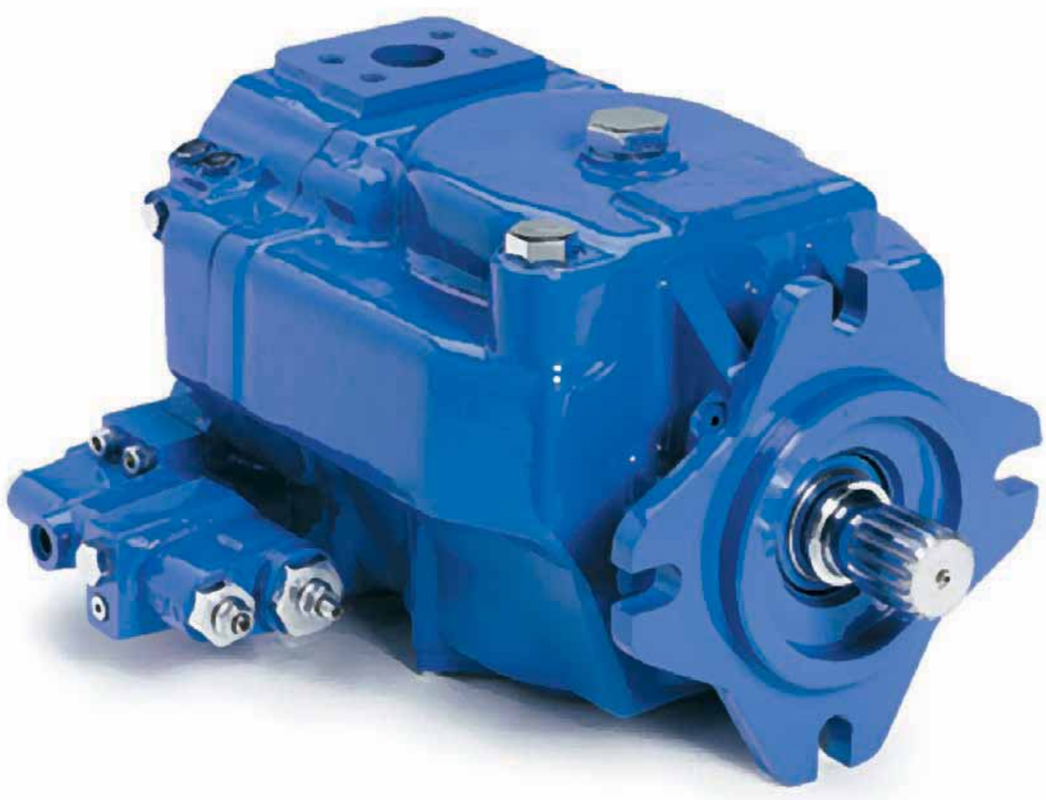
Eaton PVH Variable Displacement Piston Pumps
Vickers® Product Line

57-141 cc^3
(3.5-8.6 in^3)

H-Series
Industrial Variable
Displacement

H-Series
Mobile Variable
Displacement



Powering Business Worldwide

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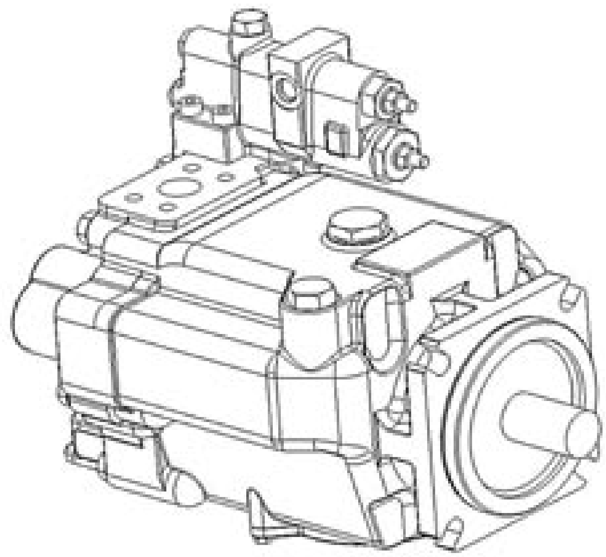
H Series Variable Displacement Piston Pumps

Introduction



Eaton's Vickers® PVH high flow, high performance pumps are a family of variable displacement, inline piston units that incorporate the proven design, quality manufacturing techniques and operating features of other Vickers piston pumps, but in a smaller, lighter package.

The PVH series has been specially designed to meet the 250 bar (3625 psi) continuous duty performance requirements of new generation equipment designs.

These are efficient, reliable pumps, with a selection of optional controls for maximum operational flexibility. Designed specifically for strenuous application, they provide the productivity gains and controllability improvements desired in earthmoving, construction, machine tool, plastics, and all other energy-conscious markets. As with all Eaton products, these pumps have been fully laboratory tested and field proven.

PVH Series Benefits

- Versatile design includes single pumps, thru-drive arrangements, and a variety of drive shaft and control options that will adapt to any application and provide the most cost effective installation.
- Proven components designed into a heavy duty, compact housing to provide 250 bar (3625 psi) continuous operating performance, and 280 bar (4050 psi) operating performance in a load sensing system. This design assures long life at the higher performance levels required of today's power-dense machinery.
- Compact and lightweight design to reduce the application weight, and provide better access for installation and servicing.
- Service kits developed for the most critical rotating and control components to simplify and assure successful pump servicing.
- Quiet designs available for noise-sensitive industrial applications, reducing sound levels further to provide a more acceptable environment.
- Designed for maximum efficiency in any type of application. A variety of compensators provide the most effective system control, and the 95%-plus volumetric efficiency means more flow, and more input energy, is directed to the work and not into heat and waste.
- Heavy duty bearings and shafts result in minimum internal deflections and wear, providing for longer life and maximum uptime.

Hydraulic System Design Calculations

Basic Formulas

Output Flow (Q)

$$\text{lpm} = \frac{\text{cm}^3/\text{r} \times \text{rpm}}{1000} \qquad \text{gpm} = \frac{\text{in}^3/\text{r} \times \text{rpm}}{231}$$

Input Power (P)

$$\text{kW} = \frac{\text{l/min} \times \text{bar}}{600} \qquad \text{hp} = \frac{\text{gpm} \times \text{psi}}{1714}$$

Shaft Torque (M)

$$\text{N-m} = \frac{\text{bar} \times \text{cm}^3/\text{r}}{62.8} \qquad \text{lb-in} = \frac{\text{psi} \times \text{in}^3/\text{r}}{6.28}$$

Shaft Speed (n)

$$\text{rpm} = \frac{1000 \times 1/\text{min}}{\text{cm}^3/\text{r}} \qquad \text{RPM} = \frac{231 \times \text{gpm}}{\text{in}^3/\text{r}}$$

Output Power (P)

$$\text{kW} = \frac{\text{N-m} \times \text{RPM}}{9549} \qquad \text{hp} = \frac{\text{lb-in} \times \text{rpm}}{63{,}025}$$

Volumetric Displacement

$$\text{cm}^3/\text{r} = \frac{\text{lpm} \times 1000}{\text{rpm}} \qquad \text{in}^3/\text{r} = \frac{\text{gpm} \times 231}{\text{rpm}}$$

Basic Formulas

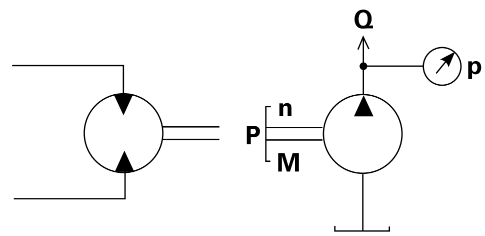
bar = 10 Newtons/cm^2
gpm = gallons per minute
hp = horsepower
lb-in = pound inch
lb-ft = pound feet
kW = kilowatt
kgf = kilograms force
l/min = liters per minute
N-m = Newton meters
psi = pounds per square inch
rpm = revolutions per minute

Efficiencies

$$\text{Volumetric } N_v = \frac{\text{gpm actual}}{\text{gpm theorectical}}$$

$$\text{Mechanical } N_m = \frac{\text{lb-in actual}}{\text{lb-in theorectical}}$$

Total Nt = Nv x Nm



Commonly Used Conversions

To Convert	Into	Multiply by
bar	psi	14.5
cm^3	in^3	0.06102
˚C	˚F	(˚C x 1.8) +32
gallons (US)	liters	3.785
kg	lbs	2.205
kgf/cm^2	psi	14.2
kW	hp	1.341
liters	US Gallons	0.2642
mm	inches	0.03937
N-m	lb-in	8.85
N-m	lb-ft	0.7375
˚F	˚C	(˚F-32)/1.8
hp	kW	0.7457
inch	mm	2.54
in^3	cm^3	16.39
lb-in	N-m	0.113
lb-ft	N-m	1.356
lbs	kg	0.4535
psi	bar	0.06896
psi	kgf/cm^2	.070307

Note: Performance charts can be found on subsequent pages.

Model Codes
PVH Piston Pump

PVH	063	R	01	AB	1	0	B	23	14	00	00	1	00	1	00	00	0	A
1, 2 ,3	4, 5, 6	7	8, 9	10, 11	12	13	14	15, 16	17, 18	19, 20	21, 22	23	24, 25	26	27, 28	29, 30	31	32

1, 2, 3 Pump Series
PVH – PVH OC Piston Pump

4, 5, 6 Displacement
057 – 57.4 cm3/r [3.50 in3/r]
063 – 63.1 cm3/r [3.85 in3/r]
074 – 73.7 cm3/r [4.50 in3/r]
081 – 81.0 cm3/r [4.94 in3/r]
098 – 98.3 cm3/r [6.00 in3/r]
106 – 106.5 cm3/r [6.50 in3/r]
131 – 131.1 cm3/r [8.00 in3/r]
141 – 141.0 cm3/r [8.60 in3/r]

7 Rotation
R – Right-Hand Rotation (cw)
L – Left-Hand Rotation (ccw)

8, 9 Front Mounting and Input Shaft
01 – 4 Bolt C, 1-1/4 inch Dia. Keyed
02 – 4 Bolt C, 14T 12/24 DP Splined
03 – 4 Bolt C, 17T 12/24 DP Splined
04 – 4 Bolt C, 1-1/2 inch Tapered Shaft & Woodruff Keyway
05 – 4 Bolt C, 1-1/4 inch Dia. Tapered Keyed & 3/4-16 UNF-2A Ext Thread
08 – 2 Bolt B, 15T 16/32 DP Splined
0N – 4 Bolt M (ISO 125B4HW) with 32.1 (1.26) Dia Straight Keyed
10 – 4 Bolt C, 14T 12/24 DP Splined, 73.2 (2.88) Shaft Ext and 49.0 (1.93) Spline
13 – 4 Bolt C, 1-1/2 inch Dia Straight Keyed
16 – 4 Bolt C, 44.4 (1.75) Dia Straight Keyed
17 – 4 Bolt C, 1-1/4 in Dia Tapered Keyed & M20 x 1-1/2 in. Ext Thread
23 – 2 Bolt C, 17T 12/24 DP Splined Shaft
24 – 2 Bolt B 19T 24/48 DP Splined
30 – 4 Bolt C, 14T 12/24 DP Splined, 78.0 (3.07) Shaft Extension and 54.0 (2.12) Spline Length
51 – 2/4 Bolt C, 1-1/4 inch Dia Straight Keyed
52 – 2/4 Bolt C, 14T 12/24 DP Splined
53 – 2/4 Bolt C, 17T 12/24 DP Splined
58 – 2 Bolt B, 15T 16/32 DP Splined
60 – 2/4 Bolt C, 14T 12/24 DP Splined, 73.2 (2.88) Shaft Extension and 49.0 (1.93) Spline Length
62 – 2 Bolt C, 13T 8/16 DP Splined

10, 11 Main Ports Size & Location
AA – Side Ports; Suction 2 in. (Code 61) Pressure 1 in. (Code 61)
AB – Side Ports; Suction 2 in. (Code 61) - w/ M12 Threads; Pressure 1 in. (Code 61) - w/ M10 Threads
AC – Side Ports; Suction 2 in. (Code 61) - w/ M12 Threads; Pressure 1.25 in. (Code 61) - w/ M12 Threads
AD – Side Ports; Suction 2.5 in. (Code 61) w/ M12 Threads; Pressure 1 in. (Code 61) w/ M10 Threads
AE – Side Ports; Suction 2.5 (Code 61) w/ M12 Threads; Pressure 1.25 (Code 61) w/ M12 Threads
AF – Side Ports; Suction 2.5 in. (Code 61) ; Pressure - 1.25 in. (Code 62)
AG – Side Ports; Suction - 2.5 in. (Code 61) w/ M12 Threads; Pressure - 1.25 in. (Code 62) w/ M14 Threads
AH – Side Ports; Suction - 2.0 in. (Code 61) w/ M12 Threads; Pressure - 1.0 in. (Code 61) w/ M12 Threads
AJ – Side Ports; Suction 2.5 in. (Code 61); Pressure 1.0 in. (Code 61)
AL – Side Ports; Suction - 2.5 in. (Code 61); Pressure - 1.25 in. (Code 61)

12 Drain Ports Size & Location
1 – #8 SAE O-Ring Port - Bottom (Top Plugged)
2 – #8 SAE O-Ring Port - Top (Bottom Plugged)
3 – #10 SAE O-Ring Port - Bottom (Top Plugged)
4 – #10 O-Ring Port - Top (Bottom Plugged)
5 – #8 3/4-16 UNF-2B SAE O-Ring Port - Bottom (Top Plugged)
6 – #8 3/4-16 UNF-2B SAE O-Ring Port - Top (Bottom Plugged)
7 – #10 7/8-14 UNF-2B SAE O-Ring Port - Bottom (Top Plugged)
8 – #10 7/8-14 UNF-2B SAE O-Ring Port - Top (Bottom Plugged)
9 – #12 SAE O-Ring Port - Bottom (Top Plugged)
A – #12 SAE O-Ring Port - Top (Bottom Plugged)
B – M22 x 1.5 Metric O-Ring - Bottom (Top Plugged)
C – M22 X 1.5 Metric O-Ring - Top (Bottom Plugged)
F – Vertical Mount w/ G 1/2 BSPP - Bottom (Top Plugged)
G – Vertical Mount w/ G 1/2 BSPP - Top (Bottom Plugged)

13 Diagnostic Pressure Ports
0 – No Diagnostic Pressure Ports

14 Controller Type*
A – Pressure Compensator
B – Pressure And Flow Compensator
D – Pressure Compensator w/ Torque Sensing
E – Pressure And Flow Compensator w/ Torque Sensing
G – IC Pressure Compensator
H – IC Pressure and Flow Compensator
J – IC Pressure and Flow Compensator w/ Torque Sensing
N – Pressure and Flow Compensator w/ Unload Valve

** Torque control is not available with case-to-inlet check value. Specify "AA" Pump Special Features*

Model Codes
PVH Piston Pump

PVH	063	R	01	AB	1	0	B	23	14	00	00	1	00	1	00	00	0	A
1, 2 ,3	4, 5, 6	7	8, 9	10, 11	12	13	14	15, 16	17, 18	19, 20	21, 22	23	24, 25	26	27, 28	29, 30	31	32

15,16 Pressure Comp. Setting

07 – 66-74 bar [957-1073 psi]
23 – 226-234 bar [3278-3394 psi]
25 – 246-254 bar [3568-3684 psi]

Other Settings Available by Request

17,18 Flow Compensator Setting

00 – No Flow Comp. Setting
14 – 13-15 bar [189-218 psi]
24 – 23-25 bar [334-363 psi]
AA – Unload Valve Standby 39-41 bar [334-363 psi]

Other Settings Available by Request

19,20 Torque Setting/ Other Comp.

00 – None
04 – 36-44 bar [522-638 psi]
14 – 136-144 bar [1973-2089 psi]
AA – Unload Valve 186.2-193 bar [2700-2800 psi] Reset 157.8-164.6 bar [2288-2387 psi]
AB – Unload Valve 203.4-210.2 bar [2950-3050 psi] Reset 183-190 bar [2650-2748 psi]

21,22 Control Special Features

AB –** No Control Special Features
AA – Bleed Down Orifice 0.37 [.015] Ø
AR – Bleed Down Orifice 0.65 [.026] Ø
AV – 1.60 [.063] Ø Orifice (IC Control Only)
AW – 0.76 [.030] Ø Orifice (IC Control Only)

23 Maximum Displacement Option

1 – Standard Displacement (As given in code title)
2 – Adjustable Max Displacement (Set at Max)
F – Adjustable Max Displacement (Set at Max) w/ Extended Adjusting Screw

Other Settings Available by Request.

24,25 Auxiliary (Rear) Mount and Output Shaft

00 – No Auxiliary Mounting Features
AA – 2/4 Bolt C, 14T 12/24DP
AB – 2/4 Bolt B, 15T 16/32DP
AC – 2 Bolt A, 9T
AY – 2/4 Bolt B, 13T 16/32DP
AZ – 2/4 Bolt C, 17T 12/24DP
BA – 2 Bolt A, 11T 16/32DP

26 Shaft Seal

1 – Single, OneWay Shaft Seal, Viton®
3 – Single, OneWay Shaft Seal, Nitrile
5 – Double, TwoWay Shaft Seal, Viton® W/ VHO Filter
6 – Double, TwoWay Shaft Seal, Nitrile W/ VHO Filter

27,28 Pump Special Features

00 – No Pump Special Features
AA – No Case To Inlet Check
AE – Q250 Valve Plate, No Case To Inlet Check Valve
AF – Q140 Valve Plate, No Case To Inlet Check Valve
AP – Pressure Lube Swashplate
AR – Pressure Lube Swashplate, No Case To Inlet Check Valve
SC – Q250 Valve Plate, Grooved Saddle Bearings, No Case To Inlet Check Valve
BH – Q250 Valve Plate, Pressure Lube Swashplate
BM – Q250 Valve Plate, Pressure Lube Swashplate, No Case To Inlet Check Valve
BR – Q140 Valve Plate, Grooved Saddle Bearings, No Case To Inlet Check Valve

29,30 Paint

00 – No Paint
01 – Blue Primer

31 Identification

0 – Standard

32 Design Code

A – First Design

Performance Data

Performance data is typical with SAE 10W anti-wear hydraulic oil at 50°C (120°F) and at zero pump inlet pressure, except where otherwise indicated.

Rated Characteristics of PVH Industrial Pumps*

Parameters	PVH057	PVH063	PVH074	PVH081	PVH098	PVH106	PVH131	PVH141
Geometric displacement, max. cm^3/r	57,4	63,1	73,7	81,0	98,3	106,5	131,1	141,1
(in^3/r)	(3.5)	(3.85)	(4.5)	(4.94)	(6.0)	(6.50)	(8.0)	(8.60)
Rated pressure bar (psi)	250 (3625)†	230 (3300)†	250 (3625)†	230 (3300)†	250 (3625)†	230 (3300)†	250 (3625)†	230 (3300)†
Rated speeds in r/min at various inlet pressures								
127 mm Hg (5″ Hg)	1500	1500	1500	1500	1500	1500	1200	1200
Zero inlet pressure	1800	1800	1800	1800	1800	1800	1500	1500
0,48 bar (7 psi)	1800	1800	1800	1800	1800	1800	1800	1800
Typical effective flow in l/min (USgpm) Rated Pressure								
at 1500 r/min 83	102		140		186			
	(22)		(27)		(37)		(49)	
at 1800 r/min	98		125		170		223	
	(26)		(33)		(45)		(59)	

† In load sensing systems the compensator can be set at 280 bar (4060 psi).
* Industrial Valve Plates are specified in Pump Special Feature 'Q250' or 'Q140'

Ratings of PVH Industrial Pumps with Alternate Fluids

Parameters	Petroleum based	Polyol ester	Water glycol	HWBF(90–10) thickened
Max. pressure bar (psi)	250 (3625)	230 (3300)	172 (2500)	155 (2250)
Max. speed in r/min at:				
1,0 bar abs. (0 psi)	1800 ‡	1800	1800	1700
0,85 bar abs. (5″ Hg)	1500 □	1500	1500	1500
Max. inlet temp. deg. C (deg. F)	93 (200)	65 (150)	50 (120)	50 (120)

‡ 1500 rpm for PVH131/141 only. □ 1200 rpm for PVH131/141 only.

Rated Characteristics of PVH Mobile Pumps ◊

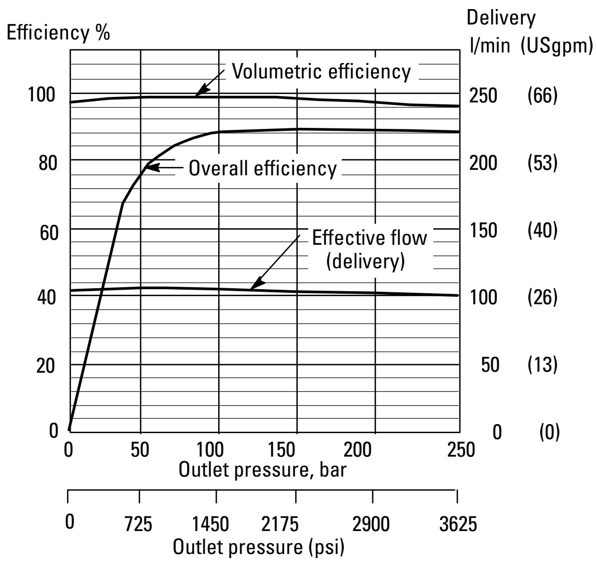
Parameters	PVH057	PVH063	PVH074	PVH081	PVH098	PVH106	PVH131	PVH141
Rated speeds in r/min at various inlet pressures								
127 mm Hg (5″ Hg)	2000	2000	1850	1850	1750	1750	1650	1500
Zero inlet pressure	2400	2400	2200	2200	2100	2100	2000	2000
0,48 bar (7 psi)	3000	3000	2750	2750	2600	2600	2500	2500
Typical effective flow in l/min (USgpm) at 250 bar (3625 psi) and rated speed @ zero inlet pressure	134 (35)	146 (38)	156 (41)	172 (45)	202 (53)	216 (57)	249 (66)	272 (72)

◊ Displacements & rated pressure are same as for PVH*** industrial pumps.

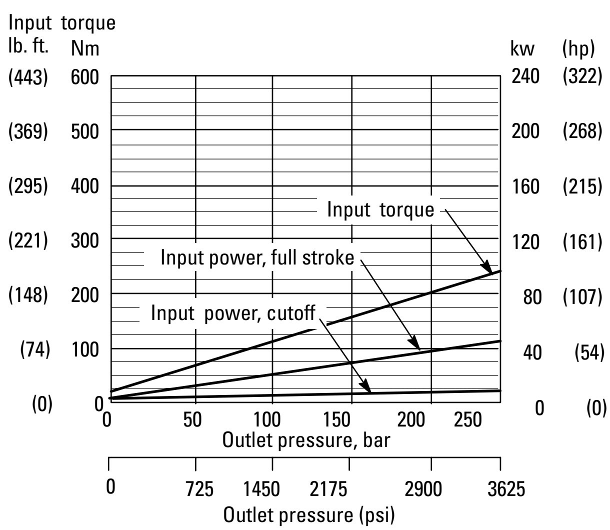
Performance Data

PVH057

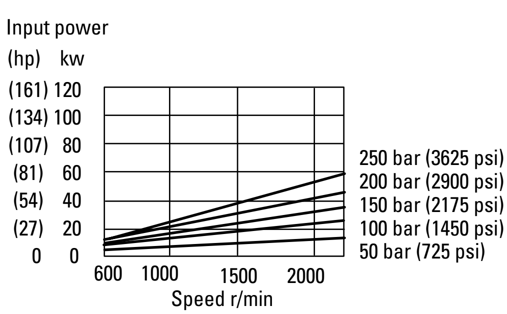
Delivery and efficiency versus outlet pressure at 1800 r/min



Input torque and power versus outlet pressure at 1800 r/min

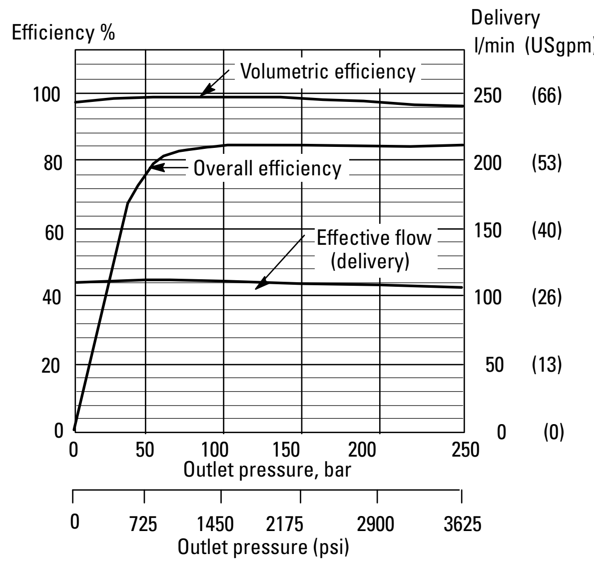


Input power versus speed

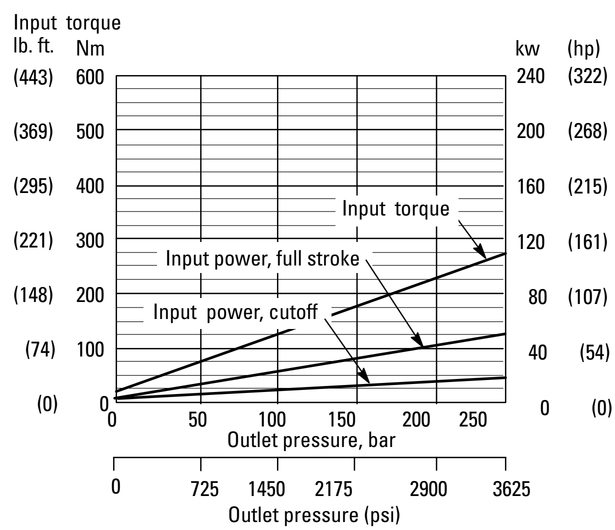


PVH063

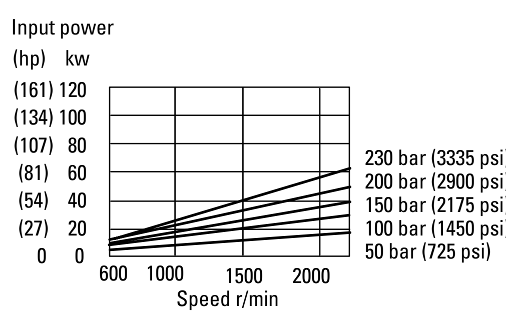
Delivery and efficiency versus outlet pressure at 1800 r/min



Input torque and power versus outlet pressure at 1800 r/min



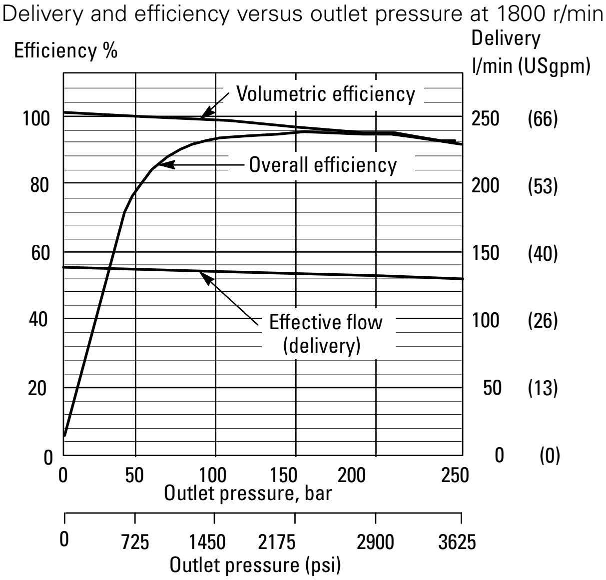
Input power versus speed



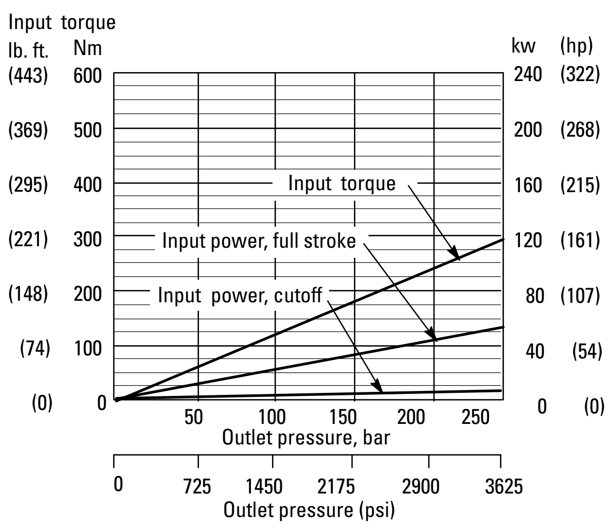
Performance Data

PVH074

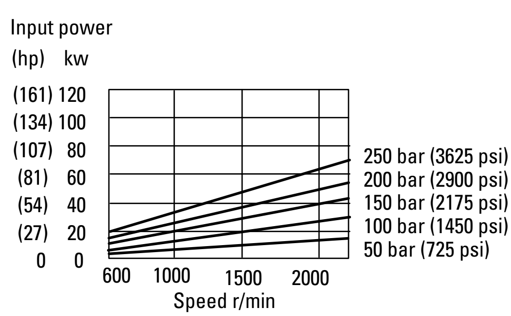
Delivery and efficiency versus outlet pressure at 1800 r/min



Input torque and power versus outlet pressure at 1800 r/min

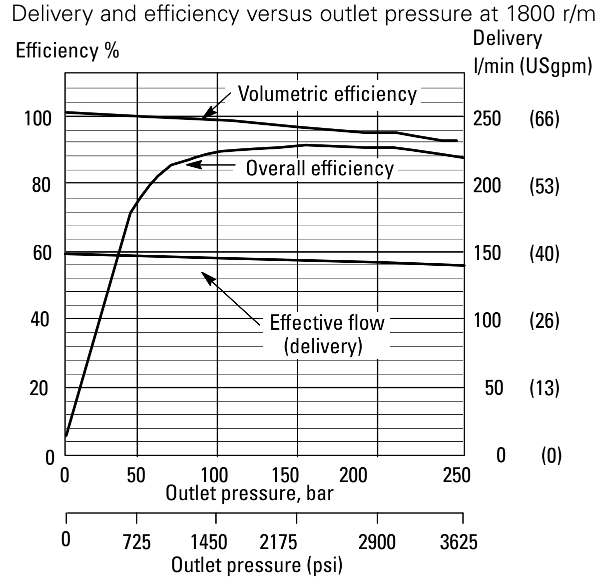


Input power versus speed

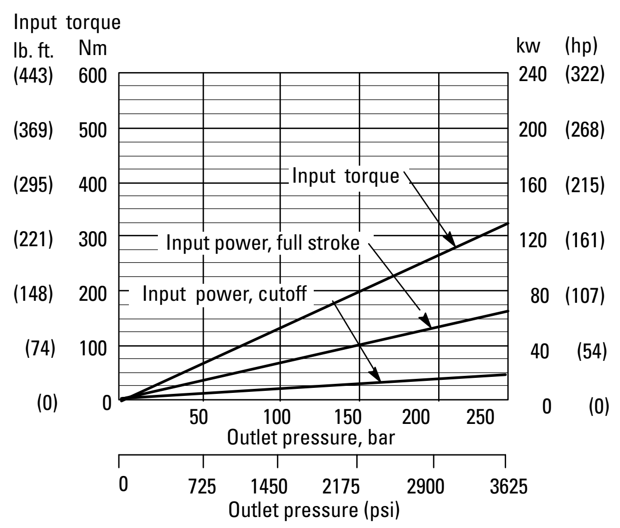


PVH081

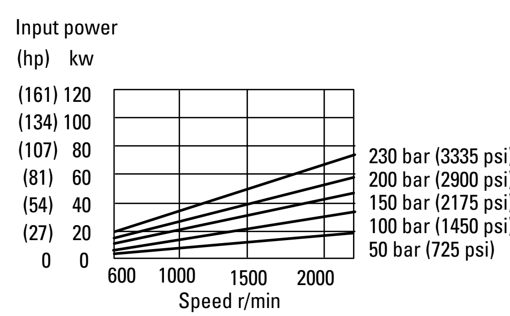
Delivery and efficiency versus outlet pressure at 1800 r/min



Input torque and power versus outlet pressure at 1800 r/min



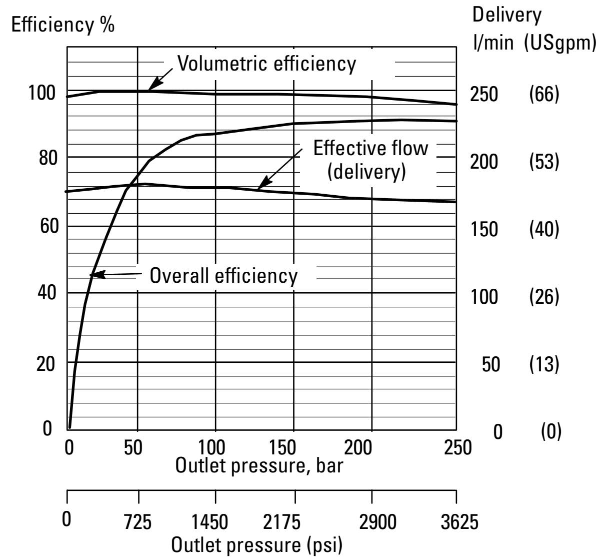
Input power versus speed



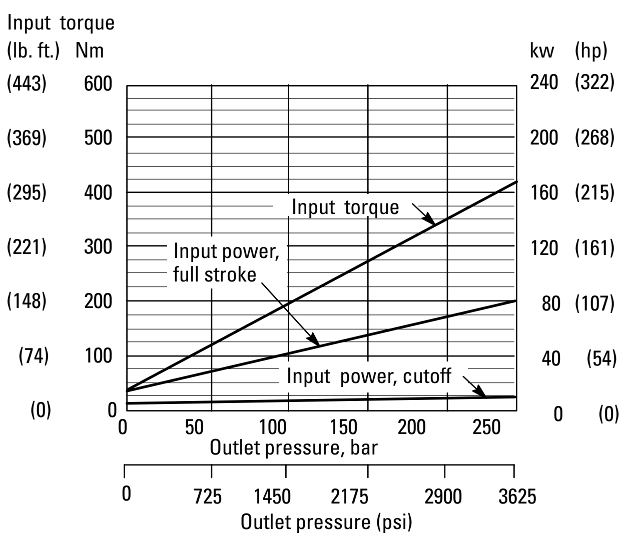
Performance Data

PVH098

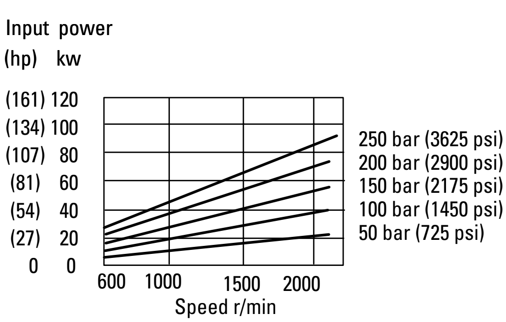
Delivery and efficiency versus outlet pressure at 1800 r/min



Input torque and power versus outlet pressure at 1800 r/min

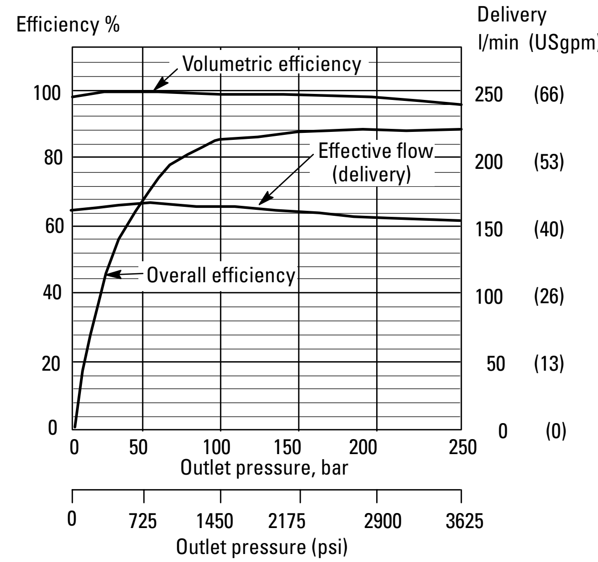


Input power versus speed

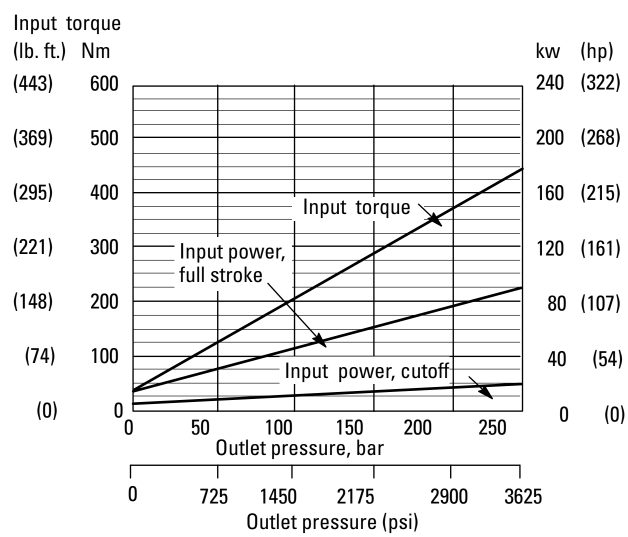


PVH106

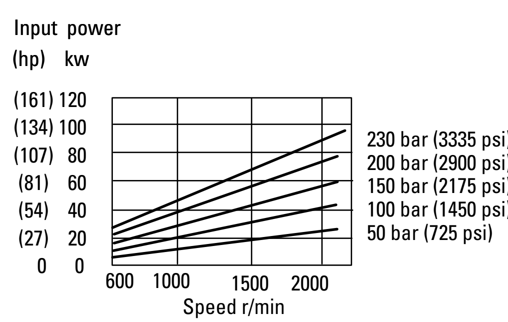
Delivery and efficiency versus outlet pressure at 1800 r/min



Input torque and power versus outlet pressure at 1800 r/min



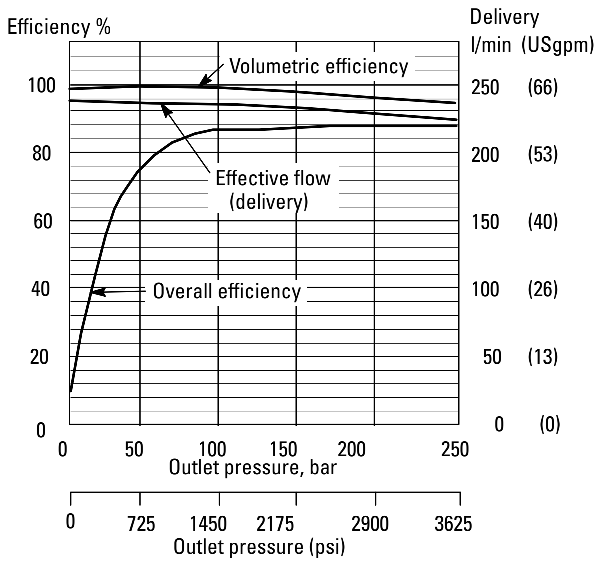
Input power versus speed



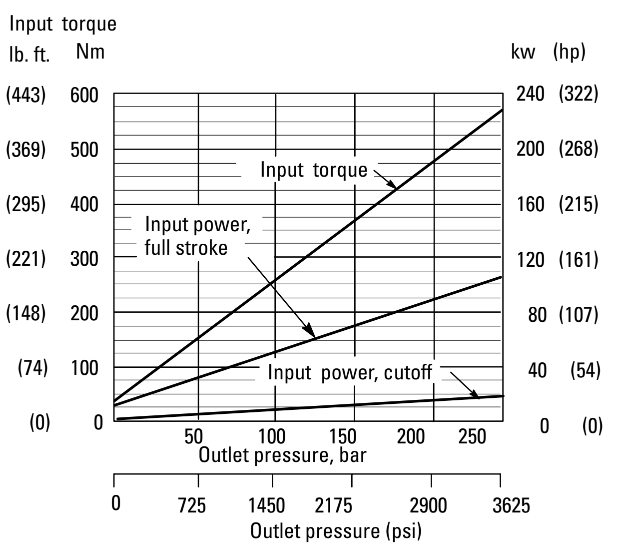
Performance Data

PVH131

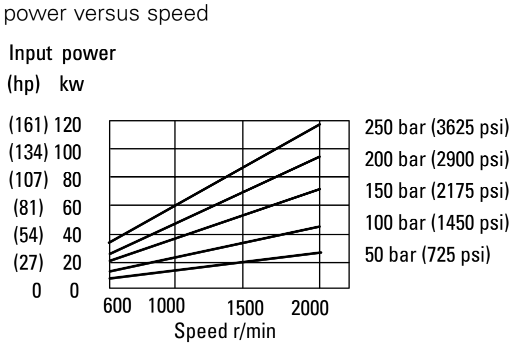
Delivery and efficiency versus outlet pressure at 1800 r/min



Input torque and power versus outlet pressure at 1800 r/min

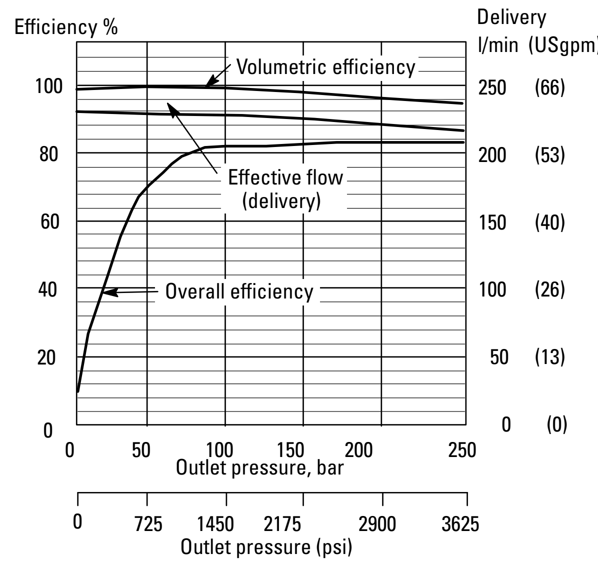


Input power versus speed

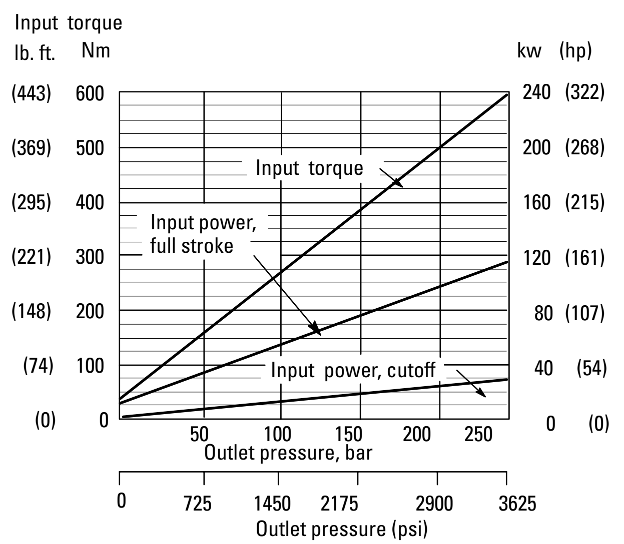


PVH141

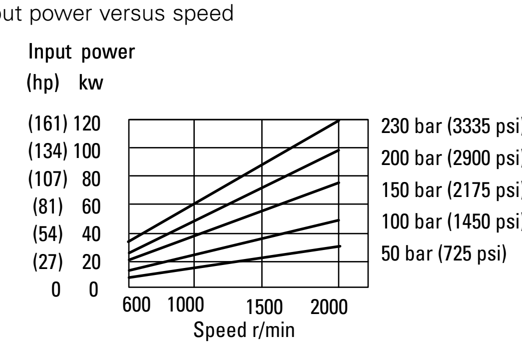
Delivery and efficiency versus outlet pressure at 1800 r/min



Input torque and power versus outlet pressure at 1800 r/min



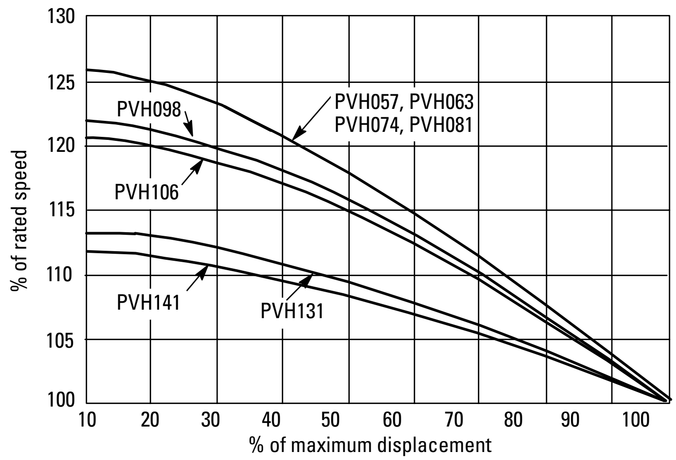
Input power versus speed



Performance Data

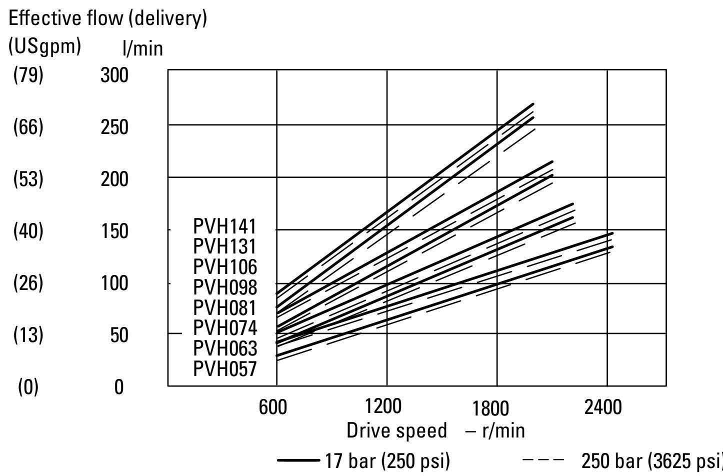
Performance data is typical with SAE 10W anti-wear hydraulic oil at 50°C (120°F) and at zero pump inlet pressure, except where otherwise indicated.

Rated Speed at Reduced Displacement and Zero Inlet Pressure

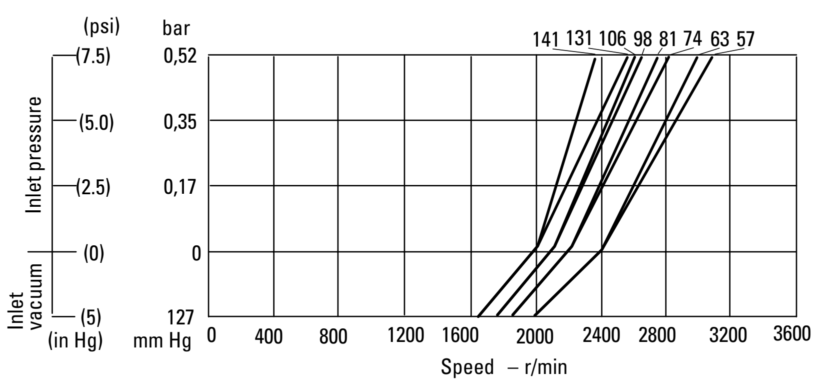


Note: Speeds at 10% displacement represent maximums at load-sense standby condition. These speeds must be reduced to rated speeds at 100% displacement before leaving standby condition, or pump damage may result.

Effective Flow at Maximum Torque



Inlet Pressure/Vacuum versus Speed, Mobile Pumps



Performance Data

Response Data

Model series/ Control type	Typical yoke response † On stroke	Off stroke
PVH057/A**	.101 sec.	.015 sec.
PVH057/B**	.080 sec.	.014 sec
PVH063	.101 sec.	.015 sec.
PVH063	.080 sec.	.014 sec
PVH074/A**	.097 sec.	.015 sec.
PVH074/B**	.088 sec.	.028 sec.
PVH081	.097 sec.	.015 sec.
PVH081	.088 sec.	.028 sec.
PVH098/A**	.134 sec.	.019 sec.
PVH098/B**	.118 sec.	.029 sec.
PVH106	.134 sec.	.019 sec.
PVH106	.118 sec.	.029 sec.
PVH131/A**	.139 sec.	.019 sec.
PVH131/B**	.118 sec.	.029 sec.
PVH141	.139 sec.	.019 sec.
PVH141	.118 sec.	.029 sec.

† Based on 6900 bar/sec (100,000 psi/sec) pressure rise at rated speed and pressure.

Sound Levels

Vickers PVH pumps are designed to provide the highest levels of system performance with noise levels within OSHA requirements. The standard models exhibit low sound levels across a wide range of operating speeds and pressures to accommodate the conditions necessary for high performance mobile vehicles. In addition, the quieter QI models provide even lower sound levels at typical in-plant conditions.

Sound is generated by a variety of factors associated with the system, machine, and environment. For more information concerning the causes and nature of noise in machinery, and methods to reduce sound levels, refer to Eaton's "More Sound Advice" bulletin 390 and "Noise Control in Hydraulic Systems" bulletin 510.

Mobile Version – Sound Level dB(a) DIN (NFPA) ‡

Pressure bar (psi)	PVH057 1200 r/min	PVH057 1800 r/min	PVH063 1800 r/min	PVH063 2300 r/min	PVH074 1200 r/min	PVH074 1800 r/min	PVH081 1800 r/min	PVH081 2100 r/min	PVH098 1200 r/min	PVH098 1800 r/min	PVH106 1800 r/min	PVH106 2000 r/min	PVH131 1200 r/min	PVH131 1800 r/min	PVH141 1800 r/min	PVH141 1900 r/min
70 (1015)	71	76	77	78	71	76	74	74	71	75	80	80	76	82	81	84
140 (2030)	76	76	77	80	76	78	75	77	74	78	84	82	81	87	86	86
210 (3025)	77	81	79	83	77	81	79	79	77	82	86	84	88	89	88	87
250 (3625)	77	81	80	84	77	81	79	79	78	84	86	85	83	90	89	88

Industrial Version* – Sound Level dB(a) DIN (NFPA) ‡

Pressure bar (psi)	PVH057 1200 r/min	PVH057 1800 r/min	PVH063 1200 r/min	PVH063 1800 r/min	PVH074 1200 r/min	PVH074 1800 r/min	PVH081 1500 r/min	PVH081 1800 r/min	PVH098 1200 r/min	PVH098 1800 r/min	PVH106 1500 r/min	PVH106 1800 r/min	PVH131 1200 r/min	PVH131 1800 r/min	PVH141 1200 r/min	PVH141 1500 r/min
70 (1015)	64	71	66	73	65	73	73	79	69	75	73	81	75	80	74	74
140 (2030)	68	73	70	72	69	74	72	78	70	76	75	84	77	84	76	78
210 (3025)	70	76	73	76	73	77	75	79	75	80	77	85	80	87	79	81
250 (3625)	71	78	73	77	73	78	76	79	77	82	78	85	82	89	79	82

‡ DIN: Computed semi-anechoic values per DIN 45635. NFPA: Recorded in a semi-anechoic chamber in accordance with NFPA Recommended Standard 13.9.70.12. All values shown are the higher of either maximum displacement or fully compensated conditions.

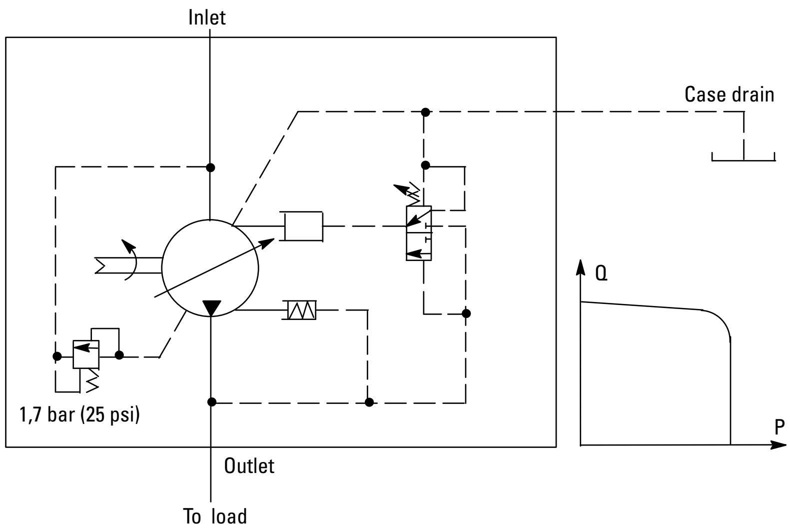
* Q250 Valve Plate

Due to the rounding of numbers during conversion, the difference between DIN and NFPA ratings may be one or two numbers; for example 69 (71) or 69 (72).

Control Options

Pressure Compensator Control (A)

The pump will provide a continuously modulated flow to meet changing load demands at a pre-adjusted compensator pressure. At pressures below the compensator setting, the pump will operate at maximum displacement. The compensator is available in two pressure ranges.



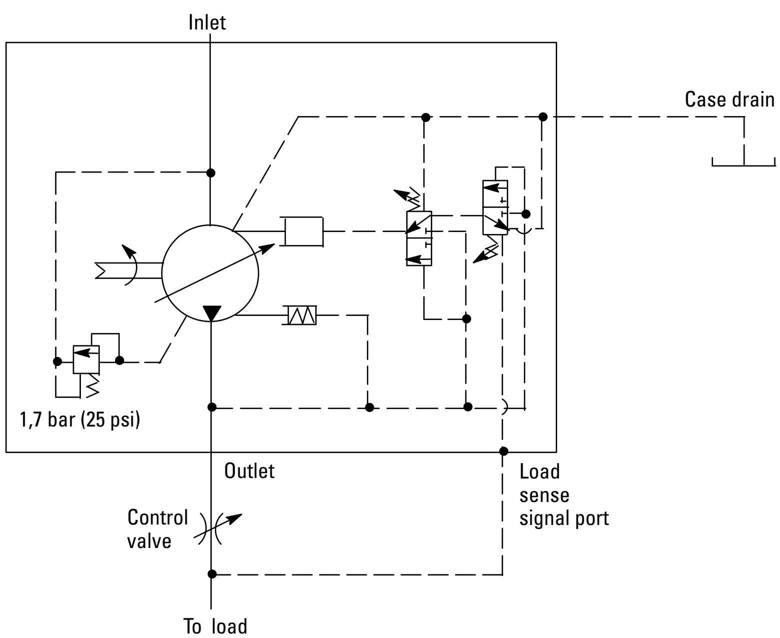
Load Sensing and Pressure Compensator Control (B)

The pump will provide power matching of pump output to system load demand, maximizing efficiency and improving load metering characteristics of any directional control valve installed between the pump and the load.

Load sensing ensures that the pump always provides only the amount of flow needed by the load. At the same time, the pump operating pressure adjusts to the actual load pressure plus a pressure differential required for the control action. When the system is not demanding power, the load sense control will operate in an energy-saving stand-by mode.

Typically, the differential pressure is that between the pressure inlet and service port of a proportionally controlled directional valve, or a load sensing directional control valve. The standard differential pressure setting for load sense is 20 bar (290 psi), but can be adjusted to between 17 and 30 bar (247 and 435 psi) on the pump.

If the load pressure exceeds the system pressure setting, the pressure compensator destrokes the pump. The load sensing line must be as short as possible and can also be used for remote control or unloading of the pump pressure. For remote control purposes, it is recommended that you contact your Vickers representative for the correct configuration of the control.



Control Options

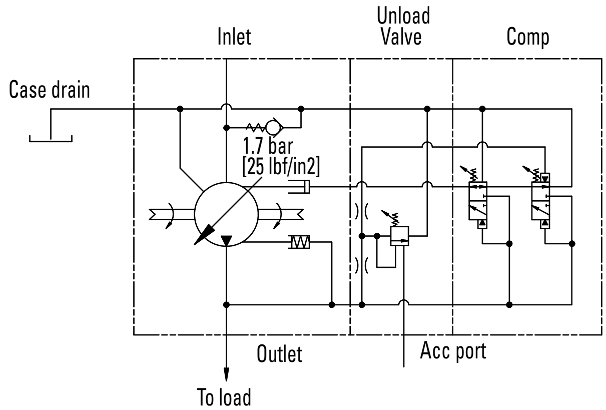
Pressure and Flow Compensator with Unloading Valve for Accumulator Circuit
This pump control functions as a load-sensing pressure compensator that unloads the pump at a preset pressure and loads the pump after preset pressure drop.

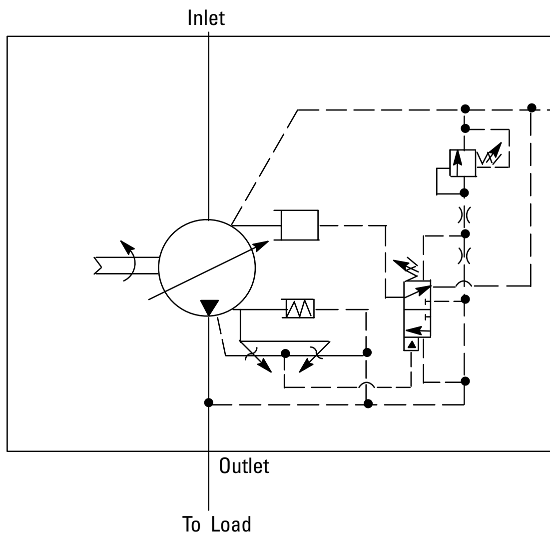
Pressure and Torque Limiter Control (D)
The pump senses pressure and flow and starts destroking at a predetermined input torque level. The rate of flow reduction is normally tailored to follow the maximum power capability curve of the prime mover. Input torque is limited while the pressure compensator limits the system pressure.

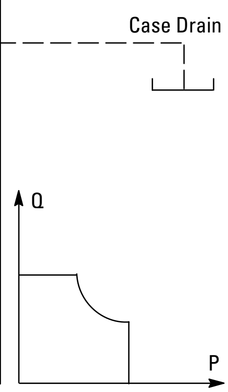
When the input speed remains constant (i.e. industrial drives), the torque limiter acts as an input power limiter. This allows a smaller electric motor to be used if maximum pressure and maximum flow are not required at the same time. At low load levels, the control permits high pump displacement and high load speeds. Under heavy loads, speed is reduced, preventing stalling of the prime mover. In the case of variable speed drives (I.C. engines), this function provides, in addition to pressure compensation or limiting, a torque limiting ability that can be adjusted to the torque/speed characteristics of the engine.

The start of torque limiting (pump-destroking) is pressure dependent. This pressure is selectable (see model code) and is factory preset to between 30% and 80% of the maximum pressure control setting. The minimum torque pressure setting is 40 bar (580 psi).

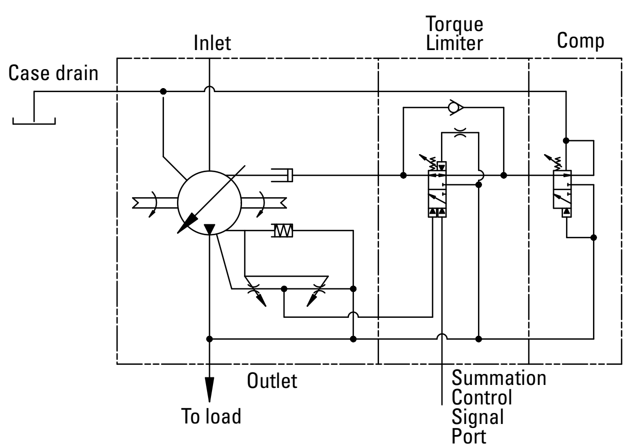
Unloading Valve Circuit (N)







Summation Control (C)

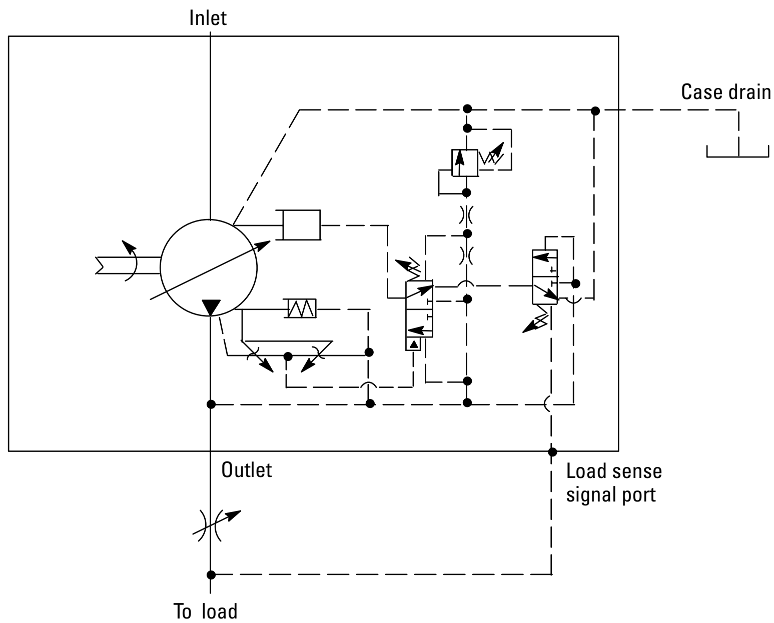


Control Options

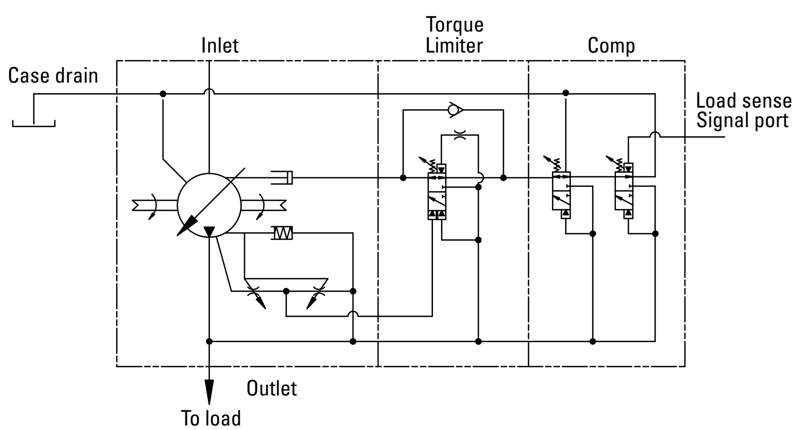
Pressure and Torque Limiting, Plus Load Sensing, Control (E)

The pump's control functions like a load sensing control, but with additional torque limiting tailored to the size of the drive motor selected. The limiting function is the same as for a pressure compensator with torque limiting (see D description, previous page). The combination of the two controls provides the following benefits:

1. The energy savings of a variable displacement load sensing control.
2. The pump pressure follows the load pressure.
3. The torque control allows smaller drive motors to be used.
4. The pressure compensator de-strokes the pump as maximum pressure is reached.
5. The pump pressure can also be remotely controlled using the load sense line. The E control allows complete control of flow and pressure, either mechanically or electrically, if used with proportional valves.



Sumation Control (F)



Industrial Control Compensator

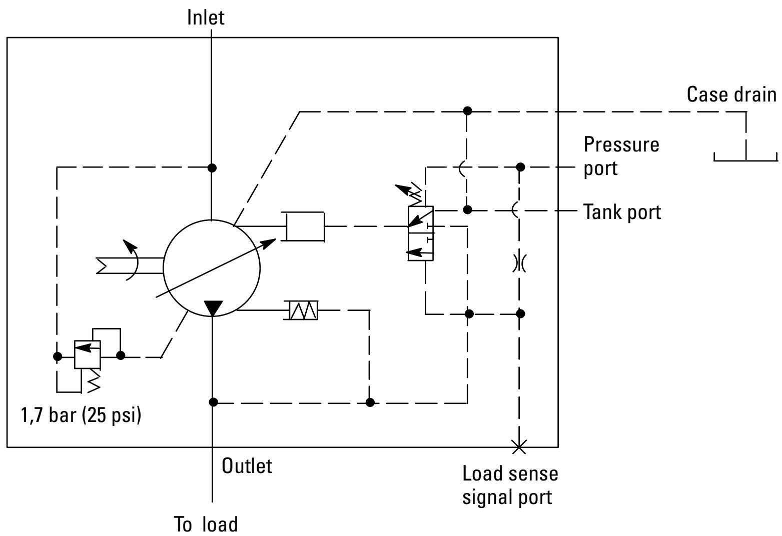
This pump is intended for use when multiple, remote, or electrically controlled compensating settings, with or without load sensing or, with or without torque control are desired.

Pressure compensation is obtained when an internal plug is removed, the load-sense signal port is kept plugged, and internal pilot pressure is applied to the spring chamber of the control spool. For pressure compensation with load sensing, the internal plug stays, the load-sense signal port is unplugged, and pilot pressure is externally applied.

An external relief valve (not supplied) controls spring chamber pressure. The externally adjustable spring determines the differential pressure setting of the control. Outlet pressure is limited to the value of the spring chamber (pressure port) pressure, plus control differential pressure.

(continued on next page)

Pressure Compensating Without Load Sensing (G)



Industrial Control Compensator

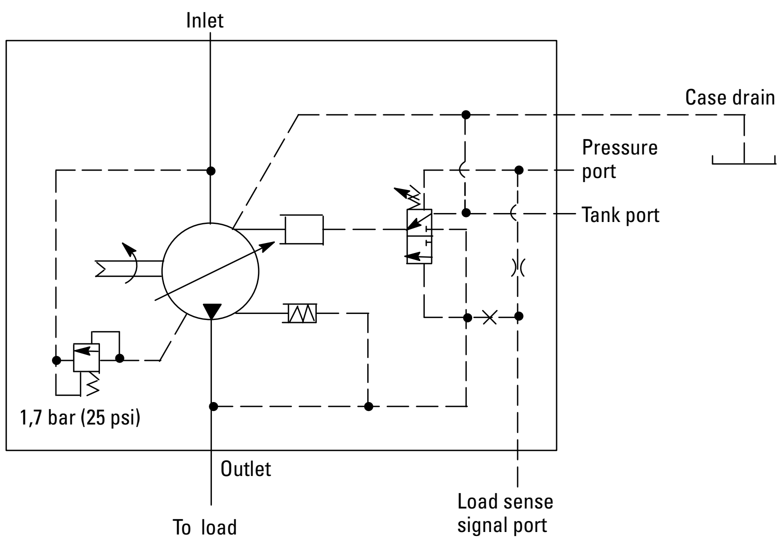
(continued)

Spring chamber (pilot) pressure is separated from outlet pressure by an internal orifice. Outlet pressure shifts the spool when pressure drop across the orifice reaches the differential pressure setting, and the pump de-strokes.

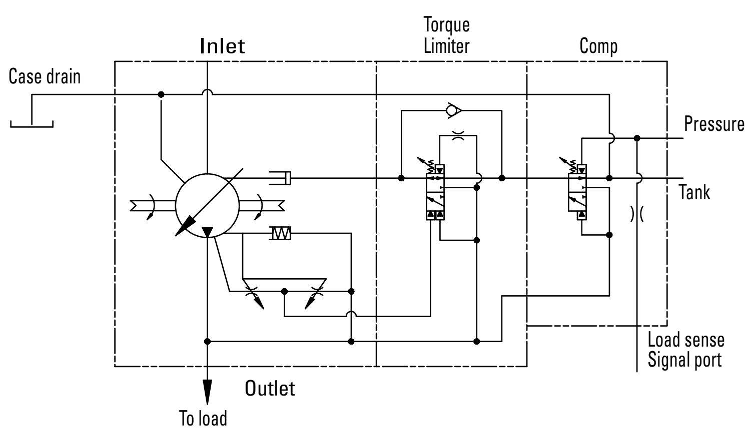
The relief valve can be mounted to an NFPA-D03/ISO 4401-03 pad on the pump control, or remotely located via tapping and blanking plates installed on the pad. See "Ordering Procedure", page 35, for more on valves and plates.

The standard factory-set differential pressure setting of the pump control is 20 bar (290 psi) and is not specified in the pump model number. Any other ordered differential pressure, within the control's adjustable pressure range of 17–35 bar (247–508 psi), will be specified in the model number.

Pressure Compensating with Load Sensing (H)



Pressure Compensating with Load Sensing and Torque Control (J)



Input Shaft Selection Data

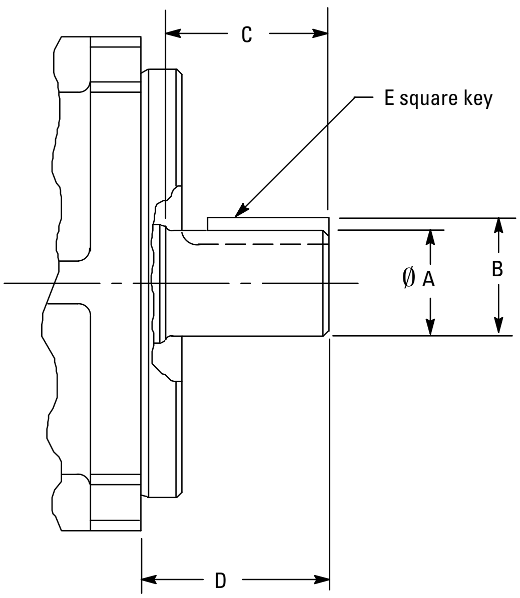
Multiple pump arrangements can be formed by a PVH thru-drive pump and any suitable pump (single or multiple) that can be installed on the SAE “A”, “B”, or “C” rear-mounting option available for the thru-drive pump.

It is important to check that maximum torque values for individual pump sections, or complete pumps, occurring in a specific application will not exceed the limits tabled below.

Shaft Code	Shaft Designation	Basic Pump Series	Thru-drive Pump Series	Maximum Input Torque Nm (lb. in.)	Maximum Thru-drive Output Torque Nm (lb. in.)
N	ISO 3019/2 – E32N	PVH057/063	–	450 (3,980)	–
	short straight keyed	PVH074/081	–	450 (3,980)	–
1	SAE “C” (J744-32-1)	PVH057/063	PVH057/063	450 (3,980)	335 (2,965)
	straight keyed	PVH074/081	–	450 (3,980)	–
		PVH098/106	–	450 (3,980)	–
2	SAE “C” (J744-32-4)	PVH057/063	PVH057/063	640 (5,660)	335 (2,965)
	14T 12/24 DP FRSF spline	PVH074/081	–	640 (5,660)	–
		PVH098/106	–	640 (5,660)	–
3	SAE “CC” (J744-38-4)	–	PVH074/081	1215 (10,750)	460 (4.070)
	17T 12/24 DP FRSF spline	–	PVH098/106	1215 (10,750)	640 (5,660)
		PVH131/141	PVH131/141	1215 (10,750)	640 (5,660)
12	SAE “D” (J744-44-4)	PVH131/141	PVH131/141	1215 (10,750)	640 (5,660)
	13T 8/16 DP FRSF spline				
13	SAE “CC” (J744-38-1)	–	PVH074/081	765 (6,770)	460 (4.070)
	straight keyed	–	PVH098/106	765 (6,770)	460 (4.070)
		PVH131/141	–	765 (6,770)	–
16	SAE “D” (J744-44-1)	–	PVH131/141	1200 (10,620)	640 (5,660)
	straight keyed				

Note: Any deviation from maximum input torques must be approved by Eaton. To assure developed thru-drive loads are within PVH pump limitations, actual torque values must not exceed values shown.

Input Shaft Dimensions



Straight Keyed Shafts*

Shaft Code	Shaft Designation	A	B	C	D	E
1	SAE “C” (J744-32-1)	31,75 (1.25)	35,32 (1.38)	48,0 (1.89)	56,0 (2.20)	7,93 (.312)
13	SAE “CC” (J744-38-1)	38,10 (1.50)	42,39 (1.67)	54,0 (2.12)	62,0 (2.44)	9,52 (.375)
16	SAE “D” (J744-44-1)	44,45 (1.75)	49,46 (1.95)	67,0 (2.64)	75,0 (2.95)	11,11 (.438)
N	ISO 3019/2–E32N	32,00 (1.26)	35,00 (1.38)	58,0 (2.28)	68,1 (2.68)	10,00 (.393)

* See torque limits on previous page.

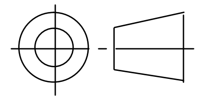
Spline Shafts*

Shaft code	Shaft designation	Number of teeth	C	D
2	SAE “C” (J744-32-4)	14	48,0 (1.89)	56,0 (2.20)
3	SAE “CC” (J744-38-4)	17	54,0 (2.13)	62,0 (2.44)
12	SAE “D“ (J744-44-4)	13	67,0 (2.64)	75,0 (2.95)

* See torque limits on previous page.

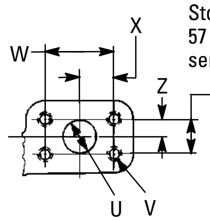
Installation Dimensions

Basic Pump with Pressure Compensator and Load Sense Controls

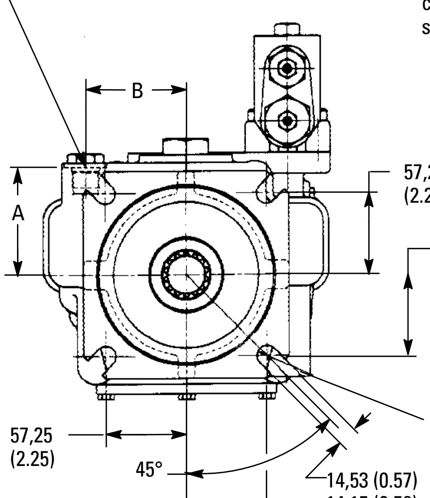


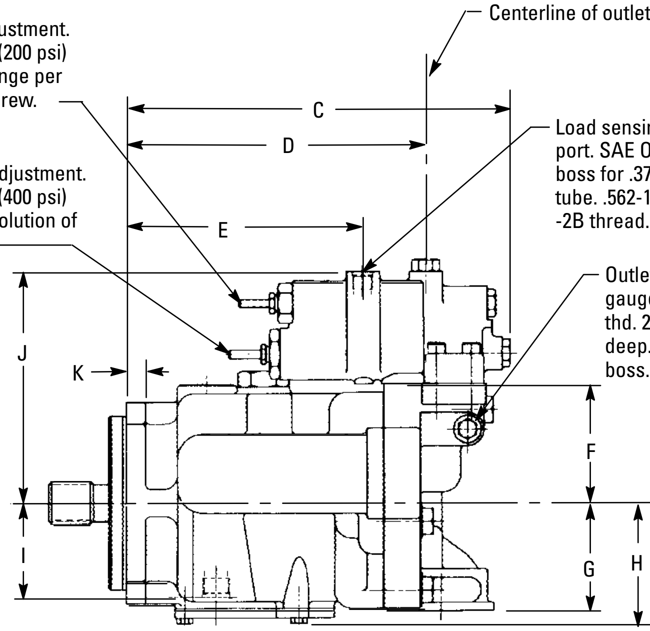
3rd angle projection

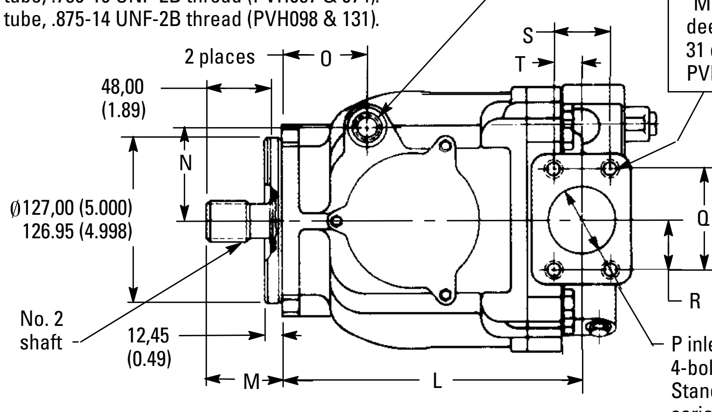
Dimensions in mm (inches)



View A-A







For shaft options and dimensions, see pages 16 and 17. Standard SAE pump mounting flange shown; see page 26 for optional SAE 2-bolt/4-bolt and ISO flanges. See page 29 for shaft-up mounting option.

Installation Dimensions

Basic Pump with Pressure Compensator and Load Sense Controls

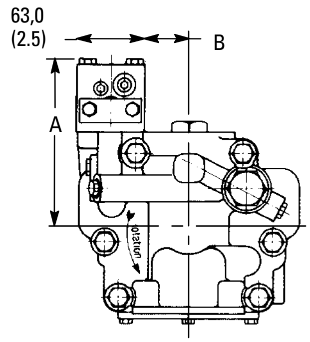
	A	B	C	D	E	F	G	H	I
PVH057	76,0	71,0	293,0	216,5	171,3	86,0	79,0	88,0	69,0
PVH063	(2.99)	(2.79)	(11.54)	(8.52)	(6.74)	(3.39)	(3.11)	(3.46)	(2.71)
PVH074	88,0	70,0	306,6	241,2	194,3	92,0	94,0	95,0	81,0
PVH081	(3.46)	(2.75)	(12.07)	(9.50)	(7.65)	(3.62)	(3.70)	(3.74)	(3.19)
PVH098	93,1	85,0	323,5	251,3	206,1	94,5	87,5	97,1	80,1
PVH106	(3.67)	(3.35)	(12.74)	(9.89)	(8.11)	(3.72)	(3.44)	(3.82)	(3.15)
PVH131	109,4	88,8	377,0	280,4	230,4	120,0	109,0	107,4	84,8
PVH141	(4.31)	(3.50)	(14.84)	(11.04)	(9.07)	(4.72)	(4.29)	(4.23)	(3.34)

	J	K	L	M	N	O	P	Q	R
PVH057	168,0	14,0	227,4	56,1	71,0	64,8	50,8	77,77	38,88
PVH063	(6.6)	(0.55)	(8.95)	(2.21)	(2.80)	(2.55)	(2.0)	(3.06)	(1.53)
PVH074	174.0	15,0	250,1	56,0	70,0	68,0	50,8	77,77	38,88
PVH081	(6.85)	(0.59)	(9.85)	(2.20)	(2.75)	(2.68)	(2.0)	(3.06)	(1.53)
PVH098	176,5	16,0	269,3	55,5	85,0	74,2	63,5	88,9	44,45
PVH106	(6.95)	(0.63)	(10.60)	(2.18)	(3.35)	(2.92)	(2.5)	(3.50)	(1.75)
PVH131	202,0	15,0	298,6	62,0	88,8	70,6	63,5	88,9	44,45
PVH141	(7.95)	(0.59)	(11.75)	(2.44)	(3.50)	(2.78)	(2.5)	(3.50)	(1.75)

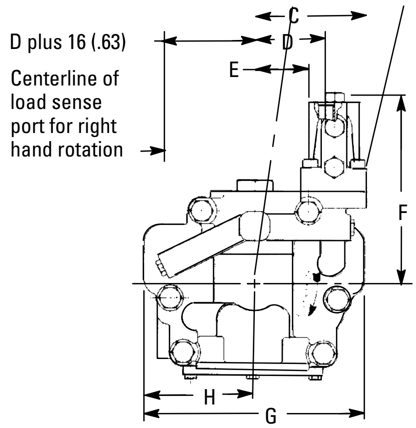
	S	T	U	V		W	X	Y	Z
PVH057	42,88	21,44	25,4	M10x1,5		52,37	26,18	26,19	13,10
PVH063	(1.69)	(0.84)	(1.0)	(.375-16)		(2.06)	(1.03)	(1.03)	(0.52)
PVH074	42,88	21,44	25,4	M10x1,5		52,37	26,18	26,19	13,10
PVH081	(1.69)	(0.84)	(1.0)	(.375-16)		(2.06)	(1.03)	(1.03)	(0.52)
PVH098	50,8	25,4	25,4	M10x15		52,37	26,19	26,19	13,10
PVH106	(2.0)	(1.0)	(1.0)	(.375-16)		(2.06)	(1.03)	(1.03)	(0.52)
PVH131	50,8	25,4	31,75	M14x2,0		66,68	33,34	31,75	15,88
PVH141	(2.0)	(1.0)	(1.25)	(.500-13)	(2.63)	(1.31)	(1.25)	(0.63)	

Installation Dimensions

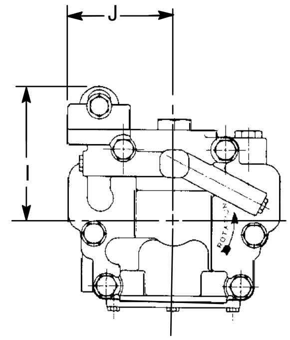
Basic Pump. Rear View with Various Controls



Right hand rotation, pressure compensated and torque limit model



Left hand rotation, pressure compensated and load sensing model

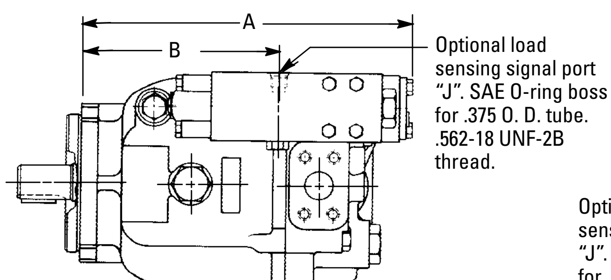


Right hand rotation, pressure compensated model

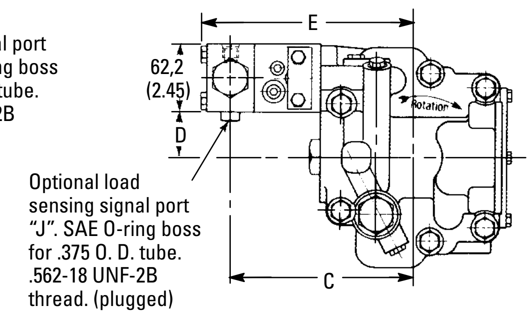
	A	B	C	D	E	F	G	H	I	J
PVH057	176,45	41,0	102,7	64,5	49,0	176,6	203,0	101,5	127,0	102,7
PVH063	(6.95)	(1.61)	(4.04)	(2.54)	(1.93)	(6.95)	(7.99)	(4.00)	(5.00)	(4.04)
PVH074	182,45	47,5	109,2	71,0	55,5	182,6	224,0	112,0	133,0	109,2
PVH081	(7.18)	(1.87)	(4.30)	(2.79)	(2.19)	(7.18)	(8.82)	(4.41)	(5.23)	(4.30)
PVH098	195.45	41,0	102,7	65,5	49,0	185,1	233,0	116,5	135,5	102,7
PVH106	(7.69)	(1.61)	(4.04)	(2.54)	(1.93)	(7.280)	(9.17)	(4.59)	(5.33)	(4.04)
PVH131	210,50	63,6	125,2	87,0	71,5	210,6	254,2	127,1	161,0	125,2
PVH141	(8.29)	(2.50)	(4.92)	(3.42)	(2.81)	(8.29)	(10.00)	(5.00)	(6.37)	(4.92)

*Add 16,0 (.63) to dimension D for right hand rotation model.

Pump with Pressure Compensation, Load Sense and Torque Limit Controls



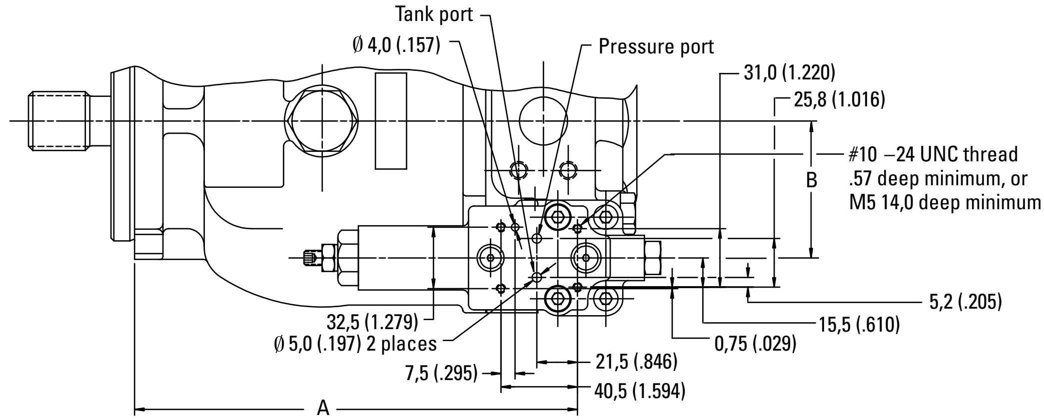
Left hand rotation, pressure compensated with load sense and torque limit model

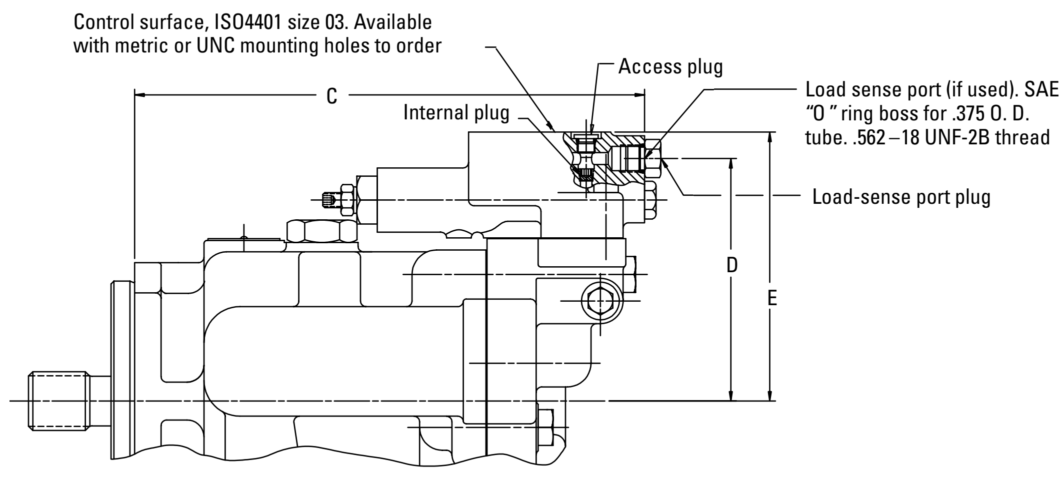


	A	B	C	D	E
PVH057	316,3	177,4	168,1	41,4	195,4
PVH063	(12.45)	(6.98)	(6.62)	(1.63)	(7.69)
PVH074	335,5	200,1	174,1	47,9	201,4
PVH081	(13.34)	(7.88)	(6.85)	(1.86)	(7.93)
PVH098	351,0	212,3	187,1	41,4	214,4
PVH106	(13.82)	(8.36)	(7.37)	(1.63)	(8.44)
PVH131	375,3	236,6	202,2	63,8	229,5
PVH141	(14.78)	(9.31)	(7.96)	(2.51)	(9.04)

Installation Dimensions

Pump with IC Compensator (Remotely Controllable Pressure Compensator, and Optional Load Sensing)





Pressure compensator:

Remove access plug, using 1/8 inch hex wrench. Remove internal plug, using 5/32 inch hex wrench. Replace access plug and torque to 12,1–12,4 Nm (107–110 lb. in.). Attach relief valve hardware (not supplied) to control surface. See page 15 for more details.

Pressure compensator with load sensing:

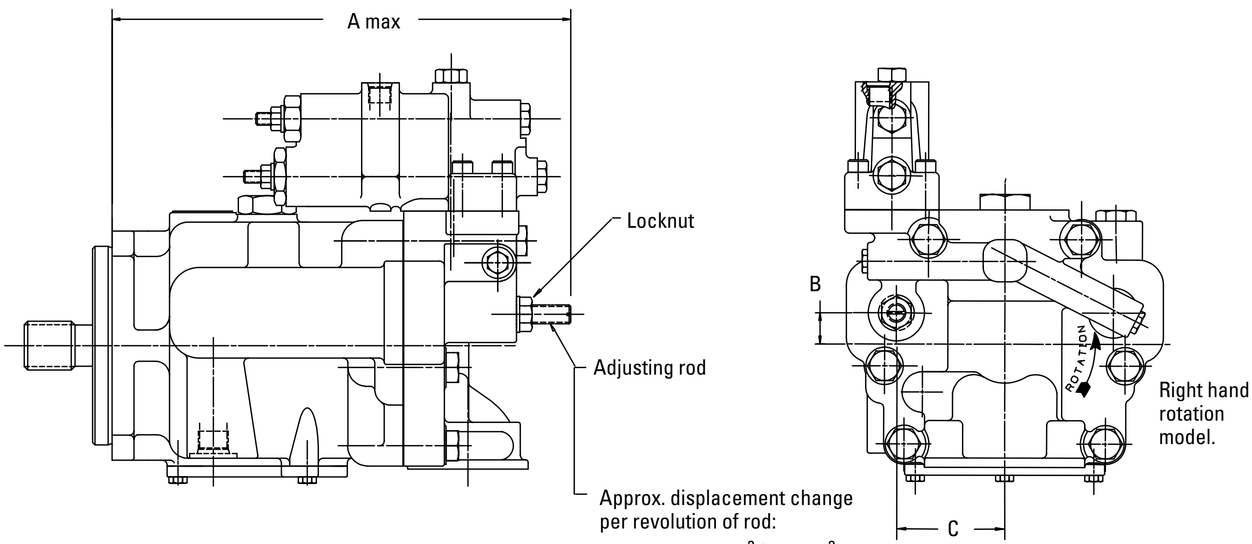
Remove load-sense port plug. (Internal plug must remain in place.) Attach line to load-sense port. Pressure decay rate of this line must not exceed 11 kbar/second (160 kpsi/second). Attach relief valve hardware (not supplied) to control surface. See page 15 for more details.

	A	B	C	D	E
PVH057	234,5	72,5	269,9	128,0	142,0
PVH063	(9.23)	(2.85)	(10.62)	(5.04)	(5.59)
PVH074	257,2	79,0	292,6	134,0	148,0
PVH081	(10.12)	(3.11)	(11.52)	(5.27)	(5.83)
PVH098	269,3	72,5	304,7	136,5	150,5
PVH106	(10.60)	(2.85)	(12.00)	(5.37)	(5.92)
PVH131	293,6	95,0	329,0	162,0	176,0
PVH141	(11.56)	(3.74)	(12.95)	(6.38)	(6.93)

Installation Dimensions

Pump with Adjustable Maximum Volume Stop

This option allows maximum pump delivery to be externally adjusted from 100 percent down to 25 percent. To assist initial priming, adjust stop to allow at least 40 percent of maximum delivery. Adjust by loosening locknut and turning adjusting rod clockwise to decrease maximum delivery, or counter-clockwise to increase maximum delivery. When desired setting is obtained, torque locknut to 25-50 Nm (18-36 lb. ft.).

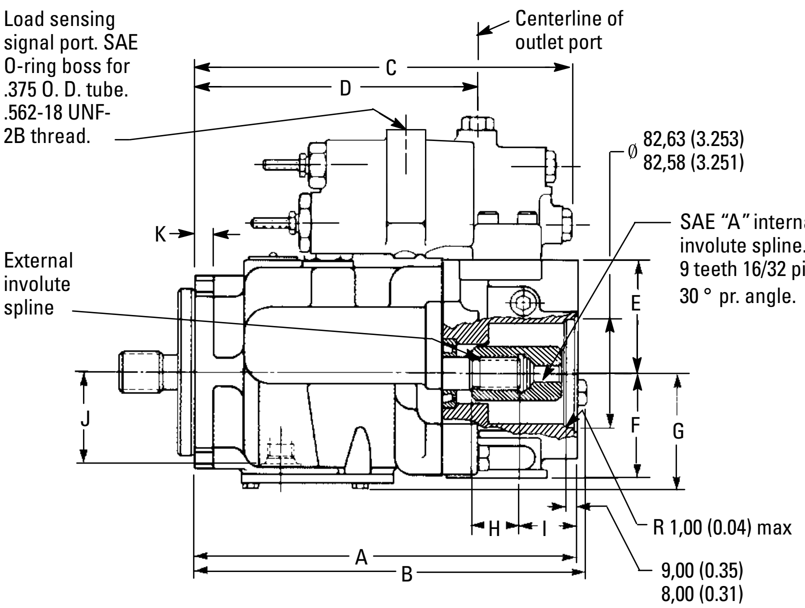


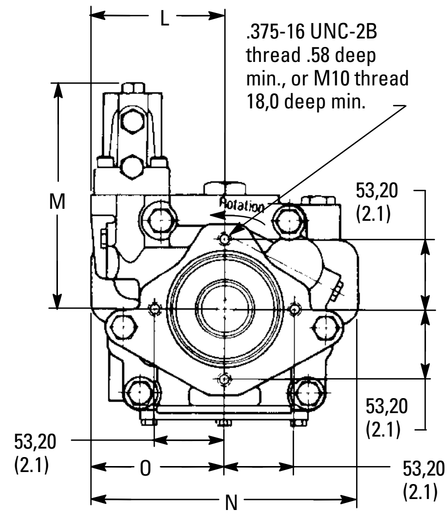
PVH057 – 4,25 cm^3 (0.259 in^3)
PVH063 – 4,70 cm^3 (0.287 in^3)
PVH074 – 5,00 cm^3 (0.305 in^3)
PVH081 – 5,47 cm^3 (0.334 in^3)
PVH098 – 6,25 cm^3 (0.381 in^3)
PVH106 – 6,76 cm^3 (0.413 in^3)
PVH131 – 8,50 cm^3 (0.519 in^3)
PVH141 – 9,15 cm^3 (0.559 in^3)

	A	B	C
PVH057	293,0	20,0	69.5
PVH063	(11.53)	(.79)	(2.74)
PVH074	306,6	22,0	76,0
PVH081	(12.07)	(.87)	(2.99)
PVH098	323,5	27,5	81,0
PVH106	(12.74)	(1.08)	(3.19)
PVH131	377,0	37,5	88,8
PVH141	(14.84)	(1.48)	(3.50)

Installation Dimensions

Thru-drive Pumps with SAE "A" Rear Pad





For shaft options and dimensions, see page 16 and 17. See page 26 for optional cover for rear pad.

Note: The O-ring for sealing the rear mounting pad is furnished with the pump. The rear drive coupling shown must be ordered separately; see page 23.

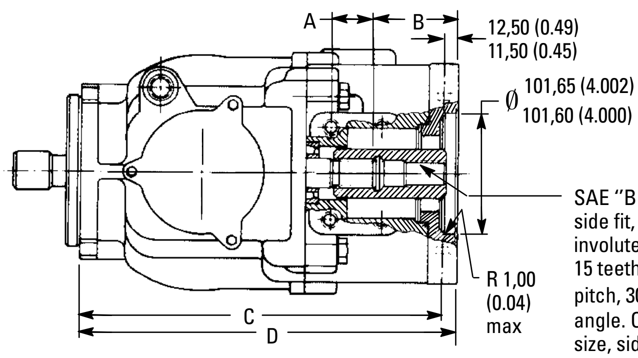
Right hand rotation, pressure compensated and load sensing model.

	A	B	C	D	E	F	G	H
PVH057	287,9	295,4	275.8	216,4	86,0	79,0	88,0	36,4
PVH063	(11.3)	(11.6)	(10.86)	(8.52)	(3.38)	(3.11)	(3.46)	(1.43)
PVH074	310,6	318,1	300,5	241,2	92,0	94,0	95,0	38,5
PVH081	(12.23)	(12.52)	(11.83)	(9.50)	(3.62)	(3.70)	(3.74)	(1.51)
PVH098	322,8	N/A	312,7	251,3	94,5	87,5	97,1	33,0
PVH106	(12.71)		(12.31)	(9.89)	(3.72)	(3.44)	(3.82)	(1.30)
PVH131	347,1	N/A	337,0	280,4	120,0	109,0	107,4	35,3
PVH141	(13.660)		(13.27)	(11.04)	(4.72)	(4.29)	(4.23)	(1.39)

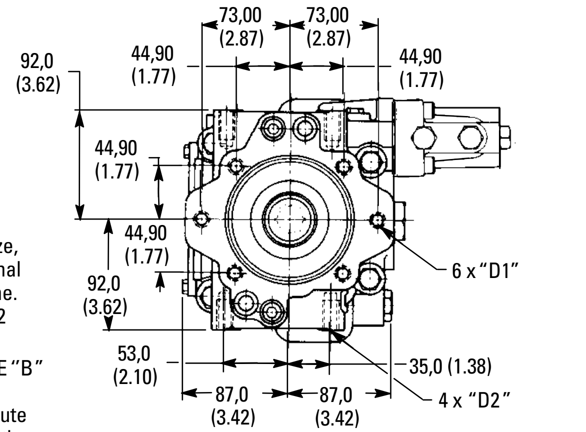
	I	J	K	L	M	N	O
PVH057	43,6	69,0	14,0	102,7	176,6	203,0	101,5
PVH063	(1.72)	(2.71)	(0.55)	(4.04)	(6.95)	(7.99)	(4.00)
PVH074	43,8	81,0	15,0	109,2	182,6	224,0	112,0
PVH081	(1.72)	(3.19)	(0.59)	(4.30)	(7.18)	(8.82)	(4.41)
PVH098	44,6	80,1	16,0	102,7	185,1	233,0	116,5
PVH106	(1.75)	(3.15)	(6.30)	(4.04)	(7.28)	(9.17)	(4.59)
PVH131	44,7	84,8	15,0	125,2	210,6	254,2	127,1
PVH141	(1.76)	(3.34)	(0.59)	(4.93)	(8.29)	(10.0)	(5.00)

Installation Dimensions

Thru-drive Pumps with SAE "B" Rear Pad Adapter

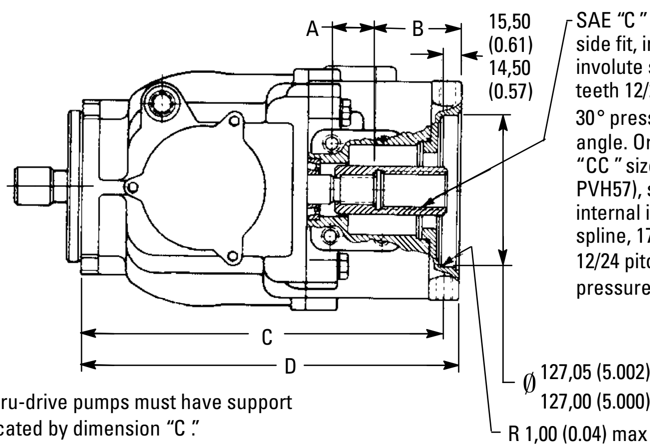


Thru-drive pumps must have support located by dimension "C."

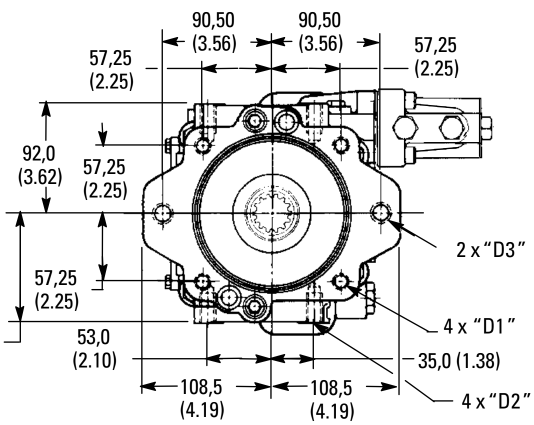


SAE "B" rear mounting. Mounting pad is machined to accept AS568-155 O-ring. Mounting pad is connected to pump case and must be sealed.

Thru-drive Pumps with SAE "C" Rear Pad Adapter



Thru-drive pumps must have support located by dimension "C."



SAE "C" rear mounting. Mounting pad is machined to accept AS568-159 O-ring. Mounting pad is connected to pump case and must be sealed.

Pump Model	A	B	C	D
PVH057	36,4	68,8	300,4	312,9
PVH063	(1.43)	(2.71)	(11.82)	(12.32)
PVH074	33,5	68,3	323,1	335,6
PVH081	(1.32)	(2.69)	(12.72)	(13.21)
PVH098	33,0	69,8	335,3	347,7
PVH106	(1.30)	(2.75)	(13.20)	(13.69)
PVH131	35,3	69,7	359,6	372,1
PVH141	(1.39)	(2.74)	(14.16)	(14.65)

	D1	D2	D3
Metric	M14x2,00	M12x1,75	M16x2,00
	25 deep	25 deep	25 deep
Inch	0,500-13 0.500-13 0.625-11		
	UNC-2B	UNC-2B	UNC-2B
	1.0 deep 1.0 deep 1.0 deep		

Note: The O-ring for sealing the rear mounting pad is furnished with the pump. The rear drive couplings shown must be ordered separately; see following page.

Thru-drive Flange Kit and Shaft Coupling

Front Pump Model Series	SAE (J744) Mounting Flange for Rear Pump	Mounting Flange Adapter Kit Number* Metric Threads	Inch Threads	Coupling Part Number**
PVH057	A (J744-82-2)	None required	None required	526682
PVH063	B (J744-101-2/4)	876394	876390	526694
	BB (J744-101-2/4)	876394	876390	526695
	C (J744-127-2/4)	876392	876389	526696
PVH074	A (J744-82-2)	None required	None required	864460
PVH081	B (J744-101-2/4)	876394	876390	864457
	BB (J744-101-2/4)	876394	876390	864459
	C (J744-127-2/4)	876392	876389	864458
	CC (J744-127-2/4)	876392	876389	864461
PVH098	A (J744-82-2)	None required	None required	877039
PVH106	B (J744-101-2/4)	876394	876390	877040
PVH131	BB (J744-101-2/4)	876394	876390	877044
PVH141	C (J744-127-2/4)	876392	876389	877045
	CC (J744-127-2/4)	876392	876389	877046

*The basic PVH thru-drive pump has an SAE “A” pad on the rear. An SAE “B” or “C” pad rear mounting requires flange adapters. Required adapters can be provided if specified in the pump model code. The best combination of price, availability and flexibility is achieved by ordering a PVH SAE “A” thru-drive model and the applicable PVH mounting flange adapter separately. For example, a PVH074C-RCF-3S-10-C25-31 may also be ordered as a PVH074C-RAF-3S-10-C25-31 and a 876389 flange adapter.

** Thru-drive shaft couplings must be ordered separately to drive the second pump.

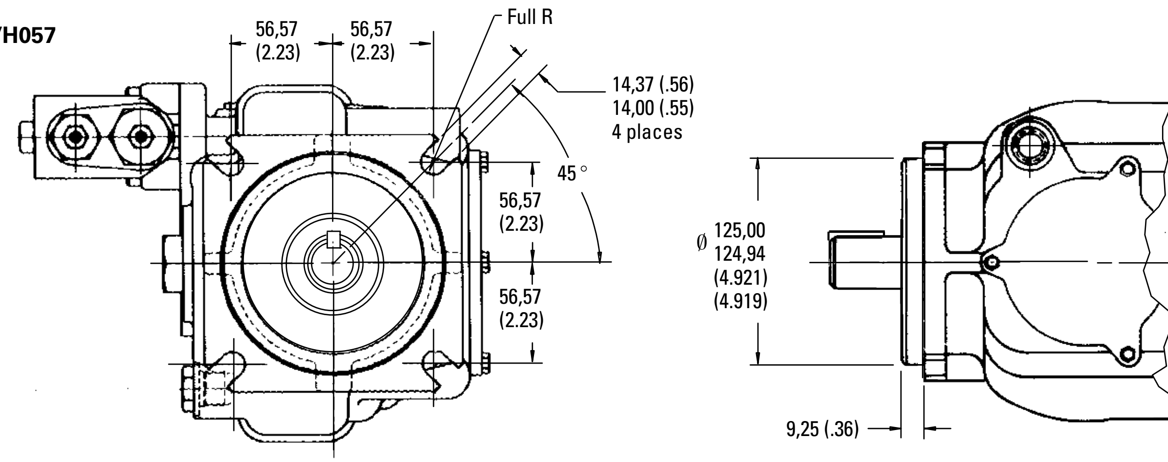
Typical Rear Pumps for Thru-drive Assemblies

Mounting	Piston pump Series	Shaft Code	Vane pump Series	Shaft Code
SAE A	PVQ10/13	3	V10	11
			V20	62
SAE B	PVQ20/32	3	20V	151
	PVQ40/45	3	25V	11
	PVE19/21	9	V2020	11
SAE BB	PVE19/21	2		
	TA19	2		
SAE C	PVH057/063	2	35V	11
	PVH074/081	2	352*V	11
	PVH098/106	2		
SAE CC	PVH131/141	3		

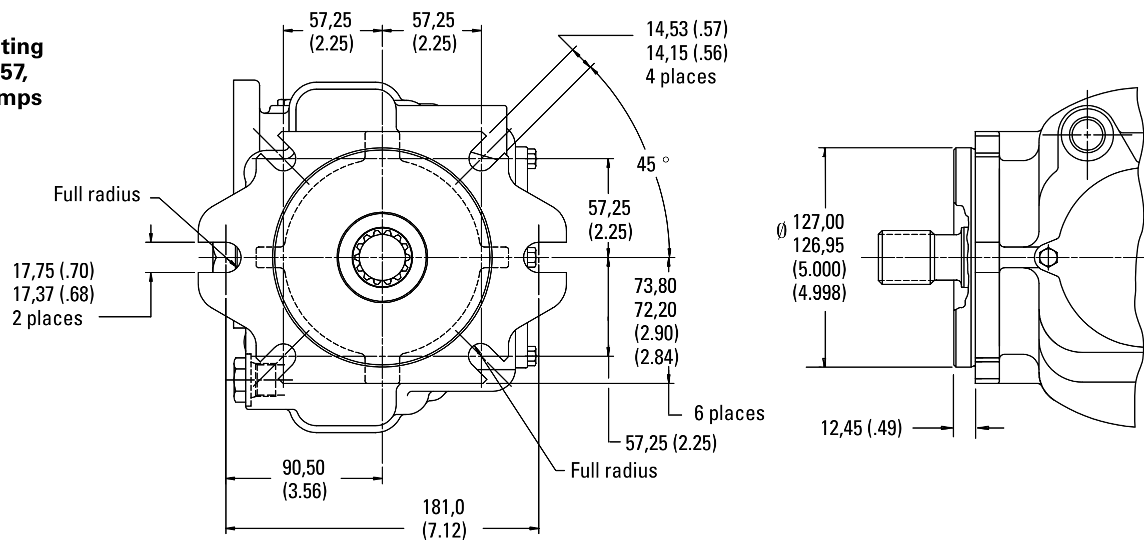
NOTE: The above Vickers pumps are examples of rear pumps for the thru-drive pumps dimensioned on pages 25 and 26. The thru-drive torque limits identified in the chart on page 16 must not be exceeded when applying these multiple pump systems.

Installation Dimensions

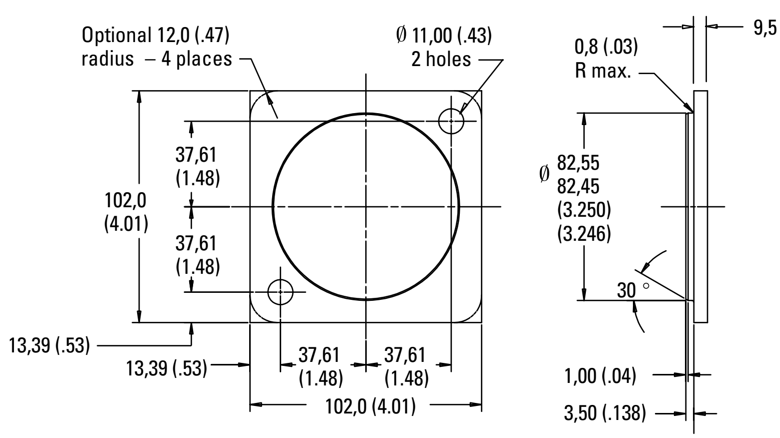
ISO 3019/2-125B4HW Mounting Flange for PVH057 and PVH074 Pumps



SAE 2–bolt/4-bolt Mounting (“027” Option) for PVH057, PVH074 and PVH098 Pumps



Cover (“031” Option) for Thru-drive SAE “A” Rear Mounting Flange



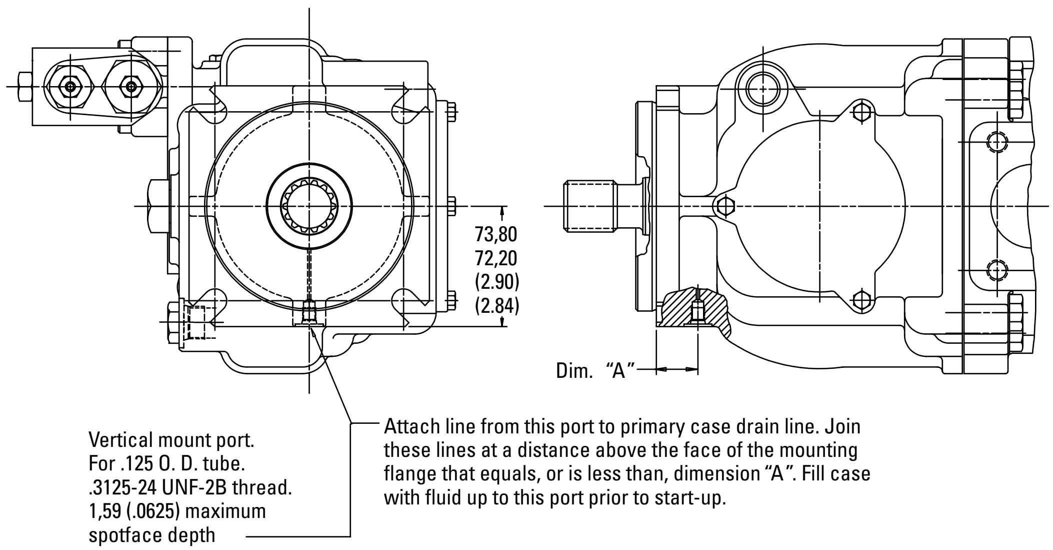
Note: When cover (part number 939790) is ordered as a separate part, two screws (part number 170177) are required to attach the cover to the pump’s rear mounting flange.

The O-ring for sealing the rear mounting flange is furnished with each thru-drive pump.

Installation Dimensions

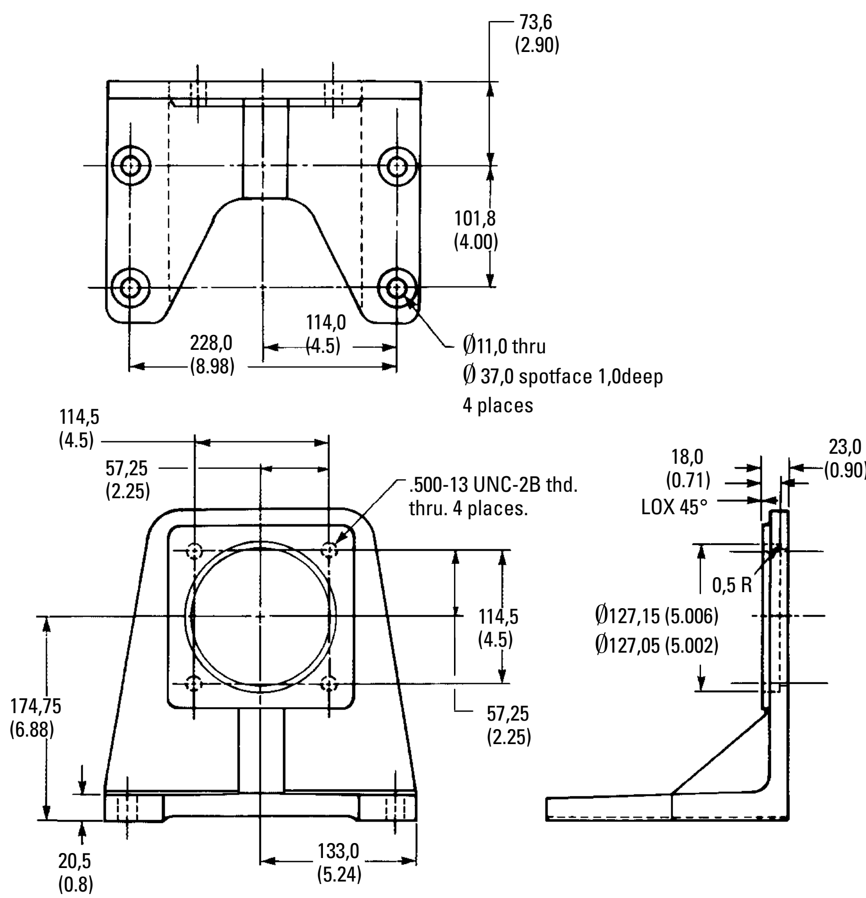
Pumps for Shaft-up Operation (Vertical Mount, “057” Option)

Model	Dim. “A”
PVH057	25,68/24.94
PVH063	(1.01/0.98)
PVH074	26,64/25,90
PVH081	(1.05/1.02)
PVH098	25,82/25,08
PVH106	(1.02/0.99)
PVH131	25,12/24,38
PVH141	(.99/0.96)



Model FB-C4-10 Foot Mounting Kit for All PVH Pumps

Each kit (part no. 02-143419) includes bracket shown and four screws for mounting to the pump. Kits are not included with pumps and must be ordered separately by model number.



Application Data

Hydraulic Fluids and Temperature Ranges

Use anti-wear hydraulic oil, or automotive type crankcase oil (designations SC, SD, SE or SF) per SAE J183 FEB80.

Select a viscosity grade that will allow optimum viscosity, between 40 cSt (180 SUS) and 16cSt (80 SUS), to be achieved.

Cold start capability at 5000 cSt. Max. intermittent temp. 104° C (220° F).

For further information, see 694.

Fluid Cleanliness

Proper fluid condition is essential for long and satisfactory life of hydraulic components and systems. Hydraulic fluid must have the correct balance of cleanliness, materials and additives for protection against wear of components, elevated viscosity and inclusion of air.

Essential information on the correct methods for treating hydraulic fluid is included in Eaton publication 561; "Vickers Guide to Systemic Contamination Control," available from your local Eaton distributor or by contacting Eaton. Recommendations on filtration and the selection of products to control fluid condition are included in 561.

Recommended cleanliness levels, using petroleum oil under common conditions, are based on the highest fluid pressure levels in the system and are coded in the chart below. Fluids other than petroleum, severe service cycles or temperature extremes are cause for adjustment of these cleanliness codes. See Eaton publication 561 for exact details.

Eaton products, as any components, will operate with apparent satisfaction in fluids with higher cleanliness codes than those described. Other manufacturers will often recommend levels above those specified. Experience has shown, however, that life of any hydraulic components is shortened in fluids with higher cleanliness codes than those listed below. These codes have been proven to provide a long trouble-free service life for the products shown, regardless of the manufacturer.

Drive Data

Mounting attitude should be horizontal. See preceding page for vertical mount option. Consult your local Vickers representative if a different arrangement is required.

Direction of shaft rotation, viewed at the prime mover end, must be as indicated in the model designation on the pump. See "5" in Model Codes, page 6.

Drive arrangement should be by direct drive through a flexible coupling. Check pump installation drawing for concentricity and squareness tolerances.

Torque capability of shafts in basic (non-thru-drive) pumps is well in excess of that needed for operation at rated pressure and maximum displacement. Limitations for multiple pumps formed by PVH thru-drives as front-end sections are specified in the chart on page 18.

Moment of Inertia (Single Pump Rotating Group)

Model	Nm.sec^2	(lb.in.sec^2)
PVH057	0,0054	(0.0475)
PVH063	0,0054	(0.0447)
PVH074	0,0078	(0.0692)
PVH081	0,0073	(0.0643)
PVH098	0,0134	(0.1189)
PVH106	0,0123	(0.1086)
PVH131	0,0210	(0.1862)
PVH141	0,0210	(0.1856)

Cleanliness Codes For Petroleum Oil Usage

	System Pressure Level		
Product	**2000 psi**	**2000-3000 psi**	**3000+ psi**
Vane pumps, fixed	20/18/15	19/17/14	18/16/13
Vane pumps, variable	18/16/14	17/15/13	
Piston pumps, fixed	19/17/15	18/16/14	17/15/13
Piston pumps, variable	18/16/14	17/15/13	16/14/12
Directional valves	20/18/15	20/18/15	19/17/14
Proportional valves	17/15/12	17/15/12	15/13/11
Servo valves	16/14/11	16/14/11	15/13/10
Pressure/Flow controls	19/17/14	19/17/14	19/17/14
Cylinders	20/18/15	20/18/15	20/18/15
Vane motors	20/18/15	19/17/14	18/16/13
Axial piston motors	19/17/14	18/16/13	17/15/12
Radial piston motors	20/18/14	19/17/13	18/16/13

Weights, Ordering, Installation/Start-up

Weights in kg (lb)*

Pump Size	Basic Pump	Thru-drive Pump SAE "A"
PVH057	30–36	31-37
PVH063	(66-79)	(68-82)
PVH074	39-45	42-48
PVH081	(86-99)	(93-106)
PVH098	43-49	44-50
PVH106	(95-108)	(97-110)
PVH131	60-66	62-68
PVH141	(132-145)	(137-150)

*Approximate dry weights. Weight for a given model depends upon the type of pump control selected.

Ordering Procedure

Order PVH pumps by the full model designation. Pump displacement, mounting flange type, direction of rotation, pump configuration, shaft end type, shaft seals, pressure adjustment range, specific control functions, and torque limiter settings are all specified in the full model code.

Various Vickers® relief valves from Eaton are suitable for use with the "IC" compensator and must be ordered separately.

Examples include:

- DGMC2-3-AT-BT (plus DG4V-3-8C directional valve) for remotely and electrically controlled dual-pressure compensation, and standby no-flow pump operation in the load sensing mode.
- DGMC-3-PT-FW-30 crossline relief module (with DG4V3-8C directional valve) for electrical selection of dual pressure compensation.
- ECGF-02-9-21 proportional relief valve, with feedback, for remote control of pressure compensation.
- ECG-02-9-30 proportional relief valve for remote control of pressure compensation.
- DGMC-3-AT-BT (plus DG4V-3-0A directional valve) for remotely and electrically selected dual-pressure compensation.
- C175-F-20 (plus blanking plate DGMA-3-B-11 and tapping plate DGMA-T2-20-S) for remote control of pressure compensation.
- CVGC-3-S12 for non-remote control of pressure compensation.
- DGMC-3-PT-FW-30 crossline relief module (with blanking plate DGMA-3-B-11) for non-remote control of pressure compensation.

Contact your Vickers representative for additional information on the application and ordering of relief valves.

Installation and Start-up

The installation of PVH pumps must be in accord with the data on pages 16 and 27.

Before the pump is started, fill the case through the uppermost drain port with hydraulic fluid of the type to be used. The case drain line must be connected directly to the reservoir and terminate below the oil level.

If the pump has the vertical-mount option, attach a secondary drain line as noted on page 29.

Maximum continuous pressure at the case drain port must not exceed 0,5 bar (7 psi). For multiple pump arrangements that include non-PVH sections, the requirements of the non-PVH units must be considered.

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Powering Business Worldwide

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October 2013

PVM Variable Displacement Piston Pumps
Vickers® Product Line

up to 315 bar
18-141cc
(1.1-8.6in³)
Variable Speed
Drive Ready

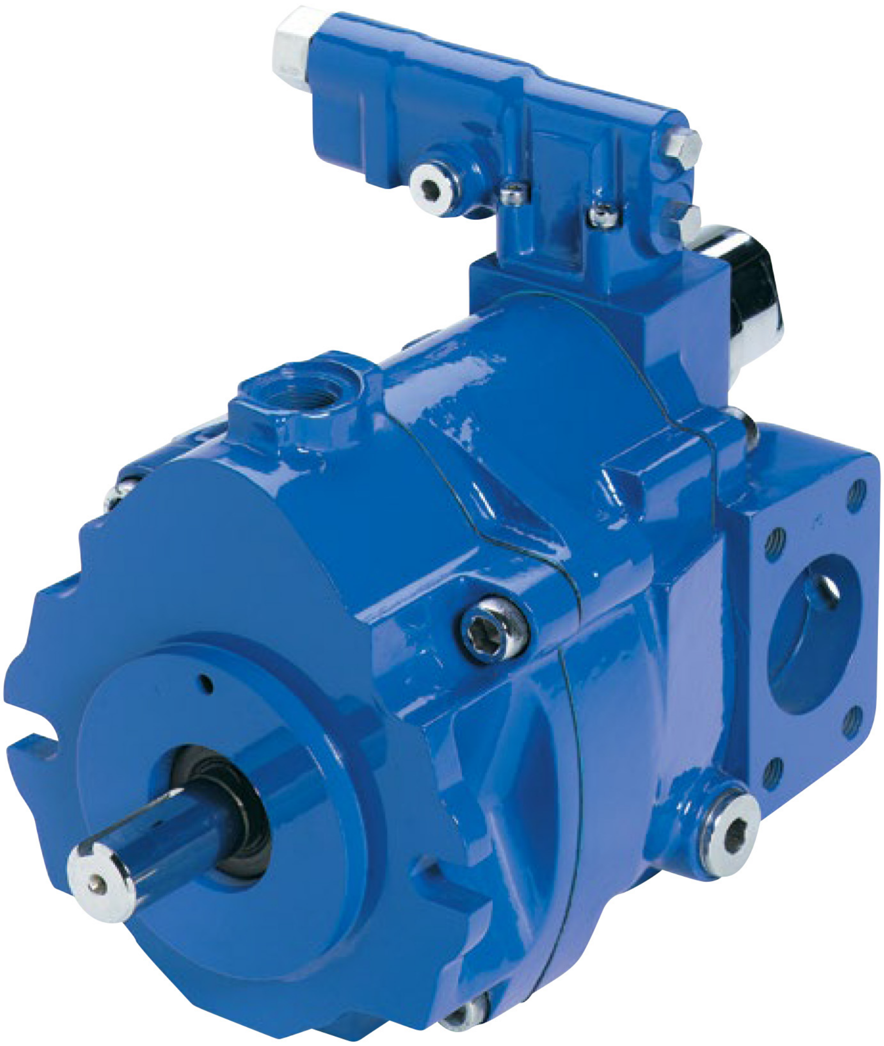

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Table of Contents

M Series Variable Displacement Piston Pumps

Introduction

Eaton M Series pumps are open circuit, axial piston designs. A variety of control options allows the pumps to perform most efficiently in a specific application. Efficiency of the pump controls allows down-sizing of system cooling needs, saving up front cost in the machine. Alternatively, cooling capacity could be kept the same and the flow capability of the system increased, thus improving performance and customer satisfaction.

The M Series also contains a strong proven rotating group allowing the pumps to handle pressures to 315 bar (4568 psi) continuous with less maintenance cost. High-load bearings and a stiff drive shaft help provide a pump life of 8000 hours at rated industrial conditions, reducing operating costs and extending operating life.

M Series pumps feature a saddle-type yoke with steel-backed polymer bearings. The stiff yoke reduces deflection and allows even loading of bearings, improving life. A single control piston reduces loading on the yoke, resulting in reduced pump size which allows installation in tighter locations.

M Series pumps operate at a level of quietness that exceeds the requirements of today's demanding work conditions. The pumps feature a unique three-piece envelope (flange, housing and valve block) specifically created for low fluid-borne and structure-borne noise levels. Another pump feature – a bimetal timing plate – improves pump filling characteristics which, in turn, reduce fluid-borne noise and extend pump life.

M Series pumps reduce, or in some cases remove, the need for damping barriers between the noise source and the operator. This saves money on the installed cost of the system while improving customer comfort.

An adjustable maximum stop provides a means of tuning flow to your system, while gauge ports allow monitoring of inlet and outlet conditions. These standard features reduce system complexity and cost.

Mounting flanges are offered in SAE and ISO configurations, and ports are offered in SAE, ISO, and BSPP in both tube and flange versions. This provides a wide variety of installation opportunities for global machine design.

Side- or end-ported models are available to facilitate plumbing and help fit the pump to your machine space needs. Multiple drain ports allow many mounting orientations, reducing installed costs.

M Series pumps are capable of operating with many types of hydraulic fluids used in industrial systems. High-water-content and phosphate ester fluids can be accommodated, in addition to the typical petroleum based and synthetic fluids.

Typical Applications

- Mining machinery
- Injection molding machines
- Metal forming machines
- Oil and Gas Equipment
- Conveyor lines
- Primary metals
- Metal cutting equipment

Features and Benefits

- Long pump life
- Quiet pump operation
- Inlet and outlet gauge ports and adjustable maximum displacement stops – standards
- Astonishingly low 4% pressure ripple
- Low installed and operating costs
- Reduced maintenance
- Flexibility in machine design
- Design promotes leak-free system

Hydraulic System Design Calculations

Basic Formulas

Output Flow (Q)

$$\text{lpm} = \frac{\text{cm}^3/\text{r} \times \text{rpm}}{1000} \qquad \text{gpm} = \frac{\text{in}^3/\text{r} \times \text{rpm}}{231}$$

Input Power (P)

$$\text{kW} = \frac{\text{l/min} \times \text{bar}}{600} \qquad \text{hp} = \frac{\text{gpm} \times \text{psi}}{1714}$$

Shaft Torque (M)

$$\text{N-m} = \frac{\text{bar} \times \text{cm}^3/\text{r}}{62.8} \qquad \text{lb-in} = \frac{\text{psi} \times \text{in}^3/\text{r}}{6.28}$$

Shaft Speed (n)

$$\text{rpm} = \frac{1000 \times 1/\text{min}}{\text{cm}^3/\text{r}} \qquad \text{RPM} = \frac{231 \times \text{gpm}}{\text{in}^3/\text{r}}$$

Output Power (P)

$$\text{kW} = \frac{\text{N-m} \times \text{RPM}}{9549} \qquad \text{hp} = \frac{\text{lb-in} \times \text{rpm}}{63{,}025}$$

Volumetric Displacement

$$\text{cm}^3/\text{r} = \frac{\text{lpm} \times 1000}{\text{rpm}} \qquad \text{in}^3/\text{r} = \frac{\text{gpm} \times 231}{\text{rpm}}$$

Basic Formulas

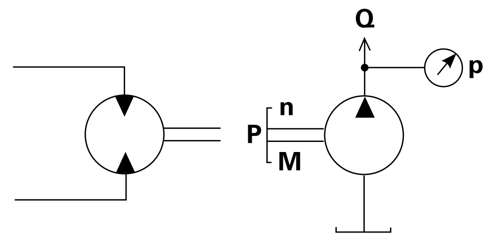
bar = 10 Newtons/cm^2
gpm = gallons per minute
hp = horsepower
lb-in = pound inch
lb-ft = pound feet
kW = kilowatt
kgf = kilograms force
l/min = liters per minute
N-m = Newton meters
psi = pounds per square inch
rpm = revolutions per minute

Efficiencies

$$\text{Volumetric Nv} = \frac{\text{gpm actual}}{\text{gpm theorectical}}$$

$$\text{Mechanical Nm} = \frac{\text{lb-in actual}}{\text{lb-in theorectical}}$$

Total Nt = Nv x Nm



Commonly Used Conversions

To Convert	Into	Multiply by
bar	psi	14.5
cm^3	in^3	0.06102
˚C	˚F	(˚C x 1.8) +32
gallons (US)	liters	3.785
kg	lbs	2.205
kgf/cm^2	psi	14.2
kW	hp	1.341
liters	US Gallons	0.2642
mm	inches	0.03937
N-m	lb-in	8.85
N-m	lb-ft	0.7375
˚F	˚C	(˚F-32)/1.8
hp	kW	0.7457
inch	mm	2.54
in^3	cm^3	16.39
lb-in	N-m	0.113
lb-ft	N-m	1.356
lbs	kg	0.4535
psi	bar	0.06896
psi	kgf/cm^2	.070307

Note: Performance charts can be found on subsequent pages.

Model Code Selection

PVM	045	E	R	01	A	E	01	AA	A	28	00	00	0	0	A	0	A
1, 2, 3	4, 5, 6	7	8	9,10	11	12	13,14	15,16	17	18,19	20,21	22,23	24	25	26	27	28

1, 2, 3 Product Series

PVM – M Series Variable Piston Pump

4, 5, 6 Displacement

Twelve displacements available 230 bar and 315 bar continuous ratings

7 Valve Plate

E - Quiet version, optimized for 1000-1800 rpm

M - Higher speed version

ref speed performance data for individual dispalcements

8 Input Rotation

R – Clockwise (Righthand)
L* – Counter-clockwise (Lefthand)

9, 10 Input Shaft

Standard SAE and ISO splined versions (Other configurations optional)

11 Mounting Flange

Thirteen options in SAE and ISO mounts

12 Main Port Location

E** – End Ported
S**** – Side Ported

13, 14 Main Port Type

SAE & ISO tube ports and 4-bolt flange (Other configurations optional)

15, 16 Pump Special Features

00 – None
AA – Adjustable Maximum Displacement Stop and single shaft (standard)
AB – Double Shaft Seal, Two Way

17 Control

0 – None
A – Pressure Compensator
B – Pressure and Flow Compensator with Bleed Orifice
C – Pressure and Flow Compensator with Plugged Orifice
E – Industrial/Remote (57cc through 141 cc only)
L - Power Control with Load Sense and Pressure compensator with Plugged Orifice (74,81 cc only, other displacements 57 cc through 141cc under development)

18, 19 Pressure Compensator Setting

00 – None
07 – 70 bar (Adjustable between 40 bar and 130 bar)
23 – 230 bar (Adjustable between 130 bar and 320 bar)
28 – 280 bar (Adjustable between 130 bar and 320 bar)

20, 21 Flow Compensator Setting

00 – None
11 – 11 bar setting
20 – 20-20 bar setting
24 – 24-24 bar setting

22, 23 Power control Torque Limiter Setting

00 – None

50-50% of rated torque*

(adjustable from 20-90% of rated torque,*for any other values specify % of rated torque)

24 Compensator Special Features

0 – None

25 Auxiliary Mounting Pad

0*** – None

(Auxiliary mounting available on all frame sizes)

26 Paint

0 – No Paint
A – Standard Blue Paint

27 Customer Identification

0 – None (Contact Eaton for Options)

28 Design Code

A – A (Initial Release)

* Not available on 074, 081, 098 and 106 End Port

** Not available on 074, 081, 098 and 106 LH

*** Through drive not available on the LH

**** Not available on 018

Model Code Options

4,5,6 Maximum Geometric Displacement

Displacement Code	018	020	045	050	057	063	074	081	098	106	131	141
cm^3/r	18,0	21,1	45,1	50,0	57,4	63,1	73,7	81,0	98,3	106,5	131,1	141,0
in^3/r	1.1	1.29	2.75	3.05	3.50	3.85	4.50	4.94	6.00	6.50	8.00	8.60

9,10 Shaft-End Type at Electric Motor End

	Shaft Code					
Description	PVM018/020	PVM045/050	PVM057/063	PVM074/081	PVM098/106	PVM131/141
SAE, SAE A, Straight Keyed	01	–	–	–	–	–
SAE, SAE 19-1, Straight Keyed	02	–	–	–	–	–
SAE, SAE A, 9T Spline	03	–	–	–	–	–
SAE, SAE A, 11T Spline	04	–	–	–	–	–
SAE, SAE B, Straight Keyed	05	05	–	–	–	–
SAE, SAE B-B, Straight Keyed	06	06	06	–	–	–
SAE, SAE B, 13T Spline	07	07	07	–	–	–
SAE, SAE B-B, 15T Spline	08	08	08	–	–	–
SAE, SAE C, Straight Keyed	–	–	09	09	09	09
SAE, SAE C-C, Straight Keyed	–	–	–	10	10	10
SAE, SAE C, 14T Spline	–	–	11	11	11	11
SAE, SAE C-C, 17T Spline	–	–	–	12	12	12
SAE, SAE D, Straight Keyed	–	–	–	–	–	13
SAE, SAE D, 13T Spline	–	–	–	–	–	14
ISO E20N, Straight Keyed	15	–	–	–	–	–
ISO E25N, Straight Keyed, Short Spigot	16	–	–	–	–	–
ISO E25N, Straight Keyed	17	17	17	–	–	–
ISO E32N, Straight Keyed, Short Spigot	–	–	18	18	18	18
ISO E40N, Straight Keyed, Short Spigot	–	–	–	19	19	19

11 Mounting Flange Specifications

Code	Description	PVM018/020	PVM045/050	PVM057/063	PVM074/081	PVM098/106	PVM131/141
A	SAE A, 2-bolt	●	○	○	○	○	○
B	ISO 80A2HW	●	○	○	○	○	○
C	SAE B, 2-bolt	●	●	●	○	○	○
D	ISO 100A2HW	●	●	●	○	○	○
E	SAE C, 2-bolt	○	○	●	●	●	●
F	ISO 125-A2HW	○	○	●	●	●	●
G	SAE C, 4-bolt	○	○	●	●	●	●
H	ISO 125B4HW	○	○	●	●	●	●
J	SAE D, 4-bolt	○	○	○	○	○	●
K	ISO 160B4HW	○	○	○	○	○	●

●= Available

○= Not Available

Model Code Options

13,14 Main Port Options

Code	Description	Inlet Outlet	PVM018/020	PVM045/050	PVM057/063	PVM074/081	PVM098/106	PVM131/141
01	SAE J1926 Tube Ports	Inlet	–20	–24	–24 (End ports only)	–	–	–
		Outlet	–12	–16	–16 (End ports only)	–	–	–
02	SAE J518 Flange Ports	Inlet	1.25 inch	2.0 inch	2.0 inch	2.0 inch	2.5 inch	2.5 inch
		Outlet	0.75 inch	1.0 inch	1.0 inch	1.0 inch	1.0 inch	1.25 inch*
03	ISO 6149-1 Tube Ports	Inlet	M42	M48	M48 (End ports only)	–	–	–
		Outlet	M27	M33	M33 (End ports only)	–	–	–
04	ISO 6162 Flange Ports	Inlet	32mm	51mm	51mm	51mm	64mm	64mm
		Outlet	19mm	25mm	25mm	25mm	25mm	32mm*
05	British Standard Parallel Pipe – Tube Ports	Inlet	G 1-1/4	G 1-1/2	–	–	–	–
		Outlet	G 3/4	G 1	–	–	–	–

*SAE Code 62, high pressure series, or ISO 400 bar. Other flange ports are SAE Code 61, standard pressure series, or ISO 25-350 bar.

25 Thru-Drive Options

Code	Description	PVM018/020	PVM045/050	PVM057/063	PVM074/081*	PVM098/106	PVM131/141
O	Single pump, non-thru-drive	●	●	●	●	●	●
A	SAE A, 2-bolt, 9T spline	●	●	●	●	●	●
B	SAE A, 2-bolt, 11T spline	●	●	○	●	●	●
C	SAE B, 2-/4-bolt, 13T spline	○	●	●	●	●	●
D	SAE B-B, 2-/4-bolt, 15T spline	○	●	●	●	●	●
E	SAE C, 2-/4-bolt, 14T spline	○	○	●	●	●	●
F	SAE C-C, 2-/4-bolt, 17T spline	○	○	○	●	●	●
G	ISO 80-A2HW, 9T SAE spline	●	●	●	●	●	●
H	ISO 80-A2HW, 11T SAE spline	●	●	○	●	●	●
J	ISO 100-A2/B4HW, 13T SAE spline	○	●	●	●	●	●
K	ISO 100-A2/B4HW, 15T SAE spline	○	○	●	●	●	●
L	ISO 125-A2/B4HW, 14T SAE spline	○	○	●	●	●	●
M	ISO 125-A2/B4HW, 17T SAE spline	○	○	○	●	●	●

●= Available

○= Not Available

* Not available on the 074/081 LH

Specifications and Performance

Quiet version, optimized for 1000-1800 rpm (E)

Displacement, Pressure and Flow Ratings At 50°C (120°F), SAE 10W oil, 1 bar absolute (0 psig) inlet

Model Series	Maximum Geometric Displacement cm^3/r (in^3/r)	Maximum Pressure bar (psi) Nominal	Peak**	Maximum Flow at 280 bar (4000 psi)* l/min (USgpm) – Average measured flow rate @1800 r/min	@1500 r/min	@1200 r/min	@1000 r/min
PVM018	18 (1.1)	315 (4568)	350 (5000)	31 (8.2)	26 (7)	21 (5.5)	17 (4.5)
PVM020	21,1 (1.29)	230 (3300)	280 (4000)	35 (9)	29 (8)	23 (6)	19 (5)
PVM045	45,1 (2.75)	315 (4568)	350 (5000)	76 (20)	65 (17)	49 (13)	42 (11)
PVM050	50,0 (3.05)	230 (3300)	280 (4000)	87 (23)	75 (20)	62 (16)	49 (13)
PVM057	57,4 (3.50)	315 (4568)	350 (5000)	102 (27)	85 (22.4)	66 (17.4)	54 (14.3)
PVM063	63,1 (3.85)	230 (3300)	280 (4000)	111 (29)	93 (24)	74 (19)	60 (16)
PVM074	73,7 (4.50)	315 (4568)	350 (5000)	127 (33.5)	106 (28)	86 (22.7)	70 (18.5)
PVM081	81,0 (4.94)	230 (3300)	280 (4000)	139 (37)	116 (31)	93 (25)	76 (20)
PVM098	98,3 (6.00)	315 (4568)	350 (5000)	170 (45)	141 (37)	112 (29.6)	92 (24.3)
PVM106	106,5 (6.50)	230 (3300)	280 (4000)	187 (49)	155 (41)	123 (32)	102 (27)
PVM131	131,1 (8.00)	315 (4568)	350 (5000)	215 (57)	178 (47)	141 (37)	118 (31)
PVM141	141,0 (8.60)	230 (3300)	280 (4000)	238 (63)	199 (53)	158 (42)	131 (35)

**Momentary system pressure spikes only.

Speed, Input Power and Torque Ratings At 50°C (120°F), SAE 10W oil, 1 bar absolute (0 psig) inlet

Model Series	Maximum Operating Speed r/min	Maximum Input Power at 280 bar (4000 psi) kw (hp)*@88% M.E. @1800 r/min	@1500 r/min	@1200 r/min	@ 1000 r/min	Maximum Torque at 280 bar (4000 psi)* Nm (lb-ft)	Approximate Weight kg (lb)
PVM018	1800	16 (22)	13 (18)	11 (15)	9 (12)	84 (62)	15 (33)
PVM020	1800	14 (18)	11 (15)	9 (12)	8 (10)	73 (54)	15 (33)
PVM045	1800	41 (55)	34 (46)	27 (37)	23 (31)	221 (163)	24 (52)
PVM050	1800	35 (47)	30 (40)	28 (38)	23 (31)	190 (140)	24 (52)
PVM057	1800	52 (70)	44 (59)	36 (49)	29 (39)	272 (201)	36 (79)
PVM063	1800	42 (57)	36 (48)	29 (39)	24 (32)	228 (168)	36 (79)
PVM074	1800	63 (84)	52 (70)	42 (56)	35 (47)	334 (246)	45 (99)
PVM081	1800	56 (75)	46 (62)	35 (47)	28 (37)	286 (211)	45 (99)
PVM098	1800	88 (118)	72 (97)	58 (78)	48 (64)	464 (342)	55 (121)
PVM106	1800	72 (97)	60 (80)	48 (64)	40 (54)	383 (282)	55 (121)
PVM131	1800	113 (152)	94 (126)	75 (101)	63 (85)	596 (440)	66 (145)
PVM141	1800	94 (126)	79 (106)	63 (85)	53 (71)	497 (367)	66 (145)

Standard Response Times*

Model Series	On Stroke (msec)	Off Stroke (msec)
PVM018	30	25
PVM020	39	26
PVM045	140	40
PVM050	140	40
PVM057	65	20
PVM063	85	20

* 3300 psi on overbore pumps

Standard Response Times*

Model Series	On Stroke (msec)	Off Stroke (msec)
PVM074	85	30
PVM081	85	30
PVM098	65	25
PVM106	72	29
PVM131	135	30
PVM141	100	30

*Values with pressure compensator control.

Specifications and Performance

Higher speed version (M)

Displacement, Pressure and Flow Ratings At 93°C (200°F), SAE 10W oil, 1 bar absolute (0 psig) inlet

Model Series	Geometric Displacement cm^3/r (in^3/r)	Maximum Pressure bar (psi) Nominal	Peak**	Maximum Flow at 280 bar (4000 psi) Flange Ports l/min (USgpm) @ 1 bar inlet	Tube Ports l/min (USgpm) @ 1 bar inlet
PVM018	18,0 (1.10)	315 (4568)	350 (5000)	46 (12) @ 2800 r/min	46 (12) @ 2800 r/min
PVM020	20,1 (1.22)	230 (3300)	280 (4000)	53 (14) @ 2800 r/min	53 (14) @ 2800 r/min
PVM045	45,1 (2.75)	315 (4568)	350 (5000)	115 (30) @ 2600 r/min	106 (28) @ 2400 r/min
PVM050	50,0 (3.05)	230 (3300)	280 (4000)	125 (33) @ 2600 r/min	116 (31) @ 2400 r/min
PVM057	57,4 (3.50)	315 (4568)	350 (5000)	140 (37) @ 2500 r/min	128 (34) @ 2300 r/min
PVM063	63,1 (3.85)	230 (3300)	280 (4000)	150 (40) @ 2500 r/min	140 (37) @ 2400 r/min
PVM074	73,7 (4.50)	315 (4568)	350 (5000)	163 (43) @ 2400 r/min	–
PVM081	81,0 (4.94)	230 (3300)	280 (4000)	181 (48) @ 2400 r/min	–
PVM098	98,3 (6.00)	315 (4568)	350 (5000)	200 (53) @ 2200 r/min	–
PVM106	106,5 (6.50)	230 (3300)	280 (4000)	222 (59) @ 2200 r/min	–
PVM131	131,1 (8.00)	315 (4568)	350 (5000)	233 (62) @ 2000 r/min	–
PVM141	141,0 (8.60)	230 (3300)	280 (4000)	258 (68) @ 2000 r/min	–

**Less than 0.5 second.

Standard Response Times*

Model Series	On Stroke (msec)	Off Stroke (msec)
PVM018	50	20
PVM020	57	22
PVM045	140	40
PVM050	140	23
PVM057	65	20
PVM063	94	20

Standard Response Times*

Model Series	On Stroke (msec)	Off Stroke (msec)
PVM074	95	30
PVM081	135	30
PVM098	85	24
PVM106	90	25
PVM131	100	30
PVM141	128	28

*Values with pressure compensator control.

Specifications and Performance

Higher speed version (M)

Speed, Input Power and Torque Ratings At 93°C (200°F), SAE 10W oil, 1 bar absolute (0 psig) inlet

Approximate	Operating Speed and Pressure r/min			Max. Input Power at	Max. Torque at	
	1 bar Inlet		0,85 bar Inlet			
Model Series	Flange Ports	Tube Ports	Flange Ports	Max. Speed and 280 bar (4000 psi) kW (hp)	280 bar (4000 psi) Nm (lb-ft)	Weight (dry) kg (lbs)
PVM018	2800 r/min			24 (32)	82 (60)	15 (33)
		2800 r/min		24 (32)		
			2600 r/min	22 (30)		
PVM020	2800 r/min			21 (28)	72 (53)	15 (33)
		2800 r/min		21 (28)		
			2600 r/min	20 (27)		
PVM045	2600 r/min			56 (75)	198 (46)	24 (52)
		2400 r/min		53 (71)		
			2200 r/min	48 (64)		
PVM050	2600 r/min			51 (68)	204 (150)	24 (52)
		2400 r/min		48 (64)		
			2200 r/min	44 (59)		
PVM057	2500 r/min			68 (91)	262 (193)	36 (79)
		2300 r/min		62 (83)		
			2100 r/min	56 (75)		
PVM063	2500 r/min			59 (79)	225 (166)	36 (79)
		2400 r/min		57 (76)		
			2200 r/min	52 (69)		
PVM074	2400 r/min			84 (113)	334 (246)	45 (99)
			1900 r/min	69 (93)		
PVM081	2400 r/min			69 (93)	276 (204)	45 (99)
			1900 r/min	55 (74)		
PVM098	2200 r/min			105 (141)	457 (337)	55 (121)
			1800 r/min	86 (115)		
PVM106	2200 r/min			87 (117)	377 (278)	55 (121)
			1800 r/min	70 (94)		
PVM131	2000 r/min			122 (164)	581 (429)	66 (145)
			1600 r/min	98 (131)		
PVM141	2000 r/min			102 (137)	483 (356)	66 (145)
			1600 r/min	81 (109)		

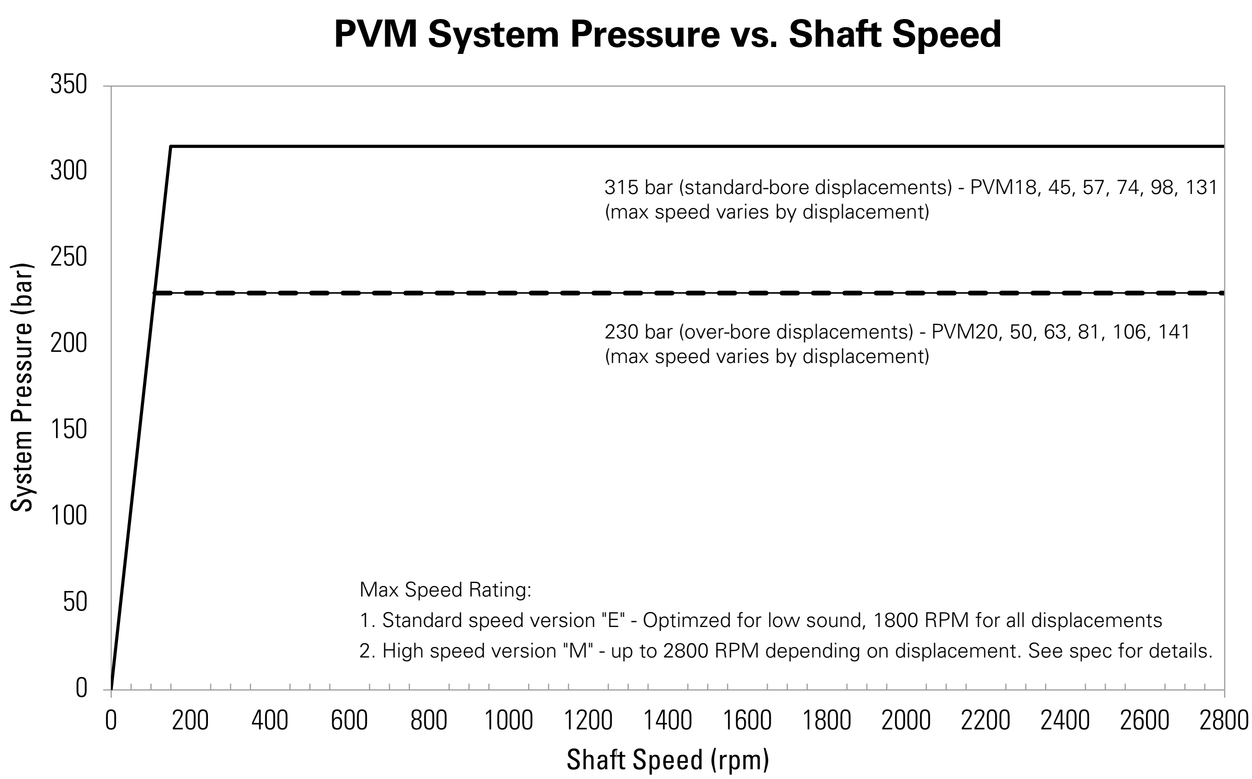
Specifications and Performance

Variable Speed Drive

Variable Speed Performance- System Pressure vs Speed

Model Series	Max Speed “E”* (rpm)	Max Speed “M”*(rpm)	Min Speed (rpm)	Nominal Pressure (bar)	Peak Pressure (bar)**	Inertia (kg-cm2)
PVM018	1800	2800	0	315	350	11.8
PVM020	1800	2800	0	230	280	11.8
PVM045	1800	2600	0	315	350	36.2
PVM050	1800	2600	0	230	280	33.9
PVM057	1800	2500	0	315	350	51.6
PVM063	1800	2500	0	230	280	50.5
PVM074	1800	2400	0	315	350	78.1
PVM081	1800	2400	0	230	280	72.7
PVM098	1800	2200	0	315	350	131.6
PVM106	1800	2200	0	230	280	122.7
PVM131	1800	2000	0	315	350	213.5
PVM141	1800	2000	0	230	280	209.7

* Valve plate type
**Less than 0.5 second.



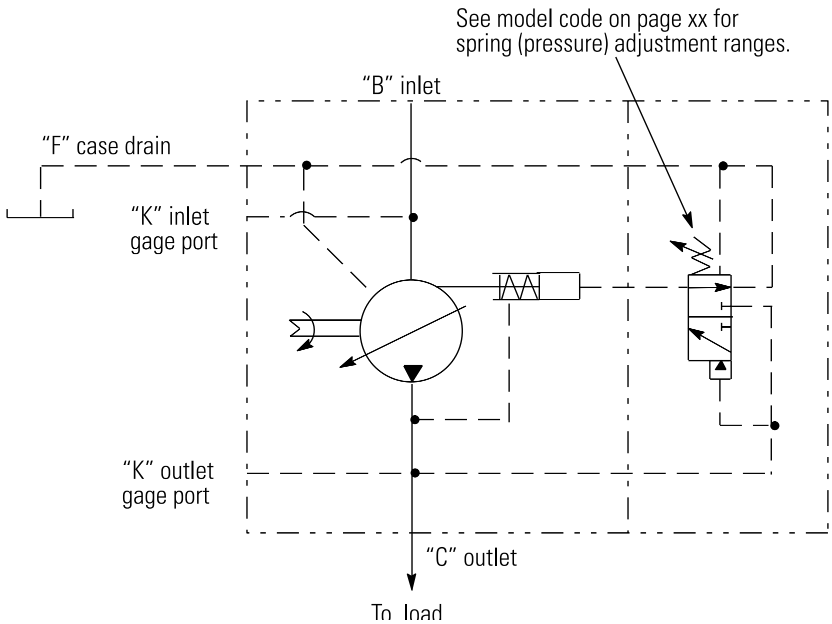
Test condition: Mineral oil SAE 10W, oil temperature 49° C (120° F), 1 bar absolute inlet pressure.

Control Options

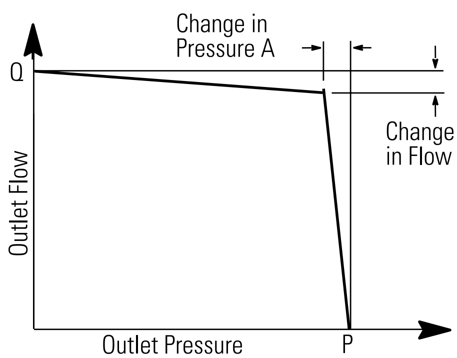
Pressure Compensator Control – Code A

The pump will provide a continuously modulated flow to meet changing load demands at a pre-adjusted compensator pressure. At pressures below the compensator setting, the pump will operate at maximum displacement. See model code on page 4 for compensator pressure ranges.

Warning: The pressure compensator may be adjusted beyond the rated pressure of the pump. When adjusting the pressure limiter, install a 0-350 bar (0-5000 psi) gage in the outlet gage port and limit the pressure setting to the continuous rated pressure for the pump displacement shown on page 7.



Industrial Pressure Cut-off Characteristics of Code A Pressure Compensator Control at 50°C (120°F), static conditions.

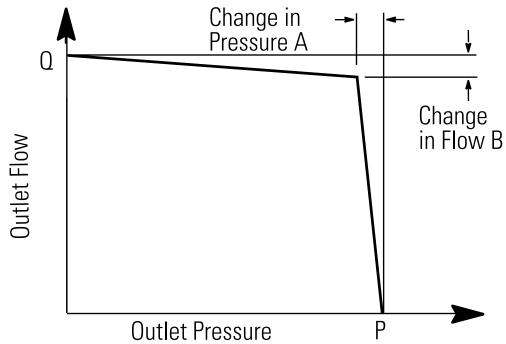


Pressure Cut-off Characteristics of Pressure Compensator Control @ 50°C (120°F), Static Conditions

Model Series	Max. Speed r/min	"Q" Outlet Flow l/min (USgpm)	"P" Outlet Pressure bar (psi)	A bar (psi)	B L/min (USgpm)
PVM018	1800	32 (8.5)	315 (4568)	2,8 (40)	4,5 (1.2)
PVM020	1800	35 (9.25)	230 (3300)	2,8 (40)	4,5 (1.2)
PVM045	1800	76 (20)	315 (4568)	10 (150)	4,5 (1.2)
PVM050	1800	87 (23)	230 (3300)	10 (150)	4,5 (1.2)
PVM057	1800	102 (27)	315 (4568)	3,5 (51)	14 (3.7)
PVM063	1800	113 (29)	230 (3300)	7,4 (107)	7,6 (2.00)
PVM074	1800	127 (33.5)	315 (4568)	1,5 (22)	37 (9.8)
PVM081	1800	141 (37)	230 (3300)	1,5 (22)	37 (9.8)
PVM098	1800	179 (47)	315 (4568)	1,5 (22)	25 (6.6)
PVM106	1800	195 (51.5)	230 (3300)	1,5 (22)	20 (5.3)
PVM131	1800	229 (60.5)	315 (4568)	3,5 (51)	19 (5.0)
PVM141	1800	238 (63)	230 (3300)	3,5 (51)	14 (3.70)

Control Options

Mobil Pressure Cut-off Characteristics of Pressure Compensator Control at 93°C (200°F), static conditions.



Pressure Cut-off Characteristics of Pressure Compensator Control @ 93°C (200°F), Static Conditions

Model Series	Rated Speed r/min	"Q" Outlet Flow l/min (USgpm)	"P" Outlet Pressure bar (psi)	A bar (psi)	B L/min (USgpm)
PVM018	2800	42 (11)	315 (4568)	2,8 (40)	4,5 (1.2)
PVM020	2800	52 (14)	230 (3300)	2,8 (41)	4,5 (1.2)
PVM045	2600	115 (30)	315 (4568)	10 (150)	4,5 (1.2)
PVM050	2600	125 (33)	230 (3300)	10 (150)	4,5 (1.2)
PVM057	2500	140 (37)	315 (4568)	3,5 (50)	14 (3.7)
PVM063	2500	159 (42)	230 (3300)	7,4 (107)	11,4 (3.00)
PVM074	2400	174 (46)	315 (4568)	1,5 (20)	37 (9.8)
PVM081	2400	185 (49)	230 (3300)	1,5 (22)	37 (9.8)
PVM098	2200	217 (57)	315 (4568)	1,5 (20)	32 (8.4)
PVM106	2200	234 (62)	230 (3300)	1,5 (22)	24 (6.33)
PVM131	2000	253 (67)	315 (4568)	1,0 (15)	23 (6.0)
PVM141	2000	258 (68)	230 (3300)	7,0 (100)	14 (3.70)

Load Sensing and Pressure Compensator Control – Code B or C

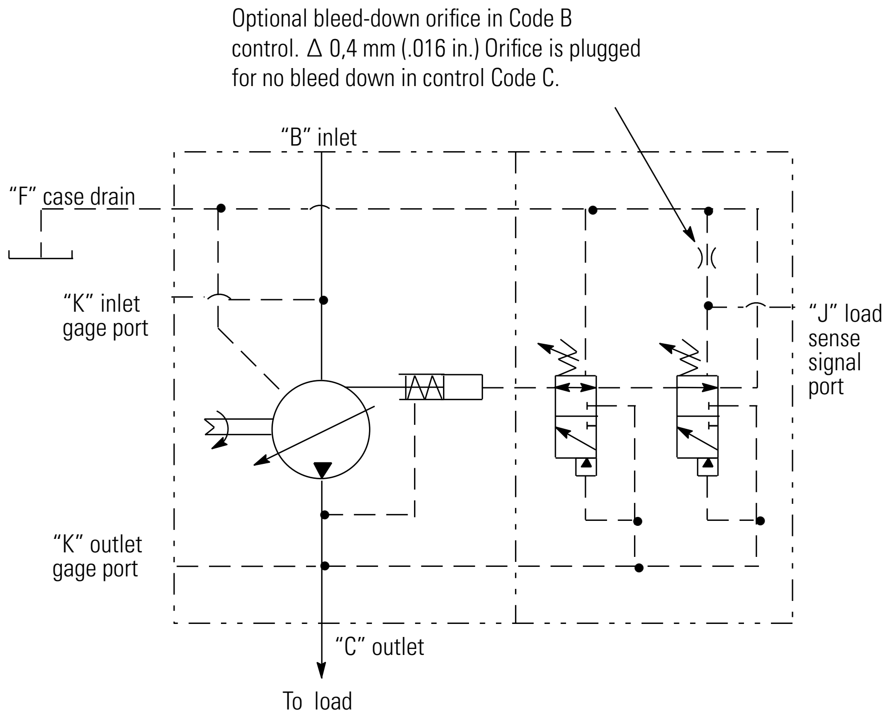
The pump will provide power matching of pump output to system load demand, maximizing efficiency and improving load metering characteristics of any directional control valve installed between the pump and the load.

Load sensing ensures that the pump always provides only the amount of flow needed by the load. At the same time, the pump operating pressure adjusts to the actual load pressure plus a pressure differential required for the control action. When the system is not demanding power, the load sense control will operate in an energy-saving stand-by mode.

Typically, the differential pressure is that between the pressure inlet and service port of a proportionally controlled directional valve, or a load sensing directional control valve. See the model code on page 4 for differential pressure settings for load sensing.

If the load pressure exceeds the system pressure setting, the pressure compensator de-strokes the pump. The load sensing line must be as short as possible and can also be used for remote control or unloading of the pump pressure. For remote control purposes, it is recommended that you contact your Eaton representative for the correct configuration of the control.

Warning: The pressure compensator may be adjusted beyond the rated pressure of the pump. When adjusting the pressure limiter, install a 0-350 bar (0-5000 psi) gage in the outlet gage port and limit the pressure setting to the continuous rated pressure for the pump displacement shown on page 7.



Control Options

Industrial Control Compensator – Code E & F (Model 057-141 only)

This pump is intended for use when multiple, remote, or electronically controlled compensating settings, with or without load sensing, are desired.

Pressure compensation is obtained when an internal plug is removed, the load-sense signal port is kept plugged, and internal pilot pressure is applied to the spring chamber of the control spool. For pressure compensation with load sensing, the internal plug stays, the load-sense signal port is unplugged, and pilot pressure is externally applied.

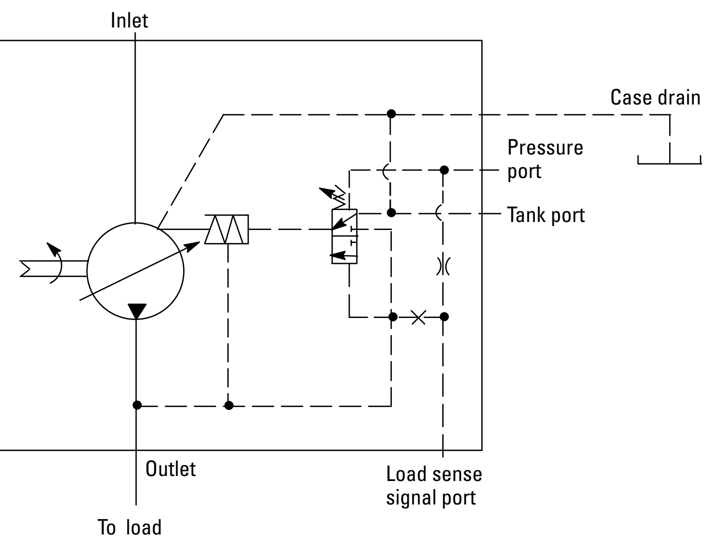
An external relief valve (not supplied) controls spring chamber pressure. The externally adjustable spring determines the differential pressure setting of the control. Outlet pressure is limited to the valve of the spring chamber (pressure port) pressure, plus control differential pressure.

Spring chamber (pilot) pressure is separated from outlet pressure by an internal orifice. Outlet pressure shifts the spool when pressure drop across the orifice reaches the differential pressure setting, and the pump de-strokes.

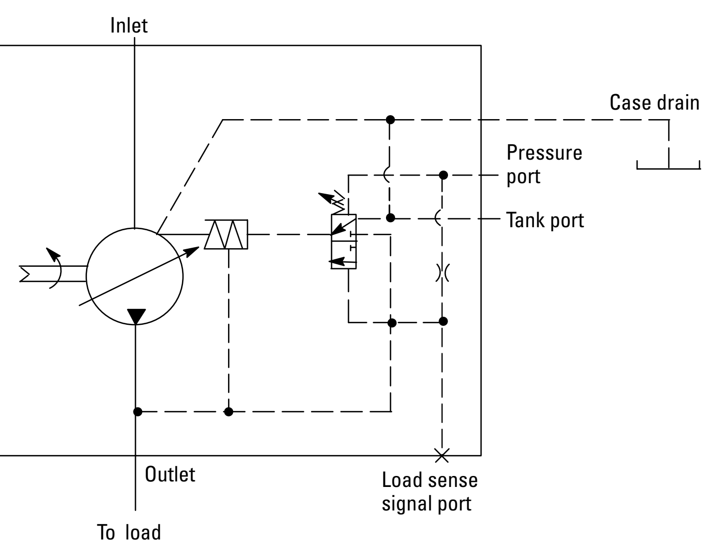
The relief valve can be mounted to an NFPA-D03/ISO 4401-03 pad on the pump control, or remotely located via tapping and blanking plates installed on the pad. See "Ordering Procedure", page 27, for more on valves and plates.

The standard factory-set differential pressure setting of the pump control is 20 bar (290 psi) and is not specified in the pump model number. Any other ordered differential pressure, within the control's adjustable pressure range of 17-35 bar (247-508 psi), will be specified in the model number.

With Pressure & Flow Compensator (E)



Pressure Compensating Without Load Sensing (F)



Control Options

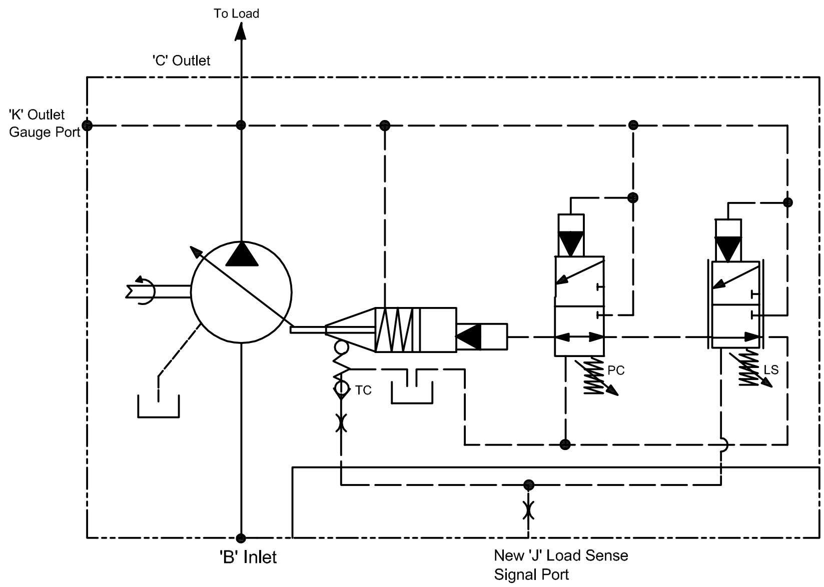
Power Control-Code L

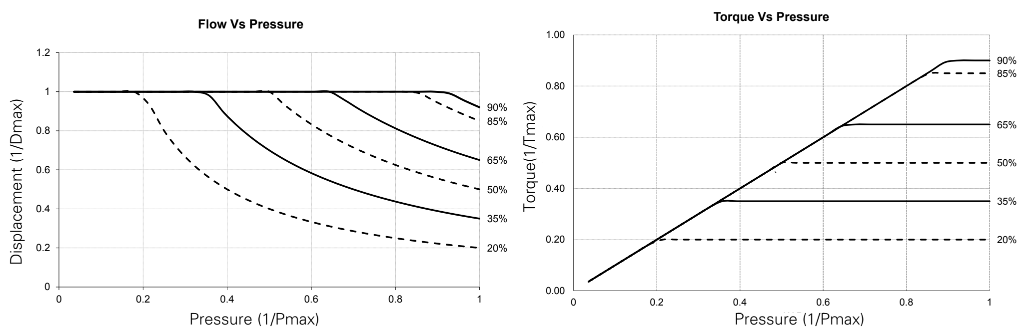
The Power control limits the maximum torque output by the piston pump by reducing the displacement as pressure increases hence limiting the power rating at a given speed.

As pressure increases the pump displacement is reduced such that the set torque value is not exceeded.

The torque can be set between 20-90% of rated torque for given displacement at 1800 rpm (model code pos 22-23, ref table below for range of torque.

Warning: The pressure compensator may be adjusted beyond the rated pressure of the pump.When adjusting the pressure limiter, install a 0-350 bar (0-5000 psi) gage in the outlet gage port and limit the pressure setting to the continuous rated pressure for the pump displacement shown on page 7.





Characteristics of Code L Power Control at 50°C (120°F), static conditions.

Torque setting range by displacemnent

Displacement (cc)	Rated Torque lb-in (N-m)	Min torque setting lb-in (N-m), 20% of rated torque*	Max torque setting lb-in (N-m), 90% of rated torque
74	2920 (330)	584 (66)	2628 (297)
81	2626 (297)	525 (59)	2363 (267)

* for Minimum torque setting (20%) the pump may not deliver the flow at higher pressure. Please contact Eaton Engineering for flow generated at max pressure

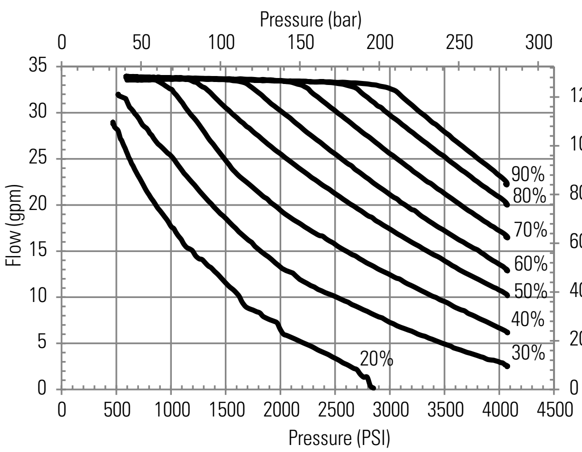
Performance

Quiet version, optimized for 1000-1800 rpm (E), PVM074/PVM081

Power Control -code L

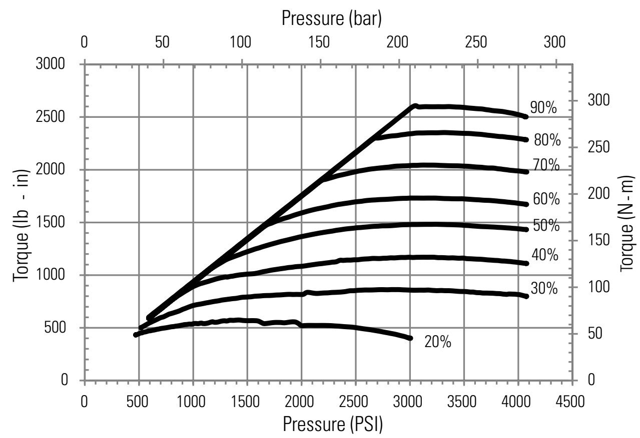
Performance curves for 74 & 81 cc with power control, at various torque setting %

Flow Vs Pressure - 74cc



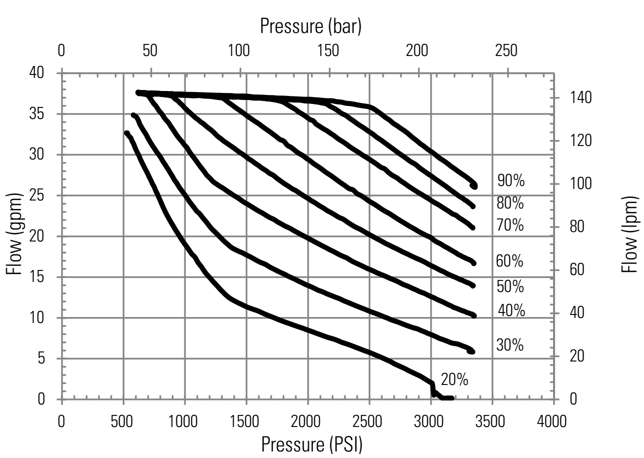
Mineral oil SAE 10W, oil temperature 49° C (120° F),
1 bar absolute inlet pressure.
Curves plotted at load sense delta P = 24 bar

Torque Vs Pressure - 74cc



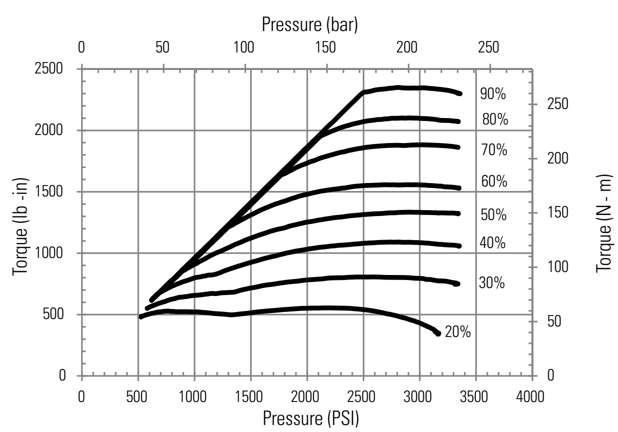
Mineral oil SAE 10W, oil temperature 49° C (120° F),
1 bar absolute inlet pressure.
Curves plotted at load sense delta P = 24 bar

Flow Vs Pressure - 81cc



Mineral oil SAE 10W, oil temperature 49° C (120° F),
1 bar absolute inlet pressure.
Curves plotted at load sense delta P = 24 bar

Torque VsPressure - 81cc

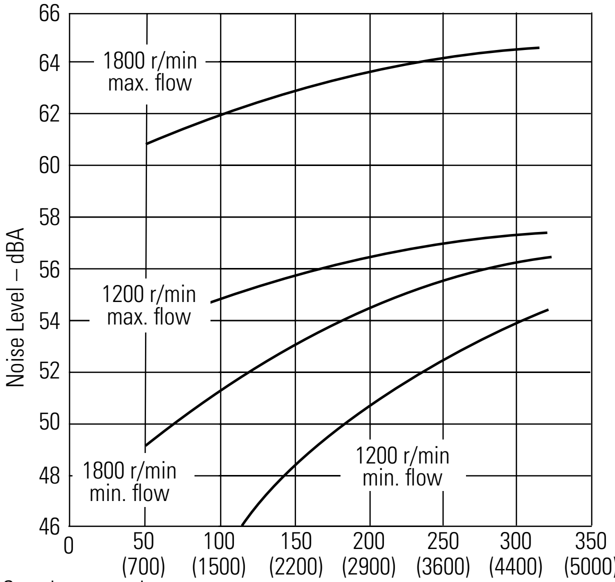


Mineral oil SAE 10W, oil temperature 49° C (120° F),
1 bar absolute inlet pressure.
Curves plotted at load sense delta P = 24 bar

Performance

Industrial PVM018

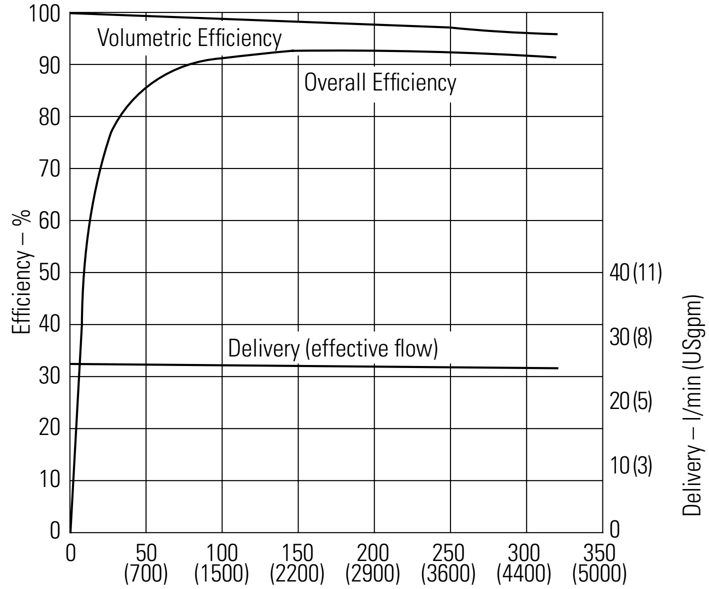
Typical Noise Levels at 1800 and 1200 r/min with
Petroleum Oil (10W) at 50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet



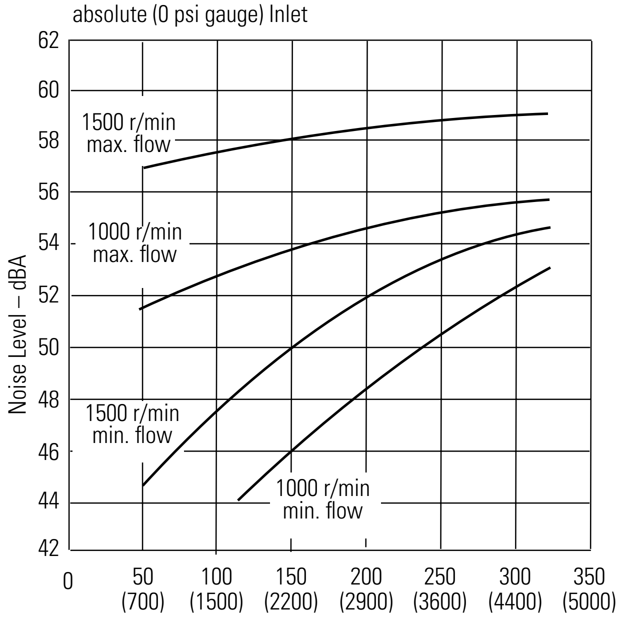
Sound pressure data equivalent to NFPA.

Outlet Pressure – bar (psi)

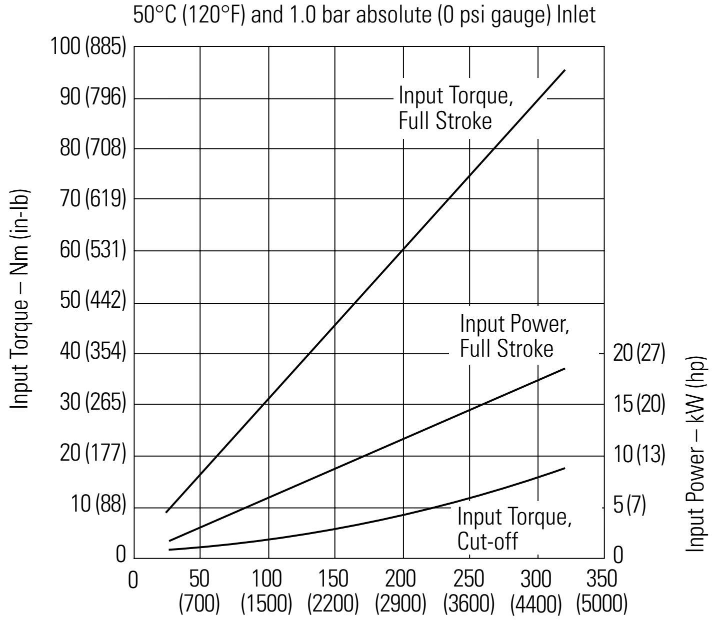
Delivery and Efficiency at 1800 r/min
50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet



Typical Noise Levels at 1500 and 1000 r/min with
Petroleum Oil (10W) at 50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet

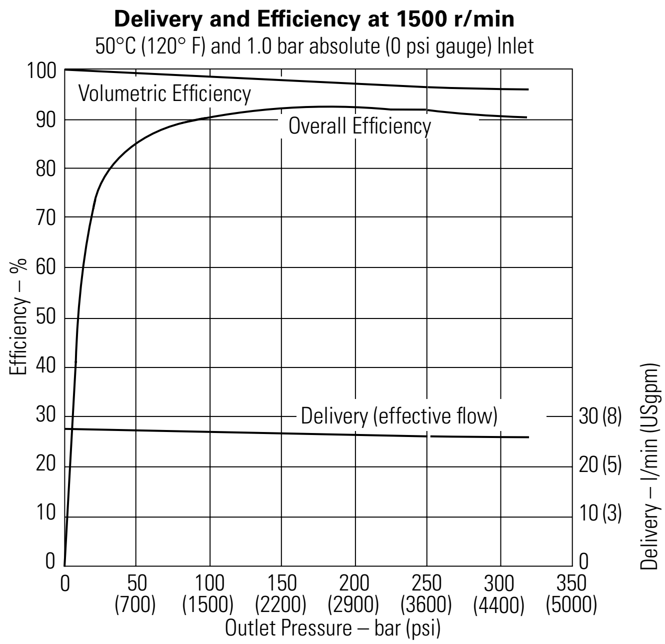


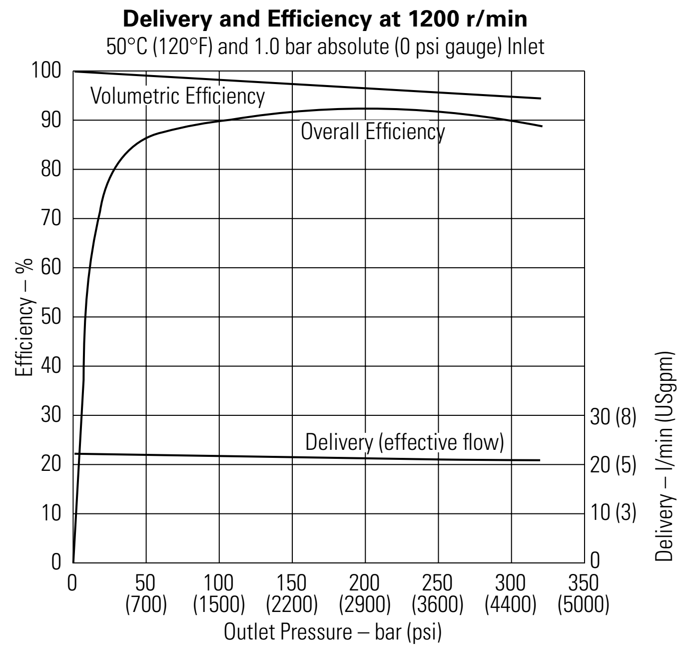
Input Torque and Power at 1800 r/min
50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet

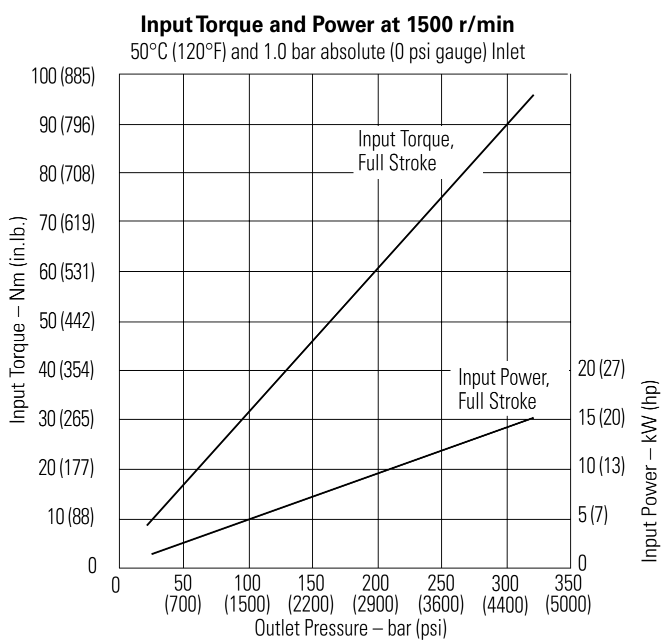


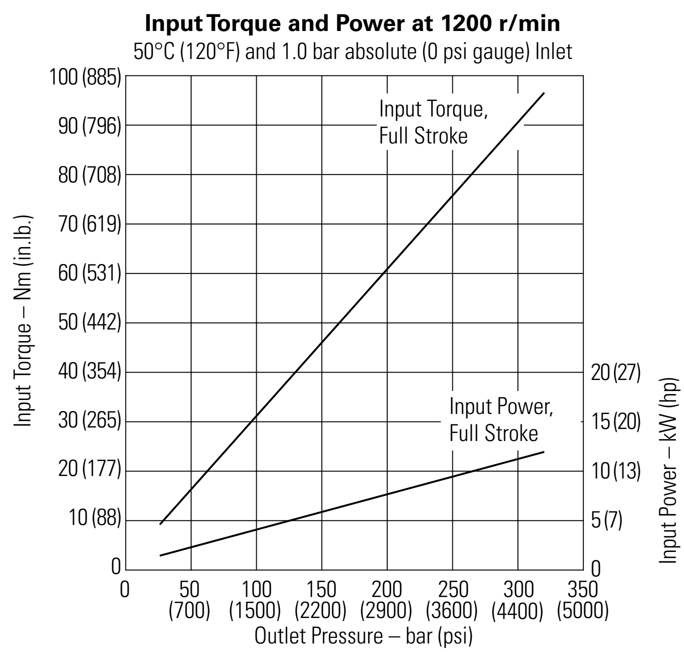
Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM018



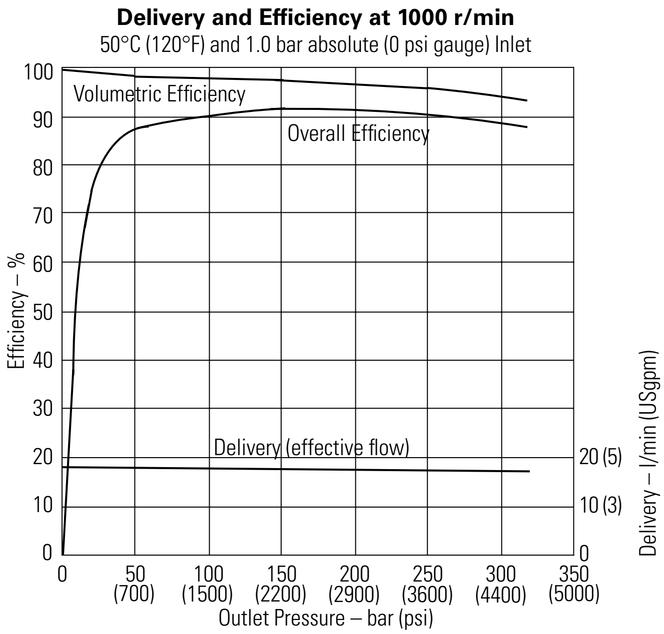


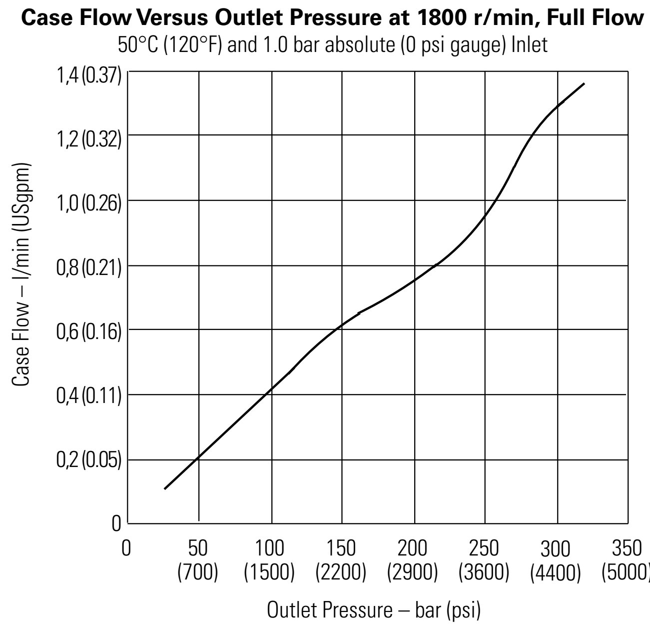


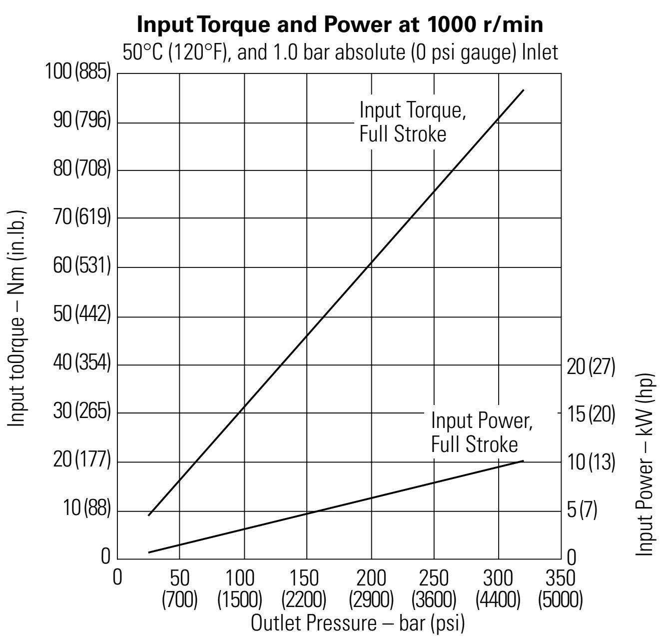


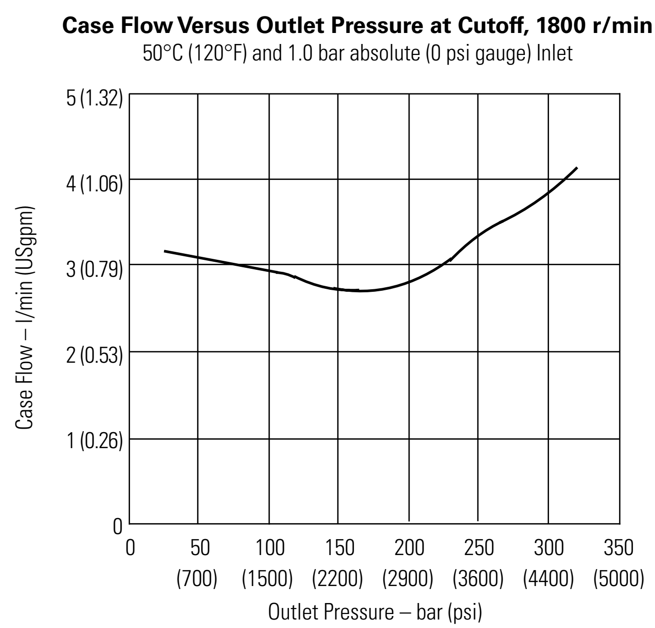
Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM018







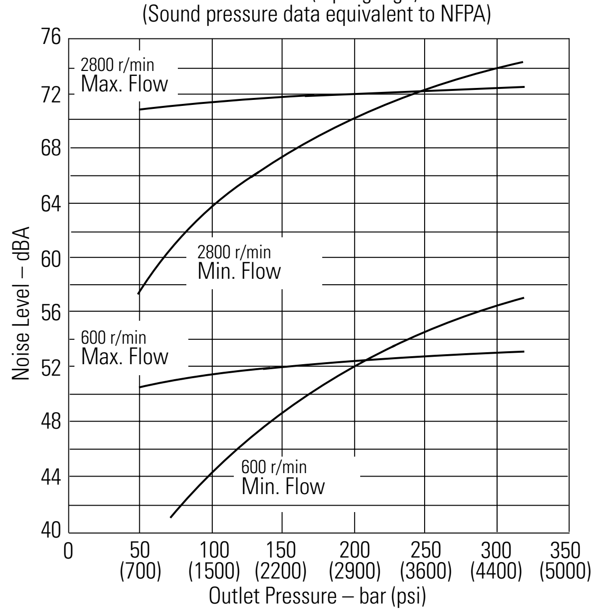


Performance

Higher speed version (M) PVM018

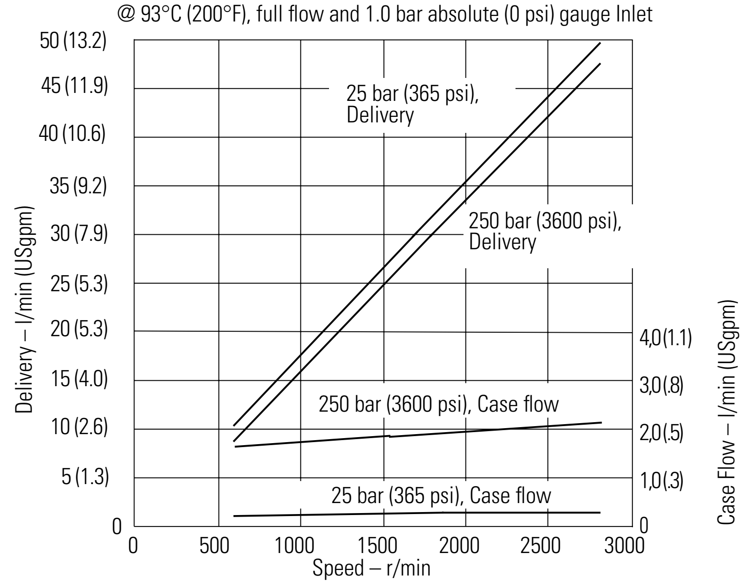
Typical Noise Levels

Petroleum Oil (10W) at 93°C (200°F), 1.0 bar absolute (0 psi gauge) Inlet (Sound pressure data equivalent to NFPA)



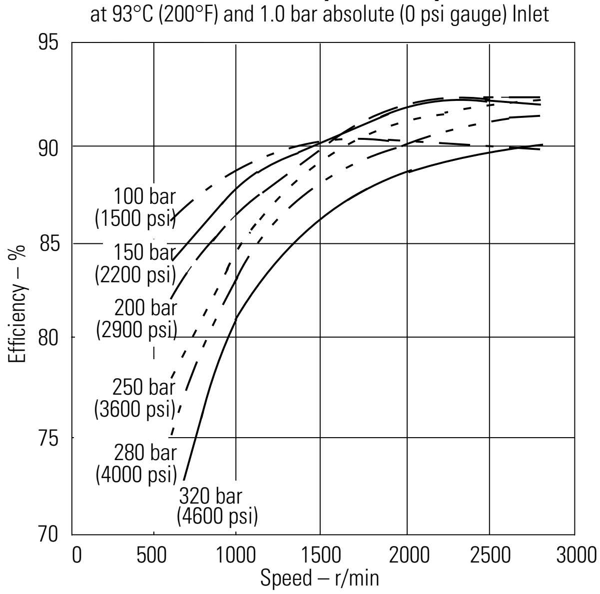
Delivery and Case Flow Versus Speed

@ 93°C (200°F), full flow and 1.0 bar absolute (0 psi) gauge Inlet



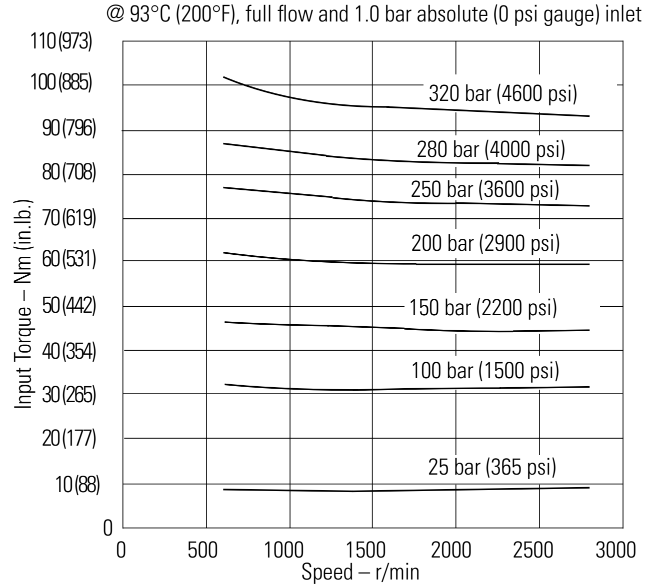
Overall Efficiency Versus Speed

at 93°C (200°F) and 1.0 bar absolute (0 psi gauge) Inlet



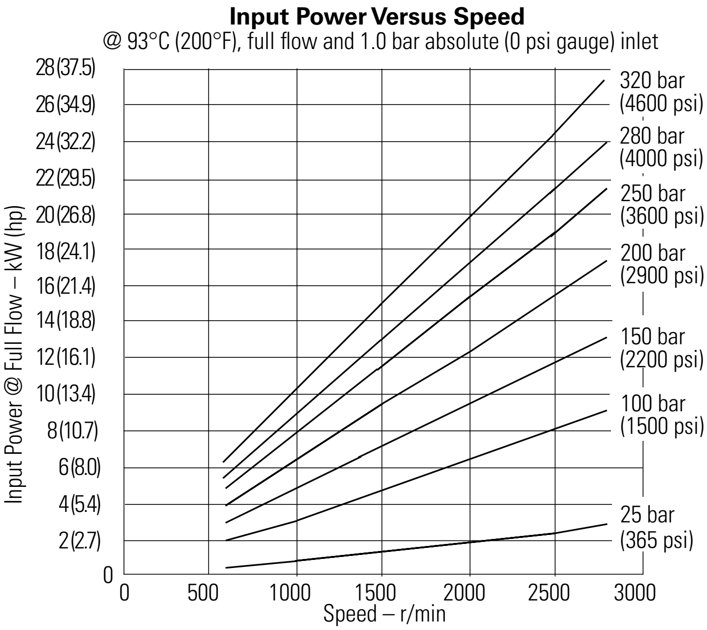
Input Torque Versus Speed

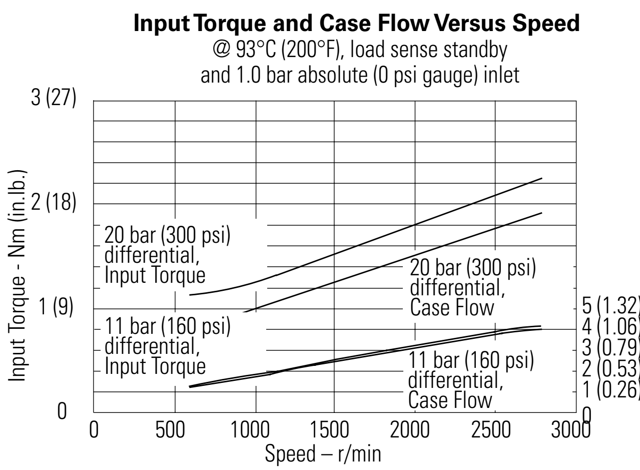
@ 93°C (200°F), full flow and 1.0 bar absolute (0 psi gauge) inlet

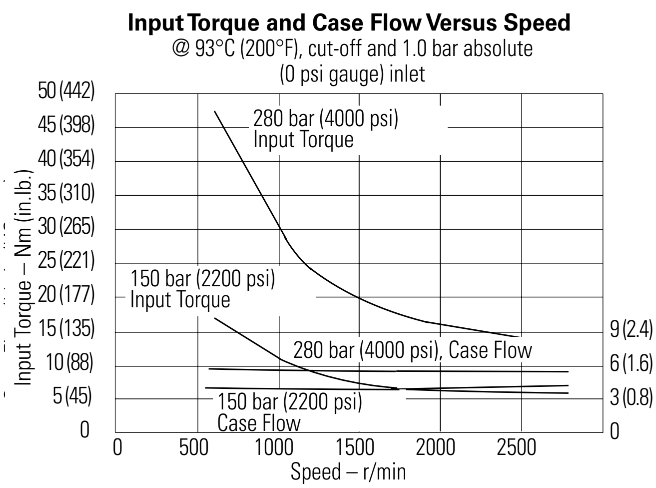


Performance

Higher speed version (M) PVM018

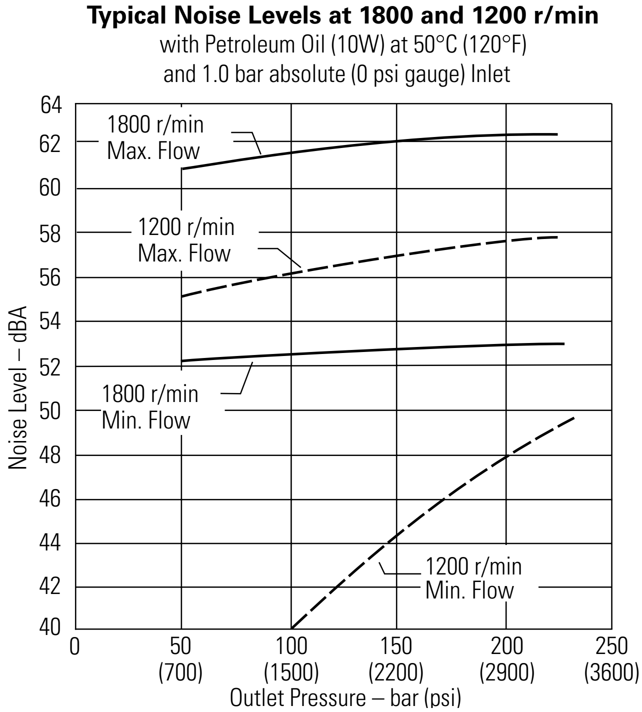


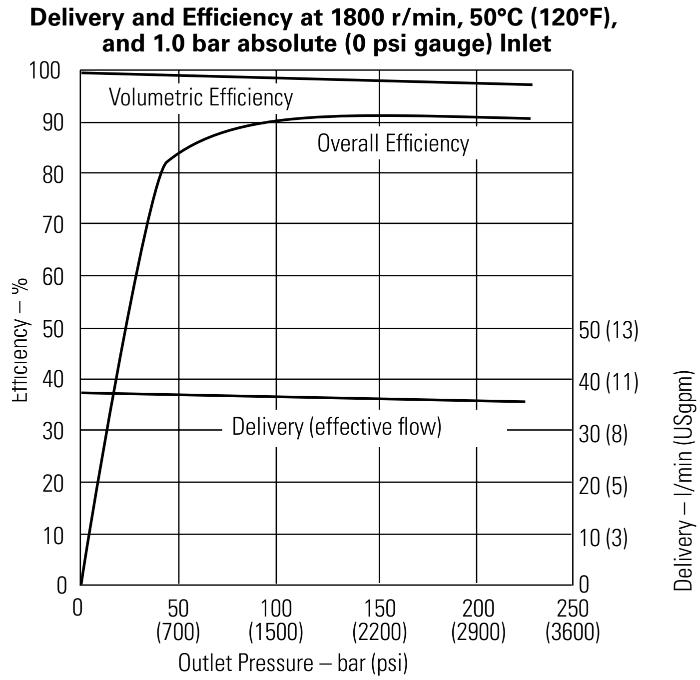


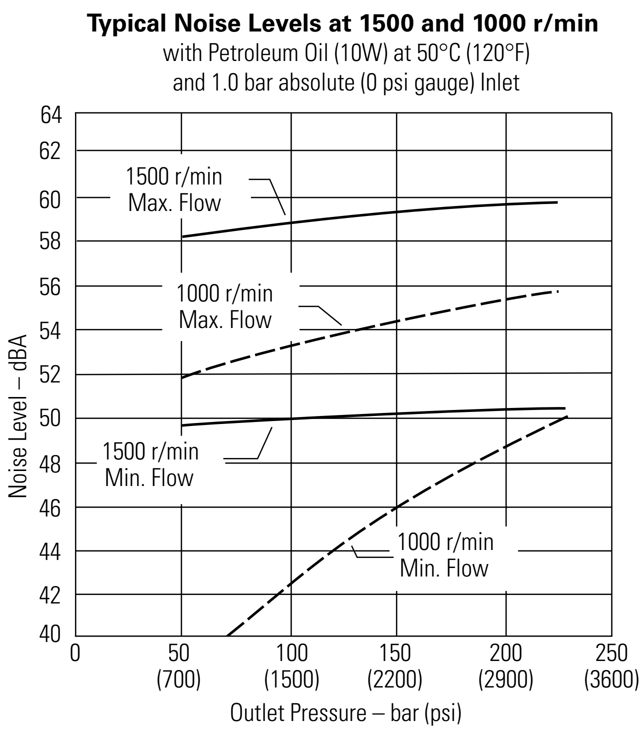


Performance

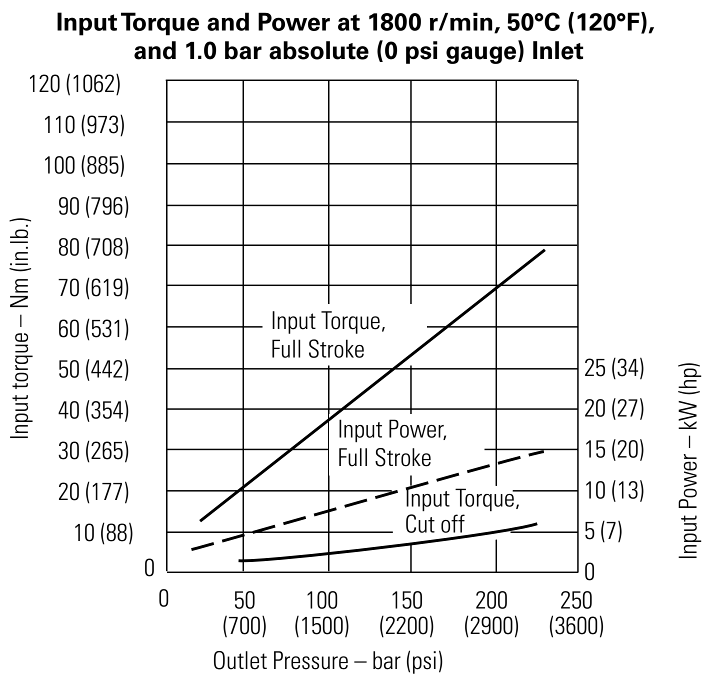
Quiet version, optimized for 1000-1800 rpm (E) PVM020







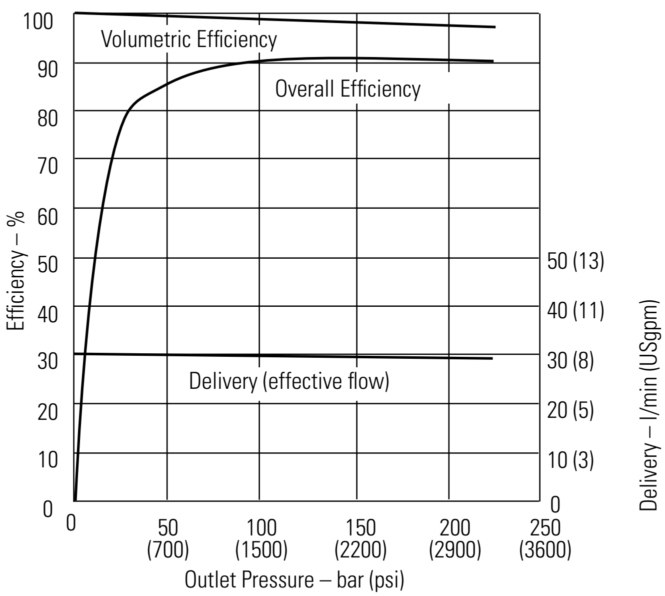
Sound pressure data
equivalent to NFPA



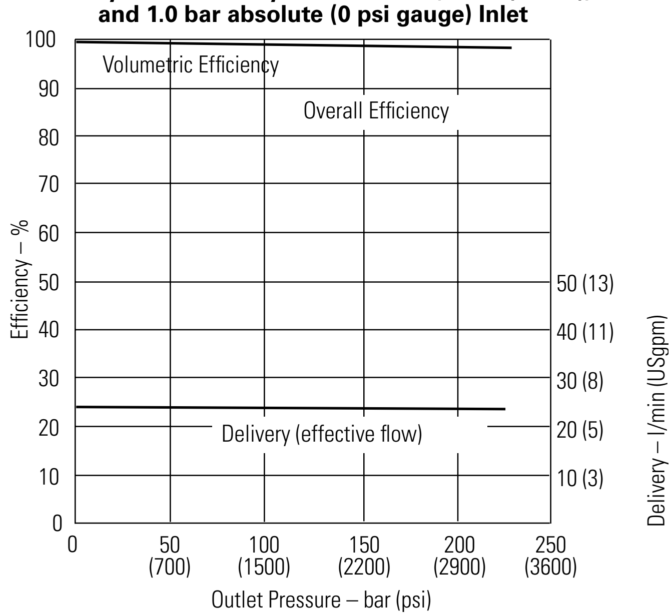
Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM020

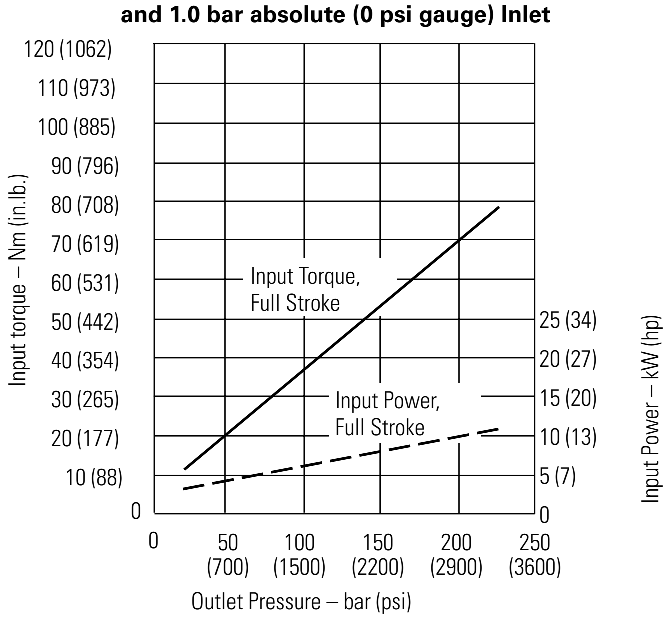
Delivery and Efficiency at 1500 r/min, 50°C (120°F), and 1.0 bar absolute (0 psi gauge) Inlet



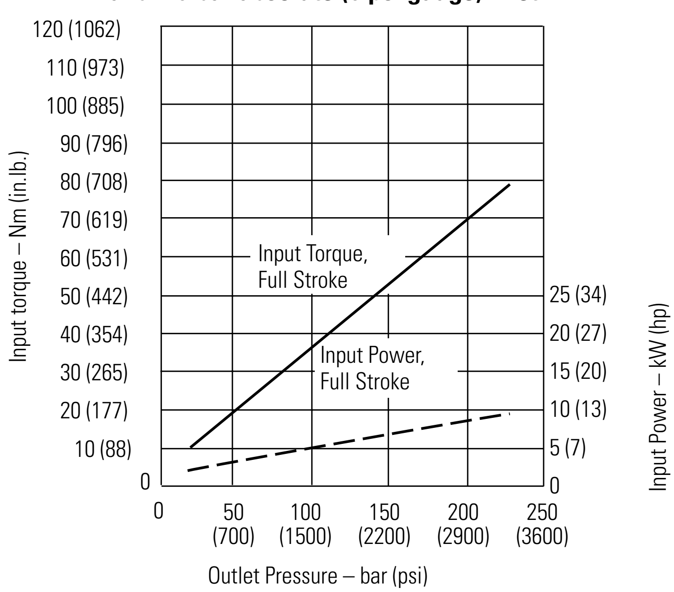
Delivery and Efficiency at 1200 r/min, 50°C (120°F), and 1.0 bar absolute (0 psi gauge) Inlet



Input Torque and Power at 1500 r/min, 50°C (120°F), and 1.0 bar absolute (0 psi gauge) Inlet



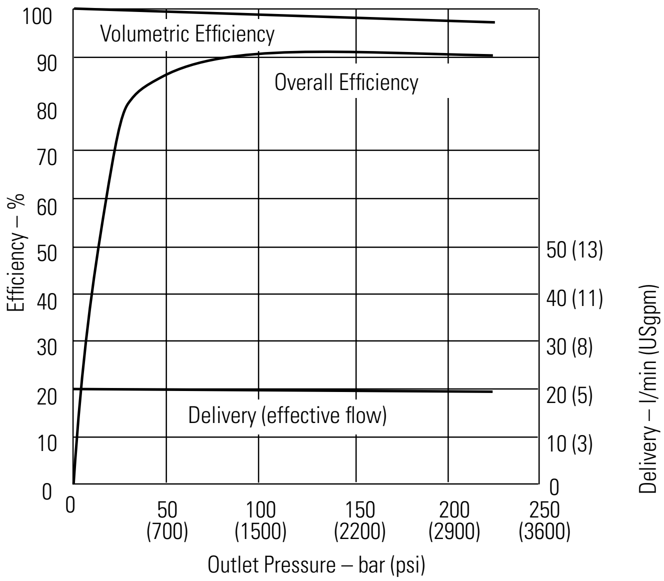
Input Torque and Power at 1200 r/min, 50°C (120°F), and 1.0 bar absolute (0 psi gauge) Inlet



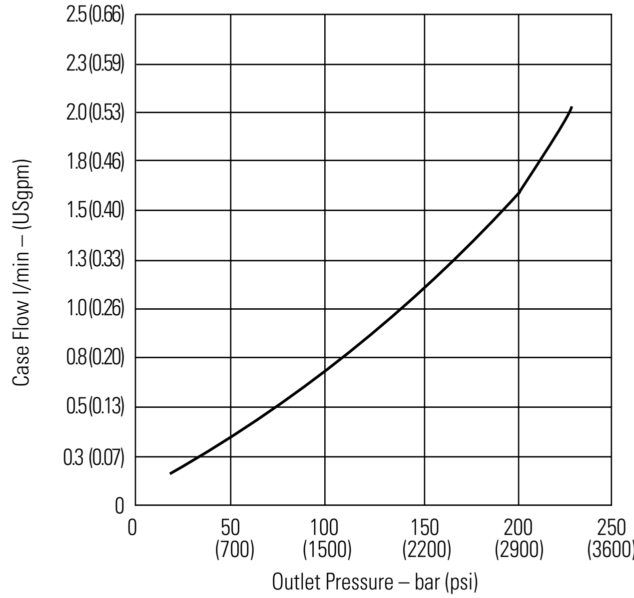
Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM020

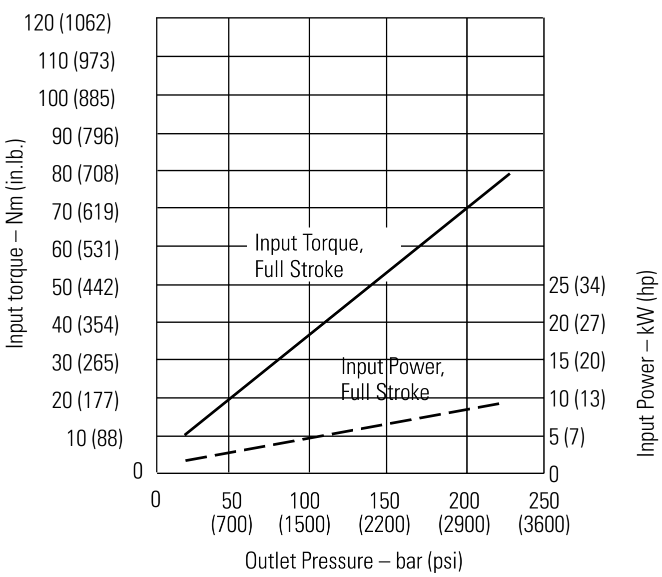
Delivery and Efficiency at 1000 r/min, 50°C (120°F), and 1.0 bar absolute (0 psi gauge) Inlet



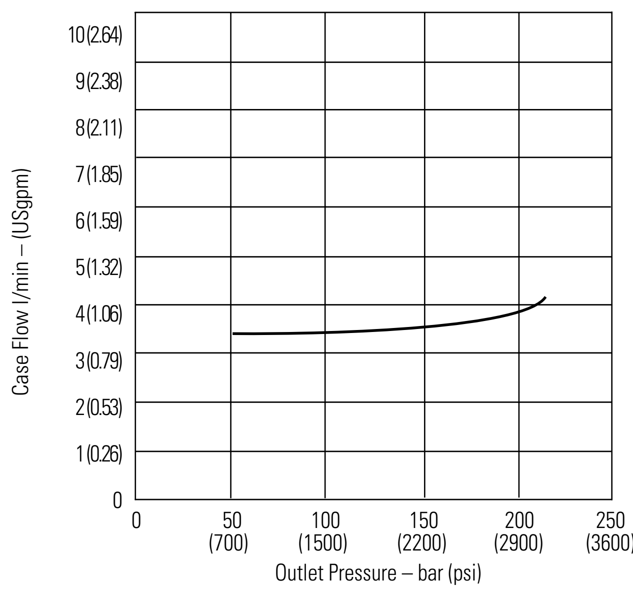
Case Flow versus Outlet Pressure at 1800 r/min, Full Flow, 50°C (120°F), and 1.0 bar absolute (0 psi gauge) Inlet



Input Torque and Power at 1000 r/min, 50°C (120°F), and 1.0 bar absolute (0 psi gauge) Inlet



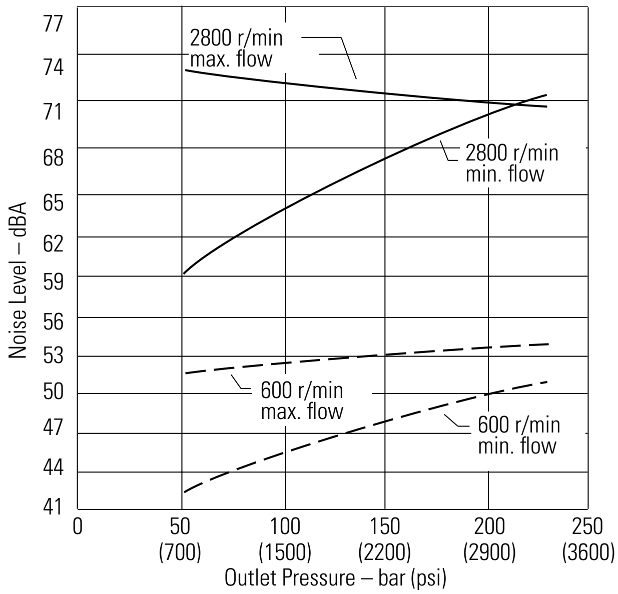
Case Flow versus Outlet Pressure at Cutoff, 1800 r/min, 50°C (120°F), and 1.0 bar absolute (0 psi gauge) Inlet



Performance

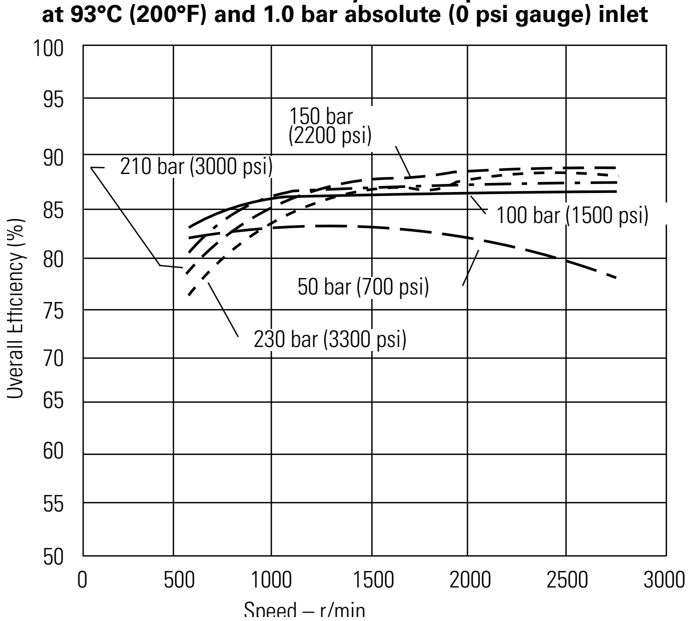
Higher speed version (M) PVM020

Typical Noise Levels at 2800 & 600 r/min with Petroleum Oil (10W at 93°C (200°F) and 1.0 bar absolute (0 psi gauge) Inlet

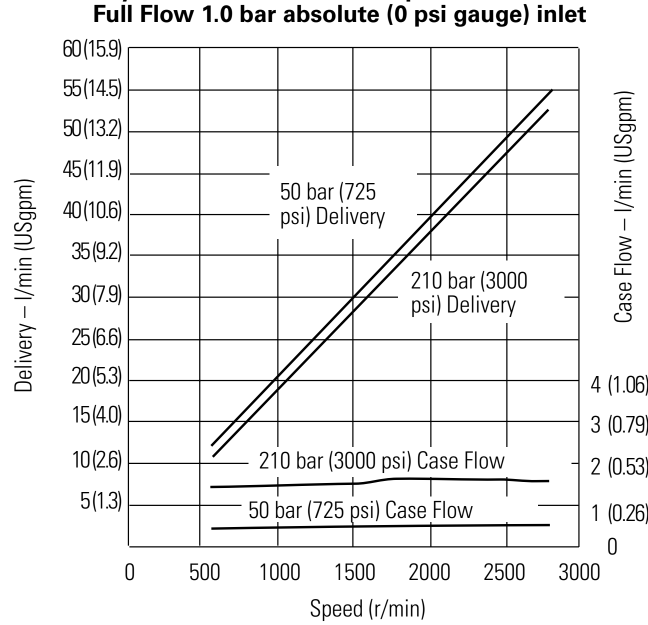


Sound pressure data
equivalent to NFPA.

Overall Efficiency versus Speed at 93°C (200°F) and 1.0 bar absolute (0 psi gauge) inlet



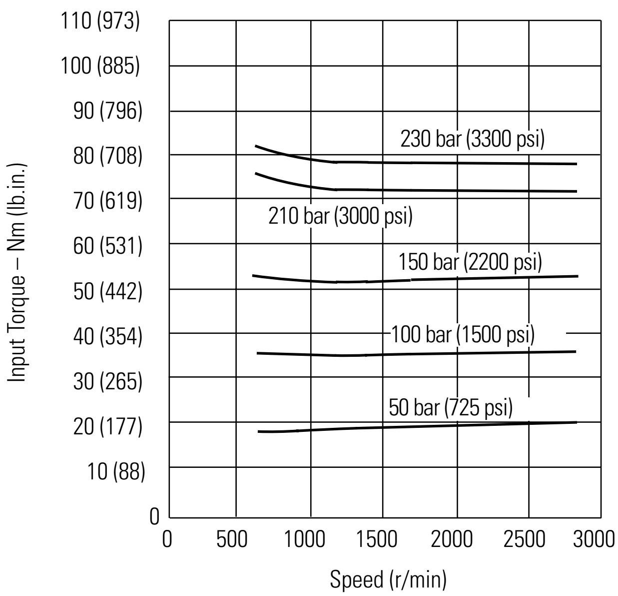
Delivery and Case Flow versus Speed at 93°C (200°F), Full Flow 1.0 bar absolute (0 psi gauge) inlet



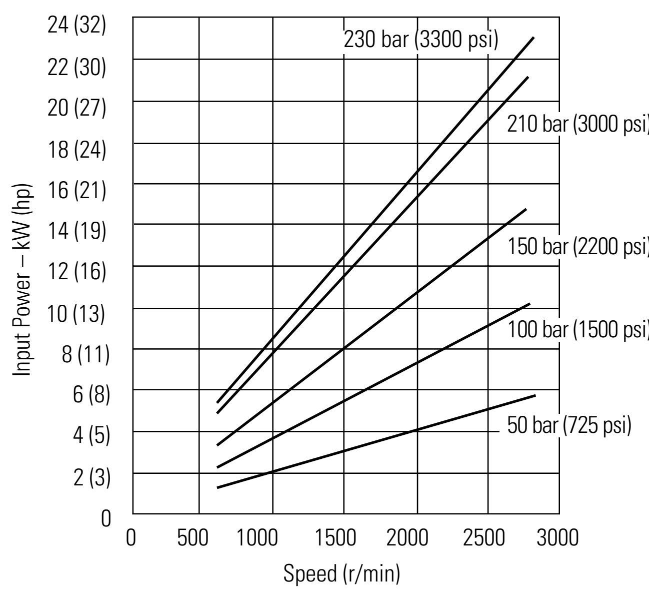
Performance

Higher speed version (M) PVM020

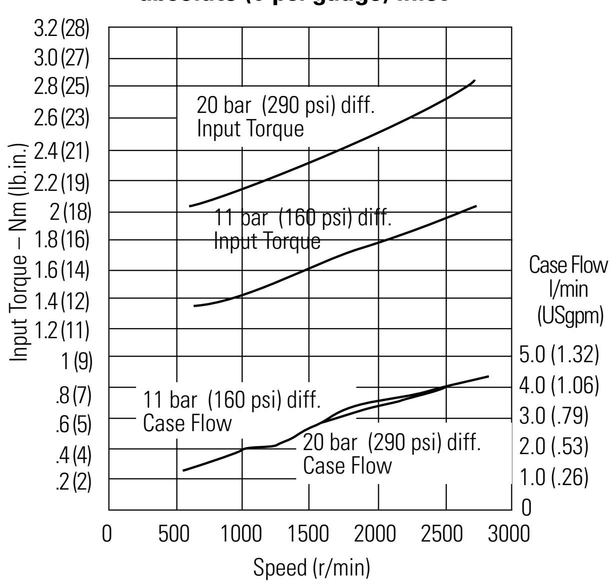
Input Torque versus Speed at 93°C (200°F), Full Flow and 1.0 bar absolute (0 psi gauge) Inlet



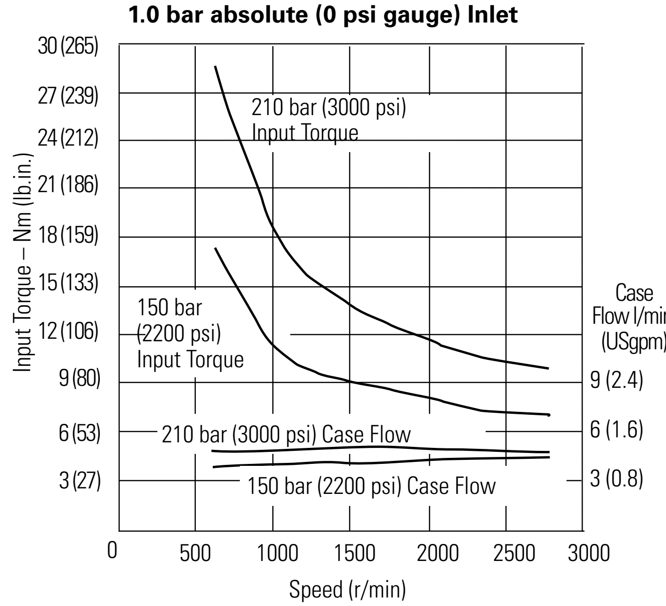
Input Power versus Speed at 93°C (200°F), Full Flow and 1.0 bar absolute (0 psi gauge) Inlet



Input Torque and Case Flow versus Speed at 93°C (200°F), Load Sense Standby and 1.0 bar absolute (0 psi gauge) Inlet

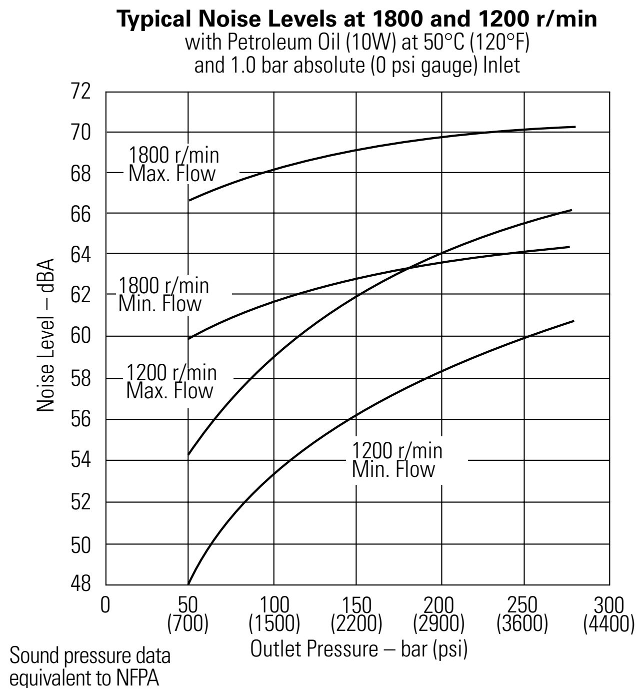


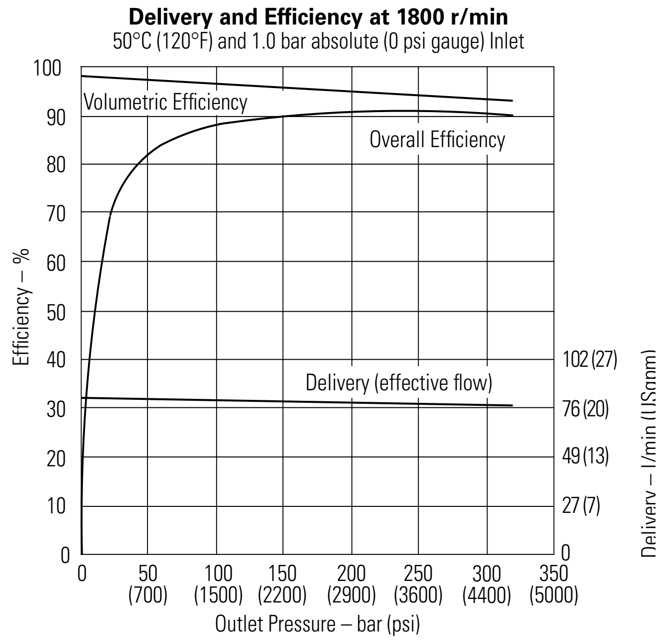
Input Torque and Case Flow versus Speed at 93°C (200°F), Pressure Limit Cut-off and 1.0 bar absolute (0 psi gauge) Inlet

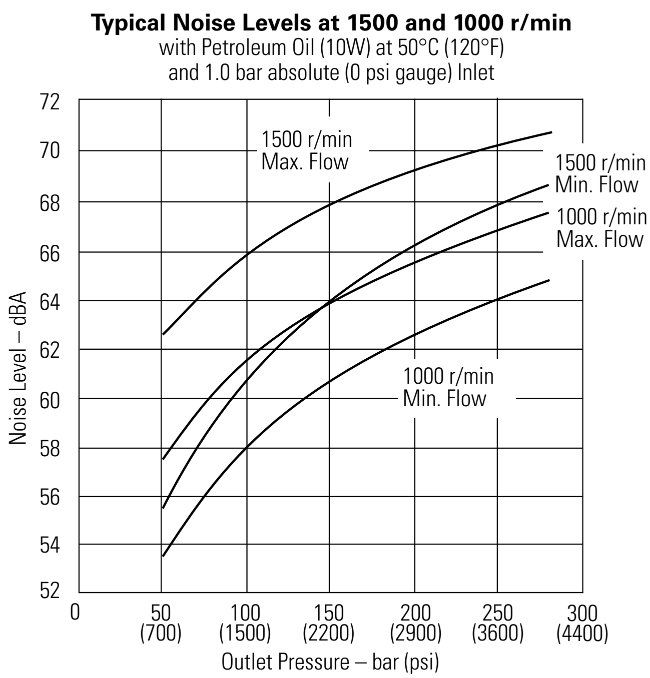


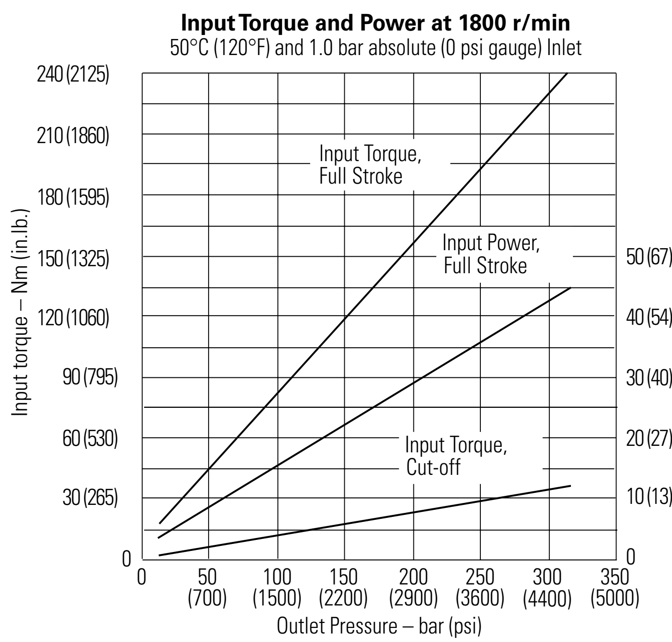
Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM045





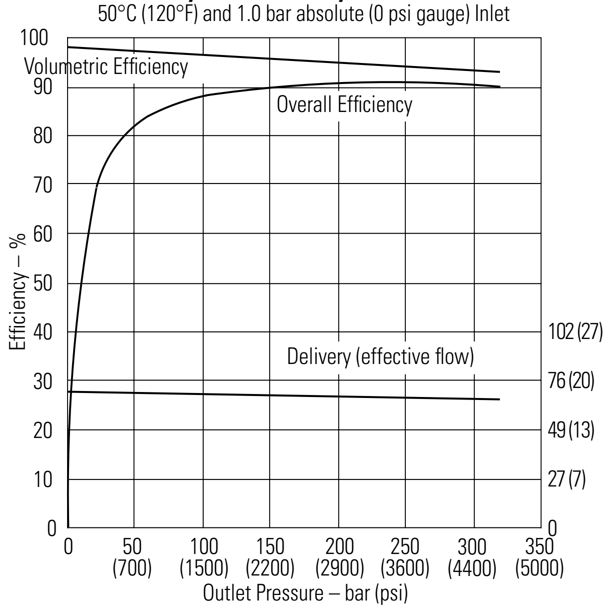




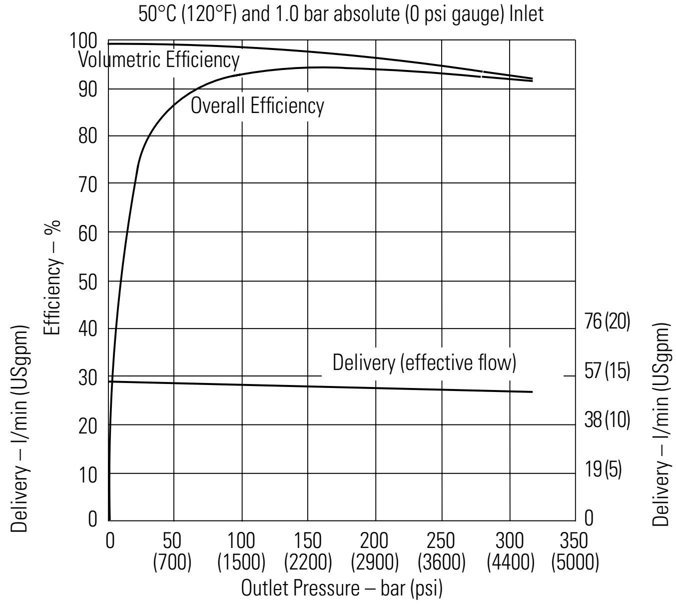
Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM045

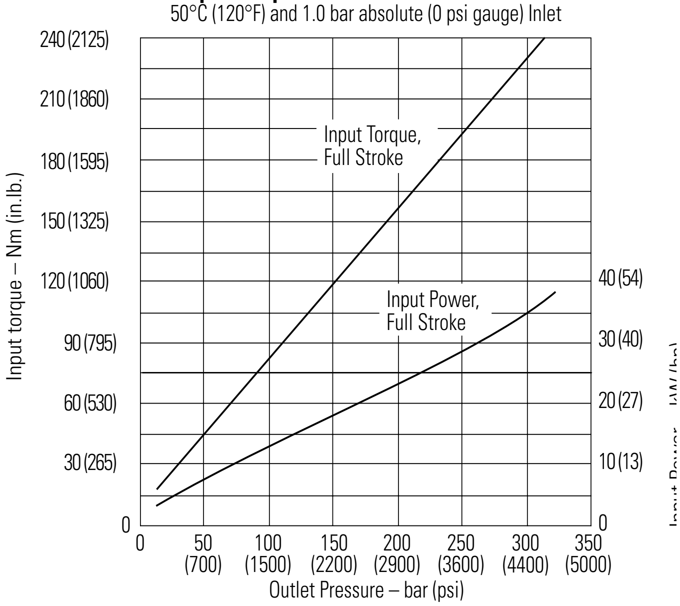
Delivery and Efficiency at 1500 r/min
50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet



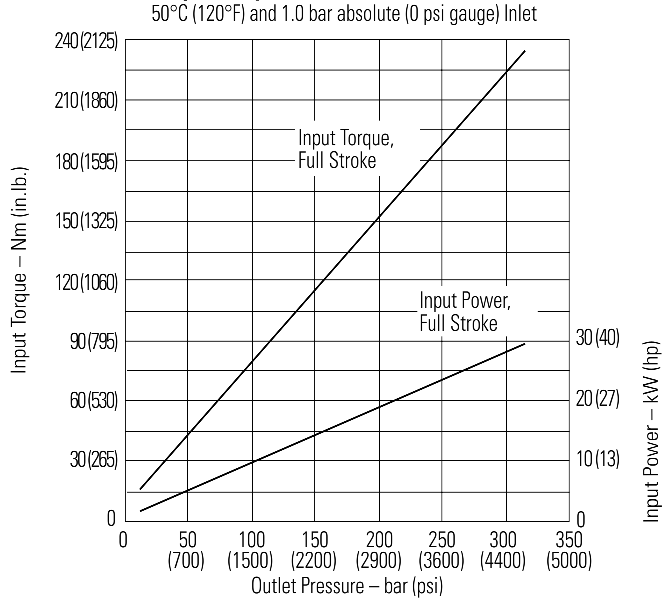
Delivery and Efficiency at 1200 r/min
50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet



Input Torque and Power at 1500 r/min
50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet



Input Torque and Power at 1200 r/min
50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet

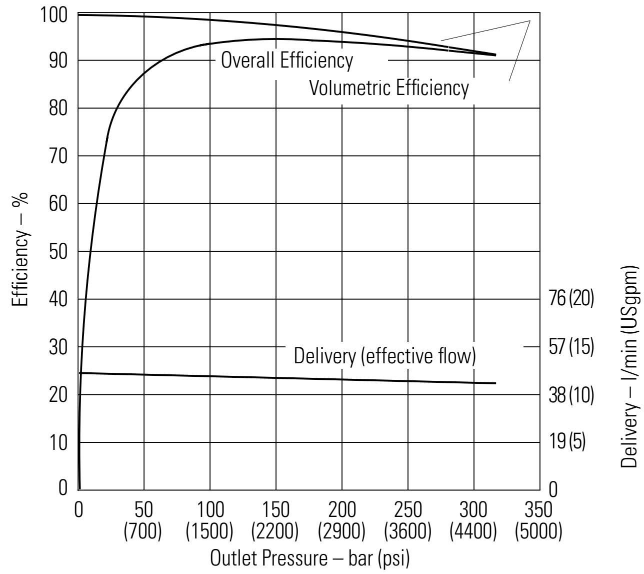


Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM045

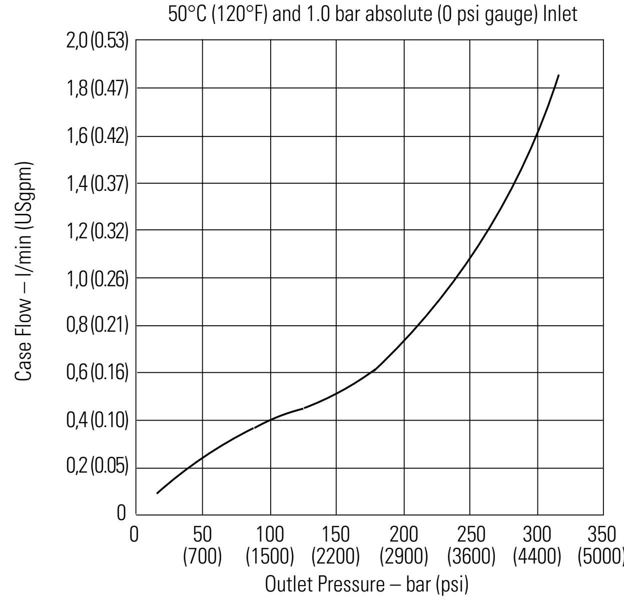
Delivery and Efficiency at 1000 r/min

50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet



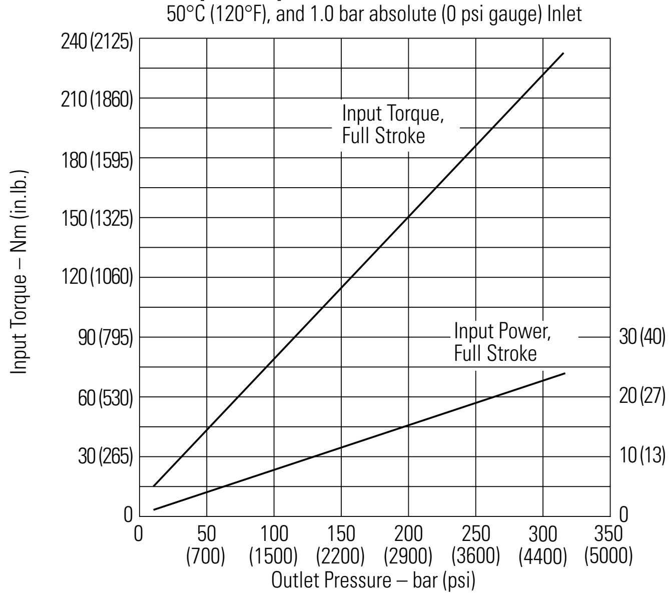
Case Flow Versus Outlet Pressure at 1800 r/min, Full Flow

50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet



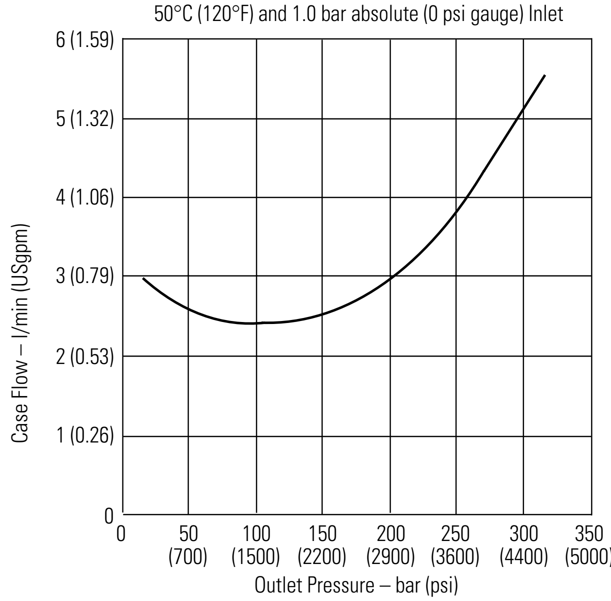
Input Torque and Power at 1000 r/min

50°C (120°F), and 1.0 bar absolute (0 psi gauge) Inlet



Case Flow Versus Outlet Pressure at Cutoff, 1800 r/min

50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet

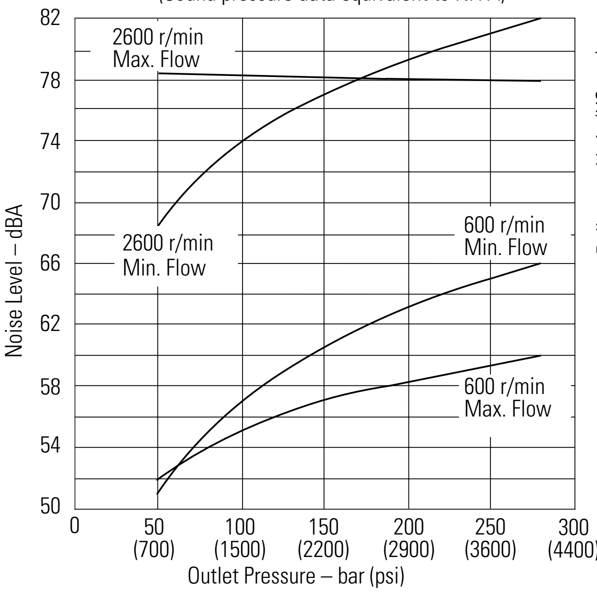


Performance

Higher speed version (M) PVM045

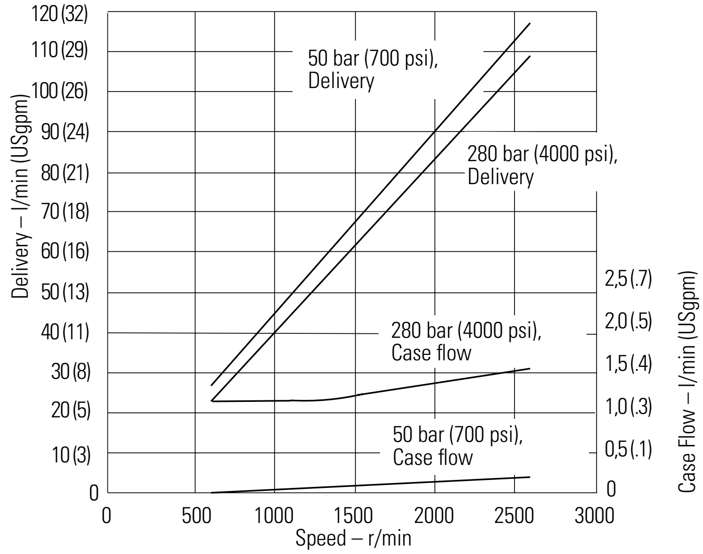
Typical Noise Levels

Petroleum Oil (10W) at 93°C (200°F),
1.0 bar absolute (0 psi gauge) Inlet
(Sound pressure data equivalent to NFPA)



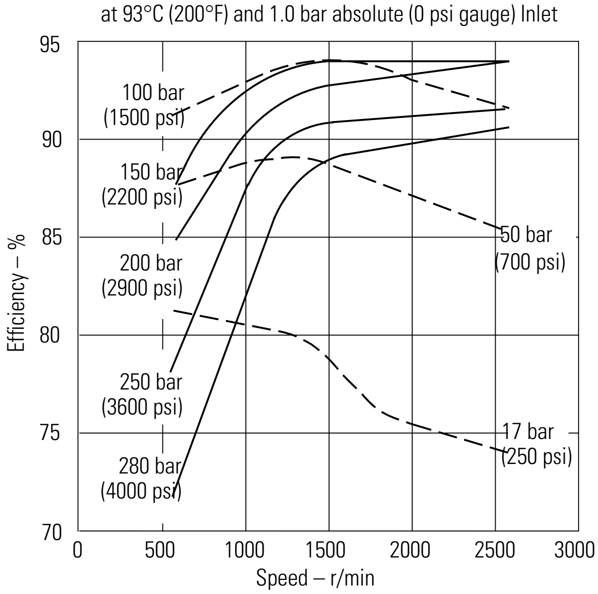
Delivery and Case Flow Versus Speed

@ 93°C (200°F), full flow and 1.0 bar absolute (0 psi) gauge Inlet



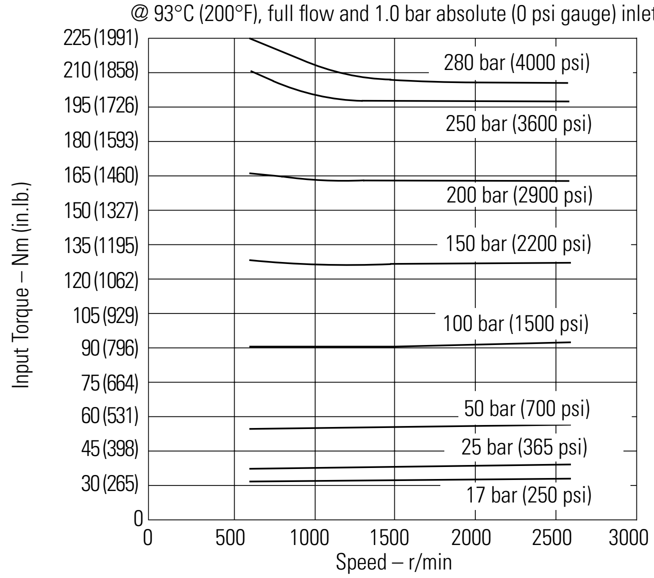
Overall Efficiency Versus Speed

at 93°C (200°F) and 1.0 bar absolute (0 psi gauge) Inlet



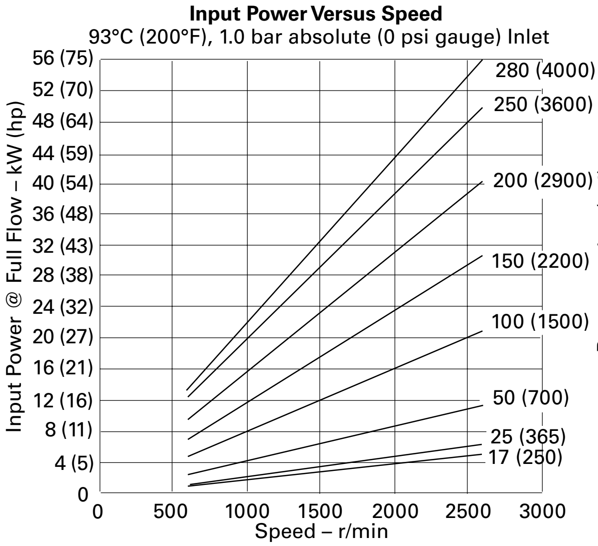
Input Torque Versus Speed

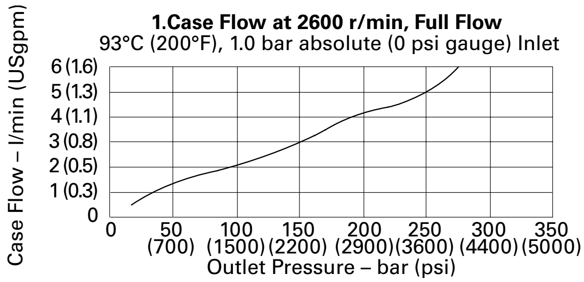
@ 93°C (200°F), full flow and 1.0 bar absolute (0 psi gauge) inlet

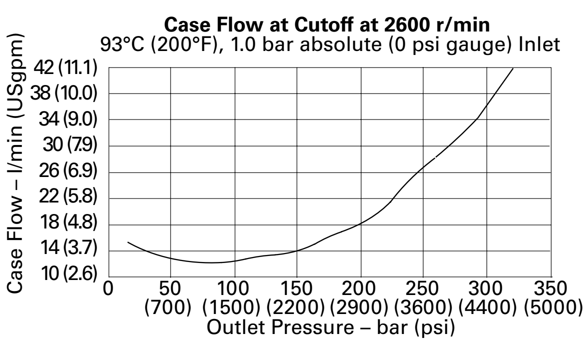


Performance

Higher speed version (M) PVM045



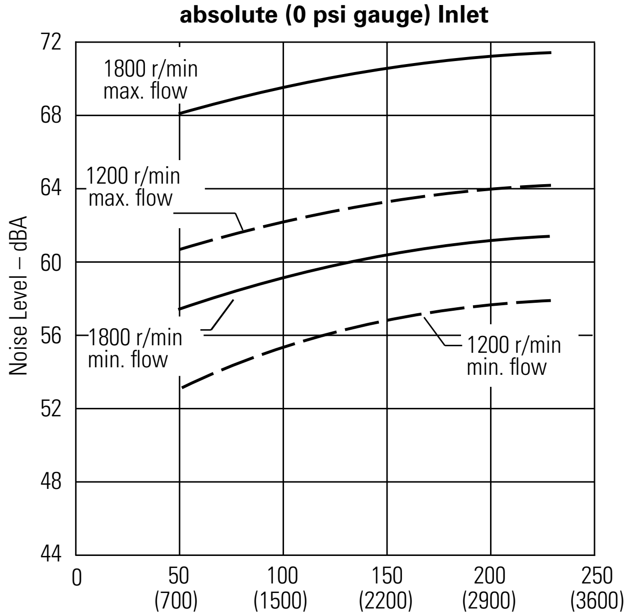




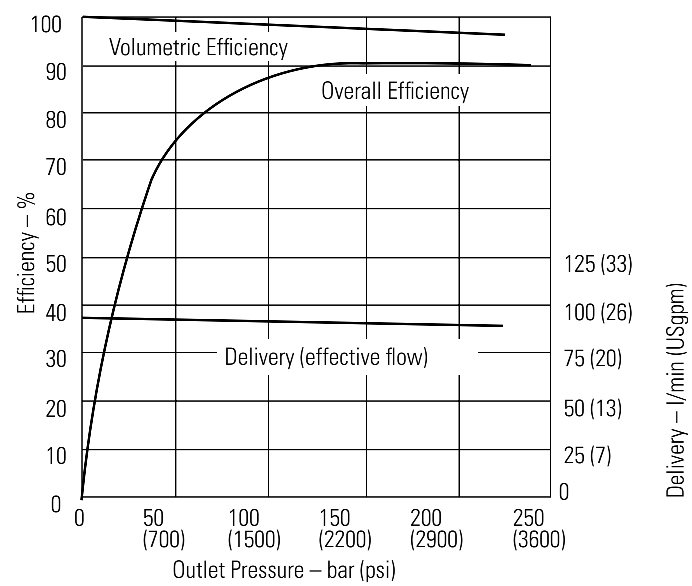
Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM050

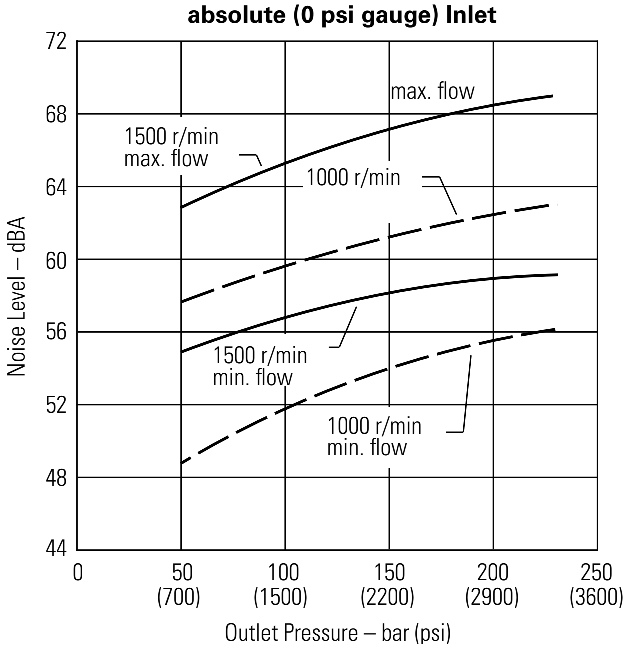
Typical Noise Levels at 1800 and 1200 r/min with Petroleum Oil (10W) at 50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet



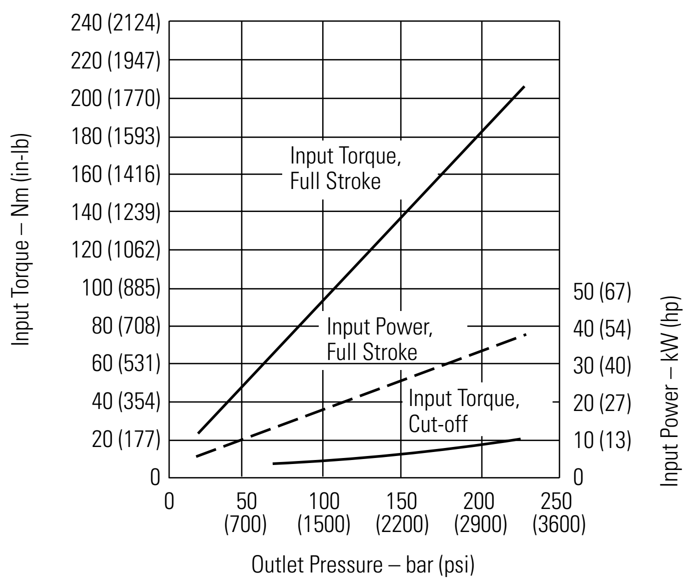
Delivery and Efficiency at 1800 r/min, 50°C (120°F), and 1.0 bar absolute (0 psi gauge) Inlet



Typical Noise Levels at 1500 and 1000 r/min with Petroleum Oil (10W) at 50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet



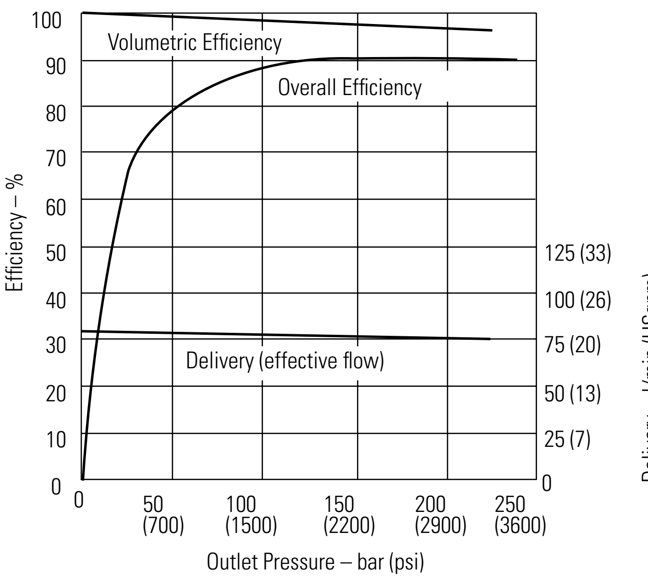
Input Torque and Power at 1800 r/min, 50°C (120°F), and 1.0 bar absolute (0 psi gauge) Inlet



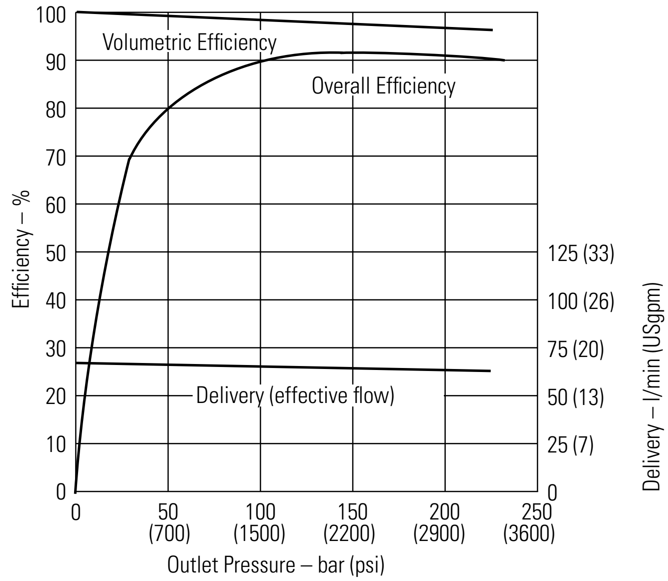
Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM050

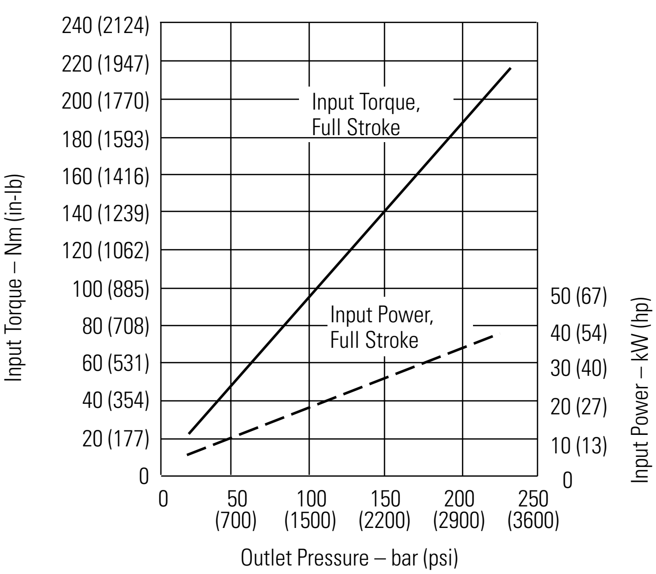
Delivery and Efficiency at 1500 r/min, 50°C (120°F), and 1.0 bar absolute (0 psi gauge) Inlet



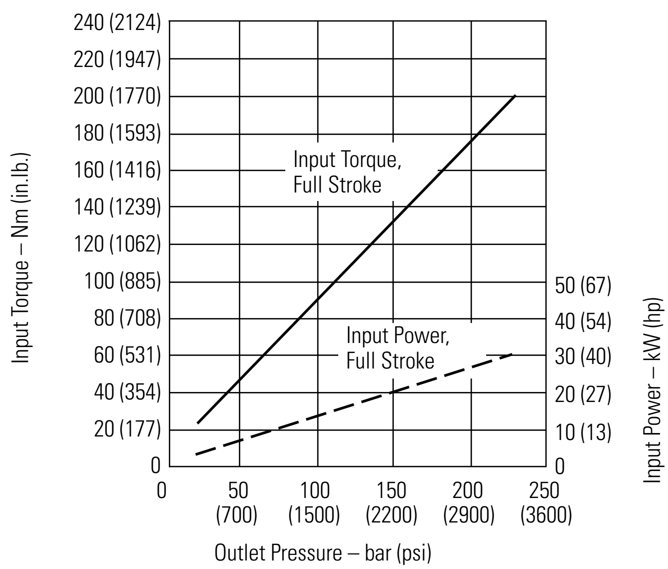
Delivery and Efficiency at 1200 r/min, 50°C (120°F), and 1.0 bar absolute (0 psi gauge) Inlet



Input Torque and Power at 1500 r/min, 50°C (120°F), and 1.0 bar absolute (0 psi gauge) Inlet



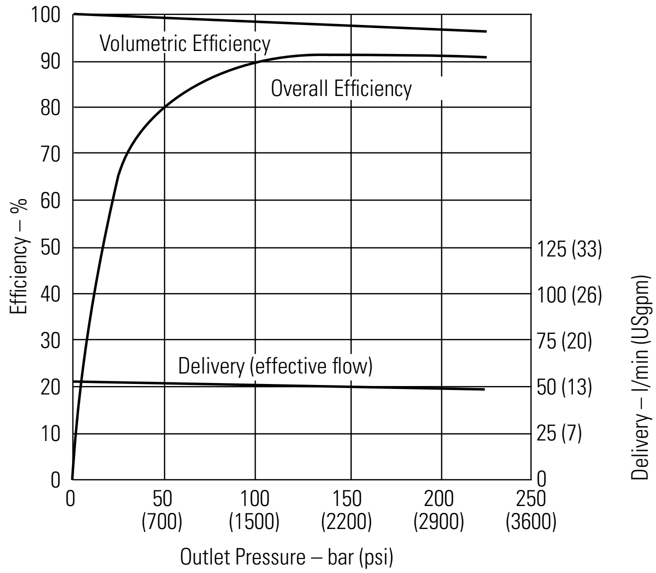
Input Torque and Power at 1200 r/min, 50°C (120°F), and 1.0 bar absolute (0 psi gauge) Inlet



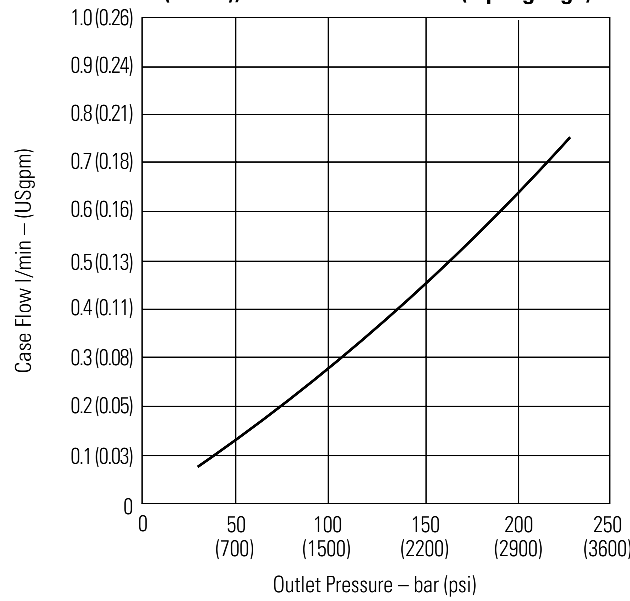
Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM050

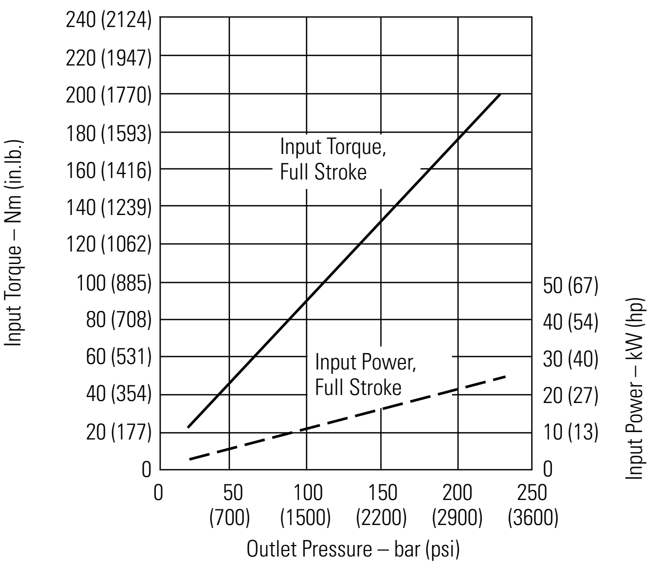
Delivery and Efficiency at 1000 r/min, 50°C (120°F), and 1.0 bar absolute (0 psi gauge) Inlet



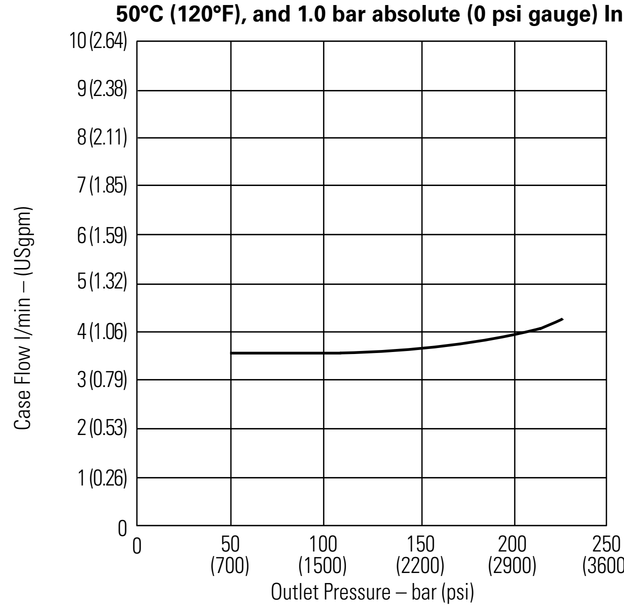
Case Flow versus Outlet Pressure at 1800 r/min, Full Flow, 50°C (120°F), and 1.0 bar absolute (0 psi gauge) Inlet



Input Torque and Power at 1000 r/min, 50°C (120°F), and 1.0 bar absolute (0 psi gauge) Inlet

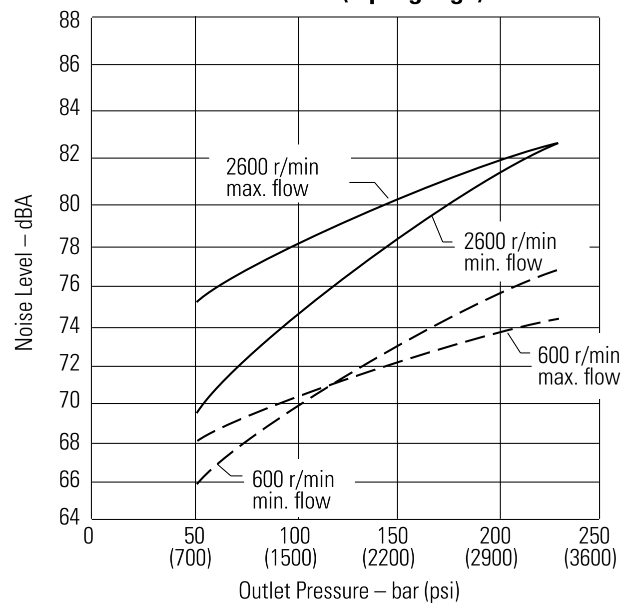


Case Flow versus Outlet Pressure at Cutoff, 1800 r/min, 50°C (120°F), and 1.0 bar absolute (0 psi gauge) Inlet



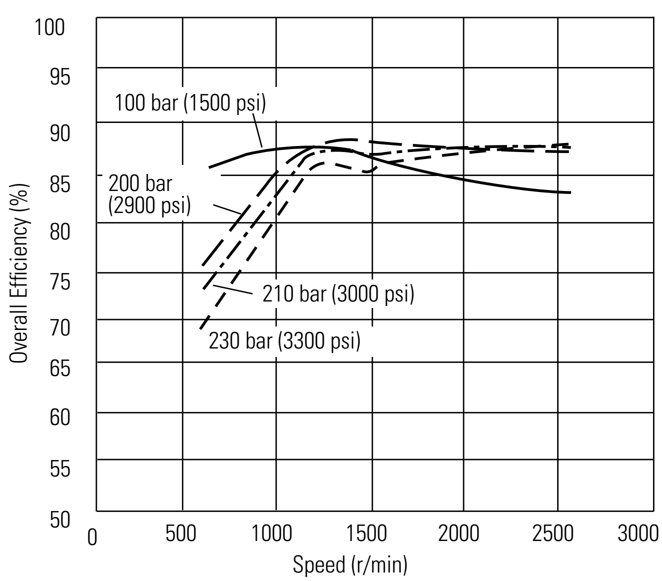
Higher speed version (M) PVM050

Typical Noise Levels at 2600 & 600 r/min with Petroleum Oil (10W) at 93°C (200°F) and 1.0 bar absolute (0 psi gauge) inlet

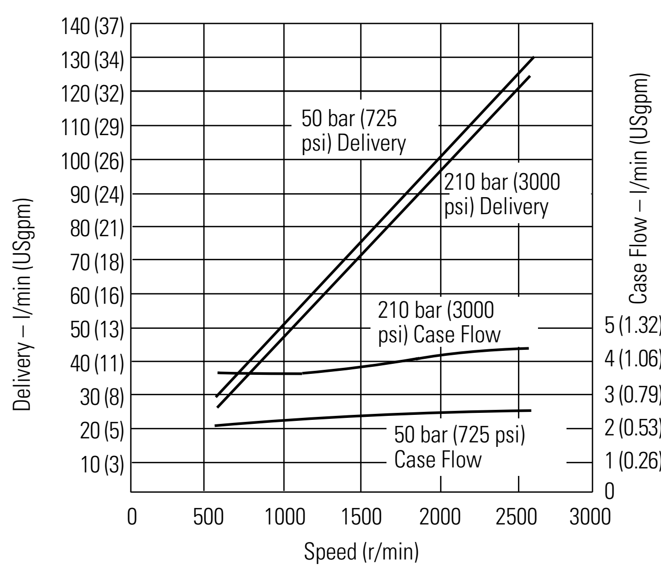


Sound pressure data equivalent to NFPA.

Overall Efficiency versus Speed at 93°C (200°F) and 1.0 bar absolute (0 psi gauge) inlet



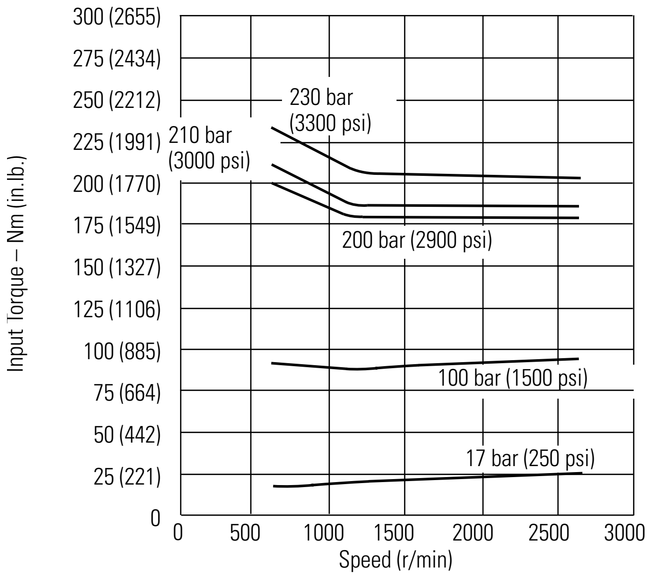
Delivery and Case Flow versus Speed at 93°C (200°F), Full Flow and 1.0 bar absolute (0 psi gauge) inlet



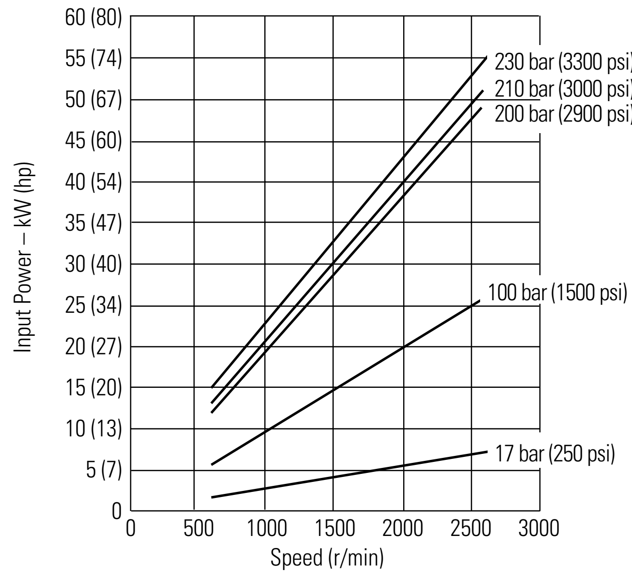
Performance

Higher speed version (M) PVM050

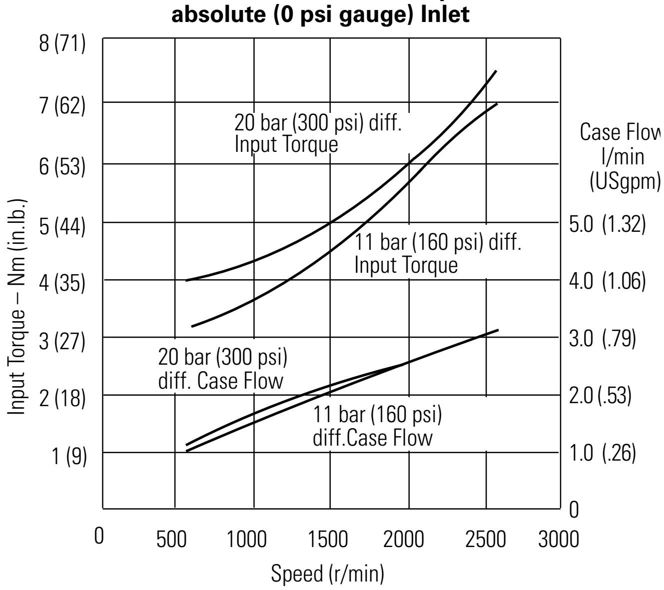
Input Torque versus Speed at 93°C (200°F), Full Flow and 1.0 bar absolute (0 psi gauge) Inlet



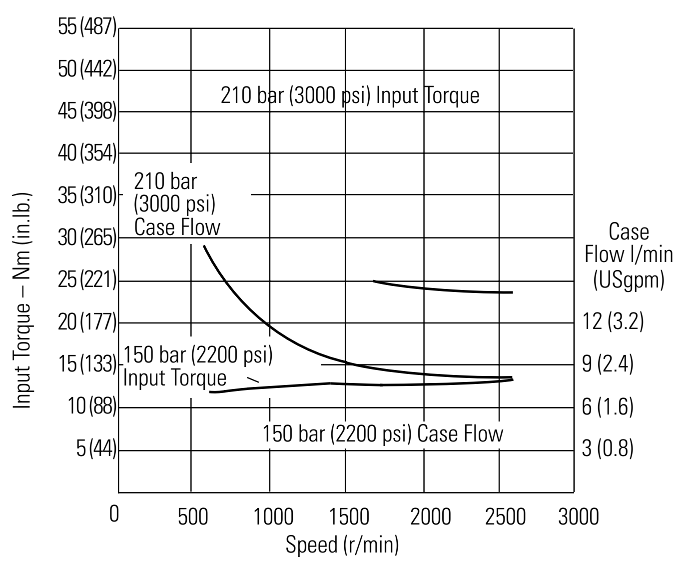
Input Power versus Speed at 93°C (200°F), Full Flow and 1.0 bar absolute (0 psi gauge) Inlet



Input Torque and Case Flow versus Speed at 93°C (200°F), Load Sense Standby and 1.0 bar absolute (0 psi gauge) Inlet



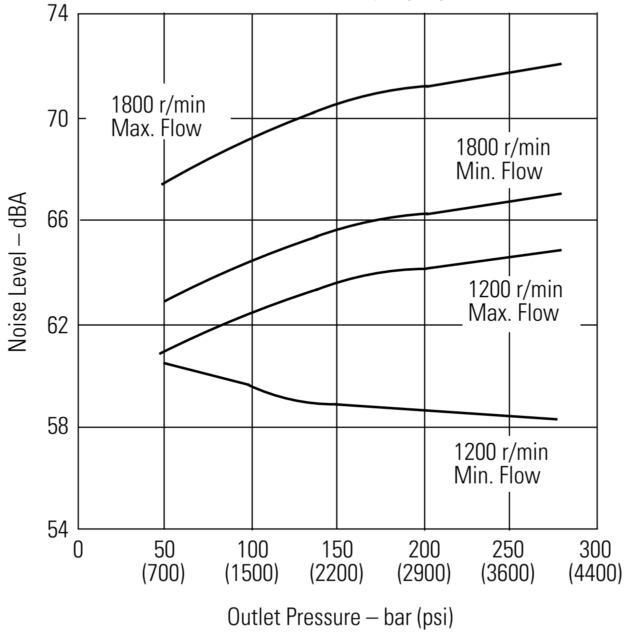
Input Torque and Case Flow versus Speed at 93°C (200°F), Pressure Limit Cut-off and 1.0 bar absolute (0 psi gauge) Inlet



Performance

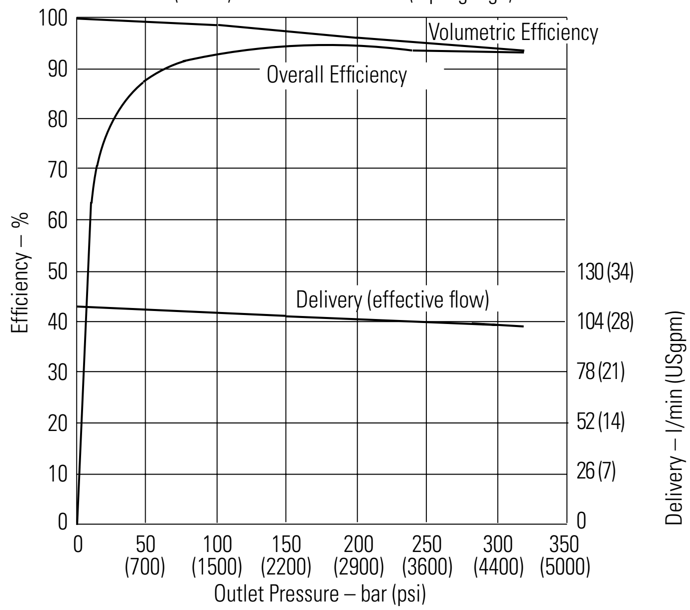
Quiet version, optimized for 1000-1800 rpm (E) PVM057

Typical Noise Levels at 1800 and 1200 r/min
with Petroleum Oil (10W) at 50°C (120°F)
and 1.0 bar absolute (0 psi gauge) Inlet

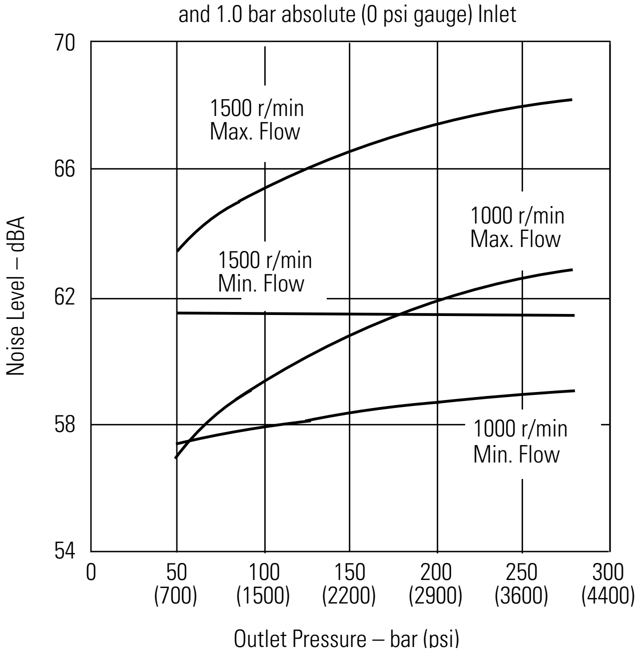


(Sound pressure data
equivalent to NFPA)

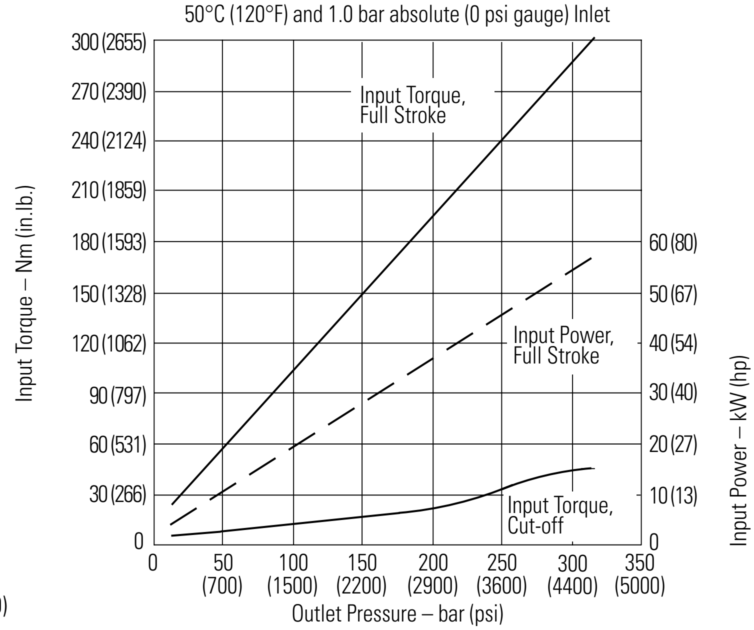
Delivery and Efficiency at 1800 r/min
50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet



Typical Noise Levels at 1500 and 1000 r/min
with Petroleum Oil (10W) at 50°C (120°F)
and 1.0 bar absolute (0 psi gauge) Inlet

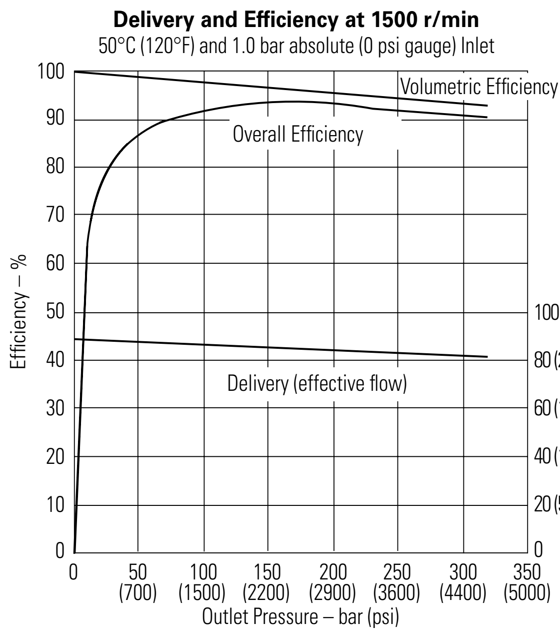


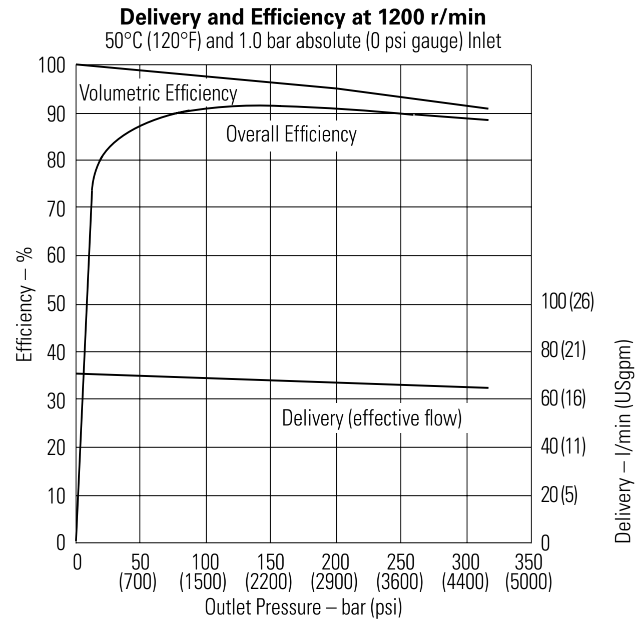
Input Torque and Power at 1800 r/min
50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet

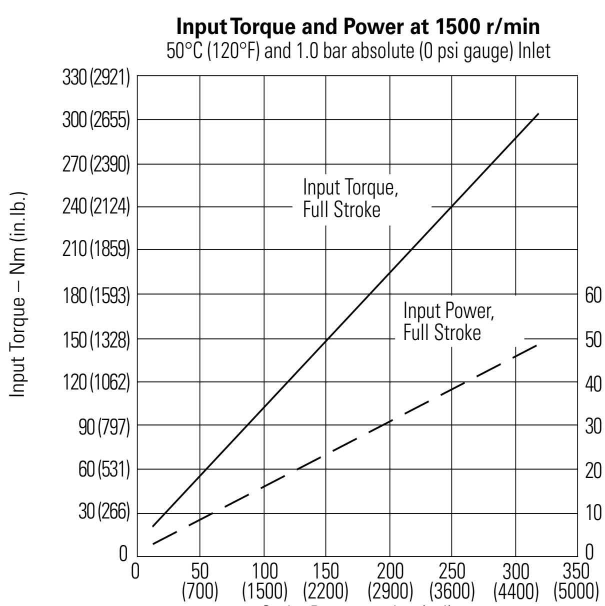


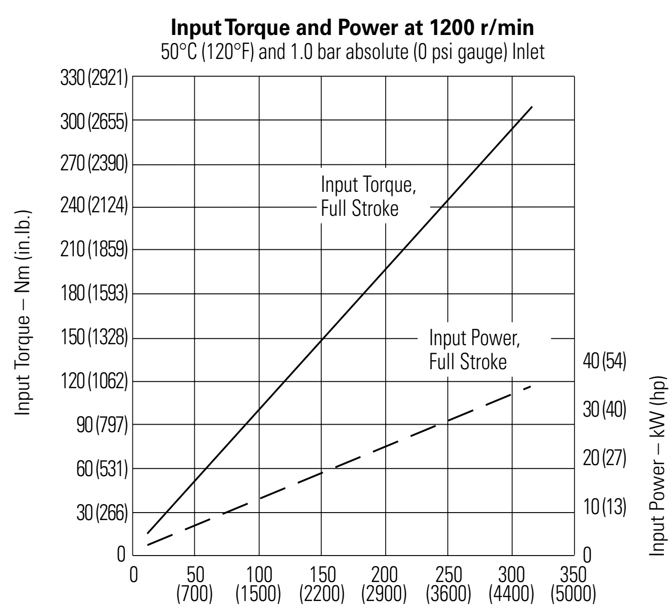
Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM057



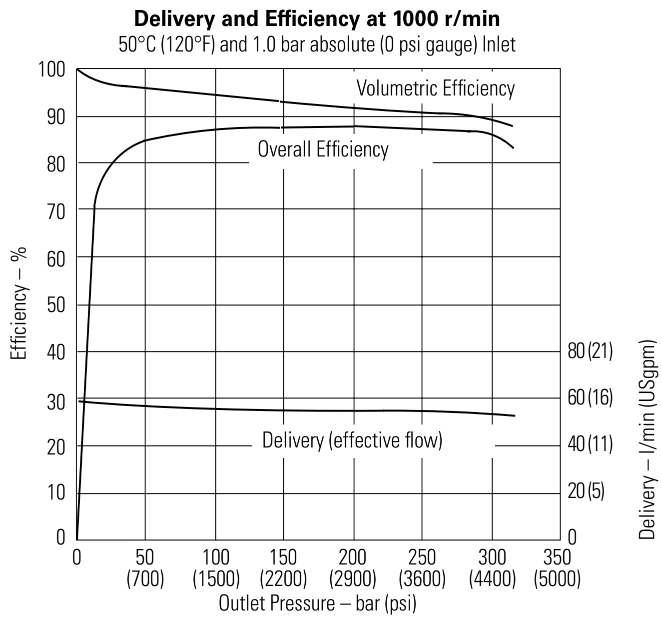


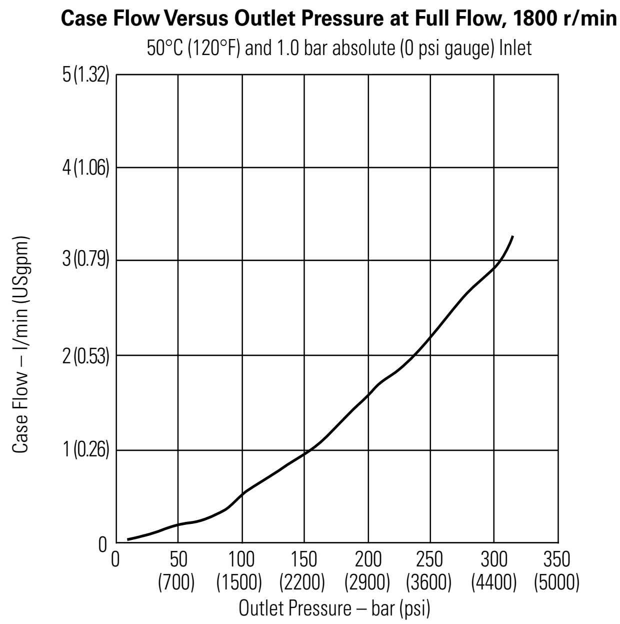


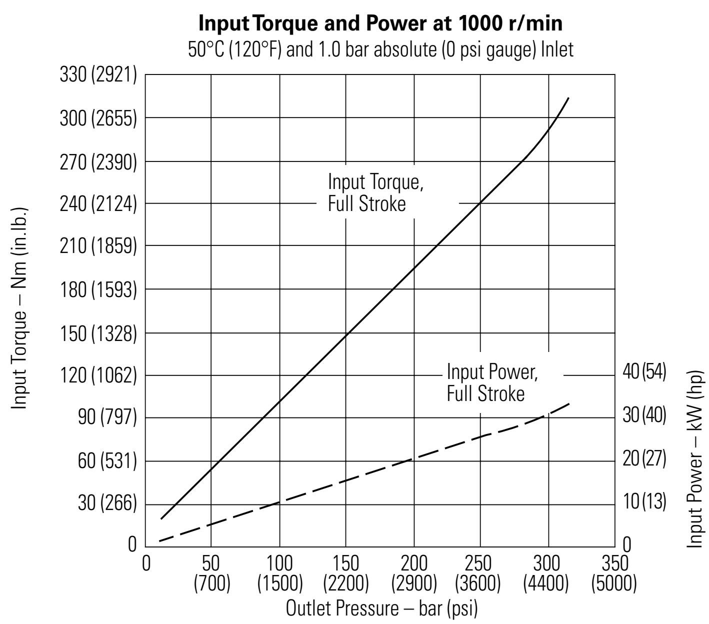


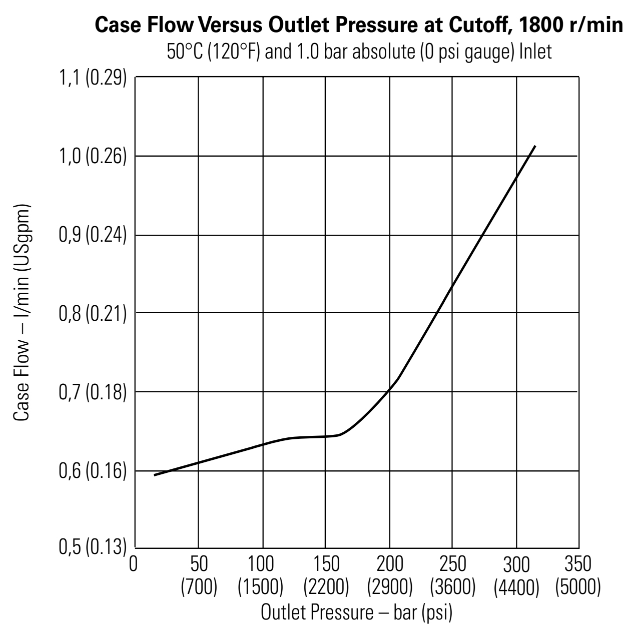
Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM057







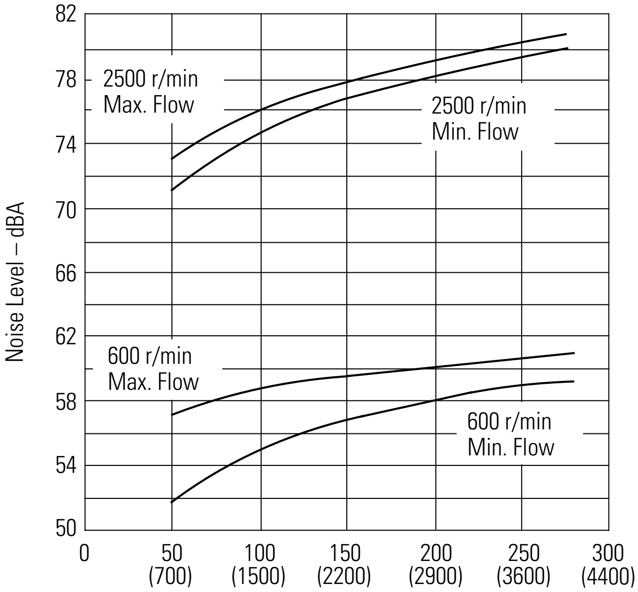


Performance

Higher speed version (M) PVM057

Typical Noise Levels

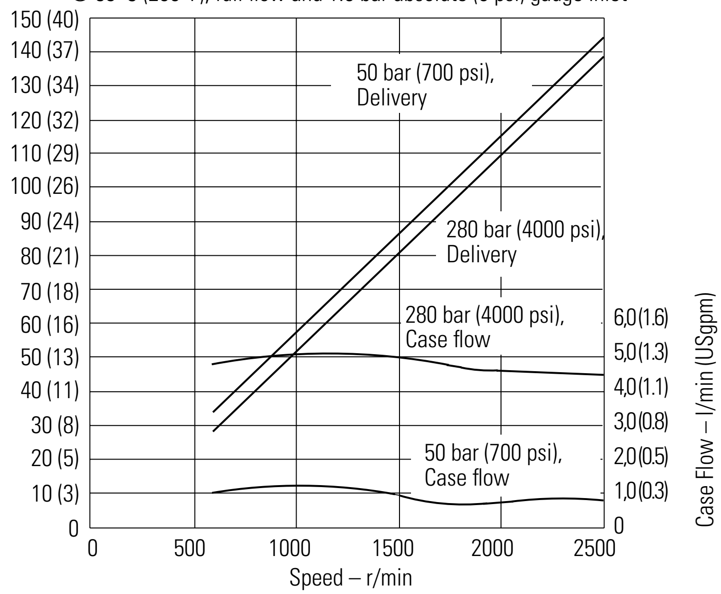
Petroleum Oil (10W) at 93°C (200°F), 1.0 bar absolute (0 psi gauge) Inlet



(Sound pressure data equivalent to NFPA)

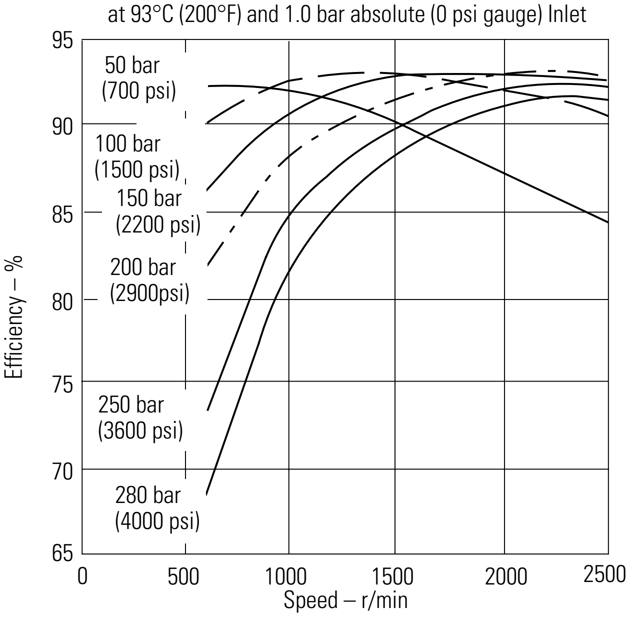
Delivery and Case Flow Versus Speed

@ 93°C (200°F), full flow and 1.0 bar absolute (0 psi) gauge Inlet



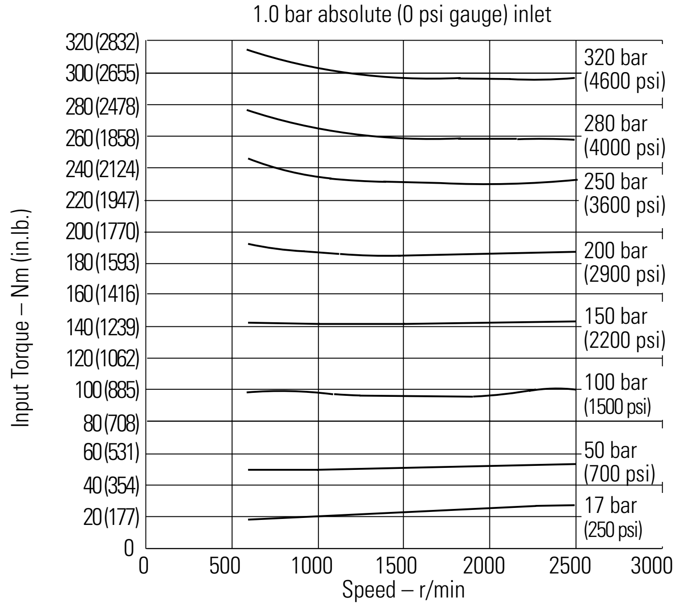
Overall Efficiency Versus Speed

at 93°C (200°F) and 1.0 bar absolute (0 psi gauge) Inlet



Input Torque Versus Speed

@ 93°C (200°F), full flow and 1.0 bar absolute (0 psi gauge) inlet

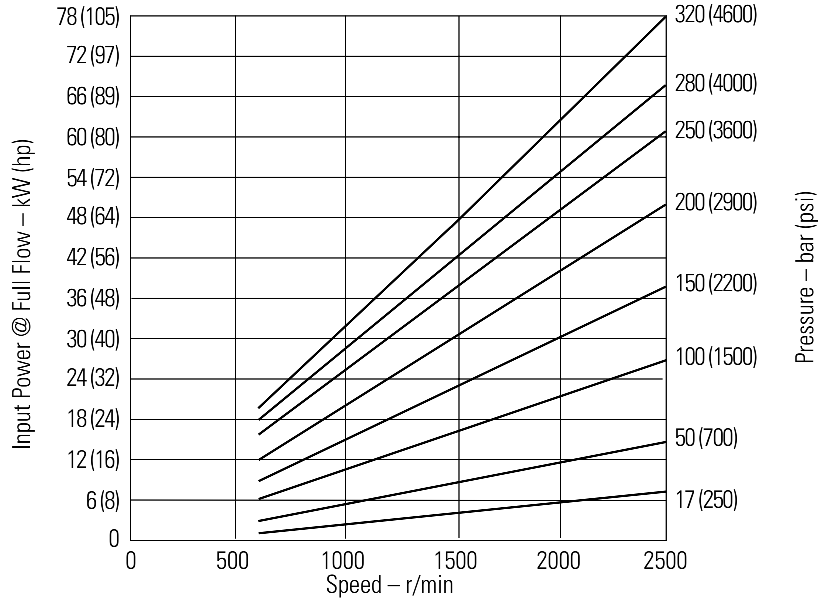


Performance

Higher speed version (M) PVM057

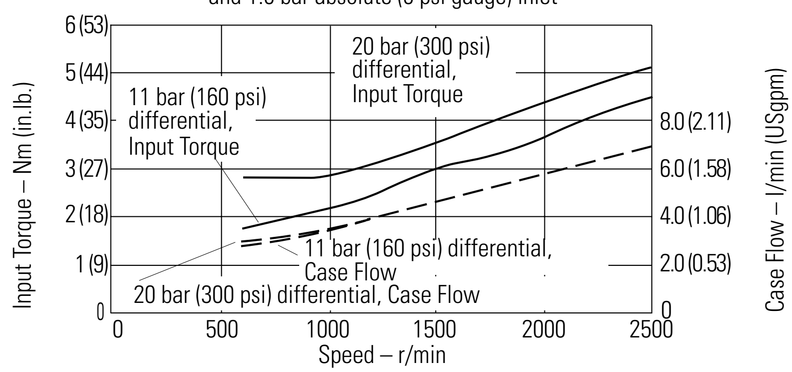
Input Power Versus Speed

93°C (200°F), 1.0 bar absolute (0 psi gauge) Inlet

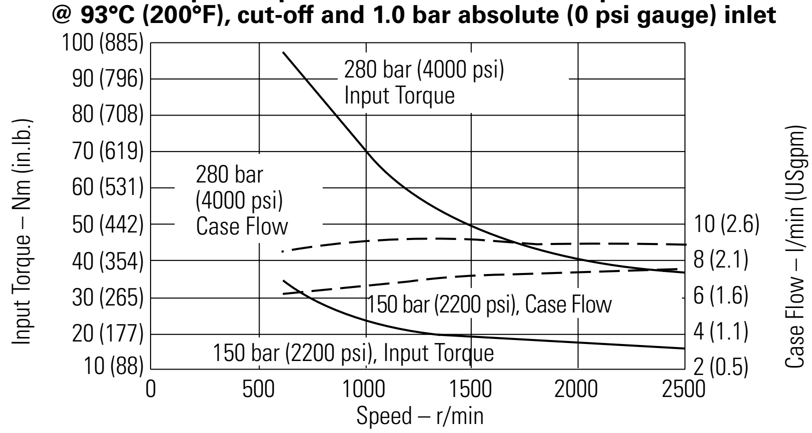


Input Torque and Case Flow Versus Speed @ 93°C (200°F), load sense standby

and 1.0 bar absolute (0 psi gauge) inlet



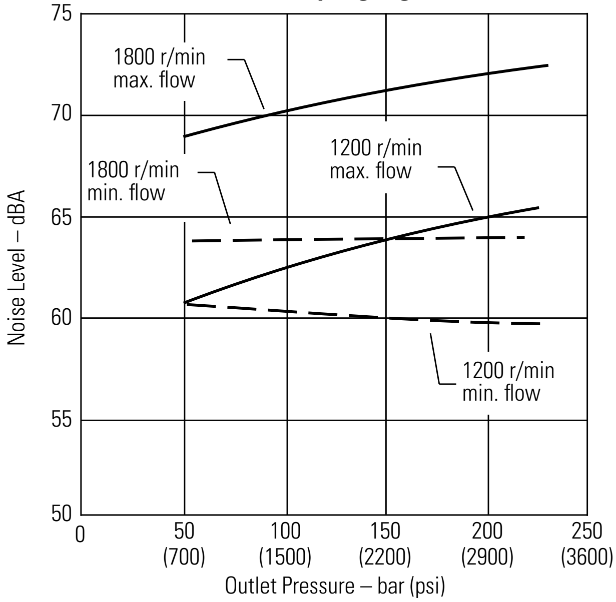
Input Torque and Case Flow Versus Speed @ 93°C (200°F), cut-off and 1.0 bar absolute (0 psi gauge) inlet



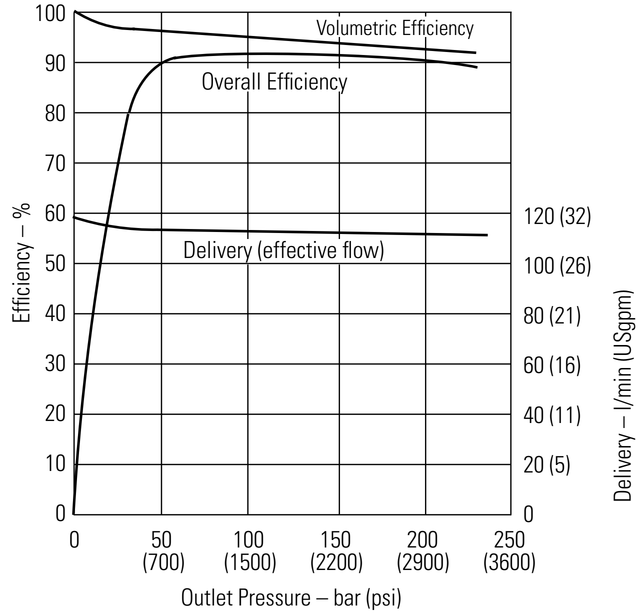
Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM063

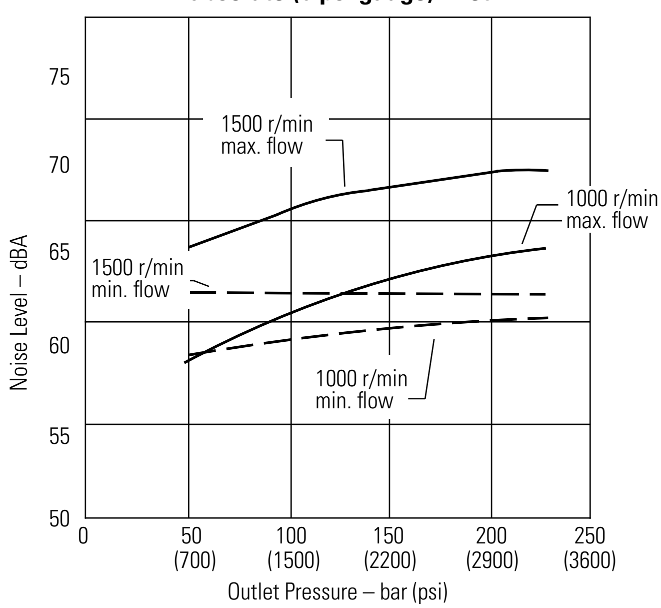
Typical Noise Levels at 1800 and 1200 r/min. with Petroleum Oil (10W) at 50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet



Delivery and Efficiency at 1800 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet

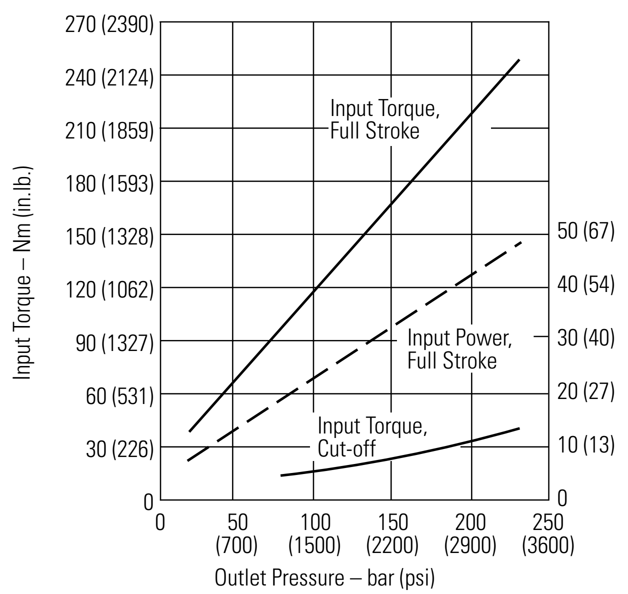


Typical Noise Levels at 1500 and 1000 r/min. with Petroleum Oil (10W) at 50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet



Sound pressure data equivalent to NFPA.

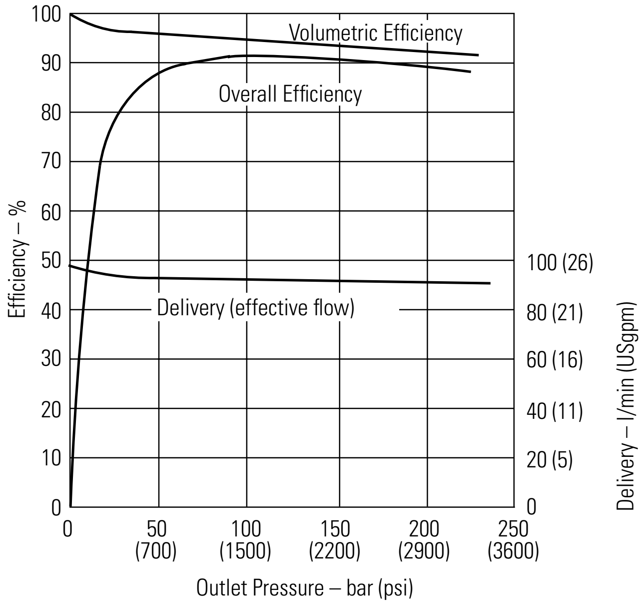
Input Torque and Power at 1800 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



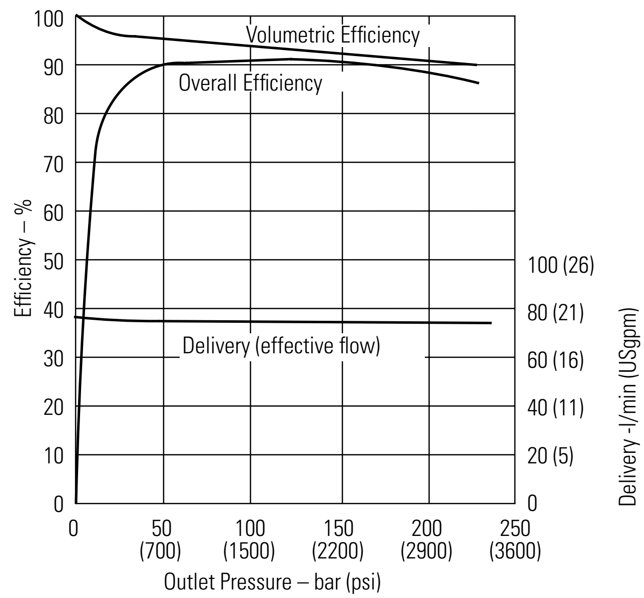
Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM063

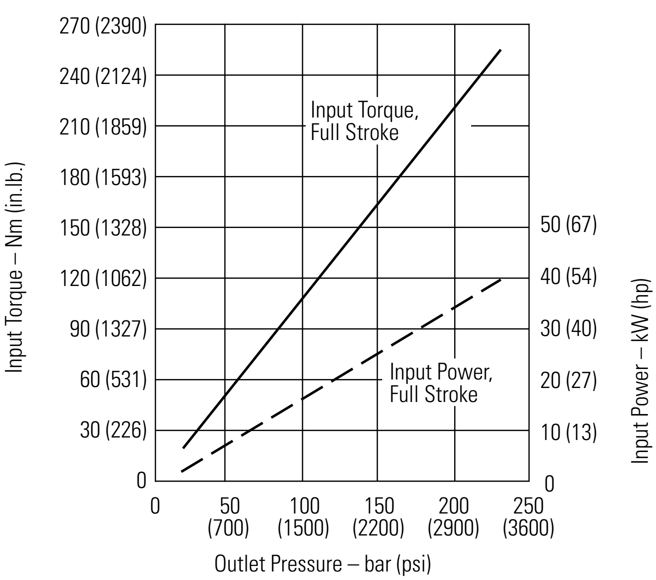
Delivery and Efficiency at 1500 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



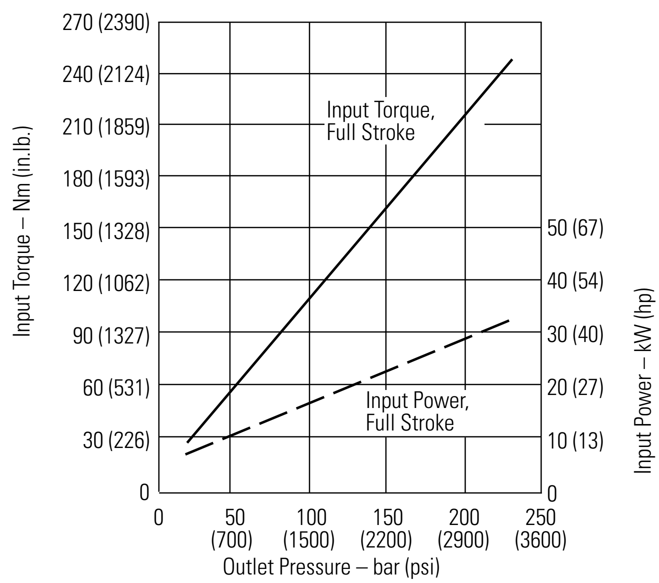
Delivery and Efficiency at 1200 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



Input Torque and Power at 1500 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



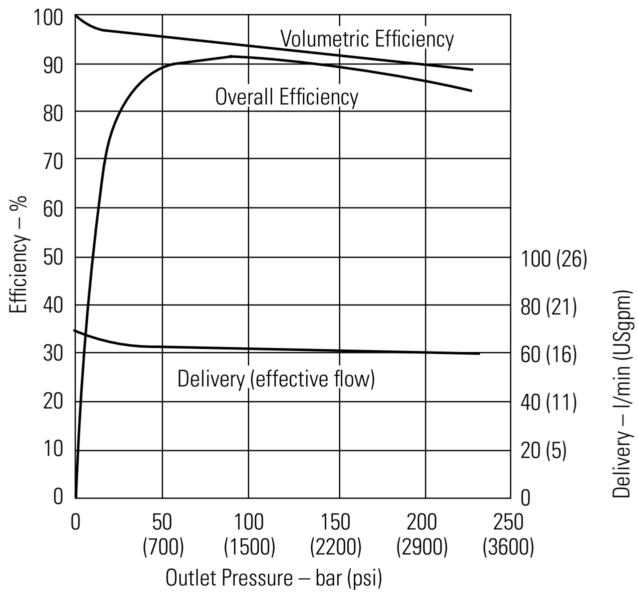
Input Torque and Power at 1200 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



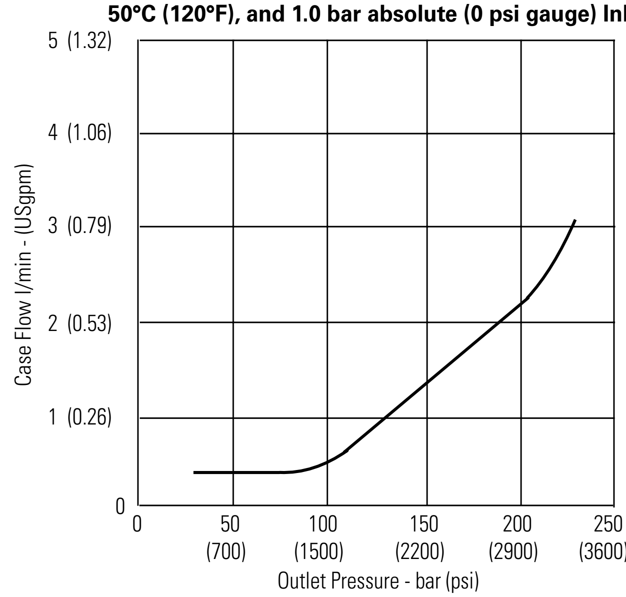
Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM063

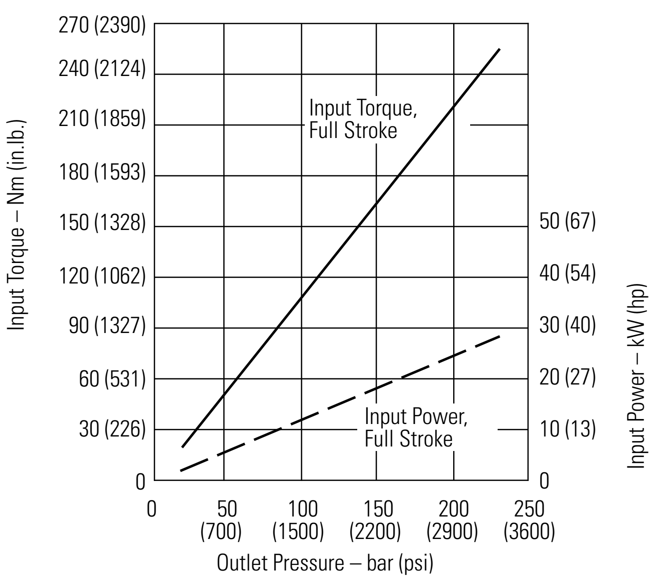
Delivery and Efficiency at 1000 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



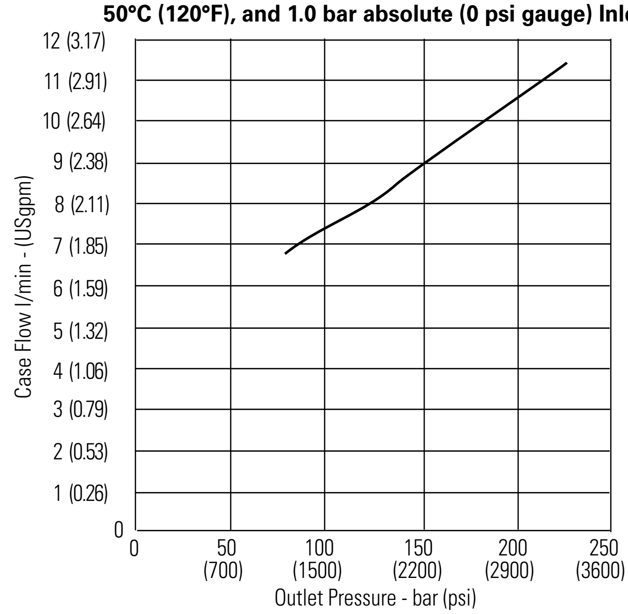
Case Flow versus Outlet Pressure at 1800 r/min, Full Flow, 50°C (120°F), and 1.0 bar absolute (0 psi gauge) Inlet



Input Torque and Power at 1000 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



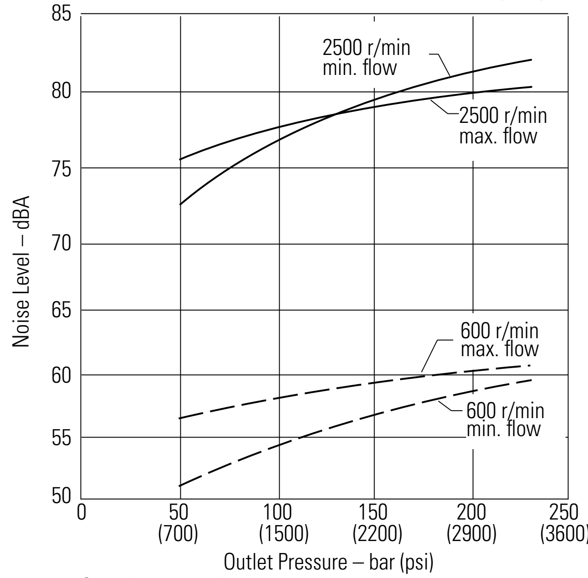
Case Flow versus Outlet Pressure at Cutoff, 1800 r/min, 50°C (120°F), and 1.0 bar absolute (0 psi gauge) Inlet



Performance

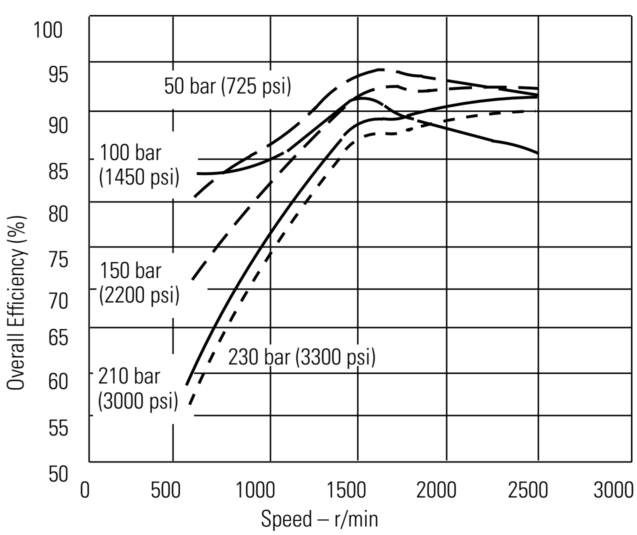
Higher speed version (M) PVM063

Typical Noise Levels at 2500 & 600 r/min with Petroleum Oil (10W) at 93°C (200°F) and 1.0 bar absolute (0 psi gauge) Inlet

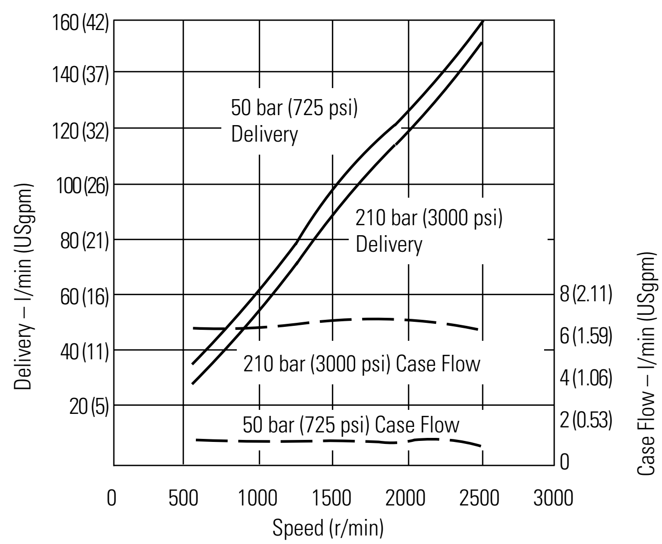


Sound pressure data
equivalent to NFPA.

Overall Efficiency versus Speed at 93°C (200°F) and 1.0 bar absolute (0 psi gauge) inlet

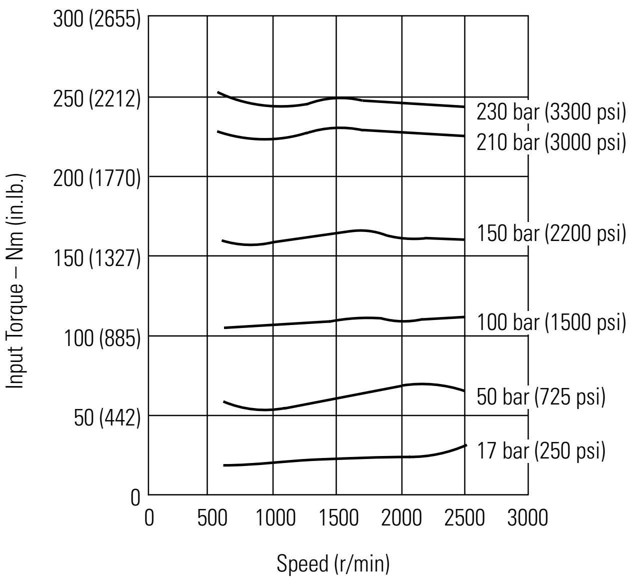


Delivery and Case Flow versus Speed at 93°C (200°F), Full Flow 1.0 bar absolute (0 psi gauge) Inlet

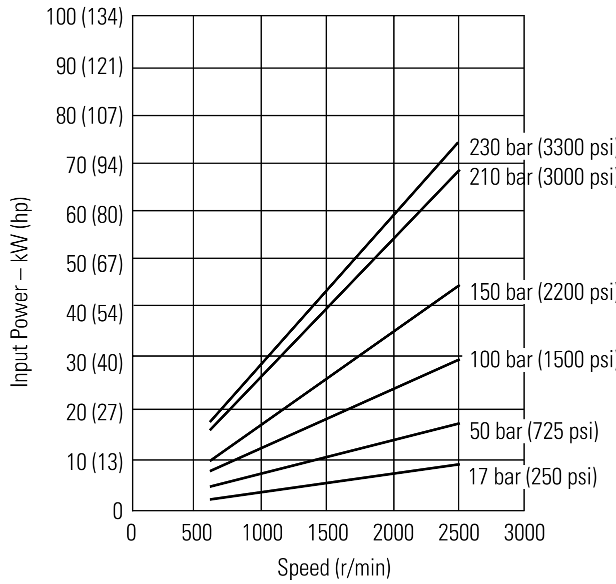


Higher speed version (M) PVM063

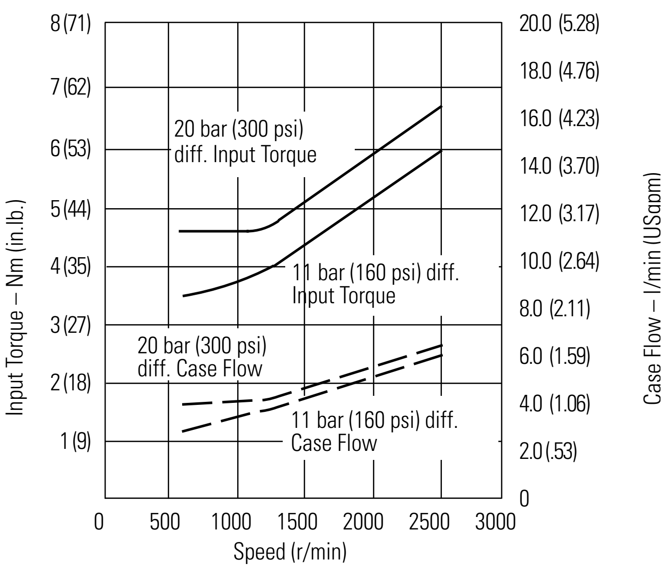
Input Torque versus Speed at 93°C (200°F), Full Flow and 1.0 bar absolute (0 psi gauge) Inlet



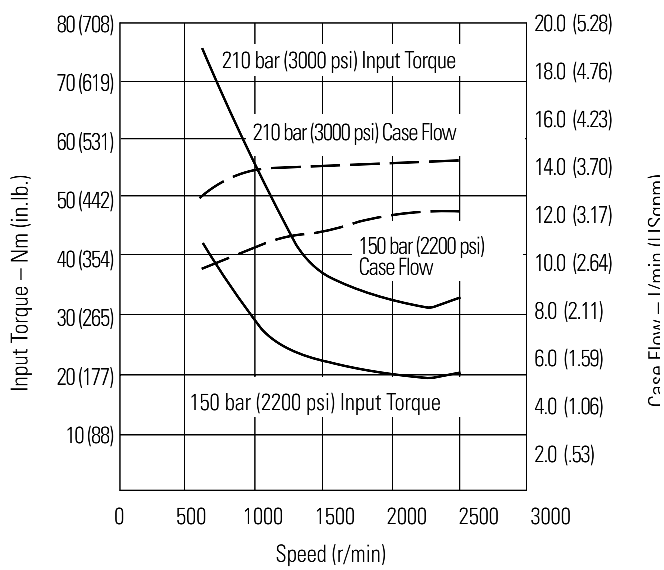
Input Power versus Speed at 93°C (200°F), Full Flow and 1.0 bar absolute (0 psi gauge) Inlet



Input Torque and Case Flow versus Speed at 93°C (200°F), Load Sense Standby and 1.0 bar absolute (0 psi gauge) Inlet



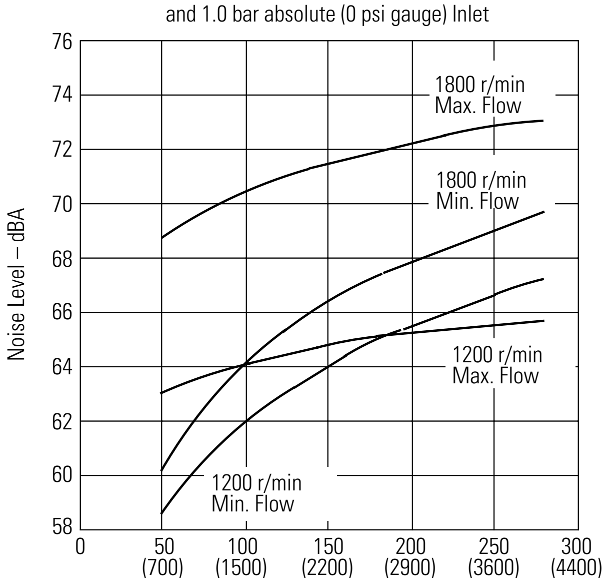
Input Torque and Case Flow versus Speed at 93°C (200°F), Pressure Limit Cut-off and 1.0 bar absolute (0 psi gauge) Inlet



Performance

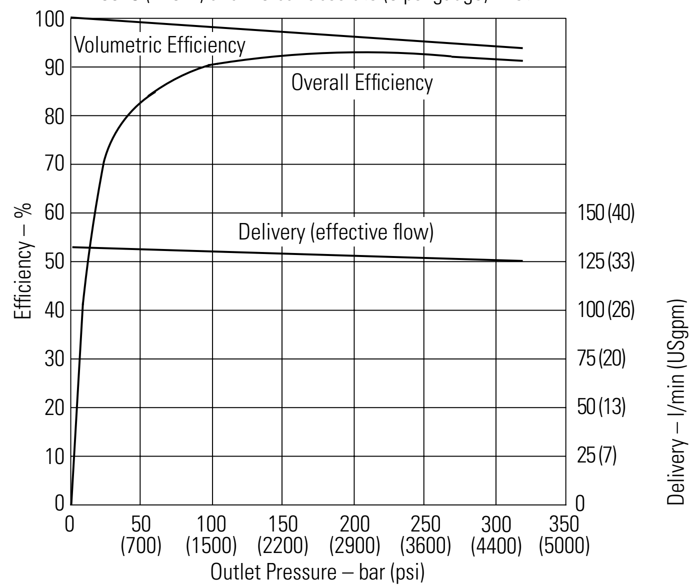
Quiet version, optimized for 1000-1800 rpm (E) PVM074

Typical Noise Levels at 1800 and 1200 r/min
with Petroleum Oil (10W) at 50°C (120°F)
and 1.0 bar absolute (0 psi gauge) Inlet

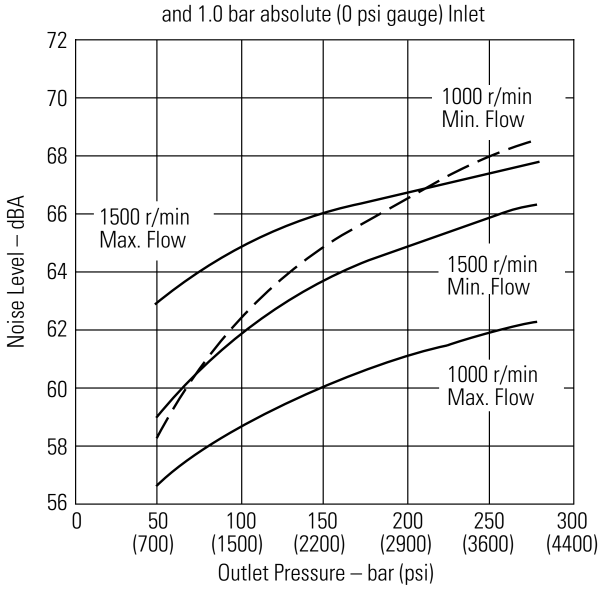


Sound pressure data
equivalent to NFPA.

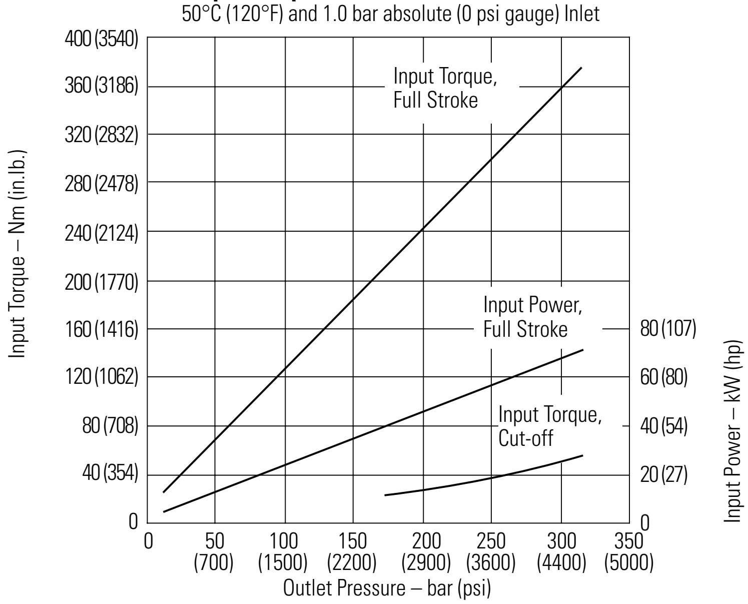
Delivery and Efficiency at 1800 r/min
50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet



Typical Noise Levels at 1500 and 1000 r/min
with Petroleum Oil (10W) at 50°C (120°F)
and 1.0 bar absolute (0 psi gauge) Inlet

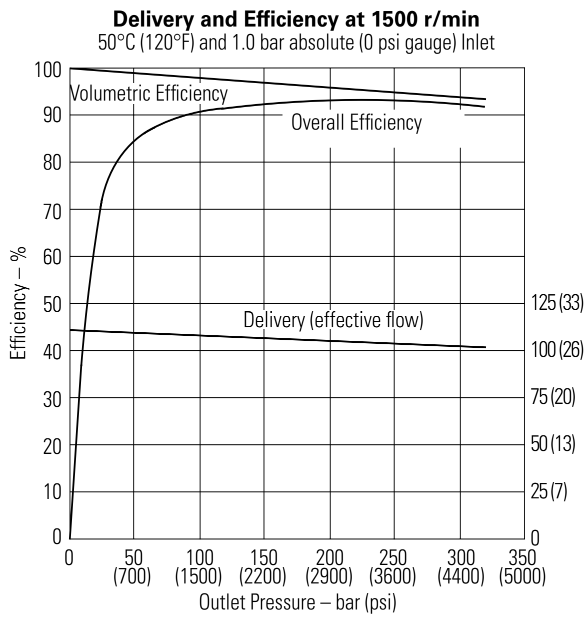


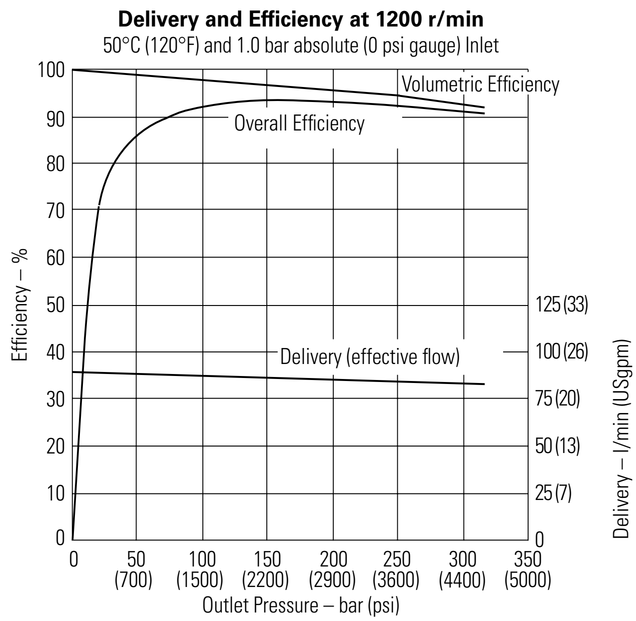
Input Torque and Power at 1800 r/min
50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet

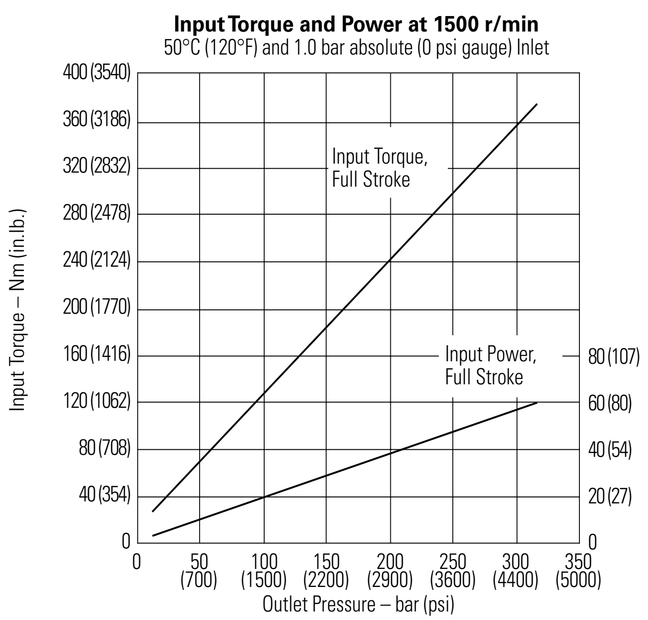


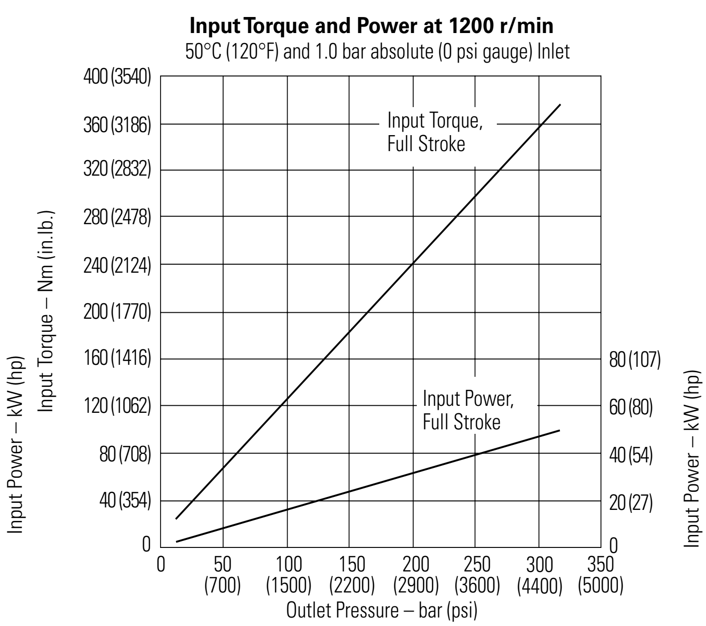
Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM074



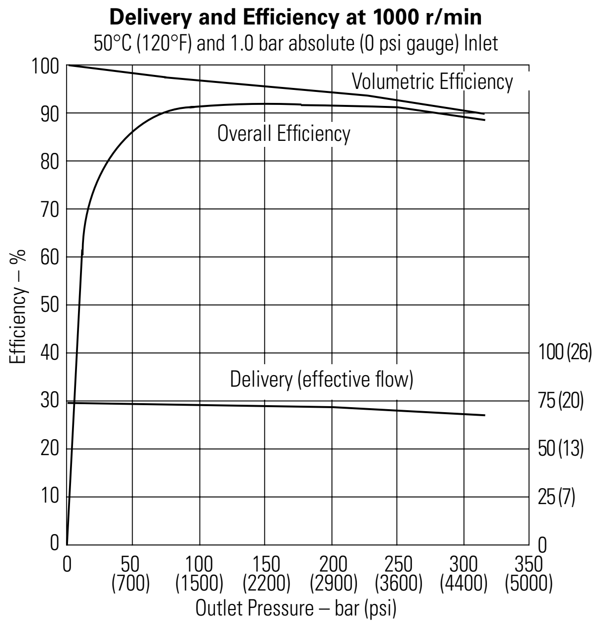


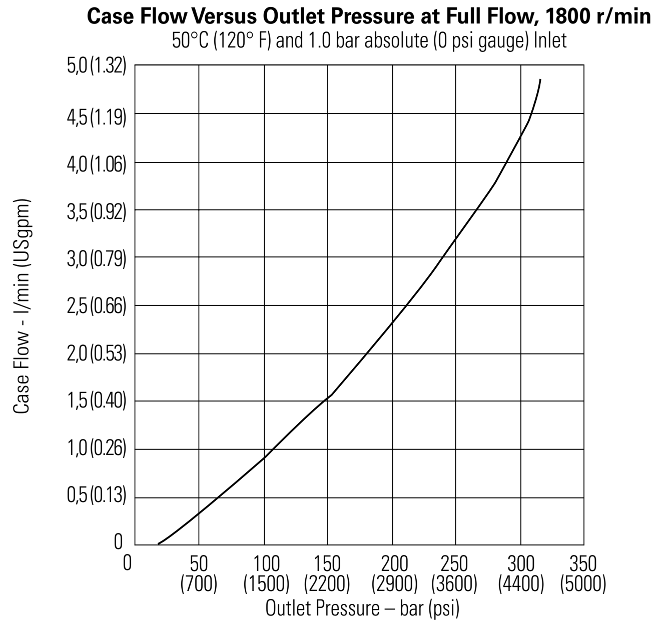


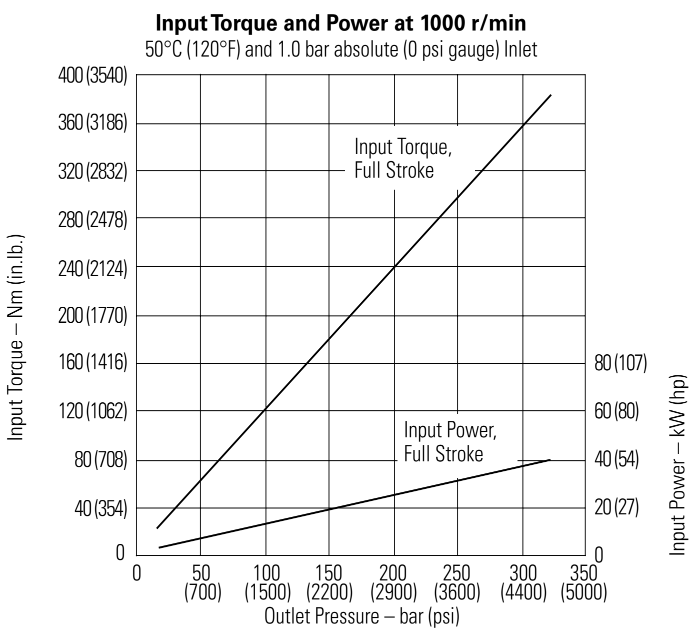


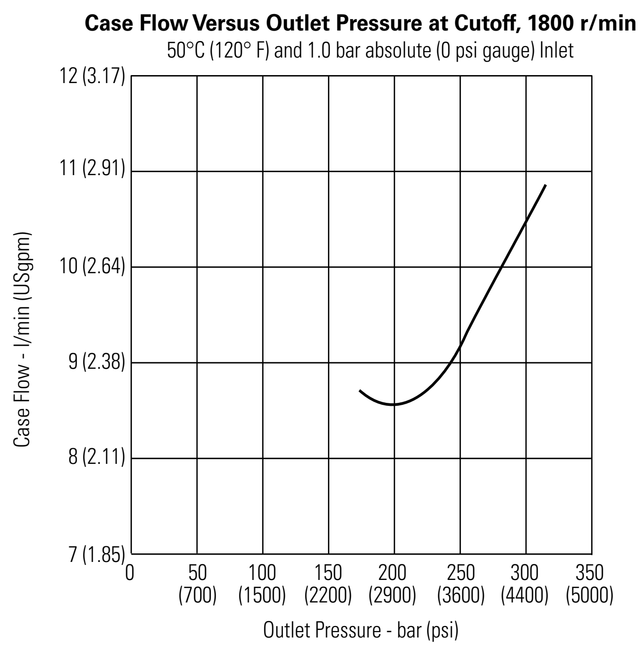
Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM074



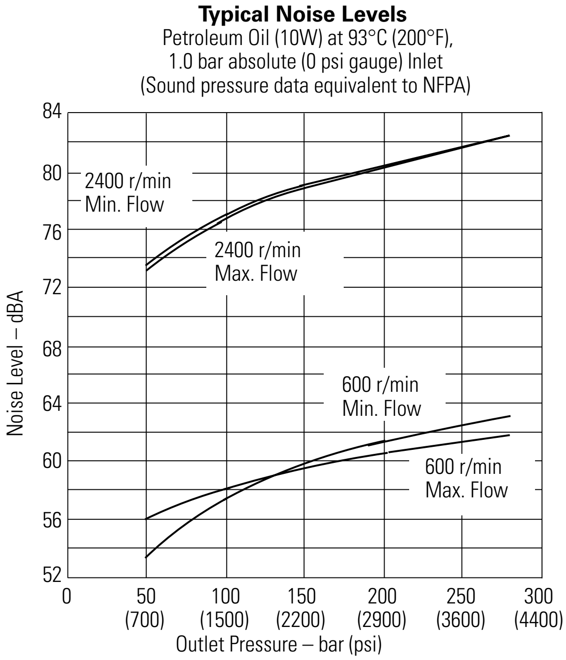


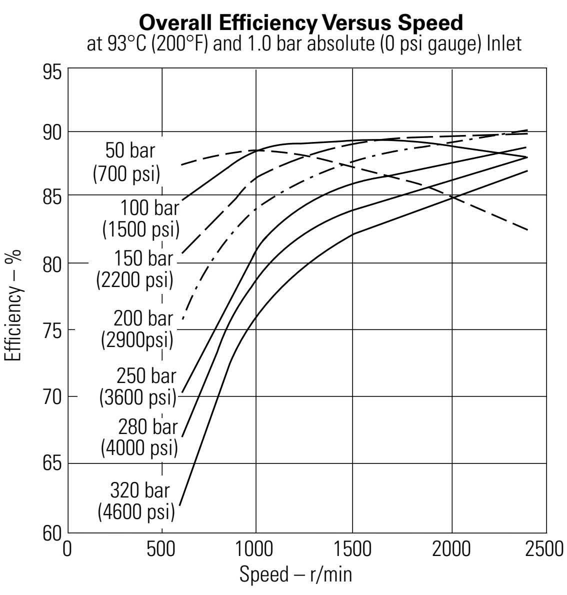


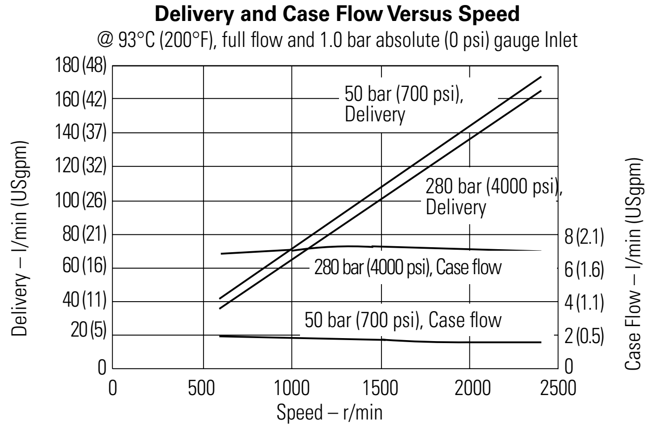


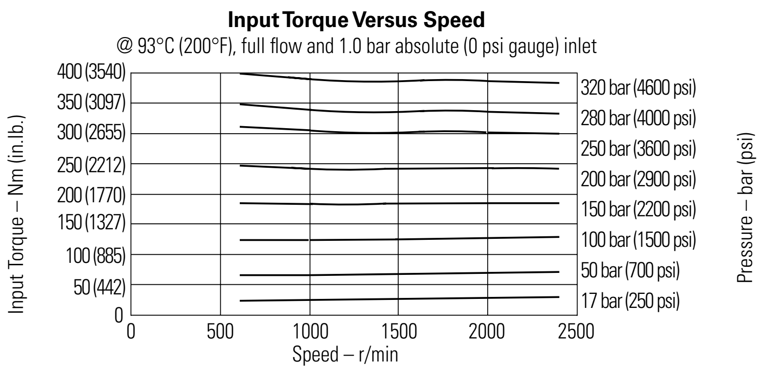
Performance

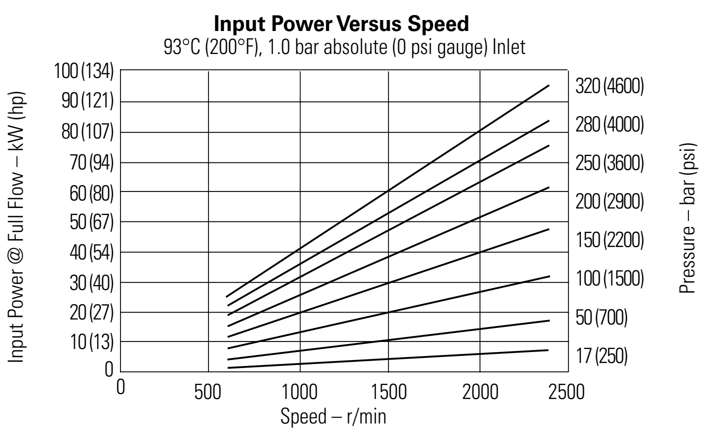
Higher speed version (M) PVM074









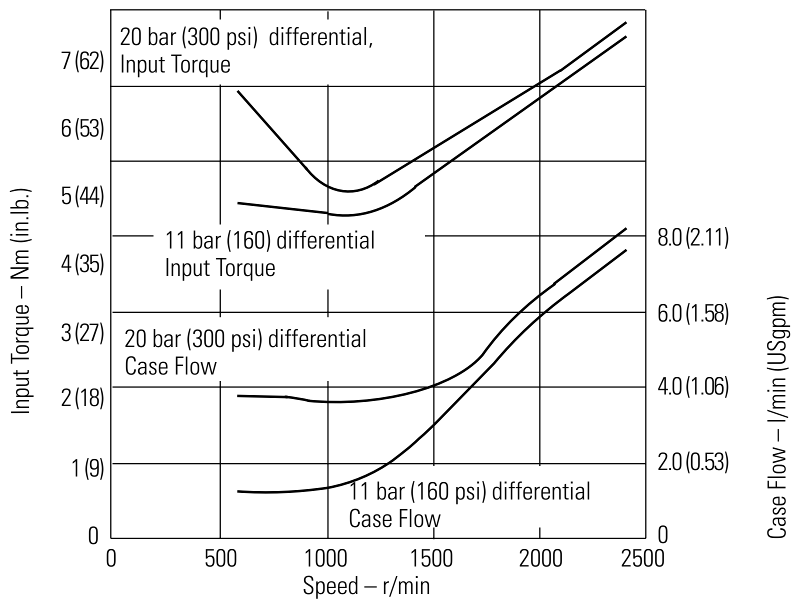


Performance

Higher speed version (M) PVM074

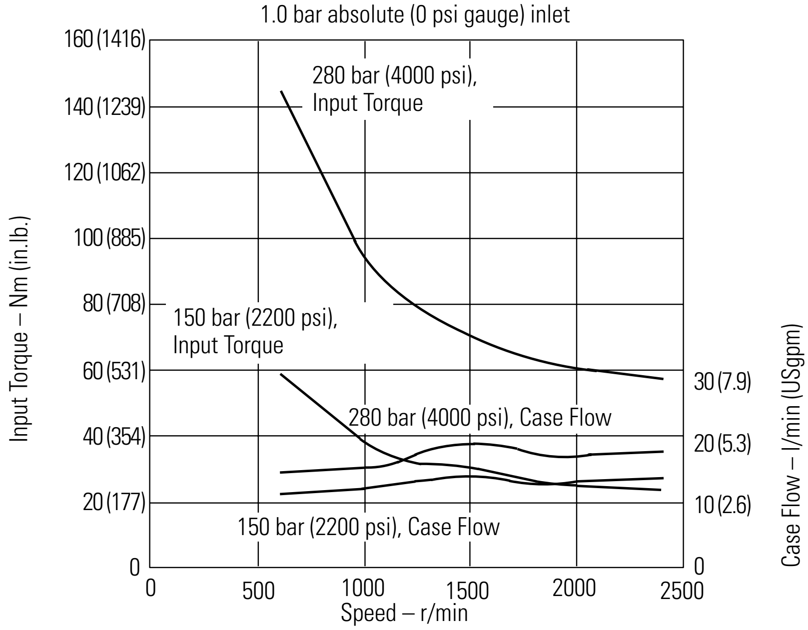
Input Torque and Case Flow Versus Speed

@ 93°C (200°F), load sense standby and
1.0 bar absolute (0 psi gauge) inlet



Input Torque and Case Flow Versus Speed

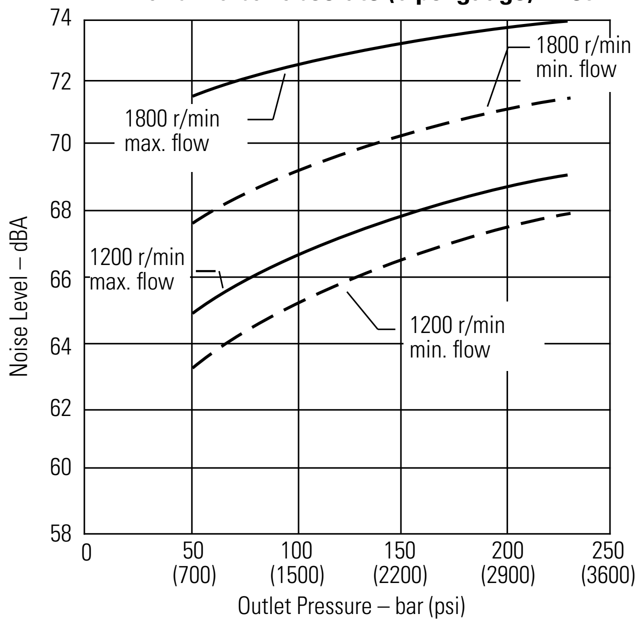
@ 93°C (200°F), cut-off and
1.0 bar absolute (0 psi gauge) inlet



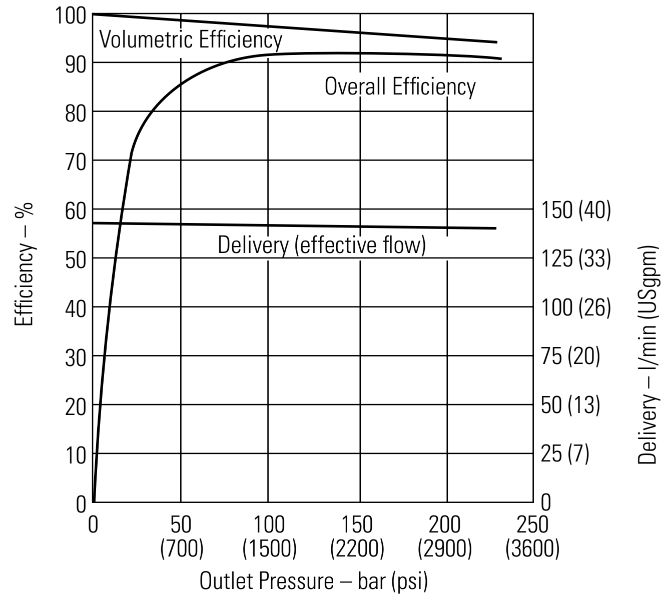
Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM081

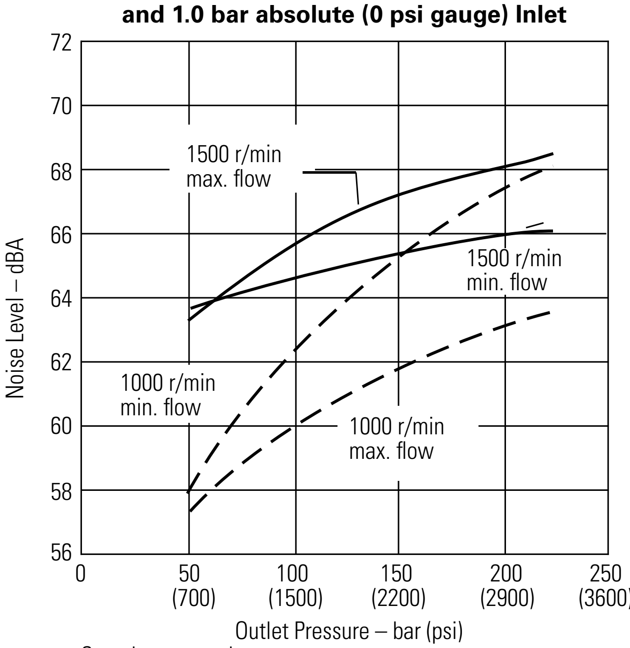
Typical Noise Levels at 1800 and 1200 r/min. with Petroleum Oil (10W) at 50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet



Delivery and Efficiency at 1800 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet

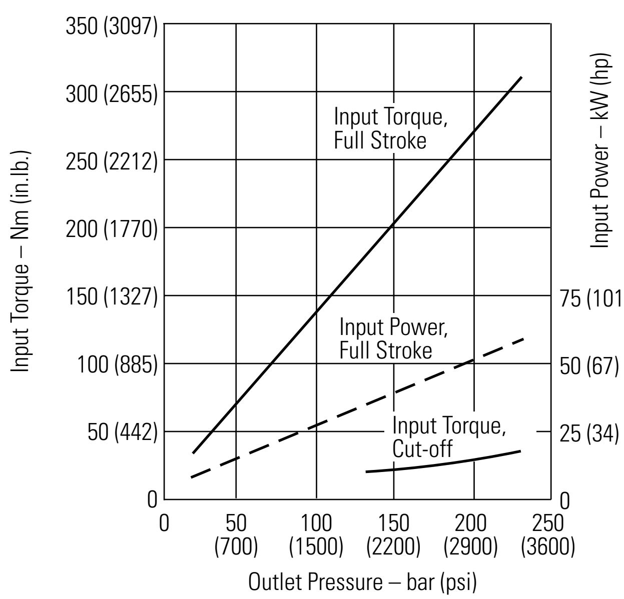


Typical Noise Levels at 1500 and 1000 r/min. with Petroleum Oil (10W) at 50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet



Sound pressure data equivalent to NFPA.

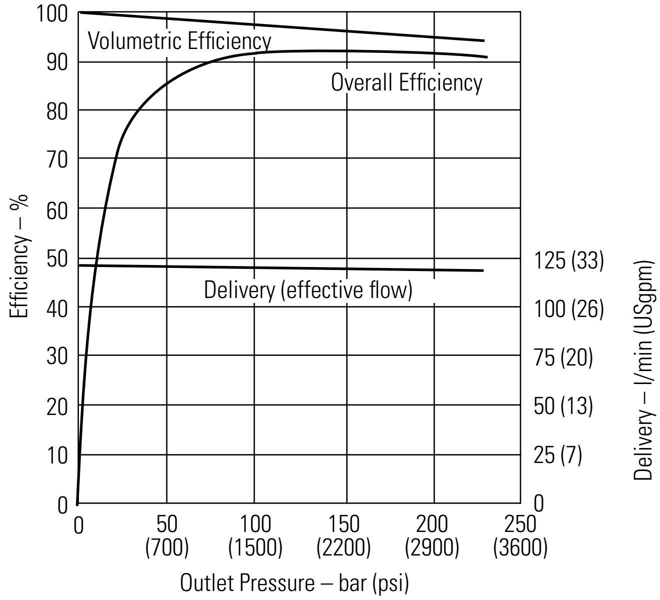
Input Torque and Power at 1800 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



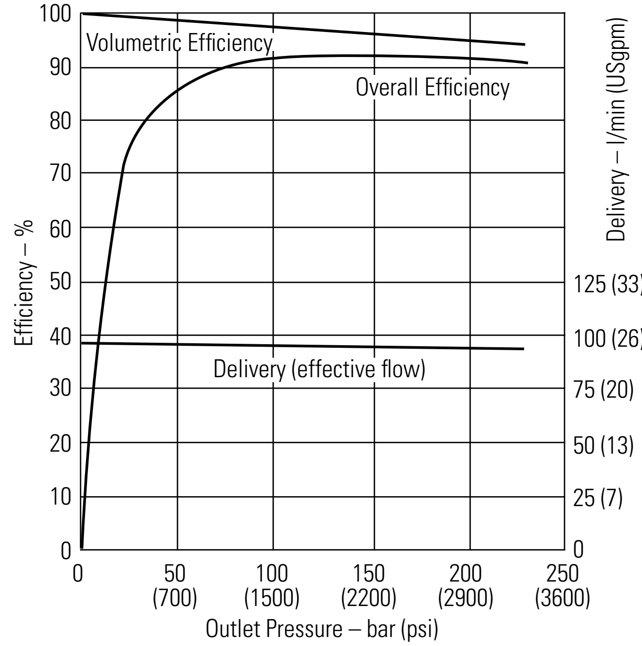
Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM081

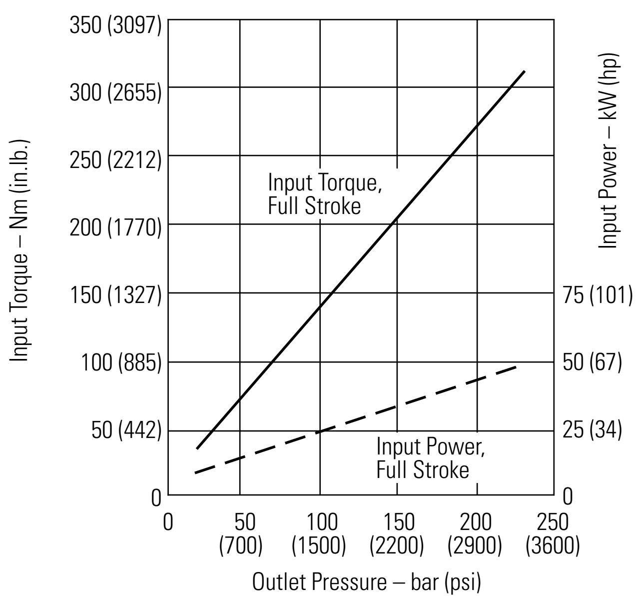
Delivery and Efficiency at 1500 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



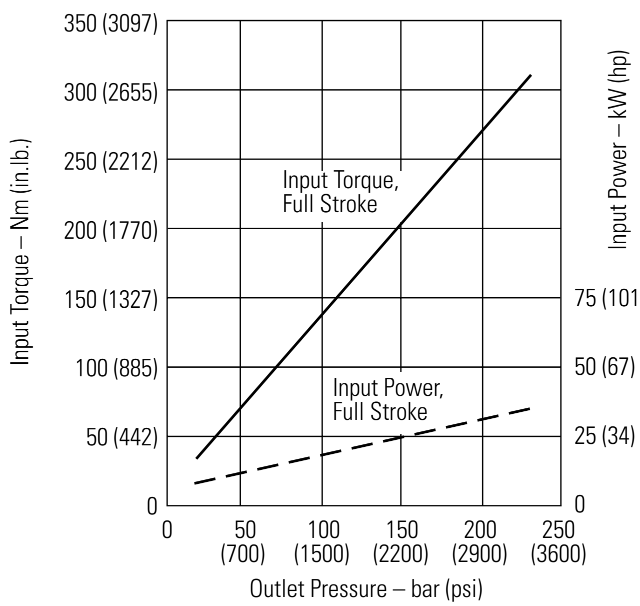
Delivery and Efficiency at 1200 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



Input Torque and Power at 1500 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



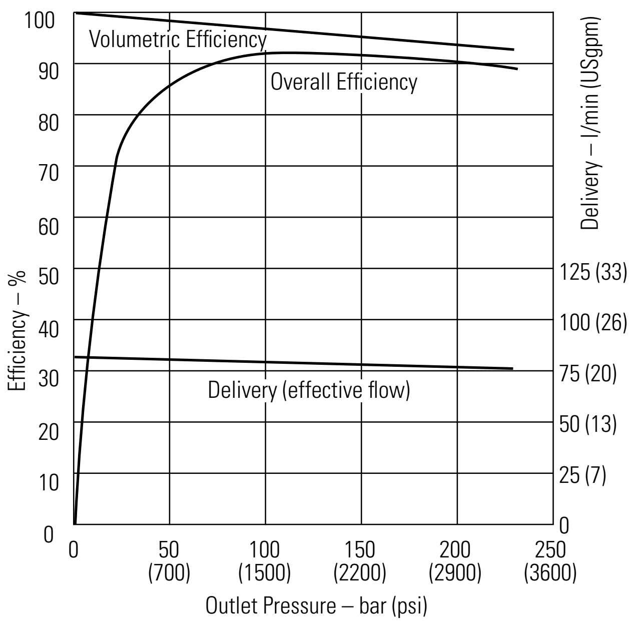
Input Torque and Power at 1200 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



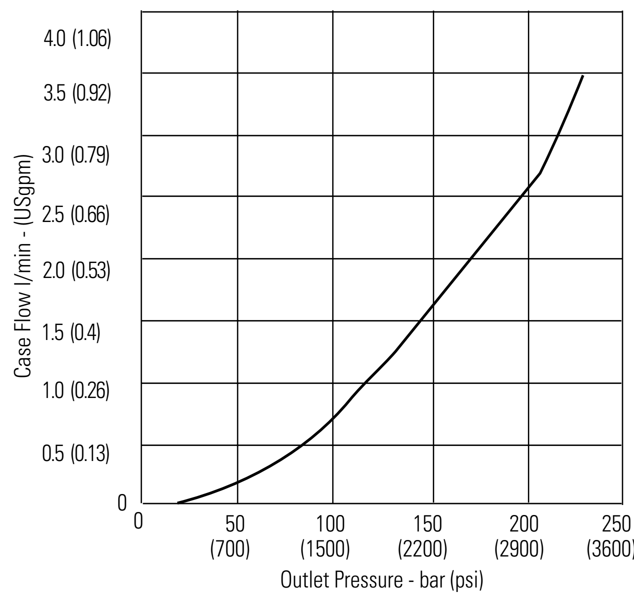
Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM081

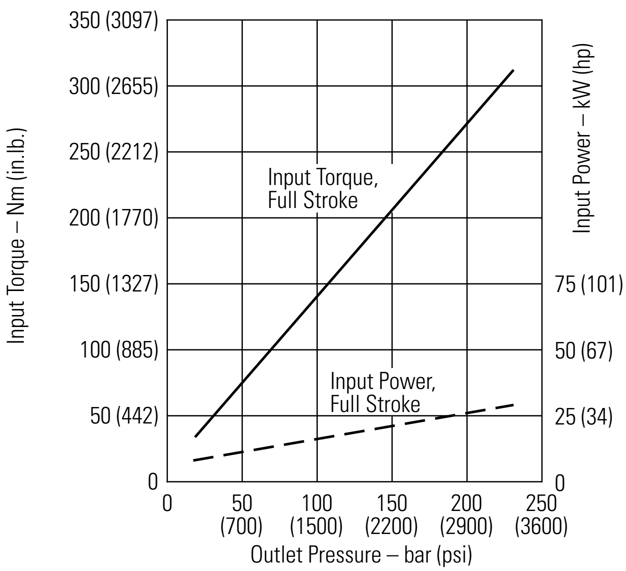
Delivery and Efficiency at 1000 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



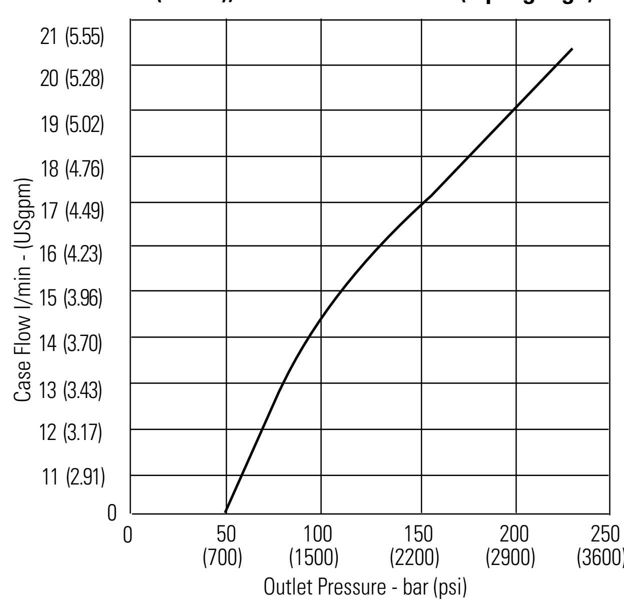
Case Flow versus Outlet Pressure at 1800 r/min, Full Flow, 50°C (120°F), and 1.0 bar absolute (0 psi gauge) Inlet



Input Torque and Power at 1000 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



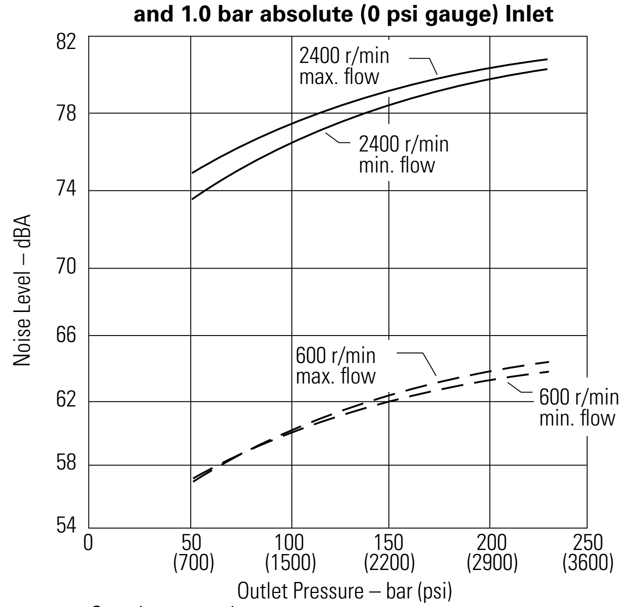
Case Flow versus Outlet Pressure at Cutoff, 1800 r/min, 50°C (120°F), and 1.0 bar absolute (0 psi gauge) Inlet



Performance

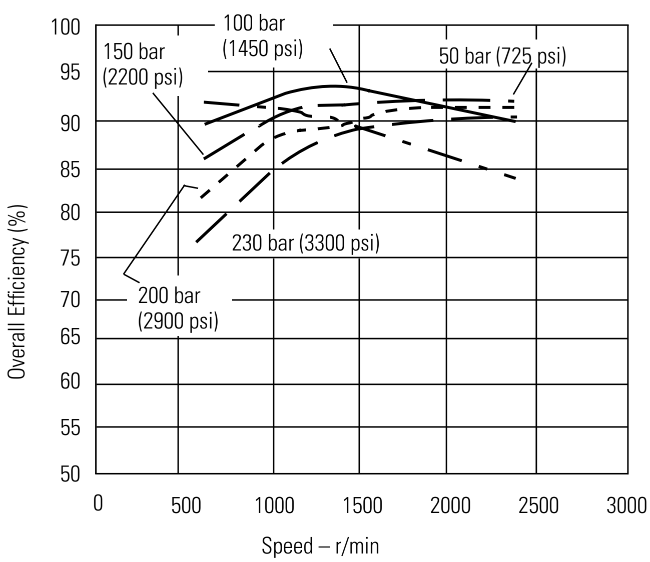
Higher speed version (M) PVM081

Typical Noise Levels at 2400 & 600 r/min with Petroleum Oil (10W) at 93°C (200°F) and 1.0 bar absolute (0 psi gauge) Inlet

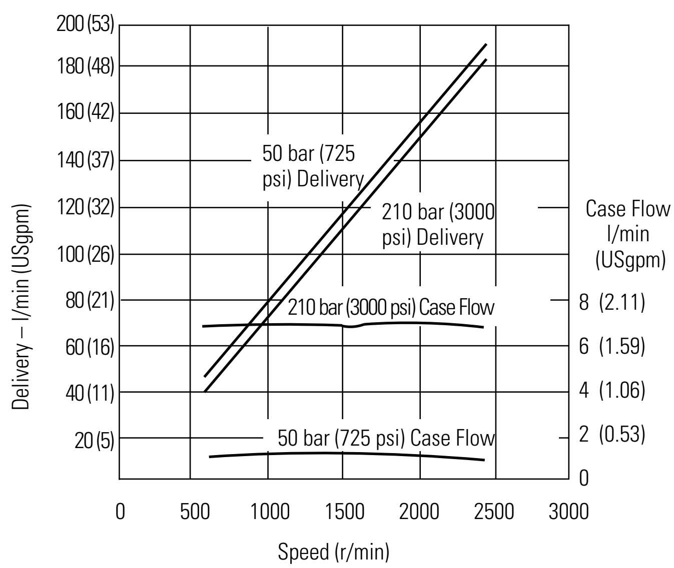


Sound pressure data equivalent to NFPA.

Overall Efficiency versus Speed at 93°C (200°F) and 1.0 bar absolute (0 psi gauge) inlet



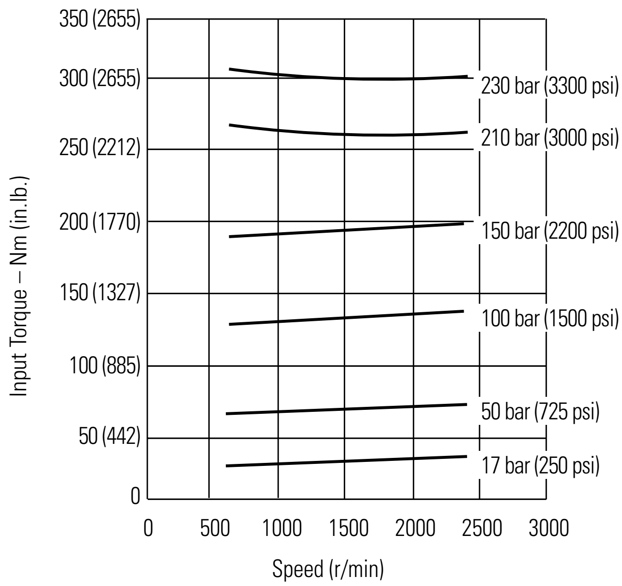
Delivery and Case Flow versus Speed at 93°C (200°F), Full Flow 1.0 bar absolute (0 psi gauge) Inlet



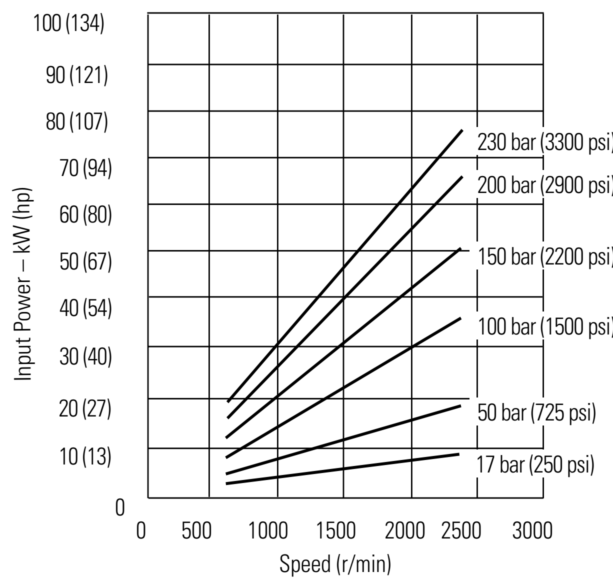
Performance

Higher speed version (M) PVM081

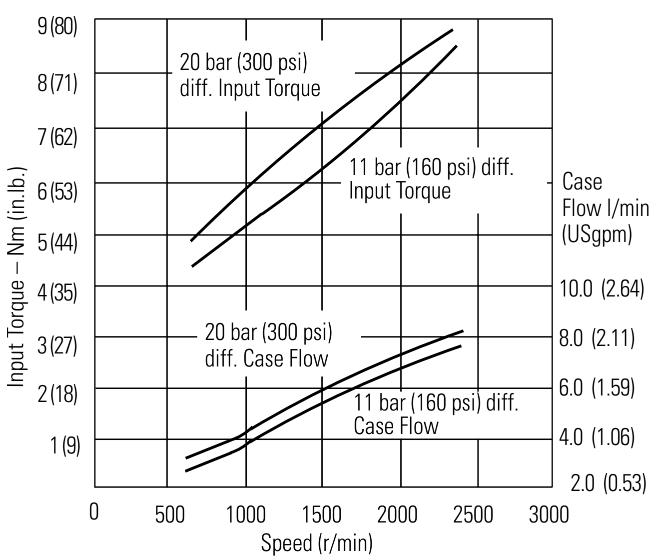
Input Torque versus Speed at 93°C (200°F), Full Flow and 1.0 bar absolute (0 psi gauge) Inlet



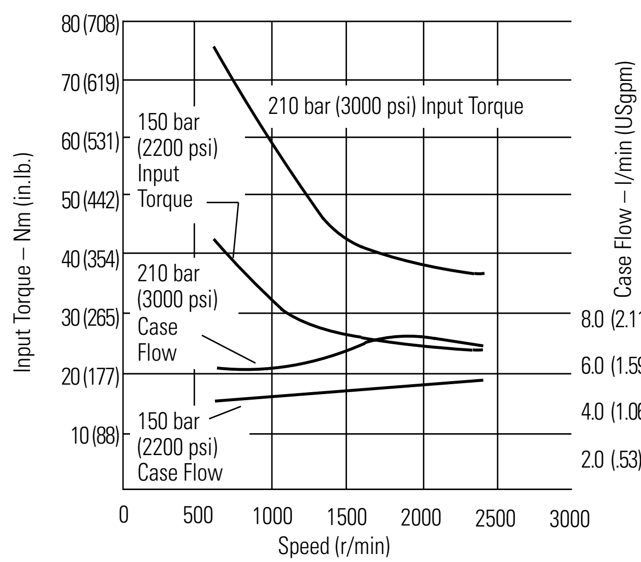
Input Power versus Speed at 93°C (200°F), Full Flow and 1.0 bar absolute (0 psi gauge) Inlet



Input Torque and Case Flow versus Speed at 93°C (200°F), Load Sense Standby and 1.0 bar absolute (0 psi gauge) Inlet

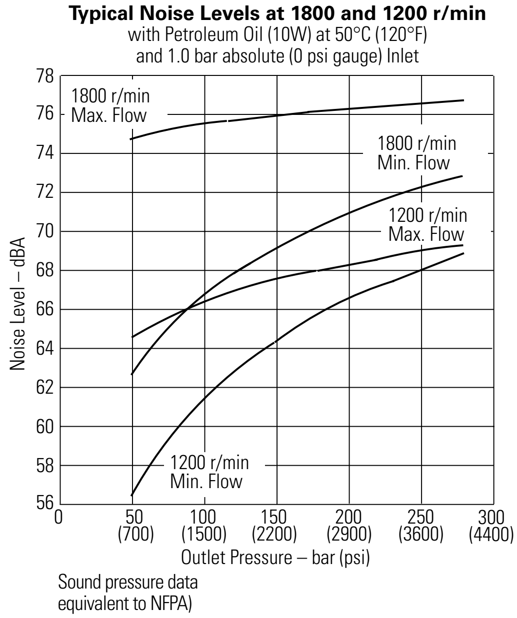


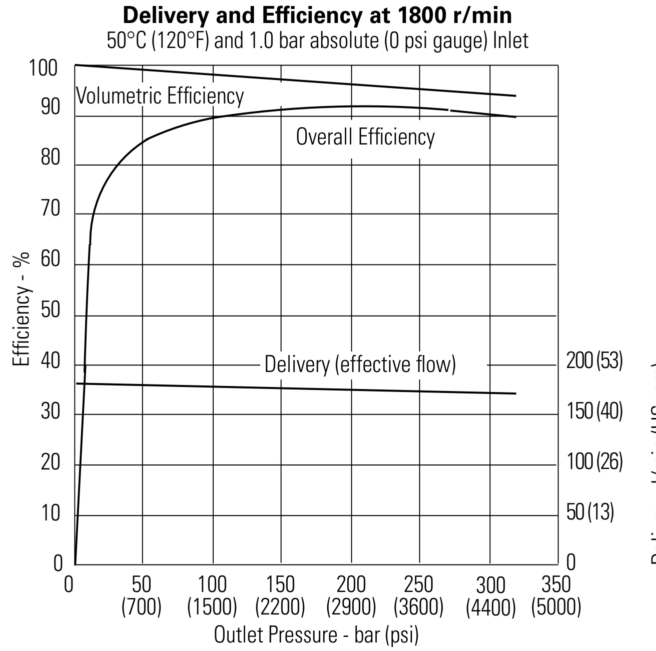
Input Torque and Case Flow versus Speed at 93°C (200°F), Pressure Limit Cut-off and 1.0 bar absolute (0 psi gauge) Inlet

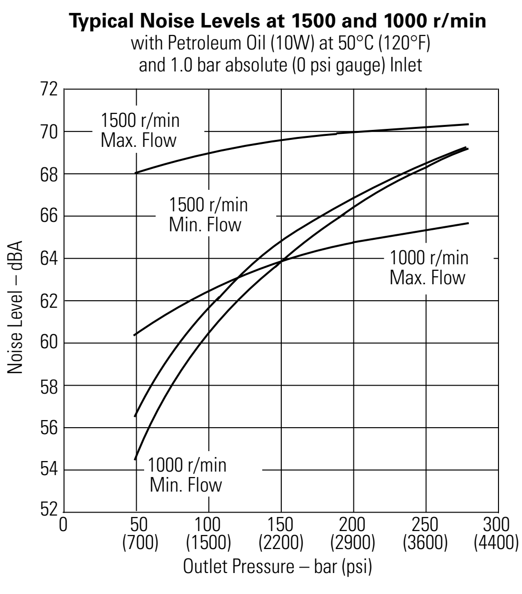


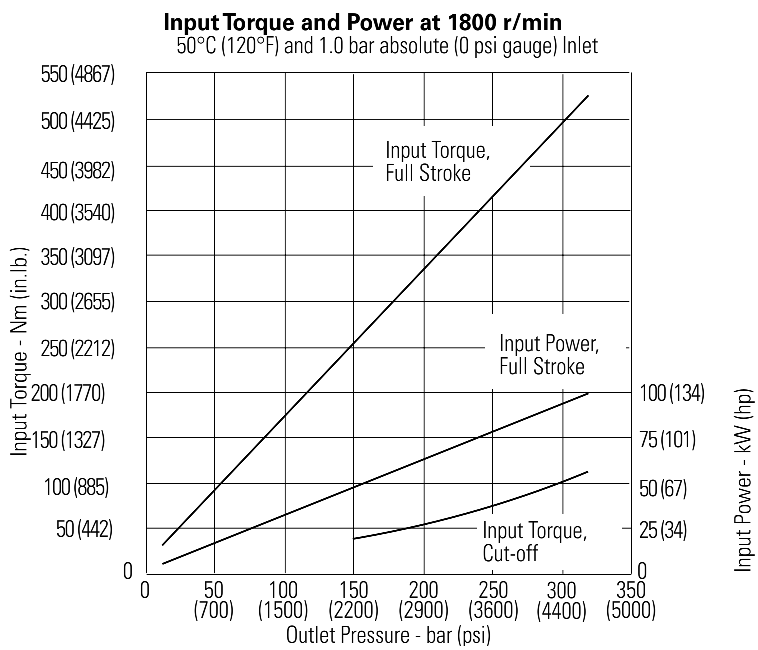
Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM098







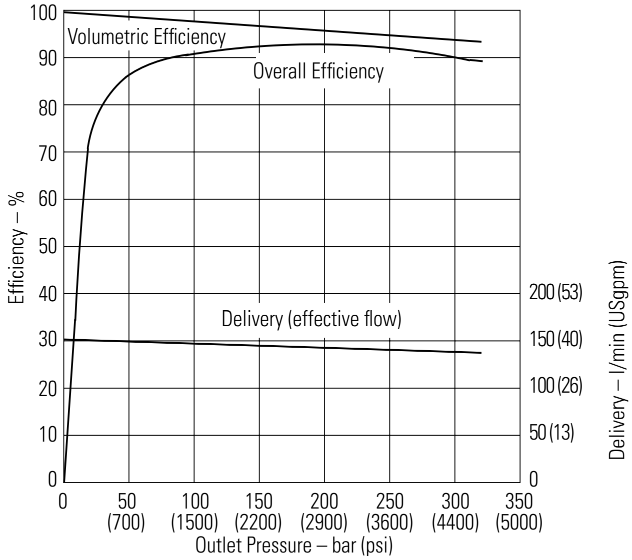


Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM098

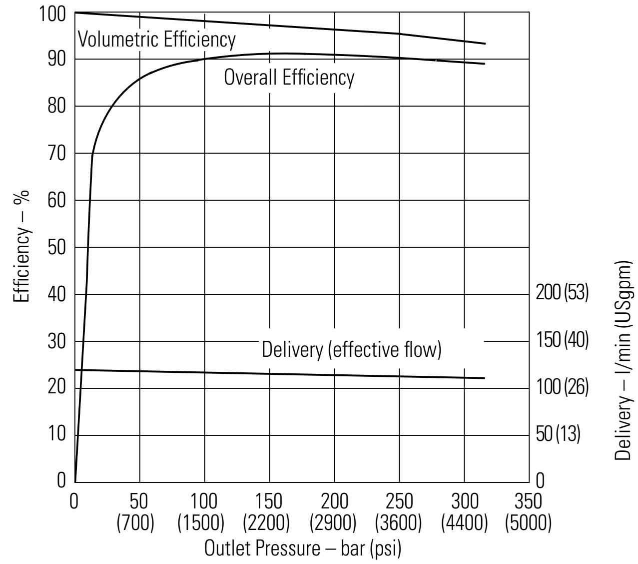
Delivery and Efficiency at 1500 r/min

50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet



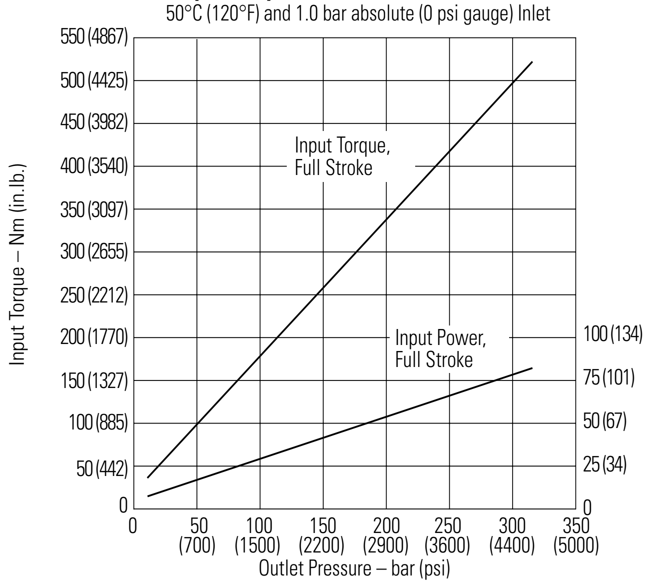
Delivery and Efficiency at 1200 r/min

50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet



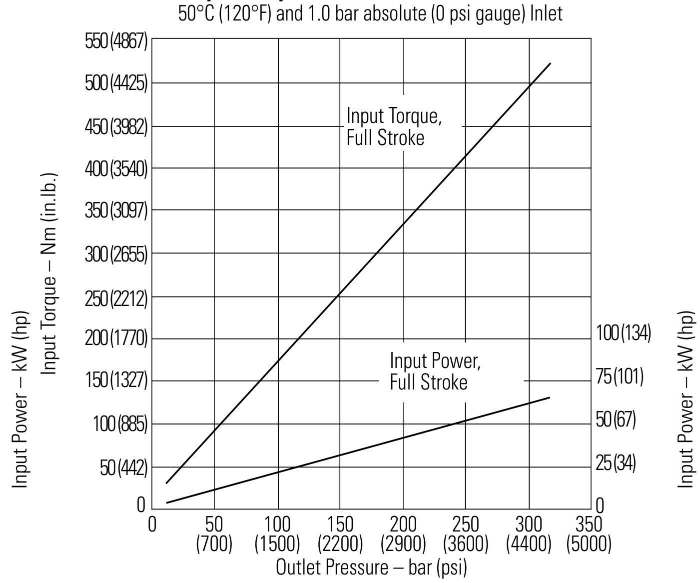
Input Torque and Power at 1500 r/min

50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet



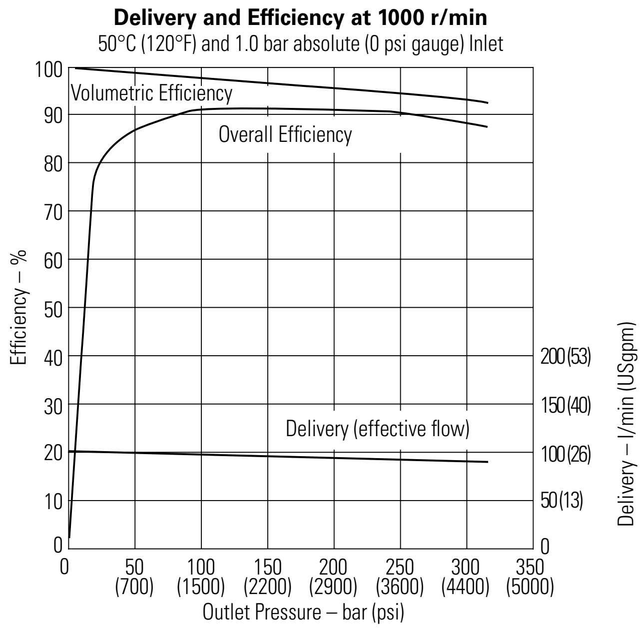
Input Torque and Power at 1200 r/min

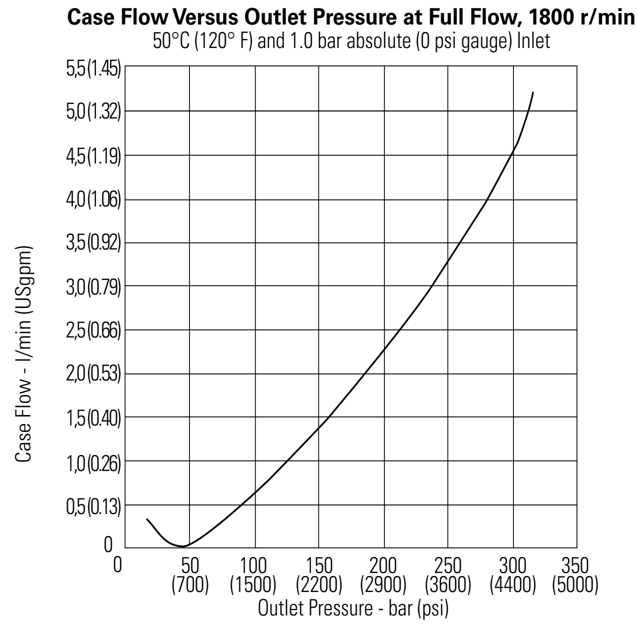
50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet

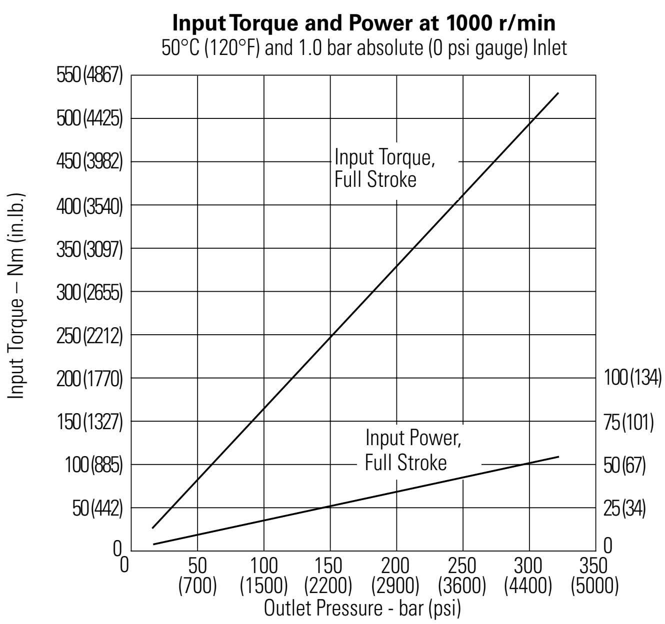


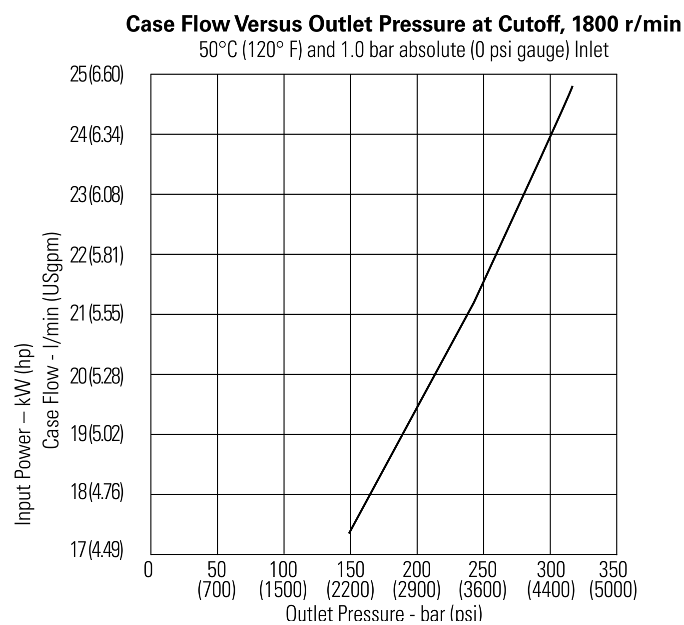
Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM098







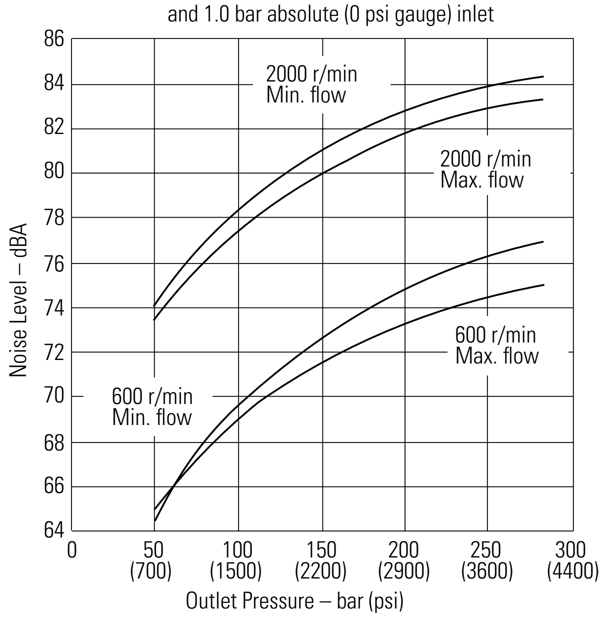


Performance

Higher speed version (M) PVM098

Typical Noise Levels at 2000 and 600 r/min

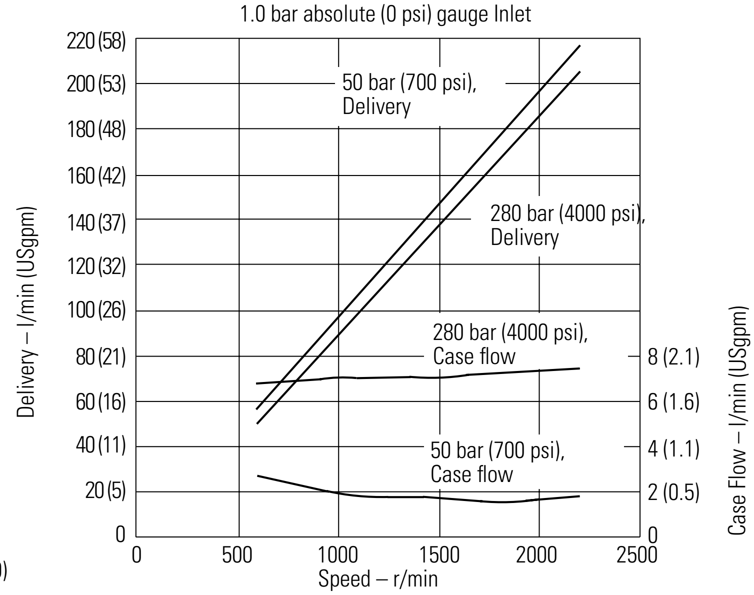
with petroleum oil (10 W) @ 93°C (200°F) and 1.0 bar absolute (0 psi gauge) inlet



Sound pressure data equivalent to NFP

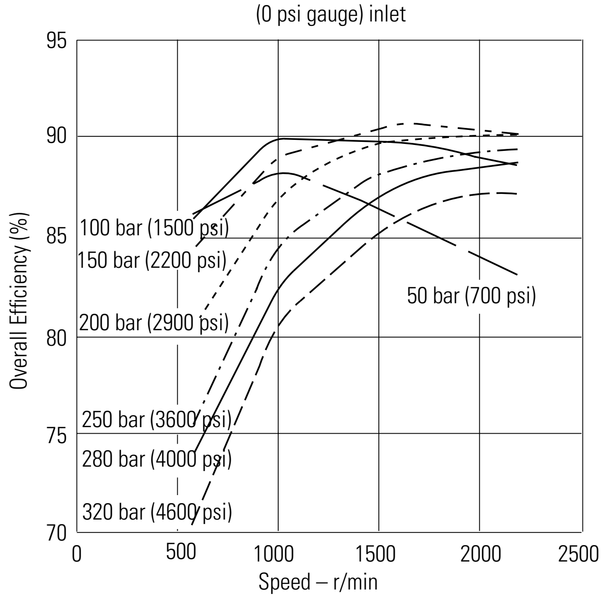
Delivery and Case Flow Versus Speed

@ 93°C (200°F), full flow and 1.0 bar absolute (0 psi) gauge Inlet



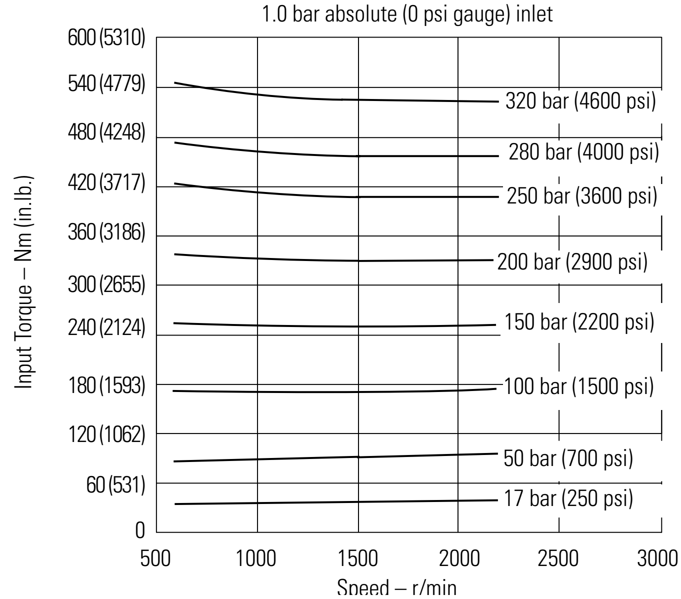
Overall Efficiency Versus Speed

@ 93°C (200°F) and 1.0 bar absolute (0 psi gauge) inlet



Input Torque Versus Speed

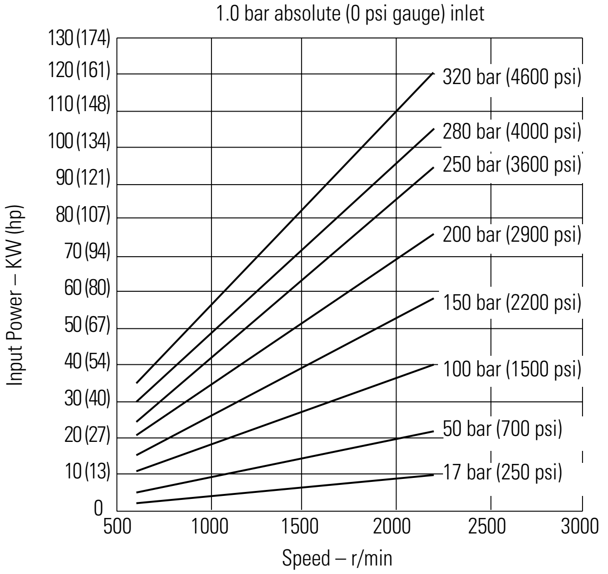
@ 93°C (200°F), full flow and 1.0 bar absolute (0 psi gauge) inlet



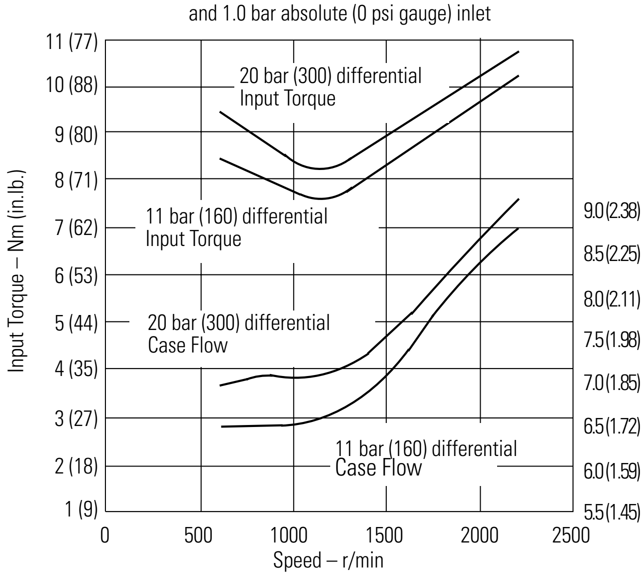
Performance

Higher speed version (M) PVM098

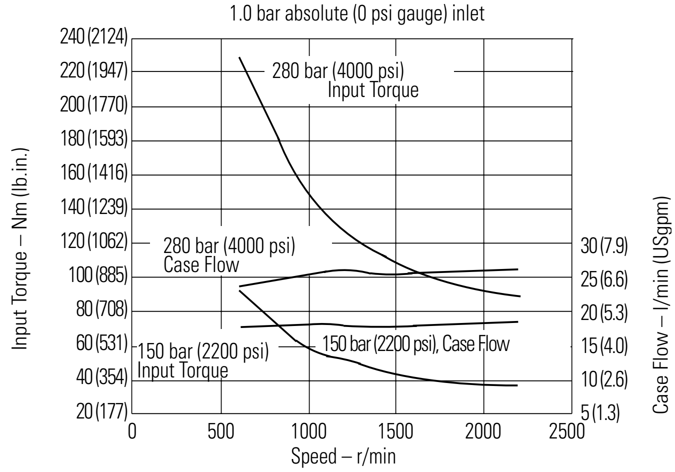
Input Power Versus Speed
@93°C (200°F), full flow and
1.0 bar absolute (0 psi gauge) inlet



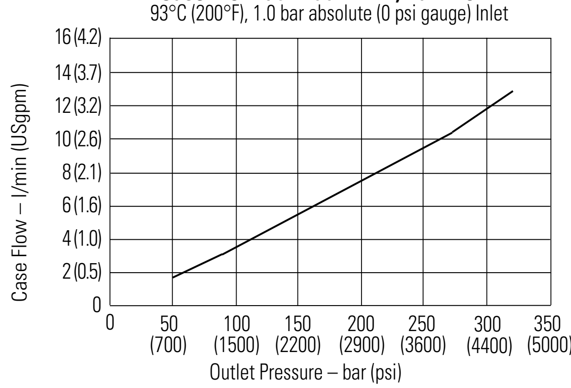
Input Torque and Case Flow Versus Speed
@ 93°C (200°F), load sense standby
and 1.0 bar absolute (0 psi gauge) inlet



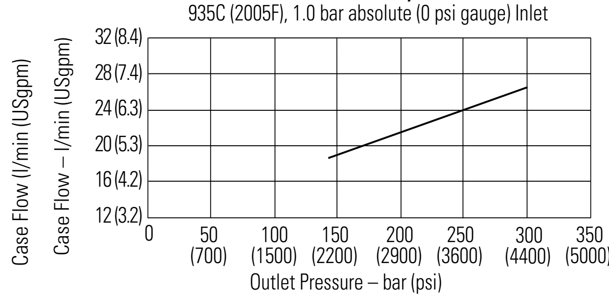
Input Torque and Case Flow Versus Speed
@ 93°C (200°F), cut-off and
1.0 bar absolute (0 psi gauge) inlet



Case Flow at 2200 r/min, Full Flow
93°C (200°F), 1.0 bar absolute (0 psi gauge) Inlet



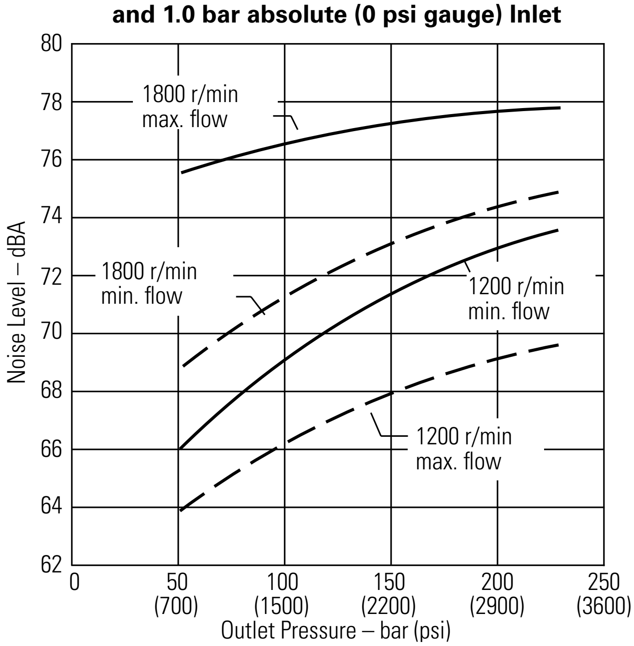
Case Flow at 2200 r/min, Minimum Flow
935C (2005F), 1.0 bar absolute (0 psi gauge) Inlet



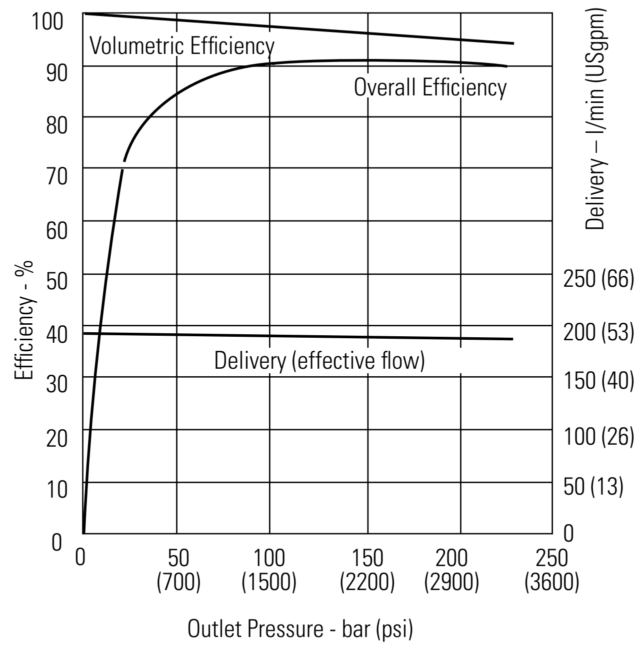
Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM106

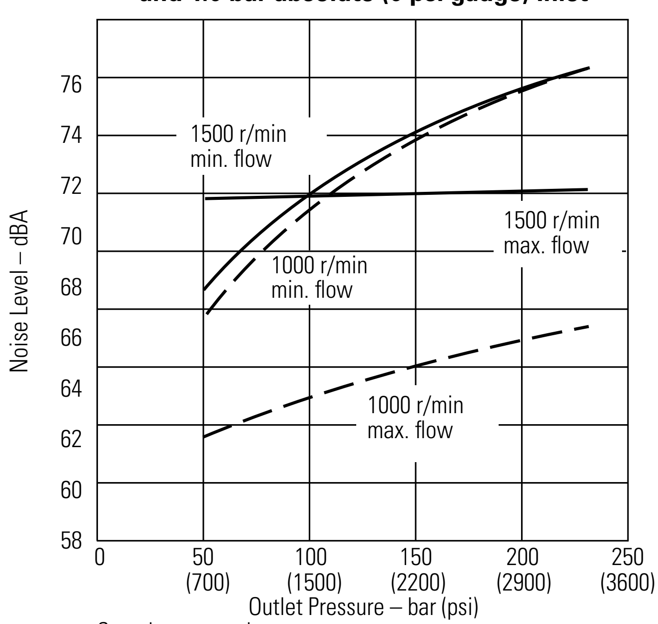
Typical Noise Levels at 1800 and 1200 r/min. with Petroleum Oil (10W) at 50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet



Delivery and Efficiency at 1800 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet

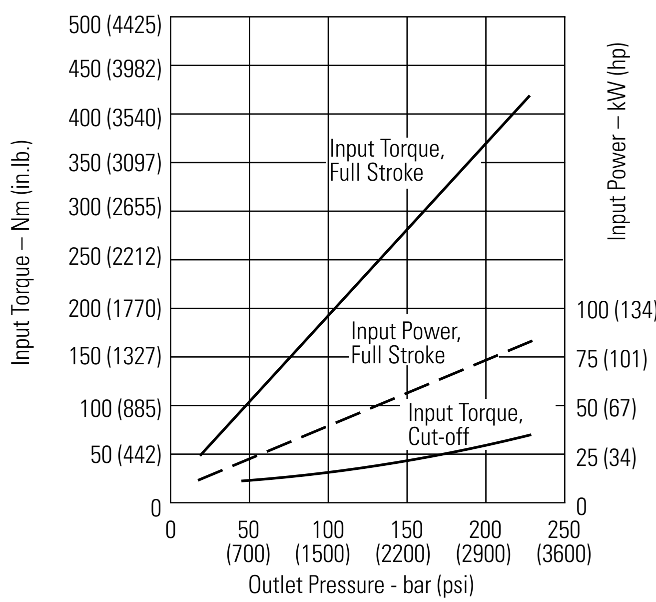


Typical Noise Levels at 1500 and 1000 r/min. with Petroleum Oil (10W) at 50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet



Sound pressure data
equivalent to NFPA.

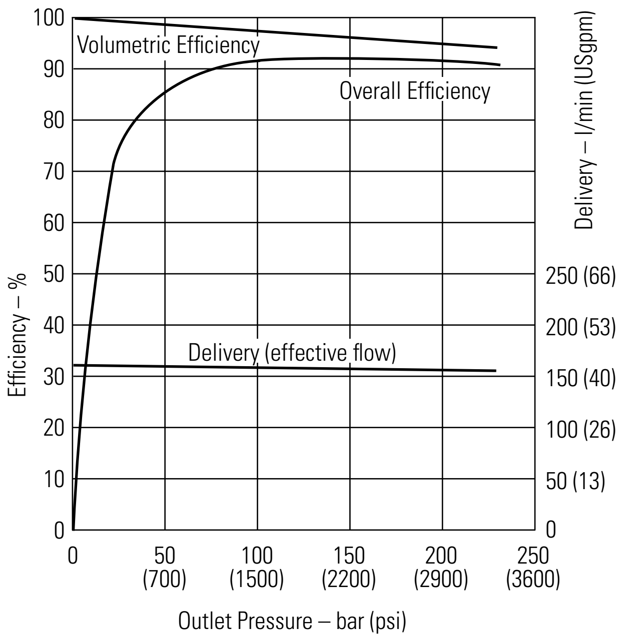
Input Torque and Power at 1800 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



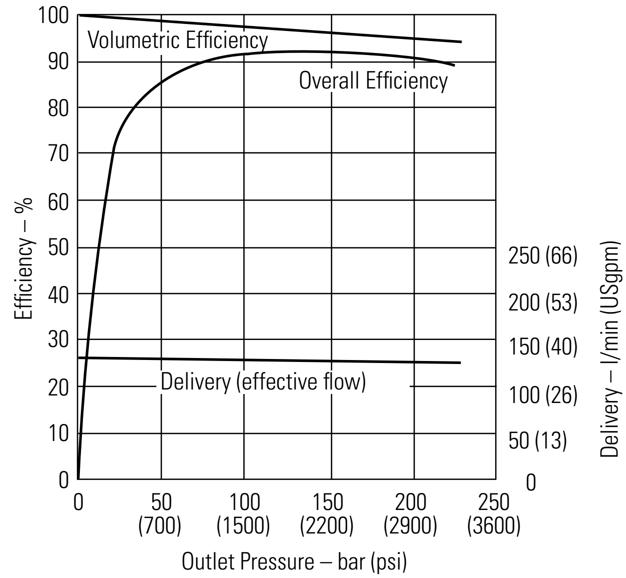
Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM106

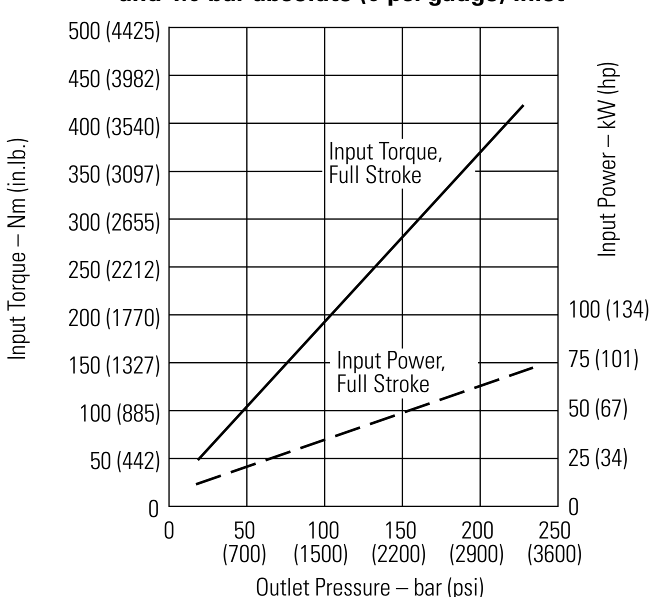
Delivery and Efficiency at 1500 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



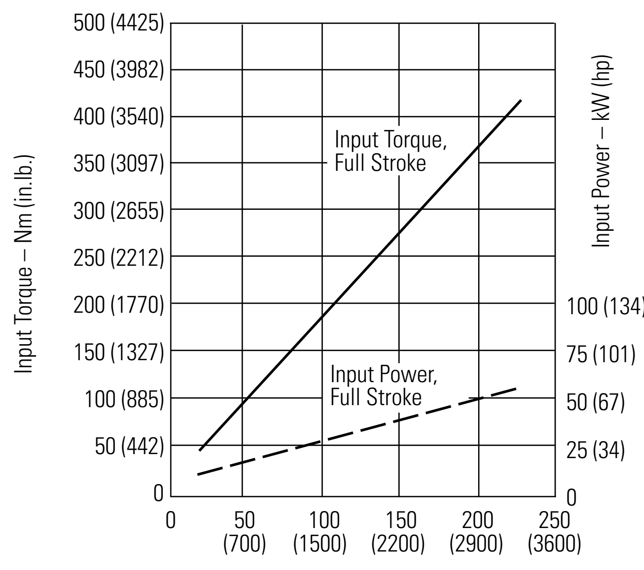
Delivery and Efficiency at 1200 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



Input Torque and Power at 1500 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



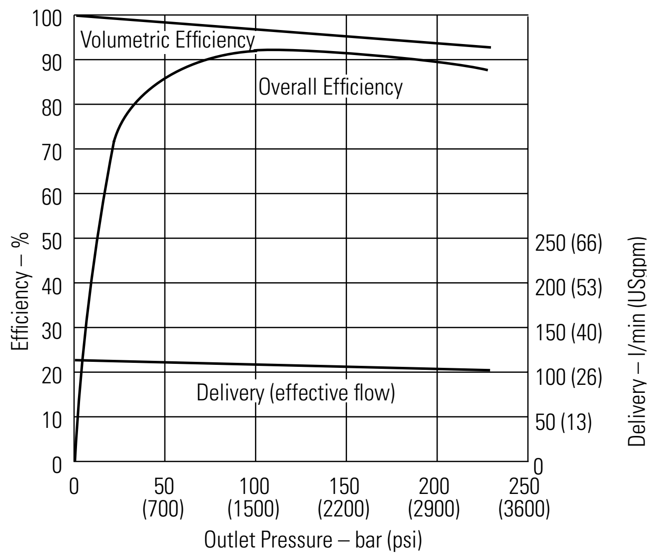
Input Torque and Power at 1200 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



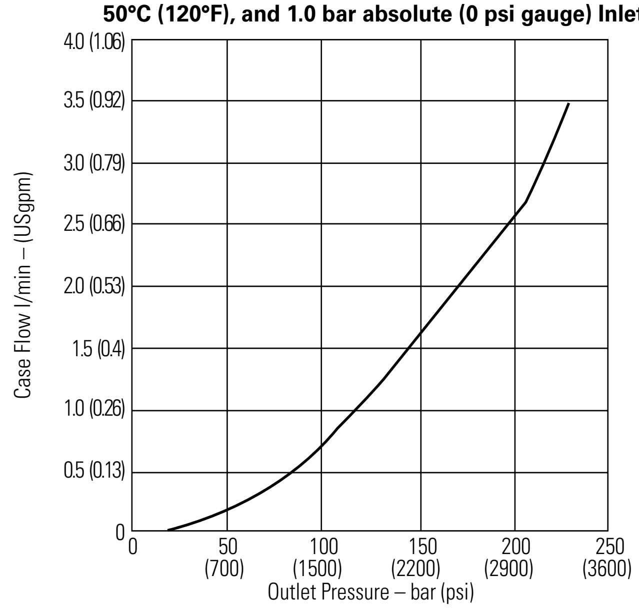
Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM106

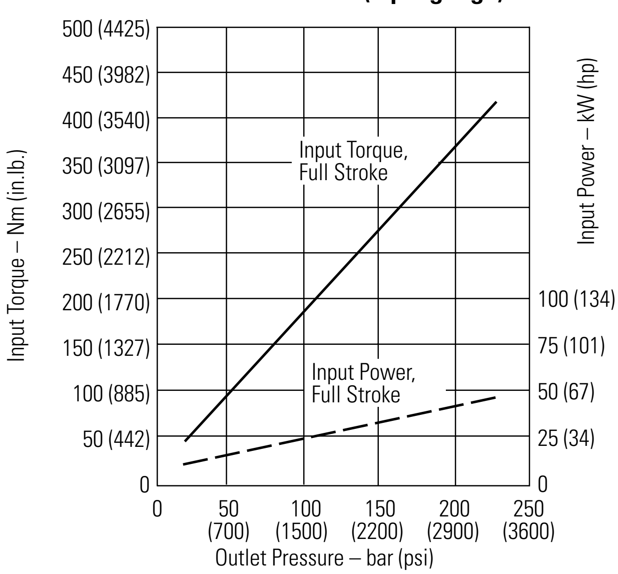
Delivery and Efficiency at 1000 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



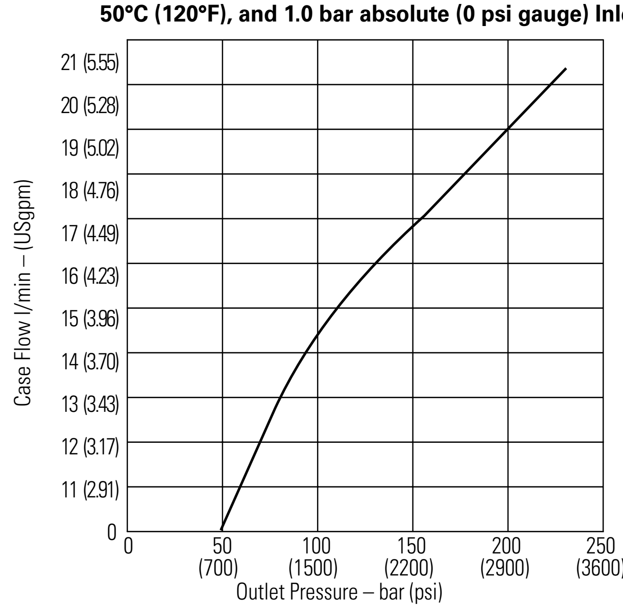
Case Flow versus Outlet Pressure at 1800 r/min, Full Flow, 50°C (120°F), and 1.0 bar absolute (0 psi gauge) Inlet



Input Torque and Power at 1000 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



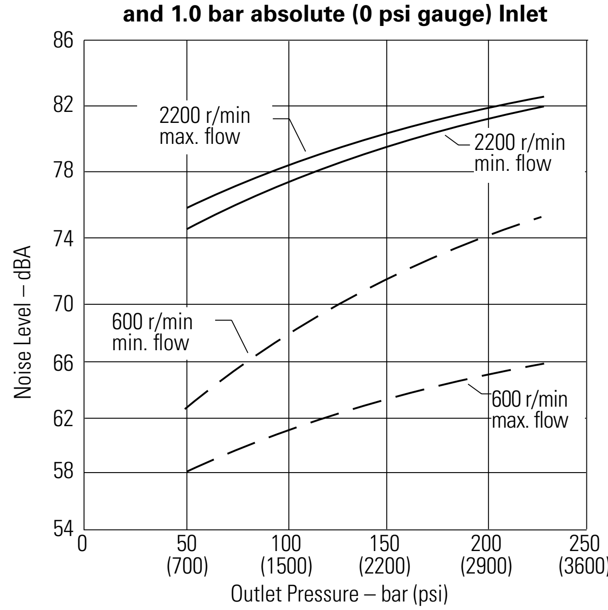
Case Flow versus Outlet Pressure at Cutoff, 1800 r/min, 50°C (120°F), and 1.0 bar absolute (0 psi gauge) Inlet



Performance

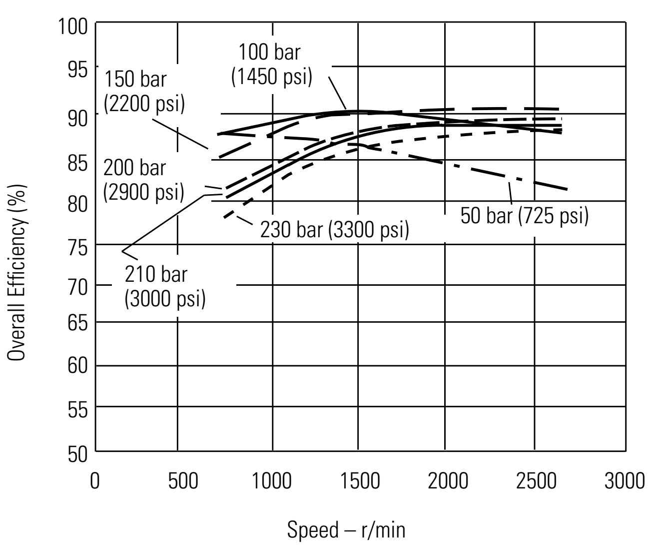
Higher speed version (M) PVM106

Typical Noise Levels at 2200 & 600 r/min with Petroleum Oil (10W) at 93°C (200°F) and 1.0 bar absolute (0 psi gauge) Inlet

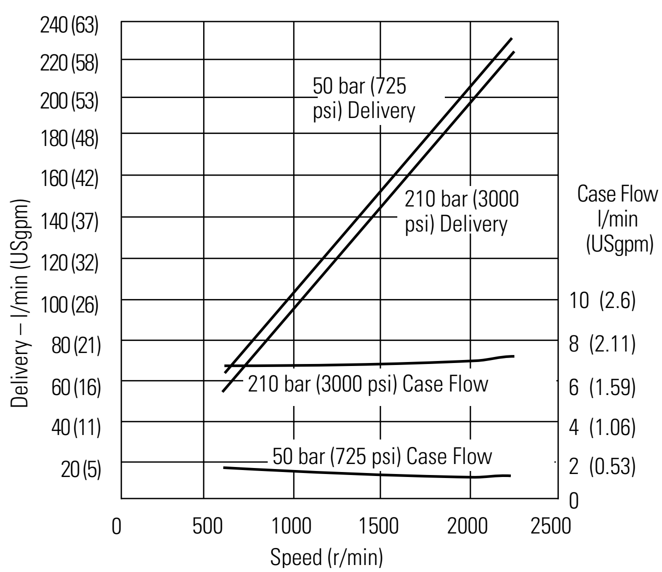


Sound pressure data equivalent to NFPA.

Overall Efficiency versus Speed at 93°C (200°F) and 1.0 bar absolute (0 psi gauge) inlet



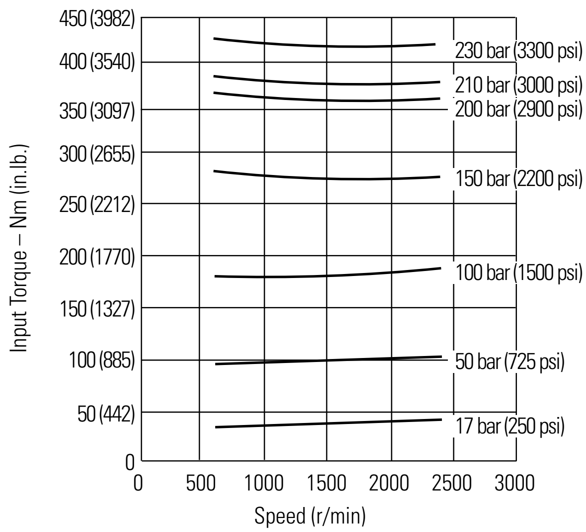
Delivery and Case Flow versus Speed at 93°C (200°F), Full Flow 1.0 bar absolute (0 psi gauge) Inlet



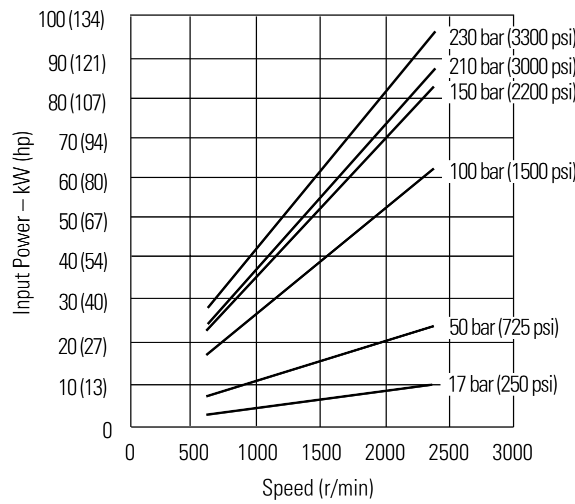
Performance

Higher speed version (M) PVM106

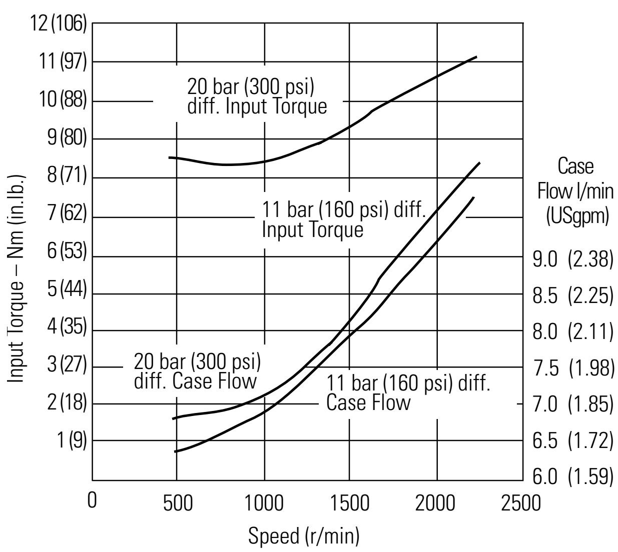
Input Torque versus Speed at 93°C (200°F), Full Flow and 1.0 bar absolute (0 psi gauge) Inlet



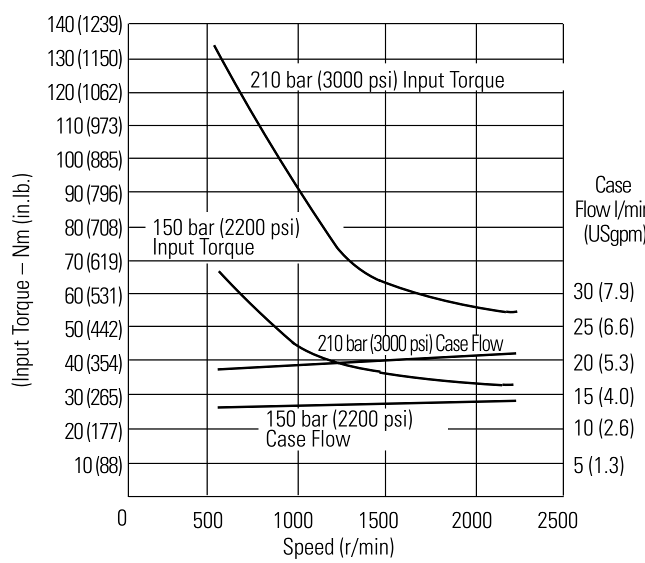
Input Power versus Speed at 93°C (200°F), Full Flow and 1.0 bar absolute (0 psi gauge) Inlet



Input Torque and Case Flow versus Speed at 93°C (200°F), Load Sense Standby and 1.0 bar absolute (0 psi gauge) Inlet



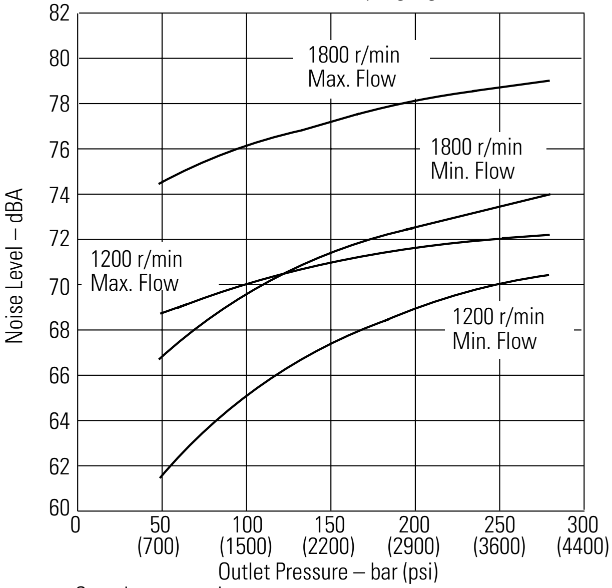
Input Torque and Case Flow versus Speed at 93°C (200°F), Pressure Limit Cut-off and 1.0 bar absolute (0 psi gauge) Inlet



Performance

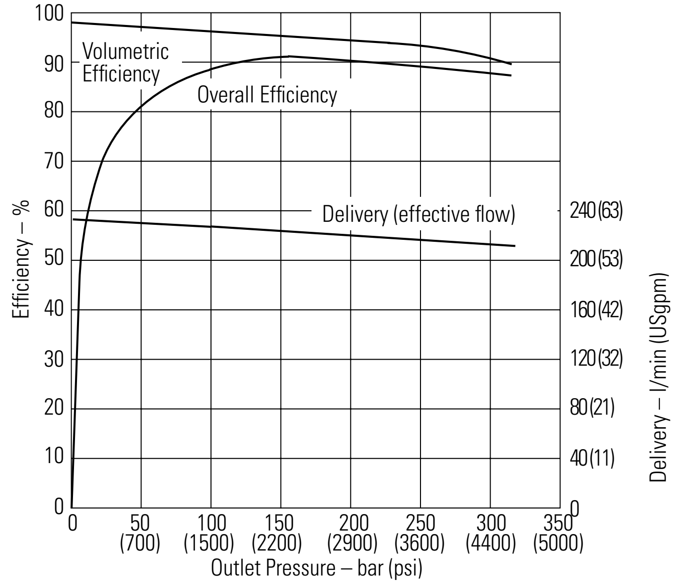
Quiet version, optimized for 1000-1800 rpm (E) PVM131

Typical Noise Levels at 1800 and 1200 r/min
with Petroleum Oil (10W) at 50°C (120°F)
and 1.0 bar absolute (0 psi gauge) Inlet

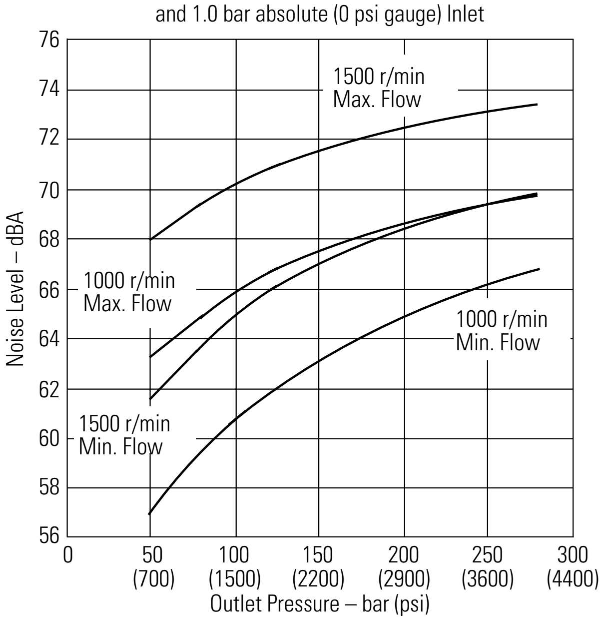


Sound pressure data equivalent to NFPA

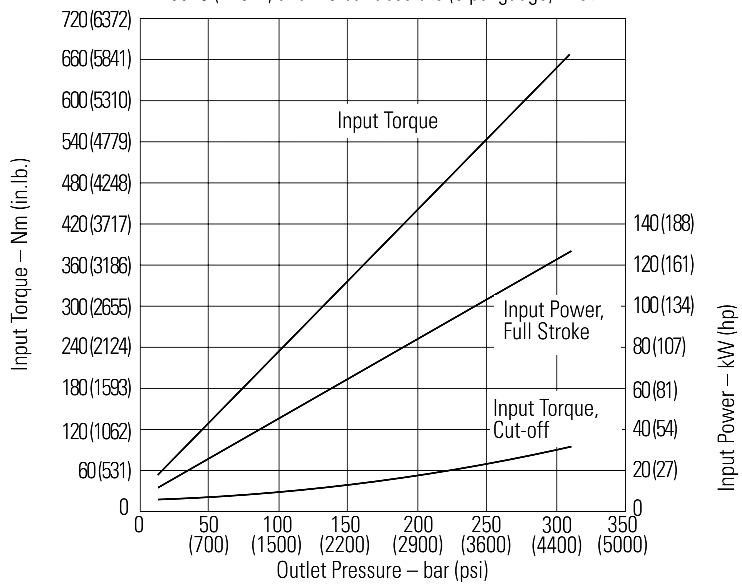
Delivery and Efficiency at 1800 r/min
50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet



Typical Noise Levels at 1500 and 1000 r/min
with Petroleum Oil (10W) at 50°C (120°F)
and 1.0 bar absolute (0 psi gauge) Inlet

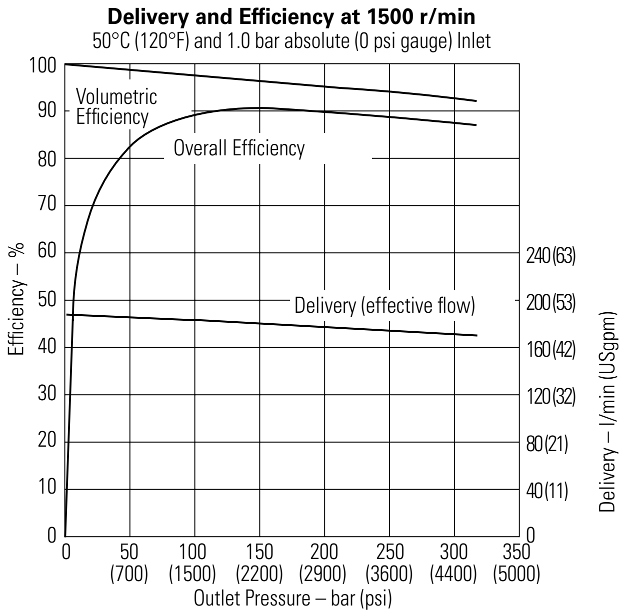


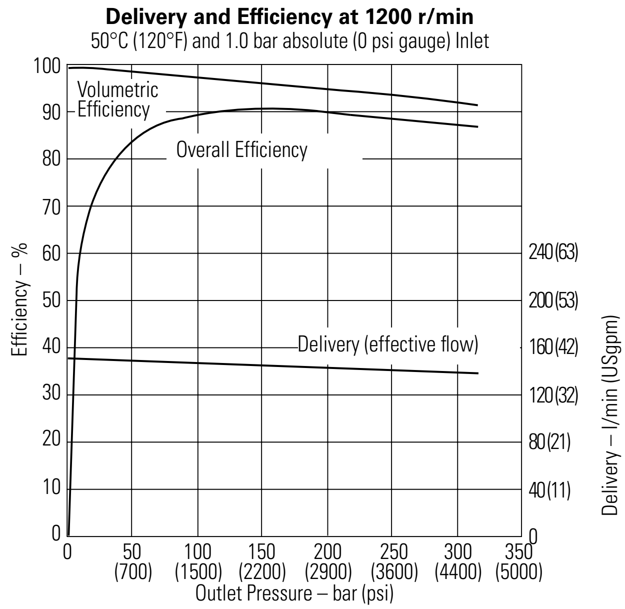
Input Torque and Power at 1800 r/min
50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet

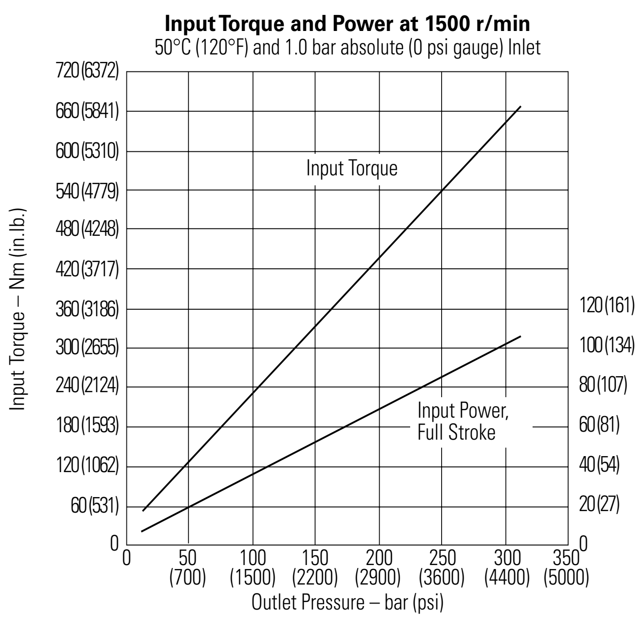


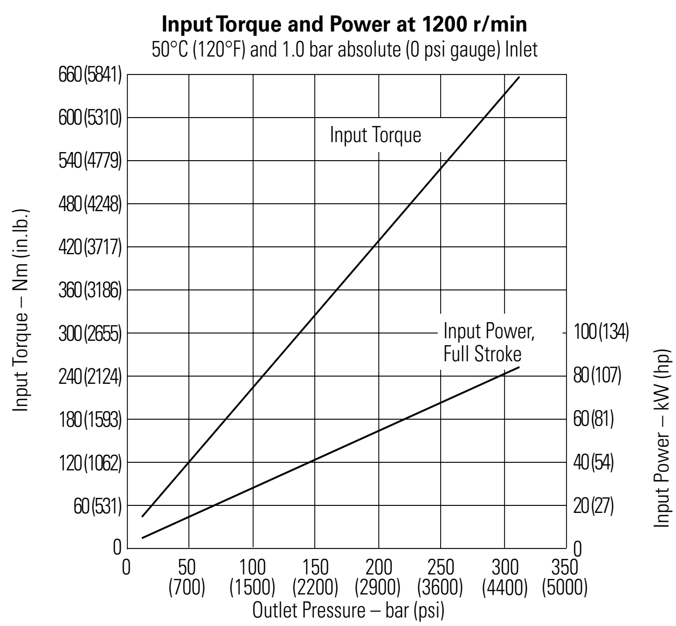
Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM131



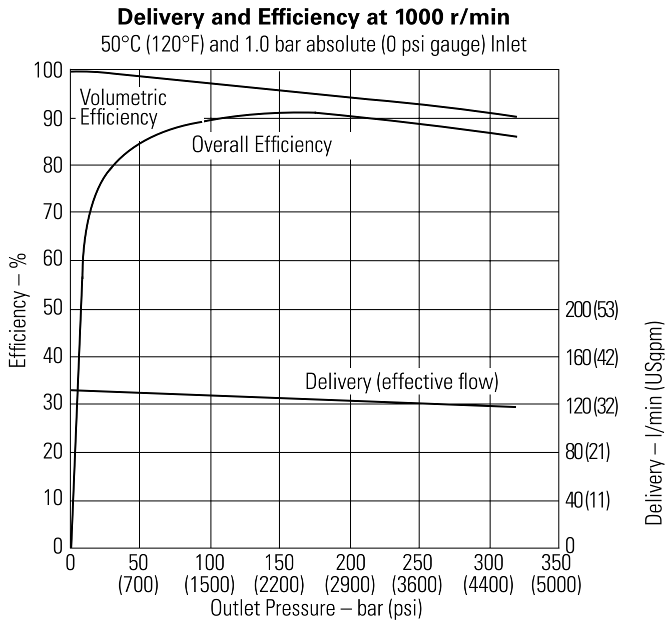


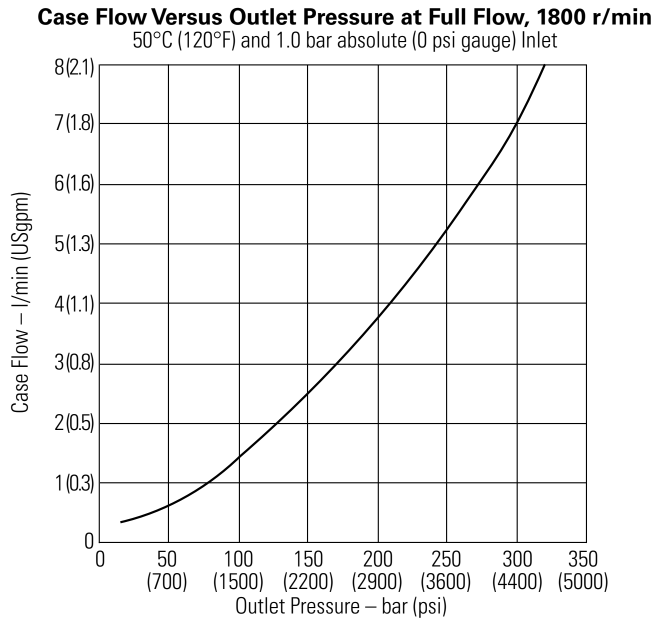


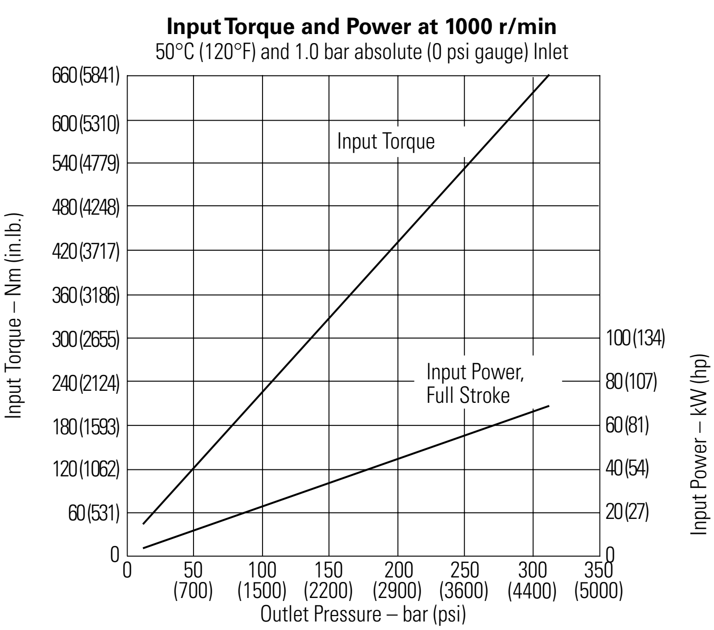


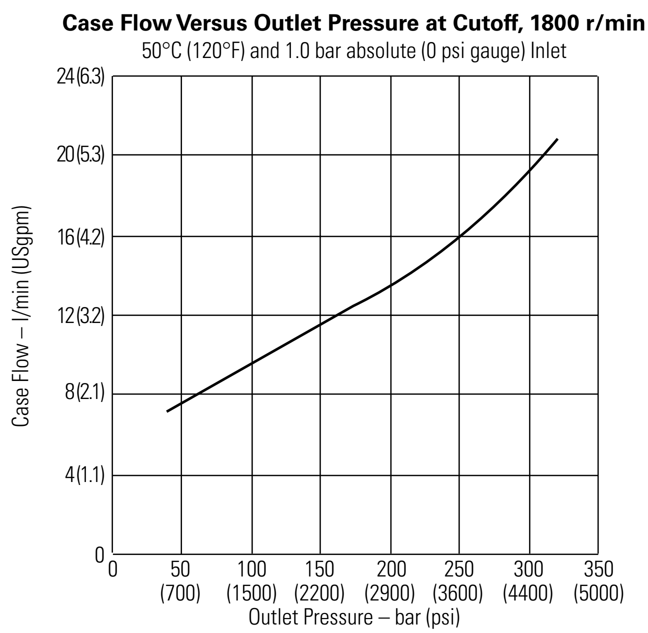
Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM131





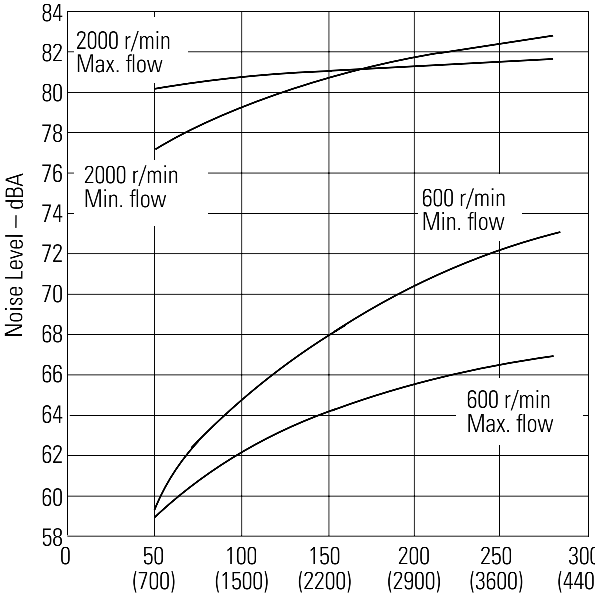




Performance

Higher speed version (M) PVM131

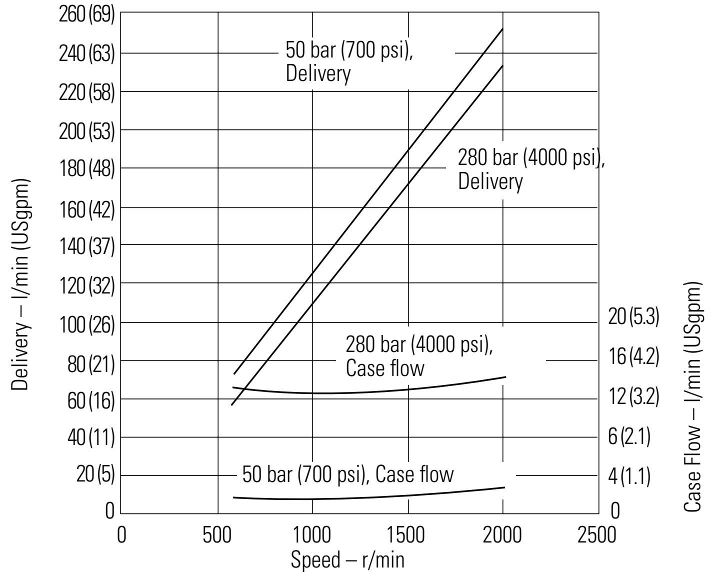
Typical Noise Levels at 2000 and 600 r/min
with petroleum oil (10 W) @ 93°C (200°F)
and 1.0 bar absolute (0 psi gauge) inlet



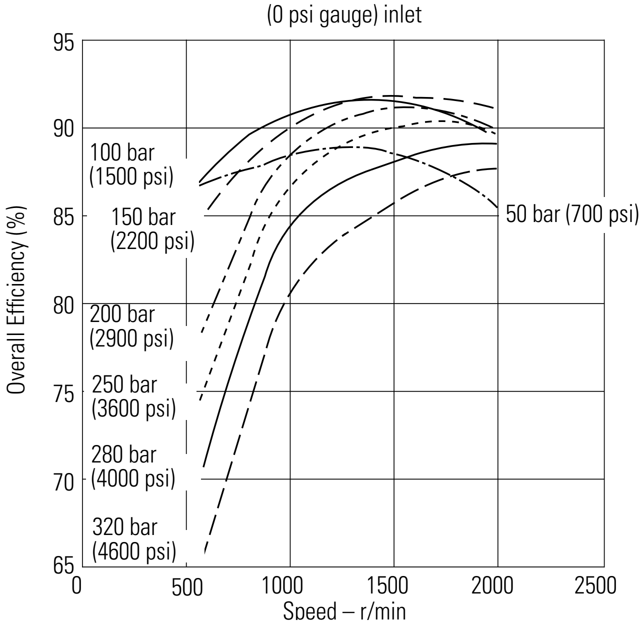
Sound pressure data

equivalent to NFPA

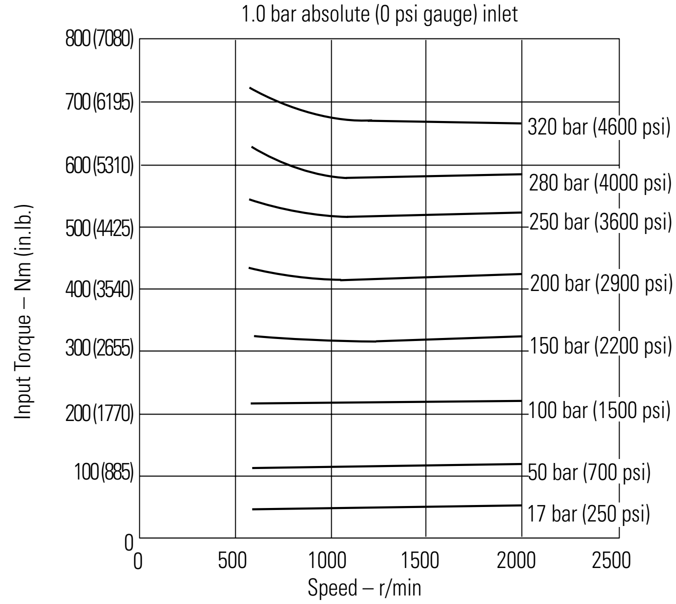
Delivery and Case Flow Versus Speed
@ 93°C (200°F), full flow and
1.0 bar absolute (0 psi) gauge Inlet



Overall Efficiency Versus Speed
@ 93°C (200°F) and 1.0 bar absolute
(0 psi gauge) inlet



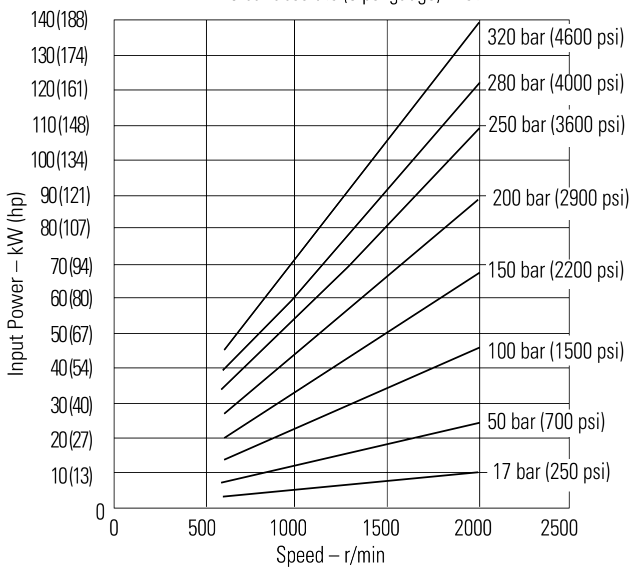
Input Torque Versus Speed
@ 93°C (200°F), full flow and
1.0 bar absolute (0 psi gauge) inlet



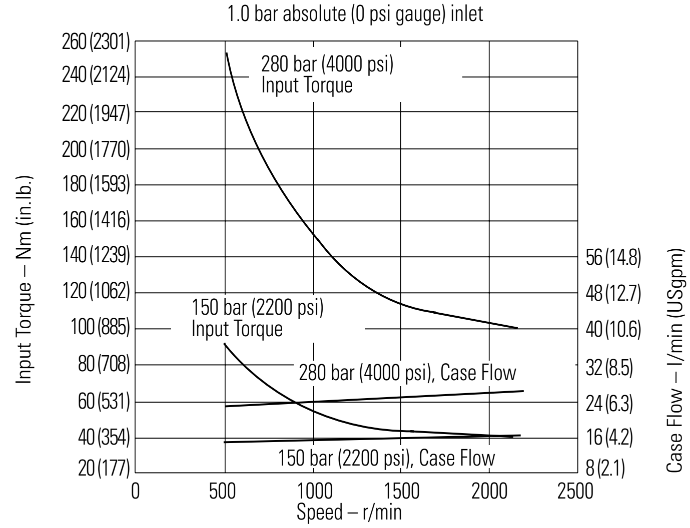
Performance

Higher speed version (M) PVM131

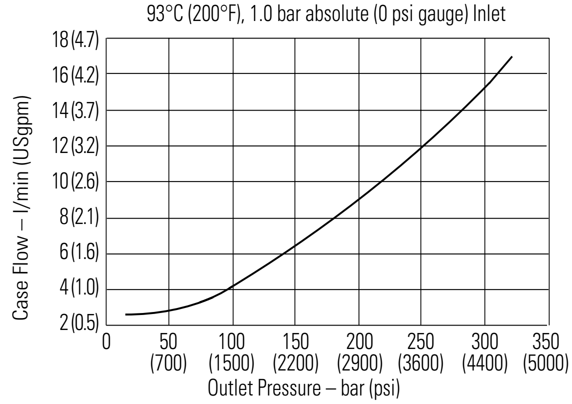
Input Power Versus Speed
@93°C (200°F), full flow and
1.0 bar absolute (0 psi gauge) inlet



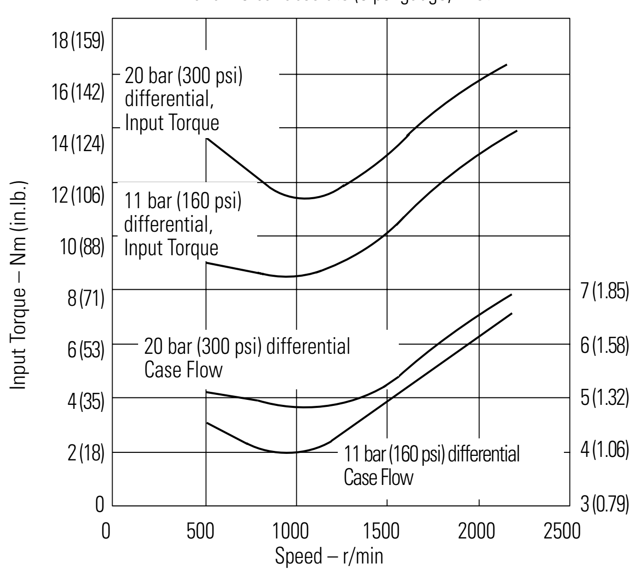
Input Torque and Case Flow Versus Speed
@ 93°C (200°F), cut-off and
1.0 bar absolute (0 psi gauge) inlet



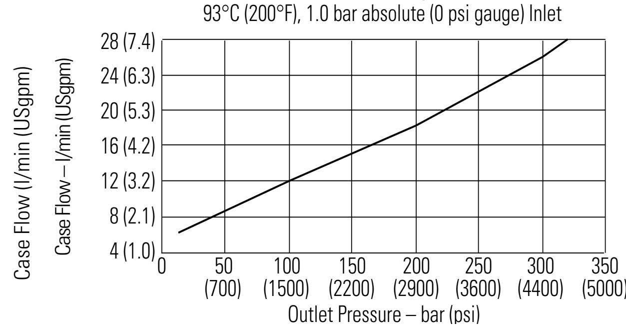
Case Flow at 2000 r/min, Full Flow
93°C (200°F), 1.0 bar absolute (0 psi gauge) Inlet



Input Torque and Case Flow Versus Speed
@ 93°C (200°F), load sense standby
and 1.0 bar absolute (0 psi gauge) inlet



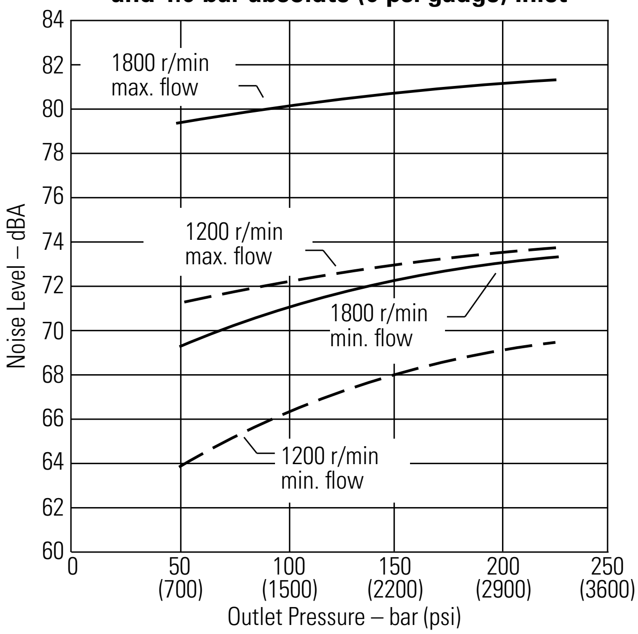
Case Flow at 2000 r/min, Minimum Flow
93°C (200°F), 1.0 bar absolute (0 psi gauge) Inlet



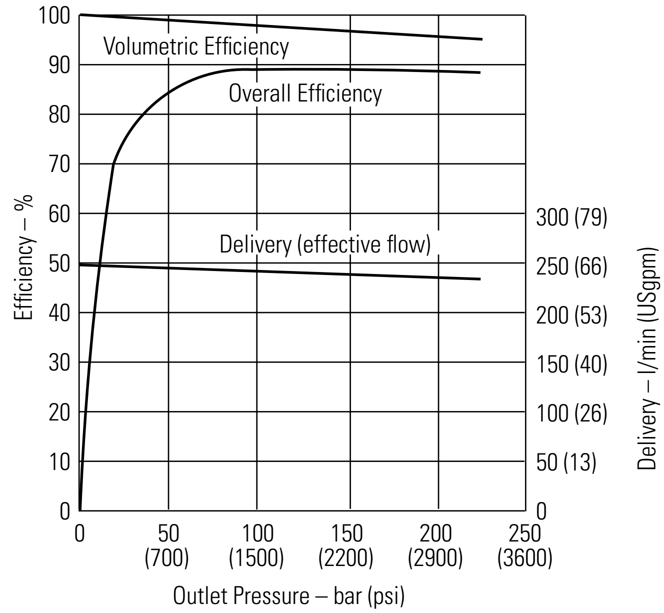
Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM141

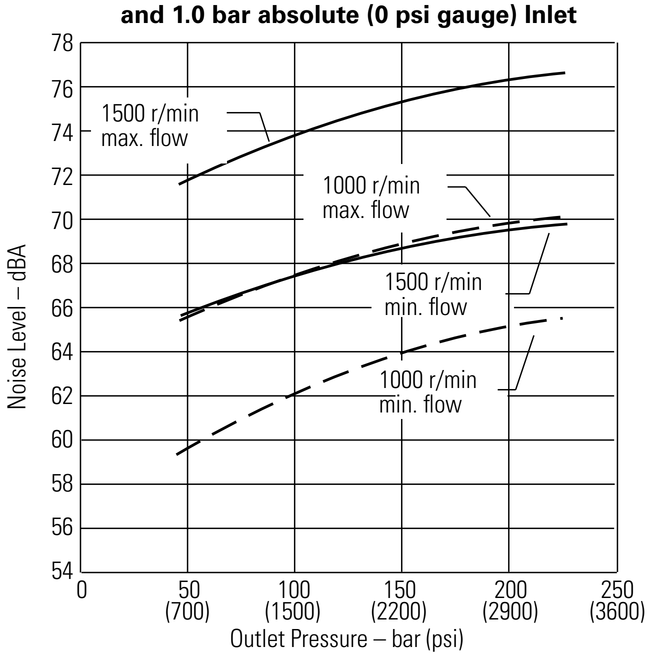
Typical Noise Levels at 1800 and 1200 r/min with Petroleum Oil (10W) at 50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet



Delivery and Efficiency at 1800 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet

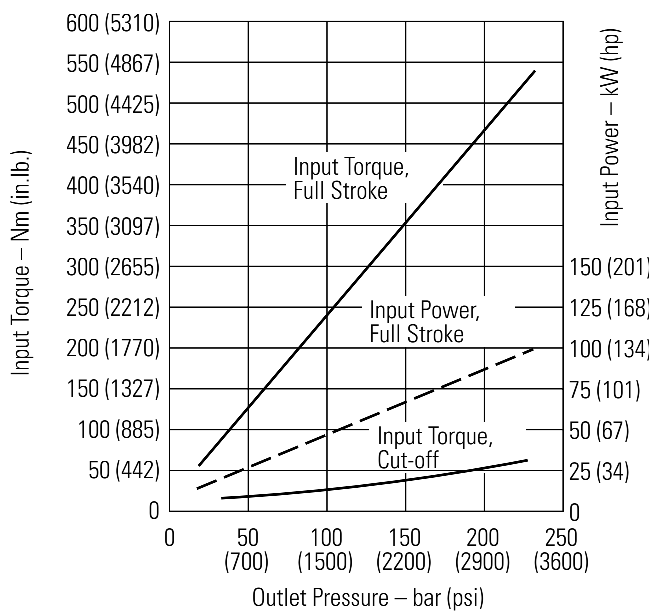


Typical Noise Levels 1500 and 1000 r/min with Petroleum Oil (10W) at 50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet



Sound pressure data equivalent to NFPA.

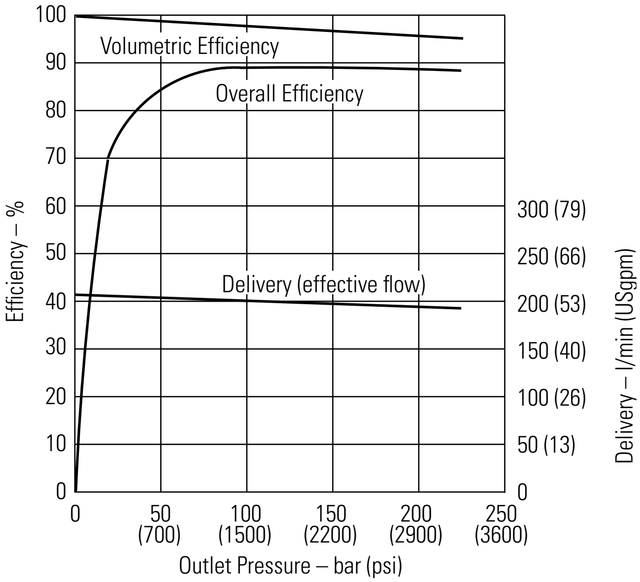
Input Torque and Power at 1800 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



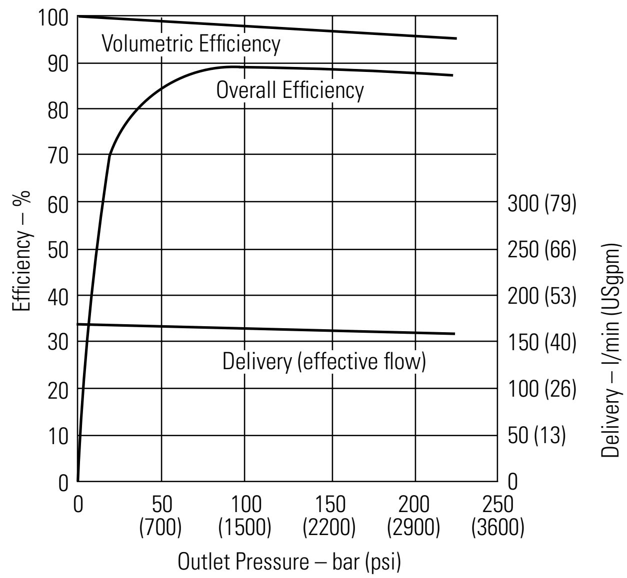
Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM141

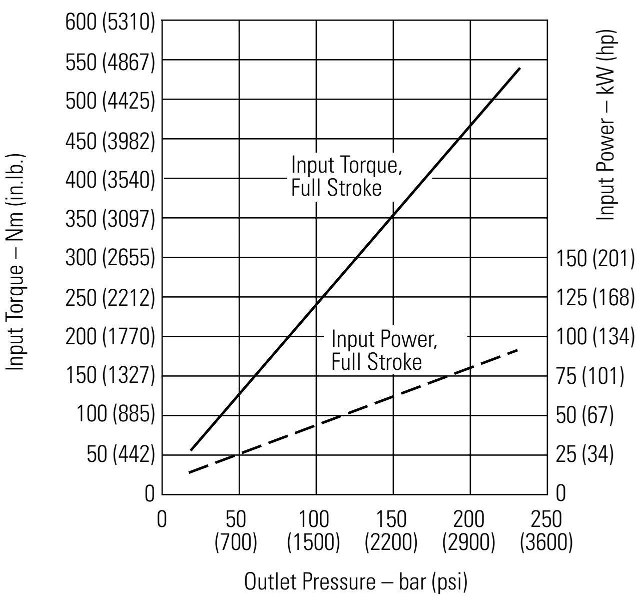
Delivery and Efficiency at 1500 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



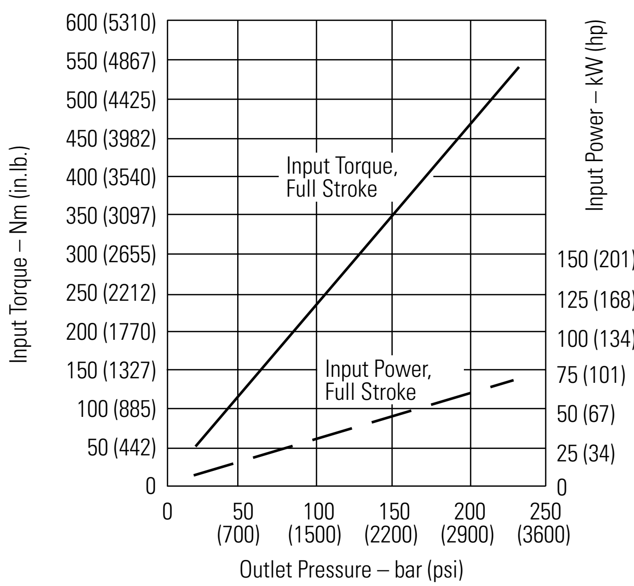
Delivery and Efficiency at 1200 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



Input Torque and Power at 1500 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



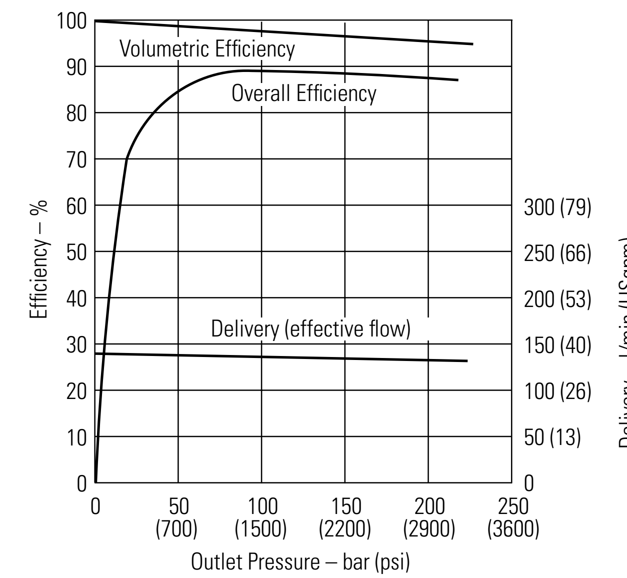
Input Torque and Power at 1200 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



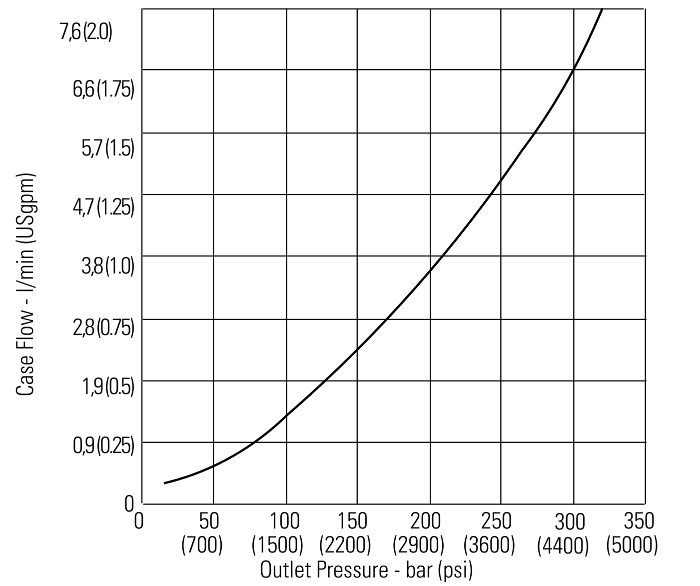
Performance

Quiet version, optimized for 1000-1800 rpm (E) PVM141

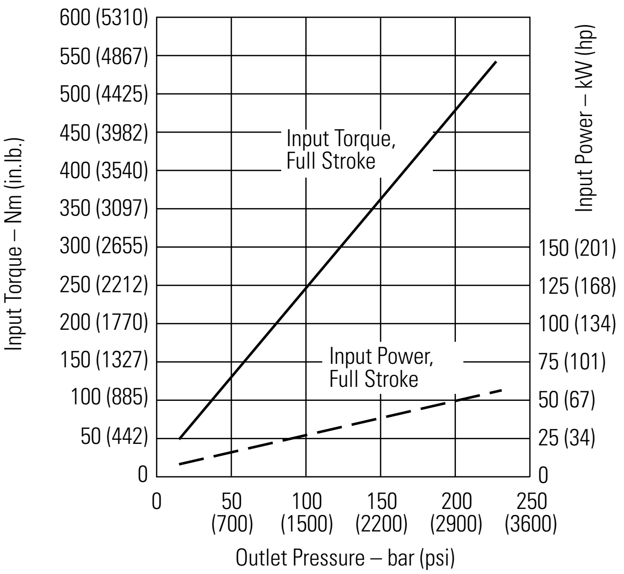
Delivery and Efficiency at 1000 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



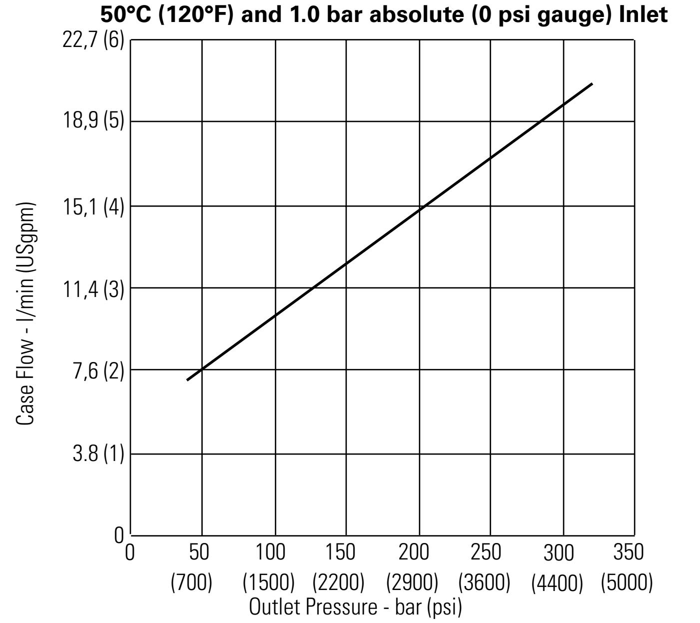
Case Flow Versus Outlet Pressure at Full Flow, 1800 r/min 50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet



Input Torque and Power at 1000 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



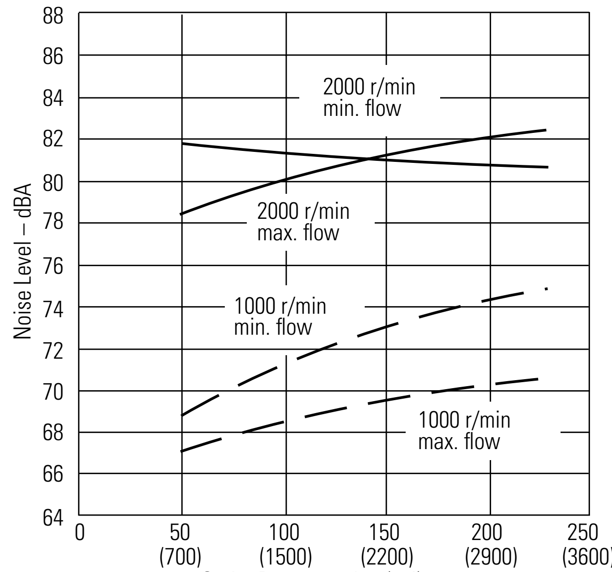
Case Flow Versus Outlet Pressure at Cutoff, 1800 r/min 50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet



Performance

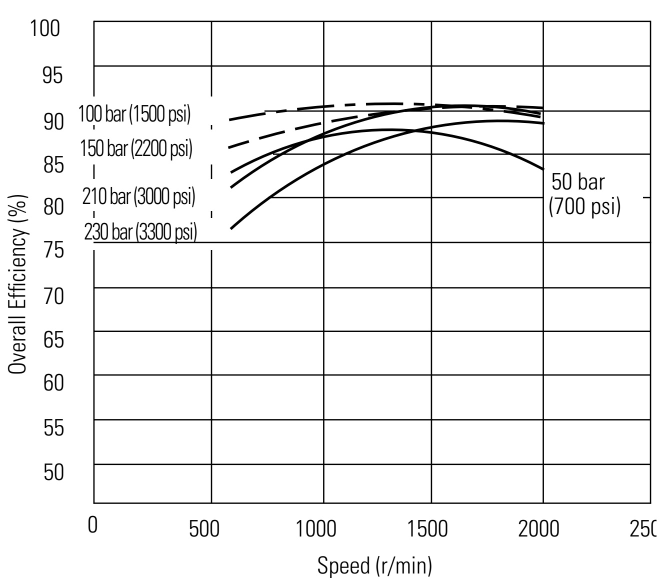
Higher speed version (M) PVM141

Typical Noise Levels at 2000 and 1000 r/min with Petroleum Oil (10W) at 93°C (200°F), and 1.0 bar absolute (0 psi gauge) Inlet

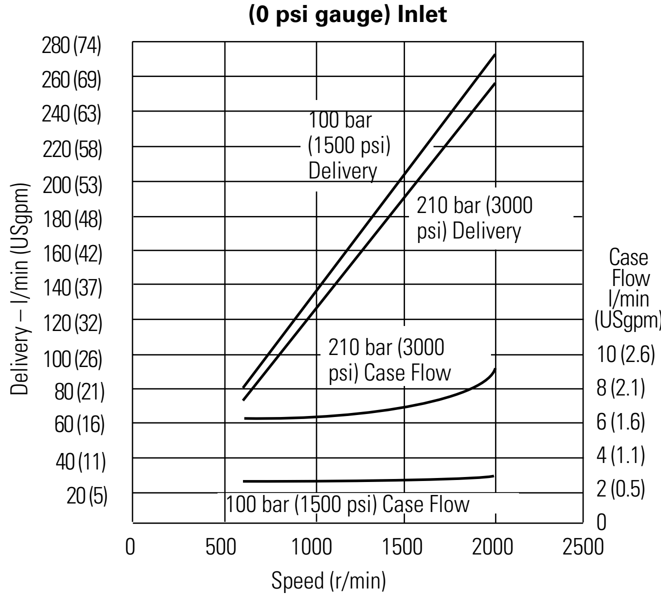


Sound pressure data equivalent to NFPA.

Overall Efficiency versus Speed at 93°C (200°F), and 1.0 bar absolute (0 psi gauge) Inlet



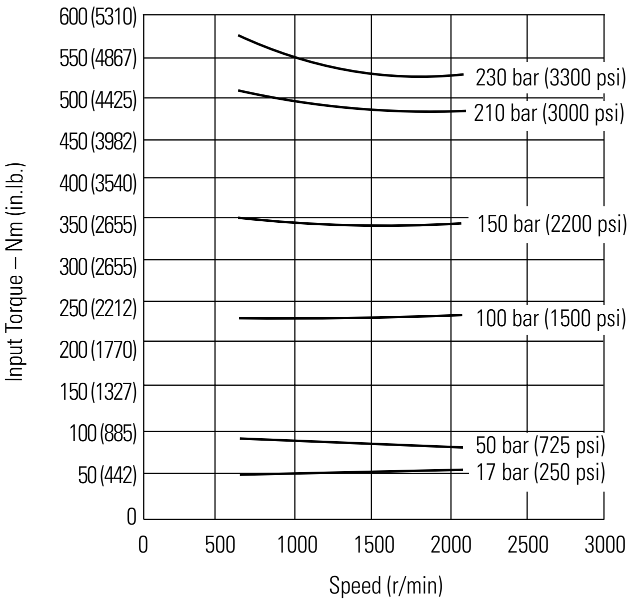
Delivery and Case Flow versus Speed at 93°C (200°F), Full Flow and 1.0 bar absolute (0 psi gauge) Inlet



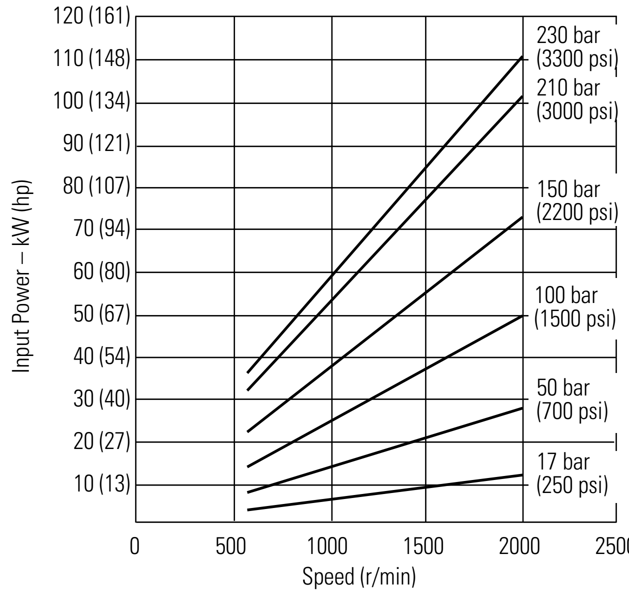
Performance

Higher speed version (M) PVM141

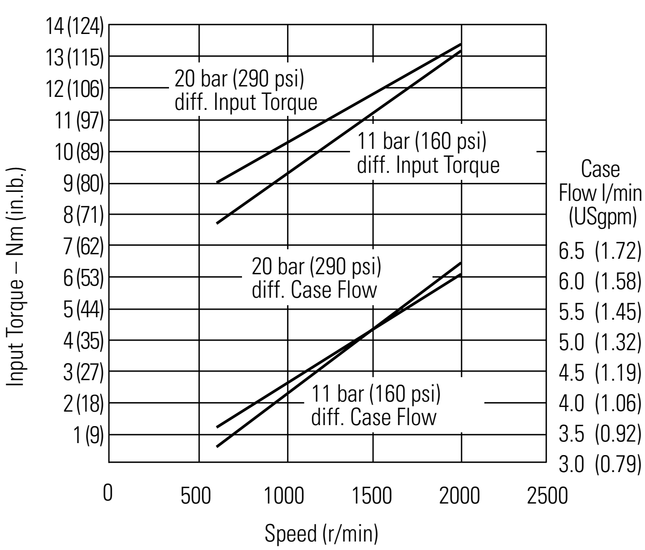
Input Torque versus Speed at 93°C (200°F), Full Flow and 1.0 bar absolute (0 psi gauge) Inlet



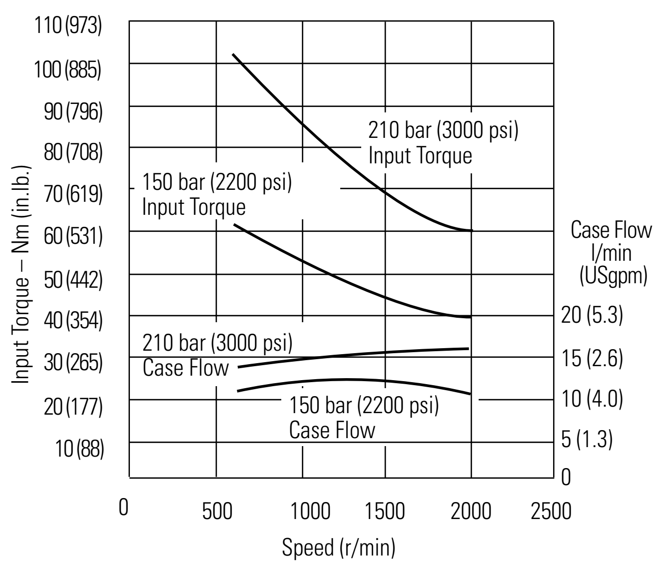
Input Power versus Speed, 93°C (200°F), and 1.0 bar absolute (0 psi gauge) Inlet

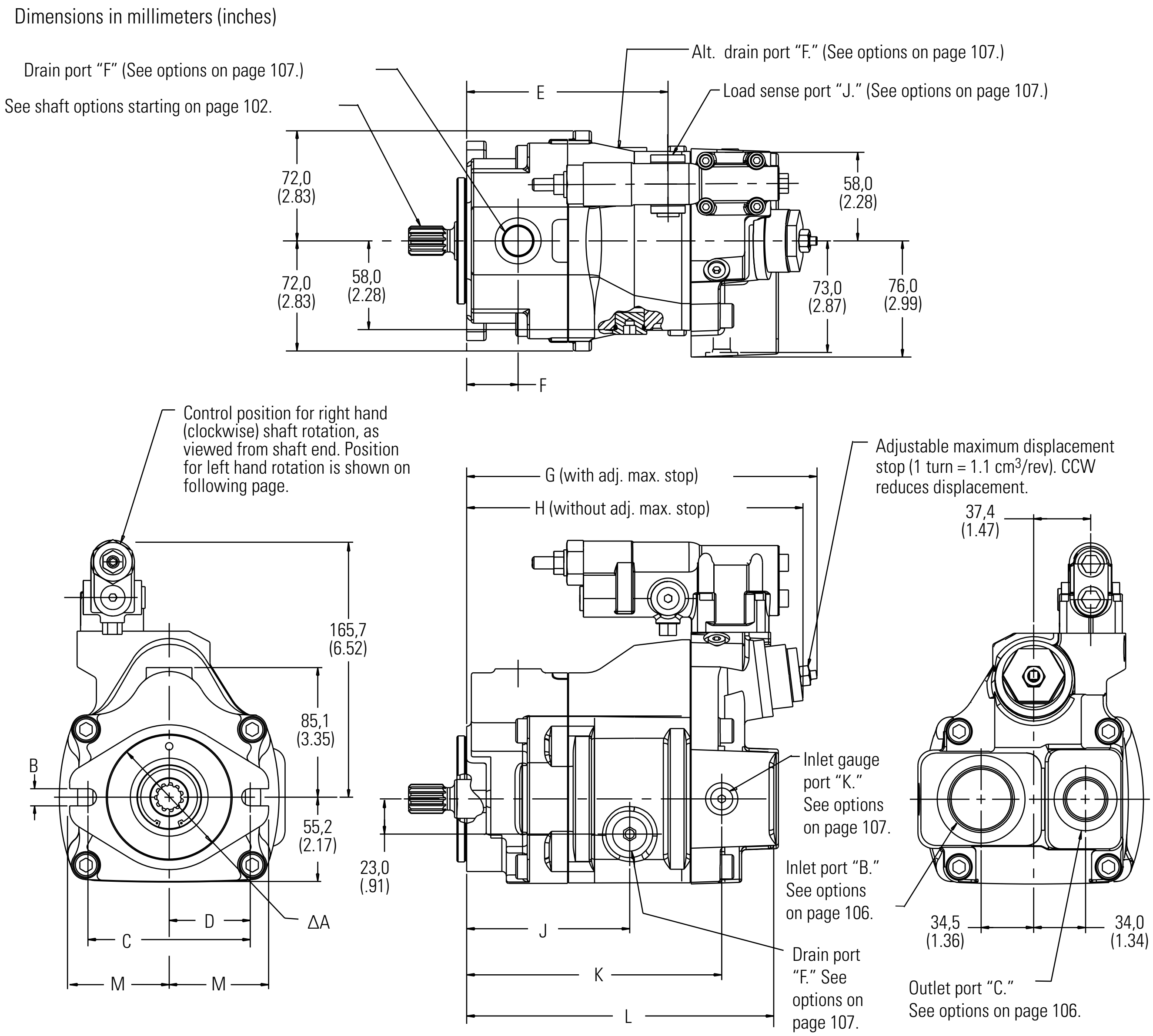


Input Torque and Case Flow versus Speed at 93°C (200°F), Load Sense Standby and 1.0 bar absolute (0 psi gauge) Inlet



Input Torque and Case Flow versus Speed at 93°C (200°F), Pressure Limit Cut-Off and 1.0 bar absolute (0 psi gauge) Inlet



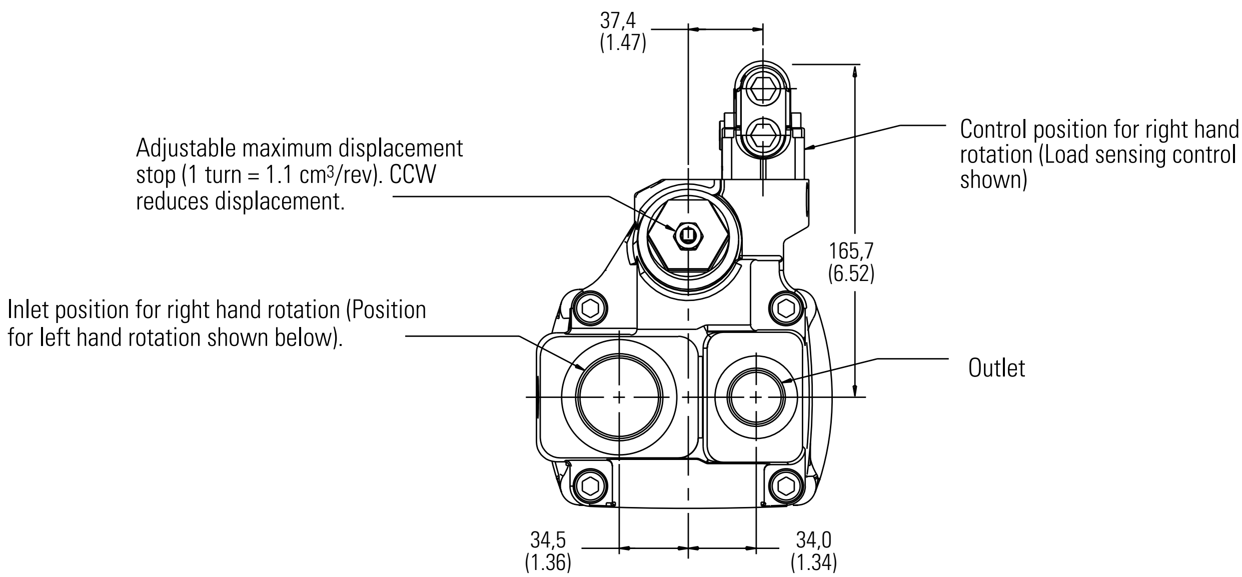


Dimensions in millimeters (inches)
Drain port "F" (See options on page 107.)
See shaft options starting on page 102.
Alt. drain port "F." (See options on page 107.)
Load sense port "J." (See options on page 107.)
E
72,0
(2.83)
72,0
(2.83)
58,0
(2.28)
58,0
(2.28)
73,0
(2.87)
76,0
(2.99)
F
Control position for right hand (clockwise) shaft rotation, as viewed from shaft end. Position for left hand rotation is shown on following page.
G (with adj. max. stop)
H (without adj. max. stop)
Adjustable maximum displacement stop (1 turn = 1.1 cm3/rev). CCW reduces displacement.
37,4
(1.47)
165,7
(6.52)
85,1
(3.35)
55,2
(2.17)
B
23,0
(.91)
D
C
ΔA
M
M
Inlet gauge port "K." See options on page 107.
Inlet port "B." See options on page 106.
J
K
L
Drain port "F." See options on page 107.
34,5
(1.36)
34,0
(1.34)
Outlet port "C." See options on page 106.

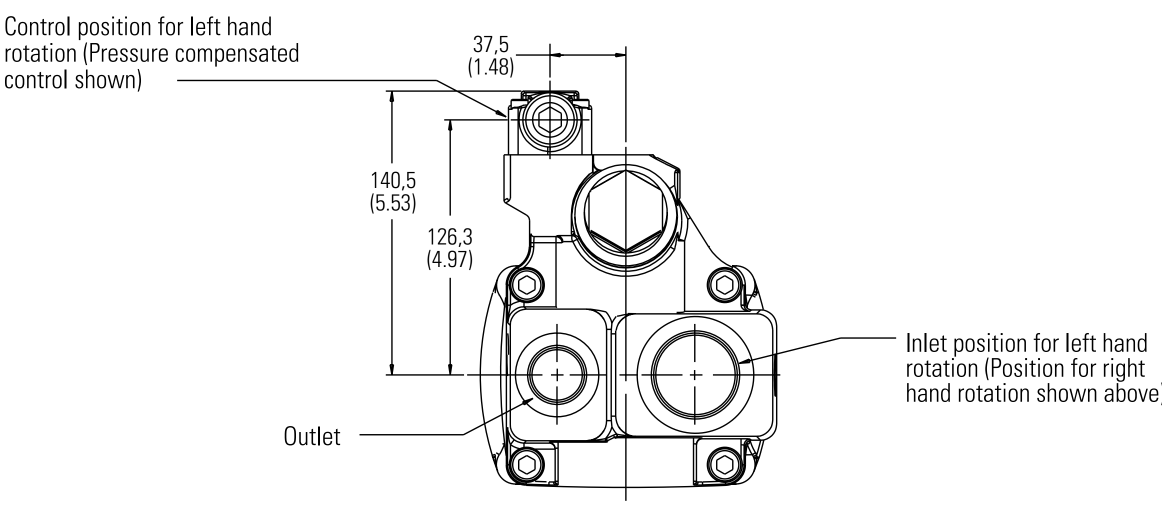
End-ported Models

PVM018/020

Dimensions in millimeters (inches)



Inlet/Outlet Ports and Control Positioned for Right Hand Rotation

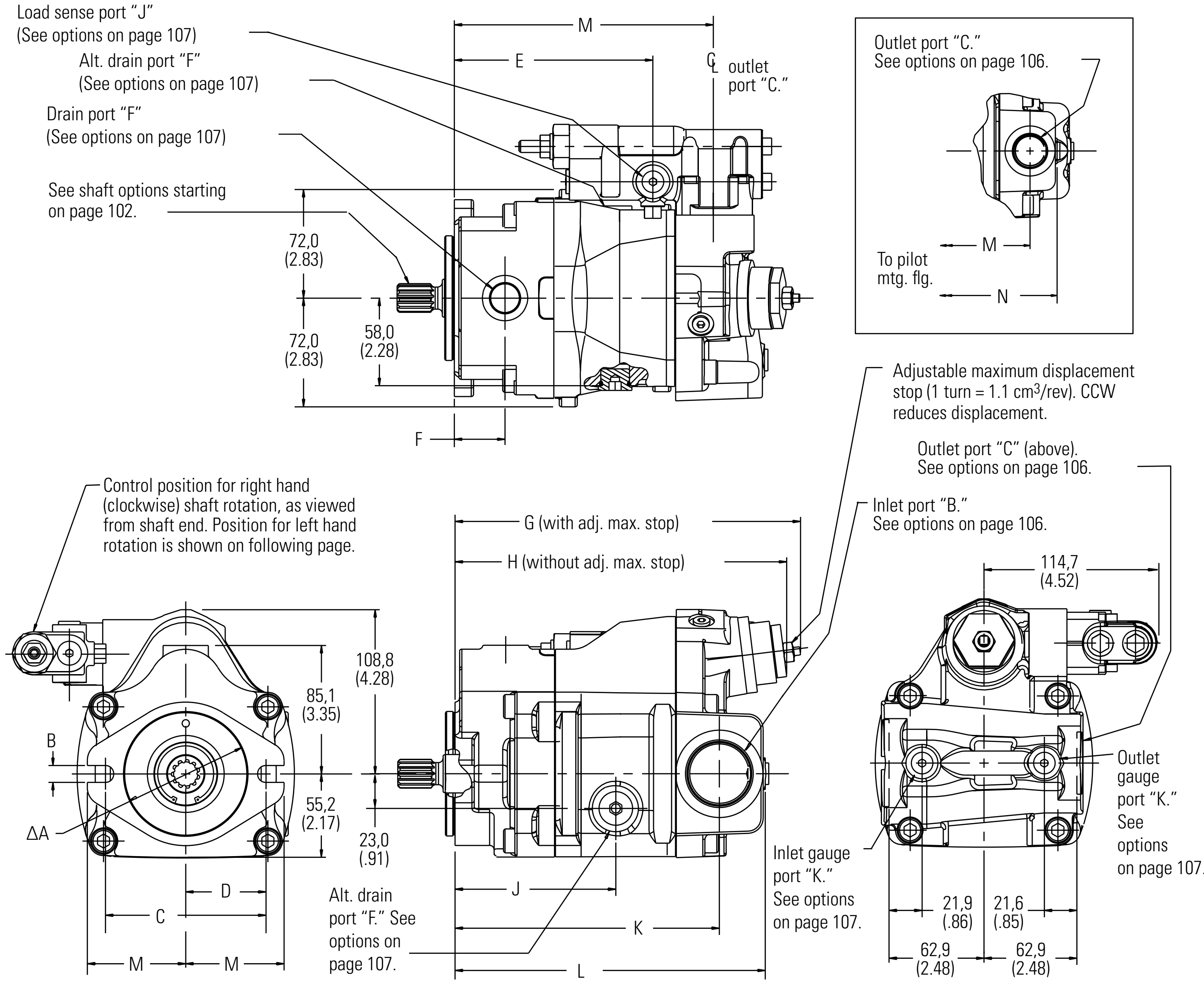


Inlet/Outlet Ports and Control Positioned for Left Hand Rotation

Side-ported Models

PVM018/020

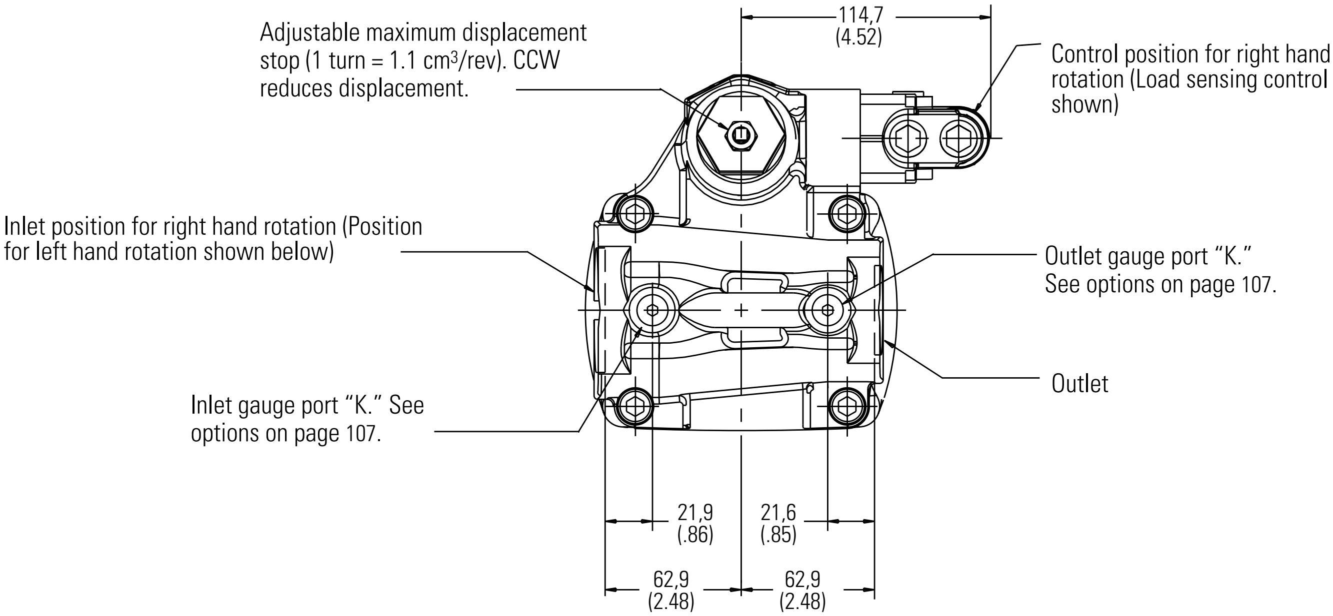
Dimensions in millimeters (inches)



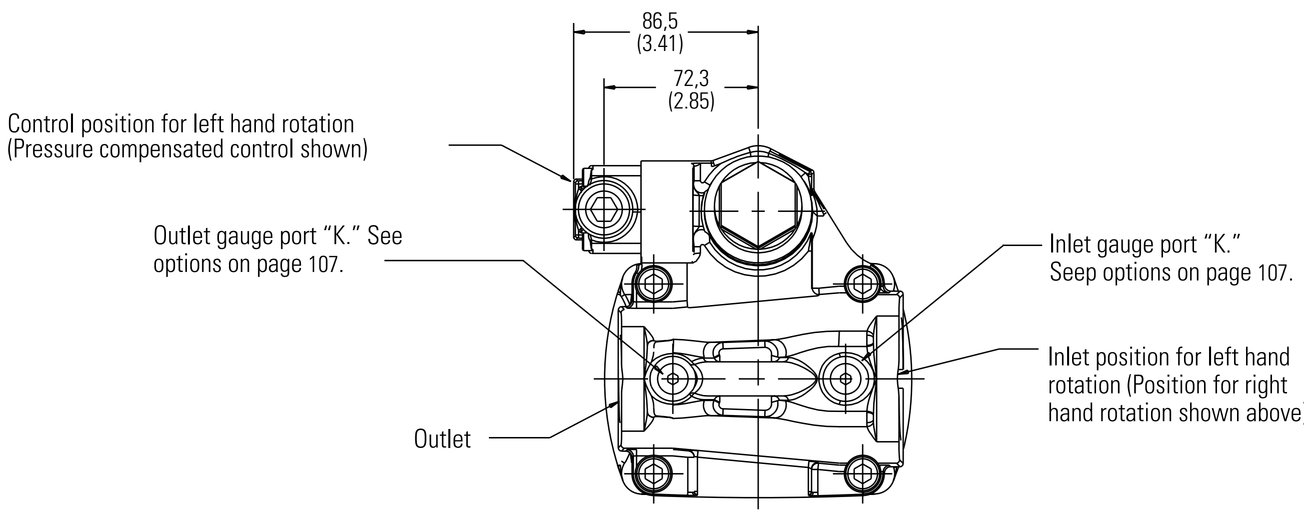
Side-ported Models

PVM018/020

Dimensions in millimeters (inches)



Inlet/Outlet Ports and Control Positioned for Right Hand Rotation

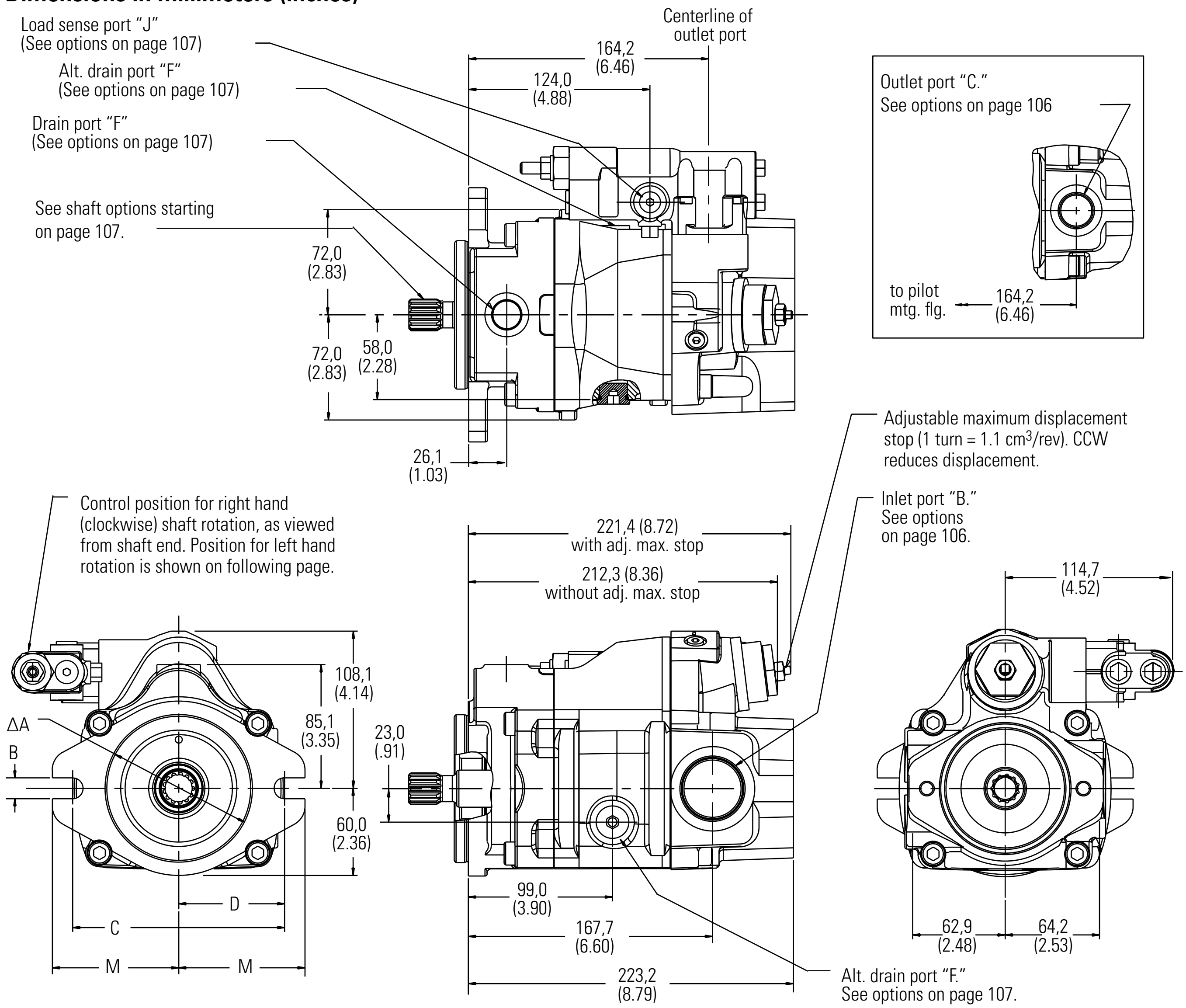


Inlet/Outlet Ports and Control Positioned for Left Hand Rotation

Thru-drive Models

PVM018/020

Dimensions in millimeters (inches)



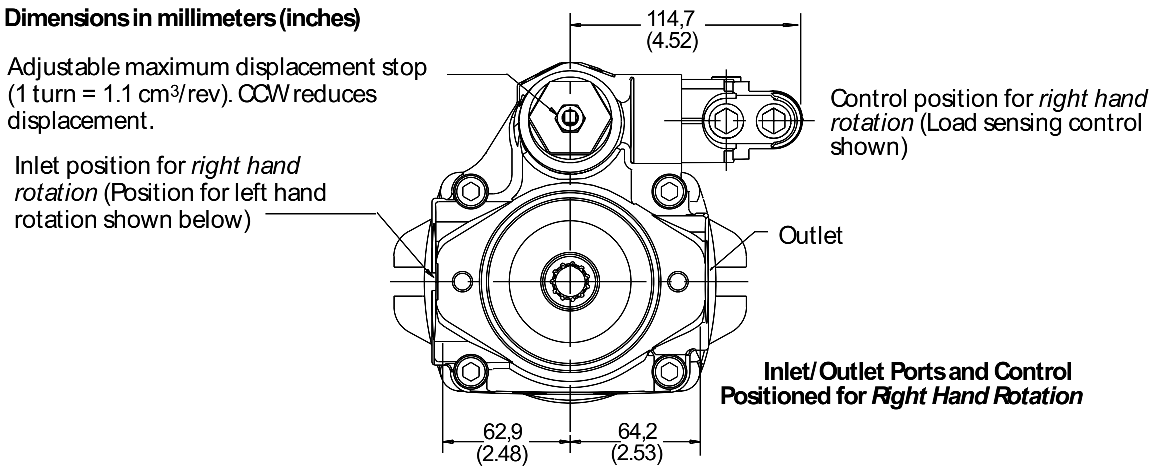
Thru-drive Models

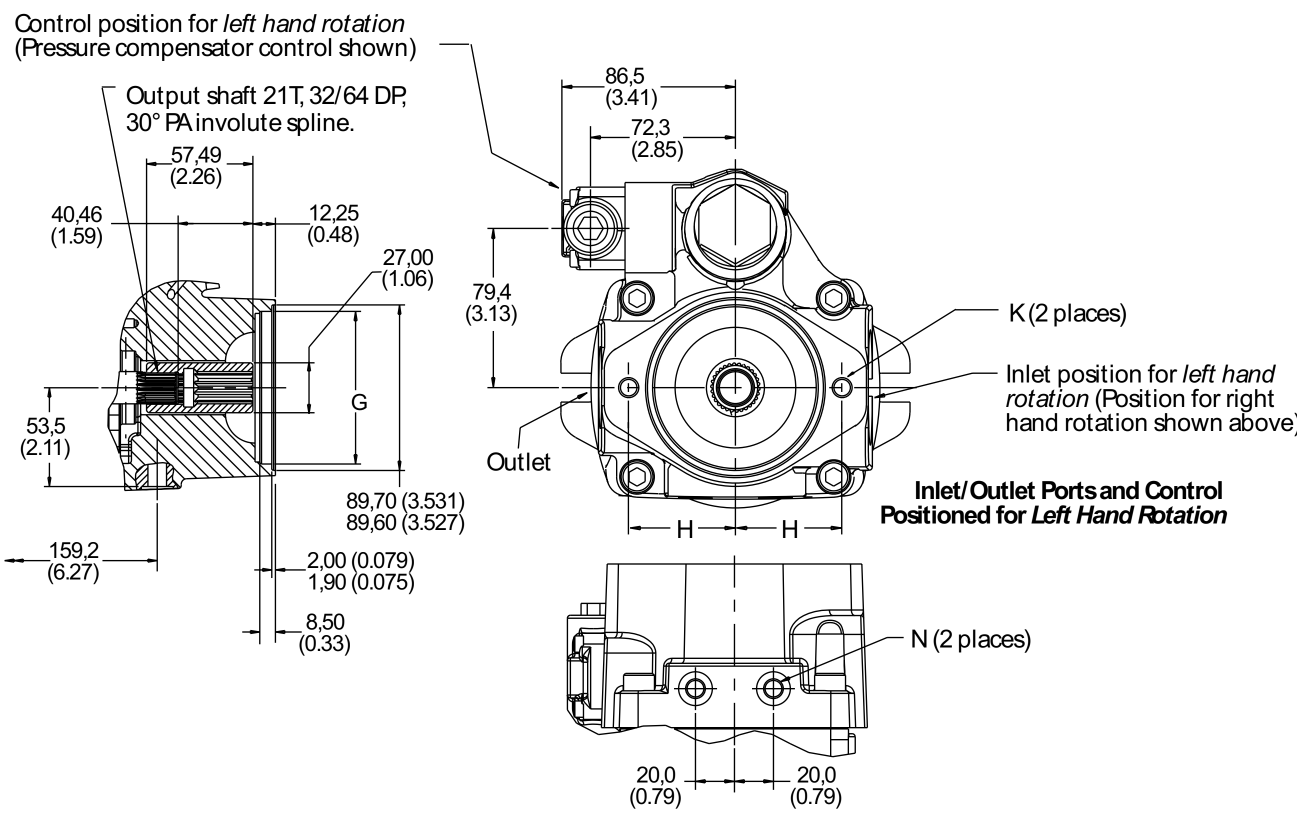
PVM018/020

Model Code Position 25

	Description
A	For SAE "A" pad with a 9T, 16/32 DP, 30° pressure angle, involute spline
B	For SAE "A" pad with a 11T, 16/32 DP, 30° pressure angle, involute spline
G	For ISO 80 A2HW pad with a 9T SAE spline
H	For ISO 80 A2HW pad with a 11T SAE spline

Dimensions in millimeters (inches)





Model Code Position 25	ØG	H	K	N
A,B	82,625 (3.253) 82,575 (3.251)	53,2 (2.09)	375-16 UNC-2B thd. 0.75 deep min	375-16 UNC-2B thd. 0.62 deep min.
G,H	80,046 (3.151) 80,002 (3.150)	54,5 (2.15)	M10 x 1,50 thd. 19,05 deep min	M10 x 1,50 thd. 15,88 deep min.

Flange Designations

PVM018/020

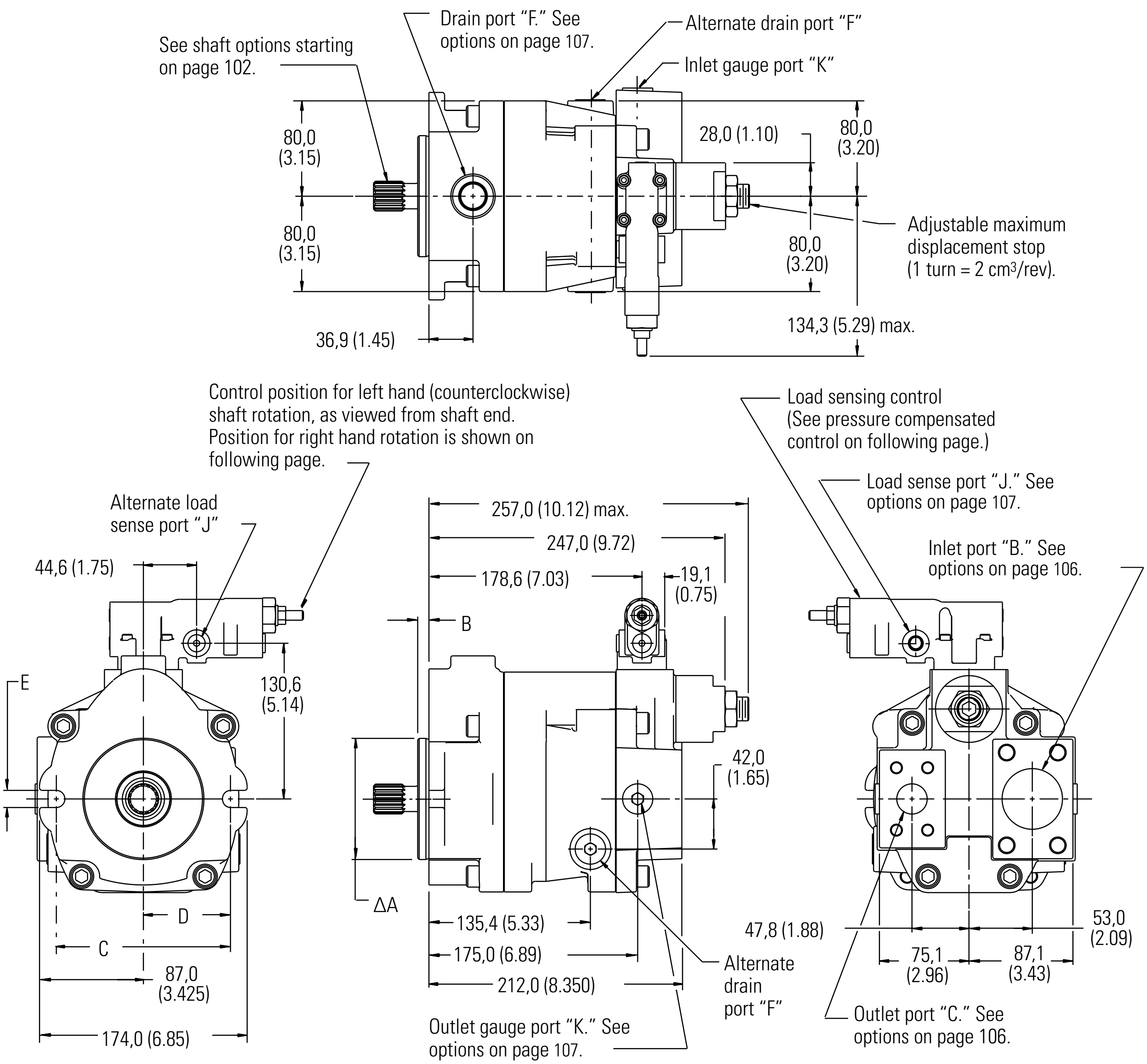
"A" Pilot Flange Designation	ØA	B	C	D	E	F	G	H	J	K	L	M
SAE J744-82-2 Model Code A	82,55 (3.25)	11,35/10,97 (.447/.432)	106,4 (4.19)	53,2 (2.09)	131,5 (5.18)	33,6 (1.32)	228,9 (9.00)	219,8 (8.65)	106,5 (4.19)	166,7 (6.56)	200,7 (7.90)	65,2 (2.57)
ISO 3019/2-80A2HW Model Code B	80,00 (3.15)	11,27/11,00 (.444/.433)	109,0 (4.29)	54,5 (2.15)								
"B" Pilot Flange Designation												
SAE J744-101-2 Model Code C	101,60 (4.00)	14,55/14,17 (.572/.557)	146,0 (5.750)	73,0 (2.875)	124,0 (4.88)	26,1 (1.03)	221,4 (8.72)	212,3 (8.36)	99,0 (3.90)	159,2 (6.27)	193,9 (7.63)	87,0 (3.43)
ISO 3019/2-100A2HW Model Code D	100,00 (3.937)	14,27/14,00 (.562/.551)	140,0 (5.512)	70,0 (2.756)								

Pilot Flange Designation	ØA	B	C	D
SAE J744-127-2 Model Code C	101,60 (4.00)	14,55/14,17 (.572/.558)	146,0 (5.75)	73,0 (2.87)
ISO 3019/2-100 A2HW Model Code D	100,00 (3.94)	14,27/14,00 (.562/.551)	140,0 (5.51)	70,0 (2.76)

End-ported Models

PVM045/050

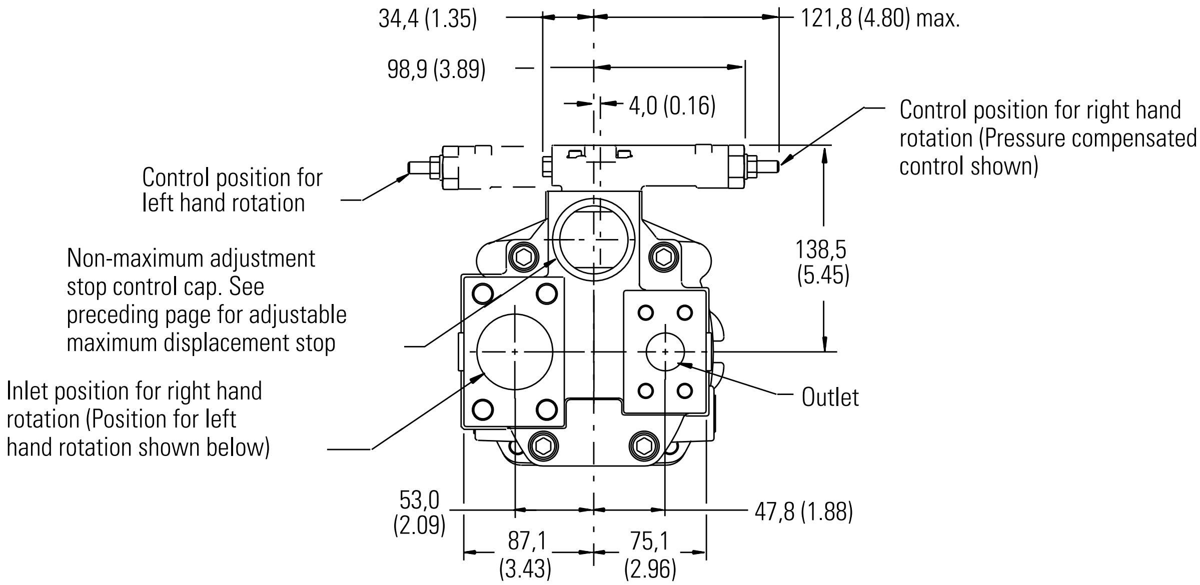
Dimensions in millimeters (inches)



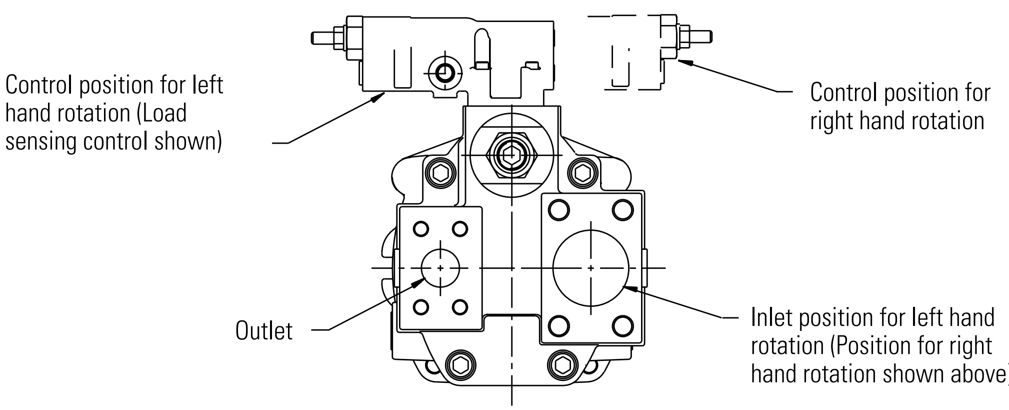
End-ported Models

PVM045/050

Dimensions in millimeters (inches)



Inlet/Outlet Ports and Control Positioned
for Right Hand Rotation

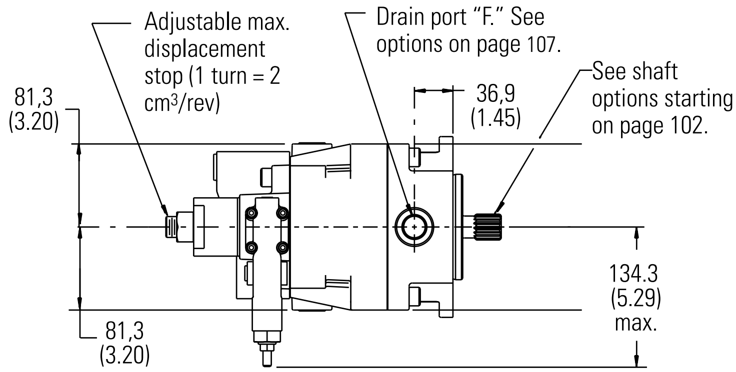


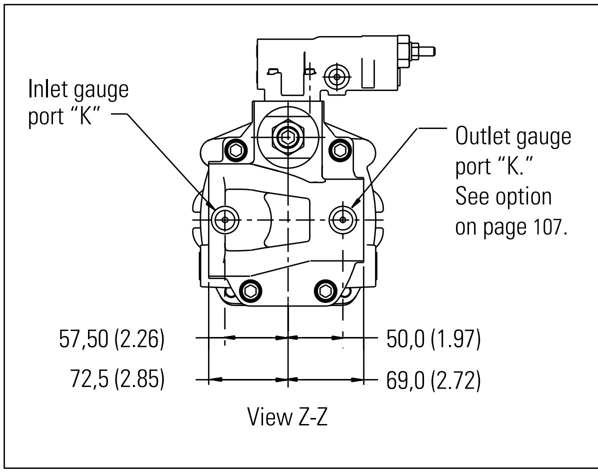
Inlet/Outlet Ports and Control Positioned
for Left Hand Rotation
Dimensions shown on preceding page.

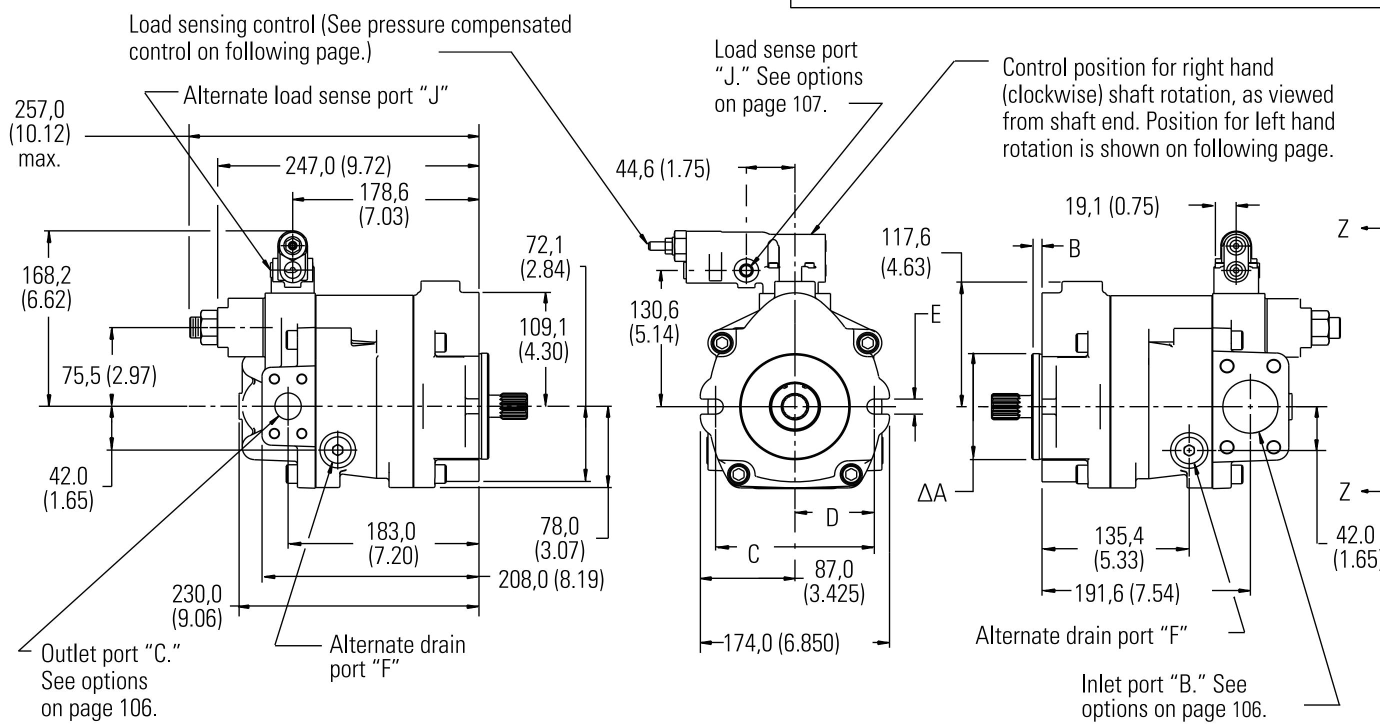
Side-ported Models

PVM045/050

Dimensions in millimeters (inches)



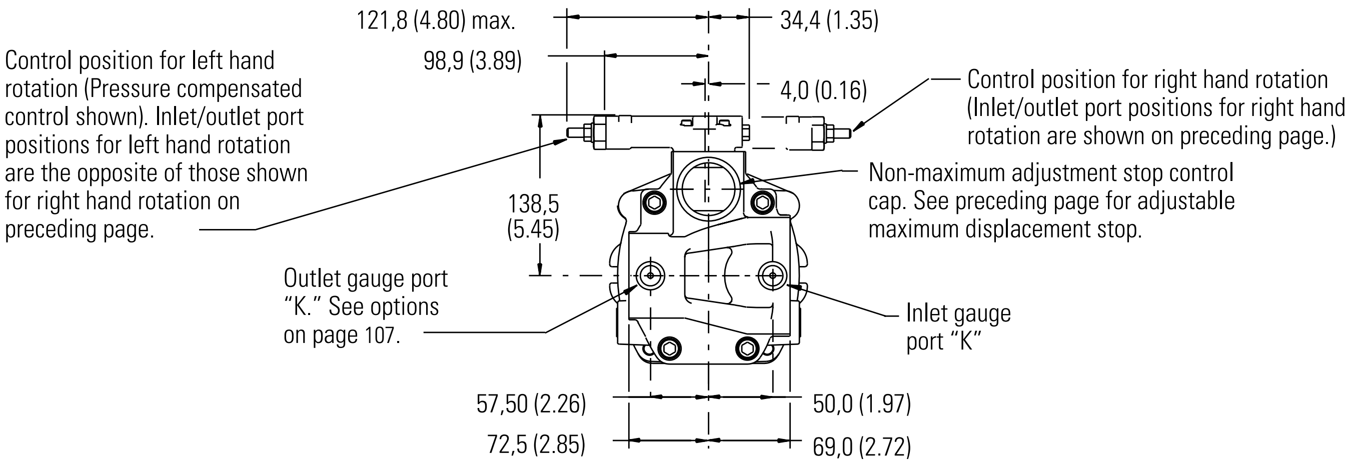




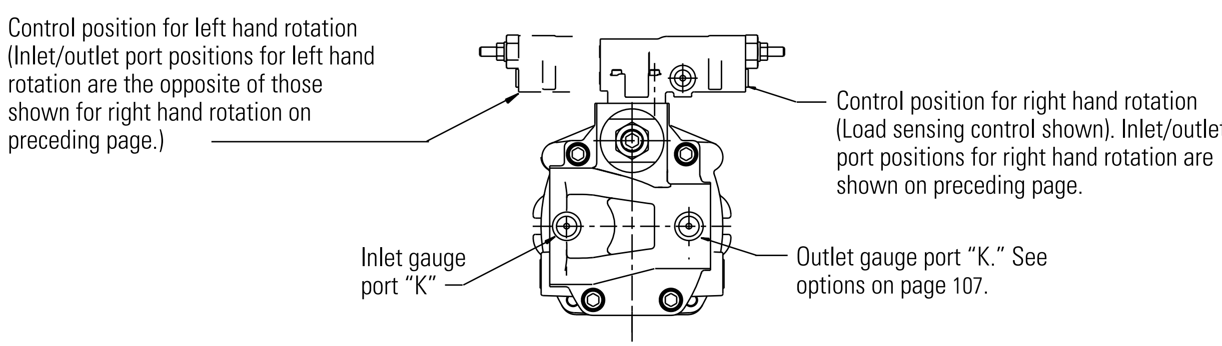
Side-ported Models

PVM045/050

Dimensions in millimeters (inches)

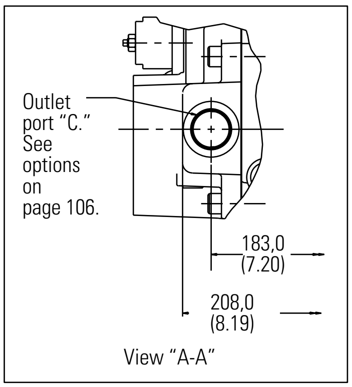


Inlet/Outlet Ports and Control Positioned
for Left Hand Rotation

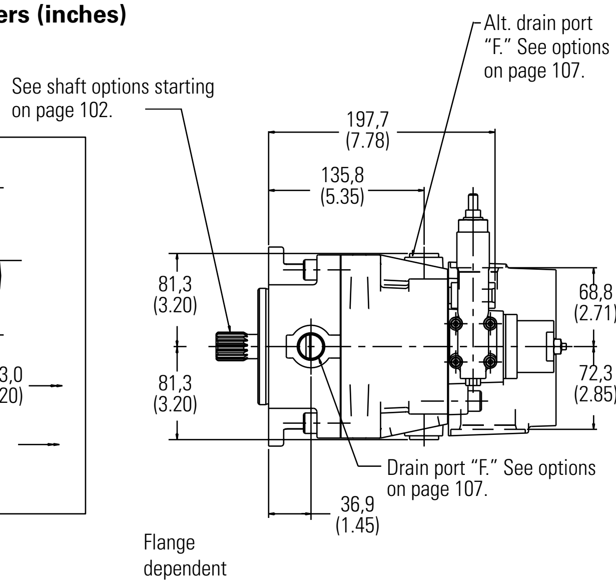


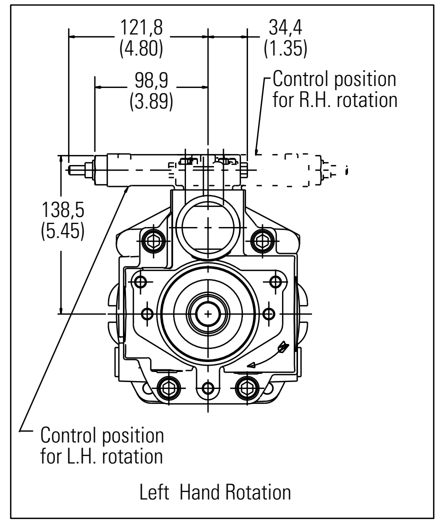
Inlet/Outlet Ports and Control Positioned
for Right Hand Rotation
Dimensions shown on preceding page.

Dimensions in millimeters (inches)

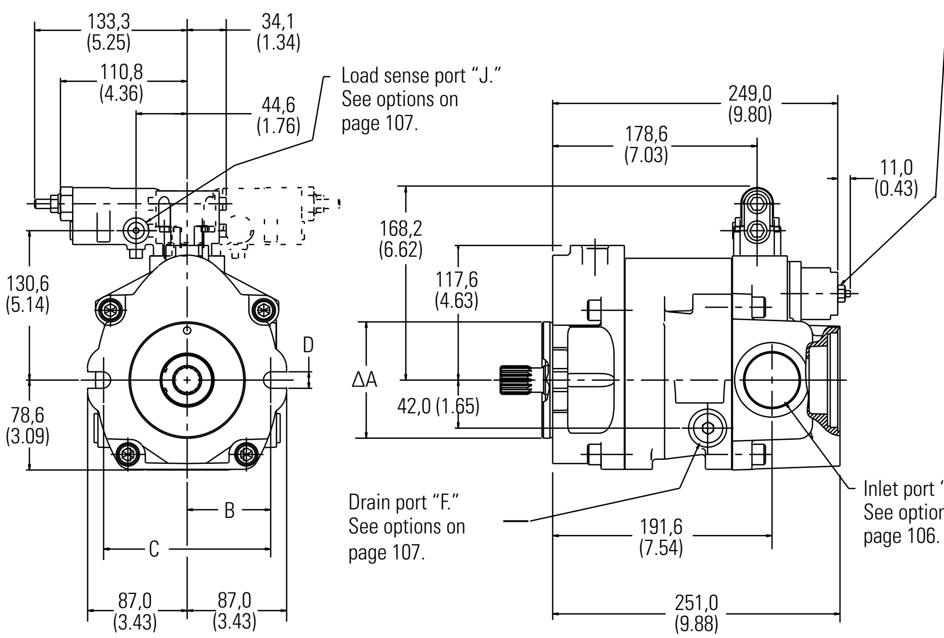


View "A-A"

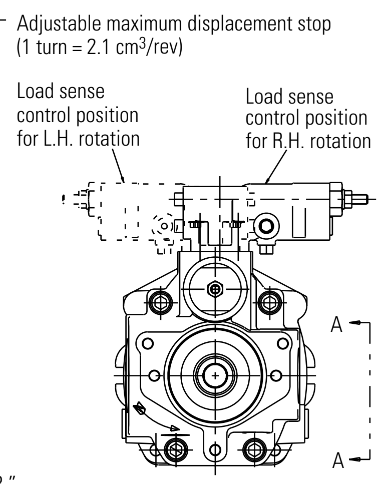




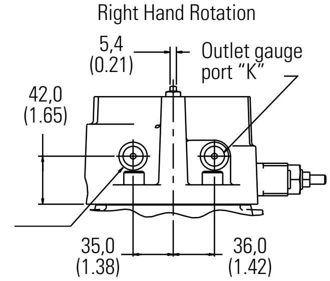
Left Hand Rotation



Right Hand Rotation with Load Sensing Control and Tube Ports

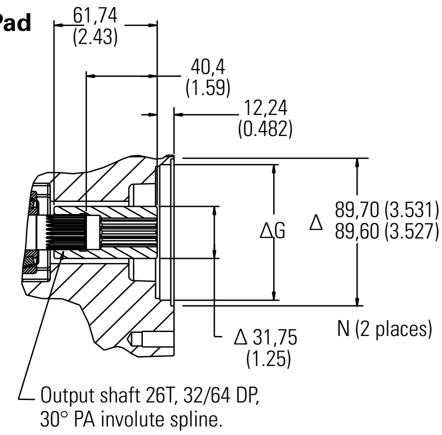


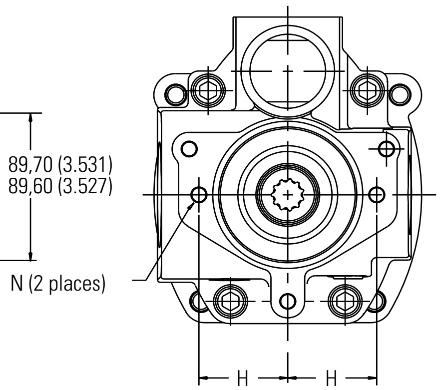
Right Hand Rotation



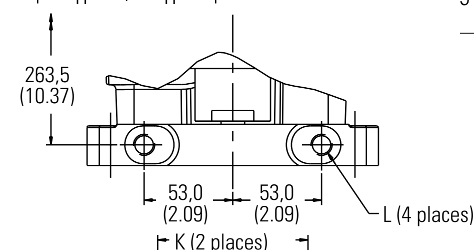
Dimensions in millimeters (inches)

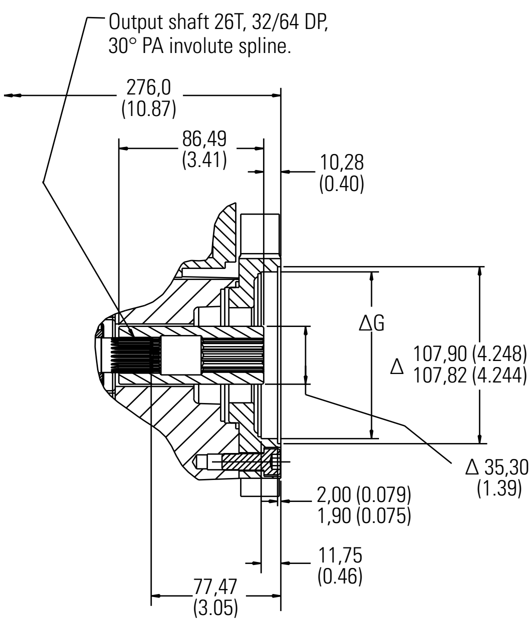
"A" Pad

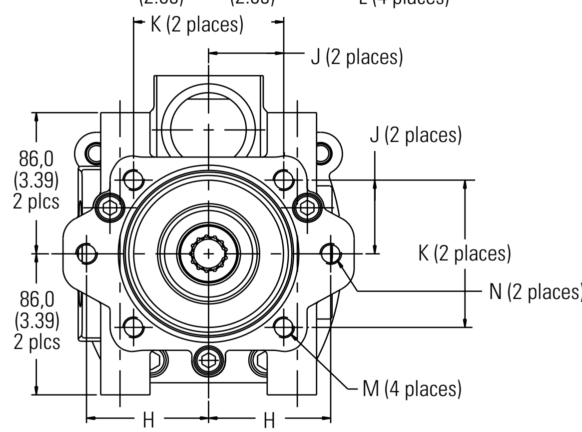




"B" Pad







Model Code Position 25	Description
A	For SAE "A" pad with a 9T, 16/32 DP, 30° pressure angle, involute spline
B	For SAE "A" pad with a 11T, 16/32 DP, 30° pressure angle, involute spline
C	For SAE "B" pad with a 13T, 16/32 DP, 30° pressure angle, involute spline
D	For SAE "B" pad with a 15T, 16/32 DP, 30° pressure angle, involute spline
G	For ISO 80-A2HW pad with a 9T SAE spline
H	For ISO 80-A2HW pad with a 11T SAE spline
J	For ISO 100-A2/B4HW pad with a 13T SAE spline

Model Code Position 25	ØG	H	J	K	L	M	N
A,B	82,58 (3.251) 82,52 (3.249)	53.2 (2.09)	–	–	–	–	.375-16 UNC-2B thd. 0.60 deep min.
G,H	80,046 (3.15) 80,002 (3.149)	54,5 (2.15)	–	–	–	–	M10 thd. x 1,50 15,0 deep min.
C,D	101,65 (4.002) 101,60 (4.00)	73,0 (2.87)	44,9 (1.77)	89,8 (3.54)	.500-13 UNC-2B thd. 24.9 deep min. M12 x 1,50 thd. 24,9 deep min.	.500-13 UNC-2B thd. thru M10 x 1,50 thd. thru	.500-13 UNC-2B thd. thru M12 x 1,50 thd. thru
J,K	100,0 (3.937) 99,946 (3.935)	70,0 (2.76)	44,2 (1.74)	88,38 (3.48)	M12 thd. x 1,50 thd. 24,9 deep min.	M10 x 1,50 thd. thru	M12 x 1,50 thd. thru

Flange Designations

PVM045/050

Pilot Flange Designation	ØA	B	C	D	E
SAE J744-101-2	101,60/101,55 (4.000/3.998)	9,70/9,19 (.382/.362)	146,0 (5.750)	73,0 (2.875)	14,55/14,17 (.572/.557)
ISO 3019/2-100A2HW	100,00/99,95 (3.937/3.935)	9,50/9,00 (.374/.354)	140,0 (5.512)	70,0 (2.756)	14,27/14,00 (.562/.551)

Pilot Flange Designation	ØA	B	C	D
SAE 2-bolt mount	101,60/101,55 (4.000/3.998)	73,0 (2.87)	146,0 (5.750)	14,55/14,17 (.572/.557)
ISO 100 2-bolt mount	100,00/99,95 (3.937/3.935)	70,0 (2.76)	140,0 (5.512)	14,27/14,00 (.562/.551)

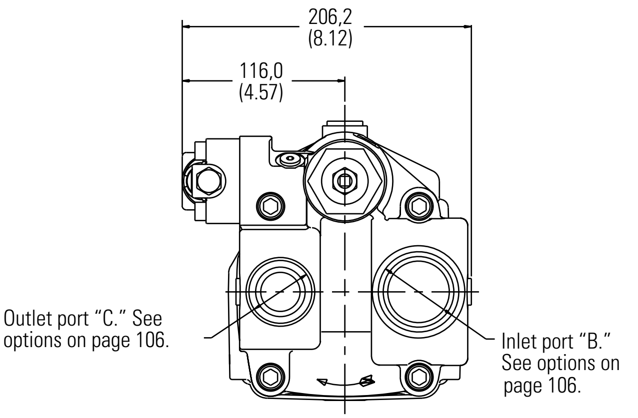
End-ported Models

PVM057/063

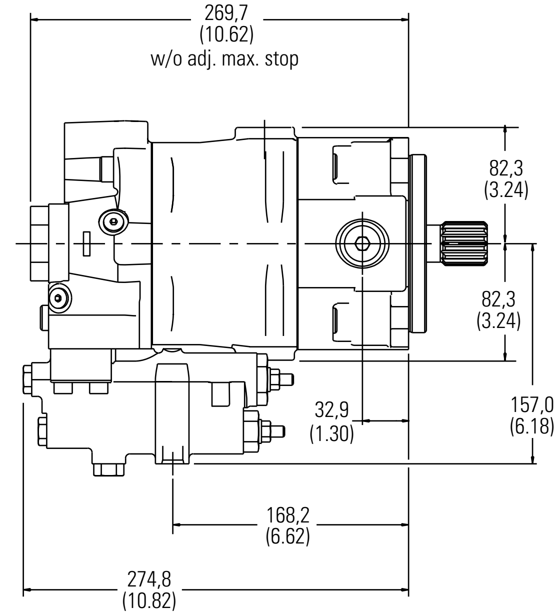
Dimensions in millimeters (inches)

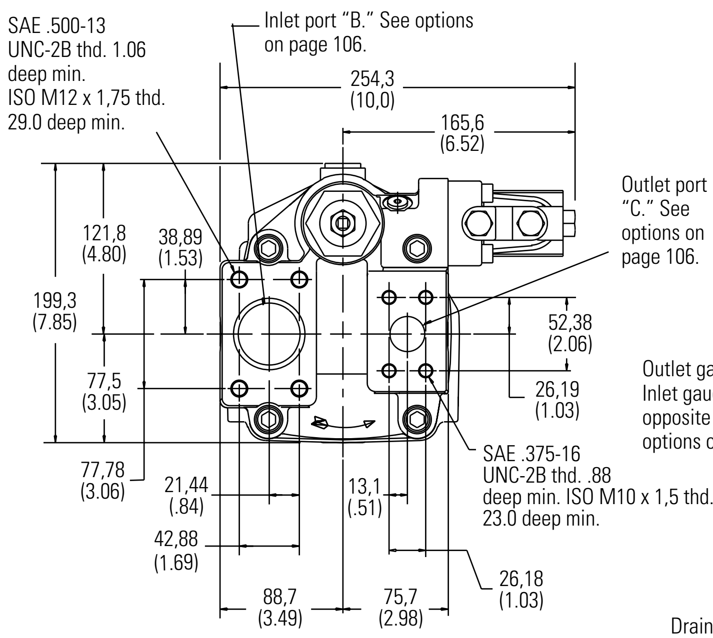
See mounting flange options on page 101.

See shaft options starting on page 102.

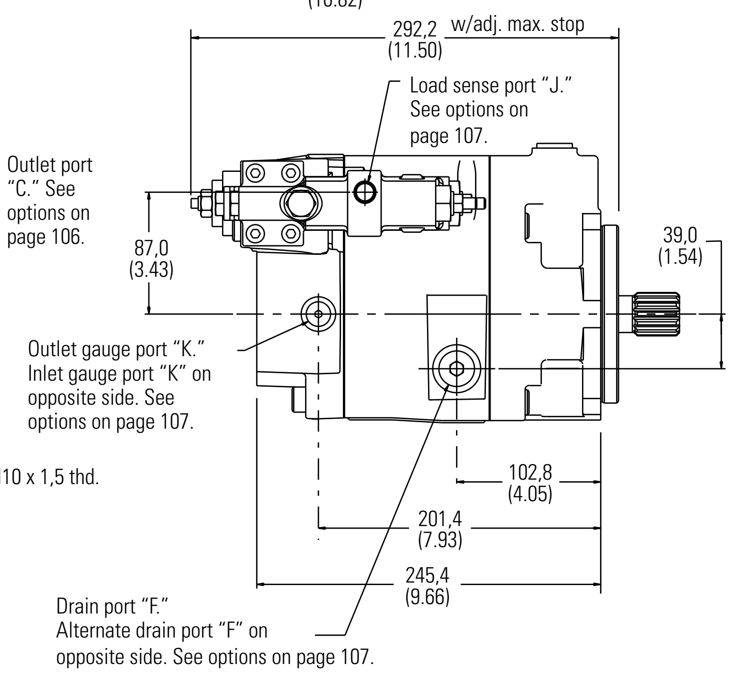


Left Hand Rotation, Tube Port
with Pressure Compensator

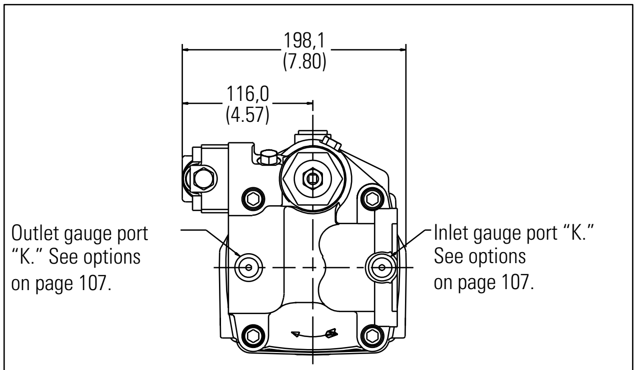




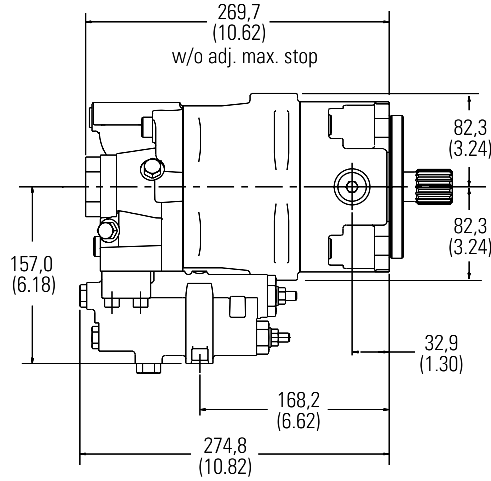
Right Hand Rotation,
Flange Port with Load Sensing Control

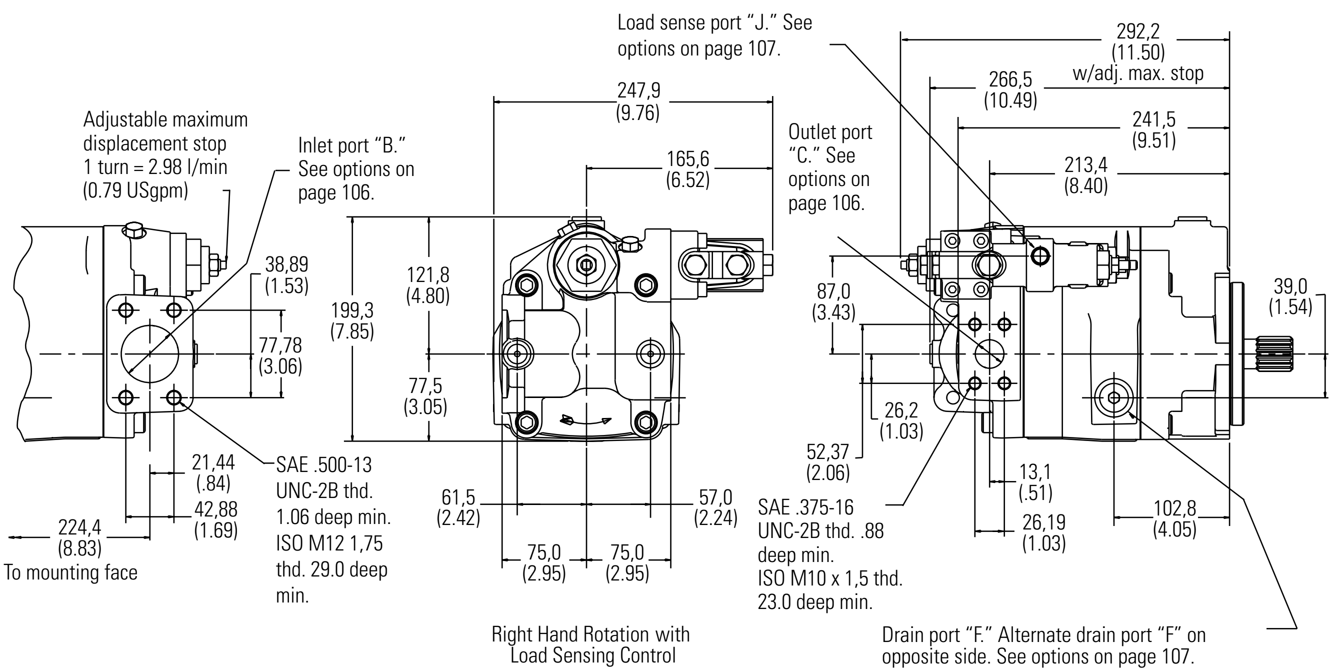


Dimensions in millimeters (inches)
See mounting flange options on page 101.
See shaft options starting on page 102.



Left Hand Rotation with Pressure Compensator





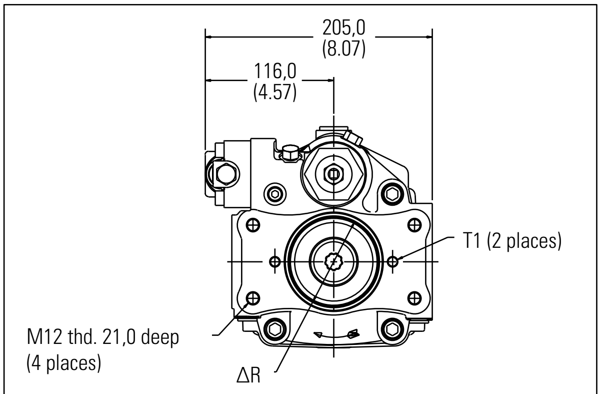
Right Hand Rotation with Load Sensing Control

Drain port "F." Alternate drain port "F" on opposite side. See options on page 107.

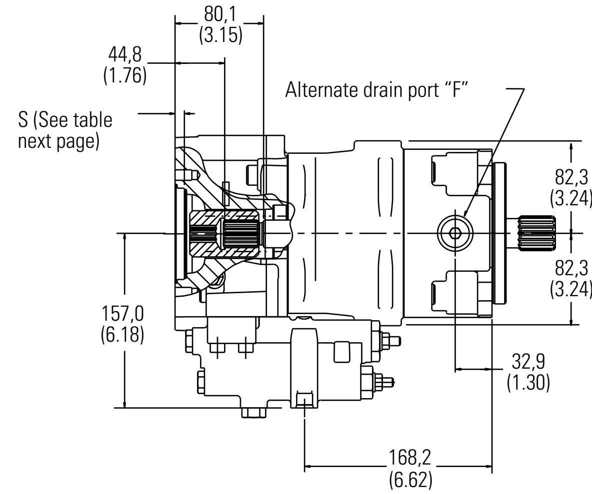
Thru-drive Models

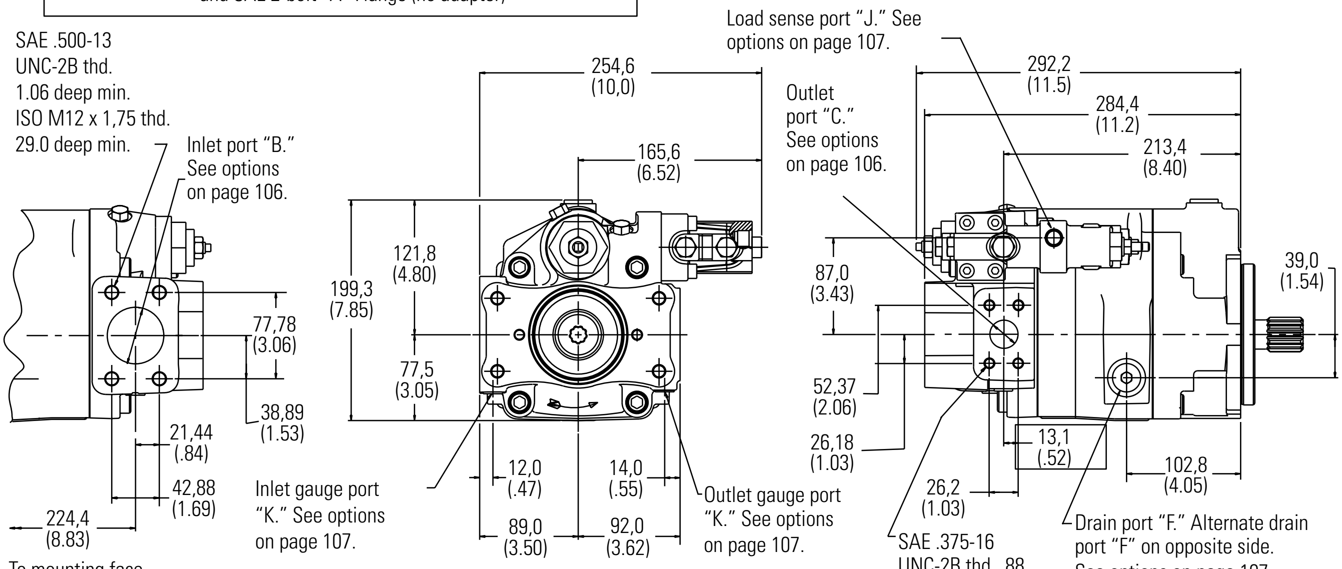
PVM057/063

Dimensions in millimeters (inches)
See pilot flange options on page 101.
See shaft options starting on page 102.



Left Hand Rotation with Pressure Compensator
and SAE 2-bolt “A” Flange (no adapter)



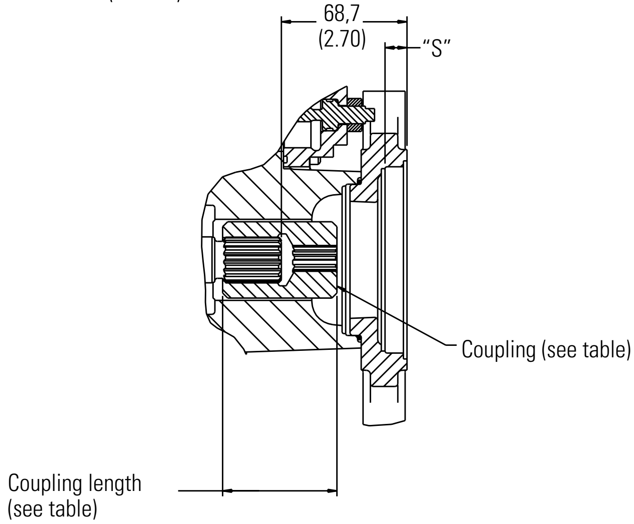


Right Hand Rotation with Load Sensing Control
and SAE 2-bolt “A” Flange (no adapter)

Thru-drive Models

PVM057/063

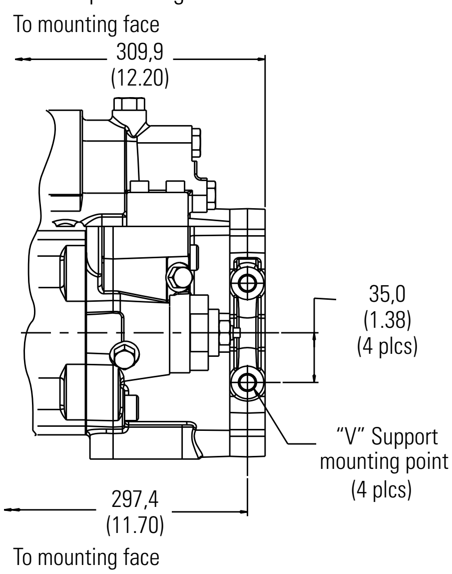
Dimensions in millimeters (inches)

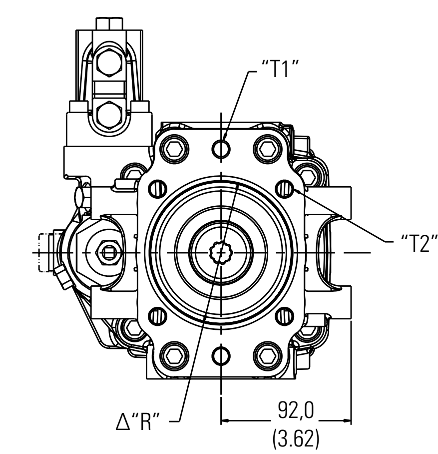


Coupling	Length	Code
SAE “A,” 9T	62,5 (2.46)	A,G
SAE “B,” 13T	93,0 (3.66)	C,J
SAE “B-B,” 15T	93,0 (3.66)	D,K
SAE “C,” 14T	93,0 (3.66)	E,L

Model Code Position 25	Description
A	SAE “A,” 9T, 16/32 DP, 30° pressure angle, involute spline
C	SAE “B,” 13T, 16/32 DP, 30° pressure angle, involute spline
D	SAE “B-B,” 15T, 16/32 DP, 30° pressure angle, involute spline
E	SAE “C,” 14T, 12/24 DP, 30° pressure angle, involute spline
G	For ISO 80-A2HW pad with a 9T SAE spline
J	For ISO 100-A2/B4HW pad with a 13T SAE spline
K	For ISO 100-A2/B4HW pad with a 15T SAE spline
L	For ISO 125-A2/B4HW pad with a 14T SAE spline

“B” Adapter Flange





Right hand rotation with Load Sensing Control and

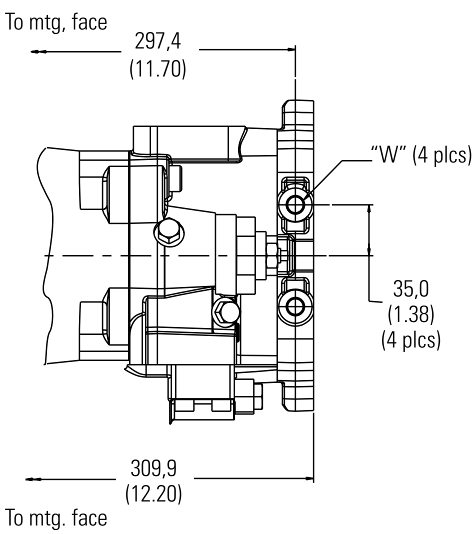
Model Code Position 25			Pilot Dia.	Pilot Depth	2-bolt	4-bolt	Support Mounting Points
	Flange	Bolt	“R”	“S”	“T1”	“T2”	“V”
A,B	SAE “A” 2-bolt	SAE	Ø82,65 (3.25±.001)	8,6/8,1 (.32/.34)	.375-16 UNC-2B thd.	N/A	N/A
G,H	ISO 80	ISO	Ø80,05 (3.15)	9,0/8,0 (.35/.31)	M10 thd.	N/A	N/A
C,D	SAE “B” 2-/4-bolt	SAE	Ø101,65 (4.002±.001)	12,5/11,5 (.49/.45)	.50-13 UNC-2B thd.	.50-13 UNC-2B thd.	.50-13 UNC-2B thd. .98” deep
J,K	ISO 100	ISO	Ø100,05 (3.94)	12,5/11,5 (.49/.45)	M12 thd.	M12 thd.	M12 thd. x 25,0 deep

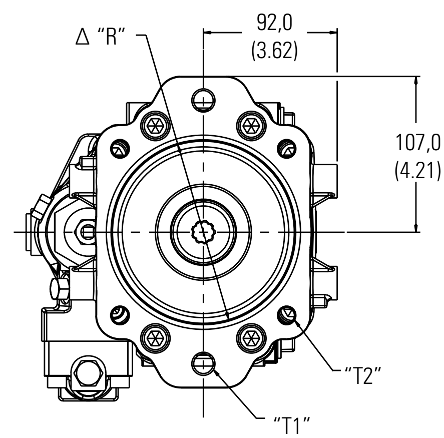
Thru-drive Models

PVM057/063

Dimensions in millimeters (inches)

“C” Adapter Flange





Left hand rotation with Pressure Compensator and
SAE 2-/4-bolt “C” Adapter Flange

Model Code Position 25			Pilot Dia.	Pilot Depth	2-bolt	4-bolt	Support Mounting Points
	Flange	**Bolt**	**“R”**	**“S”**	**“T1”**	**“T2”**	**“V”**
E,F	SAE “C” 2-/4-bolt	SAE	Ø127,05 (5.002±.001)	15,5/14,5 (.61/.57)	.625-11 UNC-2B thd.	.50-13 UNC-2B thd.	.50-13 UNC-2B thd. .98” deep
L,M	ISO 125	ISO	Ø125,05 (4.92)	15,5/14,5 (.61/.57)	M16 thd.	M12 thd.	M12 thd. x 25,0 deep

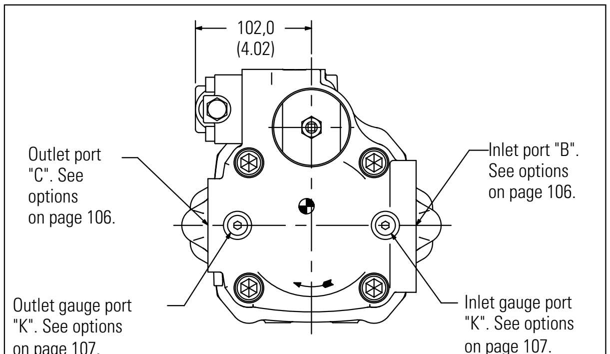
Side-ported Models

PVM074/081

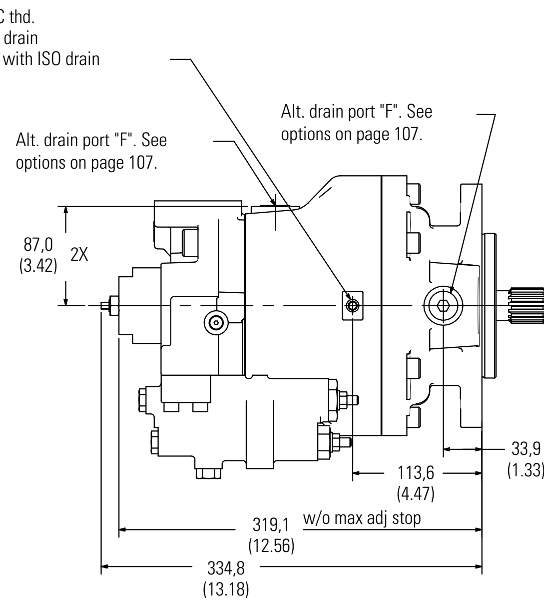
*Right Hand Only

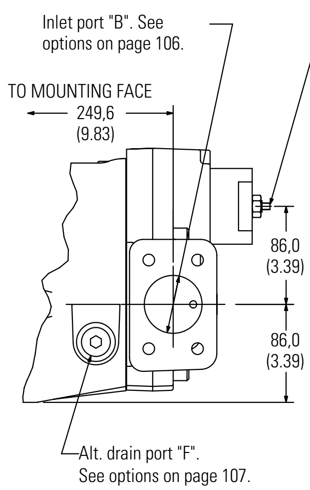
Dimensions in millimeters (inches)

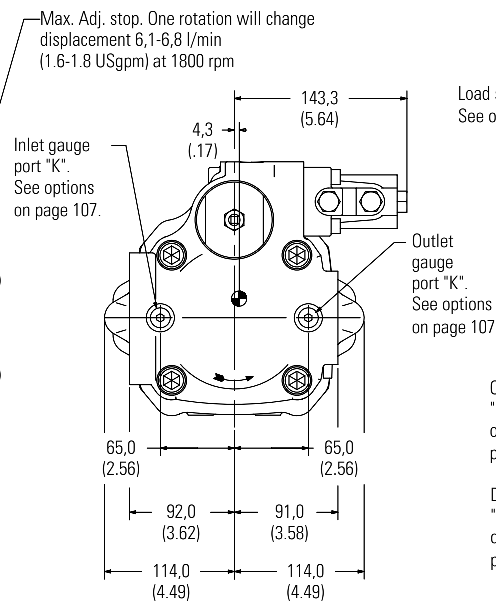
See pilot flange options on page 101.
See shaft options starting on page 102.



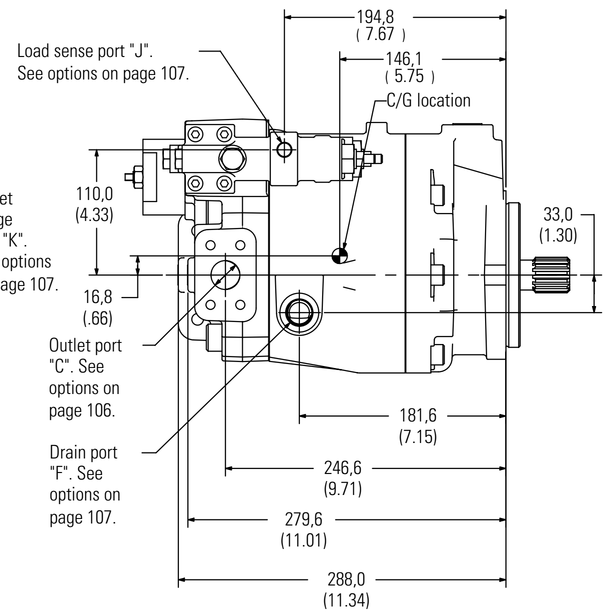
Left hand rotation
with Pressure Compensator

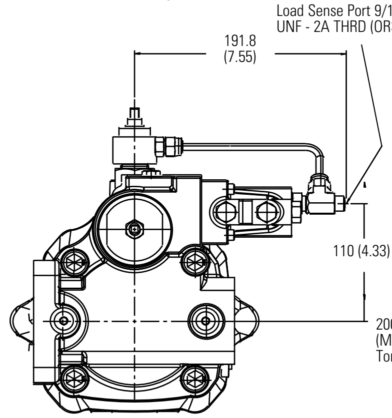




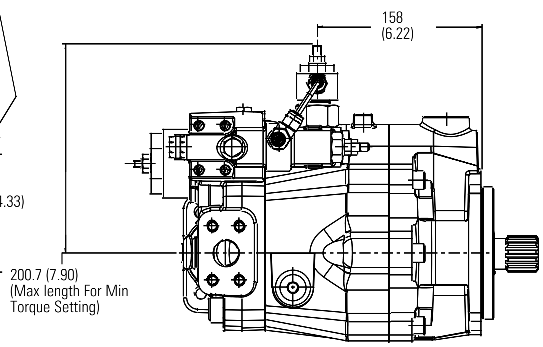


Right hand rotation
with Load Sensing Control





Right hand rotation with
Power/Torque limiter control



PVM074/108 is not available with left hand rotation in any port configuration.

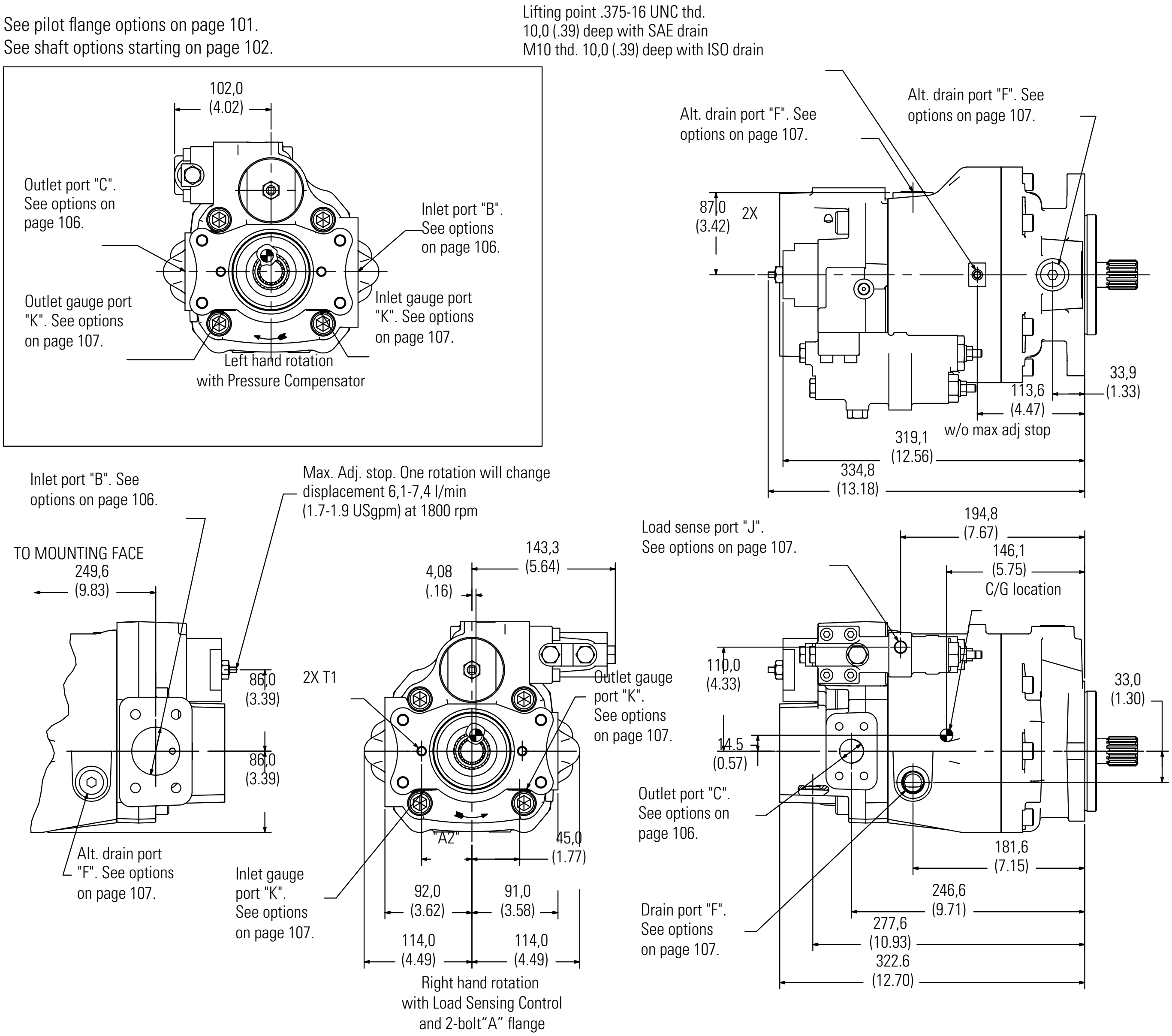
Thru-drive Models

PVM074/081

*Right-hand only

Dimensions in millimeters (inches)

See pilot flange options on page 101.
See shaft options starting on page 102.



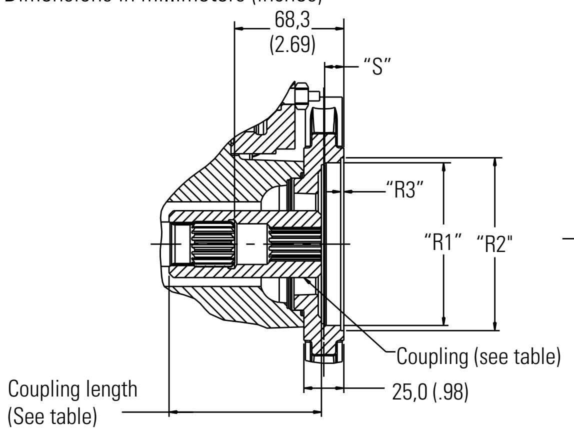
PVM074/108 is not available with left hand rotation in any port configuration.

Thru-drive Models

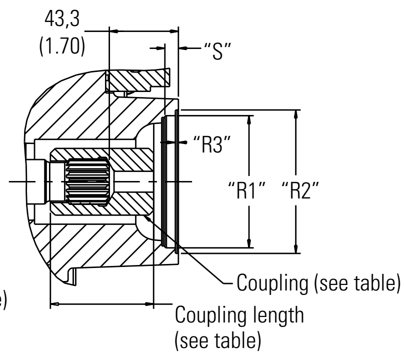
PVM074/081

*Right-hand only

Dimensions in millimeters (inches)



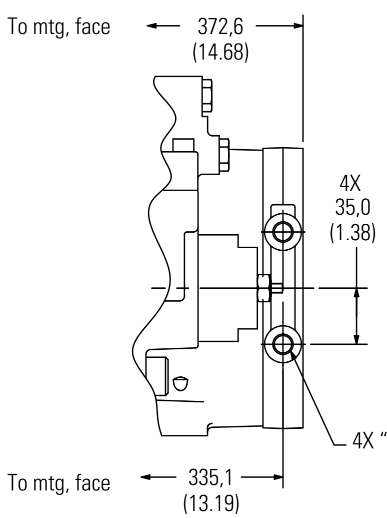
With adapter plate



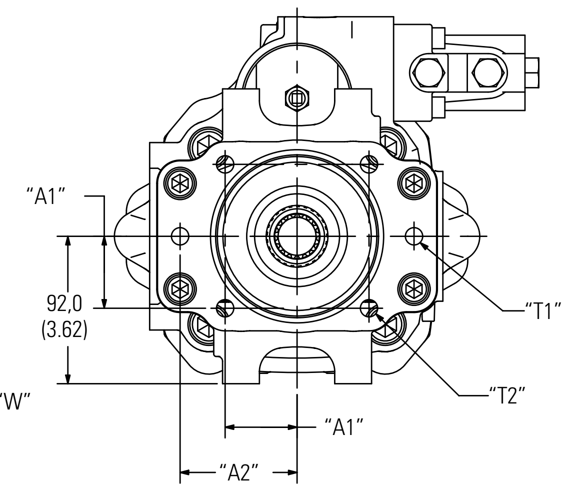
Without adapter plate

Coupling	Length	Code
SAE "A," 9T	64,5 (2.54)	A,G
SAE "A," 11T	65,3 (2.57)	B,H
SAE "B," 13T	95,3 (3.75)	C,J
SAE "B-B," 15T	95,3 (3.75)	D,K
SAE "C," 14T	95,3 (3.75)	E,L
SAE "C-C," 17T	91,8 (3.61)	F,M

"B" Adapter Flange



View rotated 90°



Right hand rotation with Load Sensing Control

Model code Position 25	Description
A	SAE "A," 9T, 16/32 DP, 30° pressure angle, involute spline
B	SAE "A," 11T, 16/32 DP, 30° pressure angle, involute spline
C	SAE "B," 13T, 16/32 DP, 30° pressure angle, involute spline
D	SAE "B-B," 15T, 16/32 DP, 30° pressure angle, involute spline
E	SAE "C," 14T, 12/24 DP, 30° pressure angle, involute spline
F	SAE "C-C," 17T, 12/24 DP, 30° pressure angle, involute spline
G	For ISO 80-A2HW pad with a 9T SAE spline
H	For ISO 80-A2HW pad with a 11 T SAE spline
J	For ISO 100-A2/B4HW pad with a 13T SAE spline
K	For ISO 100-A2/B4HW pad with a 15T SAE spline
L	For ISO 125-A2/B4HW pad with a 14T SAE spline
M	For ISO 125-A2/B4HW pad with a 17T SAE spline

Model Code Position 25	Flange	Bolt	Pilot Dia.	O-ring Dia.	O-ring Depth	Pilot Depth	2-bolt	4-bolt	Support Mounting Points	4-bolt	2-bolt
			"R1"	"R2"	"R3"	"S"	"T1"	"T2"	"W"	"A1"	"A2"
A,B G,H	SAE "A" 2-bolt	SAE	Ø82,6 (3.25)	Ø89,65 (3.53)	2,00 (.08) 1,90 (.07)	9,0/8,0 (.35/.31)	375-16 UNC-2B thd.	N/A	N/A	N/A	53,2
	ISO 80	ISO	Ø80,05 (3.15)	Ø89,75 (3.53)	2,70 (.11) 2,60 (.10)	9,0/8,0 (.35/.31)	M10 thd.	N/A	N/A	N/A	54,5 (2.15)
C,D J,K	SAE "B" 2-/4-bolt	SAE	Ø101,65 (4.00)	Ø108,05 (4.25)	2,00 (.08) 1,90 (.07)	12,5/11,5 (.49/.45)	.50-13 UNC-2B thd.	.50-13 UNC-2B thd.	.50-13 UNC-2B thd. .98"deep(1.77)	44,9 (2.87)	73,0
	ISO 100	ISO	Ø100,05 (3.94)	Ø108,75 (4.28)	2,70 (.11) 2,60 (.10)	12,5/11,5 (.49/.45)	M12 thd.	M10 thd.	M12 thd. 25,0 deep	44,19 (1.74)	70,0 (2.76)

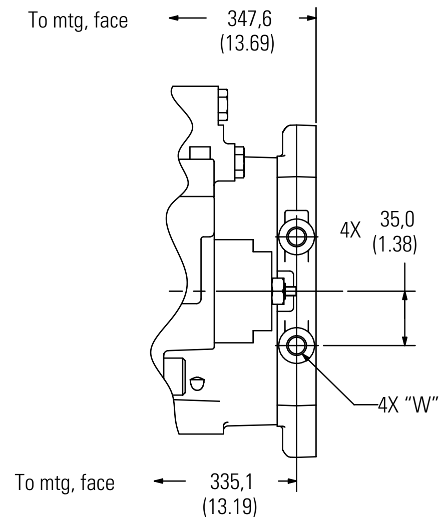
Thru-drive Models

PVM074/081

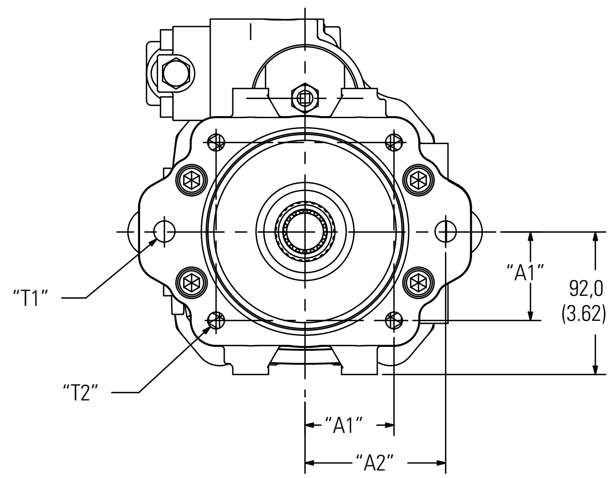
*Right-hand only

Dimensions in millimeters (inches)

"C" Adapter Flange



View rotated 90∞



Left hand rotation with Pressure Compensator and ISO or SAE 2-/4-bolt "C" Adapter Flange

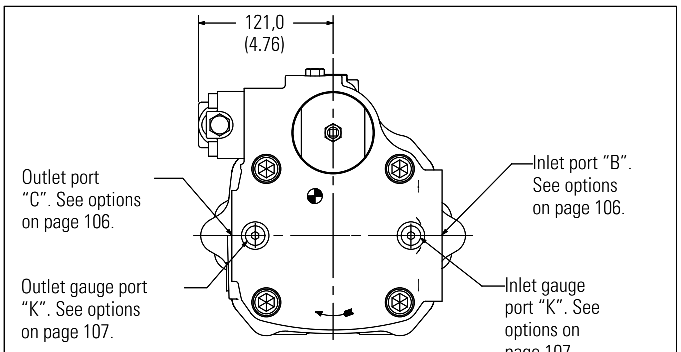
Model	Code Position 25 Flange	Bolt	Pilot Dia.	O-ring Dia.	O-ring Depth	Pilot Depth	2-bolt	4-bolt	Support Mounting Points		
			"R1"	**"R2"**	**"R3"**	**"S"**	**"T1"**	**"T2"**	**"W"**	**"A1"**	**"A2"**
E,F L,M	SAE "C" 2-/4-bolt	SAE	Ø127,05	Ø133,45	2,00 (.08)	15,5/14,5	.625-11 UNC-2B thd.	.50-13 UNC-2B thd.	.50-13 UNC-2B thd. .98" deep	57,25 (2.25)	90,5 (3.56)
	ISO 125	ISO	Ø125,05 (4.92)	Ø133,75 (3.26)	2,70 (.11) 2,60 (.10)	15,5/14,5 (.61/.57)	M16 thd.	M12 thd.	M12 thd. 25,0 deep	56,57 (2.23)	90,0 (3.54)

Side-ported Models

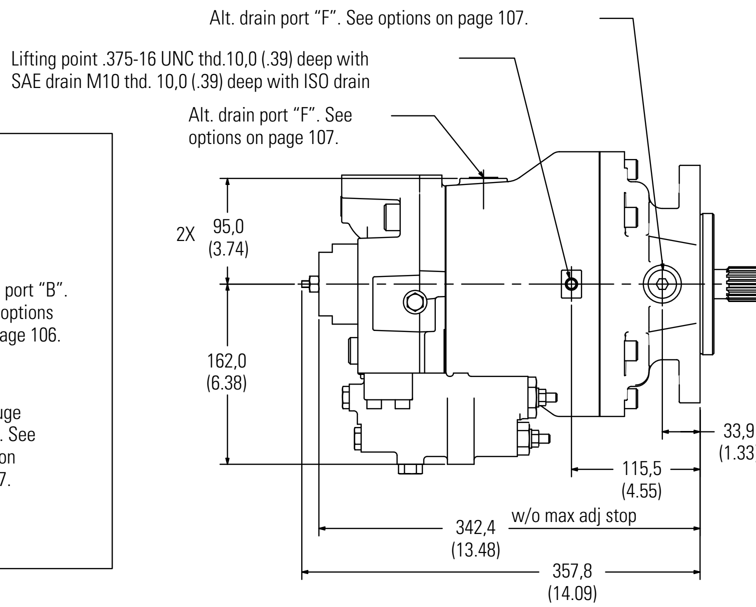
PVM098/106

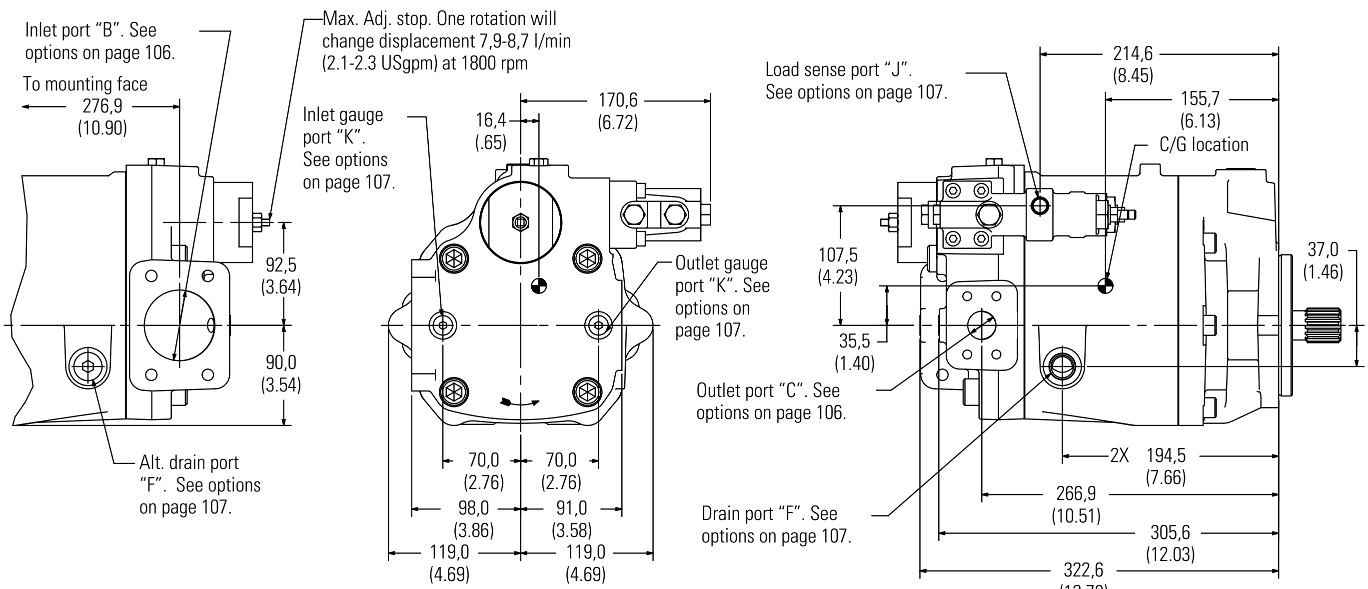
Dimensions in millimeters (inches)

See pilot flange options on page 101.
See shaft options starting on page 102.



Left hand rotation
with Pressure Compensator





Left hand rotation with Load Sensing Control

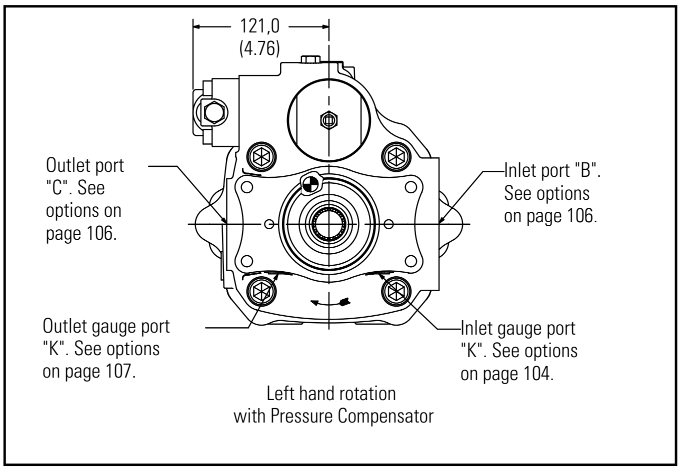
PVM098/106 is not available in left hand rotation with rear ports.

Thru-drive Models

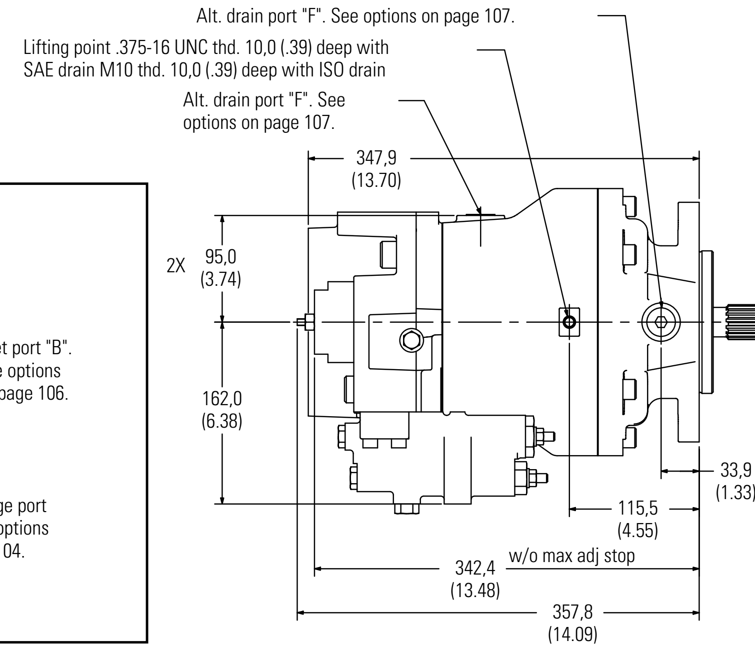
PVM098/106

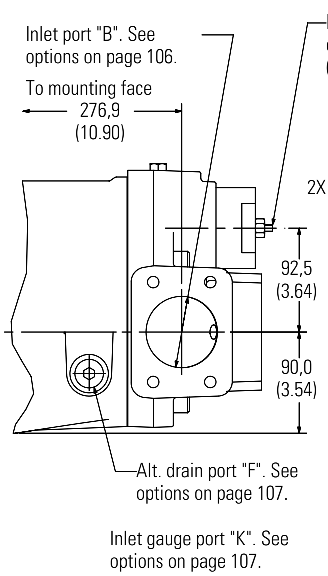
Dimensions in millimeters (inches)

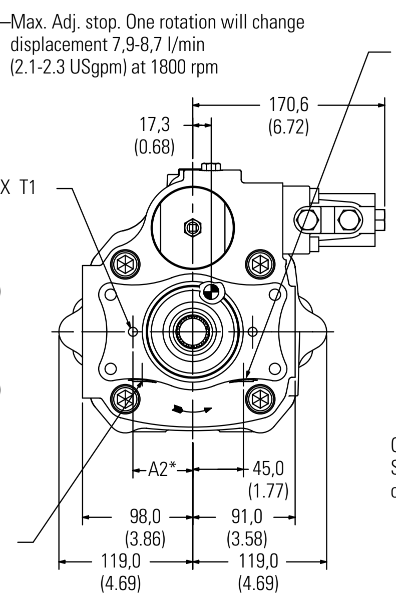
See pilot flange options on page 101.
See shaft options starting on page 102.



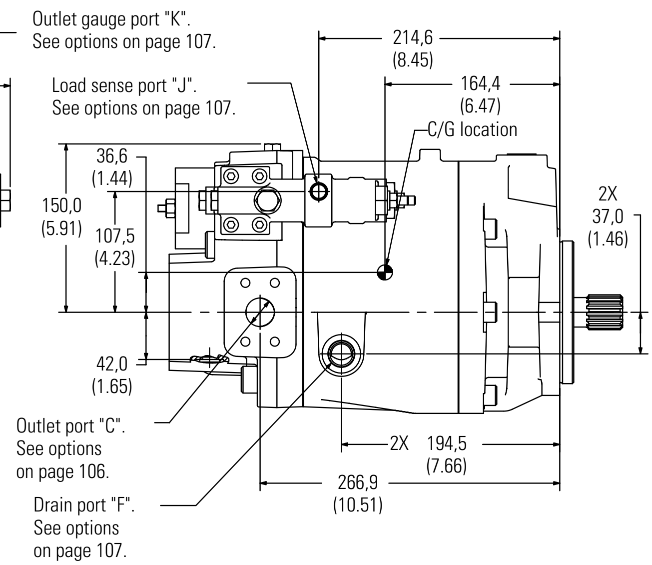
Left hand rotation with Pressure Compensator







Right hand rotation with 2-bolt “A” flange and Load Sensing Control

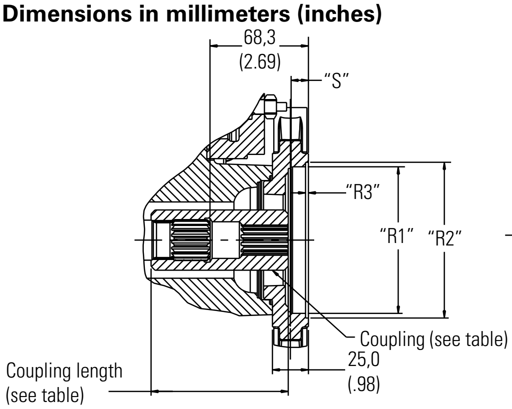


PVM098/106 is not available in left hand rotation with rear ports.

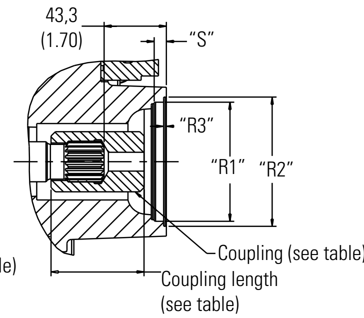
Thru-drive Models

PVM098/106

Dimensions in millimeters (inches)



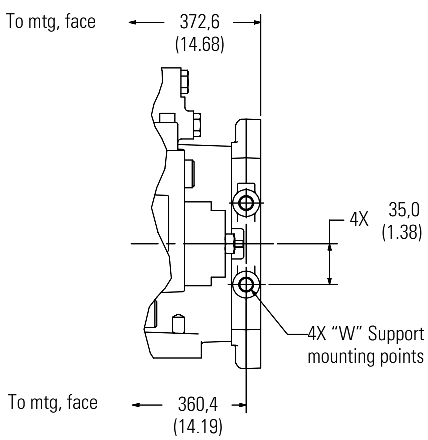
With adapter plate



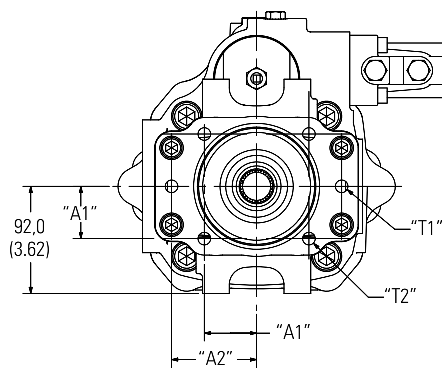
Without adapter plate

Coupling	Length	Code
SAE "A," 9T	64,5 (2.54)	A,G
SAE "A," 11T	65,3 (2.57)	B,H
SAE "B," 13T	95,3 (3.75)	C,J
SAE "B-B," 15T	95,3 (3.75)	D,K
SAE "C," 14T	95,3 (3.75)	E,L
SAE "C-C," 17T	91,8 (3.61)	F,M

"B" Adaptor Flange



View Rotated 90°



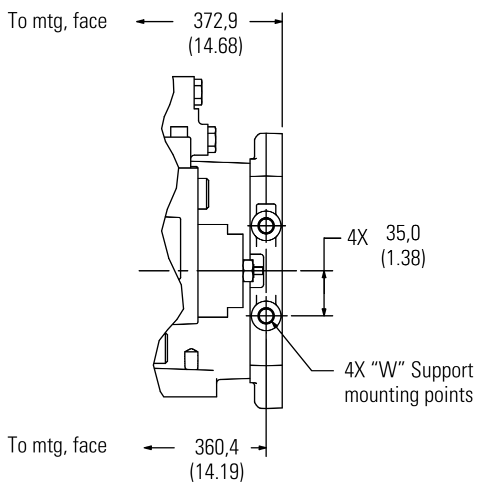
Right hand rotation with Load Sensing Control

Model Code Position 25	Description
A	SAE "A," 9T, 16/32 DP, 30° pressure angle, involute spline
B	SAE "A," 11T, 16/32 DP, 30° pressure angle, involute spline
C	SAE "B," 13T, 16/32 DP, 30° pressure angle, involute spline
D	SAE "B-B," 15T, 16/32 DP, 30° pressure angle, involute spline
E	SAE "C," 14T, 12/24 DP, 30° pressure angle, involute spline
F	SAE "C-C," 17T, 12/24 DP, 30° pressure angle, involute spline
G	For ISO 80-A2HW pad with a 9T SAE spline
H	For ISO 80-A2HW pad with a 11 T SAE spline
J	For ISO 100-A2/B4HW pad with a 13T SAE spline
K	For ISO 100-A2/B4HW pad with a 15T SAE spline
L	For ISO 125-A2/B4HW pad with a 14T SAE spline
M	For ISO 125-A2/B4HW pad with a 17T SAE spline

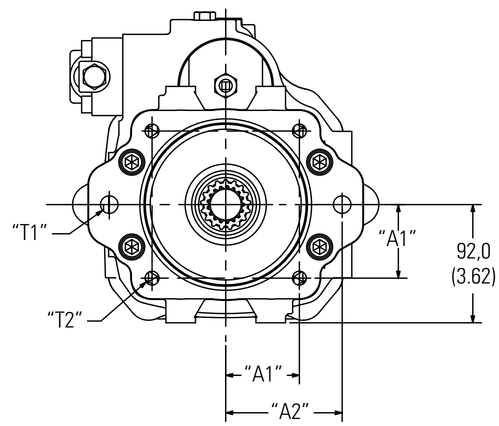
Model Code Position 25	Flange	Bolt	Pilot Dia.	O-ring Dia.	O-ring Depth	Pilot Depth	2-bolt	4-bolt	Support Mounting Points	4-bolt	2-bolt
			"R1"	"R2"	"R3"	"S"	"T1"	"T2"	"W"	"A1"	"A2"
A,B G,H	SAE "A" 2-bolt	SAE	Ø82,6 (3.25)	Ø89,65 (3.53)	2,00 (.08) 1,90 (.07)	9,0/8,0 (.35/.31)	375-16 UNC-2B thd. 0.59 deep	N/A	N/A	N/A	53,2
	ISO 80	ISO	Ø80,05 (3.15)	Ø89,75 (3.53)	2,70 (.11) 2,60 (.10)	9,0/8,0 (.35/.31)	M10 thd. x 18,0 deep	N/A	N/A	N/A	54,5 (2.15)
C,D J,K	SAE "B" 2-/4-bolt	SAE	Ø101,65 (4.00)	Ø108,05 (4.25)	2,00 (.08) 1,90 (.07)	12,5/11,5 (.49/.45)	.50-13 UNC-2B thd.	.50-13 UNC-2B thd.	.50-13 UNC-2B thd. .98" deep	44,9 (1.77)	73,0 (2.87)
	ISO 100	ISO	Ø100,05 (3.94)	Ø108,75 (4.28)	2,70 (.11) 2,60 (.10)	12,5/11,5 (.49/.45)	M12 thd.	M10 thd.	M12 thd. 25,0 deep	44,19 (1.74)	70,0 (2.76)

Dimensions in millimeters (inches)

“C” Adapter Flange



View Rotated 90°



Left hand rotation **with Pressure Compensator and ISO or SAE 2-/4-bolt “C” adapter flange**

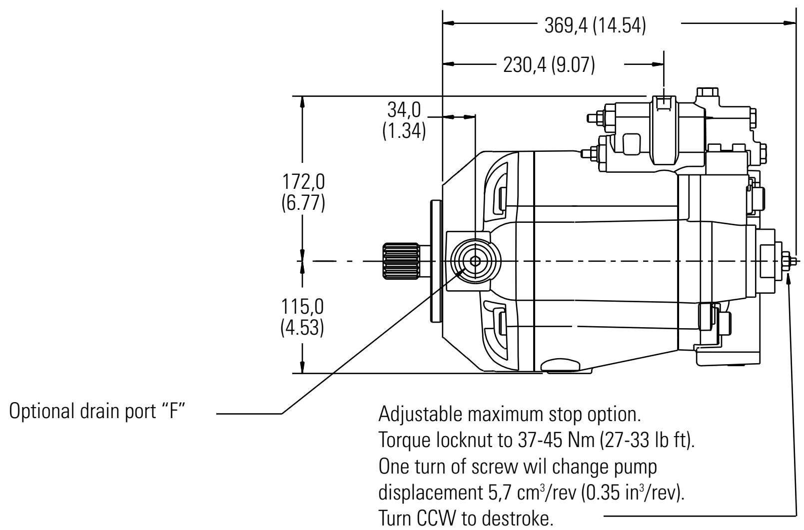
Model Code Position 25	Flange	Bolt	Pilot Dia.	O-ring Dia.	O-ring Depth	Pilot Depth	2-bolt	4-bolt	Support Mounting Points		
			“R1”	**“R2”**	**“R3”**	**“S”**	**“T1”**	**“T2”**	**“W”**	**“A1”**	**“A2”**
E,F L,M	SAE “C” 2-/4-bolt	SAE	Ø127,05	Ø133,45	2,00 (.08)	15,5/14,5	.625-11 UNC-2B thd.	.50-13 UNC-2B thd.	.50-13 UNC-2B thd. .98” deep	57,25 (2.25)	90,5 (3.56)
	ISO 125	ISO	Ø125,05 (4.92)	Ø133,75 (3.26)	2,70 (.11) 2,60 (.10)	15,5/14,5 (.61/.57)	M16 thd.	M12 thd.	M12 thd. 25,0 deep	56,57 (2.23)	90,0 (3.54)

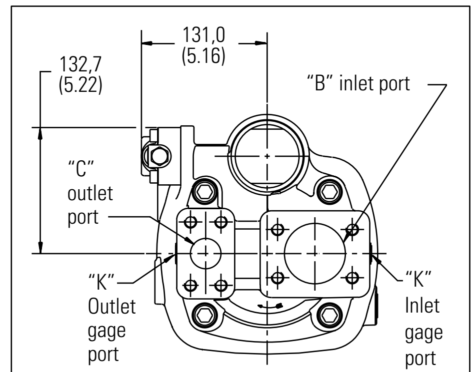
End-ported Models

PVM131/141

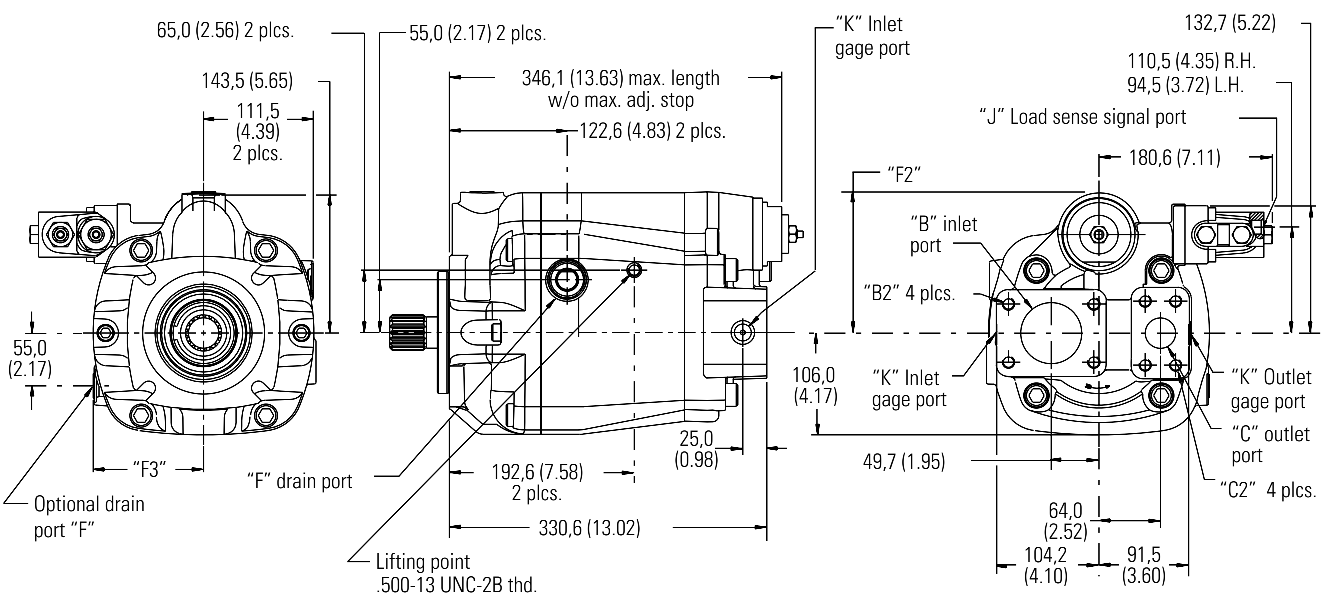
Dimensions in millimeters (inches)

See pilot flange options on page 101.
See shaft options starting on page 102.





Left hand rotation
with Pressure Compensator



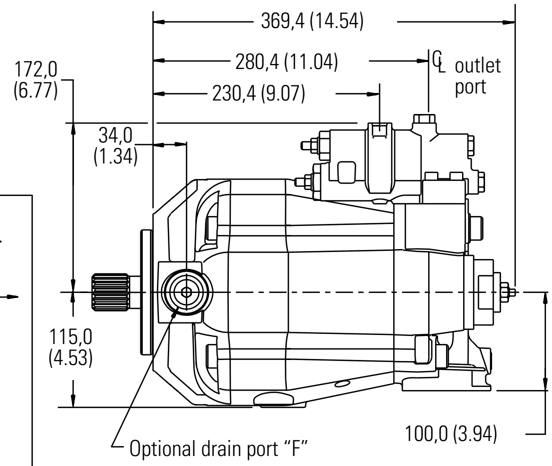
Right hand rotation **with**
Load Sensing Control

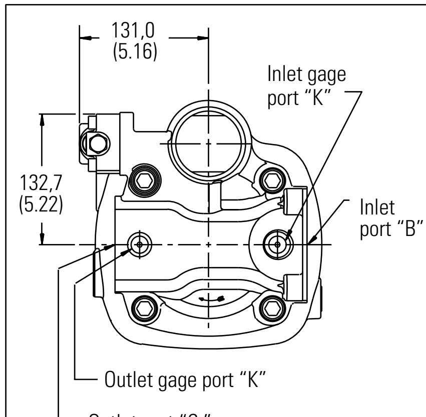
Side-ported Models

PVM131/141

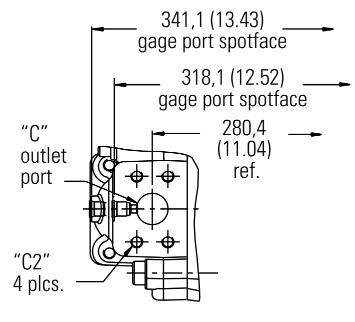
Dimensions in millimeters (inches)

See pilot flange options on page 101.
See shaft options starting on page 102.

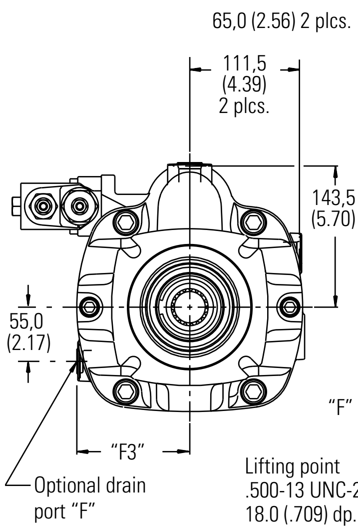


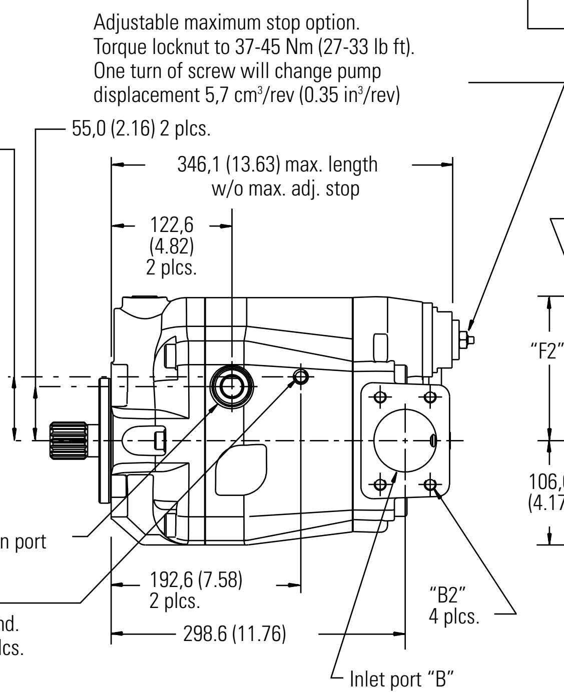


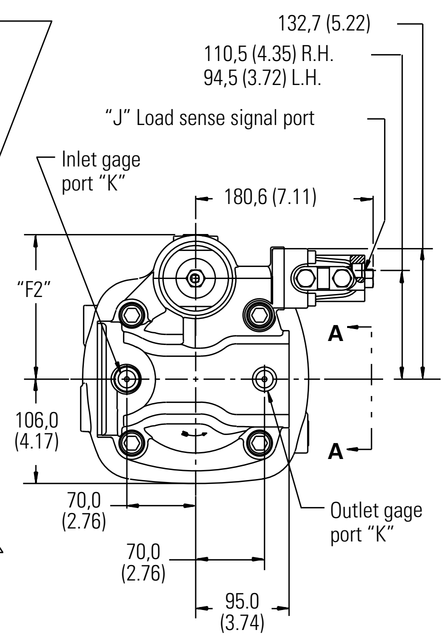
Left hand rotation with Pressure Compensator



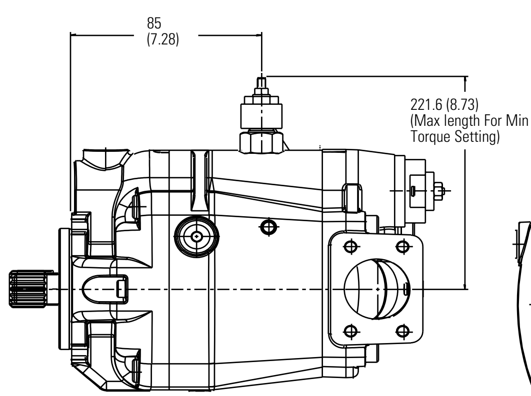
View A - A Outlet port

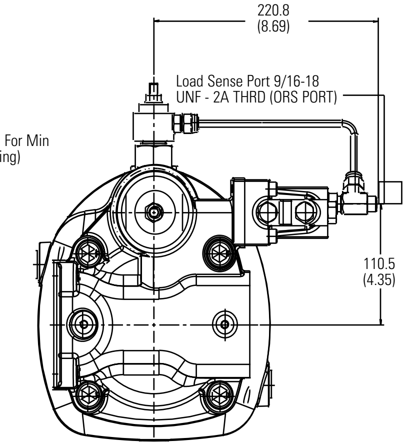






Right hand rotation with Load Sensing Control





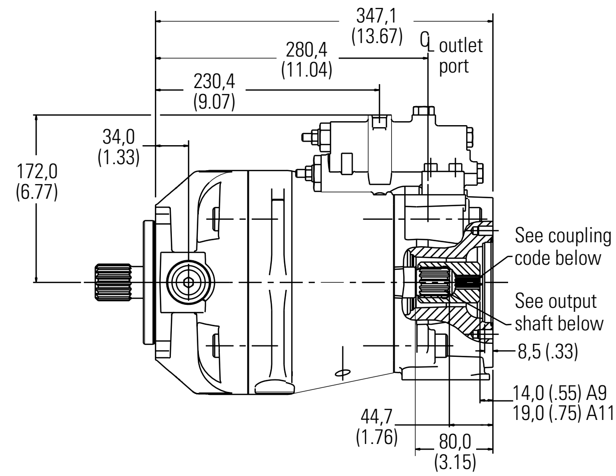
Right hand rotation with Power/Torque limiter control

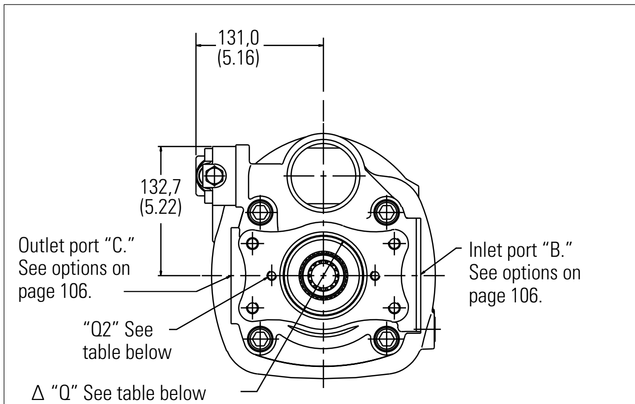
Thru-drive Models

PVM131/141

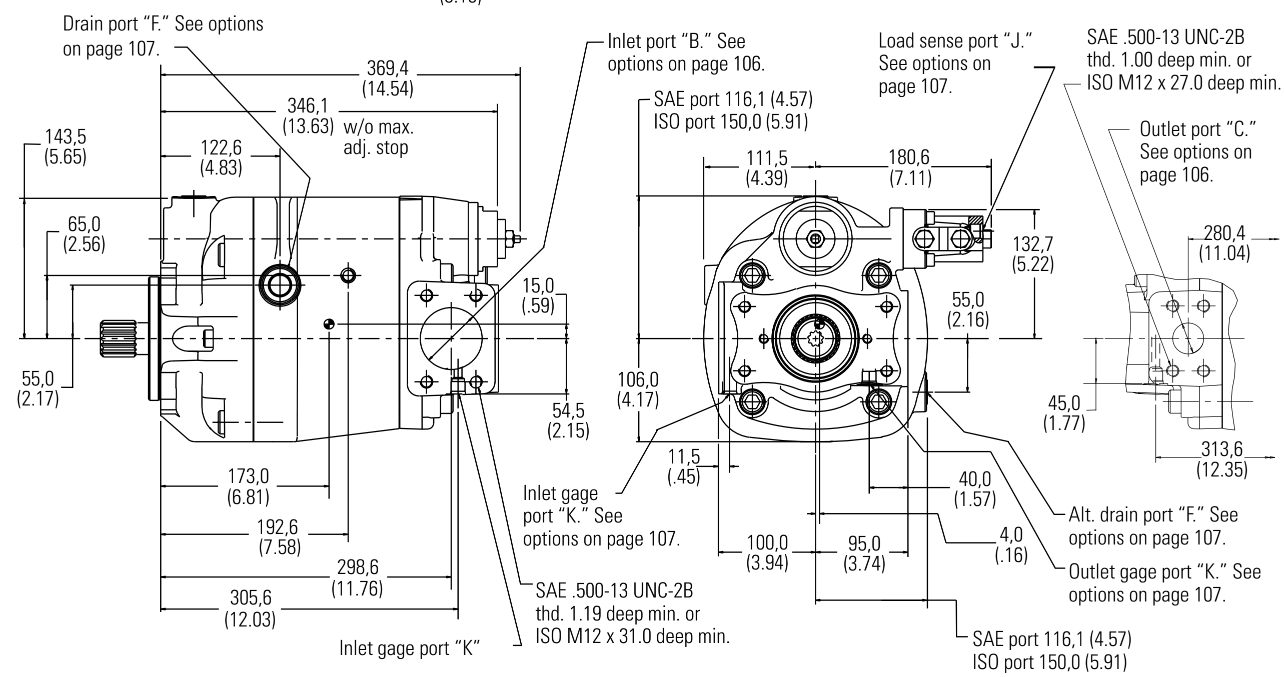
Dimensions in millimeters (inches)

See pilot flange options on page 101.
See shaft options starting on page 102.





Left Hand Rotation **with Pressure Compensator and SAE 2-bolt "A" Flange (no adapter)**



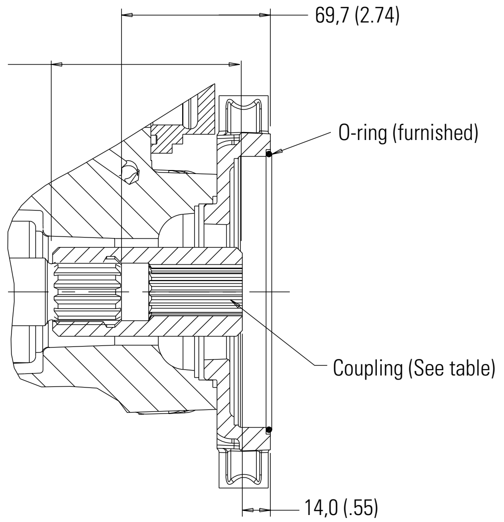
Right Hand Rotation **with Load Sensing Control and SAE 2-bolt "A" Flange (no adapter)**

Model Code Position 25	"Q1" Thru-drive Flange	"Q2" 2-bolt Thread
A,B	SAE J744-82-2 Ø82.625/82.575 bore	.375-16 UNC-2B thd. 0.80 deep
G,H	ISO 3019/2-80A2 Ø80.075/80.25 bore	M10 thd. x 18,0 deep

Thru-drive Models

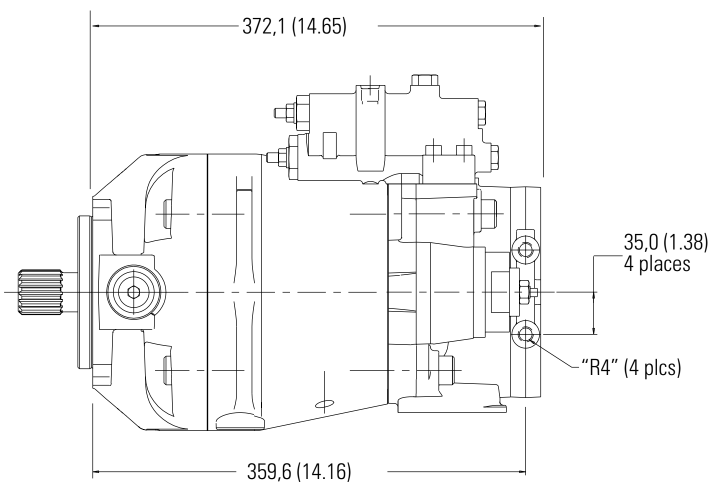
PVM131/141

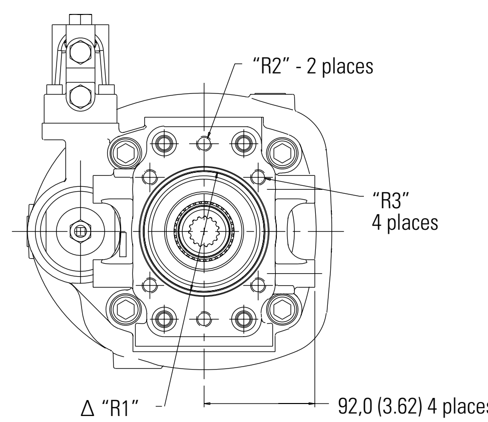
Dimensions in millimeters (inches)



Model Code Position 25	Description
A	For SAE "A" pad with a 9T, 16/32 DP, 30° pressure angle, involute spline
B	For SAE "A" pad with a 11T, 16/32 DP, 30° pressure angle, involute spline
Output shaft	14T 12/24 DP external involute spline
C	SAE "B," 13T, 16/32 DP, 30° pressure angle, involute spline
D	SAE "B-B," 15T, 16/32 DP, 30° pressure angle, involute spline
E	SAE "C," 14T, 12/24 DP, 30° pressure angle, involute spline
F	SAE "C-C," 17T, 12/24 DP, 30° pressure angle, involute spline
G	For ISO 80-A2HW pad with a 9T SAE spline
H	For ISO 80-A2HW pad with a 11T SAE spline
J	For ISO 100-A2/B4HW pad with a 13T SAE spline
K	For ISO 100-A2/B4HW pad with a 15T SAE spline
L	For ISO 125-A2/B4HW pad with a 14T SAE spline
M	For ISO 125-A2/B4HW pad with a 17T SAE spline

"B" Adapter Flange





Right Hand Rotation with SAE 2-/4-Bolt "B" Flange and ISO 100 Adapter Flange

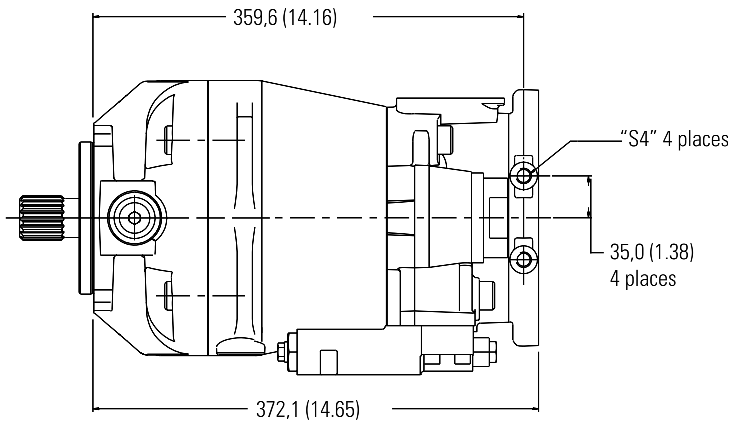
Model Code Position 25	"R1" Thru-drive Flange	"R2" 2-bolt Thread	"R3" 4-bolt Thread	"R4" Support Mounting Points
C,D	SAE J744-101-2 & -4 Ø101,675/101.625 bore 12,50/11,50 deep	.500-13 UNC-2B 0.98 deep	.500-13 UNC-2B 0.98 deep	.500-13 UNC-2B 0.98 deep
J,K	ISO 3019/2-100A2 & B2 Ø100,075/100.025 bore 12,50/11,50 deep	M12 25,0 deep	M12 25,0 deep	M12 25,0 deep

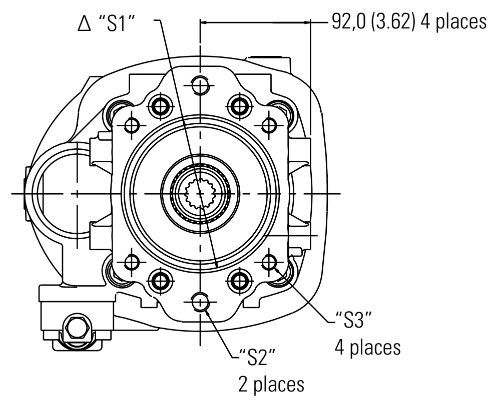
Thru-drive Models

PVM131/141

Dimensions in millimeters (inches)

"C" Adapter Flange





Left Hand Rotation **with SAE 2-/4-bolt "C" and ISO 125 Adapter Flange**

Model Code Position 25	"S1" Thru-drive Flange	"S2" 2-bolt Thread	"S3" 4-bolt Thread	"R4" Support Mounting Points
E,F	SAE J744-127-2 & -4 Ø127,075/127.025 bore 15,50/14,50 deep	.625-11 UNC-2B 0.98 deep	.500-13 UNC-2B 0.98 deep	.500-13 UNC-2B 0.98 deep
L,M	ISO 3019/2-125A2 & B4 Ø125,075/125.025 bore 15,50/14,50 deep	M16 25,0 deep	M12 25,0 deep	M12 25,0 deep

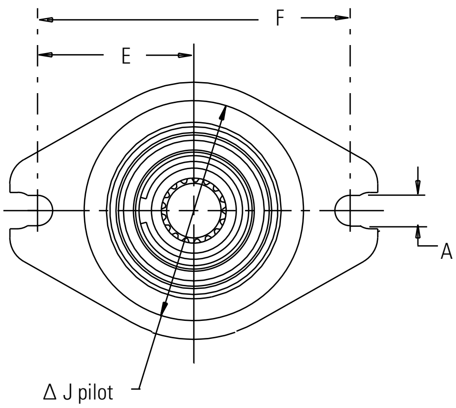
Port	"B"*	"B2"	"C"*	"C2"	"F2"	"F3"
SAE	2.50 inch dia. SAE J518 Code 61, low pressure	.500-13 UNC-2B thd. 1.19 deep minimum	1.25 inch dia. SAE J518 Code 62, high pressure	.500-13 UNC-2B thd. 1.00 deep minimum	146,8 (5.78)	114,9 (4.52)
ISO	64mm diameter. ISO 6162 Type II, 315 bar	M12 thread 31,0 deep minimum	32mm diameter. ISO 6162, 400 bar	M12 thread 27,0 deep minimum	148,5 (5.85)	116,6 (4.59)

*4-bolt flange port. See page 101 for load sensing, drain, and gage port threads.

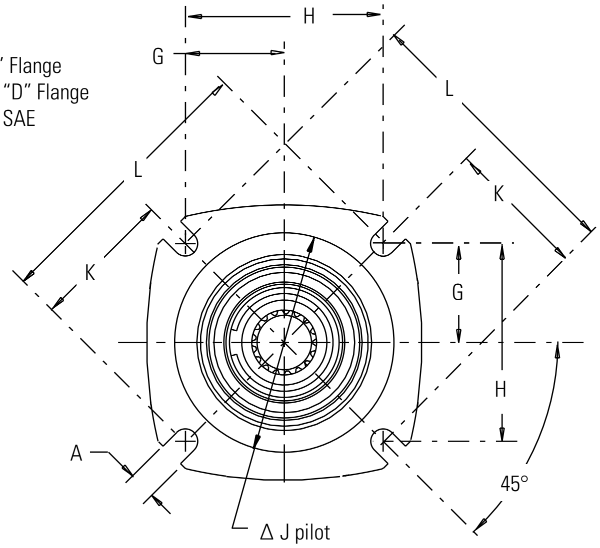
Mounting Flange Options

Dimensions in millimeters (inches)

2-bolt "A, B & C" Flange
ISO & SAE



2-bolt "B" Flange
4-bolt "C" or "D" Flange
ISO & SAE



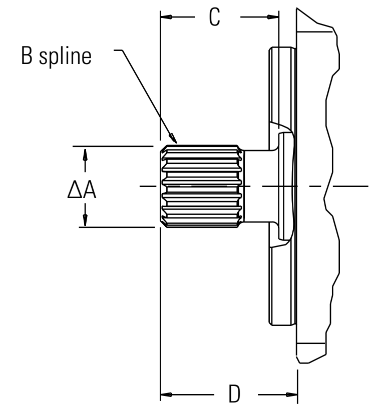
Series	2-bolt or 4-bolt Flange	Code	Flange Description	A	E	F	G	H	J	K	L
PVM018 PVM020	2-bolt "A"	A	SAE J744-82-2	Ø11,14 (4.38)	53,2 (2.09)	106,4 (4.19)	– –	– –	Ø82,53 +.02 -.03 (Ø3.249) +.000 -.001	–	–
PVM018 PVM020	2-bolt "A"	B	ISO 3019/2-80A2HW	Ø11,14 (4.38)	54,5 (2.15)	109,0 (4.29)	– –	– –	Ø79,98 +.02 -.03 (Ø3.15) +.000 -.001	–	–
PVM018 PVM020 PVM045 PVM050 PVM057 PVM063	2-bolt "B"	C	SAE J744-101-2	14,36 (.565)	73,0 (2.87)	146,0 (5.75)	– –	– –	Ø101,58+.02 -.03 (Ø3.999) ±.001	–	–
PVM018 PVM020 PVM045 PVM050 PVM057 PVM063	2-bolt "B" (special)	D	ISO 3019/2-100A2HW	14,14 (.557)	70,0 (2.76)	140,0 (5.51)	–	–	Ø100,00/99,95 (Ø3.937/3.935)	–	–
PVM057 PVM063 PVM074 PVM081 PVM098 PVM106 PVM131 PVM141	2-bolt "C"	E	SAE J744-127-2 ("C")	17,4 (.685)	90,5 (3.562)	181,0 (7.125)	–	–	Ø127,00/126,95 (Ø5.000/4.998)	–	–
		F	ISO 3019/2-125A2HW	18,0 (.709)	90,0 (3.543)	180,0 (7.09)	–	–	Ø125,00/124,95 (Ø4.921/4.919)	–	–
	4-bolt "C"	G	SAE J744-127-4 ("C")	14,2 (.559)	–	–	57,25 (2.254)	114,50 (4.508)	Ø127,00/126,95 (Ø5.000/4.998)	–	–
		H	ISO 3019/2-125B4HW	14,0 (.551)	–	–	–	–	Ø125,00/124,95 (Ø4.921/4.919)	80,0 (3.150)	160,0 (6.299)
PVM131 PVM141	4-bolt "D"	J	SAE J744-152-4 ("D")	20,6 (.812)	–	–	80,82 (3.182)	161,64 (6.364)	Ø152,40/152,35 (Ø6.000/5.998)	–	–
		K	ISO 3019/2-160B4HW	18,0 (.709)	–	–	–	–	Ø160,00/159,95 (Ø6.299/6.297)	100,0 (3.937)	200,0 (7.874)

*Flanges for PVM020 and PVM050 are shown on pages 73 and 80, respectively.

Shaft Options

Dimensions in millimeters (inches)

SAE Splined Shaft

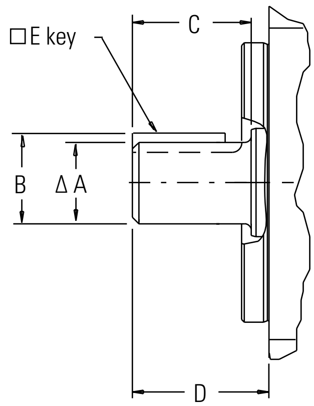


Model Series	SAE Spline Shaft Designation	Shaft Code	A max.	B	C	D	Max. Input Torque Nm (lb. in.)
PVM018/020	SAE J744-16-4 SAE “A” (9T)	03	15,88 (.625)	9T 16/32 DP	37,0 (1.46)	32,0 (1.26)	58 (517)
	SAE J744-19-4 SAE “A” (11T)	04	19,05 (.750)	11T 16/32 DP	30,0 (1.18)	38,0 (1.50)	123 (1100)
	SAE J744-22-4 SAE “B” (13T)	07	21,81 (.859)	13T 16/32 DP	33,0 (1.31)	41,0 (1.61)	208 (1850)
	SAE J744-25-4 SAE “B-B” (15T)	08	24,98 (.983)	15T 16/32 DP	38,0 (1.50)	46,0 (1.81)	337 (2987)
PVM045/050	SAE J744-22-4 SAE “B” (13T)	07	21,81 (.859)	13T 16/32 DP	33,0 (1.31)	41,0 (1.61)	208 (1850)
	SAE J744-25-4 SAE “B-B” (15T)	08	24,98 (.983)	15T 16/32 DP	38,0 (1.50)	46,0 (1.81)	337 (2987)
PVM057/063	SAE J744-22-4 SAE “B” (13T)	07	21,81 (.859)	13T 16/32 DP	33,0 (1.31)	41,0 (1.61)	208 (1850)
	SAE J744-25-4 SAE “B-B” (15T)	08	24,98 (.983)	15T 16/32 DP	38,0 (1.50)	46,0 (1.81)	337 (2987)
	SAE J744-32-4 SAE “C” (14T)	11	31,22 (1.23)	14T 12/24 DP	48,0 (1.89)	56,0 (2.20)	640 (5660)
PVM074/081 PVM098/106	SAE J744-32-4 SAE “C” (14T)	11	31,22 (1.23)	14T 12/24 DP	48,0 (1.89)	56,0 (2.20)	640 (5660)
	SAE J744-38-4 SAE “C-C” (17T)	12	37,57 (1.479)	17T 12/24 DP	54,0 (2.13)	62,0 (2.44)	1215 (10,750)
PVM131/141	SAE J744-32-4 SAE “C” (14T)	11	31,22 (1.23)	14T 12/24 DP	48,0 (1.89)	56,0 (2.20)	640 (5660)
	SAE J744-38-4 SAE “C-C” (17T)	12	37,57 (1.479)	17T 12/24 DP	54,0 (2.13)	62,0 (2.44)	1215 (10,750)
	SAE J744-44-4 SAE “D” (13T)	14	43,71 (1.721)	13T 8/16 DP	67,0 (2.63)	75,0 (2.95)	1215 (10,750)

Shaft Options

Dimensions in millimeters (inches)

SAE Keyed Shaft

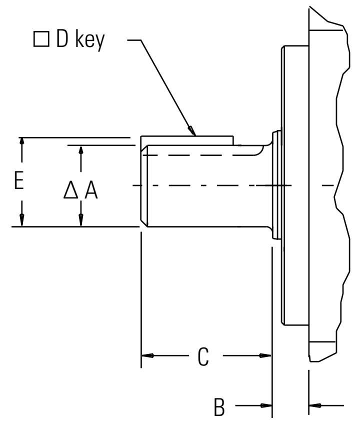


Model Series	SAE Keyed Shaft Designation	Shaft Code	A	B	C	D	E	Max. Input Torque Nm (lb. in.)
PVM018/020	SAE J744-16-1 SAE "A"	01	15,88 (.625)	17,73 (.698)	24,0 (.94)	32,0 (1.26)	4,0 (.157)	58 (517)
	SAE J744-19-1 SAE "19-1"	02	19,05 (.750)	21,23 (.836)	24,0 (.94)	32,0 (1.26)	4,81 (.189)	104 (918)
	SAE J744-22-1 SAE "B"	05	22,22 (.875)	25,12 (.989)	33,0 (1.31)	41,0 (1.61)	6,35 (.250)	135 (1200)
	SAE J744-25-1 SAE "B-B"	06	25,37 (.999)	28,22 (1.111)	38,0 (1.50)	46,0 (1.81)	6,35 (.250)	215 (1900)
PVM045/050	SAE J744-22-1 SAE "B"	05	22,22 (.875)	25,12 (.989)	33,0 (1.31)	41,0 (1.61)	6,35 (.250)	135 (1200)
	SAE J744-25-1 SAE "B-B"	06	25,37 (.999)	28,22 (1.111)	38,0 (1.50)	46,0 (1.81)	6,35 (.250)	215 (1900)
PVM057/063	SAE J744-25-1 SAE "B-B"	06	25,37 (.999)	28,22 (1.111)	38,0 (1.50)	46,0 (1.81)	6,35 (.250)	215 (1900)
	SAE J744-32-1 SAE "C"	09	31,75 (1.25)	35,32 (1.390)	48,0 (1.89)	56,0 (2.20)	7,93 (.312)	450 (3980)
PVM074/081 PVM098/106	SAE J744-32-1 SAE "C"	09	31,75 (1.25)	35,32 (1.390)	48,0 (1.89)	56,0 (2.20)	7,93 (.312)	450 (3980)
	SAE J744-38-1 SAE "C-C"	10	38,10 (1.50)	42,39 (1.67)	54,0 (2.13)	62,0 (2.44)	9,52 (.375)	765 (6770)
PVM131/141	SAE J744-32-1 SAE "C"	09	31,75 (1.25)	35,32 (1.390)	48,0 (1.89)	56,0 (2.20)	7,93 (.312)	450 (3980)
	SAE J744-38-1 SAE "C-C"	10	38,10 (1.50)	42,39 (1.67)	54,0 (2.13)	62,0 (2.44)	9,52 (.375)	765 (6770)
	SAE J744-44-1 SAE "D"	13	44,45 (1.75)	49,46 (1.95)	67,0 (2.63)	75,0 (2.95)	11,11 (.438)	1200 (10,620)

Shaft Options

Dimensions in millimeters (inches)

ISO Keyed Shaft



Model Series	ISO Keyed Shaft Designation	Shaft Code	A	B	C	D	E	Max. Input Torque Nm (lb. in.)
PVM018/020	ISO 3019/2 E20N	15	19,9 (.786)	8,5 (.335)	36 (1.42)	6 (.236)	22,5 (.886)	113 (1000)
	ISO 3019/2 E25N Short Spigot	16	25 (.984)	8,5 (.335)	42 (1.65)	8 (.315)	28,0 (1.102)	215 (1900)
	ISO 3019/2 E25N	17	25 (.984)	10 (.393)	42 (1.65)	8 (.315)	28,0 (1.102)	215 (1900)
PVM045/050	ISO 3019/2 E25N	17	25 (.984)	10 (.393)	42 (1.65)	8 (.315)	28,0 (1.102)	215 (1900)
PVM057/063	ISO 3019/2 E25N	17	25 (.984)	10 (.393)	42 (1.65)	8 (.315)	28,0 (1.102)	215 (1900)
	ISO 3019/2 E32N	18	32 (1.26)	10 (.393)	58 (2.28)	10 (.394)	35,0 (1.378)	450 (3980)
PVM074/081	ISO 3019/2 E32N	18	32 (1.26)	10,5 (.413)	58 (2.28)	10 (.394)	35,0 (1.378)	450 (3980)
PVM098/106	ISO 3019/2 E40N	19	40 (1.57)	10,5 (.413)	82 (3.23)	12 (.472)	43,0 (1.693)	870 (7700)
PVM131/141	ISO 3019/2 E32N	18	32 (1.26)	10 (.393)	58 (2.28)	10 (.394)	35,0 (1.378)	450 (3980)
	ISO 3019/2 E40N	19	40 (1.57)	10 (.393)	82 (3.23)	12 (.472)	43,0 (1.693)	870 (7700)

(1) ISO 80mm pilot only – B

(2) ISO 80mm pilot only – D

*Torque of non-thru-drive PVM pump, or combined torque of PVM thru-drive pump and thru-driven pump.

NOTE: In those cases where geometric tolerances of mounting are critical, or where specific tolerance ranges are required and not specified, consult Eaton Engineering for specific limits.

Input Shaft Selection Data

SAE Splined Shafts

Model Series	Shaft Designation	Shaft Code	Max. Input Torque† Nm (lb. in.)	Max. Thru-drive Output Torque‡ Nm (lb. in.)
PVM018/020	SAE J744-16-4 (SAE “A,” 9T)	03	58 (513)	Exceeds maximum input torque
	SAE J744-19-4 (SAE “A,” 11T)	04	123 (1100)	Exceeds maximum input torque
	SAE J744-22-4 (SAE “B,” 13T)	07	208 (1850)	123 (1100)
	SAE J744-25-4 (SAE “B-B,” 15T)	08	337 (2987)	123 (1100)
PVM045/050	SAE J744-22-4 (SAE “B,” 13T)	07	208 (1850)	208 (1850)*
	SAE J744-25-4 (SAE “B-B,” 15T)	08	337 (2987)	337 (2987)
PVM057/063	SAE J744-22-4 (SAE “B,” 13T)	07	208 (1850)	208 (1850)*
	SAE J744-25-4 (SAE “B-B,” 15T)	08	337 (2987)	337 (2987)
	SAE J744-32-4 (SAE “C,” 14T)	11	640 (5660)	337 (2987)
PVM074/081 PVM098/106	SAE J744-32-4 (SAE “C,” 14T)	11	640 (5660)	515 (4560)
	SAE J744-38-4 (SAE “C-C,” 17T)	12	1215 (10,750)	515 (4560)
PVM131/141	SAE J744-32-4 (SAE “C,” 14T)	11	640 (5660)	640 (5660)
	SAE J744-38-4 (SAE “C-C,” 17T)	12	1215 (10,750)	640 (5660)
	SAE J744-44-4 (SAE “D,” 13T)	14	1215 (10,750)	640 (5660)

SAE Keyed Shafts

Model Series	Shaft Designation	Shaft Code	Max. Input Torque† Nm (lb. in.)	Max. Thru-drive Output Torque‡ Nm (lb. in.)
PVM018/020	SAE J744-16-1 (SAE “A”)	01	58 (513)	Exceeds maximum input torque
	SAE J744-19-1 (SAE “19-1”)	02	104 (920)	Exceeds maximum input torque
	SAE J744-22-1 (SAE “B”)	05	135 (1200)	123 (1100)
	SAE J744-25-1 (SAE “B-B”)	06	215 (1900)	123 (1100)
PVM045/050	SAE J744-22-1 (SAE “B”)	05	135 (1200)	135 (1200)*
	SAE J744-25-1 (SAE “B-B”)	06	215 (1900)	215 (1900)*
PVM057/063	SAE J744-25-1 (SAE “B-B”)	06	215 (1900)	215 (1900)*
	SAE J744-32-1 (SAE “C”)	09	450 (3980)	337 (2987)
PVM074/081	SAE J744-32-1 (SAE “C”)	09	450 (3980)	450 (3980)*
PVM098/106	SAE J744-38-1 (SAE “C-C”)	10	765 (6770)	515 (4560)
PVM131/141	SAE J744-32-1 (SAE “C”)	09	450 (3980)	450 (3980)*
	SAE J744-38-1 (SAE “C-C”)	10	765 (6770)	640 (5660)
	SAE J744-44-1 (SAE “D”)	13	1200 (10,620)	640 (5660)

ISO Keyed Shafts

Model Series	Shaft Designation	Shaft Code	Max. Input Torque† Nm (lb. in.)	Max. Thru-drive Output Torque‡ Nm (lb. in.)
PVM018/020	ISO 3019/2 E20N (B mount only)	15	113 (1000)	Exceeds maximum input torque
	ISO 3019/2 E25N (B mount only)	16	215 (1900)	Exceeds maximum input torque
	ISO 3019/2 E25N (D mount only)	17	215 (1900)	123 (1100)
PVM045/050	ISO 3019/2 E25N	17	215 (1900)	215 (1900)*
PVM057/063	ISO 3019/2 E25N	17	215 (1900)	215 (1900)*
	ISO 3019/2 E32N	18	450 (3980)	337 (2987)
PVM074/081 PVM098/106	ISO 3019/2 E32N	18	450 (3980)	450 (3980)*
	ISO 3019/2 E40N	19	870 (7700)	515 (4560)
PVM131/141	ISO 3019/2 E32N	18	450 (3980)	450 (3980)*
	ISO 3019/2 E40N	19	870 (7700)	640 (5660)

†Maximum total torque of the thru-drive pump and the thru-driven pump(s).

‡Maximum torque that can be applied to the thru-driven pump(s).

*This value is limited by the maximum input torque.

Port Options

Inlet and Outlet Ports

Model Series	Inlet/Outlet Port Option (per model code, page 5)	Port Code	Inlet Port "B"	Outlet Port "C"
PVM018/020	Inch Flange	02	SAE J518 Code 61, standard pressure. 1.25 inch diameter, .4375-14 x 1.12 bolt holes	SAE J518 Code 61, standard pressure. 0.75 inches diameter, .375-16 x .88 bolt holes
	Metric Flange	04	ISO 6162 Type II, 315 bar. 31,75mm diameter, M10 x 28 bolt holes	ISO 6162 Type II, 315 bar. 19,05mm diameter, M10 x 22 bolt holes
	Inch Tube	01	SAE J514 O-ring –20, for 1-1/4 inch O.D. tube	SAE J514 O-ring -12, for 3/4 inch O.D. tube
	Metric Tube	03	ISO 6149-1, M42 thread	ISO 6149-1, M27 thread
	British Parallel Pipe	05	ISO 228-1:1994 (E), G 1-1/4 thread	ISO 228-1:1994 (E), G 3/4 thread
PVM045/050	Inch Flange	02	SAE J518 Code 61, standard pressure. 2.00 inch diameter, .500-13 x 1.06 bolt holes	SAE J518 Code 61, standard pressure. 1.00 inch diameter, .375-16 x .87 bolt holes
	Metric Flange	04	ISO 6162 Type II, 315 bar. 51mm diameter, M12 x 27 bolt holes	ISO 6162 Type II, 315 bar. 25mm diameter, M10 x 22 bolt holes
	Inch Tube	01	SAE J514 O-ring -24, for 1-1/2 inch O.D. tube	SAE J514 O-ring -16, for 1 inch O.D. tube
	Metric Tube	03	ISO 6149-1, M48 thread	ISO 6149-1, M33 thread
	British Parallel Pipe	05	ISO 228-1:1994 (E), G 1-1/2 thread	ISO 228-1:1994 (E), G1 thread
PVM057/063	Inch Flange	02	SAE J518 Code 61, standard pressure. 2.00 inch diameter, .500-13 x 1.06 bolt holes	SAE J518 Code 61, standard pressure. 1.00 inch diameter, .375-16 x .88 bolt holes
	Metric Flange	04	ISO 6162 Type II, 350 bar. 51mm diameter, M12 x 29 bolt holes	ISO 6162 Type, 350 bar. 25mm diameter, M10 x 23 bolt holes
	Inch Tube (End ported models only)	01	SAE J514 O-ring -24, for 1-1/2 inch O.D. tube	SAE J514 O-ring -16 for 1 inch O.D. tube
	Metric Tube (End ported models only)	03	ISO 6149-1, M48 thread	ISO 6149–1, M33 thread
PVM074/081	Inch Flange	02	SAE J518 Code 61, standard pressure. 2.00 inch diameter, .500-13 x 1.19 bolt holes	SAE J518 Code 61, standard pressure. 1.00 inch diameter, .375 -16 x .88 bolt holes
	Metric Flange	04	ISO 6162 Type II, 315 bar. 51mm diameter, M12 x 20 bolt holes	ISO 6162 Type, 400 bar. 25mm diameter, M10 x 17 bolt holes
PVM098/106	Inch Flange	02	SAE J518 Code 61, standard pressure. 2.50 inch diameter, .500-13 x 1.19 bolt holes	SAE J518 Code 61, standard pressure. 1.00 inch diameter, .375 -16 x .88 bolt holes
	Metric Flange	04	ISO 6162 Type I, 350 bar. 64mm diameter, M12 x 31 bolt holes	ISO 6162 Type I, 350 bar. 25mm diameter, M10 x 23 bolt holes
PVM131/141	Inch Flange	02	SAE J518 Code 61, standard pressure. 2.50 inch diameter, .500-13 x 1.19 bolt holes	SAE J518 Code 62, high pressure. 1.25 inch diameter, .500 -13 x 1.00 bolt holes
	Metric Flange	04	ISO 6162 Type II, 315 bar. 64mm diameter, M12 x 31 bolt holes	ISO 6162 Type, 400 bar. 32mm diameter, M12 x 27 bolt holes

Drain, Load Sensing, and Gauge Ports

Model Series	Inlet/Outlet Port Option (per model code, page 5)	Port Code	Drain Port "F"	Load Sensing Port "J"	Gauge Port "K"
PVM018/020	Inch Flange or Tube	01, 03	SAE J514 O-ring, .50″ O.D. tube. .750-16 UNF 2B thread	SAE J514 O-ring, .25″ O.D. tube. .4375-20 UNF 2B thread	SAE J514 O-ring, .25″ tube. .4375-20 UNF 2B thread
	Metric Flange or Tube	03, 04	ISO 6149-1 O-ring M18 x 1,5 thread	ISO 6149-1 O-ring M12 x 1,5 thread	ISO 6149-1 O-ring M12 x 1,5 thread
	British Parallel Pipe	05	ISO 228-1:1994 (E) G 1/2 thread	ISO 228-1:1994 (E) G 1/4 thread	ISO 228-1:1994 (E) G 1/4 thread
PVM045/050	Inch Flange or Tube	01, 03	SAE J514 O-ring, .625″ O.D. tube. .875-14 UNF 2B thread	SAE J514 O-ring, .250″ O.D. tube. .4375-20 UNF 2B thread	SAE J514 O-ring, .375″ O.D. tube. .5625-18 UNF 2B thread
	Metric Flange or Tube	03, 04	ISO 6149-1 O-ring M22 x 1,5 thread	ISO 6149-1 O-ring M12 x 1,5 thread	ISO 6149-1 O-ring M14 x 1,5 thread
	British Parallel Pipe	05	ISO 228-1:1994 (E) G 1/2 thread	ISO 228-1:1994 (E) G 1/4 thread	ISO 228-1:1994 (E) G 1/4 thread
PVM057/063	Inch Flange or Tube	01, 02	SAE J514 O-ring, .625″ O.D. tube. .875-14 UNF 2B thread	SAE J514 O-ring, .375″ O.D. tube. .5625-18 UNF 2B thread	SAE J514 O-ring, .375″ O.D. tube. .5625-18 UNF 2B thread
	Metric Flange or Tube	03, 04	ISO 6149-1 O-ring M22 x 1,5 thread	ISO 6149-1 O-ring M14 x 1,5 thread	ISO 6149-1 O-ring M14 x 1,5 thread
PVM074/83 PVM098/106	Inch Flange	02	SAE J514 O-ring, .625″ O.D. tube. .875-14 UNF 2B thread	SAE J514 O-ring, .375″ O.D. tube. .562-18 UNF 2B thread	SAE J514 O-ring, .375″ O.D. tube. .5625-18 UNF 2B thread
	Metric Flange	04	ISO 6149-1 O-ring M22 x 1,5 thread	ISO 6149-1 O-ring M14 x 1,5 thread	ISO 6149-1 O-ring M14 x 1,5 thread
PVM131/141	Inch Flange	02	SAE J514 O-ring, .625″ O.D. tube. .875-14 UNF 2B thread	SAE J514 O-ring, .375″ O.D. tube. .562-18 UNF 2B thread	SAE J514 O-ring, .375″ O.D. tube. .5625-18 UNF 2B thread
	Metric Flange	04	ISO 6149-1 O-ring M22 x 1,5 thread	ISO 6149-1 O-ring M14 x 1,5 thread	ISO 6149-1 O-ring M14 x 1,5 thread

Operating Requirements

Inlet Pressure, Case Pressure, and Operating Temperature Requirements

Inlet Pressure			Case Pressure			Operating Temperature	
Rated Absolute bar (psi)	Minimum bar, absolute (in. Hg)	Maximum Gauge bar (psi)	Maximum Continuous bar (psi)	Maximum Intermittent bar (psi)	Peak bar (psi)	Rated °C (°F)	Maximum Intermittent °C (°F)
1,0 (14.5)	0,85 (5)	3,5 (50)	0,5 (7)	2 (30)	3,5 (50)	82 (180)	104 (220)

Hydraulic Fluids

Fluid	Recommended Operating Viscosity Range cSt (SUS)	Maximum Viscosity at Startup cSt (SUS)	Minimum Viscosity @ Max. Intermittent Temperature of 104°C (220°F) cSt (SUS)
Use antiwear hydraulic oil, or automotive type crankcase oil (designations SC, SD, SE, or SF) per SAE J183 FEB80	16 to 40 (83 to 187)	1000 (4550)	10 (90)

For more information, see Eaton publication 579. For operation on other alternative or environmentally friendly fluids, please contact your Eaton Representative.

Fluid Cleanliness

The M Series pumps are rated in anti-wear petroleum fluids with a contamination level of 20/18/13 (Eaton) or ISO 18/13. Operation in fluids with levels more contaminated than this is not recommended. Fluids other than petroleum, severe service cycles, or temperature extremes are cause for adjustment of these codes. Please contact your Eaton Representative for specific duty cycle recommendation.

Eaton M Series pumps, as with any variable displacement piston pumps, will operate with apparent satisfaction in fluids up to the rating specified here. Experience has shown, however, that pump and hydraulic system life is not optimized with high fluid contamination levels (high ISO cleanliness codes).

Proper fluid condition is essential for long and satisfactory life of hydraulic components and systems. Hydraulic fluid must have the correct balance of cleanliness, materials, and additives for protection against wear of components, elevated viscosity and inclusion of air.

Essential information on the correct methods for treating hydraulic fluid is included in Eaton publication 561 – “Eaton Guide to Systemic Contamination Control” – Available from your local Eaton distributor. In this publication, filtration and cleanliness levels for extending the life of axial piston pumps and other system components are listed. Included is an excellent discussion of the selection of products needed to control fluid condition.

Moment of Inertia (single pump rotating group)

Model	Moment of Inertia	
	N-m (sec^2)	lbf-in (sec^2)
PVM018	0.0012	0.0104
PVM020	0.0012	0.0104
PVM045	0.0036	0.0320
PVM050	0.0034	0.0300
PVM057	0.0052	0.0457
PVM063	0.0051	0.0447
PVM074	0.0078	0.0691
PVM081	0.0073	0.0643
PVM098	0.0132	0.1165
PVM106	0.0123	0.1086
PVM131	0.0213	0.1889
PVM141	0.0210	0.1856

Specifications and Performance

Quiet version, optimized for 1000-1800 rpm (E) and Higher speed version (M)

Alternate fluids guide

	Fluid Type / Model Series	Petroleum Base	Petroleum Base	Motor Oil	Universal	Automatic	Mil Spec Fluids	Environmentally Acceptable Fluids		Fire Resistant Fluids					Specialty Fluids	Food Grade Fluid
		ZDDP	Zinc Free		Tractor	Transmission Fluid		Vegetable Base	Synthetic Base	Synthetic Base			Water Containing		Cutting Fluids	H1 - approved
		AW (HM)	AW (HM)		UTTO	ATF		HETG	HEES	Phosphate ester HFDR	Polyester - HFDU	Polyether polyol - HFDU	Water Glycol - HFC	Invert Emulsion - HFB		
1	**Model series Quiet version "E" @ 1800 RPM Unless Noted**															
	PVM 18, PVM 45, PVM 57, PVM 74, PVM 98	4060 PSI	NR	3625 PSI **	3625 PSI **	3625 PSI **	NR	3625 PSI **	3625 PSI 1800 RPM	3300 PSI **	3300 PSI **	NR	2500 PSI **	2250 PSI **	NR	3625 PSI **
	PVM 20, PVM 50, PVM 63, PVM 81, PVM 106	3335 PSI	NR	3250 PSI **	3250 PSI **	3250 PSI **	NR	3250 PSI **	3250 PSI 1800 RPM	3000 PSI **	3000 PSI **	NR	2250 PSI **	2000 PSI **	NR	3250 PSI **
	PVM 131	4060 PSI	NR	3625 PSI **	3625 PSI **	3625 PSI **	NR	3625 PSI **	3625 PSI 1500 RPM	3300 PSI ** 1500 rpm	3300PSI ** 1500 rpm	NR	2500 PSI ** 1500 rpm	2250 PSI ** 1500 rpm	NR	3625 PSI **
	PVM 141	3335 PSI	NR	3250 PSI **	3250 PSI **	3250 PSI **	NR	3250 PSI **	3250 PSI 1500 RPM	3000 PSI ** 1500 rpm	3000 PSI ** 1500 rpm	NR	2250 PSI ** 1500 rpm	2000 PSI ** 1500 rpm	NR	3250 PSI **
2	**Model Series Higher Speed Version (M)**															
	PVM 18	4060 PSI 2800 RPM	NR	3625 PSI ** 2800 RPM	3625 PSI ** 2800 RPM	3625 PSI ** 2800 RPM	NR	3625 PSI ** 2800 RPM	3625 PSI 1800 RPM	3300 PSI ** 1800 RPM	3300 PSI ** 1800 RPM	NR	2500 PSI ** 1800 RPM	2250 PSI ** 1800 RPM	NR	NR
	PVM 20	3335 PSI 2800 RPM	NR	3250 PSI ** 2800 RPM	3250 PSI ** 2800 RPM	3250 PSI ** 2800 RPM	NR	3250 PSI ** 2800 RPM	3250 PSI 1800 RPM	3000 PSI ** 1800 RPM	3000 PSI ** 1800 RPM	NR	2250 PSI ** 1800 RPM	2000 PSI ** 1800 RPM	NR	NR
	PVM 45	4060 PSI 2600 RPM	NR	3625 PSI ** 2600 RPM	3625 PSI ** 2600 RPM	3625 PSI ** 2600 RPM	NR	3625 PSI ** 2600 RPM	3625 PSI 1800 RPM	3300 PSI ** 1800 RPM	3300 PSI ** 1800 RPM	NR	2500 PSI ** 1800 RPM	2250 PSI ** 1800 RPM	NR	NR
	PVM 50	3335 PSI 2600 RPM	NR	3250 PSI ** 2600 RPM	3250 PSI ** 2600 RPM	3250 PSI ** 2600 RPM	NR	3250 PSI ** 2600 RPM	3250 PSI 1800 RPM	3000 PSI ** 1800 RPM	3000 PSI ** 1800 RPM	NR	2250 PSI ** 1800 RPM	2000 PSI ** 1800 RPM	NR	NR
	PVM 57	4060 PSI 2500 RPM	NR	3625 PSI ** 2500 RPM	3625 PSI ** 2500 RPM	3625 PSI ** 2500 RPM	NR	3625 PSI ** 2500 RPM	3625 PSI 1800 RPM	3300 PSI 1800 RPM	3300 PSI 1800 RPM	NR	2500 PSI ** 1800 RPM	2250 PSI ** 1800 RPM	NR	NR
	PVM 63	3335 PSI 2500 RPM	NR	3250 PSI ** 2500 RPM	3250 PSI ** 2500 RPM	3250 PSI ** 2500 RPM	NR	3250 PSI ** 2500 RPM	3250 PSI 1800 RPM	3000 PSI ** 1800 RPM	3000 PSI ** 1800 RPM	NR	2250 PSI ** 1800 RPM	2000 PSI ** 1800 RPM	NR	NR
	PVM 74	4060 PSI 2400 RPM	NR	3625 PSI ** 2400 RPM	3625 PSI ** 2400 RPM	3625 PSI ** 2400 RPM	NR	3625 PSI ** 2400 RPM	3625 PSI 1800 RPM	3300 PSI ** 1800 RPM	3300 PSI ** 1800 RPM	NR	2500 PSI ** 1800 RPM	2250 PSI ** 1800 RPM	NR	NR
	PVM 81	3335 PSI 2400 RPM	NR	3250 PSI ** 2400 RPM	3250 PSI ** 2400 RPM	3250 PSI ** 2400 RPM	NR	3250 PSI ** 2400 RPM	3250 PSI 1800 RPM	3000 PSI ** 1800 RPM	3000 PSI ** 1800 RPM	NR	2250 PSI ** 1800 RPM	2000 PSI ** 1800 RPM	NR	NR
	PVM 98	4060 PSI 2200 RPM	NR	3625 PSI ** 2200 RPM	3625 PSI ** 2200 RPM	3625 PSI ** 2200 RPM	NR	3625 PSI ** 2200 RPM	3625 PSI 1800 RPM	3300 PSI ** 1800 RPM	3300 PSI ** 1800 RPM	NR	2500 PSI ** 1800 RPM	2250 PSI ** 1800 RPM	NR	NR
	PVM 106	3335 PSI 2200 RPM	NR	3250 PSI ** 2200 RPM	3250 PSI ** 2200 RPM	3250 PSI ** 2200 RPM	NR	3250 PSI ** 2200 RPM	3250 PSI 1800 RPM	3000 PSI ** 1800 RPM	3000 PSI ** 1800 RPM	NR (PSI) 1800 RPM	2250 PSI ** 1800 RPM	2000 PSI **	NR	NR
	PVM 131	4060 PSI 2000 RPM	NR	3625 PSI ** 2000 RPM	3625 PSI ** 2000 RPM	3625 PSI ** 2000 RPM	NR	3625 PSI ** 2000 RPM	3625 PSI 1500 RPM	3300 PSI ** 1800 RPM	3300 PSI ** 1800 RPM	NR	2500 PSI ** 1500 RPM	2250 PSI 1500 RPM	NR	NR
	PVM 141	3335 PSI 2000 RPM	NR	3250 PSI ** 2000 RPM	3250 PSI ** 2000 RPM	3250 PSI ** 2000 RPM	NR	3250 PSI ** 2000 RPM	3250 PSI 1500 RPM	3000 PSI ** 1800 RPM	3000 PSI** 1800 RPM	NR	2250 PSI ** 1500 RPM	2000 PSI ** 1500 RPM	NR	NR

Warning: Care should be taken that mechanical and hydraulic resonances are avoided in the application of the pump. Such resonances can seriously compromise the life and/or safe operation of the pump.

Drive Data

Mounting attitude can be either horizontal or vertical, using the appropriate case drain ports to ensure that the case remains full of fluid at all times. Consult your local Eaton Representative if a different arrangement is required.

In those cases where geometric tolerances of mounting are critical, or where specific tolerance ranges are required and not specified, consult Eaton Engineering for specific limits.

Direction of shaft rotation, viewed from the prime mover end, must be as indicated in the model designation on the pump – either right hand (clockwise) or left hand (counterclockwise).

Direct coaxial drive through a flexible coupling is recommended. If drives imposing radial shaft loads are considered, please consult your Eaton Representative.

Start-up Procedure

Make sure the reservoir and circuit are clean and free of dirt/debris prior to filling with hydraulic fluid.

Fill the reservoir with filtered oil and fill to a level sufficient enough to prevent vortexing at the suction connection to pump inlet. It is good practice to clean the system by flushing and filtering, using an external slave pump.

Caution: Before the pump is started, fill the case through the uppermost drain port with hydraulic fluid of the type to be used. The case drain line must be connected directly to the reservoir and must terminate below the oil level.

Once the pump is started, it should prime within a few seconds. If the pump does not prime, check to make sure that there are no restrictions between the reservoir and the inlet to the pump, that the pump is being rotated in the proper direction, and that there are no air leaks in the inlet line and connections. Also check to make sure that trapped air can escape at the pump outlet.

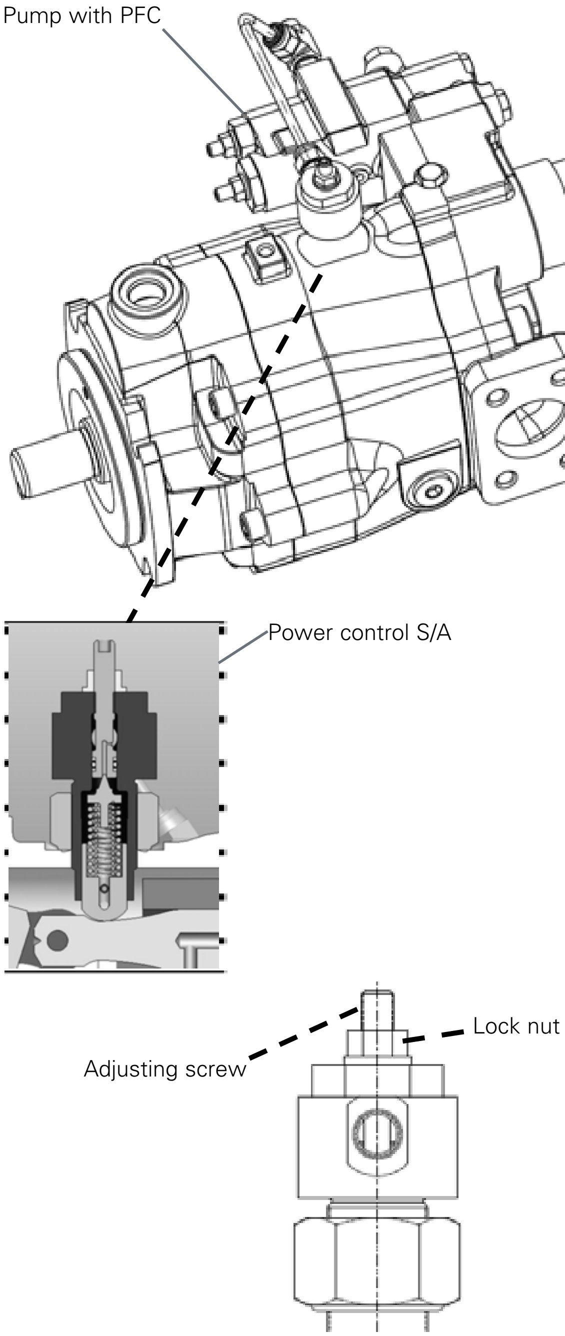
After the pump is primed, tighten the loose outlet connections, then operate for five to ten minutes (unloaded) to remove all trapped air from the circuit.

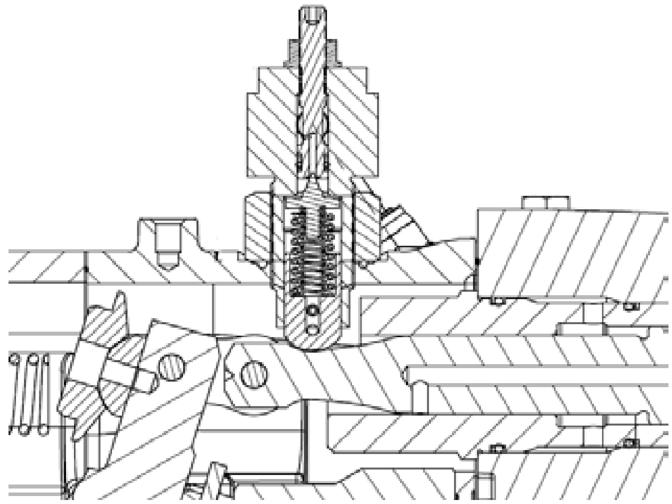
If the reservoir has a sight gage, make sure the fluid is clear – not milky.

Power Control/Torque Limiter

Description

PVM series piston pump with Power Control consists of, A) pump with modified pressure and flow compensator and B) Power Control subassembly installed.





Power Control Operation

The Power Control Subassembly consists of a poppet type valve guided by a specially designed control piston having a unique profile. The cracking pressure of the poppet valve, being guided by the profile on the control piston, is dependent on the actual displacement of the pump. For lower displacement the cracking pressure is high. As displacement is increased, the cracking pressure is reduced according to the profile on the control piston. The poppet type valve gets pressure signal either from the modified load sense port (for Pressure Flow Compensated) or the pump outlet pressure (for Pressure Compensated). The power control subassembly regulates this pressure based on the displacement. This regulated pressure is internally fed back to the control piston chamber, which compensates by adjusting the pump displacement appropriately. This results in achieving the desired control of constant nput power.

Power Control Adjustment

To adjust the control power setting, power measurement devices are required. For Input power, motor torque and speed need to be measured. For output power, devices for pump pressure and flow measurements are required. The pump comes with factory set power setting as indicated by pos. 22 23 of pump model code. It is recommended not to change this setting unless absolutely necessary. The setting can be changed by loosening the lock nut on top of the control subassembly and turning the adjust ment screw with help of allen key. Rotating adjustment screw clockwise increases the power setting while rotating it anticlockwise reduces it. After adjustment as required ensure that the locknut is tightened properly.

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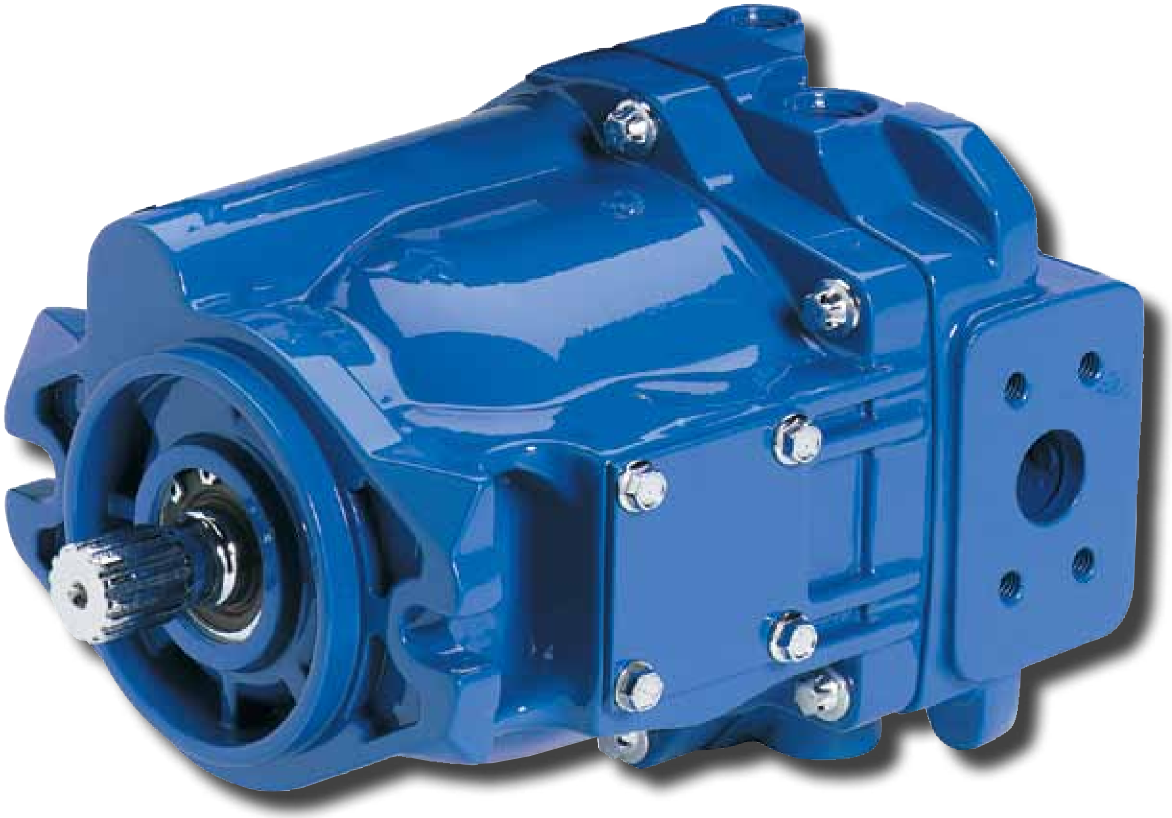


Table of Contents

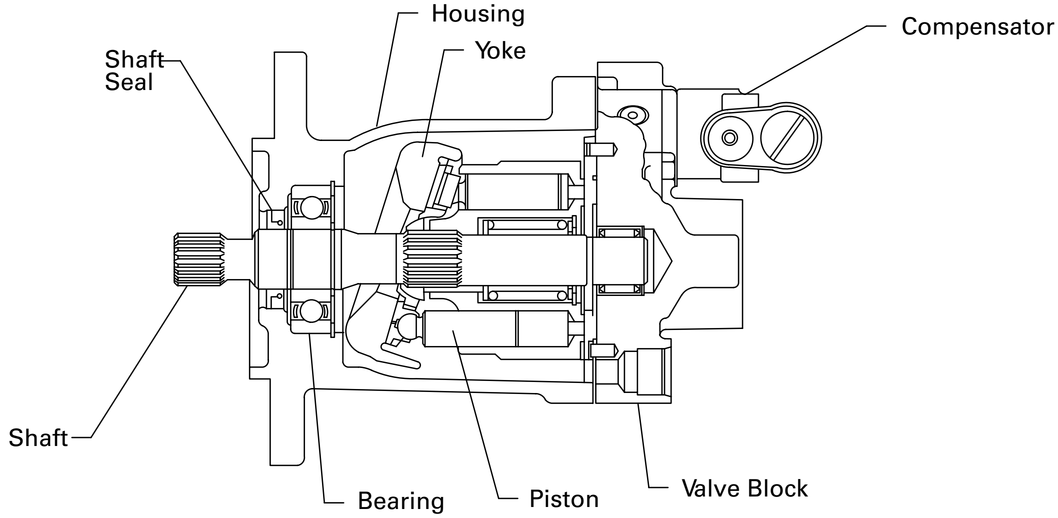
Introduction to PVE Piston Pumps

Eaton PVE piston pumps are inline, variable displacement pumps that are available in three displacement sizes. An assortment of optional controls offer maximum operating flexibility.

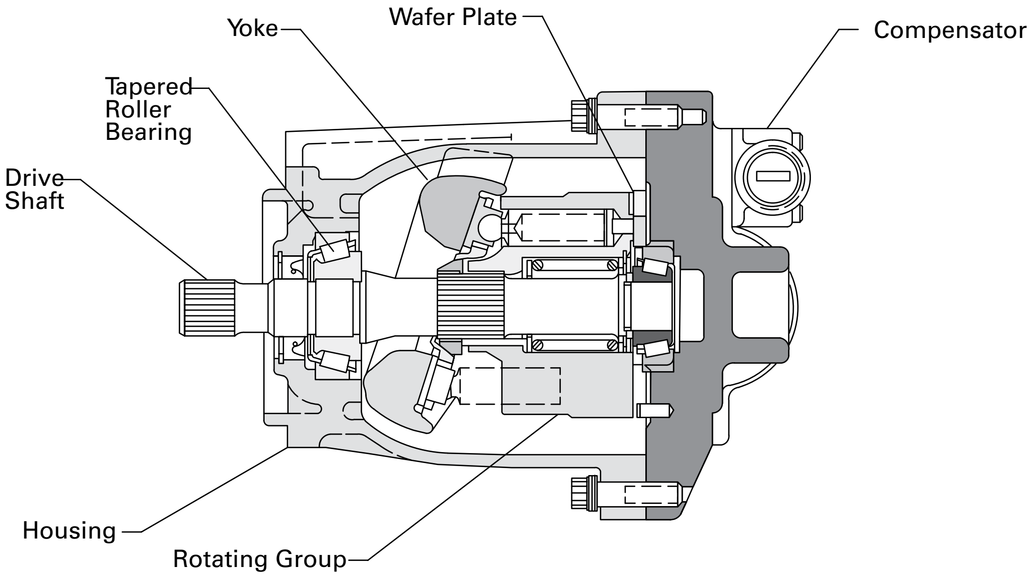
Pump displacement is varied by means of pressure and/or flow compensator controls.

Features and Benefits

- Inline, variable displacement pump
- Displacement is varied by pressure/flow compensator controls
- Optional controls for maximum operating flexibility
- Thru-drive available on PVE 19/21



PVE012 Section View



PVE012 Section View

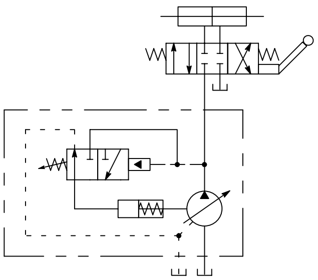
Figure 1. Sectional Views of the PVE Pumps

Pressure Compensator Control, "A" Option

This control automatically varies pump displacement to meet the system flow demand for a constant system pressure. Displacement starts to reduce to zero within 14 bar (200 psi) of the compensator setting. Power draw-off is minimized, therefore, system relief valves should not be required.

Pressure Compensator Control with Maximum Displacement Adjustment

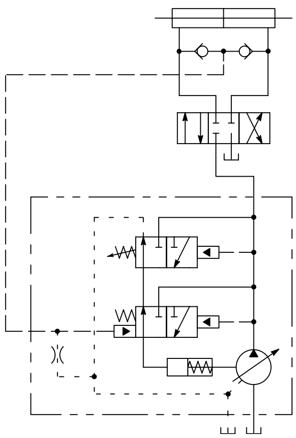
As indicated for "A" option above, except there is an independent screw adjustment of maximum displacement from 100% (rated) to 25%.



Note: Graphic symbols shown with external valve(s) and cylinder to illustrate typical usage.

Load Sensing Compensator and Pressure Limiter, "B" Option

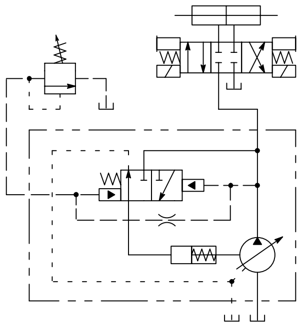
This compensator provides load sensing control under all pressure conditions up to the desired maximum. It automatically adjusts pump flow in response to a remote pressure signal and maintains outlet pressure at approximately 11 bar (160 psi) above load pressure. The integral pressure limiter overrides the load sensing control, reducing pump displacement as the preset maximum operating pressure is reached. Override begins within 14 bar (200 psi) of the preset maximum pressure compensator setting. A 24 bar LS option is also available.



Note: Optional internal bleed orifice diameter is .015″ and is "A" option-control special features.

PVE with Pressure Compensator Arranged for Remote Control, "D" Option or "J" Option

Exactly the same as the "A" (pressure compensation option) except the machine operator is able to change the compensator setting through the use of a remote pilot relief valve.



Note: A kit is available for an electrical dual pressure compensator. This control automatically adjusts pump delivery to maintain system volume requirements at either of two preselected operating pressures. This allows lower settings for low horsepower start-up, equipment testing, etc. This kit also allows for higher pressure settings as required in machine applications. For details refer to service drawing I-3255-S.

Operating Data

Displacement Speed, and Pressure Ratings

Preparation for Start-up

Before starting a PVE pump, fill the case through the uppermost drain port with clean system hydraulic fluid. The case drain line must be connected to the reservoir below oil level. For multiple pump arrangements that include non-PVE sections, the requirements of the non-PVE units must also be considered.

Mounting

Eaton Hydraulics recommends these PVE series piston pumps be mounted horizontally.

Displacement, Speed And Pressure Ratings

Model Number System	Displacement cm^3/r (in^3/r) Shaft End Pump	Cover End Pump	Rated Input Speed (At 0 psig Inlet)	Maximum Pressure bar (psi)
PVE012	25 (1.54)	–	3000	210(3000)
PVE19	41 (2.50)	–	2400	210(3000)
PVE21	45 (2.75)	–	2400	186(2700)

*Shaded product may not be available

Pressure Limits

Port	Pressure Range
Inlet**	0,2 bar to 2,0 bar (5 in. Hg. vacuum to 30 psi)
Outlet	See Maximum Pressures listed above
Drain*	0,35 bar (5 psig) maximum

*Integral relief valve protects pump by limiting case pressure peaks to 0,7 bar (10 psi) above inlet pressure. Flow from valve returned directly to pump inlet. Case drain line required to limit steady-state case pressure.

**See page 9 for Inlet vs. Speed details.
For non-intergrated units only

Operating Data

Displacement Speed, and Pressure Ratings

At Full Flow Conditions

Displacement cm^3/r (in^3/r)	Inlet Pressure/Vacuum*	Maximum Speed** rpm
PVE21 full displacement 45 (2.75) PVE19 full displacement 41 (2.50)	5 psig	2800
	0 psig	2400
	5 in. Hg.	2100
PVE19/21 destroked 33 (2.00)	5 psig	3100
	0 psig	2750
	5 in. Hg.	2500
PVE19/21 destroked 25 (1.50)	5 psig	3200
	0 psig	3000
	5 in. Hg.	2850

PVE012 limited to 3000 rpm at full displacement and 0 psig inlet.
*Minimum pressure/vacuum required at pump inlet to operate at displacement and speed listed.
**Speeds not listed, but within displacements shown above, may be calculated from values listed.

At Load Sense Standby Condition – "B" Option Controls

Model Number System	Maximum Speed rpm
PVE012	3600
PVE19	3200
PVE21	3200

Pump must be in zero flow, low pressure, standby condition when operated at listed speed. Pump may be damaged if not slowed to normal rated speed before being operated at full flow.

Response Data

	PVE012		PVE19/21	
Control Type	**On Stroke sec.**	**Off Stroke sec.**	**On Stroke sec.**	**Off Stroke sec.**
Pressure compensator	0.030	0.012	0.050	0.025
Load sense compensator	0.040	0.012	0.060	0.020

Yoke response recorded at rated speed and pressure, 0 psi inlet, 82°C (180°F), SAE 10W oil. Pressure rise was 6900 bar (100,000 psi) per second.

Sound Data

	1200 rpm, 70 bar (1000 psi)		1500 rpm, 140 bar (2000 psi)		1800 rpm, 210bar (3000 psi)	
Model Number System	**Full Stroke dB(A)**	**Compensated Stroke dB(A)**	**Full Stroke dB(A)**	**Compensated Stroke dB(A)**	**Full Stroke dB(A)**	**Compensated Stroke dB(A)**
PVE012	71	65	76	72	77	77
PVE19	79	74	83	85	86	87
PVE21	75	73	79	81	83*	83*

*2700 psi
Sound level dB(A) per ISO 4412-1 standard.

Model Code

E Series, PVE012 Pump

PV	E012	R	00	1AU	B	0	B	33	24	00	A	1	00	1	00	CD	0	A
1, 2	3,4,5,6	7	8,9	10,11	12	13	14	15,16	17,18	19,20	21	22	23,24	25	26,27	28,29	30	31

1, 2 Pump Series

PV – Open Circuit Piston Pump

3,4,5,6 Displacement

E012 – 25.2cm^3/r (1.54 in^3/r)

7 Input Shaft Rotation

R – Right-Hand Rotation (cw)

L – Left-Hand Rotation (ccw)

8, 9 Front Mounting and Input Shaft

01 – SAE B 2 bolt, Keyed

05 – SAE B 2 bolt, Splined 13t 16/32DP

09 – SAE B 2 bolt, Splined 26t 32/64DP

10,11 Main Ports Location and Size

AU – End ports, SAE o-ring; #20 suction, #12 pressure

AV – End ports, ISO 6149; M42 suction, M27 pressure

12 Drain Port Size

06 – M18 metric O-ring port – top (D1)

07 – M18 metric O-ring port – bottom (D2)

B – #8 SAE O-ring port – top (D1)

C – #8 SAE O-ring port – bottom (D2)

13 Diagnostic Pressure Port

0 – No diagnostic pressure port

14 Controller Type

A – Pressure Compensator

B – Pressure and flow compensator

C – Electric dual range pressure Compensator with directional control valve

D – Hydraulic remote control pressure compensator

E – Unloading valve (accumulator Circuits)

F – Electric dual range pressure compensator without directional control valve

15,16 Pressure Comp./Unloading Valve Setting

00 – No pressure compensator setting

33 – 207-214 bar (3000-3100 psi)

17,18 Flow Comp. Setting or Unload Valve

00 – No pressure compensator setting

11 – 9.65-12.41 bar (140-180 psi)

24 – 22.75-25.51 bar (330-370 psi)

19,20 Secondary Compensator Setting

00 – As Given in Code Title

21 Control Special Features

0 – No Special Features

A – Bleed down orifice, LS only

B – External load-sensing adjustment

G – High rate spring for low pressure setting

J – Bleed down orifice and high rate spring for low pressure setting

22 Maximum Displacement Option

1 – Standard ajdustment

2 – Adjustable maximum displacement (set at maximum)

23,24 Auxiliary Mounting and Output Shaft

00 – No auxiliary mounting or output shaft

25 Shaft Seals

0 – No shaft seal

1 – Standard shaft seal (nitrile)

26,27 Special Features

00 – No special features

28,29 Paint

00 – No paint

CD – Blue primer

30 Customer and unit identification

0 – STD – mark assembly Number, full model code and build data Code on plate

31 Design Code

A – First

Note: Consult an Eaton representative for additional settings

Shaft Torque Data

PVE012

PVE012 Shaft Torque Data

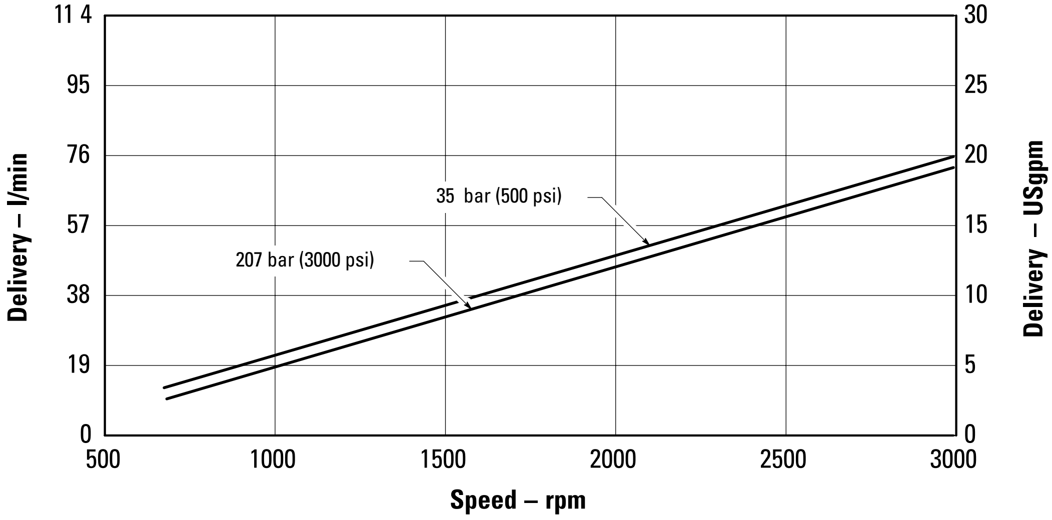
Input Shaft Torque N.m (lb.in.)	Designation	Thru-drive Option	Maximum Input
01	SAE "B" straight keyed	No	135 (1200)
05	SAE "B" spline 13T, 16/32 D.P., FRMDF	No	208 (1850)
09	Special Eaton 26T for use in rear pump of tandem PVE**-PVE12 unit	No	N/A

Performance Curves

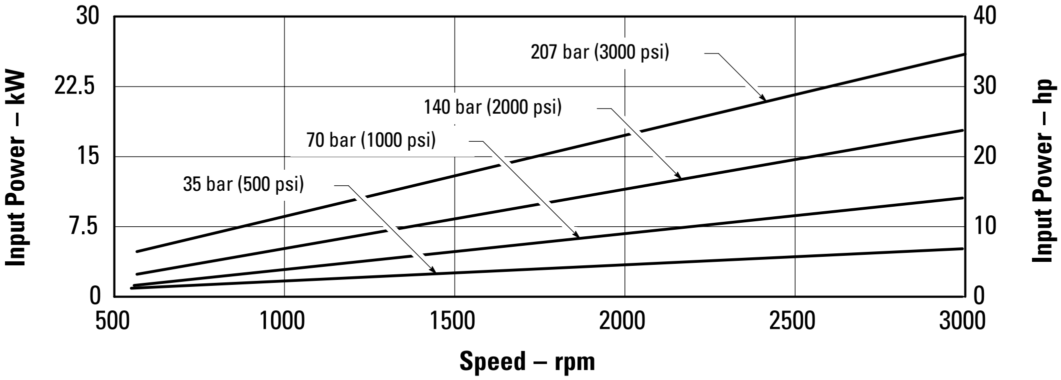
PVE012

Oil type: SAE 10W
Oil temperature: 49°C (180°F)
Inlet pressure: 0 psi

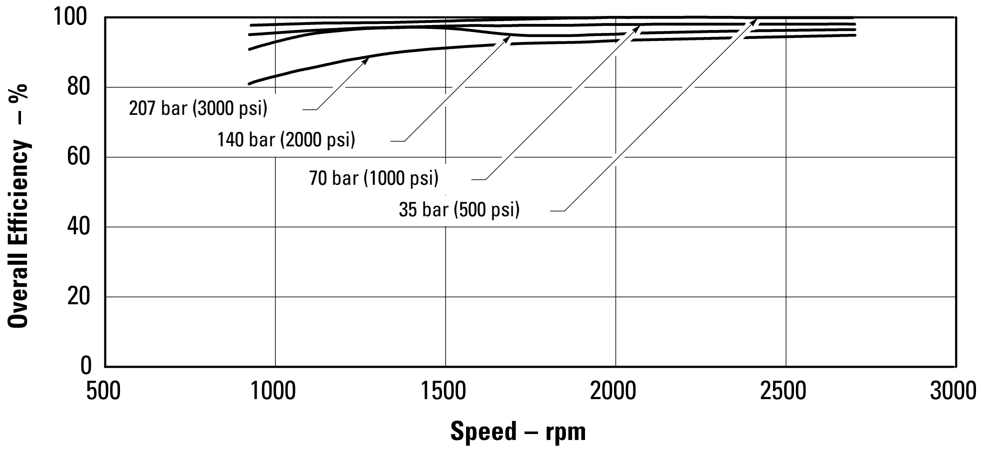
Effective Flow Versus Speed



Input Power Versus Speed

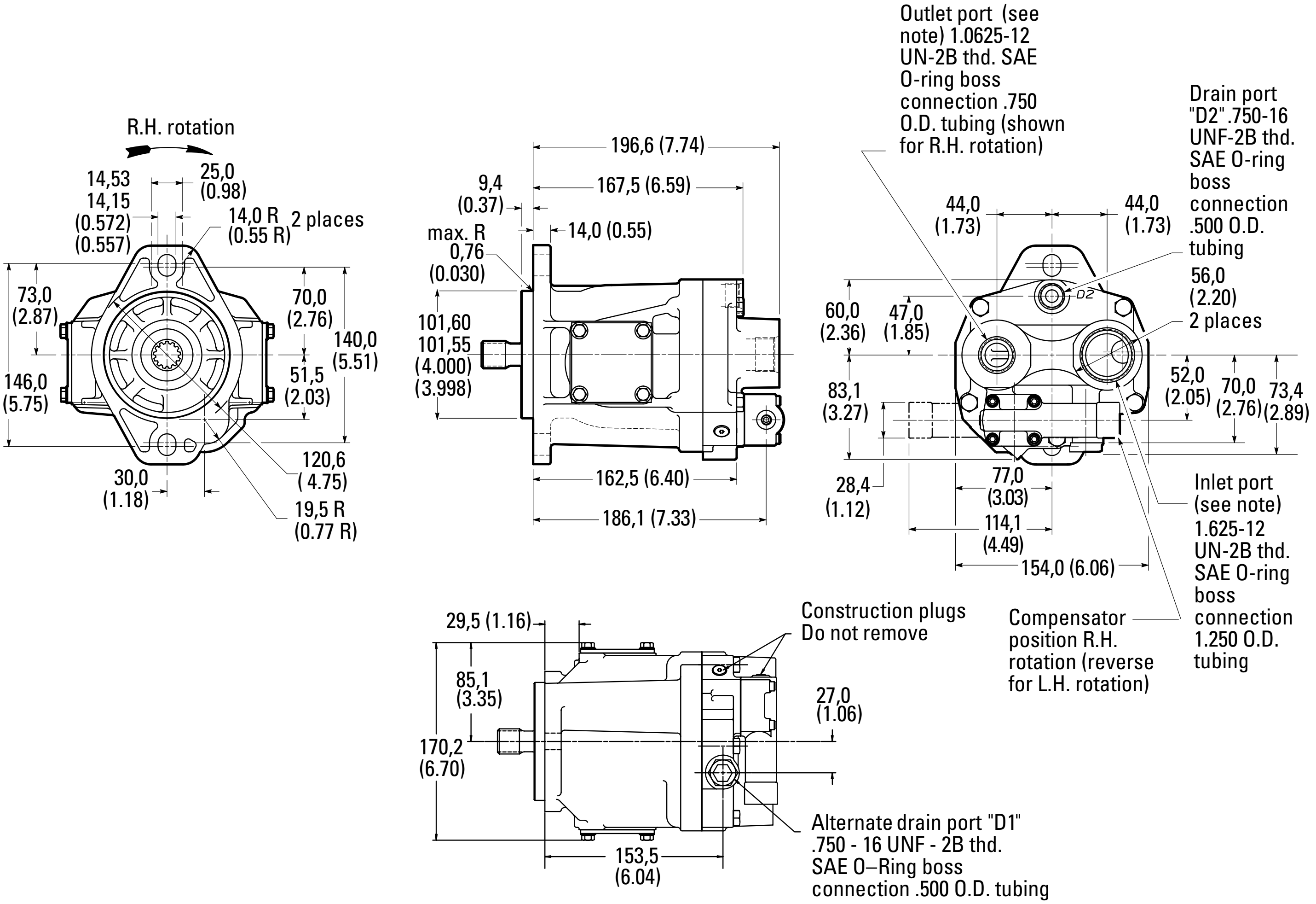


Volumetric Efficiency Versus Speed



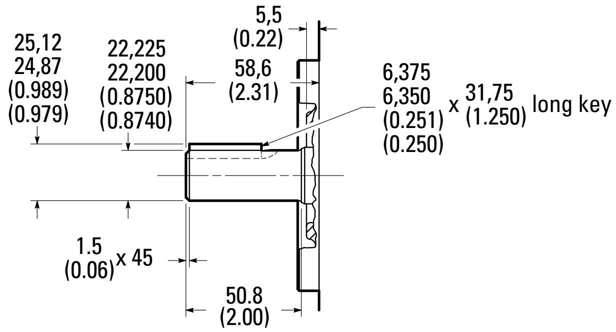
Installation Dimensions

PVE012 with Pressure Compensator



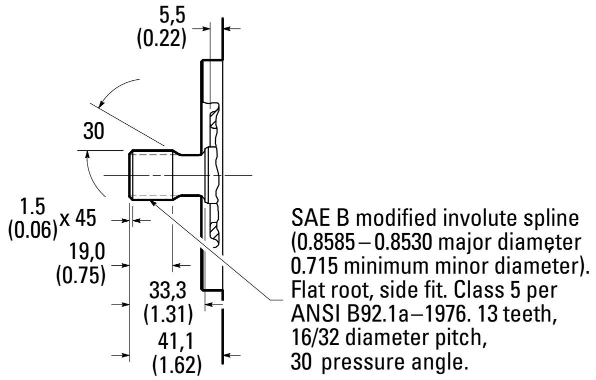
PVE012 Shaft Options

#01: SAE "B" Straight Keyed



Note: Applications requiring overhung load or side loading of shaft are subject to Eaton engineering approval.

#05: SAE "B" Splined



Controls

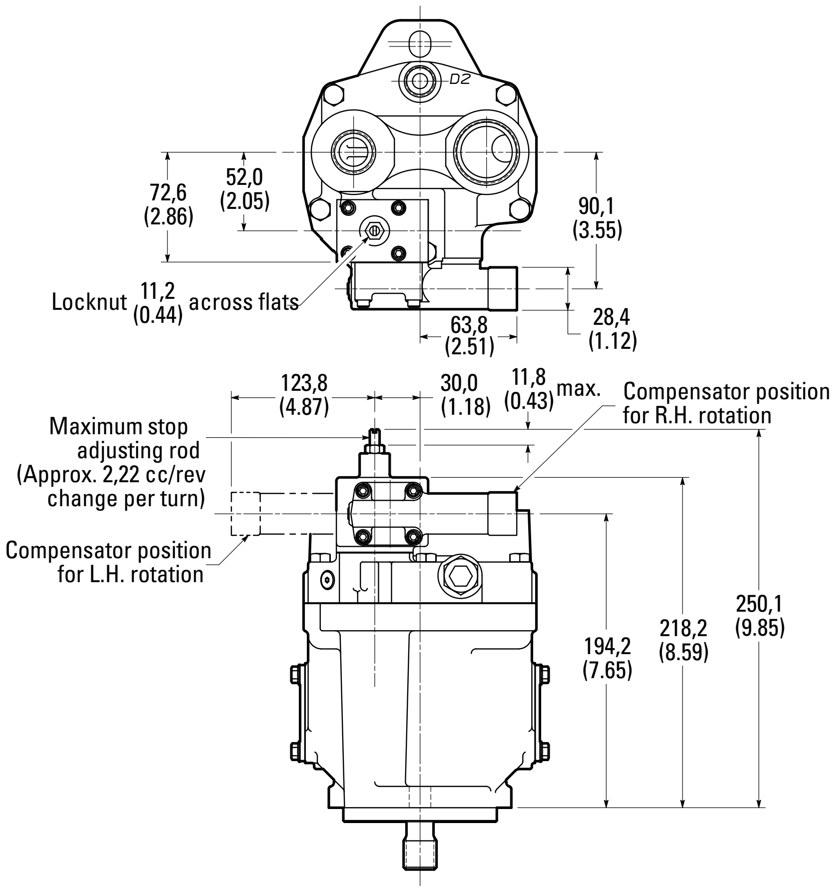
PVE012

See installation dimensions page 10 for other details.

Adjustment

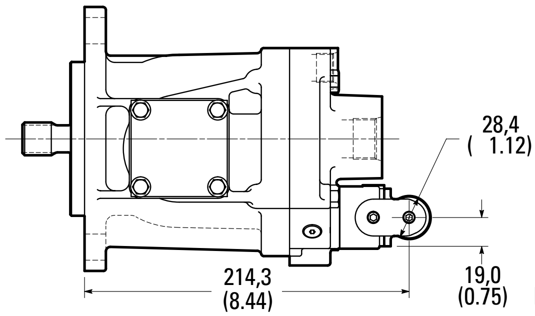
Loosen the locknut on the adjusting rod. Turn the adjusting rod clockwise to decrease maximum pump delivery, or counterclockwise to increase maximum pump delivery, until the desired setting is obtained. Secure the setting by tightening the locknut. To assist initial priming, the manual adjustment control setting must be at least 40% of the maximum flow position.

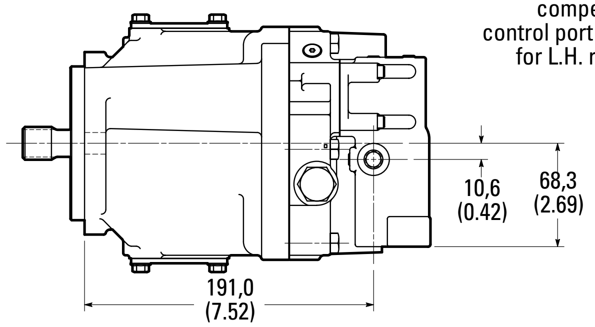
This control enables maximum pump delivery to be externally adjusted from 25% to 100% while maintaining all the standard features of a pressure compensated pump.

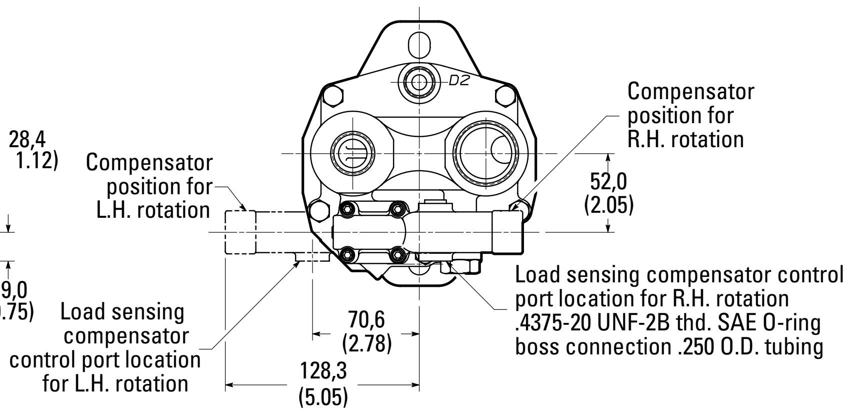


See installation dimensions page 10 for other details.

PVE012 Load Sensing with Pressure Limiter "A" Control Option



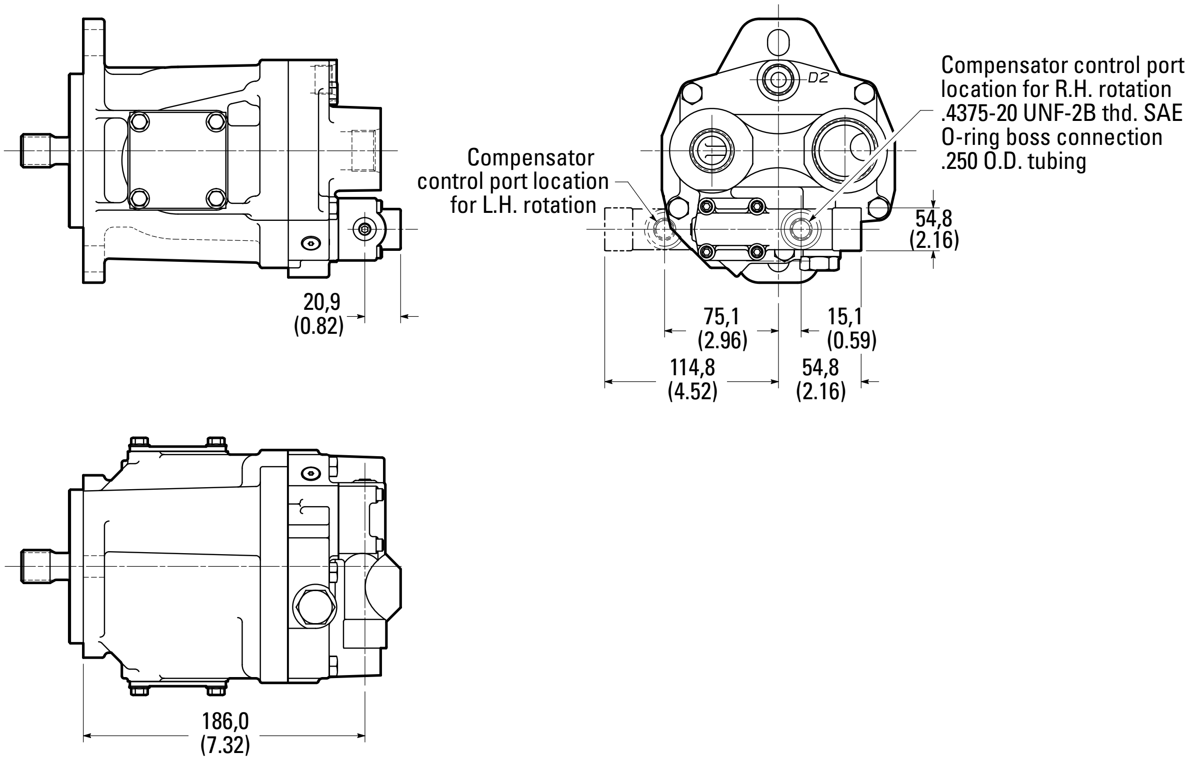




Controls

PVE012 Remote Adjustment Compensator

See installation dimensions
page 10 for other details.



Model Code

PVE19/21

PV	E19A	R	01	AA	1	0	B	33	24	00	A	1	AA	1	AF	CD	0	A
1, 2	3,4,5,6	7	8,9	10,11	12	13	14	15,16	17,18	19,20	21	22	23, 24	25	26, 27	28, 29	30	31

1, 2 Pump Series

PV – Open Circuit Piston Pump

3,4,5,6 Displacement

E19A – 41.0cm^3/r (2.50 in^3/r)
E21A – 45.1cm^3/r (2.75 in^3/r)

7 Input Shaft Rotation

R – Right-Hand Rotation (cw)
L – Left-Hand Rotation (ccw)

8, 9 Front Mounting and Input Shaft

01 – SAE B 2 bolt, Keyed

02 – SAE B-B 2 bolt, Keyed

04 – SAE B 2 bolt, tapered

05 – SAE B 2 bolt, splined 13t 16/32DP long shaft

08 – SAE B-B 2 bolt, splined 15t 16/32DP

09 – SAE B 2 bolt, splined 26t 32/64DP

10,11 Main Ports Location and Size

AA – Side ports, SAE o-ring; #24 suction, #14 pressure

AB – End ports, SAE o-ring; #24 suction, #14 pressure

AC – Side ports, SAE 4 bolt flange, Code 61; 1 1/2″ suction, 1″ pressure

AD – End ports, SAE 4 bolt flange, Code 61; 1 1/2″ suction, 1″ pressure

AE – Side ports, ISO 6149-1; M48 suction, M33 pressure

AF – End ports, ISO 6149-1; M48 suction, M33 pressure

AS – End ports ISO 6162 4 bolt flange; 1 1/2″ suction, 1″ pressure

12 Drain Port Size and Location

01 – #10 SAE O-ring port – top (D1)

02 – #10 SAE O-ring port – bottom (D2)

06 – M18 metric O-ring port – top (D1)

07 – M18 metric O-ring port – bottom (D2)

13 Diagnostic Pressure Port

0 – No diagnostic pressure port

1 – #4 SAE O-ring port – plugged

2 – M14 metric O-ring port – plugged

14 Controller Type

A – Pressure Compensator
B – Pressure and flow compensator
C – Electric dual range pressure compensator with directional control valve

D – Hydraulic remote control pressure compensator

E – Unloading valve (accumulator circuits)

F – Electric dual range pressure compensator without directional control valve

15,16 Pressure Comp./Unloading Valve Setting

00 – No pressure compensator setting

18 – 182.7-189.6 bar (2650-2750 psi)

33 – 206.8-213.7 bar (3000-3100 psi)

17,18 Flow Comp. Setting or Unload Valve

00 – No pressure compensator setting

11 – 9.65-12.41 bar (140-180 psi)

14 – 12.41-15.17 bar (180-220 psi)

24 – 22.75-25.51 bar (330-370 psi)

19,20 Secondary Compensator Setting

00 – No secondary compensator setting

04 – 186.2-193.1 bar (2700-2800 psi)

21 Control Special Features

0 – No Special Features
A – Bleed down orifice
B – External load-sensing adjustment
G – High rate spring for low pressure setting
J – Bleed down orifice and high rate spring for low pressure setting

Note: Consult an Eaton representative for additional settings

Model Code

PVE19/21

PV	E19A	R	01	AA	1	0	B	33	24	00	A	1	AA	1	AF	CD	0	A
1, 2	3,4,5,6	7	8,9	10,11	12	13	14	15,16	17,18	19,20	21	22	23,24	25	26,27	28,29	30	31

22 **Maximum Displacement Option**

1 – Standard ajdustment

2 – Adjustable maximum displacement (set at maximum)

23,24 **Auxiliary Mounting and Output Shaft**

00 – No auxiliary mounting or output shaft

AA – SAE A 2 bolt w/ 9T 16/32DP external splined shaft

AB – 2 Bolt A (SAE J744-82-2) w/ 11T 16/32DP ex. splined shaft

AC – SAE B 2 bolt w/ 13T 16/32 DP internal splined coupling

AD – SAE B 2 bolt w/ 15T 16/32DP internal splined coupling

AE – SAE B 2 bolt w/ 26T 32/64DP external splined shaft

AH – SAE A 2 bolt w/ 9T 16/32DP internal splined coupling

AJ – SAE A 2 bolt w/ 11T 16/32DP internal splined coupling

AK – SAE B 2 bolt w/ 26T 32/64DP internal splined coupling

25 **Shaft Seals**

0 – No shaft seal

1 – Flurocarbon shaft seal

26,27 **Special Features**

00 – No special features

AA – Auxiliary mounting cover plate

AF – Cast iron housing

28,29 **Paint**

00 – No paint

CD – Blue primer

30 **Customer and unit identification**

0 – Standard Eaton identification

31 **Design Code**

A – First design

Note: Consult an Eaton representative for additional settings

Shaft Torque Data

PVE19/21

Shaft Torque Data

Input Spline Data	Designation	Thru-drive Option	Maximum Torque N.m (lb.in.)
02	SAE “BB” straight keyed	Yes	215 (1900)
08	SAE “BB” spline 15T, 16/32 D.P., FRSF	Yes	337 (2987)
05	SAE “B” spline 13T, 16/32 D.P., FRSF	Yes	208 (1850)
01	SAE “B” straight keyed	No	135 (1200)
09	Special Eaton 26T for use in rear pump of tandem PVE**-PVE** unit	No	N/A

Note: See page 22 for more details.

Typical Rear Pumps for Thru-drives

PVE19/21

Typical Rear Pumps for Thru-Drives

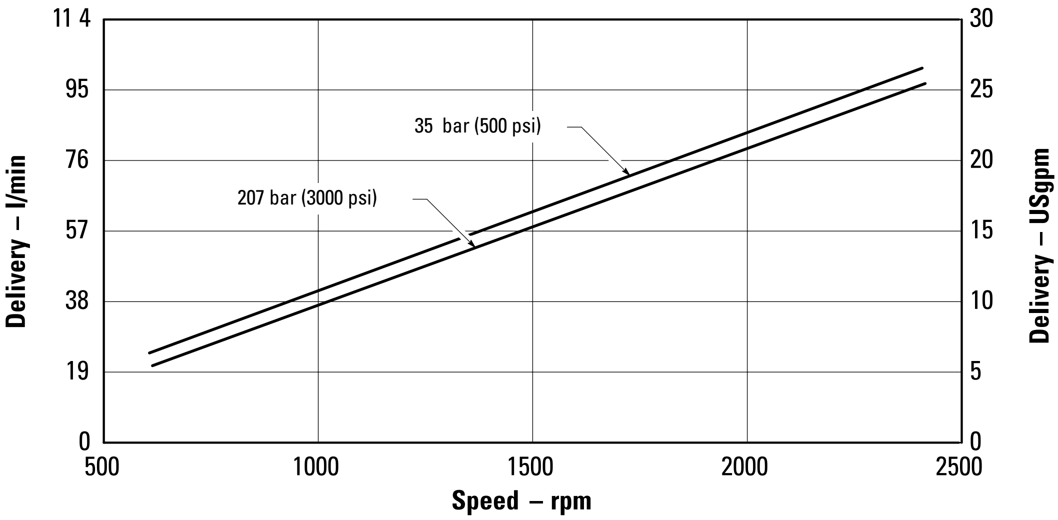
Model Code	Typical Rear Pump Model	Rear Pump Shaft Code	PVE** Thru-drive Coupling
AH	PVQ10/13 PVB5/6 V10 V20	3 Suffix -S214 11 62	864224 (9T / 9T Straight)
AC	PVE012 PVE19/21 PVQ20/32 PVQ40/45 V2010 or V2020 20V(Q)	5 5 3 5 11 151	864307 (26T / 13T Step)
AD	PVE19/21 PVQ40/45 2520V(Q)	8 8 166	475134 (26T / 15T Step)
AK	PVE012 PVE19/21 N/C PVQ40/45	9	627168 / 26T Straight)

Performance Curves

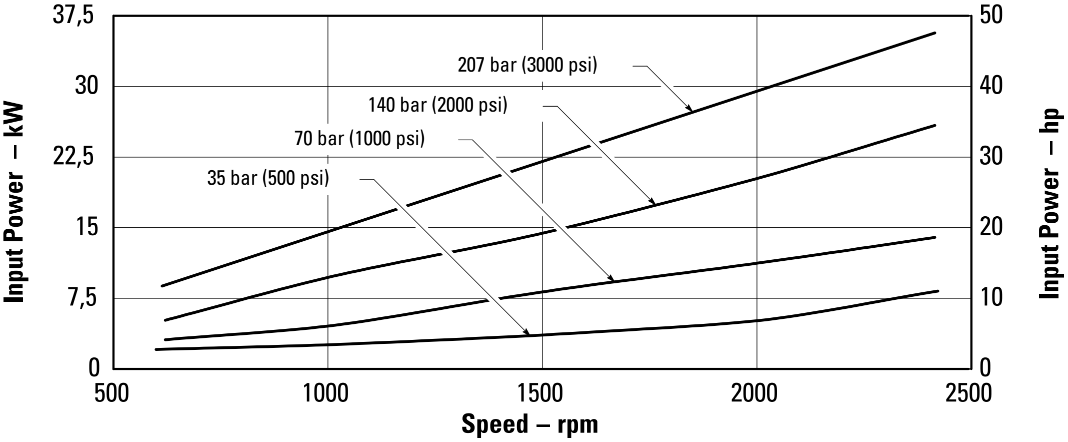
PVE19

Oil type: SAE 10W
Oil temperature: 82°C (180°F)
Inlet pressure: 0 psi

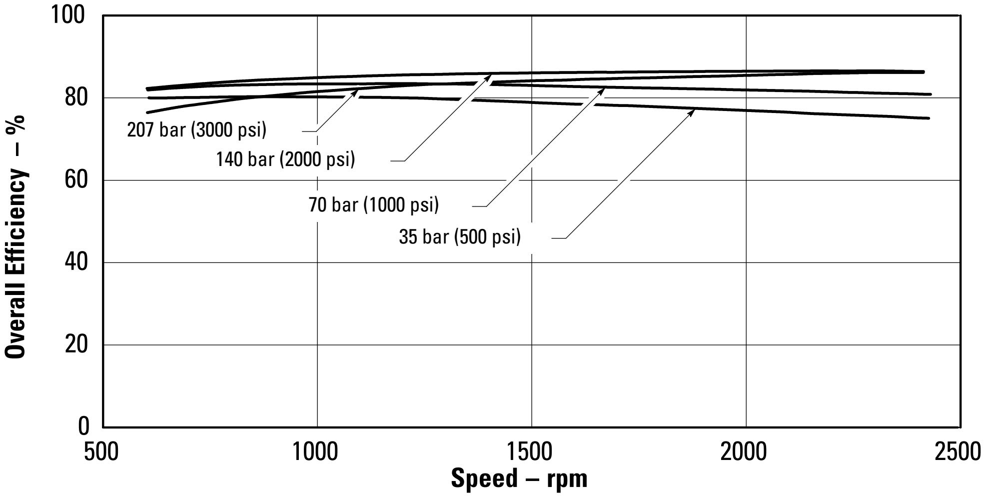
Effective Flow Versus Speed



Input Power Versus Speed



Overall Efficiency Versus Speed

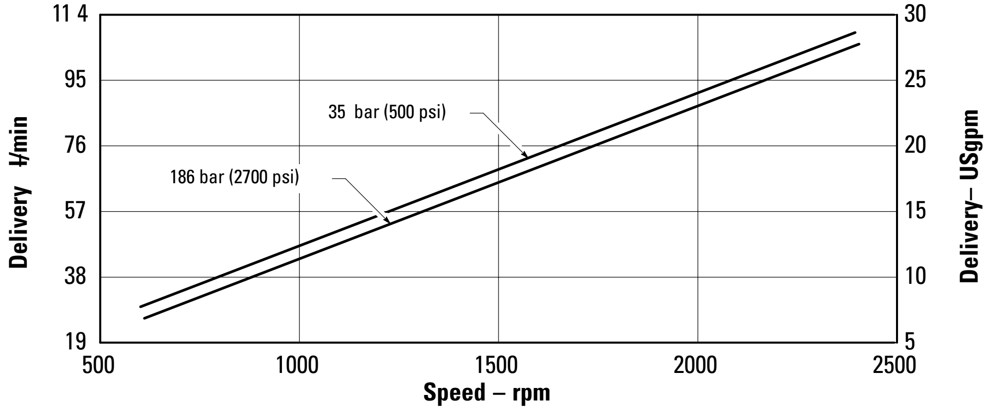


Performance Curves

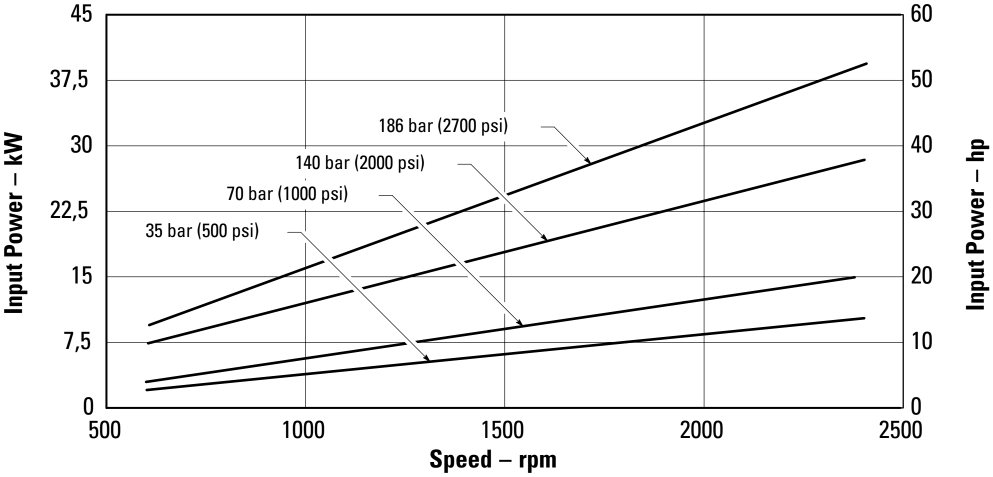
PVE19

Oil type: SAE 10W
Oil temperature: 82°C (180°F)
Inlet pressure: 0 psi

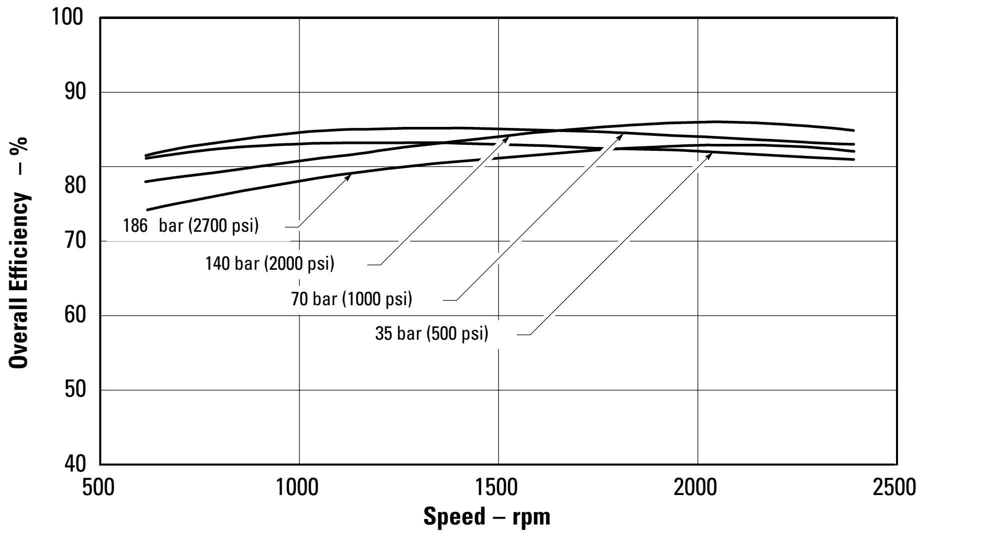
Effective Flow Versus Speed



Input Power Versus Speed



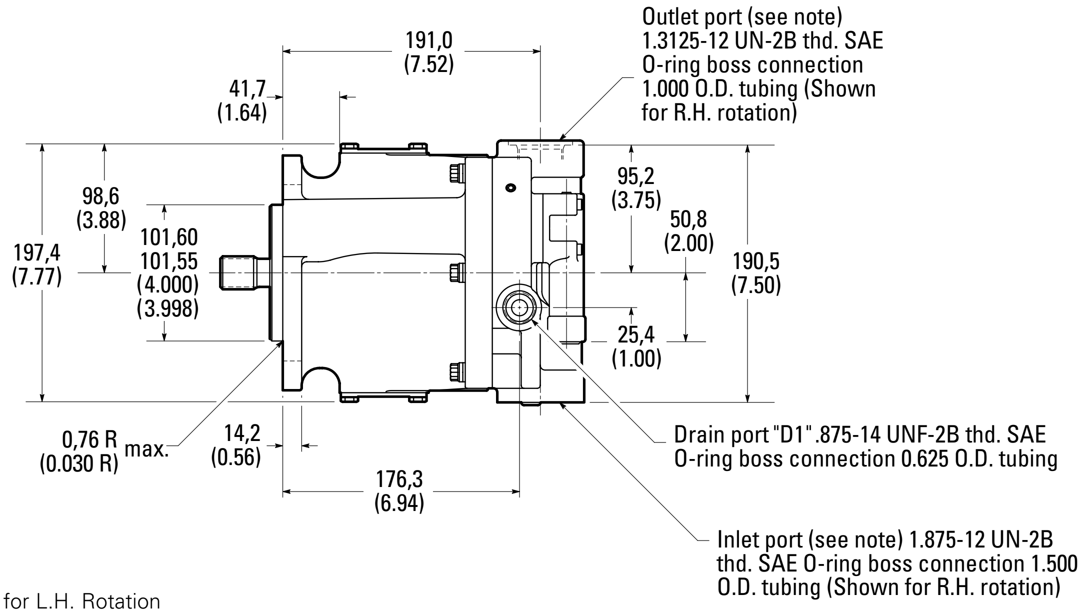
Overall Efficiency Versus Speed



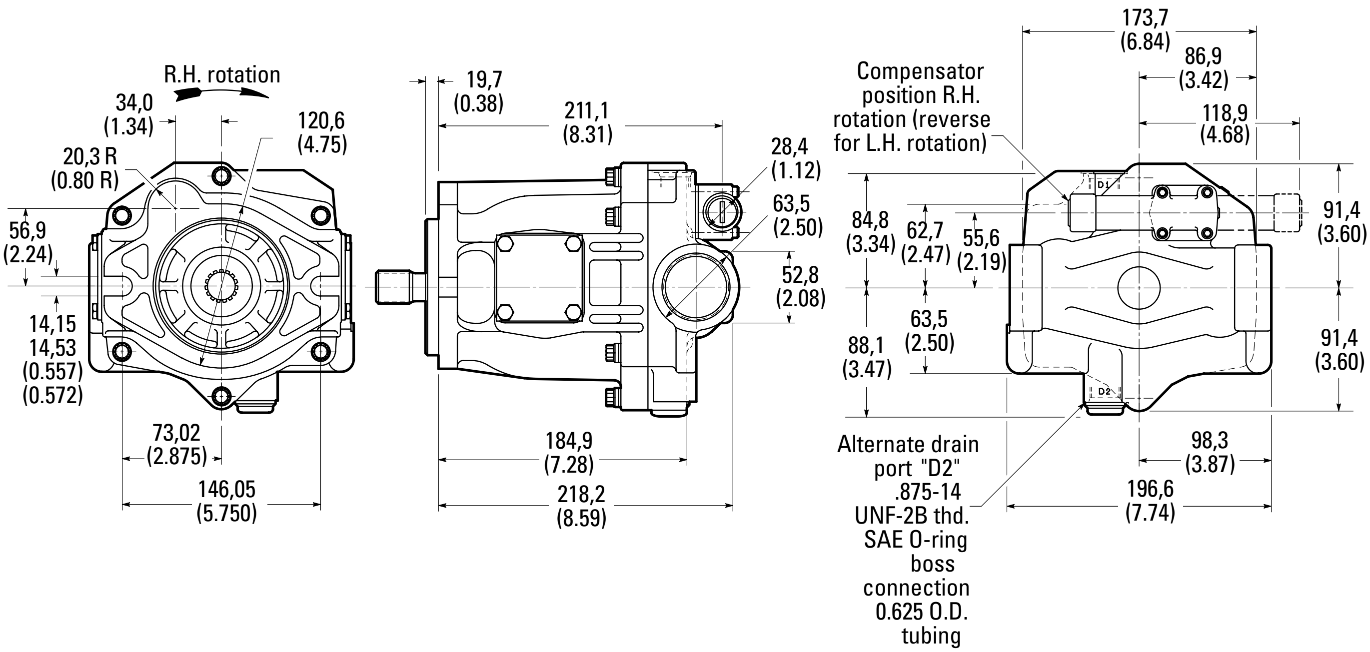
Installation Dimensions

PVE19/21 with Side Ports

Millimeters (inches)



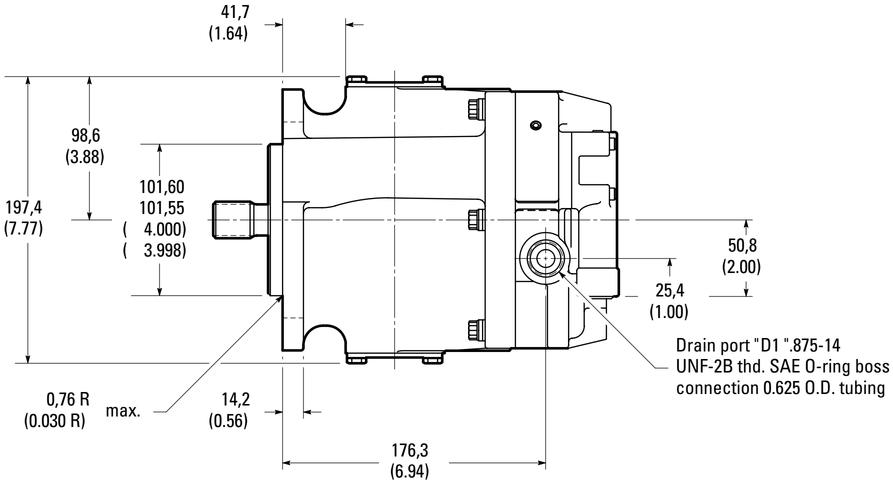
Note: Ports are reversed for L.H. Rotation



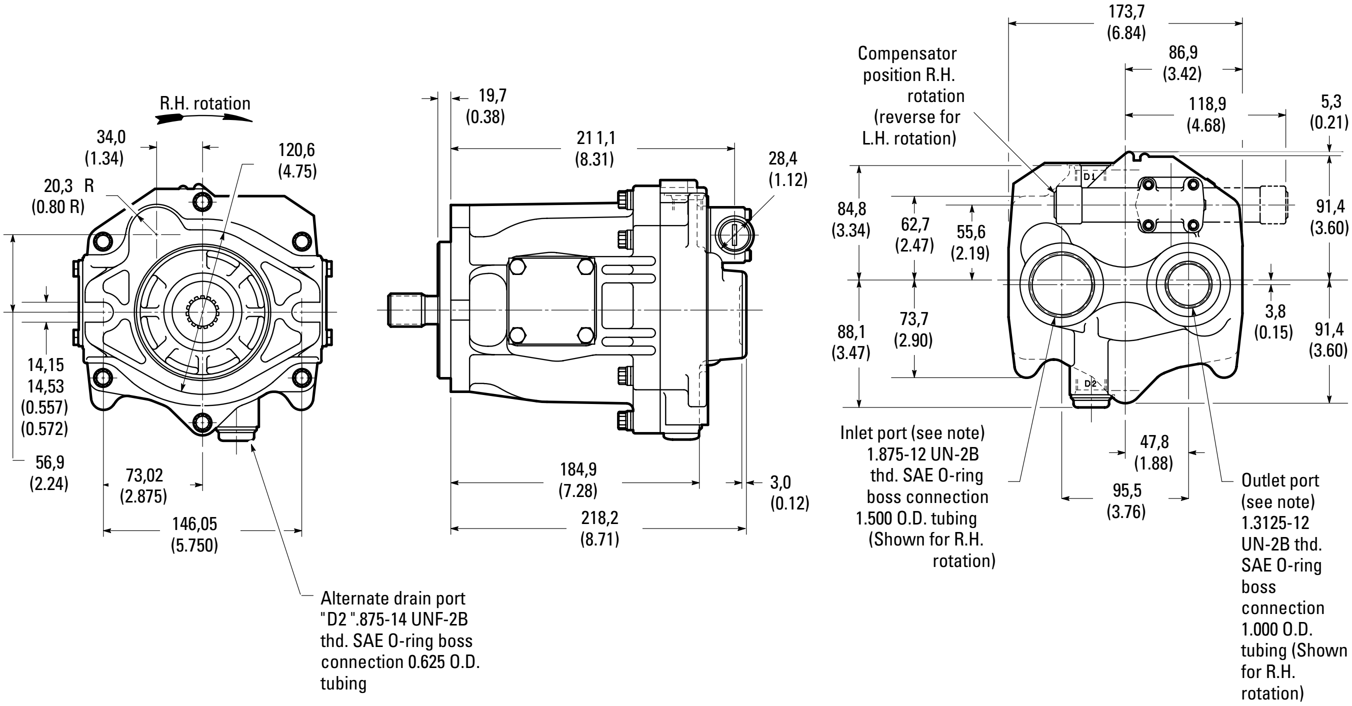
Installation Dimensions

PVE19/21 with End Ports

Millimeters (inches)



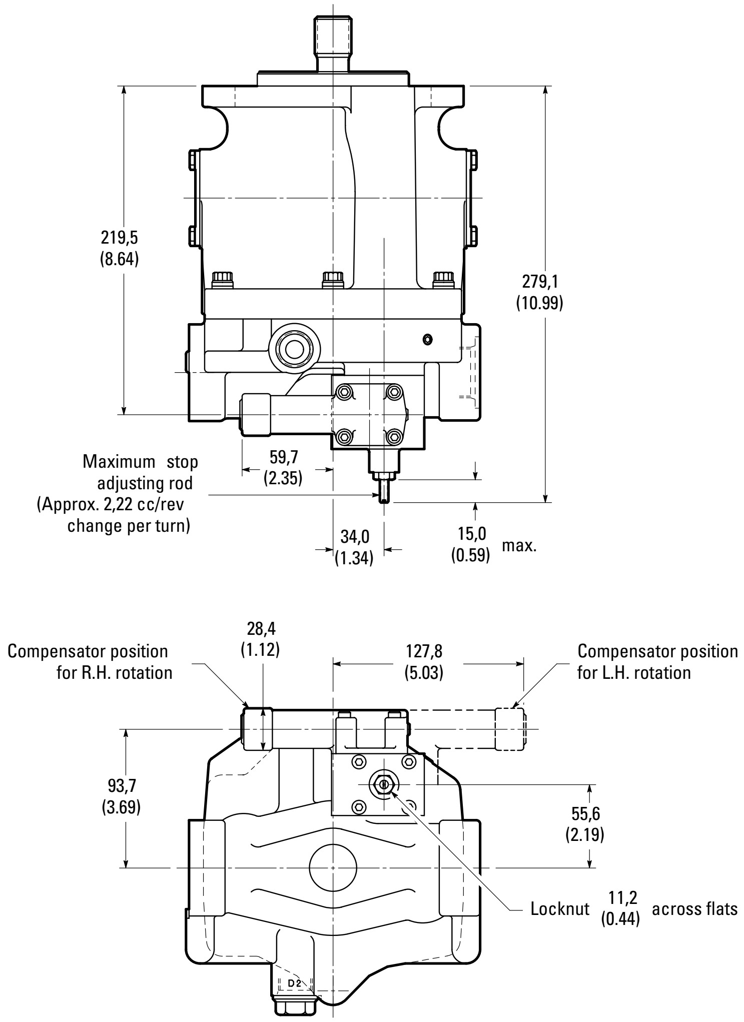
Note: Ports are reversed for L.H. Rotation



Adjustment

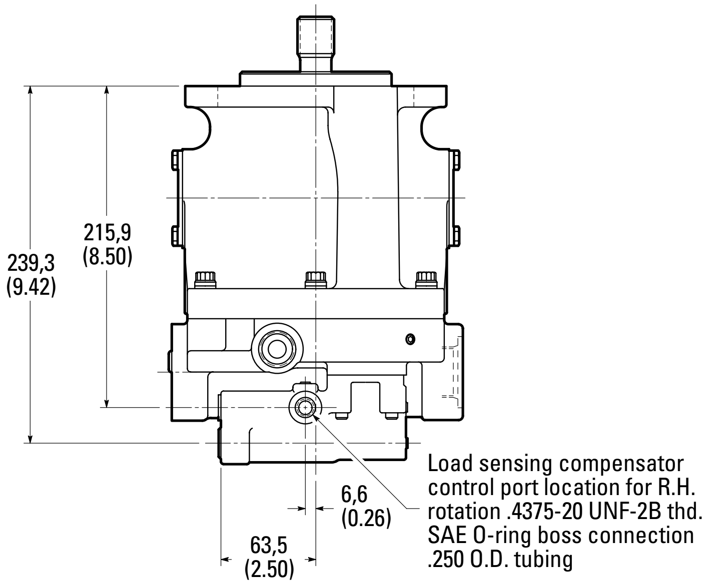
Loosen the locknut on the adjusting rod. Turn the adjusting rod clockwise to decrease maximum pump delivery, or counterclockwise to increase maximum pump delivery, until the desired setting is obtained. Secure the setting by tightening the locknut. To assist initial priming, the manual adjustment control setting must be at least 40% of the maximum flow position.

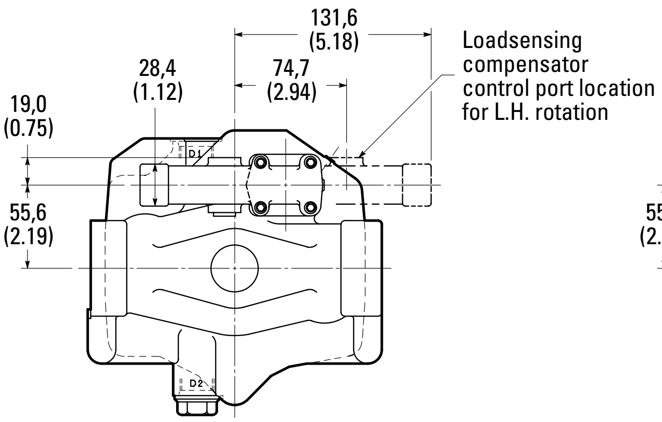
This control enables maximum pump delivery to be externally adjusted from 25% to 100% (it is not recommended below 50%) while maintaining all the standard features of a pressure compensated pump.



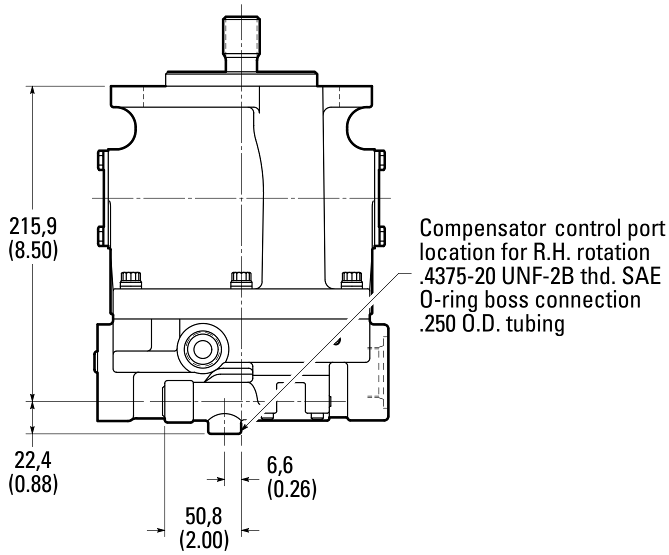
PVE19/21 Load Sensing with P ressure Limiter Control "B" Option

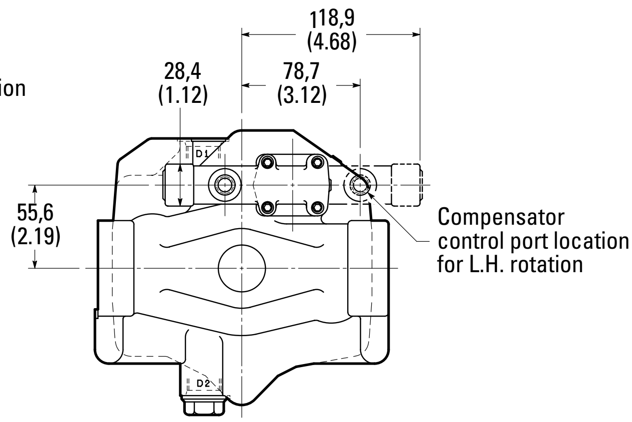
See pages19-20 for other details and dimensions.





PVE19/21 Remote Adjustment Compensator Control "D" Option





With the unloading valve control the variable pump will unload at a preset pressure. The pump will maintain this no flow, low pressure (approximately 14 bar (200 psi)) standby condition, until system pressure drops to about 85% of the preset unloading pressure. The pump will then return on stroke and provide full flow until the preset unloading pressure is reached again.

With this control, an efficient accumulator charging circuit is obtained. The pump will provide full flow to fill the accumulator until the maximum charging pressure is reached. The pump then goes to a standby condition until the accumulator pressure drops to 85% of the desired maximum. The accumulator is then recharged as the cycle starts over again.

A separate right angle check valve must be provided to maintain the accumulator hydraulic charge and prevent back flow when the pump is unloaded. The check valve's internal leakage must not exceed five drops per minute. The control port must be connected to system pressure, downstream of the check valve.

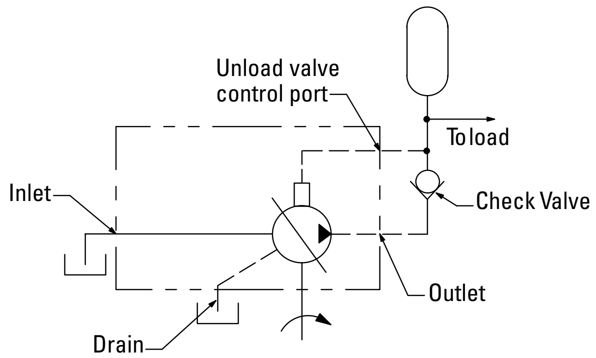
Adjustment range

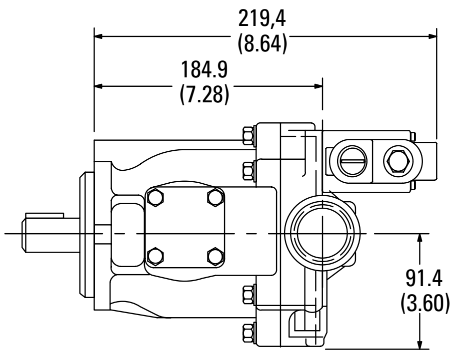
PVE19	100-210 bar (1500-3000 psi)
PVE21	100-186 bar (1500-2700 psi)

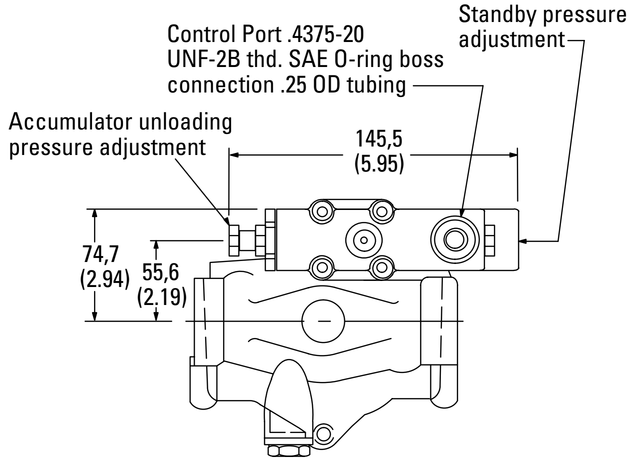
Cut-in pressure is 85% of unloading pressure, minimum.

Setting Pressures

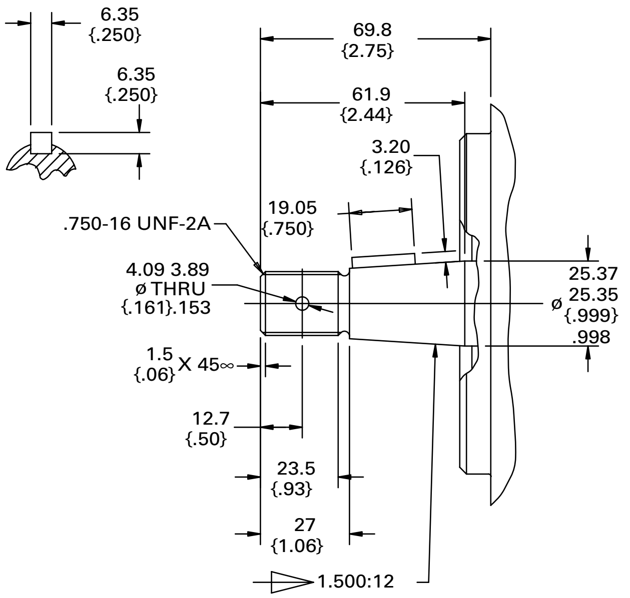
1. Back out accumulator unloading pressure adjustment screw to below desired unloading pressure.
2. Adjust desired standby pressure.
3. Set accumulator pressure by screwing in the accumulator unloading adjustment screw. Accumulator recharge (cut-in) pressure is a function of the maximum accumulator pressure and is not adjustable.
4. Check pressure settings and re-adjust if necessary.



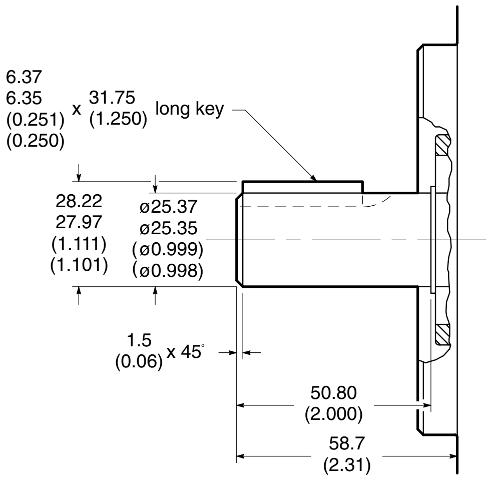




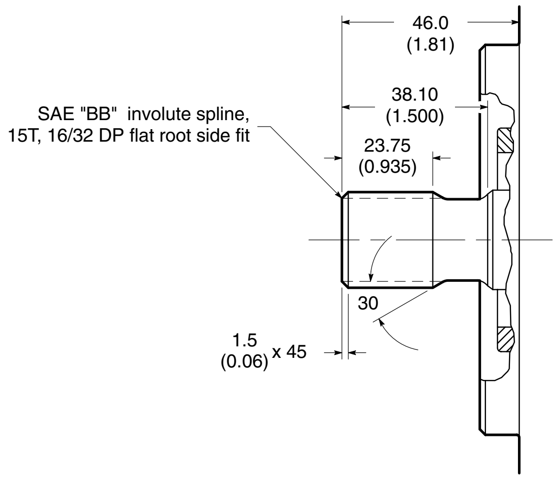
No. 04 Shaft: Tapered Key shaft



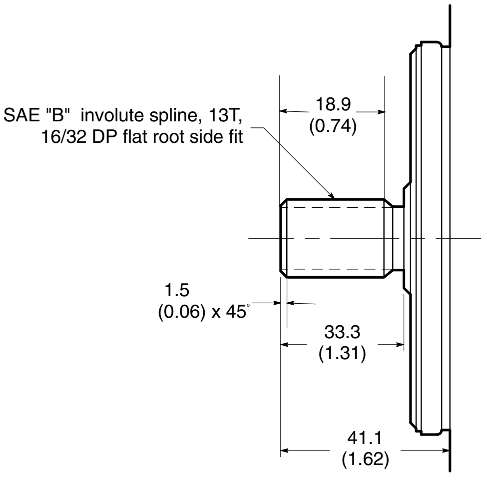
No. 02 Shaft: SAE "BB" Straight Keyed



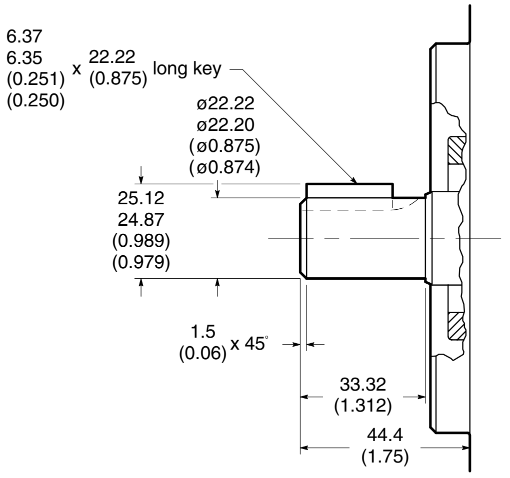
No. 08 Shaft: SAE "BB" Splined



No. 05 Shaft: SAE "B" Splined



No. 01 Shaft: SAE "B" Straight Keyed



Thru-drives

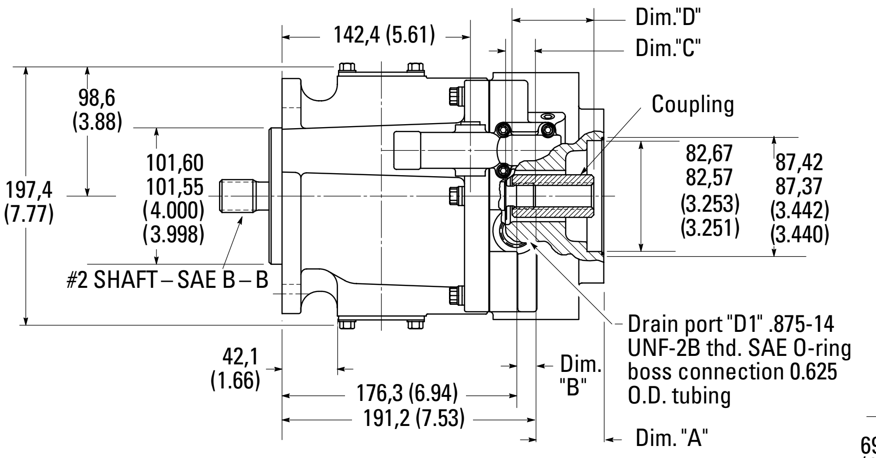
PVE19/21 SAE "A" Thru-drives

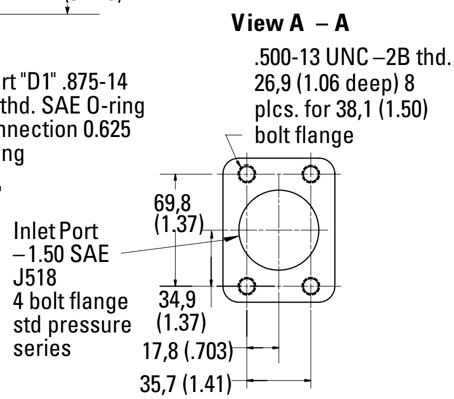
Millimeters (inches)

PVE 19/21 SAE "A" Thru-drives

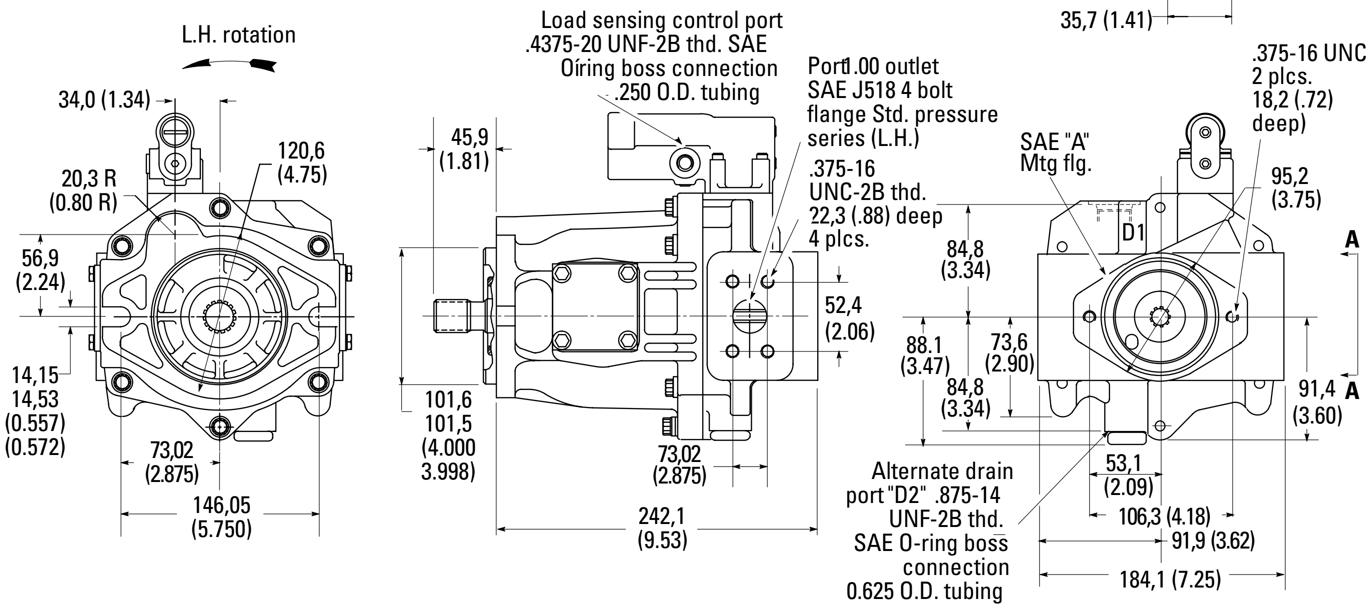
Thru-shaft	Spline Data	DIM. "A" mm (in.)	DIM. "B" mm (in.)	DIM. "C" mm (in.)	Max Torque Rating N.m (In. lbs.)	Coupling Length Dim "D" mm (in.)	
AA	9 teeth 16/32DP Flat Root Side Fit	50,8 (2.00)	12,7 (0.50)	22,6 (0.89)	58 (517)	864224 62,7 62,2	 (2.47) (2.45)
AB	11 teeth 16/32DP Flat Root Side Fit	50,8 (2.00)	14,5 (0.57)	22,6 (0.89)	123 (1100)	864325 60,9 60,7	 (2.40) (2.39)

Note: Couplings, screws and washers must be ordered separately to mount rear pump. "A" O-ring (AS568-042) is included with each thru-drive pump.





Note: Ports are reversed for R.H. Rotation



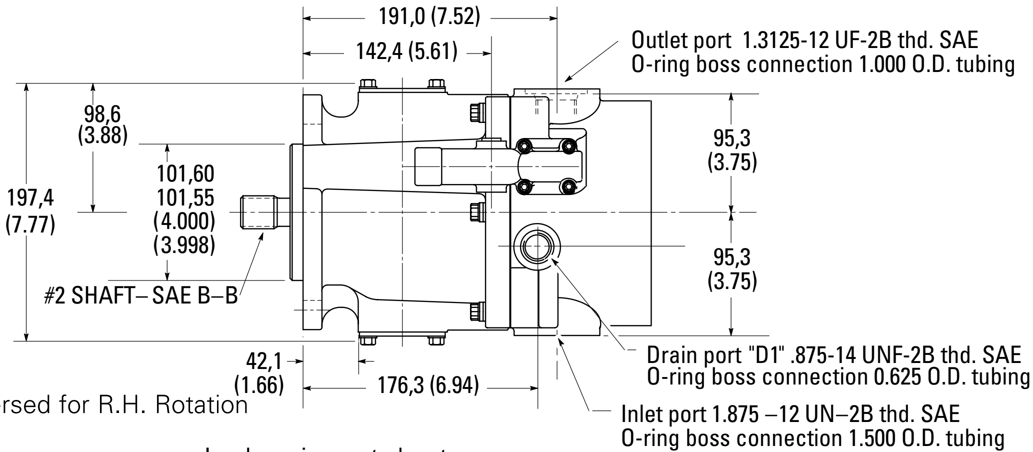
PVE19/21 SAE "B" Thru-drives

Millimeters (inches)

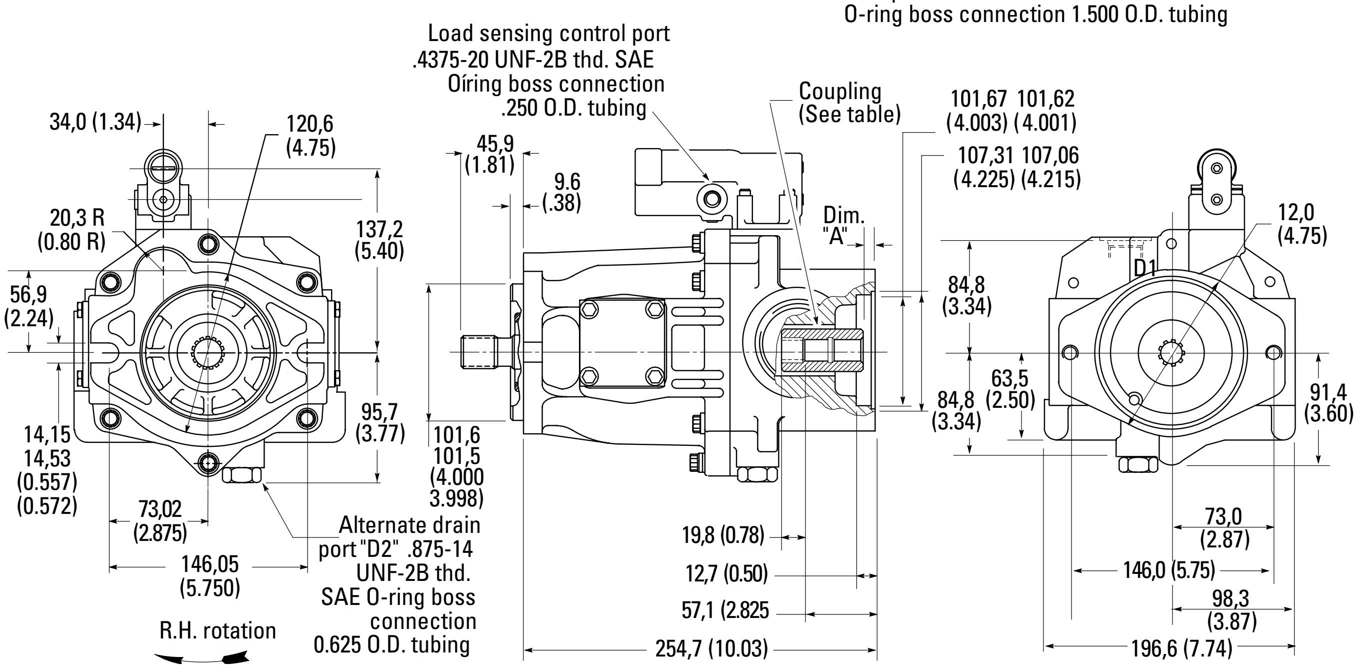
PVE 19/21 SAE "B" Thru-drives

Thru-shaft	Spline Data	Max Torque Rating N.m (In. lbs.)	DIM. "A" mm (in.)	Coupling Length Dim "D" mm (in.)
AE	Special Eaton 26 tooth 32/64DP Flat Root Side Fit	179 (1587)	10,9 (0.43)	864307 26T/13T
			20,6 (0.81)	475134 26T/15T
			24,9 (0.98)	627168 26T/26T

Note: Couplings, screws and washers must be ordered separately to mount rear pump. "A" O-ring (AS568-155) is included with each thru-drive pump. * Total input to front pump must not exceed input shaft limit! Thru shaft tongue maybe less baied on maximum input tongue to front pump.



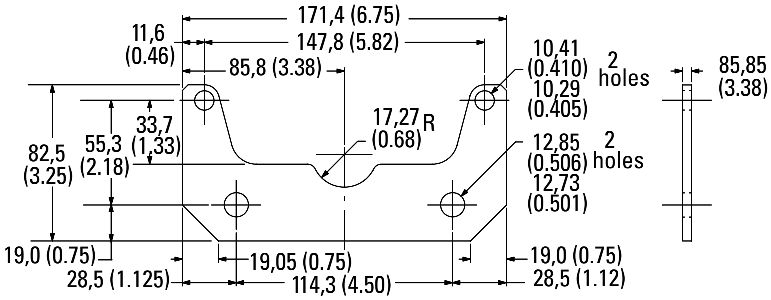
Note: Ports are reversed for R.H. Rotation



Millimeters (inches)

Thru-drive Pump Support Bracket

An optional support bracket should be used when a heavy second pump is mounted to a thru-drive PVE19/21. The support bracket (627179), two screws (199740), and two washers (427700) must be ordered separately.



Application Data

Fluid Cleanliness

Proper fluid condition is essential for long and satisfactory life of hydraulic components and systems. Hydraulic fluid must have the correct balance of cleanliness, materials, and additives for protection against wear of components, elevated viscosity, and inclusion of air. Fluid contamination levels according to ISO4406 should not exceed 21/18/13 for PVE Piston pumps.

Essential information on the correct methods for treating hydraulic fluid is included in Eaton publication 561 "Eaton Guide to Systemic Contamination Control" available from your local Eaton distributor or by contacting Eaton Hydraulics. Recommendations on filtration and the selection of products to control fluid condition are included in 561.

Recommended cleanliness levels, using petroleum oil under common conditions, are based on the highest fluid pressure levels in the system and are coded in the chart below. Fluids other than petroleum, severe service cycles, or temperature extremes are cause for adjustment of these cleanliness codes. See Eaton publication 561 for exact details.

Eaton products, as any components, will operate with apparent satisfaction in fluids with higher cleanliness codes than those described. Other manufacturers will often recommend levels above those specified. Experience has shown, however, that life of any hydraulic component is shortened in fluids with higher cleanliness codes than those listed below. These codes have been proven to provide a long, trouble-free service life for the products shown, regardless of the manufacturer.

Fire resistant fluids

Water glycol, phosphate ester and polyol ester fluids may be used with PVE pumps. With the PVE012 and PVE19, system pressure and input speed should not exceed 140 bar (2000 psi) and 1800 r/min.

System temperature should not exceed 54°C (130°F). Inlet vacuum should not exceed 101,6 millibar (3 in. Hg.).

Hydraulic fluids and temperature ranges

Use antiwear hydraulic oil, or automotive type crankcase oil designations SC, SD, SE or SF per SAE J183FEB80.

Select a viscosity grade that will allow optimum viscosity, between 40 cSt (180 SUS) and 16 cST (80 SUS), to be achieved within the optimum performance envelope shown.

For further information, see Eaton Hydraulic Hints and Trouble Shooting Guide.

Ordering procedure

Order PVE pumps by the full model designation. Pump displacement, mounting flange type, direction of rotation, pump configuration, shaft end type, seals, pressure adjustment range, specific control functions are all specified in the full model code.

Notes

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Eden Prairie, MN 55344
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Powering Business Worldwide

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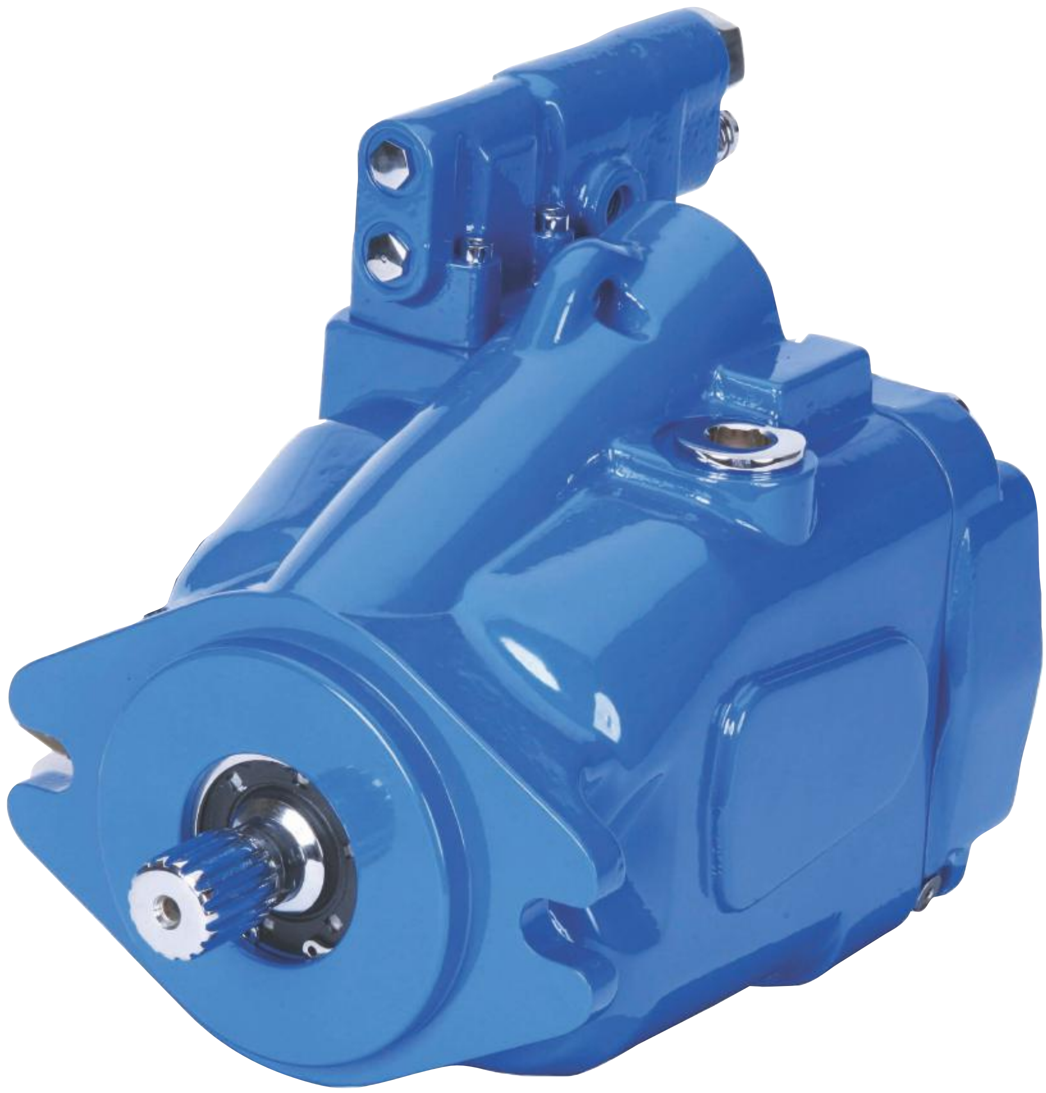
December 2009

420 Mobile Piston Pump
Design Code B

ADU041 ADU062
ADU049 ADU080



Powering Business Worldwide

Introduction

420 Series Mobile Piston Pump

Eaton's 420 Series mobile pumps are open circuit, axial piston designs with displacements of 41cc, 49cc, 62cc, and 80cc for operating speeds up to 2,650 rpm. They are available with a variety of control options to match their performance to a broad range of mobile applications.

The highly efficient pump controls reduce cooling system requirements, allowing a smaller and less expensive design to be used. Or, cooling capacity can be kept the same and the flow capability of the system increased to improve performance.

A strong, field-proven rotating group allows the pumps to handle pressures to 280 bar (4000 psi) continuous and 320 bar (4600 psi) intermittent – with less maintenance cost. 420 Series pumps use a saddle-type swashplate with steel-backed polymer bearings and a pressure lubrication passage to reduce wear and support internal loads.

The swashplate is very stiff, which reduces deflection and allows even loading of the bearings to extend the unit's service life. The combination of high load capacity bearings and a stiff drive shaft help provide a pump B10 bearing life of up to 10,280 hours at rated mobile conditions, reducing operating costs and extending operating life.

A single control piston is used to vary pump output. This design reduces the forces acting on the swashplate, resulting in reduced package size, which allows pump installation into tighter locations.

In response to customer expectations and regulatory requirements, Eaton has designed the 420 Series pumps to operate at very low noise levels. A bimetal timing plate is used to improve pump filling characteristics which further reduces fluid-borne noise and extends pump life.

Both SAE and ISO mounting flange configurations are available as well as SAE and ISO tube- and flange-type ports. Side- or end-ported models are available to facilitate plumbing and help fit the pump to machine space needs, as are multiple drain ports to allow many mounting orientations.

Typical Applications

- Loader backhoes
- Vibratory cable plows
- Mining machinery
- Dump truck lifts
- Agriculture tractors
- Chemical applicator trucks
- Railroad equipment
- Container handling, all-terrain, and truck cranes
- Vibratory cable plows
- Mining machinery and tunnel boring equipment
- Utility boom, off-road dump, and refuse trucks
- Material handling trucks and rough terrain fork lifts
- Concrete and asphalt pavers
- Feller/bunchers, forwarders, and log loaders
- Crawler dozers
- Articulate haulers
- Mini-excavators

Features and Benefits

- Long pump life
- Quiet pump operation
- Low installed and operating costs
- Reduced maintenance
- Flexibility in machine design
- Compact size saves space
- Design promotes leak-free system

Table of Contents

Model Codes

420 Mobile Piston Pump

ADU	062	R	08	AB	1	0	A	43	14	00	0A	1	AB	1	00	CD	0	B
1 2 3	4 5 6	7	8 9	10 11	12	13	14	15 16	17 18	19 20	21 22	23	24 25	26	27 28	29 30	31	32

1 2 3 Pump Series

ADU – 420 Series Open Circuit Piston Pump

4 5 6 Pump Displacement

041 – 41.0 cm3/r [2.50 in3/r]
049 – 49.2 cm3/r [3.00 in3/r]
062 – 62.3 cm3/r [3.80 in3/r]
080 – 80.0 cm3/r [4.88 in3/r]

7 Input Shaft Rotation

R – Right Hand
L – Left Hand

8 9 Front Mount and Shaft

01 – 2 Bolt B, 22.2 mm (0.875in.) Dia. Keyed Shaft
02 – 2 Bolt B, 25.4 mm (1.00in.) Dia. Keyed Shaft
03 – 2 Bolt B, 22.22 mm (.875in.) Dia. Tapered Keyed Shaft
05 – 2 Bolt B, 13 Tooth 16/32 Spline
08 – 2 Bolt B,15 Tooth 16/32 Spline
32 – 2/4 Bolt C, 14 Tooth 12/24 Spline
33 – 2/4 Bolt C, 31.8 mm (1.25in) Dia. Keyed Shaft
34 – 2 Bolt B, 15 Tooth 16/32 Sled Runner Spline
35 – 2 Bolt B, 14 Tooth 12/24 Spline
38 – 2/4 Bolt C, 31.75 mm (1.25) Dia. Tapered Keyed Shaft

10 11 Main Ports Size & Location

AA – Rear Ports Suction - 2" (Code 61); Pressure - 1" (Code 61)
AB – Side Ports Suction - 2" (Code 61); Pressure - 1" (Code 61)
AC – Rear Ports Suction - 2" (Code 61) with M12 Threads; Pressure - 1" (Code 61) with M10 Threads.
AD – Side Ports Suction - 2" (Code 61) with M12 Threads; Pressure - 1" (Code 61) with M10 Threads.
AE – Rear Ports Suction - SAE O-Ring Port; Pressure - UN-2B SAE O-Ring Port (ADU041 & ADU049 only)
AF – Side Ports Suction - #24 SAE O-Ring; Pressure - #16 SAE O-Ring (ADU041 and ADU049 Only)
AG – Rear Ports Suction - M48 Metric O-Ring; Pressure - M33 Metric O-Ring (ADU041 & ADU049 Only)
AH – Side Ports Suction - M48 Metric O-Ring; Pressure - M33 Metric O-Ring (ADU041 & ADU049 Only)
AK – Rear Ports Suction - 2" (Code 61); Pressure - #16 SAE O-Ring (ADU062 Only)

12 Case Drain Ports

1 – #12 SAE O-Ring - Top
2 – #12 SAE O-Ring - Bottom
3 – M27 x 2 O-Ring - Top
4 – M27 O-Ring - Bottom
5 – #12 SAE O-Ring - Left Side (Swash Sensor Boss)

13 Diagnostic Pressure Ports

Not available on thru-drive units

0 – No Diagnostic Pressure Ports
1 – #6 SAE O-Ring - Plugged (Rear Ports Only)
2 – M14 Metric O-Ring - Plugged (Rear Ports Only)
3 – #4 SAE O-Ring - Plugged (Side Ports Only)
4 – M12 Metric O-Ring - Plugged (Side Ports Only)

14 Controller Type

A – Pressure Flow Compensator With #4 SAE O-Ring Load Sense Port
B – Pressure Flow Compensator With M12 Metric O-Ring Load Sense Port
C – Pressure Compensator Only
H – Pressure Flow Compensator With Torque Control #4 SAE O-Ring Load Sense Port
J – Pressure Flow Compensator With Torque Control M12 Metric O-Ring Load Sense Port
K – Pressure Compensator With Torque Control
V – EH Inverse Proportional Pressure Control (vertical mounting)
W – Remote Pressure Control with .4375-20 SAE O-Ring Port, Left Side#
1 – Remote Pressure Control M12 Metric O-Ring Port, Left Side

15 16 Pressure Compensator Setting (Tolerance on Setting)*

28 – 207-214 bar [3000-3100 lbf/in2]
35 – 241-248 bar [3500-3600 lbf/in2]
43 – 276-283 bar [4000-4100 lbf/in2]

* Additional Settings Available by Request

- Recommend RPC pressure settings 10-21 bar (140-350 psi)

Model Codes

420 Mobile Piston Pump

ADU	062	R	08	AB	1	0	A	43	14	00	0A	1	AB	1	00	CD	0	B
1 2 3	4 5 6	7	8 9	10 11	12	13	14	15 16	17 18	19 20	21 22	23	24 25	26	27 28	29 30	31	32

17 18 Flow Compensator / Remote Pressure Control Setting*

00 – No Flow Compensator Setting
14 – 12-15 bar [180-220 lbf/in2]
24 – 23-26 bar [330-370 lbf/in2]

19 20 Torque Control Setting

00 – No Torque Control
AA – 40 Nm [350 in-lbs] (41,49)
AB – 51 Nm [450 in-lbs] (41,49)
AC – 62 Nm [550 in-lbs] (41,49,62)
AD – 73 Nm [650 in-lbs] (41,49,62,80)
AE – 85 Nm [750 in-lbs] (41,49,62,80)
AF – 96 Nm [850 in-lbs] (41,49,62,80)
AG – 107 Nm [950 in-lbs] (41,49,62,80)
AH – 119 Nm [1050 in-lbs] (49,62,80)
AJ – 130 Nm [1150 in-lbs] (49,62,80)
AK – 141 Nm [1250 in-lbs] (49,62,80)
AL – 153 Nm [1350 in-lbs] (62,80)
AM – 164 Nm [1450 in-lbs] (62,80)
AN – 175 Nm [1550 in-lbs] (62,80)
AP – 186 Nm [1650 in-lbs] (62,80)
AR – 198 Nm [1750 in-lbs] (62,80)
AT – 209 Nm [1850 in-lbs] (62,80)
AU – 220 Nm [1950 in-lbs] (80)

21 22 Control Special Features

00 – Control Special Features
0A – Bleed Down Orifice
0B – 24V Cold Start Valve
0D – 12V Cold Start Valve
0S – 12V DC Solenoid AMP Jr Connector (used with EH inverse proportional pressure control)
0T – 24V DC Solenoid AMP Jr Connector (used with EH inverse proportional pressure control)
0U – 12V DC Solenoid Deutsch Connector (used with EH inverse proportional pressure control)
0V – 24V DC Solenoid Deutsch Connector (used with EH inverse proportional pressure control)

23 Maximum Displacement Option*

1 – Standard Displacement (As Given In Code Title)
2 – External Manual Stroke Adjustment

24 25 Auxiliary (Rear) Mount & Output Shaft

00 – No Auxiliary Mounting Features
AB – SAE A 2 Bolt, 11T 16/32 Spline
AC – SAE B 2 Bolt, 13T 16/32 Spline
AD – SAE B 2 Bolt, 15T 16/32 Spline
AE – SAE A 2 Bolt, 9T 16/32 Spline

26 Shaft Seal

0 – No Shaft Seal
1 – Standard Polyacrylate Shaft Seal
2 – Viton Shaft Seal
3†– Double, Two-Way Shaft Seal, Viton With VHO Filter
4 – Nitrile Shaft Seal
5 – Single Viton Shaft Seal in 2/4 Bolt C Mount Pump Housing

27 28 Pump Special Features

00 – No Special Features
AA – Auxiliary Mounting Cover Plate
AB – Swash Position Sensor
AC – Shaft Speed Sensor
AD – Modified End Cover, Corner Removed
AE – Support Studs (1/2-13 UNC-2B x 117.8 (4.64) Long in Top Two End Cover/Housing Bolt Locations
AG – Swash Position Sensor and Shaft Speed Sensor

29 30 Paint

00 – No Paint
CD – Blue Primer
0B – Black

31 Identification/Packaging

0 – Standard Eaton Identification Box Packaging
J – ATEX certification

32 Design Level

B – Second Design

* Additional Settings Available by Request Additional settings available by request, including fixed displacement stops.

† Not available on SAE B mount

Specifications and Performance

General Performance Specifications

		Units	ADU041	ADU049	ADU062	ADU080
Displacement		**cc/r (in³/r)**	41.0 (2.50)	49.2 (3.00)	62.3 (3.80)	80.0 (4.88)
Weight	Single Seal[1]	**kg (lbm)**	22.9 (50.4)	22.9 (50.4)	23.8 (52.4)	24.2 (53.4)
	Dual Seal[1]		24.1 (53.1)	24.1 (53.1)	25.0 (55.1)	25.4 (56.1)
Pressure	Continuous	**bar (psi)**	280 (4060)	280 (4060)	280 (4060)	210 (3050)
	Intermittent[2]		320 (4600)	320 (4600)	320 (4600)	230 (3335)
	Peak[3]		350 (5000)	350 (5000)	350 (5000)	250 (3625)
Speed[4]	At 1 bar abs (0 psig)	**rpm**	2650	2650	2600	2500
	At .85 bar abs (5 in.Hg)		2450	2450	2400	2200
	At 2 bar abs (15 psig)		2950	2950	2800	2800
	Max (standby)		3600	3600	3600	3600
	Min		600	600	600	600
Power	Max (theoretical)	**kW (hp)**	50.7 (68.0)	60.8 (81.5)	75.6 (101.3)	61.7 (82.7)
	Standby		.98 (1.3)	.98 (1.3)	1.1 (1.5)	1.4 (1.9)
Torque	Max (theoretical)	**Nm (lb-ft)**	183 (135)	219 (162)	278 (205)	268 (198)
Bearing Life[5]	At 140 bar (2030 psi)	**B10 Hours**	103,650	55,580	33,500	17,150
	At 210 bar (3045 psi)		26,830	14,380	8,670	4,440
	At 280 bar (4060 psi)		10,280	5,510	3,320	N/A
Mass Moment of Inertia		**Nm-sec² (lb-in-sec²)**	.0033 (.0288)	.0033 (.0288)	.0046 (.0403)	.0058 (.0517)

1 Standard SAE B non-through drive.
2 Less than 10% of duty cycle.
3 Momentary system pressure spikes only.
4 Ratings based on Flange ports. Note: Tube ports are not available on the 62cc and 80cc displacements.
5 Bearing life ratings at rated speed - 1 bar abs (0 psig) inlet.

Inlet Pressure, Case Pressure, and Operating Temperature Requirements

Inlet Pressure			Case Pressure			Operating Temperature		
Rated bar abs (psig)	Minimum bar abs (in. Hg)	Maximum bar abs (psig)	Maximum Continuous bar abs (psig)	Maximum Intermittent bar abs (psig)	Peak bar abs (psig)	Rated °C (°F)	Minimum Temperature °C (°F)	Maximum Intermittent °C (°F)
1.0 (0)	0.85 (5)	4.4 (50)	1.3 (5)	3.1 (30)	6.2 (75)	93 (200)	-37 (-35)	104 (220)

Hydraulic Fluids

Fluid	Recommended Operating Viscosity Range cSt (SUS)	Maximum Continuous cSt (SUS)	Maximum Viscosity at Startup cSt (SUS)	Minimum Viscosity @ Max. Intermittent Temperature of 93°C (200°F) cSt (SUS)	Minimum Intermittent cSt (SUS)
Use antiwear hydraulic oil, or automotive type crankcase oil (designations SC, SD, SE or SF) per SAE J183 FEB80	16 to 40 (80 to 188)	430 (1192)	2100 (9720)	10 (59)	6 (46)

For more information, see Eaton publication 579. For operation on other alternative or environmentally friendly fluids, please contact your Eaton Representative.

Control Options

Load Sense and Pressure Compensator

Load Sense and Pressure Compensator Control

The pump will provide power matching of pump output to system load demand, maximizing efficiency and improving load metering characteristics of any directional control valve installed between the pump and the load.

Load sensing ensures that the pump always provides only the amount of flow needed by the load. At the same time, the pump operating pressure adjusts to the actual load pressure plus a pressure differential required for the control action. When the system is not demanding power, the load sense control will operate in an energy-saving stand-by mode.

Typically, the differential pressure is that between the pressure inlet and service port of a proportionally controlled directional valve, or a load sensing directional control valve. See the model code on page 4 for differential pressure settings for load sensing.

If the load pressure exceeds the system pressure setting, the pressure compensator de-strokes the pump. The load sensing line must be as short as possible and can also be used for remote control or unloading of the pump pressure. For remote control purposes, it is recommended that you contact your Eaton Representative for the correct configuration of the control.

Warning: The pressure compensator may be adjusted beyond the rated pressure of the pump. When adjusting the pressure limiter, install a 0-350 bar (0-5000 psi) gage in the outlet gage port and limit the pressure setting to the continuous rated pressure for the pump displacement shown on page 6.

Pressure Limit Settings

The pressure compensator uses two springs to cover the full pressure range of the ADU pumps. The high pressure spring covers the range from 140 bar (2050 psi) to 280 bar (4060 psi). The low pressure spring is adjustable from minimum pressure through 140 bar (2050 psi).

Flow Compensator (Load Sense) Settings

There are three springs used to cover the load sense adjustment range of this control.

Pressure Compensator Spring Pressure Ranges:

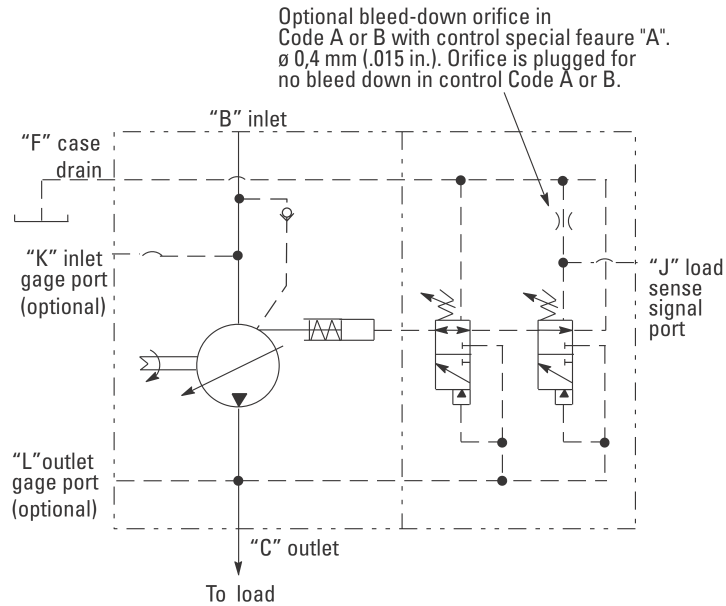
60 bar (870 psi) to 144 bar (2089 psi)

144 bar (2089 psi) to 280 bar (4060 psi)

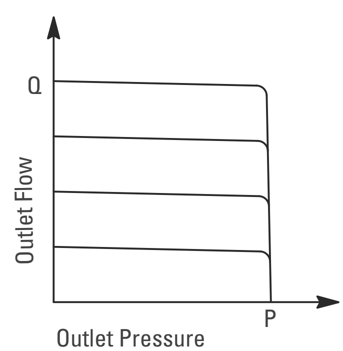
Flow Compensator (Load Sense) Spring Pressure Range:

10.3 bar (150 psi) to 17.2 bar (250 psi)

17.2 bar (250 psi) to 31.0 bar (450 psi)



Typical Operating Curve



Dynamic Response per SAE J745 (Using Swash Plate Position)

	Response (off stroke)	Recovery (on stroke)	Load Sense Recovery
	msec	msec	msec
ADU041	20	75	90
ADU049	20	75	90
ADU062	25	90	115
ADU080	26	75	115

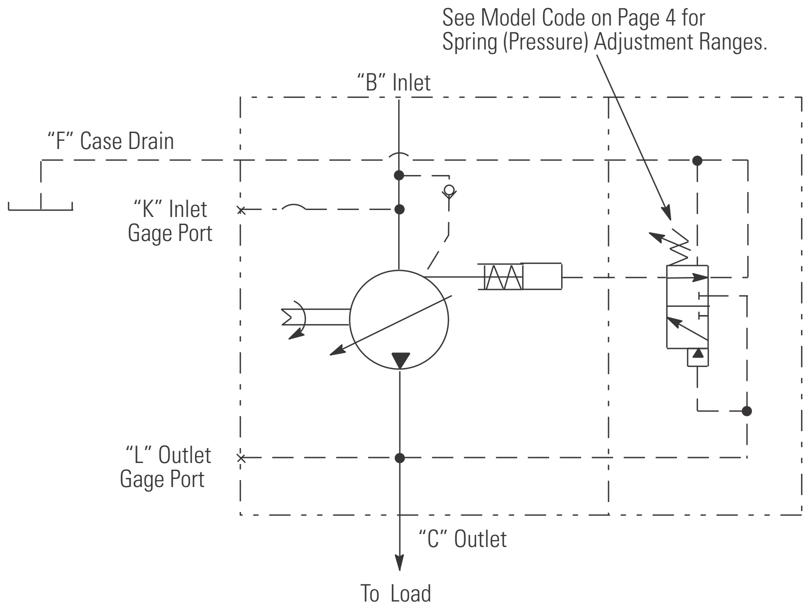
Pressure Compensator Control

The pump will provide a continuously modulated flow to meet changing load demands at a pre-adjusted compensator pressure. At pressures below the compensator setting, the pump will operate at maximum displacement. See model code on page 4 for compensator pressure ranges.

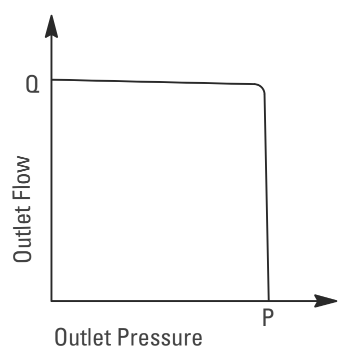
Warning: The pressure compensator may be adjusted beyond the rated pressure of the pump. When adjusting the pressure limiter, install a 0-350 bar (0-5000 psi) gage in the outlet gage port and limit the pressure setting to the continuous rated pressure for the pump displacement shown on page 6.

Pressure Limit Settings

The pressure compensator uses two springs to cover the full pressure range of the ADU pumps. The high pressure spring covers the range from 140 bar (2050 psi) to 280 bar (4060 psi). The low pressure spring is adjustable from minimum pressure through 140 bar (2050 psi).



Pressure Cut-off Characteristics of Pressure Compensator Control at 49°C (120°F), static conditions.



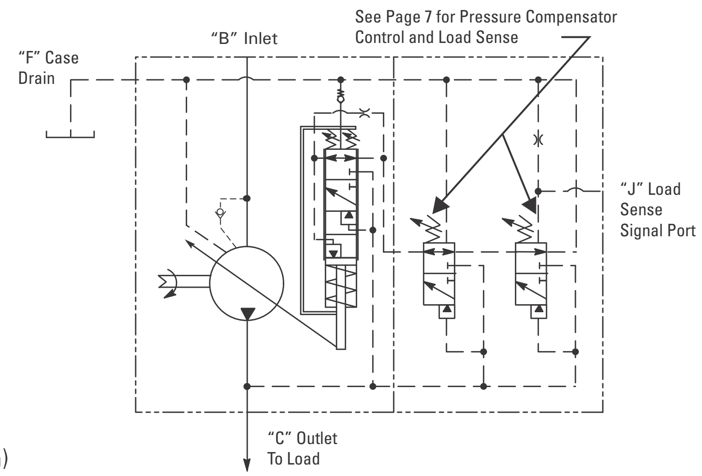
Dynamic Response per SAE J745 (Using Swash Plate Position)

	Response (off stroke)	Recovery (on stroke)
	msec	msec
ADU041	20	75
ADU049	20	75
ADU062	25	90
ADU080	26	75

Torque Control

The 420 Torque Control limits the power input to the pump preventing the engine from stalling while also optimizing the use of the engine power.

When combined with Pressure Compensator Control and/or Load Sense (refer to page 7) it will allow the 420 to remain inside the power envelope of the Pressure Flow curve. When the combination of pump flow and outlet pressure moves outside the envelope, the pump displacement will automatically be reduced.



This maximum setting is easily calculated using the following steps:

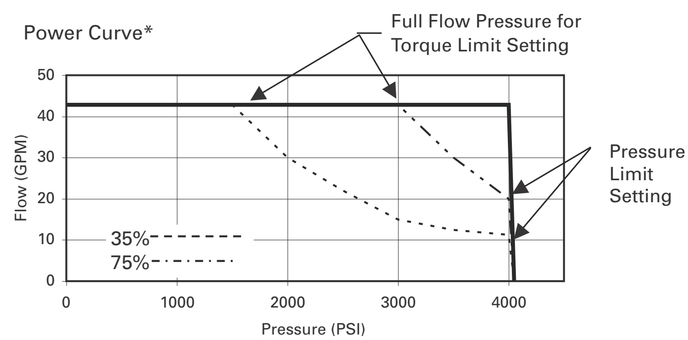
1. Select the 420 pump displacement you intend to use
2. Identify the available engine horsepower (HP) and speed (rpm)
3. Calculate the torque limit required by the system using the equations shown
4. Select the MAX torque setting from the table shown

$$\text{Torque (in-lbs)} = \frac{\text{Horsepower (HP)} \times 63025}{\text{Engine RPM}} \qquad \text{Torque (Nm)} = \frac{\text{Horsepower (KW)} \times 9550}{\text{Engine RPM}}$$

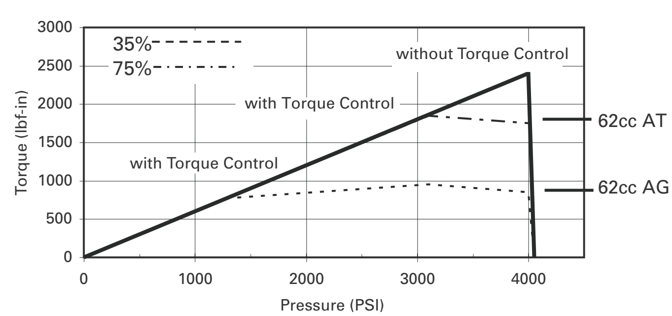
Code	Torque Setting	41cc	49cc	62cc	80cc
AA	40 Nm (350 in-lbs)			—	—
AB	51 Nm (450 in-lbs)			—	—
AC	62 Nm (550 in-lbs)				—
AD	73 Nm (650 in-lbs)				
AE	85 Nm (750 in-lbs)				
AF	96 Nm (850 in-lbs)				
AG*	107 Nm (950 in-lbs)				
AH	119 Nm (1050 in-lbs)	—			
AJ	130 Nm (1150 in-lbs)	—			
AK	141 Nm (1250 in-lbs)	—			
AL	153 Nm (1350 in-lbs)	—	—		
AM	164 Nm (1450 in-lbs)	—	—		
AN	175 Nm (1550 in-lbs)	—	—		
AP	186 Nm (1650 in-lbs)	—	—		
AR	198 Nm (1750 in-lbs)	—	—		
AT*	209 Nm (1850 in-lbs)	—	—		
AU	220 Nm (1950 in-lbs)	—	—		

* reference 62cc

Power Curve*



Torque Curve*



EH Inverse Proportional Pressure Control (IPPC)

The EH Inverse Proportional Pressure control allows for stepless variation of the max pump output pressure, as per the current signal provided to the control valve solenoid.

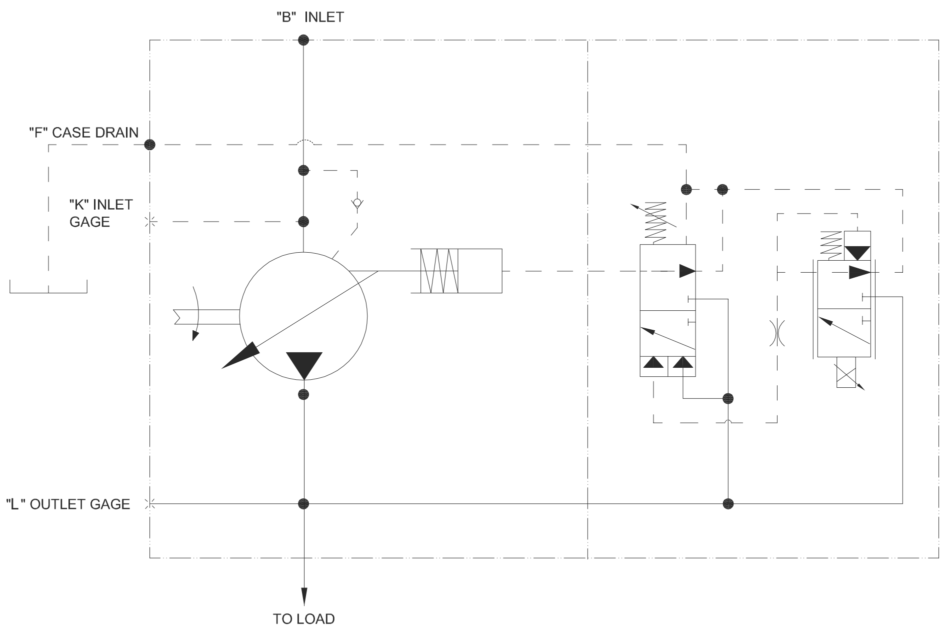
The integrated pump control makes use of an external current signal to vary the pump output pressure.

This control has an inverse proportional characteristic i.e. with increasing current signal, the max output pressure is proportionately reduced.

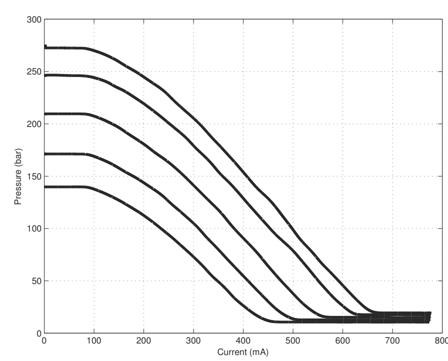
Warning: The pressure setting may be adjusted beyond the rated pressure of the pump. When adjusting the pressure, install a 0-350 bar (0-5000 psi) gage in the outlet gage port and limit the pressure setting to the continuous rated pressure for the pump displacement shown on page 6.

Pressure Limit Settings

The EH IPPC covers pressure range of the ADU pumps. The max pressure can be set from 140 bar (2050 psi) to 280 bar (4060 psi).



Typ. Current vs Pressure Characteristics of IPPC at 1800 rpm at various max pressure settings at 49 deg C (120deg F), static conditions.



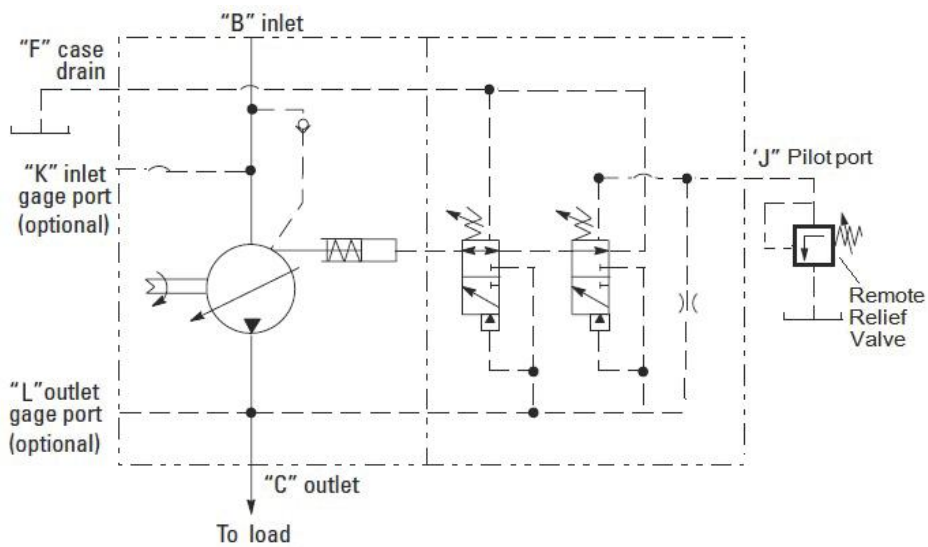
ELECTRICAL DATA

Voltage	12 V	24 V
Max Current	1500 mA	750 mA
R20, Resistance(ohm)	5.3 +/- 5%	21.2 +/- 5%
Type of Control	Current	Current
Recommended PWM Control Frequency	100 Hz	100 Hz
Duty Cycle	100%	100%
Insulation material	Class H, 180 deg C	Class H, 180 deg C
Protection Class	IP69K/IPX9K	IP69K/IPX9K
Connector	AMP Junior Power Timer/ Deutsch Connector DT04-2P	AMP Junior Power Timer/ Deutsch Connector DT04-2P
Operating Temperature	-30 deg C; 105 deg C	-30 deg C; 105 deg C

Remote Pressure Control

Remote relief valve is to be connected to pilot port "J" through necessary external piping. Standard differential pressure of 20 bar is set at RPC spool. The required outlet pressure (below 280 bar) can be set by adjusting remote relief valve setting. Once pressure reaches pre-set value, flow across remote relief valve starts, this results in RPC spool movement due to pressure imbalance. This will de-stroke the pump to maintain the set pressure.

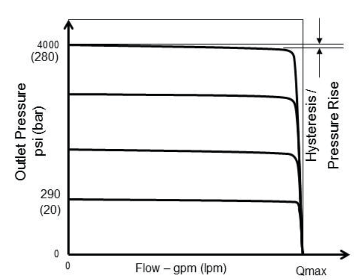
Secondary pressure compensator is provided to limit the max pressure setting as a fail safe measure. The delta pressure is factory set which can not be changed. If the remote line is connected directly to tank, the flow compensator setting selected in the model code will be the minimum pressure setting.



*** Flow Compensator is not available with RPC.**

*** Flow Compensator/ Remote Pressure Control setting should be selected within range of 10-24 bar (140-350 psi).**

*** Remote relief valve is not included in supply scope of the pump.**

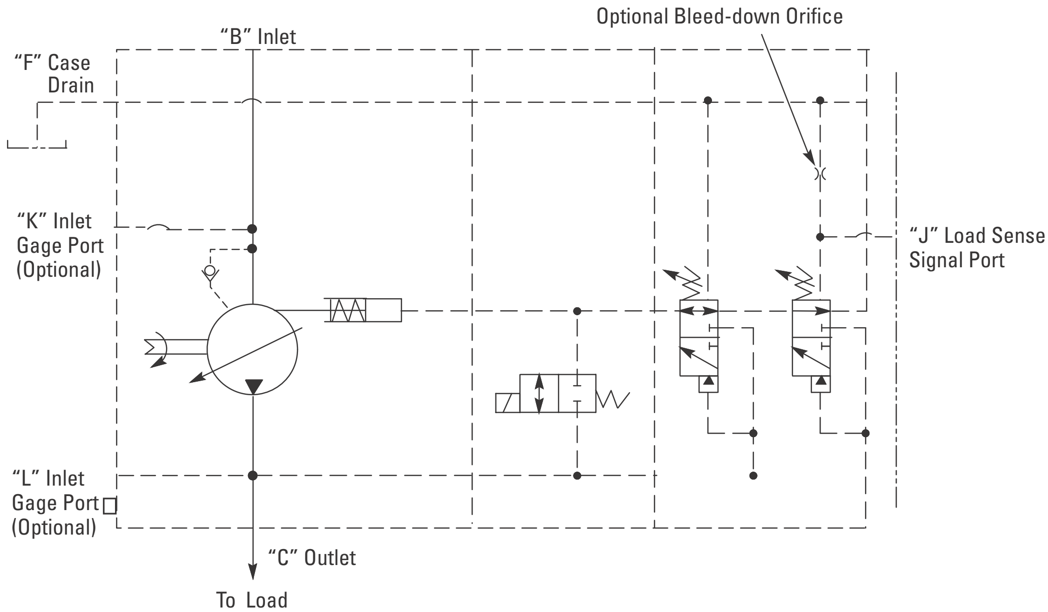


Delta Pressure setting at control valve - bar (psi)	14 - 24 (200 - 350)
Control fluid consumption - lpm (gpm)	4.5 (1.2) max.
Recommended flow rating of remote relief valve- lpm (gpm)	3 – 5 (0.8 – 1.32)
Recommended Eaton Relief Valve part number	RV5-10-S-0-50

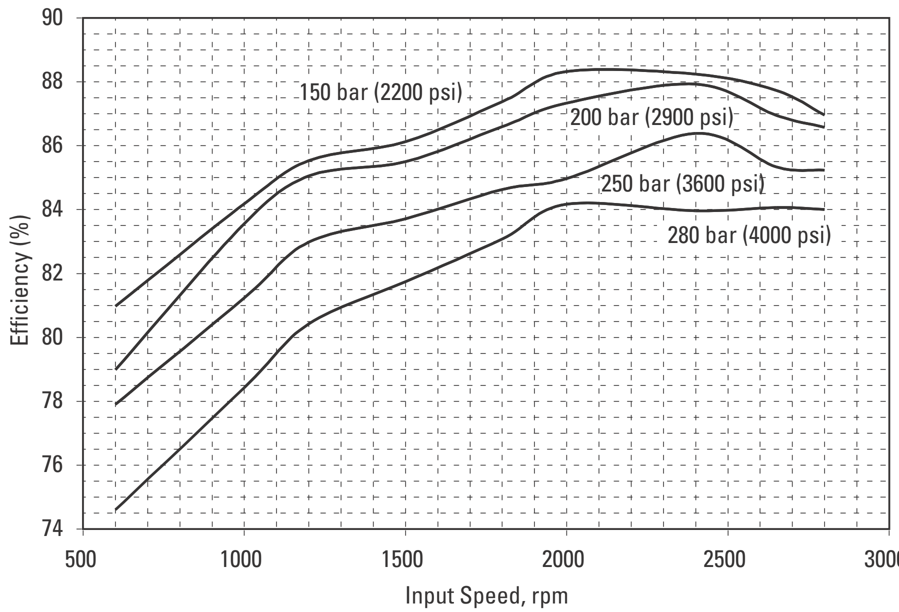
Cold Start Valve

The 420 Cold Start Valve reduces pump start-up torque by directing control pressure to the outlet.

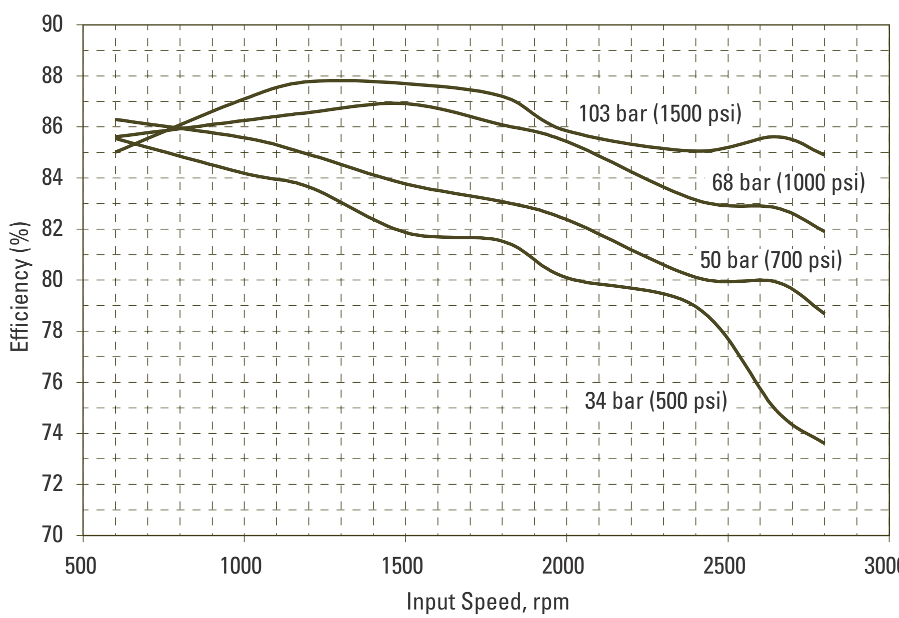
It is primarily used in cold weather applications and includes a 12 or 24 VDC directional control valve mounted between the pump housing and compensator.



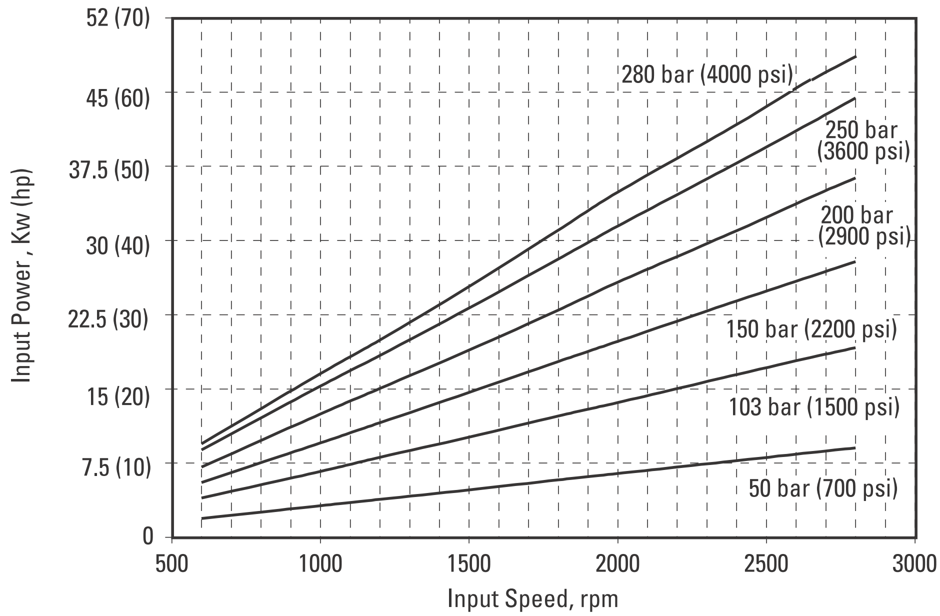
Overall Efficiency Versus Speed @ 49° C (120° F), Full Flow, and 1.0 bar (0 psi) Inlet



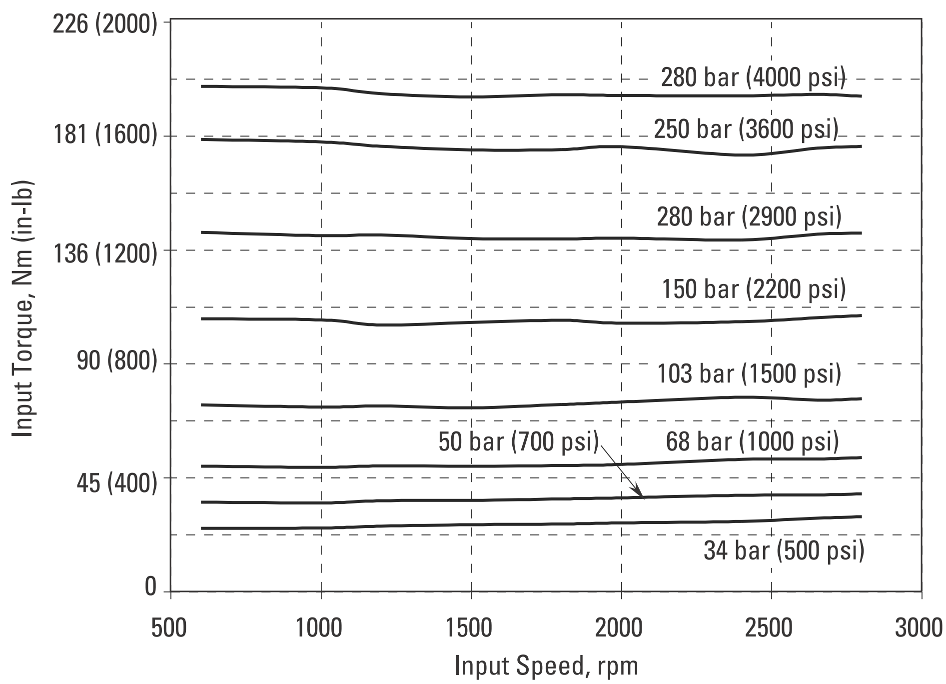
Overall Efficiency Versus Speed @ 49° C (120° F), Full Flow, and 1.0 bar (0 psi) Inlet



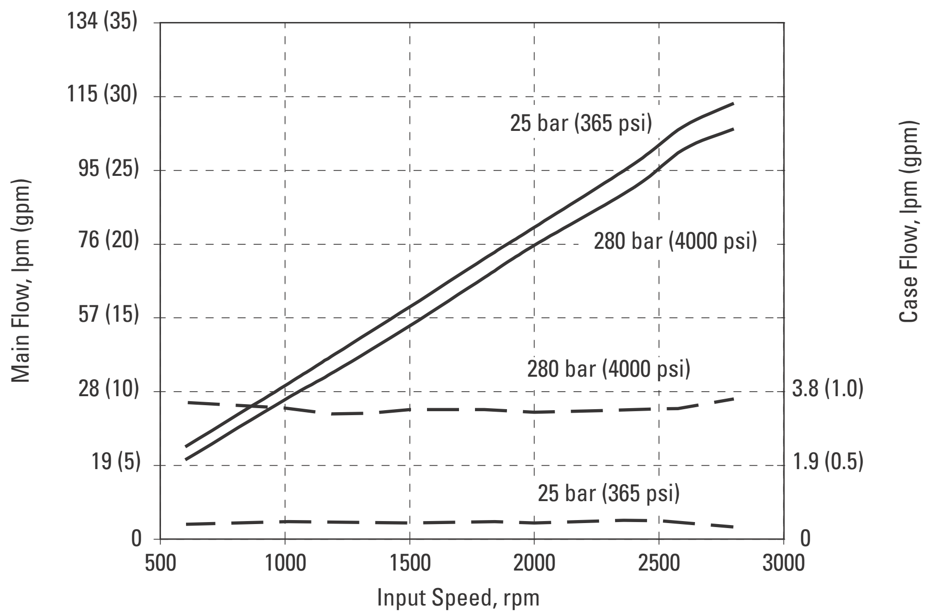
Input Power Versus Speed @ 49° C (120° F), Full Flow, and 1.0 bar (0 psi) Inlet



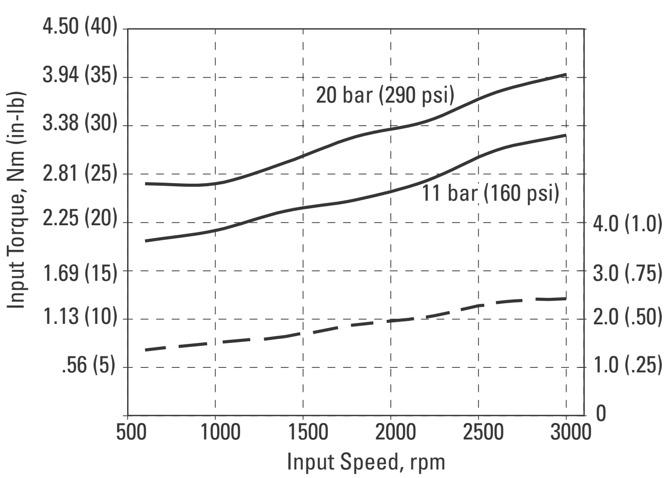
Input Torque Versus Speed @ 49° C (120° F), Full Flow, and 1.0 bar (0 psi) Inlet



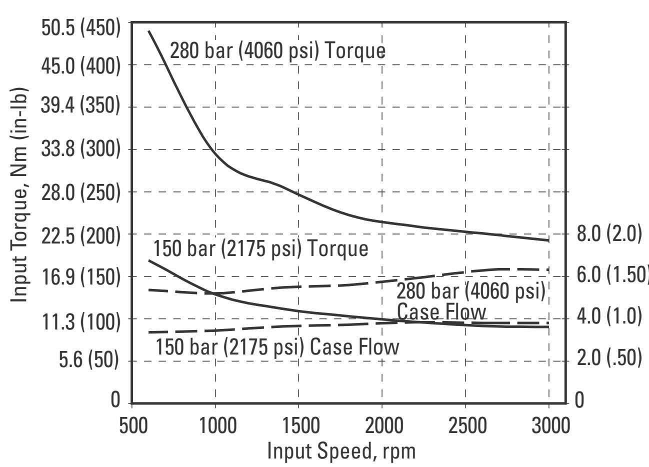
Delivery and Case Flow Versus Speed @ 49° C (120° F)



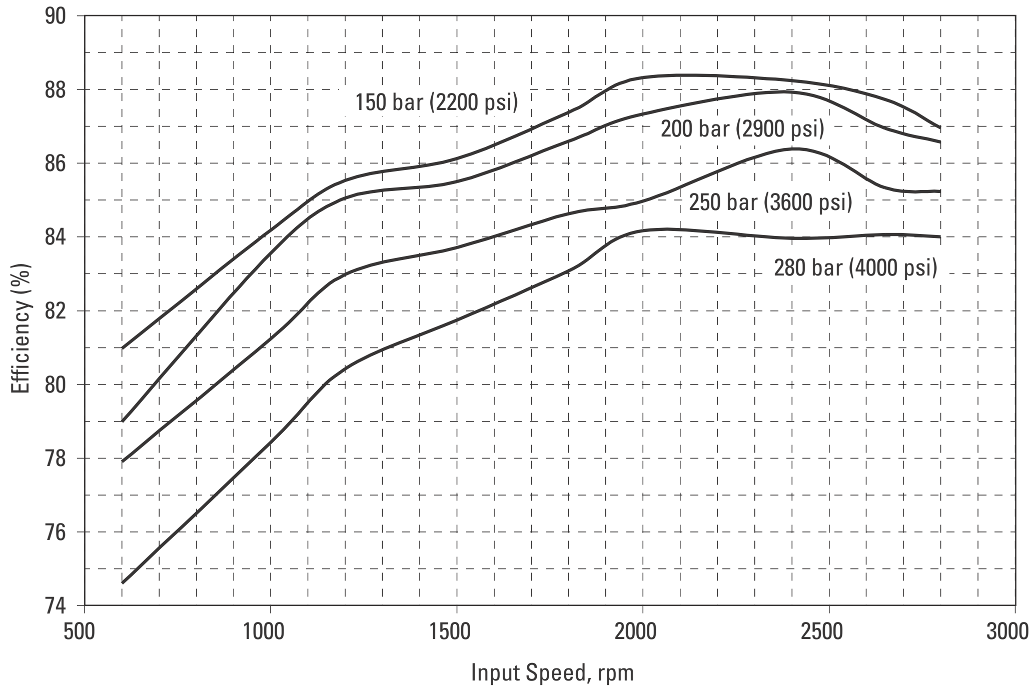
Input Torque and Case Flow Stand-by @ 49° C (120° F)



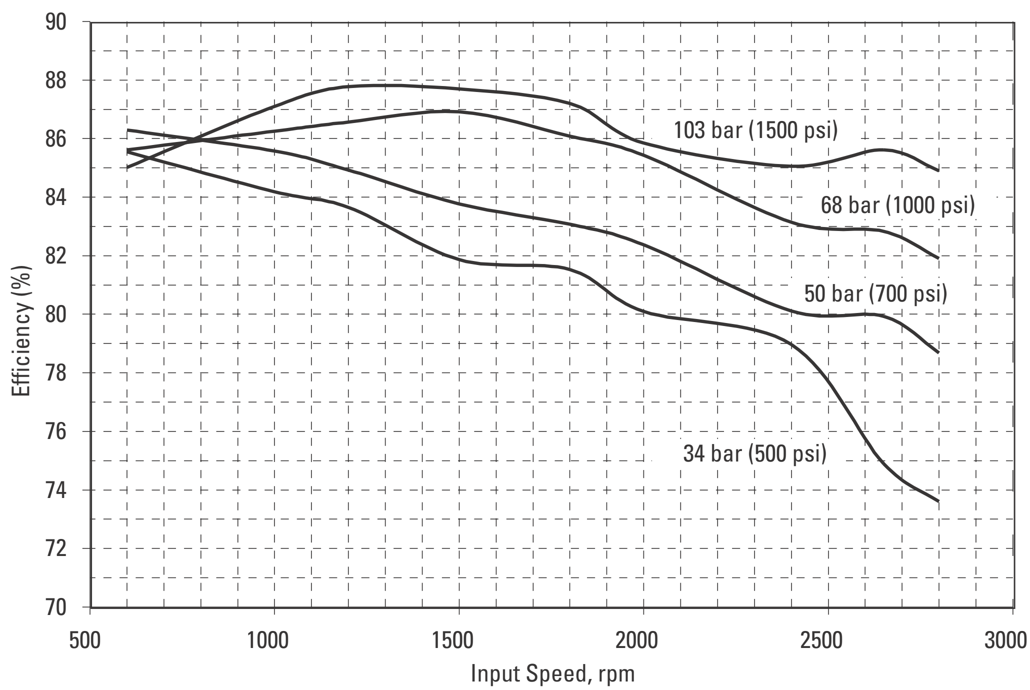
Input Torque and Case Flow Cut-off @ 49° C (120° F)



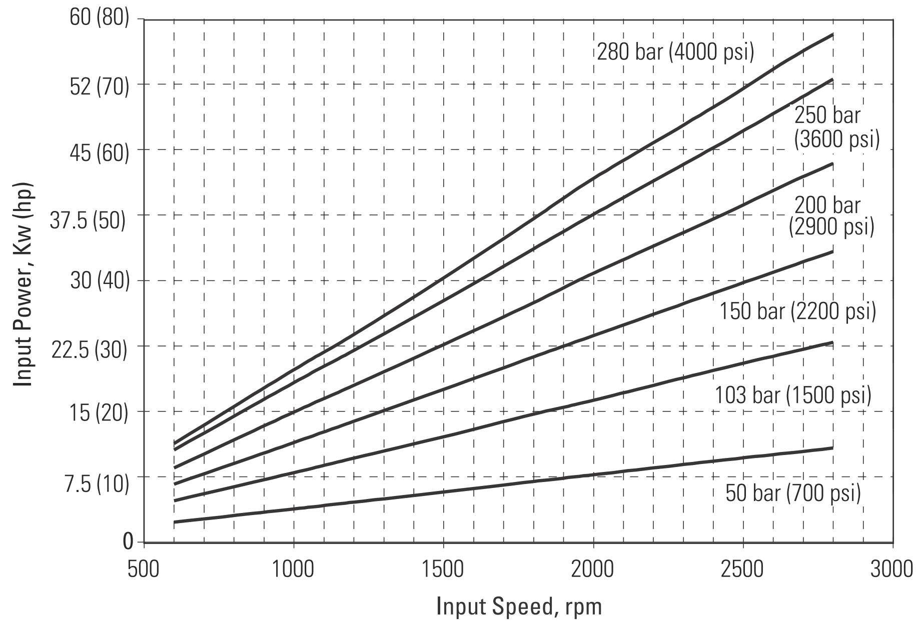
Overall Efficiency Versus Speed @ 49° C (120° F), Full Flow, and 1.0 bar (0 psi) Inlet



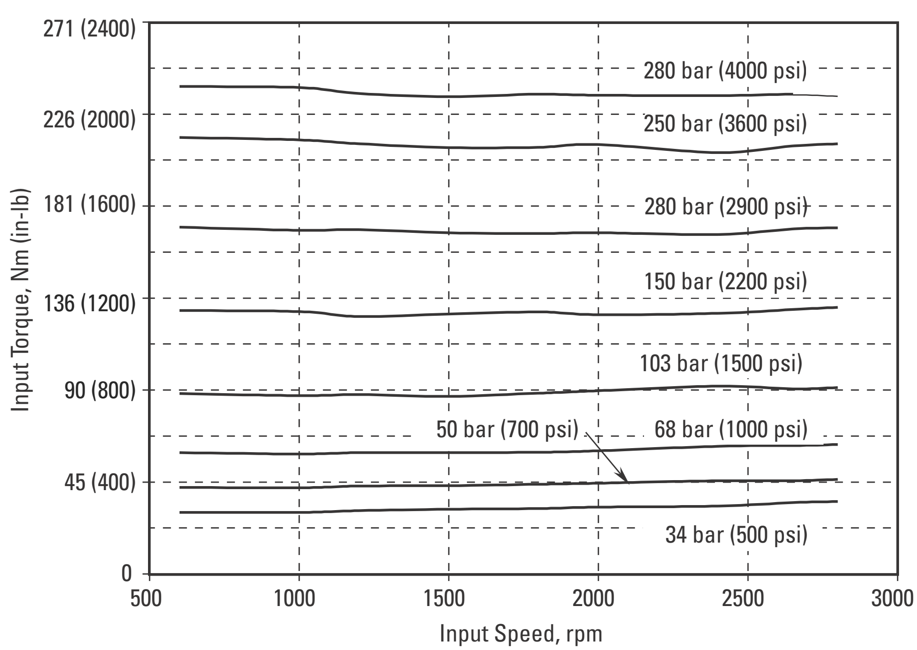
Overall Efficiency Versus Speed @ 49° C (120° F), Full Flow, and 1.0 bar (0 psi) Inlet



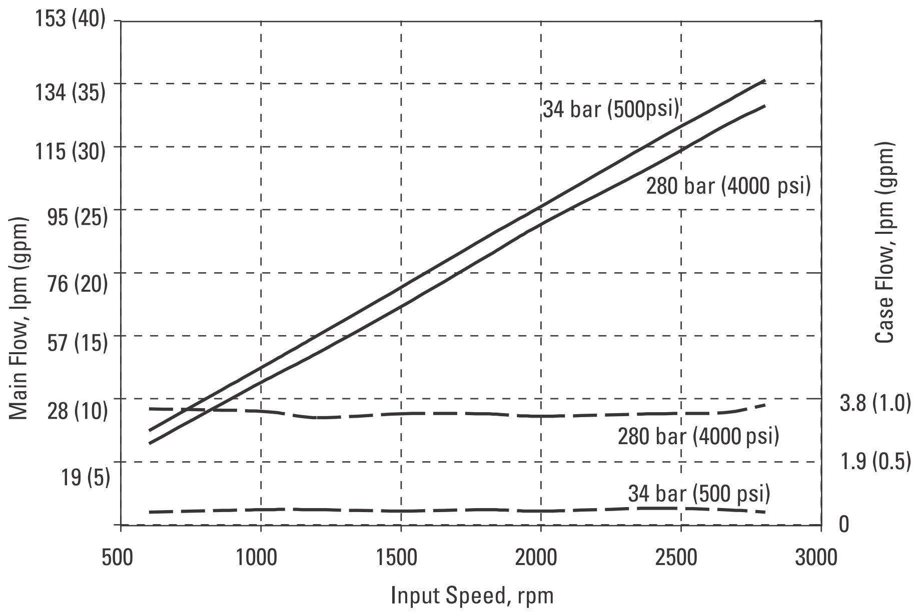
Input Power Versus Speed @ 49° C (120° F), Full Flow, and 1.0 bar (0 psi) Inlet



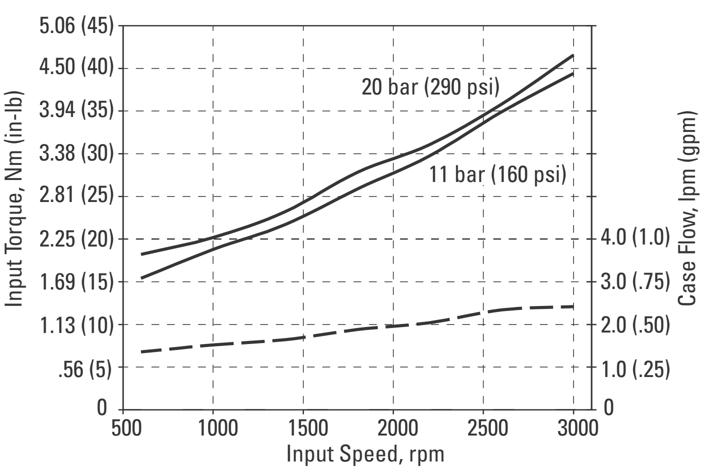
Input Torque Versus Speed @ 49° C (120° F), Full Flow, and 1.0 bar (0 psi) Inlet



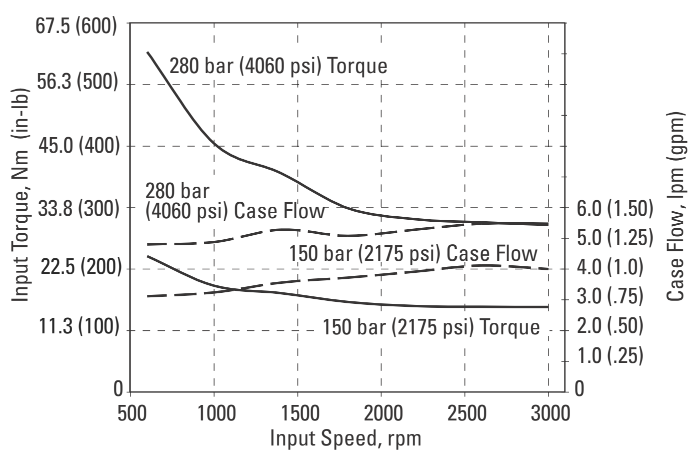
Delivery and Case Flow Versus Speed @ 49° C (120° F)



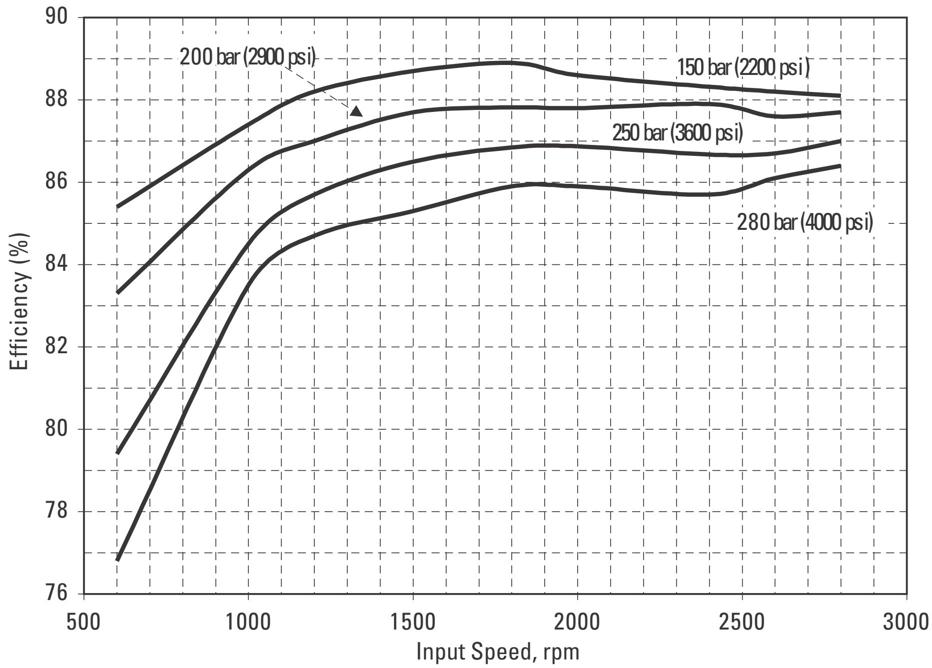
Input Torque and Case Flow Stand-by @ 49° C (120° F)



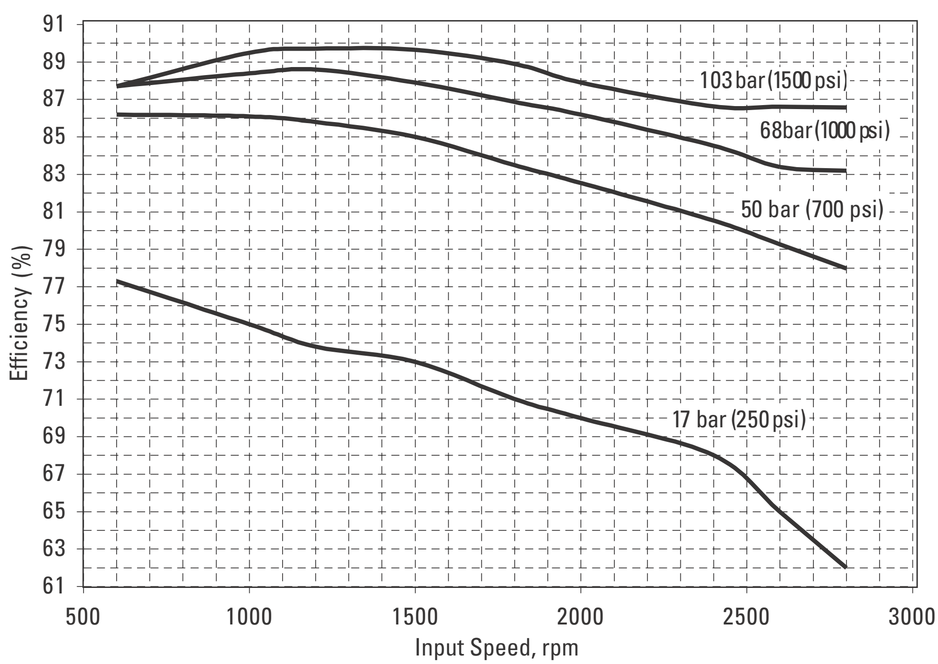
Input Torque and Case Flow Cut-off @ 49° C (120° F)



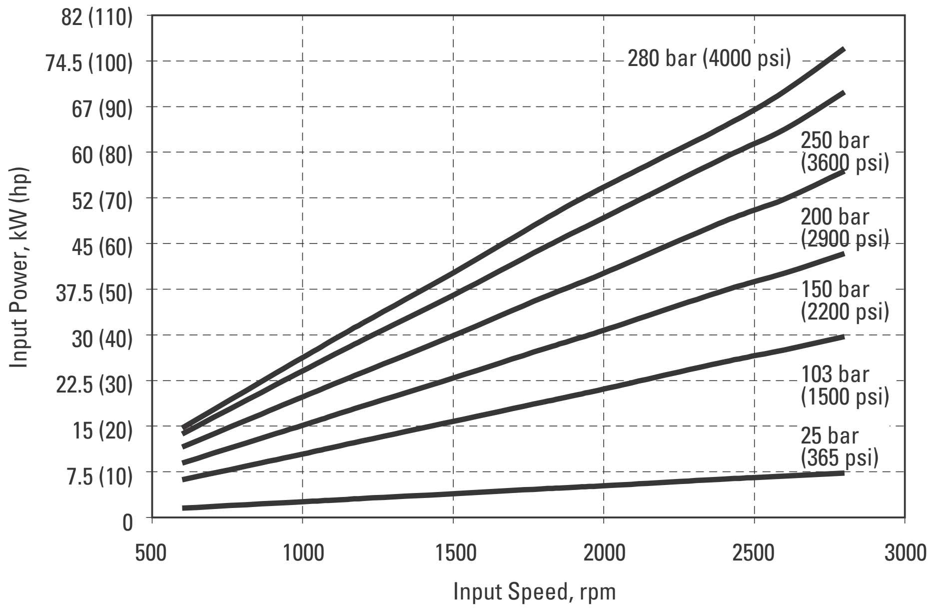
Overall Efficiency Versus Speed @ 49° C (120° F), Full Flow, and 1.0 bar (0 psi) Inlet



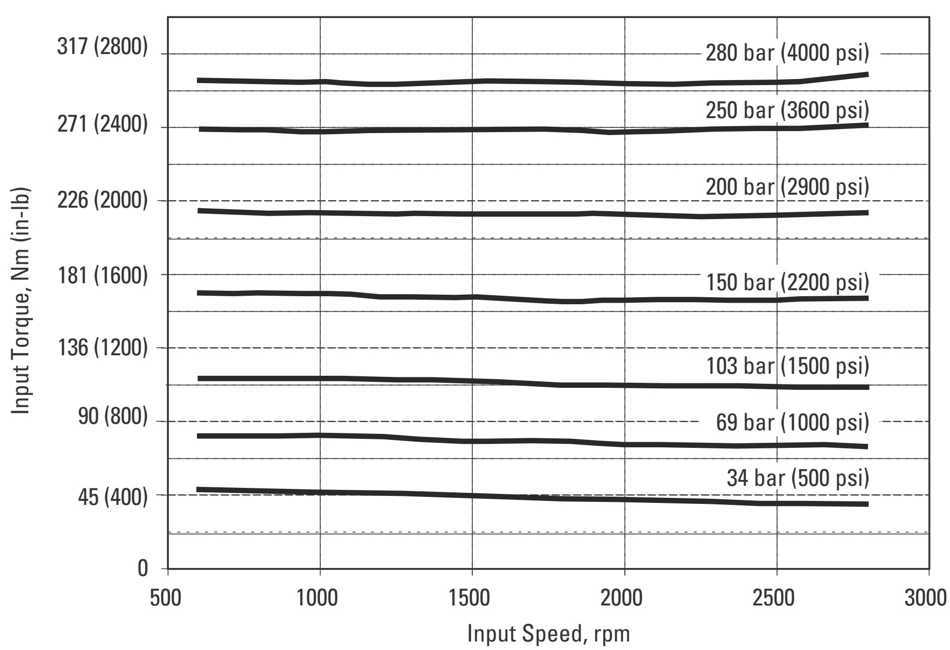
Overall Efficiency Versus Speed @ 49° C (120° F), Full Flow, and 1.0 bar (0 psi) Inlet



Input Power Versus Speed @ 49° C (120° F), Full Flow, and 1.0 bar (0 psi) Inlet



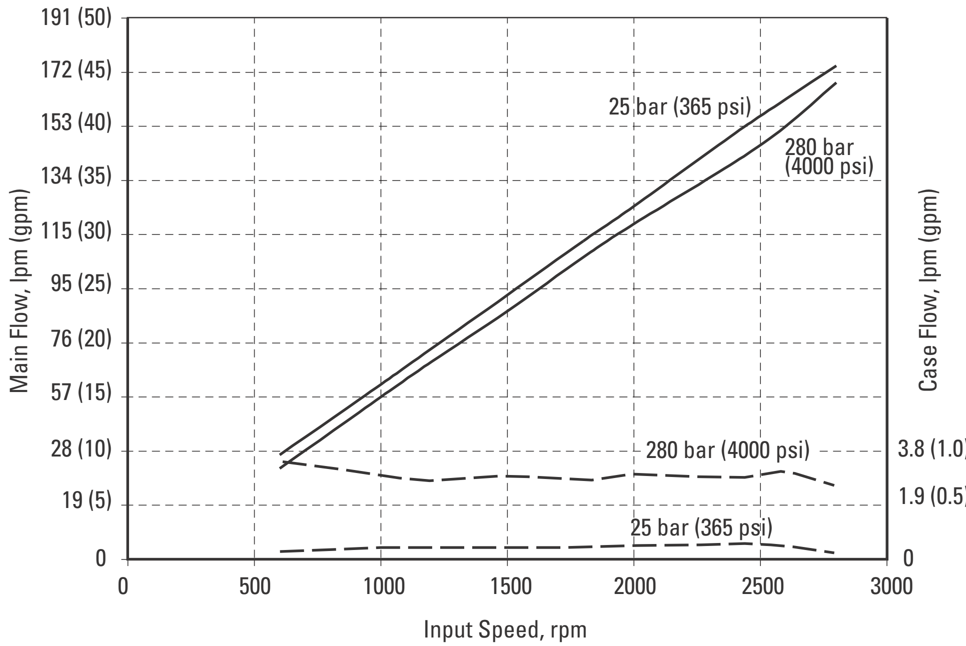
Input Torque Versus Speed @ 49° C (120° F), Full Flow, and 1.0 bar (0 psi) Inlet



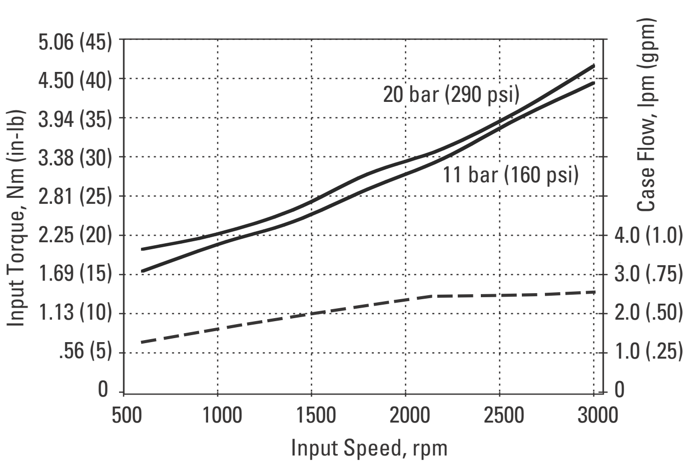
Performance

ADU062

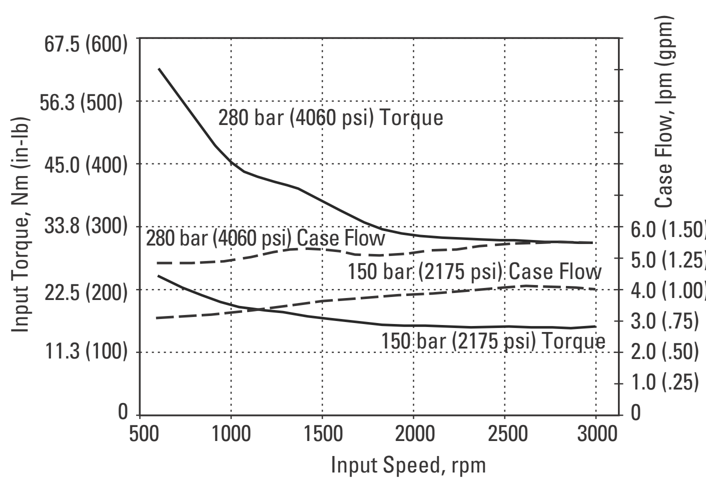
Delivery and Case Flow Versus Speed @ 49º C (120º F)



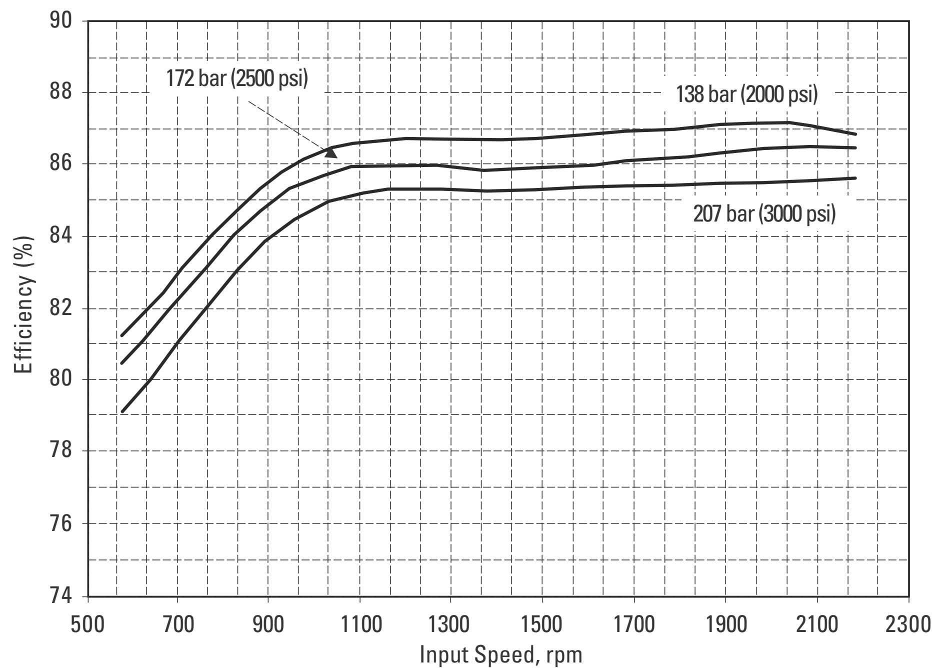
Input Torque and Case Flow Stand-by @ 49º C (120º F)



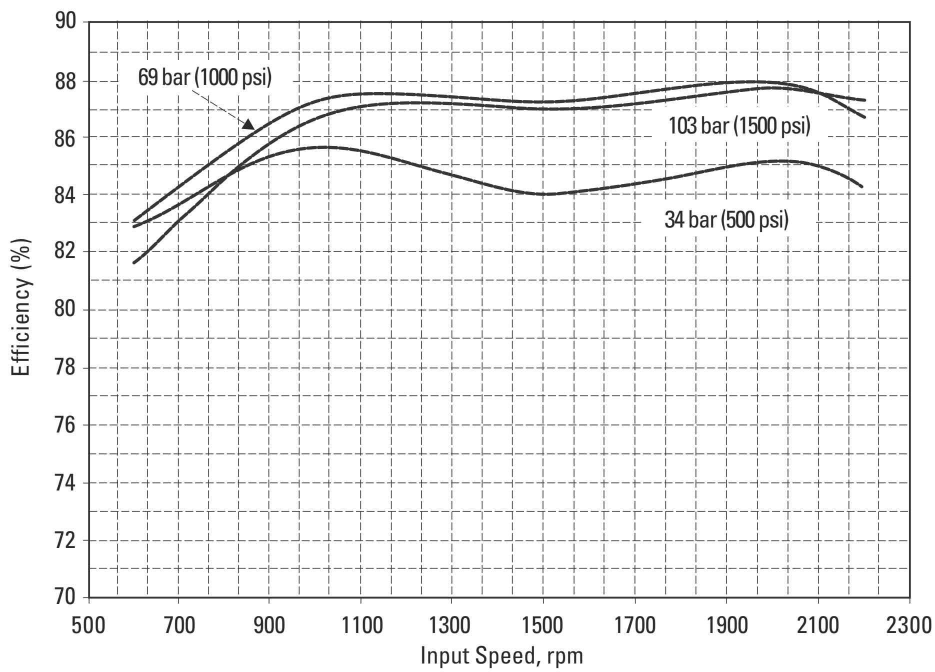
Input Torque and Case Flow Cut-off @ 49º C (120º F)



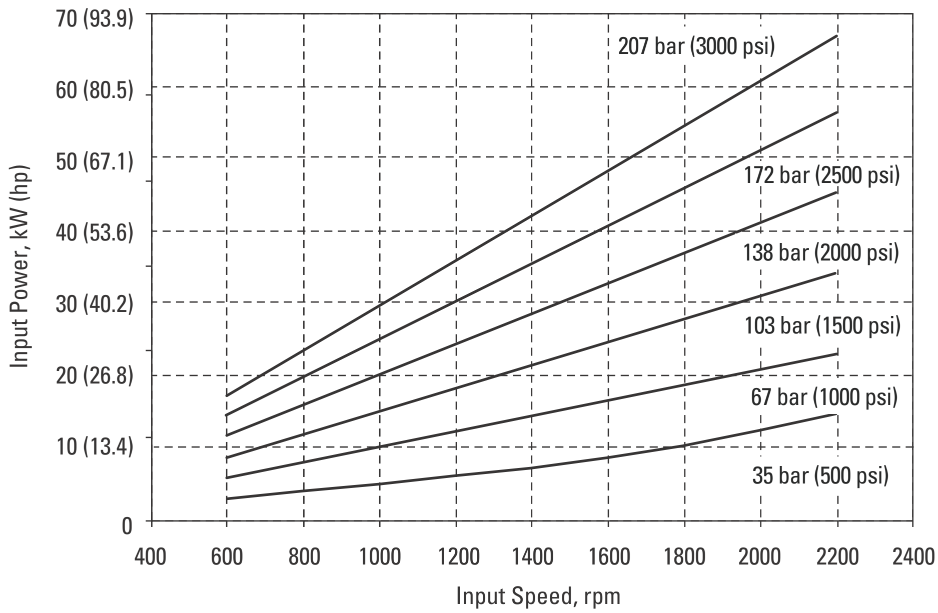
Input Power Versus Speed @ 49° C (120° F), Full Flow, and 1.0 bar (0 psi) Inlet



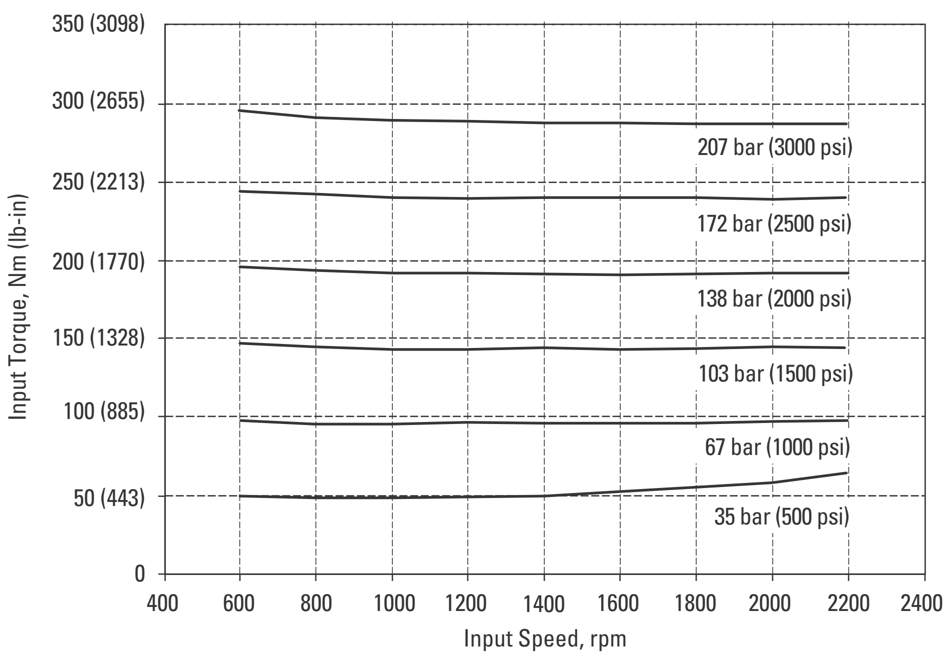
Overall Efficiency Versus Speed @ 49° C (120° F), Full Flow, and 1.0 bar (0 psi) Inlet



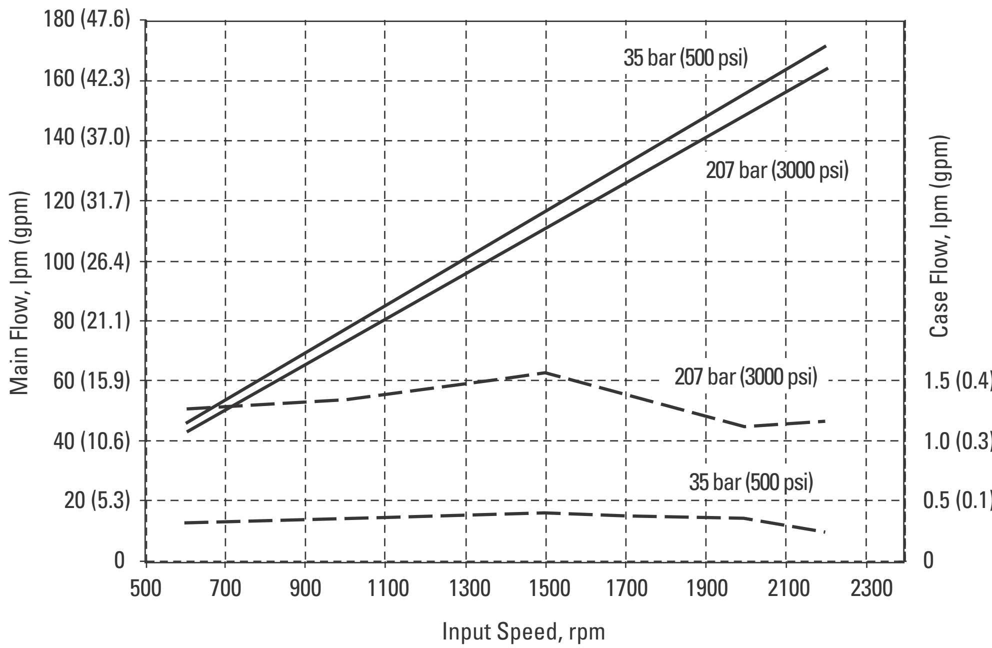
Input Power Versus Speed @ 49º C (120º F), Full Flow, and 1.0 bar (0 psi) Inlet



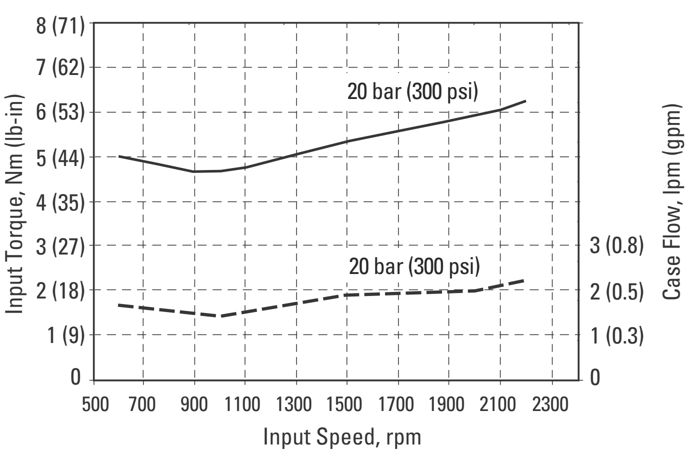
Input Torque Versus Speed @ 49º C (120º F), Full Flow, and 1.0 bar (0 psi) Inlet



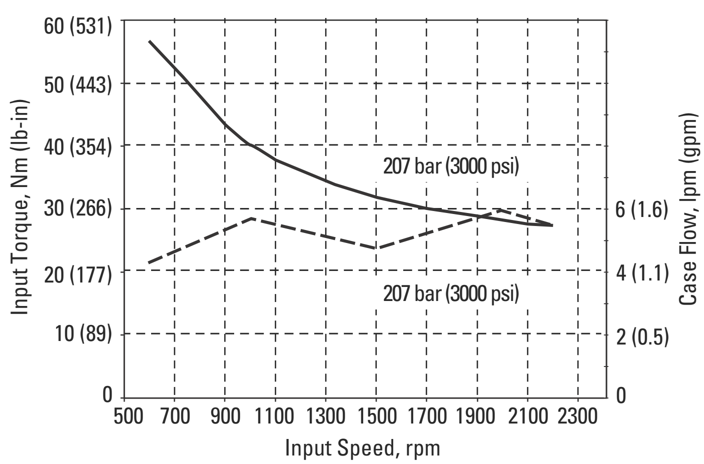
Delivery and Case Flow Versus Speed @ 49° C (120° F)



Input Torque and Case Flow Stand-by @ 49° C (120° F)



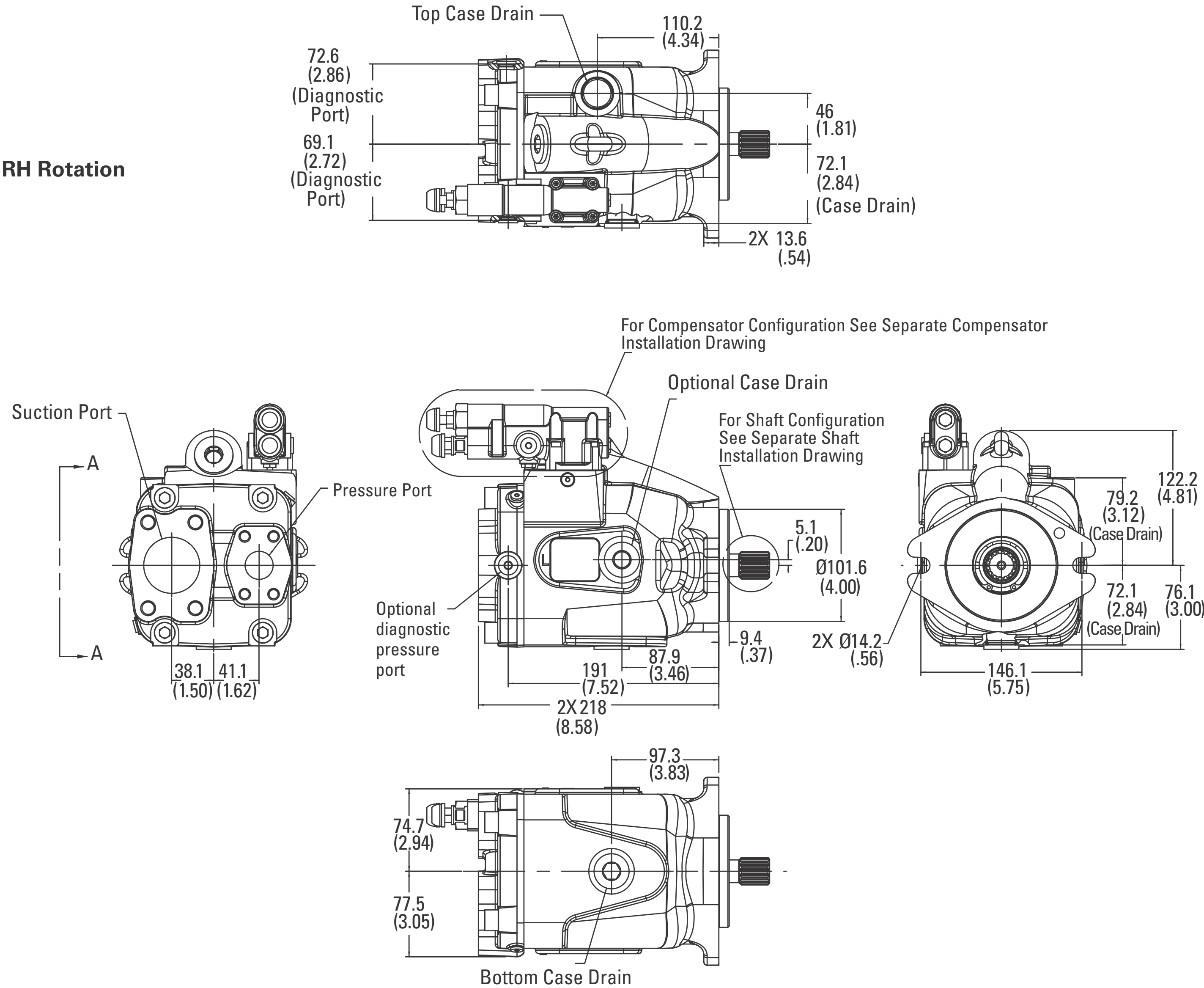
Input Torque and Case Flow Cut-off @ 49° C (120° F)



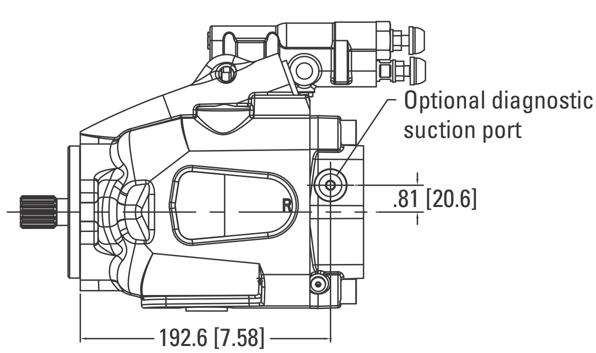
Pump Installation

B-mount / Rear-ported

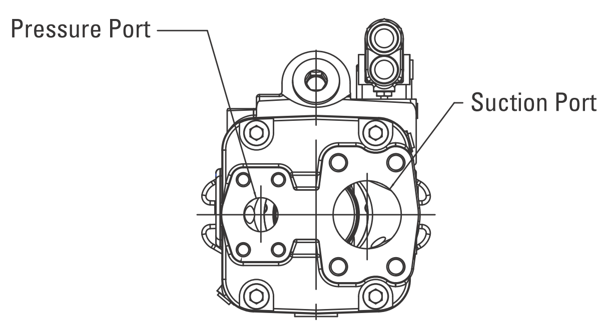
RH Rotation



View A – A



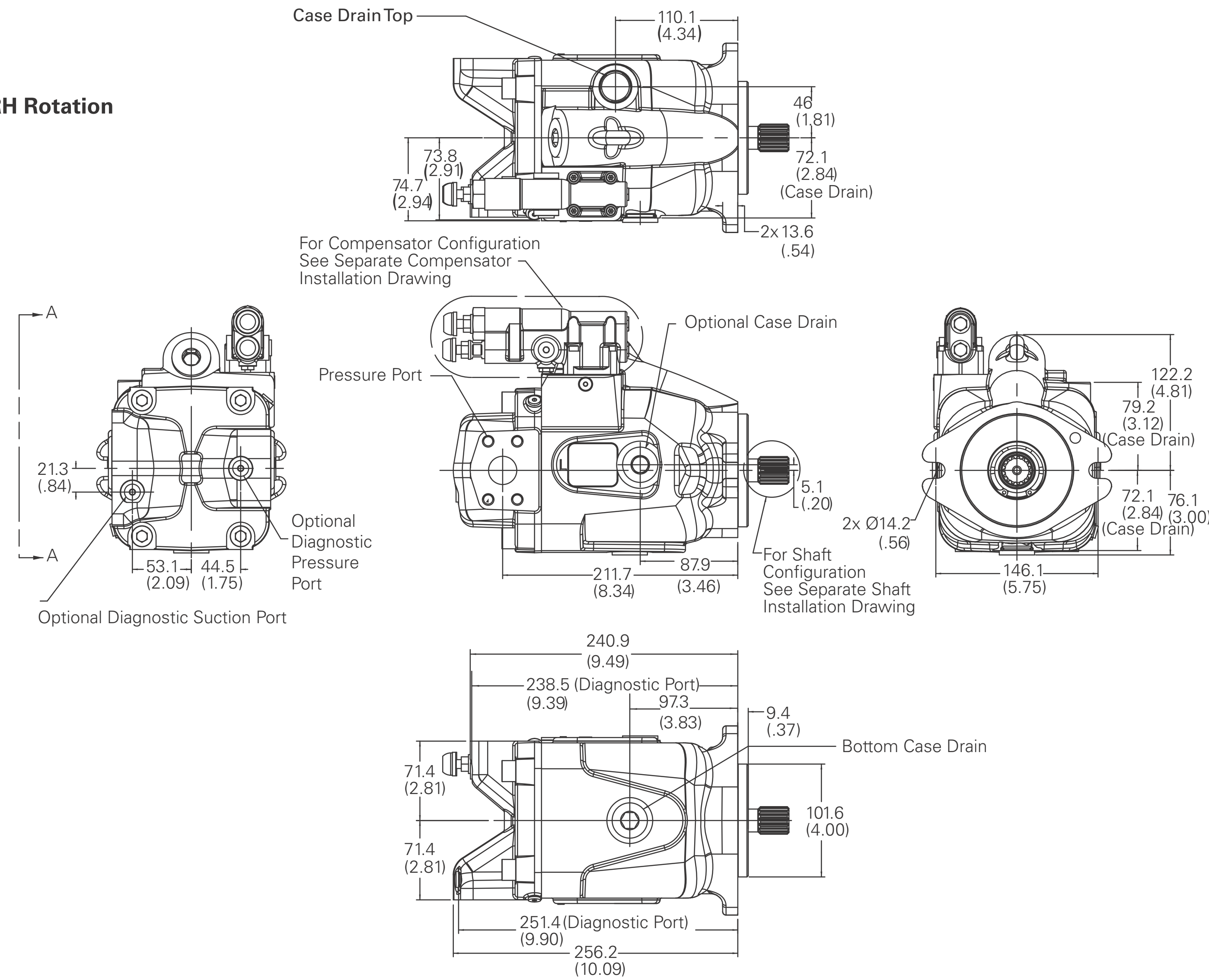
LH Rotation



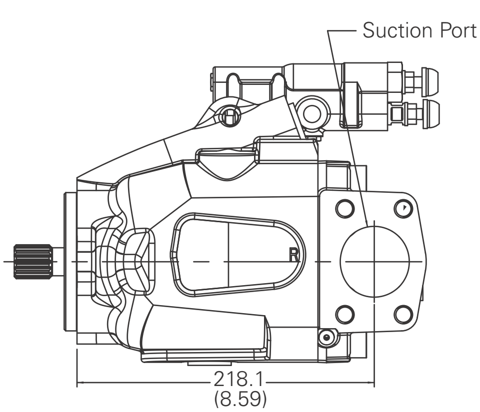
Pump Installation

B-mount / Side-ported

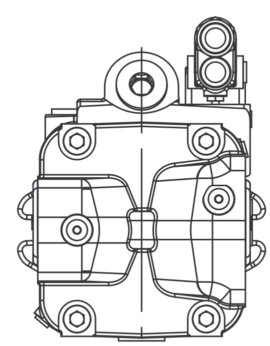
RH Rotation



View A – A



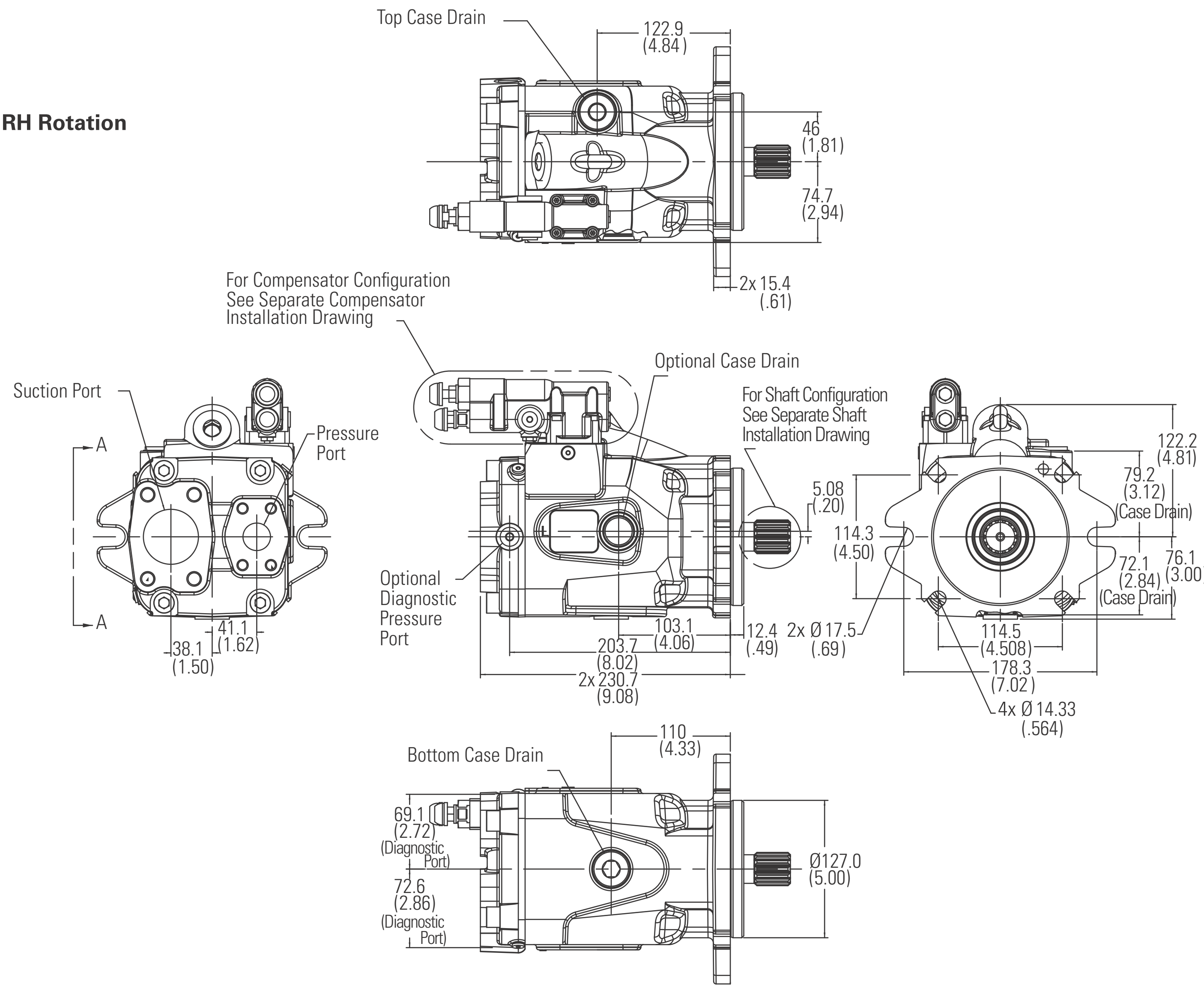
LH Rotation



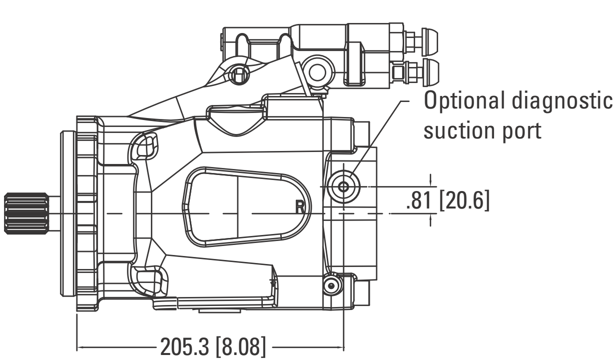
Pump Installation

C-mount / Rear-ported

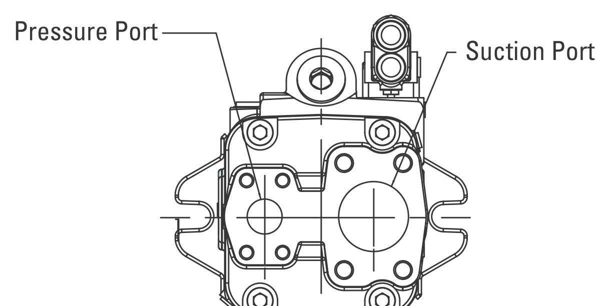
RH Rotation



View A – A



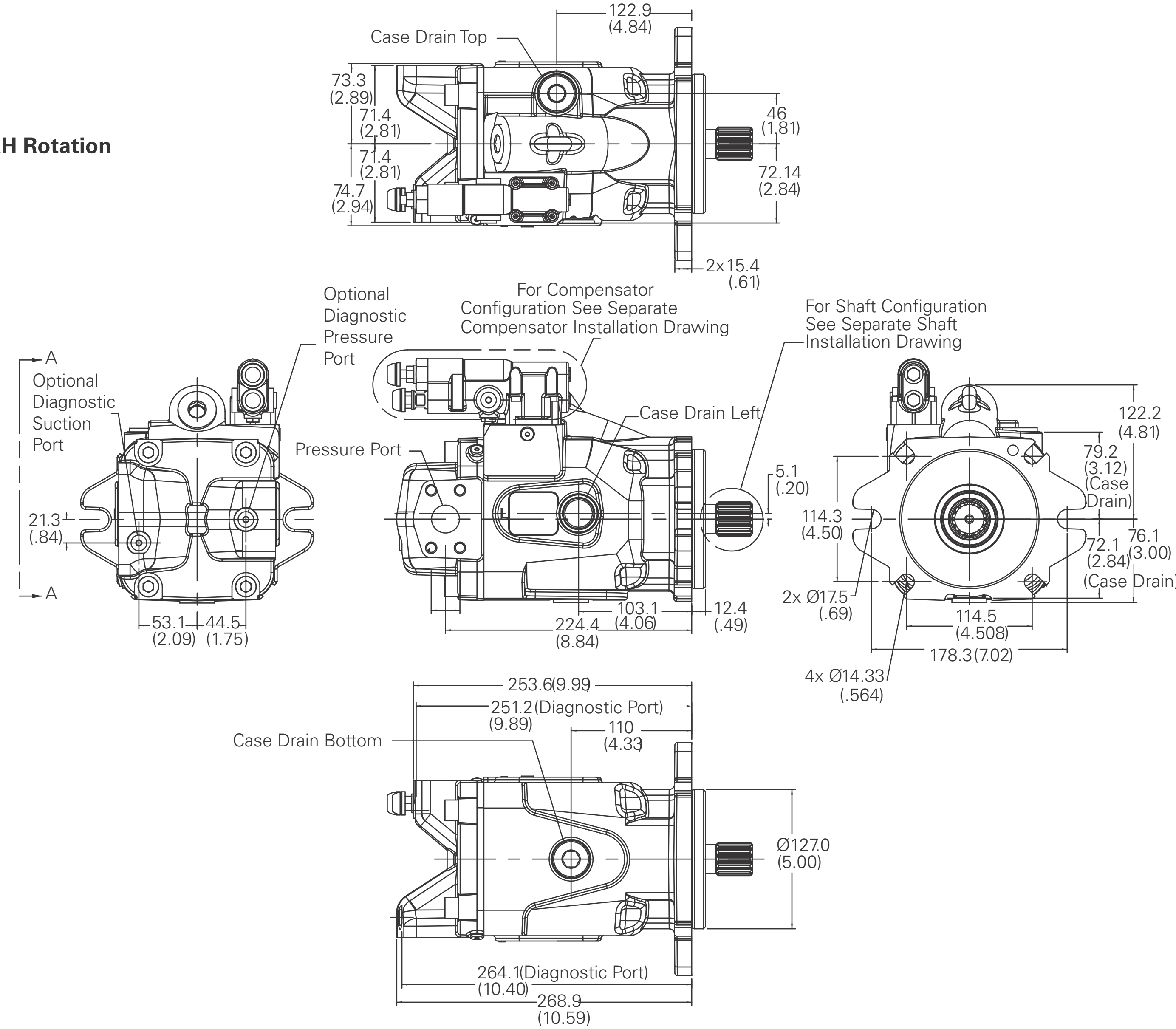
LH Rotation



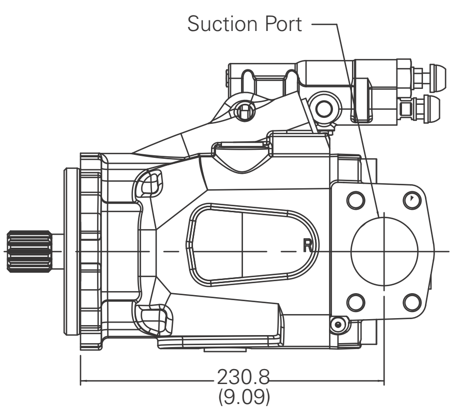
Pump Installation

C-mount / Side-ported

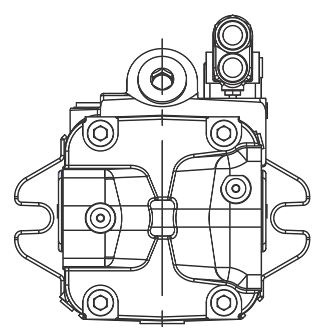
RH Rotation



View A – A

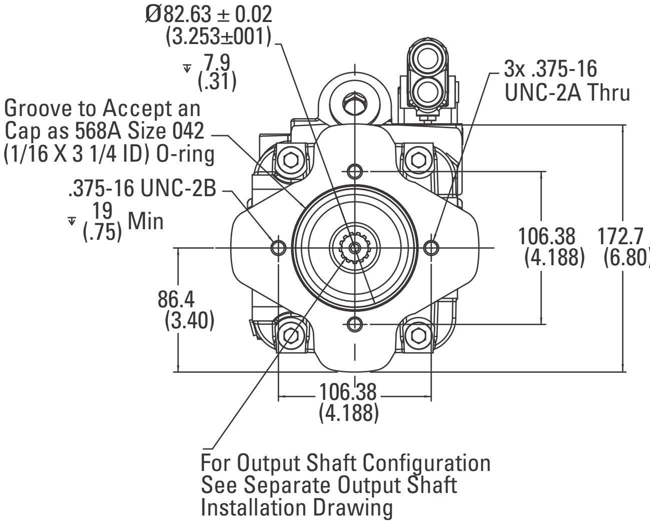


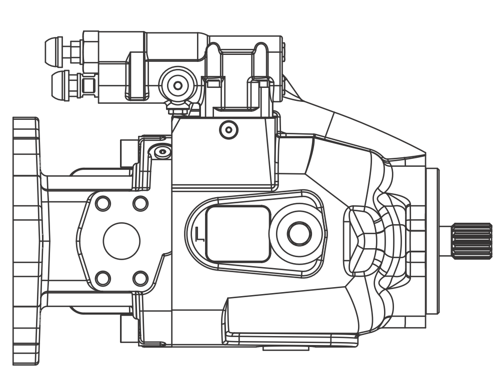
LH Rotation



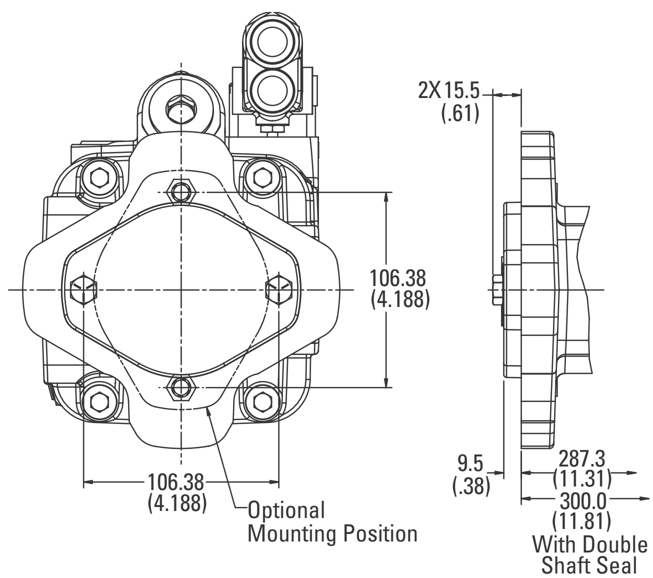
Pump Installation

Thru-Drive SAE A





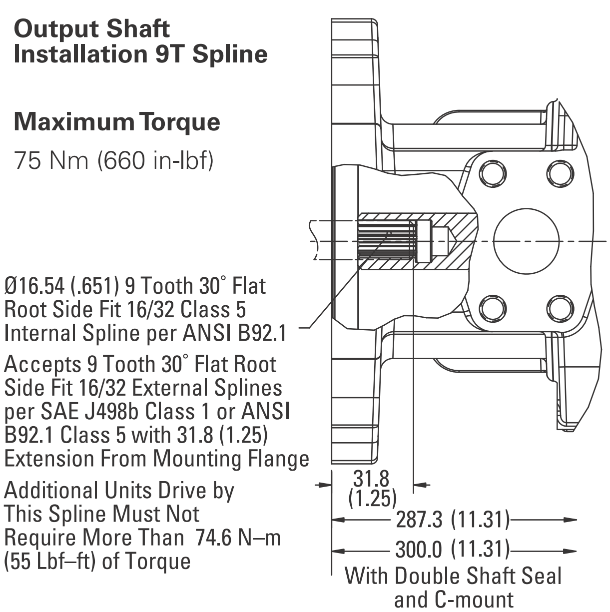
A Thru-Drive Cover Plate Installation



Output Shaft Installation 9T Spline

Maximum Torque

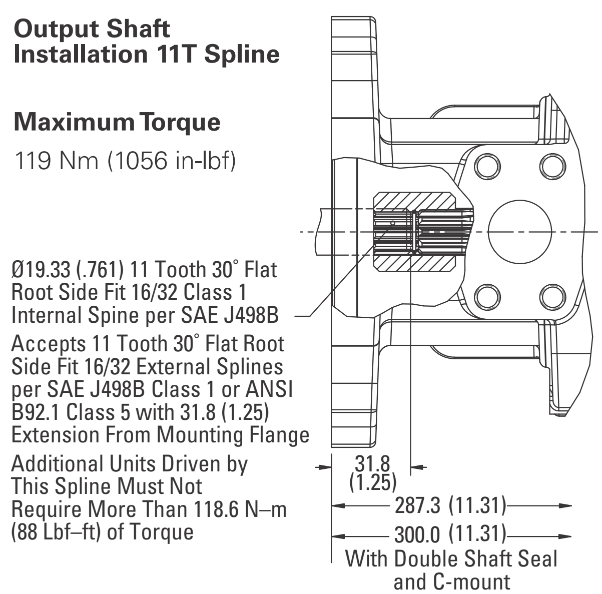
75 Nm (660 in-lbf)



Output Shaft Installation 11T Spline

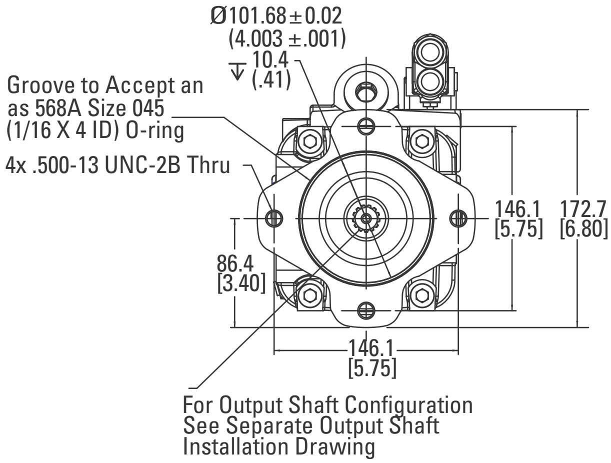
Maximum Torque

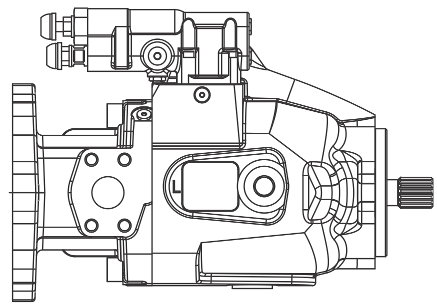
119 Nm (1056 in-lbf)



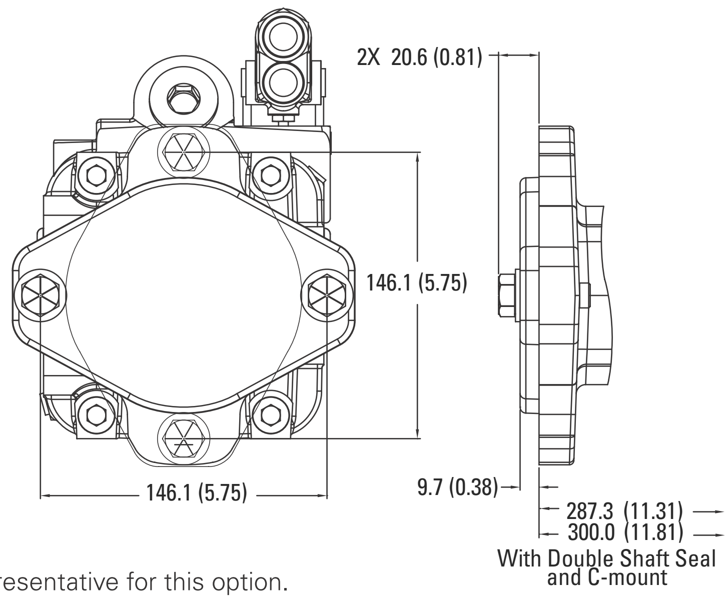
Pump Installation

Thru-Drive SAE B





B Thru-Drive Cover Plate Installation*

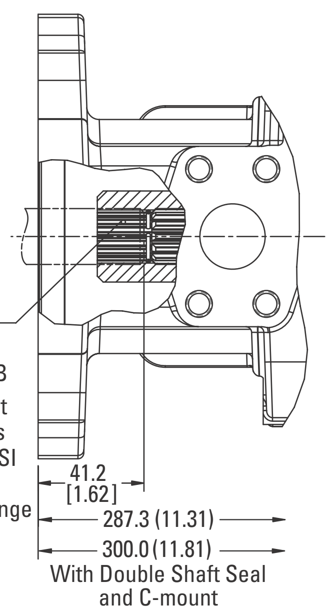


* Contact your Eaton Representative for this option.

Output Shaft Installation 13T Spline

Maximum Torque

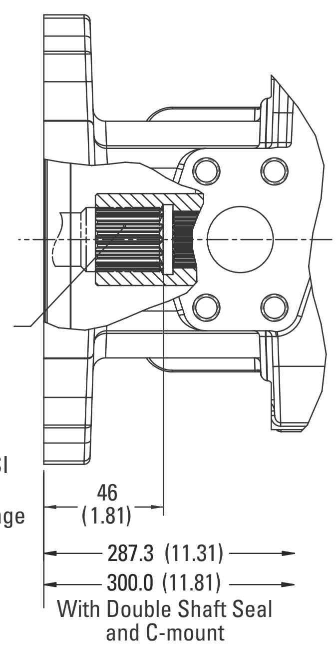
209 Nm (1850 in-lbf)



Output Shaft Installation 15T Spline

Maximum Torque

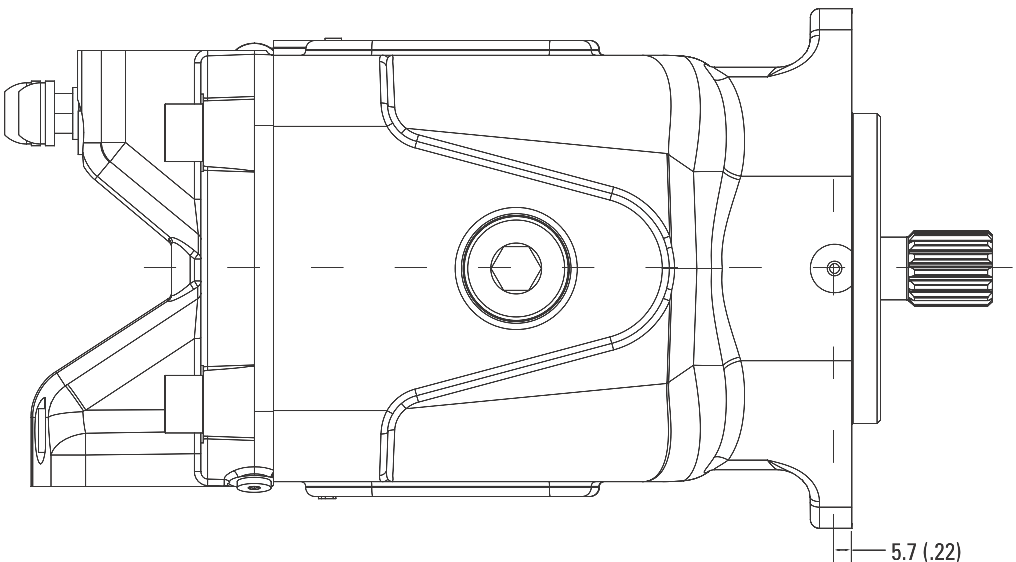
337 Nm (2987 in-lbf)



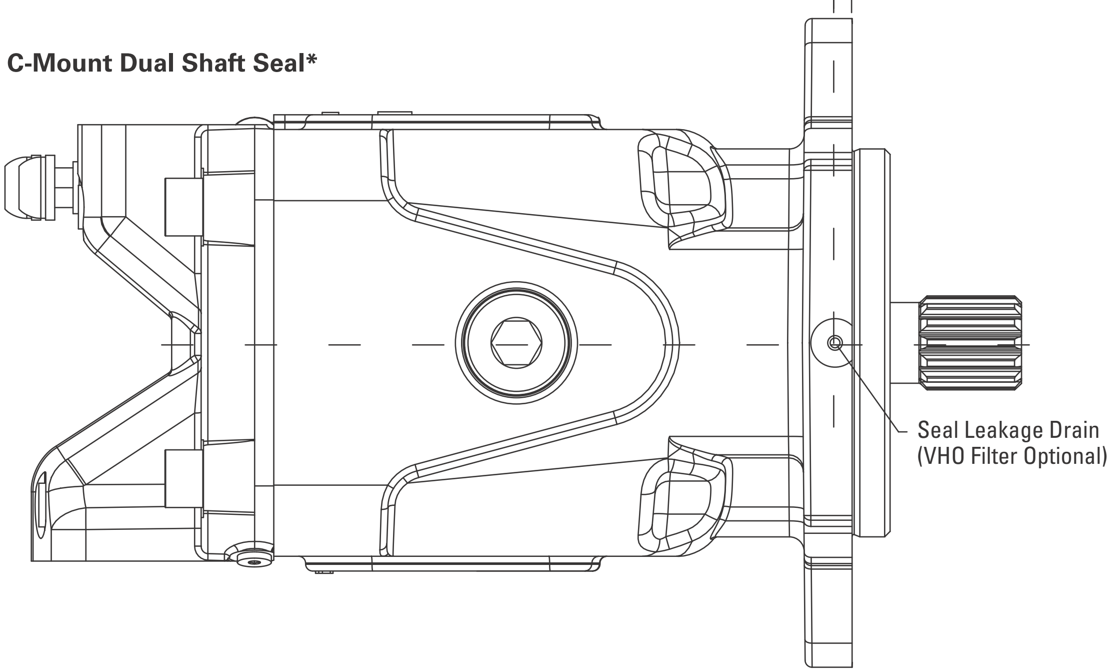
Pump Installation

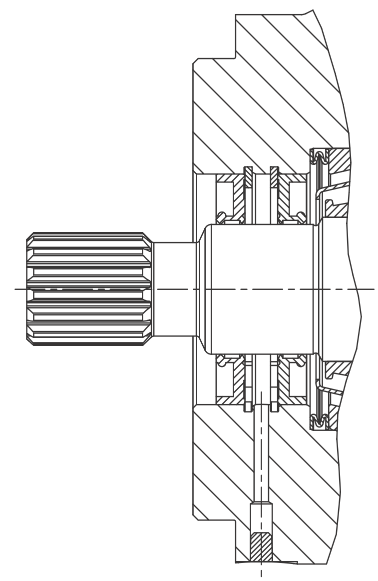
Dual Shaft Seal

B-Mount Dual Shaft Seal*



C-Mount Dual Shaft Seal*

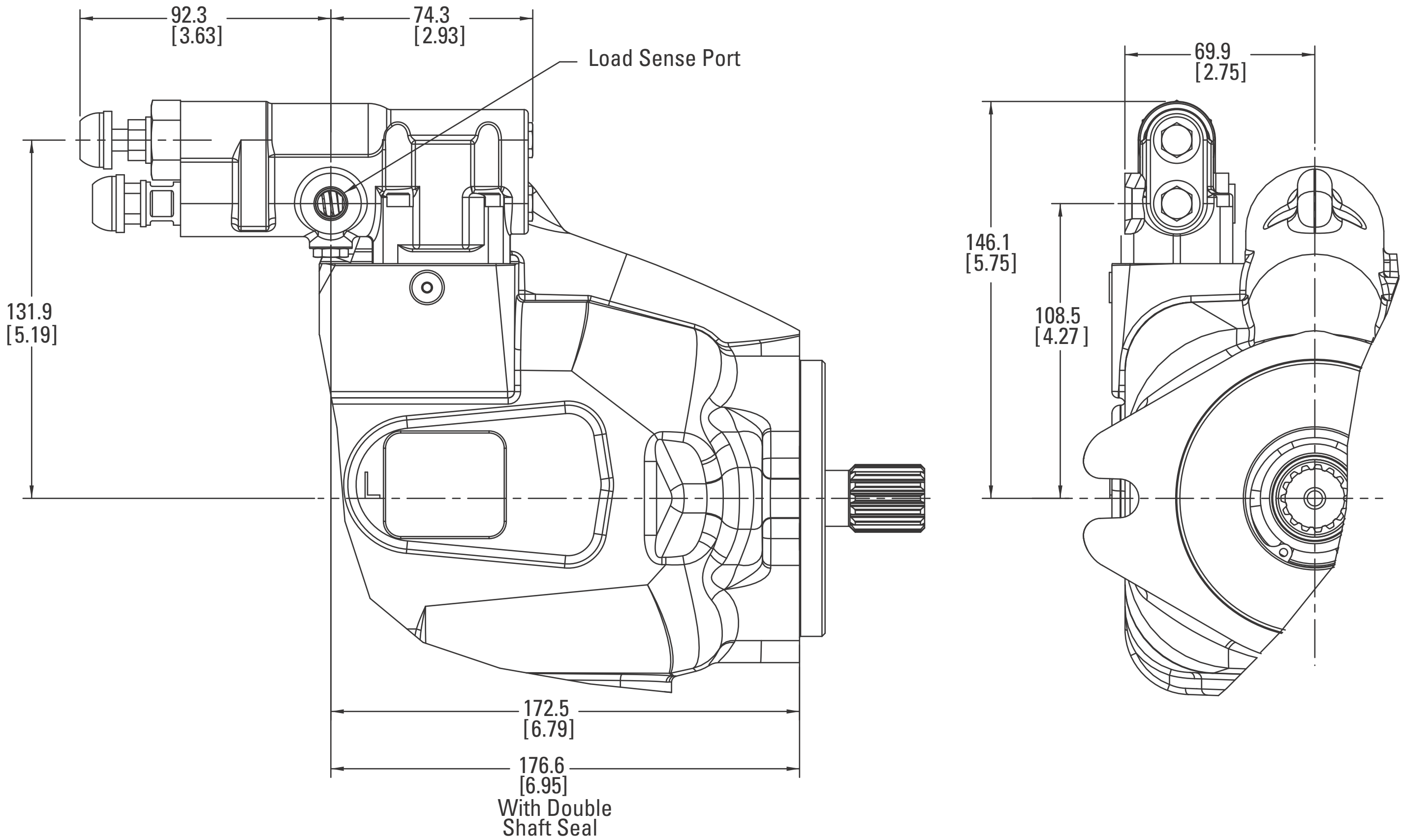


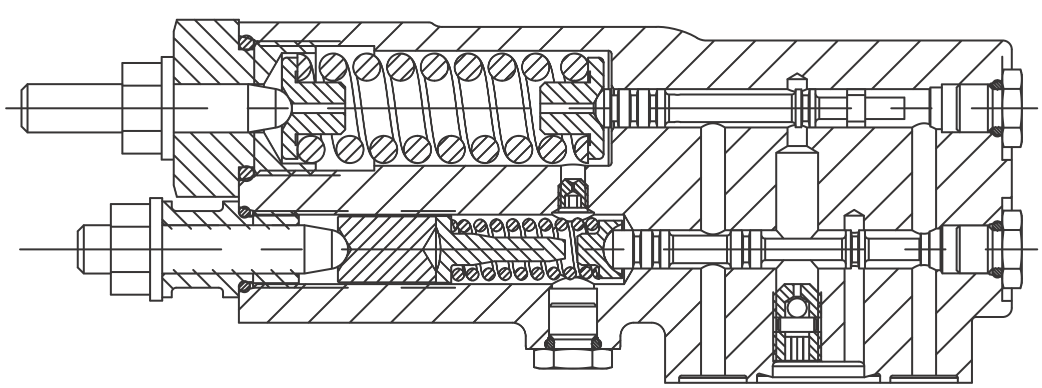


Cross Section of Dual Shaft Seal Assembly

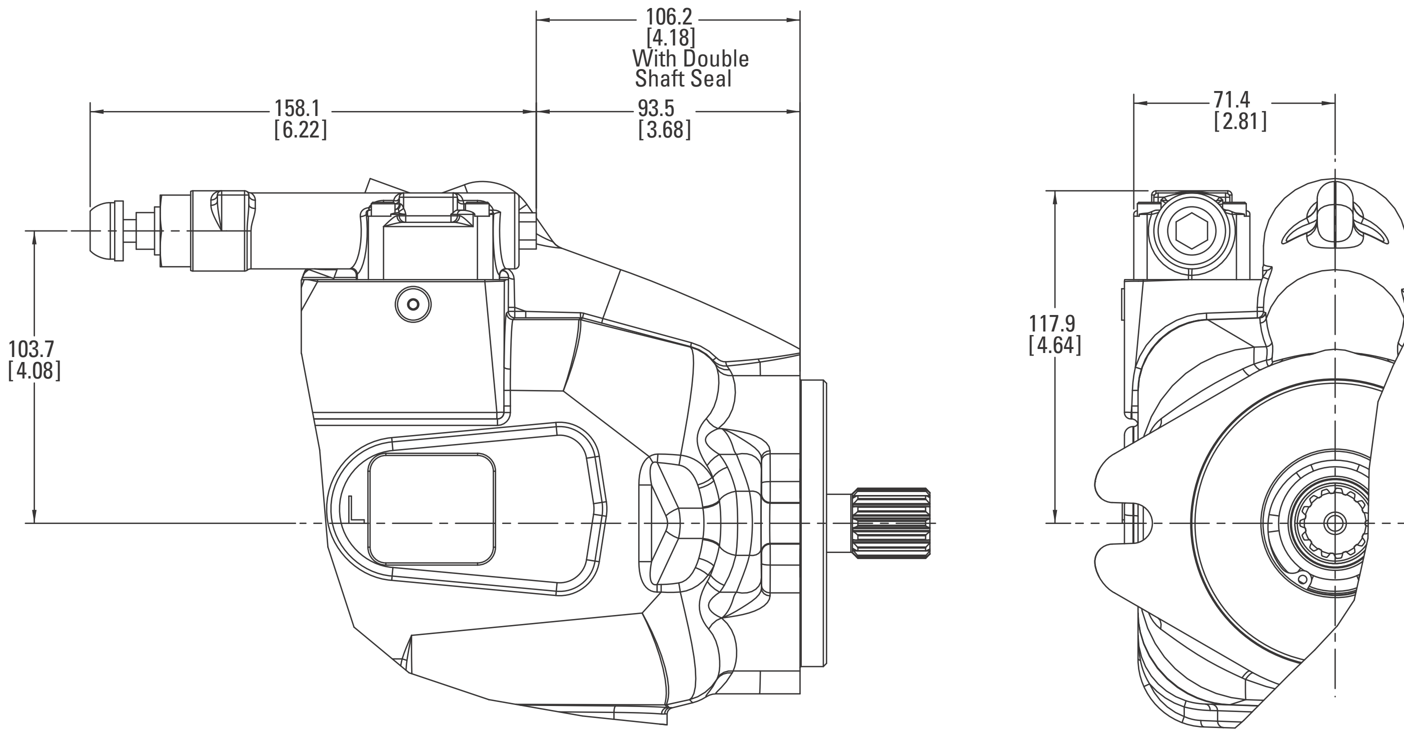
* Refer to C-Mount Pump installation drawings for port locations.

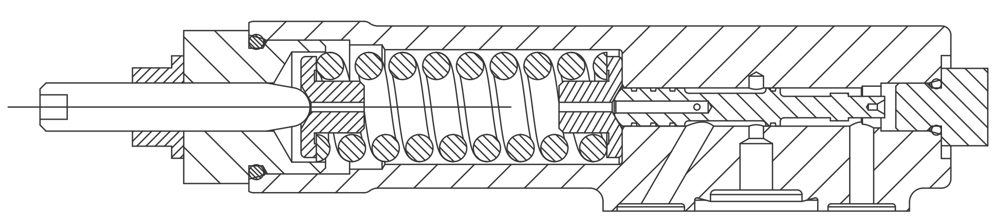
Load Sense and Pressure Compensator





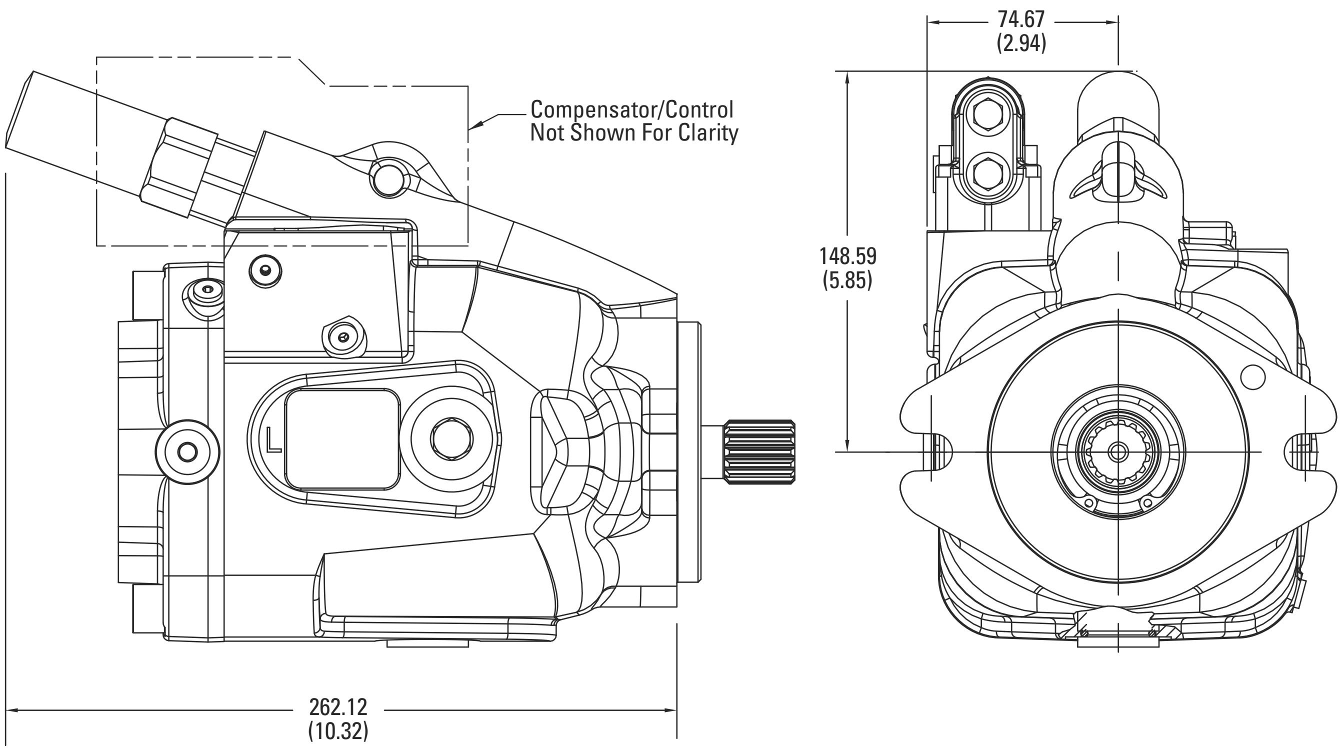
Pressure Compensator





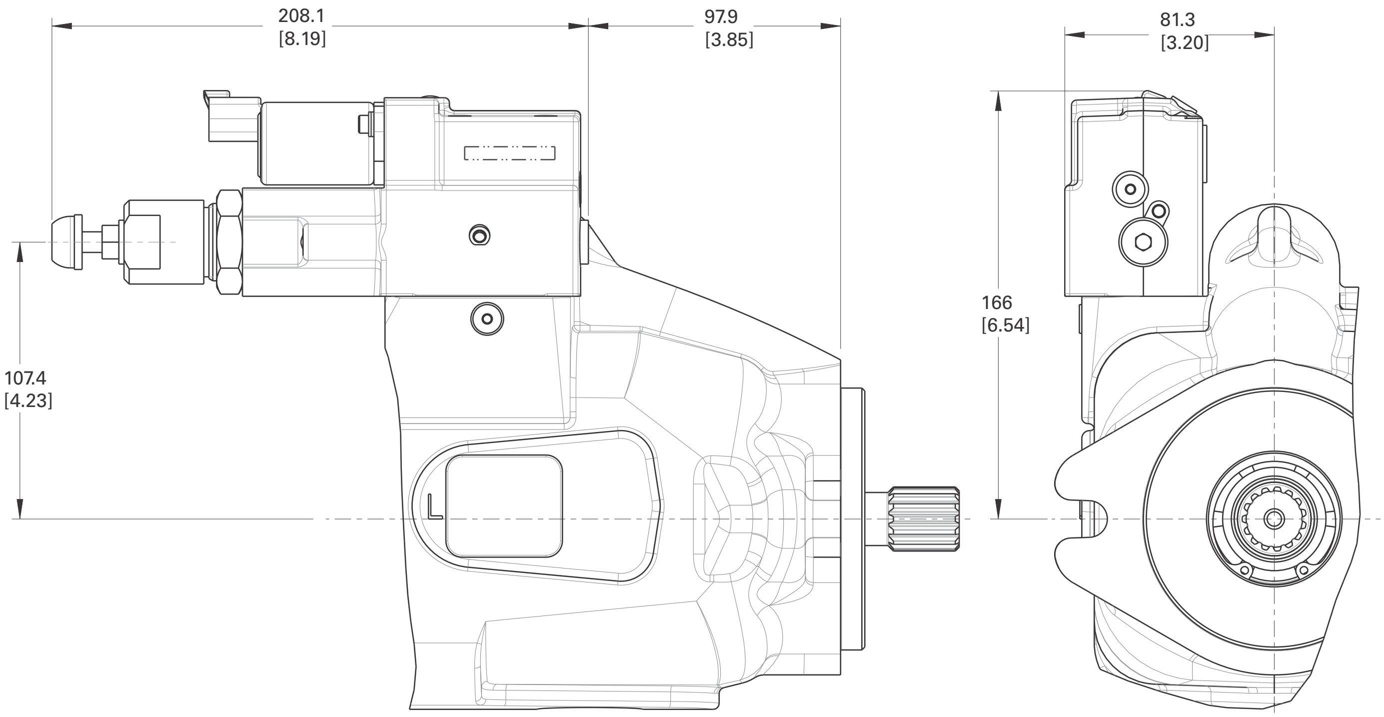
Control Installation

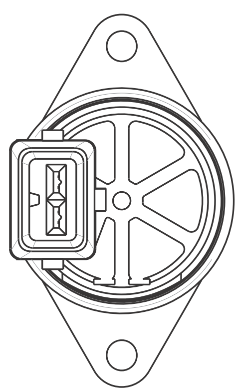
Torque Control



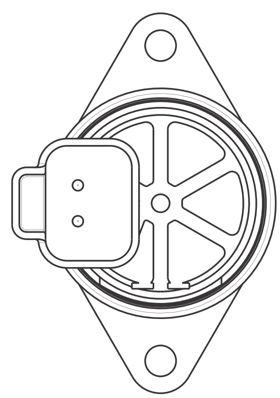
Control Installation

EH Inverse Proportional Pressure Control (IPPC)





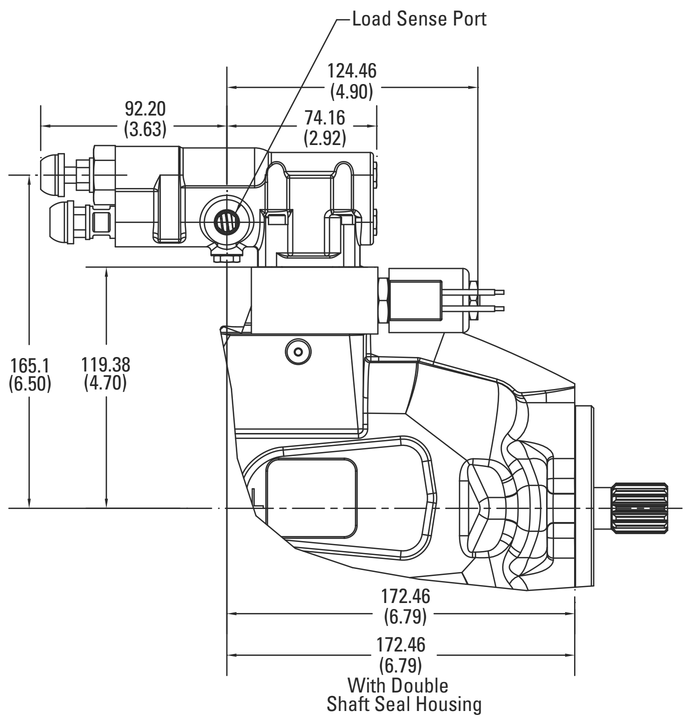
AMP CONNECTOR

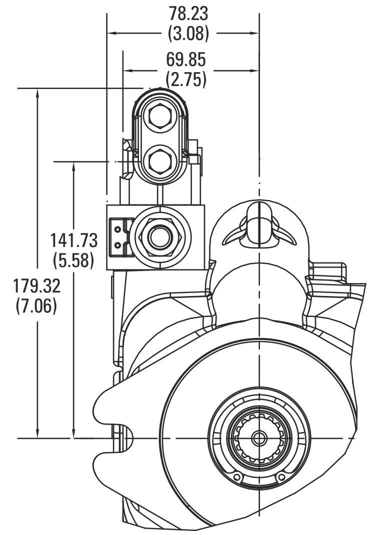


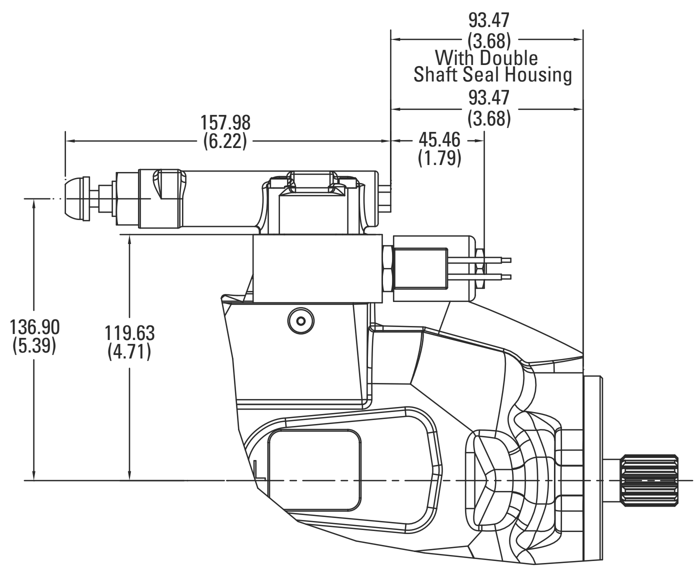
DEUTSCH CONNECTOR

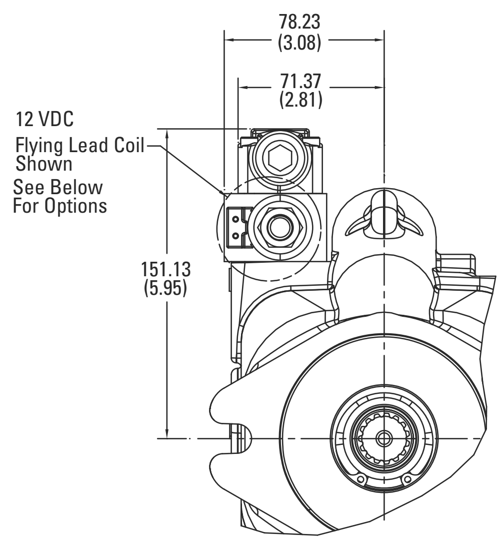
Control Installation

Cold Start Valve

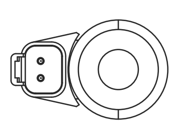




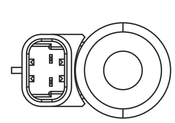




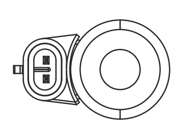
Optional Connectors



Deutsch Option



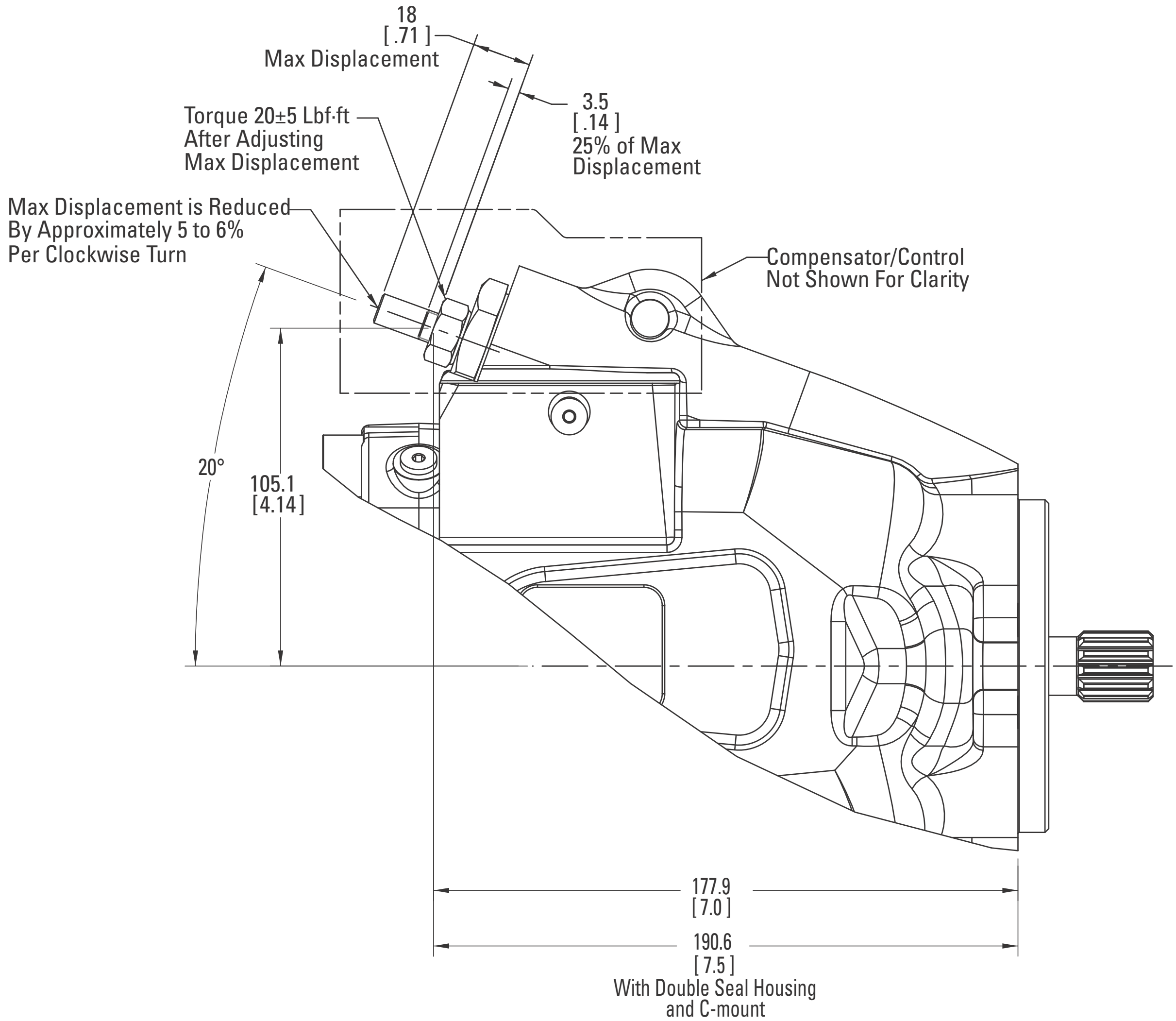
Metri-pack 280 Option



Metri-pack 150 Option

External Manual Stroke Adjustment

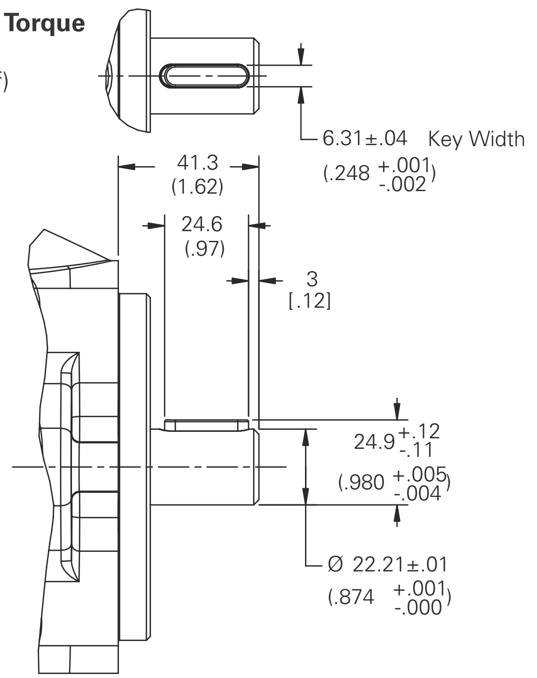
Maximum Stroke Limiter



Input Shaft Options

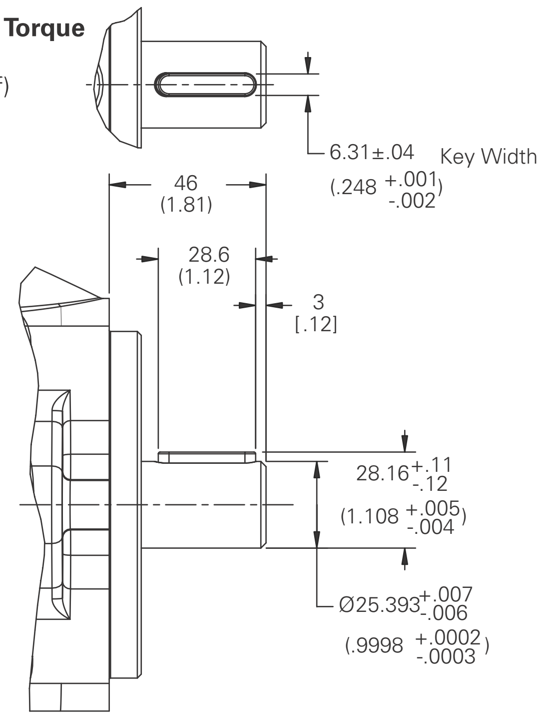
01 Code

Maximum Torque
209 Nm
(1850 in-lbf)



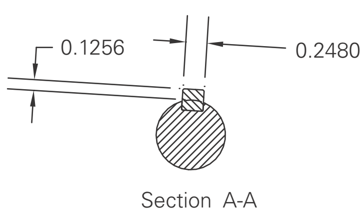
02 Code

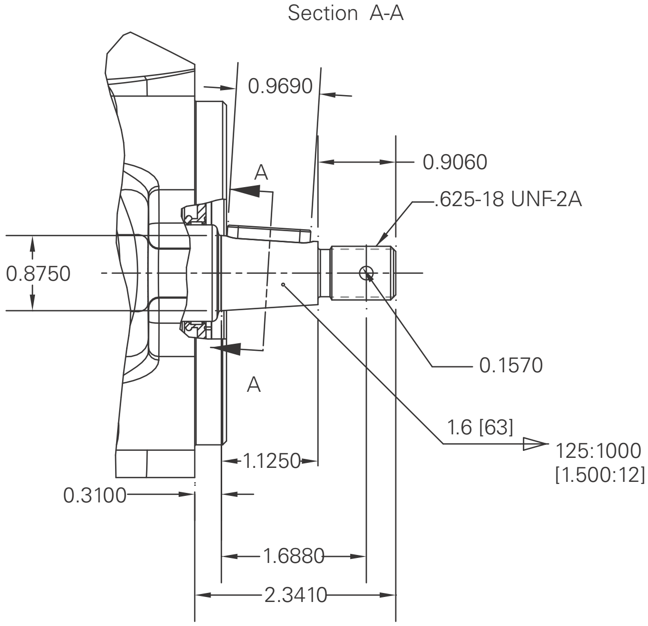
Maximum Torque
337 Nm
(2987 in-lbf)



03 Code

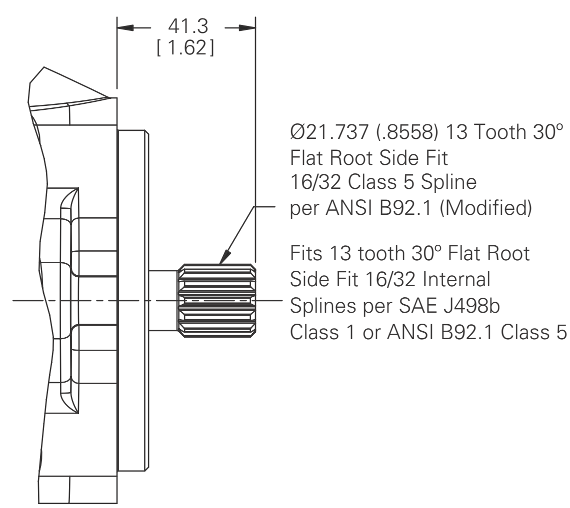
Maximum Torque
209 Nm
(1850 in-lbf)





05 Code

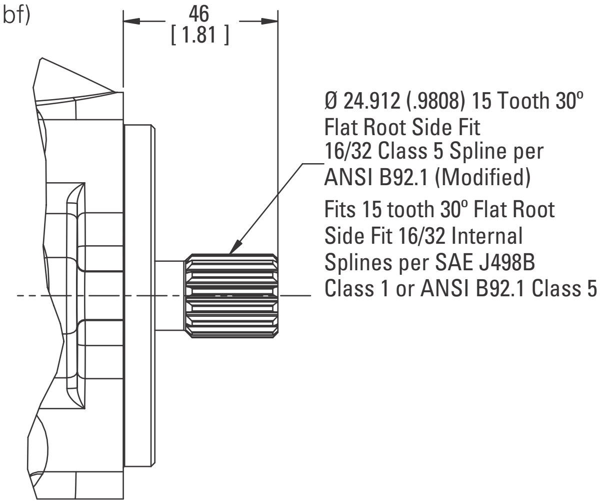
Maximum Torque
307 Nm
(2717 in-lbf)



Input Shaft Options

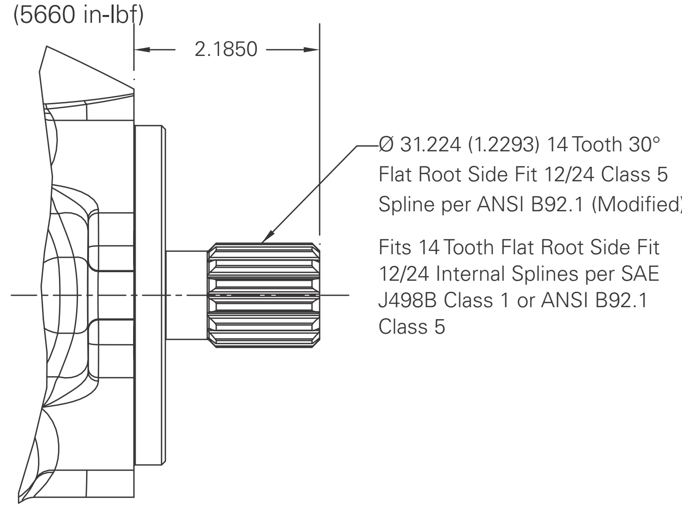
08 Code

Maximum Torque
397 Nm
(3514 in-lbf)



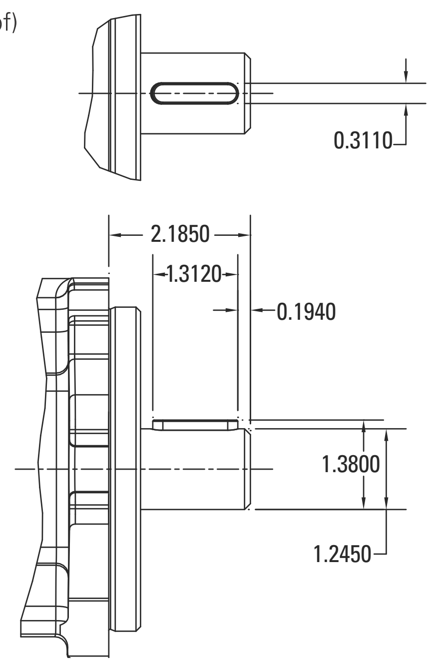
32 Code

Maximum Torque
640 Nm
(5660 in-lbf)



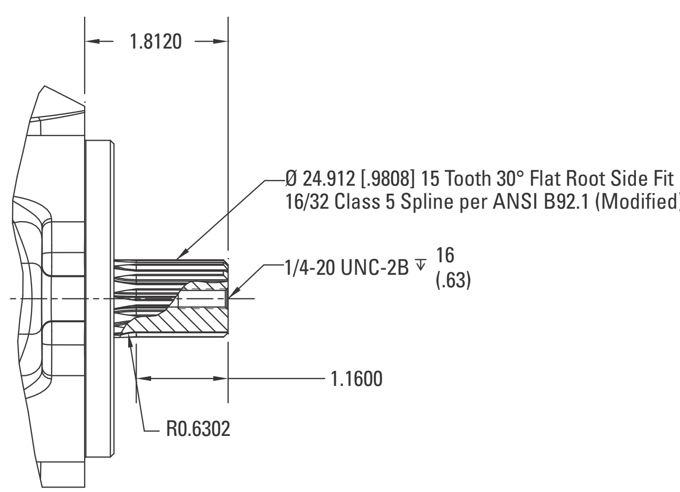
33 Code

Maximum Torque
450 Nm
(3980 in-lbf)



34 Code

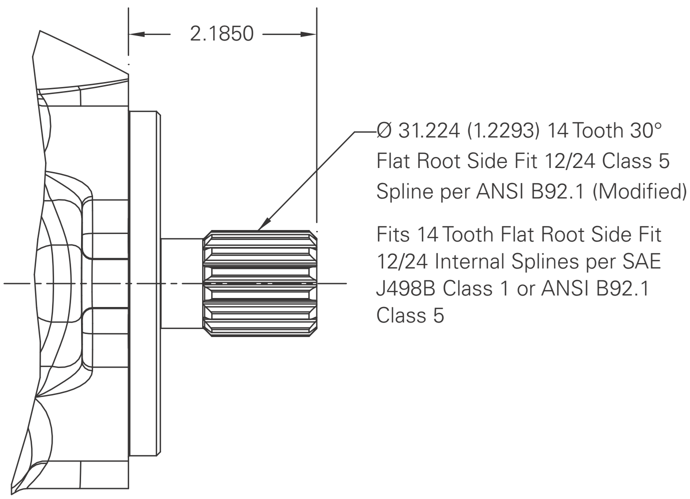
Maximum Torque
397 Nm
(3514 in-lbf)



Input Shaft Options

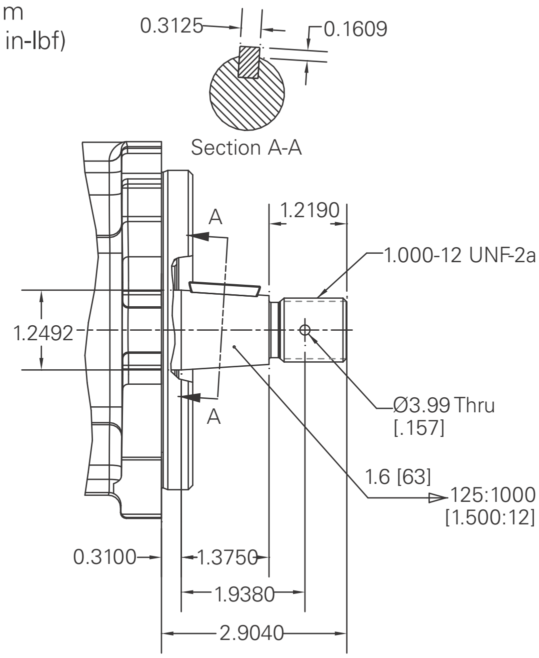
35 Code

Maximum Torque
640 Nm
(5660 in-lbf)

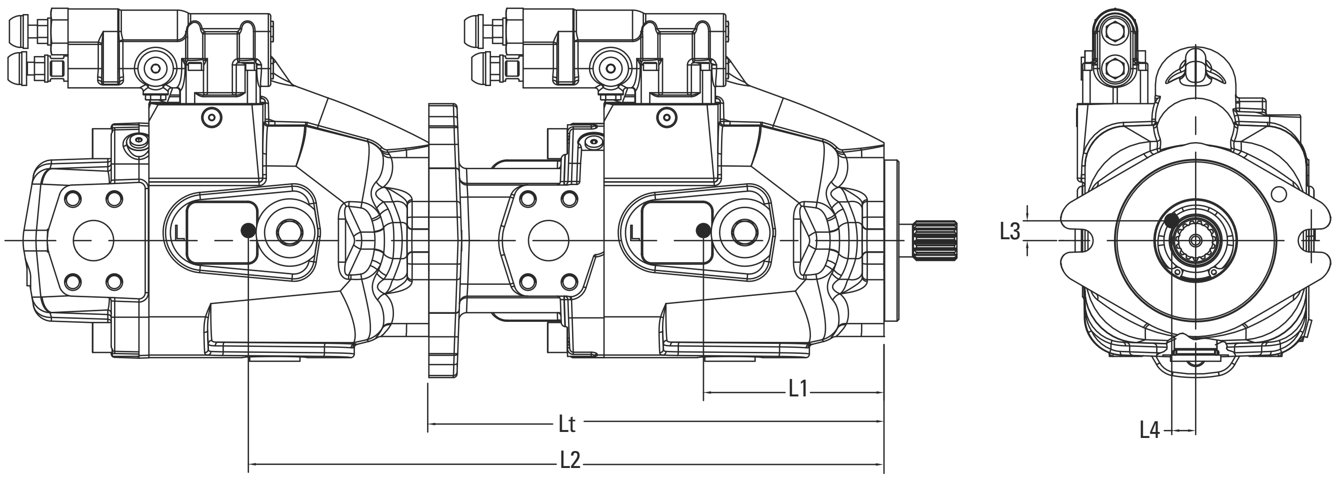


38 Code

Maximum Torque
450 Nm
(3980 in-lbf)



Center of Gravity



	Rear Port			Side Port			Thru-Drive			Length	Dual Seal
	Lcg	L3	L4	Lcg	L3	L4	Lcg	L3	L4	Lt	Lds
ADU041	109.6 (4.31)	9.6 (0.38)	2.9 (0.11)	114.7 (4.51)	9.2 (0.36)	2.4 (0.10)	131.5 (5.18)	8.2 (0.32)	2.1 (0.08)	287.3 (11.31)	13.0 (0.50)
ADU049	109.6 (4.31)	9.6 (0.38)	2.9 (0.11)	114.7 (4.51)	9.2 (0.36)	2.4 (0.10)	131.5 (5.18)	8.2 (0.32)	2.1 (0.08)	287.3 (11.31)	13.0 (0.50)
ADU062	109.9 (4.32)	9.4 (0.37)	2.9 (0.11)	114.9 (4.52)	9.0 (0.35)	2.4 (0.10)	131.3 (5.17)	8.0 (0.31)	2.1 (0.08)	287.3 (11.31)	13.0 (0.50)
ADU080	109.9 (4.32)	9.4 (0.37)	2.9 (0.11)	114.9 (4.52)	9.0 (0.35)	2.4 (0.10)	131.3 (5.17)	8.0 (0.31)	2.1 (0.08)	287.3 (11.31)	13.0 (0.50)

Dimensions in mm (in)

Examples: Calculation L_1 and L_2

Tandem ADU062 Thru-drive with ADU041 Rear Ported

L_1 = Lcg 131.3mm (5.17 inches)

L_2 = Lt + Lcg 287.3mm + 109.6mm = 396.9mm (15.6 inches)

Tandem Dual Seal ADU049 Thru-drive with ADU049 Side Ported

L_1 = Lcg + Lds 131.5mm + 13mm = 144.5mm (5.69 inches)

L_2 = Lt + Lds + Lcg 287.3mm + 13mm + 114.7mm = 415mm (16.34 inches)

Tandem Pump Applications

Eaton recommends that tandem pump applications be provided with additional support to limit overhung loading of the mounting flange. The thru-drive alternate attachment points on the rear flange may be used with a customer designed support.

Installation and Start-up

Warning: Care should be taken that mechanical and hydraulic resonances are avoided in the application of the pump. Such resonances can seriously compromise the life and/or safe operation of the pump.

Drive Data

Mounting attitude should be horizontal using the appropriate case drain ports to ensure that the case remains full of fluid at all times. Consult your local Eaton Representative if a different arrangement is required.

In those cases where geometric tolerances of mounting are critical, or where specific tolerance ranges are required and not specified, consult Eaton Engineering for specific limits.

Direction of shaft rotation, viewed from the prime mover end, must be as indicated in the model designation on the pump – either right hand (clockwise) or left hand (counterclockwise).

Direct coaxial drive through a flexible coupling is recommended. If drives imposing radial shaft loads are considered, please consult your Eaton Representative.

Start-up Procedure

Make sure the reservoir and circuit are clean and free of dirt/debris prior to filling with hydraulic fluid.

Fill the reservoir with filtered oil and fill to a level sufficient enough to prevent vortexing at the suction connection to pump inlet. It is good practice to clean the system by flushing and filtering, using an external slave pump.

Caution: Before the pump is started, fill the case through the uppermost drain port with hydraulic fluid of the type to be used. The case drain line must be connected directly to the reservoir and must terminate below the oil level.

Once the pump is started, it should prime within a few seconds. If the pump does not prime, check to make sure that there are no restrictions between the reservoir and the inlet to the pump, and that the pump is being rotated in the proper direction, and that there are no air leaks in the inlet line and connections. Also check to make sure that trapped air can escape at the pump outlet.

After the pump is primed, tighten the loose outlet connections, then operate for five to ten minutes (unloaded) to remove all trapped air from the circuit.

If the reservoir has a sight gage, make sure the fluid is clear – not milky.

Fluid Cleanliness

The 420 Series pumps are rated in anti-wear petroleum fluids with a contamination level of 21/18/13 per ISO 4406. Operation in fluids with levels more contaminated than this is not recommended. Fluids other than petroleum, severe service cycles, or temperature extremes are cause for adjustment of these codes. Please contact your Eaton Representative for specific duty cycle recommendation.

Eaton 420 Series pumps, as with any variable displacement piston pumps, will operate with apparent satisfaction in fluids up to the rating specified here. Experience has shown however, that pump and hydraulic system life is not optimized with high fluid contamination levels (high ISO cleanliness codes).

Proper fluid condition is essential for long and satisfactory life of hydraulic components and systems. Hydraulic fluid must have the correct balance of cleanliness, materials, and additives for protection against wear of components, elevated viscosity and inclusion of air.

Essential information on the correct methods for treating hydraulic fluid is included in Eaton publication 561 – "Eaton Guide to Systemic Contamination Control" – available from your local Eaton distributor. In this publication, filtration and cleanliness levels for extending the life of axial piston pumps and other system components are listed. Included is an excellent discussion of the selection of products needed to control fluid condition.

Notes

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March 2017

Q Series Piston Pumps

Variable Displacement, Quiet Series for Industrial Applications

Technical Catalog

PVQ10	
PVQ13	PVQ32
PVQ20	PVQ40
PVQ25	PVQ45

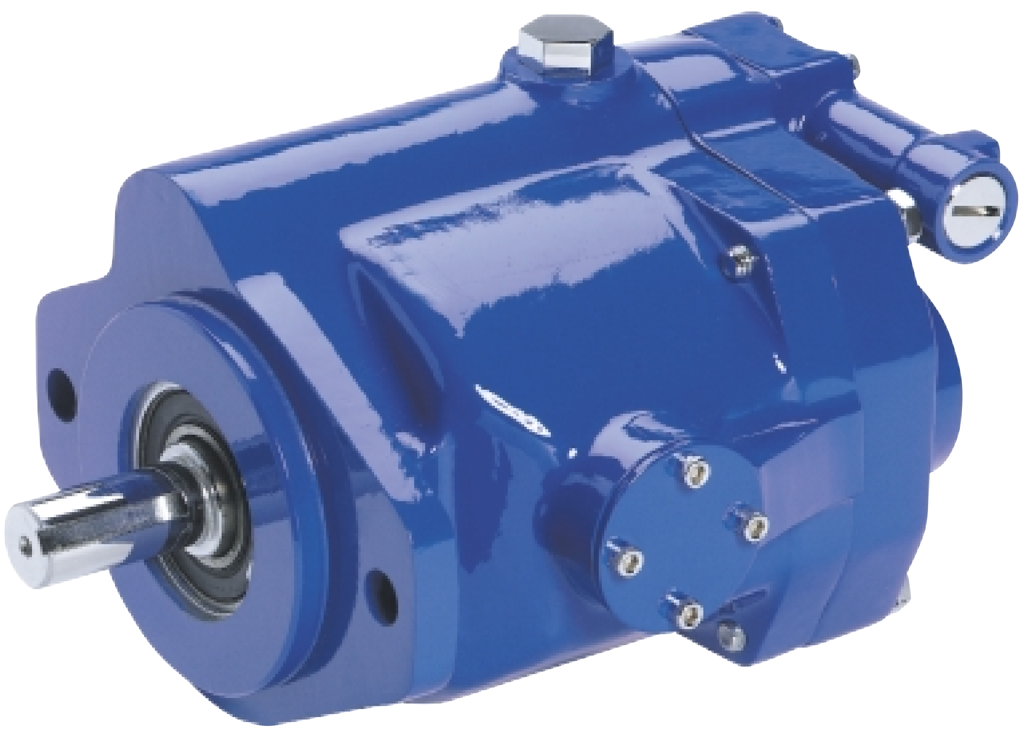


Table of Contents

Introduction

PVQ piston pumps are in-line, variable displacement units and are available in nine sizes. Displacement is varied by means of pressure and/or flow compensator controls. An impressive assortment of control options offers maximum operating flexibility.

PVQs operate at quietness levels that meet today's demanding industrial conditions. The sound level of each unit approaches or is below that of the electric motor driving it. Sound is reduced by a patented timing arrangement that also produces low pressure "pulses" in the outlet flow. This leads to reduced tendencies for noise in systems using PVQs.

The PVQ series is capable of operating with many types of hydraulic fluid. Water-content and phosphate ester fluids can be accommodated, in addition to the typical petroleum based and synthetic fluids.

Many PVQ pumps are available in a thru-drive configuration to accommodate a multitude of application and installation requirements. Thru-drive models can be coupled to various types and sizes of fixed and variable displacement pumps, resulting in a compact and versatile package. Such a package offers lower installed cost by reducing the installation size and by requiring only one mounting pad on the prime mover.

Quiet PVQs have excellent operating characteristics, and the pumps' many control and mounting options allow choosing the optimum model for any application. Additionally, PVQs possess the same durability and long life characteristics expected of the best industrial products in today's marketplace. For over 75 years, the Eaton name has been synonymous with long trouble-free service.

Operating Data

Q Series Displacement, Speed, and Pressure Ratings

DISPLACEMENT, SPEED, AND PRESSURE RATINGS

Model Number System	**Maximum Geometric Displacement cm^3/r (in^3/r)**	**Rated Speed r/min**	**Maximum Pressure bar (psi)**
PVQ10	10,5 (0.643)	1800	210 (3000)
PVQ13	13,8 (0.843)	1800	140 (2000)
PVQ20	21,1 (1.290)	1800	210 (3000)
PVQ25	25,2 (1.540)	1800	210 (3000)
PVQ32	32,9 (2.010)	1800	140 (2000)
PVQ40	41,0 (2.500)	1800	210 (3000)
PVQ45	45,1 (2.750)	1800	186 (2700)

Application Data

- Fluid Cleanliness
- Hydraulic Fluids and Temperature Ranges
- Fire Resistant Fluids
- Installation and Start-up
- Ordering Procedure

Model Number System

PVQ10 and PVQ13

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
P	V	Q	1	0	A	2	R	S	E	1	S	2	0	C	*	2	1	V	*	1	1	B	D	1	2	S	*

Nos	Feature	Code	Description
1,2,3	Series PVQ	P V Q	Inline piston pump Variable volume Quiet series
4,5	Displacement in cc/rev and pressure ratings	10	10,5 cc/rev (0.64 cir), 210 bar (3000 psi)
		13	13,8 cc/rev (0.84 cir), 140 bar (2000 psi)
6,7	Mounting flange specifications	A2	Flange SAE J744 82-2 (SAE A)
		MA	Flange ISO 3019/2-80A2HW (available with "N" drive shaft only)
8	Rotation viewed from shaft end	R	Right hand (cw), standard
		L	Left hand (ccw), optional
9,10	Ports, type and location	SE	SAE O-ring rear port, 1.0625" inlet and outlet (standard)
		SS	SAE O-ring side port, 1.3125" inlet and outlet (optional)
11	Shafts, input	1	Straight keyed SAE "A" modified, .75" dia. x 1.75" long
		3	Splined SAE "A" modified, 9T 16/32 DP major dia. fit
		N	Shaft end ISO 3019/2 E20N (available with "MA" mount only)
12	Seals	S	Buna N, standard
		F	Fluorocarbon, optional
13,14	Pump design number	20	Design number subject to change. Installation dimensions remain unchanged for designs 10-19.
15,16	Control type	C**	Pressure compensator. PVQ10: Standard model is C21, indicating setting of 210 bar (3000 psi); range is 02-21 in tens of bar (350-3000 psi). PVQ13: Standard model is C14, indicating factory setting of 138 bar (2000 psi); range is 02-14 in tens of bar (350-2000 psi).
		CM**	Low pressure compensator. Standard model is CM7, indicating factory setting of 69 bar (1000 psi); range is 02-10 in tens of bar (350-1500 psi).
15,16	Control type	C**V**B	Pressure compensator C**, as above with load-sensing. Standard load-sensing setting is 11 bar (160 psi); range 10-17 bar (150-250 psi); with bleed-down orifice. Example: C21V11B indicates PVQ10 compensator with 210 bar pressure setting and 11 bar load-sense differential.
		C**V**P	Pressure compensator with load-sensing as C**V**B above, but with bleed-down orifice plugged.
		C**VC**B	Pressure compensator with load-sensing. Compensator same as C** above. Standard load-sensing setting is 24 bar (350 psi), range 17-31 bar (250-450 psi). With bleed-down orifice.
		C**VC**P	Pressure compensator with load-sensing. Same as C**VC**B above, but with bleed-down orifice plugged.
		CG	Pressure compensator modified for hydraulic remote control.
		CD**	Electric dual range compensator. PVQ10: CD21 is standard 210 bar setting of high range (24-210 bar). PVQ13: CD14 is standard 140 bar setting of high range (24-140 bar). Both units require low range to be set by customer (20-100 bar).
		UV	Unloading Valve for accumulator circuits. See installation details.

Model Number System

PVQ10 and PVQ13

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
P	V	Q	1	0	A	2	R	S	E	1	S	2	0	C	*	2	1	V	*	1	1	B	D	1	2	S	*

Nos	Feature	Code	Description
17,18	Pressure setting	21 14	210 bar (3000 psi) PVQ10 140 bar (2000 psi) PVQ13
19,20	Flow control option	Blank V VC	No flow control
21,22	Load sense differential pressure setting	Blank 11 24	No flow control
23	Flow control option	Blank B P	No flow control
24	Displacement option	Blank D	Without adjustable maximum displacement stop (standard). Adjustable maximum displacement stop (optional).
25,26	Control design	12	O-ring seal design
27,28	Special pump option suffixes	S2 S3 S9	Shaft up mounting British Standard Parallel Threads Counterbore Ports (ISO R288 threads). Contact Eaton for available configurations. Special CG compensator for use with electronically modulated relief valves.

RATINGS

Model Number System	Maximum Geometric Displacement cm^3/r (in^3/r)	Rated Speed r/min	Maximum Pressure bar (psi)	Input Power at Max. Pressure and Rated Speed kW (hp)	Approx. Weight kg (lb)
PVQ10	10,5 (0.643)	1800	210 (3000)	7,4 (10)	7,2 (16)
PVQ13	13,8 (0.843)	1800	140 (2000)	6,5 (8.75)	7,2 (16)

Pressure Limits:

Case pressure – 0,35 bar (5 psig) maximum
Inlet pressure – 0,2 bar (5 in. Hg) vacuum to 2 bar (30 psig)

Pressure Compensators

The pressure compensator control automatically adjusts pump delivery to maintain volume requirements of the system at a preselected operating pressure. Maximum pump delivery is maintained to approximately 3,4 bar (50 psi) below the pressure setting before being reduced. The pressure compensator control operates on one side of center and has an adjustment range as designated in the model numbering system.

Pressure Compensator with Adjustable Maximum Displacement Stop

The adjustable maximum stop pressure control enables the maximum pump delivery to be externally adjusted from 25% to 100% while maintaining all of the standard features of a pressure compensated pump. To assist initial priming, manual adjustment control setting must be at least 40% of maximum flow position.

Remote Control Pressure Compensator

Exactly the same as the “C” (pressure compensation option) except the machine operator is able to change the compensator setting through the use of a remote pilot relief valve, such as Eaton C-175.

Electric Dual Range Pressure Compensator

The dual range pressure compensator control automatically adjusts pump delivery to maintain volume requirements of the system at either of two preselected operating pressures. Maximum pump delivery is maintained to approximately 3,4 bar (50 psi) below either pressure control setting before being reduced.

Control type and pressure range are designated in the model number system.

Note: Graphic symbols shown with external valve(s) and cylinder to illustrate typical usage.

Load-sensing and Pressure Limiting Compensators

This compensator provides load-sensing control under all pressure conditions up to the desired maximum. It automatically adjusts pump flow in response to a remote pressure signal and maintains outlet pressure at a level slightly above load pressure. The integral pressure limiter overrides the load-sensing control, reducing pump displacement as the preset maximum operating pressure is reached.

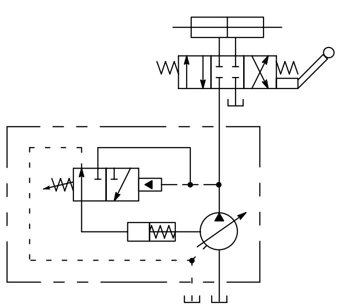
Standard load-sense differential pressure settings, by control type, follow. See model number system for setting range.

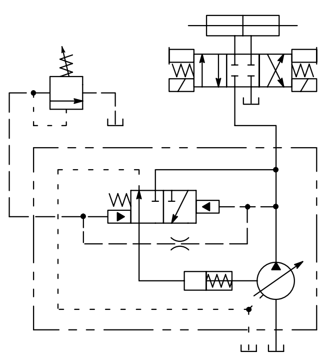
Standard load-sensing and pressure limiting control with 11 bar differential pressure (standard factory setting). Includes bleed-down orifice to exhaust load-sense signal for low-pressure standby condition.

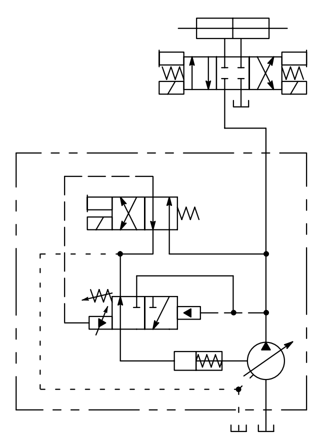
Same as C**V11B above, but with bleed-down orifice plugged.

Same as C**V11B, but with factory differential pressure setting of 24 bar.

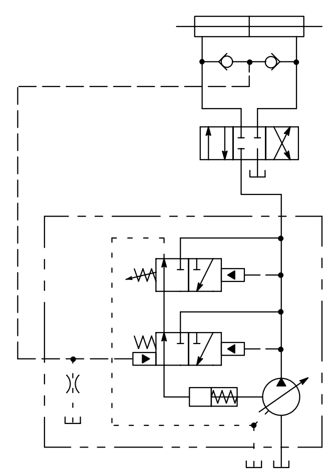
Same as C**V11P, but with factory differential pressure setting of 24 bar.







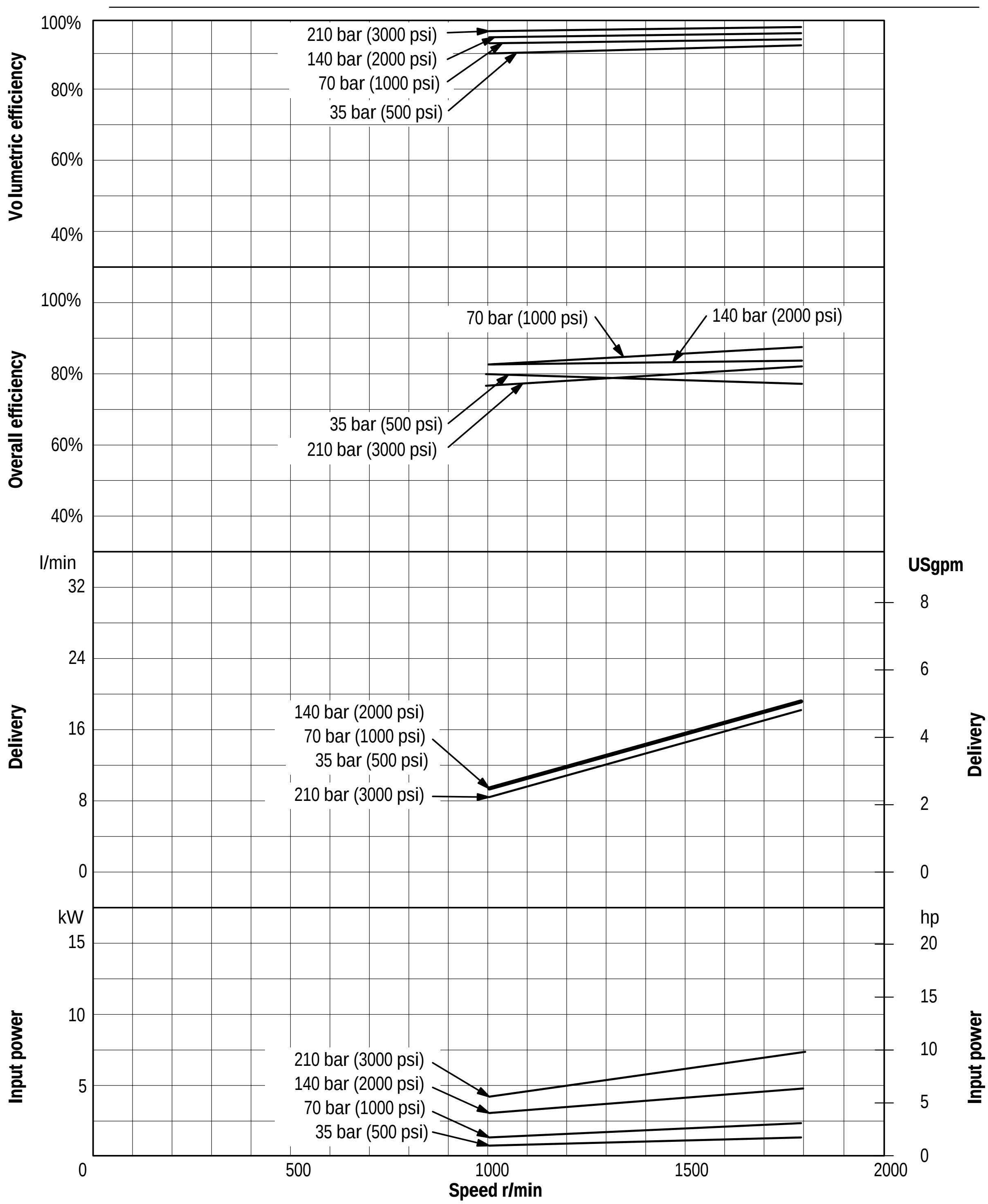
(†orifice open)
(†orifice plugged)



Performance Curves
PVQ10

Oil type: SAE 10W
Oil temperature: 49°C (120°F)
Inlet: 0.2 bar (5 in. Hg)

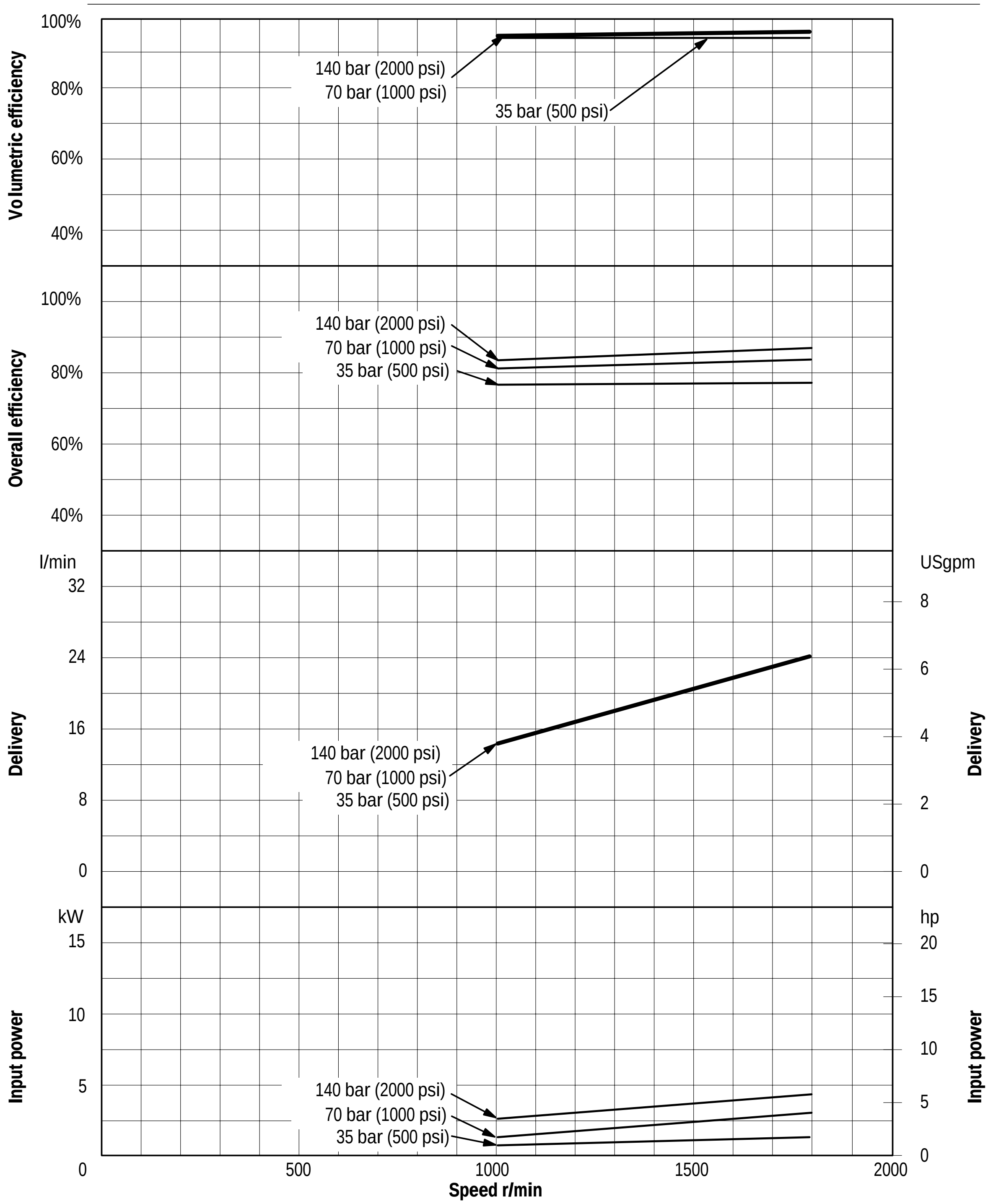
Note: To obtain full flow operation of pump, pressure compensator setting must be 14 bar (200 psi) above desired operating pressure. Full flow curves were obtained with compensator settings 14 bar (200 psi) above 210 bar (3000 psi) max. rated pressure.



Performance Curves
PVQ13

Oil type: SAE 10W
Oil temperature: 49°C (120°F)
Inlet: 0.2 bar (5 in. Hg)

Note: To obtain full flow operation of pump, pressure compensator setting must be 14 bar (200 psi) above desired operating pressure. Full flow curves were obtained with compensator settings 14 bar (200 psi) above 210 bar (3000 psi) max. rated pressure.



Operating Data

PVQ10 and PVQ13 Sound Data

Temperature: 50°C (120°F)
Test Fluid: URSA-ED (10W)
Inlet Pressure: Atmospheric (0 psig)

SOUND DATA

		Sound Level dB(A)*			
		Full Stroke		Cutoff	
Speed r/min	Pressure bar (psi)	PVQ10	PVQ13	PVQ10	PVQ13
1000	35 (500)	51	53	43	42
	70 (1000)	55	54	48	50
	100 (1500)	56	55	50	52
	140 (2000)	57	61	51	56
	175 (2500)	59	–	51	–
1200	35 (500)	53	54	46	44
	70 (1000)	55	54	49	52
	100 (1500)	56	58	51	56
	140 (2000)	57	65	53	57
	175 (2500)	60	–	54	–
1500	35 (500)	56	56	47	44
	70 (1000)	59	59	49	51
	100 (1500)	59	60	51	55
	140 (2000)	60	67	53	56
	175 (2500)	62	–	53	–
1800	35 (500)	58	58	52	49
	70 (1000)	60	61	53	56
	100 (1500)	62	63	55	58
	140 (2000)	63	–	57	–
	175 (2500)	65	–	57	–

*Sound pressure data equivalent to NFPA Standard.

Note: To ensure maximum noise reduction at full flow conditions, Engineering recommends limiting pressure of PVQ10 to 175 bar (2500 psi) and PVQ13 to 100 bar (1500 psi) at 1800 rpm.

PVQ10 and PVQ13 Response Data

Yoke response recorded at rated speed and pressure, 0 psi inlet, 82°C (180°F), SAE 10W oil. Pressure rise was 6900 bar (100,000 psi) per second.

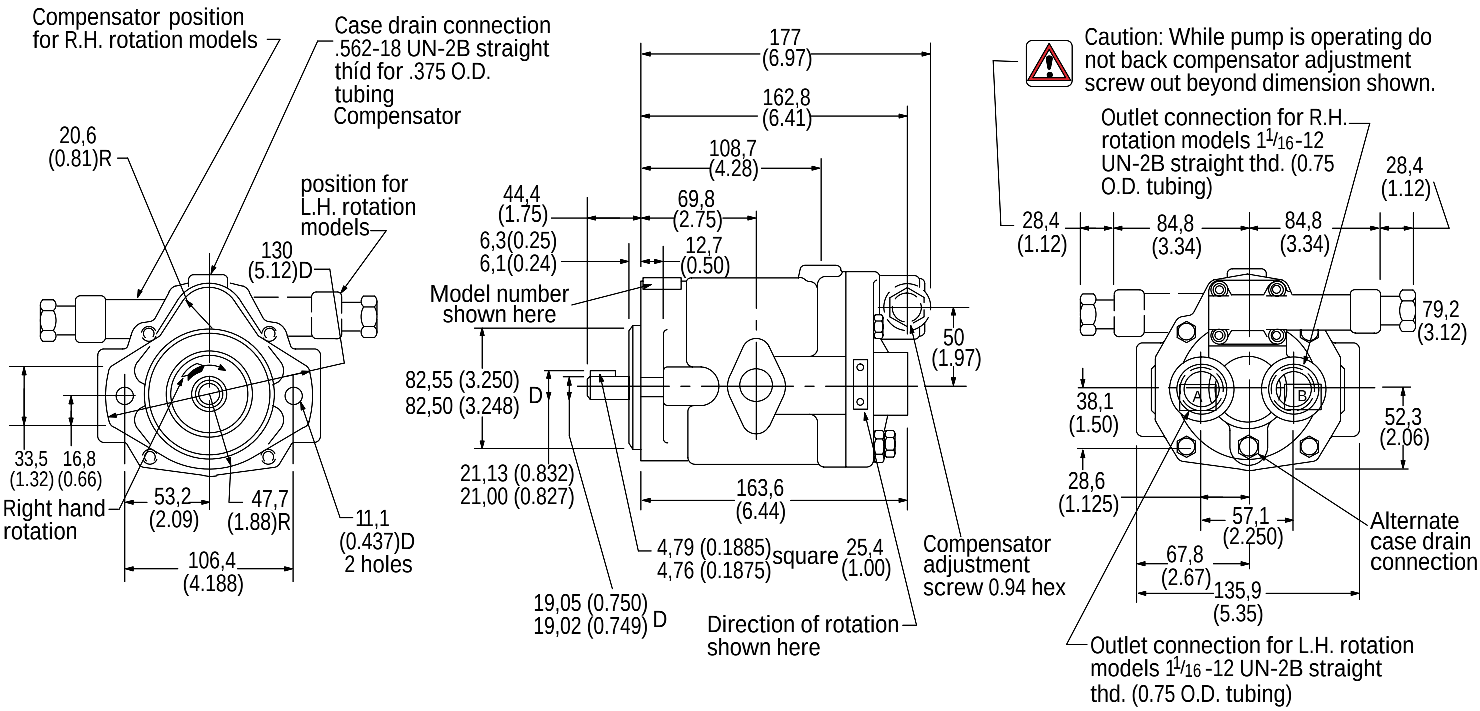
RESPONSE DATA

	PVQ10		PVQ13	
Control Type	On stroke	Off stroke	On stroke	Off stroke
Pressure compensator	0.040 sec.	0.020 sec.	0.048 sec.	0.016 sec.

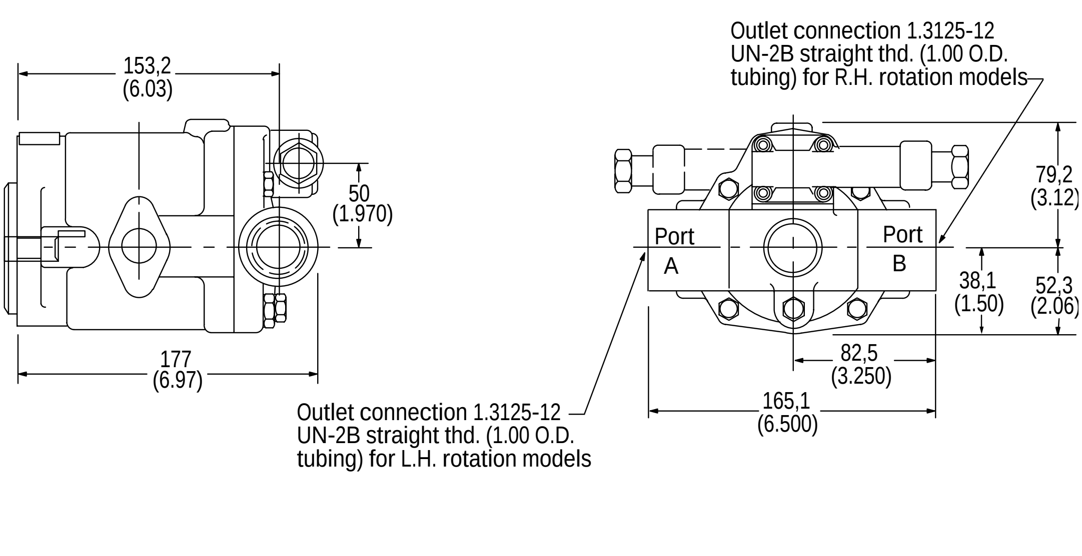
Installation Dimensions

PVQ10 and PVQ13 with Rear Ports

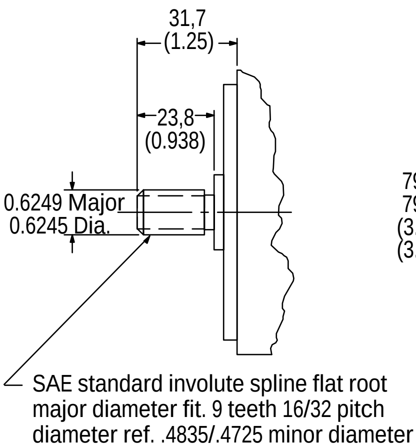
Millimeters (inches)



PVQ10 and PVQ13 with Side Ports

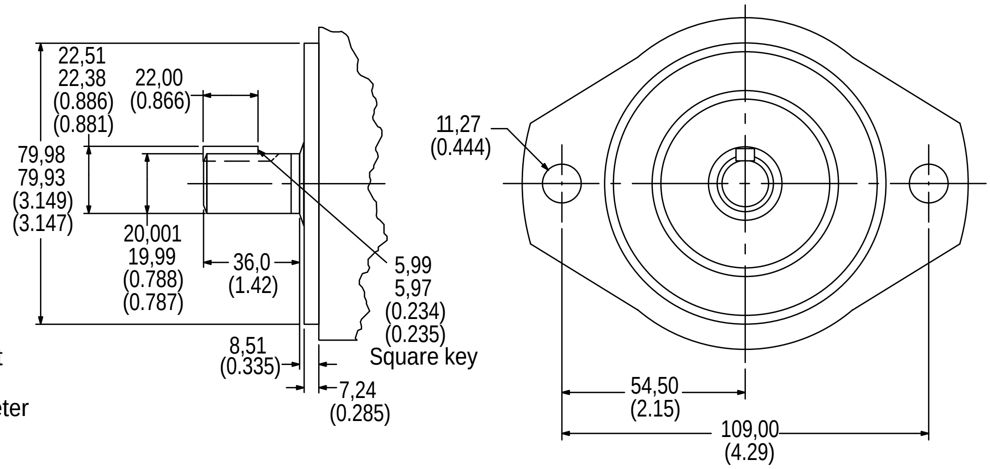


No. 3 Shaft



"N" Shaft with "MA" Flange

(Flange and shaft end ISO 3019/2-80A2HW-E20N)



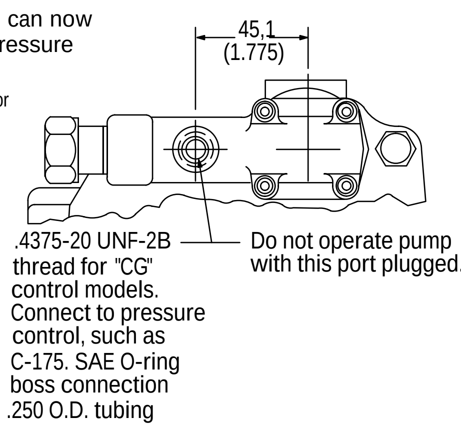
Controls

Remote Compensator

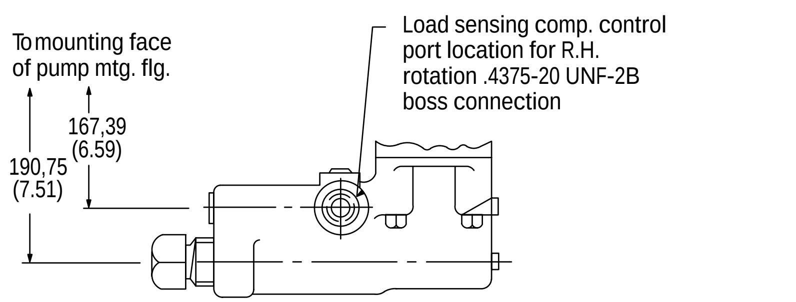
Adjustment

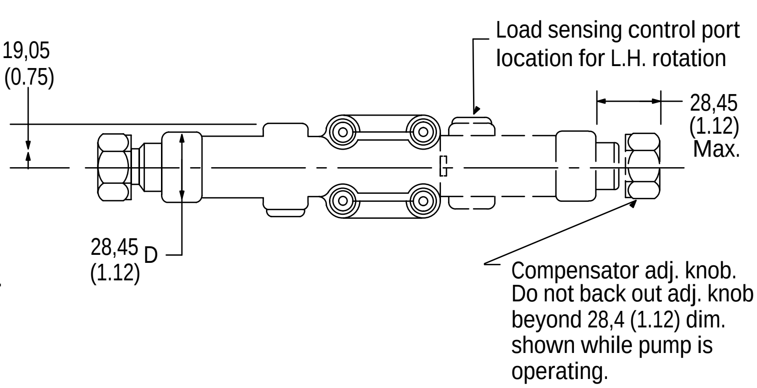
1. Turn pressure control (such as C-175) CCW to minimum setting.
2. Turn compensator adjustment plug to desired minimum pressure (17 bar, 250 psi or higher).
3. Full pressure range can now be obtained with pressure control.

Caution: Effective compensator pressure will be compensator control setting (17-69 bar, 250-1000 psig) plus remote relief valve setting.

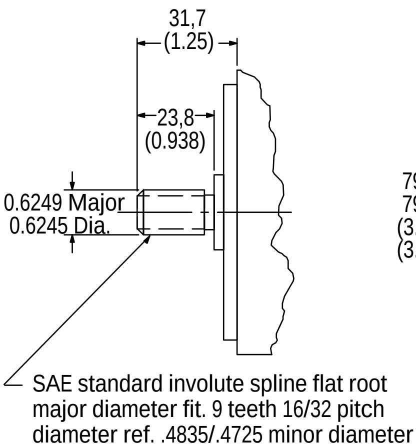


Load-sensing with Pressure Limiting Compensator



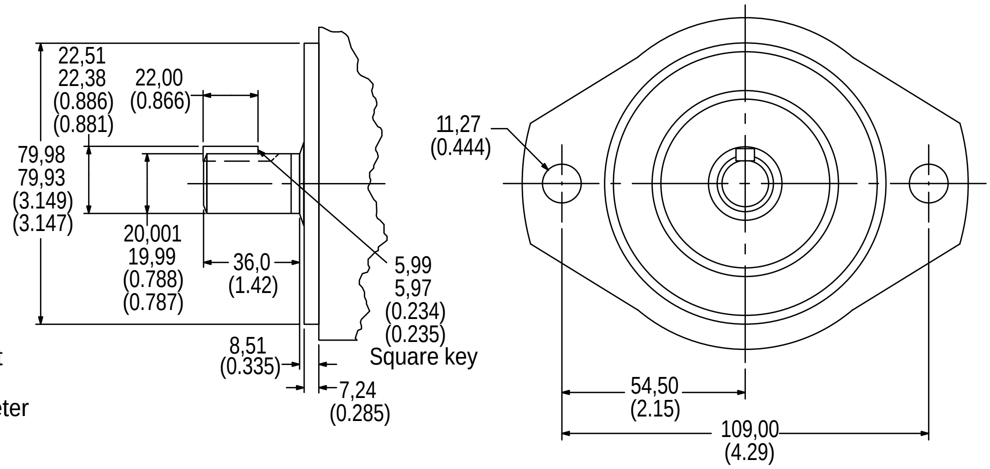


No. 3 Shaft



"N" Shaft with "MA" Flange

(Flange and shaft end ISO 3019/2-80A2HW-E20N)



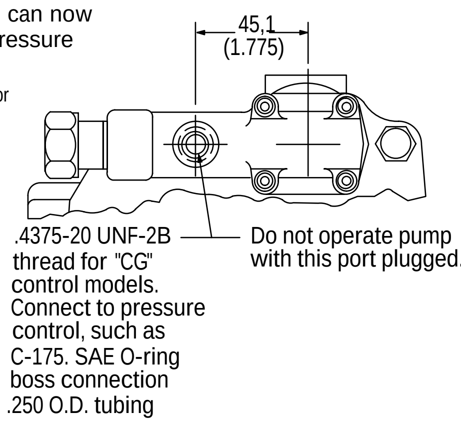
Controls

Remote Compensator

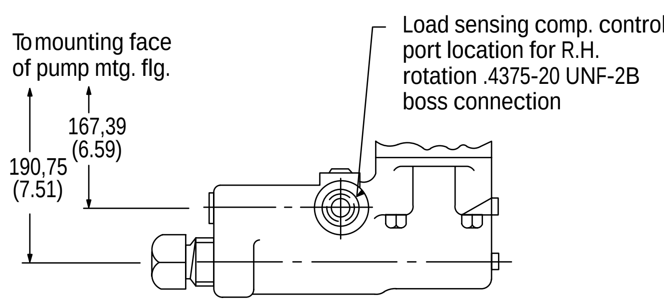
Adjustment

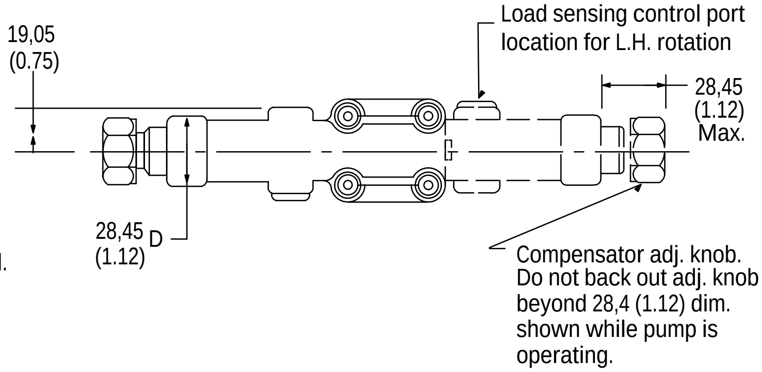
1. Turn pressure control (such as C-175) CCW to minimum setting.
2. Turn compensator adjustment plug to desired minimum pressure (17 bar, 250 psi or higher).
3. Full pressure range can now be obtained with pressure control.

Caution: Effective compensator pressure will be compensator control setting (17-69 bar, 250-1000 psig) plus remote relief valve setting.



Load-sensing with Pressure Limiting Compensator

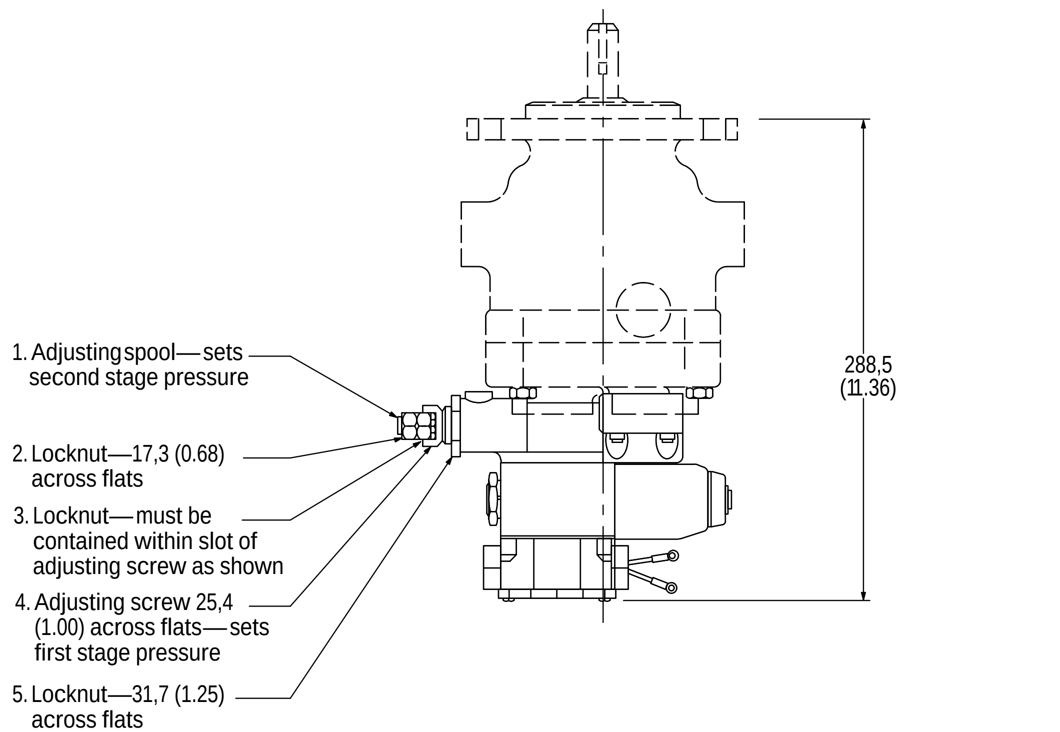


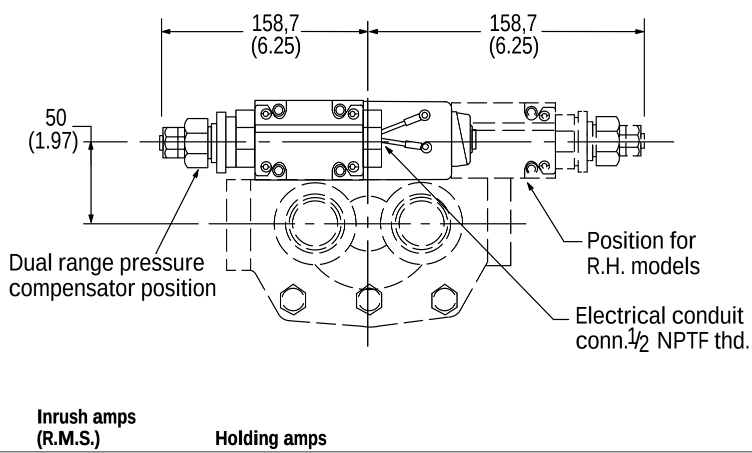


Controls
Electric Dual Range Pressure Compensator Control

Adjustment

1. With the directional valve de-energized, loosen locknut "5" and turn the adjusting screw "4" to the desired first stage pressure setting, then tighten locknut "5."
2. With solenoid de-energized, turn adjusting spool "1" counterclockwise (CCW) until nut "3" is bottomed in adjusting screw slot. (Second stage setting is now equal to first stage pressure setting.) Turn adjusting spool clockwise (CW) to desired second stage pressure requirements. One complete turn of adjusting spool equals approximately 41 bar (600 psi). Energize solenoid and check pressure setting. De-energize solenoid and re-adjust if necessary. Secure this setting by tightening locknut "2."





Solenoid Data (110V AC 50 Hz and 115/120V AC 60 Hz)

Solenoid current	Inrush amps (R.M.S.)	Holding amps
115/120V AC 60 Hz - 110V AC 50 Hz	2.0	.54 .64*

*Maximum peak inrush amps approximately 1.4 x R.M.S. value shown.

Refer to catalog GB-C-2015B for additional solenoid valve data.

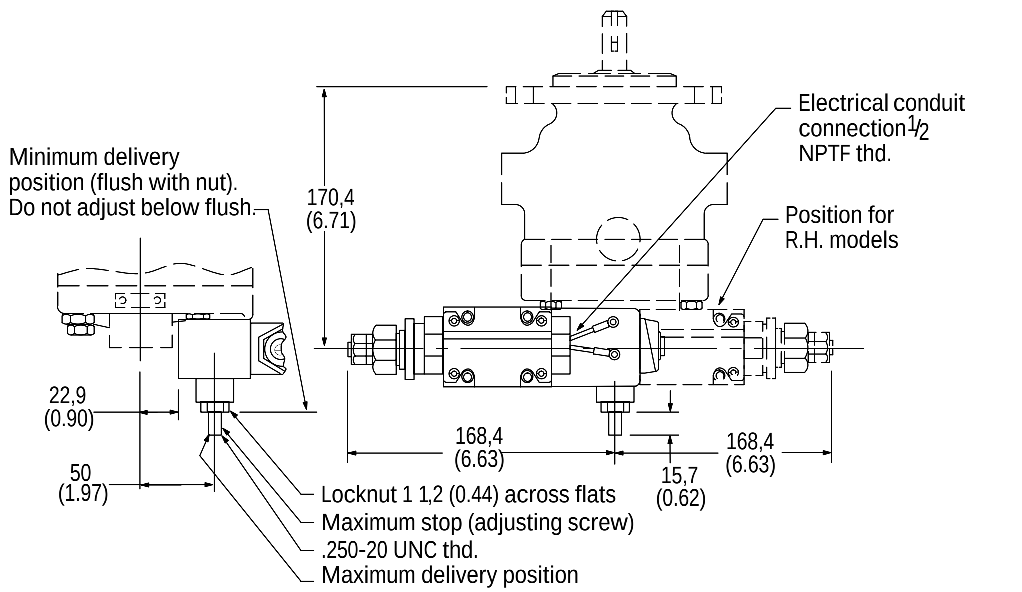
Controls
Electric Dual Range Pressure Compensator with Maximum Displacement Stop

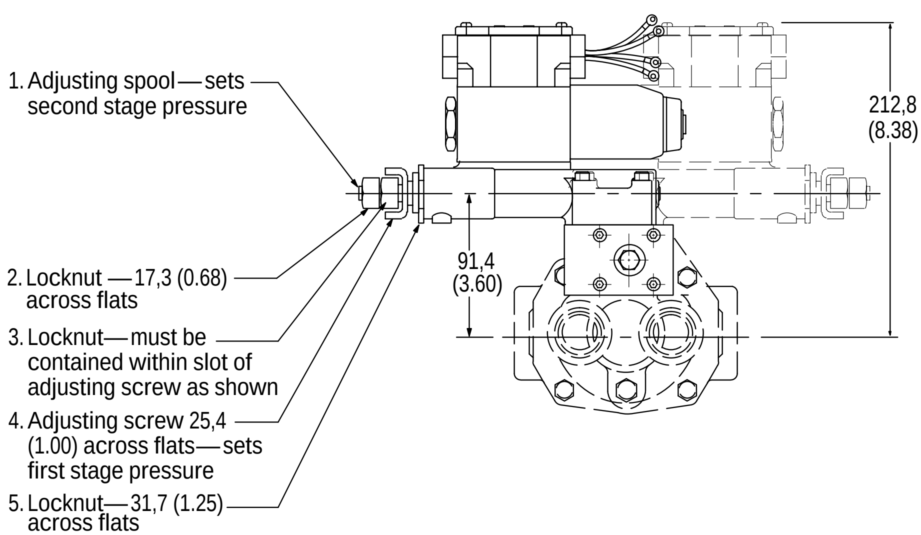
Maximum Flow Adjustment

With the system pressure below both compensator settings, loosen maximum stop adjusting screw locknut and adjust screw to desired flow position (turning screw clockwise decreases flow and turning screw counterclockwise increases flow). To lock screw in position tighten locknut. To assist initial priming, adjust control setting to at least 40% of maximum flow position.

Compensator Control

1. With the directional valve de-energized, loosen locknut "5" and turn the adjusting screw "4" to the desired first stage pressure setting, then tighten locknut "5".
2. With directional valve de-energized, turn adjusting spool "1" counterclockwise until nut "3" is bottomed in adjusting screw slot. (Second stage setting is now equal to first stage pressure setting.) Turn adjusting spool clockwise to desired second stage pressure requirements. One complete turn of adjusting spool equals approximately 41 bar (600 psi). Energize solenoid and check pressure setting. De-energize solenoid and re-adjust if necessary. Secure this setting by tightening locknut "2".





Unloading Valve Control

With the unloading valve control the variable pump will unload at a preset pressure. The pump will maintain this no flow, low pressure (approximately 14 bar [200 psi]) standby condition, until system pressure drops to about 85% of the preset unloading pressure. The pump will then return on stroke and provide full flow until the preset unloading pressure is reached again.

With this control, an efficient accumulator charging circuit is obtained. The pump will provide full flow to fill the accumulator until the maximum charging pressure is reached. The pump then goes to a standby condition until the accumulator pressure drops to 85% of the desired maximum. The accumulator is then recharged as the cycle starts over again.

A separate right angle check valve must be provided to maintain the accumulator hydraulic charge and prevent back flow when the pump is unloaded. The check valve's internal leakage must not exceed five drops per minute. The control port must be connected to system pressure, downstream of the check valve.

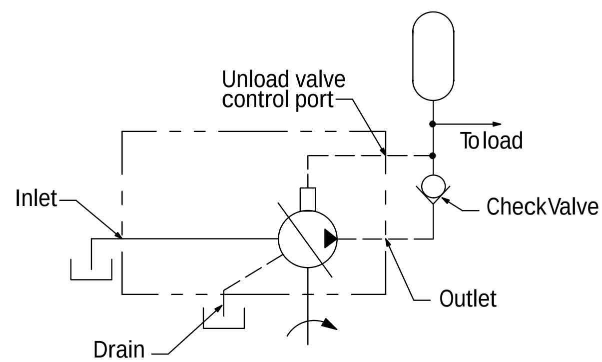
Adjustment range

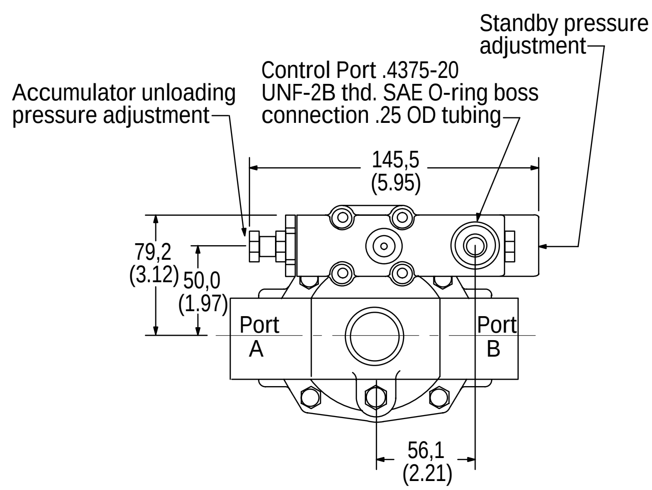
PVQ10	100-210 bar (1500-3000 psi)
PVQ13	100-140 bar (1500-2000 psi)

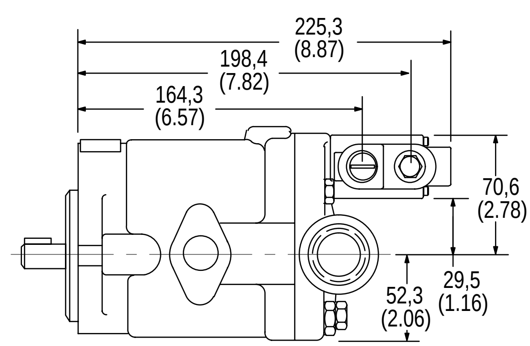
Cut-in pressure is 85% of unloading pressure, minimum.

Setting Pressures

1. Back out accumulator unloading pressure adjustment screw to below desired unloading pressure.
2. Adjust desired standby pressure.
3. Set accumulator pressure by screwing in
   the accumulator unloading adjustment screw. Accumulator recharge (cut-in) pressure is a function of the maximum accumulator pressure and is not adjustable.
4. Check pressure settings and re-adjust if necessary.







Model Number System PVQ20 and PVQ32

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
P	V	Q	2	0	A	2	R	A	9	S	E	1	S	2	1	C	*	2	1	V	*	1	1	B	D	1	2	S	*

Nos	Feature	Code	Description
1,2,3	Series PVQ	P V Q	Inline piston pump Variable volume Quiet series
4,5	Displacement in cc/rev and pressure ratings	20	21,1 cc/rev (1.29 cir), 210 bar (3000 psi)
		32	32,9 cc/rev (2.01 cir), 140 bar (2000 psi)
6,7	Mounting flange specifications	B2	Flange SAE J744 101-2 (SAE B)
		MB	Flange ISO 3019/2-100A2HW (available with N” drive shaft only)
8	Rotation viewed from shaft end	R	Right hand (cw), standard
		L	Left hand (ccw), optional
9,10	Thru-drive without coupling (available	Blank	No thru-drive
		A9	SAE J744 82-2 (SAE A) w/9T spline with side ports only)
		A11	SAE J744 82-2 (SAE A) w/11T spline
11,12	Ports, type and location	SE	SAE O-ring rear port, 1.625” inlet and outlet (standard)
		SS	SAE O-ring side port, 1.625” inlet and outlet (optional)
13	Shafts, input	1	Straight keyed SAE “B” modified, 2.31" long
		3	Splined SAE “B” modified, 13T 16/32 DP major dia. fit
		N	Shaft end ISO 3019/2 E25N (available with “MB” mount only)
		28	26-tooth splined shaft (Eaton). Used in PVQ20/32 single to mount on PVQ40/45 “B26” thru-drive.
14	Seals	S	Buna N, standard
		F	Fluorocarbon, optional
15,16	Pump design number	21	Design number subject to change. Installation dimensions remain unchanged for designs 10-19.
17,18	Control type	C**	Pressure compensator. PVQ20: Standard model is C21, indicating setting of 210 bar (3000 psi); range is 02-21 in tens of bar (350-3000 psi). PVQ32: Standard model is C14, indicating factory setting of 138 bar (2000 psi); range is 02-14 in tens of bar (350-2000 psi).
		CM**	Low pressure compensator. Standard model is CM7, indicating factory setting of 70 bar (1000 psi); range is 02-10 in tens of bar (350-2000 psi).
		C**V**B	Pressure compensator C**, as above with load-sensing. Standard load-sensing setting is 11 bar (160 psi); range 10-17 bar (150-250 psi); with bleed-down orifice. Example: C21V11B indicates PVQ20 compensator with 210 bar pressure setting and 11 bar load-sense differential.
		C**V**P	Pressure compensator with load-sensing as C**V**B above, but with bleed-down orifice plugged.
		C**VC**B	Pressure compensator with load-sensing. Compensator same as C** above. Standard load-sensing setting is 24 bar (350 psi), range 17-31 bar (250-450 psi). With bleed-down orifice.
		C**VC**P	Pressure compensator with load-sensing. Same as C**VC**B above, but with bleed-down orifice plugged.
		CG	Pressure compensator modified for hydraulic remote control.
		CD**	Electric dual range compensator. PVQ20: CD21 is standard 210 bar setting of high range (24-210 bar). PVQ32: CD14 is standard 140 bar setting of high range (24-140 bar). Both units require low range to be set by customer (20-100 bar).
		UV	Unloading Valve for accumultor circuits. See installation details.

Model Number System PVQ20 and PVQ32

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
P	V	Q	2	0	A	2	R	A	9	S	E	1	S	2	1	C	*	2	1	V	*	1	1	B	D	1	2	S	*

Nos	Feature	Code	Description
19,20	Pressure setting	21 14	210 bar (3000 psi) PVQ20 140 bar (2000 psi) PVQ32
21,22	Flow control option	Blank V VC	No flow control
23,24	Load sense differential pressure setting	Blank	No flow control
25	Flow control optional features	Blank B P	No flow control
26	Control option	Blank D	Without adjustable maximum displacement stop (standard) Adjustable maximum displacement stop (optional)
27,28	Control design	12 12 13 21	C** and CM** C**D and CM**D C**V(C)**B and C**V(C)**P UV, CD** CG 30
29,30	Special pump option suffixes	S2 S3 S9	Shaft up mounting British Standard Parallel Threads Counterbore Ports (ISO R288 threads). Contact Eaton for available configurations. Special CG compensator for use with electronically modulated relief valves

RATINGS

Model Number System	Maximum Geometric Displacement cm^3/r (in^3/r)	Rated Speed r/min	Maximum Pressure bar (psi)	Input Power at Max. Pressure and Rated Speed kW (hp)	Approx. Weight kg (lb)
PVQ20	21,1 (1.290)	1800	210 (3000)	14,9 (20)	14 (31)
PVQ32	32,9 (2.010)	1800	140 (2000)	15,6 (21)	14 (31)

Pressure Limits:

Case pressure – 0,35 bar (5 psig) maximum
Inlet pressure – 0,2 bar (5 in. Hg) vacuum to 2 bar (30 psig)

Pressure Compensator Controls

The pressure compensator control automatically adjusts pump delivery to maintain volume requirements of the system at a preselected operating pressure. Maximum pump delivery is maintained to approximately 75 psi (PVQ20) or 100 psi (PVQ32) below the pressure setting before being reduced. The pressure compensator control operates on one side of center and has an adjustment range as designated in the model numbering system.

Pressure Compensator Control with Adjustable Maximum Displacement Stop

The adjustable maximum stop pressure control enables the maximum pump delivery to be externally adjusted from 25% to 100% while maintaining all of the standard features of a pressure compensated pump. To assist initial priming, manual adjustment control setting must be at least 40% of maximum flow position.

Remote Control Pressure Compensator

Exactly the same as the "C" (pressure compensation option) except the machine operator is able to change the compensator setting through the use of a remote pilot relief valve, such as Eaton C-175.

Electric Dual Range Pressure Compensator Control

The dual range pressure compensator control automatically adjusts pump delivery to maintain volume requirements of the system at either of two preselected operating pressures.

Maximum pump delivery is maintained to approximately 75 psi (PVQ20) or 100 psi (PVQ32) below either pressure control setting before being reduced.

Control type and pressure range are designated in the model number system.

Note: Graphic symbols shown with external valve(s) and cylinder to illustrate typical usage.

Load-sensing and Pressure Limiter Compensator Control

This compensator provides load-sensing control under all pressure conditions up to the desired maximum. It automatically adjusts pump flow in response to a remote pressure signal and maintains outlet pressure at a level slightly above load pressure. The integral pressure limiter overrides the load-sensing control, reducing pump displacement as the preset maximum operating pressure is reached.

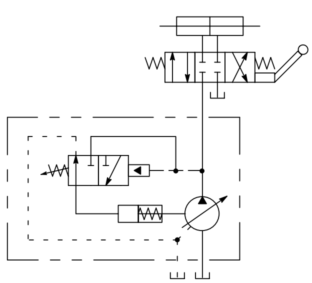
Standard load-sense differential pressure settings, by control type, follow. See model number system for setting range.

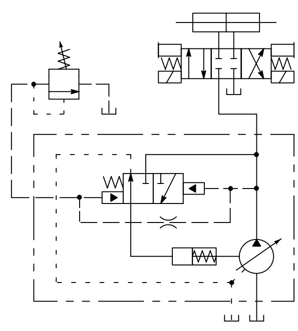
Standard load-sensing and pressure limiting control with 11 bar differential pressure (standard factory setting). Includes bleed-down orifice to exhaust load-sense signal for low-pressure standby condition.

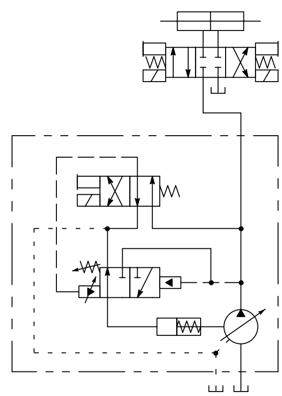
Same as C**V11B above, but with bleed-down orifice plugged.

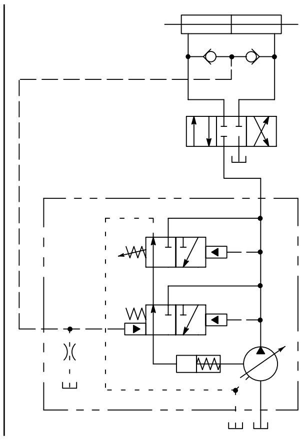
Same as C**V11B, but with factory differential pressure setting of 24 bar.

Same as C**V11P, but with factory differential pressure setting of 24 bar.









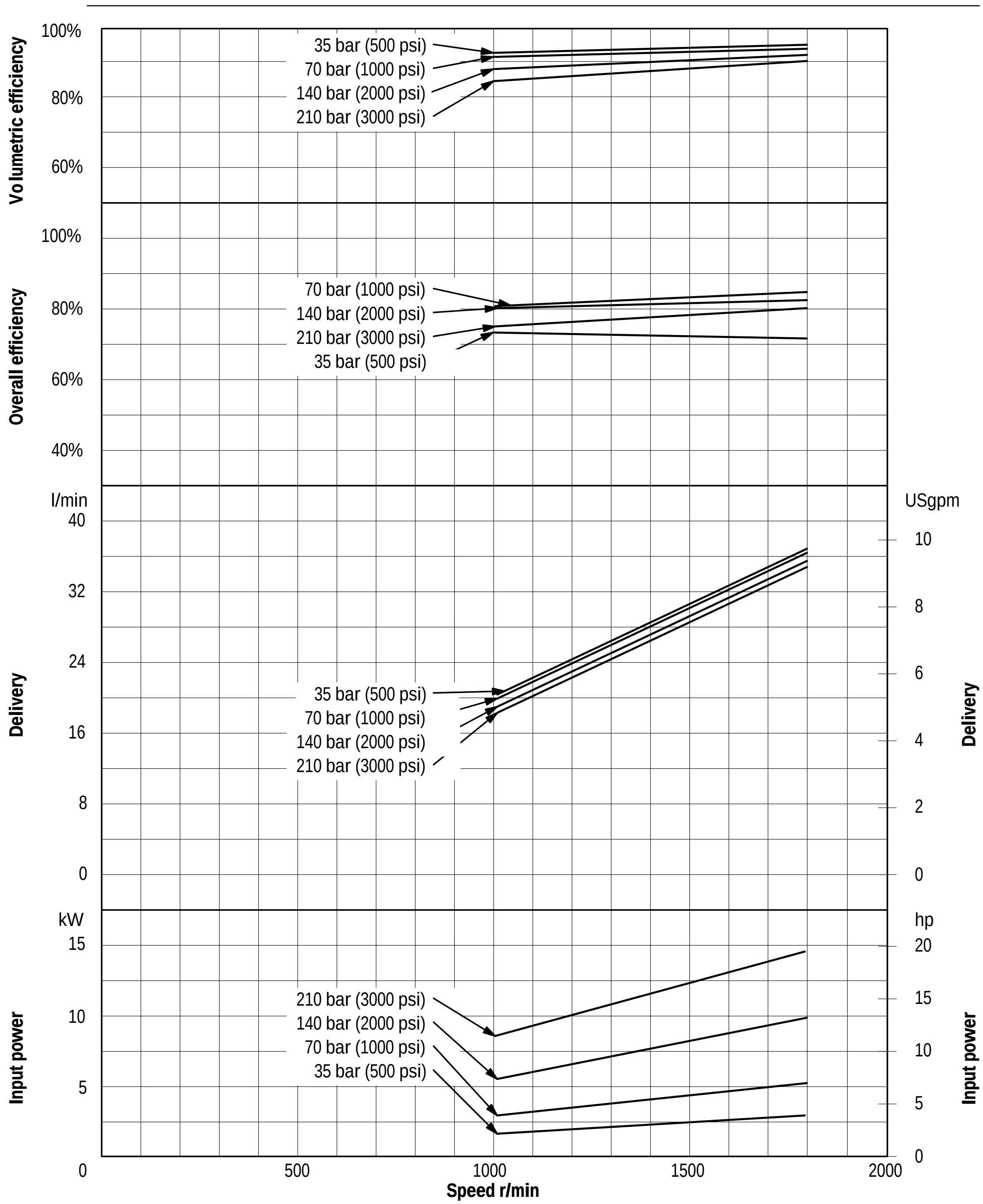
(†orifice open)
(†orifice plugged)

Performance Curves

PVQ20

Oil type: SAE 10W
Oil temperature: 49°C (120°F)
Inlet: 0.2 bar (5 in. Hg)

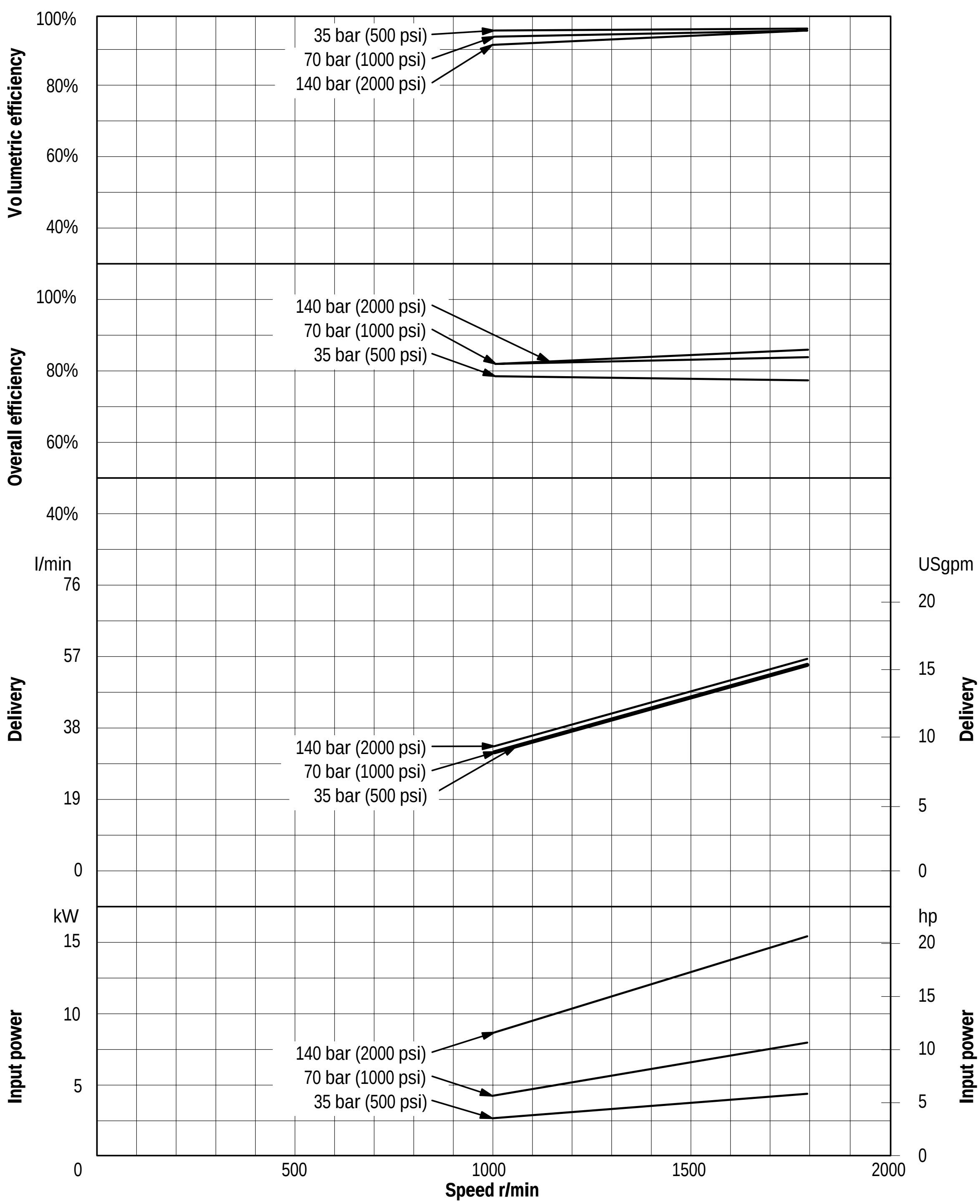
Note: To obtain full flow operation of pump, pressure compensator setting must be 14 bar (200 psi) above desired operating pressure. Full flow curves were obtained with compensator settings 14 bar (200 psi) above 210 bar (3000 psi) max. rated pressure.



Performance Curves
PVQ32

Oil type: SAE 10W
Oil temperature: 49°C (120°F)
Inlet: 0.2 bar (5 in. Hg)

Note: To obtain full flow operation of pump, pressure compensator setting must be 14 bar (200 psi) above desired operating pressure. Full flow curves were obtained with compensator settings 14 bar (200 psi) above 140 bar (2000 psi) max. rated pressure.



Operating Data

PVQ20 and PVQ32 Sound Data

Temperature: 50°C (120°F)
Test Fluid: URSA-ED (10W)
Inlet Pressure: Atmospheric (0 psig)

SOUND DATA

		Sound Level dB(A)*			
		Full Stroke		Cutoff	
Speed r/min	Pressure bar (psi)	PVQ20	PVQ32	PVQ20	PVQ32
1000	35 (500)	53	58	43	47
	70 (1000)	56	59	47	50
	140 (2000)	57	61	52	54
	210 (3000)	59	–	54	–
1200	35 (500)	55	61	43	47
	70 (1000)	58	62	48	51
	140 (2000)	59	63	52	54
	210 (3000)	61	–	55	–
1500	35 (500)	57	63	47	50
	70 (1000)	59	65	51	54
	140 (2000)	61	65	56	55
	210 (3000)	62	–	59	–
1800	35 (500)	60	66	50	53
	70 (1000)	62	67	53	56
	140 (2000)	63	68	58	62
	210 (3000)	64	–	58	–

*Sound pressure data equivalent to NFPA Standard.

PVQ20 and PVQ32 Response Data

Yoke response recorded at rated speed and pressure, 0 psi inlet, 82°C (180°F), SAE 10W oil. Pressure rise was 6900 bar (100,000 psi) per second.

RESPONSE DATA

	PVQ20		PVQ32	
Control Type	On stroke	Off stroke	On stroke	Off stroke
Pressure compensator	0.070 sec.	0.023 sec.	0.080 sec.	0.020 sec.
load-sense compensator	0.090 sec.	0.015 sec.	0.100 sec.	0.018 sec.

Shaft Torque Data

PVQ20/32A9 and PVQ20/32A11

Thru-drive Shaft Torque Data

Any deviation from these maximum torque values must be approved by Eaton engineering.

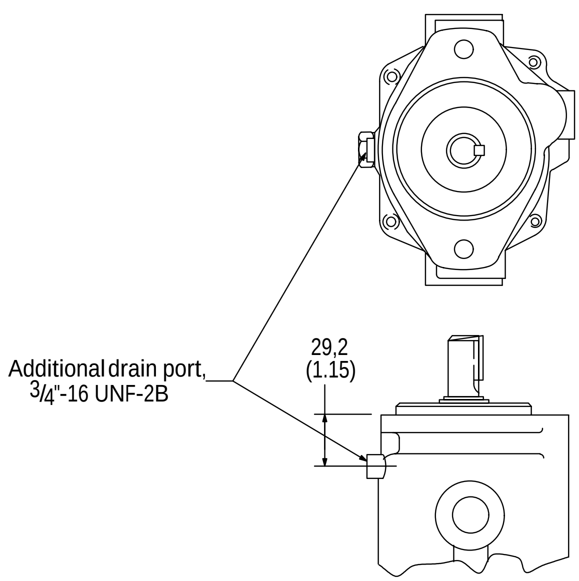
THRU-DRIVE SHAFT TORQUE DATA

Model Number System*	Input Shaft Code	Maximum Input Torque Total Nm (lb. in.)	Maximum Thru-drive Torque Output Nm (lb. in.)
PVQ20/32A9	1	135 (1200)	
	3	208 (1850)	58 (517)
	N	337 (2987)	
PVQ20/32A11	1	135 (1200)	
	3	208 (1850)	123 (1100)
	N	337 (2987)	

*SAE “B” 4 inch thru-drive pilot not available in PVQ20/32 frame size.

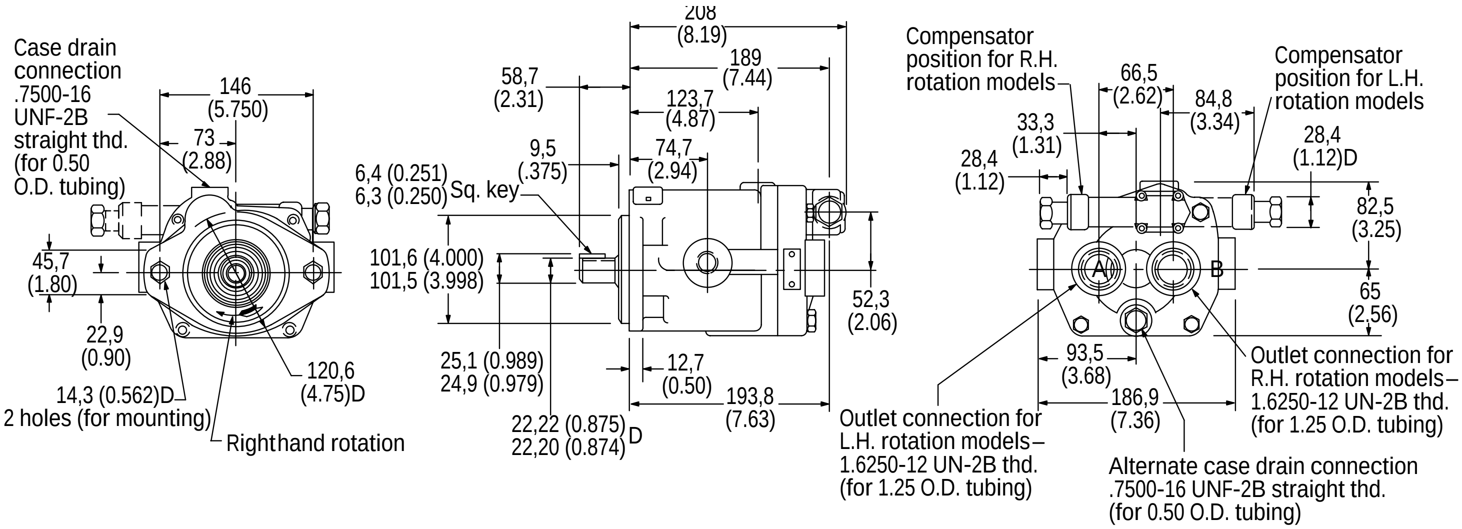
Installation Dimensions

Vertical “Shaft-up” Installation – “S2” Drain Port Option



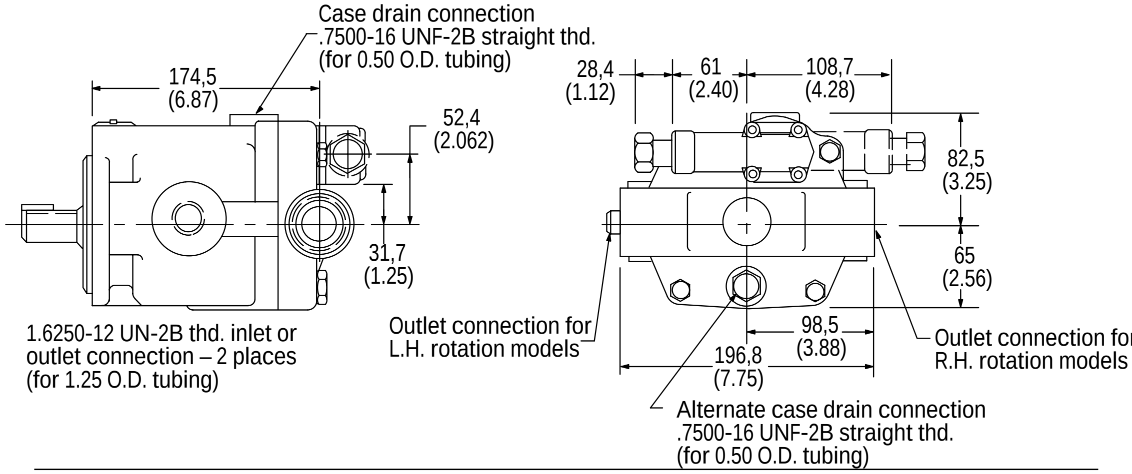
Installation Dimensions

Rear Ports, "C" and "CM" Controls, No. 1 Shaft

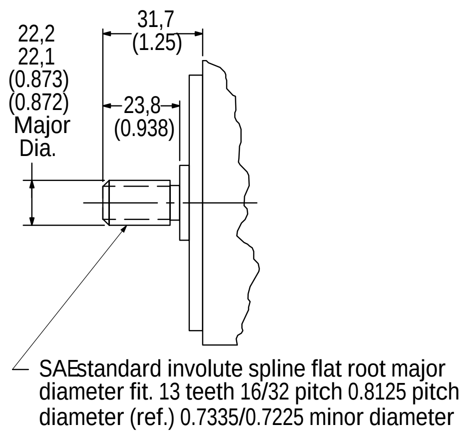


Caution – while pump is operating do not back compensator adjustment screw out beyond dimension shown.

Side Ports

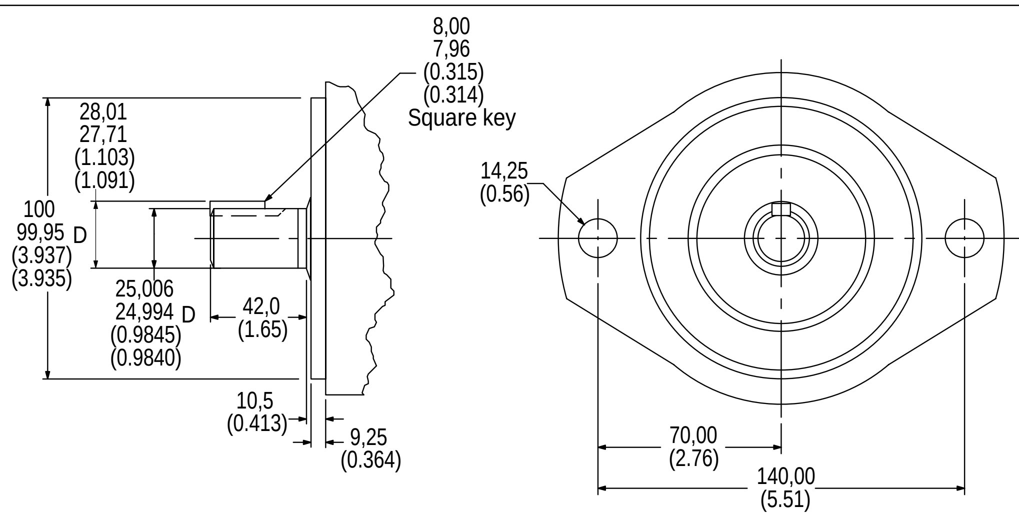


No. 3 Shaft



"N" Shaft with "MB" Flange

(Flange and shaft end ISO 3019/21000A2HW-E25N)

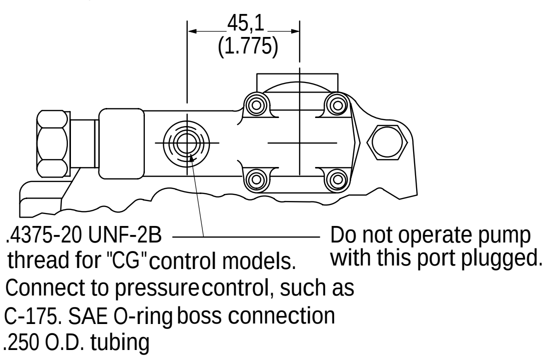


Remote Compensator

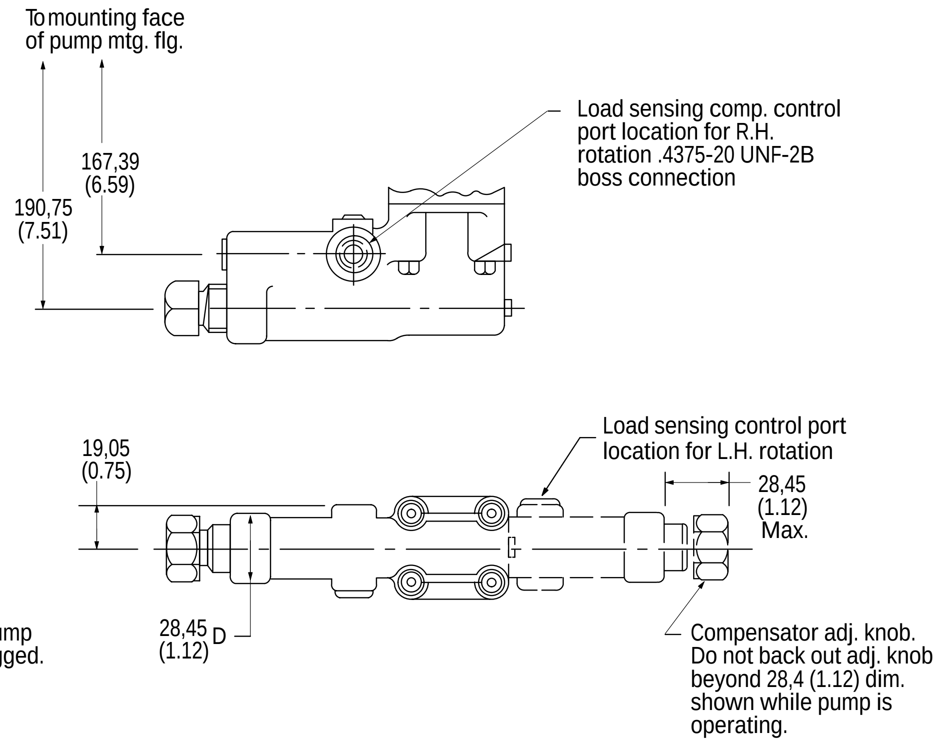
Adjustment

1. Turn pressure control (such as C-175) CCW to minimum setting.
2. Turn compensator adjustment plug to desired minimum pressure (17 bar, 250 psi or higher).
3. Full pressure range can now be obtained with pressure control.

Caution: Effective compensator pressure will be compensator control setting (17-69 bar, 250-1000 psig) plus remote relief valve setting.



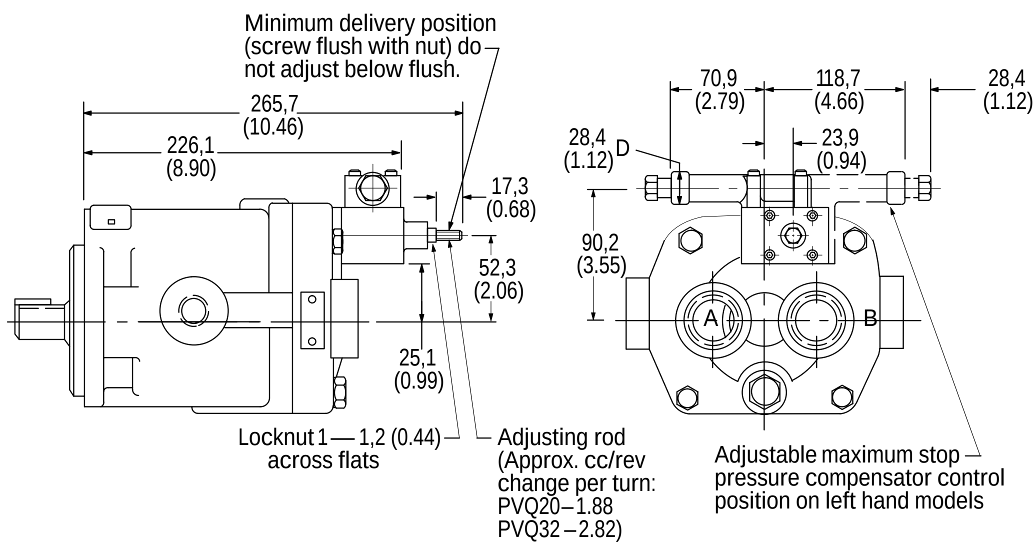
Load-sensing with Pressure Limiter



Pressure Compensator Control with Adjustable Max. Displacement Stop

Adjustment

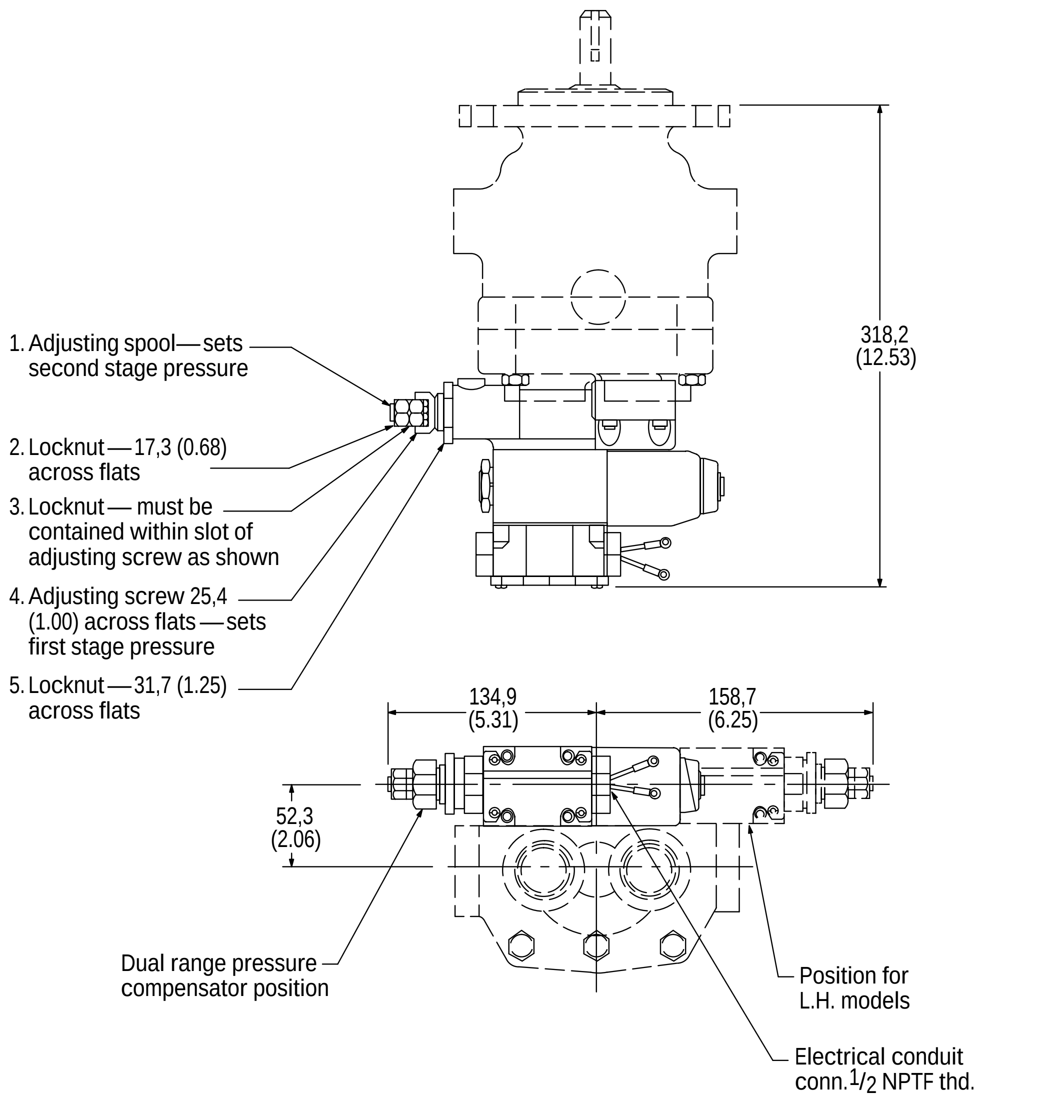
Loosen locknut on adjusting rod. Turn adjusting rod clockwise (CW) to decrease maximum pump delivery or counter-clockwise (CCW) to increase maximum pump delivery until desired setting is obtained. Secure this setting by tightening locknut.



Electric Dual Range Pressure Compensator Control

Adjustment

1. With the directional valve de-energized, loosen locknut “5” and turn the adjusting screw “4” to the desired first stage pressure setting, then tighten locknut “5”.
2. With solenoid de-energized, turn adjusting spool “1” counterclockwise (CCW) until nut “3” is bottomed in adjusting screw slot. (Second stage setting is now equal to first stage pressure setting.) Turn adjusting spool clockwise (CW) to desired second stage pressure requirements. One complete turn of adjusting spool equals approximately 41 bar (600 psi). Energize solenoid and check pressure setting. De-energize solenoid and re-adjust if necessary. Secure this setting by tightening locknut “2”.



Solenoid Data (110V AC 50 Hz and 115/120V AC 60 Hz)

Solenoid current	Inrush amps (R.M.S.)	Holding amps
115/120V AC 60 Hz – 110V AC 50 Hz	2.0	.54 .64*

*Maximum peak inrush amps approximately 1.4 x R.M.S. value shown.

Refer to catalog GB-C-2015B for additional solenoid valve data.

Controls

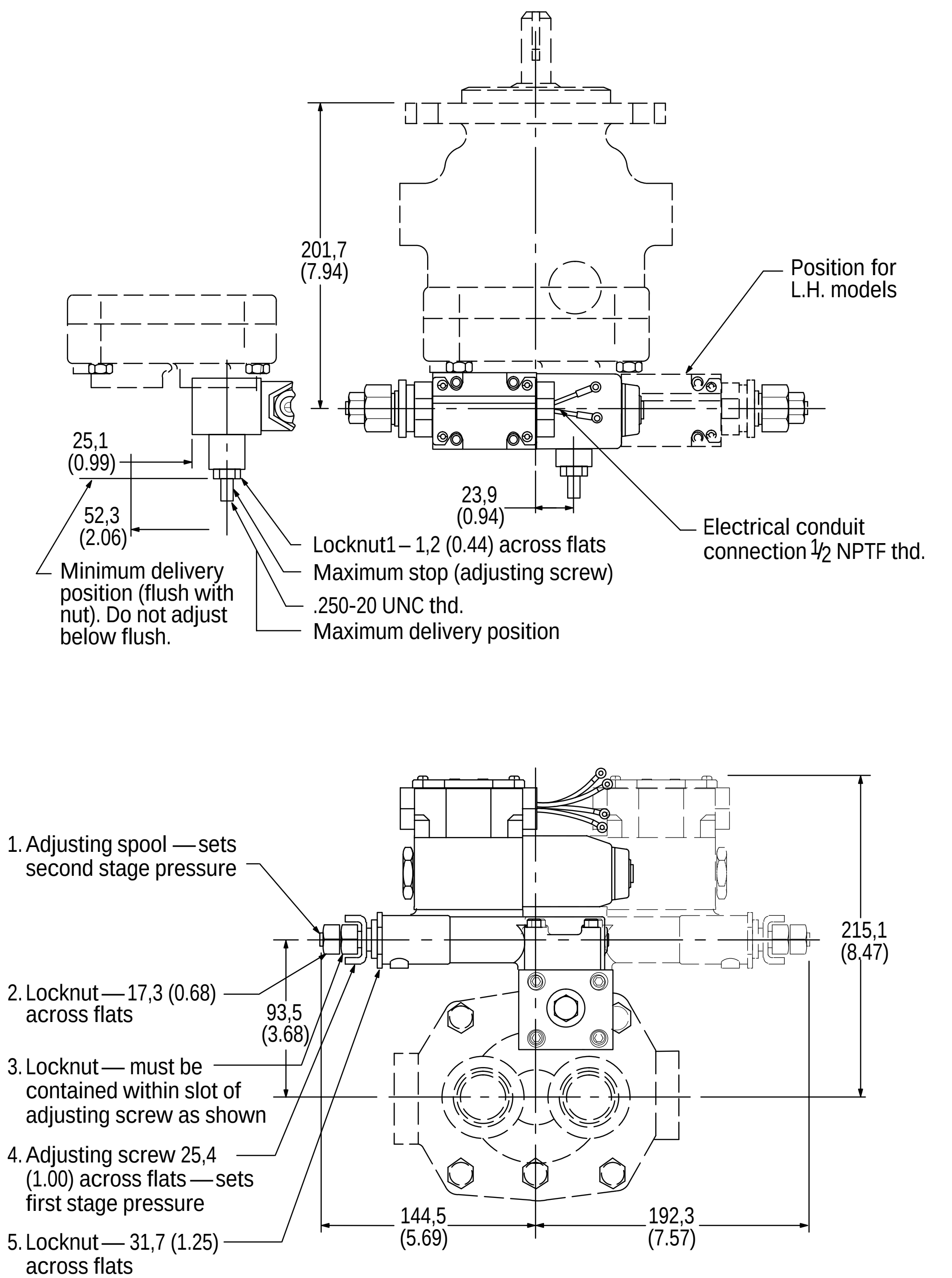
Electric Dual Range Pressure Compensator with Maximum Displacement Stop

Maximum Flow Adjustment

With the system pressure below both compensator settings, loosen maximum stop adjusting screw locknut and adjust screw to desired flow position (turning screw clockwise decreases flow and turning screw counterclockwise increases flow). To lock screw in position, tighten locknut. To assist initial priming, adjust control setting to at least 40% of maximum flow position.

Compensator Control

1. With the directional valve de-energized, loosen locknut "5" and turn the adjusting screw "4" to the desired first stage pressure setting, then tighten locknut "5".
2. With directional valve de-energized, turn adjusting spool "1" counterclockwise until nut "3" is bottomed in adjusting screw slot. (Second stage setting is now equal to first stage pressure setting.) Turn adjusting spool clockwise to desired second stage pressure requirements. One complete turn of adjusting spool equals approximately 41 bar (600 psi). Energize solenoid and check pressure setting. De-energize solenoid and re-adjust if necessary. Secure this setting by tightening locknut "2".



Unloading Valve Control

With the unloading valve control the variable pump will unload at a preset pressure. The pump will maintain this no flow, low pressure (approximately 14 bar [200 psi]) standby condition, until system pressure drops to about 85% of the preset unloading pressure. The pump will then return on stroke and provide full flow until the preset unloading pressure is reached again.

With this control, an efficient accumulator charging circuit is obtained. The pump will provide full flow to fill the accumulator until the maximum charging pressure is reached. The pump then goes to a standby condition until the accumulator pressure drops to 85% of the desired maximum. The accumulator is then recharged as the cycle starts over again.

A separate right angle check valve must be provided to maintain the accumulator hydraulic charge and prevent back flow when the pump is unloaded. The check valve's internal leakage must not exceed five drops per minute. The control port must be connected to system pressure, downstream of the check valve.

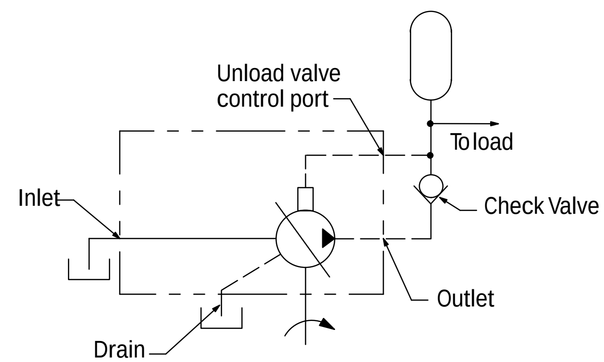
Adjustment range

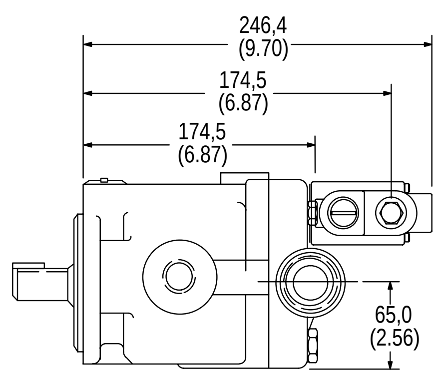
PVQ20	100-210 bar (1500-3000 psi)
PVQ32	100-140 bar (1500-2000 psi)

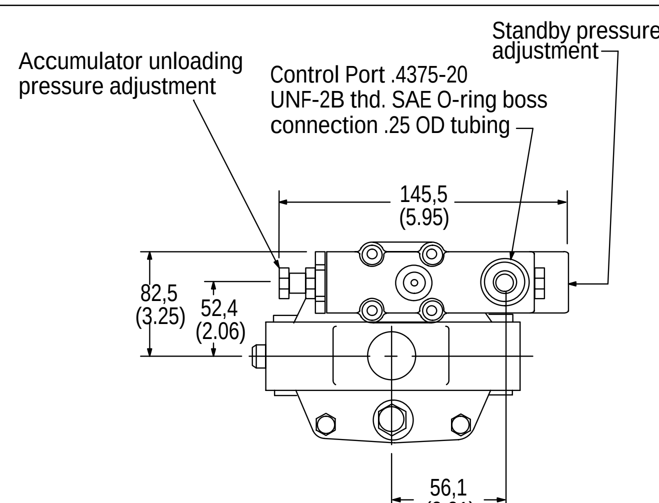
Cut-in pressure is 85% of unloading pressure, minimum.

Setting Pressures

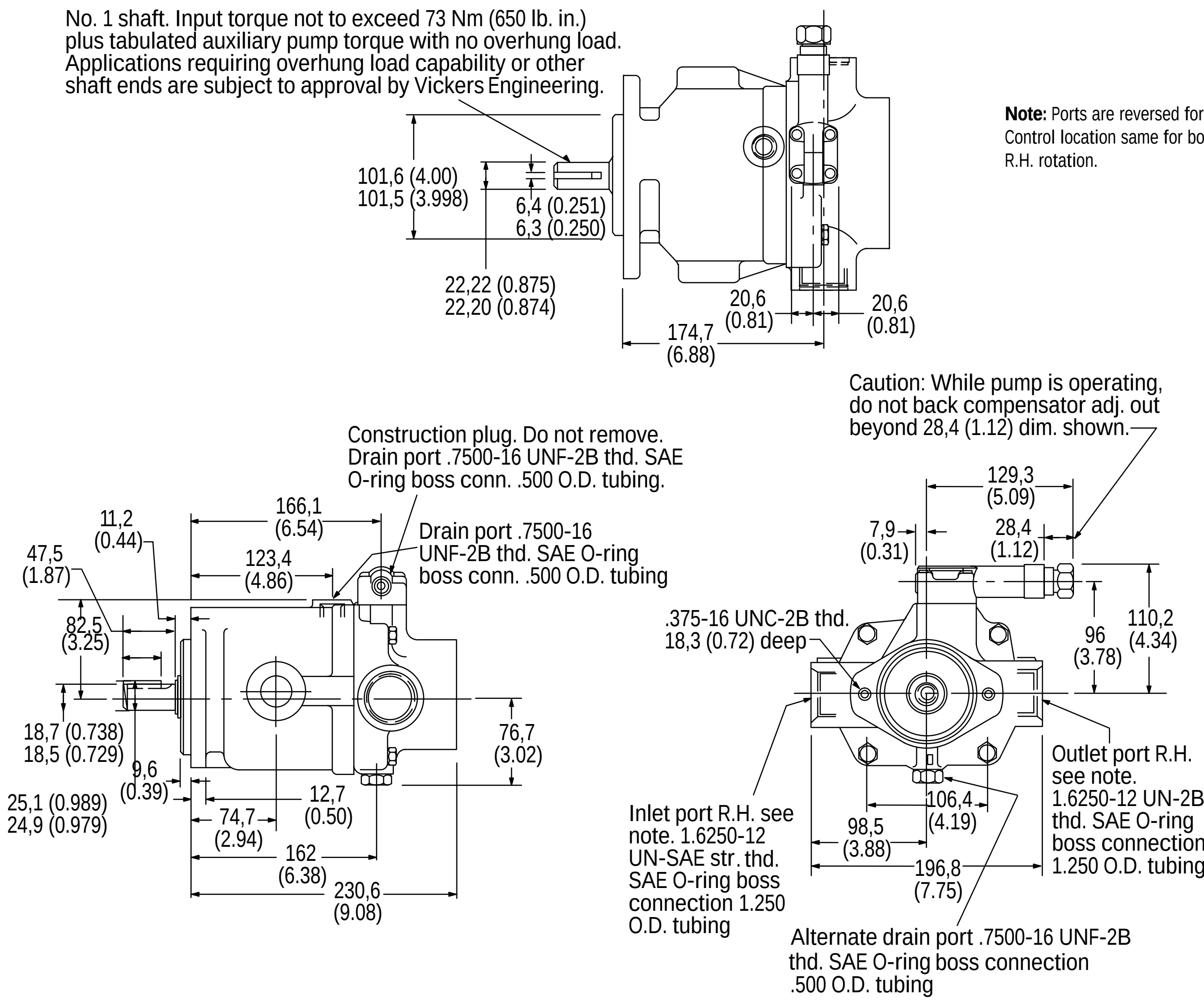
1. Back out accumulator unloading pressure adjustment screw to below desired unloading pressure.
2. Adjust desired standby pressure.
3. Set accumulator pressure by screwing in the accumulator unloading adjustment screw. Accumulator recharge (cut-in) pressure is a function of the maximum accumulator pressure and is not adjustable.
4. Check pressure settings and re-adjust if necessary.







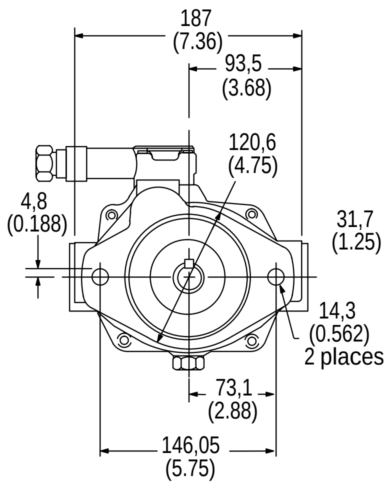
PVQ20/32
“A9” and “A11”
SAE “A”



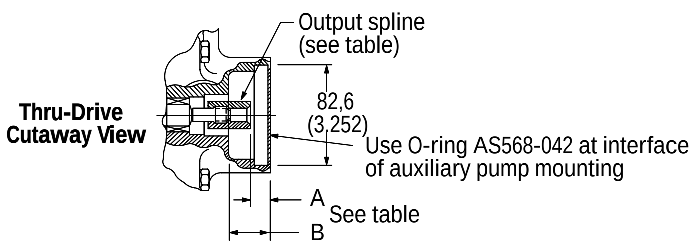
Note: Ports are reversed for L.H. rotation. Control location same for both L.H. and R.H. rotation.

Thru-drives

PVQ20/32 "A9" and "A11" SAE "A"



Note: Ports are reversed for L.H. rotation. Control location same for both L.H. and R.H. rotation.



PVQ20/32 "A9" AND "A11" SAE "A"

Model Number System	Spline Data	Max. Torque Nm (in. lb.)	Installation Dimensions mm (in) A	B	Coupling Kit
"A9"	ASA B5.15-1960 9 teeth 16/32 DP Flat root side fit	58 (517)	16,7 (0.66)	33,0 (1.30)	02-136810
"A11"	ANS B92.1-1970 11 teeth 16/32 DP Flat root side fit	123 (1100)	18,5 (0.73)	39,1 (1.54)	02-306041

Note: O-ring included with pump. Coupling kit, cap screws, and washers must be ordered separately to mount rear pump.

Typical Rear Pumps (with shaft codes) for PVQ20/32 Thru-drives

TYPICAL REAR PUMPS (WITH SHAFT CODES) FOR PVQ20/32 THRU-DRIVES

Model Series	Typical Rear Pump	Rear Pump Shaft Code	Thru-drive Coupling Kit
"A9"	PVQ10/13	3	02-136810
	PVB5/6	S124 suffix	
	V10	11	
	V20	62	

Note: "A11" (not listed above) is intended for special application only.

Model Number System

PVQ25

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
P	V	Q	2	5	A	R	1	1	A	A	1	0	B	1	1	2	4	0	0	A	2	0	0	1	A	P	C	9	0	1

Nos	Feature	Code	Description
1,2	Code title	PV	Open circuit piston pump
3,4,5,6	Displacement	Q25A	25.2cm^3/r [1.54 in^3/r]
7	Input shaft rotation	L	Left-hand rotation (CCW)
		R	Right-hand rotation (CW)
8,9	Front mounting and input shaft	01	2 Bolt B (SAE J744-101-2) with 22.2 [.88] DIA straight keyed shaft (SAE J744-22-1), key included
		05	2 Bolt B (SAE J744-101-2) with 13T 16/32DP 41.1 [1.62] long splined shaft
		09	2 Bolt B (SAE J744-101-2) with 26T 32/64DP splined shaft
		10	Shaft-2 Bolt VDMA A with 25.0 [.984] DIA straight keyed shaft, key included
10,11	Main ports location and size	AU	End ports; tube ports per SAE J514, suction 1.625-12 UN-2B, pressure – 1.0625-12 UN-2B SAE
		AV	End ports; tube ports per ISO 6149-1, suction M42 x 2, pressure – M27 x 2
12	Drain port size	6	M18 metric O-ring port – top (D1)
		7	M18 metric O-ring port – bottom (D2)
		8	M18 mertic O-ring port – shaft up
		B	.750-16 UNF-2B SAE O-ring port – top (D1)
		C	.750-16 UNF-2B SAE O-ring port – bottom (D2)
		D	.750-16 UNF-2B SAE O-ring port – shaft up
13	Diagnostic pressure point	0	No diagnostic pressure point
14	Controller type	C	Electric dual range pressure Compensator with directional control valve
		E	Unloading valve (accumulator circuits)
		G	Adjustable pressure compensator
		H	Adjustable pressure and flow compensator
		J	Adjustable hydraulic remote control pressure compensator
15,16	Pressure comp./ unloading valve setting	07	65.5-72.4 bar [950-1050 lbf/in2]
		33	206.8-213.7 bar [3000-3100 lbf/in2]
17,18	Flow comp. setting or unload VLV standby	00	No flow compensator setting
		11	9.65-12.41 bar [140-180 lbf/in2]
		24	22.75-25.51 bar [330-370 lbf/in2]
19,20	Secondary compensator setting	00	No secondary compensator setting
		04	186.2-193.1 bar [2700-2800 lbf/in2]
21	Control special features	0	No special features
		A	Bleed down orifice –
		B	External manual stroke adjustment
22	Maximum displacement option	1	Standard displacement
		2	Adjustable maximum displace-ment (set at maximum)

Note: Consult an Eaton representative for additional settings

Model Number System
PVQ25

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
P	V	Q	2	5	A	R	1	1	A	A	1	0	B	1	1	2	4	0	0	A	2	0	0	1	A	P	C	9	0	1

Nos	Feature	Code	Description
23,24	Auxiliary mounting and output shaft	00	No auxiliary mounting or output shaft
25	Shaft seals	0	No shaft seal
		1	Standard shaft seal (nitrile) Vitron option
		3	Flurocarbon
		4	HNBR shaft seal luster glycol fluids
26,27	Special features	AP	Cast iron housing and industrial timing
28,29	Paint	00	No paint
		CD	Blue primer
30	Customer and unit identification	0	STD – mark assembly Number and build data Code on plate
31	Design code	A	First

Note: Consult an Eaton representative for additional settings

RATINGS

Model Number System	Maximum Geometric Displacement cm^3/r (in^3/r)	Rated Speed r/min	Maximum Pressure bar (psi)	Input Power at Max. Pressure and Rated Speed kW (hp)	Approx. Weight kg (lb)
PVQ25	25,2 (1.54)	1800	210 (3000)	16 (24)	14 (31)

Pressure Limits:

Case pressure – 0,35 bar (5 psig) maximum
Inlet pressure – 0,2 bar (5 in. Hg) vacuum to 2 bar (30 psig)

“G” Option

Pressure Compensator Controls

The pressure compensator control automatically adjusts pump delivery to maintain volume requirements of the system at a preselected operating pressure. Maximum pump delivery is maintained to approximately 75 psi (PVQ025) below the pressure setting before being reduced. The pressure compensator control operates on one side of center and has an adjustment range as designated in the model numbering system.

Pressure Compensator Control with Adjustable Maximum Displacement Stop

The adjustable maximum stop pressure control enables the maximum pump delivery to be externally adjusted from 25% to 100% while maintaining all of the standard features of a pressure compensated pump. To assist initial priming, manual adjustment control setting must be at least 40% of maximum flow position.

“J” Option

Remote Control Pressure Compensator

Exactly the same as the pressure compensation option, except the machine operator is able to change the compensator setting through the use of a remote pilot relief valve, such as Eaton C-175.

“C” Option

Electric Dual Range Pressure Compensator Control

The dual range pressure compensator control automatically adjusts pump delivery to maintain volume requirements of the system at either of two preselected operating pressures.

Maximum pump delivery is maintained to approximately 75 psi (PVQ025) below either pressure control setting before being reduced.

Control type and pressure range are designated in the model number system.

Note: Graphic symbols shown with external valve(s) and cylinder to illustrate typical usage.

“H” Option

Load Sensing and Pressure Limiter Compensator Control

This compensator provides load-sensing control under all pressure conditions up to the desired maximum. It automatically adjusts pump flow in response to a remote pressure signal and maintains outlet pressure at a level slightly above load pressure. The integral pressure limiter overrides the load-sensing control, reducing pump displacement as the preset maximum operating pressure is reached.

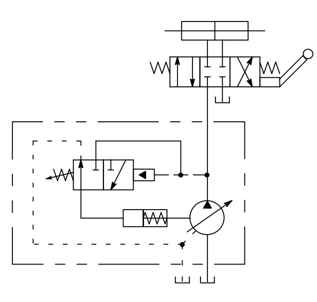
Standard load-sense differential pressure settings, by control type, follow. See model number system for setting range.

Standard load-sensing and pressure limiting control with 11 bar differential pressure (standard factory setting). Includes bleed-down orifice to exhaust load-sense signal for low-pressure standby condition.

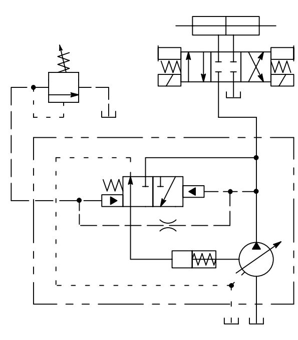
Other Standard Load Sense Options:

1. Bleed-down orifice plugged.
2. Factory differential pressure setting of 24 bar.

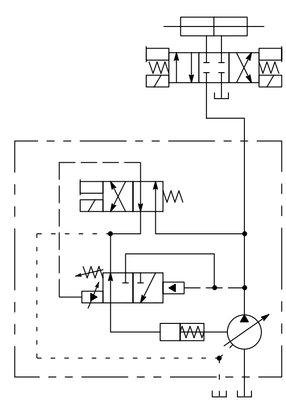
“G” Option



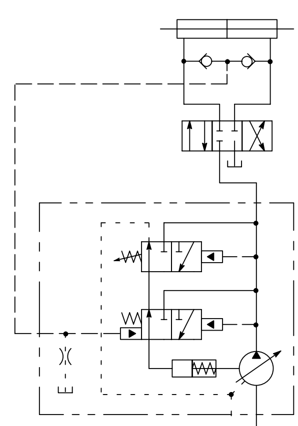
“J” Option



“H” Option



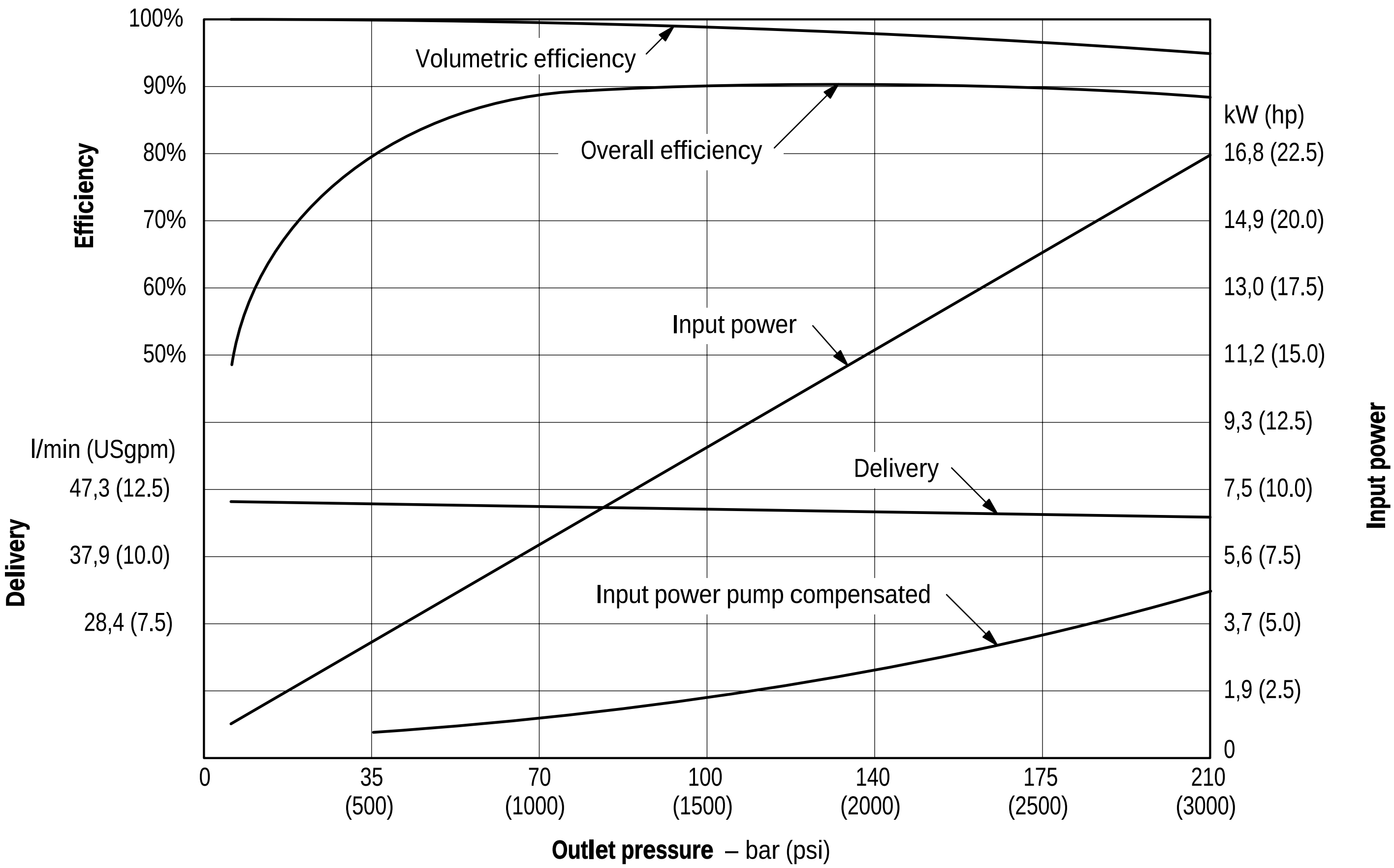
“C” Option



(†orifice open)
(†orifice plugged)

PVQ25 Performance Curves

Performance at 1800 r/min
Oil type: SAE 10W
Oil temp: 50° C (120° F)
Inlet pressure: 0 psi



Sound Data

Temperature: 50°C (120°F)
Test Fluid: URSA-ED (10W)
Inlet Pressure: Atmospheric
(0 psig)

SOUND DATA

		Sound Level dB(A)*	
Speed r/min	Pressure bar (psi)	Full Stroke	Cutoff
1000	35 (500)	56.5	54.9
	70 (1000)	57.7	58.3
	100 (1500)	58.6	60.0
	140 (2000)	59.5	61.3
	175 (2500)	60.9	62.0
	210 (3000)	66.6	63.1
1200	35 (500)	60.9	56.9
	70 (1000)	62.4	60.1
	100 (1500)	63.1	62.3
	140 (2000)	63.3	63.6
	175 (2500)	63.8	64.5
	210 (3000)	63.8	65.5
1500	35 (500)	61.9	57.7
	70 (1000)	63.5	61.9
	100 (1500)	64.2	62.7
	140 (2000)	65.3	63.3
	175 (2500)	65.1	64.7
	210 (3000)	65.9	65.3
1800	35 (500)	64.0	59.0
	70 (1000)	65.2	62.0
	100 (1500)	66.0	63.4
	140 (2000)	67.1	64.4
	175 (2500)	67.5	65.7
	210 (3000)	67.4	66.6

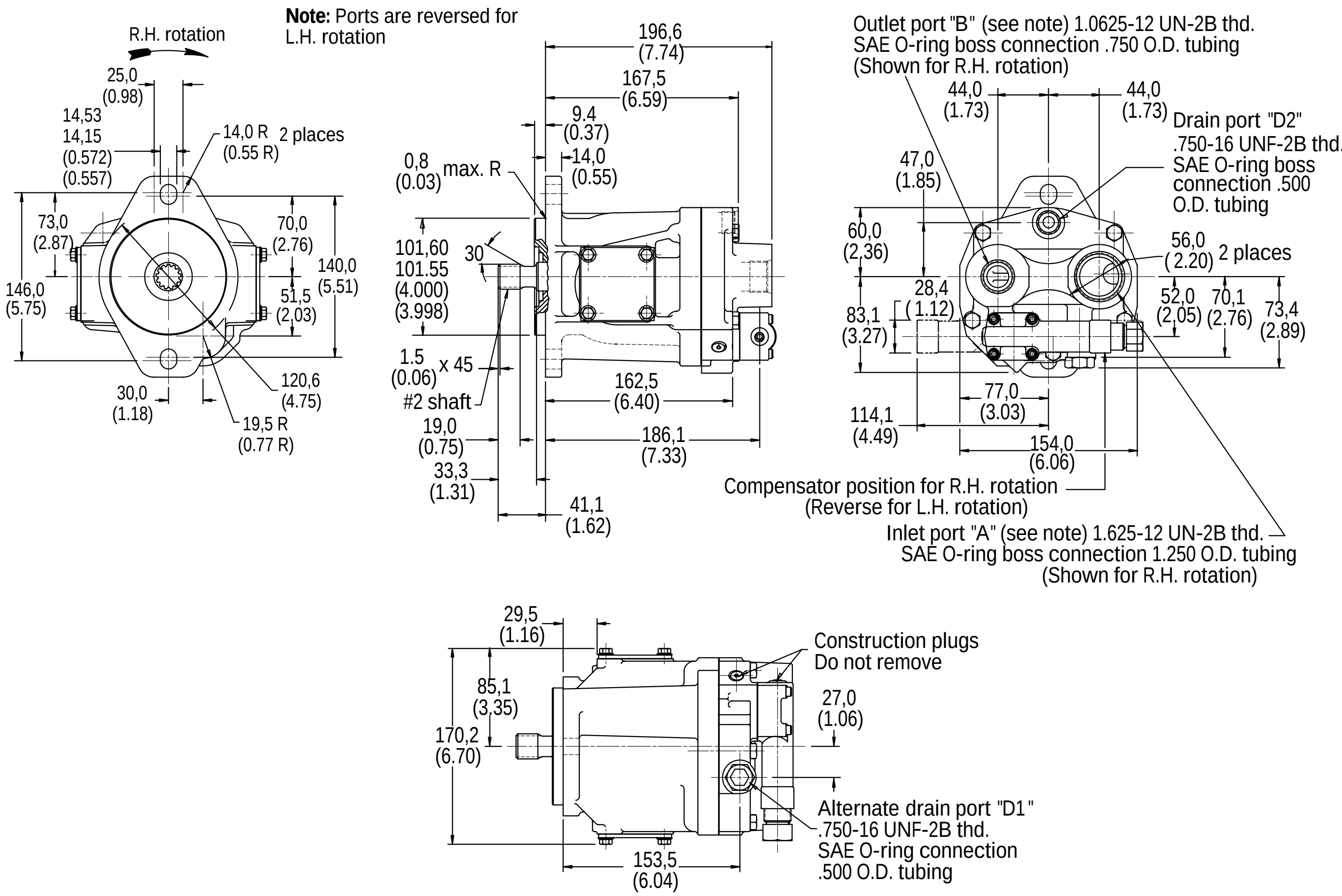
*Sound pressure data equivalent to NFPA Standard.

Response Data

Yoke response recorded at rated speed and pressure, 0 psi inlet, 82°C (180°F), SAE 10W oil. Pressure rise was 6900 bar (100,000 psi) per second.

Control Type	On stroke	Off stroke
Pressure compensator	0.030 sec.	0.012 sec.
Load sense compensator	0.040 sec.	0.012 sec.

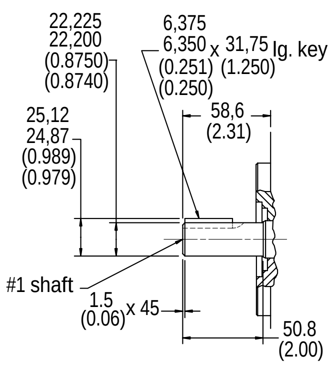
PVQ25 with Pressure Compensator Control



Shaft Options

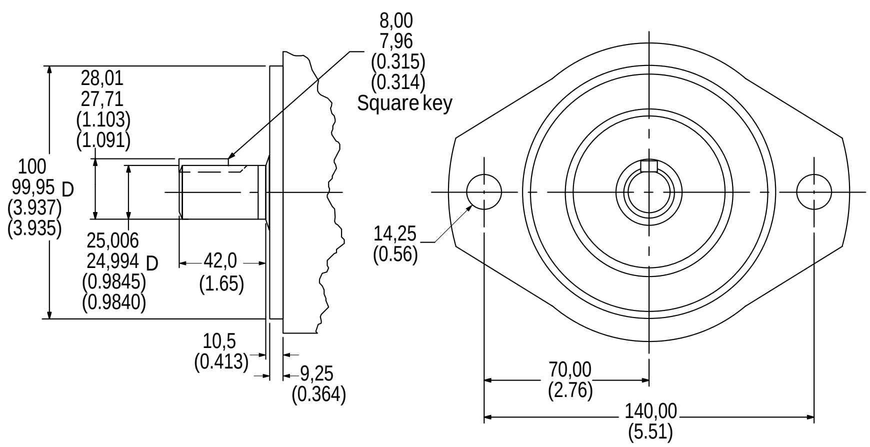
No. 1 Shaft

SAE “B” Straight keyed

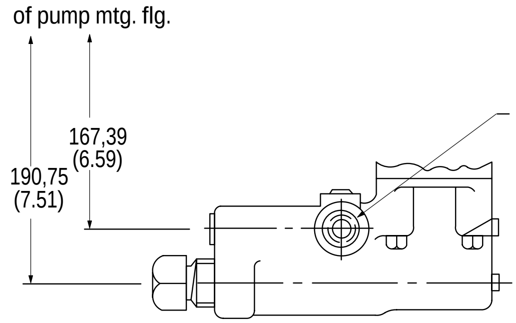


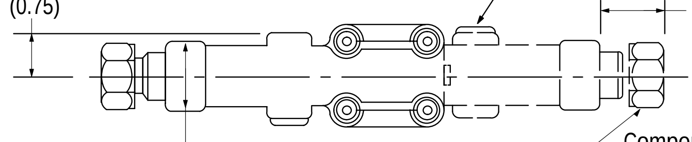
No. 10 Mounting and Input Shaft

(Flange and shaft end ISO 3019/21000A2HW-E25N)



Load Sensing with Pressure Limiter



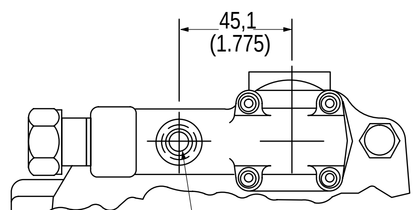


Remote Compensator

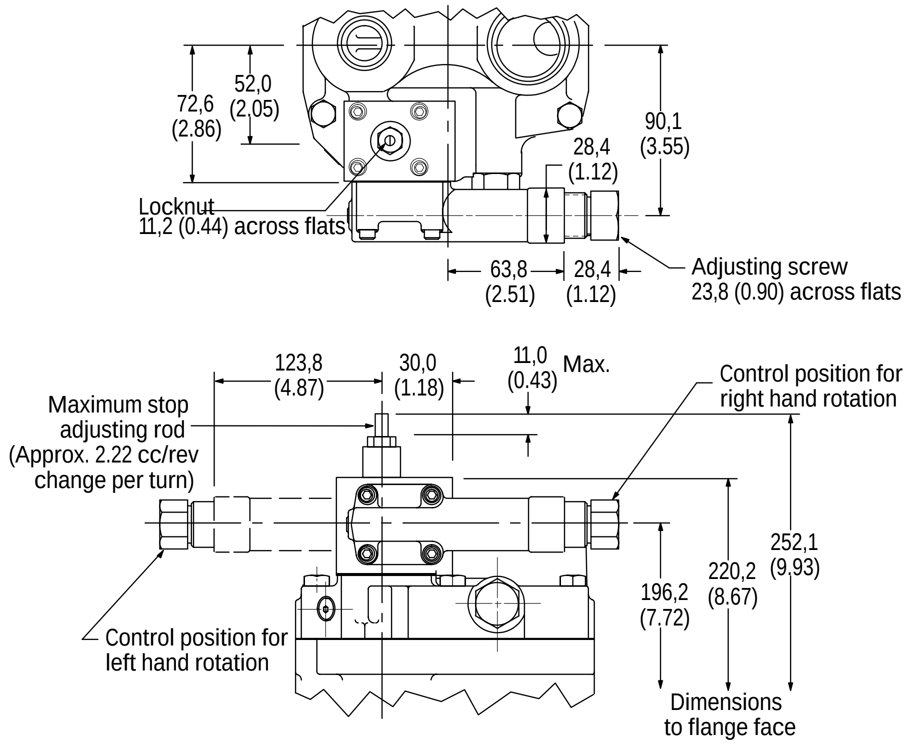
Adjustment

1. Turn pressure control (such as C-175) CCW to minimum setting.
2. Turn compensator adjustment plug to desired minimum pressure (17 bar, 250 psi or higher).
3. Full pressure range can now be obtained with pressure control.

Caution: Effective compensator pressure will be compensator control setting (17-69 bar, 250-1000 psig) plus remote relief valve setting.



Pressure Compensator Control with Adjustable Max. Displacement Stop



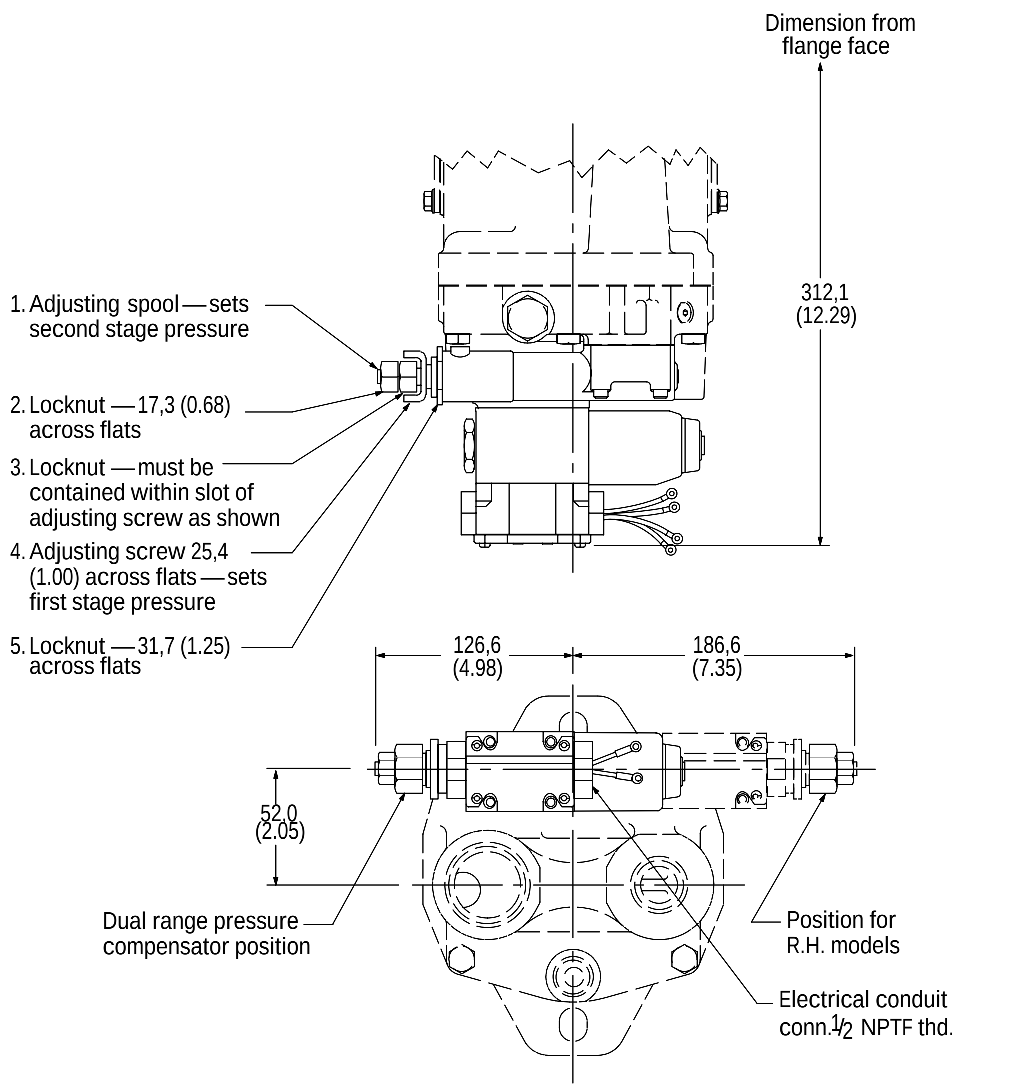
Adjustment

Loosen locknut on adjusting rod. Turn adjusting rod clockwise (CW) to decrease maximum pump delivery or counterclockwise (CCW) to increase maximum pump delivery until desired setting is obtained. Secure this setting by tightening locknut.

Electric Dual Range Pressure Compensator Control

Adjustment

1. With the directional valve de-energized, loosen locknut "5" and turn the adjusting screw "4" to the desired first stage pressure setting, then tighten locknut "5".
2. With solenoid de-energized, turn adjusting spool "1" counterclockwise (CCW) until nut "3" is bottomed in adjusting screw slot. (Second stage setting is now equal to first stage pressure setting.) Turn adjusting spool clockwise (CW) to desired second stage pressure requirements. One complete turn of adjusting spool equals approximately 41 bar (600 psi). Energize solenoid and check pressure setting. De-energize solenoid and re-adjust if necessary. Secure this setting by tightening locknut "2".



Solenoid Data (110V AC 50 Hz and 115/120V AC 60 Hz)

Solenoid current	Inrush amps (R.M.S.)	Holding amps
115/120V AC 60 Hz – 110V AC 50 Hz	2.0	.54 .64*

*Maximum peak inrush amps approximately 1.4 x R.M.S. value shown.

Refer to catalog GB-C-2015B for additional solenoid valve data.

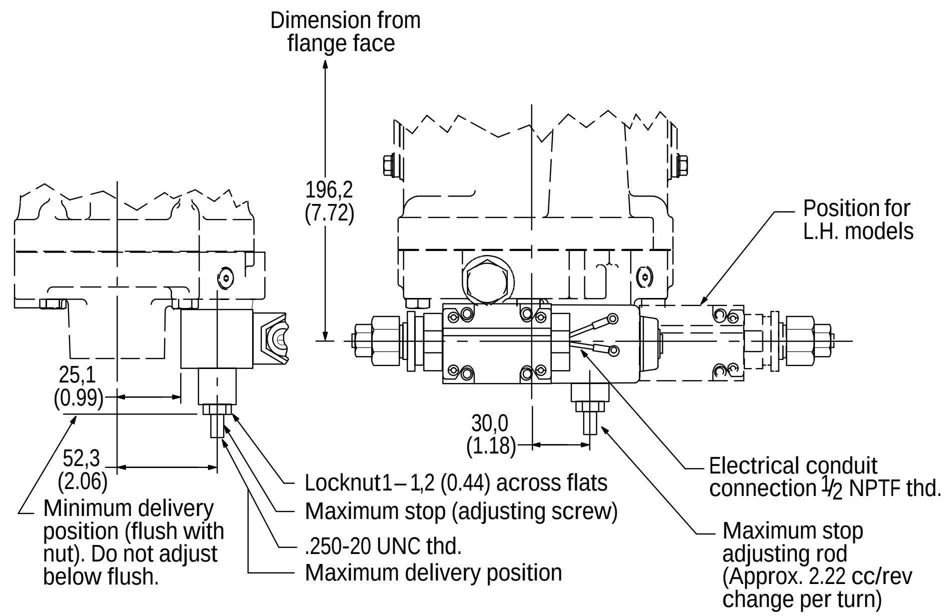
Controls
Electric Dual Range Pressure Compensator with Maximum Displacement Stop

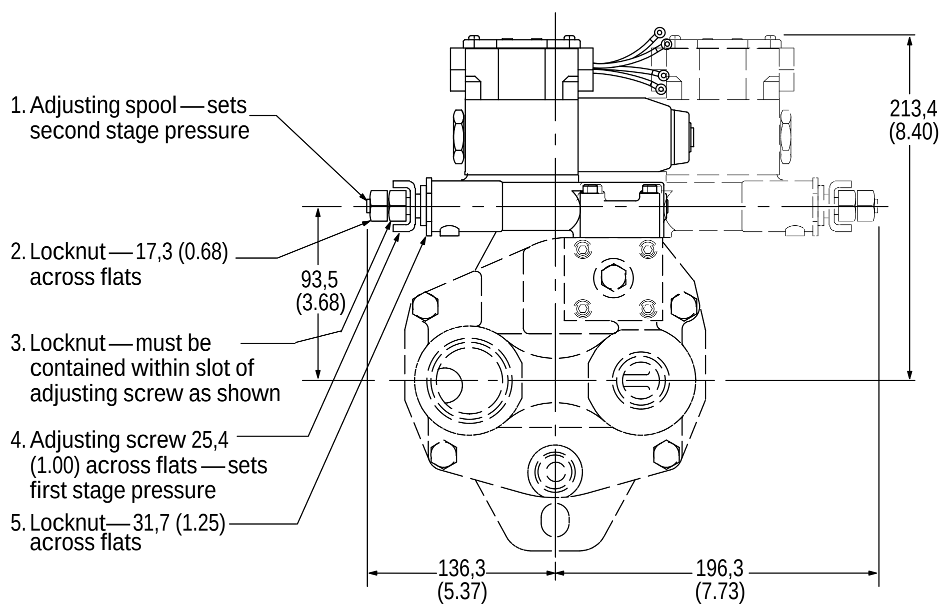
Maximum Flow Adjustment

With the system pressure below both compensator settings, loosen maximum stop adjusting screw locknut and adjust screw to desired flow position (turning screw clockwise decreases flow and turning screw counterclockwise increases flow). To lock screw in position, tighten locknut. To assist initial priming, adjust control setting to at least 40% of maximum flow position.

Compensator Control

1. With the directional valve de-energized, loosen locknut "5" and turn the adjusting screw "4" to the desired first stage pressure setting, then tighten locknut "5".
2. With directional valve de-energized, turn adjusting spool "1" counterclockwise until nut "3" is bottomed in adjusting screw slot. (Second stage setting is now equal to first stage pressure setting.) Turn adjusting spool clockwise to desired second stage pressure requirements. One complete turn of adjusting spool equals approximately 41 bar (600 psi). Energize solenoid and check pressure setting. De-energize solenoid and re-adjust if necessary. Secure this setting by tightening locknut "2".





Controls

Unloading Valve Control – "E" Option

With the unloading valve control the variable pump will unload at a preset pressure. The pump will maintain this no flow, low pressure (approximately 14 bar [200 psi]) standby condition, until system pressure drops to about 85% of the preset unloading pressure. The pump will then return on stroke and provide full flow until the preset unloading pressure is reached again.

With this control, an efficient accumulator charging circuit is obtained. The pump will provide full flow to fill the accumulator until the maximum charging pressure is reached. The pump then goes to a standby condition until the accumulator pressure drops to 85% of the desired maximum. The accumulator is then recharged as the cycle starts over again.

A separate right angle check valve must be provided to maintain the accumulator hydraulic charge and prevent back flow when the pump is unloaded. The check valve's internal leakage must not exceed five drops per minute. The control port must be connected to system pressure, downstream of the check valve.

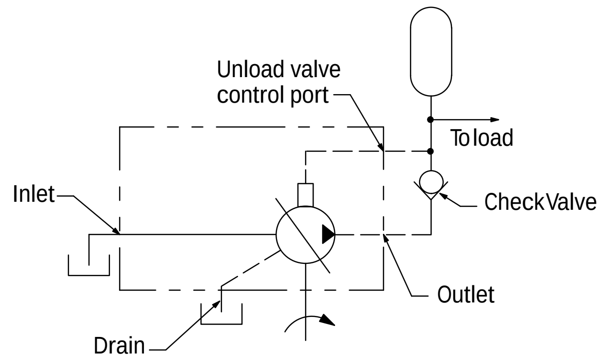
Adjustment range

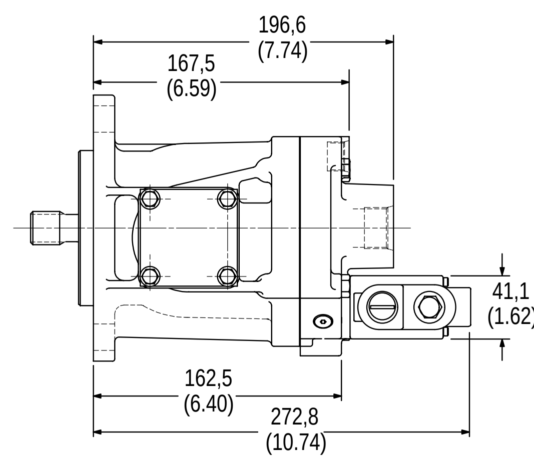
PVQ25 100-210 bar (1500-3000 psi)

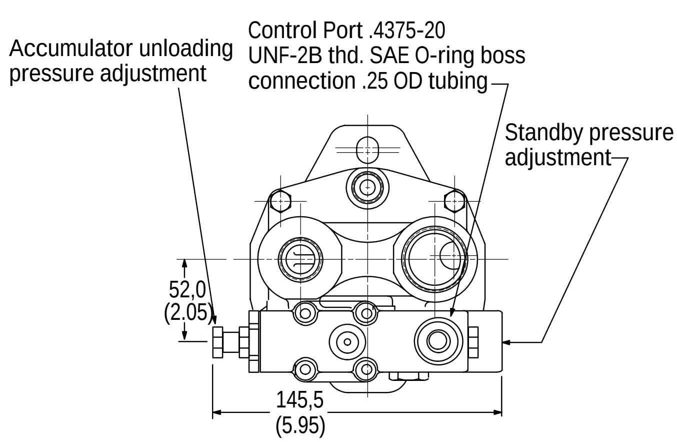
Cut-in pressure is 85% of unloading pressure, minimum.

Setting Pressures

1. Back out accumulator unloading pressure adjustment screw to below desired unloading pressure.
2. Adjust desired standby pressure.
3. Set accumulator pressure by screwing in the accumulator unloading adjustment screw. Accumulator recharge (cut-in) pressure is a function of the maximum accumulator pressure and is not adjustable.
4. Check pressure settings and re-adjust if necessary.







Model Number System PVQ40 and PVQ45

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
P	**V**	**Q**	**4**	**0**	**A**	**R**	**1**	**1**	**A**	**A**	**1**	**0**	**B**	**1**	**1**	**2**	**4**	**0**	**0**	**A**	**1**	**A**	**A**	**1**	**A**	**F**	**C**	**D**	**0**	**1**

Nos	Feature	Code	Description
1,2	Code title	PV	Open circuit piston pump
3,4,5,6	Displacement	Q40A	41.0cm^3/r [2.50 in^3/r]
		Q45A	45.1cm^3/4 [2.75 in^3/r]
7	Input shaft rotation	L	Left-hand rotation (CCW)
		R	Right-hand rotation (CW)
8,9	Front mounting and input shaft	01	2 Bolt B (SAE J744-101-2) with 22.2 [.88] DIA straight key shaft (SAE J744-22-1) (key included)
		02	2 Bolt B-B (SAE J744-101-2) with 25.4 [1.00] DIA straight key shaft (SAE J744-25-1) (key included)
		05	2 Bolt B-B (SAE J744-101-2) with 13T 16/32DP 41.1 [1.62] long splined shaft
		08	2 Bolt B-B (SAE J744-101-2) with 15T 16/32DP splined shaft
		09	2 Bolt B (SAE J744-101-2) with 26T 32/64DP splined shaft
		10	Shaft-2 Bolt VDMA A with25.0 [.984] DIA straight keyed shaft, key included
10,11	Main ports location and size	AA	Side ports; tube ports per SAE J514, suction – 1.875-12 UN-2B, pressure – 1.3125-12 UN-2B
		AB	End ports; tube ports per SAE J514, suction – 1.875-12 UN-2B, pressure – 1.3125-12 UN-2B
		AC	Side ports; SAE J518 flange, suction – 1.500 SAE 4-bolt split flange port (code 61); pressure – 1.000 SAE 4-bolt split flange port (code 61)
		AD	End ports; SAE J518 flange, suction – 1.500 SAE 4-bolt split flange port (code 61); pressure – 1.000 SAE 4-bolt split flange port (code 61)
		AE	Side ports; ISO 6149-1 tube, suction – M48 X 2, pressure – M33 X 2
		AF	End ports; ISO 6149-1 tube, suction – M48 X 2, pressure – M33 X2
		AS	End ports; ISO 6162 flange, suction – 1.500 SAE 4-bolt split flange port with M12 X 1.75 threads; pressure – 1.000 SAE 4-bolt split flange port with M10 X 1.5 threads

Nos	Feature	Code	Description
12	Drain port size and location	1	.875-14 UNF-2B SAE O-ring port–top (D1)
		2	.875-14 UNF-2B SAE O-ring port – bottom (D2)
		3	.875-14 UNF-2B SAE O-ring port – shaft up
		6	M18 X 1.5 metric O-ring port – top (D1)
		7	M18 X 1.5 metric O-ring port – bottom (D2)
		8	M18 X 1.5 metric O-ring port – shaft up
13	Diagnostic pressure port	0	No diagnostic pressure port
		1	.4375-20 UNF-2B SAE O-ring port – plugged
		2	M14 X 1.5 metric O-ring port – plugged
14	Controller type	C	Electric dual range pressure compensator with directional control valve
		E	Unloading valve (accumulator circuits)
		G	Adjustable pressure compensator
		H	Adjustable pressure and flow compensator
		J	Adjustable hydraulic remote control pressure compensator
15,16	Pressure comp./ unloading valve	07	65.5-72.4 bar [950-1050 lbf/in^2]
		18	182.7-189.6 bar [2650-2750 lbf/in^2]
		33	206.8-213.7 bar [3000-3100 lbf/in^2]
17,18	Flow comp. setting or unload valve standby	00	No flow compensator setting
		11	9.65-12.41 bar [140-180 lbf/in^2]
		14	12.41-15.17 bar [180-220 lbf/in^2]
		24	22.75-25.51 bar [330-370 lbf/in^2]
19,20	Secondary comp. setting	00	No secondary compensator setting
		04	186.2-193.1 bar [2700-2800 lbf/in^2]
21	Control special features	0	No special features
		A	Bleed down orifice
		B	External manual stroke adjustment
22	Maximum displacement option	1	Standard displacement
		2	Adjustable maximum displacement (set at maximum)

Note: Consult an Eaton representative for additional settings

Model Number System PVQ40 and PVQ45

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
P	V	Q	4	0	A	R	1	1	A	A	1	0	B	1	1	2	4	0	0	A	1	A	A	1	A	F	C	D	0	1

Nos	Feature	Code	Description
23,24	Auxiliary mounting output shaft	00	No auxiliary mounting or output shaft
		AA	2 Bolt A (SAE J744-82-2) w/ 9T 16/32DP external splined shaft
		AB	2 Bolt A (SAE J744-82-2) w/ 11T 16/32DP external splined shaft
		AC	2 Bolt B (SAE J744-101-2) w/ 13T 16/32 DP internal splined coupling
		AD	2 Bolt B (SAE J744-101-2) w/ 15T 16/32DP internal splined coupling
		AE	2 Bolt B (SAE J744-101-2) w/ 26T 32/64DP external splined shaft
		AH	2 Bolt A (SAE J744-82-2) w/ 9T 16/32DP internal splined coupling
		AJ	2 Bolt A (SAE J744-82-2) w/ 11T 16/32DP internal splined coupling
		AK	2 Bolt B (SAE J744-101-2) w/ 26T 32/64DP internal splined coupling
25	Shaft seals	0	No shaft seal
		1	Standard shaft seal (fluorocarbon)
		8	HNBR shaft seal (water glycol)
26,27	Special features	AP	Cast iron housing and industrial timing
28,29	Paint	00	No paint
		CD	Blue primer
30	Customer and unit	0	STD – mark assembly number, full model code and build date code on plate
31	Design code	A	First design

Note: Consult an Eaton representative for additional settings

RATINGS

Model Number System	Maximum Geometric Displacement cm^3/r (in^3/r)	Rated Speed r/min	Maximum Pressure bar (psi)	Input Power at Max. Pressure and Rated Speed kW (hp)	Approx. Weight kg (lb)
PVQ40	41,5 (2.500)	1800	210 (3000)	27,6 (37)	20,6 (45.4)
PVQ45	45,1 (2.750)	1800	186 (2700)	28,3 (38)	20,6 (45.4)

Pressure Limits:

Inlet pressure – 0,2 bar (5 in. Hg) vacuum to 2 bar (30 psig)
Case pressure – 0,35 bar (5 in. Hg) maximum

Note: Integral relief valve limits case pressure peaks to 0,7 bar (10 psi) higher than inlet pressure to protect pump. Flow from valve is returned directly to pump inlet. Use of case drain line required to limit steady-state case pressure.

“G” Option

Pressure Compensator Controls

This control automatically varies pump displacement to meet the system flow demand for a constant system pressure. Displacement starts to reduce to zero within 14 bar (200 psi) of the compensator setting. Power draw-off is minimized, therefore, system relief valves should not be required.

Pressure Compensator Control with Adjustable Maximum Displacement Stop

The adjustable maximum stop pressure control enables the maximum pump delivery to be externally adjusted from 25% to 100% while maintaining all of the standard features of a pressure compensated pump. To assist initial priming, manual adjustment control setting must be at least 40% of maximum flow position.

“J” Option

Remote Control Pressure Compensator

Exactly the same as the “C” (pressure compensation option) except the machine operator is able to change the compensator setting through the use of a remote pilot relief valve.

“C” Option

Electric Dual Range Pressure Compensator Control

The dual range pressure compensator control automatically adjusts pump delivery to maintain volume requirements of the system at either of two preselected operating pressures.

Maximum pump delivery is maintained to approximately 3,4 bar (50 psi) below either pressure control setting before being reduced.

Control type and pressure range are designated in the model number system.

Note: Graphic symbols shown with external valve(s) and cylinder to illustrate typical usage.

“H” Option

Load Sensing and Pressure Limiter Compensator Control

This compensator provides load-sensing control under all pressure conditions up to the desired maximum. It automatically adjusts pump flow in response to a remote pressure signal and maintains outlet pressure at a level slightly above load pressure. The integral pressure limiter overrides the load-sensing control, reducing pump displacement as the preset maximum operating pressure is reached.

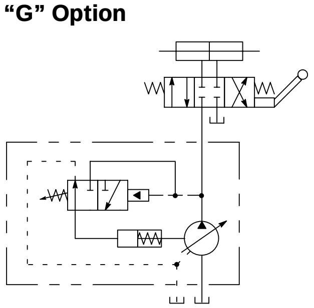
Standard load-sense differential pressure settings, by control type, follow. See model number system for setting range.

Standard load-sensing and pressure limiting control with 11 bar differential pressure (standard factory setting). Includes bleed-down orifice to exhaust load-sense signal for low-pressure standby condition.

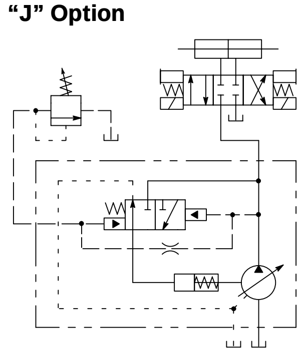
Other Standard Load Sense Options:

1. Bleed-down orifice plugged.
2. Factory differential pressure setting of 24 bar.

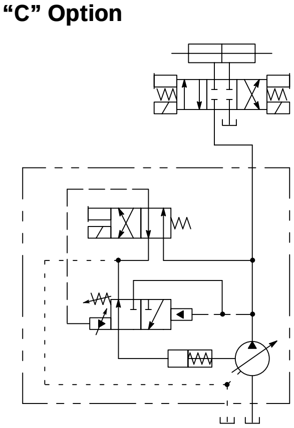
“G” Option



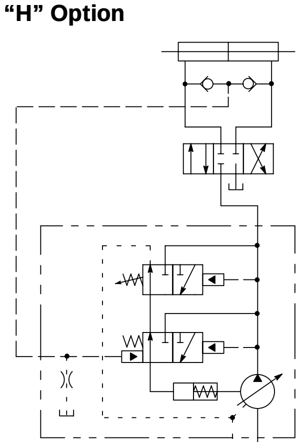
“J” Option



“C” Option



“H” Option



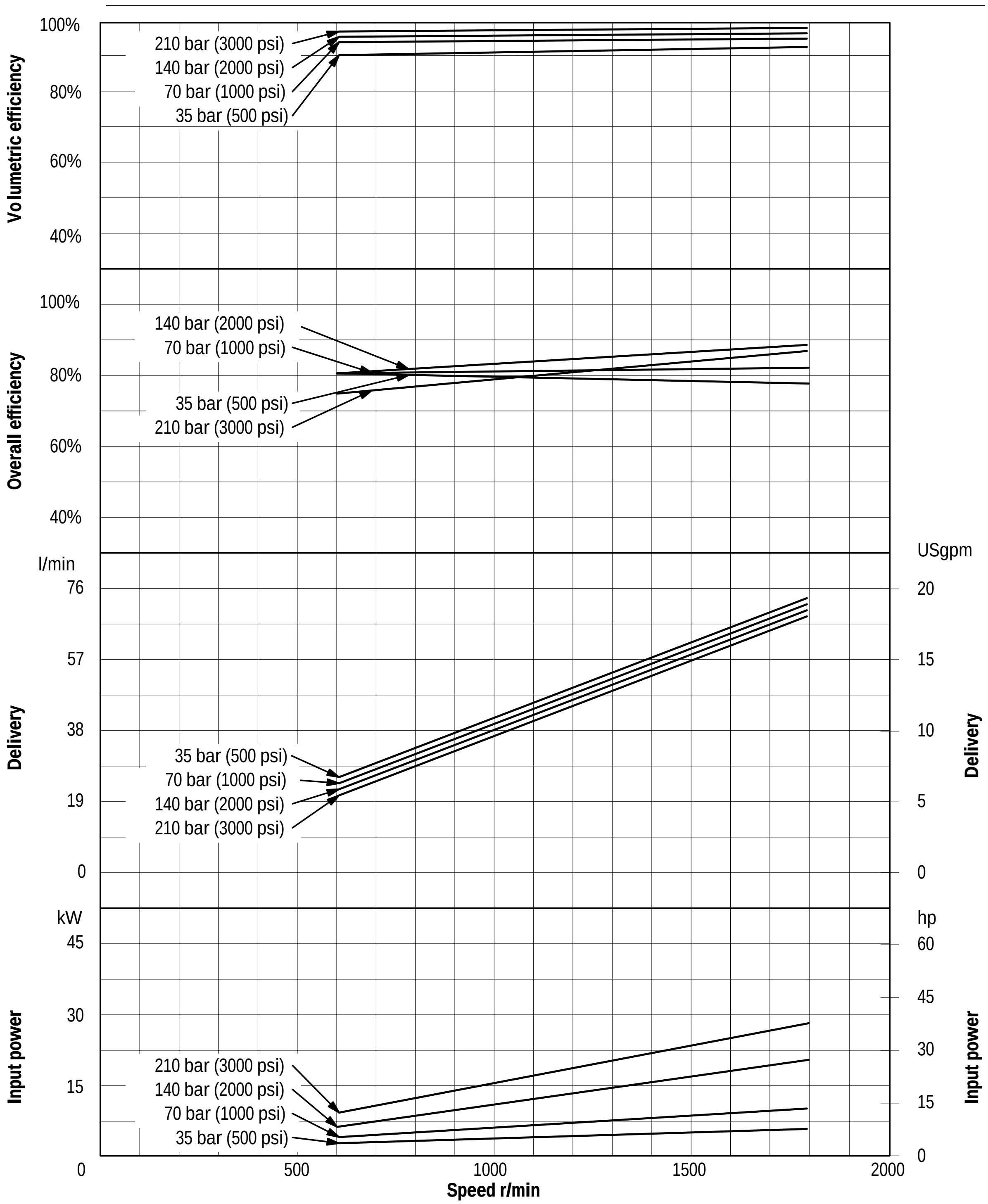
(†orifice open)
(†orifice plugged)

Performance Curves

PVQ40

Oil type: SAE 10W
Oil temperature: 82°C (180°F)
Inlet: 0 psi

Note: To obtain full flow operation of pump, pressure compensator setting must be 14 bar (200 psi) above desired operating pressure. Full flow curves were obtained with compensator settings 14 bar (200 psi) above 210 bar (3000 psi) max. rated pressure.

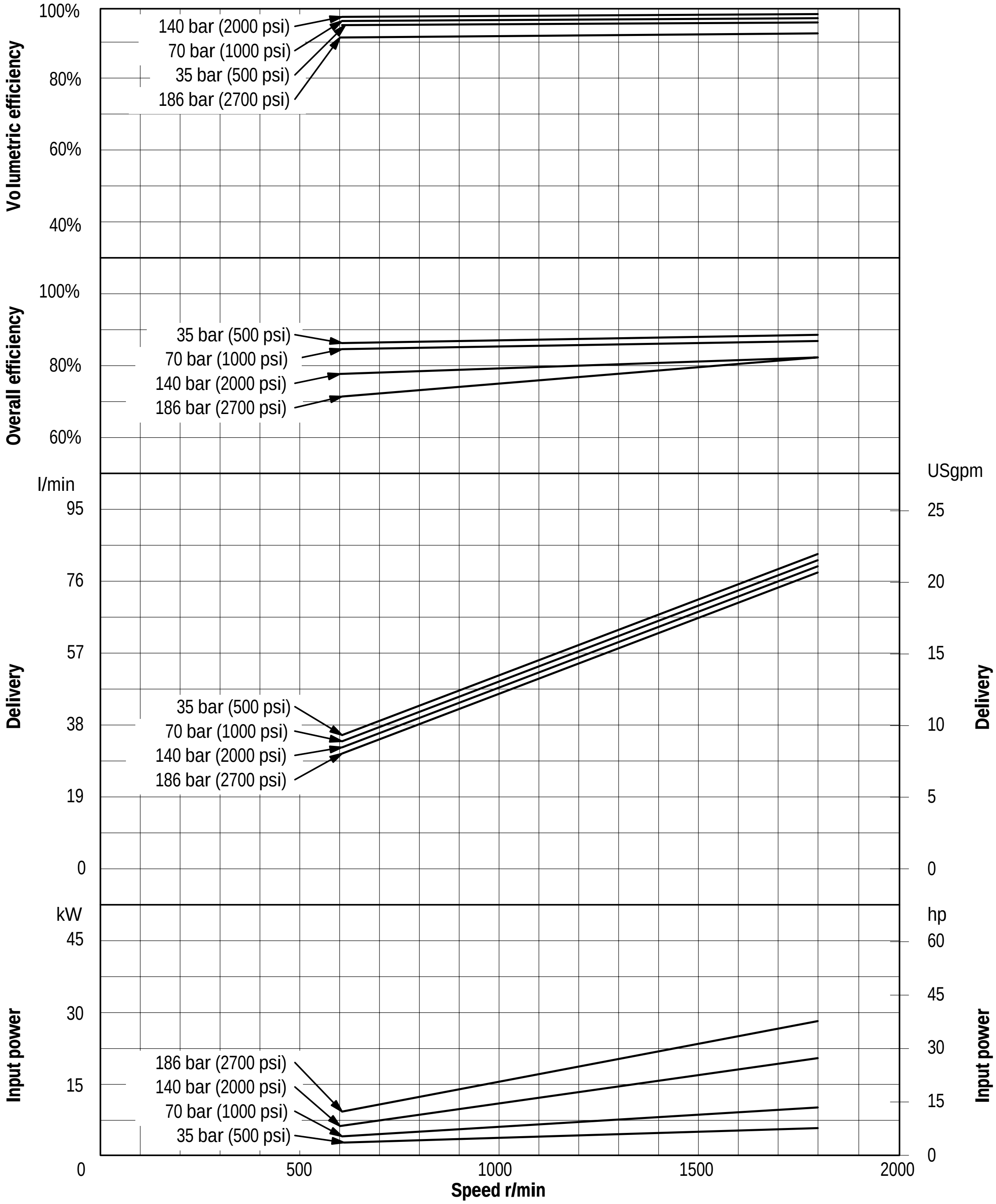


Model Series

PVQ45

Oil type: SAE 10W
Oil temperature: 82°C (180°F)
Inlet: 0 psi

Note: To obtain full flow operation of pump, pressure compensator setting must be 14 bar (200 psi) above desired operating pressure. Full flow curves were obtained with compensator settings 14 bar (200 psi) above 186 bar (2700 psi) max. rated pressure.



Operating Data

PVQ40 and PVQ45 Sound Data

Temperature: 50°C (120°F)
Test Fluid: URSA-ED (10W)
Inlet Pressure: Atmospheric (0 psig)

SOUND DATA

Speed r/min	Pressure bar (psi)	Sound Level dB(A)* Full Stroke	Cutoff
1000	35 (500)	60	58
	70 (1000)	61	61
	140 (2000)	63	65
	210 (3000)*	65	65
1200	35 (500)	61	60
	70 (1000)	62	62
	140 (2000)	65	65
	210 (3000)*	66	68
1500	35 (500)	65	61
	70 (1000)	67	64
	140 (2000)	68	67
	210 (3000)*	68	69
1800	35 (500)	68	60
	70 (1000)	69	65
	140 (2000)	69	68
	210 (3000)*	71	70

*PVQ40 at 210 bar (3000 psi) and PVQ45 at 186 bar (2700 psi)
**Sound pressure data equivalent to NFPA Standard.

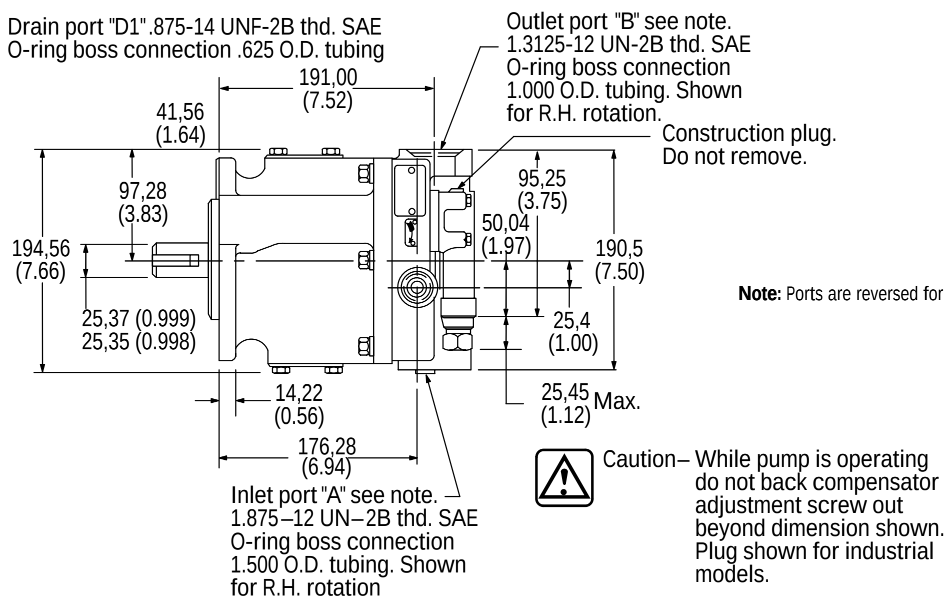
Response Data

Yoke response recorded at rated speed and pressure, 0 psi inlet, 82°C (180°F), SAE 10W oil. Pressure rise was 6900 bar (100,000 psi) per second.

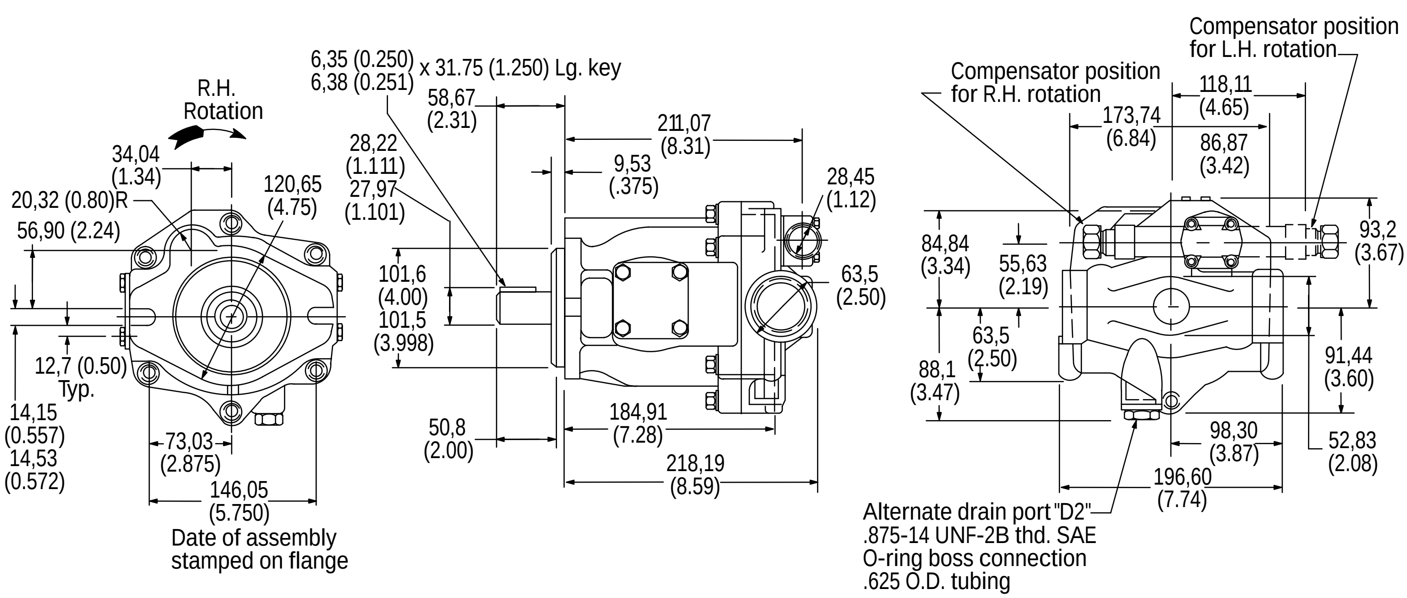
Control Type	On Stroke	Off Stroke
Pressure compensator	0.050 sec.	0.020 sec.
Load sense compensator	0.040 sec.	0.010 sec.

Side Port Controls, No. 2 Mounting and Input Shaft

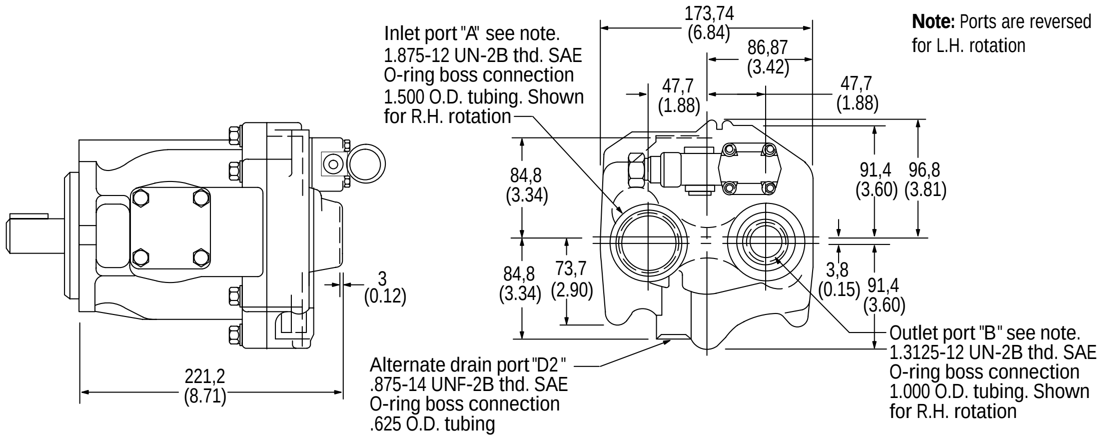
Millimeters (inches)



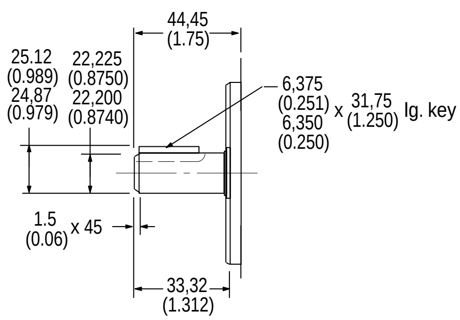
Note: Ports are reversed for L.H. rotation



Rear Ports

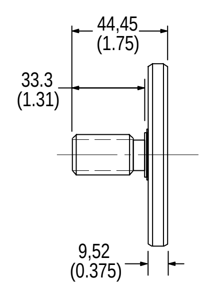


No. 1 Shaft: SAE "B" Straight Keyed



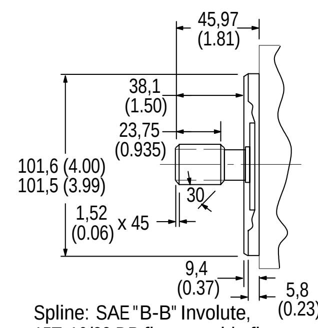
No. 05 Shaft SAE "B" Splined

y



Spline: SAE "B" Involute, 13T
16/32 DP flat root side fit

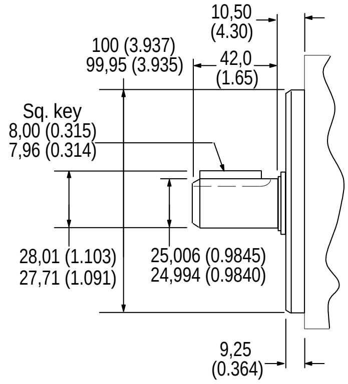
No. 08 Mounting and Input Shaft SAE "B-B" Splined

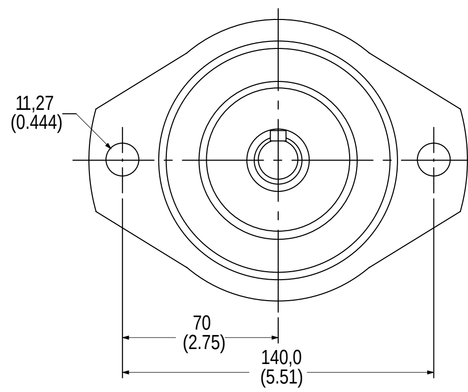


Spline: SAE "B-B" Involute,
15T, 16/32 DP flat root side fit

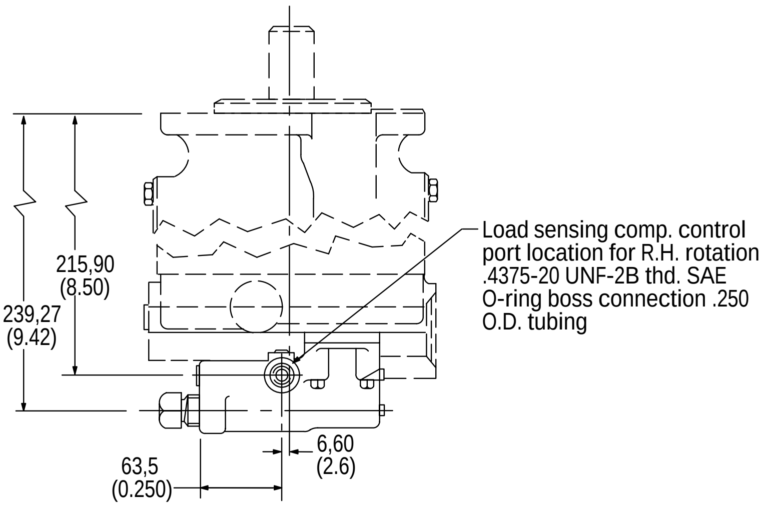
No. 10 Mounting and Input Shaft with VDMA Flange

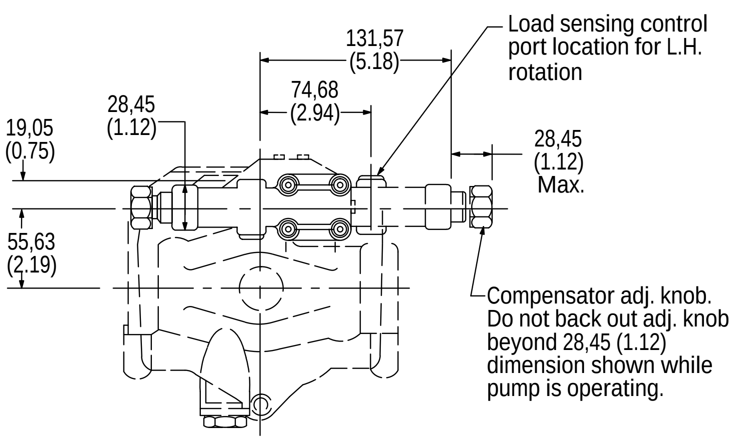
(Flange and shaft end ISO 3019/2-100A2HW-E25N)



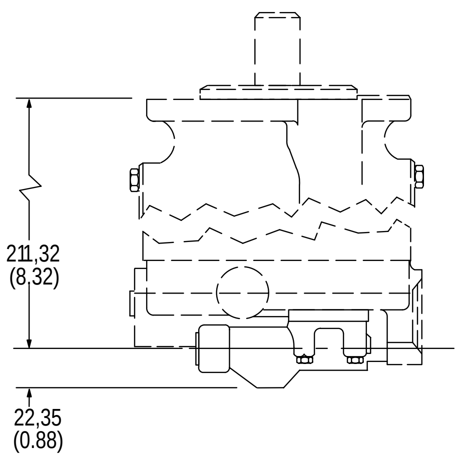


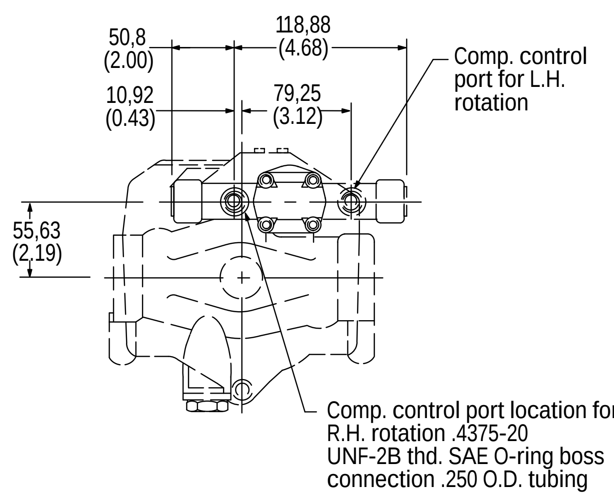
Pressure Compensator with Load Sensing





Remote Control





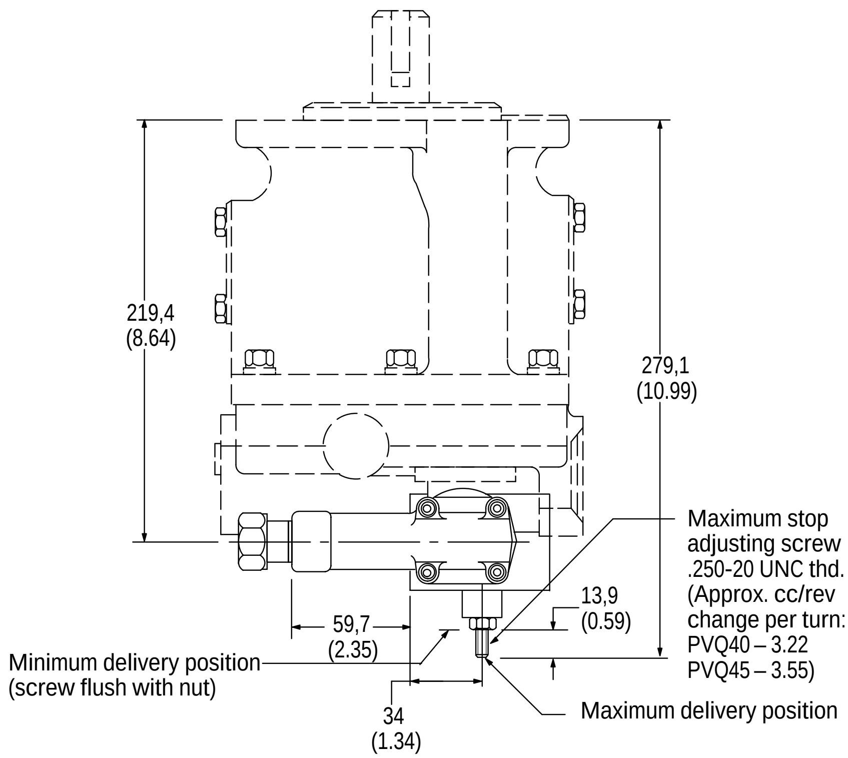
Pressure Compensator Control with Adjustable Maximum Displacement Stop

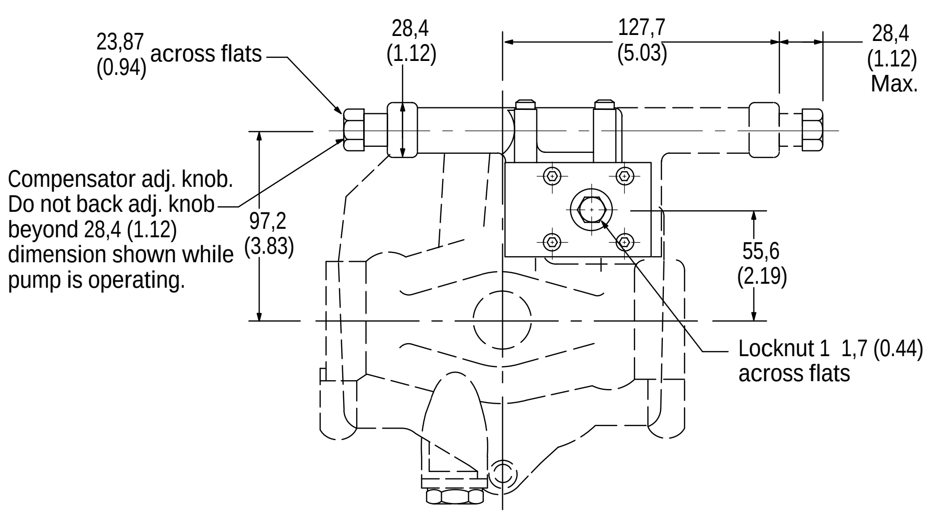
Adjustment

Loosen locknut on adjusting rod. Turn adjusting rod clockwise (CW) to decrease maximum pump delivery or counter-clockwise (CCW) to increase maximum pump delivery until desired setting is obtained. Secure this setting by tightening locknut. To assist initial priming, manual adjustment control setting must be at least 40% of maximum flow position.

This control enables the maximum pump delivery to be externally adjusted from 25% to 100% while maintaining all of the standard features of a pressure compensated pump.

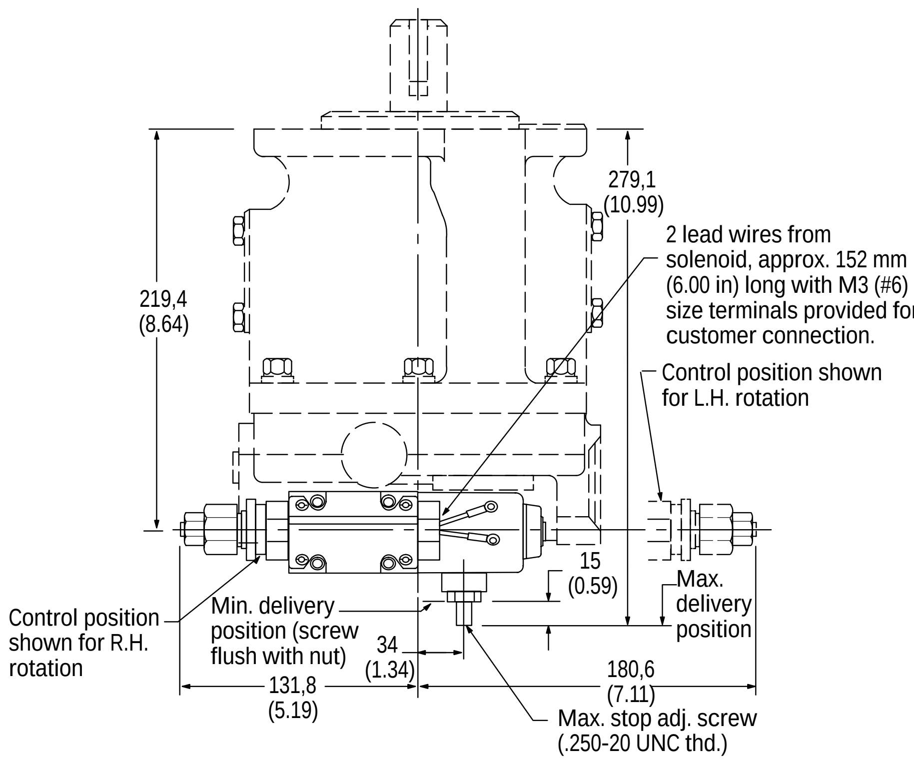
Note: Not available with thru-drive models.

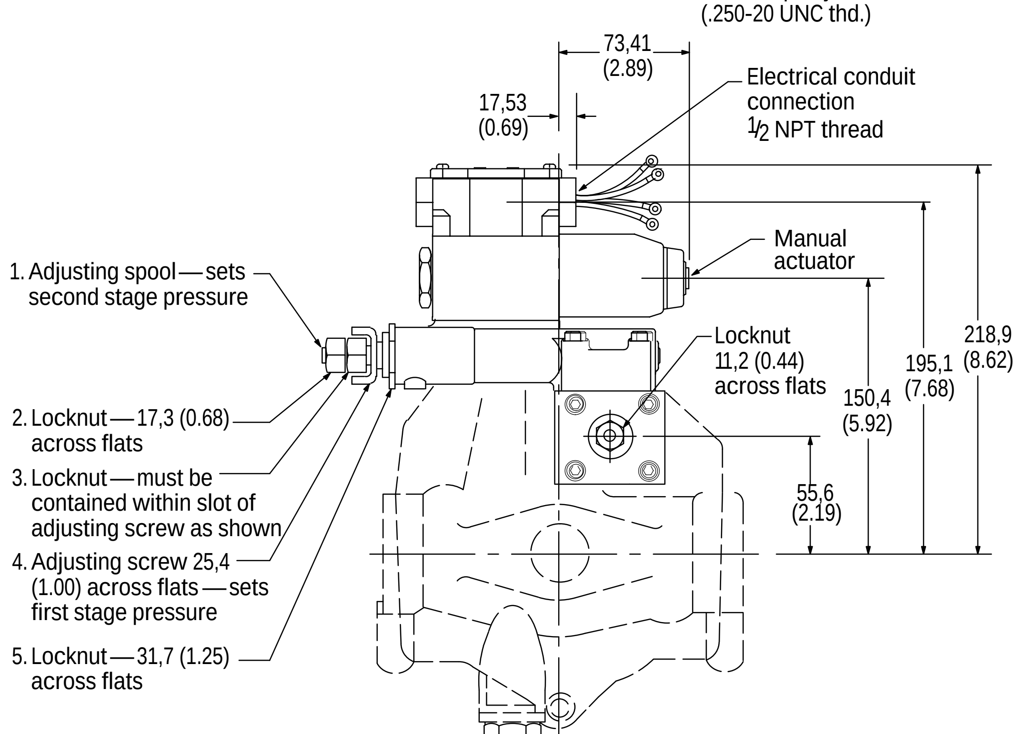




Electric Dual Range Pressure Compensator with Maximum Displacement Stop

See preceding page and following page for adjustment procedures.





Solenoid Data[u] (110V AC 50 Hz and 115/120V AC 60 Hz)

Solenoid current	Inrush amps (R.M.S.)	Holding amps
115/120V AC 60 Hz - 110V AC 50 Hz	2.0	.54 .64*

*Maximum peak inrush amps approximately 1.4 x R.M.S. value shown.

Refer to catalog GB-C-2015B for additional solenoid valve data.

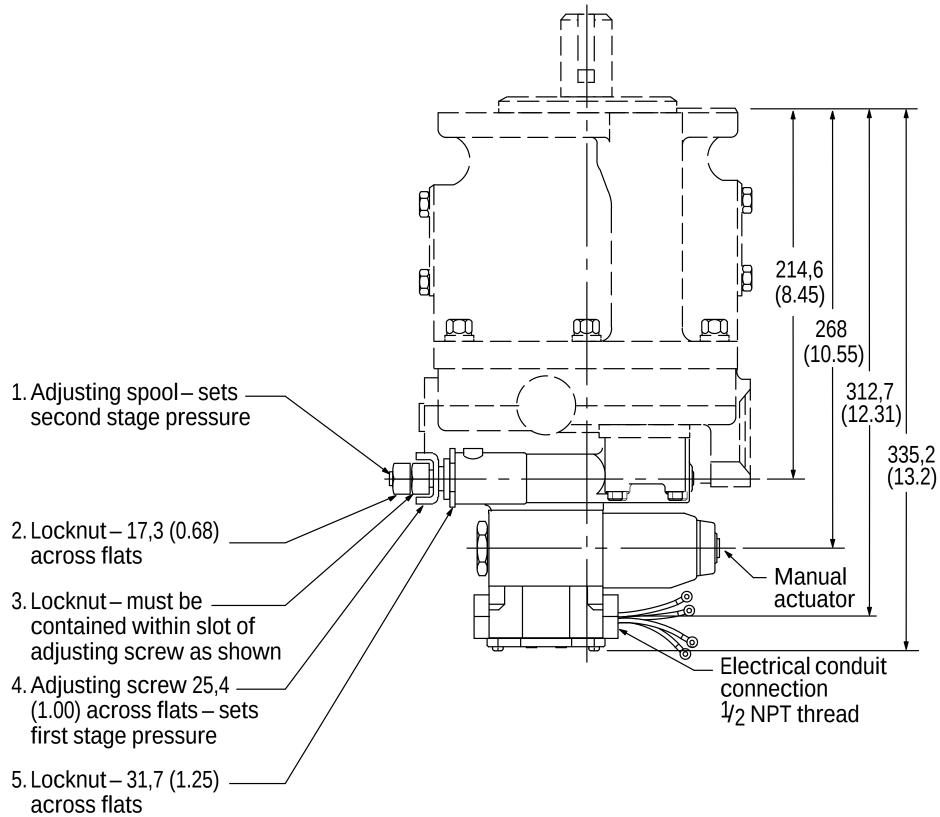
[u]**Note:** Any sliding spool valve, if held shifted under pressure for long periods of time, may stick and not spring return due to fluid residue formation and, therefore, should be cycled periodically to prevent this from happening.

Controls

Electric Dual Range Pressure Compensator Control

Adjustment

1. With the directional valve de-energized, loosen locknut “5” and turn the adjusting screw “4” to the desired first stage pressure setting, then tighten locknut “5”.
2. With solenoid de-energized, turn adjusting spool “1” counterclockwise (CCW) until nut “3” is bottomed in adjusting screw slot. (Second stage setting is now equal to first stage pressure setting.) Turn adjusting spool clockwise (CW) to desired second stage pressure requirements. One complete turn of adjusting spool equals approximately 41 bar (600 psi). Energize solenoid and check pressure setting.
De-energize solenoid and re-adjust if necessary. Secure this setting by tightening locknut “2”.



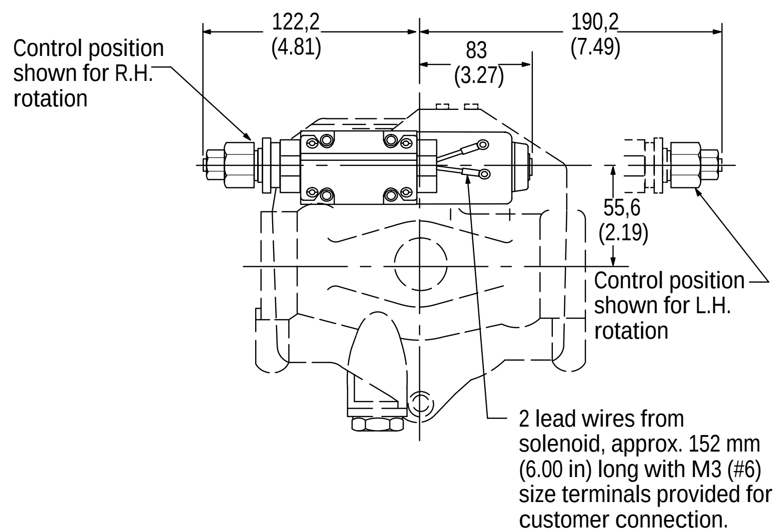
Solenoid Data[u] (110V AC 50 Hz and 115/120V AC 60 Hz)

Solenoid current	Inrush amps (R.M.S.)	Holding amps
115/120V AC 60 Hz - 110V AC 50 Hz	2.0	.54 .64*

*Maximum peak inrush amps approximately 1.4 x R.M.S. value shown.

Refer to catalog GB-C-2015B for additional solenoid valve data.

[u] **Note:** Any sliding spool valve, if held shifted under pressure for long periods of time, may stick and not spring return due to fluid residue formation and, therefore, should be cycled periodically to prevent this from happening.



Unloading Valve Control – "E" Option

With the unloading valve control the variable pump will unload at a preset pressure. The pump will maintain this no flow, low pressure (approximately 14 bar [200 psi]) standby condition, until system pressure drops to about 85% of the preset unloading pressure. The pump will then return on stroke and provide full flow until the preset unloading pressure is reached again.

With this control, an efficient accumulator charging circuit is obtained. The pump will provide full flow to fill the accumulator until the maximum charging pressure is reached. The pump then goes to a standby condition until the accumulator pressure drops to 85% of the desired maximum. The accumulator is then recharged as the cycle starts over again.

A separate right angle check valve must be provided to maintain the accumulator hydraulic charge and prevent back flow when the pump is unloaded. The check valve's internal leakage must not exceed five drops per minute. The control port must be connected to system pressure, downstream of the check valve.

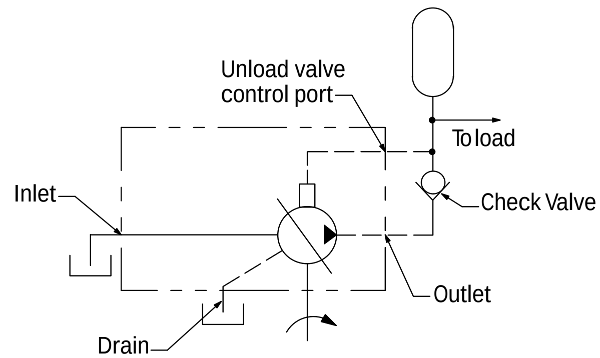
Adjustment range

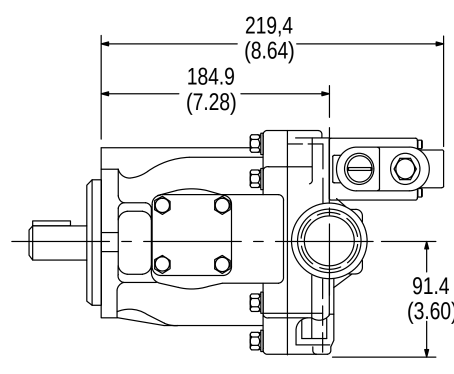
PVQ40	100-210 bar (1500-3000 psi)
PVQ45	100-186 bar (1500-2700 psi)

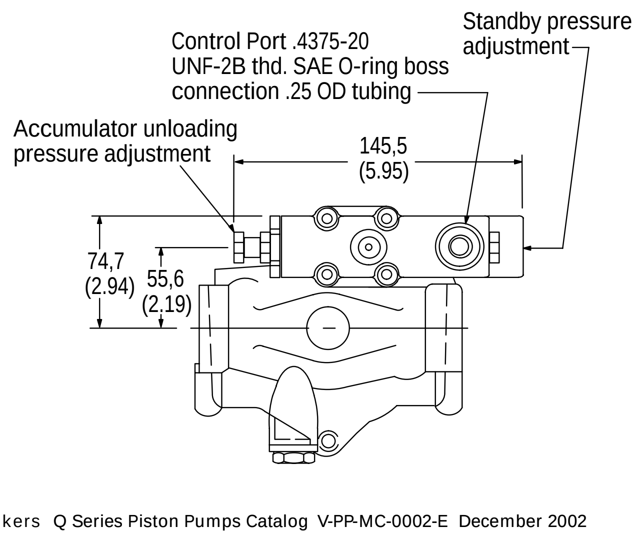
Cut-in pressure is 85% of unloading pressure, minimum.

Setting Pressures

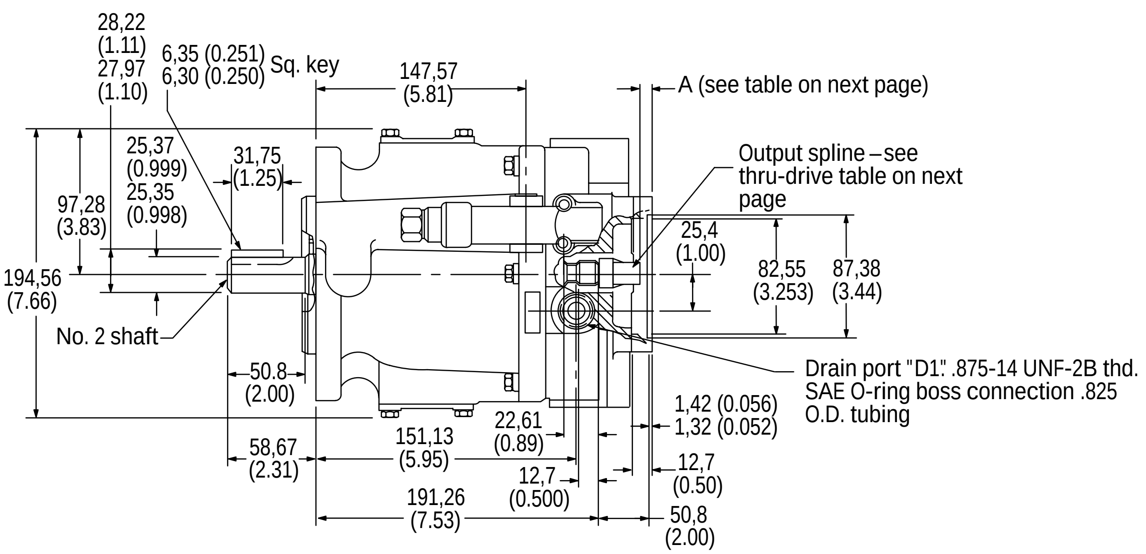
1. Back out accumulator unloading pressure adjustment screw to below desired unloading pressure.
2. Adjust desired standby pressure.
3. Set accumulator pressure by screwing in the accumulator unloading adjustment screw. Accumulator recharge (cut-in) pressure is a function of the maximum accumulator pressure and is not adjustable.
4. Check pressure settings and re-adjust if necessary.

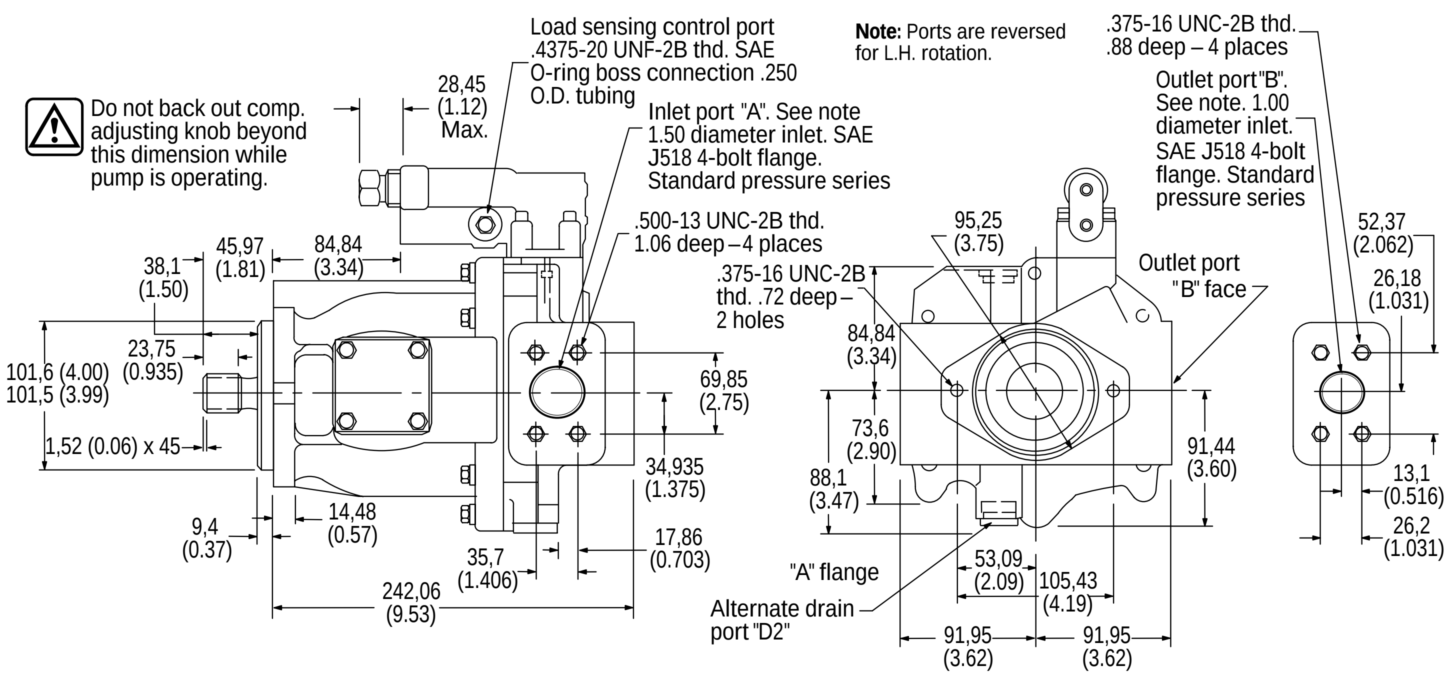






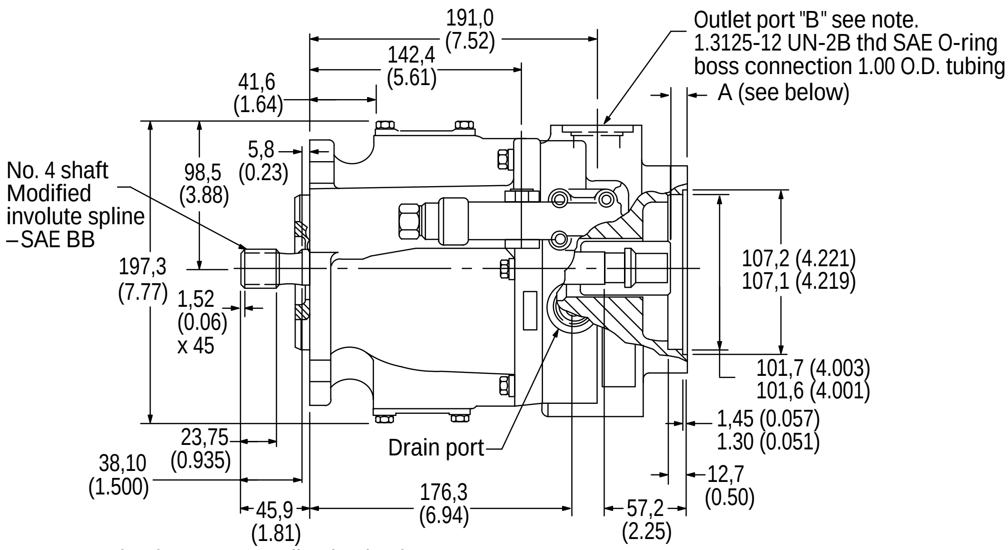
PVQ40 and PVQ45 SAE “A”



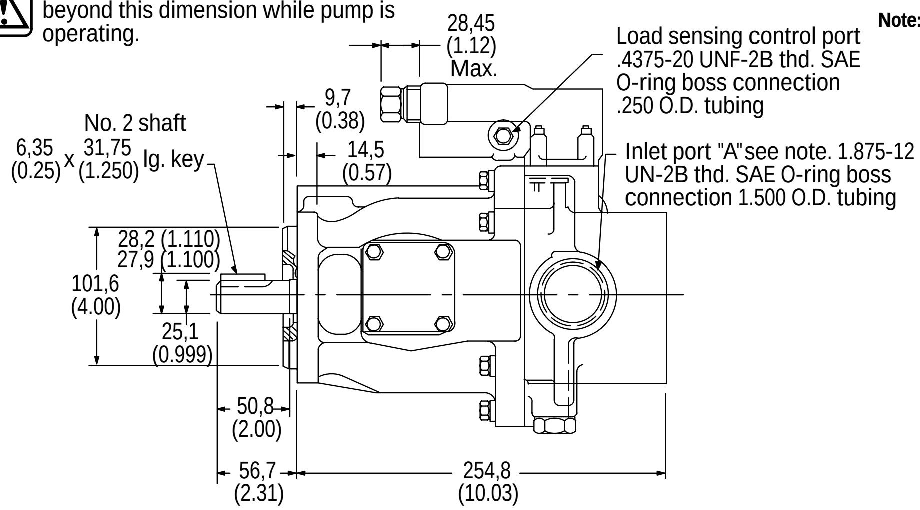


Thru-drives

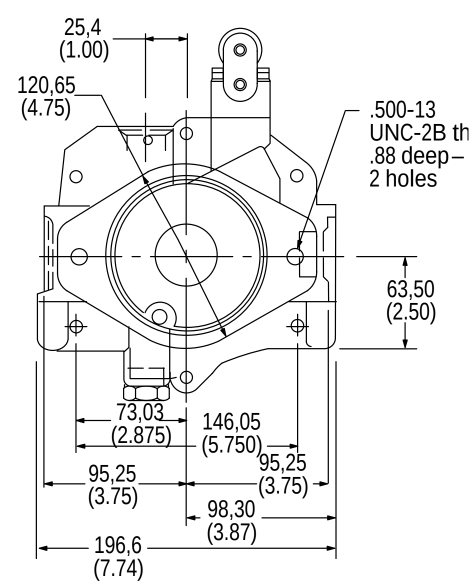
PVQ40 and PVQ45 SAE “B”



Donot back out comp. adjusting knob beyond this dimension while pump is operating.



Note: Ports are reversed for L.H. rotation.



Thru-drive Shaft	Spline Data	Max. Torque Nm (in. lb.)	Dimension A mm (in.)	Coupling Type	Thru-drive Coupling
AA	ASA B5.15-1960 9 teeth 16/32 DP Flat root side fit	58 (517)	10,92 (0.43)	9T/9T	864224
AB	ANS B92.1-1970 11 teeth 16/32 DP Flat root side fit	118 (1050)	12,57 (0.495)	11T/11T	864325
AE	Special Eaton 26 teeth 32/64 DP Flat root side fit	179 (1587)	24,89 (0.98)	26T/26T	627168
			10,92 (0.43)	26T/13T	864307
			20,56 (0.81)	26T/15T	475134

Note: Coupling, screws, and washers must be ordered separately to mount rear pump. “A” O-ring (AS568-042) and “B” O-ring (AS568-155) are included with each thru-drive pump. Couplings for “B26” are step type for 13 and 15 tooth as shown.

Thru-drives
Shaft Torque Data
PVQ40/45

THRU-DRIVE SHAFT TORQUE DATA

Shaft	Input Shaft Code	Maximum Input Torque Total Nm (lb. in.)	Maximum Thru-drive Torque Output Nm (lb. in.)
9T	2	215 (1900)	58 (517)
	5	208 (1850)	
	8	337 (2987)	
11T	2	215 (1900)	123 (1100)
	5	208 (1850)	
	8	337 (2987)	
26T	2	215 (1900)	179 (1587)
	5	208 (1850)	
	8	337 (2987)	

Note: Both input and output limits must be met.

Typical Rear Pumps (with Shaft Codes) for PVQ40/45 Thru-drives

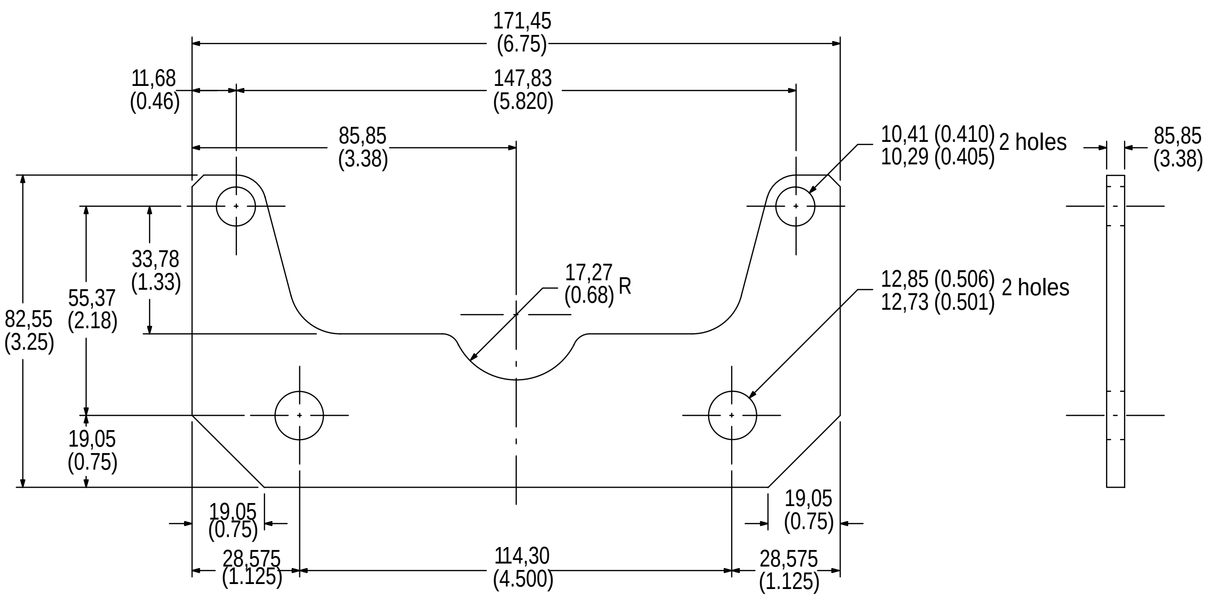
TYPICAL REAR PUMPS (WITH SHAFT CODES) FOR PVQ40/45 THRU-DRIVES

Thru-drive shaft	Typical Rear Pump	Rear Pump Shaft Code	Thru-drive Coupling
9T	PVQ10/13	3	864224
	PVB5/6	S124 suffix	
	V10	11	
	V20	62	
26T	PVE012	2	864307
		28	627168
	PVQ20/32	3	864307
		28	627168
	PVQ40/45	3	864307
		4	475134
		28	627168
	V2010 OR V2020	11	864307
	20V	151	864307
	2520V	166	475134

Note: 11T (not listed above) is intended for special application only.

PVQ40 and PVQ45 Pump Support Bracket

An optional support bracket should be used when a heavy second pump is mounted to a thru-drive PVQ40 or PVQ45. The support bracket (627179), two screws (199740), and two washers (427700) must be ordered separately.



Fluid Cleanliness

Proper fluid condition is essential for long and satisfactory life of hydraulic components and systems. Hydraulic fluid must have the correct balance of cleanliness, materials, and additives for protection against wear of components, elevated viscosity, and inclusion of air.

Essential information on the correct methods for treating hydraulic fluid is included in Eaton publication 561 “Eaton Guide to Systemic Contamination Control” available from your local Eaton distributor or by contacting Eaton. Recommendations on filtration and the selection of products to control fluid condition are included in 561.

Recommended cleanliness levels, using petroleum oil under common conditions, are based on the highest fluid pressure levels in the system and are coded in the chart below. Fluids other than petroleum, severe service cycles, or temperature extremes are cause for adjustment of these cleanliness codes. See Eaton publication 561 for exact details.

Eaton products, as any components, will operate with apparent satisfaction in fluids with higher cleanliness codes than those described. Other manufacturers will often recommend levels above those specified. Experience has shown, however, that life of any hydraulic component is shortened in fluids with higher cleanliness codes than those listed below. These codes have been proven to provide a long, trouble-free service life for the products shown, regardless of the manufacturer.

	System Pressure Level bar (psi)		
Product	**<70 (<1000)**	**70-210 (1000-3000)**	**210+ (3000+)**
Piston Pumps – Variable	**18/16/14**	**17/15/13**	**16/14/12**

Hydraulic Fluids and Temperature Ranges

Use antiwear hydraulic oil, or automotive type crankcase oil designations SC, SD, SE or SF per SAE J183FEB80.

Select a viscosity grade that will allow optimum viscosity, between 40 cSt (180 SUS) and 16 cSt (80 SUS), to be achieved within the optimum performance envelope shown below.

For further information, see Eaton data sheet B-920 or I-286-S.

Fire Resistant Fluids

All pumps can be used with water glycol and polyol ester fluids. All pumps can be operated to 140 bar (2000 psi) with these fluids, except PVQ13 and PVQ32 which are limited to 105 bar (1500 psi). Input speed should not exceed 1800 r/min. System temperature should not exceed 54° C (130° F). Inlet vacuum should not exceed 101,6 millibar (3 in. Hg). For more information, refer to Eaton publication 579.

Installation and Start-up (Commissioning)

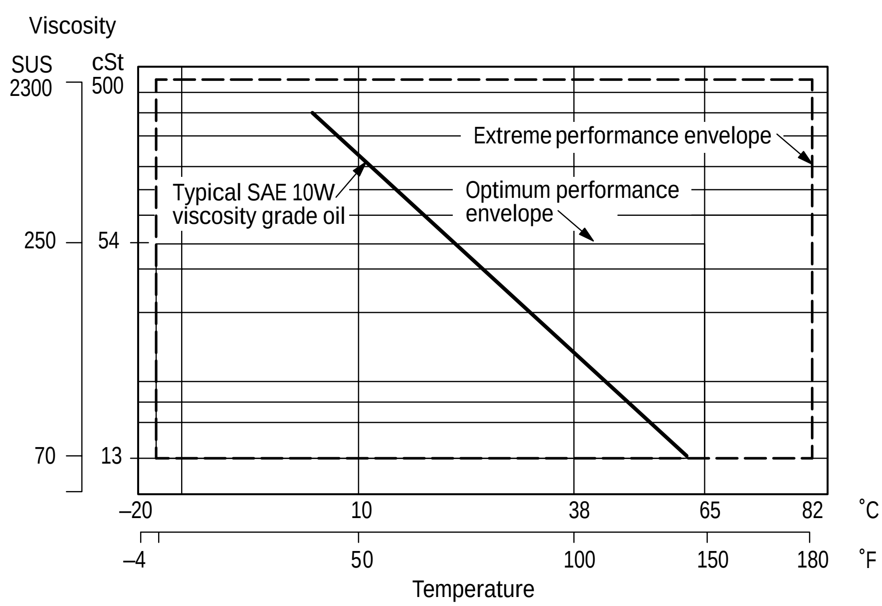
Before a pump is started, fill the case through the uppermost drain port with hydraulic oil of the type to be used. The case drain line must be connected to the reservoir below oil level.

For multiple pump arrangements that include non-PVQ sections, the requirements of the non-PVQ units must be considered.

Ordering Procedure

Order pumps by the full model designation. Pump displacement, mounting flange type, direction of rotation, pump configuration, shaft end type, seals, pressure adjustment range, and specific control functions are all specified in the full model number system.

Couplings, O-rings, capscrews and washers must be ordered separately for all thru-drive pumps.



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DG5V-7 30 Design & DG3V-7 20

ISO4401 Size 07;
ANSI/B93.7M-D07

Powering Business Worldwide

Pilot Operated Directional Valve

DG3V-7-30 Design

Solenoid Controlled Pilot Operated Directional Valve

DG5V-7-50 Design

General description

DG*V-7 valves are used primarily for controlling the starting, stopping and direction of fluid flow.

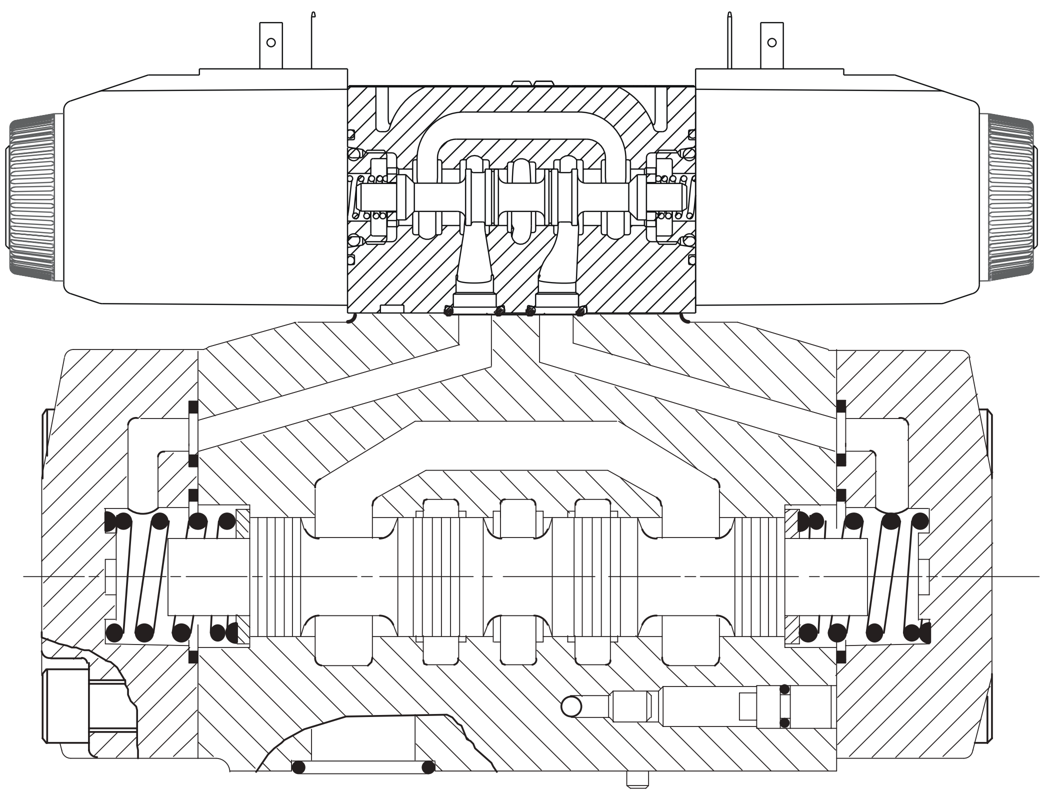
Two series of valves, DG5V solenoid controlled, pilot operated and DG3V pilot operated models are available with a wide selection of spools. These include meter-in and meter-out spools and a regeneration type that can obviate extra valves essential in traditional circuit arrangements.

All spools have been designed to provide good low shock, fast response characteristics which can be enhanced by optional stroke and/or pilot choke adjustments.

Models include spring offset, spring centered and detented versions.

Features and Benefits

- High pressure and flow capability for maximum cost-effectiveness.
- Low headloss to minimize power wastage.
- Low shock characteristics to maximize machine life.
- Facility to change solenoid coils without disturbing the hydraulic envelope.
- The many optional features, particularly for DG5V valves, permit matching to virtually every application within the valve's power capacity.
- **Optional mainstage spool position monitoring switch (CE marked)**



Model Code

DG3V-7 30 Series, Pilot Operated Directional Valves

For pilot operated valves:

*** - DG3V-7- ** ** (-**) - 20**

1 2 3 4 15

For solenoid controlled, pilot operated valves:

*** - DG5V-7- ** ** (-**) (-P**) (-E) (-T) - (-K) - (-*) - (V) M - ***** (L) - ** - ***- * - 30**

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

1 Fluid Compatibility

Blank – Standard BUNA-Nitrile Seals
F3 – Viton Seals

Note: For further information see "Hydraulic Fluids" section on page 13.

2 Spool type

See "Functional Symbols" section on pages 5-6.

3 Spool spring arrangement

A – Spring offset, end-to-end (P to B when operated)
AL – As "A" but left-hand build (P to A when operated)
B – Spring offset, end-tocenter (P to B when operated) ■
BL – As "B" but left-hand build (P to A when operated) ■
C – Spring centered
N – Two-position detented

■ DG5V option. Same function from DG3V-7-*C valves by alternating pilot supply to one port (X or Y) and permanently draining the other.

4 Spool Control

Omit if not required
1 – Stroke adjustment at both ends ▲■
2 – Pilot choke adjustment both ends
3 – "1" and "2" combined ▲■
7 – Stroke adjustment, port A end only ▼
8 – Stroke adjustment, port B end only ▼
27 – "2" and "7" combined ▼
28 – "2" and "8" combined Omit if not required

▲ Not applicable to DG5V-7-*B(L) models.

▼ Not applicable to models shown in the "Spring offset, end-to-center, opposite hand" section on page 6

◆ Not applicable to models shown in the "Spring offset, end-to-center" section on page 6

■ Not applicable for spool "8" models

5 Main Stage Spool Monitoring Switch

Blank – None
PCA – Center sensing switch on "A" port end
PCB – Center sensing switch on "B" port end
PDA – Double offset sensing switch on "A" port end
PDB – Double offset sensing switch on "B" port end
PCD – Center sensing switch on "A" port end and double offset sensing ■ switch on "B" port end
PPA – Offset sensing proximity switch "A" port end
PPB – Offset sensing proximity swtich "B" port end
PPD – Offset sensing proximity switch both ends ■

* The spool position monitoring switch shown on this technical document is CE marked and certified and complies to European Standard EN 61000-6-4: 2001 (Emissions) for Class A and European Standard EN 61000-6-2: 2001 (Immunity).

■ Not applicable for spool "8" models

6 External Pilot Supply, DG5V Valve Option

Omit for internal pilot supply
E – Valve configured for external pilot supply to port X

7 Internal Pilot Drain, DG5V Valve Option

Omit for external drain, which is also mandatory for 1, 8 and 9 spool-type valves
T – Valve configured for internal pilot valve drain.

8 Minimum Pilot Pressure Generator (P Port Option)

Blank – None
K- 0.35 bar cracking pressure

9 Manual Override Option

Blank – Plain override in solenoid end(s) only ▲
H – Water-resistant manual override on solenoid end(s) ▲
W – Twist & lock override in solenoid ends •
Z – No override at either end

▲ No override in non-solenoid end of single-solenoid valves.
• DC only

10 Solenoid Energization Indentity

V – Solenoid "A" is at port A end of pilot valve and/or solenoid "B" at port B end independent of main-stage valve port locations or spool type; German practice.

Omit (except as noted below) for US ANSI B93.9 standard whereby solenoid "A" is that which, when energized, connects P to A in main-stage valve, and/or solenoid "B" connects P to B.

Note: Energization identities on valves with type 8 spools are identical under US and German practices. In such cases the "V" code is used.

11 Solenoid Type Connection(s)

U – ISO4400, DIN43650 connector
U1 – ISO4400 fitted with PG11 plug
U6 – ISO4400 with fitted DIN plug with lights
KU – Top exit flying lead (150mm)
KUP4 – Junior timer (Amp) connector
KUP5 – Integral Deutsch connector
FW – Flying lead with 1/2" NPT thread wiring housing
FTW – Fly. lead wired terminal block & 1/2" NPT thread wiring housing
FPA3W – Fly. lead, 3 Pin connector & 1/2" NPT thread wiring housing singlesolenoid valves
FPA5W – Fly. lead, 5 pin connector & 1/2" NPT thread wiring housing

I

Model Code (Cont...)

12 **Indicator Lights**

Blank – None

L – Solenoid indicator lights•

• Flying lead coil type only

13 **Surge Suppressor/ damper**

D1 – Diode positive bias
D2 – Negative bias
D7 – Transorb type

14 **Coil Rating**

See Page 7 for circuit details

B – 110V AC 50Hz/120V AC 60 Hz
BL – 110V 50 Hz/120V 60 Hz
D – 220V AC 50 Hz/240V AC 60 Hz
DS – 28V DC 30 watt
G – 12V DC
GL – 12V DC
H – 24V DC
HL – 24V DC
HM – 24V DC 8 watt

15 **Tank Port Rating**

6 – 210 bar (3000 psi) for AC performance.
7 – 210 bar (3000 psi) for DC performance.

16 **Design Number**

20 series for DG3V valves.
30 series for DG5V valves.

Subject to change.

I

Application Notes

Pilot Pressure

a. Pilot pressure must always exceed tank line pressure by at least the requisite minimum pilot pressure. This also applies when combining open center spools (0, 1, 8, 9 and 11) with internal pilot pressure, but they should be used only with externally drained valves.

b. Internally drained valves may be used only when surges in the tank line cannot possibly overcome the minimum pilot pressure differential referred to above. When the possibility of pressure surges in the tank line exist, externally drained valves are recommended.

c. When DG5V-7-*N valves are de-energized the pilot and main spools remain in the last selected position, provided that pilot pressure is maintained. If pilot pressure fails, or falls below the minimum, the main spool will spring center.

Caution: Because of this in-built feature the flow conditions of the center position must be selected with care, for the effect on both the direction of flow and the pilot pressure.

Stroke Adjustment Options

These control the maximum opening of the main spool/ body passages by adjusting the limits of spool stroke. By this means, the response time and the pressure drop across the valve for any particular flow rate can be controlled. Stroke adjusters can be fitted at either or both ends of the main-stage valve for adjusting the stroke in one or both directions. One use of stroke adjusters is for controlling the metering characteristics of “X*” or “Y*”- type spools. (See model code #4.)

Pilot Choke Adjustment Options

These provide a meter-out flow control system to the fluid in the pilot chambers of main-stage valves. It allows the velocity of the mainstage spool to be controlled, thereby reducing transient shock condition. For optimum results, a constant reduced pilot pressure is recommended.

Control Data, General

a. Dependent on the application and the system filtration, any sliding spool valve, if held shifted under pressure for long periods of time, may stick and not move readily due to fluid residue formation. It may therefore need to be cycled periodically to prevent this from happening.

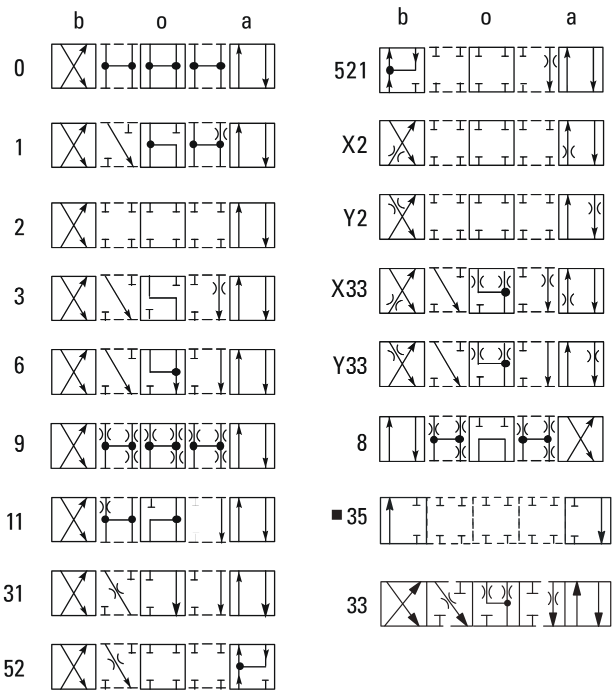
b. Surges of fluid in a common drain line serving two or more valves can be of sufficient magnitude to cause inadvertent shifting of the spools. It is recommended that circuit protection be used, such as separate drain lines.

c. Control by stroke adjusters, pilot chokes and minimum-pilot-pressure generator options is described on this page.

Functional Symbols

Spool Types

Shown in 3-position form, plus 2 transients.



Notes:

1. In the detailed and simplified symbols on this and the previous pages, the transient positions are omitted for simplicity.

2. In certain 2-position valves, the "o" position becomes an additional transient, i.e. in DG5V-7-*A(L) and DG5V-7-*N valves.

Your Eaton representative can provide further details.

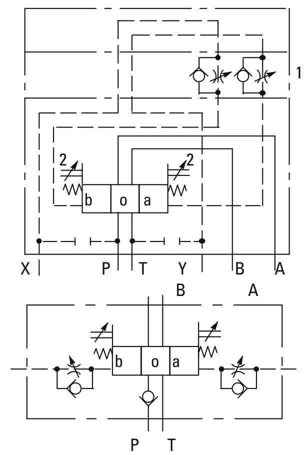
■ Only 35A available

DG3V-7 Options

The following are shown in a DG3V-7-*C example:

1. Pilot choke module
2. Stroke adjusters at either or at both ends (shown at both ends in example)

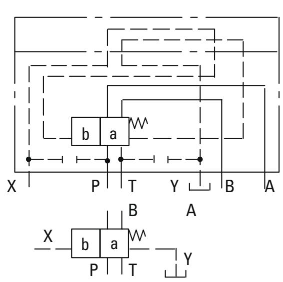
One or more options can be built into any DG3 series valve.



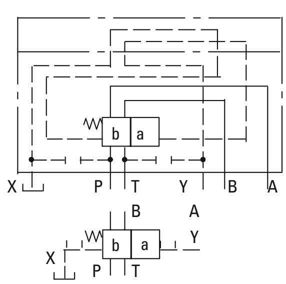
DG3V-7 Pilot Operated Models

Comprehensive and simplified symbols.

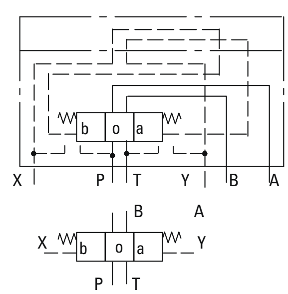
Spring Offset, End-to-End, DG3V-7-*A



Spring Offset, End-to-End, Opposite Hand, DG3V-7-*AL



Spring Centered, DG3V-7-*C



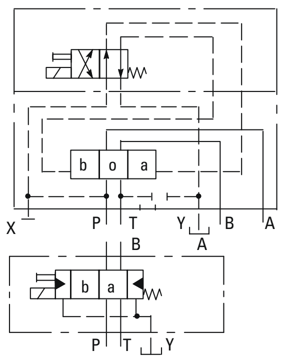
Functional Symbols

DG5V-7, Solenoid Controlled, Pilot Operated Models

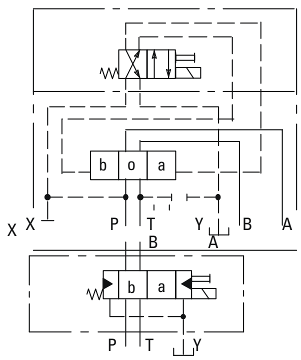
Comprehensive and simplified symbols shown configured for external pilot supply and internal drain

I

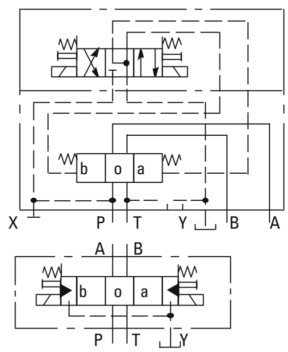
Spring Offset, End-to-End, DG5V-7-*A



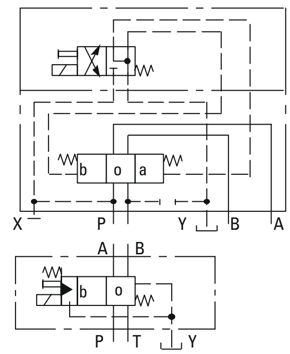
Spring Offset, End-to-End, Opposite Hand, DG5V-7-*AL



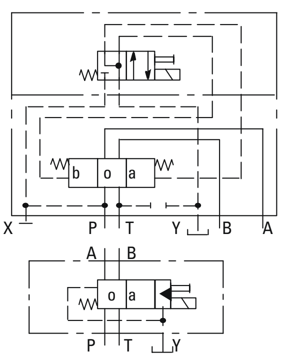
Spring Centered, DG5V-7-*C



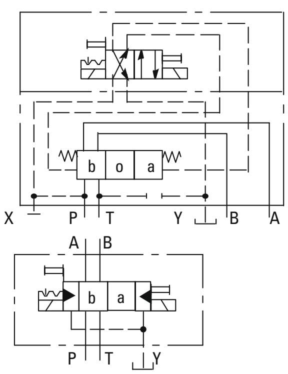
Spring Offset, End-to-Center DG5V-7-*B



Spring Offset, End-to-Center, Opposite Hand DG5V-7-*BL



Detented, DG5V-7-*N

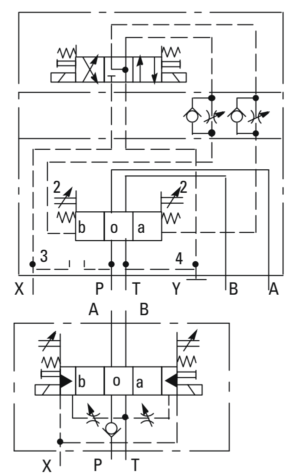


DG5V-7 Options

The following are shown in a DG5V-7-*C example:

1. Pilot choke module
2. Stroke adjusters, at either or at both ends (shown at both ends in example)
3. External pilot connection
4. Internal drain

One or more options can be built into any DG5 series valve.



SOLENOID IDENTIFICATION

Model (see also in "Model Code" on page 8)	Spool types	Solenoid identity at: Main port "A" end	Solenoid identity at: Main port "B" end
DG5V-7-*A/B(-**)(-E)(-T)(-*)-M	All except "8"	–	B
DG5V-7-*A/B(-**)(-E)(-T)(-*)-VM	All except "8"	–	A
	"8" only	B	–
DG5V-7-*AL/BL(-**)(-E)(-T)(-*)-M	All except "8"	A	–
DG5V-7-*AL/BL(-**)(-E)(-T)(-*)-VM	All except "8"	B	–
	"8" only	–	A
DG5V-7-*C/N(-**)(-E)(-T)(-*)-M	All except "8"	A	B
DG5V-7-*C/N(-**)(-E)(-T)(-*)-VM	All spools	B	A

Operating Data

MAXIMUM PRESSURES:

DG3V-7 valves; ports:	
P, A, B, X and Y	350 bar (5000 psi)
T	250 bar (3626 psi)
DG5V-7-(L)(-*)(-E)(-*) valves, (externally drained); ports:**	
P, A, B, T and X	350 bar (5000 psi) ▲
Y	210 bar (3045 psi) ▲
DG5V-7-(L)(-*)(-E)-T(-*) valves, (internally drained)u; ports:**	
P, A, B and X	350 bar (5000 psi) ▲
T	210 bar (3045 psi) ▲
Pilot pressures	See "Pilot Pressures" on page 9

▲ The DG5V, 50 design two-stage valves have been designed to satisfy the needs of most applications.
Consult your Eaton representative about an alternative model if:
a) Valves are required to remain pressurized for long periods without frequent switching, and /or
b) Back pressure on the drain port of externally drained models (or the tank port of internally drained models) is required to rise above 210 bar (3000 psi).

MAXIMUM FLOW RATES, L/MIN (USGPM) AT THE MINIMUM PILOT PRESSURES ■, AND WITH SPOOL TYPE:

See Pilot Pressures on page 12	70 (1000)	140(2000)	210 (3000)	280 (4060)	350 (5000)
0, 2, 3, 6, 31, 33, 35, 52 or 521 ◆	300 (80)	300 (80)	300 (80)	300 (80)	300 (80)
1, 9 or 11	260 (69)	220 (58)	120 (32)	100 (26)	90 (24)
8	300 (80)	300 (80)	250 (66)	165 (44)	140 (37)

■ Higher flow rates possible at higher pilot pressures; consult your local Eaton sales engineer.

◆ Consult your local Eaton sales engineer regarding flow limits relative to the regenerative position of type 52 and 521 spools.

ELECTRICAL INFORMATION

Control (swept) volume(s), DG3V and main-stage of DG5V valves:		
Center-to-end	7.28 cm3 (0.44 in3)	
End-to-end	14.56 cm3 (0.88 in3)	
Voltage ratings, DG5V valves	See 14 in "Model Code" on page 4	
Voltage limits, DG5V valves:		
Maximum voltage	See "Temperature limits", on page 8	
Minimum voltage	90% of rated voltage	
Power consumption, DG5V valves with AC solenoids:	**Initial VA rms**	**Holding VA rms**
Dual-frequency coils at 50 Hz, types "B" and "D"	265	49
Dual-frequency coils at 60 Hz, types "B" and "D"	260	48
Power consumption, DG5V valves with DC solenoids	30W at rated voltage and 20 C (68 F)	
Relative duty factor, DG5V valves	Continuous; ED = 100%	
Type of protection, DG5V valves:		
ISO 4400 coils with plug fitted correctly	IEC 144 class IP65	
Junction box	IEC 144 class IP65 (NEMA 4)	
Coil winding	Class H	
Lead wires (coil types "F****")	Class H	
Coil encapsulation	Class F	

Note : For information on pilot valves please refer segment B, C, D of the catalog.

I

Operating Data

Pressure drop characteristics	See page 9, 10
Response times, DG5V valves:	

Typical values for a DG5V-7-2C-E spring centered, externally piloted valve under standard test conditions and operating with 150 L/min (40 USgpm) at 350 bar (5000 psi).

Coil rating:	Pilot pressure, bar (psi):	Energizing	Time, ms ◆ De-energizing
110V 50 Hz	15 (218)	75	40
	50 (730)	50	40
	150 (2180)	40	40
	210 (3000)	40	40
	250 (3600)	40	40
24V DC	15 (218)	90	45 ▲
	50 (730)	65	45 ▲
	150 (2180)	55	45 ▲
	210 (3000)	55	45 ▲
	250 (3600)	55	45 ▲

◆ From applying a signal at the solenoid until the main-stage spool completes its travel.

▲ In pure switched circuit conditions, devoid of the effects of any suppression diodes and full-wave rectifiers.

TEMPERATURE LIMITS:	
Fluid temperature limits	See appendix
Ambient temperature limits:	See appendix
Minimum ambient, all valves	-20°C (-4°F)
Maximum ambients, DG5V valves with coils listed in 12 in "Model Code" two pages back, and under conditions stated below:	
Dual-frequency coils:	
at 50 Hz and 107% of rated voltage	65°C (150°F)
at 50 Hz and 110% of rated voltage	65°C (150°F)
at 60 Hz and 107% of rated voltage	65°C (150°F)
at 60 Hz and 110% of rated voltage	65°C (150°F)
Single-frequency (50 Hz) coils at 50 Hz and 110% of rated voltage	65°C (150°F)
DC coils at 110% of rated voltage	70°C (158°F)

INSTALLATION DIMENSIONS:	
Valves	See page 11, 12, 13
Mass (weight), basic models:	**kg (lb) approx.**
DG3V-7-*A(L)	10,0 (22.0) ◆
DG3V-7-*/*B(L)/*C	7,3 (16.1) ◆
DG5V-7-*A/B (AC voltages)	8,4 (18.5) ◆
DG5V-7-*A/B (DC voltages)	8,5 (18.7) ◆
DG5V-7-*C/N (AC voltages)	8,7 (19.2) ◆
DG5V-7-*C/N (DC voltages)	9,1 (20.0) ◆

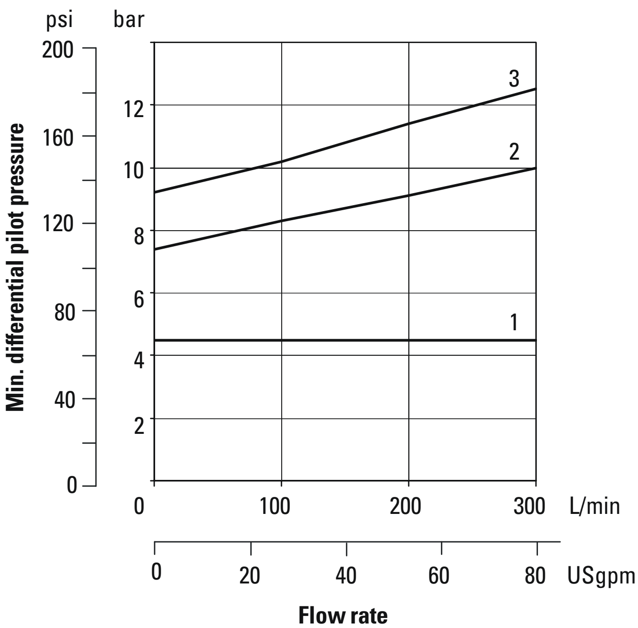
◆ Add 1,1 kg (2.4 lb) when pilot chock adjustment is fitted.

Note : For information on pilot valves please refer segment B, C, D of the catalog.

Performance Data

Pilot Pressures

Maximum: 350 bar (5000 psi). Typical minimum differential pilot pressure characteristics, shown below, are based on looped flow through P to A to B to T under standard test conditions.

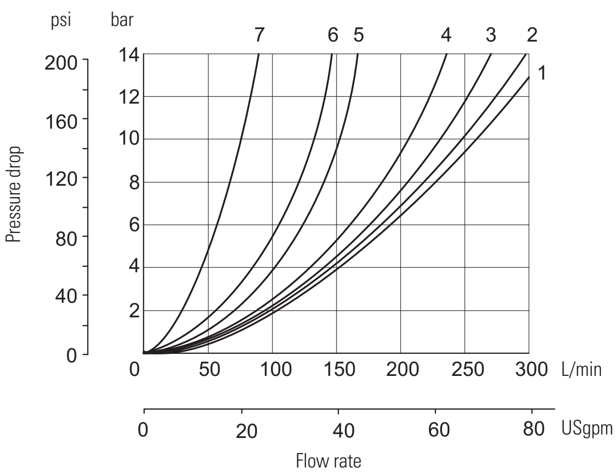


Spool Types	0	1	2	3	4	6	8	9	11	31	33	52	X*	Y*
Curve ref.	1	1	3	3	1	2	1	1	1	3	3	3	3	3

Applicable to:

Model	Spool type	Curve correction
DG3V-7-*C	All	As drawn
DG5V-7-*A(L)	0, 2, 6, 9, 52, X2 & Y2	Subtract 3 bar (44 psi)
DG5V-7-*B(L)	0, 2, 6, 52▲, X2 & Y2	As drawn
DG5V-7-*C	All	As drawn
DG5V-7-*N	0, 2, 6, 9, 52, X2 & Y2	As drawn

▲ DG5V-7-52BL models only.



FLOW-DIRECTION CURVE REFERENCE

SPOOL TYPE	P - A	B - T	P - B	A - T	P - T
0	2	1	2	3	3■
1	1	2	2	3	4▼
2	1	2	1	2	-
3	1	2	1	3	-
4	2	2	2	1	6
6	1	1	1	3	-
8	2	2	2	1	5
9	1	2	1	3	7
11	2	3	1	2	4
31	1	3	1	2	-
33	1	2	1	2	-
52▲	2•	-	3 ▼	-	-
52◆	-	-	3	3	-

■ Ports A and B plugged. ▼ Port A plugged. ▲ Selected P to A.
• Port B plugged. ◆ Selected P to B.

Pressure Drop Characteristics

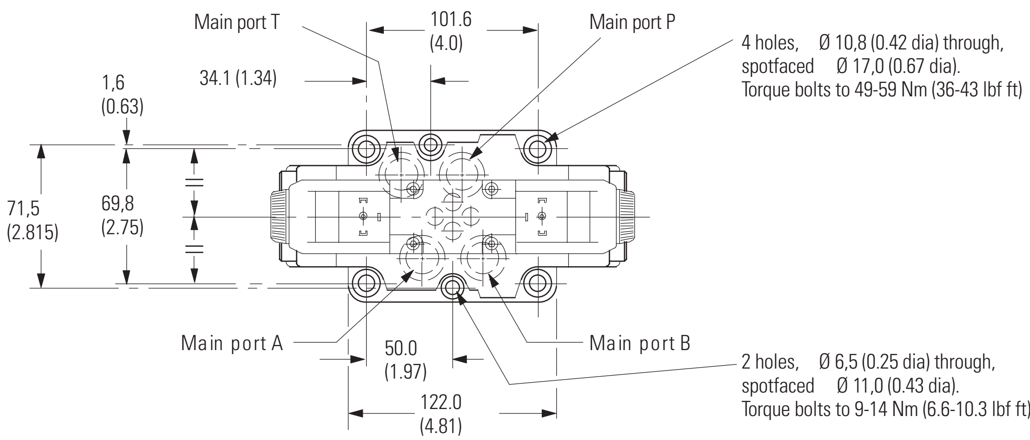
The following typical pressure drops (△p) at flow rates (Q) are based on standard test conditions, using oil of 0,865 specific gravity. Except where otherwise stated, for any other flow rate (Q1) the pressure drop (△p1) will be approximately $\triangle p1 = \triangle p\,(Q1/Q)^2$.

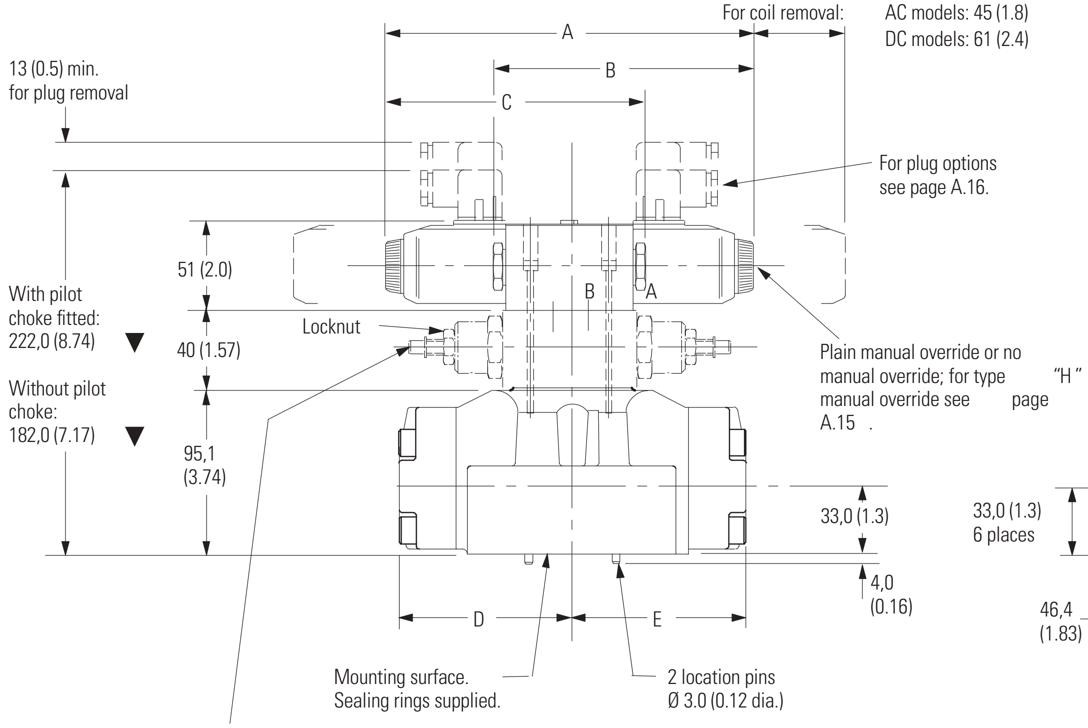
Installation Dimensions

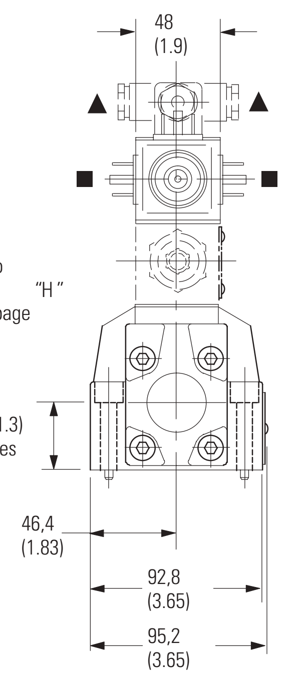
Millimeters (inches)

Solenoid Controlled Models with ISO 4400 (DIN 43650) Electrical Connections and Pilot Choke

DG5V-7–**(L)(-2)(-E)(-T)(-*)-(V)M–U example
For dimensions A, B, C, D and E see page 16
For solenoid identification see page 16
For stroke adjusters see page 15







Pilot choke adjusters fitted when Model Code $\boxed{4}$ = 2, 3, 27 or 28.
To adjust, turn locknut counter-clockwise, then turn screw clockwise to slow down rate of spool travel, or counter-clockwise to increase the rate. Retighten locknut to 25-30 Nm (18-22 lbf ft).

▼ May vary according to plug source.

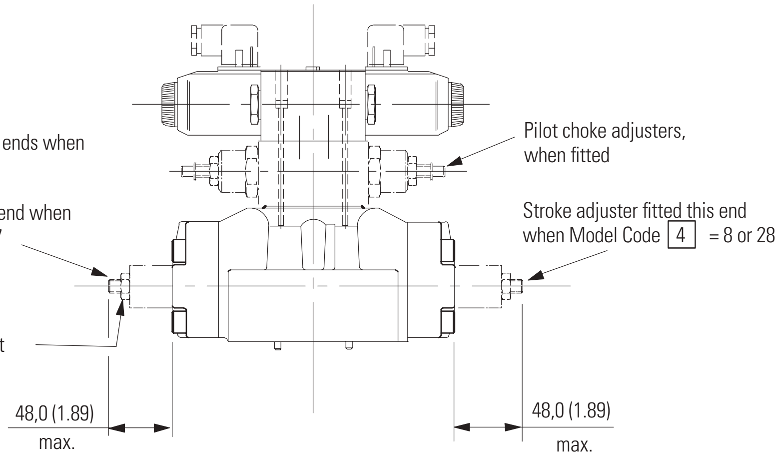
■ Alternative plug positions by loosening knurled nut counter-clockwise, turning coil and
re-tightening nut.

▲ Cable entry can be positioned at 90 either way from position shown, by re-assembling the contact holder into the appropriate position inside the plug connector housing.

Installation Dimensions

Solenoid Controlled Models with Stroke Adjusters

DG5V-7-***(L)(-2)(-E)(-T)(-*)-(V)M-U example
For solenoid identification see page 16



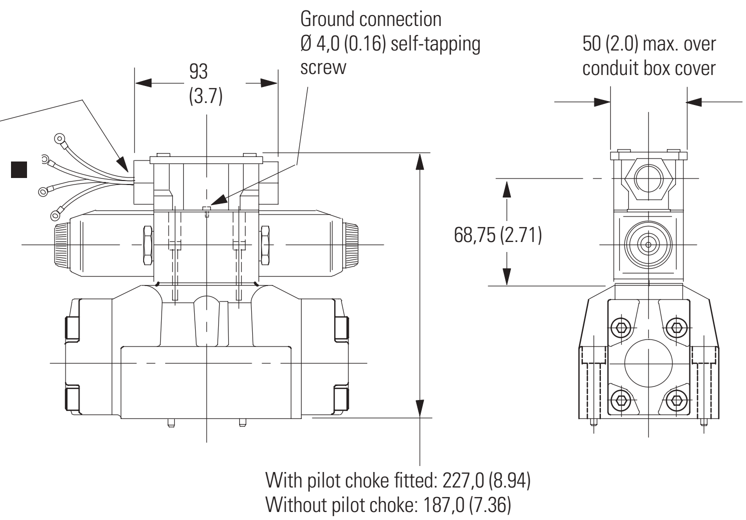
To Adjust:

Turn locknut counter-clockwise, then turn screw clockwise to shorten stroke, or counter-clockwise to increase stroke. Re-tighten locknut.

Solenoid Controlled Models with Junction Box having Optional Terminal Strip and Indicator Lights

DG5V-7-***(L)(-**)(-E)(-T)(-*)-(V)MF**(L) example.
For solenoid identification see page 16

Available also with other options shown above and on previous page.



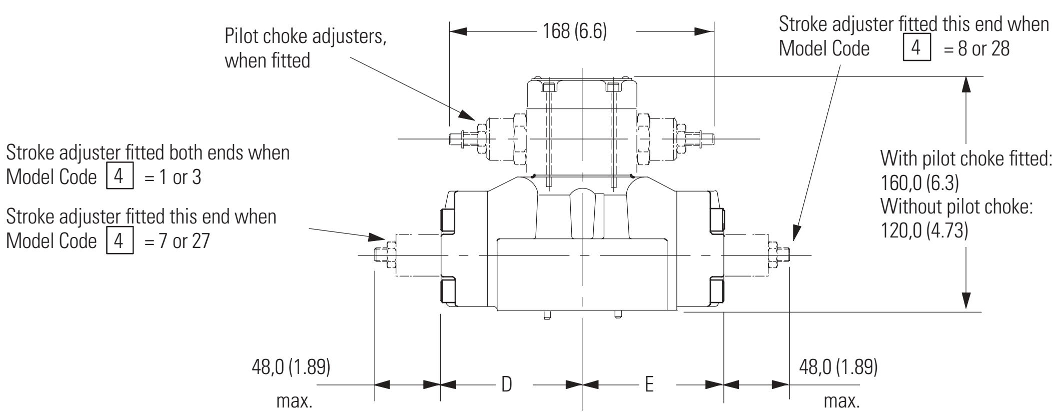
M20-6H x 1,5 thread for F(T)J options, or 1/2" NPT for F(T)W options, at both ends. Closure plug fitted at one end.
For other options see 10 & 11 in Model Code", eight pages back, and under NFPA Connector---" and "Terminal Strip and Lights" sections, two pages on.

■ Ref. "Model Code": 9

Codes "FW": 2 lead wires for each solenoid, approx. 150 (6.0) long.
M3 (#6) terminals provided for customer connection.
Codes "FTW": Valve supplied with lead wires connected into terminal strip suitable for M3 (#6) terminals provided for customer connection.

Pilot Operated Models with Optional Pilot Choke and/or Stroke Adjusters

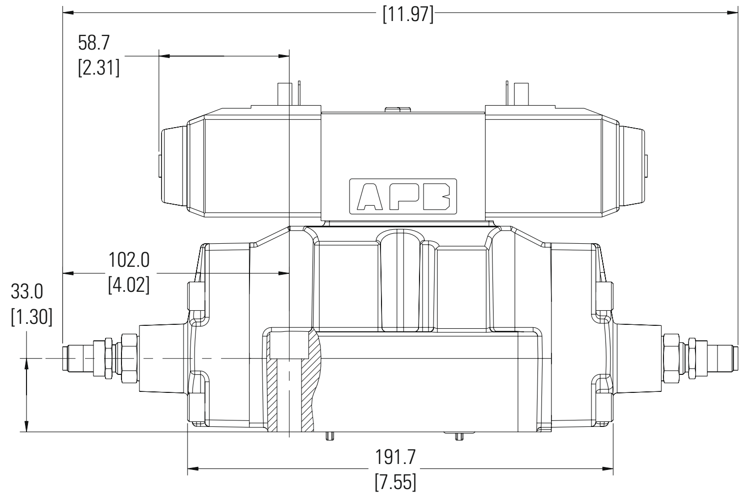
DG3V-7-**(-2)(-**) examples



Installation Dimensions

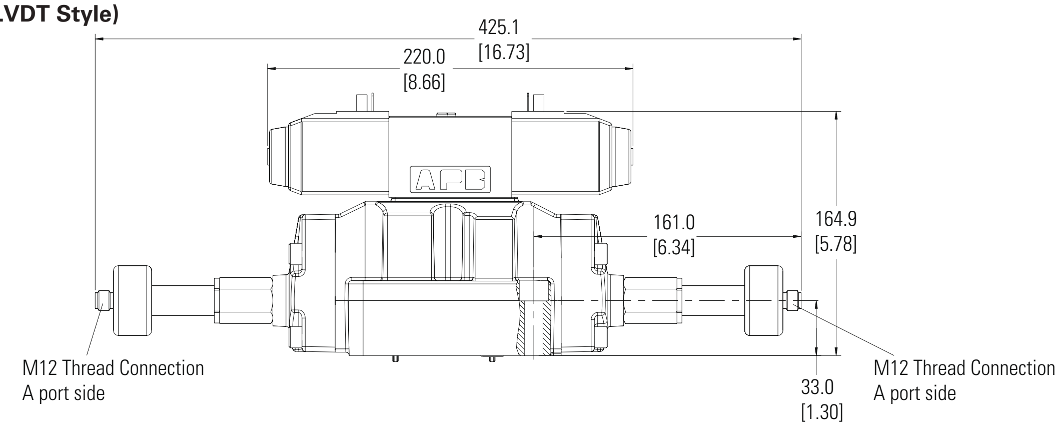
DG5V-7 with Main Stage Spool Monitoring Switch
"PPA", "PPB" or "PPD" Models (Proximity Switch)

Millimeters (inches)



DG5V-7 with Main Stage Spool Monitoring Switch
"PPA", "PPB" or "PPD" Models (LVDT Style)

Millimeters (inches)



Installation Dimensions

Solenoid Identification

Model (see also in 10 "Model Code" on page I.3)	Spool types	Solenoid identity at: Main port "A" end	Main port "B" end
DG5V-7-*A/B(-**)(-E)(-T)(-K)(-*)-M	All except "4" & "8"	-	B
DG5V-7-*A/B(-**)(-E)(-T)(-K)(-*)-VM	All except "4" & "8" "4" & "8" only	- B	A -
DG5V-7-*AL/BL(-**)(-E)(-T)(-K)(-*)-M	All except "4" & "8"	A	-
DG5V-7-*AL/BL(-**)(-E)(-T)(-K)(-*)-VM	All except "4" & "8" "4" & "8" only	B -	- A
DG5V-7-*C/D/N(-**)(-E)(-T)(-K)(-*)-M	All except "4" & "8"	A	B
DG5V-7-*C/D/N(-**)(-E)(-T)(-K)(-*)-VM	All Spools	B	A

DIMENSIONS

Basic model designation	AC models			DC models				
	A	B	C	A	B	C	D	E
DG3V-7-*C	–	–	–	–	–	–	97,0 (3.82)	97,0 (3.82)
DG3V-7-*A ■	–	–	–	–	–	–	97,0 (3.82)	131,0 (5.16)
DG3V-7-*A(L) ■ DG3V-7-*D	–	–	–	–	–	–	131,0 (5.16)	97,0 (3.82)
DG5V-7-*A ■ DG5V-7-*B ■ DG5V-7-4/8BL	–	147 (5.8)	–	–	157 (6.2)	–	97,0 (3.82)	97,0 (3.82)
DG5V-7-*AL ■ DG5V-7-*BL ■ DG5V-7-4/8B	–	–	147 (5.8)	–	–	157 (6.2)	97,0 (3.82)	97,0 (3.82)
DG5V-7-*C DG5V-7-*N	200 (7.8)	–	–	220 (8.7)	–	–	97,0 (3.82)	97,0 (3.82)
DG5V-7-*D	200 (7.8)			220 (8.7)			131,0 (5.16)	97,0 (3.82)

■ Not types "8" or "8" spools.

Electrical Information

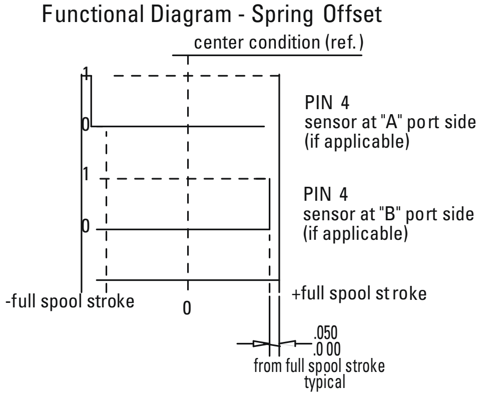
Main Stage Spool Monitoring Switch (Proximity Switch)

SPECIFICATIONS

Supply Voltage (Vs)	10 to 30 Vdc
Supply Current (Is)	8 mA at 24 Vdc (plus load current)
Supply Over-voltage Rating:	35 Vdc continuous
Supply Reverse Polarity Rating	-35 Vdc (with no shorts)
Short Circuit Tolerance:	Continuous short between any two pins
High Potential Test, Pin to Case:	300 Vdc
Electronmagnetic Compatibility:	ISO 7637 Parts O and I worst case and Immunity to Radiated Electromagnetic Fields, 10 KHZ to 1 GHZ per SAE J1113/25 Sep 95
Pins to Case Resistance	50 Megohms
Load Dump Tolerance:	80 Vdc Peak, 400 ms Decay, with 1.5 Ohm Source Impedance
Switching Frequency:	0 to 3K Hz
Output:	Open collector PNP sourcing, normally open
Sensing Distance (offset position):	1.27 ± 0.25 mm (.050” ± .010”)
Hysteresis:	0.25 mm (.010”) Max.
Rise/Fall Time:	6.5/1.5 microsec R1=820 Ohm, C1=20 pF @ 8Vdc
Output Leakage Current	10μa Max.
Output Voltage High:	+Vs – 2.2 Vdc minimum
Output Load Current:	200 mA Max.
Operating Pressure:	350 bar (5000 psi)
Operating Temperature:	-40° to 110°C
Humidity:	0 to 100%

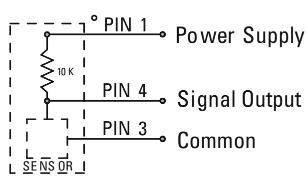
Electrical information shown in this window is for offset sensing, Proximity Switch "PPA" , "PPB" or "PPD" Models

Functional Diagram - Spring Offset

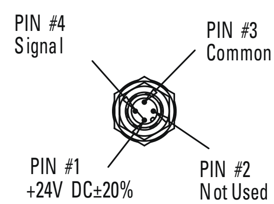


0= voltage at pin 4 0.5V min.
1= voltage at pin 4 (Vs –2.2V) min.

Output Circuit Wiring Instructions



Connector Detail



Electrical Information

Main Stage Spool Monitoring Switch (LVDT Style)

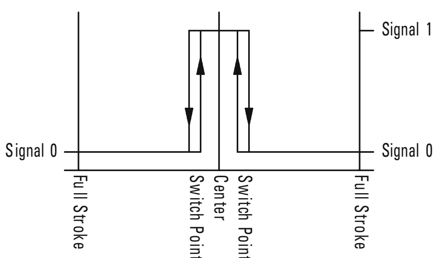
SPECIFICATIONS

Supply Voltage (Vs)	24VDC +/-20%
(Full Wave Bridge with Capacitor) Reverse Polarity Protection	Max. 300 V Installed
Ripple Voltage	10%
Current Consumption	40 mA Approx.
Outputs	NC Contact Positive
Sensing Distance (offset position)	5.85 to 6.15 mm
Sensing Distance (from center position)	± 0.35 to 0.65 mm
Hysteresis	<0.06 mm
Output Voltage	(No Short Circuit Protection)
Signal 1	Vs – 2.5 V
Signal 0	< 1.8 V
Output Current	< 400 mA AT INPUT + 20%
Environmental Protection	IP65 (With Mounted Plug)
Operating Temp Range	-20˚ C to +85˚ C
Operating Pressure	315 bar (4500 psi)
CE Declaration of Conformity No.	00 02 002 9 93

ATTENTION: EMC ONLY ENSURED WHEN USING SCREENED CABLES AND SCREENED PLUG CASING!

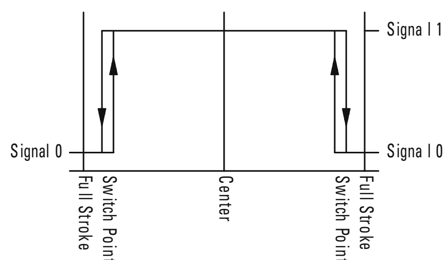
Electrical information shown in this window is for offset sensing, Proximity Switch "PPA" , "PPB" or "PPD" Models

TYPICAL "PCA/PCB" OUTPUT
(FOR SENSING CENTER POSITION)



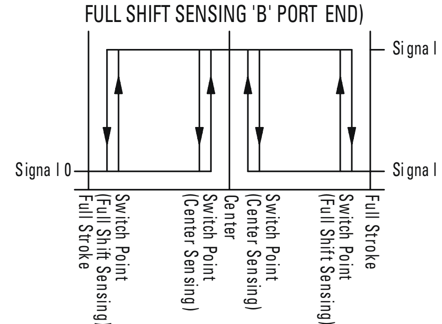
Signal 0 = Voltage at pin 2/4 < 1.8 V
Signal 1 = Voltage at pin 2/4 > (Vs – 2.5V)

TYPICAL "PDA/PDB" OUTPUT
(FOR FULL SHIFT SENSING)



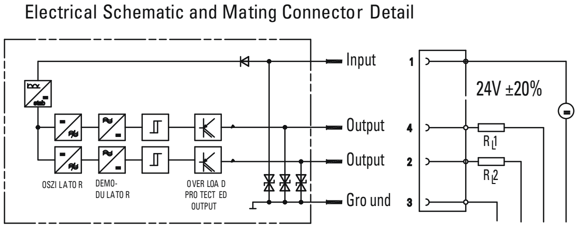
Signal 0 = Voltage at pin 2/4 < 1.8V
Signal 1 = Voltage at pin 2/4 > (Vs – 2.5V)

TYPICAL "PCD" OUTPUT
(FOR CENTER SENSING 'A' PORT END,
FULL SHIFT SENSING 'B' PORT END)



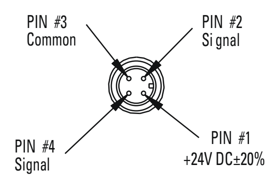
Signal 0 = Voltage at pin 2/4 < 1.8V
Signal 1 = Voltage at pin 2/4 > (Vs – 2.5V)

Electrical Schematic and Mating Connector Detail



R_L1, R_L2 = e.g. Coil Resistance of the switch relay >/= 60 OHMS

Connector Detail



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Powering Business Worldwide

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DG4V-5 20 Design

ISO4401 Size 05;
ANSI/B93.7M-D05

EATON

Powering Business Worldwide

Solenoid Operated Directional Valve

DG4V-5-20 Design

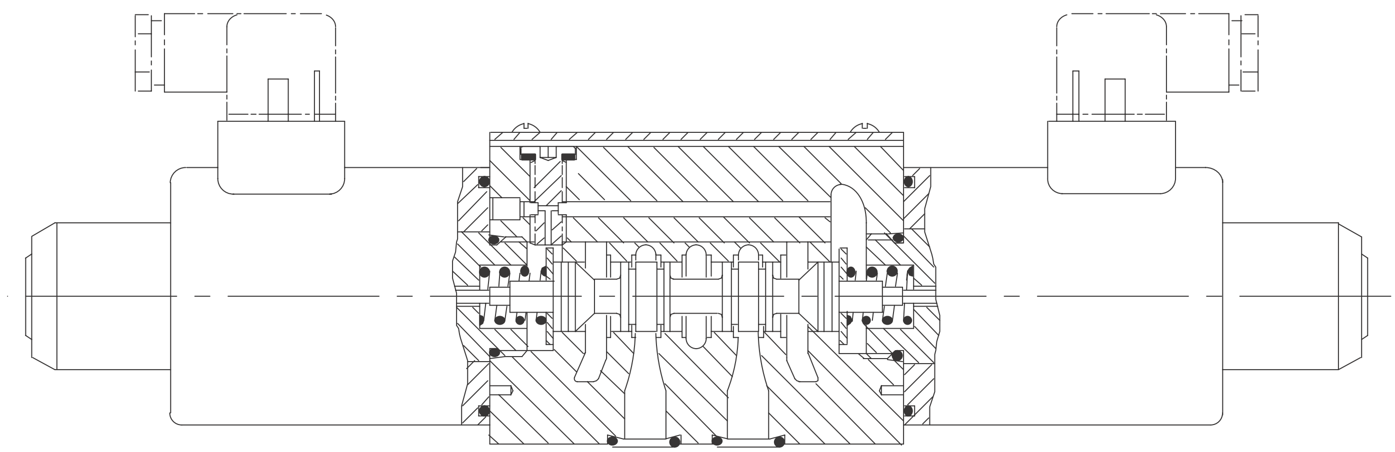
General description

A range of four-port solenoid operated directional control valves with four-land spool design to facilitate provision of smooth, variable valve response speeds.

The range includes:

- AC and DC wet-armature solenoid options with ISO 4400 (DIN 43650) electrical connections and manual overrides.
- Variable speed changeover potential in all DC models; see "Response Times" section.
- Many spool types; in spring-offset, spring-centered and detented arrangements.
- Compact, cost effective system design when used with Eaton® SystemStak™ valves and subplates.

G



Model Code

(F13-) DG4V-5 - * *(L) (J) (-**) - (V) M - (S6) - U - ** 6 - 20 - J****

(F13-)	DG4V-5	***	*(L)	(J)	(-**)	(V)	(S6)	U	**	6	20	J**
1	2	3	4	5	6	7	8	9	10	11	12	13

1 Prefix, fluid compatibility

Blank – AC or DC-voltage models for petroleum oils, water-in-oil (invert) emulsions or phosphate esters.
AC - voltage models for water glycols.
F13 – DC-voltage models for water glycols.

2 Model Series

4 – Solenoid operated
V – Pressure rating 315 bar (4568 psi) on P, A & B parts
5 – ISO4401 Size 05

3 Spool type

See "Functional Symbols" section

4 Spool spring arrangement

A – Spring offset to A. Single end.
AL – As 'A', but left hand build
B – Spring centered. Single end.
BL – As 'B', but left hand build
C – Spring centered. Double End.
N – No spring detented. Double end.

5 Spool design

Blank-"0A" DC-valves and all AC valves except "8B(L)" and "8C"spool/ spring arrangements.
J – All DC valves except "0A"spool/ spring arrangements. AC valves with "8B(L)" and "8C" spool/spring arrangements.

6 Manual override option

Blank- Standard plain override(s) in solenoid end(s) only▼
H – Water-resistant override(s) in solenoid end(s)▼
W – Twist and lock override in solenoid end only
Z – No overrides at either end

Omit for standard plain override(s) in solenoid end(s) only▼

▼ No override in non-solenoid end of single-solenoid valves.

7 Solenoid energization identity

V – Solenoid "A" is at port A end and/ or solenoid "B" is at port B end, independent of spool type

Note: Used to selct the identification of the solenoid. Refer to page 4.

8 Spool position indicator switch

Blank – No spool position monitoring switch.
S7 – Spool position monitoring switch. Single solenoid valves only

9 Coil Type

U – ISO 4400 (DIN 43650) mounting(s) without plug(s)
U1 – ISO 4400 with fitted DIN plug
U6 – ISO 4400 with fitted DIN plug with lights
KU – Flying leads from top of the solenoid
KUM5LD3 – M12 connector with diod lights
KUP10 – Flying leads metri-pack connector (male)
KUP4 – Junior timer (AMP) connector
KUP5D2 – Moulded Deutsch connector with diode
KUP6D2 – Flying lead with Deutsch connector with diode

10 Coil rating

A – 110V AC 50
C – 220V AC 50
ED – 240V AC 50
EK – 115V AC 60
EH – 230V AC 60
G – 12V DC
H – 24V DC
HL – 24V DC (32W)
OJ – 48V DC
P – 110V DC
DJ – 98V DC (42W)
EJ – 196V DC (43W)
EO – 205V DC (43W)
KK – 48V AC 50HZ
NN – 24V AC 50HZ

11 Tank Pressure Rating

6 – 160 Bar Tank Pressure Rating

12 Design number

Subject to change. Installation dimensions unaltered for design numbers 20 to 29 inclusive.

13 Spool speed control

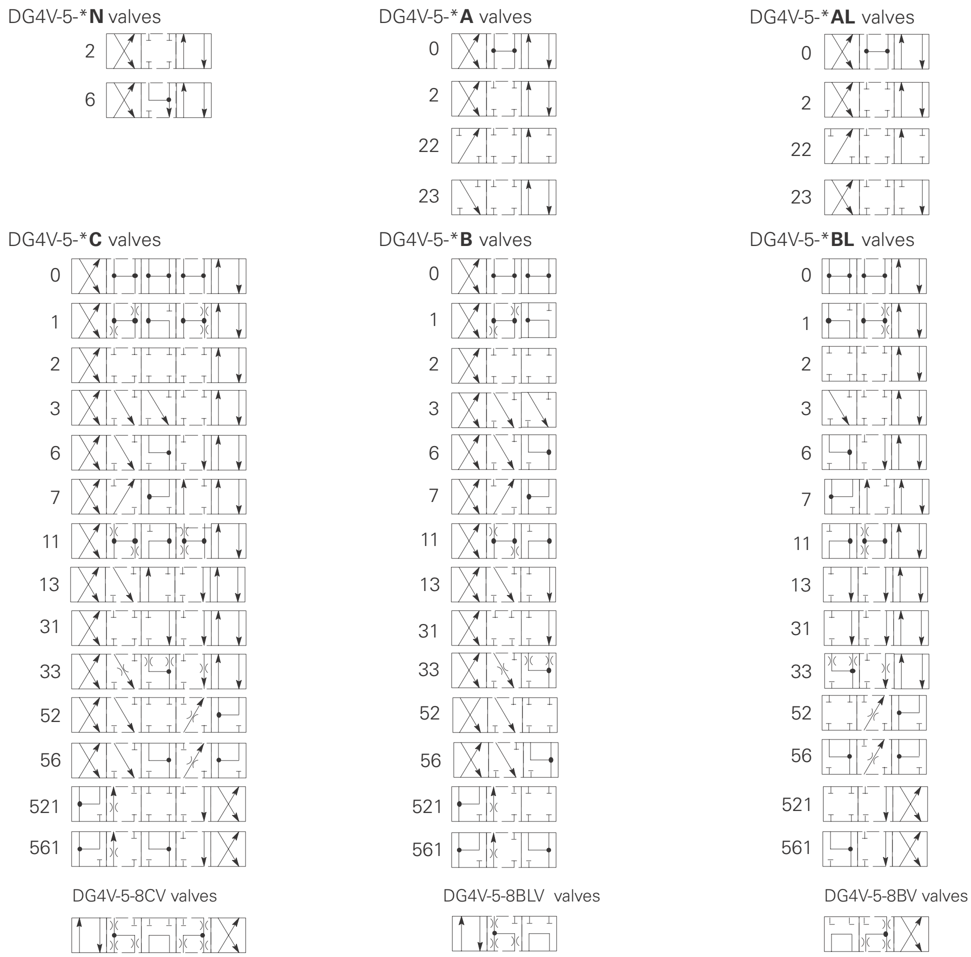
J06 – 0,6 mm orifice
J08 – 0,8 mm orifice
J10 – 1,0 mm orifice
J12 – 1,2 mm orifice
J99 – no orifice. Must be specified where future fitting of orifice is required, see page A.11, "Spool Speed Control Orifice"

G

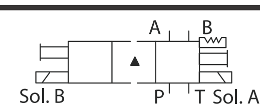
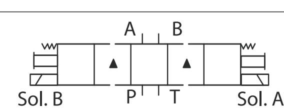
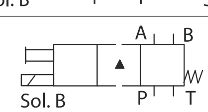
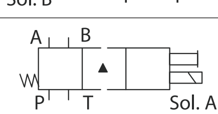
Functional Symbols

Spool Options

The valve function schematics apply to both U.S. and European valves.



Solenoid Identified Standards

	U.S. Solenoid Standard
Double solenoid valves, two position, detented	
Double solenoid valves, spring centered	
Single solenoid valves, solenoid at port A end	
Single solenoid valves, solenoid at port B end	

▲ Transient condition only

Operating Data

Feature	DG4V-5	
Pressure Limits		
P, A and B ports	315 bar (4500 psi)	
T port: T_A	120 bar (1750 psi) for AC Sol.	
T_B	160 bar (2325 psi) for DC Sol.	
Flow rating	See performance data	
Relative duty factor	Continuous; ED = 100%	
Type of protection: ISO 4400 coils with plug fitted correctly	IEC 144 class IP65	
Coil winding	Class H	
Lead wires (coils type F***)	Class H	
Coil encapsulation	Class F	
Permissable voltage fluctuation:		
Maximum	Refer to temperature limits.	
Minimum	90% rated	
Typical response times at 100% rated volts measured from application/removal of voltage to full spool displacement of "2C" spool at:		
Flow rate P-A, B-T	40 l/min (10.6 USgpm)	
Pressure	175 bar (2537 psi)	
AC (~) energizing	30 ms	
AC (~) de–energizing	40 ms	
DC (=) energizing	120 ms ■	
DC (=) de–energizing	45 ms ■*	
Power consumption, AC solenoids (for coils listed in model code).	**Initial VA (RMS)▲**	**Holding VA (RMS)**
Full power coils:		
Dual frequency coils at 50 Hz	700	105
Dual frequency coils at 60 HZ	105	130
Power consumption, DC solenoids at rated voltage and 20 C (68 F).		
Full power coils:		
Others	38W	
Model type "HL"	32W	
Mass, Approx. kg (lb)		
Single solenoid models, AC coils	4,0 (8.8)	
Single solenoid models, DC coils	4,8 (10.6)	
Double solenoid models, AC coils	4,5 (9.9)	
Double solenoid models, DC coils	6,3 (13.9)	
Temperature Limits		
Minimum ambient	–20 °C (–4 °F)	
Maximum ambient:		
AC 50 Hz valves	50 °C (122 °F)	
AC 60 Hz valves	40 °C (104 °F)	
DC valves	70 °C (158 °F)	

Spool Speed Control Orifice
For fine tuning of valve spool speed. Only applicable to valves already fitted with an orifice or blank plug, see model code, page 3.
Orifice Kit
Orifice kits must be ordered separately, part number 02-350116. Kit comprises 1 off each as per code 13 on page 3:

***** In pure switched conditions, devoid of the efffects of any suppression diodes and full-wave rectifiers.

■ DG4V-5-2CJ valves. Longer response times can be obtained by fitting an orifice plug in a special pilot port, standard in all bodies. An orifice kit 459065, containing a selection of plugs of differing orifice size, can be ordered separately. Ask your Eaton representative for details.

▲ 1st half cycle; armature fully retracted.

G

Operating Data

Spool Position Indicator Models

Spool/spring arrangement types 0A, 2A, 2AJ , 22A, 22AJ, 35A, 35AJ, 0BJ, 2BJ, 6BJ

DC model type "S7"

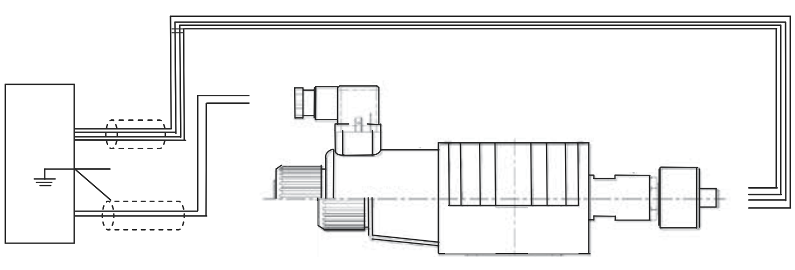
This product has been designed and tested to meet specific standards outlined in the European Electromagnetic Compatibility Directive (EMC) 2004/108/EC. For instructions on installation requirements to achieve effective protection levels see this leaflet and the Installation Wiring Practices for Vickers Electronic Products leaflet 2468. Wiring practices relevant to this Directive are indicated by

⚠ Electromagnetic Compatibility (EMC).

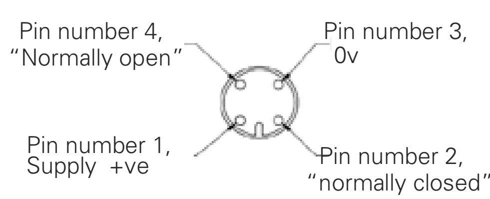
Input:	
Supply voltage	20-32 VDC
Reverse Pol. Protection	Yes
	outputs with alternating function - PNP
Output:	
Max output load	<=400mA ; Duty Ratio 100%
Short Circuit Protection	Yes
Hysteresis	<=0.05mm
Electrical connector	M12x1 4-Pole
Thermal shift	<=±0.1mm
Pin Connections;	
Pin 1	+ Supply
Pin 2	Normal Closed
Pin 3	0V
Pin 4	Normal Open
EMC Protection	DIN EN 61000-6-1/2/3/4, Aug 2002
Humidity	0-95% rel. (nach DIN 40040)
Protection Class	IP65 DIN 40050
Vibration 0-500Hz	Max. 20g
Shock	Max. 50g

G

Wiring Connections



Warning
All power must be switched off before connecting or disconnecting any plugs.



Customer protective ground connection

WARNING: Electromagnetic Compatibility (EMC)
It is necessary to ensure that the unit is wired up in accordance with the connection arrangements shown above. For effective protection the user's electrical cabinet, the valve subplate or manifold and the cable screens should be connected to efficient ground points.
In all cases both valve and cable should be kept as far away as possible from any sources of electromagnetic radiation such as cables carrying heavy current, relays and certain kinds of portable radio transmitters, etc. Difficult environments could mean that extra screening may be necessary to avoid the interference.

Performance Data

Typical with mineral oil at 36 cSt (168.6 SUS) and a specific gravity of 0.87.

Max. Flow Rates

Based on warm solenoid(s) operating at 10% below rated voltage.
Flow limits applicable to following usages:

1. All valves except those with types 22, 52, 56, 521 and 561 spools having simultaneous equal flow rates from P to A or B and from B or A to T.
2. Valves with type 22 spools having flow from P to A or B, the other being blocked. T is drained at all times.
3. Valves with types 52, 56, 521 and 561 spools having one service port connected to the full bore end of a 2:1 area ratio double-acting cylinder and the other service port to the annulus end.
4. Valves with type 23 spools having single flow from A or B to T, P and the other service port being blocked.

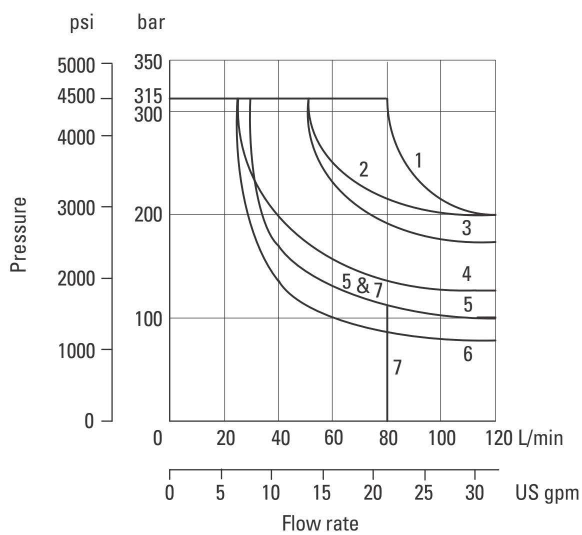
Consult Eaton with application details if any of the following are required:

a) Single flow path, i.e. P to A, P to B, A to T or B to T.

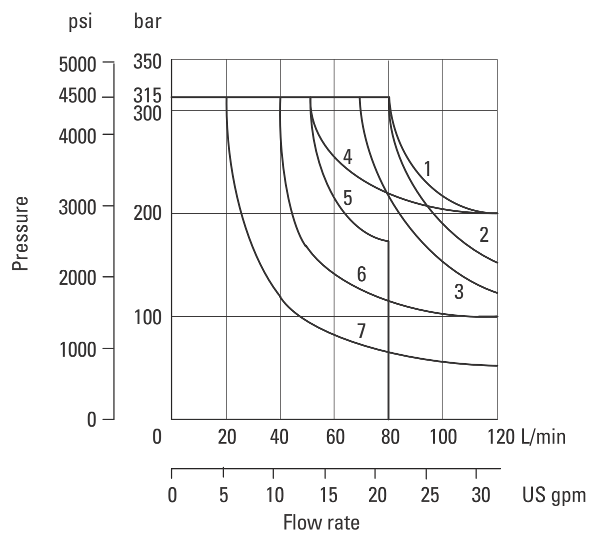
b) Substantially different simultaneous flow rates between P to A or B and B or A to T.

c) Spools as in 3 above are to be used with cylinder ratios greater than about 3:1 at low flow rates or 2:1 at high flow rates.

AC Solenoid Valves



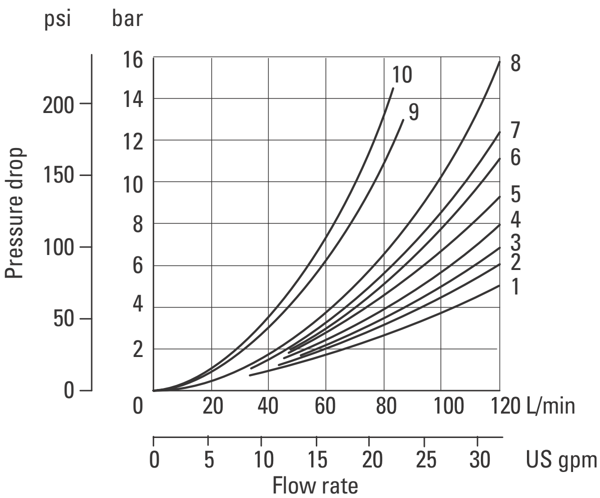
DC Solenoid Valves

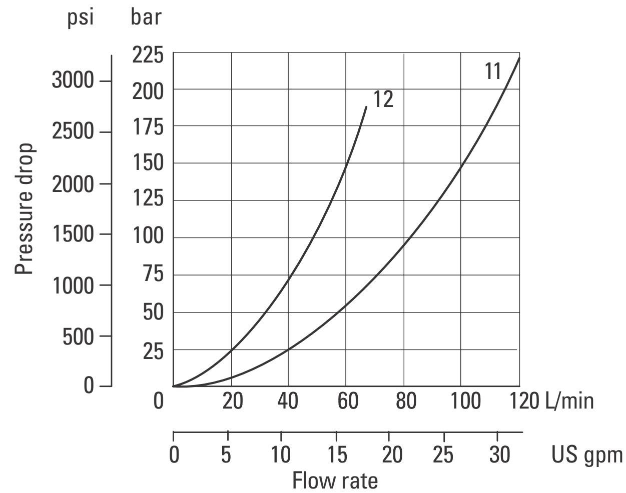


Spool/spring code	AC valve graph curve	DC valve graph curve
0A(L)	3	2
0B(L) & 0C	2	4
1B(L) & 1C	6	7
2A(L)	3	2
2B(L), 2C & 2N	1	1
3B(L), 3C, 6B(L) & 6C	4	6
6N	3	3
7B(L) & 7C	1	1
8B(L) & 8C	7	5
11B(L), 11C & 22A(L)	6	7
23A(L)	5	6
31B(L) & 31C	4	6
33B(L), 33C	3	6
52B(L), 52C, 56BL, 56C, 521B, 521C, 561B & 561C	4	6

Performance Data

Pressure Drops Typical with petroleum oil at 36 cSt (170 SUS) and a specific gravity of 0,87



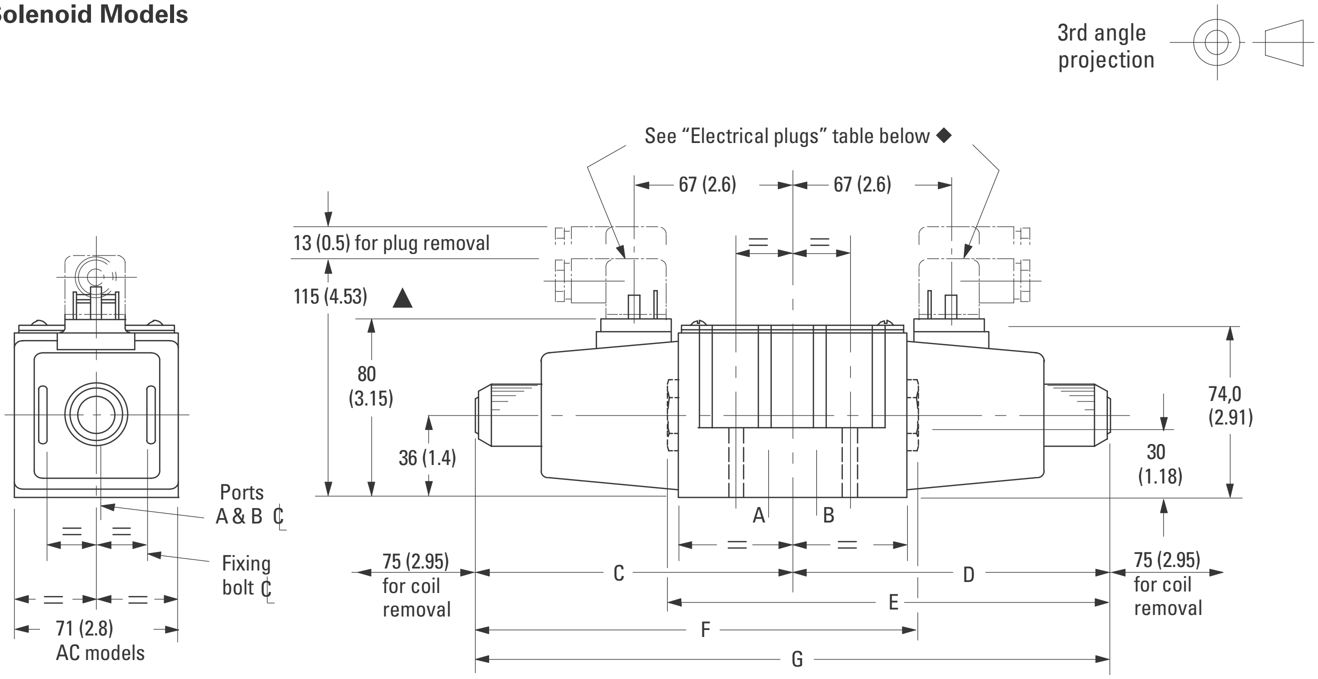


Spool/spring code	Spool positions covered	P to A	P to B	A to T	B to T	P to T	A to B or B to A
0A(L)	Both	2	2	4	5	–	–
0B(L) & 0C	De-energized Energized	– 1	– 1	– 6	– 7	3t –	– –
1B(L) & 1C	De-energized Energized	– 1	– 2	– 6	– 4	6u –	– –
2A(L)	Both	3	3	5	6	–	–
2B(L) & 2C	All	2	2	4	5	–	–
2N	Both	3	3	5	6	–	–
3B(L) & 3C	De-energized Energized	– 2	– 3	5 6	– 5	– –	– –
6B(L) & 6C	De-energized Energized	– 3	– 3	5m 6	6u 7	– –	– –
6N	Both	4	4	4	5	–	–
7B(L) & 7C	De-energized Energized	3m 2	3u 2	– 5	– 6	– –	5■ –
8B(L) & 8C	All	2	2	7	8	8	–
11B(L) & 11C	De-energized Energized	– 2	– 1	– 4	– 7	6m –	– –
22A(L)	Both	3	3	–	–	–	–
23A(L)	Both	3	3	5	6	–	–
31B(L) & 31C	De-energized Energized	– 3	– 2	– 4	6 7	– –	– –
33B(L) & 33C	De-energized Energized	– 2	– 2	12m 5	12u 6	– –	– –
52BL & 52C	All	7m	8	4	–	–	9■
56BL & 56C	De-energized Energized	– 7m	– 8	8m 6	10u –	– –	– 9■
521B & 521C	All	8	7u	–	5	–	9■
561B & 561C	De-energized Energized	– 8	– 7u	10m –	8u 7	– –	– 9■

t A and B blocked u A blocked m B blocked ■ P blocked

Installation Dimensions in mm (inches)

AC Solenoid Models



▲ May vary according to plug source.

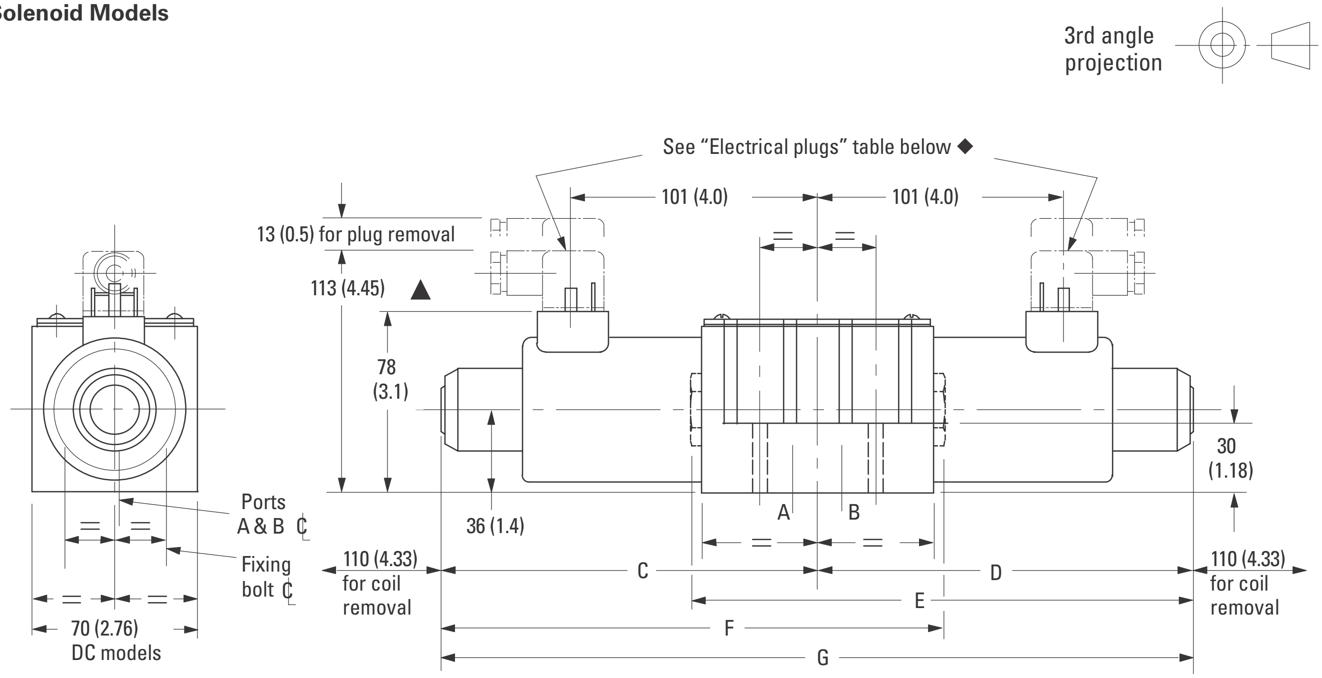
◆ The cable entry can be repositioned at 90° intervals from the position shown.
This is done by reassembling the contact holder into the appropriate position inside the plug housing.

Model	Solenoid at:	C	D	E	F	G
DG4V-5-*A(L)/B(L)(-Z)-(V)M	Port A end	123 (4.84)	–	–	182 (7.17)	–
	Port B end	–	123 (4.84)	182 (7.17)	–	–
DG4V-5-*C/N(-Z)-(V)M	Both ends	123 (4.84)	123 (4.84)	–	–	246 (9.68)
DG4V-5-*C/N-H-(V)M	Both ends	138 (5.43)	138 (5.43)	–	–	276 (0.87)

G

Installation Dimensions in mm (inches)

DC Solenoid Models



G

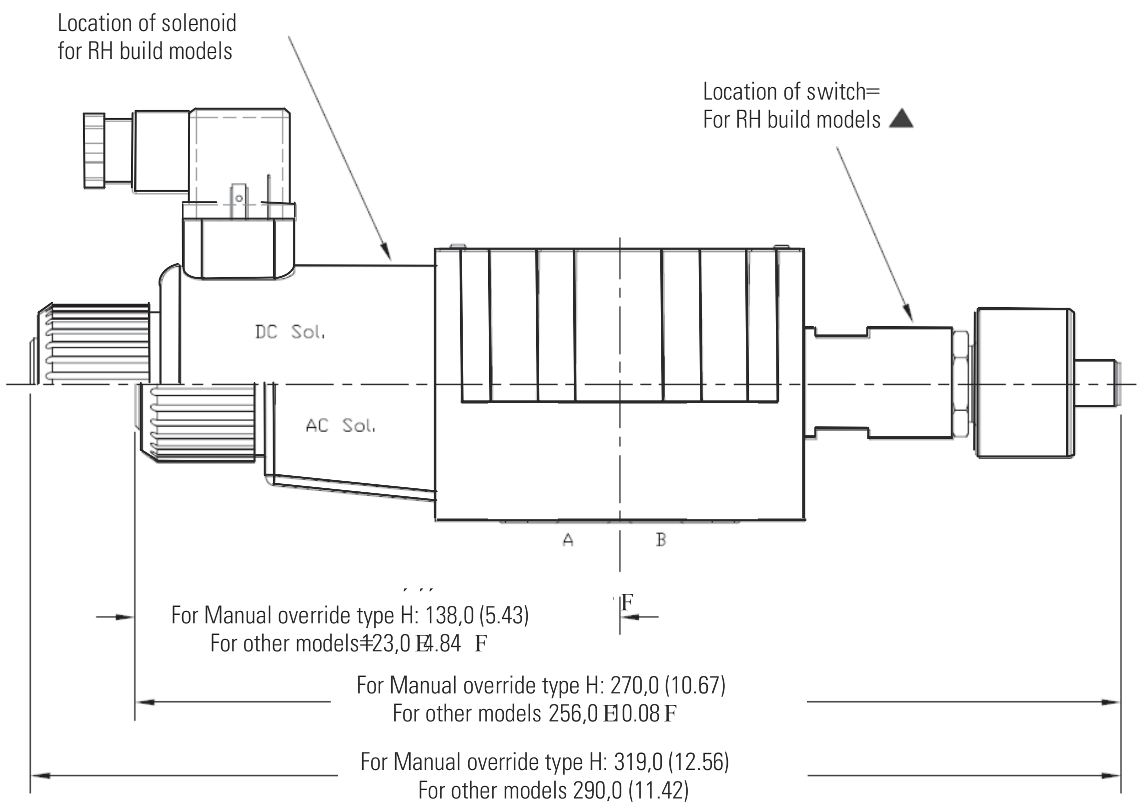
▲ May vary according to plug source.

◆ The cable entry can be repositioned at 90° intervals from the position shown. This is done by reassembling the contact holder into the appropriate position inside the plug housing.

Model	Solenoid at:	C	D	E	F	G
DG4V-5-*A(L)/B(L)(-Z)-(V)M	Port A end Port B end	156 (6.14) –	– 156 (6.14)	– 215 (8.46)	215 (8.46) –	– –
DG4V-5-*C/N(-Z)-(V)M	Both ends	156 (6.14)	156 (6.14)	–	–	312 (12.28)
DG4V-5-*C/N-H-(V)M	Both ends	185 (7.28)	185 (7.28)	–	–	370 (14.57)

Installation Dimensions in mm (inches)

Spool Position Indicator Switch Models



▲ For LH models ("L" in model code location 4) solenoid and switch locations are reversed

⚠ **Wiring:** See warning note on page 6

Electrical Plugs and Connectors

DIN 43650 Connector

Cable diameter range:

Wire section range:

Terminals:

Type of protection:

Connector can be positioned at 90° intervals on valve by re-assembling contact holder into appropriate position inside connector housing.

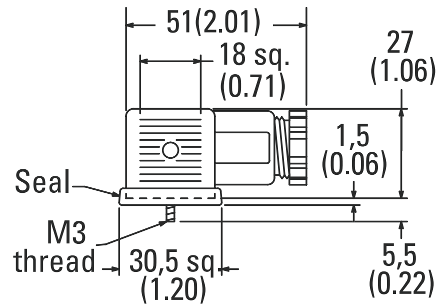
Connectors with and without indicator lights are available (order separately):

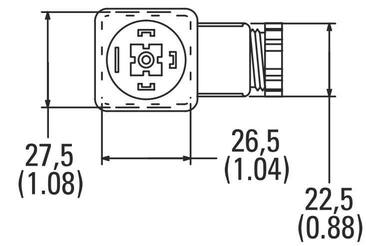
Ø6–10 mm (0.24–0.40)

Ø,5–1,5 mm2 (0.0008– 0.0023 in2)

Screw type

IEC144 class IP65, when plugs are fitted correctly to the valves with interface seals (supplied with plugs) in place.

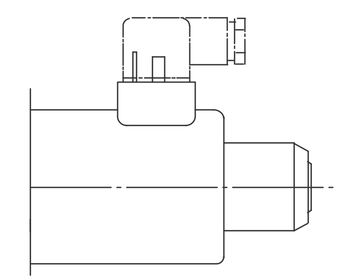




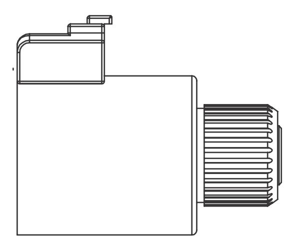
Recptacle	Voltage (AC or DC)	Part Numbers Gray – "A" sol.	Black – "B" sol.
U1 Coils without lights	–	710776	710775
U6 Coils with lights	12-24	977467	977466
	100-125	977469	977468
	200-240	977471	977470

Connecters

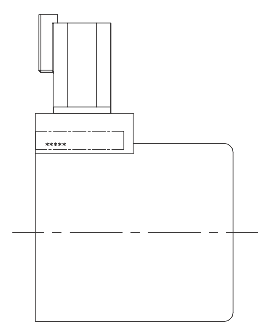
U/U1/U6



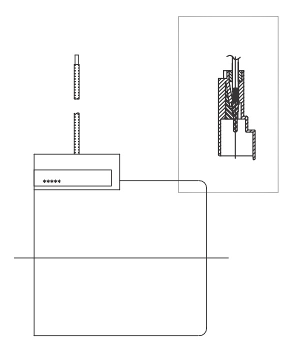
KUP5



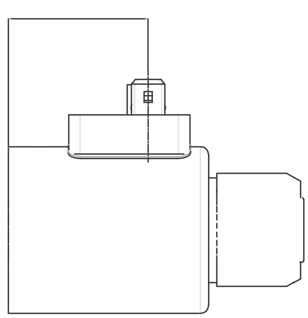
KUP5



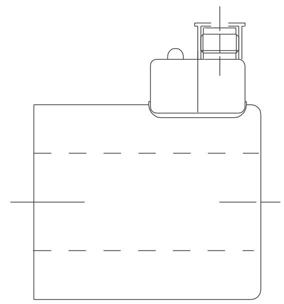
KUP6



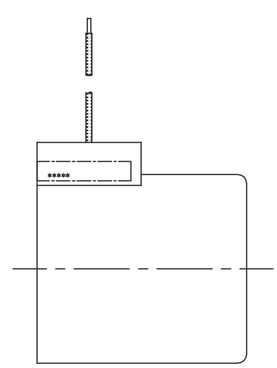
KUP4



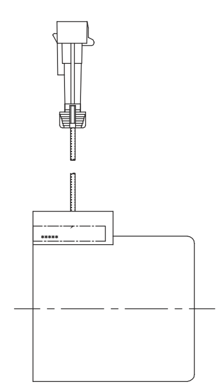
KUM5L



KU



KUP10



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Powering Business Worldwide

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October 2015

DG4V-3-60 Design

ISO4401 Size 03;
ANSI/B93.7M-D03

Powering Business Worldwide

Solenoid Operated Directional Valve

DG4V-3-60 Design

B

General Description
Solenoid operated directional control valves are for directing and stopping flow at any point in a hydraulic system.

• Efficient control of greater hydraulic powers without increasing solenoid power consumption.

• Installed cost and space savings from higher power/weight-and-size ratios.

• Installation flexibility resulting from choice of numerous combinations of solenoid connectors and locations.

• Viton seals as standard for multi-fluid capability. Nitrile seals available as a model code option.
• Higher sustained machine productivity and higher uptime because of proven fatigue life and endurance, tested over 20 million cycles.

• Solenoid coils can be changed quickly and easily without leakage from hydraulic system.

• Compact, cost effective system design when used with Eaton® SystemStak™ valves and subplates.

DG4V3-S/R- High Performance and Standard Performance Valves

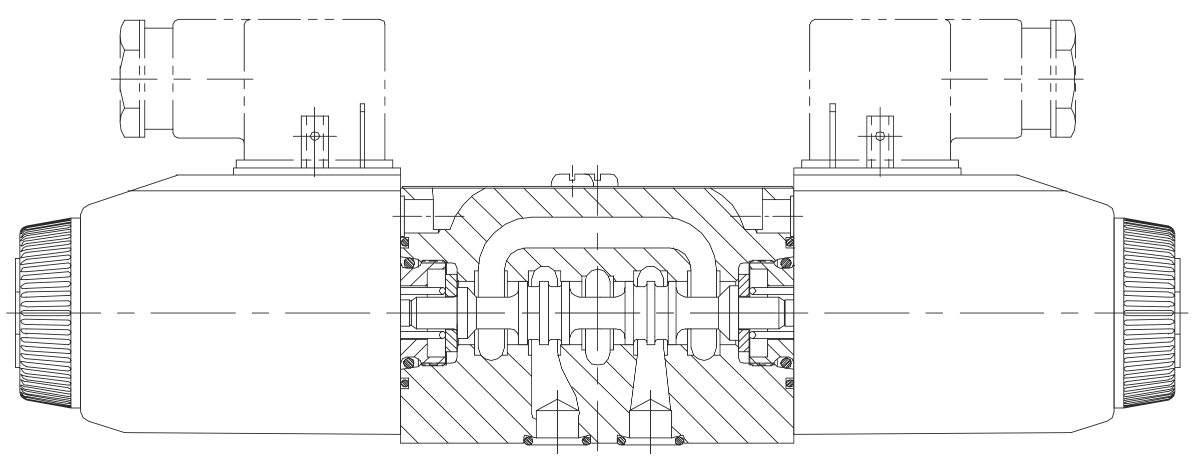
• Minimum pressure drop 2.5 bar at 30 l/min

• Range of coil connectors including DIN, Deutsch, AMP and terminal box
• Range of coil voltages and power options

• Up to 80 l/min (21 USgpm) and up to 40 l/min (10.5 USgpm) respectively at 350 bar (5000 psi).

• Offers designers the opportunity to select the optimum value package for each application.

• International standard interface. The valve mounting face conforms to ISO 4401, size 03 and is compatible with related international standards.



DG4V-3 Model Series

* DG4V–3 * – ** *(L) –(**)–(V) M–(S*)–* ** * D* (L)– * *–6*–(EN***)–(P**–A**–B**–T**)

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

B

1 Seal Type
Blank – Viton
F6 – Buna Nitrile/High CAN

2 Model series
4 – Solenoid operated
V – Pressure rating 350 bar (5000 psi) on P, A & B ports
3 – ISO4401 Size 03

3 Performance
Blank – High performance
S – Standard performance
R – Standard performance with 8 Watt coil

4 Spool Type
Please refer functional symbols on Page 5 for spool types.

5 Spool Spring Arrangement
A – Spring offset, end-to-end
AL – Same as "A" but left hand build
B – Spring offset, end to center
BL – Same as "B" but left hand build
C – Spring centered
N – No-spring detented

6 Manual Override Option
Blank – Plain override(s) in solenoid end(s) only ▲
H – Water-resistant override(s) on solenoid end(s) ▲
Z – No overrides at either end
W – Twist and lock override in solenoid ends•

▲No override in non-solenoid end of single solenoid valves
• DC high performance only

7 Solenoid Energization Identity
Blank – None
V – Solenoid "A" is at port "A" end and/ or solenoid "B" is at port "B" end, independent of spool type

NOTE: Used to select the identification of the solenoid. Refer to table on page 4.

8 Flag Symbol
M – Electrical options and features

9 Spool Indicator Switch
S7 – Spool position monitoring switch. Single solenoid valves only.
NOTE: Refer Page B-6 and B-10 for further details

10 Coil Type
U – ISO4400, DIN43650 connector
U1 – ISO4400 fitted with PG11 plug
U6 – ISO4400 with fitted DIN plug with lights
KU – Top exit flying lead (150mm)
KUP4 – Junior timer (Amp) connector
KUP5 – Integral Deutsch connector
KUPM4L- Integral M12, 4-Pin connector
FW – Flying lead with 1/2" NPT thread wiring housing
FTW – Fly. lead wired terminal block & 1/2" NPT thread wiring housing
FPA3W – Fly. lead, 3 Pin connector & 1/2" NPT thread wiring housing
FPA5W – Fly. lead, 5 pin connector & 1/2" NPT thread wiring housing
X4 – Atex approved coil, 'me' type
X5 – Atex approved coil, 'd' type▲
▲Also CSA and UL approved

11 Surge Suppressor/ Damper
D1 – Diode positive bias
D2 – Negative bias
D7 – Transorb type

See Page12 for circuit details

12 Solenoid Indicator Lights
Blank – None
L – Solenoid indicator lights▲

▲Flying lead coil type only

13 Coil Rating
B – 110V AC 50Hz/120V AC 60 Hz
BL – 110V 50 Hz/120V 60 Hz
D – 220V AC 50 Hz/240V AC 60 Hz
DS – 28V DC 30 watt
ER – 120V AC 60 Hz ▲
ES – 240V AC 60 Hz ▲
G – 12V DC
GL – 12V DC
H – 24V DC
HL – 24V DC
HM – 24V DC 8 watt

▲X5 coil type only

14 Tank Pressure Rating
Refer to "Operating Data" for port T pressure ratings.
4 – 70 bar (1000 psi) ▲
5 – 100 bar (1500 psi) for standard performance models, DG4V-3S, with AC or DC solenoids.
6 – 207 bar (3000 psi) for AC high performance models, DG4V-3, including spool position indicator type S6.
7 – 207 bar (3000 psi) for DC high performance models, DG4V-3, including spool position indicator type S6.

▲X5 coil type only

15 Design Number
60 – Basic design
61 – Type 8 spool

16 Special Features
"EN***" code number assigned as required.

EN21 – CSA approved models with 1/2" NPT entry conduit box, type FW and solenoid coil letter B,D,G, or H.
EN38 - Low leakage version. Typical leakage 5ml/min/land at 100 bar.

NOTE: EN38 valve spools have additional overlap and resulting 2X pressure drop compared to standard valve spools.

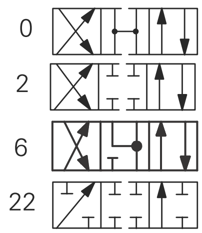
17 Orifice Plug
00 – No orifice required
03 – 0.3 mm dia.
06 – 0.6 mm dia.
08 – 0.8 mm dia.
09 – 0.9 mm dia.
10 – 1.0 mm dia.
13 – 1.3 mm dia.
15 – 1.5 mm dia.
20 – 2.0 mm dia.
23 – 2.3 mm dia.

Functional Symbols

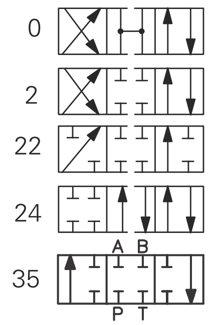
Spool Options

The valve function schematics apply to both U.S. and European valves.

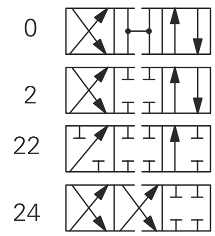
DG4V-3(S)-*NV



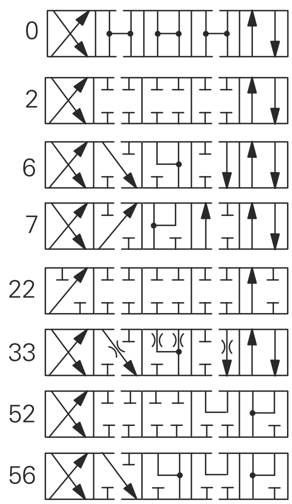
DG4V-3(S)-*AV



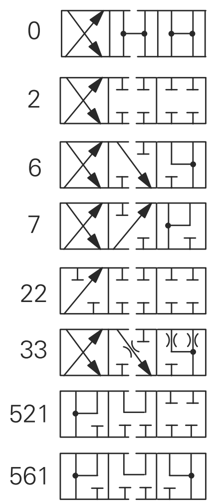
DG4V-3(S)-*ALV



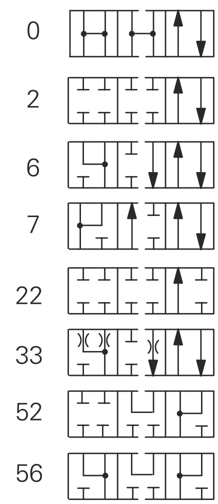
DG4V-3(S)-*CV



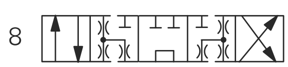
DG4V-3(S)-*BV



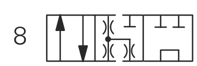
DG4V-3(S)-*BLV



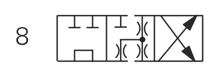
DG4V-3(S)-8CV



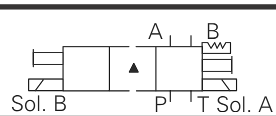
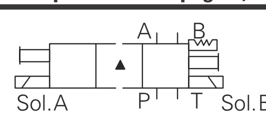
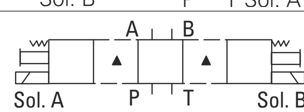
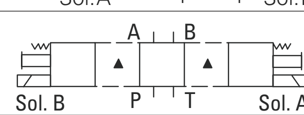
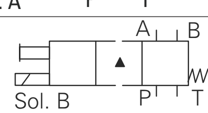
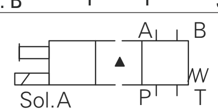
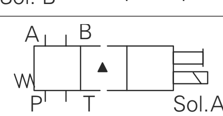
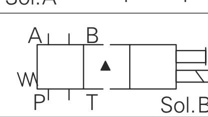
DG4V-3(S)-8BLV



DG4V-3(S)-8BV



Solenoid Identified to US and European Standards

	U.S. Solenoid Standard	European Solenoid Standard (specify "V" in the model code at position 7 on page 3)
Double solenoid valves, two position, detented		
Double solenoid valves, spring centered		
Single solenoid valves, solenoid at port A end		
Single solenoid valves, solenoid at port B end		

▲ Transient condition only

Operating Data

B

Feature	DG4V-3		DG4V-3S		DG4V-3R	
Pressure Limits P, A and B ports	350 bar (5075 psi)		350 bar (5075 psi) ■		350 bar (5075 psi)	
T port:	210 bar (3045 psi)		100 bar (1450 psi)		210 bar (3045 psi)	
Flow rating	See performance data		See performance data		See performance data	
Relative duty factor	Continuous; ED = 100%		Continuous; ED = 100%		Continuous; ED = 100%	
Type of protection: ISO 4400 coils with plug fitted correctly	IEC 144 class IP65		IEC 144 class IP65		IEC 144 class IP65	
Coil winding	Class H		Class H		Class H	
Lead wires (coils type F***)	Class H		Class H		Class H	
Coil encapsulation	Class F		Class F		Class F	
	Permissable voltage fluctuation:					
Maximum	Refer to temperature limits.		Refer to temperature limits.		Refer to Temperature Limits	
Minimum	90% rated		90% rated		90% rated	
Typical response times at 100% rated volts measured from application/removal of voltage to full spool displacement of "2C" spool at:						
Flow rate P-A, B-T	20 l/min (5.3 USgpm)		40 l/min (10.6 USgpm)		20 l/min (5.3 Usgpm)	
Pressure	175 bar (2537 psi)		175 bar (2537 psi)		175 bar (2527 PSI)	
AC (~) energizing	18 ms		15 ms		18 ms	
AC (~) de–energizing	32 ms		23 ms		32 ms	
DC (=) energizing	60 ms		45 ms		60 ms	
DC (=) de–energizing	40 ms		28 ms		40 ms	
Power consumption, AC solenoids (for coils listed in model code).	**Initial VA (RMS)** ▲	**Holding VA (RMS)**	**Initial VA (RMS)** ▲	**Holding VA (RMS)**	**Initial VA (RMS)**	**Holding VA (RMS)**
Full power coils: Dual frequency coils at 50 Hz	265	49	280	61	N/A	
Dual frequency coils at 60 HZ	260	48	300	58	N/A	
Low power coils, "BL" and "DL": (Not available with "N" – No-spring detented models)	Low power coils not usable with DG4V-3S valves.		170	37	N/A	
Dual frequency coils at 50 Hz	–	–	190	37	N/A	
Dual frequency coils at 60 Hz	–	–	–	–	N/A	
Power consumption, DC solenoids at rated voltage and 20 C (68 F).						
Full power coils: 12V, model type "G"	30W	–	30W	–	N/A	
24V, model type "H"	30W	–	30W	–	N/A	
Low power coils: 12V, model type "GL"	Low power coils not usable with DG4V-3S valves.		–	18W	N/A	
24V, model type "HL"			18W	–	N/A	
24V, HM Coil			8W	–	N/A	

■ For applications where valves are to remain pressurized (either energized or de-energized) at pressures over 210 bar (3045 psi) without frequent switching, it is recommended to use the high performance model, DG4V-3.

▲ 1st half cycle; armature fully retracted.

Operating Data

Spool Position Indicator Models

Spool/spring arrangement types 0A, 0B, 2A, 2B, 22A, 23A, 35A, 52B, 3B, 6B

B

DC model type “S7”

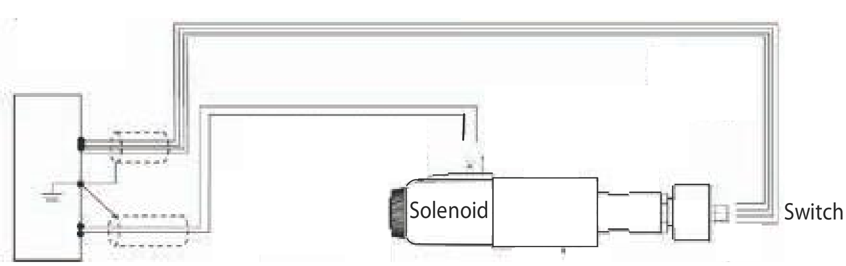
This product has been designed and tested to meet specific standards outlined in the European Electromagnetic Compatibility Directive (EMC) 2004/108/EC. For instructions on installation requirements to achieve effective protection levels see this leaflet and the Installation Wiring Practices for Vickers Electronic Products leaflet 2468. Wiring practices relevant to this Directive are indicated by
⚠ Electromagnetic Compatibility (EMC).

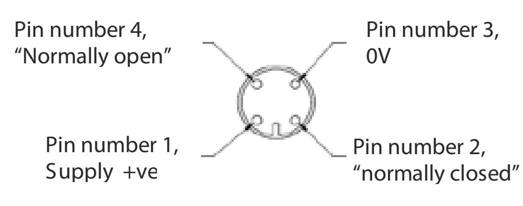
Input:	
Supply Voltage	20-32 VDC
Reverse Pol. Protection	Yes
	outputs with alternating function - PNP
Output:	
Max output load	<=400mA ; Duty Ratio 100%
Short Circuit Protection	Yes
Hysteresis	<=0.05mm
Electrical connector	M12x1 4-Pole
Thermal shift	<=±0.1mm
Plug connections:	
Pin 1	+ Supply
Pin 2	Normal Closed
Pin 3	0V
Pin 4	Normal Open
EMC	Protection DIN EN 61000-6-1/2/3/4, Aug 2002
Humidity	0-95% rel. (nach DIN 40040)
Protection Class	IP65 DIN 40050
Vibration 0-500Hz	Max. 20g
Shock	Max. 50g

• Factory setting ensures this condition under all combinations of manufacturing tolerance and of temperature drift (see “Temperature Limits”) .

Wiring Connections

Warning
All power must be switched off before connecting or disconnecting any plugs.





MI2 4 PIN CONNECTOR DETAILS

Customer’s protective ground connection

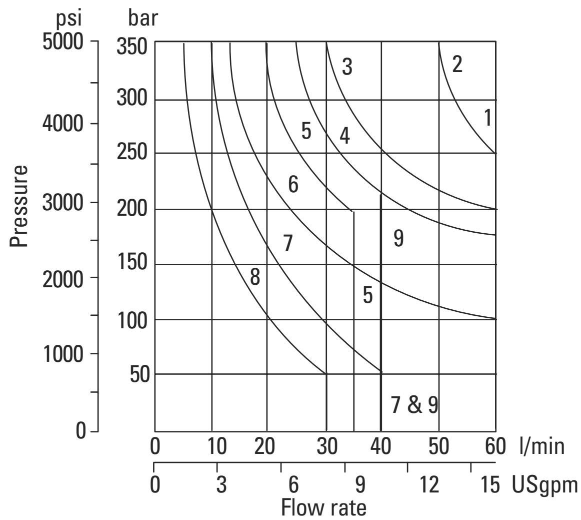
WARNING: Electromagnetic Compatibility (EMC)
It is necessary to ensure that the unit is wired up in accordance with the connection arrangements shown above. For effective protection the user’s electrical cabinet, the valve subplate or manifold and the cable screens should be connected to efficient ground points.
In all cases both valve and cable should be kept as far away as possible from any sources of electromagnetic radiation such as cables carrying heavy current, relays and certain kinds of portable radio transmitters, etc. Difficult environments could mean that extra screening may be necessary to avoid the interference.

Performance Data

DG4V-3 models (high performance)

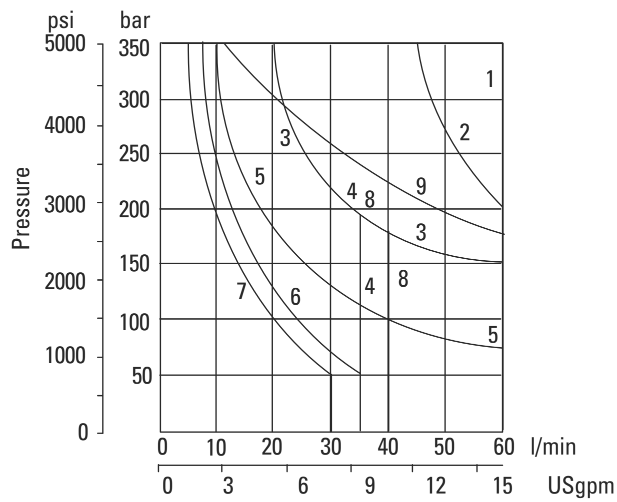
Graph 1

AC solenoid valves operating at 50 Hz



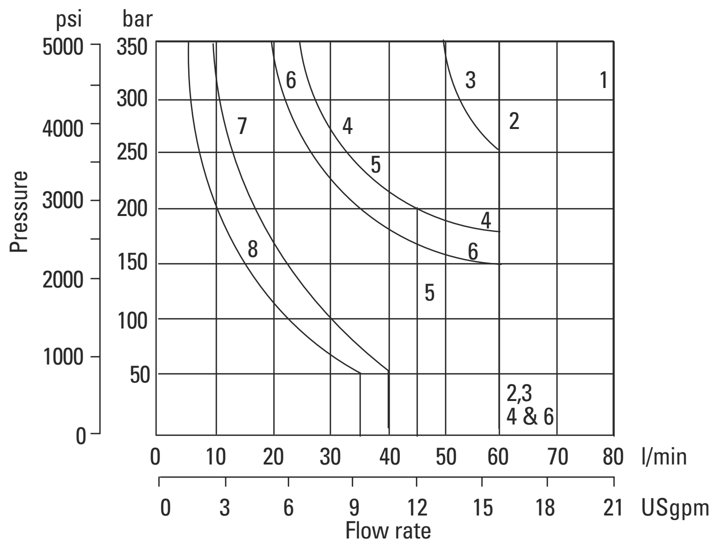
Graph 2

AC solenoid valves operating at 60 Hz



Graph 3

DC solenoid valves



Spool/ spring code	Graph 1 curve	Graph 2 curve	Graph 3 curve
0A(L)	2	2	3
0B(L) & 0C	1	1	2
2A(L)	2	2	3
2B(L) & 2C	1	1	1
2N	1	1	2
6B(L) & 6C	6	5	6
7B(L) & 7C	1	1	2
8B(L) & 8C	5 ▲	4 ▲	5 ▲
22A(L)	8	7	8
22B(L) & 22C	7	6	7
24A(L)	9	8	5
33B(L) & 33C	4	3	4
52BL, 52C,	6	5	6
56BL & 56C	6	5	6
521B & 561B	6	5	6

▲ Consult Eaton regarding each application that will jointly have flow rates approaching this curve and a pressurized volume exceeding 2000 cm3 (122 cu.in.)

Performance Data

Typical with mineral oil at 36 cSt (168.6 SUS) and a specific gravity of 0.87.

Maximum flow rates

Performance based on full power solenoid coils warm and operating at 90% rated voltage.

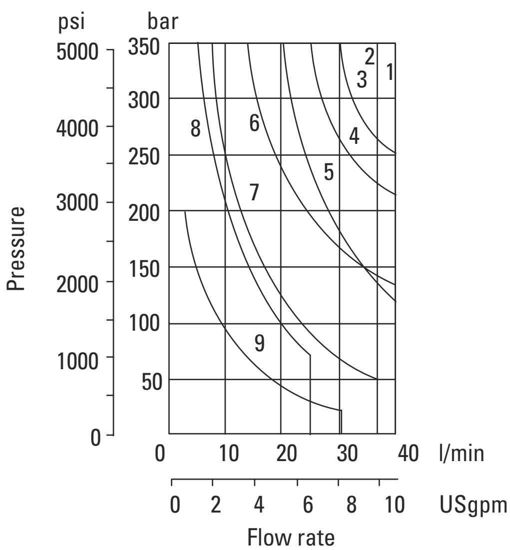
See note at bottom of next page when using low power coils (DG4V-3 models only).

B

DG4V-3S models (standard performance)

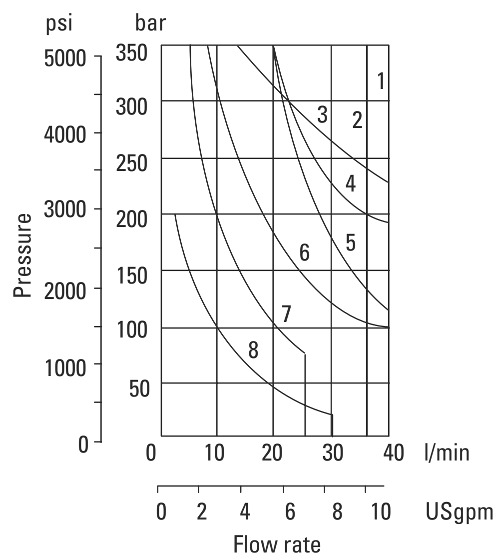
Graph 4

AC solenoid valves operating at 50 Hz



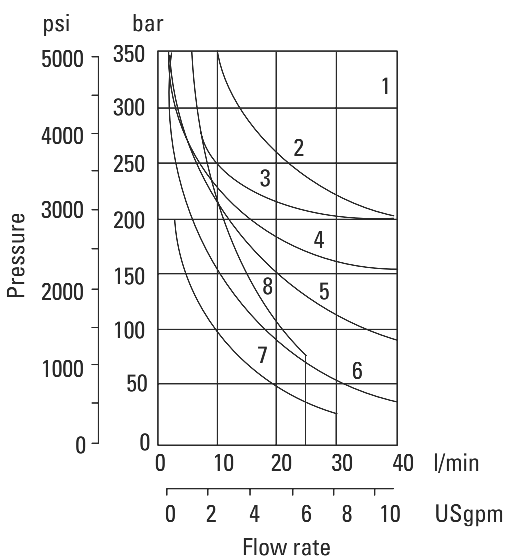
Graph 5

AC solenoid valves operating at 60 Hz



Graph 6

DC solenoid valves



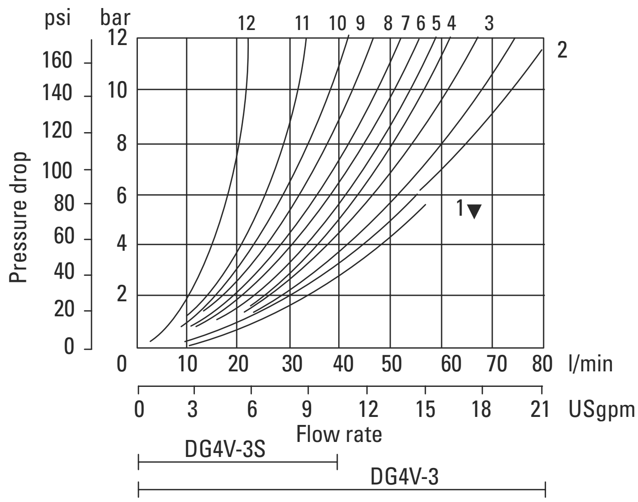
Spool/spring code	Graph 4 curve	Graph 5 curve	Graph 6 curve
0A(L)	1	1	3
0B(L) & 0C	1	1	1
2A(L)	5	5	3
2B(L) & 2C	2	2	3
2N	1	1	1
6B(L) & 6C	6	6	5
7B(L) & 7C	6	6	2
8B(L) & 8C	8 ▲	7 ▲	8 ▲
22A(L)	9	8	7
22B(L) & 22C	7	7	6
24A(L)	6	6	5
33B(L) & 33C	4	4	4
52BL, 52C,	6	6	5
56BL & 56C	6	6	5
521B & 561B	6	6	5

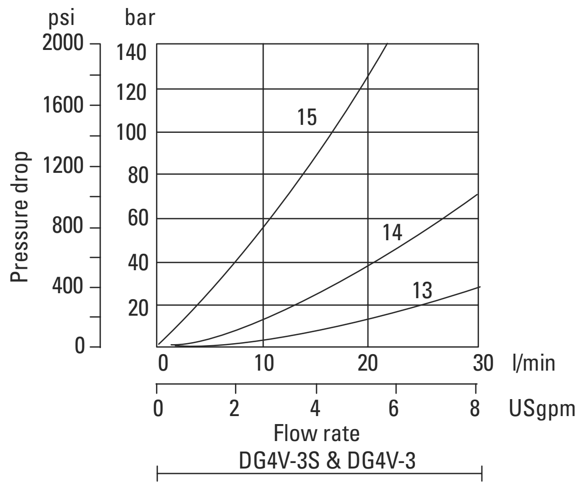
▲ Consult Eaton regarding each application that will jointly have flow rates approaching this curve and a pressurized volume exceeding 2000 cm^3 (122 cu.in.)

Performance Data

B

Pressure drops





▼ Curve for spool type 6: not recommended for flows in excess of 60 l/min (15.8 USgpm).

Pressure drops in offset positions except where otherwise indicated

Spool/spring code	Spool positions covered	P to A	P to B	A to T	B to T	P to T	B to A or A to B
0A(L)	Both	5	5	2	2	–	–
0B(L) & 0C	De-energized	–	–	–	–	4▲∆	–
	Energized	4	4	2	2	–	–
2A(L)	Both	6	6	5	5	–	–
2B(L) & 2C	Energized	5	5	2	2	–	–
2N	Both	6	6	3	3	–	–
6B(L) & 6C	De-energized	–	–	3▲	3∆	–	–
	Energized	6	6	1	1	–	–
7B(L) & 7C	De-energized	6▲	6∆	–	–	–	7❍
	Energized	4	4	3	3	–	–
8B(L) & 8C	All	9	9	5	5	3	–
22A(L), 22B(L) & 22C	All	6	6	–	–	–	–
24A(L)	De-energized	6	6	2	2	–	–
33B(L) & 33C	De-energized	–	–	15▲	15∆	–	–
	Energized	5	5	2	2	–	–
52BL & 52C	Energized	6▲	6∆	2	–	–	10❍
56BL	Both	6▲	6∆	11▲	10∆	–	10❍
56C	De-energized	–	–	11▲	10∆	–	10❍
	Energized	6▲	6∆	2	–	–	10❍
521B	All	6▲	6∆	–	–	–	10❍
561B	De-energized	–	–	10▲	11∆	–	10❍
	Energized	6	6∆	–	–	–	10❍

▲“B” plugged ∆ “A” plugged ❍“P” plugged

For other viscosities, pressure drops approximate to:

Viscosity cSt (SUS)						
14	20	43	54	65	76	85
(17.5)	(97.8)	(200)	(251)	(302)	(352)	(399)
% of ∆p						
81	88	104	111	116	120	124

A change to another specific gravity will yield an approximately proportional change in pressure drop.

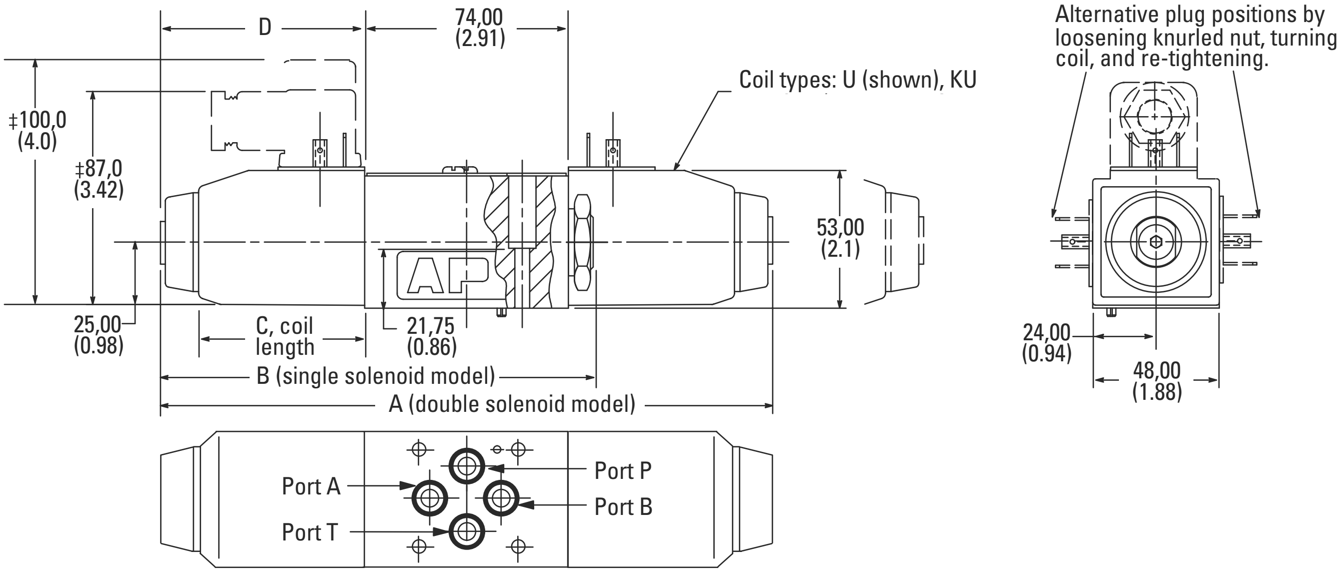
The specific gravity of a fluid may be obtained from its producer. Fire resistant fluids usually have higher specific gravities than oil.

Installation Dimension

Models for use with ISO 4400 (DIN 43650) connectors

3rd angle projection

Double solenoid models	Single solenoid models			
DG4V-3(S)-*C-**-(V)M-U-**-60	DG4V-3(S)-*A(-**) ■	As shown	DG4V-3(S)-*AL(-**) ■	Solenoid and end cap interchanged
DG4V-3(S)-*N-**-(V)M-U-**-60	DG4V-3(S)-*B(-**) ■		DG4V-3(S)-*BL(-**) ■	
	DG4V-3(S)-8BL(-**)		DG4V-3(S)-8B(-**)	



■ Not applicable to type "8" spool.

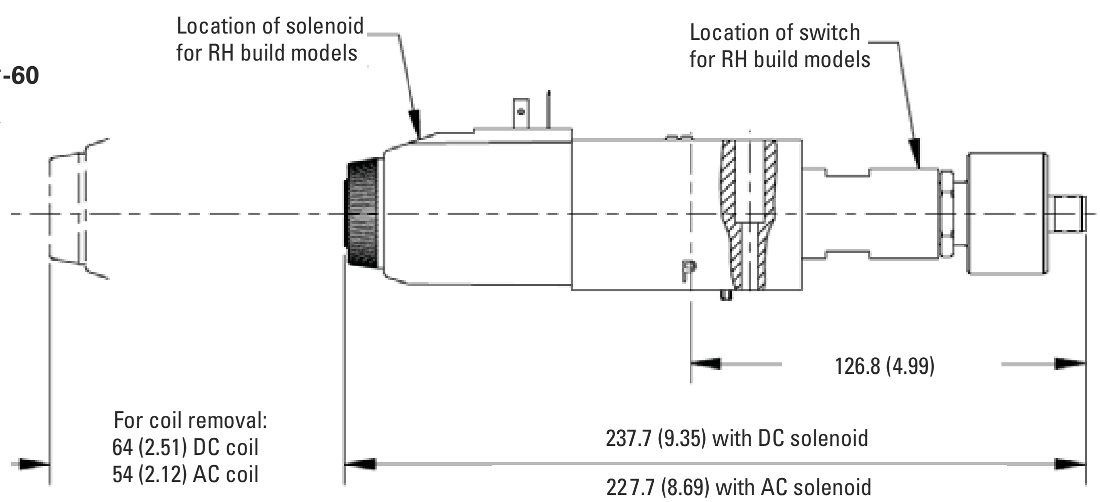
‡ Can vary dependent on source of plug.

Dimensions in mm(in).

Model type	AC or DC	A Dim.	B Dim.	C Dim.	D Dim.
All	DC =	220 (8.66)	156 (6.14)	61 (2.5)	73 (2.87)
DG4V-3	AC ~	200 (7.87)	146 (5.75)	51 (2.1)	63 (2.48)
DG4V-3S	AC ~	200 (7.87)	146 (5.75)	45 (1.7)	63 (2.48)

DG4V-3-*A(L)-(V)M-S7-U--60**

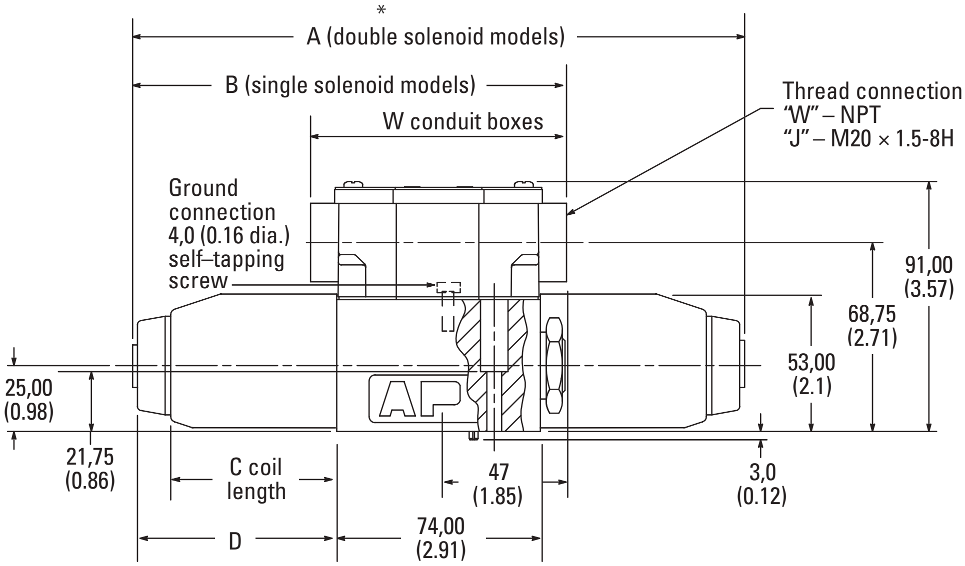
Single solenoid models with Inductive type switch indicating when the spool is in the spring off-set position. Refer Pg6 connection to switch.

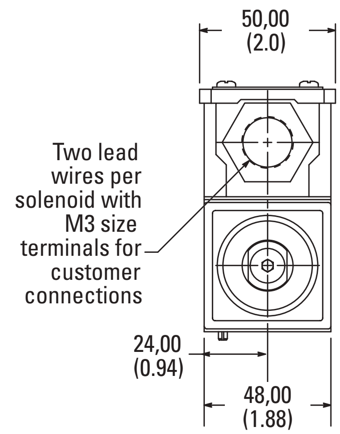


Installation Dimension

Models with "F" type coils (lead wires) and conduit box.

Double solenoid models	Single solenoid models			
DG4V-3(S)-*C-**-(V)M-F-**-60	DG4V-3(S)-*A(-**)●	As shown	DG4V-3(S)-*AL(-**)●	Spolenoid and end cap interchanged
DG4V-3(S)-*N-**-(V)M-F-**-60	DG4V-3(S)-*B(-**)●		DG4V-3(S)-*BL(-**)●	
	DG4V-3(S)-8BL(-**)		DG4V-3(S)-8B(-**)	





* 89 (3.5) for FPB – W conduit boxes
104 (4.0) All plug-in conduit boxes

Dimensions in mm(in).

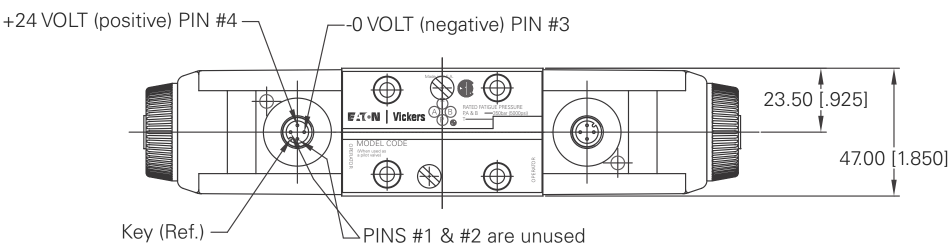
Model type	AC or DC	A Dim.	B Dim.	C Dim.	D Dim.
All	DC =	220 (8.66)	156,5 (6.14)	61 (2.5)	73 (2.87)
DG4V-3	AC ~	200 (7.87)	146,5 (5.75)	51 (2.1)	63 (2.48)
DG4V-3S	AC ~	200 (7.87)	146,5 (5.75)	45 (1.7)	63 (2.48)

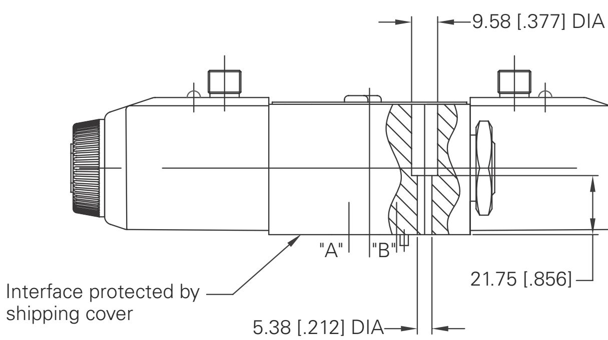
Codes "FW": 2 lead wires for each solenoid, approximately 150,00 (6.00) long. M3 (#6) terminals provided for customer connection.

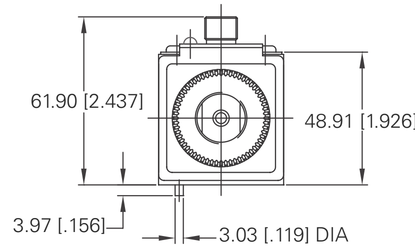
Codes "FTW": Valve supplied with lead wires connected into terminal strip suitable for M3 (#6) terminals for customer connection.

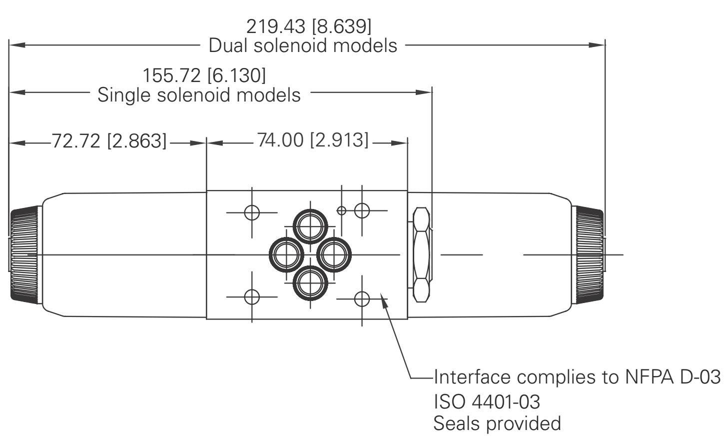
Installation Dimension

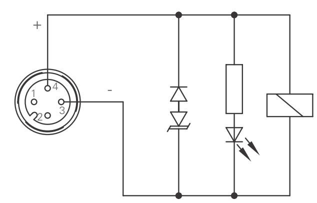
M12 Connector type







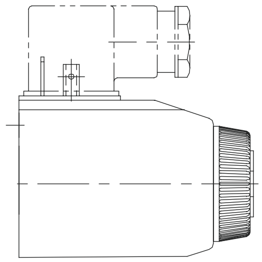




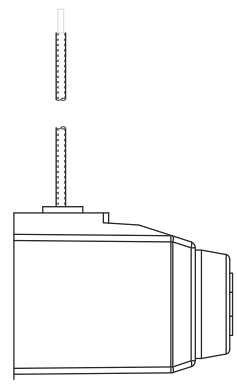
Electrical Schematic

Electrical Plugs and Connectors

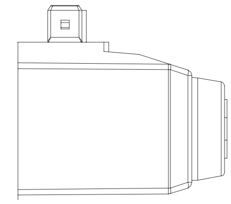
U/U1/U6



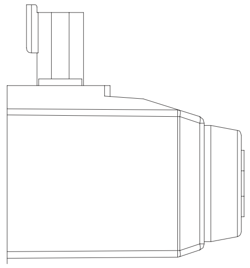
KU



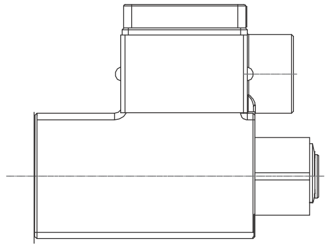
KUP4



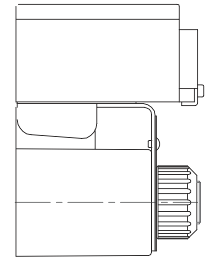
KUP5



X4



X5

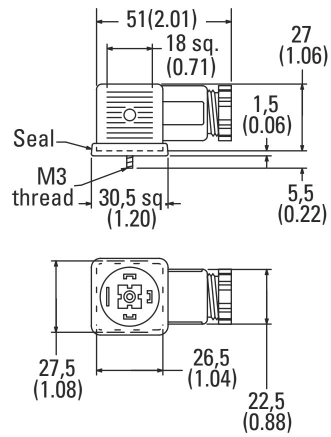


DIN 43650 Connector

Cable diameter range:	Ø6–10 mm (0.24–0.40)
Wire section range:	Ø,5–1,5 mm2 (0.0008–0.0023 in2)
Terminals:	Screw type
Type of protection:	IEC144 class IP65, when plugs are fitted correctly to the valves with interface seals (supplied with plugs) in place.

Connector can be positioned at 90° intervals on valve by re-assembling contact holder into appropriate position inside connector housing.

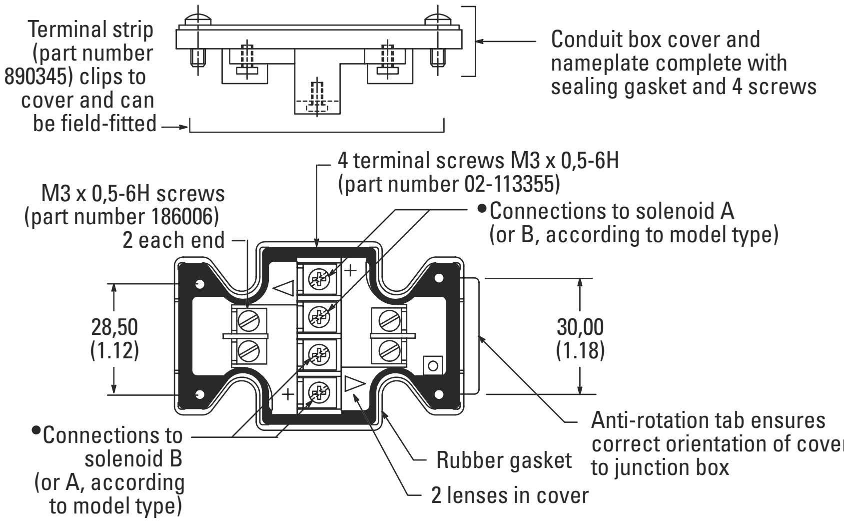
Connectors with and without indicator lights are available (order separately):

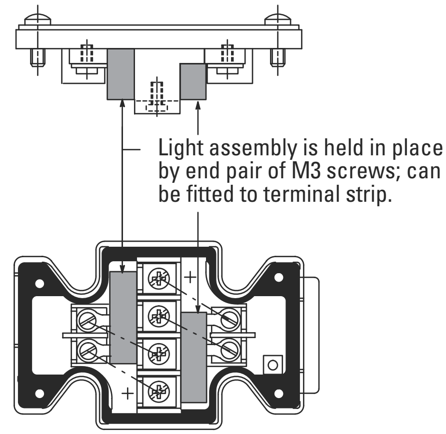


B

Terminal strip and lights

For valves with type "F" coils.





1. For DC coils the +ve lead(s) must be connected to the terminal(s) marked +. When using 3-wire incoming leads to double solenoid valves (i.e. common neutral) the inner pair of terminals must be interconnected.

2. For correct light indication of energized solenoid ensure that solenoid leads are correctly connected: light terminals are common with each outer pair of solenoid terminals according to the side with + mark.

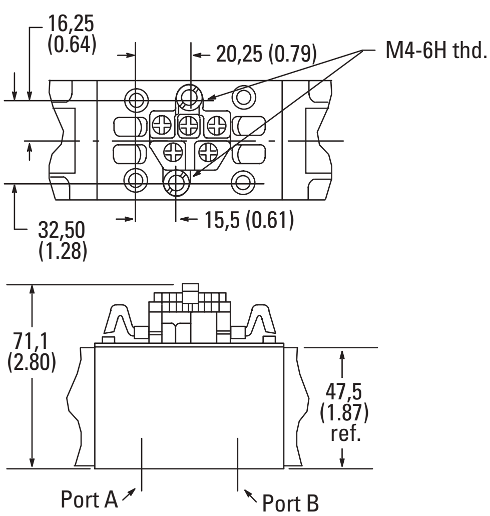
Insta-Plug

DG4V-3(S)---FPA---60
DG4V-3(S)---FPBW---60

Eaton 2-part "Insta-Plug" eliminates breaking electrical inputs for valve disconnect. A male half is pre-wired to the valve body. The mating plug is inside a wire housing with external terminals for machine wire connections.

Captive thumb screws, when loosened, permit the wire housing to be pulled clear of the valve for disconnect. A longer ground post provides first make/last break ground connection.

PA configuration



Dimensions in mm(in).

Electrical Plugs and Connectors

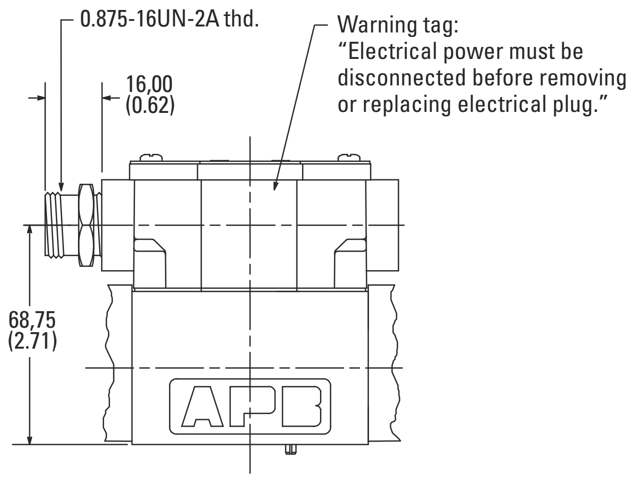
NFPA Connector T3.5.29-1980

DG4V-3(S)–FPA3W(L)-**-60

DG4V-3(S)–FPA5W(L)-**-60

The receptacle is a standard three or five pole connector with shortened leads and terminals added. The five pole plug has four leads 101,6 (4.0) long and one 177,8 (7.0) long. The three pole plug has two leads 101,6 (4.0) long and one 177,8 (7.0). All wires have underwriters recognized non-solder insulated eyelet terminals. The green wire is used for the ground (earth) connection (No. 8 screw furnished). Valves are supplied pre-wired.

Connection details and model type/model code references

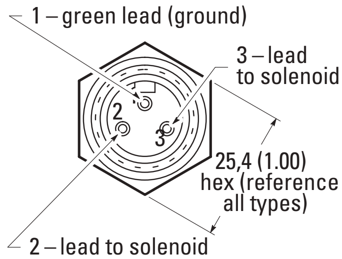


3 pin connector
Use with single solenoid valve

Key model code designations:

DG4V-3(S)-*A(L)(-**)-(V)M-FPA3W(L)

DG4V-3(S)-*B(L)(-**)-(V)M-FPA3W(L)

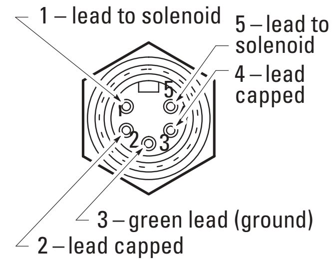


5 pin connector
Use with single solenoid valve

Key model code designations:

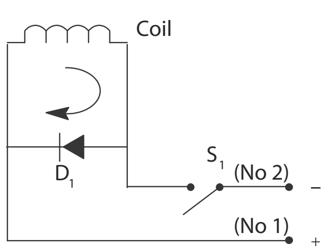
DG4V-3(S)-*A(L)(-**)-(V)M-FPA5W(L)

DG4V-3(S)-*B(L)(-**)-(V)M-FPA5W(L)



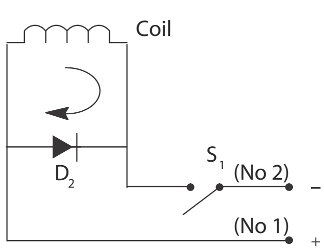
Surge Suppression Devices (For DC Valves)
Standard diode (D1), (D2)
Diode in parallel with coil, positive bias. When switch (S1) is opened, the energy stored in the coil is trapped and dissipated by the diode (D1), (D2).

- Works only with DC voltage
- Polarity dependent
- Increase drop out time



Surge Suppression Devices (For DC Valves)
Standard diode (D2)
Diode in parallel with coil, negative bias. When switch (S1) is opened, the energy stored in the coil is trapped and dissipated by the diode (D2).

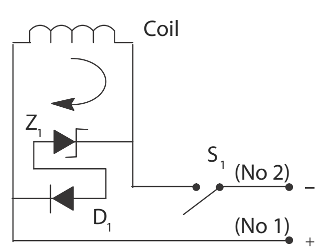
- Works only with DC voltage
- Polarity dependent
- Increase drop out time



Transzorb (D7)

Diode and Zener diode in parallel with coil. When switch (S1) is opened, the energy stored in the coil is trapped and dissipated by the diode (D1) and Zener diode (Z1) and the coil resistance.

- The Zener makes exact limitation of inductive spikes.
- Works only with DC voltage
- Polarity dependent



NOTE: These surge suppression devices are "Polarity Dependent." Proper biasing conditions must be met when installing/connecting a coil in a system. Times represent cessation/application of voltage to coil versus velocity (start/stop) of a cylinder using a single solenoid, spring offset valve (time in milliseconds).

Valve Shift and Dropout Times with and without Surge Suppression

Shift	Dropout	
CETOP 3		
Do Diode	23	60
Diode Alone	23	131
Diode/Zener	23	78

B

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Powering Business Worldwide

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DG3V-8 & DG5V-8 10 Design

ISO4401 Size 08;
ANSI/B93.7M-D08

EATON

Powering Business Worldwide

Remote Pilot Operated Directional Valve

DG3V-8 10 Design

Solenoid Controlled Pilot Operated Directional Valve

DG5V-8 10 Design

General description

The Size 8 Directional Control Valve serves as a control valve package. It offers directional control, pilot pressure reducers, pilot chokes, and main stage stroke adjustment to control the flow.

The valves are generally used to control large flows up to 700 l/min (185 USgpm) at 350 bar (5000 psi) and provide low pressure drops. The range includes:

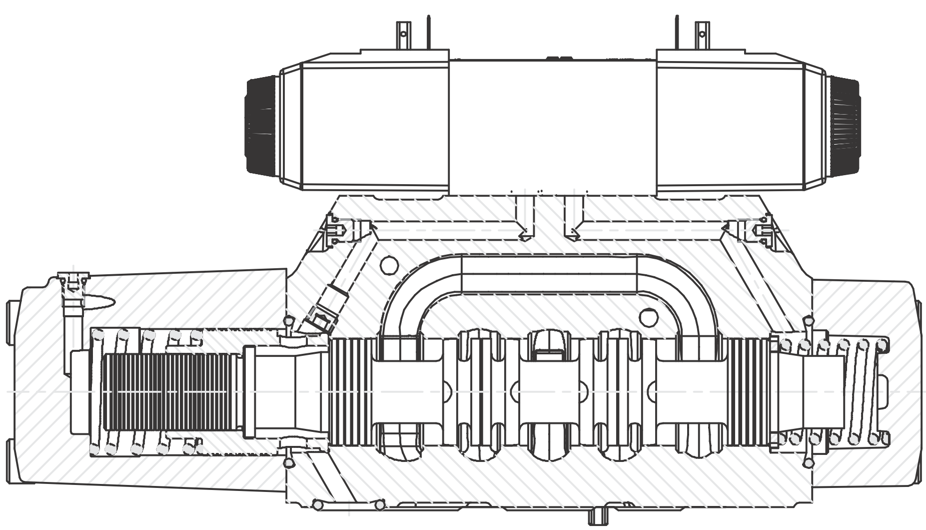
- DG3V-8 - remote pilot operated valve.
- DG5V-8-H - DG4V-3-60 high performance D03 pilot valve 210 bar (3000 psi) tank line rating.

Each valve contains a mainstage spool which is positioned in the valve by special arrangement. The four arrangements are:

- Spring offset - For single stage operation, one spring returns spool to an offset position. For two–stage operation, springs and washers are removed from main stage and offset action is obtained from pilot valve.
- Spring centered - Spring and washer are located on both ends of main stage spool to control centering.
- Pressure centered - Centering springs are used in addition to pilot pressure, to provide positive centering should pilot pressure fail.
- No–spring detented - Springs and washers are provided so that in the event of pilot pressure failure, the main spool will spring center.

Features and Benefits

- A ''mini-system'' capability with wide variety of spool and spring arrangements, stroke and pilot choke adjustments, integral check valves and port orifices.
- High force solenoids and centering springs assure consistent shifting through a wide range of pressure and silting extremes.
- Optional Mainstage Spool Position Monitoring Switch (CE marked)
- Suitable for demanding industrial or mobile applications by providing for reliable operations.
- Endurance tested to 10 million cycles and fatigue tested without failure to ensure highest reliability.
- Fatigue testing performed to NFPA specifications to ensure the highest reliability in applications requiring high flows and pressure.
- Solid cast body and cored passages for maximum strength and minimal pressure drop.
- Electrical options including coil types, connections, and wiring housings allow full compatibility and reliable performance in any system application.
- Plain, waterproof, and lockable manual override options are available to facilitate system troubleshooting or servicing.



SECTION THROUGH SPOOL BORE CENTERLINE

Model Codes

DG3V-8 Remote Pilot Operated Directional Valves

(F*) - DG3V - 8 - (B) - ** - (L) - (*) - (*) - 10

1 2 3 4 5 6 7 8 9

1 Special Seals

Blank – None
F3 – Seals for fire resistant fluids.
F6 – Seals for water glycol.

2 Directional Control Valve

DG3V – Subplate mounting; pilot operated-remote operator. Pressure rating 350 bar (5000 psi) for all ports. (See minimum pilot pres sure requirements on page 6.

3 Valve Size

8 – Valve size CE TOP 8, NFPA D08

4 Gauge Ports

Blank – .4375-20 UNF-2B Thread
B – 1/4 B SP Thread

5 Spool Types

Please refer functional symbols on page 7 for spool types.

6 Spool Spring Arrangement

Blank – No spring
A – Spring offset to cylinder ‘A’
C – Spring centered
D – Pressure centered

7 Left Hand Build

L – A Models only, omit if not required.

8 Spool Control Modifications

Blank – None
1 – Stroke adjustment (both ends) (available on C & B lank (no spring) models)
2 – Pilot choke adjustment (available on all models)
3 – Pilot choke and stroke adjusters (both ends) (available on C & B lank (no spring) models)
7 – Stroke adjusters on cylinder A end only (available on A, C & B lank (no spring) models)
8 – Stroke adjusters on cylinder ‘B’ end only (available on A, C, & B lank (no spring) models)
27 – If both are required (available on A, C, & B lank (no spring) models)
28 – If both are required (available on AL left hand

9 Check Valve in Pressure Port

Blank – None
K – 0,35 bar (5 psi) check
Q – 2,42 bar (35 psi) check
R – 3,45 bar (50 psi) check
S – 5,20 bar (75 psi) check

10 Design Number

Subject to change. Installation dimensions remain as shown for design numbers 10 through 19.

J

Model Codes

DG5V-8 Solenoid Controlled Pilot Operated Directional Valves

(F*)-DG5V-8 - * - (B) - * ** - (**) - (*) - P - (E) - (T) - (*) - (V)M - * ** * * - (L) - (*) - ** - 10**

1   2   3   4   5   6   7   8   9   10   11   12   13   14   15   16   17   18

1 Special Seals

(Omit if not required.)

F3 – Seals for fire resistant fluids.

F6 – Seals for water glycol.

2 Pilot Valve Type

H – CETOP 3, High performance

3 Gauge Ports

Blank – 4375-20 UNF-2B Thread

B – 1/4 BSP Thread

4 Spool Types

Please refer functional symbols on page 7 for spool types.

5 Spool spring arrangement

A – Spring offset, end-to-end (P to B when operated)

AL – As “A” but left-hand build (P to A when operated)

B – Spring offset, end-tocenter (P to B when operated) ■

BL – As “B” but left-hand build (P to A when operated) ■

C – Spring centered

N – Two-position detented

■ DG5V option. Same function from DG3V-8-*C valves by alternating pilot supply to one port (X or Y) and permanently draining the other.

6 Manual Override Option

Blank – Plain override in solenoid end(s) only ▲

H – Water-resistant manual override on solenoid end(s) ▲

W – Twist & lock override in solenoid ends

Z – No override at either end

▲ No override in non-solenoid end of single-solenoid valves.

7 Spool Control

Blank – None

1 – Stroke adjustment at both ends ▲■

2 – Pilot choke adjustment both ends

3 – “1” and “2” combined ▲■

7 – Stroke adjustment, port A end only ▼

8 – Stroke adjustment, port B end only ▼

27 – “2” and “7” combined ▼

28 – “2” and “8” combined

Omit if not required

▲ Not applicable to DG5V-7-*B(L) models.

▼ Not applicable to models shown in the “Spring offset, end-to-center, opposite hand” section on page 6

◆ Not applicable to models shown in the “Spring offset, end-to-center” section on page 6

■ Not applicable for spool “8” models

8 Main Stage Spool Monitoring Switch

Blank – None

PCA – Center sensing switch on “A” port end (not available on “D”, pressure centered, and 1/3/7/27, stroke adjust models)

PCB – Center sensing switch on “B” port end (not available on 1/3/8/28, stroke adjust models)

PDA – Double offset sensing switch on “A” port end (not available on “D”, pressure centered, and 1/3/7/27, stroke adjust models)

PDB – Double offset sensing switch on “B” port end (not available on 1/3/8/28, stroke adjust models)

PCD – Center sensing switch on “A” port end and double offset sensing switch on “B” port end (not available on “D”, pressure centered, and 1/3/7/8/27/28, stroke adjust models)

PPA – Offset sensing proximity switch “A” port end (not available on “D”, pressure centered, and 1/3/7/27, stroke adjust models)

PPB – Offset sensing proximity switch “B” port end (not available on 1/3/8/28, stroke adjust models)

PPD – Offset sensing proximity switch both ends (not available on “D”, pressure centered, and 1/3/7/8/27/28, stroke adjust models)

Note: The spool position monitoring switch shown on this technical document is CE marked and certified and complies to European Standard EN 61000-6-4: 2001 (Emissions) for Class A and European Standard EN 61000-6-2: 2001 (Immunity).

9 External Pilot Pressure

E – External pilot pressure. Omit for internal pilot pressure models.

10 Internal Pilot Drain

T – Internal pilot drain to ‘T’ port.

Omit for external pilot drain models.

11 Check Valve in Pressure Port

(Omit if not required.)

K – 0,35 bar (5 psi) check

Q – 2,42 bar (35 psi) check

R – 3,45 bar (50 psi) check

S – 5,20 bar (75 psi) check

12 Solenoid Energization Identity

Blank – Standard arrangement for ANSI B93.9 (i.e. energize solenoid A to follow flow P to A).

V – Solenoid identification determined by position of solenoid (i.e. solenoid A at port A end/solenoid B at port B end).

Note

4 and 8 type spools are always V. Solenoid energization identity is independent of mainstage porting.

13 Flag Symbol

M – Electrical options and features

14 Coil Type

U – ISO4400, DIN43650 connector

U1 – ISO4400 fitted with PG11 plug

U6 – ISO4400 with fitted DIN plug with lights

KU – Top exit flying lead (150mm)

KUP4 – Junior timer (Amp) connector

KUP5 – Integral Deutsch connector

FW – Flying lead with 1/2” NPT thread wiring housing

FTW – Fly. lead wired terminal block & 1/2” NPT thread wiring housing

FPA3W – Fly. lead, 3 Pin connector & 1/2” NPT thread wiring housing

FPA5W – Fly. lead, 5 pin connector & 1/2” NPT thread wiring housing

J

Model Codes (Contd.)

(F*)-DG5V-8 - * - (B) - * ** - (**) - (*) - P - (E) - (T) - (*) - (V)M - * ** * * - (L) - (*) - ** - 10**

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

15 Indicator Lights

Blank – None
L – Solenoid indicator light•
•Flying lead coil type only

16 Surge Suppressor damper

(DC voltages only, omit if not required)
D1 – Diode positive bias
D2 – Negative bias
D7 – Transorb type

17 Coil Voltage

See electrical information on page 9 for voltages available. Others available upon request.
B – 110V AC 50Hz/120V AC 60 Hz
BL – 110V 50 Hz/120V 60 Hz
D – 220V AC 50 Hz/240V AC 60 Hz
DS – 28V DC 30 watt
G – 12V DC
GL – 12V DC
H – 24V DC
HL – 24V DC
HM – 24V DC 8 watt

18 Design Number

J

Application Notes

General Description

DG5V-8 models are two-stage directional control valves having an integrally mounted wet armature solenoid pilot valve. These valves are generally used to control the movement of a work cylinder or the rotation of a fluid motor.

Pressure Centered Models

Designated by ''D'' under spring/spool arrangement in model code.

This option provides faster, more positive spring centering time by use of pilot pressure to center the spool. The valve spool is returned to center position when pilot pres sure is applied at both ends of the spool. The centering springs are used in addition to pilot pressure to ensure positive centering of spool.

If pilot pres sure fails or falls below the required minimum, the spool will spring return to the center position. Pilot pres sure is not available through the use of and integral check valve. Pressure centered valves have a drain port ''W'' and must have provisions for this feature.

Note

Pressure centered valves require a pilot valve which directs pilot oil to connections ''X'' and ''Y'' of the valve at the same time pressure centering is desired. The centering time depends on the rate of pressure rise in the pilot chamber.

Spring Offset Models

Designated by ''A'' under spring/spool arrangement in model code.

Spring offset model has an internal spring which returns the spool to offset position when the pilot connection ''X'' is open to tank. Pilot connection ''Y'' becomes a drain connection and must be pioped directly to tank at atmospheric pressure through a surge-free tank line. Back pressure at this connection would cause valve to malfunction.

Caution: Spring offset models contain a high assembled spring load. Call Eaton Service for disassembly instructions.

Spring Centered Models

Designated by ''C'' under spring/spool arrangement in model code.

A spring and washer arrangement is used on both ends of the spool. If control pressure is removed, the valve will go to center position due to spring force.

No-Spring Models

Designated by a ''Blank'' under spring/spool arrangement in model code.

When the solenoid is de-energized, the spool returns to the last position attained.

Performance Characteristics

Spring centered, pressure centered and spring offset models require continuous pilot pressure to maintain shifted position. Spring centered models return valve spool to center position by centering springs when pilot pressure fails or falls below minimum requirement.

Shift Times

Shift times are defined as the time from pilot pressure application/removal to the point of the s tart of a pressure rise/decline in appropriate port.

Caution: Flow conditions of the spring centered position must be selected with care, both for the effect on the direction of the flow, and the pilot pres sure. (The "9" main spool will not ensure sufficient pilot pressure in the center position for internal pilot pressure models).

Pressure centered models:

Valve spool is returned to center position by pilot pressure, when pilot pressure is removed. If pilot pressure fails or falls below the required minimum, the valve spool will spring return to center position. (At spring centered valve flow rates).

Caution: Surges of oil in a common tank line serving these and other valves can be sufficient enough to cause inadvertent shifting of these valves. This is very critical in the no-spring detented valves. Separate tank lines or a vented manifold with a continuous downward path to tank is necessary.

Note

Any sliding spool valve, if held for long periods of time, may s tick and not spring return due to fluid residue formation and therefore, should be cycled periodically to prevent this from happening.

Shifting Action

The pilot valve solenoids of spring centered, pressure centered, and spring offset models must be energized continuous ly to keep the main stage spool in the shifted position. No-spring detented models only need to be energized momentarily (for approximately 0.1 second).

Spring centered and pressure centered models return the valve spool to the center position when both solenoids are de-energized or pilot pres sure fails or falls below minimum requirements. Spring offset models return the spool to the offset position by pilot pres sure when the solenoid is de-energized.

When no-spring detented models are de-energized, the pilot and main spools remain in their las t position as long as there are no unusual shock, vibration, or pressure transients, and the spool axis is horizontal. If pilot pressure fails or falls below minimum requirements, the main spool will spring center (at spring centered flow rates), but will not drift to a reversal of flow position. The pilot stage will remain in the detented position.

When used as other than a normal 4–way valve, consult your Eaton representative.

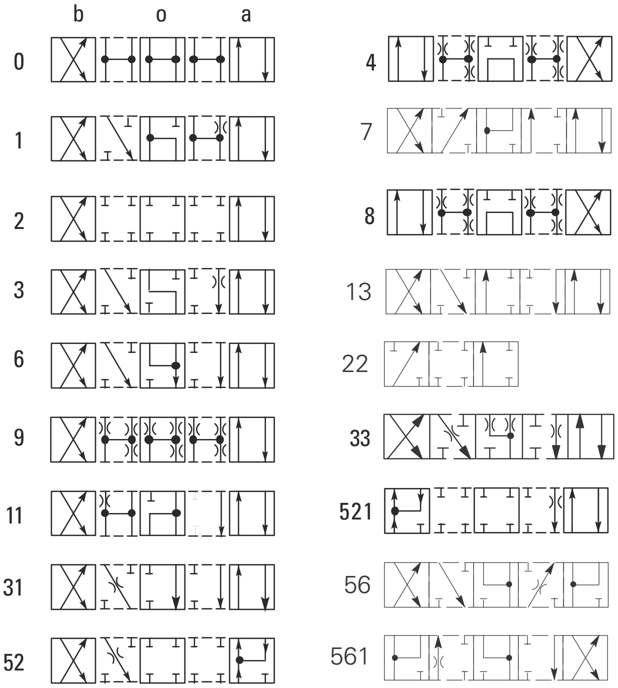
J

Functional Symbols

Spool Type and Center Position

Spool Types

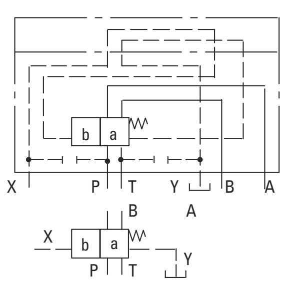
Shown in 3-position form, plus 2 transients.



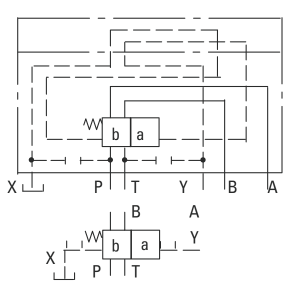
DG3V-8 Pilot Operated Models

Comprehensive and simplified symbols.

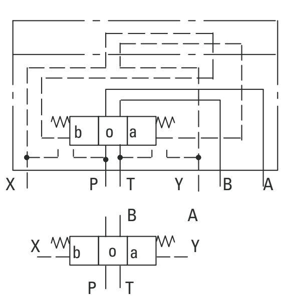
Spring Offset, End-to-End, DG3V-8-*A



Spring Offset, End-to-End, Opposite Hand, DG3V-8-*AL



Spring Centered, DG3V-8-*C



Notes:

1. In the detailed and simplified symbols on this and the previous pages, the transient positions are omitted for simplicity.
2. In certain 2-position valves, the "o" position becomes an additional transient, i.e. in DG5V-8-*A(L) and DG5V-8-*N valves.

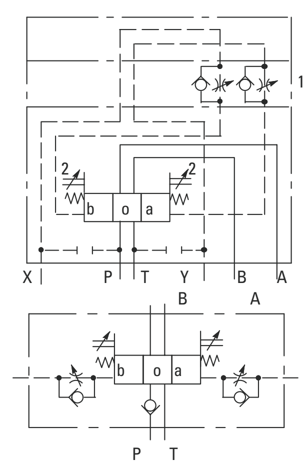
Your Eaton representative can provide further details.

DG3V-8 Options

The following are shown in a DG3V-8-*C example:

1. Pilot choke module
2. Stroke adjusters at either or at both ends (shown at both ends in example)

One or more options can be built into any DG3 series valve.



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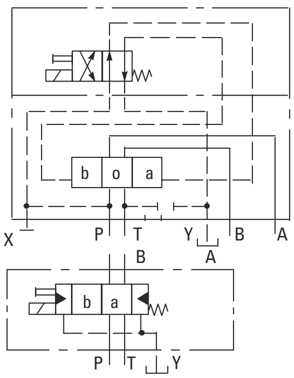
Functional Symbols

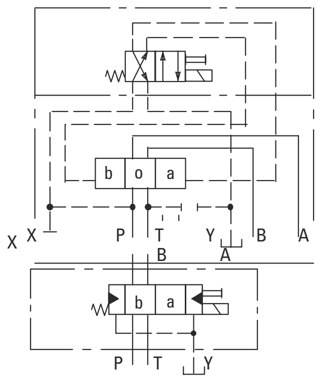
DG5V-8, Solenoid Controlled, Pilot Operated Models

Comprehensive and simplified symbols shown configured for external pilot supply and internal drain

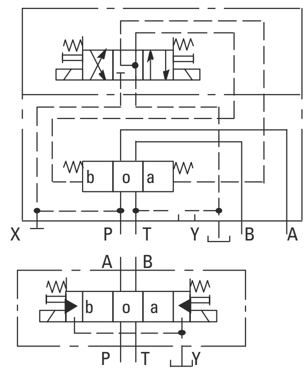
Spring Offset, End-to-End, DG5V-8-*A



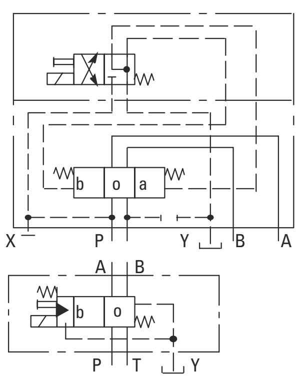
Spring Offset, End-to-End, Opposite Hand, DG5V-8-*AL



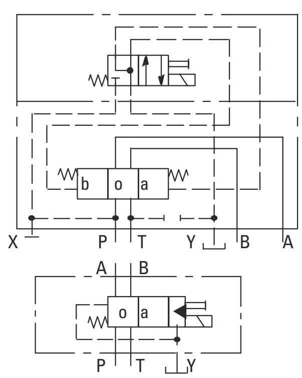
Spring Centered, DG5V-8-*C



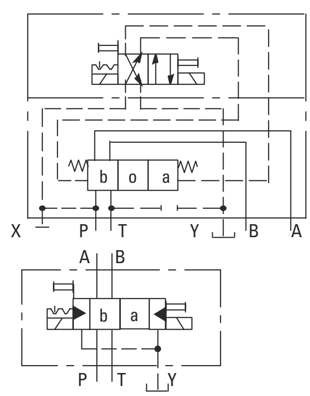
Spring Offset, End-to-Center DG5V-8-*B



Spring Offset, End-to-Center, Opposite Hand DG5V-8-*BL



Detented, DG5V-8-*N

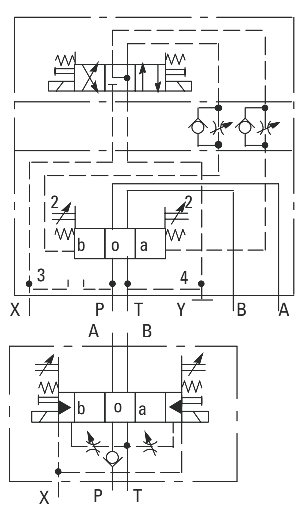


DG5V-8 Options

The following are shown in a DG5V-8-*C example:

1. Pilot choke module
2. Stroke adjusters, at either or at both ends (shown at both ends in example)
3. External pilot connection
4. Internal drain

One or more options can be built into any DG5 series valve.



Operating Data

MAXIMUM PRESSURES:

DG3V-8 valves; ports:	
P, A, B and T *****	350 bar (5000 psi)
Y **§**	350 bar (5000 psi)
DG5V-8 valves, (externally drained)	
P, A, B, T and X *****	350 bar (5000 psi) ▲
Y **§**	350 bar (5000 psi)
DG5V-8 valves, (internally drained)	
P, A, B and X	350 bar (5000 psi) ▲
T **§**	350 bar (5000 psi)
Maximum flow without mal-function (DG3V-8 and DG5V-8)	700 L/min (185 Usgpm)
Pilot pressures	See "Pilot Pressures" on page 28

ELECTRICAL INFORMATION:

Voltage ratings, DG5V valves	See 17 in "Model Code" on page 5	
Voltage limits, DG5V valves:		
Maximum voltage	See "Temperature limits", on page 10	
Minimum voltage	90% of rated voltage	
Power consumption, DG5V valves with AC solenoids:	**Initial VA rms**	**Holding VA rms**
Dual-frequency coils at 50 Hz, types "B" and "D"	265	49
Dual-frequency coils at 60 Hz, types "B" and "D"	260	48
Power consumption, DG5V valves with DC solenoids	30W at rated voltage and 20^{0}C (68^{0}F)	
Relative duty factor, DG5V valves	Continuous; ED = 100%	
Type of protection, DG5V valves:		
ISO 4400 coils with plug fitted correctly	IEC 144 class IP65	
Junction box	IEC 144 class IP65 (NEMA 4)	
Coil winding	Class H	
Lead wires (coil types "F****")	Class H	
Coil encapsulation	Class F	

Note: For information on pilot valves please refer segment B, C, D of the catalog.

▲ The DG5V, 10 design two-stage valves have been designed to satisfy the needs of most applications.
Consult your Eaton representative about an alternative model if:
a) Valves are required to remain pressurized for long periods without frequent switching, and /or
b) Back pressure on the drain port of externally drained models (or the tank port of internally drained models) is required to rise above 350 bar (5000 psi).

* The method for verifying the rated fatigue pressure of the complete unit conforms to NFPA/T2.6.1 R1-1991 (Catalog C/90), Fluid Power Systems and Products method for verifying the fatigue pressure rating of the pressure containing envelope.

§ Internal drain models drain the pilot valve through the tank port of the mainstage. External drain models drain the pilot valve through the ''Y' port of the mainstage. To provide proper operation without malfunction, the pilot pressure must always exceed tank or drain line pressure by the minimum pilot pressure required per valve and spool type (see charts on page 16). Tank or drain line surges which would reduce this differential are to be avoided as they may cause the mainstage to shift. Mainstage tank pressure is limited to the tank line rating of the pilot valve on internally drained models (with ''T'' included in the model code). Internal drains may be used with all models except pressure centered ''D'' models. Pressure centered models must be externally drained through ''Y'' and ''W'' ports. To achieve the maximum tank line rating of 350 bar (5000 psi) of the mainstage, an external pilot drain must be used and it is recommended that a separate line be provided directly to the tank.

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Operating Data

Pressure drop characteristics	See page 11, 12
Response times, DG5V valves:	

Typical values for a DG5V-8-2C-E spring centered, externally piloted valve under standard test conditions and operating with 150 L/min (40 USgpm) at 350 bar (5000 psi).

Coil rating:	Pilot pressure, bar (psi):	Energizing	Time, ms ◆ De-energizing
110V 50 Hz	15 (218)	75	40
	50 (730)	50	40
	150 (2180)	40	40
	210 (3000)	40	40
	250 (3600)	40	40
24V DC	15 (218)	90	45 ▲
	50 (730)	65	45 ▲
	150 (2180)	55	45 ▲
	210 (3000)	55	45 ▲
	250 (3600)	55	45 ▲

◆ From applying a signal at the solenoid until the main-stage spool completes its travel.

▲ In pure switched circuit conditions, devoid of the effects of any suppression diodes and full-wave rectifiers.

TEMPERATURE LIMITS:

Fluid temperature limits	See appendix
Ambient temperature limits:	See appendix
Minimum ambient, all valves	-20°C (-4°F)
Maximum ambients, DG5V valves with coils listed in 12 in "Model Code" two pages back, and under conditions stated below:	
Dual-frequency coils:	
at 50 Hz and 107% of rated voltage	65°C (150°F)
at 50 Hz and 110% of rated voltage	65°C (150°F)
at 60 Hz and 107% of rated voltage	65°C (150°F)
at 60 Hz and 110% of rated voltage	65°C (150°F)
Single-frequency (50 Hz) coils at 50 Hz and 110% of rated voltage	65°C (150°F)
DC coils at 110% of rated voltage	70°C (158°F)

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INSTALLATION DIMENSIONS:

Valves	See page 16 to 25
Mass (weight), basic models:	**kg (lb) approx.**
DG3V-8-*A(L)	10,0 (22.0) ◆
DG3V-8-*/*B(L)/*C	7,3 (16.1) ◆
DG5V-8-*A/B (AC voltages)	8,4 (18.5) ◆
DG5V-8-*A/B (DC voltages)	8,5 (18.7) ◆
DG5V-8-*C/N (AC voltages)	8,7 (19.2) ◆
DG5V-8-*C/N (DC voltages)	9,1 (20.0) ◆

◆ Add 1,1 kg (2.4 lb) when pilot chock adjustment is fitted.

Note: For information on pilot valves please refer segment B, C, D of the catalog.

Performance Data

DG3V – 8 Models

Typical with mineral oil at 36 cSt (168.6 SUS) and a specific gravity of 0.87.

Maximum flow rates

Performance based on full power solenoid coils warm and operating at 90% rated voltage.

Pressure Drop & Malfunction Flow

The following table lists the appropriate pressure drop curve and malfunction flow curve between ports for each spool type. Use the following example to determine pressure drop for a selected spool.

Example: Find the pressure drop from P→B for type 7 spool. Using the table find numeral 7 in the spool type column. To the right of numeral 7 find the reference curve 2 (from pressure drop curve chart at bottom of page) under P→B column.

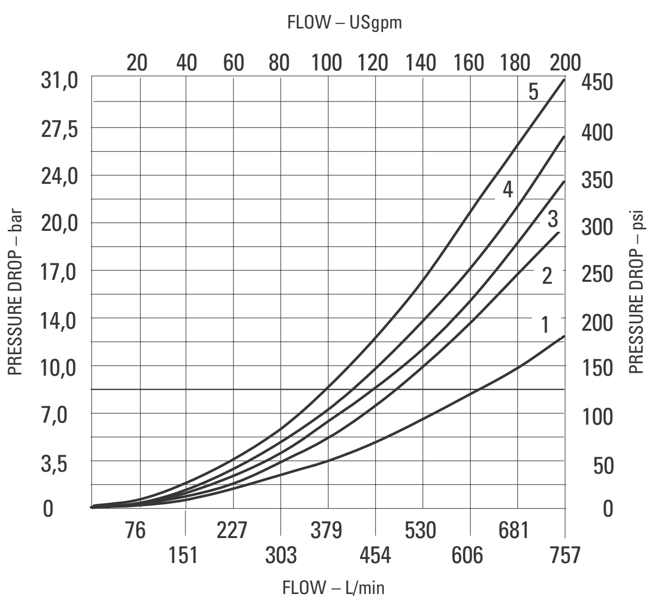
The pressure drop from P→B for type 7 spool would be obtained on curve 2. Likewise, the malfunction for numeral 7 would be found on curve 1 (from malfunction flow curve chart at bottom of page).

Spool Type	Pressure Drop Curve Number P→A	B→T	P→B	A→T	P→T in Center	Malfunction Flow Curve Number
0	2	2	2	2	3	1
1	1	2	1	3	2	3
11	1	3	1	1	3	3
2	1	2	1	1	–	2
3	1	2	1	4	–	2
31	1	3	1	1	–	2
4	4	3	4	2	5	3
6	1	3	1	4	–	1
7	2	2	2	1	–	1
8	4	3	4	2	5	1
9	2	3	2	2	28 bar 400 psid) @ 189 L/min (50 USgpm)	4
33	1	3	1	2	–	2
35	See page 28					
52	2	–	4	4	–	1
521	2	4	4	–	–	1

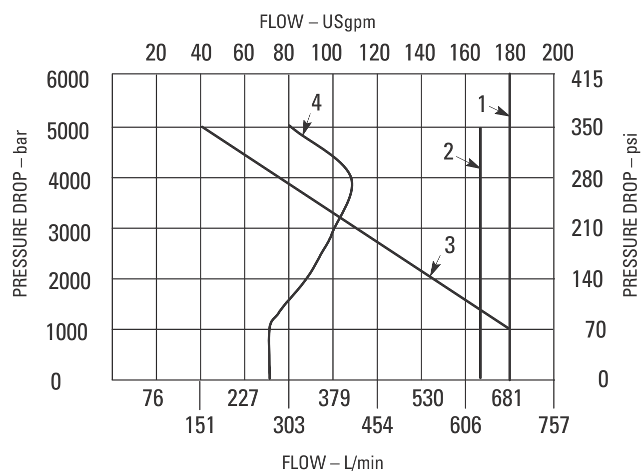
1. Figures in the pressure drop chart give approximate pressure drop (ΔP) when passing 473 l/min (125 USgpm) flow (Q) of 35 cSt (164 SUS) fluids(s) having .865 specific gravity.
2. For any other flow rate (Q_1), the pressure drop (ΔP_1) will be approximately: $\Delta P_1 = P(Q_1/Q)^2$.
3. For any other viscosity(s), the pressure drop (ΔP), will change as follows:
4. For any other specific gravity (G_1), the pressure drop (ΔP_1) will be approximately: $\Delta P_1 = \Delta P(G_1/G)$.

Viscosity cSt (SUS)	14 (17.5)	20 (97.8)	43 (200)	54 (251)	65 (302)	76 (352)	85 (399)
% of PΔ (Approx.)	81	88	104	111	116	120	124

Pressure Drop Curves



Malfunction Flow Curves



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Performance Data

DG3V-8 Model

Response Time

The response time shown in the charts are defined as the time between pilot pressurization/ de-pressurization and the initial change in the inlet port pressure.

SPRING CENTERING TIMES @ RATED FLOW & PRESSURE

Spool Type	Time
Closed Center	.040 sec.
Open Center	.050 sec.

Centering Times for Pressure Centered Valves @ Rated Pressure (A to P or B to P)

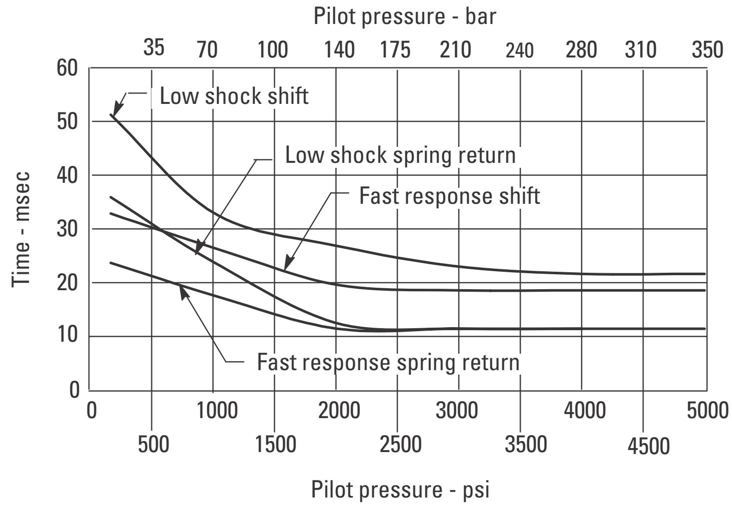
ee malfunction flow curves on page 7.
350 bar (5000 psi)
350 bar (5000 psi)
350 bar (5000 psi)
nforms to NFPA/T2.6.1 R1-1991 e fatigue pressure rating of the

Integral Check Valves

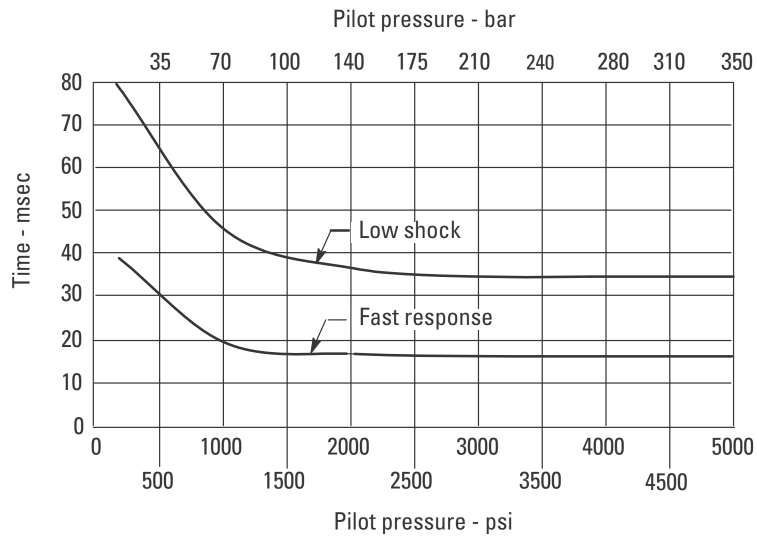
For internal pilot pressure, an integral pressure port check valve is available. This back pressure will be present at the cylinder ports. The pilot pressure generated is the total of: P→T drop through the valve in center condition, pressure drop through the check valve, plus the pressure at the tank port.

To prevent load drop, a check valve in the pressure port can be used to prevent reverse flow from a cylinder port to the pressure port.

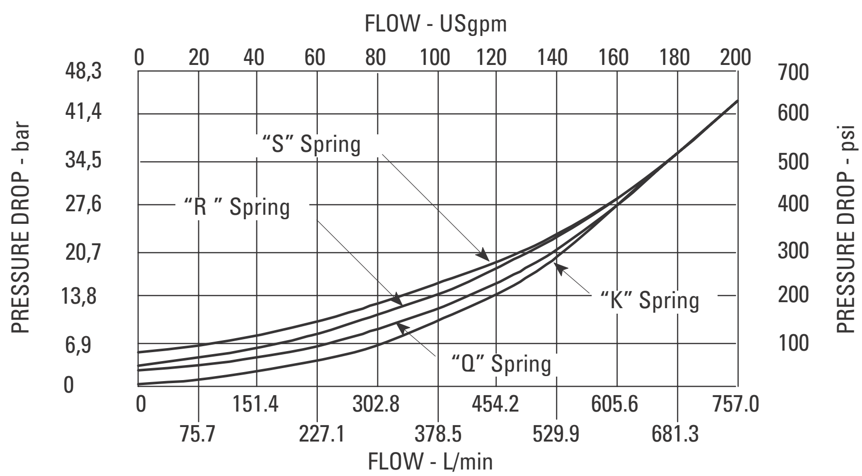
Offset to Offset



Center to Offset



Pressure Drop Across Check Valve



Performance Data

DG5V-8 Model

Pressure Drop & Malfunction Flow

The following table lists the appropriate pressure drop curve and malfunction flow curve between ports for each spool type. Use the following example to determine pressure drop for a selected spool.

Example: Find the pressure drop from P➞B for type 7 spool. Using the table find numeral 7 in the spool type column.

To the right of numeral 7 find the reference curve 2 (from pressure drop curve chart at bottom of page) under P➞B column.

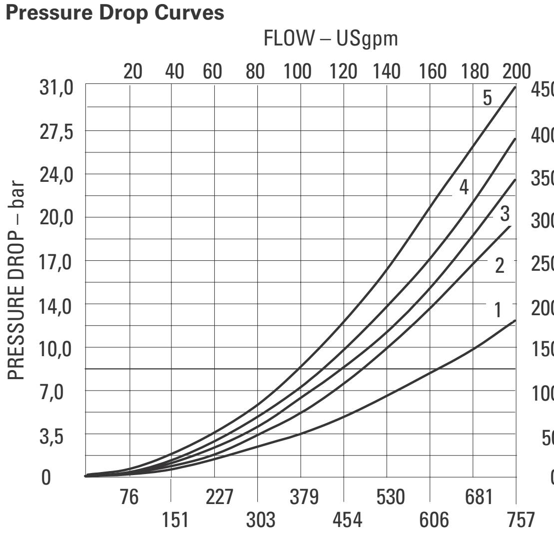
The pressure drop from P➞B for type 7 spool would be obtained on curve 2. Likewise, the malfunction for numeral 7 would be found on curve 1 (from malfunction flow curve chart at bottom of page).

1. Figures in the pressure drop chart give approximate pressure drop (ΔP) when passing 473 l/min (125 USgpm) flow (Q) of 35 cSt (164 SUS) fluids(s) having .865 specific gravity.
2. For any other flow rate(Q_1), the pressure drop (ΔP_1) will be approximately $\Delta P_1 = \Delta P(Q_1/Q)^2$.
3. For any other viscosity(s), the pressure drop (ΔP), will change as follows:
4. For any other specific gravity (G_1), the pressure drop (ΔP_1) will be approximately: $\Delta P_1 = \Delta P(G_1/G)$.

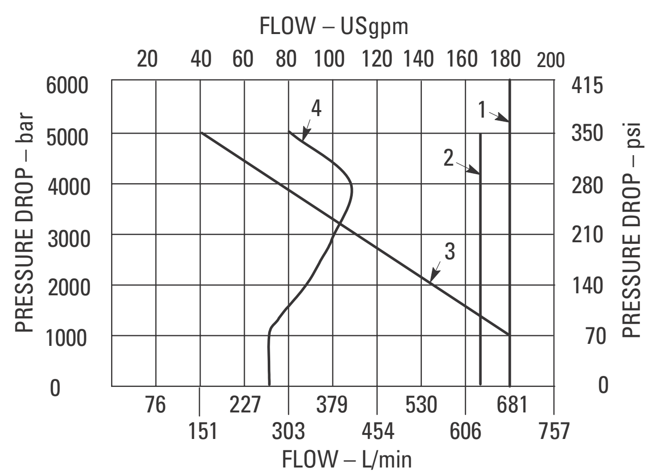
Viscosity cSt (SUS)	14 (75)	32 (150)	43 (200)	54 (250)	65 (300)	76 (350)	86 (400)
% of PΔ (Approx.)	93	111	119	126	132	137	141

SPOOL TYPE	PRESSURE DROP CURVE NUMBER					MALFUNCTION FLOW CURVE NUMBER
	P A	B T	P B	A T	P T In Center	
0	2 ➞	2 ➞	2 ➞	2 ➞	3 ➞	1
1	1	2	1	3	2	3
11	1	3	1	1	3	3
2	1	2	1	1	–	2
3	1	2	1	4	–	2
31	1	3	1	1	–	2
4	4	3	4	2	5	3
6	1	3	1	4	–	1
7	2	2	2	1	–	1
8	4	3	4	2	5	1
9	2	3	2	2	28 bar (400 psid) @ 189 L/min (50 USgpm)	4
33	1	3	1	2	–	2
35A	See page 28					
52	2	–	4	4	–	1
521	2	4	4	–	–	1

Pressure Drop Curves



Malfunction Flow Curves



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Performance Data

DG5V-8 Model

Response Times

Response times are defined as the time from solenoid energization/de-energization to the point of the start of a pressure rise/decline in appropriate port.

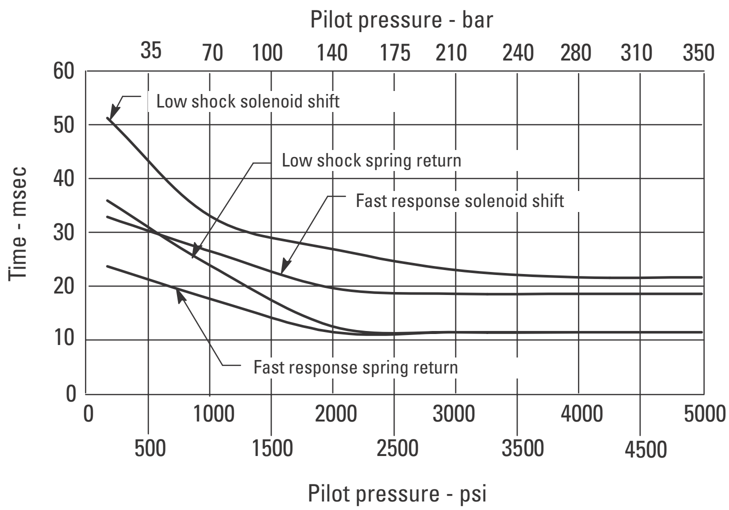
Solenoid Energizing

Spring centered, pressure centered and spring offset DG5V-8 types must be energized continuously. No-spring detented DG5V-8 type may be energized momentarily. Pressure centered and spring centered DG5V-8 types return valve spool to center position when both solenoids are de-energized.

Mounting Position

No–spring detented valves must be installed with the longitudinal axis horizontal for good machine reliability. The mounting position of spring centered and spring offset models is unrestricted provided that the pilot pressure supply is maintained as required. (Spring offset valves do not have a spring in the main spool section).

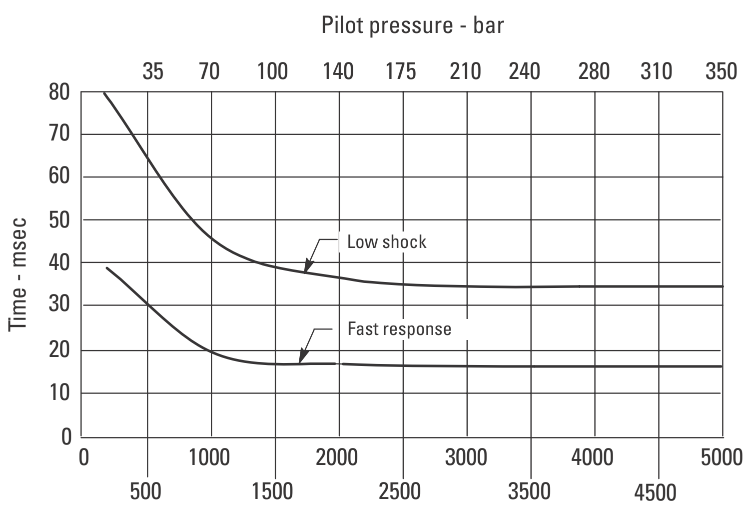
Offset to Offset



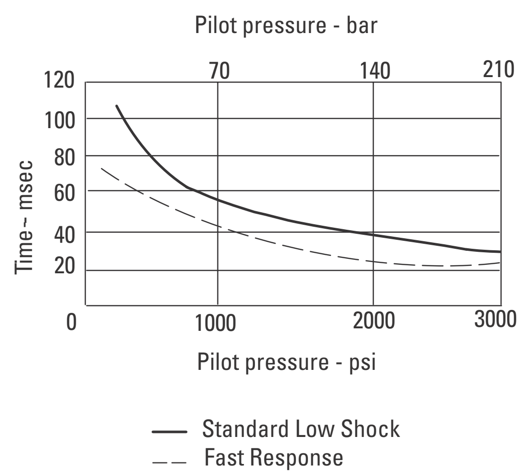
SPRING CENTERING TIMES @ RATED FLOW & PRESSURE

Spool Type	Time
Closed Center	.040 sec.
Open Center	.050 sec.

Center to Offset



Centering Times for Pressure Centered Valves @ Rated Pressure (A to P or B to P)

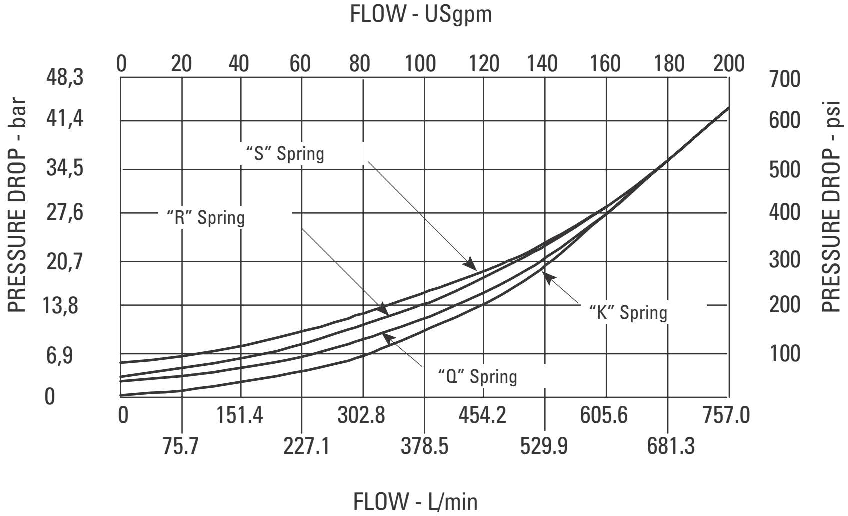


Integral Check Valves

For internal pilot pressure, an integral pressure port check valve is required for internally piloted valves with open center spools (0,1,4,8 & 9). The pilot pressure generated is the total of: P→T drop through the valve in center condition, pressure drop through the check valve, plus the pressure at the tank port.

For proper operation, total pressure drop must be greater than the minimum required pilot pressure (see chart). To prevent load drop, a check valve in the pressure port can be used to prevent reverse flow from a cylinder port to pressure port. If using as reverse flow check, maximum reverse pressure is limited to 210 bar (3000 psi).

Pressure Drop Across Check Valve



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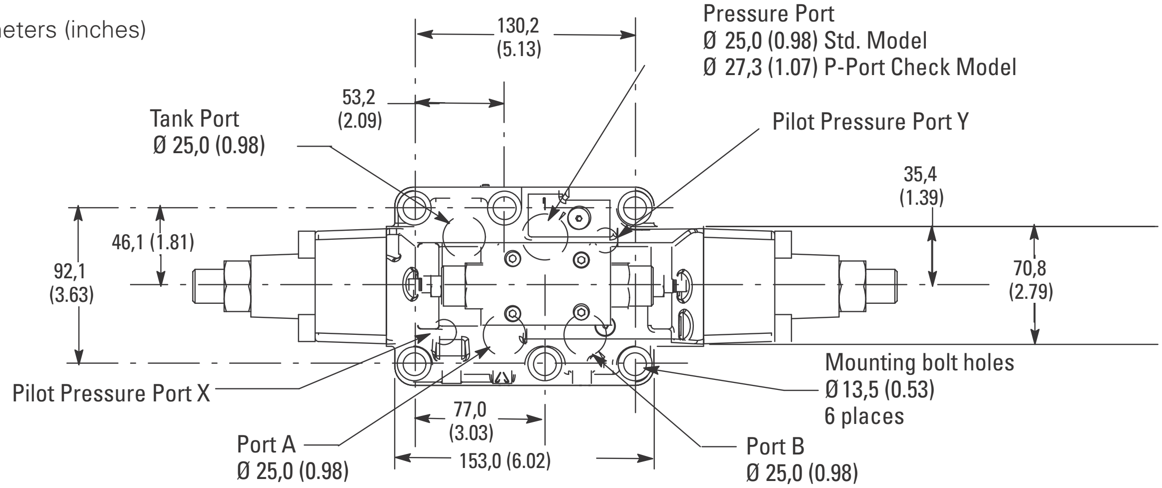
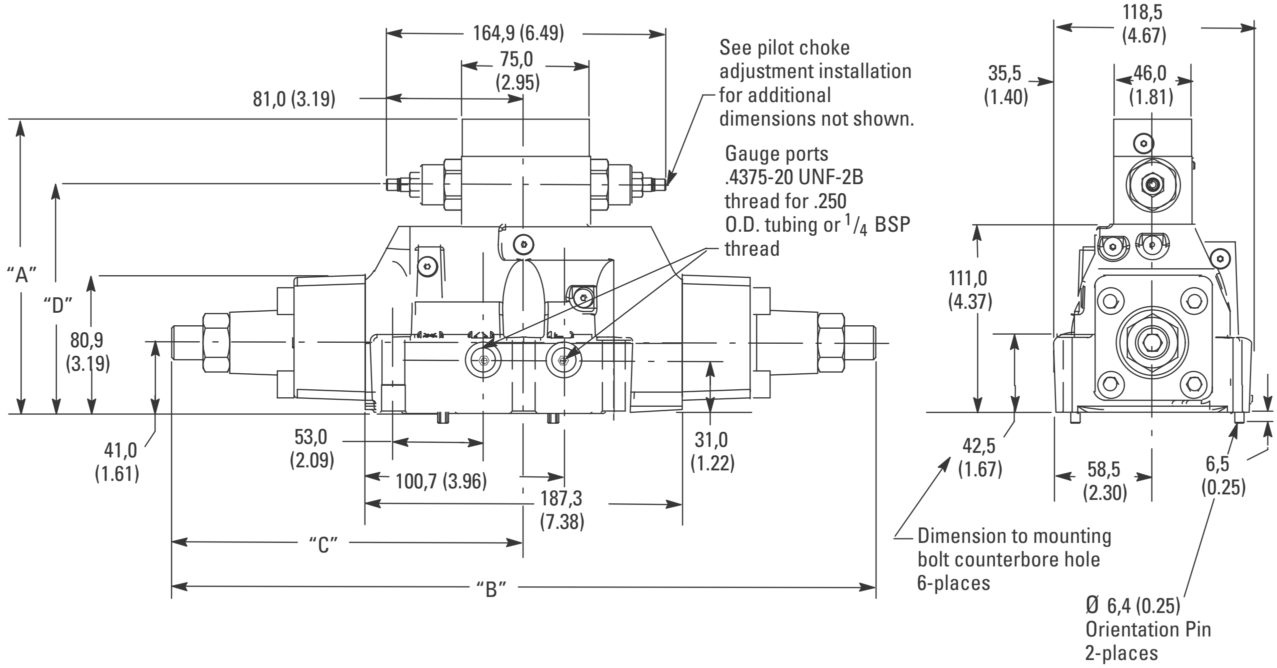
Installation Dimensions

DG3V-8-(C)-*-*-10 Spring Centered Model

Millimeters (inches)





SPOOL CONTROL MODIFICATIONS	"A" DIMENSION	"B" DIMENSION	"C" DIMENSION	"D" DIMENSION (PILOT CHOKE ADJUSTMENT)
Without pilot choke or stroke adjustment	133,0 (5.23)	265,3 (10.44)	132,6 (5.22)	–
Stroke adjustment (both ends)	133,0 (5.23)	415,9 (16.37)	208,0 (8.18)	–
Pilot choke adjustment	173,0 (6.81)	265,3 (10.44)	132,6 (5.22)	134,2 (5.28)
Stroke adjustment on cyl. 'A'	133,0 (5.23)	340,6 (13.40)	208,0 (8.18)	–
Stroke adjustment on cyl. 'B'	133,0 (5.23)	340,6 (13.40)	132,6 (5.22)	–
Pilot choke and stroke adjustment on cyl. 'A'	173,0 (6.81)	340,6 (13.40)	208,0 (8.18)	134,2 (5.28)
Pilot choke and stroke adjustment on cyl. 'B'	173,0 (6.81)	132,6 (5.22)	134,2 (5.28)	134,2 (5.28)
Pilot choke and stroke adjustment (both ends)	173,0 (6.81)	415,9 (16.37)	208,0 (8.18)	134,2 (5.28)

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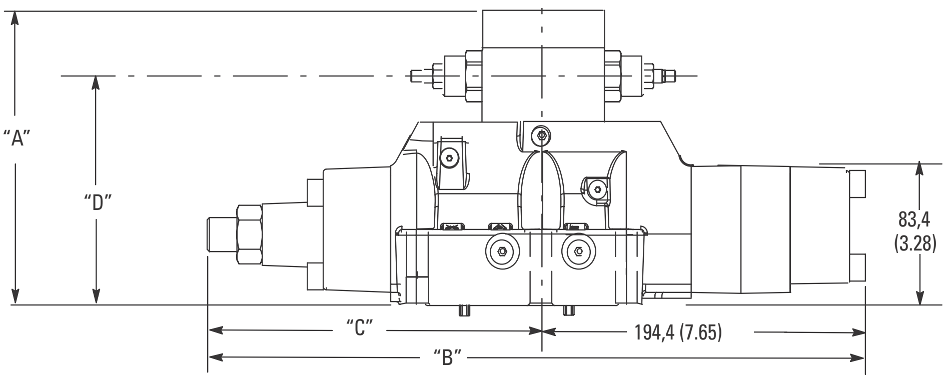
DG3V-8-(L)-*-*-10 Spring Offset Model

Millimeters (inches)



SPOOL CONTROL MODIFICATIONS	"A" DIMENSION	"B" DIMENSION	"C" DIMENSION	"D" DIMENSION (PILOT CHOKE ADJUSTMENT)
Without pilot choke or stroke adjustment	133,0 (5.23)	265,3 (10.44)	132,6 (5.22)	–
Without pilot choke or stroke adjustment (left-hand build)	133,0 (5.23)	326,9 (12.87)	194,4 (7.65)	134,2 (5.28)
Pilot choke adjustment	173,0 (6.81)	265,3 (10.44)	132,6 (5.22)	134,2 (5.28)
Stroke adjustment on cyl. 'A' (left-hand build)	133,0 (5.23)	402,3 (15,83)	208,0 (8.18)	–
Stroke adjustment on cyl. 'B'	133,0 (5.23)	340,6 (13.40)	132,6 (5.22)	–
Pilot choke and stroke adjustment on cyl. 'A' (left-hand build)	173,0 (6.81)	340,6 (13.40)	208,0 (8.18)	134,2 (5.28)
Pilot choke and stroke adjustment on cyl. 'B'	173,0 (6.81)	340,6 (13.40)	132,6 (5.22)	134,2 (5.28)

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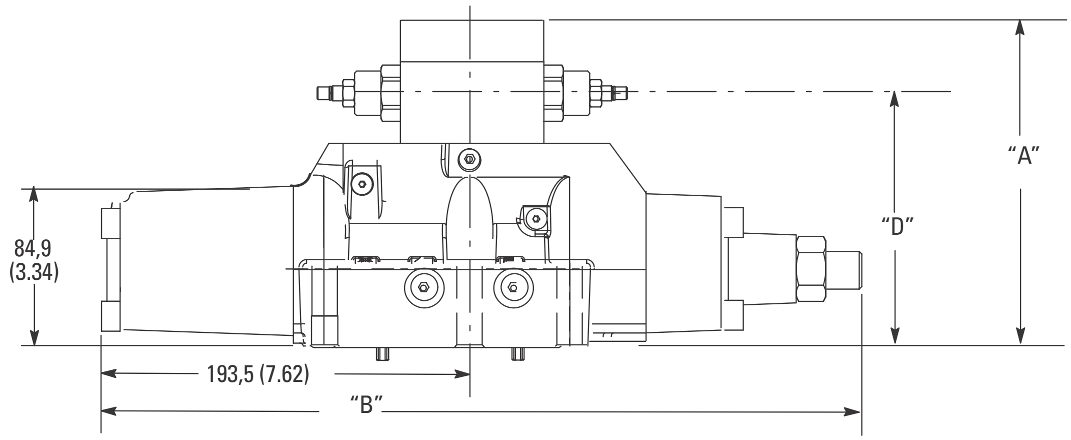
DG3V-8-D-*-*-10 Pressure Centered Model

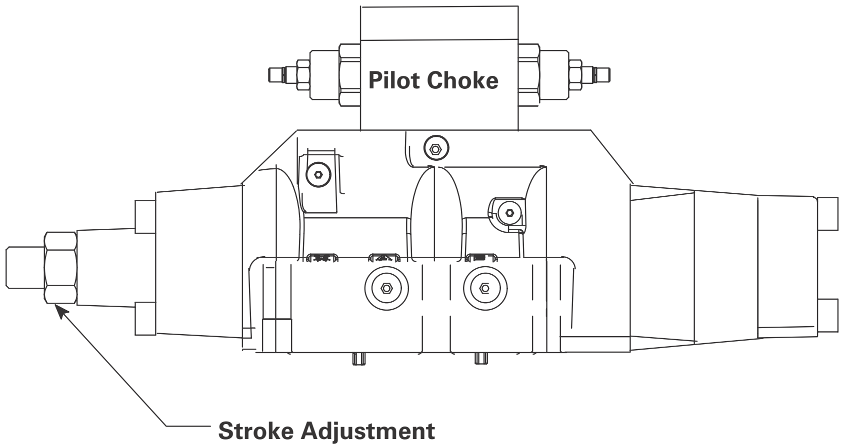
Millimeters (inches)



Installation Dimensions

Pilot Choke
DGMFN-3-Y-A2W-B2W-41

Pilot choke increases the amount of time to shift the mainstage spool, lowering the possibility of large flow transients in the circuit.
It is adjusted by backing off locknuts and turning adjusting screws inward to decrease rate of spool travel and outward to increase spool travel rate. See spool control modifications in model code.



Stroke Adjustment

Stroke adjustment limits movement of the mainstage spool. Backing off the jamnut and turning the adjusting screw inward decreases spool stroke. See spool control modifications in model code.).

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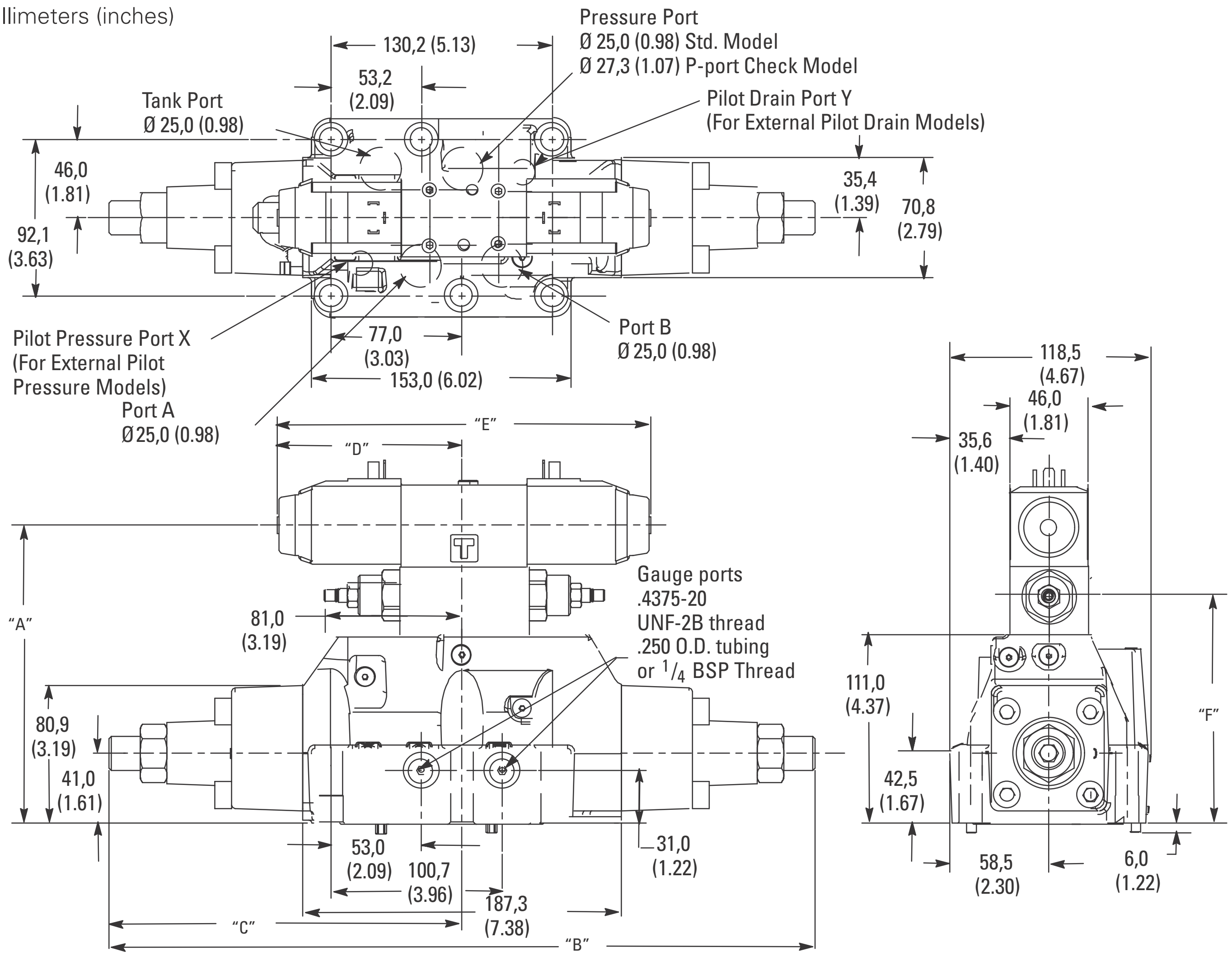
Installation Dimensions

DG5V-8 H-*-M-*-10
Spring Centered Model

Millimeters (inches)



Dimensions

Spool Control Modifications	"A"	"B"	"C"	"D" AC Sol.	"D" DC Sol.	"E" pilot Dual Solenoid AC Sol.	"E" pilot Dual Solenoid DC Sol.	"E" pilot Single Solenoid AC Sol.	"E" pilot Single Solenoid DC Sol.	"F" Pilot Choke
Without pilot choke or stroke adjustment	135,6 (5.33)	265,3 (10.44)	132,6 (5.22)							-
Stroke adjustment (both ends)		415,9 (16.37)	208,0 (8.18)							
Pilot choke adjustment	175,6 (6.91)	265,3 (10.44)	132,6 (5.22)							134,2 (5.28)
Stroke adjust. on cyl. 'A'	135,6 (5.33)	340,6 (13.40)	208,0 (8.18)	98,8 (3.88)	108,8 (4.28)	200,0 (7.87)	220,0 (8.66)	146,5 (5.76)	156,5 (6.16)	-
Stroke adjust on cyl. 'B'			132,6 (5.22)							
Pilot choke and stroke adjust. on cyl 'A'	175,6 (6.91)		208,0 (8.18)							134,2 (5.28)
Pilot choke and stroke adjust. on cyl. 'B'			132,6 (5.22)							
Pilot choke and stroke adjust. on both ends		415,9 (16.37)	208,0 (8.18)							

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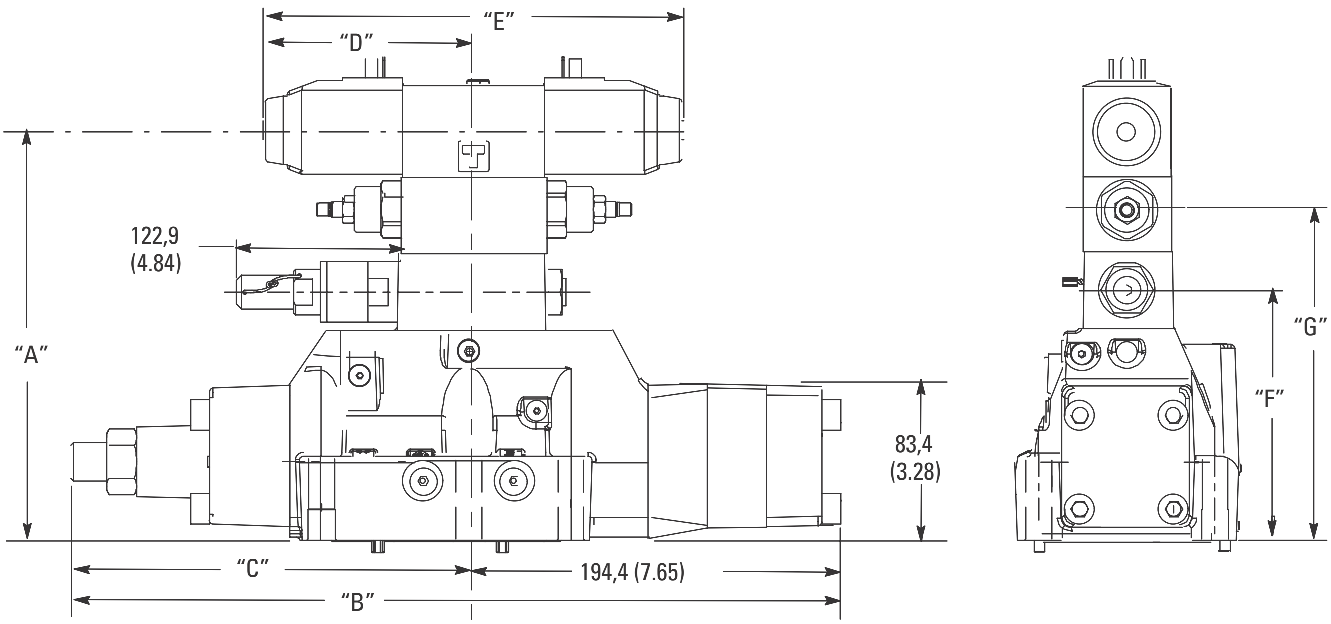
Installation Dimensions

DG5V-8-A(L)-*-*-10
Spring Offset Model

Millimeters (inches)



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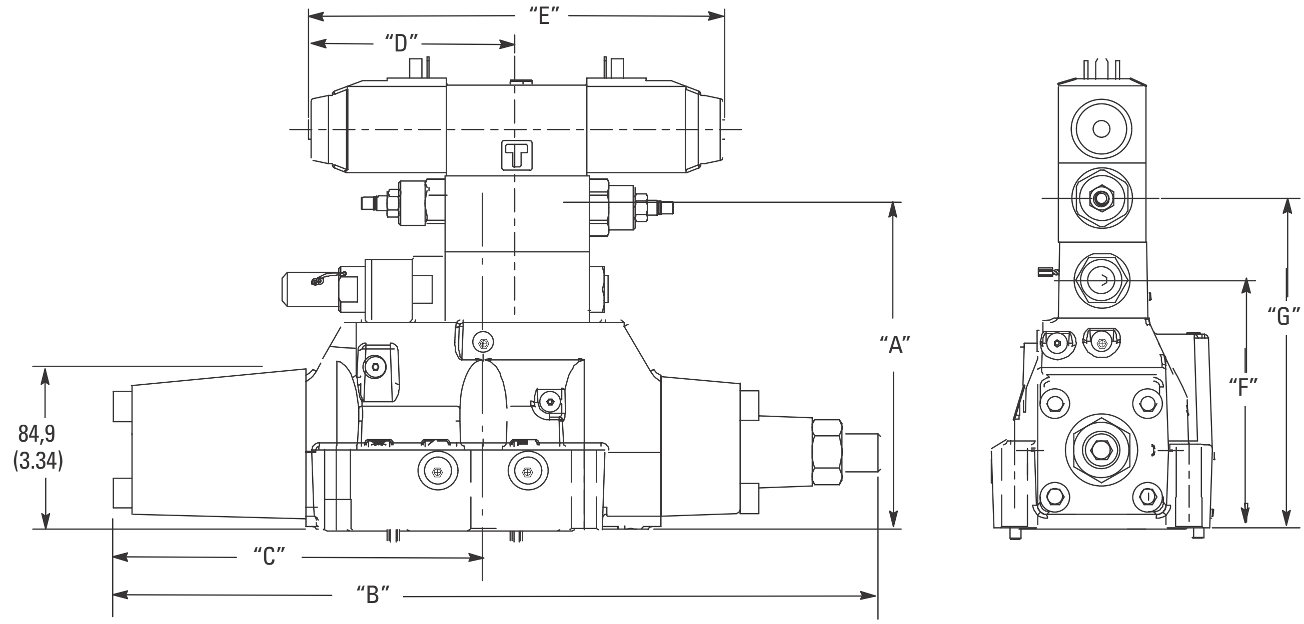
Spool Control Modifications	"A"	"B"	"C"	"D" AC Sol.	"D" DC Sol.	"E" pilot Dual Solenoid AC Sol.	"E" pilot Dual Solenoid DC Sol.	"E" pilot Single Solenoid AC Sol.	"E" pilot Single Solenoid DC Sol.	"F" Reducer Module	"G" Pilot Choke
Without pilot choke or stroke adjustment	175,6 (6.91)	265,3 (10.44)	132,6 (5.22)	98,8 (3.88)	108,8 (4.28)	200,0 (7.87)	220,0 (8.66)	146,5 (5.76)	156,5 (6.16)	134,2 (5.28)	-
Stroke adjustment (both ends)		415,9 (16.37)	208,0 (8.18)								
Pilot choke adjustment	215,6 (8.48)	265,3 (10.44)	132,6 (5.22)								134,2 (5.28)
Stroke adjust. on cyl. 'A'	175,6 (6.91)	340,6 (13.40)	208,0 (8.18)								-
Stroke adjust on cyl. 'B'			132,6 (5.22)								
Pilot choke and stroke adjust. on cyl 'A'	215,6 (8.48)		208,0 (8.18)								134,2 (5.28)
Pilot choke and stroke adjust. on cyl. 'B'			132,6 (5.22)								
Pilot choke and stroke adjust. on both ends		415,9 (16.37)	208,0 (8.18)								

Installation Dimensions

DG5V-8-D-*-*-10
Pressure Centered Model

Millimeters (inches)



Dimensions

Spool Control Modifications (without Reducer)	"A"	"B"	"C"	"D" AC Sol.	"D" DC Sol.	"E" pilot Dual Solenoid AC Sol.	"E" pilot Dual Solenoid DC Sol.	"E" pilot Single Solenoid AC Sol.	"E" pilot Single Solenoid DC Sol.	"F" Reducer Module	"G" Pilot Choke
Without pilot choke or stroke adjustment	135,6 (5 33)	326,1 (12.83)	193,5 (7.61)	98,8 (3.88)	108,8 (4.28)	200,0 (7.87)	220,0 (8.66)	146,5 (5.76)	156,5 (6.16)	–	–
Stroke adjust on cyl. 'B'		401 5 (15.80)									
Pilot choke and stroke adjust. on cyl. 'B'	175,6 (6.91)										134,2 (5.28)
(With reducer)											
Without pilot choke or stroke adjustment	175,6 (6.91)	326,1 (12.83)									–
Stroke adjust on cyl. 'B'		401,5 (15.80)	193,5 (7.61)	98,8 (3.88)	108,8 (4.28)	200,0 (7.87)	220,0 (8.66)	146,5 (5.76)	156,5 (6.16)	131,0 (5.15)	
Pilot choke and stroke adjust. on cyl. 'B'	215,6 (8.48)										134,2 (5.28)

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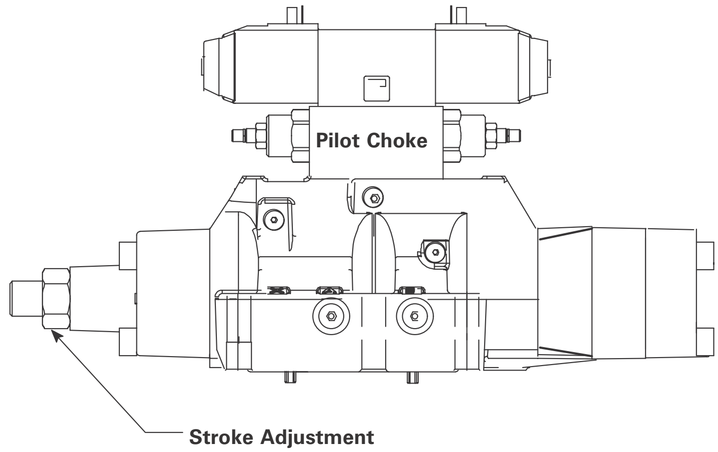
Optional Features

Pilot Choke
DGMFN-3-Y-A2W-B2W-41

Pilot choke increases the amount of time to shift the mainstage spool, lowering the possibility of large flow transients in the circuit.
It is adjusted by backing off locknuts and turning adjusting screws inward to decrease rate of spool travel and outward to increase spool travel rate. See spool control modifications in model code.

Stroke Adjustment

Stroke adjustment limits movement of the mainstage spool. Backing off the jamnut and turning the adjusting screw inward decreases spool stroke. See spool control modifications in model code.



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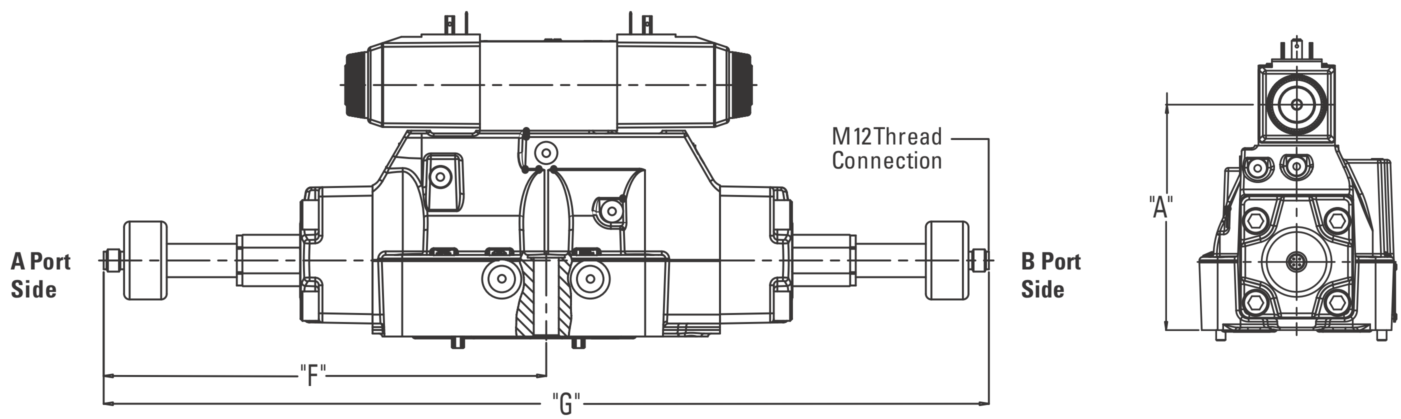
Installation Dimensions

DG5V-8 with Main Stage Spool Monitoring Switch "PC*" or "PD*" Models (LVDT Style Switch)

Millimeters (inches)



MODEL CODE	"A" DIMENSION	"F" DIMENSION	"G" DIMENSION
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-PCA/PDA-(*)-(V)M-*-10	135.6[5.34]	238.7[9.40]	371.3[14.62]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-PCA/PDA-(*)-(V)M-*-10	175.6[6.91]	238.7[9.40]	371.3[14.62]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-2-PCA/PDA-(*)-(V)M-*-10	175.6[6.91]	238.7[9.40]	371.3[14.62]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-2-PCA/PDA-(*)-(V)M-*-10	215.6[8.49]	238.7[9.40]	371.3[14.62]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-8-PCA/PDA-(*)-(V)M-*-10	135.6[5.34]	238.7[9.40]	446.6[17.58]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-8-PCA/PDA-(*)-(V)M-*-10	175.6[6.91]	238.7[9.40]	446.6[17.58]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-28-PCA/PDA-(*)-(V)M-*-10	175.6[6.91]	238.7[9.40]	446.6[17.58]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-28-PCA/PDA-(*)-(V)M-*-10	215.6[8.49]	238.7[9.40]	446.6[17.58]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-PCB/PDB-(*)-(V)M-*-10	135.6[5.34]	132.7[5.22]	371.3[14.62]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-PCB/PDB-(*)-(V)M-*-10	175.6[6.91]	132.7[5.22]	371.3[14.62]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-2-PCB/PDB-(*)-(V)M-*-10	175.6[6.91]	132.7[5.22]	371.3[14.62]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-2-PCB/PDB-(*)-(V)M-*-10	215.6[8.49]	132.7[5.22]	371.3[14.62]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-7-PCB/PDB-(*)-(V)M-*-10	135.6[5.34]	208.0[8.19]	446.6[17.58]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-7-PCB/PDB-(*)-(V)M-*-10	175.6[6.91]	208.0[8.19]	446.6[17.58]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-27-PCB/PDB-(*)-(V)M-*-10	175.6[6.91]	208.0[8.19]	446.6[17.58]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-27-PCB/PDB-(*)-(V)M-*-10	215.6[8.49]	208.0[8.19]	446.6[17.58]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-PCD-(*)-(V)M-*-10	135.6[5.34]	238.7[9.40]	477.3[18.79]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-PCD-(*)-(V)M-*-10	175.6[6.91]	238.7[9.40]	477.3[18.79]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-2-PCD-(*)-(V)M-*-10	175.6[6.91]	238.7[9.40]	477.3[18.79]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-2-PCD-(*)-(V)M-*-10	215.6[8.49]	238.7[9.40]	477.3[18.79]
DG5V-8-H-(B)-*D-(*)-PCB/PDB-(*)-(V)M-*-10	135.6[5.34]	193.5[7.62]	432.1[17.01]
DG5V-8-H-R-(B)-*D-(*)-PCB/PDB-(*)-(V)M-*-10	175.6[6.91]	193.5[7.62]	432.1[17.01]
DG5V-8-H-(B)-*D-(*)-2-PCB/PDB-(*)-(V)M-*-10	175.6[6.91]	193.5[7.62]	432.1[17.01]
DG5V-8-H-R-(B)-*D-(*)-2-PCB/PDB-(*)-(V)M-*-10	215.6[8.49]	193.5[7.62]	432.1[17.01]

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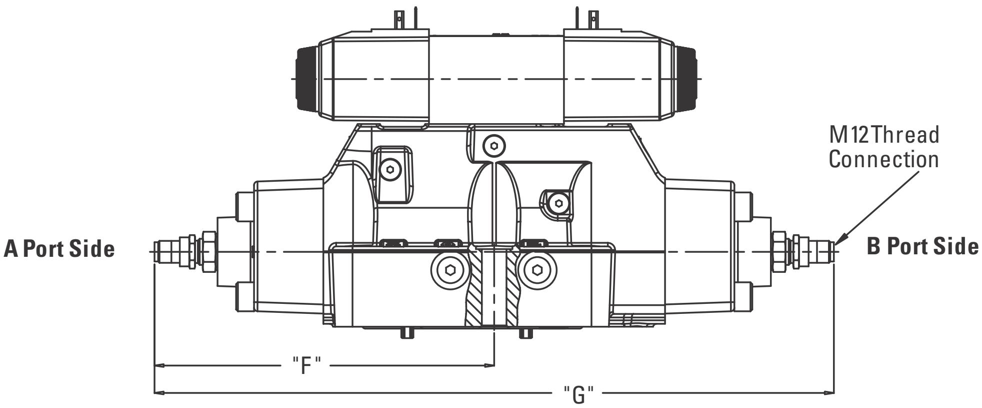
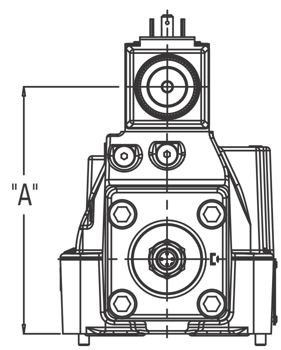
DG5V-8 with Main Stage Spool Monitoring Switch “PPA”, “PPB” or “PPD” Models (Proximity Switch)

Millimeters (inches)

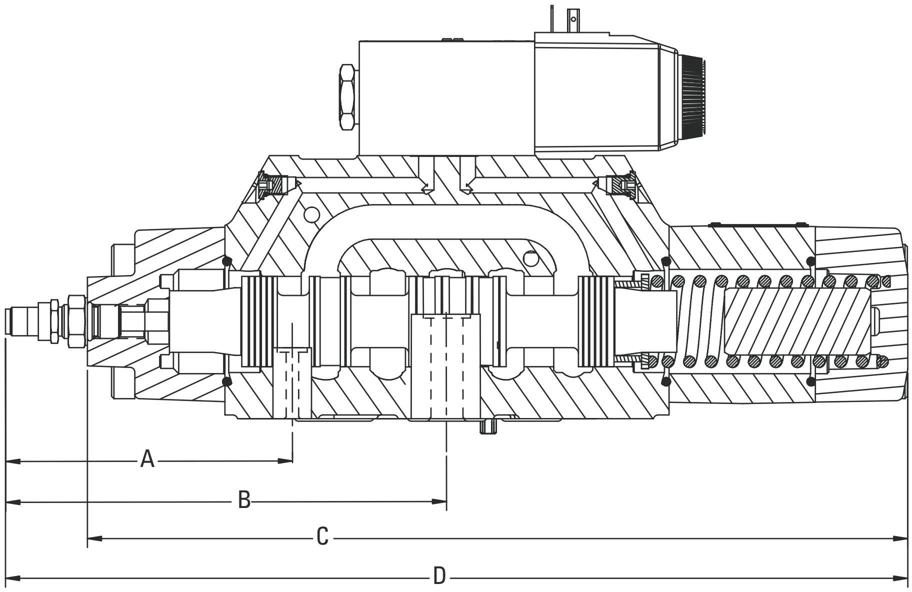




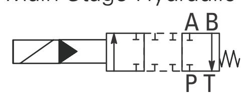
MODEL CODE	“A’ DIMENSION	“F” DIMENSION	“G” DIMENSION
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-PPA-(*)-(V)M-*-10	135.6[5.34]	186.2[7.33]	318.8[12.55]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-PPA-(*)-(V)M-*-10	175.6[6.91]	186.2[7.33]	318.8[12.55]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-2-PPA-(*)-(V)M-*-10	175.6[6.91]	186.2[7.33]	318.8[12.55]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-2-PPA-(*)-(V)M-*-10	215.6[8.49]	186.2[7.33]	318.8[12.55]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-8-PPA-(*)-(V)M-*-10	135.6[5.34]	186.2[7.33]	394.2[15.52]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-8-PPA-(*)-(V)M-*-10	175.6[6.91]	186.2[7.33]	394.2[15.52]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-28-PPA-(*)-(V)M-*-10	175.6[6.91]	186.2[7.33]	394.2[15.52]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-28-PPA-(*)-(V)M-*-10	215.6[8.49]	186.2[7.33]	394.2[15.52]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-PPB-(*)-(V)M-*-10	135.6[5.34]	132.7[5.22]	318.8[12.55]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-PPB-(*)-(V)M-*-10	175.6[6.91]	132.7[5.22]	318.8[12.55]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-2-PPB-(*)-(V)M-*-10	175.6[6.91]	132.7[5.22]	318.8[12.55]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-2-PPB-(*)-(V)M-*-10	215.6[8.49]	132.7[5.22]	318.8[12.55]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-7-PPB-(*)-(V)M-*-10	135.6[5.34]	208.0[8.19]	394.2[15.52]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-7-PPB-(*)-(V)M-*-10	175.6[6.91]	208.0[8.19]	394.2[15.52]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-27-PPB-(*)-(V)M-*-10	175.6[6.91]	208.0[8.19]	394.2[15.52]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-27-PPB-(*)-(V)M-*-10	215.6[8.49]	208.0[8.19]	394.2[15.52]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-PPD-(*)-(V)M-*-10	135.6[5.34]	186.2[7.33]	372.4[14.66]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-PPD-(*)-(V)M-*-10	175.6[6.91]	186.2[7.33]	372.4[14.66]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-2-PPD-(*)-(V)M-*-10	175.6[6.91]	186.2[7.33]	372.4[14.66]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-2-PPD-(*)-(V)M-*-10	215.6[8.49]	186.2[7.33]	372.4[14.66]
DG5V-8-H-(B)-*D-(*)-PPB-(*)-(V)M-*-10	135.6[5.34]	193.5[7.62]	379.7[14.95]
DG5V-8-H-R-(B)-*D-(*)-PPB-(*)-(V)M-*-10	175.6[6.91]	193.5[7.62]	379.7[14.95]
DG5V-8-H-(B)-*D-(*)-2-PPB-(*)-(V)M-*-10	175.6[6.91]	193.5[7.62]	379.7[14.95]
DG5V-8-H-R-(B)-*D-(*)-2-PPB-(*)-(V)M-*-10	215.6[8.49]	193.5[7.62]	379.7[14.95]

Installation Dimensions

Valve for Safety Circuit Application (35A Spool)



DG5V with PPA Switch Option Shown



MODEL	A	B	C	D	LEAKAGE P-A	FLOW CURVE
	mm (in)	mm (in)	mm (in)	mm (in)	cc/min (in^3/min)	
DG5V5-35A	118.5 (4.67)		234.7 (9.24)	262.1 (10.32)	Available upon request	Available upon request
DG5V7-35A		152.1 (5.99)	252.1 (9.92)	286.6 (11.28)	Available upon request	See DG5V7 catalog
DG5V8-35A		151.7 (5.97)	346.0 (13.62)	380.5 (14.98)	156 (9.5)	Available upon request
DG5V10-35A		230.7 (9.10)	443.4 (17.46)	476.3 (18.8)	Available upon request	Available upon request

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Electrical Information

DG5V-8 with Main Stage Spool Monitoring Switch “PC*” or “PD*” Models (LVDT Style Switch)

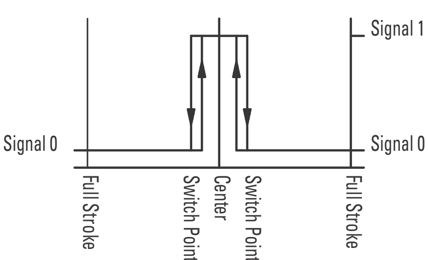
Millimeters (inches)

SPECIFICATIONS

Supply Voltage (Vs) (Full Wave Bridge with Capacitor)	24VDC ± 20%
Reverse Polarity Protection	MAX. 300V Installed
Ripple Voltage	10%
Current Consumption	40mA Approx.
Outputs	NC Contact Positive (No Short Circuite Protection)
Sensing Distance (offset position)	5.85 to 6.15 mm
Sensing Distance (from center position)	± 0.35 to 0.65 mm
Hysteresis	≤0.06 mm
Output Voltage Signal 0 Signal 1	 < 1.8V Vs – 2.5V
Output Current	<400mA at Input +20%
Environmental Protection	IP65 (With Mounted Plug)
Operating Temperature Range	-20°C to +85°C
Max. Operating Pressure	315 bar (4500 psi)
CE Declaration of Conformity No.	00 02 002 9 93
P-Channel, Contact Positive	

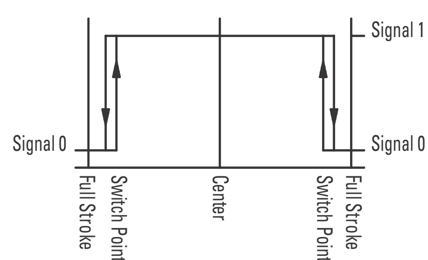
ATTENTION: EMC ONLY ENSURED WHEN USING SCREENED CABLES AND SCREENED PLUG CASING.

TYPICAL “PCA/PCB“ OUTPUT
(FOR SENSING CENTER POSITION)



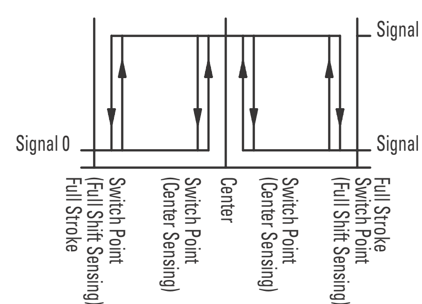
Signal 0 = Voltage at pin 2/4 < 1.8V
Signal 1 = Voltage at pin 2/4 > (Vs – 2.5V)

TYPICAL “PDA/PDB” OUTPUT
(FOR FULL SHIFT SENSING)



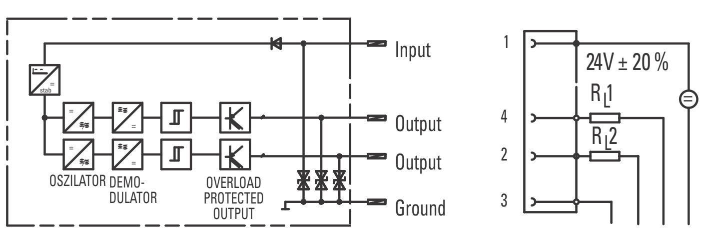
Signal 0 = Voltage at pin 2/4 < 1.8V
Signal 1 = Voltage at pin 2/4 > (Vs – 2.5V)

TYPICAL “PCD” OUTPUT
(FOR CENTER SENSING 'A' PORT END,
FULL SHIFT SENSING 'B' PORT END)



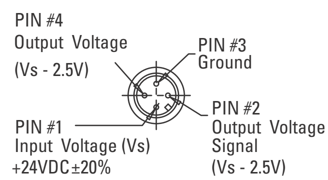
Signal 0 = Voltage at pin 2/4 < 1.8V
Signal 1 = Voltage at pin 2/4 > (Vs – 2.5V)

Electrical Schematic and Mating Connector Detail



R_L1,R_L2 = e.g. Coil Resistance of the switch relay >/ = 60 OHMS

Connector Detail



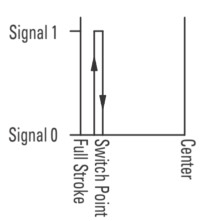
DG5V-8 with Main Stage Spool Monitoring Switch “PPA”, “PPB” or “PPD” Models (Proximity Switch)

Millimeters (inches)

SPECIFICATIONS	
Supply Voltage (Vs):	10 to 30 Vdc
Supply Current (Is):	8mA at 24Vdc (Plug Load Current)
Supply Over-Voltage Rating:	35Vdc Continuous
Supply Reverse Polarity Rating:	-35Vdc (With No Shorts)
Short Circuit Tolerance:	Continuous Short Between any Two Pins
High Potential Test, Pin to Case:	300Vdc
Electromagnetic Compatibility:	ISO 7637 Parts 0 and 1 Worst Case and Immunity to Radiated Electromagnetic Fields, 10KHz to 1GHz per SAE J1113/25 SEP 95
Pins to Case Resistance:	> 50 MEGOHMS
Load Dump Tolerance:	80Vdc PEAK, 400ms Decay, with 1.5 OHM Source Impedance
Switching Frequency:	0 to 3K Hz
Output:	Open Collector PNP Sourcing, Normally Open
Sensing Distance (offset position):	1.27 ± 0.25 mm (.050" ± .010") of Full Stroke
Hysteresis:	0.25 mm (.010") Max.
Rise/Fall Time:	6.5/1.5 Microsec Rl = 820 OHM, Cl = 20 pF @ 8Vdc
Output Leakage Current:	10 mA Max
Output Voltage High:	+Vs – 2.2Vdc Min
Output Load Current:	200mA Max
Operating Pressure:	350 bar (5000 psi)
Operating Temperature:	-40° to 110°C
Humidity:	0% to 100%

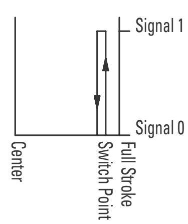
ATTENTION: EMC ONLY ENSURED WHEN USING SCREENED CABLES AND SCREENED PLUG CASING.

TYPICAL “PPA” OUTPUT



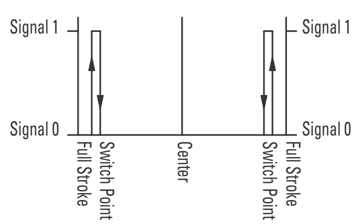
Signal 0 = Voltage at pin 4 = 0V
Signal 1 = Voltage at pin 4 > (Vs – 2.2V)

TYPICAL “PPB” OUTPUT

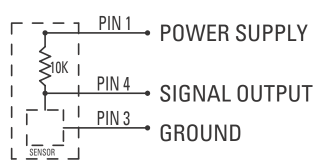


Signal 0 = Voltage at pin 4 = 0V
Signal 1 = Voltage at pin 4 > (Vs – 2.2V)

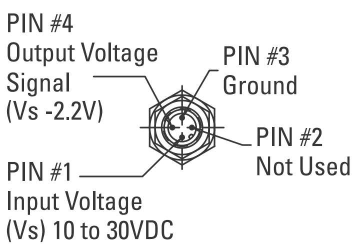
TYPICAL “PPD” OUTPUT



Output Circuit Wiring Instuctions



Connector Detail



Pilot Valves

General description

Pilot valves are identified in the model code by the following letters: "S" Standard or "H" High Performance. The pilot valves can be ordered to match a variety of mainstage spool types and valve bodies.

The chart below shows ordering information for each pilot valve. For example, to order a High Performance pilot "H" with a Spring Offset mainstage "A", use the following model code: DG4V-3- 2A-M-*-60

MINIMUM PILOT PRESSURE REQUIREMENTS

Spool Type	Pilot Pressure bar (psi)	
	A, B, C, F, N Models	**D Models**
Closed center	10 (150)	P to A: 12 (175) P to B: 21 (300)
Open center	5 (75)	P to A: 10 (150) P to B: 10 (150)

VALVE MODEL CODE: HIGH PERFORMANCE/STANDARD	MAIN STAGE SPOOL TYPE	PILOT VALVE MODEL CODE
DG5V-8-H-*A-*-M-*-10	All except 4 & 8	DG4V-3-2A-M-*-60
	4A & 8A only	DG4V-3-2AL-VM-*-60
	4AL & 8AL only	DG4V-3-2A-VM-*-60
DG5V-8-H-*B-*-M-*-10	All except 4 & 8	DG4V-3-6B-M-*-60
	4B & 8B only	DG4V-3-6BL-VM-*-60
	4BL & 8BL only	DG4V-3-6B-VM-*-60
DG5V-8-H-*C-*-M-*-10	All except 4 & 8	DG4V-3-6C-M-*-60
	4C & 8C only	DG4V-3-6C-VM-*-60
DG5V-8-H-*D-*-M-*-10	All except 4 & 8	DG4V-3-7C-M-*-60
	4D & 8D only	DG4V-3-7C-VM-*-60
DG5V-8-H-*F-*-M-*-10	All except 4 & 8	DG4V-3-6F-M-*-60
	4F & 8F only	DG4V-3-6FL-VM-*-60
	4FL & 8FL only	DG4V-3-6F-VM-*-60
DG5V-8-H-*N-*-M-*-10	All except 4 & 8	DG4V-3-6N-M-*-60
	4N & 8N only	DG4V-3-6N-VM-*-60

Notes

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