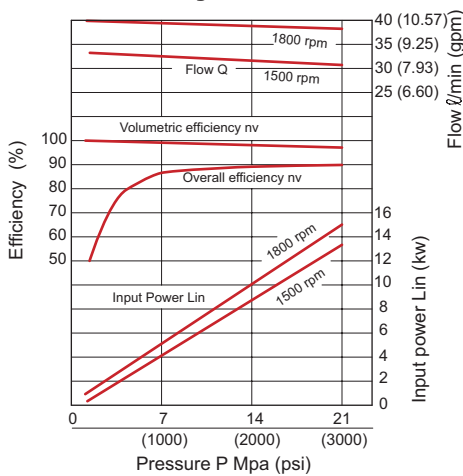
**PCP10** 1800 rpm, 10.5 gpm (at no load), 3000 psi max

Model	Pressure Range (psi)	Displacement per rev.	Flow @1800 rpm	Weight
PCP10-.5K-2AK-2	143-500	1.34 cu-in 22.2 cc	10.5 gpm (39.6 lpm)	23.0 lbs 10.5 kgs
PCP10-1K-2AK-2	286-1000			
PCP10-2K-2AK-2	500-2000			
PCP10-3K-2AK-2	500-3000			

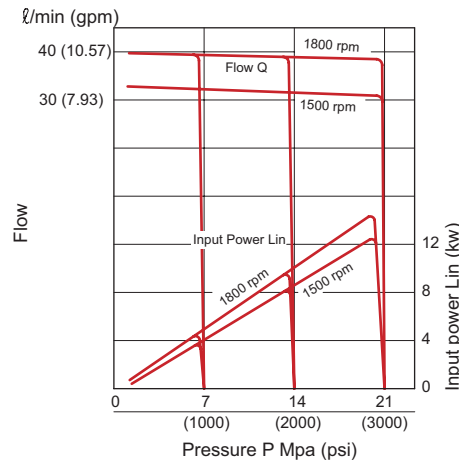
### Performance Data

Typical performance curves based on ISO VG32 Oil @ 120°F, (49°C)

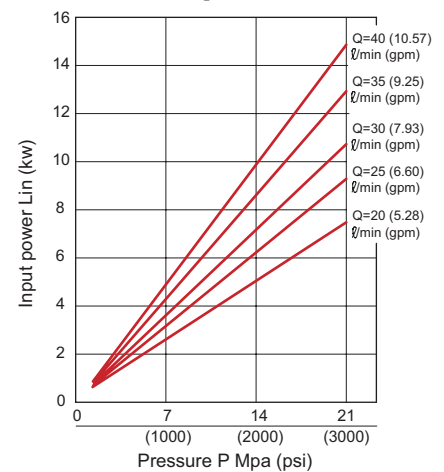
#### Efficiency Curves



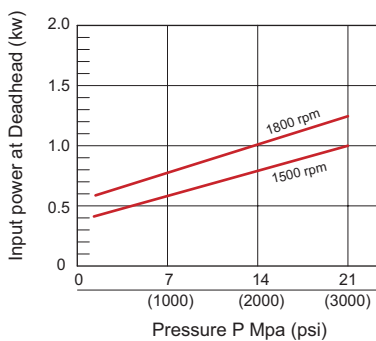
#### Pressure vs Flow



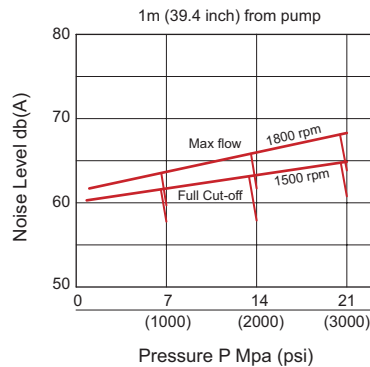
#### Power Input



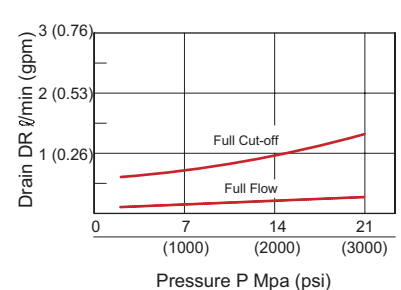
#### Deadhead Power



#### Noise Level



#### Drain Curve

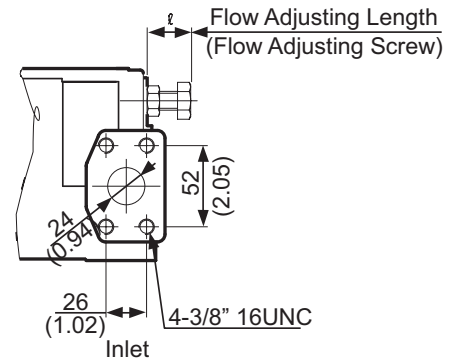
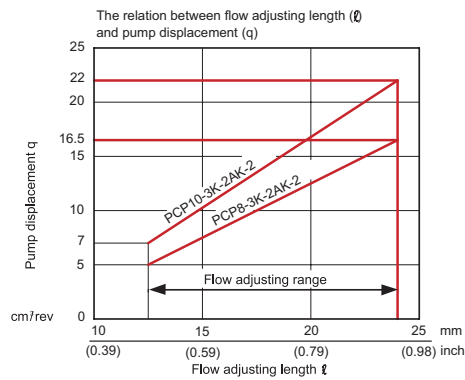
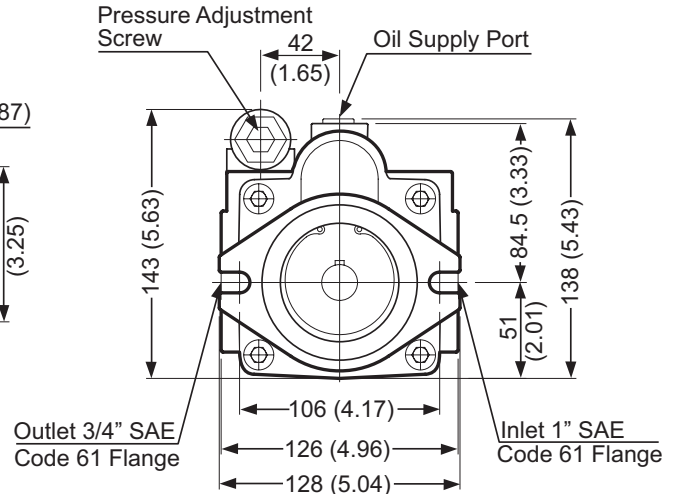
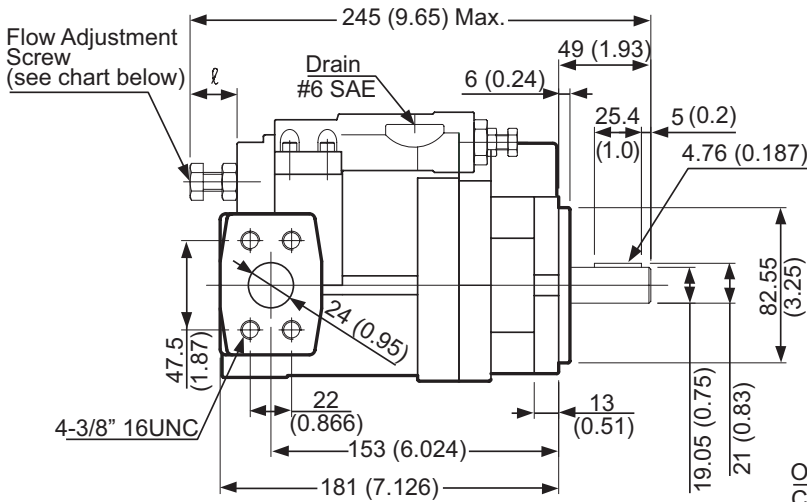




### Dimensional Data

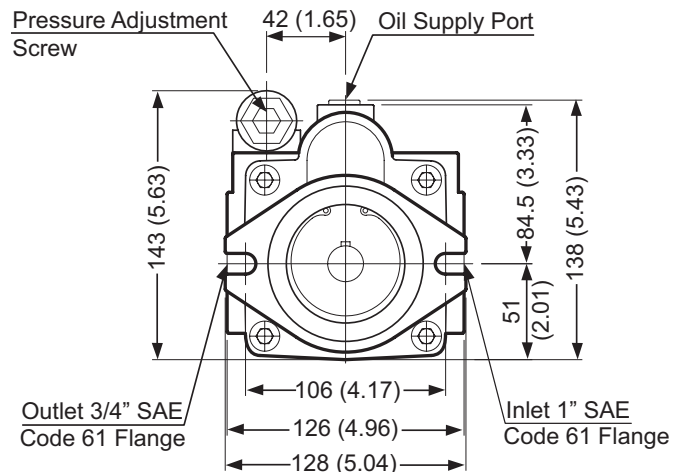
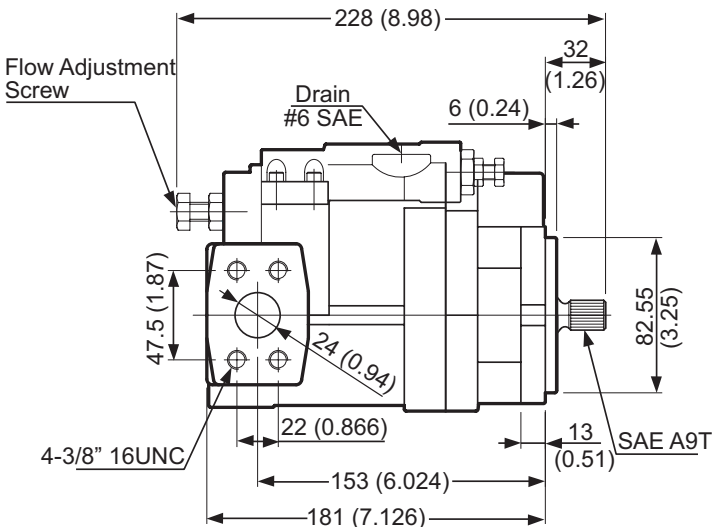
#### PCP8/10-3K-2AK-2

Units: mm (inches)  
Weight: 23.0 lbs/ 10.5 kgs



#### PCP8/10-3K-2AS-2

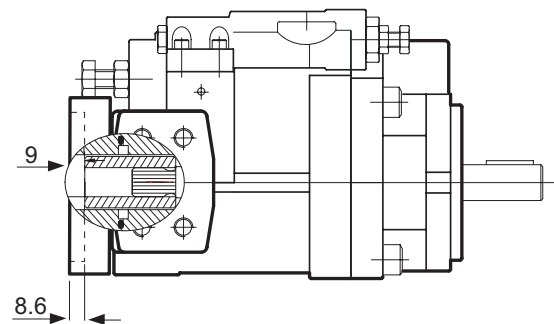
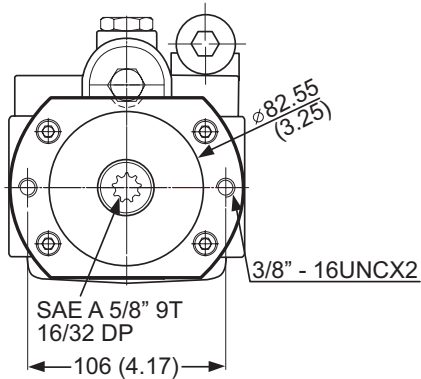
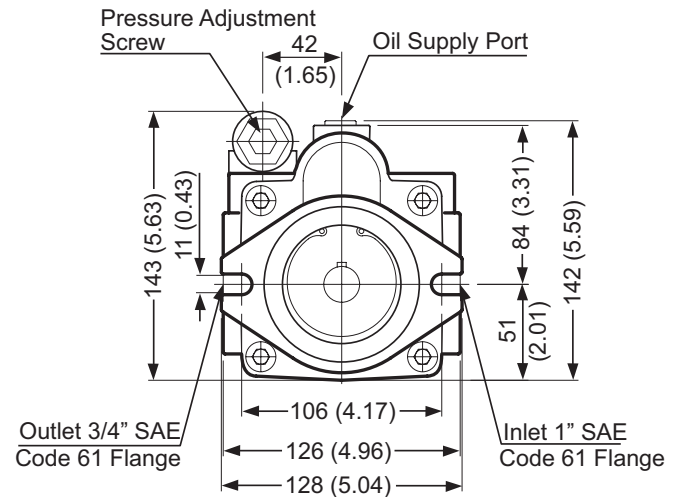
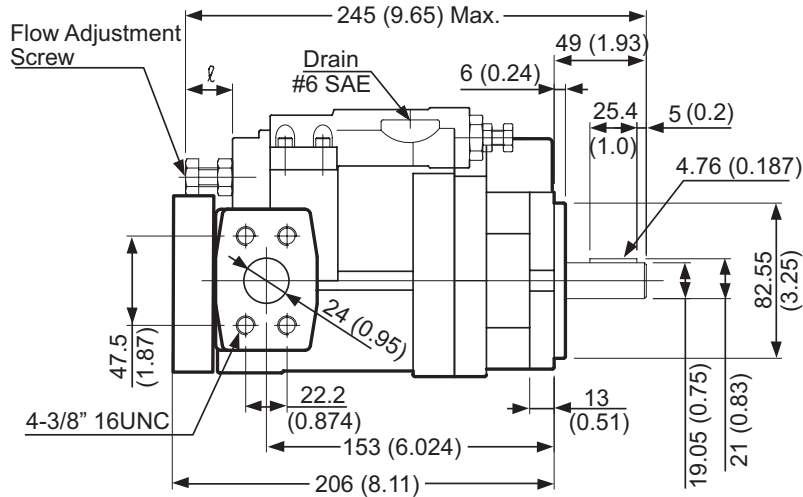
Units: mm (inches)  
Weight: 23.0 lbs/ 10.5 kgs



**Dimensional Data**

**PCP8/10-3K-2AK-2AS-2**

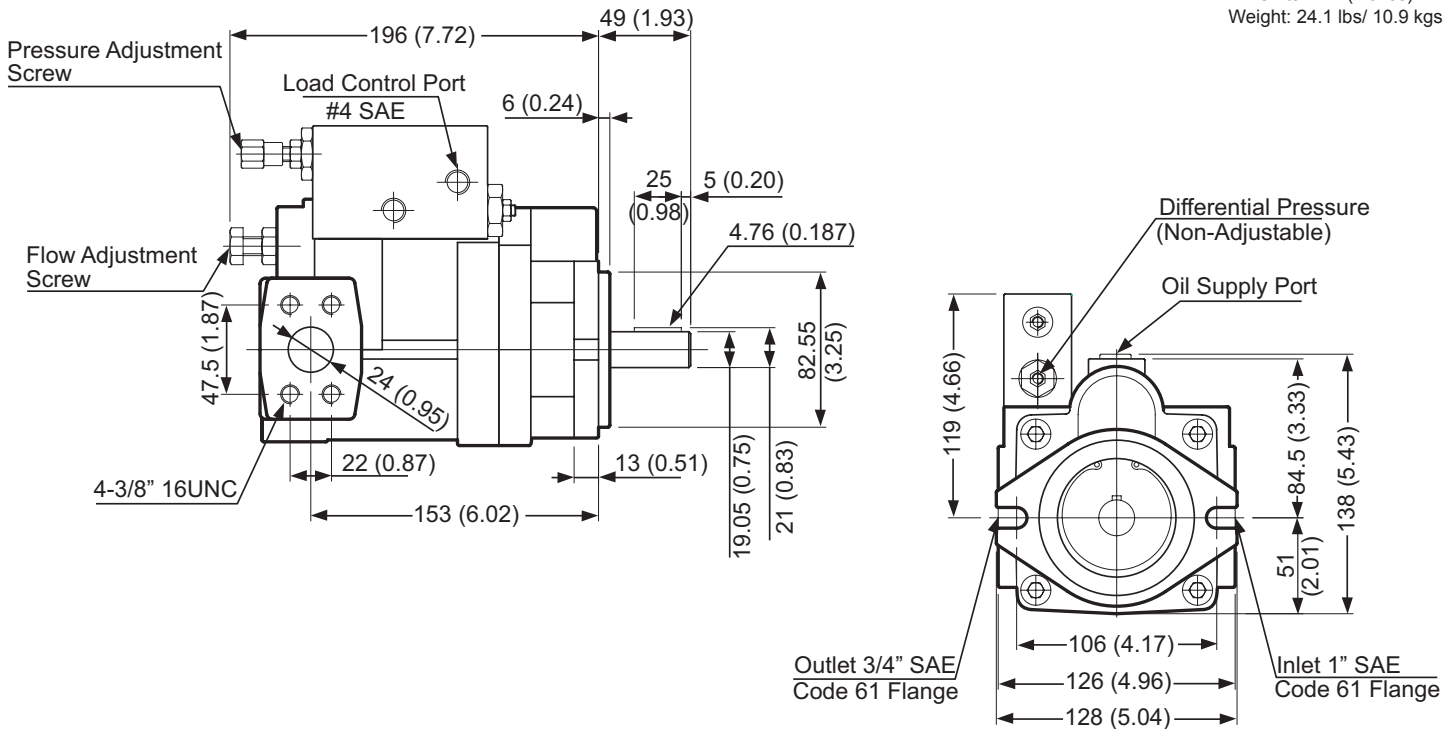
Units: mm (inches)  
Weight:



### Dimensional Data

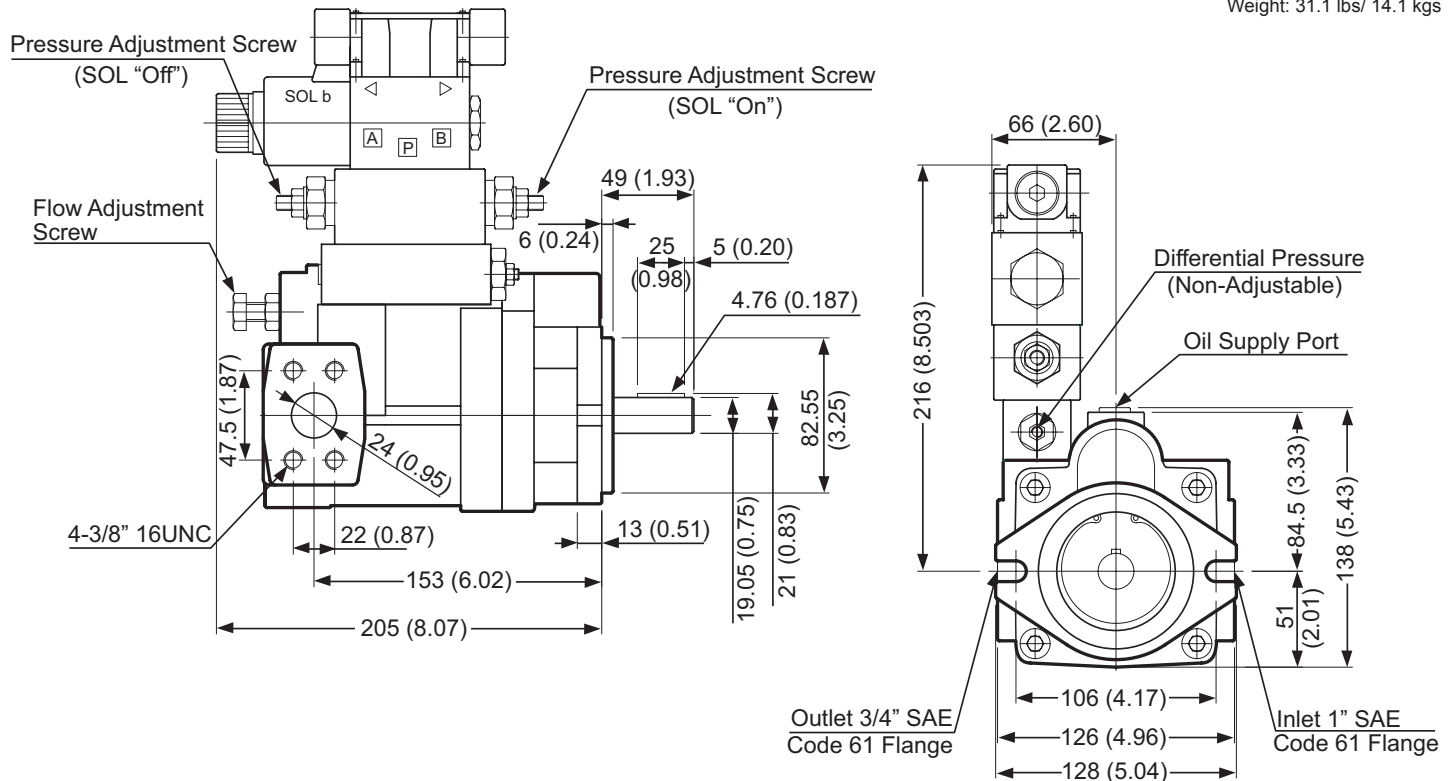
#### PCP8/10-3K-2AK-2-LS

Units: mm (inches)  
Weight: 24.1 lbs/ 10.9 kgs



#### PCP8/10-3K-2AK-2-2PSO

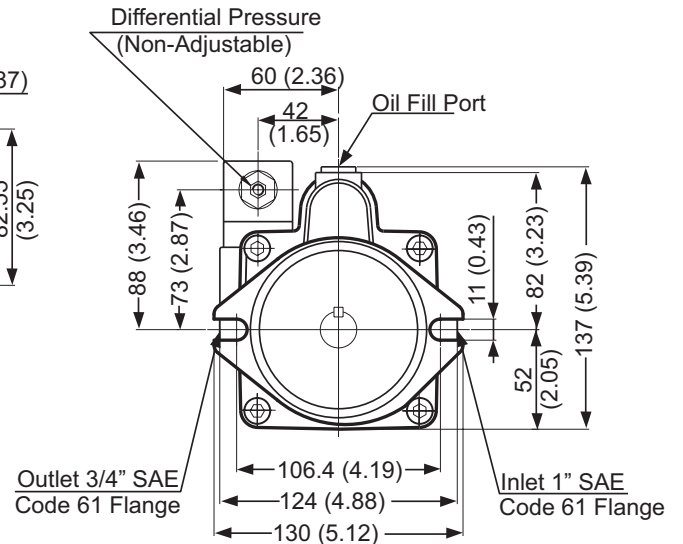
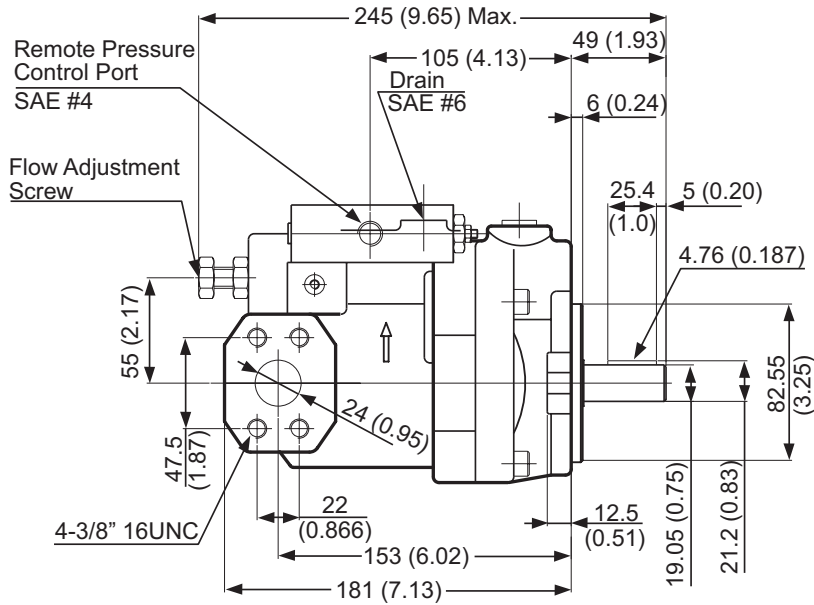
Units: mm (inches)  
Weight: 31.1 lbs/ 14.1 kgs



### Dimensional Data

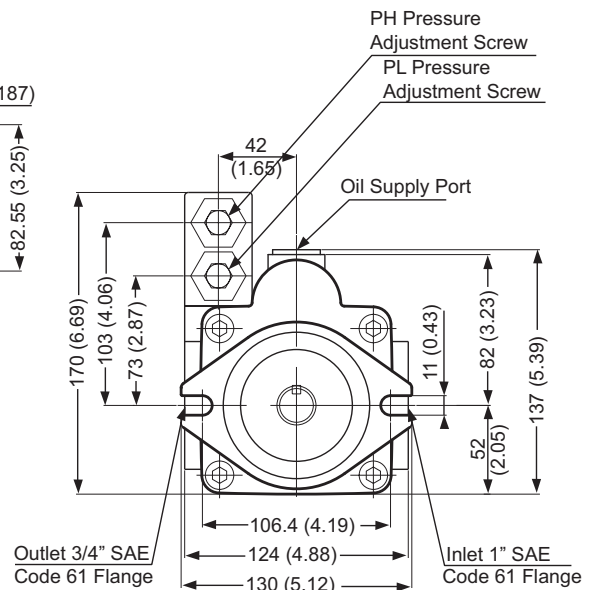
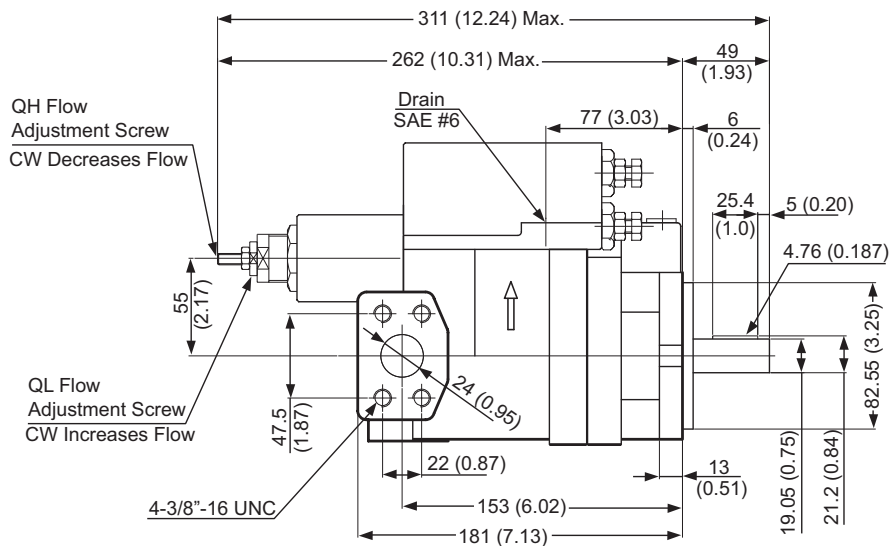
#### PCP8/10-3K-2AK-2-RC

Units: mm (inches)  
Weight: 23.0 lbs/ 10.5 kgs



#### PCP8/10-3K-2AK-2-2P2F

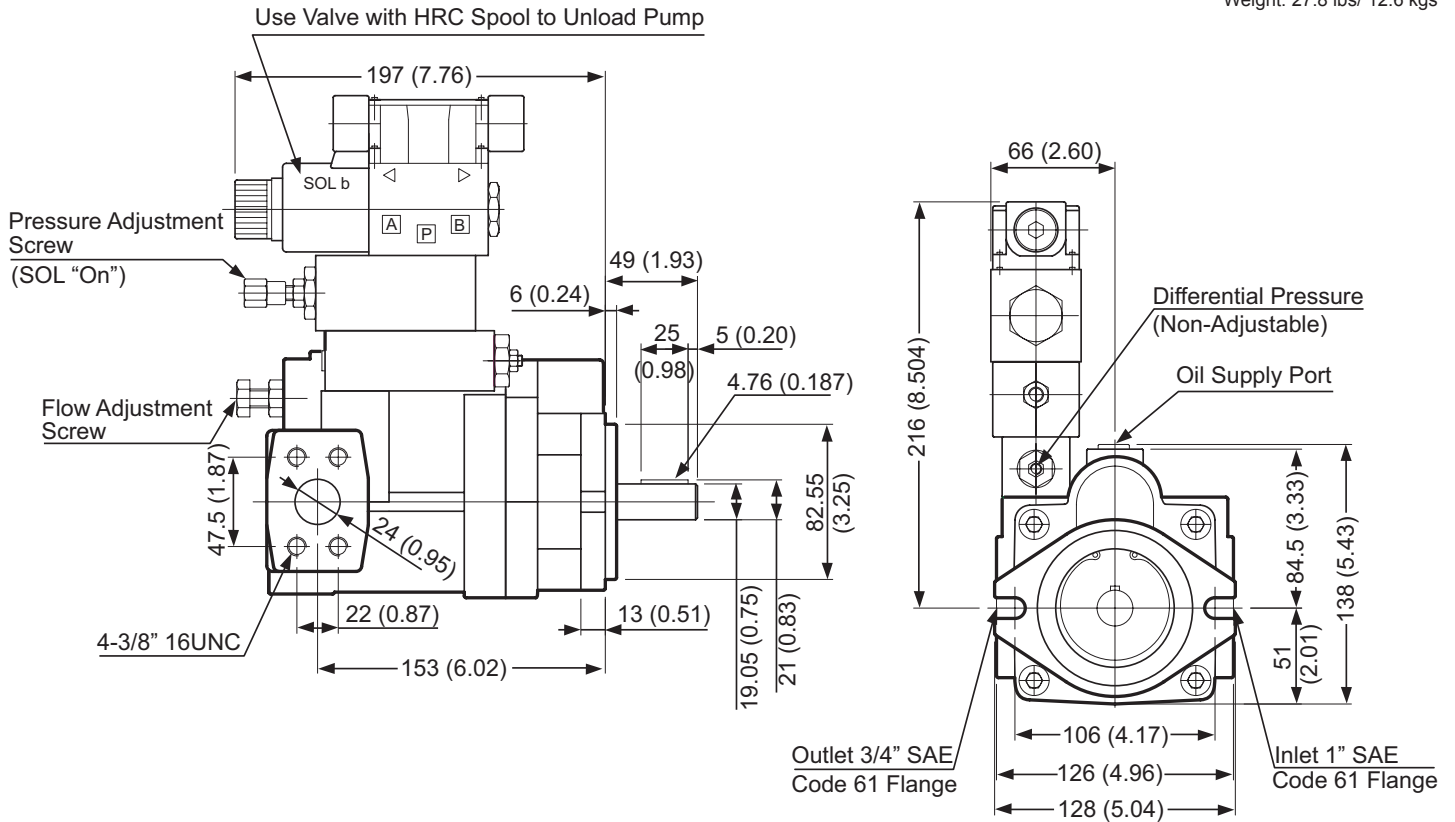
Units: mm (inches)  
Weight: 23.0 lbs/ 10.5 kgs



### Dimensional Data

#### PCP8/10-3K-2AK-2-SO

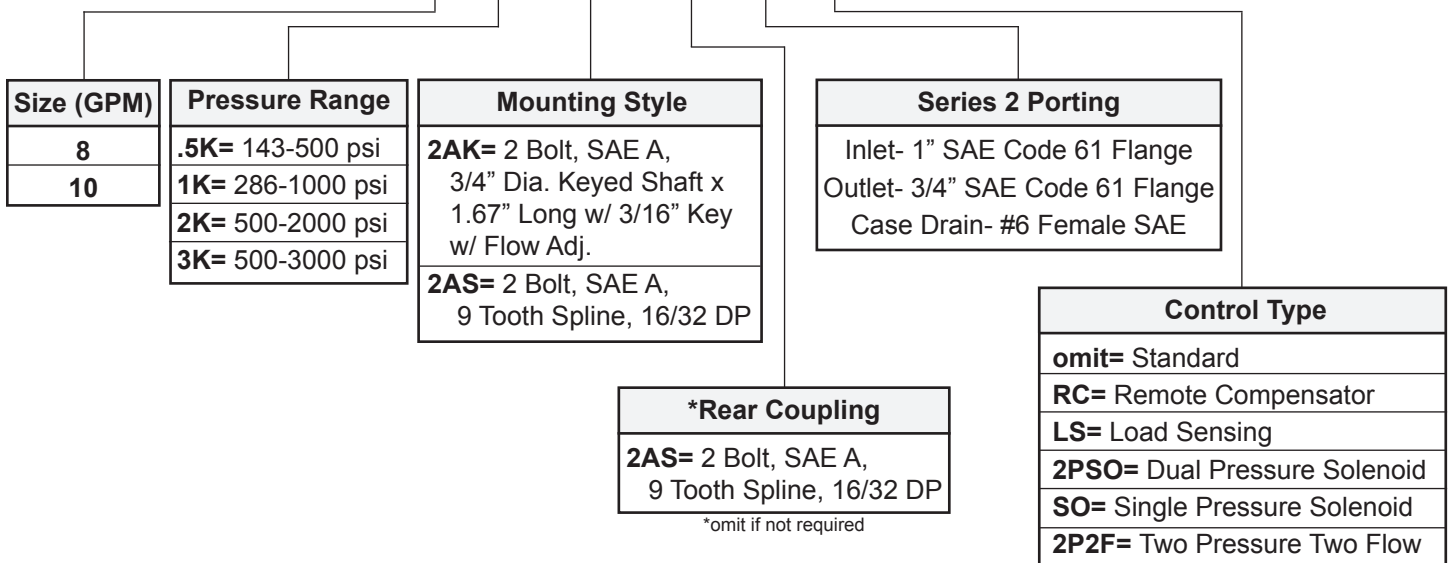
Units: mm (inches)  
Weight: 27.8 lbs/ 12.6 kgs

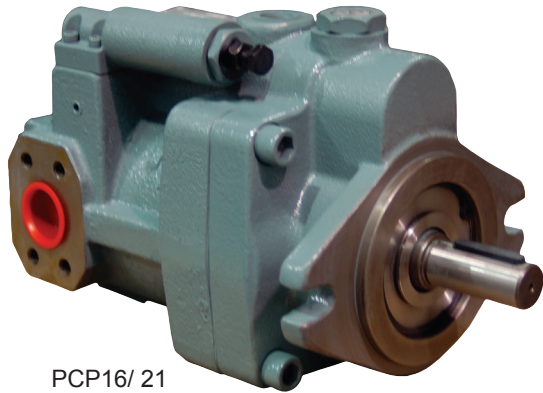


### Ordering Information

#### PCP8 - 3K - 2AK - 2AS - 2 - RC

Note: Available right hand rotation (only)- viewed facing pump shaft





PCP16/ 21

### Specifications

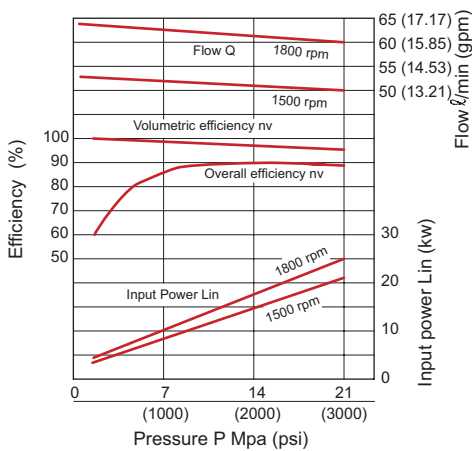
**PCP16** 1800 rpm, 16.6 gpm (at no load), 3000 psi max

Model	Pressure Range (psi)	Displacement per rev.	Flow @1800 rpm	Weight
PCP16-.5K-2BK-2	143-500	2.14 cu-in 35.0 cc	16.6 gpm (63.0 lpm)	51.0 lbs 23.0 kgs
PCP16-1K-2BK-2	286-1000			
PCP16-2K-2BK-2	500-2000			
PCP16-3K-2BK-2	500-3000			

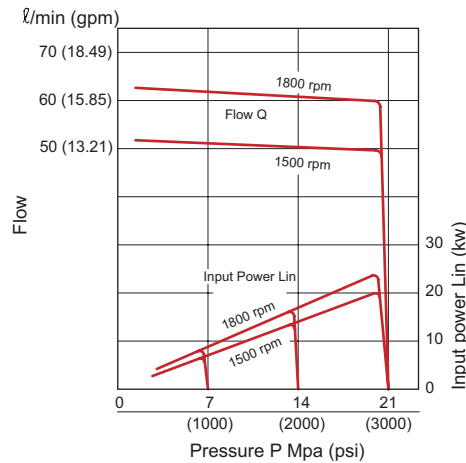
### Performance Data

Typical performance curves based on ISO VG32 Oil @ 120°F, (49°C)

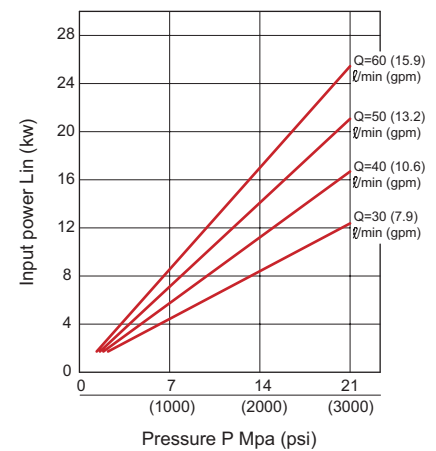
#### Efficiency Curves



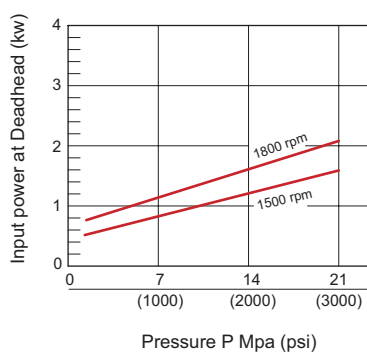
#### Pressure vs Flow



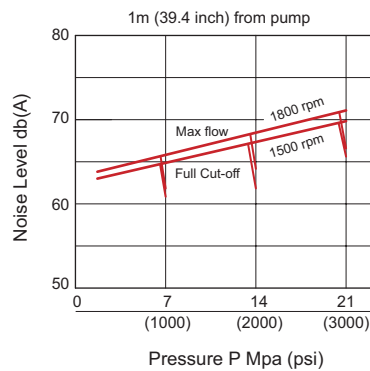
#### Power Input



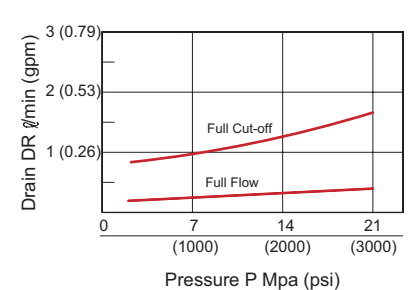
#### Deadhead Power



#### Noise Level



#### Drain Curve



**Specifications**

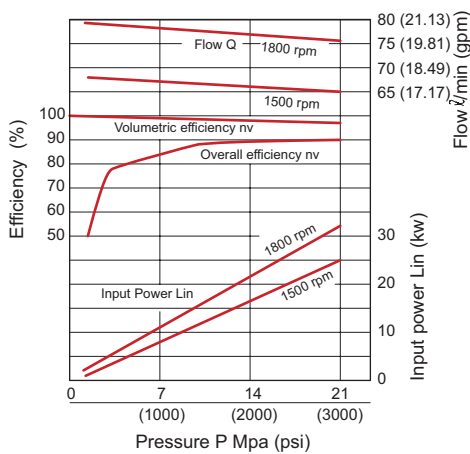
**PCP21** 1800 rpm, 21.5 gpm (at no load), 3000 psi max

Model	Pressure Range (psi)	Displacement per rev.	Flow @1800 rpm	Weight
PCP21-.5K-2BK-2	143-500	2.76 cu-in 45.0 cc	21.5 gpm (81.0 lpm)	51.0 lbs 23.0 kgs
PCP21-1K-2BK-2	286-1000			
PCP21-2K-2BK-2	500-2000			
PCP21-3K-2BK-2	500-3000			

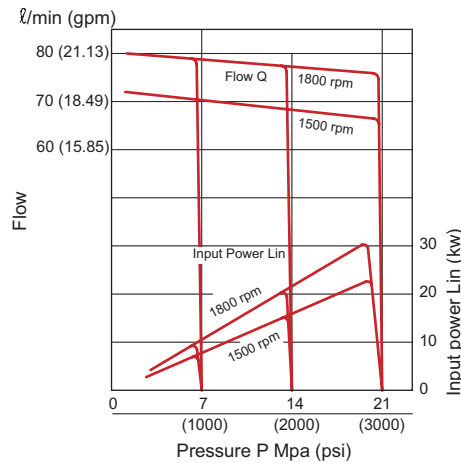
**Performance Data**

Typical performance curves based on ISO VG32 Oil @ 120°F, (49°C)

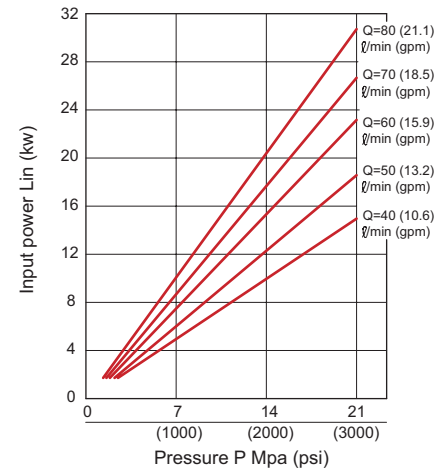
**Efficiency Curves**



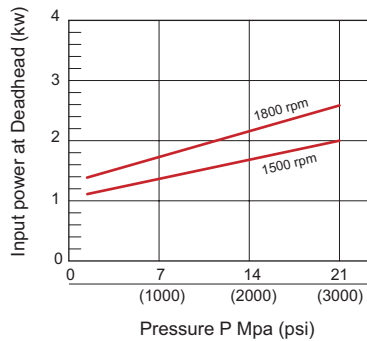
**Pressure vs Flow**



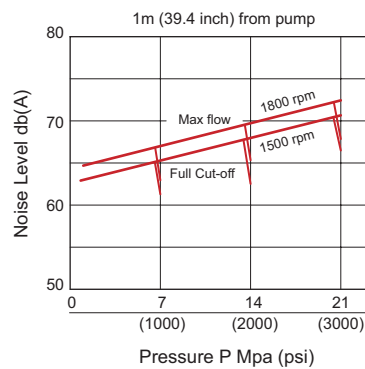
**Power Input**



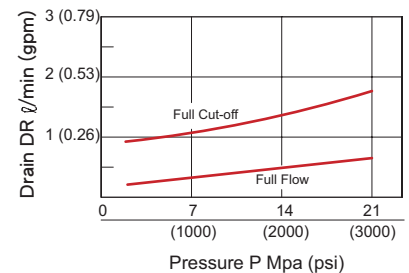
**Deadhead Power**



**Noise Level**



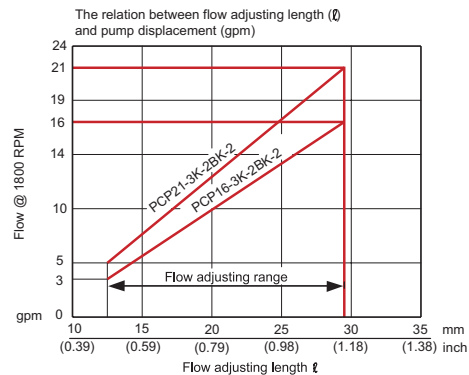
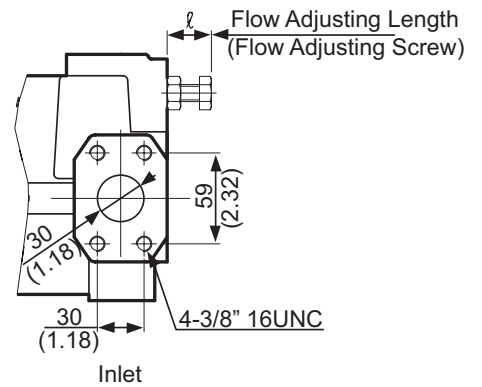
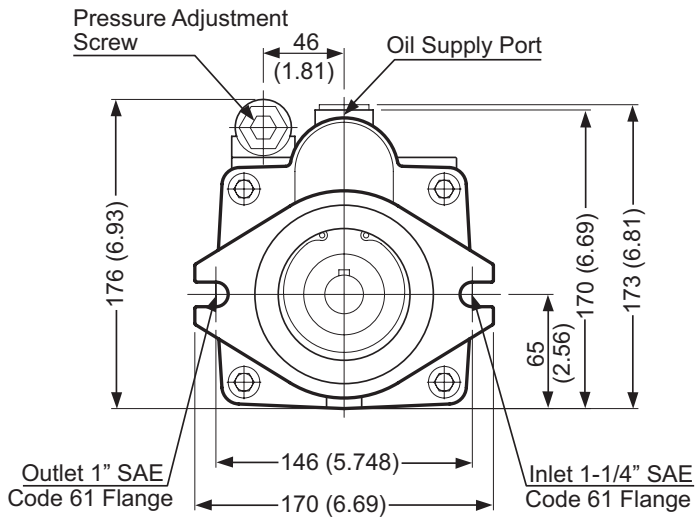
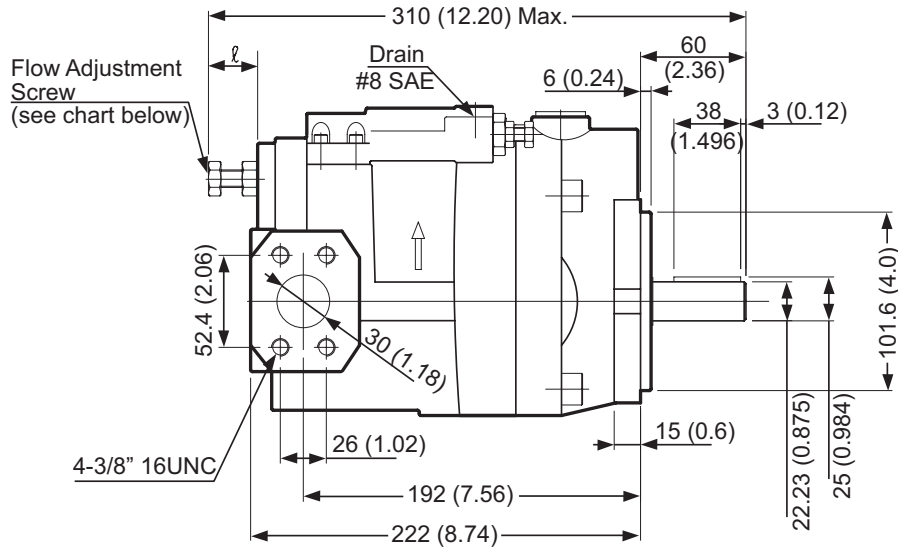
**Drain Curve**



### Dimensional Data

#### PCP16/21-3K-2BK-2

Units: mm (inches)  
Weight: 51.0 lbs/ 23.0 kgs

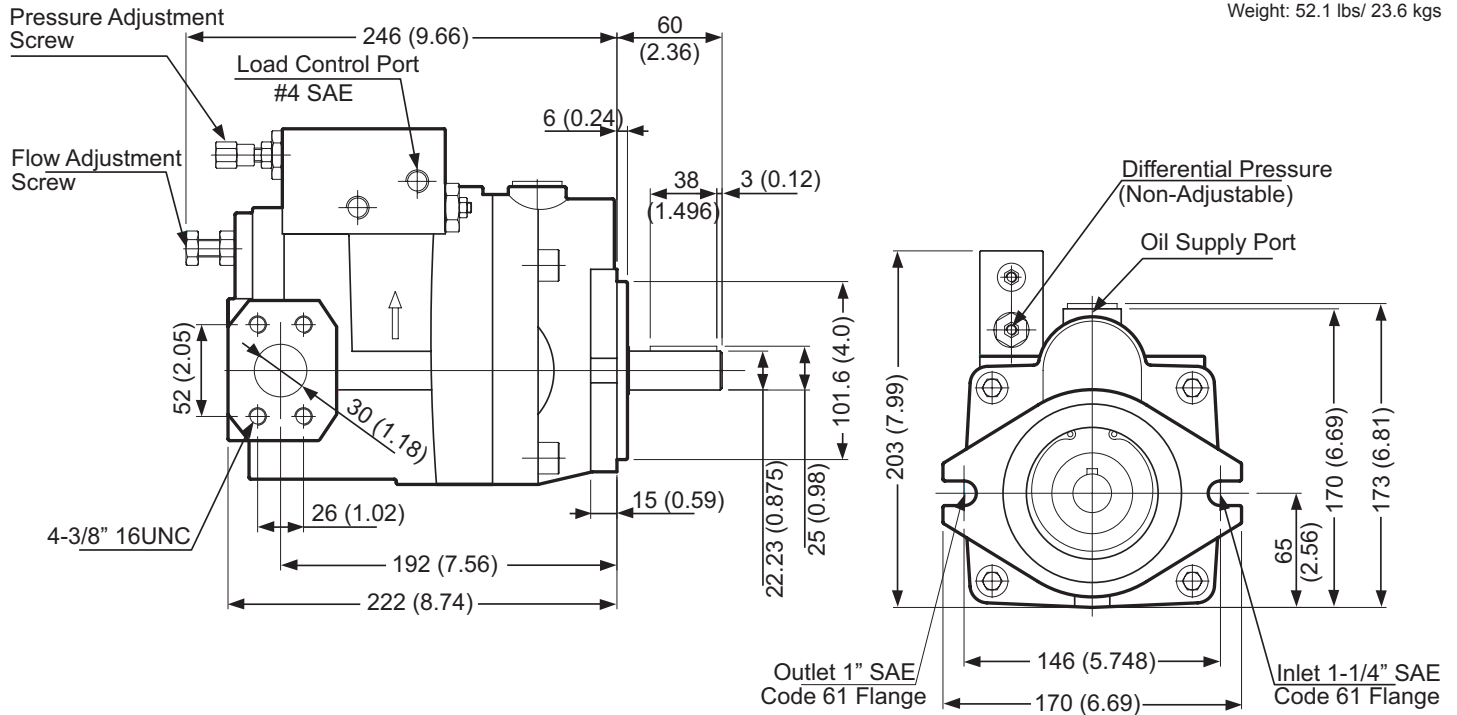




### Dimensional Data

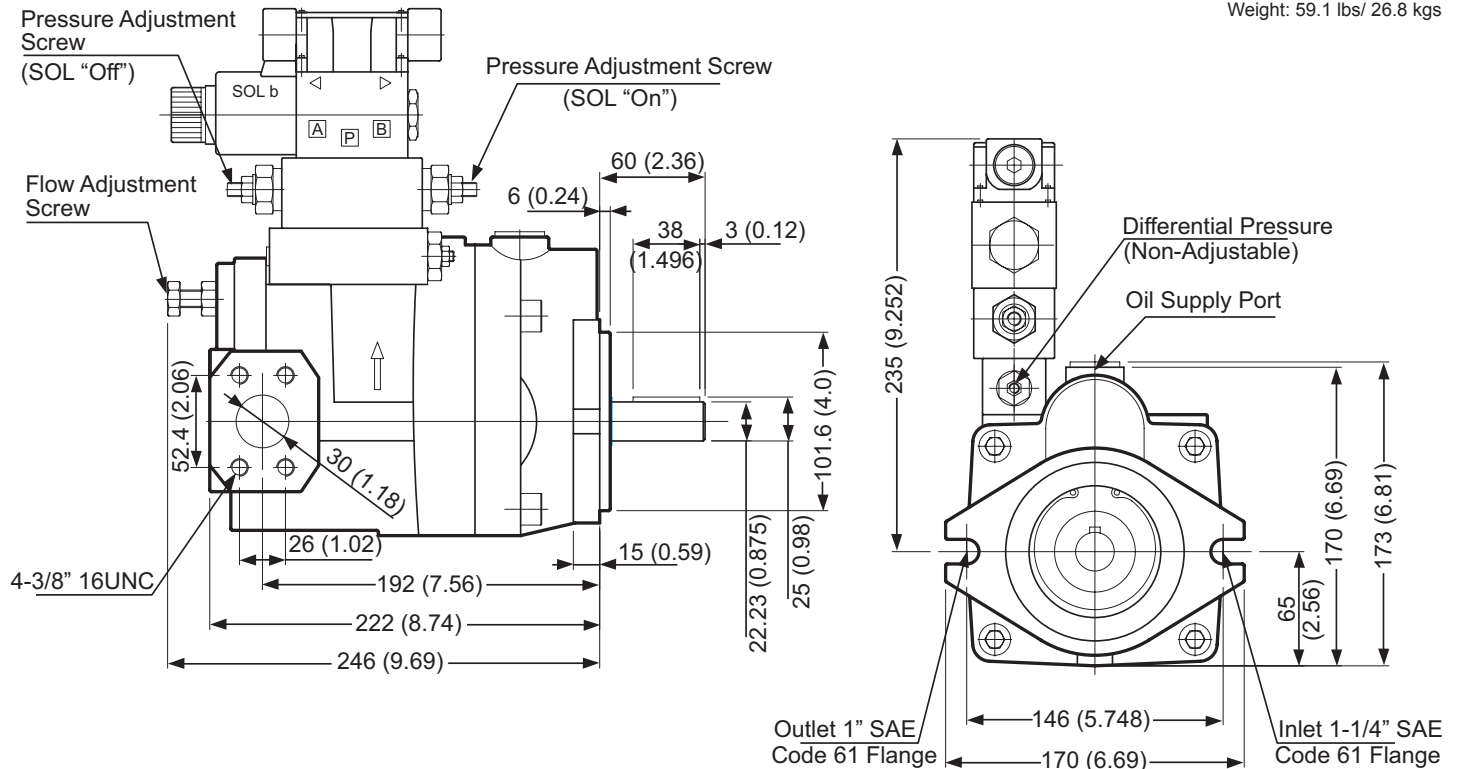
#### PCP16/21-3K-2BK-2-LS

Units: mm (inches)  
Weight: 52.1 lbs/ 23.6 kgs



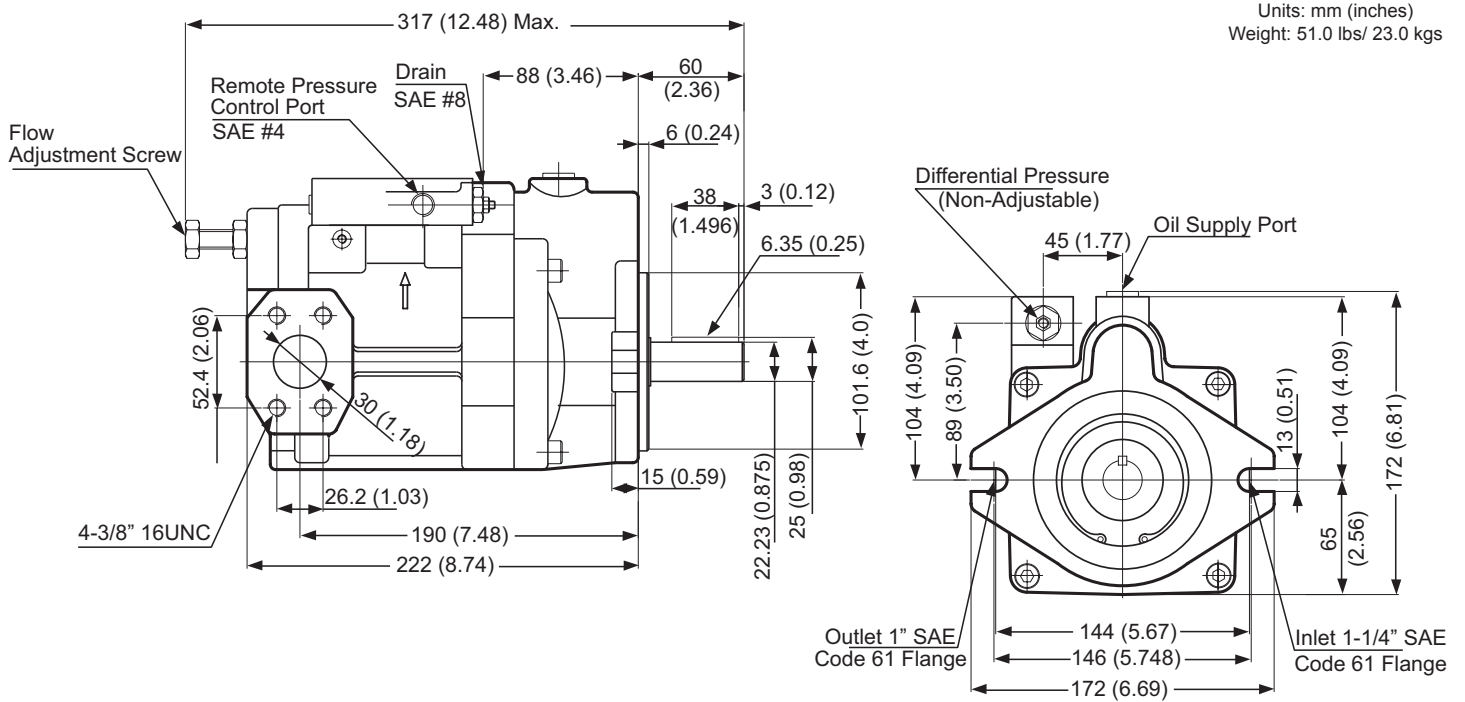
#### PCP16/21-3K-2BK-2-2PSO

Units: mm (inches)  
Weight: 59.1 lbs/ 26.8 kgs

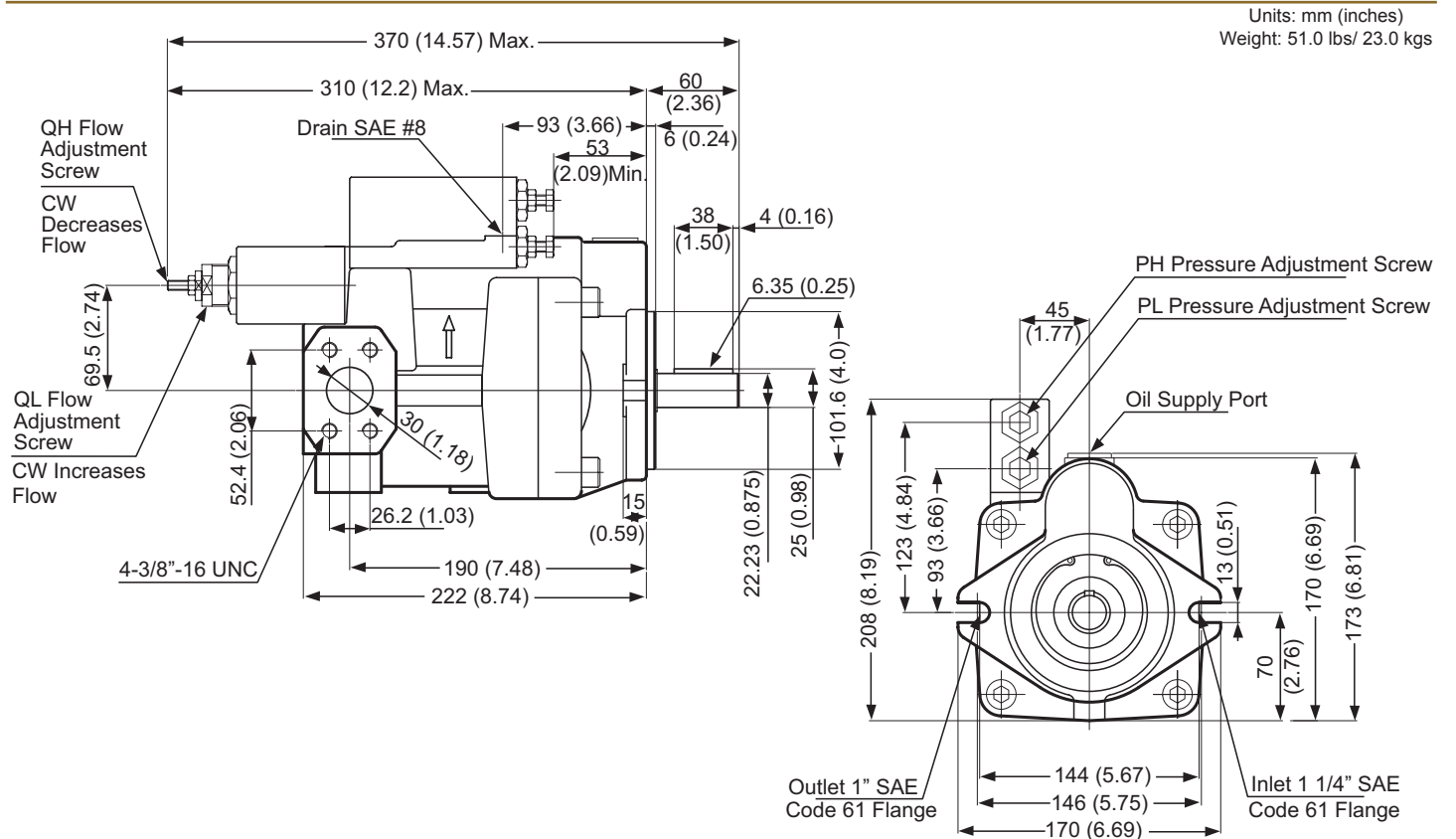


### Dimensional Data

#### PCP16/21-3K-2BK-2-RC



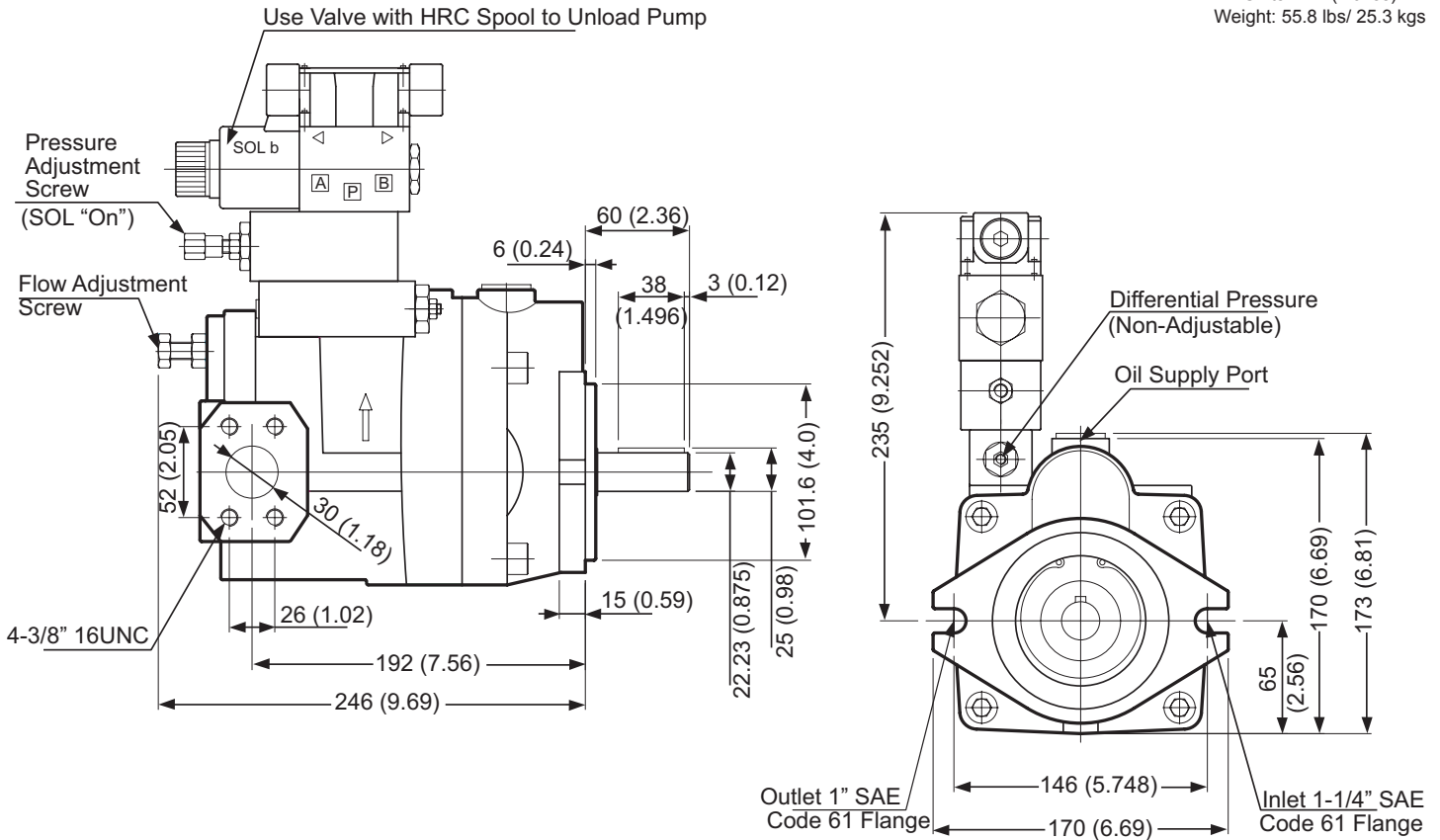
#### PCP16/21-3K-2BK-2-2P2F



### Dimensional Data

#### PCP16/21-3K-2BK-2-SO

Units: mm (inches)  
Weight: 55.8 lbs/ 25.3 kgs



### Ordering Information

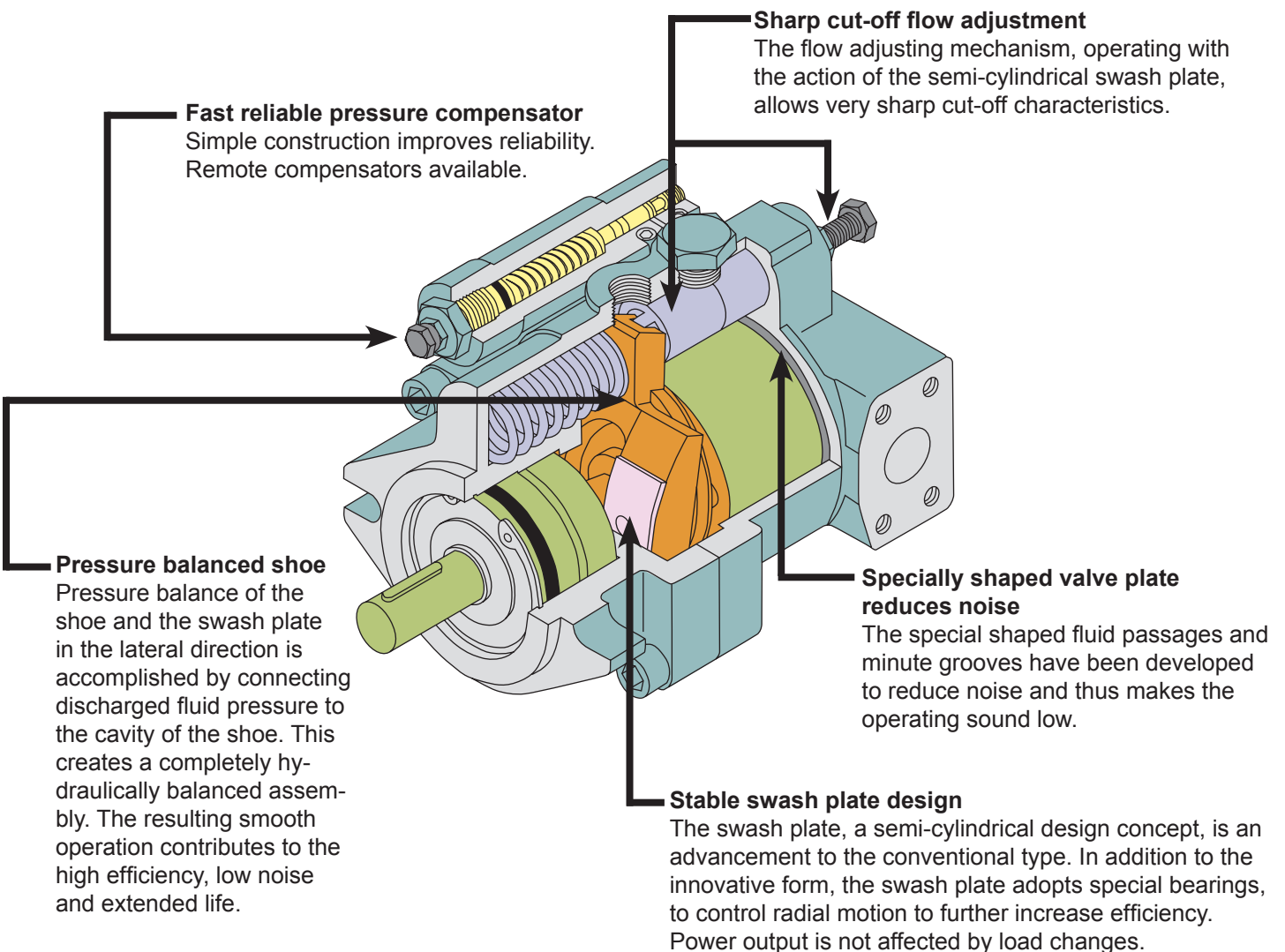
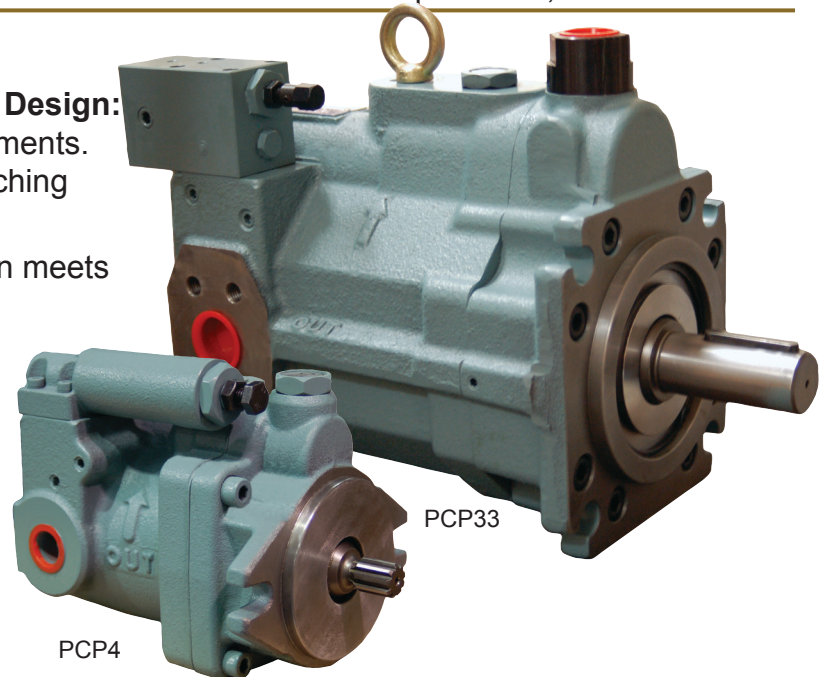
#### PCP16 - 3K - 2BK - 2 - LS

Note: Available right hand rotation (only)- viewed facing pump shaft

Size (GPM)	Pressure Range	Mounting Style	Series 2 Porting	Control Type
16	.5K= 143-500 psi	2BK= 2 Bolt, SAE B, 7/8" Dia. Keyed Shaft x 2.125" Long w/ 1/4" Key w/ Flow Adj.	Inlet- 1-1/4" SAE Code 61 Flange Outlet- 1" SAE Code 61 Flange Case Drain- #8 Female SAE	omit= Standard
21	1K= 286-1000 psi			RC= Remote Compensator
	2K= 500-2000 psi			LS= Load Sensing
	3K= 500-3000 psi			2PSO= Dual Pressure Solenoid
				SO= Single Pressure Solenoid
				2P2F= Two Pressure Two Flow

## Features

- **Variable Volume, Pressure Compensated Design:** Reduces heat, noise and horsepower requirements. Pump maintains constant pressure while matching system flow demands.
- **Super Quiet Operation:** Swash plate design meets low noise demands.
- **Compact and Simple Design:** Dependable operation-compensator not prone to contamination.
- **Long Service Life:** Sturdy construction, precise machining ensures durability.
- **Volume Adjustment Standard:** Pump flow may be varied to match system requirements.





## Notes

### Notes On Pump Installation

1. A flexible coupling to connect the drive shaft and pump shaft is recommended so that minimum radial and thrust loads are applied to the pump shaft.
2. The alignment of the pump shaft with the drive shaft should be within 0.002 in. The eccentric angle should be within one degree.
3. The length of the coupling on the pump shaft should be more than two-thirds the width of the coupling.
4. The pump mounting base should be rigid structure.
5. The pump suction pressure should not exceed -4.3psi (the suction port flow velocity less than 6.5 ft/sec).
6. The pump should be mounted with the drain port at a position to maintain fluid in the pump case. The drain back pressure should be less than 14.3 psi.

### Fluid Conditions

1. Use good quality petroleum fluid. The fluid viscosity should be 20 – 200 cSt (98 - 900 SUS). For general use, R&O type and anti-wear type of ISO VG32 and 68 are recommended. The optimum viscosity during operation in 20 – 50 cSt (98 – 232 SUS).
2. Operating temperature range is 41 – 140 F. During start up at temperature below 32 F, perform warmup operations at a low pressure and low speed and do not flow the pump until fluid temperature reaches (41F).
3. Use a suction strainer with a filtering level of 100u \*150 mesh). Use a 20u line and magnet filters to extend the life of the pump.

### Precautions When Starting

1. Before starting the pump, fill the pump case with fluid.

Hydraulic fluid case capacities:

Model	Capacity
PCP4	13.4 cu-in
PCP8, PCP10	18.3 cu-in
PCP16, PCP21	30.5 cu-in

2. Make certain the pump turns in the direction indicated by the arrow- Clockwise facing the shaft.
3. Entrained air in the pump and piping will cause noise and vibrations. (We recommend a flooded suction when possible.) On initial start-up; start the pump unloaded over the relief at low pressure to bleed air. Raise the relief and set the pump pressure compensator. Note: The system relief is used as a safety should always be set at least 10% above the pump's pressure. Thereafter, if your circuit is difficult to purge the air at starting, we recommend use of an air bleed valve in your circuit.

### Setting the Pressure and Flow Rate

The flow rate is set at maximum and the pressure is set at minimum at the factory.

Pressure adjustment: turn the pressure adjusting screw clockwise to increase pressure.

Flow rate adjustment: turn the flow adjusting screw clockwise to decrease the flow rate.

Minimum Flow settings:

Model	Flow
PCP4	2 gpm
PCP8	4 gpm
PCP10	5 gpm
PCP16	8 gpm
PCP21	10 gpm
PCP33	16 gpm

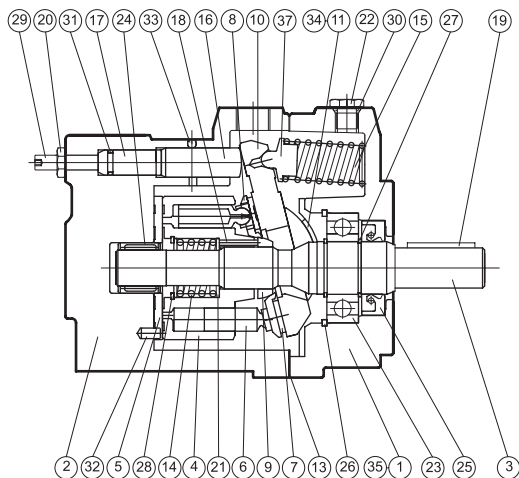


## Control Type

Symbol	External View	Performance Curves	Hydraulic Circuit	Description
<b>PC</b>				<p><b>Pressure Compensating Control (Standard)</b></p>
<b>RC</b>				<p><b>Remote Compensator Control</b></p> <p>The pressure can be controlled according to the pilot pressure.</p> <p>The flow can be controlled manually.</p>
<b>2P2F</b>				<p><b>Two Pressure Two Flow (High/Low) Control</b></p> <p>By means of the sequence valve, two stage flow rate can be obtained and each flow rate has the different pressure eventually enabling energy savings.</p>
<b>SO</b>				<p><b>Solenoid "On/Off" Control (Single Pressure)</b></p> <p>An unloading solenoid valve is used to minimize the lost energy when the pump output is not required.</p> <p>Reduces dead-head HP (Heat)</p>
<b>2PSO</b>				<p><b>Solenoid "On/Off" Control (Dual Pressure)</b></p> <p>By means of "On/Off" electrical control of D03 solenoid valve, two different pressure compensating settings can be obtained.</p>
<b>LS</b>				<p><b>Load Sensing Control</b></p> <p>The "LS" compensator is used for load sensing circuits and is a true load sensor. This is the "RC" compensator with a plug in the compensator spool. The plug prevents pilot flow from entering the circuit which will eliminate creeping of the load.</p> <p>The "LS" compensator will let the pump deliver a constant flow rate to the circuit by providing an adjustable P across the customer's orifice or valve. The pump will operate at 250-400 psi, (17.2~27.5 bar) above "Load Pressure".</p>

## Cross Section Drawing

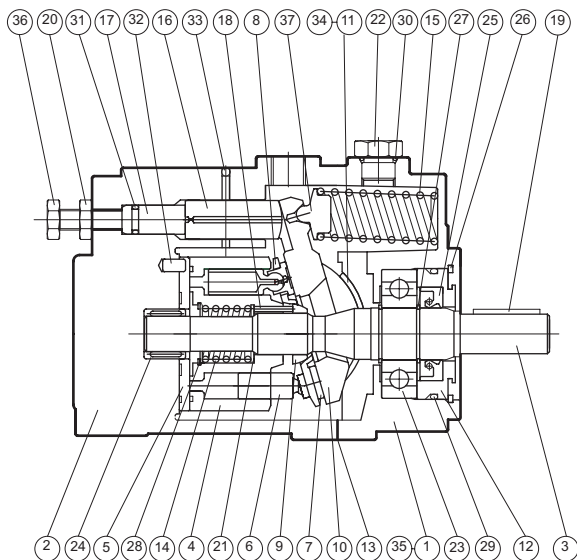
### PCP4-Type



### PCP4-Type

	PCP8/10-Type Size	Qty
13) Gasket	_____	1
23) Ball Bearing	6205	1
24) Needle Bearing	TA 1720	1
25) Oil Seal	TCN 25 45 11	1
30) O-Ring	P11	1
31) O-Ring	P9	1

### PCP8/10/16/21-Type



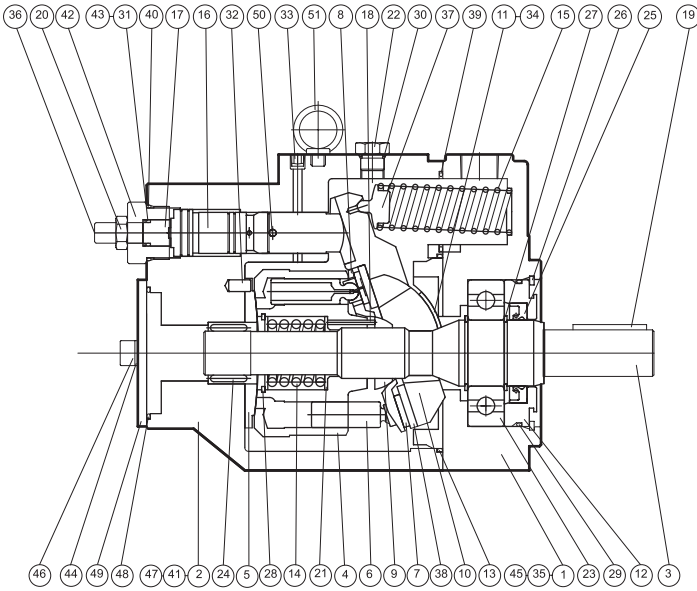
### PCP8/10/16/21-Type

	PCP8/10-Type Size	PCP16/21-Type Size	Qty
13) Gasket	_____	_____	1
23) Ball Bearing	6305	6306	1
24) Needle Bearing	TA 1720	TA 2025	1
25) Oil Seal	TCN 25 45 11	TCN 30 50 11	1
29) O-Ring	G58	G70	1
30) O-Ring	P14	P14	1
31) O-Ring	P10A	P14	1

1) Body	9) Barrel Holder	17) Guide	25) Oil Seal	33) Expander Plug
2) Case	10) Swash Plate	18) Needle	26) Snap Ring	34) Machine Screw
3) Shaft	11) Thrust Brush	19) Key	27) Snap Ring	35) Machine Screw
4) Cylinder Barrel	12) Seal Holder	20) Nut	28) Snap Ring	36) Flow Adjustment Screw
5) Valve Plate	13) Gasket	21) Retainer	29) O-Ring	37) Spring Holder
6) Piston	14) Spring	22) Plug	30) O-Ring	
7) Shoe	15) Spring	23) Ball Bearing	31) O-Ring	
8) Shoe Holder	16) Control Piston	24) Needle Bearing	32) Pin	

## Cross Section Drawing

### PCP33/47-Type

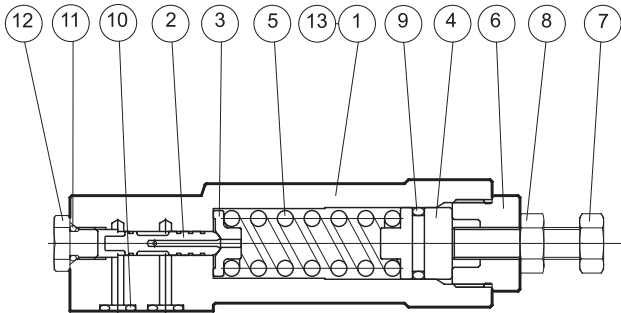


### PCP33/47-Type

	PCP33-Type Size	PCP47-Type Size	Qty
13) O-Ring	G130	G155	1
23) Ball Bearing	6309	6310	1
24) Needle Bearing	RNA 6905	RNA 6906	1
25) Oil Seal	TCN 45 68 12	TCN 50 72 12	1
29) O-Ring	G95	G105	1
30) O-Ring	P14	P14	1
31) O-Ring	P14	P16	1
39) O-Ring	G50	G50	1
40) O-Ring	P34	P36	1
41) O-Ring	P9	P9	1
48) O-Ring	G85	G85	1

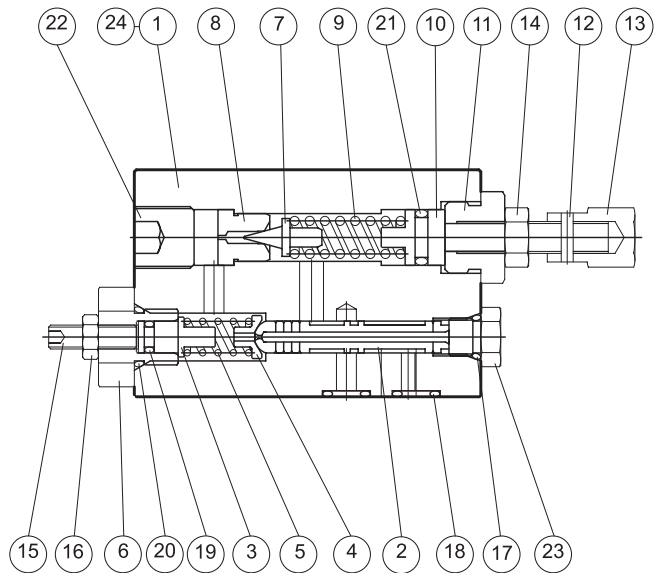
## Pressure Compensator/ Cross Section Drawing

### PCP4/8/16/21-Type



	Size	Qty
9) O-Ring	P14	1
10) O-Ring	P6	1
11) O-Ring	P6	1

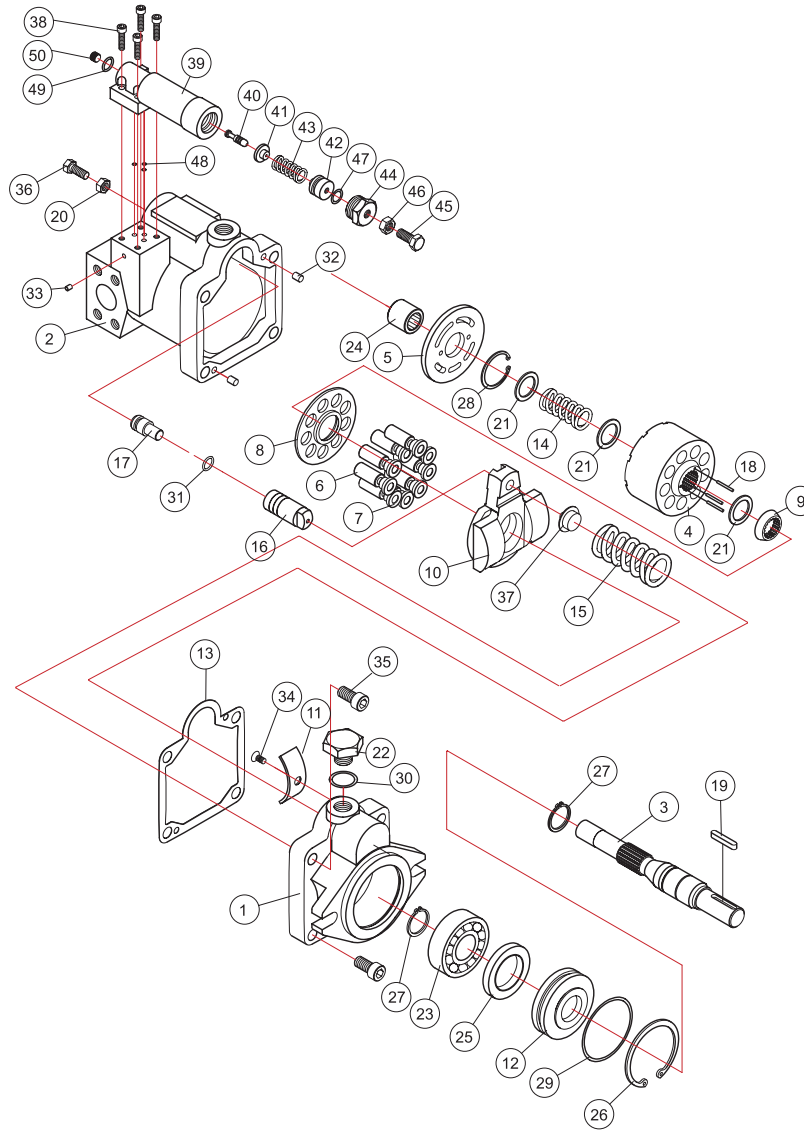
### PCP33/47-Type



	Size	Qty
17) O-Ring	P8	1
18) O-Ring	P9	1
19) O-Ring	P5	1
20) O-Ring	P12	1
21) O-Ring	P10A	1



## Parts Breakdown



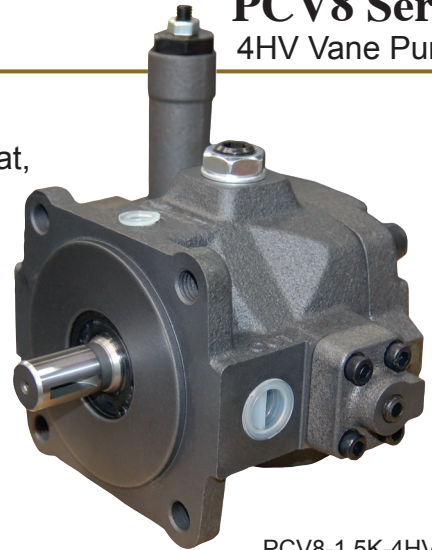
1) Body	11) Thrust Brush	21) Retainer	31) O-Ring	41) Holder
2) Case	12) Seal Holder	22) Plug	32) Pin	42) Plunger
3) Shaft	13) Gasket	23) Ball Bearing	33) Expander Plug	43) Spring
4) Cylinder Barrel	14) Spring C	24) Needle Bearing	34) Machine Screw	44) Retainer
5) Valve Plate	15) Spring S	25) Oil Seal	35) Machine Screw	45) Pressure Adjusting Bolt
6) Piston	16) Control Piston	26) Snap Ring	36) Flow Adjustment Bolt	46) Nut
7) Shoe	17) Guide	27) Snap Ring	37) Spring Holder	47) O-Ring
8) Shoe Holder	18) Needle	28) Snap Ring	38) Machine Screw	48) O-Ring
9) Barrel Holder	19) Key	29) O-Ring	39) Body	49) O-Ring
10) Swash Plate	20) Nut	30) O-Ring	40) Spool	50) Plug



# PCV8 Series 4HV Vane Pumps

## Features

- **Variable Volume, Pressure Compensated Design:** Reduces heat, noise and horsepower requirements. Pump maintains constant pressure while matching system flow demands.
- **Quiet Operation:** Noise levels as low as 70 dBA.
- **Compact and Simple Design:** Dependable operation-compensator not prone to contamination.
- **Long Service Life:** Sturdy construction, precise machining ensures durability
- **Volume Adjustment Standard:** Pumps can be reduced as much as 50% of total maximum displacement.

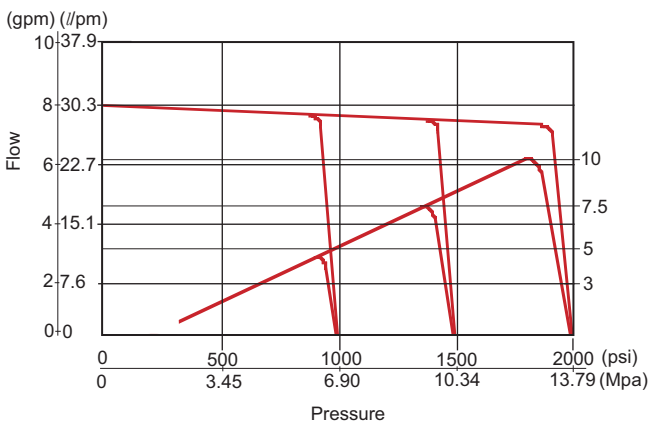


PCV8-1.5K-4HV-1

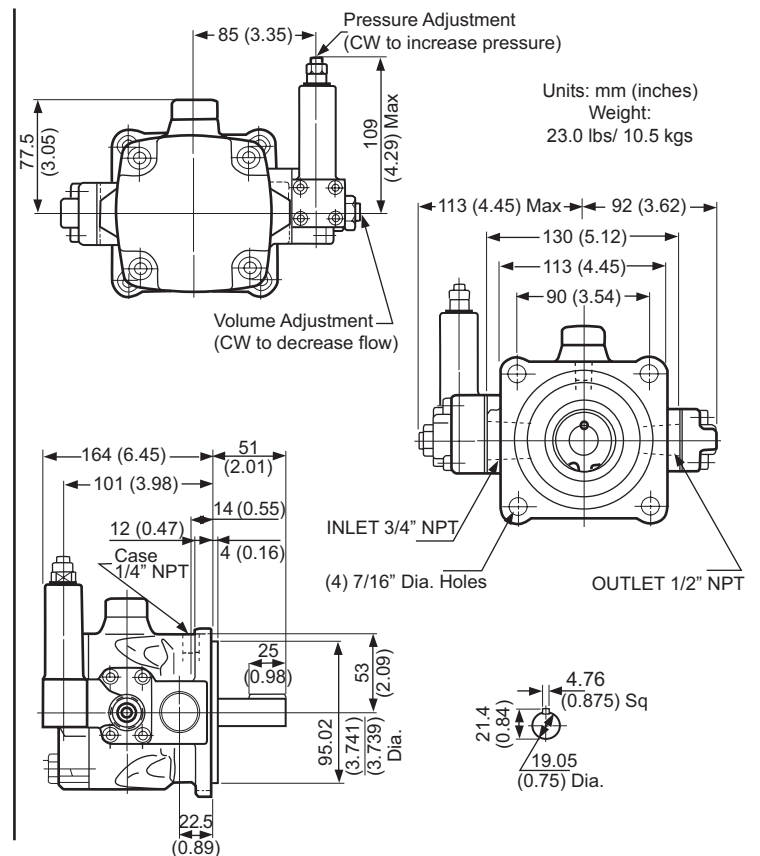
## Specifications

Typical performance curves based on ISO VG46 Oil @ 120°F, (49°C)

**PCV8-2K** 1750 RPM, 7.9 GPM (at no load), 2000 PSI Max



## Dimensional Data



## Ordering Information

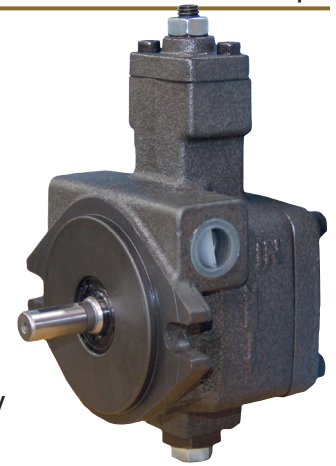
**PCV8 - 2K - 4HV - 1**

Size (gpm)	Code	Press Range	Mounting Style	Series 1 Porting
8	1.5K	500-1500 psi	<b>4HV=</b> 4HV Mount, 4 Bolt, 3.74" dia. pilot & 5.0" bolt circle, 3/4" dia. Keyed Shaft x 1.45" Long w/ 3/16" Key, w/ Flow Adj.	3/4" inlet, 1/2" outlet 1/4" case, all female NPT
	2K	1000-2000 psi		



### Features

- **Variable Volume, Pressure Compensated Design:** Reduces heat, noise and horsepower requirements. Pump maintains constant pressure while matching system flow demands.
- **Simplified Circuit Design:** Direct spring operated compensator, no safety relief valve required.
- **Quiet Operation:** Noise levels as low as 67 dBA.
- **Compact and Simple Design:** Dependable operation-compensator not prone to contamination.
- **Long Service Life:** Sturdy construction, precise machining ensures durability
- **Volume Adjustment Standard:** Pumps can be reduced as much as 50% of total maximum displacement.

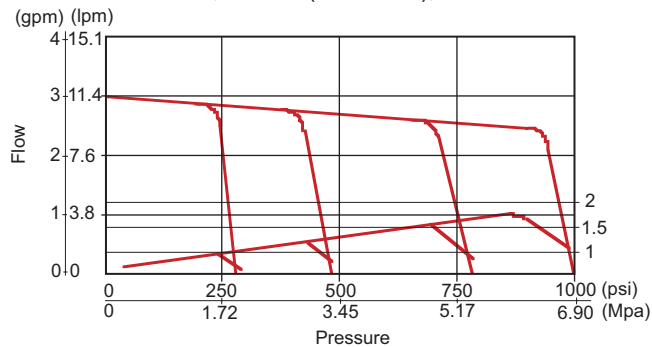


PCV3-1K-2AK-1

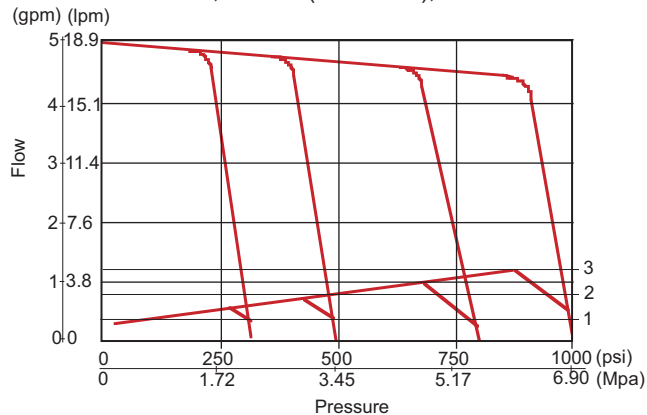
### Specifications

Typical performance curves based on ISO VG46 Oil @ 120°F, (49°C)

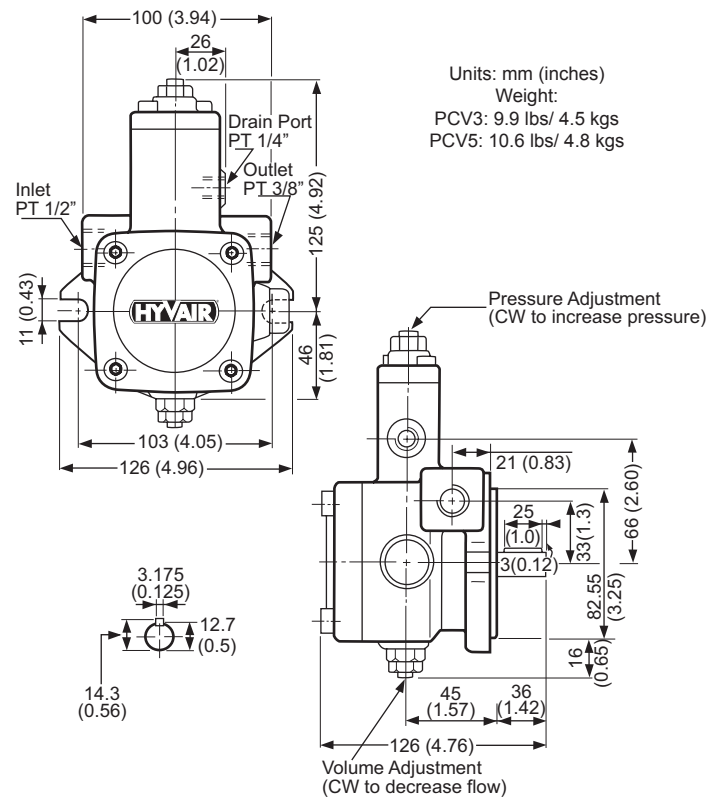
**PCV3** 1750 RPM, 3 GPM (at no load), 1000 PSI Max



**PCV5** 1750 RPM, 5 GPM (at no load), 1000 PSI Max



### Dimensional Data



### Ordering Information

#### PCV3 - 1K - 2AK - 1

Size (gpm)	Code	Press Range	Mounting Style	Series 1 Porting
3	300	150-300 psi	<b>2AK=</b> SAE-A, 2 Bolt, 1/2" Dia. Keyed Shaft x 1.42" Long w/ 1/8" Key Flow Adj. Std.	1/2" inlet, 3/8" outlet 1/4" case, all female NPT
5	600	200-600 psi		
	800	400-800 psi		
	1K	400-1000 psi		



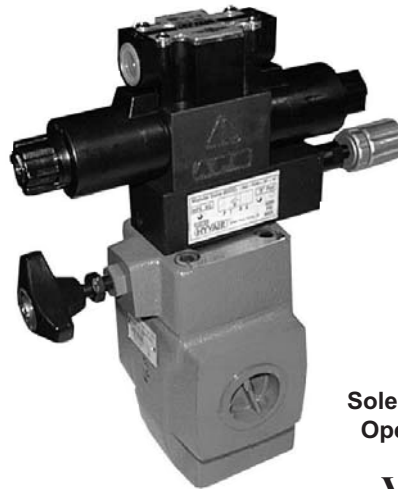
INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS



## POR20 SERIES

### Pilot Operated Relief Valves





**Solenoid Controlled Pilot Operated Relief Valves**

### Specifications

- 3/4" & 1-1/4" NPT ports (#12 SAE available in T type)
- Maximum Flow:** 3/4" = 50 gpm, 1-1/4" = 100 gpm
- Minimum Flow:** 3/4" = 2.0 gpm, 1-1/4" = 4 gpm
- 3K pressure standard (1000-3500 psi)
- 1K pressure range available (350-1000 psi)
- Recommended for petroleum based fluids- ISO VG32-68
- Recommended filtration- 10 micron
- Cold starts: 250 SUS maximum viscosity
- Maximum Temperature:** 180°F, (82.2°C) or minimum fluid viscosity of 80 SUS
- All models can be vented for remote control. Specify suffix "D03" for integral solenoid control of relief valve.

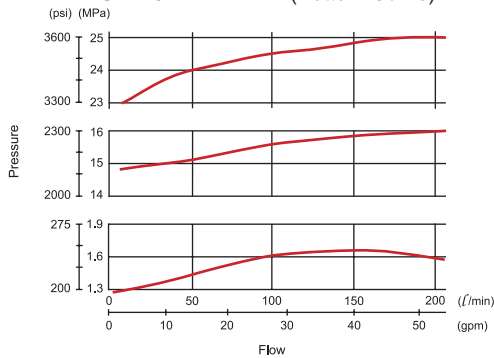
### Vent Circuits

All POR20 relief valves may be vented to obtain remote pressure control (use direct acting remote relief see DR2 series pg. 50). Use small diameter line when plumbing the remote relief as short in length as possible to prevent chattering.

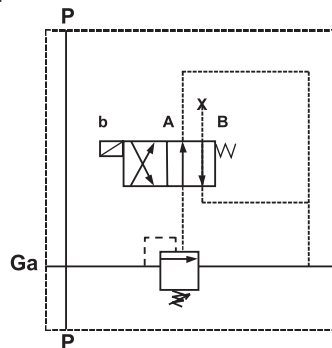
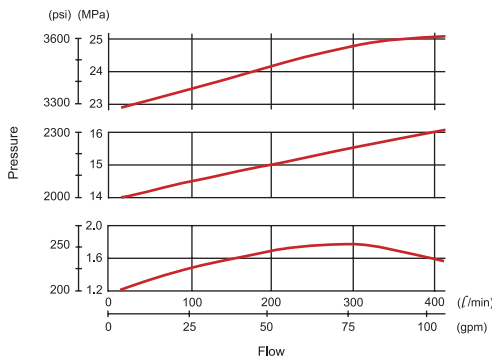
Below are common circuits used with the option D03 solenoid operated relief valves. Many other circuits are possible.

The valves to complete the circuits are sold separately from the relief valves.

**3/4" POR20-12FP-3K**  
**POR20-12FP-1K (Bottom Curve)**



**1-1/4" POR20-20FP-3K**  
**POR20-20FP-1K (Bottom Curve)**



Normally Vented- Energize for Pressure

Also shown:  
D03S-1A-115A-35 Solenoid Valve  
When the "a" coil is energized, the main relief valve will rise to set point on the valve

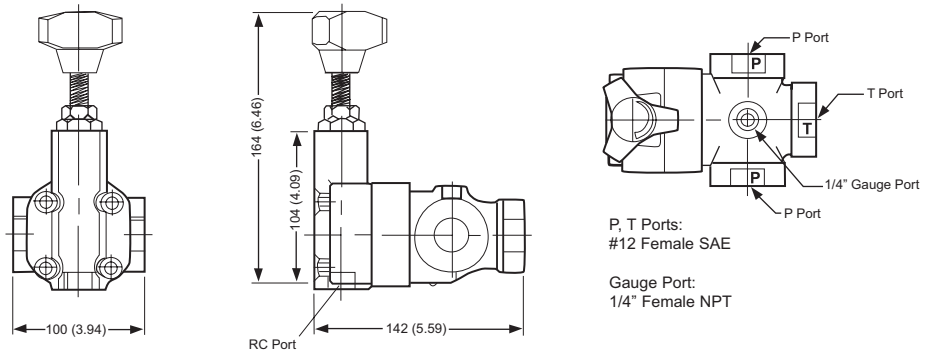
Use D03S-1AR-115A-35 for energize to vent  
(above p/n's for 115 VAC)

POR20-12FP-3K-D03

### Dimensional Data

POR20-12FS-3K (T style)  
#12 SAE Relief Valve

Units: mm/ (Inch)



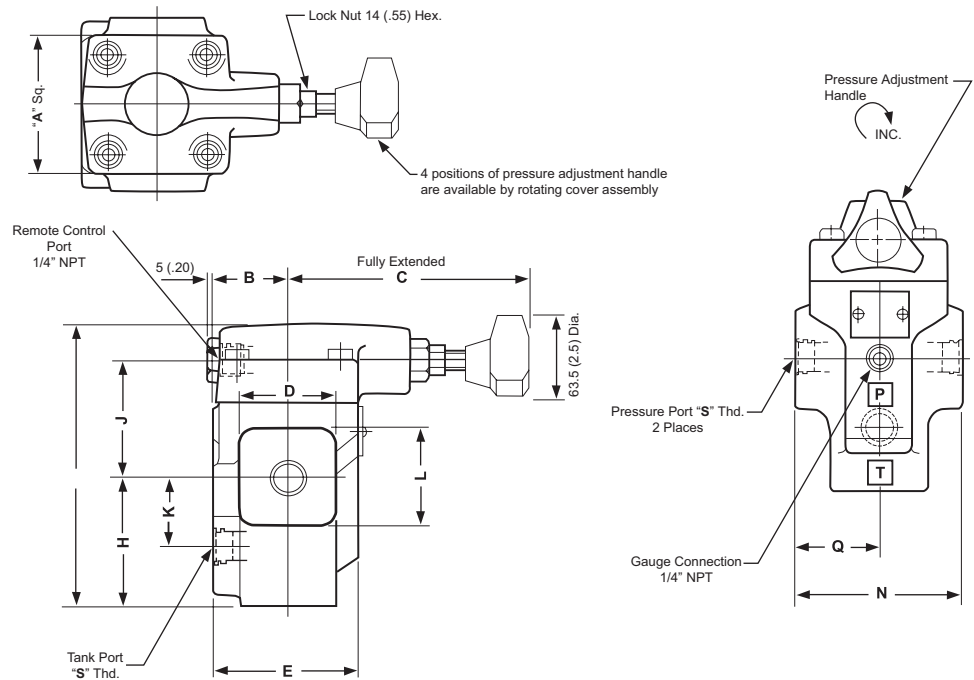
P, T Ports:  
#12 Female SAE

Gauge Port:  
1/4" Female NPT

POR20-12FP 3/4" NPT

POR20-20FP 1-1/4" NPT  
(Below)

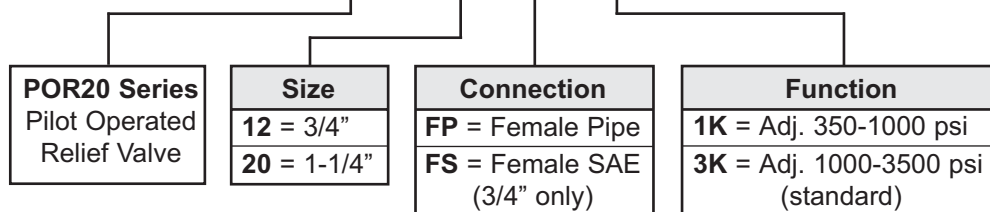
Units: mm/ (Inch)



Model	A	B	C	D	E	F	H	J	K	L	N	Q	S
POR20-12FP	80 (3.15)	48 (1.91)	129 (5.08)	58.5 (2.3)	88 (3.46)	154 (6.04)	68 (2.68)	66.5(2.62)	39.4(1.55)	72.5(2.85)	90 (3.54)	45 (1.77)	3/4" NPT
POR20-20FP	86 (3.39)	48 (1.91)	186 (7.32)	82 (3.23)	98 (3.86)	185 (7.28)	89.5(3.52)	77.5(3.05)	51 (2.0)	86 (3.86)	126 (4.96)	63 (2.48)	1-1/4" NPT

### Ordering Information

#### POR20 - 12 - FP - 3K





INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS



## D03 & D05 SERIES

### Pilot Operated Valves - Air or Oil



D03A-2C-35



D05H-1A-35



# D03 & D05 Series Pilot Operated Valves - Air or Oil

## Features

**Air Pilot Operation:** Standard pneumatic operators have low shifting pressures and quick response, series **A**. **A** series come with manual overrides and breather filter vents standard.

**Hydraulic Pilot Operation:** Standard hydraulic operators have moderate shifting pressures and quick response, series **H**.



## Common Models

### Pneumatic Pilot



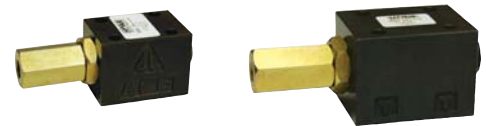
**Size: D03**  
Model: D03A-1A-35

**Size: D05**  
Model: D05A-1A-35

### Single Operator



### Hydraulic Pilot



**Size: D03**  
Model: D03H-1A-35

**Size: D05**  
Model: D05H-1A-35

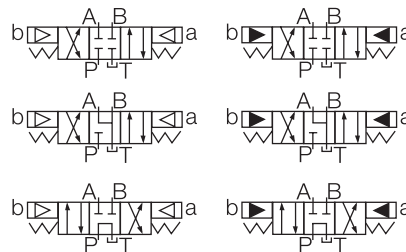
### Pneumatic Pilot



**Size: D03**  
Model: D03A-2B

**Size: D05**  
Model: D05A-2B-35

### Double Operators



Model: D03A-2F-35

Model: D05A-2F-35

Model: D03A-2C-35

Model: D05A-2C

### Hydraulic Pilot



**Size: D03**  
Model: D03H-2B-35

**Size: D05**  
Model: D05H-2B-35

Model: D03H-2F-35

Model: D05H-2F-35

Model: D03H-2C-35

Model: D05H-2C-35



## Specifications

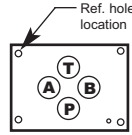
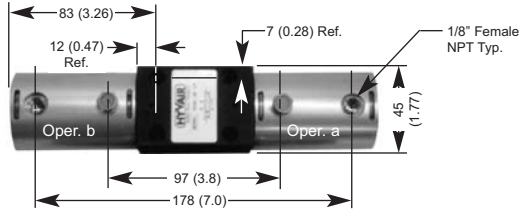
Size			
		<b>D03</b>	<b>D05</b>
Maximum Flow Rates*		25 gpm (94 lpm)	40 gpm (151 lpm)
Maximum Operating Pressure	P, A, B, Ports*	5000 psi (350 bar)	5000 psi (350 bar)
	T Port- Including Surges	300 psi (20 bar)	300 psi (20 bar)
Internal Leakage	@ 3000 psi	0.18 cu-in/ min (3 ml/ min)	0.22 cu-in/ min (3.5 ml/ min)
Cycle Rate	Maximum	200 cycles/ min	
Mounting Surface	NFPA	T3.5.1.MR1-D03	T3.5.1.MR1-D05
	ISO	ISO 4401- 03	ISO 4401- 05
Weight	Single Air Pilot	2.5 lbs (1.1 kg)	6.2 lbs (2.8 kg)
	Double Air Pilot	3.0 lbs (1.4 kg)	6.6 lbs (3.0 kg)
	Single Hyd. Pilot	2.3 lbs (1.05 kg)	5.9 lbs (2.4 kg)
	Double Hyd. Pilot	2.5 lbs (1.13 kg)	6.1 lbs (2.7 kg)
Pilot Pressures Min/Max	A Series (Air)	20/250 psi (1.4/17.5 bar)	20/250 psi (1.4/17.5 bar)
	H Series (Hydraulic)	200/3000 psi (13.8/210 bar)	
Operating Conditions	Working Temperature	40- 160° F (5- 70°C)	
	Operating Viscosity	80- 300 SUS (17- 65 cSt)	
	Max. Start-up Viscosity	1500 SUS (315 cSt)	
	Filtration	25 micron or less, (ISO 18/15)	
	Recommended Fluids	Petroleum Based Fluids- ISO VG32-68, Phosphate Ester, Most Vegetable Oils, Water Based Fluids to 40% Water	

\*Some spools rated less- check max. pressures and flows below. Flows are reduced if valve is used as 2 way or 3 way only- consult factory. For continuous flow conditions or high cycling applications, a recommended max. flow rating is: 1/2 x maximum flow rating.

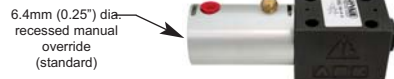
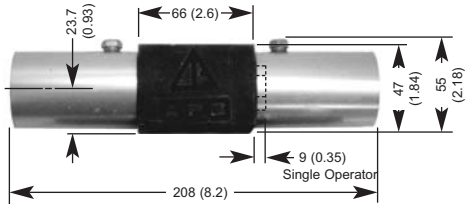
Model Symbol	Valve Spool Type	D03A Max. flow gpm (lpm)	D05A Max. flow gpm (lpm)	Symbol	Valve Spool Type	D03A Max. flow gpm (lpm)	D05A Max. flow gpm (lpm)
	<b>1A</b>	20 (75)	32 (120)		<b>2F</b>	20 (75)	40 (150)
	<b>1AY</b>	20 (75)	32 (120)		<b>2H</b>	20 (75)	40 (150)
	<b>2B</b>	20 (75)	32 (120)		<b>2K</b>	20 (75)	40 (150)
	<b>2C</b>	12 (45)	17 (65)		<b>2T</b>	25 (94)	40 (150)
					<b>3A</b>	25 (45)	40 (150)

## Dimensional Data- D03

### Series D03A



NFPA: T3.5.1.MR1-D03  
ISO: 4401-08



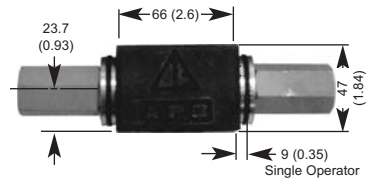
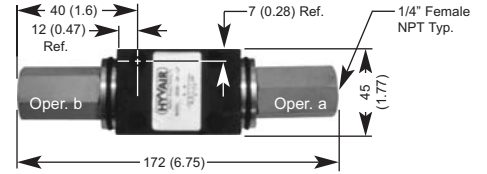
6.4mm (0.25") dia. recessed manual override (standard)  
Add 35.5mm (1.4") length for each knob type override

**D03A- Single Pilot**

Units: mm/ (Inch)

Note: Use (4) 10-24 SHCS X 1-3/4" mounting screws

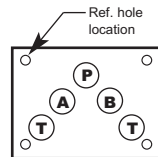
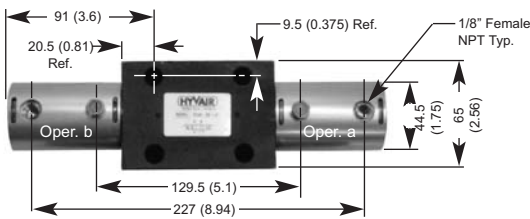
### Series D03H



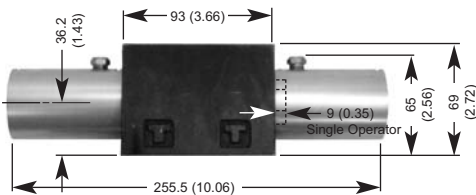
**D03H- Single Pilot**

## Dimensional Data- D05

### Series D05A



NFPA: T3.5.1.MR1-D05  
ISO: 4401-05



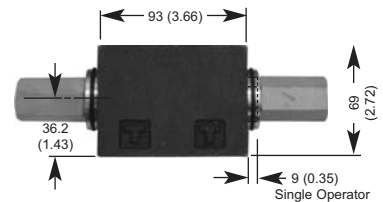
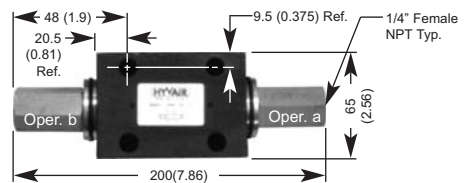
6.4mm (0.25") dia. recessed manual override (standard)  
Add 35.5mm (1.4") length for each knob type override

**D05A- Single Pilot**

Units: mm/ (Inch)

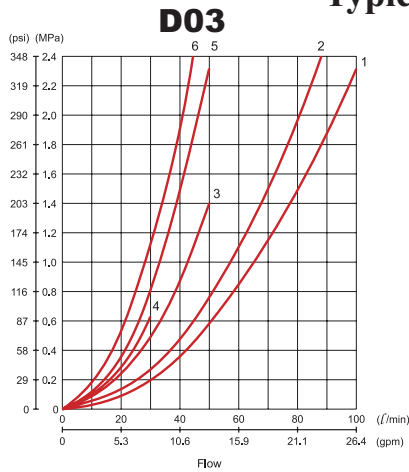
Note: Use (4) 1/4-20 SHCS X 1-1/2" mounting screws

### Series D05H



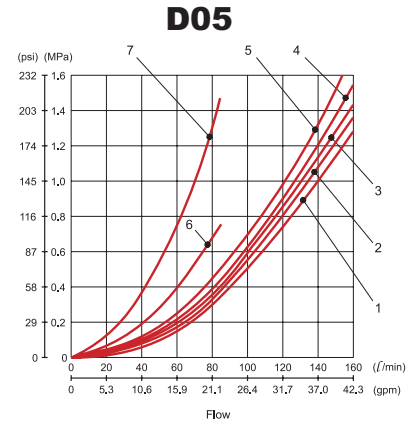
**D05H- Single Pilot**

## Typical Pressure Drop Curves



Viscosity of hydraulic fluid: 150SUS (32mm<sup>2</sup>/s)

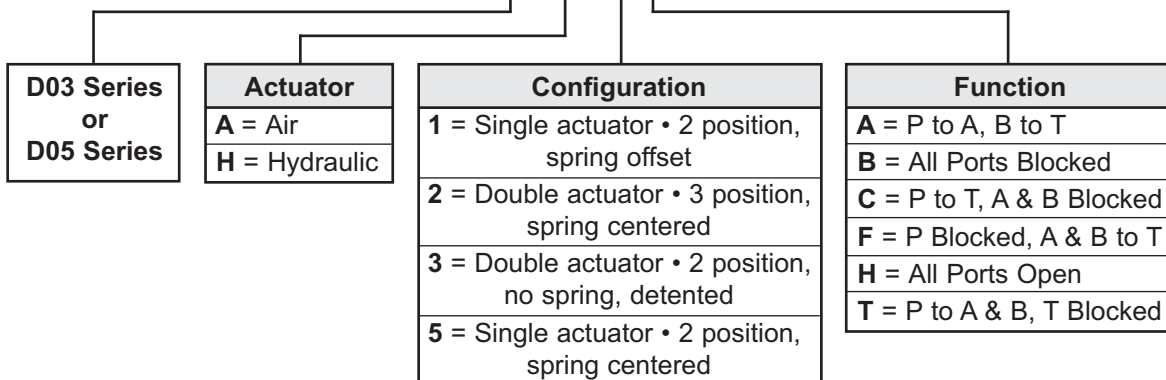
**Note:** For maximum pressure and flows refer to specifications page.



Description	D03 Flow Path					Valve Spool Type		D05 Flow Path					
	P→A	P→B	A→T	B→T	P→T			P→A	P→B	A→T	B→T	P→T	
Spring Offset, (Closed in Transition)	2	2	2	2			<b>1A</b>		3	3	4	4	
Spring Offset, (Open in Transition)	1	1	1	1			<b>1AY</b>		1	1	4	4	
Spring Centered, All Ports Blocked	2	2	2	2			<b>2B</b>		3	3	3	3	
Spring Centered, P to T, A & B Blocked	6	6	5	5	3		<b>2C</b>		7	7	7	7	6
Spring Centered, P to Blocked, A & B to T	2	2	1	1			<b>2F</b>		3	3	1	1	
Spring Centered, All Ports Open	1	1	1	1	1		<b>2H</b>		1	1	1	1	1
Spring Centered, P & B Blocked, A to T	2	2	1	2			<b>2K</b>		3	3	1	3	
Spring Centered, P to A & B, T Blocked	1	1	2	2			<b>2T</b>		1	1	3	3	
Detented (Closed in Transition)	2	2	2	2			<b>3A</b>		3	3	4	4	

## Ordering Information

### D03 A - 2 B - 35



# PNEUMATIC ACCESSORIES

CHECK, BALL, SHUTTLE, QUICK EXHAUST VALVES, ETC.



## Check Valves

1/8" thru 1/2" Ports



Check Valves- Series 40 1/8" thru 1/2" ports

### Dimensional Data

Units: mm (inch)

Model	Port Size	Body	Length
C40-2FP-5	1/8"	14 (0.55) hex	42 (1.65)
C40-4FP-5	1/4"	17 (0.67) hex	50 (1.97)
C40-6FP-2	3/8"		
C40-8FP-2	1/2"	24 (0.94) hex	63 (2.48)

250 psi maximum  
Soft seal design

### Ordering Information

#### C40 - 4FP - 5

Code	Description	Size	Description
C40	Check Valve- Series 40	2FP	1/8" Female Pipe
		4FP	1/4" Female Pipe
		6FP	3/8" Female Pipe
		8FP	1/2" Female Pipe

## Quick Exhaust Valves

1/8" thru 3/4" Ports



Quick Exhaust Valves 1/8" thru 3/4" ports

### Ordering Information

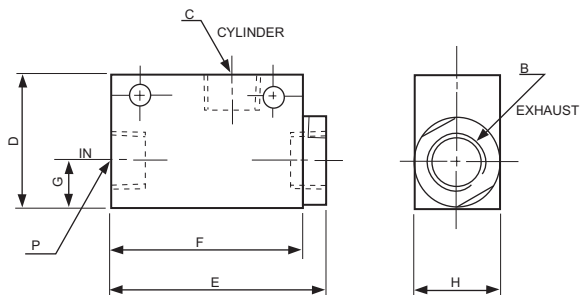
#### QE - 604

Code	Description	Size	Description
QE	Quick Exhaust Valve	402	1/4" Exhaust 1/8" Inlet- Cylinder
		604	3/8" Exhaust 1/4" Inlet- Cylinder
		606	3/8" Exhaust 3/8" Inlet- Cylinder
		1208	3/4" Exhaust 1/2" Inlet- Cylinder
		1212	3/4" Exhaust 3/4" Inlet- Cylinder

### Dimensional Data

Units: mm (inch)

Model	Inlet Port P	Exhaust Port B	Cylinder Port C	D	E	F	G	H
QE402	1/8"	1/4"	1/8"	32 (1.26)	46 (1.81)	40 (1.57)	10 (0.39)	10 (0.39)
QE604	1/4"	3/8"	1/4"	37.5 (1.48)	61 (2.40)	54.6 (2.15)	13.5 (0.53)	25 (0.99)
QE606	3/8"	3/8"	3/8"	37.5 (1.48)	61 (2.40)	54.6 (2.15)	13.5 (0.53)	25 (0.99)
QE1208	1/2"	3/4"	1/2"	80.5 (3.17)	89 (3.50)	44.5 (1.75)	17 (0.67)	89 (3.50)
QE1212	3/4"	3/4"	3/4"	80.5 (3.17)	89 (3.50)	44.5 (1.75)	17 (0.67)	89 (3.50)



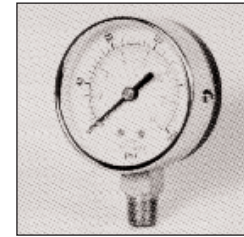
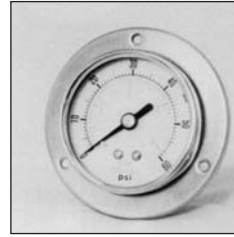
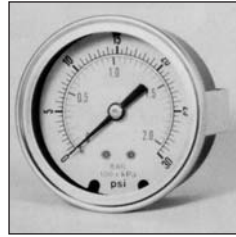
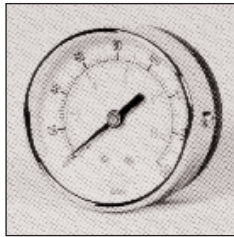
# PNEUMATIC ACCESSORIES

CHECK, BALL, SHUTTLE, QUICK EXHAUST VALVES, ETC.



## Pressure Gauges

1/8" thru 1/2" Ports



### Ordering Information

**HYV- 160 - 1.5 - 2 - N - CB - H**

Pressure Range	Gauge Size (Dia)	Port Size	Mounting	Port Location	Series
-30Vac	160	2- 1/8" MP	N- None	BM- Bottom	O- Hydraulic Service; Glycerin Filled, 304SS Case, Brass Internals
15	200	4- 1/4" MP	P- Panel	CB- Center/ Back	U- Air Service; Dry, Non-Filled, Black Steel Case, Brass Internals
30	300	8- 1/2" MP	U- U-Clamp	LB- Lower/ Back	H- Same as code U above but black face and white "Hyvair" logo
60	400		W- Wall		
100	500				

## Breather Vents, Mufflers, Muffler Speed Control

1/8" thru 1" Connection



Breather Vents



Mufflers



Muffler Speed Control

### Specifications

Maximum Pressure: 200 psi (13.8 bar)  
 Maximum Temp: 35 - 300°F (1 - 149°C)  
 Material:  
 Body- Brass  
 Element- Sintered Bronze  
 40 micron

Units: mm/ (Inch)

### Dimensional Data

#### Breather Vents

Model	Connection	Length	Hex
BV2	1/8"	12.7 (0.50)	11.2 (0.44)
BV4	1/4"	17.5 (0.69)	14.2 (0.56)
BV6	3/8"	21.1 (0.83)	17.5 (0.69)
BV8	1/2"	23.9 (0.94)	22.4 (0.88)
BV12	3/4"	25.9 (1.02)	26.9 (1.06)
BV16	1"	34.0 (1.34)	34.0 (1.34)

#### Mufflers

Model	Connection	Length	Hex
MF2	1/8"	23.4 (0.92)	11.2 (0.44)
MF4	1/4"	33.0 (1.30)	14.2 (0.56)
MF6	3/8"	40.1 (1.58)	17.5 (0.69)
MF8	1/2"	47.0 (1.85)	22.4 (0.88)
MF12	3/4"	55.6 (2.19)	30.2 (1.19)
MF16	1"	73.4 (2.89)	35.0 (1.38)

#### Muffler Speed Control

Model	Connection	Length	Hex
MSC2	1/8"	38.1 (1.50)	12.7 (0.50)
MSC4	1/4"	42.9 (1.69)	14.2 (0.56)
MSC6	3/8"	42.9 (1.69)	17.5 (0.69)
MSC8	1/2"	50.8 (2.00)	22.4 (0.88)
MSC12	3/4"	69.9 (2.75)	26.9 (1.06)
MSC16	1"	76.2 (3.00)	34.0 (1.34)

### Ordering Information

**MF - 4**

Code	Description	Size	Connection
BV	Breather Vent	2	1/8"
MF	Muffler	4	1/4"
MSC	Muffler Speed Control	6	3/8"
		8	1/2"
		12	3/4"
		16	1"





# 100 thru 800 Series

## Manual Valves



### MANUAL VALVES

1/8" thru 1/2" Ports



**FV-Foot Valve**  
FV-404-542S-G

#### SPECIFICATIONS

1. **Media:** Air (No other gases or liquids)
2. **Operation:** Manual - Direct
3. **Operation Temp. Range:** RV Series: 14 - 175°F (-10 - 80°C)  
All Others: 41 - 140°F (5 - 60°C)
4. **Maximum Pressure:** 150 psig (10.3 bar)
5. **Working Pressure:** 0 - 135 psig (0 - 9.3 bar)
6. **Flows:**

100 Series (1/8")	Cv=0.14
200 Series (1/4")	Cv=0.80 (1/8" Exhaust Ports)
FV-404 (1/4")	Cv=1.0
LV-204 (1/4")	Cv=1.0 (1/8" Exhaust Ports)
LV-404 (1/4")	Cv=1.9
RV-404 (1/4")	Cv=2.5
RV-406 (3/8")	Cv=2.7
RV-808 (1/2")	Cv=3.0
7. **Lubrication:** None Required



**RV-Rotary Valve**  
RV-404-443  
RV-406-443



**RV-Rotary Valve**  
RV-808-443DB



**PP-Push Pull Valve**  
PP-204-542D  
PP-606-332D



**LV-Lever Valve**  
LV-204-542D, LV-204-542S  
LV-404-542D, LV-404-542S, LV-404-543DB  
LV-406-542D, LV-406-543DB  
LV-808-542D, LV-808-542S, LV-808-543DB



**AVNPP-Push Pull Valve Namur**  
AVNPP-604-542S



**P-Push Valve**  
P-204-542S



**CV-Cam Valve**  
CV-102-232NC  
CV-102-332



**TV-Toggle Valve**  
TV-102-232D



**PBM-Push Button M**  
PBM-102-232NC



**ES-Emergency Stop**  
ES-102-232D  
ES-204-542D



**TS-Twist Select**  
TS-102-232D  
TS-204-542D  
TS-404-232D



**PBF-Push Button Flush**  
PBF-102-232NC  
PBF-204-542S  
PBF-404-332NC



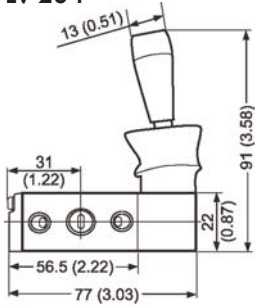
**PBE-Push Button Extended**  
PBE-102-232NC  
PBE-204-542S

### DIMENSIONS

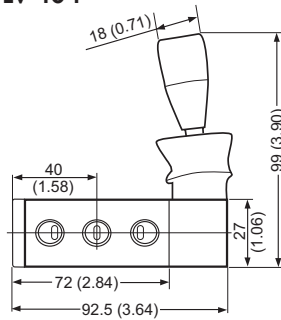
Units: mm/ (Inch)

#### Lever Valve 1/4", 3/8", 1/2"

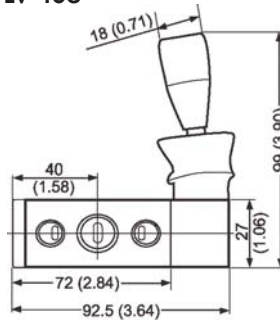
**LV-204**



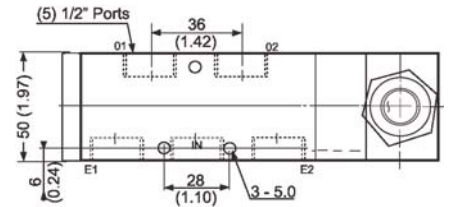
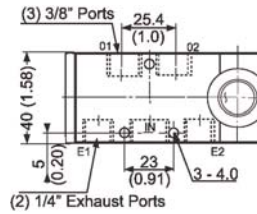
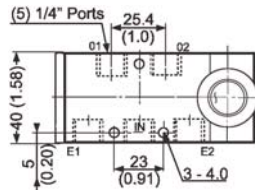
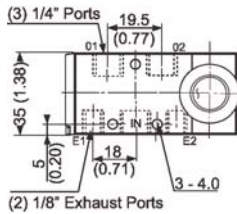
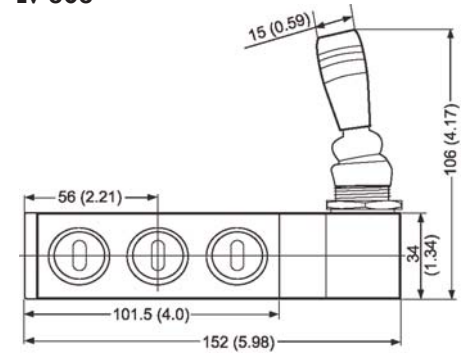
**LV-404**



**LV-406**

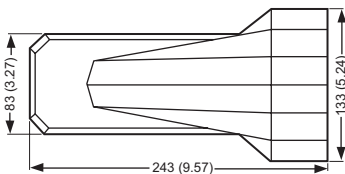
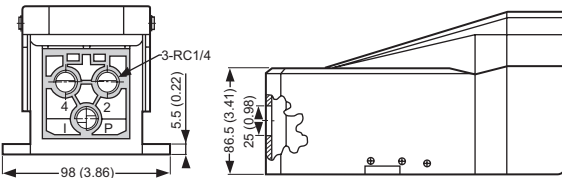
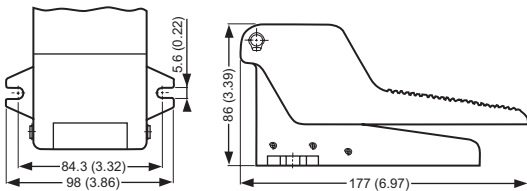


**LV-808**

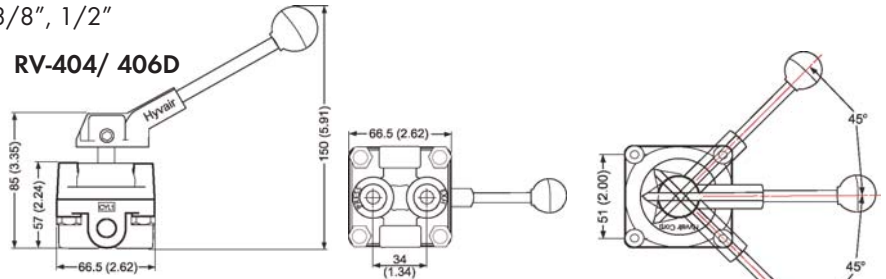


#### Foot Valve 1/4" and Rotary Valve 1/4", 3/8", 1/2"

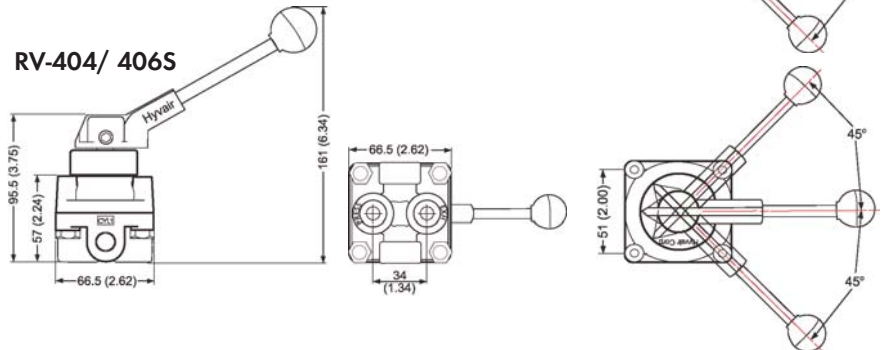
**FV-404-542S**



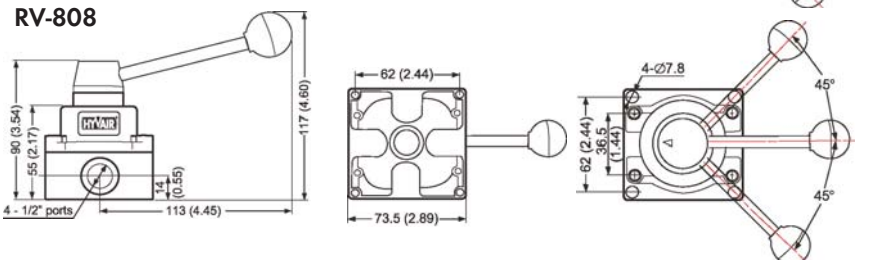
**RV-404/ 406D**



**RV-404/ 406S**



**RV-808**

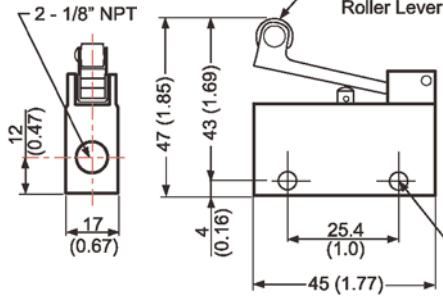




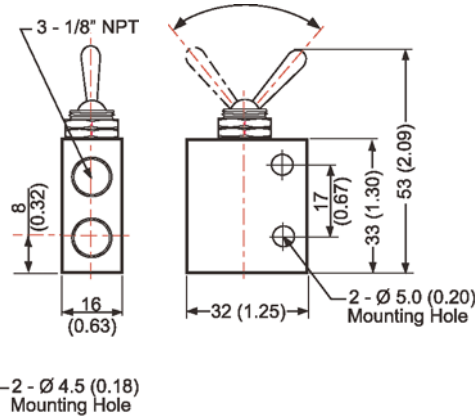
### DIMENSIONS

Units: mm/ (Inch)

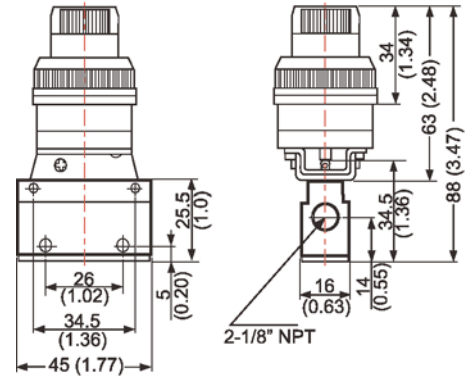
**Cam Valve CV-102**



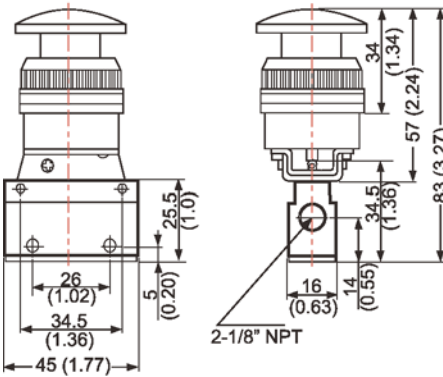
**Toggle Valve TV-102**



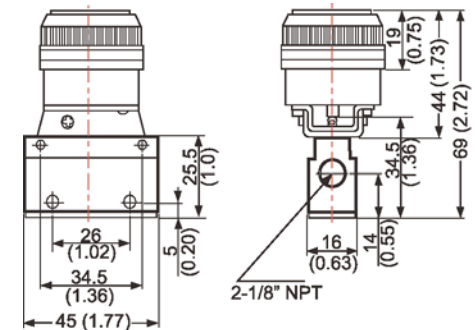
**Twist Select Valve TS-102**



**Push Button-M Valve PBM-102**

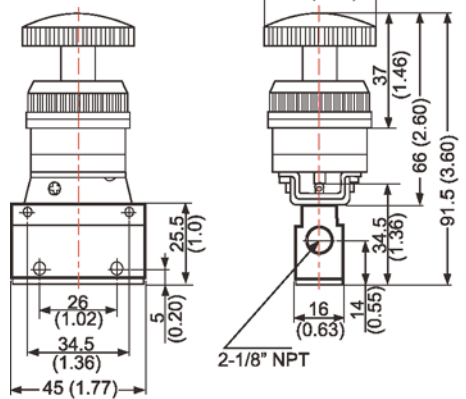


**Push Button Flush Valve PBF-102**  
**Push Button Extended Valve PBE-102**  
 (add 6.5 mm button height for PBE)



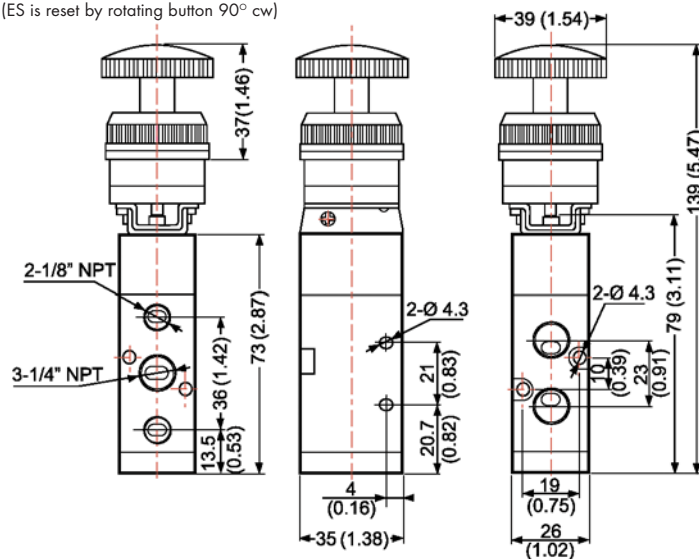
**Emergency Stop Valve ES-102**

(ES is reset by rotating button 90° cw)

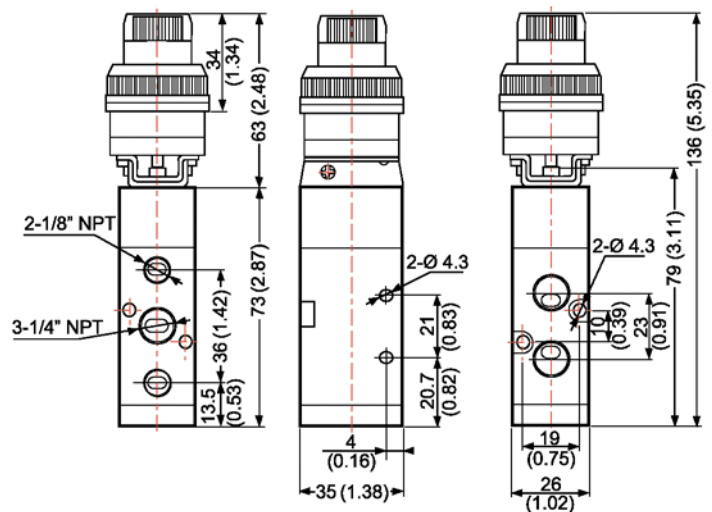


**Emergency Stop Valve ES-204**

(ES is reset by rotating button 90° cw)



**Twist Select Valve TS-204**



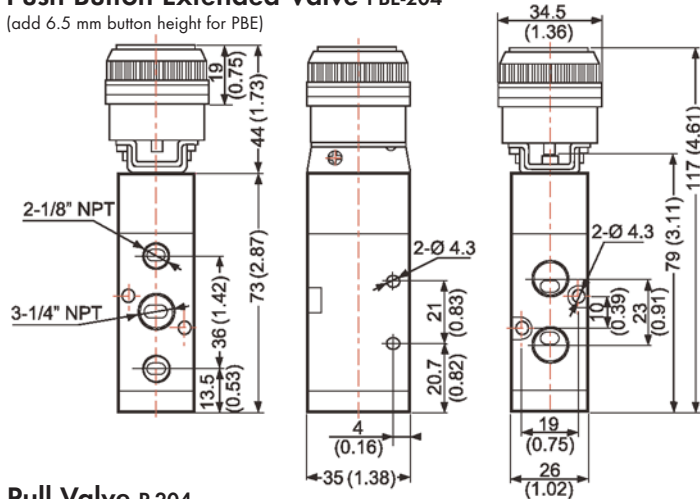
### DIMENSIONS

Units: mm/ (Inch)

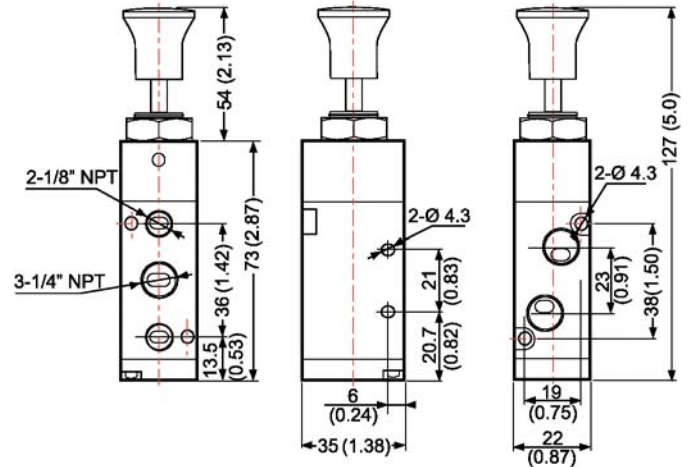
#### Push Button Flush Valve PBF-204

#### Push Button Extended Valve PBE-204

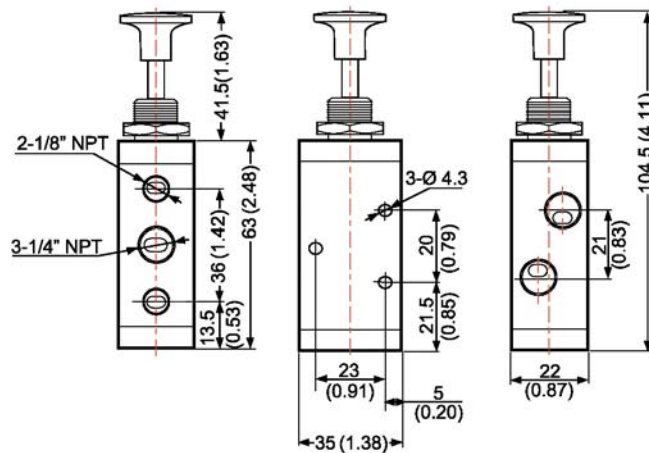
(add 6.5 mm button height for PBE)



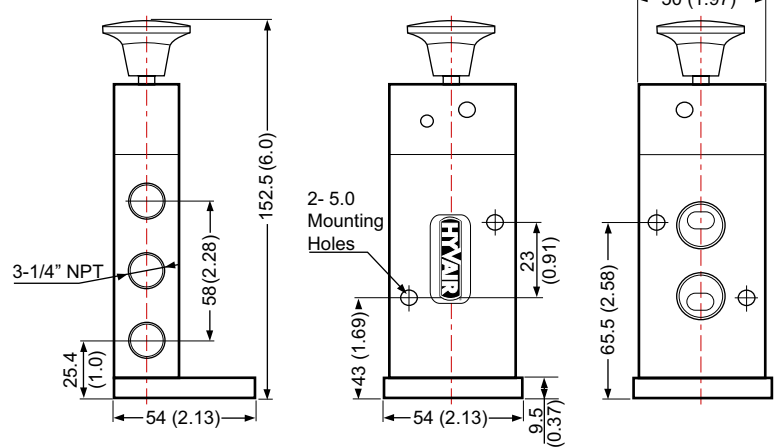
#### Push Pull Valve PP-204



#### Pull Valve P-204



#### Namur Push Pull Valve AVNPP-604



### ORDERING INFORMATION/ PRODUCT IDENTIFICATION

## TS - 204 - 542S - RD

Code	Operator	Size	Description	Code	Configurations	Code	Knob Color
CV	Cam Valve	102	1/8" Ports	232NC	2 port, 3 way, 2 pos., normally closed	omit	N/A
ES	Emergency Stop	202	1/8" Ports	232NO	2 port, 3 way, 2 pos., normally open	BK	Black- Standard
FV	Foot Valve	204	1/4" Ports (1/8" Exhaust)	232D	2 port, 3 way, 2 pos., detented	GR	Green
LV	Lever Valve	404	1/4" Ports	332D	3 port, 3 way, 2 pos., detented	RD	Red
PBE	Push Button Extended	606	3/8" Ports	443DB	4 port, 4 way, 3 pos., detented, blocked		
PBF	Push Button Flush	804	1/4" Ports	542S	5 port, 4 way, 2 pos., spring return		
PBM	Push Button M	806	3/8" Ports	542D	5 port, 4 way, 2 pos., detented		
P	Push Valve	808	1/2" Ports	543DB	5 port, 4 way, 3 pos., detented, blocked		
AVNPP	Namur Push Pull Valve						
PP	Push Pull Valve						
RV	Rotary Valve						
TS	Twist Select						
TV	Toggle Valve						

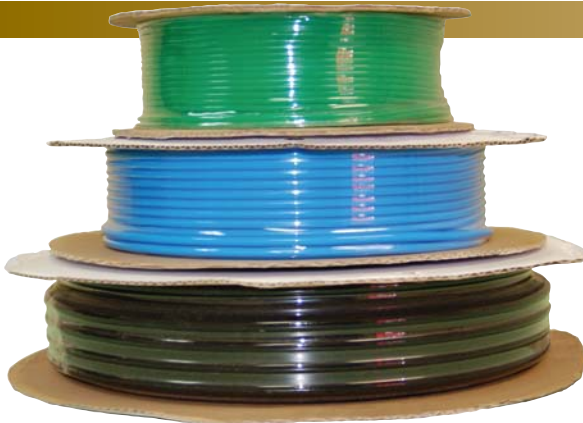
Spring centered valves available- special order only. (Minimum qty's apply)

# POLYURETHANE TUBING

100 & 500 FT. LENGTHS



5/32" thru 1/2"



Polyurethane Tubing

## Specifications

1. **Compatible Fluid Type:** Air (No other gases or liquids)
2. **Working Pressure Range:** -25.9"Hg-100psi (759mmHg - 600kPa)
3. **Temperature Range:** 32 - 110°F (0 - 45°C)
4. **Color:** Blue, Clear, Red, Black, Yellow, Green, White
5. **Sizes:** 5/32", 1/4", 5/16", 3/8", 1/2"

Size:	5/32"	1/4"	5/16"	3/8"	1/2"
ID:	0.079"	0.165"	0.197"	0.250"	0.333"

All polyurethane tubing supplied 95 Durometer

## Features

- Polyurethane tubing is made from high quality polymer and exhibits the characteristics of elasticity and chemical resistance.
- Polyurethane material has the exceptional physical properties of durability and anti-abrasion, yet remains flexible.

## Ordering Information

**PU - 4T - BK - 100'**

Code	Description	Code	Size	Code	Color	Code	Description
PU	Polyurethane	2.5T	5/32"	BL	Blue	100'	100 Ft. Length
		4T	1/4"	CL	Clear	500'	500 Ft. Length
		5T	5/16"	RD	Red		
		6T	3/8"	BK	Black		
		8T	1/2"	YL	Yellow		
				GN	Green		
				WH	White		



TC-1 Tubing Cutter





INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS



## APV & SPV SERIES

### Poppet Valves



SPV-8FP-332NC-110A-SR



APV-8FP-332NC

### Specifications

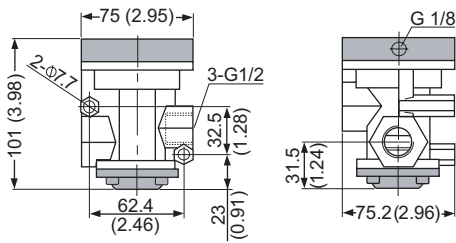
- **Media:** Air (No other gases or liquids)
- **Motion Pattern:** Stop Type
- **Function:** 3 Port, 3 Way, Normally Closed
- **Max. Pressure:** 217 psi (1.5 MPa)
- **Working Pressure:** 20 - 145 psi (0 - 1.0 MPa)
- **Voltage Range:** +/- 10%
- **Body Material:** Aluminum
- **Lubrication:** None Required



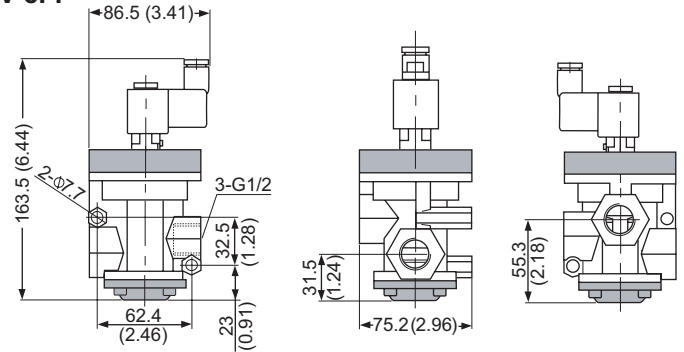
### Dimensional Data

Units: mm/ (Inch)

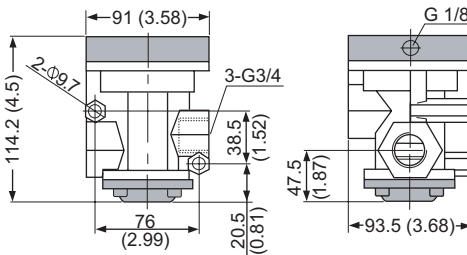
#### APV-8FP



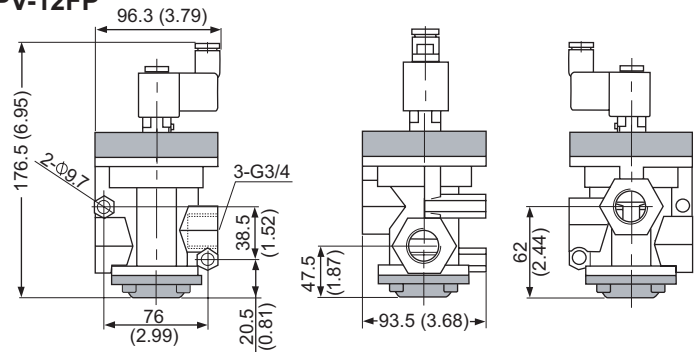
#### SPV-8FP



#### APV-12FP

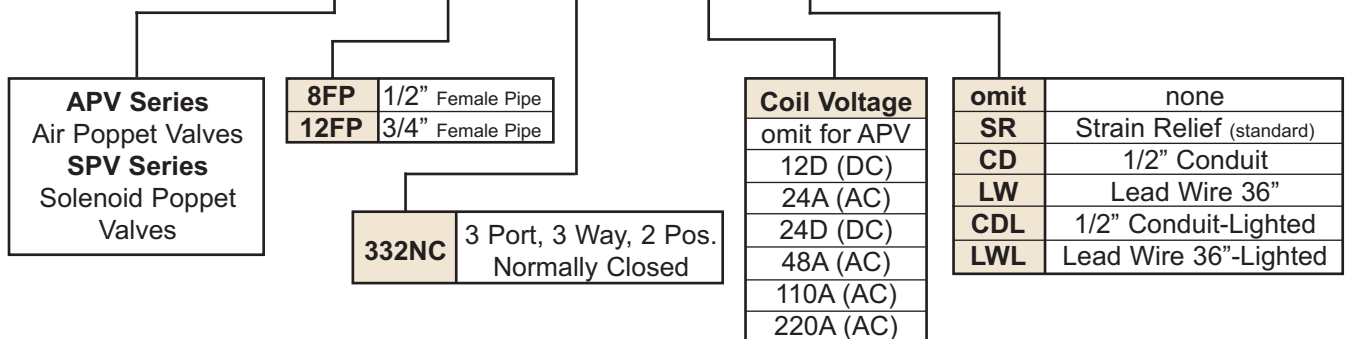


#### SPV-12FP



### Ordering Information

#### APV - 12FP - 332NC - 110A - SR



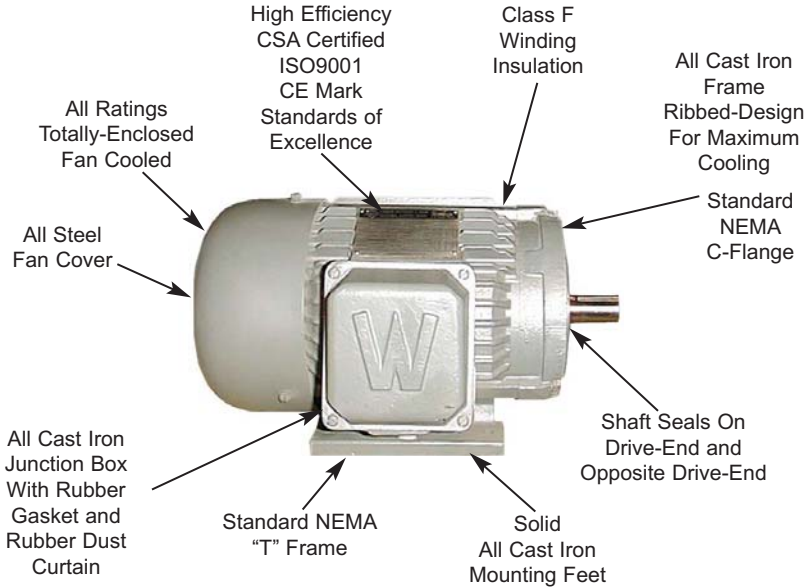
# HYDRAULIC POWER ACCESSORIES



## SYSTEM COMPONENTS

### Electric Motors: 143TC thru 405TC

Visit [www.hyvair.com](http://www.hyvair.com) Fluid Power Data for performance data and dimensional information.  
(56 frame steel construction & single phase motors also listed)



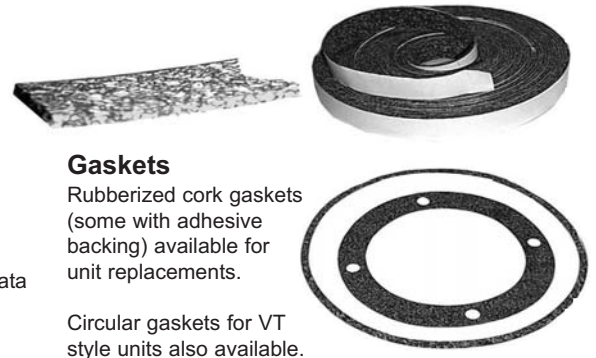
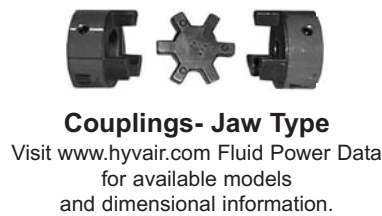
Motor HP	WW Series 1200 RPM	Standard WW Series 1800 RPM	WW Series 3600 RPM
1	WW1-12-145TC	WW1-143TC	
1.5	WW1.5-12-182TC	WW1.5-145TC	WW1.5-3C6-145TC
2	WW2-12-184TC	WW2-145TC	WW2-36-145TC
3	WW3-12-213TC	WW3-182TC	WW3-36-182TC
5	WW5-12-215TC	WW5-184TC	WW5-36-184TC
7.5	WW7.5-12-254TC	WW7.5-213TC	WW7.5-36-213TC
10	WW10-12-256TC	WW10-215TC	WW10-36-215TC
15	WW15-12-284TC	WW15-254TC	WW15-36-254TC
20	WW20-12-286TC	WW20-256TC	WW20-36-256TC
25	WW25-12-324TC	WW25-284TC	WW25-36-284TSC
30	WW30-12-326TC	WW30-286TC	WW30-36-286TSC
40	WW40-12-364TC	WW40-324TC	WW40-36-324TSC
50	WW50-12-365TC	WW50-326TC	WW50-36-326TSC
60	WW60-12-404TC	WW60-364TC	WW60-36-364TSC
75	WW75-12-405TC	WW75-365TC	WW75-36-365TSC
100	WW100-12-444TC	WW100-405TC	WW100-36-405TSC

Note: Motors are shipped with anti-rotation lock on output shaft to prevent damage during shipment. Remove lock before starting.

(Not generally used for continuous duty hyd. pumps)

### Pump/ Motor Adapters: 56TC thru 405TC

Visit [www.hyvair.com](http://www.hyvair.com) Fluid Power Data for available models and dimensional information.

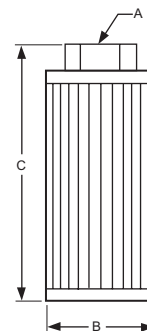


### Suction Strainers: 3/8" thru 3"



A, Size Female NPT	Part Number	B	C
3/8	FO-08989	2-1/4	2-11/16
1/2	FO-08995	2-1/4	2-11/16
3/4	FO-09005	3-3/16	3-1/2
1	FO-09010	3-3/16	5-3/4
1-1/4	FO-09020	3-3/16	7-3/8
1-1/2	FO-10035	4-3/16	9-1/8
2	FO-00935	4-3/16	9-1/8
2-1/2	FO10060	5-1/16	12-1/2

Units: inches



# HYDRAULIC POWER ACCESSORIES **HYVAIR**<sup>®</sup>

## SYSTEM COMPONENTS



**HYV-1**  
Return filter gauge  
For ITF and Canister Filters  
0-25 psi green/ 26-50 psi red,  
1/8" npt center back mount



**TA46F**  
Small Filler/ Breather  
1.61" Bolt Circle  
10 micron breather



**FB-12S (standard)**  
Filler/ Breather  
2.87" Bolt Circle  
Plastic ABS version avail.



**SLG5 (standard)**  
5" Sight Gauge w/ Dual Scale  
Thermometer 0°F to 220°F &  
-20°C to 110°C

Aluminum/ Glass Construction  
(no fading plastic used)



**SLG3 (VTB & VTD18)**  
shown right, 3" centerline  
between bolts- plastic lens,  
aluminum shell

### Temp Switch

Normally Closed SPST:  
T22-4-(temp)°F  
120°, 140°, 150° Avail.  
230 vac max.  
6 amps max.

Normally Open SPST:  
T23-4-(temp)°F  
121°, 141°, 151° Avail.  
230 VAC max.  
4 amps max.



8" insertion depth  
(flange= 3 equally spaced 0.15"  
dia. holes on 2.87" bolt circle)

### Float Switch

L180001  
10 VA SPST  
0.1 amps @120 VAC  
0.25 amps @24 VDC

220° F max.  
8" insertion depth  
(flange= 3 equally spaced 0.15"  
dia. holes on 2.87" bolt circle)

6" actuation point (low mark on  
sight gauge)

(supplied N.O. with dry tank;  
float may be flipped 180° to  
modify for N.C.)



### Heater 1.5kW

BGS713J7S  
230/460VAC 1 phase, 0-110°F Thermostat w/ light  
2" male NPT connection, 14" insertion length,  
1/2" conduit knock-out, 5-1/2" dia. shell x  
6-1/4" exterior length

Series B, brass ball valve designed for air, oil, and water.  
Pressure Ratings:  
1/4" thru 2": 600 psi @100°F, 100 psi @375°F  
2 1/2" thru 4": 400 psi @100°F, 100 psi @200°F

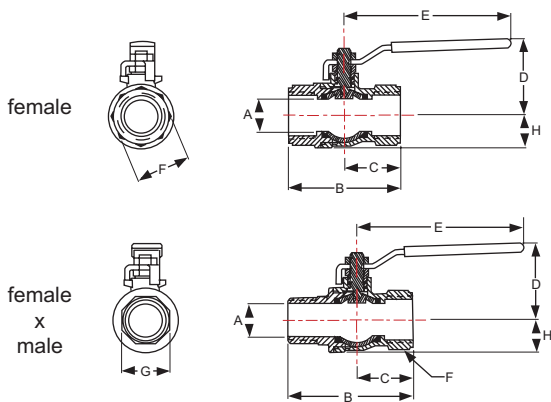
### Materials:

Body/ End Cap- Brass, forged  
Ball- Chrome plated brass  
Nut, Stem, Pkg. Nut- Brass  
Ball Seats, Thrust Washer, Stem Seal- Reinforced PTFE  
Handle- Steel dactromet finish w/ vinyl grip  
Option "L" for Locking handle



B-BV-✱FP

B-BV-8FP-8MP



SIZE (npt)	MODEL	Dimensions			
		A	B	D	E
1/4" female	B-BV-4FP	0.375	1.75	1.44	3.75
1/4" female x male	B-BV-4FP-4MP	0.32	2.17	1.56	3.23
3/8" female	B-BV-6FP	0.375	1.75	1.50	3.75
3/8" female x male	B-BV-6FP-6MP	0.38	2.17	1.56	3.23
1/2" female	B-BV-8FP	0.5625	2.0	1.875	3.625
1/2" female x male	B-BV-8FP-8MP	0.59	2.66	1.73	3.94
3/4" female	B-BV-12FP	0.75	2.25	2.125	4.375
3/4" female x male	B-BV-12FP-12MP	0.75	2.91	1.97	4.72
1" female	B-BV-16FP	0.9375	2.75	2.25	4.75
1" female x male	B-BV-16FP-16MP	0.95	3.56	2.13	4.72
1-1/4" female	B-BV-20FP	1.25	3.25	2.75	5.1875
1-1/2" female	B-BV-24FP	1.50	3.50	3.0	5.625
2" female	B-BV-32FP	2.0	4.1875	3.5	6.0
2-1/2" female	B-BV-40FP	2.375	5.5	5.0	9.0
3" female	B-BV-48FP	3.0625	6.25	5.375	9.0
4" female	B-BV-64FP	3.9063	7.5	6.0	10.0

Units: inches



# HYDRAULIC POWER ACCESSORIES **HYVAIR**<sup>®</sup>

## PRESSURE GAUGES

General Hydraulic Service

Stainless Steel Case, Brass Internals, Glycerin-Filled, 1/8" 1/4" & 1/2" NPT Ports, Vacuum to 15,000 PSI



**BM- Bottom Ports**  
Crimped Case- Standard



**TB- Twist on Bezel**  
(Optional)



**LB- Lower Back Ports**  
**U- Mounting Clamp**



**CB- Center Back Ports**  
**P- Panel Mounting**



**W- Wall Mounting**  
**TB- Twist on Bezel**

**Brass Pressure Snubber:**

1/4" Female NPT  
x 1/4" Male NPT

Model Number
602



Model 602: we recommend the "green striped" element (porosity 20) for most hydraulic applications.

**316SS Pressure Snubber:**

1/4" Female NPT  
x #4" Male SAE

Model Number:
D-SN1-4FP-4MS



**Steel Pressure Snubber:**

1/4" Female NPT  
x #6" Male SAE

Model Number:
S-SN1-4FP-6MS



**Gauge Isolator:**

Isolates and holds gauge's last pressure- no drain  
#6 SAE 1/4" NPT

Model Number	Model Number
G11-6FS	G11-4FP

### Ordering Information

**HYV- 2K - 2.5 - 4 - U - CB - O - Option Code/s** - (Omit if None)

Pressure Range- Zero to: (psig)				Gauge Size- Dia.	Port Size	Mounting	Port Location	Series
-30 Vac	160	800	6k	1.5	2- 1/8" MP	N- None	BM- Bottom	<b>O-</b> Hyd. Service; Glyc. Filled, 304SS Case, Brass Internals <b>U-</b> Air Service; Dry, Non-Filled, Steel Case, Brass Internals <b>M-</b> Mfg Code- must be in place to continue options <b>H-</b> same as series U but with black face & Hyvair logo
15	200	1k	10k	2	4- 1/4" MP	P- Panel	CB- Center/ Back	
30	300	1.5k	15k	2.5	8- 1/2" MP	U- U-Clamp	LB- Lower/ Back	
60	400	2k	20k	4	4F- 1/8" MP	W- Wall		
100	500	3k	25k	6	4MS- 4MS			
	600	4k	30k		4A- 9/16-18 Aminco			
		5k	35k		6A- 3/4-16 Aminco			
Available Dry or Filled				Available Filled Only		Example: 0-2000 psig, 2.5" Dia., 1/4" Male NPT, U- Clamp Mounting, Center Back Ports, OEM Series- Glycerin Filled		

Case	Internals	Fill Fluid	Options (Listed Alphabetically)	
<b>B-</b> Brass	<b>B-</b> Brass	<b>D-</b> Dry	<b>A-</b> Adapter Ring 4-1/2"	<b>MP-</b> Max Press. Pointer
<b>C-</b> 304SS	<b>C-</b> 304SS	<b>F-</b> Fillable	<b>B-</b> Bar/ Psi	<b>P-</b> Plastic Lens
<b>D-</b> 316SS	<b>D-</b> 316SS	<b>G-</b> Glycerin	<b>C-</b> Calibrated	<b>R-</b> Red Stationary Pointers
<b>P-</b> Polyamid	<b>M-</b> Monel	<b>S-</b> Silicon	<b>G-</b> Glass Lens	<b>RS-</b> Restrictor Screw
<b>S-</b> Steel	<b>S-</b> Steel		<b>K-</b> kPa/ Psi	<b>SB-</b> Solid Front/ Blow-Out Back
			<b>K2-</b> kg/sq-cm	<b>T-</b> High Temp Service
			<b>MD-</b> Mirror Dial w/ Knife Edge Pointer	<b>Z-</b> Special/ Write Out
			<b>MM-</b> Min/ Max Pointers	





# HYDRAULIC POWER ACCESSORIES **HYVAIR**<sup>®</sup>

## QUICK DISCONNECTS- TWO WAY

Interchanges with S600, AN Series

**ISO A:**  
1/4" thru 1", Steel Only

### PRESSURE RATINGS

SERIES	PSI	BAR
4FP	4,600	315
6FP	3,000	207
8FP	3,600	248
12FP	4,000	275
16FP	3,000	207

### FLOW CAPACITY

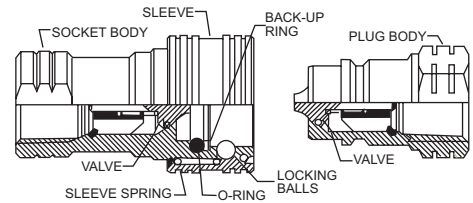
SERIES	Cv	Ac
4FP	0.8	19
6FP	1.8	46
8FP	3.2	80
12FP	5.9	148
16FP	9.7	242

### SIZE SOCKETS

1/4" FPT	QD-2WA-4FP-4S
3/8" FPT	QD-2WA-6FP-6S
1/2" FPT	QD-2WA-8FP-8S
3/4" FPT	QD-2WA-12FP-12S
1" FPT	QD-2WA-16FP-16S

### SIZE PLUGS

1/4" FPT	QD-2WA-4FP-4P
3/8" FPT	QD-2WA-6FP-6P
1/2" FPT	QD-2WA-8FP-8P
3/4" FPT	QD-2WA-12FP-12P
1" FPT	QD-2WA-16FP-16P



The hyair series A conforms to the dimensional requirements of the ISO Standard 7241-I Series A. All pressure ratings maintain a 4:1 safety factor

This series available steel only at this time.  
(No material prefix required)

SIZE	SOCKET	DIMENSIONS			SIZE	PLUG	DIMENSIONS		
		A	B	C			D	E	F
1/4" FPT	QD-2WA-4FP-S	1.89	1.07	0.88	1/4" FPT	QD-2WA-4FP-4P	1.40	0.86	0.75
3/8" FPT	QD-2WA-6FP-S	2.22	1.27	1.00	3/8" FPT	QD-2WA-6FP-6P	1.68	1.00	0.88
1/2" FPT	QD-2WA-8FP-S	2.62	1.50	1.31	1/2" FPT	QD-2WA-8FP-8P	1.95	1.22	1.06
3/4" FPT	QD-2WA-12FP-S	3.24	1.88	1.56	3/4" FPT	QD-2WA-12FP-12P	2.39	1.52	1.31
1" FPT	QD-2WA-16FP-S	3.89	2.11	1.88	1" FPT	QD-2WA-16FP-16P	2.83	1.79	1.62

Interchanges with FP45, HN Series

**ISO B:**  
1/4" thru 2" (1/4" thru 1" shown),  
Steel, Brass, Stainless

### PRESSURE RATINGS

SIZE	"S" STEEL STANDARD SERVICE		"B" BRASS SERVICE		"C"= 303SS "D"= 316SS	
	PSI	BAR	PSI	BAR	PSI	BAR
4FP	3,700	255	2,700	186	3,700	255
6FP	3,700	255	2,200	152	3,700	255
8FP	5,000	345	2,250	155	4,250	293
12FP	4,000	275	2,000	138	3,500	242
16FP	4,000	275	1,500	103	2,500	173

### FLOW CAPACITY

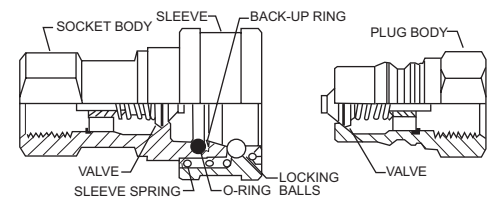
SIZE	Cv	Cv LESS VALVES	
		W/VALVE	ACTUATOR
4FP	1.1	2.2	1.0
6FP	1.9	4.0	1.8
8FP	3.2	7.6	3.1
12FP	7.2	21.0	7.2
16FP	10.3	36.0	10.4

### SIZE STEEL SOCKETS

1/4" FPT	SQD-2WB-4FP-4S
3/8" FPT	SQD-2WB-6FP-6S
1/2" FPT	SQD-2WB-8FP-8S
3/4" FPT	SQD-2WB-12FP-12S
1" FPT	SQD-2WB-16FP-16S

### SIZE STEEL PLUGS

1/4" FPT	SQD-2WB-4FP-4P
3/8" FPT	SQD-2WB-6FP-6P
1/2" FPT	SQD-2WB-8FP-8P
3/4" FPT	SQD-2WB-12FP-12P
1" FPT	SQD-2WB-16FP-16P



The hyair series B conforms to ISO 7241-1 series B standard. All pressure ratings maintain a 4:1 safety factor

Specify material prefix when ordering:  
S= Steel, B= Brass, C= 303SS, D= 316SS

SIZE	SOCKET	DIMENSIONS			SIZE	PLUG	DIMENSIONS		
		A	B	C			D	E	F
1/4" FPT	QD-2WB-4FP-4S	2.26	1.17	0.88	1/4" FPT	QD-2WB-4FP-4P	1.52	0.87	0.75
3/8" FPT	QD-2WB-6FP-6S	2.56	1.42	1.00	3/8" FPT	QD-2WB-6FP-6P	1.76	1.01	0.88
1/2" FPT	QD-2WB-8FP-8S	2.96	1.86	1.28	1/2" FPT	QD-2WB-8FP-8P	2.03	1.30	1.13
3/4" FPT	QD-2WB-12FP-12S	3.48	2.22	1.56	3/4" FPT	QD-2WB-12FP-12P	2.36	1.52	1.31
1" FPT	QD-2WB-16FP-16S	4.13	2.61	1.86	1" FPT	QD-2WB-16FP-16P	2.85	1.88	1.63



# POWER AMPLIFIERS

## REM-S SERIES- POWER AMPLIFIERS



### REM-S

For Single Solenoid Proportional Valve



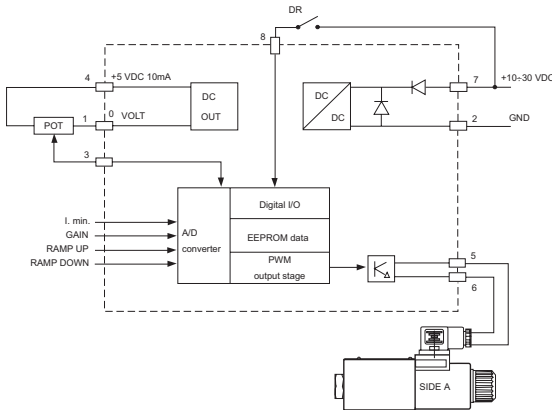
REM-SR-01-G003

Supply voltage (stabilized)	12VDC to 28VDC
Supply voltage (Maximum)	30VDC
Max. power	40W
Maximum output current	2.8 A
External potentiometer supply (output)	+5V/I <sub>max</sub> , 10mA
Reference (input)	0V to +5V, 0V to 10V
Polarization current adjustment (I <sub>min</sub> )	0 to 50%I <sub>max</sub>
Ramp time adjustments	0 to 10 sec
Output signal test point (Valve Current)	1Volt= 1Ampere ±5%
Ambient operating temperature	40-160°F (5°-70°C)
Weight	0.33 lb (0.15kg)

### REM-S Series Proportional Valve Amplifier

#### Electrical Circuit and Connections

Sup (2-7)	Power Supply
Out (1-4)	Output to external potentiometer
Ref (3)	Reference
SO (5-6)	Output at solenoid
DR (8)	Ramp off (closed contact= exclusion)
Pot	External reference potentiometer
CS	Feedback current
PS	Final Stage
SC	Cable Screen
VC	Current measure test point at solenoid
PWM	Pulse width modulate wave



The electronic control card type REM-S has been designed to drive single solenoid proportional valves without integral position transducer. The control card is enclosed in an "OCTAL" type housing, a typical (8 pin) relay mounting standard.

The output stage operates on the pulse width modulation principle (P.W.M.) and is provided with current feedback in order to obtain a solenoid output current proportional to the reference input signal. Output short circuit and supply polarity inversion protection is provided.

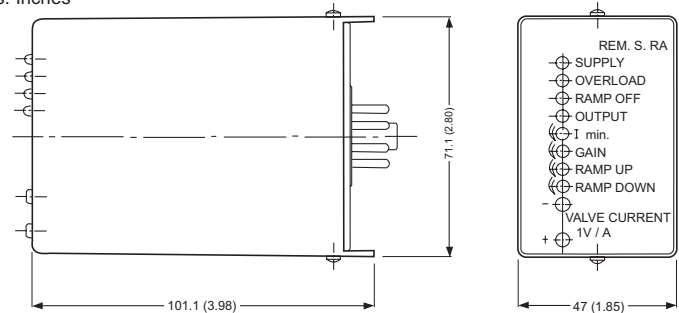
Gain, minimum current and rise and fall ramp time adjustments are possible through the corresponding front panel trimming potentiometers, while the output current to the solenoid can be measured via the Valve Current test points and the ramp operation can be excluded.

**Attention please: electronic regulators must be used in dampness and water protected places.**

#### Dimensional Data

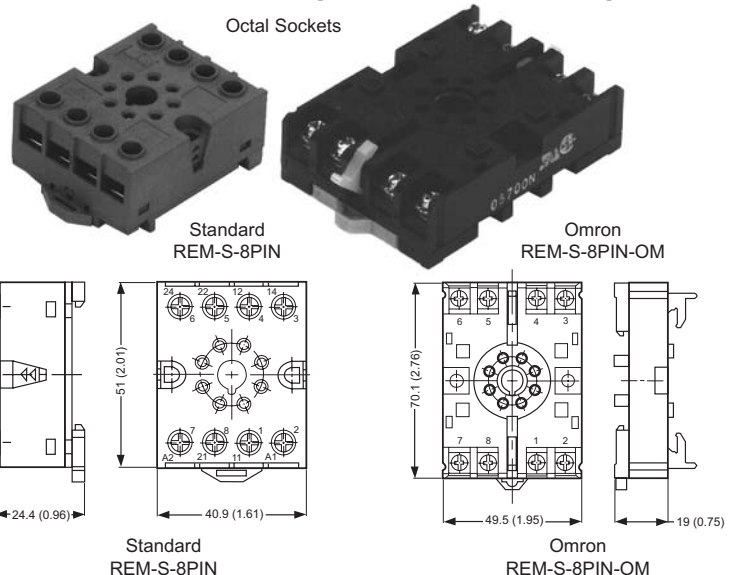
### REM-S Proportional Valve Amplifier

Units: Inches



### REM-S 8 PIN Socket Proportional Valve Amplifier

Octal Sockets



#### Adjustment Panel

- 12 to 28 VDC (green led)
- Overload protection (red led)
- Ramp off (red light)
- Output to solenoid (yellow led)
- Minimum current adjustment
- Max flow adjustment (ratio Q/I)
- Ramp up time adjustment
- Ramp down time adjustment
- Current at test point (1V=1A)



# POWER AMPLIFIERS

## REM-S SERIES- POWER AMPLIFIERS



### REM-S

#### For Single Solenoid Proportional Valve

#### Calibration procedure

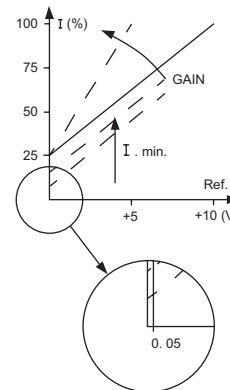
Connect the card in the proper way following the previous page diagram but without powering it. Turn completely anticlockwise the 4 trimming potentiometers and position the reference potentiometer on zero. Before powering the card, ensure that any unforeseen hydraulic system movement cannot cause material damage or injury to people. Power now the card; the green LED should light up.

#### Minimum current or polarization current adjustment

Turn slowly the minimum current trimming potentiometer clockwise ( $I_{min}$ ) until an actuator movement can be visually detected. Turn slowly anticlockwise the potentiometer: the minimum current setting will be adjusted correctly when the actuator movement stops. For the REMD model with minimum initial threshold current, turn the reference potentiometer up to a  $V_{ref}$  of 50mV

#### Maximum current GAIN Adjustment

Turn first the ramp time trimming potentiometers clockwise by at least 10 turns, if the system could be damaged by a too fast solenoid operation (evaluate the application carefully). The maximum actuator speed can now be adjusted. Turn the (reference signal) potentiometer to its maximum setting and rotate slowly the GAIN trimming potentiometer (GAIN) until the maximum required speed is obtained. The speed can now be varied by moving the potentiometer. The GAIN setting could change the  $I_{min}$  current setting. For this reason it's better to recheck the  $I_{min}$  after GAIN setting.



#### Ramp time adjustment

The ramp time is the time taken to pass from the minimum to the maximum current valve, and vice versa. It's adjustable from a minimum of 0s up to a maximum of 10seconds (to reach the maximum current value set). Turning clockwise the trimming potentiometer, the ramp time increases.

#### Notes:

- The ramp fall time affects the actuator stop position. Moving the reference potentiometer to zero Volt, the actuator goes on moving till the set ramp time is elapsed. Therefore it's necessary to adjust it properly.
- When the overload red LED lights up, it will be necessary to switch off the power to the card, switching it on again after having eliminated the cause of overload.

#### DIP switch table

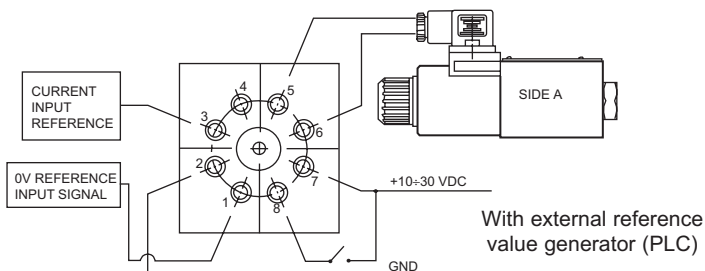
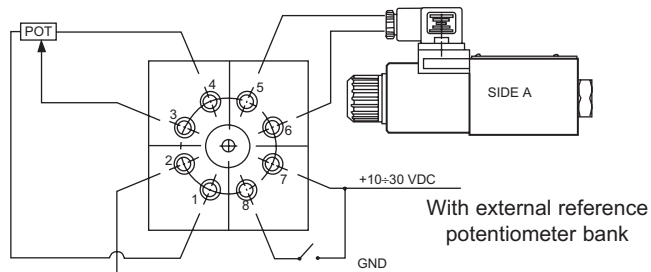
Six miniature switches are mounted internally on one of the REM sides. The REM configuration to suit any particular application can be implemented by setting these switches, which can be reached through the unit ventilating slots.

PWM frequency (100 to 330 Hz), minimum (continuous or step) current, reference voltage range and maximum current ( $I_{max}$ ) can thus be adjusted.

Switch #	Function		Dither (Hz)		Input ref. (Volts)		I <sub>max</sub> (Amps)		
	100	330	0 to 5	0-10	0.8	1.6	3.2		
1	off	on							
2			On Always						
3			on	off					
4			off	off					
5						off	on	off	
6						on	off	off	

On= Down Position  
Off- Up Position  
(Also marked on DIP switch board)

## Typical Connections



## Ordering Information

### REM-SRA\* - \*-G003

Max Output: X= 0.8A  
Y= 1.6A (std)  
Z= 2.8A

Input Reference: 0= 0-10 V (std)  
5= 0-5 V

Frequency Dither: 1= 100Hz (std)  
2= 330 Hz

REM-SRAY-01-G003= Standard Settings  
See DIP switch settings



# POWER AMPLIFIERS

## REM-D SERIES- POWER AMPLIFIERS

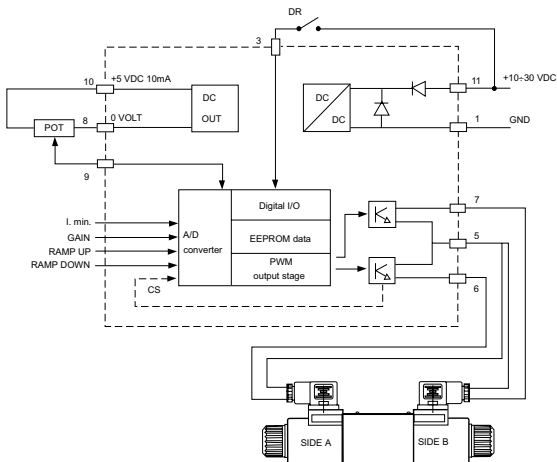


REM-DRAY-01-G003

### REM-D Series Proportional Valve Amplifier

#### Electrical Circuit and Connections

Sup (1-11)	Power Supply
Out (8-10)	Output to external potentiometer
Ref (9)	Reference
0V (4)	Common
SO A (5-6)	Output at solenoid A
SO B (5-7)	Output at solenoid B
DR (3)	Ramp off (closed contact= exclusion)
Pot	External reference potentiometer
CS	Feedback current
PS	Final Stage
VC	Current measure test point at solenoid
SC	Cable Screen
PWM	Pulse width modulate wave



**Adjustment Panel**  
 12 to 28 VDC (green led)  
 Overload protection (red led)  
 Ramp off (red light)  
 Output to solenoid (yellow led)  
 Minimum current adjustment  
 Max flow adjustment (ratio Q/I)  
 Ramp up time adjustment  
 Ramp down time adjustment  
 Current at test point (1V=1A)

### REM-D

For Double Solenoid Proportional Valve

Supply voltage (stabilized)	12VDC to 28VDC
Supply voltage (Maximum)	30VDC
Max. power	40W
Maximum output current	2.8 A
External potentiometer supply (output)	+5V/I <sub>max</sub> , 10mA
Reference (input)	-5V to +5V, -10V to 10V
Polarization current adjustment (I <sub>min</sub> )	0 to 50%I <sub>max</sub>
Ramp time adjustments	0 to 10 sec
Output signal test point (Valve Current)	1Volt= 1Ampere ±5%
Ambient operating temperature	40-160°F (5°-70°C)
Weight	0.44 lb (0.2kg)

The electronic control card type REM-D has been designed to drive double solenoid proportional valves without integral position transducer. The control card is enclosed in an "UNDECAL" type housing, a typical (11 pin) relay mounting standard.

The output stage operates on the pulse width modulation principle (P.W.M.) and is provided with current feedback in order to obtain a solenoid output current proportional to the reference input signal. Output short circuit and supply polarity inversion protection is provided.

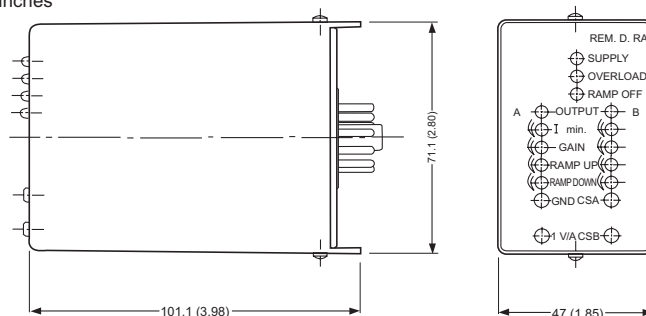
Gain, minimum current and rise and fall ramp time adjustments are possible through the corresponding front panel trimming potentiometers, while the output current to the solenoid can be measured via the Valve Current test points and the ramp operation can be excluded.

**Attention please: electronic regulators must be used in dampness and water protected places.**

### Dimensional Data

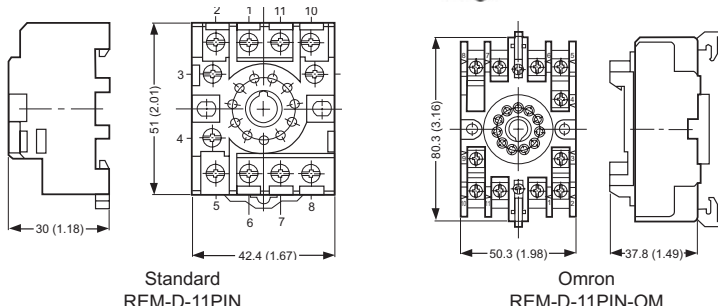
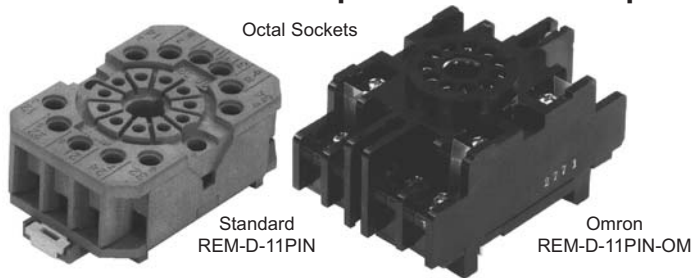
#### REM-D Proportional Valve Amplifier

Units: Inches



#### REM-D 11 PIN Socket Proportional Valve Amplifier

Octal Sockets



# POWER AMPLIFIERS

## REM-D SERIES- POWER AMPLIFIERS



### REM-D

For Double Solenoid Proportional Valve

#### Calibration procedure

Connect the card in the proper way following the previous page diagram but without powering it. Turn completely anticlockwise the 4 trimming potentiometers and position the reference potentiometer on zero. Before powering the card, ensure that any unforeseen hydraulic system movement cannot cause material damage or injury to people. Power now the card; the green LED should light up.

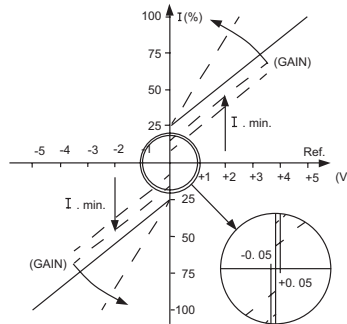
#### Minimum current or polarization current adjustment

Turn slowly the minimum current trimming potentiometer clockwise ( $I_{min}$ ) until an actuator movement can be visually detected. Turn slowly anticlockwise the potentiometer: the minimum current setting will be adjusted correctly when the actuator movement stops. For the REMS model with minimum initial threshold current, turn the reference potentiometer up to a  $V_{ref}$  of 50mV

#### Maximum current GAIN Adjustment

Turn first the ramp time trimming potentiometers clockwise by at least 10 turns, if the system could be damaged by a too fast solenoid operation (evaluate the application carefully). The maximum actuator speed can now be adjusted.

Turn the (reference signal) potentiometer to its maximum setting and rotate slowly the GAIN trimming potentiometer (GAIN) until the maximum required speed is obtained. The speed can now be varied by moving the potentiometer. The GAIN setting could change the  $I_{min}$  current setting. For this reason it's better to recheck the  $I_{min}$  after GAIN setting.



#### Ramp time adjustment

The ramp time is the time taken to pass from the minimum to the maximum current valve, and vice versa. It's adjustable from a minimum of 0s up to a maximum of 10 seconds (to reach the maximum current value set). Turning clockwise the trimming potentiometer, the ramp time increases.

#### Notes:

- The ramp fall time affects the actuator stop position. Moving the reference potentiometer to zero Volt, the actuator goes on moving till the set ramp time is elapsed. Therefore it's necessary to adjust it properly.
- When the overload red LED lights up, it will be necessary to switch off the power to the card, switching it on again after having eliminated the cause of overload.

#### DIP switch table

Six miniature switches are mounted internally on one of the REM sides. The REM configuration to suit any particular application can be implemented by setting these switches, which can be reached through the unit ventilating slots.

PWM frequency (100 to 330 Hz), minimum (continuous or step) current, reference voltage range and maximum current ( $I_{max}$ ) can thus be adjusted.

Switch #	Function	Dither (Hz)		Input ref. (Volts)		I <sub>max</sub> (Amps)		
		100	330	0 to 5	0-10	0.8	1.6	3.2
1		off	on					
2				On Always				
3				on	off			
4				off	off			
5						off	on	off
6						on	off	off

On= Down Position  
Off- Up Position  
(Also marked on DIP switch board)

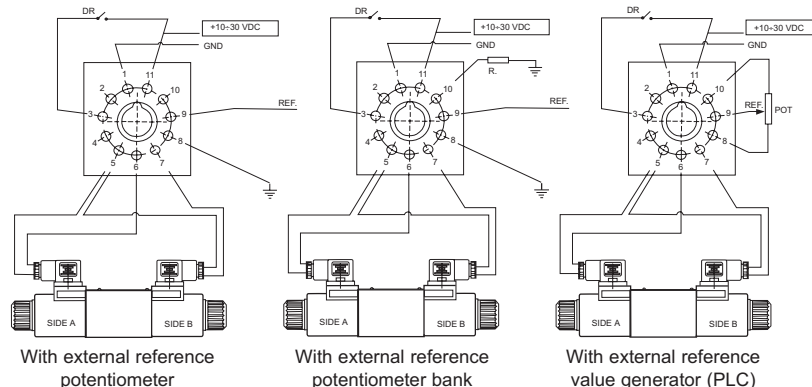
### Ordering Information

REM-DRA\* - \* -G003

Max Output: X= 0.8A Y= 1.6A (std) Z= 2.8A  
Input Reference: 0= 0-10 V (std) 5= 0-5 V  
Frequency Dither: 1= 100Hz (std) 2= 330 Hz

REM-DRAY-01-G003= Standard Settings  
See DIP switch settings

### Typical Connections





INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS

***PFB SERIES***

## **Pressure Filters With Bypass**



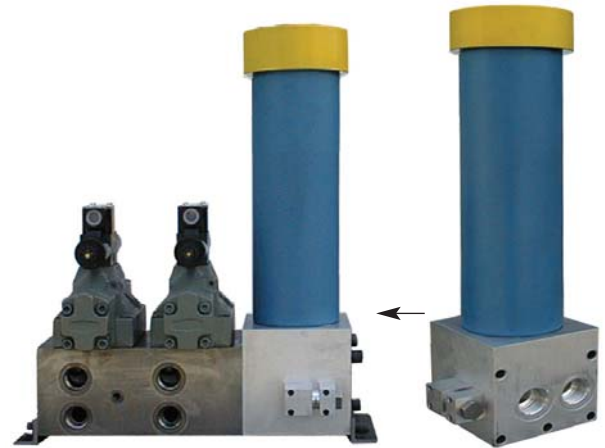
*PFB100-16FS-28.0-25-D1*

## Features

- **High Flow, Bypass Elements:** Element Designed for High Flows and Low Pressure Drops.
- **Replaceable Elements:** Element May be Easily Replaced by Unscrewing End Cap. Only the Element Must Be Disposed.
- **High Quality Glass Fiber Filter Media:** Coreless Element Supported by Support Fleece
- **Three Element Lengths:** 9", 18" & 27" Lengths Available. Elements Will Interchange With Popular Manufactured Elements



**PFB100 "T" Style  
In-Line Filter**



**PFB105 Modular Filter  
D08 Mounting**

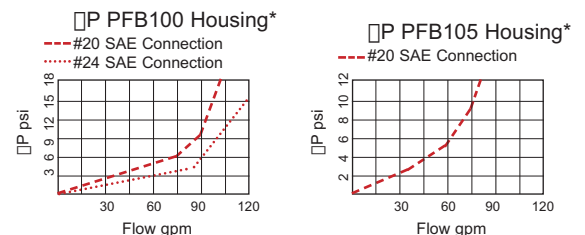
## Specifications

<b>Maximum Pressures</b>	Head & Housing	3,000 psi (210 bar) Maximum Working Pressure
	Element	Series B1=150 psi Differential Collapse w/ 50 psi Reusable Bypass Valve Series B2= 290 psi Differential Collapse w/ 50 psi Reusable Bypass Valve
<b>Temperature</b>	-15° F to +230° F (Viscosities Permitting)	
<b>Recommended Fluids</b>	Petroleum Based Fluids- ISO VG32-68, Phosphate Ester, Most Vegetable Oils, Water Based Fluids to 40% Water	
<b>Materials</b>	Filter Heads, Filter Body	Aluminum, Steel
	Filter Element	Glass Fiber ( $\eta_k \geq 200$ ) with Mesh Support (steel end caps)

## Element Flow Ratings

Bowl Length	Filter Rating (microns) $\eta_k \geq 200$	Model Number (Element Only)	Element Flow*	
			( $\Delta P= 5$ psi)	( $\Delta P= 10$ psi)
1	3 $\square$ Absolute	9-3	41	82
	12 $\square$ Absolute	9-10	62	124
	25 $\square$ Absolute	9-25	100	200
2	3 $\square$ Absolute	18.6-3	82	164
	12 $\square$ Absolute	18.6-10	124	248
	25 $\square$ Absolute	18.6-25	166	332
3	3 $\square$ Absolute	28-3	125	250
	12 $\square$ Absolute	28-10	250	500
	25 $\square$ Absolute	28-25	250	500

## Filter Housing Pressure Drops



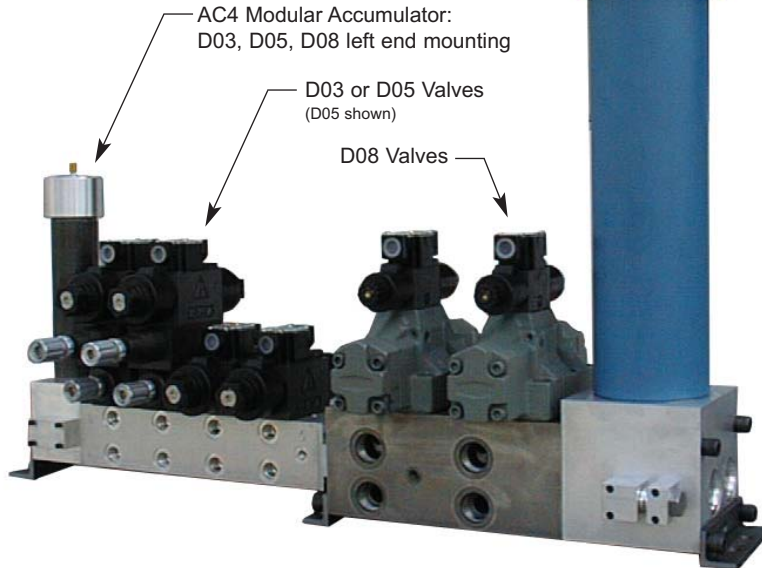
Maximum Flows:  
PFB100: 125 GPM      PFB105: 90 GPM

\*Element GPM with viscosity of 150 SUS, Specific Gravity of .88 (ISO 32 Oil at 100° F).  
Total pressure drop=  $\square$ P Housing +  $\square$ P Element  
Shaded areas are beyond housing rating of PFB100 (125 gpm max.)



**PFB100 "T" Style**  
Pressure Filter

Differential Indicator,  
Relief Valve, Optional



**PFB105 Modular Pressure Filter**  
Attaches to Hyvair D08 Manifolds

Size 20 Female SAE Ports Only  
Differential Indicator,  
Relief Valve, Outlet Check Valve Optional

### Ordering Information

#### FILTER ASSEMBLY

**PFB100 - 20FS - 18.6 - 3 - D1**

PFB100 "T" Style  
PFB105 Modular

Code	Size
16FS	#16 Female SAE
20FS	#20 Female SAE
24FS	#24 Female SAE

Code	Element Length / Max. Flow Rating
9.0	9.0 (40 gpm)
18.6	18.6" (80 gpm)
28.0	28.0" (120 gpm)

Code	Filtration
3	3 Micron
10*	10 Micron
25	25 Micron

\*Code 10  
Micron Rating  
12 □ □<sub>x</sub> ≥ 200  
10 □ □<sub>x</sub> ≥ 75

Code	Optional Codes- List Alphabetically
C	Outlet Check Valve (7 psi cracking)
D1	50 psi Differential Pressure Indicator
DE1	50 psi Diff. Pressure & Electrical Indicator
R	Relief Valve 300-3000 psi, 50 gpm max.

#### ELEMENT ONLY

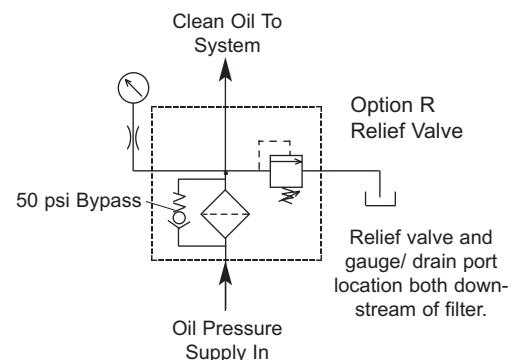
**B1-S1-26-3.9 - 18.6 - 3**

Bypass Series 1, Steel End Caps  
Buna N seals, Nominal Size 26  
(1.625" ID on filter head end,  
1.89" ID on bypass check end),  
3.9" Outer Diameter

Code	Element Length/ Max. Flow
9	3.44" (40 gpm)
18.6	6.05" (80 gpm)
28	10.3" (120 gpm)

Code	Filtration
3	3 Micron
10*	12 Micron
25	25 Micron

\*Code 10  
Micron Rating  
12 □ □<sub>x</sub> ≥ 200  
10 □ □<sub>x</sub> ≥ 75





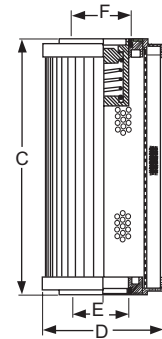
## Dimensional Data

### B1 Pressure Filter Elements

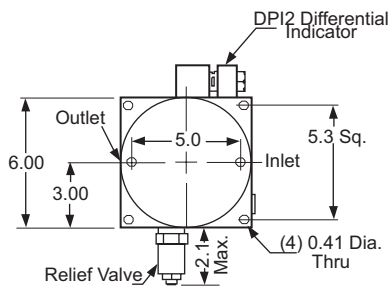
(FOR PF100 AND PF105)

Element NB1S1263.9-	C	D	E	F (bypass)
9-*	9.0	3.8	1.625	1.89
18.6-*	18.6	3.8	1.625	1.89
28-*	28.0	3.8	1.625	1.89

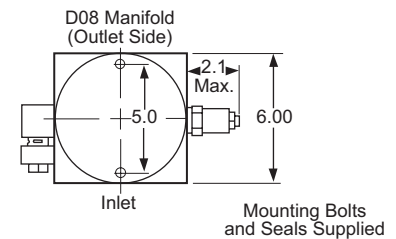
Units: Inches



### PFB100 Pressure Filter

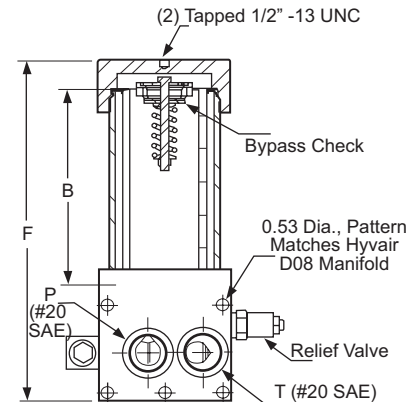
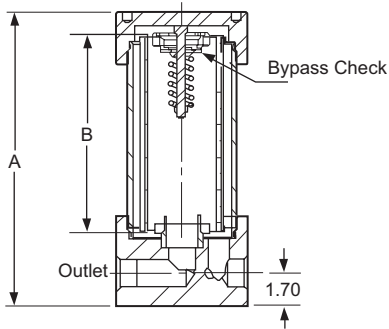


### PFB105 Pressure Filter

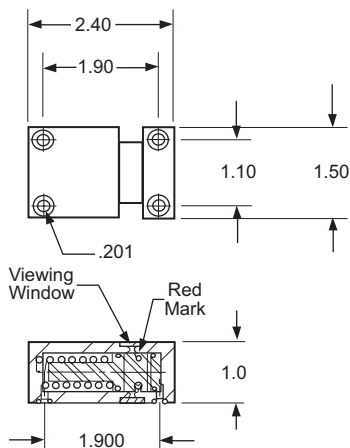


Element Length	A	B (Tube Length)	F
9.0	13.9	4.28	15.8
18.6	23.6	6.90	25.5
28.0	32.9	11.17	34.8

Units: Inches



### DPI2 Differential Pressure Indicator



DE1 and DE2 Differential Electric Indicators:  
Available soon.

Differential Indicators:	System Pressure 1000 psi	
	start	dirty
Option Code: <b>D1 (50 psi)</b> Full Model: DPI2-3K-11-A1	□P= 33	49
Option Code: <b>D2 (150 psi)</b> Full Model: DPI2-3K-31-A1	□P= 80	144



INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS



***PF SERIES***

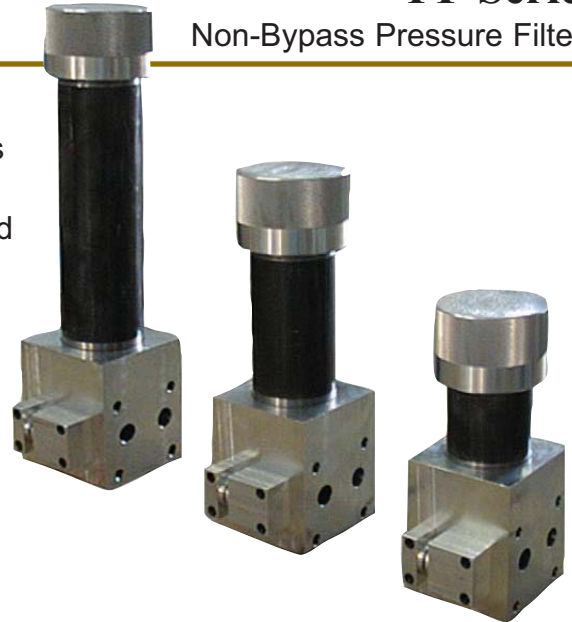
## **Non-Bypass Pressure Filters**



*PF4-16FS-10.3-10-D1*

**Features**

- **3000 psi Differential Non-Bypass Elements:** Element is Replaced Periodically or if Machine Speed Slows
- **Replaceable Elements:** Element May be Easily Replaced by Unscrewing End Cap. Available in Three Lengths
- **High Quality Glass Fiber Filter Media:** Supported by Both Support Fleece and a Stainless Steel Wire Mesh



**Specifications**

<b>Maximum Pressures</b>	Head & Housing	3,000 psi (210 bar) Maximum Working Pressure
	Element	3,000 psid (210 bar) Minimum Collapsing Pressure
<b>Temperature</b>	-15° F to +230° F (Viscosities Permitting)	
<b>Recommended Fluids</b>	Petroleum Based Fluids- ISO VG32-68, Phosphate Ester, Most Vegetable Oils, Water Based Fluids to 40% Water	
<b>Materials</b>	Filter Heads, Filter Body	Aluminum, Steel
	Filter Element	Glass Fiber ( $\beta_x \geq 200$ ) with Stainless Wire Mesh Support

**Multi-Pass Performance to ISO 4572 Standards**

The beta ratio refers to a 16-bar pressure difference.  
test duct ACFTD

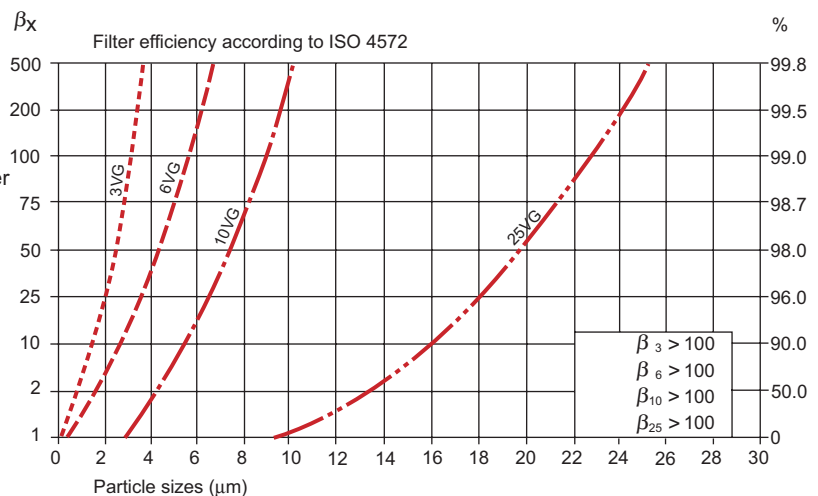
$$\beta_x = \frac{\text{amount of particles size } > \mu\text{m before filter}}{\text{amount of particles size } > \mu\text{m after filter}}$$

conversion of filtration quotient  $\beta_x$  into filtration efficiency in %

$$\frac{\text{filtration quotient} - 1}{\text{filtration quotient}} \times 100 = \%$$

e.g.  $\beta_{10} = 75 \rightarrow \frac{(75-1)}{75} \times 100 = 98.7\%$

**Glass Fiber**



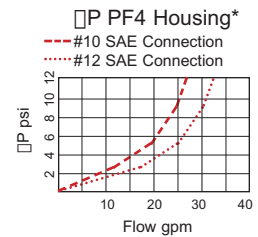
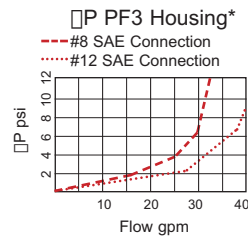
Application	ISO 4406	NAS 1638	Hyvair
Servo valve systems, high pressure circuits, very low flow applications- where silting can occur	13/ 9	3-4	3 $\mu$
Proportional valves	16/13	7-8	10 $\mu$
General heavy industrial, low pressure circuits	19/15	9-11	25 $\mu$

### Element Flow Ratings

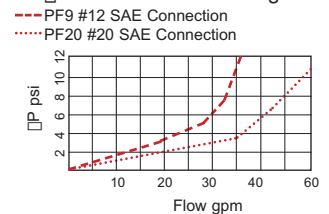
Bowl Length	Filter Rating (microns) □ ≥ 200	Model Number (Element Only)	Element Flow*	
			(□P= 10 psi)	(□P= 20 psi)
1	3□ Absolute	3.4-3	8	17
	10□ Absolute	3.4-10	18	37
	25□ Absolute	3.4-25	32	60
2	3□ Absolute	6.1-3	15	38
	10□ Absolute	6.1-10	30	>75
	25□ Absolute	6.1-25	61	>75
3	3□ Absolute	10.3-3	18	>75
	10□ Absolute	10.3-10	44	>75
	25□ Absolute	10.3-25	74	>75

\*Element GPM with viscosity of 150 SUS, Specific Gravity of .88 (ISO 32 Oil at 100° F).  
Total pressure drop= □P Housing + □P Element

### Filter Housing Pressure Drops



□P PF9 & PF20 Housing\*



**PF3 In-Line Pressure Filter**  
Sizes:  
NPT- 8FP, 12FP, 16FP  
SAE- 8FS, 10FS, 12FS  
No Indicator Available



**PF4 Modular Pressure Filter**  
Attaches to Hyvair D03, D05, or D08 Manifolds  
Size:  
10FS female SAE only  
Differential Indicator, Relief Valve, Optional



**PF9 "T" Style Pressure Filter**  
Sizes:  
NPT- 8FP, 12FP, 16FP  
SAE- 8FS, 10FS, 12FS  
Differential Indicator, Optional



**PF20 Double "T" Style Pressure Filter**  
Sizes:  
NPT- 12FP, 16FP, 20FP  
SAE- 12FS, 16FS, 20FS  
Differential Indicator Optional  
(Uses 2 elements)

### Ordering Information

#### FILTER ASSEMBLY

**PF4 - 10FS - 10.3 - 3 - D1**

PF3 In-Line
PF4 Modular
PF9 "T" Style
PF20 Double "T"

Code	Size
8FS	#8 Female SAE
10FS	#10 Female SAE
12FS	#12 Female SAE
16FS	#16 Female SAE
20FS	#20 Female SAE
8FP	1/2" Female NPT
12FP	3/4" Female NPT
16FP	1" Female NPT
20FP	1-1/4" Female NPT

Code	Element Length / Max. Flow Rating
3.4	3.44" (15 gpm)
6.1	6.05" (23 gpm)
10.3	10.3" (40 gpm)

Code	Filtration
3	3 Micron
10	10 Micron
25	25 Micron

Code	Optional Codes- List Alphabetically
D1	50 psi Differential Pressure Indicator
D2	150 psi Differential Pressure Indicator
DE1	50 psi Diff. Pressure & Electrical Indicator
DE2	150 psi Diff. Pressure & Electrical Indicator
R	Relief Valve 300-3000 psi, 50 gpm max.

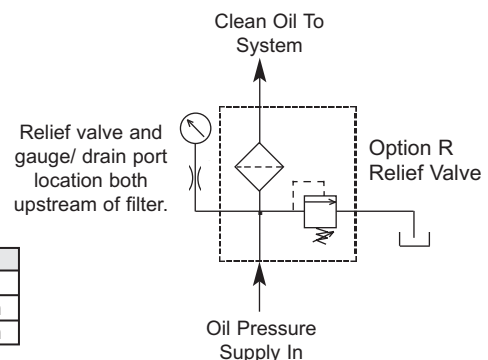
#### ELEMENT ONLY

**NB1-S1-14-1.7 - 10.3 - 3**

Non-Bypass Series 1, Steel End Caps Buna N seals, Nominal Size 14 (.875" ID), 1.7" Outer Diameter

Code	Element Length/ Flow Rating
3.4	3.44" (15 gpm)
6.1	6.05" (23 gpm)
10.3	10.3" (40 gpm)

Code	Filtration
3	3 Micron
10	10 Micron
25	25 Micron



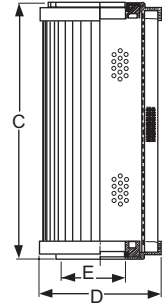
### Dimensional Data



**NB1 Pressure Filter Elements**  
(FOR PF3, PF4, PF9 AND PF20)

Element NB1S1141.7-	C	D	E	3 $\square$ Dirt Capacity	10 $\square$ Dirt Capacity	25 $\square$ Dirt Capacity
3.4-*	3.44	1.7	.875	6.4 g	7.0 g	11.5 g
6.1-*	6.05	1.7	.875	10.6 g	11.6 g	19.0 g
10.3-*	10.3	1.7	.875	15.2 g	16.7 g	27.3 g

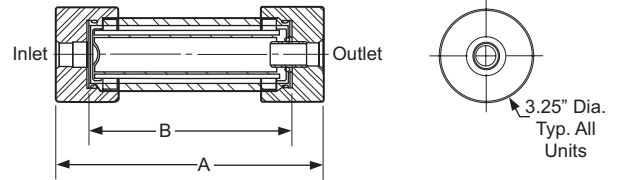
Units: Inches



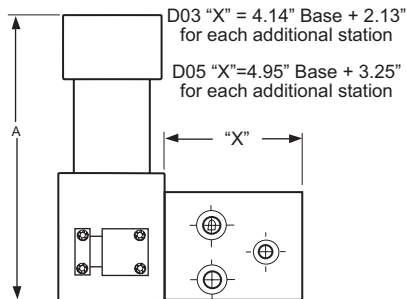
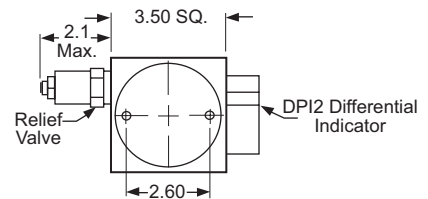
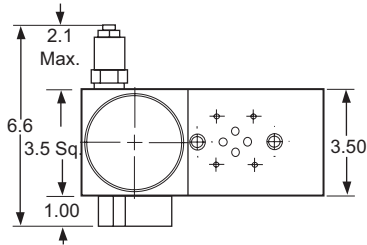
**PF3 Pressure Filter**

Element / Length	A	B (Tube Length)	C
3.4	7.18	4.28	3.44
6.1	9.80	6.90	6.05
10.3	14.07	11.17	10.3

Units: Inches

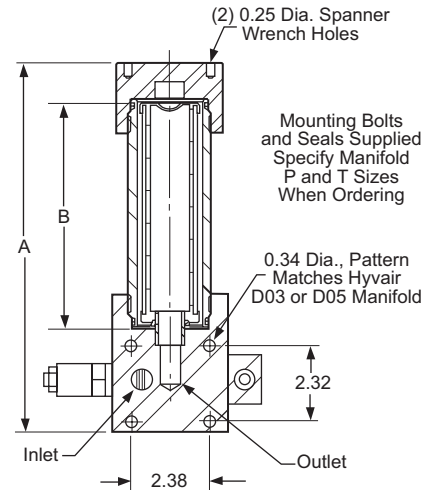


**PF4 Pressure Filter**

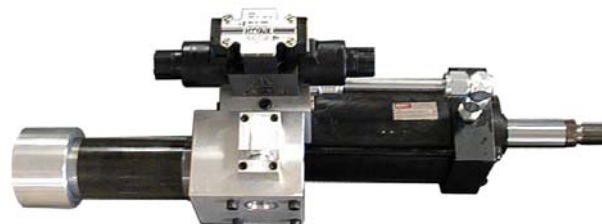
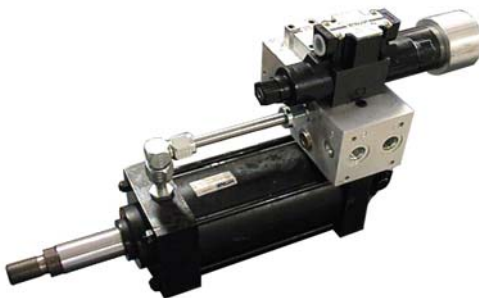


Element / Length	A	B (Tube Length)
3.4	8.26	4.28
6.1	10.88	6.90
10.3	15.15	11.17

Units: Inches

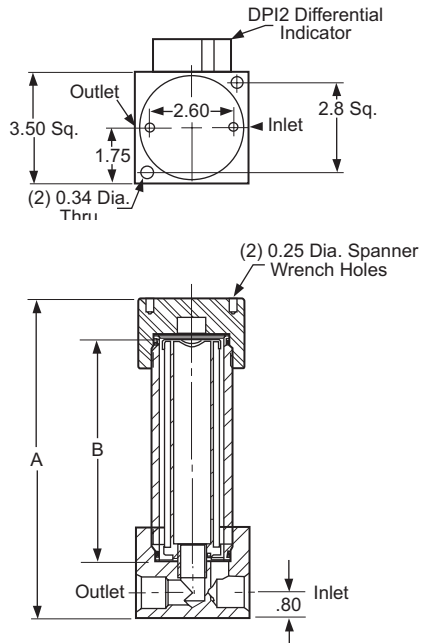


Manifolds (with slight modification) and PF4 pressure filters mounted directly to cylinder.



**Dimensional Data**

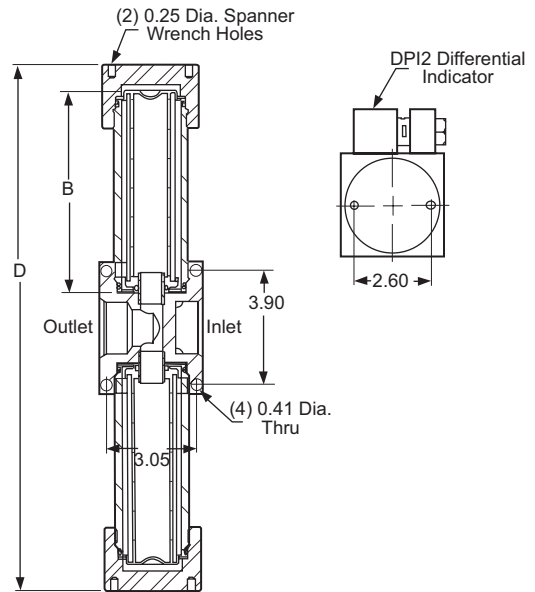
**PF9 Pressure Filter**



Element / (Act. Length)	A	B (Tube Length)
3.4 (3.44")	7.18	4.28
6.1 (6.05")	9.80	6.90
10.3 (10.3")	14.07	11.17

Units: Inches

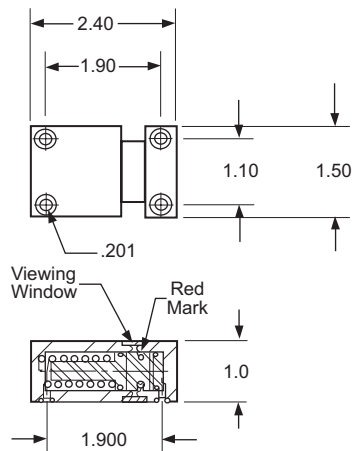
**PF20 Pressure Filter**



Element / (Act. Length)	D	B (Tube Length)
3.4 (3.44")	12.66	4.28
6.1 (6.05")	17.90	6.90
10.3 (10.3")	26.44	11.17

Units: Inches

**DPI2 Differential Pressure Indicator**



DE1 and DE2 Differential Electric Indicators:  
Available soon.

Differential Indicators:	System Pressure 1000 psi	
	start	dirty
Option Code: <b>D1 (50 psi)</b> Full Model: DPI2-3K-11-A1	□P= 33	49
Option Code: <b>D2 (150 psi)</b> Full Model: DPI2-3K-31-A1	□P= 80	144



INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS



**0 - 35K psi**

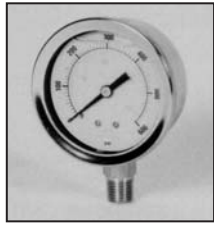
## Pressure Gauges



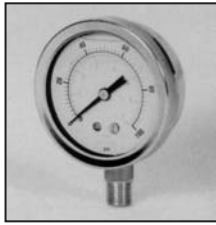
160-2.5-4-N-CB-0

General Hydraulic Service

Stainless Steel Case, Brass Internals, Glycerin-Filled, 1/8" 1/4" & 1/2" NPT Ports, Vacuum to 15,000 PSI



**BM-Bottom Ports**  
Crimped Case- Standard



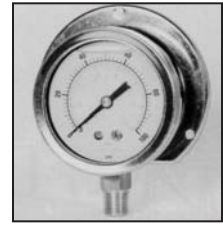
**TB- Twist on Bezel**  
(Optional)



**LB- Lower Back Ports**  
U- Mounting Clamp



**CB- Center Back Ports**  
P- Panel Mounting



**W- Wall Mounting**  
**TB- Twist on Bezel**

**Brass Pressure Snubber:**

1/4" Female NPT  
x 1/4" Male NPT

Model Number
602



**316SS Pressure Snubber:**

1/4" Female NPT  
x #4" Male SAE

Model Number:
D-SN1-4FP-4MS



**Steel Pressure Snubber:**

1/4" Female NPT  
x #6" Male SAE

Model Number:
S-SN1-4FP-6MS



**Gauge Isolator:**

Isolates and holds gauge's last pressure- no drain  
#6 SAE 1/4" NPT

Model Number	Model Number
G11-6FS	G11-4FP

Model 602: we recommend the "green striped" element (porosity 20) for most hydraulic applications.

**Ordering Information**

**HYV2K - 2.5 - 4 - U - CB - O - Option Code/s - (Omit if None)**

Pressure Range- Zero to: (psig)				Gauge Size- Dia.	Port Size	Mounting	Port Location	Series
-30 Vac	160	800	6k	1.5	2- 1/8" MP	N- None	BM- Bottom	O- Hyd. Service; Glyc. Filled, 304SS Case, Brass Internals
15	200	1k	10k	2	4- 1/4" MP	P- Panel	CB- Center/ Back	U- Air Service; Dry, Non-Filled, Steel Case, Brass Internals
30	300	1.5k	15k	2.5	8- 1/2" MP	U- U-Clamp	LB- Lower/ Back	M- Mfg Code- must be in place to continue options
60	400	2k	20k	4	4F- 1/8" MP	W- Wall		H- same as series U but with black face & Hyvair logo
100	500	3k	25k	6	4MS- 4MS			
	600	4k	30k		4A- 9/16-18 Aminco			
		5k	35k		6A- 3/4-16 Aminco			
Available Dry or Filled		Available Filled Only		<p><b>Example:</b> 0-2000 psig, 2.5" Dia., 1/4" Male NPT, U- Clamp Mounting, Center Back Ports, OEM Series- Glycerin Filled</p>				

Case	Internals	Fill Fluid	Options (Listed Alphabetically)	
B- Brass	B- Brass	D- Dry	A- Adapter Ring 4-1/2"	MP- Max Press. Pointer
C- 304SS	C- 304SS	F- Fillable	B- Bar/ Psi	P- Plastic Lens
D- 316SS	D- 316SS	G- Glycerin	C- Calibrated	R- Red Stationary Pointers
P- Polyamid	M- Monel	S- Silicon	G- Glass Lens	RS- Restrictor Screw
S- Steel	S- Steel		K- kPa/ Psi	SB- Solid Front/ Blow-Out Back
			K2- kg/sq-cm	T- High Temp Service
			MD- Mirror Dial w/ Knife Edge Pointer	Z- Special/ Write Out
			MM- Min/ Max Pointers	





INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS



## PRC20 SERIES

### Pressure Reducing Valves



### Specifications

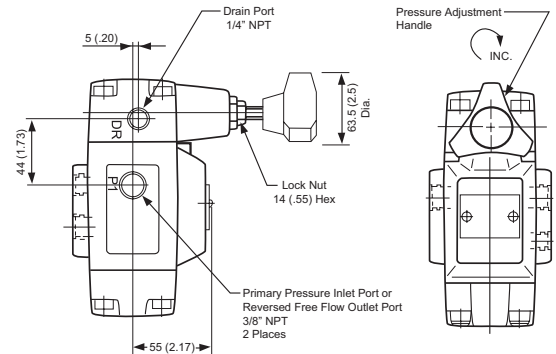
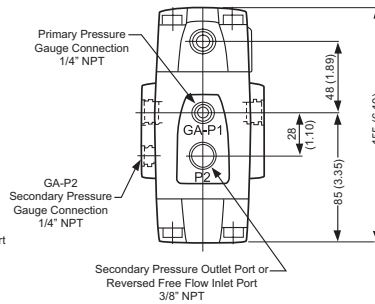
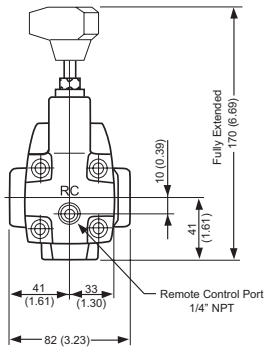
- 3/8", 3/4" & 1-1/4" NPT ports
- Maximum Flow: (Inlet @3000 psi):** 3/8"= 13gpm, 3/4"= 33gpm, 1-1/4"= 66gpm
- Pilot Flow:** 3/8" & 3/4" = 0.25 gpm, 1-1/4" = 0.4 gpm
- 3K pressure standard (adj. 1000-3000 psi)
- 1K pressure range available (100-1000 psi)
- Series PRC20 - with reverse flow check
- Recommended for petroleum based fluids- ISO VG32-68
- Recommended filtration- 10 micron
- Cold starts: 250 SUS maximum viscosity
- Maximum Temperature:** 180°F, (82.2°C) or minimum fluid viscosity of 80 SUS
- All PRC20 pressure reducing valves may be vented to obtain remote pressure control (use direct acting remote relief see DR2 series). Use small diameter line when plumbing the remote relief as short in length as possible to prevent pressure surges.



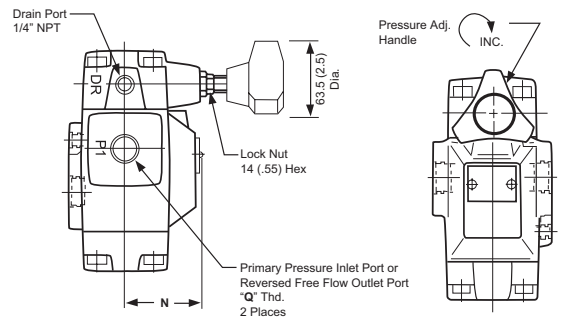
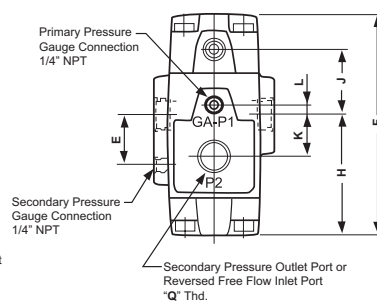
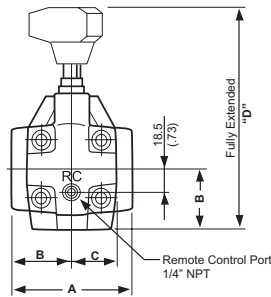
### Dimensional Data

Units: mm (inches)

**PRC20-6FP**  
3/8" Pressure Reducing Valve with Reverse Flow Check (shown)



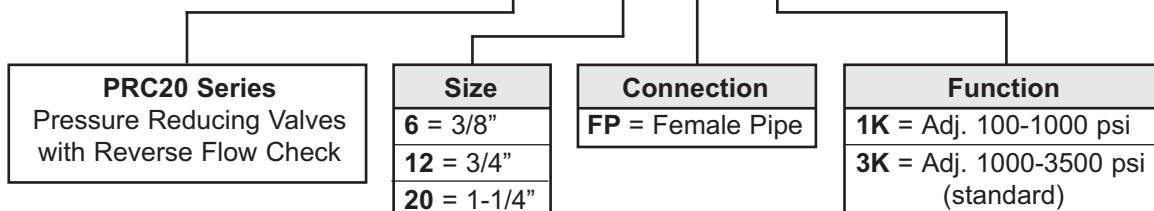
**PRC20-12FP- 3/4"**  
**PRC20-20FP- 1-1/4"**  
Pressure Reducing Valves with Reverse Flow Check (shown)



Model	A	B	C	D	E	F	H	J	K	L	N	Q
<b>PRC20-12FP</b>	95 (3.74)	47.5 (1.87)	36.5 (1.44)	167 (6.57)	42 (1.65)	1.82 (7.17)	100 (3.94)	52 (2.05)	33 (1.30)	9 (0.35)	63 (2.48)	3/4" NPT
<b>PRC20-20FP</b>	132 (5.2)	66 (2.6)	43 (1.69)	183 (7.2)	52 (2.05)	220 (8.66)	124 (4.88)	56 (2.20)	39 (1.54)	12 (0.47)	88 (3.46)	1-1/4" NPT

### Ordering Information

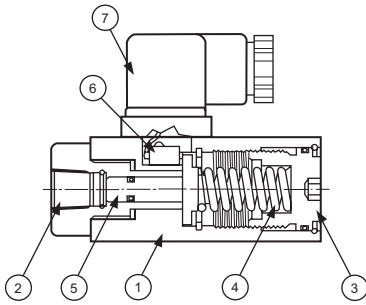
#### PRC20 - 12 - FP - 3K



### Ordering Information

#### PS20 - 2K

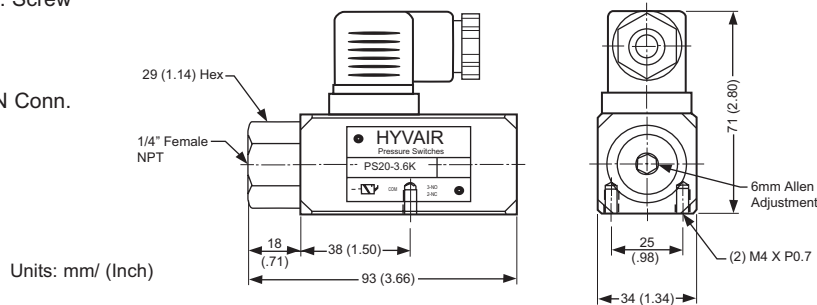
Code	Pressure Range
.5K	90-500 psi
1K	90-1000 psi
2K	200-2000 psi
3.6K	500-3600 psi



1. Body- (Iron)
2. Connection Port 1/4"
3. Pressure Adj. Screw
4. Spring
5. Piston
6. Micro Switch
7. Electrical DIN Conn.



PS20 Pressure Switch

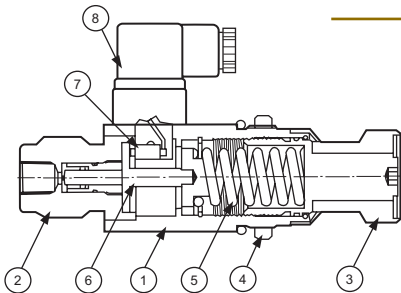


### Ordering Information

#### PS20 - 5K -K

Code	Pressure Range
1.5K	200-1000 psi
3.6K	500-3600 psi
5K	700-5000 psi

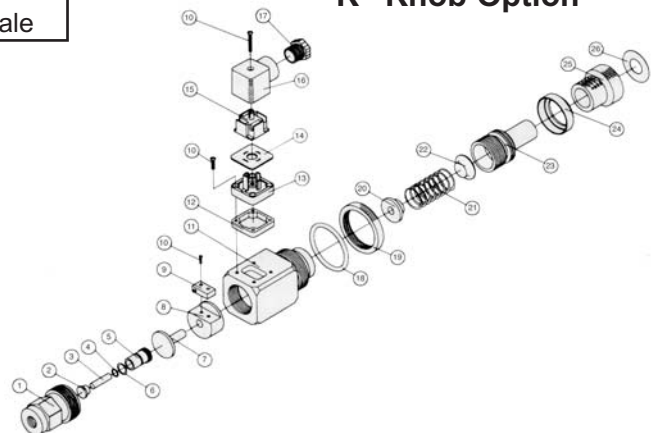
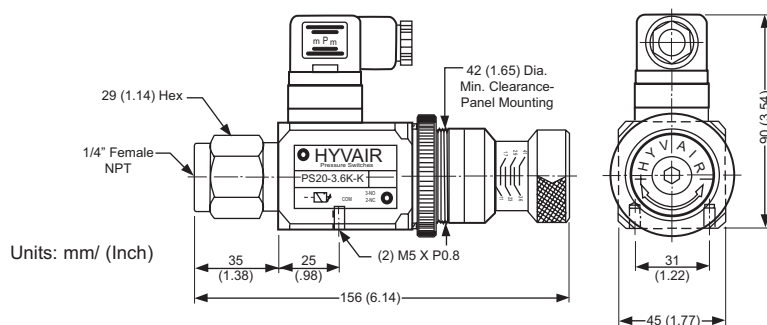
Code	Option
K	Knurled Adjustment Knob with Pressure Read Out Scale



1. Body- (Iron)
2. Connection Port 1/4"
3. Pressure Adj. Knob
4. Panel Mount Nut
5. Spring
6. Piston
7. Micro Switch
8. Electrical DIN Conn.



PS20 Pressure Switch "K" Knob Option



# INSTRUMENTATION/ ELECTRONICS



## PRESSURE SWITCHES

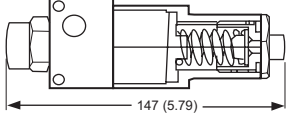


### PS30 Pressure Switch

#### Features

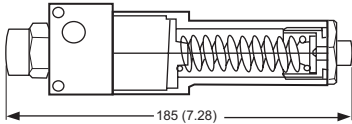
- Hydraulic Input - Pneumatic Output
- Stainless Wetted Parts
- Anodized Aluminum Body
- For Pilot Circuits Only
- CV = .15

PS30



147 (5.79)  
Units: mm/ (Inch)

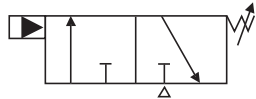
PS30-L



185 (7.28)

#### Operating Pressure

Air Pressure: 0 - 150 psi  
Hydraulic Pressure: 0 - 5000 psi



### Ordering Information

#### PS30 - L - 3K - omit - K

- Hydraulic Input
- Pneumatic Output
- 18 to 22% Dead Band

#### Optional L = Long

12 to 16% Dead Band

#### Range

- 1K - 1000psi
- 2K - 2000psi
- 3K - 3000psi

#### Air Signal

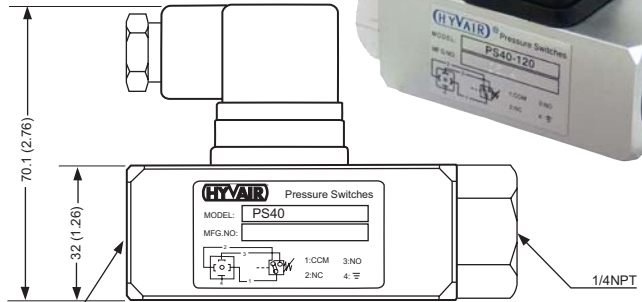
- omit - 2 Pos • 3 way • Normally Closed
- NO - 2 Pos • 3 way • Normally Open

K = Knob Option

### PS40 Pressure Switch

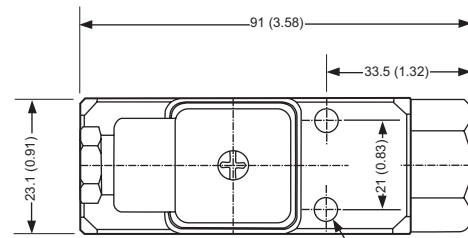
#### Features

- Pneumatic Input - Electric or Pneumatic Output



6mm allen socket adjustment  
CW=increasing

Units: mm/ (Inch)



(2) .21" Dia. Holes

### Ordering Information

#### D03-PSA - 2K

Code	Size
3	D03
5	D05

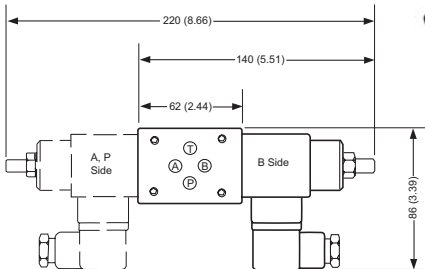
Code	Sensing Port
A	A Port
B	B Port
P	P Port
AB	Both A & B Port

Code	Pressure Range
.5K	90-500 psi
1K	90-1000 psi
2K	200-2000 psi
3.6K	500-3600 psi



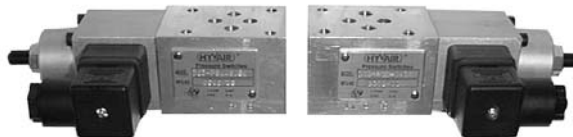
### D03 Pressure Switch

#### D03



D03-PSA  
D03-PSP

D03-PSB

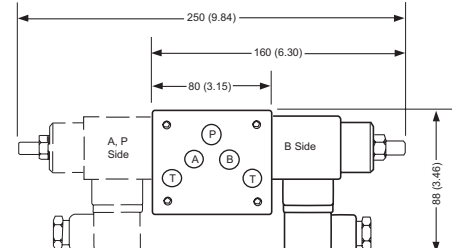


D03-PSAB

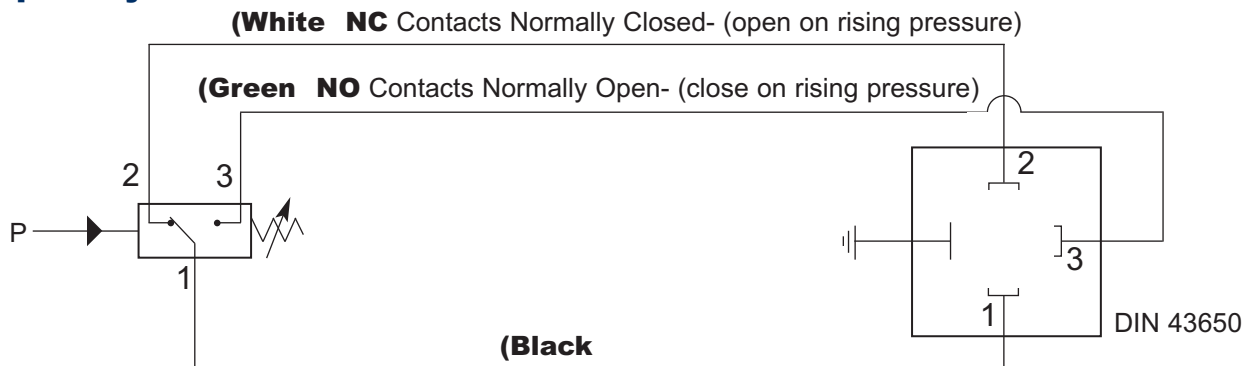


Units: mm/ (Inch)

#### D05



### Graphic Symbol



### Specifications

Fluid:  
Hydraulic, lubricating and light oils

Construction:  
Piston actuated

Adjustment Range:  
90 - 5200 psi (6 - 350 bar)

Ambient Temperature:  
(130° to 175° F (-25° to 80° C))

Maximum Viscosity:  
450 SSU (1000 mm<sup>2</sup>/s)

Maximum Switching Rate:  
20 cycles/ min

Repeatability:  
± 3%

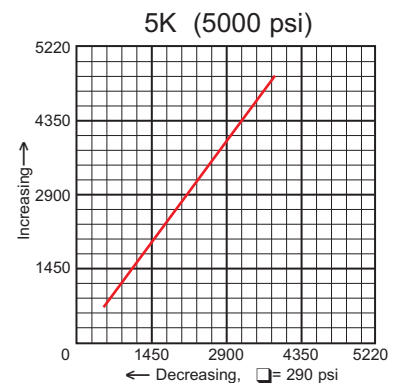
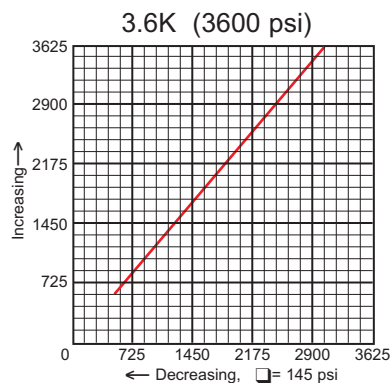
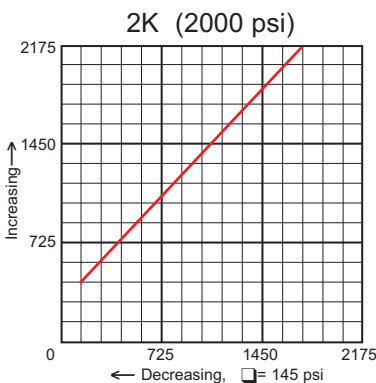
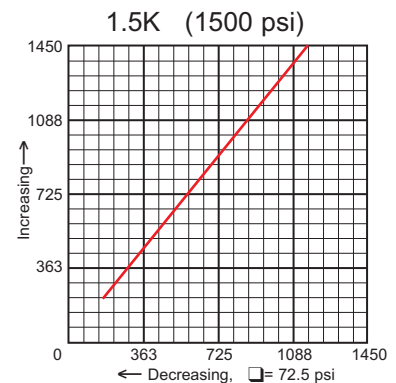
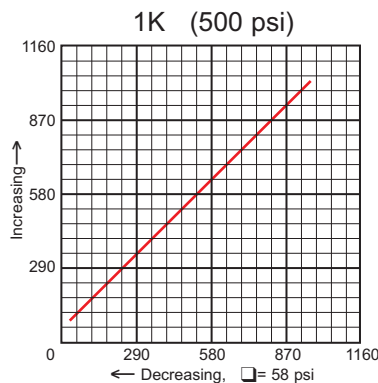
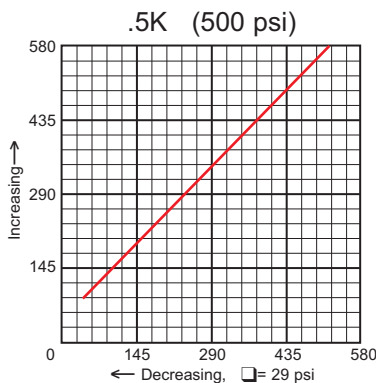
Electrical Connection:  
DIN 43650 Table A

Mounting:  
Arbitrary

Switching Element:  
Microswitch

	Switch Ratings:	
	Resistive	Inductive
14 VDC	3A	1.5A
30VDC	2A	1A
120VAC	3A	1A
240VAC	3A	0.5A

### Hysteresis Diagrams (PSI)





INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS



***EPD03 SERIES***

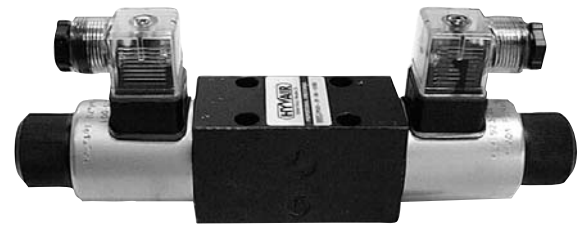
## Proportional Valves



*EPD03-2B-2G-12VDC*

### Features

- High Flow:** EPD03 series control the direction and the volume of the flow according to the feeding current to the proportional solenoid. By using a valve body equipped with increased passage channels it is possible to reach the highest capacity of its dimensions at a parity of pressure drops. (9 gpm with  $\Delta p$  of 120 psi).
- Hydrostats Available:** For a more accurate flow control, 2 or 3-way modular hydrostats (pressure compensation valves) are available.

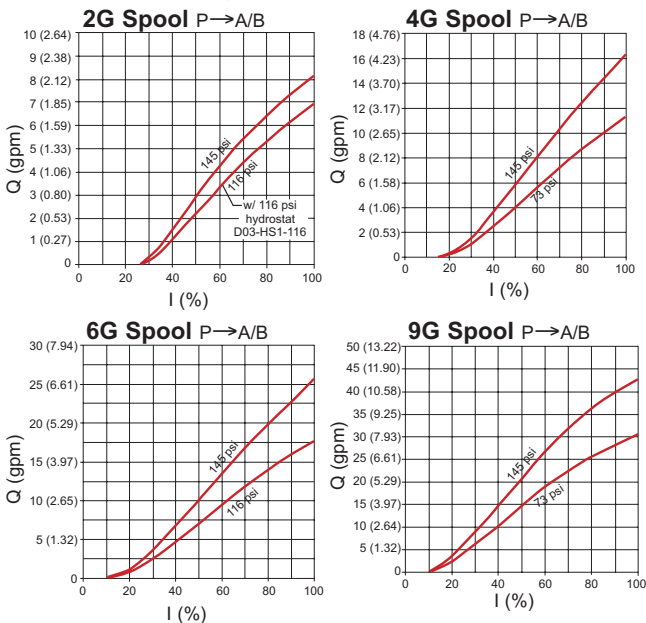


EPD03-2B-2G-12VDC

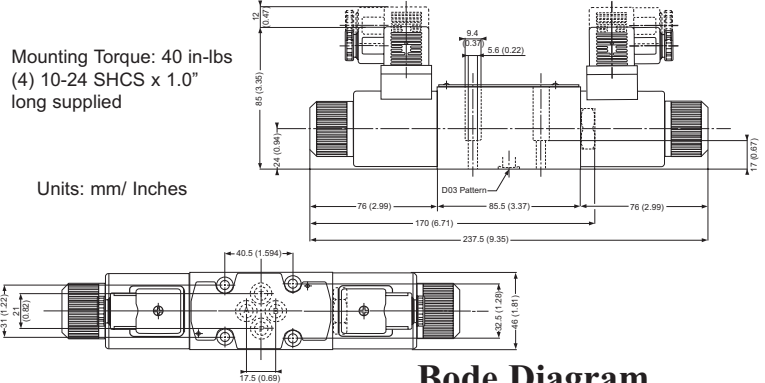
### Specifications

Spool Type	Model	Rated Flow Range (gpm)	Max. Pressure P,A,B Ports	Max. Pressure T Port	Duty Cycle	Frequency Response	Weight
	EPD03-2B-2G-12VDC	2	5000 psi (350 bar)	2000 psi (210 bar)	Continuous 100% ED	28 Hz @-3db (Signal 25%)	6.4 lbs 2.9 kg
	EPD03-2B-4G-12VDC	4					
	EPD03-2B-6G-12VDC	6					
	EPD03-2B-9G-12VDC	9					
	EPD03-2F-2G-12VDC	2					
	EPD03-2F-4G-12VDC	4					
	EPD03-2F-6G-12VDC	6					
	EPD03-2F-9G-12VDC	9					

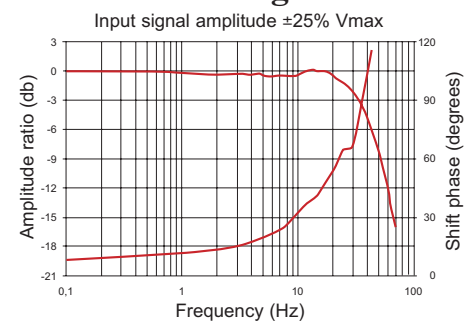
### Input Signal vs Flow Curves



### Dimensional Data



### Bode Diagram



### Ordering Information

**EPD03 - 2\* - \*G - 12VDC**

#### Spool Type:

**B**= all ports blocked  
**F**= P blocked, A & B to Tank

#### Spool Flow:

**2**= 2 gpm  
**4**= 4 gpm  
**6**= 6 gpm  
**9**= 9 gpm

Note: All EPD03 valves Meter In/ Meter Out Design  
 All specifications/ flow curves using fluid-150SUS (32mm<sup>2</sup>/s), @ 122°F (50°C)

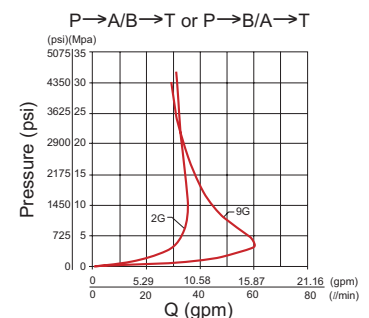
#### Operating Notes:

Fluid viscosity: 80-300 SUS (17-65cSt)  
 Fluid temperature: 40-160F<sup>o</sup> (5°-70°C)  
 Ambient temperature: -4-160F<sup>o</sup> (-20°-70°C)  
 Max. contamination level: 10 micron (class 8 NAS 1638)  
 Mounting Torque: 40 in-lbs

#### 12V Coil Information

Max current: 1.76A  
 Solenoid coil resistance : 4.8 Ohm @68°F (20°C)  
 Solenoid coil resistance when hot: 7.34 Ohm  
 Hysteresis P/A/B/T with a pressure compensator: 5% of spool max. flow  
 Response Time (transient function with stepped electrical input signals): 36ms @70 psi drop (26ms returning to center)

### Power Limits





INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS

***EPD05 SERIES***

## Proportional Valves



*EPD05-2B-8G-12VDC*



### Features

- High Flow:** EPD05 series control the direction and the volume of the flow according to the feeding current to the proportional solenoid. By using a valve body equipped with increased passage channels it is possible to reach the highest capacity of its dimensions at a parity of pressure drops. (15 gpm with  $\Delta p$  of 120 psi).
- Hydrostats Available:** For a more accurate flow control, 2 or 3-way modular hydrostats (pressure compensation valves) are available.

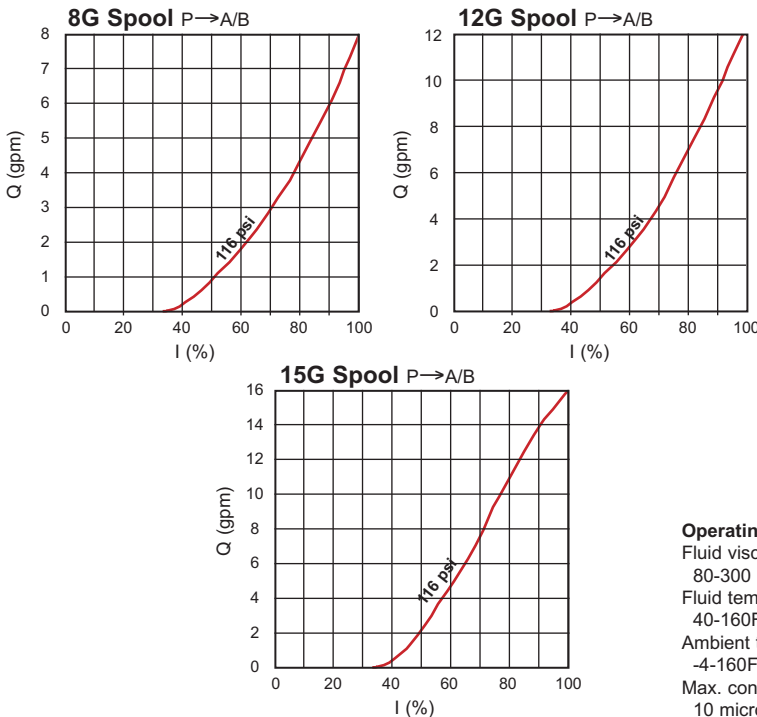


EPD05-2B-8G-12VDC

### Specifications

Spool Type	Model	Rated Flow Range (gpm)	Max. Pressure P,A,B Ports	Max. Pressure T Port	Duty Cycle	Frequency Response	Weight
	EPD05-2B-8G-12VDC	8	5000 psi (350 bar)	2000 psi (210 bar)	Continuous 100% ED	13 Hz @-6db (Signal 25%)	13 lbs 5.9 kg
	EPD05-2B-12G-12VDC	12					
	EPD05-2B-15G-12VDC	15					
	EPD05-2F-8G-12VDC	8					
	EPD05-2F-12G-12VDC	12					
	EPD05-2F-15G-12VDC	15					

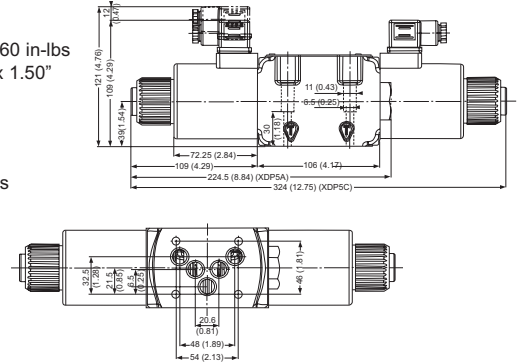
### Input Signal vs Flow Curves



### Dimensional Data

Mounting Torque: 60 in-lbs  
(4) 1/4-20 SHCS x 1.50" long supplied

Units: mm/ Inches

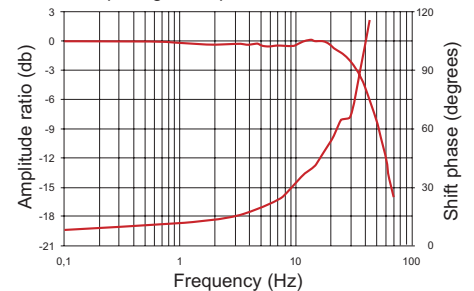


#### Operating Notes:

Fluid viscosity:  
80-300 SUS (17-65cSt)  
Fluid temperature:  
40-160F° (5°-70°C)  
Ambient temperature:  
-4-160F° (-20°-70°C)  
Max. contamination level:  
10 micron (class 8 NAS 1638)

### Bode Diagram

Input signal amplitude  $\pm 25\%$  Vmax



### Ordering Information

**EPD05 - 2\* - \*G - 12VDC**

#### Spool Type:

**B**= all ports blocked  
**F**= P blocked, A & B to Tank

#### Spool Flow:

**8**= 8 gpm  
**12**= 12 gpm  
**15**= 15 gpm

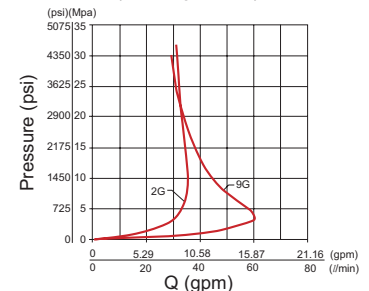
Note: All EPD05 valves Meter In/ Meter Out Design  
All specifications/ flow curves using fluid-  
150SUS (32mm<sup>2</sup>/s), @ 122°F (50°C)

#### 12V Coil Information

Max current: 2.5A  
Solenoid coil resistance :  
2.8 Ohm @68°F (20°C)  
Hysteresis P/A/B/T with a pressure compensator: 4% of spool max. flow  
Response Time (transient function with stepped electrical input signals):  
80ms @116 psi drop (70ms returning to center, 100ms shifting to other coil)

### Power Limits

P→A/B→T or P→B/A→T





INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS



## PS30 SERIES

### Pressure Switches



## Standard Features

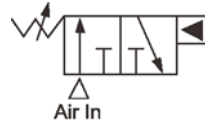
- Hydraulic Input - Pneumatic Output
- Stainless Wetted Parts
- Anodized Aluminum Body
- For Pilot Circuits Only
- CV = .15
- 5 to 10% Dead Band



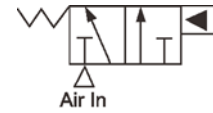
PS30L-3K-NC

## Operating Pressure

- Air Pressure: 150 psi
- Hydraulic Pressure: 150 - 3000 psi



Normally Open



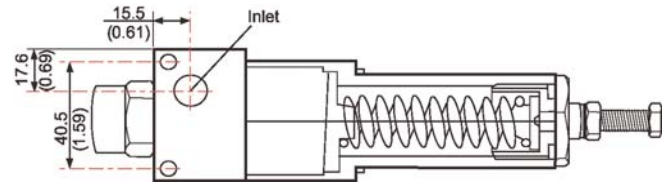
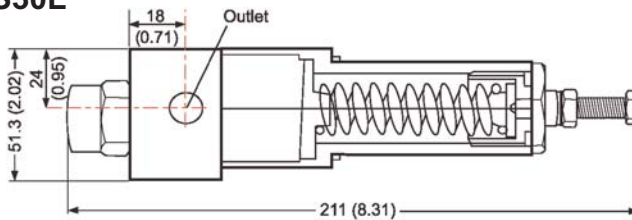
Normally Closed

## Dimensional Data

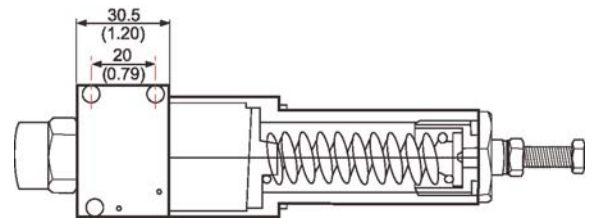
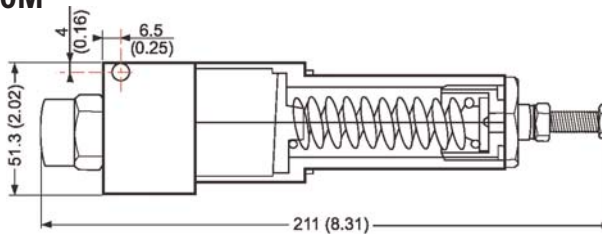
Units: mm (inches)

(All Ports 1/4" FNPT)

### PS30L

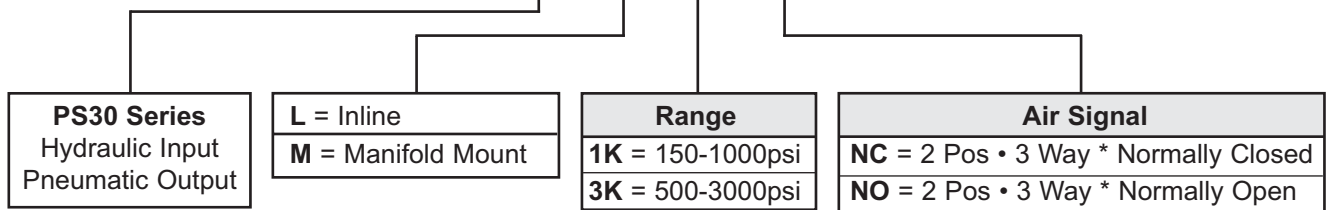


### PS30M



## Ordering Information

**PS30 - L - 3K - NC**

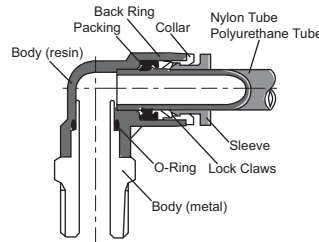


# PTC FITTINGS

PUSH TO CONNECT FITTINGS



5/32" thru 1/2"



## Features

- Quick release design allows instant connection and disconnecting of the tube.
- Nickel plated brass body resists corrosion and maintains the stylistic appearance.
- Teflon thread sealant is pre-applied and does not require any additional sealant.

## Specifications

1. **Compatible Fluid Type:** Air (No other gases or liquids)
2. **Working Pressure Range:** -29"Hg-150psi (760mmHg - 900kPa)
3. **Temperature Range:** 32 - 140°F (0 - 60°C)
4. **Suitable Tubing:** Nylon, Polyurethane, Polyethelene
5. **Body Material/ Color:** PBT/ Black
6. **Threaded Material/ Sizes:** Nickel Plated Brass/ 10-32, 1/8", 1/4", 3/8", 1/2"
7. **Seal Material:** Buna- Nitrile
8. **Button Color:** Blue
9. **Orientable:** 360°

Push To Connect Fittings 5/32" thru 1/2"

Part Number	T (thd)	D (tube)
PTC-STR-10MF-2.5T	10-32	5/32"
PTC-STR-2MP-2.5T	1/8"	5/32"
PTC-STR-4MP-2.5T	1/4"	5/32"
PTC-STR-10MF-4T	10-32	1/4"
PTC-STR-2MP-4T	1/8"	1/4"
PTC-STR-4MP-4T	1/4"	1/4"
PTC-STR-6MP-4T	3/8"	1/4"
PTC-STR-2MP-5T	1/8"	5/16"
PTC-STR-4MP-5T	1/4"	5/16"
PTC-STR-6MP-5T	3/8"	5/16"
PTC-STR-2MP-6T	1/8"	3/8"
PTC-STR-4MP-6T	1/4"	3/8"
PTC-STR-6MP-6T	3/8"	3/8"
PTC-STR-6MP-8T	3/8"	1/2"
PTC-STR-8MP-8T	1/2"	1/2"

Part Number	D <sub>2</sub> (tube)	D (tube)
PTC-STR-2.5T-4TS	5/32"	1/4"

Part Number	T (thd)	D (tube)
PTC-STR-2FP-2.5T	1/8"	5/32"
PTC-STR-4FP-2.5T	1/4"	5/32"
PTC-STR-2FP-4T	1/8"	1/4"
PTC-STR-4FP-4T	1/4"	1/4"
PTC-STR-6FP-6T	3/8"	3/8"

Part Number	T (thd)	D (tube)
PTC-ELB-10MF-2.5T	10-32	5/32"
PTC-ELB-2MP-2.5T	1/8"	5/32"
PTC-ELB-10MF-4T	10-32	1/4"
PTC-ELB-2MP-4T	1/8"	1/4"
PTC-ELB-4MP-4T	1/4"	1/4"
PTC-ELB-6MP-4T	3/8"	1/4"
PTC-ELB-2MP-5T	1/8"	5/16"
PTC-ELB-4MP-5T	1/4"	5/16"
PTC-ELB-2MP-6T	1/8"	3/8"
PTC-ELB-4MP-6T	1/4"	3/8"
PTC-ELB-6MP-6T	3/8"	3/8"
PTC-ELB-6MP-8T	3/8"	1/2"
PTC-ELB-8MP-8T	1/2"	1/2"

Part Number	D (tube)
PTC-STR-2.5T	5/32"
PTC-STR-4T	1/4"
PTC-STR-5T	5/16"
PTC-STR-6T	3/8"
PTC-STR-8T	1/2"

Part Number	D <sub>2</sub> (tube)	D (tube)
PTC-STR-2.5T-4T	5/32"	1/4"
PTC-STR-5T-6T	5/16"	3/8"

Part Number	D (tube)
PTC-ELB-4T	1/4"
PTC-ELB-5T	5/16"
PTC-ELB-6T	3/8"



# PTC FITTINGS

PUSH TO CONNECT FITTINGS



5/32" thru 1/2"

Part Number	D (tube)
PTC-ELB-2.5T-2.5TS	5/32"
PTC-ELB-4T-4TS	1/4"
PTC-ELB-5T-5TS	5/16"



Part Number	T (thd)	D (tube)
PTC-TEE-10MF-2.5T	10-32	5/32"
PTC-TEE-2MP-2.5T	1/8"	5/32"
PTC-TEE-4MP-2.5T	1/4"	5/32"
PTC-TEE-10MF-4T	10-32	1/4"
PTC-TEE-2MP-4T	1/8"	1/4"
PTC-TEE-4MP-4T	1/4"	1/4"
PTC-TEE-4MP-6T	1/4"	3/8"
PTC-TEE-6MP-6T	3/8"	3/8"



Part Number	T (thd)	D (tube)
PTC-TEE-2.5T-2MP-2.5T	1/8"	5/32"
PTC-TEE-6T-4MP-6T	1/4"	3/8"



Part Number	D (tube)
PTC-TEE-2.5T	5/32"
PTC-TEE-4T	1/4"
PTC-TEE-5T	5/16"
PTC-TEE-6T	3/8"
PTC-TEE-8T	1/2"



Part Number	D (tube)
PTC-Y-2.5T	5/32"
PTC-Y-4T	1/4"
PTC-Y-6T	3/8"



Part Number	T (thd)	D (tube)
PTC-Y-2MP-2.5T	1/8"	5/32"
PTC-Y-4MP-4T	1/4"	1/4"
PTC-Y-4MP-6T	1/4"	3/8"



Part Number	T (thd)	D (tube)
PTC-STR-BLK-4FP-4T	1/4"	1/4"
PTC-STR-BLK-4FP-6T	1/4"	3/8"
PTC-STR-BLK-8FP-8T	1/2"	1/2"



Part Number	D (tube)
PTC-STR-BLK-2.5T	5/32"
PTC-STR-BLK-4T	1/4"
PTC-STR-BLK-6T	3/8"



Part Number	T (thd)	D (tube)
PTC-ELB-FC-10MF-2.5T	10-32	5/32"
PTC-ELB-FC-2MP-4T	1/8"	1/4"
PTC-ELB-FC-4MP-4T	1/4"	1/4"
PTC-ELB-FC-6MP-4T	3/8"	1/4"
PTC-ELB-FC-4MP-6T	1/4"	3/8"
PTC-ELB-FC-6MP-6T	3/8"	3/8"
PTC-ELB-FC-8MP-8T	1/2"	1/2"



Part Number	D (tube)
PTC-PLU-6TS	3/8"



## Ordering Information

### PTC - ELB- -4 MP-4 T

Code	Description	Code	Description	Code	Special Feature	Code*	Size	Code*	Connection
PTC	Push to Connect Fitting	STR	Straight	omit	none	10	10-32 UNF	FP	Female Pipe
		ELB	Elbow	FC	Flow Control	2	1/8"	MF	Male Fine (10-32 only)
		TEE	Tee			2.5	5/32"	MP	Male Pipe
		Y	Y			4	1/4"	T	Tube
		BLK	Bulkhead			5	5/16"	TS	Tube Stem
		PLU	Plug			6	3/8"		
						8	1/2"		

\*Repeat as Necessary alphabetically. Do not duplicate unless specifying tee's branch.

Note: Tee's are always specified with the branch connection called out first.





INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS

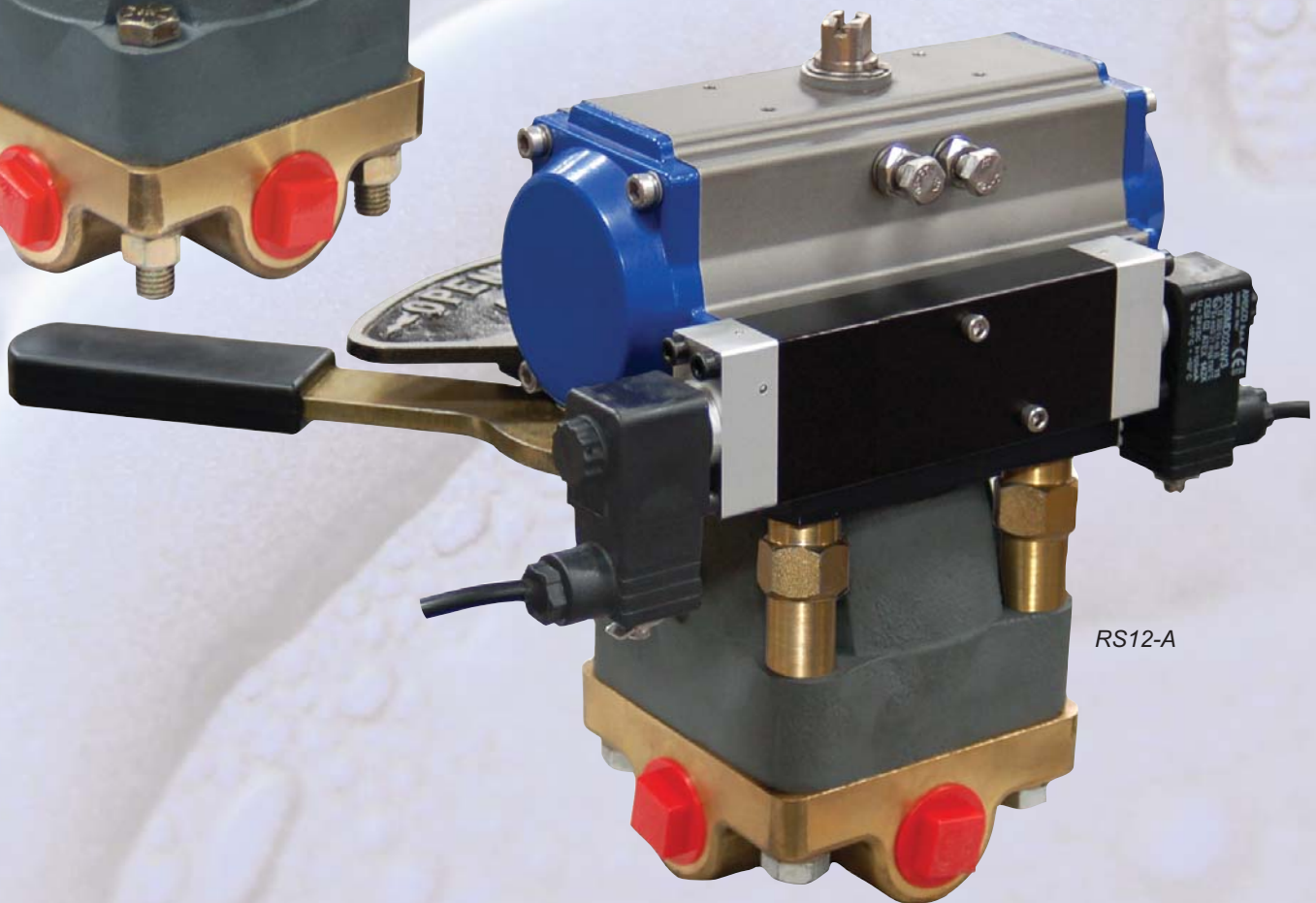


**RS SERIES**

## Rotor Shear™ Zero Leakage Rotary Valves



RS12-M



RS12-A



## RS Series

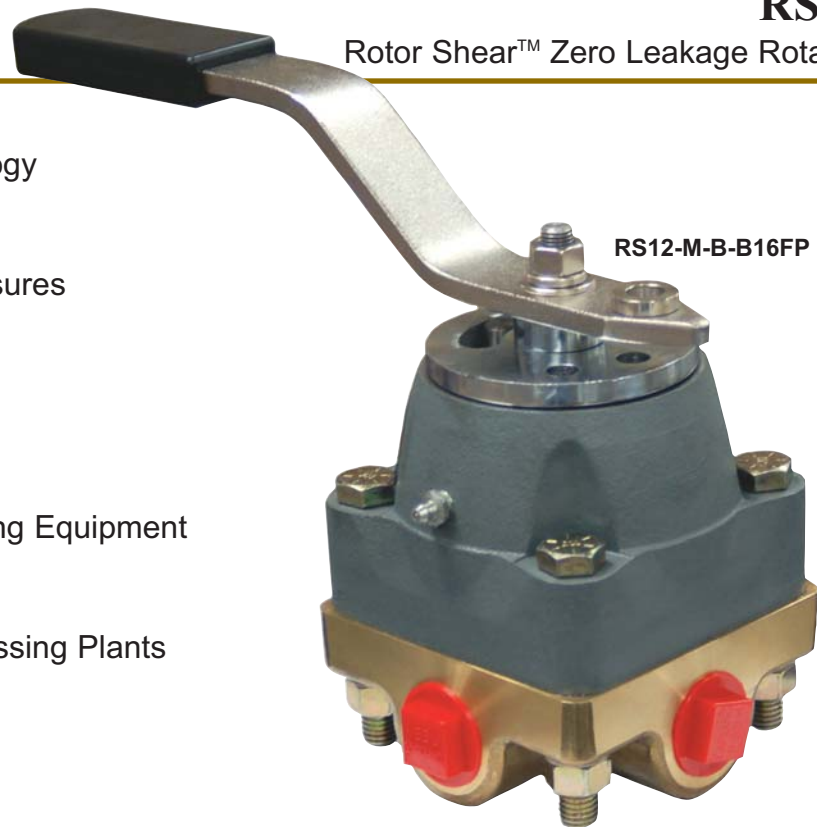
Rotor Shear™ Zero Leakage Rotary Valves

### Standard Features

- Original Rotor Shear™ Technology
- High Velocity Flow
- Tolerates Contaminates
- Low Handle Load at High Pressures
- Spring Return Option
- Low Pressure Drop

### Applications

- Land-Based and Offshore Drilling Equipment
- Steel Mills
- Nitrogen Charging Panels
- Refineries and Chemical Processing Plants
- Power Generation Facilities



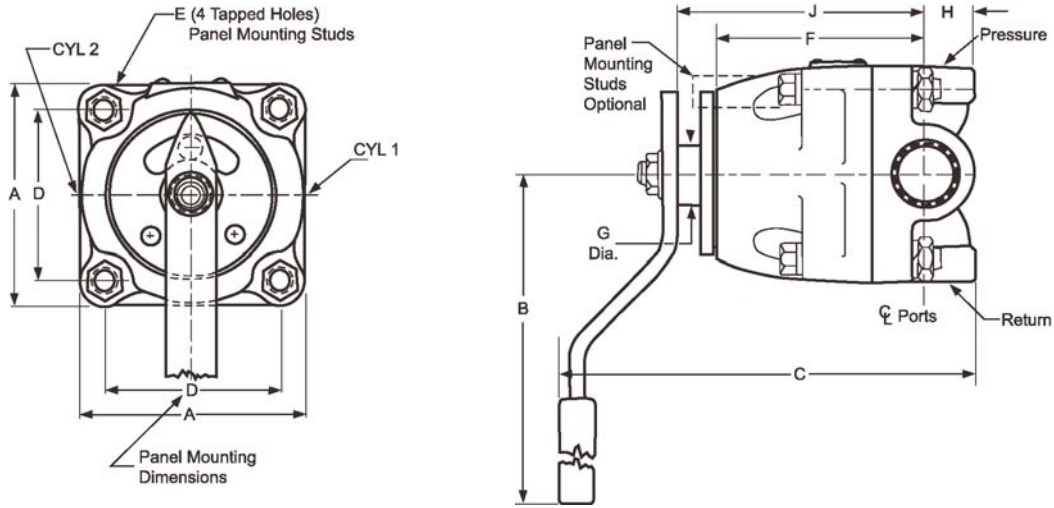
### Specifications

- **Working Pressure:** 3,000 psi (207 bar)  
Hydraulic Oil or Lubricated Water
- **Flow Capacity:** 75 gpm (284 l/min)
- **Back Pressure:** Must not exceed 250 psi (17.2 bar) at return port for satisfactory operation
- **Pressure Drop:** 14 psi (0.96 bar) at 20 ft/sec
- **Proof Pressure:** 1-1/2 times working pressure except at return port
- **Burst Pressure:** 2-1/2 times working pressure except at return port
- **Media Temperature Range:** -40° to +250°F (-40° to +121°C)

### Materials

- **Rotor:** Stainless Steel
- **Pressure Seals:** Stainless Steel
- **Shaft:** Stainless Steel
- **Body:** Bronze
- **Housing:** Ductile Iron
- **Standard O-ring:** Buna N
- **Weight:** 21.5 lbs (9.8 kg)

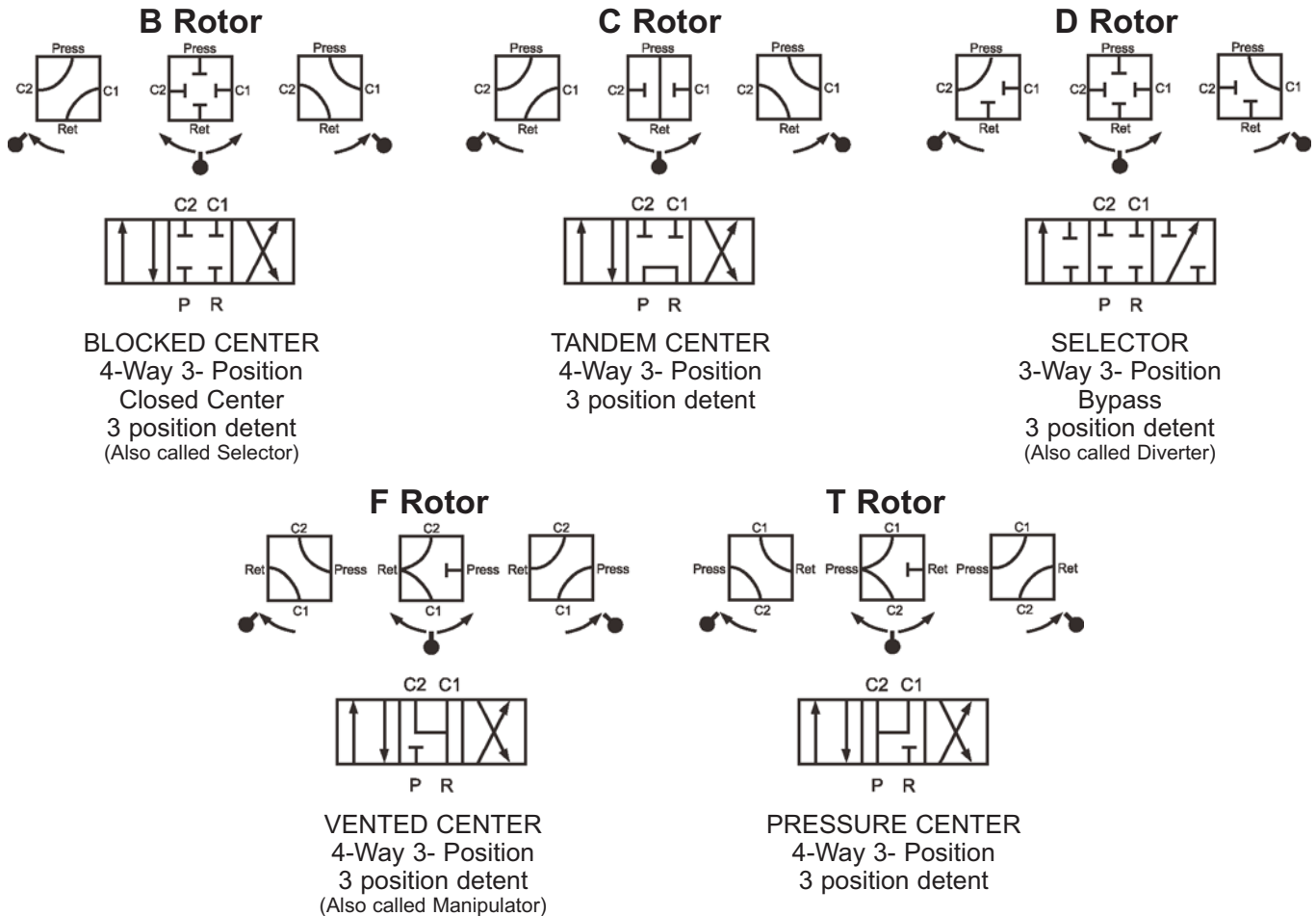
**Dimensional Data**



SIZE	A	B	C	D	E	F	G Dia.	H	J
3/4" & 1"	116.8 (4.6)	254.0 (10.0)	221.0 (8.7)	91.4 (3.6)	1/2 - 13 NC	121.9 (4.8)	33.0 (1.3)	25.4 (1.0)	132.1 (5.2)

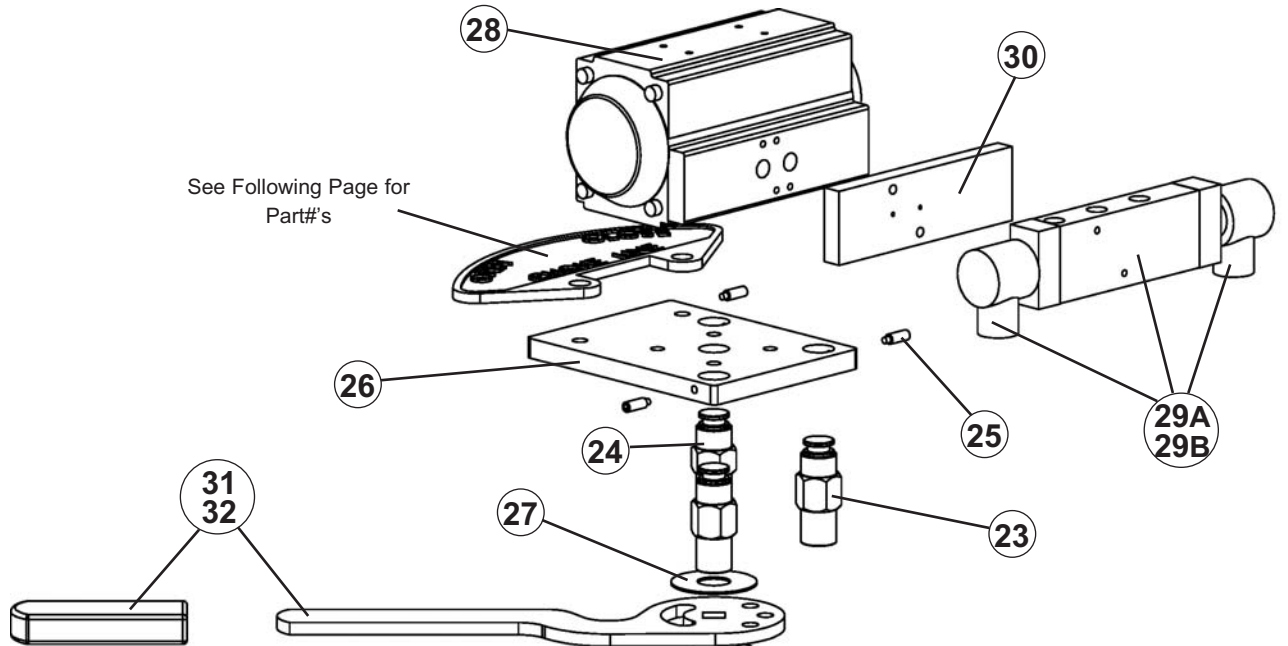
Units: mm (inches)

**Rotor Flow Patterns**

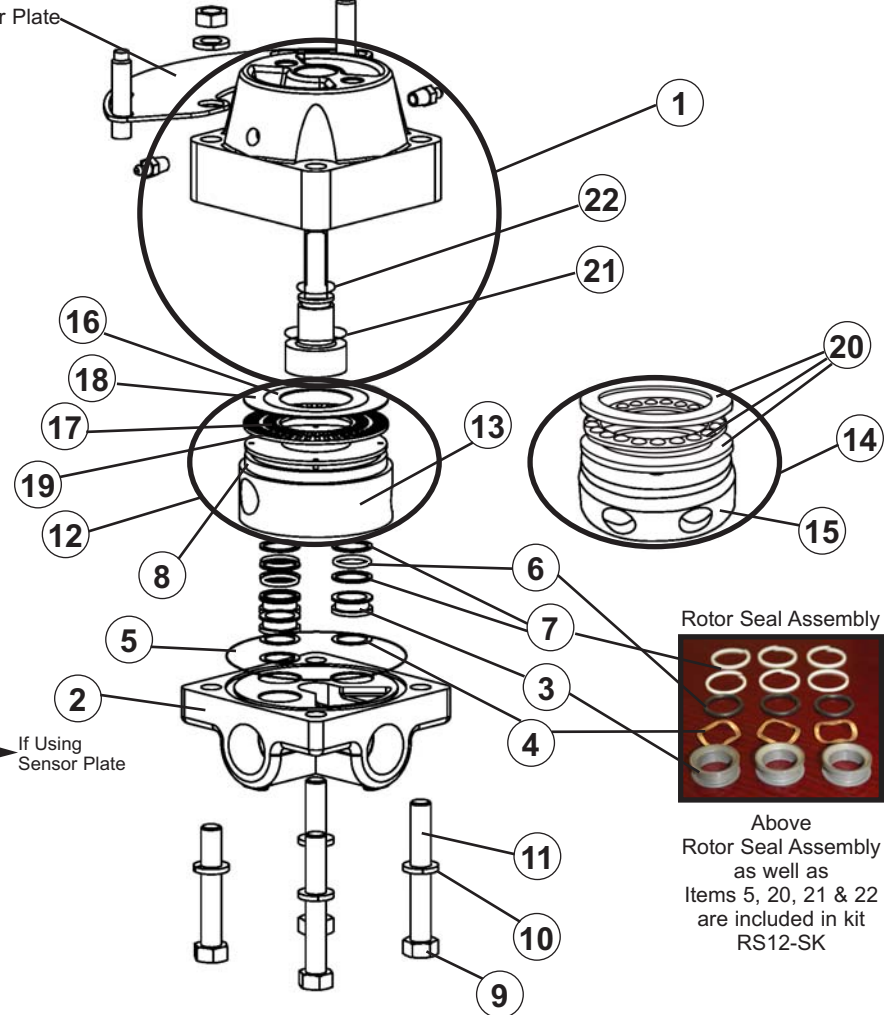




## RS 12A - Parts



No.	Part Number	Description	Qty
1	RS12-A	Actuated Housing Assembly	1
2	RS12B-16FP	1" NPT Base	1
3	RS12-SS	Rotor Seal 3000 psi	3
4	RS12-WW	Wave Washer	3
5	243B70	O'Ring RS12B	1
6	117B70	O'Ring RS12SS	3
7	117ST	TFE Back Up RSS12	3
8	339B70	O'Ring H Rotor	1
9	1/2-13NUT	GR8 Zinc	1
10	1/2LCKWASHER	GR8 Zinc	4
11	1/2-13x3.5HHCS	GR8 Zinc PL	4
12	RS12-BH	Blocked H Rotor (Assembly)	1
13	RS12-BR-H	Blocked H Rotor (Rotor Only)	1
14	RS12-BB	Blocked B Rotor (Assembly)	1
15	RS12-BR-B	Blocked B Rotor (Rotor Only)	1
16	AS-4565	Washer (Inner)	1
17	NTB-4565	Needle Bearing (Inner)	1
18	AS-6590	Washer (Outer)	1
19	NTB-6590	Needle Bearing (Outer)	1
20	51113	Roller Bearing	1
21	212B70	O'Ring Shaft	1
22	115B70	O'Ring Shaft	1
23	RS12-MS	Mounting Stud	2/3
24	RS12-MSS	Mounting Stud Short	1
25	1/4-20x1/3	Full Dog Plated	3
26	RS12-AMP	A32DA Mounting Plate	1
27	RS12-NW	Nylon Washer	1
28	A32DA	Pneumatic Actuator	1
29A	SVXN-604-543SF	Expl. Proof Sol. Valve w/ 24 DC coils	1
29B	SVAXN-604-543SF	Expl. Proof Sol. Valve w/ Atex coils	1
30	DA32-OP	Orifice Plate	1
31	RS12-AHDL	Actuated Handle w/ Grip	1
32	RS12-MHDL	Manual Handle w/ Grip	1



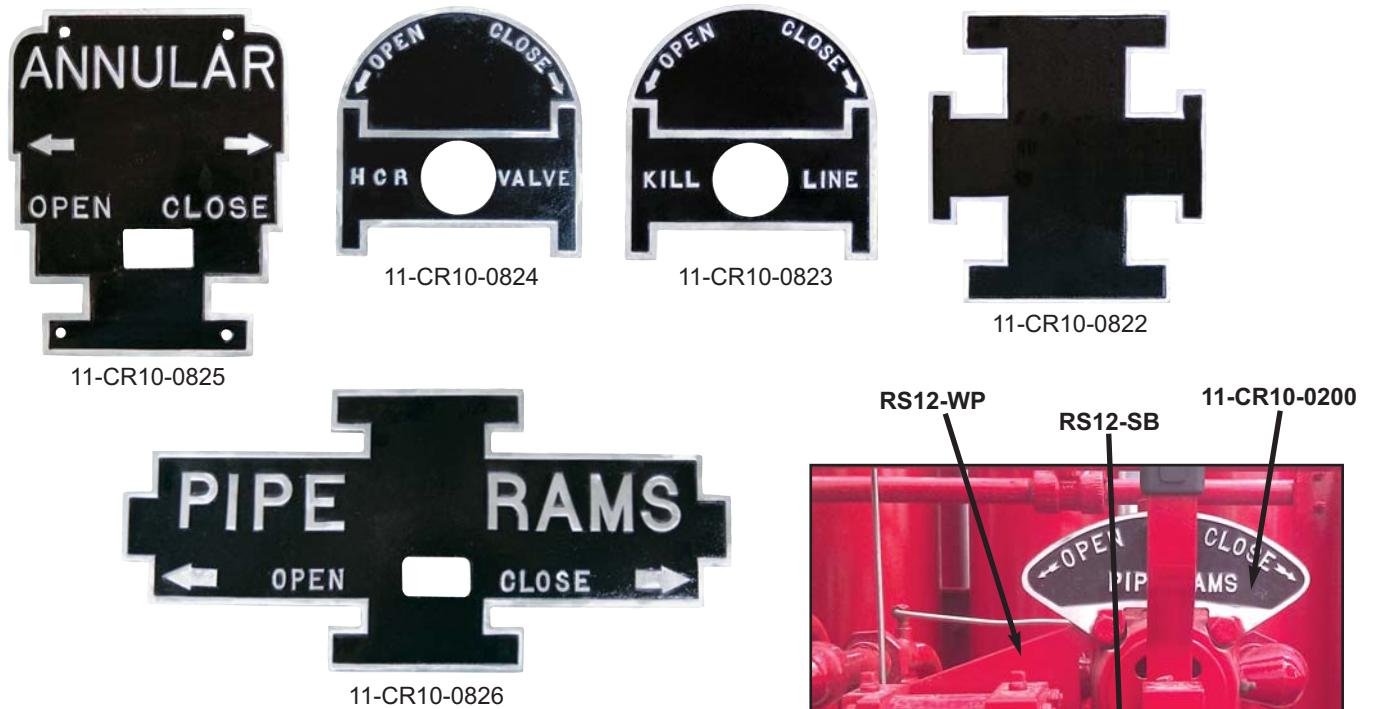
Above Rotor Seal Assembly as well as items 5, 20, 21 & 22 are included in kit RS12-SK

**Parts/ Accessories**

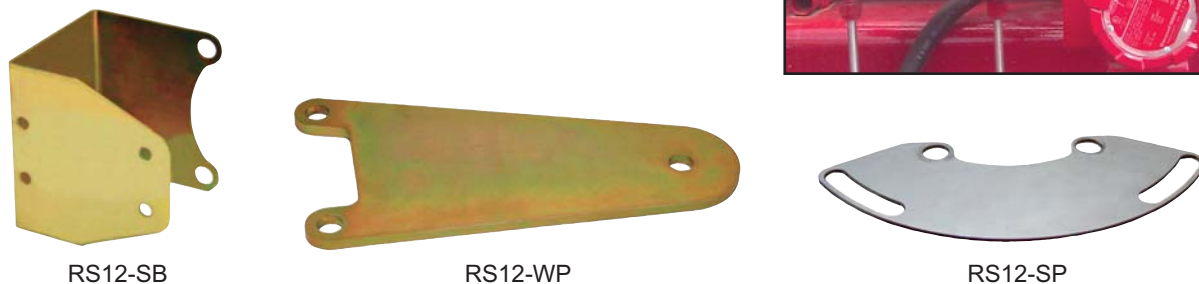
**CRESCENT MOON PLATES**



**NAMEPLATES**

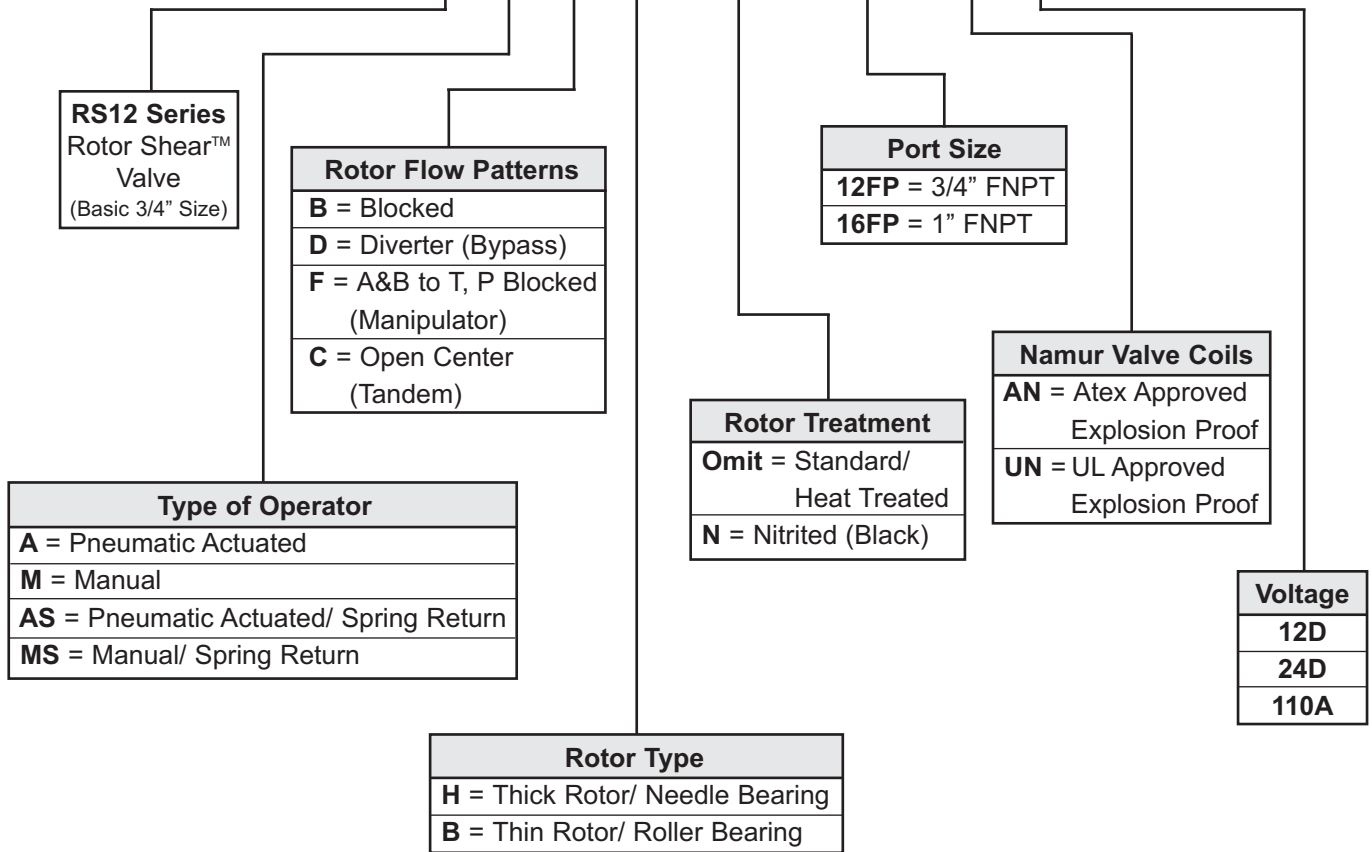


**SWITCH BRACKETS, WING PLATES, SENSOR PLATES**



**Ordering Information**

**RS12 M - B - B - OMIT - 16FP - AN 24D**



**H Type Rotor**



**B Type Rotor**





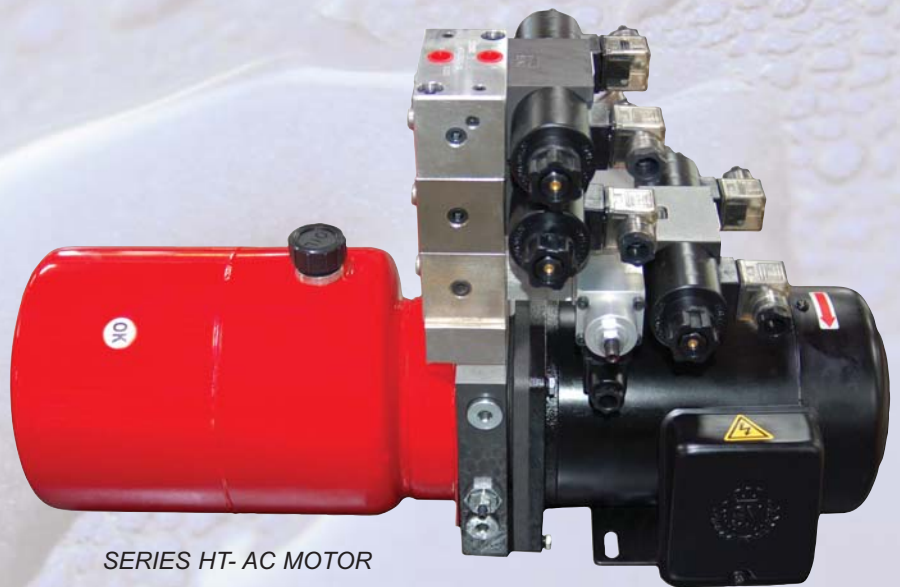
INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS

**HT & VT SERIES**

## AC Motor Small Power Units



*SERIES VT- AC MOTOR*



*SERIES HT- AC MOTOR*

## Ordering Information



**SERIES VT10- AC MOTOR**

### HT2 - 1HP1 - G1.4 - Options

Type/ Tank Size
HT0.8
HT1.3
HT2
VT3
VT10

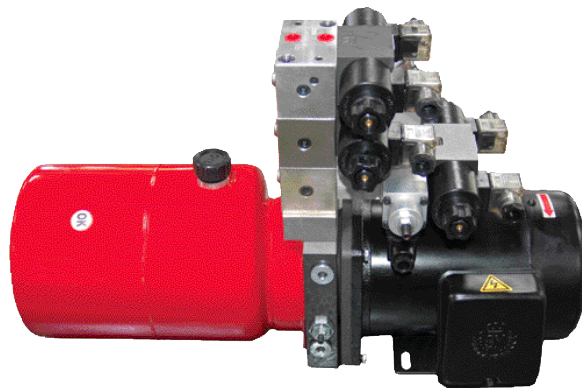
HP
.5
1
2
3

Phase
1
3

Flow (GPM@1800 rpm)
.7
.9
1.4
1.9
3
3.5

Options
DV-Voltage Dump Valve (specify voltage & current type)
D03-X_PorS Manifold (specify number of manifold stations & type of circuit: parallel or series)

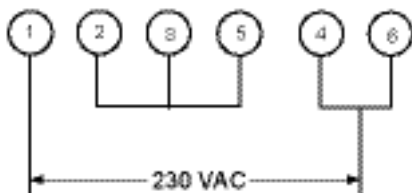
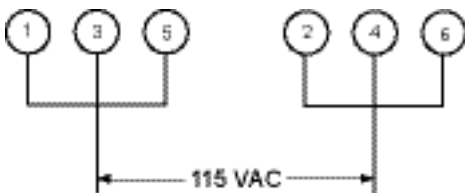
Rated @ 2500 PSI Max.



**SERIES HT- AC MOTOR**  
(With Optional Adapter, Manifolds & D03 Valves)

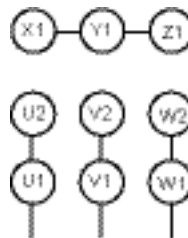
## Wiring

### SINGLE PHASE

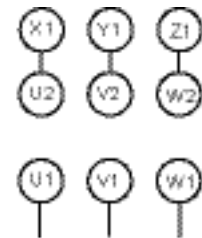


(CCW Rotation)

### THREE PHASE



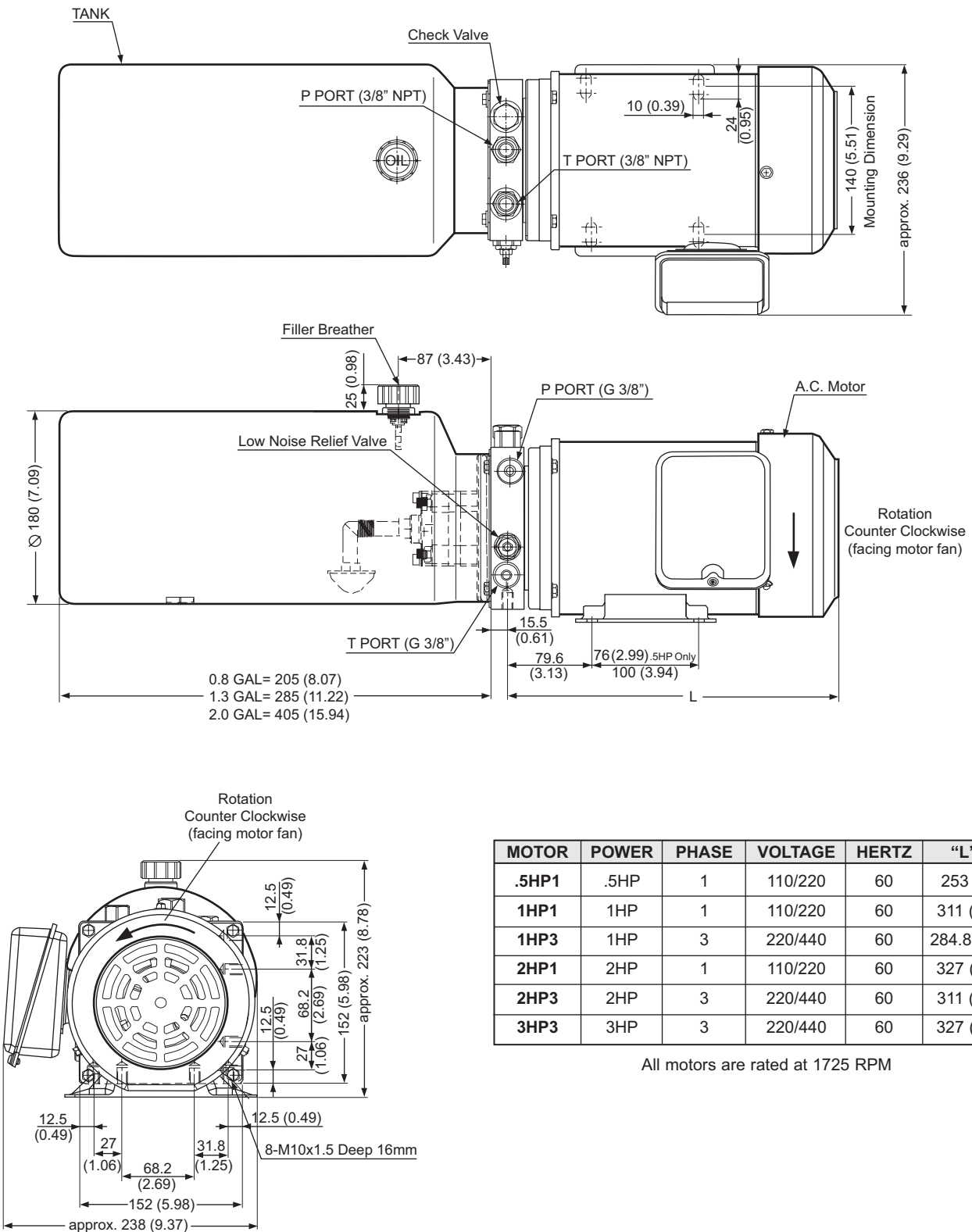
200  
208  
220  
230  
VAC



400  
415  
440  
460  
VAC

## Dimensional Data

Units: mm (inches)

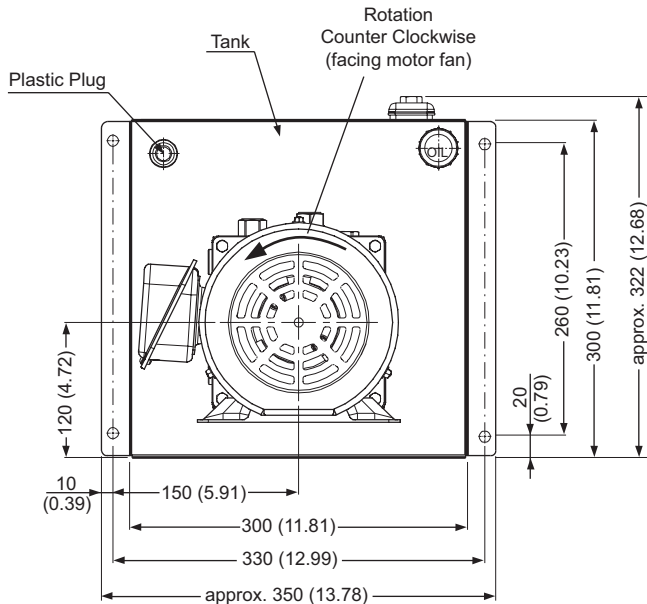
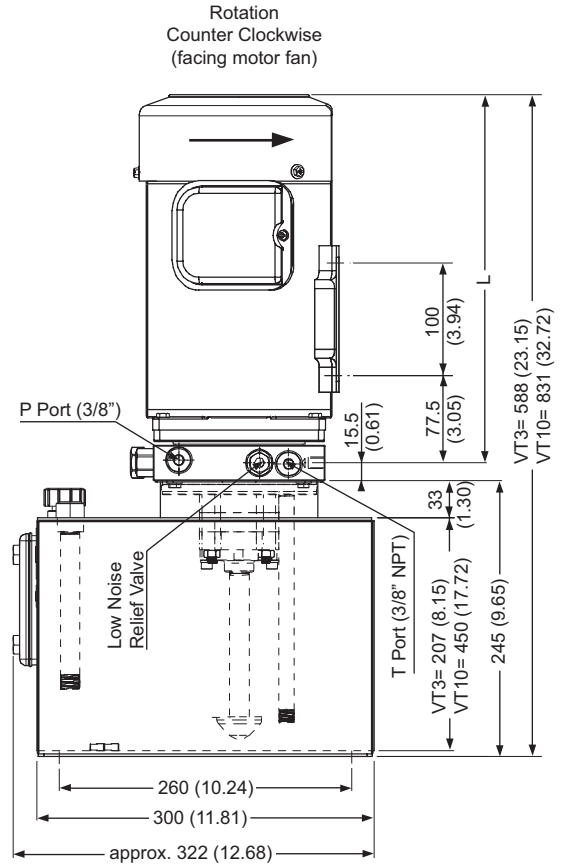
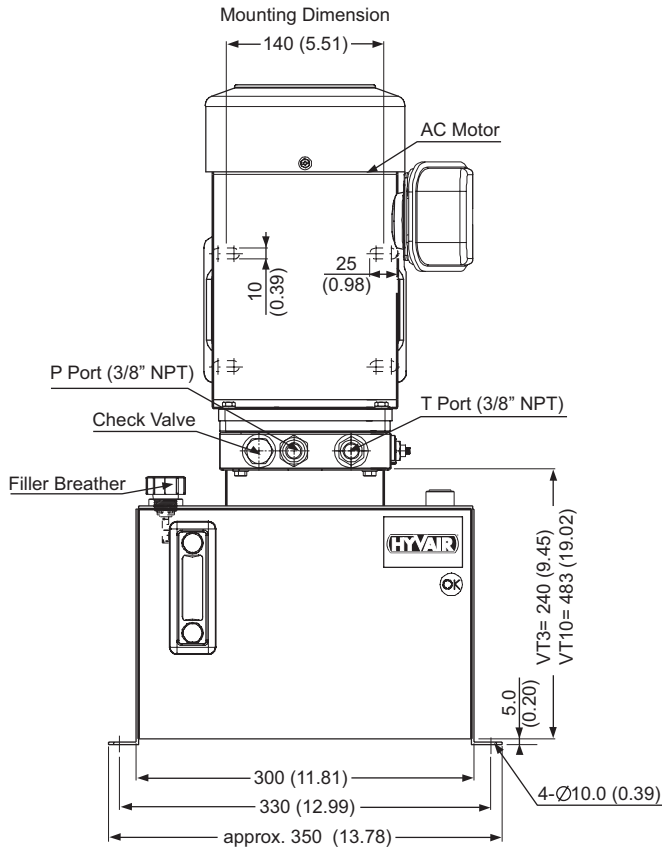


MOTOR	POWER	PHASE	VOLTAGE	HERTZ	"L" DIM
.5HP1	.5HP	1	110/220	60	253 (9.96")
1HP1	1HP	1	110/220	60	311 (12.24")
1HP3	1HP	3	220/440	60	284.8 (11.21")
2HP1	2HP	1	110/220	60	327 (12.87")
2HP3	2HP	3	220/440	60	311 (12.24")
3HP3	3HP	3	220/440	60	327 (12.87")

All motors are rated at 1725 RPM

### Dimensional Data

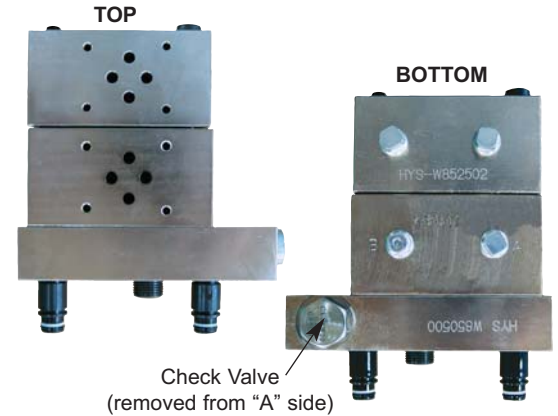
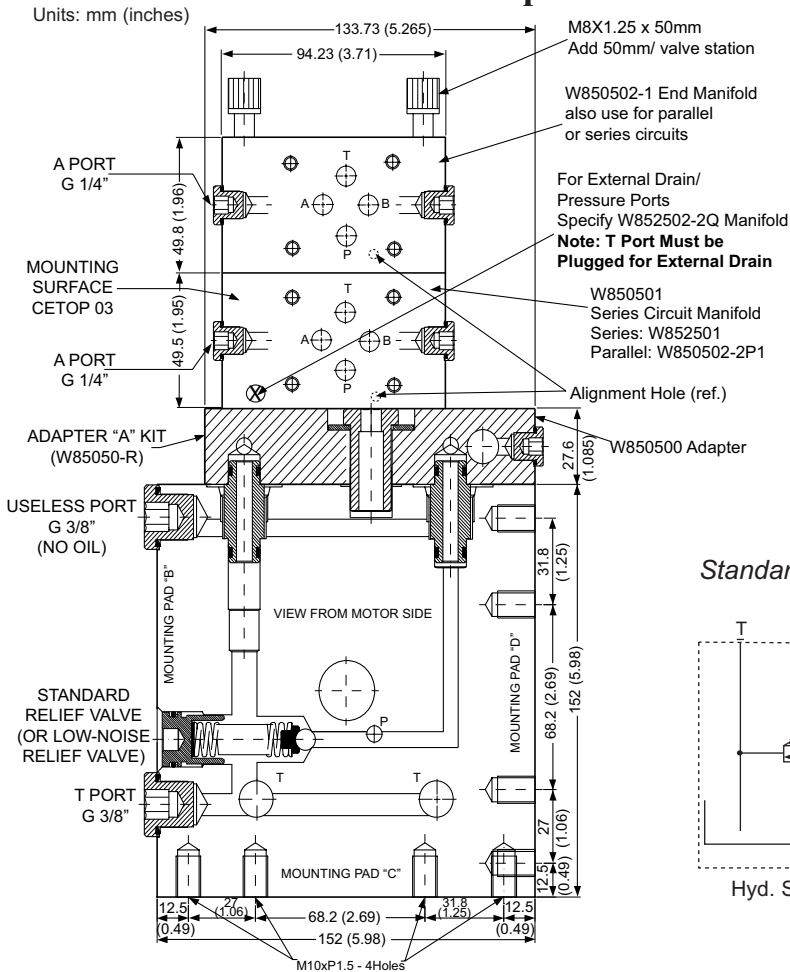
Units: mm (inches)



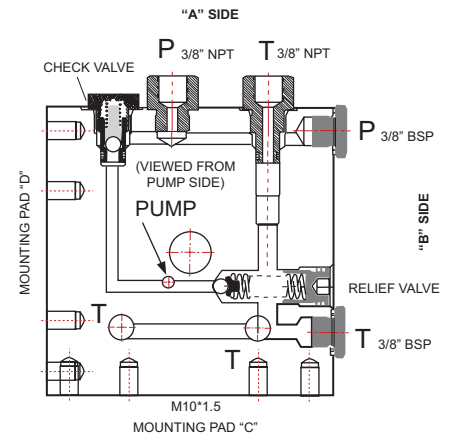
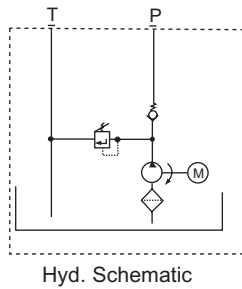
MOTOR	POWER	PHASE	VOLTAGE	HERTZ	"L" DIM
.5HP1	.5HP	1	110/220	60	253 (9.96")
1HP1	1HP	1	110/220	60	311 (12.24")
1HP3	1HP	3	220/440	60	284.8 (11.21")
2HP1	2HP	1	110/220	60	327 (12.87")
2HP3	2HP	3	220/440	60	311 (12.24")
3HP3	3HP	3	220/440	60	327 (12.87")

All motors are rated at 1725 RPM

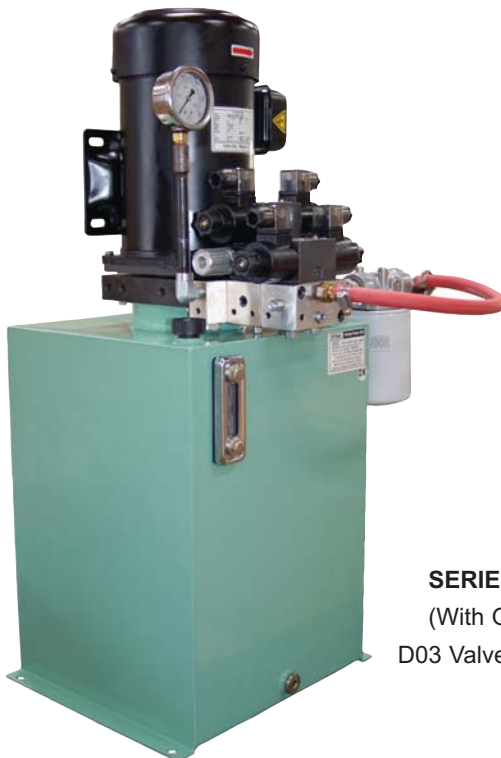
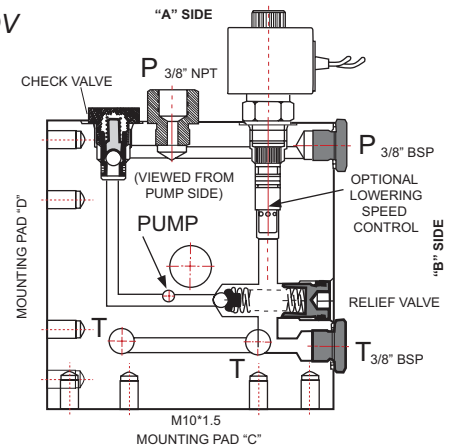
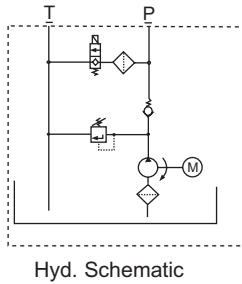
### Optional Manifolds/ Adapter



#### Standard Configuration



#### With Lowering Valve- DV



**SERIES VT10- AC MOTOR**  
 (With Optional Return Filter,  
 D03 Valves, Adapter & Manifolds)



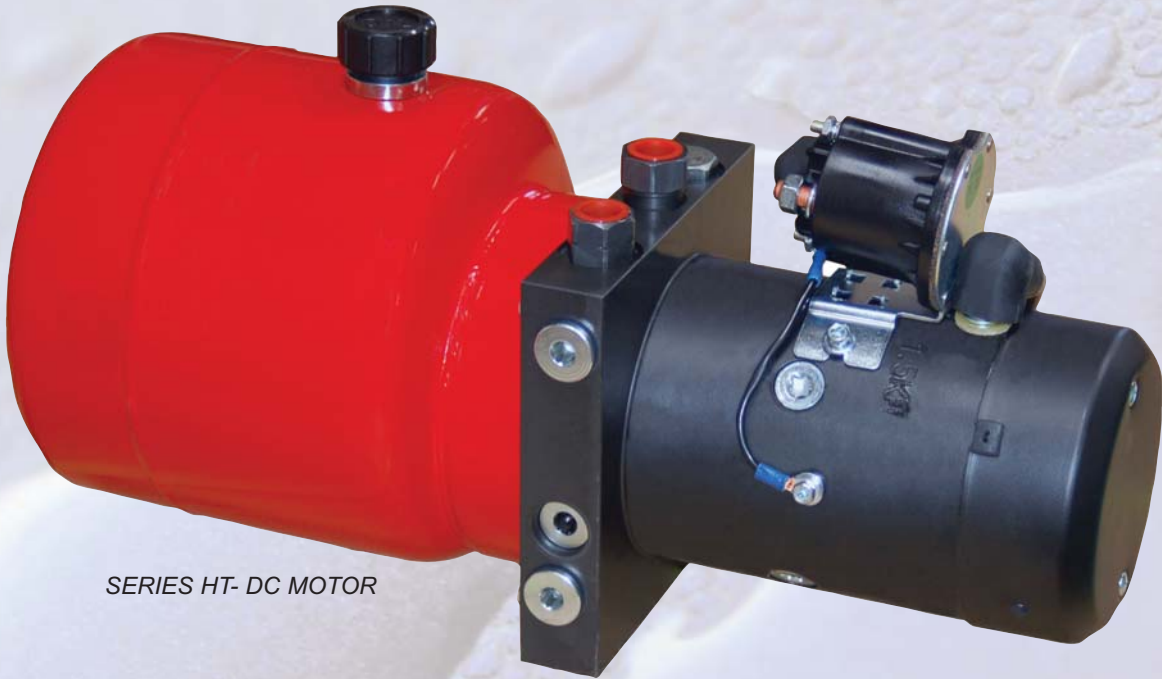


INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS



***HT SERIES***

## DC Motor Small Power Units



*SERIES HT- DC MOTOR*

### Ordering Information

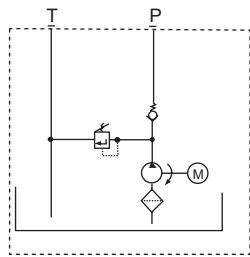


**HT 2 - 12VDC - G.7 - DVP**

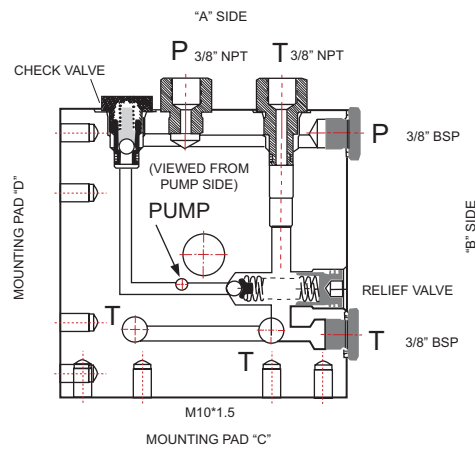
Gallons	Voltage	Flow	Options
0.8	12	.7	DV Dump Valve (specify voltage & current type)
1.3	24	.9	DVP Dump Valve w/ Pendant
2		(GPM@1800)	D03 Manifold (specify number of manifold stations & type of circuit: parallel or series)

Rated @ 2500 PSI Max.  
Intermittent Duty

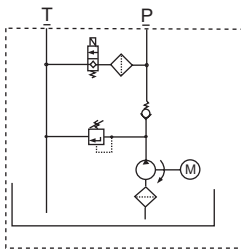
Standard Configuration



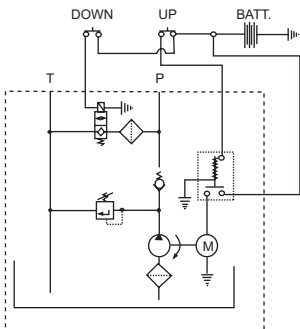
Hyd. Schematic



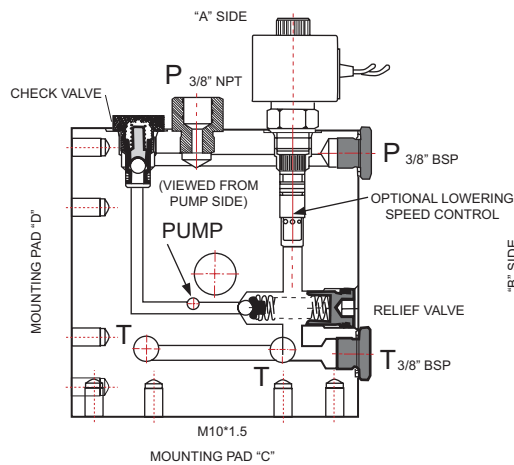
### With Lowering Valve- DV



Hyd. Schematic



Hyd. Schematic & Electric Schematic



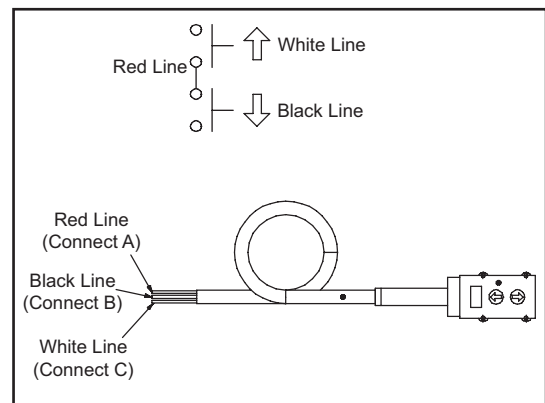
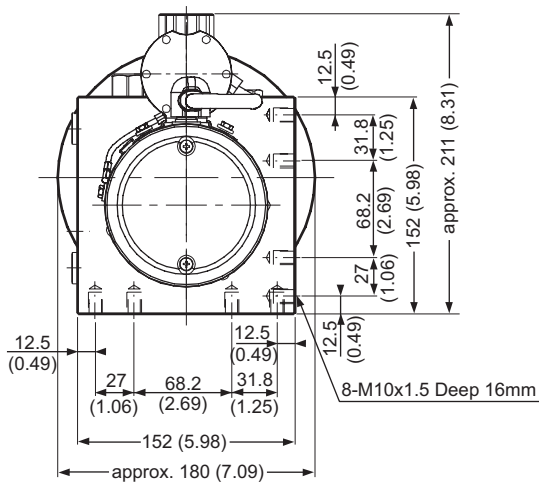
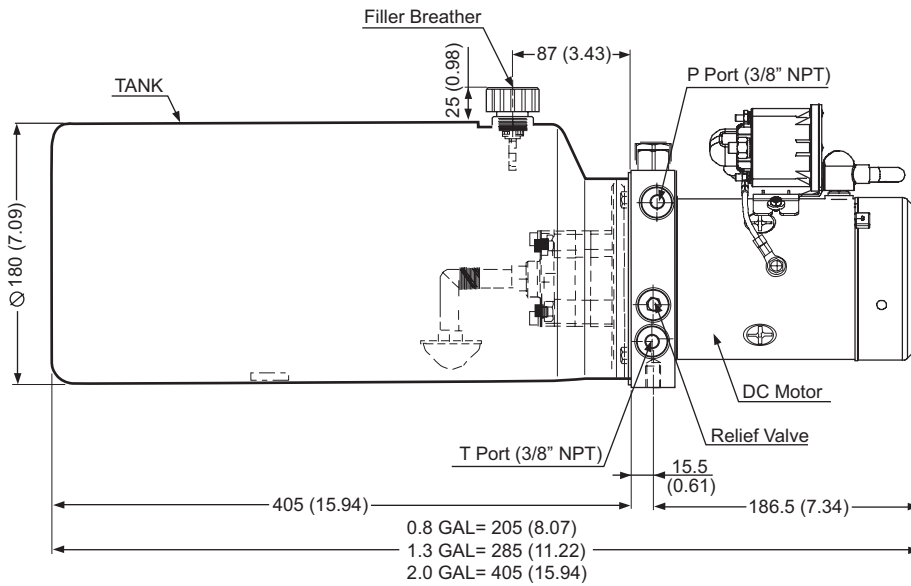
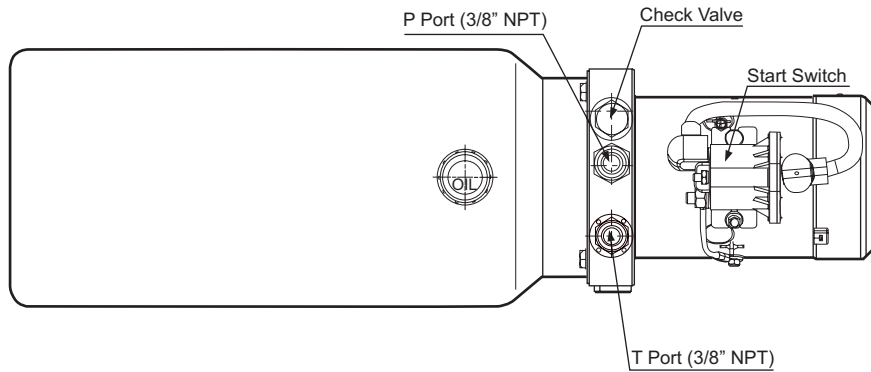
(Red Wire is Common)

Unit supplied with 2 button pendant w/ 4 meter cable.



## Dimensional Data

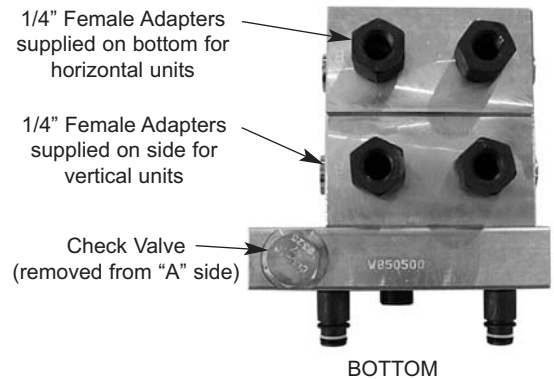
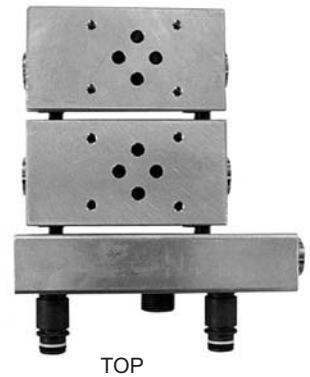
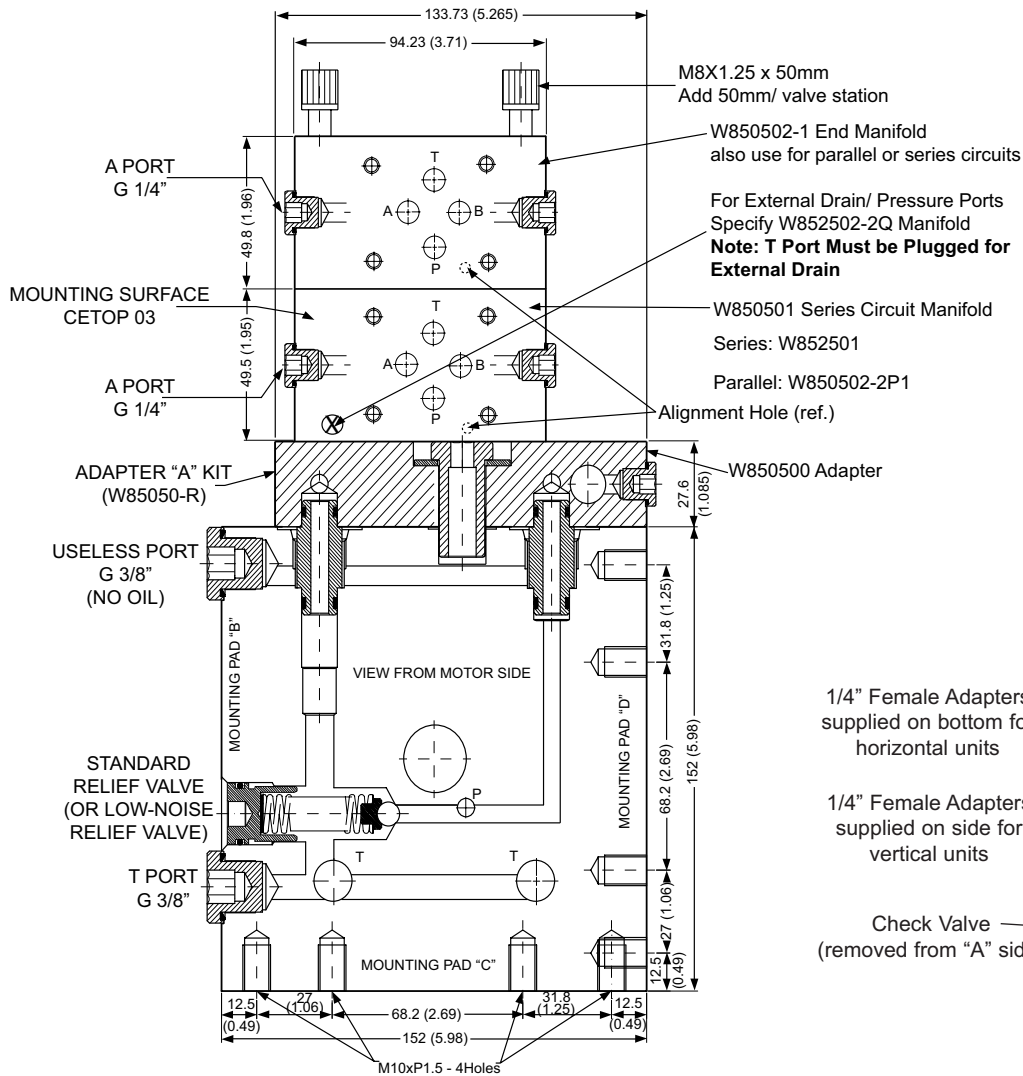
Units: mm (inches)



Unit supplied with 2 button pendant w/ 4 meter cable.

## Optional Manifolds/ Adapter

Units: mm (inches)



# SOLENOID VALVES

200 THRU 800 SERIES- SOLENOID VALVES



1/8" thru 1/2" Ports

SV808-543B-110A-SRL



SV406-542D-110A-SRL

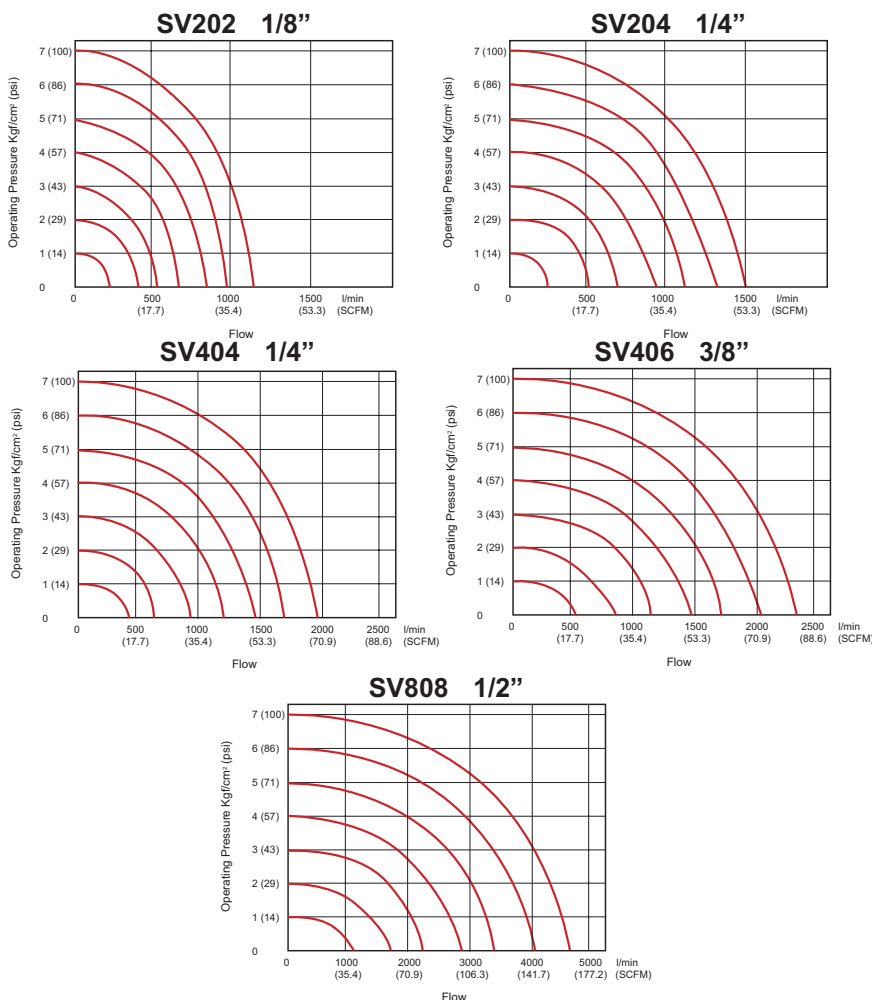
SV202-542S-110A-SRL

Solenoid Valves- 200 thru 800 Series

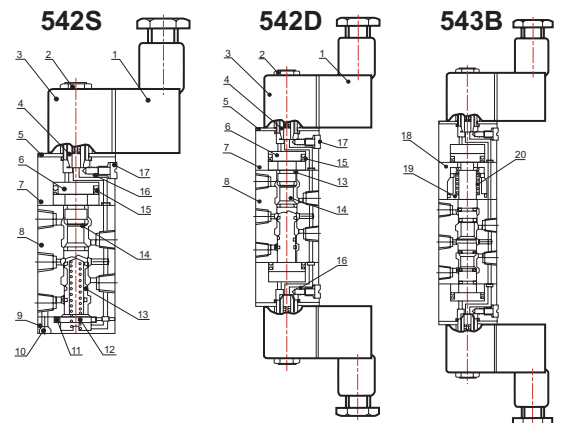
## Specifications

- Media:** Air (No other gases or liquids)
- Operation:** Solenoid (Direct Acting)
- Function:** 5 port, 4 way
- Operation Temp. Range:** 41 - 140°F (5 - 60°C)
- Maximum Pressure:** 135 psi (9.3 bar)
- Working Pressure:** 21 - 114 psi (1.5 - 8.0 bar)
- Orifice:** 200 Series: 12 mm<sup>2</sup> - 16 mm<sup>2</sup>  
400 Series: 18 mm<sup>2</sup> - 30 mm<sup>2</sup>  
800 Series: 30 mm<sup>2</sup> - 50 mm<sup>2</sup>
- Flows:**
- Lubrication:** None Required
- Maximum Cycle Rate:** 200 Series: 5 cycles/ second  
400 Series: 4 cycles/ second  
800 Series: 3 cycles/ second
- Insulation:** Class F
- Power Consumption:** AC: 4.5 VA DC: 3.0 W

## Flow Data



## Parts Breakdown



No.	Name	No.	Name
1	Connector	11	Bottom Cover Gasket
2	Nut	12	Spool Spring
3	Coil	13	Spool O-Ring
4	Armature Assembly	14	Spool
5	Fixed Plate	15	Piston O-Ring
6	Piston	16	Override Spring
7	Pilot Kit	17	Manual Override
8	Body	18	Side Cover
9	Bottom Cover	19	Spring Holder
10	Fixed Screw	20	Return Spring



# SOLENOID VALVES

200 THRU 800 SERIES- SOLENOID VALVES

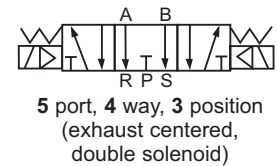
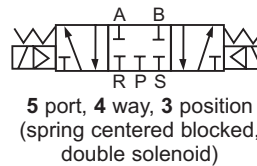
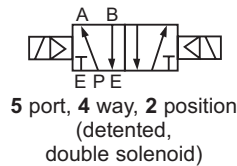
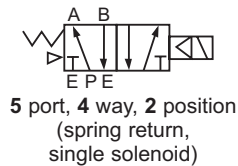


1/8" thru 1/2" Ports

## Construction Material

Name	Material			Name	Material		
	542S	542D	543B		542S	542D	543B
Body	Aluminum Alloy			Fixed Plate	Nickel Plated Steel		
Spool	Aluminum Alloy			Nut	Plastic		
Manual Override O-Ring	NBR			Manual Override	Plastic		
Connector Gasket	NBR			Bottom Cover	200 Series: NBR 400/800 Series: Zinc Alloy		
Spool O-Ring	HNBR			Manual Override Spring	Stainless Steel		
Bottom Cover Gasket	NBR			Spool Spring	Stainless Steel		
Pilot Gasket	NBR			Pilot Body	PBT+Glass Fiber		
Connector	Plastic			Fixed Screw	Iron		
Return Holder O-Ring			NBR	Coil Cover	Heat-Resistant Resin		
Return Kit			Copper	Manifold	Aluminum Alloy		
Side Cover			Aluminum Alloy	Piston	Plastic		
Return Spring			Stainless Steel	Armature	Pure Iron		
Return Spring Kit			Copper				

## Symbols



## Ordering Information

**SV - 204 - 542D - 110A - SR**

Code	Description
SV	Solenoid Valve

Model	Port Size
202	1/8"
204	1/4" (1/8" Exhaust)
404	1/4"
406	3/8" (1/8" Exhaust)
808	1/2"

Coil Voltage
omit (none)
12D (DC)
24A (AC)
24D (DC)
48A (AC)
110A (AC)
220A (AC)

Code	Electrical Connector
omit	none
SR	Strain Relief (standard)
CD	1/2" Conduit
LW	Lead Wire 36"
CDL	1/2" Conduit-Lighted
LWL	Lead Wire 36"-Lighted

Code	Standard Configurations
542S	5 port, 4 way, 2 pos., spring return
542D	5 port, 4 way, 2 pos., detented (double solenoid)
543B	5 port, 4 way, 3 pos., spring centered- all ports blocked (double solenoid)
543F	5 port, 4 way, 3 pos., exhaust center- P blocked, A & B to exhaust (double solenoid)



# SOLENOID VALVES

200 THRU 800 SERIES- SOLENOID VALVES



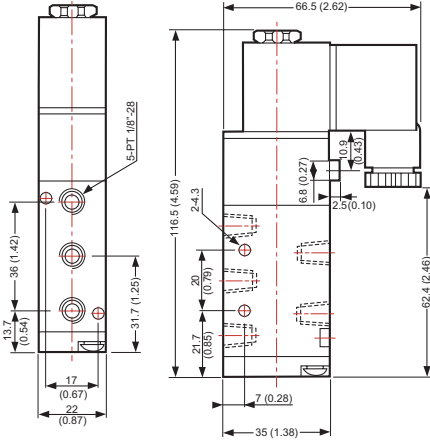
1/8" thru 1/2" Ports

## Dimensional Data

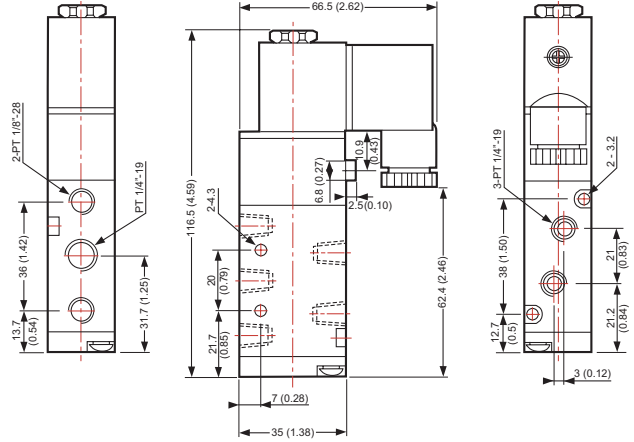
### 200 SERIES

Units: mm/ (Inch)

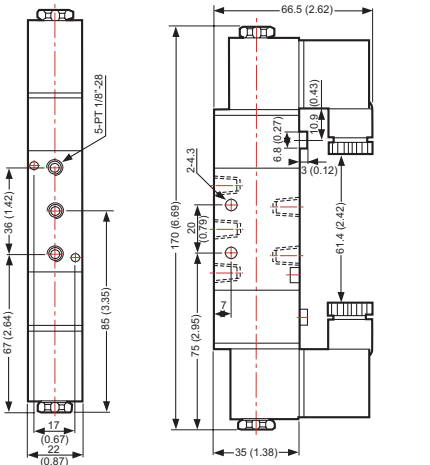
SV202-542S



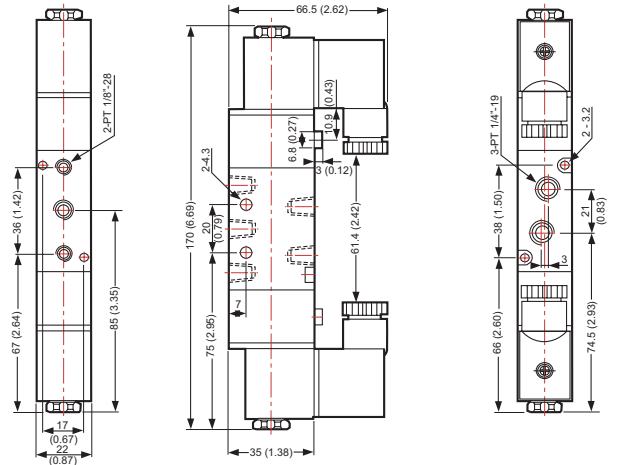
SV204-542S



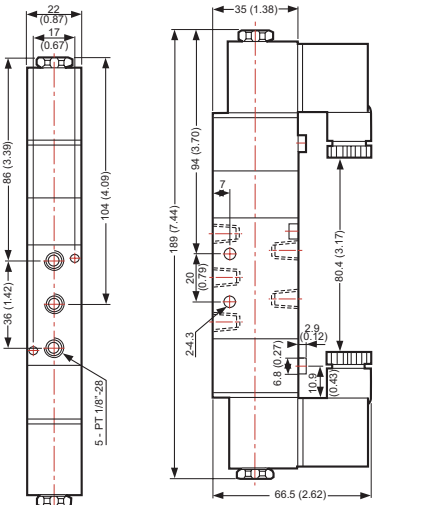
SV202-542D



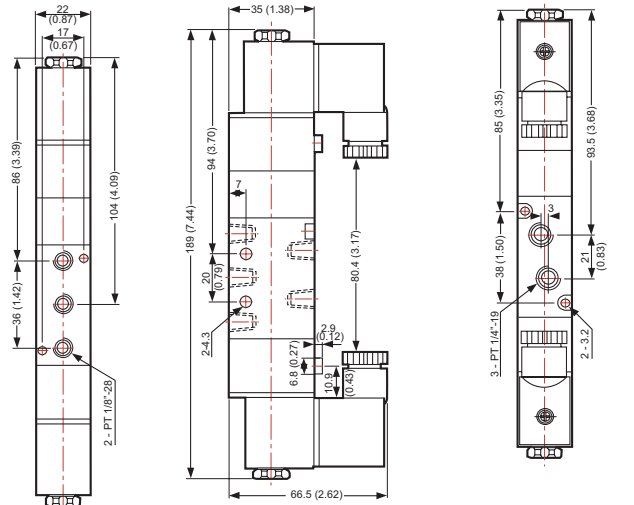
SV204-542D



SV202-543B



SV204-543B



# SOLENOID VALVES

200 THRU 800 SERIES- SOLENOID VALVES



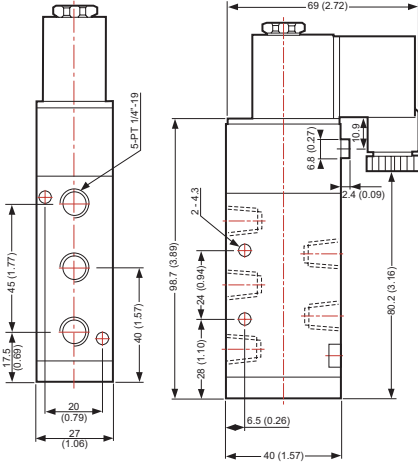
1/8" thru 1/2" Ports

## Dimensional Data

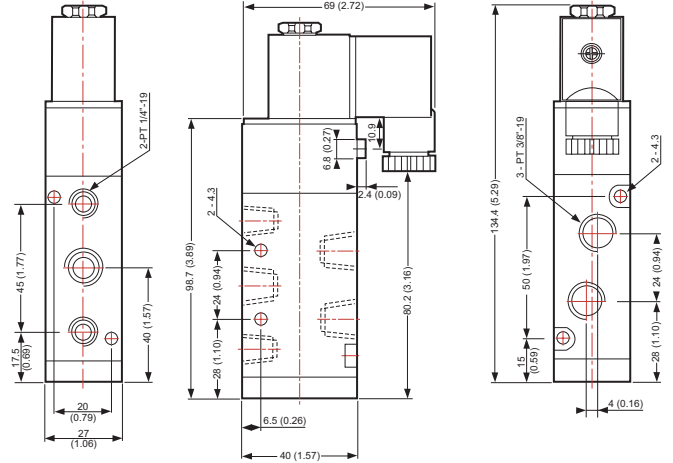
### 400 SERIES

Units: mm/ (Inch)

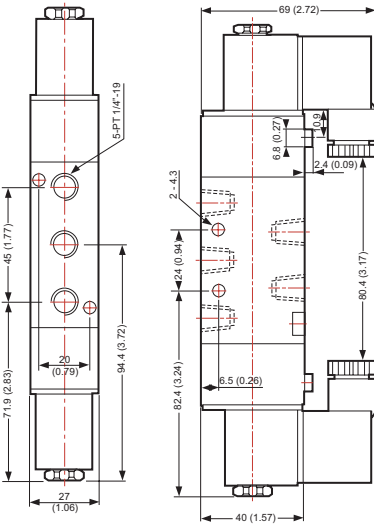
SV404-542S



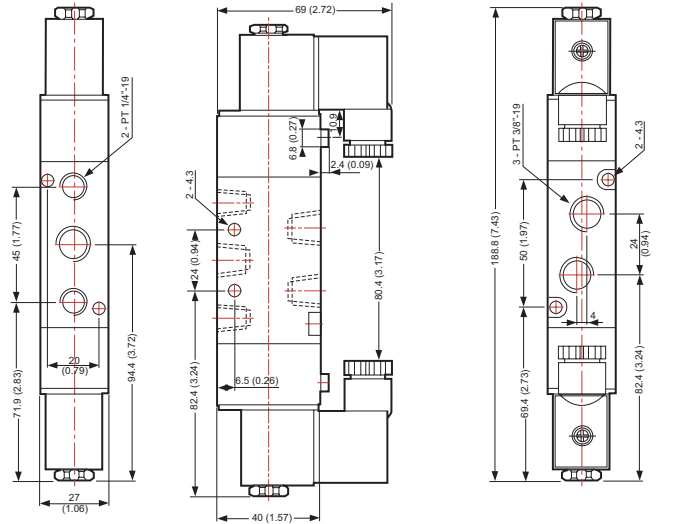
SV406-542S



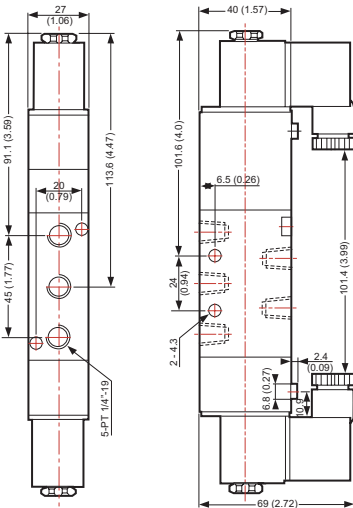
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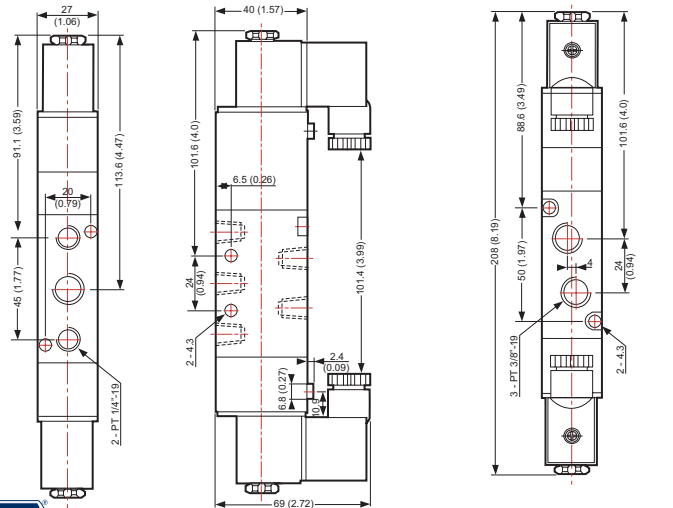
SV406-542D



SV404-543B



SV406-543B





# SOLENOID VALVES

200 THRU 800 SERIES- SOLENOID VALVES



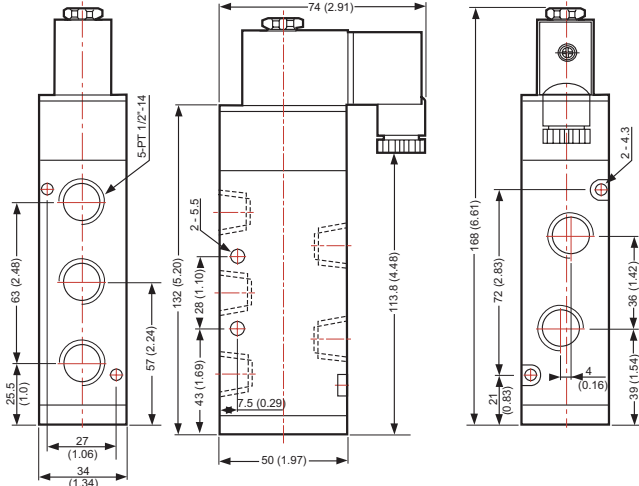
1/8" thru 1/2" Ports

## Dimensional Data

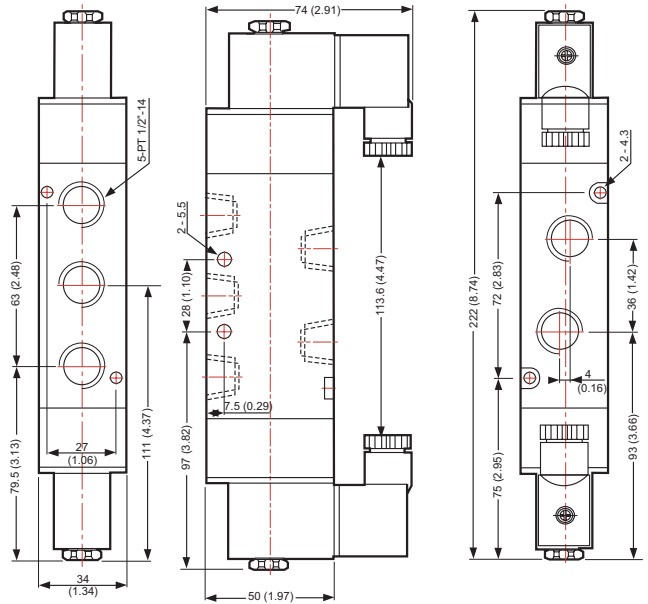
### 800 SERIES

Units: mm/ (Inch)

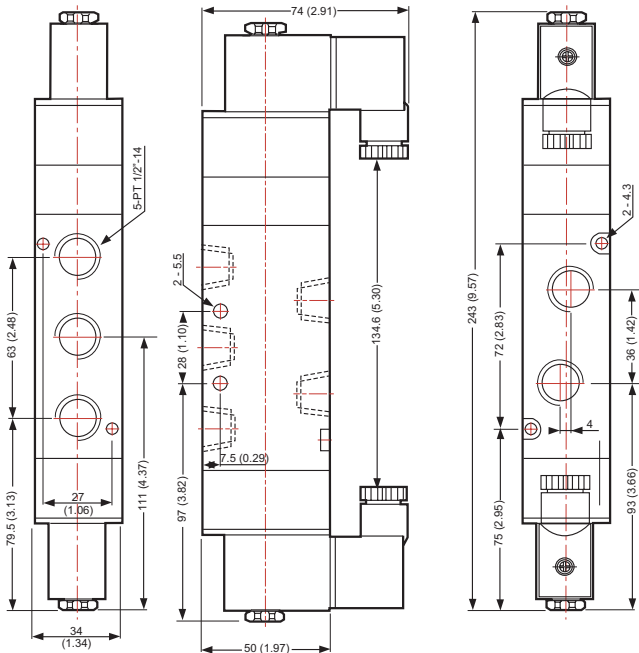
**SV808-542S**



**SV808-542D**



**SV808-543B**



# SOLENOID VALVES

COILS & CONNECTORS



## Dimensional Data

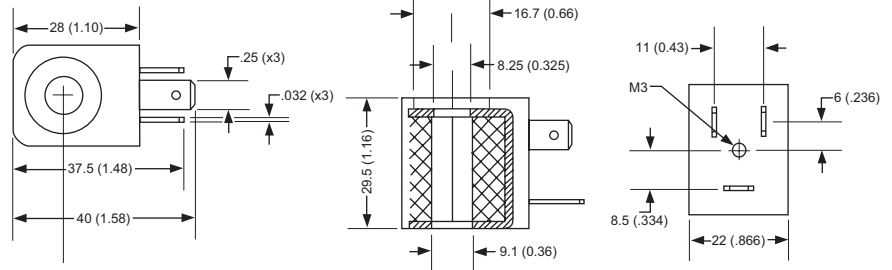
Units: mm/ (Inch)

### C-Voltage/ Current Type Mini-DIN Coil

C-12VDC C-24VDC C-24VAC  
C-110VAC C-220VAC



C-110VAC

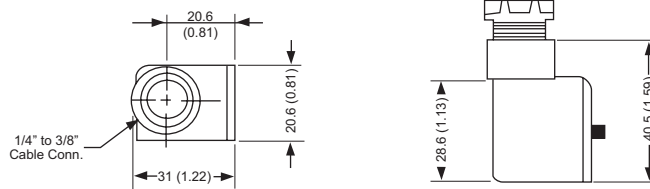


### CC-SR Strain Relief Connector

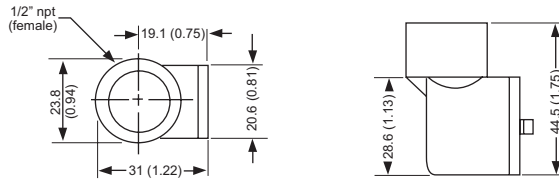
CC-SRL-DC (6-48VAC or VDC)  
CC-SRL-AC (100-240 VAC)



CC-SR-AC

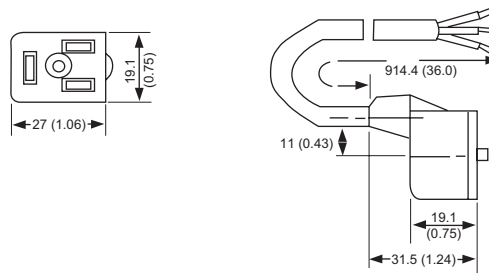


### CC-CD 1/2" Conduit Connector



### CC-LW 36" Lead Wire Connector

CC-LWL-DC (6-48VAC or VDC)  
CC-LWL-AC (100-240VAC)



## Ordering Information

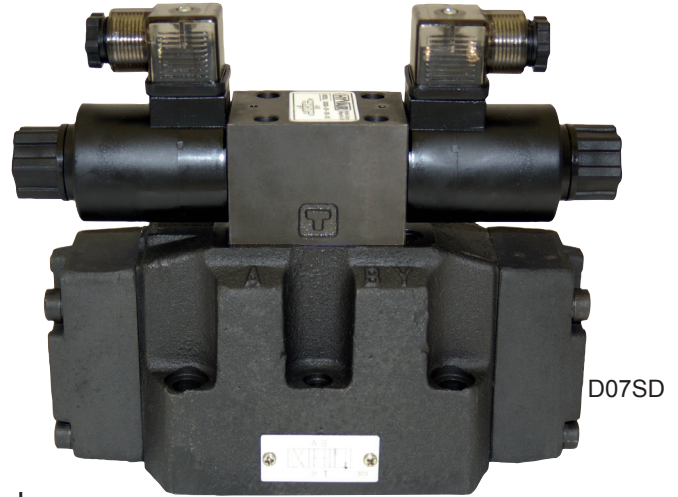
### 110A - SR

Coil Voltage	Code	Electrical Connector
12D (DC)	SR	Strain Relief
24A (AC)	CD	1/2" Conduit
24D (DC)	LW	Lead Wire 36"
110A (AC)	CDL	1/2" Conduit-Lighted
220A (AC)	LWL	Lead Wire 36"-Lighted



**Features**

- **High Pressure/ High Flow:**  
4600 psi (320 bar)/ 80 gpm (300 lpm)
- **Pilot Operation:**  
Main spool controlled by D03 solenoid pilot valve
- **Oil Immersed, Quiet Solenoid Design:**  
Moving core immersed in hydraulic oil provides quiet pilot operation
- **Wiring:**  
Electrical box with indicator lights and terminal strip connection standard. DIN coils available and provided with DIN connector.
- **Maintenance:** Indicator lamps to diagnose connection; Plug-in coils provide easy changing
- **High Reliability:** Valve designed to last 20 million spool shifts under proper use.

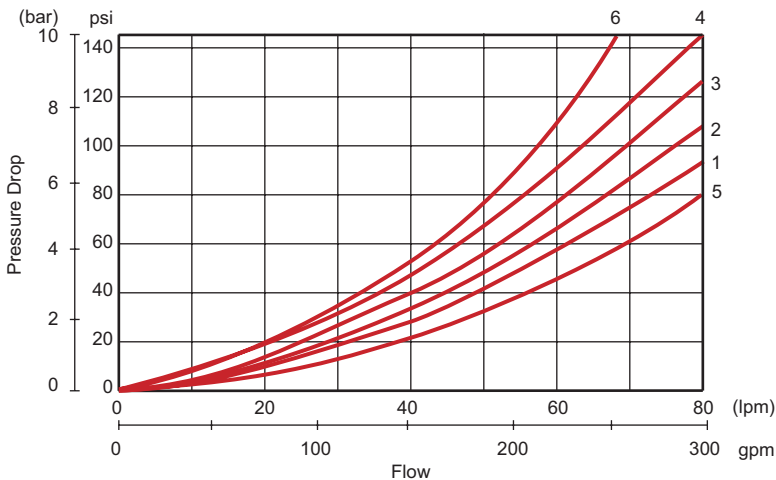

**Technical Data**

<b>Maximum Flow Rate from port P to A, B, T</b>	80 gpm (300 lpm)
<b>Maximum Operating Pressure:</b> ports P, A, B port T port T (external drain version)	4600 psi (320 bar) 3000 psi (210 bar) 3600 psi (250 bar)
<b>Pressure Drop</b>	see pressure drop curves
<b>Hydraulic Fluid</b>	Petroleum Oils (HM, HL, HLP)
<b>Fluid Temperature Range for NBR seals</b>	-22 to +176°F (-30 to +80°C)
<b>Fluid Temperature Range for FPM seals</b>	-4 to + 176°F (-20 to +80°C)
<b>Maximum Ambient Temperature</b>	up to 122°F (50°C)
<b>Viscosity Range</b>	98 - 1840 SUS (20 - 400) mm <sup>2</sup> /s
<b>Maximum Degree of Fluid Contamination</b>	Class 21/ 18/ 15 to ISO 4406 (1999)
<b>Weight:</b> Single Solenoid Double Solenoid	19 lbs (8.5 kg) 20 lbs (9.1 kg)

**Performance Characteristics**

PRESSURE	MINIMUM	MAXIMUM
Pilot Pressure	72.5 psi (5 bar)	3043 psi (210 bar)
Pressure on Line T with internal drainage	—	2029 psi (140 bar)
Pressure on Line T with external drainage	—	3623 psi (250 bar)
MAXIMUM FLOW RATES	PRESSURES	
	3045 psi (210 bar)	4640 psi (320 bar)
Spool Type 2C	66 gpm (250 lpm)	53 gpm (200 lpm)
All Other Spools	80 gpm (300 lpm)	66 gpm (250 lpm)

**Pressure Drop Curves**

 Measured at  $v = 166 \text{ SUS (35 mm}^2\text{/s)}$  and  $t = 122^\circ\text{F (50}^\circ\text{C)}$ 


Valve Spool Type	Spool Position	Flow Path				
		P→A	P→B	A→T	B→T	P→T
<b>1A, 1AY</b> <b>1AR, 1ARY</b>	De-Energized Energized	1	1	2	3	
<b>2B</b>	Energized	1	1	2	3	
<b>2C</b>	De-Energized Energized	6	6	3	4	6
<b>2F</b>	De-Energized Energized	1	1	4 <sup>•</sup> 1	4 <sup>0</sup> 2	
<b>2H</b>	De-Energized Energized	5	5	1	2	6 <sup>*</sup>
<b>3A, 3AY</b>	Energized	1	1	2	3	

\*A-B blocked    •B blocked    0A blocked

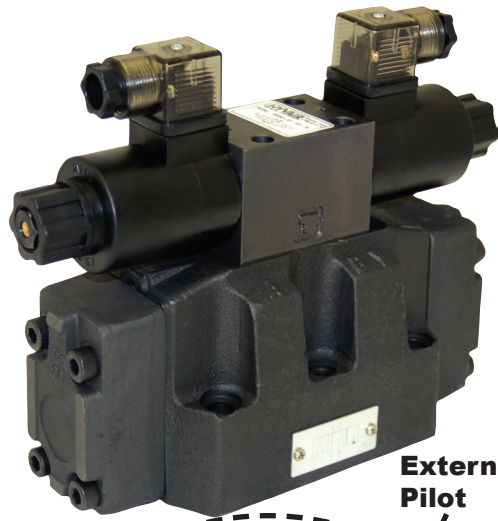
**Spool Symbols**

Two positions with spring return	
<b>1A</b>	
<b>1AY</b>	
<b>1AR</b>	
<b>1ARY</b>	
Three positions with spring centered	
<b>2B</b>	
<b>2C</b>	
<b>2F</b>	
<b>2H</b>	
Two positions with mechanical detent on pilot valve	
<b>3A</b>	
<b>3AY</b>	

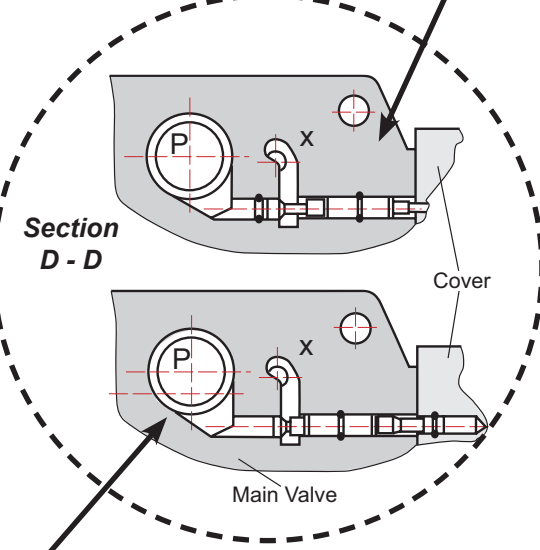
Units: mm (inches)

### Dimensional Data

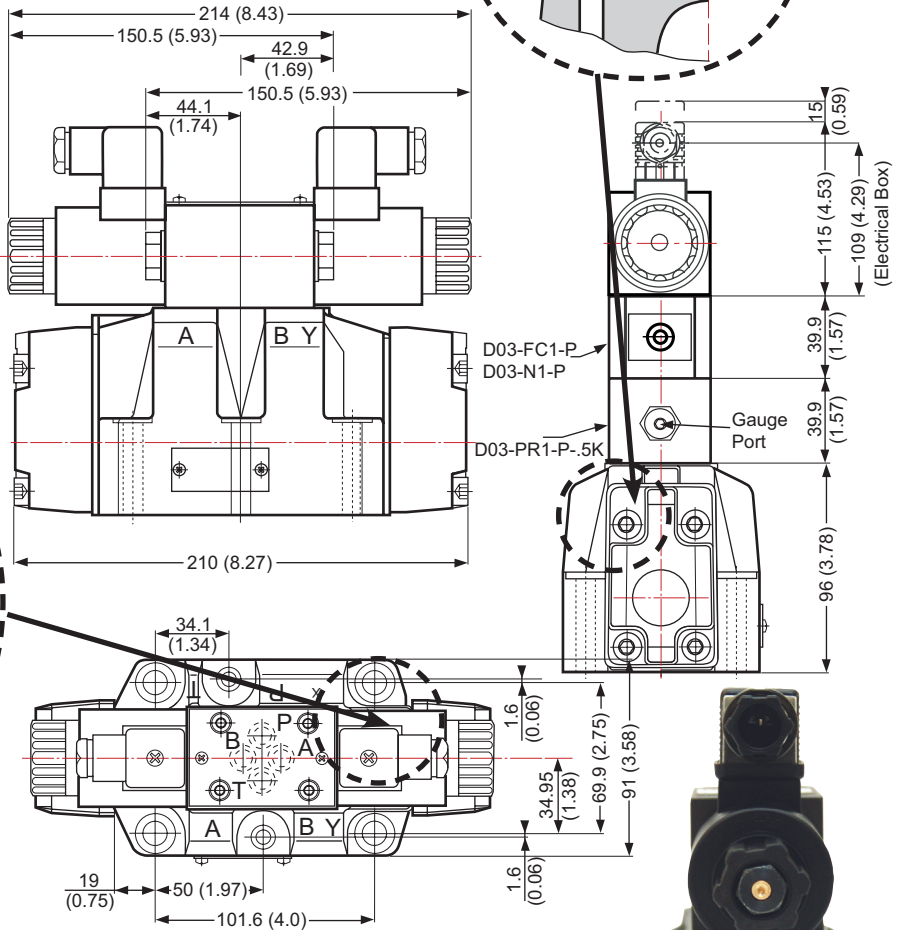
Remove Access Plug to Add or Remove Lower External Drain Plug  
 Plug = External Drain  
 No Plug = Internal Drain



**External Pilot**



**Internal Pilot**



### Installation Dimensions

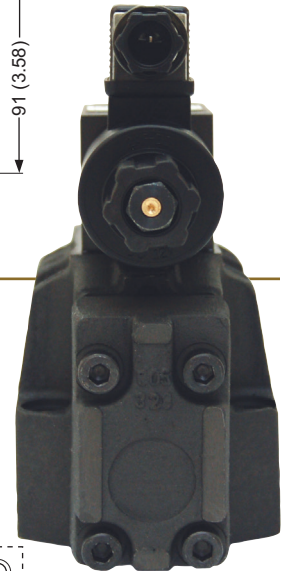
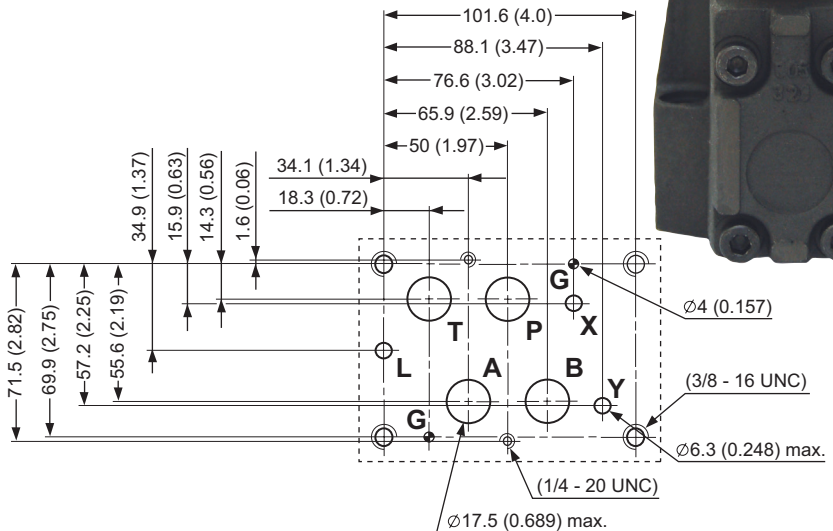
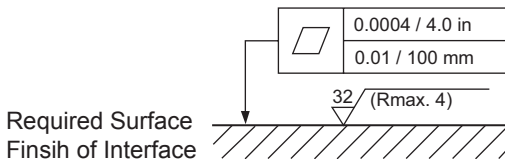
**Single Valve Fastening:**

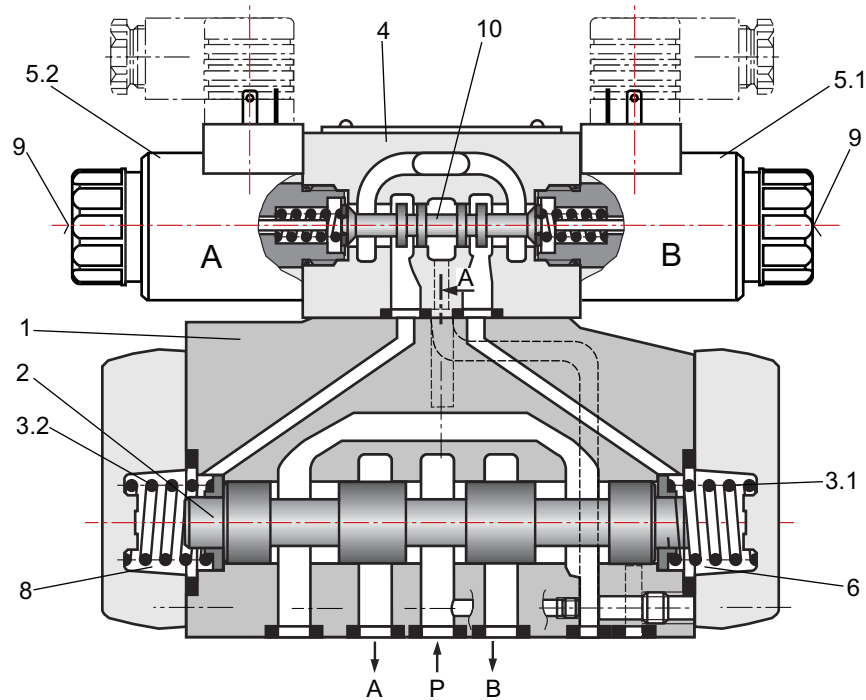
4 Bolts (3/8-16 UNC x 2-1/4")  
 29.5 ft-lbs / GR 8 SHCS

2 Bolts (1/4-20 UNC x 2-1/4")  
 5.9 ft-lbs / GR 8 SHCS

**O Rings: (metric)**

4 O-rings type 22.22 x 2.62  
 2 O-rings type 10.82 x 1.78



**Cross Section**


1-Main Valve with Housing	3.2-Return Spring	5.2-Solenoid	9-Manual Override
2-Main Control Spool	4-Pilot Valve	6-Spring Chamber	9-Manual Override
3.1-Return Spring	5.1-Solenoid	8-Spring Chamber	10-Pilot Spool

**Ordering Information**
**D07 S - 2 B - 115 A - Options - 35**

Size	Code	Actuator	Code	Configuration	Code	Spool Function	Voltage	Current/Connector
D07	S	Solenoid	1	Single Solenoid • 2 position, spring offset	A	P to A, B to T	12	A   AC D   DC
	SD	Solenoid w/ Din Coil						
	SC	Solenoid w/ *Pilot Choke						
	SDC	Solenoid w/ Din Coil & *Pilot Choke						
			2	Double Solenoid • 3 position, spring centered	B	All Ports Blocked	24	
			3	Double Solenoid • 2 position, no center, detented	C	P to T, A & B Blocked	115	
					F	P Blocked, A & B to T	230	
					H	All Ports Open		

\*Pilot choke valve, (D03FC1-AB-MO- meter out flow control), provides softer shifting.

Also consider additionally using D03PR1-P-.5K pressure reducing valve if system pressure is above 1,000 psi. (See dimensional data)

**Options:**

“EP” suffix for External Pilot (x-port connection) “ED” suffix for External Drain (y-port connection)

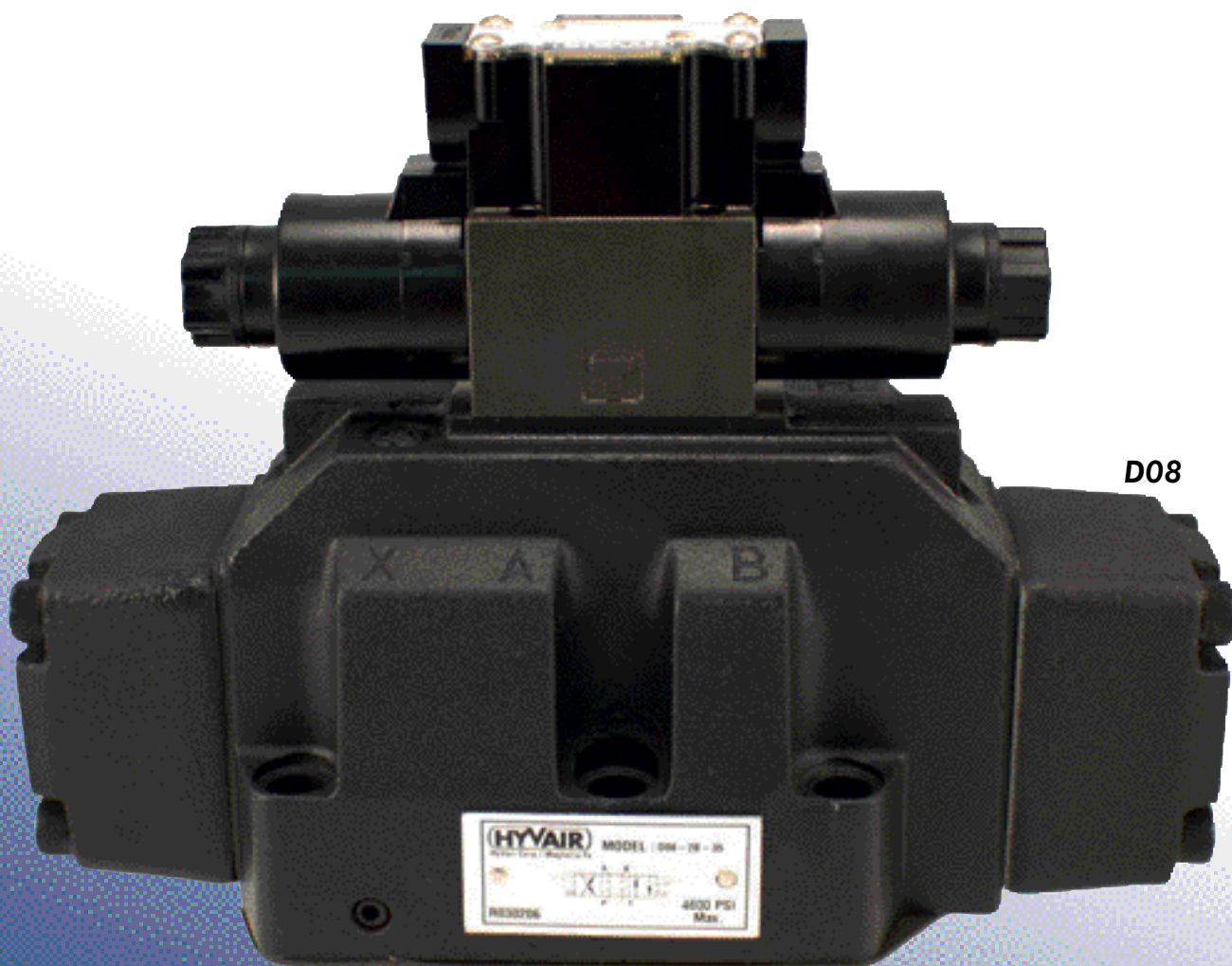
At least one of these options must be used on C & H spools unless Internal Pre Load Check (standard) is used.



**D08**

Series 35

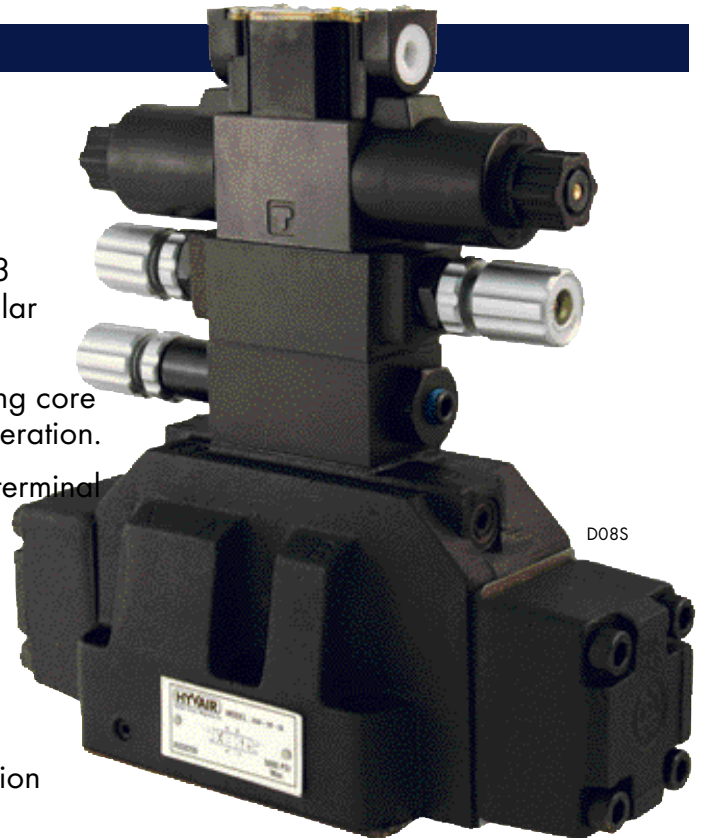
Solenoid Pilot Operated Directional Valves



D08

**GENERAL FEATURES**
**STANDARD FEATURES**

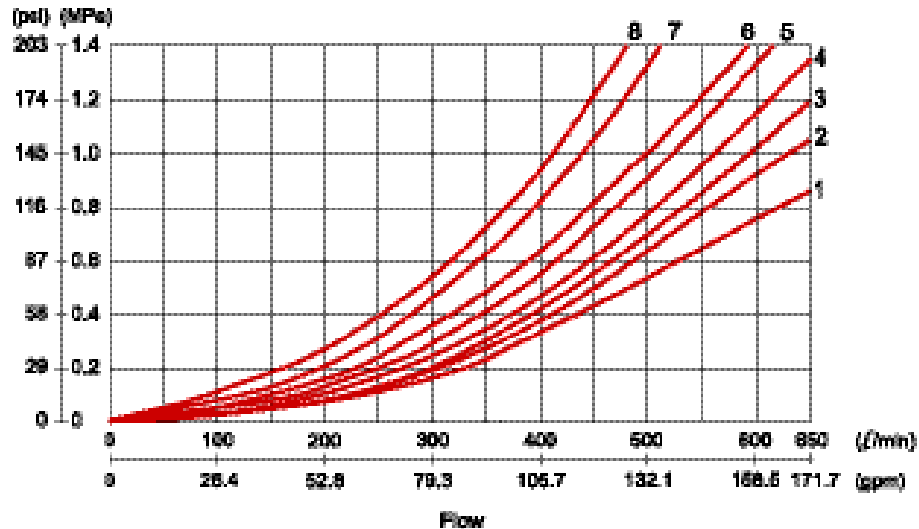
- **High Pressure/ High Flow:** 158gpm (600lpm)/ 4641psi (320bar)
- **Pilot Operation:** Main spool controlled by D03 solenoid pilot valve- allows for addition of modular valves to reduce shifting shock.
- **Oil Immersed, Quiet Solenoid Design:** Moving core immersed in hydraulic oil provides quiet pilot operation.
- **Wiring:** Electrical box with indicator lights and terminal strip connection standard. DIN coils available and provided with DIN connector. AC DIN connectors supplied with indicator lights at no extra charge.
- **Maintenance:** Indicator lamps to diagnose connection; Plug-in coils provide easy changing.
- **High Reliability:** Valve designed to last 20 million spool shifts under proper use.


**TECHNICAL DATA**

<b>Nominal Flow Rates:</b> @ 4641 psi	158 gpm (600 lpm)
@ 1000 psi	100 gpm (378 lpm)
<b>Maximum Operating Pressure:</b> ports P, A, B	4641 psi (320 bar)
*port T-Including Surges	2000 psi (140 bar)
<b>Internal Leakage @ 3000 psi</b>	6 cu-in/ min (98 ml/ min)
<b>Maximum Cycle Rate</b>	150 cycles/ min
<b>Mounting Surface: NFPA</b>	T3.5.1.MR-D08
<b>ISO</b>	ISO 4401- 08
<b>Weight: Single Solenoid</b>	29 lbs (13.1 kg)
<b>Double Solenoid</b>	30 lbs (13.5 kg)
<b>Operating Conditions:</b> <b>Working Temperature</b>	40 - 160°F (5 - 70°C)
<b>Operating Viscosity</b>	80 - 300 SUS (17.65 cSt)
<b>Maximum Start-up Viscosity</b>	1500 SUS (315 cSt)
<b>Filtration</b>	25 micron or less, (ISO 18/15)
<b>Recommended Fluids</b>	Petroleum Based Fluids- ISO VG32-68, Most Vegetable Oils

\*3000 psi available - specify external drain



**PRESSURE DROP CURVES**


For continuous flow conditions or high cycling applications, a recommended max. flow rating is: 1/2 x maximum flow rating.

Standard 115 VAC Model Codes	Symbol	Valve Spool Type	Description	Max. operating pressure psi (bar)	Max. flow gpm (lpm)	Flow Path			
						P→A	P→B	A→T	B→T
D08S-1A-115A-35 (Pilot Valve D03S-1A-115A-35)		<b>1A</b>	Spring Centered; All Ports Blocked/ Hydraulic Offset (Closed in Transition)	<b>4600</b> (320)	<b>75</b> (283)	1	1	1	3
D08S-2B-115A-35 (Pilot Valve D03S-2F-115A-35)		<b>2B</b>	Spring Centered; All Ports Blocked	<b>4600</b> (320)	<b>75</b> (283)	1	1	1	3
D08S-2C-115A-ED-35 (Pilot Valve D03S-2F-115A-35)		<b>2C</b>	Spring Centered; P to T, A & B Blocked	<b>4600</b> (320)	<b>65</b> (283)	3	1	2	4
D08S-2F-115A-35 (Pilot Valve D03S-2F-115A-35)		<b>2F</b>	Spring Centered; P to Blocked, A & B to T	<b>4600</b> (320)	<b>75</b> (283)	2	2	3	5
D08S-2H-115A-ED-35 (Pilot Valve D03S-2F-115A-35)		<b>2H</b>	Spring Centered; All Ports Open	<b>4600</b> (320)	<b>75</b> (283)	4	4	3	4
D08S-3A-115A-35 (Pilot Valve D03S-3A-115A-35)		<b>3A</b>	Spring Centered; All Ports Blocked/ Hydraulic Detented (Closed in Transition)	<b>4600</b> (320)	<b>75</b> (283)	1	1	1	3

Maximum flows may be increased by 30% (except spool 2C) if 250 psi pilot pressure is maintained.

External draining may be required where high tank line pressures exist (high flow)- the differential pressure between pilot pressure and back pressure at tank port should always be 70 psi minimum

### Pilot/ Drain Configurations

Spool Codes A, B, F Supplied Internal Pilot & Internal Drain Standard

Spool Codes C and H Supplied Internal Pilot & Internal Drain Standard

⇒ 70 psi back-pressure check provided in pressure port to provide shifting pressure.

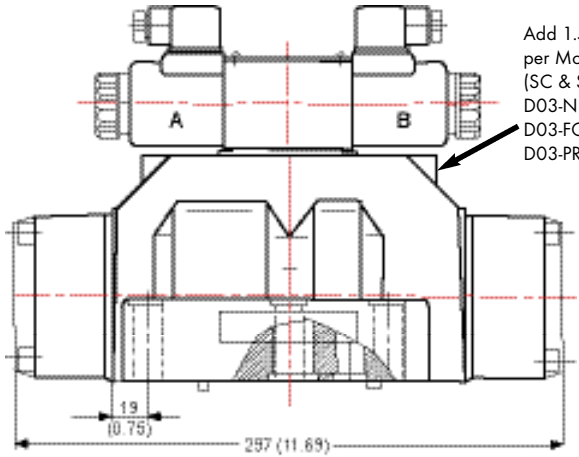
External Drain- Specify "ED" Suffix External Pilot- Specify "EP" suffix

Only use Hyvair plugs with short insertion depth.

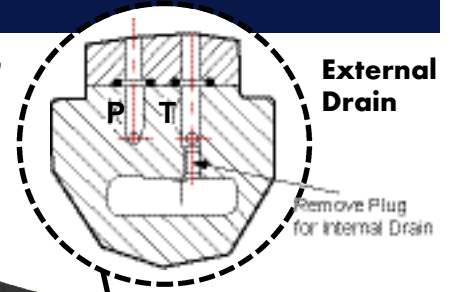
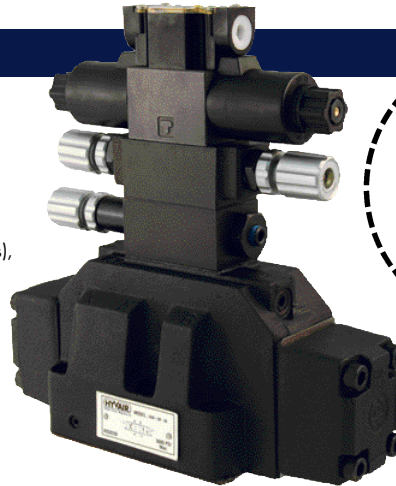
### DIMENSIONS

Units: mm (inches)

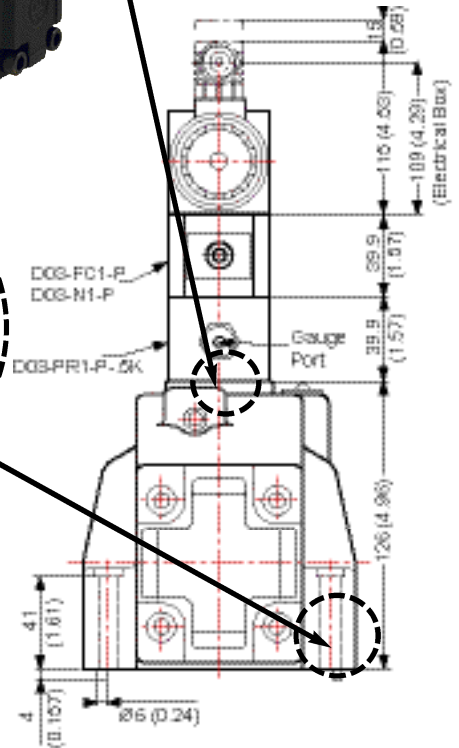
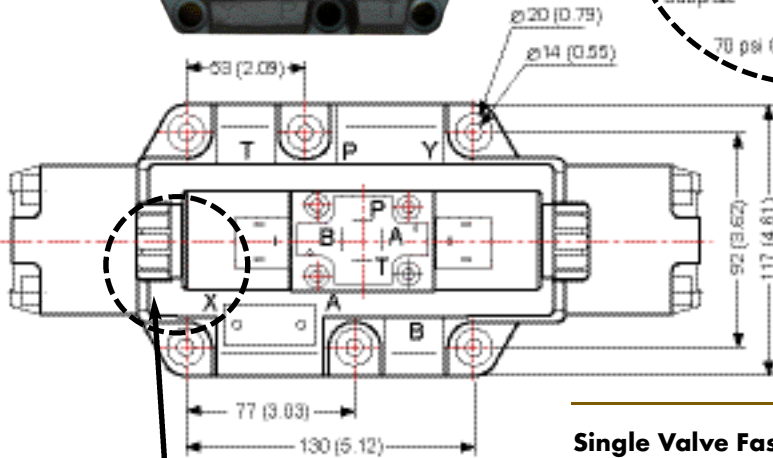
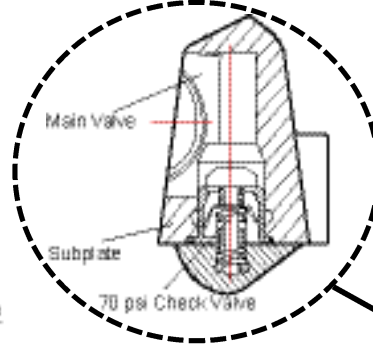
### D08 - DIMENSIONAL DRAWING



Add 1.57" per Modular Valve (SC & SDC options), D03-N1-P, D03-FC1-AB-MO, D03-PR1-P-5K



**Pre Load Check**  
(Spools C & H Only)



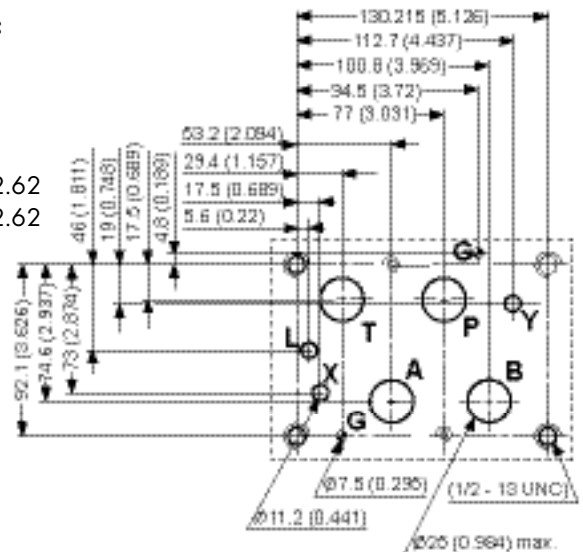
### INSTALLATION DIMENSIONS

**Single Valve Fastening:**

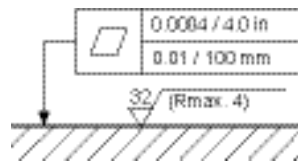
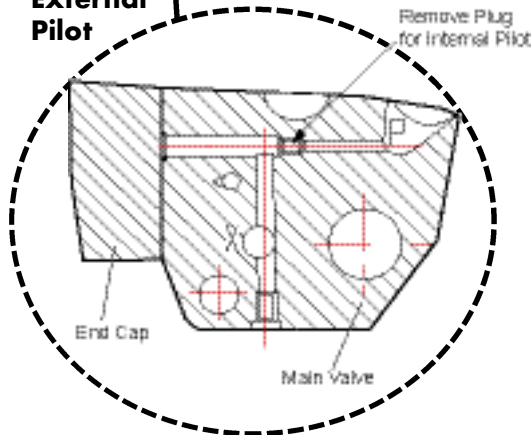
- 6 Bolts M12 x 60
- 50.9 ft-lbs (69 Nm)

**O Rings: (metric)**

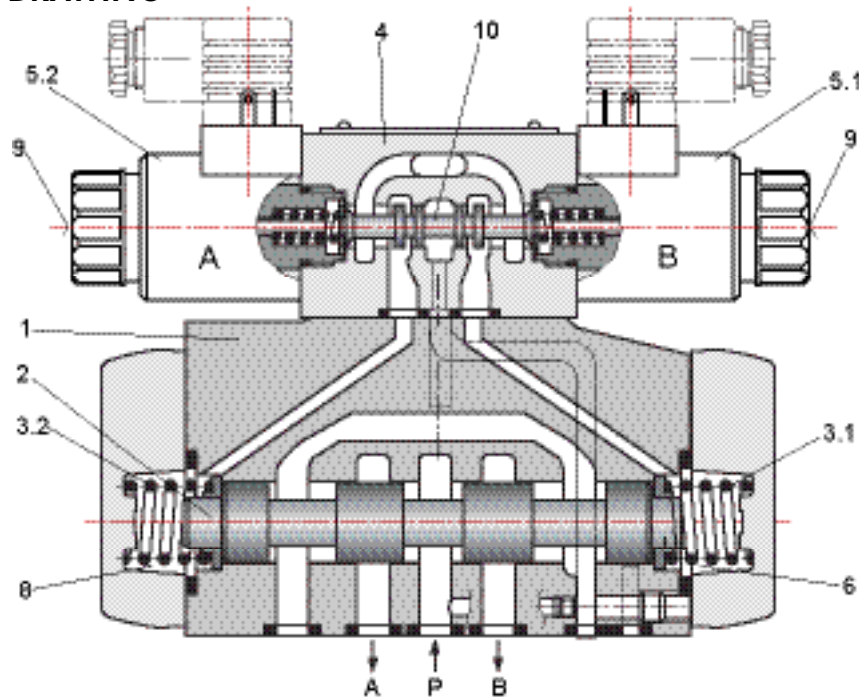
- 4 O-rings type 29.82 x 2.62
- 2 O-rings type 20.29 x 2.62



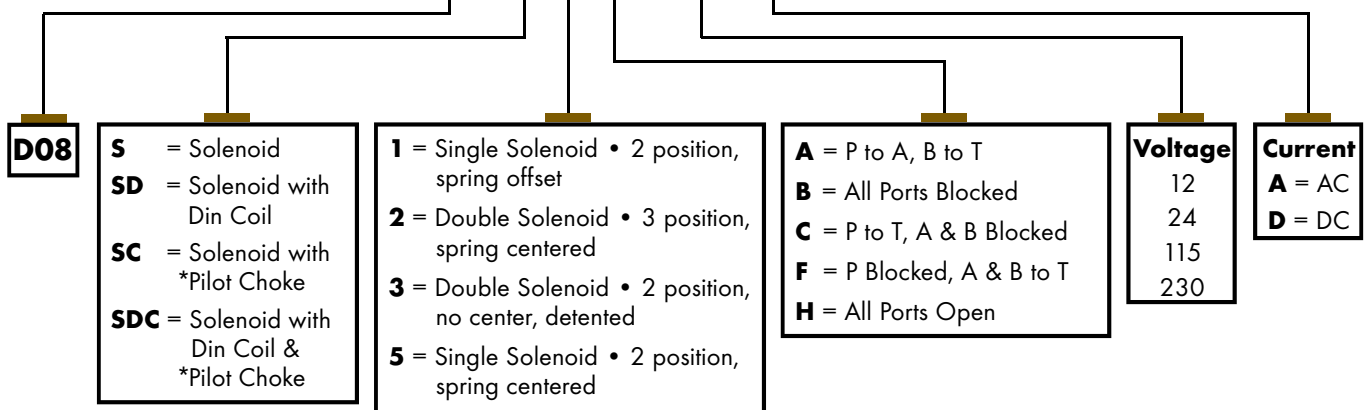
**External Pilot**



Required Surface Finish of Interface

**CROSS SECTION**
**CROSS SECTION DRAWING**


1) Main Valve with Housing	3.2) Return Spring	5.2) Solenoid	9) Manual Override
2) Main Control Spool	4) Pilot Valve	6) Spring Chamber	9) Manual Override
3.1) Return Spring	5.1) Solenoid	8) Spring Chamber	10) Pilot Spool

**ORDERING INFORMATION**
**ORDERING EXAMPLE**
**D08 S-2 B- 115 A - Options - 35**


\*Pilot choke valve, (D03FC1-AB-MO- meter out flow control), provides softer shifting.

Also consider additionally using D03PR1-P-.5K pressure reducing valve if system pressure is above 1,000 psi. (See dimensional data)

**Options:**

"EP" suffix for External Pilot (x-port connection) "ED" suffix for External Drain (y-port connection)

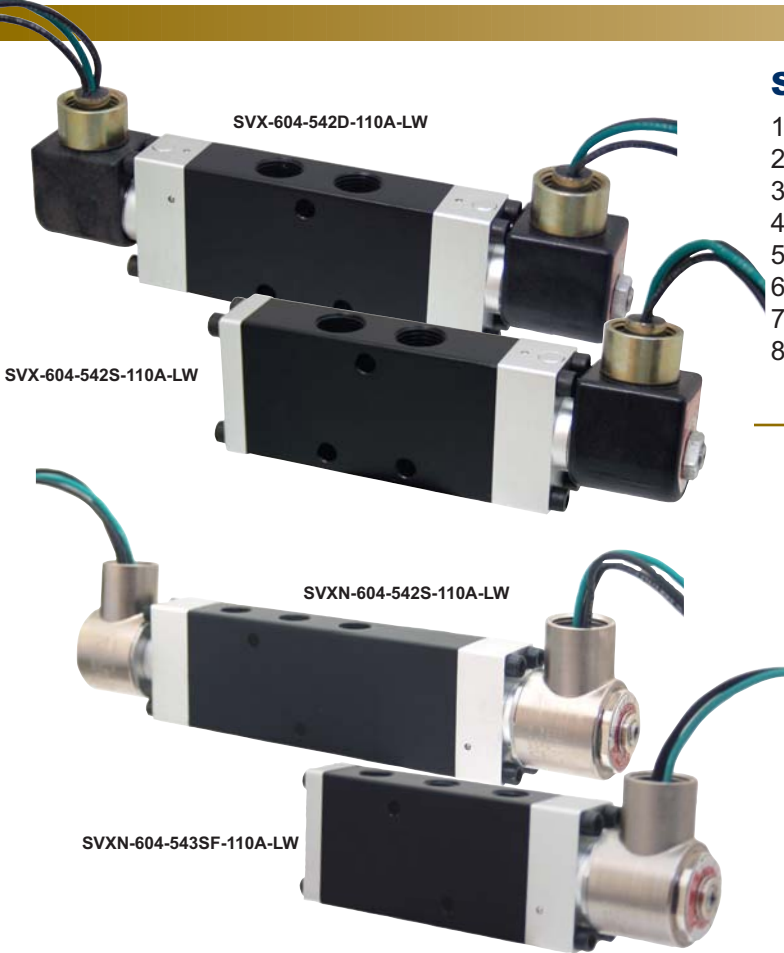
At least one of these options must be used on C & H spools unless Internal Pre Load Check (standard) is used.

# SOLENOID VALVES

600 SERIES- EXPLOSION PROOF SOLENOID VALVES



1/4" & 3/8" Ports



## Specifications

1. **Media:** Air (No other gases or liquids)
2. **Operation:** Solenoid (Direct Acting)
3. **Function:** 5 port, 4 way
4. **Operation Temp. Range:** 41 - 140°F (5 - 60°C)
5. **Maximum Pressure:** 135 psi (9.3 bar)
6. **Working Pressure:** 21 - 114 psi (1.5 - 8.0 bar)
7. **Lubrication:** None Required
8. **Insulation:** Class F

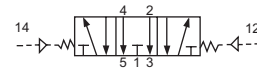
## Symbols



5 port, 4 way, 2 position  
(spring return,  
single solenoid)



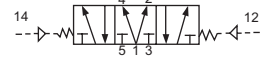
5 port, 4 way, 2 position  
(detented,  
double solenoid)



5 port, 4 way, 3 position



5 port, 4 way, 3 position  
(spring centered blocked,  
double solenoid)



5 port, 4 way, 3 position

Explosion Proof Solenoid Valves- 600 Series

## Ordering Information

### SVX - 606 - 542S - 24D - SR

Code	Description	Model	Port Size	Coil Voltage	Code	Electrical Connector
SVX	Solenoid Valve Explosion Proof	604	1/4"	omit (none)	omit	none
		606	3/8"	12D (DC)	SR	Strain Relief (standard)
				24A (AC)	CD	1/2" Conduit
				24D (DC)	LW	Lead Wire 36"
				48A (AC)	CDL	1/2" Conduit-Lighted
				110A (AC)	LWL	Lead Wire 36"-Lighted
				220A (AC)		
Code	Standard Configurations					
542S	5 port, 4 way, 2 pos., spring return					
542D	5 port, 4 way, 2 pos., detented (double solenoid)					
543F	5 port, 4 way, 3 pos.,					

Available/ Not Stocked:

543B & 543T



# SOLENOID VALVES

## 600 SERIES- EXPLOSION PROOF SOLENOID VALVES



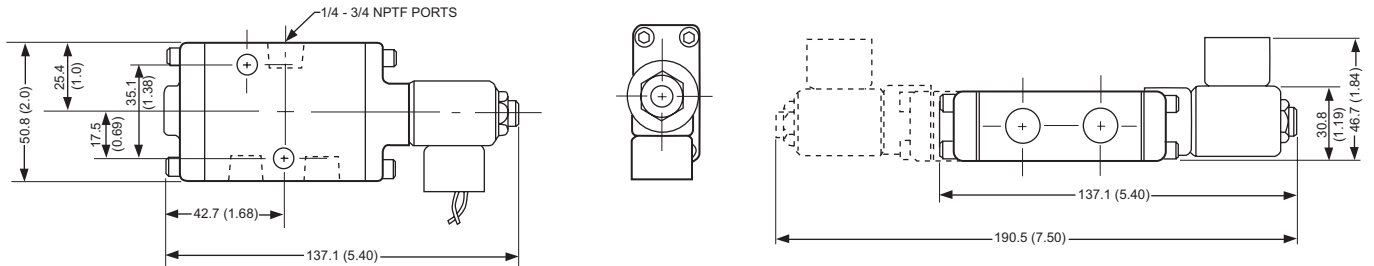
1/4" & 3/8" Ports

### Dimensional Data

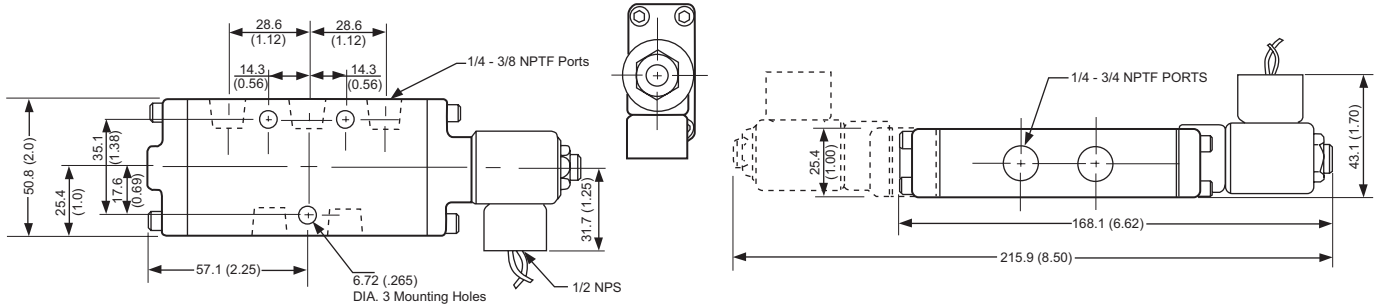
Units: mm/ (Inch)

### 600 SERIES EXPLOSION PROOF

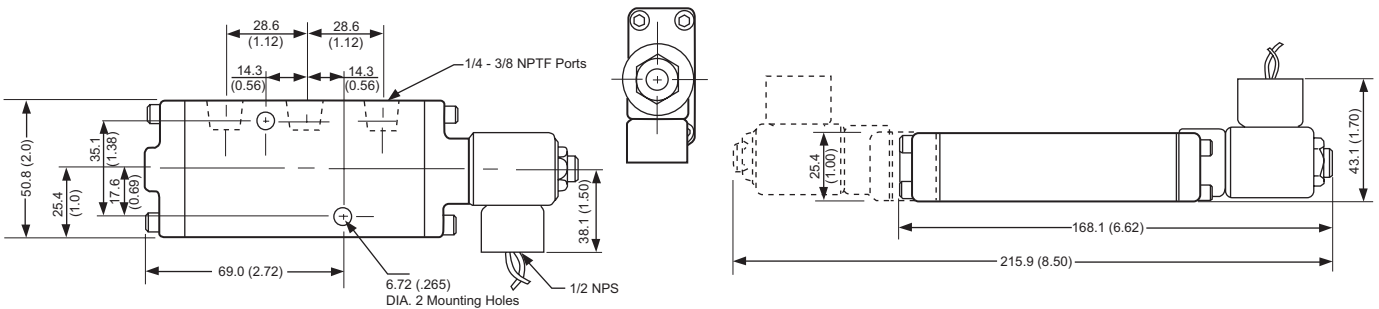
#### SVX - 3 Way



#### SVX - 4 Way



#### SVXN - Namur



# SOLENOID VALVES

400 SERIES- NAMUR SOLENOID VALVES



1/4" Ports



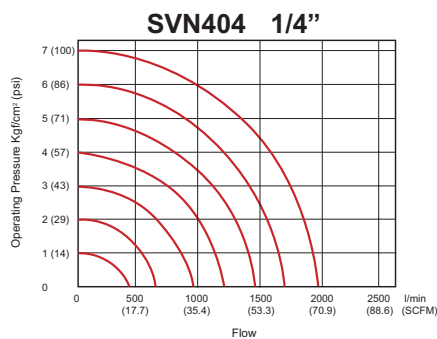
SVN-404-542D-110A-SRL

Namur Solenoid Valves- 400 Series

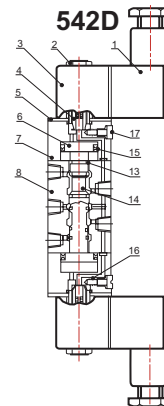
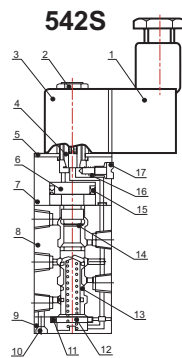
## Specifications

1. **Media:** Air (No other gases or liquids)
2. **Operation:** Solenoid (Direct Acting)
3. **Function:** 5 port, 4 way
4. **Operation Temp. Range:** 41 - 140°F (5 - 60°C)
5. **Maximum Pressure:** 135 psi (9.3 bar)
6. **Working Pressure:** 21 - 114 psi (1.5 - 8.0 bar)
7. **Orifice:** 14 mm<sup>2</sup> - 30 mm<sup>2</sup>
8. **Flows:**
9. **Lubrication:** None Required
10. **Maximum Cycle Rate:** 5 cycles/ second
11. **Insulation:** Class F
12. **Power Consumption:** AC: 4.5 VA DC: 3.0 W

## Flow Data



## Parts Breakdown



No.	Name	No.	Name
1	Connector	10	Fixed Screw
2	Nut	11	Bottom Cover Gasket
3	Coil	12	Spool Spring
4	Armature Assembly	13	Spool O-Ring
5	Fixed Plate	14	Spool
6	Piston	15	Piston O-Ring
7	Pilot Kit	16	Override Spring
8	Body	17	Manual Override
9	Bottom Cover		

## Symbols



5 port, 4 way, 2 position  
(spring return,  
single solenoid)



5 port, 4 way, 2 position  
(detented,  
double solenoid)

## Ordering Information

### SVN - 404 - 542S - 110A - SR

Code	Description
SVN	Solenoid Valve Namur

Model	Port Size
404	1/4"

Code	Standard Configurations
542S	5 port, 4 way, 2 pos., spring return
542D	5 port, 4 way, 2 pos., detented (double solenoid)

Coil Voltage
omit (none)
12D (DC)
24A (AC)
24D (DC)
48A (AC)
110A (AC)
220A (AC)

Code	Electrical Connector
omit	none
SR	Strain Relief (standard)
CD	1/2" Conduit
LW	Lead Wire 36"
CDL	1/2" Conduit-Lighted
LWL	Lead Wire 36"-Lighted







INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS



## D2 SERIES

### Stainless Steel Ball Valves- ISO5211 2 Piece



D2BV-16-FP-V2

D2BV-8-FP-V2



D2BV-24-FP



### Specifications

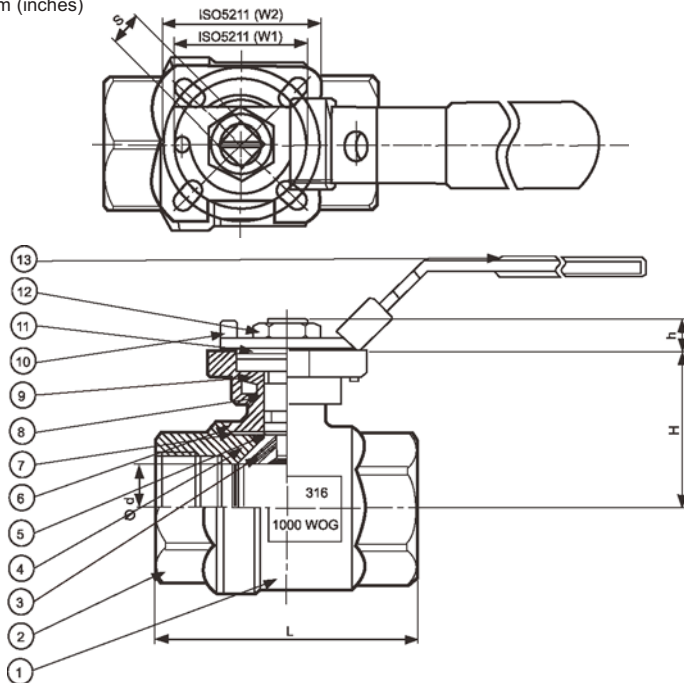
- 1/2" thru 2" Female NPT
- 2 Piece, Full Ported Design
- ISO5211 Direct Mounting Pad
- 1000 psi Maximum
- Anti-Blowout Stem - Weep Hole
- Adjustable Vee Style Stem Packing
- Oil, Water, Air and General Chemical Service
- Temperature Rating: -20 to 350°F, (-25 to 175°C)



D2BV-24-FP

### Dimensional Data

Units: mm (inches)



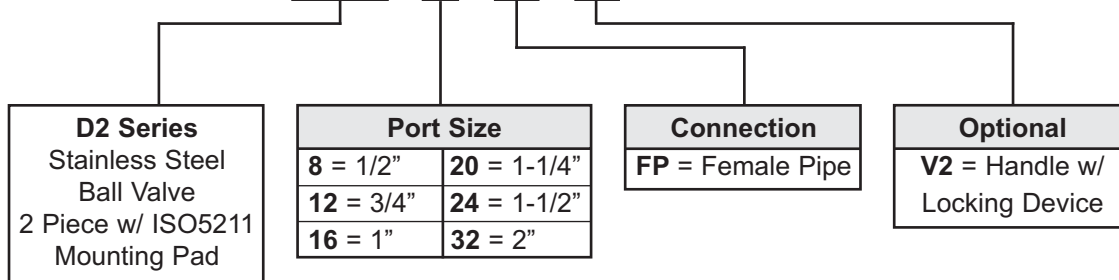
### Materials

1. Body- ASTM A351 GR. CF8M
2. Cap- ASTM A351 GR. CF8M
3. Ball- ASTM A351 GR. CF8M
4. Stem- ASTM A276 GR. 316
5. Seat- PTFE
6. Gasket- PTFE
7. Thrust Washer- PTFE
8. Packing- PTFE
9. Gland- 304SS
10. Handle- 304SS
11. Spring Washer- 304SS
12. Handle Nut- 304SS
13. Handle Sleeve- Vinyl

SIZE	Model	∅ d	L	H	h	S	W1	W2	ISO5211	Wt kg (lb)
1/2"	D2-BV-8FP-V2	15.0(0.59)	60 (2.36)	38 (1.50)	7 (0.28)	9 (0.35)	36 (1.42)	42 (1.65)	F03/ F04	
3/4"	D2-BV-12FP-V2	20.0(0.79)	70 (2.75)	42.4(1.67)	9 (0.35)	9 (0.35)	36 (1.42)	42 (1.65)	F03/ F04	
1"	D2-BV-16FP-V2	25.0(0.98)	82 (3.23)	48.5(1.91)	12 (0.47)	11 (0.43)	42 (1.65)	50 (1.97)	F04/ F05	
1-1/4"	D2-BV-20FP-V2	32.0(1.26)	96 (3.78)	54 (2.13)	12 (0.47)	11 (0.43)	42 (1.65)	50 (1.97)	F04/ F05	
1-1/2"	D2-BV-24FP-V2	38.0(1.50)	112 (4.41)	66 (2.60)	16 (0.63)	14 (0.55)	50 (1.97)	70 (2.75)	F05/ F07	
2"	D2-BV-32FP-V2	50.0(1.97)	126 (4.96)	74 (2.91)	16 (0.63)	14 (0.55)	50 (1.97)	70 (2.75)	F05/ F07	

### Ordering Information

#### D2BV - 16 - FP - V2





INDUSTRIAL FLUID POWER COMPONENTS  
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## D3 SERIES

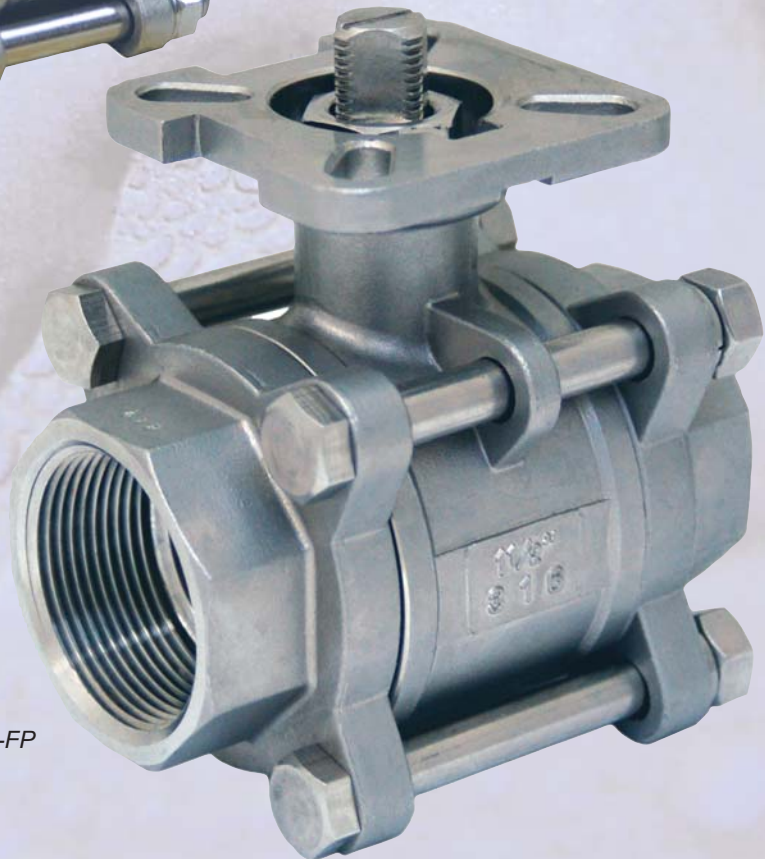
### Stainless Steel Ball Valves- ISO5211 3 Piece



D3BV-12-FP-V2



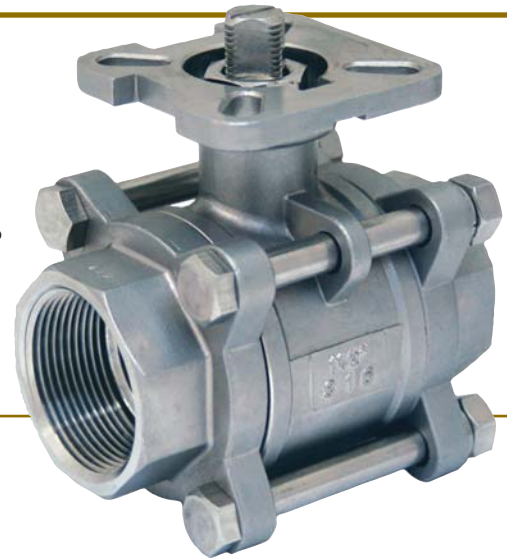
D3BV-8-FP-V2



D3BV-24-FP

### Specifications

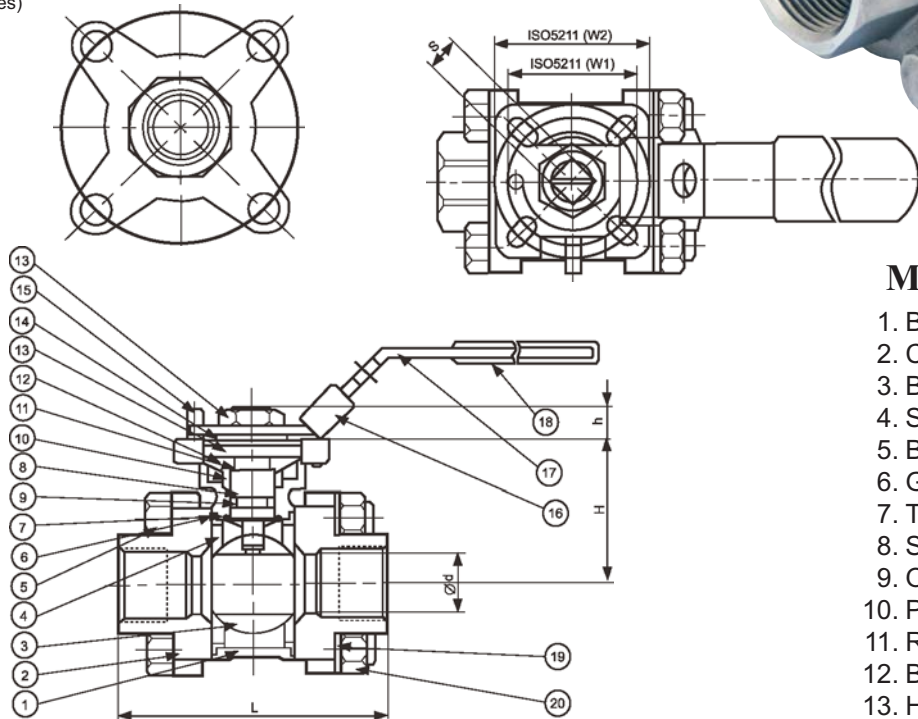
- 1/2" thru 2" Female NPT
- 3 Piece, Full Ported Design
- ISO5211 Direct Mounting Pad
- 1000 psi Maximum
- Adjustable Vee Style Stem Packing
- Oil, Water, Air and General Chemical Service
- Temperature Rating: -20 to 350°F, (-25 to 175°C)



D3BV-24-FP

### Dimensional Data

Units: mm (inches)



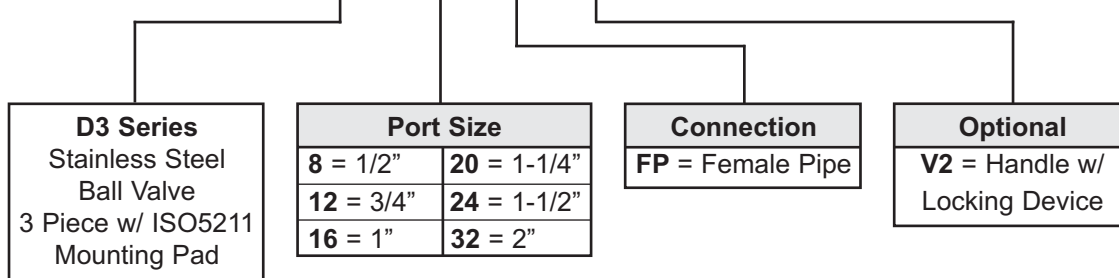
### Materials

1. Body- ASTM A351 GR. CF8M
2. Cap- ASTM A351 GR. CF8M
3. Ball- ASTM A351 GR. CF8M
4. Seat- PTFE
5. Bolts- ASTM A93 GR. BBM
6. Gasket- PTFE
7. Thrust Washer- PTFE
8. Stem- ASTM A276 GR. 316
9. O-Ring- Viton
10. Packing- PTFE
11. Ring- 304SS
12. Belleville Washer- 410SS
13. Handle Nut- 304SS
14. Stem Washer- 304SS
15. Set Screw- 304SS
16. Locking Plate- 304SS
17. Handle- 304SS
18. Handle Sleeve- Vinyl
19. Bolt Washer- 304SS
20. Bolt Nuts- ASTM A 194 GR. 8M

SIZE	Model	∅ d	L	H	h	S	W1	W2	ISO5211	Wt kg (lb)
1/2"	D3-BV-8FP-V2	15.0(0.59)	65.5(2.58)	38 (1.50)	7 (0.28)	9 (0.35)	36 (1.42)	42 (1.65)	F03/ F04	
3/4"	D3-BV-12FP-V2	20.0(0.79)	77.6(3.06)	42.4(1.67)	9 (0.35)	9 (0.35)	36 (1.42)	42 (1.65)	F03/ F04	
1"	D3-BV-16FP-V2	25.0(0.98)	83.5(3.29)	48.5(1.91)	12 (0.47)	11 (0.43)	42 (1.65)	50 (1.97)	F04/ F05	
1-1/4"	D3-BV-20FP-V2	32.0(1.26)	102.5(4.04)	54 (2.13)	12 (0.47)	11 (0.43)	42 (1.65)	50 (1.97)	F04/ F05	
1-1/2"	D3-BV-24FP-V2	40.0(1.58)	117.6(4.63)	66 (2.60)	16 (0.63)	14 (0.55)	50 (1.97)	70 (2.75)	F05/ F07	
2"	D3-BV-32FP-V2	50.0(1.97)	130.2(5.13)	74 (2.91)	16 (0.63)	14 (0.55)	50 (1.97)	70 (2.75)	F05/ F07	

### Ordering Information

#### D3BV - 16 - FP - V2





INDUSTRIAL FLUID POWER COMPONENTS  
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**D SERIES**

## Stainless Steel Ball Valves



DBV-4-FP-V2



DBV-12-FP-V2



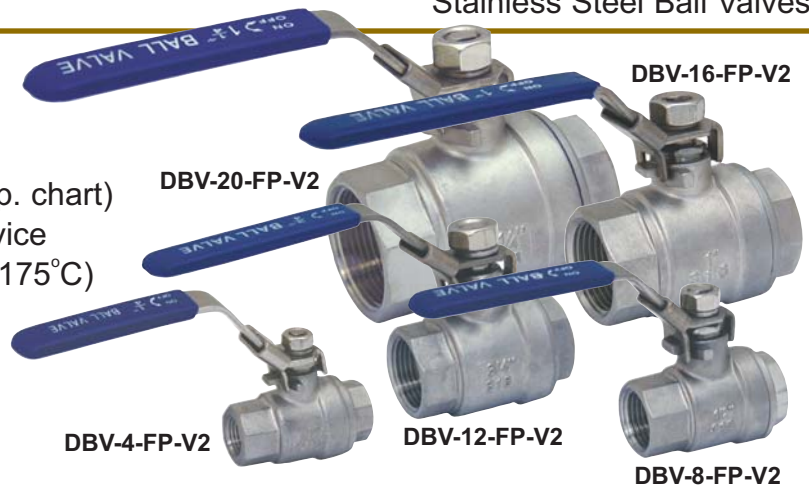
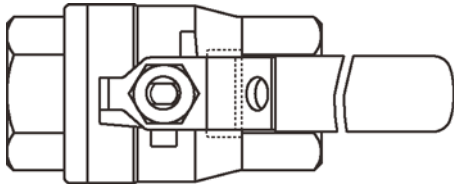
DBV-20-FP-V2



# D Series Stainless Steel Ball Valves

## Specifications

- 1/4" thru 2" Female NPT
- 2 Piece, Full Ported Design
- 1000 psi Maximum (see pressure vs. temp. chart)
- Oil, Water, Air and General Chemical Service
- Temperature Rating: -20 to 350°F, (-25 to 175°C)

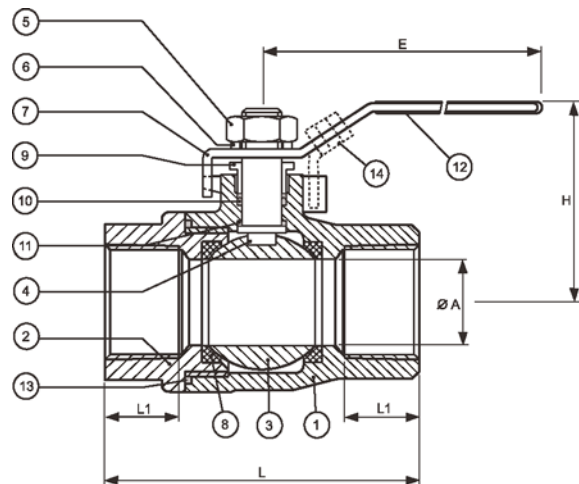


## Materials

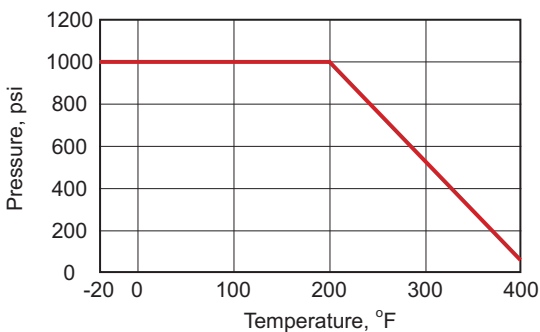
1. Body- ASTM A351 GR. CF8M
2. End Cap- ASTM A351 GR. CF8M
3. Ball- 316SS
4. Stem- 316SS
5. Stem Nut- 304SS
6. Stem Washer- 304SS
7. Handle- 304SS
8. Seat- PTFE
9. Gland Nut- 304SS
10. Stem Packing- PTFE
11. Thrust Washer- PTFE
12. Handle Sleeve- Vinyl
13. Joint Gasket- PTFE
14. Locking Device (option "V2")- 304SS

## Dimensional Data

Units: mm (inches)

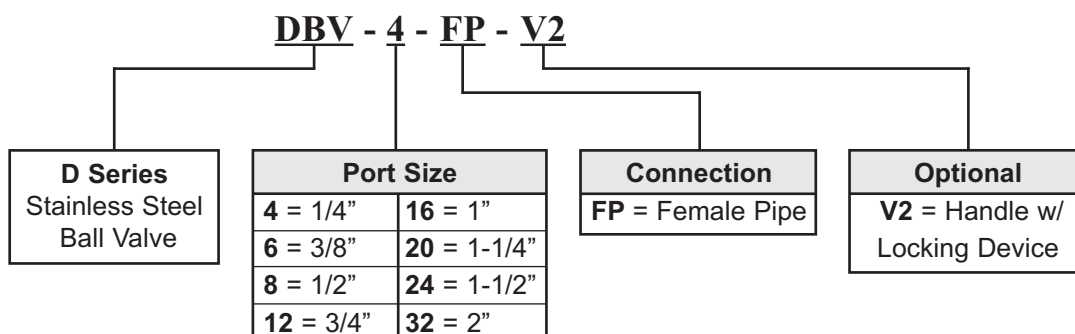


## Pressure/ Temperature Curve



SIZE	Model	Ø A	E	H	L1	L	Wt kg (lb)
1/4"	D-BV-4FP-V2	11.2(0.44)	96(3.78)	50(1.96)	12(0.47)	49(1.93)	0.23(0.50)
3/8"	D-BV-6FP-V2	12.6(0.49)	98(3.86)	50(1.96)	13(0.51)	55(2.17)	0.23(0.50)
1/2"	D-BV-8FP-V2	15.0(0.59)	98(3.86)	55(2.17)	14(0.55)	52(2.05)	0.36(0.79)
3/4"	D-BV-12FP-V2	20.0(0.78)	114(4.49)	64(2.52)	16(0.63)	60(2.36)	0.47(1.03)
1"	D-BV-16FP-V2	25.0(0.98)	125(4.92)	67(2.64)	18(0.71)	72(2.83)	0.82(1.81)
1-1/4"	D-BV-20FP-V2	32.0(1.26)	138(5.43)	84(3.31)	20(0.79)	87(3.43)	1.17(2.58)
1-1/2"	D-BV-24FP-V2	38.0(1.49)	190(7.48)	86(3.38)	22(0.86)	110(4.33)	1.82(4.01)
2"	D-BV-32FP-V2	50.0(1.96)	190(7.48)	95(3.74)	25(0.98)	126(4.96)	2.83(6.24)

## Ordering Information



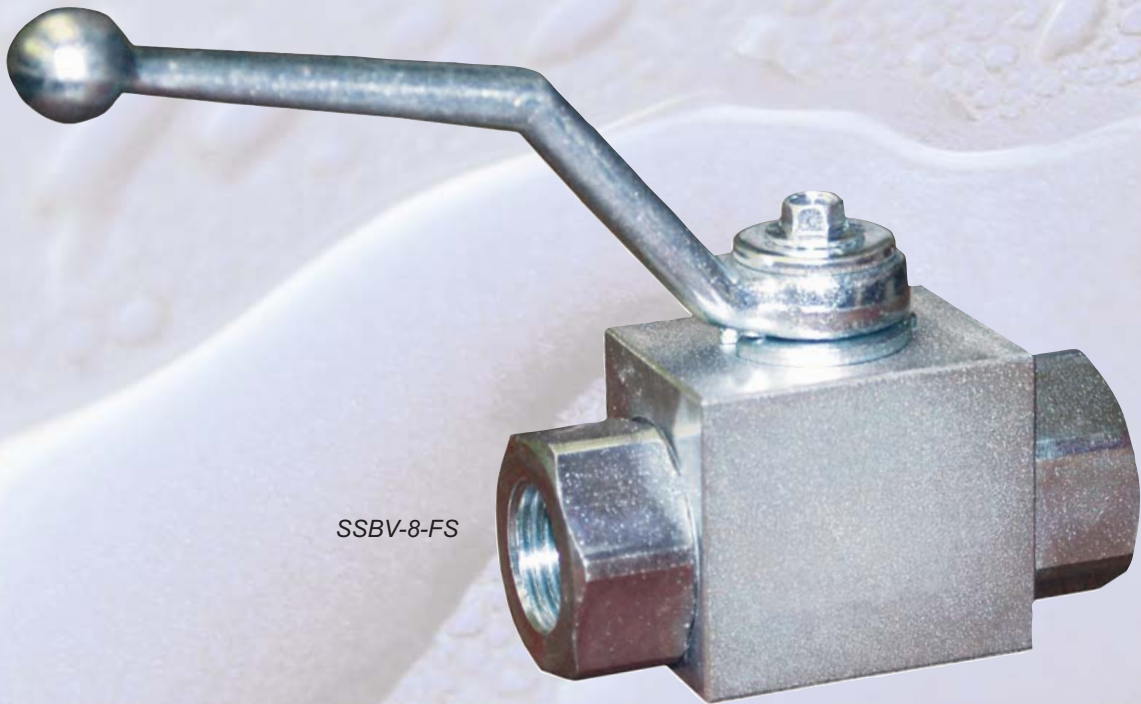


INDUSTRIAL FLUID POWER COMPONENTS  
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**SS SERIES**

## Stainless Steel Ball Valves- High Pressure



SSBV-8-FS

### Specifications

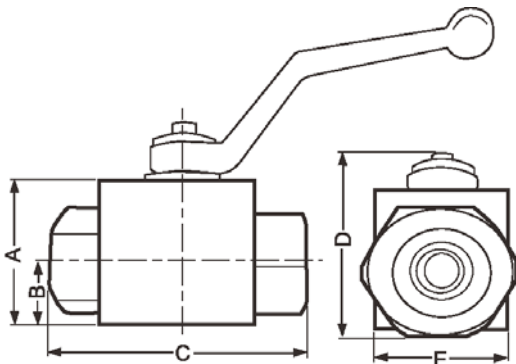
- 1/4" thru 2" Female NPT or SAE
- 3 Piece, Full and Reduced Port Design  
Block Style Bodies are Full Port Up To 1"  
Block Style Bodies Exceeding 1" are Reduced Down to a 1" Port  
Round Body Valves are Full Port
- 7250 psi Maximum
- 316 Stainless Steel
- Temperature Rating: -30 to 212°F, (-35 to 100°C)
- Intended for Medium to High Pressure Hydraulic & Water Applications



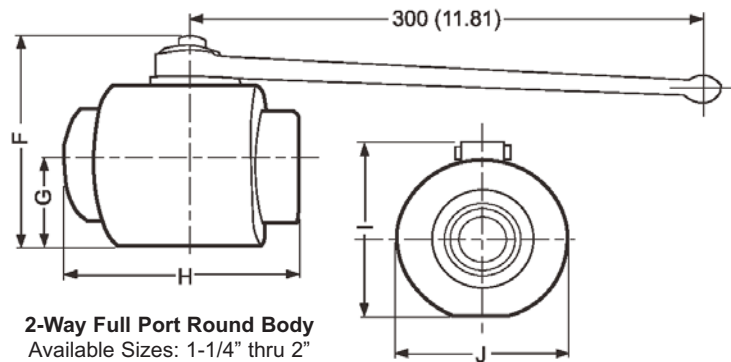
SSBV-8-FS

### Dimensional Data

Units: mm (inches)



**2-Way Block Style - Full & Reduced Port**  
Available Sizes: 1/4" thru 1-1/2"

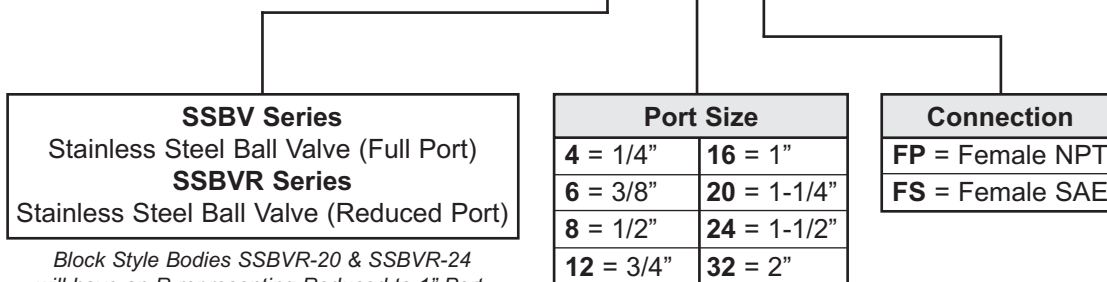


**2-Way Full Port Round Body**  
Available Sizes: 1-1/4" thru 2"

SIZE	A	B	C	D	E	F	G	H	I	J	Max Press
1/4"	35 (1.38)	14 (.55)	71 (2.80)	49 (1.93)	30 (1.18)	—	—	—	—	—	7250 psi
3/8"	40 (1.57)	17 (.67)	73 (2.87)	54 (2.13)	35 (1.38)	—	—	—	—	—	7250 psi
1/2"	43 (1.69)	18 (.71)	83 (3.27)	57 (2.24)	37 (1.46)	—	—	—	—	—	7250 psi
3/4"	55 (2.17)	23 (.91)	95 (3.74)	73 (2.87)	45 (1.77)	—	—	—	—	—	5800 psi
1"	65 (2.56)	29 (1.14)	113 (4.45)	83 (3.27)	55 (2.17)	—	—	—	—	—	5075 psi
1-1/4"	65 (2.56)	29 (1.14)	121 (4.76)	83 (3.27)	55 (2.17)	83 (3.25)	42 (1.65)	115 (4.53)	101 (3.98)	88 (3.46)	5075 psi
1-1/2"	65 (2.56)	29 (1.14)	124 (4.88)	83 (3.27)	55 (2.17)	98 (3.86)	48 (1.89)	131 (5.16)	115 (4.53)	102 (4.03)	5075 psi
2"	—	—	—	—	—	103 (4.06)	52 (2.03)	140 (5.51)	120 (4.72)	109 (4.29)	5075 psi

### Ordering Information

#### SSBV - 4 - FP





INDUSTRIAL FLUID POWER COMPONENTS  
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**S SERIES**

## Steel Ball Valves- High Pressure



SBV-16-FS

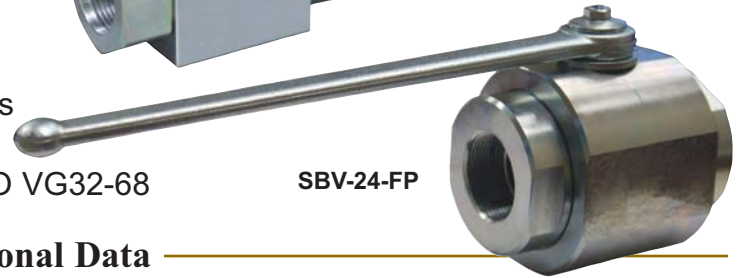
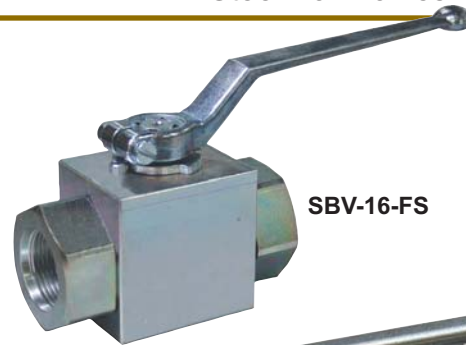


SBV-24-FP



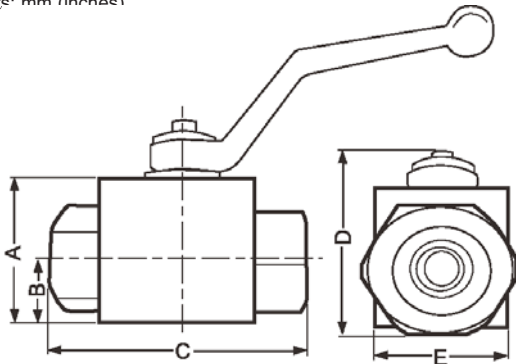
## Specifications

- 1/4" thru 2" Female NPT or SAE
- 3 Piece, Full and Reduced Port Design, Block Style Bodies are Full Port Up To 1", Block Style Bodies Exceeding 1" are Reduced Down to a 1" Port, Round Body Valves are Full Port
- 7250 psi Maximum
- Standard POM Ball Seats with Buna Stem Seals
- Temperature Rating: 14 to 212°F, (-10 to 100°C)
- Recommended for Petroleum Based Fluids- ISO VG32-68

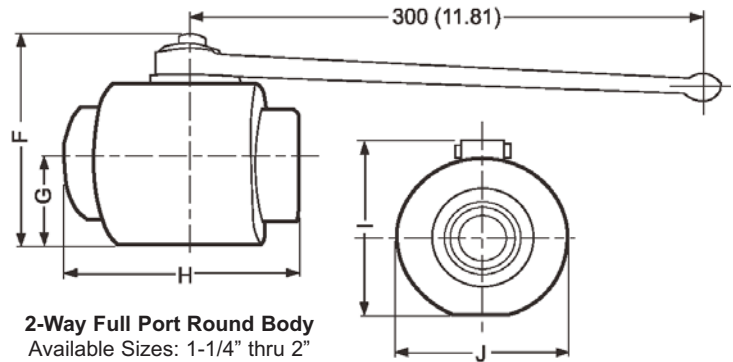


## Dimensional Data

Units: mm (inches)



**2-Way Block Style - Full & Reduced Port**  
Available Sizes: 1/4" thru 1-1/2"

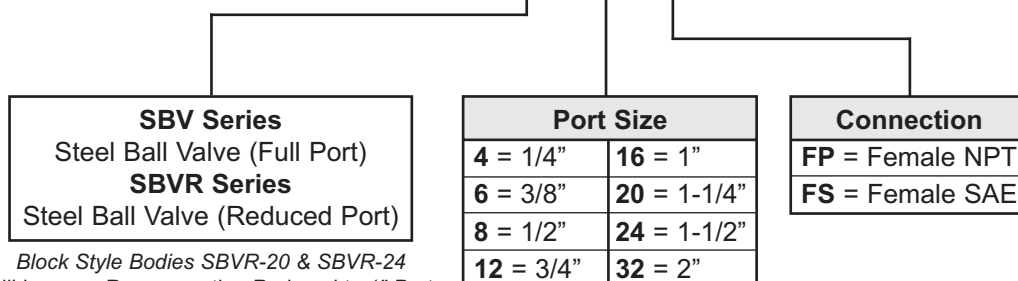


**2-Way Full Port Round Body**  
Available Sizes: 1-1/4" thru 2"

SIZE	A	B	C	D	E	F	G	H	I	J	Max Press
1/4"	35 (1.38)	14 (.55)	71 (2.80)	49 (1.93)	30 (1.18)	—	—	—	—	—	7250 psi
3/8"	40 (1.57)	17 (.67)	73 (2.87)	54 (2.13)	35 (1.38)	—	—	—	—	—	7250 psi
1/2"	43 (1.69)	18 (.71)	83 (3.27)	57 (2.24)	37 (1.46)	—	—	—	—	—	7250 psi
3/4"	55 (2.17)	23 (.91)	95 (3.74)	73 (2.87)	45 (1.77)	—	—	—	—	—	5800 psi
1"	65 (2.56)	29 (1.14)	113 (4.45)	83 (3.27)	55 (2.17)	—	—	—	—	—	5075 psi
1-1/4"	65 (2.56)	29 (1.14)	121 (4.76)	83 (3.27)	55 (2.17)	83 (3.25)	42 (1.65)	115 (4.53)	101 (3.98)	88 (3.46)	5075 psi
1-1/2"	65 (2.56)	29 (1.14)	124 (4.88)	83 (3.27)	55 (2.17)	98 (3.86)	48 (1.89)	131 (5.16)	115 (4.53)	102 (4.03)	5075 psi
2"	—	—	—	—	—	103 (4.06)	52 (2.03)	140 (5.51)	120 (4.72)	109 (4.29)	5075 psi

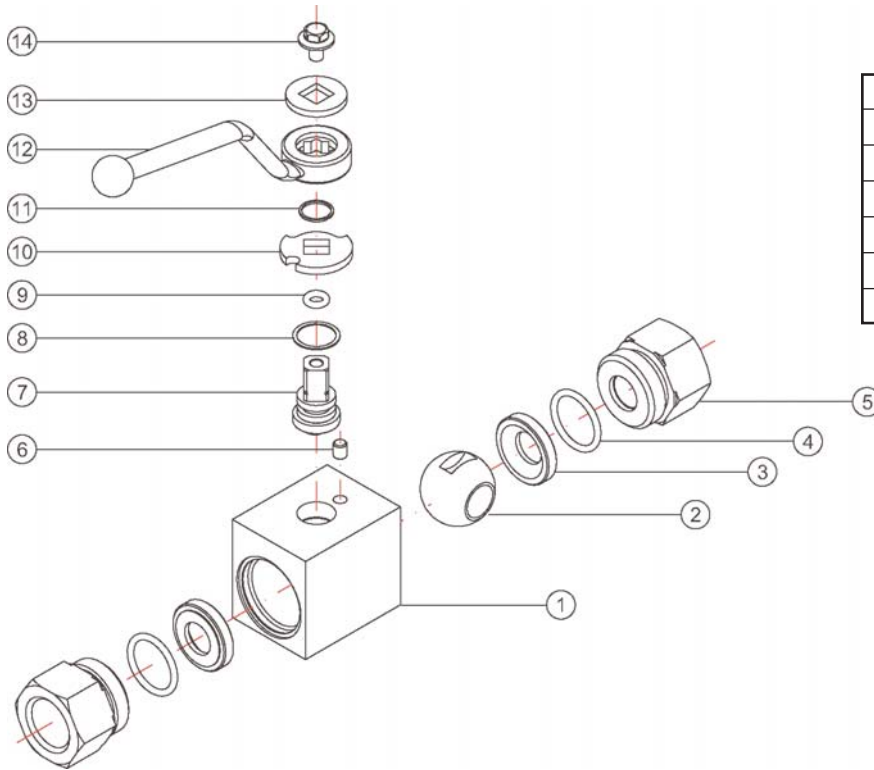
## Ordering Information

### SBV - 4 - FP



Block Style Bodies SBVR-20 & SBVR-24 will have an R representing Reduced to 1" Port. Round Style Bodies are Full Port.

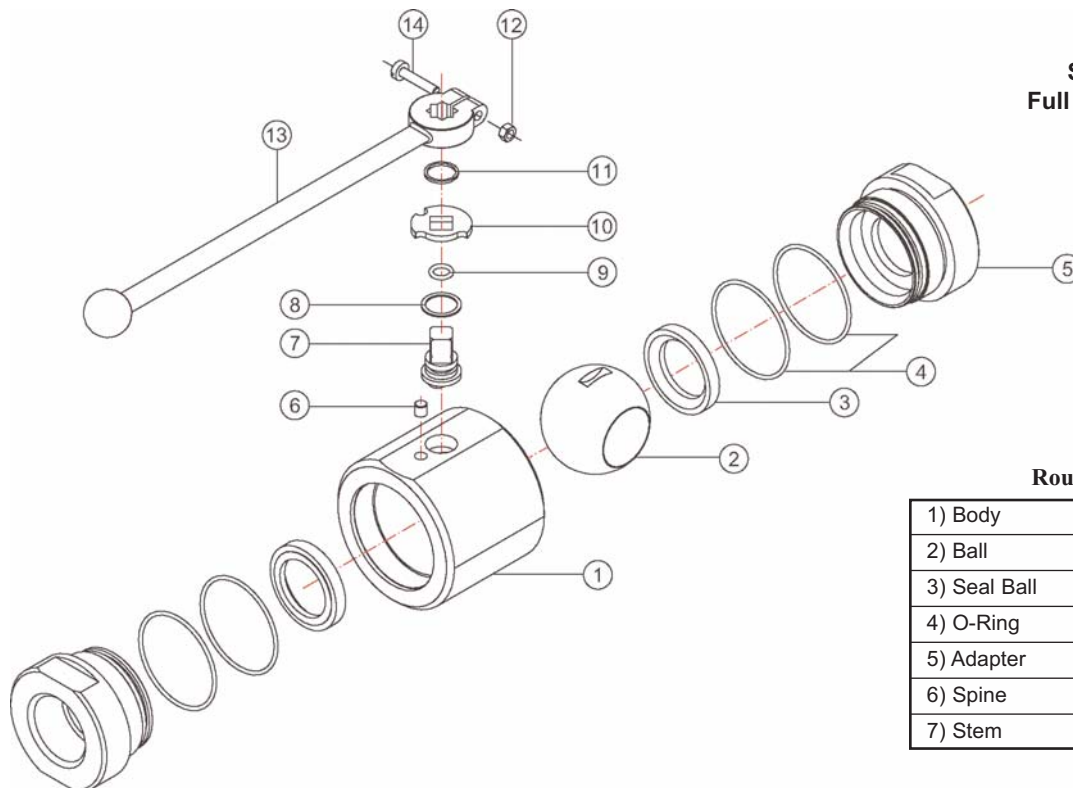
**Parts Breakdown**



**Block Style 1/4" thru 1-1/2"**

1) Body	8) Seal-stem
2) Ball	9) O-Ring
3) Seal Ball	10) Washer
4) O-Ring	11) Seeger
5) Adapter	12) Handle
6) Spine	13) Washer
7) Stem	14) Screw

**Steel Ball Valves  
Full & Reduced Port (Block Style)  
1/4" thru 1-1/2"**



**Steel Ball Valves  
Full Flow (Round Body)  
1-1/4" thru 2"**

**Round Body 1-1/4" thru 2"**

1) Body	8) Seal-stem
2) Ball	9) O-Ring
3) Seal Ball	10) Washer
4) O-Ring	11) Seeger
5) Adapter	12) Screw
6) Spine	13) Handle
7) Stem	14) Nut

# HYDRAULIC POWER UNITS

## STACK TANK



ST Series

### Features

- Flooded Suction:** Longer pump life; pump always stays primed. No pump rusting during shut-down periods. Air bleed valves are not required.
- Easy Reservoir Draining:** Pump not required for draining. Drain ball valve provided.
- Self Flushing:** System flushes any material in suction line when a pump is replaced.
- Color Code Identification:** Allows for easy identification of items.
- In-Tank Filter System:** Provides easy element replacement without line drainage.
- Convenient Suction Strainer Maintenance:** Clean out access cover allows replacement of suction strainer without draining reservoir.
- Removable Top Plate:** Removable top allows for easy reservoir cleaning. No leaky end bells that make access for cleaning difficult.
- Conserves Space:** While still allowing general maintenance, the stack tank design saves floor space.

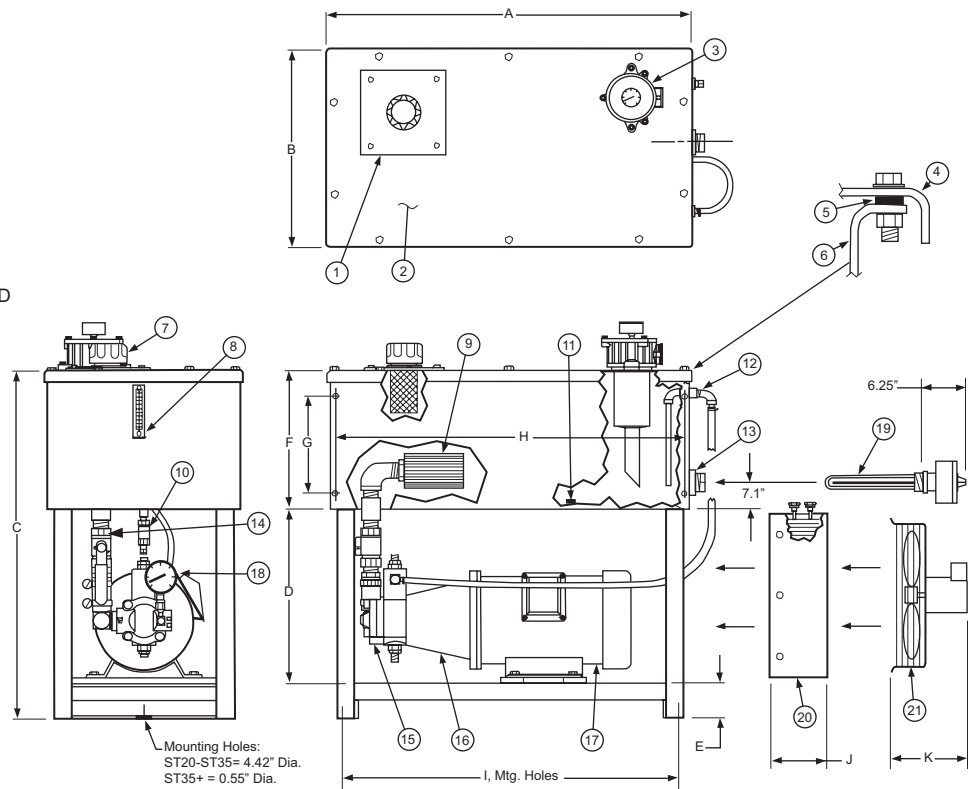


ST35 Stack Tank

### Dimensional Data

#### ITEM IDENTIFICATION:

- CLEAN-OUT COVER (YELLOW)
- VALVE MOUNTING AREA
- RETURN FILTER (YELLOW)
- TANK LID
- RUBBERIZED GASKET
- TANK BODY
- FILLER/ BREATHER #FB-12S  
(EXTRA BREATHER SUPPLIED 50 GAL+)
- SITE & TEMPERATURE GAUGE #SLG5
- SUCTION STRAINER
- 1/2" NPT DRAIN BALL VALVES- PLUGGED
- MAGNETS (1 PER 5 GALLONS)
- (3) RETURN COUPLINGS STANDARD
- 2" NPT HEATER COUPLING (OPTIONAL)
- SUCTION BALL VALVE
- PUMP
- PUMP MOTOR ADAPTER (ORANGE)
- ELECTRIC MOTOR
- PRESSURE GAUGE WITH SNUBBER
- HEATER (OPTIONAL)
- HEAT EXCHANGER (OPTIONAL)
- COOLING FAN (OPTIONAL)
- DRIP PAN (OPTIONAL)
- PAINT (OPTIONAL)  
COLOR CODES:  
BLUE- UNIT COLOR PAINT  
ORANGE- DANGER  
YELLOW- MAINTENANCE  
GRAY- ELECTRICAL



Model Number	Reservoir Capacity	Dimensions (Inches)											Std. Return Filter (10 $\mu$ )	4" Lip Drip Pan	Maximum Horsepower
		A	B	C	D	E	F	G	H	I	J	K			
ST20	20 Gallon	32.0	17.5	37.3	19.5	5.5	12.0	8	30.6	28.4	4.25	5.9	ITF200-12FS-10MNPE	30.9" x 48"	10
ST35	35 Gallon	36.5	22.5	41.0	21.5	6.0	13.5	8	35.3	32.5	4.25	6.0	ITF250-12FS-10MNPE	30.9" x 48"	15
ST70	70 Gallon	46.5	26.3	52.5	29.0	7.25	16.5	8	45.3	42.5	4.25	6.0	ITF425-24FS-10MNPE	38.8" x 52"	50
ST100	100 Gallon	46.5	26.3	58.3	29.0	7.25	22.0	8	45.3	42.5	9.0	6.0	ITF450-24FS-20-10	38.8" x 52"	100
ST150	150 Gallon	46.5	26.3	69.3	29.0	7.25	34.0	8	45.3	42.5	9.0	6.0	ITF450-24FS-30-10	38.8" x 52"	100



# HYDRAULIC POWER UNITS

## STACK TANK



ST Series

### ST20-5HP-PCV10

#### Stack Tank:

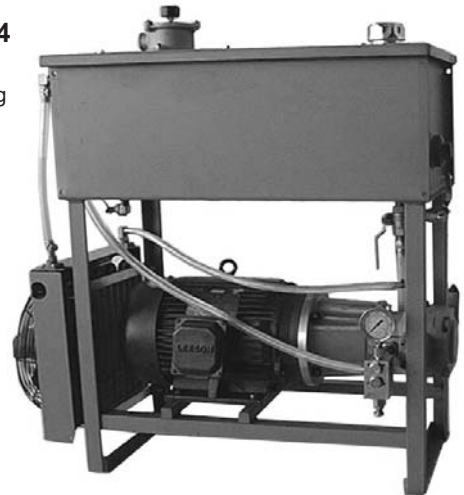
Heat exchanger cooling case drain line, D03 and D05 valves mounted on rail



### ST35-10HP-PCV14

#### Stack Tank:

Heat exchanger cooling case drain line, DR30 safety relief with gauge



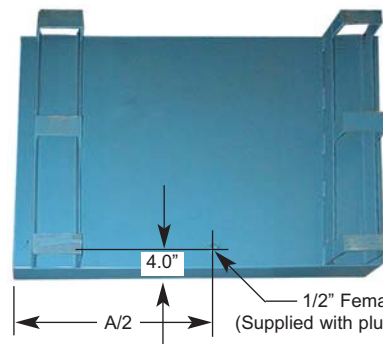
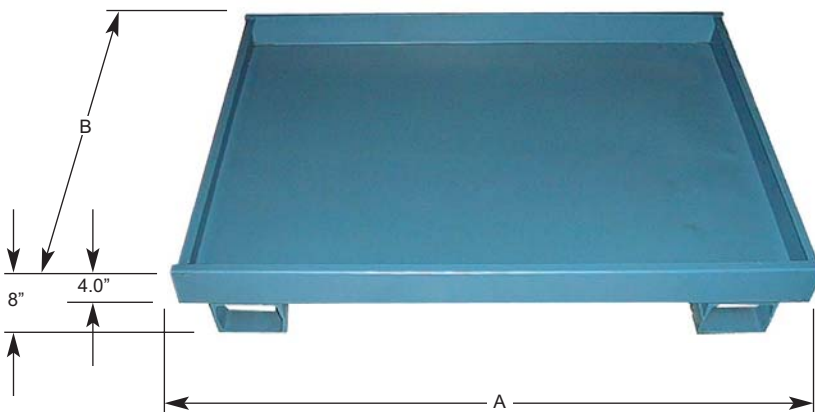
### ST100-75HP-PCP39

#### Stack Tank:

Heat exchanger cooling return line, P0R20 safety relief w/ gauge, 2.5 gallon accumulator, Motor starter package



## Drip Pans



Bottom View

Fork Lift Pockets:  
5.5" Wide x  
3.75" Tall

Model Number	Reservoir Capacity	A	B
DP35	35± Gallon	48"	30.9"
DP70	70+ Gallon	52"	38.8"



# HYDRAULIC POWER UNITS

## STACK TANK - RIGHT ANGLE



STR Series

### Features

- Flooded Suction:** Longer pump life; pump always stays primed. No pump rusting during shut-down periods. Air bleed valves are not required.
- Easy Reservoir Draining:** Pump not required for draining. Drain ball valve provided each end.
- Self Flushing:** System flushes any material in suction line when a pump is replaced.
- Color Code Identification:** Allows for easy identification of items.
- In-Tank Filter System:** Provides easy element replacement without line drainage.
- Convenient Suction Strainer Maintenance:** Clean out access cover allows replacement of suction strainer without draining reservoir.
- Removable Top Plate:** Removable top allows for easy reservoir cleaning. No leaky end bells that make access for cleaning difficult.
- Conserves Space:** While still allowing general maintenance, the stack tank design saves floor space. Multiple pump/ motor assemblies may be mounted under the same reservoir.
- Extended Pump/ Motor Mounting Bars:** Easy pump or motor replacement- pump may be lowered onto bars: electric motor lifting eye accessible.

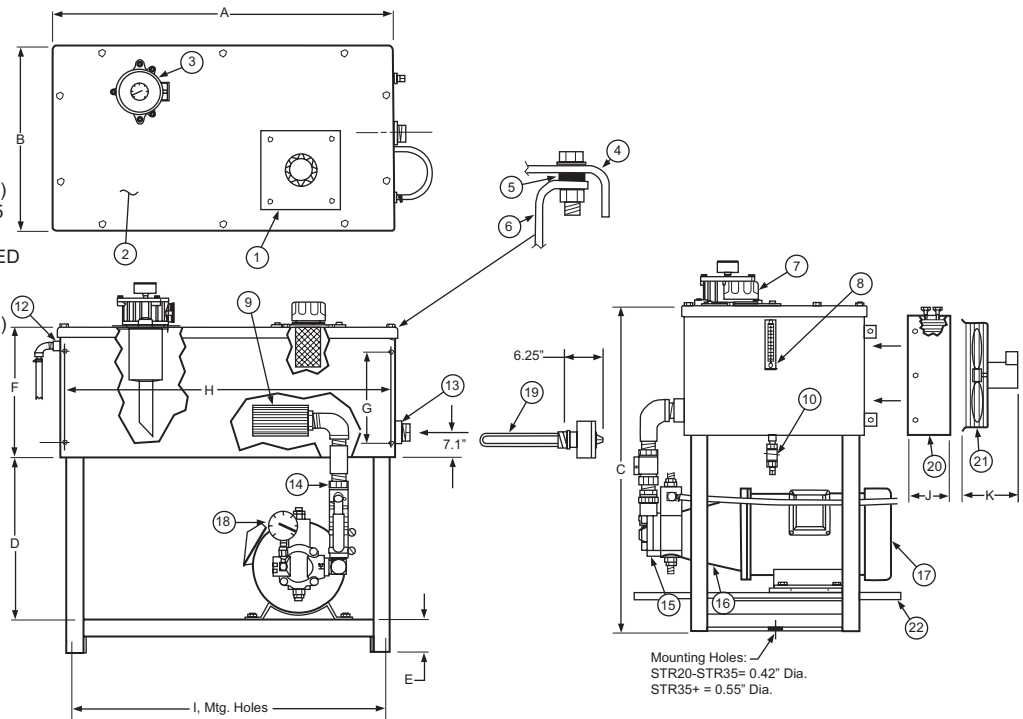


STR100 Stack Tank

### Dimensional Data

- ITEM IDENTIFICATION:**
- CLEAN-OUT COVER (YELLOW)
  - VALVE MOUNTING AREA
  - RETURN FILTER (YELLOW)
  - TANK LID
  - RUBBERIZED GASKET
  - TANK BODY
  - FILLER/ BREATHER #FB-12S (EXTRA BREATHER SUPPLIED 50 GAL+)
  - SIGHT & TEMPERATURE GAUGE #SLG5
  - SUCTION STRAINER
  - 1/2" NPT DRAIN BALL VALVES- PLUGGED
  - MAGNETS (NOT SHOWN)
  - (3) RETURN COUPLINGS STANDARD
  - 2" NPT HEATER COUPLING (OPTIONAL)
  - SUCTION BALL VALVE
  - PUMP
  - PUMP MOTOR ADAPTER (ORANGE)
  - ELECTRIC MOTOR
  - PRESSURE GAUGE WITH SNUBBER
  - HEATER (OPTIONAL)
  - HEAT EXCHANGER (OPTIONAL)
  - COOLING FAN (OPTIONAL)
  - MOTOR MOUNTING BARS
  - PAINT (OPTIONAL)

**COLOR CODES:**  
 BLUE- UNIT COLOR PAINT  
 ORANGE- DANGER  
 YELLOW- MAINTENANCE  
 GRAY- ELECTRICAL



Model Number	Reservoir Capacity	Dimensions (Inches)											Std. Return Filter (10 $\mu$ )	4" Lip Drip Pan	Maximum Horsepower
		A	B	C	D	E	F	G	H	I	J	K			
STR20	20 Gallon	32.0	17.5	37.3	19.5	5.5	12.0	8	30.6	28.4	4.25	5.9	ITF200-12FS-10MNPE	30.9" x 48"	10
STR35	35 Gallon	36.5	22.5	41.0	21.5	6.0	13.5	8	35.3	32.5	4.25	6.0	ITF250-12FS-10MNPE	30.9" x 48"	15
STR70	70 Gallon	46.5	26.3	52.5	29.0	7.25	16.5	8	45.3	42.5	4.25	6.0	ITF425-24FS-10MNPE	38.8" x 52"	50
STR100	100 Gallon	46.5	26.3	58.3	29.0	7.25	22.0	8	45.3	42.5	9.0	6.0	ITF450-24FS-20-10	38.8" x 52"	100
STR150	150 Gallon	46.5	26.3	69.3	29.0	7.25	34.0	8	45.3	42.5	9.0	6.0	ITF450-24FS-30-10	38.8" x 52"	100



# HYDRAULIC POWER UNITS

STACK TANK - RIGHT ANGLE

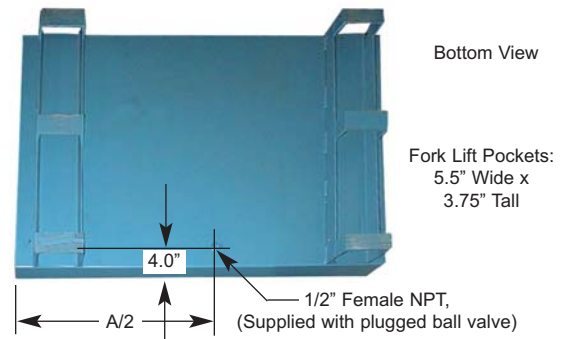
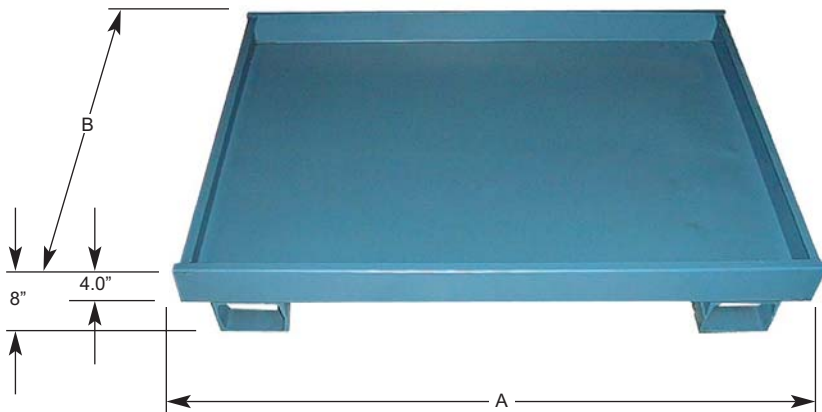


STR Series



**STR100-50HP-PCP77 Stack Tank:**  
D08 valve, Pump solenoid on/off, Drip pan

## Drip Pans



Model Number	Reservoir Capacity	A	B
DP35	35≤ Gallon	48"	30.9"
DP70	70+ Gallon	52"	38.8"



# HYDRAULIC POWER UNITS

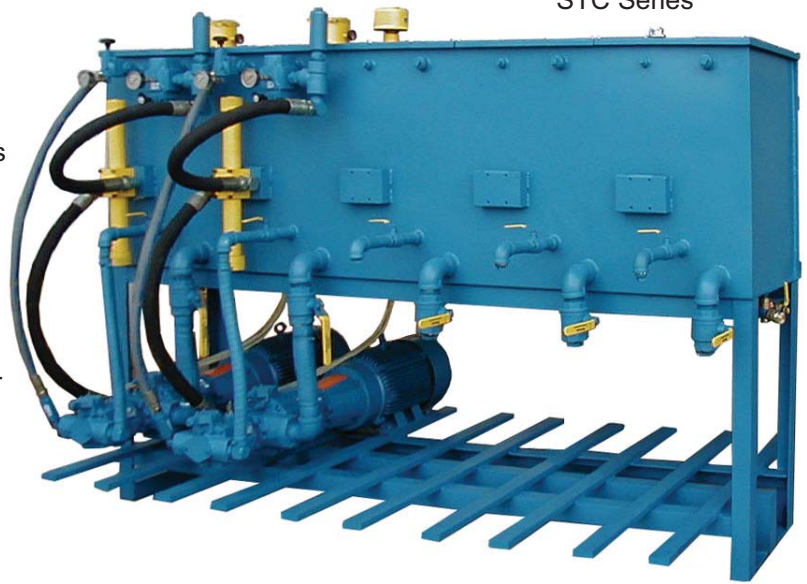
## STACK TANK - CENTRAL SYSTEMS



STC Series

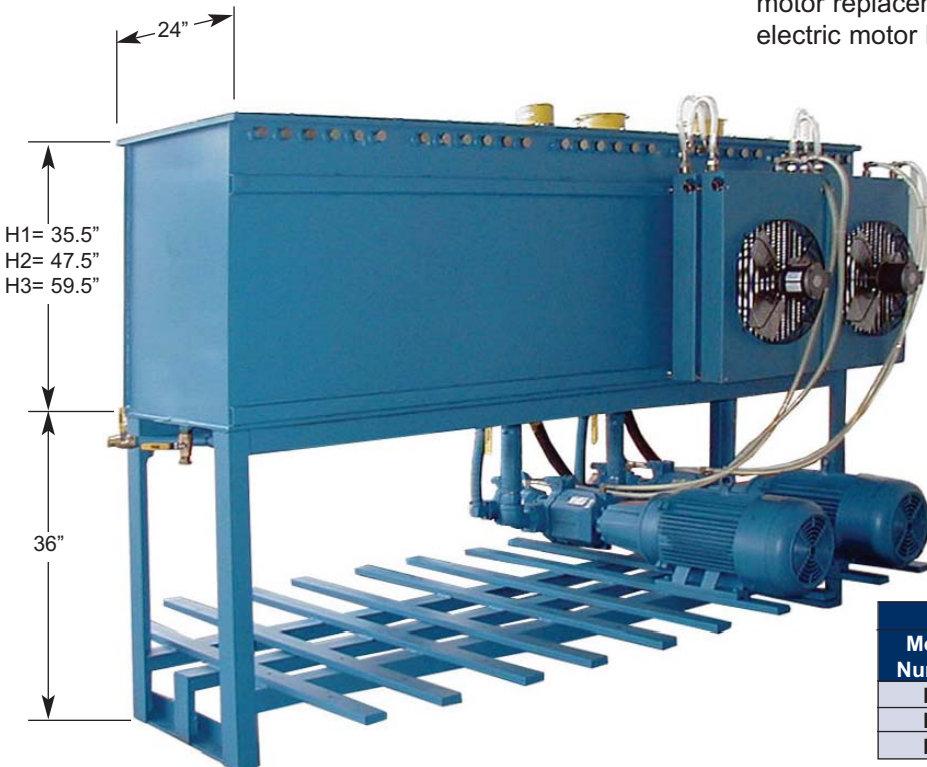
### Features

- Expandable Central Systems:** Additional pump and motor assemblies may be added for future expansion.
- Flooded Suction:** Longer pump life; pump always stays primed. No pump rusting during shut-down periods. Air bleed valves are not required.
- Easy Reservoir Draining:** Pump not required for draining. Drain ball valve provided each end.
- Self Flushing:** System flushes any material in suction line when a pump is replaced.
- Color Code Identification:** Allows for easy identification of items.
- In-Tank Filter System:** Provides easy element replacement without line drainage.
- Kidney Loops:** Filtration and/ or cooling loops may easily be added to standard tanks.
- Convenient Suction Strainer Maintenance:** Clean out access cover allows replacement of suction strainer without draining reservoir.
- Removable Sectional Top Plates:** Removable top plates allows for future expansions as well as easy reservoir cleaning without removing the entire lid. No leaky end bells.
- Large Mounting Area:** Heat exchangers, relief valves, pressure filters etc. may be mounted along the reservoir walls.



**STC-H1X10- Stack Tank (400 Gallons)**  
Shown with PCP77 and tandem mounted PCP28 piston pumps and PF20 pressure filters

- Conserves Space:** While still allowing easy maintenance, the stack tank design saves floor space. Multiple
  - pump/ motor assemblies may be mounted under the same reservoir.
- Extended Pump/ Motor Mounting Bars:** Easy pump or motor replacement- pump may be lowered onto bars: electric motor lifting eyes are accessible.



Unit equipped for future expansion.

Two stacked HE562 case drain heat exchangers (one per pump) utilizing the same fan.

Full length sight gauge tube (not shown) provided this series.  
Lexan tube is protected by steel frame.  
Shut off ball valves also provided

Model Number	Tank Size, Gallons				
	Tank Length				
	4'	6'	8'	10'	12'
H1	160	240	320	400	480
H2	220	330	440	550	660
H3	280	420	560	700	840





INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS

# SD03, 5, 7 & 8 SERIES

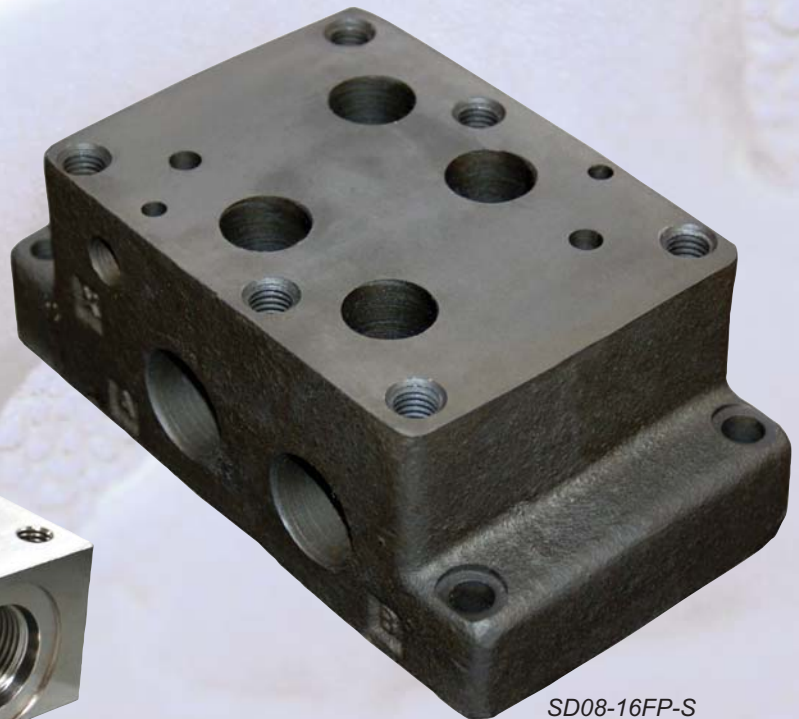
## Subplates



SD03-6FP-S



SD05-8FP-S



SD08-16FP-S



SD07-12FS-S

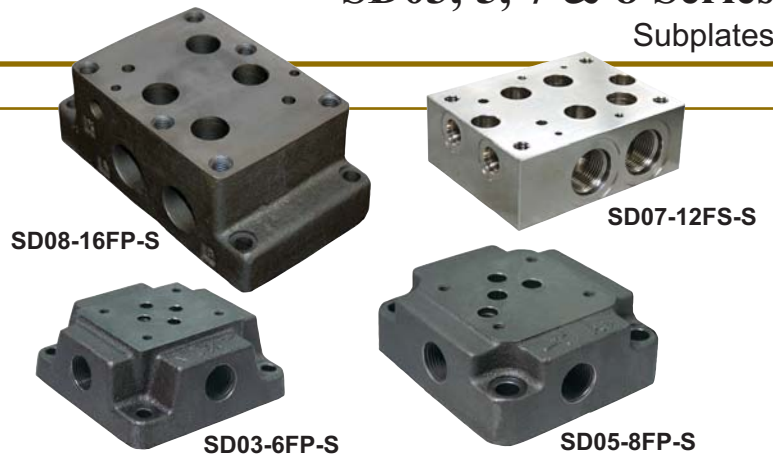




# SD03, 5, 7 & 8 Series Subplates

## Features

- Rugged Design:** Heavy duty subplates handle pressure shocks and severe applications.
- Easy Valve Replacement:** Subplate mounted valves allow for quick valve replacement without disrupting plumbing.
- New High Flow D05:** SD05H-16FS-S Subplates with two tank line connections to the D05 pattern.



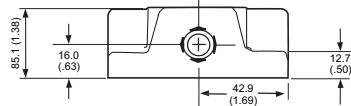
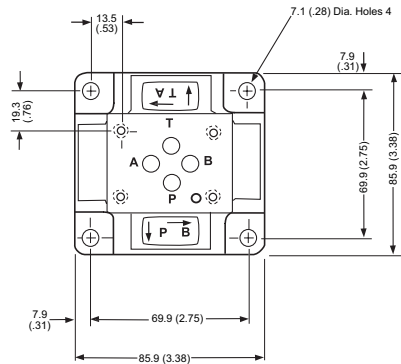
## Specifications

Size	D03	D05	D07	D08
<b>Mounting Surfaces: General Patterns</b>		<b>D05- Standard</b> 		
<b>Model Number</b>				
<b>Side Ports</b>	SAE Ports: SD03-6FS-S NPT Ports: SD03-6FP-S	SD05-8FS-S SD05-8FP-S	SD07-12FS-S N/A	SD08-16FS-S SD08-16FP-S
<b>Bottom Ports</b>	SAE Ports: N/A NPT Ports: SD03-6FP-B	N/A SD05-8FP-B	SD07-12FS-B N/A	N/A N/A
<b>Mounting Surface</b>	NFPA: T3.5.1.MR1-F1984-03 ISO: ISO 4401-03	T3.5.1.MR1-F1984-D05 ISO 4401-05		T3.5.1.MR1-D08 ISO 4401-08
<b>Nominal Flow Rates</b>	5 gpm (19 lpm)	12 gpm (45 lpm)		50 gpm (190 lpm)
<b>Material</b>	Ductile Cast Iron	Ductile Cast Iron	Nickel Plated Steel	Ductile Cast Iron
<b>Maximum Pressure</b>	Cast Iron 5000 psi (350 bar) Aluminum (optional) 3000 psi (210 bar)			
<b>Recommended Fluids</b>	Petroleum Based Fluids- ISO VG32-68, Phosphate Ester, Most Vegetable Oils, Water Based Fluids to 40% Water			

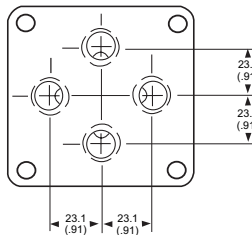
### Dimensional Data

Units: mm/ (Inch)

#### Series SD03

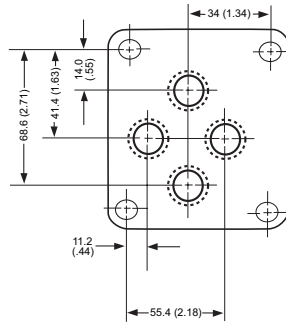
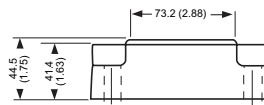
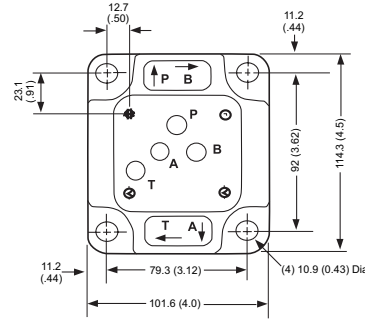


**SD03-6F\*S**  
Side Ported

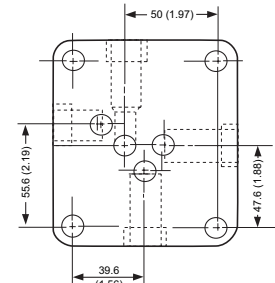
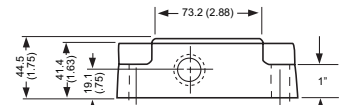
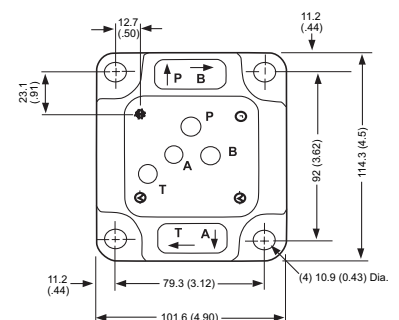


**SD03-6FP-B**  
Bottom Ported

#### Series SD05

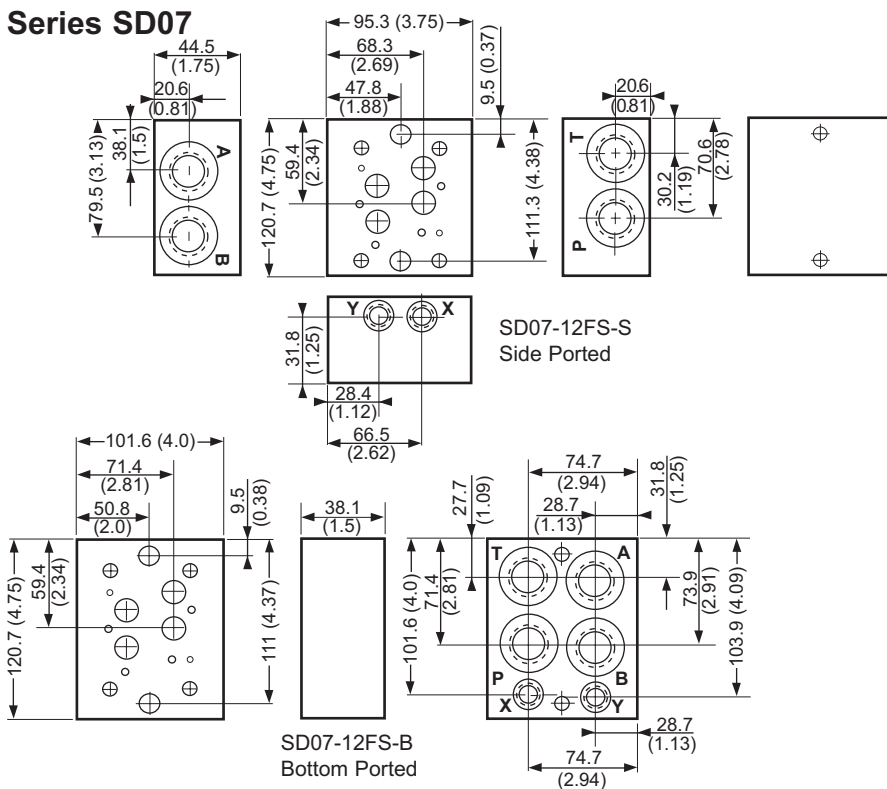


**SD05-8FP-B**  
Bottom Ported



**SD05-8F\*S**  
Side Ported

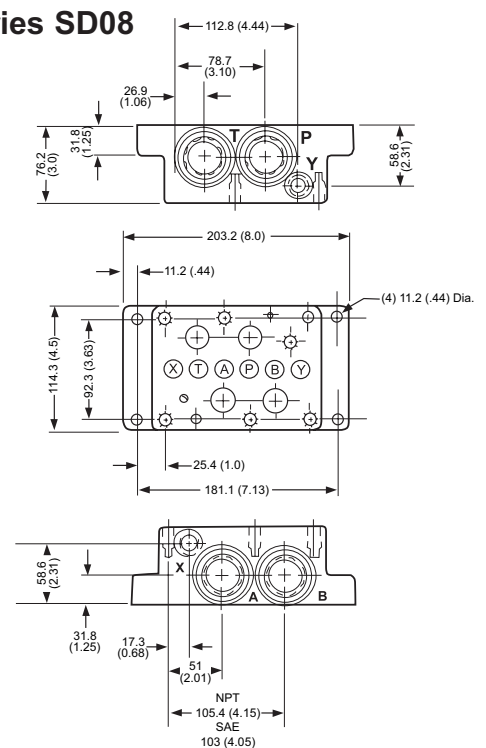
#### Series SD07



**SD07-12FS-S**  
Side Ported

**SD07-12FS-B**  
Bottom Ported

#### Series SD08

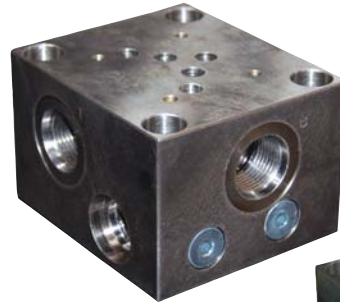
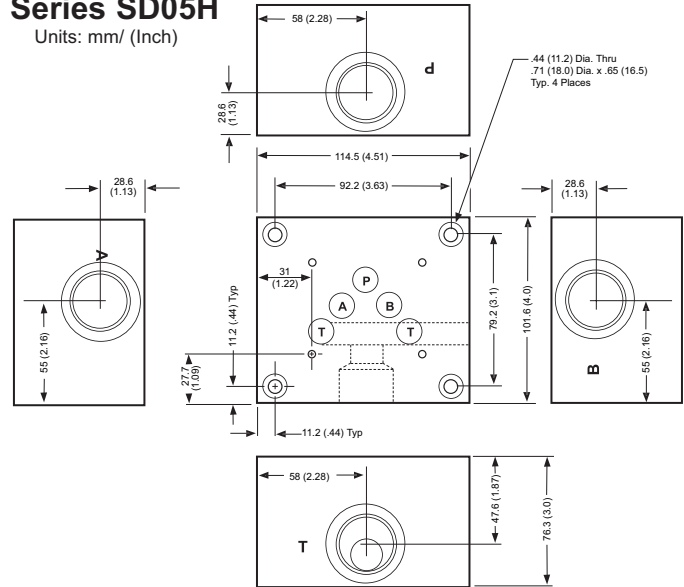


### Dimensional Data

Size		D05
Mounting Surfaces: General Patterns		<b>D05H- High Flow</b>
Model Number		
Side Ports	SAE Ports	SD05H-12or16FS-S SD05H-12FS-C-S (w/ relief cavity)
	NPT Ports	N/A
Bottom Ports	SAE Ports	N/A
	NPT Ports	N/A
Mounting Surface	NFPA	T3.5.1.MR1-D05
	ISO	ISO 4401-05
Nominal Flow Rates		25 gpm (95 lpm)
Material		Nickel Plated Steel
Recommended Fluids		Petroleum Based Fluids- ISO VG32-68, Phosphate Ester, Most Vegetable Oils, Water Based Fluids to 40% Water

### Series SD05H

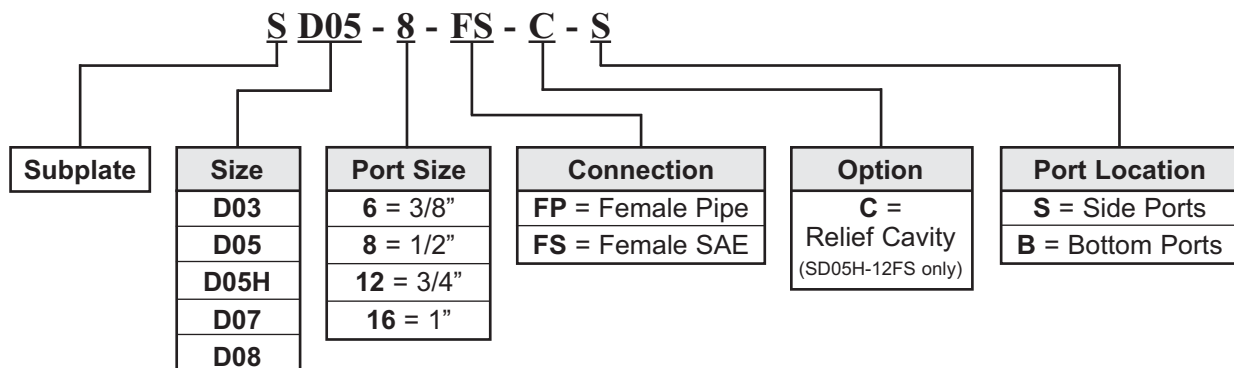
Units: mm/ (Inch)



SD05H-12FS-C-S



### Ordering Information

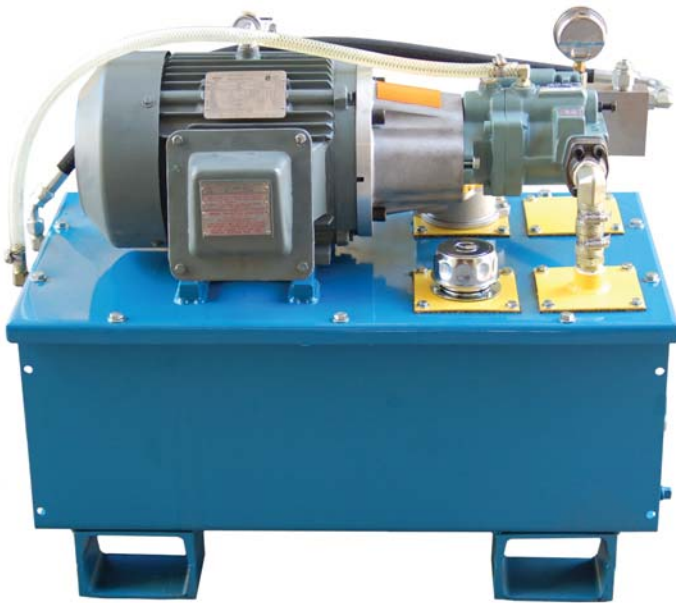


# HYDRAULIC POWER UNITS

## TOP MOUNT TANK



Top Mount Series

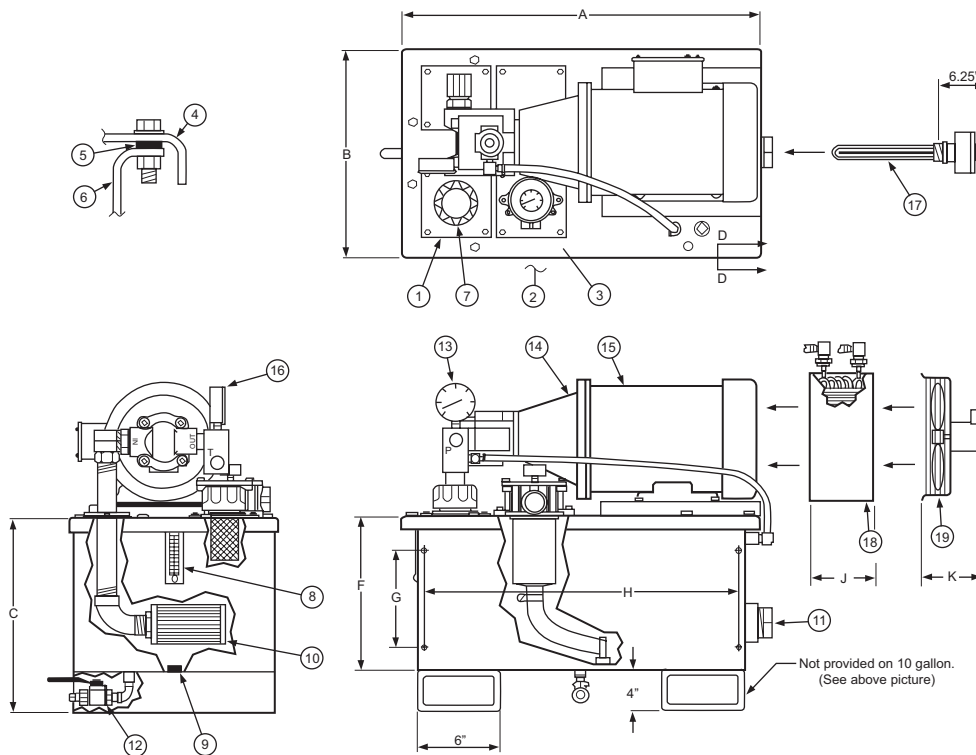


TMT20 Top Mount Tank

### Features

- Pump and Motor Accessible:** Ability to replace easily.
- Easy Reservoir Draining:** Pump not required for draining.
- Color Code Identification:** Allows for easy identification of items.
- In-Tank Filter System:** Provides easy element replacement without line drainage.
- Convenient Suction Strainer Maintenance:** Clean out access cover allows replacement of suction strainer without draining reservoir.
- Removable Top Plate:** Removable top allows for easy reservoir cleaning. No leaky end bells that make access for cleaning difficult.
- Conserves Space:** While still allowing easy maintenance, the top mount tank design saves floor space.

### Dimensional Data



#### ITEM IDENTIFICATION:

- CLEAN-OUT COVER (YELLOW)
- VALVE MOUNTING AREA
- RETURN FILTER (YELLOW)
- TANK LID
- RUBBERIZED GASKET
- TANK BODY
- FILLER/ BREATHER
- SIGHT & TEMPERATURE GAUGE
- MAGNETS (1 PER 5 GALLONS)
- SUCTION STRAINER WITH BYPASS VALVE
- 2" NPT HEATER COUPLING (OPTIONAL)
- 1/2" NPT DRAIN BALL VALVE WITH PLUG
- PUMP
- PUMP MOTOR ADAPTER (ORANGE)
- ELECTRIC MOTOR
- PRESSURE GAUGE WITH SNUBBER
- HEATER (OPTIONAL)
- HEAT EXCHANGER (OPTIONAL)
- COOLING FAN (OPTIONAL)
- PAINT (OPTIONAL)  
 COLOR CODES:  
 BLUE- UNIT COLOR PAINT  
 ORANGE- DANGER  
 YELLOW- MAINTENANCE  
 GRAY- ELECTRICAL

Model Number	Reservoir Capacity	Dimensions (Inches)								Std. Return Filter (10 $\mu$ )	4" Lip Drip Pan	Maximum Horsepower
		A	B	C	F	G	H	J	K			
TMT10	10 Gallon	26.0	15.0	12.3						ITF200-8FS-10MNPE		5
TMT20	20 Gallon	32.0	17.5	16.0	12.0	8	30.6	4.25	5.9	ITF200-12FS-10MNPE	30.9" x 48"	10
TMT35	35 Gallon	36.5	22.5	17.5	13.5	8	35.3	4.25	6.0	ITF250-12FS-10MNPE	30.9" x 48"	15
TMT70	70 Gallon	46.5	26.3	20.5	16.5	8	45.3	4.25	6.0	ITF425-24FS-10MNPE	38.8" x 52"	50
TMT100	100 Gallon	46.5	26.3	26.0	22.0	8	45.3	9.0	6.0	ITF450-24FS-20-10	38.8" x 52"	100
TMT150	150 Gallon	46.5	26.3	37.0	33.0	8	45.3	9.0	6.0	ITF450-24FS-30-10	38.8" x 52"	100

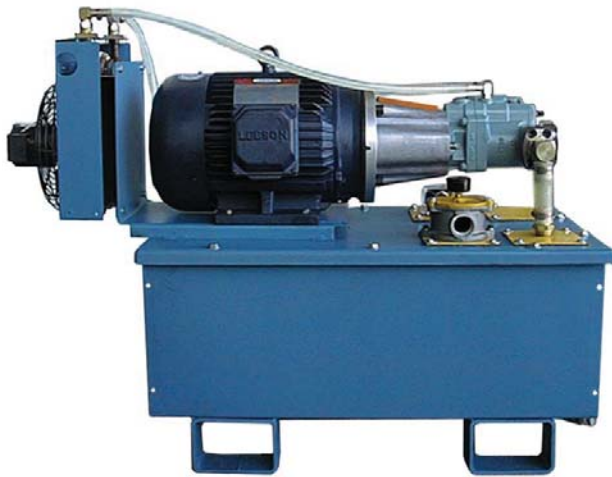


# HYDRAULIC POWER UNITS

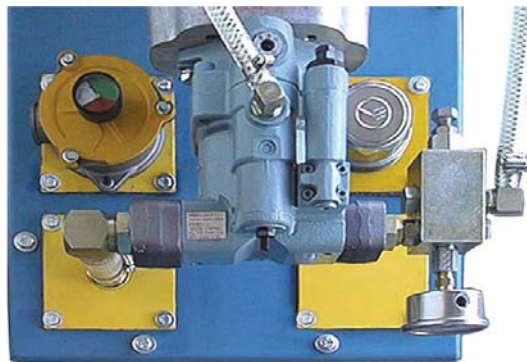
TOP MOUNT TANK



Top Mount Series



**TMT20-10HP-PCP8**  
Top Mount Tank:  
HE90-HF cooler,  
DR30 safety relief



**Covers may be relocated:**  
Fill, suction, return or access plates may be moved as specified by the customer. (units 20+ gallons)

Standard arrangement is same as the dimensional drawing (left).



**TMT200- Lubrication System:**  
We provide the reservoir, pump/ motors, heaters, coolers, modulating valves and Barksdale level, pressure, and temperature controls.

Customer contracts directly with our motor controls house for the electrical package.





INDUSTRIAL FLUID POWER COMPONENTS  
AND SYSTEMS



**X SERIES**

## Transmitters/ Transducers



XMT1-2K-4MP

### Features

- **High Pressure Range:** 14 - 7250 psi (1 - 600 bar)
- **Accurate:** +/- 0.5% at -20 to 85°C
- **Compact Size/ Performance Ratio**
- **Robust Package:** All Laser Welded Stainless Steel for Optimal Media Isolation
- **Maximum Flexibility:** Temperature Compensation



### Specifications

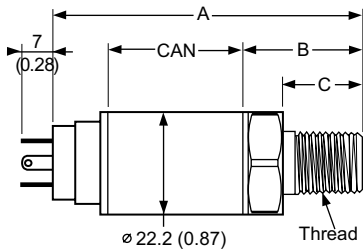
	XDR1 Transducer	XMT1 Transmitter	XDR2 Transducer
<b>Output Type</b>	0.5 - 4.5 VOLTS	4-- 20 mA	1 - 5 VOLTS
<b>Accuracy</b> at -20 to 85°C	0.5%FS		
<b>Total Error Accuracy</b> at -40 to 19°C; 86 to 105°C	1.0%FS		
<b>Compensated Temperature</b>	-40 to -105°C		
<b>Operating and Storage Temperature</b>	-40 to -105°C		
<b>Stability (Typical)</b>	0.25%FS/Year		
<b>Zero Pressure Offset</b>	0.5V	40 mA	1.0V
<b>Full Scale Output</b>	4.5V	20 mA	5.0V
<b>Proof Pressure</b>	3x FS		
<b>Burst Pressure</b> (Absolute Pressure Transducers)	10 x FS or 15000Psia		
<b>Burst Pressure</b> (Gage Pressure Transducers)	5 x FS		

### Electrical Specifications

Pin	
1	+ Power (8-30 VDC)
2	Output (4-20mA)
3	Ground (Case)
4	Not Used

	XDR1 Transducer	XMT1 Transmitter	XDR2 Transducer
<b>Output Type</b>	0.5 - 4.5 VOLTS	4-- 20 mA	1 - 5 VOLTS
<b>Supply Voltage</b>	5 + / - 0.5	8 to 30 Volts	8 to 30 Volts
<b>Supply Current</b>	<5 mA	Not Applicable	<5 mA
<b>Output Current</b>	0.45 mA Max (Sink or Source)	Not Applicable	0.45 mA Max (Sink or Source)
<b>Response Time</b>	<1 ms	<1 ms	<1 ms
<b>Reverse Polarity Protection</b>	N/A	Yes	Yes

### Dimensional Data



Code	Thread Size	A		B	C
		Current Output 20mmCAN	Current Output 30mmCAN		
4MP	1/4" - 18NPT	68.5 (2.70)	58.5 (2.30)	26.5 (1.04)	18.0 (0.71)
2MP	1/8" - 27NPT	63.5 (2.50)	53.5 (2.11)	21.5 (0.85)	13.0 (0.51)

### Ordering Information

#### XMT1 - 3.6K - 4MP

<b>X Series</b>	<b>Pressure Range</b>	<b>Thread Size</b>
XMT1 = Transmitter	1K = 1000psi	4MP = 1/4" - 18NPT
XDR1 = Transducer	2K = 2000psi	2MP = 1/8" - 27NPT
XDR2 = Transducer	3.6K = 3600psi	
	5.8K = 5800psi	

# HYDRAULIC POWER UNITS

## VERTICAL TANK 1-5 GALLON



VTA & VTB Series

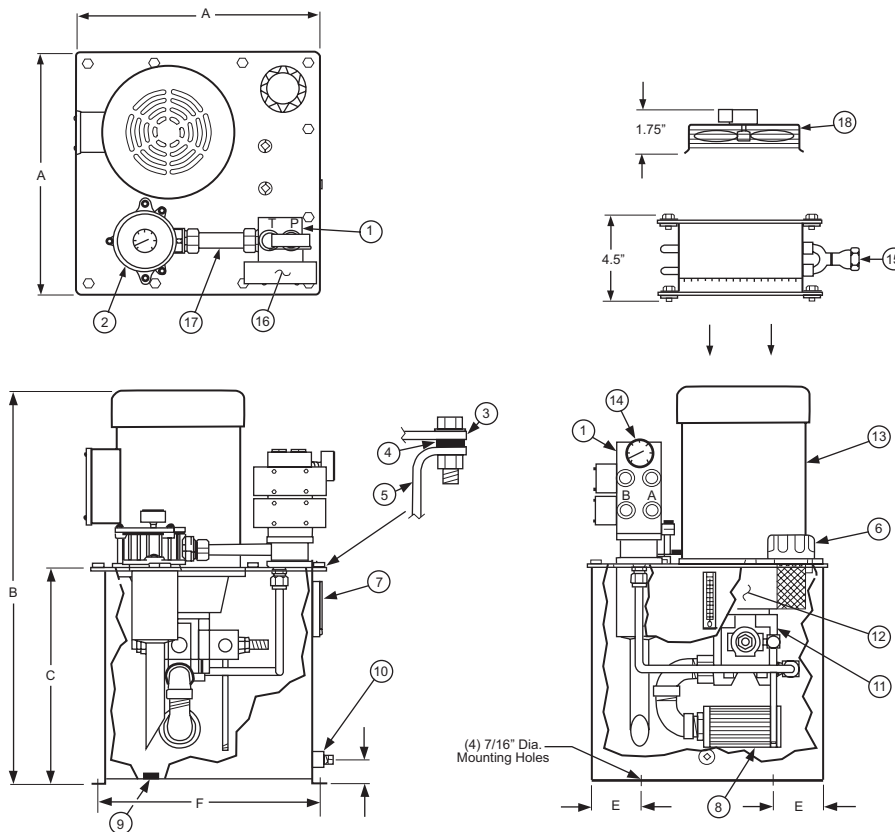
### Features

- Flooded Suction:** Longer pump life; pump always stays submersed. No pump rusting during shut-down periods. Air bleed valves are not required.
- Color Code Identification:** Allows for easy identification of items.
- In-Tank Filter System:** Provides easy element replacement without line drainage and also stays within overall unit envelope dimensions.
- Removable Top Plate:** Removable top allows for easy reservoir cleaning. No leaky end bells that make access for cleaning difficult.
- Conserves Space:** While still allowing general maintenance, the vertical tank design saves floor space.



VTB5 Vertical Tank

### Dimensional Data



#### ITEM IDENTIFICATION:

- MANIFOLD
  - RETURN FILTER (LID PAINTED YELLOW)  
# ITF100-8FS-10MNPE WITH HYV-1 GAUGE
  - TANK LID
  - RUBBERIZED GASKET
  - TANK BODY
  - FILLER/ BREATHER #FB-12S- 3& 5 GALLON,  
#TA46F FOR 1 GALLON
  - SIGHT & TEMPERATURE GAUGE:  
#SLG3 FOR 3 GALLON  
#SLG5 FOR 5 GALLON  
( NOT INCLUDED ON 1 GALLON UNITS)
  - SUCTION STRAINER
  - MAGNETS (1 PER 5 GALLONS)
  - DRAIN PLUG
  - PUMP
  - PUMP MOTOR ADAPTER (ORANGE COVER)
  - ELECTRIC MOTOR- NOW CAST IRON  
STANDARD IF 3 PHASE, 1HP AND LARGER
  - PRESSURE GAUGE WITH SNUBBER
  - HEAT EXCHANGER (OPTIONAL):  
# HE45-V, NO FAN  
# HE45-VF, WITH FAN
  - MULTIPLE VALVE COMBINATIONS- (MAY  
EXCEED OVERALL ENVELOPE DIMENSIONS  
DEPENDING ON VALVING)
  - PRE-PLUMBED TANK LINE
  - HEAT EXCHANGER FAN Y110099 (OPTIONAL)  
4.7" DIA., 15.2WATTS, 115 VAC, 0.25 AMP  
24" FREE LEADS FOR CONNECTION
- PAINT (OPTIONAL)**  
 COLOR CODES:  
 BLUE- UNIT COLOR PAINT  
 ORANGE- DANGER  
 YELLOW- MAINTENANCE  
 GRAY- ELECTRICAL

Model Number	Reservoir Capacity	Dimensions (Inches)					
		A	B Max. (with 2 HP*)	C	D	E	F
VTA1	1 Gallon	10.0	20.1	8.4	1.75	1.5	10
VTB3	3 Gallon	12.5	22.5	9.8	1.75	1.5	12.5
VTB5	5 Gallon	12.5	24.5	12.8	1.75	1.5	12.5

\*2 HP standard 1800 RPM 230/460V, 3 phase motor.  
 (Only NEMA sizes 56C thru 145C may be used with the VTA and VTB reservoirs)





# HYDRAULIC POWER UNITS

VERTICAL TANK 5-40 GALLON



VTC & VTF Series

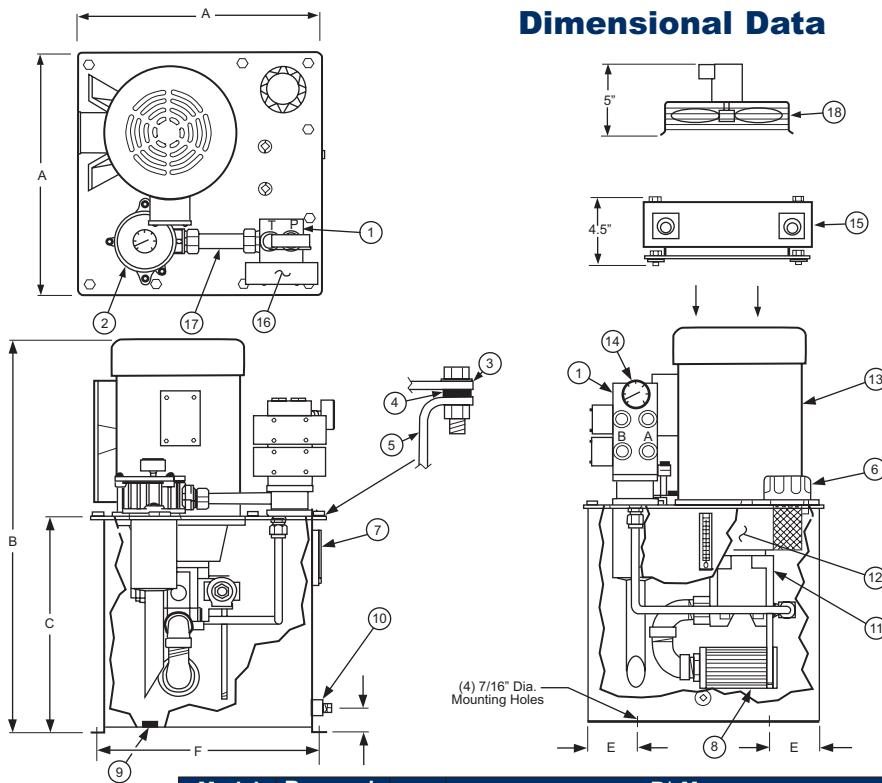


VTF40 & VTC 15 Vertical Tank

## Features

- Most Versatile:** Many pumps available in this series.
- Flooded Suction:** Longer pump life; pump always stays submerged. No pump rusting during shut-down periods. Air bleed valves are not required.
- Color Code Identification:** Allows for easy identification of items.
- In-Tank Filter System:** Provides easy element replacement without line drainage and also stays within overall unit envelope dimensions.
- Removable Top Plate:** Removable top allows for easy reservoir cleaning. No leaky end bells that make access for cleaning difficult.
- Conserves Space:** While still allowing general maintenance, the vertical tank design saves floor space.

## Dimensional Data



### ITEM IDENTIFICATION:

- MANIFOLD
  - RETURN FILTER (LID PAINTED YELLOW)  
# ITF100-8FS-10MNPPE WITH HYV-1 GAUGE
  - TANK LID
  - RUBBERIZED GASKET
  - TANK BODY
  - FILLER/ BREATHER #FB-12S
  - SIGHT & TEMPERATURE GAUGE #SLG5
  - SUCTION STRAINER
  - MAGNETS (1 PER 5 GALLONS)
  - DRAIN PLUG
  - PUMP
  - PUMP MOTOR ADAPTER (ORANGE COVER)
  - ELECTRIC MOTOR- CAST IRON STANDARD (EXCEPT SINGLE PHASE MOTORS)
  - PRESSURE GAUGE WITH SNUBBER
  - HEAT EXCHANGER (OPTIONAL):  
# HE90V- NO FAN  
# HE90VF- WITH FAN
  - MULTIPLE VALVE COMBINATIONS- (MAY EXCEED OVERALL ENVELOPE DIMENSIONS DEPENDING ON VALVING)
  - PRE-PLUMBED TANK LINE
  - HEAT EXCHANGER FAN Y110104 (OPTIONAL)  
7" DIA., 1/30 HP, 115 VAC, 1AMP
- PAINT (OPTIONAL)**  
 COLOR CODES:  
 BLUE- UNIT COLOR PAINT  
 ORANGE- DANGER  
 YELLOW- MAINTENANCE  
 GRAY- ELECTRICAL

Dimensions (Inches)

Model Number	Reservoir Capacity	A	B* Max.					C	D	E	F	
			3 HP	5 HP	7.5 HP	10 HP	15 HP					
VTC5	5 Gallon	16	24.0	25.0	27.3	28.9	N/A	N/A	11.3	1.7	3.5	15.2
VTC10	10 Gallon	16	27.5	28.5	30.8	32.4	N/A	N/A	14.8	1.7	3.5	15.2
VTC15	15 Gallon	16	33.0	34.0	36.3	37.9	N/A	N/A	20.3	1.7	3.5	15.2
VTC20	20 Gallon	16	38.3	39.3	41.6	43.2	N/A	N/A	25.6	1.7	3.5	15.2
VTF25	25 Gallon	19.5	34.1	36.1	37.4	39.0	41.0	42.0	21.4	1.7	3.5	18.7
VTF30	30 Gallon	19.5	37.9	39.9	41.2	42.8	44.8	45.9	25.3	1.7	3.5	18.7
VTF35	35 Gallon	19.5	41.8	43.8	45.1	46.7	48.7	49.8	29.2	1.7	3.5	18.7
VTF40	40 Gallon	19.5	45.7	47.7	49.0	50.6	52.6	53.7	33.1	1.7	3.5	18.7

\*Standard 1800 RPM, TEFC, 230/460V, 3 phase motor.



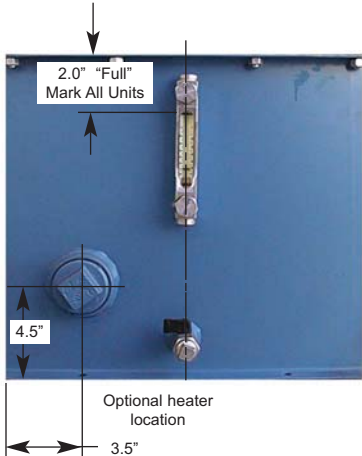
# HYDRAULIC POWER UNITS

VERTICAL TANK 5-40 GALLON

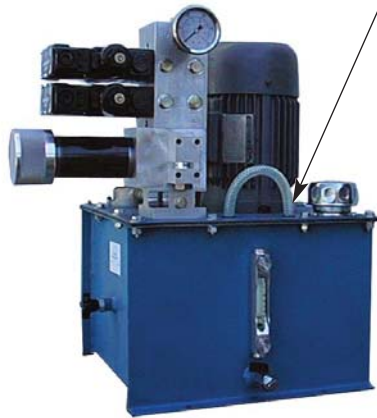


VTC Series

ALL reservoir capacities actually larger than stated for a 2" air gap allowance to full mark on sight glass.



Hose from case drain- may be removed if adding heat exchanger

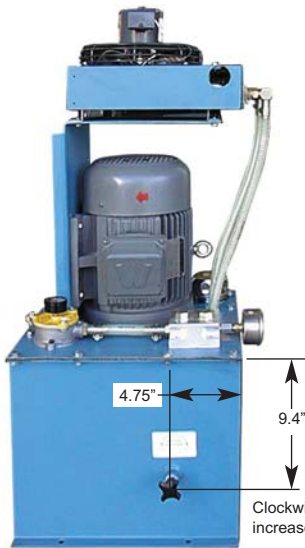


**VTC5-3HPC3-PCV5 Vertical Tank with PF4 Modular Pressure Filter**



**VTC5-7.5HPC3-G5 Vertical Tank: 1 station VTE-D03-1R manifold with integral relief valve and HE90 return line cooler**

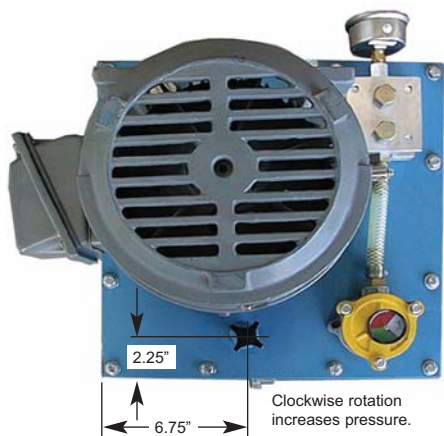
Sight gauge face may be rotated to any side.



**VTC10-5HPC3-PCV8 Vertical Tank with HE90-VF Heat Exchanger and D0305-OB Outlet Block**

D03 or D05 manifolds may be added of any length.

Sight gauge face must be supplied as shown.



**VTC10-5HPC3-PCP4 Vertical Tank with D0305-OB Outlet Block**

D03 or D05 manifolds may be added of any length.

Sight gauge face may be rotated to any side.



# HYDRAULIC POWER UNITS

VERTICAL TANK 18 & 24 GALLON



VTD Series



All VTD units have (3) 3/8" bulkhead fittings and (1) 1/2" bulkhead fitting for drains etc.



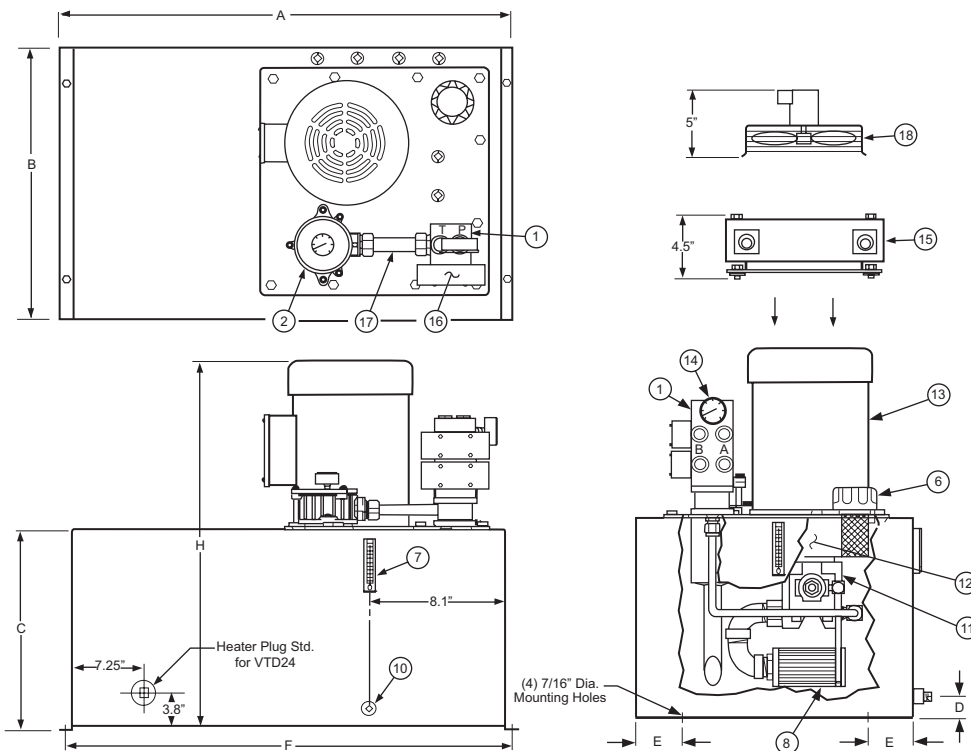
(right side view)

**VTD14- 14 Gallon Vertical**  
Accepts VTB 13" x 13" Lids



**VTD24- 24 Gallon Vertical**  
Accepts VTC 16.5" x 16.5" Lids

## Dimensional Data



### ITEM IDENTIFICATION:

1. MANIFOLD
  2. RETURN FILTER (LID PAINTED YELLOW)  
# ITF100-8FS-10MNPE FOR VTD18  
#ITV200-12FP-10MNPE FOR VTD24
  3. TANK LID
  4. RUBBERIZED GASKET
  5. TANK BODY
  6. FILLER/ BREATHER #FB-12S
  7. SIGHT & TEMPERATURE GAUGE #SLG5
  8. SUCTION STRAINER
  9. MAGNETS (1 PER 5 GALLONS)
  10. DRAIN PLUG
  11. PUMP
  12. PUMP MOTOR ADAPTER (ORANGE COVER)
  13. ELECTRIC MOTOR- CAST IRON STANDARD (EXCEPT SINGLE PHASE MOTORS)
  14. PRESSURE GAUGE WITH SNUBBER
  15. HEAT EXCHANGER (OPTIONAL):  
FOR VTD18:  
# HE45-V, NO FAN  
# HE45-VF, WITH FAN  
FOR VTD24:  
# HE90-V, NO FAN  
# HE90-VF, WITH FAN
  16. MULTIPLE VALVE COMBINATIONS- (MAY EXCEED OVERALL ENVELOPE DIMENSIONS DEPENDING ON VALVING)
  17. PRE-PLUMBED TANK LINE
  18. HEAT EXCHANGER FAN :  
FOR VTD18: 4.7" DIA., 15.2W, 115 VAC, 0.25 AMP 24" FREE LEADS  
FOR VTD24: 7" DIA., 1/30 HP, 115 VAC, 1AMP
- PAINT (OPTIONAL)**  
COLOR CODES:  
BLUE- UNIT COLOR PAINT  
ORANGE- DANGER  
YELLOW- MAINTENANCE  
GRAY- ELECTRICAL

Dimensions (Inches)

Model Number	Reservoir Capacity	Dimensions (Inches)						H* Max.			
		A	B	C	D	E	F	2 HP	5 HP	7.5 HP	10 HP
VTD18	18 Gallon	25.8	19.5	10.8	1.7	2.0	24.8	22.5	N/A	N/A	N/A
VTD24	24 Gallon	25.8	19.5	14.5	1.7	2.0	24.8	N/A	28.2	30.5	32.1

\*Standard 1800 RPM, TEFC 230/460V, 3 phase motor.

