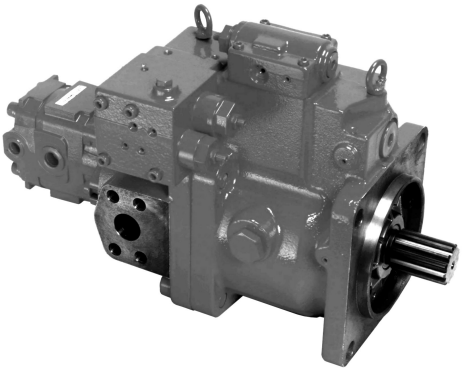
Sizes 45, 80, 112 and 140 Up to 510 kW and 320bar @ 2500 rpm	Swash-plate Axial Piston Pump Series K3VL	Data Sheet P-1002/10.00 GB



Features

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

Model K3VL	Page 1.52	Data Sheet P-1002/10.00

Kawasaki
Hydraulic Products

General Description

The K3VL Series Swash Plate Type Axial Piston Pumps are designed to specifically satisfy the mobile, marine and general industrial machinery market where a medium pressure variable displacement pump is required. K3VL Pumps are available in nominal displacements ranging from 45 to 140 cm3/rev with various pressure, torque limiter, and combination load sensing control options.

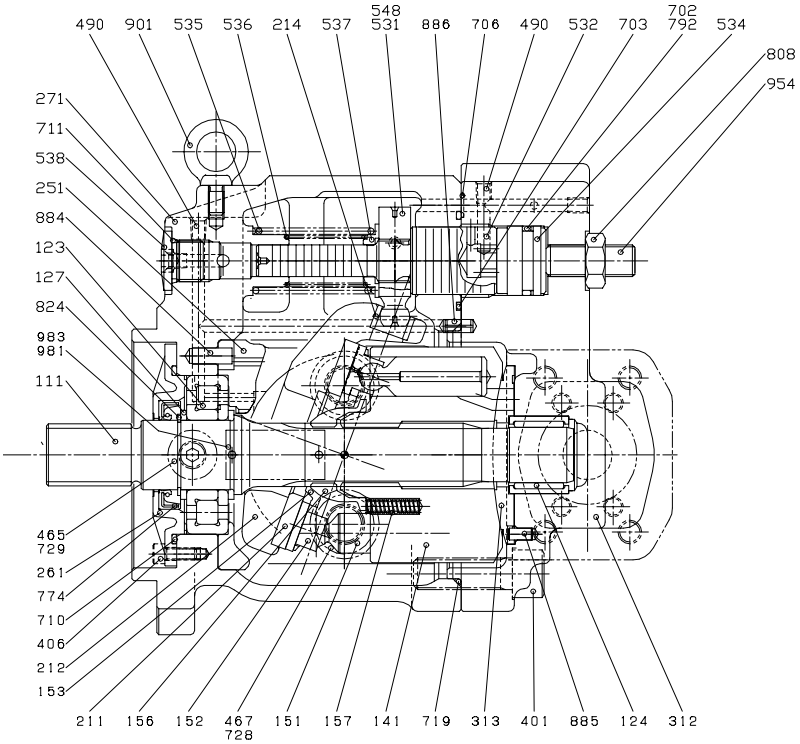
Technical Description

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

Rotating Group - Providing the main rotary pumping action.

Swash Plate Group - To vary the pump's delivery flow rate.

Valving Cover Group - Providing the switching of oil between suction and delivery ports.



K3VL80 Cross Section

Model	Page	Data Sheet
K3VL	2.52	P-1002/10.00

Kawasaki Hydraulic Products

Technical Description (continued)

The Rotating Group

The Rotating Group comprises:

(a) Drive shaft (111),
(b) Cylinder block (141),
(c) Pistons (9 x151),
(d) Shoes (9 x 152),
(e) Setting plate (153),
(f) Spherical bush (156),
(g) Cylinder springs (9 x 157).

The drive shaft is coupled to the cylinder block through a splined section and supported at both of its ends by bearings (123 & 124) and the drive shaft. The shoe is swaged over the spherical end of the piston forming a spherical ball joint. Additionally the shoe has a hydrostatic pocket to balance the hydraulic thrust developed by the piston pressure allowing the shoe to lightly slide against the shoe plate (211).

The subgroup consisting of the pistons and shoes are pressed against the shoe plate by the cylinder springs acting through the setting plate and the spherical bush. The force developed by these cylinder springs also press the cylinder block against the valve plate (313). With the smallest K3VL45 unit a single centralised spring with individual push pins provide the shoe and cylinder block hold down force.

Swash Plate Group

The Swash Plate Group comprises:

(a) Swash plate (212),
(b) Shoe plate (211),
(c) Swash plate support (251),
(d) Tilting bush (214),
(e) Tilting pin (531)
(f) Servo piston (532),
(g) Servo assist springs (535 & 536).

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

Any linear movement of the servo piston produced by the regulator pressure applied to either end is translated through the tilting pin into an angular movement of the swash plate which varies the tilting or swash angle of the pump. A screw adjuster and lock nut (954) is available to adjust the maximum tilting angle condition. The servo assist springs are provided to ensure good on stroking response particularly at low operating pressures.

Technical Description (continued)

Valve Cover Group

The Valve Cover Group comprises:

(a) Valve cover (312),
(b) Valve plate (313)
(c) Valve plate pin (885).

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

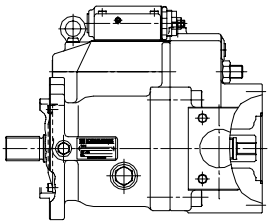
Pump Operation

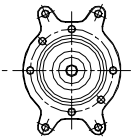
When the pump’s drive shaft is driven by a prime mover (Electric motor, Engine etc.), the cylinder block being spline coupled to the shaft will also rotate. If the swash plate has been tilted, the pistons arranged in the cylinder block due to the shoe being retained on the swash plate surface will both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

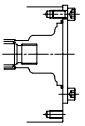
Through Drive Option

The pump is available with a through drive capability (see installation section) where a through drive shaft with splined end is incorporated capable of taking a similar torque to that of the pump itself and an SAE "A" mounting interface is provided.

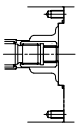
By suitable use of adaptors and splined couplings a wide variety of through drive mounting capabilities are available. The formation of these kits and there relevant part numbers will be found in the installation section.



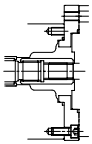




Cover Kit



SAE "A" Kit



SAE "B" Kit

Technical Data

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

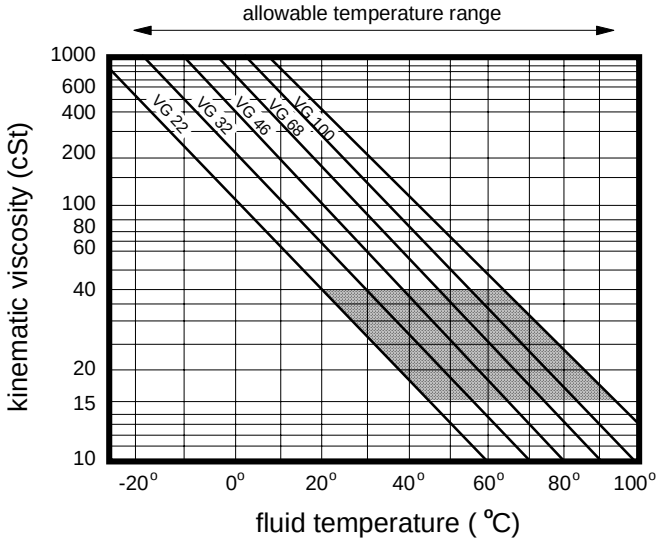
Hydraulic Data

Pressure Fluid

Mineral oil, phosphate ester, fatty acid ester and water glycol. Phosphate ester is only suitable for use with FPM seals.

Use a high quality, anti-wear, mineral based hydraulic fluid when the pressure exceeds 207 bar. In applications where fire resistant fluids are required consult Kawasaki Precision Machinery (UK) Ltd. The following chart illustrates the effects on pump life when non-standard fluids are used:

Fluid selection



Technical Data (continued)

Filtration & Contamination Control

Filtration

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

This begins by ensuring that at the time of installation that all piping, tanks etc. are rigorously cleaned in a sanitary way. Likewise, during start up thorough flushing should be done at minimal operating pressure so as to remove any residual contamination. Flushing should be provided using an off line filtration system and after flushing the filter elements should be replaced.

A full flow return line filter of 10 micron nominal should be utilised and in addition a 150 micron mesh suction strainer is recommended. Typical filtration circuits are shown in the K3VL brochure.

To prevent contaminant ingress from the external environment a 5 to 10 micron filter within the tanks breather is also recommended.

Suggested Acceptable Contamination Level

The relationship between contamination level and pump life is very difficult to predict as it depends on the type and nature of the contaminant present in the system. Sand or Silica in particular, due to its abrasive nature, does significantly reduce the expected life of a pump.

Based on the precondition that there is no significant presence of Silica type substances then a minimum Cleanliness level of 18/15 to ISO/DIS 4406 (NAS Class 9) is recommended.

Working Fluid Types

Anti-Wear Type Hydraulic fluid

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

Fire-resistant Fluids

Some kind of fire-resistant fluids require special materials for seals, paint and metal finishing. Please consult Kawasaki Precision Machinery (UK) Limited and provide details of the particular fluid specification and the working conditions so that any special requirements can be ascertained.

In general, fire-resistant fluids have a low viscosity index and their viscosity also changes significantly with operating temperature and service life. For this reason, the circuit should be provided with an adequately sized cooler or forced cooling so that temperatures can be stabilised.

Due to the inherent water content of some of these fluids the minimum allowable suction pressure will be higher than that of an equivalent mineral oil and so needs to be fully evaluated by Kawasaki Precision Machinery (UK) Limited. The following table provides an overview of the precautions and characteristics that can be expected with these types of fluids.

Technical Data (continued)

Fire-resistant Fluids (continued)

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

○ recommended △ usable (higher density)

Technical Data (continued)

pump model			45		80		112		140	
capacity		cc/rev	45		80		112		140	
pressure ratings	rated	bar	320							
	peak	bar	350							
Speed ratings	self prime	rpm	2700		2400		2200		2100	
	max boosted	rpm	3250		3000		2700		2500	
max operating speed		rpm	600							
case drain pressures	max	bar	2							
	peak	bar	6							
weight		kg	25		34		60		60	
case fill capacity		cc	600		800		1000		1000	
max allowable input torque		Nm	225		400		981		981	
mounting flange		type	SAE B	ISO 100	SAE C	ISO 125	SAE D	ISO 180	SAE D	ISO 180
		bolts	2	2	2	2	4	4	4	4
input shaft		type	SAE B-B	ISO 25mm	SAE C	ISO 32mm	SAE D	ISO 45mm	SAE D	ISO 45mm
		form	spline & key	key	spline & key	key	spline & key	key	spline & key	key
allowable through torque	SAE 'A'	Nm	61							
	SAE 'A-A'		118							
	SAE 'B'		203							
	SAE 'B-B'		225							
	SAE 'C'				400					
	SAE 'C-C'						559			
	SAE 'D'								699	
temperature range		^{0}C	-20 to 95							
viscosity range		cSt	10 to 1,000							
max. contamination level			18/15 (ISO/DIS 4406)							

CAUTIONS!

1. Make sure the pump case is filled with clean, filtered fluid of the type used in the system before operation.
2. The pump case must be full at all times to ensure lubrication of the internal components.

Mechanical Displacement Limiter

Mechanical displacement limiter is available for ALL models Qmax range 50 to 100%.

Ordering Code – K3VL Series

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

K3VL Series Pump

Maximum displacement

45	45 cm^3/rev
80	80 cm^3/rev
112	112 cm^3/rev
140	140 cm^3/rev

Design series

A

Hydraulic Fluid Type

-	Mineral oil
W	Water glycol
Z	Phosphate ester

Circuit type

1	Open circuit

Through drive & porting

0	Single pump, side ported
A	SAE "A" through drive, side ported
B	SAE "B" through drive, side ported
BB	SAE "BB" through drive, side ported
C	SAE "C" through drive, side ported
D	SAE "D" through drive, side ported
R	Single pump, rear ported
S	Single pump with plastic cover (Stock Pump
N	Single pump with Steel cover, side ported

Direction of rotation

R	Clockwise rotation
L	Counter-clockwise rotation

Mounting flange & shaft

S	SAE standard spline and mount
M	ISO keyed & mount
K	SAE keyed & mount
T	SAE smaller spline & mount (not K3VL80)

Porting threads

M	Metric threaded
S	UNC threaded

Control device configuration

P	Remote pressure compensator
L	Load sensing & pressure control

Additional pressure control

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

Unloader solenoid (Type N below)

blank	For all other options except PN & LN
115A	115V AC, 50.60Hz,DIN43550 Plug
235A	230 V AC, 50.60Hz,DIN43550 Plug
12D	12V DC, DIN 43550 Plug
24D	24V DC, DIN 43550 Plug

Torque limiter type

blank	Without torque limiter
/1	with torque limiter control

Torque limiter setting

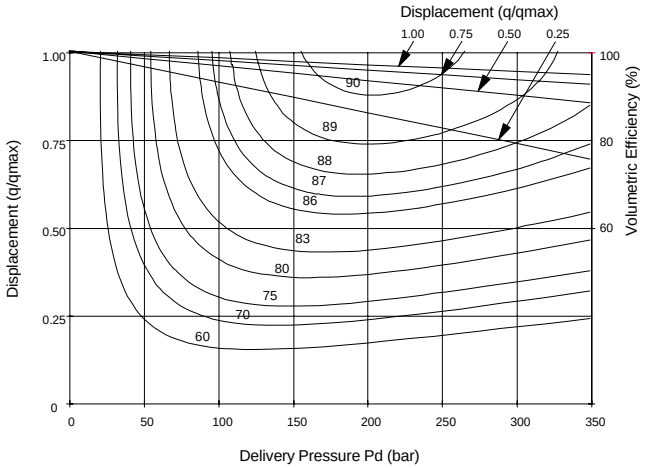
L*	Low setting range
M*	Medium setting range
H*	High setting range

Model	Page	Data Sheet
K3VL	9.52	P-1002/10.00

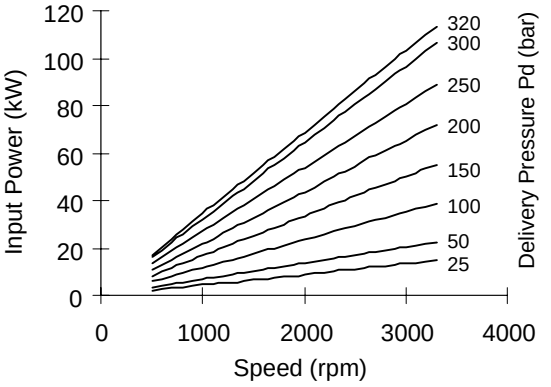
Kawasaki Hydraulic Products

Performance - K3VL45

Performance Curve
(Speed Range 1500 rpm & 1800 rpm with atmospheric inlet)
Test temperature 50^{0}C, Viscosity 31cSt (ISO VG 46)



Power Curve
Note: Atmospheric Inlet, Full displacement



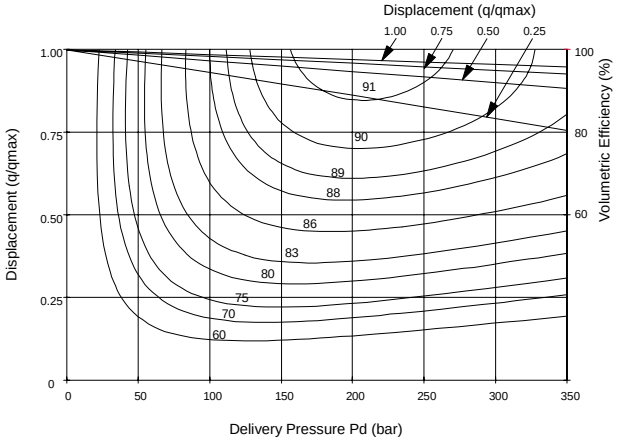
Model	Page	Data Sheet
K3VL	10.52	P-1002/10.00

Kawasaki Hydraulic Products

Performance K3VL80

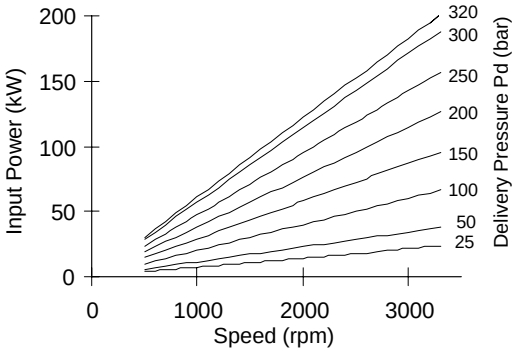
Performance Curve

(Speed Range 1500 rpm & 1800 rpm with atmospheric inlet)
Test temperature 50^{0}C, Viscosity 31cSt (ISO VG 46)



Power Curve

Note: Atmospheric Inlet, Full displacement



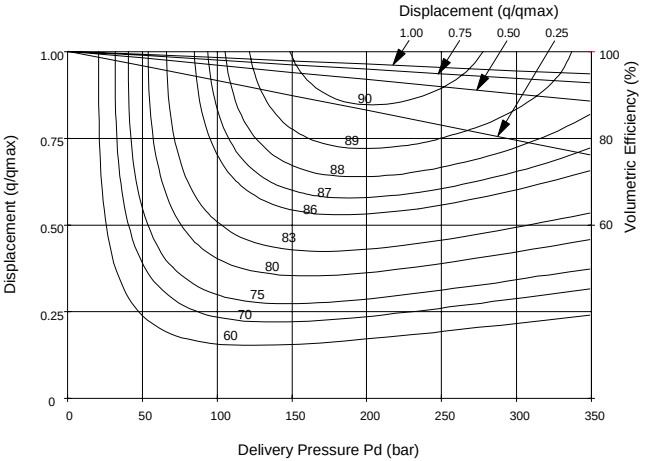
Model	Page	Data Sheet
K3VL	11.52	P-1002/10.00

Kawasaki Hydraulic Products

Performance - K3VL112

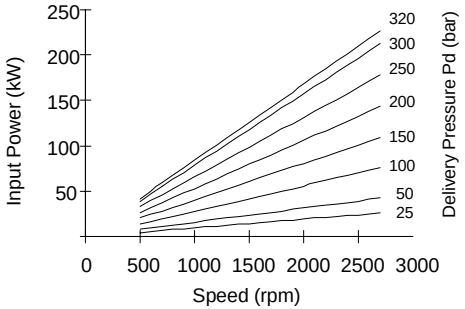
Performance Curve

(Speed Range 1500 rpm & 1800 rpm with atmospheric inlet)
Test temperature 50^{0}C, Viscosity 31cSt (ISO VG 46)



Power Curve

Note: Atmospheric Inlet, Full displacement



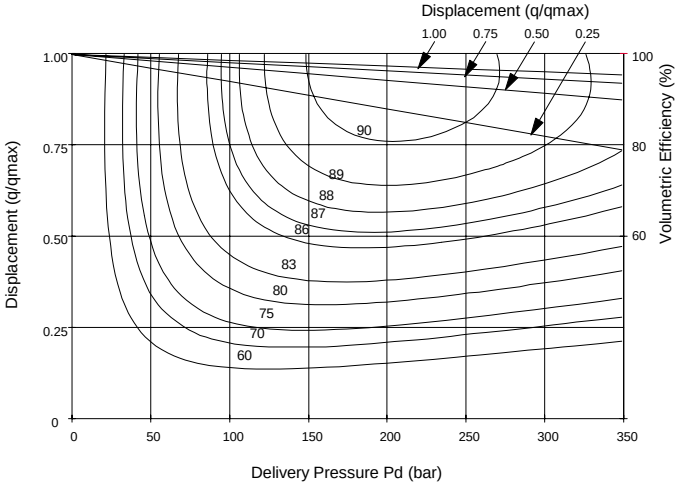
Model	Page	Data Sheet
K3VL	12.52	P-1002/10.00

Kawasaki Hydraulic Products

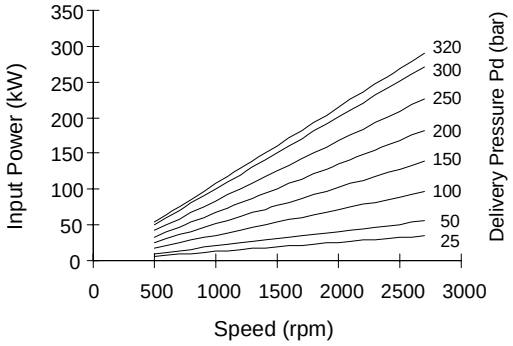
Performance - K3VL140

Performance Curve

(Speed Range 1500 rpm & 1800 rpm with atmospheric inlet)
Test temperature 50^{0}C, Viscosity 31cSt (ISO VG 46)



Power Curve
Note: Atmospheric Inlet, Full displacement

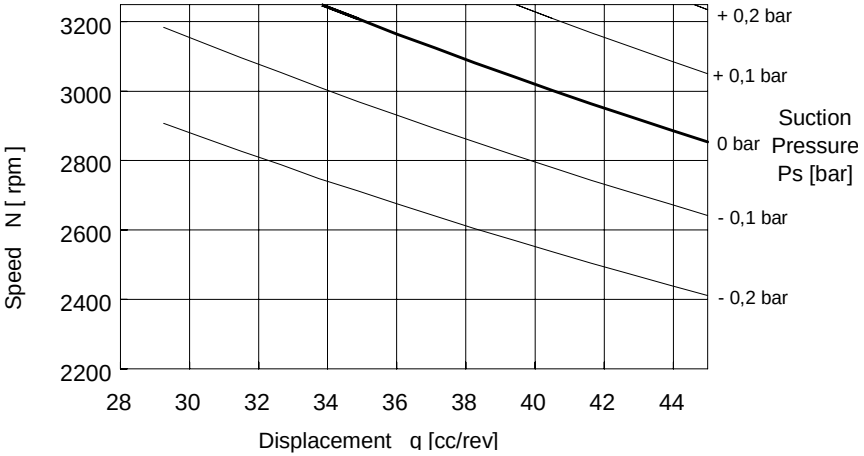


Model	Page	Data Sheet
K3VL	13.52	P-1002/10.00

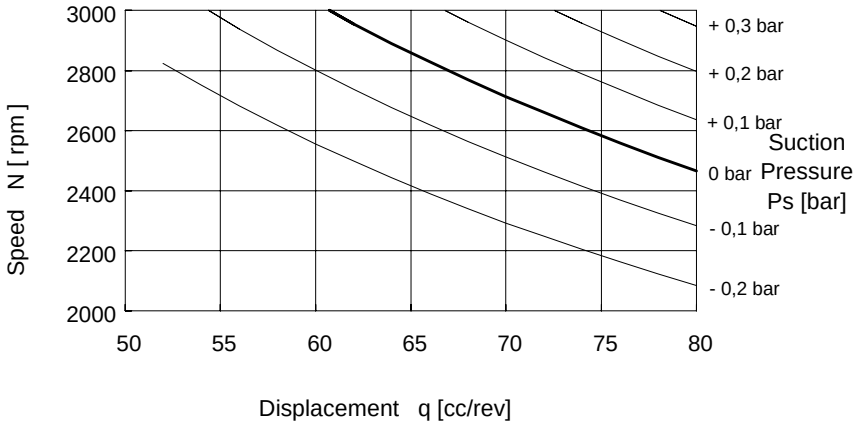
Kawasaki Hydraulic Products

Self Priming Curves

K3VL45 Self Priming Capability



K3VL80 Self Priming Capability

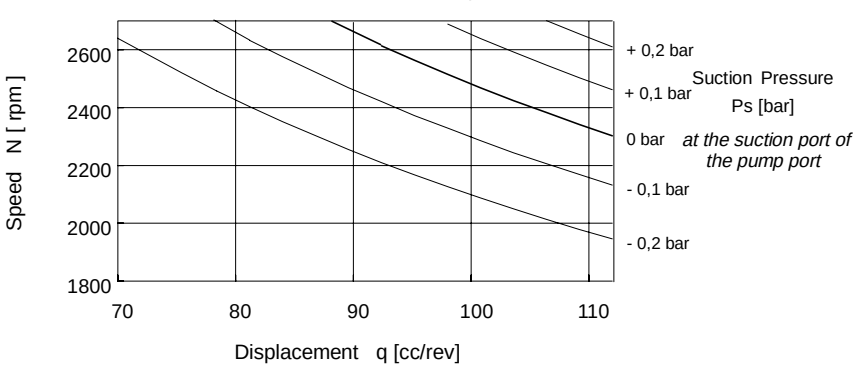


Model	Page	Data Sheet
K3VL	14.52	P-1002/10.00

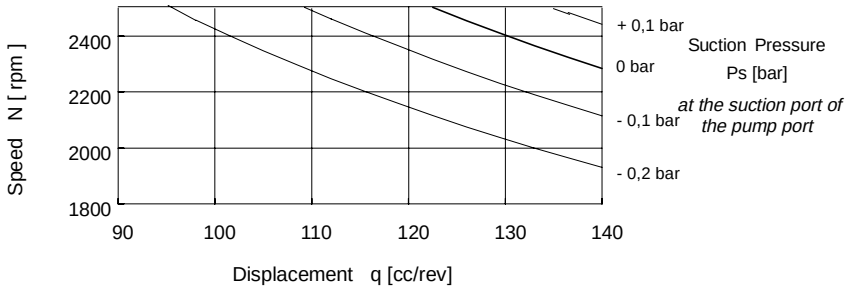
Kawasaki Hydraulic Products

Self Priming Curves (continued)

K3VL112 Self Priming Capability



K3VL140 Self Priming Capability

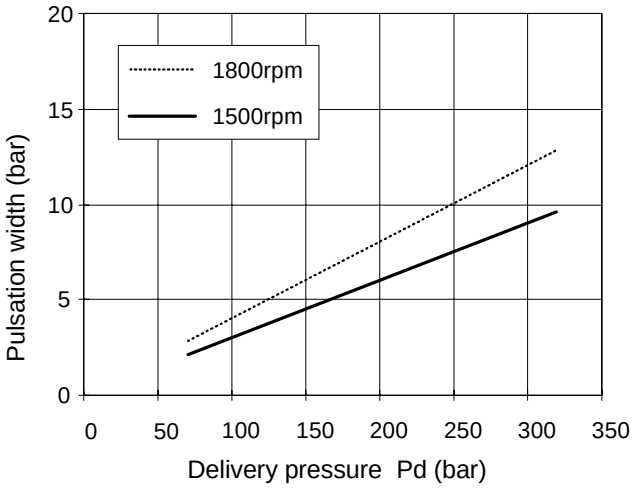


Model	Page	Data Sheet
K3VL	15.52	P1002/10.00

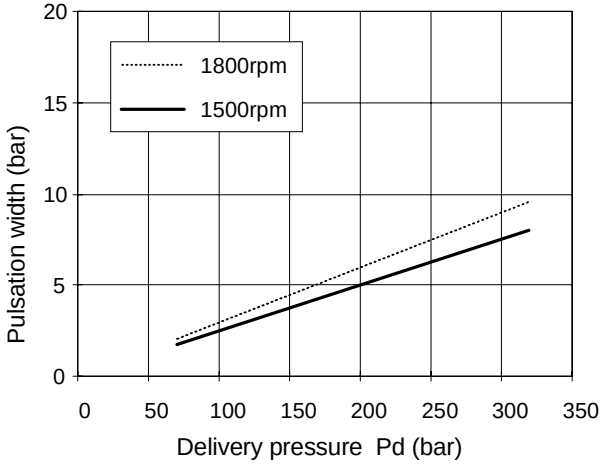
Kawasaki Hydraulic Products

Pressure pulsation

K3VL45 pulsation graph

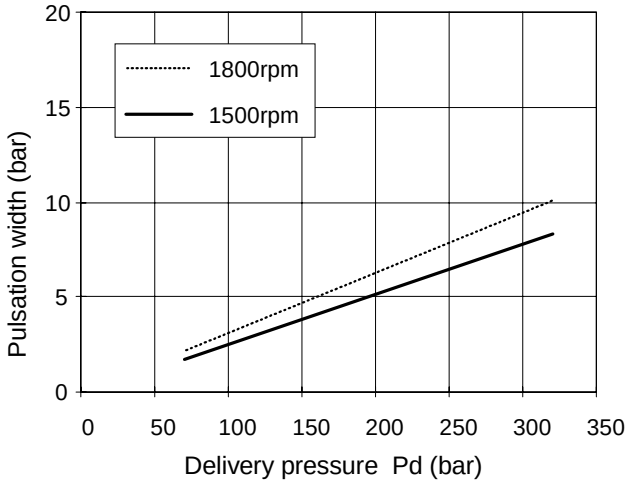


K3VL80 pulsation graph

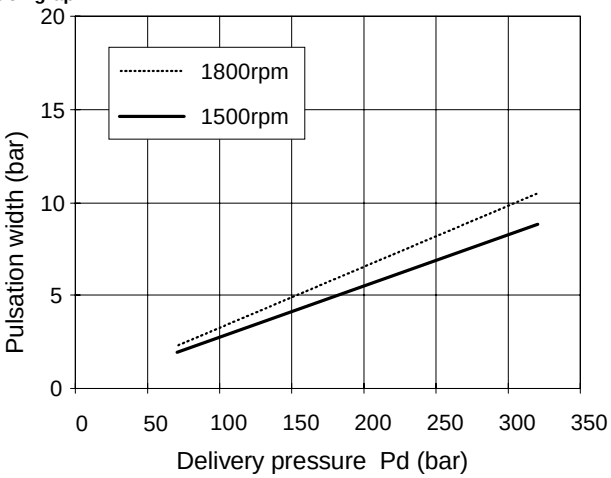


Pressure pulsation (continued)

K3VL112 pulsation graph



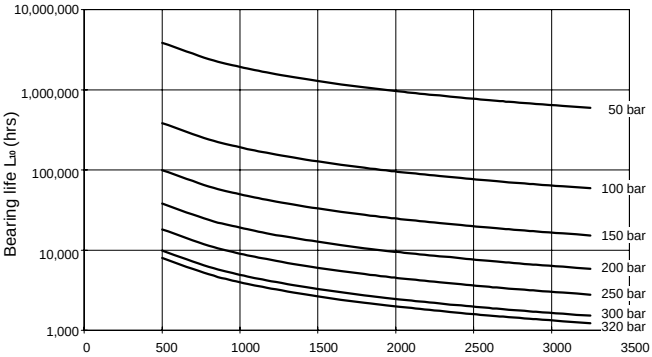
K3VL140 pulsation graph



Bearing Life (Full Displacement)

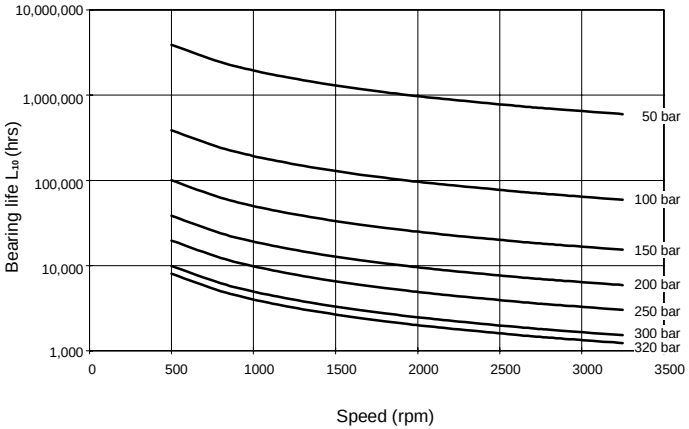
K3VL45

Note: Service and other life factors have unity value



K3VL80

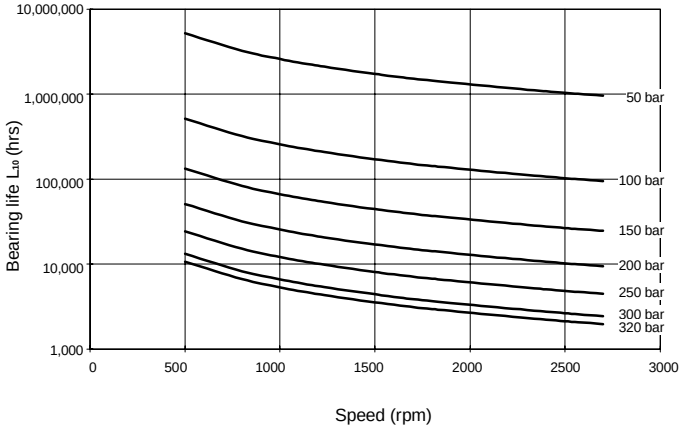
Note: Service and other life factors have unity value



Bearing Life (Full Displacement) (Continued)

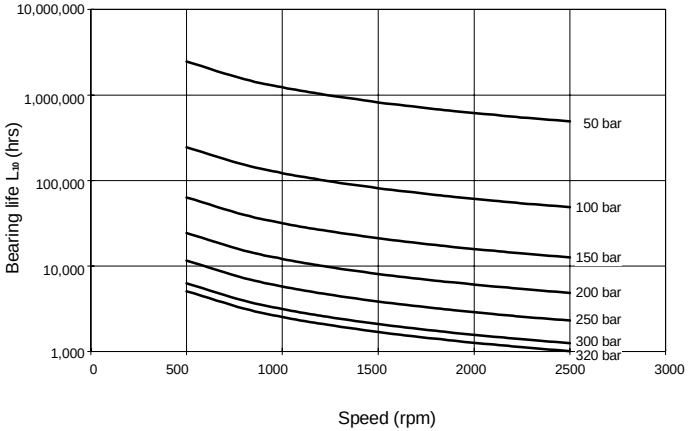
K3VL112

Note: Service and other life factors have unity value



K3VL140

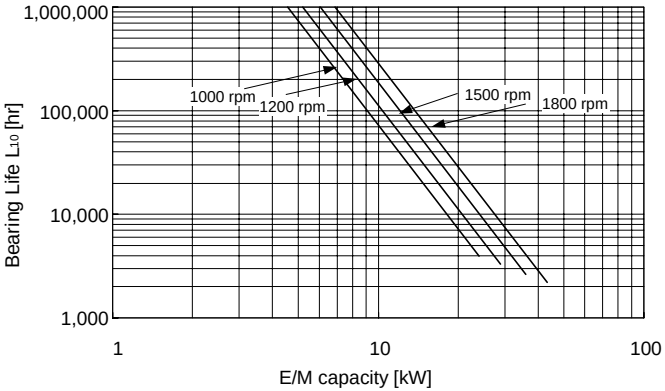
Note: Service and other life factors have unity value



Bearing Life (Industrial situation)

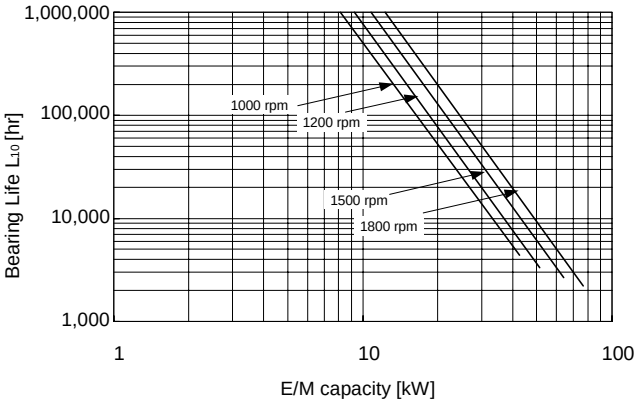
K3VL45

Note: Service and other life factors have unity value



K3VL80

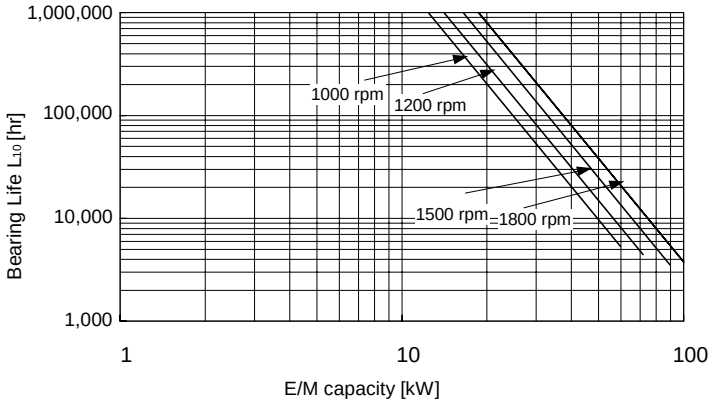
Note: Service and other life factors have unity value



Bearing Life (Industrial Situation) (continued)

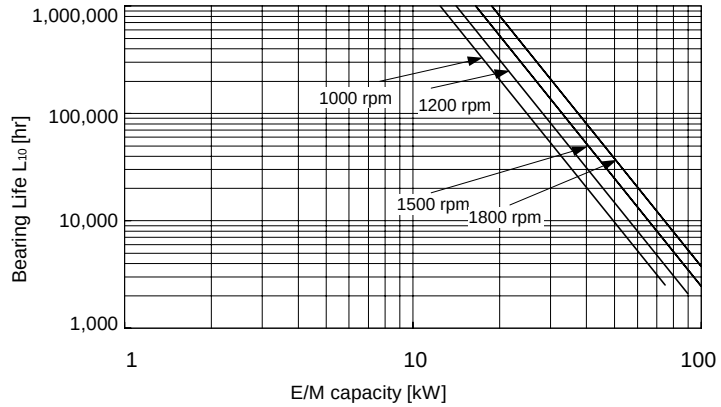
K3VL112

Note: Service and other life factors have unity value



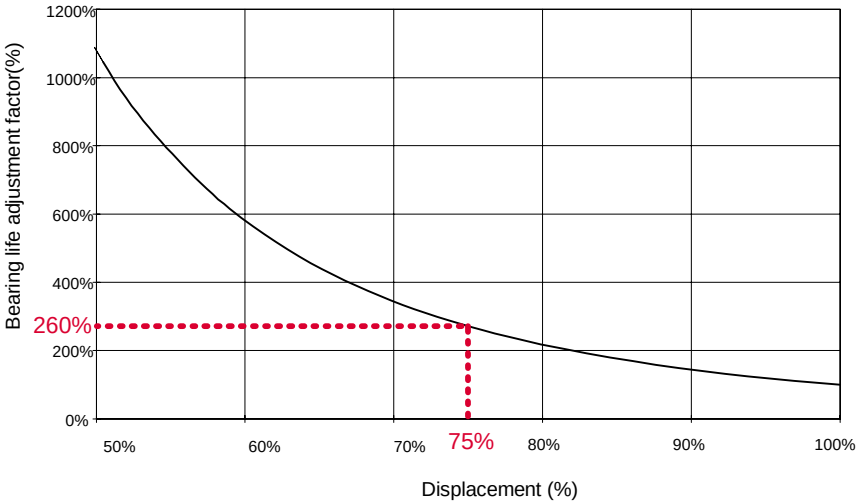
K3VL140

Note: Service and other life factors have unity value



Bearing Life (continued)

Bearing Life Correction Factors for Partial Displacement



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

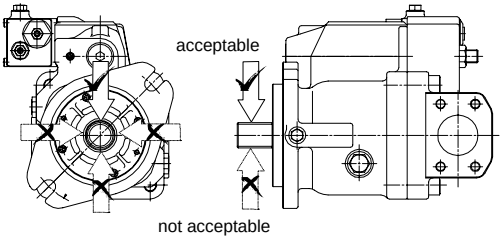
For example as shown above if the bearing life at full displacement from the previous graphs was say 50,000 hours, then at the same operating condition with only 75% displacement the bearing life would be 260% of 50,000 hours or 130,000 hours.

Radial Loading Capacity

No axial shaft loading possible

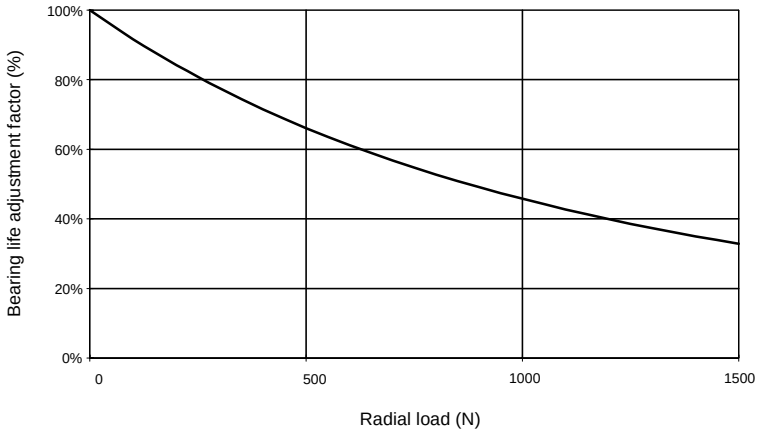
Radial loading is achievable but in specific orientation:-

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

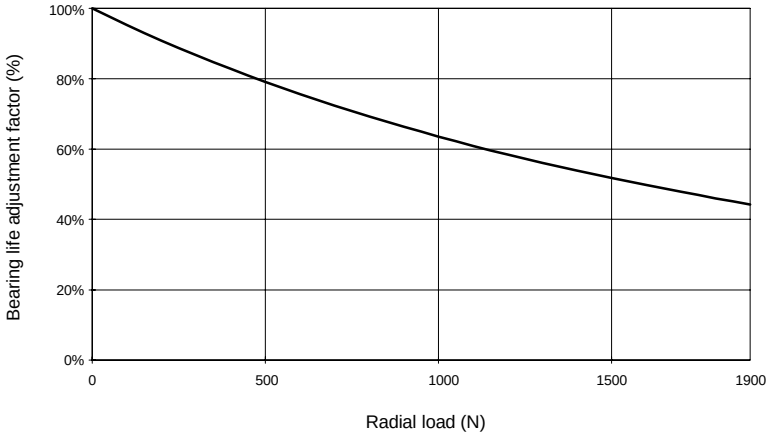


Radial Loading Capacity (continued)

K3VL45 Radial Loading Capacity



K3VL80 Radial Loading Capacity

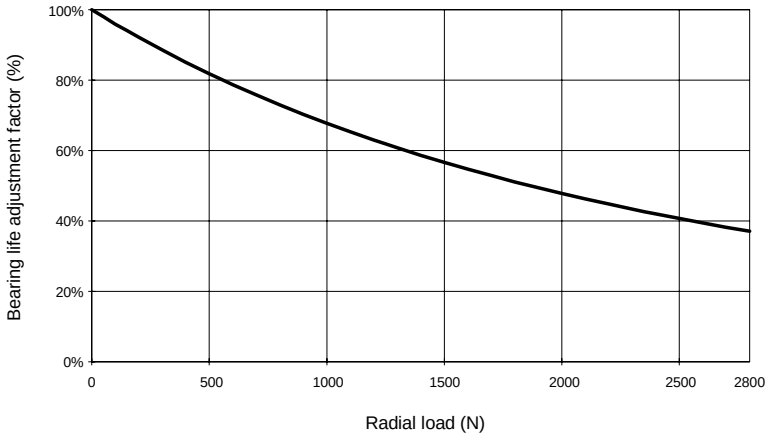


Model	Page	Data Sheet
K3VL	24.52	P-1002/10.00

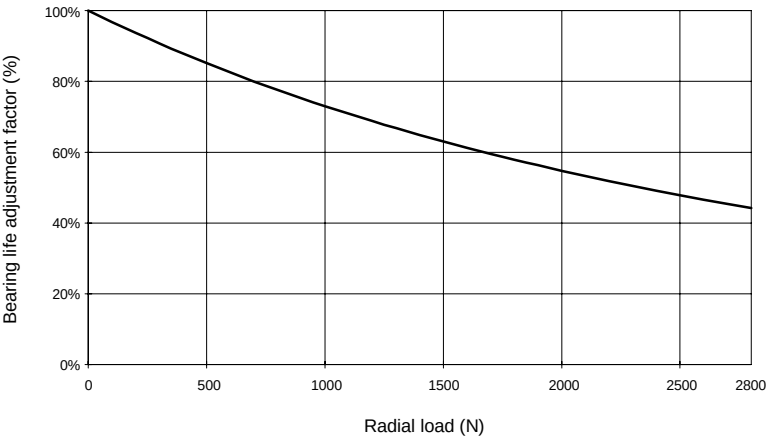
Kawasaki Hydraulic Products

Radial Loading Capacity (continued)

K3VL112 Radial Loading Capacity



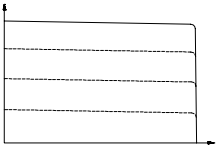
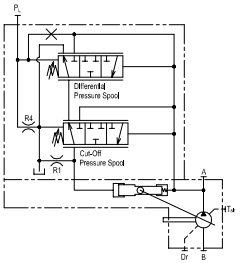
K3VL140 Radial Loading Capacity



Functional Description of Regulator

Key to Hydraulic Circuit Annotations	
Annotation	**Description**
A_1	Main pump delivery
A_2	Auxiliary pump delivery
a_1	Gauge port main pump delivery
a_2	Gauge port auxiliary pump delivery
B_2	Gear pump suction
B_1	Main pump suction
b	Suction gauge port
Dr	Drain
Pi	Pilot pressure
Pc	Remote Pilot Port, Pressure Compensator
Pi	Pilot Port Displacement Control
P_L	Load sense port
Psv	Pressure Assist Port

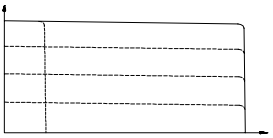
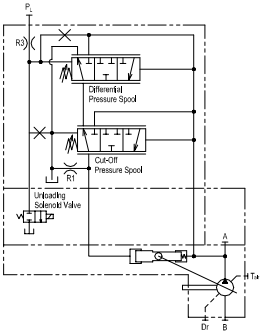
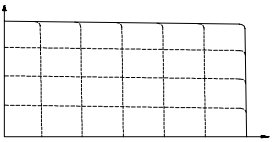
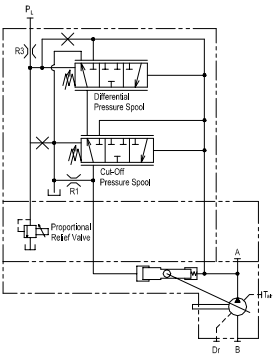
Note: The optional attached gear pump is recommended for all displacement control options. Hydraulic circuit diagrams illustrate the attached gear pump

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

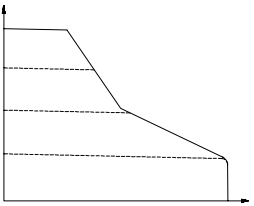
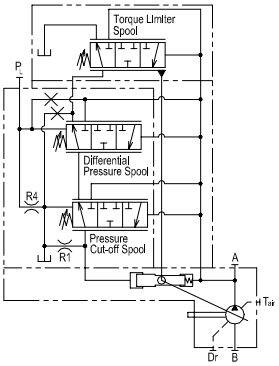
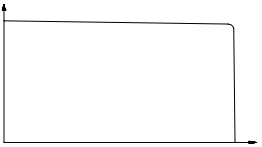
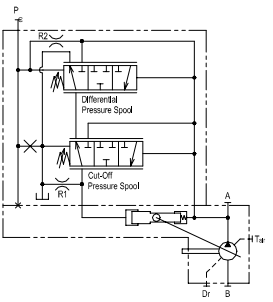
Model	Page	Data Sheet
K3VL	26.52	P-1002/10.00

Kawasaki Hydraulic Products

Functional Description of Regulator (continued)

Regulator Code	Control Curves	Hydraulic Circuit
LN Load Sense and Pressure Cut-off with Integrated Unloading Valve An integrated unloading valve is sandwiched between the Load Sense regulator and pump to effectively de-stroke the swashplate when an electric signal is provided.		
LV Load Sense and Pressure Cut-off with Integrated Proportional Relief Valve An integrated proportional relief valve is sandwiched between the Load Sense regulator and pump to control the maximum pressure setting by varying an electric signal to the valve. A separate amplifier is required.		

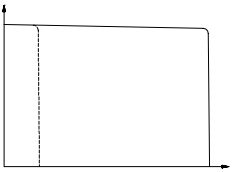
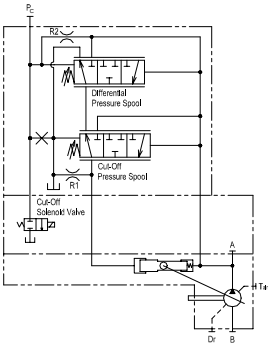
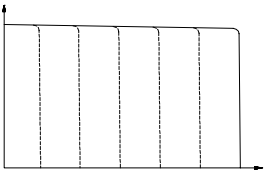
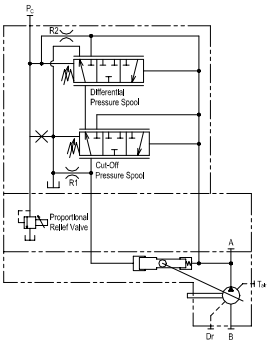
Functional Description of Regulator (continued)

Regulator Code	Control Curves	Hydraulic Circuit
LO/1 Load Sense and Pressure Cut-off with Torque Limiting L0/L1 control functions as previously noted. In response to a rise in delivery pressure the swashplate angle is decreased, restricting the input torque. This regulator prevents excessive load against the prime mover. The torque limit control module is comprised of two springs that oppose the spool force generated by the system pressure. By turning an outer and inner spring adjustment screw, the appropriate input torque limit can be set.		
PO Pressure Cut-off As system pressure rises to the cut-off setting, the swashplate de-strokes to prevent the system pressure from exceeding the compensator setting. It is imperative that a safety relief valve be installed in the system. **Note:** By connecting the Pc port to a remote pressure control, variable pump pressure control can be achieved		

Model	Page	Data Sheet
K3VL	28.52	P-1002/10.00

Kawasaki Hydraulic Products

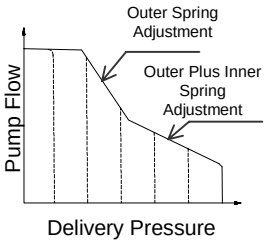
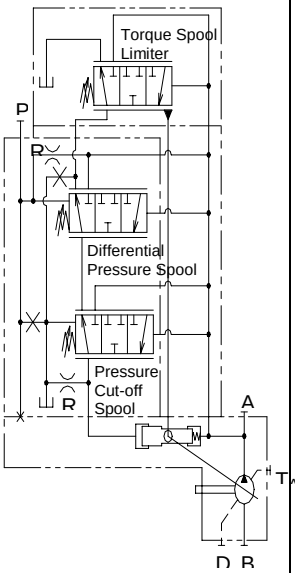
Functional Description of Regulator (continued)

Regulator Code	Control Curves	Hydraulic Circuit
PN Pressure Cut-off with Integrated Unloading Valve An integrated unloading valve is sandwiched between the Pressure Cut-off regulator and pump to effectively de-stroke the swashplate when an electric signal is provided.		
PV Pressure Cut-off with Integrated Proportional Relief Valve An integrated proportional relief valve is sandwiched between the Pressure Cut-off regulator and the pump to control the maximum pressure setting by varying an electric signal to the valve. A separate amplifier is required.		

Model	Page	Data Sheet
K3VL	29.52	P-1002/10.00

Kawasaki Hydraulic Products

Functional Description of Regulator (continued)

Regulator Code	Control Curves	Hydraulic Circuit
PO/1 Pressure Cut-off with Torque Limiting P0/P1 control functions as previously noted. In response to a rise in delivery pressure the swashplate angle is reduced, restricting the input torque. This regulator prevents excessive load against the prime mover. The torque limit control module is comprised of two springs that oppose the spool force generated by the system pressure. By turning an outer and inner spring adjustment screw, the appropriate input torque limit can be set. **Note:** By connecting the Pc port to a remote pressure control, variable pump pressure control can be achieved as indicated below.		

Model	Page	Data Sheet
K3VL	30.52	P-1002/10.00

Kawasaki Hydraulic Products

Torque Limiter Settings

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

970 rpm				
Power	Pump Frame Size			
(KW)	45	80	112	140
5.5	L3			
7.5	L1	L6		
11	M1	L2		
15	H3	M4	L3	L6
18.5		M1	M4	L3
22		H3	M2	L1
30		H1	H4	M2
37			H2	H4
45				H2

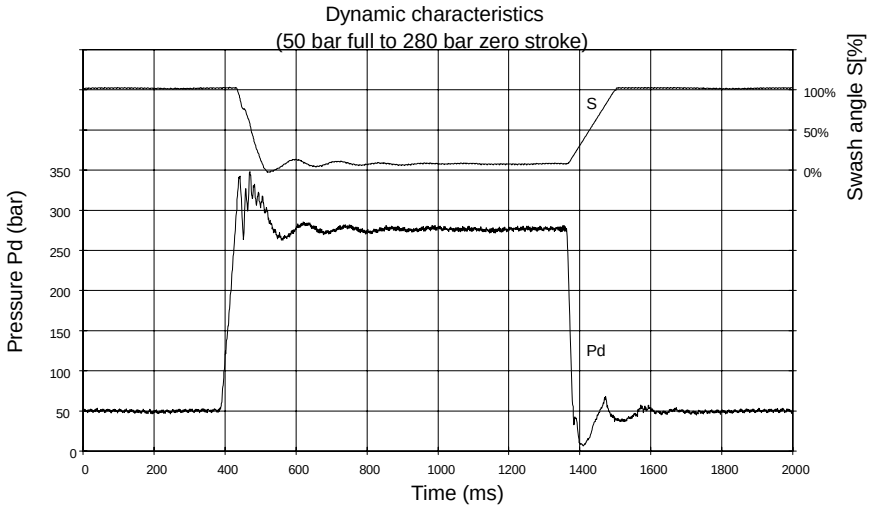
1150 rpm				
Power	Pump Frame Size			
(KW)	45	80	112	140
7.5	L2			
11	M3	L4		
15	H4	L1	L4	
18.5	H2	M3	L2	L5
22		M1	M4	L3
30		H2	M1	M3
37			H3	M1
45			H2	H4
55				H2

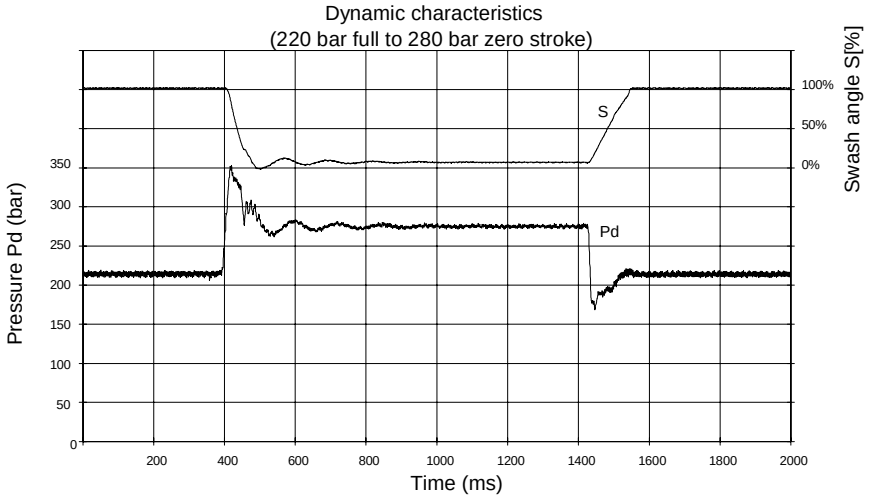
1450 rpm				
Power	Pump Frame Size			
(KW)	45	80	112	140
7.5	L4			
11	L1	L6		
15	M2	L3		
18.5	H4	L1	L4	
22	H3	M4	L3	L6
30		H4	M3	L2
37		H2	M1	M3
45		H1	H4	M2
55			H2	H4
75				H1

1750 rpm				
Power	Pump Frame Size			
(KW)	45	80	112	140
11	L2			
15	M4	L5		
18.5	M2	L3		
22	H4	L1	L4	
30	H1	M2	L1	L4
37		H4	M3	L2
45		H2	M1	M3
55		H1	H4	M2
75			H1	H3
90				H1

Dynamic Curves (Typical)

K3VL112 Pressure Control



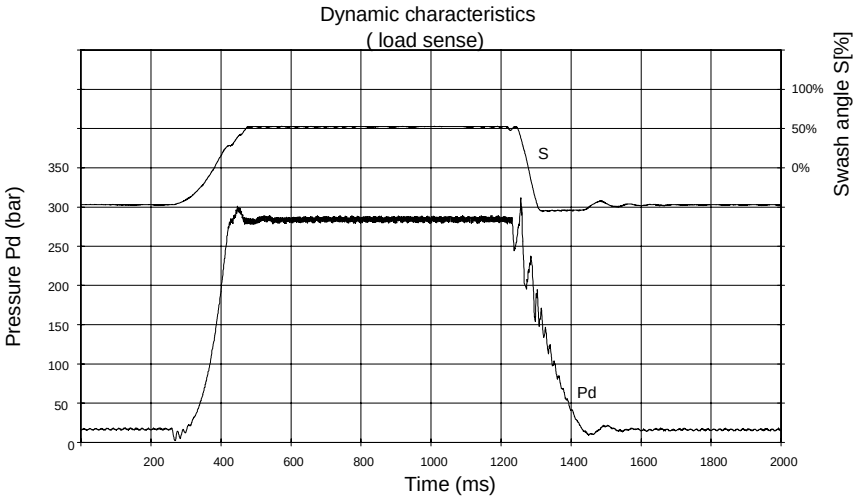


Model	Page	Data Sheet
K3VL	32.52	P-1002/10.00

Kawasaki
Hydraulic Products

Dynamic Curves (Typical) (continued)

K3VL112 Load Sensing



Model	Page	Data Sheet
K3VL	33.52	P-1002/10.00

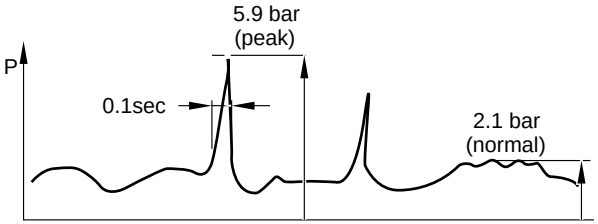
Kawasaki Hydraulic Products

Installation

Recommended Pump Mounting

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

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



Mounting the Pump Above the Tank

If the pump is to be mounted above the level of the tank the suction line must initially rise above the level of the pump before continuing to the tank as shown in the illustration below. The maximum allowable height the pump can be mounted above the fluid level is 1 meter. The minimum suction pressure should be-0.1 bar or above.

Installation (continued)

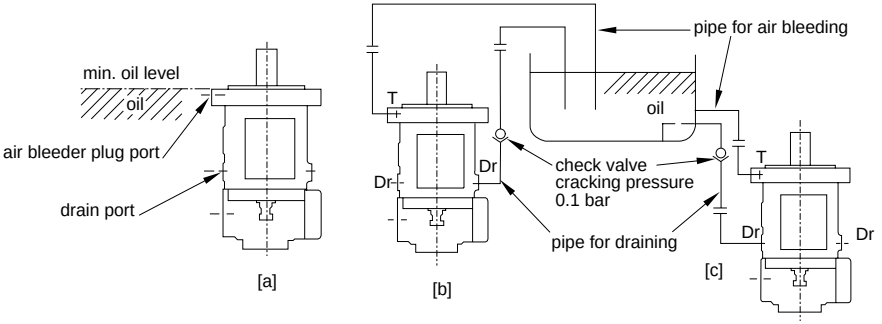
Mounting the Pump Vertically (shaft up)

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

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

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

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



A check valve with cracking pressure of 0.1 bar should be fitted to the case drain line as shown. Recommended Kawasaki check valves are as follows: (refer to Kawasaki industrial valve information - data sheet C1001)

Model	Recommended Kawasaki check valve
K3VL 45	C10G - 10/01-*
K3VL 80	C15G - 10/01-*
K3VL 112	C15G - 10/01-*
K3VL 140	C15G - 10/01-*

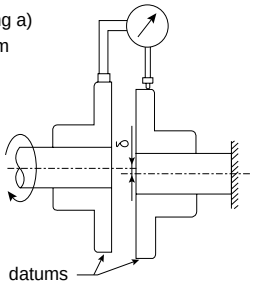
Drive Shaft Coupling

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

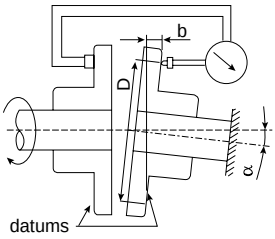
Do not apply any radial or axial loading to the pump shaft. For applications where radial or side loads exist please contact Kawasaki Precision Machinery (UK) Ltd.for recommendations.

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

dial gauge (reading a)
$\delta = a/2$ 0.025mm



dial gauge (reading b)
$\alpha = SIN^{-1}(b/D)$
0.2°

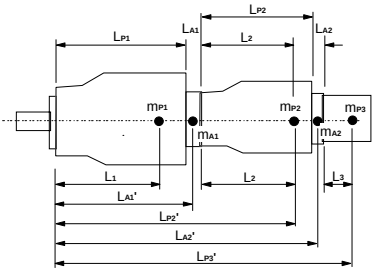


For engine drives a split type pinch bolt drive flange and flexible coupling is recommended.

Through Drive Limitations

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

Through Drive Limitations (Continued)



M_{Px} = mass of pump [kg]
L_{Px} = length of pump [mm]
L_x = distance of CofG from pump mounting face [mm]
M_{Ax} = mass of adaptor kit [mg]
L_{Ax} = width of adaptor kit [mm]

Bending Moment = $((L_1.m_{P1})+(L_{A1}'.m_{A1})+(L_{P2}'.m_{P2})+(L_{A2}'.m_{A2})+(L_{P3}'.m_{P3})+...) /102$ [Nm]

$= ((L_1.m_{P1})$
$+(L_{P1}+(L_{A1}/2)).m_{A1}$
$+(L_{P1}+L_{A1}+L_2).m_{P2}$
$+(L_{P1}+L_{A1}+L_{P2}+(L_{A2}/2)).m_{A2})$
$+(L_{P1}+L_{A1}+L_{P2}+L_{A2}).m_{P3})$
$+.....) / 102$

Pump overall length [mm] (Lp)

pump size	Single Pump Type "0"	Stock Pump Type "S"
45	244	244
80	272	272
112	308	308
140	308	308

Pump approximate weight [kg] (Mp)

pump size	without torque limiter		with torque limiter	
	Single Pump Type "0"	Stock Pump Type "S"	Single Pump Type "0"	Stock Pump Type "S"
45	25	28	27	30
80	35	38	37	40
112	65	69	67	71
140	65	69	67	71

Pump CofG from mount [mm] (L)

pump size	Single Pump Type "0"	Stock Pump Type "S"
45	120	120
80	130	130
112	150	150
140	150	150

pump size	Maximum Permisable Bending Moment (Nm)
45	137
80	244
112	462
140	462

Adaptor Kits weight (Ma) & width (La)

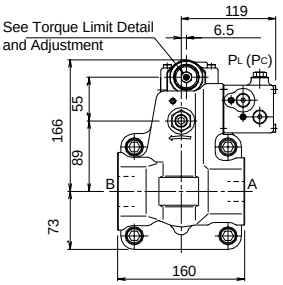
pump size	adaptor kit	weight (Max)	width (Lax)
45	SAE "A"	0	0
	SAE "B" & "BB"	2	20
80	SAE "A"	0	0
	SAE "B" & "BB"	3	20
	SAE "C" & "CC"	4	24.5
112 & 140	SAE "A"	0	0
	SAE "B" & "BB"	3	25
	SAE "C" & "CC"	5	30
	SAE "D"	10	43

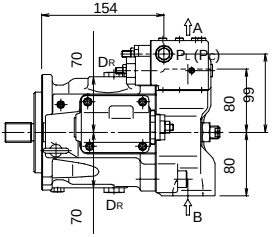
Unit Dimensions

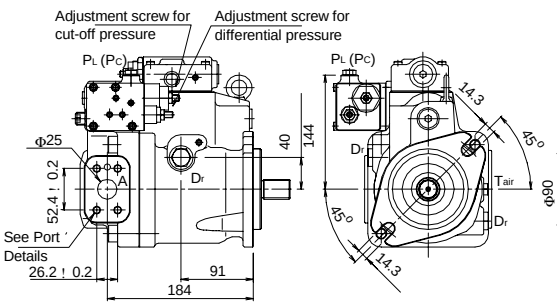
K3VL45 Installation

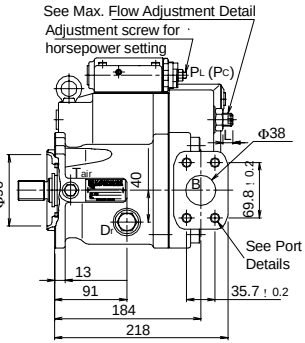
K3VL45 with Cut-Off / Load Sense Control
& Torque Limit Module (Clockwise Rotation)

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









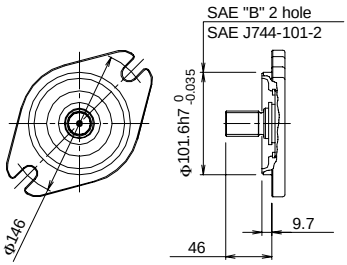
Model	Page	Data Sheet
K3VL	38.52	P-1002/10.00

Kawasaki
Hydraulic Products

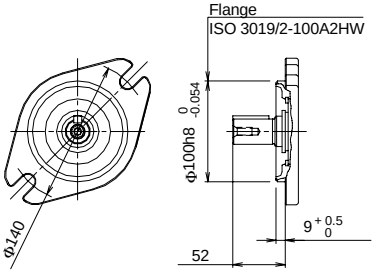
Unit Dimensions (Continued)

K3VL45 Mounting Flange & Shaft Options

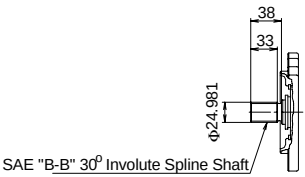
SAE Type



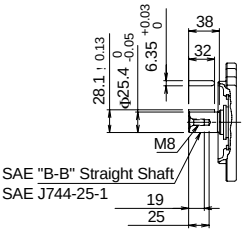
ISO Type



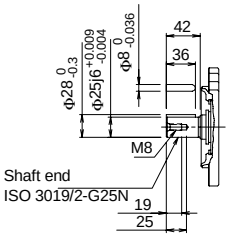
SAE Spline Shaft



SAE Straight Shaft



ISO Straight Shaft

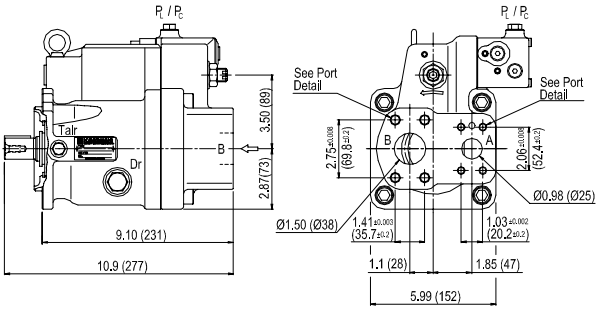


Model	Page	Data Sheet
K3VL	39.52	P-1002/10.00

Kawasaki Hydraulic Products

Unit Dimensions (Continued)

K3VL45 Rear Port



K3VL45 Porting Details

Main SAE Flanged Ports

Des.	Port Name	Port Size	Tightening Torque (Nm)	Flange Threads
UNF Threaded Version ("S" in position 9 of model code)				
A	Delivery Port	SAE J518C Std pressure (code 61) 1"	57	3/8-16UNC-2B x 18mm
B	Suction Port	SAE J518C Std pressure (code 61) 1 1/2"	98	1/2-13UNC-2B x 22mm
Metric Version ("M" in position 9 of model code)				
A	Delivery Port	SAE J518C Std pressure (code 61) 1"	57	M10 x 17
B	Suction Port	SAE J518C Std pressure (code 61) 1 1/2"	98	M12 x 20

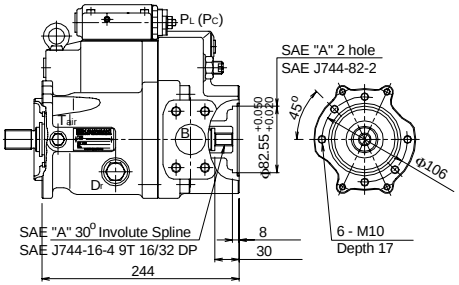
Auxiliary Ports

Des.	Port Name	Port Size	Tightening Torque (Nm)
SAE Version ("S", "K" or "T" in position 8 of model code)			
Dr	Drain Port (x2)	SAE J1926/1 Straight thread O ring boss 1/2"OD Tube 3/4-16UNF-2B	98
PL PC	Load Sensing Port Pressure Control Port	SAE J1926/1 Straight thread O ring boss 1/4"OD Tube 7/16-20UNF-2B	12
Tair	Air Bleeder Port	SAE J1926/1 Straight thread O ring boss 1/4"OD Tube 7/16-20UNF-2B	12
ISO Version ("M" in position 8 of model code)			
Dr	Drain Port (x2)	M22 x 1.5 DIN 3852	98
PL PC	Load Sensing Port Pressure Control Port	M14 x 1.5 DIN 3852	25
Tair	Air Bleeder Port	M14 x 1.5 DIN 3852	25

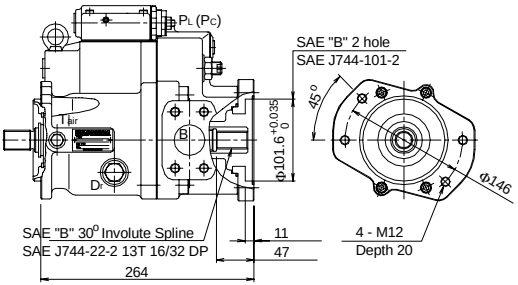
Unit Dimensions (Continued)

K3VL45 Through Drive Options

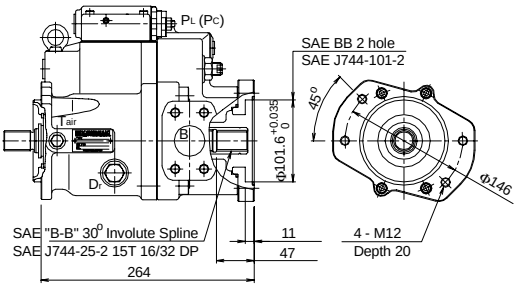
Through Drive "A"



Through Drive "B"



Through Drive "B-B"

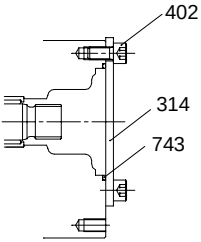


Model	Page	Data Sheet
K3VL	41.52	P-1002/10.00

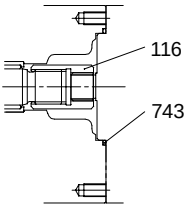
Kawasaki Hydraulic Products

Unit Dimensions (Continued)

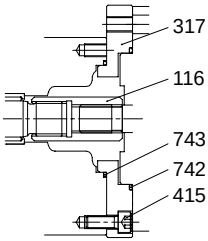
K3VL45 Adaptor Kits



Cover Kit



SAE "A"
T/D Kit



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

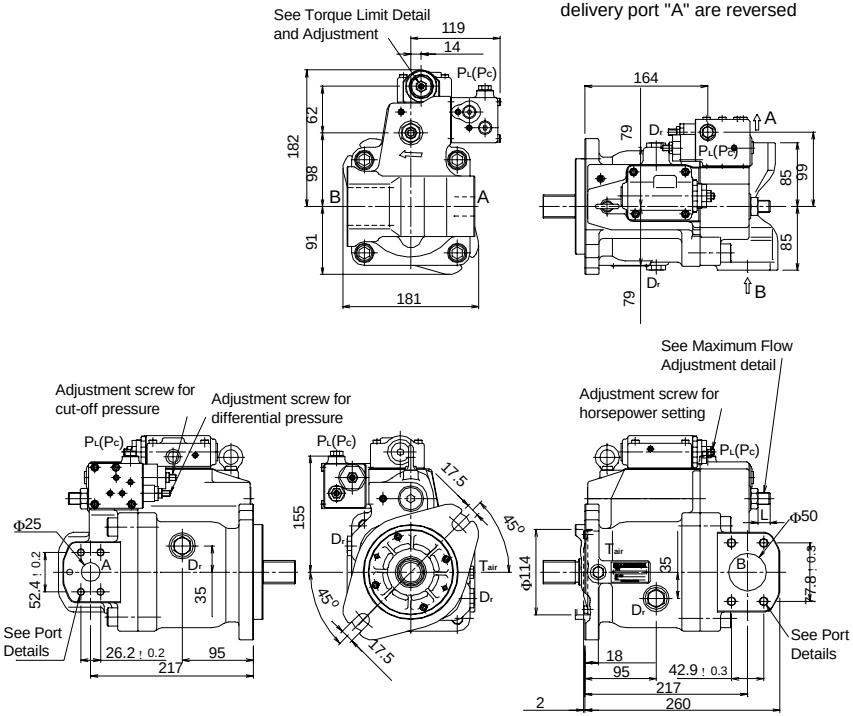
No	Part Name	Qty	Cover Kit	SAE "A" T/D Kit	SAE "B" T/D Kit	SAE "BB" T/D Kit
---	T/D Kit		29L8TN	29L4TA	29L4TB	29L4T2
743	O-Ring	1	00RBG85	00RBG85	00RBG85	00RBG85
742	O-Ring	1	---------	---------	00RBG105	00RBG105
415	Screw hex SHC	4	---------	---------	0SBM825	0SBM825
402	Screw hex SHC	2	0SBM1020	---------	---------	---------
317	Subplate	1	---------	---------	2924750-0358	2924750-0358
314	Cover	1	2923150-0316	---------	---------	---------
116	Coupling	1	---------	2903150-0264	2903150-0265	2903150-0266

Unit Dimensions (Continued)

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



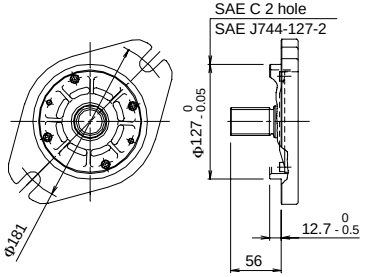
Model	Page	Data Sheet
K3VL	43.52	P-1002/10.00

Kawasaki Hydraulic Products

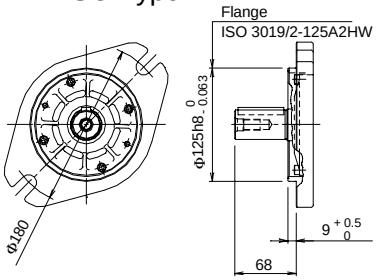
Unit Dimensions (Continued)

K3VL80 Mounting Flange and Shaft Options

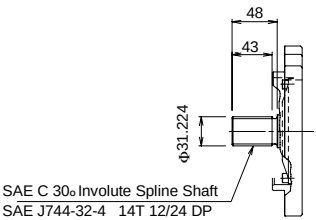
SAE Type



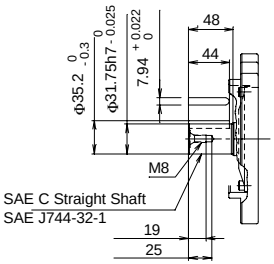
ISO Type



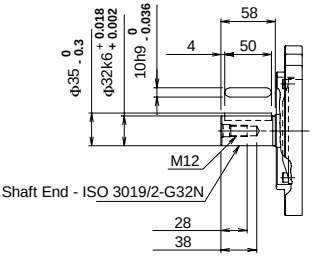
SAE Spline Shaft



SAE Straight Shaft



ISO Straight Shaft

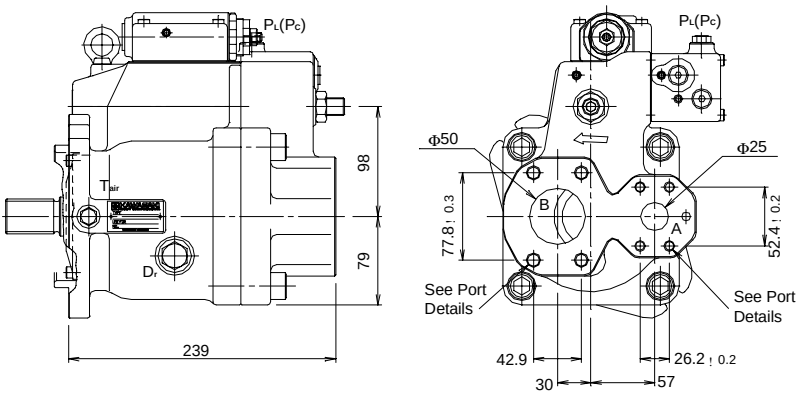


Model	Page	Data Sheet
K3VL	44.52	P-1002/10.00

Kawasaki Hydraulic Products

Unit Dimensions (Continued)

K3VL80 Rear Port Option



K3VL80 Porting Details

Main SAE Flanged Ports

Des.	Port Name	Port Size	Tightening Torque (Nm)	Flange Threads
UNF Threaded Version ("S" in position 9 of model code)				
A	Delivery Port	SAE J518C Std pressure (code 61) 1"	57	3/8-16UNC-2B x 18mm
B	Suction Port	SAE J518C Std pressure (code 61) 2"	98	1/2-13UNC-2B x 22mm
Metric Version ("M" in position 9 of model code)				
A	Delivery Port	SAE J518C Std pressure (code 61) 1"	57	M10 x 17
B	Suction Port	SAE J518C Std pressure (code 61) 2"	98	M12 x 20

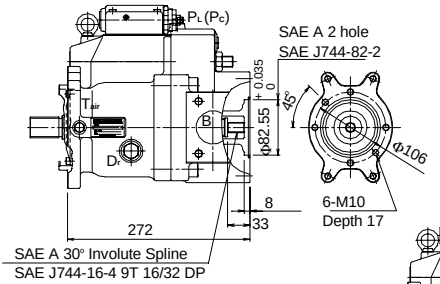
Auxiliary Ports

Des.	Port Name	Port Size	Tightening Torque (Nm)
SAE Version ("S", "K" or "T" in position 8 of model code)			
Dr	Drain Port (x2)	SAE J1926/1 Straight thread O ring boss 1/2"OD Tube 3/4-16UNF-2B	98
PL PC	Load Sensing Port Pressure Control Port	SAE J1926/1 Straight thread O ring boss 1/4"OD Tube 7/16-20UNF-2B	12
Tair	Air Bleeder Port	SAE J1926/1 Straight thread O ring boss 1/4"OD Tube 7/16-20UNF-2B	12
ISO Version ("M" in position 8 of model code)			
Dr	Drain Port (x2)	M22 x 1.5 DIN 3852	98
PL PC	Load Sensing Port Pressure Control Port	M14 x 1.5 DIN 3852	25
Tair	Air Bleeder Port	M14 x 1.5 DIN 3852	25

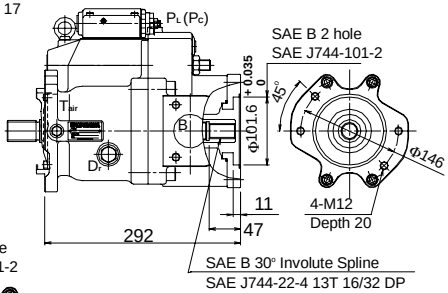
Unit Dimensions (Continued)

K3VL80 Through Drive Options

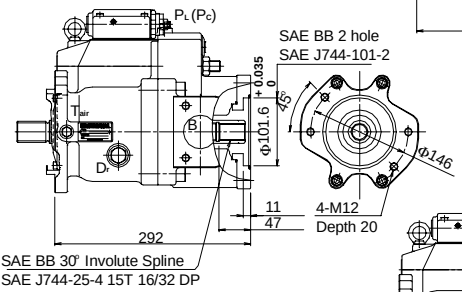
Through Drive "A"



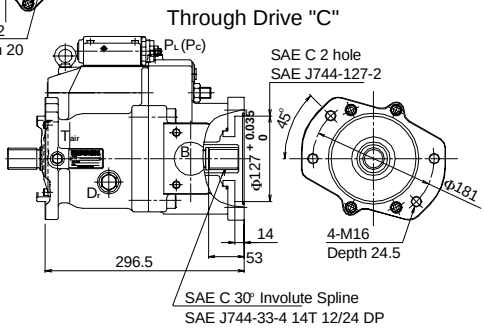
Through Drive "B"



Through Drive "B-B"



Through Drive "C"

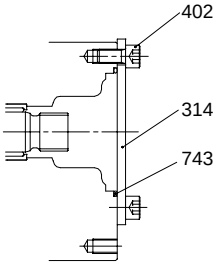


Model	Page	Data Sheet
K3VL	46.52	P-1002/10.00

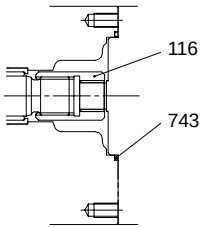
Kawasaki Hydraulic Products

Unit Dimensions (Continued)

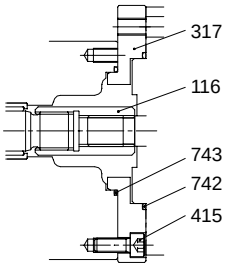
K3VL80 Adaptor Kits



Cover Kit



SAE "A"
T/D Kit



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

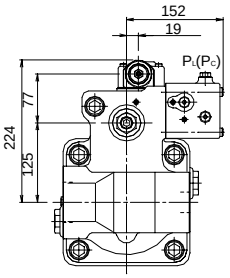
No	Part Name	Qty	Cover Kit	SAE "A" T/D Kit	SAE "B" T/D Kit	SAE "BB" T/D Kit	SAE "BB" T/D Kit
---	T/D Kit		29L8TN	29L8TA	29L8TB	29L8T2	29L8TC
743	O-Ring	1	00RBG85	00RBG85	00RBG85	00RBG85	00RBG85
742	O-Ring	1	---------	---------	00RBG105	00RBG105	00RBG130
415	Screw hex SHC	4	---------	---------	0SBM1025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

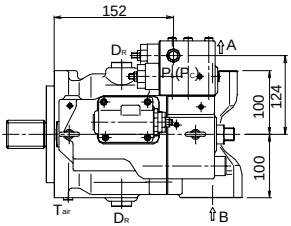
Unit Dimensions (Continued)

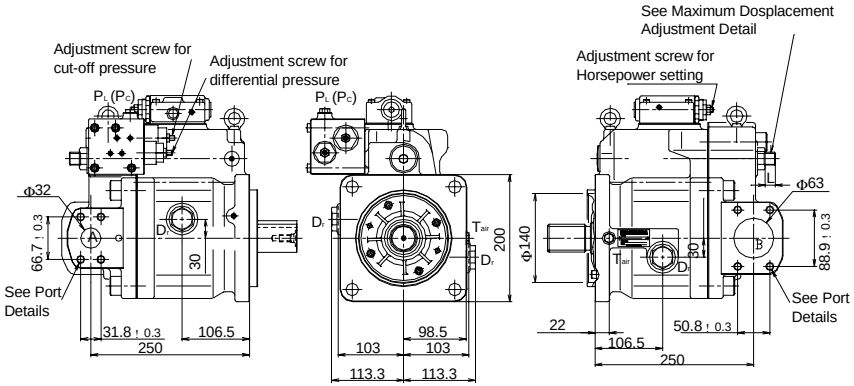
K3VL112/140 Installation

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

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







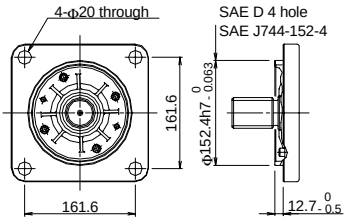
Model	Page	Data Sheet
K3VL	48.52	P-1002/10.00

Kawasaki
Hydraulic Products

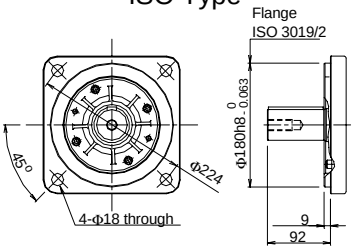
Unit Dimensions (Continued)

K3VL112/140 Mounting Flange and Shaft Options

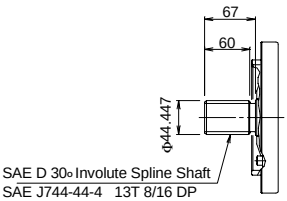
SAE Type



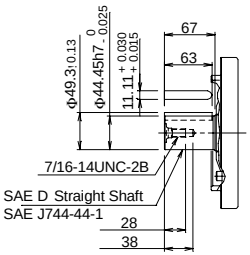
ISO Type



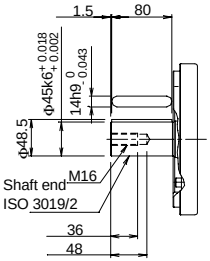
SAE Spline Shaft



SAE Straight Shaft



ISO Straight Shaft

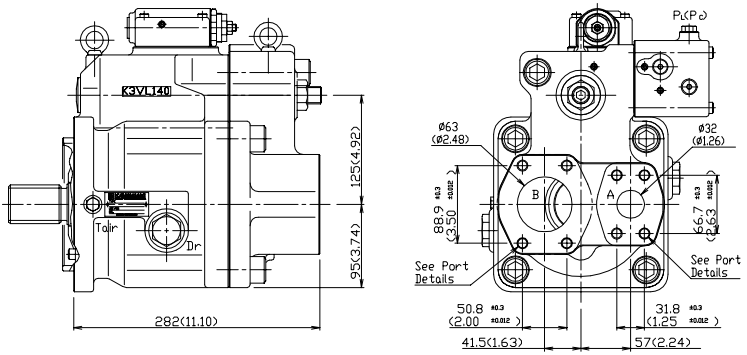


Model	Page	Data Sheet
K3VL	49.52	P-1002/10.00

Kawasaki Hydraulic Products

Unit Dimensions (Continued)

K3VL112/140 Rear Port Option



K3VL112/140 Porting Details

Main SAE Flanged Ports

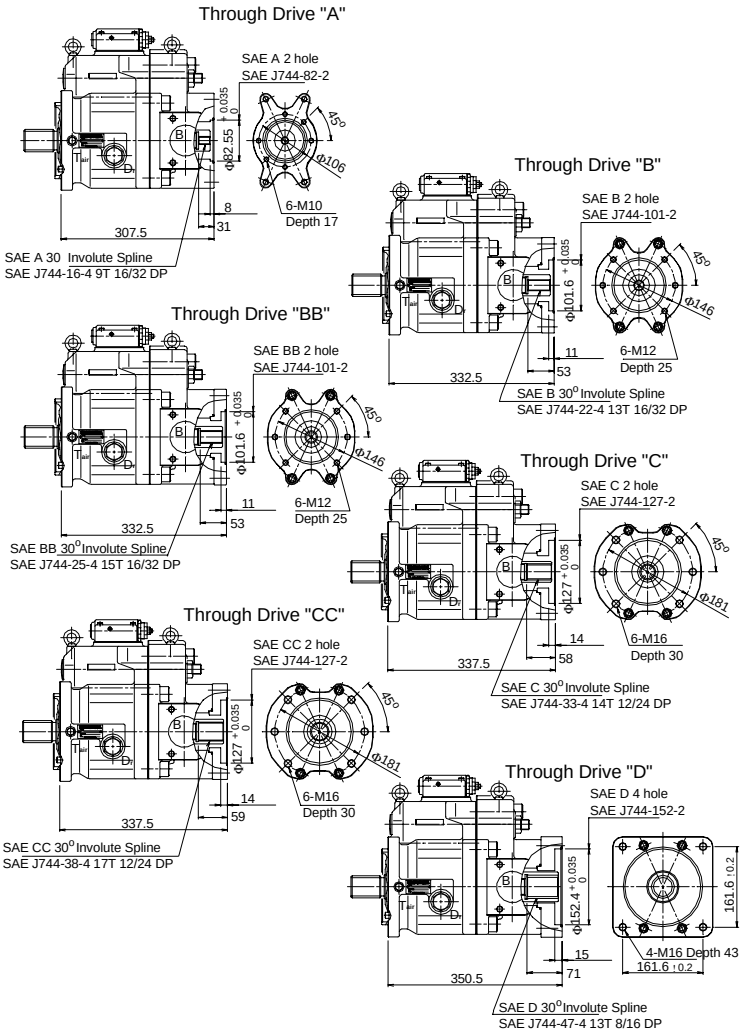
Des.	Port Name	Port Size	Tightening Torque (Nm)	Flange Threads
UNF Threaded Version ("S" in position 9 of model code)				
A	Delivery Port	SAE J518C high pressure (code 62) 1 1/4"	98	1/2-13UNC-2B x 22mm
B	Suction Port	SAE J518C Std pressure (code 61) 2 1/2"	98	1/2-13UNC-2B x 22mm
Metric Version ("M" in position 9 of model code)				
A	Delivery Port	SAE J518C high pressure (code 62) 1 1/4"	157	M14 x 19
B	Suction Port	SAE J518C Std pressure (code 61) 2 1/2"	98	M12 x 17

Auxiliary Ports

Des.	Port Name	Port Size	Tightening Torque (Nm)
SAE Version ("S", "K" or "T" in position 8 of model code)			
Dr	Drain Port (x2)	SAE J1926/1 Straight thread O ring boss 3/4"OD Tube 1 1/16-12UN-2B	167
PL PC	Load Sensing Port Pressure Control Port	SAE J1926/1 Straight thread O ring boss 1/4"OD Tube 7/16-20UNF-2B	12
Tair	Air Bleeder Port	SAE J1926/1 Straight thread O ring boss 1/4"OD Tube 7/16-20UNF-2B	12
ISO Version ("M" in position 8 of model code)			
Dr	Drain Port (x2)	M27 x 2 DIN 3852	167
PL PC	Load Sensing Port Pressure Control Port	M14 x 1.5 DIN 3852	25
Tair	Air Bleeder Port	M14 x 1.5 DIN 3852	25

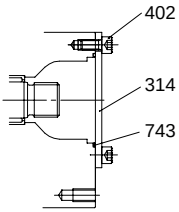
Unit Dimensions (Continued)

K3VL112/140 Through Drive Options

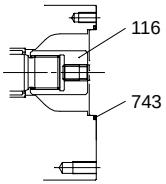


Unit Dimensions (Continued)

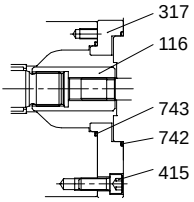
K3VL112/140 Adaptor Kits



Cover Kit



SAE "A" T/D Kit



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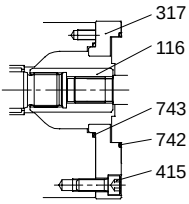

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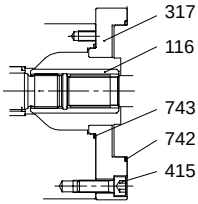
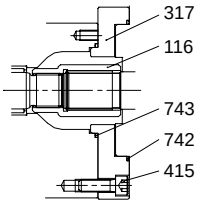
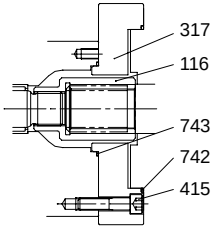


SAE "C" T/D Kit



SAE "C-C" T/D Kit



SAE "D" T/D Kit

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

No	Part Name	Qty	SAE "C" T/D Kit	SAE "CC" T/D Kit	SAE "D" T/D Kit
---	T/D Kit		29L4TC	29L4T3	29L4TD
743	O-Ring	1	00RBG85	00RBG85	00RBG85
742	O-Ring	1	00RBG130	00RBG130	00RBG150
415	Screw hex SHC	4	OSBM1235	0SBM1235	0SBM1250
402	Screw hex SHC	2	---------	---------	---------
317	Subplate	1	2924750-0361	2924750-0361	2924750-0362
314	Cover	1	---------	---------	---------
116	Coupling	1	2903150-0271	2903150-0272	2903150-0273

KAWASAKI PRECISION MACHINERY (UK) LTD
Ernesettle, Plymouth, Devon, PL5 2SA, England
Tel: +44 1752 364394 Fax: +44 1752 364816
E Mail:info@ kpm-uk.co.uk
Web site: http://www.kpm-uk.co.uk

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