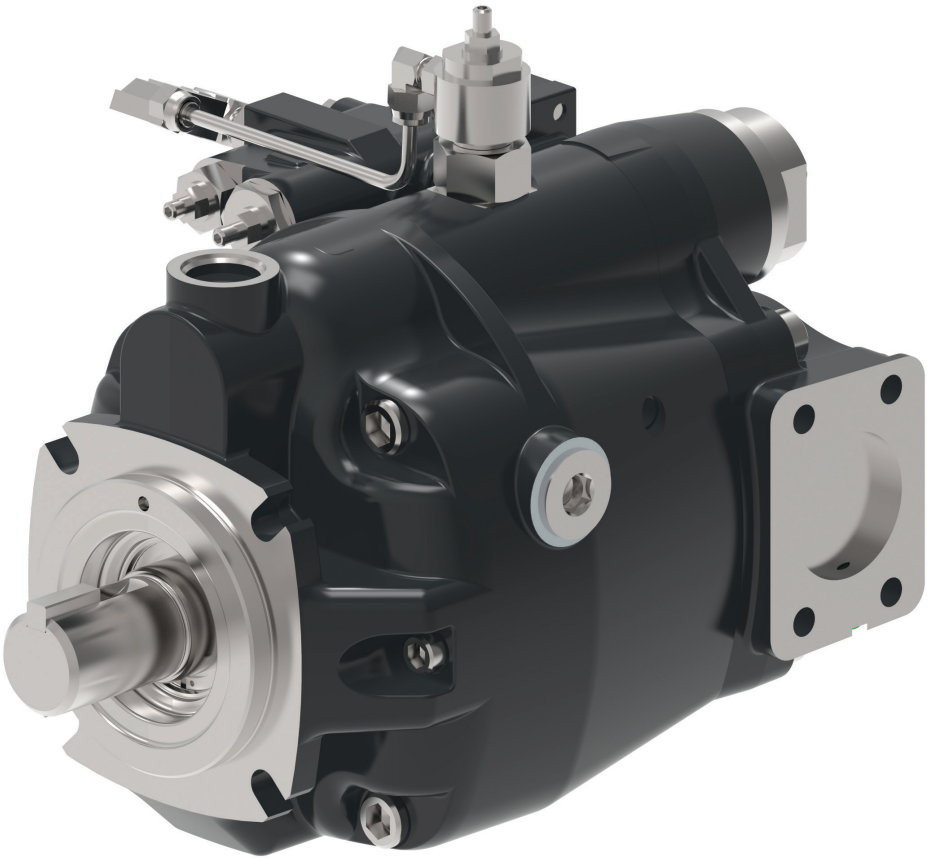
ENGINEERING
TOMORROW

User Guide

Vickers by Danfoss
PVM Variable Displacement Piston Pump
Design Code B

Up to 315 bar
131/141 cc/rev
(8 - 8.6 in^3/rev)
Variable Speed Drive Ready



VICKERS
by Danfoss

BC468270675805en-000101

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M Series Variable Displacement Piston Pumps

Introduction

Vickers by Danfoss 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 up to 315 bar (4568 psi) continuous with less maintenance cost. High-load carrying capacity bearings and a stiff drive shaft help provide very long life 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 flange is offered in SAE configurations, and ports are offered in SAE flange versions.

Side 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

- Tear drop shaped housing contains fluid borne sound and reduces operator fatigue
- Standard adjustable maximum volume screw and gage ports give the ultimate in flexibility to the engineer or service technician
- High overall efficiency reduces operating costs
- Robust shaft bearings extends operating life and lowers maintenance costs
- Multiple port types and locations aid in flexibility of machine design
- Very low pressure ripple reduces shock in the system resulting in less leakage

Model Code Selection

PVM	131	*	R	**	C	*	*	*	***	**	000	*	*	B	-	**	0	*
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

1,2,3 **Product Series**

PVM – M Series Variable Piston Pump

4,5,6 **Displacement**

131 131.1 cm3/r [8.00 in3/r] (315 bar max.)
141 141.0 cm3/r [8.60 in3/r] (230 bar max.)

7 **Valve Plate**

E - Industrial -1800 rpm max

M - Higher speed version.

8 **Input Rotation**

R – Clockwise (Right hand)

L – Counter-clockwise (Left hand)

9, 10 **Input Shaft**

09 - SAE J744-32-1 SAE C Straight Keyed
10 - SAE J744-38-1 SAE C-C Straight Keyed
11 - SAE J744-32-4 SAE C 14T Spline
13 - SAE J744-44-1 SAE D Straight Keyed
14 - SAE J744-44-4 SAE D 13T Spline
25 - SAE J744-127-4 C 4-BOLT with 38.1 [1.50] dia. Straight Woodruff Keyed

11 **Mounting Flange**

G – SAE J744-127-4 C 4-Bolt
J – SAE J744-152-4 D 4-Bolt

12 **Main Port Location**

S – Side Ported

13 **Main Port Type**

2 - SAE J518 Flange Ports SAE Auxiliary Ports
4 - Flange W/ M33x2 Case Drain Port

14 **Control**

0 - None
A - Pressure Compensator
B - Pressure and Flow Compensator with Bleed Down Orifice
C - Pressure and Flow Compensator with Plugged Orifice
E - Industrial Control (Pressure and flow compensated)
F -Industrial Control (Pressure compensated)
L - Power Control/Torque Limiter

15,16,17 **Pressure Compensator Setting**

000 - None
070 - 070±4 bar [1015±58 lbf/in2] [Default]
230 - 230±4 bar [3335±58 lbf/in2] [Default for 141 cc/r]
315 - 315 bar [4567 lbf/in2] [Default for 131cc/r]

18,19 **Flow Compensator Setting**

00 – None
11 – 11 bar setting
20 – 20 bar setting

20,21,22 **Power control Torque Limiter Setting**

000 – None
050 – Limited to 50 kW* (Adjustable From 20-90 % Of Rated Torque, * For Any Other Values Specify Power in kW, Available in Increments Of 5 kW)

23 **Auxiliary Mounting Pad**

0 - None (Non-Through Drive)
1 - Auxiliary SAE A-Mount with Cover Plate and No Coupler
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

24 **Paint**

0 – No paint
A – Standard black paint

25 **Design Code**

B – B

Differentiator

26 **-** -

27, 28 **Pump Special Features**

00 – Adjustable Max Displacement Stop

29 **Compensator Special Features**

0 – None
(Contact Danfoss for options)

30 **Customer Identification**

0 – None
(Contact Danfoss for options)

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	Geometric Displacement cm³/r (in³/r)	Maximum Pressure bar (psi) Nominal	Peak**	Maximum Flow at 315 bar (4500 psi) @1800 r/min	@1500 r/min	@1200 r/min	@1000 r/min
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)

**Less than 0.5 second.

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. @1800r/min	@1500 r/min	@1200r/min	@1000r/min	Max torque at 280 bar (4000psi) Nm (lb-ft)r/min	Approx Wt kg (lb)
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)
PVM131	135	30
PVM141	100	30

*Values with pressure compensator control.

High 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 cm³/r (in³/r)	Maximum Pressure bar (psi) Nominal	Peak**	Maximum Flow at 315 bar (4500 psi) Flange Ports l/min (USgpm) @ 1 bar inlet
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.

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

Approximate Model Series	Operating Speed and Pressure r/min 1 bar Inlet Flange Ports	0,85 bar Inlet Flange Ports	Max. Input Power at Max. Speed and 280 bar (4000 psi) kW (hp)	Max. Torque at 280 bar (4000 psi) Nm (lb-ft)	Weight (dry) kg (lbs)
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)		

Standard Response Times*

Model Series	On Stroke (msec)	Off Stroke (msec)
PVM131	100	30
PVM050	128	28

*Values with pressure compensator control.

Specifications and Performance

Variable Speed Drive

Variable Speed Performance- System Pressure vs Speed

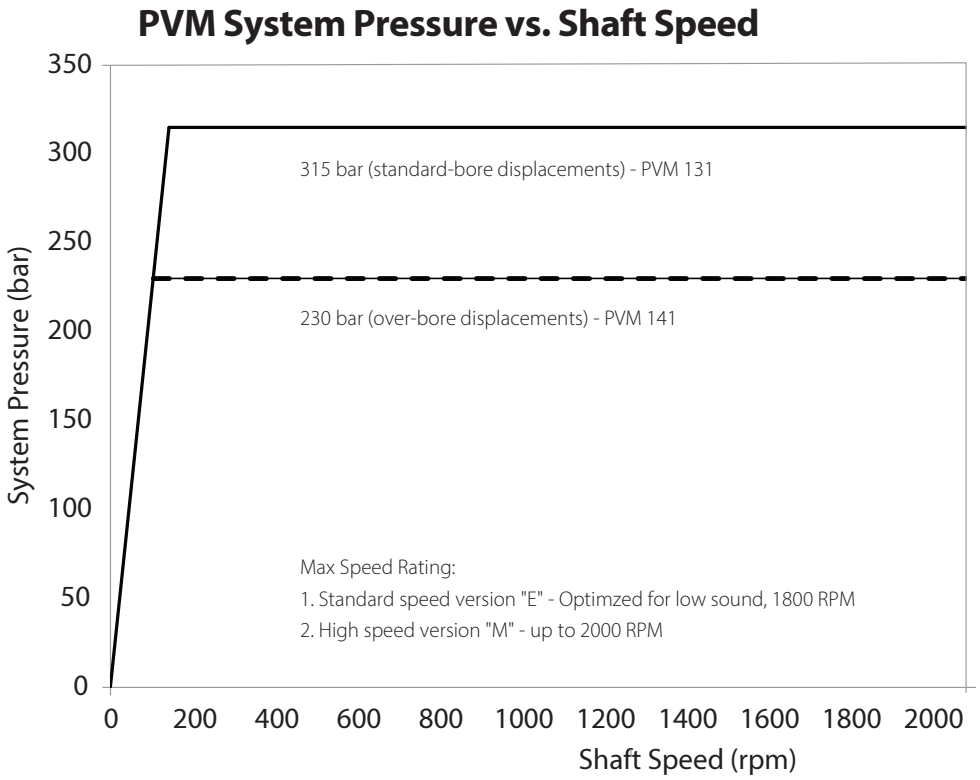
Model Series	Max Speed "E"* (rpm)	Max Speed "M"*(rpm)	Min Speed (rpm)	Nominal Pressure (bar)	Peak Pressure (bar) **	Inertia (kg-cm2)
PVM131	1800	2000	0	315	350	213.5
PVM141	1800	2000	0	230	280	209.7

* Valve plate type
**Less than 0.5 second.

Note - For Variable Speed Drive applications, Modelcode Position 14 should be set at 0 and position 15, 16, 17 should be set to 000 to configure pump to "Fixed Displacement" type.

Moment of Inertia (single pump rotating group)

Model	Moment of Inertia	
	N-m (sec^2)	lbf-in (sec^2)
PVM131	0.0213	0.1889
PVM141	0.0210	0.1856



Test condition: Mineral oil SAE 10W, oil temperature 49º C (120º 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.

⚠ **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

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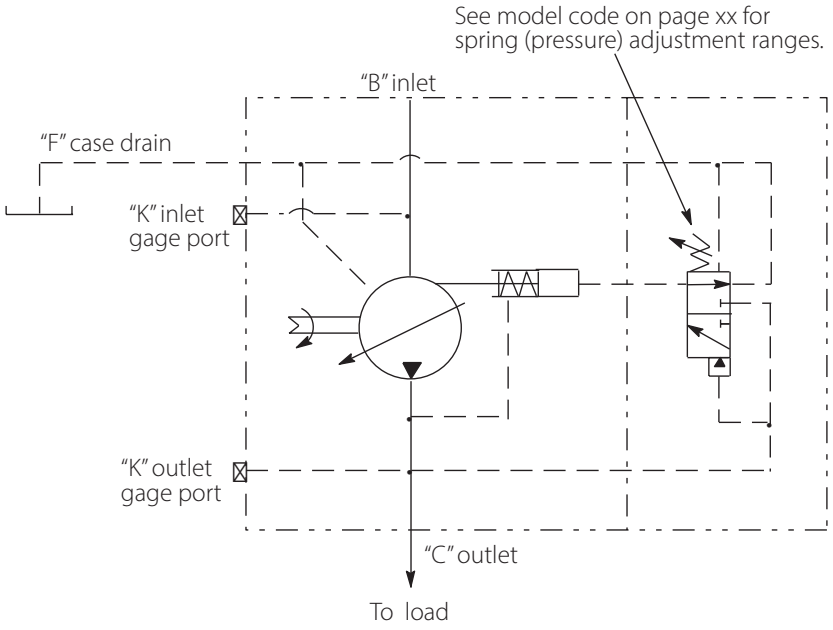
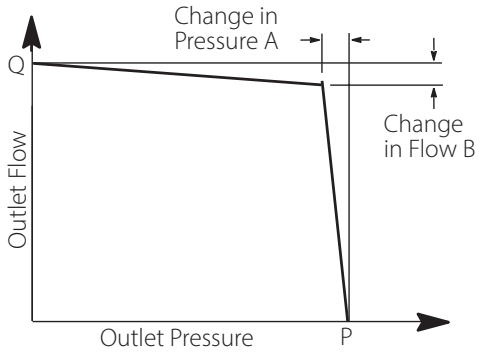


Pressure Cut-off Characteristics of Pressure Compensator Control

Industrial: at 50°C (120°F), Static conditions
Mobile: 93°C (200 °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)
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)

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)
PVM131	2000	253 (67)	315 (4568)	1,0 (15)	23 (6.0)
PVM141	2000	258 (68)	230 (3300)	7,0 (100)	14 (3.70)

Control Options

Load Sensing and Pressure Compensator Control – Code B or C

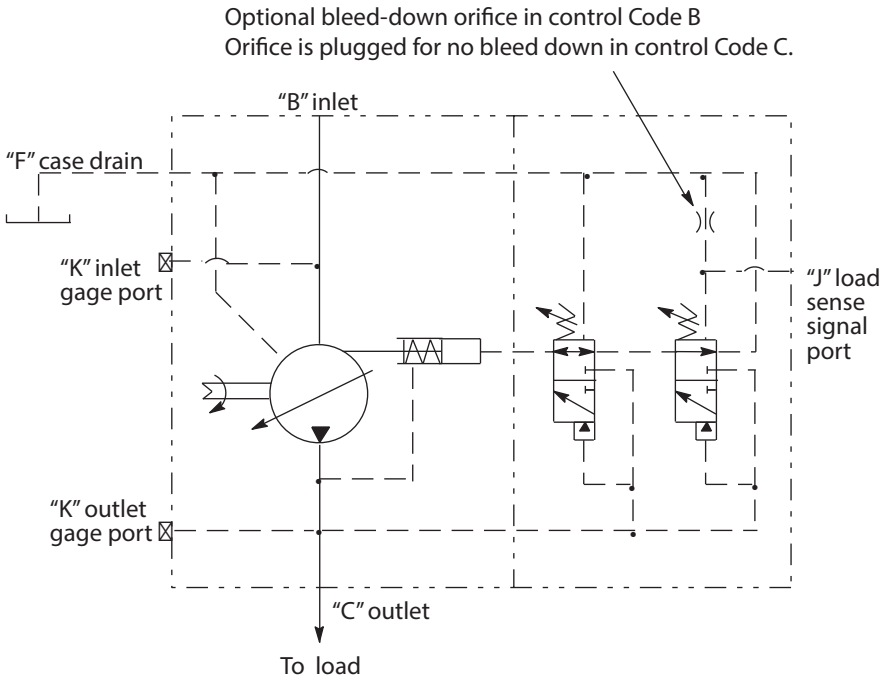
The pump will provide power matching of pump output to system load demand, maximizing efficiency and improving load metering characteristics of any directional control valve installed between the pump and the load.

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.

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 Danfoss 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..



Control Options

Industrial Control
Compensator – Code E and F

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.

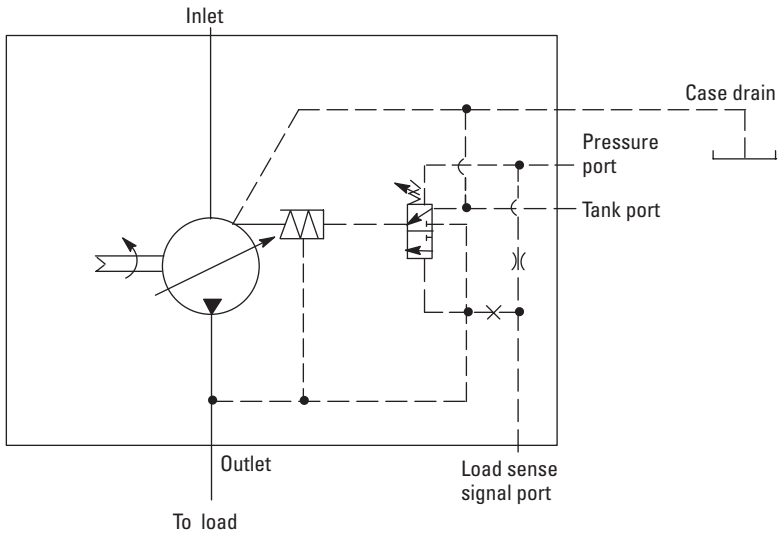
An external relief valve (not supplied) controls spring chamber pressure. The externally adjustable spring determines the differential pressure setting of the control. Outlet pressure is limited to the valve of the spring chamber (pressure port) pressure, plus control differential pressure.

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.

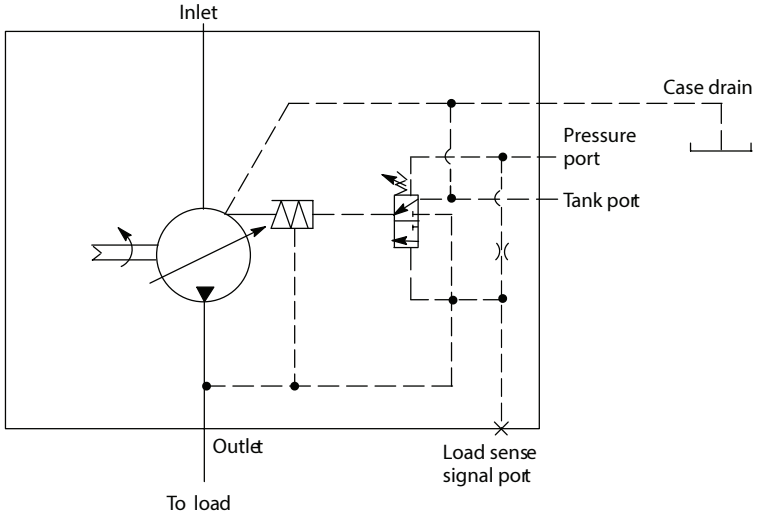
The relief valve can be mounted to an NFPA-D03/ISO 4401-03 pad on the pump control, or remotely located via tapping and blanking plates installed on the pad.

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.

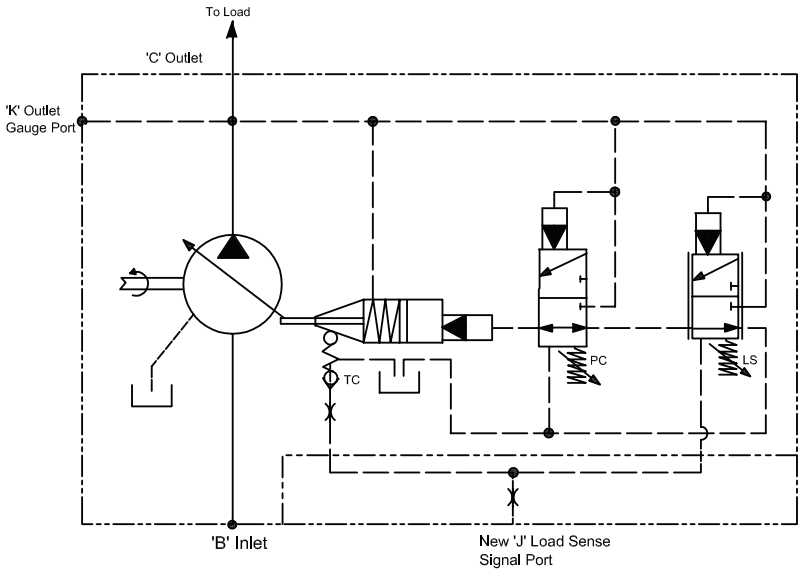
As pressure increases the pump displacement is reduced such that the set torque value is not exceeded.

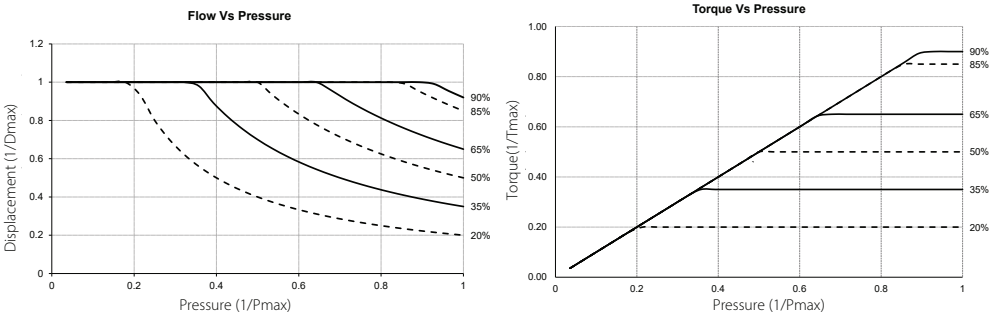
The torque can be set between 20-90% of rated torque for given displacement at 1500 rpm.

⚠ 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.

Note:

If the application runs at a different speed, for example 1800 rpm, and the power should be limited to 50 kW then use this formula:
(50 kW)/(1800 rpm)×1500 rpm=41.66 kW
Then round off to the next available modelcode i.e., 045.





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
131	5815 (657)	1164 (131.5)	1726 (591)
141	5443 (516)	912 (103)	4111 (464.5)

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

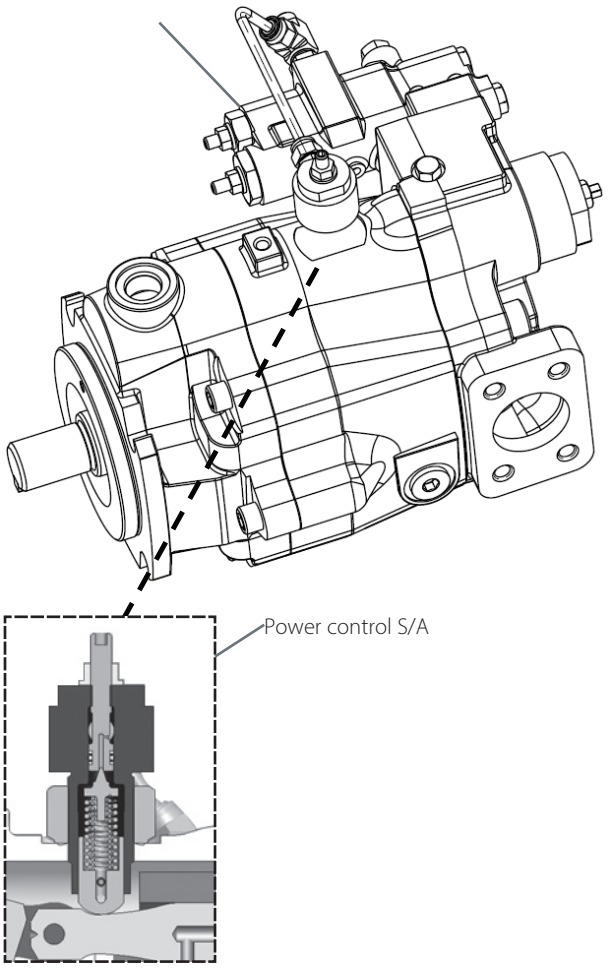
Control Options

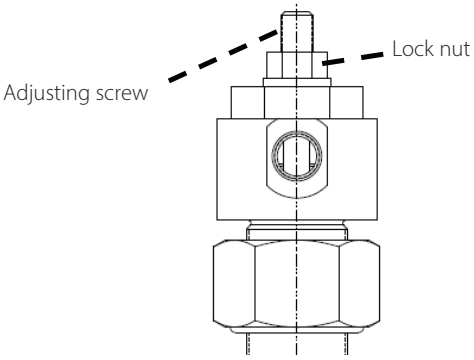
Operation and installation - Power Control / Torque Limiter

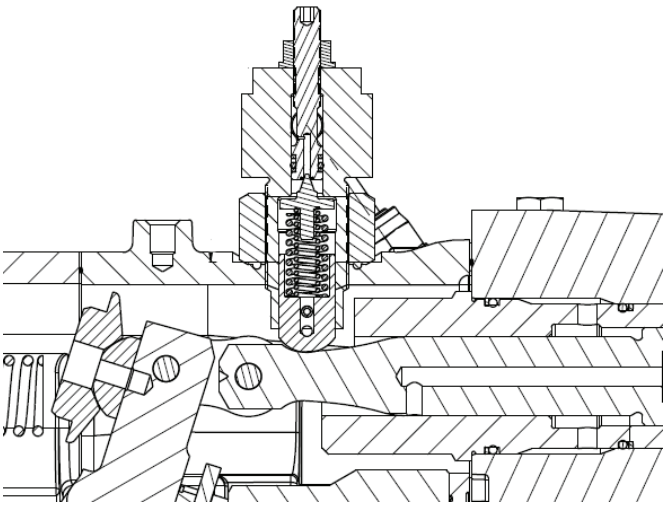
Description

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

Pump with Power limiter control







Power Control Operation

The Power Control Subassembly consists of a poppet type valve guided by a specially designed control piston with a unique profile. The pressure setting 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 pressure setting is high. As displacement is increased, the pressure setting 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 input power.

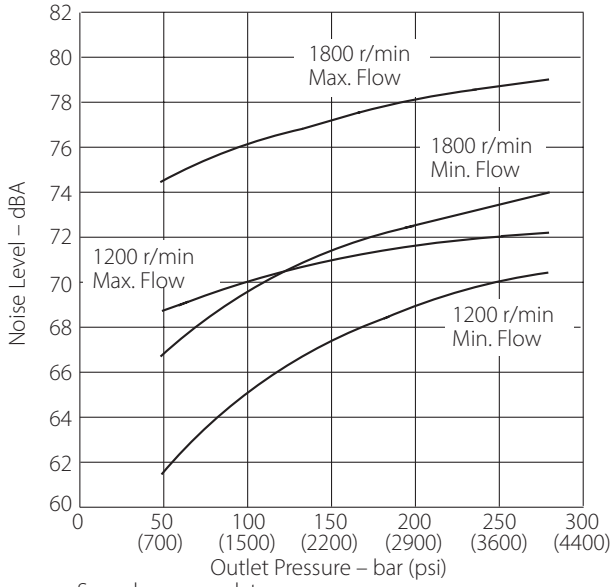
Power Control Adjustment

To adjust the control power setting, power measurement devices are required. For Input power, motor torque and speed need to be measured, typically achieved by use of a clamp style ammeter. For output power, devices for pump pressure and flow measurements are required, such as pressure gages or transducers, and flow meters. The pump comes with factory set power setting. 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 a hex key. Rotating adjustment screw clockwise increases the power setting while rotating it anti-clockwise reduces it. After adjustment as required ensure that the locknut is tightened properly.

Performance

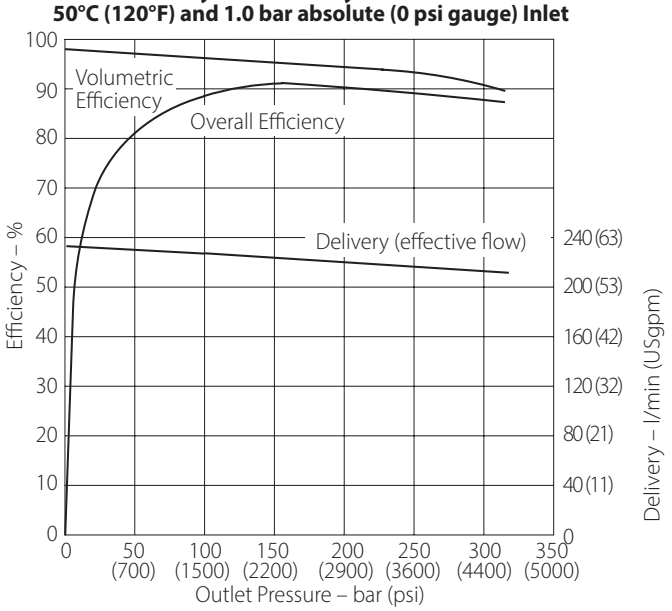
Quiet version, optimized for 1000-1800 rpm (E) PVM131

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

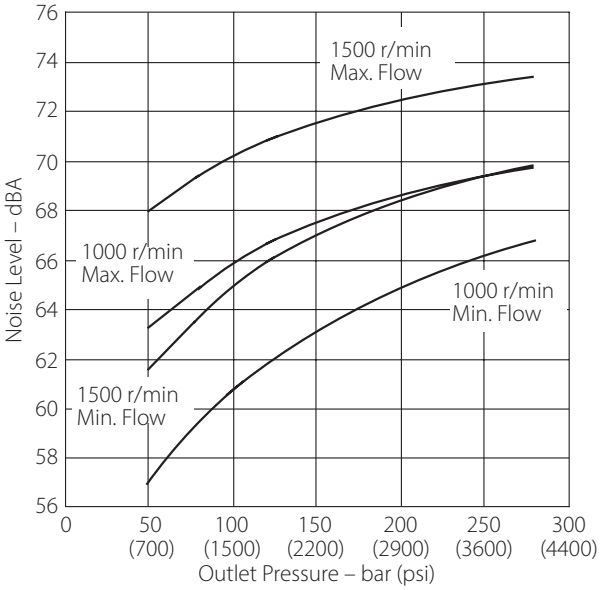


Sound pressure data
equivalent to NFPA

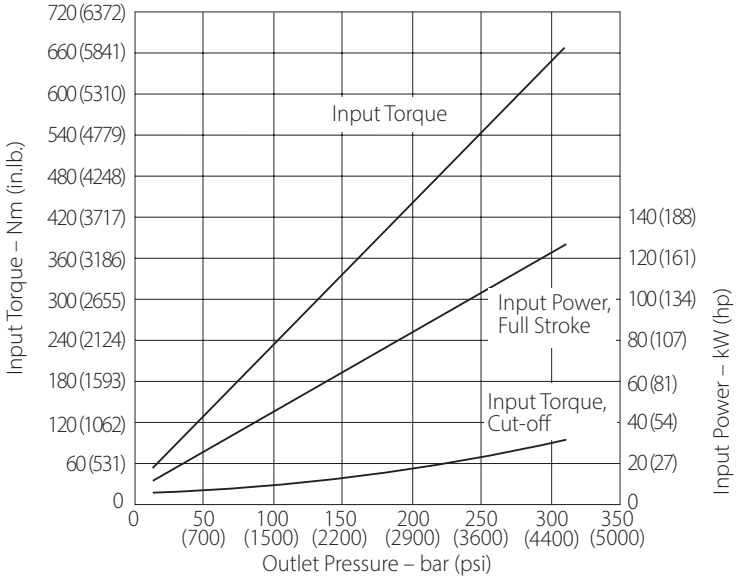
Delivery and E ciency at 1800 r/min
50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet



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

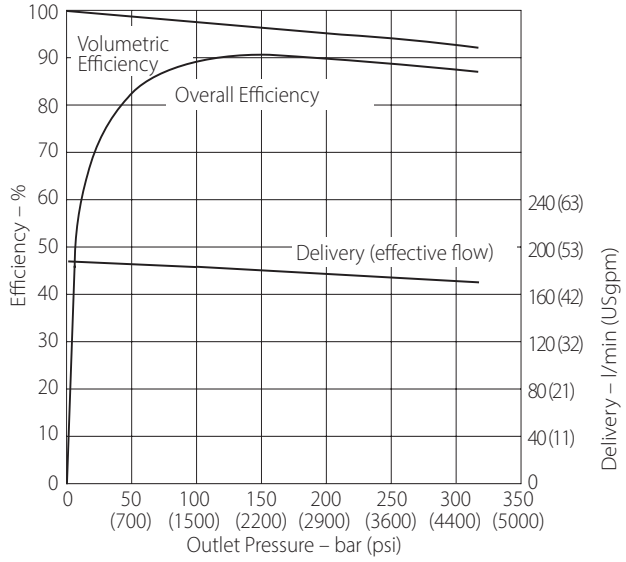


Performance

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

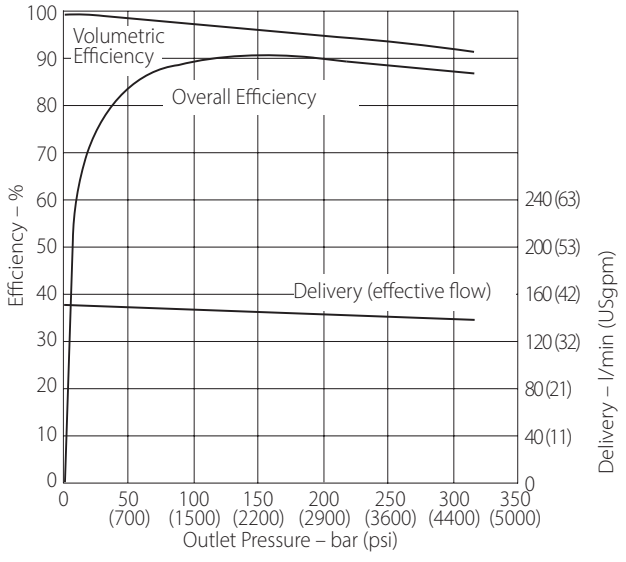
Delivery and E ciency at 1500 r/min

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



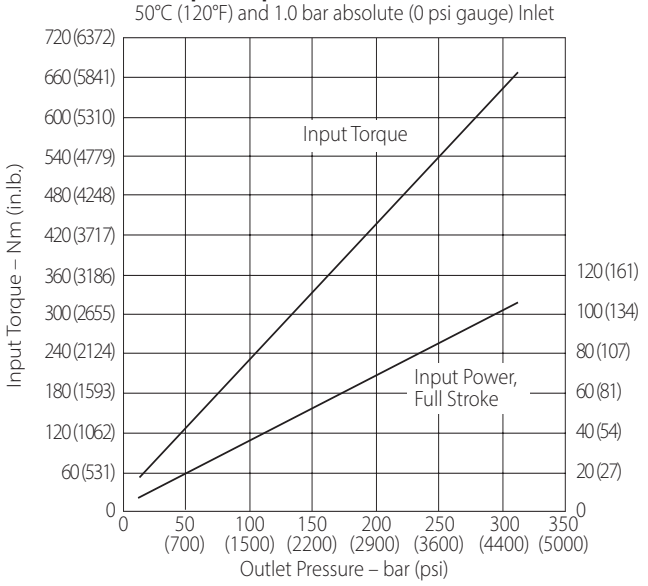
Delivery and E ciency at 1200 r/min

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



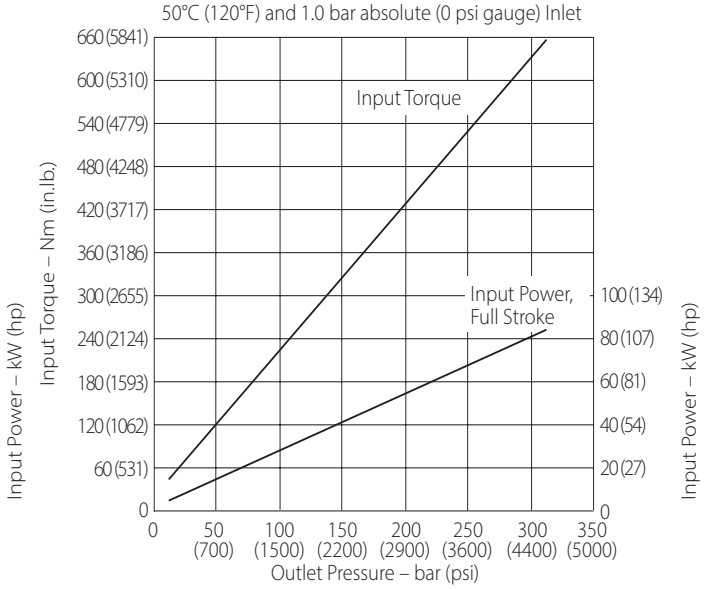
Input Torque and Power at 1500 r/min

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

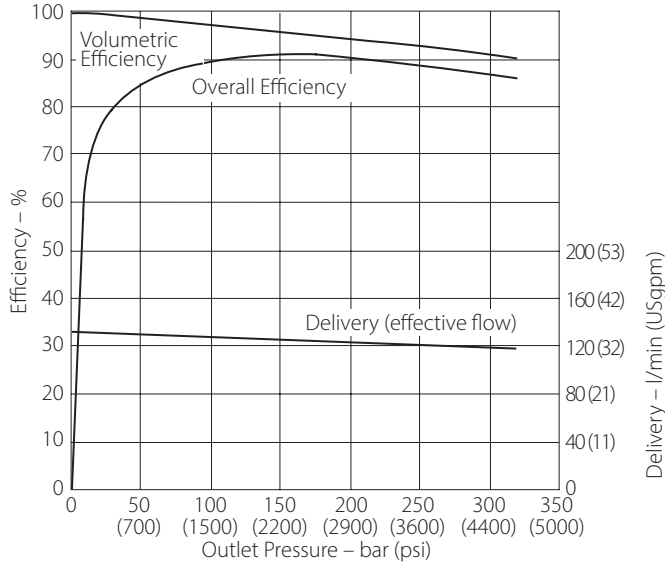


Performance

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

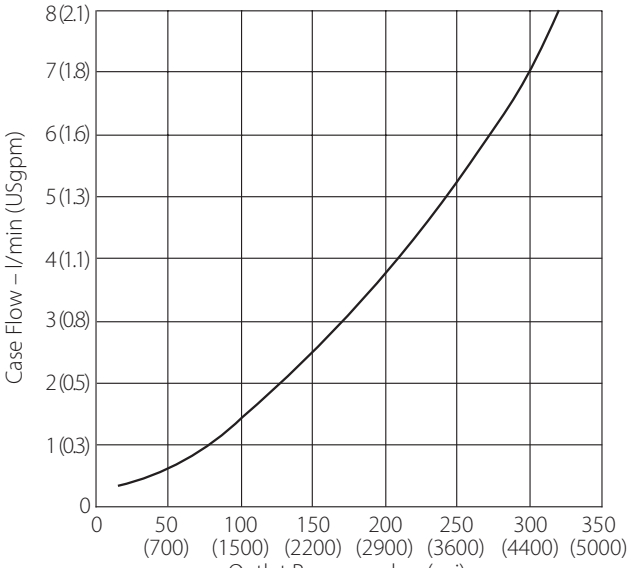
Delivery and E ciency at 1000 r/min

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



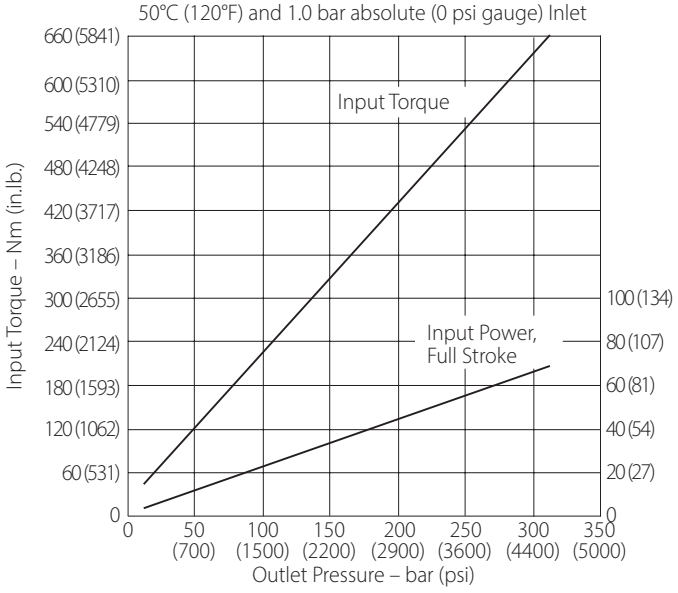
Case Flow Versus Outlet Pressure at Full Flow, 1800 r/min

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



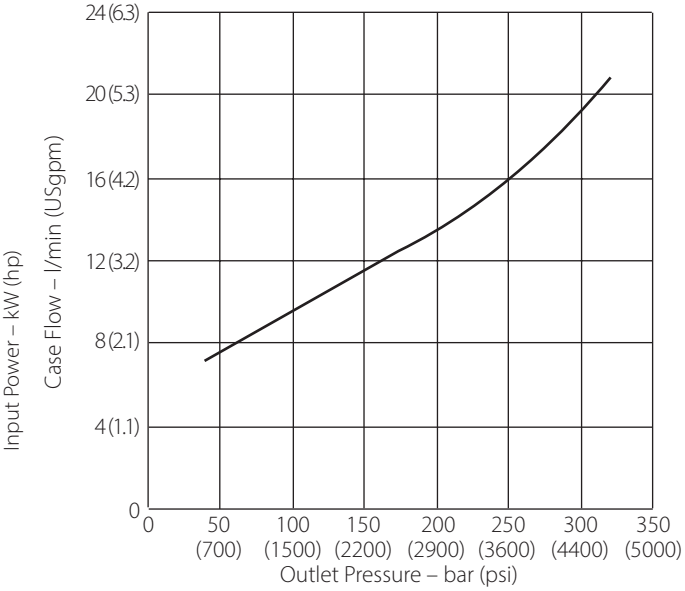
Input Torque and Power at 1000 r/min

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



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

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

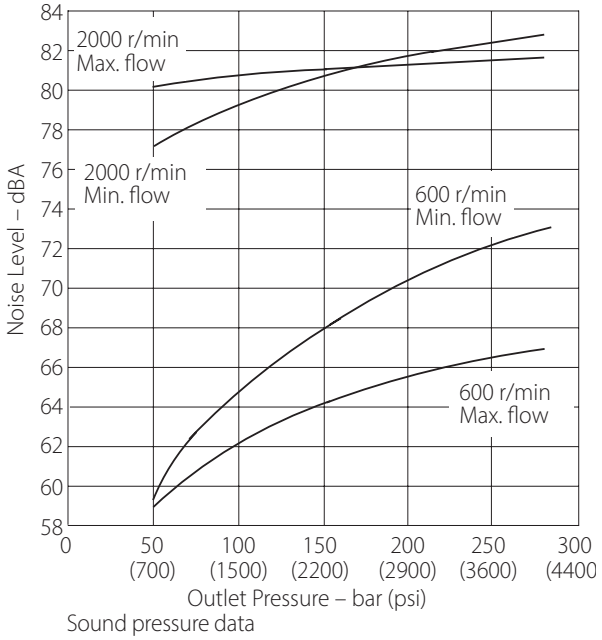


Performance

Higher speed version (M) PVM131

Typical Noise Levels at 2000 and 600 r/min

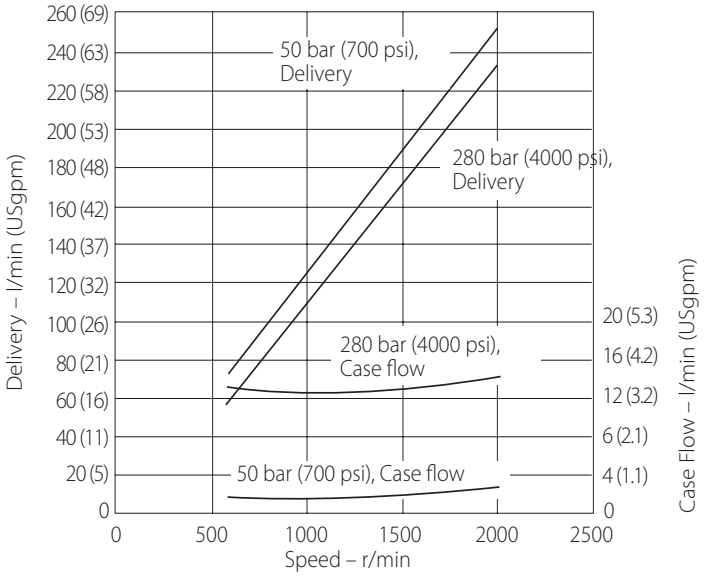
with petroleum oil (10 W) @ 93°C (200°F)
and 1.0 bar absolute (0 psi gauge) inlet



Sound pressure data
equivalent to NFPA

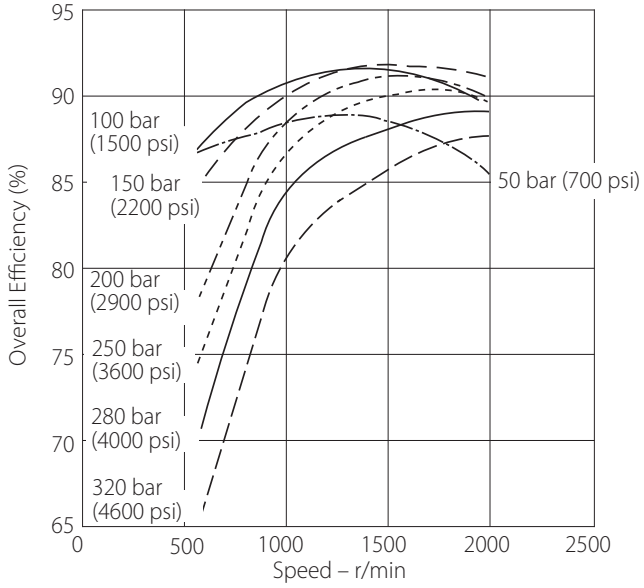
Delivery and Case Flow Versus Speed

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



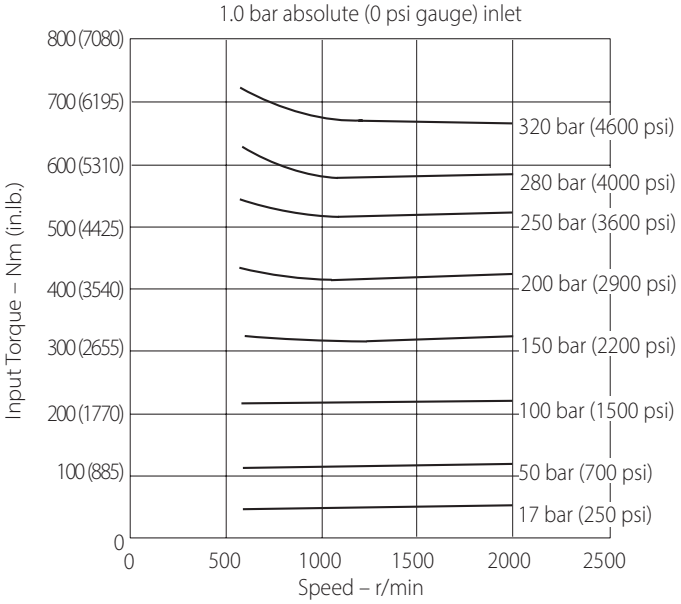
Overall E ciency Versus Speed

@ 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

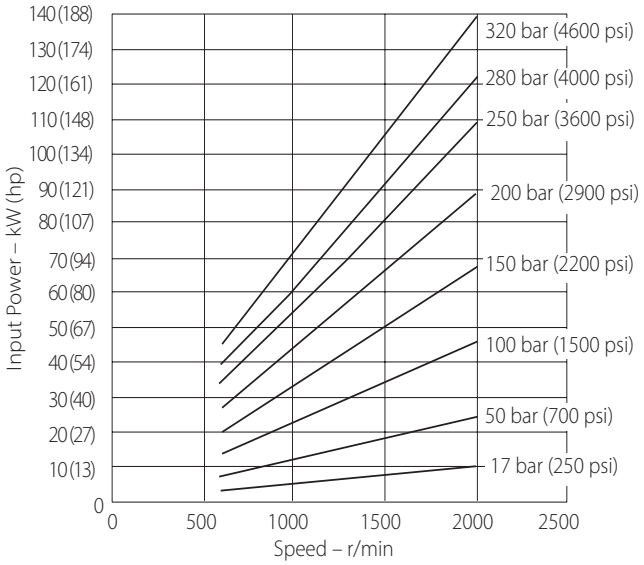


Performance

Higher speed version (M) PVM131

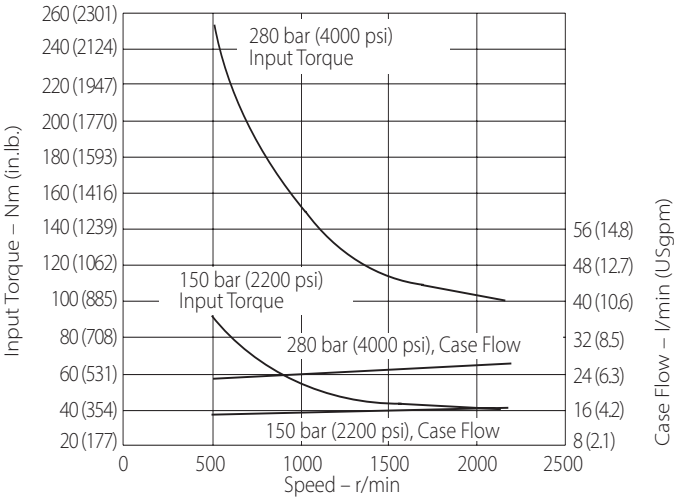
Input Power Versus Speed

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



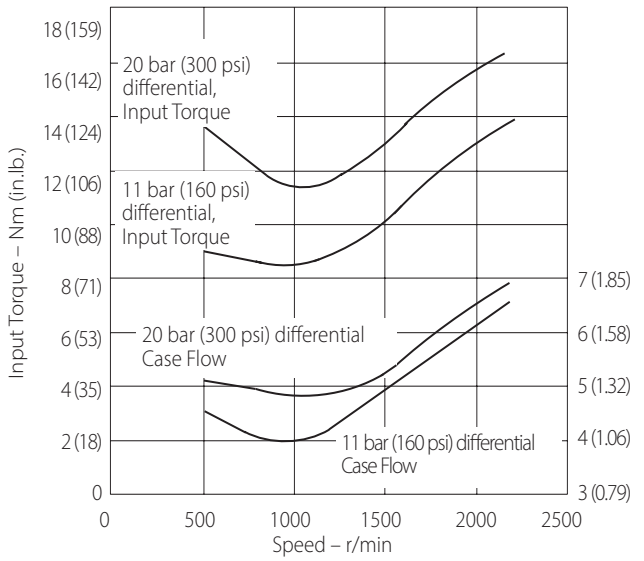
Input Torque and Case Flow Versus Speed

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



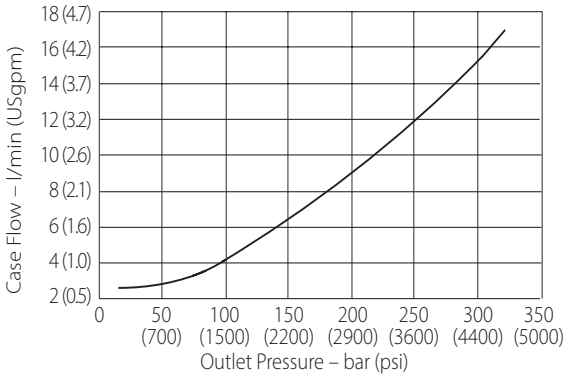
Input Torque and Case Flow Versus Speed

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



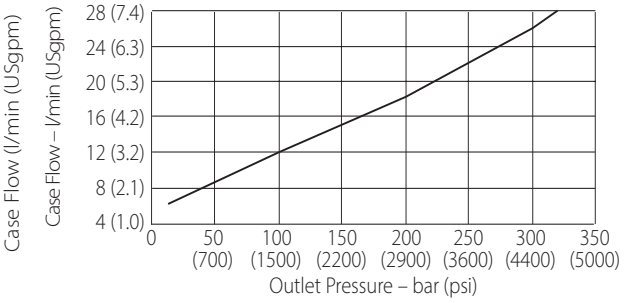
Case Flow at 2000 r/min, Full Flow

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



Case Flow at 2000 r/min, Minimum Flow

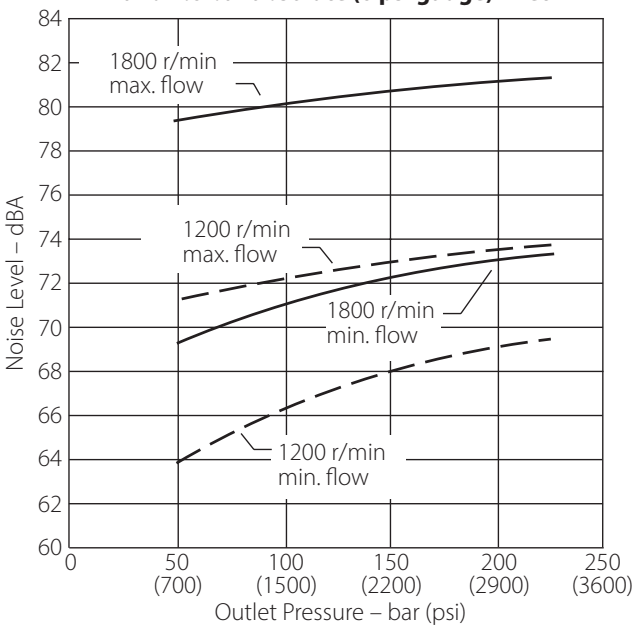
93°C (200°F), 1.0 bar absolute (0 psi gauge) Inlet



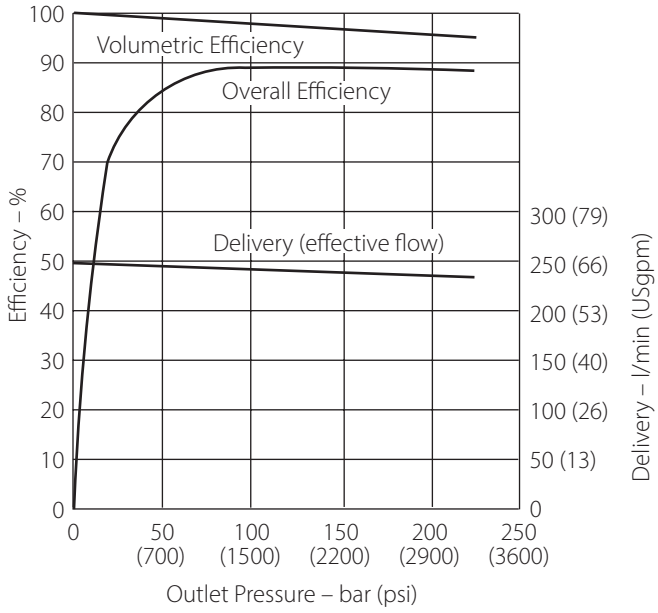
Performance

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

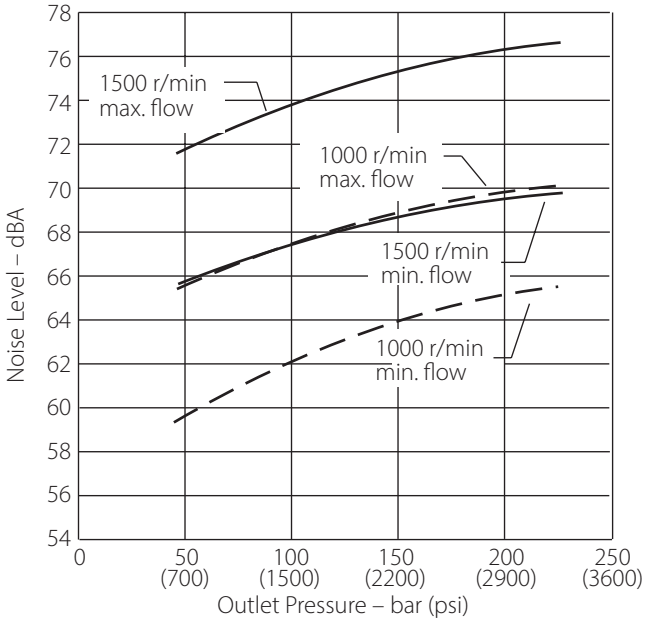
Typical Noise Levels at 1800 and 1200 r/min with Petroleum Oil (10W) at 50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet



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

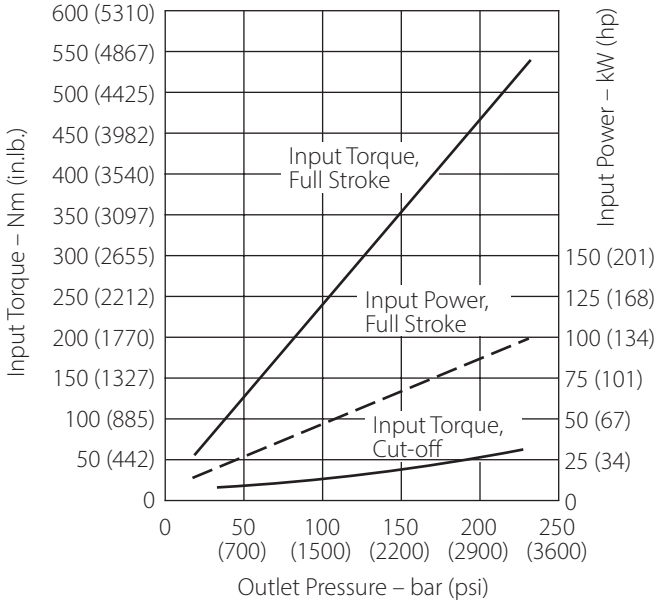


Typical Noise Levels 1500 and 1000 r/min with Petroleum Oil (10W) at 50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet



Sound pressure data equivalent to NFPA.

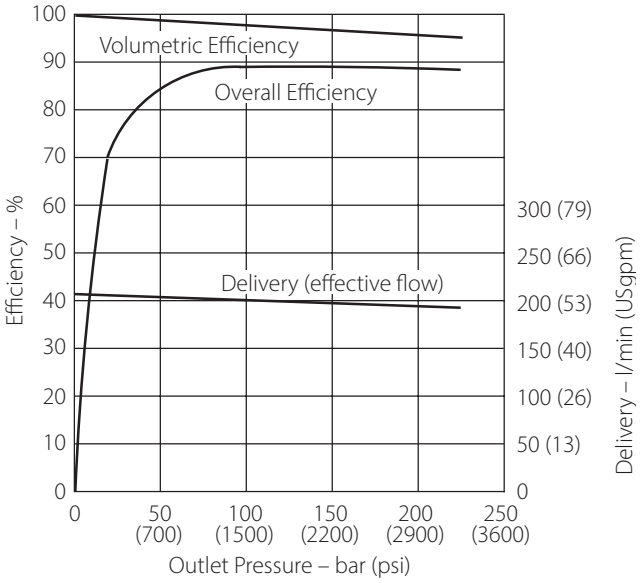
Input Torque and Power at 1800 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



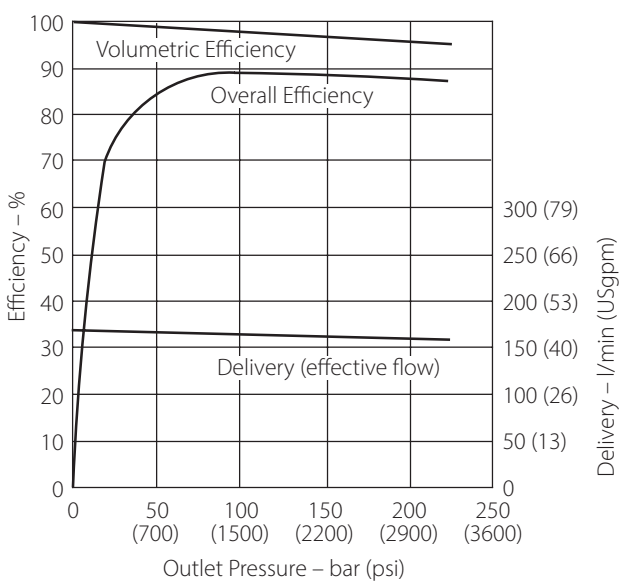
Performance

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

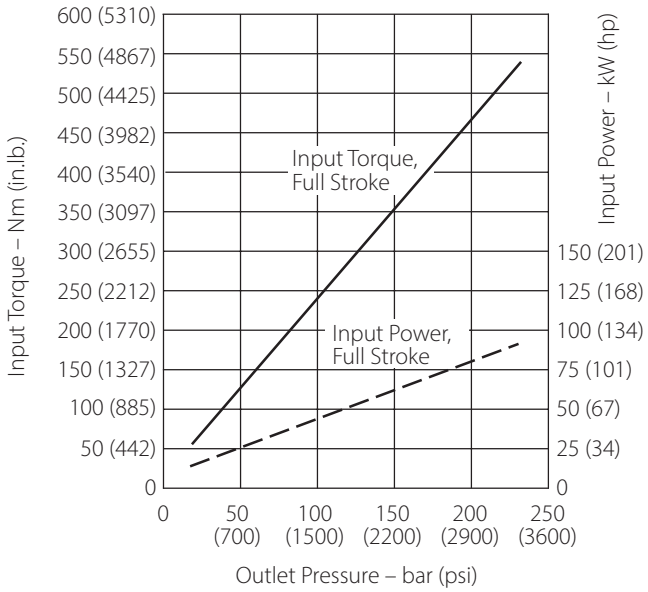
Delivery and E ciency at 1500 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



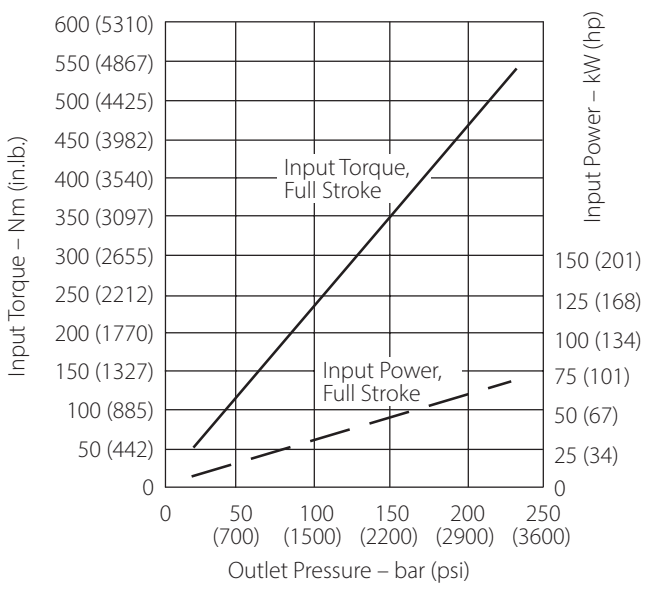
Delivery and E ciency at 1200 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



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



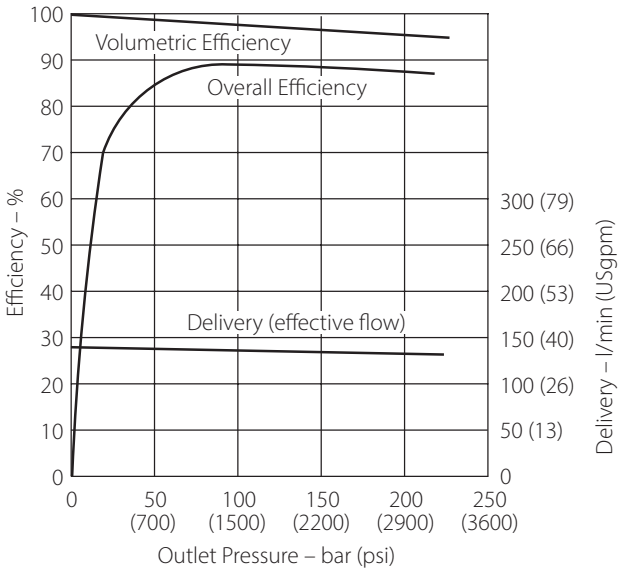
Input Torque and Power at 1200 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



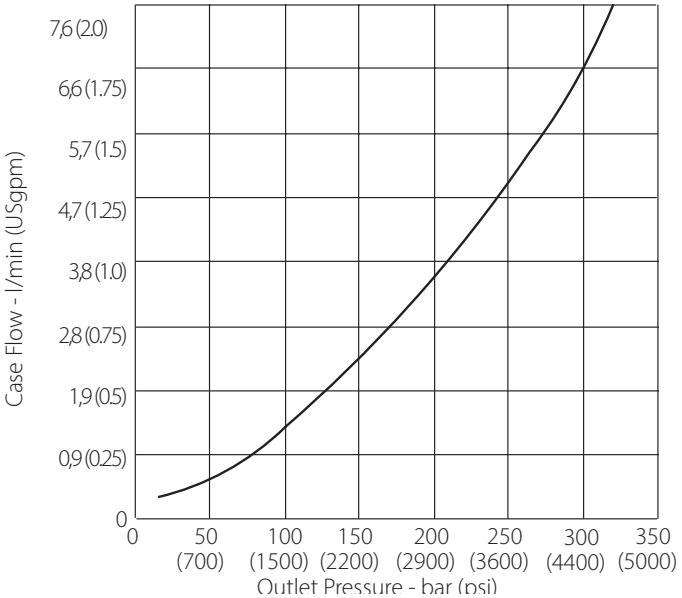
Performance

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

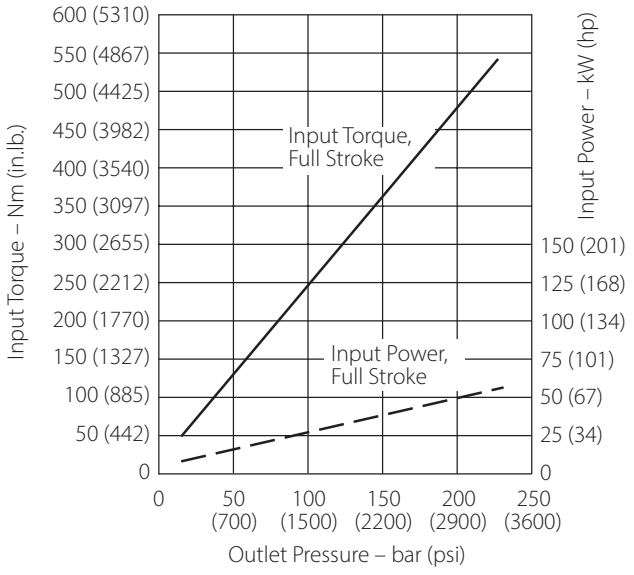
Delivery and E ciency at 1000 r/min, 50C (120F), and 1.0 bar absolute (0 psi gauge) Inlet



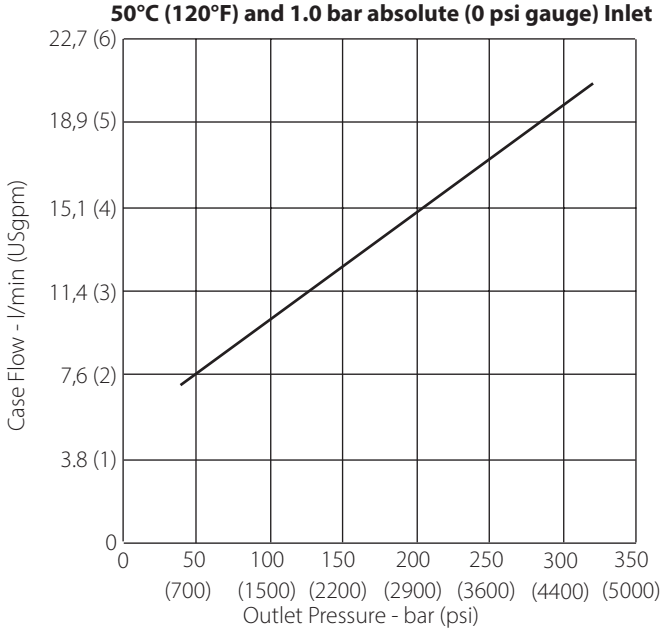
Case Flow Versus Outlet Pressure at Full Flow, 1800 r/min 50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet



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



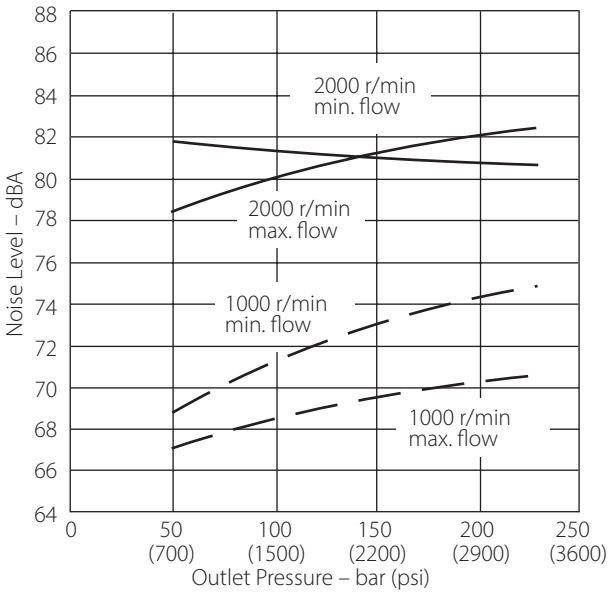
Case Flow Versus Outlet Pressure at Cuto , 1800 r/min 50°C (120°F) and 1.0 bar absolute (0 psi gauge) Inlet



Performance

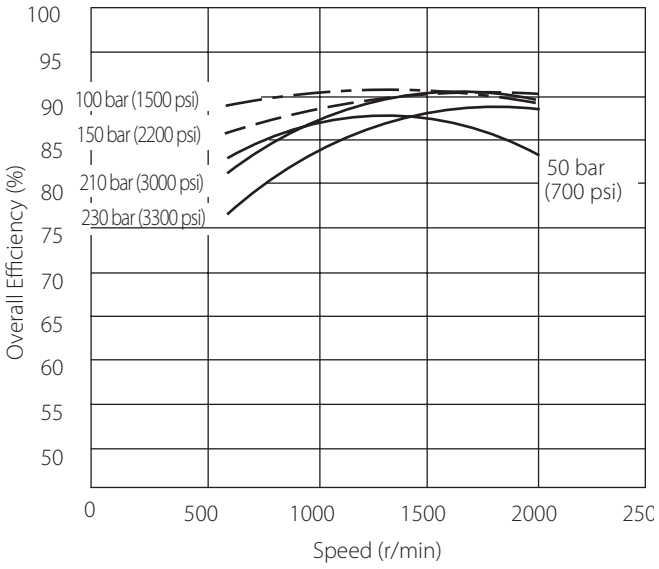
Higher speed version (M) PVM141

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

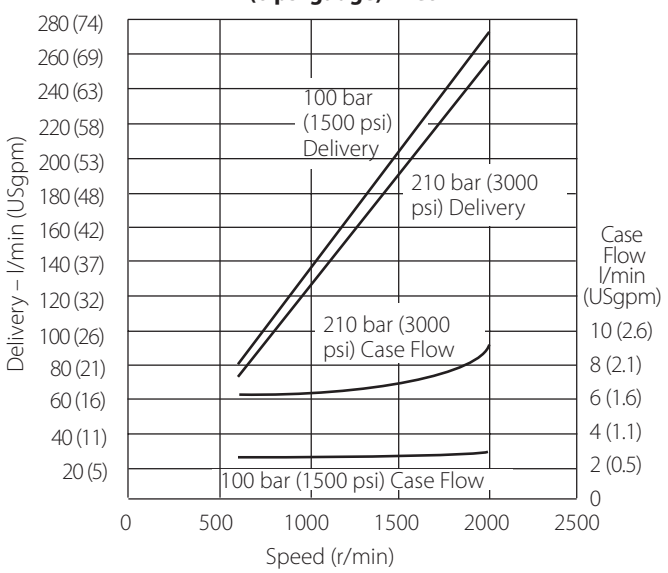


Sound pressure data equivalent to NFPA.

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



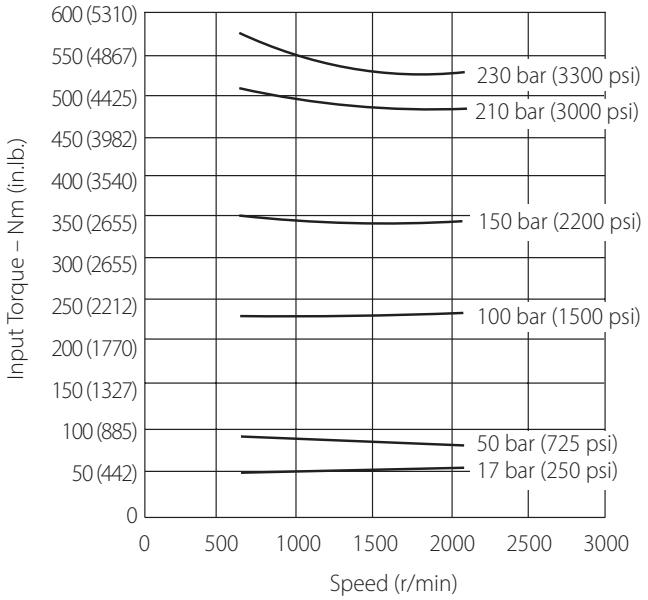
Delivery and Case Flow versus Speed at 93°C (200°F), Full Flow and 1.0 bar absolute (0 psi gauge) Inlet



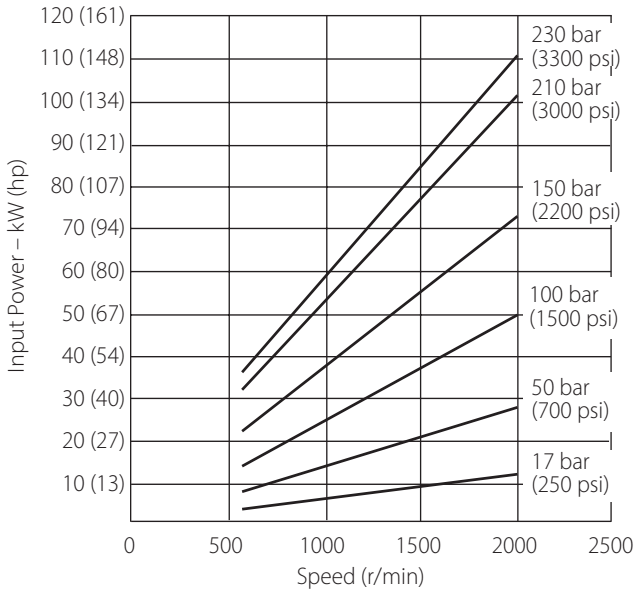
Performance

Higher speed version (M) PVM141

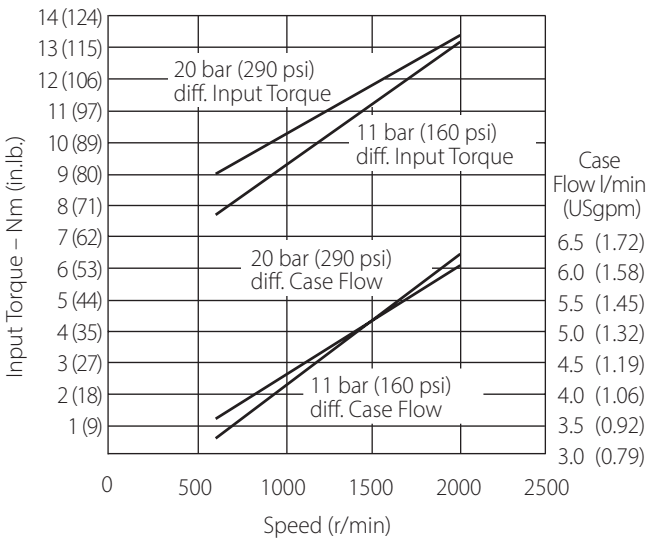
Input Torque versus Speed at 93°C (200°F), Full Flow and 1.0 bar absolute (0 psi gauge) Inlet



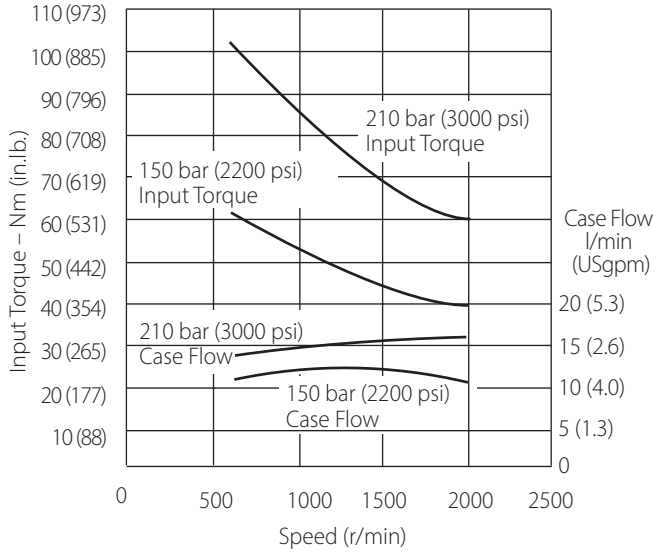
Input Power versus Speed, 93°C (200°F), and 1.0 bar absolute (0 psi gauge) Inlet



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



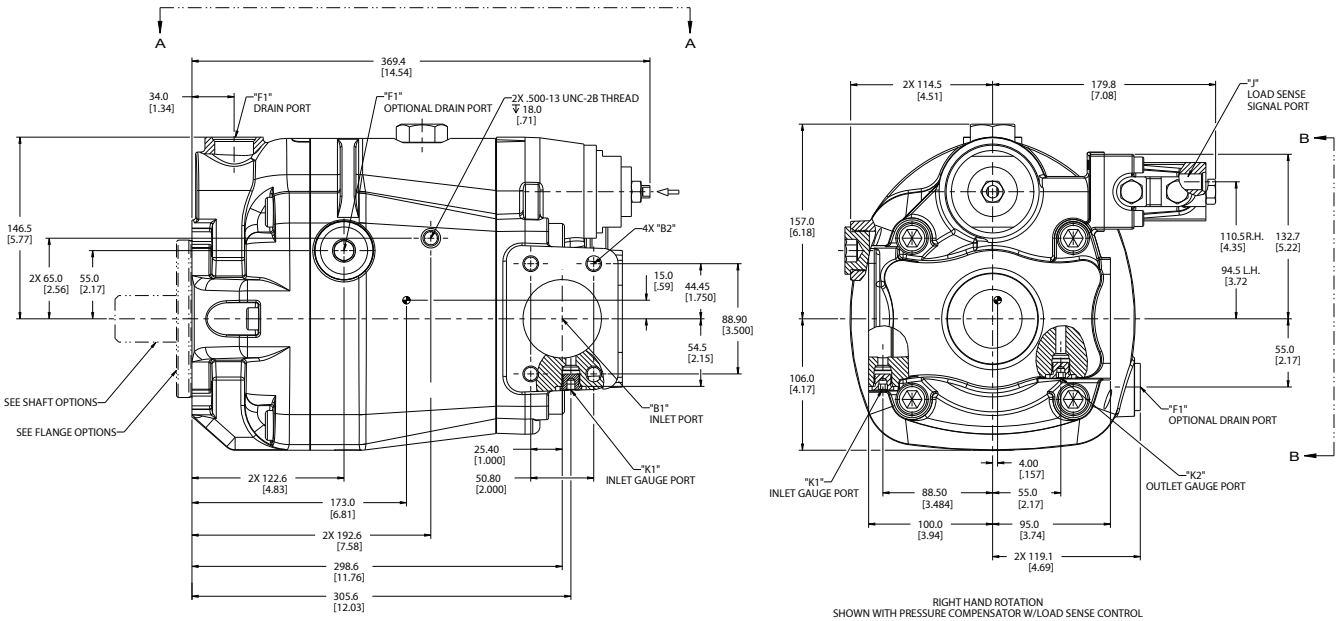
Input Torque and Case Flow versus Speed at 93°C (200°F), Pressure Limit Cut-O and 1.0 bar absolute (0 psi gauge) Inlet



Side-ported Models

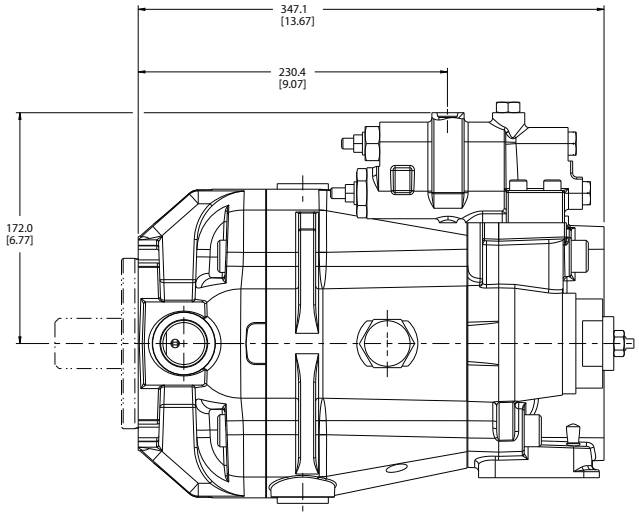
Without through-drive capability

PVM131/141

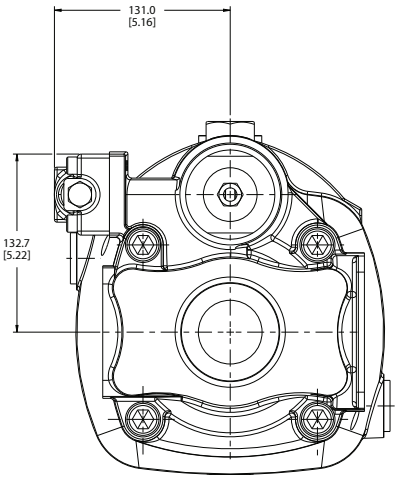


RIGHT HAND ROTATION
SHOWN WITH PRESSURE COMPENSATOR W/LOAD SENSE CONTROL

PORT	"B1"	"B2"	"C1"	"C2"	"F1"	"J"	"K1"	"K2"
SAE PORT	Ø 2.5 INLET PORT "B" SAE J518C 4 BOLT FLANGE PORT STANDARD PRESSURE SERIES	.500-13 UNC-2B THREAD ↧ 1.19 MINIMUM	Ø 1.25 OUTLET PORT "C" SAE J518C, 4 BOLT FLANGE PORT HIGH PRESSURE SERIES	.500-13 UNC-2B THREAD ↧ 1.00 MINIMUM	SAE J514 O-RING BOSS PORT "F" FOR 1 O.D. TUBE 1.3125-12UN-2B THREAD	SAE O-RING BOSS PORT "J" FOR .375 O.D. TUBE .562-18 UNF-2B THREAD	SAE J514 O-RING BOSS PORT "K1" FOR .375 O.D. TUBE .562-18 UNF-2B THREAD	SAE J514 O-RING BOSS PORT "K2" FOR .375 O.D. TUBE .562-18 UNF-2B THREAD



VIEW A-A

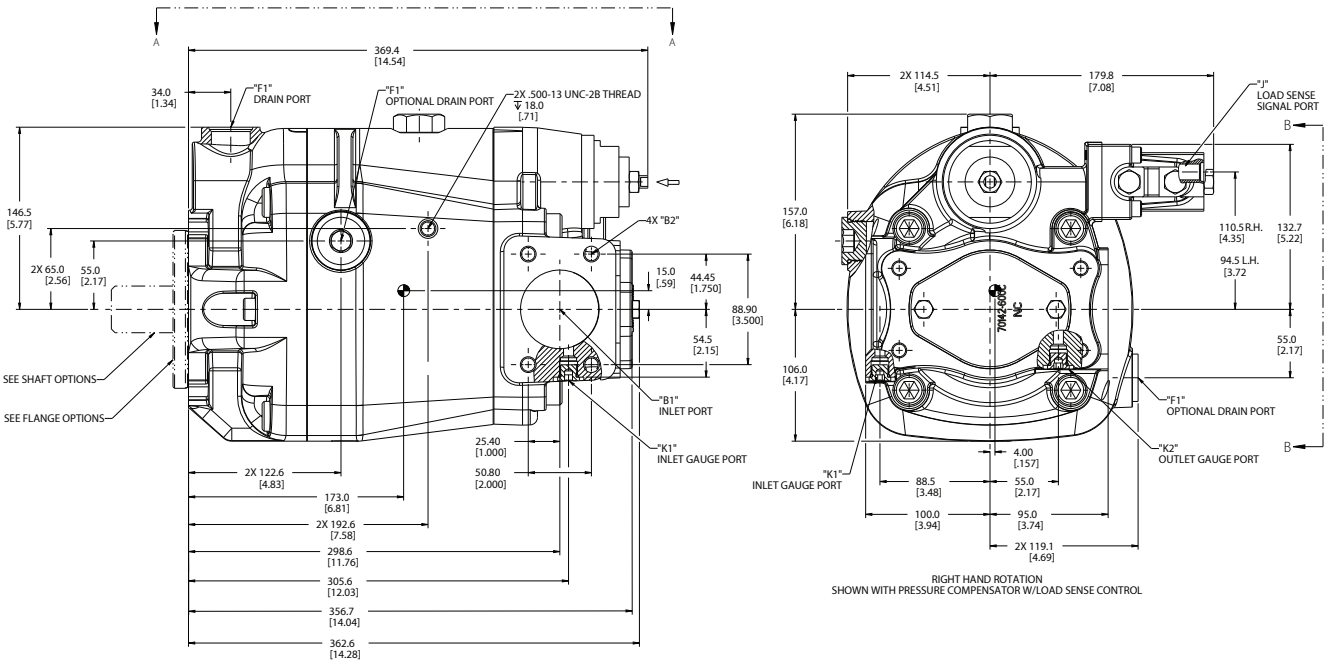


LEFT HAND ROTATION
SHOWN WITH PRESSURE COMPENSATOR

Side-ported Models

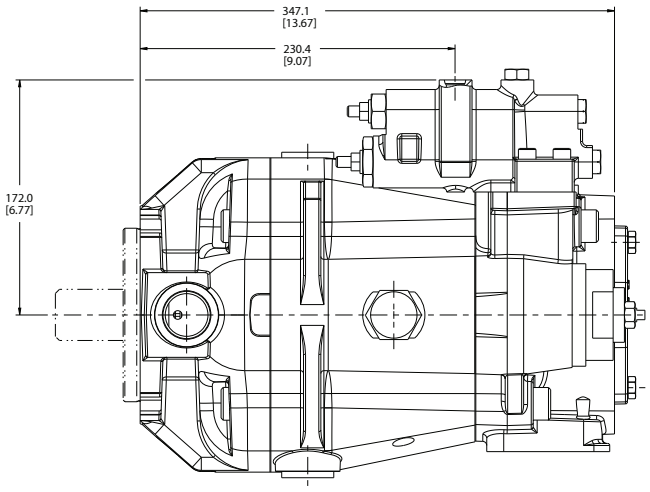
With through-drive capability

PVM131/141

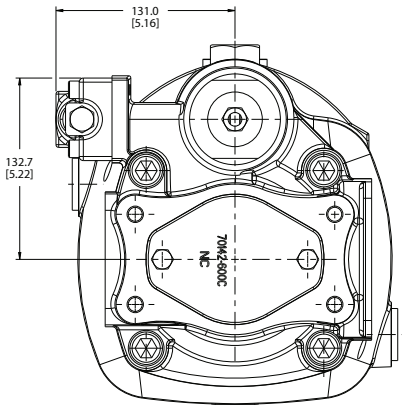


RIGHT HAND ROTATION
SHOWN WITH PRESSURE COMPENSATOR W/LOAD SENSE CONTROL

PORT	"B1"	"B2"	"C1"	"C2"	"F1"	"J"	"K1"	"K2"
SAE PORT	Ø 2.5 INLET PORT "B" SAE J518C 4 BOLT FLANGE PORT STANDARD PRESSURE SERIES	.500-13 UNC-2B THREAD ↧ 1.19 MINIMUM	Ø 1.25 OUTLET PORT "C" SAE J518C, 4 BOLT FLANGE PORT HIGH PRESSURE SERIES	.500-13 UNC-2B THREAD ↧ 1.00 MINIMUM	SAE J514 O-RING BOSS PORT "F" FOR 1 O.D. TUBE 1.3125-12UN-2B THREAD	SAE O-RING BOSS PORT "J" FOR .375 O.D. TUBE .562-18 UNF-2B THREAD	SAE J514 O-RING BOSS PORT "K1" FOR .375 O.D. TUBE .562-18 UNF-2B THREAD	SAE J514 O-RING BOSS PORT "K2" FOR .375 O.D. TUBE .562-18 UNF-2B THREAD



VIEW A-A

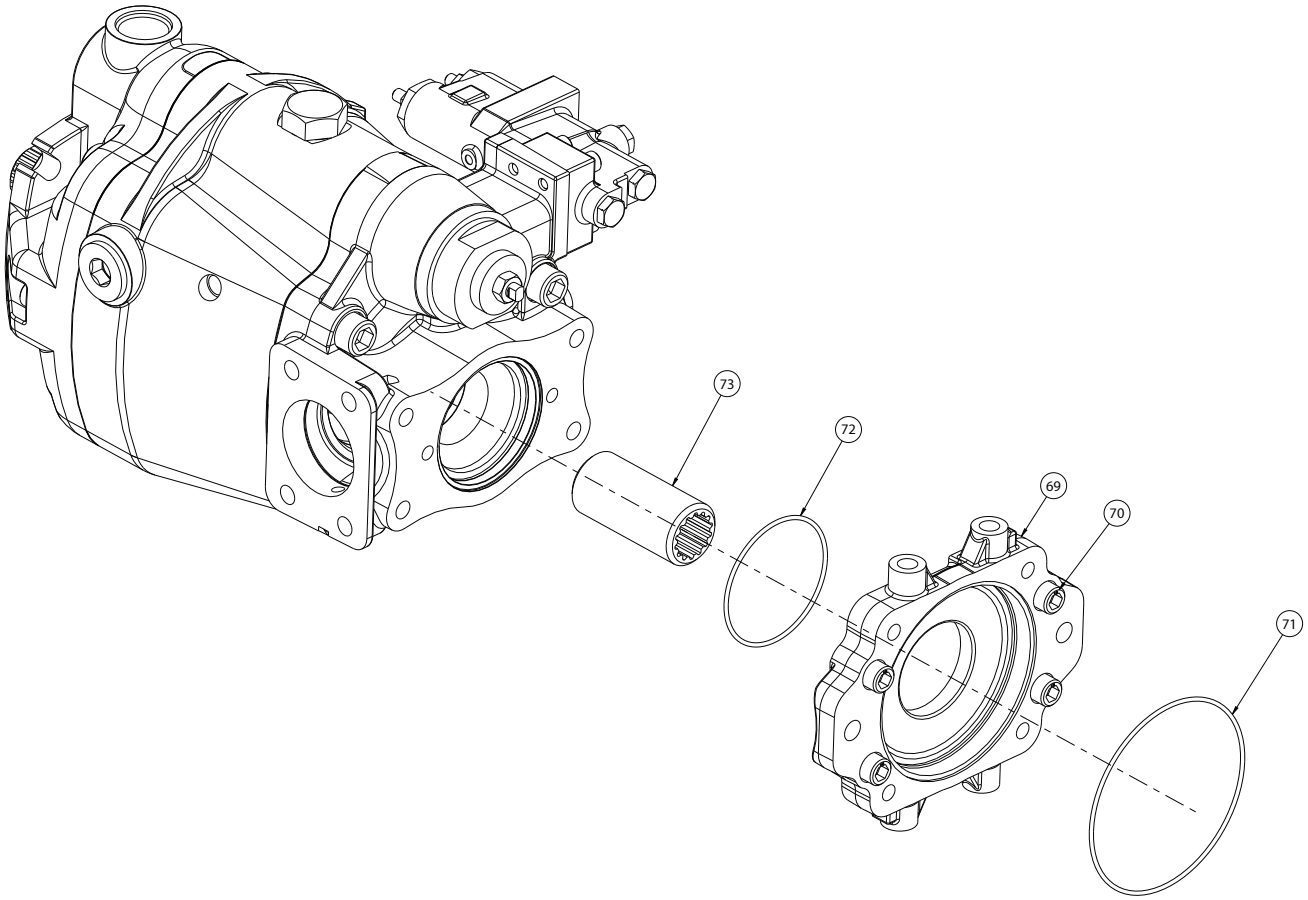


LEFT HAND ROTATION
SHOWN WITH PRESSURE COMPENSATOR

Through-drive Models

PVM131/141

Generic through-drive assembly



MODEL CODE POSITION 23	Item No. 69 (Adapter) (QTY 1)	Item No.70 (Screw) (QTY 4)	Item No.71 (O-ring) (QTY 1)	Item No.72 (O-ring) (QTY 1)	Item No.73 (Coupler) (QTY 1)
A	○	○	○	●	●
B	○	○	○	●	●
C	●	●	●	●	●
D	●	●	●	●	●
E	●	●	●	●	●
F	●	●	●	●	●

○ = Not required for through-drive

● = Required for through-drive

Model Code Position 23	
	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	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

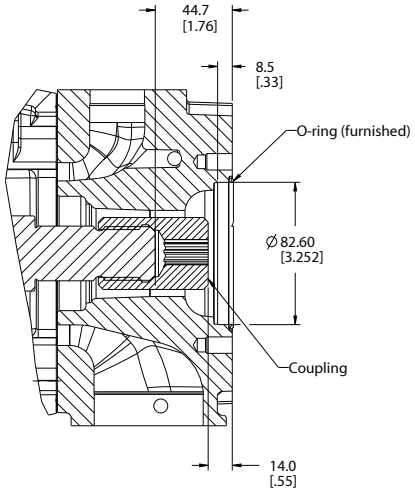
Thru-drive Models

PVM131/141

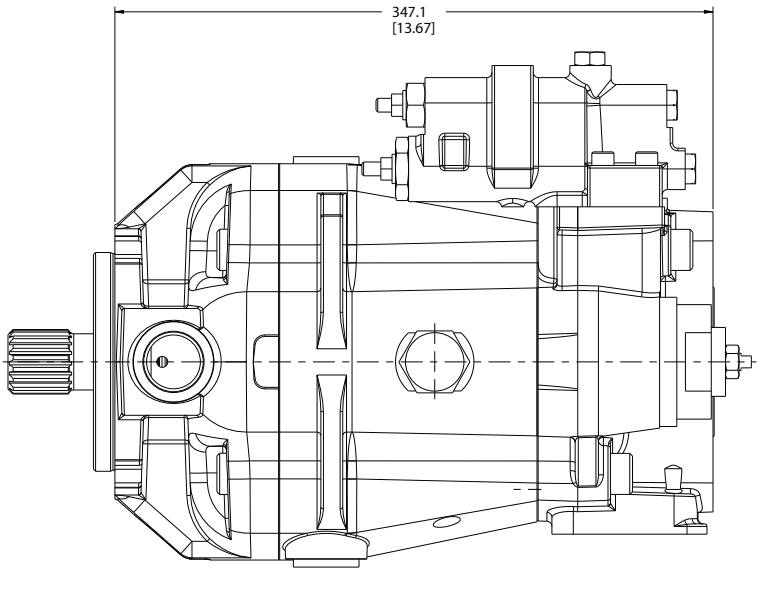
SAE "A" Adaptor Flange

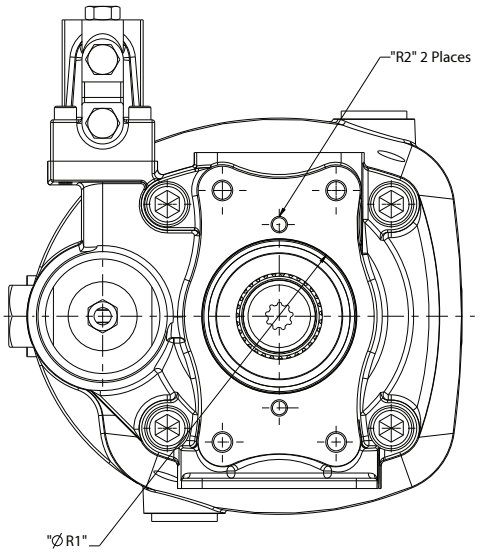
Features are in metric but use inch threads

Dimensions are in millimeters (inches)



Model Code		
Position 23	**"R1" Thru-drive Flange**	**"R2" 2-bolt Thread**
A,B	SAE J744-82-2 Ø 82.63/82.58 bore	.375-16 UNC-2B thd. 0.80 deep





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

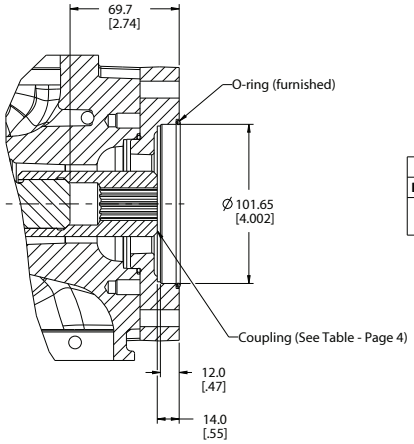
Thru-drive Models

PVM131/141

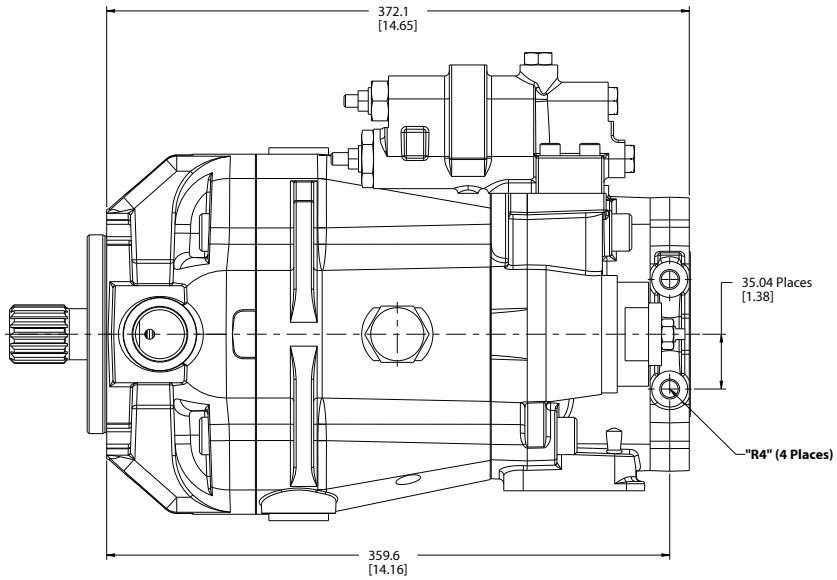
SAE "B" Adaptor Flange

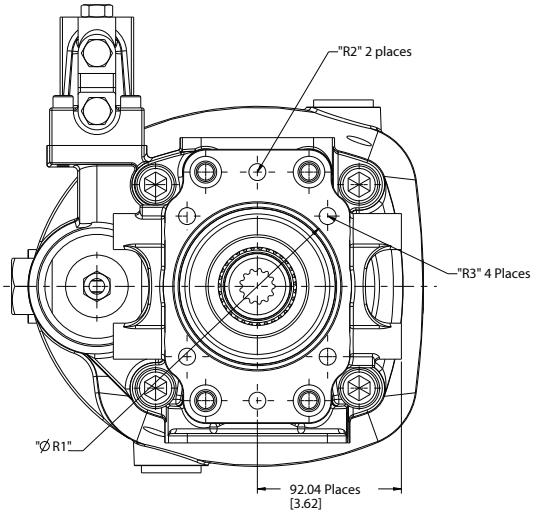
Features are in metric but use inch threads

Dimensions are in millimeters (inches)



Model Code				
Position 23	**R1 Thru-drive Flange**	**"R2" 2-bolt Thread**	**"R3" 4-bolt Thread**	**"R4" Support Mounting Points**
C,D	SAE J744-101-2 & -4 Ø 101.68/101.63 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





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

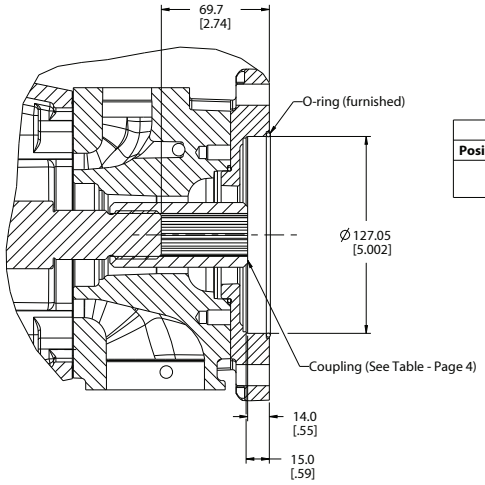
Thru-drive Models

PVM131/141

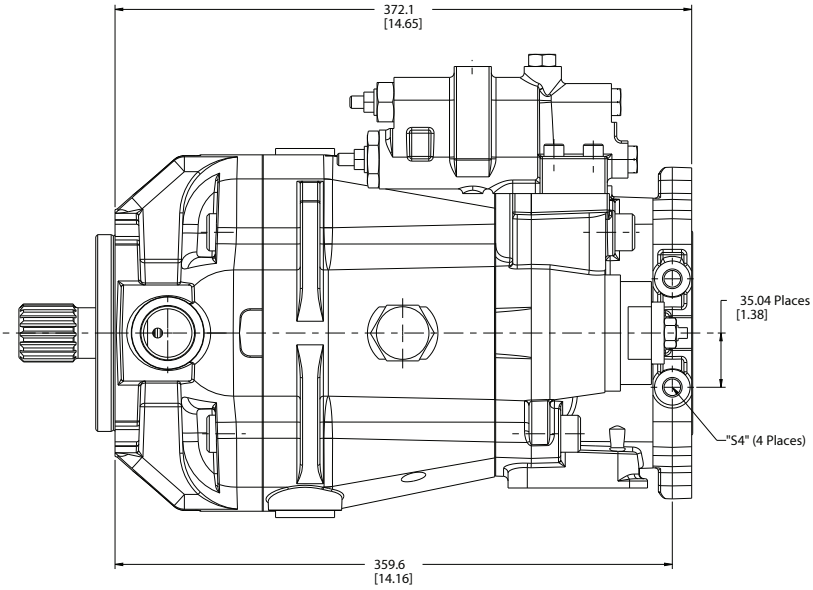
SAE "C" Adaptor Flange

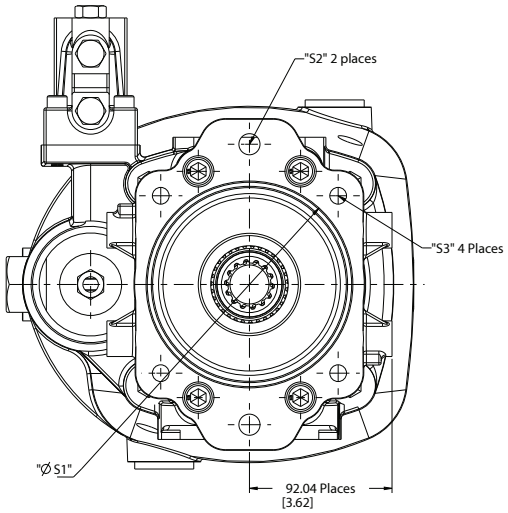
Features are in metric but use inch threads

Dimensions are in millimeters (inches)



Model Code				
Position 23	**S1 Thru-drive Flange**	**S2 2-bolt Thread**	**"S3" 4-bolt Thread**	**R4 Support Mounting Points**
E,F	SAE J744-127-2 & -4 Ø 127.08/127.03 bore 15.50/14.50 deep	.625-13 UNC-2B 0.98 deep	.500-13 UNC-2B 0.98 deep	.500-13 UNC-2B 0.98 deep

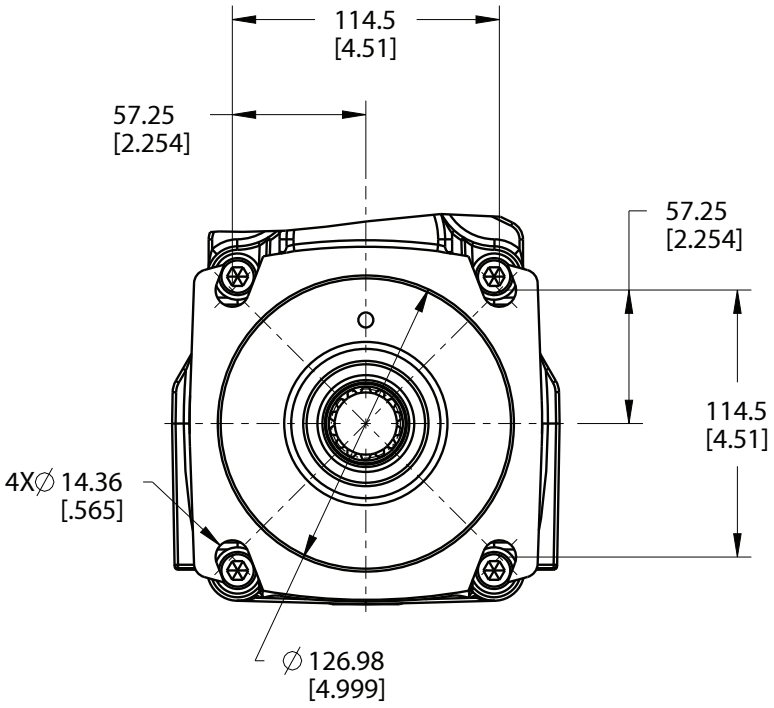


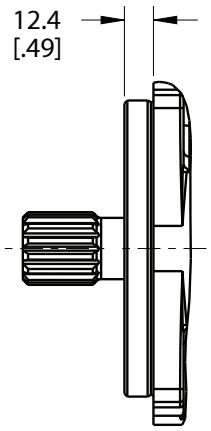


Right Hand Rotation with SAE 2-/4-bolt "C" Flange and ISO 125 Adapter Flange

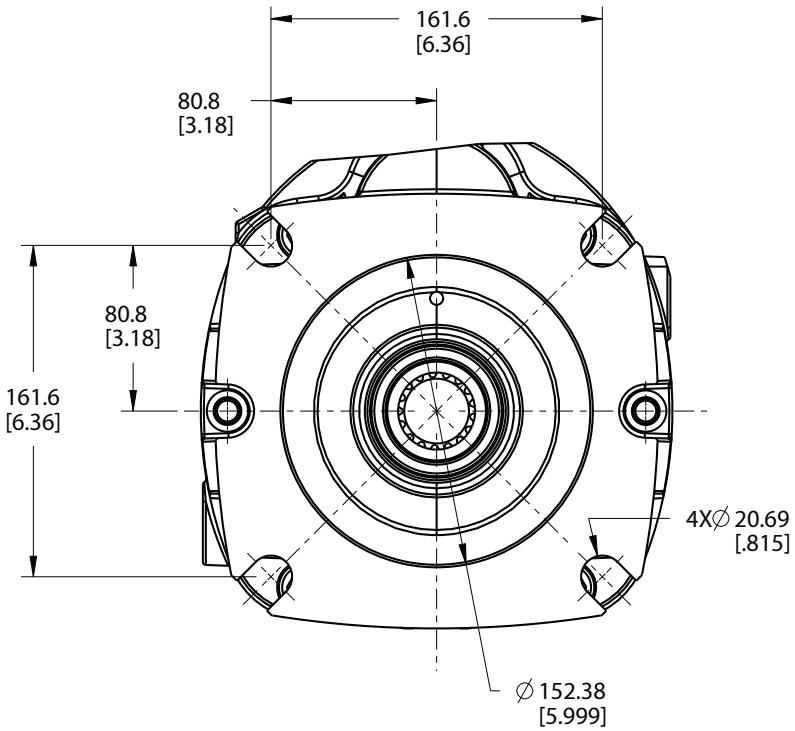
Mounting Flange Options

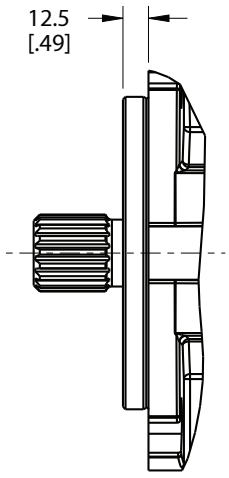
G – SAE J744-127-4 C 4-BOLT





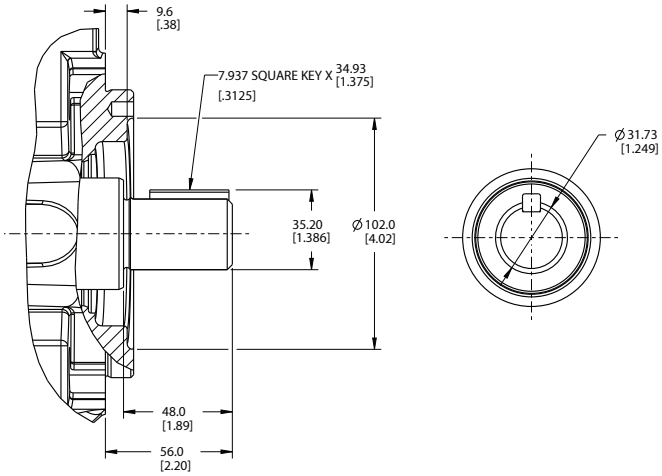
J – SAE J744-152-4 (D 4-BOLT)



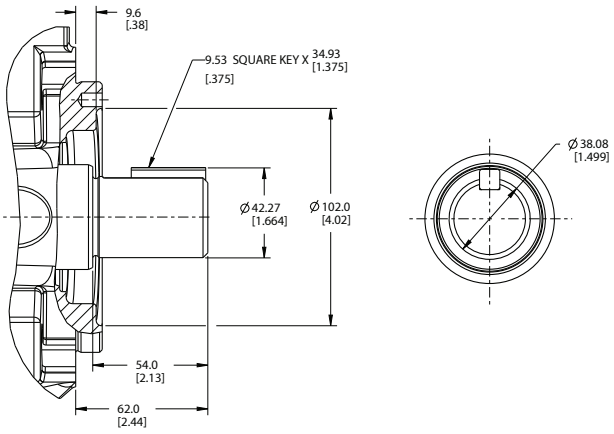


Shaft Options

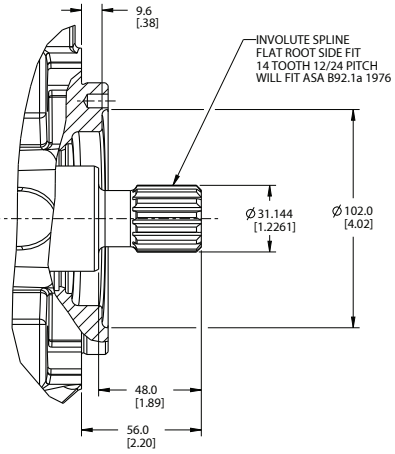
09 - SAE J744-32-1 SAE C STRAIGHT KEYED



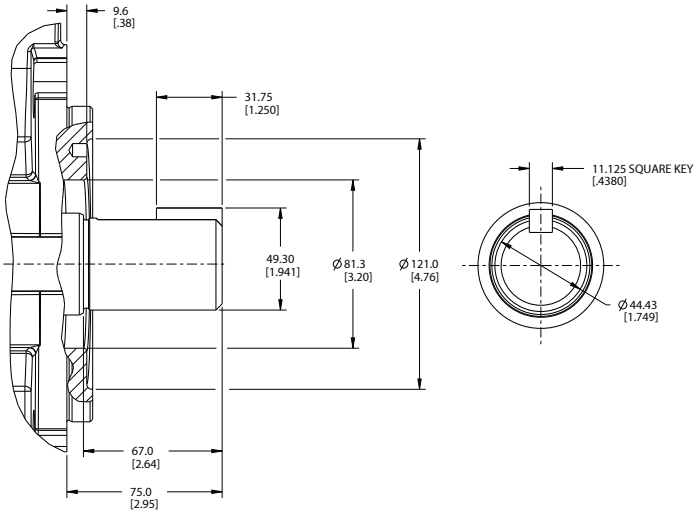
10 - SAE J744-38-1 SAE C-C STRAIGHT KEYED



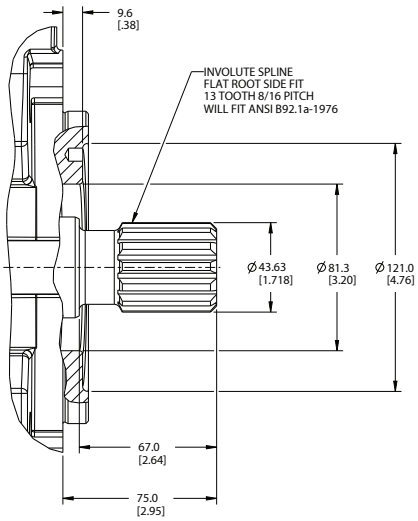
11 - SAE J744-32-4 SAE C 14T SPLINE



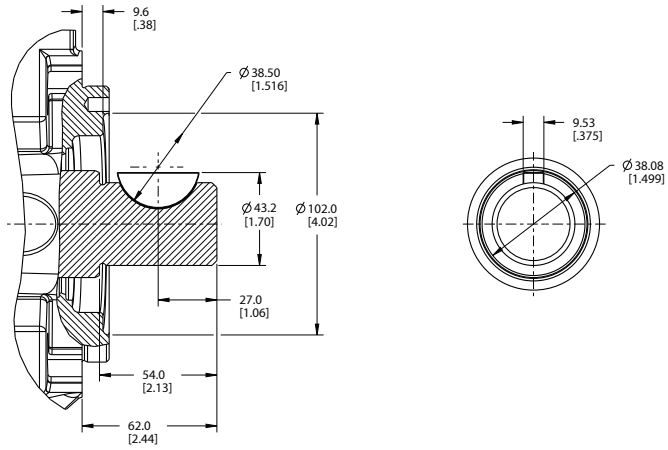
13 - SAE J744-44-1 SAE D STRAIGHT KEYED



14 - SAE J744-44-4 SAE D 13T SPLINE



25 - SAE J744-127-4 C 4-BOLT WITH 38.1 [1.50] DIA STRAIGHT WOODRUFF KEYED



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.)
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.)
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)

†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	Port Code	Inlet Port "B"	Outlet Port "C"
PVM131/141	Inch Flange	2	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

Drain, Load Sensing, and Gauge Ports

Model Series	Inlet/Outlet Port Option	Port Code	Drain Port "F"	Load Sensing Port "J"	Gauge Port "K"
PVM131/141	Inch Flange	2	SAE J514 O-ring, 1" O.D. tube. 1.3125-12UN-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

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 Danfoss publication 579. For operation on other alternative or environmentally friendly fluids, please contact your Danfoss Representative.

Bearing life at 50º C (120º F), SAE 10W oil, 1 bar abs (0 psig) inlet pressure

Model Series	$Pressure_{rated}$ bar (psi)	$Speed_{rated}$ rpm	$Flow_{rated}$ lpm (gpm)	Bearing $life_{rated}$ L10 hours
131	315 (4568)	1800	215 (57)	14000

Bearing life can be modified for flow, speed and pressure using the formula:

$$L_{adjusted} = life_{rated}\, x \left(\frac{Pressure_{rated}}{Pressure_{adjusted}}\right)^{3.33} \left(\frac{Speed^{rated}}{Speed_{adjusted}}\right) x \left(\frac{Flow_{rated}}{Flow_{adjusted}}\right)^{3.33}$$

Example: PVM131 operating at 1200 rpm, at 230 bar, and 200 lpm

From the chart, find that the rated life is 14000 L10 hours, the rated pressure is 315 bar, the rated flow is 215 lpm and the rated speed is 1800 rpm. Using the formula provided, the new bearing life expectation is calculated as follows:

$$L_{adjusted} = 14000x \quad \left(\frac{315}{230}\right)^{3.33} \quad \left(\frac{1800}{1200}\right) \quad \left(\frac{215}{200}\right)^{3.33}$$

$$L_{adjusted} = 14000x2.85x1.5x1.27$$

$$L_{adjusted} = 76010 \text{ L10 hours}$$

Further modification to bearing life are possible, including de-rating due to special fluids. Generally, standard water-glycol fluids reduce rated bearing life to 20% And case flushing is required. Please contact Danfoss engineering for assistance.

Fluid Cleanliness

The M Series pumps are rated in anti-wear petroleum fluids with a contamination level of 20/18/13 (Danfoss) 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 Danfoss Representative for specific duty cycle recommendation.

Vickers by Danfoss 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 Danfoss publication 561 – "Danfoss Guide to Systemic Contamination Control" – Available from your local Danfoss 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 (sec²)	**lbf-in (sec²)**
PVM131	0.0213	0.1889
PVM141	0.0210	0.1856

Specifications and Performance

	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 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 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

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 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 Danfoss 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 Danfoss 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 Danfoss 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.

ENGINEERING
TOMORROW

VICKERS
by Danfoss

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Printed in USA
Document No. V-PUPI-TM007-E3
DAM No: BC468270675805en-000101
October 2023