

NACHI Hydraulic Pumps

Features

- 1 Nachi Fujikoshi hydraulic pumps are finished by high-grade, precision machining technology unique to the comprehensive manufacturer Nachi Fujikoshi using carefully selected materials and traditional heat treatment technology. High performance and quality are assured with all models of Nachi Fujikoshi hydraulic pumps.
- 2 Noise has been thoroughly reduced on hydraulic pumps, a general source of noise on machinery and equipment. All models such as the low-noise type IP series can be operated quietly with little noise.
- 3 Attention has been paid to surface treatment and selection of materials in NACHI hydraulic pumps so that they can be applied extensively with fire-resistant hydraulic operating fluid.

Installation and Maintenance

- 1 Limit the eccentricity between the drive shaft and hydraulic pump shaft to .001 in., keep the angle error within 1° and use flexible couplings for connections.
- 2 When operating hydraulic pumps with belts, gears and chains, prevent a radial or thrust load exceeding the allowable value from being applied on the pump shaft. Also, if necessary, install a device that prevents a load (bending force) from being applied at right angles on the shaft. Mount hydraulic pumps so that the pump shaft is horizontal.
- 3 Use a rigid pump mounting base.
- 4 The direction of rotation is determined on each hydraulic pump. Operate the hydraulic pump in the correct direction of rotation after checking the indicated model No. on the nameplate or the arrow indicating the direction of rotation on the body. The direction of rotation is clockwise when viewed from the shaft end.
- 5 Limit the suction pressure to within the range 4.3 psi.
- 6 With external drain type hydraulic pumps, directly connect the drain to the tank, insert the drain pipe under the oil level, and limit the drain back pressure to 4.3 psi.
- 7 When connecting steel pipes to the suction and discharge sides, prevent force pressure from being applied on the hydraulic pump by the piping.
- 8 Set the clamping length of couplings and hydraulic pump shafts so that it is within at least 2/3 or more of the coupling width. Also, use a size of coupling that matches the shaft diameter.

- 9 When inserting couplings into shafts, insert them gently. When removing couplings from shafts, be sure to use a pulley extractor. Avoid hitting the shaft when attaching or removing couplings.
- 10 Connect to the suction port above the horizontal to keep oil inside hydraulic pumps.
- 11 Provide an air bleed valve in circuits where it is difficult to release air at startup.
- 12 Be sure to use only specified bolts on hydraulic pumps. Use grade 8 or equivalent.

Uni-pumps

Uni-pumps are compact pump/motor units which have a motor directly coupled to the hydraulic pump. Variable discharge volume type vane pumps and piston pumps are available. As each of these pumps are ideally integrated with the motor, they can be easily installed, and more compact equipment configurations can be achieved economically.

- Standard Motor:
 - totally-enclosed splashproof housing surface flange cooled self-actuating type (totally enclosed fan-cooled type)
 - 5 hp to 4P or less: Class E insulation
 - 7 hp to 4P or more: Class B insulation
 - Voltage 200V···50/60 Hz
220V···60 Hz

Management of Hydraulic Operating Fluid

- 1 Use mineral oil-based hydraulic operating fluid.
- 2 Provide a suction filter of about 100 to 150 mesh on the suction port.
- 3 When operating hydraulic pumps at a high pressure or when using fire-resistant hydraulic operating fluid, oil contamination greatly affect pump service life. So, use a filter of 10 μm or less.
- 4 Consult your agent when using fire-resistant hydraulic operating fluid. When using water- or glycol-based hydraulic operating fluid, refer to page N-3 for details on applicable models of hydraulic pumps.
- 5 For details on the viscosity of hydraulic operating fluid, refer to the separate item "Hydraulic Operating Fluid."

Terms Used in This Catalog

The following describes the meanings of the terms used in this catalog:

- Rated Pressure:
The maximum pressure at which a hydraulic pump can be used continuously.
- Maximum Operating Pressure:
The maximum pressure (including surge pressure) at which a hydraulic pump can be used within six seconds at most within 1/10 of the cycle time.
- Allowable Peak Pressure:
The maximum pressure (set pressure + surge pressure) that can be momentarily allowed.

The following shows the standards in Lists of Sealing Parts:

JIS standard B2401 (O-ring)
JIS standard B2407 (backup ring)
SAE standard AS568 (O-ring)

Pipe apertures mentioned in this catalog that are indicated as "G*//*" comply with JIS B2351 O-ring seal systems. Note, however, that G3/4 adopts dimensions before JIS revisions were made in 1990. Nachi Fujikoshi adopts P24 as the O-ring size whereas P22.4 is stated in current JIS standards.

Calculation Formula Required when Selecting Hydraulic Pumps and Motors

1. Pump Discharge Flow Rate

$$Q_p = \left(\frac{q \cdot N \cdot \eta_v}{231} \right) \text{ gal/min}$$

q = discharge volume per rotation (cu in/rev)

N = revolution speed (min^{-1})

η_v = volume efficiency

2. Power Required for Pump Drive

$$W_{p1} = \frac{P \cdot Q_p}{1714} \text{ (hp)}$$

P = discharge pressure (psi)

η = overall efficiency

3. Motor Revolution Speed

$$N = \left(\frac{120 \cdot f}{P} \right) \cdot (1 - S) \text{ (min}^{-1}\text{)}$$

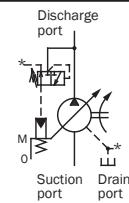
f = frequency (50Hz, 60 Hz)

P = number of motor poles

S = slip rate

Hydraulic Pump Selection Table

Pump Type	Name	Type Classification	Rated Pressure psi	Displacement cu in / rev										Page
Variable piston pumps	PVS series variable piston pump	PVS	3000	.21									2.74	A-3
	Uni-pump	UPV	3000	.21									2.74	
	PZS series variable piston pump	PZS	3000									2.56		
	PZ load-sensitive variable piston pump	PZ	3000									.48		
Variable discharge volume vane pumps	VDS series compact variable vane pump	VDS	1015	.18								.5		B-1
	Uni-pump	USV	1015	.18								.5		
	VDR22 design series variable vane pump	VDR	2030									.3		
	Uni-pump	UVD	1015									.3		
	VDR13 design series variable vane pump	VDR	870									.24		
	Uni-pump	UVD	870									.24		
	VDC series high-pressure variable vane pump	VDC	2030									.3		
	Uni-pump	UVC	1015									.3		
	UVN series variable vane uni-pump	UVN	1160									.49		
Internal gear pump	IPH series IP pump	IPH	3625									.21		C-1
	IPH series double IP pump	IPH	3045									.43		

PVS Series Variable Volume Piston Pumps**.48 to 2.74 cu in/rev
3045 psi**

- Design No. 30 is applied on PVS-OB to make the pump more compact and lighter, and reduce noise.
- Production of PVS-3B has been discontinued. Use PZS-3B.
- Pressure adjustment 3 type has been added to PVS-1B-22 and PVS-2B-45. (Design No. 20 is applied only on PVS-2B-45*3)

Features**Energy-saving Type with Drastically Reduced Loss**

A NACHI-proprietary semi-circular barrel swash plate that receives pressure on its surface ensures a stable discharge volume at all times. This eliminates excess discharge volume, and enables the

effective use of power corresponding to the load cycle. This "energy-saving type" conserves energy, reduces power loss, and helps to reduce hydraulic costs.

Silent Type That Demonstrates Its Power Quietly

Proprietary low-noise mechanisms are incorporated on the shoe, swash plate, valve plate, and other locations to ensure silent operation. In particular, a semi-circular barrel swash plate stabilizes operation characteristics to ensure silent operation.

Specifications

Model No.	Volume in³/rev (cm³/rev)	Discharge volume at no-load gpm				Pressure adjustment range psi	Permitted peak pressure psi	Rotating speed min⁻¹		Mass lbs
		1000min⁻¹	1200min⁻¹	1500min⁻¹	1800min⁻¹			Min.	Max.	
PVS-0B-8*0-E30	.18 - .48 (8.0)	2.1	2.5	3.2	3.8	290 to 507 290 to 1015 435 to 2030 435 to 3045	3625	500	2000	17
PVS-1B-16*0-(*)-E13	.3 - 1.0 (16.5)	4.4	5.2	6.5	7.8	290 to 507 290 to 1015 435 to 2030 435 to 3045	3625	500	2000	23
PVS-1B-22*0-(*)-E13	.42 - 1.34 (22.0)	5.8	7.0	8.7	10.5	290 to 507 290 to 1015 435 to 2030 435 to 3045	3625	500	2000	23
PVS-2B-35*0-(*)-E13	.48 - 2.1 (35.0)	9.2	11.1	13.9	16.6	290 to 507 290 to 1015 435 to 2030 435 to 3045	3625	500	2000	51
PVS-2B-45*0-(*)-E13	.67 - 2.74 (45.0)	11.9	14.3	17.9	21.5	290 to 507 290 to 1015 435 to 2030 435 to 3045	3625	500	2000	51

Note: Direction of rotation is clockwise when viewed from the shaft end.

- Handling
- Cautions during Pump Installation and Piping
- 1 Use flexible couplings for connecting the pump shaft to the drive shaft, and prevent a radial or thrust load from being applied on the pump shaft.
- 2 For centering of the pump shaft, limit the eccentricity between the drive shaft and hydraulic pump shaft to .002 in, and keep the angle error within 1°.
- 3 Set the clamping length of couplings and hydraulic pump shafts so that it is within at least 2/3 or more of the coupling width.
- 4 Use a sufficiently rigid pump mounting base.
- 5 Set the pressure on the pump suction side to 4.3 or more (suction port flow velocity within 6 ft/sec).
- 6 Raise part of the drain piping to above the topmost part of the pump body, and

insert the return section of the drain piping into the hydraulic operating fluid. Also, observe the values in the following table to limit the drain back pressure to 14 psi.

Model No.	PVS-0B	PVS-1B
Pipe joint size	3/8" or more	1/2" or more
Pipe I.D.	3/8"	1/2"
Pipe length	39"	39"

• Management of Hydraulic Operating Fluid

- 1 Use good-quality hydraulic operating fluid, and use within a kinematic viscosity range of 20 to 200 centistokes during operation. Use an R&O type and antiwear hydraulic fluid of ISO-VG32 to 68. The optimum kinematic viscosity during

operation is 20 to 50 centistokes. 2 The operating temperature range is 40 to 190° F. When the oil temperature at startup is 40° F or less, warm up the hydraulic pump by low-pressure, low-operation speed operation until the oil temperature reaches 40° F.

- 3 Provide a suction strainer with a filtering grade of about 100µm (150 mesh). Be sure to provide a return line filter of grade 10µm or less on the return line to the tank. (When the hydraulic pump is used at a high pressure of 2000 psi or more, we recommend providing a filter of 10µm or less.)
- 4 Manage the hydraulic operating fluid so that contamination is maintained at class NAS10 or lower.
- 5 Use hydraulic operating fluid within an operating ambient temperature of 32 to 140° F.

(continued on following page)

- Caution at Startup NACHI-proprietary
- 1 Before you start pump operation, fill the pump body with clean hydraulic operating fluid via the lubrication port.

Model No.	Injection amount cu in
PVS-0B-8	13
PVS-1B-16, 22	18
PVS-2B-35, 45	39

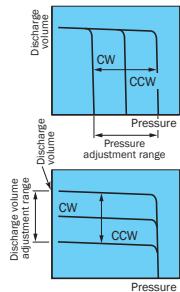
- 2 An unload is required when the motor is started under condition WYE-Delta Start. Consult your agent regarding the circuit.
- 3 Make sure that the pump operates in the direction of rotation the same as that indicated by the arrow on the pump body.

4 Air entering the pump or pipes may cause noise or vibration. At startup, set the pump discharge side to a no-load state, and operate the pump in the inching mode to release any air in the pump or pipes.

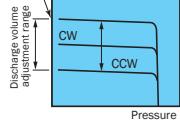
- 5 Provide an air bleed valve in circuits where it is difficult to release air at startup.
- How to Set Pressure and Discharge Volume

The default pump discharge volume is set to "maximum" and default discharge pressure is set to "minimum". Change the discharge volume and discharge pressure settings according to your particular operating conditions.

[Pressure adjustment]
Turning the pressure adjusting screw CW increases the pressure.



[Discharge volume adjustment]
Turning the flow rate adjusting screw CW decreases the discharge volume.



Note:

- For details regarding the relationship between flow rate adjustment length l and pump capacity q , see the tables provided in the installation dimension drawings for each of the pumps.
- Firmly tighten the lock nuts after you have finished adjustments.

Note:

- Variable control mechanism

Standard Type

N* Pressure compensation type (manual mode)

Option type

P* Pressure compensation type (remote control mode)

R Load Sense

N*Q* 2-pressure, 2-flow rate control

R* A S ⊕ Solenoid cutoff control

W* A S ⊕ 2-pressure control

RQ* A S ⊕ 2-pressure, 2-flow rate control w/ solenoid cutoff

C* A S ⊕ 2-cutoff control

- * : Pressure adjustment range

0 : 286 - 500

1 : 286 - 1000

2 : 429 - 2000

3 : 429 - 3000

- ⊕ : Applicable to solenoid specifications A, S

A ⊕ : SA-G01

S ⊕ : SS-G01

1 : 100V 50/60Hz

2 : 200V 50/60Hz

3 : DC12V

4 : DC24V

Explanation of Model No.

PVS - 1 B - 16 N 2 - (*) - 12

Design No. 30: PVS-0B
12: PVS-1B, PVS-2B (BSPT piping)
E13: PVS-1B, PVS-2B (SAE piping)
E20: PVS-2B-45N3

Auxiliary Symbol None: Side port type
Z: Axial port type

Pressure Adjustment Range [Note] Reference

Variable Control Mechanism [Note] Reference

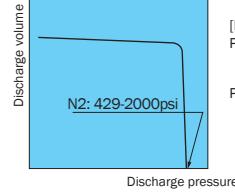
Max. Pump Capacity (cm³/rev)
Nominal 8, 16, 22, 35, 45

Mounting Method
B: Mounting flange type A: Mounting foot type

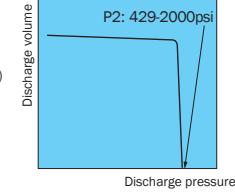
Pump Size 0,1,2

PVS Series Variable Piston Pump

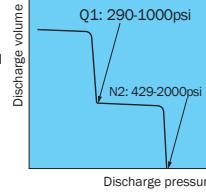
[Example 1]
N* Pressure compensation type (manual mode)
PVS-1B-16N2



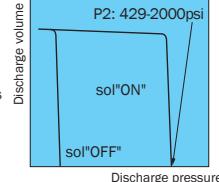
[Example 2]
P* Pressure compensation type (remote control mode)
PVS-1B-16P2



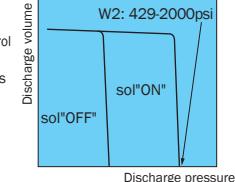
[Example 3]
N*Q* 2-pressure, 2-flow rate control
PVS-1B-16N2Q1



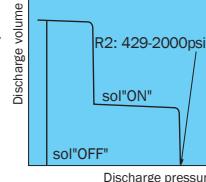
[Example 4]
R* S ⊕ Solenoid cutoff control
PVS-1B-16R2S2
Solenoid specifications
120V 50/60Hz
SS-G01



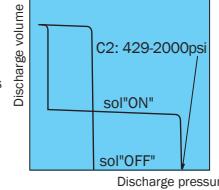
[Example 5]
W* S ⊕ 2-pressure control
PVS-1B-16W2S1
Solenoid specifications
120V 50/60Hz
SS-G01



[Example 6]
RQ* S ⊕ 2-pressure, 2-flow rate control w/ solenoid cutoff
PVS-1B-16RQ2S1
Solenoid specifications
120V 50/60Hz
SS-G01



[Example 7]
C* S ⊕ 2-cutoff control
PVS-1B-16C2S2
Solenoid specifications
120V 50/60Hz
SS-G01



■ R, load sense available for all PVS models.

■ NQ, RS, WS, RQS and CS types are not available for the PVS-0B-8.

■ NQ, RQS and CS types are not available for the PVS-1B-16-Z and PVS-2B-35-Z.
22

Variable Control Mechanisms

Symbol	External View	Characteristics	Hydraulic Circuit	Explanation
N		Discharge volume Discharge pressure		Pressure compensation type (manual system) When the discharge pressure reaches the preset volume set by the pressure compensator, the discharge volume is automatically reduced to hold the pressure at the set pressure.
P		Discharge volume Discharge pressure		Pressure compensation type (remote control mode) This mode demonstrates the same characteristics as the manual mode. The discharge pressure can be adjusted by external pilot pressure. The discharge volume can be adjusted manually.
NQ		Discharge volume q1 q2 P1 P2 Discharge pressure		2-pressure, 2-flow rate control type The discharge volume changes in two stages by the pump's built-in sequence valve. This allows conventional high/ low pressure control to be performed on a single pump unit, and save energy in the hydraulic circuit.
RS (RA)		Discharge volume SOL "OFF" "ON" Discharge pressure		Solenoid cutoff control type A solenoid valve for unload is integrated into the pressure compensation type to minimize energy loss when pump output is not required. Only a slight amount of heat is generated.
WS (WA)		Discharge volume SOL "OFF" "ON" P1 P2 Discharge pressure		2-pressure control type Two pressure compensation types can be obtained by switching the solenoid valve ON/OFF. Two types of output control are possible with the actuator set to a constant speed.
RQS (RQA)		Discharge volume q1 q2 P1 SOL ON SOL OFF P2 Discharge pressure		2-pressure, 2-flow rate control type w/ solenoid cutoff The discharge volume can be changed in two stages by the sequencer valve and solenoid valve for unload mounted on the pump, and unloading is possible when pressure oil is not required.
CS (CA)		Discharge volume q1 q2 SOL ON P1 SOL OFF P2 Discharge pressure		2-cutoff control type Two types of pressure - flow rate characteristics can be obtained by the solenoid valve and cylinder mounted on the pump.
R		Discharge volume Discharge pressure		Load sense type This mode demonstrates the same characteristics as the manual mode. The discharge pressure can be adjusted by external pilot pressure. The discharge volume can be adjusted manually. Note 2)

Note 1: Many other variable control mechanism are also available in addition to those in the above table. Please consult your agent for details.

Note 2: We recommend ZR-T02-*5895* as the remote control valve. For details, consult your agent. Prevent the pipe volume up to the remote control valve from falling below 10 cu in.

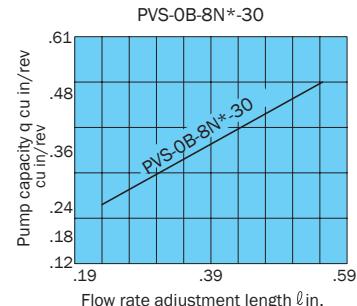
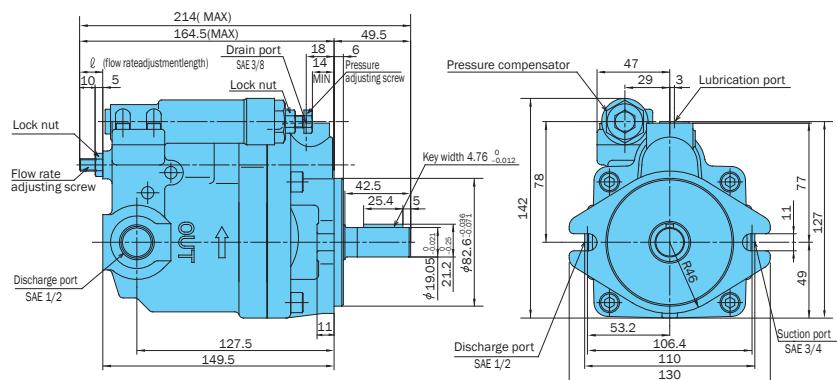
Pressure Compensation Type

PVS-0B-8N*-30

Manual Mode: Standard Type

2 Bolt SAE A Mount

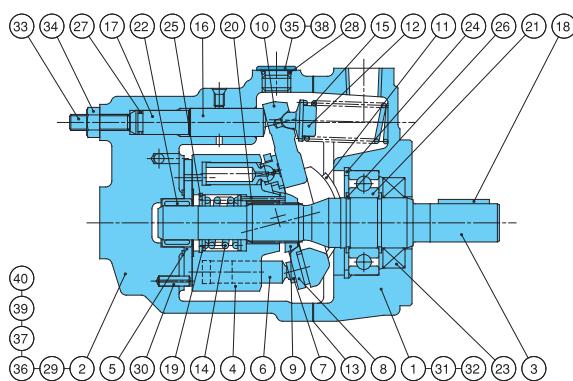
Installation Dimension Drawing



Flow rate adjustment length ℓ in.

Set a flow rate adjustment length within the above range. Oil will leak if the pump is operated below the adjustment range lower limit.

Cross-Sectional Drawing



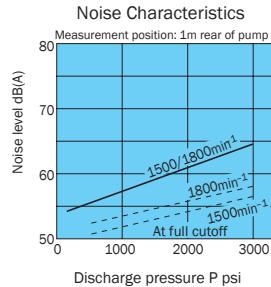
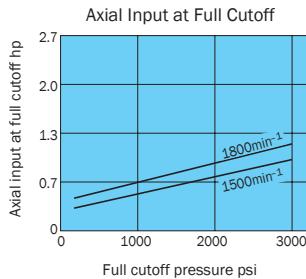
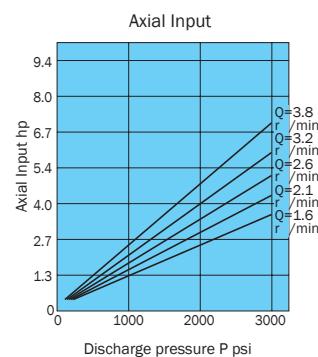
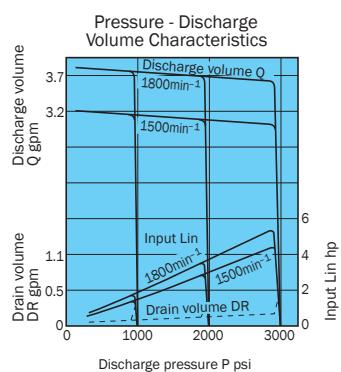
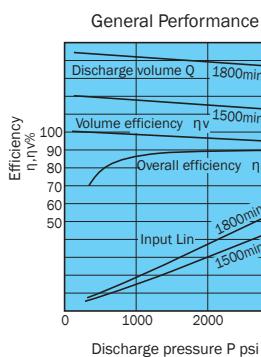
Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Body	15	Spring S	29	Parallel pin
2	Case	16	Control piston	30	Spring pin
3	Shaft	17	Guide pin	31	Hexagon socket head bolt
4	Cylinder barrel	18	Parallel key	32	Cross-recessed countersunk head screw
5	Valve plate	19	Retainer		
6	Piston	20	Needle	33	Hexagon socket set
7	Shoe	21	Ball bearing		screw
8	Shoe holder	22	Needle bearing	34	Hexagon nut
9	Barrel holder	23	Oil seal	35	Hexagon plug
10	Swash plate	24	Snap ring	36	Metal plug
11	Thrust bush	25	Snap ring	37	Nameplate
12	Spring holder	26	Snap ring	38	Lubrication port plate
13	Gasket	27	O-ring	39	CAUTION plate
14	Spring C	28	O-ring	40	Rivet

Seal Kit Part No. PSS-100000				
Part No.	Part Name	Q'ty	PVS-OB-8	
			Size	Remarks
*	13	Packing	1	PSC46-100000
	23	Oil seal	1	TCV-254511
	27	O-ring	1	1B-P9
	28	O-ring	1	1B-P11

Parts marked by an asterisk "*" are not available on the market.
Consult your agent.

Pressure Compensation Type

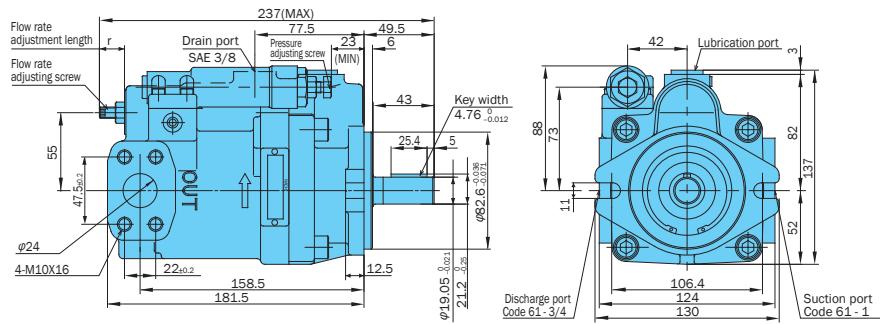
Typical characteristics at hydraulic operating fluid kinematic viscosity of 32 centistokes



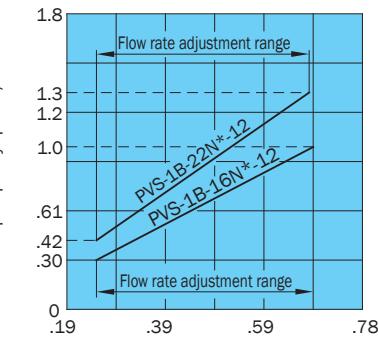
Installation Dimension Drawing

PVS-1B-
16N*(Z)-E13
22

SAE A Mount
(side port type)



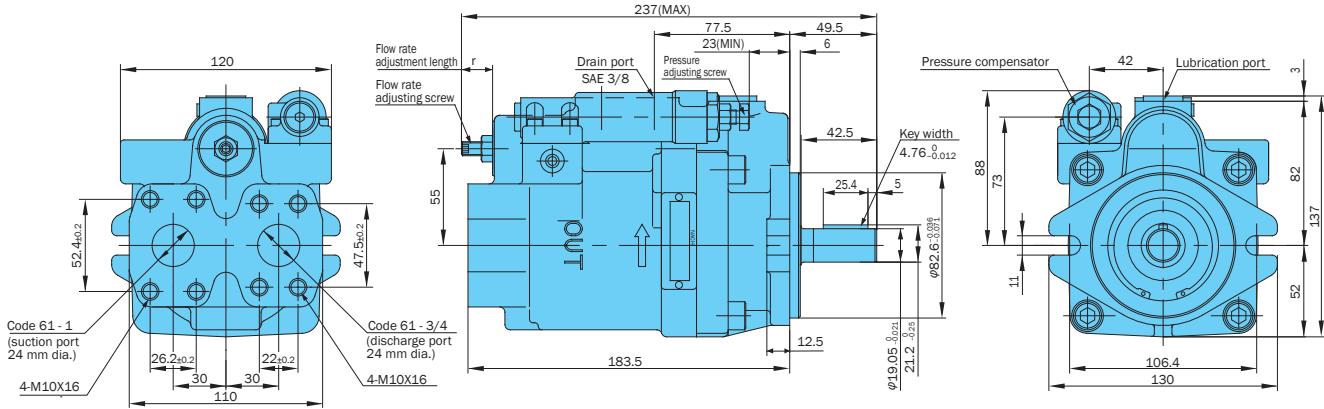
Relationship between flow rate adjustment length (l) and pump capacity (q)



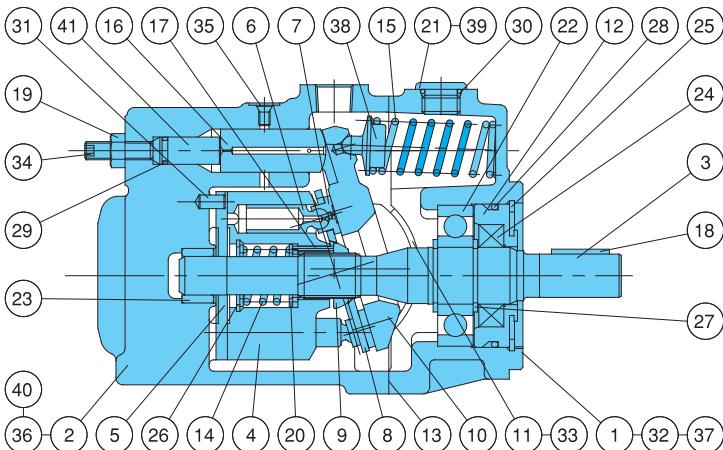
Flow rate adjustment length l in

Set a flow rate adjustment length within the above range. Oil will leak if the pump is operated below the adjustment range lower limit.

(Axial Port Type)



Cross-Sectional Drawing



Part No. Part Name Part No. Part Name

1	Body	22	Ball bearing
2	Case	23	Needle bearing
3	Shaft	24	Oil seal
4	Cylinder barrel	25	Snap ring
5	Valve plate	26	Snap ring
6	Piston	27	Snap ring
7	Shoe	28	O-ring
8	Shoe holder	29	O-ring
9	Barrel holder	30	O-ring
10	Swash plate	31	Pin
11	Thrust bush	32	Hexagon socket head bolt
12	Seal holder	33	Cross-recessed countersunk head screw
13	Gasket	34	Hexagon socket set screw
14	Spring C	35	Metal plug
15	Spring S	36	Nameplate
16	Control piston	37	CAUTION plate
17	Needle	38	Spring holder
18	Key	39	Spring holder plate
19	Nut	40	Rivet
20	Retainer	41	Guide pin
21	Plug		

List of Sealing Parts (Kit Model Number PSS-101000-2A)

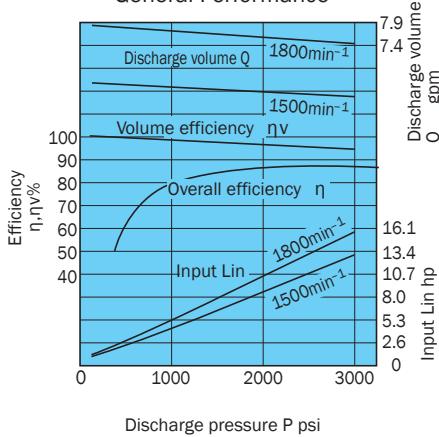
Part No.	Name	Q'ty	Size	Remarks
* 13	Gasket	1	PS46-101000	Nihon Gasket
24	Oil seal	1	TCN-254511	N.O.K
28	O-ring	1	1B-G55	JIS B 2401
29	O-ring	1	1B-P9	JIS B 2401
30	O-ring	1	1B-P14	JIS B 2401

Parts marked by an asterisk "*" are not available on the market.
Consult your agent.

Performance Curves

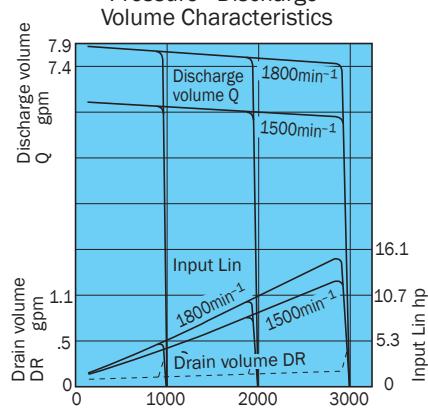
PVS-1B-16N*(Z)-E13

General Performance

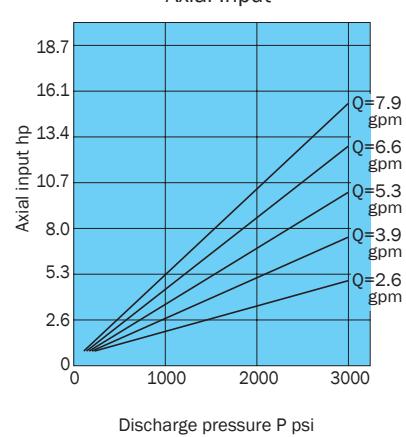


Typical characteristics at hydraulic operating fluid kinematic viscosity of 32 centistokes

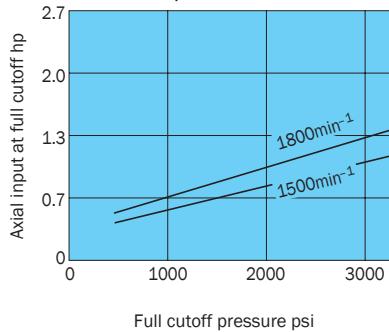
Pressure - Discharge Volume Characteristics



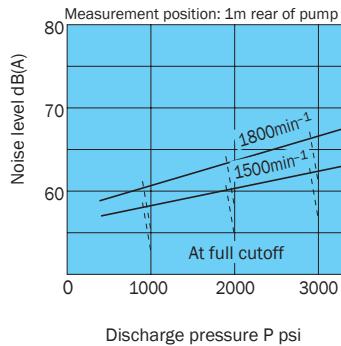
Axial Input



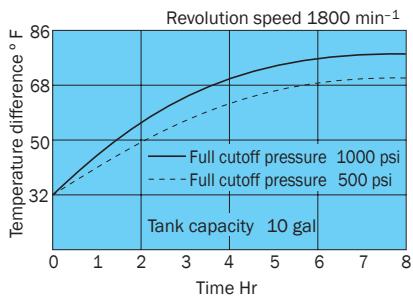
Axial Input at Full Cutoff



Noise Characteristics



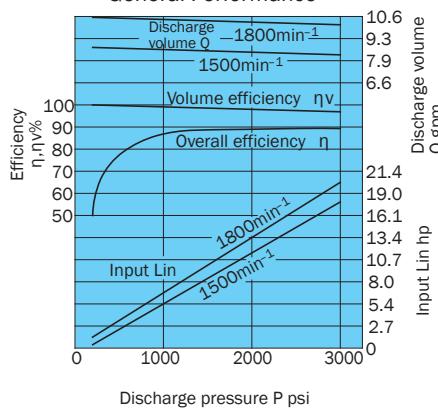
Oil Temperature Rise Characteristics PVS-1B-16N1-12



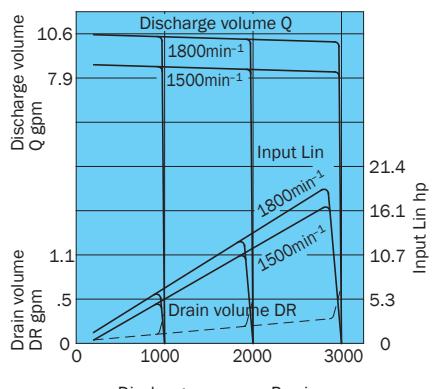
Performance Curves

PVS-1B-22N*(Z)-E13

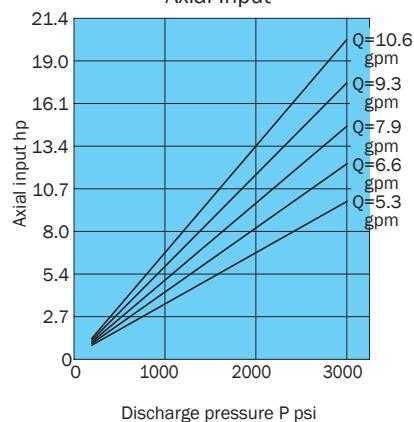
General Performance



Pressure - Flow Rate Characteristics



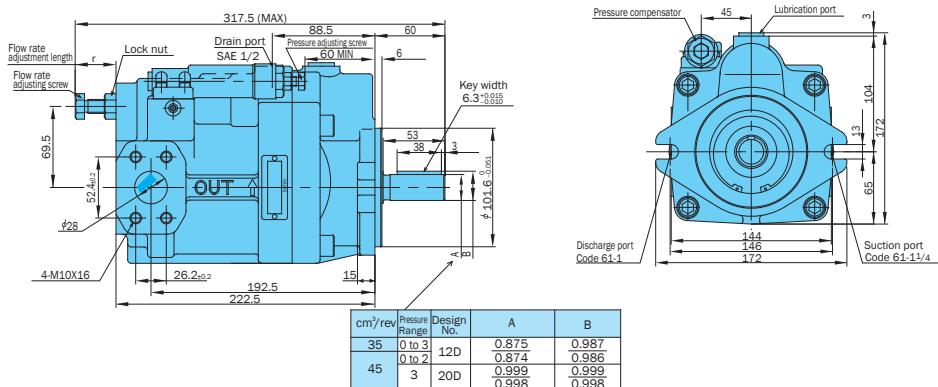
Axial Input



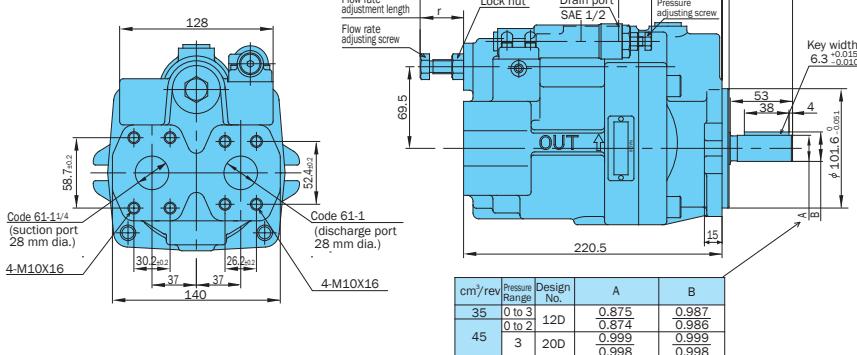
Installation Dimension Drawing

PVS-2B- $\frac{35}{45}$ N*(Z)-E13

**SAE B Mount
(side port type)**



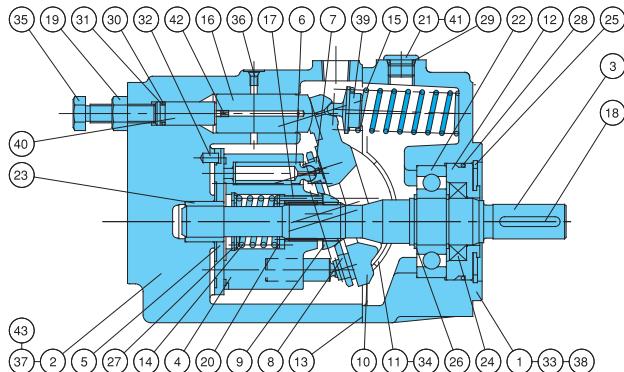
(axial port type)



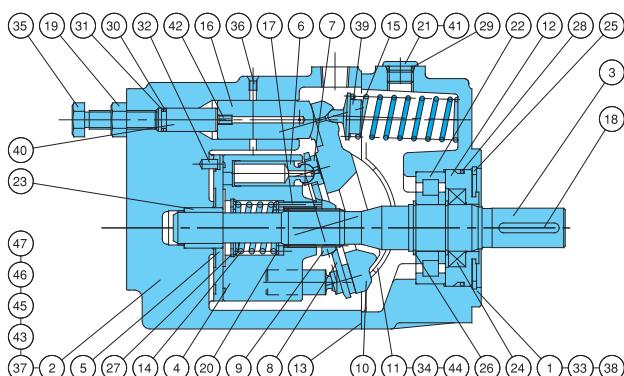
Cross-Sectional Drawing

PVS-2B- $\frac{35}{45}$ N*(Z)-E13

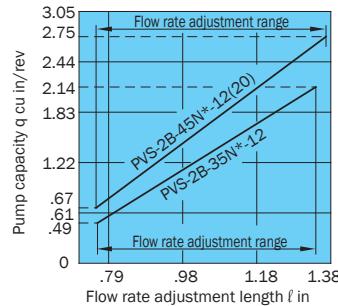
SAE B Mount



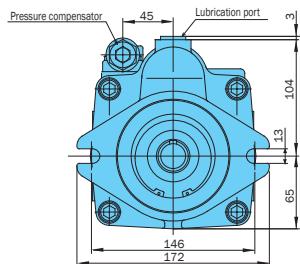
PVS-2B-45N3-(Z)-E13



Relationship between flow rate adjustment length (l) and pump capacity (q)



Set a flow rate adjustment length within the above range. Oil will leak if the pump is operated below the adjustment range lower limit.



Part No.	Part Name	Part No.	Part Name	Part No.	Part Name	
1	Body	146	16	Control piston	31	Backup ring
2	Case	172	17	Needle	32	Pin
3	Shaft	18	18	Key	33	Hexagon socket
4	Cylinder barrel	19	19	Nut	head bolt	
5	Valve plate	20	20	Retainer	34	Cross-recessed countersunk head screw
6	Piston	21	21	Plug	35	Flow rate adjustment screw
7	Shoe	22	22	Ball bearing	35	Flow rate adjustment screw
8	Shoe holder	23	23	Needle bearing	36	Metal plug
9	Barrel holder	24	24	Oil seal	36	Nameplate
10	Swash plate	25	25	Snap ring	37	CAUTION plate
11	Thrust bush	26	26	Snap ring	38	Guide
12	Seal holder	27	27	Snap ring	39	Spring holder
13	Gasket	28	28	O-ring	40	Pivot
14	Spring C	29	29	O-ring	41	Lubrication port plate
15	Spring S	30	30	O-ring	42	Orifice

List of Sealing Parts (Kit Model Number PSS-102000-2A)

Part No.	Part Name	Q'ty	PVS-2B-35/45	
			Size	Remarks
13	Gasket	1	PS46-102000-0A	Nihon Gasket
24	Oil seal	1	TCN-305011Z	N.O.K
28	O-ring	1	1B-G70	JIS B 2401
29	O-ring	1	1B-P14	JIS B 2401
30	O-ring	1	1B-P11	JIS B 2401
31	Backup ring	1	T2-P11	JIS B 2407

Parts marked by an asterisk "*" are not available on the market. Consult your agent.

Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Body	17	Needle	33	Hexagon socket head bolt
2	Case	18	Key	34	Cross-recessed countersunk head screw
3	Shaft	19	Nut		
4	Cylinder barrel	20	Retainer		
5	Valve plate	21	Plug	35	Flow rate adjusting screw
6	Piston	22	Roller bearing	36	Metal plug
7	Shoe	23	Needle bearing	37	Nameplate
8	Shoe holder	24	Oil seal	38	CAUTION plate
9	Barrel holder	25	Snap ring	39	Spring holder
10	Swash plate	26	Snap ring	40	Guide
11	Thrust bush	27	Snap ring		
12	Seal holder	28	O-ring	41	Lubrication port plate
13	Gasket	29	O-ring	42	Orifice
14	Spring C	30	O-ring	43	Rivet
15	Spring S	31	Backup ring	44	Orifice
16	Control piston	32	Pin	45	Pin
				46	O-ring
				47	Plug

List of Sealing Parts (Kit Model Number PSBS-102220)

Part No.	Part Name	Q'ty	PVS-2B-45N3	
			Size	Remarks
13	Gasket	1	PS46-102000-0A	Nihon Gasket
24	Oil seal	1	TON-305011Z	N.O.K
28	O-ring	1	1B-G70	JIS B 2401
29	O-ring	1	1B-P14	JIS B 2401
30	O-ring	1	1B-P11	JIS B 2401
46	O-ring	2	1B-P5	JIS B 2401
31	Backup ring	1	T2-P11	JIS B 2407

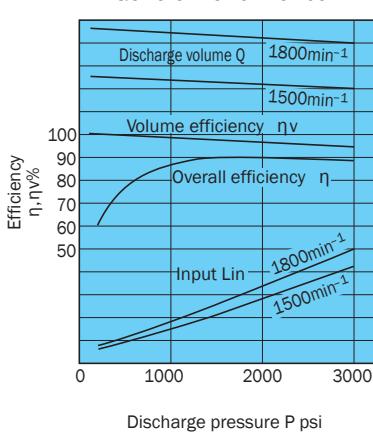
Parts marked by an asterisk "*" are not available on the market. Consult your agent.

Performance Curves

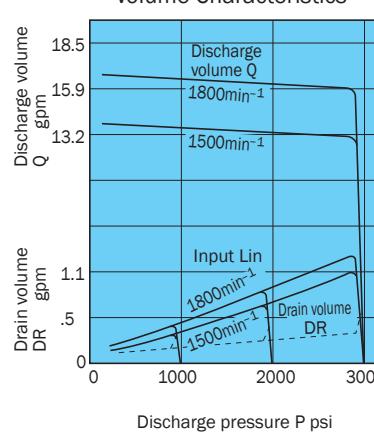
Typical characteristics at hydraulic operating fluid kinematic viscosity of 32 centistokes

PVS-2B-35N*(Z)-E13

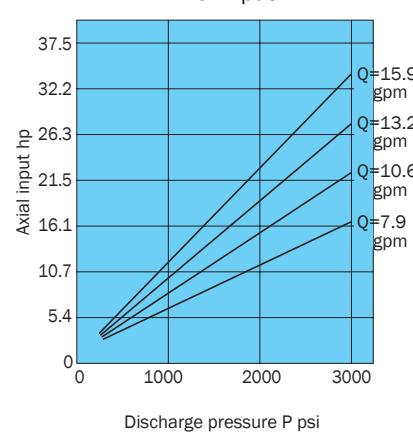
General Performance



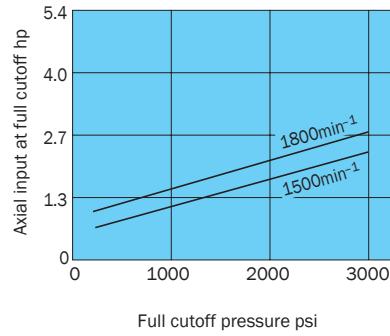
Pressure - Discharge Volume Characteristics



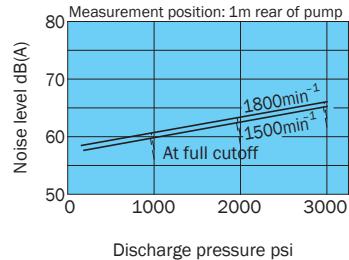
Axial Input



Axial Input at Full Cutoff



Noise Characteristics

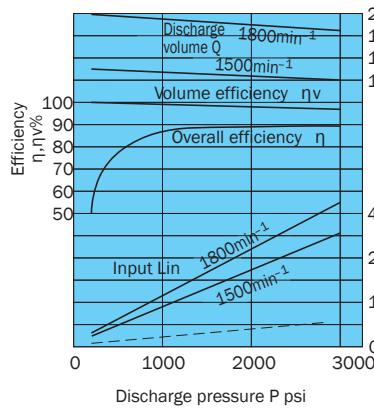


Performance Curves

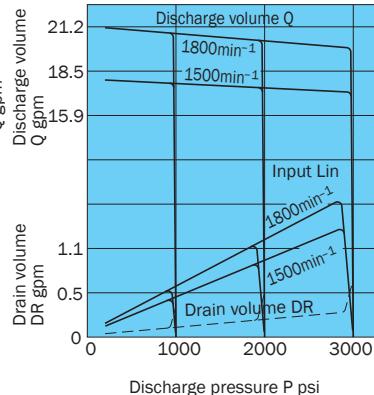
Typical characteristics at hydraulic operating fluid kinematic viscosity of 32 centistokes

PVS-2B-45N*(Z)-E13

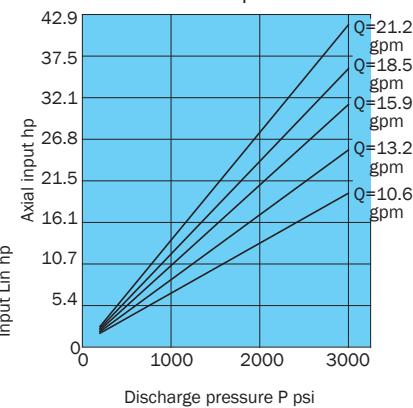
General Performance



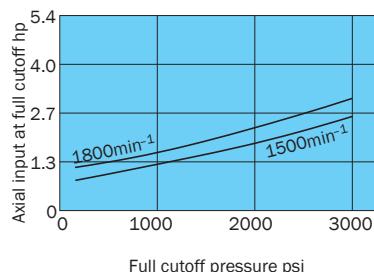
Pressure - Discharge Volume Characteristics



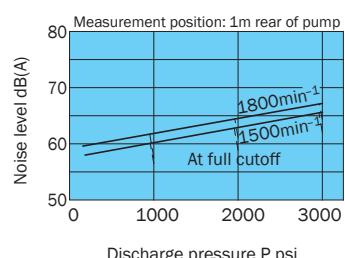
Axial Input



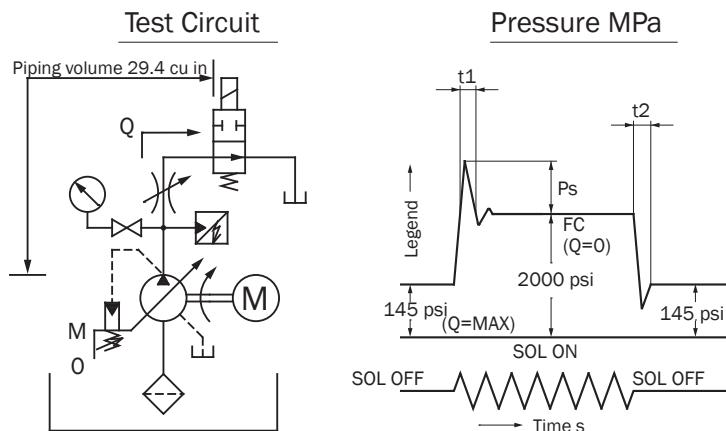
Axial Input at Full Cutoff



Noise Characteristics



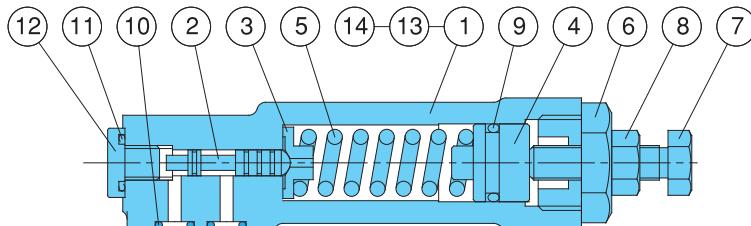
Response Performance



Model No.	Response Time (s)		Surge Pressure psi
	t_1	t_2	
PVS-0B-8	0.03 to 0.04	0.04 to 0.06	290 to 580
PVS-1B-16	0.05 to 0.06	0.07 to 0.08	580 to 1000
PVS-1B-22	0.05 to 0.06	0.07 to 0.08	725 to 1160
PVS-2B-35	0.05 to 0.06	0.05 to 0.07	870 to 1300
PVS-2B-45	0.05 to 0.06	0.05 to 0.07	870 to 1300

Response performance changes according to pipe volume and size.
Use a surgeless valve to prevent surge pressure.

Pressure Compensator



Part No.	Part Name	Part No.	Part Name
1	Body	8	Nut
2	Spool	9	O-ring
3	Holder	10	O-ring
4	Plunger	11	O-ring
5	Spring	12	Plug
6	Retainer	13	Plug
7	Pressure adjusting bolt	14	Mounting bolt

List of Sealing Parts

Part No.	Name	Q'ty	Size
			For 0B, 1B, 2B
9	O-ring	1	1A-P14
10	O-ring	3	1B-P6
11	O-ring	1	1B-P10

Note: O-ring 1A/B-** refers to JIS B2401-1A/B.

Replacement Items

PVS Rotating Group

PVS-0B-8*E30	PSCG-100000-OF
PVS-1B-16*E13	PSG-101100-0A
PVS-1B-22*E13	PSG-101200-1E
PVS-2B-35*E13	PSG-102100-0A
PVS-2B-45*E13	PSG-102200-0A
PVS-2B-45N3*E20	

Includes Items 4,5,6 & 7

PVS Thrust Plate Item 11

PVS-0B-8*E30	PSC69-100000
PVS-1B-16*E13	PS69-101000
PVS-1B-22*E13	PS69-101000
PVS-2B-35*E13	PS69-102000
PVS-2B-45*E13	PS69-102000

Compensator Part Numbers

N0 - PSN-101000	P - ZR-G01-P-E2405C
N1 - PSN-101010	R - ZR-G01-R3-E2171B
N2 - PSN-101020	
N3 - PSN-101030	

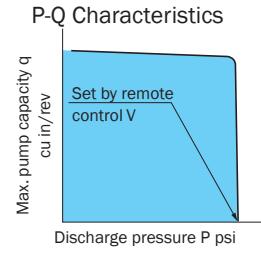
Pressure Compensation Type (remote control mode)

Explanation of Model No.: **PVS - 0 B - 8 P* - E30**

Design No.
E30: PVS-0*
E12: PVS-1*, PVS-2 *
E20: PVS-2*45P3 only

- Pressure adjustment range
 - 0: 286 - 500
 - 1: 286 - 1000
 - 2: 429 - 2000
 - 3: 429 - 3000

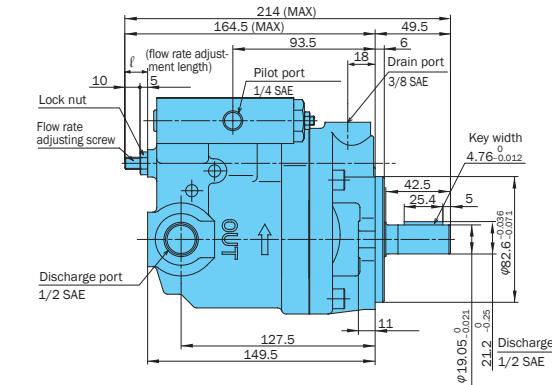
P: Pressure compensation type (remote control mode)



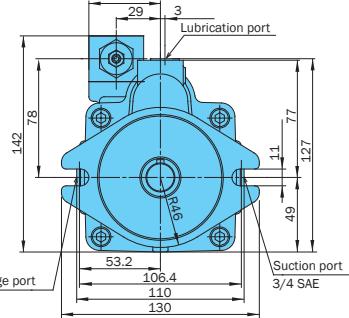
Installation Dimension Drawing

The ZR-T02-*-5895* is the recommended remote control valve. Provide piping to the remote control valve at a pipe volume of 9 cu in or less.

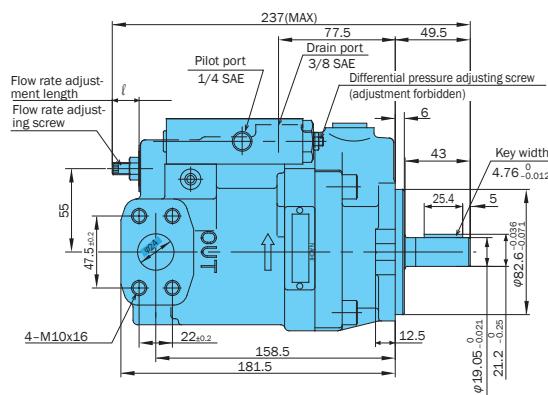
PVS-0B-8P*-E30



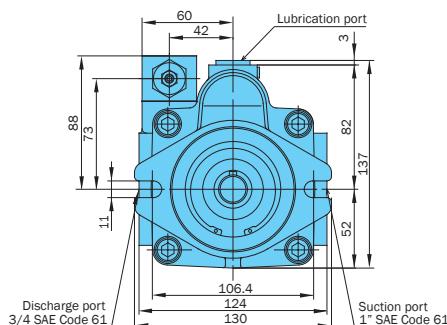
SAE A Mount



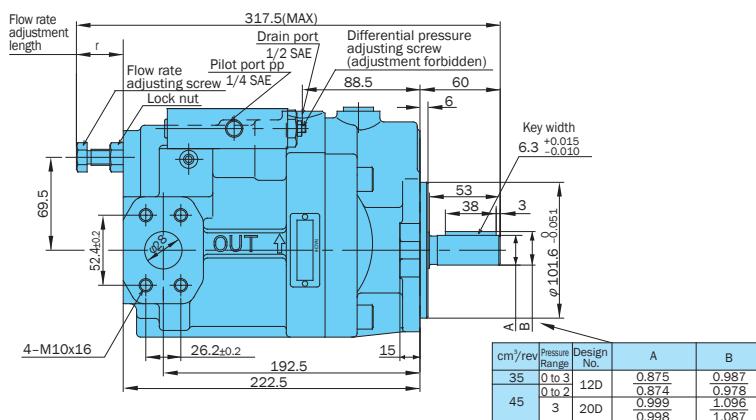
PVS-1B- $\frac{16}{22}$ P*-E13



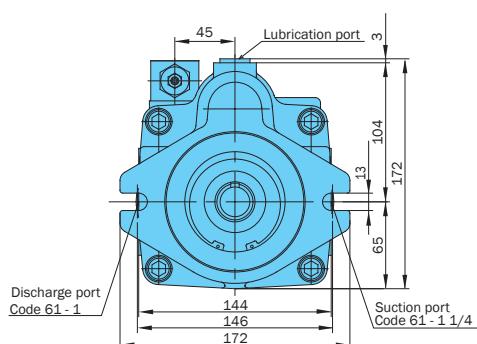
SAE A Mount



PVS-2B-³⁵₄₅ P*-E13



SAE B Mount



2-Pressure, 2-Flow Rate Control Type

Explanation of model No.: **PVS - 1 B - 16 N 3 Q 1 - E13**

Design No.

E13: PVS-1 *, PVS-2 *
E20: PVS-2 *-45N3Q*

Pressure adjustment range

N*: High-pressure adjustment range,
P2 (Set to lowest pressure before shipping)

Q*: Low-pressure adjustment range,
P1 (Set to 3.5 MPa before shipping)

0: 286 - 500 psi

1: 286 - 1000 psi

2: 429 - 2000 psi

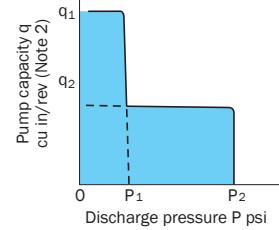
3: 429 - 3000 psi

NQ: 2-pressure, 2-flow rate control

Max. pump capacity (cm³/rev) Nominal 16, 22, 35, 45

Pump size 1, 2

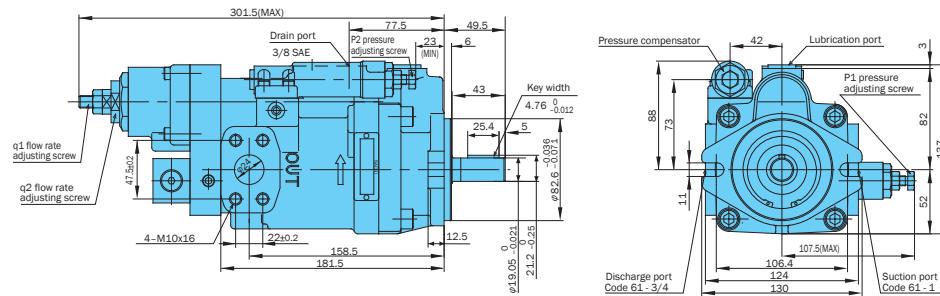
P-Q Characteristics



Installation Dimension Drawing

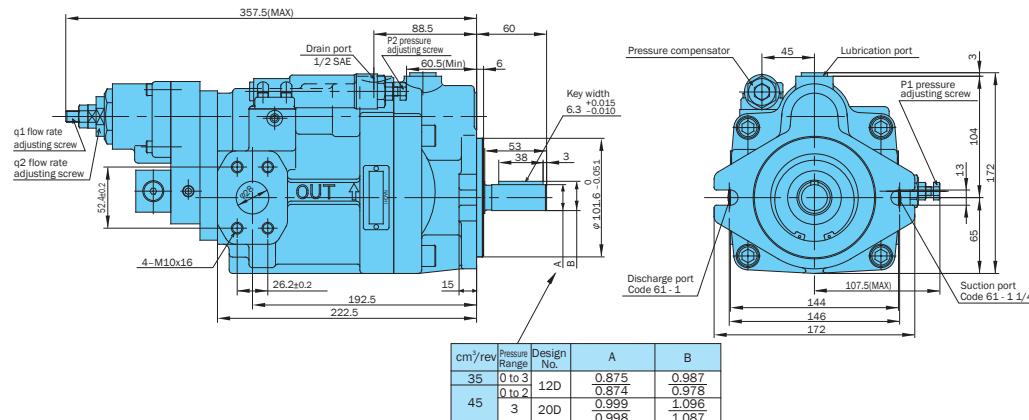
**PVS-1B- 16
22 N*Q*-E13**

SAE A Mount



**PVS-2B- 35
45 N*Q*-E13(E20)**

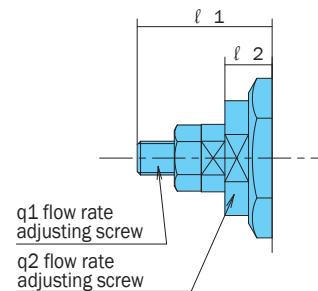
SAE B Mount



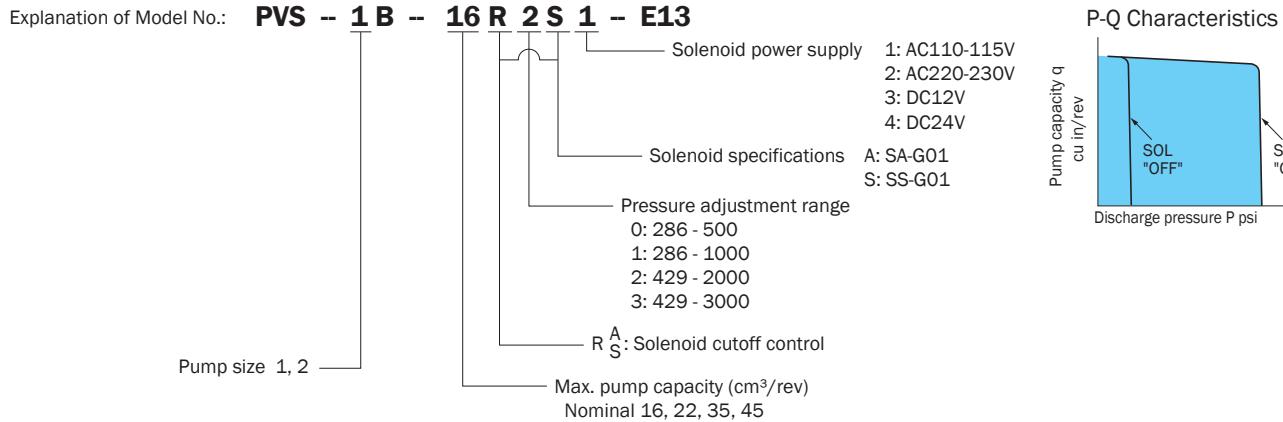
Pump Model No.	q ₂ Adjustment Range (in ³ /rev)	Default q ₂ (Setting in ³ /rev)
PVS-1B-16	.12 to 0.6	.2
PVS-1B-22	.12 to .79	.26
PVS-2B-35	.12 to 1.16	.42
PVS-2B-45	.18 to 1.46	.54

Note 1: The setting range of maximum pump capacity q_1 varies according to the setting of q_2 .

Note 2: Overall efficiency at a low flow rate is worse than at the maximum flow rate. Pay attention to this when selecting the motor capacity for the drive.

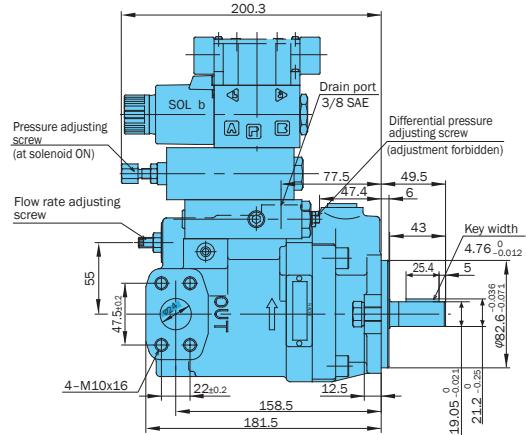


Solenoid Cutoff Control Type

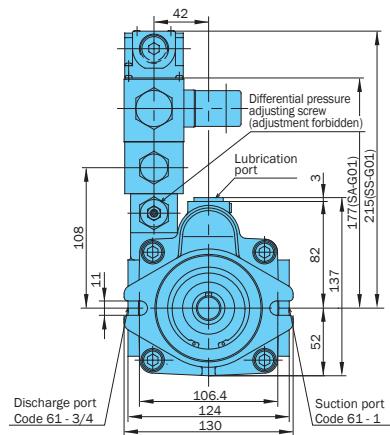


Installation Dimension Drawing

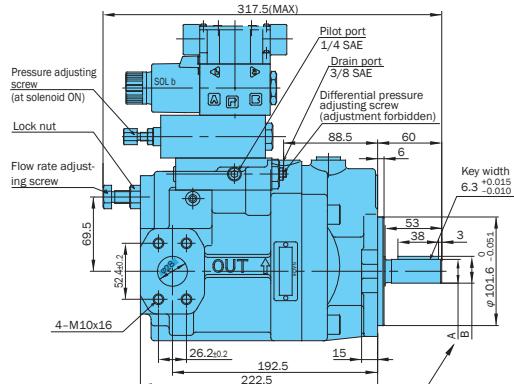
PVS-1B-16R*_SA*-E13



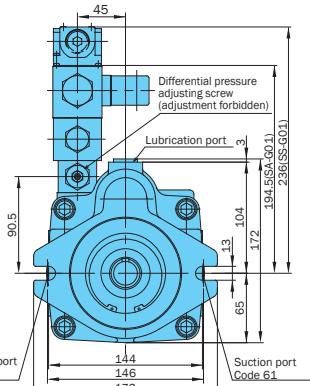
SAE A Mount



PVS-2B-35 R*_SA*-E13



SAE B Mount



cm ³ /rev	Pressure Range	Design No.	A	B
35	0 to 3	120	0.875	0.987
	0 to 2		0.841	0.978
45	3	200	0.999	1.096
			0.998	1.087

- The coil surface temperature increases if this pump is kept continuously energized.
Do not touch the surface of the coil directly with your hands.

2-Pressure Control Type

Explanation of model No.: **PVS - 1B - 16 W 2S 1 - E13**

Pump size 1, 2

Solenoid power supply 1: AC110-115V

2: AC220-230V

3: DC12V

4: DC24V

Solenoid specifications A: SA-G01

S: SS-G01

Pressure adjustment range

0: 286 - 500

1: 286 - 1000

2: 429 - 2000

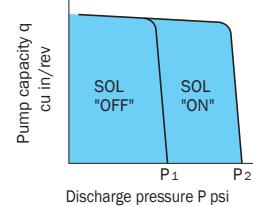
3: 429 - 3000

W^A_S: 2-pressure control

Max. pump capacity (cm³/rev)

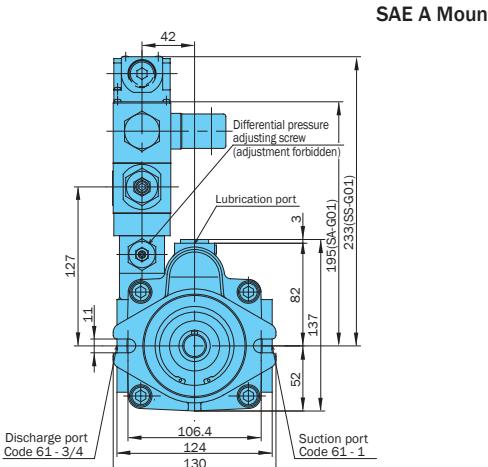
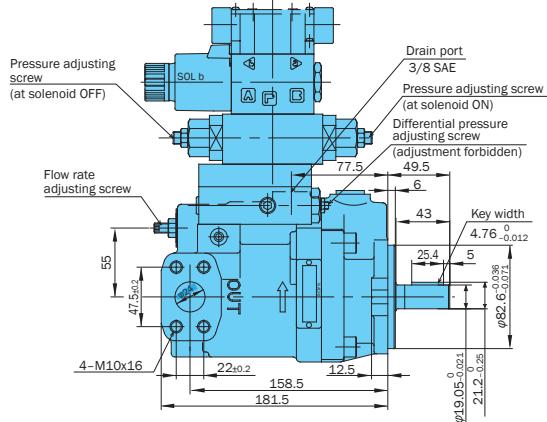
Nominal 16, 22, 35, 45

P-Q Characteristics

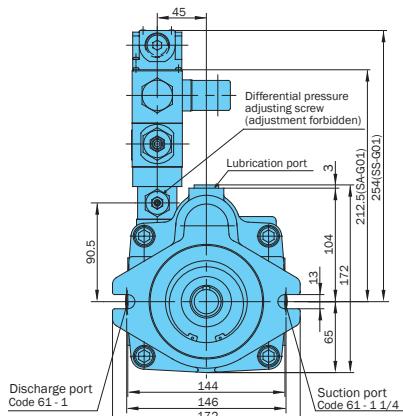
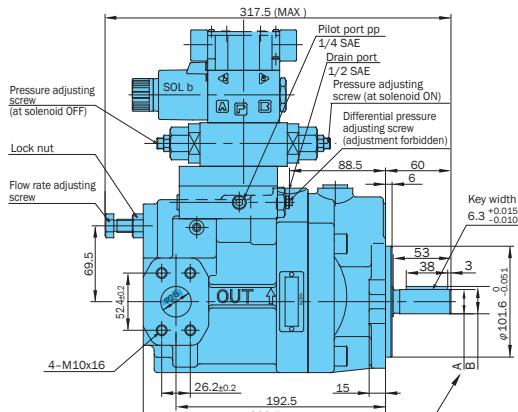


Installation Dimension Drawing

**PVS-1B-16
22 W^A_S-E13**



**PVS-2B-35
45 W^A_S-E13**

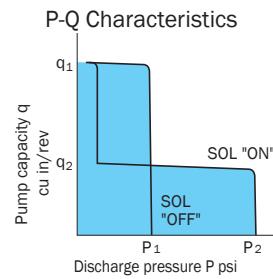
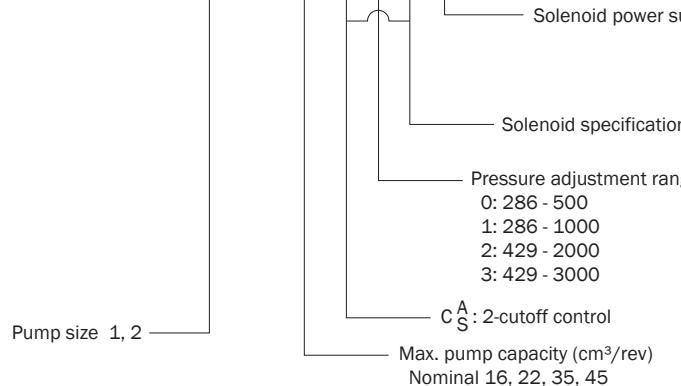


cm ³ /rev	Pressure Range	Design No.	A	B
35	0 to 3	12D	0.875	0.987
	0 to 2		0.874	0.978
45	3	200	0.999	1.096
			0.998	1.087

■ The coil surface temperature increases if this pump is kept continuously energized.
Do not touch the surface of the coil directly with your hands.

2-Cutoff Control Type

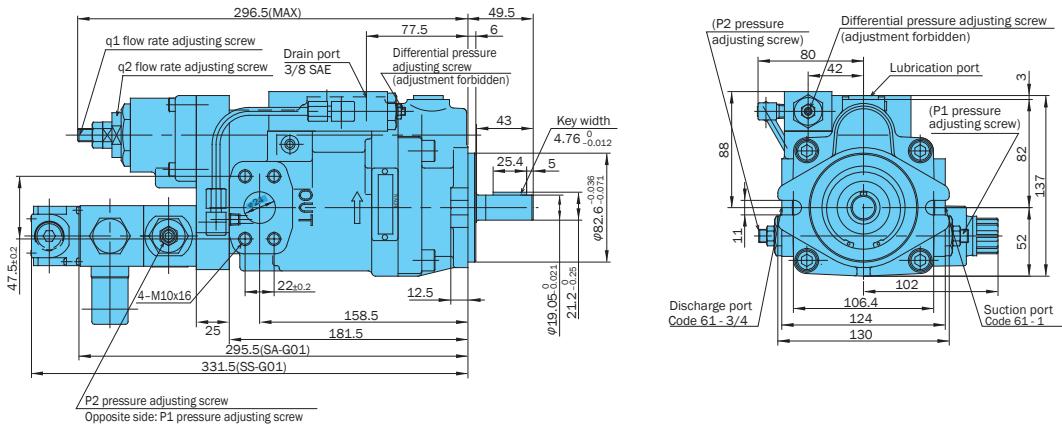
Explanation of Model No.: **PVS - 1B - 16 C 2 S 1 - E13**



Installation Dimension Drawing

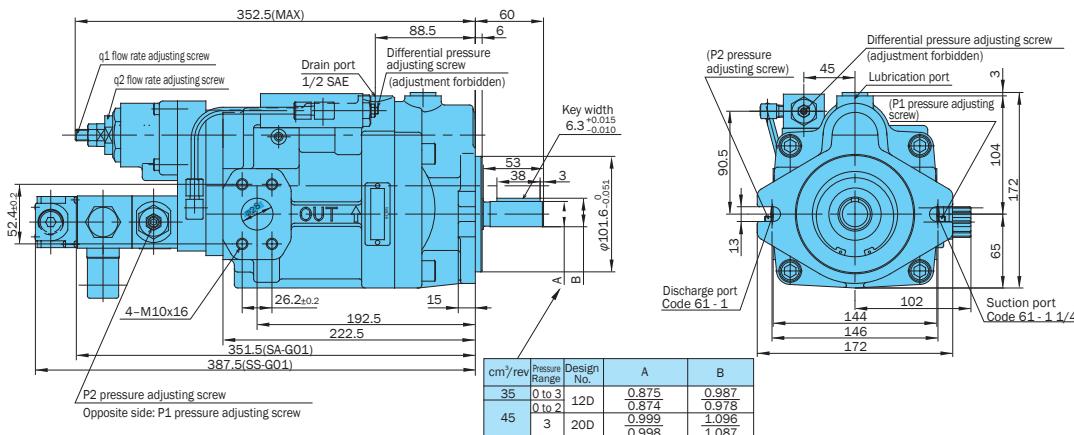
PVS-1B-16 C* A* E13
22 S

SAE A Mount



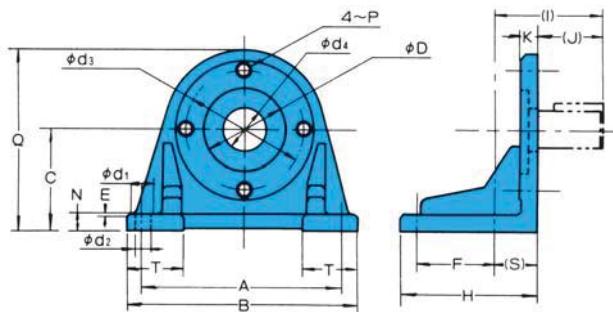
PVS-2B-35 C* A* E20
45 S

SAE B Mount



■ The coil surface temperature increases if this pump is kept continuously energized.
Do not touch the surface of the coil directly with your hands.

Foot Mounting Kit



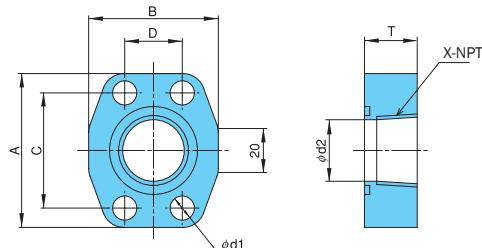
Kit Model No.	Applicable Pump Model No.	Accessories				Dimensions				
		Bolt	Q'ty	Washer	Q'ty	A	B	C	E	F
IHM-2-10	PVS-0B PVS-1B	TB-10 × 30	2	WP-10	2	127	152.5	69.8	1	50.8
IHM-4-10	PVS-2B	TB-12 × 30	2	WP-12	2	220.7	246	107.95	1	114.3

Kit Model No.	Dimensions												Weight kg		
	H	(I)	(J)	K	N	P	Q	(S)	T	φD	φd ₁	φd ₂	φd ₃	φd ₄	
IHM-2-10	96	64.5	32	17.5	13	M10	135	32.5	36.5	82.6	22	11	106.4	50	2.0
IHM-4-10	140	56.7	44	16	16	M12	195.5	12.7	53	101.6	22	11	146	40	5.5

When only the mounting feet are required, the pump mounting bolts, washers and other parts are sold together as the Foot Mounting Kit.

Piping Flange Kit

For PVS-1B, 2B



Plunger Kit model No.	PVS-1B-16/22				PVS-2B-35/45			
	PSF-101000		PSF-102000					
	Suction port	Discharge port	Suction port	Discharge port				
A	70	65	79	70				
B	59	52	73	59				
C	52.4	47.5	58.7	52.4				
D	26.2	22.0	30.2	26.2				
T	24	24	28	24				
φd ₁	φ11	φ11	φ11	φ11				
φd ₂	φ28	φ22	φ37	φ28				
X	1	3/4	1-1/4	1				
Mounting bolt	TH-10 × 40	TH-10 × 40	TH-10 × 45	TH-10 × 40				
Washer	WS-B-10	WS-B-10	WS-B-10	WS-B-10				
O-ring	1B-G35	1B-G30	1B-G45	1B-G35				
Weight lbs	1.3	1.1	1.6	1.3				

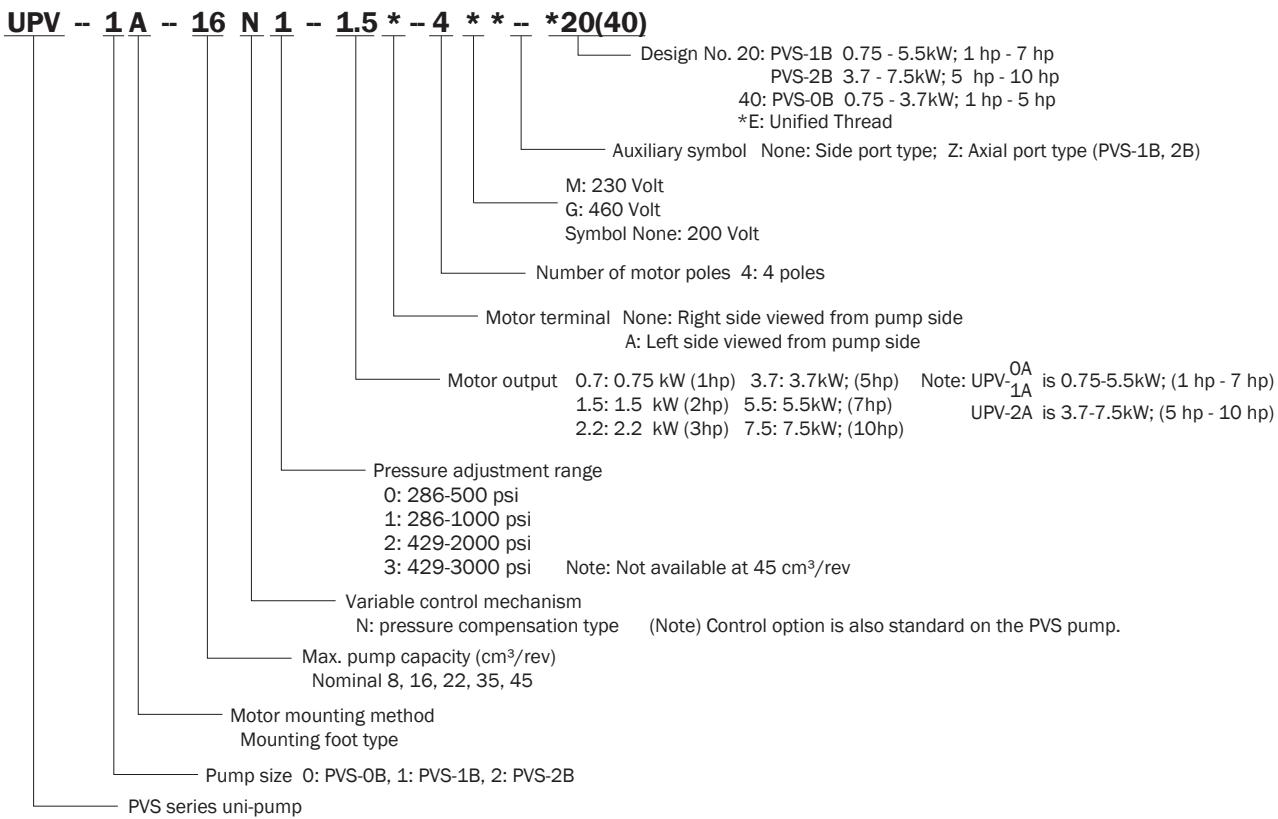
Notes: 1. The piping flange is on sale in the Flange Kit which includes mounting bolts, washers and O-rings.

2. O-ring 1B/B-** refers to JIS B2401-1B.

3. For details on tightening torque, see page C-11.

Uni-Pump Specifications

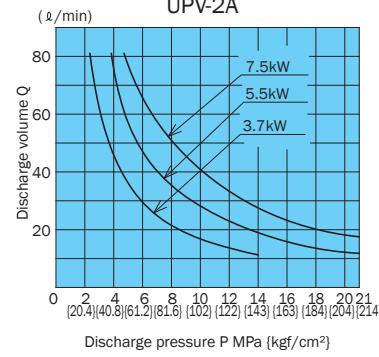
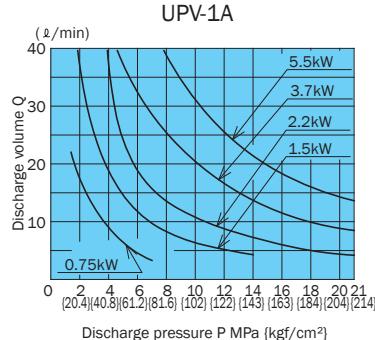
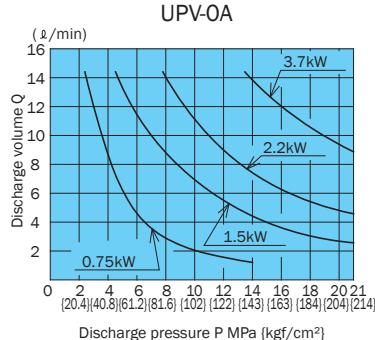
Explanation of Model No.:



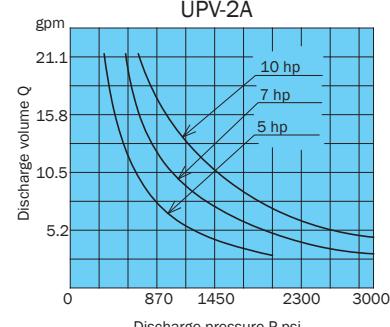
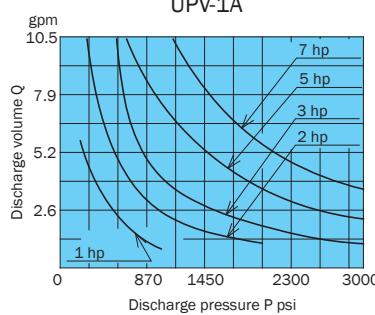
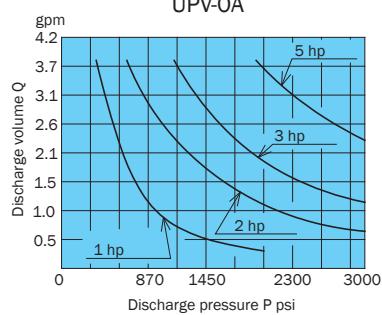
*This Uni-Pump is the metric version from Japan

Motor selection curves

Metric Version



U.S. Version



• How to select the motor

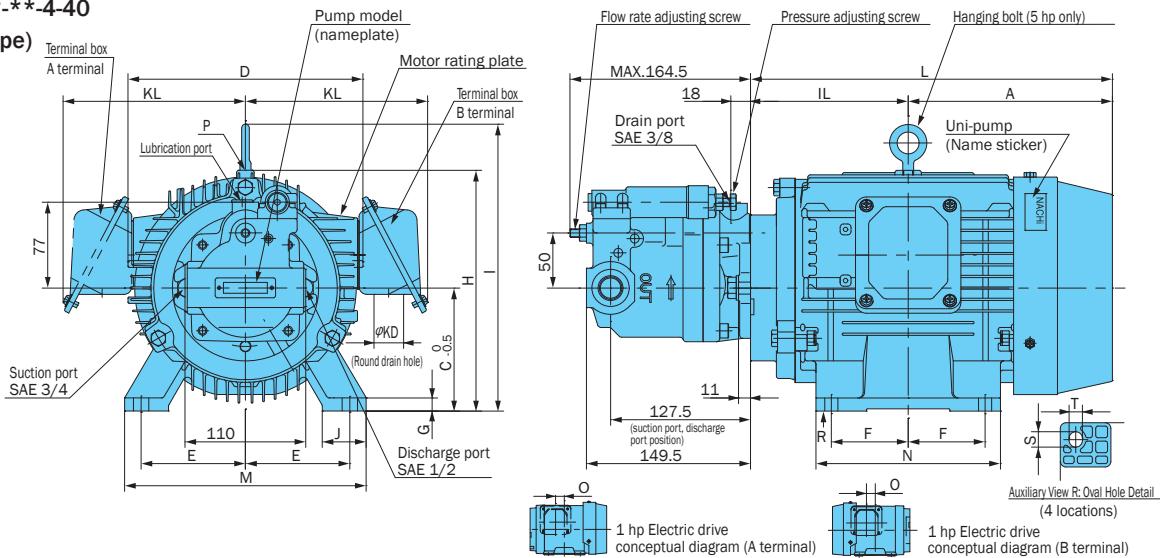
The lower side of the output curves for each of the motors shown above indicates the operating range under rated output for that motor.

* Select a uni-pump that has a pressure and flow rate that is within the range of the drive so that the drive will not overload

Installation Dimension Drawings

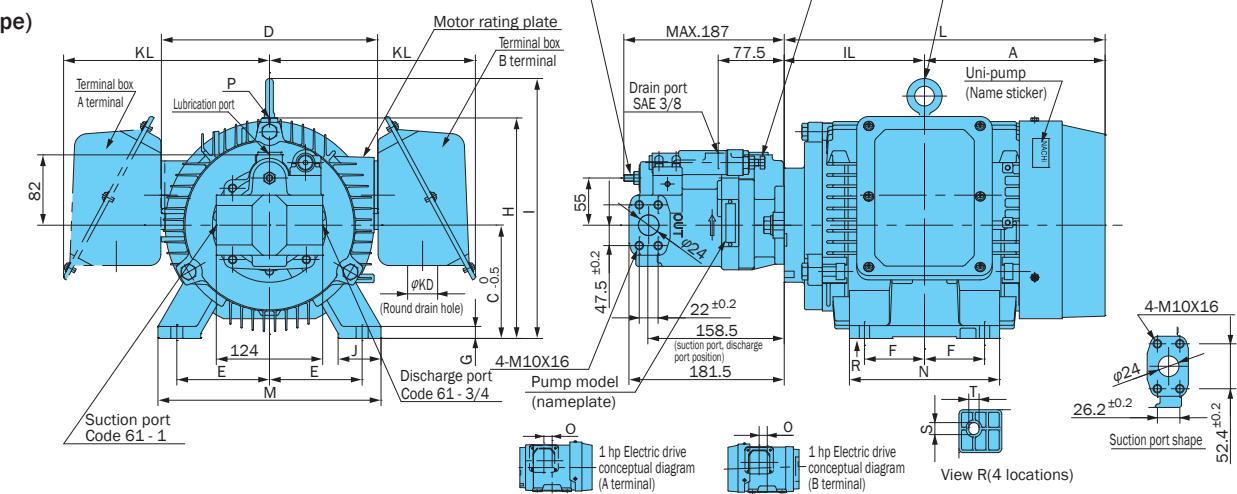
UPV-0A-8-**-4-40**

(side port type)



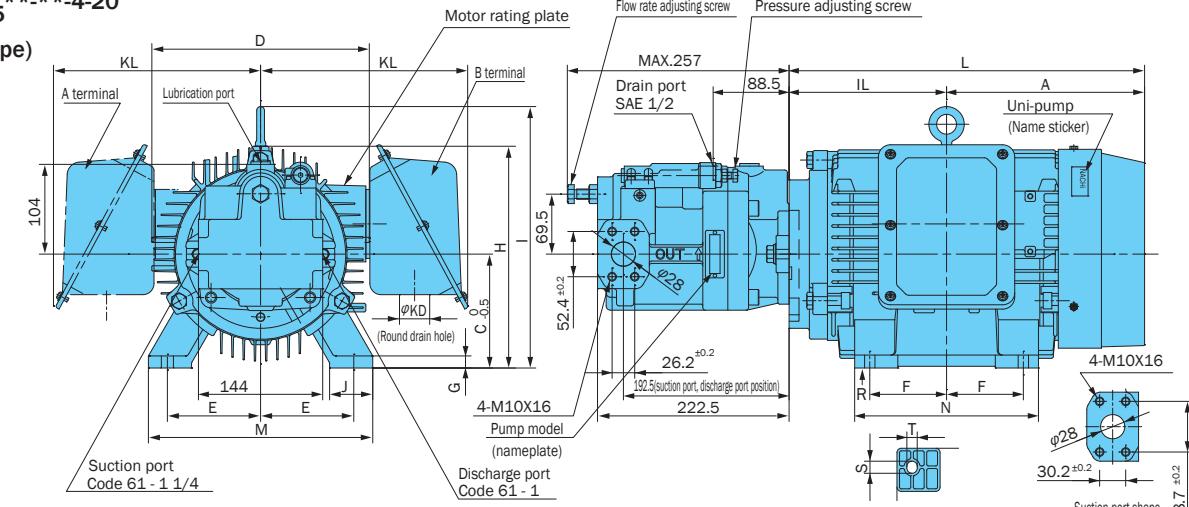
UPV-1A-16-**-4-20
22**

(side port type)



UPV-2A-35-**-4-20
45**

(side port type)



*These Pumps are Metric Versions from Japan

1. Drive motor is fully enclosed fan cooled, 1 to 5 hp is E type, and 7 to 10 hp is B type.
2. Standard voltage for drive motor is 200 VAC, 50/60 Hz or 220 VAC, 60 Hz; EM - 230 VAC, EG - 460 VAC
3. Viewed from the pump side, suction port is on the left and discharge port is on the right.
4. Broken lines indicate instances for the A terminal. Broken lines pass through to the other side of the pump along its center.

Note: A terminal measurements are in parentheses ().

Motor Specifications

Output hp	Motor Dimensions																Frame No.	Weight lbs	
	A	IL	C	D	E	F	G	H	I	J	L	M	N	SxT	KD	KL	O		
1	133	107.5	80	170	62.5	50	4.5	165	-	35	240.5	165	130	18X10	φ27	157	27.5	80M	14.5
2	143	118.5	90	198	70	62.5	10	190	-	40	261	176	150	12X10	φ27	159	-	90L	16
3	157.5	133	100	198	80	70	12	200	-	40	290.5	200	168	14X12	φ27	159	-	100L	21
5	186	143.5	112	214	95	70	12	-	261	40	329.5	220	168	14X12	φ27	166	-	112M	27
7	210.5	163.5	132	252	108	70	15	-	303	50	374	260	175	14X12	φ35	240	-	132S	42
10	229.5	182.5	132	252	108	89	15	-	303	50	412	260	213	14X12	φ35	240	-	132M	48

Characteristics of drive motor for unipump (domestic standard 3 rating)

Output hp	Poles	(Note ¹) Model Number TYPE (N)	Voltage [V]	Frequency [Hz]	Current rating [A]	RPM rating [min ⁻¹]	Heat resistance
.5	4	VBDA (VDS series only)	200	50	2.2	1400	B
			200	60	2.0	1680	
			230-460	60	2.0	1710	
1	4	V*DA-*A4*07	200	50	3.8	1410	B
			200	60	3.4	1690	
			230-460	60	3.4	1720	
2	4	V*DA-*A4*15	200	50	7.0	1410	B
			200	60	6.2	1690	
			230-460	60	6.0	1710	
3	4	V*DA-*A4*22	200	50	9.8	1400	B
			200	60	8.9	1680	
			230-460	60	8.5	1710	
5	4	V*DA-*A4*37	200	50	16.0	1410	B
			200	60	14.8	1690	
			230-460	60	14.0	1710	
7	4	V*DA-*A4*55	200	50	23.8	1430	B
			200	60	21.0	1730	
			230-460	60	20.0	1740	
10	4	V*DA-*A4*75	200	50	31.8	1435	B
			200	60	28.2	1730	
			230-460	60	27.0	1740	

1. The asterisks * indicate variations in the hydraulic pump series, size, and position of terminal box.

Check the ratings sticker on the top of the drive motor.

2. Contact us for variations in voltage.