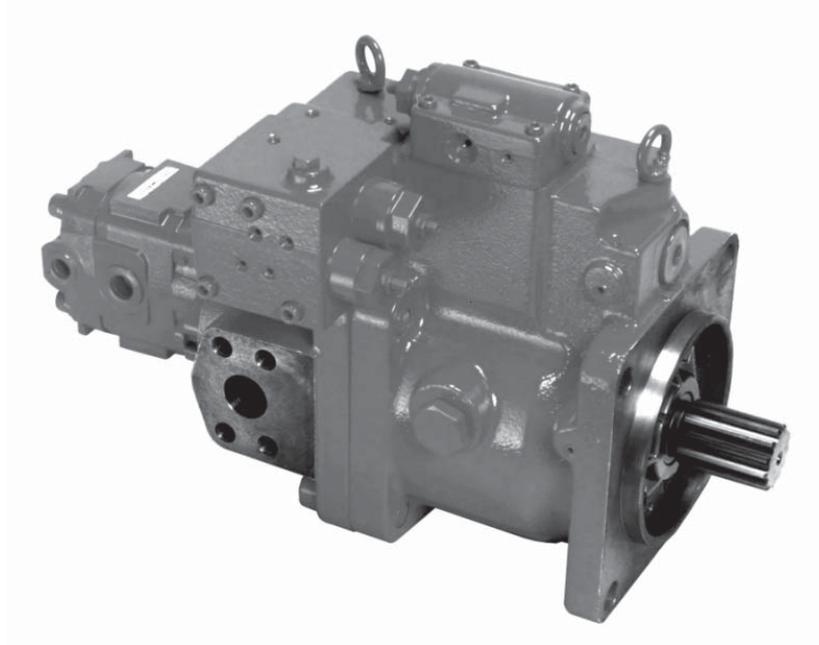


Sizes 45, 60, 80, 112,
140 and 200
Up to 203 kW
and 320bar

Swash-plate
Axial Piston Pump
B Series K3VL

Data Sheet
P-1002/02.09
GB



Features

- ◇ SAE and ISO mount.
- ◇ Small installation envelope.
- ◇ Through drive.
- ◇ SAE and metric ports.
- ◇ Side and rear porting.
- ◇ Vertical mount capability.
- ◇ Multiple drain ports.
- ◇ CW and CCW rotation.
- ◇ Opposed stroking pistons.
- ◇ Rated pressure 320 bar.
- ◇ Swash plate pillow support.
- ◇ Maximum displacement stop.
- ◇ Servo assist springs.
- ◇ Hydrostatic pillow bearing.
- ◇ Overcentre bleed.
- ◇ Pressure compensation.
- ◇ Integral proportional pressure.
- ◇ Load sensing.
- ◇ Integral unload.
- ◇ Torque limiter.
- ◇ Rigid construction.
- ◇ Long life roller bearings.
- ◇ Various sealing options.
- ◇ Low pulsation.
- ◇ Proven rotating group.
- ◇ Separate swash plate.
- ◇ Spherical valve plate.
- ◇ Super-finished bores.
- ◇ Solid pistons.

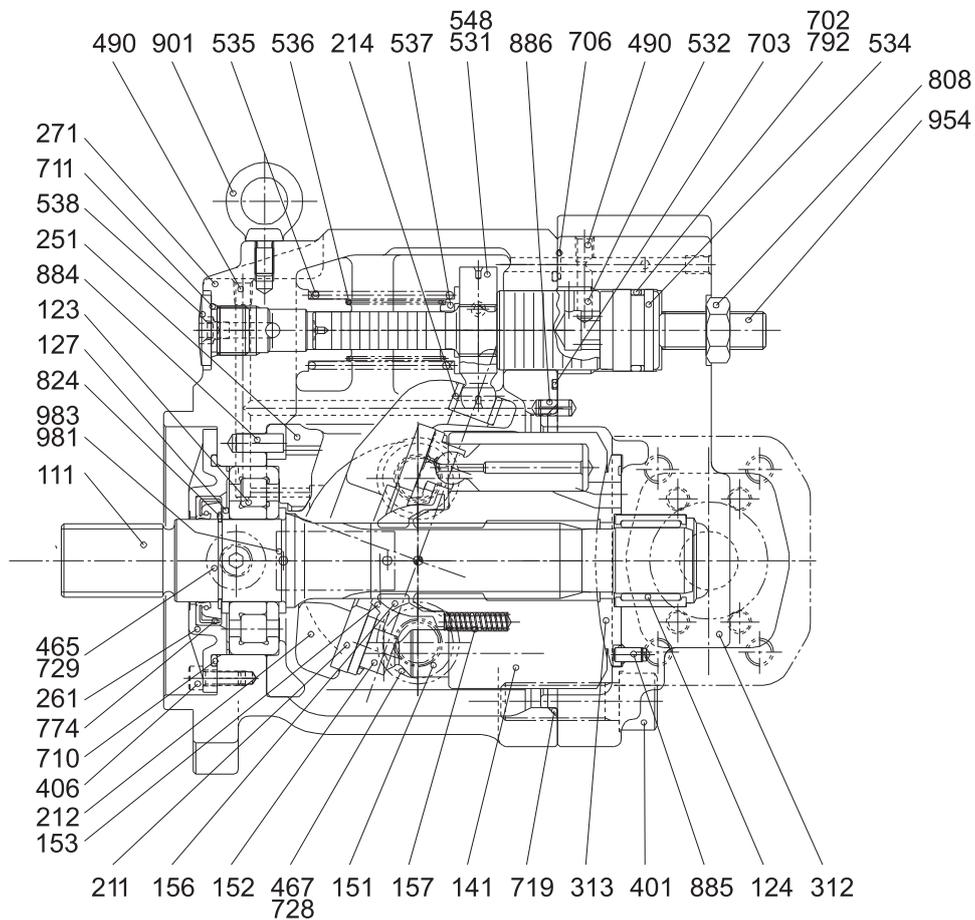
General Description

The K3VL Series Swash Plate Type Axial Piston Pumps are designed to specifically satisfy the marine and general industrial machinery market where a high pressure variable displacement pump is required. K3VL Pumps are available in nominal displacements ranging from 45 to 200 cm³/rev with various pressure, torque limiter, and combination load sensing control options.

Technical Description

The components of the K3VL pump can be divided into three sub-groupings:

- Rotating Group** – Providing the main rotary pumping action.
- Swash Plate Group** – To vary the pump’s delivery flow rate.
- Valving Cover Group** – Providing the switching of oil between suction and delivery ports.



K3VL80 Cross Section



Technical Description (continued)**The Rotating Group**

The Rotating Group comprises:

- (a) Valve plate 313
- (b) Cylinder block, 141
- (c) Pistons, 9 x 151 + Shoes, 9 x 152
- (d) Setting plate, 153
- (e) Spherical bush, 156
- (f) Cylinder springs, 9 x 157

The drive shaft is coupled to the cylinder block through a splined section and supported at both of its ends by bearings. The shoe is swaged over the spherical end of the piston forming a spherical ball joint. Additionally the shoe has a hydrostatic pocket to balance the hydraulic thrust developed by the piston pressure allowing the shoe to lightly slide against the shoe plate.

The subgroup consisting of the pistons and shoes are pressed against the shoe plate by the cylinder springs acting through the setting plate and the spherical bush. The force developed by these cylinder springs also press the cylinder block against the valve plate. Only the K3VL45-60 units use a single centralised spring with individual push pins provide the shoe and cylinder block hold down force.

Swash Plate Group

The Swash Plate Group comprises:

- (a) Swash plate, 212
- (b) Shoe plate, 211
- (c) Swash plate support, 251
- (d) Tilting bush, 214
- (e) Tilting pin, 531
- (f) Servo piston, 532

The swash plate on the reverse side to the shoe location is a cylindrical form which is a "pillow" supported by the hydrostatic bearing provided by the swash plate support. The tilting bush is inserted into the swash plate and into this is installed the spherical portion of the tilting pin which is coupled to the servo piston.

Any linear movement of the servo piston produced by the regulator pressure applied to either end is translated through the tilting pin into an angular movement of the swash plate which varies the tilting or swash angle of the pump. A screw adjuster and lock nut is available to adjust the maximum tilting angle condition. The servo assist springs are provided to ensure good on stroking response particularly at low operating pressures.



Technical Description (continued)**Valve Cover Group**

The Valve Cover Group comprises:

- (a) Valve cover, 312
- (b) Valve pin, 885

The valve plate with its two "kidney" shaped ports is installed onto the valve plate located by the valve plate pin. These two ports serve to supply and exhaust oil to and from the cylinder block. The oil passage switched by the valve plate is connected to the externally piped suction and outlet pressure ports through the valve cover. This valve plate is spherical in form for all but the smallest 45-60 unit.

Pump Operation

When the pump's drive shaft is driven by a prime mover (Electric motor, Engine etc.), the cylinder block being spline coupled to the shaft will also rotate. If the swash plate has been tilted, the pistons arranged in the cylinder block due to the shoe being retained on the swash plate surface will both rotate with the cylinder block and reciprocate once per revolution. Paying attention to one such piston then it will move away from the valve plate for half a rotation (suction stroke) and move towards the valve plate for the second half of rotation (oil delivery stroke). The larger the tilt angle, the longer the piston stroke and the higher is the pump's displacement. As the swash plate tilting angle approaches so the piston makes no stroke and thereby delivers no oil.

Through Drive Option

By suitable use of adaptors and splined couplings a wide variety of through drive mounting capabilities are available. The formation of these kits and their relevant part numbers will be found in the installation section.



Technical Data

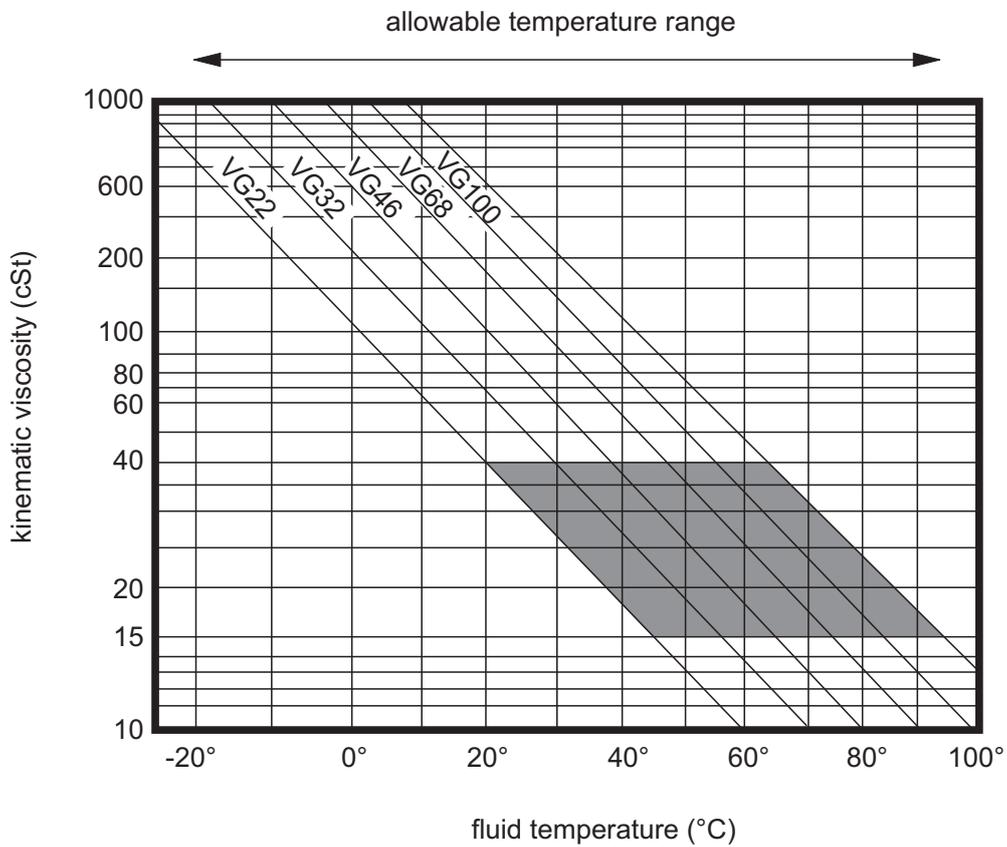
For applications outside the following parameters, please consult Kawasaki Precision Machinery (UK) Ltd.

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 207 bar. In applications where fire resistant fluids are required consult Kawasaki Precision Machinery (UK) Ltd. The following chart illustrates the effects on pump life when non-standard fluids are used:

Fluid selection



Technical Data (continued)**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 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 and in addition a 150 micron mesh suction strainer is recommended. Typical filtration circuits are shown in the K3VL brochure.

To prevent contaminant ingress from the external environment a 5 to 10 micron filter within the tanks 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 9).

Working Fluid Types**Anti-Wear Type Hydraulic fluid**

It is generally recommended to use an anti-wear type hydraulic fluid as the mineral oil type when the operating pressure exceeds 210 bar.

Fire-resistant Fluids

Some kind of fire-resistant fluids require special materials for seals, paint and metal finishing. Please consult Kawasaki Precision Machinery (UK) Limited 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 stabilised. 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 Kawasaki Precision Machinery (UK) Limited. The following table provides an overview of the precautions and characteristics that can be expected with these types of fluids.



Technical Data (continued)

Fire-resistant Fluids (continued)

parameter:- / fluid type:-	mineral oil	polyol ester	water glycol
Maximum Pressure (bar)	320	320	210
Recommended Temperature Range (deg C)	20 ~ 60	20 ~ 60	10 ~ 50
Cavitation susceptibility	○	△	△
Expected life expectancy compared to mineral oil	100%	50% ~ 100%	20% ~ 80%

○ recommended △ usable (higher density)

Technical Data (continued)**Pump Start Up Precautions****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 spherical bushes that need to be continuously lubricated. Part seizure or total premature failure will occur very quickly if this procedure is not rigidly followed.

Piping & Circuit Checking

Check to see that the piping and full hydraulic circuit is completed and that any gate valves etc. are open.

Direction of Rotation

Check to ensure that direction of rotation is correct and that the suction 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, as stated previously, that the maximum steady state drain line pressure at the pump casing does not exceed 1 bar. (Maximum peak pressure 4 bar). A suitable drain line hose and drain line filter when required must be selected to ensure this.

Long Term Out of Usage

It is undesirable to leave the pump out of use for a long period of 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.

Pumps

Technical Data (continued)

Specifications

The following table indicates all of the specifications for the complete K3VL pump range from 45-200cc. More detailed efficiency curves and other related information will be found in a later section.

pump model			45		60			
capacity		cc/rev	45		60			
pressure ratings	rated	bar	320		250			
	peak	bar	350		280			
speed ratings	self prime	rpm	2700		2400			
	max. boosted	rpm	3250		3000			
minimum operating speed		rpm						
case drain pressure	max. continuous	bar						
	peak	bar						
weight		Kg	25					
case fill capacity		L	0.6					
maximum allowable input torque		Nm	150	225		150	225	
mounting flange		type	SAE B	SAE B-B	ISO100	SAE B	SAE B-B	ISO100
		bolts	2	2	2	2	2	2
input shaft		type	SAE B-B	SAE B-B	ISO 25mm	SAE B-B	SAE B-B	ISO 25mm
		form	Spline	Spline & Key	Key	Spline	Spline & Key	Key
allowable through drive torque	SAE "A"	Nm						
	SAE "B"							
	SAE "B-B"							
	SAE "C"							
	SAE "C-C"							
	SAE "D"							
SAE "E"								
temperature range		°C						
viscosity range		cSt						
maximum contamination level								

80		112		140		200	
80		112		140		200	
320						350	
350						400	
2400		2200		2100		1900	
3000		2700		2500		2200	
600							
1							
4							
34		60		60		100	
0.8		1.4		1.4		3	
400		981*1		981*1		1000	1800
SAE C	ISO125	SAE	ISO180	SAE D	ISO180	SAE E	SAE E
2	2	2 and 4 bolt	4	2 and 4 bolt	4	4	4
SAE C	ISO 32mm	SAE C, C-C and D	ISO 45mm	SAE C, C-C and D	ISO 45mm	SAE D	SAE F
Spline & Key	Key	Spline & Key	Key	Spline & Key	Key	Spline & Key	Spline
61							
150							
225							
400							
				680			
				699			
						699	
-20 – + 95							
10 to 1,000							
-18/15 ISO 4406 or SAE AS 4059E Table 1 Class 9 (NAS 9)							

Technical Data (continued)**Specifications***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 1 bar. If the flow is reduced, or if 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.

***1**

In case of reduced torque input shafts

SAE C shaft Input Torque reduced to 400 Nm

SAE CC shaft Input Torque Reduced to 680 Nm



Ordering Code – K3VLSeries

K3VL 80 / B - 1 0 R S S - L 0 A 12D - /1-H*

K3VL Series Pump

Maximum displacement

45	45 cm ³ /rev
60	60 cm ³ /rev
80	80 cm ³ /rev
112	112 cm ³ /rev
140	140 cm ³ /rev
200	200 cm ³ /rev

Design series

B

Hydraulic Fluid Type

– Mineral oil
W Water glycol (not K3VL 200)

All other fluids contact Kawasaki

Circuit Type

1 Open Circuit

Through drive & porting

0	Single pump, 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 through drive, side ported
D	SAE-D through drive, side ported
E	SAE-E (K3VL 200 only)
R	Single pump, rear ported
S	Single pump with plastic cover (Stock Pump)
N	Single pump with Steel cover, side ported

Direction of rotation

R Clockwise rotation
L Counter-clockwise rotation

Mounting flange & shaft

S	SAE spline & mount (see drawing for detail)
M	ISO key & mount (see drawing for detail) (not 200)
F	SAE-D mount with SAE-F spline shaft
K	SAE key & mount (see drawing for detail)
T*	SAE-B spline & SAE- B 2 bolt mount for 45 (not 80) SAE- CC spline & SAE- D 4 bolt mount for 112/140 (not 200)
U*	45 only, SAE-B key & SAE-B 2 bolt mount
C*	112/140 only, SAE-C spline & SAE- C 2 bolt mount
R*	112/140 only, SAE- C spline & SAE- D 4 bolt mount
X*	112/140 only, SAE- C key & SAE- C 2 bolt mount
W*	112/140 only, SAE -CC spline & SAE- C 2 bolt mount

(*Non standard options)

Additional control options

Blank Without additional limiter

Torque limit control

/1-S* Special low setting contact Kawasaki
/1-L* Low setting range
/1-M* Medium setting range
/1-H* High setting range

Displacement control (Without torque limit)

/1-E0 Electrical displacement control (pilot pressure required)
/1-Q0 Pilot operated displacement control

Unloader solenoid

(Type N below)

blank	For all other options except PN & LN
115A	115V AC, 50.60Hz, DIN 43550 Plug
235A	230V AC, 50.60Hz, DIN 43550 Plug
12D	12V DC, DIN 43550 Plug
24D	24V DC, DIN 43550 Plug

Design

Additional pressure control

0	No additional control
N	With integrated unloading valve
V	With integrated remote control valve
M	With integrated unloading control valve
1	Load sensing only (R4 plugged)

Control device configuration

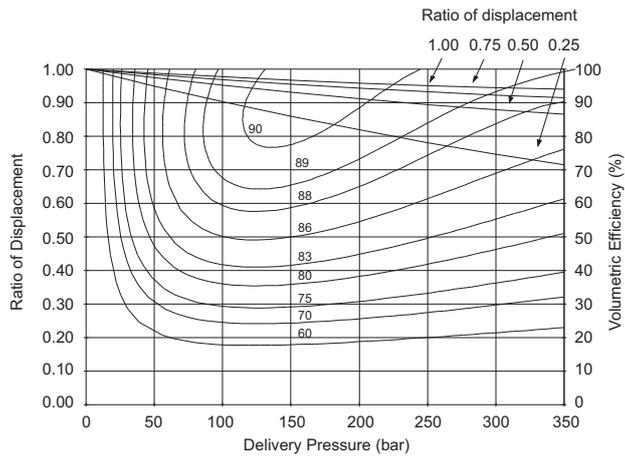
P	Remote pressure compensator
L	Load sensing & pressure control

Porting threads

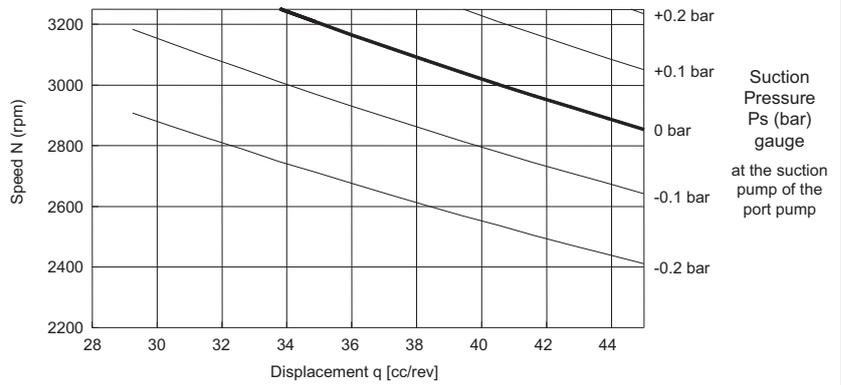
M	Metric threaded
S	UNC threaded

Performance K3VL45

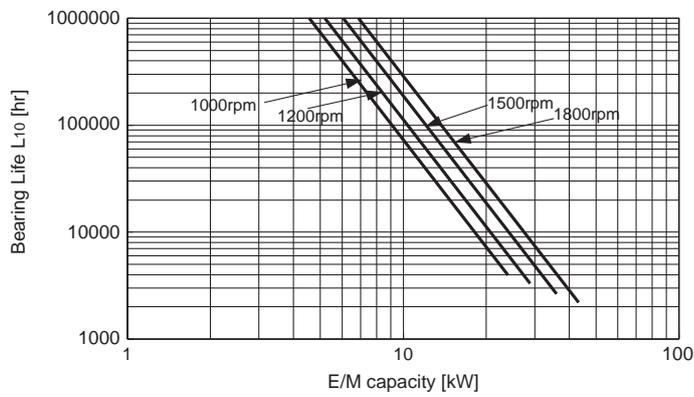
Pump Efficiency (%)



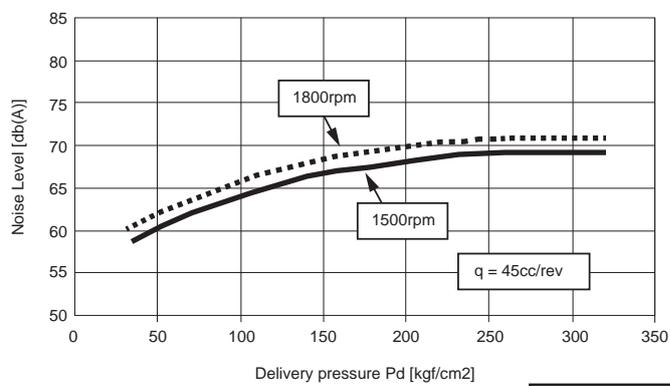
Self Priming Capability



Bearing Life

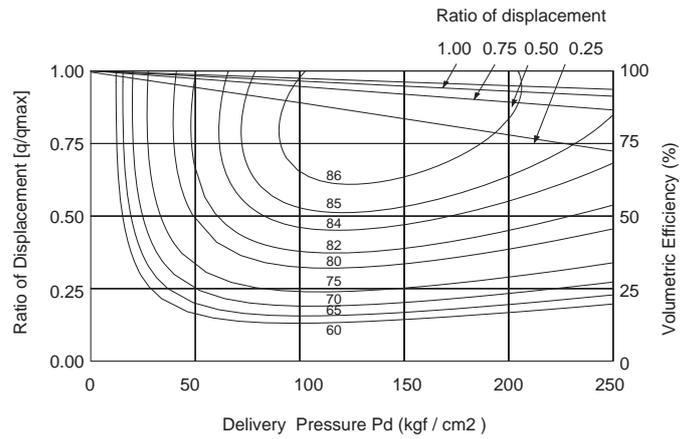


Noise Level

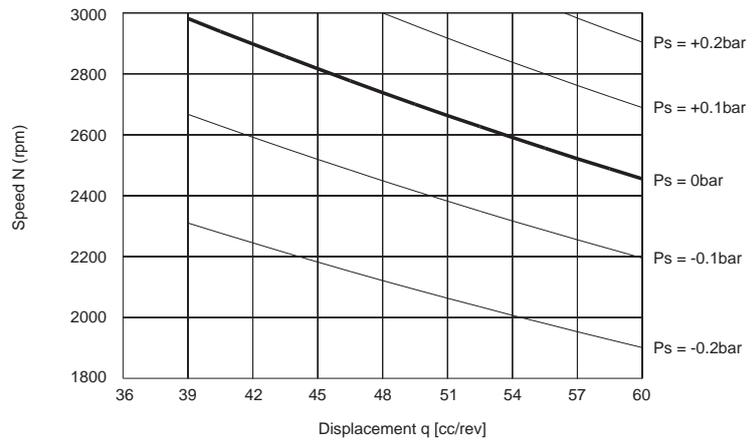


Performance K3VL60

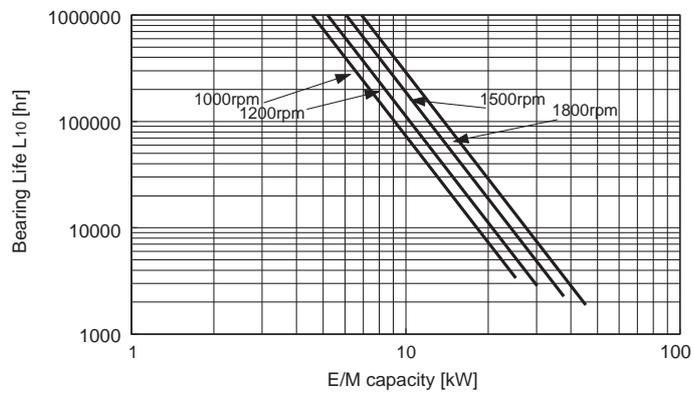
Pump Efficiency (%)



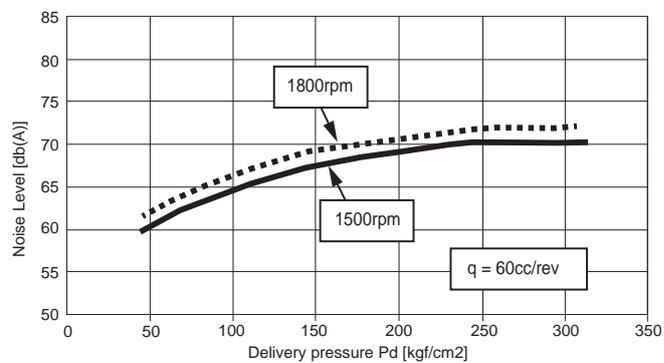
Self Priming Capability



Bearing Life

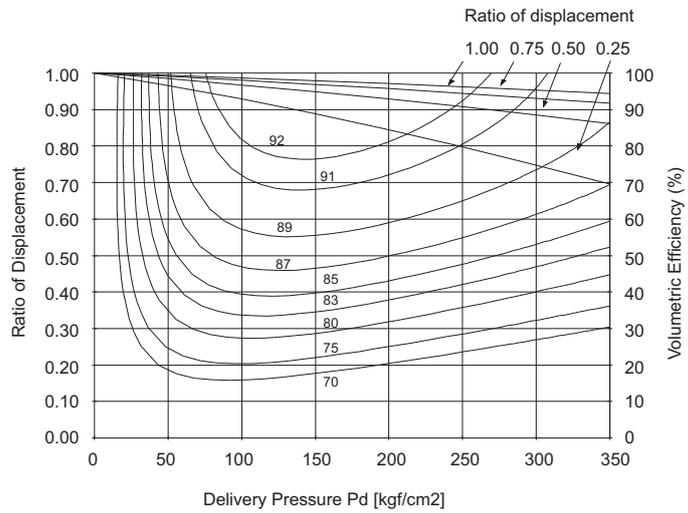


Noise Level

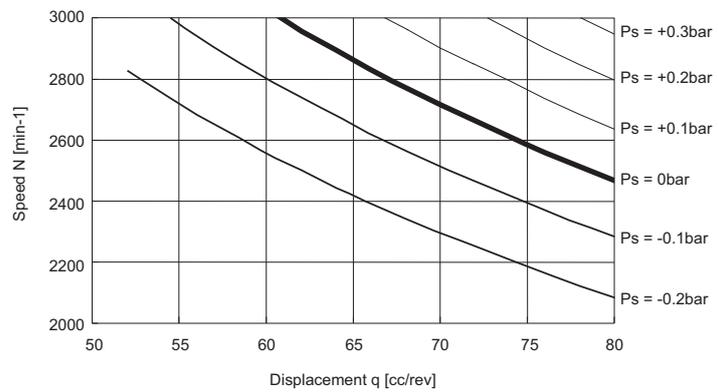


Performance K3VL80

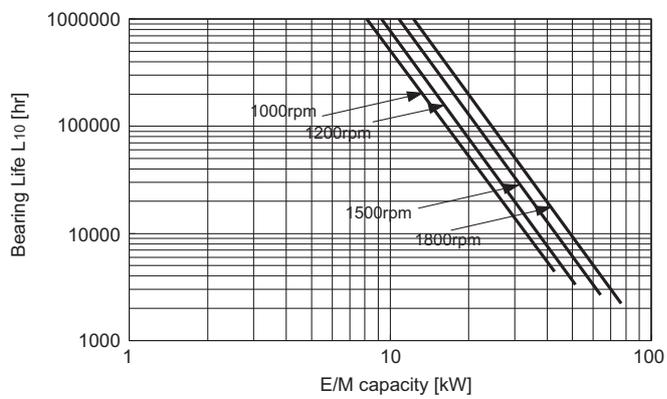
Pump Efficiency (%)



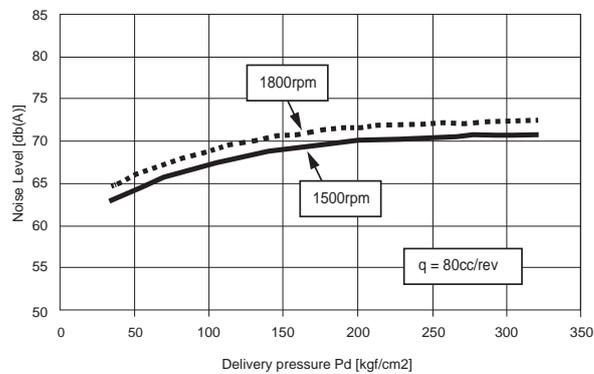
Self Priming Capability



Bearing Life

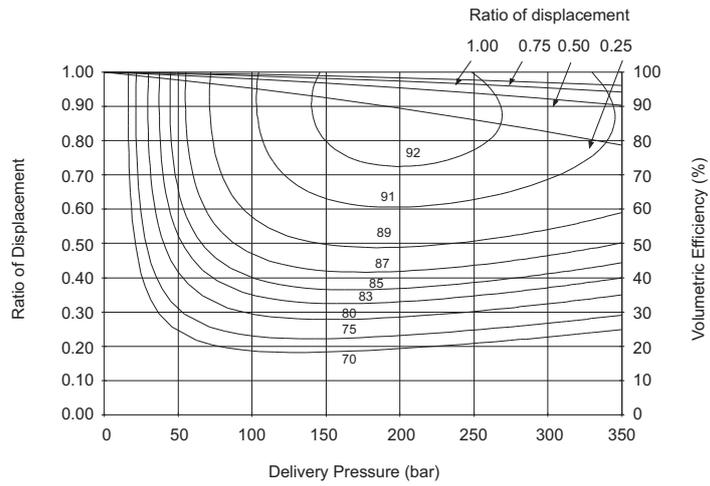


Noise Level

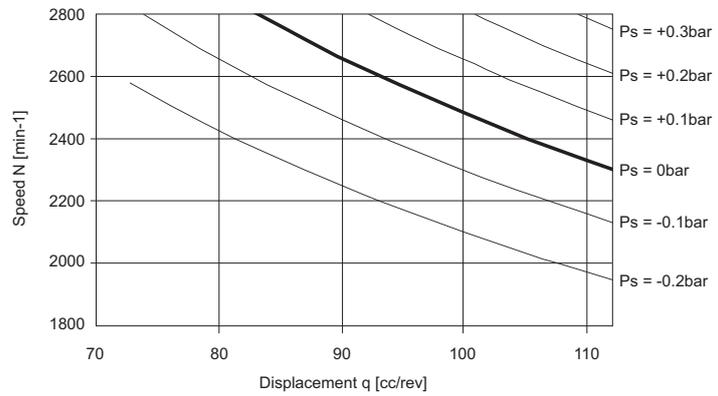


Performance K3VL112

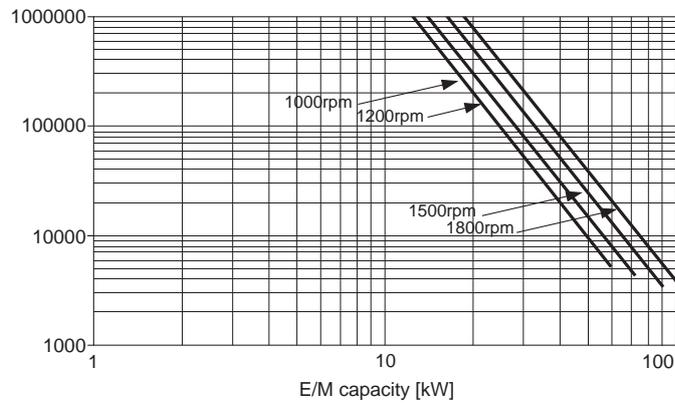
Pump Efficiency (%)



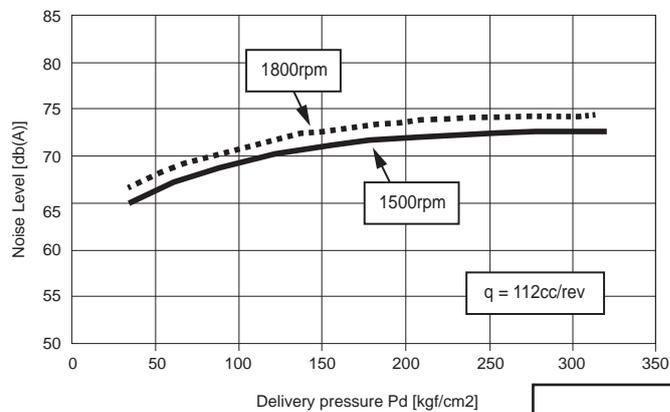
Self Priming Capability



Bearing Life

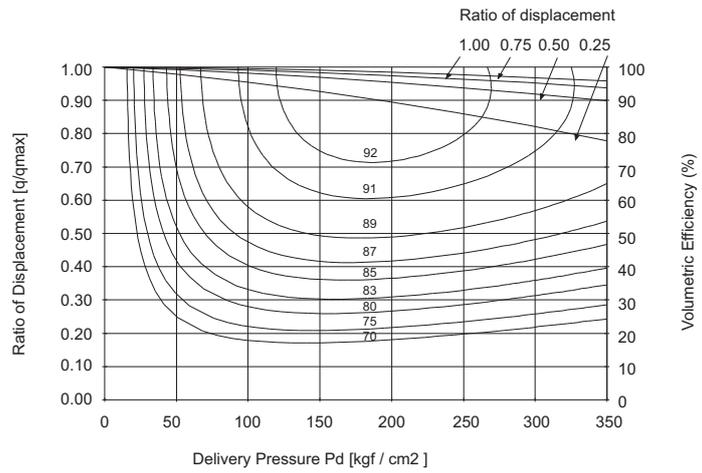


Noise Level

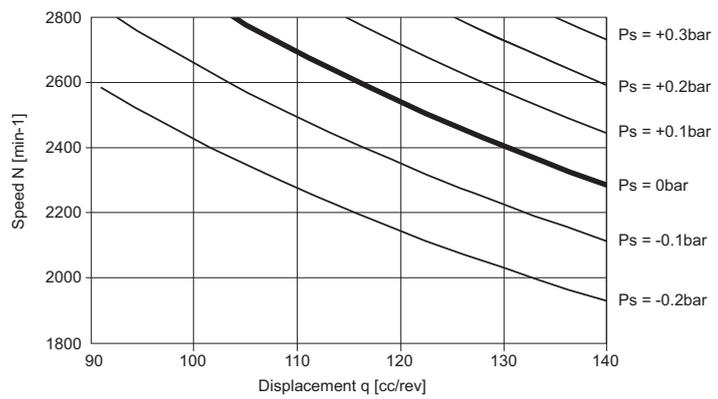


Performance K3VL140

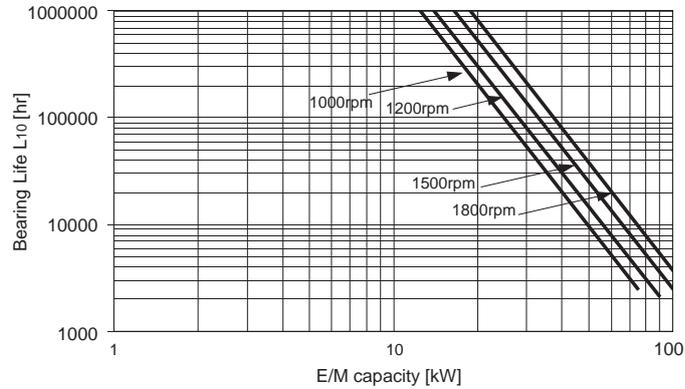
Pump Efficiency (%)



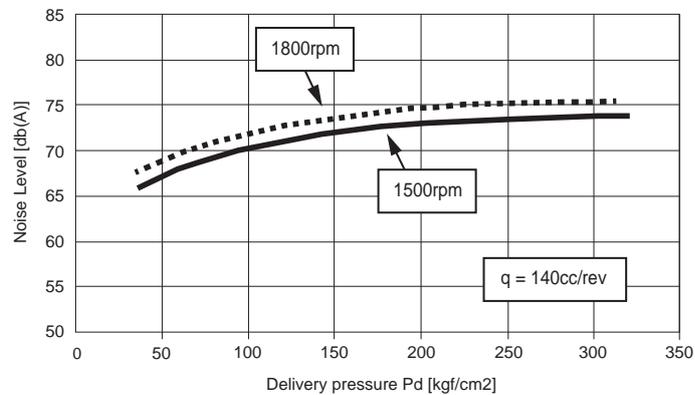
Self Priming Capability



Bearing Life

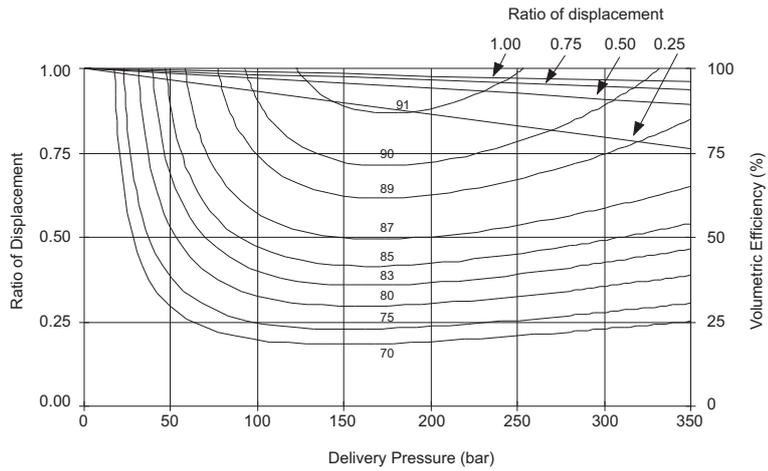


Noise Level

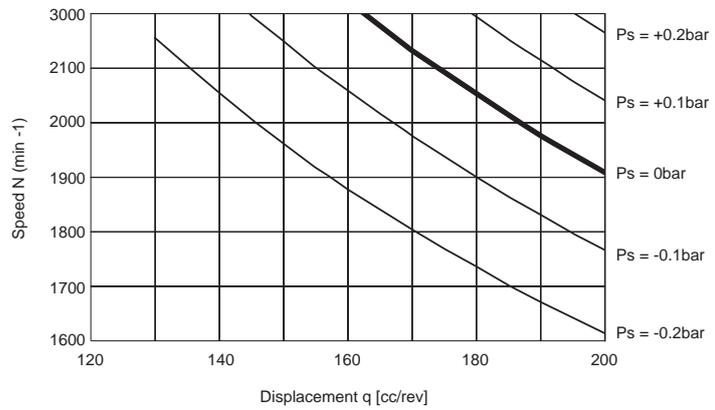


Performance K3VL200

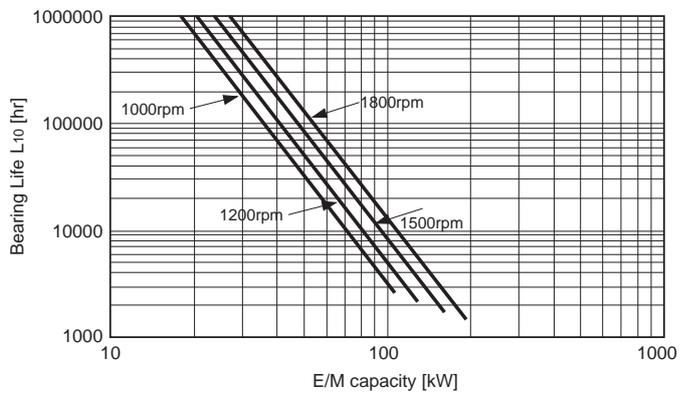
Pump Efficiency (%)



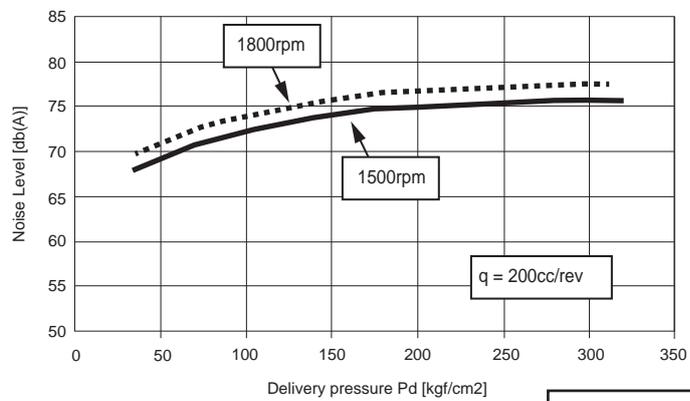
Self Priming Capability



Bearing Life

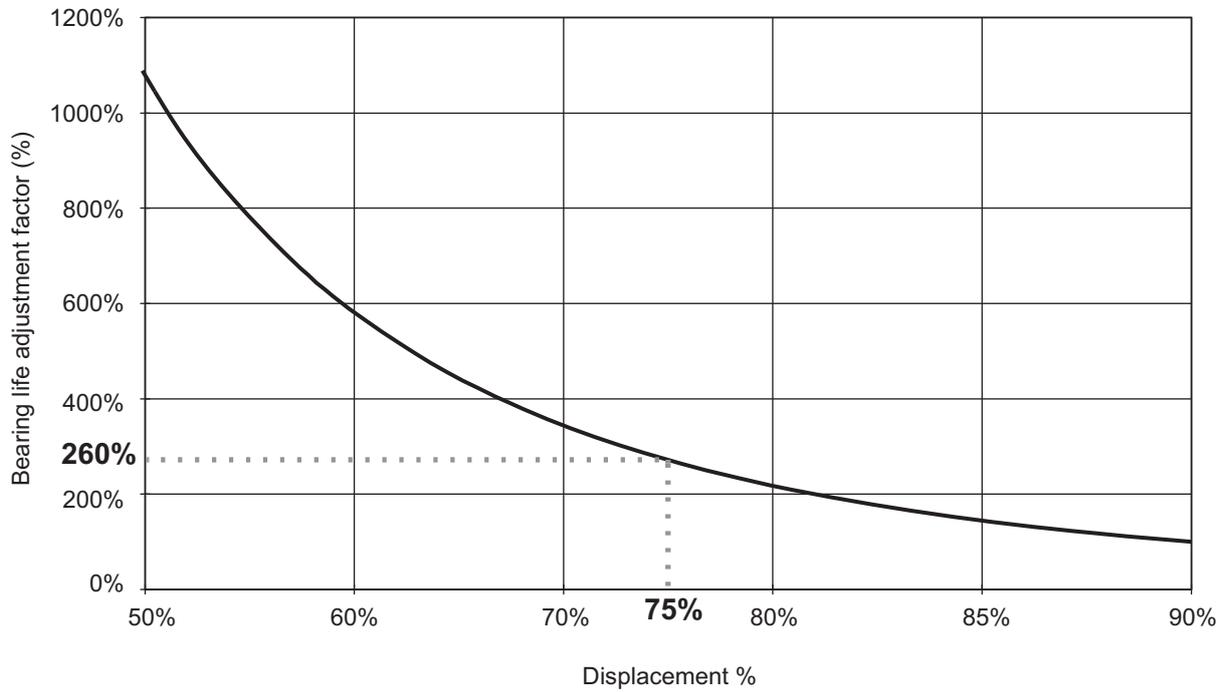


Noise Level



Bearing Life (continued)

Bearing Life Correction Factors for Partial Displacement



All bearing life curves on the previous pages refer to L10 life at full displacement. The foregoing curve is therefore to be used where duty cycle considerations require one to compute weighted life, which include partial displacement conditions.

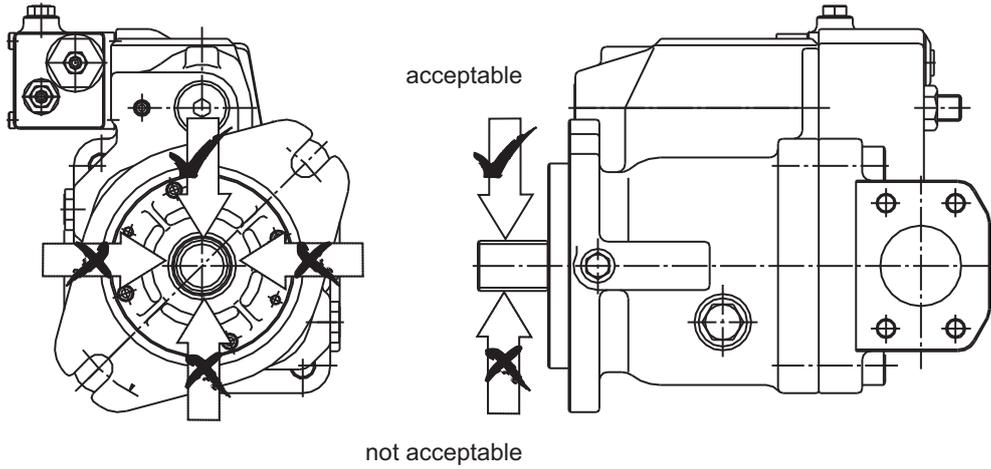
For example as shown above if the bearing life at full displacement from the previous graphs was say 50,000 hours, then at the same operating condition with only 75% displacement the bearing life would be 260% of 50,000 hours or 130,000 hours.



Radial Loading Capacity

No axial shaft loading possible Radial loading is achievable but in specific orientation:-

In addition because of the high bearing capacity of this front bearing, radial shaft loading can be allowed provided that its orientation is such that it is this front bearing that takes the additional load (See diagram below).



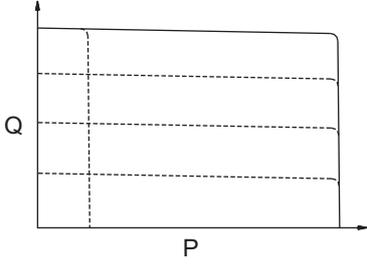
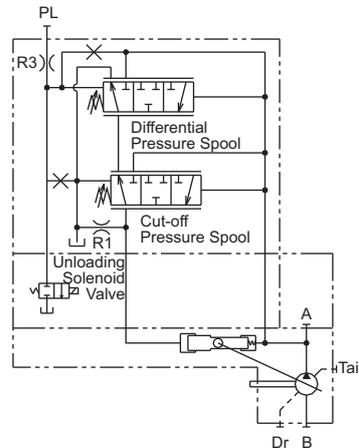
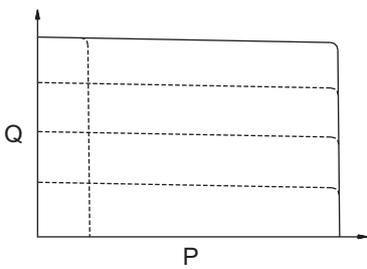
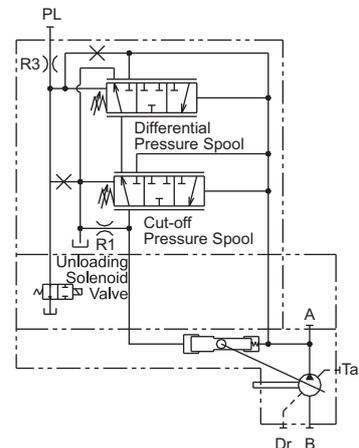
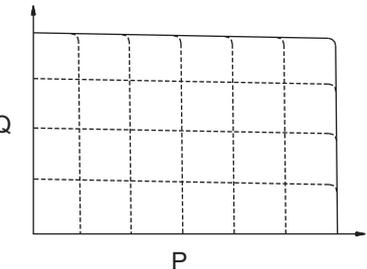
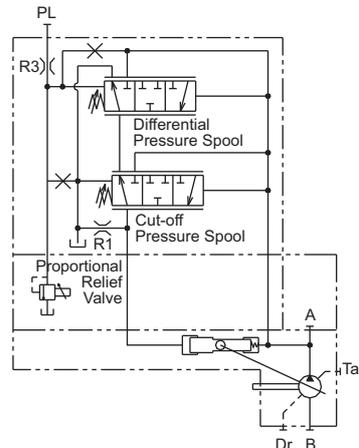
Functional Description of Regulator

Key to Hydraulic Circuit Annotations	
Annotations	Description
A ₁	Main pump delivery
A ₂	Auxiliary pump delivery
a ₁	Gauge port main pump delivery
a ₂	Gauge port auxiliary pump delivery
B ₂	Gear pump suction
B ₁	Main pump suction
b	Suction gauge port
Dr	Drain
Pi	Pilot pressure
Pc	Remote pilot port, Pressure compensator
Pi	Pilot port displacement control
P _L	Load sense port
Psv	Pressure assist port
Ps	Inlet pressure

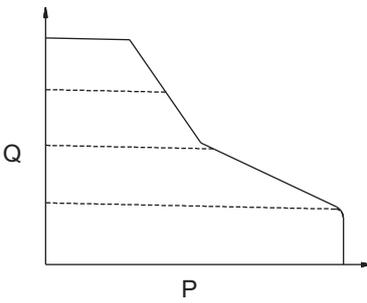
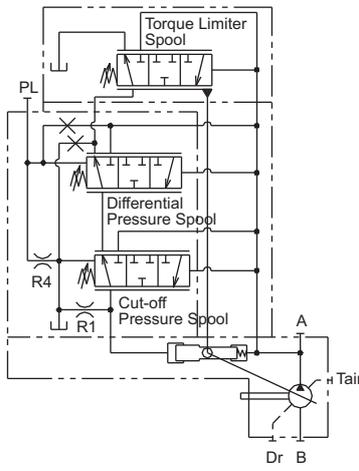
Notes: The optional attached gear pump is recommended for all displacement control options. Hydraulic circuit diagrams illustrate the attached gear pump.

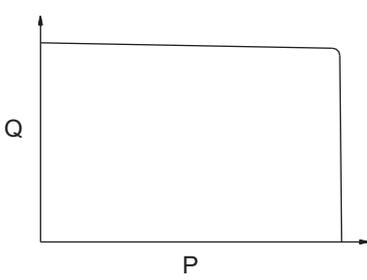
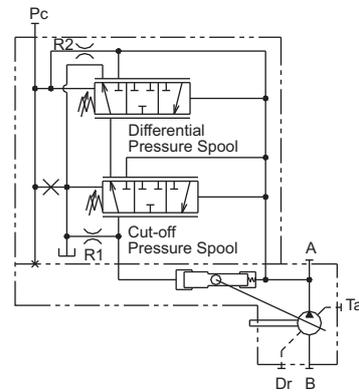
Regulator Code	Control Curves	Hydraulic Circuit
<p>L0/L1 Load Sense and Pressure Cut-off</p> <p>Pump displacement is controlled to match the flow requirement as a function of the system differential pressure (load pressure vs delivery pressure). In addition, there is a pressure cut off function incorporated into the control. With the L1 option, the bleed-off orifice R4 is plugged.</p>		

Functional Description of Regulator (continued)

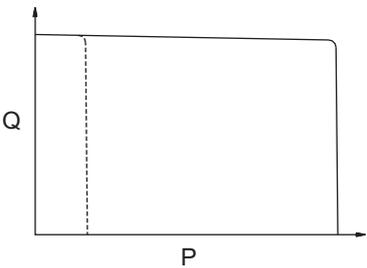
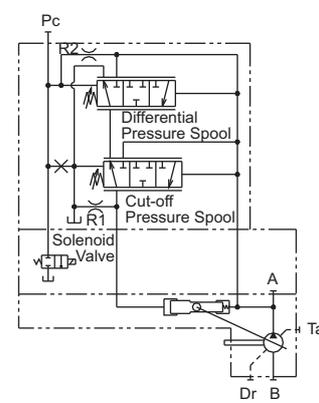
Regulator Code	Control Curves	Hydraulic Circuit
<p>LN Load Sense and Pressure Cut-off with Integrated Unloading Valve (Normally Closed)</p> <p>An integrated unloading valve is sandwiched between the Load Sense regulator and pump to effectively de-stroke the swashplate when an electric signal is provided.</p>		
<p>LM Load Sense and Pressure Cut-off with Integrated Unloading Valve (Normally Open)</p> <p>An integrated unloading valve is sandwiched between the Load Sense regulator and the pump. An electrical signal must be provided to prevent the Load Sense line from draining.</p>		
<p>LV Load Sense and Pressure Cut-off with Integrated Proportional Relief Valve</p> <p>An integrated proportional relief valve is sandwiched between the Load Sense regulator and pump to control the maximum pressure setting by varying an electric signal to the valve. A separate amplifier is required.</p>		

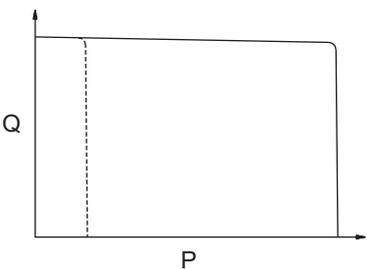
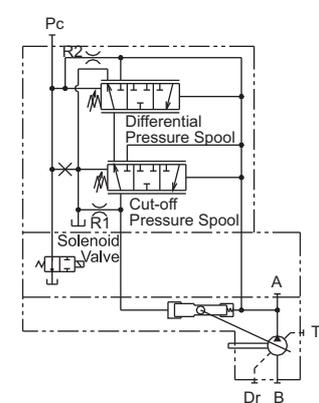
Functional Description of Regulator (continued)

Regulator Code	Control Curves	Hydraulic Circuit
<p>L0/L1 Load Sense and Pressure Cut-off with Torque Limiting</p> <p>L0/L1 control functions as previously noted. In response to a rise in delivery pressure the swashplate angle is decreased, restricting the input torque. This regulator prevents excessive load against the prime mover. The torque limit control module is comprised of two springs that oppose the spool force generated by the system pressure. By turning an outer and inner spring adjustment screw, the appropriate input torque limit can be set.</p>		

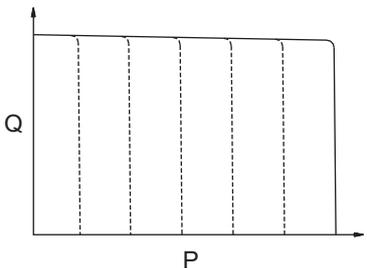
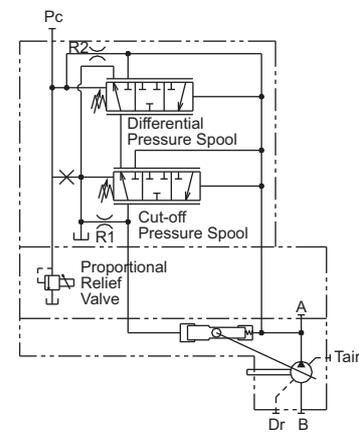
Regulator Code	Control Curves	Hydraulic Circuit
<p>P0 Pressure Cut-off</p> <p>As system pressure rises to the cut-off setting, the swashplate de-strokes to prevent the system pressure from exceeding the compensator setting. It is imperative that a safety relief valve be installed in the system.</p> <p>Note: By connecting the Pc port to a remote pressure control, variable pump pressure control can be achieved.</p>		

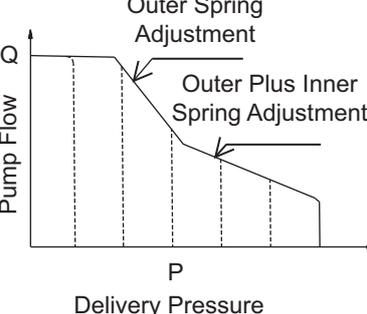
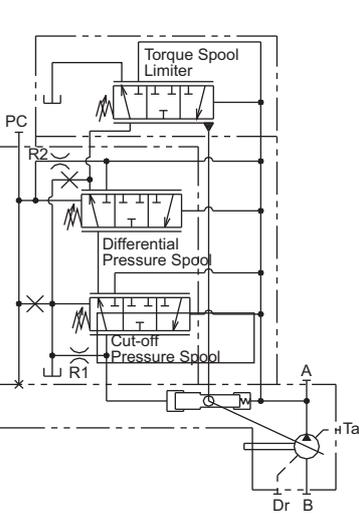
Functional Description of Regulator (continued)

Regulator Code	Control Curves	Hydraulic Circuit
<p>PN Pressure Cut-off with Integrated Unloading Valve (Normally Closed)</p> <p>An integrated unloading valve is sandwiched between the Pressure Cut-off regulator and pump to effectively de-stroke the swashplate when an electric signal is provided.</p>		

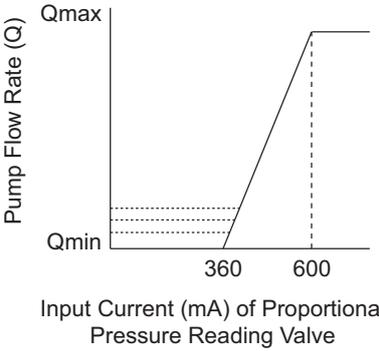
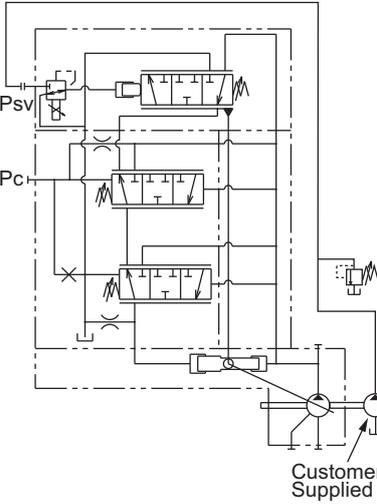
Regulator Code	Control Curves	Hydraulic Circuit
<p>PM Pressure Cut-off with Integrated Unloading Valve (Normally Open)</p> <p>An integrated unloading valve is sandwiched between the Pressure Cut-off regulator and the pump.</p> <p>An electrical signal must be provided to prevent the Pressure cut-off line from draining.</p>		

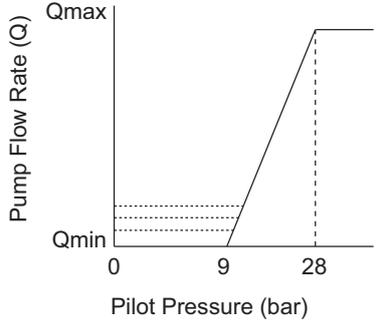
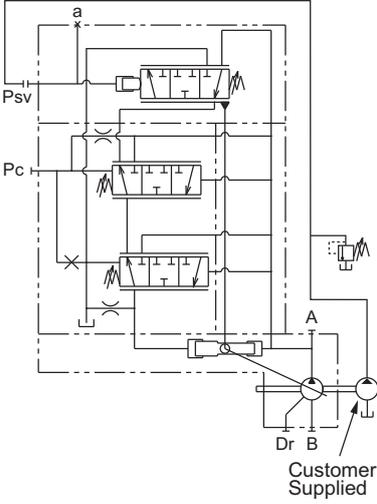
Functional Description of Regulator (continued)

Regulator Code	Control Curves	Hydraulic Circuit
<p>PV Pressure Cut-off with Integrated Proportional Relief Valve</p> <p>An integrated proportional relief valve is sandwiched between the Pressure Cut-off regulator and the pump to control the maximum pressure setting by varying an electric signal to the valve.</p> <p>A separate amplifier is required.</p>		

Regulator Code	Control Curves	Hydraulic Circuit
<p>P0/1 Pressure Cut-off with Torque Limiting</p> <p>P0/1 control functions as previously noted. In response to a rise in delivery pressure the swashplate angle is reduced, restricting the input torque. This regulator prevents excessive load against the prime mover.</p> <p>The torque limit control module is comprised of two springs that oppose the spool force generated by the system pressure. By turning an outer and inner spring adjustment screw, the appropriate input torque limit can be set.</p> <p>Note: By connecting the Pc port to a remote pressure control, variable pump pressure control can be achieved.</p>		

Functional Description of Regulator (continued)

Regulator Code	Control Curves	Hydraulic Circuit
<p>/1-E0 Electrical Displacement Control</p> <p>Varying the input current signal to the pump controller's electronic proportional pressure reducing valve (PPRV) allows the user to control the pump displacement. As the current signal to the PPRV increases, the pump displacement increases proportionally.</p> <p>Note: An external pressure supply of 40 bar is required at the PSV Port (50bar max).</p>		

Regulator Code	Control Curves	Hydraulic Circuit
<p>/1-Q0 Pilot Operated Displacement Control</p> <p>Varying the input pressure signal to the PSV port allows the user to control the pump displacement. As the pressure signal to the PSV increases, the pump displacement increases proportionally.</p>		

Torque Limiter Settings

The following tabulations show the power limitation at various electric motor speeds for a specific pump. When selecting a control setting please ensure that the power limitation of a particularly sized electric motor to your national standard is not exceeded.

K3VL45				
KW	970	1150	1450	1750
3.7	S3	S4		
5.5	L3	S1	S3	S4
7.5	L1	L2	L4	S2
11	M1	M3	L1	L2
15	H3	H4	M2	M4
18.5		H2	H4	M2
22			H3	H4
30				H1
37				
45				
55				
75				
90				

K3VL60				
KW	970	1150	1450	1750
3.7				
5.5	S2	S4		
7.5	L4	S1	S3	
11	M4	L2	L4	S1
15	M2	M3	L1	L3
18.5	H2	M1	M3	L1
22		H2	M2	M3
30			H1	H3
37				H1
45				
55				
75				
90				

K3VL80				
KW	970	1150	1450	1750
3.7				
5.5	S2	S4		
7.5	L6	S1	S3	
11	L2	L4	L6	S1
15	M4	L1	L3	L5
18.5	M1	M3	L1	L3
22	H3	M1	M4	L1
30	H1	H2	H4	M2
37			H2	H4
45			H1	H2
55				H1
75				
90				

K3VL112				
KW	970	1150	1450	1750
3.7				
5.5				
7.5	S5	S6		
11	S1	S3	S5	S6
15	L3	L4	S2	S4
18.5	M4	L2	L4	S2
22	M2	M4	L3	L4
30	H4	M1	M3	L1
37	H2	H3	M1	M3
45		H2	H4	M1
55			H2	H4
75				H1
90				

K3VL140				
KW	970	1150	1450	1750
3.7				
5.5				
7.5				
11	S2	S4		
15	L6	S1	S3	
18.5	L3	L5	S1	S3
22	L1	L3	L6	S1
30	M2	M3	L2	L4
37	H4	M1	M3	L2
45	H2	H4	M2	M3
55		H2	H4	M2
75			H1	H3
90				H1

K3VL200				
KW	970	1150	1450	1750
3.7				
5.5				
7.5				
11				
15				
18.5	S1			
22	L4	S1		
30	L2	L3	L5	S2
37	M3	L1	L3	L5
45	M1	M3	L2	L3
55	H5	M1	M3	L2
75	H1	H3	H6	M2
90		H1	H4	H6
110			H2	H4
132				H2

 **S-rating Springs**
Please contact Kawasaki

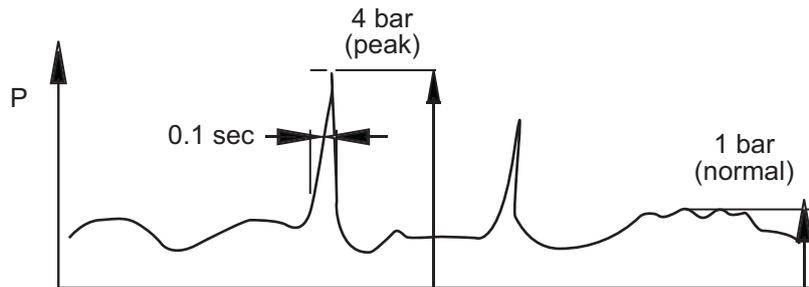


Installation

Recommended Pump Mounting

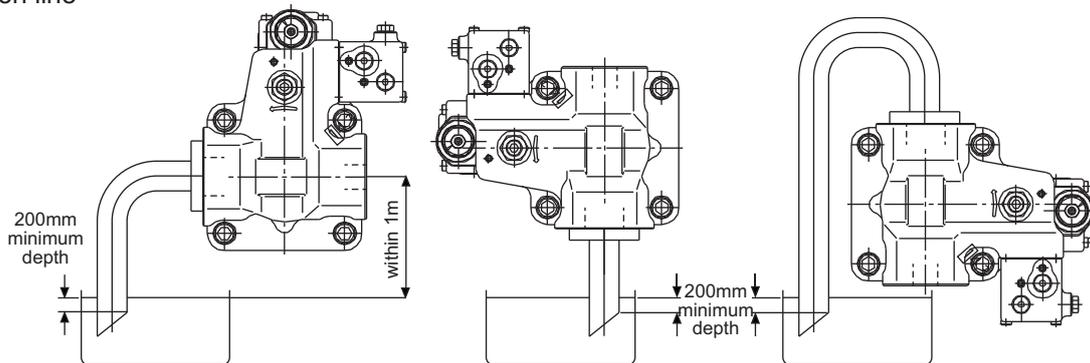
The pump should be mounted horizontally with the case drain piping initially rising above the level of the pump before continuing to the tank as shown in the illustration below. Do not connect the drain line to the suction line.

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



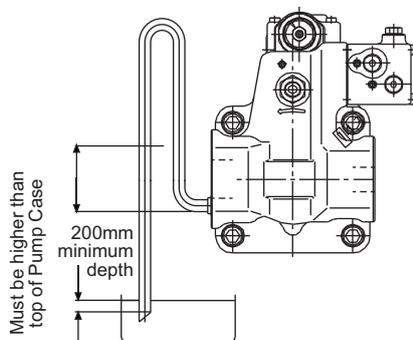
Mounting the Pump Above the Tank

Suction line



Drain line

“Goose neck” configuration is required, this prevents direct drop of oil level in the pump case.



Cautions

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

Installation (continued)

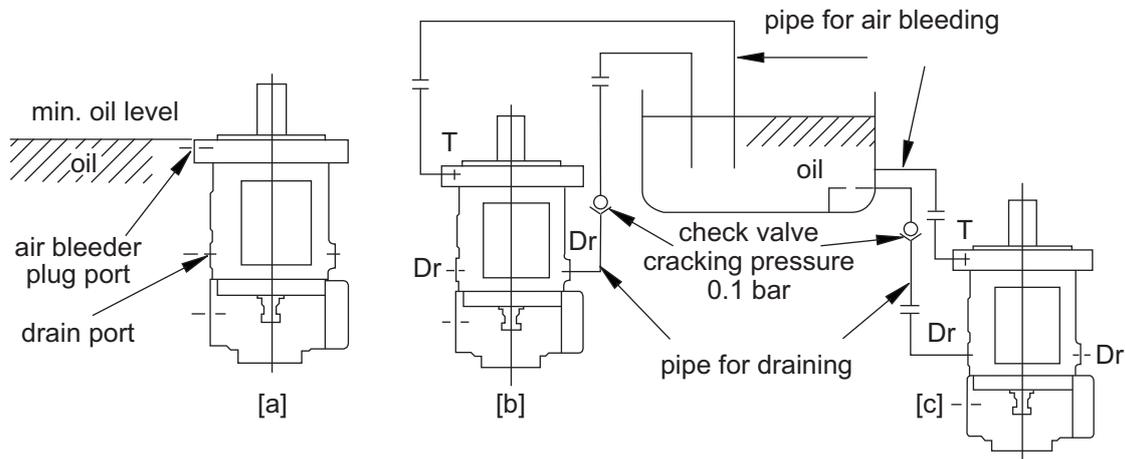
Mounting the Pump Vertically (shaft up)

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

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 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. 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. Recommended Kawasaki check valves are as follows: (refer to Kawasaki industrial valve information - data sheet C1001)

Model	Recommended Kawasaki check valve
K3VL45/60	C10G – 10/01-*
K3VL80	C15G – 10/01-*
K3VL112	C15G – 10/01-*
K3VL140	C15G – 10/01-*
K3VL200	C15G – 10/01-*

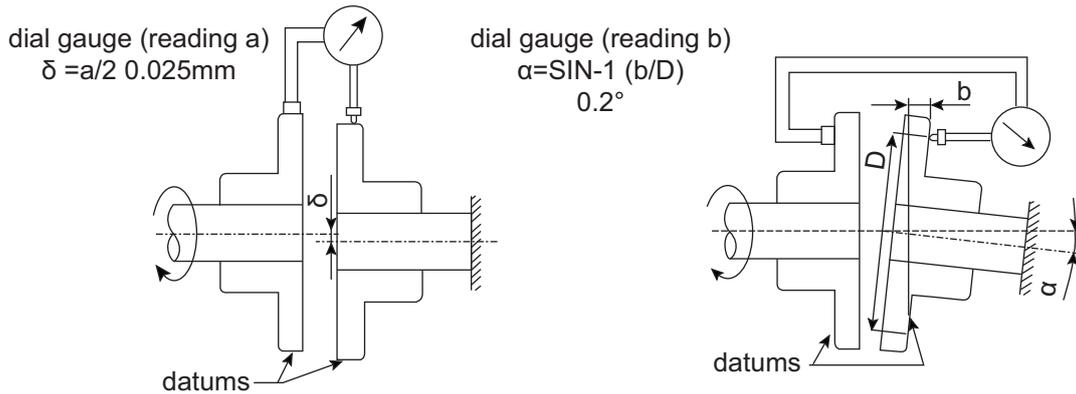


Drive Shaft Coupling

Use a flexible coupling to connect the pump shaft to an engine flywheel or electric motor shaft. Alignment should be within 0.05mm 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 Kawasaki Precision Machinery (UK) Ltd. for recommendations.

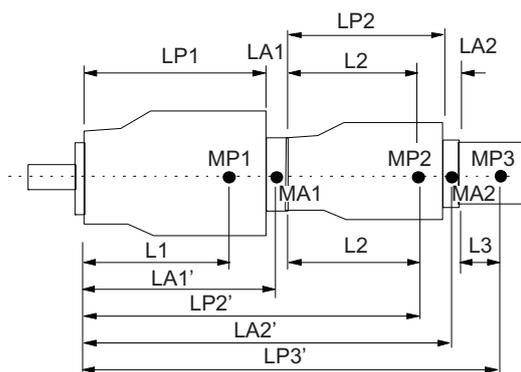
Do not force the coupling on or off the pump shaft. Use the threaded hole in the end of the pump shaft to fix or remove the coupling.



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

Through Drive Limitations

Apart from predefined maximum throughput limitations, one must also ensure that to prevent a possible excessive bending moment occurring that the maximum combined bending moment of the combination is not exceeded as determined in the following expression



- MPX = mass of pump [kg]
- LPX = length of pump [mm]
- Lx = distance of CofG from pump mounting face [mm]
- MAX = mass of adaptor kit [kg]
- LAX = width of adaptor kit [mm]

$$\begin{aligned} \text{Bending Moment} = & ((L1.mP1) + (LA1'.mA1) + (LP2'.mP2) + (LA2'.mA2) + LP3'.mP3) + \dots / 102 [Nm] \\ & ((L1.mP1) \\ & + (LP1+(LA1/2)).mA1 \\ & + (LP1+LA1+L2).mP2 \\ & + (LP1+LA1+LP2(LA2/2)).mA2) \\ & + (LP1+LA1+LP2+LA2).mP3) \\ & + \dots) / 102 \end{aligned}$$



Through Drive Limitations (continued)**Pump overall length [mm] (Lp)**

Pump Size	Single Pump Type "0"	Stock Pump Type "S"
45/60	244	244
80	272	272
112/140	308	308
200	359	359

Pump approximate weight [kg] (Mp)

Pump Size	Without torque limiter		With torque limiter	
	Single Pump Type "0"	Stock Pump Type "S"	Single Pump Type "0"	Stock Pump Type "S"
45/60	25	28	27	30
80	35	38	37	40
112/140	65	69	67	71
200	95	103	97	105

Pump CofG from mount [mm] (L)

Pump Size	Single Pump Type "0"	Stock Pump Type "S"
45/60	120	120
80	130	130
112/140	150	150
200	190	190

Pump Size	Maximum Permissible Bending Moment (Nm)
45/60	137
80	244
112/140	462
200	930

Adaptor Kits weight (Ma) & Width (La)			
Pump size	Adaptor Kit	Weight (Max)	Width (Lax)
45/60	SAE "A"	0	0
	SAE "B" & "BB"	2	20
80	SAE "A"	0	0
	SAE "B" & "BB"	3	20
	SAE "C"	4	24.5
112 & 140	SAE "A"	0	0
	SAE "B" & "BB"	3	25
	SAE "C" & "CC"	5	30
	SAE "D"	10	43
200	SAE "A"	1	6
	SAE "B" & "BB"	8	25
	SAE "C" & "CC"	8	30
	SAE "D"	10	38
	SAE "E"	15	38

Electrical Displacement Control Application

The standard minimum flow setting for the K3VL pump is 0.5-3.0% of the maximum pump delivery. The pumps minimum displacement stop can be modified if a greater minimum flow rate is required. In order for the electronic displacement control to function, a minimum pilot pressure for 40 bar must be supplied to the Psv port on the regulator. A gear pump attached to the rear of the K3VL pump or an external pressure source can be used to provide the required pilot pressure.

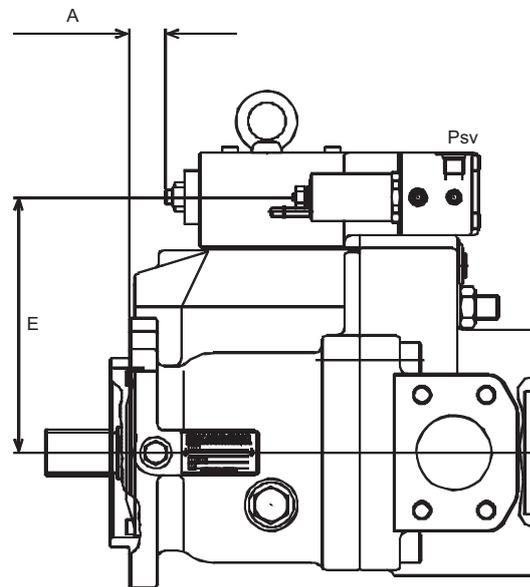
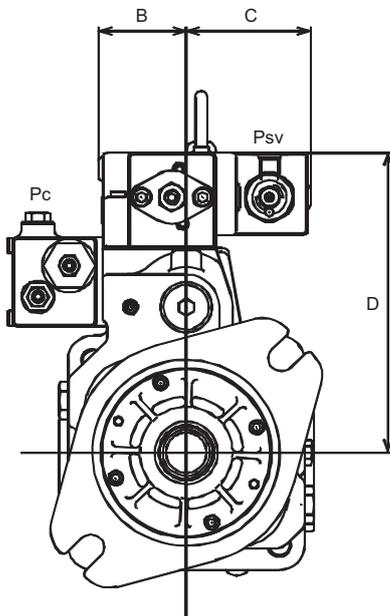
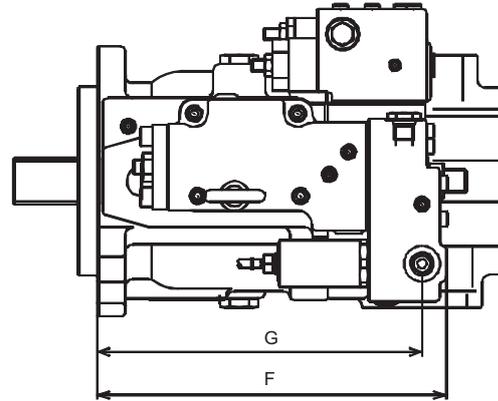
Proportional Pressure Reducing Valve Specification

Maximum Pilot Pressure	:	50 bar If higher pressure required contact KPM
Max Flow	:	10 l/min
Hydraulic oil	:	Mineral oil
Oil temp range	:	-20~+90°C
Viscosity range	:	5~500 cst
Allowable contamination	:	NAS grade 10 and below
Electrical specifications,		
Rated current	:	700 mA
Recommended dither	:	80 Hz / 200 mAp-p
Coil resistance	:	17.5 (at 20°C)
Ambient temperature range	:	-30~+80°C
Water resistance	:	According to JIS D 0203 S2



Unit Dimensions (continued)

Electrical Displacement Control



Installation Dimensions (mm)

Pump Size	A	B	C	D	E	F	G
K3VL45/60	21	52	90	187	157	226	210
K3VL80	25	59	83	202	172	233	217
K3VL112/140	38	64	78	244	214	247	231
K3VL200	57	61	80	258	229	257	249



Unit Dimensions (continued)

Unloading valve module (Type N,M)

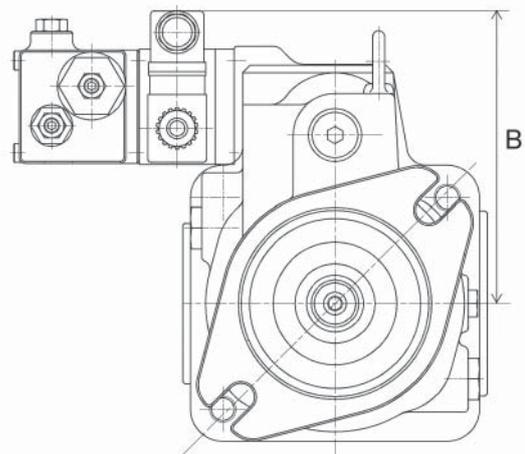
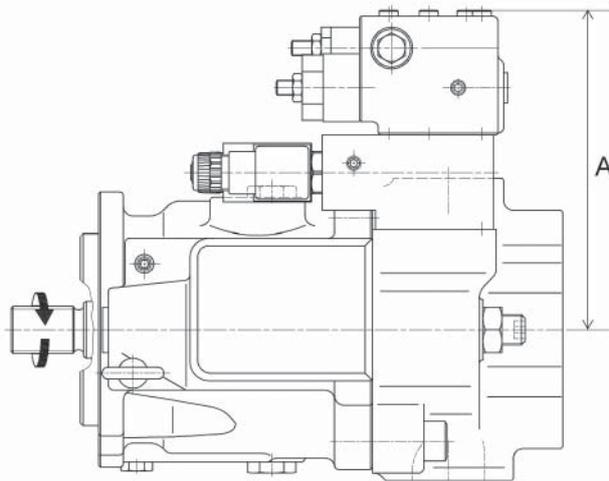
	A	B
K3VL45-60	169	155
K3VL80	169	166
K3VL112/140	202	190
K3VL200	212	205

Proportional pressure module (*V)

	A	B
K3VL45-60	179	233
K3VL80	179	244
K3VL112/140	212	280
K3VL200	222	295

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

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

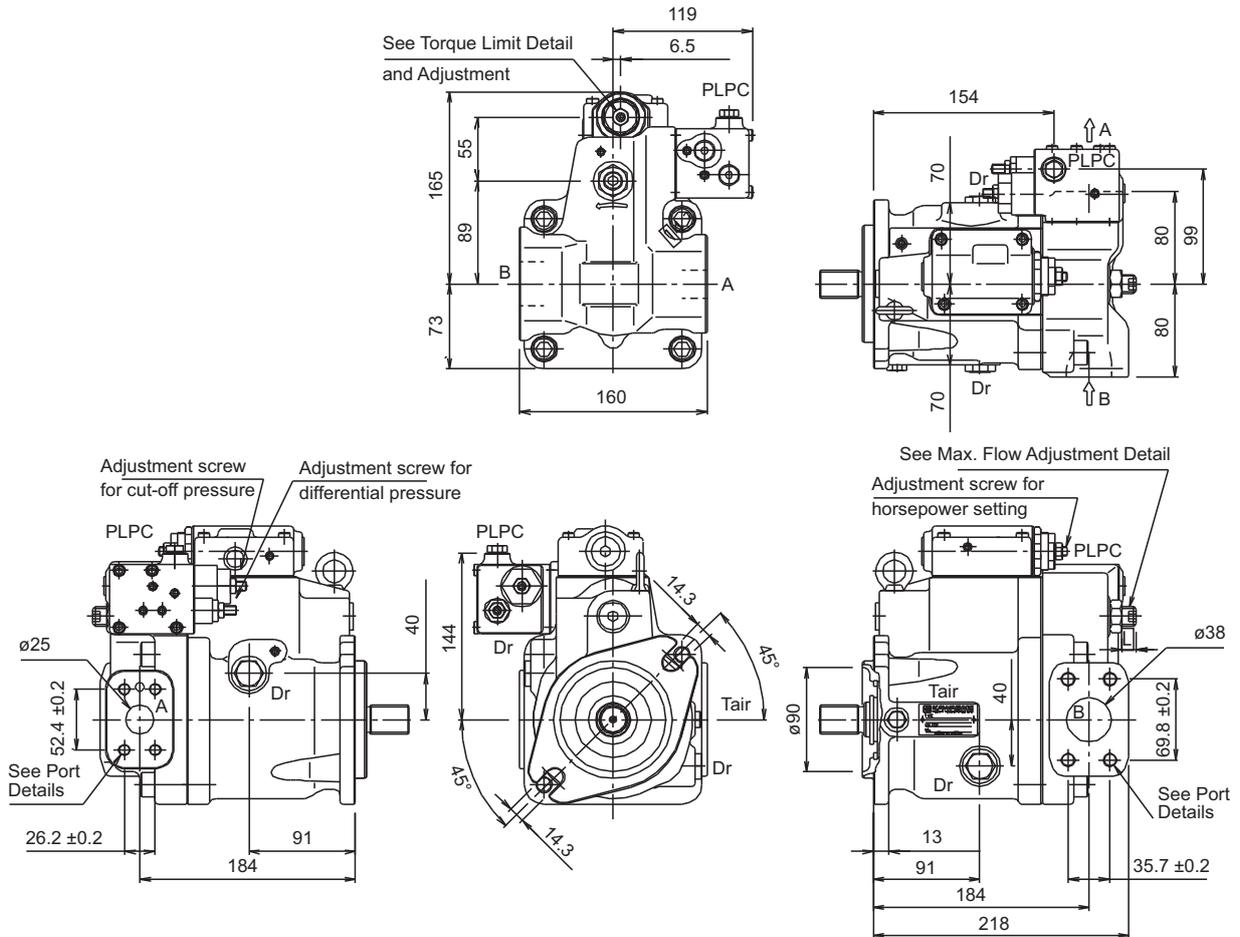


Unit Dimensions

K3VL45/60 Installation

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

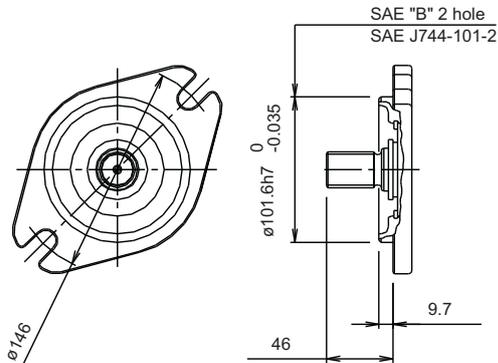
Note
for counter clockwise rotation,
the suction port "B" and the
delivery port "A" are reversed



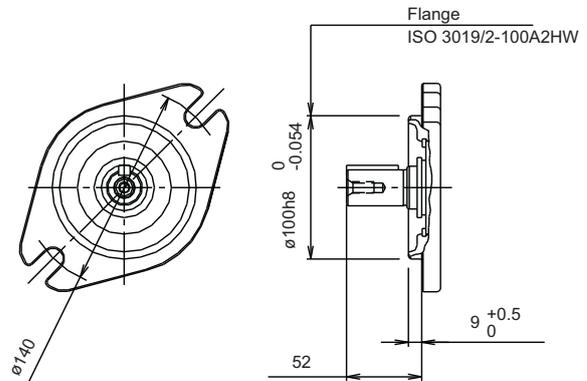
Unit Dimensions (continued)

K3VL45/60 Mounting Flange and Shaft Options

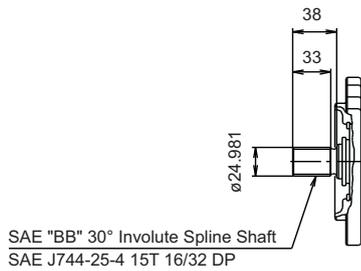
SAE Type



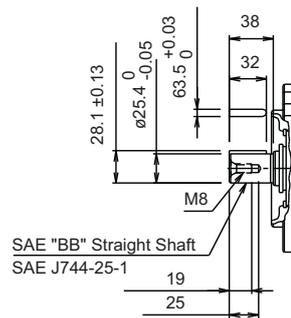
ISO Type



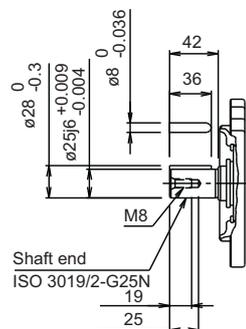
SAE Spline Shaft



SAE Straight Shaft

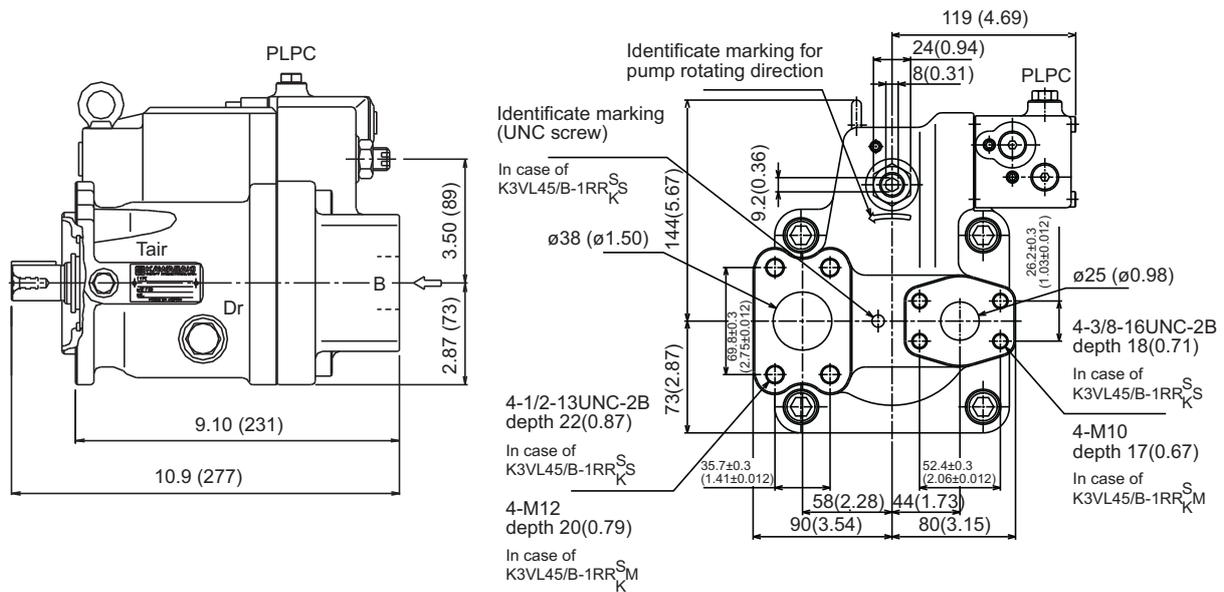


ISO Straight Shaft



Unit Dimensions (continued)

K3VL45/60 Rear Port



K3VL45 Porting Details

Main SAE Flanged Ports

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

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

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

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

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

Auxiliary Ports

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

SAE Version ("S", "K", "U" 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	98
PLPC	Load Sensing Port Pressure Control Port	SAE J1926/1 Straight thread O ring boss 1/4" OD Tube 7/16-20UNF-2B	12
Tair	Air Bleeder Port	SAE J1926/1 Straight thread O ring boss 1/4" OD Tube 7/16-20UNF-2B	12

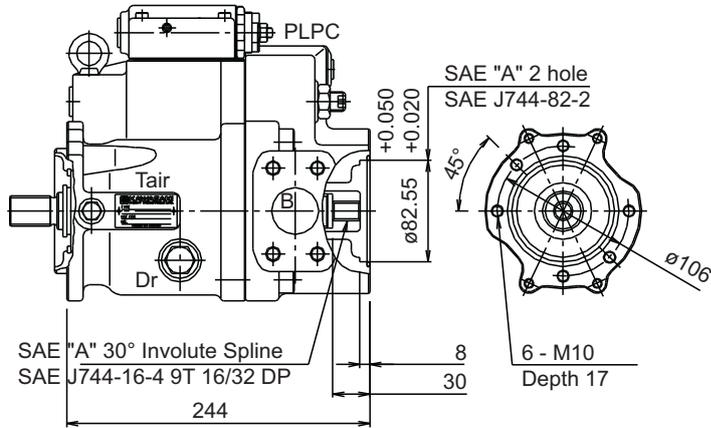
ISO Version ("M" in position 8 of model code)

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

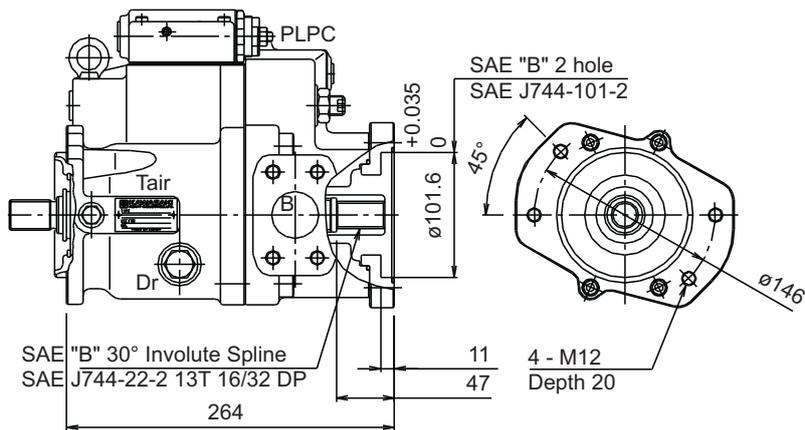
Unit Dimensions (continued)

K3VL45/60 Through Drive Options

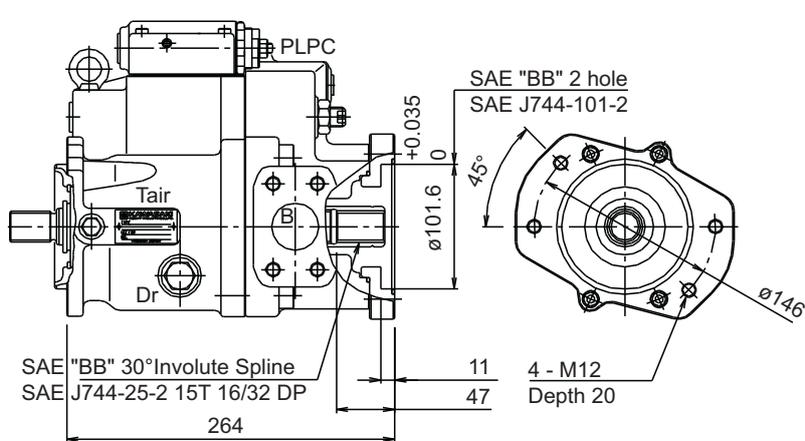
Through Drive "A"



Through Drive "B"

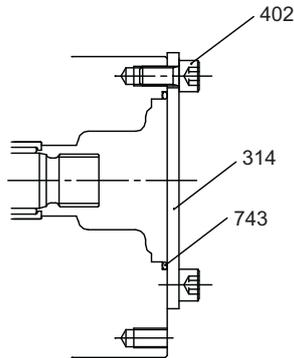


Through Drive "BB"

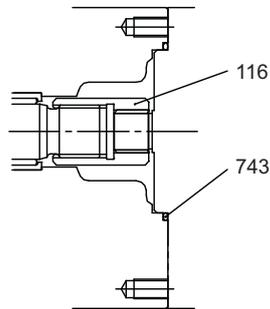


Unit Dimensions (continued)

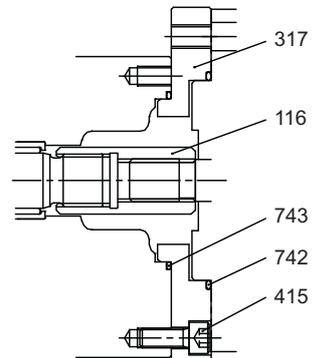
K3VL45/60 Adaptor Kits



Cover Kit



SAE "A"
T/D Kit



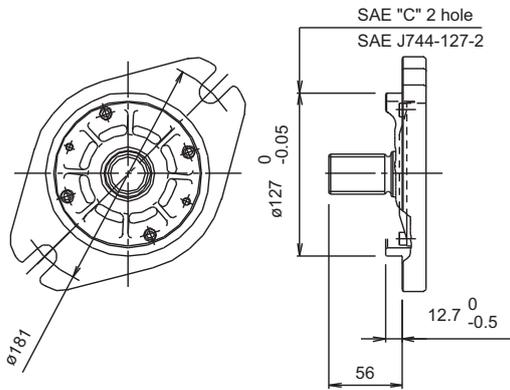
SAE "B" & "BB"
T/D Kit

No.	Part Name	QTY	Cover Kit	SAE "A" T/D Kit	SAE "B" T/D Kit	SAE "BB" T/D Kit
—	T/D Kit		29L8TN	29L4TA	29L4TB	29L4T2
743	T/D Kit	1	00RBG85	00RBG85	00RBG85	00RBG85
742	T/D Kit	1			00RBG105	00RBG105
415	T/D Kit	4			0SBM825	0SBM825
402	T/D Kit	2	0SBM1020			
317	T/D Kit	1			2924750-0358	2924750-0358
314	T/D Kit	1	2923150-0316			
116	T/D Kit	1		2903150-0264	2903150-0265	2903150-0266

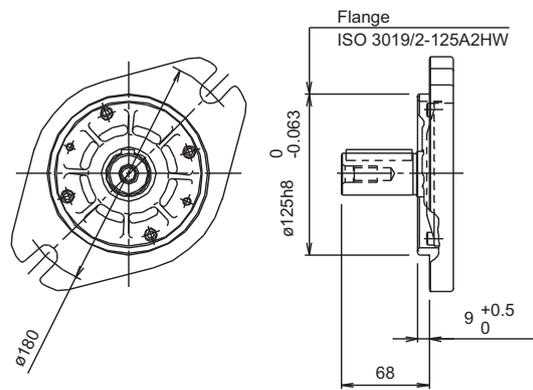


Unit Dimensions (continued)
K3VL80 Mounting Flange and Shaft Options

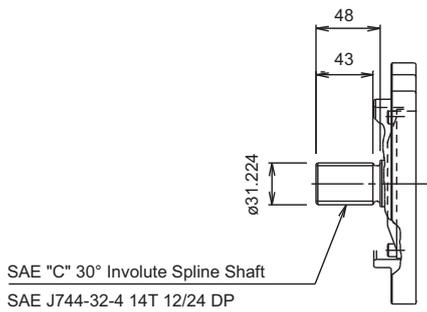
SAE Type



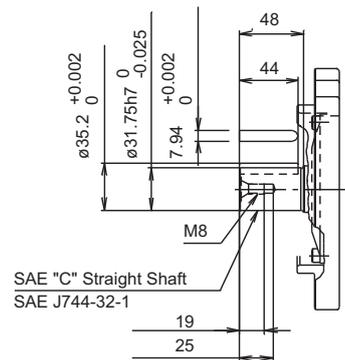
ISO Type



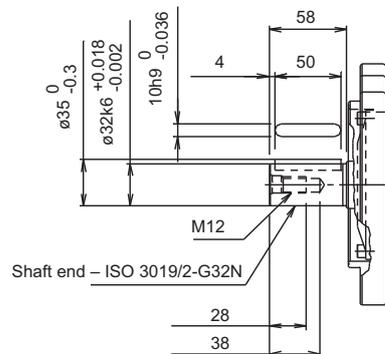
SAE Spline Shaft



SAE Straight Shaft

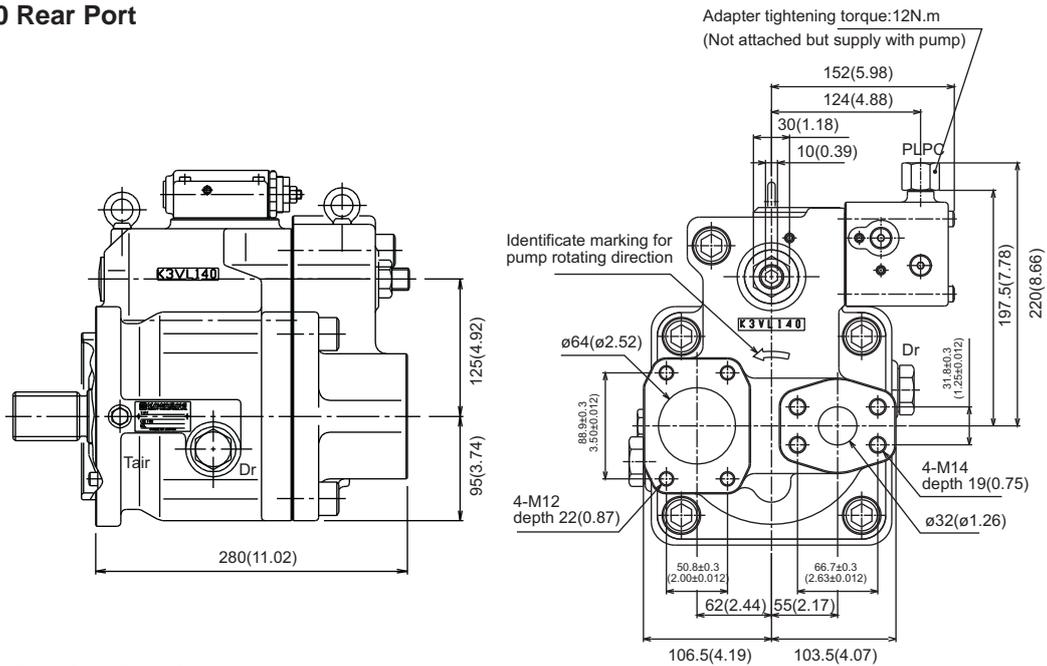


ISO Straight Shaft



Unit Dimensions (continued)

K3VL80 Rear Port



K3VL80 Porting Details

Main SAE Flanged Ports

Des.	Port Name	Port Size	Tightening Torque (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"	57	3/8-16UNC-2B x 18mm
B	Suction Port	SAE J518C Std pressure (code 61) 2"	98	1/2-13UNC-2B x 22mm

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

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

Auxiliary Ports

Des.	Port Name	Port Size	Tightening Torque (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	98
PLPC	Load Sensing Port Pressure Control Port	SAE J1926/1 Straight thread O ring boss 1/4" OD Tube 7/16-20UNF-2B	12
Tair	Air Bleeder Port	SAE J1926/1 Straight thread O ring boss 1/4" OD Tube 7/16-20UNF-2B	12

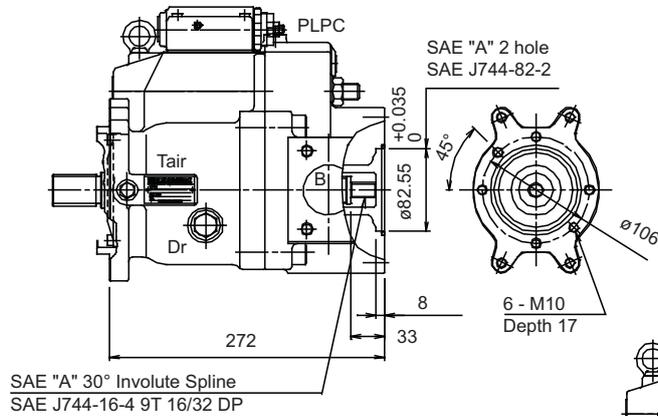
ISO Version ("M" in position 8 of model code)

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

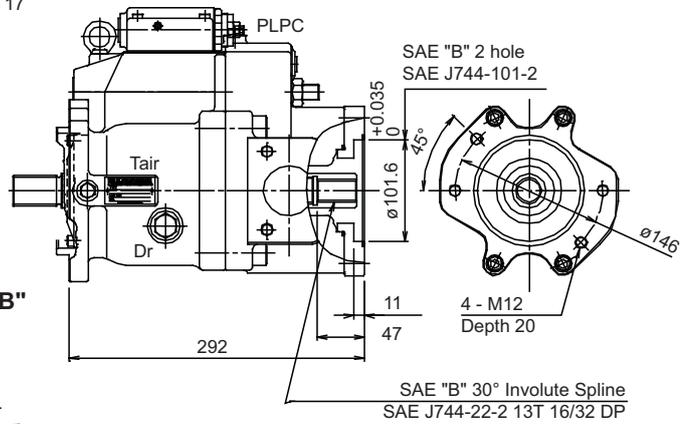
Unit Dimensions (continued)

K3VL80 Through Drive Options

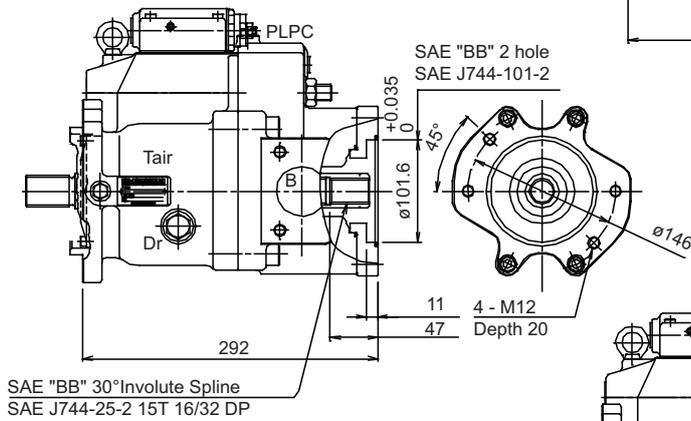
Through Drive "A"



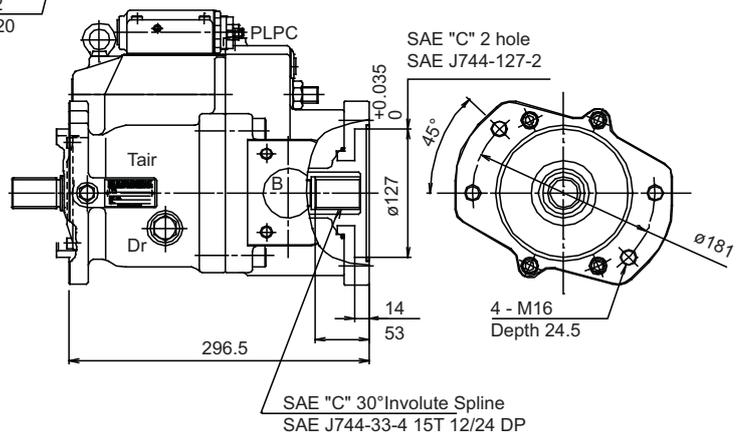
Through Drive "B"



Through Drive "BB"

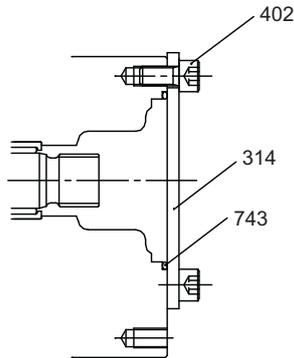


Through Drive "C"

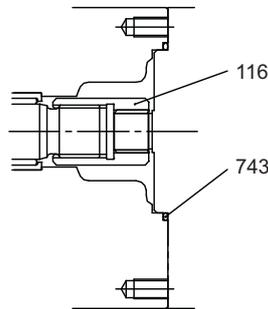


Unit Dimensions (continued)

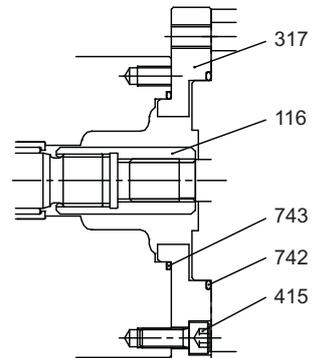
K3VL80 Adaptor Kits



Cover Kit



SAE "A"
T/D Kit



SAE "B", "BB" & "C"
T/D Kit

No.	Part Name	QTY	Cover Kit	SAE "A" T/D Kit	SAE "B" T/D Kit	SAE "BB" T/D Kit	SAE "C" T/D Kit
—	T/D Kit		29L8TN	29L8TA	29L8TB	29L8T2	29L8TC
743	O-Ring	1	00RBG85	00RBG85	00RBG85	00RBG85	00RBG85
742	O-Ring	1			00RBG105	00RBG105	00RBG130
415	Screw Hex SHC	4			0SBM1025	0SBM1025	0SBM1030
402	Screw Hex SHC	2	0SBM1020				
317	Subplate	1			2924750-0354	2924750-0354	2924750-0355
314	Cover	1	2923150-0316				
116	Coupling	1		2903150-0241	2903150-0262	2903150-0267	2903150-0263

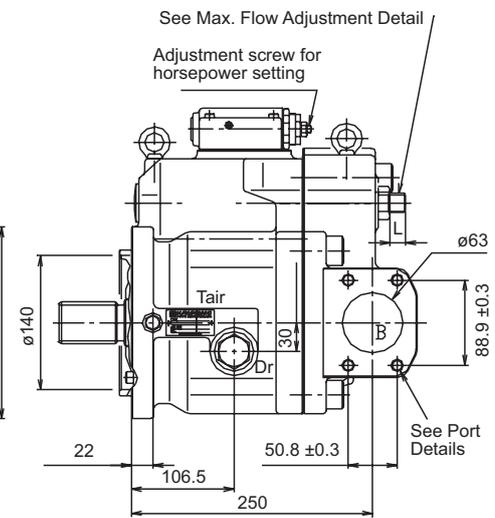
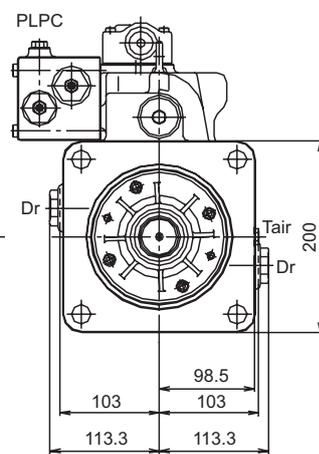
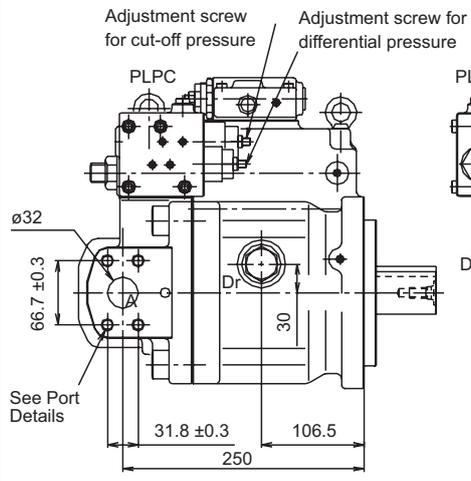
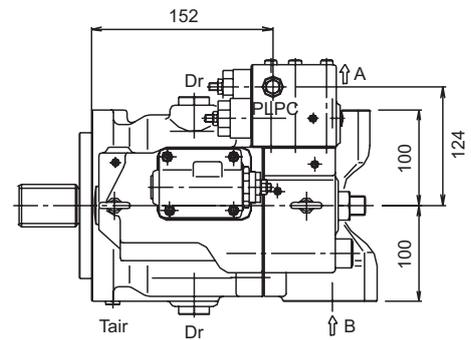
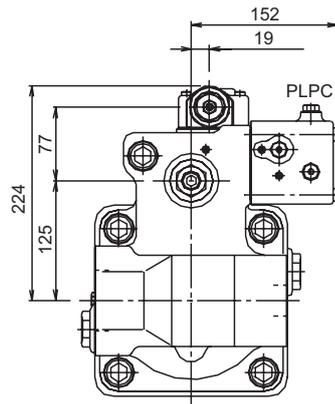


Unit Dimensions (continued)

K3VL112/140 Installation

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

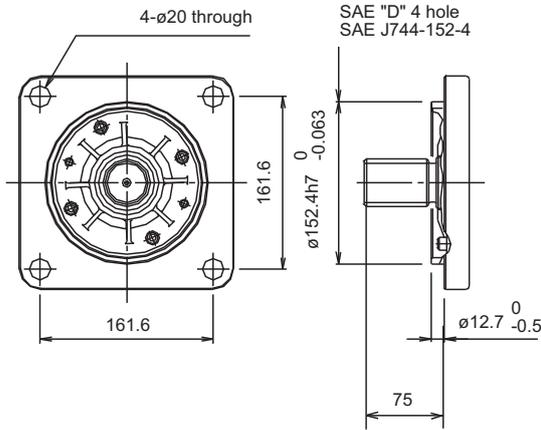
Note
for counter clockwise rotation,
the suction port "B" and the
delivery port "A" are reversed



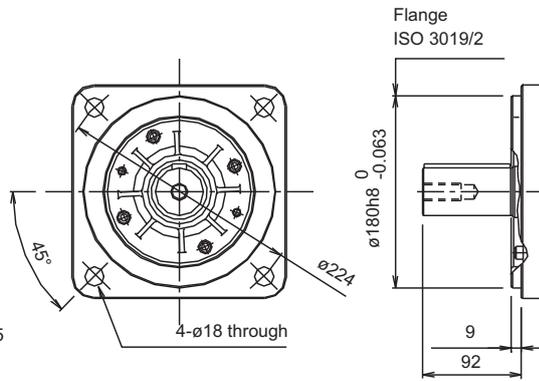
Unit Dimensions (continued)

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

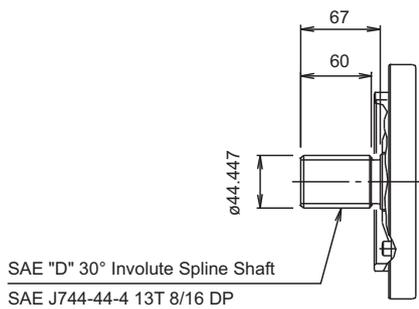
SAE "D" Type



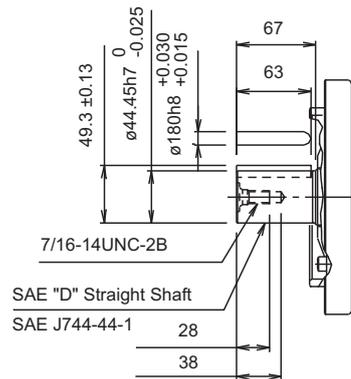
ISO Type



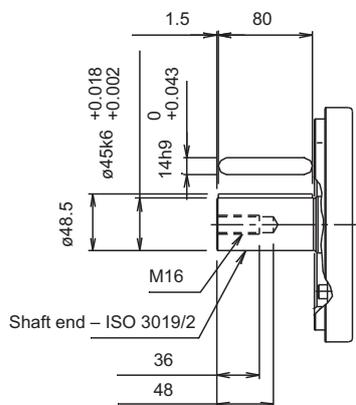
SAE Spline Shaft



SAE Straight Shaft

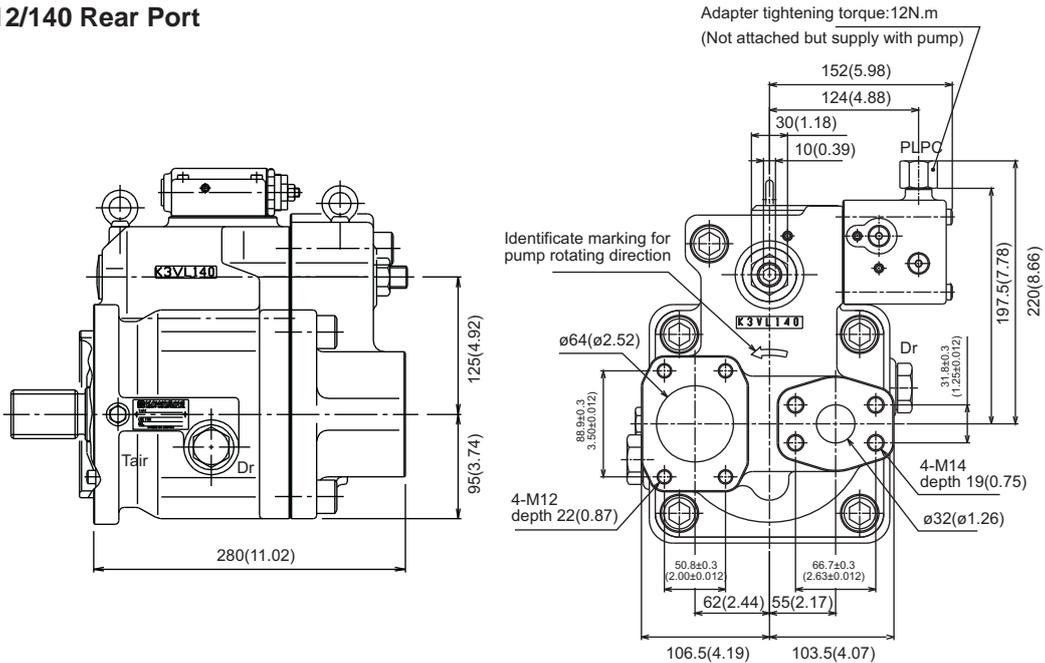


ISO Straight Shaft



Unit Dimensions (continued)

K3VL112/140 Rear Port



K3VL112/140 Porting Details

Main SAE Flanged Ports

Des.	Port Name	Port Size	Tightening Torque (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) 1 1/4"	98	1/2-13UNC-2B x 22mm
B	Suction Port	SAE J518C Std pressure (code 61) 2 1/2"	98	1/2-13UNC-2B x 22mm

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

A	Delivery Port	SAE J518C high pressure (code 62) 1 1/4"	157	M14 x 19
B	Suction Port	SAE J518C Std pressure (code 61) 2 1/2"	98	M12 x 17

Auxiliary Ports

Des.	Port Name	Port Size	Tightening Torque (Nm)
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SAE Version ("S", "K", "C", "R", "U", "X" or "T" in position 8 of model)

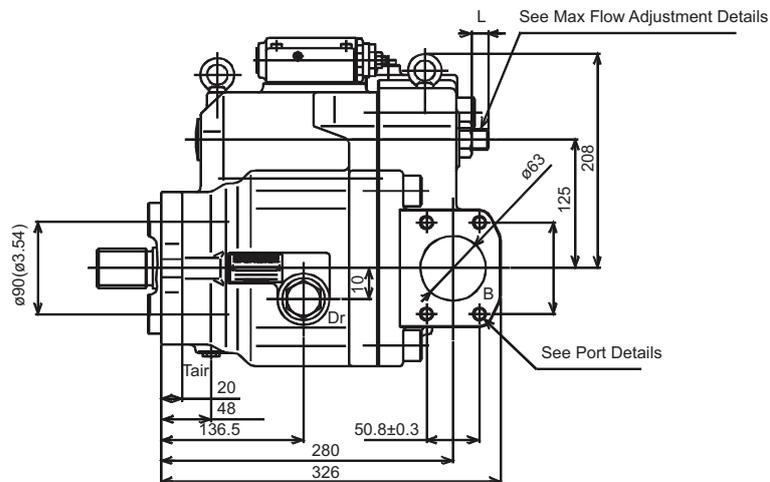
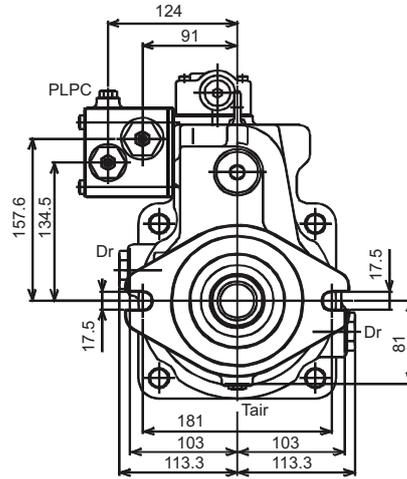
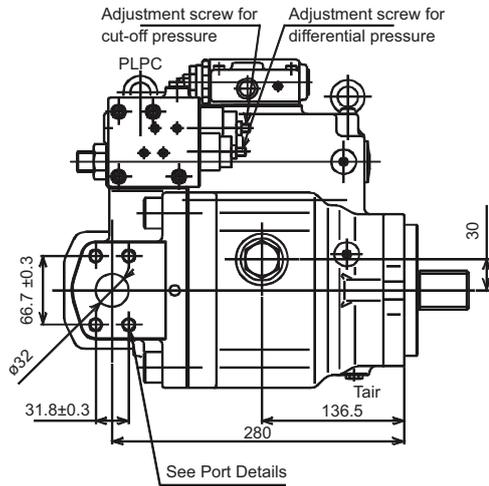
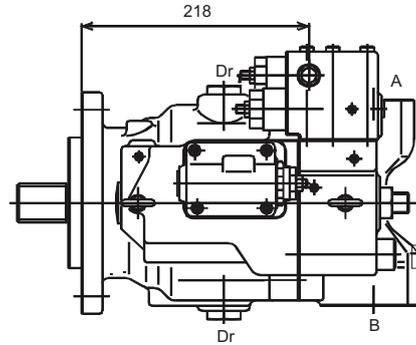
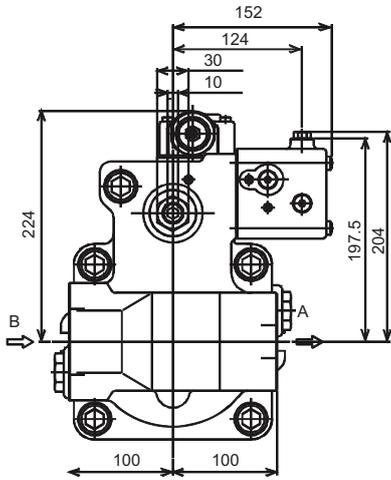
Dr	Drain Port (x2)	SAE J1926/1 Straight thread O ring boss 3/4" OD Tube 1 1/16-12UN-2B	167
PLPC	Load Sensing Port Pressure Control Port	SAE J1926/1 Straight thread O ring boss 1/4" OD Tube 7/16-20UNF-2B	12
Tair	Air Bleeder Port	SAE J1926/1 Straight thread O ring boss 1/4" OD Tube 7/16-20UNF-2B	12

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

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

Unit Dimensions (continued)

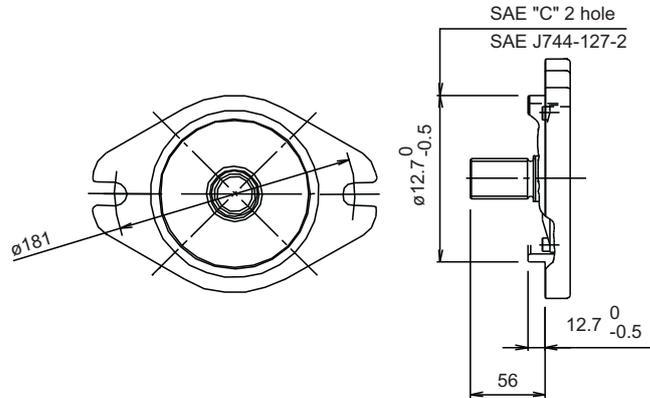
K3VL112/140 (2 Bolt) Installation



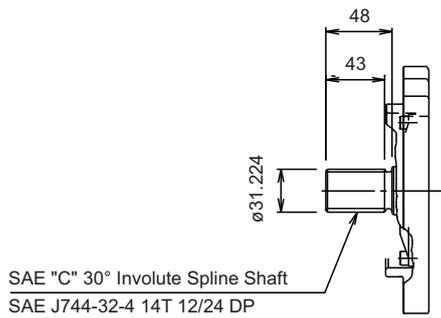
Unit Dimensions (continued)

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

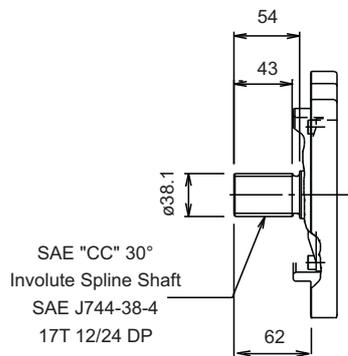
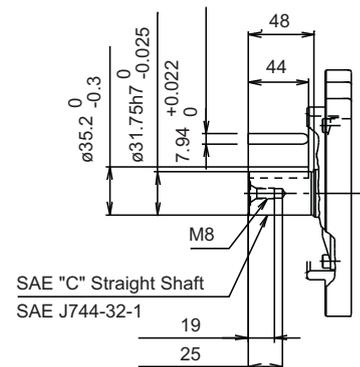
SAE "C" Type



SAE "C" Spline Shaft



SAE "C" Straight Shaft



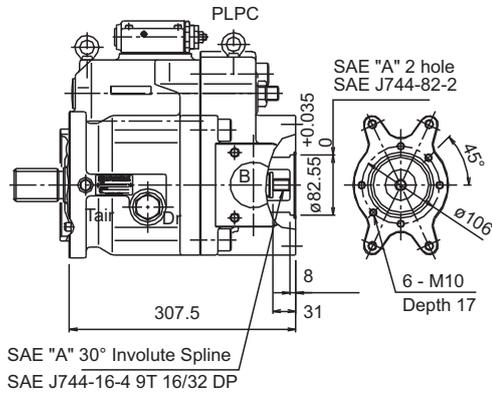
Shaft Detail – SAE "CC" Spline



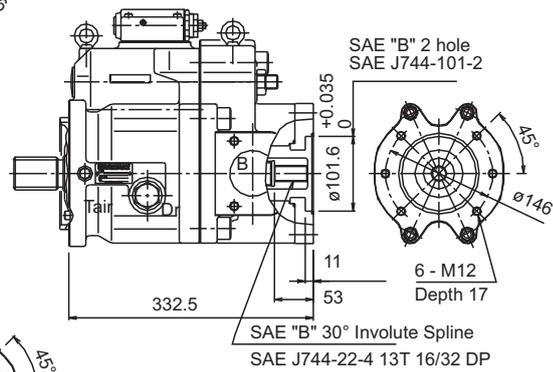
Unit Dimensions (continued)

K3VL112/140 Through Drive Options

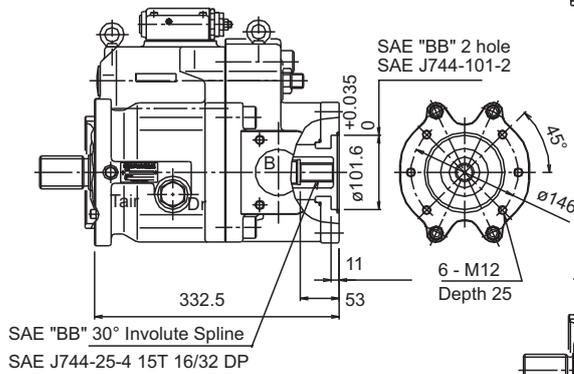
Through Drive "A"



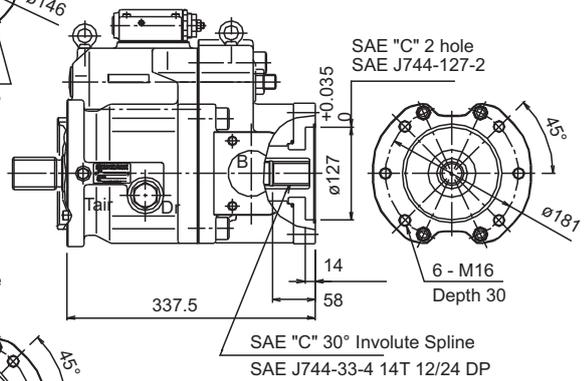
Through Drive "B"



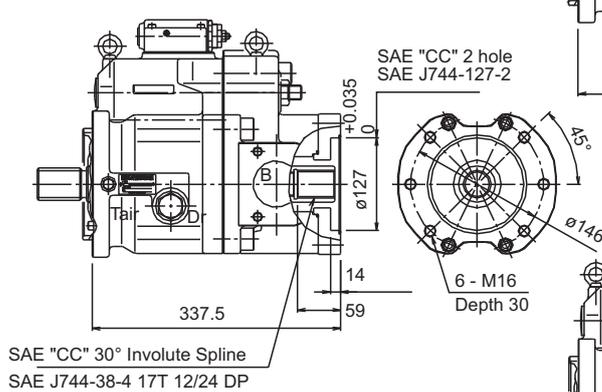
Through Drive "BB"



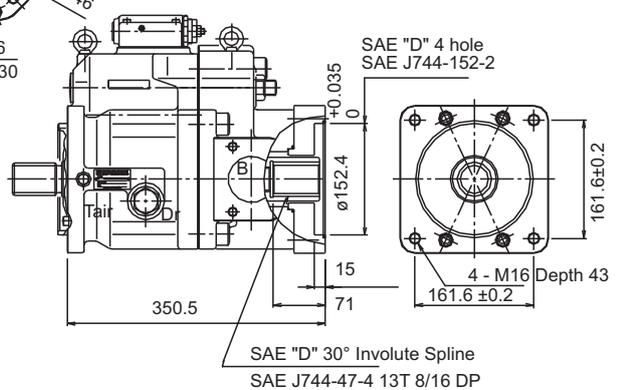
Through Drive "C"



Through Drive "CC"

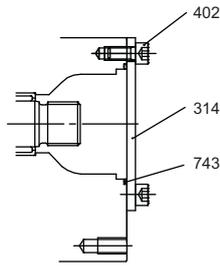


Through Drive "D"

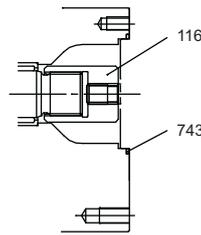


Unit Dimensions (continued)

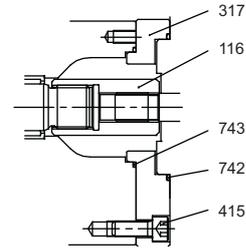
K3VL112/140 Adaptor Kits



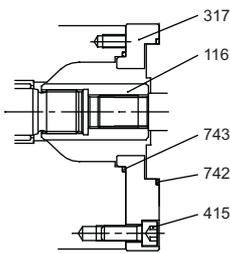
Cover Kit



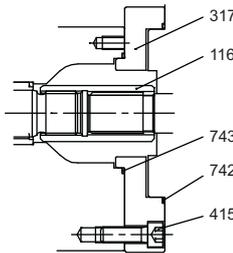
SAE "A" T/D Kit



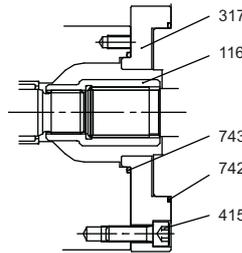
SAE "B" T/D Kit



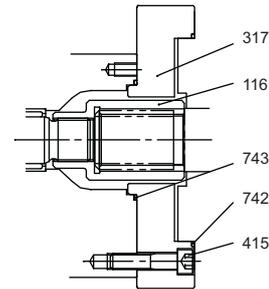
SAE "BB" T/D Kit



SAE "C" T/D Kit



SAE "CC" T/D Kit



SAE "D" T/D Kit

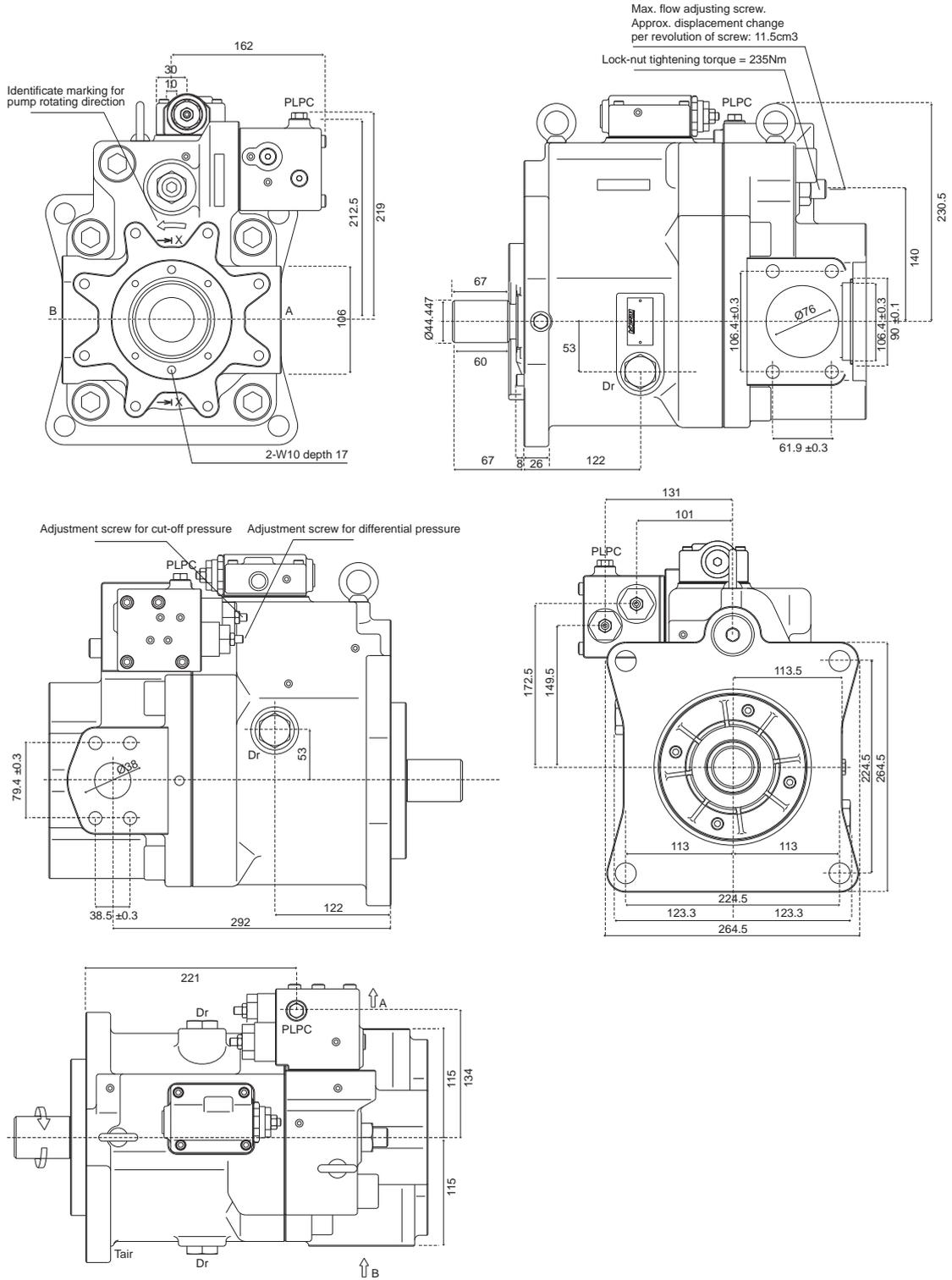
No.	Part Name	QTY	Cover Kit	SAE "A" T/D Kit	SAE "B" T/D Kit	SAE "BB" T/D Kit
—	T/D Kit		29L8TN	29LHTA	29LHTB	29LHT2
743	O-Ring	1	00RBG85	00RBG85	00RBG85	00RBG85
742	O-Ring	1			00RBG105	00RBG105
415	Screw Hex SHC	4			0SBM1230	0SBM1230
402	Screw Hex SHC	2	0SBM1020			
317	Subplate	1			2924750-0360	2924750-0360
314	Cover	1	2923150-0316			
116	Coupling	1		2903150-0268	2903150-0269	2903150-0270

No.	Part Name	QTY	SAE "C" T/D Kit	SAE "CC" T/D Kit	SAE "D" T/D Kit
—	T/D Kit		29LHTC	29L8TB	29L8T2
743	O-Ring	1	00RBG85	00RBG85	00RBG85
742	O-Ring	1	00RBG130	00RBG130	00RBG150
415	Screw Hex SHC	4	0SBM1235	0SBM1235	0SBM1250
	Screw Hex SHC	2			
317	Subplate	1	2924750-0361	2924750-0361	2924750-0362
314	Cover	1			
116	Coupling	1	2903150-0271	2903150-0272	2903150-0273

Unit Dimensions (continued)

K3VL200 Installation

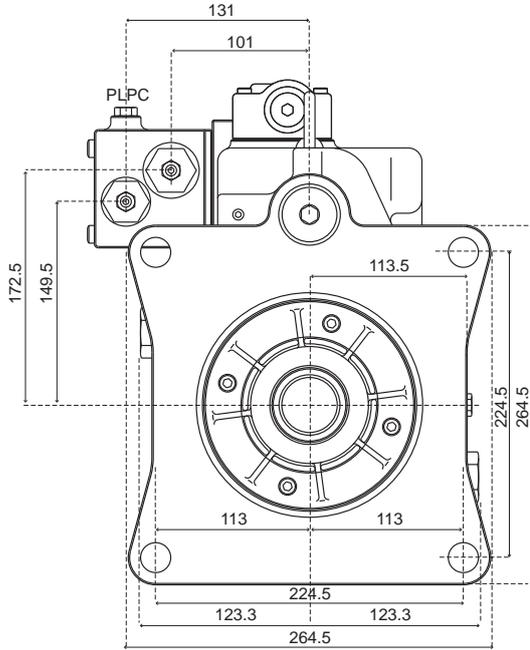
K3VL with Cut-Off / Load Sense Control
& Torque Limit Module (Clockwise Rotation)



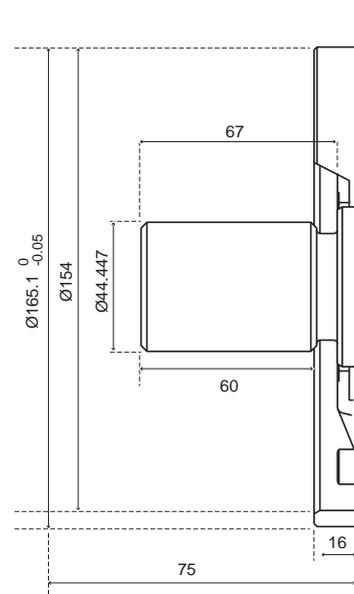
Unit Dimensions (continued)

K3VL200 Mounting Flange and Shaft Options

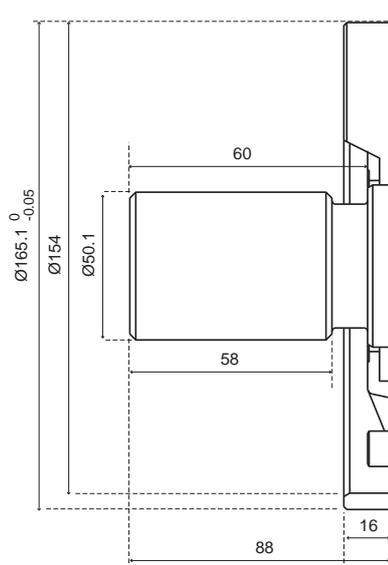
SAE Type



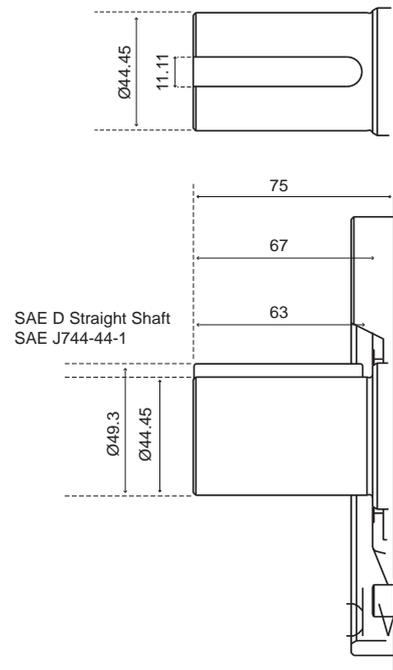
SAE Spline "D" Shaft



SAE Spline "F" Shaft



SAE Straight Shaft



Unit Dimensions (continued)**K3VL200**

No.	Part Name	QTY	SAE "A"
—	T/D Kit		29LKTA
116	Coupling K3VL 200	1	2903150-0761
317	Sub Plate K3VK 200	1	2924750-0674
407	SHCS	4	0SBM825
712	O-Ring 84.4 I/D x 3.1 Sec	1	0SBM85
742	O-Ring 84.4 I/D x 3.1 Sec	1	00RBG85

No.	Part Name	QTY	SAE "B"	SAE "C"	SAE "D"	SAE "E"
—	T/D Kit		29LKTB	29LKTC	LKTD	29LKTE
116	Coupling K3VL 200	1	2903150-0762	2903150-0763	2903150-0764	2903150-0764
317	Sub Plate K3VK 200	1	2924750-0675	2924750-0667	2924750-0677	2924750-0686
407	SHCS	8	0SBM1230	0SBM1230	0SBM1245	0SBM1245
712	O-Ring	1	00RBG120	00RBG125	00RBG125	00RBG125
742	O-Ring	1	00RBG105	00RBG130	PCPP155	PCPP170

Main SAE Flanged Ports

Des.	Port Name	Port Size	Tightening Torque (Nm)	Flange Threads
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UNC Threaded Version ("S", "K" in position 9 of model code)

A	Delivery Port	SAE J518C high pressure (code 62) 1 1/2"	235	5/8-11UNC-2B
B	Suction Port	SAE J518C Std pressure (code 61) 3"	235	5/8-11UNC-2B

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

A	Delivery Port	SAE J518C high pressure (code 62) 1 1/2"	235	M16
B	Suction Port	SAE J518C Std pressure (code 61) 3"	235	M16

Auxiliary Ports

Des.	Port Name	Port Size	Tightening Torque (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 3/4" O.D Tube 1.1/16-12UNF-2B	167
PLPC	Load Sensing Port Pressure Control Port	SAE J1926 Straight thread O ring boss 1/4" O.D Tube 7/16-20UNF-2B	12
Tair	Air Bleeder Port	SAE J1926 Straight thread O ring boss 1/4" O.D Tube 7/16-20UNF-2B	12

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