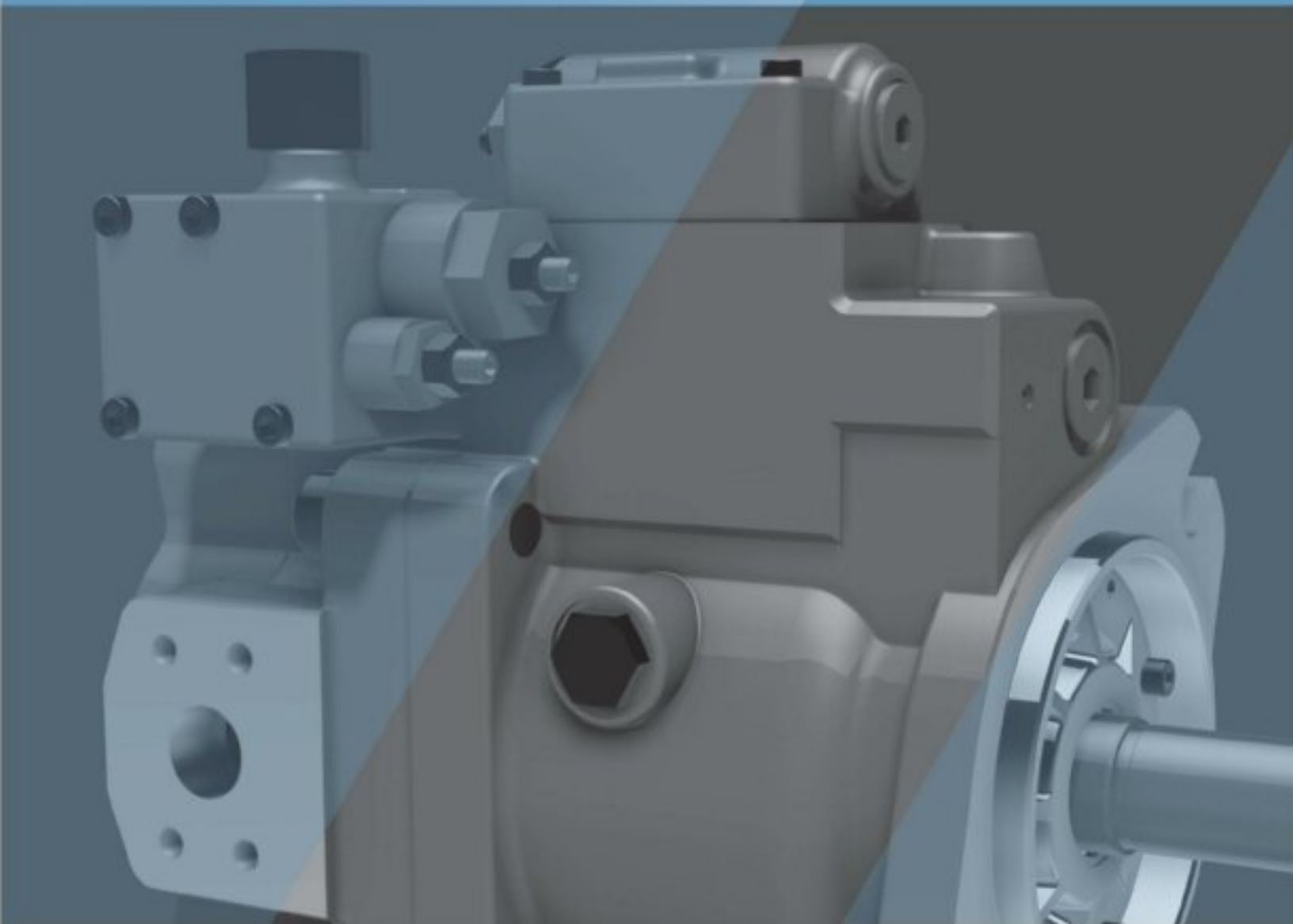
Kawasaki
Powering your potential

Swash-plate Axial Piston Pump

K3VL



CONTENTS

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 cm^3/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 - L0 () /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. 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

1.

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 achive full flow or pressure. Contact Kawasaki for application assistance.

2 Technical Information

2-1 Technical Data

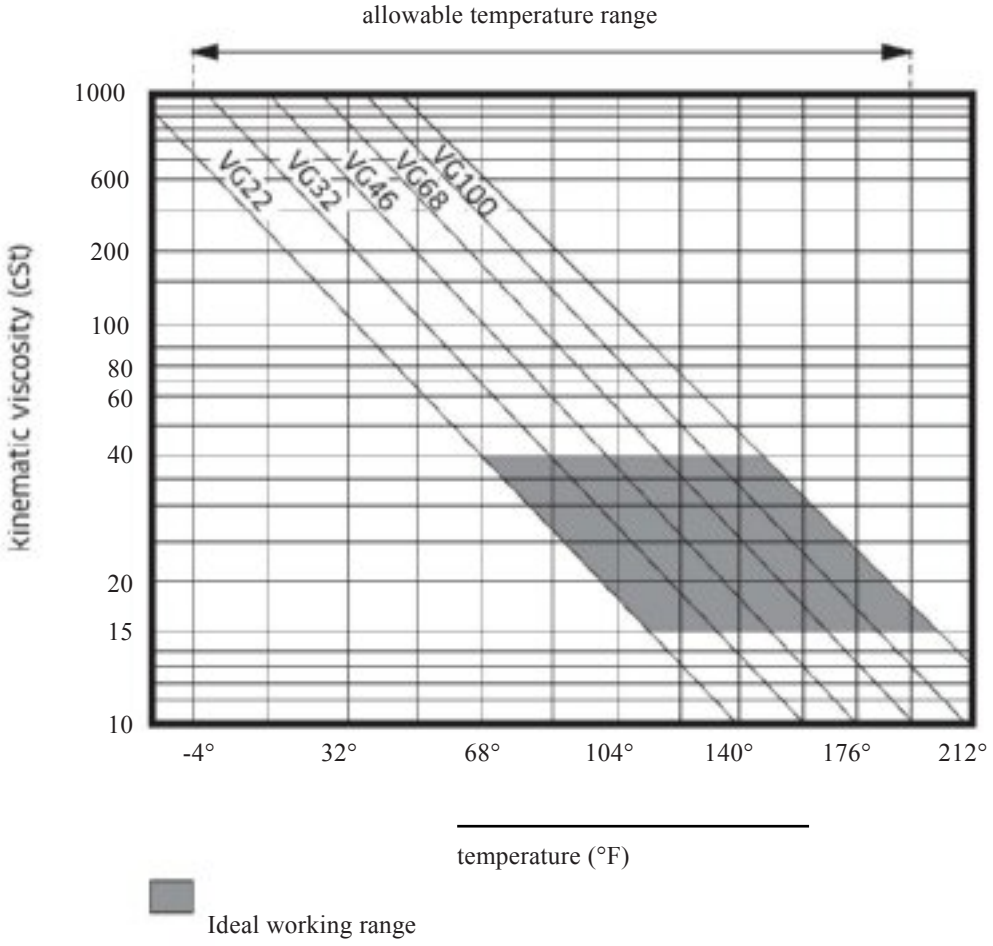
For applications outside the following parameters, please consult KPM.

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.

Parameter \ Fluid Type	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 susceptability	○	△	△
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 /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 - ºF (ºC)		-4º to 203º (-20º to 95º)							
*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)	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.

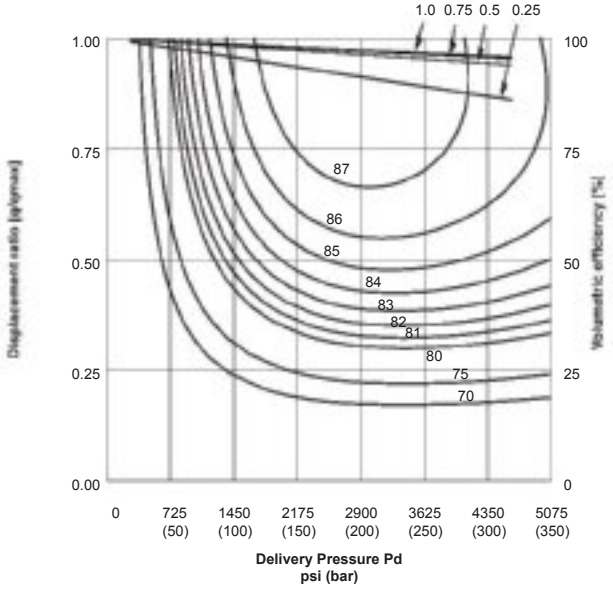
Viscosity Range

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

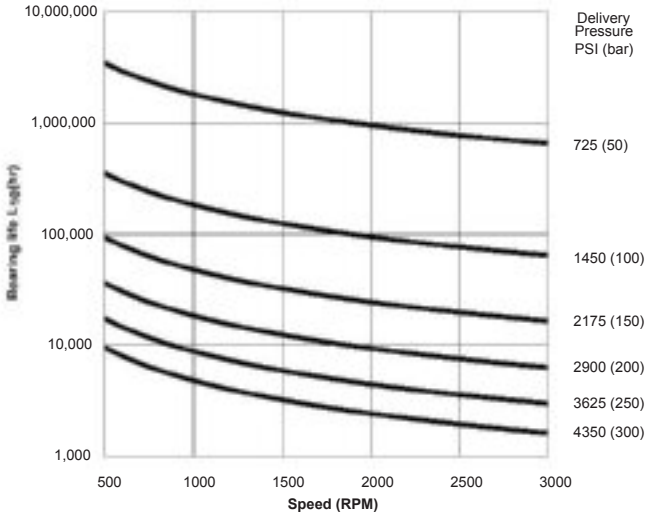
2-3 Performance Data

Performance Curves - K3VL28

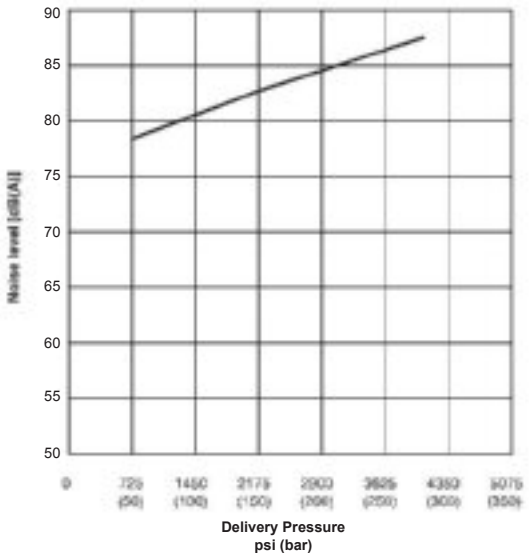
Efficiency



Bearing Life



Noise Level



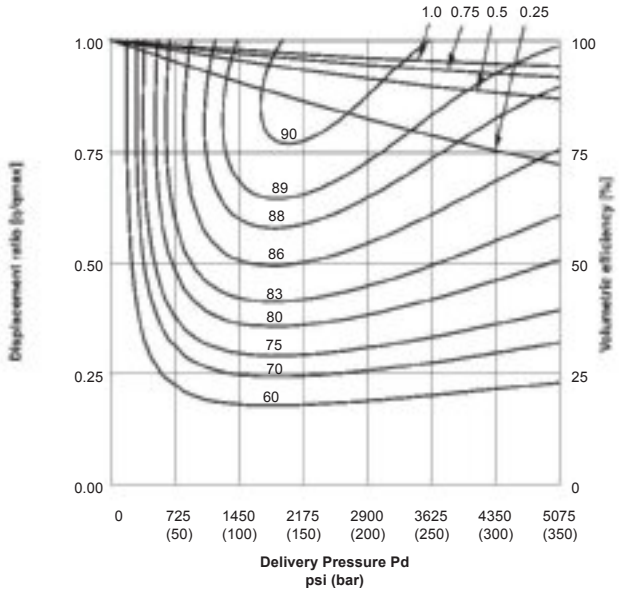
Performance Notes:

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.

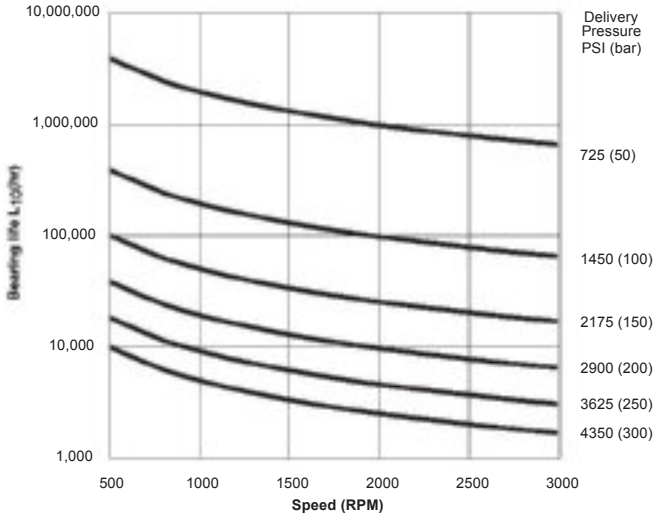
2-3 Performance Data (cont)

Performance Curves - K3VL45

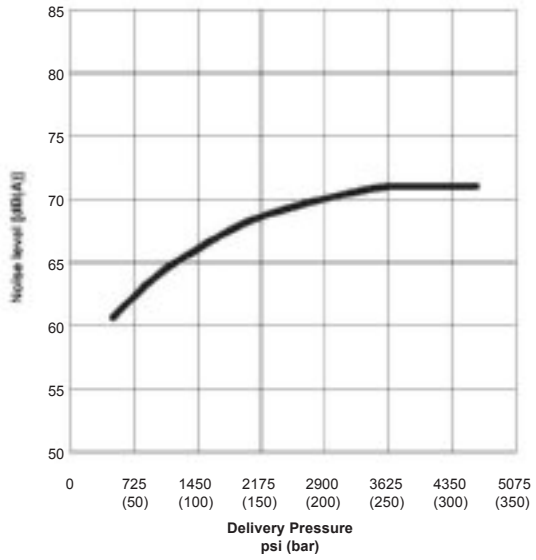
Efficiency



Bearing Life



Noise Level



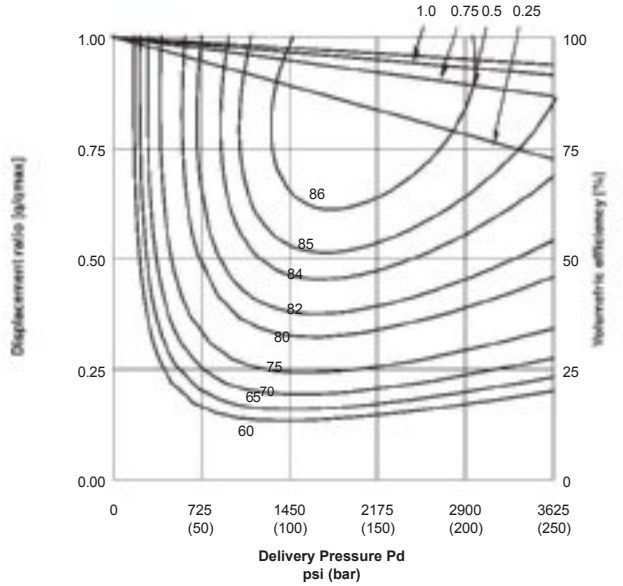
Performance Notes:

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.

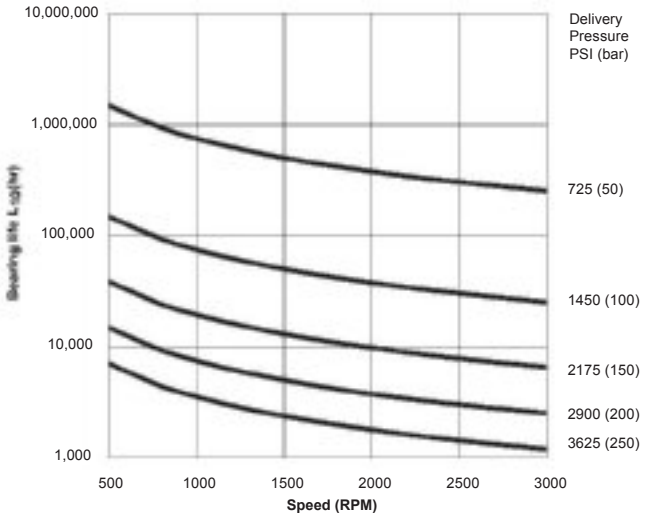
2-3 Performance Data (cont)

Performance Curves - K3VL60

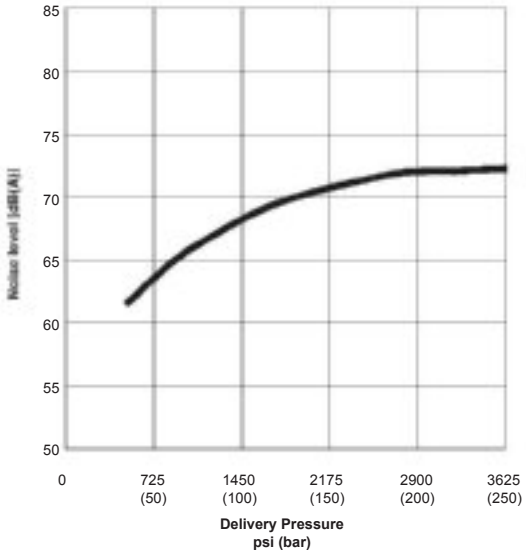
Efficiency



Bearing Life



Noise Level



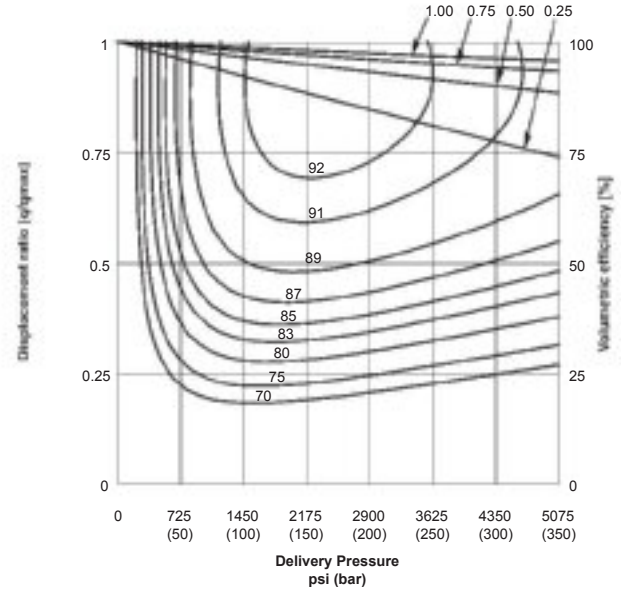
Performance Notes:

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.

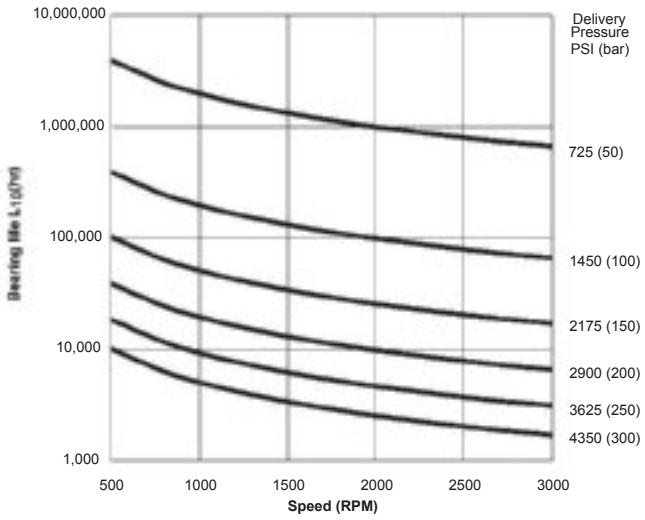
2-3 Performance Data (cont)

Performance Curves - K3VL80

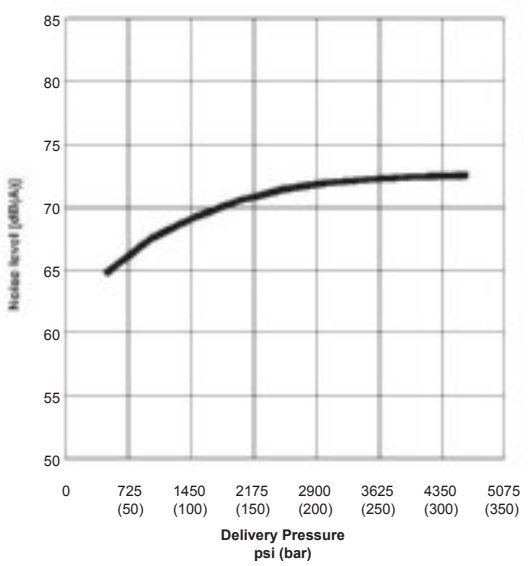
Efficiency



Bearing Life



Noise Level



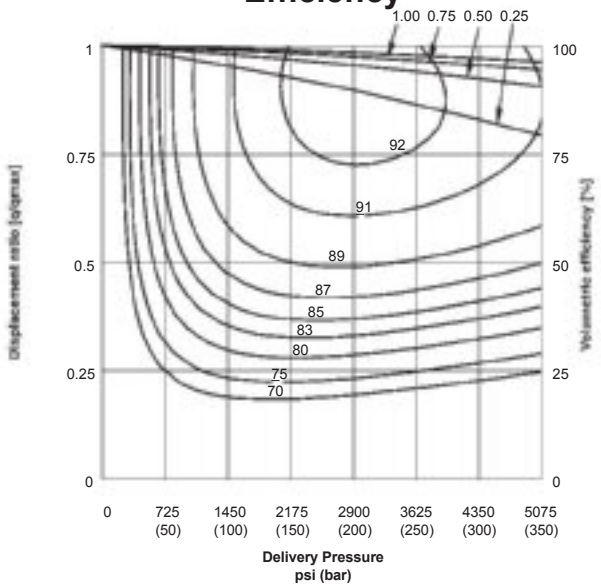
Performance Notes:

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.

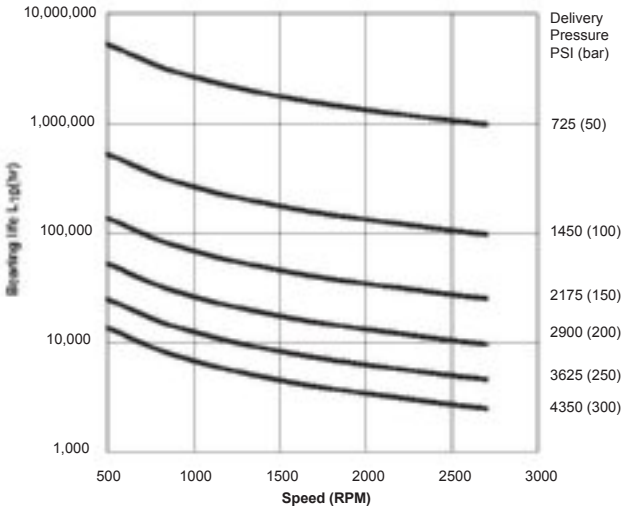
2-3 Performance Data (cont)

Performance Curves - K3VL112

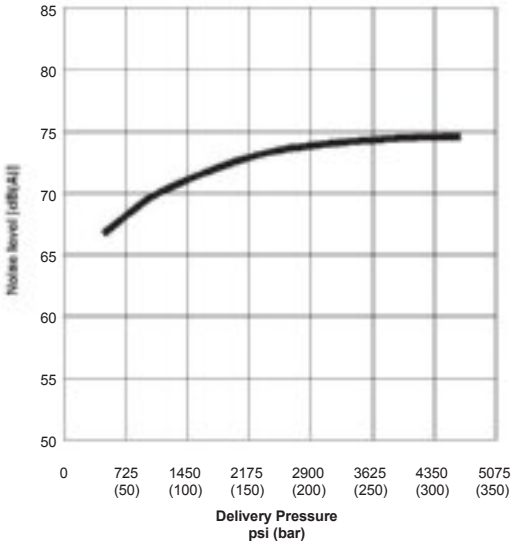
Efficiency



Bearing Life



Noise Level



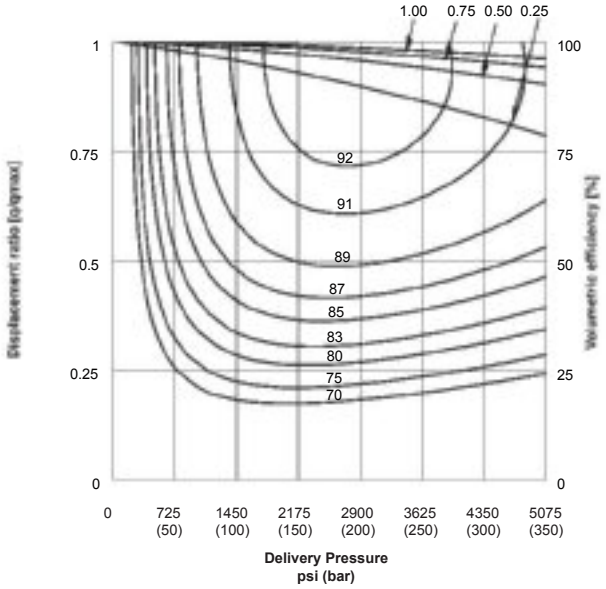
Performance Notes:

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.

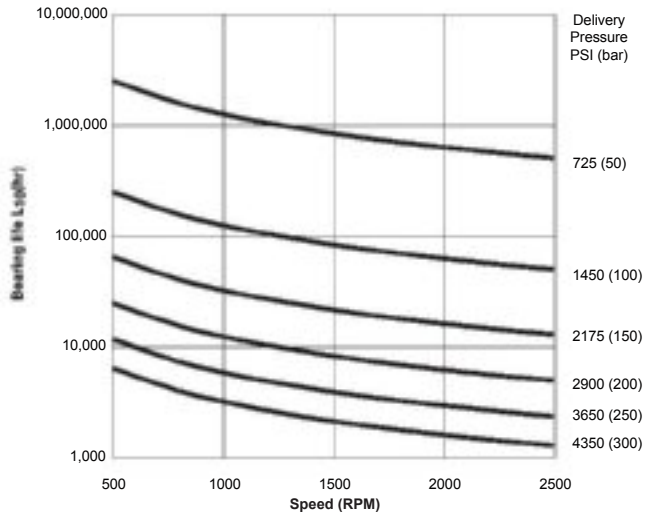
2-3 Performance Data (cont)

Performance Curves - K3VL140

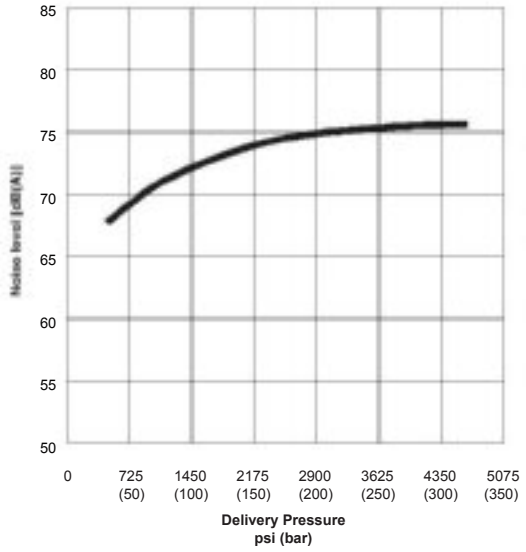
Efficiency



Bearing Life



Noise Level



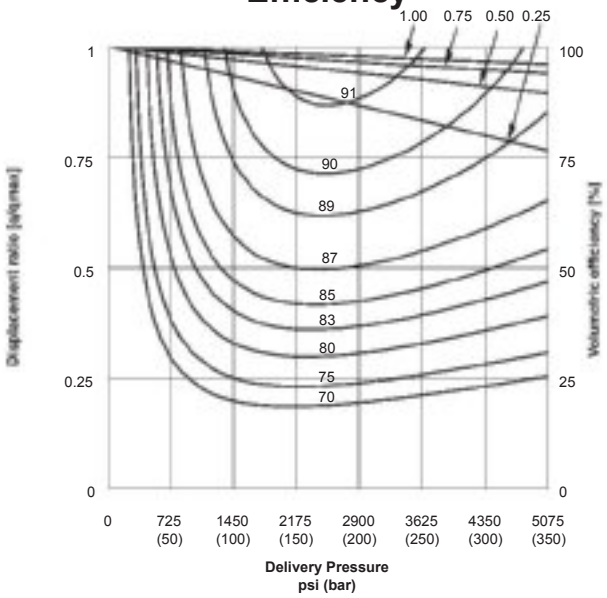
Performance Notes:

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.

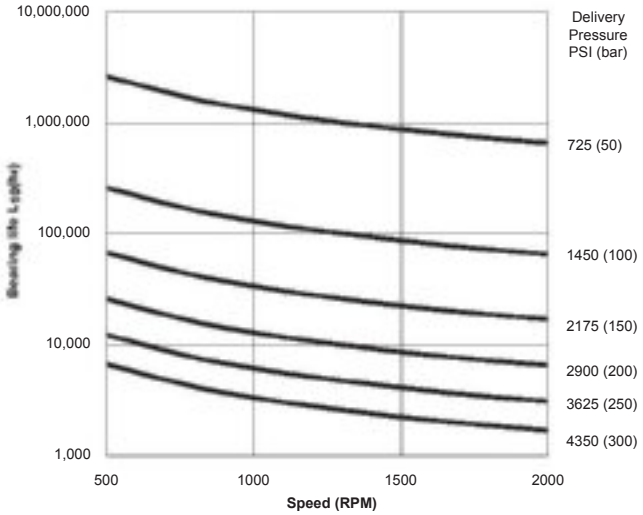
2-3 Performance Data (cont)

Performance Curves - K3VL200

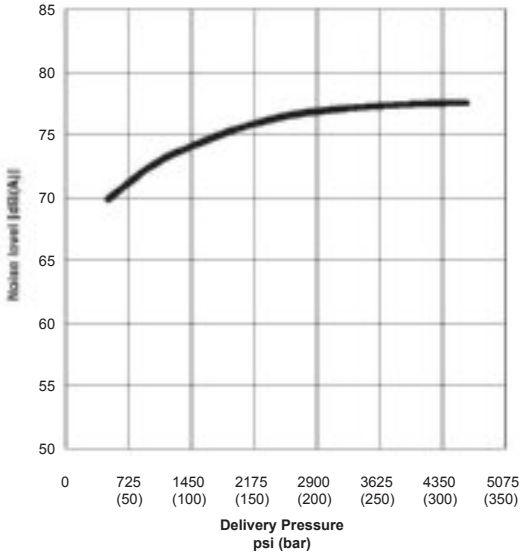
Efficiency



Bearing Life



Noise Level



Performance Notes:

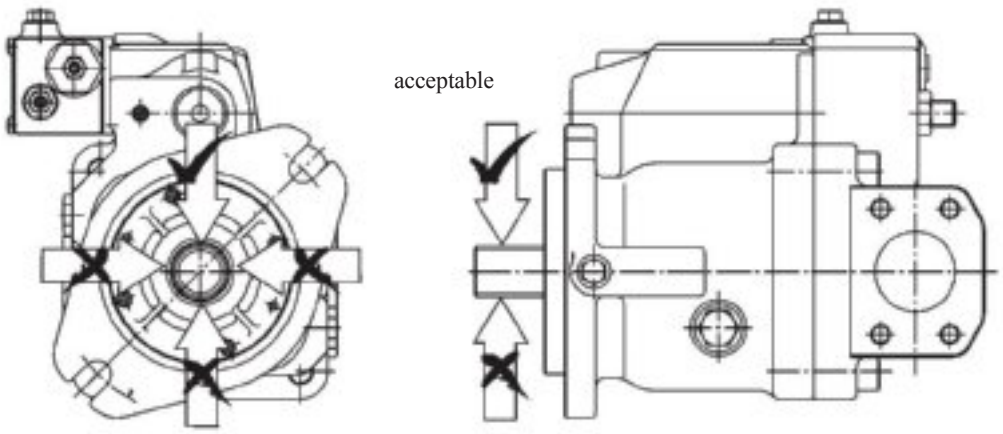
1. All curves are based on an input speed of 1800 rpm, ISOVG46 hydraulic oil, 122°F (50°C) oil temperature, and 0 psi (0 bar) inlet condition, unless otherwise noted.
2. L_{10} bearing life is defined as the period of time for 10% of an identical group of bearings operated under the same conditions to 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.

2-4 Radial Loading Capacity

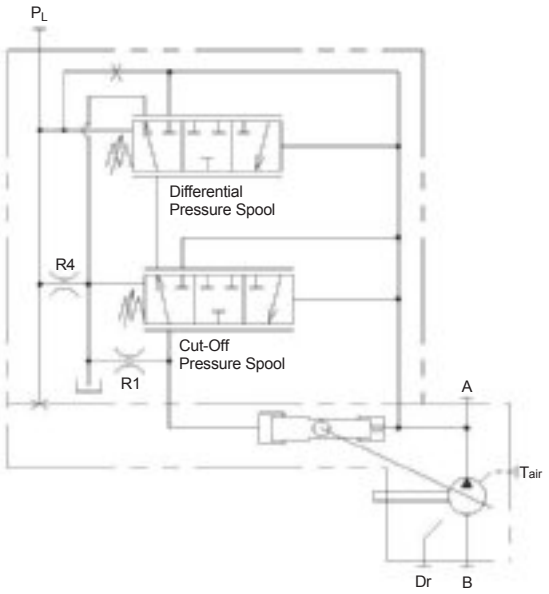
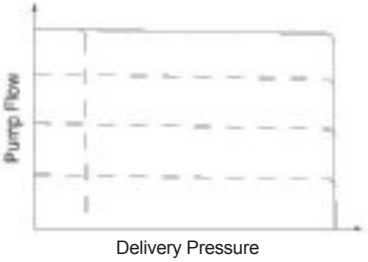
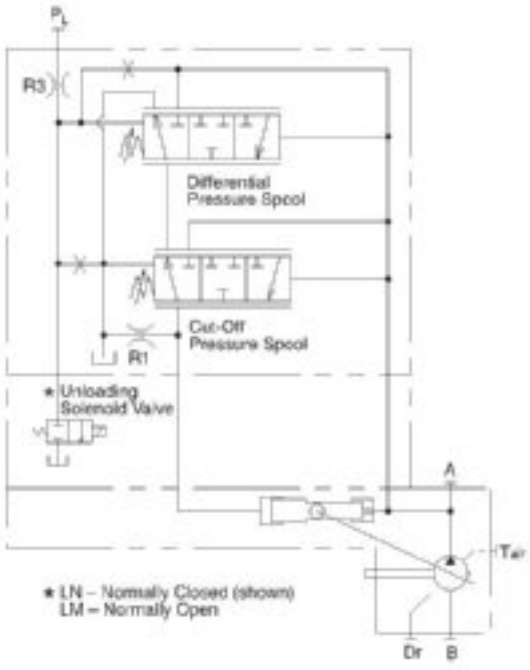
Axial shaft load is not permitted. Radial shaft load is possible with proper orientation. Contact KPM.

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.

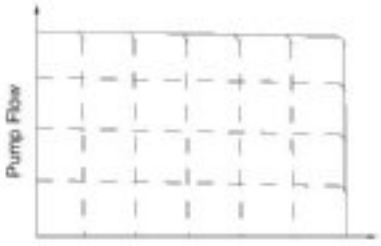
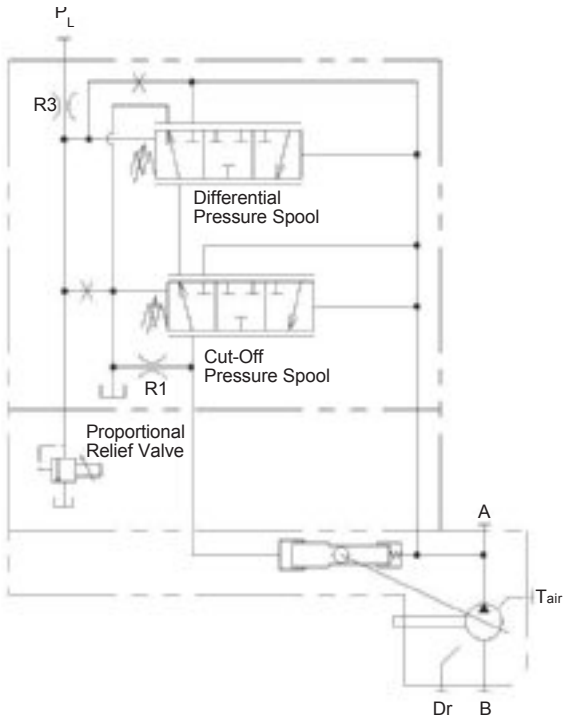
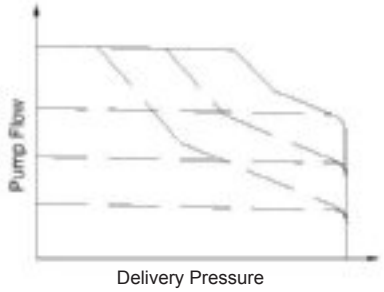
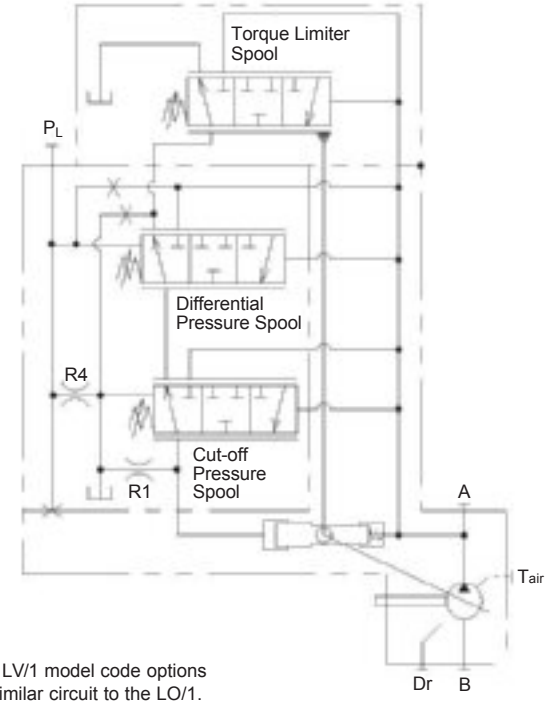


2-5 Functional Description of Regulator

Regulator code	Hydraulic Circuit
LO/L1 Load Sensing and Pressure Cut-off Description: The load sense regulator controls the pump displacement to best match the flow and pressure requirements of the load. The pump delivery pressure (Dp) is the sum of the load pressure (Ls), plus the differential pressure (rP) setting. Ls + P = Dp 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. Differential Pressure: Standard Settng - 218 psi (15 bar) Adjustment Range - 145 psi (10 bar) ~ 300 psi (21 bar) Cut-off Pressure: Standard Setting - 4600 psi (320 bar) Adjustment range - 300 psi (21bar) ~ 4600 psi (320 bar) L1 Option: With the L1 option, the bleed-off orifice (R4) is plugged. When this option is applied, threre must be another bleed-off orifice in the external valving to prevent trapped pressure.  	
LN or LM Load Sensing and Pressure Cut-off with Integrated Unloading Valve* 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. Standby Pressure: The minimum standby pressure is approximately 200 psi (14 bar) at the minimum Differential Pressure setting. * Can also be used with the torque limiting and proportional displacement control regulators  	

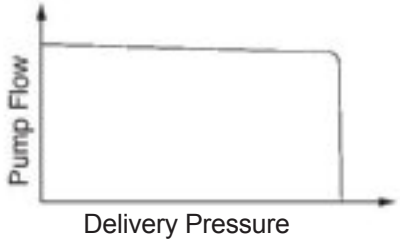
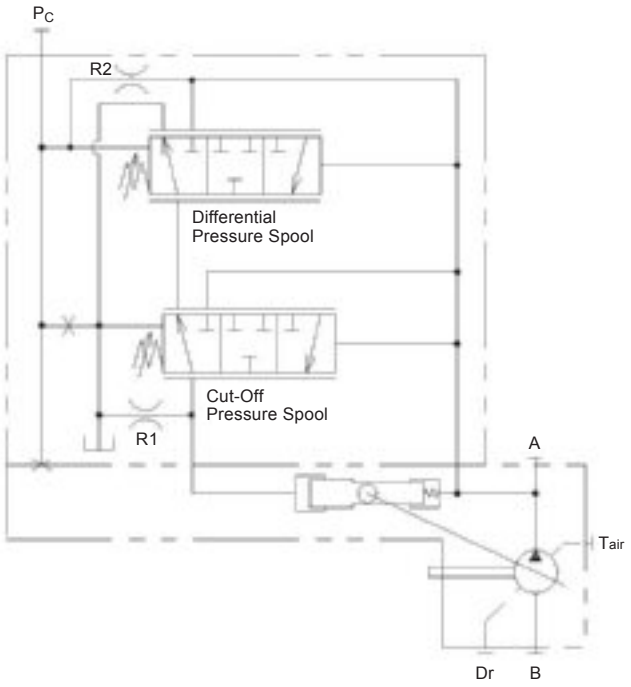
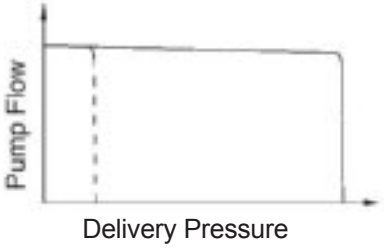
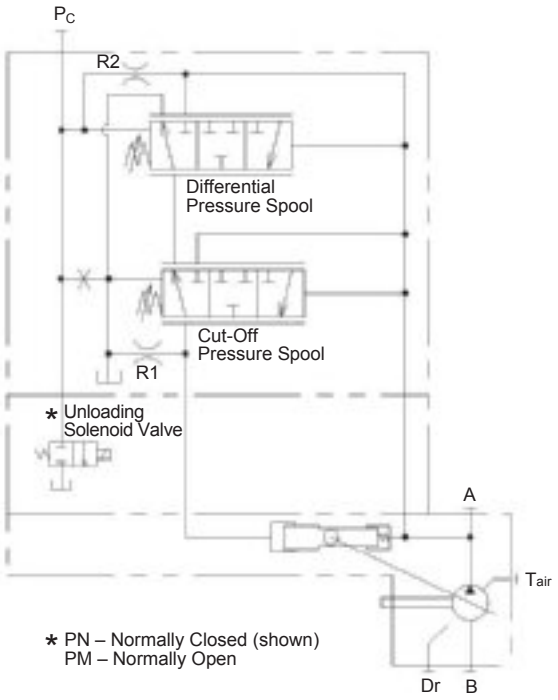
Warning: A safety relief valve should be installed in the hydraulic circuit at the pump outlet.

2-5 Functional Description of Regulator (cont)

Regulator code	Hydraulic Circuit
LV or LV2 Load Sensing and Pressure Cut-off with Integrated Proportional Relief Valve* Description: An integrated proportional relief valve issandwiched between the load sense regulator and pumpto control the maximum operating pressure by varying an electrical signal to the valve. The LV control is designed for industrial applications operating on 24vdc control power. The LV2 control is designed for mobile applications operating on 12vdc or 24vdc control power. Standby Pressure: The minimum standby pressure is approximately 200 psi (14 bar) at the minimum Differential Pressure setting. Amplifier: A separate amplifier is required for either control option. See section 16 for available amplifiers. * Can also be used with the torque limiting and proportional displacement control regulators 	
L0/1-** Load Sensing and Pressure Cut-off with Torque Limiting 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. The torque limiter regulator monitors delivery pressure and the swashplate angle and adjusts the pump displacement to limit input torque to a preset value. 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 x 5252/N Please reference the torque limiting code chart on page 3. 	 LN/1 and LV/1 model code options utilize a similar circuit to the LO/1.

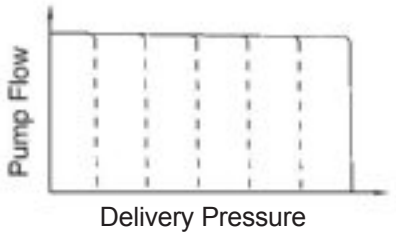
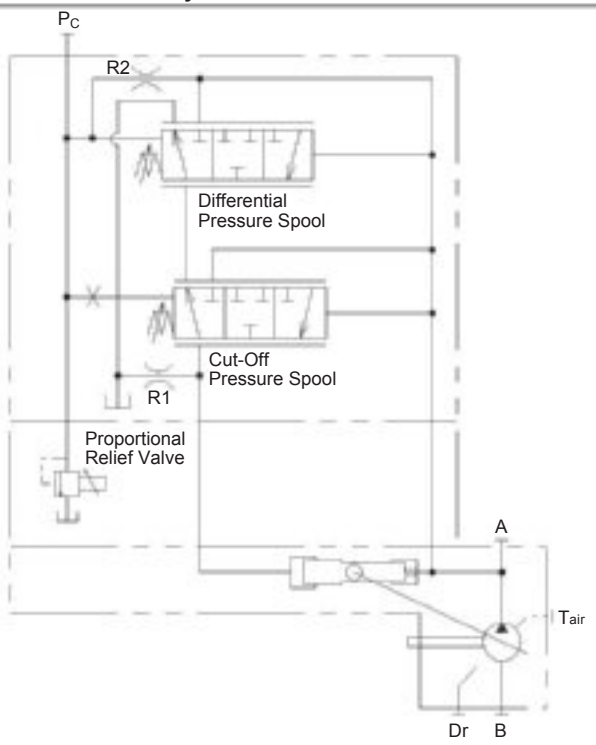
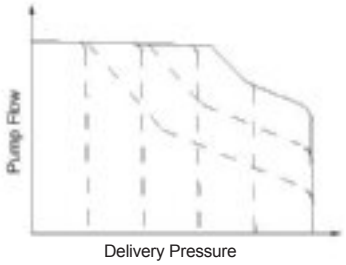
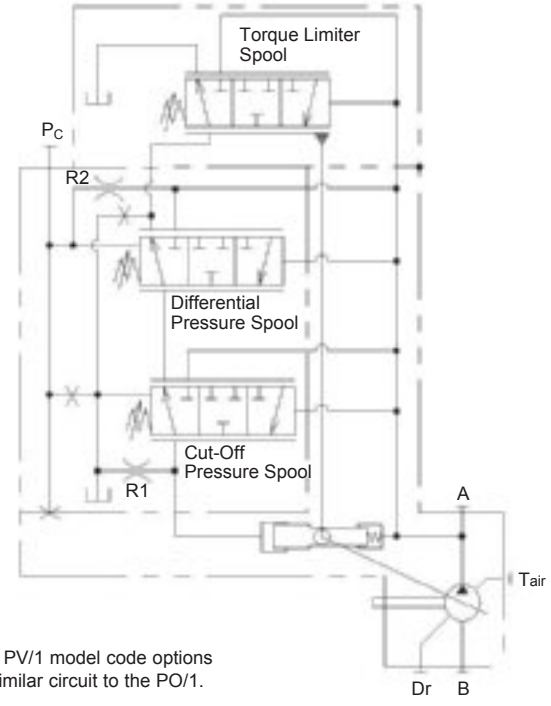
Warning: A safety relief valve should be installed in the hydraulic circuit at the pump outlet.

2-5 Functional Description of Regulator (cont)

Regulator code	Hydraulic Circuit
PO Pressure Cut-off 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. Differential Pressure: Standard Setting - 218 psi (15 bar) Adjustment Range - 145 psi (10 bar) ~ 300 psi (15 bar) Cut-off Pressure: Standard Setting - 4600 psi (320 bar) Adjustment Range - 300 psi (21 bar) ~ 4600 psi (320 bar) 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. 	
PN or PM Pressure Cut-off with Integrated Unloading Valve* 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. Standby Pressure: The minimum standby pressure is approximately 200 psi (14 bar) at the minimum DifferentialPressure setting. * Can also be used with the torque limiting and proportional displacement control regulators 	

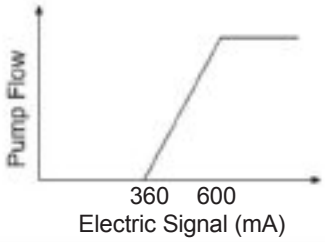
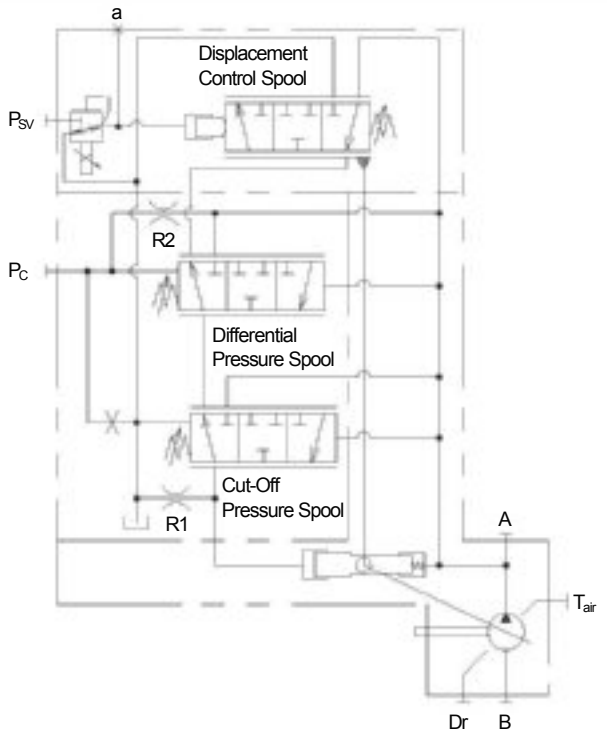
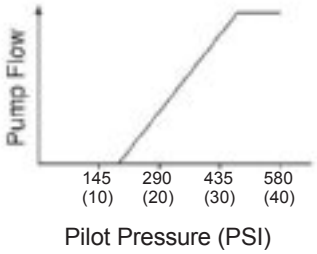
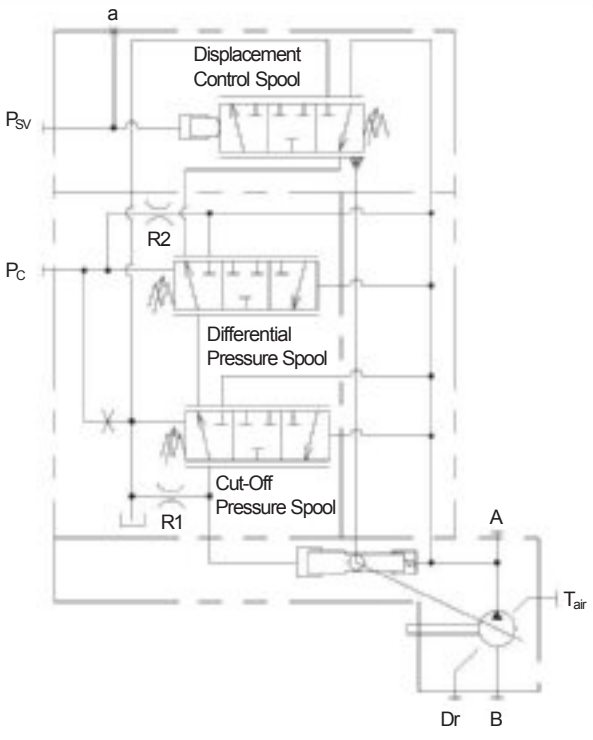
Warning: A safety relief valve should be installed in the hydraulic circuit at the pump outlet.

2-5 Functional Description of Regulator (cont)

Regulator code	Hydraulic Circuit
PV or PV2 Pressure Cut-off with Integrated Proportional Relief Valve* 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. The PV control is designed for industrial applications operating on 24vdc control power. The PV2 control is designed for mobile applications operating on 12vdc or 24vdc control power. Standby Pressure: The minimum standby pressure is approximately 200 psi (14 bar) at the minimum Differential Pressure setting. Amplifier: Separate amplifier is required for either control option. See Section 16 for available amplifiers. * Can also be used with the torque limiting and proportional displacement control regulators 	
P0/1-** Pressure Cut-off with Torque Limiting 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. The torque limiter regulator monitors delivery pressure and the swashplate angle and adjusts the pump displacement to limit input torque to a preset value. 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 x 5252/N Please reference the torque limiting code chart on page 3. 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. 	 PN/1 and PV/1 model code options utilize a similar circuit to the PO/1.

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
P0/1-E0 Electronic Proportional Displacement Control with Pressure Cut-off 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 infinetly 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. Note: The pump outlet pressure must be greater than 100 psi for proper regulator operation. Amplifier: A pulse width modulated (PWM) amplifier is required to operate the E0 control. The recommended dither frequency is 50-200Hz. See section 16 for amplifiers. Coil specifications: Rated current: 700 mA Recommeded dither frequency: 50-200Hz Coil resistance: 17.5Ωat 20° C Connector type: Nihon AMP Econoseal J series, Mark I 	
PO/1-QO Hydraulic Pilot Displacement Control with Pressure Cut-off 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. Remote control: By connecting the Pc port to a remote pressure control, variable pump pressure control (or unloading) can be achieved. 	

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.

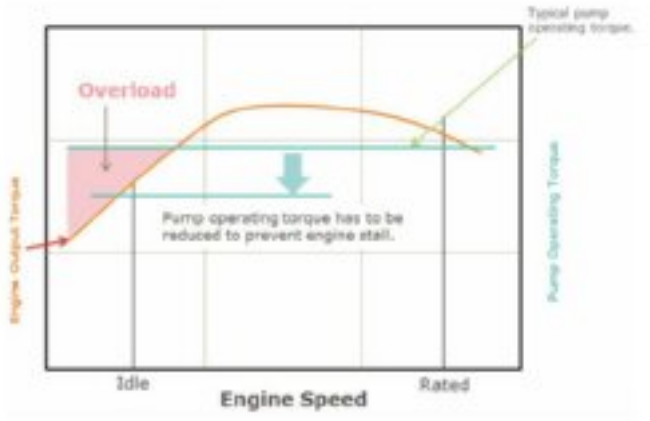
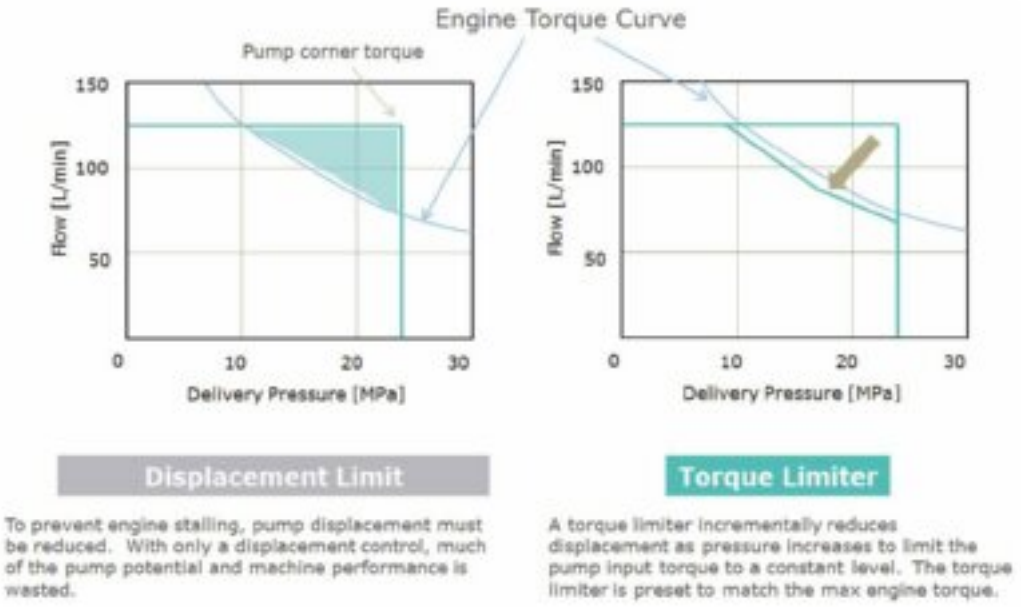


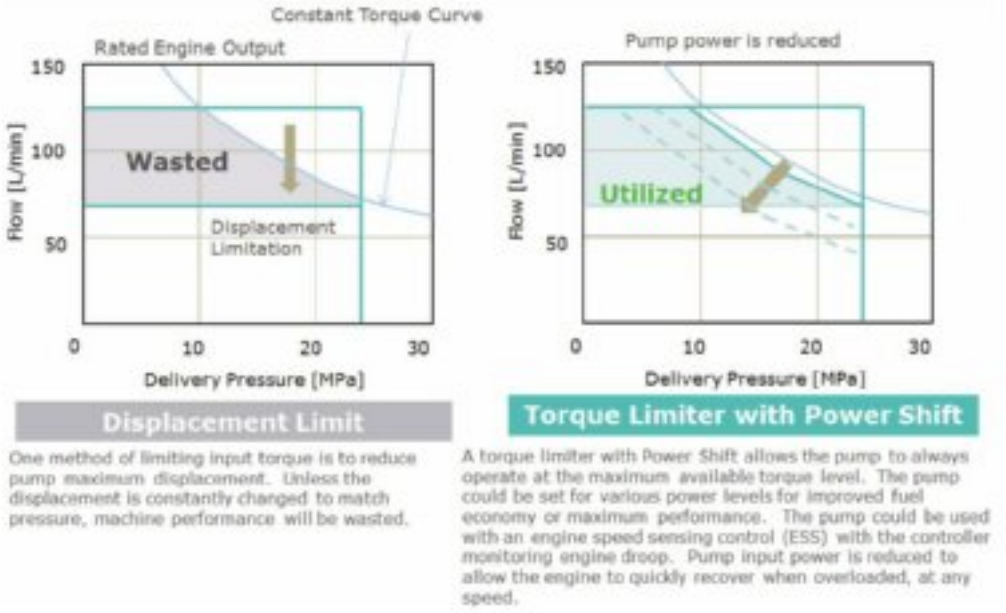
Figure 1

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.

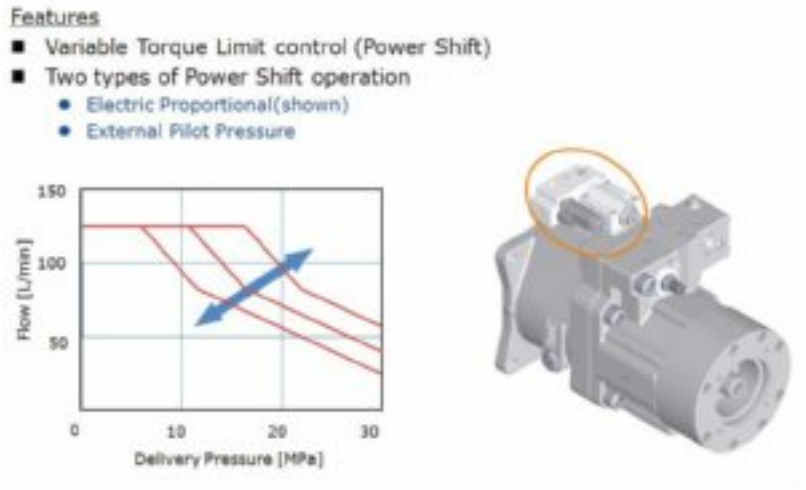


A torque limiter with Power Shift allows the pump to always operate at the maximum available torque. The pump can be set for various power levels for improved fuel economy or maximum performance. The pump can be used with an engine speed sensing control (ESS) with the controller monitoring engine droop.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

2-6 Power Shift (cont)



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



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

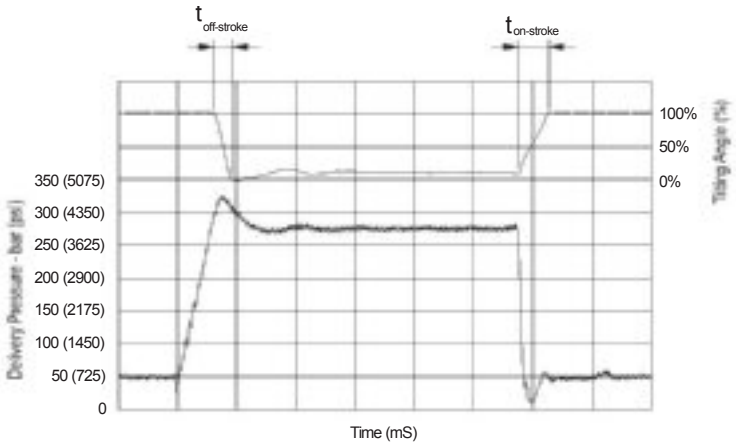
Pressure Cut-off Dynamic Response

50 to 280 bar (725 to 4060 psi)

	$t_{off\text{-}stroke}$	$t_{on\text{-}stroke}$
Unit	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)

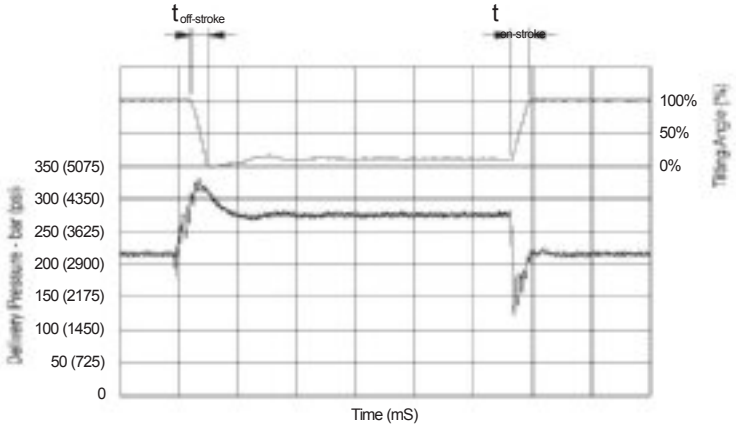


220 to 280 bar (3190 to 4060 psi)

	$t_{off\text{-}stroke}$	$t_{on\text{-}stroke}$
Unit	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)



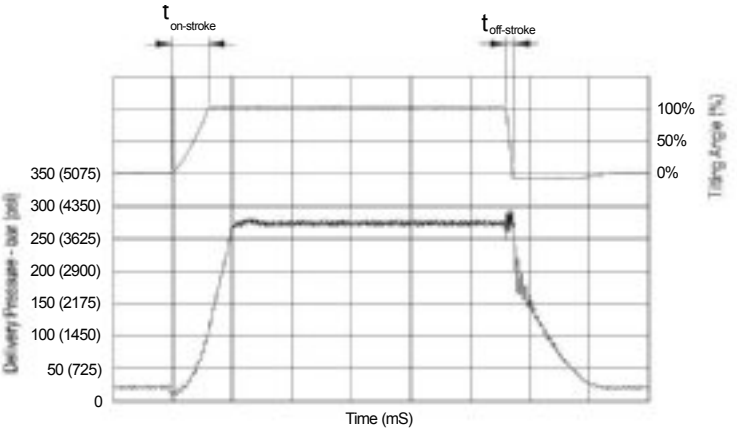
Load Sensing Dynamic Response

20 to 280 bar (290 to 4060 psi)

	$t_{off\text{-}stroke}$	$t_{on\text{-}stroke}$
Unit	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)



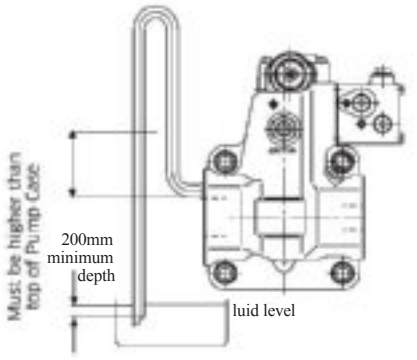
Note: The response values shown in the tables above are typical of those experienced in the laboratory. Actual response time will vary with different hydraulic circuits.

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.



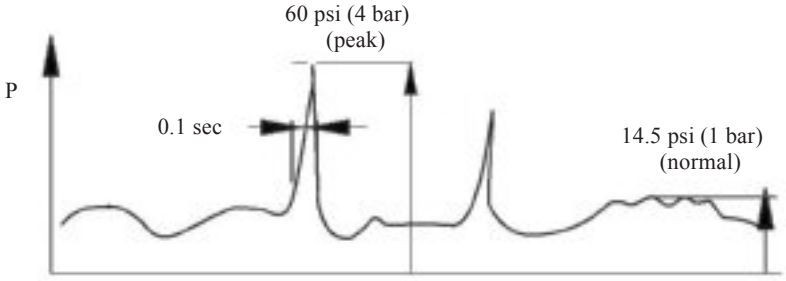
Cautions

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).

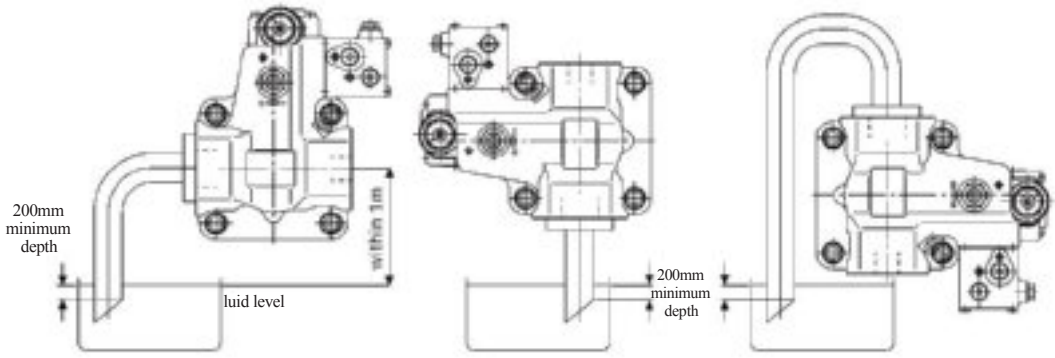
C) The oil in the pump case must be refilled when the pump has not been operated for one month or longer.

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)

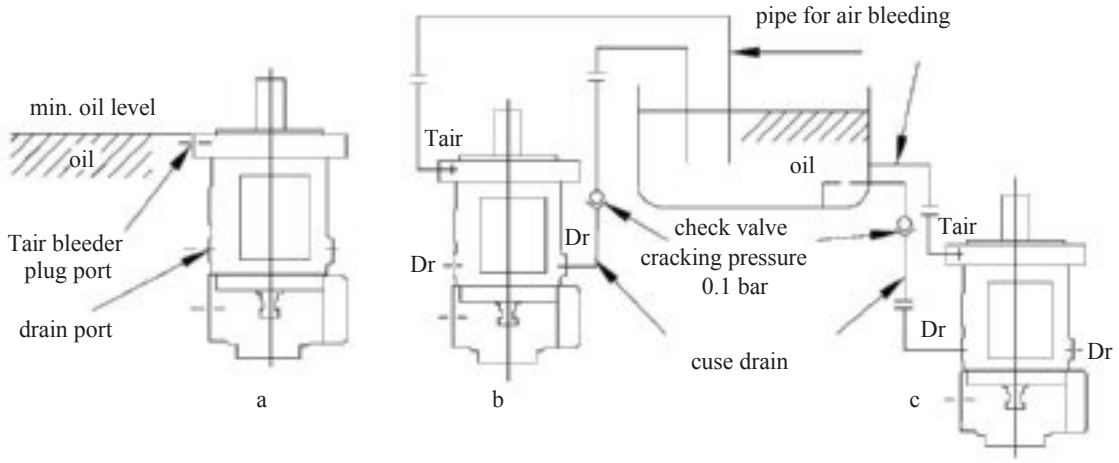
Note: Both the Tair and one case drain port must be used.

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)

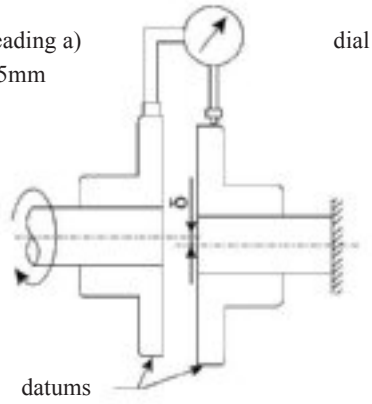
Drive Shaft Coupling

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.

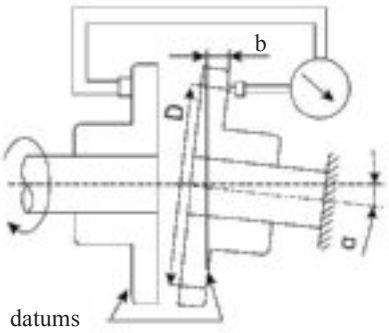
Do not apply any radial or axial loading to the pump shaft. For applications where radial or side loads exist please contact KPM for recommendations.

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.

dial gauge (reading a)
δ a/2 0.025mm



dial gauge (reading b)
αSN-1 (b/D)
0.2



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	Maximum Permisable 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)

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)

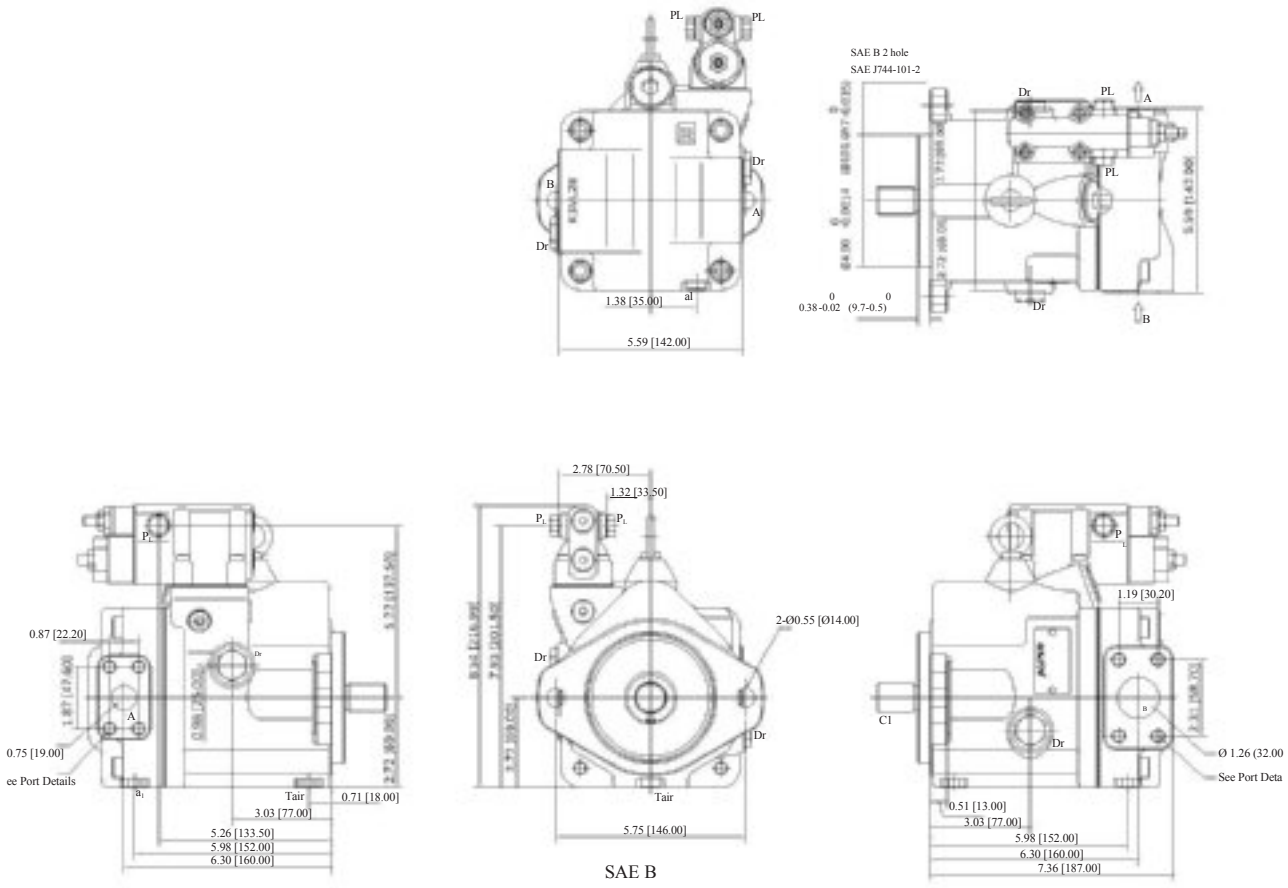
Adaptor Kits Weight & Width			
Frame size	Adaptor Kit	Weight lbs (Kg)	Width in.(mm)
K3VL28	SAE 'A'	0 (0)	0 (0)
	SAE 'B'	4.4 (2)	0.8 (20)
K3VL45 & 60	SAE 'A'	0 (0)	0 (0)
	SAE 'B' & 'BB'	4.4 (2)	0.8 (20)
K3VL80	SAE 'A'	0 (0)	0 (0)
	SAE 'B' & 'BB'	6.6 (3)	0.8 (20)
	SAE 'C', 'CC' & 'C4'	8.8 (4)	1.0 (24.5)
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.



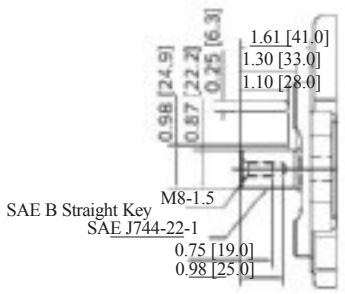
Port Details

Des.	Port Name	Port Size and Description	Tightening Torque lb-ft (Nm)
A	Delivery Port	¾ SAE J518C Code 61 (5,000 psi)	
		Unified Thread Type 'S' ⅜-16-2B(0.66")	42 (57)
B	Inlet Port	1¼ SAE J518 Code 61 (3,000 psi)	
		Unified Thread Type 'S' ⅞-16-2B(0.66")	42 (57)
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 (⅞"-20 UNF-2B)	9 (12)
T	Air Bleed Port	¼ O-Ring Boss -4 SAE J1926/1 (⅞"-20 UNF-2B)	9 (12)
a	Gauge Port	¼ O-Ring Boss -4 SAE J1926/1 (⅞"-20 UNF-2B)	9 (12)

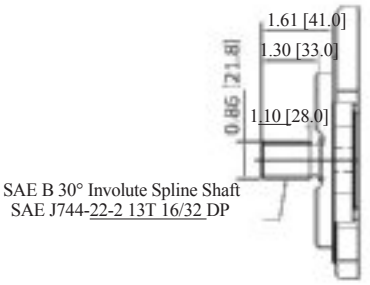
3-1 K3VL28 Installation (cont)

K3VL28 Shaft & Through Drive Options

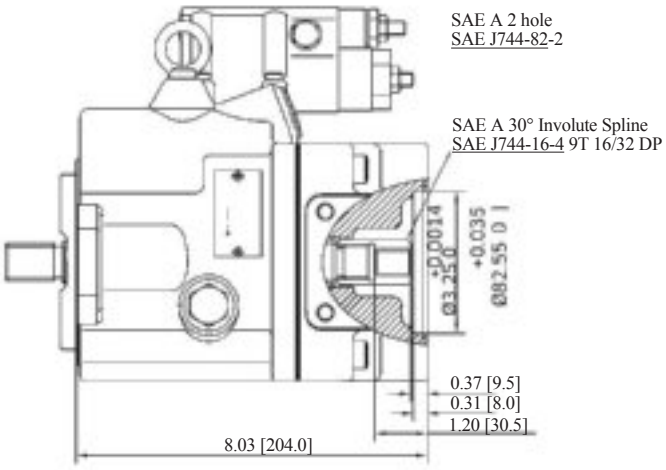
Model Code Option ‘K’ Shaft

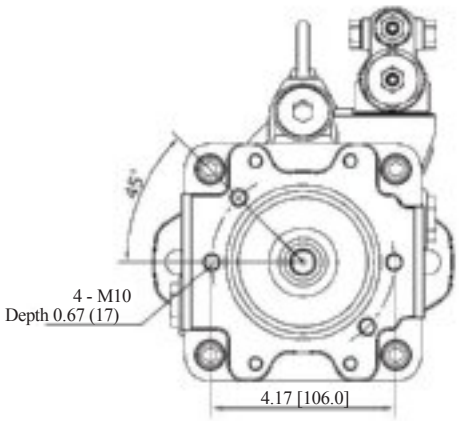


Model Code Option ‘S’ Shaft

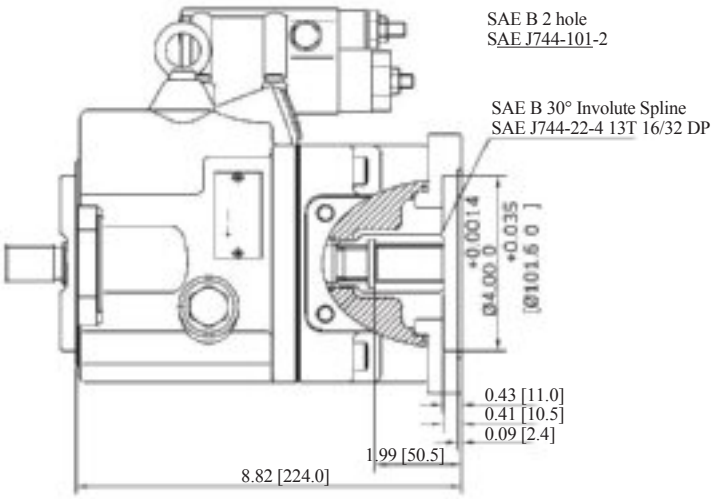


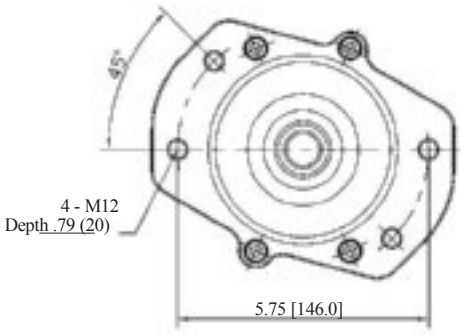
Through Drive SAE ‘A’





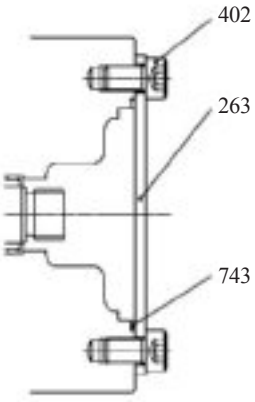
Through Drive SAE ‘B’



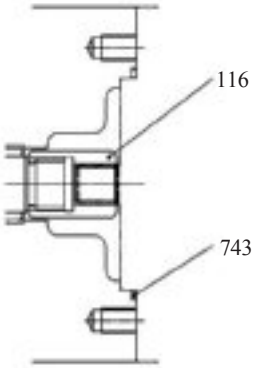


3-1 K3VL28 Installation (cont)

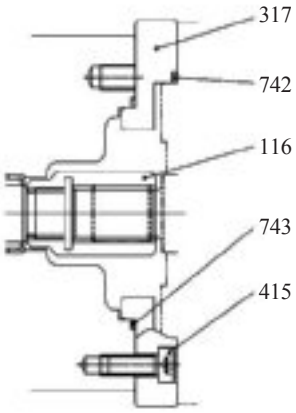
K3VL28 Adaptor Kits



Cover Kit



SAE 'A' T/D Kit

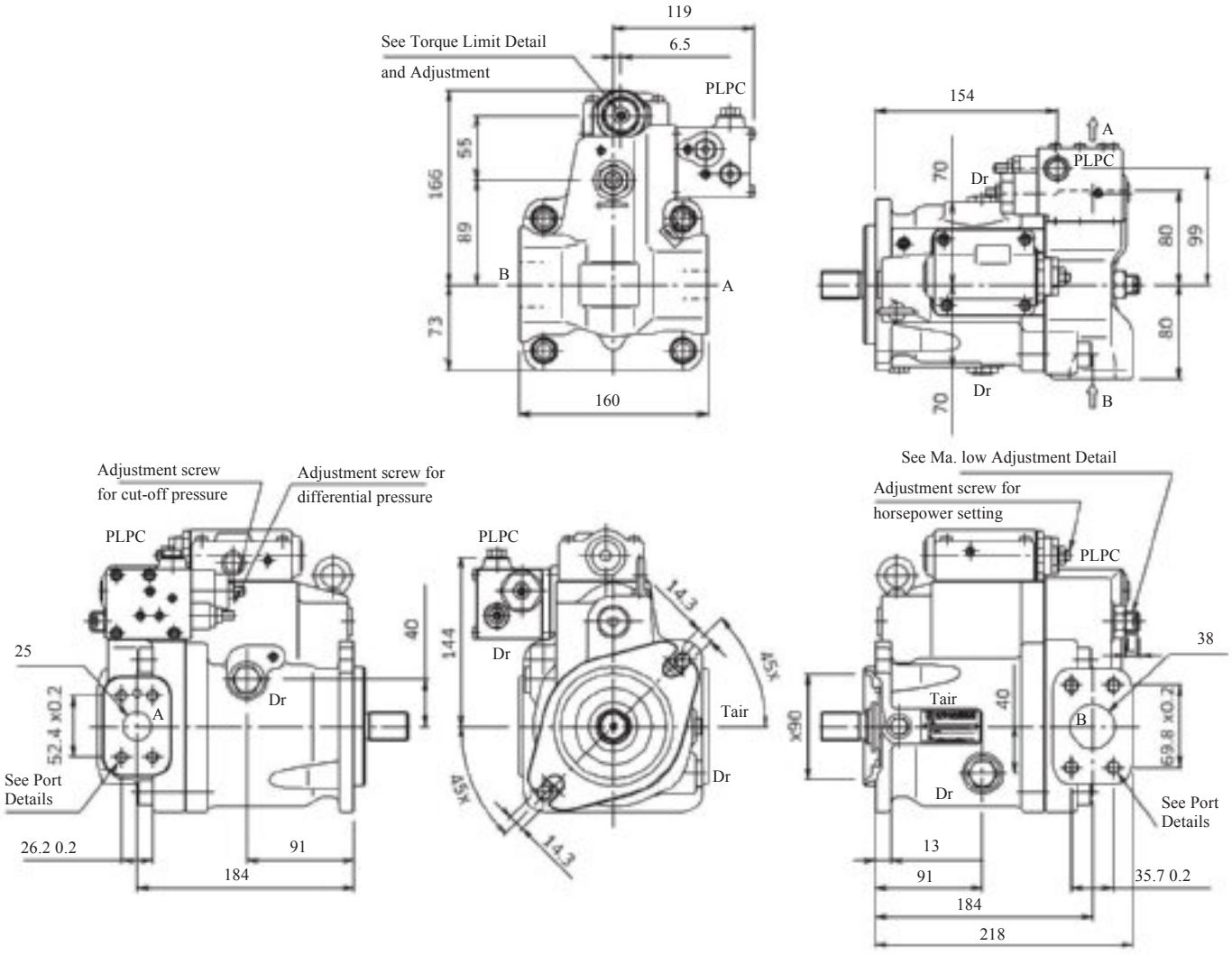


SAE "B" T/D KIT

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)

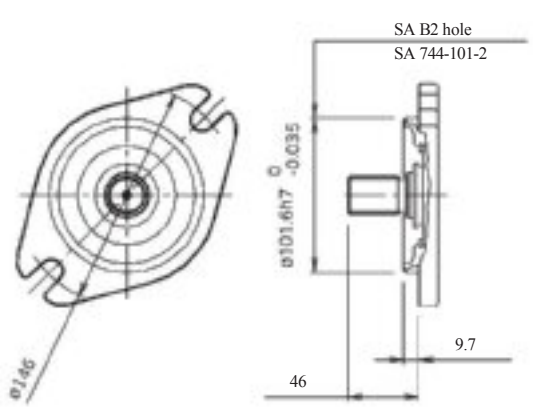


Note: for counter clockwise rotation, the inlet port ‘B’ and the delivery port ‘A’ are reversed.

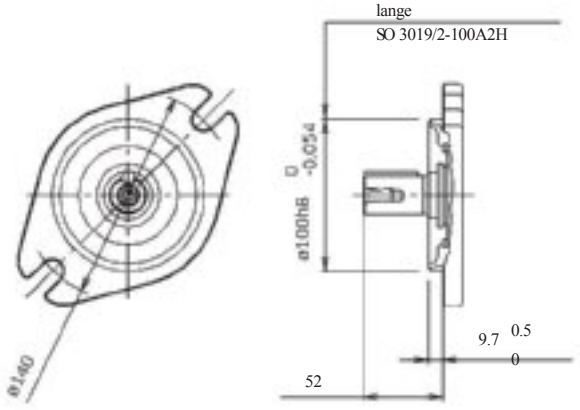
3-2 K3VL45/60 Installation (cont)

K3VL45/60 Mounting Flange and Shaft Options

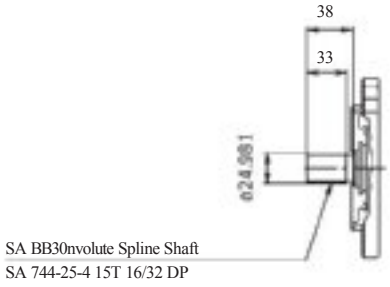
SAE Type



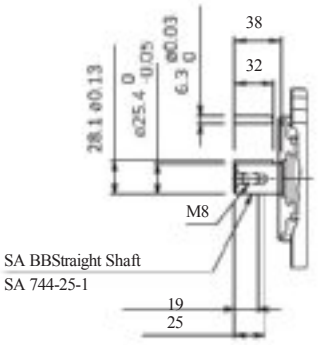
ISO Type



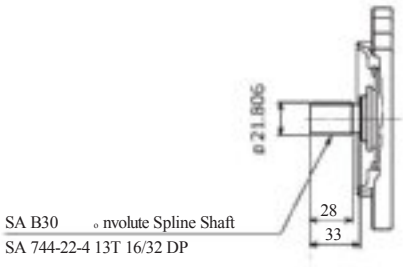
SAE 'BB' Spline Shaft



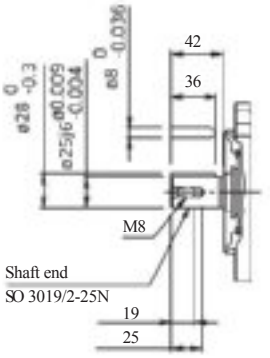
SAE 'BB' Parallel Keyed Shaft



SAE 'B' Spline Shaft

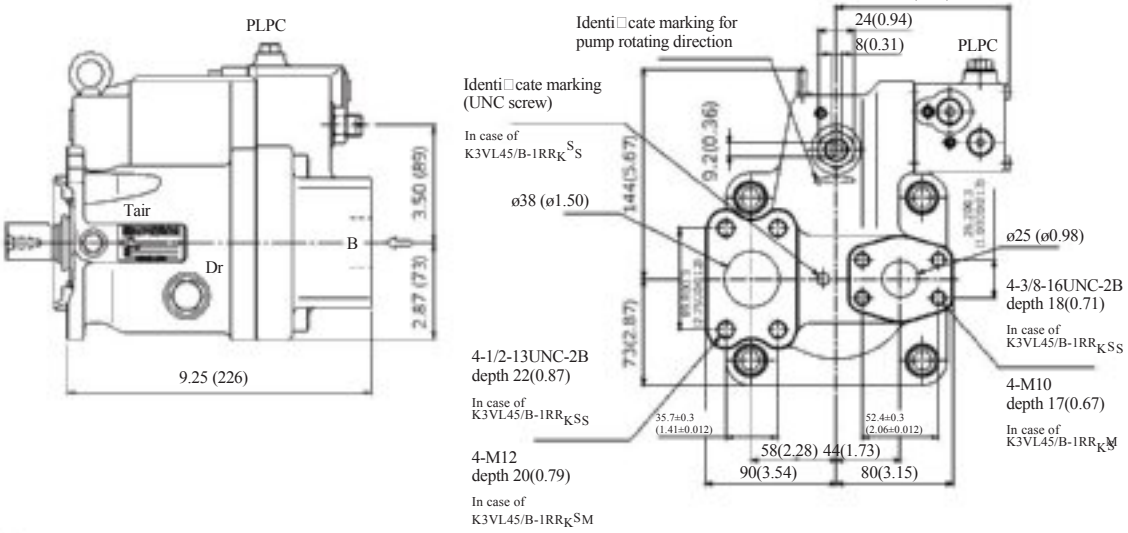


ISO Parallel Keyed Shaft



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)	⅜-16UNC-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

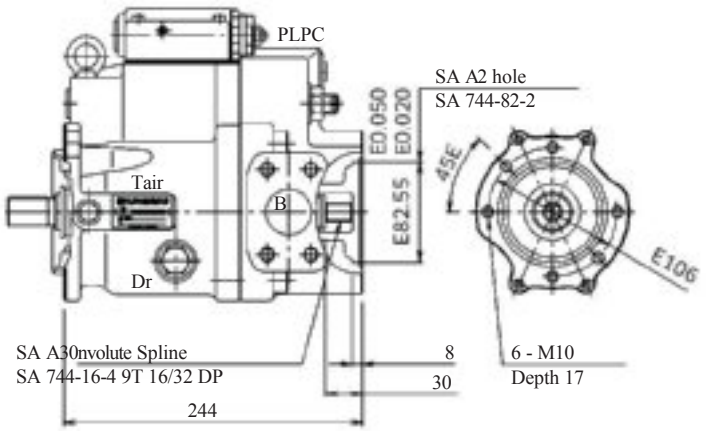
Auxiliary Ports

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)

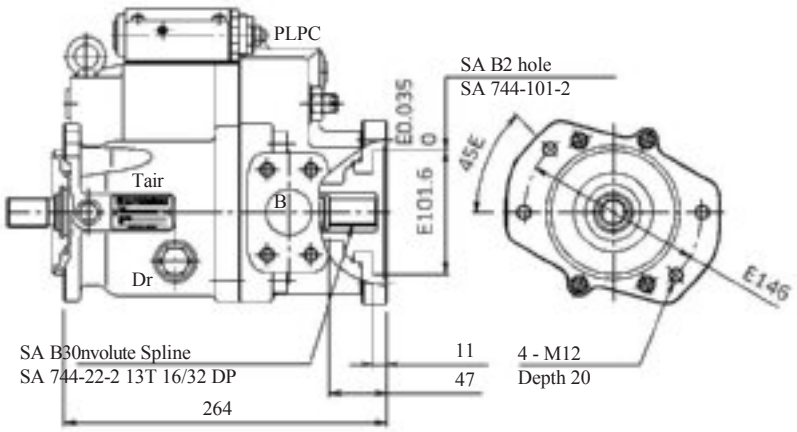
3-2 K3VL45/60 Installation (cont)

K3VL45/60 Through Drive Options

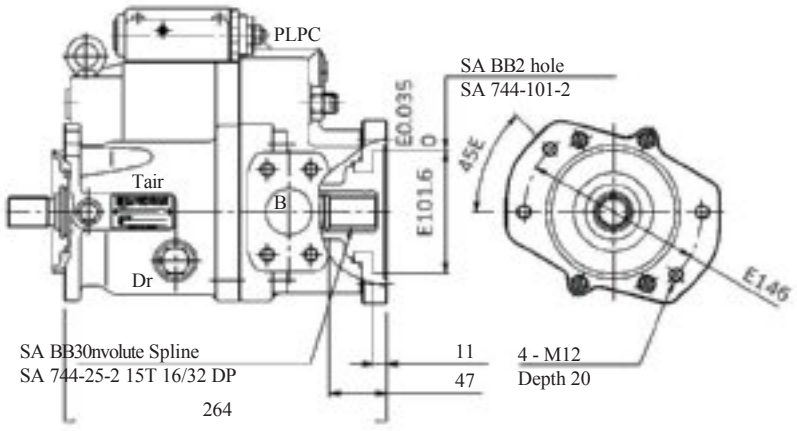
Through Drive ‘A’



Through Drive ‘B’

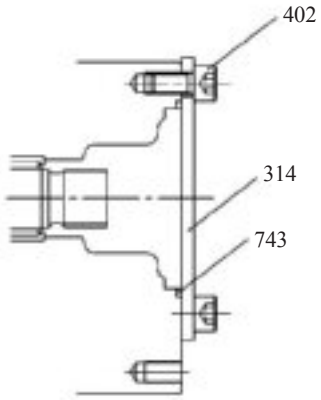


Through Drive ‘BB’

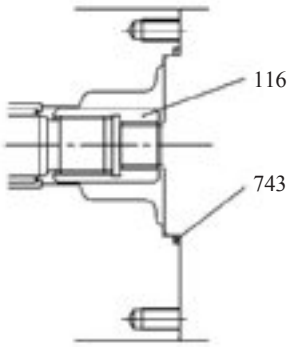


3-2 K3VL45/60 Installation (cont)

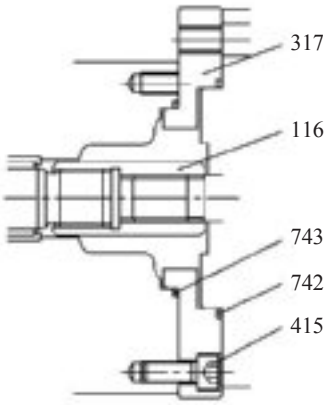
K3VL45/60 Adaptor Kits



COVER KIT



SAE 'A' T/D KIT

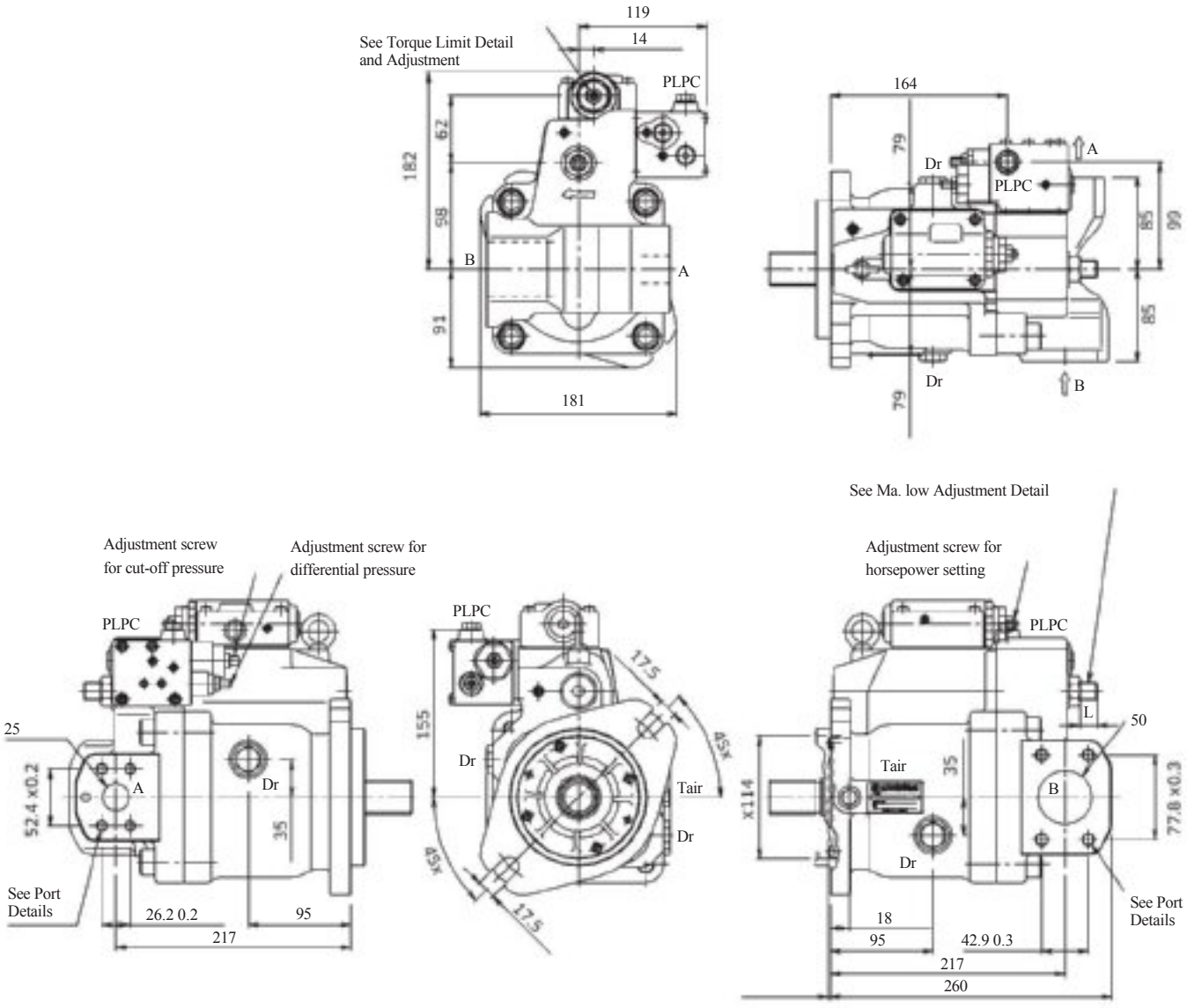


SAE 'B' & 'BB' T/D KIT

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)

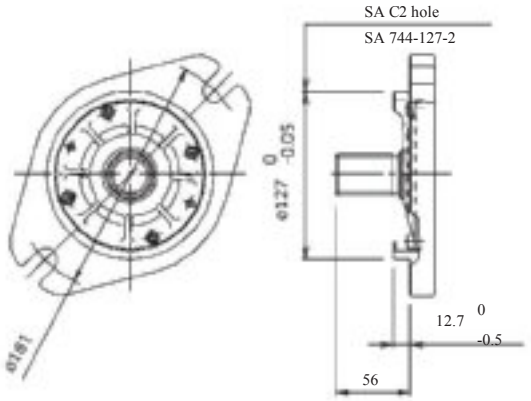


Note: for counter clockwise rotation, the suction port 'B' and the delivery port 'A' are reversed

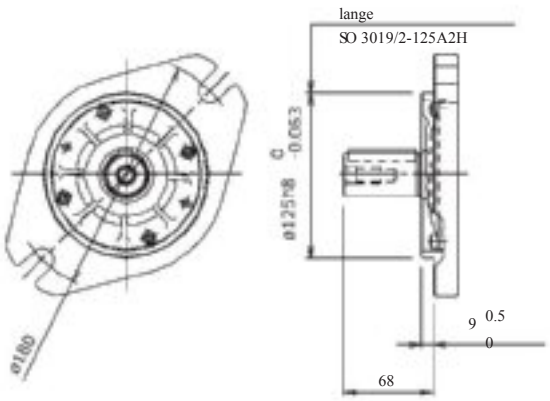
3-3 K3VL80 Installation (cont)

K3VL80 Mounting Flange and Shaft Options

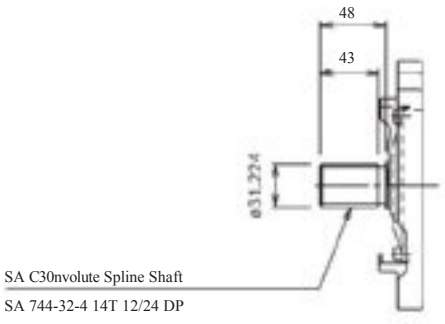
SAE Type



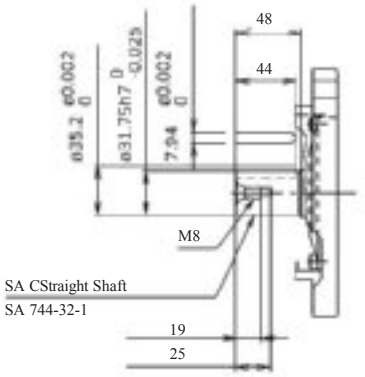
ISO Type



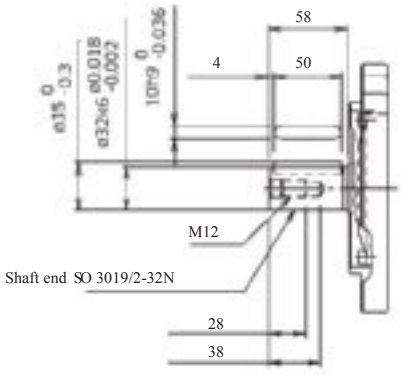
SAE 'C' Spline Shaft



SAE 'C' Parallel Keyed Shaft

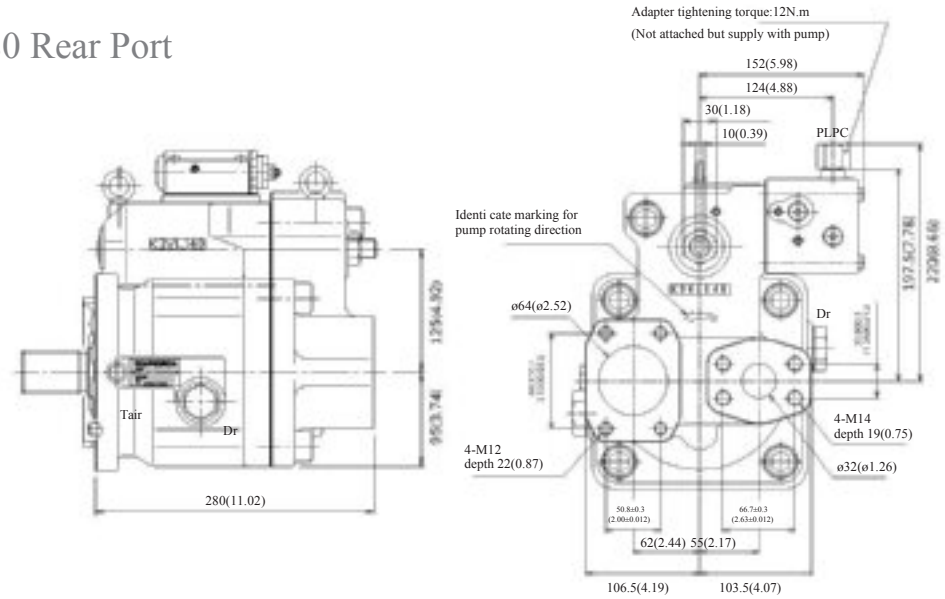


ISO Parallel Keyed Shaft



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
UNF Threaded Version ('S' in position 9 of model code)				
A	Delivery Port	SAE J518C Std pressure (code 61) 1”	42 (57)	⅜-16UNC-2B x 18 mm
B	Suction Port	SAE J518C Std pressure (code 61) 2”	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) 2”	72 (98)	M12 x 20

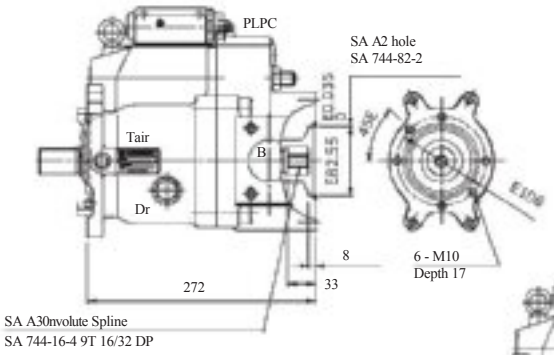
Auxiliary Ports

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)

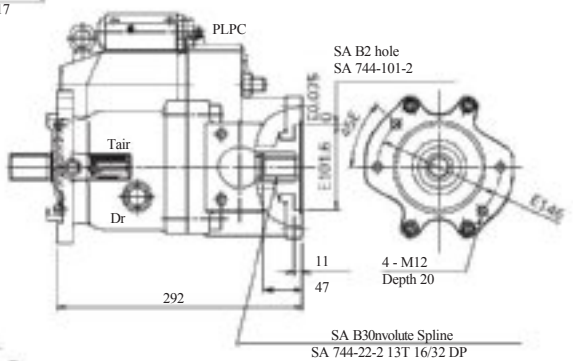
3-3 K3VL80 Installation (cont)

K3VL80 Through Drive Options

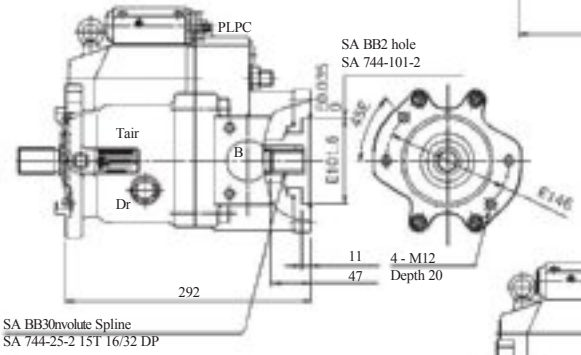
Through Drive ‘A’



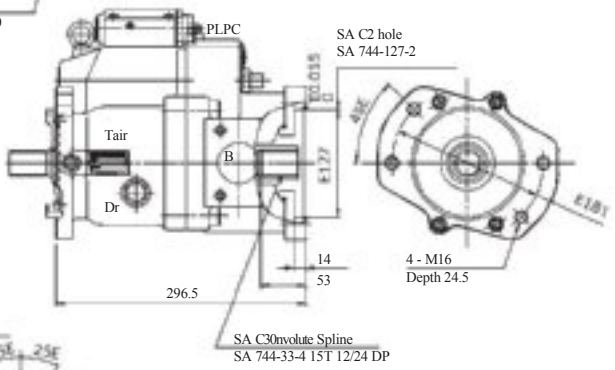
Through Drive ‘B’



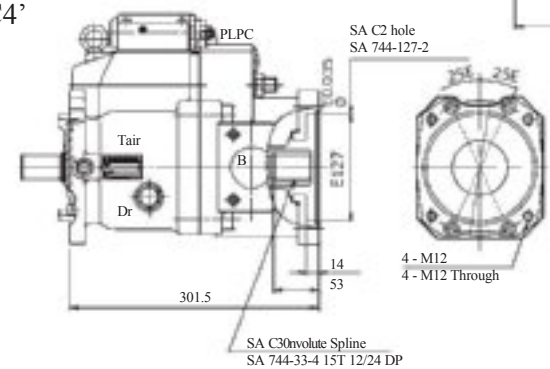
Through Drive ‘BB’



Through Drive ‘C’

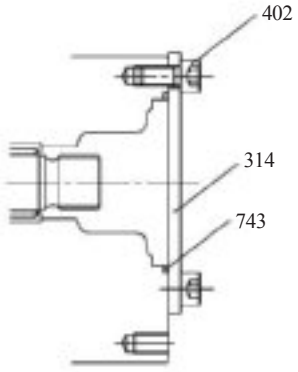


Through Drive ‘C4’

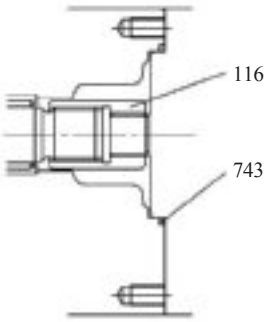


3-3 K3VL80 Installation (cont)

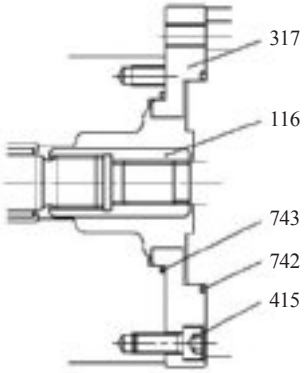
K3VL80 Adaptor Kits



Cover Kit



SAE 'A' T/D Kit



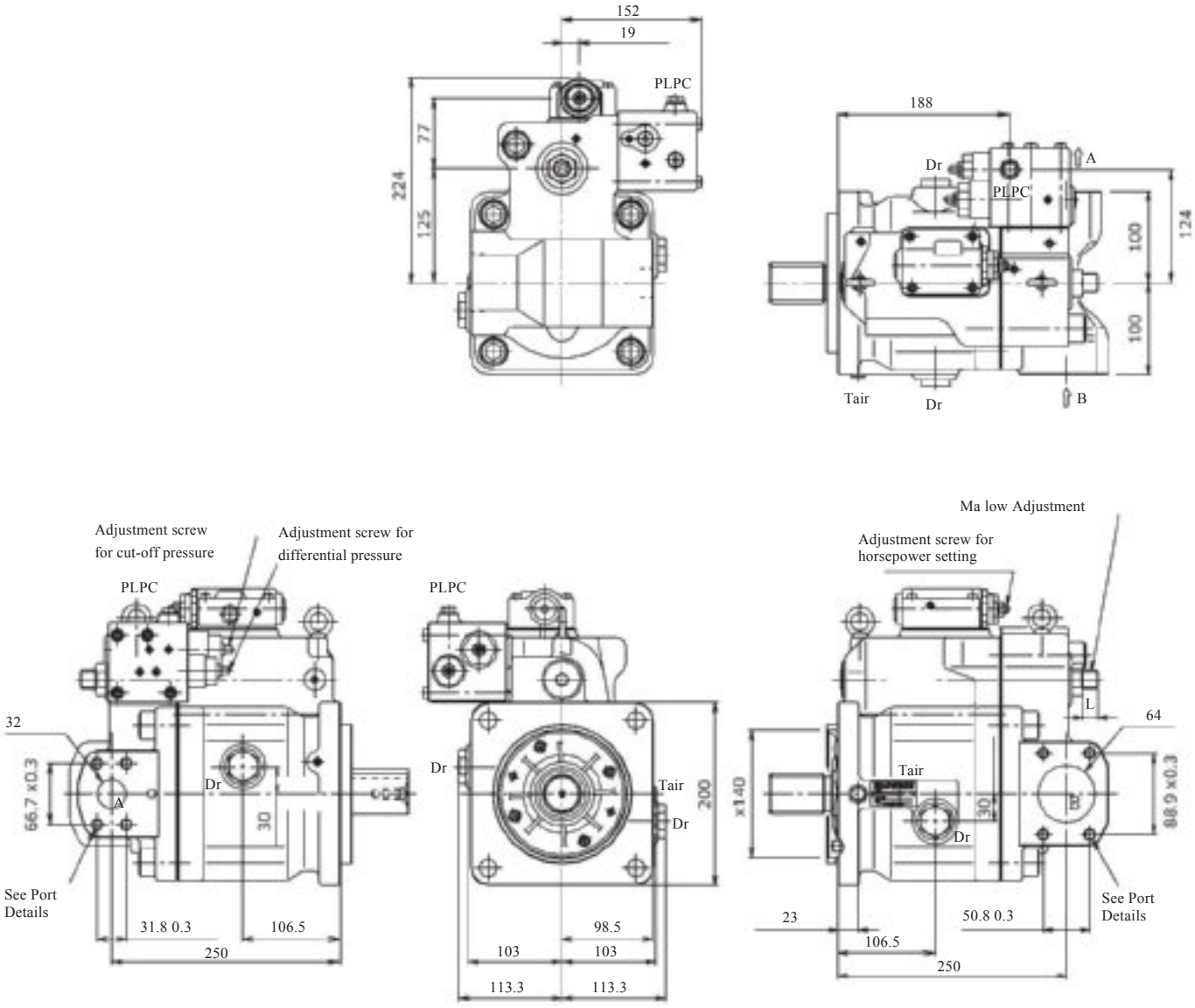
SAE 'B', 'BB', 'C' & 'C4' T/D Kit

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-0SBM1025
402	Screw Hex SHC	2	P-0SBM1020	-	-
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-0SBM1025	P-0SBM1030	P-0SBM1030
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)

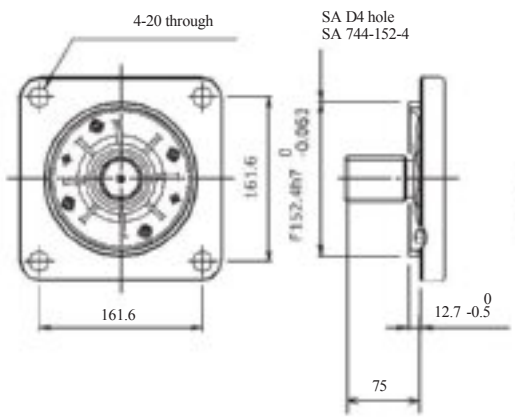


Note: for counter clockwise rotation, the suction port ‘B’ and the delivery port ‘A’ are reversed.

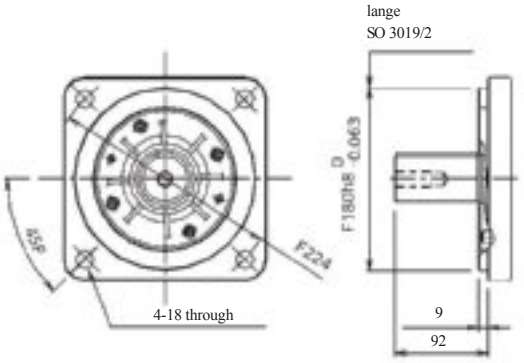
3-4 K3VL112/140 Installation (cont)

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

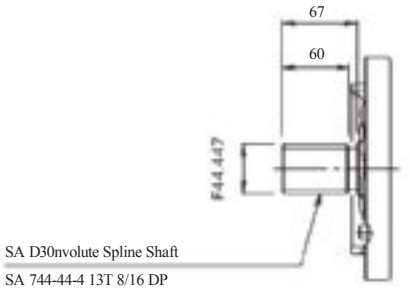
SAE ‘D’ Type



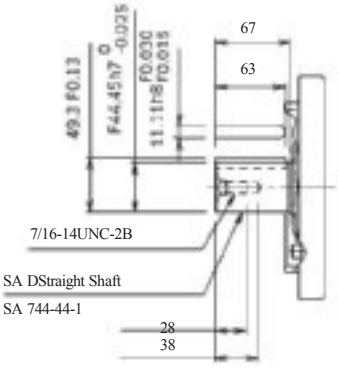
ISO Type



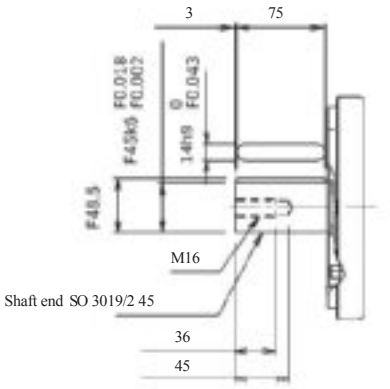
SAE ‘D’ Spline Shaft



SAE ‘D’ Parallel Keyed Shaft

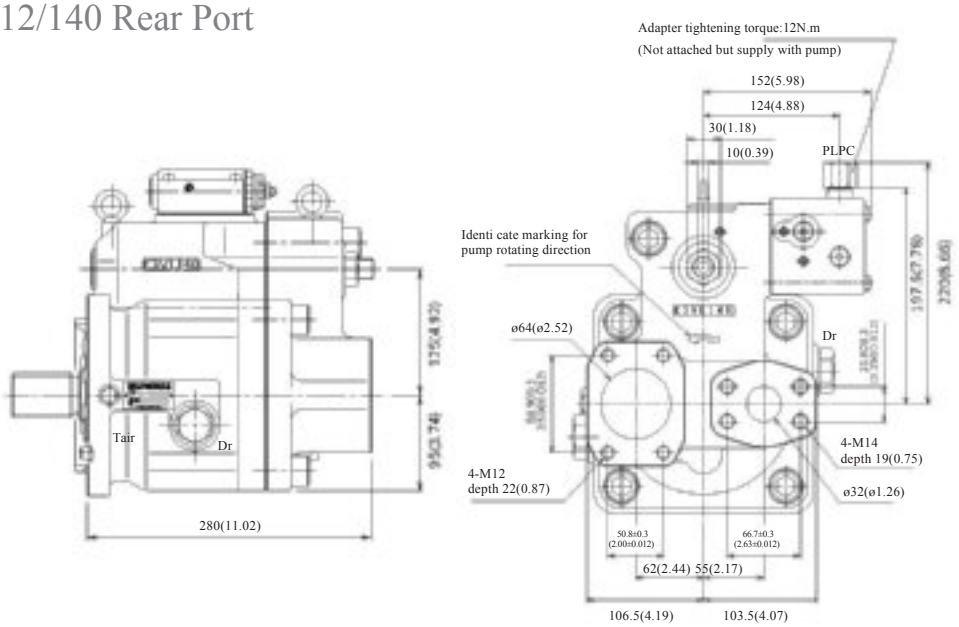


ISO Parallel Keyed Shaft



3-4 K3VL112/140 Installation (cont)

K3VL112/140 Rear Port



K3VL112/140 Porting Details

Main SAE Flanged Ports

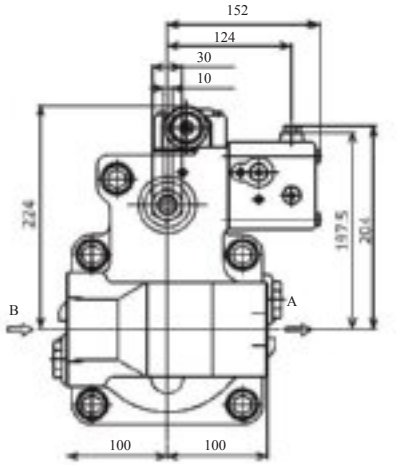
Des.	Port Name	Port Size	Tightening Torque lb-ft (Nm)	Flange Threads
UNF Threaded Version ('S' in position 9 of model code)				
A	Delivery Port	SAE J518C high pressure (code 62) 1¼"	116 (157)	½-13UNC-2B x 22 mm
B	Suction Port	SAE J518C Std pressure (code 61) 2½"	72 (98)	½-13UNC-2B x 22 mm
Metric Version ('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

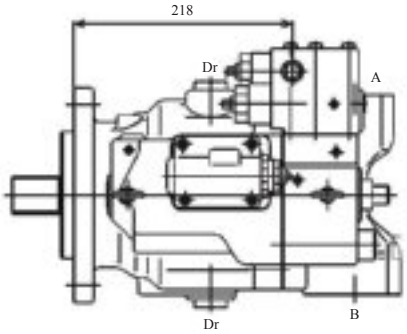
Auxiliary Ports

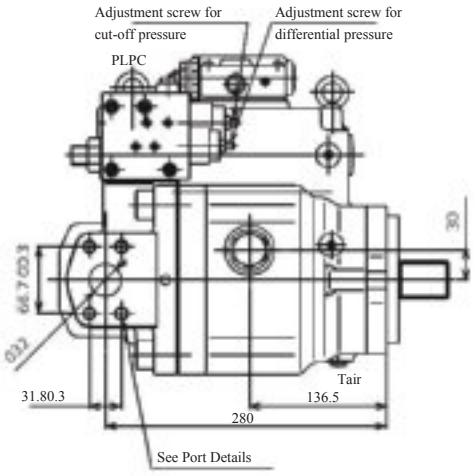
Des.	Port Name	Port Size	Tightening Torque lb-ft (Nm)
SAE Version ('S', 'K', 'C', 'R', 'U', 'X' or 'T' in position 8 of model)			
Dr	Drain Port (x2)	SAE J1926/1 Straight thread O ring boss ¾" OD Tube 1 1/16-12UN-2B	123 (167)
PLPC	Load Sensing Port Pressure Control Port	SAE J1926/1 Straight thread O ring boss ¼" OD Tube 7/8-20UNF-2B	9 (12)
Tair	Air Bleeder Port	SAE J1926/1 Straight thread O ring boss ¼" OD Tube 7/8 -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)

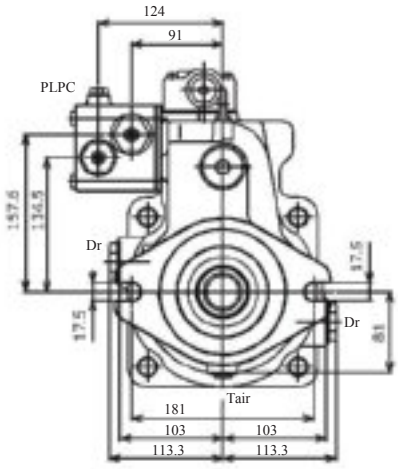
3-4 K3VL112/140 Installation (cont)

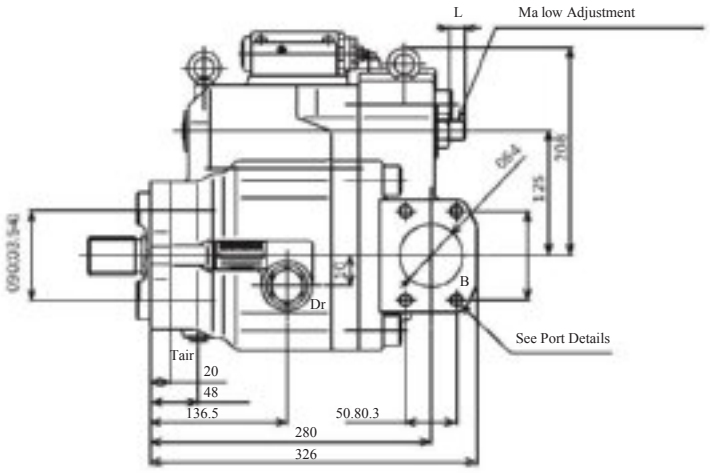
K3VL112/140 (SAE C 2 Bolt) Installation







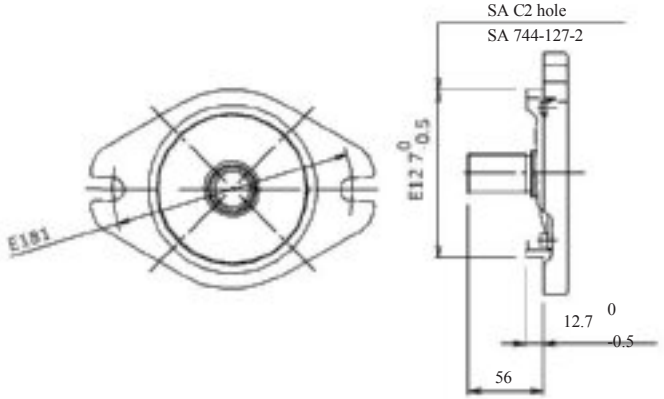




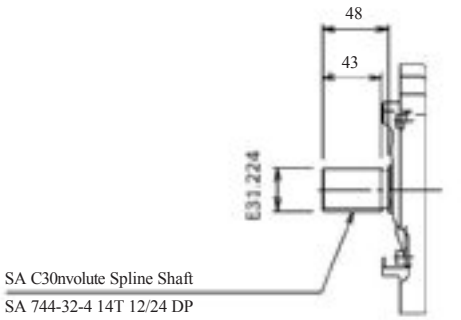
3-4 K3VL112/140 Installation (cont)

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

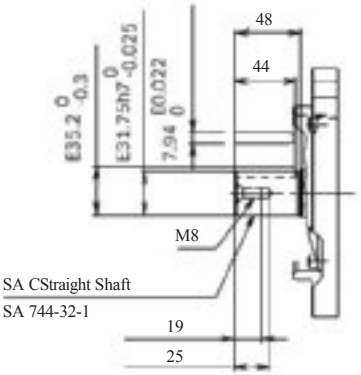
SAE ‘C’ Type



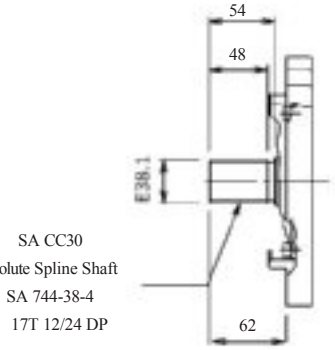
SAE ‘C’ Spline Shaft



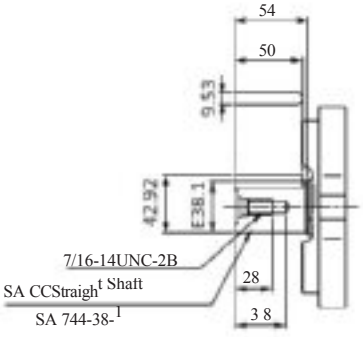
SAE ‘C’ Parallel Keyed Shaft



SAE ‘CC’ Spline Shaft



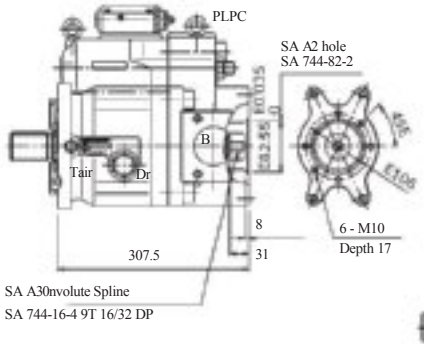
SAE ‘CC’ Parallel Keyed Shaft



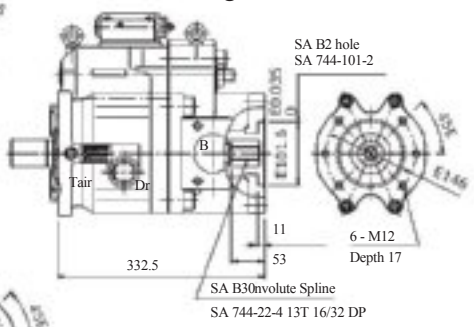
3-4 K3VL112/140 Installation (cont)

K3VL112/140 Through Drive Options

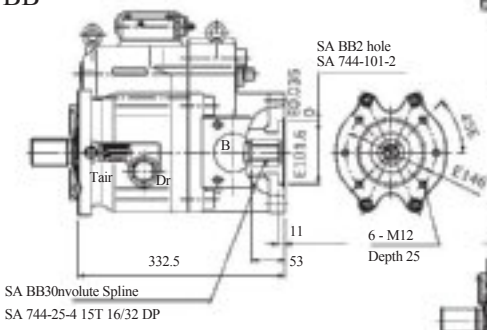
Through Drive ‘A’



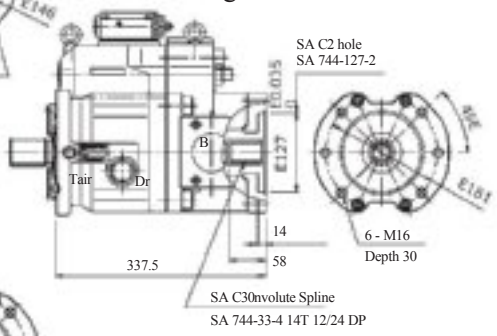
Through Drive ‘B’



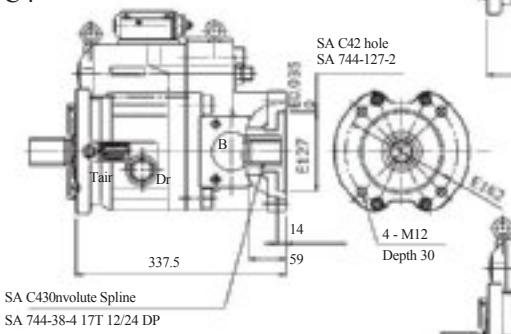
Through Drive ‘BB’



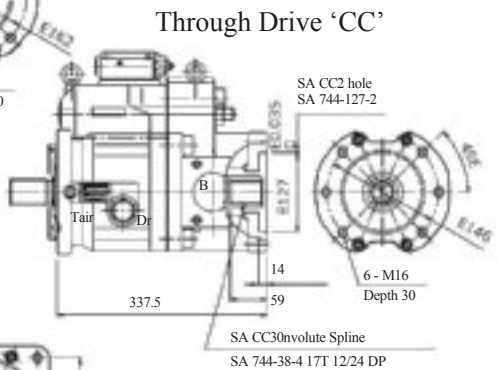
Through Drive ‘C’



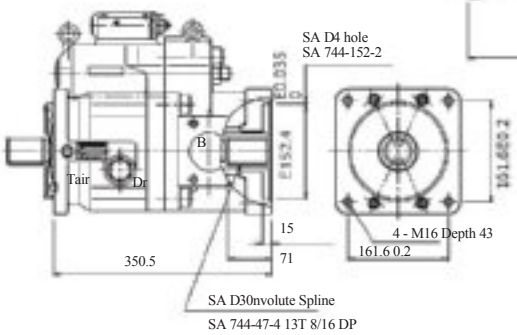
Through Drive ‘C4’



Through Drive ‘CC’

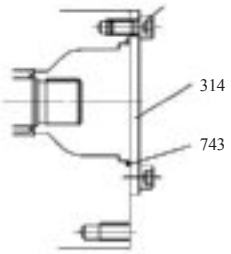


Through Drive ‘D’

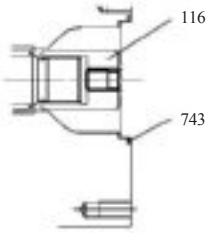


3-4 K3VL112/140 Installation (cont)

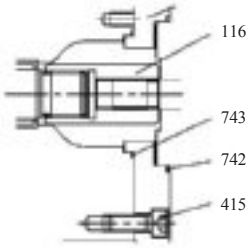
K3VL112/140 Adaptor Kits



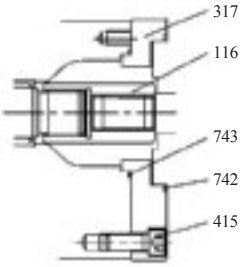
COVER KIT



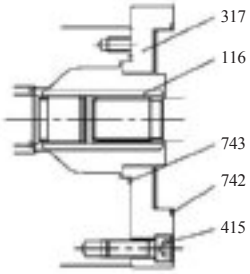
SAE 'A' T/D KIT



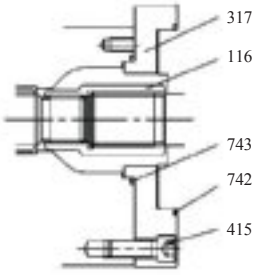
SAE 'B' T/D KIT



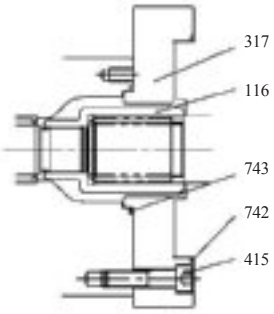
SAE 'BB' T/D KIT



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



SAE 'CC' T/D KIT



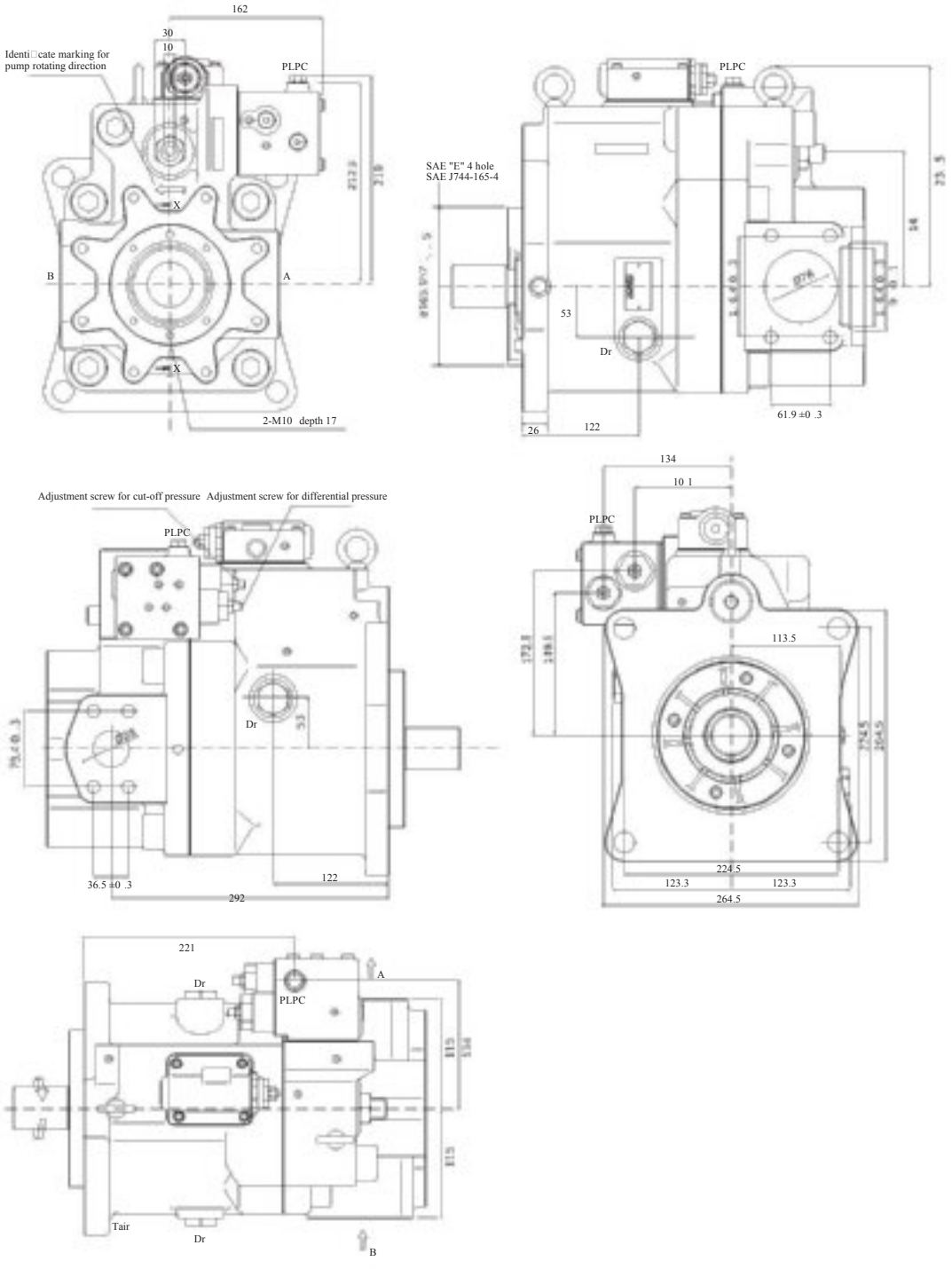
SAE 'D' T/D KIT

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

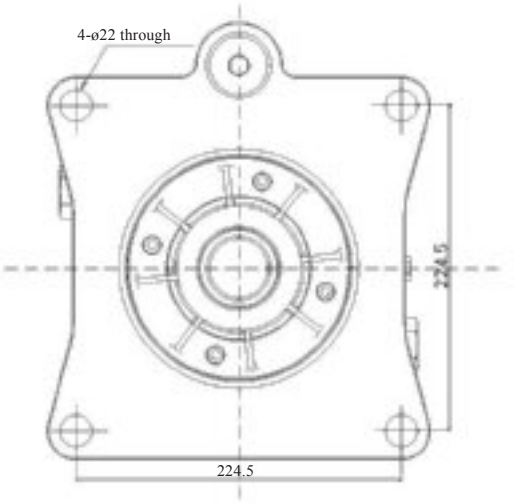
K3VL200 with Cut-Off / Load Sense Control & Torque Limit Module (Clockwise Rotation)



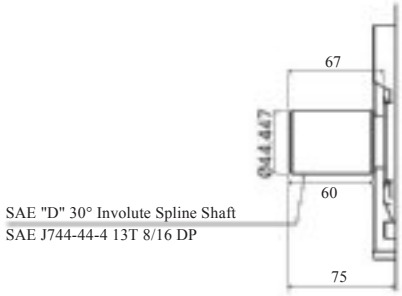
3-5 K3VL200 Installation (cont)

K3VL200 Mounting Flange and Shaft Options

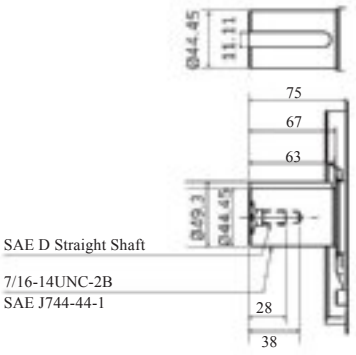
SAE Type



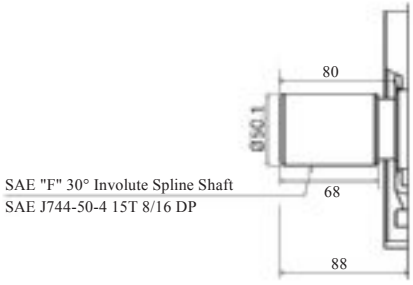
SAE Spline ‘D’ Shaft



SAE ‘D’ Parallel Keyed Shaft



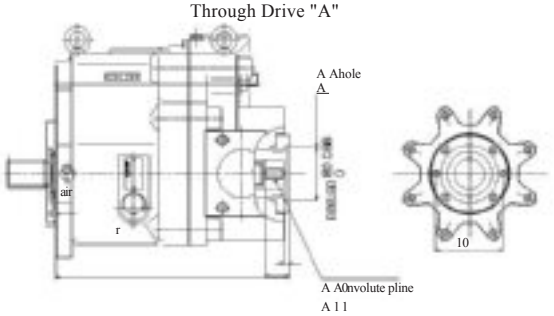
SAE Spline ‘F’ Shaft



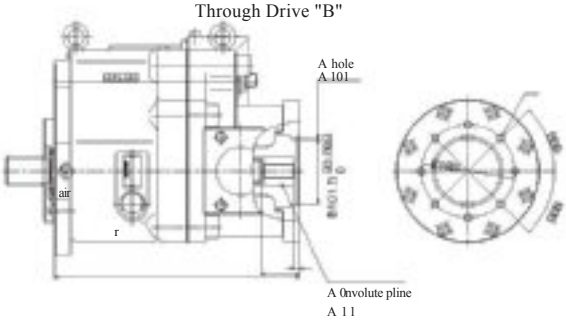
3-5 K3VL200 Installation (cont)

K3VL200 Mounting Flange and Shaft Options

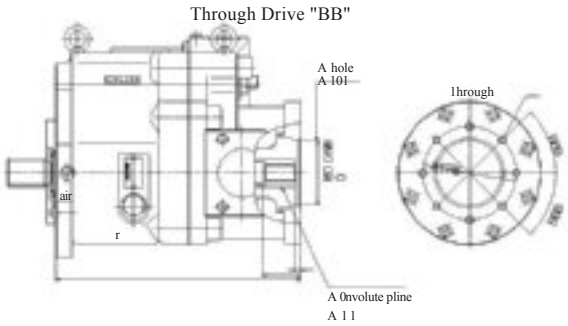
Through Drive "A"



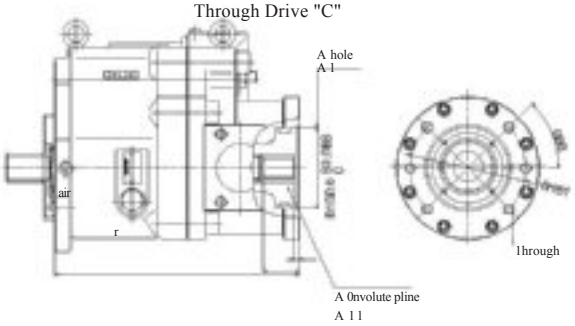
Through Drive "B"



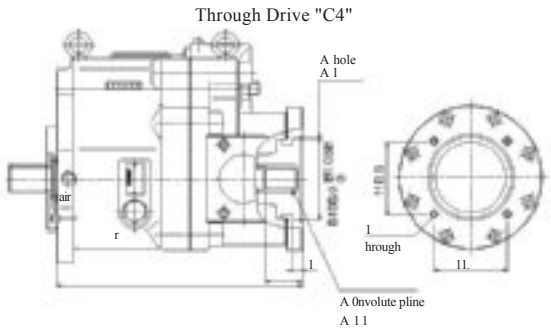
Through Drive "BB"



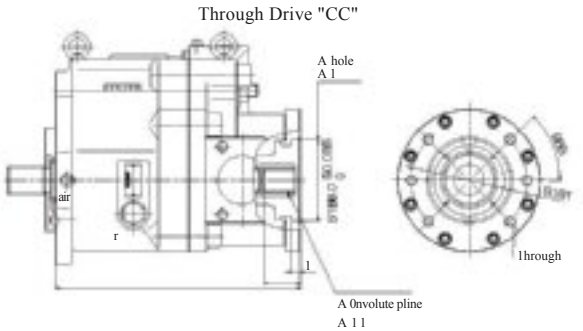
Through Drive "C"



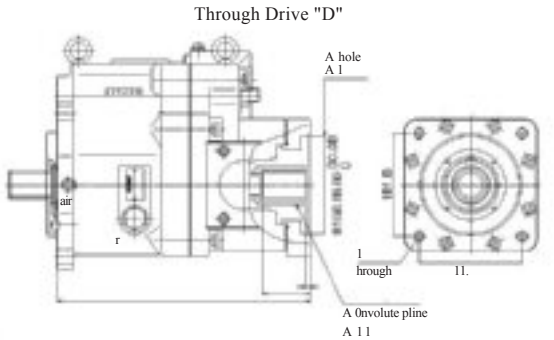
Through Drive "C4"



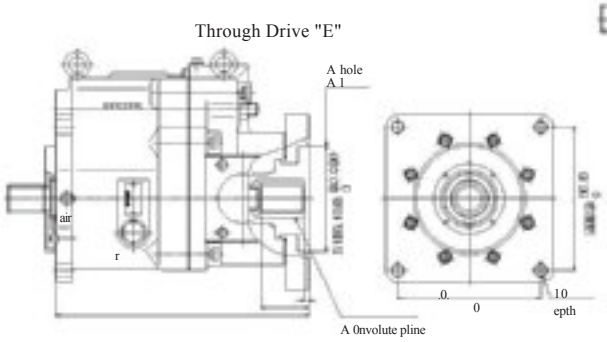
Through Drive "CC"



Through Drive "D"



Through Drive "E"



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) 0SBM825	P-0SBM1230	P-0SBM1230	P-0SBM1230
743	O-Ring	1	P-0SBM85	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-0SBM1230	P-0SBM1230	P-0SBM1245	P-0SBM1245
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

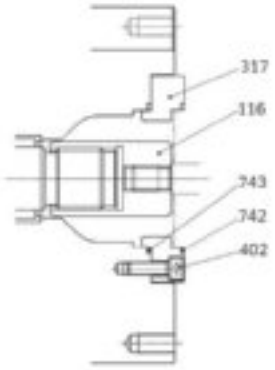
Des.	Port Name	Port Size	Tightening Torque lb-ft (Nm)	Flange Threads
UNC Threaded Version ('S', 'K' in position 9 of model code)				
A	Delivery Port	SAE J518C high pressure (code 62) 1½"	173 (235)	5/8-11UNC-2B
B	Suction Port	SAE J518C Std pressure (code 61) 3"	173 (235)	5/8-11UNC-2B
Metric Version ('M' 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

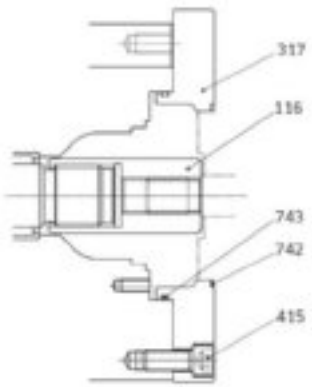
Des.	Port Name	Port Size	Tightening Torque lb-ft (Nm)
SAE Version ('S', 'K' in position 8 of model)			
Dr	Drain Port (x2)	SAE J1926 Straight thread O ring boss ¾" O.D Tube 1 1/16-12UNF-2B	123 (167)
PLPC	Load Sensing Port Pressure Control Port	SAE J1926 Straight thread O ring boss ¼" O.D Tube 7/8-20UNF-2B	9 (12)
Tair	Air Bleeder Port	SAE J1926 Straight thread O ring boss ¼" O.D Tube 7/8-20UNF-2B	9 (12)

3-5 K3VL200 Installation (cont)

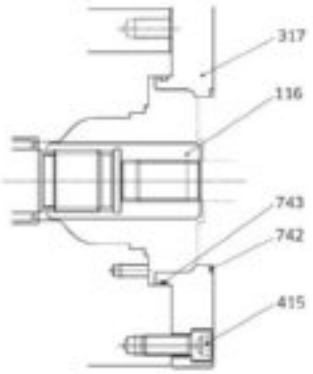
K3VL200 Through drive kits



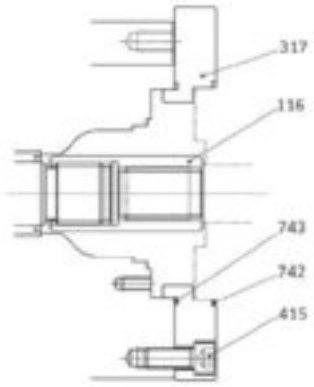
SAE “A” T/D Kit



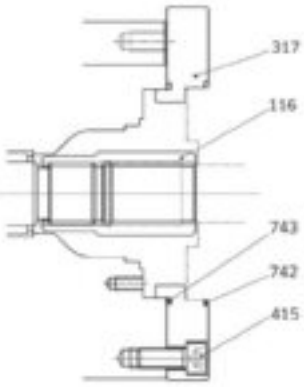
SAE “B” T/D Kit



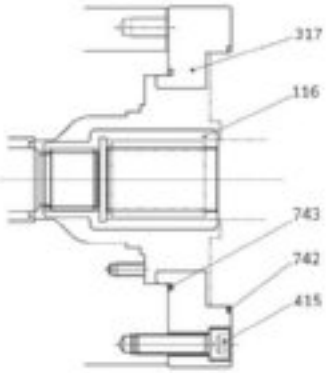
SAE “BB” T/D Kit



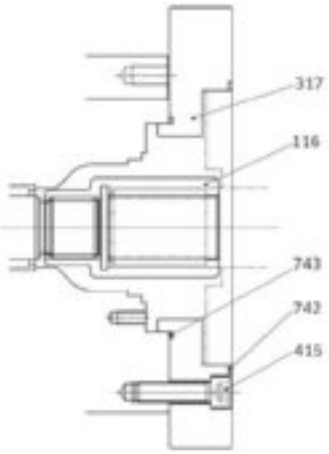
SAE “C” & “C4” T/D Kit



SAE “CC” T/D Kit

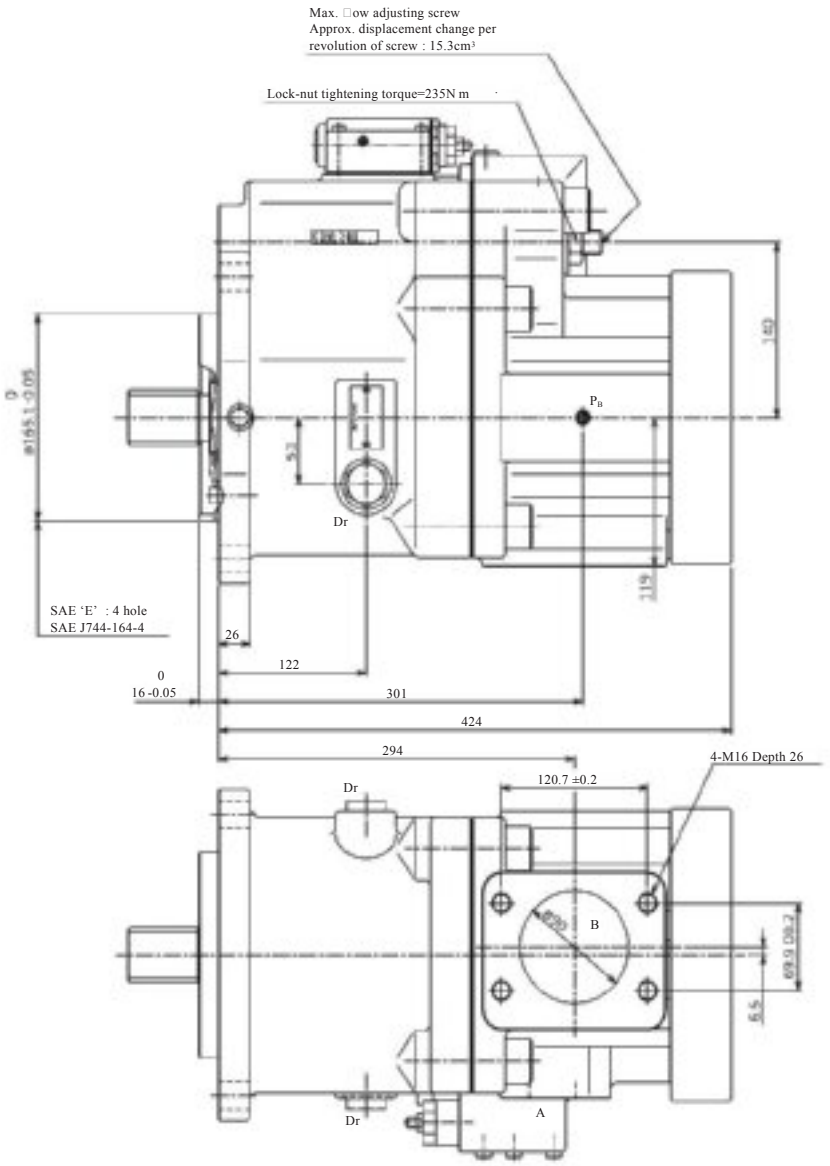


SAE “D” T/D Kit

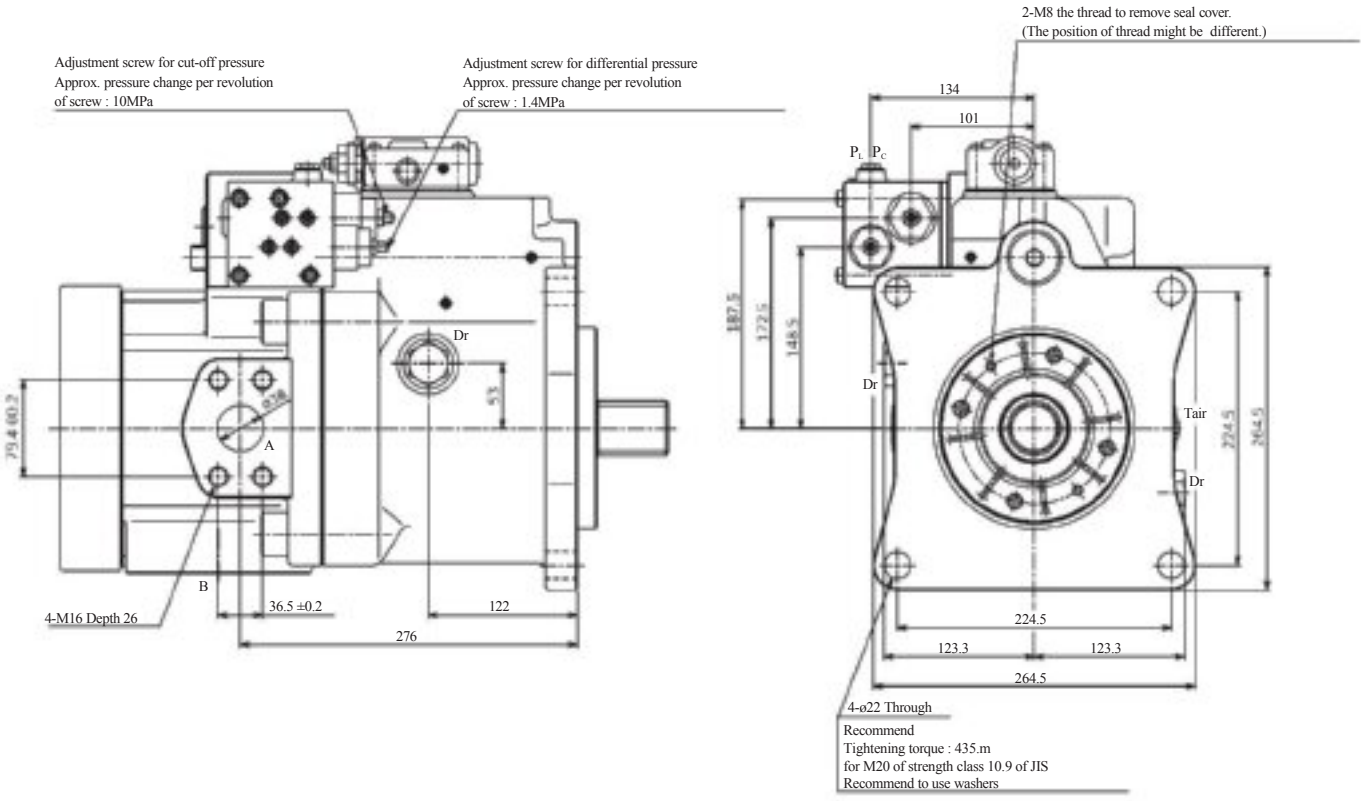


SAE “E” T/D Kit

3-6 K3VL200H Installation

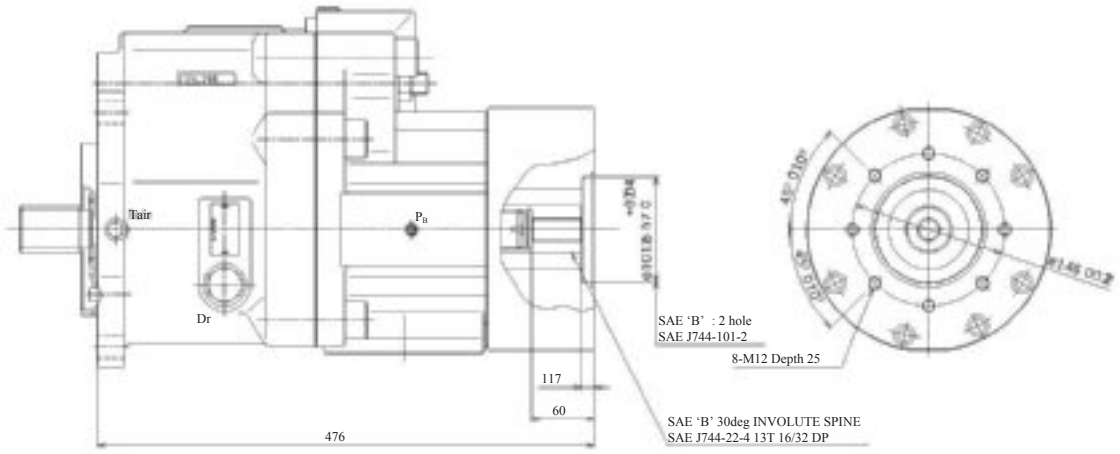


3-6 K3VL200H Installation (cont)

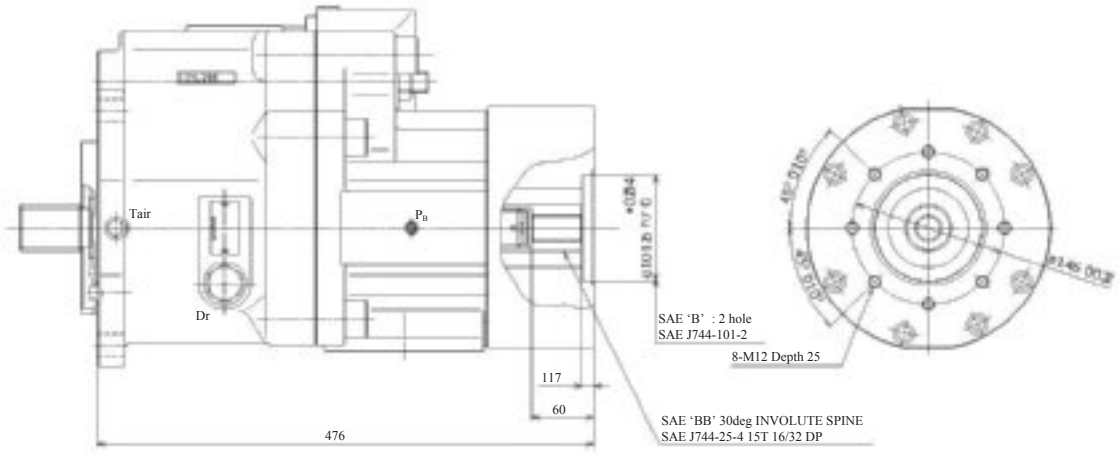


3-6 K3VL200H Installation (cont)

SAE 'B' Through Drive

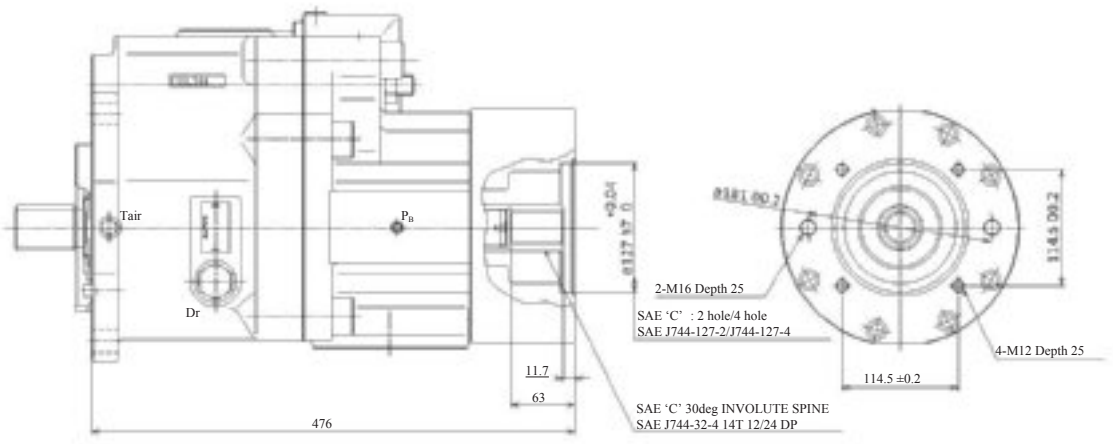


SAE 'B-B' Through Drive

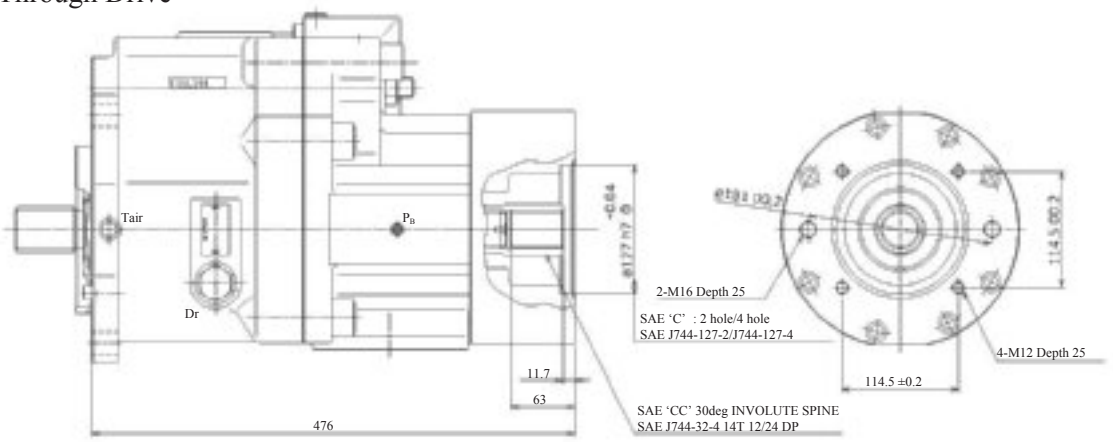


3-6 K3VL200H Installation (cont)

SAE 'C' Through Drive

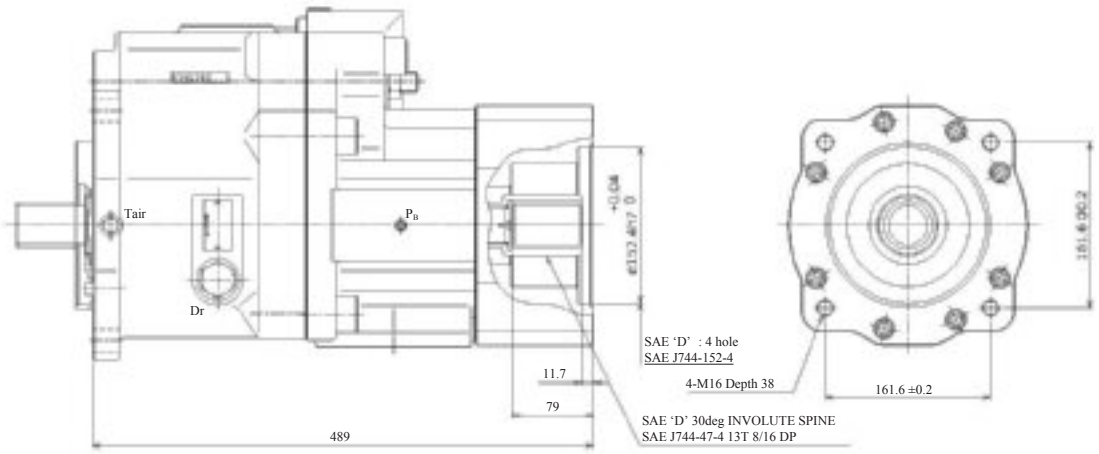


SAE 'C-C' Through Drive

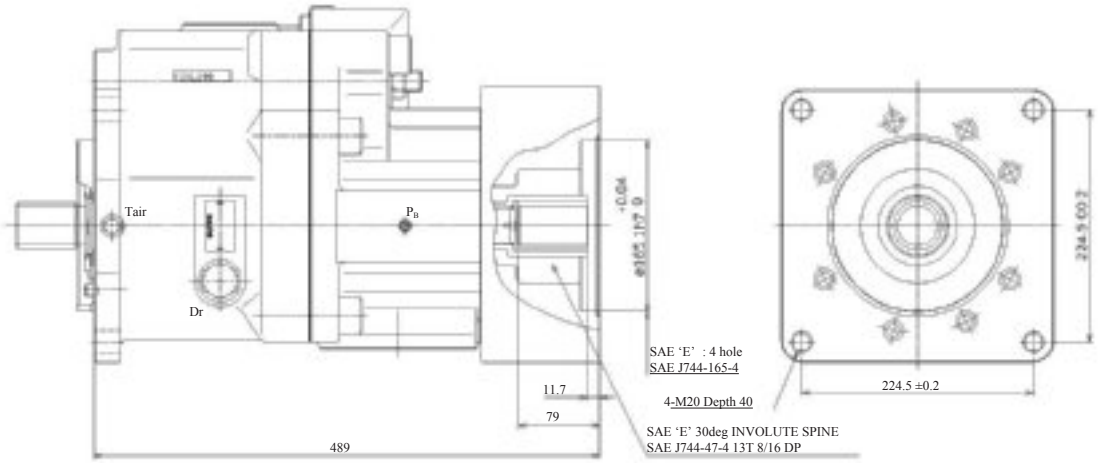


3-6 K3VL200H Installation (cont)

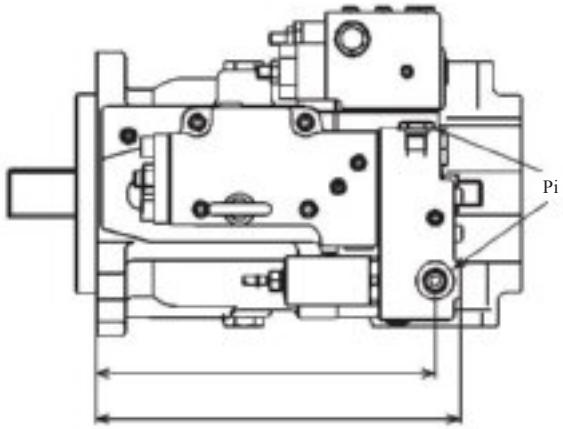
SAE 'D' Through Drive

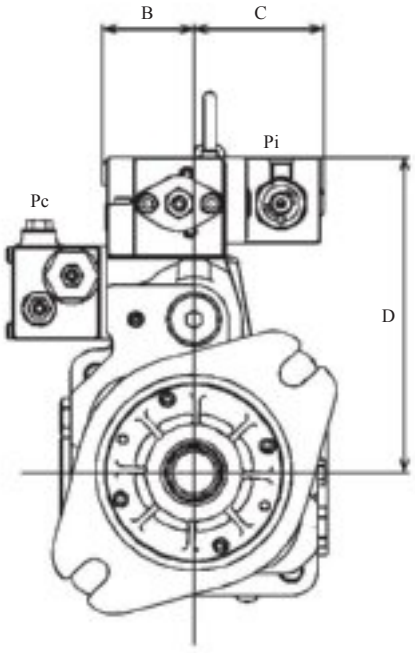


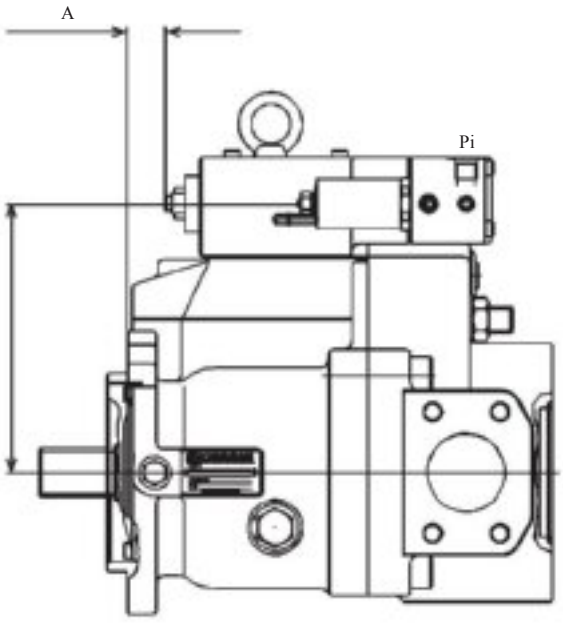
SAE 'D-D' Through Drive



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)

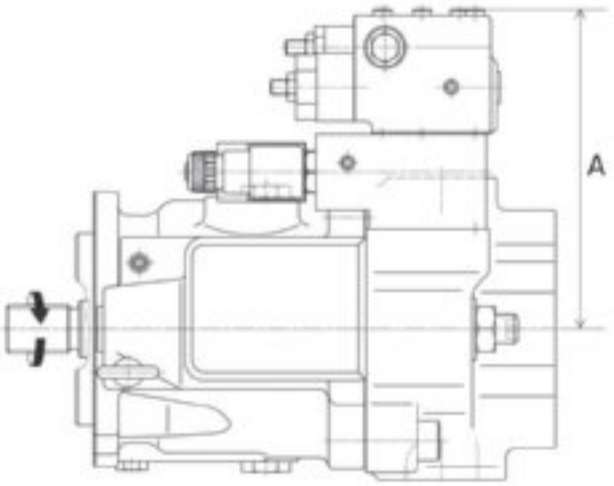
Pump Size	A	B
K3VL45/60	6.7 (169)	6.1 (155)
K3VL80	6.7 (169)	6.5 (166)
K3VL112/140	8.0 (202)	7.5 (190)
K3VL200	8.3 (212)	8.1 (205)

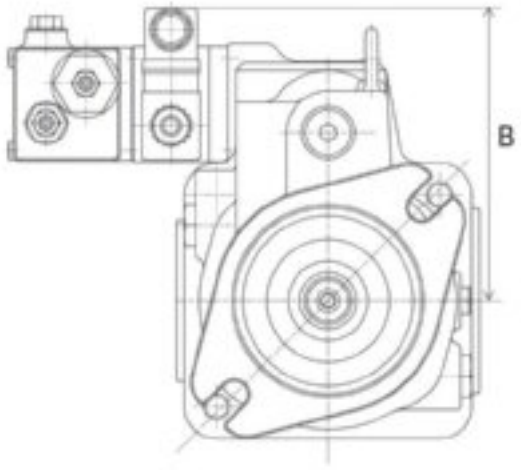
Proportional pressure module (*V) in. (mm)

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.

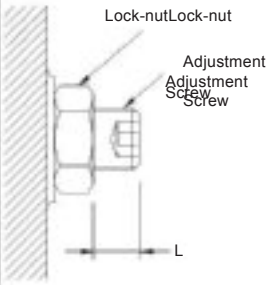
B : Distance between the center line of the pump and top of the solenoid valve.





3-8 Max Flow Adjustment

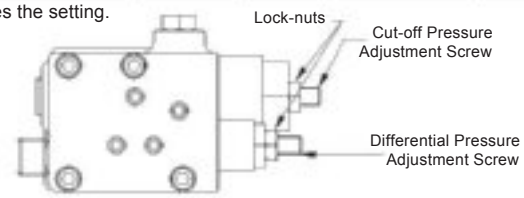
Flow Adjustment	Unit	K3VL45	K3VL60	K3VL80	K3VL112	K3VL140	K3VL200
Adjustment Screw: Internal Hex size	mm	8	8	8	10	10	10
Displacement Per Screw Revolution	in^3 (cm^3)	0.3 (4.9)	0.37 (6.1)	0.36 (6.0)	0.70 (11.5)	0.73 (12.0)	0.93 (15.3)
Displacement Adjustment Range	in^3 (cm^3)	0.98 - 2.75 (16 - 45)	1.65 - 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)



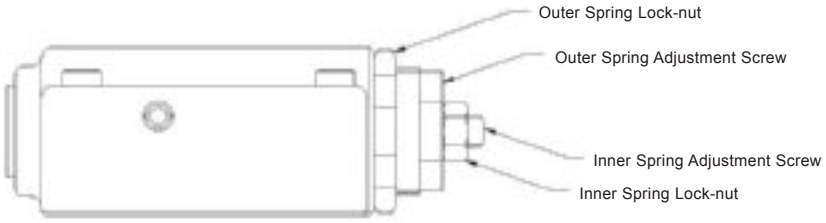
Pressure Cut-off or Load Sense (P0/L0) Control Regulator

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 -ft (Nm)	12 (16)	12 (16)	12 (16)

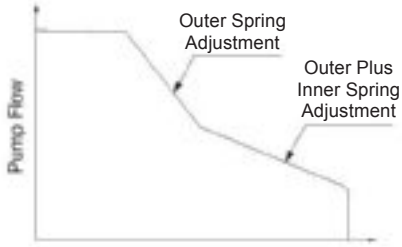
*1 Turning the adjustment screw clockwise increases the setting.



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	lbf-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	lbf-ft (Nm)	12 (16)

Adjusting the K3VL torque limiter.

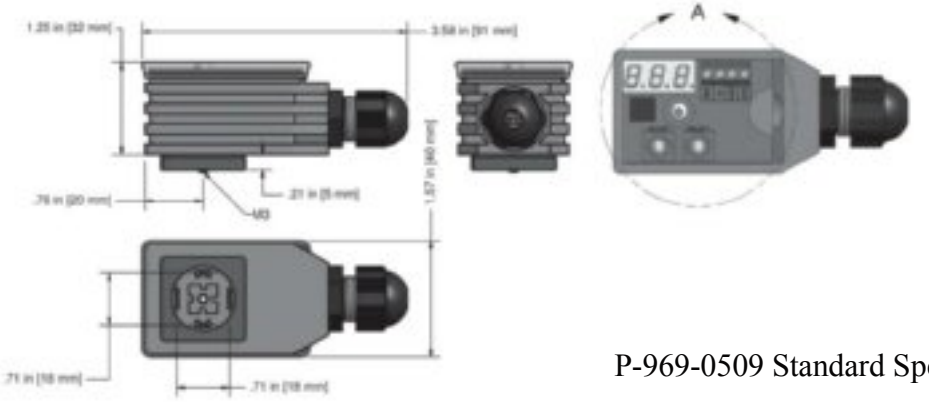
The torque limiter has two adjustments, one for the outer spring and the other for the inner spring.
The outer spring adjustment changes the top half of the PQ curve and the inner spring adjustment will change the bottom half. A clockwise adjustment will increase the setting. A change to the outer adjustment 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

irect solenoid ountcable gland connection



P-969-0509 Standard Specifications

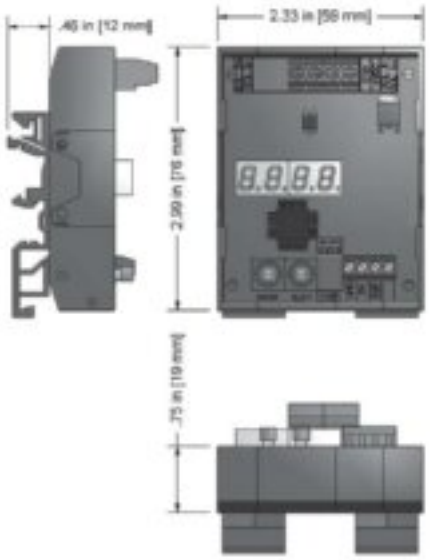
Operating voltage:	to
Maximum output current:	.00Aps
Input signal:	10to 0A
Maximum ramp time:	.ec
PWM / Dither frequency:	00
Linearity:	1
Operating Temperature:	0 ° to elsius
Protection Grade:	

P-969-0509 Cable Requirements

able rated to 10elsius is reuired.
ound cable with a diaeter range of 0.10.0
is reuired to aintainrating.

P-969-0510

rail ount



P-969-0510 Standard Specifications

Operating voltage:	to
Maximum output current:	.00Aps
Input signal:	10to 0A
Maximum ramp time:	.ec
PWM / Dither frequency:	00
Linearity:	1
Operating Temperature:	0 ° to 0 elsius

Notes: