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* Each section will have a contents page for that specific section as this is a combined document.

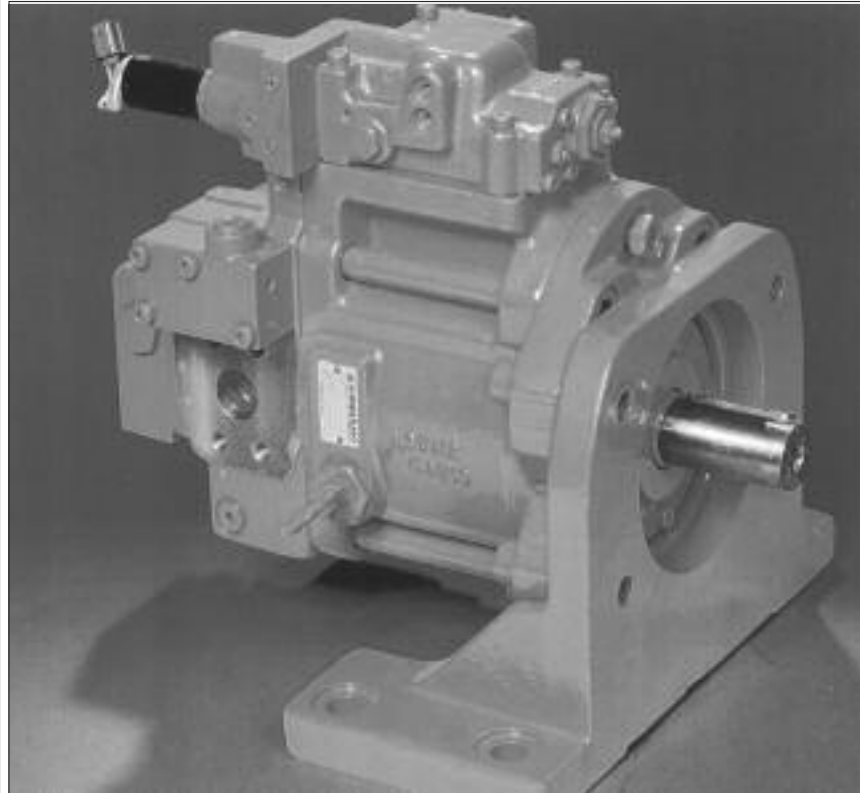
Axial Piston Pumps

K3VG (Industrial Use) – 2006 Version	2
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K8V (Closed Loop, Hydrostatic Drives) – 2017 Version	168
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 **Kawasaki**

K3VG

**Swash-plate Type Axial Piston Pumps
for Open Circuits in
General Industrial Machinery**



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1 General Description

The K3VG Series Swash Plate Type Axial Piston Pumps are designed to specifically satisfy the industrial open circuit market where noise, efficiency, controllability and extended pump life are considered to be essential. K3VG Pumps are available in nominal displacements ranging from 3.84 to 34.2 in³/rev (63 to 560 cm³/rev) with various pressure, flow, and combination control options.

Key features of K3VG Pumps include:

- 1. Reliable, High Pressure and Long Life Design** - The K3VG Series Design is based on the K3V Mobile Series Pump where more than 700,000 units have been supplied to the Construction Machinery Market. The K3VG pump incorporates high load bearings and a friction free contacting mechanism for the piston-shoes. This design has resulted in a pump with high reliability and long service life.
- 2. Low Noise** - The unique, compact and rigid housing construction in addition to the semi-cylindrical pillow type swash-plate and its anti-vibration supporting mechanism has significantly reduced noise levels.
- 3. High Efficiency and High Self-Priming Capability** - K3VG Pumps encompass a spherical shaped valve plate design and improved hydraulic balancing which provide stable cylinder rotation, thus achieving high efficiency even in low-pressure, low-speed operating conditions. The spherical shaped valve plate also enables a shortened radius of the cylinder ports, which reduces the peripheral velocity and pressure-drop. This feature significantly improves the self-priming capability of the pump.
- 4. Extensive Range of Control Options** - A large variety of hydromechanical and hydroelectric control methods are available. Displacement, pressure cutoff, horsepower control, and various combinations of these controls are available.
- 5. Auxiliary Gear Pump** - Various sizes of optional gear pumps can be provided. Therefore, no separate pump unit is necessary as a control pressure source or system medium-pressure source and possible to attach high pressure gear pump. Hydraulic units can thus be made compact and more economical.

2 Specifications

Pump Model		63	112	180	280	180DT	280DT
Displacement	in ³ (cm ³ /rev)	3.84 (63)	6.83 (112)	11.0 (180)	17.1 (280)	22.0 (360)	34.2 (560)
¹ Rated Pressure	psi (bar)	5075 (350)	5075 (350)	5075 (350)	5075 (350)	5075 (350)	5075 (350)
² Peak Pressure	psi (bar)	5800 (400)	5800 (400)	5800 (400)	5800 (400)	5800 (400)	5800 (400)
Max Input Torque	lb-ft (Nm)	232 (314)	412 (559)	665 (902)	1032 (1400)	1330 (1804)	2065 (2800)
³ Max Self Priming Speed	rpm	2600	2200	1850	1600*	1850	1600*
⁴ Max Boosted Speed	rpm	3250	2700	2300	2000	2300	2000
Mass	lb (kg)	106 (48)	150 (68)	190 (86)	353 (160)	353 (160)	661 (300)

Fluid Operating Temperature Range -4° F ~ 176° F (-20° ~ 80° C)

Hydraulic Fluid Mineral Anti-wear Hydraulic Fluid
10 to 1000 cSt
For fluids over 200 cSt please contact Kawasaki
For other fluid types please contact Kawasaki

Fluid Cleanliness 19/16/14 ISO/DIS 4406
(NAS Class 9)

Filtration Suction-line: 150-μ mesh
Return line: 10-μ nominal or better

*Precautions must be taken when operating the K3VG280/DT at 1800 rpm. In order to prevent damage to the pump:

Suction Pressure	Maximum Displacement
+7.1 psi (0.5 bar)	280 cc/rev
0 psi (0 bar)	250 cc/rev
-1.4 psi (-0.1 bar)	232 cc/rev

¹ Consult bearing life charts for high horsepower applications.

Please contact Kawasaki for application assistance.

² Maximum allowable safety relief valve setting.

³ Steady State Suction Pressure ≥-1.45 psi (-2.95 in Hg), (-0.1 bar)

⁴ Minimum Recommended Boost Pressure at Suction Port ≥14.5 psi (29.52 in Hg), (1 bar)

3 Model Coding

PUMP AND ACCESSORIES

K3VG 180DT - 1 A N R S - 1PM1 -01
 [1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11]

[1] K3VG Series Variable Displacement, Axial Piston, Open Loop Pump

[2] Maximum Displacement

Single type	63	63 cm ³ /rev
	112	112 cm ³ /rev
	180	180 cm ³ /rev
	280	280 cm ³ /rev
Tandem type	180DT	360 cm ³ /rev
	280DT	560 cm ³ /rev

[3] Hydraulic Fluid Type.....- Mineral oil
 W Water glycol
 Z Phosphate ester

[4] Circuit Type.....1 Open loop

[5] Attached Gear Pump.....0 Without gear pump
 1 10 cm³/rev with built in relief valve
 580 psi setting (725 psi max)
 (not available on tandem)
 2 15 cm³/rev with built in relief valve
 580 psi setting (725 psi max)
 (not available on tandem)
 3 Without gear pump, with pilot port
 4 ~ D With mounting provisions for gear pump (see page 20)

[6] Mounting Bracket/Port Flanges.....N No bracket, no flange (order separately, see page 20-21)

[7] Direction of Rotation.....R Clockwise
 (viewed @ shaft end) L Counterclockwise (tandem only)

[8] Design Series.....blank Installation and performance details remain
 S unaltered for both design series.

[9] Mounting Orientation.....- Standard horizontal mounting
 V Vertical mounting

[10] Regulator Code**** See page 3

[11] Auxiliary Gear Pump.....blank Single pump or tandem pump without gear pump
 -01 Tandem Pump with auxiliary gear pump

REGULATOR ORDERING CODE

K3VG180DT - 1ANR - 1 P M 1 - 01
 [10.1] [10.2] [10.3] [10.4]

[10.1] Horsepower/Pressure Control	0	Without Horsepower or Pressure Cutoff Control
	1	Horsepower Control
	5	Horsepower and Pressure Cutoff Control
	6	Pressure Cutoff Control with Remote Pressure Cutoff Control Capability
	7	Horsepower and Pressure Cutoff Control with Remote Pressure Cutoff Control Capability
[10.2] Flow Control	0	Without Flow Control
	P	Positive Flow Control
	N	Negative Flow Control
	E	Electric Control
	L	Load Sense Control
[10.3] Power Control Mode.....	H	High Horsepower Band
	M	Medium Horsepower Band
	L	Low Horsepower Band
	0	No horsepower control
[10.4] Power Setting Code	1 - 5	See tabulations on page 4
	A, B	
	0	No horsepower control

STANDARD GEAR PUMP ARRANGEMENTS

An auxiliary gear pump is available to provide a pilot signal to the flow control mechanism of the K3VG regulator. The optimum capacity gear pump for each K3VG pump is tabulated in the table below. The auxiliary gear pumps have an integrated relief valve set at 560 psi.

Pump Size and Ordering Code	Gear Pump Displacement
K3VG63 - 11### - ####	10.0 cm ³ /rev
K3VG112 - 11### - ####	10.0 cm ³ /rev
K3VG180 - 11### - ####	10.0 cm ³ /rev
K3VG280 - 12### - ####	15.0 cm ³ /rev
K3VG180DT - 1A### - #### - 01	25.3 cm ³ /rev
K3VG280DT - 1A### - #### - 01	32.5 cm ³ /rev

HORSEPOWER SET CODES

Standard Regulator at 1200 rpm

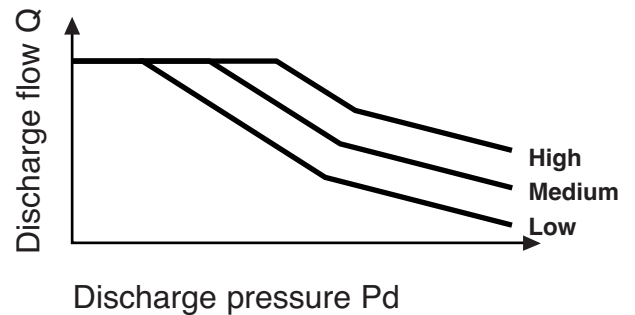
Motor Power hp (kw)	K3VG Pump Frame Size					
	63	112	180	280	180DT	280DT
15 (11.2)	L2					
20 (14.9)	M2					
25 (18.6)	H5	L2				
30 (22.4)	H3	M4				
40 (29.8)		M1	L1			
50 (37.3)		H4	M3			
60 (44.7)		H2	M2	L2		
75 (55.9)			H5	M5	L3	
100 (74.6)			H1	M1	M3	L4
125 (93.2)				H3	M1	L2
150 (111.9)				H1	H3	M4
200 (149.1)					HA	MA
250 (186.4)						H5
300 (223.7)						H2

Example:

Pump: K3VG112-10NR-10??
 Electric Motor: 50hp at 1800 rpm
 Horsepower Set Code: M3
 Final Model Code: K3VG112-10NR-10**M3**

Standard Regulator at 1500 rpm

Motor Power hp (kw)	K3VG Pump Frame Size					
	63	112	180	280	180DT	280DT
15 (11.2)	L4					
20 (14.9)	L1					
25 (18.6)	M2					
30 (22.4)	M1	L3				
40 (29.8)	H2	M3	L3			
50 (37.3)		M1	L1			
60 (44.7)		H5	M4			
75 (55.9)		H3	M2	L2		
100 (74.6)			H4	M4	L2	
125 (93.2)			H2	M2	M4	
150 (112)				H4	M2	L3
200 (149)					H4	MB
250 (186.4)					HA	MA
300 (224)						HA
350 (261)						HB



Standard Regulator at 1800 rpm

Motor Power hp (kw)	K3VG Pump Frame Size					
	63	112	180	280*	180DT	280DT*
20 (14.9)	L3					
25 (18.6)	L1					
30 (22.4)	M2					
40 (29.8)	H4	L1				
50 (37.3)	H2	M3	L3			
60 (44.7)		M1	L1			
75 (55.9)		H5	M4			
100 (74.6)		H1	M1	L1*	L4	
125 (93.2)			H4	M4*	L2	
150 (111.9)			H2	M2*	M4	
200 (149.1)				HA*	MA	LA*
250 (186.4)					HB	MB*
300 (223.7)					HA	MA*
350 (261.0)						HA*
400 (298.3)						H4*
450 (335.6)						H2*

*See precaution for operating K3VG280 and K3VG280DT at 1800 rpm on page 1.

HORSEPOWER ADJUSTMENT RANGE

The horsepower setting can be adjusted via external adjusting screws. The adjustment range of each horsepower control mode is given in the tables below.

K3VG63

Horsepower control mode		1200 rpm hp (kW)	1500 rpm hp (kW)	1800 rpm hp (kW)
H	High horsepower	23.5~35.9 (17.5~26.8)	29.5~45.3 (22.0~33.8)	35.6~54.7 (26.6~40.8)
M	Medium horsepower	16.6~23.9 (12.4~17.8)	20.9~30.0 (15.6~22.4)	25.3~36.3 (18.9~27.1)
L	Low horsepower	11.3~20.1 (8.4~15.0)	14.2~25.3 (10.6~18.9)	17.2~30.6 (12.8~22.8)

K3VG112

Horsepower control mode		1200 rpm hp (kW)	1500 rpm hp (kW)	1800 rpm hp (kW)
H	High horsepower	39.3~33.1 (29.3~49.3)	49.6~83.2 (37.0~62.1)	59.8~100.5 (44.6~75.0)
M	Medium horsepower	28.8~48.4 (21.5~36.1)	36.3~61.1 (27.1~45.6)	43.8~73.7 (32.7~55.0)
L	Low horsepower	20.2~32.6 (15.1~24.3)	25.6~41.2 (19.1~30.7)	30.8~49.6 (23.0~37.0)

K3VG180

Horsepower control mode		1200 rpm hp (kW)	1500 rpm hp (kW)	1800 rpm hp (kW)
H	High horsepower	59.4~102.5 (43.6~76.5)	73.7~129.3 (55.0~96.5)	89.0~156.0 (66.4~116.4)
M	Medium horsepower	46.6~79.8 (34.8~59.5)	58.8~100.5 (43.9~75.0)	71.0~121.3 (53.0~90.5)
L	Low horsepower	31.8~48.4 (23.7~36.1)	40.1~61.1 (29.9~45.6)	48.4~73.7 (36.1~55.0)

K3VG280

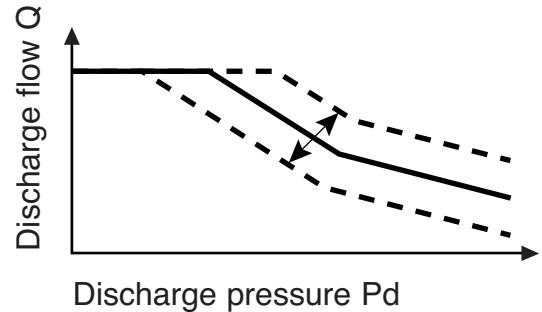
Horsepower control mode		1200 rpm hp (kW)	1500 rpm hp (kW)	1800 rpm hp (kW)
H	High horsepower	95.7~159.6 (71.4~119.1)	120.6~201.2 (90.0~150.1)	180.0~220.0 (134.3~164.0)
M	Medium horsepower	71.6~120.6 (53.4~90.0)	90.2~152.1 (67.3~113.5)	120.0~180.0 (89.5~134.3)
L	Low horsepower	49.7~79.7 (37.1~59.5)	62.7~100.5 (46.8~75.0)	80.0~125.0 (59.7~93.3)

K3VG180DT

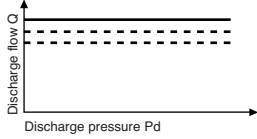
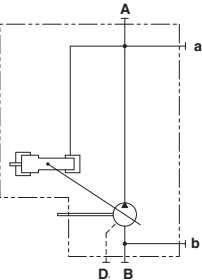
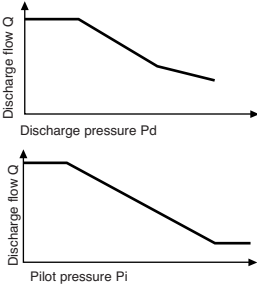
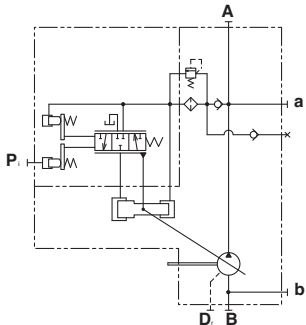
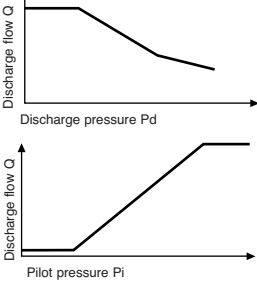
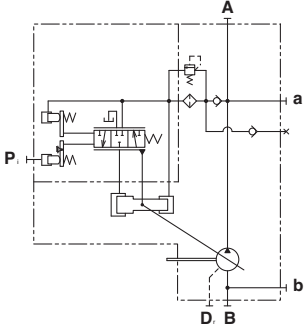
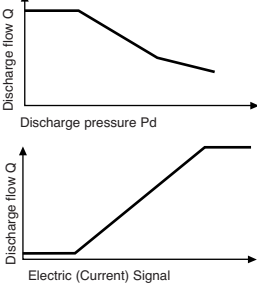
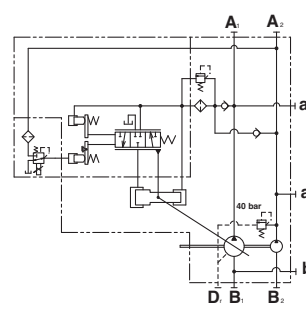
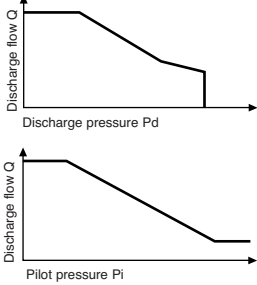
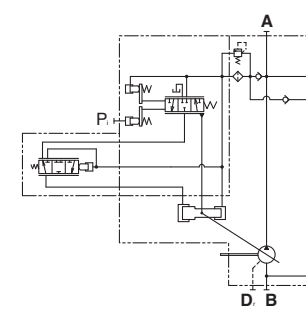
Horsepower control mode		1200 rpm hp (kW)	1500 rpm hp (kW)	1800 rpm hp (kW)
H	High horsepower	116.2~205.1 (86.7~153.0)	146.6~258.5 (109.4~192.9)	176.9~312.2 (132.0~232.9)
M	Medium horsepower	93.4~143.0 (69.7~106.7)	117.8~180.3 (87.9~134.5)	142.1~217.7 (106.0~162.4)
L	Low horsepower	63.7~96.9 (47.5~72.3)	80.3~122.1 (59.9~91.1)	96.9~147.4 (72.3~110.0)

K3VG280DT

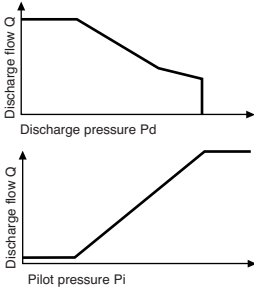
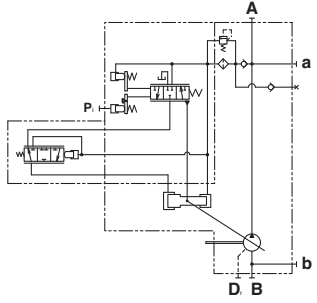
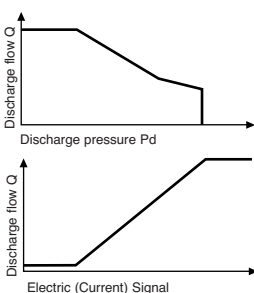
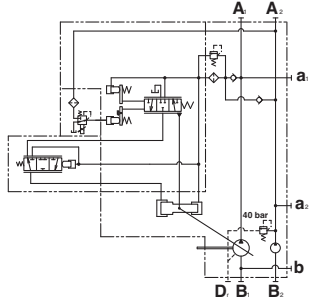
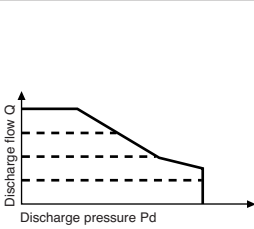
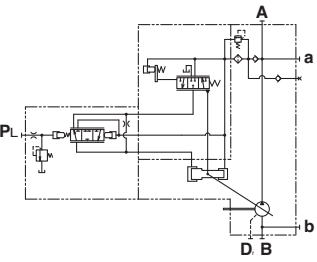
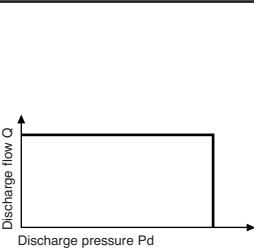
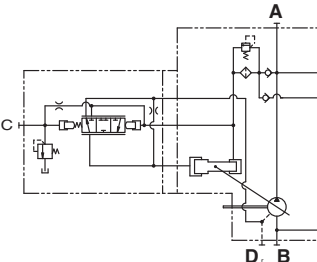
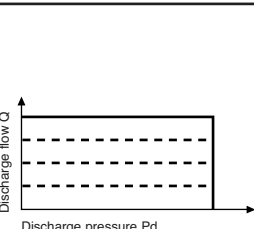
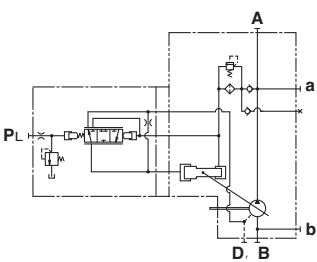
Horsepower control mode		1200 rpm hp (kW)	1500 rpm hp (kW)	1800 rpm hp (kW)
H	High horsepower	209.8~319.1 (156.5~238.1)	264.4~402.5 (197.3~300.3)	290.0~450.0 (216.0~335.0)
M	Medium horsepower	145.8~254.3 (108.8~189.7)	183.9~320.6 (137.2~239.2)	240.0~310.0 (179.0~231.0)
L	Low horsepower	99.5~170.1 (74.2~126.9)	125.3~214.5 (93.5~160.0)	160.0~245.0 (119.0~183.0)



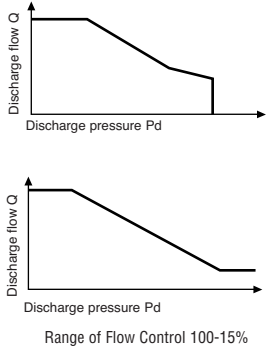
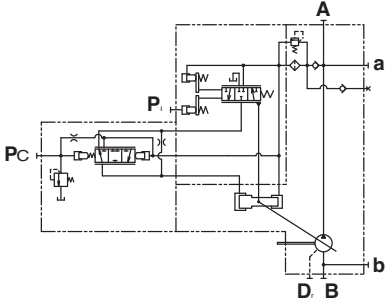
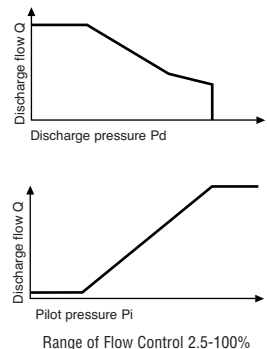
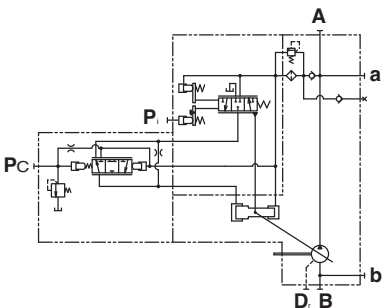
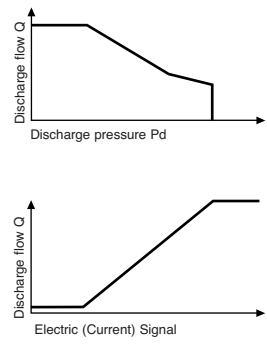
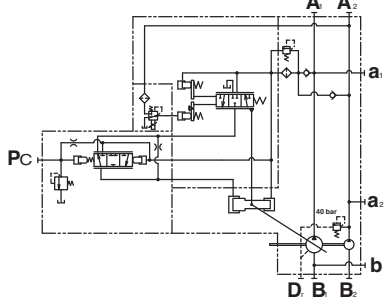
FUNCTIONAL DESCRIPTION OF REGULATORS

Regulator Code	Control Curves	Hydraulic Circuit
<p>0000 Stepless Manual Displacement Control The pump is supplied without a regulator. The discharge flow can be steplessly adjusted by manually turning adjustment screws on the pump. This adjustment provision is a standard feature on all K3VG pumps providing a means to limit the maximum and minimum displacement.</p>	 <p>Range of Flow Control 50-100%</p>	
<p>10## Horsepower Control 1N## Horsepower and Negative Flow Control In response to a rise in delivery pressure, the swash plate tilting angle is decreased, restricting the input torque. This regulator prevents excessive load against the prime mover. By adding a pilot signal to the Pi port the discharge flow can be infinitely adjusted within the range of the pump. An increase in pilot signal will result in a decrease in flow, hence the Negative control.</p>	 <p>Range of Flow Control 100-15%</p>	
<p>1P## Horsepower and Positive Flow Control This regulator combines the Horsepower Control with Positive Flow Control. By adding a pilot signal to the Pi port the discharge flow can be infinitely adjusted within the range of the pump. An increase in pilot signal will result in an increase in flow, hence the Positive control.</p>	 <p>Range of Flow Control 2.5-100%</p>	
<p>1E## Horsepower and Electric Flow Control This regulator combines the Horsepower Control with Electric Flow Control. A proportional reducing valve is added to the regulator so the discharge flow can be infinitely adjusted within the range of the pump. An increase in electric signal to the proportional reducing valve will result in an increase in flow. This regulator requires an amplifier (refer to page 9) to provide the electric signal.</p>	 <p>Range of Flow Control 2.5-100%</p>	
<p>50## Horsepower and Pressure Cutoff 5N## Horsepower, Pressure Cutoff and Negative Flow Control This regulator combines the Horsepower Control with Pressure Cutoff Control. By adding a pilot signal to the Pi port the discharge flow can be infinitely adjusted within the range of the pump. An increase in pilot signal will result in a decrease in flow, hence the Negative control.</p>	 <p>Range of Flow Control 100-15%</p>	

FUNCTIONAL DESCRIPTION OF REGULATORS (continued)

Regulator Code	Control Curves	Hydraulic Circuit
<p>5P## Horsepower, Pressure Cutoff and Positive Flow Control This regulator combines the Horsepower Control with Pressure Cutoff Control. By adding a pilot signal to the Pi port the discharge flow can be infinitely adjusted within the range of the pump. An increase in pilot signal will result in an increase in flow, hence the Positive control.</p>	 <p>Range of Flow Control 2.5-100%</p>	
<p>5E## Horsepower, Pressure Cutoff and Electric Flow Control This regulator combines the Horsepower Control with Pressure Cutoff and Electric Flow Control. A proportional reducing valve is added to the regulator so the discharge flow can be infinitely adjusted within the range of the pump. An increase in electric signal to the proportional reducing valve will result in an increase in flow. This regulator requires an amplifier (refer to page 9) to provide the electric signal.</p>	 <p>Range of Flow Control 2.5-100 %</p>	
<p>5L## Horsepower and Load Sense Control This regulator combines Horsepower Control and Load Sense Control.</p>	 <p>Range of Flow Control 2.5-100%</p>	
<p>6000 Pressure Cutoff Control This regulator maintains a constant pressure regardless of the discharge flow. It is imperative that a safety relief valve is installed in the circuit. By connecting the Pc port to a remote pressure control, variable pump pressure control can be achieved. A subplate can be added to the regulator that will accommodate a "DO3" proportional relief valve for variable Pressure Cutoff Control.</p>		
<p>6L00 Load Sense Control This regulator controls the pump displacement to match the flow requirement as a function of load pressure. In addition, there is a Pressure Cutoff Function incorporated into the regulator.</p>	 <p>Range of Flow Control 2.5-100%</p>	

FUNCTIONAL DESCRIPTION OF REGULATORS (continued)

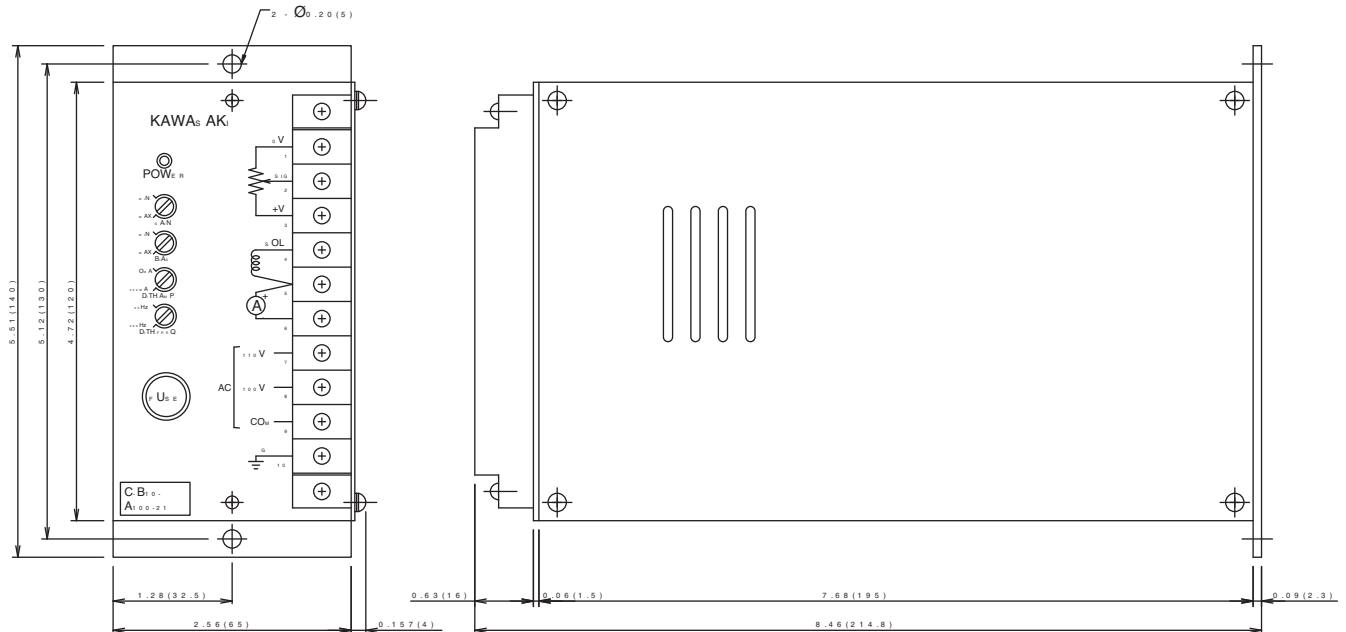
Regulator Code	Control Curves	Hydraulic Circuit
<p>70## Horsepower and Pressure Cutoff 7N## Horsepower, Pressure Cutoff and Negative Flow Control (with Remote Pressure Cutoff Capability)</p> <p>This regulator combines the Horsepower Control with Pressure Cutoff Control. By adding a pilot signal to the Pi port the discharge flow can be infinitely adjusted within the range of the pump. An increase in pilot signal will result in a decrease in flow, hence the Negative control.</p> <p>By connecting the Pc port to a remote pressure control, variable pump pressure control can be achieved.</p> <p>A subplate can be added to the regulator that will accommodate a "DO3" proportional relief valve for variable Pressure Cutoff Control.</p>		
<p>7P## Horsepower, Pressure Cutoff and Positive Flow Control (with Remote Pressure Cutoff Capability)</p> <p>This regulator combines the Horsepower Control with Pressure Cutoff Control. By adding a pilot signal to the Pi port the discharge flow can be infinitely adjusted within the range of the pump. An increase in pilot signal will result in an increase in flow, hence the Positive control.</p> <p>By connecting the Pc port to a remote pressure control, variable pump pressure control can be achieved.</p> <p>A subplate can be added to the regulator that will accommodate a "DO3" proportional relief valve for variable Pressure Cutoff Control.</p>		
<p>7E## Horsepower, Pressure Cutoff and Electric Flow Control (with Remote Pressure Cutoff Capability)</p> <p>This regulator combines the Horsepower Control with Pressure Cutoff and Electric Flow Control. A proportional reducing valve is added to the regulator so the discharge flow can be infinitely adjusted within the range of the pump. An increase in electric signal to the proportional reducing valve will result in an increase in flow. This regulator requires an amplifier (refer to page 9) provide the electric signal.</p> <p>By connecting the Pc port to a remote pressure control, variable pump pressure control can be achieved.</p> <p>A subplate can be added to the regulator that will accommodate a "DO3" proportional relief valve for variable Pressure Cutoff Control.</p>		

4 C-B10-A###-21 Proportional Amplifier

Specifications

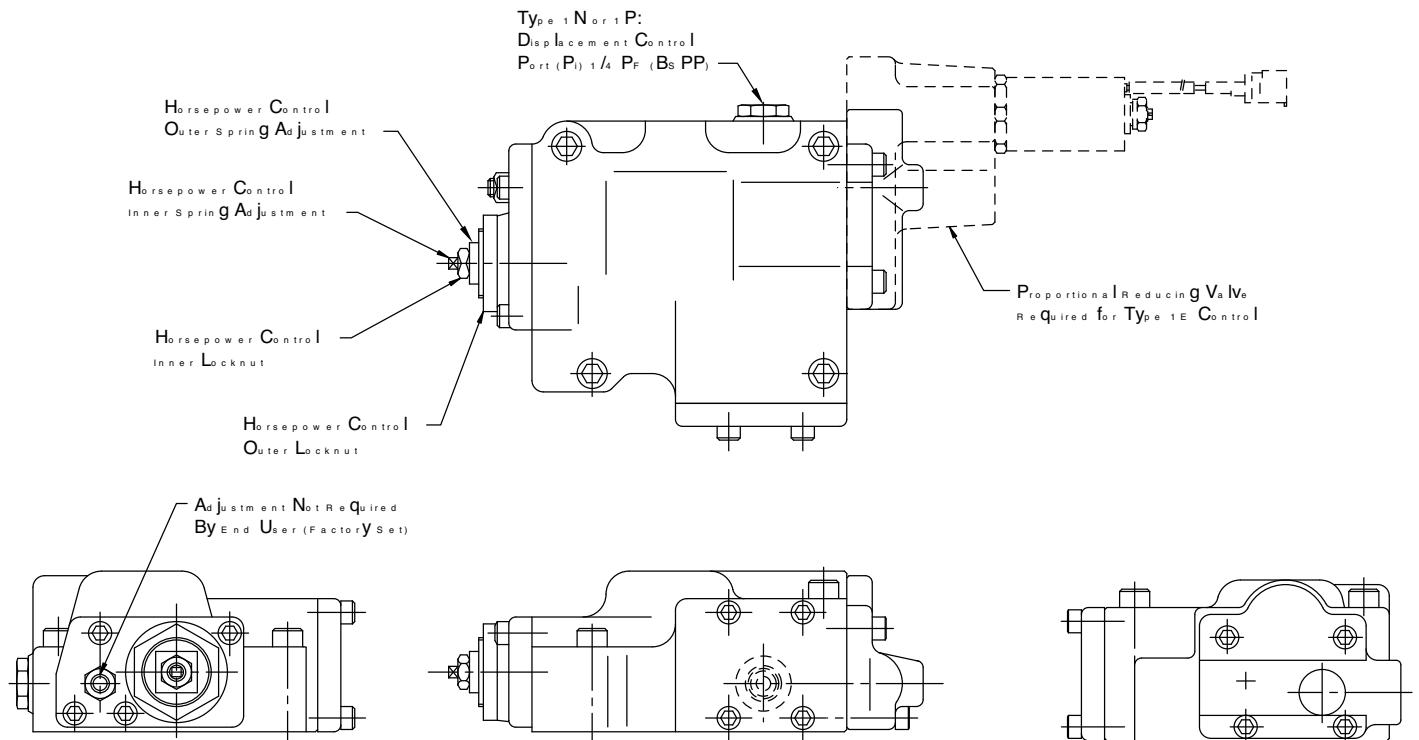
Supply Input Voltage (50/60Hz)	A100 / 110V $\pm 10\%$ A200 / 220V $\pm 10\%$
Command Input Signal Voltage	0 ~ 10 VDC
Rated Output Current	750 mA
Maximum Output Current	1.0 A
Power Consumption	Maximum 40 VA
Load Resistance	45 Ω or less
Input Impedance	50 k Ω
Ambient Temperature Range	32 ~ 122° F (0 ~ 50° C)
Maximum Humidity	90% RH (no dew permissible)
Vibration Resistance (JIS C091 IIB Type 3)	Amplitude 0.12 in (3.0 mm) peak to peak Frequency 16.7 Hz
Insulation	100MW minimum at 500 VDC
Mass	6.8 lb (3.1 Kg)
Gain Adjustment Range	35 ~ 160 mA/V
Bias Adjustment Range	0 ~ 250 mA
Linearity	Up to 2% FS
Current Stability	Up to 1.0% FS (ambient temperature change 122° F) Up to 1.0% FS (for supply voltage change $\pm 10\%$) Up to 1.5% FS (load resistance change 33 ~ 45 Ω)
Supply Fuse	1.6 A
Dither Frequency Adjustment Range	50 ~ 200 Hz
Dither Amplitude Adjustment Range	0 ~ 250 mA Peak to Peak

Installation Drawing

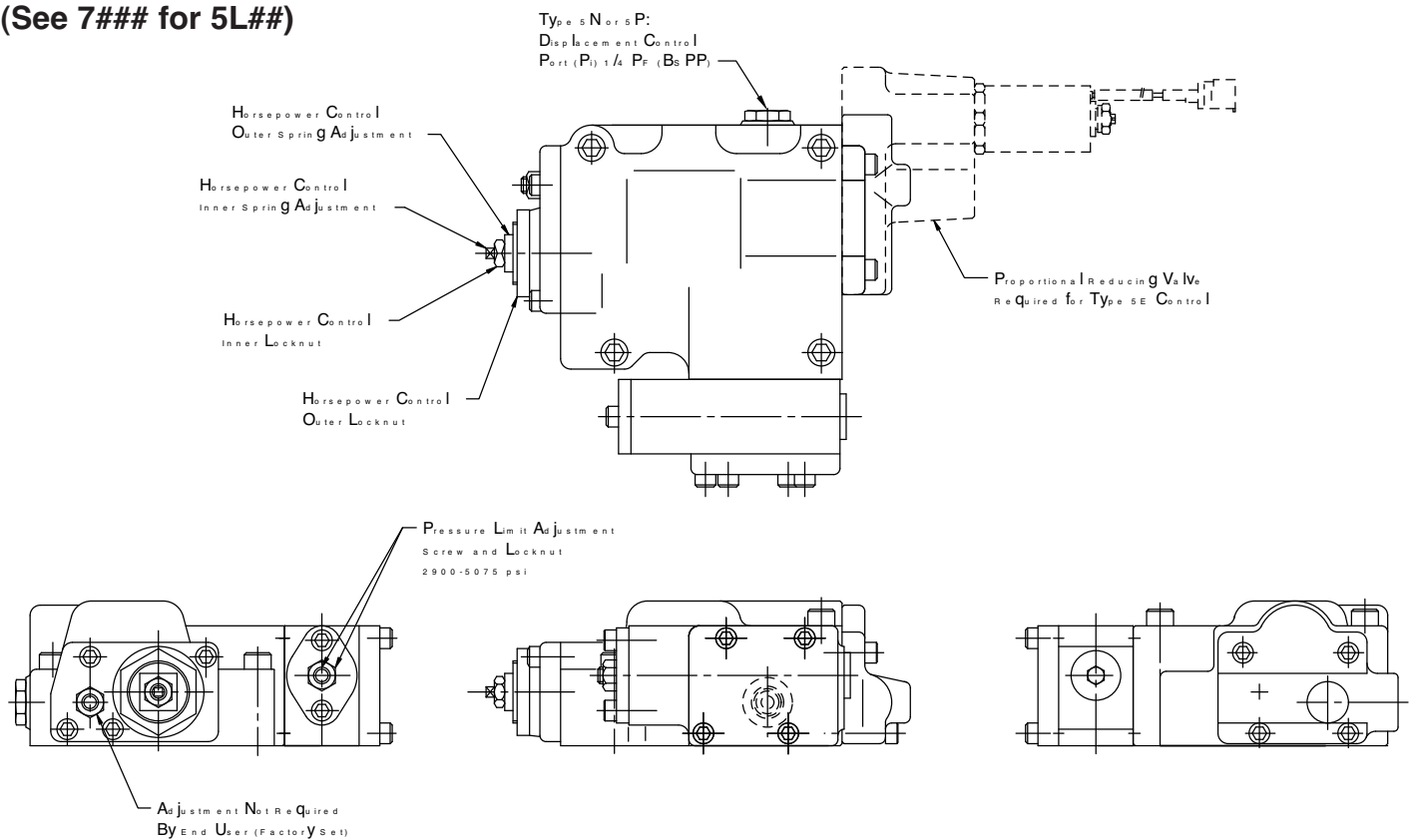


5 Pump Controls

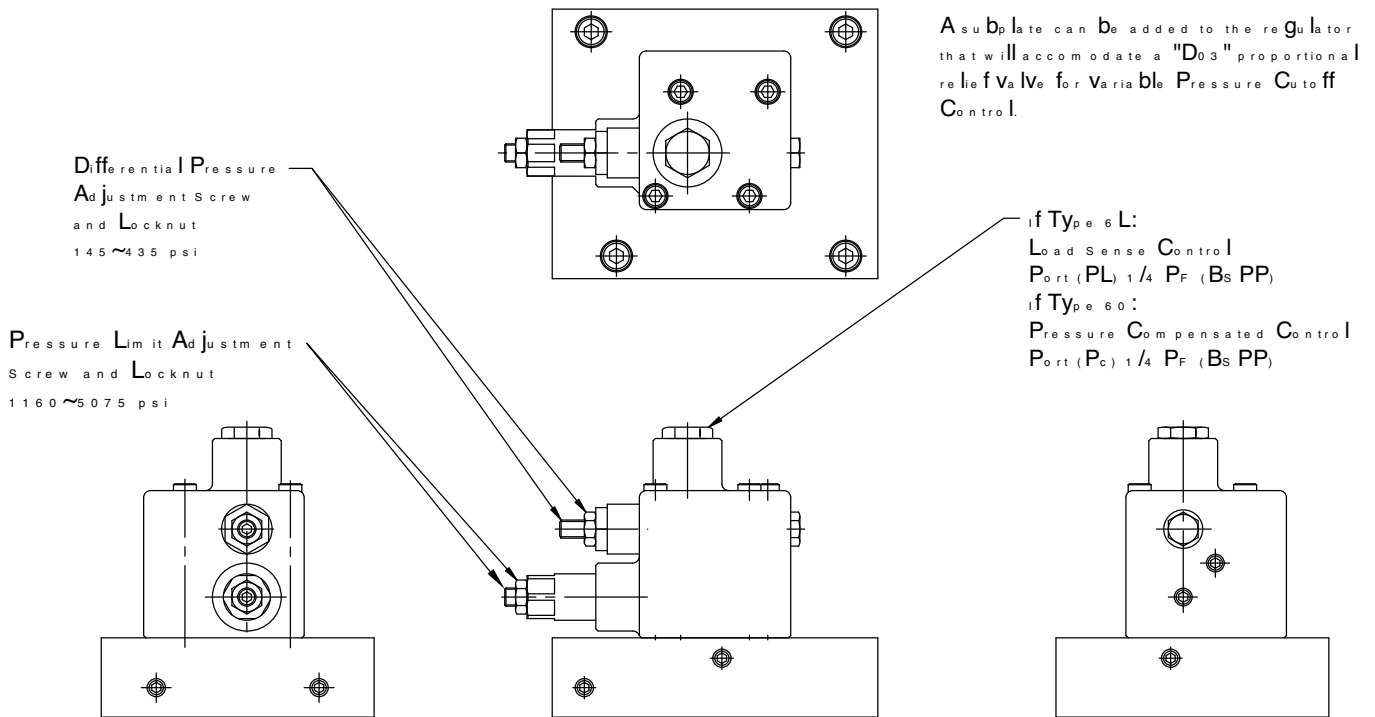
Pump Controls — Type 1###



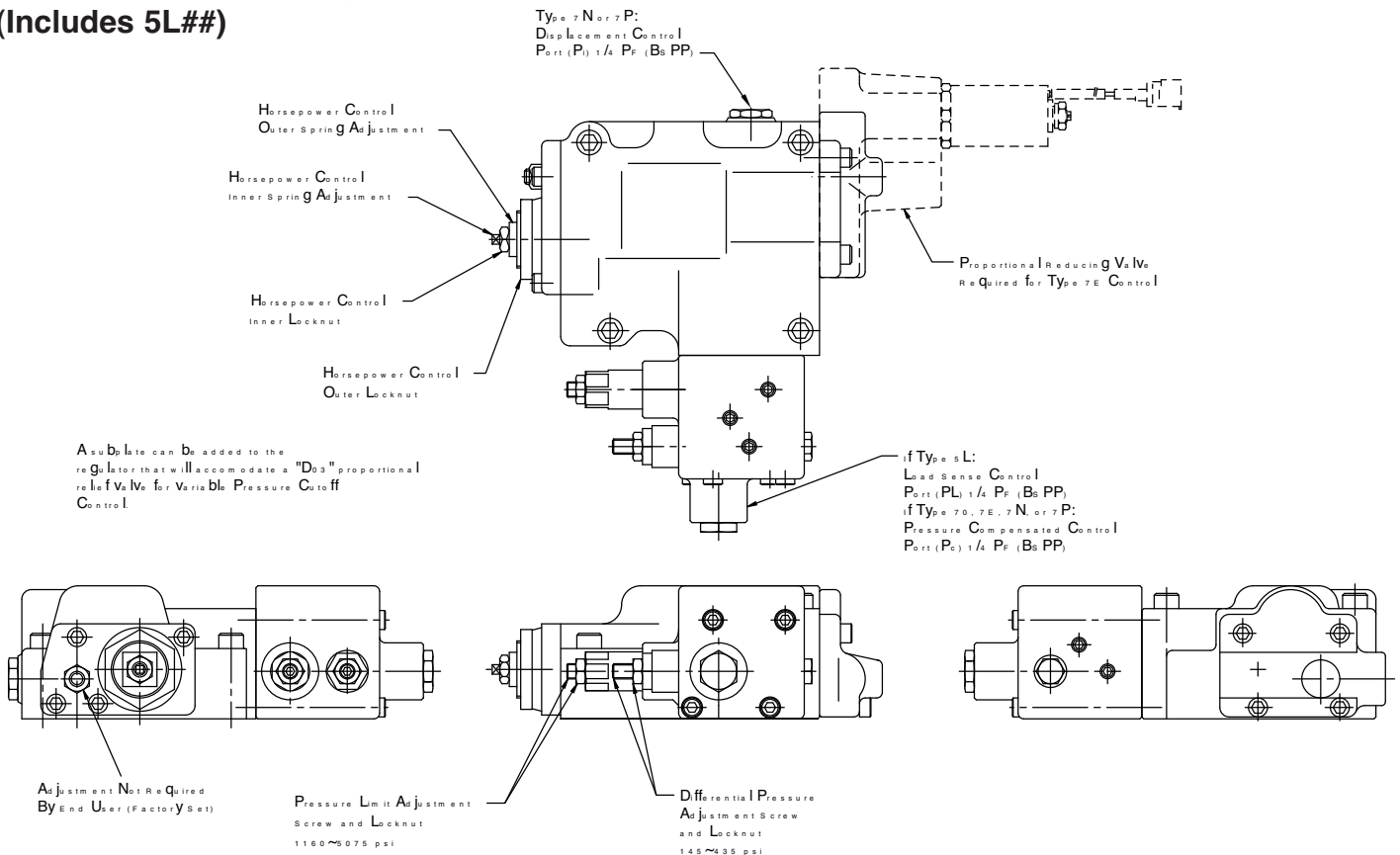
Pump Controls — Type 5### (See 7### for 5L##)



Pump Controls — Type 6#00



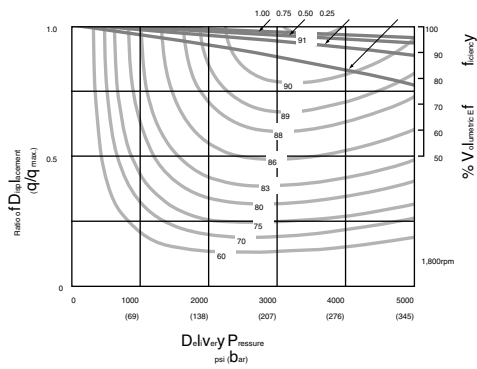
Pump Controls — Type 7### (Includes 5L##)



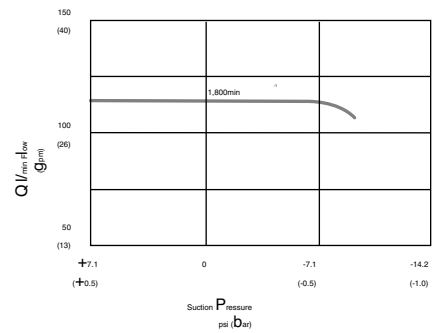
6 Performance and Flow Control Curves

K3VG63

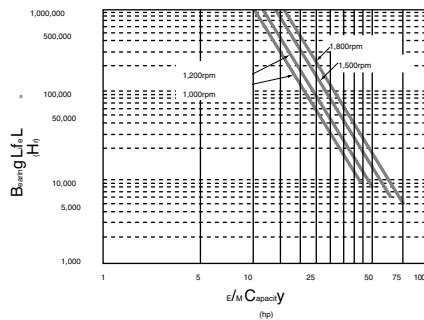
Overall Efficiency (%)



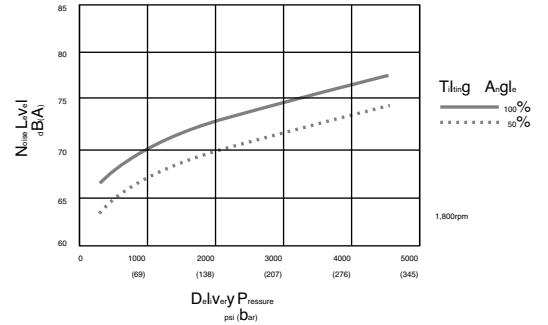
Self-Priming Capability



Bearing Life

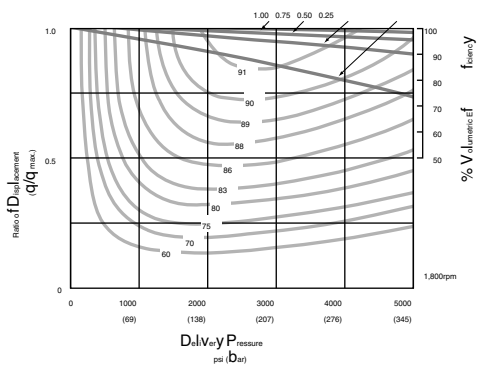


Noise Level

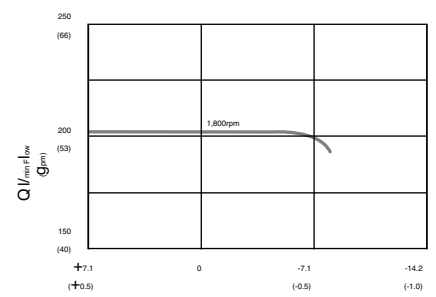


K3VG112

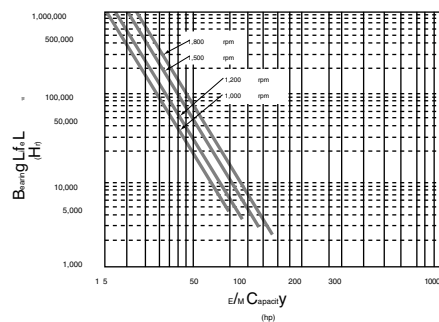
Overall Efficiency (%)



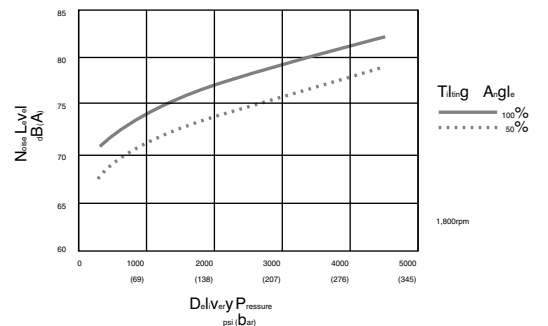
Self-Priming Capability



Bearing Life

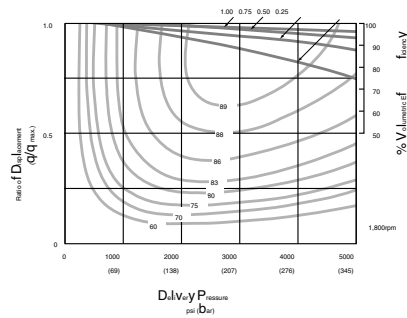


Noise Level

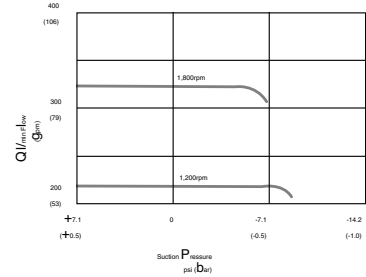


K3VG180/180DT

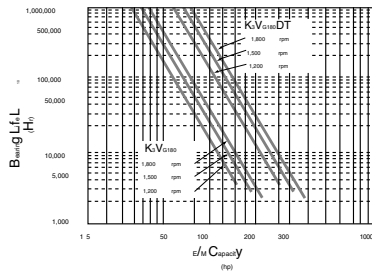
Overall Efficiency (%)



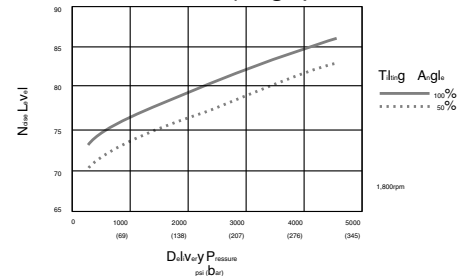
Self-Priming Capability



Bearing Life

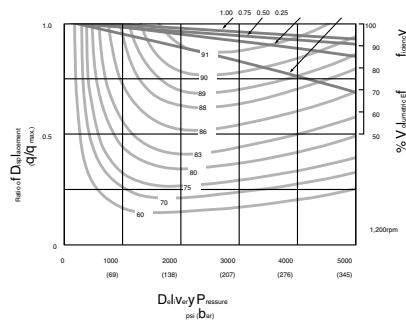


Noise Level K3VG180 (single)

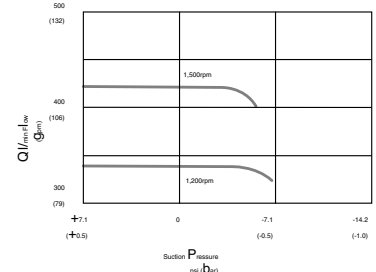


K3VG280/280DT

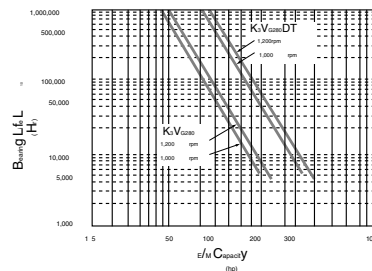
Overall Efficiency (%)



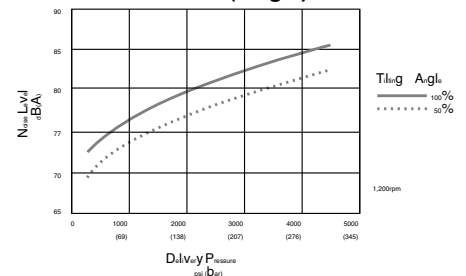
Self-Priming Capability



Bearing Life

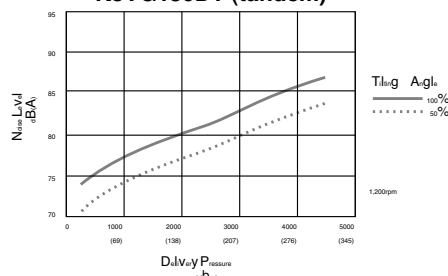


Noise Level K3VG280 (single)

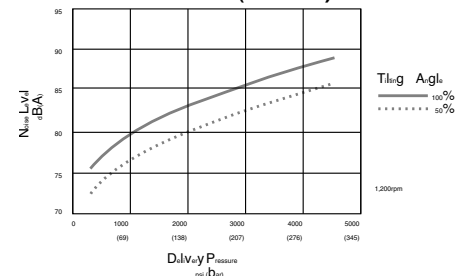


K3VG180DT/280DT

Noise Level K3VG180DT (tandem)

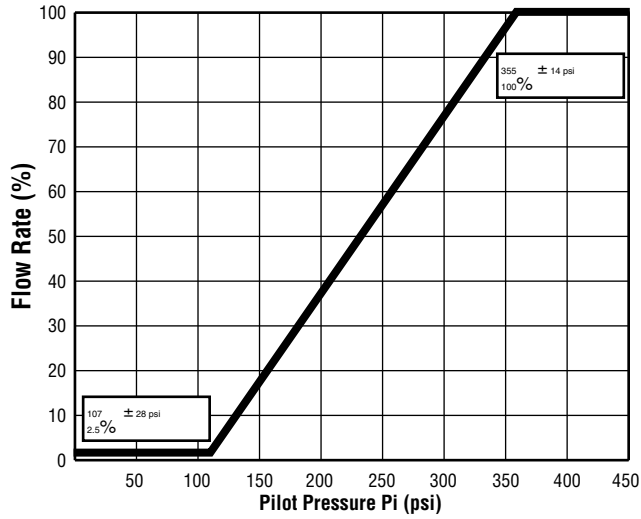


Noise Level K3VG280DT (tandem)

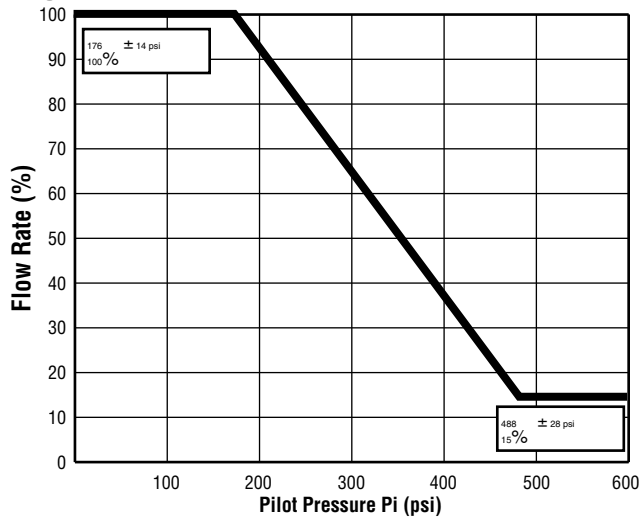


K3VG63 Flow Control Curves

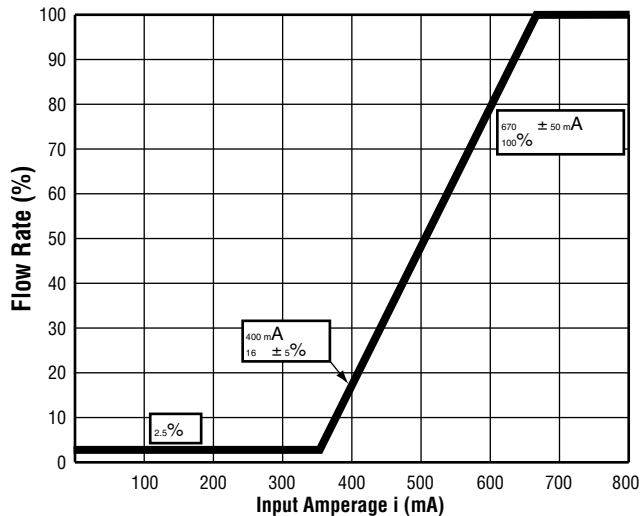
Positive Flow Control (*P**)



Negative Flow Control (*N**)

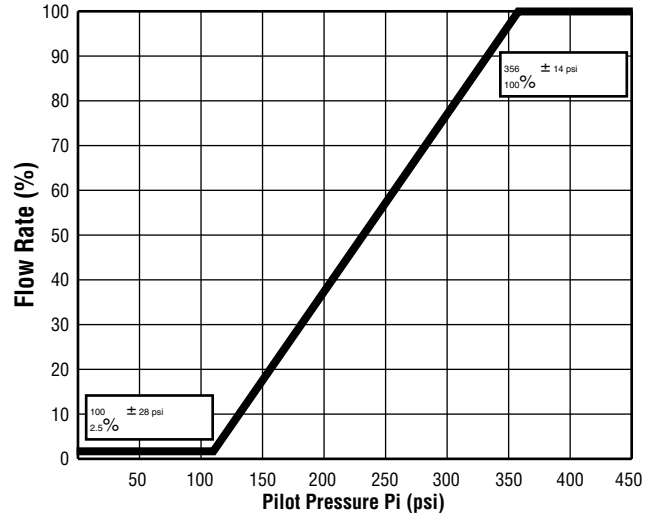


Electric Flow Control (*E**)

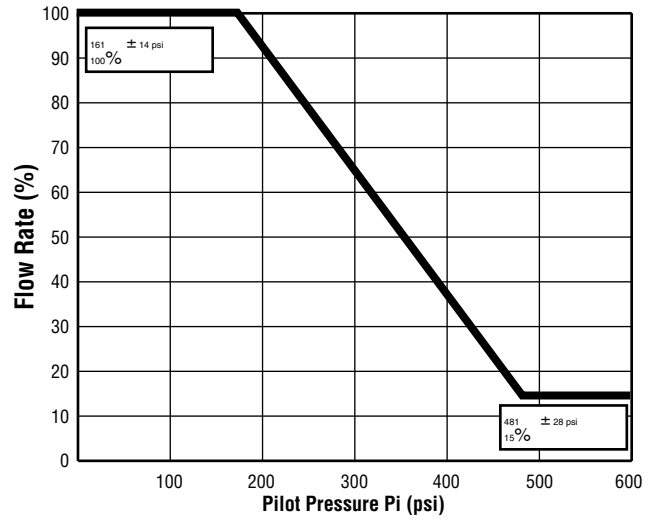


K3VG112 Flow Control Curves

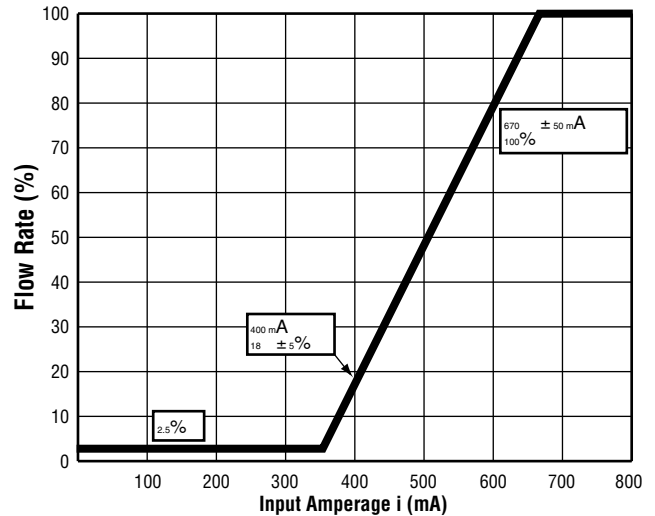
Positive Flow Control (*P**)



Negative Flow Control (*N**)

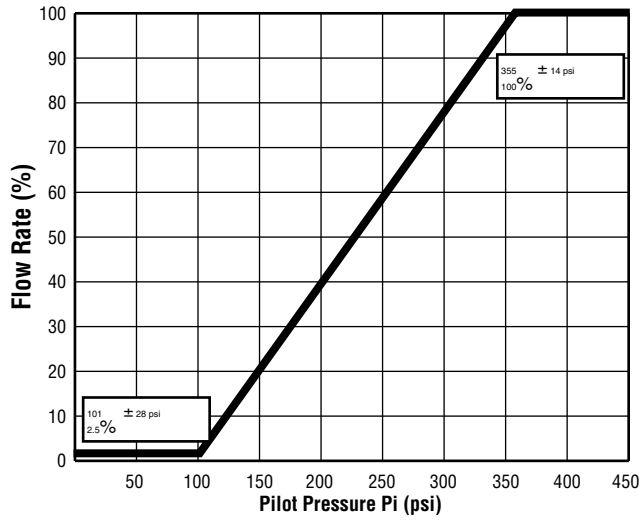


Electric Flow Control (*E**)

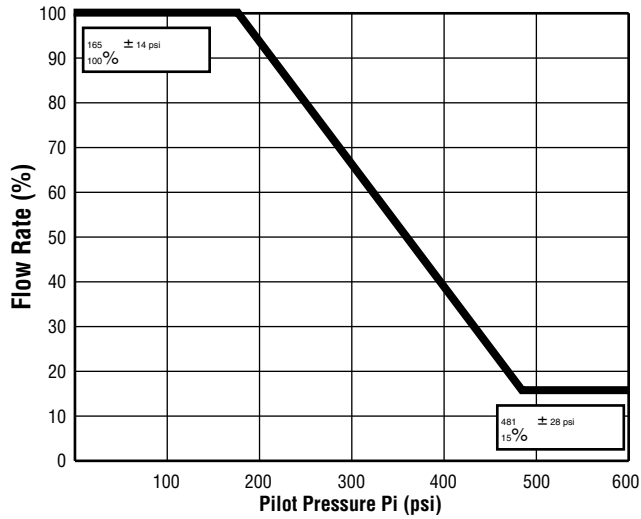


K3VG180 / 180DT Flow Control Curves

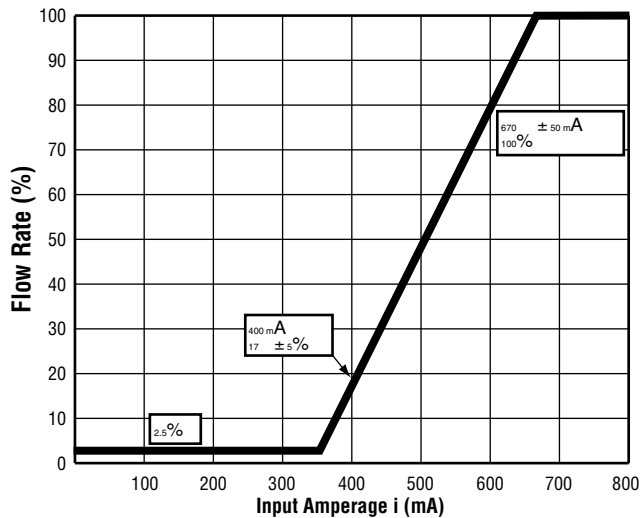
Positive Flow Control (*P**)



Negative Flow Control (*N**)

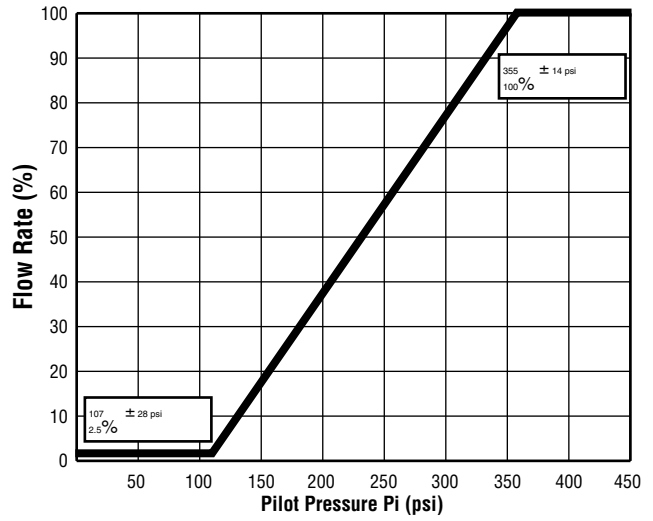


Electric Flow Control (*E**)

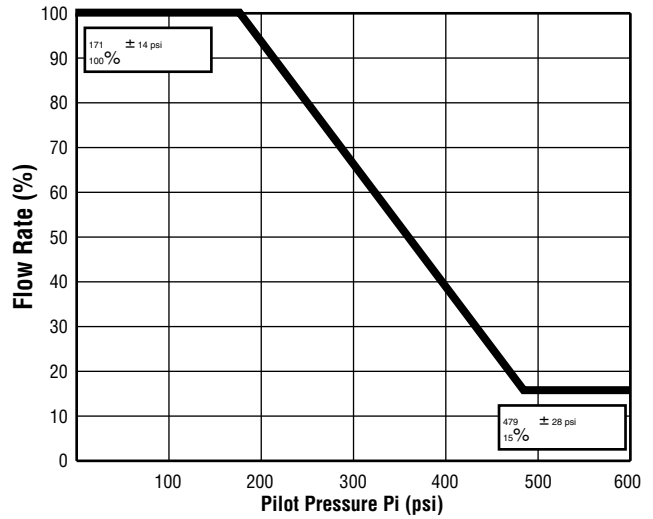


K3VG280 / 280DT Flow Control Curves

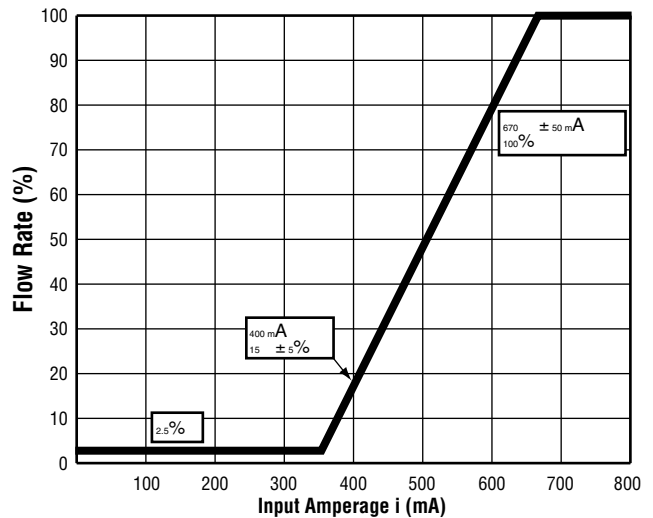
Positive Flow Control (*P**)



Negative Flow Control (*N**)



Electric Flow Control (*E**)

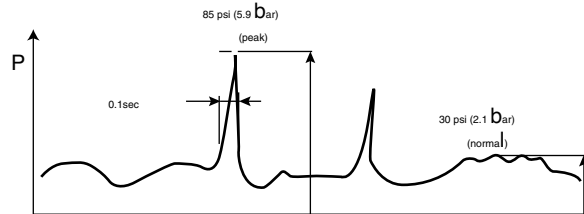


7 Mounting Precautions

Recommended pump mounting

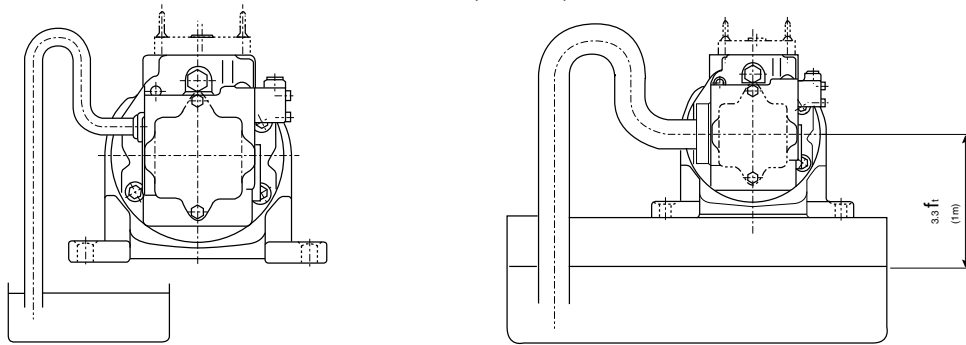
The pump should be mounted horizontally with the case drain piping initially rising above the level of the pump before continuing to the tank as shown in the illustration below. Do not connect the drain line to the suction line.

The uppermost drain port should be used and the drain piping should be equal or larger in size than the drain port to minimize pressure in the pump case. The pump case pressure should not exceed 30 psi (2.1 bar) as shown in the illustration below. (Peak pressure should never exceed 85 psi [5.9 bar].)



Mounting the pump above the tank

If the pump is to be mounted above the level of the tank the suction line must initially rise above the level of the pump before continuing to the tank as shown in the illustration below. The “goose neck” configuration is required because there is a very small bleed orifice between the case and the suction line within the valve plate as such one needs this inlet condition to ensure case oil is not drained. The maximum allowable height the pump can be mounted above the tank is 3.3 feet (1 meter). The minimum suction pressure should be -1.45 psi (-0.1 bar) or above.



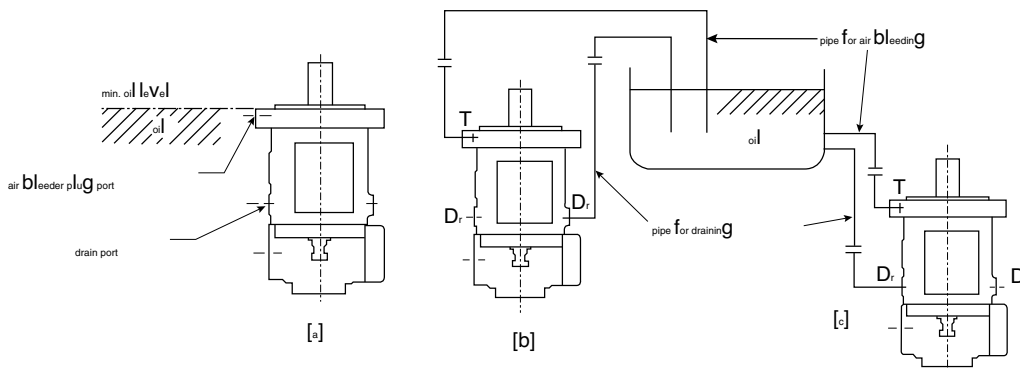
Mounting the pump vertically (shaft up)

For applications requiring vertical installation (shaft up) the pump must be provided with additional means to lubricate the front bearing. Do not use a standard pump for this type of application. (Mounting orientation “V” type should be used.)

The oil level in the tank should be higher than the pump mounting flange as shown in illustration [a] below. If the oil level in the tank is lower than the pump mounting flange then forced lubrication is required through the air bleed port (0.25 ~ 0.50 GPM [1 ~ 2 l/min]).

When installing the pump in the tank and submerged in the oil, open the drain port and air bleed port to provide adequate lubrication to the internal components.

When installing the pump outside the tank run piping for the drain and air bleed ports to tank (see illustration [c]). If the drain or air bleed piping rise above the level of oil (see illustration [b]) fill the lines with oil before operation.



8 Filtration

For satisfactory service life for the K3VG pumps the oil should be continuously filtered to a minimum cleanliness level of 19/16/14 ISO/DIS 4406 (NAS Class 9).

At minimum a 10 μ filter should be installed in the return line and an 80 ~ 150 mesh strainer installed in the suction line.

9 Hydraulic Fluid Requirements

Use a high quality, anti-wear, mineral based hydraulic fluid when the pressure exceeds 3000 psi (207 bar). The viscosity must be between 10 cSt and 200 cSt for normal operation.

In applications where fire resistant fluids are required please consult Kawasaki for recommendations. The seals and ratings may need to be changed to ensure compatibility. The chart below illustrates the effects on pump life when using non-standard fluids.

Fluid type >>		mineral oil	phosphate ester	polyol ester	water glycol
Max pressure	psi (bar)	5075 (350)	3045 (210)	3045 (210)	3045 (210)
Temperature range	°F (°C)	68~140 (20~60)			50~112 (10~50)
Cavitation resistance		●	∅	∅	∅
Percentage pump life compared to mineral oil		100	60	50	20

● =optimum

∅=acceptable but with reduced pump life

10 Initial Start-Up

Make sure the pump case is filled with clean, filtered fluid of the type used in the system before operation. **When installing tandem pumps (K3VG180DT and K3VG280DT) make certain that both the front and rear pumps are filled with oil through both case drain ports.** The pump case must be full at all times to ensure proper lubrication of internal components.

11 Drive Shaft Coupling

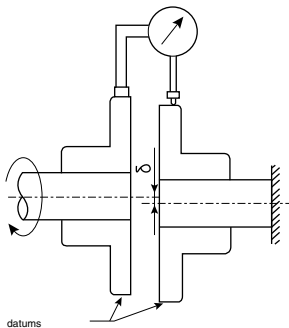
Use a flexible coupling to connect the pump shaft to an engine flywheel or electric motor shaft. Alignment should be within 0.001 in (0.025 mm) parallel and 0.2° angular as shown in the illustration below.

Do not apply any radial or axial loading to the pump shaft. For applications where radial or side loads exist please contact Kawasaki for recommendations.

Do not hammer the coupling on or off the pump shaft. Use the threaded hole in the end of the pump shaft to fix or remove the coupling.

$$\text{dial gauge (reading a)}$$

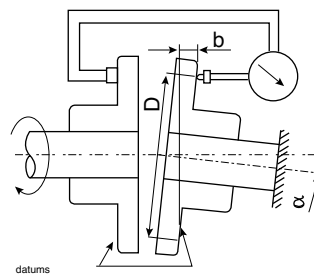
$$\delta = a/2 \leq 0.001''$$



$$\text{dial gauge (reading b)}$$

$$\alpha = \sin^{-1} (b/D)$$

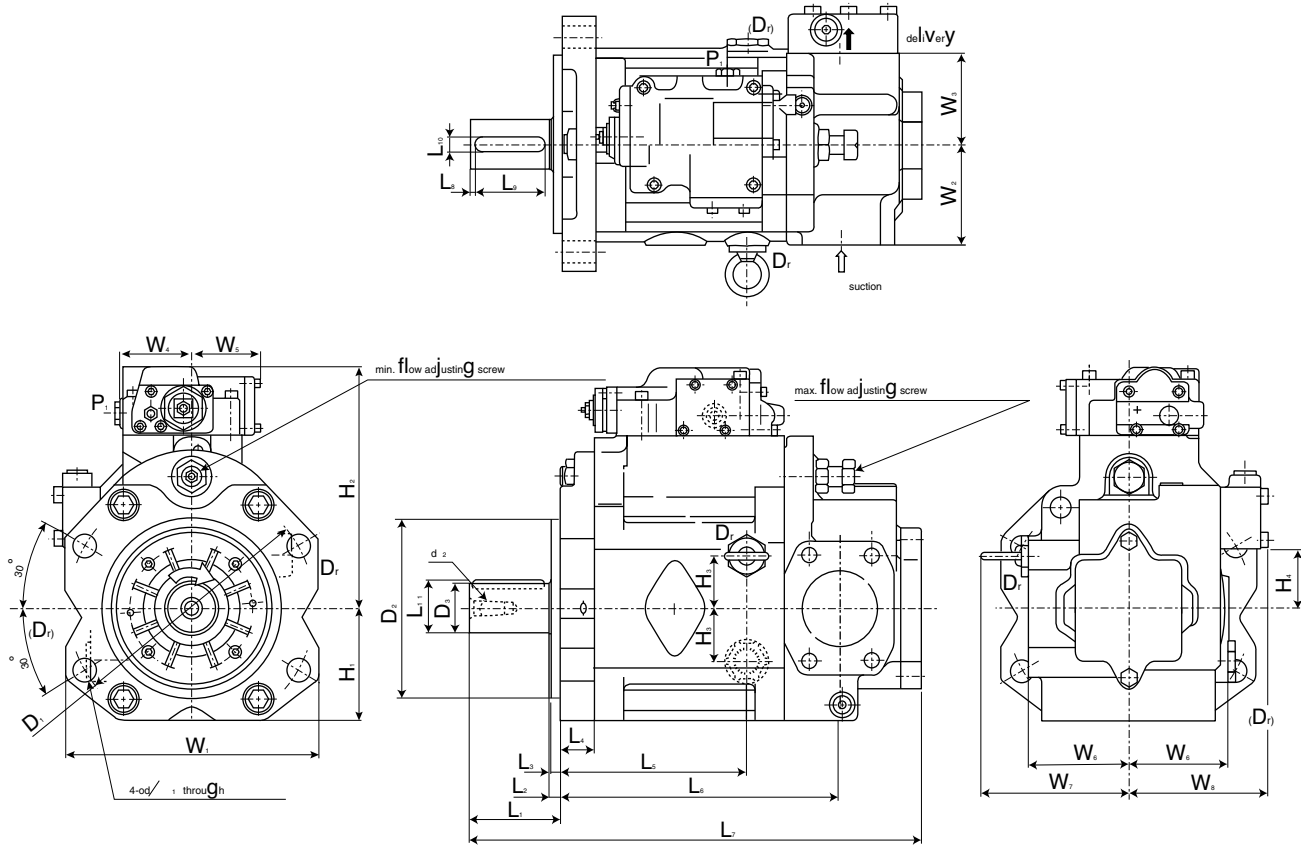
$$\leq 0.2^\circ$$



12 Installation Drawings

K3VG63/112/180/280 (WITHOUT ATTACHMENT)

The standard mounting type (mounting in the horizontal direction of shaft).
For the vertical mounting type, see the separate information.

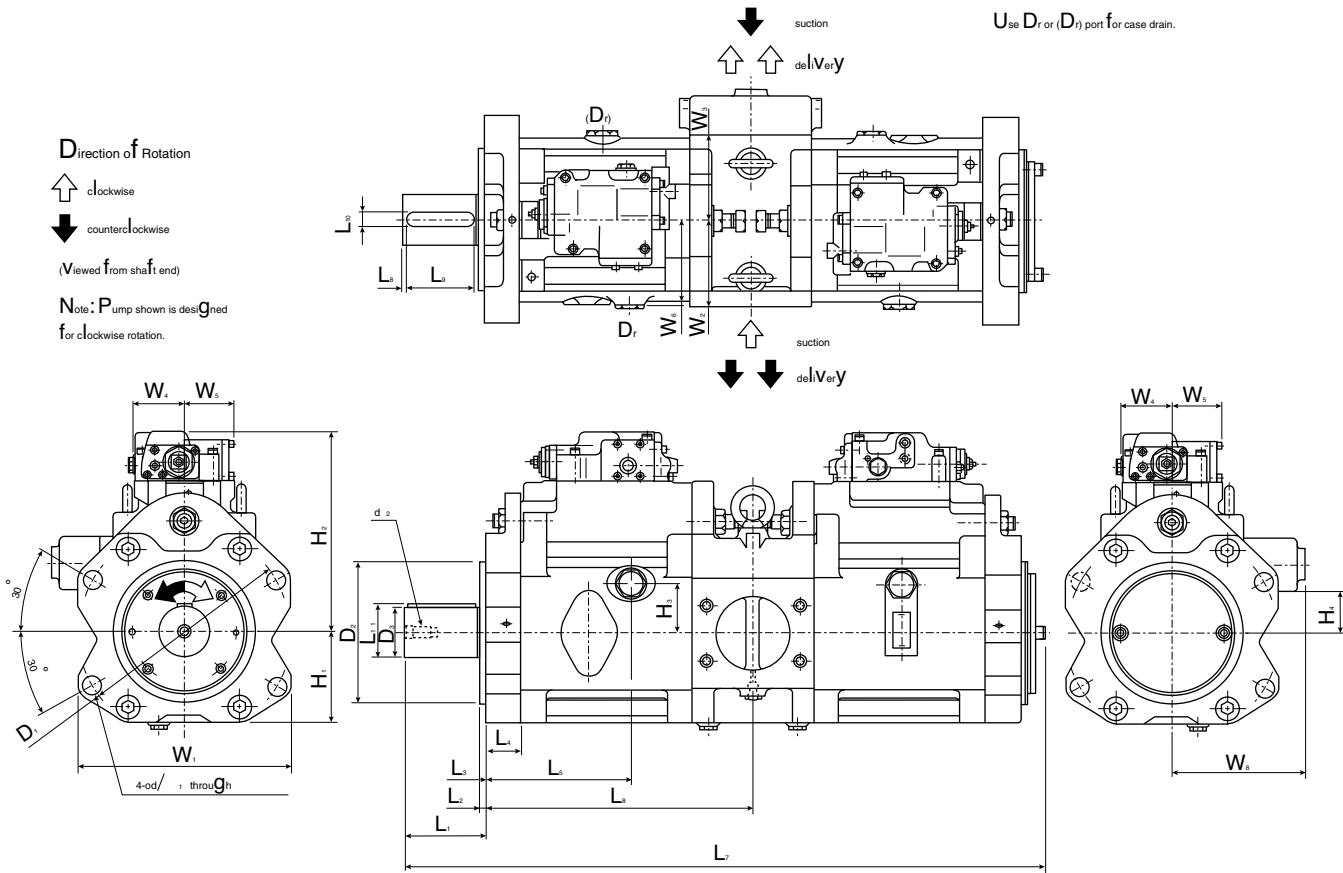


Dimensions of single pumps without gear pump - in (mm)

Pump size	D ₁	D ₂	D ₃	L ₁	L ₂	L ₃	L ₄	L ₅	L ₆	L ₇	L ₈	L ₉	L ₁₀	L ₁₁
63	7.09 (180)	4.92 ^{-0.002} _{-0.004} (125)	1.26 (32 ^{k6})	2.67 (68)	0.39 (10)	0.32 (8)	1.06 (27)	5.43 (138)	8.27 (210)	13.74 (349)	0.16 (4)	1.97 (50)	0.39 (10)	1.38 (35)
112	8.82 (224)	6.30 ^{-0.002} _{-0.004} (160)	1.55 (40 ^{k6})	3.62 (92)	0.39 (10)	0.32 (8)	1.30 (33)	6.57 (167)	9.80 (249)	16.50 (419)	0.20 (5)	2.76 (70)	0.47 (12)	1.69 (43)
180	9.84 (250)	7.09 ^{-0.002} _{-0.004} (180)	1.97 (50 ^{k6})	3.62 (92)	0.39 (10)	0.32 (8)	1.42 (36)	7.48 (190)	11.22 (285)	18.35 (466)	0.20 (5)	2.76 (70)	0.55 (14)	2.11 (53.5)
280	11.81 (300)	7.87 ^{-0.002} _{-0.004} (200)	2.17 (55 ^{k6})	3.62 (92)	0.39 (10)	0.35 (9)	1.97 (50)	7.99 (203)	13.82 (351)	21.22 (539)	0.20 (5)	2.76 (70)	0.63 (16)	2.32 (59)

Pump size	H ₁	H ₂	H ₃	H ₄	W ₁	W ₂	W ₃	W ₄	W ₅	W ₆	W ₇	W ₈	d ₁	d ₂
63	3.50 (89)	7.68 ^{-0.002} _{-0.004} (195)	1.46 (37)	1.61 (41)	7.48 (190)	2.76 (70)	2.76 (70)	2.83 (72)	2.72 (69)	2.99 (76)	4.53 (115)	4.45 (113)	0.71 (18)	M12
112	3.94 (100)	8.66 ^{-0.002} _{-0.004} (220)	1.61 (41)	1.93 (49)	9.21 (234)	3.54 (90)	3.15 (80)	2.83 (72)	2.72 (69)	3.54 (90)	5.43 (138)	4.92 (125)	0.87 (22)	M12
180	7.09 (112)	9.65 ^{-0.002} _{-0.004} (245)	2.09 (53)	2.28 (58)	10.08 (256)	3.94 (100)	3.62 (92)	2.83 (72)	2.72 (69)	3.98 (101)	5.87 (149)	5.47 (139)	0.87 (22)	M16
280	5.00 (127)	11.26 ^{-0.002} _{-0.004} (286)	2.76 (70)	2.68 (68)	11.81 (300)	4.72 (120)	4.72 (120)	2.83 (72)	2.72 (69)	4.65 (118)	—	6.57 (167)	1.02 (26)	M16

K3VG180DT/280DT (WITHOUT ATTACHMENTS)



Dimensions of tandem pumps without gear pump - in (mm)

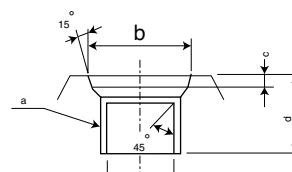
Pump size	D ₁	D ₂	D ₃	L ₁	L ₂	L ₃	L ₄	L ₅	L ₆	L ₇	L ₈	L ₉	L ₁₀	L ₁₁
180DT	9.84 (250)	7.09 ^{-0.002} _{-0.004} (180)	2.36 (60 ^{h6})	4.53 (115)	0.39 (10)	0.32 (8)	1.42 (36)	7.48 (190)	12.24 (311)	30.95 (786)	0.20 (5)	3.74 (95)	0.71 (18)	2.52 (64)
280DT	11.81 (300)	7.87 ^{-0.002} _{-0.004} (200)	2.76 (70 ^{h6})	4.53 (115)	0.39 (10)	0.35 (9)	1.97 (50)	7.99 (203)	14.72 (374)	35.28 (896)	0.20 (5)	3.74 (95)	0.79 (20)	2.93 (74.5)

Pump size	H ₁	H ₂	H ₃	H ₄	W ₁	W ₂	W ₃	W ₄	W ₅	W ₆	W ₈	d ₁	d ₂
180DT	7.09 (112)	9.65 (245)	2.09 (53)	2.01 (51)	10.08 (256)	3.94 (100)	3.94 (100)	2.83 (72)	2.72 (69)	3.98 (101)	6.50 (165)	0.87 (22)	M16
280DT	5.00 (127)	11.26 (286)	2.76 (70)	2.32 (59)	11.81 (300)	4.72 (120)	4.72 (120)	2.83 (72)	2.72 (69)	4.65 (118)	7.28 (185)	1.02 (26)	M16

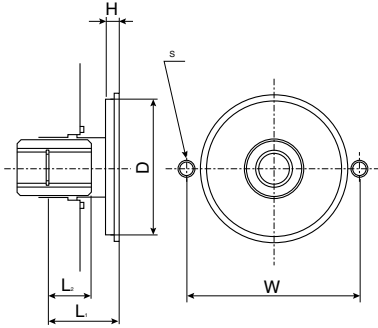
DRAIN PORT

Dimensions of drain ports - in (mm)

Pump size	a	b	c	d
63	PF 1/2	0.890 (22.6)	0.098 (2.5)	0.75 (19)
112	PF 3/4	1.213 (30.8)	0.138 (3.5)	0.79 (20)
180, 180DT	PF 3/4	1.213 (30.8)	0.138 (3.5)	0.79 (20)
280, 280DT	PF 3/4	1.213 (30.8)	0.138 (3.5)	0.79 (20)

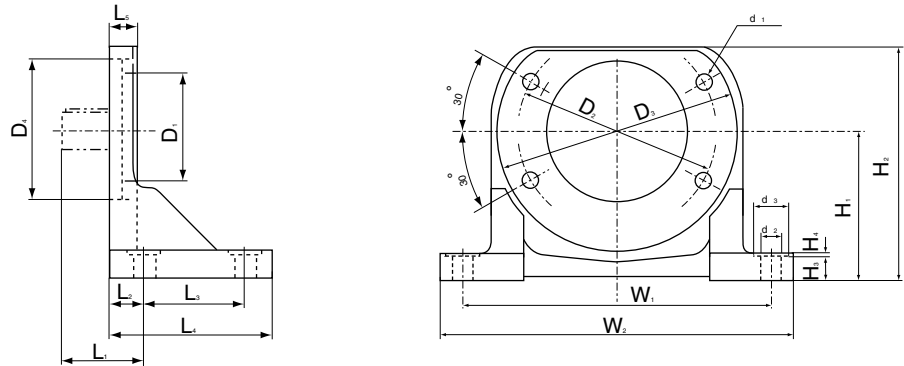


MOUNTING PROVISIONS FOR ATTACHING GEAR PUMPS



Size		63, 112, 180, 280				280, 180DT, 280DT
Install form code	Without assist pressure port	5	7	9	C	A
	With assist pressure port	4	6	8	D	
Dimensions (mm)	D	82.5				101.6
	H	8				11
	W	106				146
	S	2-M10 depth16				2-M12 depth20
	L ¹	34	43	37	34	43
	L ²	18	26	26	17	26
Dimensions of Spline(mm)	Rule	SAE flat root, side fit				
	Number of teeth	11	13	11	10	13
	Diametral pitch	16/32				
	Pressure angle	30°				
	Root diameter	19.05 ^{+0.279} ₀	22.225 ^{+0.279} ₀	19.05 ^{+0.279} ₀	17.463 ^{+0.279} ₀	22.225 ^{+0.279} ₀
	Measurements over pins	13.358 ⁰ _{-0.076}	16.589 ⁰ _{-0.067}	13.358 ⁰ _{-0.076}	11.887 ⁰ _{-0.084}	16.589 ⁰ _{-0.067}
	Pin diameter	2.743				
Allowable max. torque(lb-ft)	42.7	157.9	92	67.4	157.9	

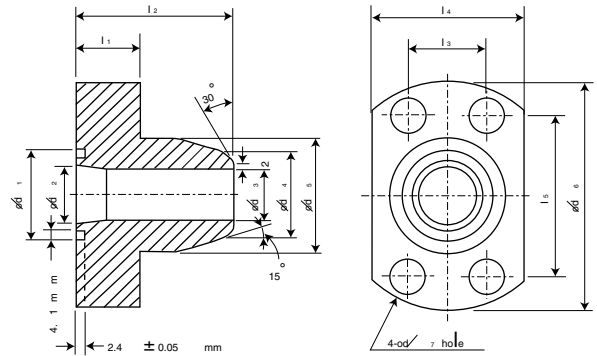
FOOT BRACKET (ACCESSORY)



Dimensions of foot bracket - in (mm)

Pump size	D ₁	D ₂	D ₃	D ₄	L ₁	L ₂	L ₃	L ₄	L ₅	H ₁	H ₂	H ₃	H ₄	W ₁	W ₂	d ₁	d ₂	d ₃
63	4.92 (125)	7.09 (180)	8.43 (214)	—	2.95 (75)	1.26 (32)	3.66 (93)	5.91 (150)	0.98 (25)	5.20 (132)	8.15 (207)	0.87 (22)	0.12 (3)	11.02 (280)	12.60 (320)	M16	0.71 (18)	1.26 (32)
112	6.30 (160)	8.82 (224)	10.39 (264)	—	3.94 (100)	1.50 (38)	7.09 (112)	7.09 (180)	1.18 (30)	6.30 (160)	9.92 (252)	1.06 (27)	0.12 (3)	13.19 (335)	15.12 (384)	M20	0.87 (22)	1.58 (40)
180	7.09 (180)	9.84 (250)	11.42 (290)	—	3.94 (100)	1.73 (44)	5.20 (132)	8.35 (212)	1.65 (36)	7.09 (180)	11.18 (284)	1.30 (33)	0.12 (3)	14.76 (375)	16.85 (428)	M20	0.87 (22)	1.58 (40)
280	11.02 (200)	11.81 (300)	13.39 (340)	9.84 (250)	3.94 (100)	1.97 (50)	15.75 (400)	19.69 (500)	1.65 (42)	8.86 (225)	14.09 (358)	1.54 (39)	0.12 (3)	17.72 (450)	20.47 (520)	M24	1.34 (34)	2.36 (60)
180DT	7.09 (180)	9.84 (250)	11.42 (290)	8.03 (204)	4.84 (123)	1.73 (44)	12.60 (320)	15.75 (400)	1.65 (36)	11.02 (200)	11.97 (304)	1.30 (33)	0.12 (3)	14.76 (375)	16.85 (428)	M20	0.87 (22)	1.58 (40)
280DT	11.02 (200)	11.81 (300)	13.39 (340)	9.84 (250)	4.84 (123)	1.97 (50)	15.75 (400)	19.69 (500)	1.65 (42)	8.86 (225)	14.09 (358)	1.54 (39)	0.12 (3)	17.72 (450)	20.47 (520)	M24	1.34 (34)	2.36 (60)

FLANGE ACCESSORY FOR DELIVERY PORT (SAE CODE 62)



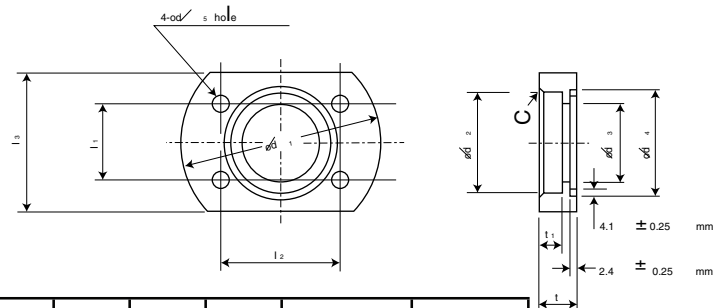
Delivery Port Flange - in (mm)

Pump size	l_1	l_2	l_3	l_4	l_5	d_1	d_2	d_3	d_4	d_5	d_6	d_7	SAE Pipe Size	Screw Size
63	0.98 (25)	2.17 (55)	1.095 (27.8)	2.13 (54)	2.252 (57.2)	1.58 (40)	1.02 (26)	0.835 (21.2)	1.339 (34.0)	1.693 (43)	3.23 (82)	0.43 (11)	1	M10-40
112	1.18 (30)	2.56 (65)	1.252 (31.8)	2.40 (61)	2.626 (66.7)	1.77 (45)	1.26 (32)	1.177 (29.9)	1.681 (42.7)	1.97 (50)	3.78 (96)	0.55 (14)	1 1/4	M12-45
180	1.38 (35)	2.95 (75)	1.437 (36.5)	2.76 (70)	3.126 (79.4)	1.97 (50)	1.50 (38)	1.354 (34.4)	1.913 (48.6)	2.28 (58)	4.53 (115)	0.71 (18)	1 1/2	M16-55
280	1.38 (35)	2.95 (75)	1.437 (36.5)	2.76 (70)	3.126 (79.4)	1.97 (50)	1.50 (38)	1.354 (34.4)	1.913 (48.6)	2.28 (58)	4.53 (115)	0.71 (18)	1 1/2	M16-55
180DT	1.18 (30)	2.56 (65)	1.252 (31.8)	2.40 (61)	2.626 (66.7)	1.77 (45)	1.26 (32)	1.177 (29.9)	1.681 (42.7)	1.97 (50)	3.78 (96)	0.55 (14)	1 1/4	M12-45
280DT	1.38 (35)	2.95 (75)	1.437 (36.5)	2.76 (70)	3.126 (79.4)	1.97 (50)	1.50 (38)	1.354 (34.4)	1.913 (48.6)	2.28 (58)	4.53 (115)	0.71 (18)	1 1/2	M16-55

When using confluence block - in (mm)

180DT	1.58 (40)	3.54 (90)	1.752 (44.5)	3.39 (86)	3.811 (96.8)	2.56 (65)	2.01 (51)	1.697 (43.1)	2.382 (60.5)	2.80 (71)	5.51 (140)	0.87 (22)	2	M20-65
280DT	1.58 (40)	3.54 (90)	1.752 (44.5)	3.39 (86)	3.811 (96.8)	2.56 (65)	2.01 (51)	1.697 (43.1)	2.382 (60.5)	2.80 (71)	5.51 (140)	0.87 (22)	2	M20-65

FLANGE ACCESSORY FOR SUCTION PORT (SAE CODE 61)



Suction Port Flange - in (mm)

Pump size	l_1	l_2	l_3	t	t_1	d_1	d_2	d_3	d_4	d_5	C	SAE Pipe Size	Screw Size
63	1.406 (35.7)	2.752 (69.9)	3.15 (80)	0.79 (20)	0.39 (10)	4.33 (110)	1.933 (49.1)	1.50 (38)	2.17 (55)	0.55 (14)	0.12 (3)	1 1/2	M12-35
112	2.000 (50.8)	3.500 (88.9)	4.13 (105)	0.98 (25)	0.59 (15)	5.12 (130)	3.031 (77.0)	2.52 (64)	3.15 (80)	0.55 (14)	0.12 (3)	2 1/2	M12-40
180	2.441 (62.0)	4.189 (106.4)	4.92 (125)	1.18 (30)	0.79 (20)	6.30 (160)	3.543 (90.0)	2.99 (76)	3.54 (90)	0.71 (18)	0.12 (3)	3	M16-50
280	2.752 (69.9)	4.752 (120.7)	5.32 (135)	1.18 (30)	—	6.69 (170)	3.543 (90.0)	3.54 (90)	4.13 (105)	0.71 (18)	0.16 (4)	3	M16-50
180DT	3.063 (77.8)	5.126 (130.2)	5.71 (145)	1.18 (30)	0.79 (20)	7.48 (190)	4.543 (115.4)	3.94 (100)	4.72 (120)	0.71 (18)	0.16 (4)	4	M16-50
280DT	3.063 (77.8)	5.126 (130.2)	5.71 (145)	1.18 (30)	0.79 (20)	7.48 (190)	4.543 (115.4)	3.94 (100)	4.72 (120)	0.71 (18)	0.16 (4)	4	M16-50

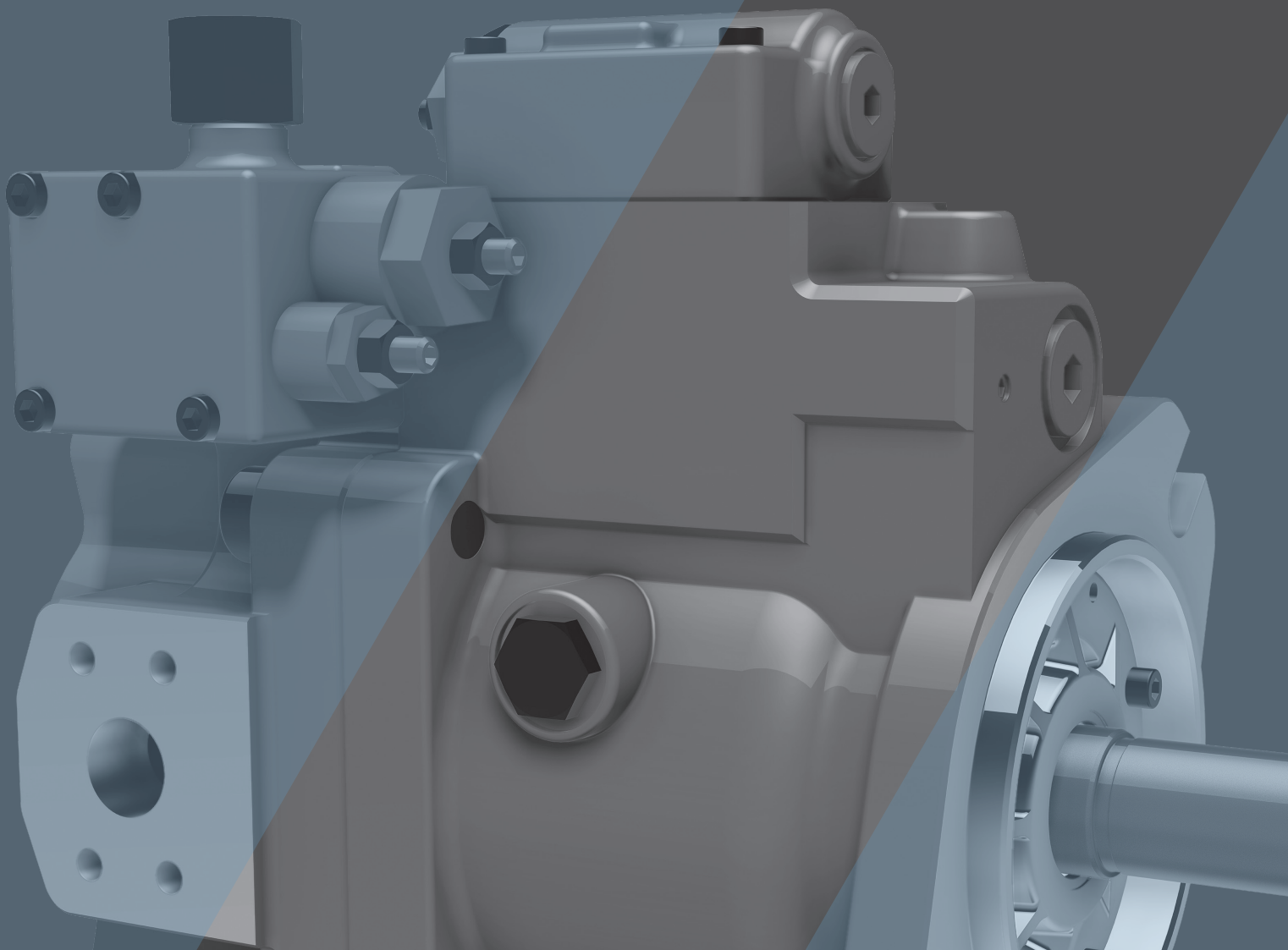


Kawasaki Precision Machinery (U.S.A.), Inc.

5080 36th Street S.E., Grand Rapids, MI 49512
(616) 949-6500 • Fax (616) 975-3103

www.kpm-usa.com

Swash-plate Axial Piston Pump K3VL

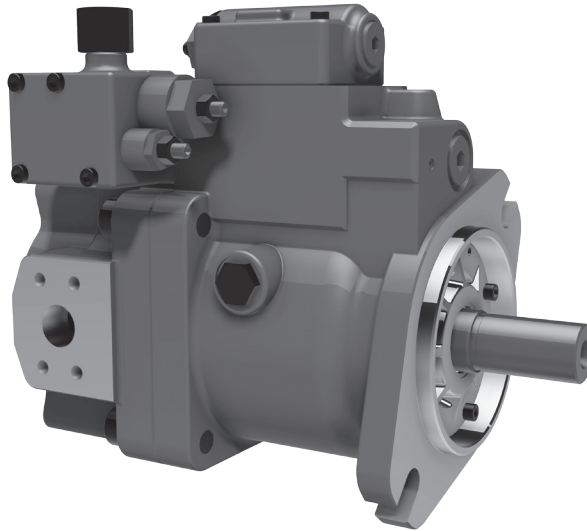


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K3VL B Series

Swash-plate Axial Piston Pump



■ General Descriptions

The K3VL Series Swash Plate Type Axial Piston Pumps are designed to satisfy the marine, mobile and industrial markets where a medium/high pressure variable displacement pump is required.

K3VL Pumps are available in nominal displacements ranging from 28 to 200 cm³/rev with various pressure, torque limiter, and a combination of load sensing control options.

■ Features

**4600 PSI (320 bar) Continuous Pressure Rating
(3625 PSI (250 bar) for K3VL60)**

High Overall Efficiency (>90% peak)

Exceptional Self Priming capability

SAE and ISO Mounting and Shaft

**Excellent Reliability and very long
Service Life**

High Power to Weight Ratio

Numerous Control options

Highly Responsive Controls

Low Pulsation and Noise Emissions

**Integral Unloading or Proportional Pressure
Relief Valves available**

**High Speed Version with Integral Impeller
(K3VL200H)**

1

Ordering Code

1-1 Pump Options

K3VL 80 () /B - 1 0 R S S - LO () /1-H1

K3VL Series Pump

Maximum Displacement

28	1.71 in ³ /rev
45	2.75 in ³ /rev
60	3.66 in ³ /rev
80	4.88 in ³ /rev
112	6.83 in ³ /rev
140	8.54 in ³ /rev
200	12.20 in ³ /rev

Impeller (K3VL200 only)

H	With Impeller
---	---------------

Design Series

B	K3VL45 - 200
C	K3VL28 Only

Hydraulic Fluid Type

-	Mineral Oil (Nitrile Seals + Viton Shaft Seal)
V	Viton Seals Throughout
1. W	Water Glycol (Nitrile Seals including Shaft Seal)

All other fluids contact KPM

Circuit Type

1	Open Circuit
---	--------------

Porting Threads

M	Metric threaded
S	UNC threaded

Mounting Flange & Shaft

K	SAE Key & Mount
M	ISO Key & Mount (not K3VL200)
S	SAE Spline & Mount
R*	SAE-C Spline & D Mount (K3VL112/140 Only)
C*	SAE-C Spline & C2 Mount (K3LV112/140 Only)
X*	SAE-C Key & C2 Mount (K3VL112/140 Only)
Y*	SAE-CC Key & C2 Mount (K3VL112/140 Only)
W*	SAE-CC Spline & C2 Mount (K3VL112/140 Only)
F*	SAE-F Spline & E Mount (K3VL200 Only)
T	SAE-B Spline & B Mount (K3VL45/60 Only)

Direction of Rotation

R	Clockwise Rotation
L	Counter Clockwise Rotation

Through Drive & Porting

O	Without Through Drive (CW Only)
A	SAE-A Through Drive, Side Ported
B	SAE-B Through Drive, Side Ported
1. BB	SAE-BB Through Drive, Side Ported
5. C	SAE-C, 2 Bolt, Through Drive, Side Ported
5. C4	SAE-C, 4 Bolt, Through Drive, Side Ported
2. CC	SAE-CC, 2 Bolt, Through Drive, Side Ported
2. CC4	SAE-CC, 4 Bolt, Through Drive, Side Ported
6. D	SAE-D Through Drive, Side Ported
7. E	SAE-E Through Drive, Side Ported
R	Single Pump, Rear Ported
N	Single Pump with Steel Cover, Side Ported
S	No Coupling, Prepared For Through Drive

* Non standard options

1-2 Regulator Options

K3VL 80 () /B - 1 0 R S S - L0 ()()/1-H1

Regulator Type

	L0	Load Sense & Pressure Cut-Off (With R4 Bleed)
	L1	Load Sense & Pressure Cut-Off (With R4 Blocked)
1.	LM	Load Sense & Integral Unload (Normally Open)
1.	LN	Load Sense & Integral Unload (Normally Closed)
1,3.	LV	Load Sense & Integral Proportional Relief
4.	LV2	Load Sense & Integral Proportional Relief (Mobile)
	P0	Pressure Cut-Off
1.	PM	Pressure Cut-Off & Integral Unload (Normally Open)
1.	PN	Pressure Cut-Off & Integral Unload (Normally Closed)
1,3.	PV	Pressure Cut-Off & Integral Proportional Relief
4.	PV2	Pressure Cut-Off & Integral Proportional Relief (Mobile)

1.
1.
1,3.
4.
1.
1.
1,3.
4.

- 1. Not Available on K3VL28 or with Through Drives
- 2. Only Available on K3VL 112 & 140
- 3. LV & PV options require an amplifier. See Section 3-9
- 4. LV2/PV2 available with 12VDC or 24VDC selenoid coils
- 5. K3VL80 and Larger
- 6. K3VL112 and Larger
- 7. K3VL200 Only

Additional Control Options

Blank	Without Additional Controls
-------	-----------------------------

Either Torque Limit Control

/1-S##	Special Low Setting Range*
/1-L##	Low Setting Range
/1-M##	Medium Setting Range
/1-H##	High Setting Range

or Displacement Control

/1-E0	Electric Displacement Control (Pilot Pressure Required)
/1-Q0	Pilot Operated Displacement Control
/1-00	Cover Plate
E1	Electric flow regulator (Pilot pressure required) Molded AMP connector, 24V Soneloid
E2	Electric flow regulator (Pilot pressure required) Molded Deutsch connector, 24V Soneloid
E3	Electric flow regulator (Pilot pressure required) Molded Deutsch connector, 12V Soneloid

Solenoid Connector

A	Two Pin Deutsch DT 64-ZP Connector
B	DIN Connector - 150/DIN 43650 - Form A

Unloader Solenoid

Blank	For all other options except PN/PM/LN/LM
115A	115 V AC, 50, 60 Hz - DIN 43550 Plug
230A	230 V AC, 50, 60 Hz - DIN 43550 Plug
12D	12 V DC - DIN 43550 Plug
24D	24 V DC - DIN 43550 Plug

- see Torque Setting Table below
* Non Standard Options - Contact KPM

1-4 Torque Limiter Control - Setting Table

Input Speed = 1150 RPM							
Motor Power		K3VL Pump Frame Size					
HP	ft-lbs	45	60	80	112	140	200
5	23	S4					
6	27	S3					
6.6	30	S2					
7.2	33	S1	S4	S4			
8	36	L4	S3	S3			
9	39	L3	S2	S2			
10	45	L2	S1	S1	S6		
11	51	L1	L4	L6	S5		
13	60	M4	L3	L5	S4		
15	69	M3	L2	L4	S3	S4	
16	75	M2	L1	L3	S2	S3	
18	81	M1	M4	L2	S1	S2	
20	90	H4	M3	L1	L4	S1	
24	108	H3	M2	M4	L3	L6	
25	114	H2	M1	M3	L2	L5	
26	120	H1	H3	M2	L1	L4	S2
29	132		H2	M1	M4	L3	S1
33	150		H1	H4	M3	L2	L5
35	162			H3	M2	L1	L4
39	180			H2	M1	M3	L3
49	222			H1	H4	M2	L2
49	225				H3	M1	L1
59	270				H2	H4	M3
66	300				H1	H3	M2
73	333					H2	M1
79	360					H1	H6
87	399						H5
99	450						H4
100	456						H3
115	525						H2
122	555						H1

Input Speed = 1750 RPM							
Motor Power		K3VL Pump Frame Size					
HP	ft-lbs	45	60	80	112	140	200
7.5	23	S4					
9	27	S3					
10	30	S2					
11	33	S1	S4	S4			
12	36	L4	S3	S3			
13	39	L3	S2	S2			
15	45	L2	S1	S1	S6		
17	51	L1	L4	L6	S5		
20	60	M4	L3	L5	S4		
23	69	M3	L2	L4	S3	S4	
25	75	M2	L1	L3	S2	S3	
27	81	M1	M4	L2	S1	S2	
30	90	H4	M3	L1	L4	S1	
36	108	H3	M2	M4	L3	L6	
38	114	H2	M1	M3	L2	L5	
40	120	H1	H3	M2	L1	L4	S2
44	132		H2	M1	M4	L3	S1
50	150		H1	H4	M3	L2	L5
54	162			H3	M2	L1	L4
60	180			H2	M1	M3	L3
74	222			H1	H4	M2	L2
75	225				H3	M1	L1
90	270				H2	H4	M3
100	300				H1	H3	M2
111	333					H2	M1
120	360					H1	H6
133	399						H5
150	450						H4
152	456						H3
175	525						H2
185	555						H1

- S Spring type: Ultra Low spring force
 L Spring type: Low spring force
 M Spring type: Medium spring force
 H Spring type: High spring force
 1-6 Adjustment setting

The shaded areas of the chart indicate torque limiter settings which may not allow the pump to achieve full flow or pressure. Contact Kawasaki for application assistance.

2

Technical Information

2-1 Technical Data

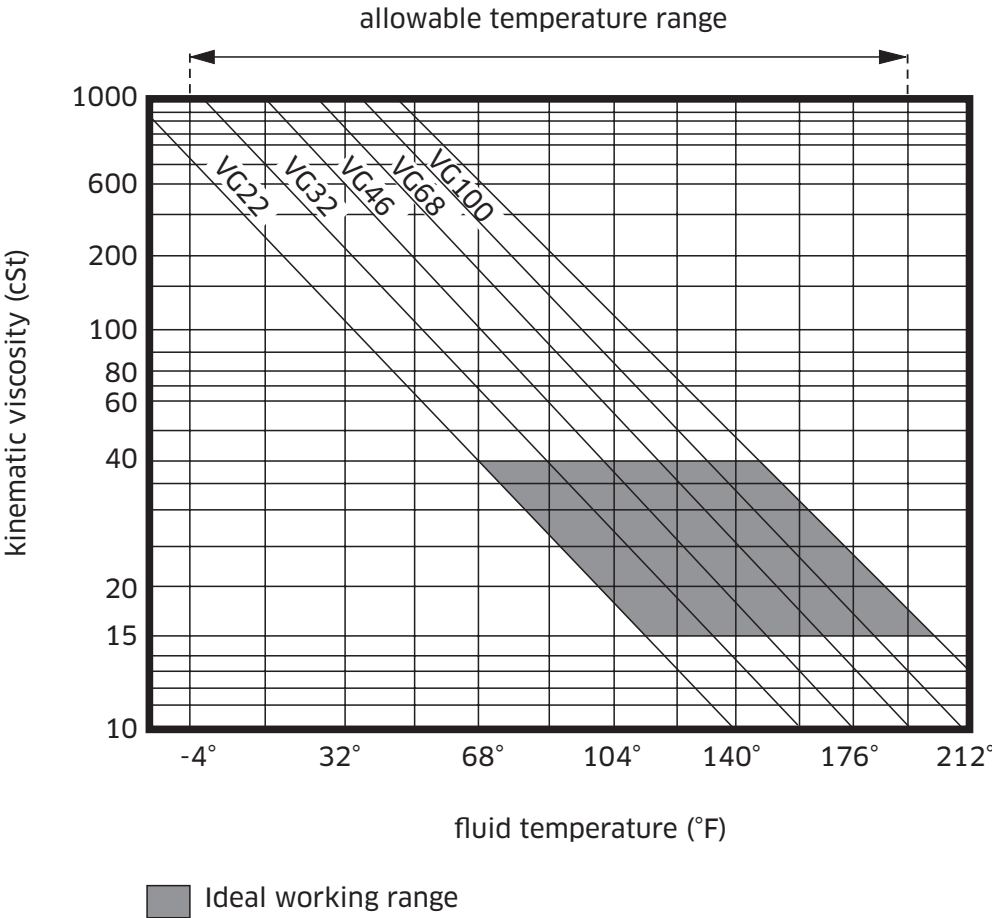
For applications outside the following parameters, please consult KPM.

◆ Hydraulic Data

Pressure Fluid Mineral oil, polyol ester and water glycol.

Use a high quality, anti-wear, mineral based hydraulic fluid when the pressure exceeds 206 bar. In applications where fire resistant fluids are required consult KPM.

◆ Fluid selection



2-1 Technical Data (cont)

◆ Filtration & Contamination Control

Filtration

The most important means to prevent premature damage to the pump and associated equipment and to extend its working life, is to ensure that hydraulic fluid contamination control of the system is working effectively.

This begins by ensuring that at the time of installation, all piping, tanks etc. are rigorously cleaned. Flushing should be provided using an off line filtration system.

A minimum flow return line filter of 10 micron nominal should be utilized to prevent contaminant ingress from the external environment, a 5 to 10 micron filter within the tank's breather is also recommended.

◆ Suggested Acceptable Contamination Level

The relationship between contamination level and pump life is very difficult to predict as it depends on the type and nature of the contaminant present in the system. Sand or Silica in particular, due to its abrasive nature, does significantly reduce the expected life of a pump. Based on the precondition that there is no significant presence of Silica type substances then a minimum Cleanliness level of -/18/15 ISO 4406 or SAE AS 4059E Table 1 Class 9 (NAS 1638 Class 9).

◆ Working Fluid Types

Anti-Wear Type Hydraulic fluid

It is generally recommended to use an anti-wear hydraulic fluid like mineral oil when the operating pressure exceeds 206 bar.

Fire-resistant Fluids

Certain types of fire-resistant fluids require special materials for seals, paint and metal finishing. Please consult KPM and provide details of the particular fluid specification and the working conditions so that any special requirements can be ascertained.

In general, fire-resistant fluids have a low viscosity index and their viscosity also changes significantly with operating temperature and service life. For this reason, the circuit should be provided with an adequately sized cooler or forced cooling so that temperatures can be stabilized. Due to the inherent water content of some of these fluids the minimum allowable suction pressure will be higher than that of an equivalent mineral oil and so needs to be fully evaluated by KPM. The following table provides an overview of the precautions and characteristics that can be expected with these types of fluids.

Fluid Type Parameter	Mineral Oil	Polyol Ester	Water Glycol
Maximum Pressure PSI (bar)	4600 (320)	4600 (320)	3000 (210)
Recommended Temperature Range (deg F(C))	68 - 140 (20 - 60)	68 - 140 (20 - 60)	68 - 140 (20 - 60)
Cavitation susceptibility	○	△	△
Life expectancy compared to mineral oil	100%	<100%	20%

○ recommended △ usable (higher density)

2-1 Technical Data (cont)

◆ Pump Start Up Precautions

Pump Case Filling

Be sure to fill the pump case with clean oil through the drain port. Filling only the suction line with oil is insufficient. The pump contains bearings and high-speed sliding parts including pistons with shoes and spherical bushings that need to be continuously lubricated. Part seizure or failure may occur.

Piping & Circuit Checking

Check to see that all piping in the full hydraulic circuit is completed and that all components are properly set.

Direction of Rotation

Check to ensure that direction of rotation is correct and that the inlet and delivery lines are connected correctly.

Start Up

Jog start the motor and check once more for correct rotation. Run the pump unloaded for a period to ensure that all residual air within the system is released. Check for external leakage, abnormal noise and vibrations.

Case Drain Pressure

Please ensure, that the maximum steady state drain line pressure at the pump casing does not exceed 14.5 PSI (1 bar). (Maximum peak pressure 58 PSI (4 bar)). A suitable drain line hose must be selected and return directly back to the tank and terminate below the oil level.

Long Term Storage

It is undesirable to leave the pump out of use for a long period e.g. a year or more. In such a situation it is recommended that the pump is run for a short period on a more frequent basis even if it is just unloaded. With regard to a pump held in storage then rotating the shaft on a frequent basis is sufficient. If the pump is left out for more than the suggested time it will require a service inspection.

2-2 Specifications

Pump Model		K3VL28	K3VL45	K3VL60	K3VL80	K3VL112	K3VL140	K3VL200	K3VL200H
Displacement - in ³ /rev (cc/rev)		1.71 (28)	2.75 (45)	3.66 (60)	4.88 (80)	6.83 (112)	8.54 (140)	12.20 (200)	12.20 (200)
Pressure Rating - psi (bar)	Rated	4600 (320)		3625 (250)	4600 (320)			5075 (350)	5075 (350)
	^{*1} Peak	5075 (350)		4060 (280)	5075 (350)			5800 (400)	5800 (400)
Speed Rating (rpm at Max. Displacement)	^{*2} Self Prime	3000	2700	2400	2400	2200	2200	1900	2200
	^{*3} Maximum	3600	3250	3000	3000	2700	2500	2200	2200
Minimum Operating Speed - rpm		600							
Maximum Allowable Case Drain Pressure - psi (bar)	Continuous	15 (1)							
	Peak	60 (4)							
Pump Case Prefill Capacity - Gallons (Liters)		0.16 (0.60)			0.21 (0.80)	0.37 (1.40)		.78 (3)	.78 (3)
Weight - lb (kg)		44 (20)	55 (25)	55 (25)	77 (35)	143 (65)		220 (100)	269 (122)
Temperature Range - °F (°C)		-4° to 203° (-20° to 95°)							
^{*4} Viscosity Range - SUS (cSt)		55 to 4650 (10 to 1000)							
Maximum Contamination Level		20/18/15 ISO/DIS 4406 (Class 9)							
^{*5} Standard Mounting Flange and Shaft	Mounting	2-Bolt SAE B			2-Bolt SAE C	4-Bolt SAE D		4-Bolt SAE E	4-Bolt SAE E
	Shaft	SAE B Spline or Key	SAE B-B Spline or Key		SAE C Spline or Key	SAE D Spline or Key		SAE D Spline or Key	SAE D Spline or Key
Optional Mounting Flange and Shaft	Mounting	-			-	2-Bolt SAE C		-	-
	Shaft	-	SAE B Spline		-	SAE C or C-C Spline or Key		SAE F Spline	SAE F Spline
Input Shaft Torque Rating		Refer to Table 2.1							
Through Drive Torque Rating lb-ft (Nm)	SAE A	45 (61)	90 (123)						
	SAE B	115 (155)	214 (290)		251 (340)				
	SAE B-B	-	214 (290)		406 (550)				
	SAE C	-			295 (400)	516 (700)	730 (990)	730 (990)	
	SAE C-C	-			-		516 (700)	730 (990)	730 (990)
	SAE D	-			-		516 (700)	1032 (1400)	1032 (1400)
	^{*6} SAE E	-			-		-		1032 (1400)

*1 The instant allowable surge pressure as defined by DIN24312. Life and durability of the pump will be affected.

*2 Steady state inlet pressure should be greater than or equal to 0 psi (0 bar) gauge.

*3 Steady state inlet pressure should be greater than or equal to 4.5 psi (0.3 bar) gauge. However the maximum inlet pressure should not exceed 145 psi (10 bar).

*4 At viscosities from 930 to 4650 SUS (200 to 1000cSt), warm up at no load is required.

*5 ISO mounting and shaft also available. Contact Kawasaki for further information.

*6 SAE E through drive uses the SAE D shaft.

2-2 Specifications (cont)

◆ Input Shaft Torque Ratings

SAE Splined Shafts						
Shaft Designation	SAE B	SAE B-B	SAE C	SAE C-C	SAE D/E	SAE F
Input Torque Rating lb-ft (Nm)	126 (171)	200 (272)	407 (552)	682 (925)	1084 (1470)	1438 (1950)

SAE Keyed Shafts					
Shaft Designation	SAE B	SAE B-B	SAE C	SAE C-C	SAE D/E
Input Torque Rating lb-ft (Nm)	107 (145)	170 (230)	317 (430)	516 (700)	922 (1250)

ISO Keyed Shafts			
Shaft Designation	ISO 25 mm	ISO 32 mm	ISO 45 mm
Input Torque Rating lb-ft (Nm)	107 (145)	170 (230)	317 (430)

Note:

The splined shaft surface will have a finite life due to wear unless adequate lubrication is provided.

2-2 Specifications (cont)

#1 Maximum allowable shaft torques are based on achieving an infinite life for a coupling assembly that is lubricated and completely clamped and utilises the full spline/key length as engagement.

The following points therefore need to be fully considered:-

- i) Lubrication of shaft couplings should be in accordance with the coupling manufacturers instructions.
- ii) The maximum allowable input shaft torque is based on ensuring an infinite life condition by limiting the resultant combined shaft bending and torsional stress.
- iii) This allowable input shaft torque can be further increased dependant on the resultant surface stress at the spline interface which is highly dependant on coupling selection and the provision of adequate spline lubrication.

If you have an application that requires higher input torque please consult KPM.

#2 Allowable through drive torques are based on the achieving an infinite life for a fully lubricated coupling and full spline engagement with a mineral oil based anti-wear hydraulic fluid.

Notes:

Rated Pressure

Pressure at which life and durability will not be affected.

Peak Pressure

The instant allowable surge pressure as defined by BS ISO 2944:2000. Life and durability however will be shortened.

Maximum Self Priming Speed

Values are valid for an absolute suction pressure of 14.5 psi (1 bar). If the displacement is reduced and the inlet pressure is increased the speed may also be increased.

Maximum Boosted Speed

Values stated are the absolute maximum permitted speed for which an increased inlet pressure will be required.

Weight

Approximate dry weights, dependant on exact pump type.

Hydraulic Fluid

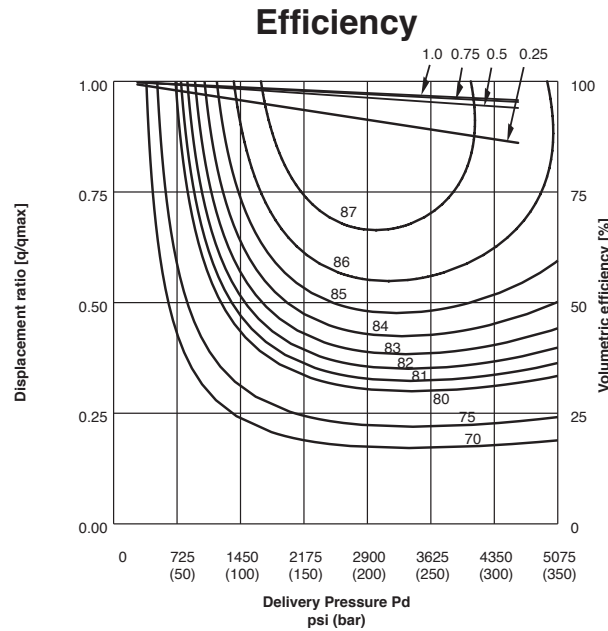
Mineral anti wear hydraulic fluid - for other fluid types please consult KPM.

Viscosity Range

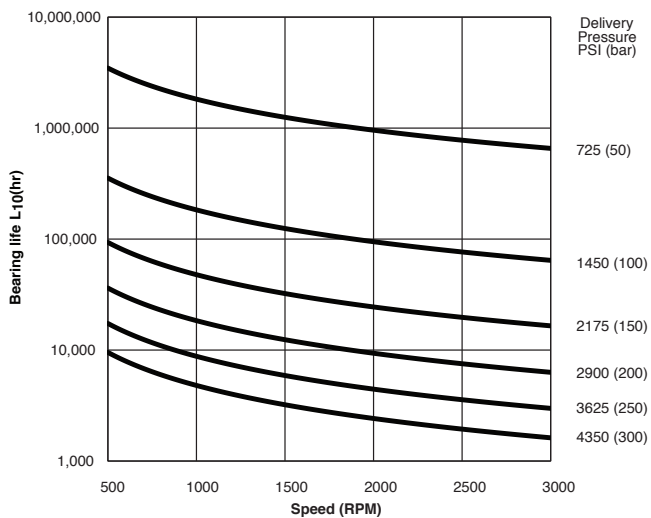
If viscosity is in range 200 to 1,000 cSt, then warming up is necessary before commencing full scale running.

2-3 Performance Data

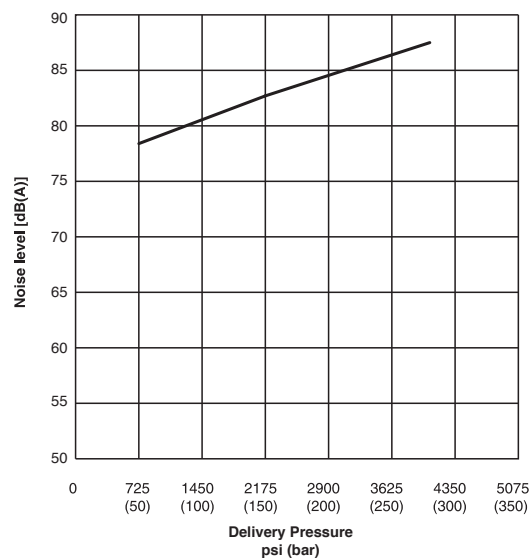
Performance Curves - K3VL28



Bearing Life



Noise Level

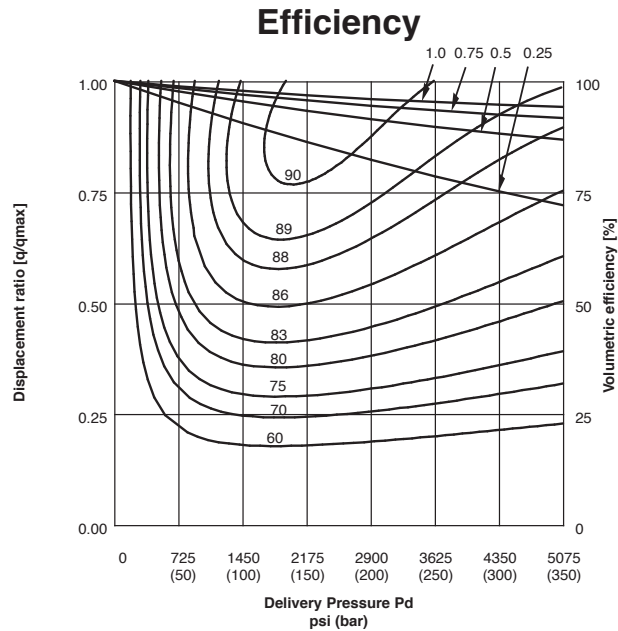


Performance Notes:

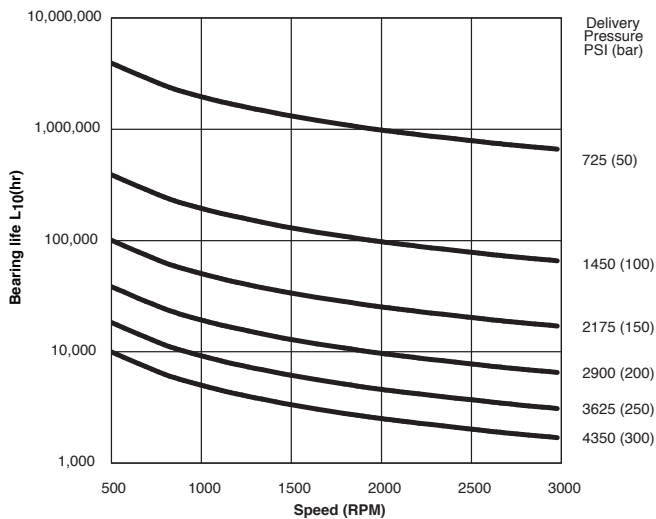
- All curves are based on an input speed of 1800 rpm, ISOVG46 hydraulic oil, 122°F (50°C) oil temperature, and 0 psi (0 bar) inlet condition, unless otherwise noted.
- L_{10} bearing life is defined as the period of time for 10% of an identical group of bearings operated under the same conditions to begin to fail as a result of rolling fatigue. Bearing life is further reduced by elevated temperatures, contamination, shaft radial loads, and lubricant breakdown. Consult Kawasaki for detailed bearing life analysis.
- Noise levels are measured in a semi-anechoic chamber in a manner similar to NFPA 13.9.70.12 and DIN 43635
- For application requirements not covered by the performance curves above, consult Kawasaki.

2-3 Performance Data (cont)

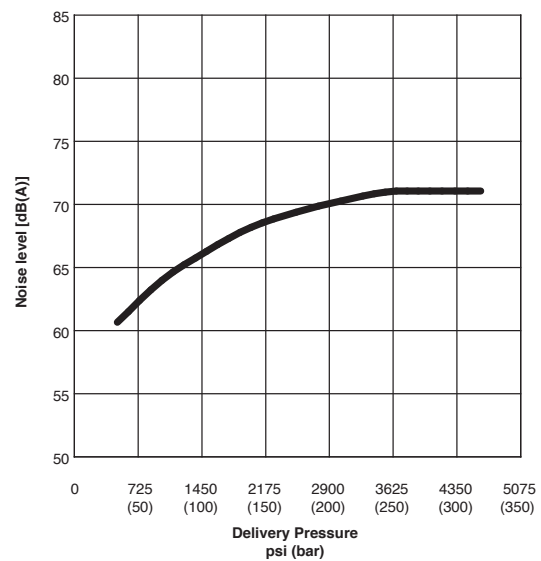
Performance Curves - K3VL45



Bearing Life



Noise Level

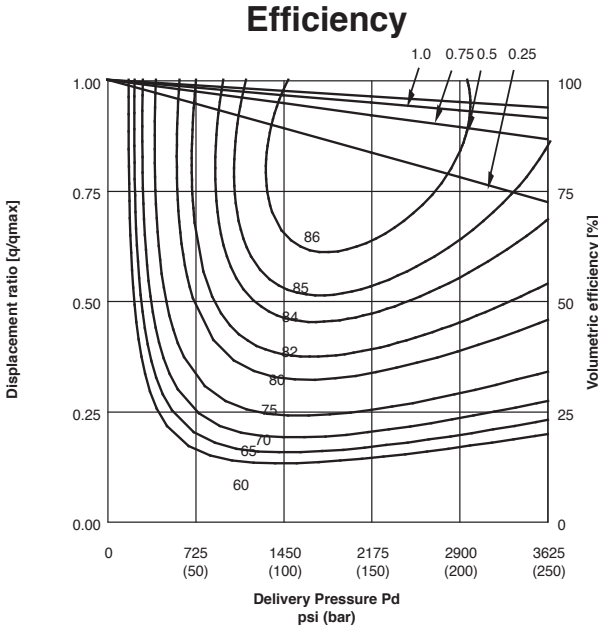


Performance Notes:

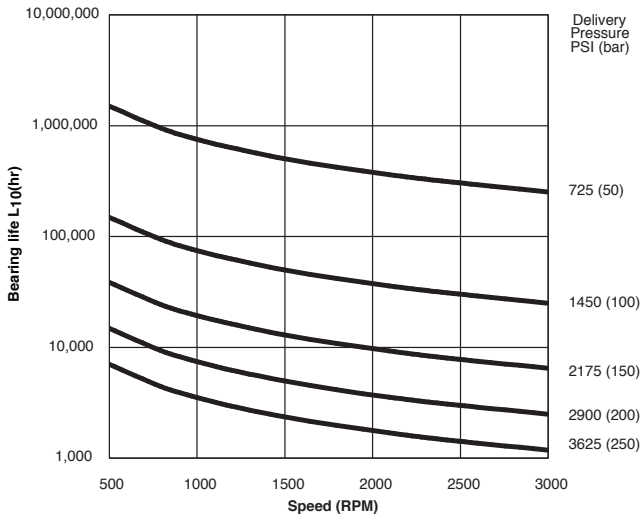
1. All curves are based on an input speed of 1800 rpm, ISOVG46 hydraulic oil, 122°F (50°C) oil temperature, and 0 psi (0 bar) inlet condition, unless otherwise noted.
2. L_{10} bearing life is defined as the period of time for 10% of an identical group of bearings operated under the same conditions to begin to fail as a result of rolling fatigue. Bearing life is further reduced by elevated temperatures, contamination, shaft radial loads, and lubricant breakdown. Consult Kawasaki for detailed bearing life analysis.
3. Noise levels are measured in a semi-anechoic chamber in a manner similar to NFPA 13.9.70.12 and DIN 43635
4. For application requirements not covered by the performance curves above, consult Kawasaki.

2-3 Performance Data (cont)

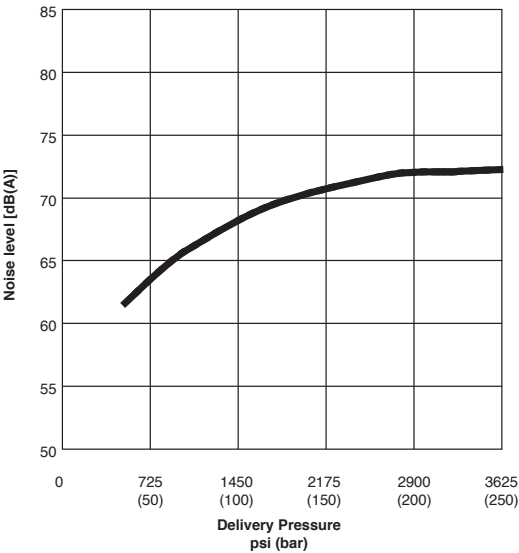
Performance Curves - K3VL60



Bearing Life



Noise Level

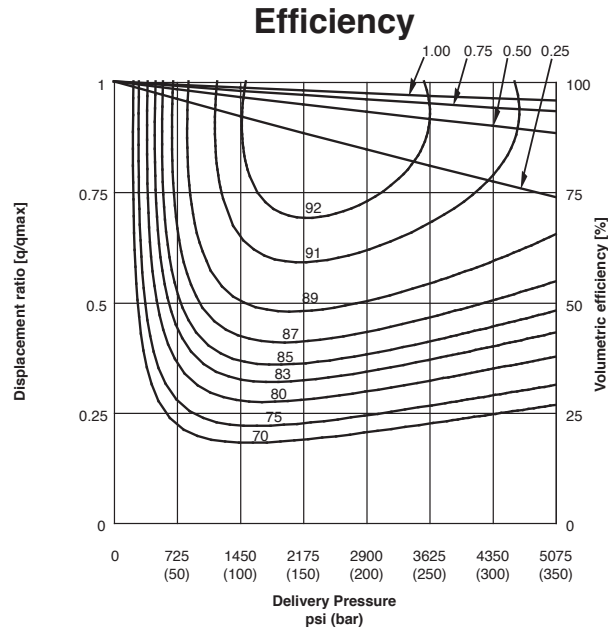


Performance Notes:

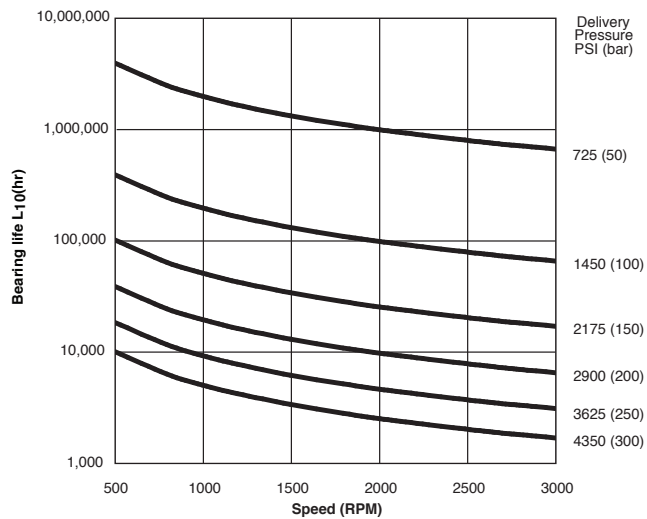
1. All curves are based on an input speed of 1800 rpm, ISOVG46 hydraulic oil, 122°F (50°C) oil temperature, and 0 psi (0 bar) inlet condition, unless otherwise noted.
2. L_{10} bearing life is defined as the period of time for 10% of an identical group of bearings operated under the same conditions to begin to fail as a result of rolling fatigue. Bearing life is further reduced by elevated temperatures, contamination, shaft radial loads, and lubricant breakdown. Consult Kawasaki for detailed bearing life analysis.
3. Noise levels are measured in a semi-anechoic chamber in a manner similar to NFPA 13.9.70.12 and DIN 43635
4. For application requirements not covered by the performance curves above, consult Kawasaki.

2-3 Performance Data (cont)

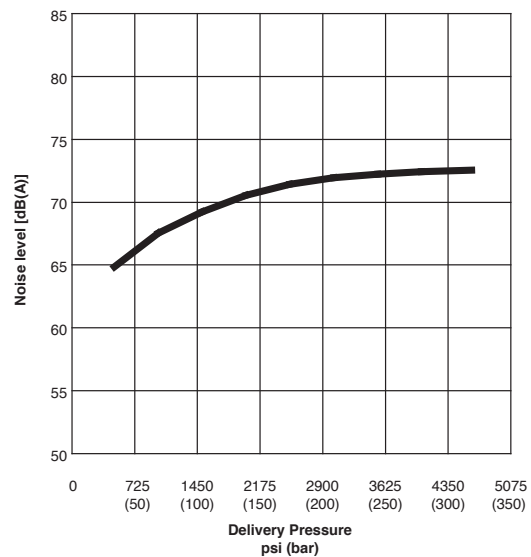
Performance Curves - K3VL80



Bearing Life



Noise Level

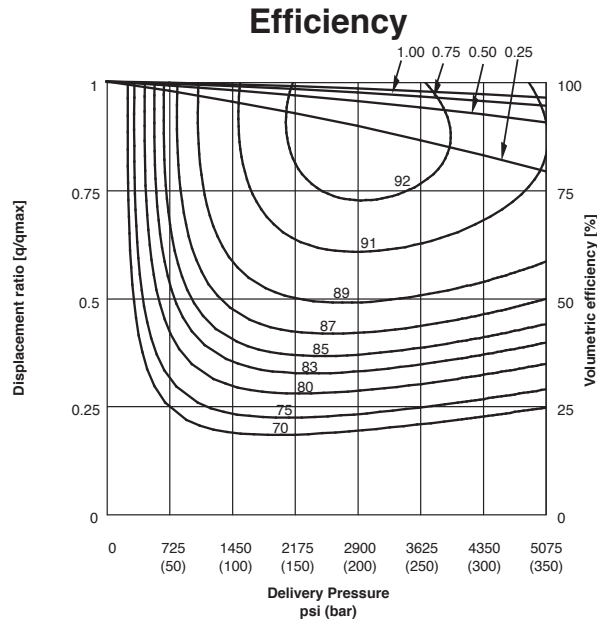


Performance Notes:

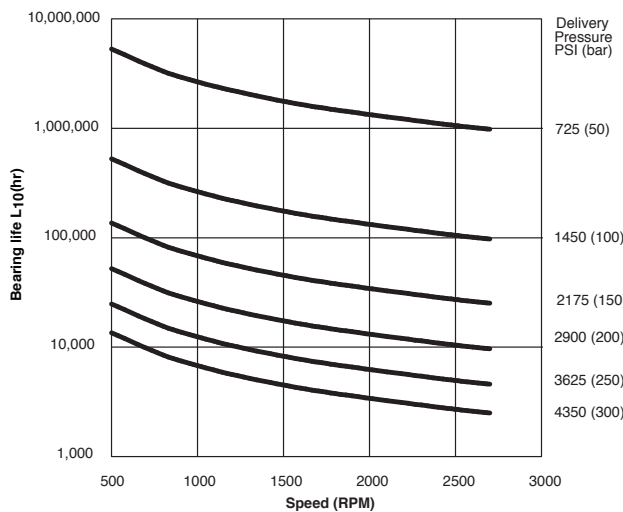
1. All curves are based on an input speed of 1800 rpm, ISOVG46 hydraulic oil, 122°F (50°C) oil temperature, and 0 psi (0 bar) inlet condition, unless otherwise noted.
2. L_{10} bearing life is defined as the period of time for 10% of an identical group of bearings operated under the same conditions to begin to fail as a result of rolling fatigue. Bearing life is further reduced by elevated temperatures, contamination, shaft radial loads, and lubricant breakdown. Consult Kawasaki for detailed bearing life analysis.
3. Noise levels are measured in a semi-anechoic chamber in a manner similar to NFPA 13.9.70.12 and DIN 43635
4. For application requirements not covered by the performance curves above, consult Kawasaki.

2-3 Performance Data (cont)

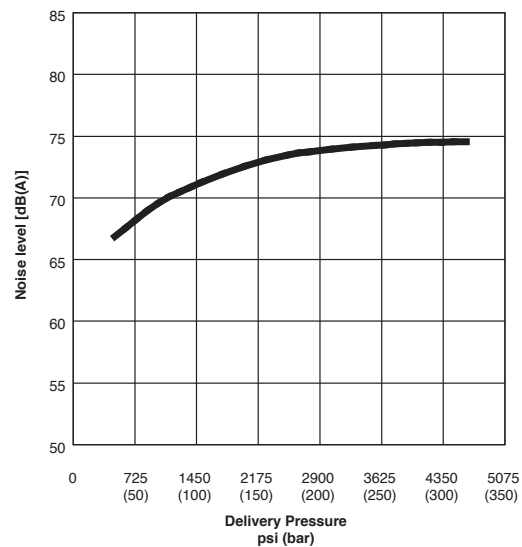
Performance Curves - K3VL112



Bearing Life



Noise Level

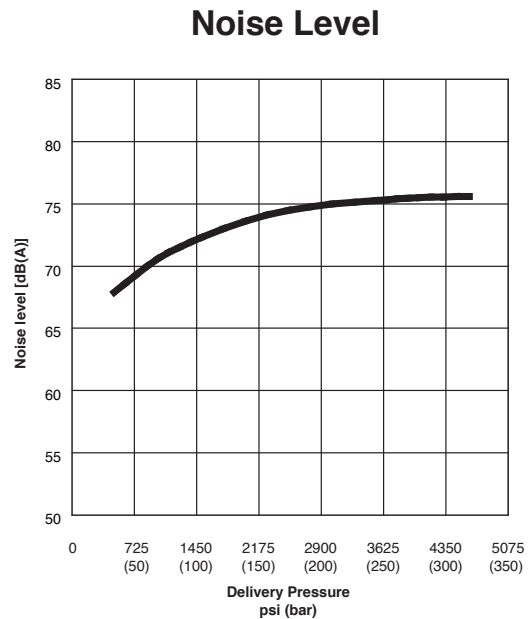
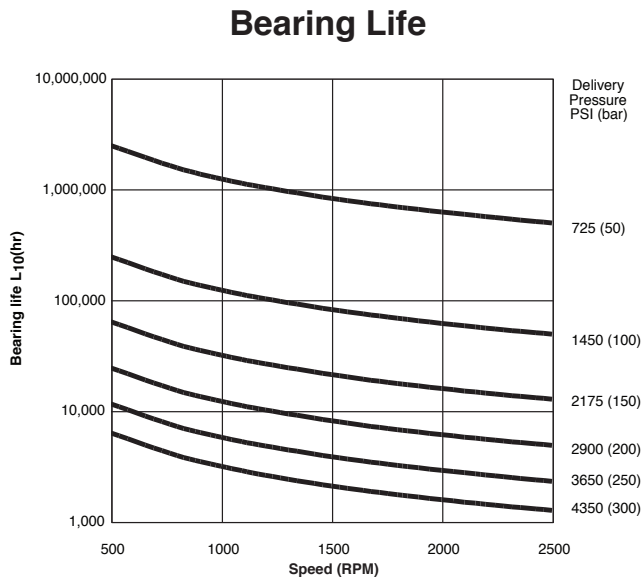
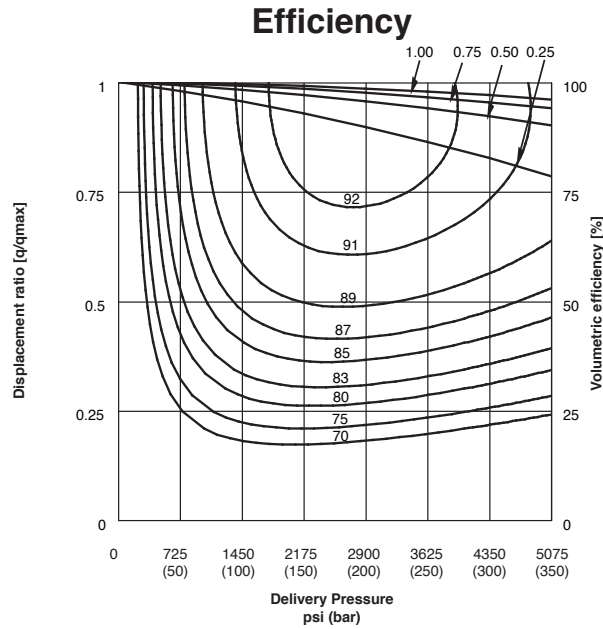


Performance Notes:

1. All curves are based on an input speed of 1800 rpm, ISOVG46 hydraulic oil, 122°F (50°C) oil temperature, and 0 psi (0 bar) inlet condition, unless otherwise noted.
2. L_{10} bearing life is defined as the period of time for 10% of an identical group of bearings operated under the same conditions to begin to fail as a result of rolling fatigue. Bearing life is further reduced by elevated temperatures, contamination, shaft radial loads, and lubricant breakdown. Consult Kawasaki for detailed bearing life analysis.
3. Noise levels are measured in a semi-anechoic chamber in a manner similar to NFPA 13.9.70.12 and DIN 43635
4. For application requirements not covered by the performance curves above, consult Kawasaki.

2-3 Performance Data (cont)

Performance Curves - K3VL140

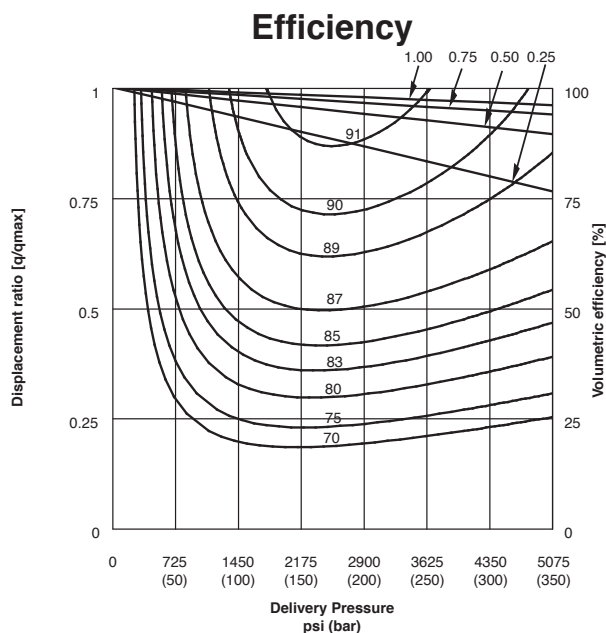


Performance Notes:

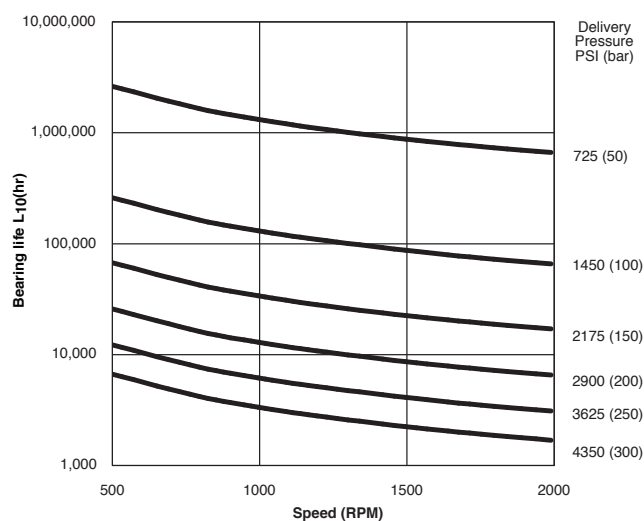
1. All curves are based on an input speed of 1800 rpm, ISOVG46 hydraulic oil, 122°F (50°C) oil temperature, and 0 psi (0 bar) inlet condition, unless otherwise noted.
2. L_{10} bearing life is defined as the period of time for 10% of an identical group of bearings operated under the same conditions to begin to fail as a result of rolling fatigue. Bearing life is further reduced by elevated temperatures, contamination, shaft radial loads, and lubricant breakdown. Consult Kawasaki for detailed bearing life analysis.
3. Noise levels are measured in a semi-anechoic chamber in a manner similar to NFPA 13.9.70.12 and DIN 43635
4. For application requirements not covered by the performance curves above, consult Kawasaki.

2-3 Performance Data (cont)

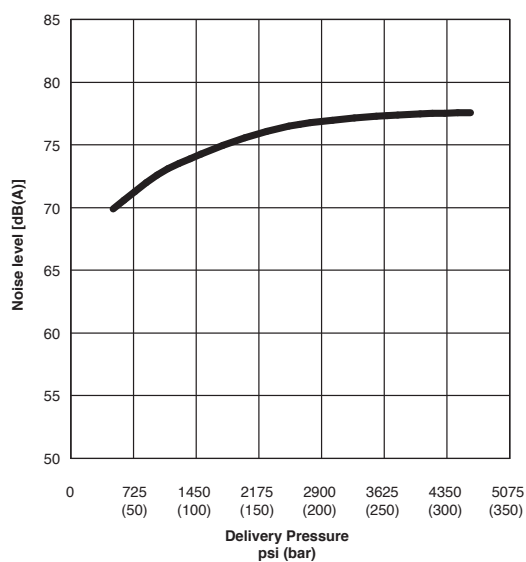
Performance Curves - K3VL200



Bearing Life



Noise Level



Performance Notes:

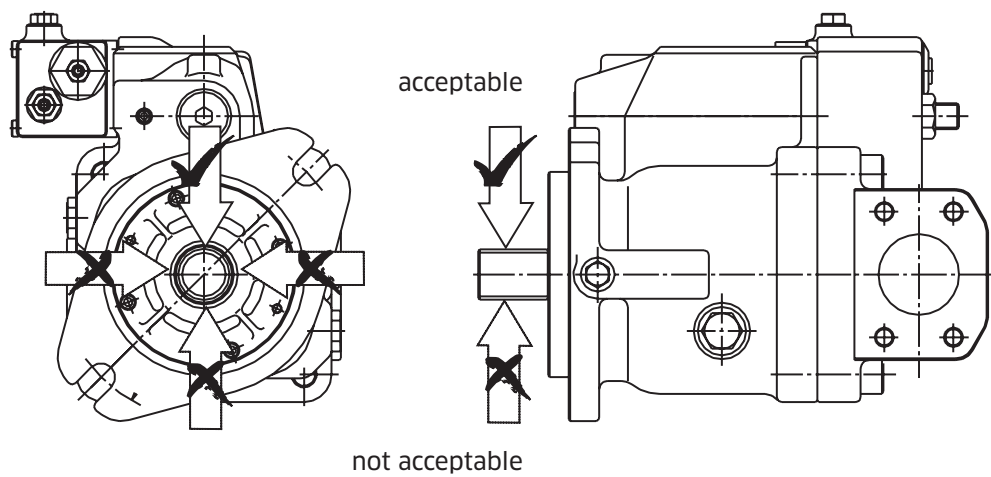
- All curves are based on an input speed of 1800 rpm, ISOVG46 hydraulic oil, 122°F (50°C) oil temperature, and 0 psi (0 bar) inlet condition, unless otherwise noted.
- L_{10} bearing life is defined as the period of time for 10% of an identical group of bearings operated under the same conditions to begin to fail as a result of rolling fatigue. Bearing life is further reduced by elevated temperatures, contamination, shaft radial loads, and lubricant breakdown. Consult Kawasaki for detailed bearing life analysis.
- Noise levels are measured in a semi-anechoic chamber in a manner similar to NFPA 13.9.70.12 and DIN 43635
- For application requirements not covered by the performance curves above, consult Kawasaki.

2-4 Radial Loading Capacity

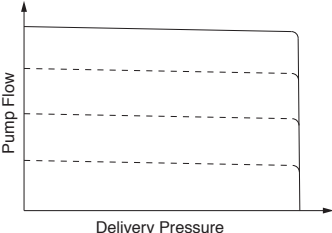
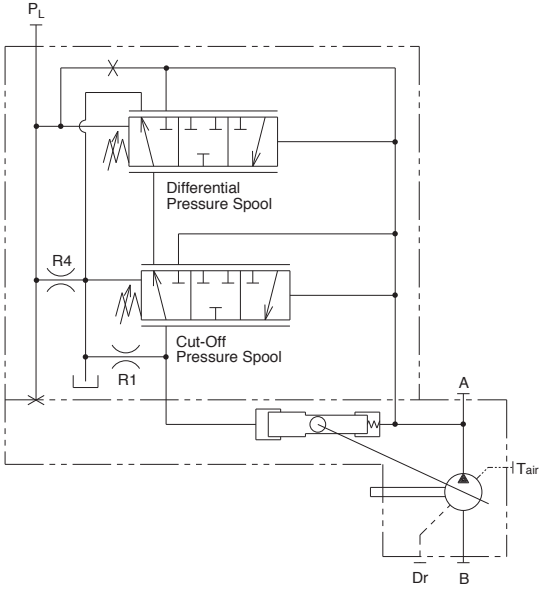
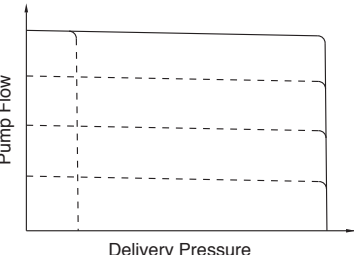
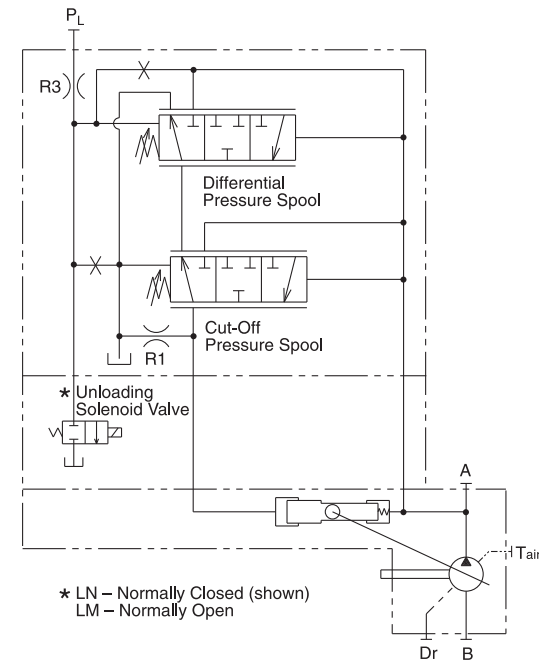
Axial shaft load is not permitted. Radial shaft load is possible with proper orientation. Contact KPM.

Radial shaft loading can be allowed provided that its orientation is such that the front bearing takes the additional load (See diagram below).

Note: In this case bearing life will be reduced.

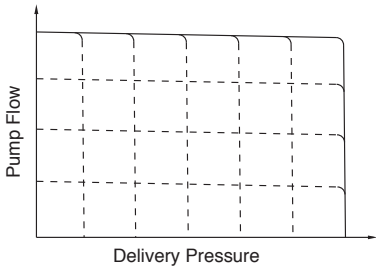
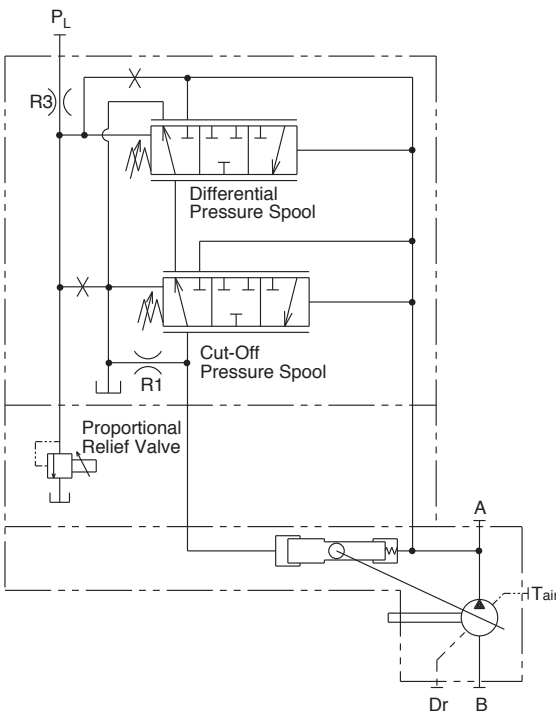
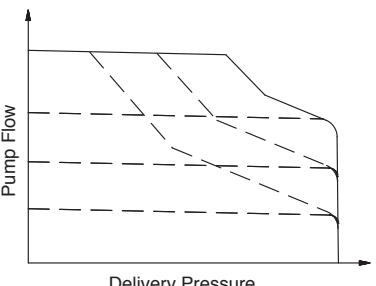
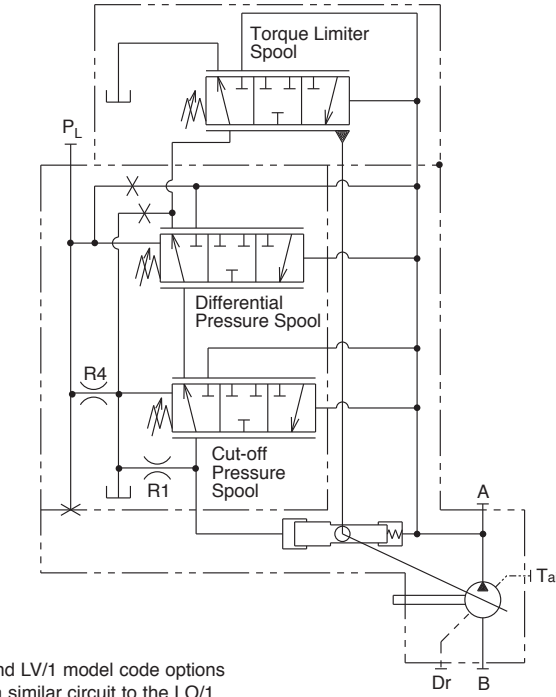


2-5 Functional Description of Regulator

Regulator code	Hydraulic Circuit
<p>L0/L1 Load Sensing and Pressure Cut-off</p> <p>Description: The load sense regulator controls the pump displacement to best match the flow and pressure requirements of the load.</p> <p>The pump delivery pressure (D_p) is the sum of the load pressure (L_s), plus the differential pressure (rP) setting. $L_s + \Delta P = D_p$</p> <p>When the pump discharge pressure reaches the preset value of the cut-off spool, the pump destrokes to limit the outlet pressure to that setting. When the system requires no flow or pressure, the pump returns to an energy saving low pressure standby condition.</p> <p>Differential Pressure: Standard Setting - 218 psi (15 bar) Adjustment Range - 145 psi (10 bar) ~ 300 psi (21 bar)</p> <p>Cut-off Pressure: Standard Setting - 4600 psi (320 bar) Adjustment range - 300 psi (21bar) ~ 4600 psi (320 bar)</p> <p>L1 Option: With the L1 option, the bleed-off orifice (R4) is plugged. When this option is applied, there must be another bleed-off orifice in the external valving to prevent trapped pressure.</p> 	
<p>LN or LM Load Sensing and Pressure Cut-off with Integrated Unloading Valve*</p> <p>Description: An integrated unloading valve is sandwiched between the load sense regulator and the pump which allows the pump to operate in a low pressure standby condition.</p> <p>Standby Pressure: The minimum standby pressure is approximately 200 psi (14 bar) at the minimum Differential Pressure setting.</p> <p>* Can also be used with the torque limiting and proportional displacement control regulators</p> 	 <p>* LN – Normally Closed (shown) LM – Normally Open</p>

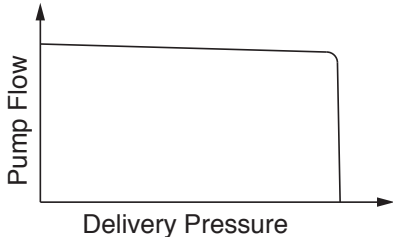
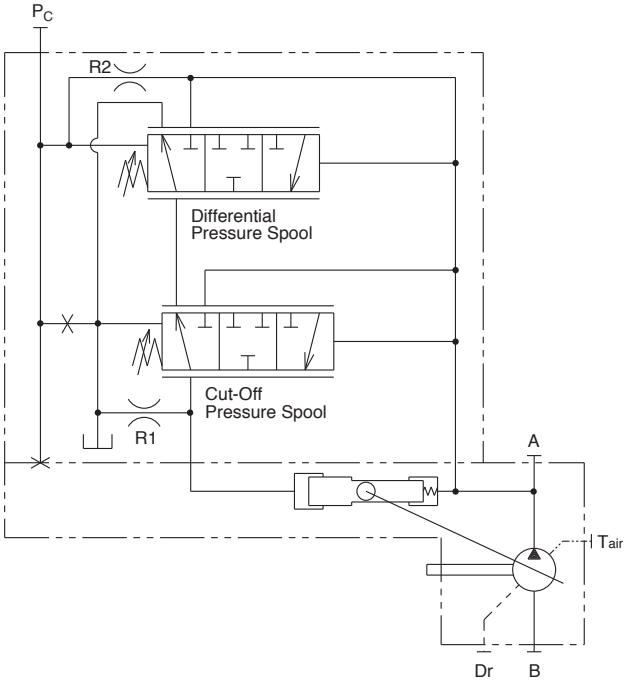
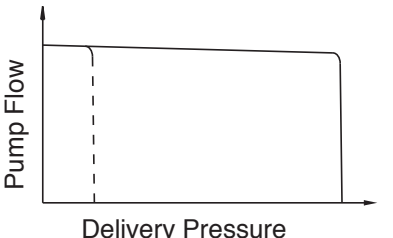
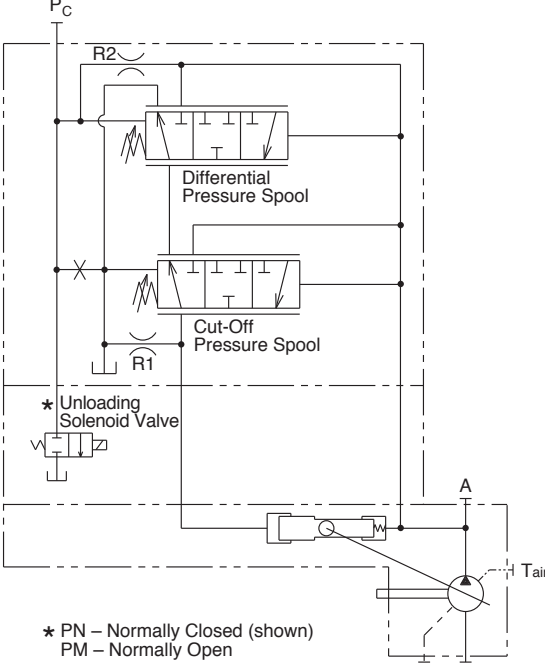
Warning: A safety relief valve should be installed in the hydraulic circuit at the pump outlet.

2-5 Functional Description of Regulator (cont)

Regulator code	Hydraulic Circuit
<p>LV or LV2 Load Sensing and Pressure Cut-off with Integrated Proportional Relief Valve*</p> <p>Description: An integrated proportional relief valve is sandwiched between the load sense regulator and pump to control the maximum operating pressure by varying an electrical signal to the valve.</p> <p>The LV control is designed for industrial applications operating on 24vdc control power.</p> <p>The LV2 control is designed for mobile applications operating on 12vdc or 24vdc control power.</p> <p>Standby Pressure: The minimum standby pressure is approximately 200 psi (14 bar) at the minimum Differential Pressure setting.</p> <p>Amplifier: A separate amplifier is required for either control option. See section 16 for available amplifiers.</p> <p>* Can also be used with the torque limiting and proportional displacement control regulators</p> 	
<p>L0/1-** Load Sensing and Pressure Cut-off with Torque Limiting</p> <p>Description: The L0/L1 control functions as previously noted. The torque limiter regulator controls the pump displacement to best match the power available from the prime mover.</p> <p>The torque limiter regulator monitors delivery pressure and the swashplate angle and adjusts the pump displacement to limit input torque to a preset value.</p> <p>The preset torque limit value (T - ft-lbs) may be calculated using prime mover drive speed (N - rpm) and power value. (HP - horsepower) $T = Hp \times 5252/N$</p> <p>Please reference the torque limiting code chart on page 3.</p> 	 <p>LN/1 and LV/1 model code options utilize a similar circuit to the L0/1.</p>

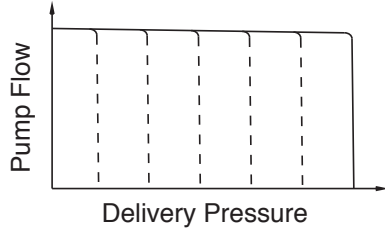
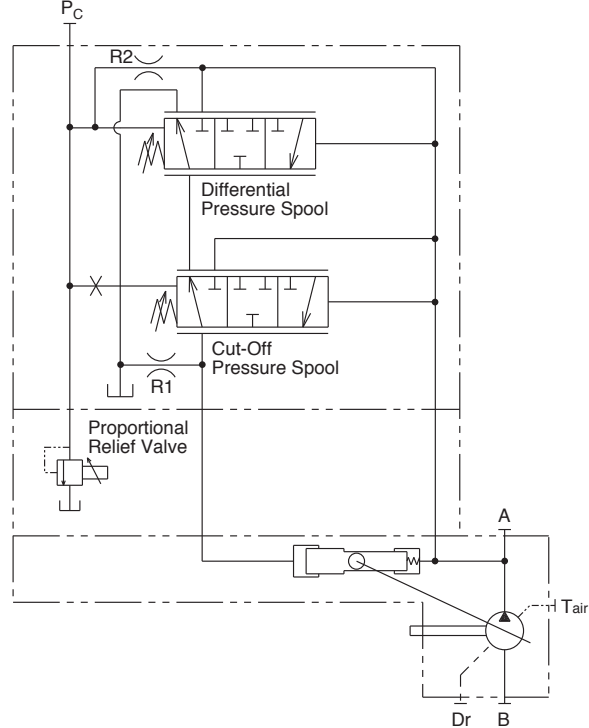
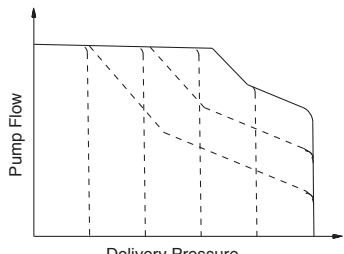
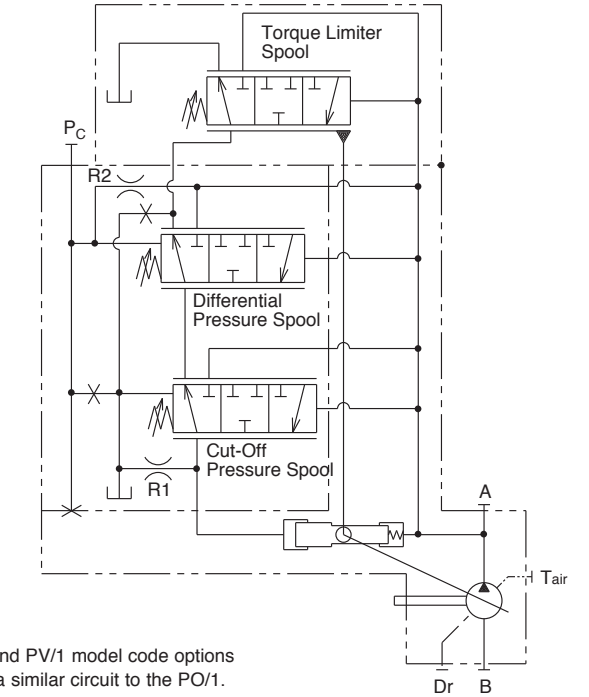
Warning: A safety relief valve should be installed in the hydraulic circuit at the pump outlet.

2-5 Functional Description of Regulator (cont)

Regulator code	Hydraulic Circuit
<p>P0 Pressure Cut-off</p> <p>Description: The Pressure Cut-off regulator monitors delivery pressure and destrokes the pump once the pressure reaches the cut-off pressure setting. When the delivery pressure drops below the cut-off setting, the pump will return to maximum displacement.</p> <p>Differential Pressure: Standard Setting - 218 psi (15 bar) Adjustment Range - 145 psi (10 bar) ~ 300 psi (15 bar)</p> <p>Cut-off Pressure: Standard Setting - 4600 psi (320 bar) Adjustment Range - 300 psi (21 bar) ~ 4600 psi (320 bar)</p> <p>Remote Control: The pump can be remotely controlled by connecting a relief valve to the Pc port of the regulator. The flow rate from the Pc port will be ~.4 gpm (1.5 lpm). The pump can also be unloaded to operate at a low pressure standby condition by using a solenoid valve.</p> 	
<p>PN or PM Pressure Cut-off with Integrated Unloading Valve*</p> <p>Description: An integrated unloading valve is sandwiched between the pressure put-off regulator and the pump which allows the pump to operate in a low pressure standby condition.</p> <p>Standby Pressure: The minimum standby pressure is approximately 200 psi (14 bar) at the minimum Differential Pressure setting.</p> <p>* Can also be used with the torque limiting and proportional displacement control regulators</p> 	 <p>* PN – Normally Closed (shown) PM – Normally Open</p>

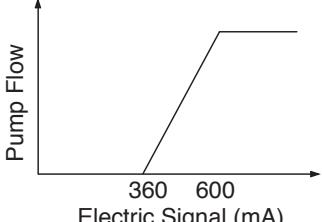
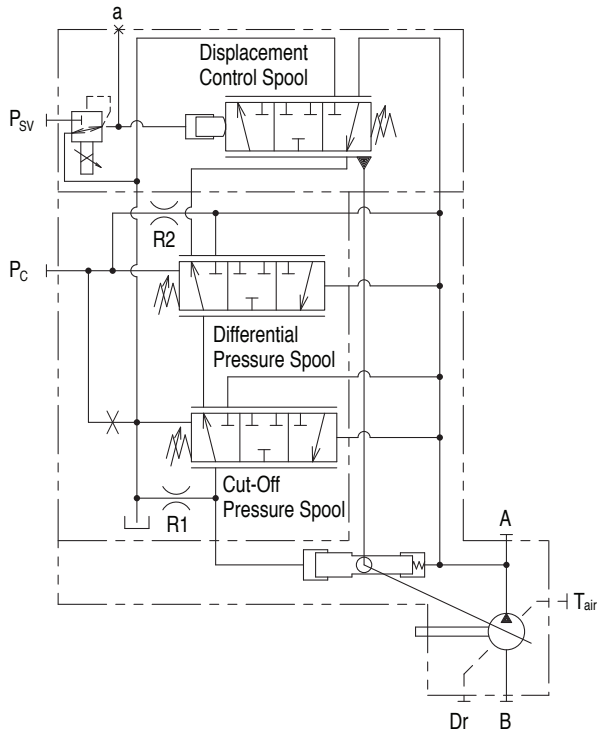
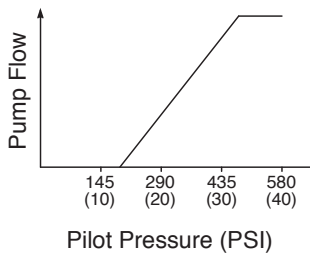
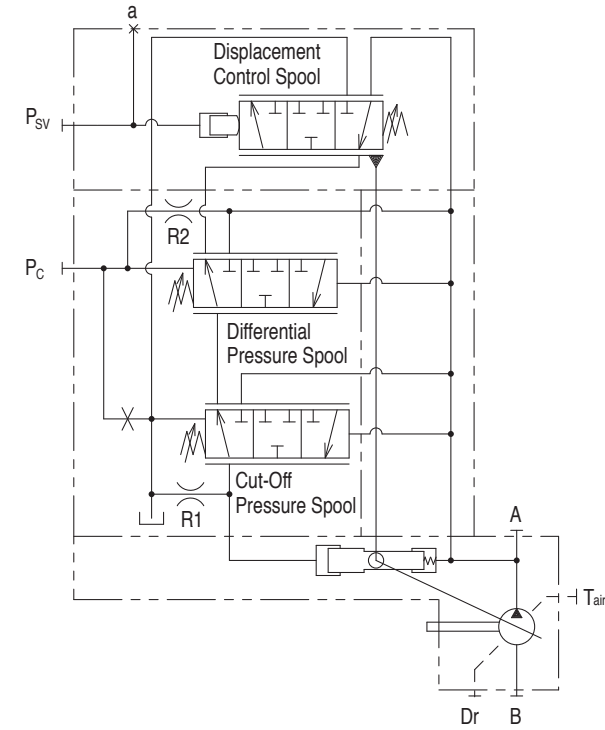
Warning: A safety relief valve should be installed in the hydraulic circuit at the pump outlet.

2-5 Functional Description of Regulator (cont)

Regulator code	Hydraulic Circuit
<p>PV or PV2 Pressure Cut-off with Integrated Proportional Relief Valve*</p> <p>Description: An integrated proportional relief valve is sandwiched between the pressure cut-off regulator and pump to control the maximum operating pressure by varying an electric signal to the valve.</p> <p>The PV control is designed for industrial applications operating on 24vdc control power.</p> <p>The PV2 control is designed for mobile applications operating on 12vdc or 24vdc control power.</p> <p>Standby Pressure: The minimum standby pressure is approximately 200 psi (14 bar) at the minimum Differential Pressure setting.</p> <p>Amplifier: Separate amplifier is required for either control option. See Section 16 for available amplifiers.</p> <p>* Can also be used with the torque limiting and proportional displacement control regulators</p> 	
<p>P0/1-** Pressure Cut-off with Torque Limiting</p> <p>Description: The P0 control functions as previously noted. The torque limiter regulator controls the pump displacement to best match the power available from the prime mover.</p> <p>The torque limiter regulator monitors delivery pressure and the swashplate angle and adjusts the pump displacement to limit input torque to a preset value.</p> <p>The preset torque limit value (T - ft-lbs) may be calculated using prime mover drive speed (N - rpm) and power value. (HP - horsepower) $T = Hp \times 5252/N$</p> <p>Please reference the torque limiting code chart on page 3.</p> <p>Remote Control: The pump can be remotely controlled by connecting a relief valve to the Pc port of the regulator. The flow rate from the Pc port will be ~.4 gpm (1.5 lpm).</p> <p>The pump can also be unloaded to operate at a low pressure standby condition by using a solenoid valve.</p> 	 <p>PN/1 and PV/1 model code options utilize a similar circuit to the P0/1.</p>

Warning: A safety relief valve should be installed in the hydraulic circuit at the pump outlet.

2-5 Functional Description of Regulator (cont)

Regulator code	Hydraulic Circuit
<p>P0/1-E0 Electronic Proportional Displacement Control with Pressure Cut-off</p> <p>Description: The P0 control functions as previously noted. A proportional pressure reducing valve (PPRV) is added to the regulator so the pump flow can be infinitely controlled within the range of the pump. An increase in electric signal to the PPRV will result in an increase in flow. A pilot pressure of 580 psi must be supplied to the PSV port.</p> <p>Note: The pump outlet pressure must be greater than 100 psi for proper regulator operation.</p> <p>Amplifier: A pulse width modulated (PWM) amplifier is required to operate the E0 control. The recommended diather frequency is 50-200Hz.</p> <p>See section 16 for amplifiers.</p> <p>Coil specifications: Rated current: 700 mA Recommended diather frequency: 50-200Hz Coil resistance: 17.5Ωat 20° C Connector type: Nihon AMP Econoseal J series, Mark I</p> 	
<p>P0/1-Q0 Hydraulic Pilot Displacement Control with Pressure Cut-off</p> <p>Description: P0 control functions as previously noted. By applying a varying hydraulic pilot pressure to the Psv port of the displacement controller, the pump flow can be infinitely controlled within the range of the pump. An increase in the hydraulic pilot signal results in an increase of output flow. Maximum output flow is achieved at 480 psi.</p> <p>Remote control: By connecting the Pc port to a remote pressure control, variable pump pressure control (or unloading) can be achieved.</p> 	

2-6 Power Shift

Kawasaki K3VL and K3VLS series pumps with Power Shift control

With today's ever changing demands on hydraulics and the advent of new Tier 4 engine, the need to vary the input torque of hydraulic pumps becomes evident. When the engine is operating at low idle, available torque is low and can be stalled. Using the Power Shift regulator, input torque to the pump can be limited to prevent engine overload and stalling at varying engine speeds and output power. Optimizing the horsepower input demands of the pump can result in significant savings in fuel consumption and emission output.

Kawasaki Power Shift is a low-cost alternative that maximizes machine versatility and can be retrofit into existing machine design platforms. Reduces fuel consumption, emissions and noise. Being able to operate at lower RPM with maximum efficiency, significant reduction in cooling demands and overall machine wear will be realized.

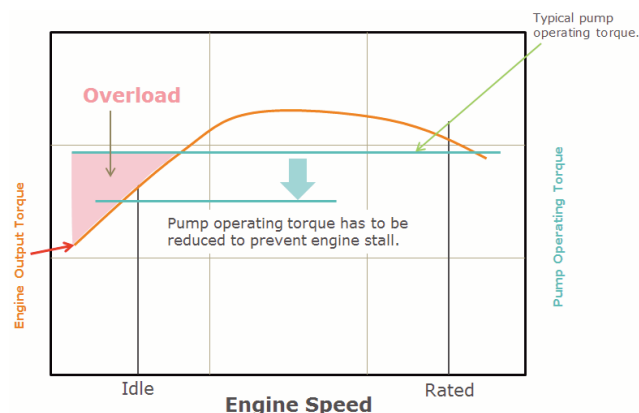
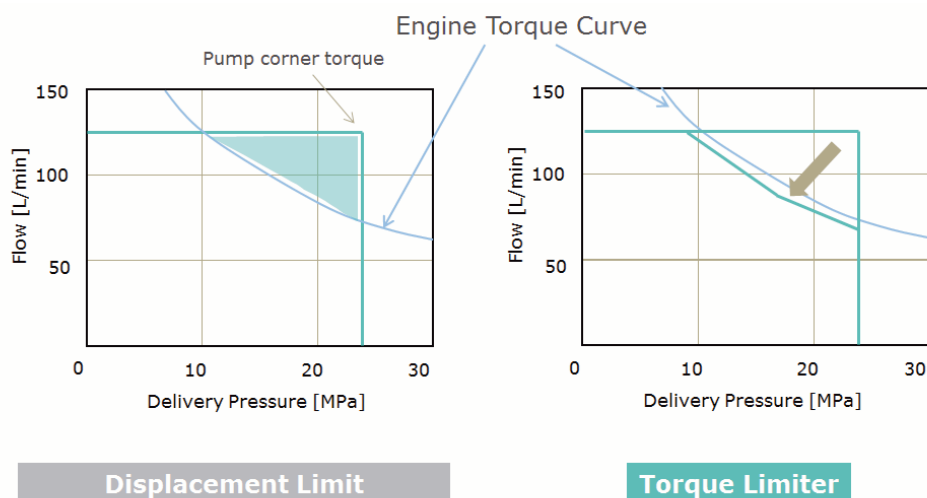


Figure 1

From Figure 1 we can see that as engine speed varies available output torque varies as well. To prevent engine stall the input torque requirement of the pump must change accordingly.

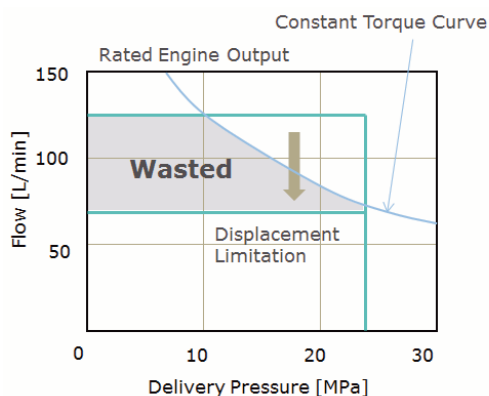


Displacement Limit
To prevent engine stalling, pump displacement must be reduced. With only a displacement control, much of the pump potential and machine performance is wasted.

Torque Limiter
A torque limiter incrementally reduces displacement as pressure increases to limit the pump input torque to a constant level. The torque limiter is preset to match the max engine torque.

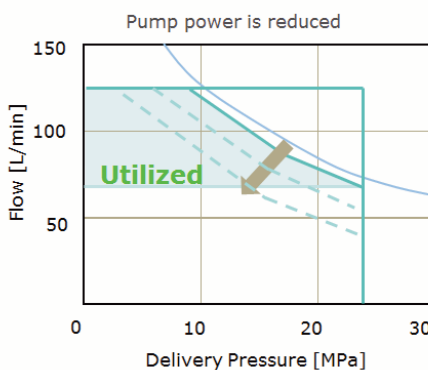
A torque limiter with Power Shift allows the pump to always operate at the maximum available torque. The pump can be set for various power levels for improved fuel economy or maximum performance. The pump can be used with an engine speed sensing control (ESS) with the controller monitoring engine droop. Pump input power is reduced to allow the engine to quickly recover preventing overload, at any speed.

2-6 Power Shift (cont)



Displacement Limit

One method of limiting input torque is to reduce pump maximum displacement. Unless the displacement is constantly changed to match pressure, machine performance will be wasted.



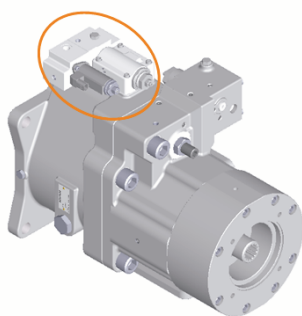
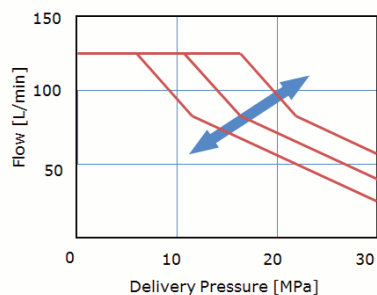
Torque Limiter with Power Shift

A torque limiter with Power Shift allows the pump to always operate at the maximum available torque level. The pump could be set for various power levels for improved fuel economy or maximum performance. The pump could be used with an engine speed sensing control (ESS) with the controller monitoring engine droop. Pump input power is reduced to allow the engine to quickly recover when overloaded, at any speed.

There are currently two versions of Power Shift available to meet system design requirements, Electric proportional or hydraulic pilot control.

Features

- Variable Torque Limit control (Power Shift)
- Two types of Power Shift operation
 - Electric Proportional (shown)
 - External Pilot Pressure



Key benefits of Kawasaki Power Shift:

- Reduction in emissions
- Reduction in fuel consumption
- Reduction in noise emission
- Reduction in cooling demands
- Increased machine versatility
- Longer machine life
- Can be retrofit to existing platforms
- Lower implementation cost

Please contact Kawasaki KPM for more information on the Power Shift control options.

2-7 Response Time

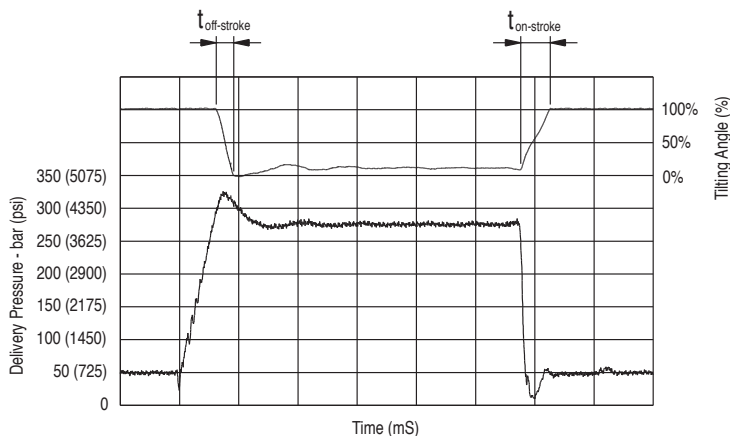
Pressure Cut-off Dynamic Response

50 to 280 bar (725 to 4060 psi)

Unit	t _{off-stroke}	t _{on-stroke}
	mS	
K3VL28	20	40
K3VL45/60	60	100
K3VL60	60	100
K3VL80	95	170
K3VL112	90	140
K3VL140	90	140
K3VL200	110	240

Test Conditions:

Pump Speed = 1800 rpm
 Inlet Condition = 0 psi (bar)
 Oil Type = ISO VG46
 Oil Temperature = 122°F (50°C)
 Compressed Oil Volume = 1.32 gallons (5 liters)

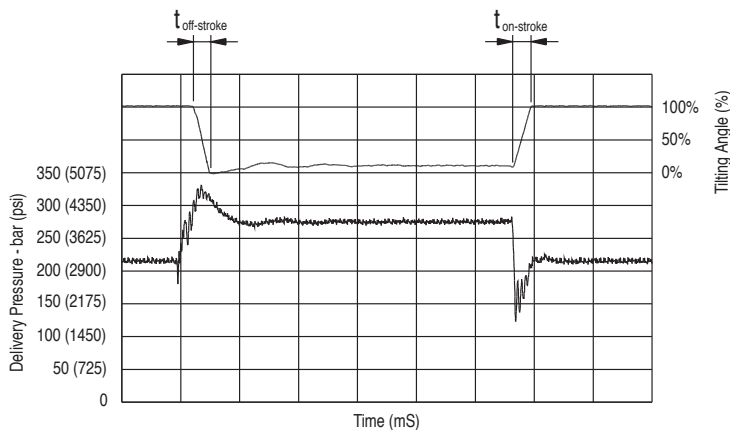


220 to 280 bar (3190 to 4060 psi)

Unit	t _{off-stroke}	t _{on-stroke}
	mS	
K3VL28	20	40
K3VL45/60	60	70
K3VL60	60	70
K3VL80	100	110
K3VL112	100	120
K3VL140	100	120
K3VL200	110	220

Test Conditions:

Pump Speed = 1800 rpm
 Inlet Condition = 0 psi (bar)
 Oil Type = ISO VG46
 Oil Temperature = 122°F (50°C)
 Compressed Oil Volume = 1.32 gallons (5 liters)



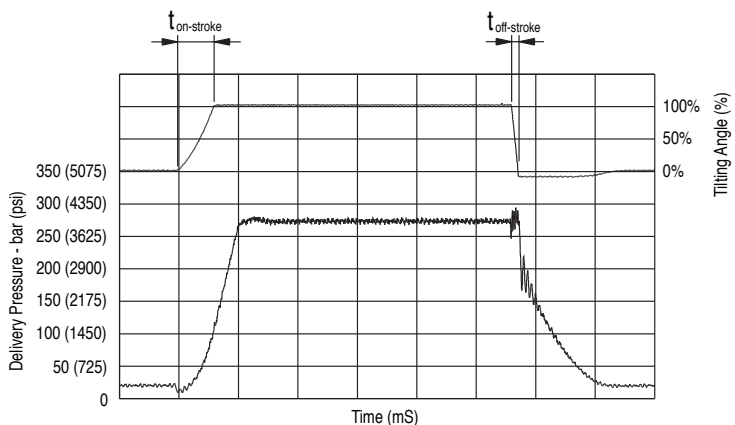
Load Sensing Dynamic Response

20 to 280 bar (290 to 4060 psi)

Unit	t _{off-stroke}	t _{on-stroke}
	mS	
K3VL28	20	70
K3VL45/60	20	115
K3VL60	20	115
K3VL80	55	155
K3VL112	55	195
K3VL140	55	195
K3VL200	65	190

Test Conditions:

Pump Speed = 1800 rpm
 Inlet Condition = 0 psi (bar)
 Oil Type = ISO VG46
 Oil Temperature = 122°F (50°C)
 Compressed Oil Volume = 1.32 gallons (5 liters)



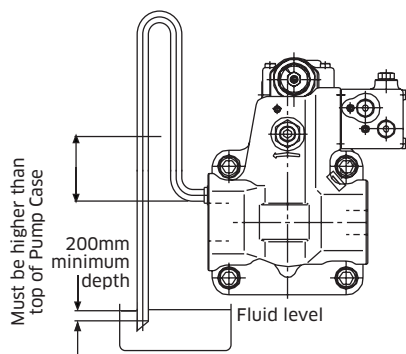
Note: The response values shown in the tables above are typical of those experienced in the laboratory. Actual response time will vary with different hydraulic circuits.

2-8 Installation

◆ Pump Mounting Options

Drain line

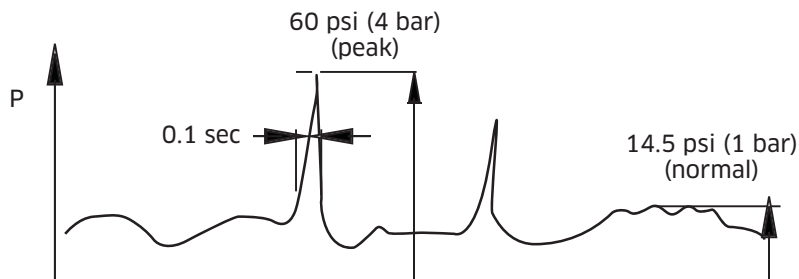
It is the preferred option to mount the pump with the case drain piping initially rising above the pump before continuing to the tank. Do not connect the drain line to the inlet line.



Cautions

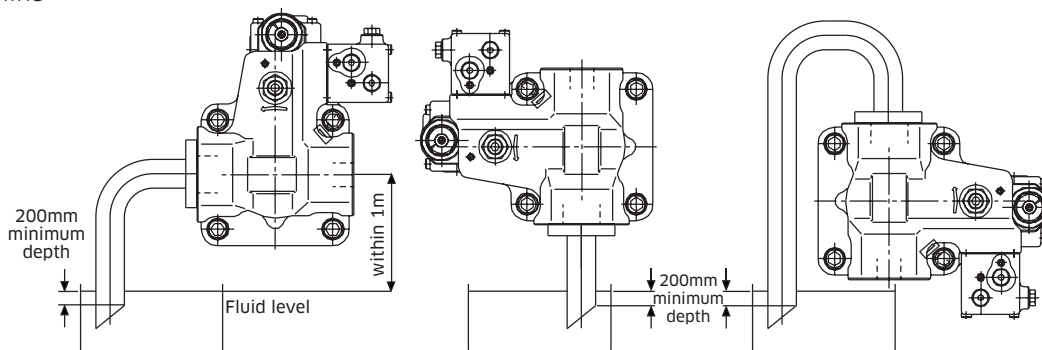
- A)** Inlet and drain pipes must be immersed by 8.2" (200 mm) minimum from the lowest level under operating conditions.
- B)** Height from the oil level to the center of the shaft must be within 3.3 ft (1 meter) maximum. (consult KPM).
- C)** The oil in the pump case must be refilled when the pump has not been operated for one month or longer.

The uppermost drain port should be used and the drain piping should be equal or larger in size than the drain port to minimise pressure in the pump case. The pump case pressure should not exceed 14.5 psi (1 bar) as shown in the illustration below. (Peak pressure should never exceed 60 psi (4 bar)).



Mounting the Pump Above the Tank

Suction line



2-8 Installation (cont)

Mounting the Pump Vertically (shaft up)

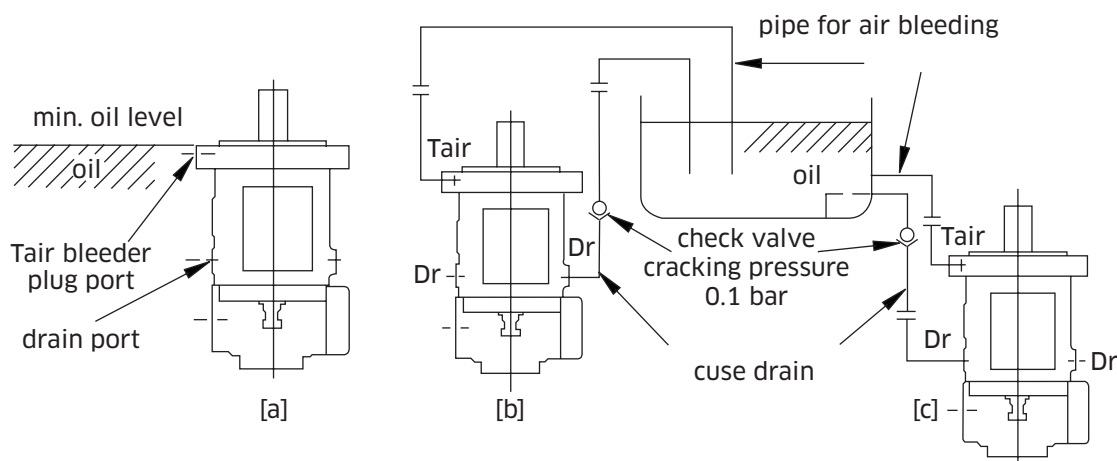
Note: Both the Tair and one case drain port must be used.

For applications requiring vertical installation (shaft up) please remove the Tair bleed plug and connect piping as shown in the illustration below.

When installing the pump in the tank and submerged in the oil, open the drain port and Tair bleed port to provide adequate lubrication to the internal components. See illustration [a].

The oil level in the tank should be higher than the pump-mounting flange as shown in illustration [a] below. If the oil level in the tank is lower than the pump mounting flange then forced lubrication is required through the Tair bleed port 0.6 - 1.2 spm (1 ~ 2 l/min).

When installing the pump outside the tank run piping for the drain and Tair bleed ports to tank (see illustration [c]). If the drain or Tair bleed piping rise above the level of oil (see illustration [b]) fill the lines with oil before operation. motor to your national standard is not exceeded.



A check valve with cracking pressure of 0.1 bar should be fitted to the case drain line as shown.

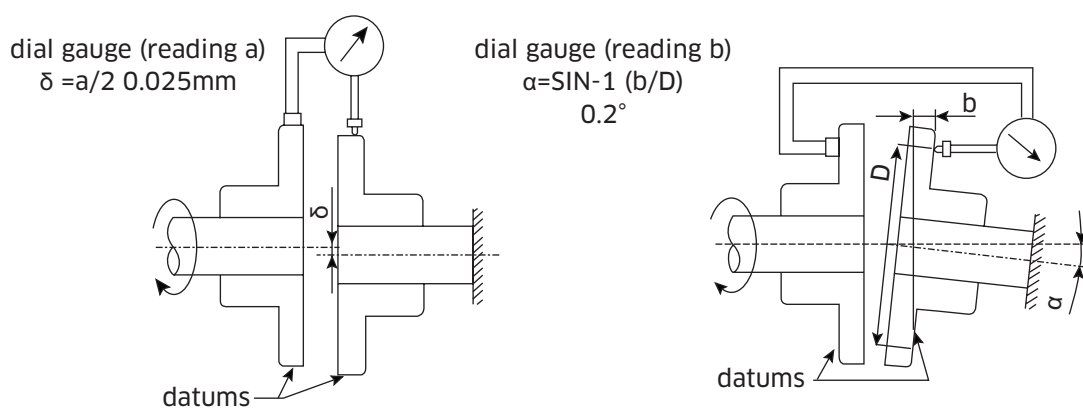
2-8 Installation (cont)

◆ Drive Shaft Coupling

Use a flexible coupling to connect the pump shaft to an engine flywheel or electric motor shaft. Alignment should be within 0.05 mm TIR as shown in the illustration below.

Do not apply any radial or axial loading to the pump shaft. For applications where radial or side loads exist please contact KPM for recommendations.

Do not force the coupling on or off the pump shaft. Use the threaded hole in the end of the pump shaft to fix or remove the coupling.



For engine drives a split type pinch bolt drive flange and flexible coupling is recommended.

Moment of Inertia and Torsional Stiffness

Frame Size	Moment of Inertia GD^2 (kgf·m ²)	Torsional Stiffness (N·m/rad)
K3VL28	8.36×10^{-3}	2.20×10^4
K3VL45	1.54×10^{-2}	3.59×10^4
K3VL60	1.54×10^{-2}	3.59×10^4
K3VL80	2.92×10^{-2}	4.83×10^4
K3VL112	8.06×10^{-2}	9.33×10^4
K3VL140	8.06×10^{-2}	9.33×10^4
K3VL200	1.83×10^{-1}	1.54×10^5
K3VL200H	1.83×10^{-1}	1.54×10^5

2-8 Installation (cont)

Through Drive Limitations

Pump over all length in. (mm)	
Frame size	Single pump type N
K3VL28	8.6 (219)
K3VL45	9.6 (244)
K3VL60	9.6 (244)
K3VL80	10.7 (272)
K3VL112	12.1 (307.5)
K3VL140	12.1 (307.5)
K3VL200	14.1 (359)
K3VL200H	16.7 (424)

Frame size	Pump approx weight lbs. (Kg)	
	Single pump type N	
	Without Torque Limiter	With Torque Limiter
K3VL28	49 (22)	(na)
K3VL45	62 (28)	66 (30)
K3VL60	62 (28)	66 (30)
K3VL80	84 (38)	88 (40)
K3VL112	152 (69)	157 (71)
K3VL140	152 (69)	157 (71)
K3VL200	227 (103)	232 (105)
K3VL200H	313 (142)	309 (140)

Frame size	Pump CofG from mount in. (mm)
	Single pump type N
K3VL28	4.5 (115)
K3VL45	4.7 (120)
K3VL60	4.7 (120)
K3VL80	5.1 (130)
K3VL112	5.9 (150)
K3VL140	5.9 (150)
K3VL200	7.5 (190)
K3VL200H	8.8 (223)

Frame size	Maximum Permissible Bending Moment lb-ft (Nm)
K3VL28	101 (137)
K3VL45	101 (137)
K3VL60	101 (137)
K3VL80	180 (244)
K3VL112	341 (462)
K3VL140	341 (462)
K3VL200	686 (930)
K3VL200H	686 (930)

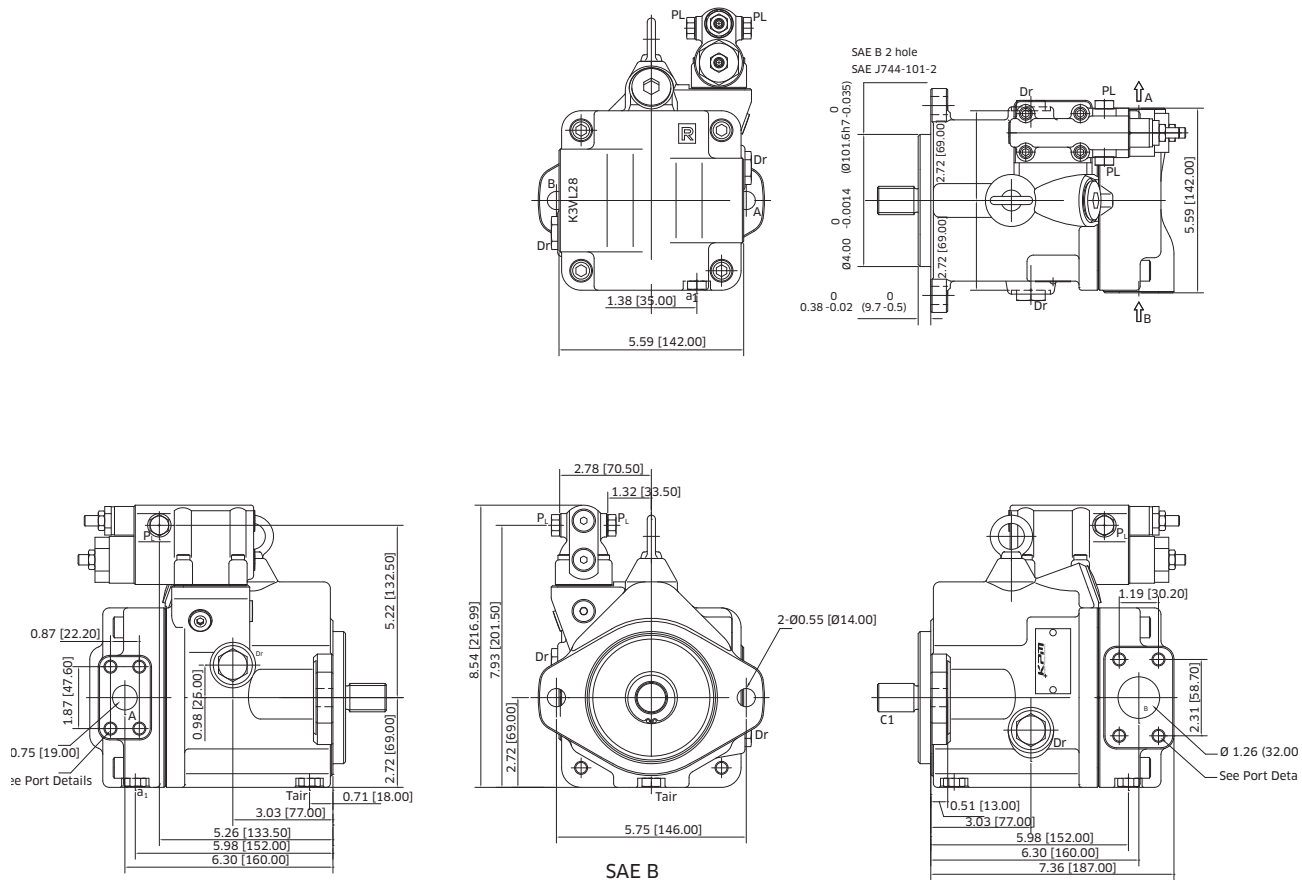
Adaptor Kits Weight & Width			
Frame size	Adaptor Kit	Weight lbs (Kg)	Width in.(mm)
K3VL28	SAE 'A'	0 (0)	0 (0)
	SAE 'B'	4.4 (2)	0.8 (20)
K3VL45 & 60	SAE 'A'	0 (0)	0 (0)
	SAE 'B' & 'BB'	4.4 (2)	0.8 (20)
K3VL80	SAE 'A'	0 (0)	0 (0)
	SAE 'B' & 'BB'	6.6 (3)	0.8 (20)
	SAE 'C', 'CC' & 'C4'	8.8 (4)	1.0 (24.5)
K3VL112 & 140	SAE 'A'	0 (0)	0 (0)
	SAE 'B' & 'BB'	6.6 (3)	1.0 (25)
	SAE 'C', 'CC' & 'C4'	11.0 (5)	1.2 (30)
	SAE 'D'	22.1 (10)	1.7 (43)
K3VL200	SAE 'A'	2.2 (1)	0.2 (6)
	SAE 'B' & 'BB'	17.6 (8)	1.0 (25)
	SAE 'C', 'CC' & 'C4'	17.6 (8)	1.2 (30)
	SAE 'D'	22.1 (10)	1.5 (38)
	SAE 'E'	33.1 (15)	1.5 (38)

3 Dimensions

3-1 K3VL28 Installation

◆ K3VL28 with Cut-Off / Load Sense Control (Clockwise Rotation)

Inlet and outlet ports reversed for counter clockwise rotation.



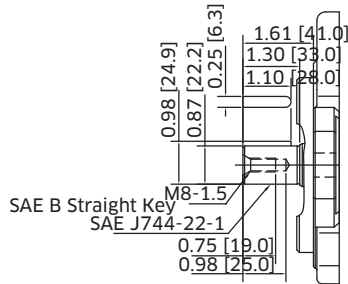
Port Details

Des.	Port Name	Port Size and Description	Tightening Torque lb-ft (Nm)
A	Delivery Port	¾ SAE J518C Code 61 (5,000 psi)	42 (57)
		Unified Thread Type 'S' ¾-16-2B(0.66")	
B	Inlet Port	1¼ SAE J518 Code 61 (3,000 psi)	42 (57)
		Unified Thread Type 'S' 7/16-16-2B(0.66")	
Dr	Drain Port	½ O-Ring Boss -8 SAE J1926/1 (¾"-16 UNF-2B)	72 (98)
P	P0/L0 Control Port	¼ O-Ring Boss -4 SAE J1926/1 (7/16"-20 UNF-2B)	9 (12)
T	Air Bleed Port	¼ O-Ring Boss -4 SAE J1926/1 (7/16"-20 UNF-2B)	9 (12)
a	Gauge Port	¼ O-Ring Boss -4 SAE J1926/1 (7/16"-20 UNF-2B)	9 (12)

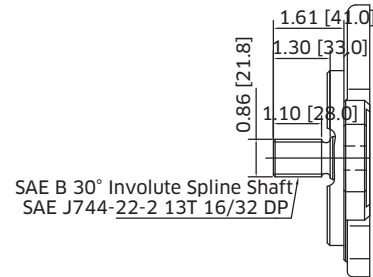
3-1 K3VL28 Installation (cont)

◆ K3VL28 Shaft & Through Drive Options

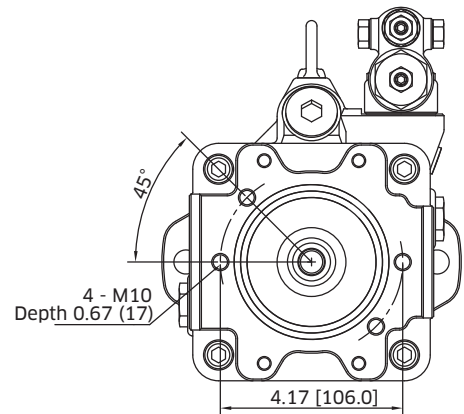
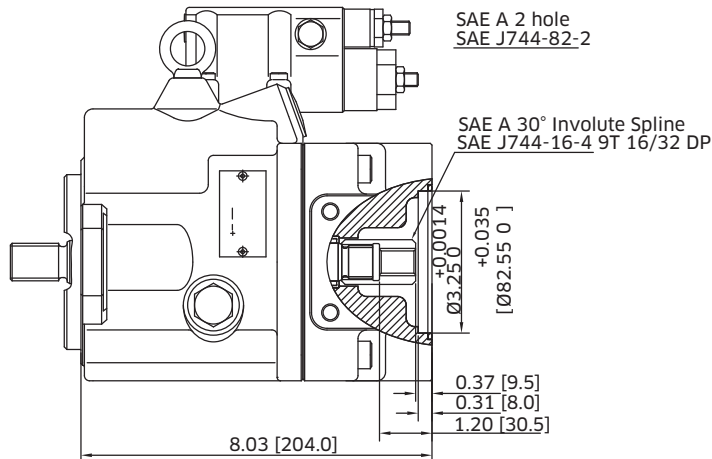
Model Code Option 'K' Shaft



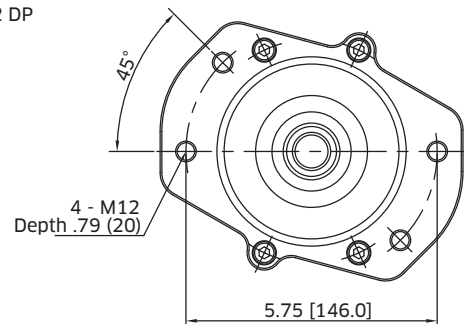
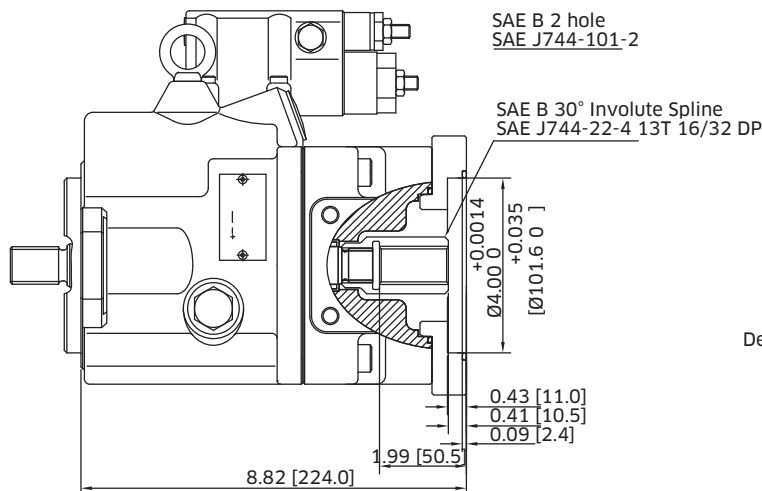
Model Code Option 'S' Shaft



Through Drive SAE 'A'

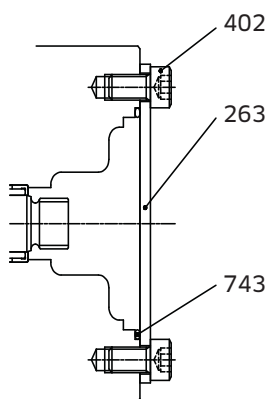


Through Drive SAE 'B'

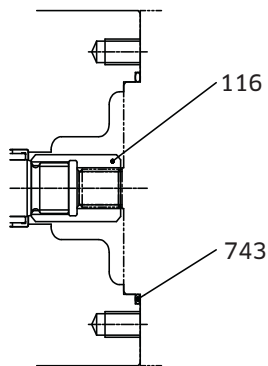


3-1 K3VL28 Installation (cont)

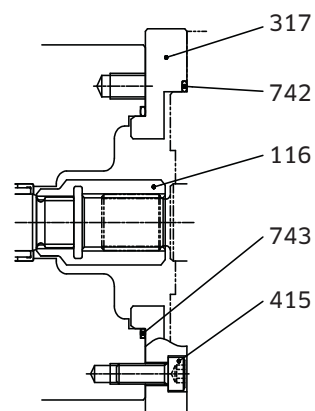
◆ K3VL28 Adaptor Kits



Cover Kit



SAE 'A' T/D Kit

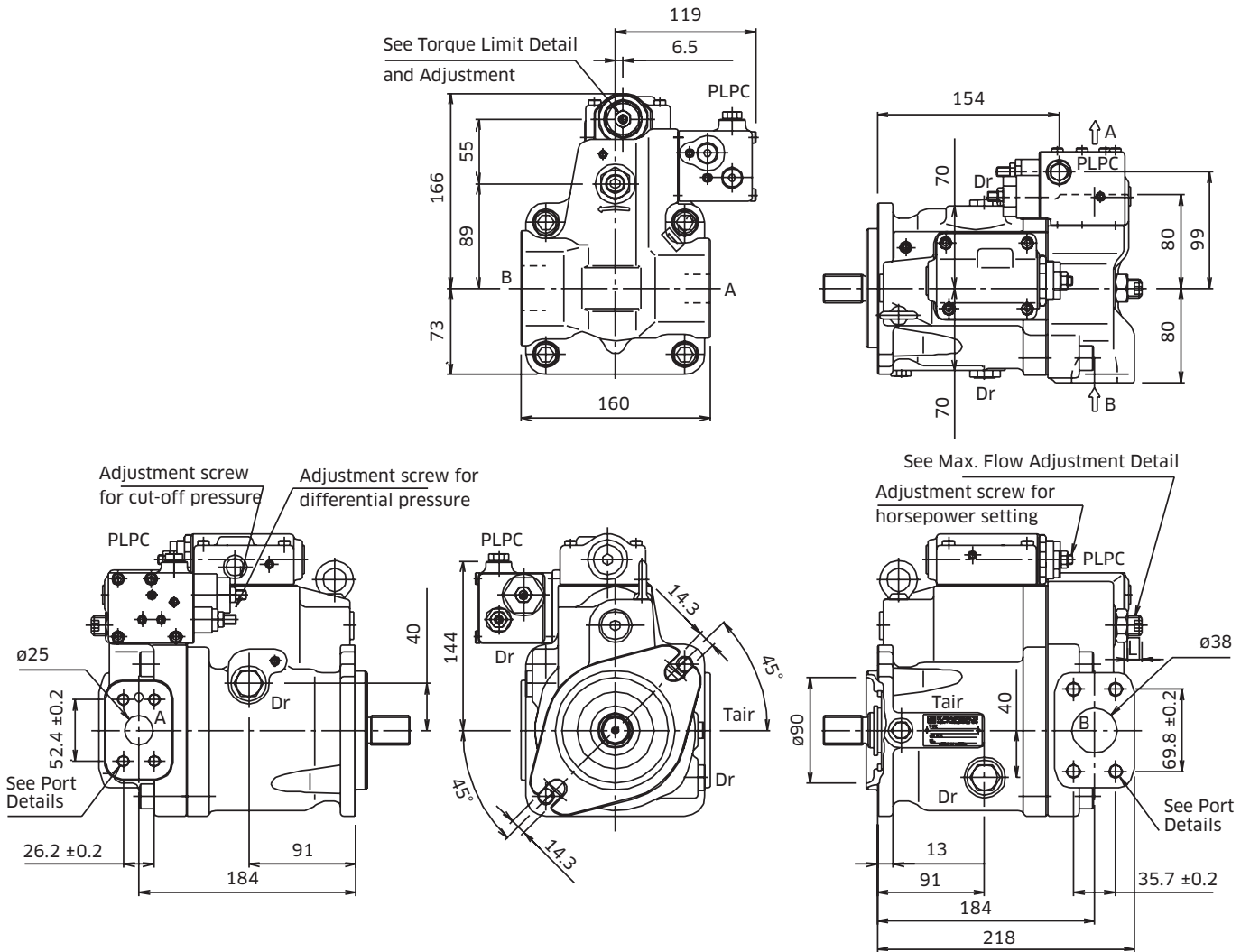


SAE "B" T/D KIT

NO.	Part Name	Qty	Cover Kit	SAE 'A' T/D Kit	SAE 'B' T/D Kit
-	T/D Kit	-	P-29L8TN	P-29L3TA	P-29L3TB
743	O-Ring	1	P-00RBG85	P-00RBG85	P-00RBG85
742	O-Ring	1	-	-	P-00RBG105
415	Screw Hex SHC	4	-	-	P-0SBM825
402	Screw Hex SHC	2	P-0SBM1020	-	-
317	Subplate	1	-	-	P-29247500358
314	Cover	1	P-29247500326	-	-
116	Coupling	1	-	P-29031501307	P-29031501325

3-2 K3VL45/60 Installation

◆ K3VL45/60 with Cut-Off / Load Sense Control & Torque Limit Module (Clockwise Rotation)

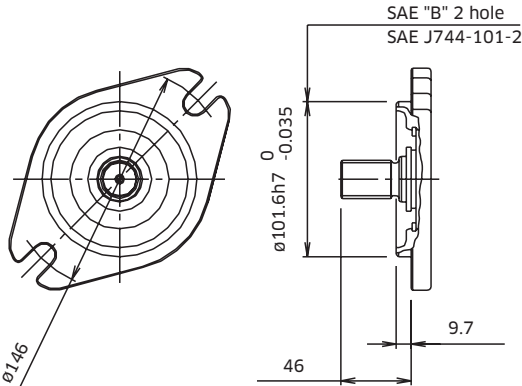


Note: for counter clockwise rotation, the inlet port 'B' and the delivery port 'A' are reversed.

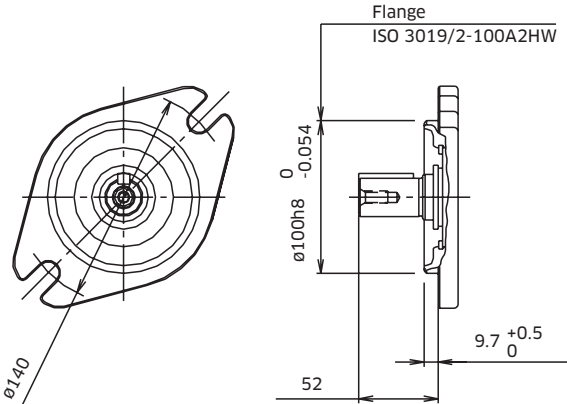
3-2 K3VL45/60 Installation (cont)

◆ K3VL45/60 Mounting Flange and Shaft Options

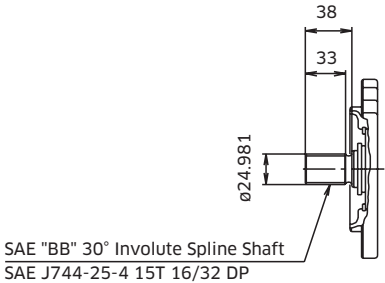
SAE Type



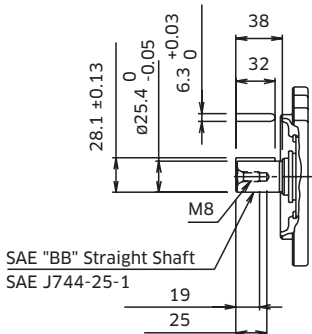
ISO Type



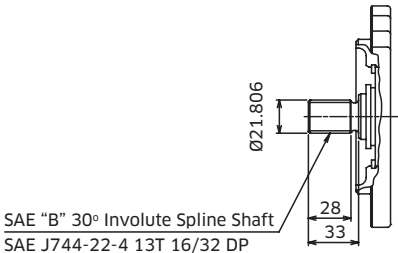
SAE 'BB' Spline Shaft



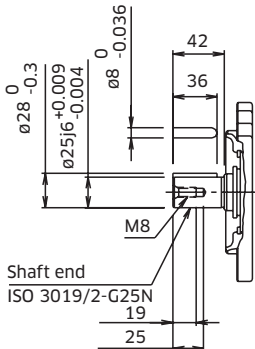
SAE 'BB' Parallel Keyed Shaft



SAE 'B' Spline Shaft

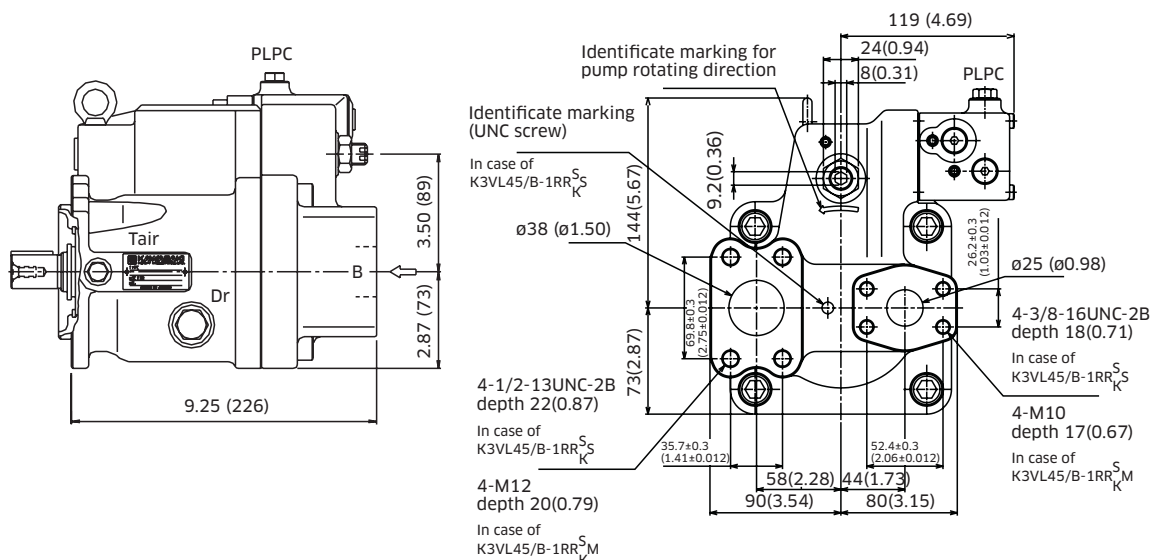


ISO Parallel Keyed Shaft



3-2 K3VL45/60 Installation (cont)

◆ K3VL45/60 Rear Port



◆ K3VL45/60 Porting Details

Main SAE Flanged Ports

Des.	Port Name	Port Size	Tightening Torque lb-ft (Nm)	Flange Threads
------	-----------	-----------	------------------------------	----------------

UNF Threaded Version ('S' in position 9 of model code)

A	Delivery Port	SAE J518C Std pressure (code 61) 1"	42 (57)	¾-16UNC-2B x 18 mm
B	Suction Port	SAE J518C Std pressure (code 61) 1-½"	72 (98)	½-13UNC-2B x 22 mm

Metric Version ('M' in position 9 of model code)

A	Delivery Port	SAE J518C Std pressure (code 61) 1"	42 (57)	M10 x 17
B	Suction Port	SAE J518C Std pressure (code 61) 1-½"	72 (98)	M12 x 20

Auxiliary Ports

Des.	Port Name	Port Size	Tightening Torque lb-ft (Nm)
------	-----------	-----------	------------------------------

SAE Version ('S', 'K', or 'T' in position 8 of model)

Dr	Drain Port (x2)	SAE J1926/1 Straight thread O ring boss ½" OD Tube ¾-16UNF-2B	72 (98)
PLPC	Load Sensing Port Pressure Control Port	SAE J1926/1 Straight thread O ring boss ½" OD Tube ¾-16UNF-2B	9 (12)
Tair	Air Bleeder Port	SAE J1926/1 Straight thread O ring boss ¼" OD Tube ⅞-20UNF-2B	9 (12)

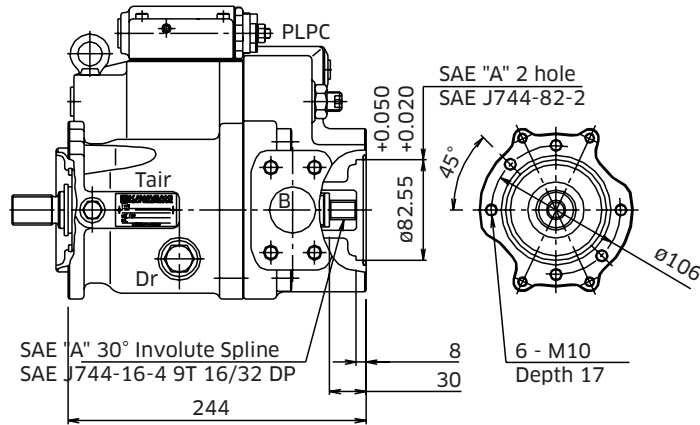
ISO Version ('M' in position 8 of model code)

Dr	Drain Port (x2)	M22 x 1.5 DIN 3852	72 (98)
PLPC	Load Sensing Port Pressure Control Port	M14 x 1.5 DIN 3852	18 (25)
Tair	Air Bleeder Port	M14 x 1.5 DIN 3852	18 (25)

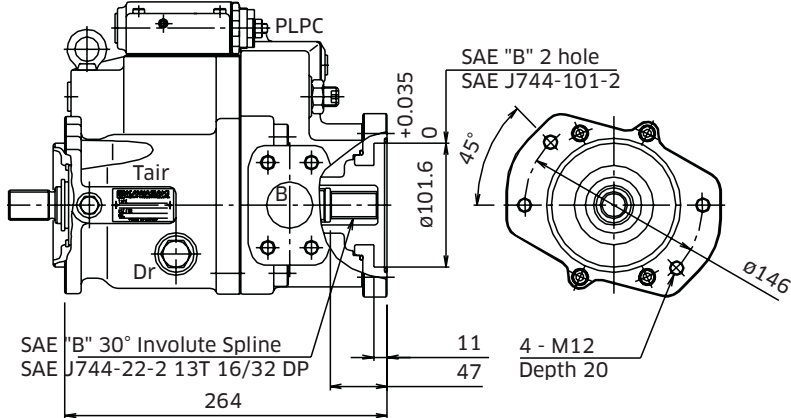
3-2 K3VL45/60 Installation (cont)

◆ K3VL45/60 Through Drive Options

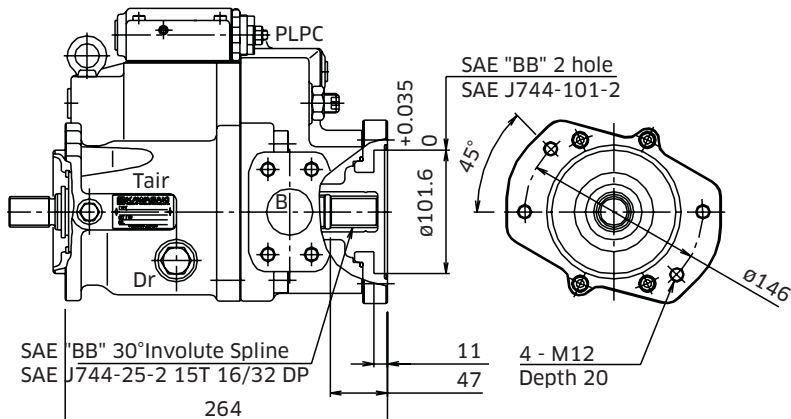
Through Drive 'A'



Through Drive 'B'

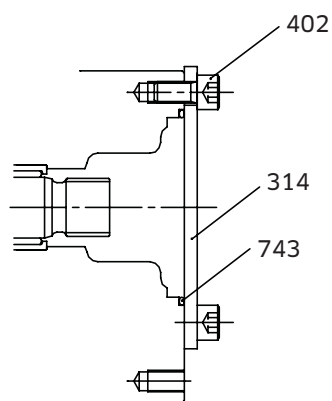


Through Drive 'BB'

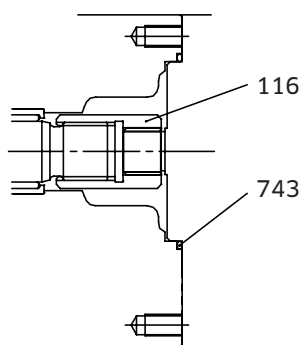


3-2 K3VL45/60 Installation (cont)

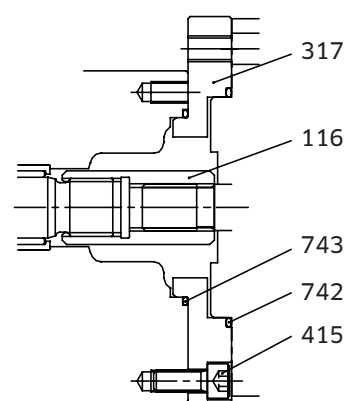
◆ K3VL45/60 Adaptor Kits



COVER KIT



SAE 'A' T/D KIT

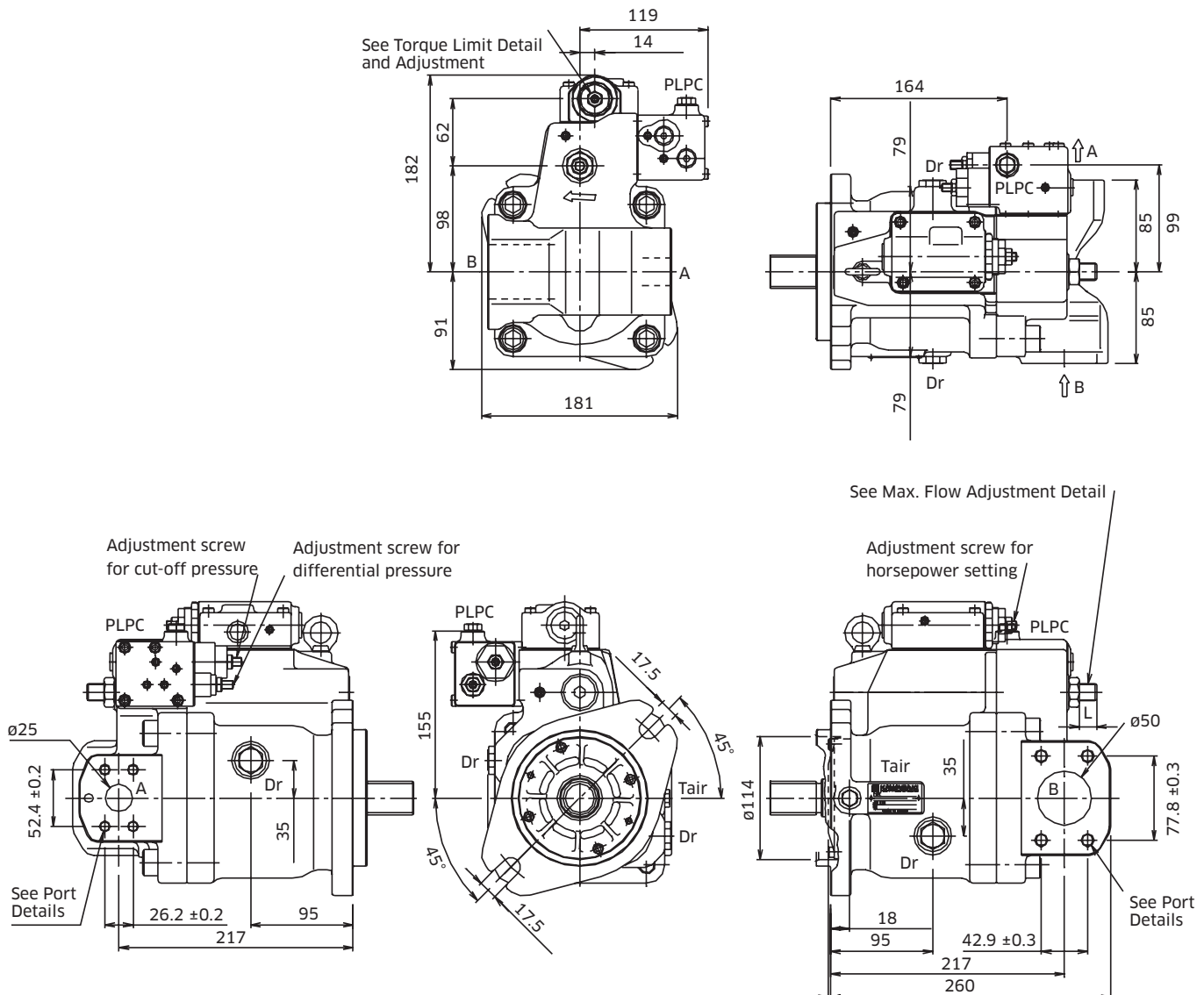


SAE 'B' & 'BB' T/D KIT

NO.	Part Name	Qty	Cover Kit	SAE 'A' T/D Kit	SAE 'B' T/D Kit	SAE 'BB' T/D Kit
-	T/D Kit	-	P-29L8TN	P-29L4TA	P-29L4TB	P-29L4T2
743	O-Ring	1	P-00RBG85	P-00RBG85	P-00RBG85	P-00RBG85
742	O-Ring	1	-	-	P-00RBG105	P-00RBG105
415	Screw Hex SHC	4	-	-	P-0SBM825	P-0SBM825
402	Screw Hex SHC	2	P-0SBM1020	-	-	-
317	Subplate	1	-	-	P-29247500358	P-29247500358
314	Cover	1	P-29231500316	-	-	-
116	Coupling	1	-	P-29031500264	P-29031500265	P-29031500266

3-3 K3VL80 Installation

◆ K3VL80 with Cut-Off / Load Sense Control & Torque Limit Module (Clockwise Rotation)

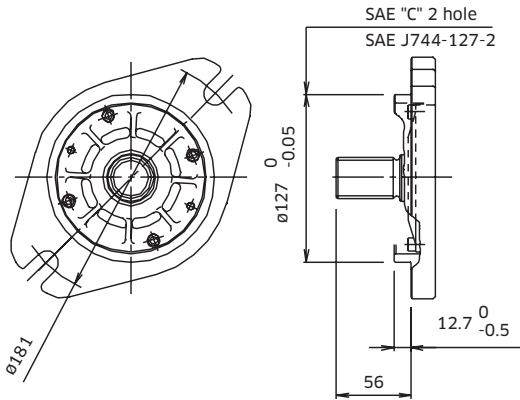


Note: for counter clockwise rotation, the suction port 'B' and the delivery port 'A' are reversed

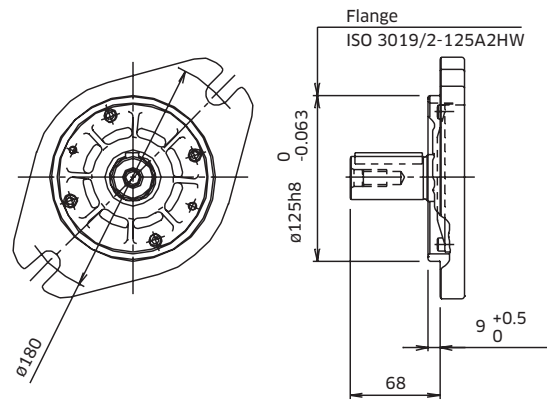
3-3 K3VL80 Installation (cont)

◆ K3VL80 Mounting Flange and Shaft Options

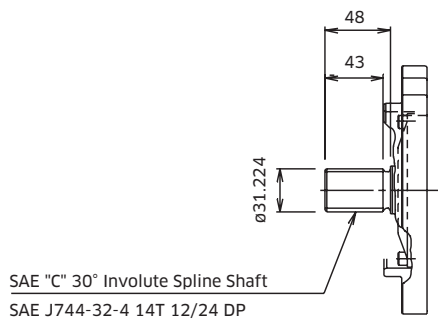
SAE Type



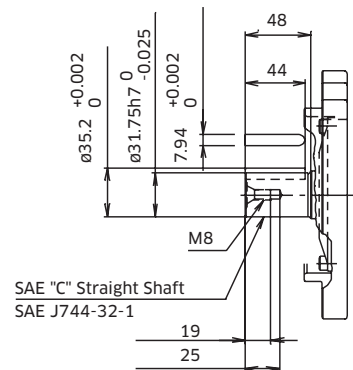
ISO Type



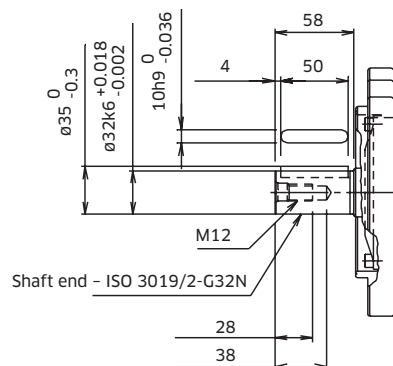
SAE 'C' Spline Shaft



SAE 'C' Parallel Keyed Shaft

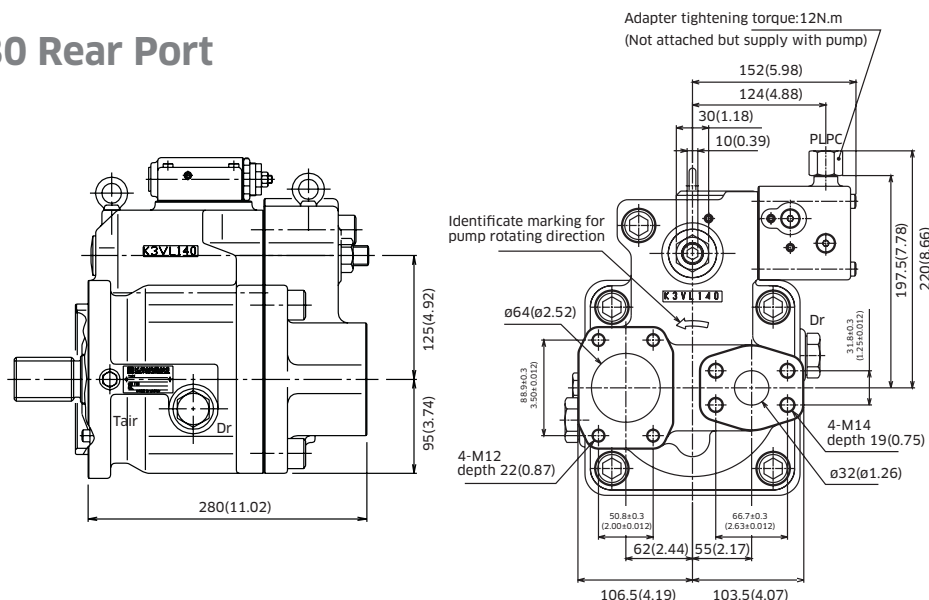


ISO Parallel Keyed Shaft



3-3 K3VL80 Installation (cont)

◆ K3VL80 Rear Port



◆ K3VL80 Porting Details

Main SAE Flanged Ports

Des.	Port Name	Port Size	Tightening Torque lb-ft (Nm)	Flange Threads
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UNF Threaded Version ('S' in position 9 of model code)

A	Delivery Port	SAE J518C Std pressure (code 61) 1"	42 (57)	3/8"-16UNC-2B x 18 mm
B	Suction Port	SAE J518C Std pressure (code 61) 2"	72 (98)	1/2"-13UNC-2B x 22 mm

Metric Version ('M' in position 9 of model code)

A	Delivery Port	SAE J518C Std pressure (code 61) 1"	42 (57)	M10 x 17
B	Suction Port	SAE J518C Std pressure (code 61) 2"	72 (98)	M12 x 20

Auxiliary Ports

Des.	Port Name	Port Size	Tightening Torque lb-ft (Nm)
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SAE Version ('S', 'K', or 'T' in position 8 of model)

Dr	Drain Port (x2)	SAE J1926/1 Straight thread O ring boss 1/2" OD Tube 3/4"-16UNF-2B	72 (98)
PLPC	Load Sensing Port Pressure Control Port	SAE J1926/1 Straight thread O ring boss 1/2" OD Tube 3/4"-16UNF-2B	9 (12)
Tair	Air Bleeder Port	SAE J1926/1 Straight thread O ring boss 1/4" OD Tube 7/8"-20UNF-2B	9 (12)

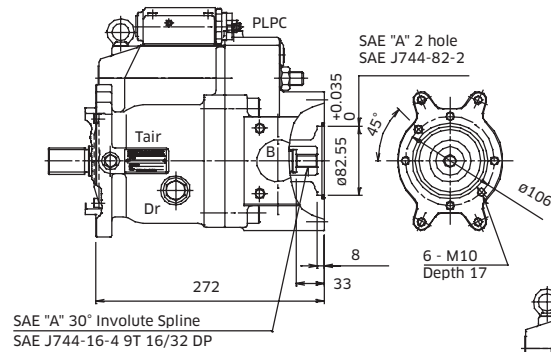
ISO Version ('M' in position 8 of model code)

Dr	Drain Port (x2)	M22 x 1.5 DIN 3852	72 (98)
PLPC	Load Sensing Port Pressure Control Port	M14 x 1.5 DIN 3852	18 (25)
Tair	Air Bleeder Port	M14 x 1.5 DIN 3852	18 (25)

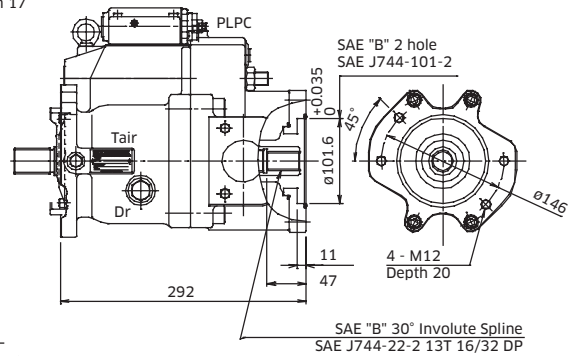
3-3 K3VL80 Installation (cont)

◆ K3VL80 Through Drive Options

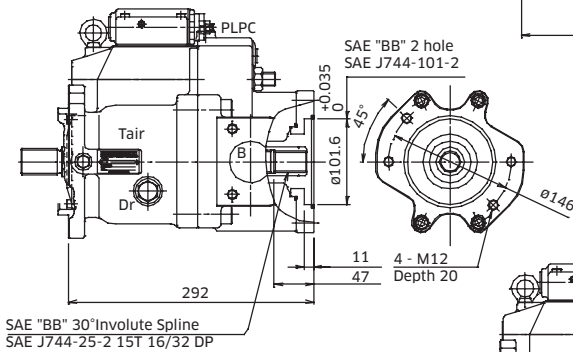
Through Drive 'A'



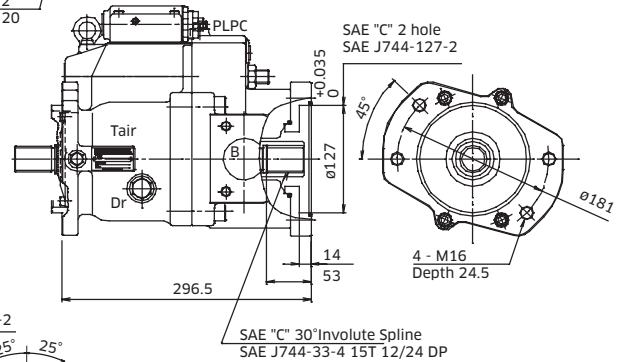
Through Drive 'B'



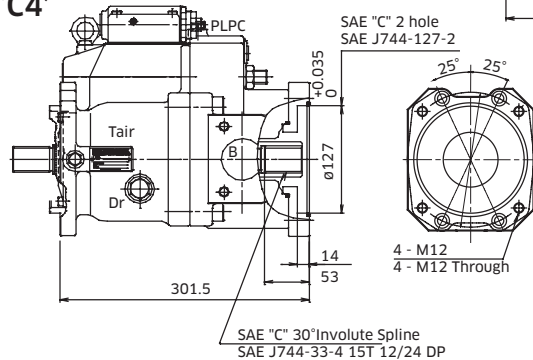
Through Drive 'BB'



Through Drive 'C'

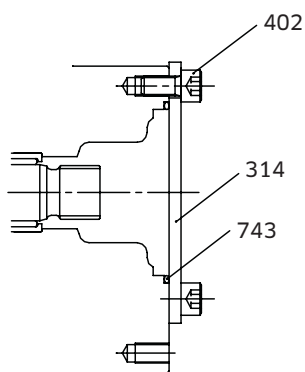


Through Drive 'C4'

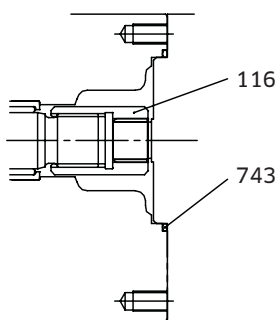


3-3 K3VL80 Installation (cont)

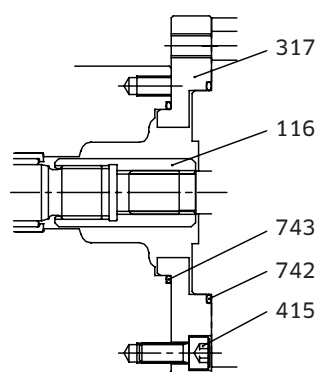
◆ K3VL80 Adaptor Kits



Cover Kit



SAE 'A' T/D Kit



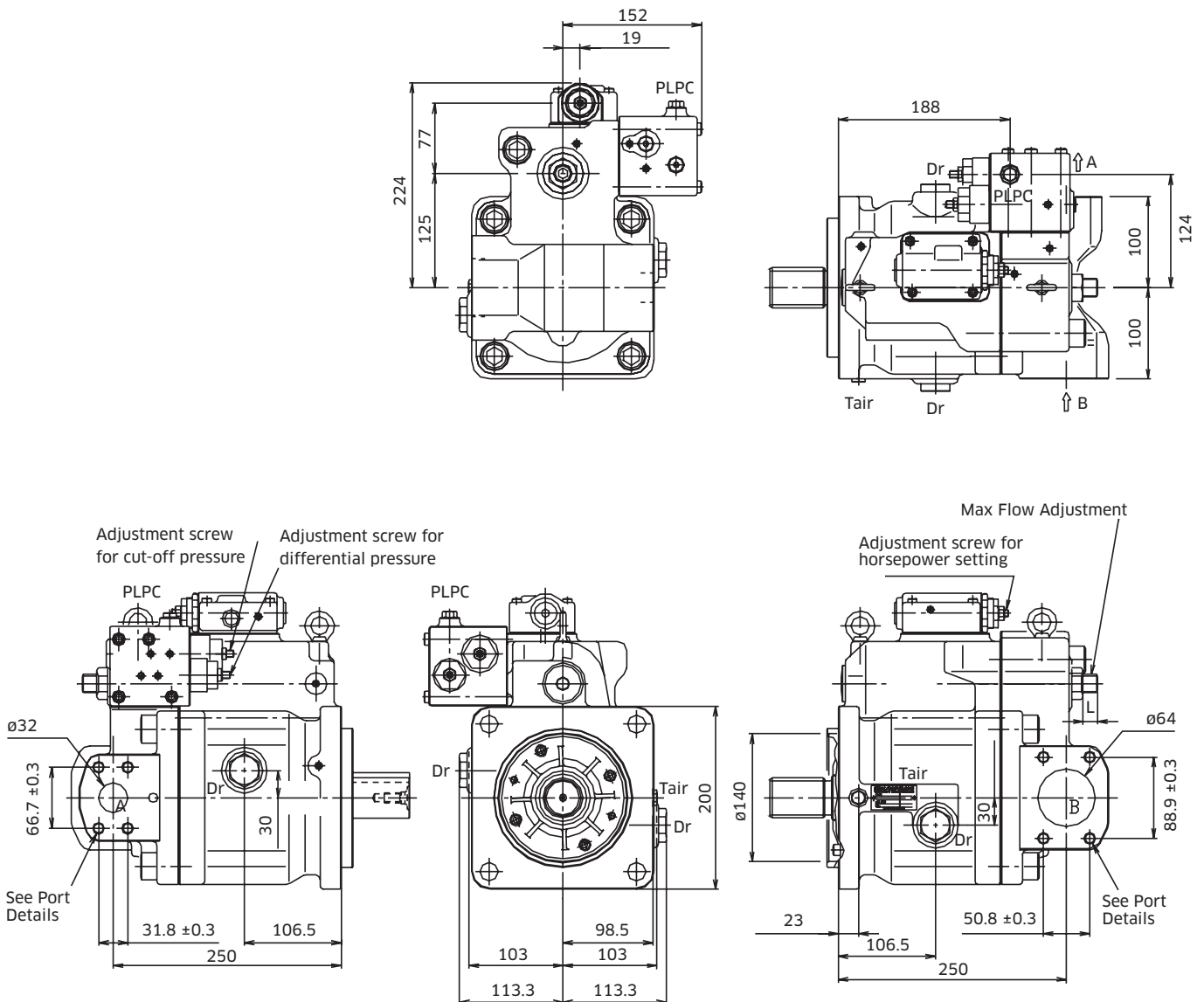
SAE 'B', 'BB', 'C' & 'C4' T/D Kit

NO.	Part Name	Qty	Cover Kit	SAE 'A' T/D Kit	SAE 'B' T/D Kit
-	T/D Kit	-	P-29L8TN	P-29L8TA	P-29L8TB
743	O-Ring	1	P-00RBG85	P-00RBG85	P-00RBG85
742	O-Ring	1	-	-	P-00RBG105
415	Screw Hex SHC	4	-	-	P-OSBM1025
402	Screw Hex SHC	2	P-OSBM1020	-	-
317	Subplate	1	-	-	P-29247500354
314	Cover	1	P-29231500316	-	-
116	Coupling	1	-	P-29031500241	P-29031500262

NO.	Part Name	Qty	SAE 'BB' T/D Kit	SAE 'C' T/D Kit	SAE 'C4' T/D Kit
-	T/D Kit	-	P-29L8T2	P-29L8TC	P-29L8TC4
743	O-Ring	1	P-00RBG85	P-00RBG85	P-00RBG85
742	O-Ring	1	P-00RBG105	P-00RBG130	P-00RBG130
415	Screw Hex SHC	4	P-OSBM1025	P-OSBM1030	P-OSBM1030
402	Screw Hex SHC	2	-	-	-
317	Subplate	1	P-29247500354	P-29247500355	P-29247500439
314	Cover	1	-	-	-
116	Coupling	1	P-29031500267	P-29031500263	P-29031500263

3-4 K3VL112/140 Installation

◆ K3VL112/140 with Cut-Off / Load Sense Control & Torque Limit Module (Clockwise Rotation)

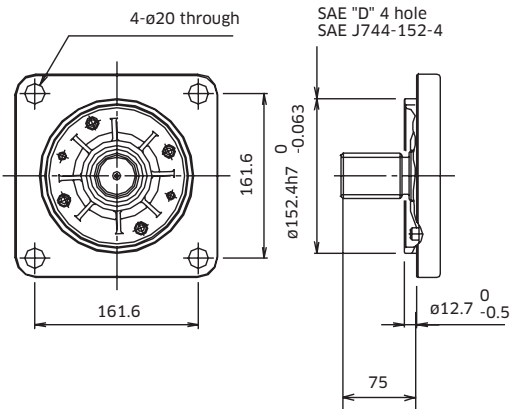


Note: for counter clockwise rotation, the suction port 'B' and the delivery port 'A' are reversed.

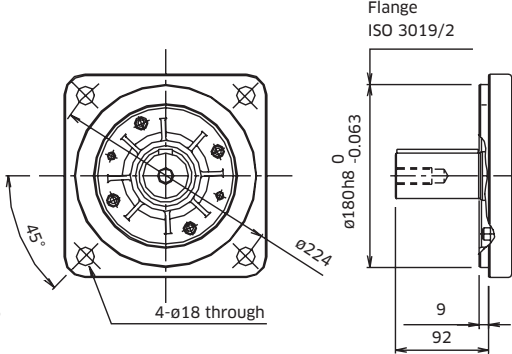
3-4 K3VL112/140 Installation (cont)

◆ K3VL112/140 (SAE D 4 BOLT) Mounting Flange & Shaft Options

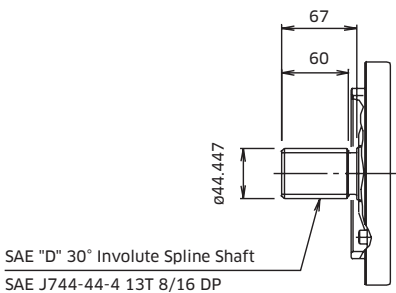
SAE 'D' Type



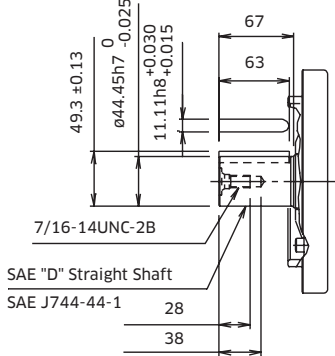
ISO Type



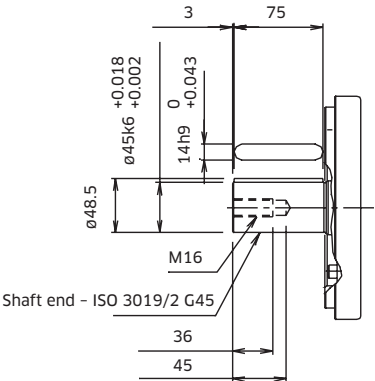
SAE 'D' Spline Shaft



SAE 'D' Parallel Keyed Shaft

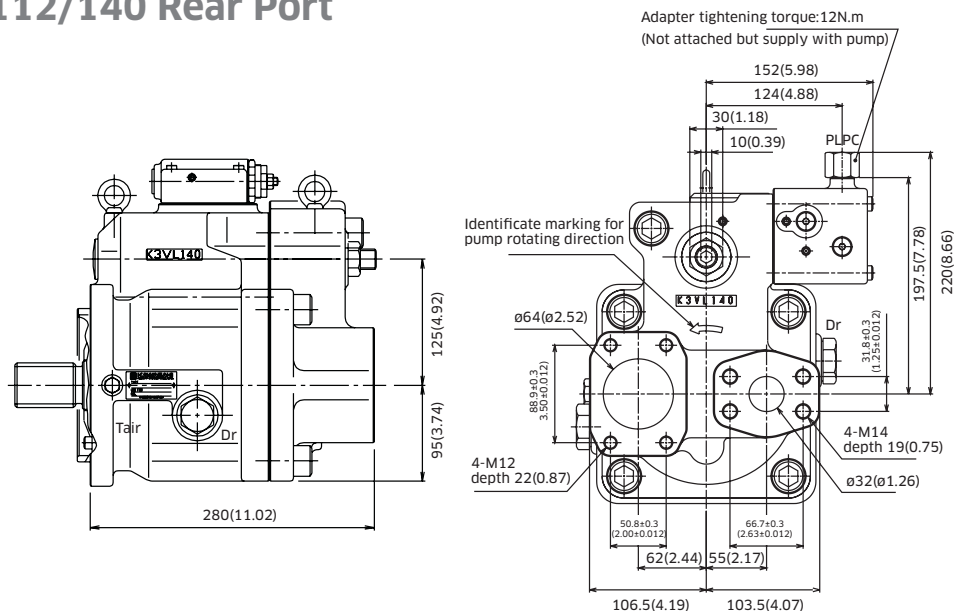


ISO Parallel Keyed Shaft



3-4 K3VL112/140 Installation (cont)

◆ K3VL112/140 Rear Port



◆ K3VL112/140 Porting Details

Main SAE Flanged Ports

Des.	Port Name	Port Size	Tightening Torque lb-ft (Nm)	Flange Threads
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UNF Threaded Version ('S' in position 9 of model code)

A	Delivery Port	SAE J518C high pressure (code 62) 1¼"	116 (157)	½-13UNC-2B x 22 mm
B	Suction Port	SAE J518C Std pressure (code 61) 2½"	72 (98)	½-13UNC-2B x 22 mm

Metric Version ('M' in position 9 of model code)

A	Delivery Port	SAE J518C high pressure (code 62) 1¼"	116 (157)	M14 x 19
B	Suction Port	SAE J518C Std pressure (code 61) 2½"	72 (98)	M12 x 17

Auxiliary Ports

Des.	Port Name	Port Size	Tightening Torque lb-ft (Nm)
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SAE Version ('S', 'K', 'C', 'R', 'U', 'X' or 'T' in position 8 of model)

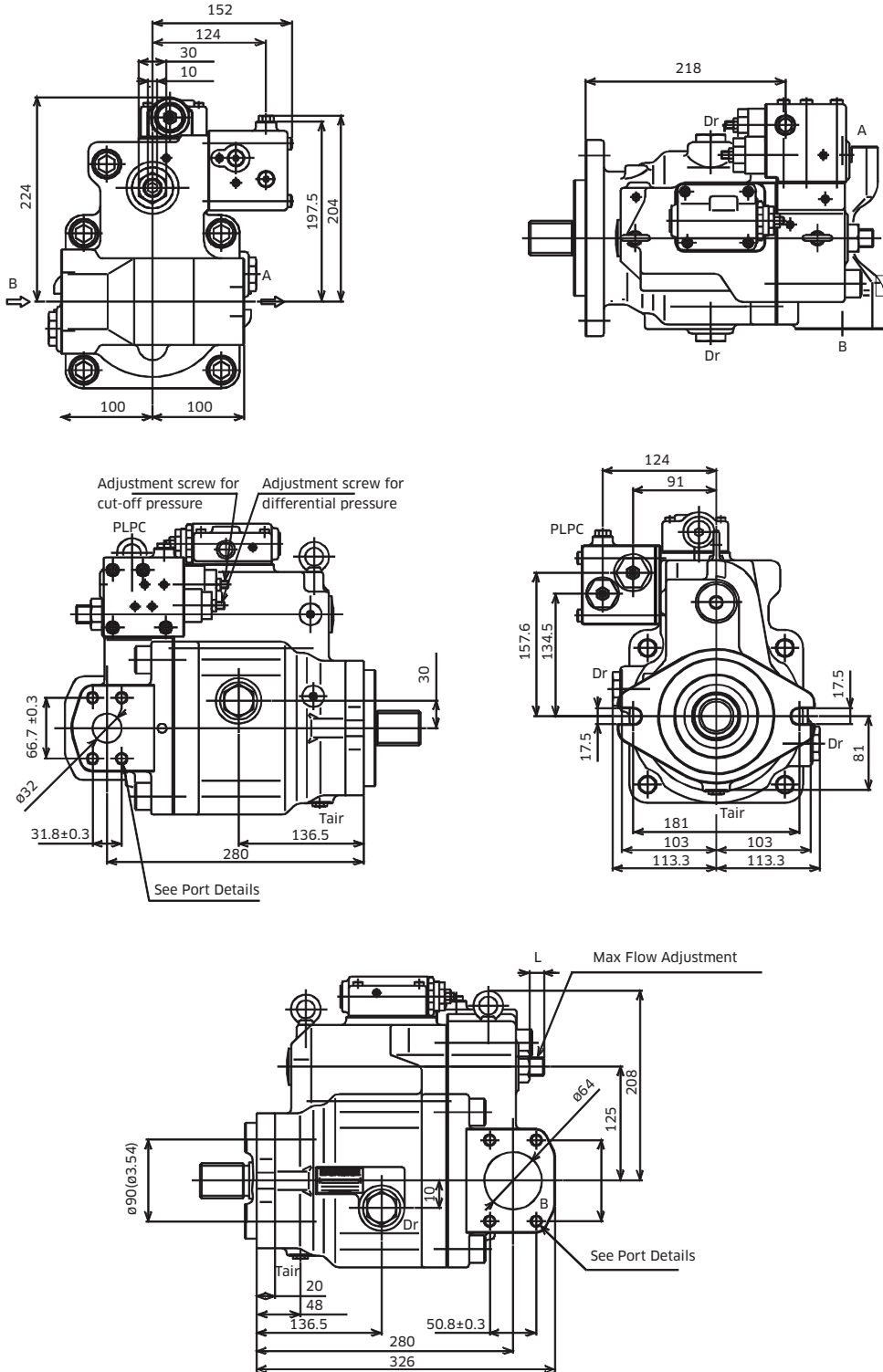
Dr	Drain Port (x2)	SAE J1926/1 Straight thread O ring boss ¼" OD Tube 1⅙ -12UN-2B	123 (167)
PLPC	Load Sensing Port Pressure Control Port	SAE J1926/1 Straight thread O ring boss ¼" OD Tube ⅞ -20UNF-2B	9 (12)
Tair	Air Bleeder Port	SAE J1926/1 Straight thread O ring boss ¼" OD Tube ⅞ -20UNF-2B	9 (12)

ISO Version ('M' in position 8 of model code)

Dr	Drain Port (x2)	M27 x 2 DIN 3852	123 (167)
PLPC	Load Sensing Port Pressure Control Port	M14 x 1.5 DIN 3852	18 (25)
Tair	Air Bleeder Port	M14 x 1.5 DIN 3852	18 (25)

3-4 K3VL112/140 Installation (cont)

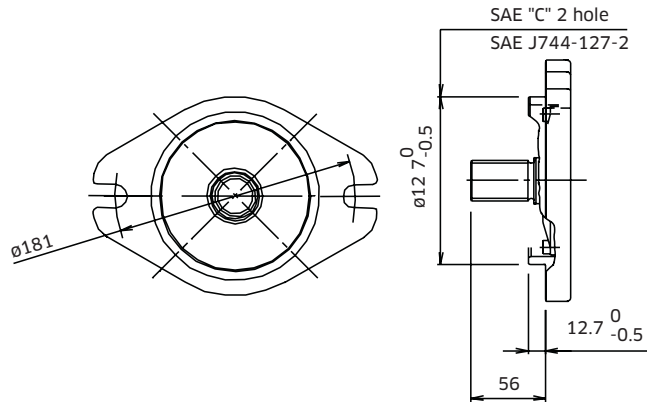
◆ K3VL112/140 (SAE C 2 Bolt) Installation



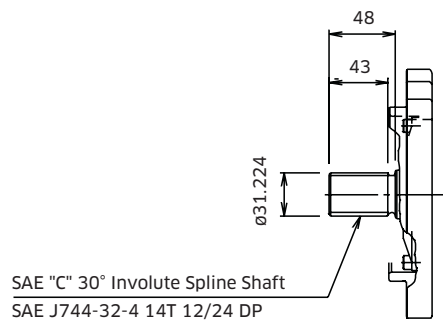
3-4 K3VL112/140 Installation (cont)

◆ K3VL112/140 Mounting Flange (2 Bolt) and Shaft Options

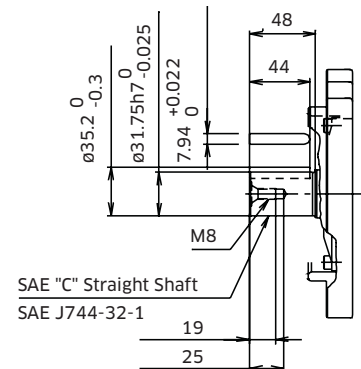
SAE 'C' Type



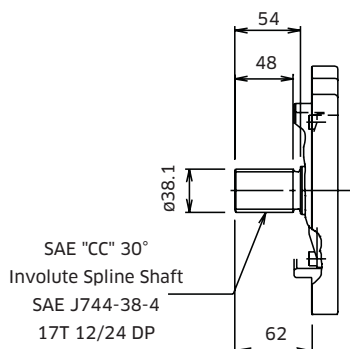
SAE 'C' Spline Shaft



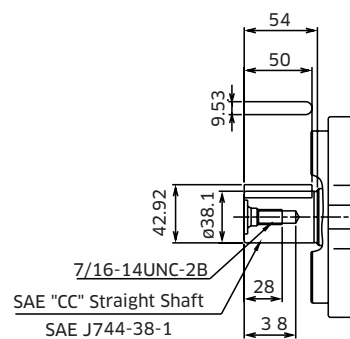
SAE 'C' Parallel Keyed Shaft



SAE 'CC' Spline Shaft



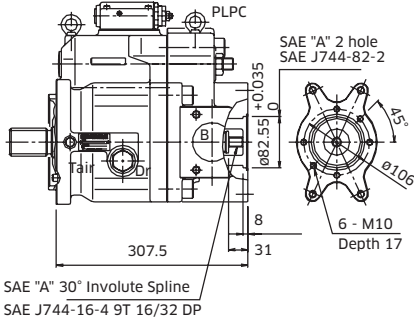
SAE 'CC' Parallel Keyed Shaft



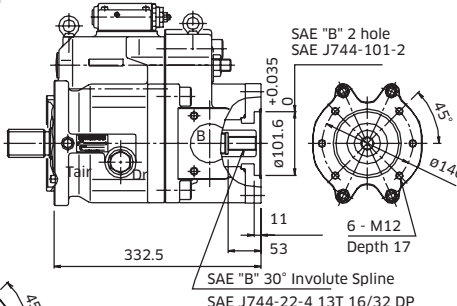
3-4 K3VL112/140 Installation (cont)

◆ K3VL112/140 Through Drive Options

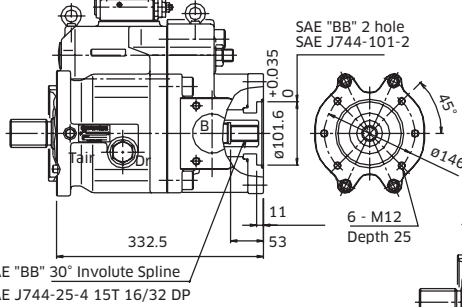
Through Drive 'A'



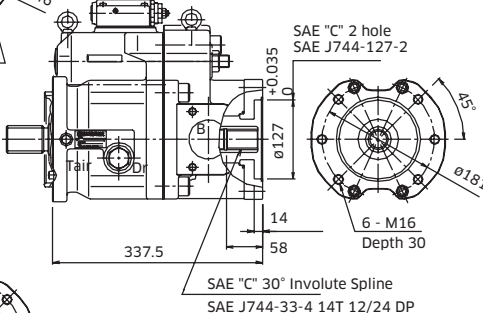
Through Drive 'B'



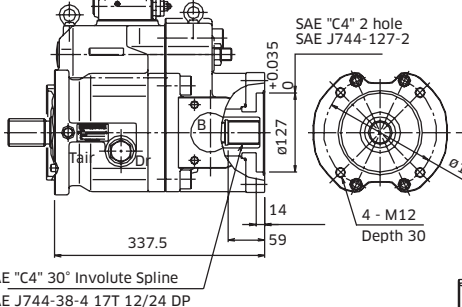
Through Drive 'BB'



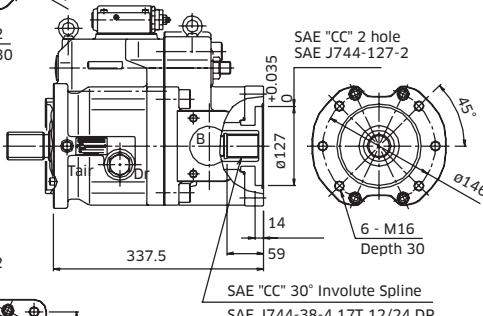
Through Drive 'C'



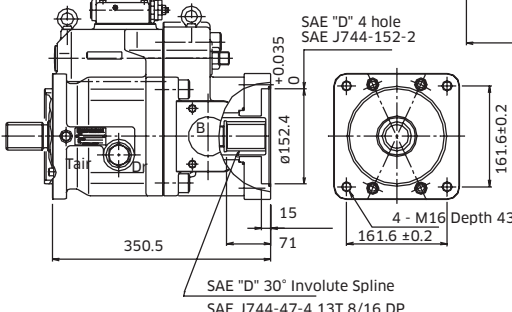
Through Drive 'C4'



Through Drive 'CC'

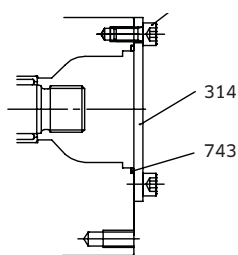


Through Drive 'D'

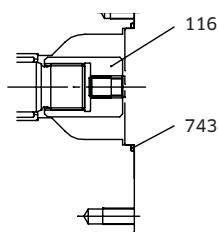


3-4 K3VL112/140 Installation (cont)

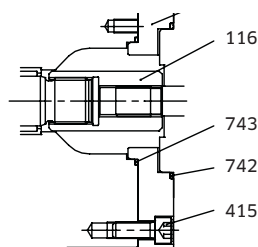
◆ K3VL112/140 Adaptor Kits



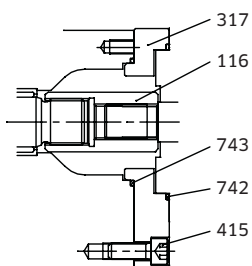
COVER KIT



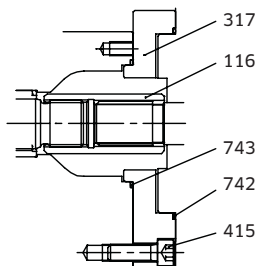
SAE 'A' T/D KIT



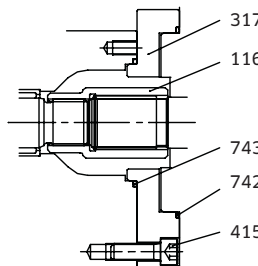
SAE 'B' T/D KIT



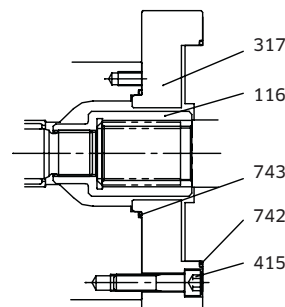
SAE 'BB' T/D KIT



SAE 'C' & 'C4' T/D KIT



SAE 'CC' T/D KIT



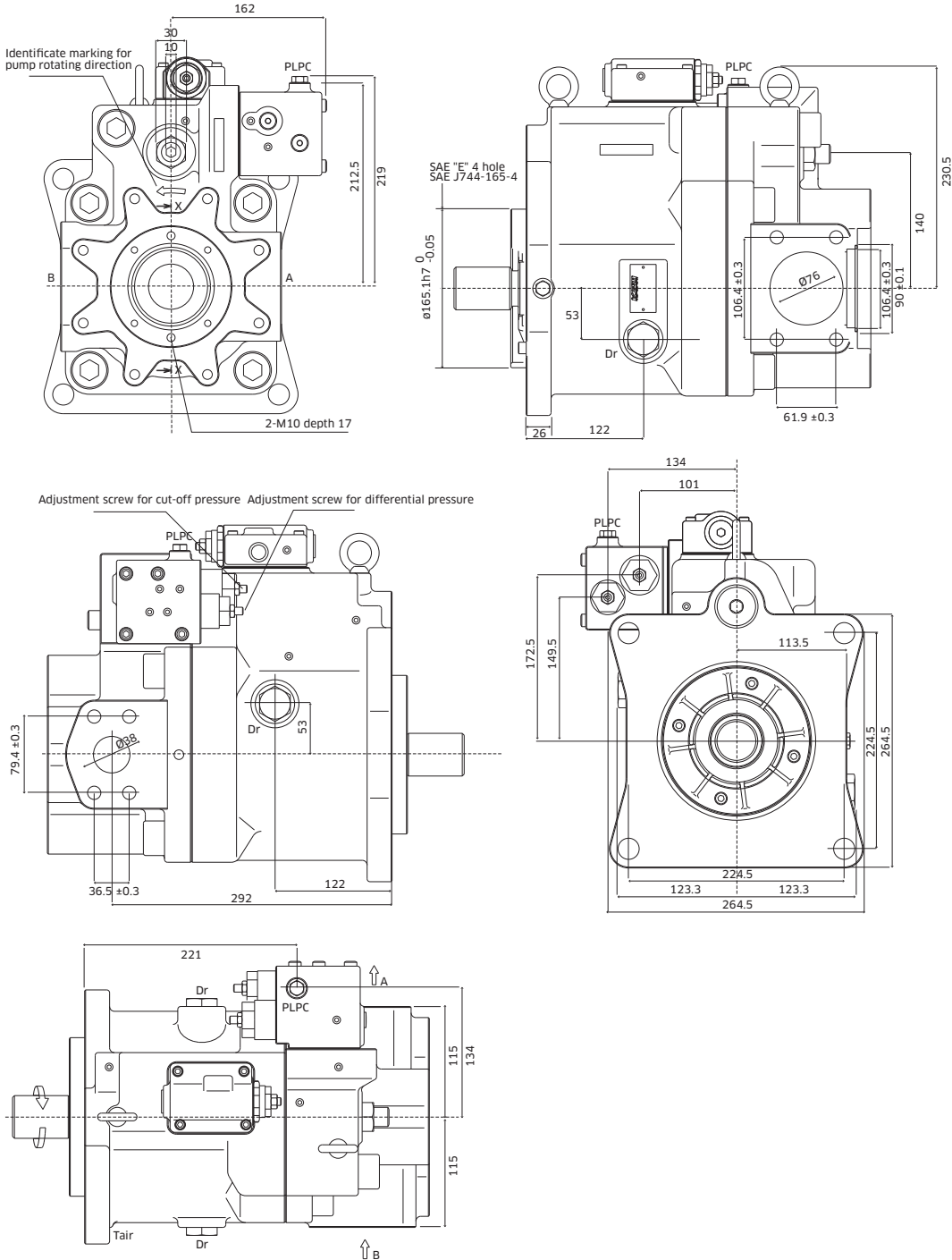
SAE 'D' T/D KIT

NO.	Part Name	Qty	Cover Kit	SAE 'A' T/D Kit	SAE 'B' T/D Kit	SAE 'BB' T/D Kit
-	T/D Kit	-	P-29L8TN	P-29LHTA	P-29LHTB	P-29LHT2
743	O-Ring	1	P-00RBG85	P-00RBG85	P-00RBG85	P-00RBG85
742	O-Ring	1	-	-	P-00RBG105	P-00RBG105
415	Screw Hex SHC	4	-	-	P-0SBM1230	P-0SBM1230
402	Screw Hex SHC	2	P-0SBM1020	-	-	-
317	Subplate	1	-	-	P-29247500360	P-29247500360
314	Cover	1	P-29231500316	-	-	-
116	Coupling	1	-	P-29031500268	P-29031500269	P-29031500270

NO.	Part Name	Qty	SAE 'C' T/D Kit	SAE 'C4' T/D Kit	SAE 'CC' T/D Kit	SAE 'D' T/D Kit
-	T/D Kit	-	P-29LHTC	P-29LHT4	P-29LHT3	P-29LHTD
743	O-Ring	1	P-00RBG85	P-00RBG85	P-00RBG85	P-00RBG85
742	O-Ring	1	P-00RBG130	P-00RBG130	P-00RBG130	P-00RBG150
415	Screw Hex SHC	4	P-0SBM1235	P-0SBM1235	P-0SBM1235	P-0SBM1250
402	Screw Hex SHC	2	-	-	-	-
317	Subplate	1	P-29247500361	P-29247500603	P-29247500361	P-29247500362
314	Cover	1	-	-	-	-
116	Coupling	1	P-29031500271	P-29031500272	P-29031500272	P-29031500273

3-5 K3VL200 Installation

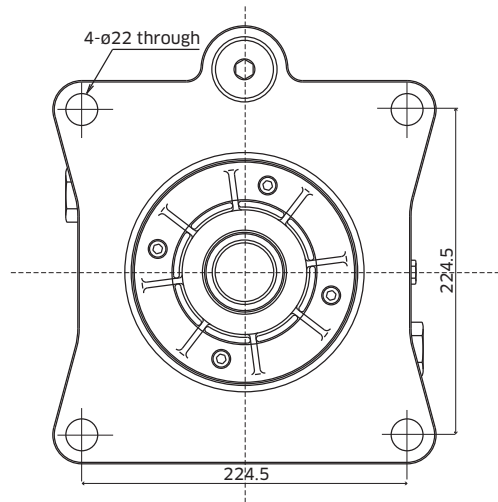
◆ K3VL200 with Cut-Off / Load Sense Control & Torque Limit Module (Clockwise Rotation)



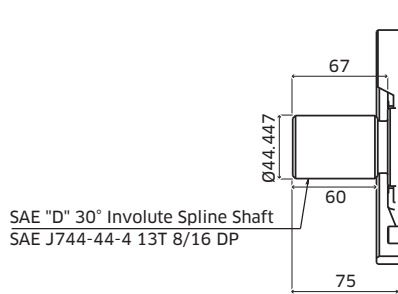
3-5 K3VL200 Installation (cont)

◆ K3VL200 Mounting Flange and Shaft Options

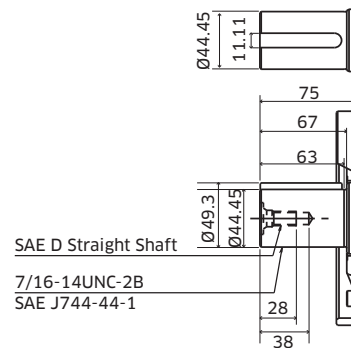
SAE Type



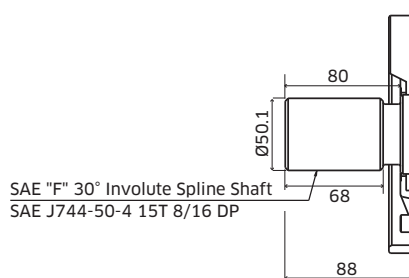
SAE Spline 'D' Shaft



SAE 'D' Parallel Keyed Shaft

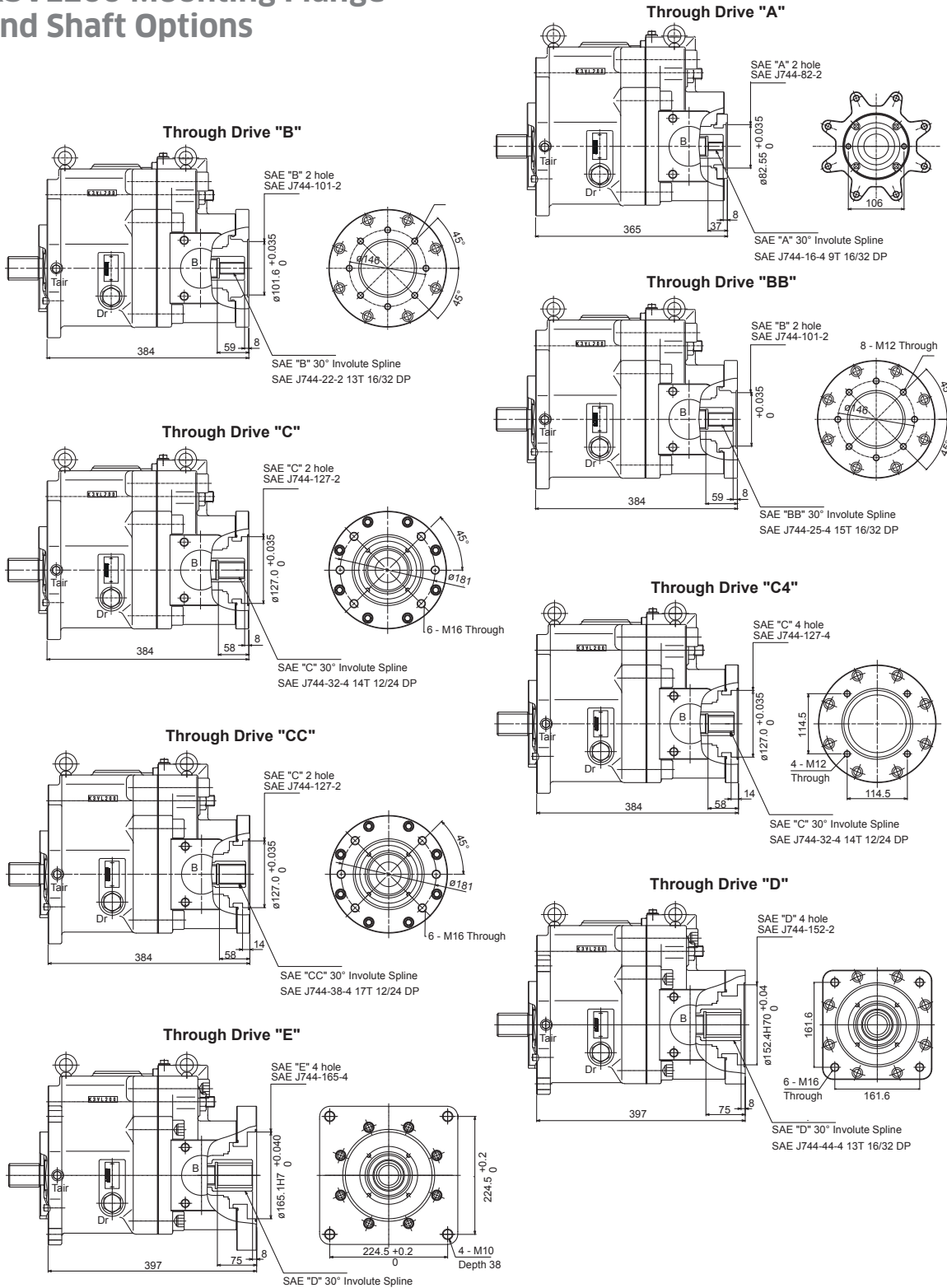


SAE Spline 'F' Shaft



3-5 K3VL200 Installation (cont)

◆ K3VL200 Mounting Flange and Shaft Options



3-5 K3VL200 Installation (cont)

◆ K3VL200

NO.	Part Name	Qty	SAE 'A'	SAE 'B'	SAE 'BB'	SAE 'C'
-	T/D Kit	-	P-29LKTA	P-29LKTB	P-29LKT2	P-29LKTC
116	Coupling K3VL 200	1	P-29031500761	P-29031500762	P-29031500804	P-29031500763
317	Sub Plate K3VK 200	1	P-29247500674	P-29247500675	P-29247500675	P-29247500667
407	SHCS	8	P-(4 off) OSBM825	P-OSBM1230	P-OSBM1230	P-OSBM1230
743	O-Ring	1	P-OSBM85	P-00RBG120	P-00RBG120	P-00RBG125
742	O-Ring	1	P-00RBG85	P-00RBG105	P-00RBG105	P-00RBG130

NO.	Part Name	Qty	SAE 'C4'	SAE 'CC'	SAE 'D'	SAE 'E'
-	T/D Kit	-	P-29LKTC4	P-29LKT3	P-LKTD	P-29LKTE
116	Coupling K3VL 200	1	P-29031500763	P-29031500805	P-29031500764	P-29031500764
317	Sub Plate K3VK 200	1	P-29247500677	P-29247500667	P-29247500677	P-29247500686
407	SHCS	8	P-OSBM1230	P-OSBM1230	P-OSBM1245	P-OSBM1245
743	O-Ring	1	P-00RBG125	P-00RBG125	P-00RBG125	P-00RBG125
742	O-Ring	1	P-00RBG130	P-00RBG130	P-PCPP155	P-PCPP170

Main SAE Flanged Ports

Des.	Port Name	Port Size	Tightening Torque lb-ft (Nm)	Flange Threads
------	-----------	-----------	------------------------------	----------------

UNC Threaded Version ('S', 'K' in position 9 of model code)

A	Delivery Port	SAE J518C high pressure (code 62) 1½"	173 (235)	5/8-11UNC-2B
B	Suction Port	SAE J518C Std pressure (code 61) 3"	173 (235)	5/8-11UNC-2B

Metric Version ('M' in position 9 of model code)

A	Delivery Port	SAE J518C high pressure (code 62) 1½"	173 (235)	M16
B	Suction Port	SAE J518C Std pressure (code 61) 3"	173 (235)	M16

Auxiliary Ports

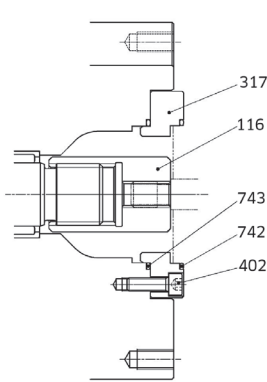
Des.	Port Name	Port Size	Tightening Torque lb-ft (Nm)
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SAE Version ('S', 'K' in position 8 of model)

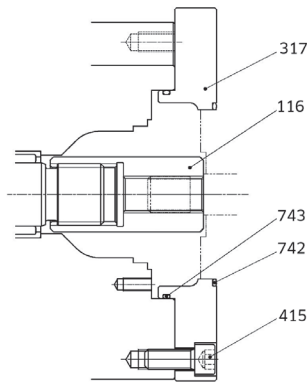
Dr	Drain Port (x2)	SAE J1926 Straight thread O ring boss ¾" O.D Tube 1 ¹ / ₁₆ -12UNF-2B	123 (167)
PLPC	Load Sensing Port Pressure Control Port	SAE J1926 Straight thread O ring boss ¼" O.D Tube 7 ⁸ / ₈ -20UNF-2B	9 (12)
Tair	Air Bleeder Port	SAE J1926 Straight thread O ring boss ¼" O.D Tube 7 ⁸ / ₈ -20UNF-2B	9 (12)

3-5 K3VL200 Installation (cont)

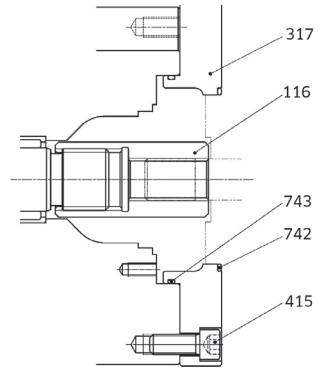
◆ K3VL200 Through drive kits



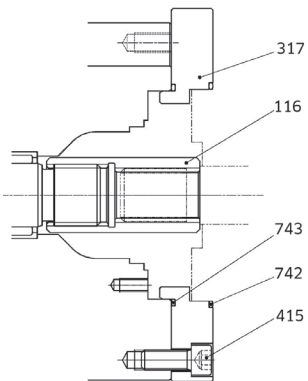
SAE "A" T/D Kit



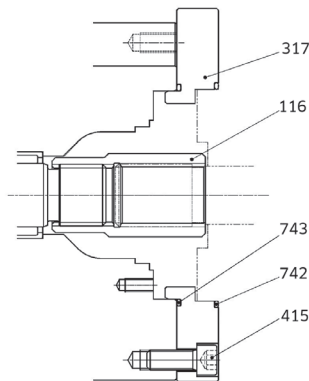
SAE "B" T/D Kit



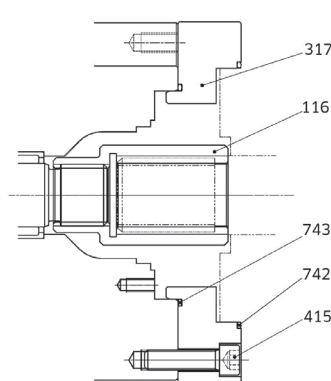
SAE "BB" T/D Kit



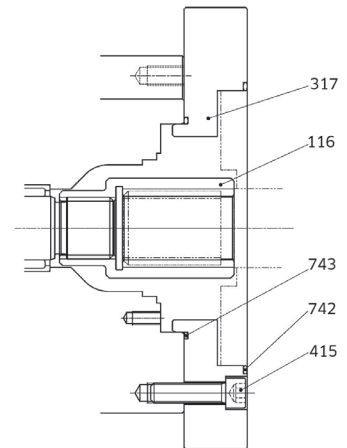
SAE "C" & "C4" T/D Kit



SAE "CC" T/D Kit

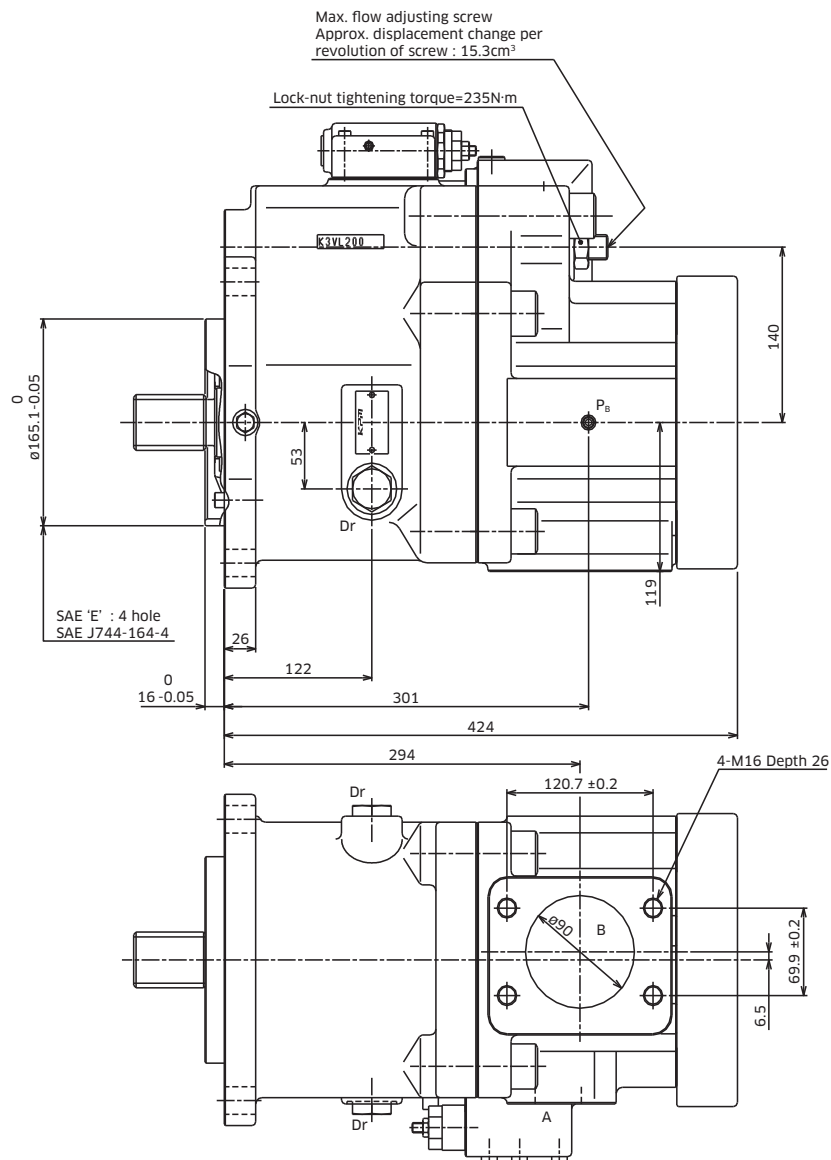


SAE "D" T/D Kit

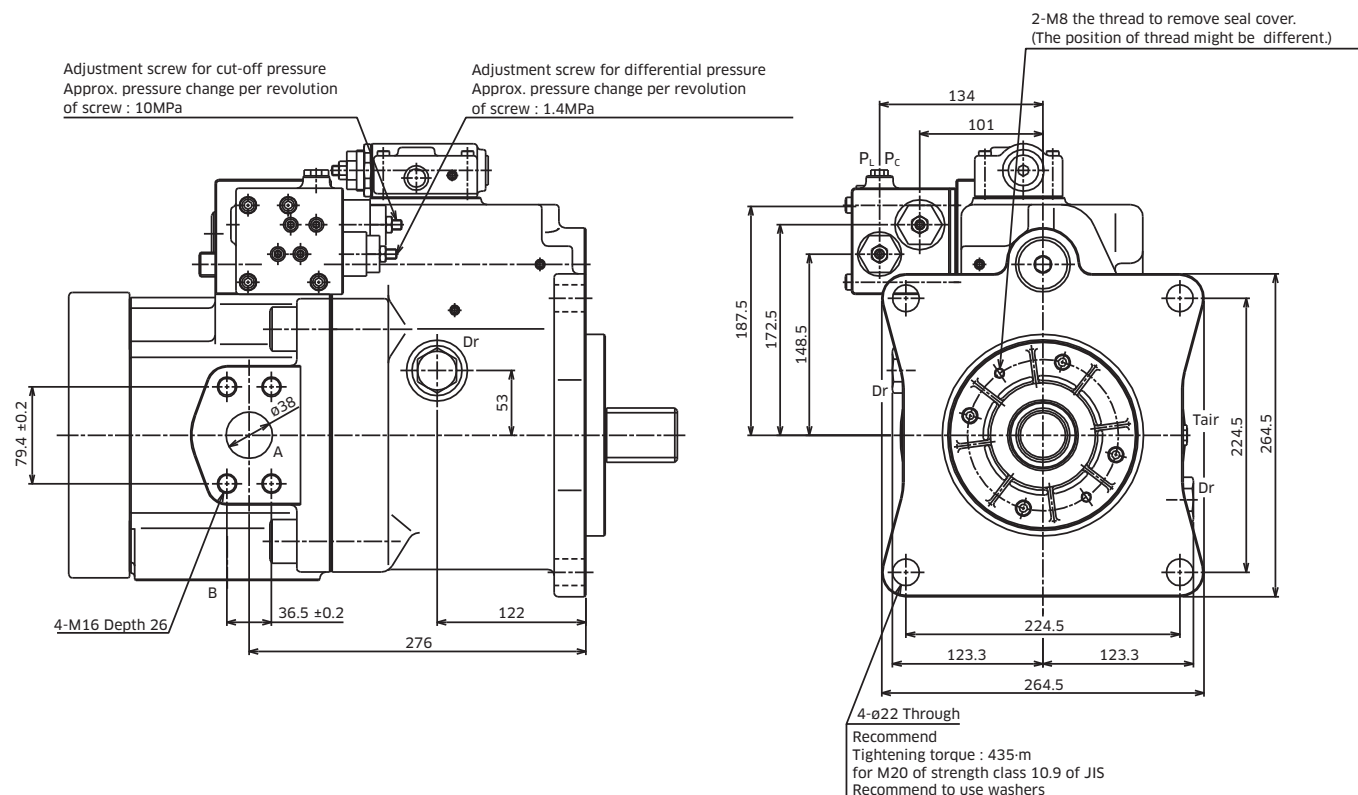


SAE "E" T/D Kit

3-6 K3VL200H Installation

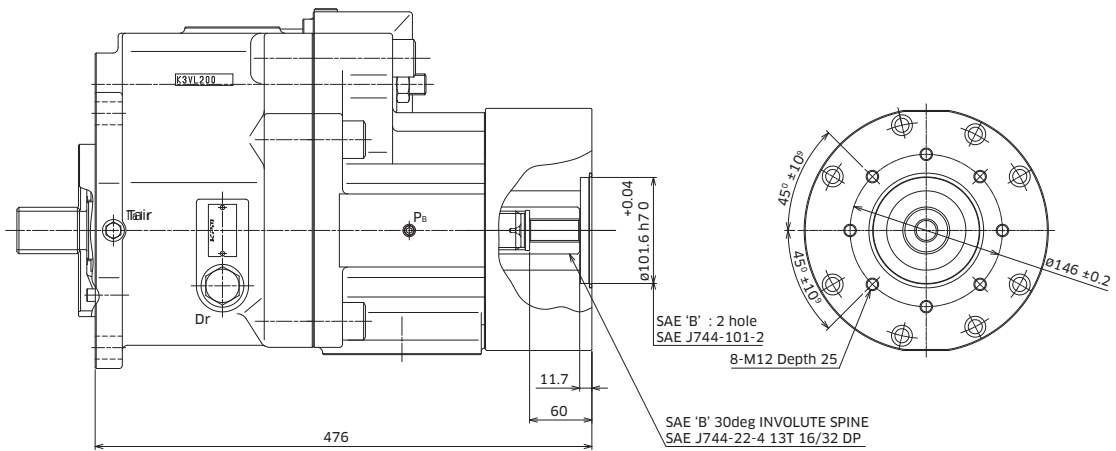


3-6 K3VL200H Installation (cont)

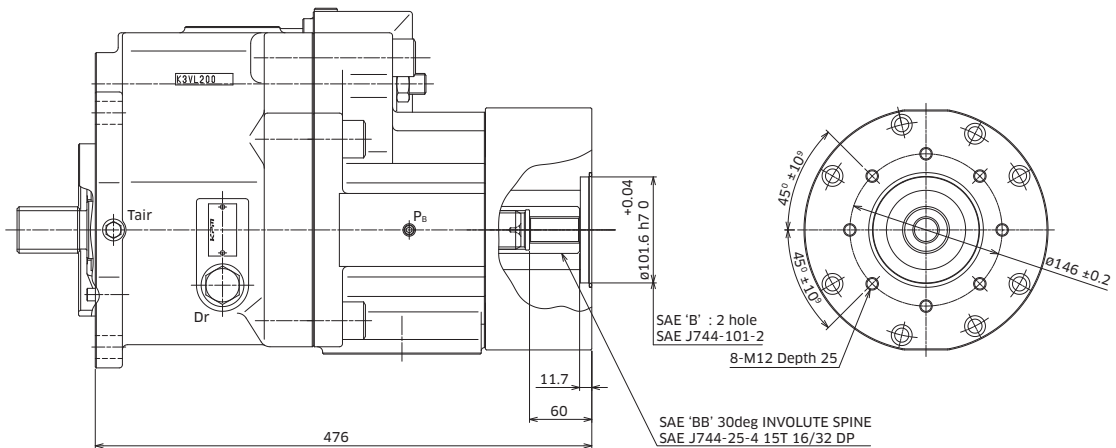


3-6 K3VL200H Installation (cont)

SAE 'B' Through Drive

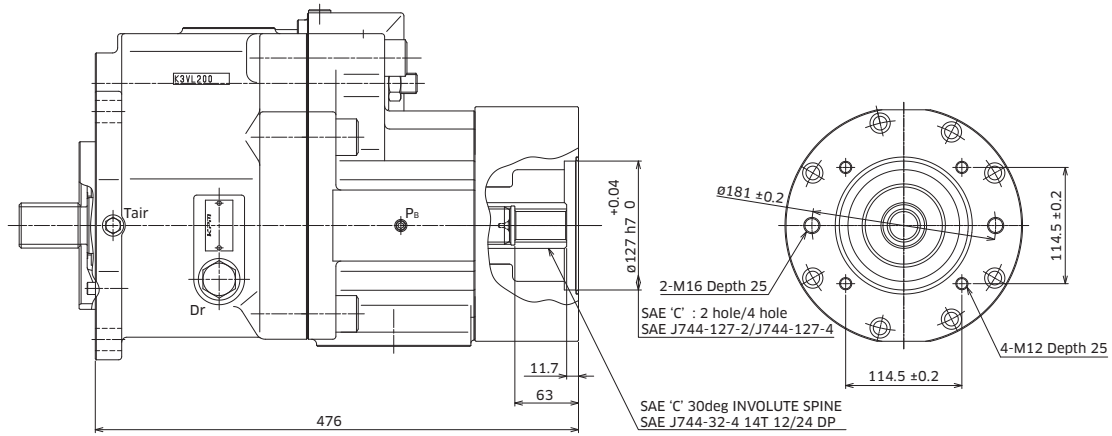


SAE 'B-B' Through Drive

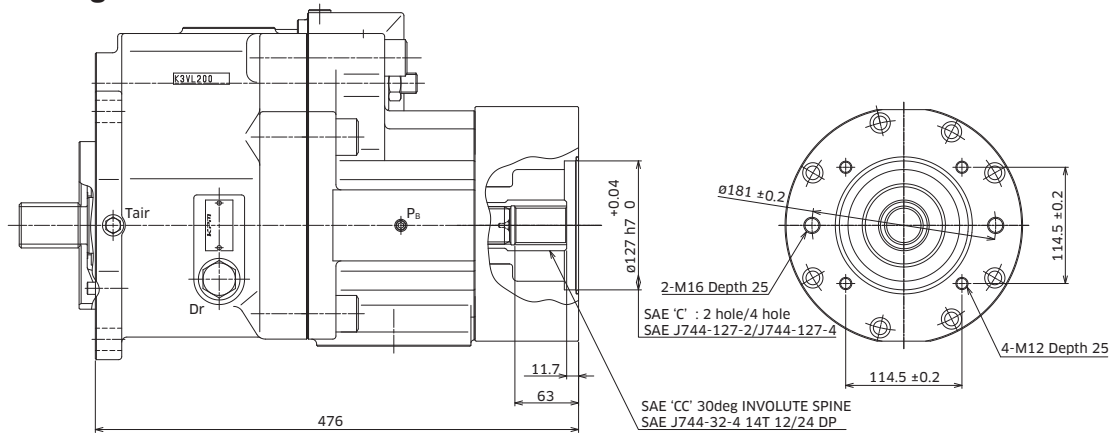


3-6 K3VL200H Installation (cont)

SAE 'C' Through Drive

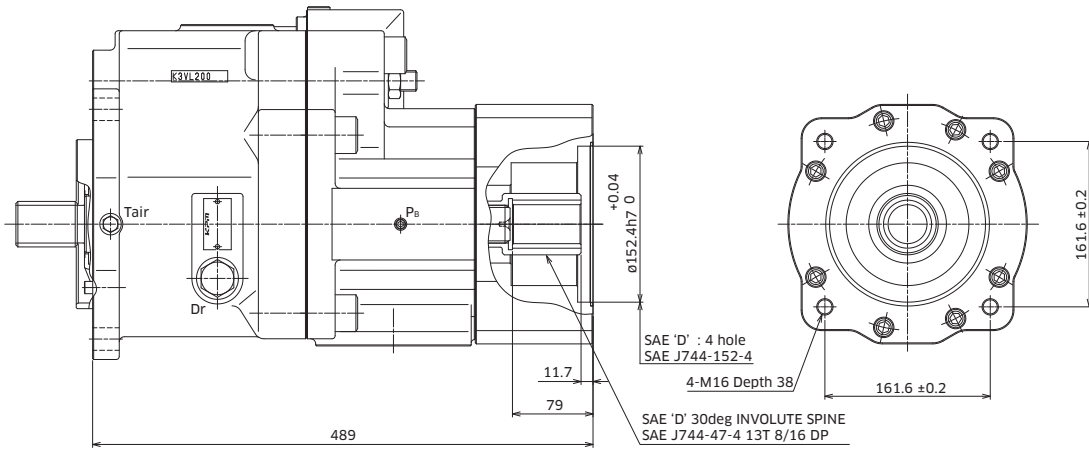


SAE 'C-C' Through Drive

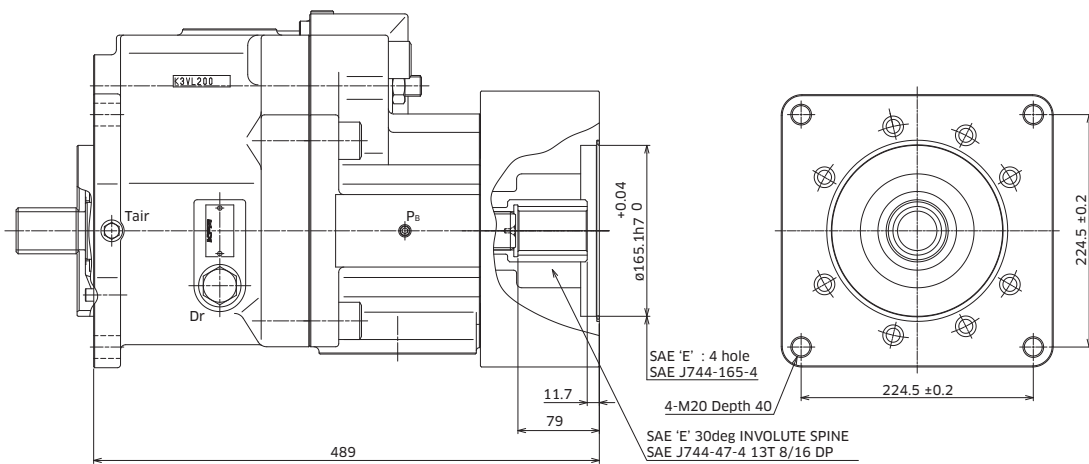


3-6 K3VL200H Installation (cont)

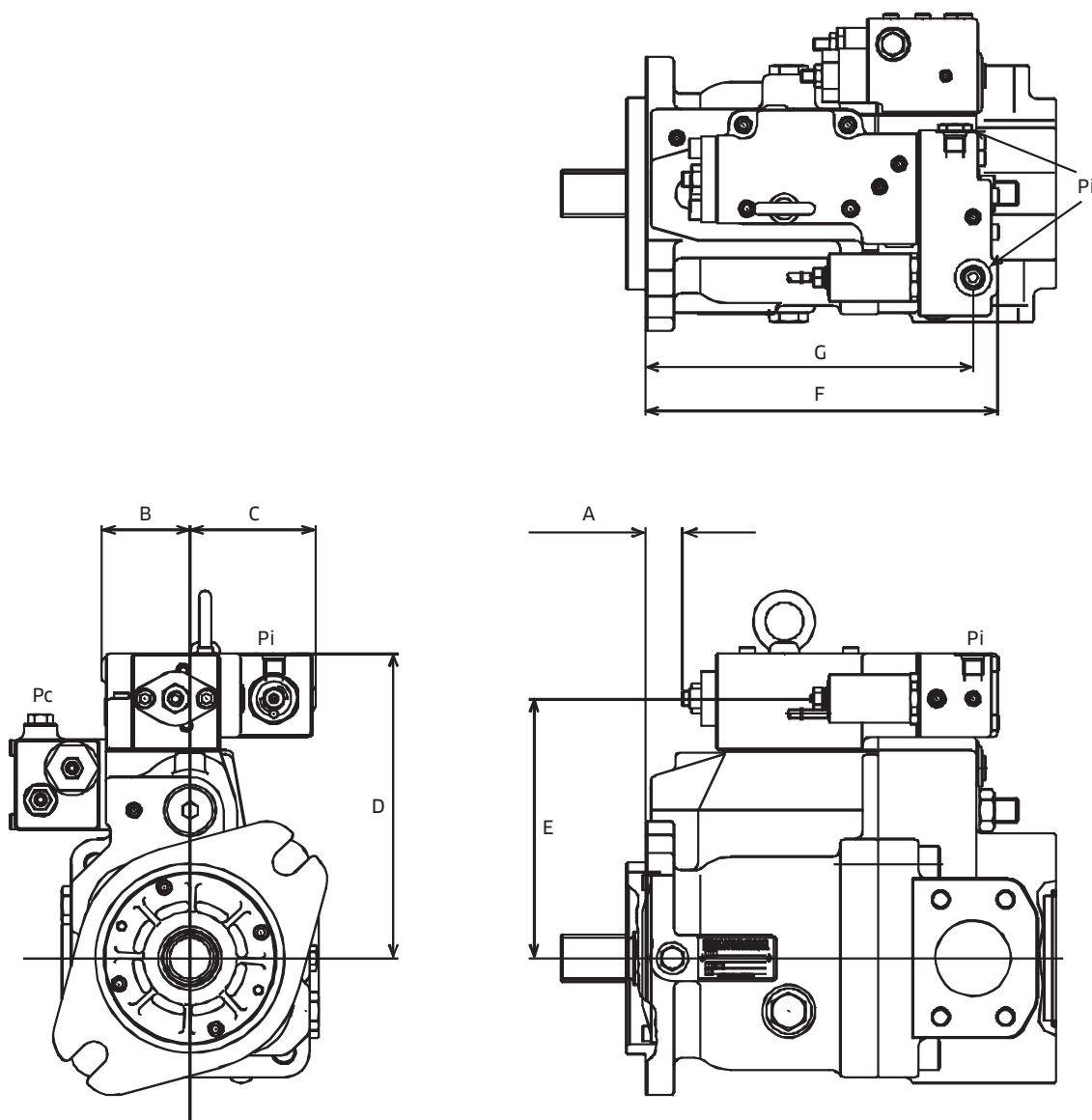
SAE 'D' Through Drive



SAE 'D-D' Through Drive



3-7 Electrical Displacement Control



Installation Dimensions in. (mm)

Pump Size	A	B	C	D	E	F	G
K3VL45/60	0.8 (21)	2.0 (52)	3.5 (90)	7.4 (187)	6.2 (157)	8.9 (226)	8.3 (210)
K3VL80	1.0 (25)	2.3 (59)	3.3 (83)	8.0 (202)	6.8 (172)	9.2 (233)	8.5 (217)
K3VL112/140	1.5 (38)	2.5 (64)	3.1 (78)	9.6 (244)	8.4 (214)	9.7 (247)	9.1 (231)
K3VL200	2.2 (57)	2.4 (61)	3.1 (80)	10.2 (258)	9.0 (229)	10.1 (257)	9.8 (249)

3-7 Electrical Pressure Control (cont)

Unloading valve module (Type N,M) in. (mm)

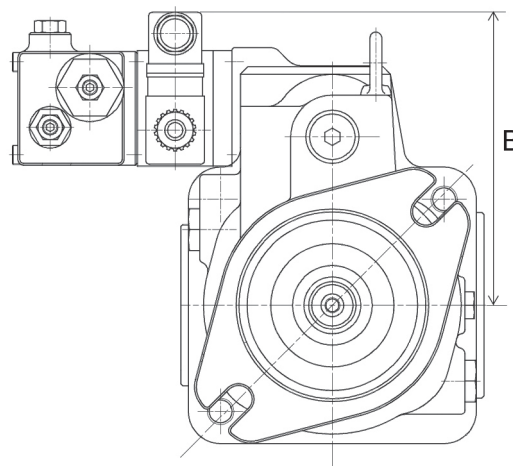
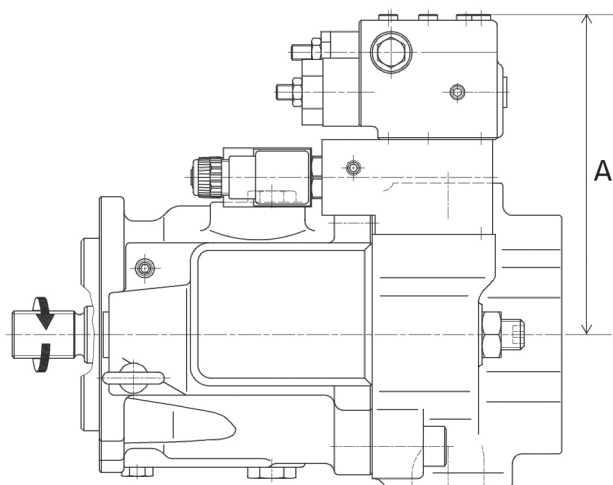
Pump Size	A	B
K3VL45/60	6.7 (169)	6.1 (155)
K3VL80	6.7 (169)	6.5 (166)
K3VL112/140	8.0 (202)	7.5 (190)
K3VL200	8.3 (212)	8.1 (205)

Proportional pressure module (*V) in. (mm)

Pump Size	A	B
K3VL45/60	7.0 (179)	9.2 (233)
K3VL80	7.0 (179)	9.6 (244)
K3VL112/140	8.3 (212)	11.0 (280)
K3VL200	8.7 (222)	11.6 (295)

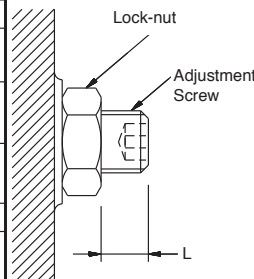
A : Distance between the center line of the pump and the top of the bolt head for the cut off regulator.

B : Distance between the center line of the pump and top of the solenoid valve.



3-8 Max Flow Adjustment

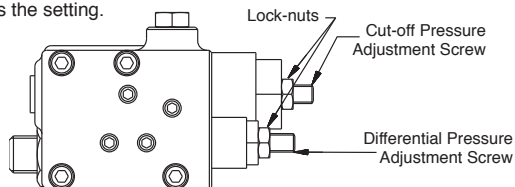
Flow Adjustment	Unit	K3VL45	K3VL60	K3VL80	K3VL112	K3VL140	K3VL200
Adjustment Screw: Internal Hex size	mm	8	8	8	10	10	10
Displacement Per Screw Revolution	in ³ (cm ³)	0.3 (4.9)	0.37 (6.1)	0.36 (6.0)	0.70 (11.5)	0.73 (12.0)	0.93 (15.3)
Displacement Adjustment Range	in ³ (cm ³)	0.98 - 2.75 (16 - 45)	1.65 - 3.70 (24 - 60)	2.15 - 4.88 (35 - 80)	3.42 - 6.83 (56 - 112)	4.27 - 8.54 (70 - 140)	6.1 - 12.2 (100 - 200)
Exposed Screw Length (L)	in (mm)	0.02 - 0.47 (0.5 - 12.1)	0.02 - 0.47 (0.5 - 12.1)	0.02 - 0.59 (0.5 - 15.0)	0.14 - 0.63 (3.8 - 16)	0.04 - 0.63 (1.0 - 16)	0.35 - 1.00 (8.9 - 25.3)
Lock-nut Hex Size	mm	24	24	24	30	30	30
Lock-nut Tightening Torque	lbf-ft (Nm)	94 (128)	94 (128)	94 (128)	173 (235)	173 (235)	173 (235)



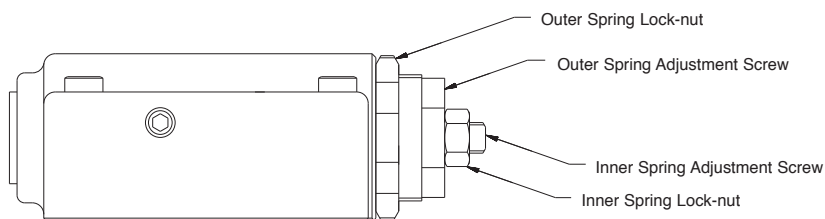
Pressure Cut-off or Load Sense (P0/L0) Control Regulator

P0/L0 Regulator Adjustment	Unit	K3VL28	K3VL45/60/80	K3VL112/140/200
Cut-off/Load Sense Adjustment Screws: Internal Hex Size	mm	4	4	4
Cut-off Pressure Change Per Screw Revolution ^{*1}	psi (bar)	1160 (80)	580 (40)	1330 (92)
Differential Pressure Change Per Screw Revolution ^{*1}	psi (bar)	188 (13)	188 (13)	80 (5.5)
Cut-off/Load Sense Adjustment Screws: Lock-nut Hex Size	mm	13	13	13
Lock-nut Tightening Torque	lb _r -ft (Nm)	12 (16)	12 (16)	12 (16)

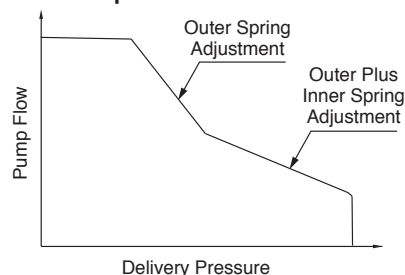
^{*1} Turning the adjustment screw clockwise increases the setting.



Torque Limit Control Module



Torque Limit P-Q Curve



Torque Limit Control Module Adjustments

Outer Spring Adjustment Screws: External Hex Size	mm	27
Outer Spring Lock-nut Size	mm	41
Outer Spring Lock-nut Tightening Torque	lb _r -ft (Nm)	75 (102)
Inner Spring Adjustment Screw: Internal Hex Size	mm	4
Inner Spring Lock-nut Size	mm	13
Inner Spring Lock-nut Tightening Torque	lb _r -ft (Nm)	12 (16)

Adjusting the K3VL torque limiter.

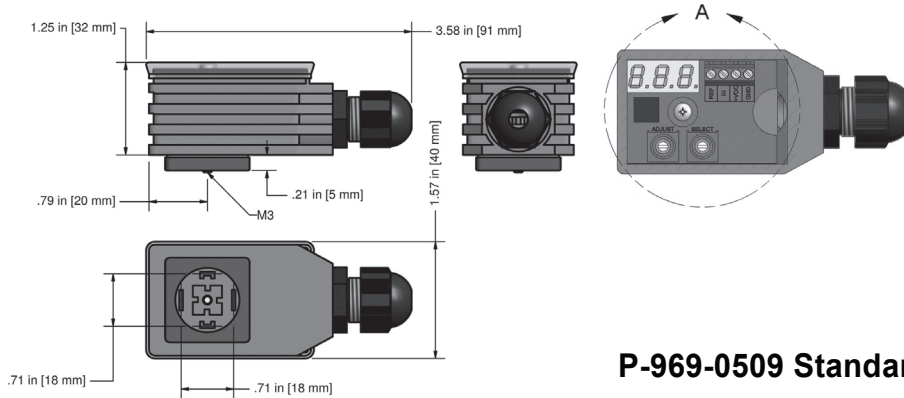
The torque limiter has two adjustments, one for the outer spring and the other for the inner spring. The outer spring adjustment changes the top half of the PQ curve and the inner spring adjustment will change the bottom half. A clockwise adjustment will increase the setting. A change to the outer adjustment will change the setting of both the inner and outer springs; the inner adjustment has no effect on the outer adjustment. Adjust the outer adjustment first, then the inner.

Each torque limited pump is factory preset to a specific horsepower setting. Refer to the horsepower designation charts on page 3.

3-9 Proportional Amplifiers

P-969-0509

Direct DIN solenoid mount, PG9 cable gland connection



P-969-0509 Standard Specifications

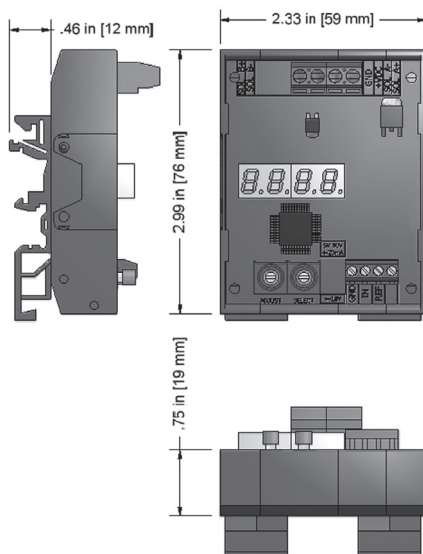
Operating voltage:	9 to 36 VDC
Maximum output current:	3.00Amps
Input signal:	5V, 10V, 4 to 20mA
Maximum ramp time:	99.5 Sec
PWM / Dither frequency:	40-450Hz
Linearity:	1%
Operating Temperature:	-40° to +75° Celsius
Protection Grade:	IP65

P-969-0509 Cable Requirements

- Cable rated to 105° Celsius is required.
- Round cable with a diameter range of 4-8mm (0.15 - 0.30") is required to maintain IP65 rating.

P-969-0510

DIN rail mount



P-969-0510 Standard Specifications

Operating voltage:	9 to 36 VDC
Maximum output current:	3.00Amps
Input signal:	5V, 10V, 4 to 20mA
Maximum ramp time:	99.5 Sec
PWM / Dither frequency:	40-450Hz
Linearity:	1%
Operating Temperature:	-40° to +80° Celsius

Notes:

U.S.A

Kawasaki Precision Machinery (U.S.A.), Inc.
3838 Broadmoor Avenue S.E.
Grand Rapids
Michigan 49512
U.S.A.

Tel: +1-616-975-3100

Website: www.kpm-usa.com

CHINA

Kawasaki Precision Machinery Trading (Shanghai) Co., Ltd.
17th Floor (Room 1701), The Headquarters Building
No168 XiZang Road (M)
Huangpu District
Shanghai 200001
China

Tel: +86-021-3366-3800

KOREA

Flutek, Ltd.
98 GIL 6, Gongdan, Seongsan
Changwon
Kyung Nam, 641-370,
Korea

Tel: +82-55-286-5551

Website: www.flutek.co.kr

**The specified data is for product description purposes only
and may not be deemed to be guaranteed unless expressly
confirmed in the contract.**

**KAWASAKI PRECISION
MACHINERY (UK) LTD**

Ernesettle, Plymouth
Devon, PL5 2SA, England

Tel: +44 1752 364394

Fax: +44 1752 364816

Mail: info@kpm-uk.co.uk

Website: www.kpm-eu.com

OTHER GLOBAL SALES OFFICES

JAPAN

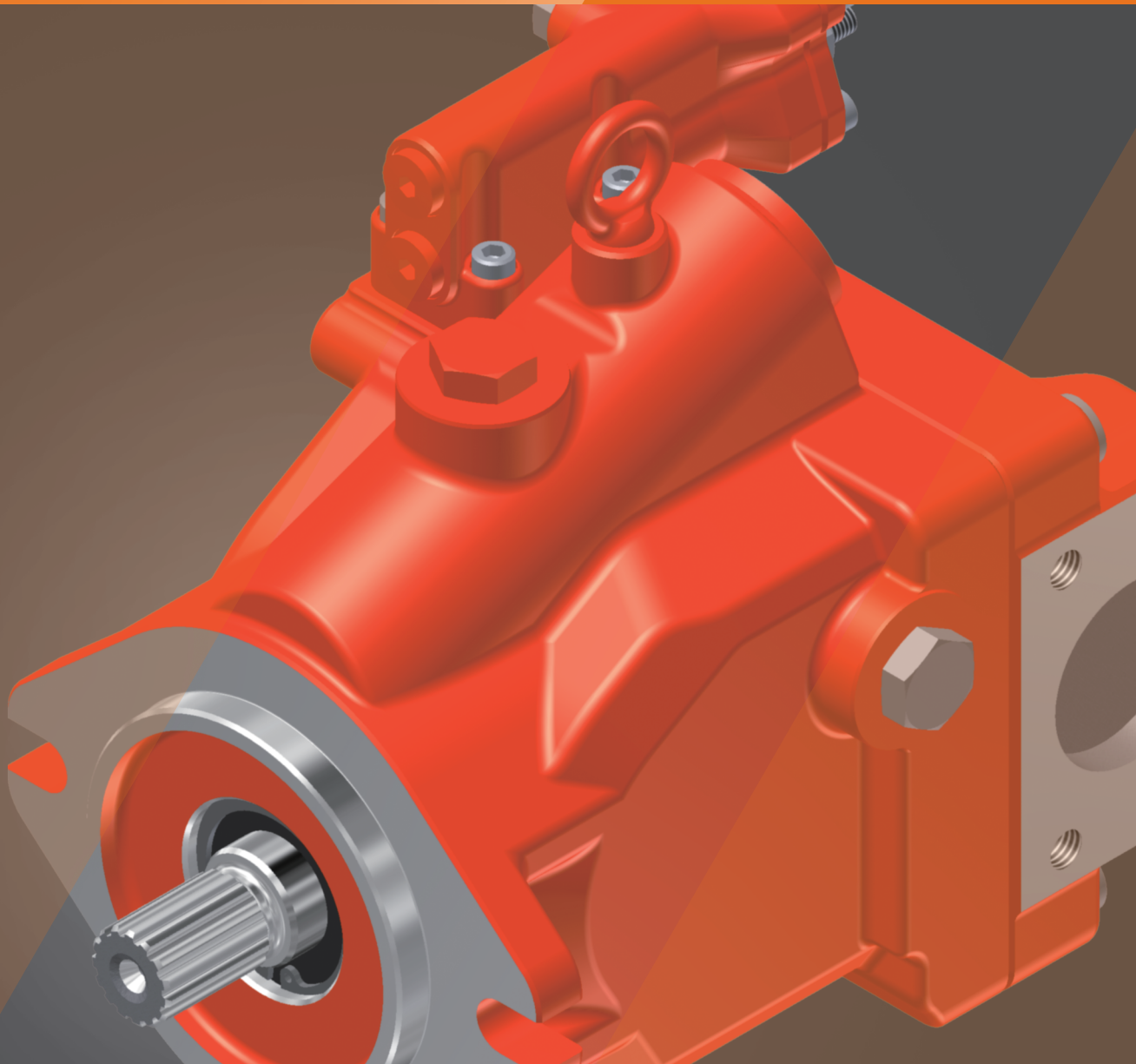
Kawasaki Heavy Industries. Ltd, Precision Machinery Company
Tokyo Head Office
1-14-5, Kaigan, Minato-ku,
Tokyo 105-8315, Japan

Tel: +81-3-3435-2111

Website: www.khi.co.jp/kpm

Data sheet: P-2001/09.14

Swash Plate Type Axial Piston Pump **K3VLS Series**



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I . Applications / Product Usage

The following must be taken into consideration before use.

1. The operating condition of the products shown in this catalog varies depending upon each application. Therefore, the product suitability must be judged by the designer of the hydraulic system and/or the person who finalizes the technical specifications of the machine after analysis and testing. The product specification shall be determined based on the latest catalog and technical documents. The system must be designed taking into account the possibility of machine failure to ensure that all safety, warning, and application requirements are met.
2. For the proper use of the products, descriptions given in the SAFETY PRECAUTIONS must be observed.
3. The technical information in this catalog represents typical characteristics and performance of the products as of the published date.
4. If the intended use of the products is included in the following, please consult with Kawasaki in advance.
 - (1) Use the product in the operating conditions or environments other than those described in the technical documents.
 - (2) Use the product in the nuclear sector, aviation sector, medical sector, and/or food sector.
 - (3) Use the product in applications which may cause substantial harm to others and their property, and especially in applications where ensuring safety is a requirement.
5. The information described in this catalog is subject to change without notice. For the latest information, please contact Kawasaki.

II. Safety Precautions

Before using the product, you **MUST** read this catalog and **MUST** fully understand how to use the product. To use the product safely, you **MUST** carefully read all Warnings and Cautions in this catalog.

1. Cautions related to operation



- Use the personal protective equipment to prevent injury when the product is in operation.



- Some components are heavy. Handle the product carefully not to hurt your hands and lower back.



- Do not step on, hit or drop, or apply strong force to the product, as these actions may cause operation failure, product damage, or oil leakage.



- Wipe off any oil on the product or the floor completely, as oil can create slippery conditions that may cause drop of the product and personal injury.

2. Warnings and cautions related to installation and removal of the product



- Installation, removal, piping, and wiring must be done by a qualified technician.



- Make sure that the hydraulic power unit is turned off and that the electric motor or engine has completely stopped before starting installation or removal. You must also check that the system pressure has dropped to zero.



- Make sure that the power source is turned off before installing electric components to reduce the risk of electric shock.



- Clean the threads and the mounting surface to prevent damage or oil leakage. Inadequate cleaning may cause insufficient torque and broken seals.



- Use the designated bolts and fasten them with prescribed torque when installing the product. Use of undesignated bolts, and excessive or insufficient tightening torque may induce operation failure, damage, or oil leakage.

3. Warnings and cautions for operation



- Always equip the product with explosion or ignition protection if it is used in potentially explosive or combustible atmospheres.



- Shield rotary parts, such as the motor and pump shaft, to avoid injury.



- Stop operation immediately, and take proper measures when the abnormality such as unusual noise, oil leakage, and smoke is found. Continuing operation under such condition may bring about damage, a fire hazard, or injury.



- Make sure that all pipes, hoses, and connecting points with pipes or hoses, are correctly connected and tightened before starting operation.



- Use the product under the operating conditions and limitations described in the catalog, drawings, and specification sheets.



- Do not touch the product in operation. to reduce the risk of skin burn.



- Use the proper hydraulic oil and maintain the filtration at the recommended level to prevent premature wear and damage.

4. Cautions related to maintenance



- Never modify the product without approval from Kawasaki.



- Disassembly of the product may void the warranty.



- Keep the product clean and dry when storing or transporting.



- The seals may need to be replaced if the product has been stored for an extended period of time.



- Making adjustments of this product will result in the warranty being null and void.

III. Handling Precautions

1. Operating Fluid and Temperature Range

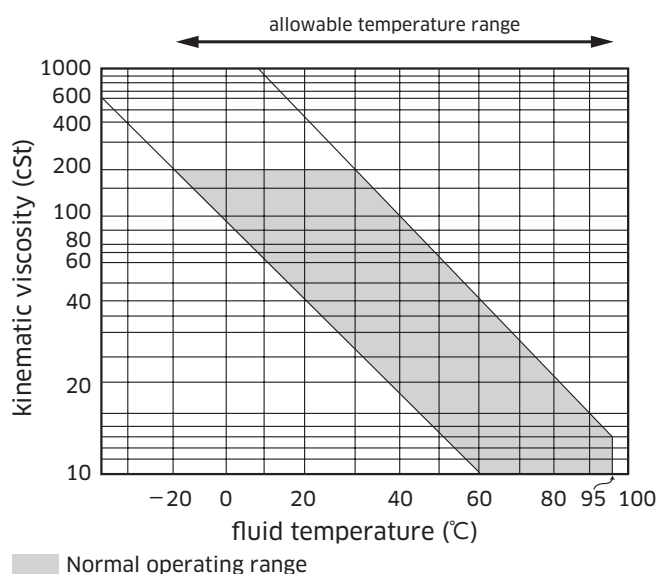
1) Operating fluid

Values shown in this catalog are based upon using mineral oil based anti-wear hydraulic fluid. To ensure optimal performance use of mineral oil based anti-wear hydraulic fluid is recommended.

2) Viscosity and temperature range

To minimize both oil and seal deterioration, a maximum operating temperature of 60°C should be considered. Please note that the regulator may become slow to respond when operating at low temperatures (below 20°C) in extreme cold environments. At such low temperature it is strongly suggested that a warm up cycle is introduced until an operating temperature of 20°C is achieved.

	Normal operating range	Allowable range
Viscosity [mm ² /s(cSt)]	10 to 200	10 to 1,000
Fluid temperature [°C (°F)]	-20 to +95 (-4 to +203)	



2. Filtration and Contamination Control

1) Filtration of working oil

The most important means to prevent premature damage to the pump and associated equipment and to extend its working life, is to ensure that hydraulic fluid contamination control of the system is working effectively.

This begins by ensuring that at the time of installation that all piping, tanks etc. are rigorously cleaned in a sanitary way. Flushing should be provided using an off line filtration system and after flushing the filter elements should be replaced.

A full flow return line filter of 10 micron nominal should be utilised to prevent contaminant ingress from the external environment, a 5 to 10 micron filter with the tank's breather is also recommended.

2) Suggested acceptable contamination level

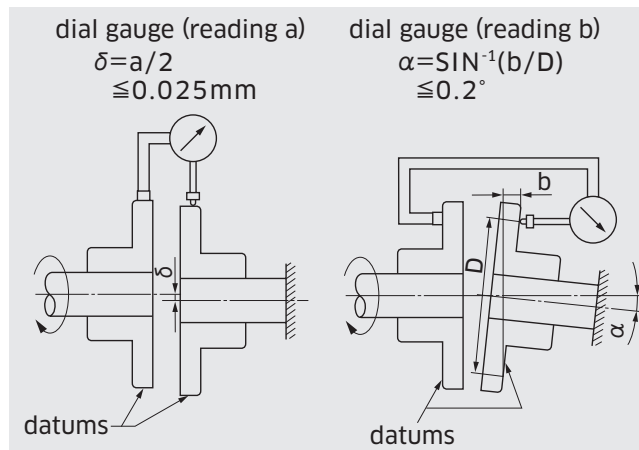
The relationship between contamination level and pump life is very difficult to predict as it depends on the type and nature of the contaminant present in the system. Sand or Silica in particular, due to its abrasive nature, does significantly reduce the expected life of a pump. Based on the precondition that there is no significant presence of Silica type substances then a minimum Cleanliness level of -/18/15 ISO 4406 or SAE AS 4059E Table 1 Class 9 (NAS 1638 Class 9).

III. Handling Precautions

3. Drive Shaft Coupling

Alignment between the prime mover and the pump shaft should be within 0.05 mm TIR*. In case the pump is directly coupled to the engine flywheel, use a flexible coupling.

*TIR = Total Indicator Reading



4. Oil Filling and Air Bleeding

1) Pump case filling

Be sure to fill the pump casing with oil through the drain port, filling only the suction line with oil is totally insufficient. The pump contains bearings and high-speed sliding parts including pistons with shoes and a spherical bush that need to be continuously lubricated. Part seizure or total premature failure will occur very quickly if this procedure is not rigidly followed.

2) Air bleeding

Run the pump unloaded for a period to ensure that all residual air within the system is released.

3) Long term out of usage

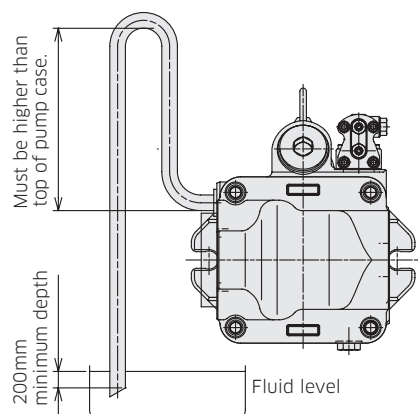
It is undesirable to leave the pump out of use for a long period e.g. a year or more. In such a situation it is recommended that the pump is run for a short period on a more frequent basis even if it is just unloaded. With regard to a pump held in storage then rotating the shaft on a frequent basis is sufficient. If the pump is left out for more than the suggested time it will require a service inspection.

III. Handling Precautions

5. Drain Piping

1) Installation of drain line

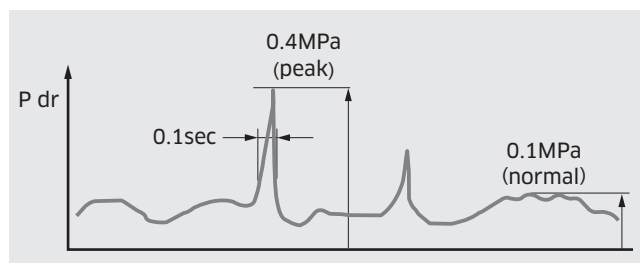
It is the preferred option to mount the pump with the case drain piping initially rising above the pump before continuing to the tank. Do not connect the drain line to the inlet line.



Cautions

- A)** Inlet and drain pipes must be immersed by 200 mm minimum from the lowest level under operating conditions.
- B)** Height from the oil level to the centre of the shaft must be within 1 meter maximum.
- C)** The oil in the pump case must be refilled when the pump has not been operated for one month or longer.

The uppermost drain port should be used and the drain piping must be larger in size than the drain port to minimise pressure in the pump case. The pump case pressure must not exceed 0.1 MPa as shown in the illustration below. (Peak pressure must never exceed 0.4 MPa.)



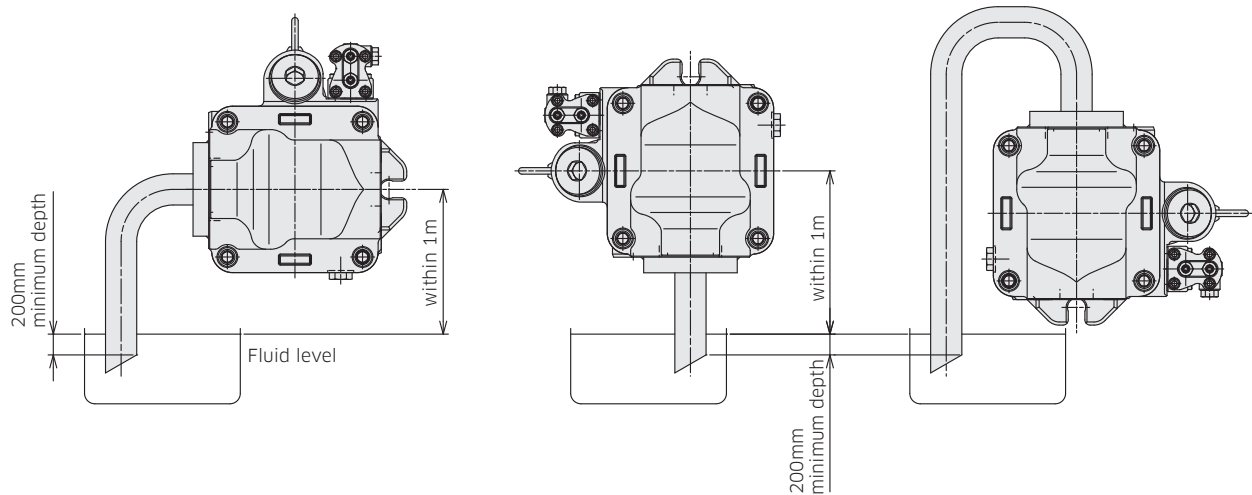
2) Size of drain hose or drain pipe

The internal bore size of the drain hose or drain pipe must be larger than that of the drain port. Arrange the drain line as short as possible.

III. Handling Precautions

6. Mounting the Pump Above the Tank

Suction line



7. Shaft Loading and Bearing Life

Although K3VLS pumps are equipped with bearings that can accept some external thrust and radial forces, application of such loads will affect bearing life. Depending on the load magnitude, the load position, and the load orientation, bearing life may be significantly reduced.

IV. Conversion Factors, Formula and Definition

◆ Conversion Factors

	Formula	Note
Displacement	1 cm ³ = 0.061 in ³	
Pressure	1 MPa = 145 psi	
Flow	1 L/min = 0.264 gpm	US gallon
Torque	1 Nm = 0.74 lb ft	
Power	1 kW = 1.341 hp	
Weight	1 kg = 2.205 lb	

◆ Formula

	Metric system		Imperial system	
Output flow	$Q = q \times N \times \eta_v / 1000$	L/min	$Q = q \times N \times \eta_v / 231$	gal/min
Input torque	$T = q \times \Delta P / 2\pi / \eta_m$	Nm	$T = q \times \Delta P / 24\pi / \eta_m$	lbf ft
Input power	$L = T \times N / 9550 = Q \times \Delta P / 60 / \eta_t$	kW	$L = T \times N / 5252 = Q \times \Delta P / 1714 / \eta_t$	hp

◆ Definition

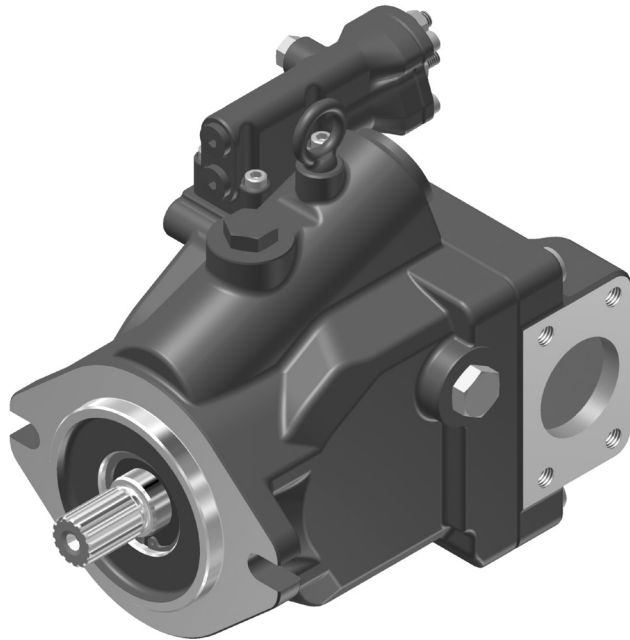
q	= Pump displacement / rev.	cm ³ (in ³)
L	= Input power	kW (hp)
N	= Speed	min ⁻¹ (rpm)
ΔP	= $P_d - P_s$	MPa (psi)
P_d	= Pump delivery pressure	MPa (psi)
P_s	= Pump suction pressure	MPa (psi)
P_L	= Load sensing pressure	MPa (psi)
P_{dr}	= Pump case pressure	MPa (psi)
P_f	= Power shift pressure	MPa (psi)
P_{sv}	= Servo pressure	MPa (psi)
T	= Input torque	Nm (lbf-ft)
T_{max}	= Maximum input torque	Nm (lbf-ft)
η_v	= Pump volumetric efficiency	
η_m	= Pump mechanical efficiency	
η_t	= Pump total efficiency	

MEMO

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K3VLS Series

Swash Plate Type Axial Piston Pump



■ Specifications

Size : 50, 65, 85, 105, 150
Rated Pressure : 28 MPa
Peak Pressure : 35 MPa

■ General Descriptions

The K3VLS are variable displacement axial piston pumps of swash plate design, suitable for use in mobile applications and industrial vehicles with medium pressure hydraulic systems.

The K3VLS pumps enable flexible configuration in a wide range of applications with their compact size and light weight design.

The K3VLS series pumps are available in size (rated displacement) ranging from 50 to 150 cm³/rev with various control options, such as load sensing, pressure cut-off, and horsepower controls.

■ Features

- Variable axial piston pump of swash plate design in open circuits
- High overall efficiency
- Compact size
- Light weight
- Excellent reliability
- Numerous control options
- High stability
- Highly responsive controls

1

Ordering Code

1-1 Pump Options

Model Code **K3VLS 105 - 1 BB R CC S - L1 A A M1**

1. K3VLS Series Pump

K3VLS Series, Variable Displacement, Axial Piston, Open Loop Pump

2. Pump Size

	50	65	85	105	150
Maximum Displacement cm ³	●	●	●	●	●

3. O-ring Material

-	NBR (Orings:Nitrile rubber, Oil Seal: Fluoro rubber)
V	Viton (Orings: Fluoro rubber, Oil Seal: Fluoro rubber)

4. Series Type Code

1	Standard Type
---	---------------

5. Through Drive and Porting

		50	65	85	105	150
0	w/o Through Drive, Side Ported	●	●	●	●	●
A	SAE-A Through Drive, Side Ported	●	●	●	●	—
B	SAE-B Through Drive, Side Ported	●	●	●	●	●
BB	SAE-BB Through Drive, Side Ported	●	●	●	●	●
C	SAE-C, 2/4 bolt, Through Drive, Side Ported	—	●	●	●	●
CC	SAE-CC, 2/4 bolt, Through Drive, Side Ported	—	—	—	●	●
N	w/ Through Drive Shaft, w/o Coupling, Closed w/ Steel Cover, Side Ported	●	●	●	●	●
R	w/o Through Drive, Rear Ported	●	●	●	○	○

6. Direction of Rotation

		50	65	85	105	150
R	Clockwise	●	●	●	●	●
L	Counterclockwise	●	●	●	●	●

7. Mounting Flange and Shaft

		50	65	85	105	150
B	SAE-B Mount & SAE B Spline	●	●	—	—	—
BB	SAE-B Mount & SAE BB Spline	●	●	—	—	—
C	SAE-C Mount & SAE C Spline (Only SAE C-4 mount for K3VLS65 & 150)	—	●	●	●	●
CC	SAE-C Mount & SAE CC Spline (Only SAE C-4 mount for K3VLS150)	—	—	—	●	●
D	SAE-D Mount & SAE D Spline (for K3VLS150, w/ Torque Limit Control is not available)	—	—	—	—	●
K2	SAE-B Mount & SAE BB Keyed Shaft (for K3VLS50 & 65)	◆	◆	—	—	—
K3	SAE-C Mount & SAE C Keyed Shaft (for K3VLS65 & 85)	—	◆	◆	—	—
K4	SAE-C Mount & SAE CC Keyed Shaft (for K3VLS105)	—	—	—	◆	—

8. Flange / Mounting Fixing Thread (Suction-Delivery, Through Drive)

	Flange Thread Suction- Delivery	Mounting Thread Through Drive	50	65	85	105	150
S	Unified	Metric	●	●	●	●	●
H	Metric	Metric	●	●	●	●	●

- : Available
- : Please contact Kawasaki
- : Not available
- ◆ : Only available in Europe/US

1. Ordering Code

1-2 Regulator Options

Model Code 1 2 3 4 5 6 7 8 9 10 11 12 13
K3VLS 105 - 1 BB R CC S - L1 A A M1 - T***

9. Flow Control

	Load Sense	Pressure Cut-Off Control	50	65	85	105	150
L0	w/ LS, w/ Bleed-off Orifice	w/ Pressure Cut-Off	●	●	●	●	●
L1	w/ LS, w/o Bleed-off Orifice	w/ Pressure Cut-Off	●	●	●	●	●
P0	w/o LS	w/ Pressure Cut-Off	●	●	●	●	●
	Electric Inverse Proportional Pressure Control		50	65	85	105	150
PR2	PR2 : w/o LS, w/ Pressure Cut-Off - Electric Inverse Proportional Pressure Control (24V, Deutsch Connector)		●	●	●	●	●

10. Differential Pressure Setting Range (For the details see page 14)

		50	65	85	105	150
Blank	In case PR2 is chosen at "9"	●	●	●	●	●
A	Standard Setting Range (1.0 - 3.0MPa)	●	●	●	●	●
C	High Setting Range (1.5 - 4.0MPa)	●	●	●	●	●

11. Additional Control Options

(For the additional control options "11", only one option per column is acceptable.)

		50	65	85	105	150
Blank	w/o Any Additional Control or in case PR2 is chosen at "9"	●	●	●	●	●
	Torque Limit Control	50	65	85	105	150
00	w/o Any Additional Control, w/ cover plate for Torque Limit	◆	◆	◆	◆	◆
A	w/o Power Shift Control	●	●	●	●	●
B	w/ Power Shift Control Pilot Operated	●	●	●	●	●
C2	w/ Electric Proportional Reducing Valve, Voltage:24V, Deutsch Connector	●	●	●	●	●
C3	w/ Electric Proportional Reducing Valve, Voltage:12V, Deutsch Connector	●	●	●	●	●
	Electric Displacement Control (Positive Control)	50	65	85	105	150
E2	w/ Fail-safe Function Voltage:24V, Deutsch Connector	●	●	—	—	—
E3	w/ Fail-safe Function Voltage:12V, Deutsch Connector	●	●	—	—	—
F2	w/o Fail-safe Function, Voltage:24V, Deutsch Connector	●	●	—	—	—
F3	w/o Fail-safe Function, Voltage:12V, Deutsch Connector	●	●	—	—	—

- : Available
- : Please contact Kawasaki
- : Not available
- ◆ : Only available in Europe/US

1. Ordering Code

1-2 Regulator Options

Model Code 1 2 3 4 5 6 7 8 9 10 11 12 13
K3VLS 105 - 1 BB R CC S - L1 A A M1 - T***

12. Torque Limit Setting (Available only with the attachment of Torque Limiter)

		50	65	85	105	150
Blank	w/o Any Torque Limit Setting	●	●	●	●	●
H1	H Spring, Corner Torque 85%	●	●	●	●	●
H2	H Spring, Corner Torque 75%	●	●	●	●	●
H3	H Spring, Corner Torque 65%	●	●	●	●	●
H4	H Spring, Corner Torque 55%	●	●	●	●	●
M1	M Spring, Corner Torque 70%	●	●	●	●	●
M2	M Spring, Corner Torque 60%	●	●	●	●	●
M3	M Spring, Corner Torque 50%	●	●	●	●	●
M4	M Spring, Corner Torque 40%	●	●	●	●	●
M5	M Spring, Corner Torque 30%	●	●	●	●	●

Code H1 to H4: for torque limit control with power shift control (Additional Control Option Code [11]: "B", "C2", and "C3")
 Code M1 to M5: for torque limit control without power shift control (Additional Control Option Code [11]: "A")

13. Special Suffix

T***	Special Suffix
------	----------------

- : Available
- : Please contact Kawasaki
- : Not available
- ◆ : Only available in Europe/US

2

Technical Information

2-1 Specifications

Size		50	65	85	105	150
Displacement	cm ³	50	65	85	105	150
Pressure	Rated MPa	28				
	Peak MPa	35				
Allowable case pressure	MPa	0.1 continuous / 0.4 peak				
Speed	Self prime* ¹ min ⁻¹	2,700	2,600	2,500	2,300	2,200
	Maximum* ² min ⁻¹	3,250	3,000	3,000	2,640	2,400
Case volume	L	0.8	1.0	1.2	1.7	2.3
Temperature range	°C	-20 to +95				
Viscosity range	cSt	10 to 1,000				
Maximum contamination level		ISO 4406 -/18/15				
Allowable through drive torque Nm	SAE A	123	123	123	123	-
	SAE B	380	380	380	380	380
	SAE BB	435	435	435	435	435
	SAE C	-	435	435	558	435
	SAE CC	-	-	-	702	899
	SAE D	-	-	-	-	-
Mass	kg	21	25	31	37	52
Moment of inertia	kg m ²	2.89×10^{-3}	5.30×10^{-3}	6.77×10^{-3}	9.85×10^{-3}	1.82×10^{-2}
Torsional stiffness	Nm/rad	4.56×10^4	5.26×10^4	6.79×10^4	1.32×10^5	1.99×10^5
Coating		Red synthetic resin primer				

* 1 : Self prime speed is the maximum operating speed under the self priming condition at maximum displacement. Steady state inlet pressure should be greater or equal to 0 MPa gauge.

* 2 : Maximum speed is the maximum operating speed that can run without damage to the pump under restriction of operating conditions.

■ Allowable maximum input torque

1. SAE spline shaft

	SAE B	SAE BB	SAE C	SAE CC	SAE D
Spline specifications	13T 16/32 DP	15T 16/32 DP	14T 12/24 DP	17T 12/24 DP	13T 8/16 DP
Allowable maximum input torque (Nm)	200	315	630	1,060	1,490
Pump size	K3VLS50 K3VLS65	K3VLS50 K3VLS65	K3VLS65 K3VLS85 K3VLS105 K3VLS150	K3VLS105 K3VLS150	K3VLS150

(Note) Maximum pressure must be reduced to operate within the allowable maximum input torque as below when the torque limit control is not used.

SAE B spline K3VLS50: 24 MPa K3VLS65: 18 MPa

SAE C spline K3VLS150: 25 MPa

For above options, if 28 MPa is needed, use the torque limit control.

2. Technical Information

2-1 Specifications

2. SAE keyed shaft

	SAE BB	SAE C	SAE CC
Keyed Width (mm)	6.35	7.94	9.53
Allowable maximum input torque (Nm)	230	430	700
Pump size	K3VLS50 K3VLS65*	K3VLS65 K3VLS85	K3VLS105

*(Note) Maximum pressure must be reduced to operate within allowable maximum input torque as below when the torque limit control is not used.

SAE BB Key K3VLS65: 22 MPa

For above options, if 28 MPa is needed, use the torque limit control.(Power shift H1 & H2 not available)

2. Technical Information

2-2 Functional Description of Regulator

◆ Load Sensing and Pressure Cut-off (Ordering Code [9]: L0 / L1)

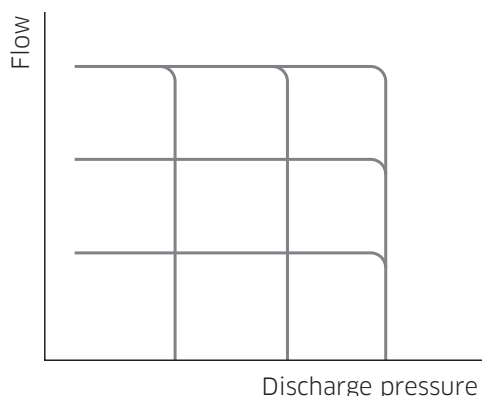
This regulator has function of flow and pressure control (i.e. load sensing control and pressure cut-off control.)

To control flow a variable orifice is used. (A variable orifice is not included in the pump and shall be prepared separately.) Pump displacement is controlled to maintain the differential pressure across the orifice constant. The flow is controlled to a required flow regardless of pump delivery pressure. In addition, there is a pressure cut off function incorporated into the control. The pressure cut-off function overrides the flow control function.

L0 control: with a bleed off orifice

L1 control: without a bleed off orifice

Releasing the pressure at port PL results in standby condition, which provides zero flow at unloading condition. The unloading pressure is typically 0.1 to 0.2 MPa higher than differential pressure setting.



Flow, Pressure control curve

■ Differential pressure setting

Standard setting at factory : 1.5 +0.3/-0.2 MPa

Load sensing differential pressure range can be selected from two setting ranges.

unit: MPa

Code	Adjustment range	Adjustment sensitivity
A	1.0 to 3.0	1.3 / turn
C	1.5 to 4.0	2.5 / turn

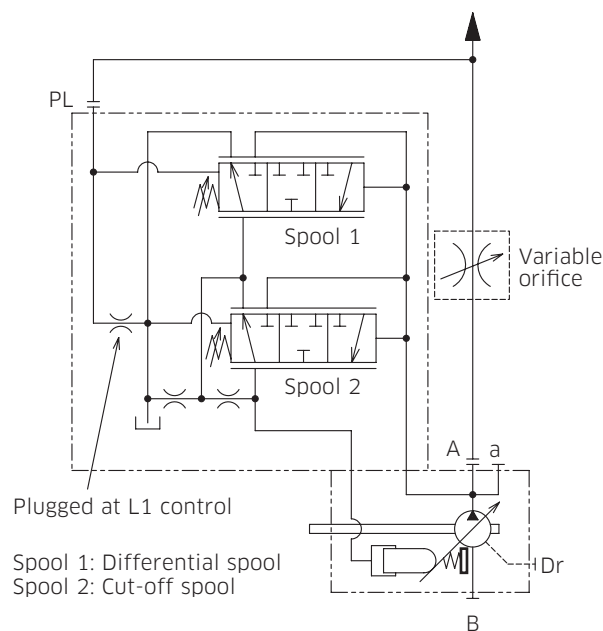
■ Pressure cut-off setting

Standard setting at factory : 28 0/-1.5 MPa

Pressure cut -off setting range is from 5 MPa to 28 MPa.

unit: MPa

Adjustment range	Adjustment sensitivity
5.0 to 28.0	8.0 / turn



Hydraulic circuit

2. Technical Information

2-2 Functional Description of Regulator

◆ Electric Inverse Proportional Pressure Control -Voltage:24V, Deutsch Connector (Ordering Code [9]: PR2)

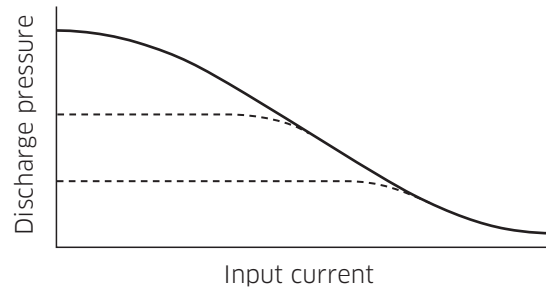
This regulator is Electro-hydraulic pressure control type of regulator. A current is input from the controller to the solenoid of the regulator, and the pressure is controlled by the inverse proportional solenoid valve. Since the regulator tries maintaining the pressure which is set by the valve, the pump discharge is controlled according to the load of the actuator. Thus, the pump supplies only the amount of hydraulic oil required by the actuator. Even if the input current to the solenoid becomes zero at the electric failure of the machine, the pressure set will be maximum, and the pump displacement will be also maximum, so it functions as electric fail-safe.

The pressure of cut-off valve can be set between 28MPa and 10MPa. The control effective range of the solenoid is decided by the cut-off valve setting. (e.g. in case the cut-off setting is 20MPa, the control range is 230mA - 500mA.)

■ Recommended dither condition for the input current

Dither frequency: 200 Hz
Dither amplitude: 200 mA_{p-p}

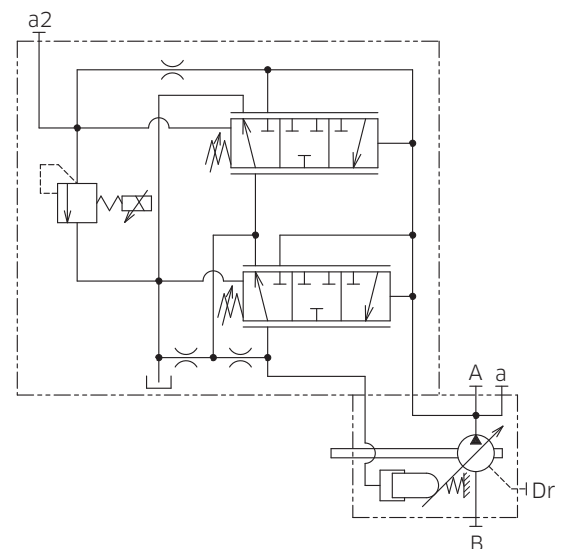
	PR2
Rated current [mA]	700
Coil resistance (at 20°C) [Ω]	26.2
Power consumption (at cold) [W]	22
Connector type	Ladd Distribution DT04-2P
Water proof	IP69K



Input current - Discharge pressure curve

Max. pressure setting	Input current control range
28 MPa	120 - 500 mA
26 MPa	150 - 500 mA
24 MPa	180 - 500 mA
22 MPa	210 - 500 mA
20 MPa	230 - 500 mA
18 MPa	250 - 500 mA
16 MPa	275 - 500 mA
14 MPa	300 - 500 mA
12 MPa	325 - 500 mA
10 MPa	350 - 500 mA

Control effective range



Hydraulic circuit

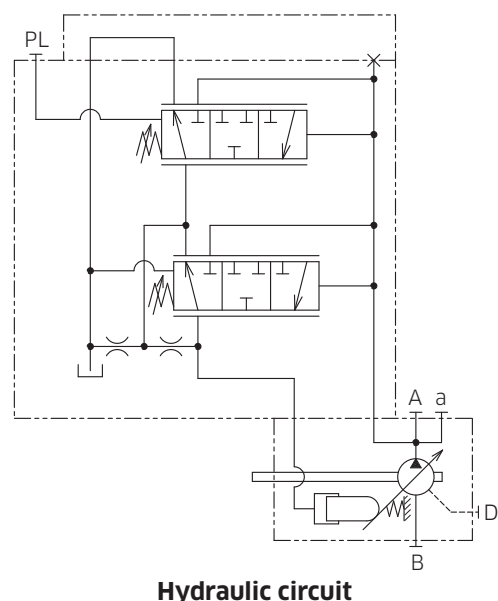
2. Technical Information

2-2 Functional Description of Regulator

◆ w/o Any Additional Control, w/cover plate for Torque Limit (Ordering Code [11]: 00)

When the "00" option is selected in section 11 of the model code the K3VLS pump is supplied as a torque limit ready pump. The pump has a blanking plate fitted instead of the torque limiter. This offers better flexibility to configure the pump as required.

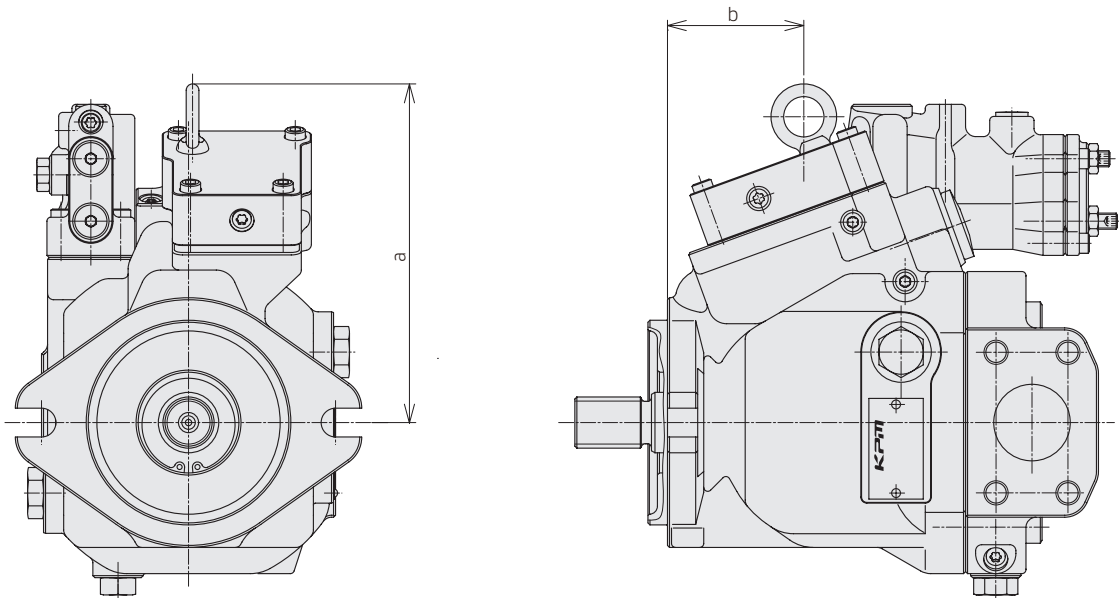
The pump as ordered will function as a load sense or pressure compensated pump depending on your selection of flow control in section 9 of the model code. If the torque limit blanking cover is then replaced with a torque limit regulator the pump has the torque limit control functionality. Note that the torque limit regulator would need to be set.



2. Technical Information

2-2 Functional Description of Regulator

- ◆ w/o Any Additional Control,
w/cover plate for Torque Limit
(Ordering Code [11]: 00)



	a	B
K3VLS50	168	68
K3VLS65	180	74
K3VLS85	182	81
K3VLS105	200	81
K3VLS150	210	94

2. Technical Information

2-2 Functional Description of Regulator

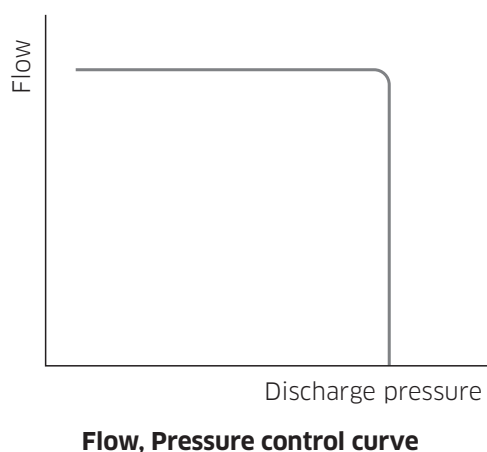
◆ Pressure Cut-off (Ordering Code [9]: P0)

This regulator has function of pressure control. As discharge pressure rises to the cut-off setting, the pump displacement is reduced to prevent the discharge pressure from exceeding and keep the set pressure. It is imperative that a safety relief valve be installed in the system.

By connecting the Pc port to a remote pressure control relief valve, variable pump pressure control can be achieved.

The remote pressure control relief valve is to be set to 1.5 MPa below to the required system pressure.

The remote control relief valve is out of scope of supply.



■ Differential pressure setting

Standard setting at factory : 1.5 +0.3/-0.2 MPa

Load sensing differential pressure range can be selected from two setting ranges.

unit: MPa

Code	Adjustment range	Adjustment sensitivity
A	1.0 to 3.0	1.3 / turn
C	1.5 to 4.0	2.5 / turn

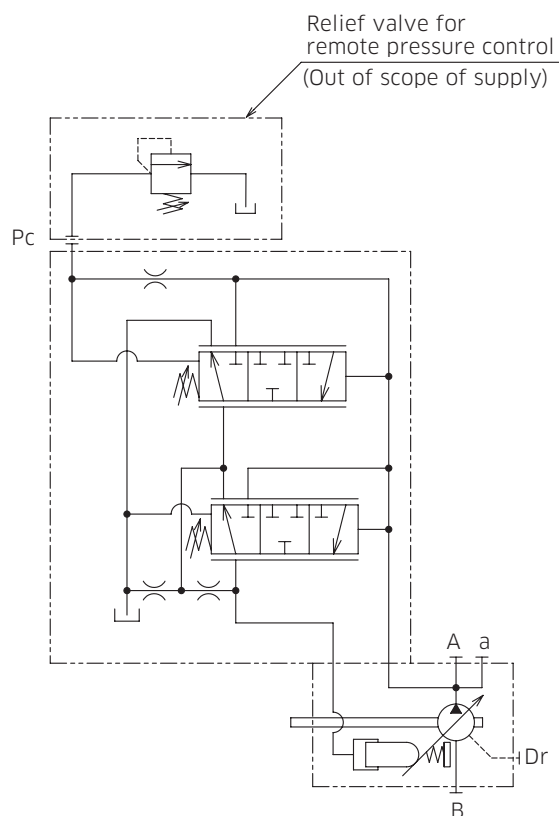
■ Pressure cut-off setting

Standard setting at factory : 28 0/-1.5 MPa

Pressure cut -off setting range is from 5 MPa to 28 MPa.

unit: MPa

Adjustment range	Adjustment sensitivity
5.0 to 28.0	8.0 / turn



Hydraulic circuit

2. Technical Information

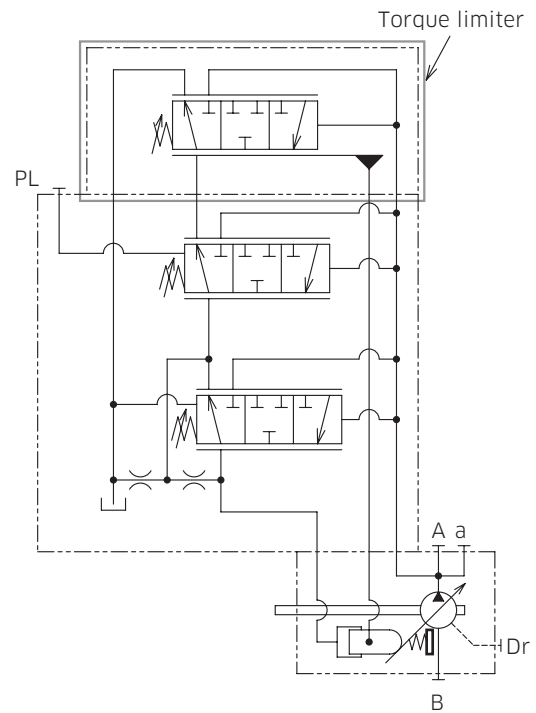
2-2 Functional Description of Regulator

◆ Torque Limiter (Ordering Code [11]: A)

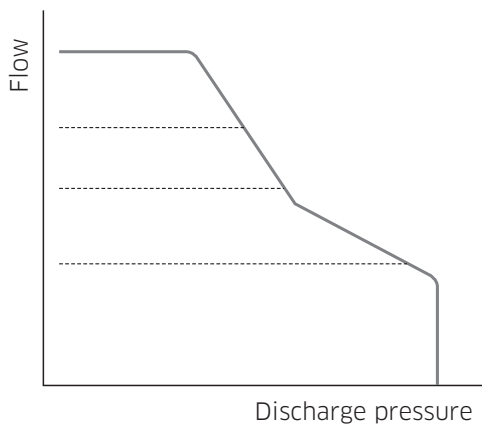
L0/L1 control functions as previously noted. In response to a rise in delivery pressure the swash plate angle is decreased, restricting the input torque. This regulator prevents excessive load against the prime mover.

The torque limiter is comprised of two springs that oppose the spool force generated by the system pressure. By turning the adjustment screws, the appropriate input torque limit can be set.

Torque limiter control setting is shown in the attached table, and the torque limiter can be adjusted by the torque value of the table. Refer to the instruction manual for adjustment.



Hydraulic circuit



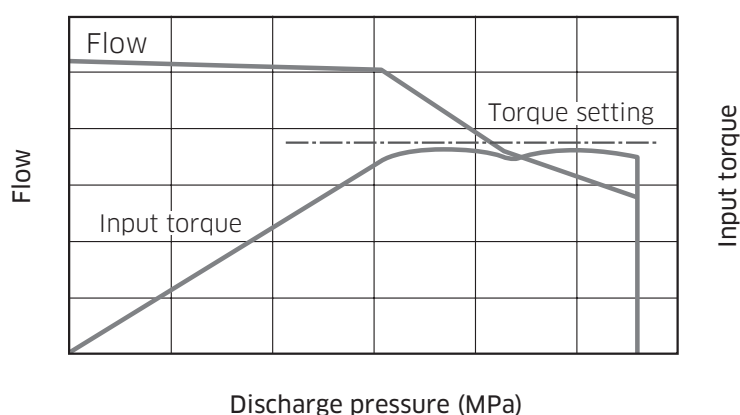
Torque limiter control curve

2. Technical Information

2-2 Functional Description of Regulator

◆ Torque Limiter Settings (Ordering Code [11]: A)

■ Pump control curve (sample)



■ Torque setting without power shift function

Pump size	Ordering code [12]				
	M1	M2	M3	M4	M5
K3VLS50	155	135	110	90	65
K3VLS65	200	175	145	115	85
K3VLS85	265	227	190	150	115
K3VLS105	330	281	235	190	140
K3VLS150	470	400	335	265	-

Unit : Nm

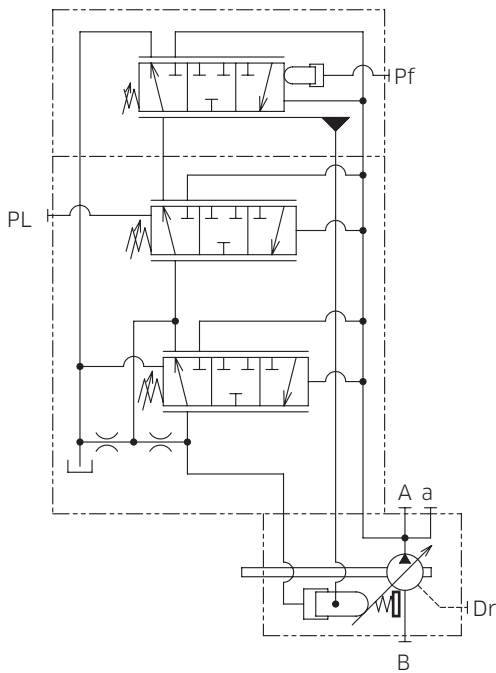
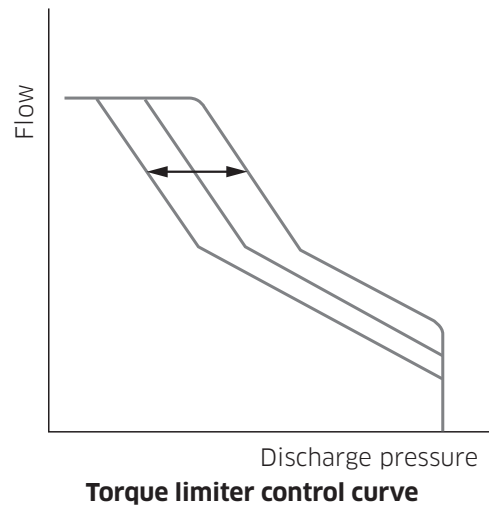
2. Technical Information

2-2 Functional Description of Regulator

◆ Torque Limiter with Power Shift (Ordering Code [11]: B, C2, C3)

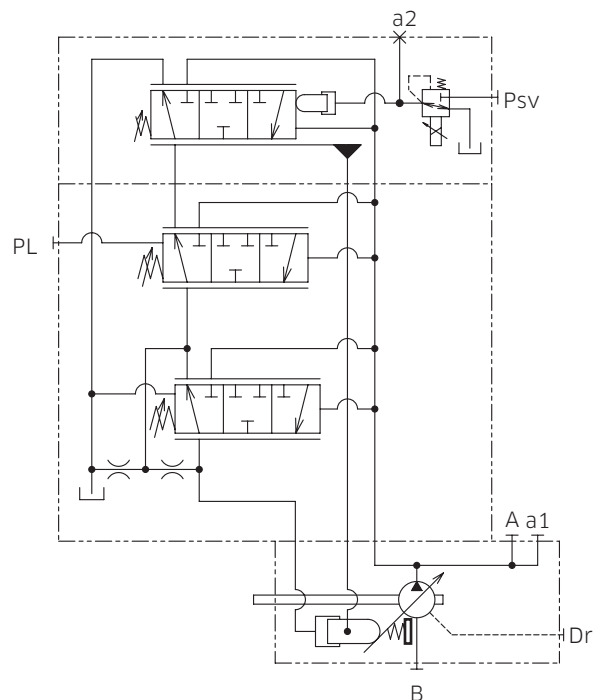
Torque limiter is available with variable torque limit control. Torque limit setting can be varied by the external pilot pressure supply (code "B") or the integrated electric proportional control valve with the external servo pressure supply (code "C"). Code "B" and "C" enable to shift the power control setting as shown in the following torque limiter control characteristic curve.

See the table (page 19) for torque setting according to the external pilot pressure or the input current to the integrated proportional valve. Required servo pressure to the solenoid is 3.5 to 4.5 MPa.



External pilot pressure (Pf) range: 0 to 4.0 MPa

Hydraulic circuit, code B



Required servo pressure (Psv): 3.5 to 4.5 MPa

Hydraulic circuit, code C

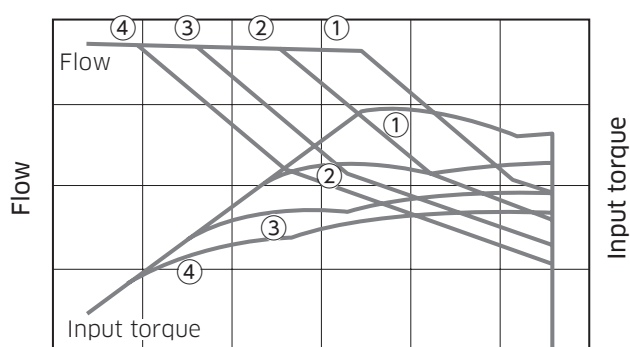
2. Technical Information

2-2 Functional Description of Regulator

◆ Torque Limiter and Power Shift Settings

(Ordering Code[11] : B, C2, C3)

■ Pump control curve with power shift (sample)



Discharge pressure

■ Recommended dither condition for the input current

Dither frequency: 100 Hz

Dither amplitude: for C2 200 mA_{p-p}
for C3 400 mA_{p-p}

	C2	C3
Rated current [mA]	750	1,500
Coil resistance [Ω]	20.8	4.7
Power consumption (at 100°C) [W]	19	
Connector type	Ladd Distribution DT04-2P	
Water proof	IP6K6/IPX9K	

■ Table. Torque Setting with power-shift function

Ordering code [11]	Code : B	Code : C2, C3							
		Pump size	Pf (MPa)	Current (mA)		Ordering code [12]			
				24V C2	12V C3	Max. Input torque (Nm)			
				H1	H2	H3	H4		
K3VLS50	①	0.00	0		220	200	170	150	
	②	0.75	290	570	190	170	145	125	
	③	2.00	490	970	165	140	120	100	
	④	3.30	690	1,370	135	115	95	80	
K3VLS65	①	0.00	0		285	250	220	190	
	②	0.75	290	570	245	215	185	160	
	③	2.00	490	970	210	180	150	130	
	④	3.30	690	1,370	175	145	120	100	
K3VLS85	①	0.00	0		375	330	290	245	
	②	0.75	290	570	325	285	245	205	
	③	2.00	490	970	280	240	200	165	
	④	3.30	690	1,370	230	195	160	125	
K3VLS105	①	0.00	0		455	405	360	310	
	②	0.75	290	570	395	350	305	260	
	③	2.00	490	970	340	295	250	210	
	④	3.30	690	1,370	280	235	200	160	
K3VLS150	①	0.00	0		655	585	510	440	
	②	0.75	290	570	570	500	435	370	
	③	2.00	490	970	475	410	355	295	
	④	3.30	690	1,370	385	330	275	225	

Input torque in the above table is planned value and for reference.

Displacement ratio (%) = Displacement / Max. Displacement

2. Technical Information

2-2 Functional Description of Regulator

◆ Electric Displacement Control (Positive Control)

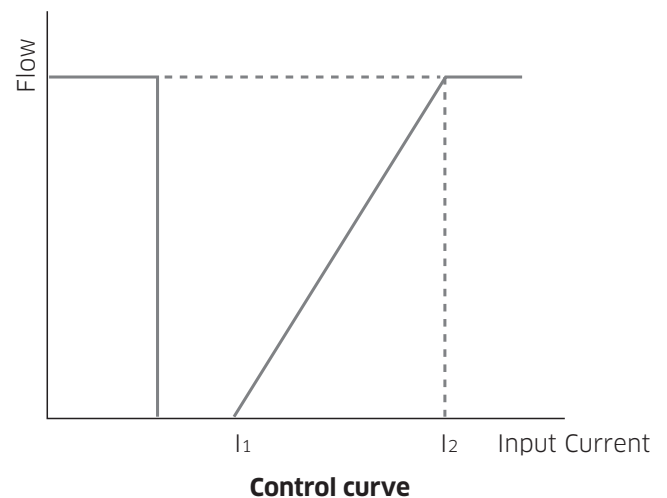
- With Fail-safe Function (Ordering Code[11]: E2, E3)
- Without Fail-safe Function (Ordering Code[11]: F2, F3)

The electric displacement control enables the pump displacement to be changed according to the change of input current to the solenoid. The pump displacement can be adjusted in proportion to the input current between the input current of I_1 and I_2 (refer to control curve).

With fail-safe function, at loss of input current in such case of brakage of electric wires, the pump displacement becomes maximum automatically. Even under this condition the load sensing and pressure cut-off control can be operated.

The fail-safe function is designed only for usage in short period for emergency. Necessary repair is to be made in the soonest opportunity.

For the hydraulic circuit refer to page 26.



Unit: mA

Ordering code	I_1	I_2
E2, F2	200	600
E3, F3	400	1,200

■ Note for pumps with fail-safe

■ Note for start up

Due to its structure, the electric displacement control requires larger input current than I_2 at start up, then normal proportional control can be achieved between I_1 and I_2 .

■ Minimum operating pressure

With fail-safe function, in order to ensure safety and repeatability of control the minimum operating pressure of 5 MPa is to be secured. This avoids switching the pump to fail-safe mode unexpectedly.

■ Input current ramp time requirement

With fail-safe function (Ordering code: E2, E3), ramp time of 200 msec or larger is to be secured.

■ Recommended dither condition for the input current

Dither frequency: 150 Hz

Dither amplitude: for E2, F2 200 mA_{p-p}
for E3, F3 400 mA_{p-p}

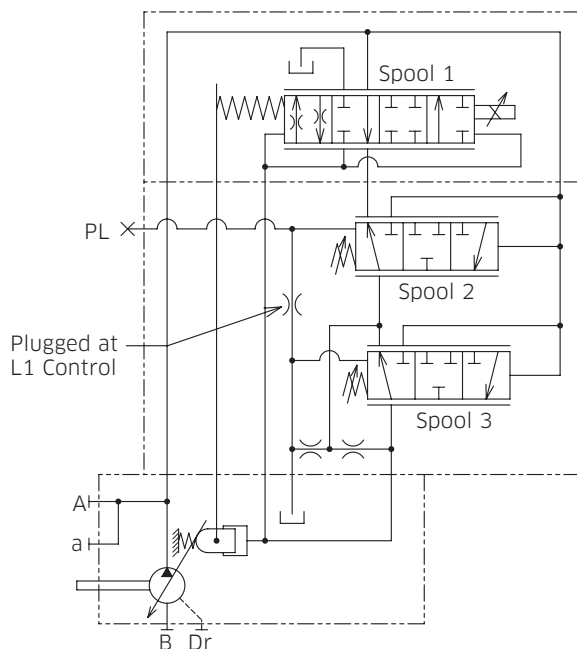
	E2, F2	E3, F3
Rated current [mA]	700	1,400
Coil resistance (at 20°C) [Ω]	22.6	5.7
Power consumption (at 20°C) [W]	11.2	11.2
Connector type	Ladd Distribution DT04-2P	
Water proof	IP67	

2. Technical Information

2-2 Functional Description of Regulator

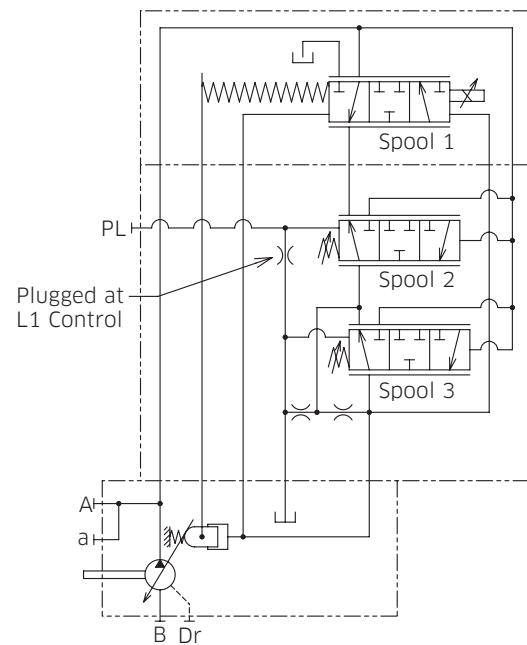
◆ Electric Displacement Control (Positive Control)

- With Fail-safe Function (Ordering Code[11]: E2, E3)
- Without Fail-safe Function (Ordering Code[11]: F2, F3)



Spool 1: Electric Flow Control Valve
 Spool 2: Differential Spool
 Spool 3: Cut-off Spool

Hydraulic Circuit With Fail-safe Function



Spool 1: Electric Flow Control Valve
 Spool 2: Differential Spool
 Spool 3: Cut-off Spool

Hydraulic Circuit Without Fail-safe Function

2. Technical Information

2-3 Functional Description of Pump

◆ Change Pump Maximum Displacement (Ordering Code : None)

Pump Maximum displacement can be changed to the below list by the replacement of the Qmax. stopper. It can be applied to Standard type and with Horsepower control. Refer to the instruction manual for replacement procedures.

Pump Size	Qmax. Stopper (for Standard type · with Horsepower control)					
	Default	- 5 cm ³	- 10 cm ³	- 15 cm ³	- 20 cm ³	- 25 cm ³
K3VLS50	50	45	40	35	-	-
K3VLS65	65	60	55	-	-	-
K3VLS85	85	80	75	70	-	-
K3VLS105	105	100	95	90	-	-
K3VLS150	150	145	140	-	130	125

Unit : cm³

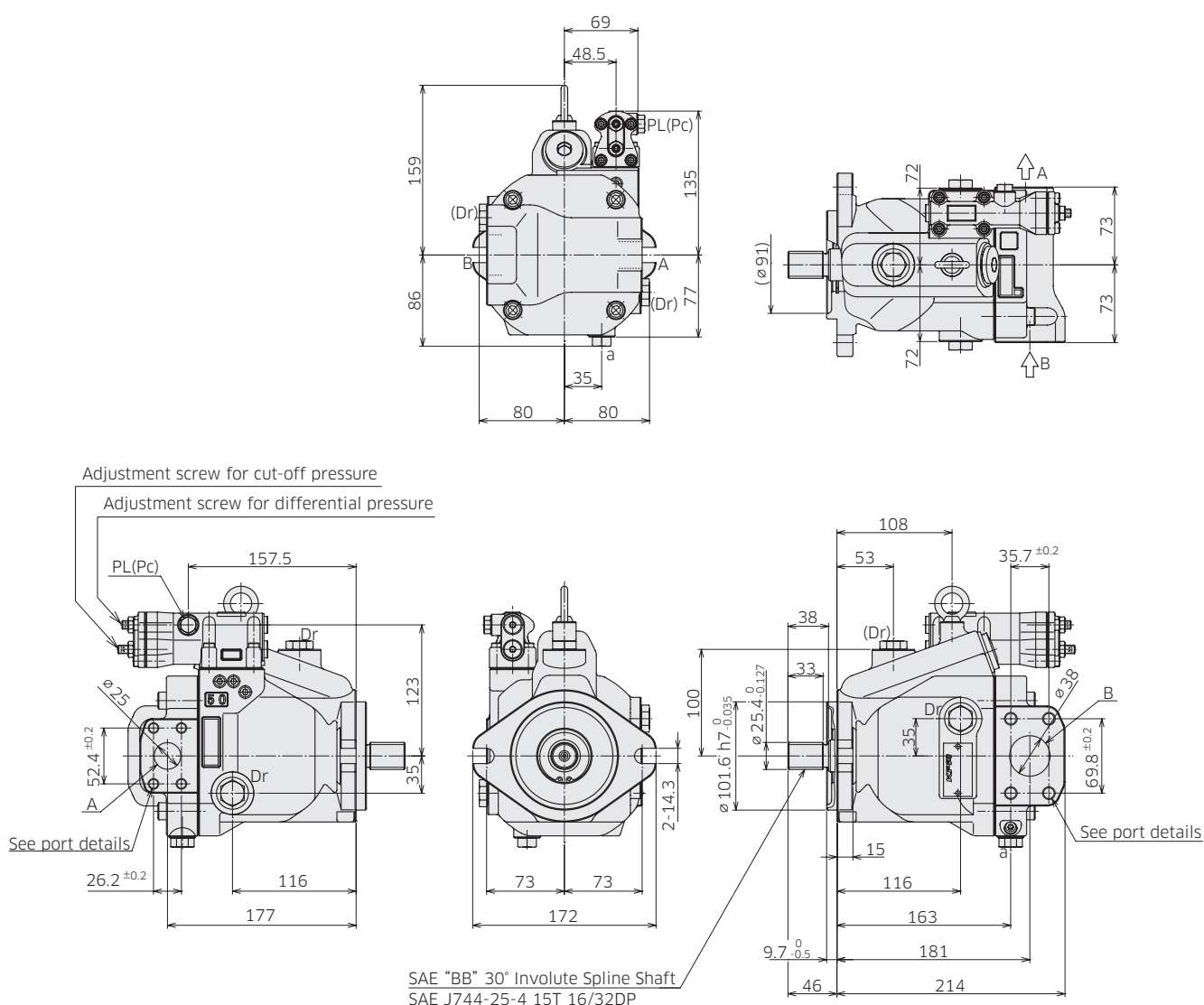
3 Dimensions

3-1 Installation Dimensions

*Dimensions in mm.

◆ K3VLS50 with Cut-off/Load Sense Control, Side Port (Clockwise Rotation)

Model Code : K3VLS 50 - 1 0 R BB * - L0 A
 : K3VLS 50 - 1 0 R BB * - L1 A
 : K3VLS 50 - 1 0 R BB * - P0 A



Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit.

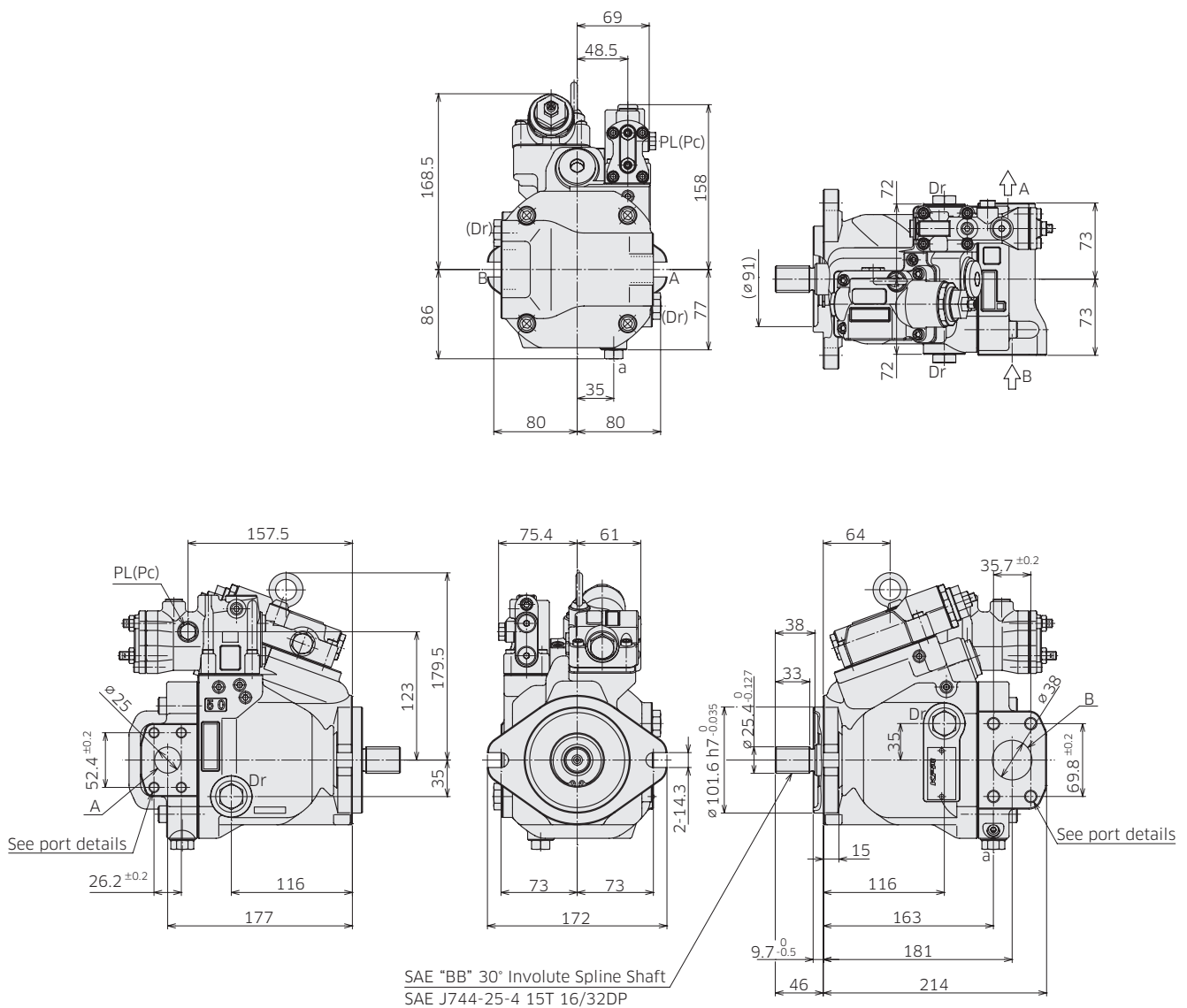
3. Dimensions

3-1 Installation Dimensions

*Dimensions in mm.

◆ K3VLS50 with Torque Limit Control, Side Port (Clockwise Rotation)

Model Code : K3VLS 50 - 1 0 R BB * - L0 A A
 : K3VLS 50 - 1 0 R BB * - L1 A A
 : K3VLS 50 - 1 0 R BB * - P0 A A



3. Dimensions

3-1 Installation Dimensions

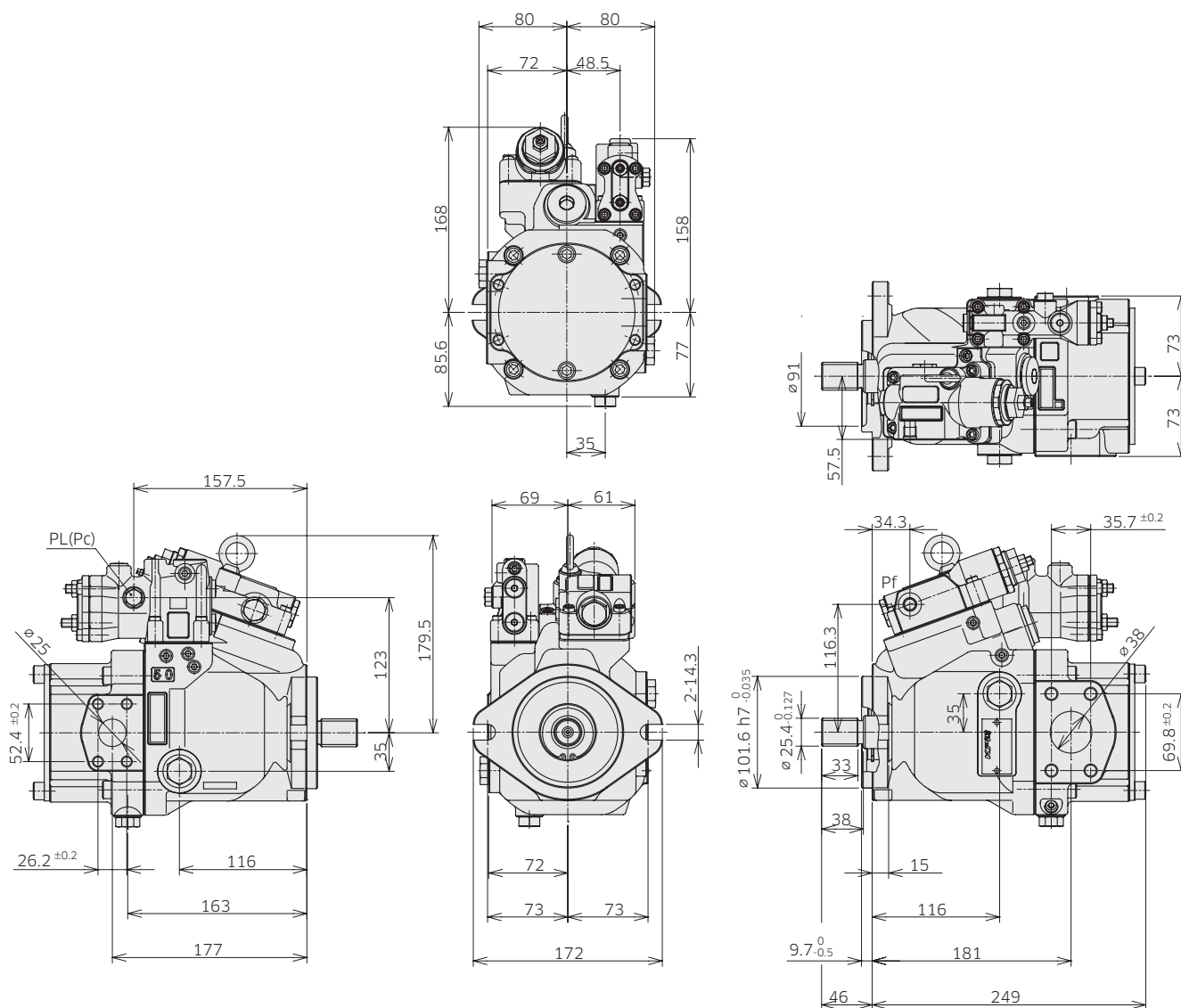
* Dimensions in mm.

◆ K3VLS50 Torque Limit with Power Shift Control, Side Port (Clockwise Rotation)

Model Code : K3VLS 50 - 1 N R BB * - L0 A B

: K3VLS 50 - 1 N R BB * - L1 A B

: K3VLS 50 - 1 N R BB * - P0 A B



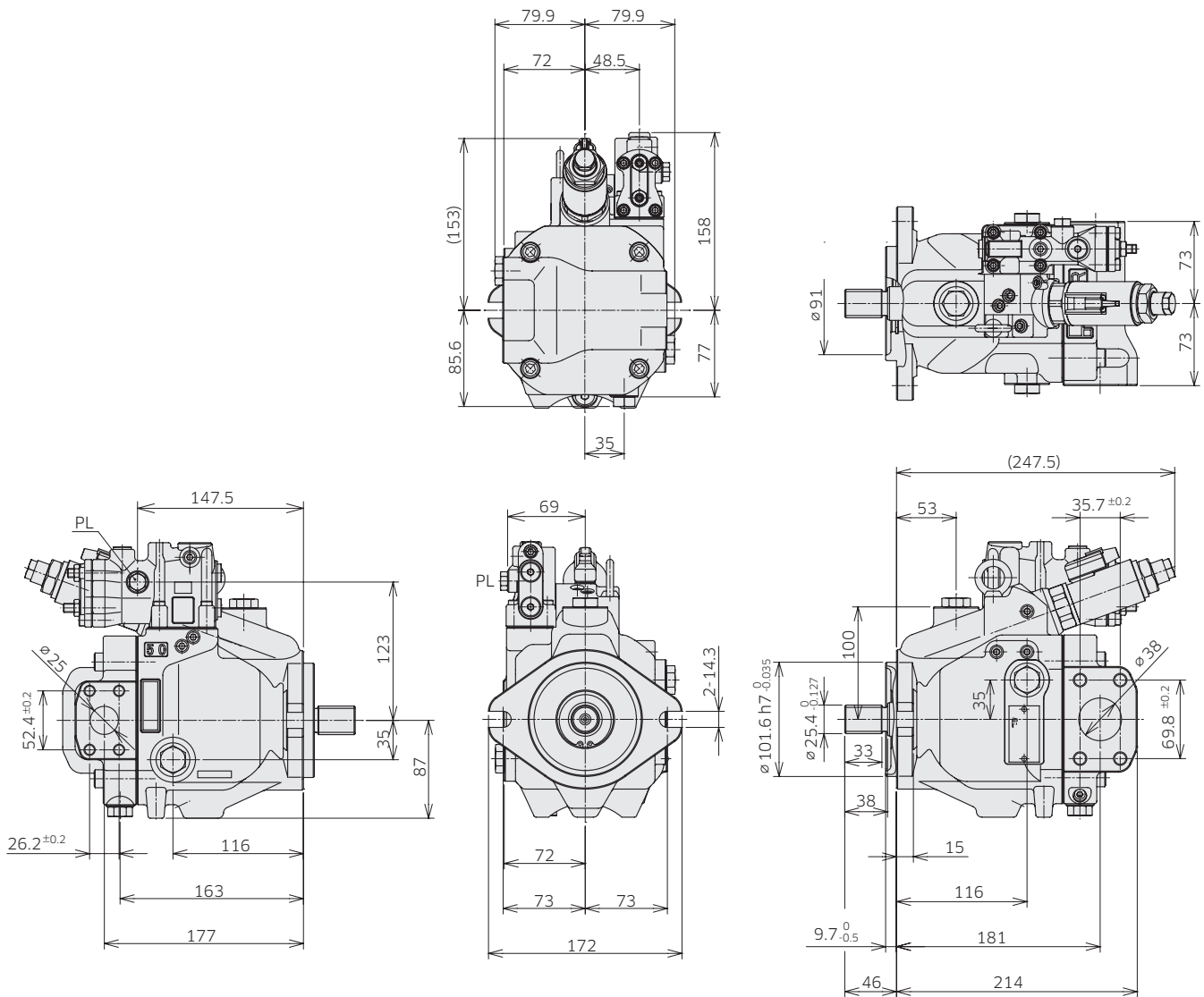
3. Dimensions

3-1 Installation Dimensions

* Dimensions in mm.

◆ K3VLS50 Electric Displacement Control , Side Port (Clockwise Rotation)

Model Code : K3VLS 50 - 1 0 R BB * - LO A E or - LO A F
 : K3VLS 50 - 1 0 R BB * - L1 A E or - L1 A F
 : K3VLS 50 - 1 0 R BB * - PO A E or - PO A F



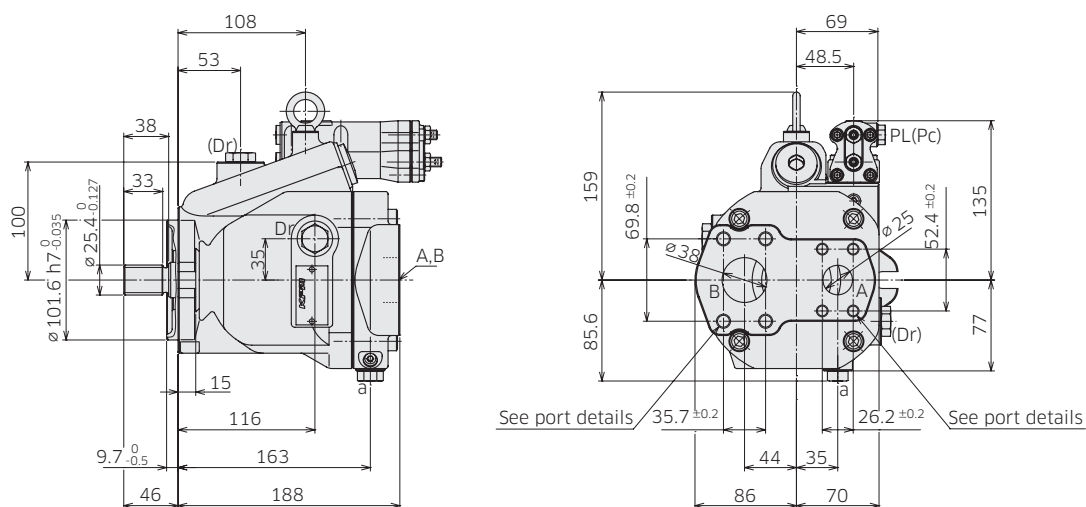
3. Dimensions

3-1 Installation Dimensions

* Dimensions in mm.

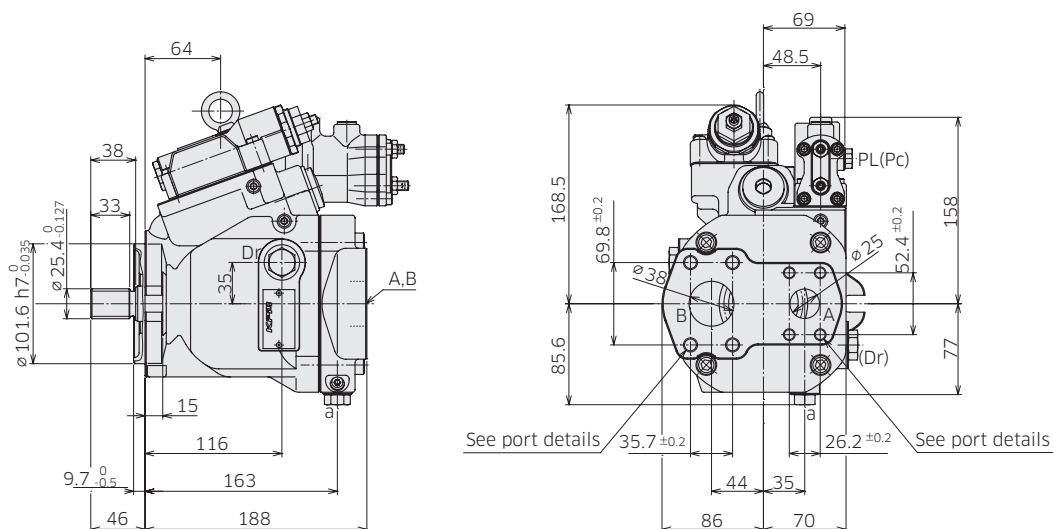
◆ K3VLS50 Rear Port (Clockwise Rotation)

Model Code : K3VLS 50 - 1 R R BB * - L0 A
 : K3VLS 50 - 1 R R BB * - L1 A
 : K3VLS 50 - 1 R R BB * - P0 A



◆ K3VLS50 Torque Limit Control, Rear Port (Clockwise Rotation)

Model Code : K3VLS 50 - 1 R R BB * - L0 A A
 : K3VLS 50 - 1 R R BB * - L1 A A
 : K3VLS 50 - 1 R R BB * - P0 A A



3. Dimensions

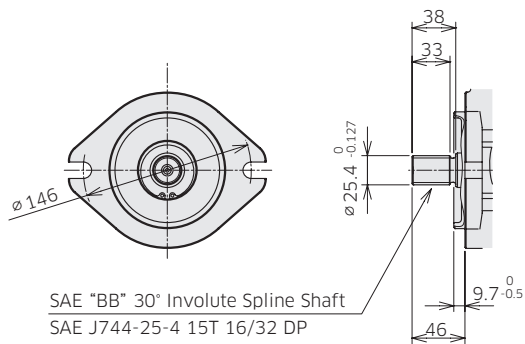
3-1 Installation Dimensions

*Dimensions in mm.

◆ K3VLS50 Mounting Flange and Shaft Options

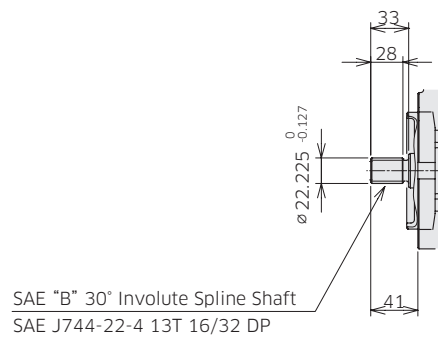
SAE BB Spline Shaft

Ordering Code "7. Mounting Flange and Shaft": BB



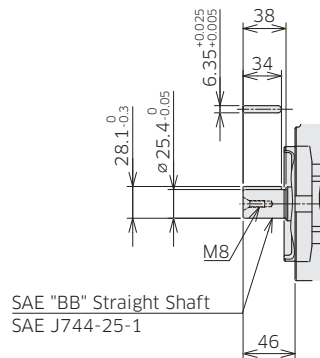
SAE B Spline Shaft

Ordering Code "7. Mounting Flange and Shaft": B



SAE BB Keyed Shaft

Ordering Code "7. Mounting Flange and Shaft": K2



Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit.

◆ K3VLS50 Porting Details

Main SAE Flanged Ports

Des	Port name	Port size	Flange threads	Tightening torque (Nm)
-----	-----------	-----------	----------------	------------------------

UNF Threaded Version ('S' in position 8 of model code)

A	Delivery port	SAE J518C std pressure (code 61) 1"	3/8-16UNC-2B-18	57
B	Suction port	SAE J518C std pressure (code 61) 1-1/2"	1/2-13UNC-2B-22	98

Metric Version ('H' in position 8 of model code)

A	Delivery port	PORT ISO 6162-1: 2012 P25M	M10-17	57
B	Suction port	PORT ISO 6162-1: 2012 P38M	M12-20	98

Auxiliary Ports

Des	Port name	Port size	Tightening torque (Nm)
-----	-----------	-----------	------------------------

SAE Version

Dr	Drain port	3/4-16UNF-2B-14.3 (ISO 11926-1: 1995)	98
PL	Load sensing port	7/16-20UNF-2B-11.5 (ISO 11926-1: 1995)	12
Pc	Pressure control port	7/16-20UNF-2B-11.5 (ISO 11926-1: 1995)	12
a	Gauge port	9/16-18UNF-2B-12.7 (ISO 11926-1: 1995)	59
Psv	Servo pressure port	7/16-20UNF-2B-11.5 (ISO 11926-1: 1995)	12
Pf	Power shift pressure port	7/16-20UNF-2B-11.5 (ISO 11926-1: 1995)	12

3. Dimensions

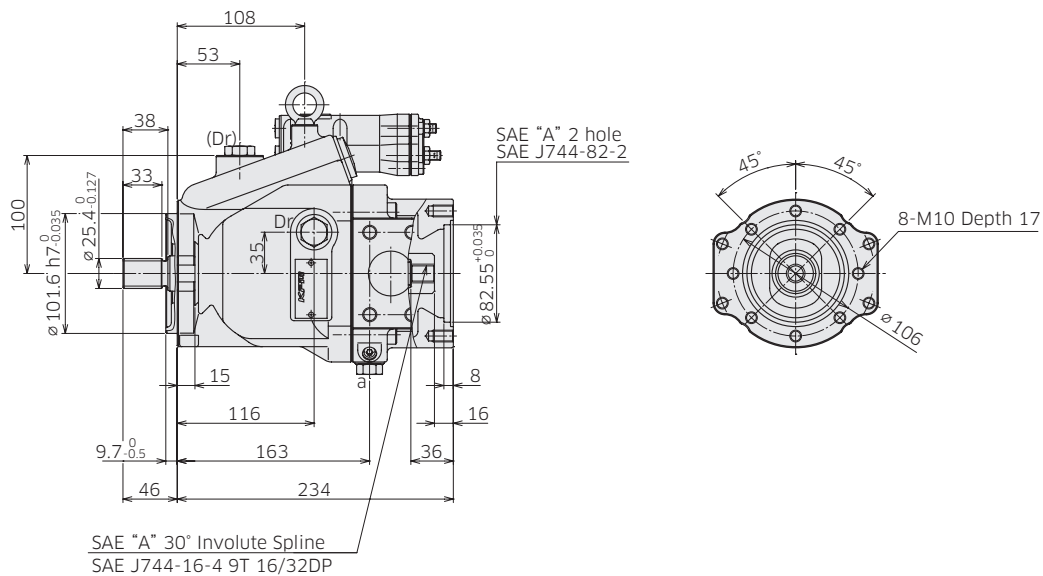
3-1 Installation Dimensions

* Dimensions in mm.

◆ K3VLS50 Through Drive Options

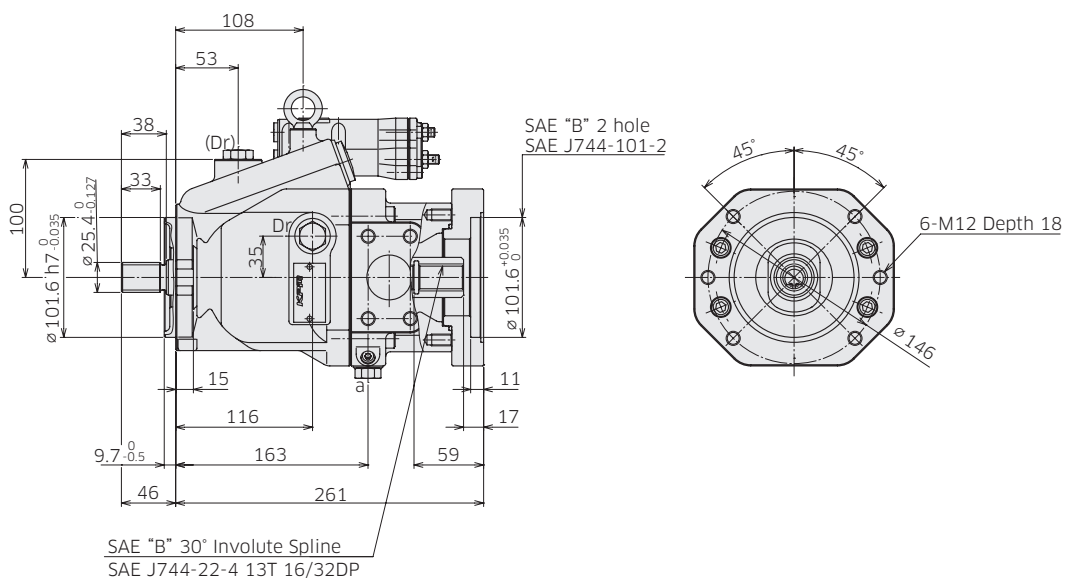
Through Drive SAE A

Ordering Code "5. Through Drive and Porting": A



Through Drive SAE B

Ordering Code "5. Through Drive and Porting": B



Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit.

3. Dimensions

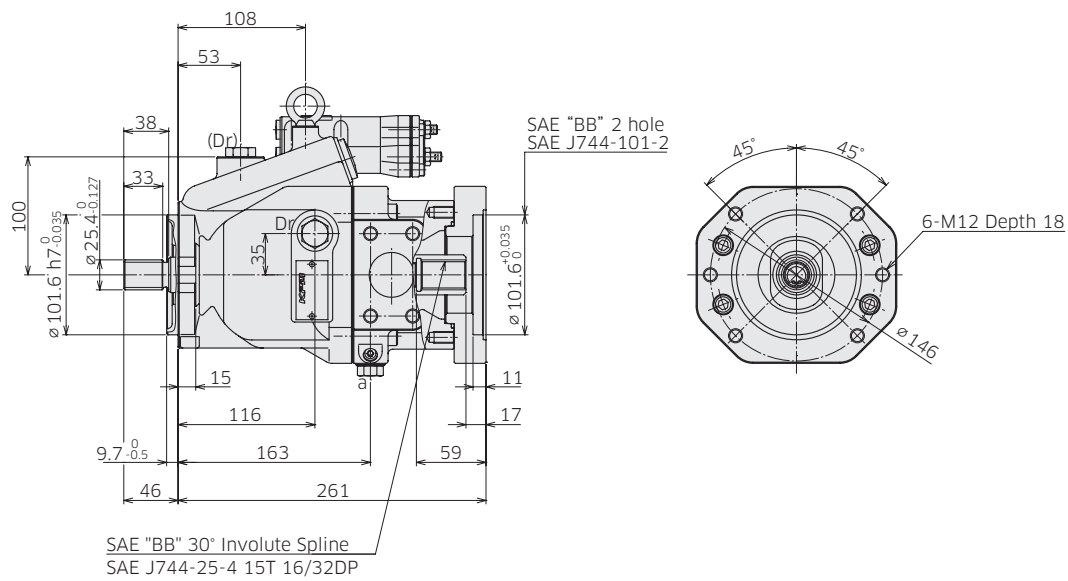
3-1 Installation Dimensions

*Dimensions in mm.

◆ K3VLS50 Through Drive Options

Through Drive SAE BB

Ordering Code "5. Through Drive and Porting": BB



Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit.

3. Dimensions

3-1 Installation Dimensions

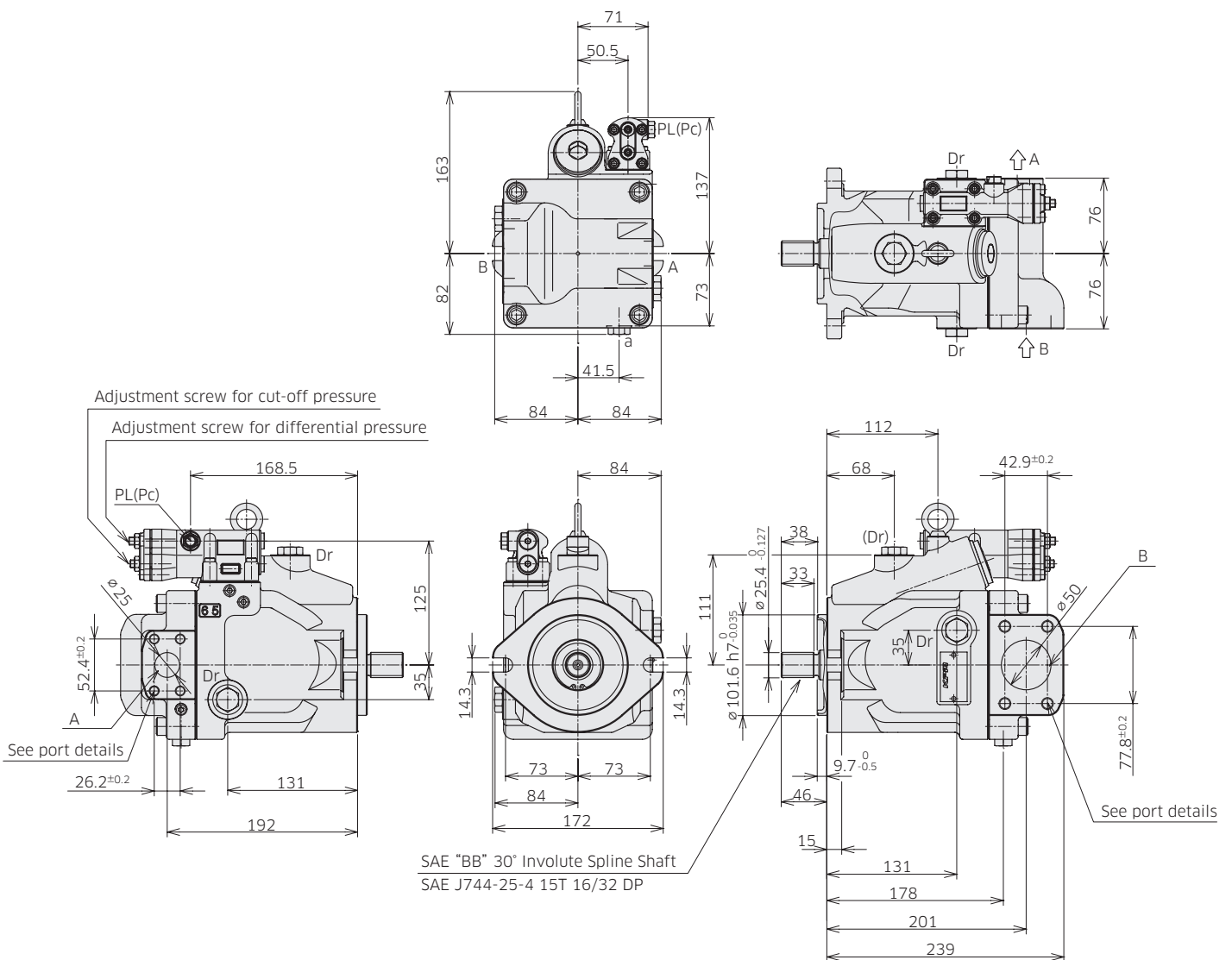
*Dimensions in mm.

◆ K3VLS65 with Cut-off / Load Sense Control, Side Port (Clockwise Rotation)

Model Code : K3VLS 65 - 1 0 R BB * - L0 A

: K3VLS 65 - 1 0 R BB * - L1 A

: K3VLS 65 - 1 0 R BB * - P0 A



Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit.

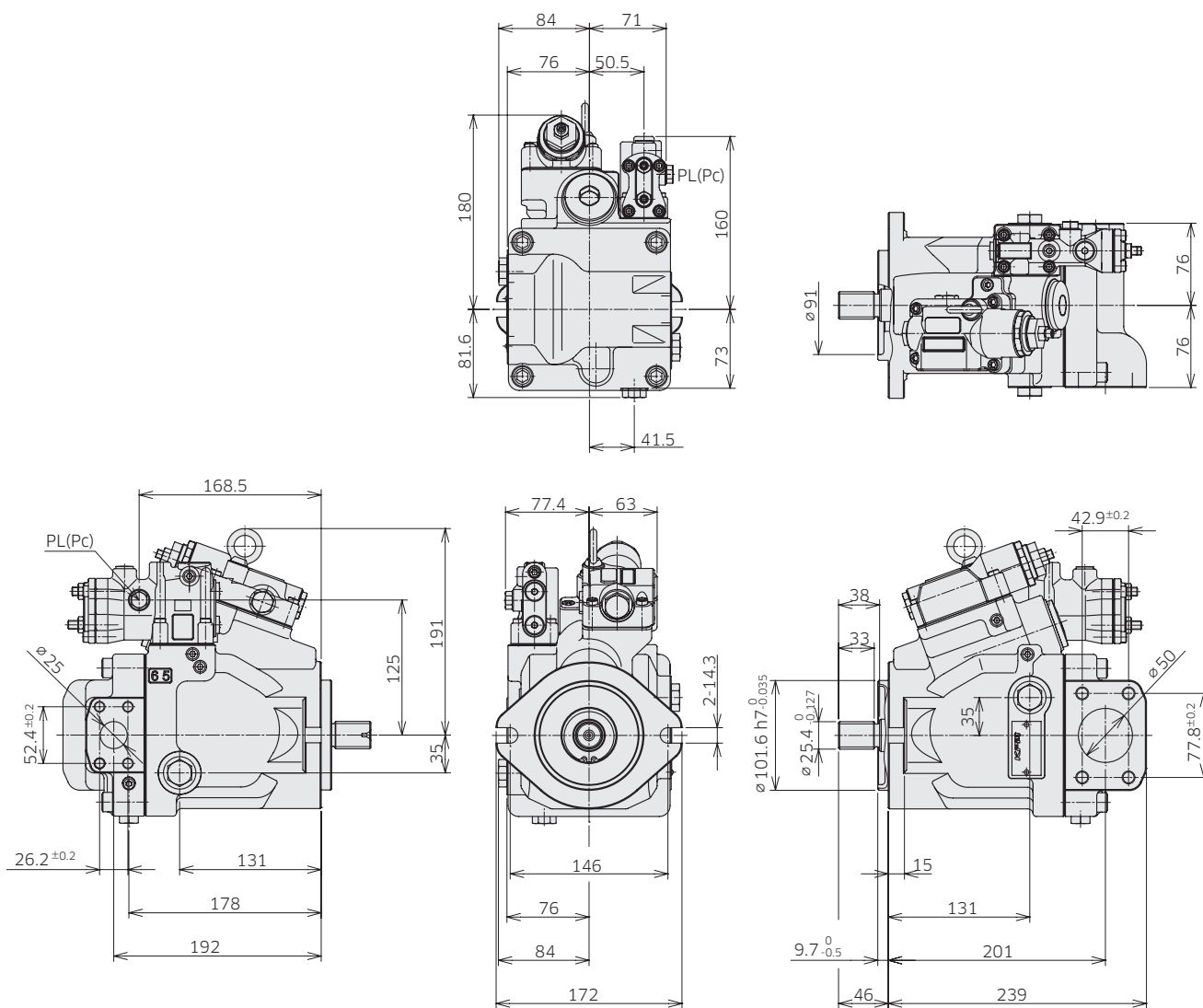
3. Dimensions

3-1 Installation Dimensions

* Dimensions in mm.

◆ K3VLS65 Torque Limit Control, Side Port (Clockwise Rotation)

Model Code : K3VLS 65 - 1 0 R BB * - L0 A A
 : K3VLS 65 - 1 0 R BB * - L1 A A
 : K3VLS 65 - 1 0 R BB * - P0 A A



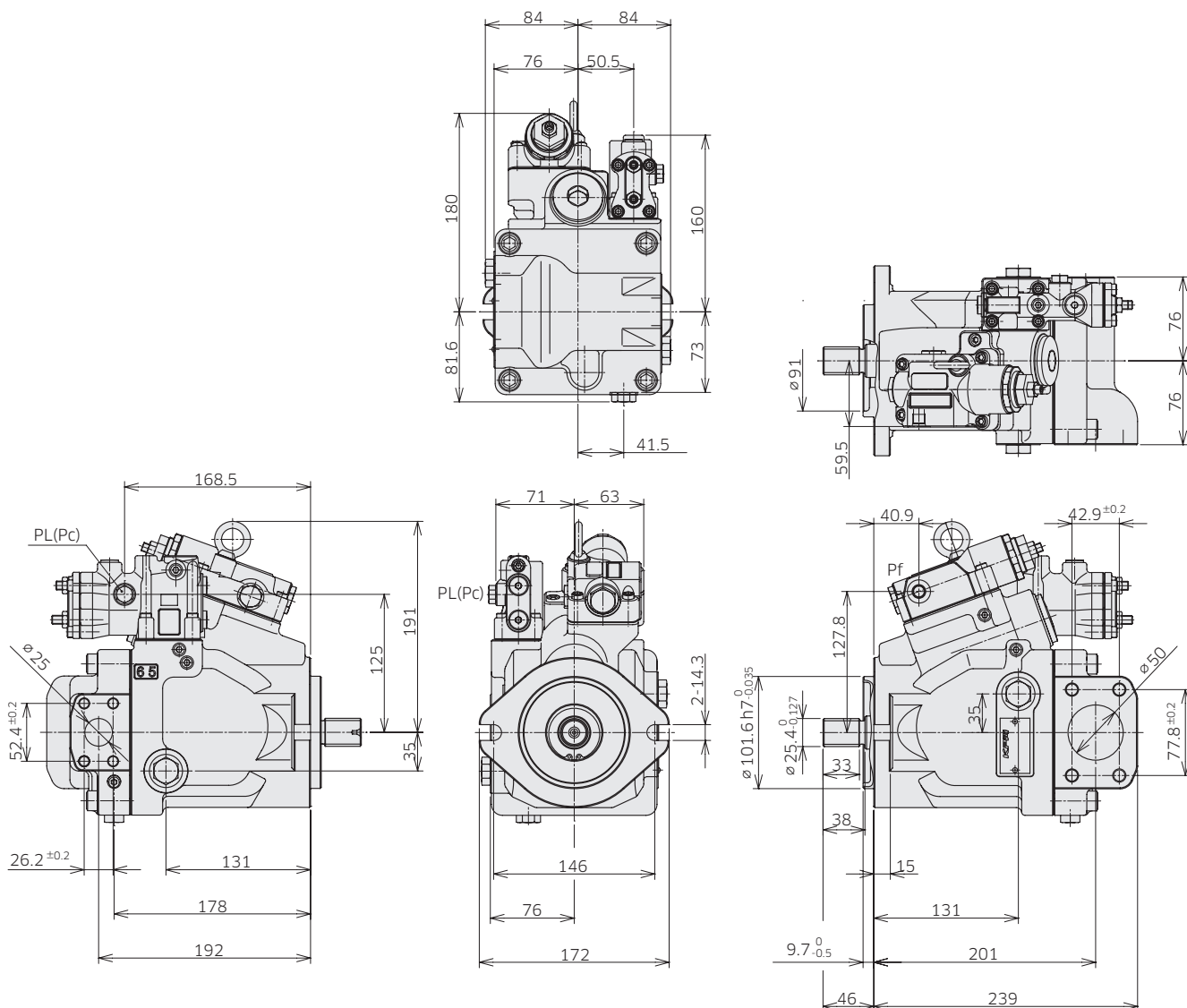
3. Dimensions

3-1 Installation Dimensions

* Dimensions in mm.

◆ K3VLS65 Torque Limit with Power Shift Control, Side Port (Clockwise Rotation)

Model Code : K3VLS 65 - 1 0 R BB * - L0 A B
 : K3VLS 65 - 1 0 R BB * - L1 A B
 : K3VLS 65 - 1 0 R BB * - P0 A B



3. Dimensions

3-1 Installation Dimensions

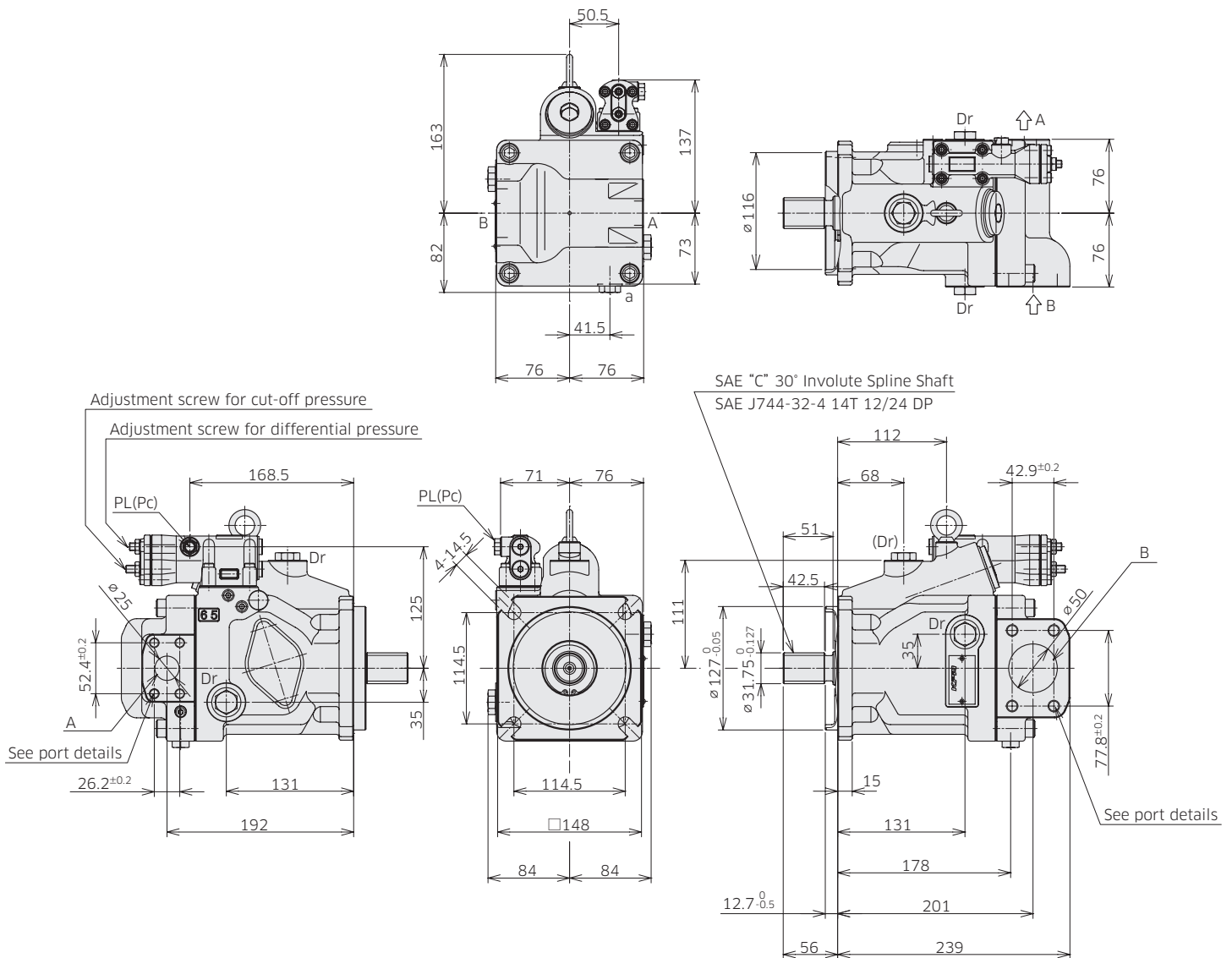
*Dimensions in mm.

◆ K3VLS65 with Cut-off Load Sense Control, Side Port (Clockwise Rotation, SAE C-4 Mount Type)

Model Code : K3VLS 65 - 1 0 R C * - L0 A

: K3VLS 65 - 1 0 R C * - L1 A

: K3VLS 65 - 1 0 R C * - P0 A



Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit.

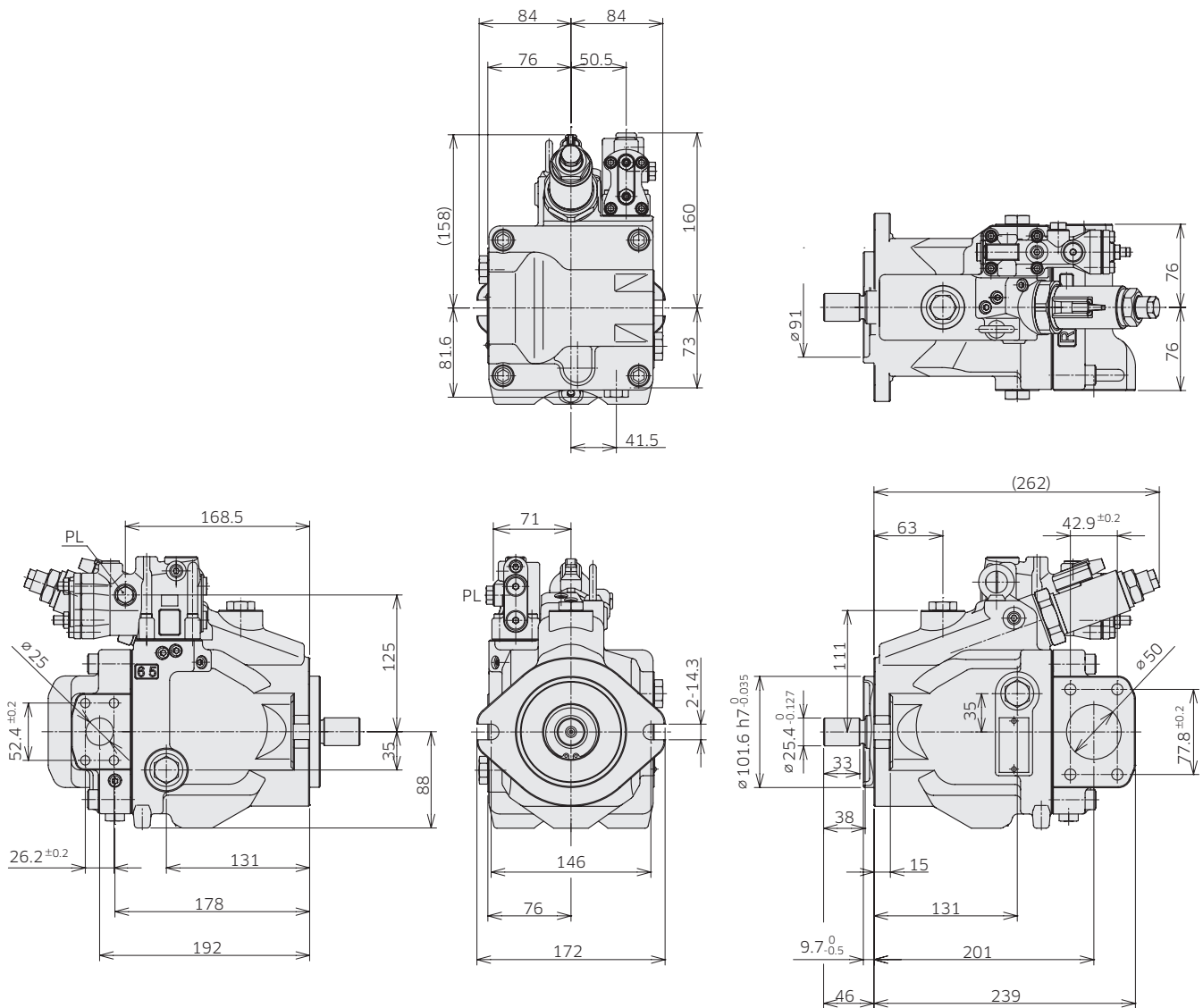
3. Dimensions

3-1 Installation Dimensions

* Dimensions in mm.

◆ K3VLS65 Electric Displacement Control , Side Port (Clockwise Rotation)

Model Code : K3VLS 65 - 1 0 R BB * - L0 A E or - L0 A F
 : K3VLS 65 - 1 0 R BB * - L1 A E or - L1 A F
 : K3VLS 65 - 1 0 R BB * - P0 A E or - P0 A F



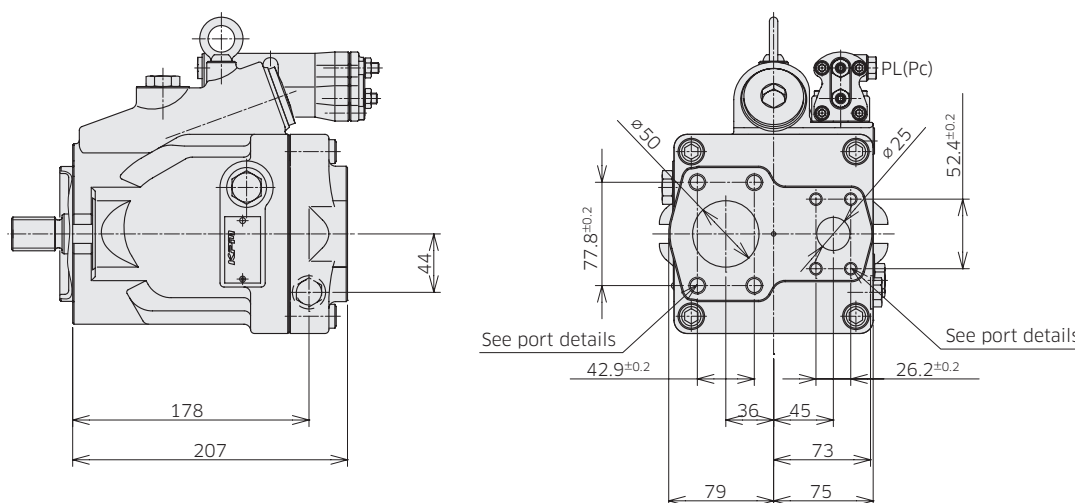
3. Dimensions

3-1 Installation Dimensions

* Dimensions in mm.

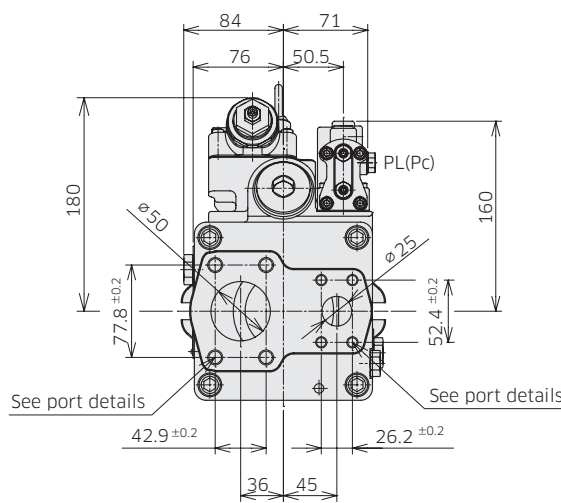
◆ K3VLS65 Rear Port (Clockwise Rotation)

Model Code : K3VLS 65 - 1 R R BB * - L0 A
 : K3VLS 65 - 1 R R BB * - L1 A
 : K3VLS 65 - 1 R R BB * - P0 A



◆ K3VLS65 Torque Limit Control, Rear Port (Clockwise Rotation)

Model Code : K3VLS 65 - 1 R R BB * - L0 A A
 : K3VLS 65 - 1 R R BB * - L1 A A
 : K3VLS 65 - 1 R R BB * - P0 A A



3. Dimensions

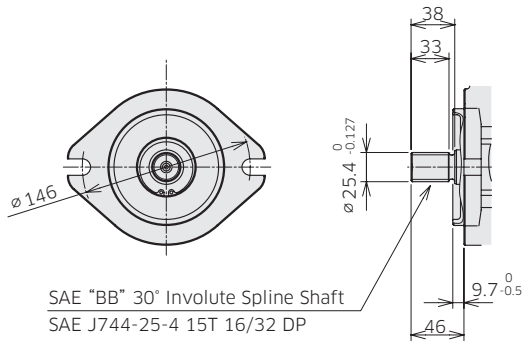
3-1 Installation Dimensions

* Dimensions in mm.

◆ K3VLS65 Mounting Flange and Shaft Options

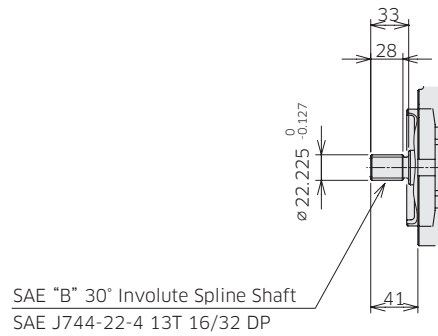
SAE BB Spline Shaft

Ordering Code "7. Mounting Flange and Shaft": BB



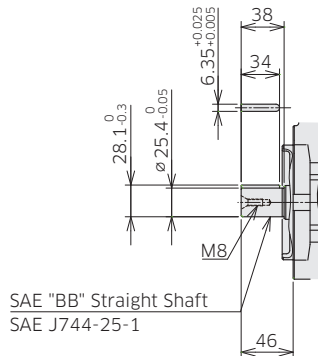
SAE B Spline Shaft

Ordering Code "7. Mounting Flange and Shaft": B



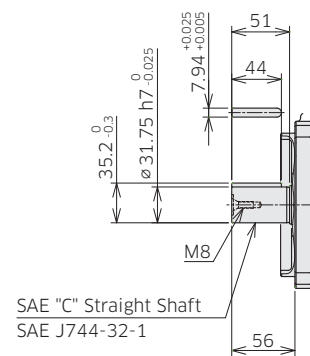
SAE BB Keyed Shaft

Ordering Code "7. Mounting Flange and Shaft": K2



SAE C Keyed Shaft

Ordering Code "7. Mounting Flange and Shaft": K3



Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit.

◆ K3VLS65 Porting Details

Main SAE Flanged Ports

Des	Port name	Port size	Flange threads	Tightening torque (Nm)
-----	-----------	-----------	----------------	------------------------

UNF Threaded Version ('S' in position 8 of model code)

A	Delivery port	SAE J518C std pressure (code 61) 1"	3/8-16UNC-2B-18	57
B	Suction port	SAE J518C std pressure (code 61) 2"	1/2-13UNC-2B-22	98

Metric Version ('H' in position 8 of model code)

A	Delivery port	PORT ISO 6162-1: 2012 P25M	M10-17	57
B	Suction port	PORT ISO 6162-1: 2012 P51M	M12-20	98

Auxiliary Ports

Des	Port name	Port size	Tightening torque (Nm)
-----	-----------	-----------	------------------------

SAE Version

Dr	Drain port	3/4-16UNF-2B-14.3 (ISO 11926-1: 1995)	98
PL	Load sensing port	7/16-20UNF-2B-11.5 (ISO 11926-1: 1995)	12
Pc	Pressure control port	7/16-20UNF-2B-11.5 (ISO 11926-1: 1995)	12
a	Gauge port	9/16-18UNF-2B-12.7 (ISO 11926-1: 1995)	59
Psv	Servo pressure port	7/16-20UNF-2B-11.5 (ISO 11926-1: 1995)	12
Pf	Power shift pressure port	7/16-20UNF-2B-11.5 (ISO 11926-1: 1995)	12

3. Dimensions

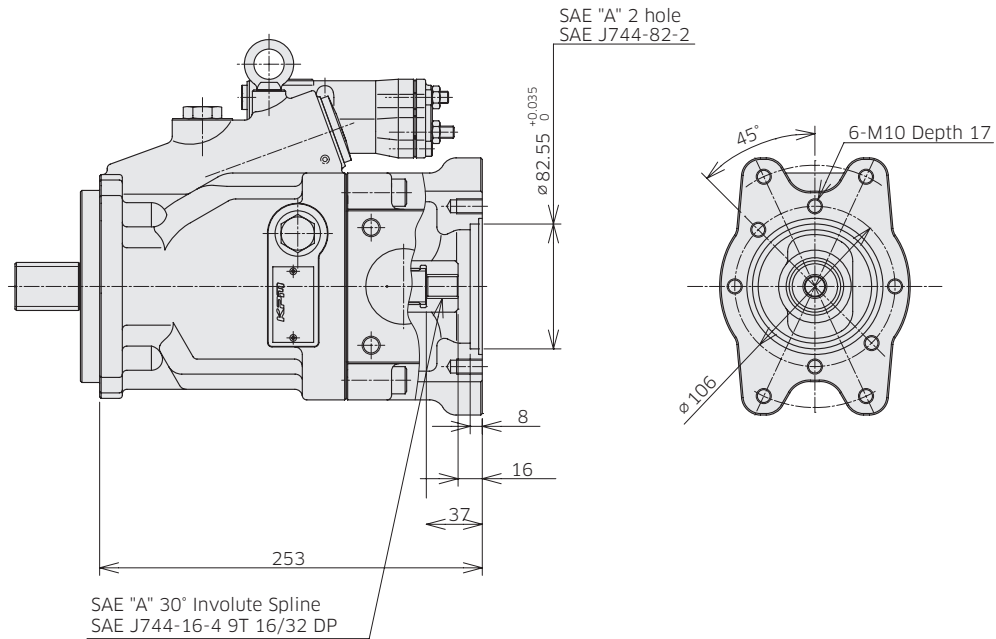
3-1 Installation Dimensions

* Dimensions in mm.

◆ K3VLS65 Through Drive Options

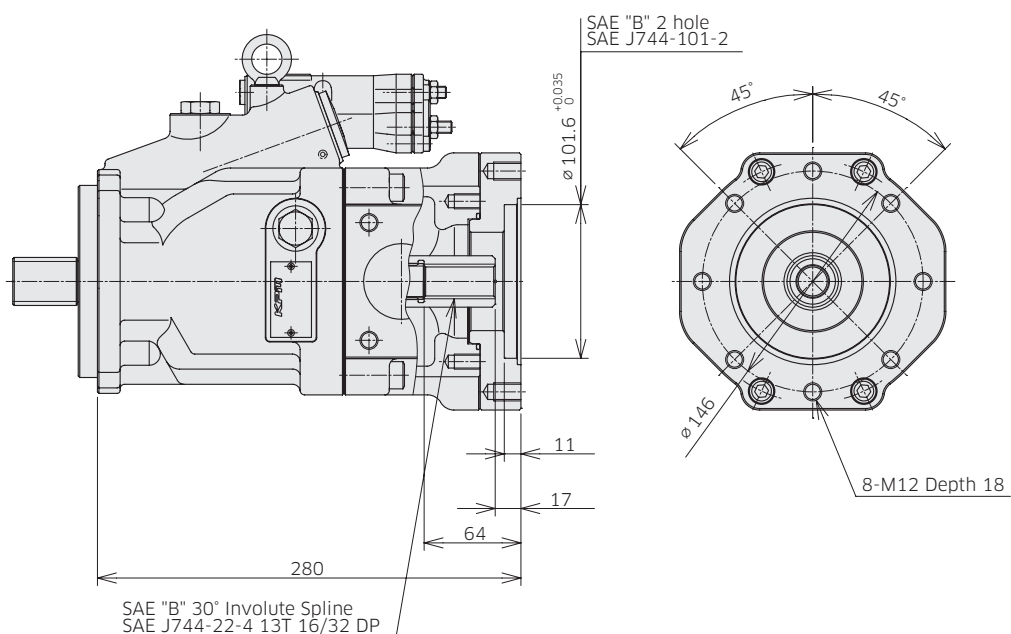
Through Drive SAE A

Ordering Code "5. Through Drive and Porting": A



Through Drive SAE B

Ordering Code "5. Through Drive and Porting": B



Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit.

3. Dimensions

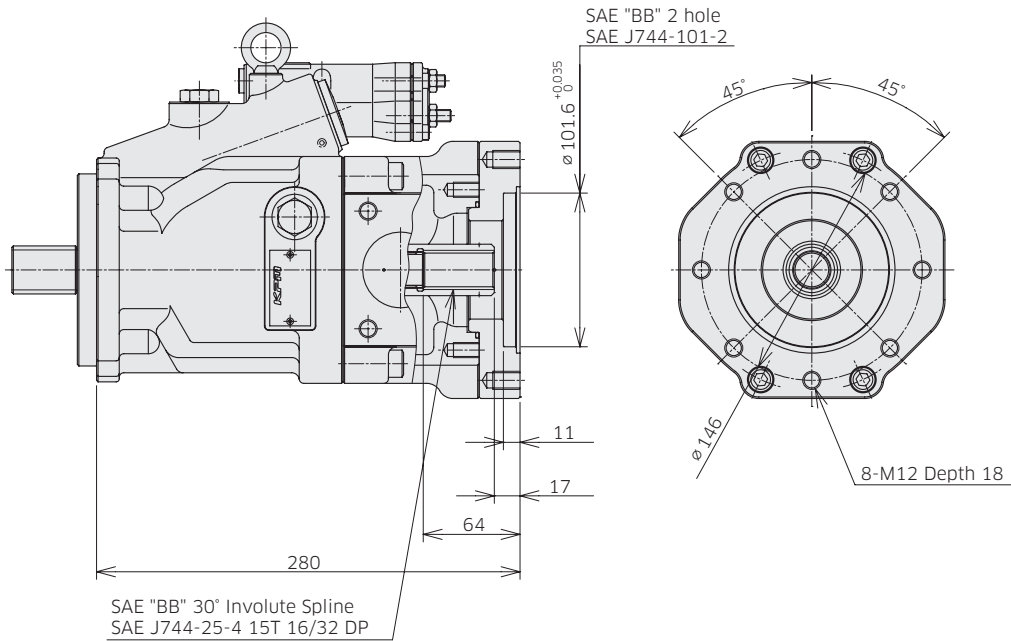
3-1 Installation Dimensions

* Dimensions in mm.

◆ K3VLS65 Through Drive Options

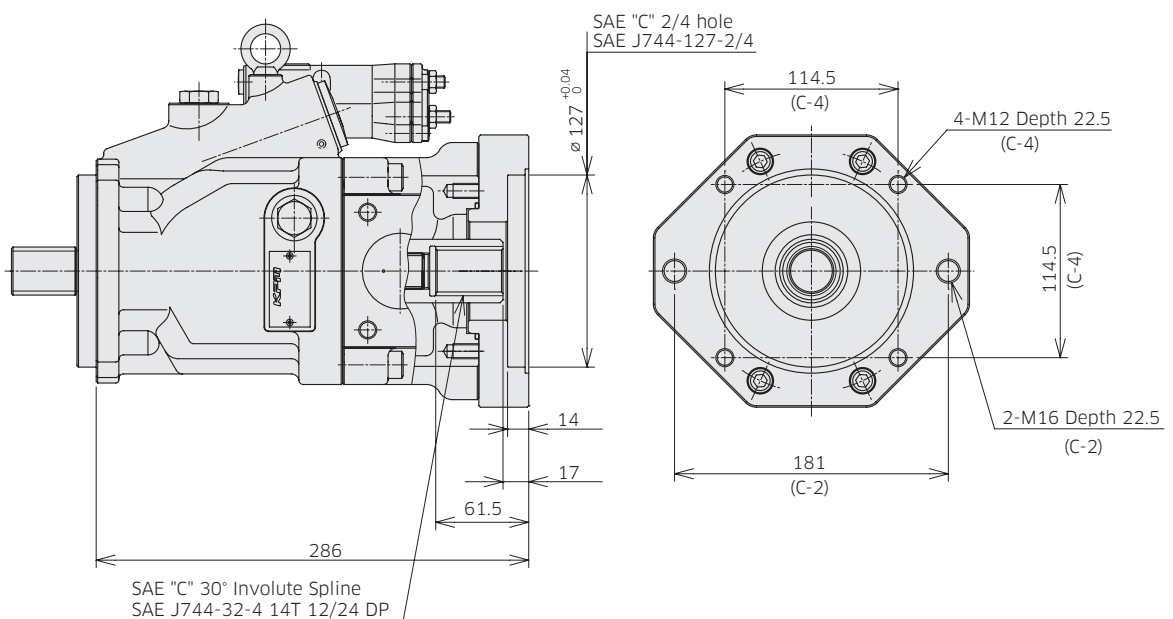
Through Drive SAE BB

Ordering Code "5. Through Drive and Porting": BB



Through Drive SAE C

Ordering Code "5. Through Drive and Porting": C



Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit.

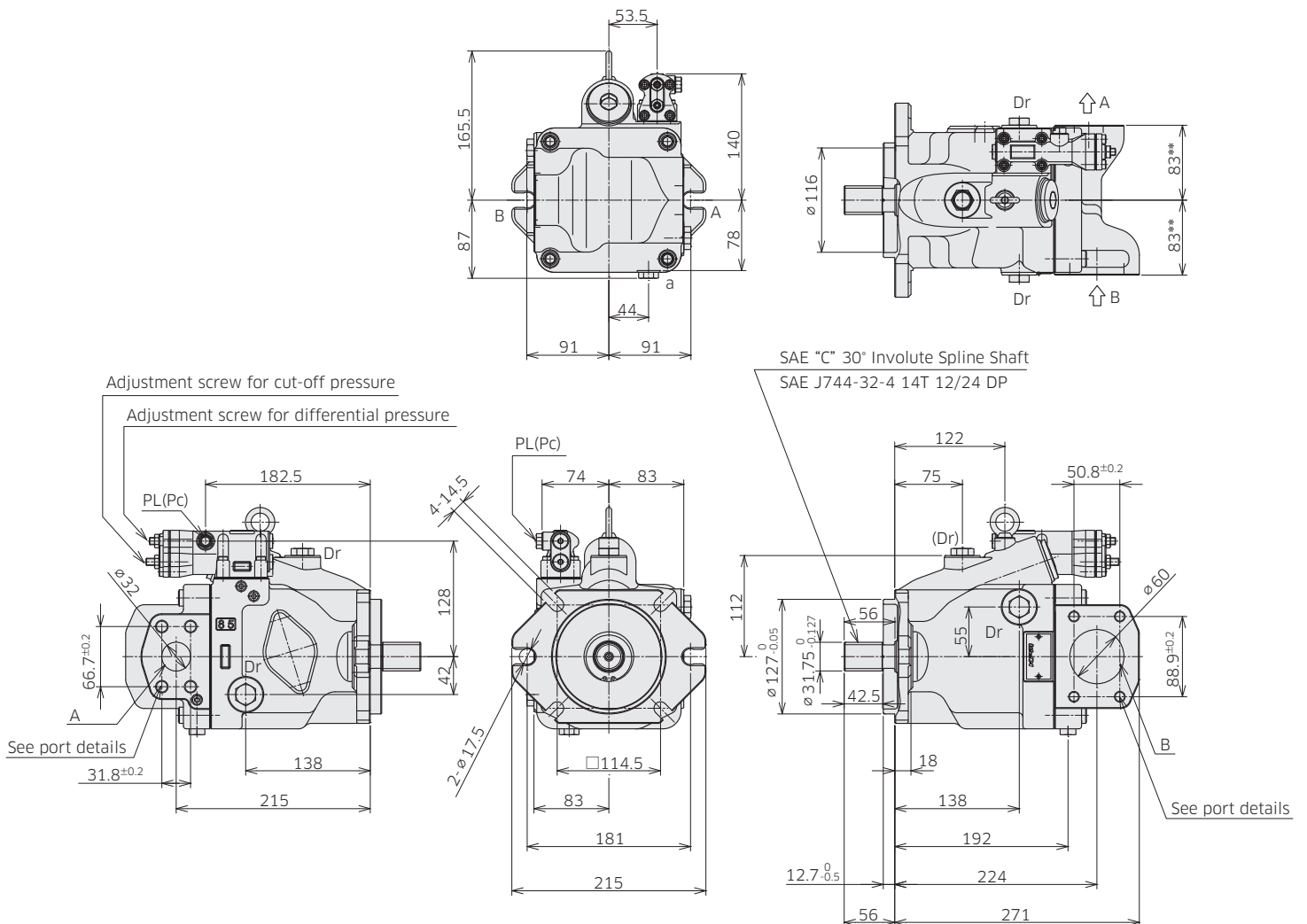
3. Dimensions

3-1 Installation Dimensions

* Dimensions in mm.

◆ K3VLS85 with Cut-off / Load Sense Control, Side Port (Clockwise Rotation)

Model Code : K3VLS 85 - 1 0 R C * - L0 A
 : K3VLS 85 - 1 0 R C * - L1 A
 : K3VLS 85 - 1 0 R C * - P0 A



Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit.
 (**) With a through drive is 86 mm

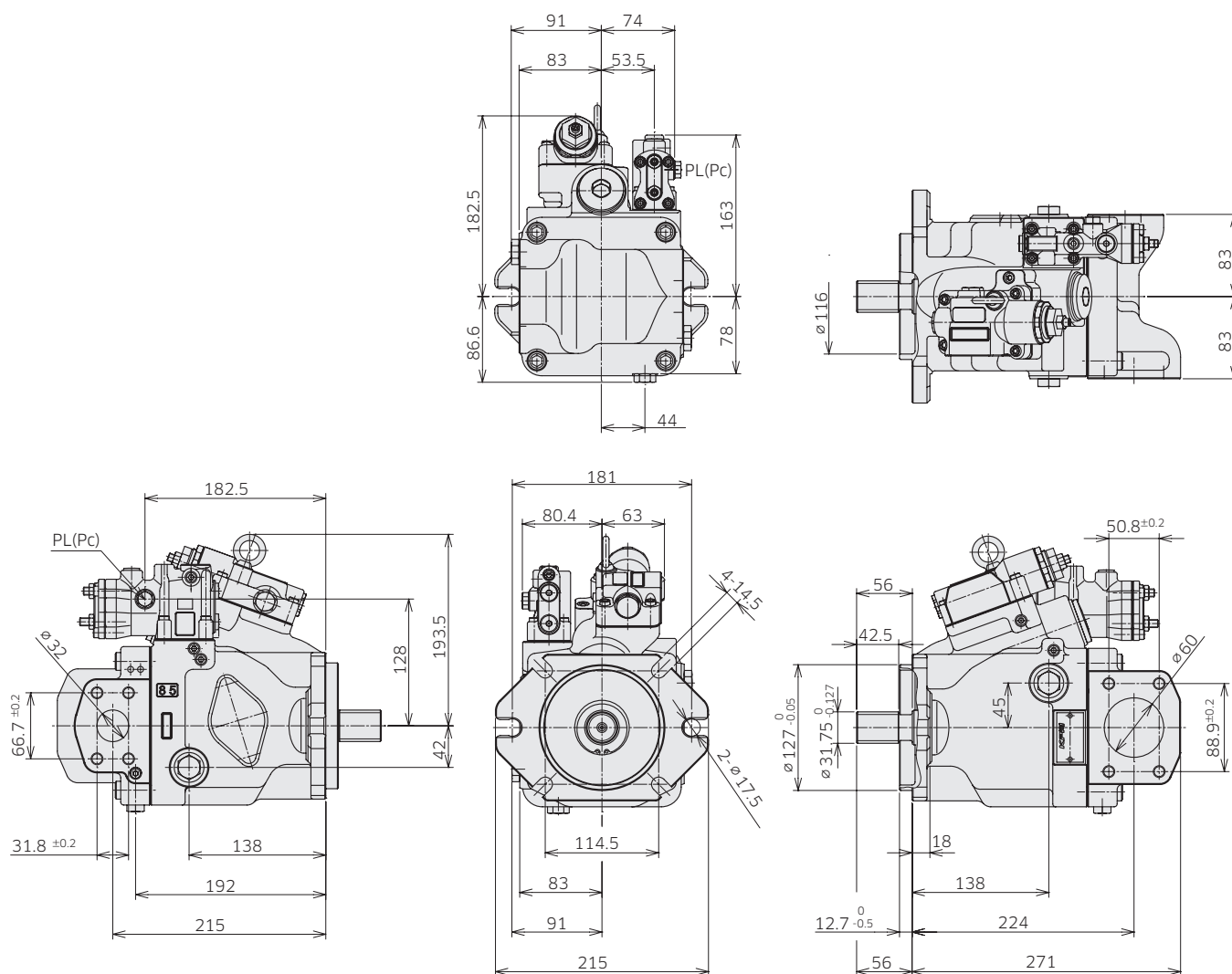
3. Dimensions

3-1 Installation Dimensions

*Dimensions in mm.

◆ K3VLS85 Torque Limit Control, Side Port (Clockwise Rotation)

Model Code : K3VLS 85 - 1 0 R C * - L0 A A
 : K3VLS 85 - 1 0 R C * - L1 A A
 : K3VLS 85 - 1 0 R C * - P0 A A



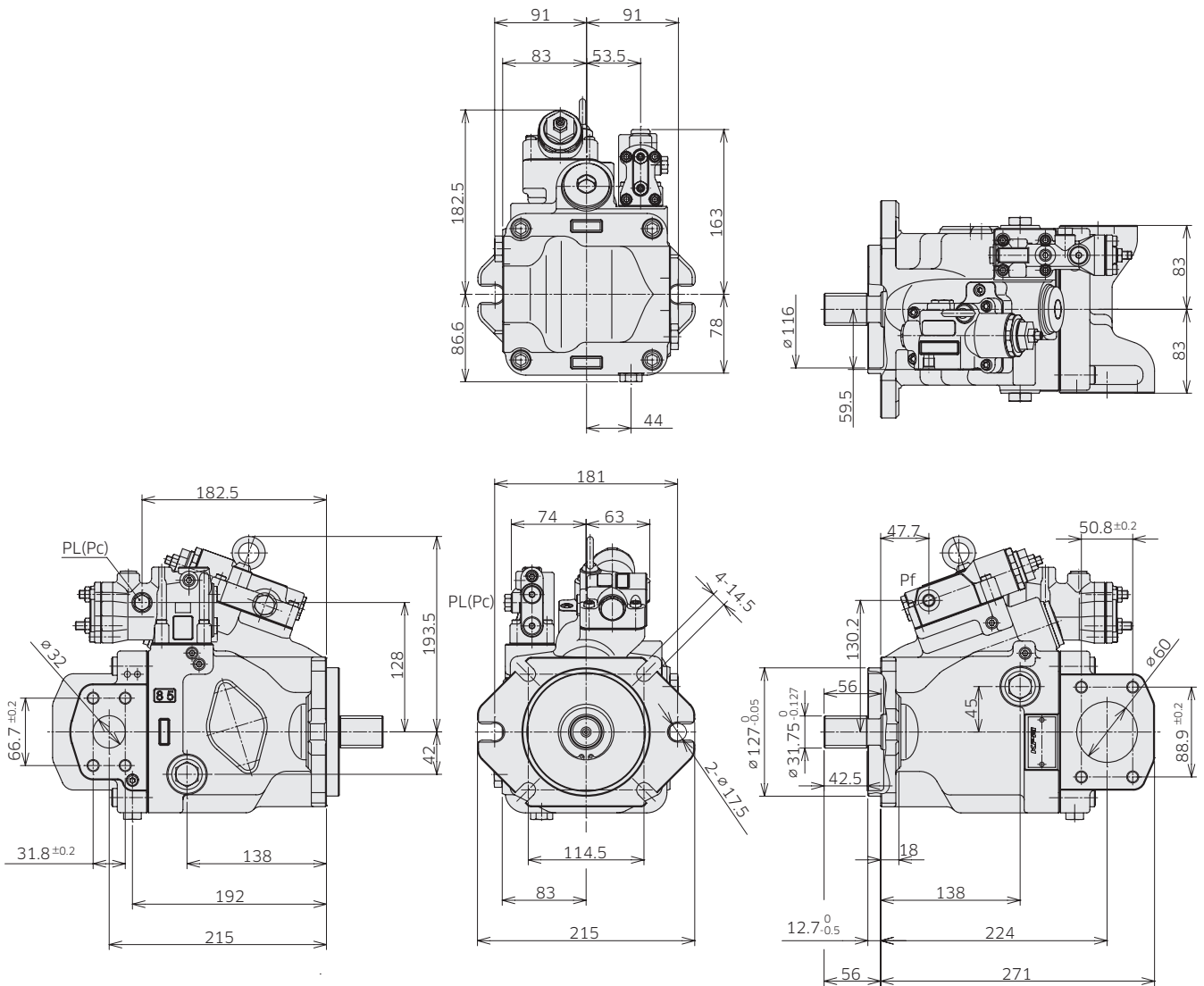
3. Dimensions

3-1 Installation Dimensions

*Dimensions in mm.

◆ K3VLS85 Torque Limit with Power Shift Control, Side Port (Clockwise Rotation)

Model Code : K3VLS 85 - 1 0 R C * - L0 A B
 : K3VLS 85 - 1 0 R C * - L1 A B
 : K3VLS 85 - 1 0 R C * - P0 A B



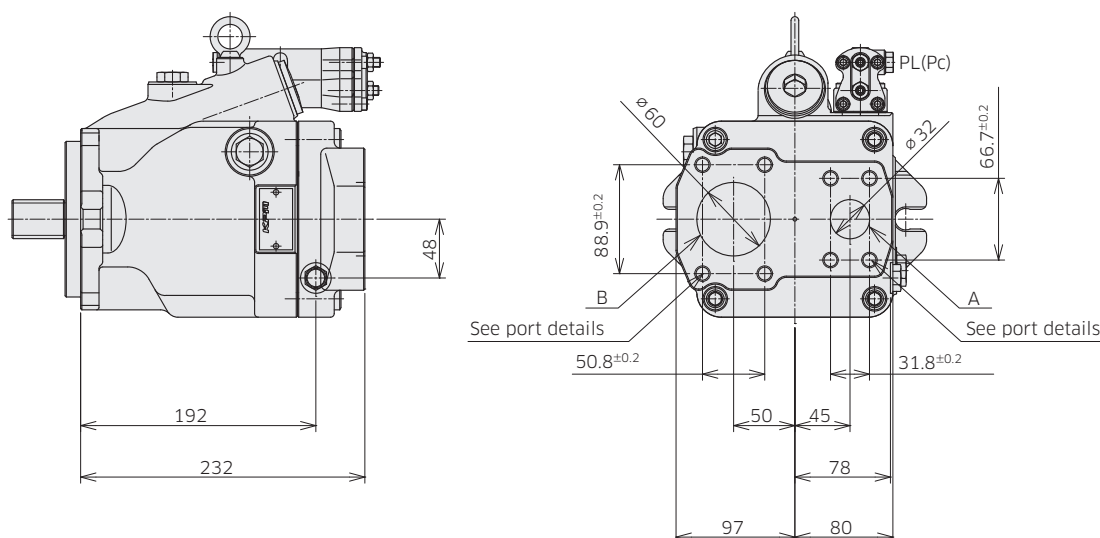
3. Dimensions

3-1 Installation Dimensions

* Dimensions in mm.

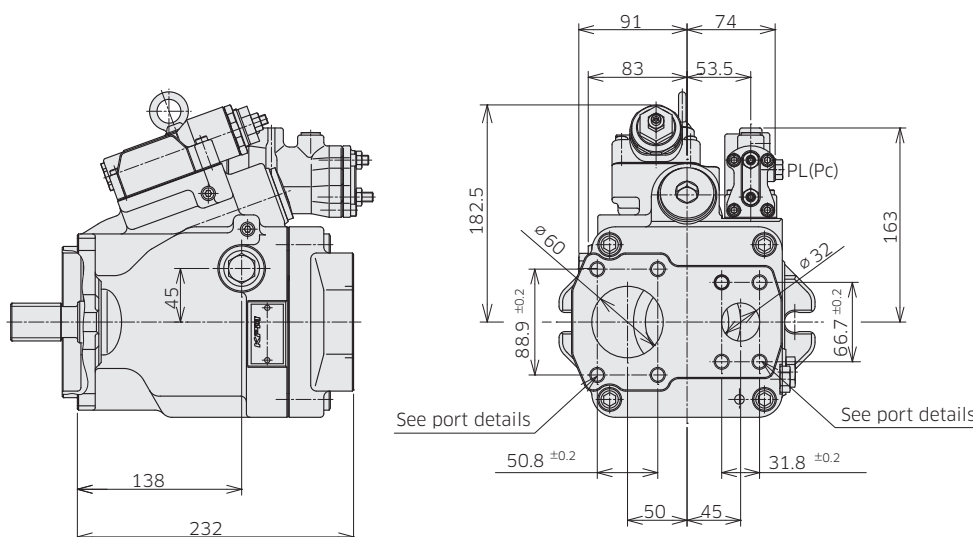
◆ K3VLS85 Rear Port (Clockwise Rotation)

Model Code : K3VLS 85 - 1 R R C * - L0 A
 : K3VLS 85 - 1 R R C * - L1 A
 : K3VLS 85 - 1 R R C * - PO A



◆ K3VLS85 Torque Limit Control, Rear Port (Clockwise Rotation)

Model Code : K3VLS 85 - 1 R R C * - L0 A A
 : K3VLS 85 - 1 R R C * - L1 A A
 : K3VLS 85 - 1 R R C * - PO A A



3. Dimensions

3-1 Installation Dimensions

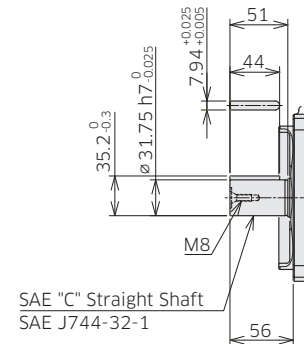
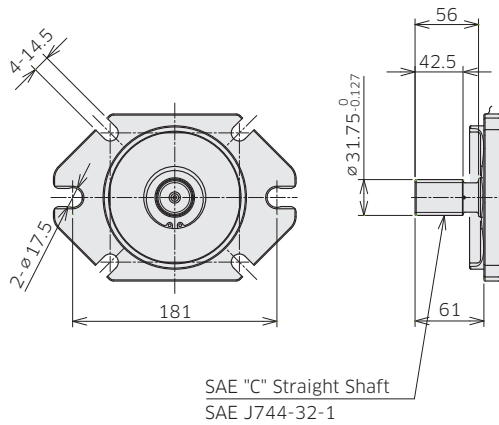
◆ K3VLS85 Mounting Flange and Shaft Options

SAE C Spline Shaft

Ordering Code "7. Mounting Flange and Shaft": C

SAE C Keyed Shaft

Ordering Code "7. Mounting Flange and Shaft": K3



◆ K3VLS85 Porting Details

Main SAE Flanged Ports

Des	Port name	Port size	Flange threads	Tightening torque (Nm)
-----	-----------	-----------	----------------	------------------------

UNF Threaded Version ('S' in position 8 of model code)

A	Delivery port	SAE J518C high pressure (code 62) 1-1/4"	1/2-13UNC-2B-22	98
B	Suction port	SAE J518C std pressure (code 61) 2-1/2"	1/2-13UNC-2B-22	98

Metric Version ('H' in position 8 of model code)

A	Delivery port	PORT ISO 6162-2: 2012 P32M	M12-23	98
B	Suction port	PORT ISO 6162-1: 2012 P64M	M12-22	98

Auxiliary Ports

Des	Port name	Port size	Tightening torque (Nm)
-----	-----------	-----------	------------------------

SAE Version

Dr	Drain port	3/4-16UNF-2B-14.3 (ISO 11926-1: 1995)	98
PL	Load sensing port	7/16-20UNF-2B-11.5 (ISO 11926-1: 1995)	12
Pc	Pressure control port	7/16-20UNF-2B-11.5 (ISO 11926-1: 1995)	12
a	Gauge port	9/16-18UNF-2B-12.7 (ISO 11926-1: 1995)	59
Psv	Servo pressure port	7/16-20UNF-2B-11.5 (ISO 11926-1: 1995)	12
Pf	Power shift pressure port	7/16-20UNF-2B-11.5 (ISO 11926-1: 1995)	12

3. Dimensions

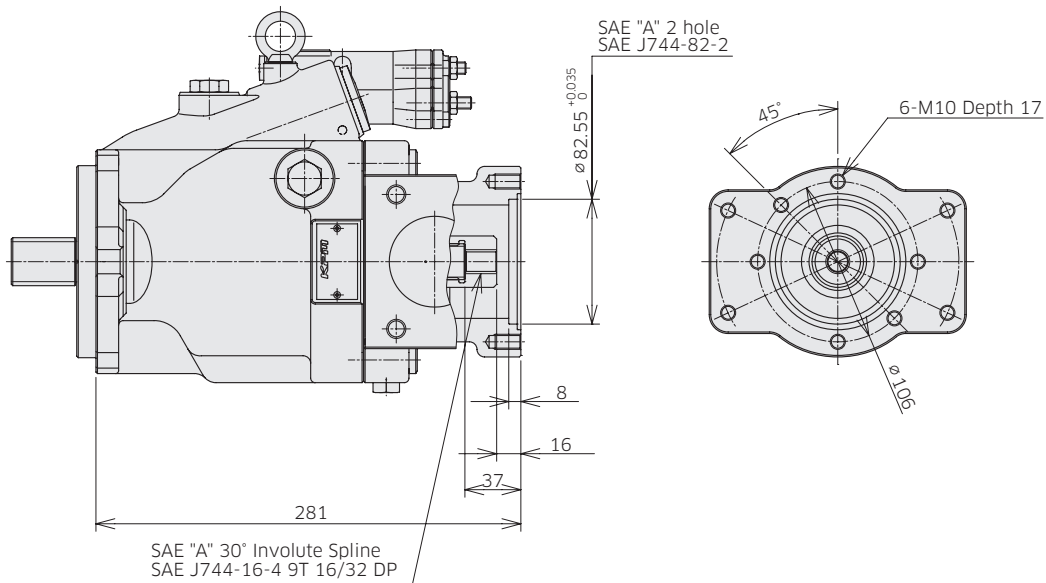
3-1 Installation Dimensions

*Dimensions in mm.

◆ K3VLS85 Through Drive Options

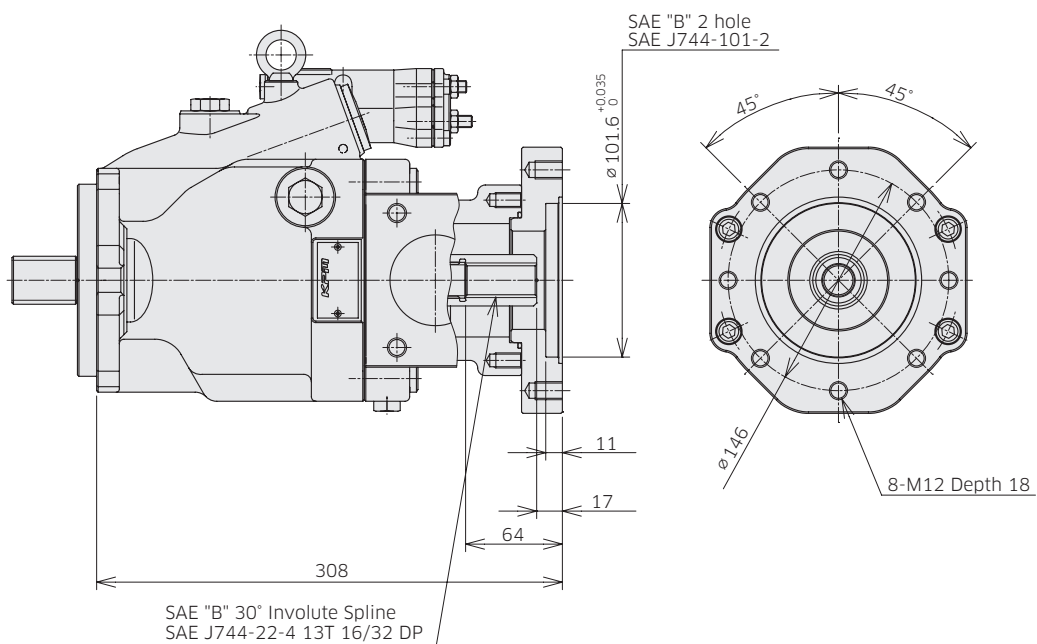
Through Drive SAE A

Ordering Code "5. Through Drive and Porting": A



Through Drive SAE B

Ordering Code "5. Through Drive and Porting": B



Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit.

3. Dimensions

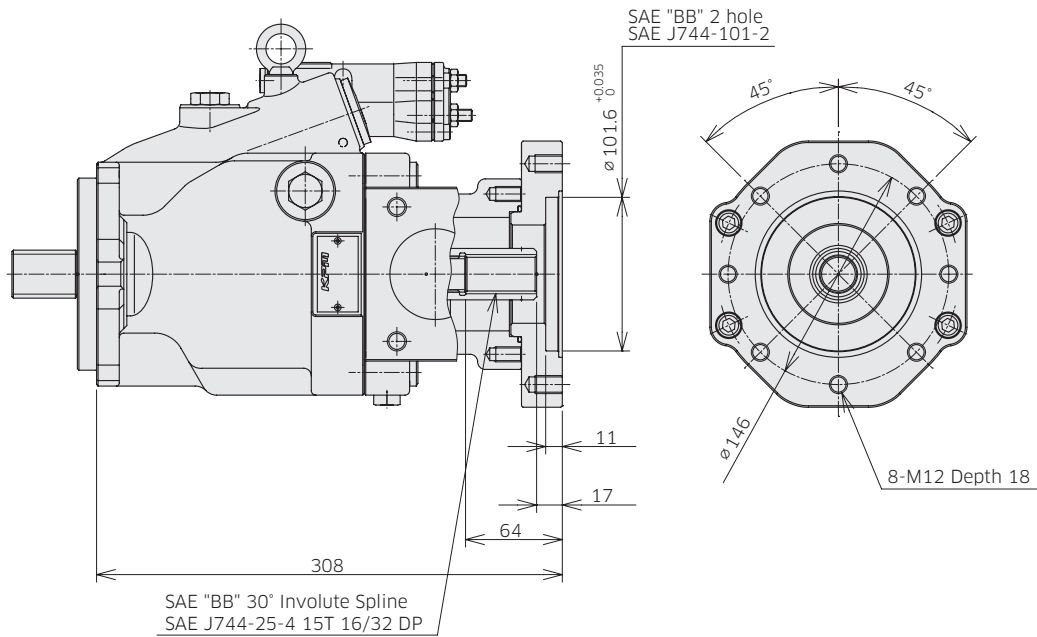
3-1 Installation Dimensions

*Dimensions in mm.

◆ K3VLS85 Through Drive Options

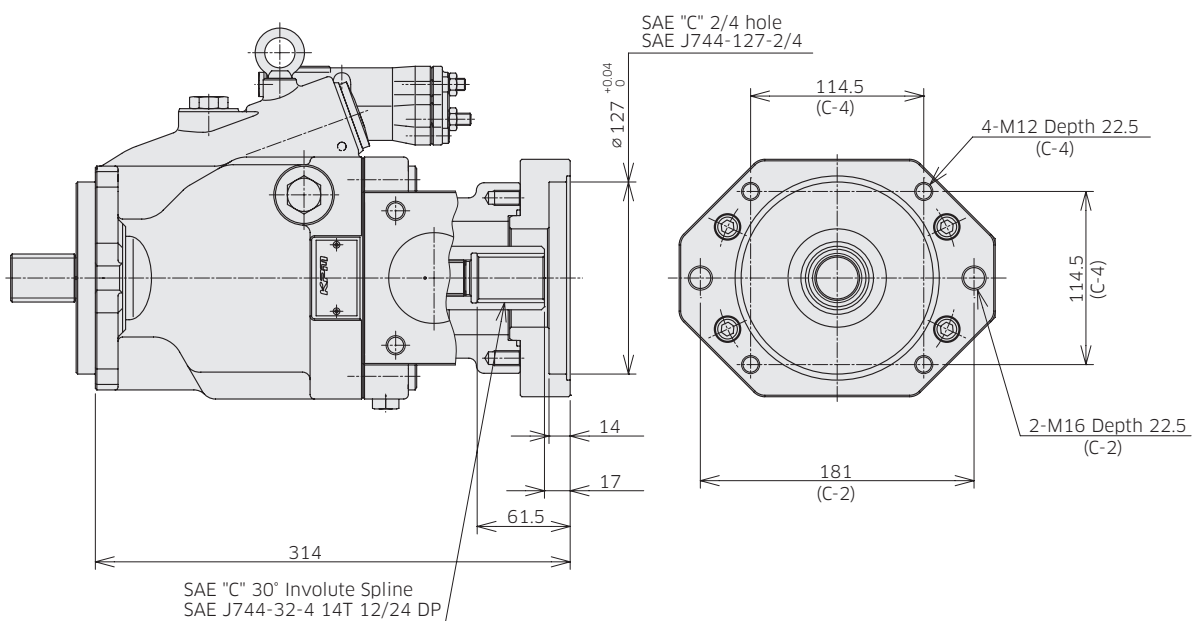
Through Drive SAE BB

Ordering Code "5. Through Drive and Porting": BB



Trough Drive SAE C

Ordering Code "5. Through Drive and Porting": C



Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit.

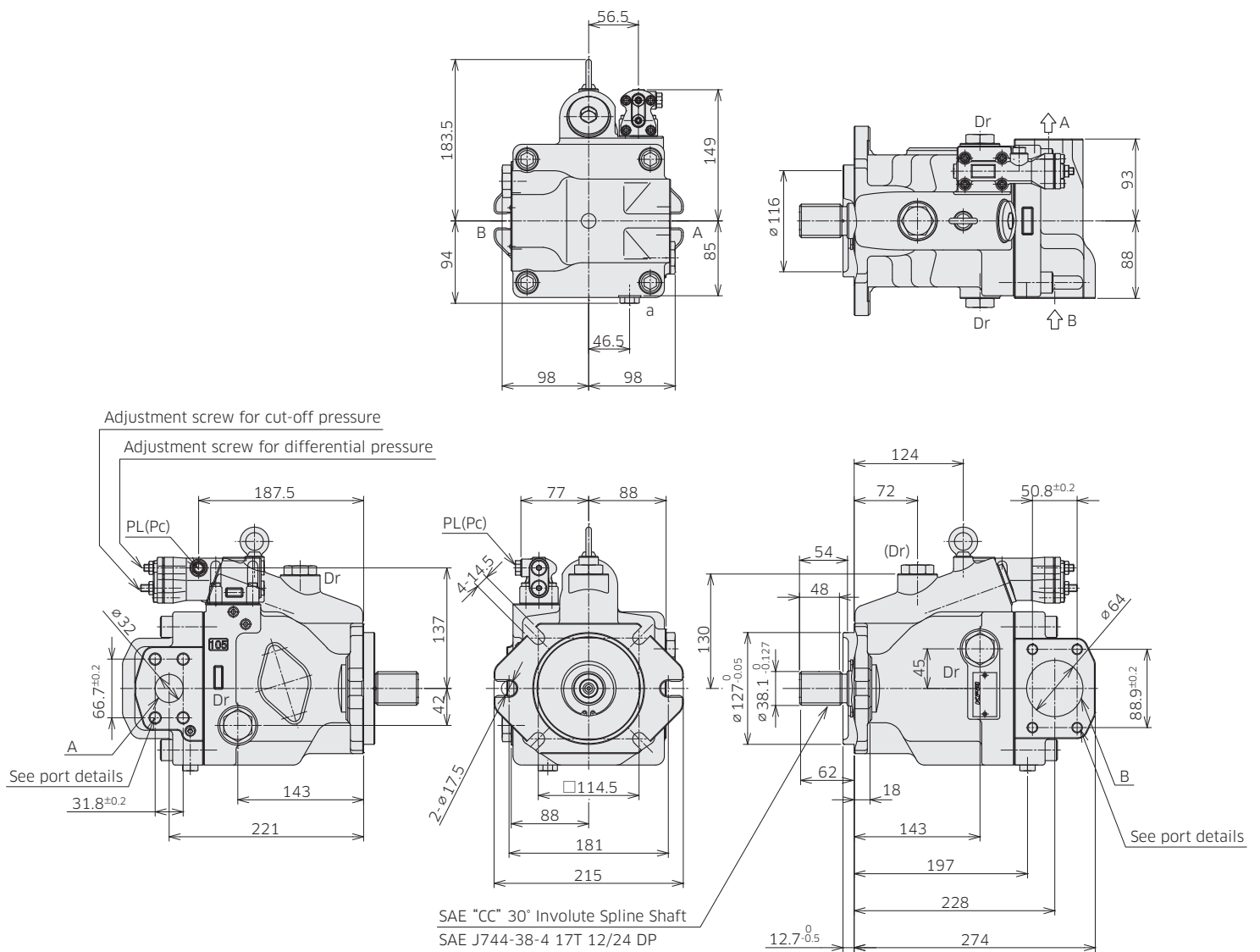
3. Dimensions

3-1 Installation Dimensions

* Dimensions in mm.

◆ K3VLS105 with Cut-off / Load sense Control, Side Port (Clockwise Rotation)

Model Code : K3VLS 105 - 1 0 R CC * - L0 A
 : K3VLS 105 - 1 0 R CC * - L1 A
 : K3VLS 105 - 1 0 R CC * - P0 A



Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit.

3. Dimensions

3-1 Installation Dimensions

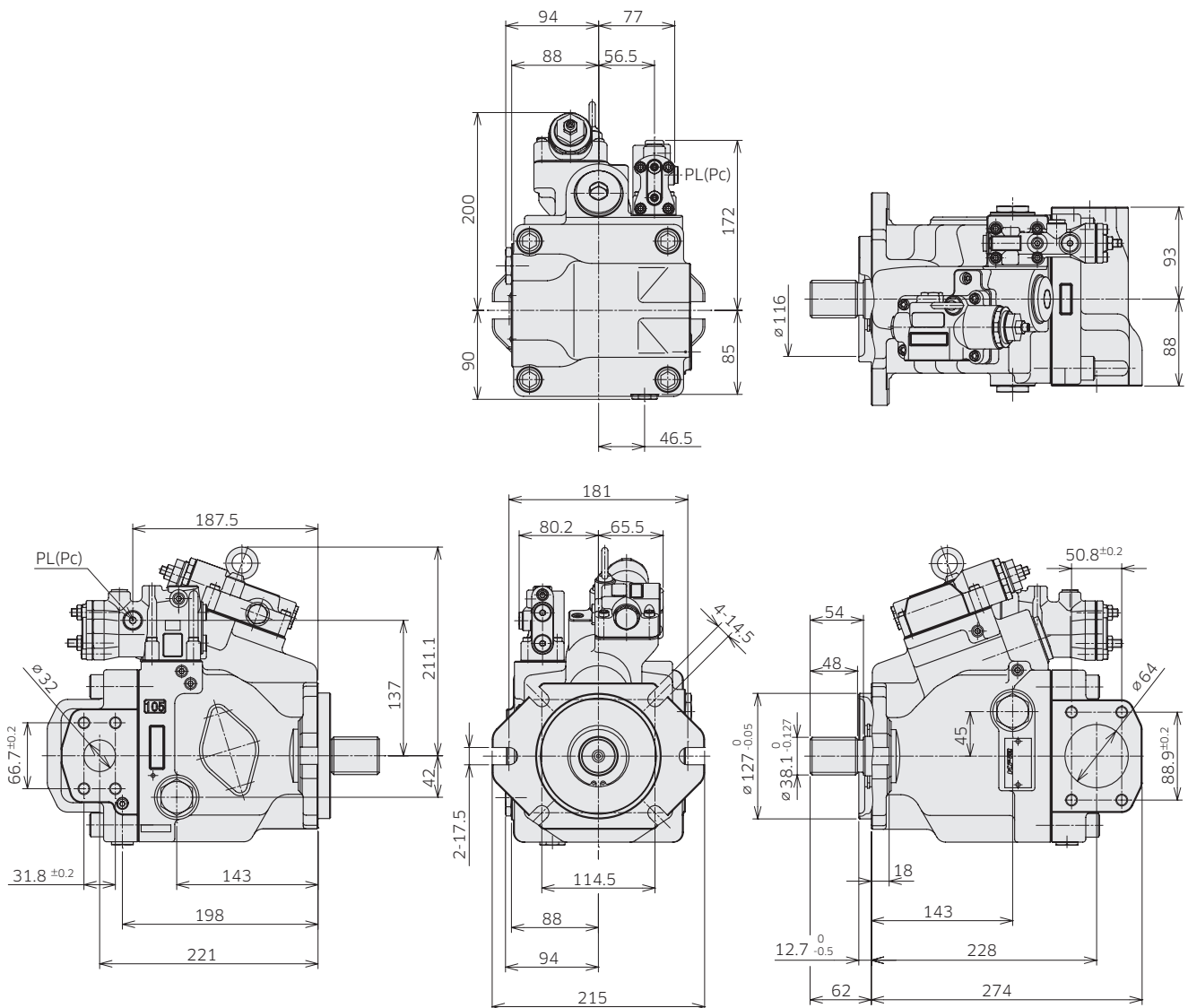
* Dimensions in mm.

◆ K3VLS105 Torque Limit Control, Side Port (Clockwise Rotation)

Model Code : K3VLS 105 - 1 0 R CC * - L0 A A

: K3VLS 105 - 1 0 R CC * - L1 A A

: K3VLS 105 - 1 0 R CC * - P0 A A



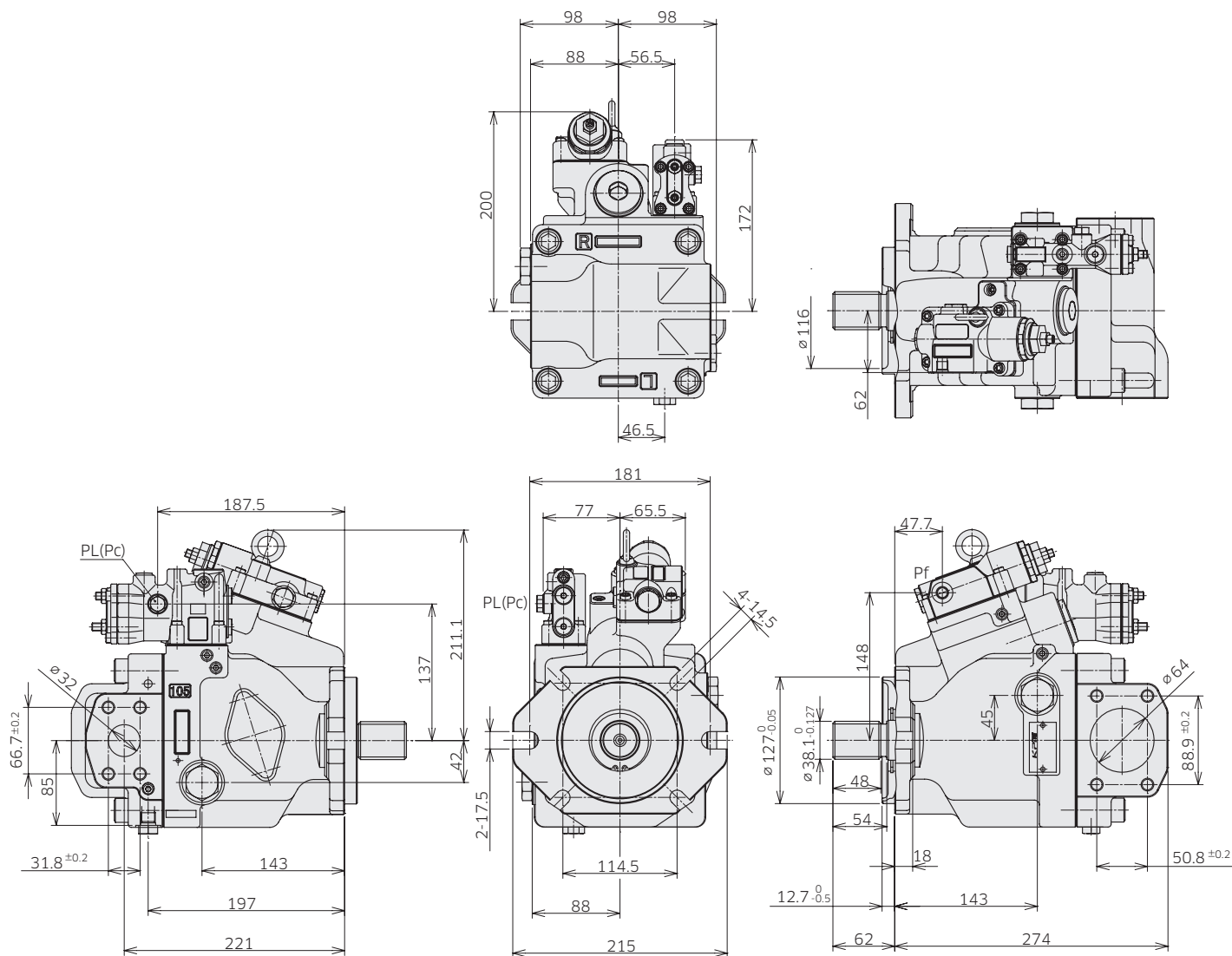
3. Dimensions

3-1 Installation Dimensions

*Dimensions in mm.

◆ K3VLS105 Torque Limit with Power Shift Control, Side Port (Clockwise Rotation)

Model Code : K3VLS 105 - 1 0 R CC * - L0 A B
 : K3VLS 105 - 1 0 R CC * - L1 A B
 : K3VLS 105 - 1 0 R CC * - P0 A B



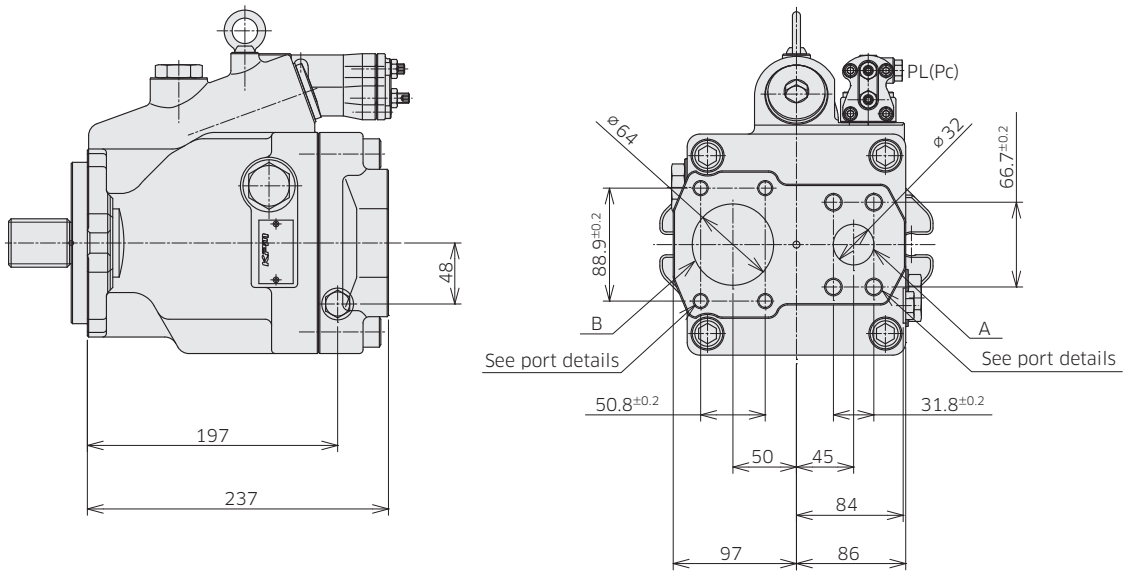
3. Dimensions

3-1 Installation Dimensions

* Dimensions in mm.

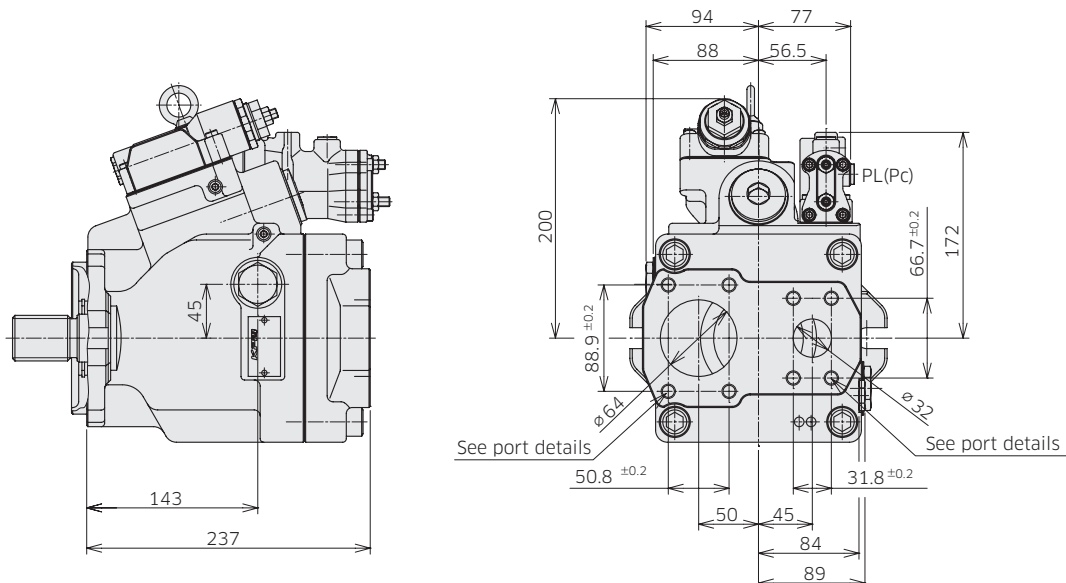
◆ K3VLS105 Rear Port (Clockwise Rotation)

Model Code : K3VLS 105 - 1 R R CC * - L0 A
 : K3VLS 105 - 1 R R CC * - L1 A
 : K3VLS 105 - 1 R R CC * - P0 A



◆ K3VLS105 Torque Limit Control, Rear Port (Clockwise Rotation)

Model Code : K3VLS 105 - 1 R R CC * - L0 A A
 : K3VLS 105 - 1 R R CC * - L1 A A
 : K3VLS 105 - 1 R R CC * - P0 A A



3. Dimensions

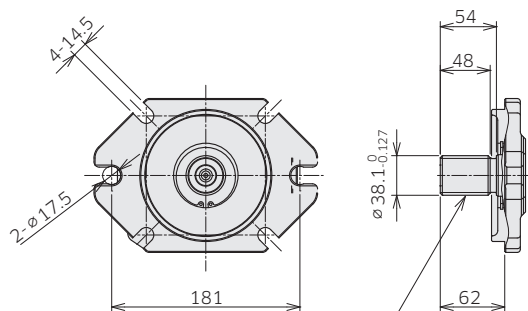
3-1 Installation Dimensions

*Dimensions in mm.

◆ K3VLS105 Mounting Flange and Shaft Options

SAE CC Spline Shaft

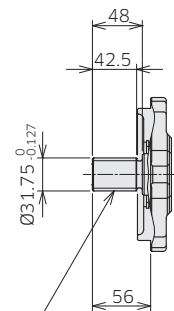
Ordering Code "7.Mounting Flange and Shaft": CC



SAE "CC" 30° Involute Spline Shaft
SAE J744-38-4 17T 12/24 DP

SAE C Spline Shaft

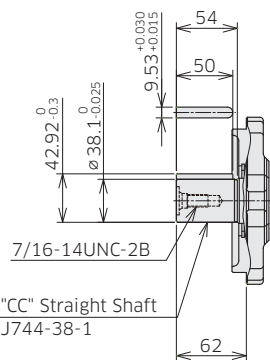
Ordering Code "7.Mounting Flange and Shaft": C



SAE "C" 30° Involute Spline Shaft
SAE J744-32-4 14T 12/24 DP

SAE CC Keyed Shaft

Ordering Code "7. Mounting Flange and Shaft": K4



SAE "CC" Straight Shaft
SAE J744-38-1

Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit.

3. Dimensions

3-1 Installation Dimensions

◆ K3VLS105 Porting Details

Main SAE Flanged Ports

Des	Port name	Port size	Flange threads	Tightening torque (Nm)
-----	-----------	-----------	----------------	------------------------

UNF Threaded Version ('S' in position 8 of model code)

A	Delivery port	SAE J518C high pressure (code 62) 1-1/4"	1/2-13UNC-2B-22	98
B	Suction port	SAE J518C std pressure (code 61) 2-1/2"	1/2-13UNC-2B-22	98

Metric Version ('H' in position 8 of model code)

A	Delivery port	PORT ISO 6162-2: 2012 P32M	M12-23	98
B	Suction port	PORT ISO 6162-1: 2012 P64M	M12-22	98

Auxiliary Ports

Des	Port name	Port size	Tightening torque (Nm)
-----	-----------	-----------	------------------------

SAE Version

Dr	Drain port	1-1/16-12UN-2B-19 (ISO 11926-1: 1995)	167
PL	Load sensing port	7/16-20UNF-2B-11.5 (ISO 11926-1: 1995)	12
Pc	Pressure control port	7/16-20UNF-2B-11.5 (ISO 11926-1: 1995)	12
a	Gauge port	9/16-18UNF-2B-12.7 (ISO 11926-1: 1995)	59
Psv	Servo pressure port	7/16-20UNF-2B-11.5 (ISO 11926-1: 1995)	12
Pf	Power shift pressure port	7/16-20UNF-2B-11.5 (ISO 11926-1: 1995)	12

3. Dimensions

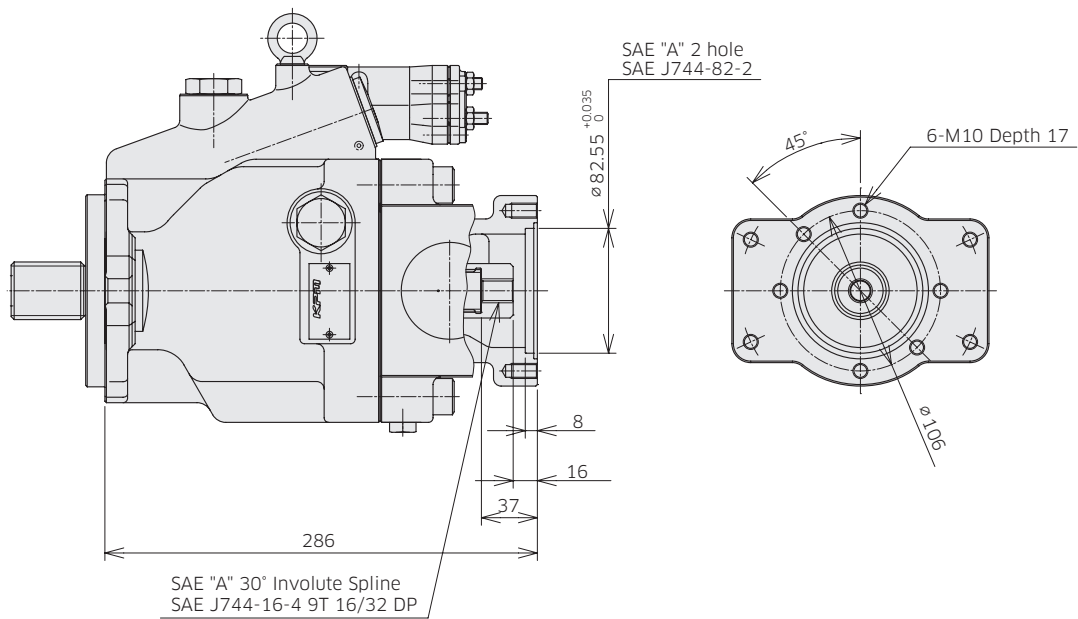
3-1 Installation Dimensions

* Dimensions in mm.

◆ K3VLS105 Through Drive Options

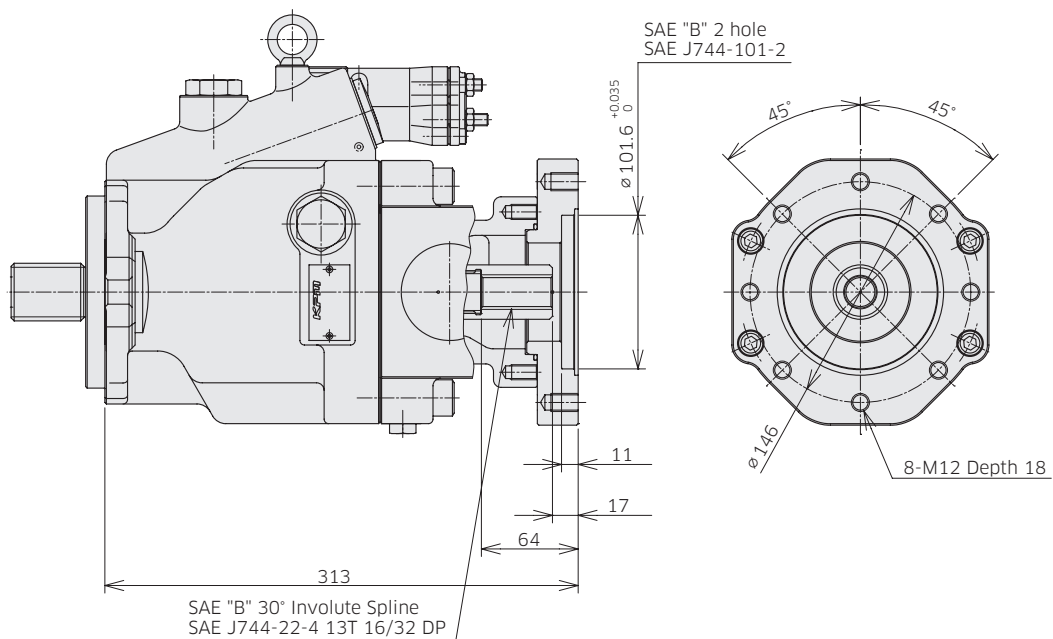
Through Drive SAE A

Ordering Code "5. Through Drive and Porting": A



Through Drive SAE B

Ordering Code "5. Through Drive and Porting": B



Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit.

3. Dimensions

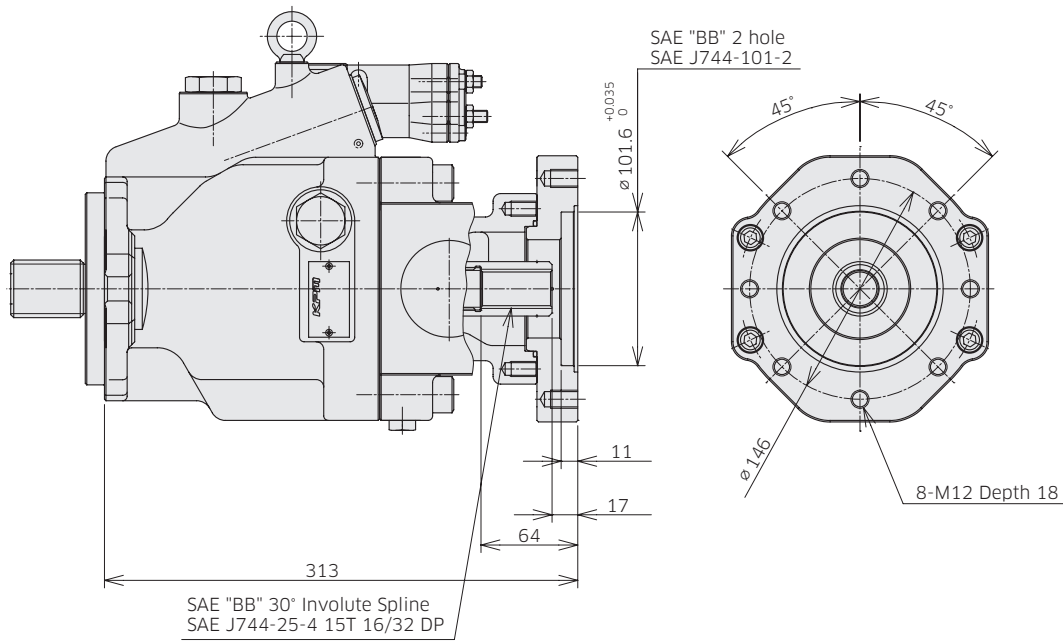
3-1 Installation Dimensions

*Dimensions in mm.

◆ K3VLS105 Through Drive Options

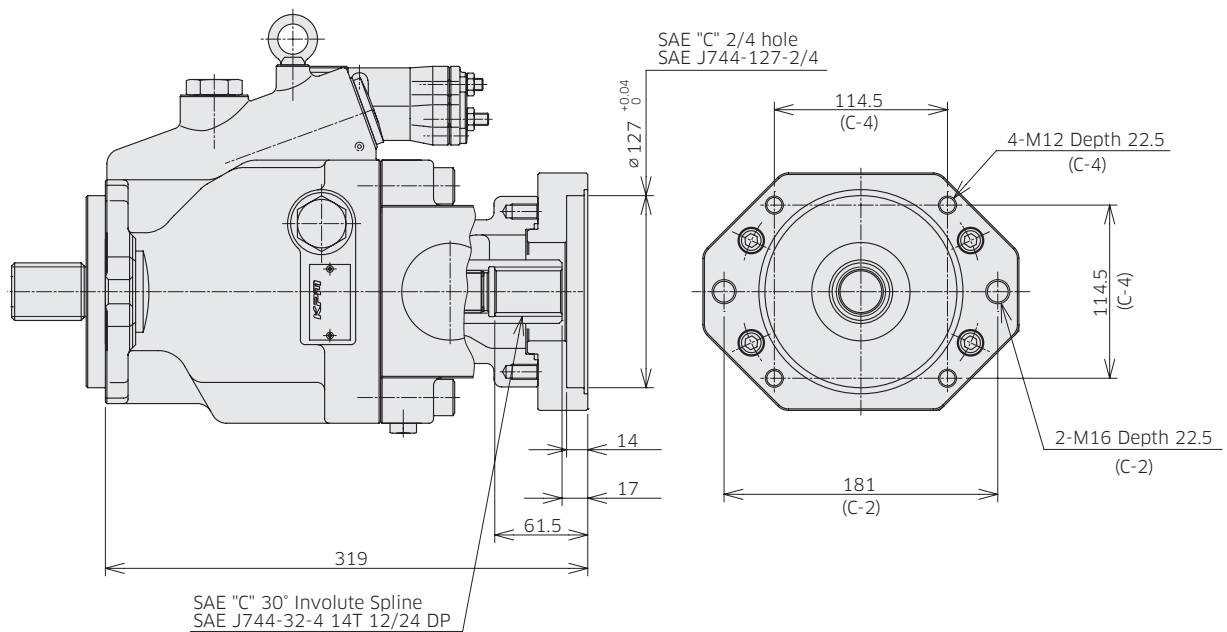
Through Drive SAE BB

Ordering Code "5. Through Drive and Porting": BB



Through Drive SAE C

Ordering Code "5. Through Drive and Porting": C



Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit.

3. Dimensions

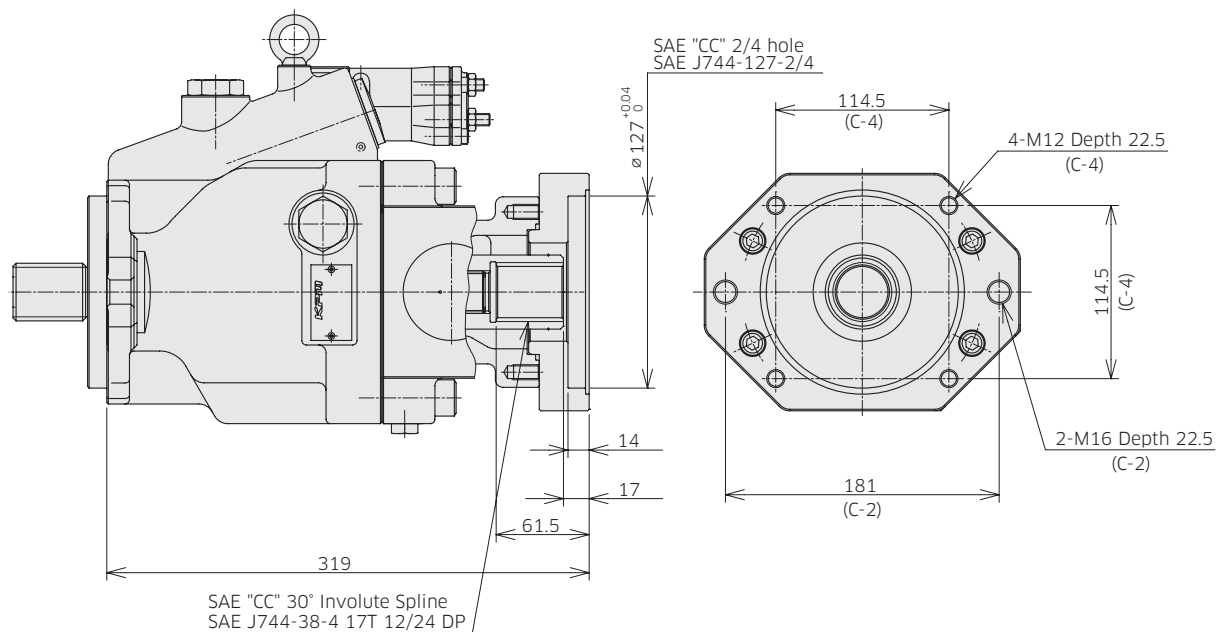
3-1 Installation Dimensions

*Dimensions in mm.

◆ K3VLS105 Through Drive Options

Through Drive SAE CC

Ordering Code "5. Through Drive and Porting": CC



Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit.

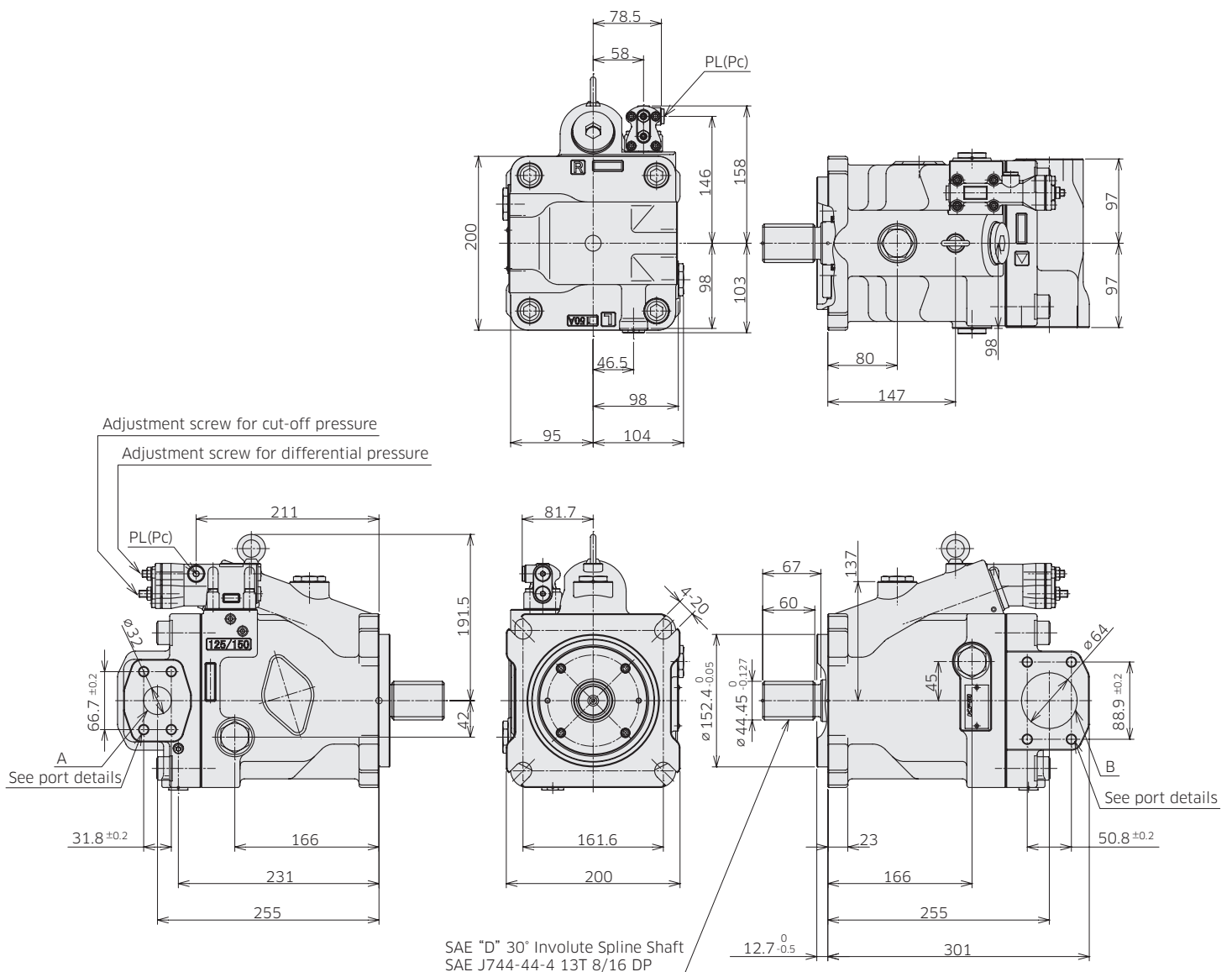
3. Dimensions

3-1 Installation Dimensions

* Dimensions in mm.

◆ K3VLS150 with Cut-off/Load Sense Control, Side Port (Clockwise Rotation)

Model Code : K3VLS 150 - 1 0 R D * - L0 A
 : K3VLS 150 - 1 0 R D * - L1 A
 : K3VLS 150 - 1 0 R D * - P0 A



Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit.

3. Dimensions

3-1 Installation Dimensions

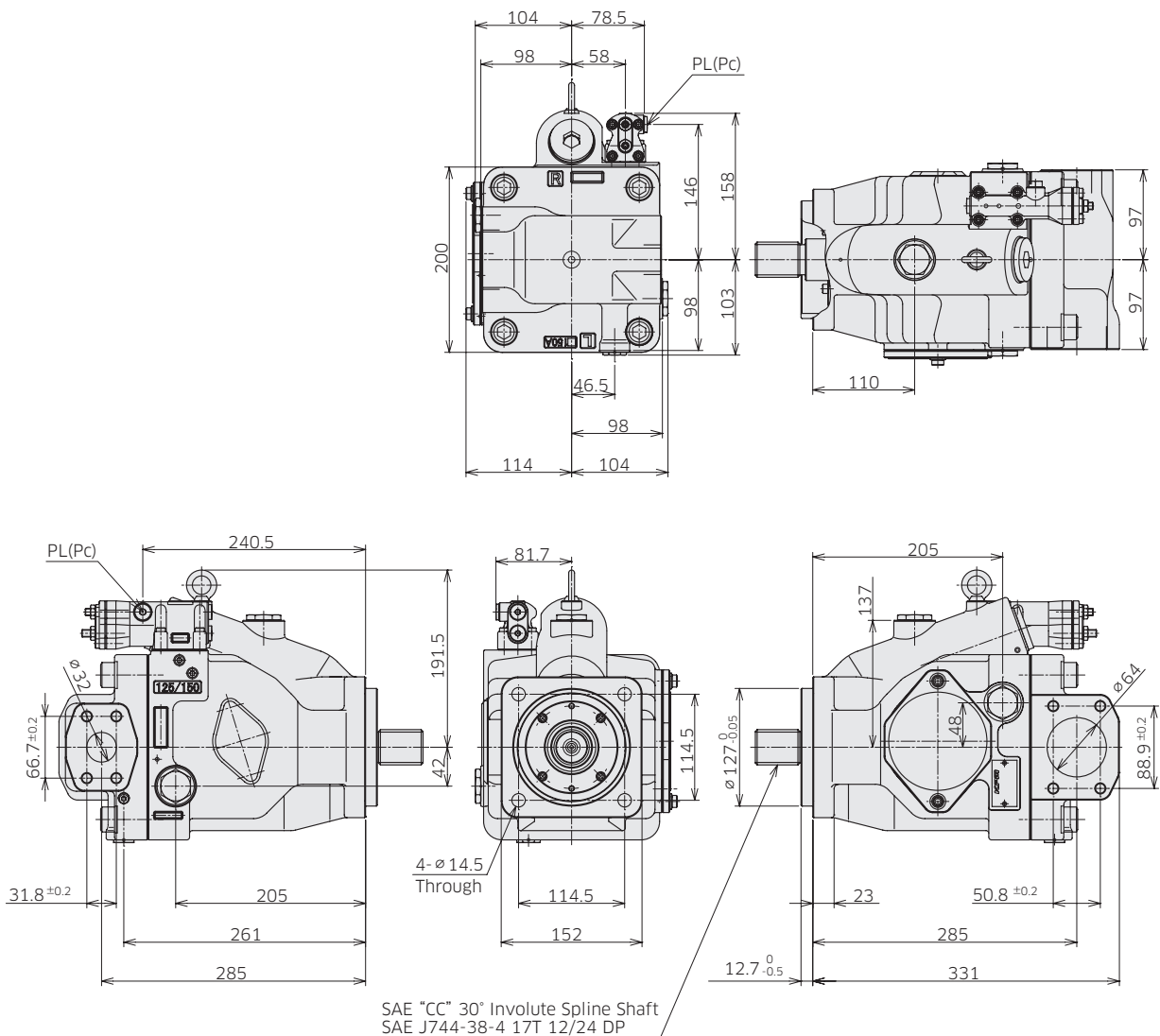
*Dimensions in mm.

◆ K3VLS150 with Cut-off/Load Sense Control, Side Port (Clockwise Rotation, SAE C-4 Mount Type)

Model Code : K3VLS 150 - 1 0 R CC * - L0 A

: K3VLS 150 - 1 0 R CC * - L1 A

: K3VLS 150 - 1 0 R CC * - P0 A



Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit.

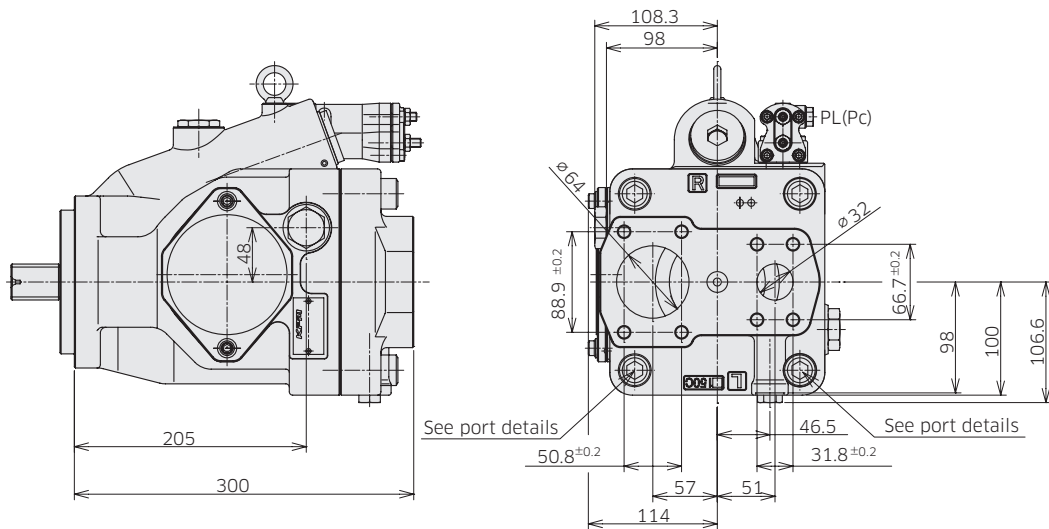
3. Dimensions

3-1 Installation Dimensions

*Dimensions in mm.

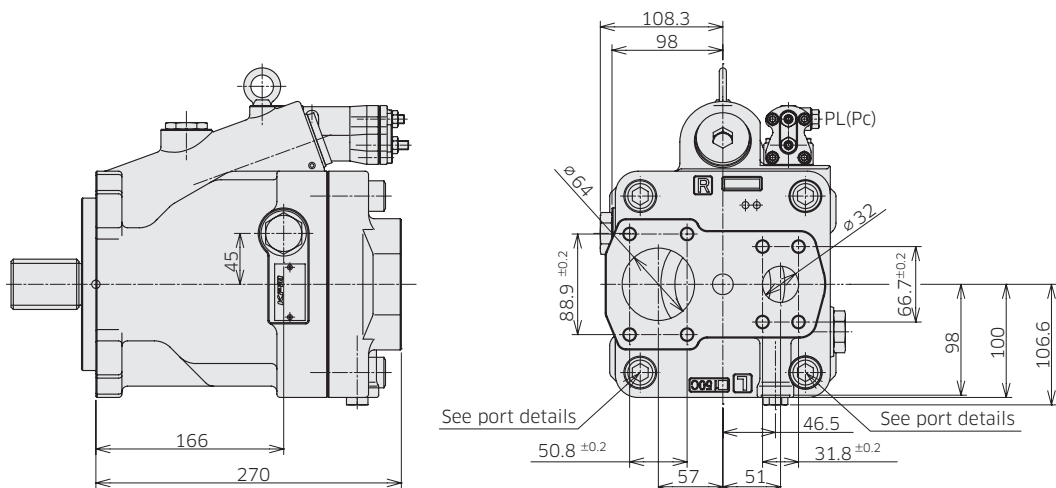
◆ K3VLS150 Rear Port (Clockwise Rotation, SAE C-4 Mount Type)

Model Code : K3VLS 150 - 1 R R C * - L0 A
 : K3VLS 150 - 1 R R C * - L1 A
 : K3VLS 150 - 1 R R C * - P0 A



◆ K3VLS150 Rear Port (Clockwise Rotation, SAE D Mount Type)

Model Code : K3VLS 150 - 1 R R D * - L0 A
 : K3VLS 150 - 1 R R D * - L1 A
 : K3VLS 150 - 1 R R D * - P0 A



3. Dimensions

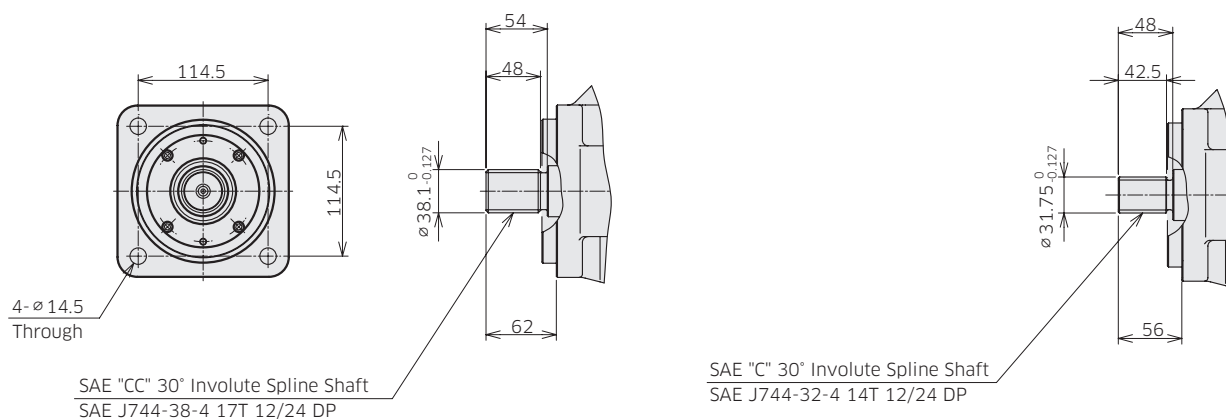
3-1 Installation Dimensions

* Dimensions in mm.

◆ K3VLS150 Mounting Flange and Shaft Options

SAE CC Spline Shaft
Ordering Code "7. Mounting Flange and Shaft": CC

SAE C Spline Shaft
Ordering Code "7. Mounting Flange and Shaft": C



Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit.

◆ K3VLS150 Porting Details

Main SAE Flanged Ports

Des	Port name	Port size	Flange threads	Tightening torque (Nm)
-----	-----------	-----------	----------------	------------------------

UNF Threaded Version ('S' in position 8 of model code)

A	Delivery port	SAE J518C high pressure (code 62) 1-1/4"	1/2-13UNC-2B-22	98
B	Suction port	SAE J518C std pressure (code 61) 2-1/2"	1/2-13UNC-2B-22	98

Metric Version ('H' in position 8 of model code)

A	Delivery port	PORT ISO 6162-2:2012 P32M	M12-23	98
B	Suction port	PORT ISO 6162-1:2012 P64M	M12-23	98

Auxiliary Ports

Des	Port name	Port size	Tightening torque (Nm)
-----	-----------	-----------	------------------------

SAE Version

Dr	Drain port	1-1/16-12UN-2B-19 (ISO 11926-1: 1995)	167
PL	Load sensing port	7/16-20UNF-2B-11.5 (ISO 11926-1: 1995)	12
Pc	Pressure control port	7/16-20UNF-2B-11.5 (ISO 11926-1: 1995)	12
a	Gauge port	9/16-18UNF-2B-12.7 (ISO 11926-1: 1995)	59
Psv	Servo pressure port	7/16-20UNF-2B-11.5 (ISO 11926-1:1995)	12
Pf	Power shift pressure port	7/16-20UNF-2B-11.5 (ISO 11926-1:1995)	12

3. Dimensions

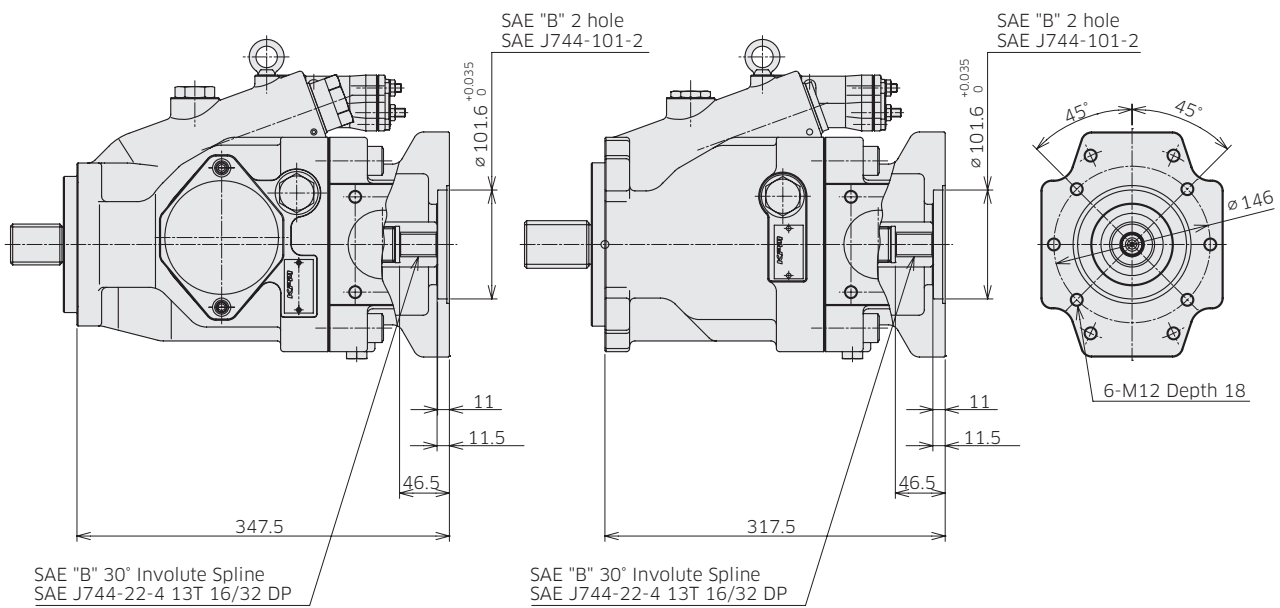
3-1 Installation Dimensions

* Dimensions in mm.

◆ K3VLS150 Through Drive Options

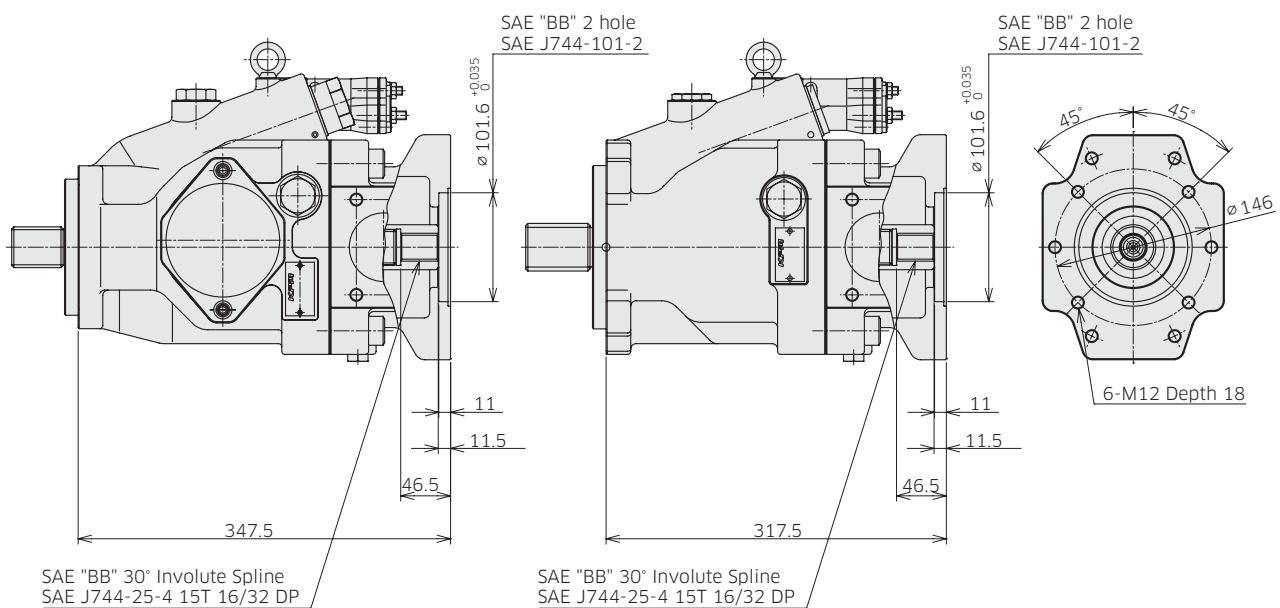
Through Drive SAE B

Ordering Code "5. Through Drive and Porting": B



Through Drive SAE BB

Ordering Code "5. Through Drive and Porting": BB



Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit.

3. Dimensions

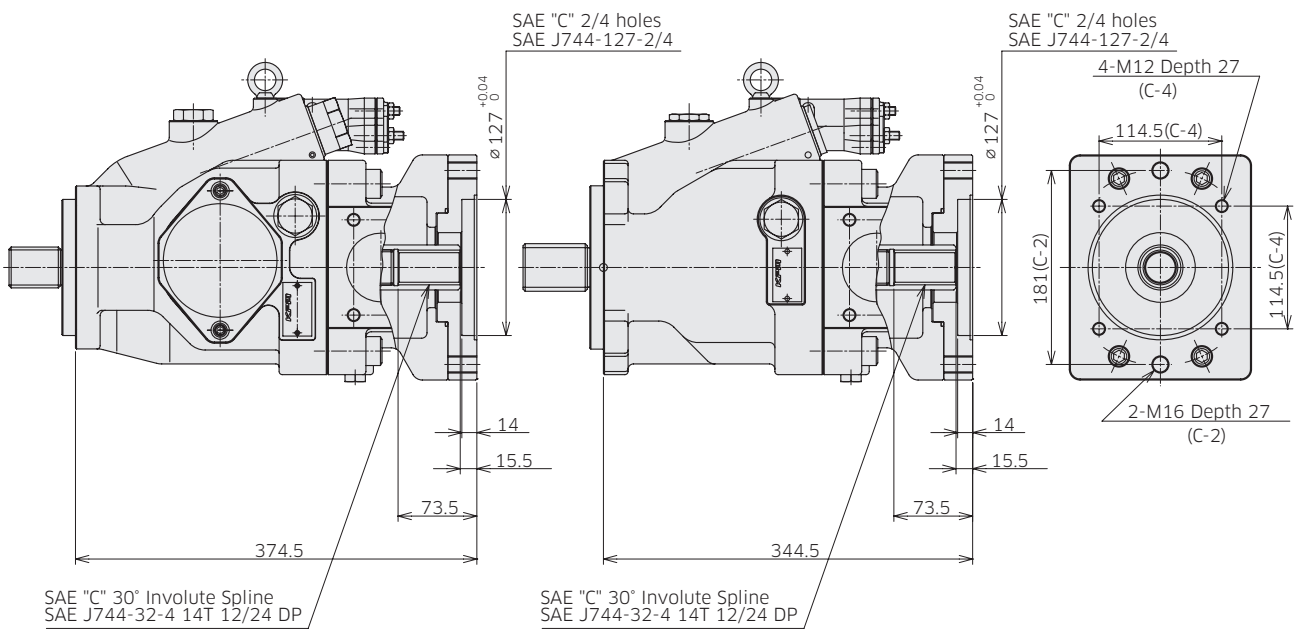
3-1 Installation Dimensions

* Dimensions in mm.

◆ K3VLS150 Through Drive Options

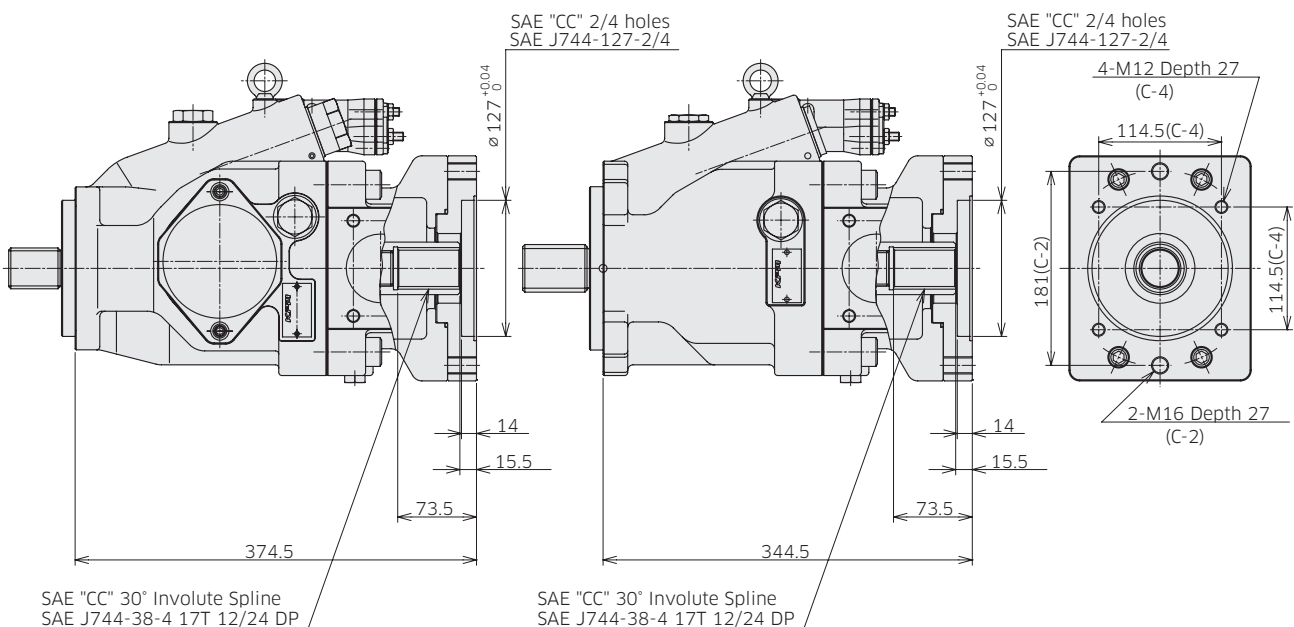
Through Drive SAE C

Ordering Code "5. Through Drive and Porting": C



Through Drive SAE CC

Ordering Code "5. Through Drive and Porting": CC



Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit.

3. Dimensions

3-2 Installation of Auxiliary Pumps

■ Allowable mass moment for combination pump

K3VLS series can consist of multiple pumps using through drive mounting. The second pump can be attached up to the same size of the first pump. The table below shows the maximum allowable mass moment to the mounting flange of the first pump under the dynamic acceleration of 10G. The moment can be calculated by the formula shown below.

	K3VLS50	K3VLS65		K3VLS85		K3VLS105		K3VLS150	
	SAE B mount	SAE B mount	SAE C mount	SAE C-2 mount	SAE C-4 mount	SAE C-2 mount	SAE C-4 mount	SAE C mount	SAE D mount
Allowable mass moment T_m (Nm) (dynamic acceleration of 10G)	180	210	330	280	410	280	410	500	680

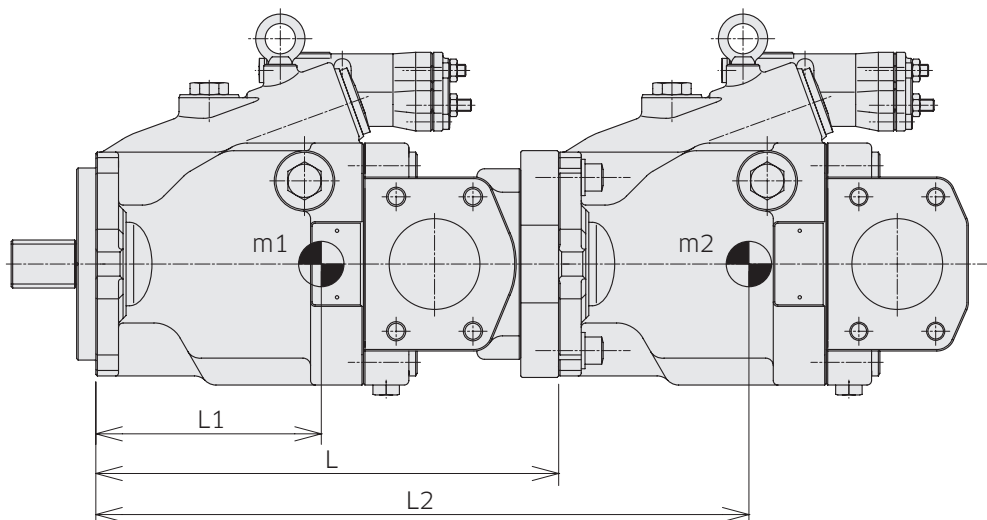
■ Calculation formula for mass moment

$$T_m = (m_1 \times L_1 + m_2 \times L_2 + m_3 \times L_3 + \dots) \times 1 / 102$$

$m_1, m_2, m_3 \dots$: Weight of pump [kg]

$L_1, L_2, L_3 \dots$: Center of gravity [mm]

See next page for values.



3. Dimensions

3-2 Installation of Auxiliary Pumps

■ Values for calculation of mass moment

Through drive size ported	Length, weight		50	65 SAE B mount	65 SAE C mount	85	105	150 SAE C mount	150 SAE D mount
Without through drive, side ported	Total length L (mm)		214	239	239	271	274	331	301
	Center of gravity L1 (from mounting face: mm)		107	117	113	126	131	166	139
	Weight (kg)	with torque limiter	24	28	29	34	40	57	55
		without torque limiter	21	25	26	31	37	54	52
Without through drive, rear ported	Total length L (mm)		188	207	207	232	237	300	270
	Center of gravity L1 (from mounting face: mm)		101	111	108	120	123	161	134
	Weight (kg)	with torque limiter	23	27	28	33	39	56	54
		without torque limiter	20	24	25	29	35	53	51
SAE A	Total length L (mm)		234	253	253	281	286	–	–
	Center of gravity L1 (from mounting face: mm)		116	129	126	136	137	–	–
	Weight (kg)	with torque limiter	26	31	32	37	42	–	–
		without torque limiter	23	28	29	33	39	–	–
SAE B SAE BB	Total length L (mm)		261	280	280	308	313	348	318
	Center of gravity L1 (from mounting face: mm)		133	146	142	152	152	182	155
	Weight (kg)	with torque limiter	29	35	35	41	46	63	61
		without torque limiter	26	31	32	37	43	60	58
SAE C SAE CC	Total length L (mm)		–	–	278	314	319	375	345
	Center of gravity L1 (from mounting face: mm)		–	–	150	157	156	198	171
	Weight (kg)	with torque limiter	–	–	37	42	47	69	67
		without torque limiter	–	–	35	38	44	66	64

K3VLS Inquiry Form

Please go to the page below link. An Inquiry Form which is formed by excel is available at the download section.
https://global.kawasaki.com/en/industrial_equipment/hydraulic/pumps/k3vls.html

Kawasaki Heavy Industries, Ltd.

Precision Machinery Business Division

<http://www.khi.co.jp/kpm/>

Tokyo Head Office

1-14-5 Kaigan, Minato-ku, Tokyo 105-8315, Japan
Phone +81-3-3435-6862 Fax. +81-3-3435-2023

Kobe Head Office

Kobe Crystal Tower, 1-3 Higashikawasaki-cho 1-chome, Chuo-ku, Kobe 650-8680, Japan
Phone +81-78-360-8607 Fax. +81-78-360-8609

Nishi-kobe Works

234, Matsumoto, Hasetani-cho, Nishi-ku, Kobe 651-2239, Japan
Phone +81-78-991-1160 Fax. +81-78-991-3186

OVERSEAS SUBSIDIARIES

Kawasaki Precision Machinery (UK) Ltd.

Ernesettle Lane, Ernesettle, Plymouth, Devon, PL5 2SA United Kingdom
Phone +44-1752-364394 Fax. +44-1752-364816
<http://www.kpm-eu.com>

Kawasaki Precision Machinery (U.S.A.), Inc.

3838 Broadmoor Avenue S.E. Grand Rapids, Michigan 49512, U.S.A.
Phone +1-616-975-3100 Fax. +1-616-975-3103
<http://www.kpm-usa.com>

Kawasaki Precision Machinery (Suzhou) Ltd.

668 JianLin Rd, New District, Suzhou, 215151 China
Phone +86-512-6616-0365 Fax. +86-512-6616-0366

Kawasaki Precision Machinery Trading (Shanghai) Co., Ltd.

17th Floor (Room 1701), The Headquarters Building, No168, XiZang Road (M), Huangpu District, Shanghai, 200001, China
Phone +86-21-3366-3800 Fax. +86-21-3366-3808

Kawasaki Chunhui Precision Machinery (Zhejiang) Ltd.

No.200 Yasha Road Shangyu Economic Development Zone, Shansyu, Zhejiang, 312300, China
Phone +86-575-8215-6999 Fax. +86-575-8215-8699

Flutek, Ltd.

98 GIL 6, Gongdan-Ro, Seongsan-Ku, Changwon-Si, Kyungnam, 51567, Korea
Phone +82-55-210-5900 Fax. +82-55-286-5557

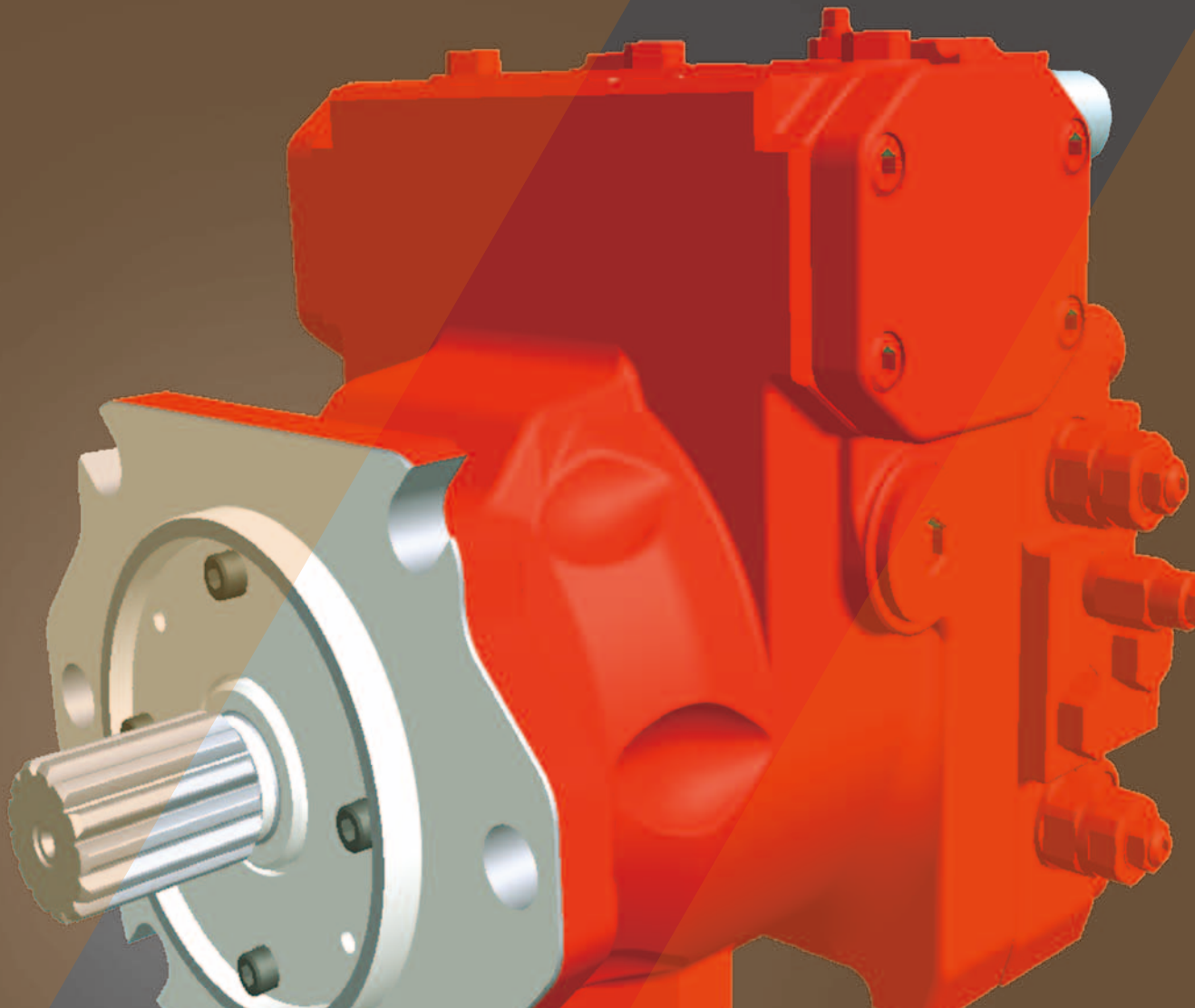
Wipro Kawasaki Precision Machinery Private Limited

No. 15, Sy. No. 35 & 37, Kumbalgodu Industrial Area, Kumbalgodu Village, Kengeri Hobli, Bangalore, - 560074 ,India



QR code
Precision Machinery
Business Division

Closed Loop
Swash Plate Type Axial Piston Pump
K8V Series



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I . Applications / Product Usage

The following must be taken into consideration before use.

1. The operating condition of the products shown in this catalog varies depending upon each application. Therefore, the product suitability must be judged by the designer of the hydraulic system and/or the person who finalizes the technical specifications of the machine after analysis and testing. The product specification shall be determined based on the latest catalog and technical documents. The system must be designed taking into account the possibility of machine failure to ensure that all safety, warning, and application requirements are met.
2. For the proper use of the products, descriptions given in the SAFETY PRECAUTIONS must be observed.
3. The technical information in this catalog represents typical characteristics and performance of the products as of the published date.
4. If the products are intended to use in the following, please consult with Kawasaki in advance.
 - (1) Use the product under the operating conditions or environments other than those described in the technical documents.
 - (2) Use the product in the nuclear sector, aviation sector, medical sector, and/or food sector.
 - (3) Use the product in applications which may cause substantial harm to others and their property, and especially in applications where ensuring safety is a requirement.
5. The information described in this catalog is subject to change without notice. For the latest information, please contact Kawasaki.

II. Safety Precautions

Before using the product, you **MUST** read this catalog and **MUST** fully understand how to use the product. To use the product safely, you **MUST** carefully read all Warnings and Cautions in this catalog.

1. Cautions related to operation



- Use the personal protective equipment to prevent injury when the product is in operation.



- Some components are heavy. Handle the product carefully not to hurt your hands and lower back.



- Do not step on, hit or drop, or apply strong force to the product, as these actions may cause operation failure, product damage, or oil leakage.



- Wipe off any oil on the product or the floor completely, as oil can create slippery conditions that may cause drop of the product and personal injury.

2. Warnings and Cautions related to installation and removal of the product



- Installation, removal, piping, and wiring must be done by a qualified technician.



- Make sure that the hydraulic power unit is turned off and that the electric motor or engine has completely stopped before starting installation or removal. You must also check that the system pressure has dropped to zero.



- Make sure that the power source is turned off before installing electric components to reduce the risk of electric shock.



- Clean the threads and the mounting surface to prevent damage or oil leakage. Inadequate cleaning may cause insufficient torque and broken seals.



- Use the designated bolts and fasten them with prescribed torque when installing the product. Use of undesignated bolts, and excessive or insufficient tightening torque may induce operation failure, damage, or oil leakage.

3. Warnings and Cautions for operation



- Always equip the product with explosion or ignition protection if it is used in potentially explosive or combustible atmospheres.



- Shield rotary parts, such as the motor and pump shaft, to avoid injury.



- Stop operation immediately, and take proper measures when the abnormality such as unusual noise, oil leakage, and smoke is found. Continuing operation under such condition may bring about damage, a fire hazard, or injury.



- Make sure that all pipes, hoses, and connecting points with pipes or hoses, are correctly connected and tightened before starting operation.



- Use the product under the operating conditions and limitations described in the catalog, drawings, and specification sheets.



- Do not touch the product in operation, to reduce the risk of skin burn.



- Use the proper hydraulic oil and maintain the filtration at the recommended level to prevent premature wear and damage.

4. Cautions related to maintenance



- Never modify the product without approval from Kawasaki.



- Disassembly of the product may void the warranty.



- Keep the product clean and dry when storing or transporting.



- The seals may need to be replaced if the product has been stored for an extended period of time.



- Making adjustments of this product will result in the warranty being null and void.

III. Handling Precautions

1. Operating Fluid and Temperature Range

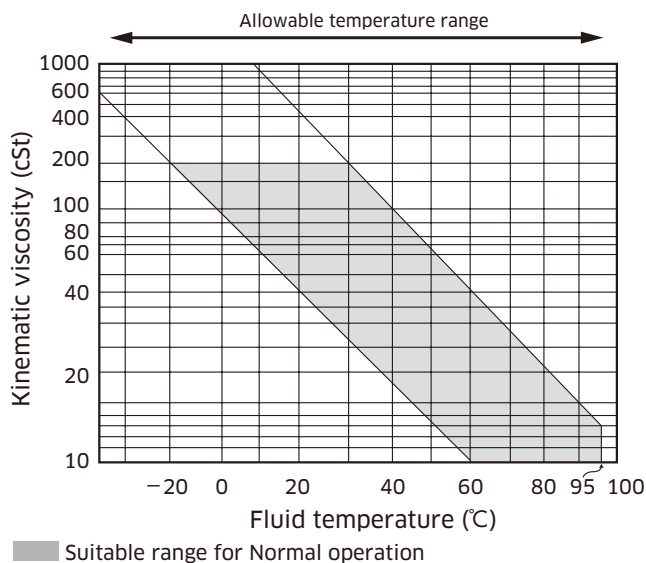
1) Operating fluid

Values shown in this catalog are based upon using mineral oil based anti-wear hydraulic fluid. To ensure optimal performance use of mineral oil based anti-wear hydraulic fluid is recommended.

2) Viscosity and temperature range

To minimize both oil and seal deterioration, a maximum operating temperature of 60°C should be considered. Please note that the regulator may become slow to respond when operating at low temperatures (below 20°C) in extreme cold environments. At such low temperature it is strongly suggested that a warm up cycle is introduced until an operating temperature of 20°C is achieved.

	Suitable range for Normal operation	Allowable range
Viscosity [mm ³ /s(cSt)]	10 to 200	10 to 1,000
Fluid Temperature [°C (°F)]	-20 to +95 (-4 to +203)	



2. Filtration and Contamination Control

1) Filtration of working oil

The most important means to prevent premature damage to the pump and associated equipment and to extend its working life, is to ensure that hydraulic fluid contamination control of the system is working effectively.

This begins by ensuring that at the time of installation that all piping, tanks etc. are rigorously cleaned in a sanitary way. Flushing should be provided using an off line filtration system and after flushing the filter elements should be replaced.

2) Suggested acceptable contamination level

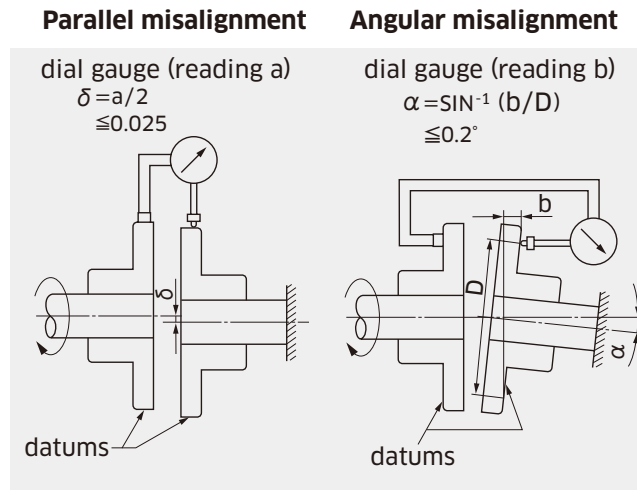
The relationship between contamination level and pump life is very difficult to predict as it depends on the type and nature of the contaminant present in the system. Sand or Silica in particular, due to its abrasive nature, does significantly reduce the expected life of a pump. Based on the precondition that there is no significant presence of Silica type substances then a minimum Cleanliness level of -/18/15 ISO 4406 or SAE AS 4059E Table 1 Class 9 (NAS 1638 Class 9).

III. Handling Precautions

3. Drive Shaft Coupling

Alignment between the prime mover and the pump shaft should be within a tolerated margin, that is, parallel misalignment within 0.05mm TIR* and angular misalignment within 0.2° TIR*. In case the pump is directly coupled to the engine flywheel, use a flexible coupling.

*TIR = Total Indicator Reading



4. Oil Filling and Air Bleeding

1) Pump case filling

Be sure to fill the pump casing with oil through the drain port, filling only the suction line with oil is totally insufficient. The pump contains bearings and high-speed sliding parts including pistons with shoes and a spherical bush that need to be continuously lubricated. Part seizure or total premature failure will occur very quickly if this procedure is not rigidly followed.

2) Air bleeding

Run the pump unloaded for a period to ensure that all residual air within the system is released.

3) Long term out of usage

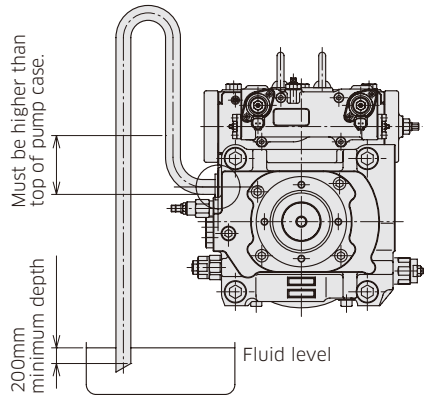
It is undesirable to leave the pump out of use for a long period e.g. a year or more. In such a situation it is recommended that the pump is run for a short period on a more frequent basis even if it is just unloaded. With regard to a pump held in storage then rotating the shaft on a frequent basis is sufficient. If the pump is left out for more than the suggested time it will require a service inspection.

III. Handling Precautions

5. Drain Piping

1) Installation of drain line

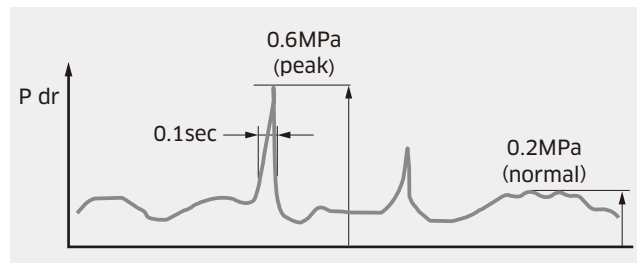
It is the preferred option to mount the pump with the case drain piping initially rising above the pump before continuing to the tank. Do not connect the drain line to the inlet line.



Cautions

- A) Inlet and drain pipes must be immersed by 200 mm minimum from the lowest level under operating conditions.
- B) Height from the oil level to the centre of the shaft must be within 1 meter maximum.
- C) The oil in the pump case must be refilled when the pump has not been operated for one month or longer.

The uppermost drain port should be used and the drain piping must be larger in size than the drain port to minimize pressure in the pump case. The pump case pressure must not exceed 0.2 MPa as shown in the illustration below. (Peak pressure must never exceed 0.6 MPa.)



2) Size of drain hose or drain pipe

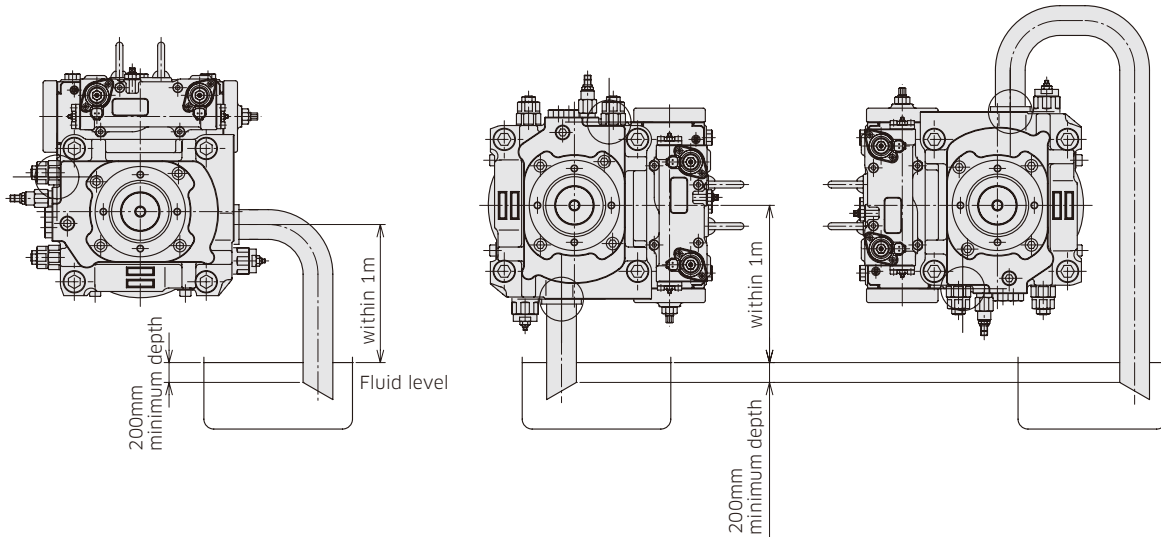
The internal bore size of the drain hose or drain pipe must be larger than that of the drain port. Arrange the drain line as short as possible.

III. Handling Precautions

6. Mounting the Pump Above the Tank

When installing the pump above the tank, please ensure to connect the charge inlet line as shown below and fill it with hydraulic fluids.

Suction line



7. Shaft Loading and Bearing Life

Although K8V pumps are equipped with bearings that can accept some external radial forces, exertion of external radial loads will affect bearing life. Depending on the load magnitude, the load position, and the load orientation, bearing life may be influenced and reduced.

Consult with Kawasaki for further details.

8. Minimum Boost Pressure

The K8V series pump requires the minimum boost pressure of 2.0 MPa in the low pressure line in order to provide stable control. In addition, setting value of the charge pressure should be lower than that of the low pressure relief valve.

IV. Conversion Factors, Formula and Definition

◆ Conversion Factors

	Formula	Note
Displacement	$1 \text{ cm}^3 = 0.061 \text{ in}^3$	
Pressure	$1 \text{ MPa} = 145 \text{ psi}$	
Flow	$1 \text{ L/min} = 0.264 \text{ gpm}$	US gallon
Torque	$1 \text{ Nm} = 0.74 \text{ lb ft}$	
Power	$1 \text{ kW} = 1.341 \text{ hp}$	
Weight	$1 \text{ kg} = 2.205 \text{ lb}$	

◆ Formula

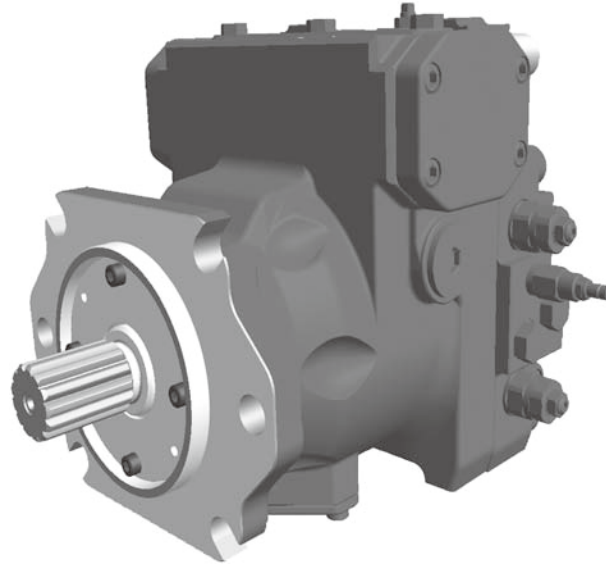
	Metric system		Imperial system	
Output flow	$Q = q \times N \times \eta_v / 1000$	L/min	$Q = q \times N \times \eta_v / 231$	gal/min
Input torque	$T = q \times \Delta P / 2\pi / \eta_m$	Nm	$T = q \times \Delta P / 24\pi / \eta_m$	lbf-ft
Input power	$L = T \times N / 9550 = Q \times \Delta P / 60 / \eta_t$	kW	$L = T \times N / 5252 = Q \times \Delta P / 1714 / \eta_t$	hp

◆ Definition

q	= Pump displacement / rev.	$\text{cm}^3 (\text{in}^3)$
L	= Input power	kW (hp)
N	= Speed	$\text{min}^{-1} (\text{rpm})$
N_{\max}	= Maximum speed at maximum displacement	$\text{min}^{-1} (\text{rpm})$
ΔP	= $P_{\text{high}} - P_{\text{low}}$ (Differential pressure)	MPa (psi)
P_{high}	= High pressure	MPa (psi)
P_{low}	= Low pressure	MPa (psi)
P_{rated}	= Rated pressure	MPa (psi)
P_{peak}	= Peak pressure	MPa (psi)
P_c	= charge pressure	MPa (psi)
T	= Input torque	Nm (lbf-ft)
T_{\max}	= Maximum input torque	Nm (lbf-ft)
η_v	= Pump volumetric efficiency	
η_m	= Pump mechanical efficiency	
η_t	= Pump total efficiency	

K8V Series

Closed Loop Swash Plate Type Axial Piston Pump



■ Specifications

Size: 71, 90, 125
 Rated Pressure: 40 MPa
 Peak Pressure: 45 MPa

■ General Descriptions

The K8V series are variable displacement axial piston pumps for closed loop systems, with superior overall efficiency, stability, and control characteristics.

The K8V pumps are applicable for a wide range of applications, including industrial vehicles such as construction machinery, agricultural equipment with hydrostatic drive systems, and other closed loop applications. Also, this pump can be used in combination with M7V series motors for high pressure closed loop applications.

The K8V series with a range in pump size from 71 to 130 cm³/rev are equipped with electric or hydraulic pilot displacement control. The K8V series pumps, having the integrated components required for a closed system, such as a charge pump, high and low pressure relief valves, and a cut-off valve, enable a compact closed loop system.

■ Features

- Swash plate type, variable displacement axial piston pump for closed loop system
- High overall efficiency
- Suitable for wide range of applications
- Precise flow control
- High stability
- Excellent reliability
- Various integrated valves
- Bypass function for emergency towing

1

Ordering Code

1-1 Pump Options

Please fill the Inquiry Form on page 36 and 37 in order to specify the requirement.

Model Code **K8V 125 A R D1 A1 A B B X X X X - P1 D C B - 01**

1. K8V Series Pump
K8V Series, Variable Displacement,
Axial Piston, Closed Loop Pump

2. Size

	71	90	125
Pump Size	●	●	●

3. Model Code

	71	90	125
A Series A	●	●	●

4. Direction of Rotation

	71	90	125
R Clockwise	●	●	●
L Counterclockwise	●	●	●

5. Mounting Flange and Shaft

	71	90	125
C1 SAE C Mount & SAE C Shaft (14T-12/24DP)	●	—	—
C2 SAE C Mount & SAE CC Shaft (17T-12/24DP)	●	—	—
D1 SAE D Mount & SAE D Shaft (13T-8/16 DP)	—	●	●
D2 SAE D Mount & SAE F Shaft (15T-8/16 DP)	—	—	●

6. Through Drive

	71	90	125
A1 SAE A, 2 bolt, Through Drive (9T, 16/32 DP)	●	●	●
B1 SAE B, 2 bolt, Through Drive (13T, 16/32 DP)	●	●	●
B2 SAE BB, 2 bolt, Through Drive (15T, 16/32 DP)	●	●	●
C1 SAE C, 2/4 bolt, Through Drive (14T, 12/24 DP)	●	●	●
C2 SAE CC, 2/4 bolt, Through Drive (17T, 12/24 DP)	—	●	●
D1 SAE D, 2/4 bolt, Through Drive (13T, 8/16 DP)	—	●	●
X Without Through Drive	●	●	●

7. Thread Type (Suction/Delivery)

	Type of Threaded Port	Thread Type for Flange Port	71	90	125
A	UNF	Metric	●	●	●
B	Metric	Metric	○	○	○
C	UNF	UNF	●	●	●

8. Charge Pump

	71	90	125
A 20 cm ³	●	●	—
B 28 cm ³	—	—	●
X Without Integrated Charge Pump	●	●	●

9. Stroking Speed Control Orifice

	71	90	125
A Φ0.8	●	—	●
B Φ1.0	●	●	●
C Φ1.2	●	●	●
D Φ1.4	—	●	—
X Without Orifice Available Only with Code X of Pressure Cut-off Valve [16]	●	●	●

10. Mechanical Stroke Limiter

	71	90	125
A With Mechanical Stroke Limiter	○	○	○
X Without Mechanical Stroke Limiter	●	●	●

11. Filtration System

	71	90	125
A Integral Pressure Filtration	○	○	○
B Remote Pressure Filtration With Ports For External Charge Circuit Filter	●	●	●
X Without Pressure Filtration	●	●	●

13. Special Features

	71	90	125
A A - Code Corresponding to the Feature will Be Set Up When Necessary	○	○	○
X Without Any Special Feature	●	●	●

12. Swivel Angle Sensor

	71	90	125
A With Swivel Angle Sensor	○	○	○
X Without Swivel Angle Sensor	●	●	●

● : Available
○ : Under development
— : Not available

1. Ordering Code

1-2 Regulator Options

Please fill the Inquiry Form on page 36 and 37 in order to specify the requirement.

Model Code **K8V 125 A R D1 A1 A B B X X X X - P1 D C B - 01**

14. Control Option

		71	90	125
P1	Electronic Proportional Displacement Control (24V)	●	●	●
P2	Electronic Proportional Displacement Control (12V)	●	●	●
P3	Hydraulic Proportional Displacement Control	●	●	●
M1	Manual Control with Lever	○	○	○

15. High Pressure Relief Valve

		71	90	125
A	30 MPa	●	●	●
B	35 MPa	●	●	●
C	40 MPa	●	●	●
D	45 MPa	●	●	●
S	Customized Pressure Setting for Special Case	●	●	●

16. Pressure Cut-Off Valve

		71	90	125
A	30 MPa	●	●	●
B	35 MPa	●	●	●
C	40 MPa	●	●	●
S	Customized Pressure Setting for Special Case	●	●	●
X	Without Pressure Cut-Off Valve	●	●	●

Note: The pressure setting of cut-off valve must be at least 5MPa lower than the pressure setting of high pressure relief valve.

17. Low Pressure Relief Valve

		71	90	125
B	2.5 MPa	●	●	●
S	Customized Pressure Setting for Special Case	●	●	●
X	Without Low Pressure Relief Valve	●	●	●

18. Design Code

**	01 ~
----	------

- : Available
- : Under development
- : Not available

2

Technical Information

2-1 Specifications

Size		71	90	125	
Displacement	Main pump	cm ³	71	90	130
	Charge pump	cm ³	20	20	28
Pressure, main	Rated	MPa	40		
	Peak	MPa	45		
Pressure, charge	Rated	MPa	2.5		
	Peak	MPa	4.0		
Allowable case pressure		MPa	0.2 continuous / 0.6 peak		
Speed	Rated* ¹	min ⁻¹	3,300	3,050	2,850
	Maximum* ² (intermittent)	min ⁻¹	4,100	3,800	3,450
	Minimum	min ⁻¹	500	500	500
Case volume		L	2.5	3.0	4.0
Temperature range		°C	- 20 to +95 (case drain: 115 maximum, intermittent)		
Viscosity range		cSt	10 to 1,000		
Maximum contamination level			ISO 4406 -/18/15		
Allowable through drive torque	Nm	SAE A	123	123	123
		SAE B	395	395	395
		SAE BB	455	575	640
		SAE C	455	575	725
		SAE CC	-	575	830
		SAE D	-	575	830
Mass		kg	60	72	95
Moment of inertia		kg · m ²	8.71×10^{-3}	1.21×10^{-2}	2.35×10^{-2}
Torsional stiffness		Nm/rad	7.97×10^4	1.46×10^5	2.04×10^5
Coating			Red synthetic resin primer		

* 1 : maximum allowable speed for continuous operation.

* 2 : maximum allowable speed for limited operating period and duty. Exceeding this value will result in a reduced service life or the destruction of the pump.

Note: Operation above the maximum values or below the minimum values may result in a loss of function, a reduced service life or the destruction of the pump.

■ Allowable maximum input torque

	SAE C (Ordering code[5]: C1)	SAE CC (Ordering code[5]: C2)	SAE D (Ordering code[5]: D1)	SAE F (Ordering code[5]: D2)
Spline specification	14T DP=12/24	17T DP=12/24	13T DP=8/16	15T DP=8/16
Allowable and maximum input torque (Nm)	600	1,070	1,470	2,255
Pump size	K8V71	K8V71 (Combination pump)	K8V90/125	K8V125 (Combination pump)

Input shaft splines conform to SAE J744.

Involute splines conform to ANSI B92.1a, 30° pressure angle, side fit.

Two mounting options are available each for the K8V71 and the K8V125.

If a combination pump of the K8V71 or the K8V125 requires the input torque higher than the allowable maximum input torque of C1 (600Nm) or D1 (1470Nm), C2 or D2 option must be chosen.

Proper lubrication is required to reduce friction and wear of the shaft.

2. Technical Information

2-1 Specifications

◆ Relief Valve

1. High pressure relief valve

High pressure relief valves (two valves) are equipped to protect the pump from being overloaded.

The high pressure relief valves act to protect the pump from pressure spikes in dynamic control situations and are not equipped for continuous operation.

The settings of the high pressure relief valves are shown in the table below.

Pressure settings

Code[15]	Pressure setting (MPa)
A	30
B	35
C	40
D	45
S	Customized pressure setting for a special case Please contact Kawasaki.

Note:

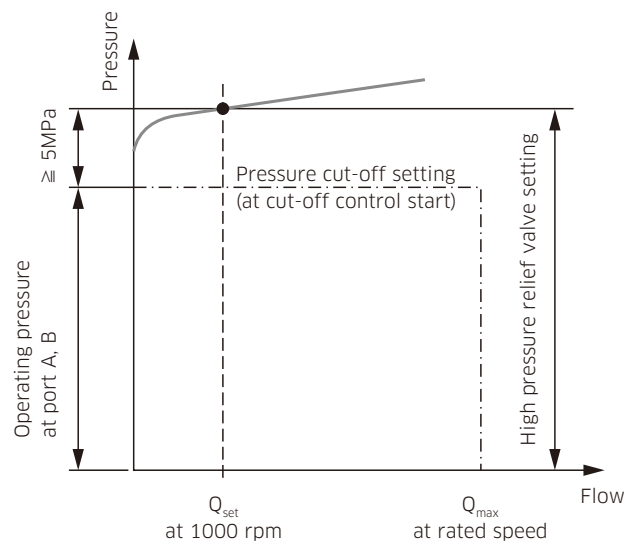
The allowable setting range of the high pressure relief valve is from 30 MPa to 45 MPa, and the customized pressure must be set within this range. For the customized pressure setting contact Kawasaki with the required pressure setting value. The pressure of the high pressure relief valve is factory preset at 40 MPa, if not specified.

2. Low pressure relief valve

Low pressure relief valve is equipped to control the pressure for charge line and servo line.

The pressure setting of an integrated low pressure relief valve is preset at 2.5 MPa at the factory.

Do not adjust the pressure of the low pressure relief valve, as it may reduce the controllability of the pump.



High pressure relief valve setting diagram

◆ Pressure Cut-off

Pressure cut-off is the function which adjusts the pump displacement to the neutral position when the pressure reaches its pressure setting.

The pressure cut-off is set lower than high pressure relief valve setting, so that the maximum pump pressure is controlled by the pressure cut-off valve, whereas the high pressure relief valve acts to the pressure spike.

The cut-off pressure must be set at least 5 MPa lower than the setting of the high pressure relief valves.

The allowable setting range of the cut-off pressure is from 30 MPa to 40 MPa.

2. Technical Information

2-1 Specifications

◆ Charge Pump

Charge flow is required on all K8V pumps applied in closed circuit systems. The charge pump supplies flow to replenish, cool and filter oil, provide charge pressure and servo pressure, and flow for system control and auxiliary functions.

The integrated charge pump is available. The available charge pump sizes are as follows;

K8V71/90: 20 cm³/rev

K8V125: 28 cm³/rev

Pressure and flow for charge circuit can be supplied by an external auxiliary pump.

An auxiliary pump for charge circuit can also be mounted on the back of main pump using through drive mounting.

In case the auxiliary pump is used for charge circuit, connect the charge pump delivery line to port C so that the flow is provided to the low pressure line and servo line. The integrated low pressure relief valve can be used in this case. If the integrated low pressure relief valve is not used, provide an appropriate relief valve in the system.

2. Technical Information

2-1 Specifications

Filtration of Charge Pump

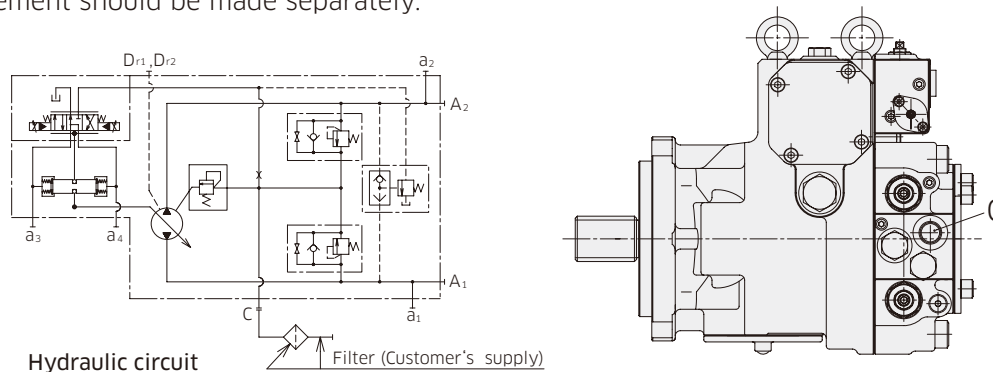
Filtration of the hydraulic fluid reduces premature wear, and enhances the reliability and productivity of the products. To ensure the cleanliness of the working fluid is essential to optimize function of the machine, and extend the service life.

Filtration system

1) External filtration system / External supply (Ordering code [11] : X)

This option is for a pump without an integrated charge pump. External charge pump supply comes from port C.

Filter arrangement should be made separately.



2) Remote filtration system (Ordering code [11] : B)

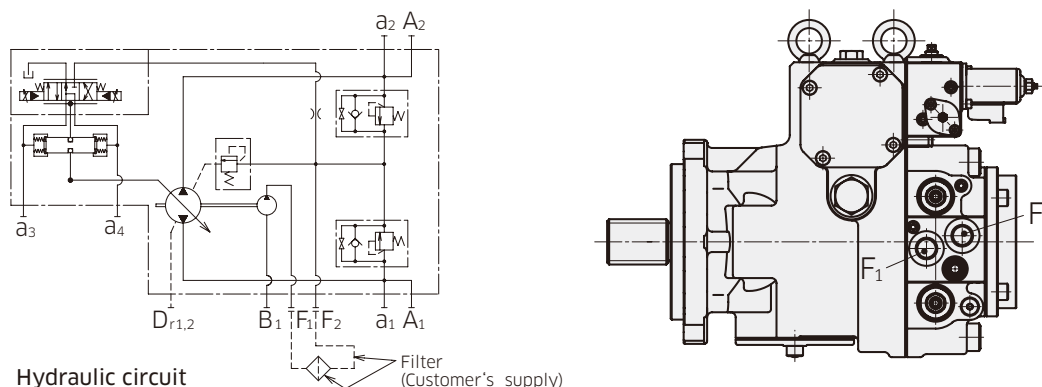
This is for a pump equipped with an integrated charge pump and ports for external charge circuit filter. The filter will be located in the discharge (pressure) line of the charge pump, as shown in the hydraulic circuit below.

Filters with bypass are not recommended.

Filter arrangement should be made separately, as the filter is not included in the delivery contents.

Charge pressure outlet: Port F_1

Charge pressure inlet: Port F_2



2. Technical Information

2-2 Functional Description of Regulator

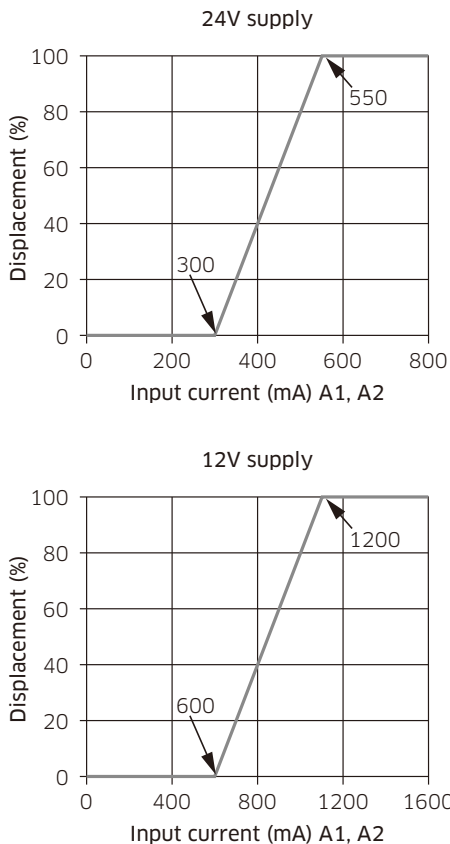
◆ Electric Proportional Control (Ordering code [14] : P1, P2)

Pump delivery flow can be proportionally controlled by the input current to the electric proportional reducing valve equipped on the regulator.

The input current of the electric proportional reducing valve signals the control spool in a regulator to stroke, and to supply pressure to the servo piston. The pump displacement varies with the stroke of the servo piston.

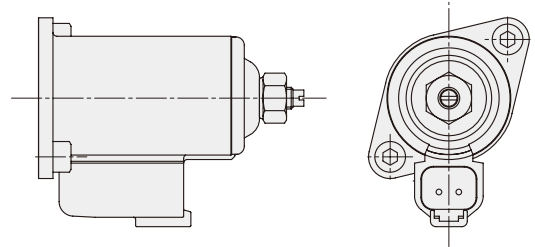
The feedback lever, connected with the servo piston at the one end, moves with the stroke of the servo piston. This movement causes the sleeve of the control spool which is connected to the other end of the feedback lever to stroke, and closes the flow passage to the servo piston. Consequently, the stroke of the servo piston stops, and the pump displacement becomes proportional to the input current.

Control characteristics



The above figures is the control characteristics of electric proportional control. The control characteristics of electric proportional control is not adjustable.

● Electrical specifications



Connector type

LADD DISTRIBUTION, DT04-2P

Rated Current and Coil Resistance

For 24 V supply: 0.7 A, 15 Ω (at 20°C)

For 12 V supply: 1.6 A, 3.3 Ω (at 20°C)

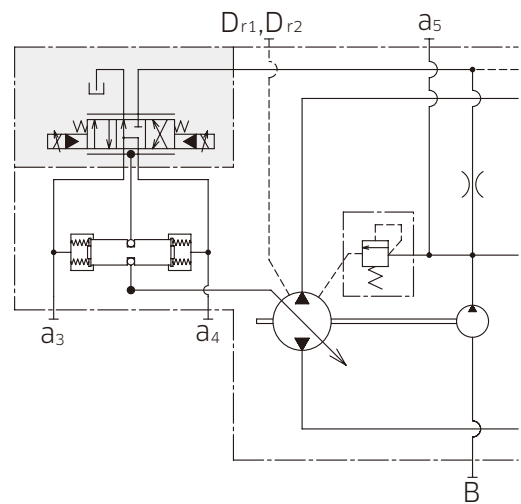
Recommended dither condition

85 Hz, 200 mAp-p for 24 V

85 Hz, 600 mAp-p for 12 V

(Note)

Electric displacement control regulator requires the minimum servo pressure is 2.0 MPa.



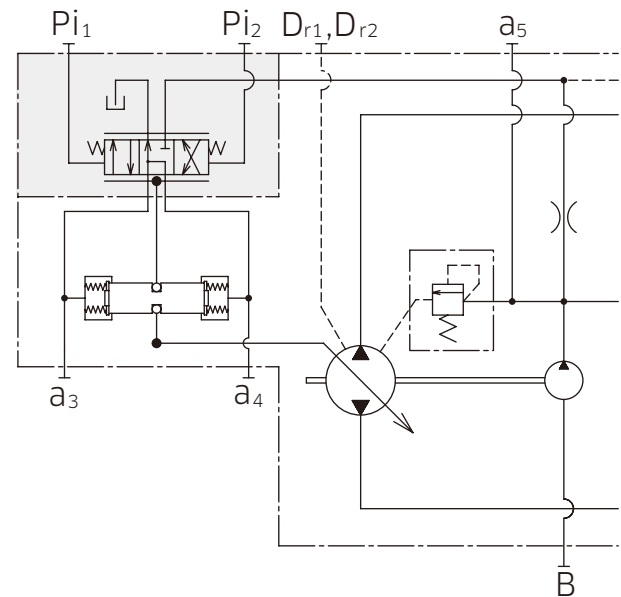
Hydraulic circuit

2. Technical Information

2-2 Functional Description of Regulator

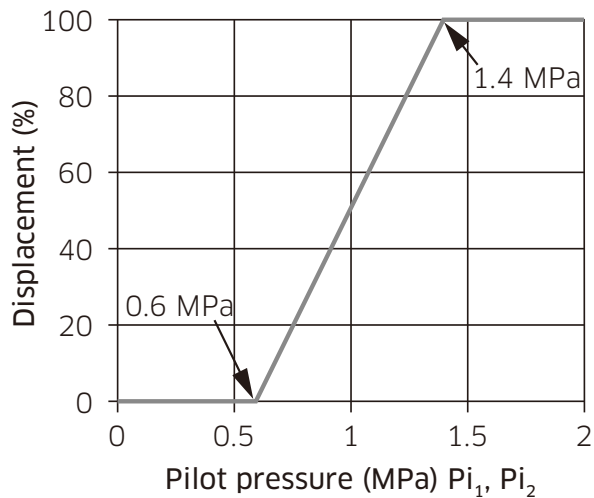
◆ Hydraulic Pilot Displacement Control (Ordering code [14] : P3)

Pump delivery flow can be proportionally controlled by the external pilot pressure supply. The external pilot pressure signals the control spool in a regulator to stroke, and to supply pressure to the servo piston. The pump displacement varies with the stroke of the servo piston. The feedback lever, connected with the servo piston at the one end, moves with the stroke of the servo piston. This movement causes the sleeve of the control spool which is connected with the other end of the feedback lever to stroke, and closes the flow passage to the servo piston. Consequently, the stroke of the servo piston stops, and the pump displacement becomes proportional to the external pilot pressure.



Hydraulic circuit

Control characteristics



The above figure is the standard control characteristic of hydraulic pilot displacement control. If non standard control characteristics is required, please contact Kawasaki.

2. Technical Information

2-2 Functional Description of Regulator

◆ Mechanical Stroke Limiter

Mechanical stroke limiter is available for option. By an adjusting screw the maximum displacement can be adjusted infinitely to the required displacement setting.

This option is under development. For details contact Kawasaki.

◆ Stroking Speed Control Orifice

Pump stroking speed (response) can be adjusted by changing the control orifice which is integrated in the servo line. The available control orifices and those response (for reference) are shown in the table below.

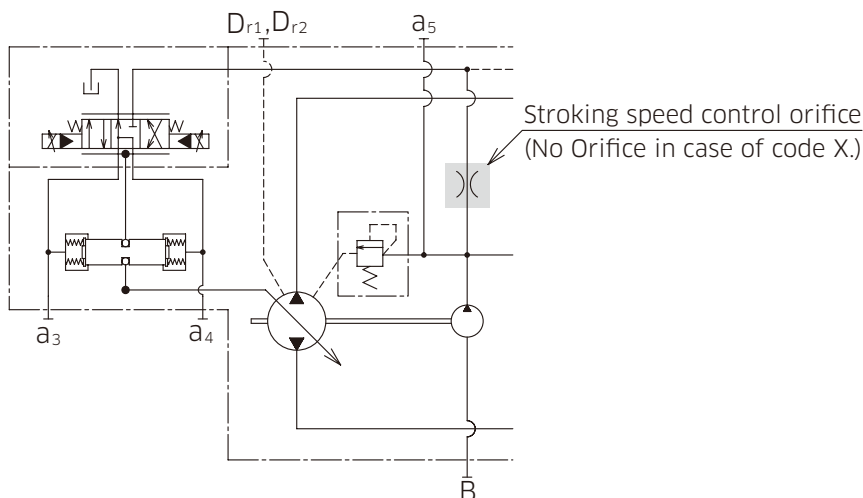
The typical orifice size used is as below;

K8V71: Φ 1.0

K8V90: Φ 1.2

K8V125: Φ 1.0

	Code [9]	Orifice size	Stroking time	
			Neutral to Max.	Max. to Neutral
K8V71	A	Φ 0.8	2.0 to 3.0 sec	0.3 to 1.0 sec
	B	Φ 1.0	1.5 to 2.0 sec	
	C	Φ 1.2	1.0 to 1.5 sec	
K8V90	B	Φ 1.0	2.0 to 2.5 sec	0.5 to 1.5 sec
	C	Φ 1.2	1.5 to 2.0 sec	
	D	Φ 1.4	1.0 to 1.5 sec	
K8V125	A	Φ 0.8	4.0 to 5.0 sec	0.5 to 1.5 sec
	B	Φ 1.0	3.0 to 4.0 sec	
	C	Φ 1.2	2.0 to 3.0 sec	



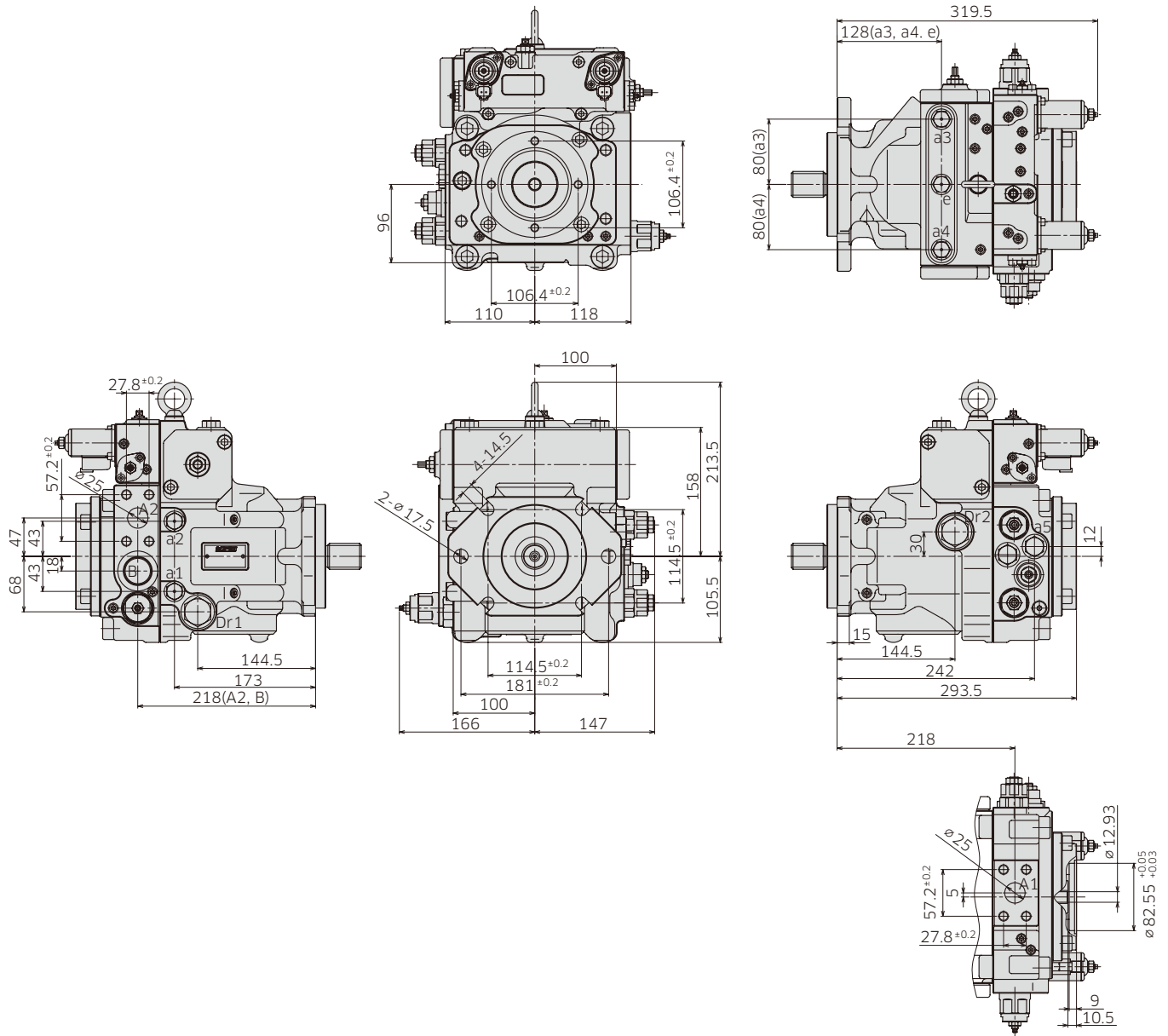
3 Dimensions

3-1 Installation Dimensions

*Dimensions in mm.

◆ K8V71

Model Code : K8V 71 A R C1 A1 * A * X X X - P1 * * * - * *



(Note) See port details for thread size on port A1 and A2.

3. Dimensions

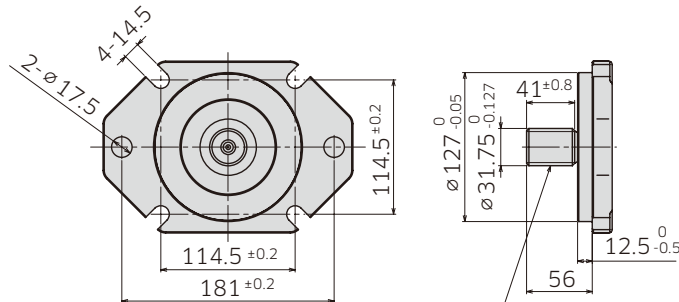
3-1 Installation Dimensions

*Dimensions in mm.

◆ K8V71 Mounting Flange and Shaft Options

SAE C Spline Shaft

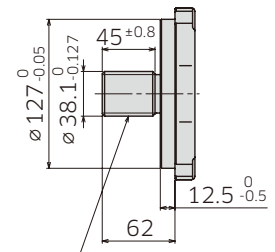
Ordering Code '5.Mounting Flange and Shaft' : C1



SAE "C" 30° Involute spline shaft
SAE J744-32-4
14T 12/24 DP

SAE CC Spline Shaft

Ordering Code '5.Mounting Flange and Shaft' : C2



SAE "CC" 30° Involute spline shaft
SAE J744-38-4
17T 12/24 DP

◆ K8V71 Port Details

Main flanged ports

Des	Port name	Port size	Flange thread	Tightening torque (Nm)
-----	-----------	-----------	---------------	------------------------

UNF thread version

A ₁ , A ₂	Pressure port	SAE J518C high pressure (Code 62) 1"	7/16-14UNC-2B-17-21.5	98
---------------------------------	---------------	--------------------------------------	-----------------------	----

Metric thread version

A ₁ , A ₂	Pressure port	SAE J518C high pressure (Code 62) 1"	M12-17	98
---------------------------------	---------------	--------------------------------------	--------	----

Auxiliary port

Des	Port name	Port size	Tightening torque (Nm)
Dr ₁ , Dr ₂	Drain port	1-1/16-12UN-2B-19 (ISO 11926-1 : 1995)	170
a ₁ , a ₂ , a ₃ , a ₄	Gauge port	9/16-18UNF-2B-12.7 (ISO 11926-1 : 1995)	59
B	Inlet port	1-5/16-12UN-2B-19 (ISO 11926-1 : 1995)	300
a ₅	Gauge port	3/4-16UNF-2B-15 (ISO 11926-1 : 1995)	98
e	Air vent port	9/16-18UNF-2B-12.7 (ISO 11926-1 : 1995)	59
F ₁	External filter port (out)	3/4-16UNF-2B-15 (ISO 11926-1 : 1995)	98
F ₂	External filter port (in)	3/4-16UNF-2B-15 (ISO 11926-1 : 1995)	98
C	External charge pressure supply port	3/4-16UNF-2B-15 (ISO 11926-1 : 1995)	98
Pi ₁ , Pi ₂	Pilot port	9/16-18UNF-2B-12.7 (ISO 11926-1 : 1995)	59

3. Dimensions

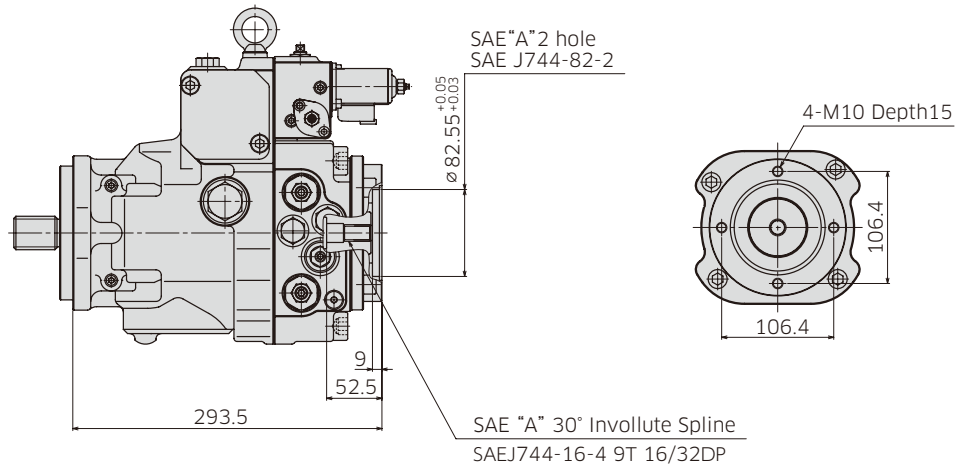
3-1 Installation Dimensions

*Dimensions in mm.

◆ K8V71 Through Drive Options

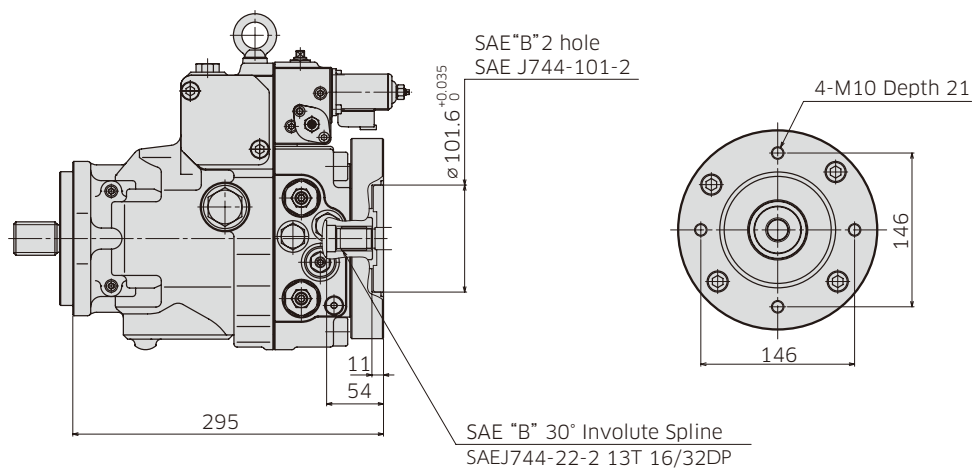
Through Drive SAE A

Ordering Code '6.Through Drive' : A1



Through Drive SAE B

Ordering Code '6.Through Drive' : B1



Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit

3. Dimensions

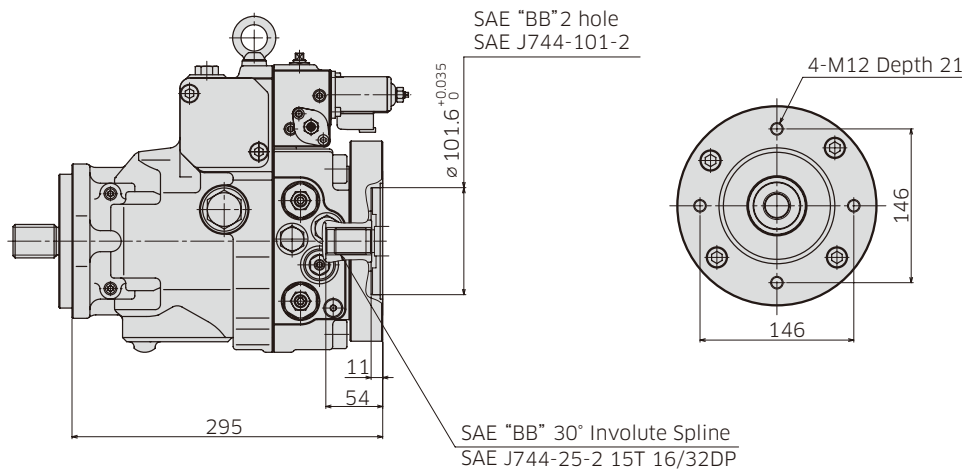
3-1 Installation Dimensions

*Dimensions in mm.

◆ K8V71 Through Drive Options

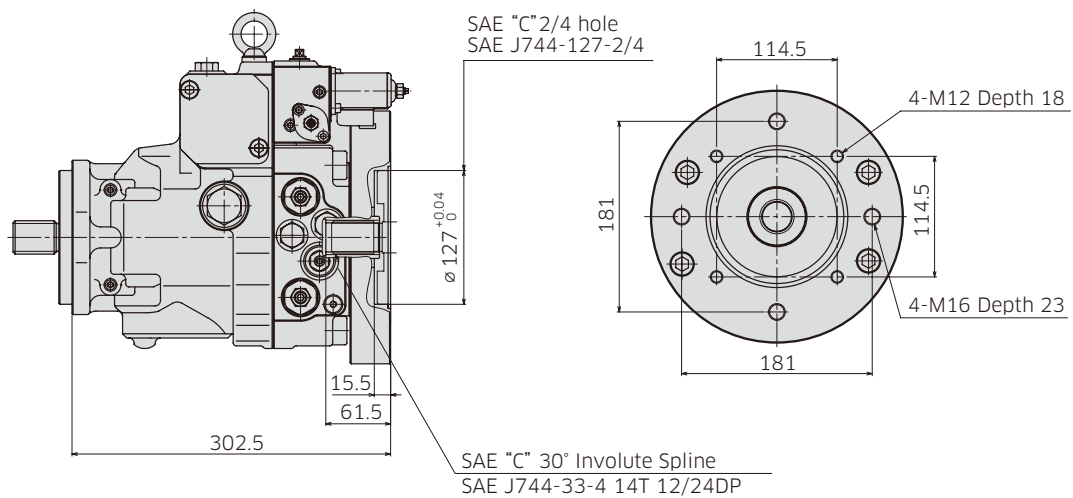
Through Drive SAE BB

Ordering Code '6.Through Drive' : B2



Through Drive SAE C

Ordering Code '6.Through Drive' : C1



Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit

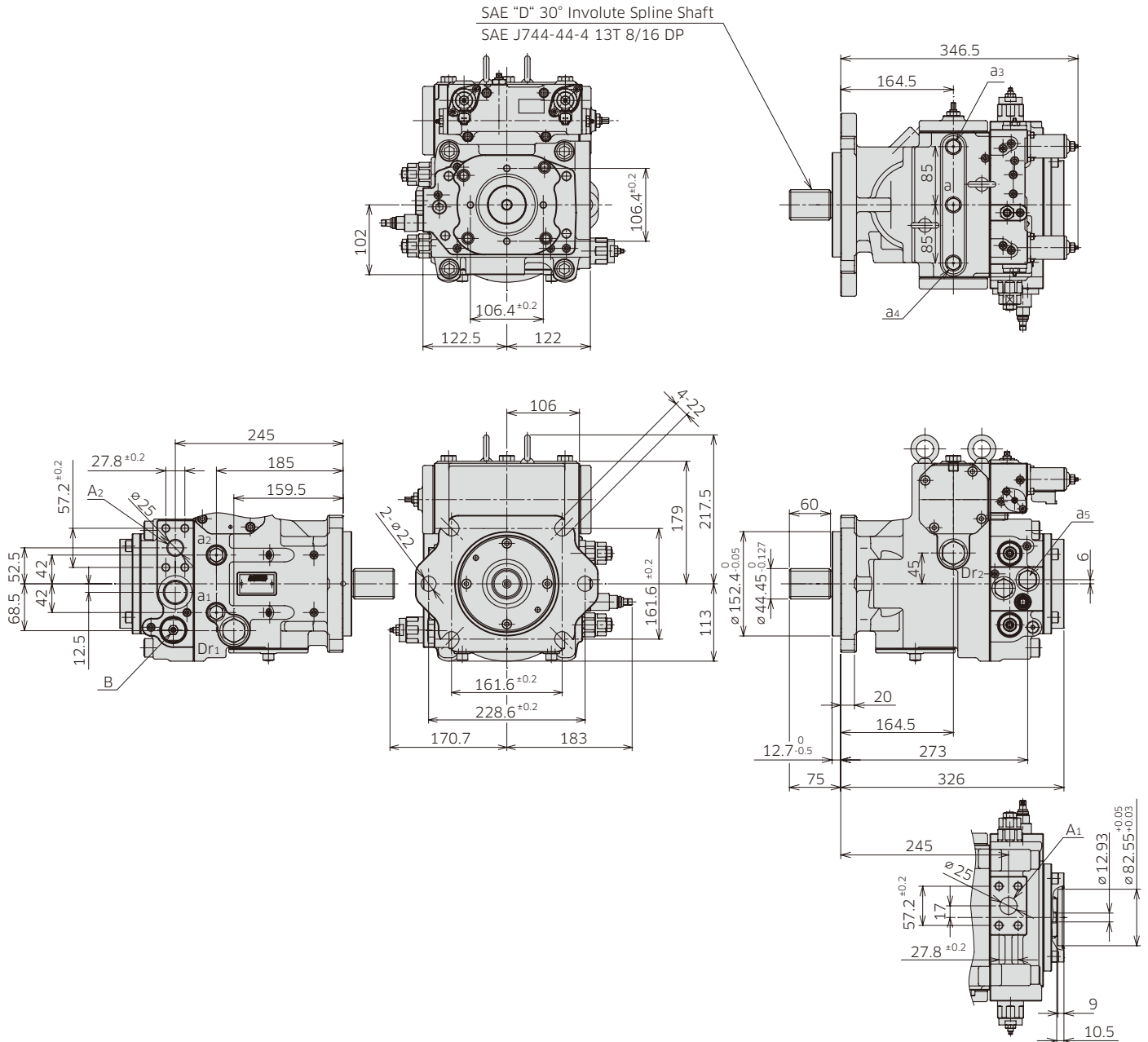
3. Dimensions

3-1 Installation Dimensions

* Dimensions in mm.

◆ K8V90

Model Code : K8V 90 A R D1 A1 * A * X X X X - P1 * * * - * *



(Note) See port details for thread size on port A1 and A2.

3. Dimensions

3-1 Installation Dimensions

◆ K8V90 Port Details

Main flanged ports

Des	Port name	Port size	Flange thread	Tightening torque (Nm)
-----	-----------	-----------	---------------	------------------------

UNF thread version

A ₁ , A ₂	Pressure port	SAE J518C high pressure (code 62) 1"	1/2-13UNC-2B-19/24	98
---------------------------------	---------------	--------------------------------------	--------------------	----

Metric thread version

A ₁ , A ₂	Pressure port	SAE J518C high pressure (code 62) 1-1/4"	M14-19	98
---------------------------------	---------------	--	--------	----

Auxiliary port

Des	Port name	Port size	Tightening torque (Nm)
Dr ₁ , Dr ₂	Drain port	1-1/16-12UN-2B-19 (ISO 11926-1 : 1995)	170
a ₁ , a ₂ , a ₃ , a ₄	Gauge port	9/16-18UNF-2B-12.7 (ISO 11926-1 : 1995)	59
B	Inlet port	1-5/16-12UN-2B-19 (ISO 11926-1 : 1995)	300
a ₅	Gauge port	7/8-14UNF-2B-16.7 (ISO 11926-1 : 1995)	143
e	Air vent port	9/16-18UNF-2B-12.7 (ISO 11926-1 : 1995)	59
F ₁	External filter port (out)	7/8-14UNF-2B-16.7 (ISO 11926-1 : 1995)	143
F ₂	External filter port (in)	7/8-14UNF-2B-16.7 (ISO 11926-1 : 1995)	143
C	External charge pressure supply port	7/8-14UNF-2B-16.7 (ISO 11926-1 : 1995)	143
Pi ₁ , Pi ₂	Pilot port	9/16-18UNF-2B-12.7 (ISO 11926-1:1995)	59

3. Dimensions

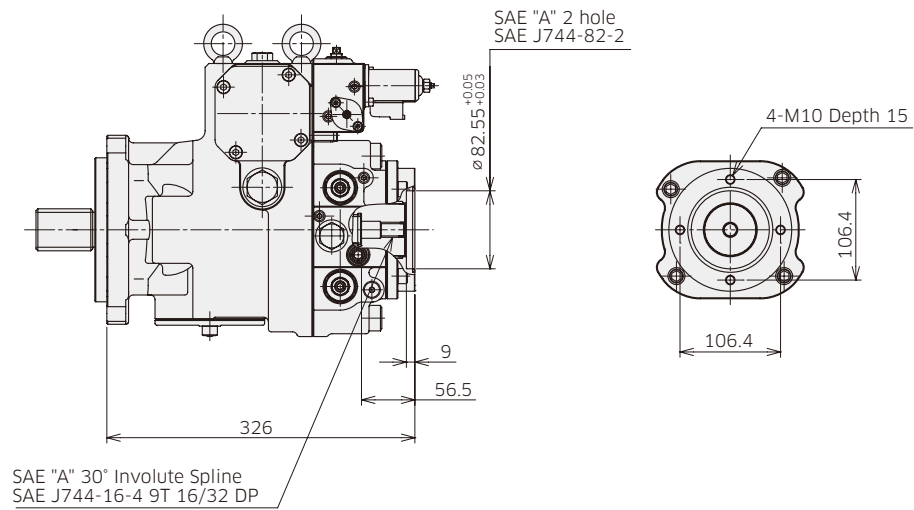
3-1 Installation Dimensions

*Dimensions in mm.

◆ K8V90 Through Drive Options

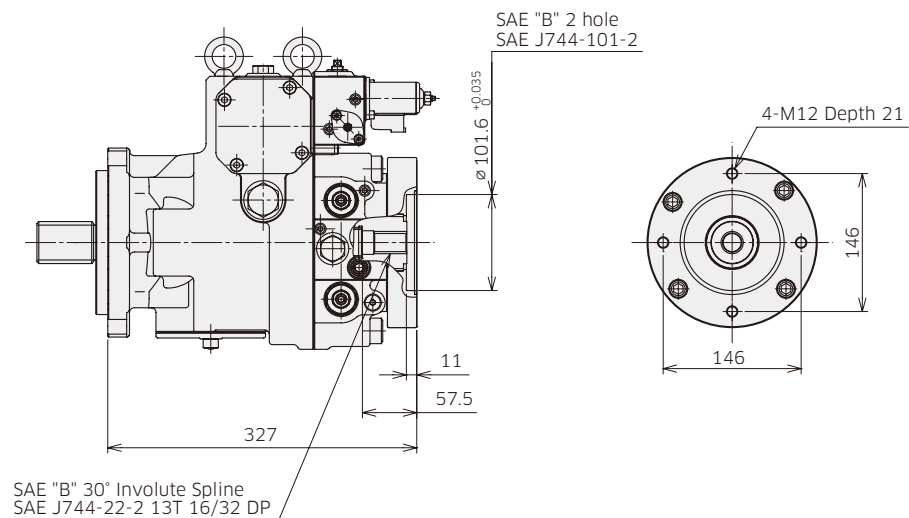
Through Drive SAE A

Ordering Code '6.Through Drive' : A1



Through Drive SAE B

Ordering Code '6.Through Drive' : B1



Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit

3. Dimensions

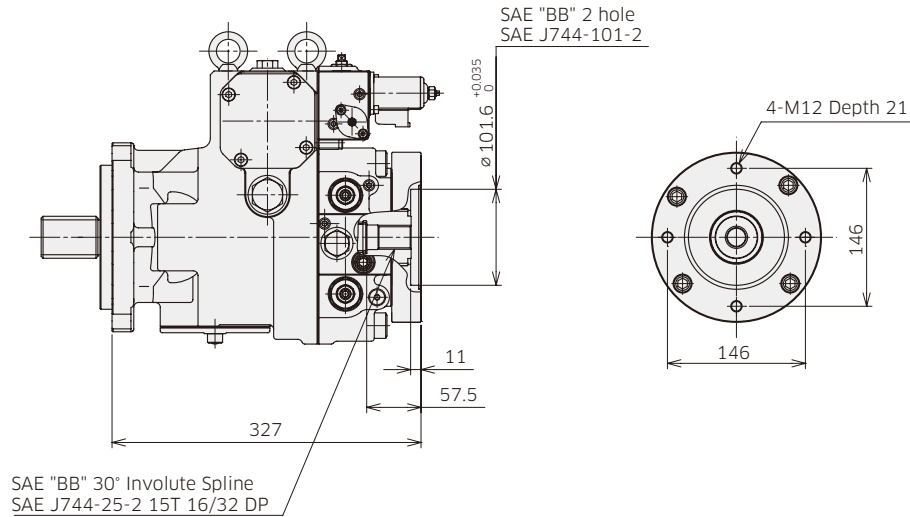
3-1 Installation Dimensions

*Dimensions in mm.

◆ K8V90 Through Drive Options

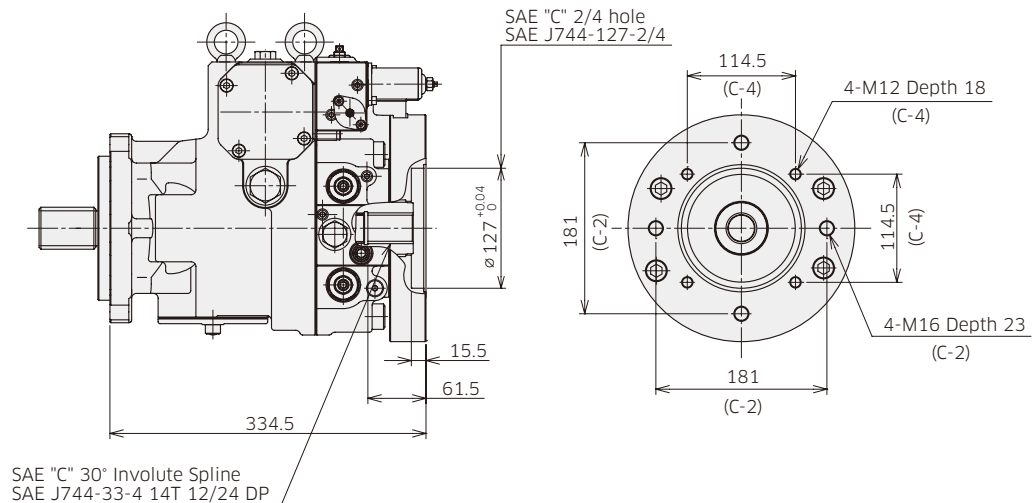
Through Drive SAE BB

Ordering Code '6.Through Drive' : B2



Through Drive SAE C

Ordering Code '6.Through Drive' : C1



Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit

3. Dimensions

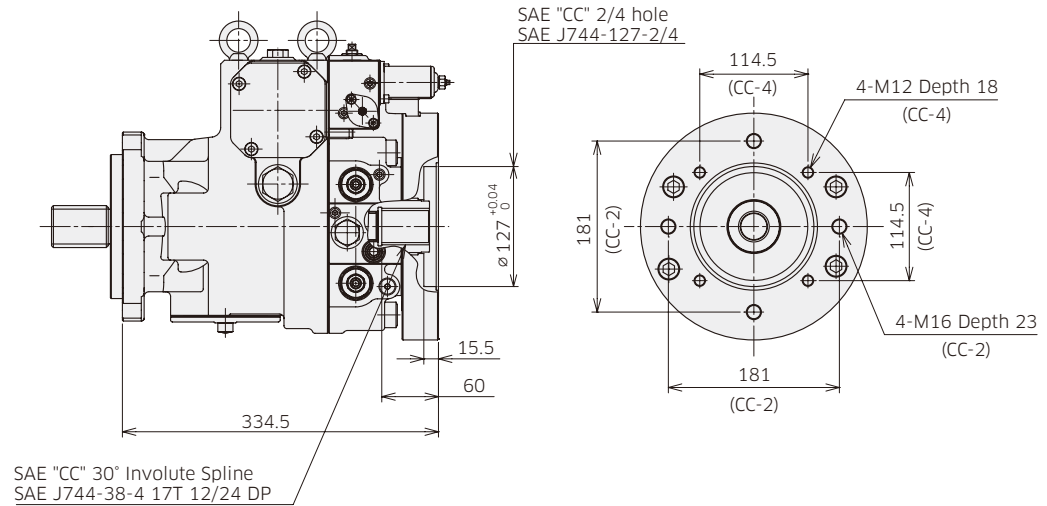
3-1 Installation Dimensions

*Dimensions in mm.

◆ K8V90 Through Drive Options

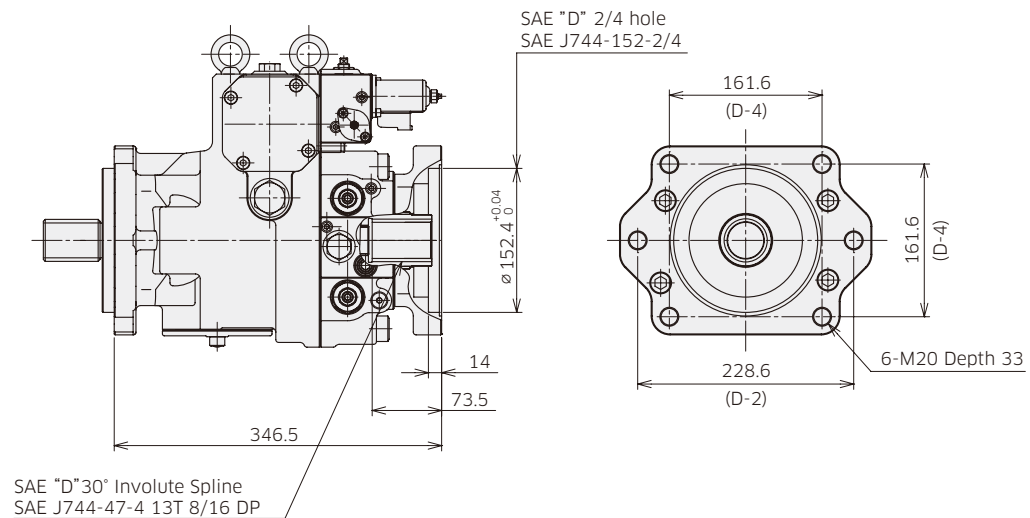
Through Drive SAE CC

Ordering Code '6.Through Drive' : C2



Through Drive SAE D

Ordering Code '6.Through Drive' : D1



Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit

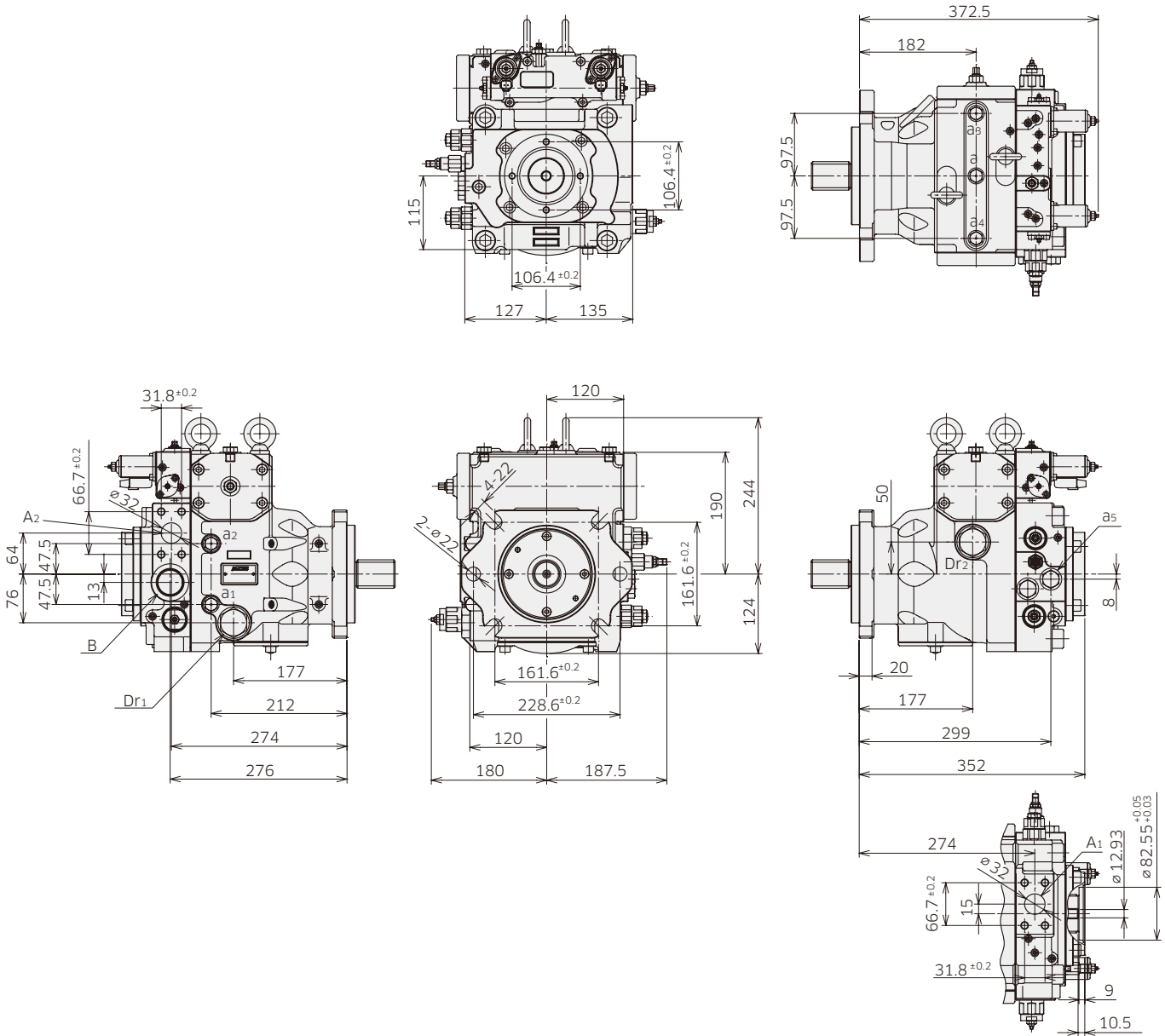
3. Dimensions

3-1 Installation Dimensions

*Dimensions in mm.

◆ K8V125

Model Code : K8V 125 A R D1 A1 * B * X X X X - P1 * * * - * *



(Note) See port details for thread size on port A1 and A2.

3. Dimensions

3-1 Installation Dimensions

*Dimensions in mm.

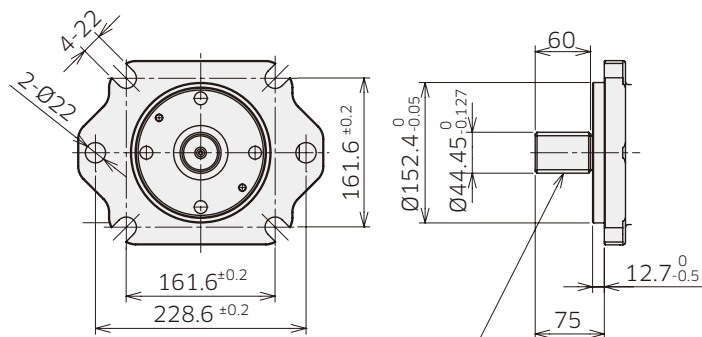
◆ K8V125 Mounting Flange and Shaft Options

SAE D Spline Shaft

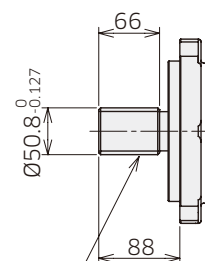
Ordering Code '5.Mounting Flange and Shaft' : D1

SAE F Spline Shaft

Ordering Code '5.Mounting Flange and Shaft' : D2



SAE "D" 30° Involute Spline Shaft
SAE J744-44-4
13T 8/16 DP



SAE "F" 30° Involute Spline Shaft
SAE J744-50-4
15T 8/16 DP

◆ K8V125 Port Details

Main flanged ports

Des	Port name	Port size	Flange thread	Tightening torque (Nm)
-----	-----------	-----------	---------------	------------------------

UNF thread version

A ₁ , A ₂	Pressure port	SAE J518C high pressure (code 62) 1-1/4"	1/2-13UNC-2B-19/24	157
---------------------------------	---------------	--	--------------------	-----

Metric thread version

A ₁ , A ₂	Pressure port	SAE J518C high pressure (code 62) 1-1/4"	M14-19	157
---------------------------------	---------------	--	--------	-----

Auxiliary port

Des	Port name	Port size	Tightening torque (Nm)
Dr ₁ , Dr ₂	Drain port	1-5/16-12UN-2B-19 (ISO 11926-1 : 1995)	300
a ₁ , a ₂ , a ₃ , a ₄	Gauge port	9/16-18UNF-2B-12.7 (ISO 11926-1 : 1995)	59
B	Inlet port	1-5/8-12UN-2B-24 (ISO 11926-1 : 1995)	350
a ₅	Gauge port	7/8-14UNF-2B-16.7 (ISO 11926-1 : 1995)	143
e	Air vent port	9/16-18UNF-2B-12.7 (ISO 11926-1 : 1995)	59
F ₁	External filter port (out)	7/8-14UNF-2B-16.7 (ISO 11926-1 : 1995)	143
F ₂	External filter port (in)	7/8-14UNF-2B-16.7 (ISO 11926-1 : 1995)	143
C	External charge pressure supply port	7/8-14UNF-2B-16.7 (ISO 11926-1 : 1995)	143
Pi ₁ , Pi ₂	Pilot port	9/16-18UNF-2B-12.7 (ISO 11926-1 : 1995)	59

3. Dimensions

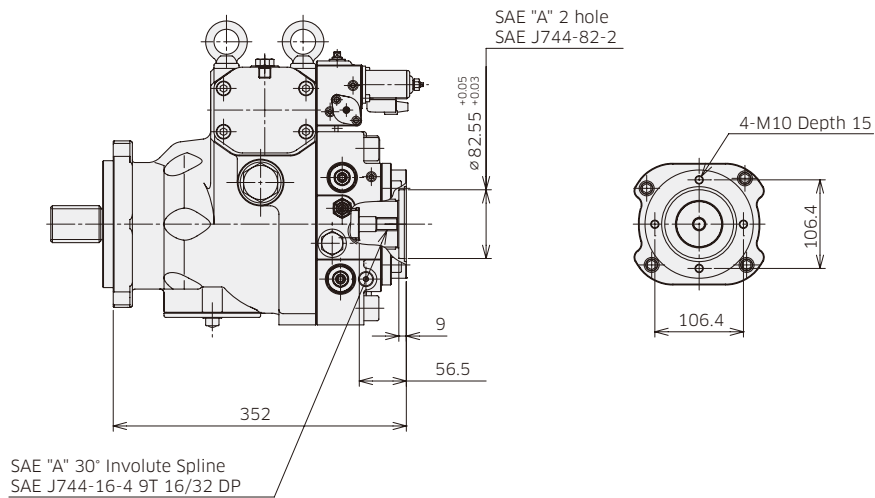
3-1 Installation Dimensions

*Dimensions in mm.

◆ K8V125 Through Drive Options

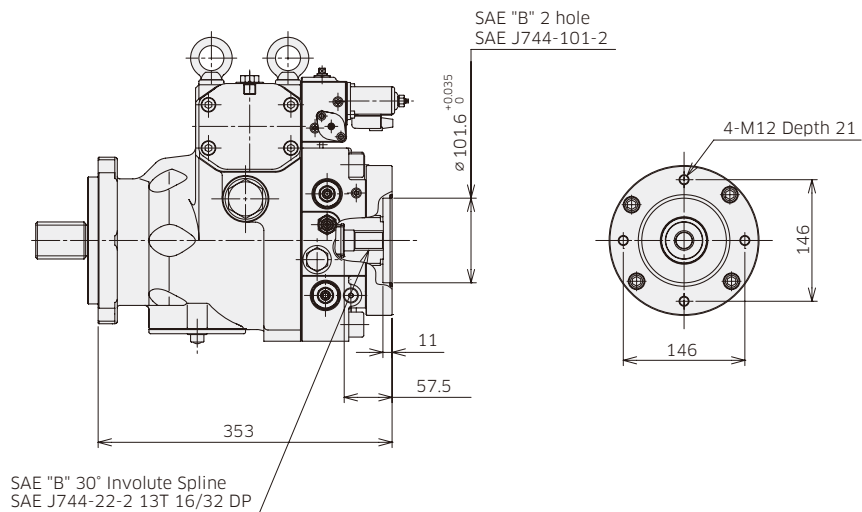
Through Drive SAE A

Ordering Code '6.Through Drive' : A1



Through Drive SAE B

Ordering Code '6.Through Drive' : B1



Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit

3. Dimensions

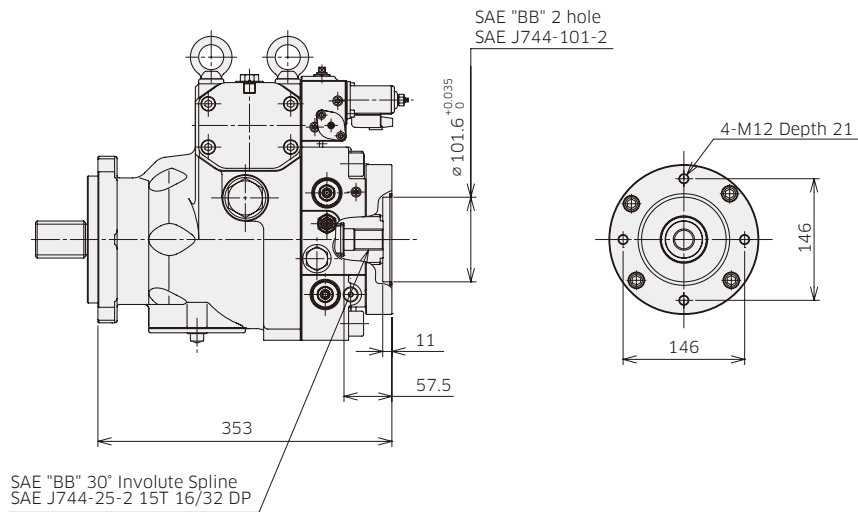
3-1 Installation Dimensions

*Dimensions in mm.

◆ K8V125 Through Drive Options

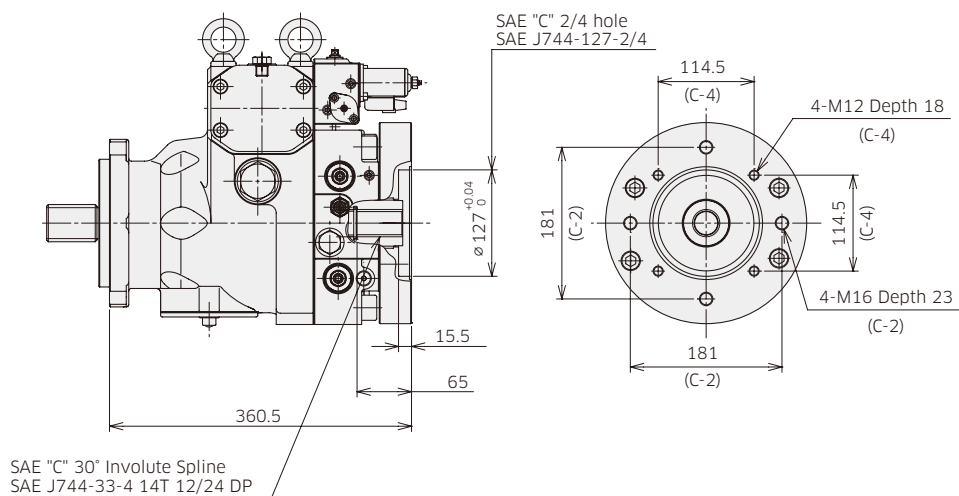
Through Drive SAE BB

Ordering Code '6.Through Drive' : B2



Through Drive SAE C

Ordering Code '6.Through Drive' : C1



Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit

3. Dimensions

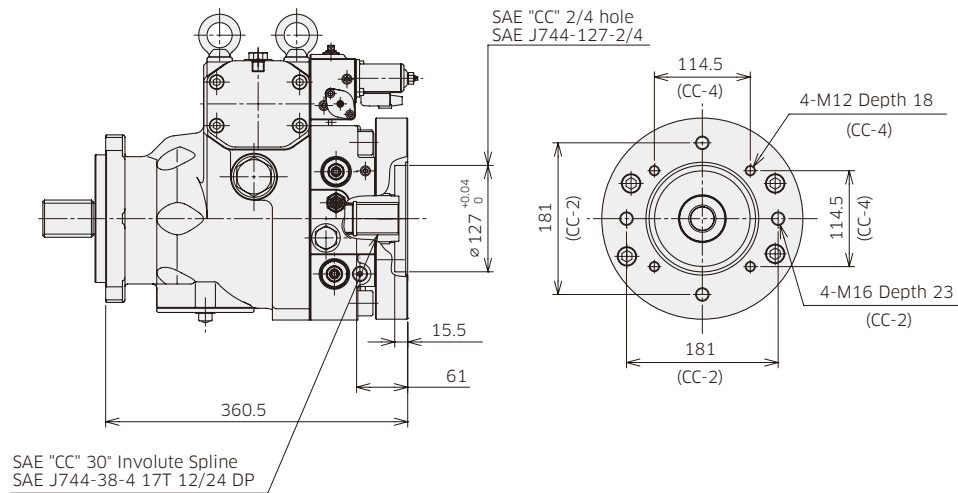
3-1 Installation Dimensions

*Dimensions in mm.

◆ K8V125 Through Drive Options

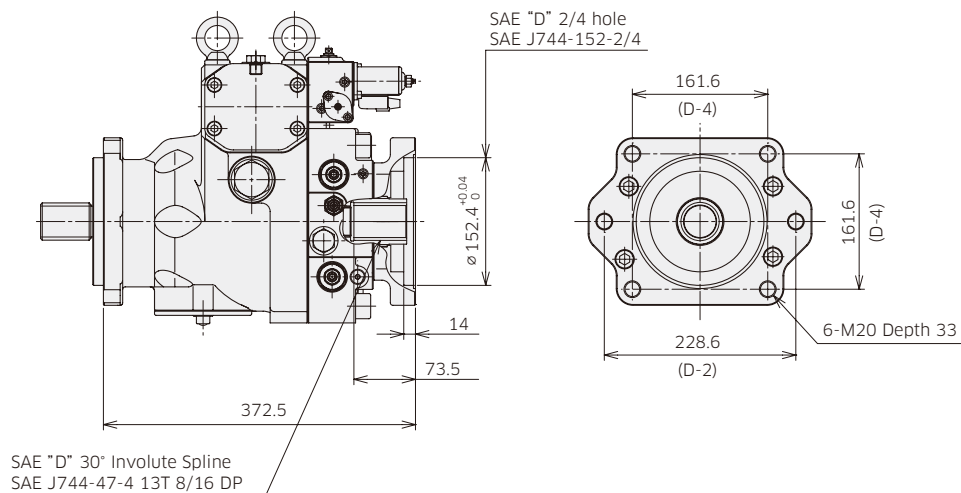
Through Drive SAE CC

Ordering Code '6.Through Drive' : C2



Through Drive SAE D

Ordering Code '6.Through Drive' : D1



Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit

3. Dimensions

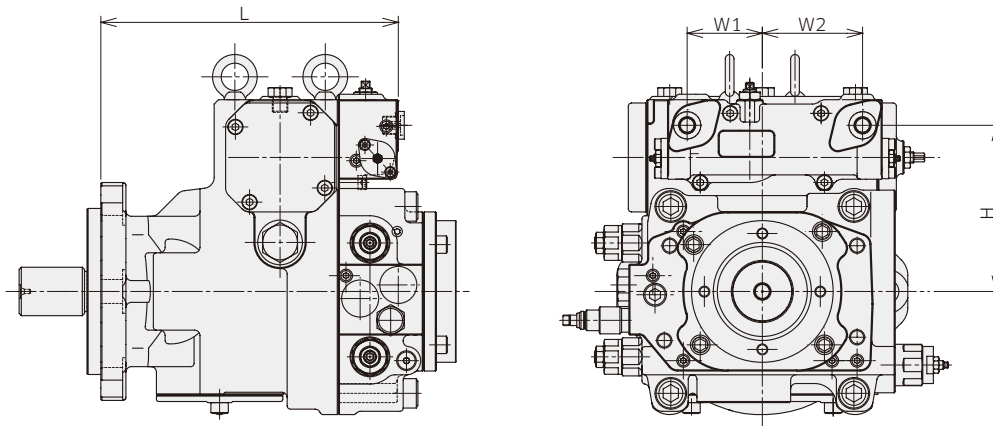
3-1 Installation Dimensions

◆ Hydraulic Pilot Displacement Control

K8V71 Model Code : K8V 71 A R C1 A1 C A C X X X X - P3 * * * - * *

K8V90 Model Code : K8V 90 A R D1 A1 C A C X X X X - P3 * * * - * *

K8V125 Model Code : K8V 125 A R D1 A1 C A B X X X X - P3 * * * - * *



(Dimensions : mm)

	L	W1	W2	H
K8V71	246	69	92	139
K8V90	273	69	92	152.5
K8V125	299	69	92	167.5

3. Dimensions

3-2 Installation of Auxiliary Pumps

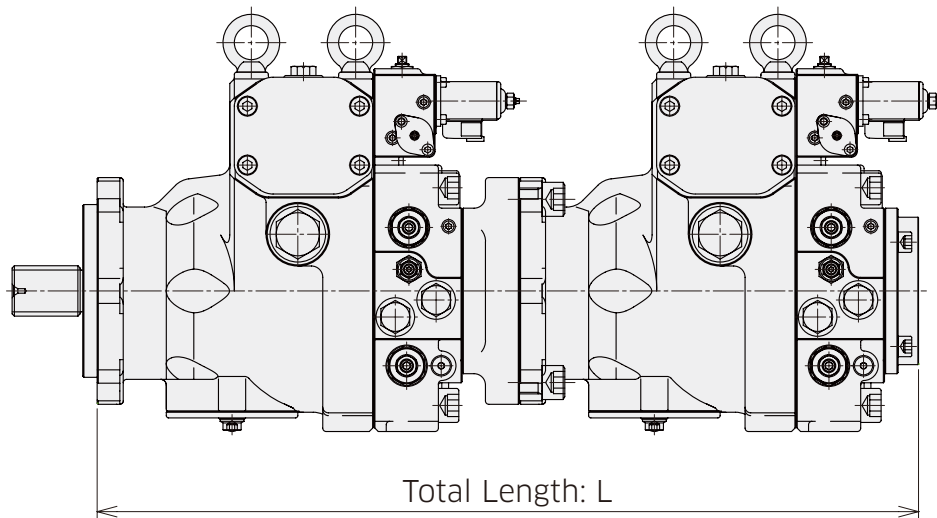
■ Allowable mass moment for combination pump

K8V series allows combination of multiple pumps using through drive mounting. Any pump up to the same size of the first pump may be mounted to the first pump.

In case of tandem configuration comprising of two pumps of the same rated size the allowable maximum dynamic acceleration to the pump unit is 10G. No additional mounting support is necessary in connecting two pumps, but use a 4-bolt mounting on the first pump when installing the pump unit. If the third pump is to be mounted on the rear of the second pump, the pump mass moment at the mounting flange shall be within the rated mass moment. Also, the input torque on the shaft needs to be within the limit of input torque tolerance. (See "Allowable maximum input torque" on page 13)

■ Total length of tandem unit (Dimensions: mm)

First pump	Second pump		
	K8V71	K8V90	K8V125
K8V71	596	-	-
K8V90	628	672.5	-
K8V125	654	698.5	724.5



Please complete the table to specify the requirements.
Please contact Kawasaki for any questions.



K8V Series Inquiry Form

Please tick the box for options.
Options with ★ are under development.

Date: _____ Machine Model: _____
 Application: _____
 Customer Name: _____

Closed Loop Swash Plate Type Axial Piston Pump

Model Code	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
K8V			A											-					-

Items	Model Code No.	Requirements	Kawasaki feed back
Pump Size	2	71 <input type="checkbox"/>	
		90 <input type="checkbox"/>	
		125 <input type="checkbox"/>	
Model Code	3	A : Series A	
Direction of Rotation	4	R : Clockwise <input type="checkbox"/>	
		L : Counterclockwise <input type="checkbox"/>	
Mounting Flange and Shaft	5	C1 : SAE C Mount & SAE C Shaft (14T-12/24DP) (for K8V71) <input type="checkbox"/>	
		C2 : SAE C Mount & SAE CC Shaft (17T-12/24DP) (for K8V71) <input type="checkbox"/>	
		D1 : SAE D Mount & SAE D Shaft (13T-8/16DP) (for K8V90/125) <input type="checkbox"/>	
		D2 : SAE D Mount & SAE F Shaft (15T-8/16DP) (for K8V125) <input type="checkbox"/>	
Through Drive	6	A1 : SAE A, 2 bolt, Through Drive (9T-16/32DP) <input type="checkbox"/>	
		B1 : SAE B, 2 bolt, Through Drive (13T-16/32DP) <input type="checkbox"/>	
		B2 : SAE BB, 2 bolt, Through Drive (15T-16/32DP) <input type="checkbox"/>	
		C1 : SAE C, 2/4 bolt, Through Drive (14T-12/24DP) <input type="checkbox"/>	
		C2 : SAE CC, 2/4 bolt, Through Drive (17T-12/24DP) (for K8V90/125) <input type="checkbox"/>	
		D1 : SAE D, 2/4 bolt, Through Drive (13T-8/16DP) (for K8V90/125) <input type="checkbox"/>	
		X : Without Through Drive <input type="checkbox"/>	
Thread Type (Suction/Delivery)	7	Type of Threaded Port	Thread Type for Flange Port
		A : UNF <input type="checkbox"/>	Metric <input type="checkbox"/>
		B : Metric <input type="checkbox"/> ★	Metric <input type="checkbox"/>
		C : UNF <input type="checkbox"/>	UNF <input type="checkbox"/>
Charge Pump	8	A : 20 cm ³ (for K8V71/90) <input type="checkbox"/>	
		B : 28 cm ³ (for K8V125) <input type="checkbox"/>	
		X : Without Integrated Charge Pump <input type="checkbox"/>	
Stroking Speed Control Orifice	9	A : Φ0.8 (for K8V71/125) <input type="checkbox"/>	
		B : Φ1.0 <input type="checkbox"/>	
		C : Φ1.2 <input type="checkbox"/>	
		D : Φ1.4 (for K8V90) <input type="checkbox"/>	
		X : Without Orifice (Available Only with Code [X] of Low Pressure Relief Valve 16) <input type="checkbox"/>	
Mechanical Stroke Limiter	10	A : With Mechanical Stroke Limiter <input type="checkbox"/> ★	
		X : Without Mechanical Stroke Limiter <input type="checkbox"/>	

Please complete the table to specify the requirements.
Please contact Kawasaki for any questions.

K8V Series Inquiry Form

Closed Loop Swash Plate Type Axial Piston Pump

Model Code	1	2	3	4	5	6	7	8	9	10	11	12	13		14	15	16	17		18
	K8V		A											-					-	

Items	Model Code No.	Requirements	Kawasaki feed back
Filtration System (When the code "X" (without charge pump) is selected in the section 8 (code for charge pump), the code "X"(without filter) must be selected in the section 11.)	11	A : Integral Pressure Filtration <input type="checkbox"/> ★	
		B : Remote Pressure Filtration with Ports For External Charge Circuit Filter <input type="checkbox"/>	
		X : Eternal filtration system / External supply <input type="checkbox"/>	
Swivel Angle Sensor	12	A : With Swivel Angle Sensor <input type="checkbox"/> ★	
		X : Without Swivel Angle Sensor <input type="checkbox"/>	
Special Features	13	A : A ~ (Code Corresponding to the Feature will be set up When Necessary) <input type="checkbox"/> ★	
		X : Without Any Special Feature <input type="checkbox"/>	
Control Options	14	P1 : Electronic Proportional Displacement Control (24V) <input type="checkbox"/>	
		P2 : Electronic Proportional Displacement Control (12V) <input type="checkbox"/>	
		P3 : Hydraulic Proportional Displacement Control <input type="checkbox"/>	
		M1 : Manual Control with Lever <input type="checkbox"/> ★	
High Pressure Relief Valve	15	A : 30 MPa <input type="checkbox"/>	
		B : 35 MPa <input type="checkbox"/>	
		C : 40 MPa <input type="checkbox"/>	
		D : 45 MPa <input type="checkbox"/>	
		S : Customized Pressure Setting for Special Case <input type="checkbox"/>	
Pressure Cut-Off Valve (High pressure relief set pressure \geq Pressure cut-off setting pressure + 5 MPa)	16	A : 30 MPa <input type="checkbox"/>	
		B : 35 MPa <input type="checkbox"/>	
		C : 40 MPa <input type="checkbox"/>	
		S : Customized Pressure Setting for Special Case <input type="checkbox"/>	
		X : Without Pressure Cut-Off Valve <input type="checkbox"/>	
Low Pressure Relief Valve	17	B : 2.5 MPa <input type="checkbox"/>	
		S : Customized Pressure Setting for Special Case <input type="checkbox"/>	
		X : Without Low Pressure Valve <input type="checkbox"/>	
Design Code	18	** : 0.1~ <input type="checkbox"/>	

Comments (Other requirements)	Operating condition, Duty cycle etc. (Describe your detail)

Request Volume	Request Delivery Date	Note

Kawasaki Heavy Industries, Ltd.

Precision Machinery Company

<http://www.khi.co.jp/kpm/>

Tokyo Head Office

1-14-5 Kaigan, Minato-ku, Tokyo 105-8315, Japan
Phone +81-3-3435-6862 Fax. +81-3-3435-2023

Kobe Head Office

Kobe Crystal Tower, 1-3 Higashikawasaki-cho 1-chome, Chuo-ku, Kobe 650-8680, Japan
Phone +81-78-360-8607 Fax. +81-78-360-8609

Nishi-kobe Works

234, Matsumoto, Hasetani-cho, Nishi-ku, Kobe 651-2239, Japan
Phone +81-78-991-1160 Fax. +81-78-991-3186

OVERSEAS SUBSIDIARIES

Kawasaki Precision Machinery (UK) Ltd.

Ernesettle Lane, Ernesettle, Plymouth, Devon, PL5 2SA United Kingdom
Phone +44-1752-364394 Fax. +44-1752-364816
<http://www.kpm-eu.com>

Kawasaki Precision Machinery (U.S.A.), Inc.

3838 Broadmoor Avenue S.E. Grand Rapids, Michigan 49512, U.S.A.
Phone +1-616-975-3100 Fax. +1-616-975-3103
<http://www.kpm-usa.com>

Kawasaki Precision Machinery (Suzhou) Ltd.

668 JianLin Rd, New District, Suzhou, 215151 China
Phone +86-512-6616-0365 Fax. +86-512-6616-0366

Kawasaki Precision Machinery Trading (Shanghai) Co., Ltd.

17th Floor (Room 1701), The Headquarters Building, No168, XiZang Road (M), Huangpu District, Shanghai, 200001, China
Phone +86-21-3366-3800 Fax. +86-21-3366-3808

Kawasaki Chunhui Precision Machinery (Zhejiang) Ltd.

No.200 Yasha Road Shangyu Economic Development Zone, Shansyu, Zhejiang, 312300, China
Phone +86-575-8215-6999 Fax. +86-575-8215-8699

Flutek, Ltd.

98 GIL 6, Gongdan-Ro, Seongsan-Ku, Changwon-Si, Kyungnam, 51567, Korea
Phone +82-55-210-5900 Fax. +82-55-286-5557

Wipro Kawasaki Precision Machinery Private Limited

No. 15, Sy. No. 35 & 37, Kumbalgodu Industrial Area, Kumbalgodu Village, Kengeri Hobli, Bangalore, - 560074, India

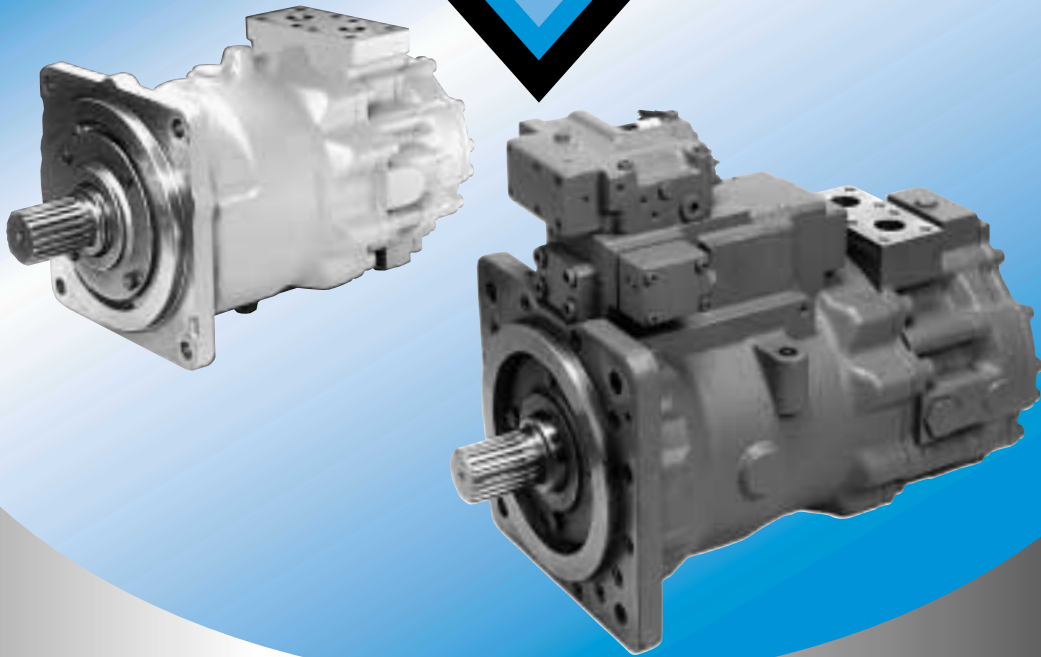


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Precision Machinery
Company Website

Kawasaki

Axial Piston Motors for General Industrial Machinery

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KPM
Kawasaki Precision Machinery

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M3X SERIES	5
Variable-Displacement Type Axial Piston Motor	
M3B SERIES	11
Axial Piston Motor with Reduction Gear	
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ON APPLICATION / USAGE OF THE PRODUCTS

Although our products are designed on the basis of our profound knowledge and long experience, and manufactured under the strict quality control system, the following must be taken into consideration in actual use.

1 The operating conditions of the products shown in this catalog vary depending upon each application. Therefore, the decision of the products' suitability to the system considered must be made by the designer of the hydraulic system and/or the person in charge of determining the specification after making analysis and conducting tests, if necessary. The study of the specification shall be done based on the latest catalog and technical documents, and the system must be composed taking into account situations regarding the possibility of machine failure.

2 Prior to use of the products, descriptions given in the SAFETY PRECAUTIONS must be observed for the proper use.

3 The technical information in this catalog represents typical characteristics and performance of the products, and is not guaranteed one.

4 In case the products are used in the following conditions or environments, please consult us prior to the use.

- ① Unspecified conditions or environments
- ② Use for atomic power, aviation, medical treatment, and/or food
- ③ Use likely to affect human beings or assets significantly or requiring particular safety





5 The information described in this catalog is subject to change without notice. For updated information, please consult us.

SAFETY PRECAUTIONS






Before you use the product, you **MUST** read the operation or operators manual and **MUST** fully understand how to use the product.

To use the product safely, you **MUST** carefully read all Warnings and Cautions in this manual. You **MUST** also observe the related regulations and rules regarding safety.








■ Cautions related to operation

- ①  **CAUTION** Use the safety equipment to avoid the injury when you operate the product.
- ②  **CAUTION** Pay enough attention on handling method to avoid pinching hands or back problems that may be caused by heavy weight of the product or handling posture.
- ③  **CAUTION** Do not step on the product, hit it, drop it or give strong outside force to it, as one of these actions may cause the failure of work, damage or oil leakage.
- ④  **CAUTION** Wipe the oil on the product or floor off completely, as the oil creates slippery conditions that may result in dropping the product or injuring.





■ Warnings and Cautions related to installation and removal of the product

- ①  **CAUTION** Installation, removal, plumbing, and wiring must be done by the certified person.
*CERTIFIED PERSON : a person who has enough knowledge like a person who is trained by Kawasaki's hydraulic school.
- ②  **WARNING** Make it sure that the power of the hydraulic power unit is turned off and that the electric motor or engine has completely stopped before starting installation or removal. You must also check the system pressure has dropped to zero.
- ③  **WARNING** Turn off the power before starting wiring or other works related to the electric power, otherwise you may be stuck by an electric shock.
- ④  **CAUTION** Clean the threads and mounting surface completely, otherwise you may experience damages or oil leakage caused by insufficient tightening torque or broken seal.
- ⑤  **CAUTION** Use the specified bolts and keep the specified tightening torque when you install the product. Usage of unauthorized bolts, lack of torque or excess of torque may create problems such as failure of work, damage and oil leakage.

■ Warnings and Cautions for operation

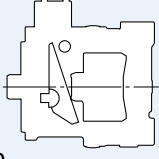
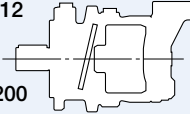
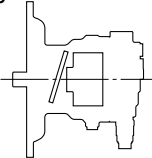
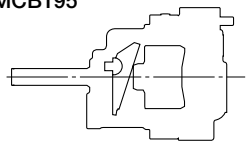
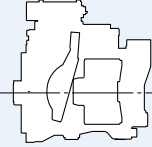
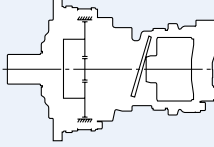
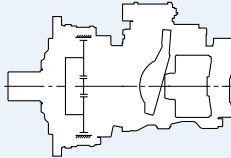
- ①  **DANGER** Never use the product not equipped with anti-explosion protection in the circumstances of possible explosion or combustion.
- ②  **WARNING** Shield the rotating part such as motor shaft and pump shaft to avoid injuries caused by being caught of fingers or cloths.
- ③  **WARNING** Stop the operation immediately if you find something wrong such as unusual noise, oil leakage or smoke, and fix it properly. If you continue operating, you may encounter damage, fire or injury.
- ④  **CAUTION** Make it sure that plumbing and wiring are correct and all the connection is tightened correctly before you start operating, especially if it is the first run.
- ⑤  **CAUTION** Use the product under the specification mentioned in the catalog, drawings and specification sheet.
- ⑥  **CAUTION** Keep your body off the product during the operations as it may become hot and burn your body.
- ⑦  **CAUTION** Use the proper hydraulic oil, and maintain the contamination in the recommended level, otherwise it may not work or be damaged.

■ Cautions related to maintenance

- ①  **CAUTION** Never modify the product without approval of Kawasaki.
- ②  **CAUTION** Do not disassemble and assemble without approval by Kawasaki. It may cause troubles and failure, or it may not work as specified. If it is necessary by all means to disassemble and assemble, it must be done by an authorized person.
- ③  **CAUTION** Keep the product from dust and rust by paying attention to the surrounding temperature and humidity when you transport or store the product.
- ④  **CAUTION** Replacing the seals may be required if you use the product after long time storage.

High-Performance Motors You Have Been Waiting for

Kawasaki Swash-Plate Type Axial Piston Motors

Displacement (cm ³)	for General Use		for Industrial Vehicles	
	General	General	for Swing	for Travel
	Fixed	Variable	Fixed	Variable
	P rated=31.4MPa (K3X series) 29.4MPa 20.6MPa (Reduction gear type)	P rated=29.4MPa 20.6MPa (Reduction gear type)	P rated=20.6MPa (size 22,45) 29.4MPa (size 63,210) 32.4MPa (size 130,180)	P rated=34.3MPa
	P max. = 34.3MPa	P max. = 34.3MPa	P max. =24.5MPa (size 22,45) 34.3MPa (size 63,210) 39.2MPa (size 130,180)	P max. = 41.2MPa
50	K3X63		M2X63	
80	K3X80		M5X130	
100	K3X90		M5X180	
150	K3X112		M2X210	MCB195
200		M3B200		
250	M3X280	M3B280		MCB530
500	M3X530	M3B530		
750	M3X800	M3B800		
1,000	M3X200-RG03S with Reduction Gear		M2X63-RG06 with Reduction Gear P rated=28.0MPa	
1,500	M3X280-RG06S with Reduction Gear	M3B280-RG06S with Reduction Gear	M5X130-RG10 with Reduction Gear P rated=27.4MPa	
3,000			M5X180-RG16 with Reduction Gear P rated=24.0MPa	DNB25 with Reduction Gear T max. = 26.3kN·m
	M3X530-RG10S with Reduction Gear	M3B530-RG10S with Reduction Gear	M5X180-RG20 with Reduction Gear P rated=29.4MPa	
5,000	M3X800-RG16S with Reduction Gear	M3B800-RG16S with Reduction Gear	M5X180-RG17C with Reduction Gear P rated=23.0MPa	
			M5X180-RG23C with Reduction Gear P rated=24.5MPa	DNB50 with Reduction Gear T max. = 58.8kN·m
20,000			M3X280-RG100C with Reduction Gear P rated=27.5MPa	DNB60 with Reduction Gear T max. = 63.7kN·m

This catalog introduces motors for general use. (Colored in in the above table.)

FEATURES

1. Wide variety variation

- Fixed Displacement Motors
M3X series consists of 4 models and 10 displacement types ranging from 149cm³ to 800cm³. M3X with reduction gear series covers a displacement range from 845cm³ to 5,120cm³. K3X series is made up of 4 models with displacement range from 63cm³ to 111cm³.
- Variable Displacement Motors
M3B series consists of 4 models with displacement range from 195cm³ to 800cm³ and from 1,512cm³ to 5,120cm³ for those with reduction gears. Several combinations of large and small displacements are available along with a wide variation of regulators are also available for various control options.

2. Excellent self-priming capability and max. speed (M3X, M3B, K3X)

- A spherical surface type valve plate and full-balancing mechanism enhance self-priming capability and max. speed.

3. High reliability based on long experience (M3X, M3B)

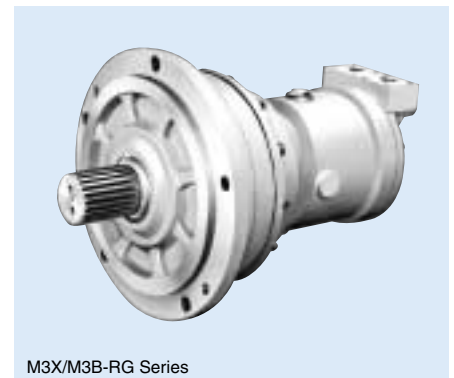
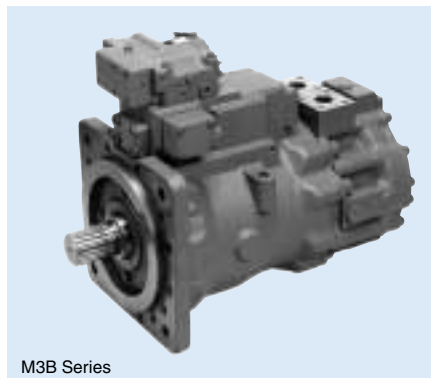
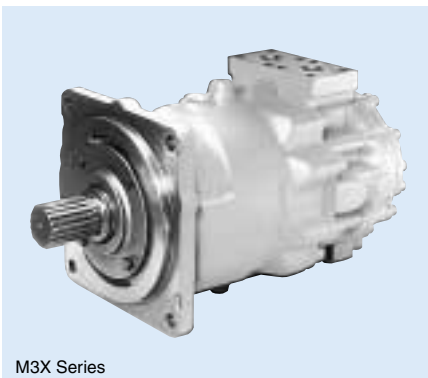
- Building on the knowledge and experiences of reputed MX/MB series, M3X/M3B series have been widely used especially as winch motors.

4. Optional parts (M3X, M3B)

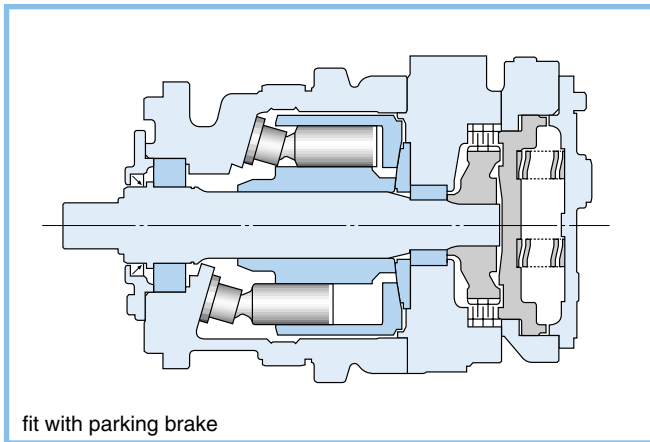
- Built-in parking brake is available for M3X/M3B motors.
- Various control valves are available for M3X/M3B motors.

5. Other motors

- M2X/M5X series motors are specifically designed for swing function of construction machinery.
- MCB series plug-in motors and DNB series case rotating type geared motors are available for traveling construction machinery.
- Low speed, high torque radial piston motors are prepared for general industrial use.



M3X Series



The M3X series are newly developed motors for construction machinery, industrial machinery or other applications.

The design based on technology and experience of current MX series is more compact and enables a speed range.

FEATURES

1. Advanced Low Speed Characteristics

New design which reduces pressure ripple and friction enabling expanded lower speed limit and smooth starting characteristics.

2. High Speed Operation

New materials enable an increase in the maximum speed which has 1.5 times of current MX series.

3. Best Fit

4 models and 10 capacity motors are carried in 149-800 cm³. Installation is the same as current MX series. Larger capacity is possible with reduction gears RG series. (Refer to page 23)

ORDERING CODE

M3X 530 - A C N - 485 - 001A - D3

M3X series

size

200 : 195cm³ 530 : 533cm³
280 : 280cm³ 800 : 800cm³

optional function code

A : standard
B : fit with a parking brake

shaft code

C : JIS involute spline (external) (standard)
P : JIS involute spline (internal)
1 : JIS straight key

direction of rotation (A port: high press., view from shaft end)

N : clockwise rotation (standard)
M : anti-clockwise rotation

oil temp. code

marks	oil temperature range	remarks
V2	90°C < θ °C	all seal parts: fluoro-rubber
V1	90°C \geq θ °C	oil seal: fluoro-rubber
blank	-20°C \leq θ \leq 90°C	
D1	-30°C < θ < -20°C	
D3	-45°C \leq θ \leq -30°C	

design code

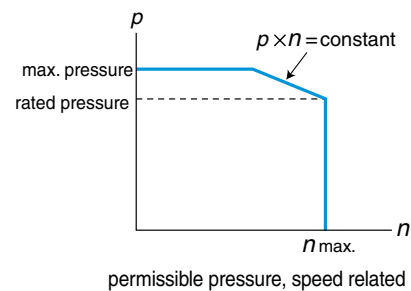
optional capacity
showed only optional capacity

SPECIFICATIONS

model		M3X200	M3X280	M3X530	M3X800	
displacement		Vg cm ³	195	280	533	800
pressure MPa (kgf/cm ²)	rated	29.4 (300)				
	max.	34.3 (350)				
max. speed		n max min ⁻¹	1,900	1,700	1,400	1,200
max. flow		L/min	370	480	750	960
rated torque		N·m	910	1,310	2,500	3,750
rated power		kW	180	230	370	470
case volume		L	1.0	1.3	2.5	3.8
moment of inertia		N·m ²	1.4	3.0	7.3	14
mass	kg	standard	42	62	90	133
		with parking brake	—	80	134	195

M3X Optional capacities

model	capacity (☆ : standard) max. speed			
	Vg	☆	☆	☆
M3X200	Vg	☆ 195	149	cm ³
	n max.	1,900	2,140	min ⁻¹
M3X280	Vg	☆ 280	252	
	n max.	1,700	1,770	
M3X530	Vg	☆ 533	499	(485)
	n max.	1,400	1,400	1,420
M3X800	Vg	☆ 800	751	(737)
	n max.	1,200	1,230	1,240



CALCULATION FORMULA

■ required input flow L/min

$$qv = \frac{Vg \cdot n}{1,000 \cdot \eta v}$$

■ output speed min⁻¹

$$n = \frac{qv \cdot 1,000 \cdot \eta v}{Vg}$$

■ output torque N·m (kgf·m)

$$T = \frac{Vg \cdot \Delta p \cdot \eta hm}{2 \cdot \pi}$$

■ output power kW (PS)

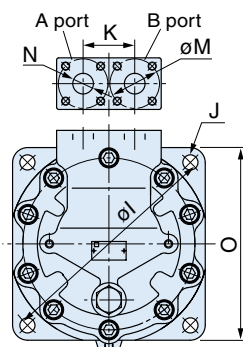
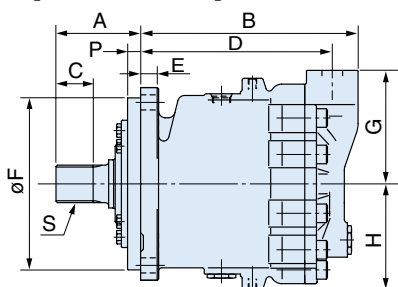
$$P = \frac{2\pi \cdot T \cdot n}{60,000} = \frac{T \cdot n}{9,550}$$

$$= \frac{qv \cdot \Delta p}{60} \cdot \eta t$$

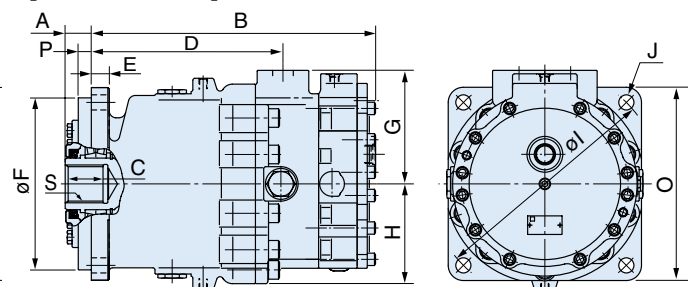
Vg	displacement	cm ³
T	torque	N·m
n	speed	min ⁻¹
Δp	effective pressure difference	MPa (kgf/cm ²)
ηv	volumetric efficiency	
ηhm	mechanical efficiency	
ηt	overall efficiency	

DIMENSIONS

[M3X***ACN]



[M3X***BPN]



(mm)

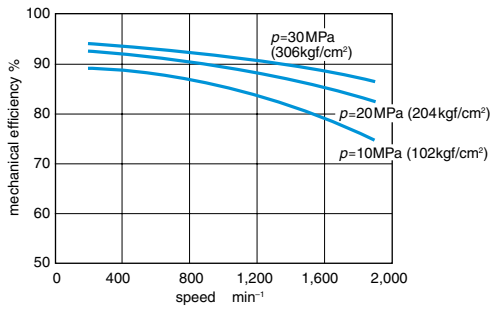
size	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	S
M3X200ACN	107	263	50	225	20	160	115	110	224	4- ϕ 18	75	2 x 4, M12-17.5	72	22	190	9	m=2.5, z=16
M3X200APN	49	263	35	225	20	160	115	110	224	4- ϕ 18	75	2 x 4, M12-17.5	72	22	190	9	m=2.5, z=13
M3X280ACN	98	290	45	252	22	200	130	124	268	4- ϕ 17	75	2 x 4, M12-17.5	72	25	230	11	m=2.5, z=16
M3X280BPN	33	290	44	252	22	200	130	124	268	4- ϕ 17	75	2 x 4, M12-17.5	72	25	230	11	m=2.5, z=16
M3X530ACN	123	316	54	278.5	24	250	165	154	335	4- ϕ 22	75	2 x 4, M12-17.5	72	30	280	19	m=2.5, z=20
M3X530BPN	38	413	55	278.5	24	250	165	154	335	4- ϕ 22	75	2 x 4, M12-17.5	72	30	280	19	m=2.5, z=20
M3X800ACN	130	350	62	312.5	27	280	178	169	376	4- ϕ 22	75	2 x 4, M12-17.5	72	28	310	16	m=3, z=19
M3X800BPN	45	461	62	325	27	280	178	169	376	4- ϕ 22	102	2 x 4, M16-23	92	30	310	16	m=3, z=19

PERFORMANCE CURVE

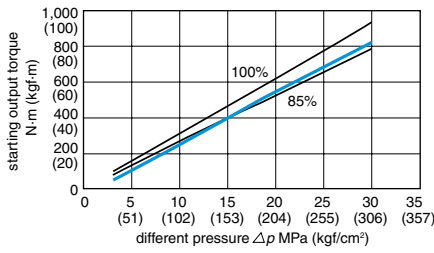
The values given in the below figures are mean ones, and not guaranteed ones.

M3X200

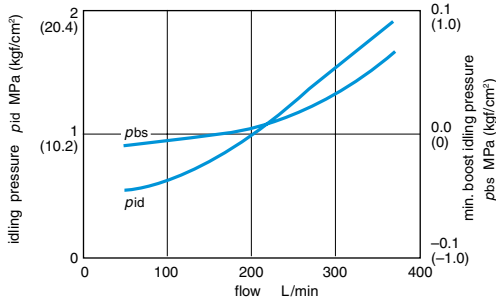
Mechanical efficiency (%)



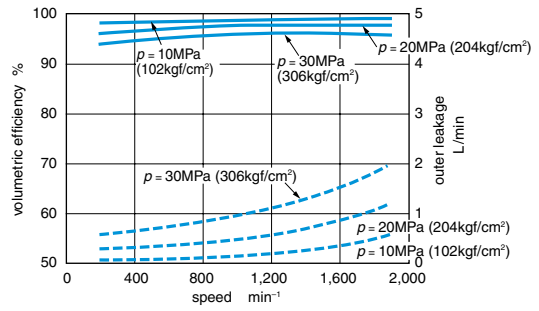
Starting mechanical efficiency



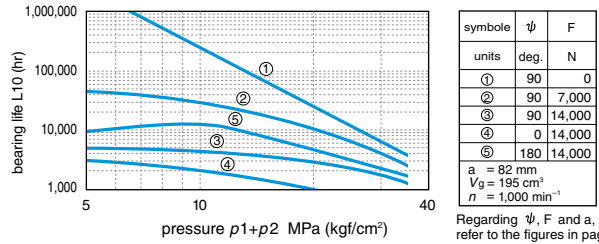
Idle & boost-graph



Volumetric efficiency

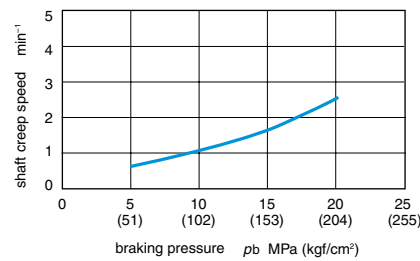


Radial load and bearing life



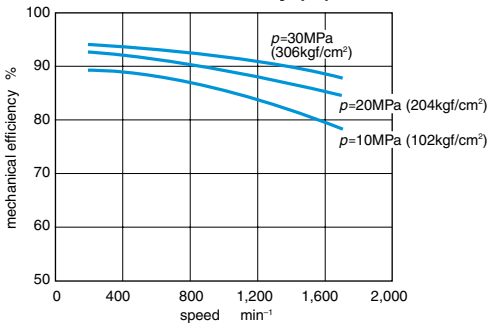
Regarding ψ , F and a, please refer to the figures in page 9.

Shaft creep speed

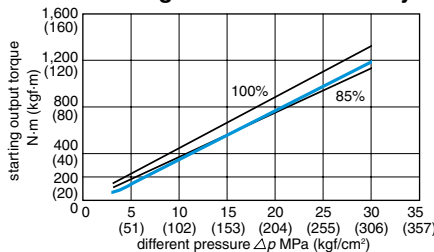


M3X280

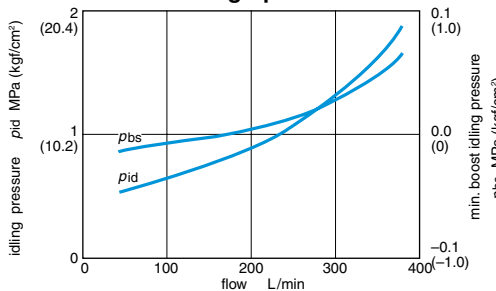
Mechanical efficiency (%)



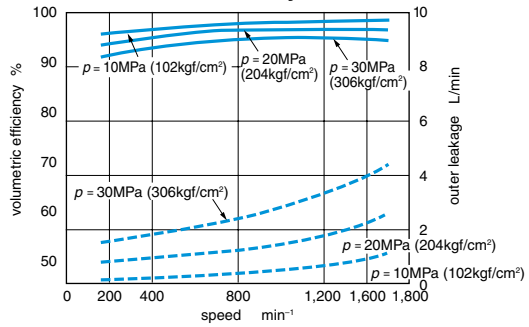
Starting mechanical efficiency



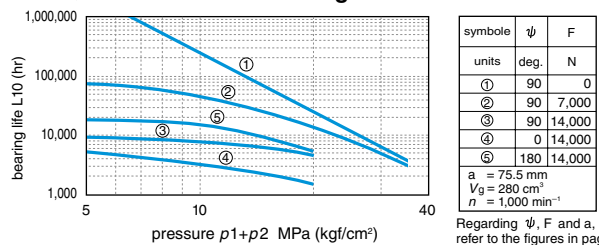
Idle & boost-graph



Volumetric efficiency

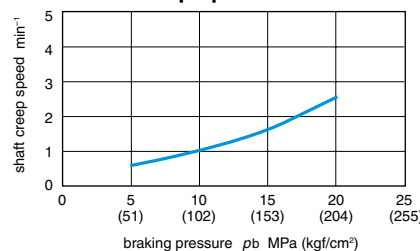


Radial load and bearing life



Regarding ψ , F and a, please refer to the figures in page 9.

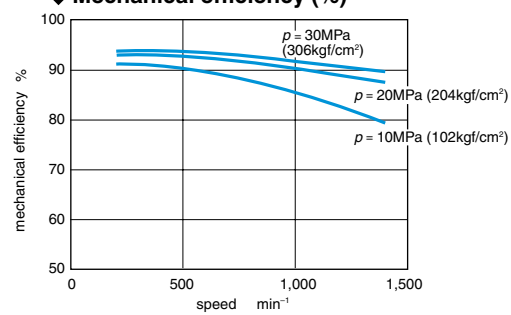
Shaft creep speed



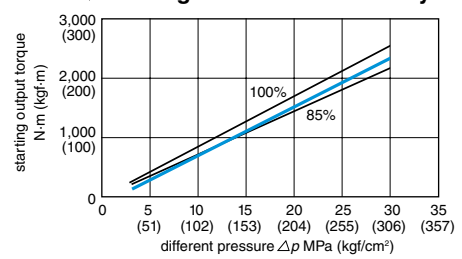
oil temperature : 50°C
oil viscosity : 32mm²/s

M3X530

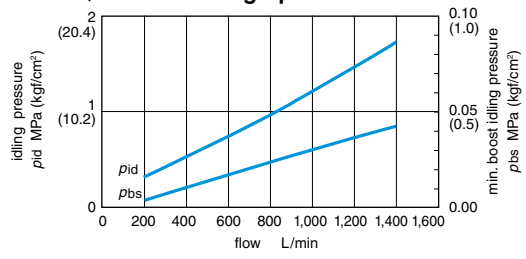
Mechanical efficiency (%)



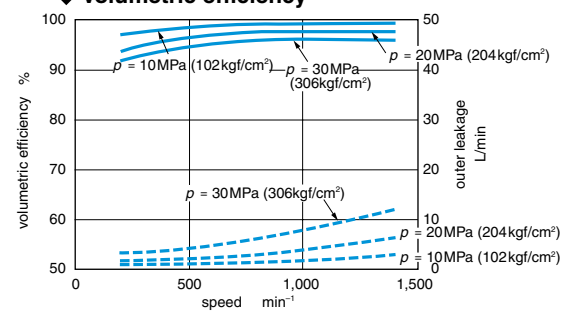
Starting mechanical efficiency



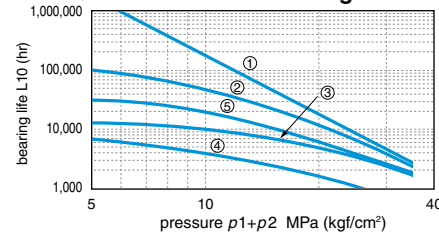
Idle & boost-graph



Volumetric efficiency



Radial load and bearing life

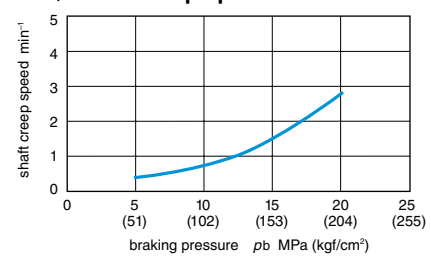


symbole	ψ	F
units	deg.	N
①	90	0
②	90	9,000
③	90	18,000
④	0	18,000
⑤	180	18,000

a = 96 mm
V_g = 533 cm³
n = 1,000 min⁻¹

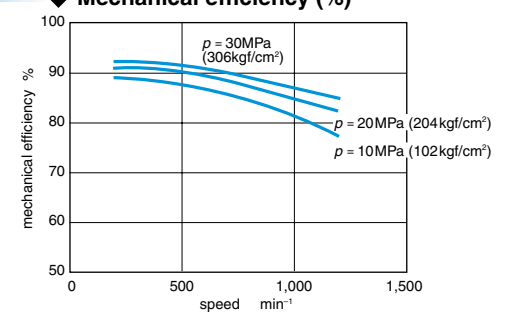
Regarding ψ, F and a, please refer to the figures in page 9.

Shaft creep speed

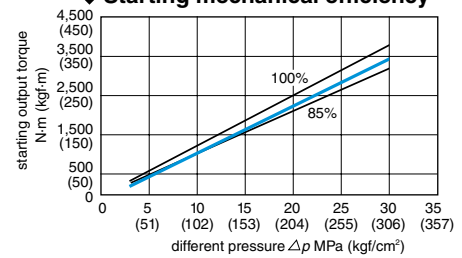


M3X800

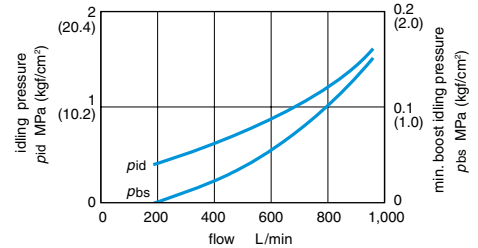
Mechanical efficiency (%)



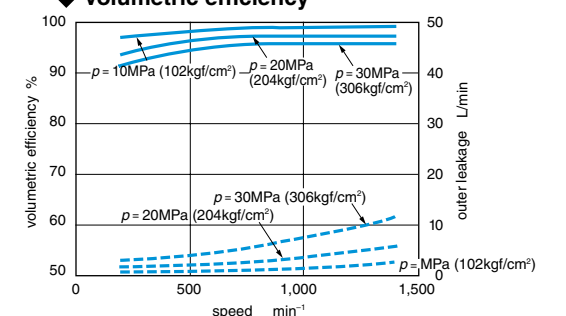
Starting mechanical efficiency



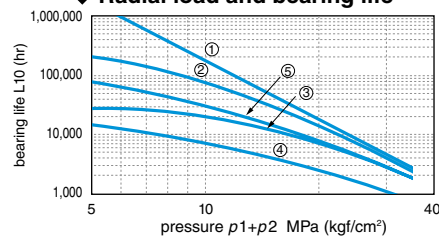
Idle & boost-graph



Volumetric efficiency



Radial load and bearing life

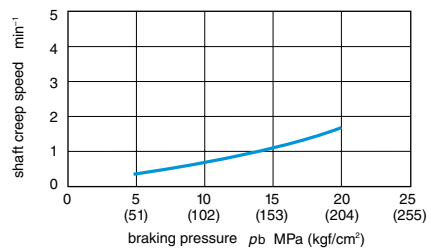


symbole	ψ	F
units	deg.	N
①	90	0
②	90	9,000
③	90	18,000
④	0	18,000
⑤	180	18,000

a = 99 mm
V_g = 800 cm³
n = 1,000 min⁻¹

Regarding ψ, F and a, please refer to the figures in page 9.

Shaft creep speed

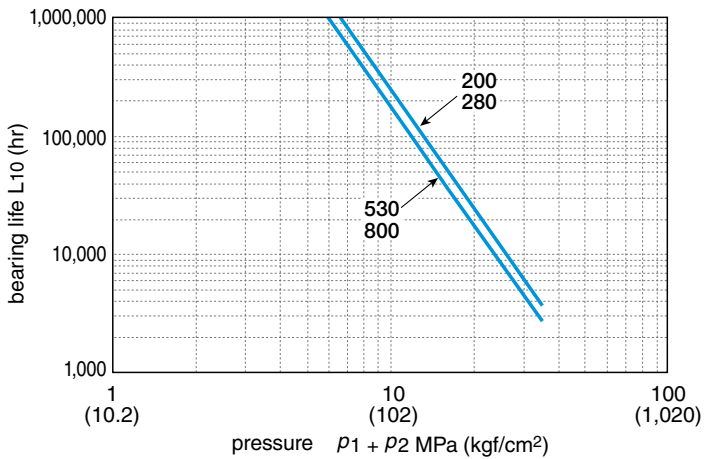


● BEARING LIFE

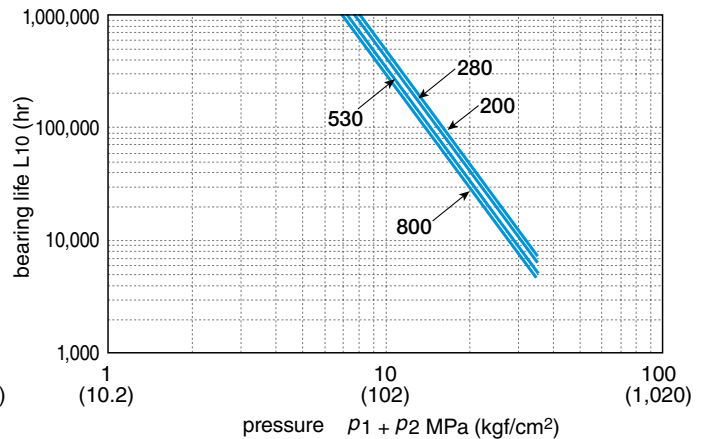
- The calculated life (B₁₀ life) shown in the graph is for speed
 $N_0 = 1,000 \text{ min}^{-1}$
 Calculation of life for a random speed N is as follows.

$$L = \frac{N_0}{N} \times L_0 \quad (L_0 : \text{calculated life for } N_0)$$

◆ M3X Front bearing life



◆ M3X Rear bearing life



(Note) p_1 : inlet pressure p_2 : outlet pressure

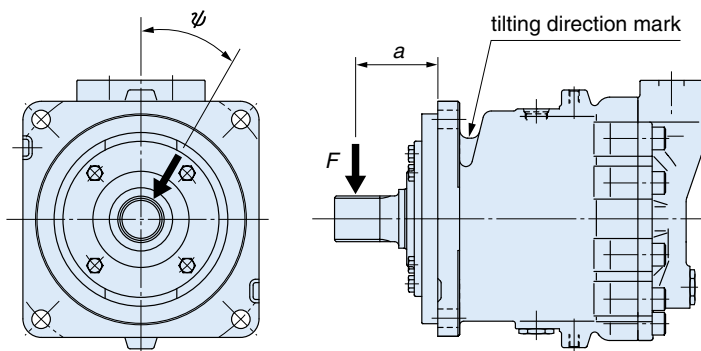
● RADIAL LOAD

- In case that radial load is applied, you are requested to install the motor so as to place the radial load toward the arrow direction shown in below. Please refer to the relevant list of each motor for allowable radial load.

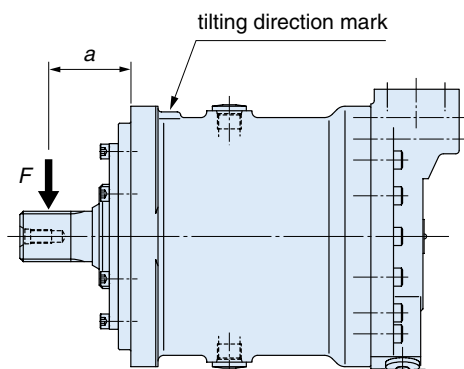
[M3X200]

[M3X530]

[M3X800]



[M3X280]



● PARKING BRAKE

model		M3B200			M3X280/M3B280			M3X530/M3B530			M3X800/M3B800			
brake torque		N·m	1,400	1,050	530	1,750	1,320	660	3,770	2,820	1,410	5,010	3,770	1,880
brake release pressure MPa (kgf/cm ²)	cracking		1.8(18)	1.4(14)	0.7(7)	2.3(23)	1.8(18)	0.9(9)	2.4(25)	1.8(18)	0.8(8)	2.4(25)	1.8(18)	0.8(8)
	stroke end		2.3(23)	1.8(18)	0.9(9)	3.0(31)	2.3(23)	1.2(12)	3.1(32)	2.3(23)	1.2(12)	3.1(32)	2.3(23)	1.2(12)
brake order code	pilot release	low press.	L16-G (standard)	L12-G	L6-G	L16-G (standard)	L12-G	L6-G	L16-G (standard)	L12-G	L6-G	L16-G (standard)	L12-G	L6-G
		high press.	—	—	—	—	—	—	H16-G	H12-G	L6-G	H16-G	H12-G	H6-G
	valve release	high press.	—	—	—	—	—	—	—	—	H6-B	—	—	H6-B

(Note1) The mechanical brakes of M3X/M3B series shall be used for parking only so please make sure not to apply the brakes when motors are driving.

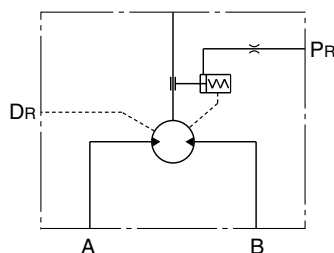
(Note2) In case of low pressure release type, brake release shall be conducted by providing hydraulic oil pressured more than stroke end pressure and less than 7.8 MPa (80kgf/cm²)

Please note that effective pressure is the differential pressure between brake release and drain.

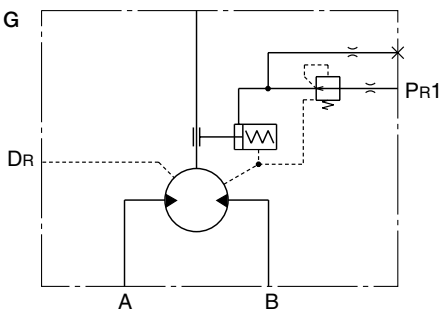
(Note3) In case of motors with H6-B as brake model code, release pressure is provided from traveling counterbalance valve, and the brake is automatically released.

◆ Hydraulic symbols

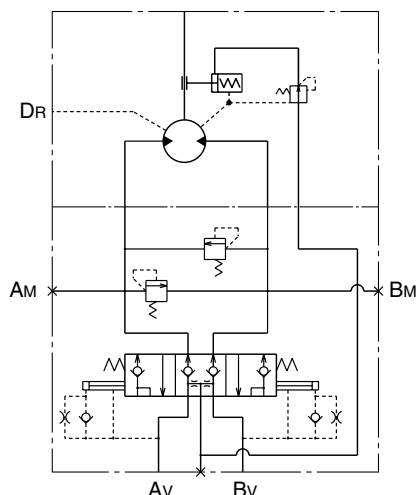
brake order code : L ※※ - G



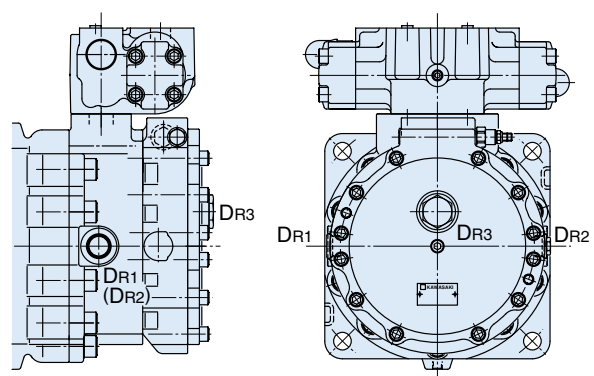
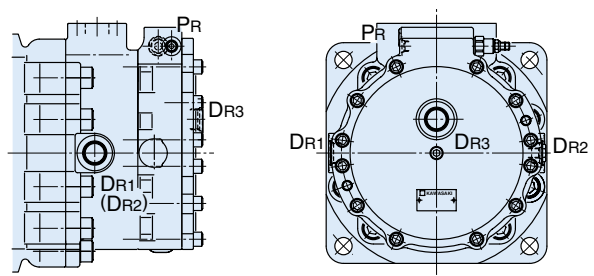
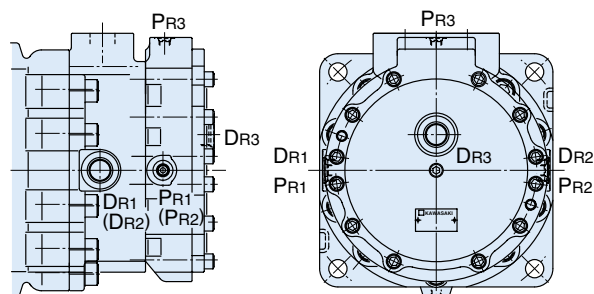
brake order code : H ※※ - G



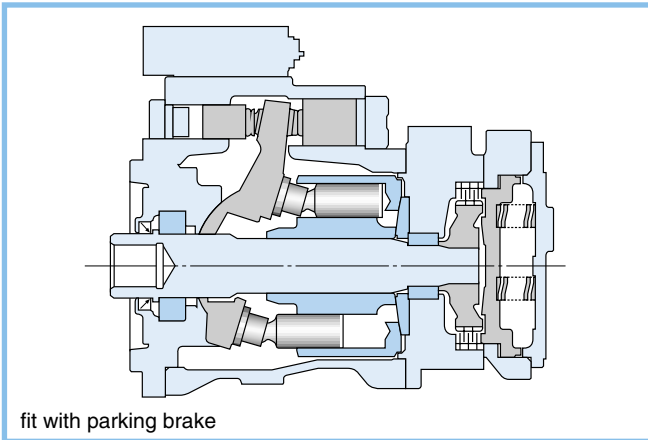
brake order code : H 6 - B



◆ Outline view of brake port



M3B Series



The M3B Series are variable displacement type motors with the same rotary components of M3X Series which enable the advanced low speed characteristic and high speed operation.

The design of various displacement control is based on current MB Series. The range of displacement is 100%–33% with 3 types of various displacement control regulators. Electric displacement control is also possible.

● FEATURES

1. Advanced Low-Speed Characteristics

New design which reduces pressure ripple and friction enabling expanded lower speed limit and smooth starting characteristics.

2. High-Speed Operation

New materials and enlargement of variable displacement range have enabled the higher maximum speed. The ratio of large to small displacement is enlarged from 2 (old model/MB series) to 3.

3. Various Displacement Control Regulator (3 Type)

- A: Directional control valve
- B: Sequence control regulator
- C: Speed & CHP control regulator (Refer to next page)

4. Electric Displacement Control

The pilot pressure can be controlled by a solenoid-operated directional control valve or a pressure-reducing valve.

● ORDERING CODE

M3B 530 - A C - 533 / 178 - 001A - D3

M3B series

size

- 200 : 195cm³ ~ 106cm³
- 280 : 280cm³ ~ 93cm³
- 530 : 533cm³ ~ 178cm³
- 800 : 800cm³ ~ 267cm³

optional function code

- A : standard
- B : fit with a parking brake

shaft code

- C : JIS involute spline (external)
- P : JIS involute spline (internal) (standard)
- 1 : JIS straight key

oil temp. code

marks	oil temperature range	remarks
V2	90°C < θ °C	all seal parts: fluoro-rubber
V1	90°C \geq θ °C	oil seal: fluoro-rubber
blank	-20°C \leq θ \leq 90°C	
D1	-30°C < θ < -20°C	
D3	-45°C \leq θ \leq -30°C	

design code

small displacement (cm³)

large displacement (cm³)

● SPECIFICATIONS

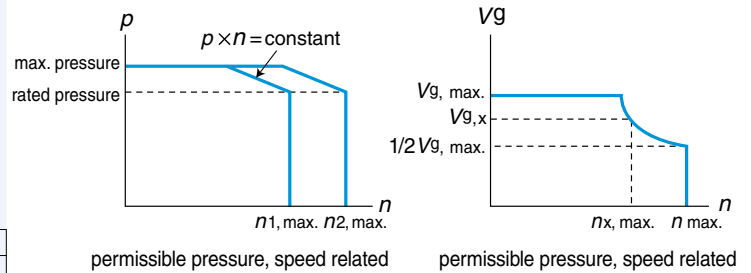
model		M3B200	M3B280	M3B530	M3B800
displacement cm ³	max. Vg, max.	195	280	533	800
	min. Vg, min.	106	93	178	267
pressure MPa (kgf/cm ²)	rated	32.0	30.0	29.4 (300)	
	max.	35.0	35.0	34.3 (350)	
max. speed min ⁻¹	n1, max. at Vg, max.	1,900	1,700	1,400	1,200
	n2, max. at ≤ 1/2 Vg, max.	2,930	2,200	1,700	1,500
max. flow	L/min	370	480	750	960
rated torque	N-m	990	1,340	2,500	3,750
rated power	kW	200	240	370	470
case volume	L	1.6	2.2	4.2	6.3
moment of inertia	N-m ²	1.4	3.0	7.3	14
mass kg	standard	72	93	147	235
	with parking brake	88	110	189	277

◆ Regulator

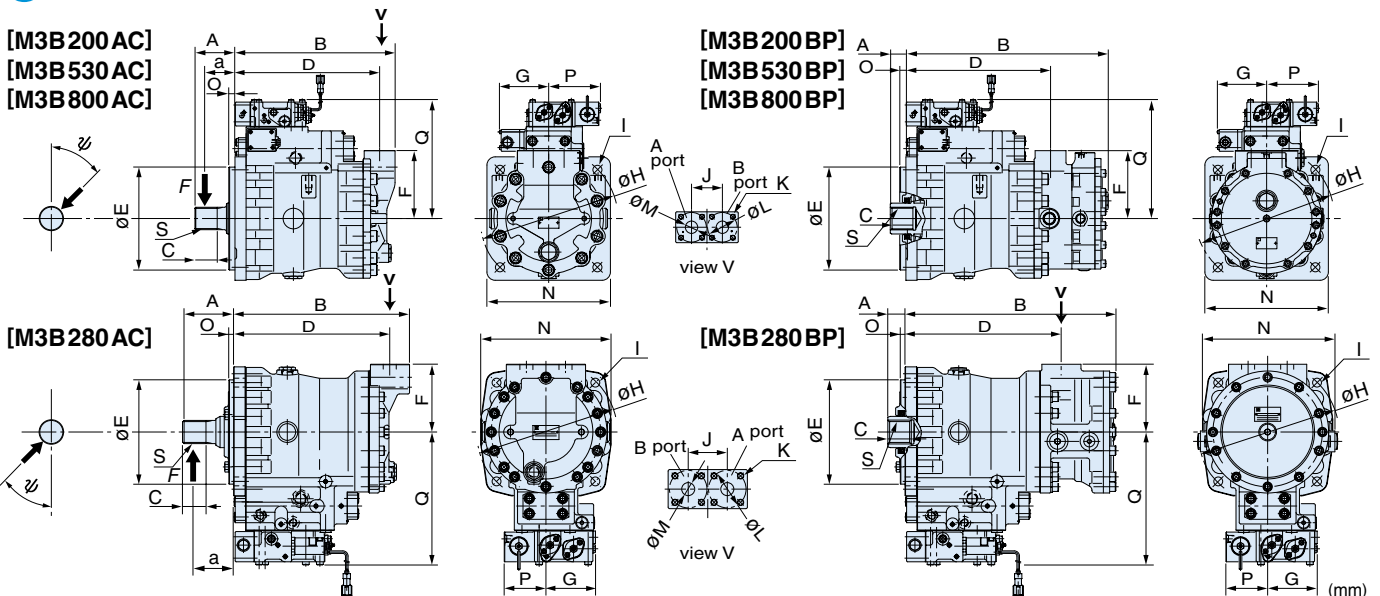
- A : Directional control valve**
Shifts displacement small or large by remote control signal.
- B : Sequence control regulator**
Automatically shifts displacement small or large depending on the load.
- C : Speed & CHP control regulator**
Maintains constant horsepower regardless of the load. Controls displacement at any position by pilot pressure. The pilot pressure can be controlled by a solenoid-operated directional control valve or a pressure-reducing valve.
CHP : Constant horsepower

◆ M3B Optional capacities

model	capacity (☆: standard)		max. speed															
	Vg,1	☆ nx,max.	cm ³	min ⁻¹														
M3B200	Vg,1	☆ 195	195	1,900														
	☆ nx,max.	1,900	106	116														
M3B280	Vg,2	127	116	106														
	☆ nx,max.	2,790	2,930															
M3B530	Vg,1	☆ 280	252															
	☆ nx,max.	1,700	1,770															
M3B800	Vg,2	200	166	149	☆ 140	132	115	99	93									
	☆ nx,max.	1,940	2,060	2,110	2,200													
M3B530	Vg,1	☆ 533	485	477														
	☆ nx,max.	1,400	1,420	1,430														
M3B800	Vg,2	370	340	327	315	280	☆ 267	242	214	192	178							
	☆ nx,max.	1,580	1,630	1,640	1,660	1,700												
M3B800	Vg,1	☆ 800	751	737	653													
	☆ nx,max.	1,200	1,230	1,240	1,300													
M3B800	Vg,2	554	533	500	470	434	420	☆ 400	369	321	267							
	☆ nx,max.	1,380	1,400	1,430	1,450	1,480	1,490	1,500										



● DIMENSIONS



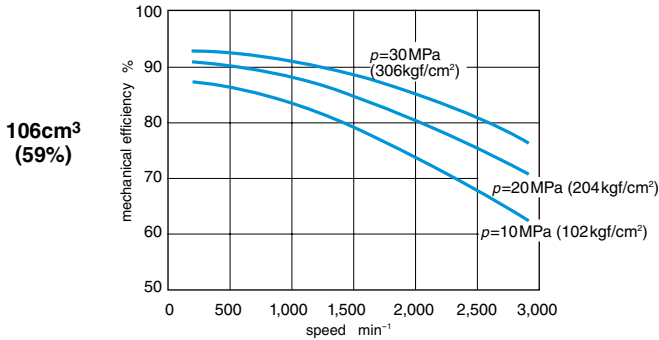
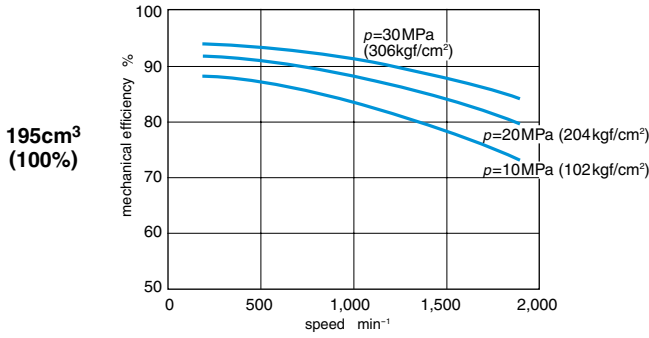
size	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	S
M3B200AP	40	286	56	249	200	144	70	250	4-ø22	75	2 x 4, M10-17.5	62	22	236	9	110	198	m=2.5, z=16
M3B200BP	40	368	56	249	200	144	70	250	4-ø22	75	2 x 4, M10-17.5	62	22	236	9	110	198	DP=12/24, z=17
M3B280AC	98	338	45	299.5	200	130	95	268	4-ø17	75	2 x 4, M12-17.5	72	25	250	9	80	255	m=2.5, z=16
M3B280BP	33	405	51	299.5	200	130	95	268	4-ø17	75	2 x 4, M12-17.5	72	25	250	9	80	255	m=2.5, z=16
M3B530AC	97	389	54	351.5	250	165	119	335	4-ø22	75	2 x 4, M12-17.5	72	30	300	15	126	289	m=2.5, z=20
M3B530BP	38	486.5	55	351.5	250	165	119	335	4-ø22	75	2 x 4, M12-17.5	72	30	300	15	126	289	m=2.5, z=20
M3B800AC	124	429	64	391.5	280	178	130	376	4-ø22	75	2 x 4, M12-17.5	72	28	345	16	133.5	330	m=3, z=19
M3B800BP	20	540	64	404	280	178	130	376	4-ø22	102	2 x 4, M16-23	92	30	345	16	133.5	330	m=3, z=19

PERFORMANCE CURVE

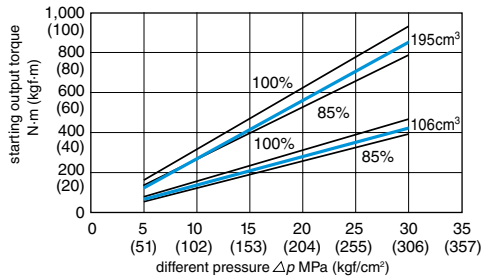
The values given in the below figures are mean ones, and not guaranteed ones.

M3B200

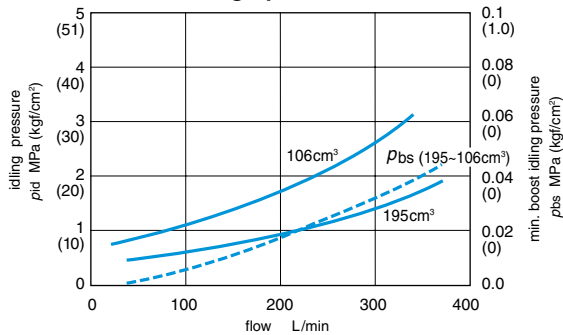
Mechanical efficiency (%)



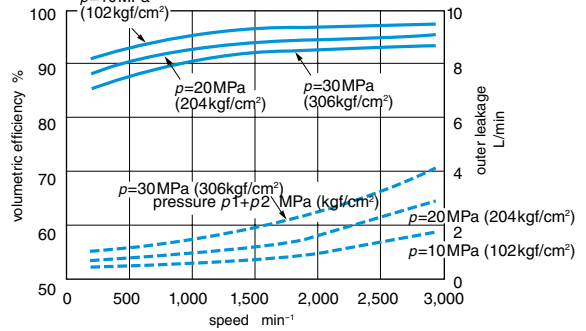
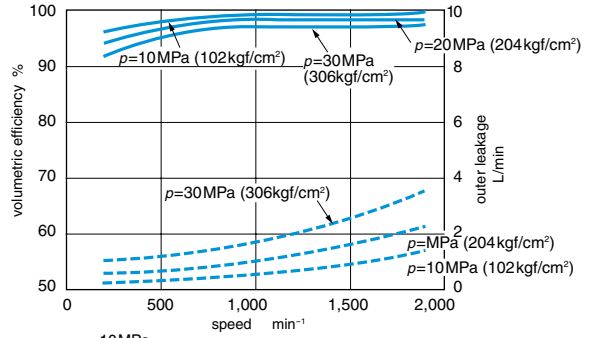
Starting mechanical efficiency



Idle & boost-graph



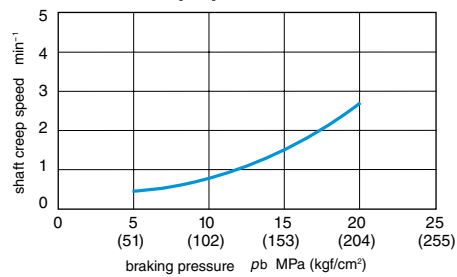
Volumetric efficiency



Radial load

No radial load shall be applied to M3B200.

Shaft creep speed



Bearing life

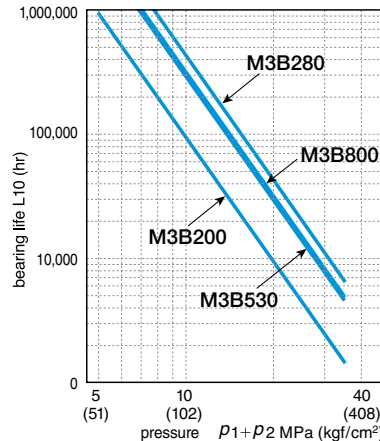
The calculated life (B_{10} life) shown in the graph is for speed $N_0 = 1,000 \text{ min}^{-1}$. Calculation of life for a random speed N and a random displacement is as follows.

$$L_x = \frac{V_{g.1}}{V_{g.x}} \cdot \frac{N_0}{N_2} \times L_0$$

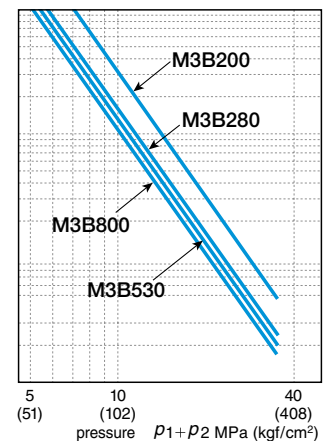
L_0 : refer to this graph
 $V_{g.1}$: max. displacement

(Note)
 p_1 : inlet pressure
 p_2 : outlet pressure

Front bearing life



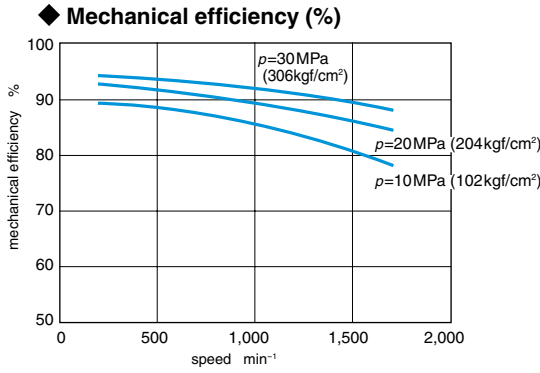
Rear bearing life



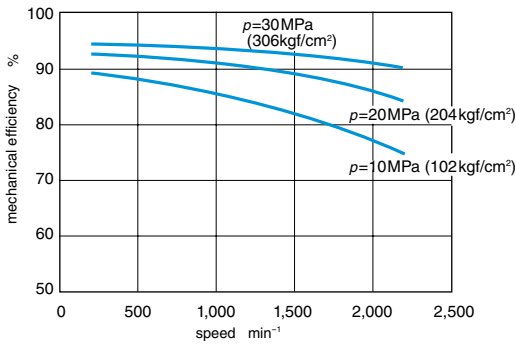
oil temperature: 50°C
oil viscosity: 32mm²/s

M3B280

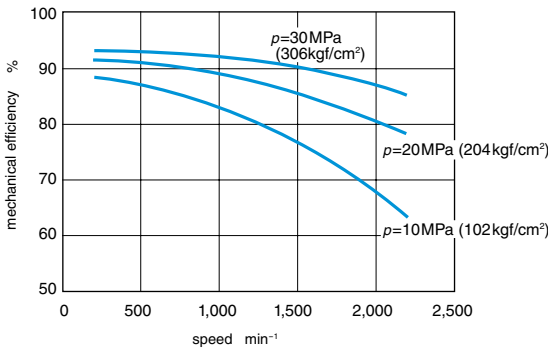
280cm³
(100%)



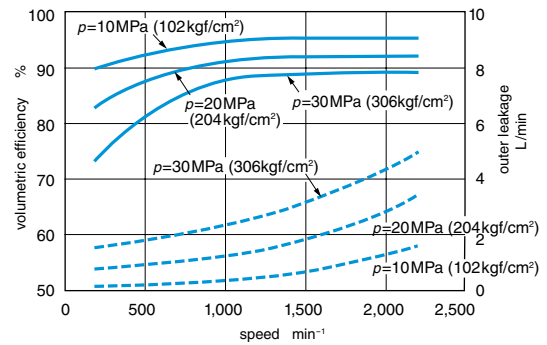
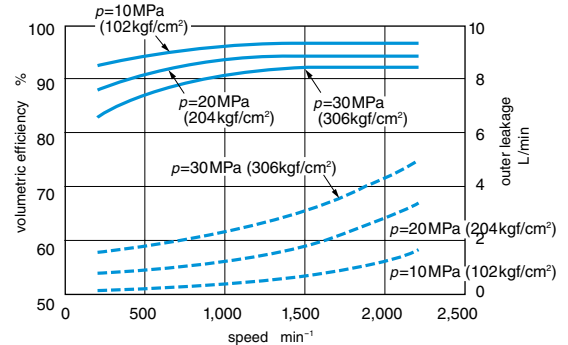
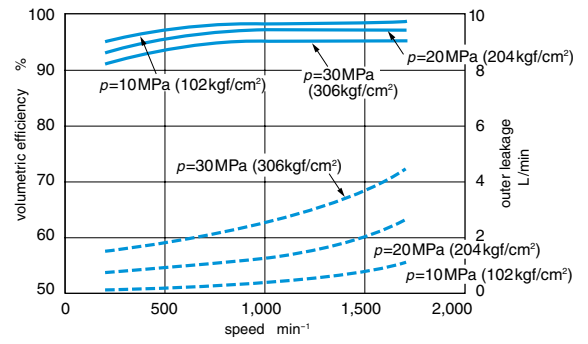
140cm³
(50%)



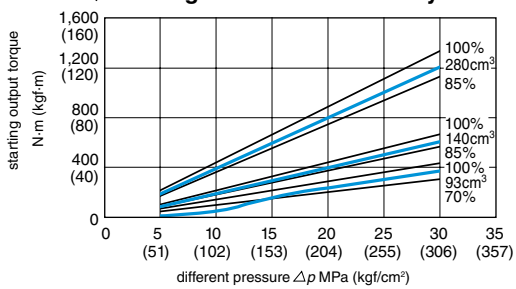
93cm³
(33%)



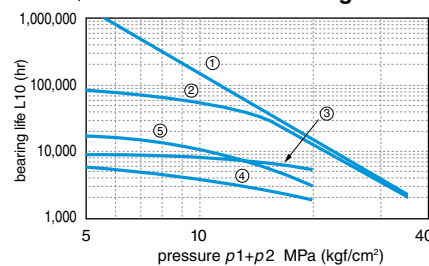
Volumetric efficiency



Starting mechanical efficiency



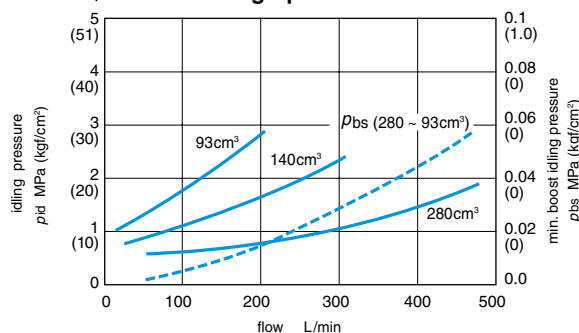
Radial load and bearing life



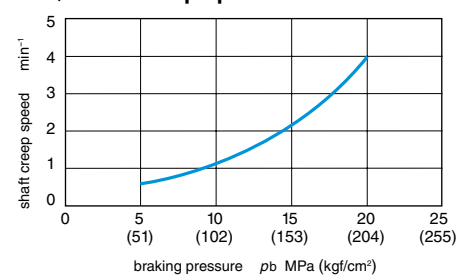
symbols	ψ	F
units	deg.	N
①	90	0
②	90	7,000
③	90	14,000
④	0	14,000
⑤	180	14,000

Regarding ψ , F and a, please refer to the figures of DIMENSIONS in page 12.

Idle & boost-graph



Shaft creep speed



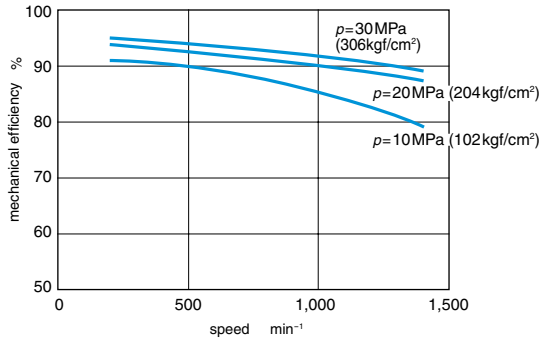
PERFORMANCE CURVE

The values given in the below figures are mean ones, and not guaranteed ones.

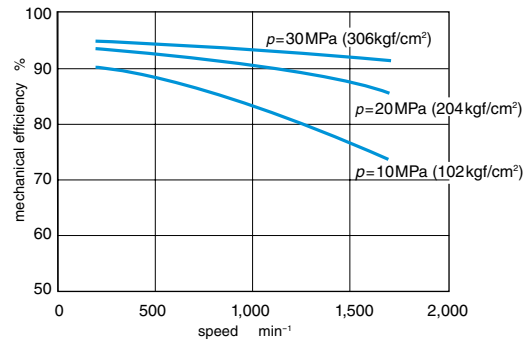
M3B530

Mechanical efficiency (%)

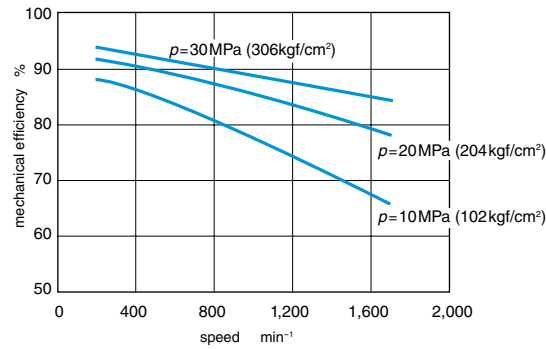
533cm³
(100%)



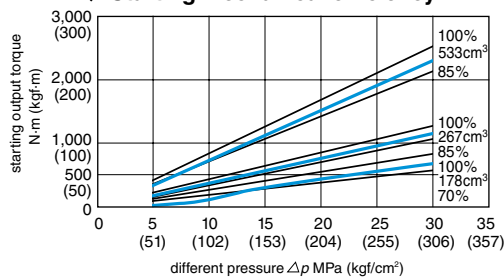
267cm³
(50%)



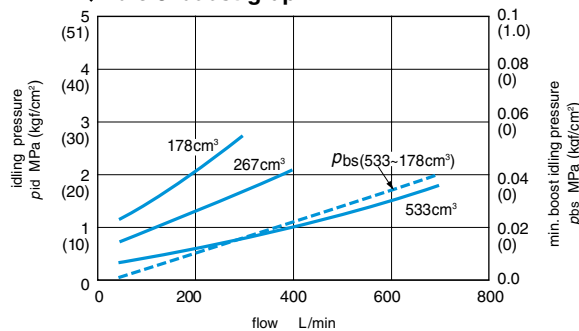
178cm³
(33%)



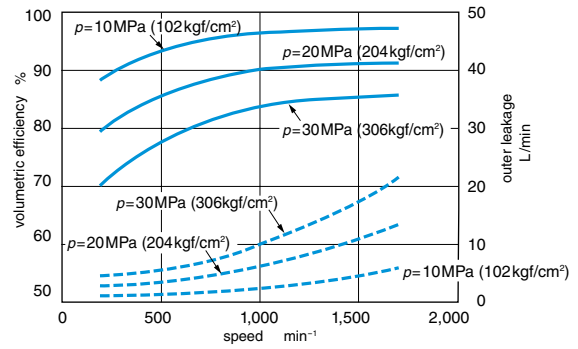
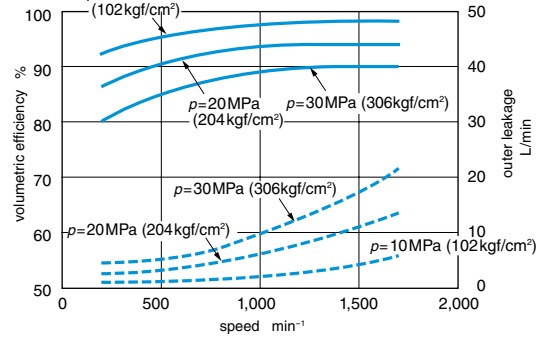
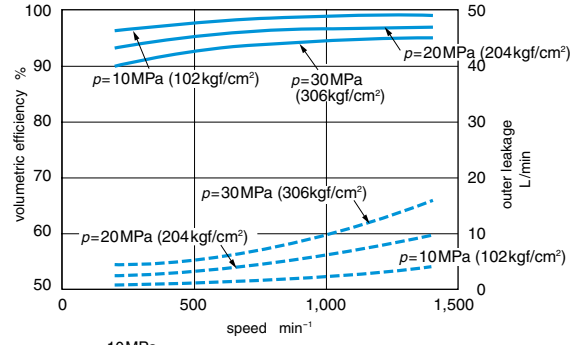
Starting mechanical efficiency



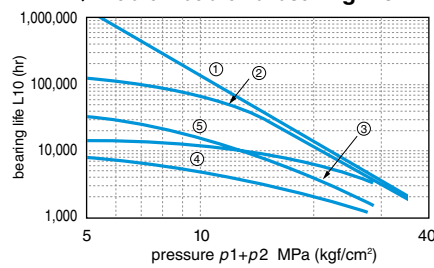
Idle & boost-graph



Volumetric efficiency



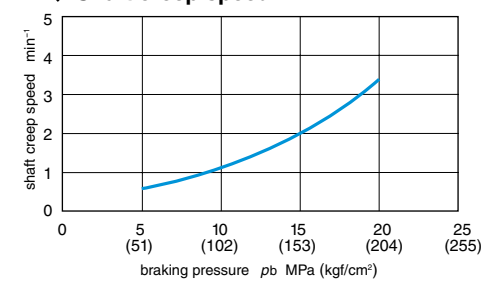
Radial load and bearing life



simbole	ψ	F
units	deg.	N
①	90	0
②	90	9,000
③	90	18,000
④	0	18,000
⑤	180	18,000

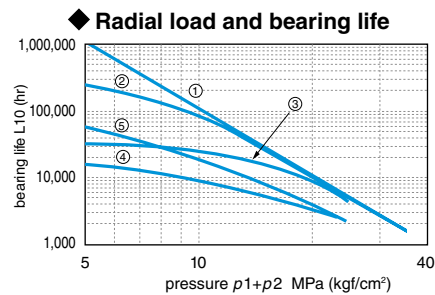
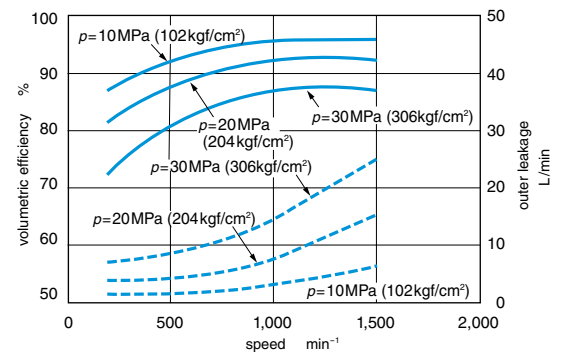
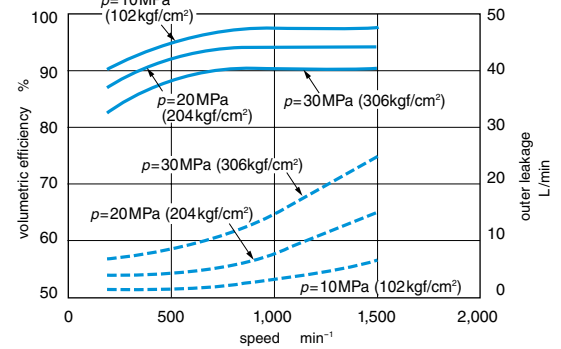
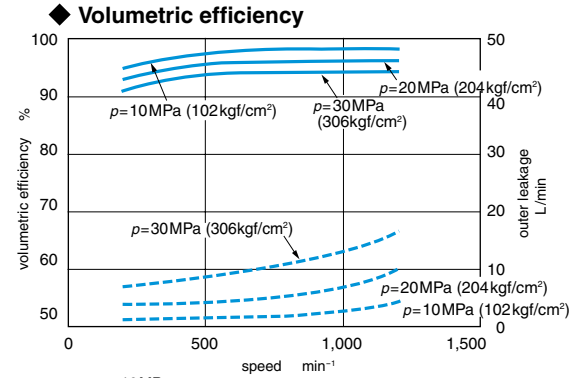
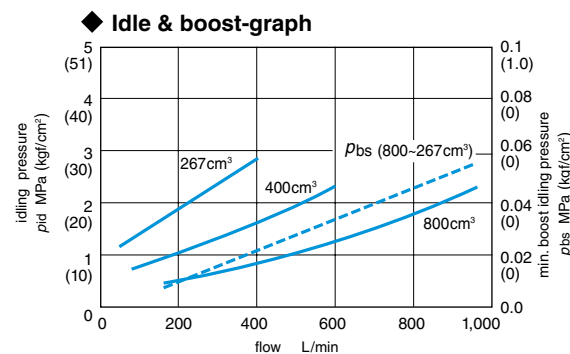
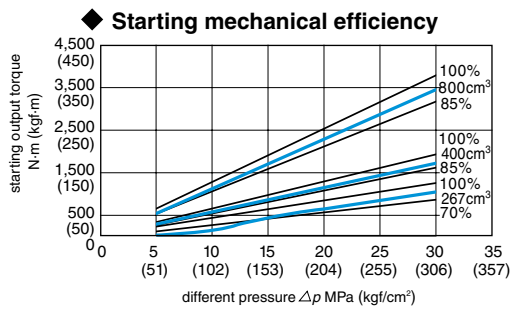
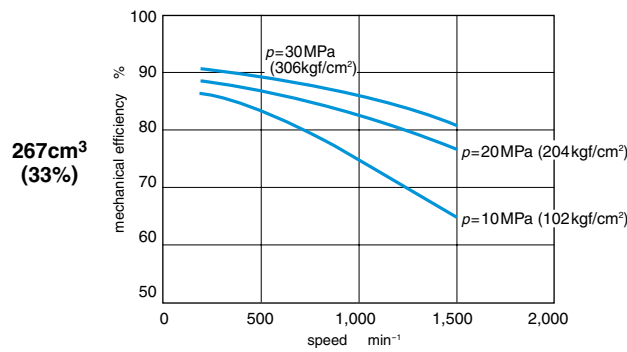
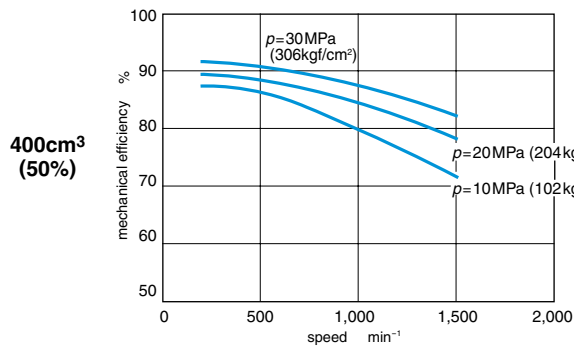
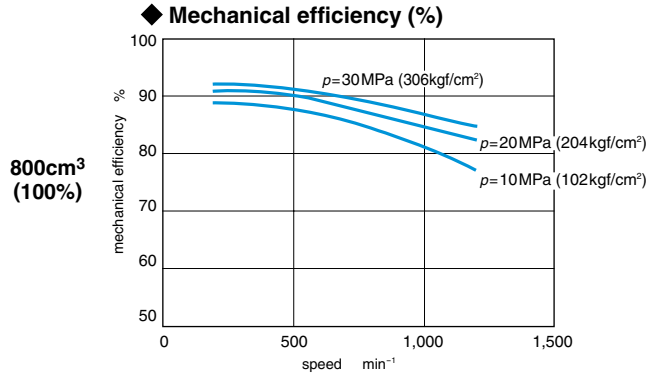
Regarding ψ, F and a, please refer to the figures of DIMENSIONS in page 12.

Shaft creep speed



oil temperature: 50 °C
oil viscosity: 32 mm²/s

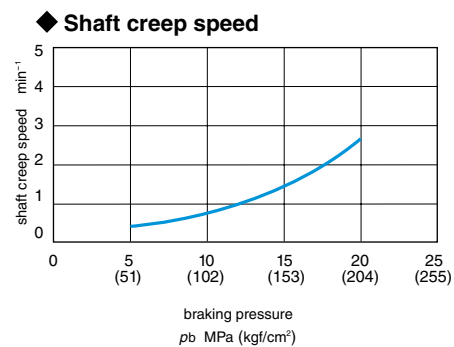
M3B800



symbole	ψ	F
units	deg.	N
①	90	0
②	90	9,000
③	90	18,000
④	0	18,000
⑤	180	18,000

$a = 92\text{ mm}$
 $V_g = 300\text{ cm}^3$
 $n = 1,000\text{ min}^{-1}$

Regarding ψ , F and a, please refer to the figures of DIMENTIONS in page 12.



REGULATORS

Pilot Control

code	control type	control curve	function & features
1	two position negative displacement shifts (pressure control type)		Two prior set displacements are shifted negatively by varying pilot pressure. Hydraulic pressure from 2.5 to 5.0 MPa shall be provided as pilot pressure.
2	two position negative displacement shifts (elctorical control type)		Two prior set displacements are shifted negatively by varying voltage. Hydraulic pressure from 2.5 to 5.0 MPa shall be provided as pilot pressure.
3	two position negative displacement control		Displacement is determined between two prior set volumes in inverse proportion to electric current. Hydraulic pressure from 4.0 to 5.0 MPa shall be provided as pilot pressure. Standard set conditions: ① 356mA (1.2 MPa), Vg.1 (100%) ② 644mA (3.5 MPa), Vg.2 (33%)
4	three position negative displacement control		Displacement is determined among three prior set volumes in inverse proportion to electric current. Hydraulic pressure from 4.0 to 5.0 MPa shall be provided as pilot pressure. Standard set conditions: ① 319mA (0.9 MPa), Vg.1 (100%) ② 393mA (1.5 MPa), Vg.x (50%) ③ 581mA (3.0 MPa), Vg.x (50%) ④ 626mA (3.4 MPa), Vg.2 (33%)
5	two position positive displacement shifts (elctorical control type)		Two prior set displacements are shifted positively by varying voltage. Hydraulic pressure from 2.5 to 5.0 MPa shall be provided as pilot pressure.
6	two position positive displacement control		Displacement is determined between two prior set volumes in proportion to electric current. Hydraulic pressure from 4.0 to 5.0 MPa shall be provided as pilot pressure. Standard set conditions: ① 100mA (3.5 MPa), Vg.2 (33%) ② 509mA (1.2 MPa), Vg.1 (100%)
7	three position positive displacement control		Displacement is determined among three prior set volumes in proportion to electric current. Hydraulic pressure from 4.0 to 5.0 MPa shall be provided as pilot pressure. Standard set conditions: ① 156mA (3.4 MPa), Vg.2 (33%) ② 244mA (3.0 MPa), Vg.x (50%) ③ 469mA (1.5 MPa), Vg.x (50%) ④ 539mA (0.9 MPa), Vg.1 (100%)

(Note1) The regulator in M3B motor operates choosing the higher pressure port between A and B port. If the servo pressure does not hold more than 2 MPa, servo pressure must be provided.

If you need to shorten the time of shifting displacement, proper servo pressure must be provided. (Refer to below fig.)

(Note2) Pilot control section in M3B motor controls pilot second pressure negatively.

Negative displacement control of Code No.2-4 may be conducted by providing pilot second pressure directly without using solenoid operated switching valve or solenoid operated proportional valve.

(Note3) Small displacement instruction must be provided on the pilot control side before using automatic control operation. Automatic control operation precedes pilot control operation.

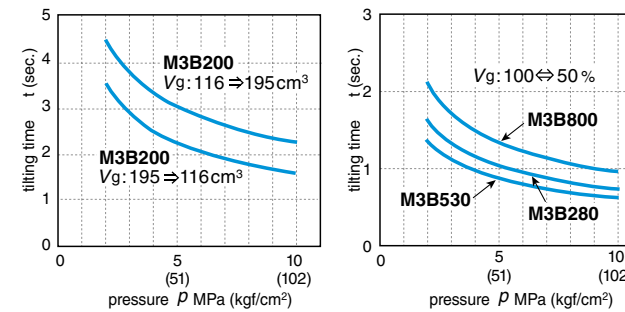
(Note4) The automatic controller of Code No. b and c operates choosing the higher pressure port between A and B port.

The regulator operated by the differential pressure $p1-p2$ is also available as optional function and if necessity arises, please contact us.

Automatic Control

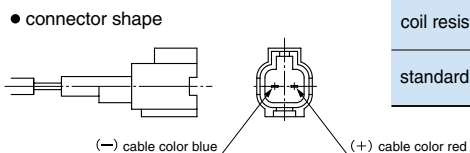
code	control type	control curve	function & features
a	without automatic control	—	—
b	sequence control		During small displacement operation, when the load increases and the pressure reaches to a certain point, the motor shifts into large displacement operation. Since then the motor maintains the large displacement operation until the pressure declines to a certain point. Standard set conditions: $p2-1 = 25$ MPa, $p1-2 = 4.3$ MPa
c	constant horsepower control		Displacement varies in order to maintain the pressure in line with the load. The motor maintains small displacement operation until the pressure increases to a certain point, and then shifting into a large displacement operation. Standard set conditions: $p2-1 = 25$ MPa

Tilting time, pressure related



Solenoid operated switching valve specifications

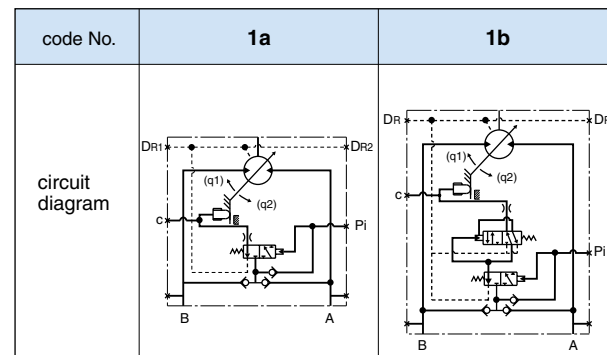
max. pressure	13.7MPa
rated voltage	DC24V
rated consuming electric power	≤ 17W (24V, 20°C)
standard connector	Mitsubishi Cable Co., Z02M-GY (2P)



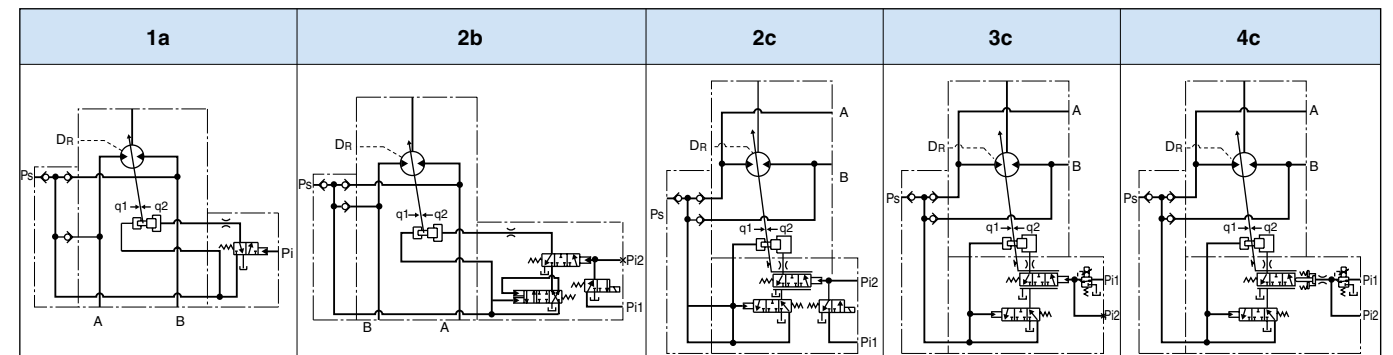
Solenoid operated proportional valve specifications

max. pressure	13.7MPa (3.9MPa in case of inverse proportion)
rated electric current	700mA
recommended dither power	80Hz/200mA _{P-P}
coil resistance value	17.5Ω (20°C)
standard connector	Mitsubishi Cable Co., Z02M-GY (2P)

M3B200 Regulators



M3B280, 530, 800 Regulators



VARIOUS VALVES to CONTROL MOTORS

Various control valves, attachable direct to flanges of M3X/M3B series, are available.

(Note) Some combinations of motors and valves need conversion plates.

Swing control valve

KSC

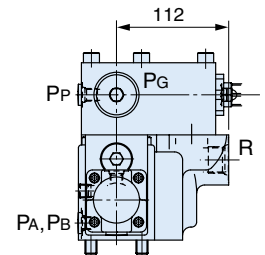
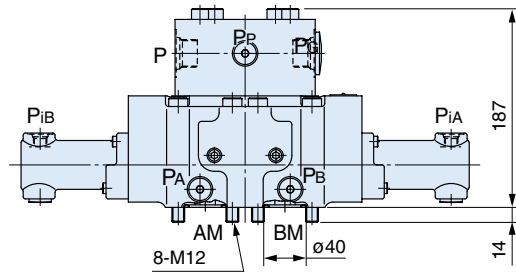
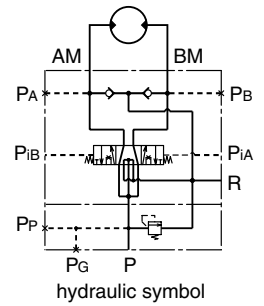
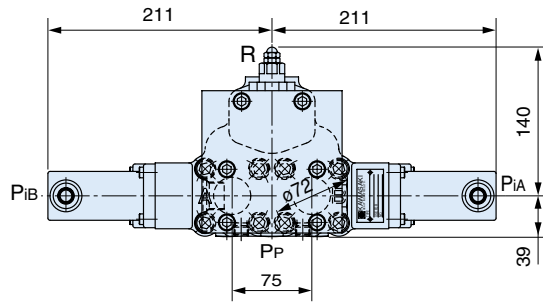
◆KSC19

Swing control valve of neutral free type.

Valve specifications

max. pressure	30.9MPa (315kgf/cm ²)
rated flow	200 L/min
set pressure range of main relief valve	14.7~30.9MPa (150~315kgf/cm ²)
allowable back pressure	1.5MPa (15kgf/cm ²)
pilot pressure	0.29~2.51MPa (3~25.6kgf/cm ²)

PA, PB, P_{IA}, P_{IB}, P_P : G1/4
P, P_G, R : G3/4

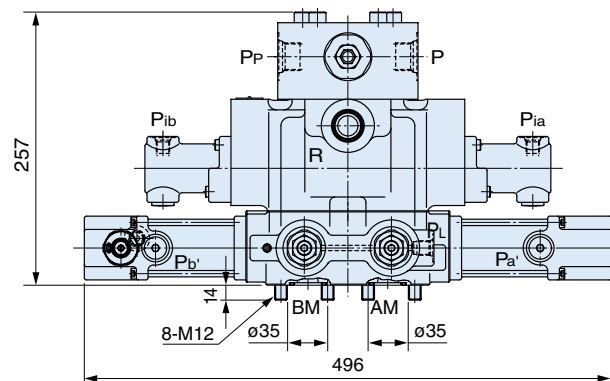
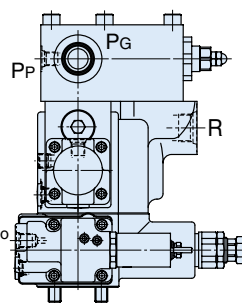
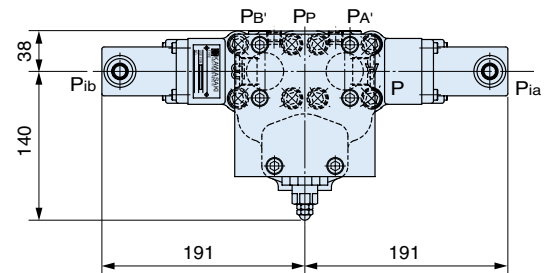
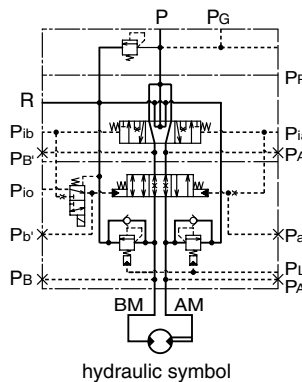


◆KSC19L

Swing control valve able to switch neutral free and lock.

Valve specifications

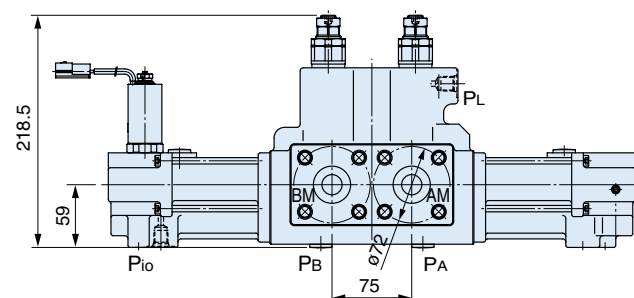
max. pressure	30.9MPa (315kgf/cm ²)
rated flow	200 L/min
set pressure range of main relief valve	14.7~30.9MPa (150~315kgf/cm ²)
allowable back pressure	1.5MPa (15kgf/cm ²)
spool spring force (free)	0.5~1.6MPa (150~315kgf/cm ²)
spool spring force (lock)	0.5~2.4MPa (5~16kgf/cm ²)
switch operation pressure of port relief	2.5~4.9MPa (25~50kgf/cm ²)
pressure for free mode switch port (P _{io})	(P _{io})max.+ 2.9MPa (30kgf/cm ²) ~



Solenoid valve specifications

max. pressure	8.3MPa (85kgf/cm ²)
leakage	~ 36cc/min (at 28cst, 2.9MPa(30kgf/cm ²))
solenoid rated voltage	DC24V
voltage variation range	20.4~29V
with anti surge	

PA, PB, P_{A'}, P_{B'}, P_{a'}, P_{b'}, P_{IA}, P_{IB}, P_{IO}, P_P : G1/4
P, P_G, R : G3/4



Counter balance valve for winch

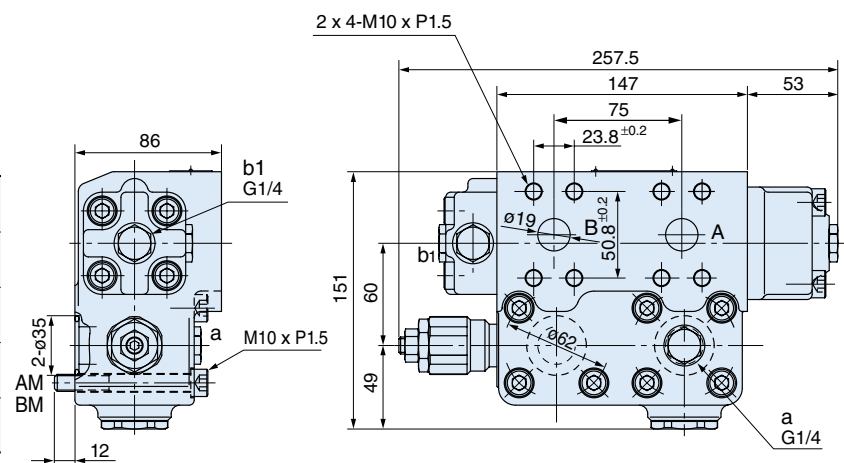
KDC

◆KDC28MR

Applicable to M3X/B 200

Valve specifications

max. pressure	34.3MPa (350kgf/cm ²)
max. flow	350 L/min
set pressure of relief valve (at 30L/min)	14.7~30.9MPa (150~315kgf/cm ²)
cracking pressure of spool	0.7MPa (7kgf/cm ²)
cracking pressure of check valve	0.7MPa (7kgf/cm ²)

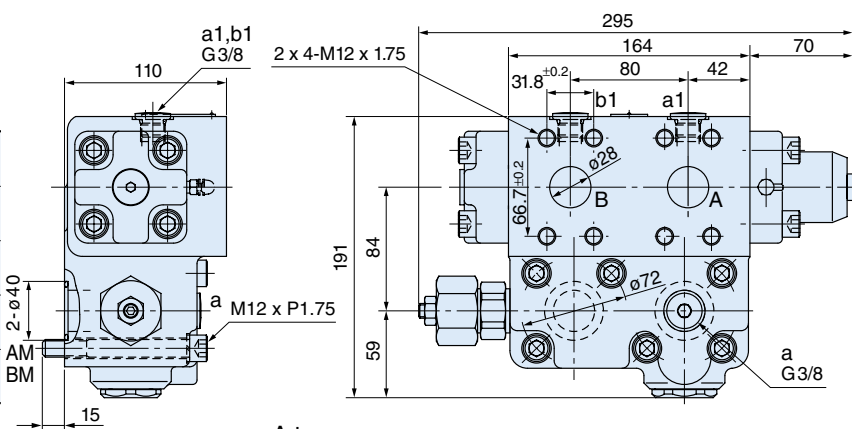


◆KDC30MR

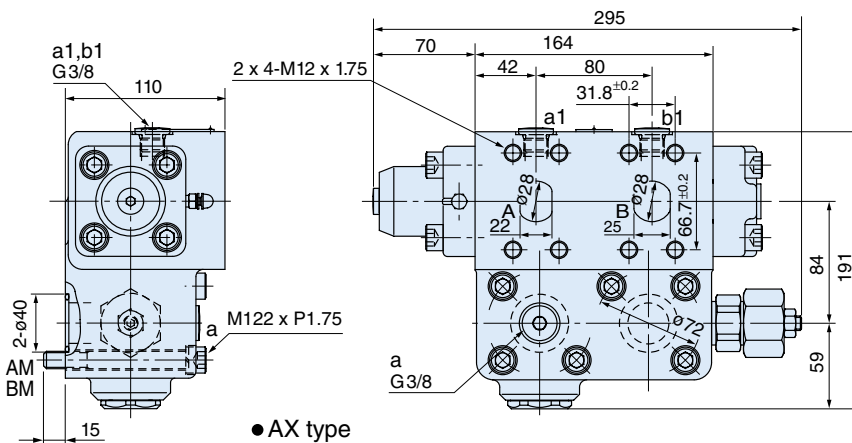
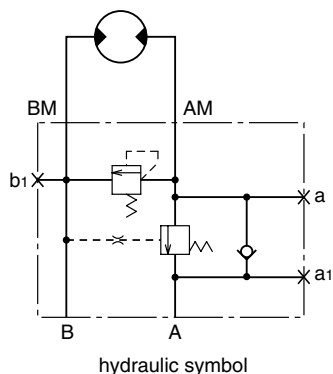
Applicable to M3X/B 200, 530, 800

Valve specifications

max. pressure	34.3MPa (350kgf/cm ²)
max. flow	500 L/min
set pressure of relief valve (at 30L/min)	34.3MPa (350kgf/cm ²)
cracking pressure of spool	0.7MPa (7kgf/cm ²)
cracking pressure of check valve	0.03MPa (0.3kgf/cm ²)



● A type



● AX type

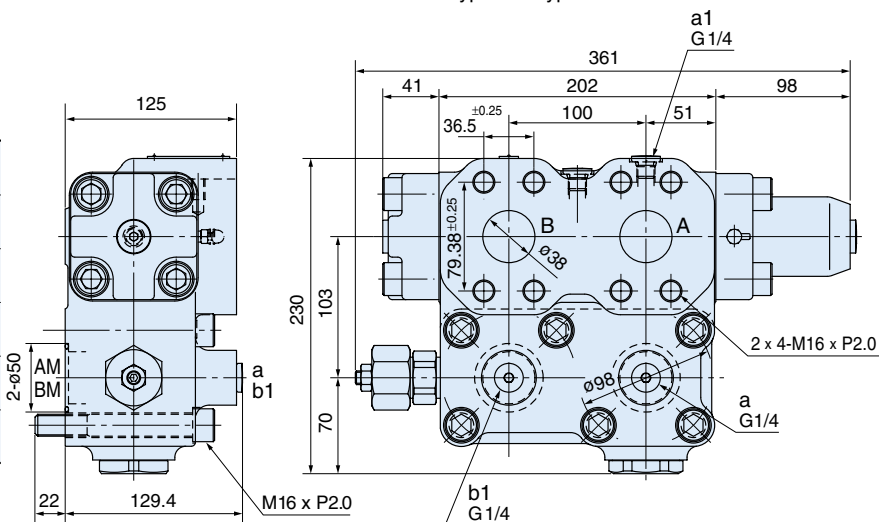
Reverse connection type of A type

◆KDC40MR

Applicable to M3X/B 530, 800

Valve specifications

max. pressure	34.3MPa (350kgf/cm ²)
max. flow	780L/min
max. flow of relief valve	300L/min
set pressure of relief valve (at 0.4~0.6L/min)	27.5MPa (280kgf/cm ²)
cracking pressure of spool	0.69MPa (7kgf/cm ²)
cracking pressure of check valve	0.03MPa (0.3kgf/cm ²)



Counter balance valve for driving

B

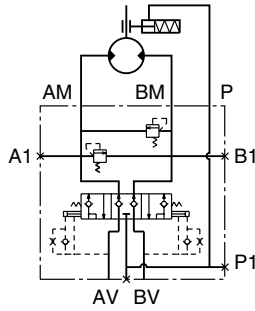
Built-in shock-less relief valve enables smooth deceleration. This valve also automatically releases negative break in motor.

◆ B25C

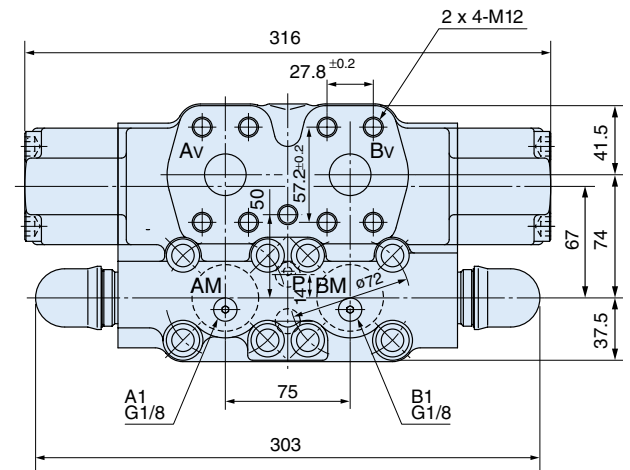
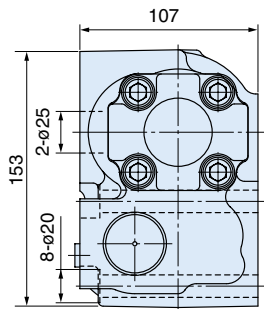
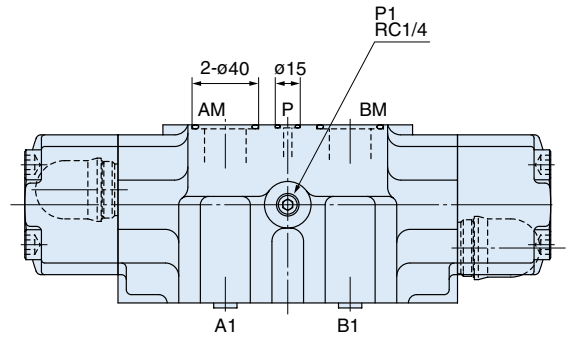
Applicable to M3X/B 530, 800

Valve specifications

rated flow	240 L/min
max. flow	350 L/min
max. pressure	30.9MPa (315kgf/cm ²)
set pressure of relief valve	Ps=30.9MPa (315kgf/cm ²)
spool shifting pressure	cracking : 0.91MPa (9.3kgf/cm ²) reset : 0.78MPa (8.0kgf/cm ²)



hydraulic symbol

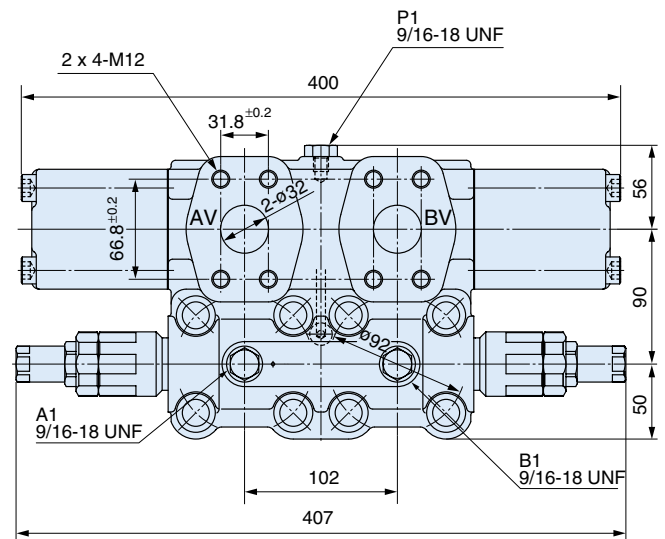
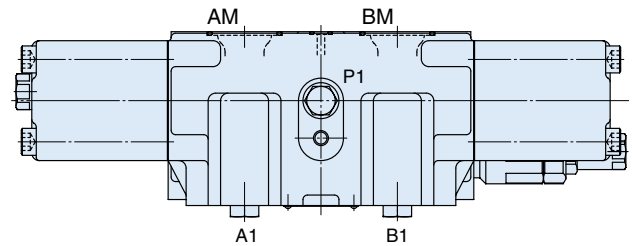
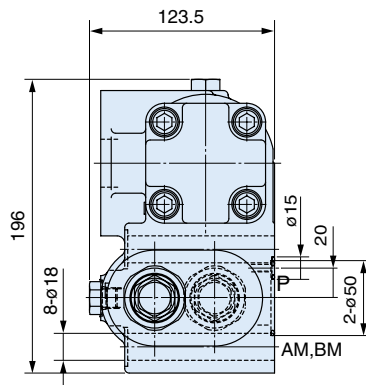


◆ B35C

Applicable to M3X/B 530, 800

Valve specifications

rated flow	380 L/min
max. flow	500 L/min
max. pressure	34.3MPa (350kgf/cm ²)
set pressure of relief valve	Ps=36.3MPa (370kgf/cm ²)
spool shifting pressure	cracking : 0.78MPa (8.0kgf/cm ²) reset : 0.69MPa (7.0kgf/cm ²)



Flushing valve

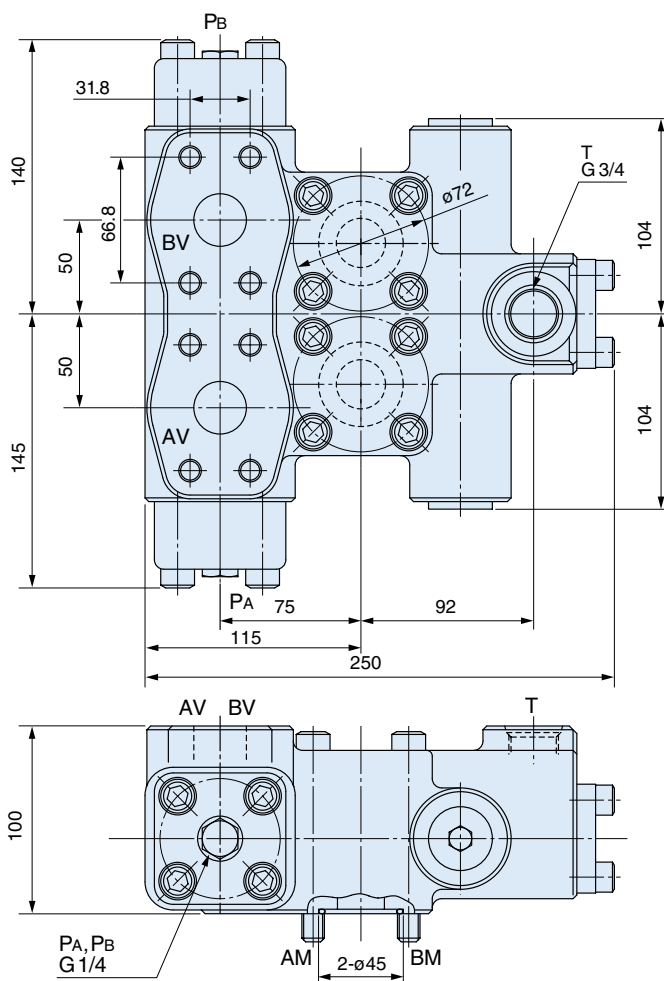
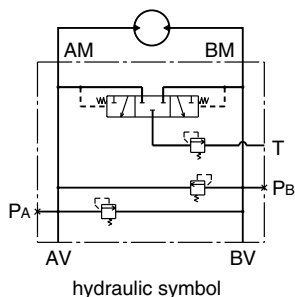
FV

This valve charges the low pressure port with working oil in closed circuit and prevents rise in temperature of the working fluid.

◆ FV30

Valve specifications

max. pressure	37.8MPa (385kgf/cm ²)
max. flow	275 L/min
set pressure of high pressure relief	34.3MPa (350kgf/cm ²)
set pressure of low pressure relief (at 70L/min)	1.8MPa (18kgf/cm ²)
spool shifting pressure	2.0MPa (20kgf/cm ²)



Check valve block

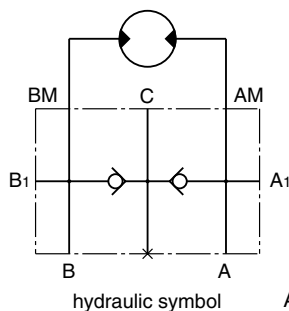
VB

This valve prevents cavitation.

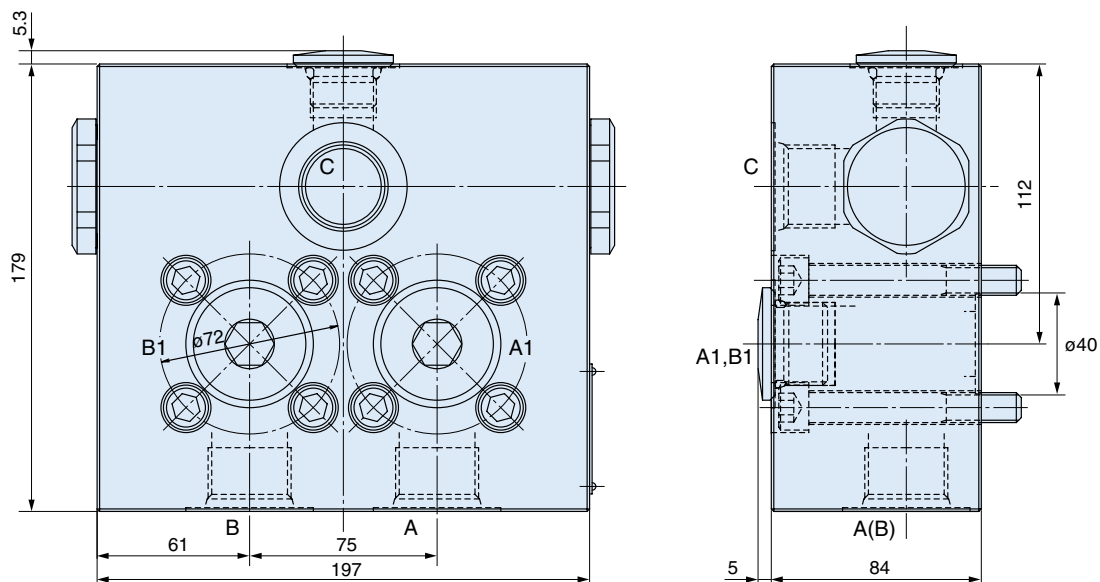
◆ VBS-199

Valve specifications

max. pressure	34.3MPa (350kgf/cm ²)
max. flow	780 L/min
cracking pressure of check valve	0.03MPa (0.3kgf/cm ²)



A, B, A1, B1, C : G1



M3X/M3B-RG Series

● SPECIFICATIONS

model		M3X200-RG03S5.7	M3X280-RG06S6.4	M3X530-RG10S5.7	M3X800-RG16S6.4
			M3B280-RG06S6.4	M3B530-RG10S5.7	M3B800-RG16S6.4
displacement	cm ³	149	252	533	800
rated pressure	MPa (kgf/cm ²)	21.9 (223)	20.6 (210)	20.6 (210)	19.6 (199)
max. speed	min ⁻¹	270	190	150	130
max. flow	L/min	230	310	450	670
theoretical output torque	N·m	2,930	5,280	9,870	16,000
gear ratio		5.65	6.40	5.65	6.4
total displacement	cm ³	840	1,610	3,010	5,120
allowable radial force	L	58,800	88,300	118,000	157,000
load point	mm	89	95	113	126
mass	kg	98	150	243	420

■ Max. pressure and Max. speed are determined by RG specification. Please make sure the temperature of the RG shall not rise beyond 80°C.

■ If the motor is used for the short operating periods such as used as winch motor and so on, the operating conditions may be beyond the rated pressure or max. speed mentioned above.
In this case please inform us of the specific operating conditions.

■ The theoretical radial force W acting on the driving shaft is calculated by the following formula.

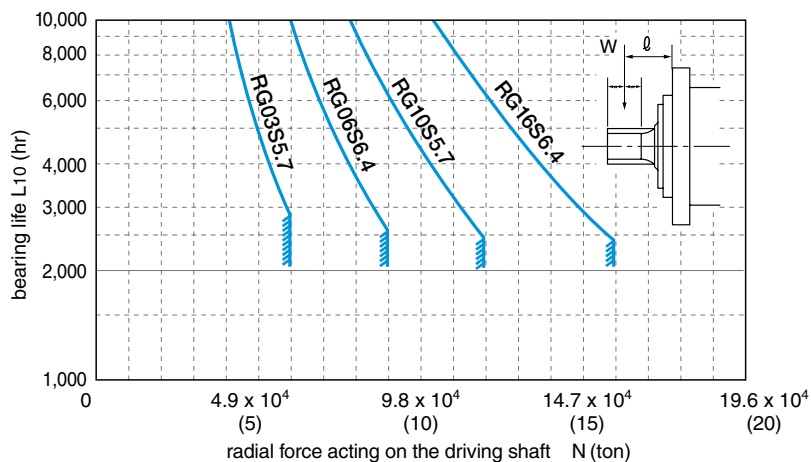
$$W = \frac{2 \times T \times 10^3 \text{ N}}{m \times Z \times \cos \alpha}$$

T : theoretical output torque N·m
 m : module mm
 Z : number of teeth
 α : standard pressure angle of cutter deg.

■ Allowable theoretical force shown in the table depends on the distance of load center from mount flange.

● BEARING LIFE

■ The life obtained in this graph is for the speed of 50 min⁻¹ and the load point of ℓ (spline center)



(Note 1) The bearing life is in inverse proportion to the speed.

(Note 2) If ℓ is larger, the bearing life becomes shorter.

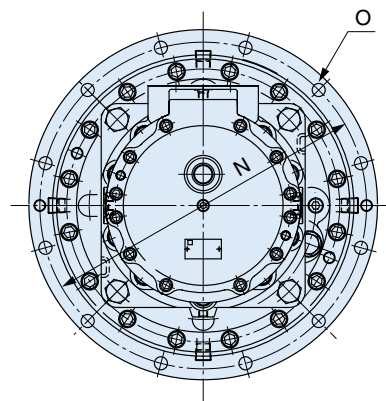
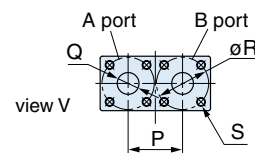
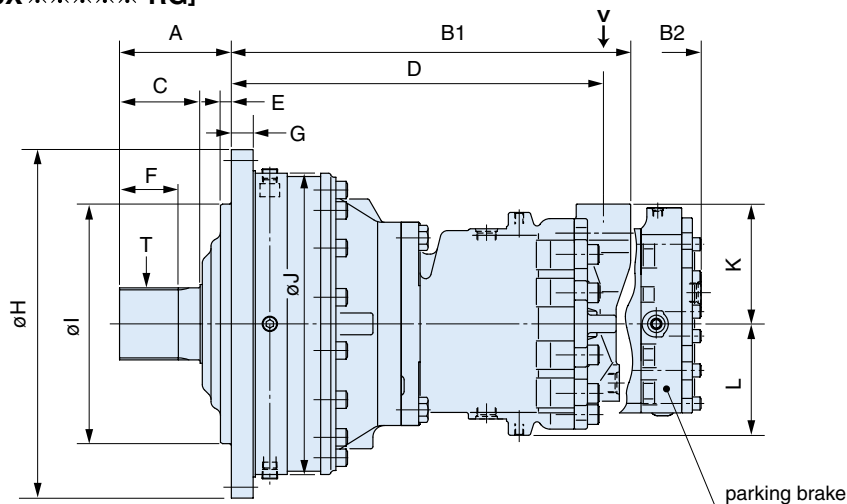
Other caution

(Note 1) The life of the gears is influenced by the operating pressure.
Please consult us, if necessary.

(Note 2) Use gear oil equivalent to GL-3 or GL-4 of API classification.

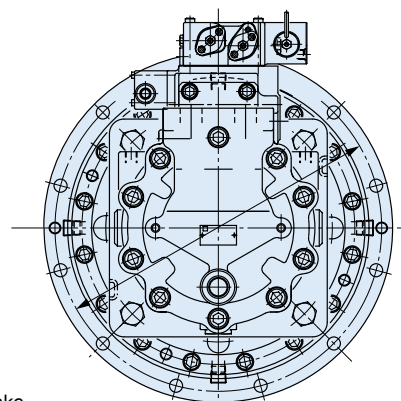
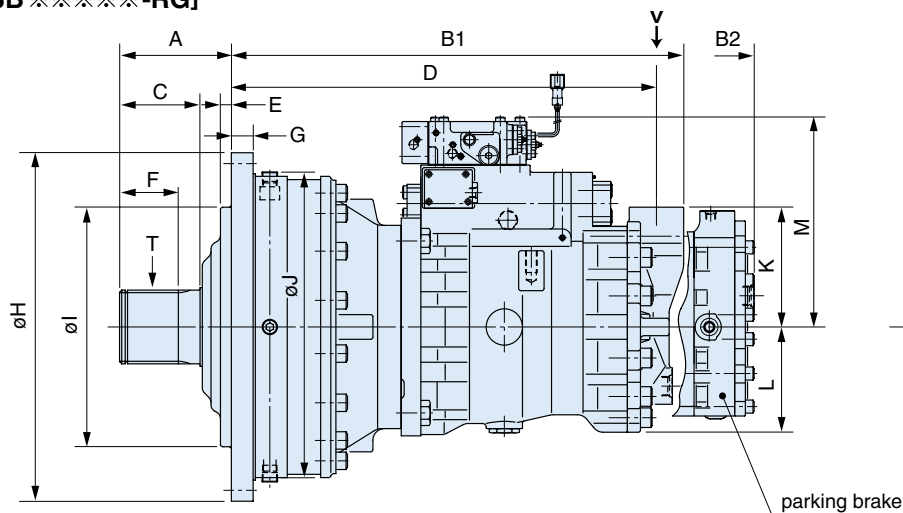
DIMENSIONS

[M3X*****-RG]



fit with parking brake

[M3B*****-RG]



no parking brake

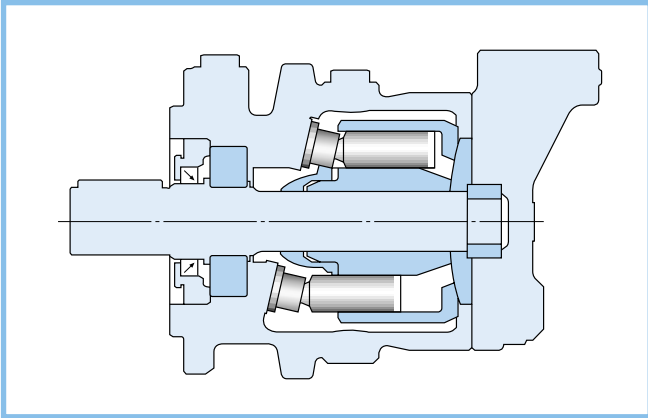
(mm)

size	A	B1	B2	C	D	E	F	G	H	I	J	K	L	M	N
M3X200AP-RG03S5.7	119	443	—	85	405	13	60	22	360	260 f7	268	122	103	—	320
M3X280*P-RG06S6.4 M3B280*P-RG06S6.4	130	501 549	569 616	95	463 511	14	70	25	394	320 f7	318	130	117	— 255	360
M3X530*P-RG10S5.7 M3B530*P-RG10S5.7	154	550 623	550 720	111	513 586	15	81	30	480	330 f7	415	165	154	— 289	450
M3X800AP-RG16S6.4 M3X800BP-RG16S6.4	164	623	739	108	586 598	20	75	179	460	380 f7	460	178	169	—	424
M3B800AP-RG16S6.4 M3B800BP-RG16S6.4	201	655	771	141	618 630	15	114	32	570	390 f7	464	178	169	332	520

size	O	P	Q	R	S	T
M3X200AP-RG03S5.7	6-ø22 (6 x 60°)	75	25	72	2 x 4-M12 x 1.75	m=2.5, z=20 (JIS D2001)
M3X280*P-RG06S6.4 M3B280*P-RG06S6.4	10-ø22 (10 x 36°)	75	25	72	2 x 4-M12 x 1.75	m=2.5, z=20 (JIS D2001)
M3X530*P-RG10S5.7 M3B530*P-RG10S5.7	12-ø18 (12 x 30°)	75	30	72	2 x 4-M12 x 1.75	m=3.75, z=26 (JIS D2001)
M3X800AP-RG16S6.4 M3X800BP-RG16S6.4	16-ø20 (16 x 22.5°)	75 102	30 32	72 92	2 x 4-M12 x 1.75 2 x 4-M16 x 2	m=3.75, z=29 (JIS D2001)
M3B800AP-RG16S6.4 M3B800BP-RG16S6.4	12-ø22 (12 x 30°)	75 102	30 32	72 92	2 x 4-M12 x 1.75 2 x 4-M16 x 2	DP=6/12, z=26 (SAE)

Counter balance valve KDS30MR or brake valve B25C is directly attachable to M3 series motors.

K3X Series



The K3X series are newly developed motors for industrial machinery.

The design is based on technology and experience of current K3V series for construction machinery or industrial machinery.

FEATURES

1. High Efficiency and Reliability

K3X series has high efficiency and high reliability by using common rotary parts of K3V Series pumps which are used widely for construction machines and have many years of experience.

2. Allowable to Apply The Radial Force

The motor shaft can withstand radial loads. But in this case, bearing life decrease.

3. Allowable to Use on Upward Motor Shaft Position

The motor has the drain port to be installed with shaft vertical.

ORDERING CODE

K3X 112 S-100M-D1

K3X series ————

size ————

63 : 64cm³ 90 : 89cm³
80 : 82cm³ 112 : 111cm³

power code, shaft code ————

0 : standard type, key standard
1 : standard type, involute spline
5 : high power type, key
6 : high power type, involute spline

oil temp. code

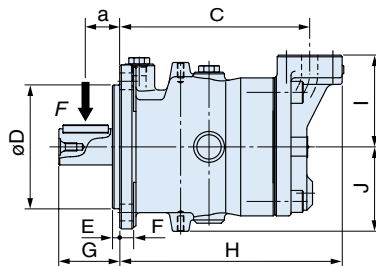
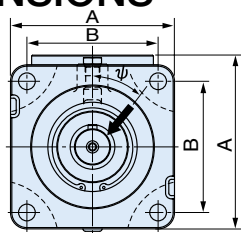
marks	oil temperature range	remarks
V2	90°C < θ °C	all seal parts: fluoro-rubber
V1	90°C ≥ θ °C	oil seal: fluoro-rubber
blank	-20°C ≤ θ ≤ 90°C	
D1	-30°C < θ < -20°C	
D3	-45°C ≤ θ ≤ -30°C	

valve cover code and direction of rotation
(A port :high press., view from shaft end)

0 : split flange and clockwise rotation standard
1 : thread flange and clockwise rotation
2 : split flange and anti-clockwise rotation
3 : thread flange and anti-clockwise rotation

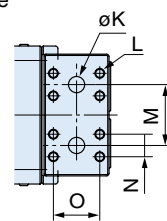
DIMENSIONS

[M3X112S]

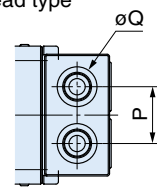


Main flange

split type



thread type



(mm)

size	A	B	C	øD	E	F	G	H	I	J	øK	L	M	N	O	P	Q
K3X63	146.5	114.5	198	127	12.7	14	55.5	234	102	91	16	M10	66	23.8	50.8	66	SAE3/4",1-1/16"-12UN-2B
K3X80/90/112	202.0	161.6	234	152.4	9.0	17	75.0	276	113	104	20	M12	75	27.8	57.2	70	SAE1",1-5/16"-12UN-2B

SPECIFICATIONS

model	standard type				high speed type					
	K3X63	K3X80	K3X90	K3X112	K3X63	K3X80	K3X90	K3X112		
displacement	Vg cm ³		63	82	89	111	51	82	89	111
pressure MPa (kgf/cm ²)	rated	31.4 (320)* ¹				31.4 (320)* ¹				31.4(320)* ²
	max.	34.3 (350)				34.3 (350)				
max. speed	n max	min ⁻¹	2,400	2,200		3,000		3,000		3,000* ²
max. flow	L/min		152	181	200	244	153	247	268	333
rated torque	N·m		316	411	450	554	255	411	446	554
rated power	kW		79	95	100	128	80	129	140	174
case volume	L		0.3	0.5		0.3	0.5			
moment of inertia	N·m ²		0.3	0.6		0.3	0.6			
mass	kg		23	40		23	40			

*1 For K3X63S with key type shaft, rated pressure is 24.5 MPa (250 kgf/cm²).

*2 In case that the motor is used at the max. speed of 3,000min⁻¹, rated pressure is 25.1 MPa (255 kgf/cm²), and at the rated pressure of 31.4 MPa (320 kgf/cm²), max. speed is 2,400min⁻¹.

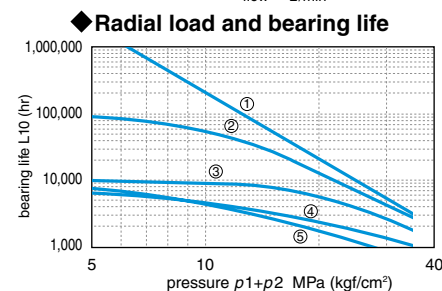
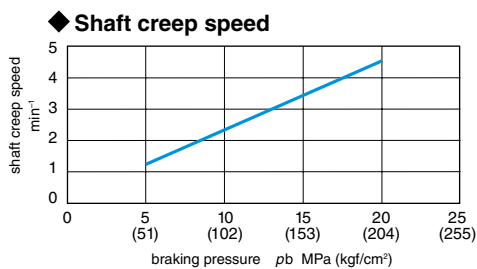
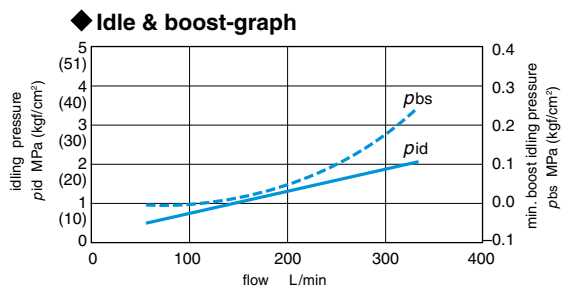
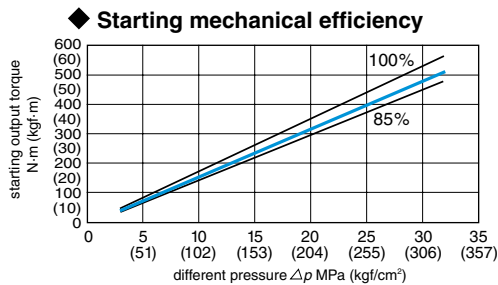
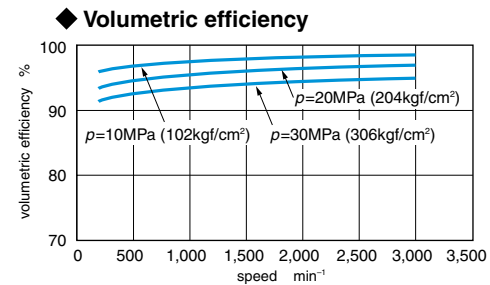
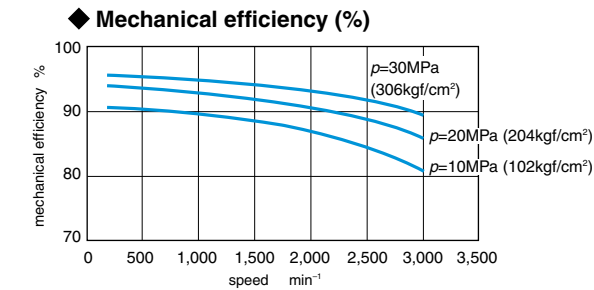
PERFORMANCE CURVE

oil temperature : 50 °C

oil viscosity : 32mm²/s

[M3X112]

The values given in the below figures are mean ones, and not guaranteed ones.



syμβole	ψ	F
units	deg.	N
①	90	0
②	90	5,000
③	90	10,000
④	0	10,000
⑤	180	10,000

a = 42 mm
Vg = 111 cm³
n = 1,000 min⁻¹

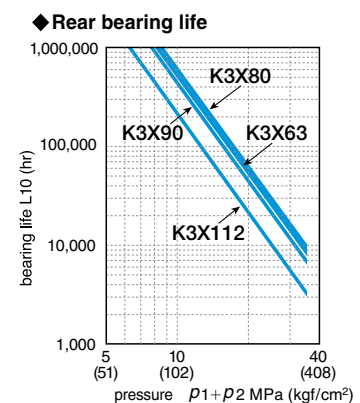
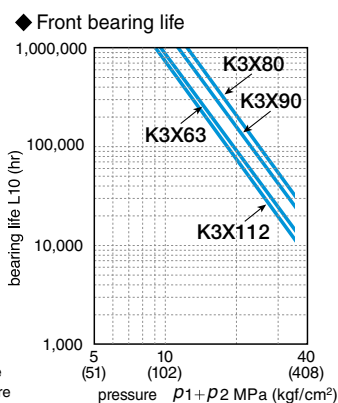
Regarding ψ, F and a, please refer to the figures of DIMENSIONS in page 25.

Bearing life

The calculated life (B₁₀ life) shown in the graph is for speed No=1,000min⁻¹. Calculation of life for a random speed N is follows.

$$L = \frac{N_0}{N} \times L_0 \quad (L_0 : \text{calculated life for } N_0)$$

(Note)
p1: inlet pressure
p2: outlet pressure



■ OPERATION PRINCIPLE

As shown in the right, the high pressure oil passes through the inlet port (a) and flows into the cylinder block (2). Hydraulic force thus acts upon the piston (4), generating an axial force F . This force F is vector-analyzed through the shoe (5) into force F_1 which is perpendicular to the swash plate (7), and force F_2 which is a vertical force with respect to the output shaft. The reaction force of force F_2 is transmitted via the piston to the cylinder block, generating a rotational force which turns the output shaft.

These are 9 equally spaced pistons in the cylinder block. The pistons connected to the high pressure inlet port transmit rotational torque sequentially to the output shaft.

Reversing the flow of operating oil causes the output shaft to rotate in reverse.

The theoretical output torque (T) is obtained by the following formula.

$$T = \frac{\Delta p \times Vg}{6.28}$$

T : Theoretical output torque N·m
 Δp : Effective pressure difference MPa
 Vg : Displacement per revolution cm³

$$1 \text{ N}\cdot\text{m} = 0.10197 \text{ kgf}\cdot\text{m} \quad 1 \text{ MPa} = 10.197 \text{ kgf/cm}^2$$

■ PARKING BRAKE (Option)

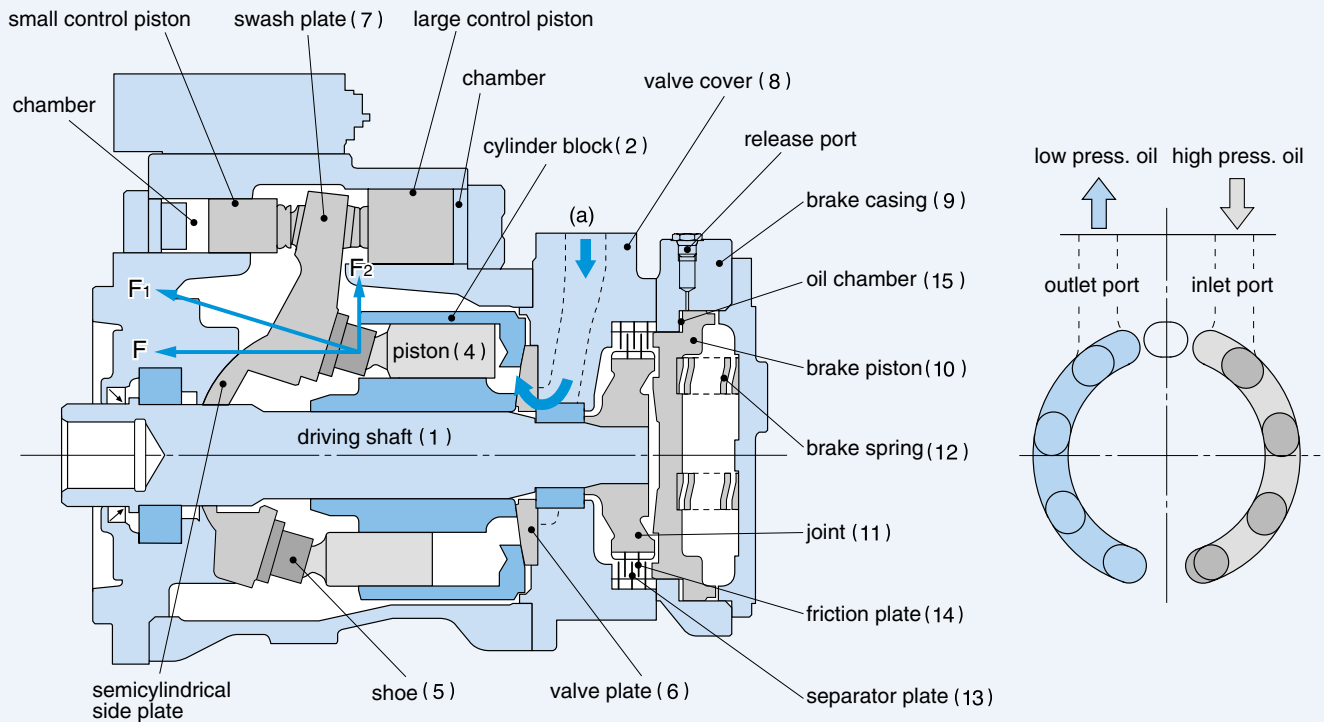
This is a negative type, oil-lubricated, multi-disc parking brake. Friction plates are cooled and lubricated by the drain oil of the hydraulic motor. The braking operation is as follows.

The friction plates (14) which are splined to the joint (11) and the separator plates (13) which are splined to the valve cover (8) are placed alternately. If not in operation, the brake piston (10) is pushed leftward by the springs (3) and the resultant friction force between the friction and the separator plates restricts the driving shaft to rotate. On the other hand, a release pressure larger than the spring force is applied to the oil chamber (15) through the release port, the brake piston (10) moves rightward and clearance is formed between the plates. So the brake is released and the driving shaft can rotate freely.

DISPLACEMENT CHANGING MECHANISM OF M3B SERIES

◆ M3B280,530,800

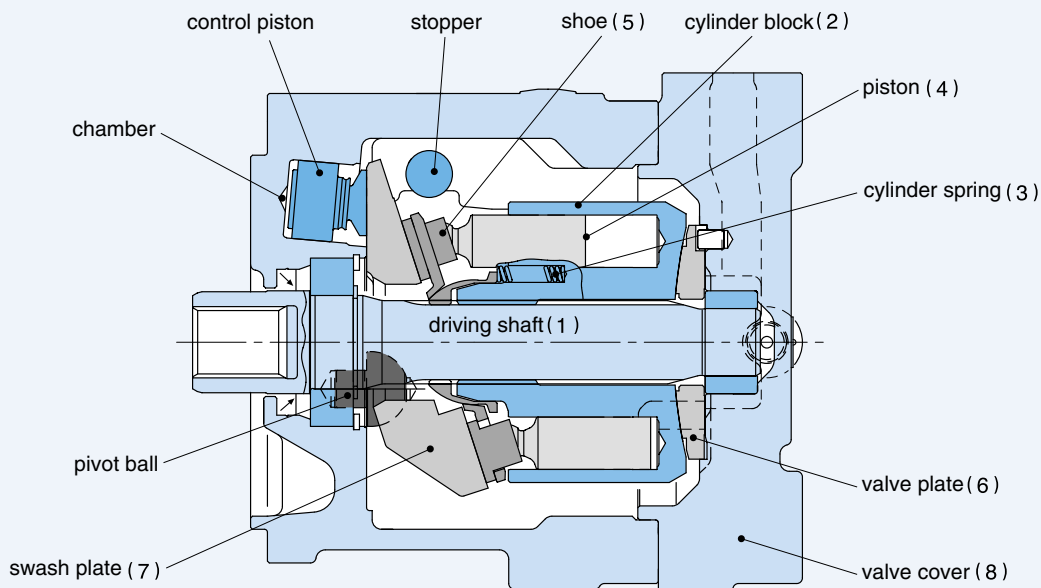
The semi cylindrical slide plate, positioned at the both sides of the swash plate, supports the load, as a swash plate supporting mechanism. Two control pistons push swash plate opposite to each other. Displacement is changed by controlling the oil supply to the chambers to adjust the tilting angle of the swash plate.



◆ M3B200

The semi spherical pivot ball, positioned at the both sides of the swash plate, supports the load, as a swash plate supporting mechanism.

The tilting angle of the swash plate diminishes by supplying the oil to the chamber of a control piston positioned at the swash plate. On the other hand, when oil is not supplied to the chamber, swash plate is retreated by the forces applied to the pistons and by the cylinder spring and the tilting angle becomes maximum.



CAUTION FOR HANDLING



1. Operating fluid and temperature range

- ① Please use antiwear hydraulic fluid as operating fluid.
- ② The allowable ranges of operating fluid are as follows.
Viscosity : 10~1,000 mm²/s (cSt)
Temperature : -20~+80°C
- ③ In case of using special fluid (Phosphate ester compounds, water-glycol fluid, fatty acid ester compounds, etc.) please consult Kawasaki for instructions prior to use.



2. Filtration

For satisfactory service life of these motors application, the operating fluid should be controlled cleaner than the cleanliness level of NAS1638 Class9. Install a 10 μm filter in the return circuit of respective actuators.



3. Mounting

- ① Regarding the mounting direction, please refer to the below list. In case of the "Option" mentioned in the list, please consult
- ② Kawasaki.

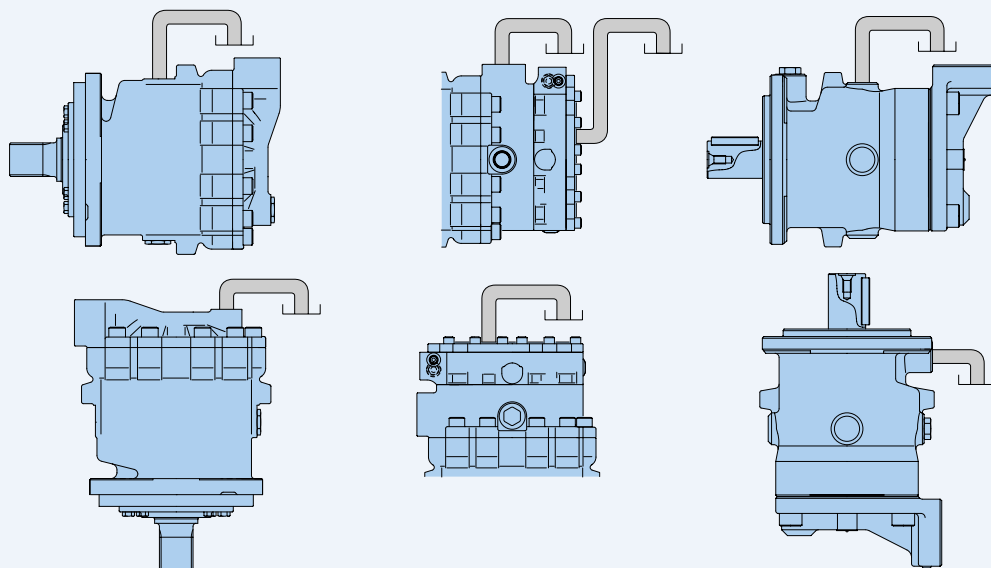
Alignment should be so carried out that the parallel error may be held within ±0.05 mm.

Direction of the shaft	M3X/M3B	M3X/M3B-RG	K3X
Horizontal	Standard	Standard	Standard
Down ward	Option	Option	Option
Up ward	—	—	Standard



4. Drain piping

- ① The motor's drain port, as shown in the following figure, should be so located that the casing can be filled with oil.
- ② Use a drain tube bigger in size than the motor's port. Keep the casing pressure normally below 0.2 MPa (2 kgf/cm²) and below 0.6 MPa (6 kgf/cm²) even at the peak.





WARNING

5.Oil filling and air venting

Before operation, be sure to fill the casing with oil through the drain port . Vent all air out of the motor and hydraulic circuit prior to operation.

The insufficient amount of oil may cause the lubrication failure, resulting in the seizure of internal parts. The volume of the oil is shown in the SPECIFICATIONS as case volume.



WARNING

6.Parking brake

This brake should be used only for parking, are not for dynamic braking. In case of driving inertial load, measures such as the adoption of the time delay valve should be taken to prevent the parking brake from being activated before the inertial mass stops.



WARNING

7.Radial and thrust load

- ① Bearing life against the radial load applied to the shaft is shown in the Performance curve for each motor type. If load point or load direction is different, please consult us.
- ② Do not apply thrust load to the shaft of these motors.
- ③ Radial and thrust load may be applied to the output shaft of the reduction gears. Please refer to P23 for the relations between the radial load and the bearing life.



CAUTION

8.Cavitation

When the motor is operating in an overrunning (pumping) mode, then to prevent the occurrence of cavitation, a positive boost pressure is required at the suction port. The minimum boost pressure requirement shown in the model performance data is based on the regular operation. In case of a rapid change of the flow volume, more boost pressure must be applied.



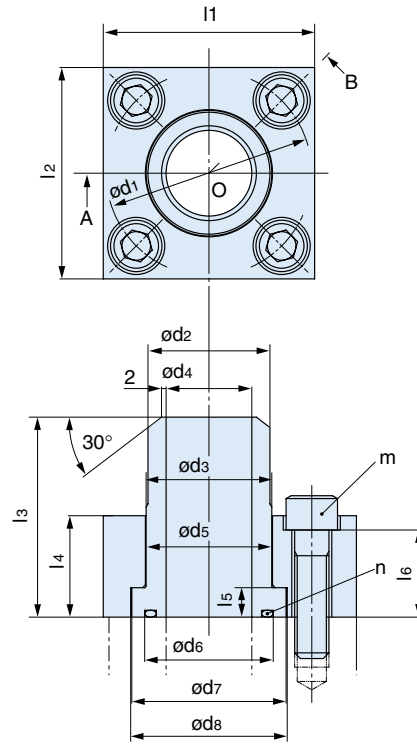
CAUTION

9.Back pressure

The lower of the two main motor ports pressures should always be less than 2.5 MPa (25 kgf/cm²). Pressure higher than this could cause a possible reduction in motor performance. In case of any doubt please consult us.

Piping size

model	main port	drain port	pilot port, gage port, etc.
M3X200	special	G3/8	
M3X280	special	G1/2	G1/4
M3X530	special	G3/4	G1/4
M3X800A	special	G3/4	G1/4
M3X800B	special	G3/4	G1/4
M3B200	special	G1/2	G1/4
M3B280	special	G1/2	G1/4
M3B530	special	G3/4	G1/4
M3B800A	special	G3/4	G1/4
M3B800B	special	G3/4	G1/4
K3X63	SAE 3/4"	SAE 1/2"	G1/4
K3X80,90,112	SAE 1"	SAE 1/2"	G1/4
KSC19	G3/4		
KSC19L	G3/4		
KDC28MR	SAE 3/4"		G1/4
KDC30MR	SAE 1-1/4"		G3/8
KDC40MR	SAE 1-1/2"		G1/4
B25C	SAE 1"		G1/8
B35C	SAE 1-1/4"		SAE 3/8"
FV30	SAE 1-1/4"		G1/4, G3/4
VBS-199	G1		G1



Flange for main ports

Flange for main ports

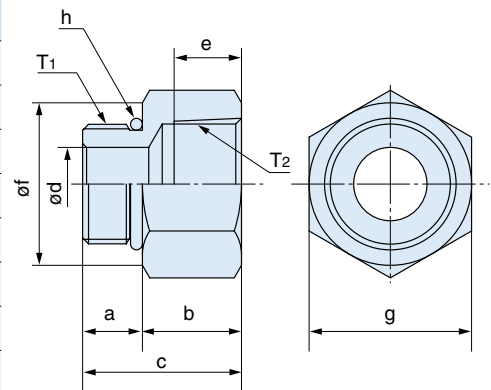
These flanges are attachable directly to the main ports of motors.

model	l1	l2	l3	l4	l5	l6	d1	d2	d3	d4	d5	d6	d7	d8	m	n	flange-sub KPM parts list (for one motor)
M3B200	64	64	60	30	8.8	25	62	34.0	35	22	35.5	35	44.5	45.2	2 X 4 X M10-40	G30	3703580-1668
M3X200 M3X/B280	74	74	60	30	9.5	25	72	34.0	38	22	38.9	40	47.6	48.4	2 X 4 X M12-45	G35	37033580-1669
M3X/B530 M3X/B800A	74	74	70	35	10.3	30	72	42.7	44	30	44.5	45	54.0	54.8	2 X 4 X M12-45	G40	37033580-1670
M3X/B800B	94	94	70	35	10.3	30	92	42.7	44	30	44.5	45	54.0	54.8	2 X 4 X M16-50	G40	37033580-1671

O-ring type thread connector

These connectors are used to convert the drain ports, pilot ports, attached valves' piping ports, etc. into PT screws.

size	T1	T2	a	b	c	d	e	f	g	h	connector KPM parts list (with o-ring)
JIS 1/4"	G1/4	RC1/4	12	17	29	5	11	19	19	P11	PSTB 1124-6
JIS 3/8"	G3/8	RC3/8	12	19	31	8	12	22	22	P14	PSTB 1124-9
JIS 1/2"	G1/2	RC1/2	16	22	38	10	15	27	27	P18	PSTB 1124-12
JIS 3/4"	G3/4	RC3/4	17	25	42	16	17	36	36	P24	PSTB 1124-19
JIS 1"	G1	RC1	21	27	48	22	19	41	41	P29	PSTB 1124-25
SAE 3/8"	9/16-18UNF	RC3/8	9.9	19	28.9	7.0	12	17.4	22	906 ^(*1)	PSTB 4043-6
SAE 1/2"	3/4-16UNF	RC1/2	11.1	22	33.1	10.0	15	22.2	26	908 ^(*1)	PSTB 4043-8
SAE 3/4"	1-1/16-12UN	RC3/4	15.0	25	40.0	15.5	17	31.7	35	912 ^(*1)	PSTB 4043-12
SAE 1"	1-5/16-12UN	RC1	15.0	27	42.0	22.0	19	38.0	41	916 ^(*1)	PSTB 4043-16



(*1) SAE AS 586

Manifold for conversion into SAE flange

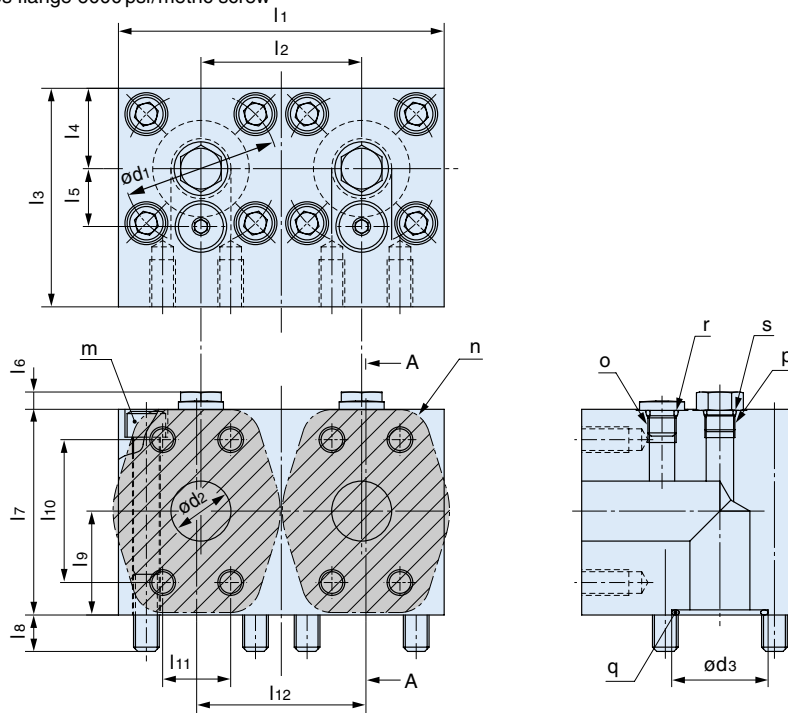
These manifolds are used to convert motor main ports into SAE flanges.

model	l1	l2	l3	l4	l5	l6	l7	l8	l9	l10	l11	l12	d1	d2	d3	m	n	o	p	q	r	s	plate-sub KPM parts list (for one motor)
M3B200	150	75	100	37.5	27	9	82	14	41.0	57.2	27.8	75	62	25	35	2X4XM10-85	1" (*1)	G1/4	9/16-18UNF (*2)	G30	P11	906 (*3)	3724750-0615
M3X200 M3X/B280	150	75	102	37.5	27	9	82	16	41.0	57.2	27.8	75	72	25	35	2X4XM12-85	1" (*1)	G1/4	9/16-18UNF (*2)	G30	P11	906 (*3)	3724750-0616
M3X/B530 M3X/B800A	152	75	102	37.5	27	9	96	17	48.5	66.7	31.8	79	72	28	45	2X4XM12-100	1-1/4" (*1)	G1/4	9/16-18UNF (*2)	G40	P11	906 (*3)	3724750-0617
M3X/B800B	202	102	120	50.0	27	9	96	21	48.5	66.7	31.8	102	92	30	45	2X4XM16-100	1-1/4" (*1)	G1/4	9/16-18UNF (*2)	G40	P11	906 (*3)	3724750-0618

(*1) SAE high pressure series flange 6000 psi/metric screw

(*2) SAE 3/8"

(*3) SAE AS 586

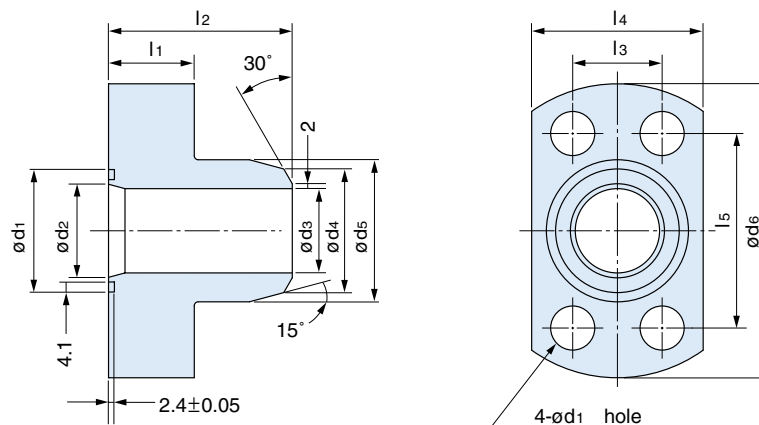


Flange for main ports (SAE standard)

These flanges are based on SAE standard. SAE conversion manifolds are necessary for M3 series.

flange size	l1	l2	l3	l4	l5	d1	d2	d3	d4	d5	d6	d7	m	n	o	flange-sub KPM parts list (for one motor)
3/4" (*1)	20	50	24	48	51	30	19	16.2	27.2	36	74	11	3/4"	4 XM10-35	G25	3703580-1804
1" (*1)	25	55	27.8	54	57.2	40	26	21.2	34.0	43	82	11	1"	4 XM10-40	G35	3703580-1805
1-1/4" (*1)	30	65	31.8	61	66.7	45	32	29.9	42.7	50	96	14	1-1/4"	4 XM12-45	G40	3703580-1806
1-1/2" (*1)	35	75	36.5	70	79.4	50	38	34.4	48.6	58	115	18	1-1/2"	4 XM16-55	G45	3703580-1807

(*1) SAE high pressure series flange (6000 psi)



KAWASAKI PRECISION MACHINERY NETWORK

Kawasaki Precision Machinery Ltd.

Head Office / Main Plant

234, Matsumoto, Hasetani-cho, Nishi-ku, Kobe 651-2239, Japan
Phone: 81-78-991-1133 Fax: 81-78-991-3186

Tokyo Office

World Trade Center Bldg., 4-1, Hamamatsu-cho 2-chome, Minato-ku, Tokyo 105-6116, Japan
Phone: 81-3-3435-6862 Fax: 81-3-3435-2023

Kobe Office

Kobe Crystal Tower, 1-3, Higashikawasaki-cho 1-chome, Chuo-ku, Kobe, 650-8680, Japan
Phone: 81-78-360-8608 Fax: 81-78-360-8609

<http://www.khi.co.jp/kpm/>

OVERSEAS SUBSIDIARIES

Kawasaki Precision Machinery (UK) LTD.

Ernesettle Lane, Ernesettle, Plymouth, Devon PL5 2SA, United Kingdom
Phone: 44-1752-364394 Fax: 44-1752-364816

<http://www.kpm-eu.com>

Kawasaki Precision Machinery of America

Division of Kawasaki Motors Corp., U.S.A.

5080, 36th St. S.E. Grand Rapids, MI 49512, U.S.A.
Phone: 1-616-949-6500 Fax: 1-616-975-3103

<http://www.kawasakipmd.com>

Flutek, Ltd.

192-11, Shinchon-dong, Changwon, Kyungnam, 641-370 Korea
Phone: 82-55-286-5551 Fax: 82-55-286-5553

KK HYDRAULICS SALES (SHANGHAI) LTD.

B-908 Far East International Plaza 317 Xianxia Rd, Shanghai 200051
Phone: 86-21-62351606 Fax: 86-21-62957080

KAWASAKI HEAVY INDUSTRIES, LTD.

OVERSEAS OFFICES

Seoul Office

c/o Kawasaki Machine Systems Korea, Ltd. 3rd Floor (307), Industrial Complex Support Bldg., 637, Kojan-Dong, Namdong-Gu, Incheon, 405-817, Korea
Phone: 82-32-821-6941 Fax: 82-32-821-6947

Beijing Office

Room No.2602, China World Tower 1, China World Trade Center, No.1 Jian Guo Men Wai Avenue, Beijing 100004, People's Republic of China
Phone: 86-10-6505-1350 Fax: 86-10-6505-1351

Shanghai Office

13th Floor, HSBC Tower, 101 Yin Cheng East Road, Pudong New Area, Shanghai 200120, People's Republic of China
Phone: 86-21-6841-3377 Fax: 86-21-6841-2266

Taipei Office

15th Floor, Fu-Key Bldg., 99 Jen-Ai Road Section 2, Taipei, Taiwan
Phone: 886-2-2322-1752 Fax: 886-2-2322-5009

Bangkok Office

17th Floor, Ramaland Bldg., 952 Rama IV Road, Bangrak, Bangkok 10500 Thailand
Phone: 66-2-632-9511 Fax: 66-2-632-9515

Kuala Lumpur Office

Letter Box No. 162, 6th Floor, UBN Tower, 10 Jalan P. Ramlee 50250, Kuala Lumpur, Malaysia
Phone: 60-3-2070-5141 Fax: 60-3-2070-5148

Jakarta Office

12th Floor, Skyline Bldg., Jl. M. H. Thamrin 9, Jakarta 10340, Indonesia
Phone: 62-21-314-0737 Fax: 62-21-314-1049

OVERSEAS SUBSIDIARIES

Kawasaki Heavy Industries (U.S.A.), Inc.

599 Lexington Avenue, Suite 3901, New York, NY 10022, U.S.A.
Phone: 1-212-759-4950 Fax: 1-212-759-6421

Houston Branch

333 Clay Street, Suite 4310, Houston, TX 77002-4103, U.S.A.
Phone: 1-713-654-8981 Fax: 1-713-654-8187

Kawasaki do Brasil Indústria e Comércio Ltda.

Avenida Paulista 542-6 Andar, Bela Vista, 01310-000, São Paulo, S.P., Brazil
Phone: 55-11-3289-2388 Fax: 55-11-3289-2788

Kawasaki Heavy Industries (U.K.) Ltd.

4th Floor, 3 St. Helen's Place, London EC3A 6AB, U.K.
Phone: 44-20-7588-5222 Fax: 44-20-7588-5333

Kawasaki Heavy Industries (Europe) B.V.

7th Floor, Riverstaete, Amsteldijk 166, 1079 LH Amsterdam, The Netherlands
Phone: 31-20-6446869 Fax: 31-20-6425725

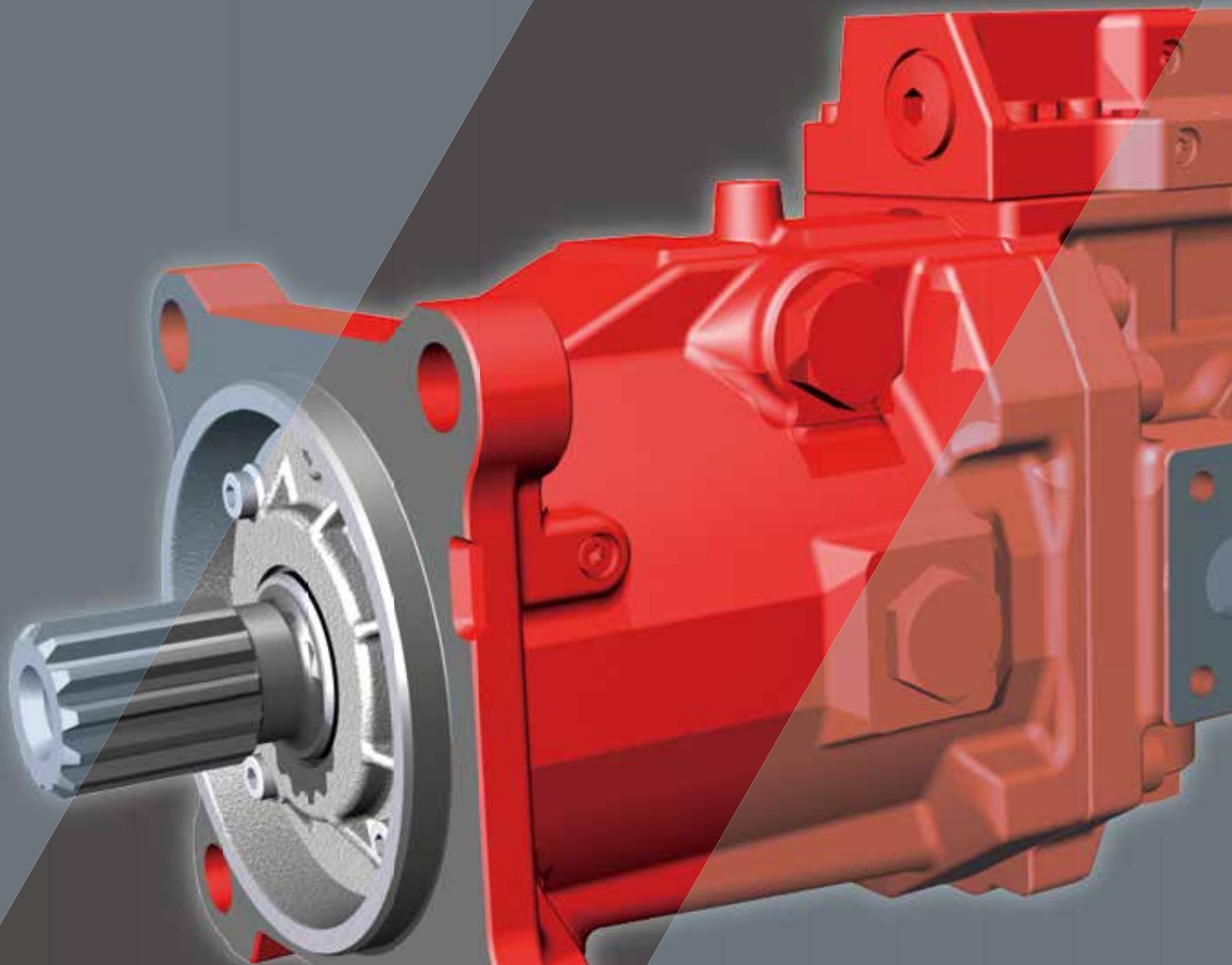
Kawasaki Heavy Industries (H.K.) Ltd.

Room 4211-16, Sun Hong Kai Centre 30 Harbour Road, Wanchai
Hong Kong People's Republic of China
Phone: 852-2522-3560 Fax: 852-2845-2905

Kawasaki Heavy Industries (Singapore) Pte. Ltd.

6 Battery Road, #18-04, Singapore 049909
Phone: 65-6225-5133-4 Fax: 65-6224-9029

Swash Plate Type Axial Piston Motor **M7V / M7X Series**



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I . Applications / Product Usage





The following must be taken into consideration before use.

1. The operating condition of the products shown in this catalog varies depending upon each application. Therefore, the product suitability must be judged by the designer of the hydraulic system and/or the person who finalizes the technical specifications of the machine after analysis and testing. The product specification shall be determined based on the latest catalog and technical documents. The system must be designed taking into account the possibility of machine failure to ensure that all safety, warning, and application requirements are met.
2. For the proper use of the products, descriptions given in the SAFETY PRECAUTIONS must be observed.
3. The technical information in this catalog represents typical characteristics and performance of the products as of the published date.
4. If the products are intended to use in the following, please consult with Kawasaki in advance.
 - (1) Use the product under the operating conditions or environments other than those described in the technical documents.
 - (2) Use the product in the nuclear sector, aviation sector, medical sector, and/or food sector.
 - (3) Use the product in applications which may cause substantial harm to others and their property, and especially in applications where ensuring safety is a requirement.
5. The information described in this catalog is subject to change without notice. For the latest information, please contact Kawasaki.






II. Safety Precautions

Before using the product, you **MUST** read this catalog and **MUST** fully understand how to use the product. To use the product safely, you **MUST** carefully read all Warnings and Cautions in this catalog.








1. Cautions related to operation

-  - Use the personal protective equipment to prevent injury when the product is in operation.
-  - Some components are heavy. Handle the product carefully not to hurt your hands and lower back.
-  - Do not step on, hit or drop , or apply strong force to the product, as these actions may cause operation failure, product damage, or oil leakage.
-  - Wipe off any oil on the product or the floor completely, as oil can create slippery conditions that may cause drop of the product and personal injury.






2. Warnings and cautions related to installation and removal of the product

-  - Installation, removal, piping, and wiring must be done by a qualified technician.
-  - Make sure that the hydraulic power unit is turned off and that the electric motor or engine has completely stopped before starting installation or removal. You must also check that the system pressure has dropped to zero.
-  - Make sure that the power source is turned off before installing electric components to reduce the risk of electric shock.
-  - Clean the threads and the mounting surface to prevent damage or oil leakage. Inadequate cleaning may cause insufficient torque and broken seals.
-  - Use the designated bolts and fasten them with prescribed torque when installing the product. Use of undesignated bolts, and excessive or insufficient tightening torque may induce operation failure, damage, or oil leakage.

3. Warnings and cautions for operation

-  - Always equip the product with explosion or ignition protection if it is used in potentially explosive or combustible atmospheres.
-  - Shield rotary parts, such as the motor and pump shaft, to avoid injury.
-  - Stop operation immediately, and take proper measures when the abnormality such as unusual noise, oil leakage, and smoke is found. Continuing operation under such condition may bring about damage, a fire hazard, or injury.
-  - Make sure that all pipes, hoses, and connecting points with pipes or hoses, are correctly connected and tightened before starting operation.
-  - Use the product under the operating conditions and limitations described in the catalog, drawings, and specification sheets.
-  - Do not touch the product in operation, to reduce the risk of skin burn.
-  - Use the proper hydraulic oil and maintain the filtration at the recommended level to prevent premature wear and damage.

4. Cautions related to maintenance

-  - Never modify the product without approval from Kawasaki.
-  - Disassembly of the product will void the warranty.
-  - Keep the product clean and dry when storing or transporting.
-  - The seals may need to be replaced if the product has been stored for an extended period of time.
-  - Making adjustments of this product will result in the warranty being null and void.

III. Handling Precautions

1. Operating Fluid and Temperature Range

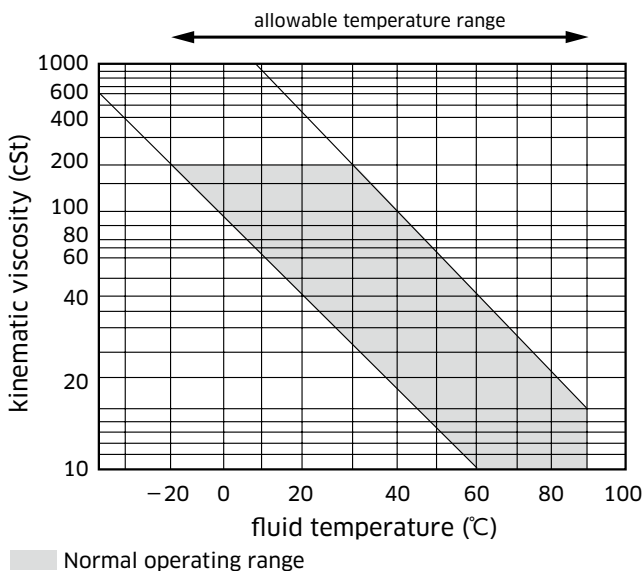
1) Operating fluid

Values shown in this catalog are based upon using mineral oil based anti-wear hydraulic fluid. To ensure optimal performance use of mineral oil based anti-wear hydraulic fluid is recommended.

2) Viscosity and temperature range

To minimize both oil and seal deterioration, a maximum operating temperature of 60°C should be considered. Please note that the regulator may become slow to respond when operating at low temperatures (below 20°C) in extreme cold environments. At such low temperature it is strongly suggested that a warm up cycle is introduced until an operating temperature of 20°C is achieved.

	Normal operating range	Allowable range
Viscosity [mm ² /s(cSt)]	10 to 200	10 to 1000
Fluid temperature [°C (°F)]	-20 to +90 (-4 to +194)	



2. Filtration and Contamination Control

1) Filtration of working oil

The most important means to prevent premature damage to the motor and associated equipment and to extend its working life, is to ensure that hydraulic fluid contamination control of the system is working effectively.

This begins by ensuring that at the time of installation that all piping, tanks etc. are rigorously cleaned in a sanitary way. Flushing should be provided using an off line filtration system and after flushing the filter elements should be replaced.

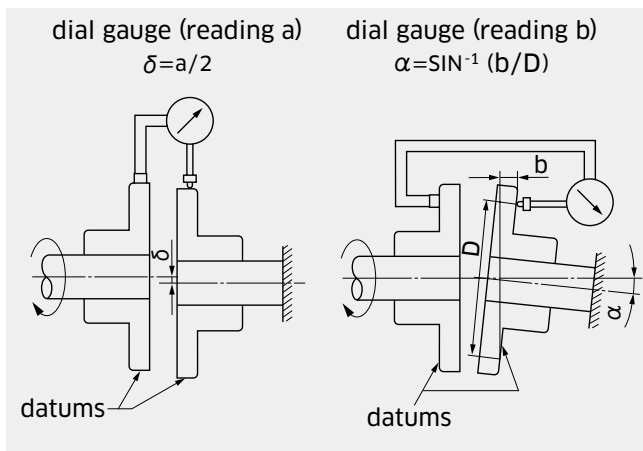
2) Suggested acceptable contamination level

The relationship between contamination level and motor life is very difficult to predict as it depends on the type and nature of the contaminant present in the system. Sand or Silica in particular, due to its abrasive nature, does significantly reduce the expected life of a motor. Based on the precondition that there is no significant presence of Silica type substances then a minimum Cleanliness level of -/18/15 ISO 4406 or SAE AS 4059E Table 1 Class 9 (NAS 1638 Class 9).

III. Handling Precautions

3. Connection of Driving Shaft

- 1) Install the motor horizontally to the shaft direction.
- 2) Alignment should be within specifications below.
Parallel misalignment $\delta \leq 0.05\text{mm}$
(Dial gauge reading $a =$ below 0.10mm)
Angular misalignment $\alpha \leq 0.2\text{deg}$



4. Oil Filling and Air Bleeding

1) Motor case filling

Be sure to fill the motor casing with oil through the drain port before start up. The motor contains bearings and high-speed sliding parts including pistons with shoes and a spherical bush that need to be continuously lubricated. Part seizure or total premature failure will occur very quickly if this procedure is not rigorously followed.

2) Air bleeding

Run the motor unloaded for a period of time to ensure that all residual air within the system is released.

3) Long term out of usage

It is undesirable to leave the motor out of use for a long period e.g. a year or more. In such a situation it is recommended that the motor is run for a short period on a more frequent basis even if it is just unloaded.

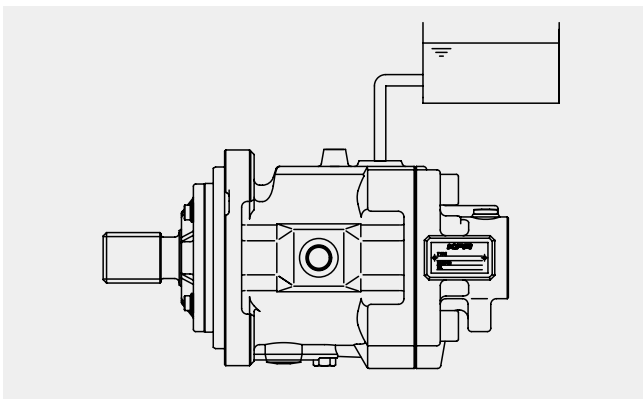
With regard to a motor held in storage then rotating the shaft on a frequent basis is sufficient. If the motor is left out for more than the suggested time it will require a service inspection.

5. Drain Piping

1) Location of the drain piping

Drain port at the highest position of the motor should be used.

Drain piping must be arranged as shown in the following figure so that the motor case is filled with the oil. The drain piping must be connected directly to the tank.

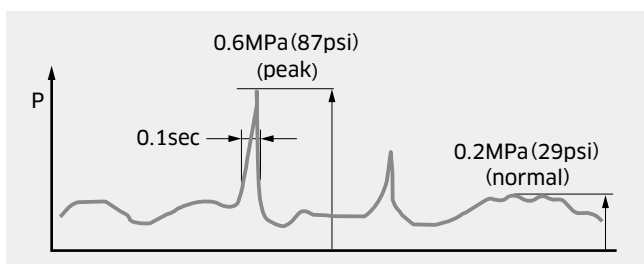


2) Size of the drain hose or pipe

The internal bore size must be larger in size than the drain port. Arrange the piping as short as possible.

3) Casing pressure

Permissible maximum case pressure is 0.2 MPa normally and 0.6 MPa peak. Refer to the following figure measured at the drain port of the motor.



4) Influence of casing pressure on beginning of control

An increase in casing pressure affects the beginning of control of the variable motor when a proportional displacement control, or a pressure related control is adopted. An increase in casing pressure induces an increase in control pressure at the beginning of control, and has an influence on the control characteristics.

Please refer to the control options of M7V motors shown on page 11.

6. Thrust and Radial Load to the Shaft

1) Thrust load

Do not apply any form of thrust load to the shaft end.

2) Radial load

Radial load is acceptable under certain conditions. Please contact Kawasaki if a radial load to be applied to the shaft. Bearing life may be influenced and reduced depending on the load magnitude, the load position, and the load orientation.

7. Direction of rotation

Direction of rotation, viewed on drive shaft		
Direction	Clockwise	Counter Clockwise
Flow	Port A to B	Port B to A

IV. Conversion Factors, Formula and Definition

◆ Conversion Factors

	Formula	Note
Displacement	1 cm ³ = 0.061 in ³	
Pressure	1 MPa = 145 psi	
Flow	1 L/min = 0.264 gpm	US gallon
Torque	1 Nm = 0.74 lb ft	
Power	1 kW = 1.341 hp	
Weight	1 kg = 2.205 lb	

◆ Formula

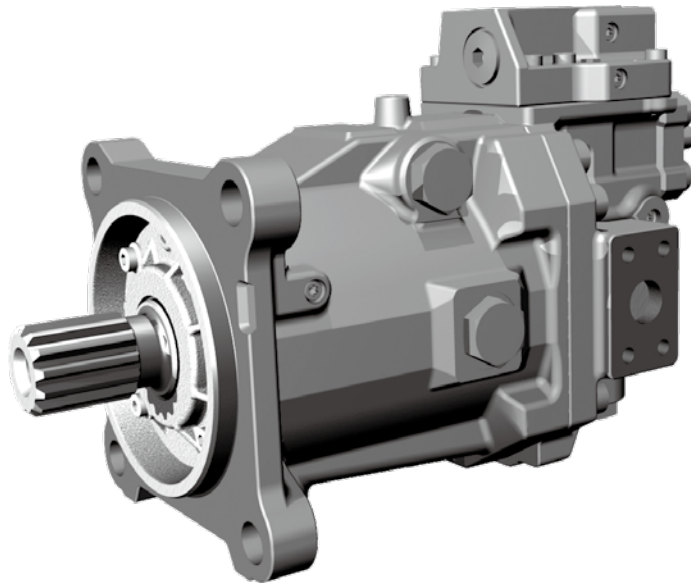
	Metric system		Imperial system	
Input flow	$Q = q \times N / (1000 \times \eta_v)$	L/min	$Q = q \times N / (231 \times \eta_v)$	gal/min
Output torque	$T = q \times \Delta P \times \eta_m / 2\pi$	Nm	$T = q \times \Delta P \times \eta_m / 24\pi$	lbf ft
Output power	$L = T \times N / 9550 = Q \times \Delta P \times \eta_t / 60$	kW	$L = T \times N / 5252 = Q \times \Delta P \times \eta_t / 1714$	hp
Speed	$N = Q \times 1000 \times \eta_v / q$	min ⁻¹	$N = Q \times 231 \times \eta_v / q$	rpm

◆ Definition

q	= Motor displacement / rev.	cm ³ (in ³)
L	= Output power	hp
N	= Speed	min ⁻¹ (rpm)
N _{nom}	= Max. speed at maximum displacement	
ΔP	= P _{high} - P _{low}	MPa (psi)
P _{high}	= High pressure	MPa (psi)
P _{low}	= Low pressure	MPa (psi)
P _{nom}	= Nominal pressure	
T	= Output torque	Nm (lbf ft)
η _v	= Motor volumetric efficiency	
η _m	= Motor mechanical efficiency	
η _t	= Motor total efficiency	

M7V Series

Variable Displacement Type Axial Piston Motors



■ Specifications

Size : 85, 112, 160, 212

Nominal Pressure : 40 MPa (5,800 psi)

Maximum Pressure : 45 MPa (6,500 psi)

■ General Descriptions

- Applicable to an open circuit and closed circuit.
- Applicable to construction machinery and industrial vehicles.
- Swash plate design allows for a compact motor.
- High power density
- Various control options make the motor suitable for a wide range of applications.

■ Features

Superior performance at High and Low speed

Optimized rotary balance design enables high speed performance and excellent low speed characteristics.

Low noise

Swash plate configuration provides the low noise.

Compact size

Swash plate configuration provides the more compact structure and flexibility in system design.

Long bearing life

Swash plate configuration results in longer bearing life.

1

M7V Ordering Code

Please fill in the Inquiry Form on page 47 in order to specify the requirement.

Model Code **M7V 112 A A 1 1 - A A 1 T1 X X X N - 01**

1. M7V Series

M7V Series, Variable Displacement, Axial Piston Motor, Applicable in Both Open and Closed Loops.

2. Size

	85	112	160	212
Standard Size	●	●	●	●

3. Series Specifications

A	Standard
---	----------

4. Mounting Flange and Port Position*

	Mounting	Port Position	85	112	160	212
A	SAE J744, 2-bolt Mount (M7V85)	Rear	●	●	●	○
B	SAE J744, 4-bolt Mount (M7V112, 160, 212)	Side	●	●	●	○
C	ISO3019-2, 4-bolt Mount	Rear	●	●	●	●
D	ISO3019-2, 4-bolt Mount	Side	●	●	●	●
E	SAE J744, 4-bolt Mount	Rear	●	—	—	—
F	SAE J744, 4-bolt Mount	Side	●	—	—	—

5. Port and Flange Fixing Thread*

	Threaded Port Type	Flange Fixing Thread Type	85	112	160	212
1	ANSI ISO11926	ANSI ASMEB1.1	●	●	●	○
2	ANSI ISO11926	Metric ISO724	○	○	○	○
3	Metric ISO6149	Metric ISO724	○	○	○	○
4	Parallel Piping ISO228	Metric ISO724	●	●	●	●

6. Shaft End*

	Standard	Specifications	85	112	160	212
1	ANSI B92.1	1 1/2 in 17T 12/24DP	●	—	—	—
2	ANSI B92.1	1 3/4 in 13T 8/16DP	—	●	●	—
3	ANSI B92.1	2 in 15T 8/16DP	—	—	○	○
4	ANSI B92.1	1 3/8 in 21T 16/32DP	●	—	—	—
5	DIN 5480	W35x2x16x9 g	●	—	—	—
6	DIN 5480	W40x2x18x9 g	●	●	—	—
7	DIN 5480	W45x2x21x9 g	—	●	●	—
8	DIN 5480	W50x2x24x9 g	—	—	●	●
9	ANSI B92.1	1 1/4 in 14T 12/24DP	●	—	—	—

*Following combination of code [4], [5], and [6] is available.

	Ordering Code		
	Code[4]	Code[5]	Code[6]
M7V85	A or B	1 or 2	1 or 9
	C or D	3 or 4	5 or 6
	E or F	1 or 4	4
M7V112	A or B	1 or 2	2
	C or D	3 or 4	6 or 7
M7V160	A or B	1 or 2	2 or 3
	C or D	3 or 4	7 or 8
M7V212	A or B	1 or 2	3
	C or D	3 or 4	8

● : Available
○ : Under development
— : Not available

1. M7V Ordering Code

Please fill in the Inquiry Form on page 47 in order to specify the requirement.

Model Code ¹**M7V** ²**112** ³**A** ⁴**A** ⁵**1** ⁶**1** - ⁷**A** ⁸**A** ⁹**1** ¹⁰**T1** ¹¹**X** ¹²**X** ¹³**X** ¹⁴**N** - ¹⁵**01**

7. Maximum Displacement

Size	85	A : 85	● B : 80	● C : 75	● D : 70	●
	112	A : 112	● B : 107	● C : 100	● D : 95	●
	160	A : 160	● B : 155	● C : 150	● D : 140	●
	212	A : 215	● B : 200	● C : 190	● D : 180	●

8. Minimum Displacement

Size	85	A : 51	● B : 40	● C : 30	● D : —	— E : —	—
	112	A : 68	● B : 50	● C : 40	● D : 30	● E : 22	●
	160	A : 96	● B : 80	● C : 60	● D : 40	● E : 32	●
	212	A : 86	● B : 70	● C : 60	● D : —	— E : —	—

9. Speed Sensor

		85	112	160	212
1	Without Speed Sensor	●	●	●	●
2	With Speed Sensor	●	●	●	●

○ For code [10] [11] please refer to page 11.

12. Accessories

		85	112	160	212
X	Without Any Accessory	●	●	●	●
1	Without Flushing Spools	●	●	●	●
2	With Low Pressure Relief Valve	○	○	○	○

13. Counter Balance Valve

		85	112	160	212
X	Without Counter Balance Valve	●	●	●	●
1	With Counter Balance Valve Hoist at CW Rotation (A port inlet)	○	○	○	○
2	With Counter Balance Valve Hoist at CCW Rotation (B port inlet)	○	○	○	○

14. Response Speed of Control

		85	112	160	212
N	Standard	●	●	●	●

15. Design Code

		85	112	160	212
**	01~	●	●	●	●

● : Available
 ○ : Under development
 — : Not available

1. M7V Ordering Code

Please fill in the Inquiry Form on page 47 in order to specify the requirement.

Model Code **M7V 112 A A 1 1 - A A 1 T1 X X X N - 01**

10. Control Options (See the table on possible combinations of optional valve and regulator options.)

			85	112	160	212	
T	T1	Electric Two Position Displacement Control	Negative Control, 24V	●	●	●	●
	T2		Negative Control, 12V	●	●	●	●
Y	Y1	Hydraulic Two Position Displacement Control	Negative Control	●	●	●	●
E	E1	Electric Proportional Control	Negative Control, 24V	●	●	●	●
	E2		Positive Control, 24V	●	●	●	●
	E3		Negative Control, 12V	●	●	●	●
	E4		Positive Control, 12V	●	●	●	●
P	P1	Hydraulic Proportional Control	Negative Control, Pi = 2.5MPa	●	●	●	●
	P2		Positive Control, Pi = 2.5MPa	●	●	●	●
	P3		Negative Control, Pi = 1.0MPa	●	●	●	●
	P4		Positive Control, Pi = 1.0MPa	●	●	●	●
H	H1	Pressure Related Control	Without Pressure Increase	●	●	●	●
	H2		With Pressure Increase	●	●	●	●
	H3		With Pressure Increase and Hydraulic Remote Control	●	●	●	●

11. Options for Optional Valves (See the table on possible combinations of optional valve and regulator options.)

			85	112	160	212	
X		Without Any Optional Valve	●	●	●	●	
A	A1	Pressure Control Valve	With a Pressure Control Valve	●	●	●	●
B	B1	Electric Two Position Control Valve	With Electric Two Position Control Valve, 24V	●	●	●	●
	B2		With Electric Two Position Control Valve, 12V	●	●	●	●

★ M7V Control Options

Note: The control options are common for all motor sizes.

		Options for Optional Valves (code [11])			
		Without Any Optional Valve	With a Pressure Control Valve	With Electric Two Position Control Valve (24V)	With Electric Two Position Control Valve (12V)
Regulator : Code [10]		X	A1	B1	B2
T	T1	●	—	—	—
	T2	●	—	—	—
Y	Y1	●	●	—	—
E	E1	●	●	—	—
	E2	●	●	—	—
	E3	●	●	—	—
	E4	●	●	—	—
P	P1	●	●	—	—
	P2	●	●	—	—
	P3	●	●	—	—
	P4	●	●	—	—
H	H1	●	—	●	●
	H2	●	—	●	●
	H3	●	—	●	●

(Note)

For combination of two position control and pressure cut-off control, please select the pressure related control (code H) with two position control as option valve (code B1 or B2).

● : Available
○ : Under development
— : Not available

2 Technical Information

2-1 Specifications

M7V series

Size		85	112	160	212
Min. Displacement : q_{\min}	cm ³ (in ³)	0 to 68 (0 to 4.2)	0 to 90 (0 to 5.5)	0 to 128 (0 to 7.9)	0 to 170 (0 to 10.5)
Max. Displacement : q_{\max}	cm ³ (in ³)	68 to 88.5 (4.2 to 5.2)	90 to 112 (5.5 to 6.9)	128 to 160 (7.9 to 9.8)	170 to 215 (10.5 to 13.1)
Max. Speed : $N_{\text{nom}} / N_{\text{max}}$ * ¹	min ⁻¹ (rpm)	3,900 / 6,150	3,550 / 5,600	3,100 / 4,900	2,900 / 4,600
Nominal pressure : P_{nom} * ²	MPa (psi)	40 (5,800)	40 (5,800)	40 (5,800)	42 (6,100)
Max. Pressure : P_{max}	MPa (psi)	45 (6,500)	45 (6,500)	45 (6,500)	50 (7,200)
Theoretical output torque	Nm (lbf ft)	541 (399)	713 (526)	1,019 (752)	1,437 (1,060)
Power	kW (hp)	221 (296)	265 (355)	331 (444)	436 (585)
Max. Flow : Q	L/min (gallon/min)	332 (88)	398 (105)	496 (131)	623 (165)
Moment of inertia	kg·m ²	0.011	0.017	0.030	0.054
Volume in the case	L (gallon)	0.8 (0.21)	1.0 (0.26)	1.5 (0.40)	2.0 (0.53)
Mass	kg (lb)	39 (86)	46 (101)	63 (139)	90 (198)
Temperature	°C (°F)	-20 to -20 to	+115 (-4 to +239) +90 (-4 to +194)	at drain port at inlet port	
Coating		Red synthetic resin primer			

Values shown in the table above are theoretical values.

* 1 : N_{nom} : Max. speed at q_{\max} .
 N_{max} : Max. speed at $q < 0.6q_{\max}$.

* 2 : Nominal pressure corresponds to the design pressure to provide proper performance, function, and service life.

2. Technical Information

2-2 Precautions for System Design

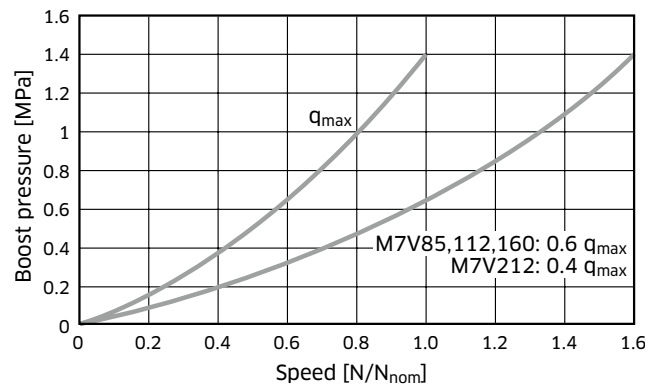
M7V series

◆ Minimum Boost Pressure

To prevent cavitation when the motor is operating in a pumping mode, a positive pressure is required at the suction port.

The figure on the right shows the minimum boost pressure requirement based on the regular operation. In case of a rapid change of the flow volume, more boost pressure must be applied.

Minimum boost pressure

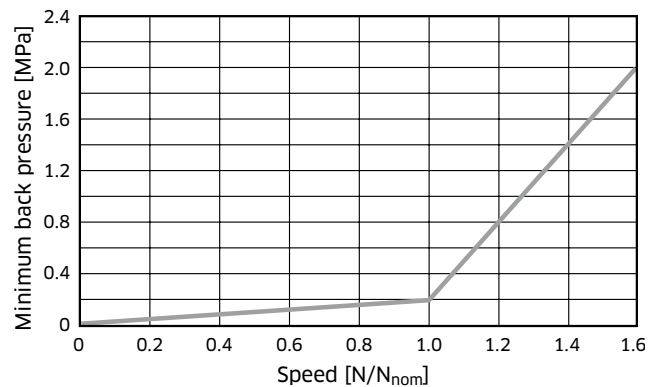


◆ Minimum Back Pressure

To ensure the optimal performance and life time the back pressure is required at the lower pressure port.

Motor casing pressure must be ≤ 0.2 MPa.

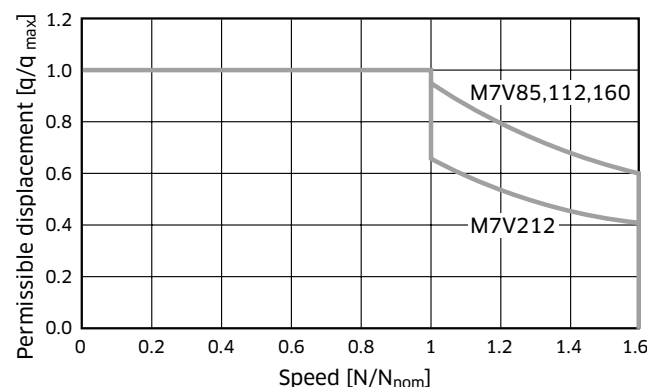
Minimum back pressure



◆ Permissible Displacement, Speed Related

The figure on the right shows permissible displacement in relation to the motor operating speed. Design the system not to exceed this requirement.

Permissible displacement



◆ Beginning of Control for Winch Device

For the safety reasons, winch device are not permissible with beginning control at q_{min}.

3 Regulators

3-1 Two Position Displacement Control

◆ Function

Two types of two position displacement control, the electric control type and hydraulic pilot control type, are available.

Two position control can switch the displacement between maximum and minimum displacement by applying the input current to the solenoid in case of the electric control or the pilot pressure externally supplied to the regulator.

◆ Control Options for Two Position Displacement Control

● Pressure control

An M7V motor with two position displacement control can additionally have pressure control function. Refer to page 25 for details.

If the motor is equipped with both two position displacement control and pressure control, pressure control overrides proportional displacement control.

Under pressure control the motor maintains minimum displacement until the operating pressure reaches the pressure setpoint. Upon reaching the pressure setpoint the motor increases displacement to maximum to obtain the required output torque, while controlling the operating pressure. If the motor reaches maximum displacement without sufficient output torque, the motor increases pressure until the required output torque is attained.

For safety reasons, winch devices are not permissible with beginning control at q_{\min} .

3. Regulators

3-1 Two Position Displacement Control - Electric Control

Ordering Code [10] [11] : T1X and T2X

◆ Function

Motor displacement is controlled between minimum and maximum by energizing the solenoid.

Control pressure is internally supplied by the port with the highest pressure.

For safety reasons, winch devices are not permissible with beginning control at q_{min} .

[Note]

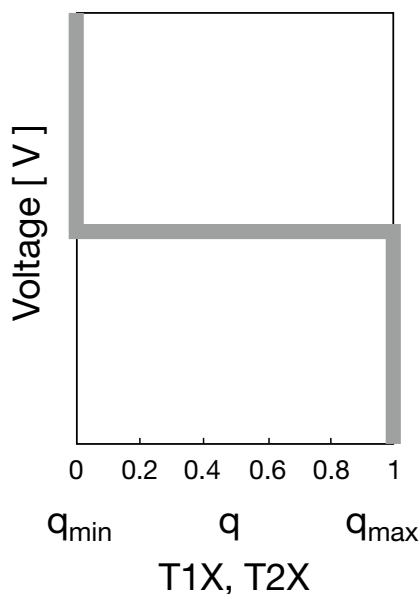
Required minimum operating pressure for control : 2.0MPa

Control type	T1X, T2X	
Electric signal	OFF	ON
Displacement	Max.	Min.
Speed	Min.	Max.

◆ Solenoid Specifications

Code	T1X	T2X
Voltage	DC24V	DC12V
Resistance (20°C)	41.5 Ω	9.4 Ω
Rated electric power consumption (20°C)	≦ 17 W	
Connector type	Deutsch DT04-2P	

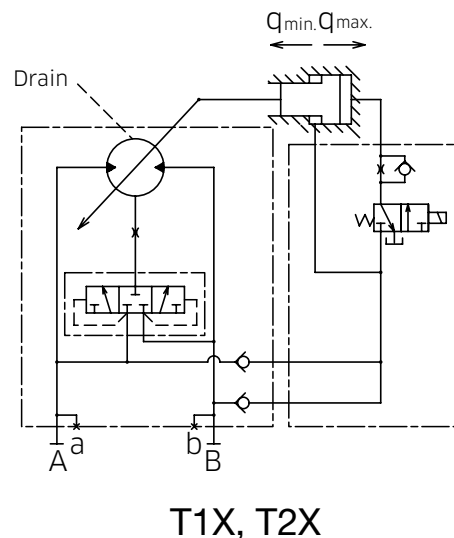
◆ Control Characteristics



The control characteristics in the above is not adjustable.

The above data are independent of the motor size.

◆ Hydraulic Circuit



3. Regulators

3-1 Two Position Displacement Control - Hydraulic Control

Ordering Code[10][11] : Y1X

◆ Function

Motor displacement is controlled between minimum and maximum by pilot pressure externally supplied.

Control pressure is internally supplied by the port with the highest pressure.

For safety reasons, winch devices are not permissible with beginning control at q_{min} .

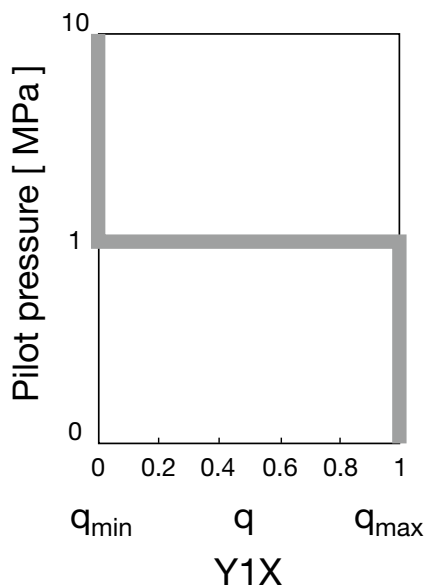
[Note]

Required minimum operating pressure for control: 2.0 MPa

Max. permissible pilot pressure : 10.0 MPa

Control type	Y1X	
Pilot pressure	OFF	ON (>1.0 MPa)
Displacement	Max.	Min.
Speed	Min.	Max.

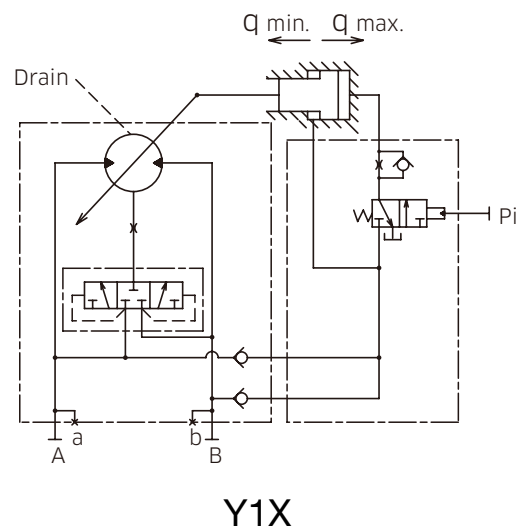
◆ Control Characteristics



The control characteristics in the above is not adjustable.

The above data are independent of the motor size.

◆ Hydraulic Circuit



3. Regulators

3-2 Proportional Displacement Control

◆ Function

There are two kinds of control methods in the proportional displacement control, namely electric proportional control and hydraulic proportional control. Proportional displacement control regulates motor displacement in proportion to either the input current of solenoid or external pilot pressure .

[Note]

As stated in page 6, casing pressure has influence on proportional displacement control both electric and hydraulic. An increase in casing pressure induces an increase in control pressure at the beginning of control, and hence parallel shift of control characteristics.

◆ Control Options for Proportional Displacement Control

● Pressure control

An M7V motor equipped with proportional control (either electric or hydraulic) can have pressure control function by using an optional valve (see page 11).

If the motor has both proportional control (either electric or hydraulic) and pressure control, pressure control overrides proportional displacement control.

Under pressure control the motor maintains minimum displacement until the operating pressure reaches the pressure setpoint. Upon reaching the pressure setpoint the motor increases displacement to maximum to obtain the required output torque, while controlling the operating pressure. If the motor reaches maximum displacement without sufficient output torque, the motor increases pressure until the required output torque is attained.

For safety reasons, winch devices are not permissible with beginning control at q_{min} .

3. Regulators

3-2 Proportional Displacement Control - Electric Proportional Control

Ordering Code [10] [11] : E1X, E2X, E3X and E4X.

◆ Function

Displacement is steplessly controlled between two preset values, from maximum to minimum and vice versa, in proportion to the input current of solenoid.

Electric proportional control delivers negative or positive displacement controls which are proportional to the input current: negative control type E1X and E3X reduce displacement from maximum to minimum against an increase in the input current, while positive control type E2X and E4X increase displacement from minimum to maximum with an increase in the input current.

Control pressure is internally supplied by the port with the highest pressure.

[Note]

Required minimum operating pressure for control: 2.0 MPa.

The above data are independent of the motor size.

◆ Solenoid Specifications

Control type	E1*, E2*	E3*, E4*
Voltage	DC24V	DC12V
Rated current (20°C)	0.7 A	1.6 A
Resistance (20°C)	15.0 Ω	3.3 Ω
Rated power consumption (20°C)	≤ 17 W	
Connector type	Deutsch DT04-2P	
Recommended dither condition	100 Hz, 200 mAp-p	150 Hz, 600 mAp-p

“*” = “X” (without any optional valve)

“A” (with a pressure control valve)

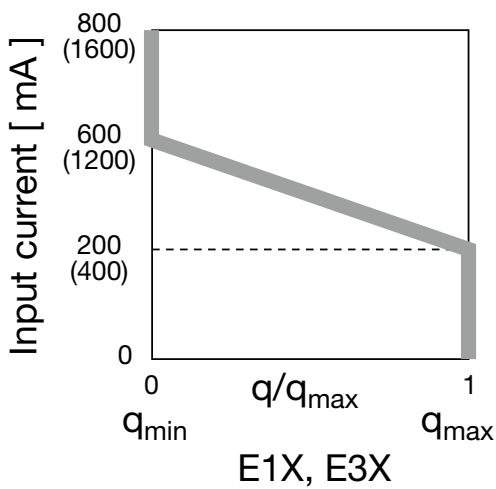
3. Regulators

3-2 Proportional Displacement Control - Electric Proportional Control

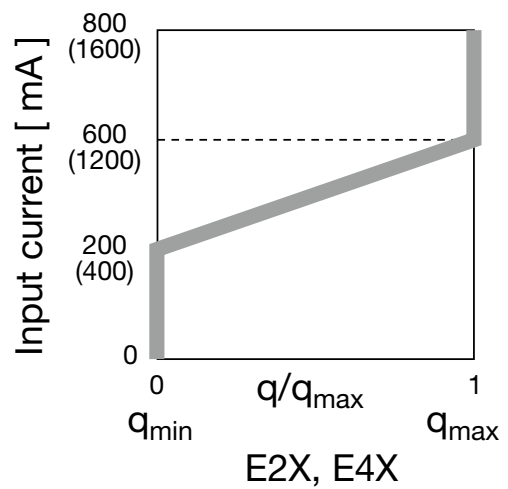
Ordering Code [10] [11] : E1X, E2X, E3X and E4X.

◆ Control Characteristics

Negative Control



Positive Control



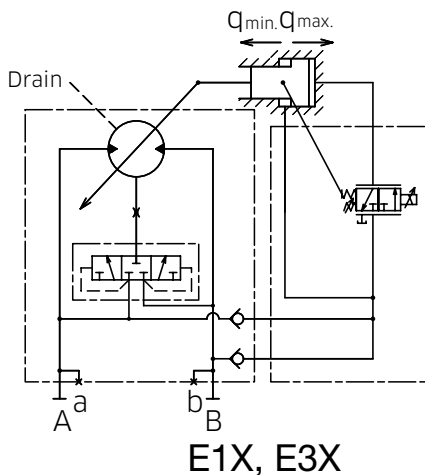
Control type		E1X, E3X (Negative control)		E2X, E4X (Positive control)	
Input current	DC 24V (DC 12V)	200mA (400mA)	600mA (1200mA)	200mA (400mA)	600mA (1200mA)
Displacement		Max.	Min.	Min.	Max.
Speed		Min.	Max.	Max.	Min.

Input current in () is for the voltage of 12 V DC.

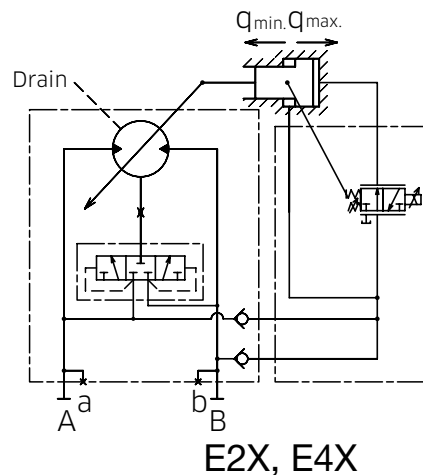
The control characteristics of E1X, E2X, E3X and E4X are not adjustable.

◆ Hydraulic Circuit

Negative Control



Positive Control



The above data are independent of the motor size.

3. Regulators

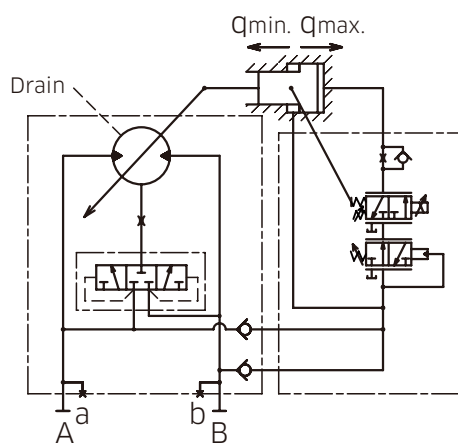
3-2 Proportional Displacement Control - Electric Proportional Control with Pressure Control Valve

Ordering Code [10] [11] : E1A1, E2A1, E3A1 and E4A1.

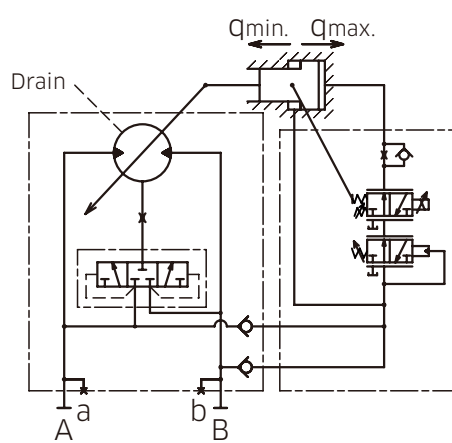
◆ Hydraulic Circuit

Negative Control with Pressure Control Valve

Positive Control with Pressure Control Valve



E1A1, E3A1



E2A1, E4A1

Electric proportional control can be combined with pressure control by using an optional valve. If the motor is equipped with electric proportional control and pressure control, pressure control overrides electric proportional control.

Under pressure control the motor maintains minimum displacement until the operating pressure reaches the pressure setpoint. Upon reaching the pressure setpoint the motor increases displacement to maximum to obtain the required output torque, while controlling the operating pressure. If the motor reaches maximum displacement without sufficient output torque, the motor increases pressure until the required output torque is attained.

Adjustable setting range of the pressure valve: 8~35 MPa

For safety reasons, winch devices are not permissible with beginning control at q_{min} .

3. Regulators

3-2 Proportional Displacement Control - Hydraulic Proportional Control

Ordering Code [10] [11] : P1X, P2X, P3X and P4X.

◆ Function

Hydraulic proportional control regulates motor displacement between maximum to minimum in response to pilot pressure externally supplied to a regulator.

This control delivers negative or positive displacement controls which are proportional to an increase in external pilot pressure: negative control type P1X and P3X reduce displacement from maximum to minimum against an increase in pilot pressure, while positive control type P2X and P4X increase displacement from minimum to maximum with an increase in pilot pressure.

Control pressure is internally supplied by the port with the highest pressure.

[Note]

Required minimum operating pressure for control: 2.0 MPa

Max. permissible pilot pressure : 10.0 MPa

Control type	P1X		P2X		P3X		P4X	
Pilot pressure	1.0 MPa*	3.5 MPa	1.0 MPa*	3.5 MPa	0.5 MPa*	1.5 MPa	0.5 MPa*	1.5 MPa
Displacement	Max.	Min.	Min.	Max.	Max.	Min.	Min.	Max.
Speed	Min.	Max.	Max.	Min.	Min.	Max.	Max.	Min.

The pressure with * in the above table is the standard start pressure at the beginning of each control. Adjustable range of pilot pressure at the beginning of control is shown in each control characteristics.

The above data are independent of the motor size.

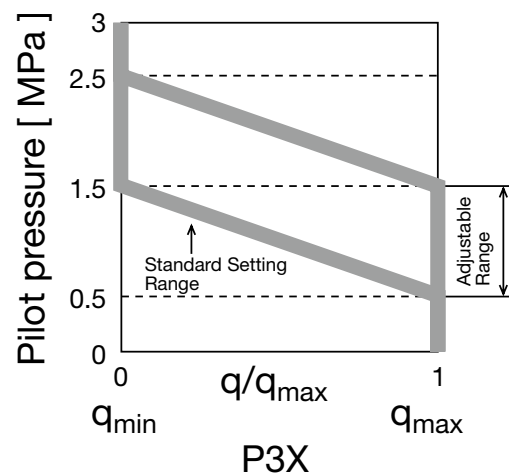
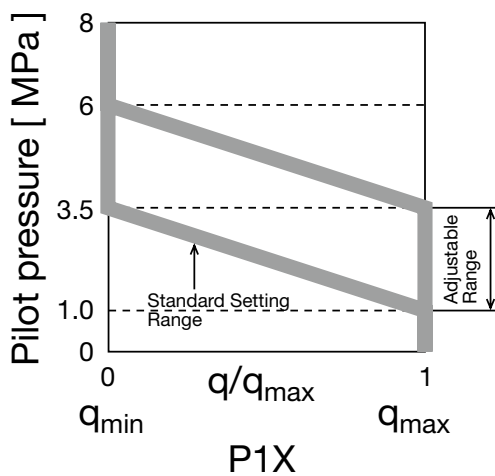
3. Regulators

3-2 Proportional Displacement Control - Hydraulic Proportional Control

Ordering Code [10] [11] : P1X, P2X, P3X and P4X.

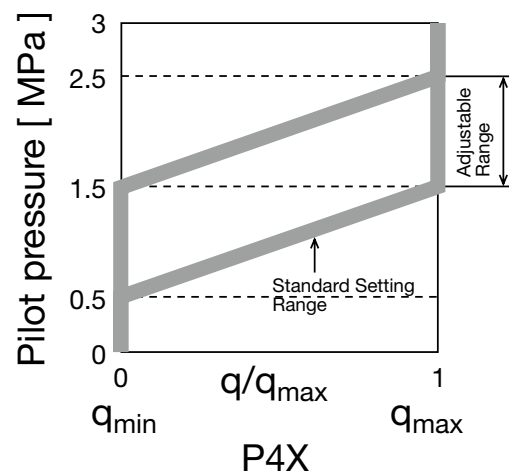
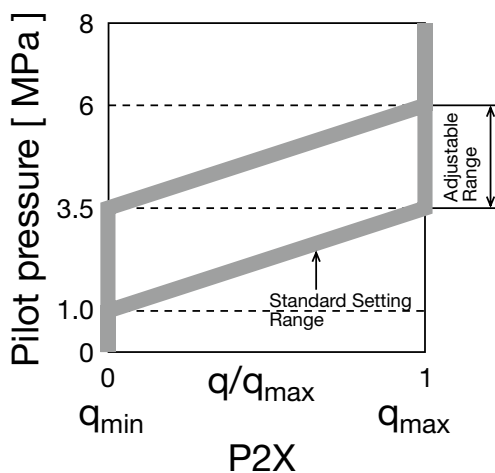
◆ Control Characteristics

Negative Control



P1X is different from P3X in adjustable range and the control start pressure. Adjustable range of P1X is 2.5 MPa, while that of P3X is 1.0 MPa. Also, the control start pressure of P1X is 1.0 MPa, while that of P3X is 0.5 MPa.

Positive Control



P2X is different from P4X in adjustable range and the control start pressure. Adjustable range of P2X is 2.5 MPa, while that of P4X is 1.0 MPa.

Also, the control start pressure of P2X is 1.0 MPa, while that of P4X is 0.5 MPa.

[Note]

The above are the standard control characteristics of hydraulic proportional control. If non-standard characteristics is required, please contact Kawasaki.

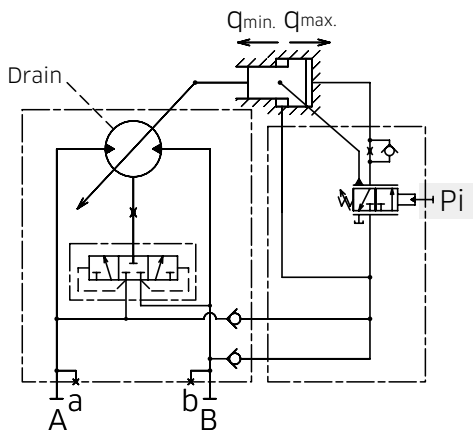
3. Regulators

3-2 Proportional Displacement Control - Hydraulic Proportional Control

Ordering Code [10] [11] : P1X, P2X, P3X and P4X.

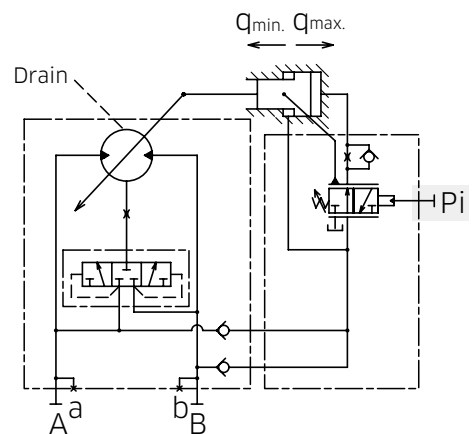
◆ Hydraulic Circuit

Negative Control



P1X, P3X

Positive Control



P2X, P4X

External pilot pressure is supplied via port Pi.

For safety reasons, winch devices are not permissible with beginning control at q_{min} .

The above data are independent of the motor size.

Allowable maximum pilot pressure (Pi): 10 MPa

3. Regulators

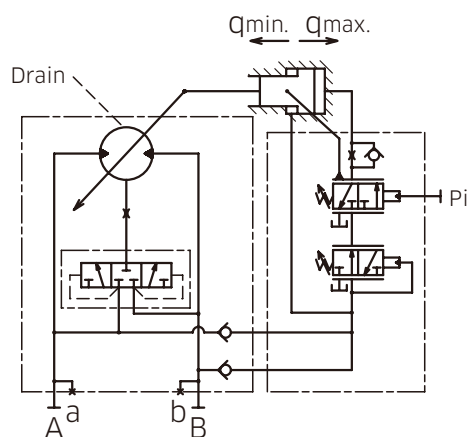
3-2 Proportional Displacement Control - Hydraulic Proportional Control with Pressure Control Valve

Ordering Code [10] [11] : P1A1, P2A1, P3A1 and P4A1.

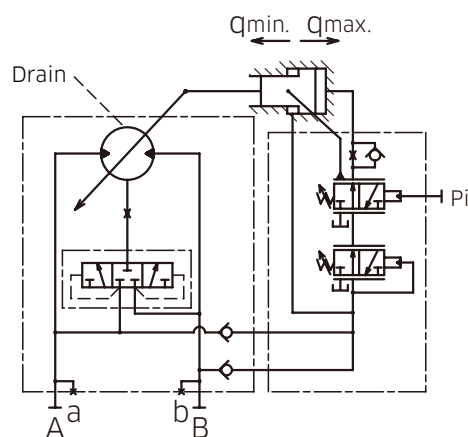
◆ Hydraulic Circuit

Negative Control with Pressure Control Valve

Positive Control with Pressure Control Valve



P1A1, P3A1



P2A1, P4A1

Hydraulic proportional control can be combined with pressure control by using an optional valve in an M7V motor. If it is equipped with both hydraulic proportional control and pressure control, the latter overrides the former.

Displacement shifts from minimum to maximum, when the operating pressure reaches the pressure setpoint. The motor increases displacement by gradually increasing the operating pressure until the required output torque is attained. If displacement reaches its maximum value without sufficient output torque, the operating pressure will rise until the required output torque is obtained.

Setting range of the pressure control valve: 8 to 35 MPa

For safety reasons, winch devices are not permissible with beginning control at $q_{min.}$.
The above data are independent of the motor size.

3. Regulators

3-3 Pressure Related Control

◆ Function

There are three kinds of control types in the pressure related control, that is constant pressure control (pressure control without pressure increase), pressure control with pressure increase, and pressure control with pressure increase and hydraulic remote control.

Displacement is controlled between minimum and maximum in line with the operating pressure.

Minimum displacement is maintained until the operating pressure reaches the pressure setpoint, and upon reaching the pressure setpoint of control it shifts to maximum displacement by controlling the operating pressure until the required output torque is obtained.

[Note]

As stated in page 6, casing pressure affects the pressure related control. An increase in casing pressure induces an increase in control pressure at the beginning of control, and thus the parallel shift of the control characteristics.

◆ Control Options for Constant Pressure Control

● Two position displacement control

An M7V motor with constant pressure control can add two position control by adopting an optional two position control valve (see page 11).

When an M7V motor is equipped with both constant pressure control and two position displacement control, constant pressure control overrides two position displacement control.

For detail of two position displacement control see page 15.

For safety reasons, winch devices are not permissible with beginning control at q_{min} .

3. Regulators

3-3 Pressure Related Control - Without Pressure Increase

Ordering Code [10] [11] : H1X

◆ Function

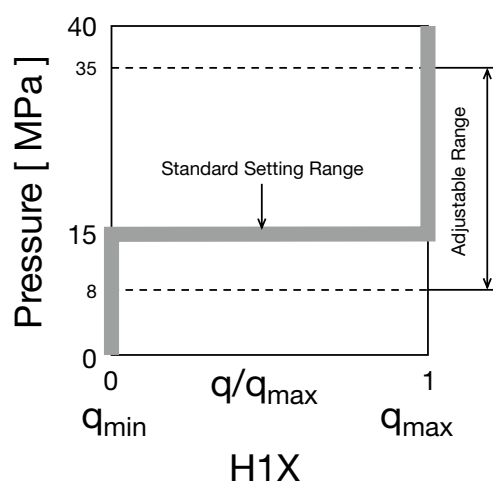
Displacement is controlled between minimum and maximum in line with the operating pressure. Minimum displacement is maintained until the operating pressure reaches a setpoint, and upon reaching the pressure setpoint it shifts to maximum displacement until the required output torque is obtained, while maintaining the set pressure.

Control pressure is internally supplied by the port with the highest pressure.

For safety reasons, winch devices are not permissible with beginning control at q_{min} .

Control type	H1X	
Displacement	Min.	Max.
Speed	Max.	Min.
Adjustable range for the control start pressure	8 to 35 MPa	

◆ Control Characteristics

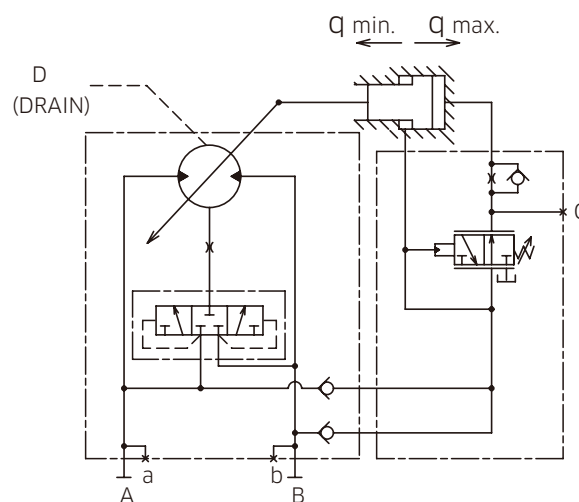


Control pressure in H1X is factory set at 15 MPa, and the above shows the standard control characteristics.

If non-standard characteristics is required, please contact Kawasaki.

The above data are independent of the motor size.

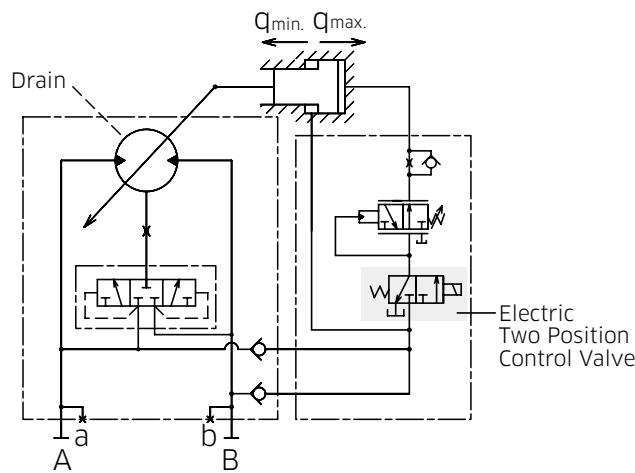
◆ Hydraulic Circuit



3. Regulators

3-3 Pressure Related Control – Without Pressure Increase with Two Position Control Valve Ordering Code [10] [11] : H1B1 and H1B2

◆ Hydraulic Circuit



H1B1, H1B2

Pressure related control (pressure control without pressure increase) can be combined with electric two position displacement control by using an electric two position control valve. If the motor has both pressure related control and electric two position displacement control, pressure related control overrides electric two position displacement control.

Specifications of electric two position control valve is shown below.

For safety reasons, winch devices are not permissible with beginning control at q_{min} .

◆ Solenoid Specifications

Code	B1	B2
Voltage	DC24V	DC12V
Resistance (20°C)	41.5 Ω	9.5 Ω
Rated power consumption (20°C)	≤ 17 W	
Connector type	Deutsch DT04-2P	

The above data are independent of the motor size.

3. Regulators

3-3 Pressure Related Control - With Pressure Increase

Ordering Code [10] [11] : H2X

◆ Function

Displacement is controlled in line with operating pressure and load conditions.

The motor maintains minimum displacement until the operating pressure reaches a setpoint, and when it exceeds the pressure setpoint it shifts to maximum displacement.

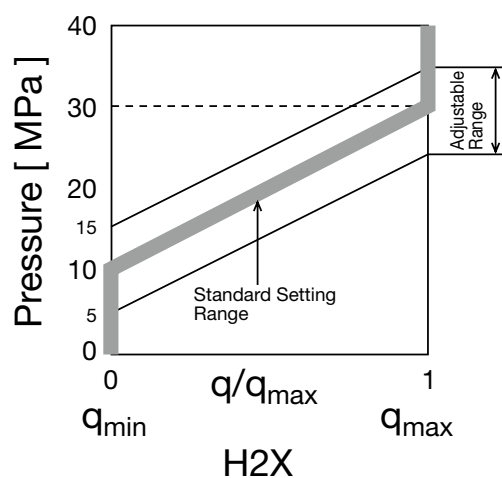
Displacement increases until the required output torque is obtained. If displacement reaches maximum without sufficient output torque, the operating pressure will rise until the required motor output torque is attained.

Control pressure is internally supplied by the port with the highest pressure.

For safety reasons, winch devices are not permissible with beginning control at q_{min} .

Control type	H2X	
Displacement	Min.	Max.
Speed	Max.	Min.
Factory setting of the control start pressure	10 MPa	
Pressure increment	20 MPa	

◆ Control Characteristics

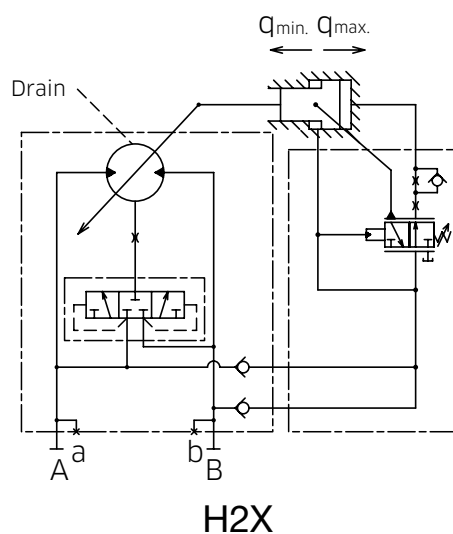


In H2 control the start of control pressure is factory set at 10 MPa, and the above shows the standard control characteristics.

If non-standard characteristics is required, please contact Kawasaki.

The above data are independent of the motor size.

◆ Hydraulic Circuit

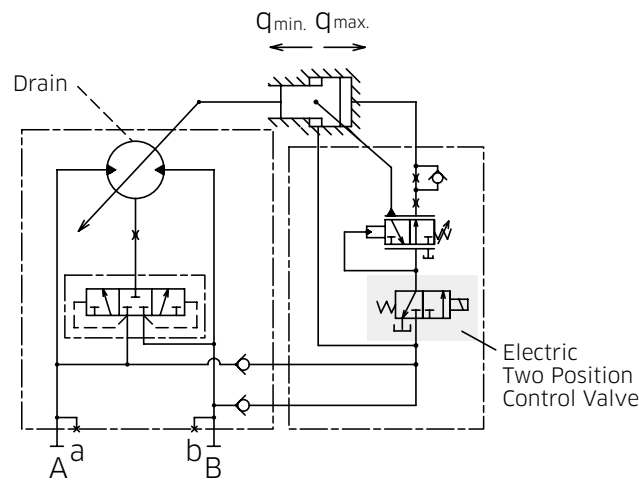


3. Regulators

3-3 Pressure Related Control – With Pressure Increase and Two Position Control Valve

Ordering Code [10] [11] : H2B1 and H2B2

◆ Hydraulic Circuit



H2B1, H2B2

Pressure related control (Pressure control with pressure increase) can be combined with electric two position displacement control by using an optional two position control valve. If the motor has both pressure related control and electric two position displacement control, pressure related control overrides electric two position displacement control.

Specifications of electric two position control valve is shown below.

For safety reasons, winch devices are not permissible with beginning control at q_{min} .

◆ Solenoid Specifications

Code	B1	B2
Voltage	DC24V	DC12V
Resistance (20°C)	41.5 Ω	9.5 Ω
Rated power consumption (20°C)	≤ 17 W	
Connector type	Deutsch DT04-2P	

The above data are independent of the motor size.

3. Regulators

3-3 Pressure Related Control – With Pressure Increase and Hydraulic Remote Control

Ordering Code [10] [11] : H3X

◆ Function

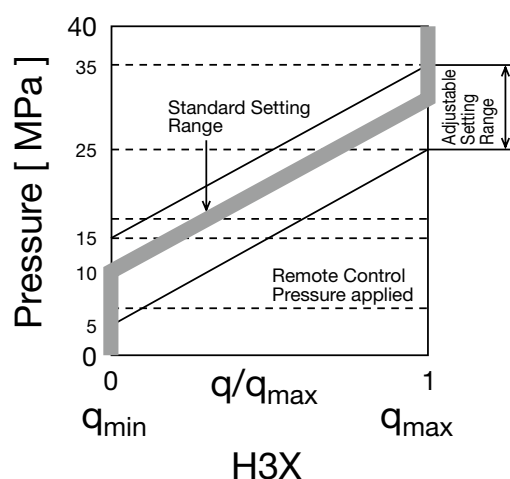
H3X control allows variations at the start of control pressure and control characteristics by applying the external remote control pressure. The application of external remote control pressure in H3X control reduces the control pressure at the beginning of the constant pressure control, and induces a parallel shift in the control characteristics.

Control pressure is internally supplied by the port with the highest pressure.

For safety reasons, winch devices are not permissible with beginning control at q_{min} .

Control type	H3X
Standard setting of the control start pressure	10 MPa
External remote control sensitivity at port Pi	1.7 MPa / 0.1 MPa
Max. permissible remote control pressure	≤ 10 MPa

◆ Control Characteristics

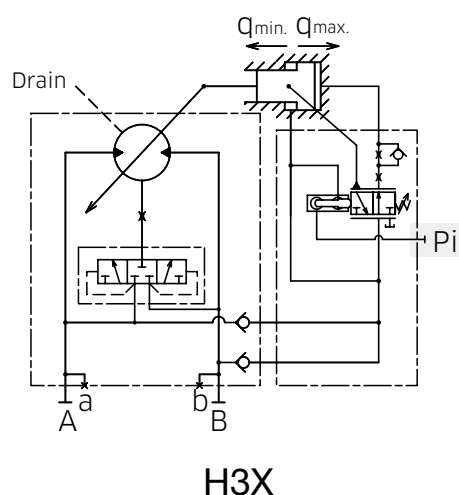


The remote pressure control in H3 type control provides variations in the control characteristics of H3 pressure related control.

For 0.1 MPa of remote control pressure the pressure at the start of control reduces by 1.7 MPa. With the remote pressure control the control characteristics shifts in parallel.

The above data are independent of the motor size.

◆ Hydraulic Circuit



External remote control pressure is supplied via port Pi.

(Note)

In case Pi port is not used please connect the port Pi to drain line.

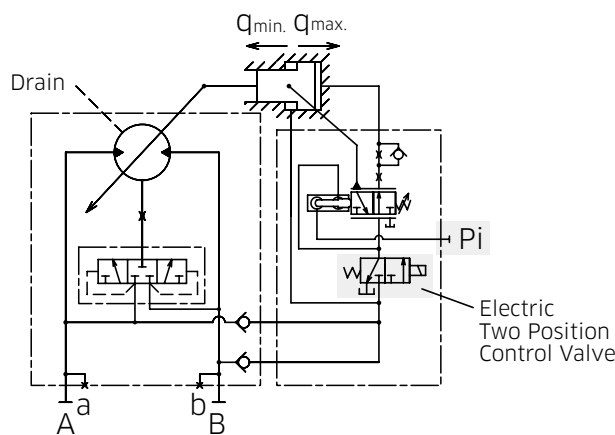
Allowable maximum pilot pressure (Pi): 10 MPa

3. Regulators

3-3 Pressure Related Control – With Pressure Increase and Hydraulic Remote Control, and Two Position Control Valve

Ordering Code [10] [11] : H3B1 and H3B2

◆ Hydraulic Circuit



H3B1, H3B2

Pressure related control (Pressure control with pressure increase and hydraulic remote control) can be combined with electric two position displacement control by using an optional two position control valve. If the motor has both pressure related control and electric two position displacement control, pressure related control overrides electric two position displacement control.

Specifications of electric two position control valve is shown below.

For safety reasons, winch devices are not permissible with beginning control at q_{min} .

◆ Solenoid Specifications

Code	B1	B2
Voltage	DC24V	DC12V
Resistance (20°C)	41.5 Ω	9.5 Ω
Rated power consumption (20°C)	≤ 17 W	
Connector type	Deutsch DT04-2P	

The above data are independent of the motor size.

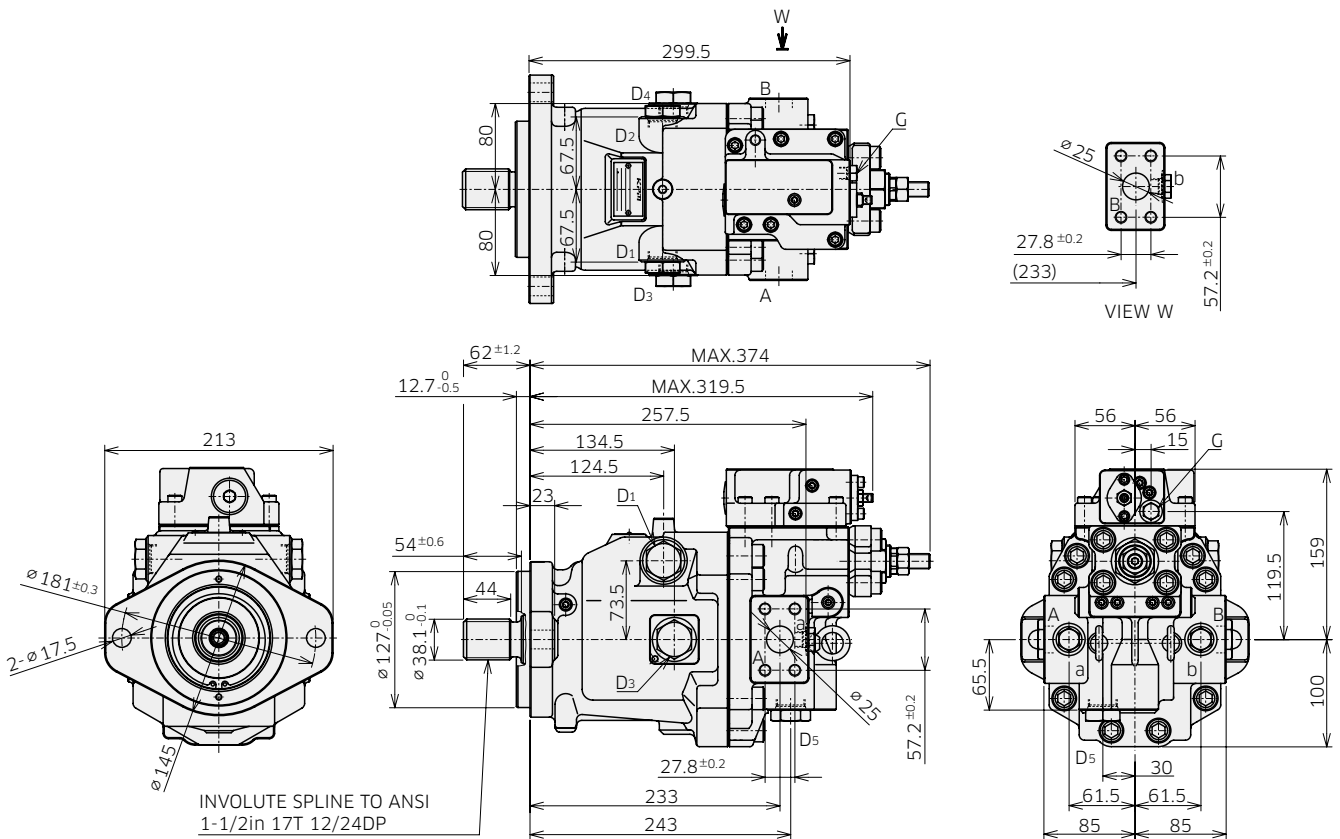
4 Dimensions

4-1 Installation Dimensions

* Dimensions in mm.

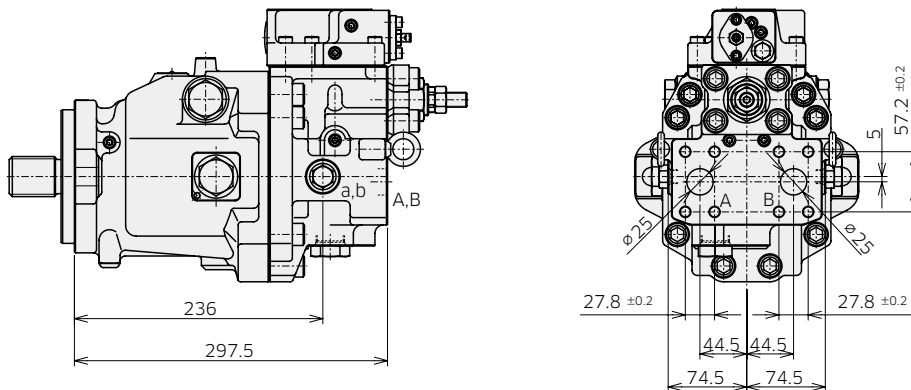
◆ M7V85 SAE 2bolt Mounting, Flange Ports at Side

Model Code : M7V 85 A B 1 1 - * * 1 H1 X X X N - * *



◆ M7V85 SAE 2bolt Rear Port

Model Code : M7V 85 A A 1 1 - * * 1 H1 X X X N - * *



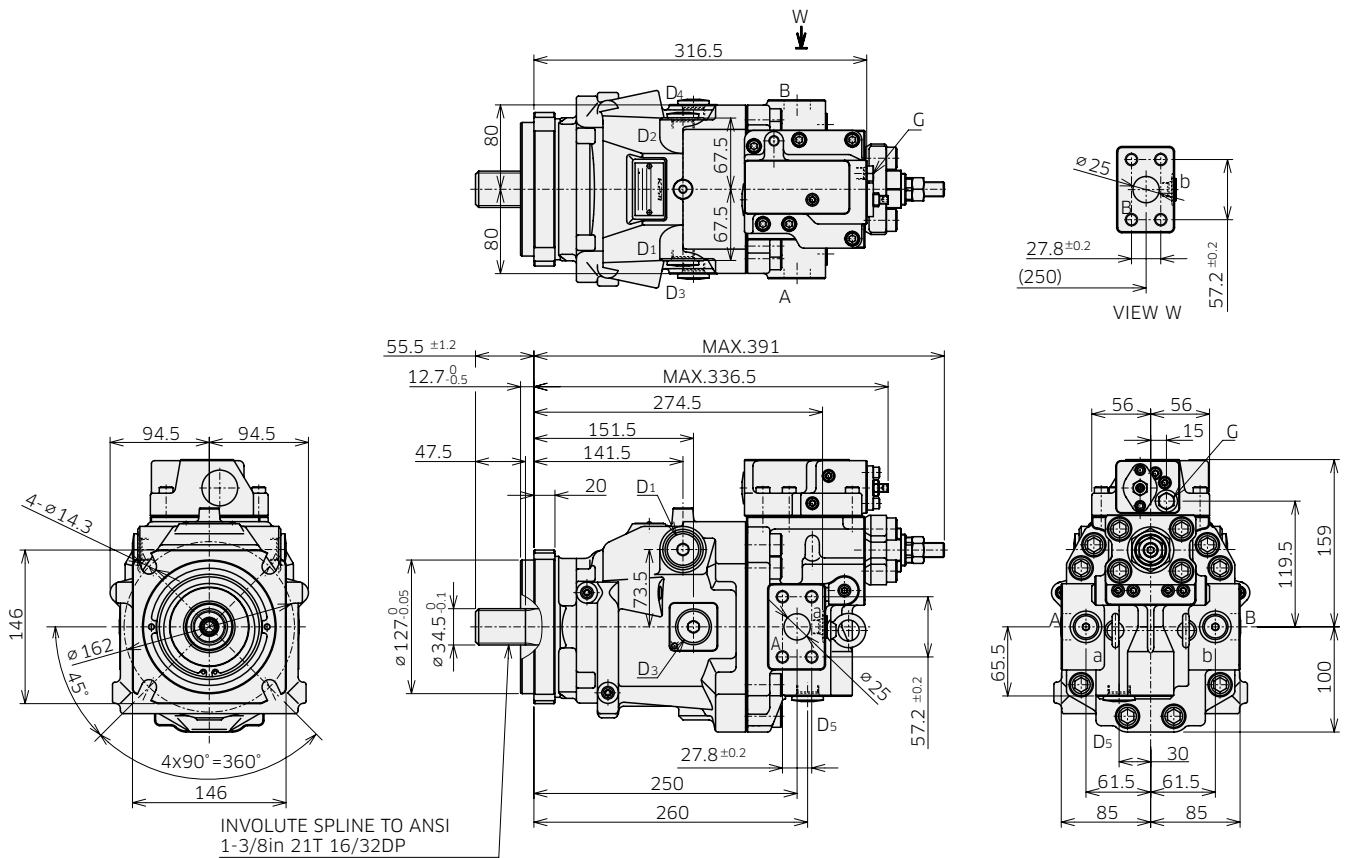
Refer to the page 45 and 46 for dimensions with other regulator options.

4. Dimensions

4-1 Installation Dimensions

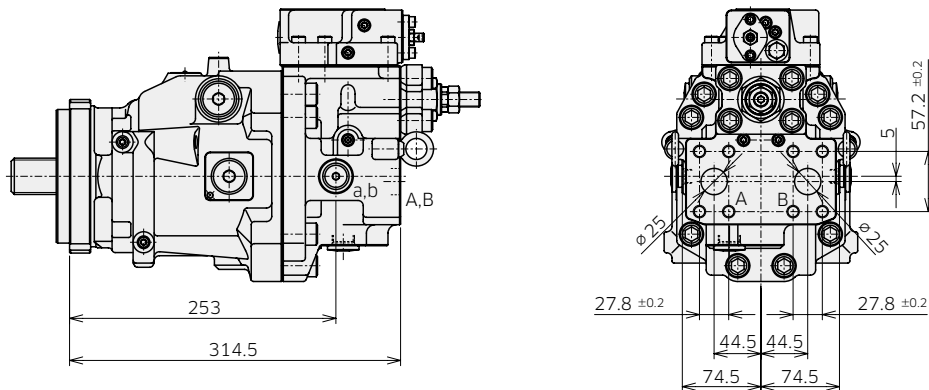
◆ M7V85 SAE 4bolt Mounting, Flange ports at Side

Model Code : M7V 85 A F 1 4 - * * 1 H1 X X X N - * *



◆ M7V85 SAE 4bolt Rear Port

Model Code : M7V 85 A E 1 4 - * * 1 H1 X X X N - * *



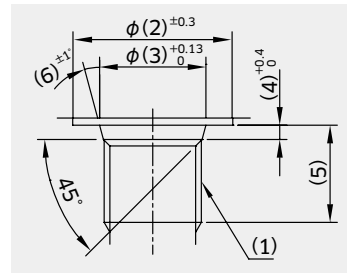
Refer to the page 45 and 46 for dimensions with other regulator options.

4. Dimensions

4-1 Installation Dimensions

◆ M7V85 Port and Flange Fixing Thread (Ordering Code: [5])

ANSI thread type (Code : 1,2)



* Dimensions in mm.

	Symbol	(1)	(2)	(3)	(4)	(5)	(6)	Tightening torque (Nm)
Gauge port	a, b	9/16-18UNF-2B	24	15.6	2.5	12.7	12	59
Gauge port	G	7/16-20UNF-2B	21	12.4	2.4	11	12	12
Pilot port	Pi	9/16-18UNF-2B	25	15.6	2.5	12.7	12	59
Drain port	D1 to D5	1-1/16-12UN-2B	41	29.2	3.3	12.7	15	170

Metric thread type (Code : 3)

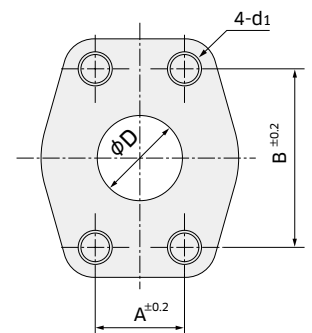
	Symbol	(1)	(2)	(3)	(4)	(5)	(6)	Tightening torque (Nm)
Gauge port	a, b	M14×1.5	25	15.8	2.4	12.5	15	47
Drain port	D1 to D5	M27×2	40	29.4	3.1	12.7	15	180

Parallel piping thread type (Code : 4)

	Symbol	(1)	(2)	(3)	(4)	(5)	(6)	Tightening torque (Nm)
Gauge port	a, b	G 1/4	24	15.6	2.5	15	15	36
Pilot port	Pi	G 1/4	24	15.6	2.5	14	15	36
Drain port	D1 to D5	G 1/2	34	22.6	2.5	12.7	15	108

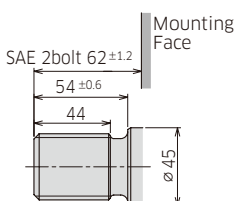
Flange port

Port thread type code	d1	A	B	D
1	7/16-14UNC-2B	27.8	57.2	25
2, 3, 4	M12	27.8	57.2	25



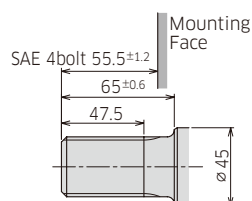
◆ Shaft End (Ordering Code [6])

ANSI B92.1a
(1-1/2in 17T 12/24DP)



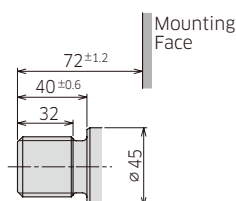
Code : 1

ANSI B92.1a
(1-3/8in 21T 16/32DP)



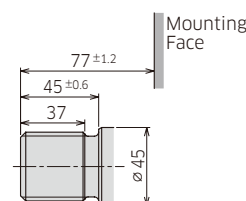
Code : 4

DIN 5480
(W35x2x16x9g)



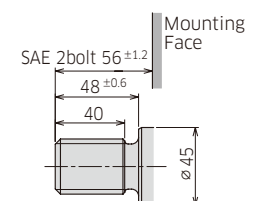
Code : 5

DIN 5480
(W40x2x18x9g)



Code : 6

ANSI B92.1a
(1-1/4in 14T 12/24DP)



Code : 9

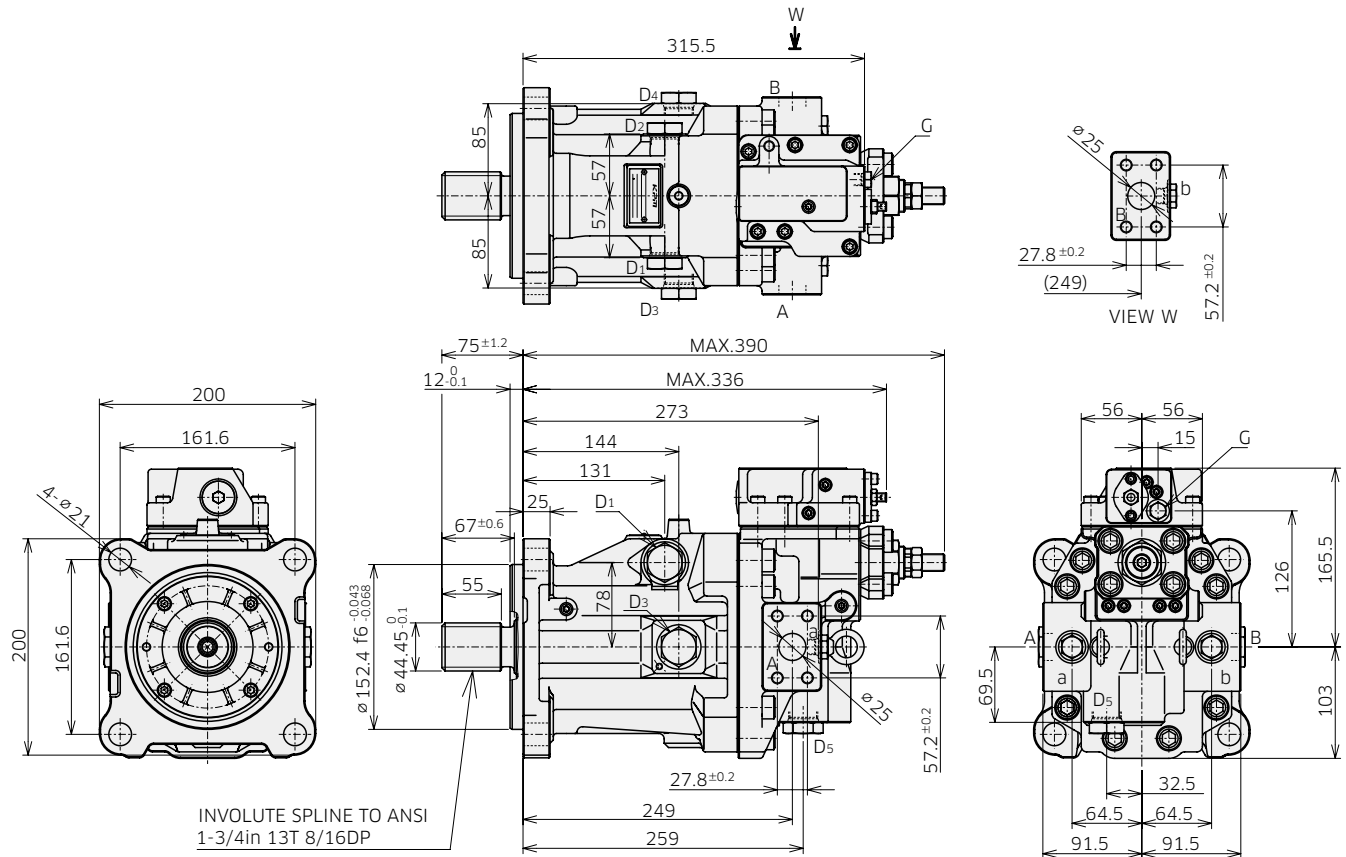
4. Dimensions

4-1 Installation Dimensions

* Dimensions in mm.

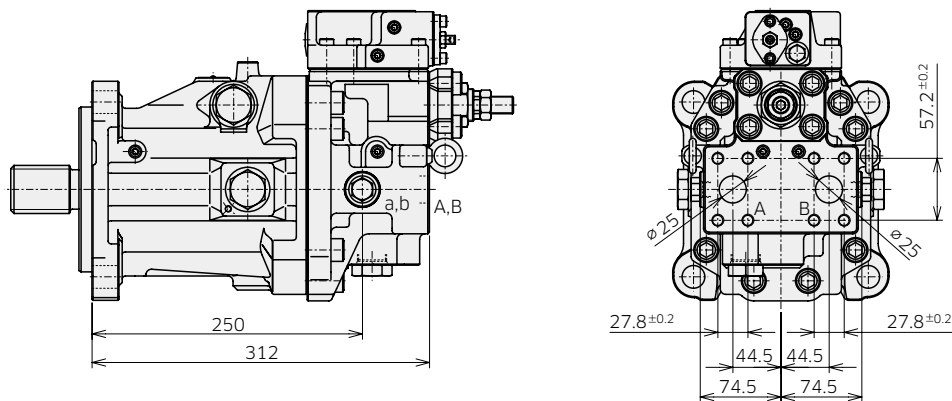
◆ M7V112 SAE Mounting, Flange Ports at Side

Model Code : M7V 112 A B 1 2 - * * 1 H1 X X X N - * *



◆ M7V112 SAE Rear Port

Model Code : M7V 112 A A 1 2 - * * 1 H1 X X X N - * *

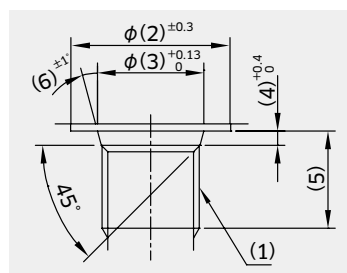


Refer to the page 45 and 46 for dimensions with other regulator options.

4. Dimensions

4-1 Installation Dimensions

◆ M7V112 Port and Flange Fixing Thread (Ordering code: [5]) Thread Port



* Dimensions in mm.

ANSI thread type (Code : 1,2)

	Symbol	(1)	(2)	(3)	(4)	(5)	(6)	Tightening torque (Nm)
Gauge port	a, b	9/16-18UNF-2B	25	15.6	2.5	12.7	12	59
Gauge port	G	7/16-20UNF-2B	21	12.4	2.4	11	12	12
Pilot port	Pi	9/16-18UNF-2B	25	15.6	2.5	12.7	12	59
Drain port	D1 to D5	1-1/16-12UN-2B	41	29.2	3.3	12.7	15	170

Metric thread type (Code : 3)

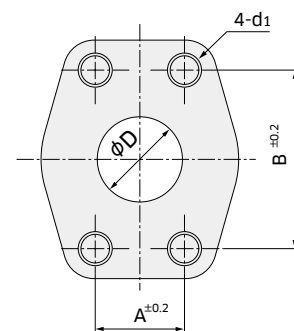
	Symbol	(1)	(2)	(3)	(4)	(5)	(6)	Tightening torque (Nm)
Gauge port	a, b	M14×1.5	25	15.8	2.4	12.5	15	47
Drain port	D1 to D5	M27×2	40	29.4	3.1	12.7	15	180

Parallel piping thread type (Code : 4)

	Symbol	(1)	(2)	(3)	(4)	(5)	(6)	Tightening torque (Nm)
Gauge port	a, b	G 1/4	25	15.6	2.5	15	15	36
Pilot port	Pi	G 1/4	25	15.6	2.5	14	15	36
Drain port	D1 to D5	G 1/2	34	22.6	2.5	12.7	15	108

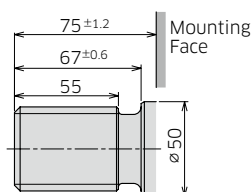
Flange port

Port thread type code	d1	A	B	D
1	7/16-14UNC-2B	27.8	57.2	25
2, 3, 4	M12	27.8	57.2	25



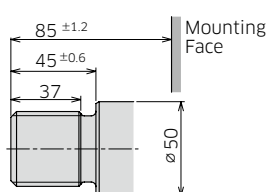
◆ Shaft End (Ordering Code [6])

ANSI B92.1a
(1-3/4in 13T 8/16DP)



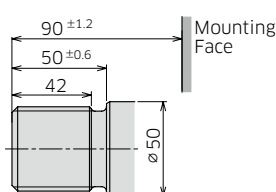
Code : 2

DIN 5480
(W40x2x18x9g)



Code : 6

DIN 5480
(W45x2x21x9g)



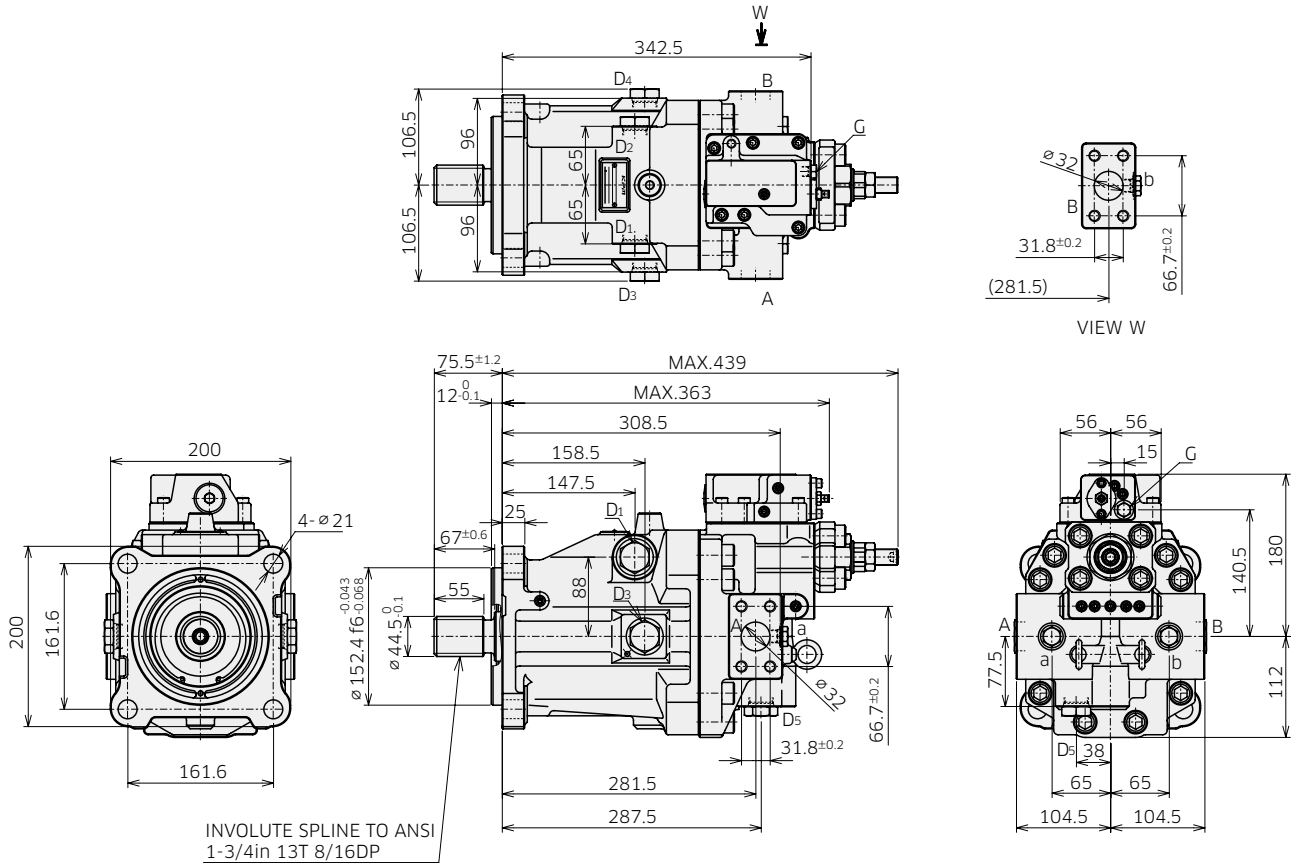
Code : 7

4. Dimensions

4-1 Installation Dimensions

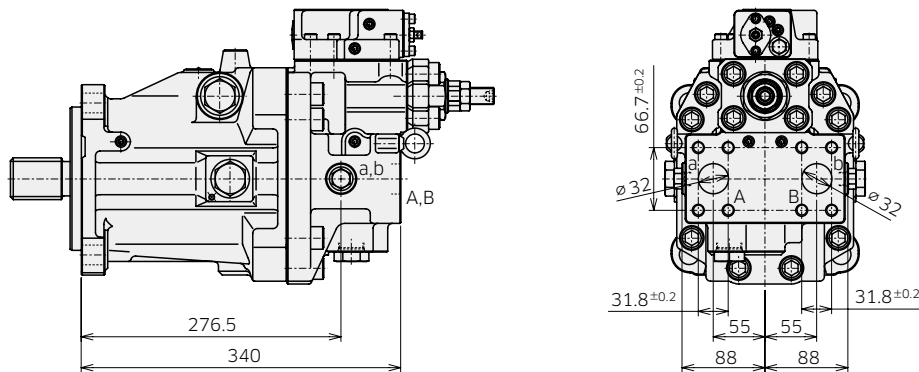
◆ M7V160 SAE Mounting, Flange Ports at Side

Model Code : M7V 160 A B 1 2 - * * 1 H1 X X X N - * *



◆ M7V160 SAE Rear Port

Model Code : M7V 160 A A 1 2 - * * 1 H1 X X X N - * *



Refer to the page 45 and 46 for dimensions with other regulator options.

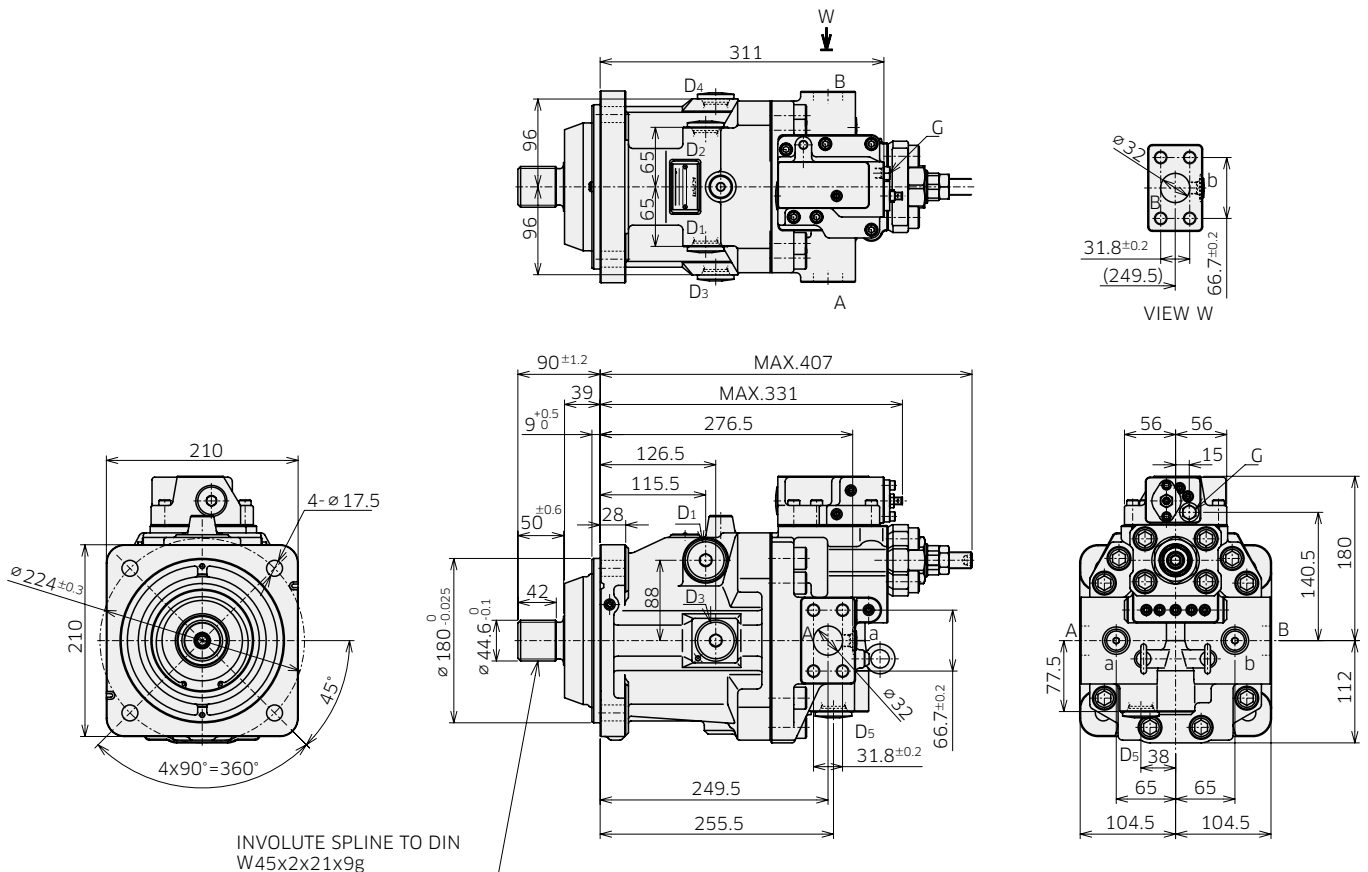
4. Dimensions

4-1 Installation Dimensions

* Dimensions in mm.

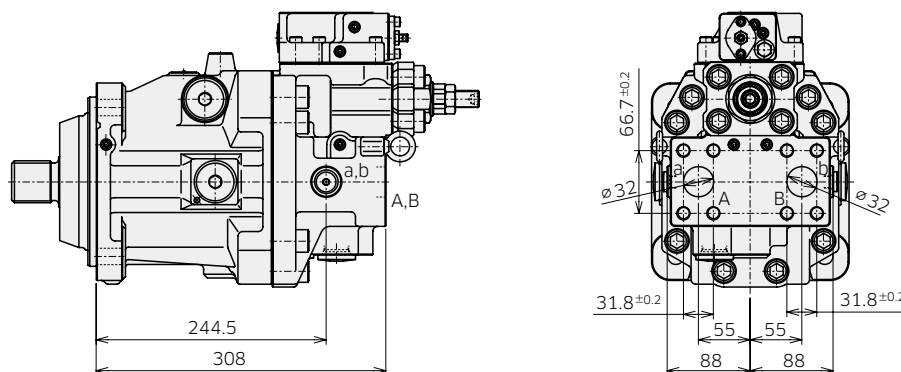
◆ M7V160 ISO Mounting, Flange Ports at Side

Model Code : M7V 160 A D 4 7 - * * 1 H1 X X X N - * *



◆ M7V160 ISO Rear Port

Model Code : M7V 160 A C 4 7 - * * 1 H1 X X X N - * *



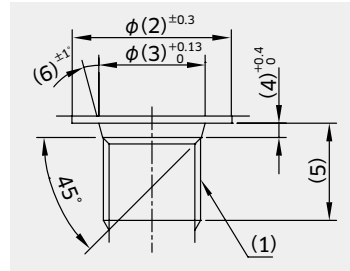
Refer to the page 45 and 46 for dimensions with other regulator options.

4. Dimensions

4-1 Installation Dimensions

* Dimensions in mm.

◆ M7V160 Port and Flange Fixing Thread (Ordering code: [5]) Thread Port



ANSI thread type (Code : 1,2)

	Symbol	(1)	(2)	(3)	(4)	(5)	(6)	Tightening torque (Nm)
Gauge port	a, b	9/16-18UNF-2B	25	15.6	2.5	12.7	12	59
Gauge port	G	7/16-20UNF-2B	21	12.4	2.4	11	12	12
Pilot port	Pi	9/16-18UNF-2B	25	15.6	2.5	12.7	12	59
Drain port	D1 to D5	1-1/16-12UN-2B	41	29.2	3.3	16.7	15	170

Metric thread type (Code : 3)

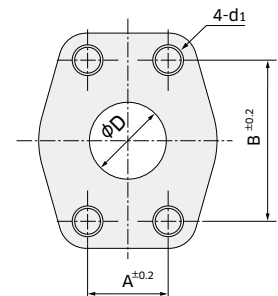
	Symbol	(1)	(2)	(3)	(4)	(5)	(6)	Tightening torque (Nm)
Gauge port	a, b	M14×1.5	25	15.8	2.4	12.5	15	47
Drain port	D1 to D5	M27×2	40	29.4	3.1	16.7	15	180

Parallel piping thread type (Code : 4)

	Symbol	(1)	(2)	(3)	(4)	(5)	(6)	Tightening torque (Nm)
Gauge port	a, b	G 1/4	25	15.6	2.5	15	15	36
Pilot port	Pi	G 1/4	25	15.6	2.5	14	15	36
Drain port	D1 to D5	G 3/4	45	30.8	3.5	16.7	15	170

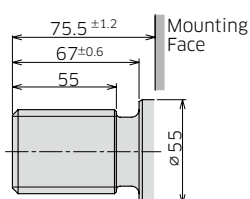
Flange Port

Port thread type code	d1	A	B	D
1	1/2-13UNC-2B	31.8	66.7	32
2, 3, 4	M14	31.8	66.7	32



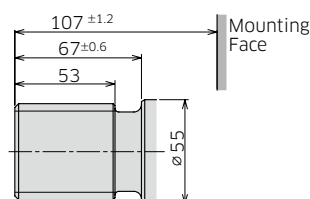
◆ Shaft End (Ordering Code [6])

ANSI B92.1a
(1-3/4in 13T 8/16DP)



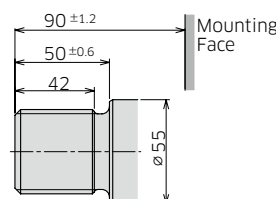
Code : 2

ANSI B92.1a
(2in 15T 8/16DP)



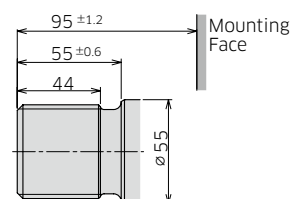
Code : 3*

DIN 5480
(W45x2x21x9g)



Code : 7

DIN 5480
(W50x2x24x9g)



Code : 8

*Code 3 is under development.

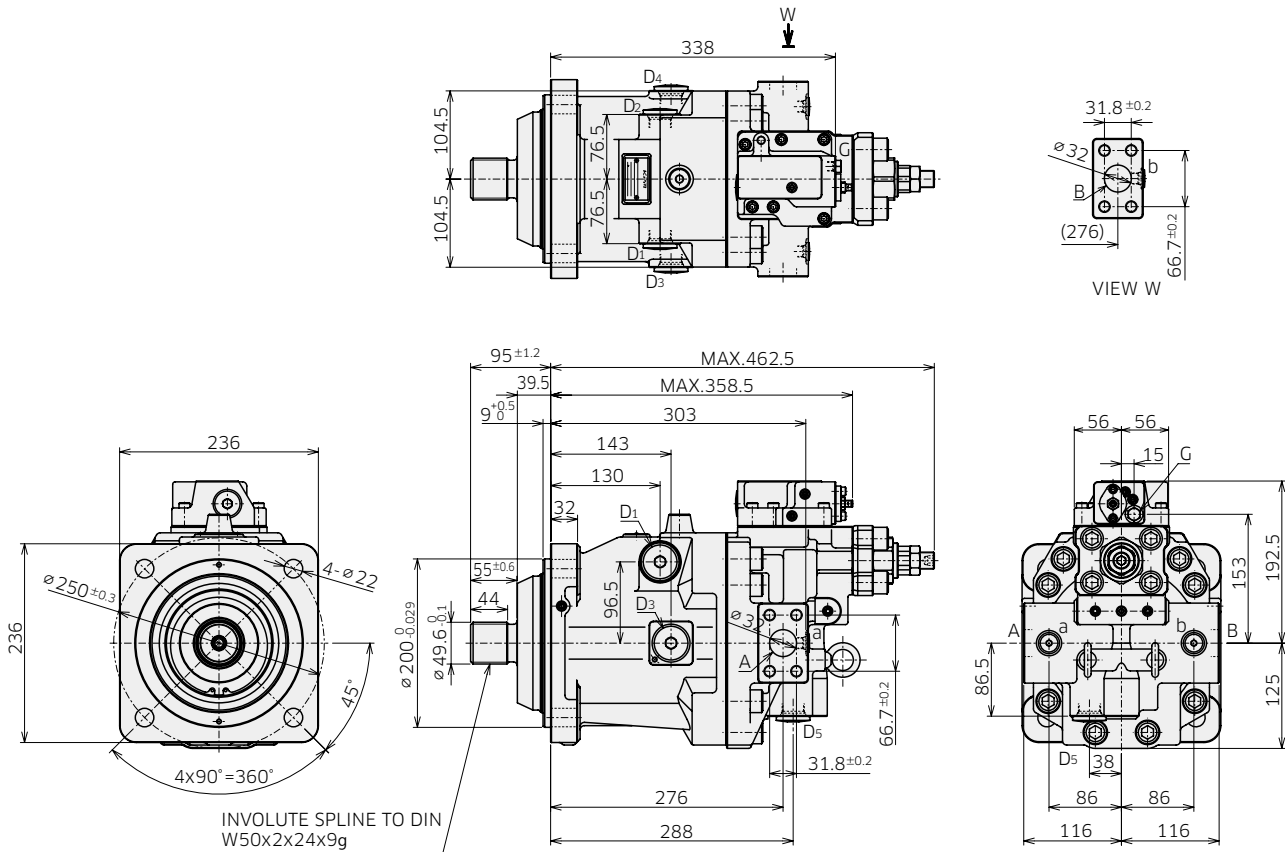
4. Dimensions

4-1 Installation Dimensions

* Dimensions in mm.

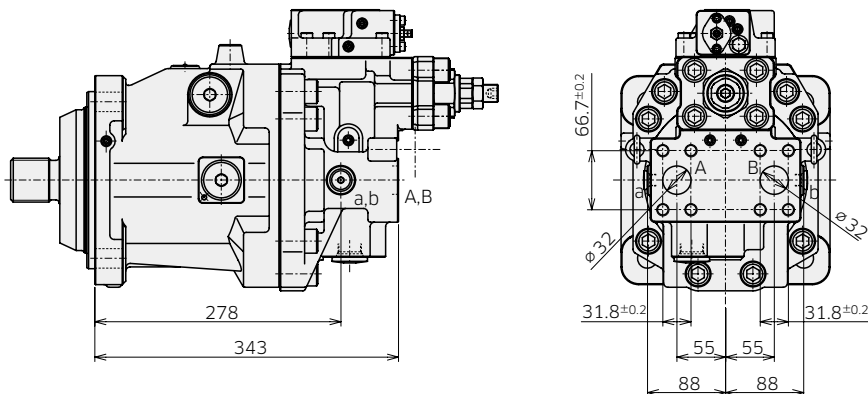
◆ M7V212 ISO Mounting, Flange Ports at Side

Model Code : M7V 212 A D 4 8 - * * 1 H1 X X X N - * *



◆ M7V212 ISO Rear Port

Model Code : M7V 212 A C 4 8 - * * 1 H1 X X X N - * *



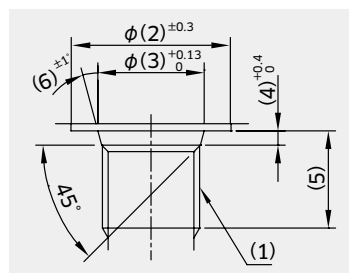
Refer to the page 45 and 46 for dimensions with other regulator options.

4. Dimensions

4-1 Installation Dimensions

* Dimensions in mm.

◆ M7V212 Port and Flange Fixing Thread (Ordering code: [5]) Thread Port



ANSI thread type (Code : 1,2)

	Symbol	(1)	(2)	(3)	(4)	(5)	(6)	Tightening torque (Nm)
Gauge port	a, b	9/16-18UNF-2B	25	15.6	2.5	12.7	12	59
Gauge port	G	7/16-20UNF-2B	21	12.4	2.4	11	12	12
Pilot port	Pi	9/16-18UNF-2B	25	15.6	2.5	12.7	12	59
Drain port	D1 to D5	1-1/16-12UN-2B	41	29.2	3.3	19	15	170

Metric thread type (Code : 3)

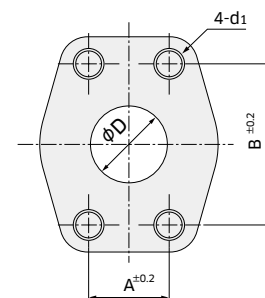
	Symbol	(1)	(2)	(3)	(4)	(5)	(6)	Tightening torque (Nm)
Gauge port	a, b	M14×1.5	25	15.8	2.4	11.5	15	47
Drain port	D1 to D5	M27×2	40	29.4	3.1	19	15	180

Parallel piping thread type (Code : 4)

	Symbol	(1)	(2)	(3)	(4)	(5)	(6)	Tightening torque (Nm)
Gauge port	a, b	G 1/4	25	15.6	2.5	15	15	36
Pilot port	Pi	G 1/4	24	15.6	2.5	14	15	36
Drain port	D1 to D5	G 3/4	45	30.8	3.5	20	15	170

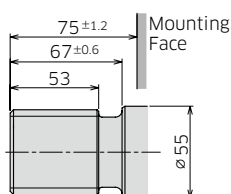
Flange port

Port thread type code	d1	A	B	D
1	1/2-13UNC-2B	31.8	66.7	32
2, 3, 4	M14	31.8	66.7	32



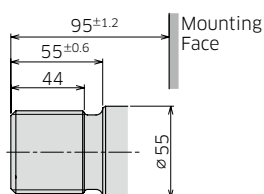
◆ Shaft End (Ordering Code [6])

ANSI B92.1a
(2in 15T 8/16DP)



Code : 3*

DIN 5480
(W50x2x24x9g)



Code : 8

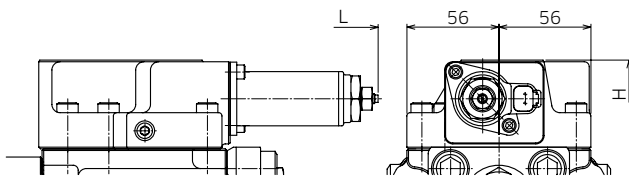
*Code 3 is under development.

4. Dimensions

4-2 Regulators Installation Dimensions

*Dimensions in mm.

◆ Electric Two Position Displacement Control Regulator Code: T1, T2

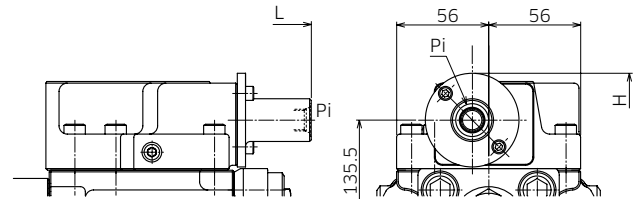


Dimension L : Length from mounting face.
Dimension H : Height from shaft center.

Dimension L, H (mm)

Motor size	Mounting type	Dimension	
		L	H
85	SAE 2bolt	390	159
	SAE 4bolt	407	
	ISO	366	
112	SAE	406	164
	ISO	374	
160	SAE	433	180
	ISO	401	
212	SAE	461	193
	ISO	429	

◆ Hydraulic Two Position Displacement Control Regulator Code: Y1



Dimension L : Length from mounting face.
Dimension H : Height from shaft center.

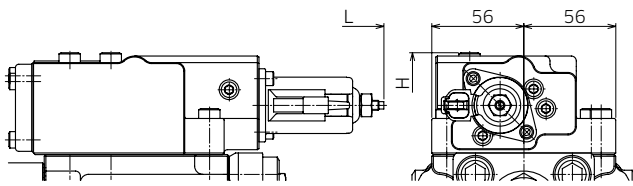
Dimension L, H (mm)

Motor size	Mounting type	Dimension	
		L	H
85	SAE 2bolt	345	164
	SAE 4bolt	362	
	ISO	321	
112	SAE	361	170.5
	ISO	329	
160	SAE	388	185
	ISO	356	
212	SAE	416	197.5
	ISO	384	

4-2 Regulators Installation Dimensions

*Dimensions in mm.

◆ Electric Proportional Control Regulator Code: E1, E2, E3 and E4

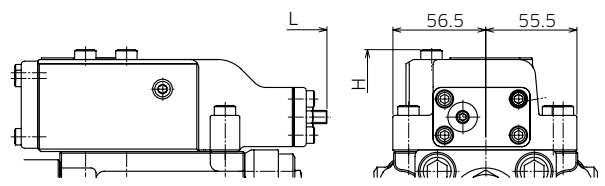


Dimension L : Length from mounting face.
Dimension H : Height from shaft center.

Dimension L, H (mm)

Motor size	Mounting type	Dimension	
		L	H
85	SAE 2bolt	392	167
	SAE 4bolt	409	
	ISO	368	
112	SAE	408	172
	ISO	376	
160	SAE	435	188
	ISO	403	
212	SAE	463	201
	ISO	431	

◆ Pressure Related Control (with Pressure Increase) Regulator Code: H2



Dimension L : Length from mounting face.
Dimension H : Height from shaft center.

Dimension L, H (mm)

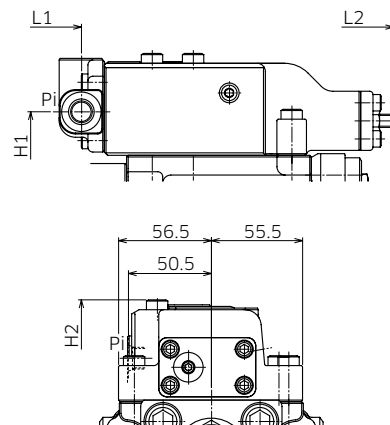
Motor size	Mounting type	Dimension	
		L	H
85	SAE 2bolt	348	167
	SAE 4bolt	365	
	ISO	324	
112	SAE	364	172
	ISO	332	
160	SAE	391	188
	ISO	359	
212	SAE	419	201
	ISO	387	

◆ Pressure Related Control (with Pressure Increase Hydraulic Remote Control) Regulator Code: H3

◆ Hydraulic Proportional Control Regulator Code: P1, P2, P3 and P4

Dimension L, H (mm)

Motor size	Mounting type	Dimension			
		L1	L2	H1	H2
85	SAE 2bolt	158	348	132	167
	SAE 4bolt	175	365		
	ISO	134	324		
112	SAE	174	364	137	172
	ISO	142	332		
160	SAE	201	391	153	188
	ISO	169	359		
212	SAE	229	419	165	201
	ISO	197	387		



Dimension L : Length from mounting face.
Dimension H : Height from shaft center.

Please fill the table to specify the requirements.
Please contact us for any questions.



M7V Series Inquiry Form

Please fill in the line, or tick the box inside the bold frame.
Options with ★ are under development.

Date: _____ Machine Model: _____
 Application: _____
 Customer Name: _____

Variable Displacement Motor

Model Code	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	M7V		A				-					X		N	-

Items	Model Code No.	Requirements	Kawasaki feed back		
Size	2	85 <input type="checkbox"/> 112 <input type="checkbox"/> 160 <input type="checkbox"/> 212 <input type="checkbox"/>			
Series Specifications	3	A : Standard			
Mounting Flange and Port Position	4	Mounting		Port Position	
		A : SAE J744, 2-bolt Mount (for M7V85)		Rear	<input type="checkbox"/>
		B : SAE J744, 4-bolt Mount (for M7V112.160.212)		Side	<input type="checkbox"/>
		C : ISO 3019-2, 4-bolt Mount		Rear	<input type="checkbox"/>
		D : ISO 3019-2, 4-bolt Mount		Side	<input type="checkbox"/>
		E : SAE J744, 4-bolt Mount (for M7V85)		Rear	<input type="checkbox"/>
Port and Flange Fixing Thread	5	Threaded Port Type		Flange Fixing Thread Type	
		1 : ANSI ISO11926		ANSI ASMEB1.1	<input type="checkbox"/>
		2 : ANSI ISO11926		Metric ISO724	<input type="checkbox"/> ★
		3 : Metric ISO6149		Metric ISO724	<input type="checkbox"/> ★
Shaft End	6	Standard		Specification	
		1 : ANSI B92.1		1 1/2 in 17T 12/24DP (for M7V85)	<input type="checkbox"/>
		2 : ANSI B92.1		1 3/4 in 13T 8/16DP (for M7V112/160)	<input type="checkbox"/>
		3 : ANSI B92.1		2 in 15T 8/16DP (for M7V160/212)	<input type="checkbox"/> ★
		4 : ANSI B92.1		1 3/8 in 21T 16/32DP (for M7V85)	<input type="checkbox"/>
		5 : DIN 5480		W35×2×16×9g (for M7V85)	<input type="checkbox"/>
		6 : DIN 5480		W40×2×18×9g (for M7V85/112)	<input type="checkbox"/>
		7 : DIN 5480		W45×2×21×9g (for M7V112/160)	<input type="checkbox"/>
		8 : DIN 5480		W50×2×24×9g (for M7V160/212)	<input type="checkbox"/>
		9 : ANSI B92.1		1 1/4 in 14T 12/24DP (for M7V85)	<input type="checkbox"/>
Displacement (cm³)	q,max (a)	7	Size	85 <input type="checkbox"/> A : 85 <input type="checkbox"/> B : 80 <input type="checkbox"/> C : 75 <input type="checkbox"/> D : 70 <input type="checkbox"/> 112 <input type="checkbox"/> A : 112 <input type="checkbox"/> B : 107 <input type="checkbox"/> C : 100 <input type="checkbox"/> D : 95 <input type="checkbox"/> 160 <input type="checkbox"/> A : 160 <input type="checkbox"/> B : 155 <input type="checkbox"/> C : 150 <input type="checkbox"/> D : 140 <input type="checkbox"/> 212 <input type="checkbox"/> A : 215 <input type="checkbox"/> B : 200 <input type="checkbox"/> C : 190 <input type="checkbox"/> D : 180 <input type="checkbox"/>	
	q,min (b)	8	Size	85 <input type="checkbox"/> A : 51 <input type="checkbox"/> B : 40 <input type="checkbox"/> C : 30 <input type="checkbox"/> D : - <input type="checkbox"/> E : - <input type="checkbox"/> 112 <input type="checkbox"/> A : 68 <input type="checkbox"/> B : 50 <input type="checkbox"/> C : 40 <input type="checkbox"/> D : 30 <input type="checkbox"/> E : 22 <input type="checkbox"/> 160 <input type="checkbox"/> A : 96 <input type="checkbox"/> B : 80 <input type="checkbox"/> C : 60 <input type="checkbox"/> D : 40 <input type="checkbox"/> E : 32 <input type="checkbox"/> 212 <input type="checkbox"/> A : 86 <input type="checkbox"/> B : 70 <input type="checkbox"/> C : 60 <input type="checkbox"/> D : - <input type="checkbox"/> E : - <input type="checkbox"/>	
Pressure	Nominal Max.				MPa MPa
Flow	Nominal		(c) L/min	Speed	Disp. Max (c)/(a)×1000= Disp. Min (c)/(b)×1000= min ⁻¹
	Max.		(d) L/min		Disp. Max (d)/(a)×1000= Disp. Min (d)/(b)×1000= min ⁻¹
Speed Sensor	9	1 : Without Speed Sensor <input type="checkbox"/> 2 : With Speed Sensor <input type="checkbox"/>			
Regulator (For Control options with optional valves see the table for M7V Control Options shown below.)	10	T	Electric Two Position Displacement Control	T1 : Negative Control, 24V <input type="checkbox"/> T2 : Negative Control, 12V <input type="checkbox"/>	
		Y	Hydraulic Two Position Displacement Control	Y1 : Negative Control <input type="checkbox"/>	
		E	Electric Proportional Control	E1 : Negative Control, 24V <input type="checkbox"/> E2 : Positive Control, 24V <input type="checkbox"/> E3 : Negative Control, 12V <input type="checkbox"/> E4 : Positive Control, 12V <input type="checkbox"/>	
				P	Hydraulic Proportional Control
		H	Pressure Related Control		
		Optional Valves (For Control options with regulator see the table for M7V Control Options shown below.)	11	X : Without Any Optional Valve <input type="checkbox"/> A : Pressure Control Valve * For regulator code E, P <input type="checkbox"/> B : Electric Two-Position Control Valve * For regulator code H <input type="checkbox"/>	A1 : With a Pressure Control Valve <input type="checkbox"/> B1 : With Electric Two-position Control Valve, 24V <input type="checkbox"/> B2 : With Electric Two-position Control Valve, 12V <input type="checkbox"/>
Accessories	12	X : Without Any Accessory <input type="checkbox"/> 1 : Without Flushing Spools <input type="checkbox"/> 2 : With Low Pressure Relief Valve <input type="checkbox"/> ★	X : Without Counter Balance Valve <input type="checkbox"/> 1 : With Counter Balance Valve Hoist at CW rotation (A port inlet) <input type="checkbox"/> ★ 2 : With Counter Balance Valve Hoist at CCW rotation (B port inlet) <input type="checkbox"/> ★		
Counter Balance Valve	13				
Response Speed of Control	14	N : Standard			
Design Code	15	** : 01~			
Max. Speed					min ⁻¹
Hydraulic Fluid ISO Grade, Brand					
Oil Temperature Range					°C
Oil Viscosity Range					mm²/s (cSt)

Comments (Other requirements)		Operating condition, Duty cycle etc. (Describe your detail)	
Request Volume	Request Delivery Date	Note	

M7X Series

Fixed Displacement Type Axial Piston Motors



■ Specifications

Size : 85, 112, 160*

Nominal Pressure : 40 MPa (5,800 psi)

Maximum Pressure : 45 MPa (6,500 psi)

■ General Descriptions

- Applicable to an open circuit and closed circuit.
- Applicable to construction machinery and industrial vehicles.
- Swash plate design allows for a compact motor.
- High power density.

■ Features

Superior performance at High and Low speed

Optimized rotary balance design enables high speed performance and excellent low speed characteristics.

Low noise

Swash plate configuration provides the low noise.

Compact size

Swash plate configuration provides the more compact structure and flexibility in system design.

Long bearing life

Swash plate configuration results in longer bearing life.

(*) means under development

5

M7X Ordering Code

Please fill the Inquiry Form on page 59 in order to specify the requirement.

Model Code **M7X** **85** **A** **A** **1** **2** - **A** **3** **B** **1** - *****

1. M7X Series

M7X Series, Fixed Displacement, Axial Piston Motor, Applicable in Both Open and Closed Loops

2. Size

	85	112	160
Standard Size	●	●	○

3. Series Specifications

A	Standard
---	----------

4. Mounting Flange and Port Position

	Mounting	Port Position	85	112	160
A	SAE J744, 4-bolt Mount	Rear	○	○	○
B	SAE J744, 4-bolt Mount	Side	●	○	○
C	ISO3019-2, 4-bolt Mount	Rear	○	○	○
D	ISO3019-2, 4-bolt Mount	Side	●	●	○
G	SAE J744, 4-bolt Mount	Upper Side	○	○	○
H	ISO3019-2, 4-bolt Mount	Upper Side	○	○	○

5. Port and Flange Fixing Thread

	Threaded Port Type	Flange Fixing Thread Type	85	112	160
1	ANSI ISO11926	ANSI ASMEB1.1	●	○	○
2	ANSI ISO11926	Metric ISO724	○	○	○
3	Metric ISO6149	Metric ISO724	○	○	○
4	Parallel piping ISO228	Metric ISO724	●	●	○

6. Shaft End

	Standard	Specification	85	112	160
1	ANSI B92.1	1 1/2 in 17T 12/24DP	○	-	○
2	ANSI B92.1	1 3/4 in 13T 8/16DP	○	○	○
3	ANSI B92.1	2 in 15T 8/16DP	○	○	○
4	ANSI B92.1	1 3/8 in 21T 16/32DP	●	-	-
5	DIN5480	W35x2x16x9 g	○	-	○
6	DIN5480	W40x2x18x9 g	○	●	○
7	DIN5480	W45x2x21x9 g	○	●	○
8	DIN5480	W50x2x24x9 g	○	○	○
9	ANSI B92.1	1 1/4 in 14T 12/24DP	●	-	-

7. Displacement Sett

Size	85	A : 90	● B : 80	● C : 75	○ D : 85	●
112	A : 112	● B : -	- C : -	- D : -	-	-
160	A : 160	- B : -	- C : -	- D : -	-	-

8. Optional Valve

		85	112	160
Blank	Without Any Optional Valve	●	●	○
X	With Counter Balance Valve Hoist at CW rotation (A port inlet)	○	○	○
Y	With Counter Balance Valve Hoist at CCW rotation (B port inlet)	○	○	○
Z	Flushing Valve	○	○	○

9. Port Option for Loop Flushing Valve Assembly

		85	112	160
Blank	Without Any Accessory	●	●	○
A	Parallel Piping ISO228	●	○	○
B	ANSI ISO11926	●	○	○

10. Speed Sensor

		85	112	160
1	Without Speed Sensor	●	●	○
2	With Speed Sensor	○	○	○

11. Design Code

		85	112	160
**	01~	●	●	○

● : Available
○ : Under development

6 Technical Information

6-1 Specifications

M7X Series

Size		85	112	160 *1
Max. Displacement : q_{max}	cm ³ (in ³)	90 (5.5)	112 (6.9)	160 (9.8)
Max. Speed : N_{nom}	min ⁻¹ (rpm)	4,500	3,550	3,100
Nominal pressure : P_{nom} *2	MPa (psi)	40 (5,800)	40 (5,800)	40 (5,800)
Max. Pressure : P_{max} *3	MPa (psi)	45 (6,500)	45 (6,500)	45 (6,500)
Theoretical output torque	Nm (lbf ft)	573 (423)	713 (526)	1,019 (752)
Power	kW (hp)	270 (362)	265 (355)	331 (444)
Max. Flow : Q	L/min (gallon/min)	405 (107)	398 (105)	496 (131)
Moment of inertia	kg·m ²	0.011	0.017	0.030
Volume in the case	L (gallon)	0.5 (0.21)	0.5 (0.21)	1.2 (0.32)
Mass	kg (lb)	26	34	45
Temperature	°C (°F)	-20 to +115 (-4 to +239) at drain port -20 to +90 (-4 to +194) at inlet port		
Coating		Red synthetic resin primer		

* 1 : Size 160 is under development.

* 2 : Nominal pressure corresponds to the design pressure to provide appropriate performance, function, and service life.

: Nominal pressure corresponds to the design pressure at which the products will function properly.

* 3 : Summation of pressure on A and B port shall be 56 MPa or less.

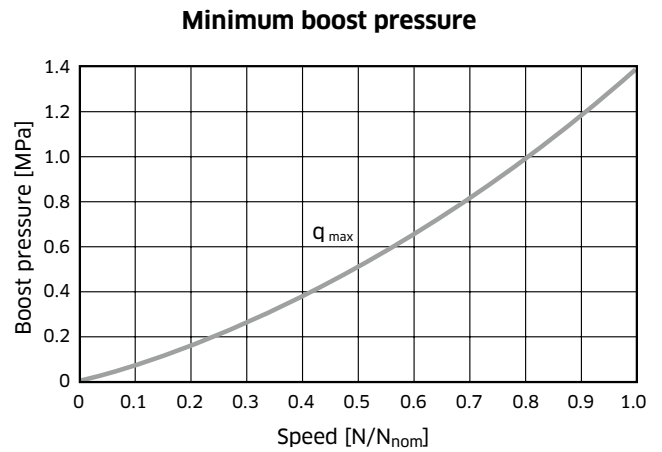
6. Technical Information

6-2 Precautions for System Design

◆ Min. Boost Pressure

To prevent cavitation when the motor is operating in a pumping mode, a positive pressure is required at the suction port.

The figure on the right shows the minimum boost pressure requirement based on regular operation. In case of a rapid change of the flow, more boost pressure must be applied.



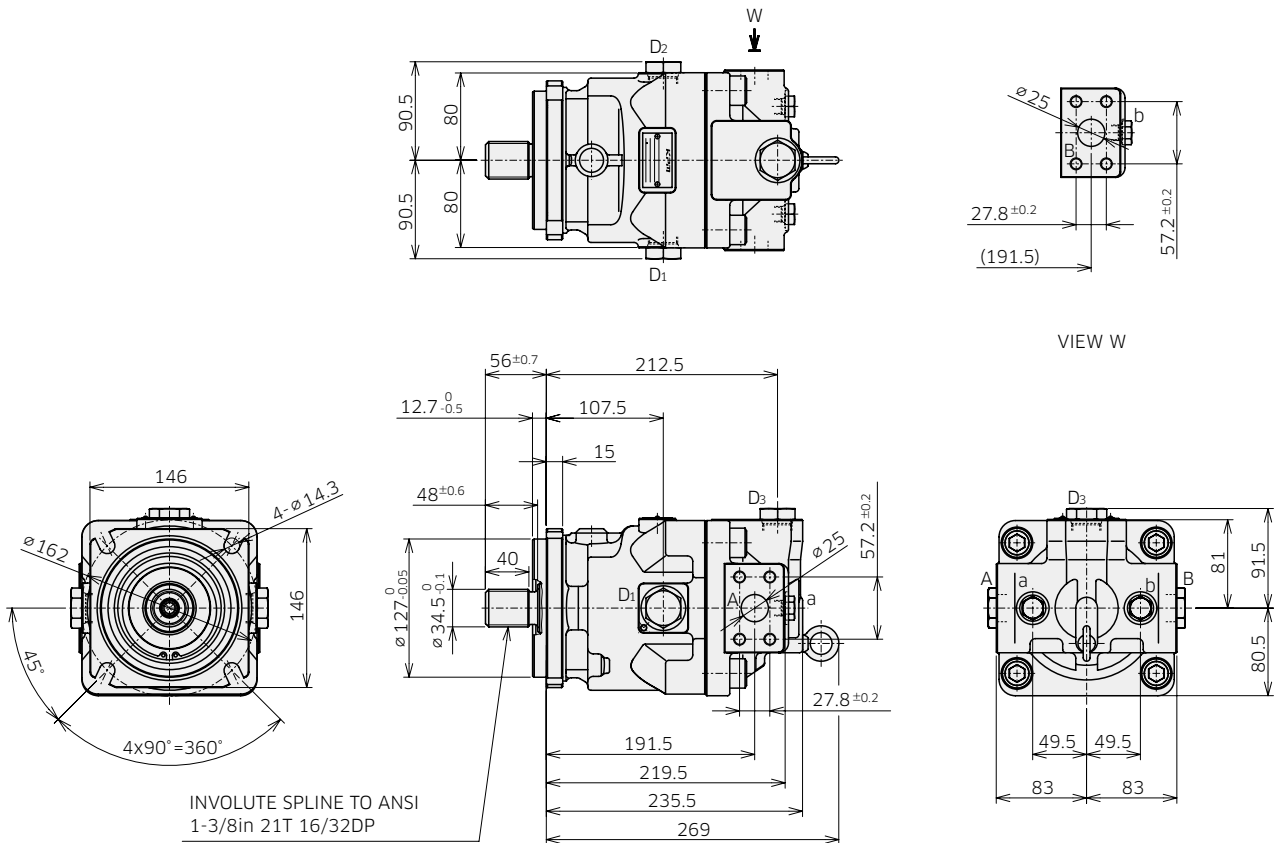
7 Dimensions

Installation Dimensions

* Dimensions in mm.

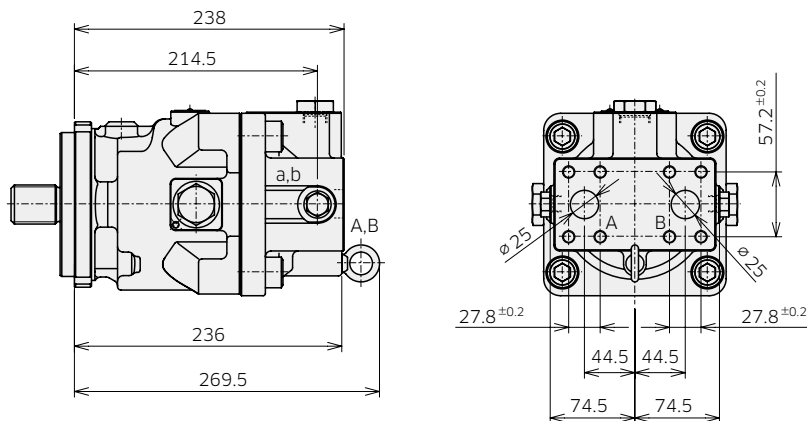
◆ M7X85 SAE Mounting, Side Port

Model Code : M7X 85 A B 1 4 - A 1



◆ M7X85 SAE Mounting, Rear Port

Model Code : M7X 85 A A 1 4 - A 1



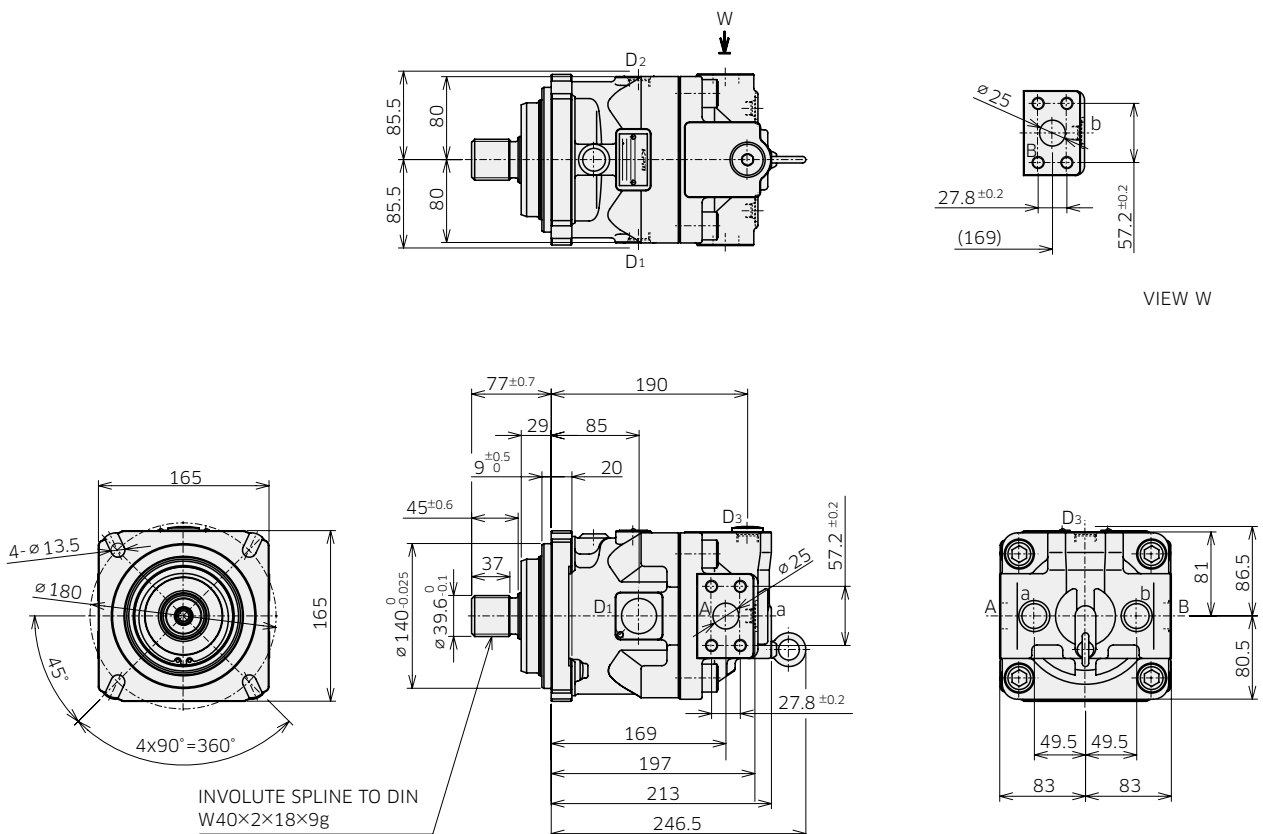
7. Dimensions

Installation Dimensions

* Dimensions in mm.

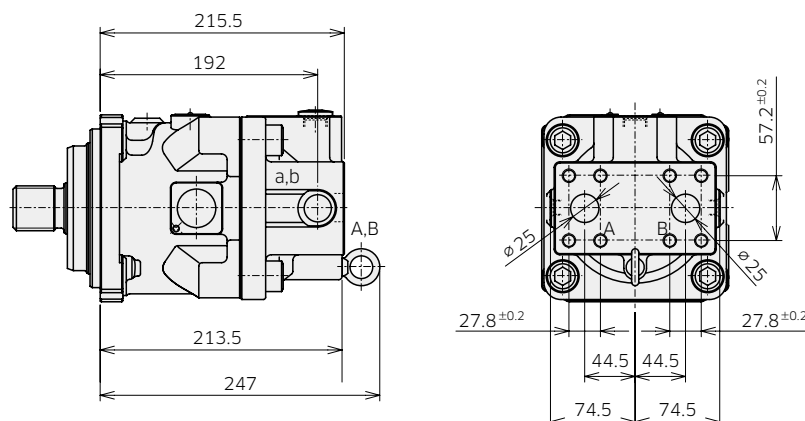
◆ M7X85 ISO Mounting, Side Port

Model Code : M7X 85 A D 4 6 - A 1



◆ M7X85 ISO Mounting, Side Port

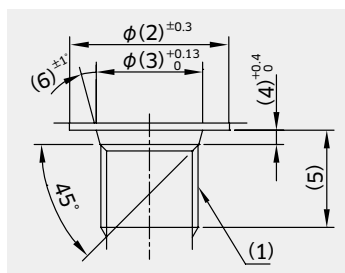
Model Code : M7X 85 A C 4 6 - A 1



7. Dimensions

Installation Dimensions

◆ M7X85 Port and Flange Fixing Thread (Ordering Code [5]) Drain and Gauge Port



* Dimensions in mm.

ANSI thread type (Code : 1,2)

	Symbol	(1)	(2)	(3)	(4)	(5)	(6)	Tightening torque (Nm)
Gauge port	a, b	9/16-18UNF-2B	24	15.6	2.5	15	12	59
Drain port	D1 to D3	1-1/16-12UN-2B	41	29.2	3.3	19	15	170

Metric thread type (Code : 3)

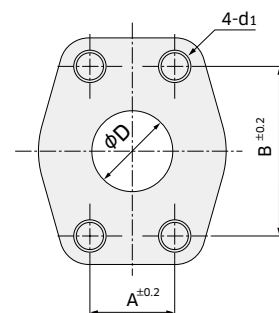
	Symbol	(1)	(2)	(3)	(4)	(5)	(6)	Tightening torque (Nm)
Gauge port	a, b	M14×1.5	24	15.8	2.4	11.5	15	47
Drain port	D1 to D3	M27×2	40	29.4	3.1	19	15	180

Parallel piping thread type (Code : 4)

	Symbol	(1)	(2)	(3)	(4)	(5)	(6)	Tightening torque (Nm)
Gauge port	a, b	G 1/4	24	15.6	2.5	15	15	36
Drain port	D1 to D3	G 1/2	34	22.6	2.5	19	15	108

Flange port

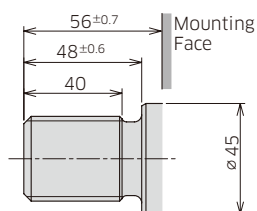
Port thread type code	d1	A	B	D
1	7/16-14UNC-2B	27.8	57.2	25
2, 3, 4	M12	27.8	57.2	25



◆ M7X85 Shaft End (Ordering Code [6])

ANSI B92.1a

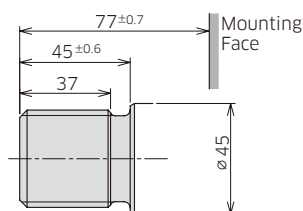
(1-3/8in 21T 16/32DP)



Code : 4

DIN 5480

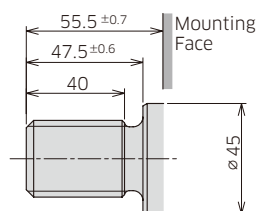
(W40x2x18x9g)



Code : 6

ANSI B92.1a

(1-1/4in 14T 12/24DP)



Code : 9

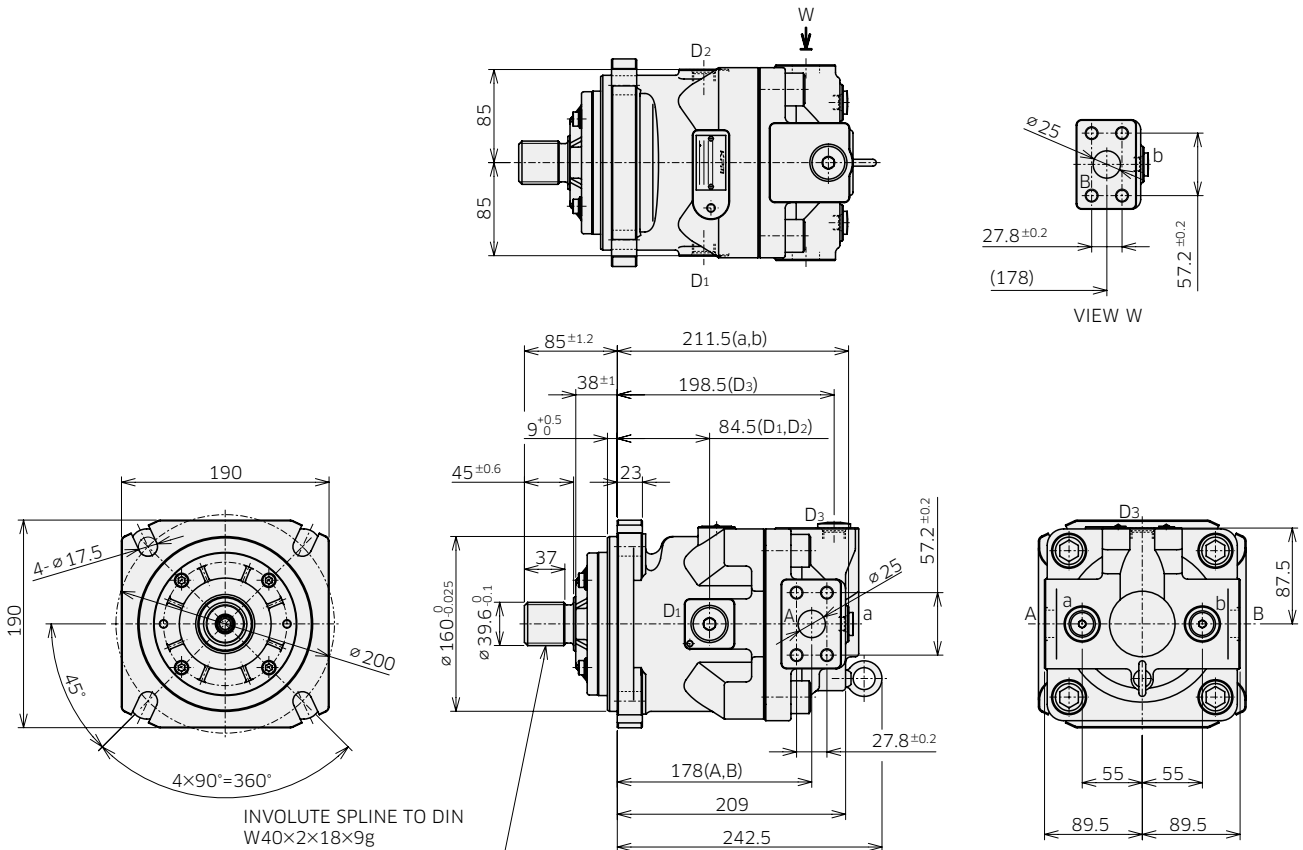
7. Dimensions

Installation Dimensions

* Dimensions in mm.

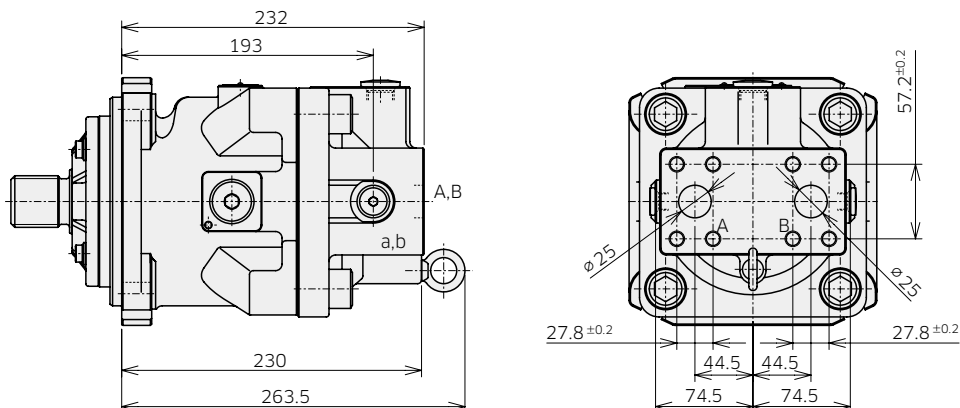
◆ M7X112 ISO Mounting, Side Port

Model Code : M7X 112 A D 4 6 - A 1



◆ M7X112 ISO Mounting, Rear Port

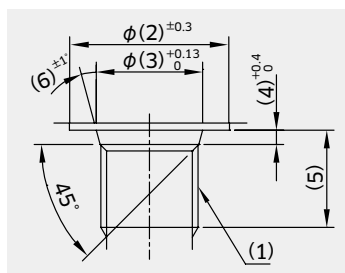
Model Code : M7X 112 A C 4 6 - A 1



7. Dimensions

Installation Dimensions

◆ M7X112 Port and Flange Fixing Thread (Ordering Code [5]) Drain and Gauge Port



* Dimensions in mm.

ANSI thread type (Code : 1,2)

	Symbol	(1)	(2)	(3)	(4)	(5)	(6)	Tightening torque (Nm)
Gauge port	a, b	9/16-18UNF-2B	24	15.6	2.5	15	12	59
Drain port	D1 to D3	1-1/16-12UN-2B	41	29.2	3.3	19	15	170

Metric thread type (Code : 3)

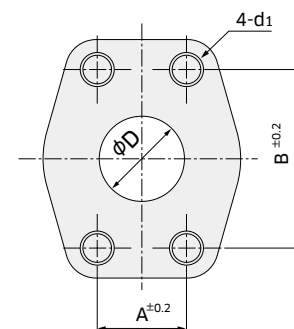
	Symbol	(1)	(2)	(3)	(4)	(5)	(6)	Tightening torque (Nm)
Gauge port	a, b	M14×1.5	24	15.8	2.4	11.5	15	47
Drain port	D1 to D3	M27×2	40	29.4	3.1	19	15	180

Parallel piping thread type (Code : 4)

	Symbol	(1)	(2)	(3)	(4)	(5)	(6)	Tightening torque (Nm)
Gauge port	a, b	G 1/4	24	15.6	2.5	15	15	36
Drain port	D1 to D3	G 1/2	34	22.6	2.5	19	15	108

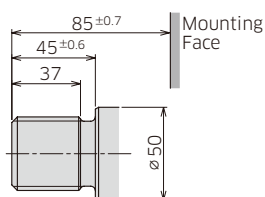
Flange port

Port thread type code	d1	A	B	D
1	7/16-14UNC-2B	27.8	57.2	25
2, 3, 4	M12	27.8	57.2	25



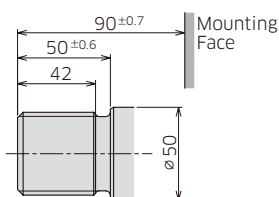
◆ M7X112 Shaft End (Ordering Code [6])

DIN 5480
(W40x2x18x9g)



Code : 6

DIN 5480
(W45x2x21x9g)



Code : 7

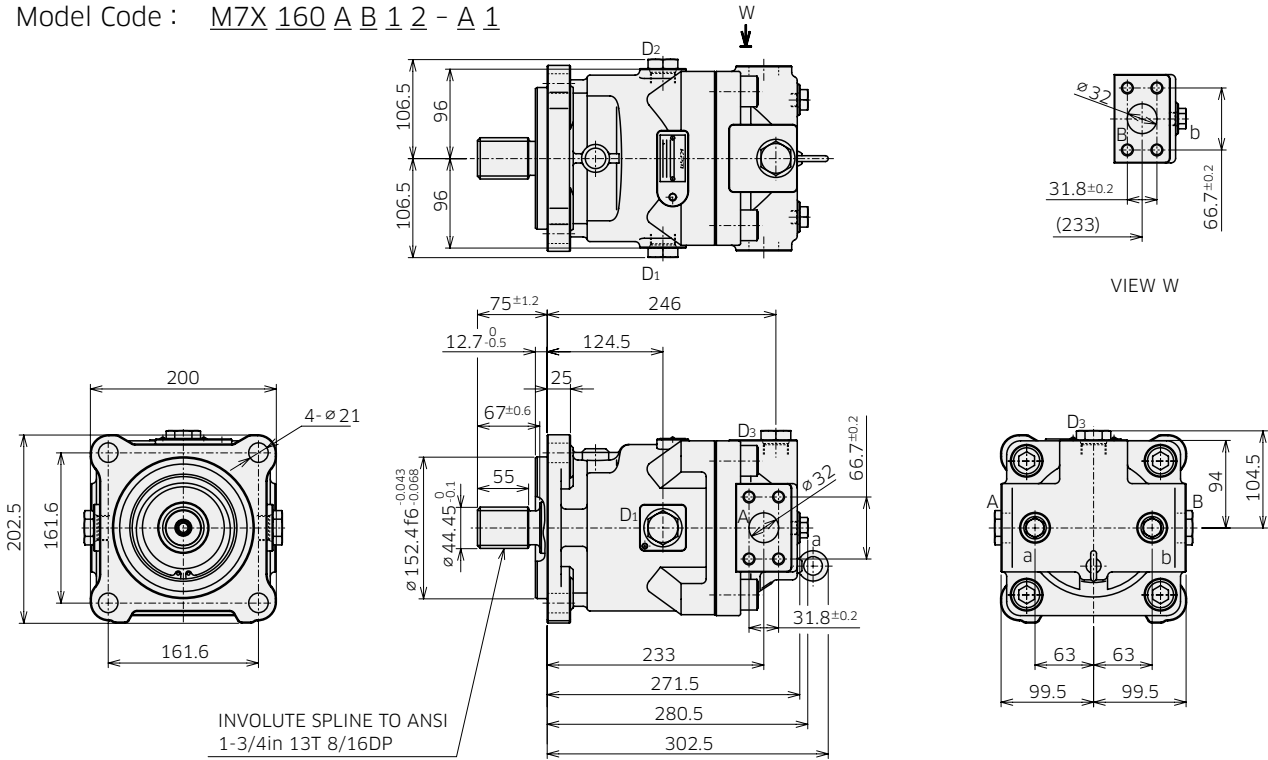
7. Dimensions

Installation Dimensions

*Dimensions in mm.

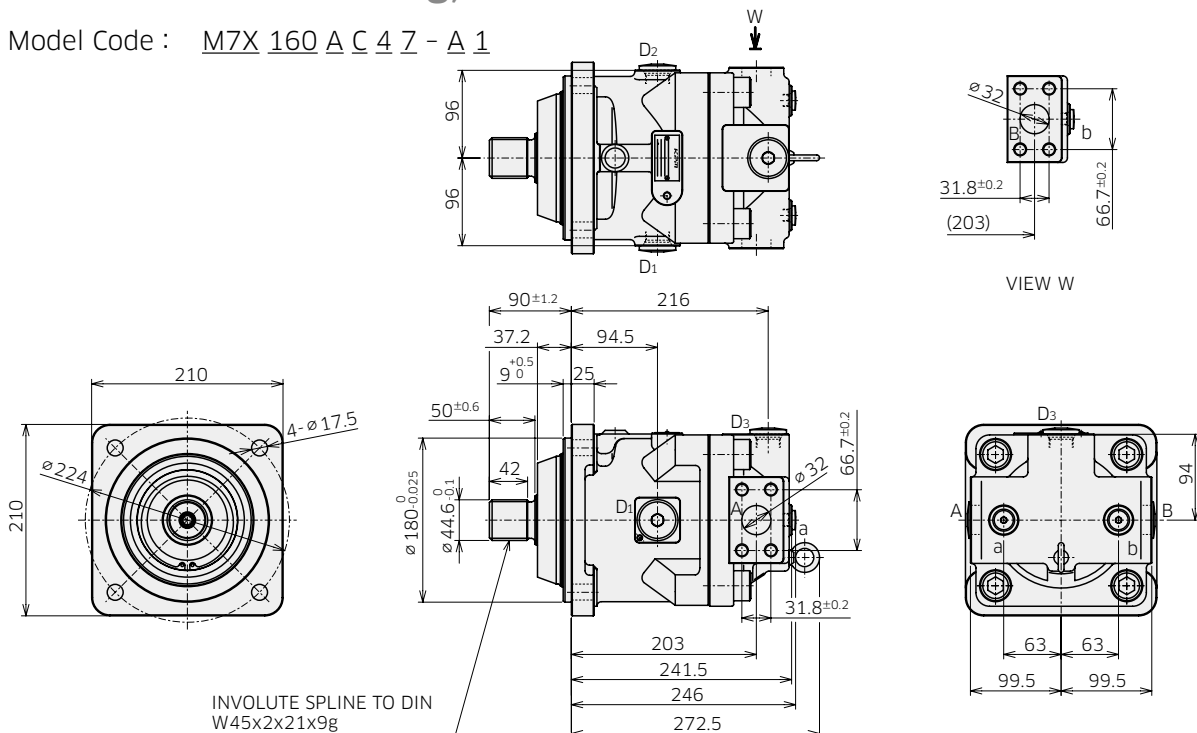
◆ M7X160 SAE Mounting, Side Port

Model Code : M7X 160 A B 1 2 - A 1



◆ M7X160 ISO Mounting, Side Port

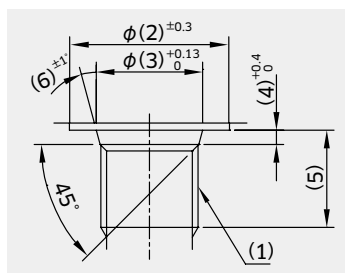
Model Code : M7X 160 A C 4 Z - A 1



7. Dimensions

Installation Dimensions

◆ M7X160 Port and Flange Fixing Thread (Ordering Code [5]) Drain and Gauge Port



* Dimensions in mm.

ANSI thread type (Code : 1,2)

	Symbol	(1)	(2)	(3)	(4)	(5)	(6)	Tightening torque (Nm)
Gauge port	a, b	9/16-18UNF-2B	24	15.6	2.5	12.7	12	59
Drain port	D1 to D3	1-1/16-12UN-2B	41	29.2	3.3	19	15	170

Metric thread type (Code : 3)

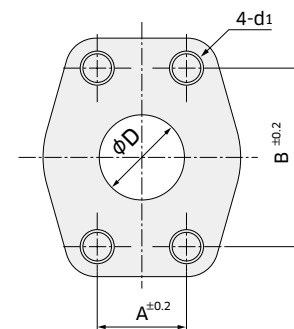
	Symbol	(1)	(2)	(3)	(4)	(5)	(6)	Tightening torque (Nm)
Gauge port	a, b	M14×1.5	24	15.8	2.4	11.5	15	47
Drain port	D1 to D3	M27×2	40	29.4	3.1	19	15	180

Parallel piping thread type (Code : 4)

	Symbol	(1)	(2)	(3)	(4)	(5)	(6)	Tightening torque (Nm)
Gauge port	a, b	G 1/4	24	15.6	2.5	15	15	36
Drain port	D1 to D3	G 3/4	45	30.8	3.5	20	15	170

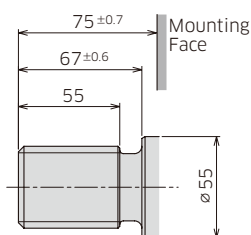
Flange port

Port thread type code	d1	A	B	D
1	1/2-13UNC-2B	31.8	66.7	32
2, 3, 4	M14	31.8	66.7	32



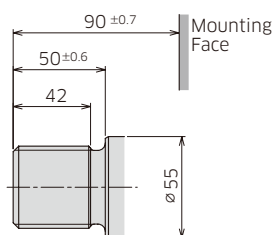
◆ Shaft End (Ordering Code [6])

ANSI B92.1a
(1-3/4in 13T 8/16DP)



Code : 2*

DIN 5480
(W45x2x21x9g)



Code : 7*

*Code 2 and 7 are under development.

Please fill the table to specify the requirements.
Please contact us for any questions.



M7X Series Inquiry Form

Please fill in the line, or tick the box inside the bold frame.
Options with ★ are under development.

Date: _____ Machine Model: _____
 Application: _____
 Customer Name: _____

Variable Displacement Motor

Model Code	1	2	3	4	5	6		7	8	9		10
	M7X		A				-			X	-	

Items	Model Code No.	Requirements		Kawasaki feed back
Size	2	85 <input type="checkbox"/> 112 <input type="checkbox"/> 160 <input checked="" type="checkbox"/> ★		
Series Specifications	3	A : Standard		
Mounting Flange and Port Position	4	Mounting Flange		Port Position
		A : SAE J744, 4-bolt Mount	Rear	<input type="checkbox"/> ★
		B : SAE J744, 4-bolt Mount	Side	<input type="checkbox"/>
		C : ISO 3019-2, 4-bolt Mount	Rear	<input type="checkbox"/> ★
		D : ISO 3019-2, 4-bolt Mount	Side	<input type="checkbox"/>
		G : SAE J744, 4-bolt Mount	Upper Side	<input type="checkbox"/> ★
H : ISO 3019-2, 4-bolt Mount	Upper Side	<input type="checkbox"/> ★		
Port and Flange Fixing Thread	5	Type of Threaded Port		Thread Type for Flange Port
		1 : ANSI ISO11926	ANSI ASMEB1.1	<input type="checkbox"/>
		2 : ANSI ISO11926	Metric ISO724	<input type="checkbox"/> ★
		3 : Metric ISO6149	Metric ISO724	<input type="checkbox"/> ★
Shaft End	6	Standard		Specification
		1 : ANSI B92.1	1 1/2 in 17T 12/24DP (for M7X85/160)	<input type="checkbox"/> ★
		2 : ANSI B92.1	1 3/4 in 13T 8/16DP	<input type="checkbox"/> ★
		3 : ANSI B92.1	2 in 15T 8/16DP	<input type="checkbox"/> ★
		4 : ANSI B92.1	1 3/8 in 21T 16/32DP (for M7X85)	<input type="checkbox"/>
		5 : DIN 5480	W35×2×16×9g (for M7X85/160)	<input type="checkbox"/> ★
		6 : DIN 5480	W40×2×18×9g	<input type="checkbox"/>
		7 : DIN 5480	W45×2×21×9g	<input type="checkbox"/>
		8 : DIN 5480	W50×2×24×9g	<input type="checkbox"/> ★
9 : ANSI B92.1	1 1/4 in 14T 12/24DP (for M7X85)	<input type="checkbox"/>		
Displacement Setting (cm³)	7	Size	85 A : 90 <input type="checkbox"/> B : 80 <input type="checkbox"/> C : 75 <input checked="" type="checkbox"/> ★ D : 85 <input type="checkbox"/>	
			112 A : 112 <input type="checkbox"/> B : - C : - D : -	
			160 A : 160 B : - C : - D : -	
Pressure	Nominal			MPa
	Max.			MPa
Flow	Nominal			L/min
	Max.			L/min
Optional Valve	8	Blank : Without Any Optional Valve		<input type="checkbox"/>
		X : With Counter Balance Valve Hoist at CW rotation (A port inlet)		<input type="checkbox"/> ★
		Y : With Counter Balance Valve Hoist at CCW rotation (B port inlet)		<input type="checkbox"/> ★
		Z : Flushing Valve		<input type="checkbox"/> ★
Port option for loop flushing valve assembly	9	Blank : Without Any Accessory		<input type="checkbox"/>
		A : Parallel Piping ISO228		<input type="checkbox"/>
		B : ANSI ISO11926		<input type="checkbox"/>
Speed Sensor	10	1 : Without Speed Sensor		<input type="checkbox"/>
		2 : With Speed Sensor		<input type="checkbox"/> ★
Design Code	11	* * : 01~		
Max. Speed				min ⁻¹
Hydraulic Fluid ISO Grade, Brand				
Oil Temperature Range		~		°C
Oil Viscosity Range		~		mm ² /s (cSt)

Comments (Other requirements)	Operating condition, Duty cycle etc. (Describe your detail)
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Request Volume	Request Delivery Date	Note
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Kawasaki Heavy Industries, Ltd.

Precision Machinery Business Division

<http://www.khi.co.jp/kpm/>

Tokyo Head Office

1-14-5 Kaigan, Minato-ku, Tokyo 105-8315, Japan
Phone +81-3-3435-6862 Fax. +81-3-3435-2023

Kobe Head Office

Kobe Crystal Tower, 1-3 Higashikawasaki-cho 1-chome, Chuo-ku, Kobe 650-8680, Japan
Phone +81-78-360-8607 Fax. +81-78-360-8609

Nishi-kobe Works

234, Matsumoto, Hasetani-cho, Nishi-ku, Kobe 651-2239, Japan
Phone +81-78-991-1160 Fax. +81-78-991-3186

OVERSEAS SUBSIDIARIES

Kawasaki Precision Machinery (UK) Ltd.

Ernesettle Lane, Ernesettle, Plymouth, Devon, PL5 2SA United Kingdom
Phone +44-1752-364394 Fax. +44-1752-364816
<http://www.kpm-eu.com>

Kawasaki Precision Machinery (U.S.A.), Inc.

3838 Broadmoor Avenue S.E. Grand Rapids, Michigan 49512, U.S.A.
Phone +1-616-975-3100 Fax. +1-616-975-3103
<http://www.kpm-usa.com>

Kawasaki Precision Machinery (Suzhou) Ltd.

668 JianLin Rd, New District, Suzhou, 215151 China
Phone +86-512-6616-0365 Fax. +86-512-6616-0366

Kawasaki Precision Machinery Trading (Shanghai) Co., Ltd.

17th Floor (Room 1701), The Headquarters Building, No168, XiZang Road (M), Huangpu District, Shanghai, 200001, China
Phone +86-21-3366-3800 Fax. +86-21-3366-3808

Kawasaki Chunhui Precision Machinery (Zhejiang) Ltd.

No.200 Yasha Road Shangyu Economic Development Zone, Shansyu, Zhejiang, 312300, China
Phone +86-575-8215-6999 Fax. +86-575-8215-8699

Flutek, Ltd.

98 GIL 6, Gongdan-Ro, Seongsan-Ku, Changwon-Si, Kyungnam, 51567, Korea
Phone +82-55-210-5900 Fax. +82-55-286-5557

Wipro Kawasaki Precision Machinery Private Limited

No. 15, Sy. No. 35 & 37, Kumbalgodu Industrial Area, Kumbalgodu Village, Kengeri Hobli, Bangalore, - 560074 ,India



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Precision Machinery
Company Website