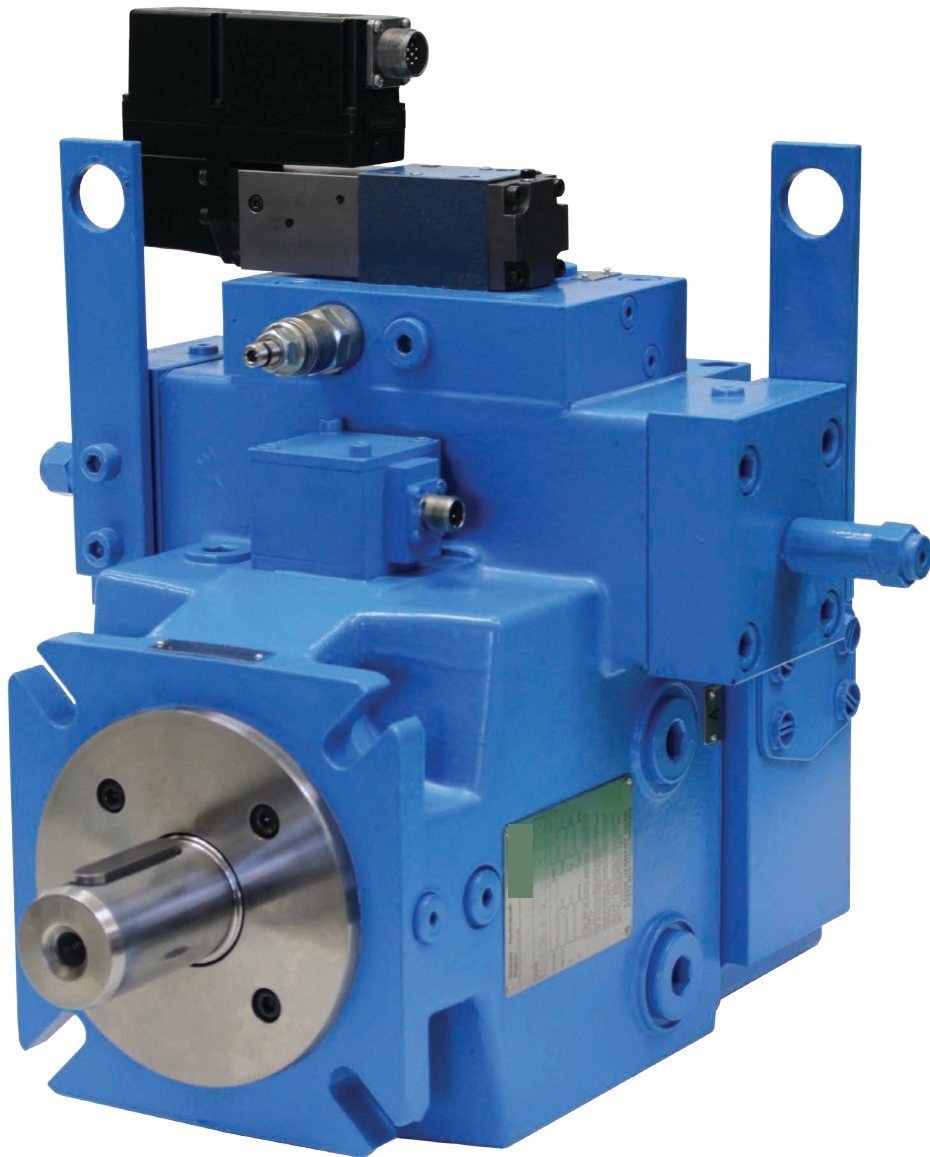


Danfoss

Hydrokraft Open Loop Piston Pump
Technical Information

W Series

Danfoss



BC442364653254en-000101

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Introduction

- Axial piston pumps with swash plate design for reliable operation and long life.
- Pressure up to 420 bar.
- Rated speed up to 1800 rev/min. Higher speeds possible.
- Oversize shafts and bearings.
- Rotating and pressure-loaded parts are pressure balanced.
- Through-drive enables multiple pump installations from a single shaft. Multiple pump combinations are also available.
- Integrated pilot pump, filter and pressure relief valves available.
- Modular design gives these pumps a wide range of applications.
- Fast response times.

Available Displacement Sizes

130 cm ³	(8.0 in ³ /rev)
180 cm ³	(11.0 in ³ /rev)
250 cm ³	(15.0 in ³ /rev)
360 cm ³	(22.0 in ³ /rev)
500 cm ³	(30.5 in ³ /rev)
750 cm ³	(45.0 in ³ /rev)

Displacement Controls

DF - Pressure compensator controlled

LR - Power control with pressure limiter

SP - Displacement proportional to electric signal (neutral = zero Q)

ST - Displacement proportional to electrical signal (neutral = Q_{max})

DP - Displacement proportional to pressure signal

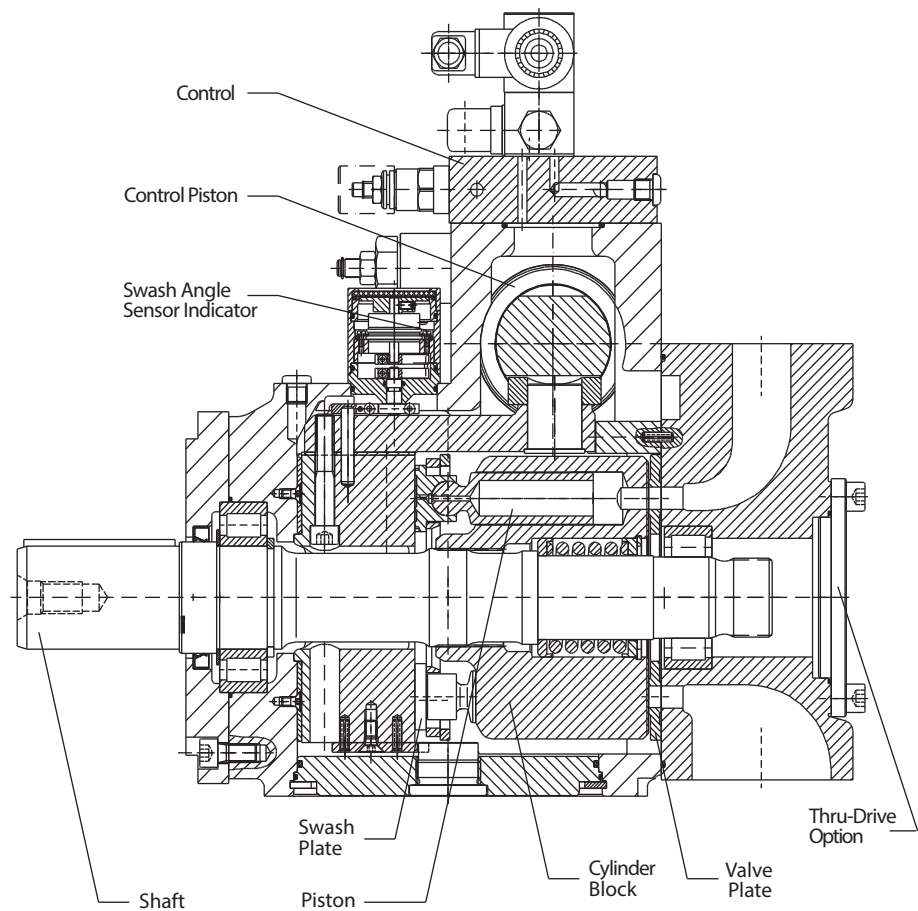
PQ - Digital controller

ES - Displacement adjustment via electric motor

Extra functions available for DP & SP:

Pressure limitation and/or power control overriding function.

Typical Section of Open Loop PVW Pump



Note

Dimensional data provided in this catalog is subject to change without notice.

Model Code

- Preferred standard option
- Other standard option
- Special option on request
- X Not available

Open Loop Pumps
W Series - DF Control

D F 0 0 0 A * * 0 0 0 0 * 0 0 * * * * * * * * * *

[24][25][26][27][28][29][30][31][32][33][34][35][36][37][38][39][40][41][42][43][44][45][46][47][48]

	Pump Size	130	180	250	360	500	750
[24][25] Control Type							
DF – Pressure compensator		●	●	●	●	●	●
[26] Displacement Adjustment Options							
0 – Not applicable							
[27][28] Electronic Controls							
0 – Not applicable							
[29] Yoke Displacement Zone							
A – Single side of centre "A"		●	●	●	●	●	●
[30] Additional Functions							
0 – None		●	●	●	●	●	●
1 – Load sensing (standard $\Delta p = 15$ bar)		●	●	●	●	●	●
A – 2-level pressure compensator, 4/2 solenoid valve ▲		○	○	○	○	○	○
B – 2-level pressure compensator, 4/3 solenoid valve ▲		○	○	○	○	○	○
[31] Pressure Control Options							
0 – None i.e. pilot operated with remote port (standard arrangement) Remote port without pilot valve Electro-		●	●	●	●	●	●
F – proportional relief valve, complete with electronic card		○	○	○	○	○	○
K – Slow upstroke screw adjustment		○	○	○	○	○	○
[32][33][34] Power Control							
000 – Not applicable							
[35] Pilot Oil Filter							
0 – Not applicable							
[36] Venting Valve							
0 1 – None		●	●	●	●	●	●
– Solenoid valve ▲		○	○	○	○	○	○
▲ Specify voltage in [39]							
[37] Position Monitoring							
0 – None							
[38] Electric MotorType							
0 – None							

	Pump Size	130	180	250	360	500	750
[39] Control Voltage							
0 – Not applicable		●	●	●	●	●	●
B – 110V AC 50 Hz / 120V AC 60 Hz		○	○	○	○	○	○
D – 220V AC 50 Hz / 240V AC 60 Hz		○	○	○	○	○	○
G – 12V DC		○	○	○	○	○	○
H – 24V DC (preferred voltage)		●	●	●	●	●	●
[40][41][42][43] Customer Adjustment Specification							
0000 – None ****		●	●	●	●	●	●
– Danfoss assigned number as per data specified in table		○	○	○	○	○	○
[44][45][46] Special Features							
000 – None ***		●	●	●	●	●	●
– Defined by Danfoss		○	○	○	○	○	○
[47][48] Design Number **							
– 10-99 assigned by Danfoss		●	●	●	●	●	●

◇ **Example for Customer Adjustment Specifications**

Special Pressure Adjustment	Main Stage Pressure Control	Pilot Valve Pressure Control	Load Sense Δp
Standard setting (bar)	20	90	15
Max. setting (bar)	40	350	40
Customer-specified adjustment (bar)	.....	.....	.....
Note: Setting must be at least 30 bar.			
Special Max. Displ. Adjustment	Minimum Displacement	Maximum Displacement	
Standard	0 cm ³ /rev	100%	
Customer-specified adjustment (cm ³ /rev)	.....	.....
Note: Special pressure adjustments and/or maximum displacement adjustments are the most common reasons for using this option.			

Model Code

Open Loop Pumps
W Series - LR Control

- Preferred standard option
- Other standard option
- Special option on request
- X Not available

L R 0 0 0 A * * * * * 0 * 0 0 * * * * * * * * * * *
 [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48]

	Pump Size	130	180	250	360	500	750
[24][25] Control Type							
LR – Power control		●	●	●	●	●	●
[26] Displacement Adjustment Options							
0 – Not applicable							
[27][28] Electronic Controls							
0 – Not applicable							
[29] Yoke Displacement Zone							
A – Single side of centre “A”		●	●	●	●	●	●
[30] Additional Functions							
2 – Pressure limiter		●	●	●	●	●	●
3 – Load sensing and pressure limiter (standard $\Delta p = 15$ bar) \blacktriangle		●	●	●	●	●	●
\blacktriangle To select Power Control without Pressure Limiter, specify ... LR ... A2F							
[31] Pressure Control Options							
0 – None i.e. pilot operated with remote port (standard arrangement) Remote port without pilot valve		●	●	●	●	●	●
F – Electro-proportional relief valve, complete with electronic card		○	○	○	○	○	○
K – Slow upstroke screw adjustment		○	○	○	○	○	○
[32][33][34] Power Control Specification							
*** – 3-digit value in kW at 1500 rev/min		●	●	●	●	●	●
[35] Pilot Oil Filter							
0 – Not applicable							
[36] Unloading Valve							
0 – None		●	●	●	●	●	●
1 – Solenoid valve \blacktriangledown		○	○	○	○	○	○
\blacktriangledown Specify voltage in [39]							
[37] Position Monitoring							
0 – Not applicable							
[38] Electric Motor Type							
0 – Not applicable							

	Pump Size	130	180	250	360	500	750
[39] Control Voltage							
0 – Not applicable		●	●	●	●	●	●
B – 110V AC 50 Hz / 120V AC 60 Hz		○	○	○	○	○	○
D – 220V AC 50 Hz / 240V AC 60 Hz		○	○	○	○	○	○
G – 12V DC		○	○	○	○	○	○
H – 24V DC		○	○	○	○	○	○
[40][41][42][43] Customer Adjustment Specification							
0000 – None ****		●	●	●	●	●	●
– Danfoss assigned number as per data specified in table below		○	○	○	○	○	○
[44][45][46] Special Features							
000 – None ***		●	●	●	●	●	●
– Defined by Danfoss		○	○	○	○	○	○
[47][48] Design Number **							
– 10-99 assigned by Danfoss		●	●	●	●	●	●

◇ **Example for Customer Adjustment Specifications**

Special Pressure Adjustment	Main Stage Pressure Control	Pilot Valve Pressure Control	Load Sense Δp
Standard setting (bar)	20	90	15
Max. setting (bar)	40	350	40
Customer-specified adjustment (bar)	.....	.....	.....

Note: Setting must be at least 30 bar.

Special Max. Displ. Adjustment	Minimum Displacement	Maximum Displacement
Standard	0 cm ³ /rev	100%
Customer-specified adjustment (cm ³ /rev)	.....	.....

Note: Special pressure adjustments and/or maximum displacement adjustments are the most common reasons for using this option.

Model Code

- Preferred standard option
- Other standard option
- Special option on request
- X Not available

Open Loop Pumps

W Series - SP Control

[22] = P, M, R or S mandatory
(electrical yoke position indicator)

S P * * * A * * * * * * 0 0 0 0 * * * * * * * * *
 [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48]

	Pump Size	130	180	250	360	500	750
[24] [25] Control Type							
SP – Displacement adjustment via proportional valve		●	●	●	●	●	●
[26] Displacement Adjustment Options							
A – CETOP 3 interface only		○	○	○	○	○	○
B – CETOP 5 interface only		○	○	○	○	○	○
C – CETOP 3 proportional valve KDG4V-3		●	●	●	●	●	●
D – CETOP 3 proportional valve KBSDG4V-3 with OBE		○	○	○	○	○	○
E – CETOP 5 proportional valve KBSDG4V-5 with OBE		○	○	○	○	○	○
F – CETOP 5 servo-valve		○	○	○	○	○	○
[27] [28] Electronic Amplifier Control							
03 – ER 9.3-10 ▲		●	●	●	●	●	●
04 – ER 9.4-10 (CETOP 3) servo		○	○	○	○	○	○
00 – No amplifier card		○	○	○	○	○	○
▲ Amplifier card required for [26] = C, D, E							
[29] Yoke Displacement Zone							
A – Single side of centre “A”		●	●	●	●	●	●
[30] Additional Functions							
0 – None		●	●	●	●	●	●
4 – Pressure limiter override		●	●	●	●	●	●
5 – Pressure limiter and power limiter override		●	●	●	●	●	●
[31] Pressure Control Options							
0 – None i.e. pilot operated with remote port (standard arrangement) Remote port without pilot valve Electro-proportional relief valve, complete with electronic card		●	●	●	●	●	●
F – Remote port without pilot valve Electro-proportional relief valve, complete with electronic card		○	○	○	○	○	○
K – Remote port without pilot valve Electro-proportional relief valve, complete with electronic card		○	○	○	○	○	○
[32] [33] [34] Power Control Specification							
*** – 3-digit value in kW at 1500 rev/min		●	●	●	●	●	●
Note If no power limiter override: 000							
[35] Pilot Oil Filter							
0 – None		○	○	○	○	○	○
V – Filter with visual indicator		○	○	○	○	○	○
E – Filter with electrical indicator		●	●	●	●	●	●
[36] Venting Valve							
0 – Not applicable							
Pump Size		130	180	250	360	500	750

	Pump Size	130	180	250	360	500	750
[37] Position Monitoring							
0 – Not applicable							
[38] Electric Motor Type							
0 – Not applicable							
[39] Venting Valve Control Voltage							
0 – Not applicable							
[40] [41] [42] [43] Customer Adjustment Specification							
0000 – None ****		●	●	●	●	●	●
– Danfoss assigned number as per data specified in table below ◊		○	○	○	○	○	○
[44] [45] [46] Special Features							
000 – None ***		●	●	●	●	●	●
– Defined by Danfoss		○	○	○	○	○	○
[47] [48] Design Number **							
– 10-99 assigned by Danfoss		●	●	●	●	●	●
Pump Size		130	180	250	360	500	750

◊ Example for Customer Adjustment Specifications

Special Pressure Adjustment	Main Stage Pressure Control	Pilot Valve Pressure Control	Load Sense Δp
Standard setting (bar)	20	90	15
Max. setting (bar)	40	350	40
Customer-specified adjustment (bar)	.....	.....	.....

Note: Setting must be at least 30 bar.

Special Max. Displ. Adjustment	Minimum Displacement	Maximum Displacement
Standard	0 cm ³ /rev	100%
Customer-specified adjustment (cm ³ /rev) .....	.....	.....

Note: Special pressure adjustments and/or maximum displacement adjustments are the most common reasons for using this option.

Model Code

- Preferred standard option
- Other standard option
- Special option on request
- X Not available

Open Loop Pumps

W Series - ST Control

21 = K mandatory (FKM with HP lubrication)

22 = L (electrical yoke position indicator)

S T * * * A * * * * * * * 0 0 0 * * * * * * * * *
 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48

	Pump Size	66	90	130	180	250
24 25 Control Type						
ST – Electronic flow control by proportional valve		●	●	●	●	●
26 Displacement Adjustment Options						
C – With CETOP 3 proportional valve		●	●	●	●	●
A – With CETOP 3 interface (no valve)		○	○	○	○	○
D – CETOP 3 proportional valve KBSDG4V-3 with OBE (electr. amplifier necessary for flow control)		●	●	●	●	●
E – CETOP 5 proportional valve KBSDG4V-5 with OBE (electr. amplifier necessary for flow control)		○	○	○	○	○
G – CETOP 3 AxisPro OBE valve with integr. flow control (no add. amplifier necessary)		○	○	○	○	○
H – CETOP 5 Axis-Pro OBE valve with integr. flow control (no add. amplifier necessary)		○	○	○	○	○
27 28 Electronic Amplifier						
03 05 00 With ER9.3 amplifier card 1)		●	●	●	●	●
– With DIN rail module 1)		○	○	○	○	○
– Without electronics		○	○	○	○	○
0A – AxisPro Command 0-10V 2)		●	●	●	●	●
0B – AxisPro Command 4-20mA 2)		●	●	●	●	●
0C – AxisPro Command by CAN-Bus 2)		●	●	●	●	●
0D – AxisPro Command special feature 2)		●	●	●	●	●
29 Yoke Displacement Zone						
A – Single side of centre “A”		●	●	●	●	●
30 Additional Functions						
0 – Without additional options		●	●	●	●	●
4 – Pressure limiter override		○	○	○	○	○
5 – Pressure limiter and power limiter override		○	○	○	○	○
31 Pressure Control Options						
0 – Including pilot relief valve and remote port option		●	●	●	●	●
F – Remote port only		○	○	○	○	○
K – Proportional relief valve + EEA-PAM amplifier card		○	○	○	○	○
L – Proportional relief valve with integrated Electronics OBE		○	○	○	○	○
32 33 34 Power Control Setting options						
000 – No power limiter override		●	●	●	●	●
*** – 3-digit value in kW at 1500 rpm		●	●	●	●	●
	Pump Size	66	90	130	180	250

	Pump Size	66	90	130	180	250
35 Pilot Oil Filter						
0 – Without filter		●	●	●	●	●
E – Filter with electr. indicator		○	○	○	○	○
36 Pilot oil supply						
A – Internal pilot oil supply only		●	●	●	●	●
B – External pilot oil supply only		○	○	○	○	○
C – Internal + external pilot oil supply by check valve		○	○	○	○	○
37 Position Monitoring						
0 – Not applicable						
38 Electric MotorType						
0 – Not applicable						
39 Control Voltage						
0 – Not applicable						
40 41 42 43 Customer Adjustment Specification						
0000 – None ****		●	●	●	●	●
– Danfoss assigned number as per data specified in table below		○	○	○	○	○
44 45 46 Special Features						
000 – None ***		●	●	●	●	●
– Defined by Danfoss		○	○	○	○	○
47 48 Design Number **						
– 10-99 assigned by Danfoss		●	●	●	●	●
	Pump Size	66	90	130	180	250

◇ Example for customer adjustment specifications A4/A5 29 30

Special pressure adjustment	Main stage pressure control	Pilot valve ▲ pressure control
Standard setting (bar)	20	90
Max. setting (bar)	40	350
Customer-specified adjustment (bar)	.....	.....
▲ Note: Setting must be at least 30bar.		
Special max. Displ. Adjustment	Minimum displacement	Maximum displacement
Standard	0 cm ³ /rev	100%
Customer-specified adjustment (cm ³ /rev)	.....	.....
Note: Special pressure adjustments and/or maximum displacement adjustments are the most common reasons for using this option. Max. displacement adjustable by screw or by stop ring- refer basic pump model code pos.13.		

1) Only for pos. 26 C, D, and E and 2) Only for pos.26 G and H

Notes:

- ST control requires a min. operation pressure of >25 bar for operation. For internal pilot oil supply it must be assured that this load pressure can be provided. Below this min. pressure value pump will automatically go on max. stroke.
- External ST control pilot pressure needs to be equal or more than 35% of max. load pressure

Model Code

W-Series Open Loop Pumps

Form Page

The 48-digit coding system has been developed to identify all configuration options for the "W" series (Open Loop) fixed and variable displacement pumps. The Model Code lets you specify a unit with the desired features. All 48 digits must be present when ordering.

You may wish to photocopy the matrix below to ensure that each number is entered in the correct box. If adjustments other than the standard setting ([40] to [43])

or special features ([44] to [46]) are needed, please provide the information when ordering.

For combination units, you may need to provide an additional model code. In such a case, each single pump section must be specified separately using this or other Danfoss catalog information. Where characters are already stated in the blank Model Code, there is no option available.

Explanation for each character

Codes

Basic Pump Model Code	[1] to [3]
Control Options	[24] to [39]
Customer Adjustment Specification	[40] to [43]
Special Features	[44] to [46]
Design Number	[47] & [28]
Combination Units Model Code	[1] to [39]

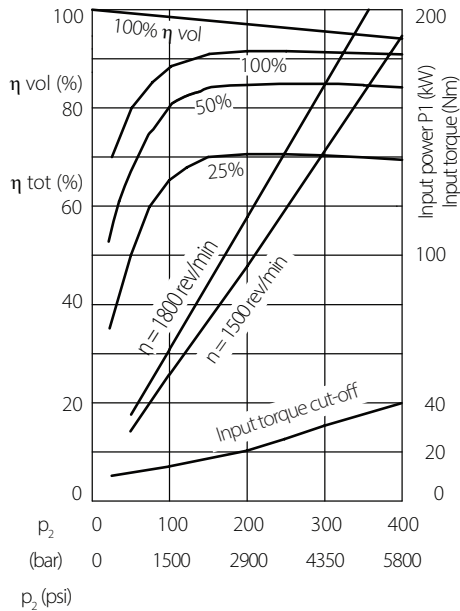
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
P		W		-										1				S	V		A			
24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
																							1	0

Specify Non Standard Adjustment Below

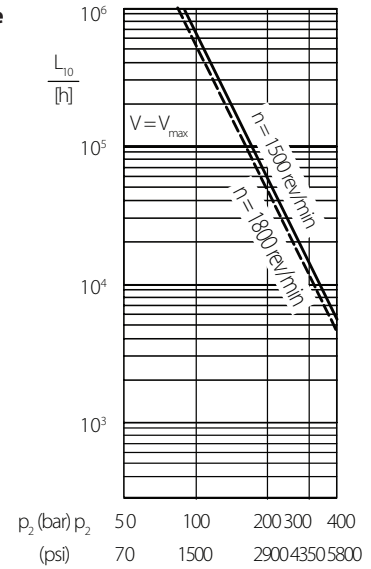
Specify Special Feature Below

Performance Curves 130 & 180 Series

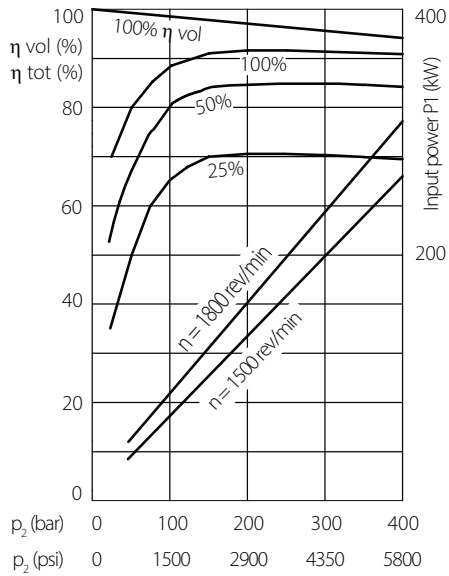
Power Efficiency Performance Curve Size 130



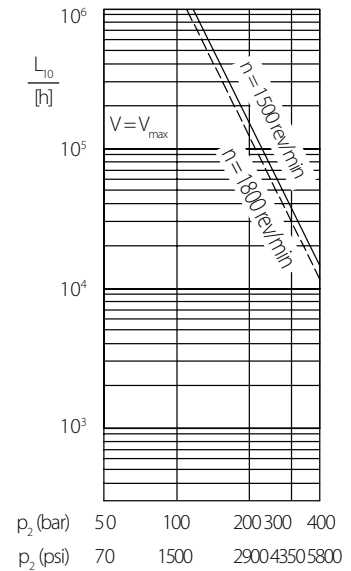
Roller Bearing Life Size 130



Power Efficiency Performance Curve Size 180



Roller Bearing Life Size 180



Double pumps

- For pumps operating in tandem, typical values are as for the individual units.
- Variable tandem units have two controls, i.e. one for each single unit.

For reduced swash angle

$$L_h = (L \text{ at } V_{max}) \times \frac{1}{\left(\frac{V}{V_{max}}\right)^{\frac{10}{3}}}$$

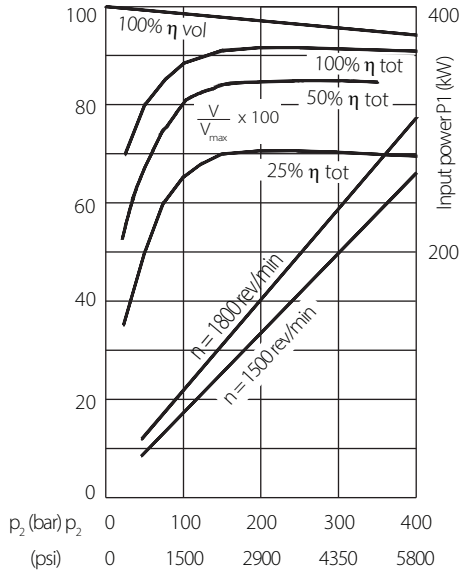
Note

Performance data is measured under specific conditions and may vary according to application and operating conditions.

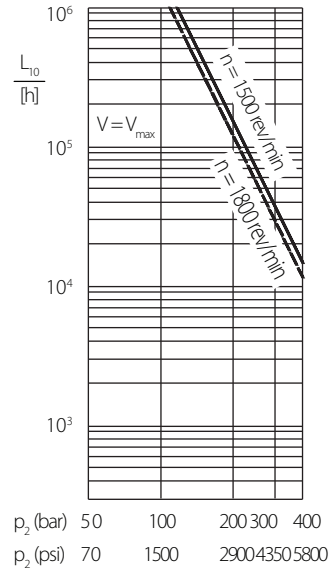
Danfoss therefore shall not be held legally responsible for any deviation from published figures.

Performance Curves 250 & 360 Series

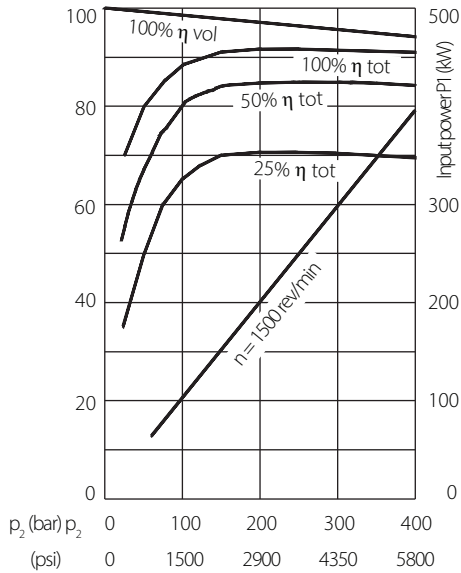
Power Efficiency Performance Curve Size 250



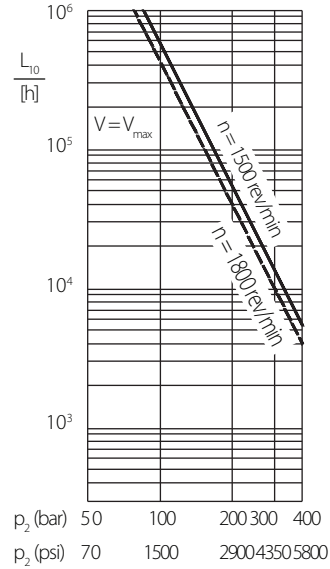
Roller Bearing Life Size 250



Power Efficiency Performance Curve Size 360



Roller Bearing Life Size 360



Combination units

- For combination pumps, typical values are as for individual units.

For reduced swash angle

$$L_h = (L \text{ at } V_{max}) \times \frac{1}{\left(\frac{V}{V_{max}}\right)^{\frac{10}{3}}}$$

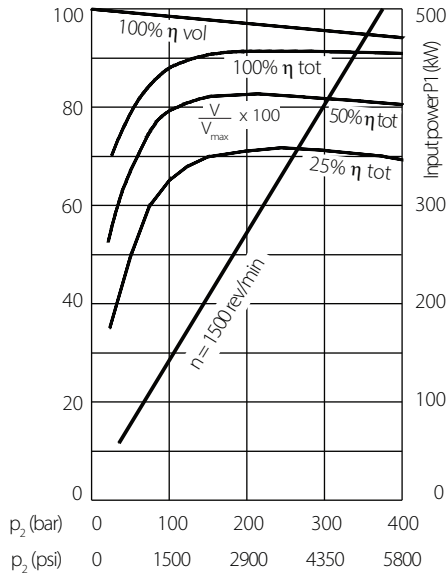
Note

Performance data is measured under specific conditions and may vary according to application and operating conditions.

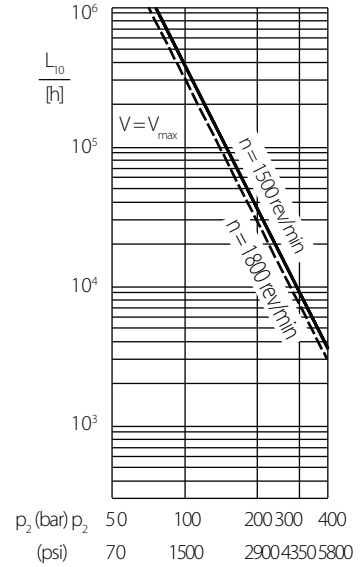
Danfoss therefore shall not be held legally responsible for any deviation from published figures.

Performance Curves 500 & 750 Series

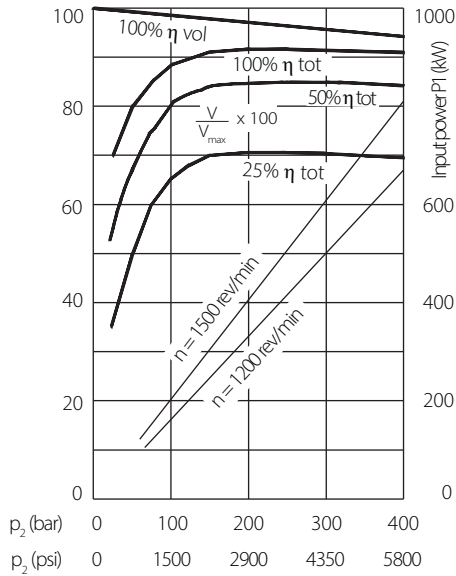
Power Efficiency Performance Curve Size 500



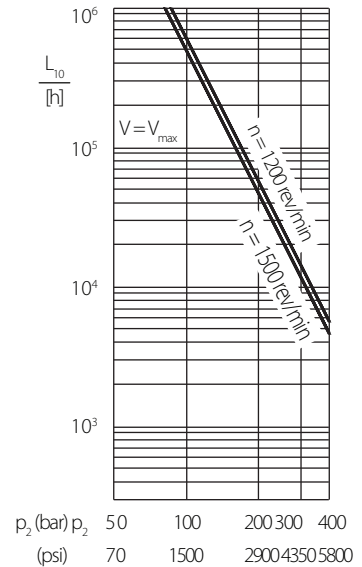
Roller Bearing Life Size 500



Power Efficiency Performance Curve Size 750



Roller Bearing Life Size 750



Combination units

- For combination pumps, typical values are as for individual units.

For reduced swash angle

$$L_h = (L \text{ at } V_{max}) \times \frac{1}{\left(\frac{V}{V_{max}}\right)^{\frac{10}{3}}}$$

Note

Performance data is measured under specific conditions and may vary according to application and operating conditions.

Danfoss therefore shall not be held legally responsible for any deviation from published figures.

Installation and Start-up

Warning: Care should be taken that mechanical and hydraulic resonances are avoided in the application of the pump. Such resonances can seriously compromise the life and/or safe operation of the pump.

Drive Data

Mounting attitude should be horizontal using the appropriate case drain ports to ensure that the case remains full of fluid at all times. Consult your local Danfoss Representative if a different arrangement is required.

In those cases where geometric tolerances of mounting are critical, or where specific tolerance ranges are required and not specified, consult Danfoss Engineering for specific limits.

Direction of shaft rotation, viewed from the prime mover end, must be as indicated in the model designation on the pump – either right hand (clockwise) or left hand (counterclockwise).

Direct coaxial drive through a flexible coupling is recommended. If drives imposing radial shaft loads are considered, please consult your Danfoss Representative.

Start-up Procedure

Make sure the reservoir and circuit are clean and free of dirt/debris prior to filling with hydraulic fluid.

Fill the reservoir with filtered oil and fill to a level sufficient enough to prevent vortexing at the suction connection to pump inlet. It is good practice to clean the system by flushing and filtering, using an external slave pump.

Caution: Before the pump is started, fill the case through the uppermost drain port with hydraulic fluid of the type to be used. The case drain line must be connected directly to the reservoir and must terminate below the oil level.

Once the pump is started, it should prime within a few seconds. If the pump does not prime, check to make sure that there are no restrictions between the reservoir and the inlet to the pump, and that the pump is being rotated in the proper direction, and that there are no air leaks in the inlet line and connections. Also check to make sure that trapped air can escape at the pump outlet.

After the pump is primed, tighten the loose outlet connections, then operate for five to ten minutes (unloaded) to remove all trapped air from the circuit.

If the reservoir has a sight gage, make sure the fluid is clear – not milky.

Fluid Cleanliness

Hydrokraft pumps are rated in anti-wear petroleum fluids with a contamination level of 18/15/13 per ISO 4066. Operation in fluids with levels more contaminated than this is not recommended. Fluids other than petroleum, severe service cycles, or temperature extremes are cause for adjustment of these codes. Please contact your Danfoss Representative for specific duty cycle recommendation.

Danfoss Hydrokraft pumps, as with any variable displacement piston pumps, will operate with apparent satisfaction in fluids up to the rating specified here. Experience has shown however, that pump and hydraulic system life is not optimized with high fluid contamination levels (high ISO cleanliness codes).

Proper fluid condition is essential for long and satisfactory life of hydraulic components and systems. Hydraulic fluid must have the correct balance of cleanliness, materials, and additives for protection against wear of components, elevated viscosity and inclusion of air.

Essential information on the correct methods for treating hydraulic fluid is included in Danfoss publication 561 "Danfoss Guide to Systemic Contamination Control" available from your local Danfoss distributor. In this publication, filtration and cleanliness levels for extending the life of axial piston pumps and other system components are listed. Included is an excellent discussion of the selection of products needed to control fluid condition.

Application Data and Fluid Recommendations

Fluid Type	DIN/ISO Classification	Rated Pressure p _N (bar)	Maximum Speed (rev/min) ▲			Recommended Seal Material	Maximum Operating Temperature (°C)	Bearing Life
			130 & 180 cm ³	250 & 360 cm ³	500 & 750 cm ³			
Water Glycol ▲	HFC	250	1800	1500	1250	NBR	45	25-100%
HFDR (phosphate ester based)	HFDR	350	1500	1200	1000	FKM	60	100% ▲
HFDU (glycol based)	HFDU	350	1500	1200	1000	FKM	60	100% ▲
HFDU (ester based)	HFDU	350	1800	1500	1250	FKM	60	100% ▲
HEES (synthetic ester)	HEES	350	1800	1500	1250	FKM	60	100% ▲

▲ See general specifications for speed limitation depending on displacement.

▲ For HFC operation, bearing flushing is mandatory. Highest speed only recommended at optimized application conditions.

Use Model Code [21] = "C" for seal option, and contact your Danfoss Representative for validation.

Seal material can differ on an individual pump depending on specific seal function.

Bearing life with HFC fluid depends significantly on fluid temperature, cleanliness, quality, flushing and application parameters.

Typical values vary between 25% and 100% compared to mineral oil.

▲ Only fluids with fully saturated esters (iodine value <10) should be used.

HFDU and HEES fluids can be used at full ratings, but need to be monitored continuously to maintain quality and performance. The following important values should always be checked:

- Water content (<= 500 ppm)
- Fluid cleanliness (18/15/13 per ISO 4406)
- TAN value (no significant change from new oil)
- Viscosity (no significant change from new oil)
- Additives (no significant change from new oil)

Under harsh operation conditions, especially with regard to temperature and water content, ester-based HFDU and HFDR fluids are prone to hydrolysis, the resulting chemical processes and products of which could damage seals and other pump components. In general, the susceptibility to temperature and contamination is significantly higher than with standard mineral oils.

In line with Danfoss Germany GmbH T&C warranty conditions covering use of HFDR/HFDU/HEES fluids, fluid-related damage is excluded.

Case/Bearing Flushing

Case and bearing flushing are mandatory for HFC fluid operation, and recommended for all other conditions where the pump is operating for longer intervals at low pressure i.e. <20 bar (<300 psi) and/or low flow at high pressure (compensated mode).

Estimated Flushing Flow Values at 1500 rev/min Pump Size

(cm ³ /rev)	Flushing Flow (l/min)
130/180	4,5,5
250/360	7,5/11
500	15
750	20

Vertical Mounting

Vertical mounting of Hydrokraft pumps is possible, but venting and lubrication of shaft bearings can require special flushing and installation procedures. For details, please refer to the Hydrokraft Application Guideline Presentation available from your Danfoss Representative.

High pressure lubrication / Hydrostatic Balancing for Yoke Bearings (half-cup bearings)

High-pressure bearing lubrication and balancing (Model Code [21] = "K") is recommended for operating conditions with either high cycle frequencies (very short up/downstroke times) and/or where the swashplate is constantly maintained at a certain angle for long periods of time (compensated mode).



For details and additional information, please refer to the "Hydrokraft Application Guideline Presentation" available from your Danfoss Representative.

General Dimensions

PVW 130 Pumps

Options illustrated:

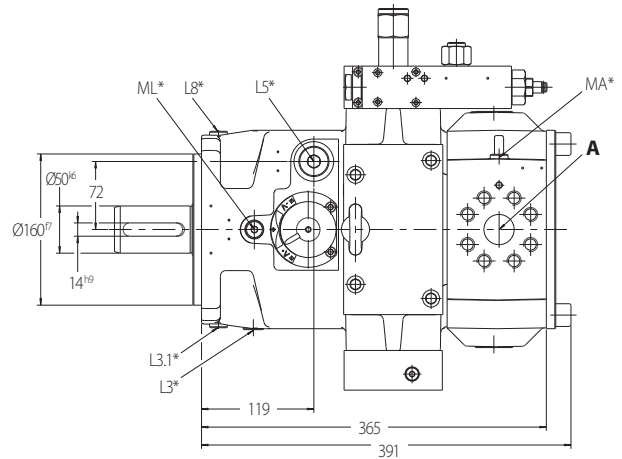
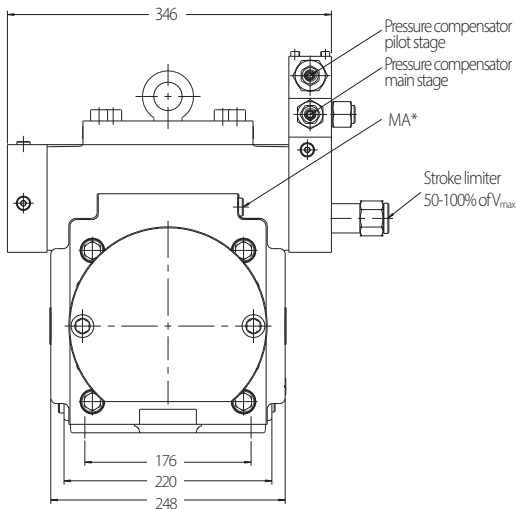
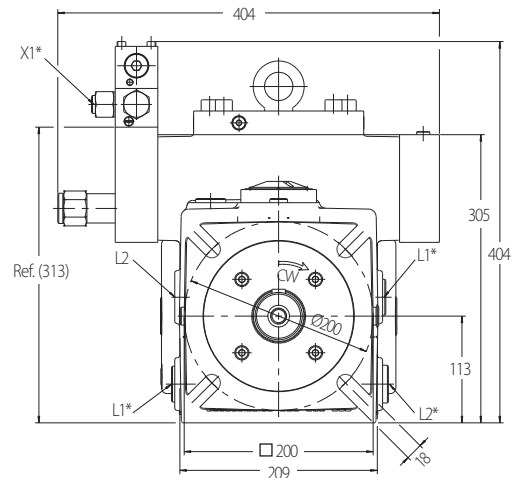
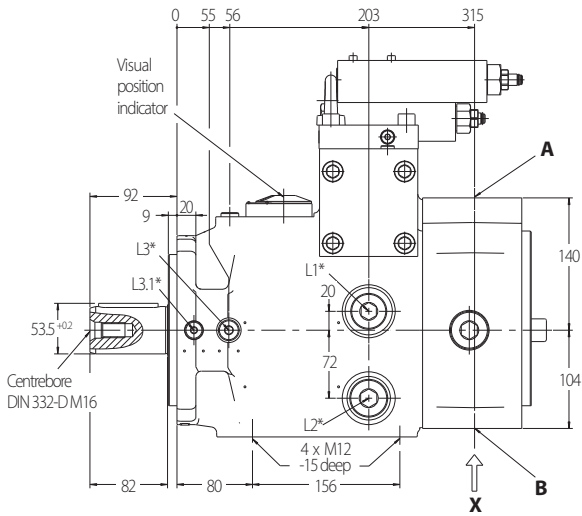
12 = **R** (clockwise rotation)

14|15 = **00** (no thru drive)

18|19 = **01** (ISO keyed shaft)

22 = **V** (visual indicator)

24|25 = **DF** control (pressure compensator)

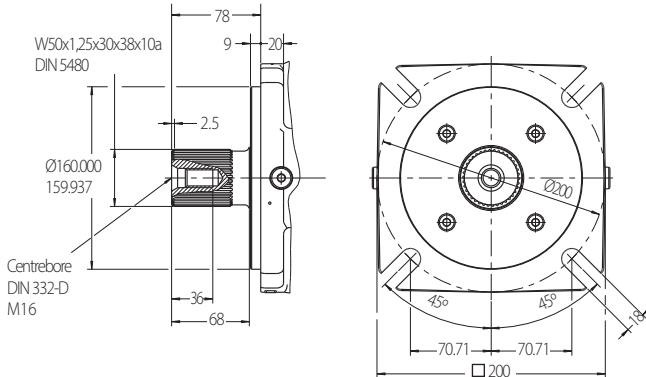


- A** - System pressure port ISO 6162-2 P32M (SAE J518 code 62, 1/4", 6000 psi)
- B** - Inlet port ISO 6162-1 P64M (SAE J518 code 62, 2 1/2", 500 psi)
- L1** - Drain port 1 3/16"-12 UNF-2B (depending on mounting position, use upper port)
- L2** - Drain port G1" (depending on mounting position, use upper port)
- L3** - Vent port for vertical mounting G 3/8" (shaft upward)
- L3.1** - Port G 1/4"

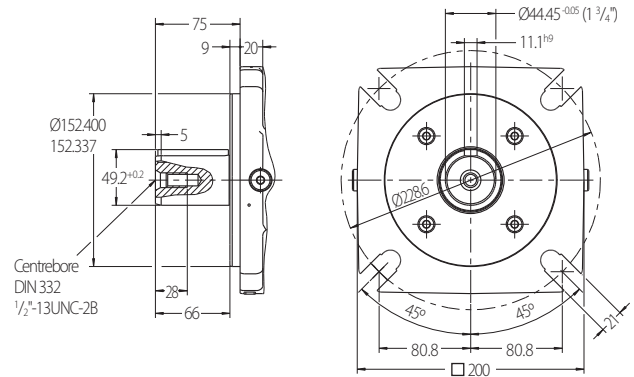
- L5** - Oil filling plug 1 1/16"-12 UNF-2B
- L8** - Air bleed port G 1/4"
- MA** - System pressure gauge port G 1/4"
- ML** - Case pressure gauge port G 1/4"
- X1** - Remote port pressure compensator G 1/4"-12.5 deep
- ...*** - Connection with plug

Shaft and Mounting Options PVW 130 Pumps

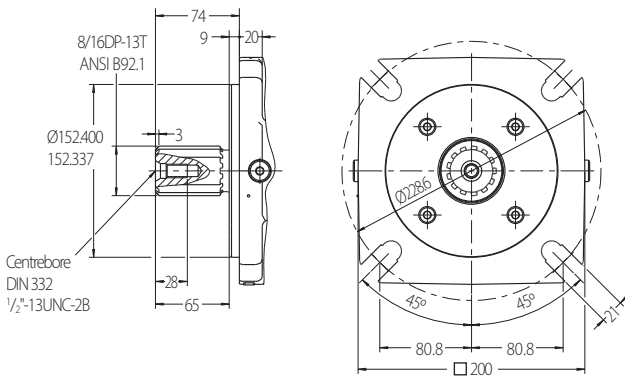
Mounting Flanges & Shaft Ends



ISO splined shaft: **10|11** = 05 & **18|19** = 02



SAE D keyed shaft: **10|11** = 0D & **18|19** = D1



SAE D splined shaft: **10|11** = 0D & **18|19** = D2

Main Ports



General Dimensions

PVW 180 Pumps

Options illustrated:

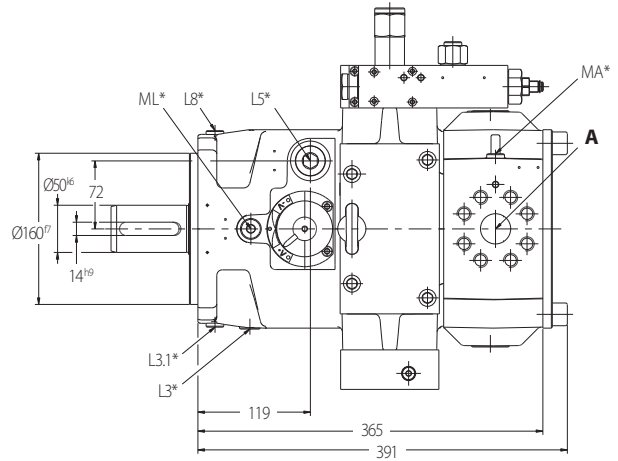
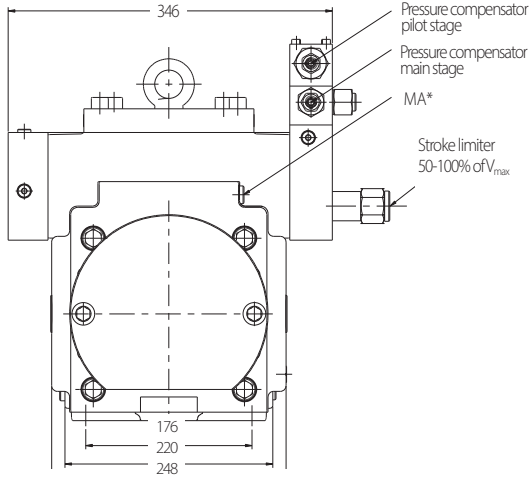
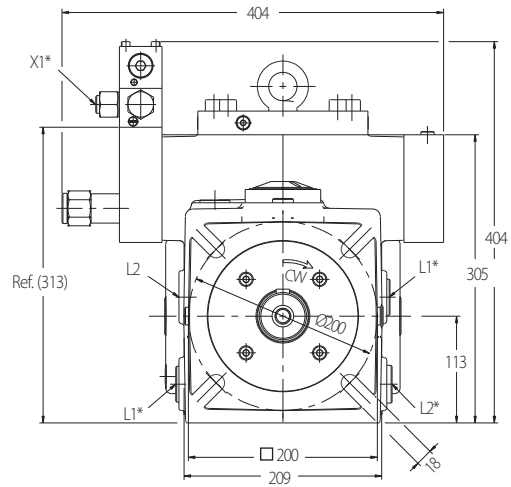
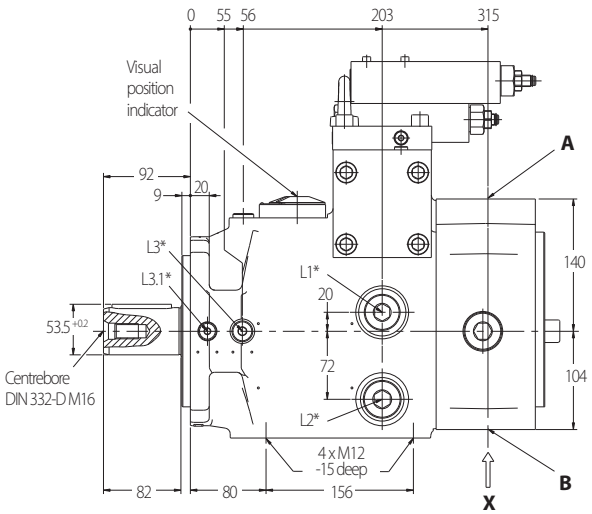
12 = **R** (clockwise rotation)

1415 = **00** (no thru drive)

1819 = **01** (ISO keyed shaft)

22 = **V** (visual indicator)

2425 = **DF** control (pressure compensator)

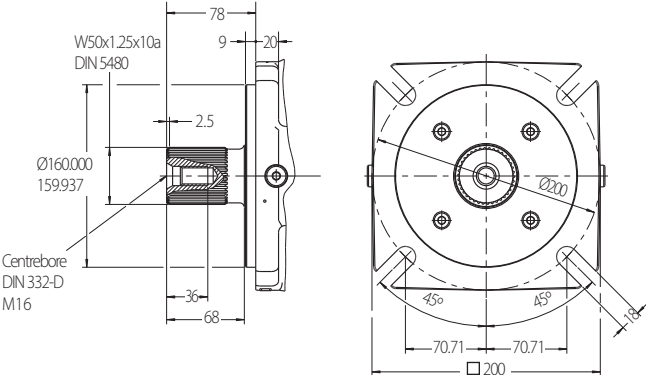


- A** - System pressure port ISO 6162-2 P32M (SAE J518 code 62, 1/4", 6000 psi)
- B** - Inlet port ISO 6162-1 P64M (SAE J518 code 62, 2 1/2", 500 psi)
- L1** - Drain port 1 3/16"-12 UNF-2B (depending on mounting position, use upper port)
- L2** - Drain port G1" (depending on mounting position, use upper port)
- L3** - Vent port for vertical mounting G 3/8" (shaft upward)
- L3.1** - Port G 1/4"

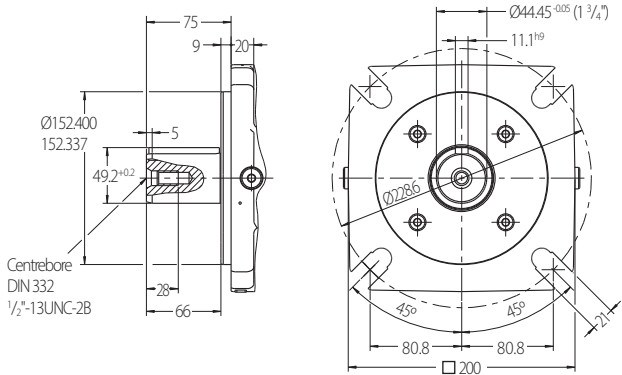
- L5** - Oil filling plug 1 1/16"-12 UNF-2B
- L8** - Air bleed port G 1/4"
- MA** - System pressure gauge port G 1/4"
- ML** - Case pressure gauge port G 1/4"
- X1** - Remote port pressure compensator G 1/4"-12.5 deep
- ...*** - Connection with plug

Shaft and Mounting Options PVW 180 Pumps

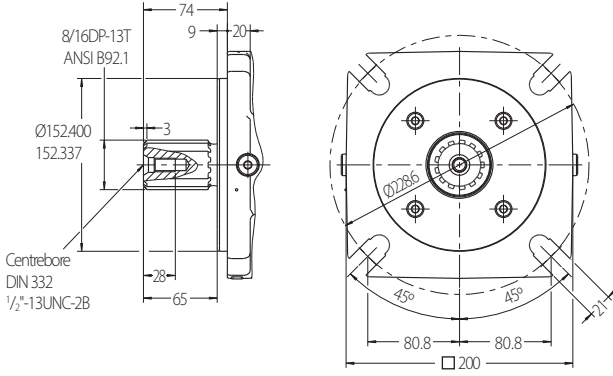
Mounting Flanges and Shaft Ends



ISO splined shaft: **10|11** = 05 & **18|19** = 02

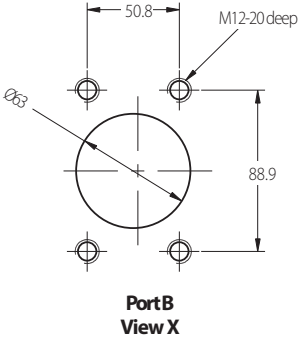
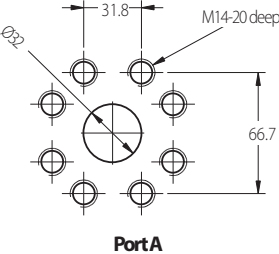


SAE D keyed shaft: **10|11** = 0D & **18|19** = D1



SAE D splined shaft: **10|11** = 0D & **18|19** = D2

Main Ports



General Dimensions

PVW 250 Pumps

Options illustrated:

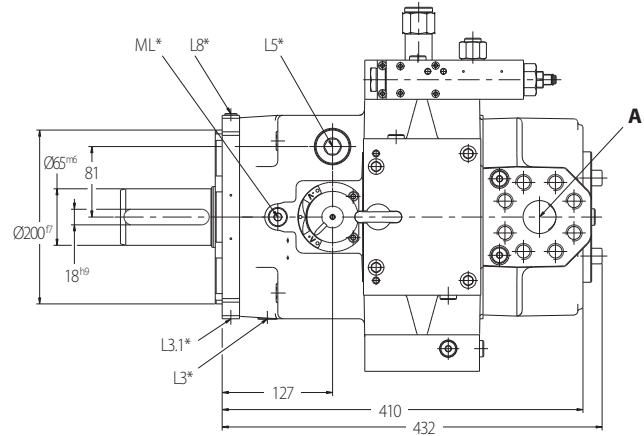
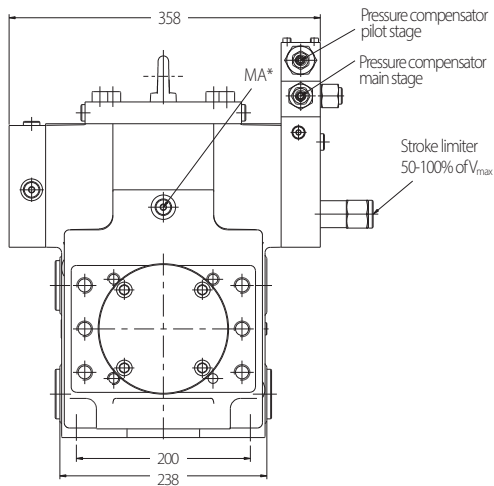
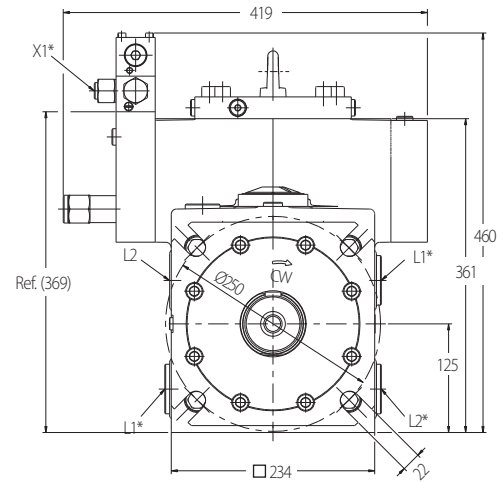
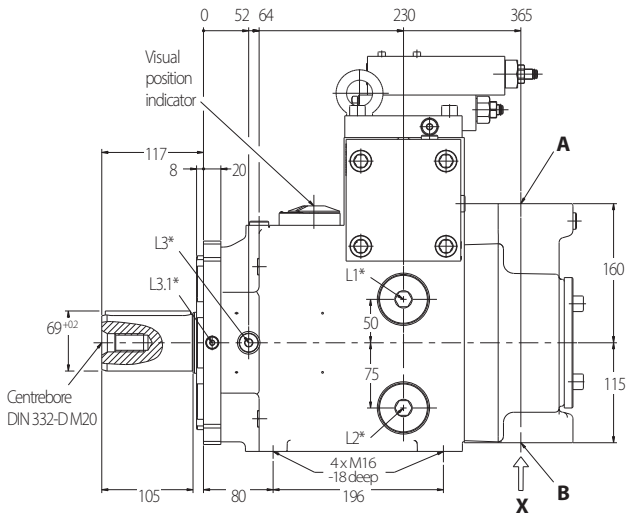
12 = **R** (clockwise rotation)

14|15 = **00** (no thru drive)

18|19 = **01** (ISO keyed shaft)

22 = **V** (visual indicator)

24|25 = **DF** control (pressure compensator)

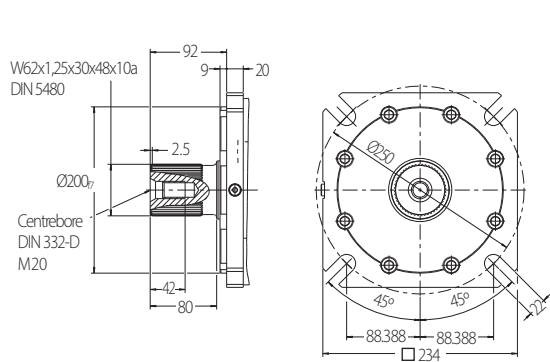


- A** - System pressure port ISO 6162-2 P38M (SAE J518 code 62, 1 1/2", 6000 psi)
- B** - Inlet pressure port ISO 6162-1 P89M (SAE J518 code 61, 3 1/2", 500 psi)
- L1** - Drain port 1 3/8"-12 UNF-2B (depending on mounting position, use upper port)
- L2** - Drain port G1 1/4" (depending on mounting position, use upper port)
- L3** - Vent port for vertical mounting G 3/8" (shaft upward)
- L3.1** - Port G 1/8"

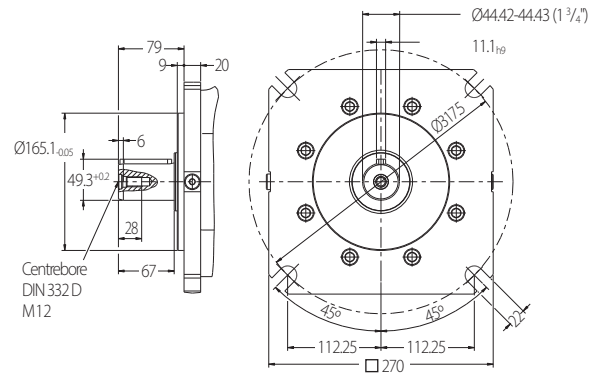
- L5** - Oil filling plug 1 1/16"-12 UNF-2B
- L8** - Air bleed port G 1/4"
- MA** - System pressure gauge port G 1/4"
- ML** - Case pressure gauge port G 1/4"
- X1** - Remote port pressure compensator G 1/4"-12.5 deep
- ...*** - Connection with plug

Shaft and Mounting Options PVW 250 Pumps

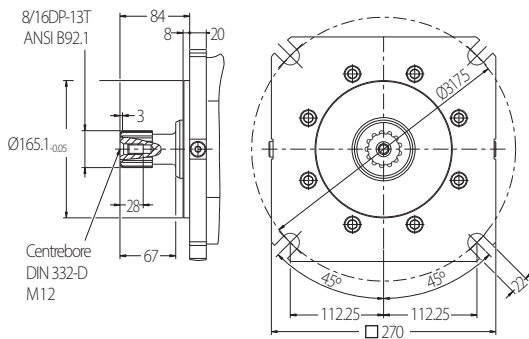
Mounting Flanges and Shaft Ends



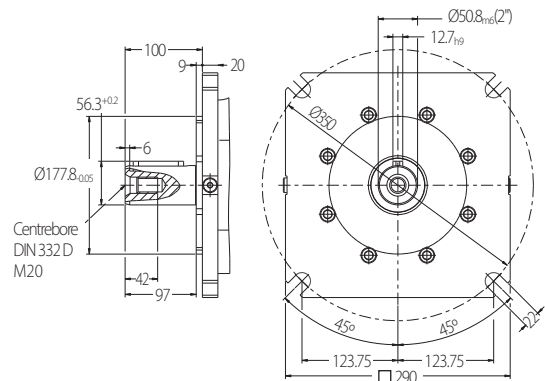
ISO splined shaft: **10|11 = 07 & 18|19 = 02**



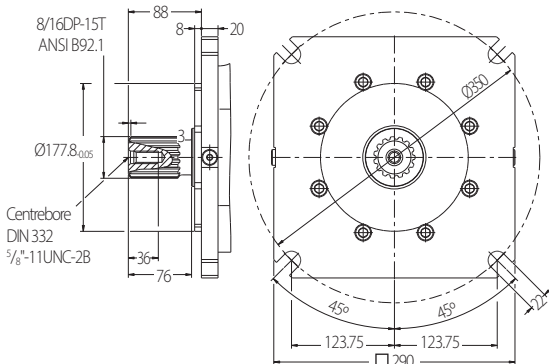
SAE E keyed shaft: **10|11 = 0E & 18|19 = E1**



SAE E splined shaft: **10|11 = 0E & 18|19 = E2**

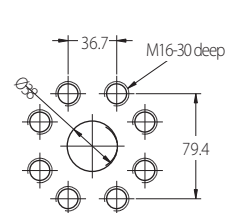


SAE F keyed shaft: **10|11 = 0F & 18|19 = F1**

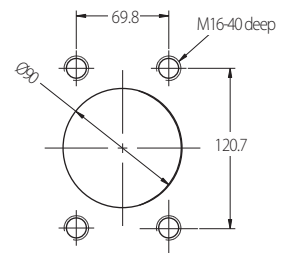


SAE F splined shaft: **10|11 = 0F & 18|19 = F2**

Main Ports



Port A



Port B
View X

General Dimensions

PVW 360 Pumps

Options illustrated:

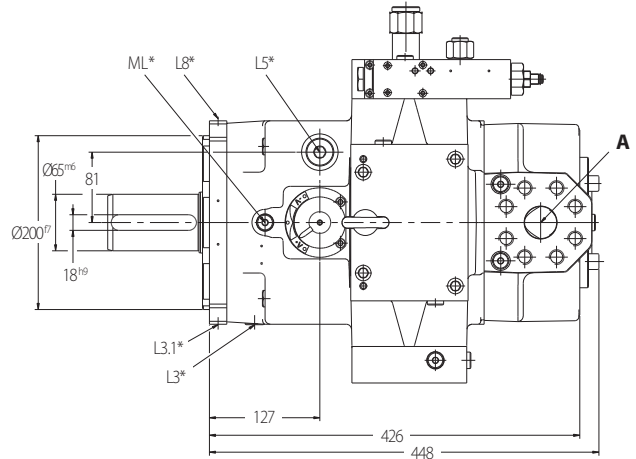
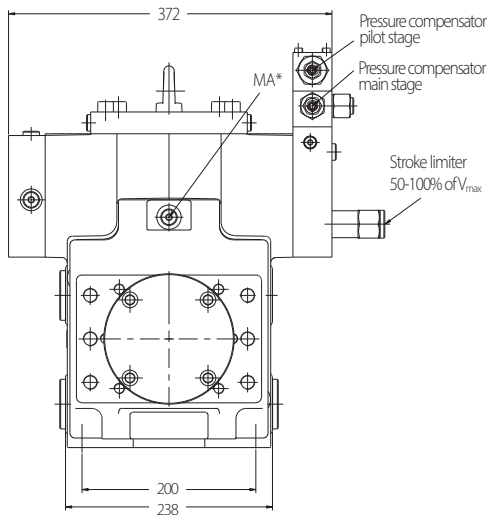
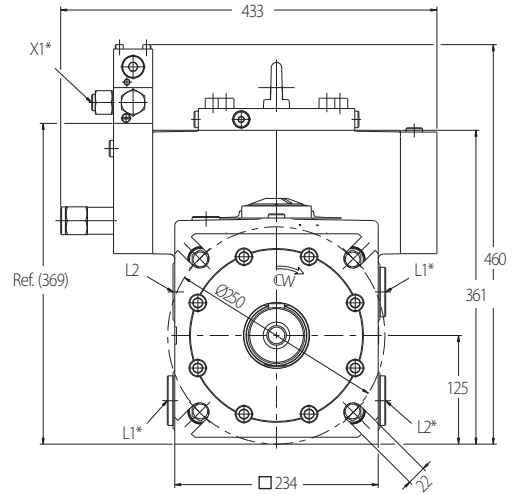
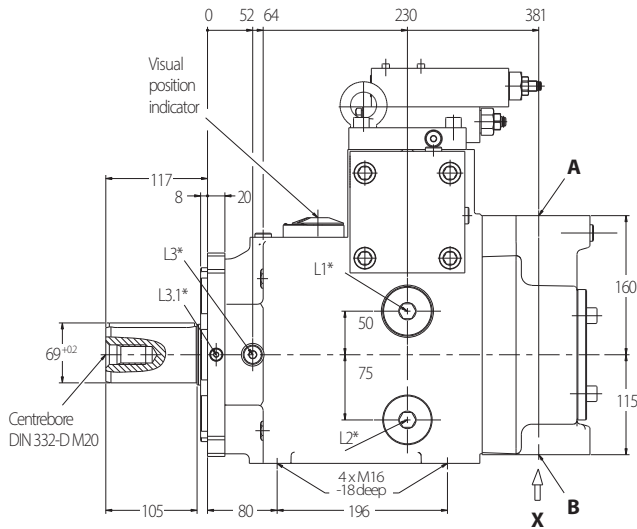
12 = **R** (clockwise rotation)

14|15 = **00** (no thru drive)

18|19 = **01** (ISO keyed shaft)

22 = **V** (visual indicator)

24|25 = **DF** control (pressure compensator)

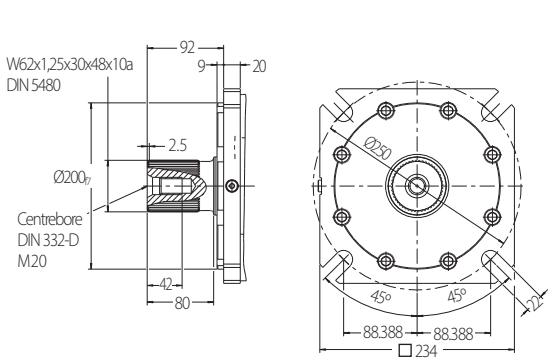


- A** - System pressure port ISO 6162-2 P38M (SAE J518 code 62, 1 1/2", 6000 psi)
- B** - Inlet pressure port ISO 6162-1 P89M (SAE J518 code 61, 3 1/2", 500 psi)
- L1** - Drain port 1 5/8"-12 UNF-2B (depending on mounting position, use upper port)
- L2** - Drain port G1 1/4" (depending on mounting position, use upper port)
- L3** - Vent port for vertical mounting G3/8" (shaft upward)
- L3.1** - Port G1/8"

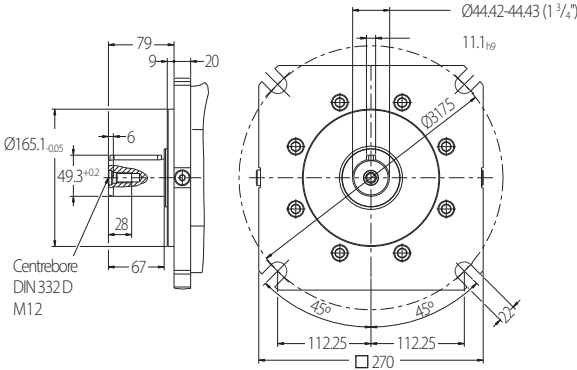
- L5** - Oil filling plug 1 1/16"-12 UNF-2B
- L8** - Air bleed port G1/4"
- MA** - System pressure gauge port G1/4"
- ML** - Case pressure gauge port G1/4"
- X1** - Remote port pressure compensator G1/4"-12.5 deep
- ...*** - Connection with plug

Shaft and Mounting Options PVW 360 Pumps

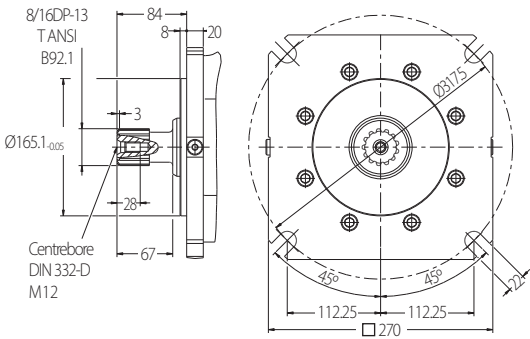
Mounting Flanges and Shaft Ends



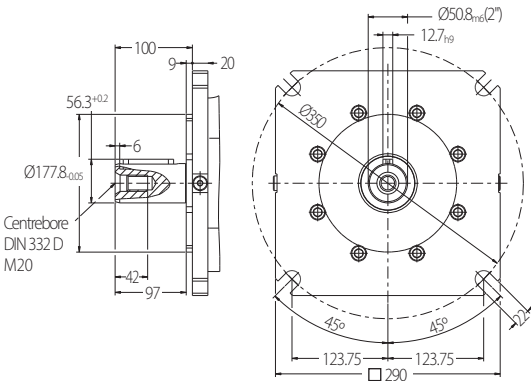
ISO splined shaft: **10|11 = 07 & 18|19 = 02**



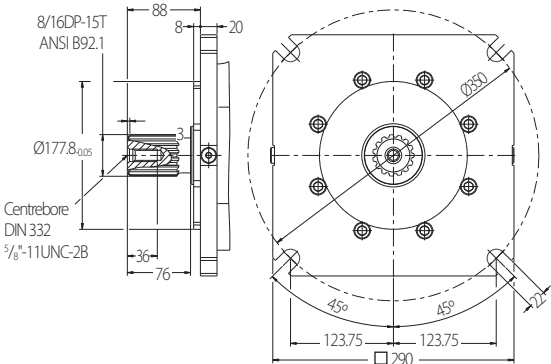
SAE E keyed shaft: **10|11 = 0E & 18|19 = E1**



SAE E splined shaft: **10|11 = 0E & 18|19 = E2**

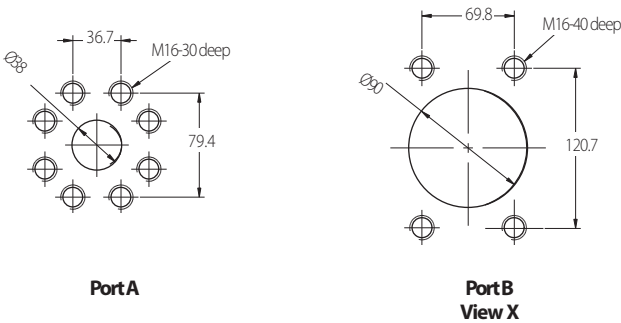


SAE F keyed shaft: **10|11 = 0F & 18|19 = F1**



SAE F splined shaft: **10|11 = 0F & 18|19 = F2**

Main Ports



General Dimensions

PVW 500 Pumps

Options illustrated:

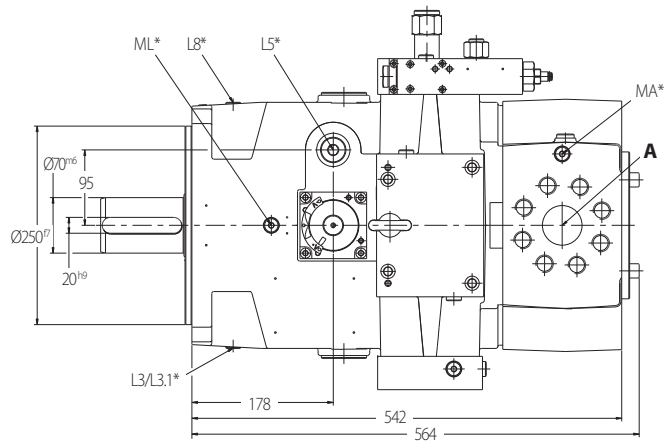
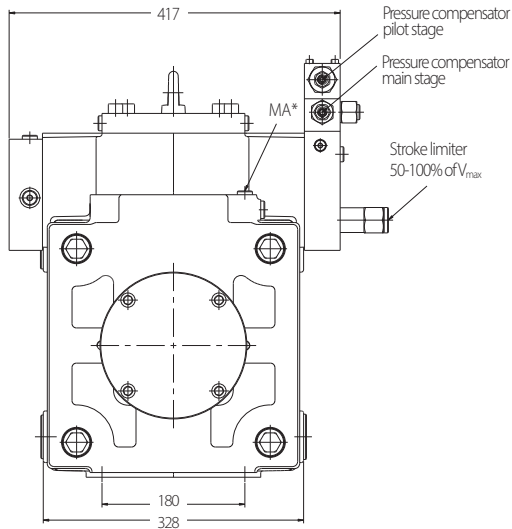
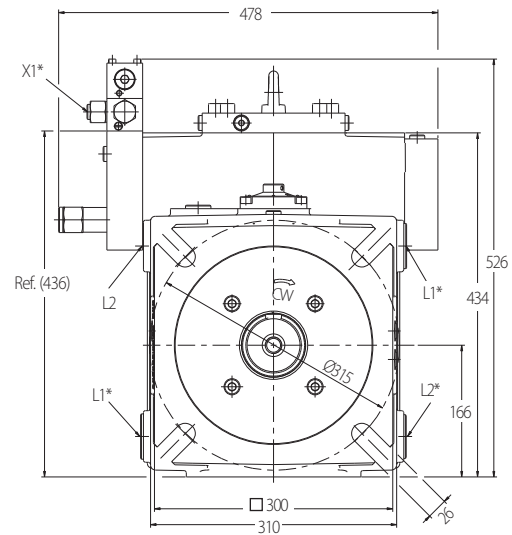
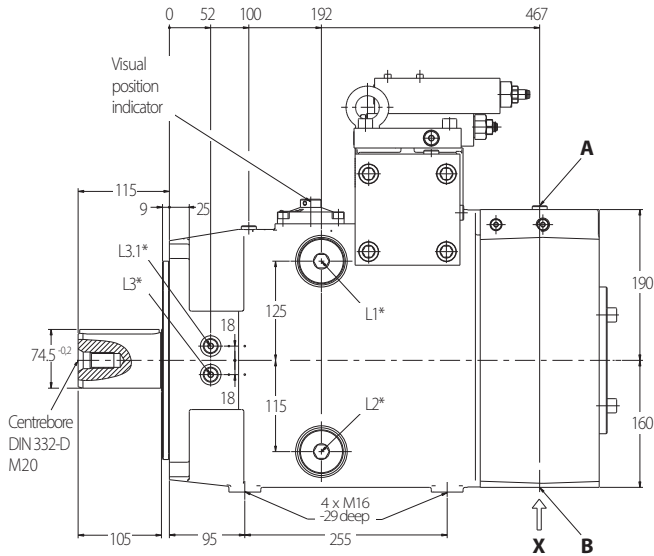
12 = **R** (clockwise rotation)

1415 = **00** (no thru drive)

1819 = **01** (ISO keyed shaft)

22 = **V** (visual indicator)

2425 = **DF** control (pressure compensator)

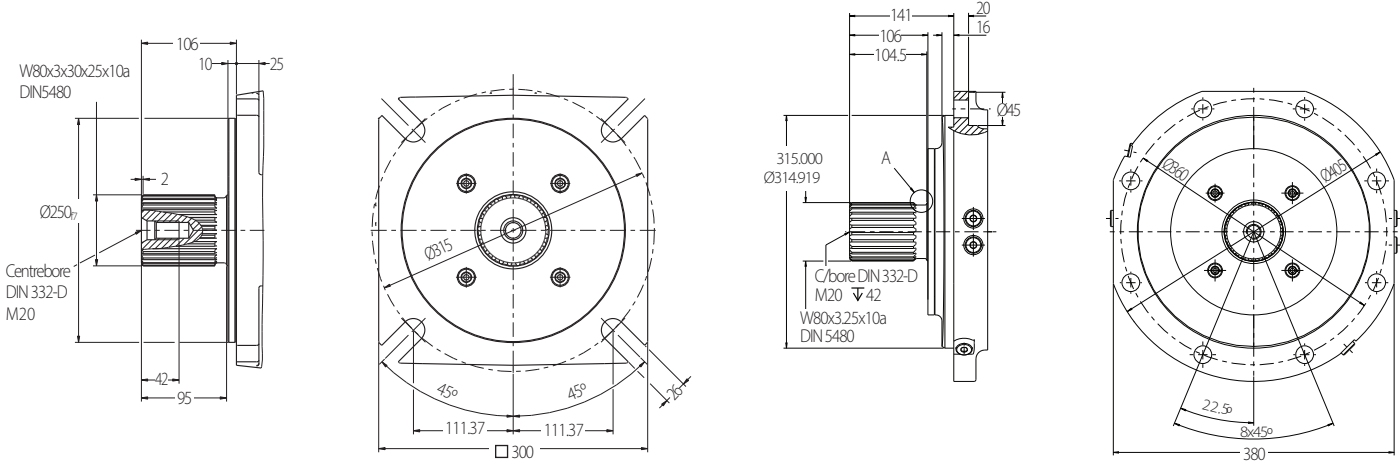


- A** - System pressure port ISO 6162-2 P51M (SAE J518 code 62, 2", 6000 psi)
- B** - System pressure port ISO 6162-1 P127M (SAE J518 code 61, 5", 500 psi)
- L1** - Drain port 1 5/8"-12 UNF-2B (depending on mounting position, use upper port)
- L2** - Drain port G1 1/2" (depending on mounting position, use upper port)
- L3** - Vent port for vertical mounting G 3/8" (shaft upward)
- L3.1** - Port G 3/8"

- L5** - Oil filling plug 1 1/16"-12 UNF-2B
- L8** - Air bleed port G 1/4"
- MA** - System pressure gauge port G 1/4"
- ML** - Case pressure gauge port G 1/4"
- X1** - Remote port pressure compensator G 1/4"-12.5 deep
- ...*** - Connection with plug

Shaft and Mounting Options PVW 500 Pumps

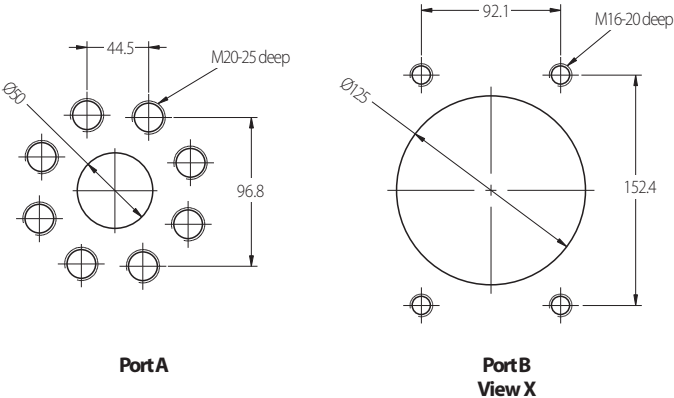
Mounting Flanges and Shaft Ends



ISO splined shaft: $\boxed{10|11} = 08$ & $\boxed{18|19} = 02$

ISO special splined shaft: $\boxed{10|11} = 09$ & $\boxed{18|19} = 05$

Main Ports



General Dimensions

PVW 750 Pumps

Options illustrated:

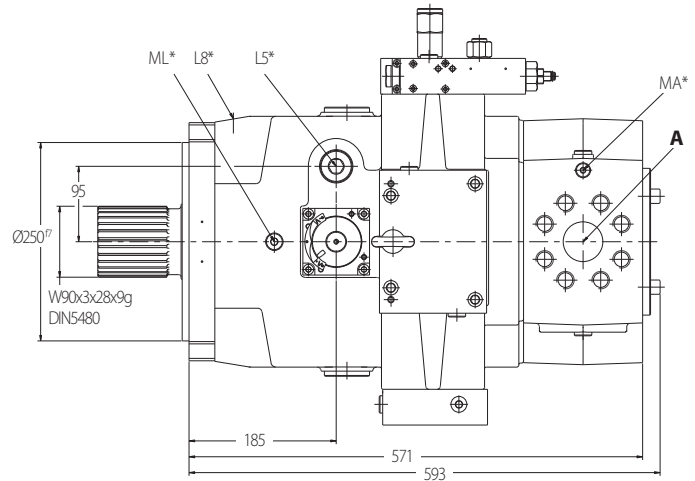
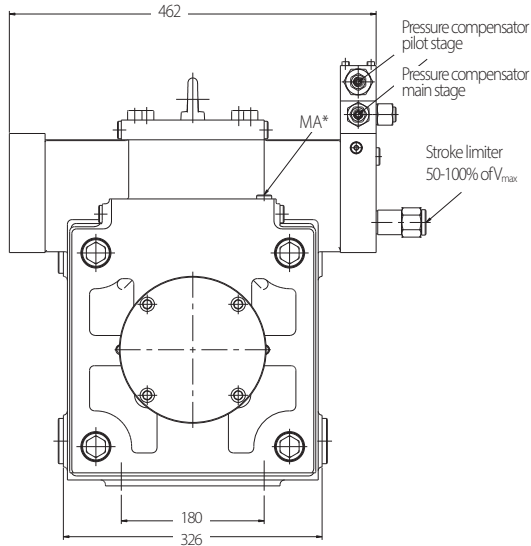
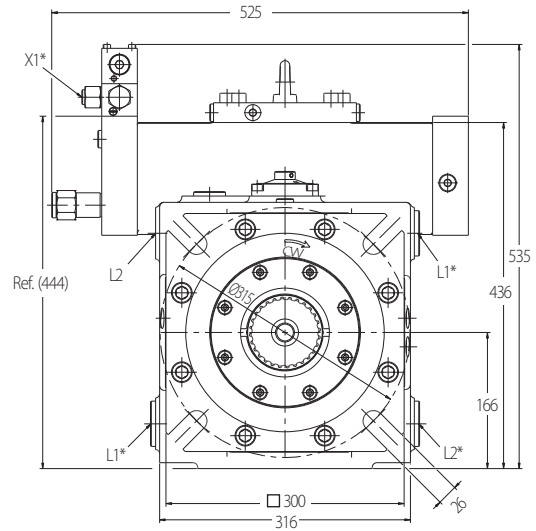
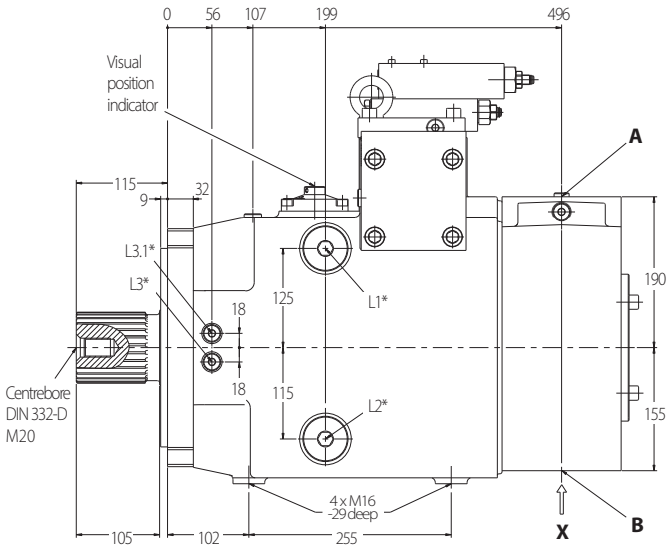
12 = **R** (clockwise rotation)

14|15 = **00** (no thru drive)

18|19 = **02** (ISO splined shaft)

22 = **V** (visual indicator)

24|25 = **DF** control (pressure compensator)



- A** - System pressure port ISO 6162-2 P51M (SAE J518 code 62, 2", 6000 psi)
- B** - System pressure port ISO 6162-1 P127M (SAE J518 code 61, 5", 500 psi)
- L1** - Drain port 1 3/8"-12 UNF-2B (depending on mounting position, use upper port)
- L2** - Drain port G1 1/2" (depending on mounting position, use upper port)
- L3** - Vent port for vertical mounting G3/8" (shaft upward)
- L3.1** - Port G3/8"

- L5** - Oil filling plug 1 1/16"-12 UNF-2B
- L8** - Air bleed port G1/4"
- MA** - System pressure gauge port G1/4"
- ML** - Case pressure gauge port G1/4"
- X1** - Remote port pressure compensator G1/4"-12.5 deep
- ...*** - Connection with plug

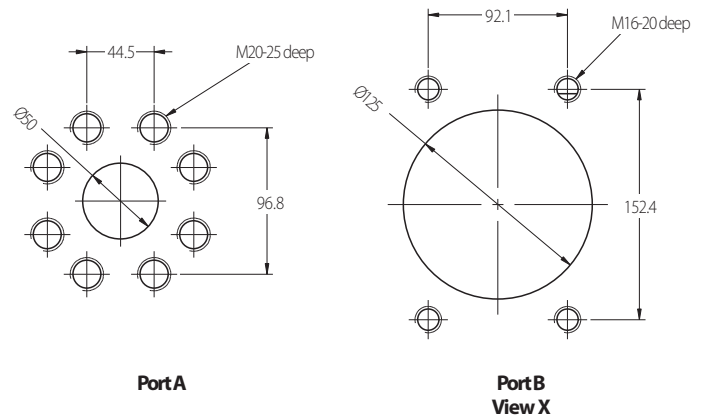
Shaft and Mounting Options PVW 750 Pumps

Mounting Flanges and Shaft Ends

ISO splined shaft: $\boxed{10|11} = 08$ & $\boxed{18|19} = 02$

as illustrated on the previous page is the only arrangement suitable for Hydrokraft pumps PVW 750.

Main Ports



Control Options DF & LR

General Description

Energy-saving hydraulic drives are possible with pressure compensated and/or power controlled pumps, especially in combination with the loadsensing option.

DF Controls

System pressure remains constant for the entire volume flow rate. System pressure can be set manually, hydraulically or electronically.

The standard Hydrokraft pressure compensator is pilot operated, has a remote port and is very stable.

LR Controls

The typical p/Q curve is a hyperbola. For constant speed, the drive torque, i.e. the power used, is held constant.

The power hyperbola can be continuously adjusted between P_{min} and P_{max} . P_{min} is given by the minimum setting of the control main stage (20 bar approx.) and power loss of the pump.

Both controller types can be combined with another or with additional options; for available options, see Model Code.

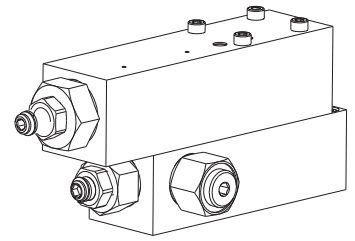
Maximum pump flow can be limited mechanically to between 50% and 100% by a screw.

As an additional option, maximum (or minimum) flow can also be limited by a spacer inside the control cylinder (Model Code position , options **4**, **5** or **6**, in combination with customer adjustment specified in positions to).

This solution is also recommended for severe operating conditions and the need for high repeatability over a long period of time. The setting must be defined before ordering since it cannot be modified in operation.

Control Options DF

For pump details, see general Installation Dimensions.



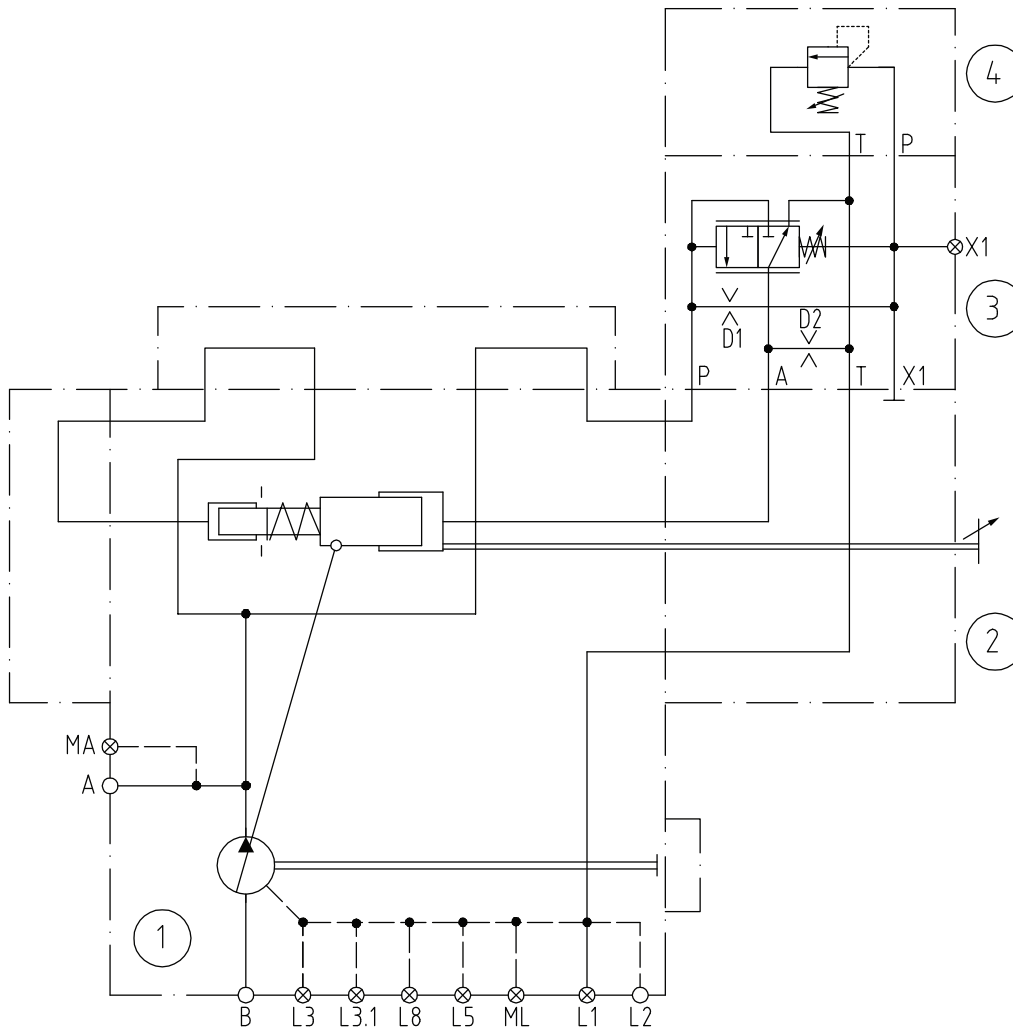
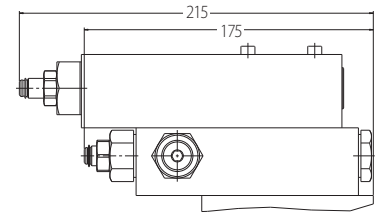
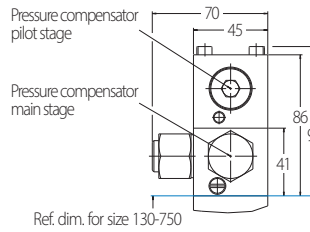
DF000A0

Options illustrated:

24 25 = **DF** (pressure compensator)

29 = **A** (yoke angle 1 side of centre)

For pump details, see general Installation Dimensions.

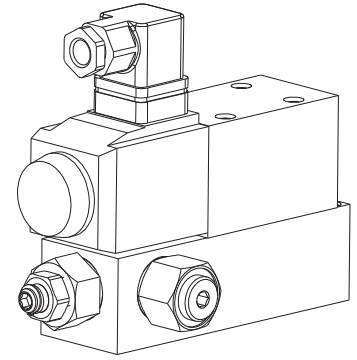


- A** - Systemport
- B** - Inlet port
- L1, L2** - Drain port
- L3** - Vent port for vertical mounting
- L3.1, L8** - Air bleed port
- L5** - Oil filling plug
- MA** - Gauge port, system pressure
- ML** - Gauge port, case pressure
- X1** - Remote port pressure compensator

- 1** - Basic pump
- 2** - Connection plate for DF-control
- 3.1** - Pressure compensator, main stage
- 3.2** - Pressure compensator, pilot stage

Control Options DF (cont.)

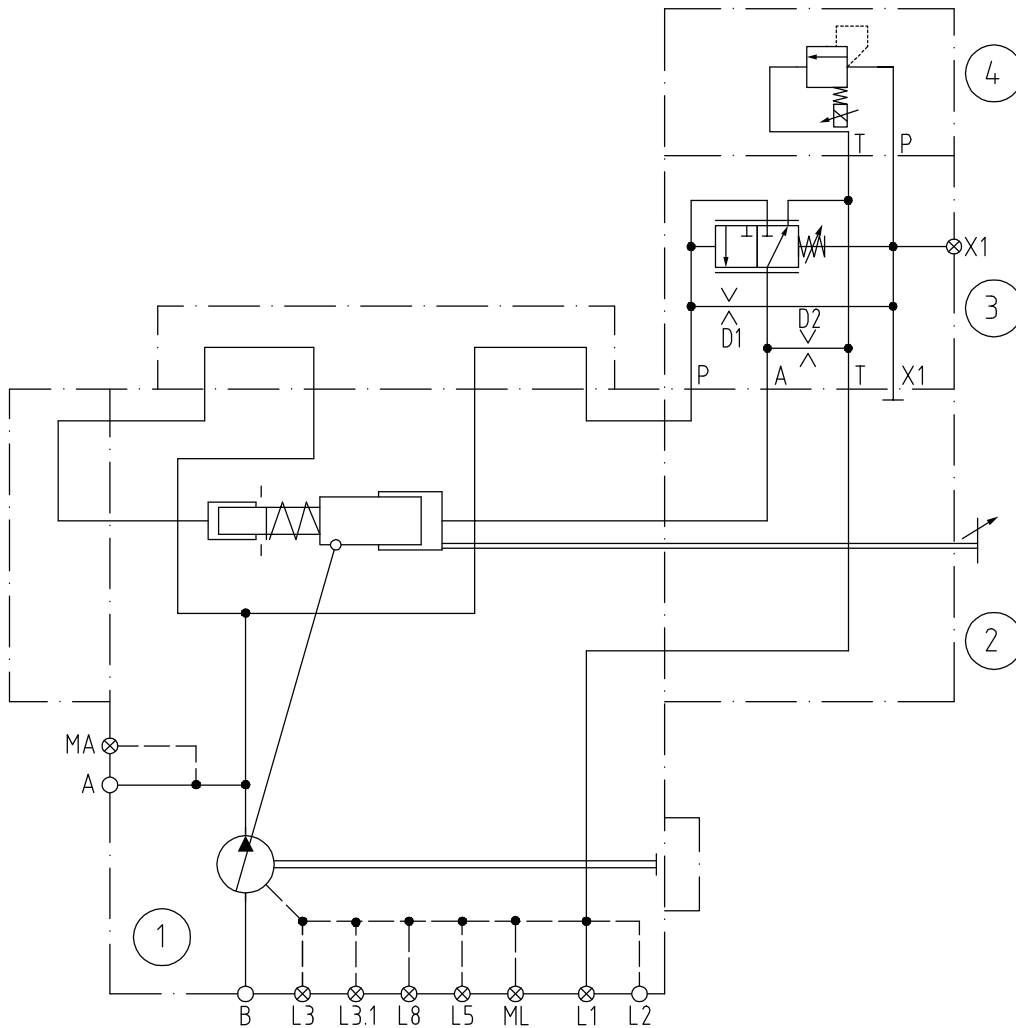
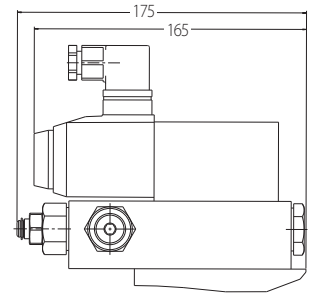
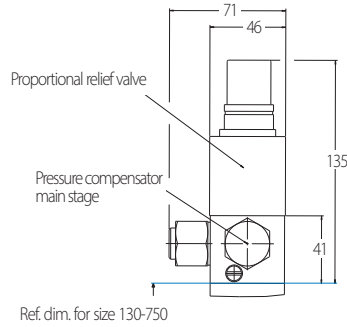
For pump details, see general Installation Dimensions.



DF000A0K

Options illustrated:

- 24,25 = **DF** (pressure compensator)
- 29 = **A** (yoke angle 1 side of centre)
- 31 = **K** (proportional relief valve)

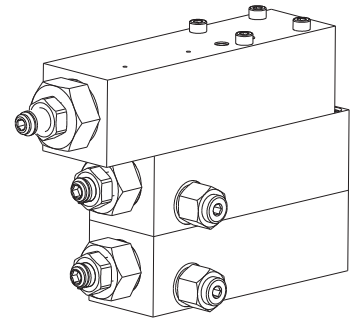


- A** - Systemport
- B** - Inlet port
- L1,L2** - Drain port
- L3** - Vent port for vertical mounting
- L3.1,L8** - Air bleed port
- L5** - Oil filling plug
- MA** - Gauge port, system pressure
- ML** - Gauge port, case pressure
- X1** - Remote port pressure compensator

- 1** - Basic pump
- 2** - Connection plate for DF-control
- 3** - Pressure compensator, I main stage
- 4** - Proportional relief valve

Control Options DF (cont.)

For pump details, see general Installation Dimensions.



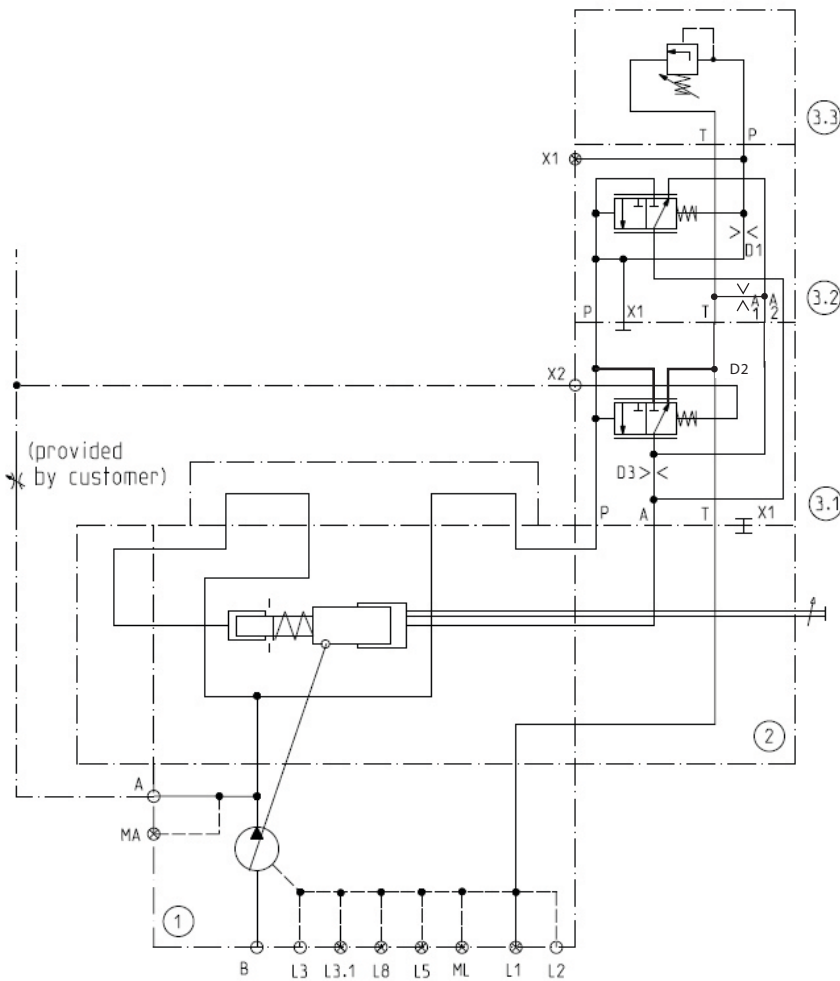
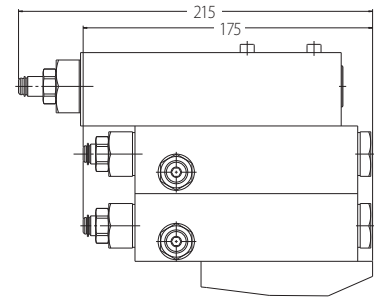
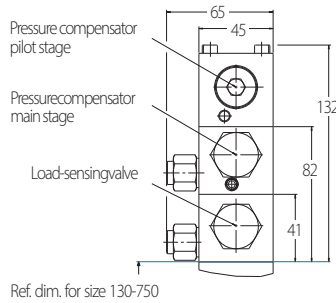
DF000A1

Options illustrated:

24 25 = DF (pressure compensator)

29 = A (yoke angle 1 side of centre)

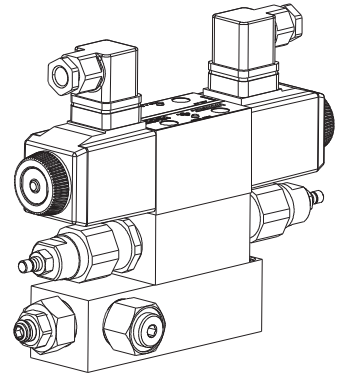
30 = 1 (load sensing)



- A, B** - Systemport
 - L1, L2** - Drain port
 - L3** - Port for front bearing flushing (vent port for vertical mounting)
 - L3.1, L8** - Air bleed port
 - L5** - Oil filling plug
 - MA** - Gauge port, system pressure
 - ML** - Gauge port, case pressure
 - X1** - Remote port pressure limiter override G_{1/4}
 - X2** - Remote port, load sense
-
- 1** - Basic pump
 - 2** - Connection plate for DF-control
 - 3.1** - Pressure limiter override, load sense stage
 - 3.2** - Pressure limiter override, lmain stage
 - 3.3** - Pressure limiter override, pilot stage

Control Options DF (cont.)

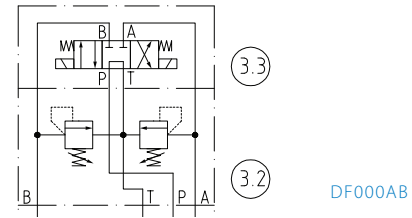
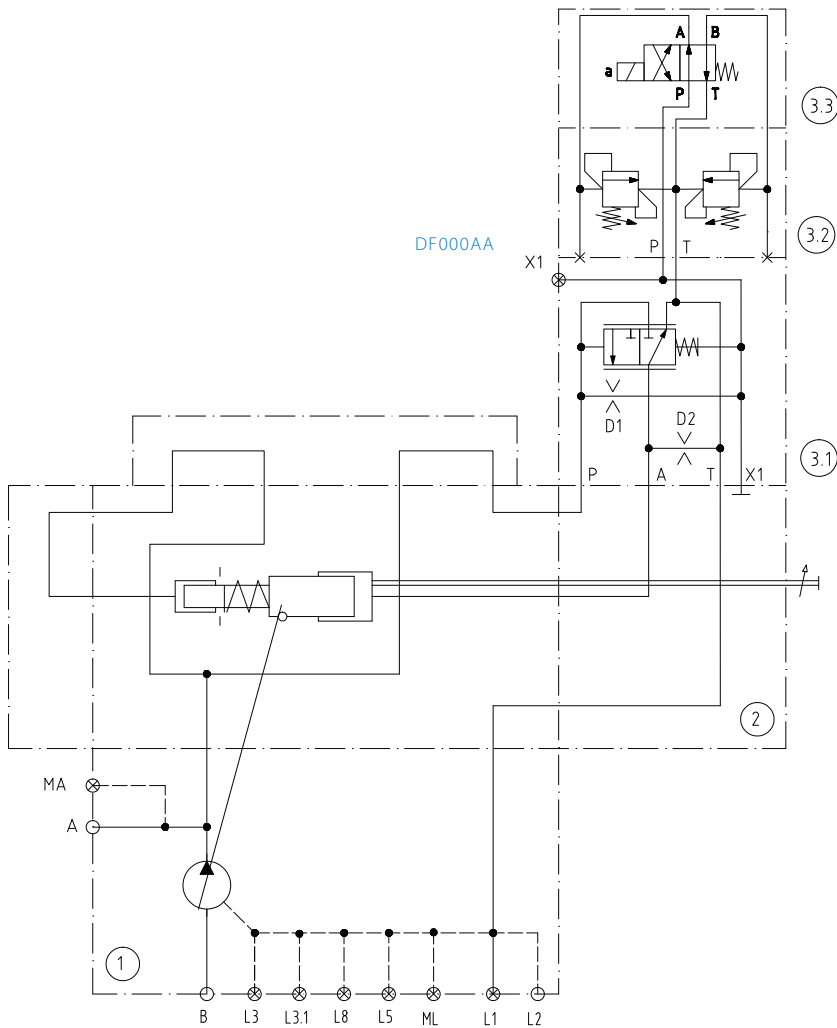
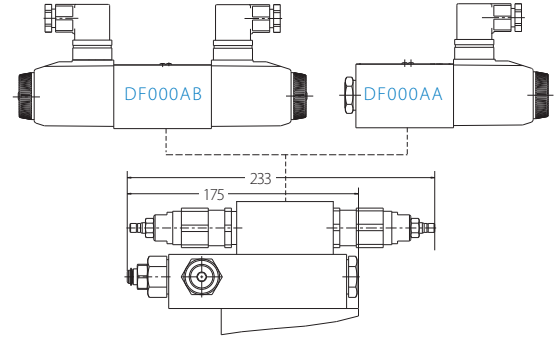
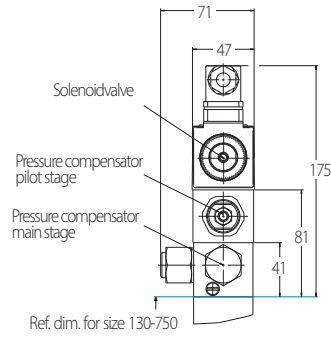
For pump details, see general Installation Dimensions.



DF000AA/DF000AB

Options illustrated:

- 24 25 = DF (pressure compensator)
- 29 = A (yoke angle 1 side of centre)
- 30 = A or B (2-level pressure compensator)

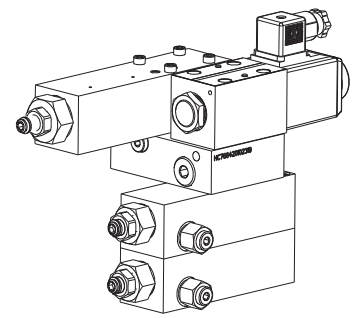


- A, B** – Systemport
- L1, L2** – Drain port
- L3** – Vent port for vertical mounting
- L3.1, L8** – Air bleed port
- L5** – Oil filling plug
- MA** – Gauge port, system pressure
- ML** – Gauge port, case pressure
- X1** – Remote port pressure limiter override G¹/₄

- 1** – Basic pump
- 2** – Connection plate for DF-control
- 3.1** – Pressure limiter override, main stage
- 3.2** – Double relief stack valve
- 3.3** – Solenoid valve
- 3.4** – 4/3 directional valve

Control Options DF (cont.)

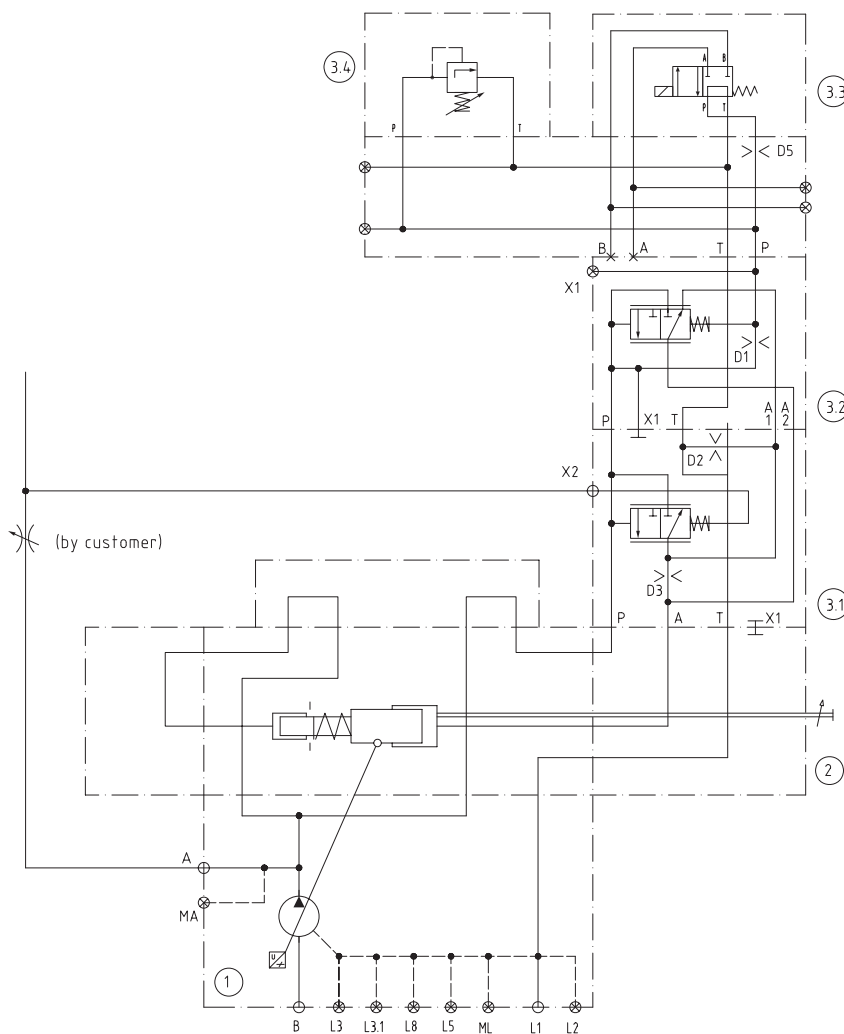
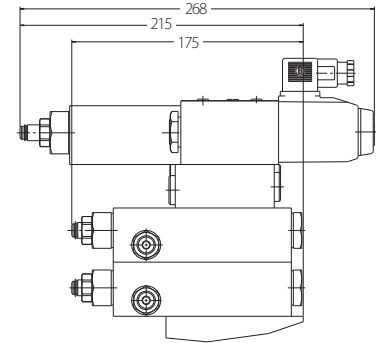
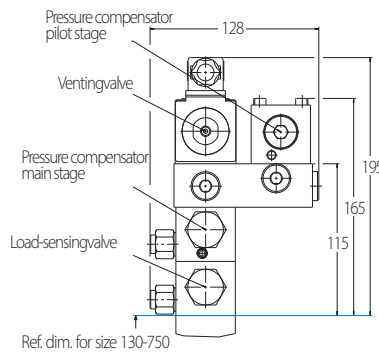
For pump details, see general Installation Dimensions.



DF000A1-100H

Options illustrated:

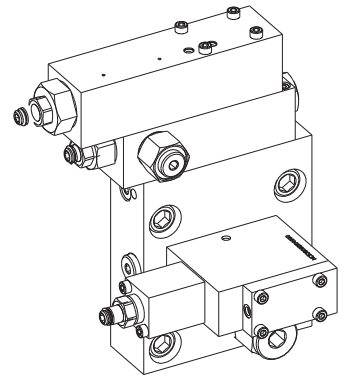
- 24 25 = **DF** (pressure compensator)
- 29 = **A** (yoke angle 1 side of centre)
- 30 = **1** (load sensing)
- 36 = **1** (venting valve)
- 39 = **H** (24V DC)



- A, B** - Systemport
 - L1, L2** - Drain port
 - L3** - Vent port for vertical mounting
 - L3.1, L8** - Air bleed port
 - L5** - Oil filling plug
 - MA** - Gauge port, systempressure
 - ML** - Gauge port, case pressure
 - X1** - Remote port pressure limiter override G_{1/4}
 - X2** - Remote portload sense
-
- 1** - Basic pump
 - 2** - Connection plate for DF-control
 - 3.1** - Pressure limiter override, load sense stage
 - 3.2** - Pressure limiter override, main stage
 - 3.3** - Venting valve
 - 3.4** - Pressure limiter override, pilot stage

Control Options LR

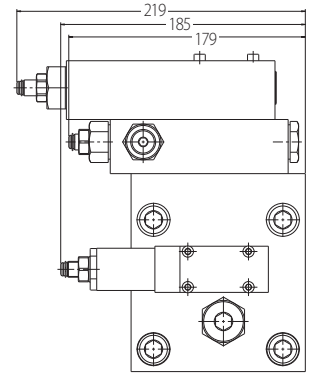
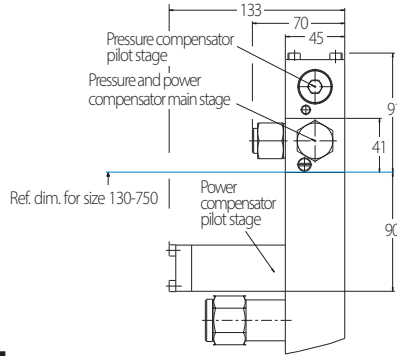
For pump details, see general Installation Dimensions.



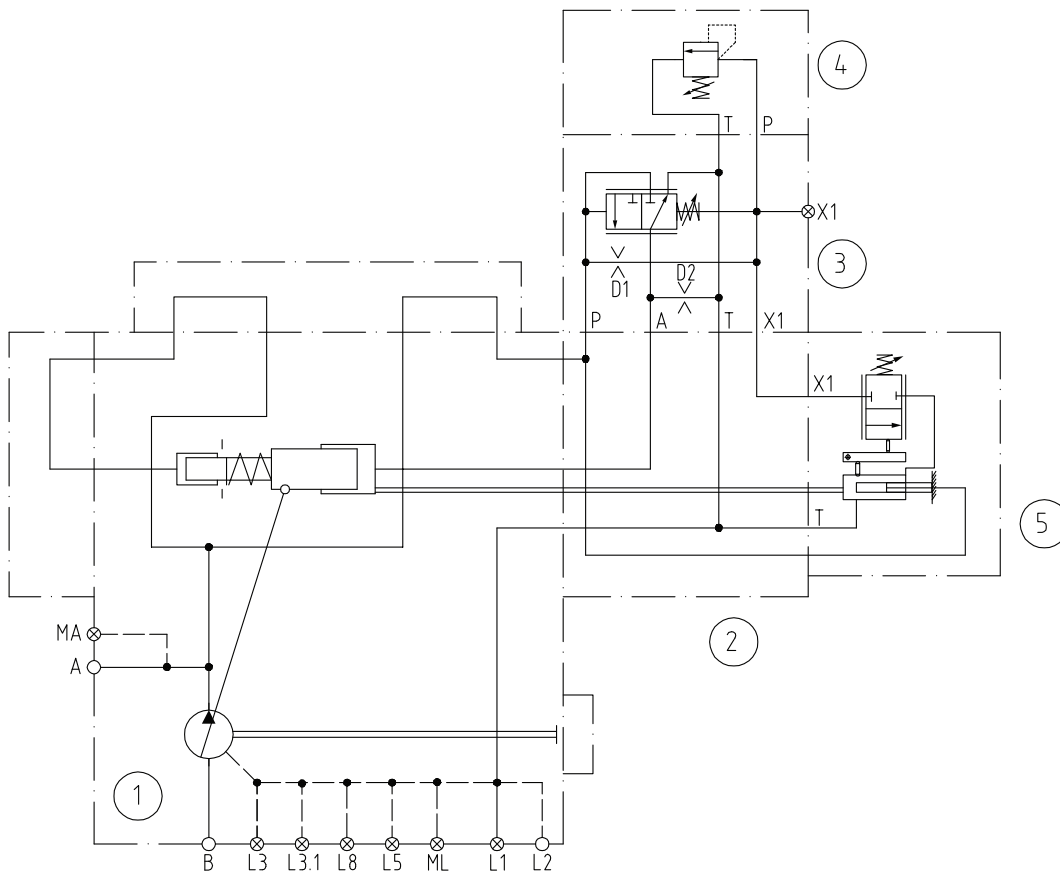
LR00A20

Options illustrated:

- 2425 = **LR** (power control)
- 29 = **A** (yoke angle 1 side of centre)
- 30 = **2** (pressure limiter)
- 31 = **0** (standard)



Pump Size	130	180	250	360	500	750
Total Width (mm)	451	451	446	484	505	574
LR Control Type	A20	215	215	219	219	219
	A2F	188	188	185	185	185
	A30	215	215	219	219	219

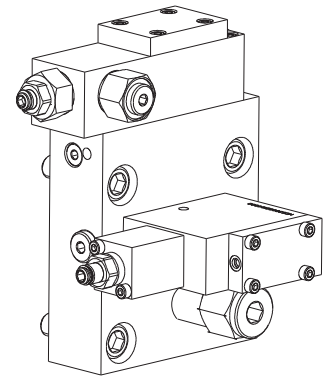


- A** - System port
- B** - Inlet port
- L1, L2** - Drain port
- L3** - Vent port for vertical mounting
- L3.1, L8** - Air bleed port
- L5** - Oil filling plug
- MA** - Gauge port, system pressure
- ML** - Gauge port, case pressure
- X1** - Remote port pressure compensator

- 1** - Basic pump
- 2** - Connection plate for LR-control
- 3** - Pressure and power compensator, main stage
- 4** - Pressure compensator, pilot stage
- 5** - Power compensator, pilot stage

Control Options LR (cont.)

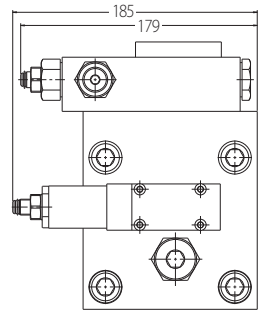
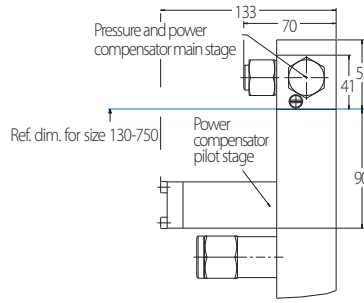
For pump details, see general Installation Dimensions.



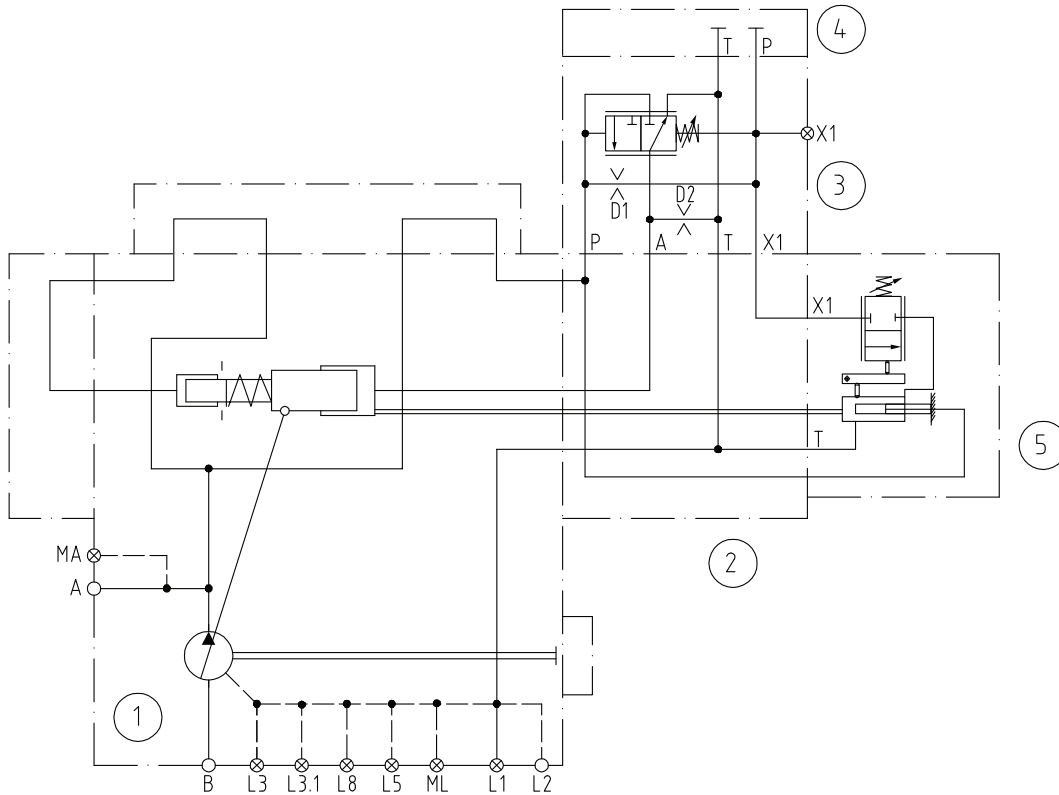
LR00A2F

Options illustrated:

- 24|25 = **LR** (power control)
- 29 = **A** (yoke angle 1 side of centre)
- 30 = **2** (pressure limiter)
- 31 = **F** (remote pilot port)



Pump Size	130	180	250	360	500	750
Total Width (mm)	451	451	446	484	505	574 LR Control
Type	A20	215	215	219	219	219
	A2F	188	188	185	185	185
	A30	215	215	219	219	219

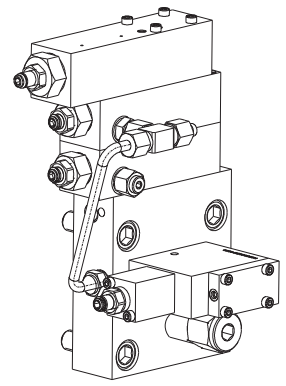


- A** - Systemport
- B** - Inlet port
- L1, L2** - Drain port
- L3** - Vent port for vertical mounting
- L3.1, L8** - Air bleed port
- L5** - Oil filling plug
- MA** - Gauge port, system pressure
- ML** - Gauge port, case pressure
- X1** - Remote port pressure compensator

- 1** - Basic pump
- 2** - Connection plate for LR-control
- 3** - Pressure and power compensator, main stage
- 4** - Closing plate
- 5** - Power compensator, pilot stage

Control Options LR (cont.)

For pump details, see general Installation Dimensions.

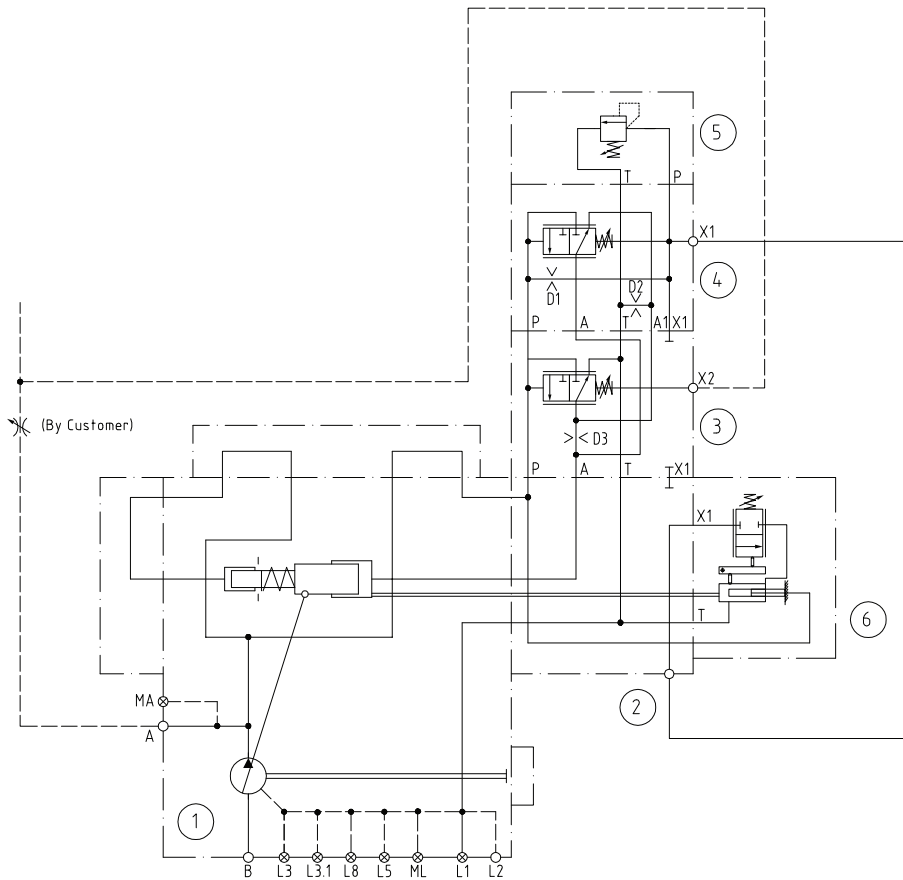
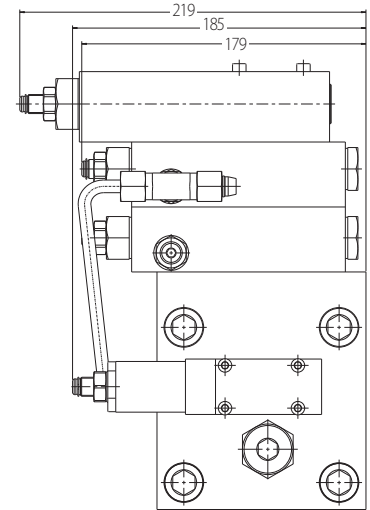
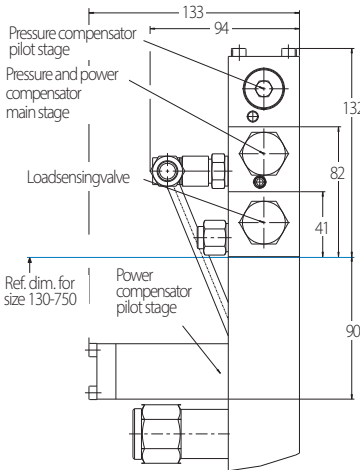


LR00A30

Options illustrated:

- 24,25 = **LR** (power control)
- 29 = **A** (yoke angle 1 side of centre)
- 30 = **3** (load sensing + pressure limiter)
- 31 = **0** (standard)

Pump Size	130	180	250	360	500	750	
Total Width (mm)	451	451	446	484	505	574	LR Control
Type	A20	215	215	219	219	219	219
	A2F	188	188	185	185	185	185
	A30	215	215	219	219	219	219



- A** - System port
 - B** - Inlet port
 - L1, L2** - Drain port
 - L3** - Vent port for vertical mounting
 - L3.1, L8** - Air bleed port
 - L5** - Oil filling plug
 - MA** - Gauge port, system pressure
 - ML** - Gauge port, case pressure
 - X1** - Remote port pressure compensator
 - X2** - Remote port load sense
-
- 1** - Basic pump
 - 2** - Connection plate for LR-control
 - 3** - Pressure and power compensator, main stage
 - 4** - Closing plate
 - 5** - Power compensator, pilot stage

Control Options SP

General Description

The energy-saving electrohydraulic displacement control type **SP** efficiently adjusts pump output by acting on the swashplate within electrically adjustable limits. The swashplate angle value is fed back to the controller unit via an electrical closed loop system.

A proportional valve and servo piston use the controller output signal to apply the required setting, resulting in a highly accurate dynamic control system.

Hysteresis is approximately 1% of end value. The SP control can also be combined with hydromechanical relief valves for pressure and/or power control.

Maximum pump flow can be limited mechanically to between 50% and 100% by a screw. As an additional option, maximum (or minimum) flow can be set by a spacer inside the control cylinder (Model Code position **13**), options **4, 5 or 6**, in combination with customer adjustment specified in positions **40 to 43**).

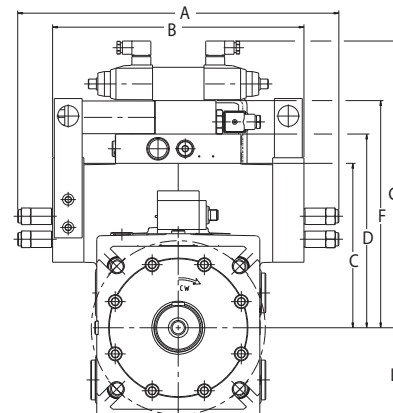
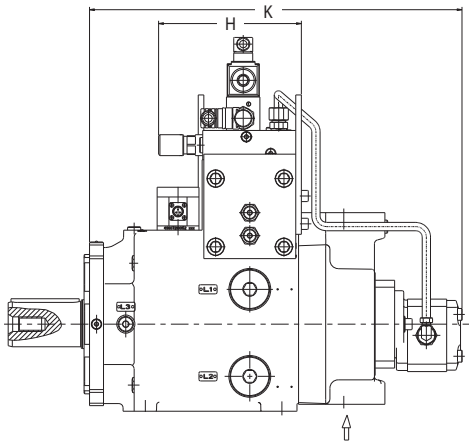
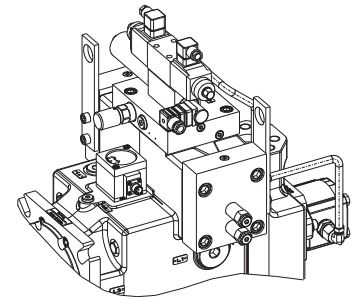
This solution is recommended for severe operating conditions and the need for high repeatability over a long period of time. The setting must be defined before ordering since it cannot be modified in operation..

Pump Dimensions with SPC03A0 Control

For basic pump details, see general Installation Dimensions.

Options illustrated:

- 24/25** = **SP** (displacement adjustment via proportional valve)
- 26** = **C** (CETOP 3 proportional valve KDG4V-3)
- 30** = **0** (no additional function)
- 35** = **E** (filter with electrical indicator)
- 36** = **0** (no venting valve)



Pump Overall Dimensions with Control SPC03A0 (mm)

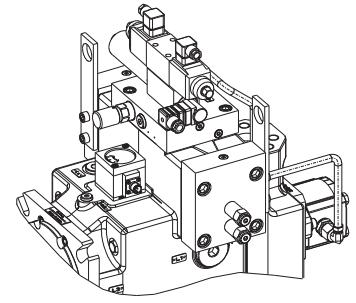
Pump Size	A	B	C	D	F	G	H	K	L
130	446	346	192	234	282	368	183	490	113
180	446	346	192	234	282	368	183	490	113
250	461	361	236	278	326	412	212	535	125
360	475	375	236	278	326	412	212	551	125
500	520	420	268	310	358	444	212	659	166
750	562	462	270	312	360	446	212	689	166

Response Time @ 1500 rev/min, SP Control with Pilot Pump Option (...OOP)

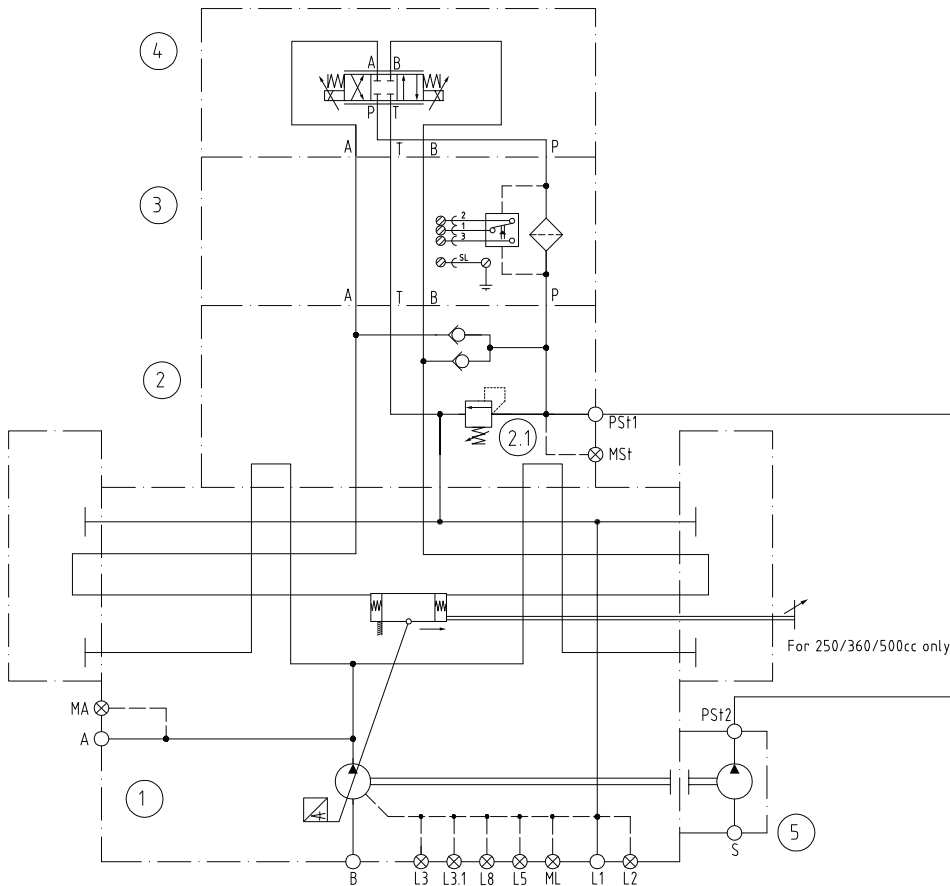
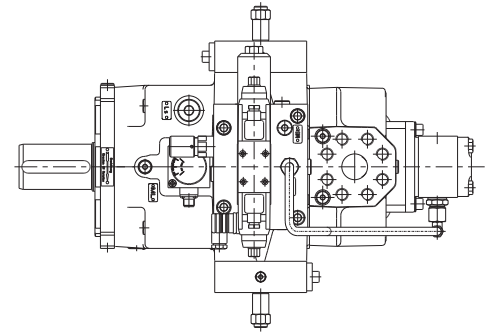
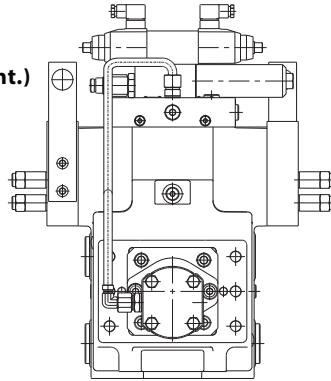
Main Pump Size (cm ³ /rev)	Pilot Pump Size	Pilot Pressure (bar)	Up/Downstroke time 0-100% displ. (ms) approx.
130	8	60	450
180	8	60	450
250	8	60	550
360	8	60	700
500	8	90	650
750	8	90	850

Control Options SP (cont.)

For basic pump details,
see general Installation Dimensions.



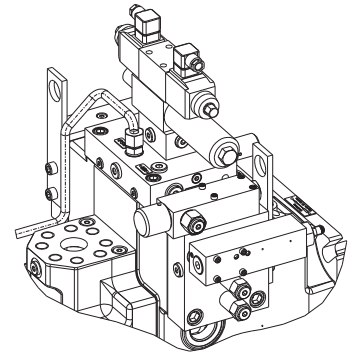
Pump dimensions with SPC03A0 control (cont.)



- A** – Systemport
 - B** – Inlet port
 - L1, L2** – Drain port
 - L3** – Vent port for vertical mounting
 - L3.1, L8** – Air bleed port
 - L5** – Oil filling plug
 - MA** – Gauge port, systempressure
 - ML** – Gauge port, case pressure
 - PS1** – Pilot pressure inlet port
 - PS2** – Pilot pump outlet port
 - MS1** – Pilot pressure gauge port
 - S** – Pilot pump inlet port
-
- 1** – Basic pump
 - 2** – Connection plate for SP-control
 - 2.1** – Pilot pressure relief valve
 - 3** – Pilot oil filter
 - 4** – Proportional control valve
 - 5** – Pilot pump

Control Options SP (cont.)

For basic pump details, see general Installation Dimensions.



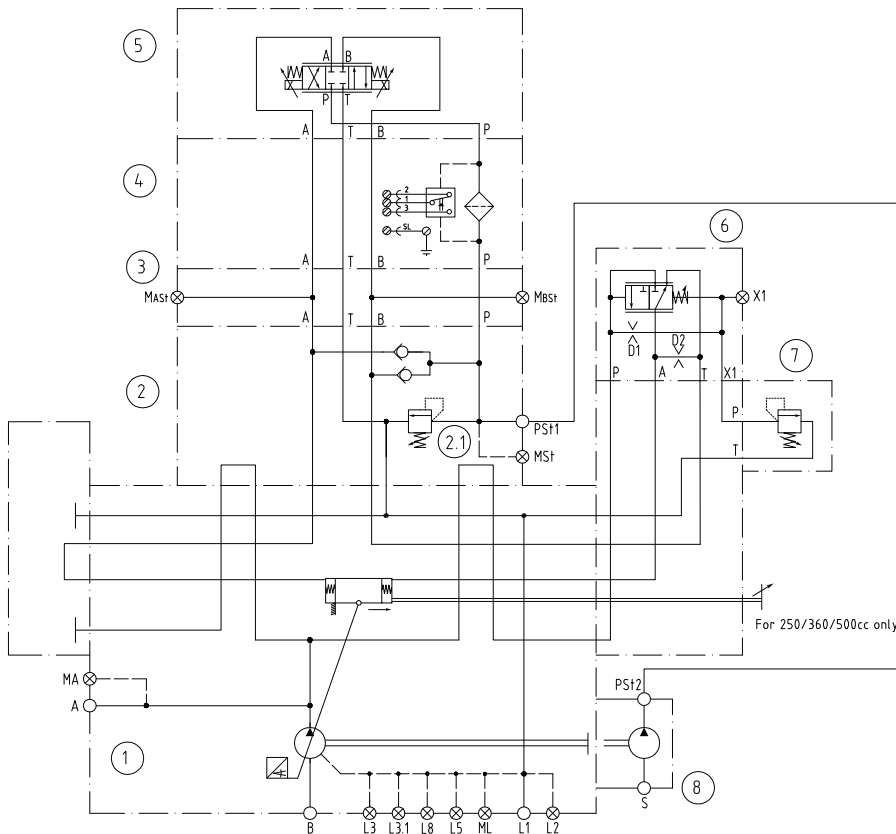
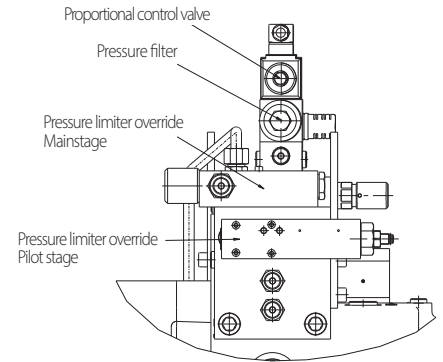
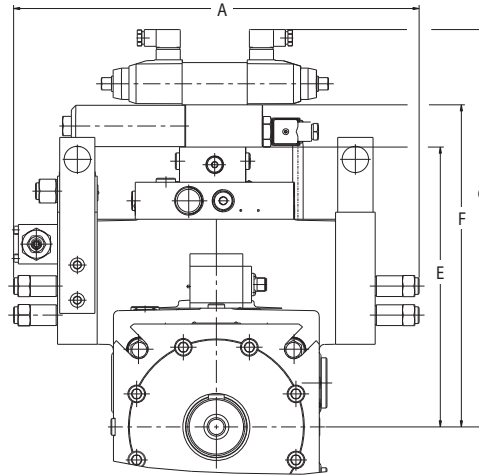
SPC03A4

Options illustrated:

- 24/25 = **SP** (displacement adjustment via proportional valve)
- 26 = **C** (CETOP 3 proportional valve KDG4V-3)
- 30 = **4** (pressure limiter override)
- 35 = **E** (filter with electrical indicator)
- 36 = **0** (no venting valve)

Pump Overall Dimensions with Control SPC03A4 (mm)

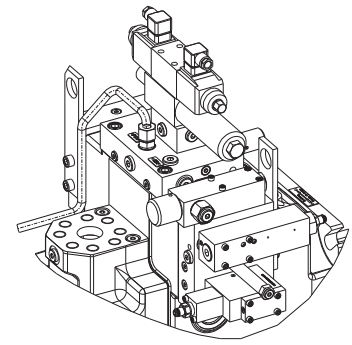
Pump Size	A	E	F	G
130	446	274	322	408
180	446	274	322	408
250	461	318	366	452
360	475	318	366	452
500	520	350	398	484
750	562	352	400	486



- A** - Systemport
 - B** - Inlet port
 - L1, L2** - Drain port
 - L3** - Vent port for vertical mounting
 - L3.1, L8** - Air bleed port
 - L5** - Oil filling plug
 - MA** - Gauge port, system pressure
 - ML** - Gauge port, case pressure
 - PS1** - Pilot pressure inlet port
 - PS12** - Pilot pump outlet port
 - MS1** - Pilot pressure gauge port
 - X1** - Remote port pressure limiter override
 - S** - Pilot pump inlet port
-
- 1** - Basic pump
 - 2** - Connection plate for SP-control
 - 2.1** - Pilot pressure relief valve
 - 3** - Subplate
 - 4** - Pilot oil filter
 - 5** - Proportional control valve
 - 6** - Pressure limiter override, main stage
 - 7** - Pressure limiter override, pilot stage
 - 8** - Pilot pump

Control Options SP (cont.)

For basic pump details, see general Installation Dimensions.



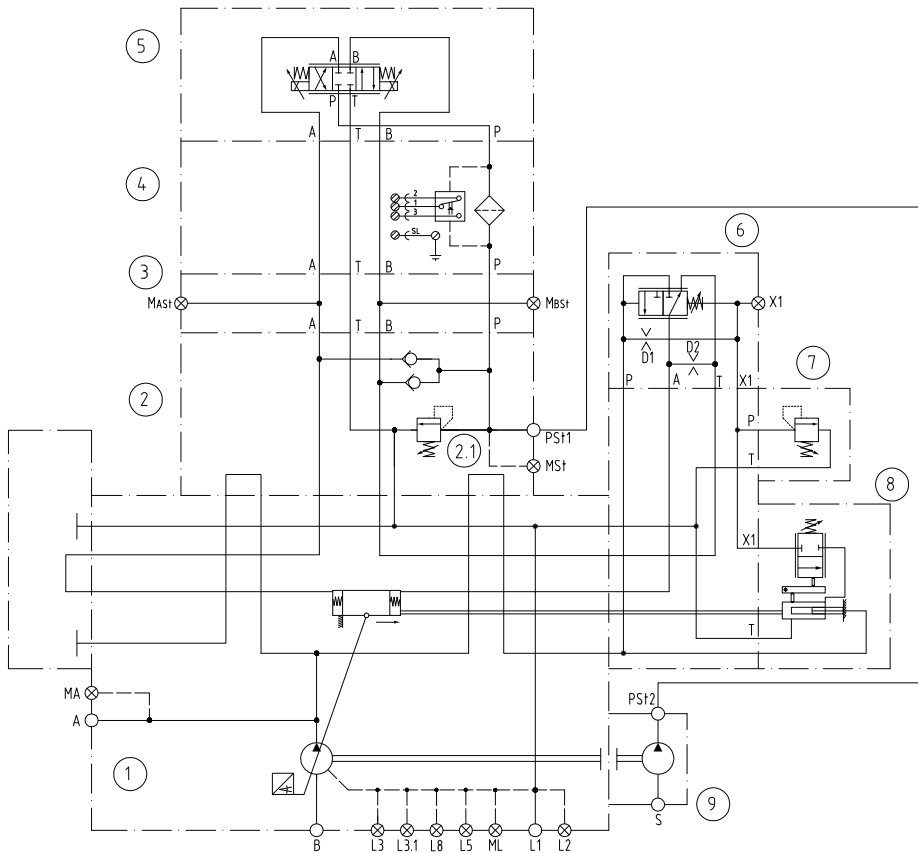
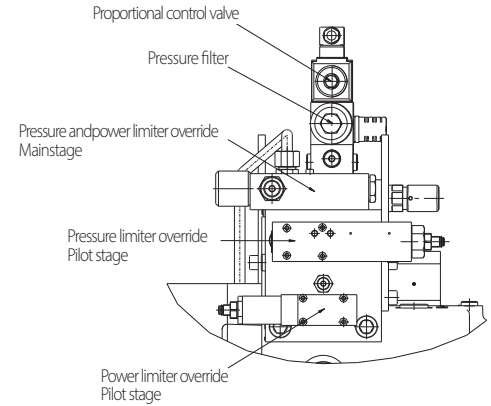
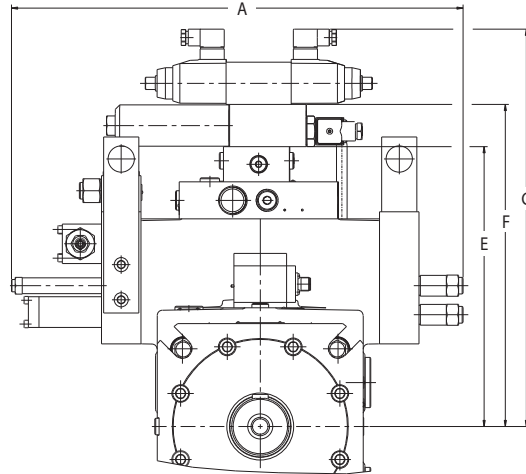
SPC03A5

Options illustrated:

- 24/25 = **SP** (displacement adjustment via proportional valve)
- 26 = **C** (CETOP 3 proportional valve KDG4V-3)
- 30 = **5** (pressure and power limiter override)
- 35 = **E** (filter with electrical indicator)
- 36 = **0** (no venting valve)

Pump Overall Dimensions with Control SPC03A5 (mm)

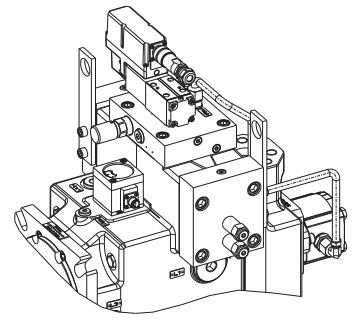
Pump Size	A	E	F	G
130	516	274	322	408
180	516	274	322	408
250	514	318	366	452
360	540	318	366	452
500	573	350	398	484
750	624	352	400	486



- A** – System port
 - B** – Inlet port
 - L1, L2** – Drain port
 - L3** – Vent port for vertical mounting
 - L3.1, L8** – Air bleed port
 - L5** – Oil filling plug
 - MA** – Gauge port, system pressure
 - ML** – Gauge port, case pressure
 - PS1** – Pilot pressure inlet port
 - PS12** – Pilot pump outlet port
 - MS1** – Pilot pressure gauge port
 - X1** – Remote port pressure limiter override
 - S** – Pilot pump inlet port
-
- 1** – Basic pump
 - 2** – Connection plate for SP-control
 - 2.1** – Pilot pressure relief valve
 - 3** – Subplate
 - 4** – Pilot oil filter
 - 5** – Proportional control valve
 - 6** – Pressure and Power limiter override, main stage
 - 7** – Pressure limiter override, pilot stage
 - 8** – Power limiter override, pilot stage
 - 9** – Pilot pump

Control Options SP (cont.)

For basic pump details, see general Installation Dimensions.



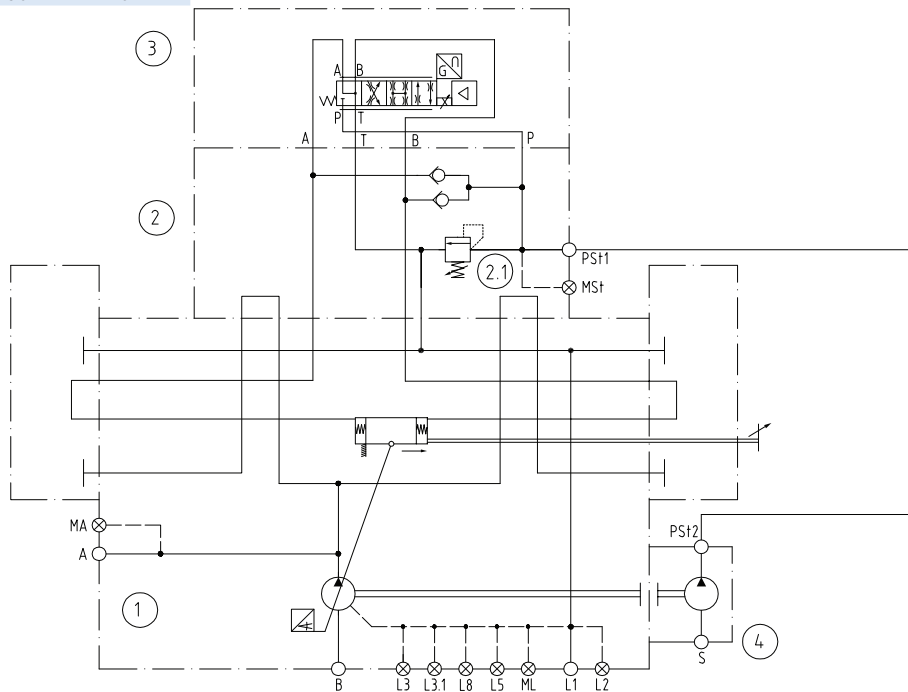
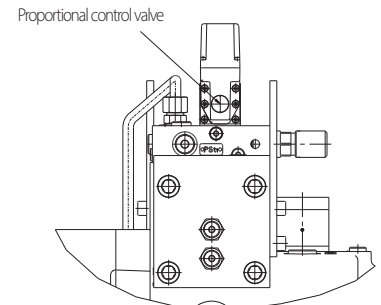
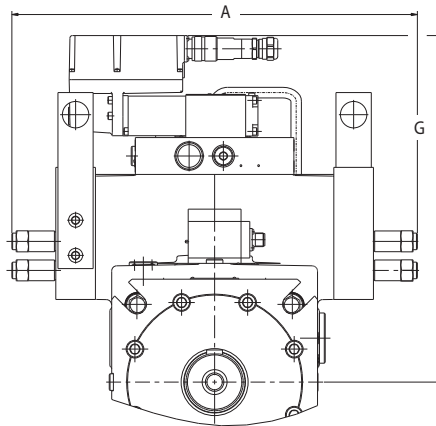
SPD0

Options illustrated:

- 24|25 = **SP** (displacement adjustment via proportional valve)
- 26 = **D** (CETOP 3 proportional valve KBS-3 with OBE)
- 30 = **0** (no additional function)
- 35 = **0** (no pilot oil filter)
- 36 = **0** (no venting valve)

Pump Overall Dimensions With Control SPD0 (mm)

Pump Size	A	G
130	446	350
180	446	350
250	461	394
360	475	394
500	520	426
750	562	428



- A** - Systemport
 - B** - Inlet port
 - L1, L2** - Drain port
 - L3** - Vent port for vertical mounting
 - L3.1, L8** - Air bleed port
 - L5** - Oil filling plug
 - MA** - Gauge port, system pressure
 - ML** - Gauge port, case pressure
 - PS1** - Pilot pressure inlet port
 - PS2** - Pilot pump outlet port
 - MS1** - Pilot pressure gauge port
 - S** - Pilot pump inlet port
-
- 1** - Basic pump
 - 2** - Connection plate for SP-control
 - 2.1** - Pilot pressure relief valve
 - 3** - Proportional control valve
 - 4** - Pilot pump

Min. Response Time @ 1500 rev/min with SPD Control

Main Pump Size	Pilot Flow Required (l/min)	Pilot Pressure Required (bar)	Up/Downstroke time 0-100% displ. (ms) approx.
130	40	130	100
180	40	130	100
250	45	150	120
360	55	150	130
500	60	200	150
750	65	200	150

Min. Response Time @ 1500 rev/min with SPE Control

Main Pump Size	Pilot Flow Required (l/min)	Pilot Pressure Required (bar)	Up/Downstroke time 0-100% displ. (ms) approx.
130	50	150	85
180	50	150	85
250	55	200	100
360	65	200	115
500	55	250	125
750	70	250	135

Control Options ST

General Description

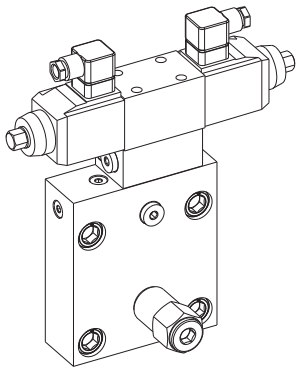
The energy-saving electrohydraulic displacement control type ST efficiently adjusts pump output by acting on the swashplate within electrically adjustable limits. The swashplate angle value is fed back to the controller unit via an electrical closed loop system. A proportional valve and servo piston use the controller output

signal to apply the required setting, resulting in a highly accurate dynamic control system.

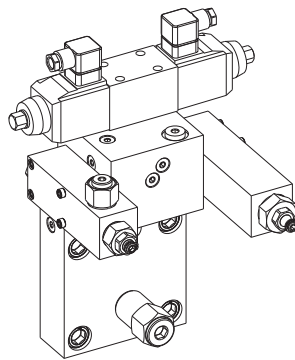
Hysteresis is approximately 1% of end value. The ST control can also be combined with hydromechanical relief valves for pressure and/or power control. Maximum pump flow can be limited mechanically to between 50% and 100% by a screw. As

an additional option, maximum (or minimum) flow can be set by a spacer inside the control cylinder (Model Code position **13**), options **4, 5 or 6**, in combination with customer adjustment specified in positions **40 to 43**). This solution is recommended for severe operating conditions and the need for high repeatability over a long period

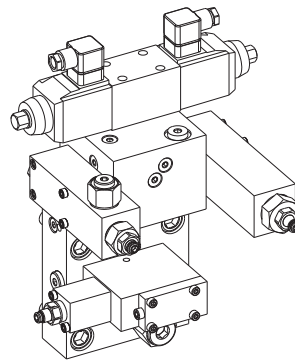
of time. The setting must be defined before ordering since it cannot be modified in operation. ST-control requires a min. operation pressure of >25 bar for operation. Below this min. pressure value pump will automatically go on max. displacement.



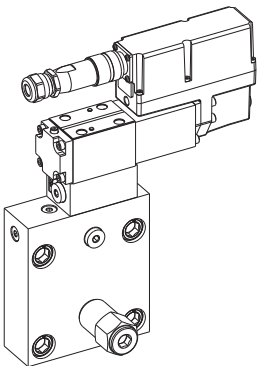
STC03A00



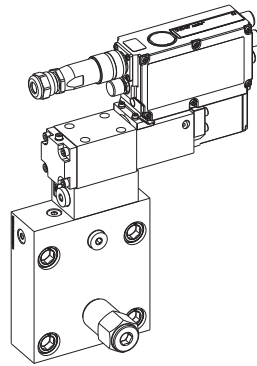
STC03A40



STC03A50



STD03A00



STG0AA

Control Options ST (cont.)

For basic pump details, see general Installation Dimensions.

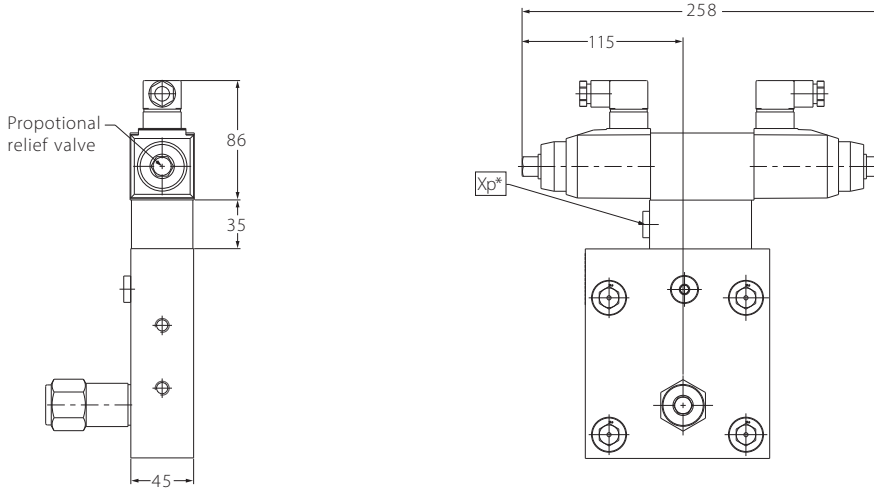
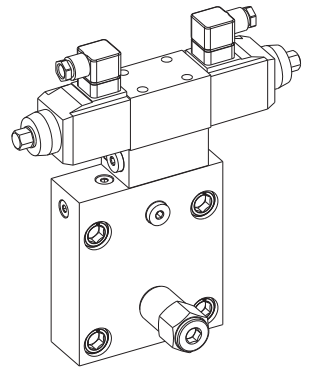
STC.....A

Options illustrated:

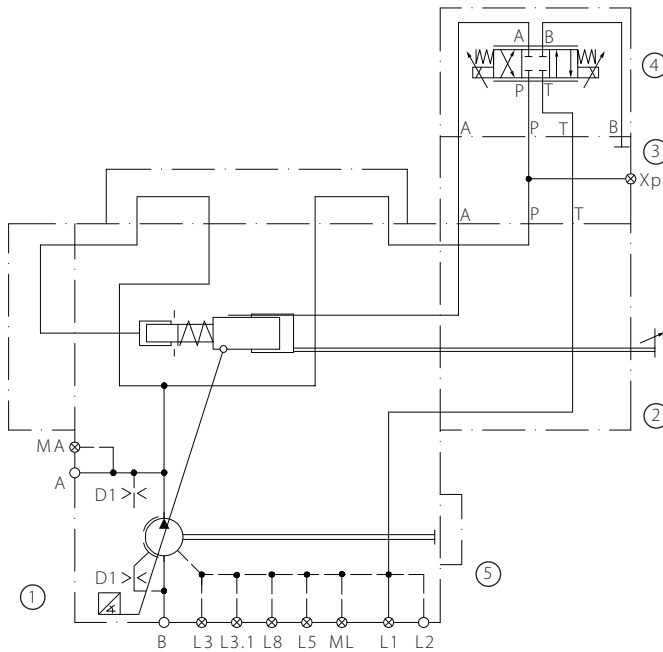
24|25 = **ST** (displacement adjustment via proportional valve)

26 = **C** (CETOP 3 proportional valve KDG4V-3)

36 = **A** (internal pilot oil supply only)



- X1 Gauge port of pilot pressure G 1/4"
- ...* Connection with plug.



- A** - Systemport
 - B** - Inlet port
 - L1, L2** - Drain port
 - L3** - Ventilation port for vertical mounting
 - L3.1, L8** - Air bleeding port
 - L5** - Oil filling plug
 - MA** - Gauge port - systempressure
 - ML** - Gauge port of case pressure
 - Xp** - Gauge port of pilot pressure
-
- 1** - Basic pump
 - 2** - Connection plate for ST-control
 - 3** - Adapter plate ST-control
 - 4** - Proportional control valve
 - 5** - Closing plate

Control Options ST (cont.)

For basic pump details,
see general Installation Dimensions.

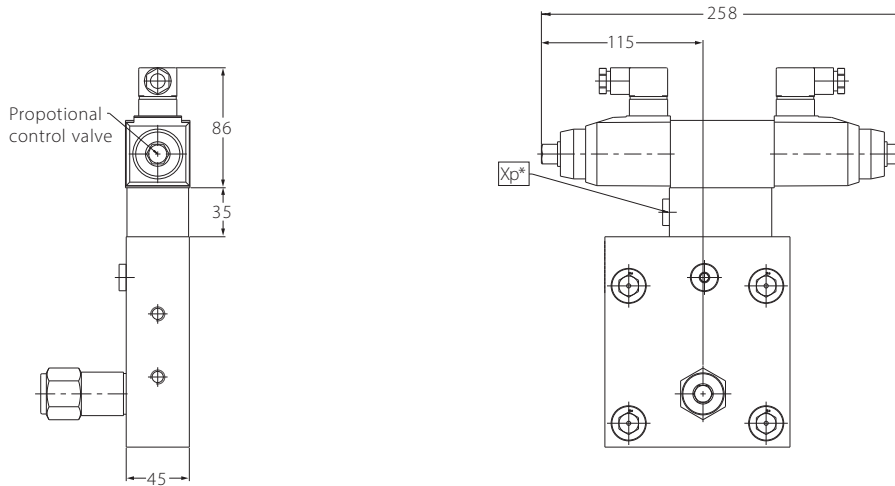
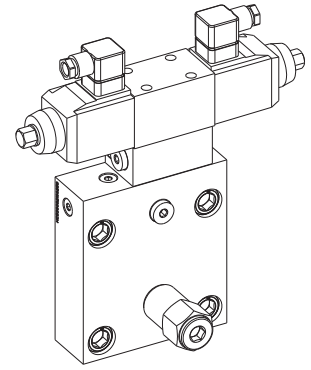
STC..... B

Options illustrated:

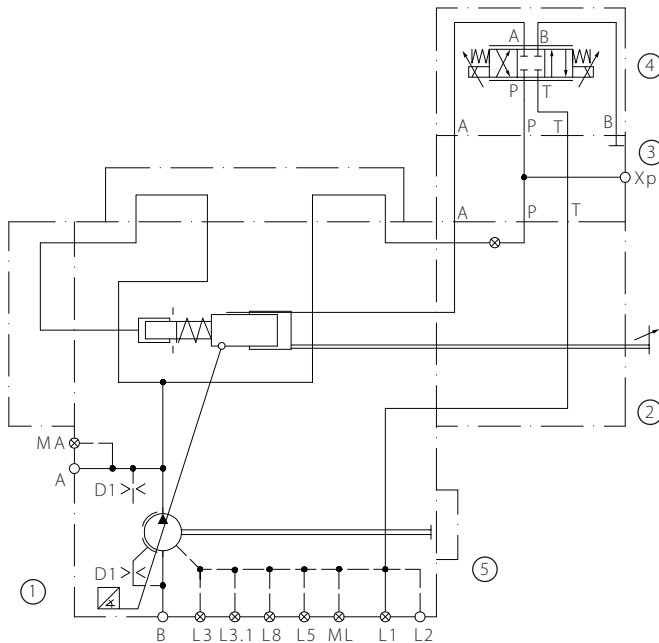
24/25 = **ST** (displacement adjustment via proportional valve)

26 = **C** (CETOP 3 proportional valve KDG4V-3)

36 = **B** (External pilot oil supply only)



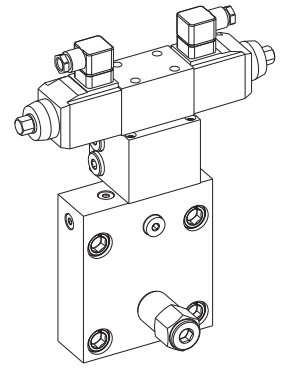
- Xp External pressure port G 1/4"
- ...* Connection with plug.



- A** - Systemport
 - B** - Inlet port
 - L1, L2** - Drain port
 - L3** - Ventilation port for vertical mounting
 - L3.1, L8** - Air bleeding port
 - L5** - Oil filling plug
 - MA** - Gauge port - systempressure
 - ML** - Gauge port of case pressure
 - Xp** - Gauge port of pilot pressure
-
- 1** - Basic pump
 - 2** - Connection plate for ST-control
 - 3** - Adapter plate ST-control
 - 4** - Proportional control valve
 - 5** - Closing plate

Control Options ST (cont.)

For basic pump details, see general Installation Dimensions.



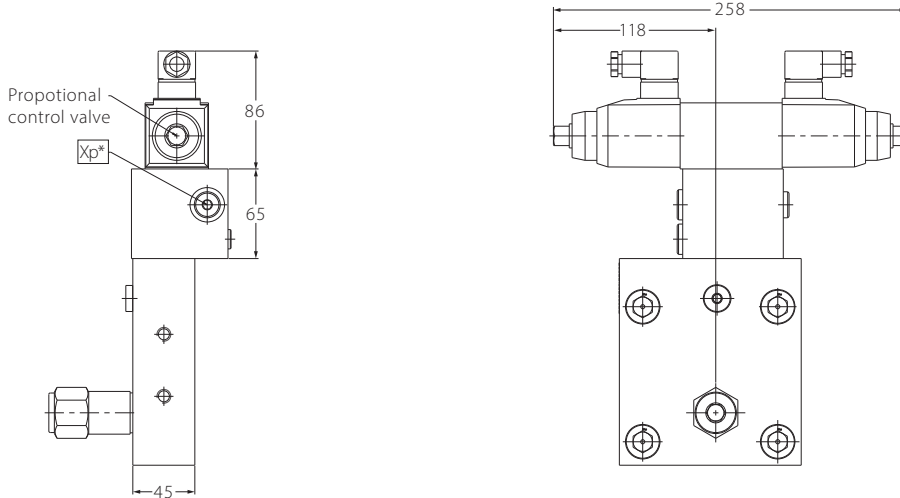
STC.....C

Options illustrated:

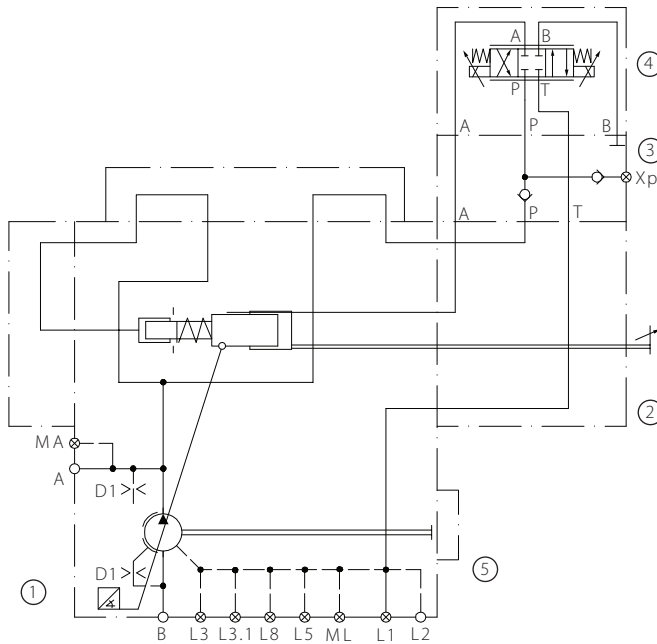
24|25 = **ST** (displacement adjustment via proportional valve)

26 = **C** (CETOP 3proportional valve KDG4V-3)

36 = **C** (Internal + External pilot oil supply by check valves)



- Xp External pressure port G 1/4"
- ...* Connection with plug.



- A** - Systemport
 - B** - Inlet port
 - L1, L2** - Drain port
 - L3** - Ventilation port for vertical mounting
 - L3.1, L8** - Air bleeding port
 - L5** - Oil filling plug
 - MA** - Gauge port - systempressure
 - ML** - Gauge port of case pressure
 - Xp** - Gauge port of pilot pressure
-
- 1** - Basic pump
 - 2** - Connection plate for ST-control
 - 3** - Adapter plate ST-control
 - 4** - Proportional control valve
 - 5** - Closing plate

Control Options ST (cont.)

For basic pump details,
see general Installation Dimensions.

STC...4...A

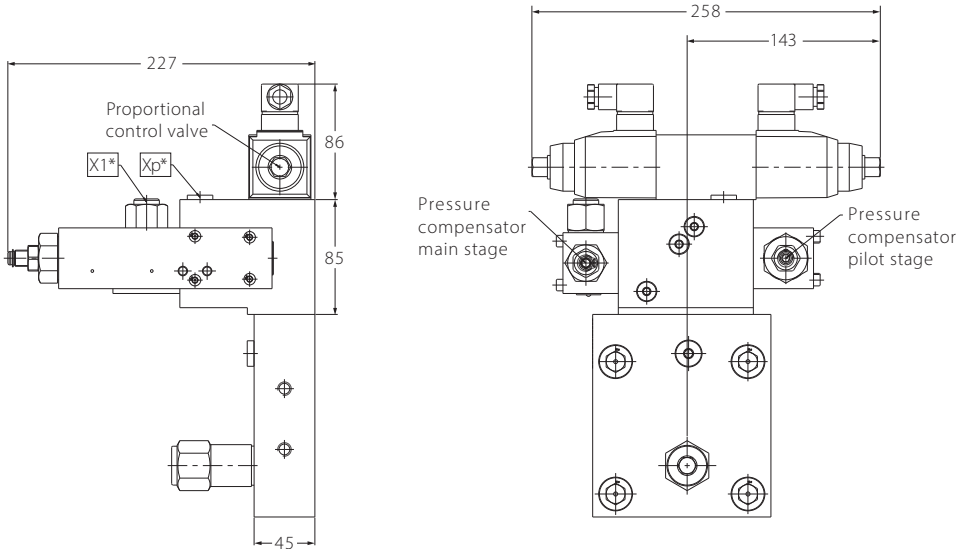
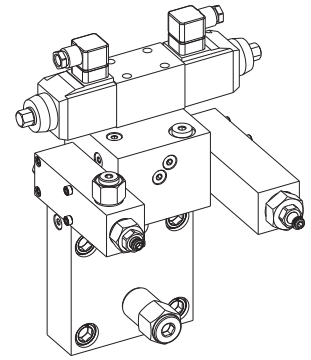
Options illustrated:

24/25 = **ST** (displacement adjustment via proportional valve)

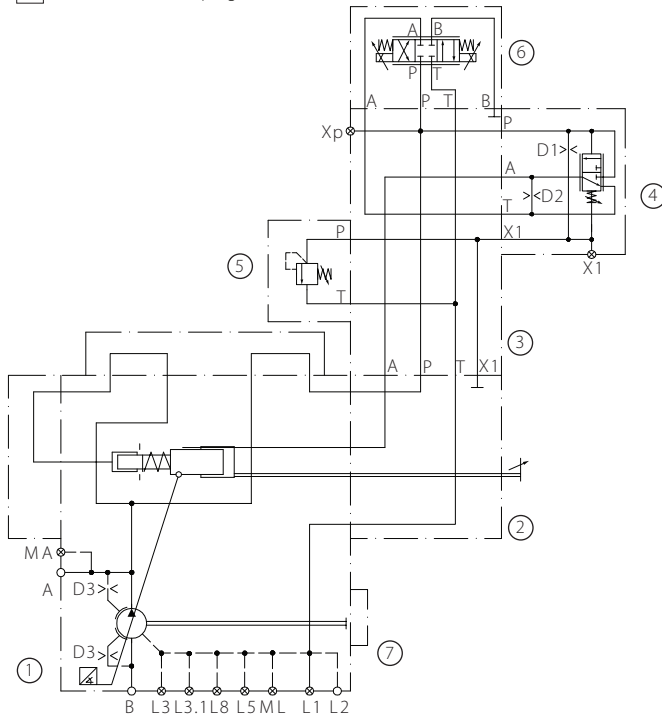
26 = **C** (CETOP 3 proportional valve KDG4V-3)

30 = **4** (Pressure limiter override)

36 = **A** (Internal pilot oil supply only)



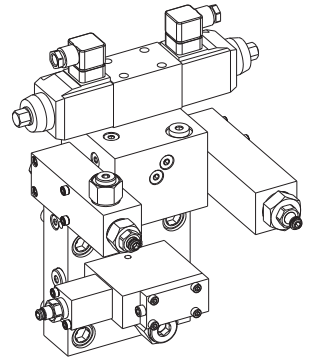
- Xp Gauge port of pilot pressure G 1/4"
- X1 Remote port pressure compensator G 1/4"-12.5 Deep
- ...* Connection with plug.



- A** - Systemport
 - B** - Inlet port
 - L1, L2** - Drain port
 - L3** - Ventilation port for vertical mounting
 - L3.1, L8** - Air bleeding port
 - L5** - Oil filling plug
 - MA** - Gauge port - system pressure
 - ML** - Gauge port of case pressure
 - X1** - Remote port pressure limiter override
 - Xp** - Gauge port of pilot pressure
-
- 1** - Basic pump
 - 2** - Connection plate for ST-control
 - 3** - Adapter plate ST-control
 - 4** - Pressure limiter override main stage
 - 5** - Pressure limiter override pilot stage
 - 6** - Proportional control valve
 - 7** - Closing plate

Control Options ST (cont.)

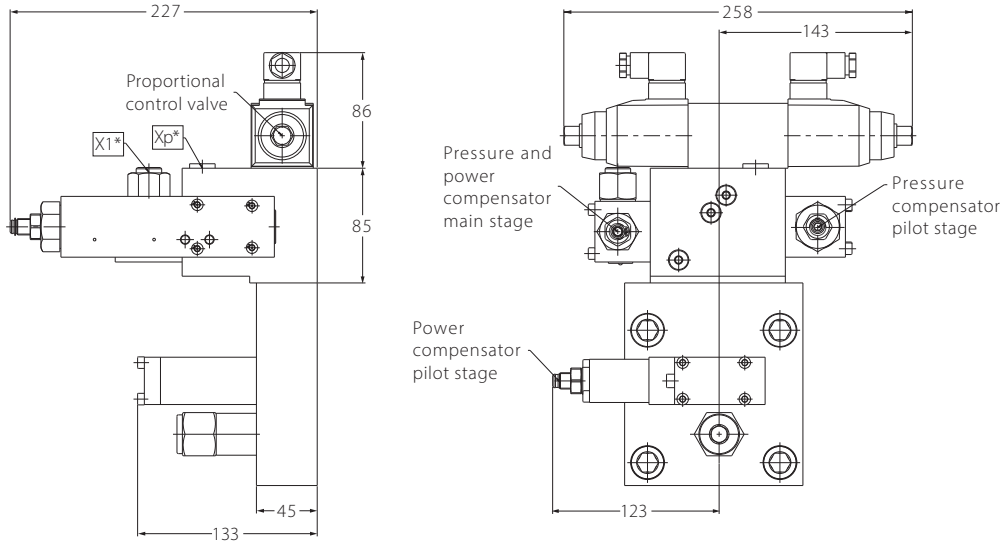
For basic pump details, see general Installation Dimensions.



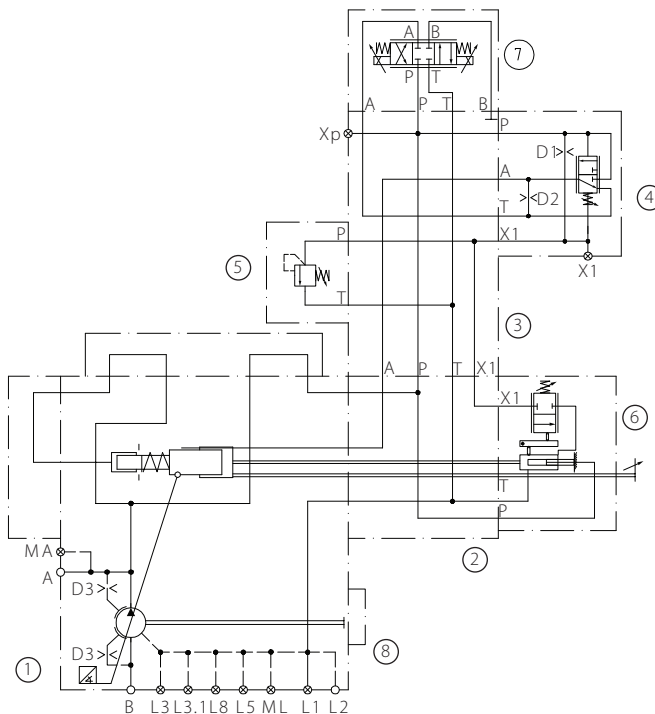
STC...5...A

Options illustrated:

- 24|25 = **ST** (displacement adjustment via proportional valve)
- 26 = **C** (CETOP 3 proportional valve KDG4V-3)
- 30 = **5** (Pressure limiter and Power limiter override)
- 36 = **B** (External pilot oil supply only)



- Xp Gauge port of pilot pressure G 1/4"
- X1 Remote port pressure compensator G 1/4"-12.5 Deep
- ...* Connection with plug.

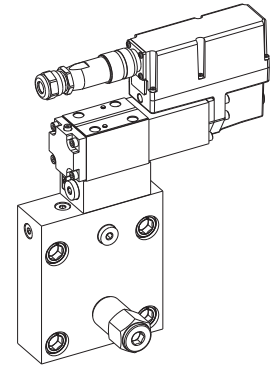


- A** - Systemport
- B** - Inlet port
- L1, L2** - Drain port
- L3** - Ventilation port for vertical mounting
- L3.1, L8** - Air bleading port
- L5** - Oil filling plug
- MA** - Gauge port - systempressure
- ML** - Gauge port of case pressure
- X1** - Remote port pressure limiter override
- Xp** - Gauge port of pilot pressure

- 1** - Basic pump
- 2** - Connection plate for ST-control
- 3** - Adapter plate ST-control
- 4** - Pressure and Power limiter override main stage
- 5** - Pressure limiter override pilot stage
- 6** - Power limiter override pilot stage
- 7** - Proportional control valve
- 8** - Closing plate

Control Options ST (cont.)

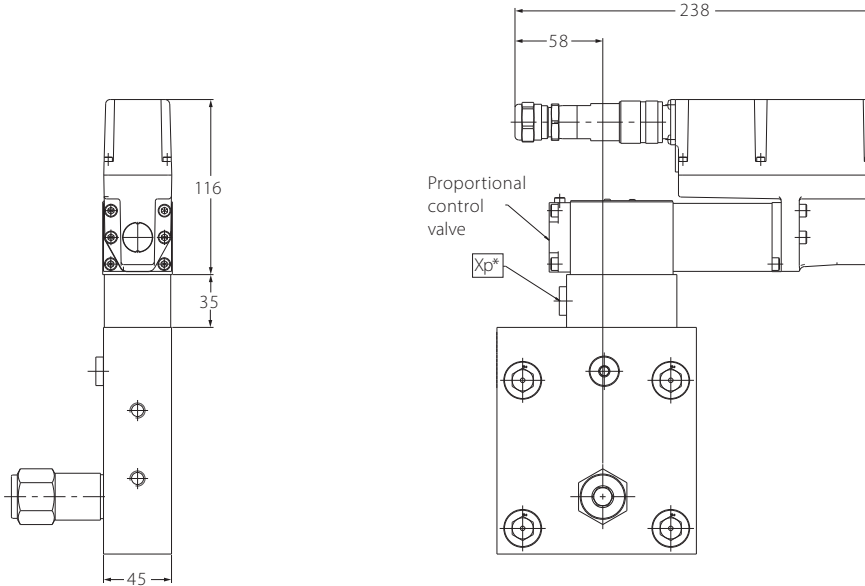
For basic pump details,
see general Installation Dimensions.



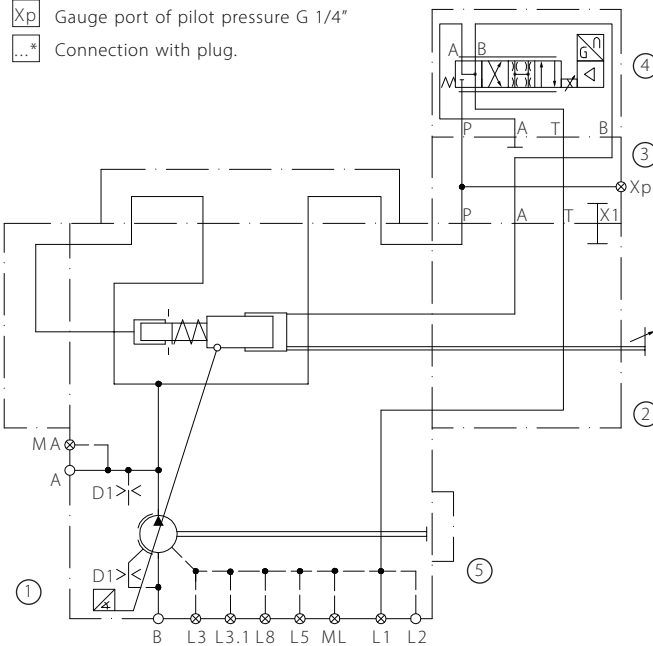
STD A

Options illustrated:

- 2425 = **ST** (displacement adjustment via proportional valve)
- 26 = **D** (CETOP 3 proportional valve KBSDG4V-3 with OBE)
- 36 = **A** (Internal pilot oil supply only)



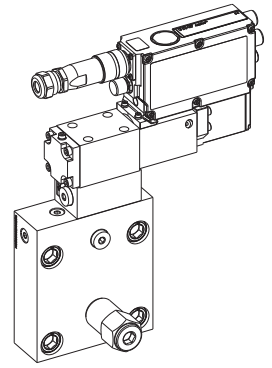
- Xp Gauge port of pilot pressure G 1/4"
- ...* Connection with plug.



- A** - Systemport
 - B** - Inlet port
 - L1, L2** - Drain port
 - L3** - Ventilation port for vertical mounting
 - L3.1, L8** - Air bleeding port
 - L5** - Oil filling plug
 - MA** - Gauge port - systempressure
 - ML** - Gauge port of case pressure
 - Xp** - Gauge port of pilot pressure
-
- 1** - Basic pump
 - 2** - Connection plate for ST-control
 - 3** - Sub plate
 - 4** - Proportional control valve
 - 5** - Closing plate

Control Options ST (cont.)

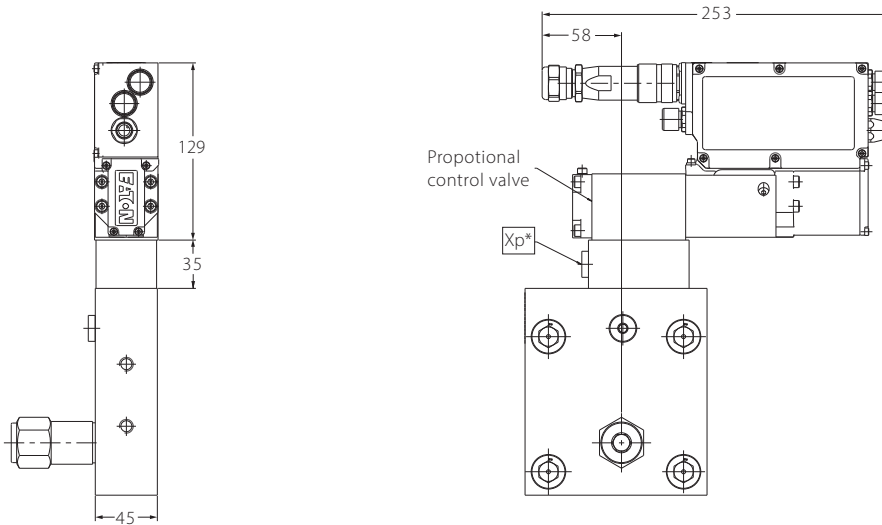
For basic pump details,
see general Installation Dimensions.



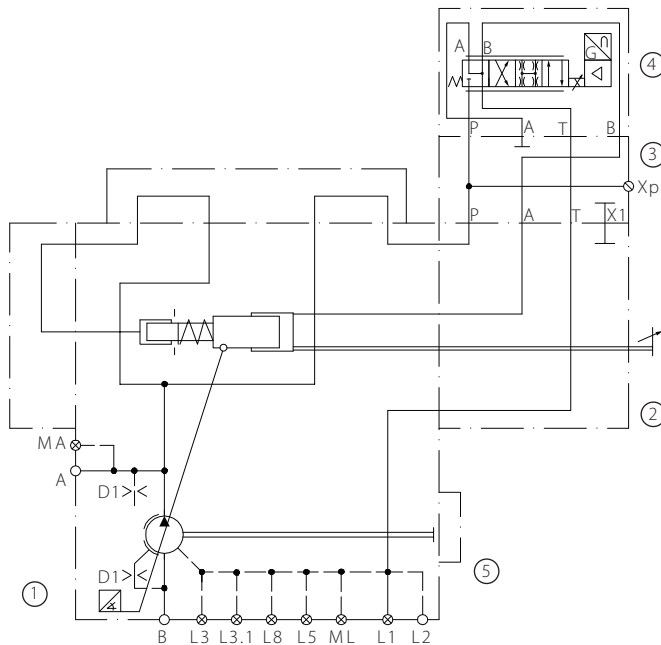
STGA

Options illustrated:

- 24|25 = **ST** (displacement adjustment via proportional valve)
- 26 = **G** (CETOP 3 AxisPro OBE valve with integr. flow control)
- 36 = **B** (External pilot oil supply only)



- Xp Gauge port of pilot pressure G 1/4"
- ...* Connection with plug.



- A** - Systemport
 - B** - Inlet port
 - L1, L2** - Drain port
 - L3** - Ventilation port for vertical mounting
 - L3.1, L8** - Air bleeding port
 - L5** - Oil filling plug
 - MA** - Gauge port - systempressure
 - ML** - Gauge port of case pressure
 - Xp** - Gauge port of pilot pressure
-
- 1** - Basic pump
 - 2** - Connection plate for ST-control
 - 3** - Sub plate
 - 4** - Proportional control valve
 - 5** - Closing plate

Control Options DP

General Description

Pump output flow is proportional to pilot pressure. A separate pilot oil circuit is required to reduce control pressure to the set value, using a suitable relief valve in line P-T and throttle valve in line P, Ø0,8 (0.03 in).

The DP control can be used for stepless flow control with standard requirements for dynamics and accuracy. No feedback signal is needed; an optical indicator is recommended (Model Code position **12**= **V**).

Maximum pump flow can be limited mechanically to between 50% and 100% by a screw. As an additional option, maximum (or minimum) flow can be set by a spacer inside the control cylinder (Model Code position **13**), options **4, 5** or **6**, in combination with customer adjustment specified in positions **40** to **43**).

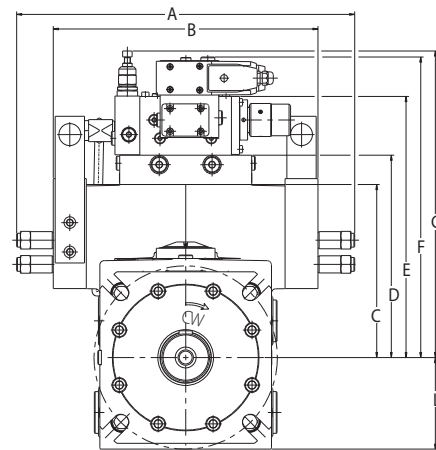
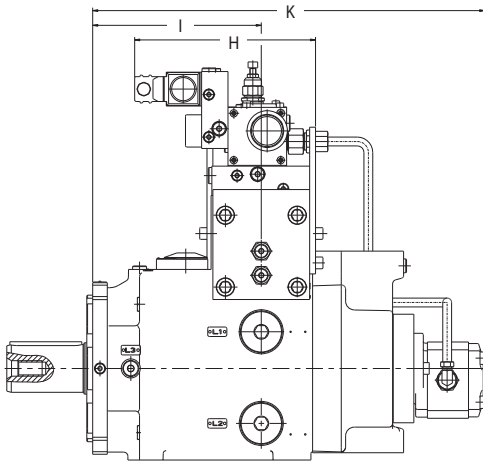
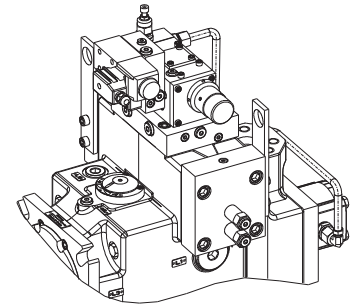
This solution is recommended for severe operating conditions and the need for high repeatability over a long period of time. The setting must be defined before ordering since it cannot be modified in operation..

Pump Dimensions with DPJ...A0 Control

For basic pump details, see general Installation Dimensions.

Options illustrated:

- 24/25** = **DP** (pilot pressure adjusted displacement)
- 26** = **J** (proportional KCG relief valve)
- 30** = **0** (no additional function)
- 35** = **0** (no pilot oil filter)



Pump Overall Dimensions With Control DPJ00A0 (mm)

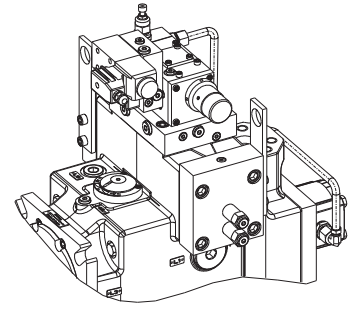
Pump Size	A	B	C	D	E	F	G	H	I	K	L
130	446	346	192	232	312	366	374	247	203	490	113
180	446	346	192	232	312	366	374	247	203	490	113
250	461	361	236	276	356	410	418	247	230	535	125
360	475	375	236	276	356	410	418	247	230	551	125
500	520	420	268	308	388	442	450	247	300	659	166
750	562	462	270	310	390	444	452	247	307	689	166

Response Time @ 1500 rev/min, DP Control with Pilot Pump Option (OP)

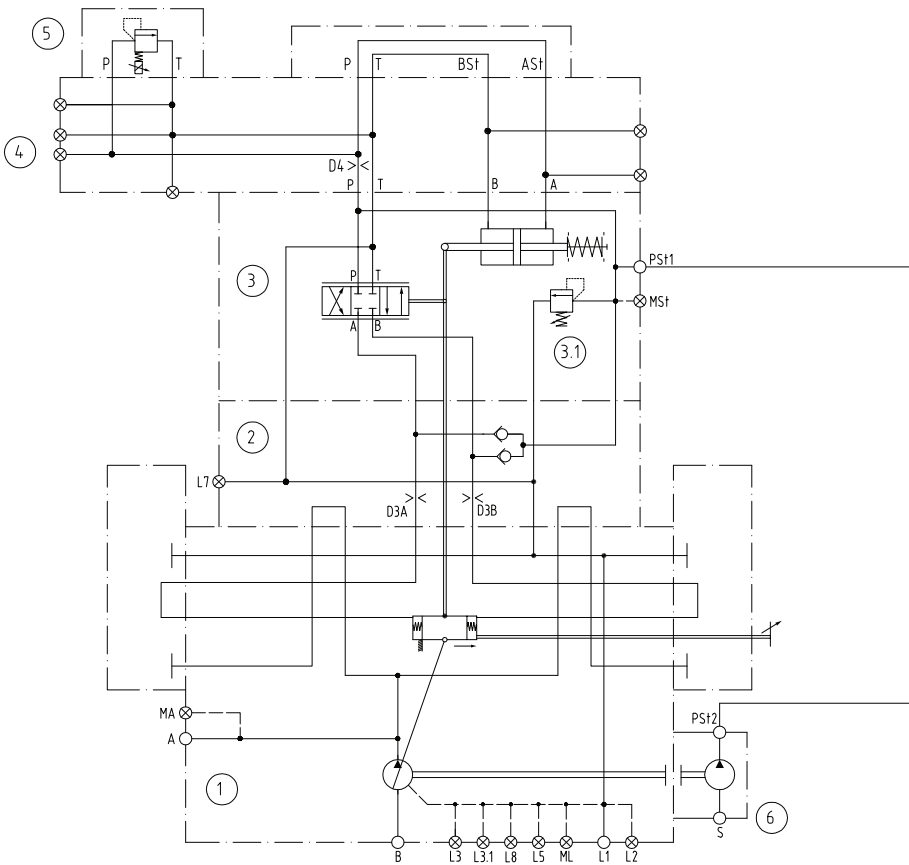
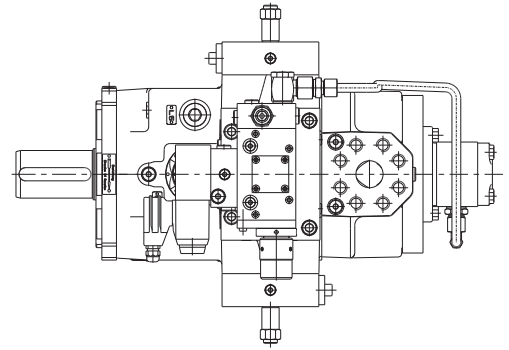
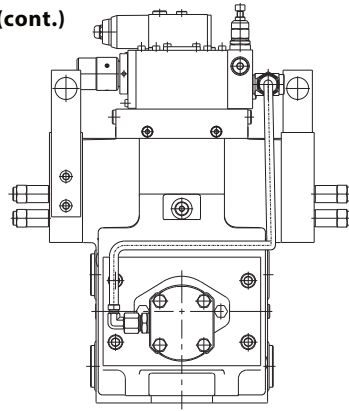
Main Pump Size	Pilot Pump Size (cm ² /rev)	Pilot Pressure (bar)	Up/Downstroke time 0-100% displ. (ms) approx.
130	8	60	1100
180	8	60	1100
250	8	60	1200
360	8	60	1600
500	8	90	1600
750	8	90	2000

Control Options DP (cont.)

For basic pump details,
see general Installation Dimensions.



Pump dimensions with DPJ...A0 control (cont.)

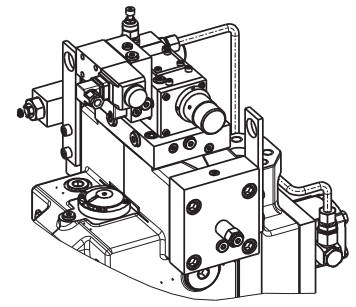


- A, B** - Systemport
- L1, L2** - Drain port
- L3** - Vent port for vertical mounting
- L3.1, L8** - Air bleed port
- L5** - Oil filling plug
- L7** - External port oil return line (optional)
- MA** - Gauge port, system pressure
- ML** - Gauge port, case pressure
- PS1** - Pilot pressure inlet port
- PS12** - Pilot pump outlet port
- MSt** - Pilot pressure gauge port
- S** - Pilot pump inlet port

- 1** - Basic pump
- 2** - Connection plate for DP-control
- 3** - DP control
- 3.1** - Pilot pressure relief valve
- 4** - Connection plate for proportional valve
- 5** - Proportional relief valve
- 6** - Pilot pump

Control Options DP (cont.)

For basic pump details, see general Installation Dimensions.



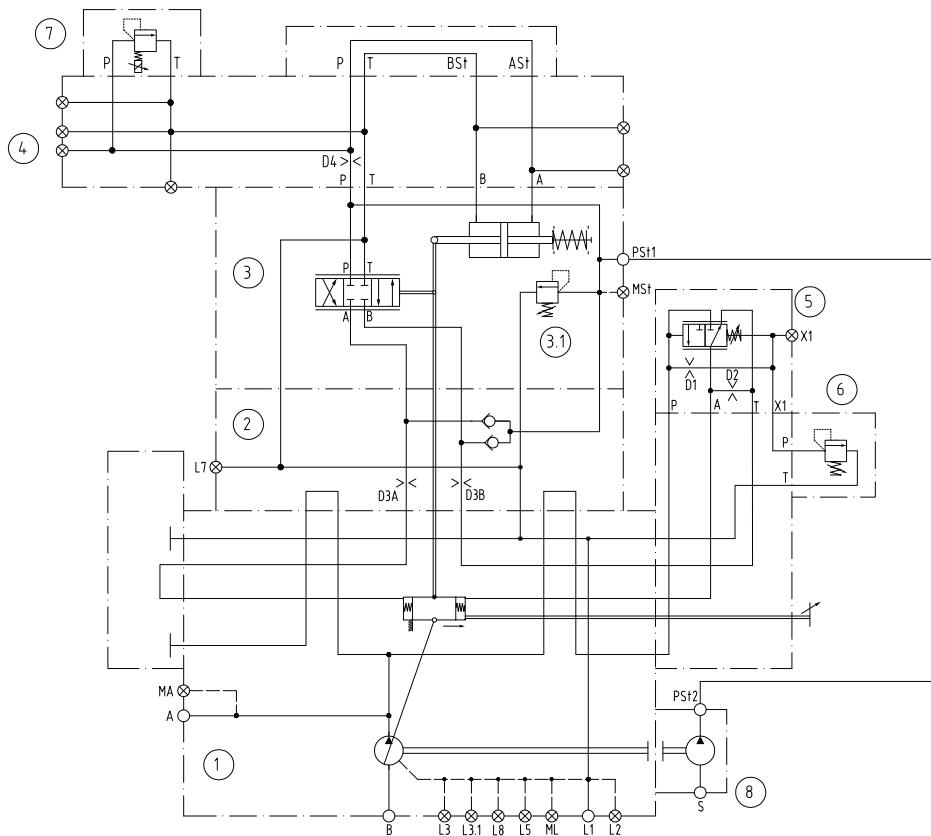
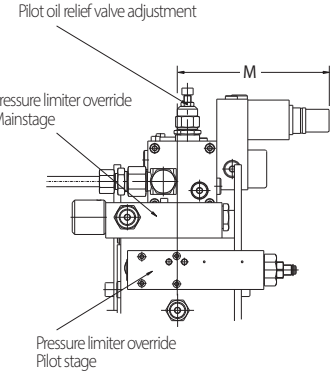
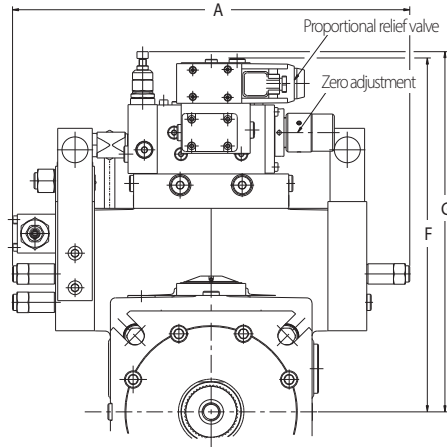
DPJ...A4

Options illustrated:

- 24|25 = DP (pilot pressure adjusted displacement)
- 26 = J (proportional KCG relief valve)
- 30 = 4 (pressure limiter override)
- 35 = 0 (no pilot oil filter)

Pump Overall Dimensions with Control DPJ4 (mm)

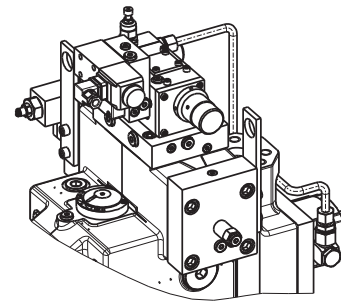
Pump Size	A	F	G	M
130	446	366	374	176
180	446	366	374	176
250	461	410	418	176
360	475	410	418	176
500	520	442	450	176
750	562	444	452	176



- A, B** – Systemport
 - L1, L2** – Drain port
 - L3** – Vent port for vertical mounting
 - L3.1, L8** – Air bleed port
 - L5** – Oil filling plug
 - L7** – External port oil return line (Optional)
 - MA** – Gauge port, systempressure
 - ML** – Gauge port, case pressure
 - PS11** – Pilot pressure inlet port
 - PS12** – Pilot pump outlet port
 - MS1** – Pilot pressure gauge port
 - X1** – Remote port pressure limiter override
 - S** – Pilot pump inlet port
-
- 1** – Basic pump
 - 2** – Connection plate for DP-control
 - 3** – DP control
 - 3.1** – Pilot pressure relief valve
 - 4** – Connection plate for proportional valve
 - 5** – Pressure limiter override, main stage
 - 6** – Pressure limiter override, pilot stage
 - 7** – Proportional relief valve
 - 8** – Pilot pump

Control Options DP (cont.)

For basic pump details, see general Installation Dimensions.

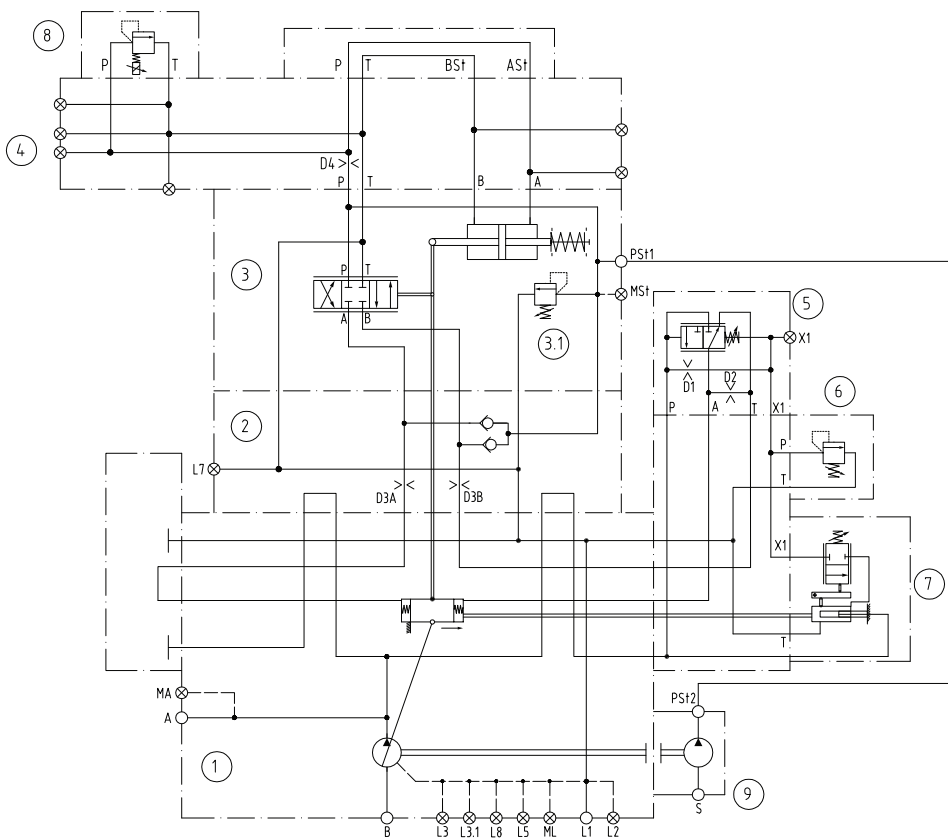
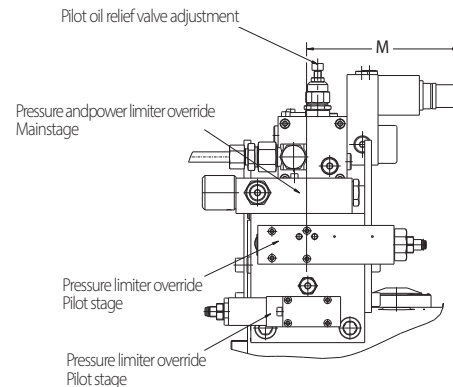
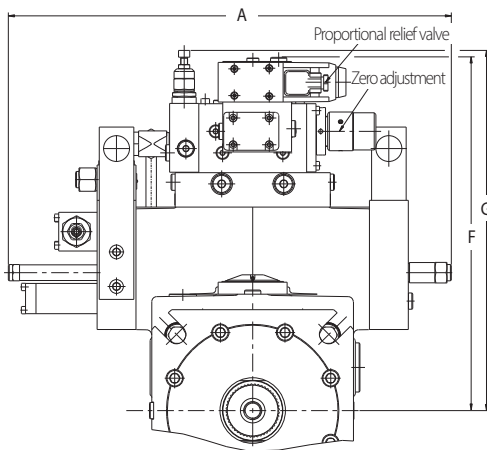


DPJ...A5

- Options illustrated:
- 24|25 = DP (pilot pressure adjusted displacement)
 - 26 = J (proportional KCG relief valve)
 - 30 = 5 (pressure and power limiter override)
 - 35 = 0 (no pilot oil filter)

Pump Overall Dimensions with Control DPJ5 (mm)

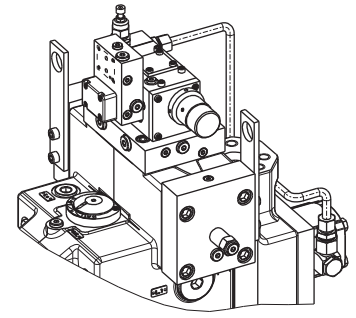
Pump Size	A	F	G	M
130	516	366	374	176
180	516	366	374	176
250	514	410	418	176
360	537	410	418	176
500	575	442	450	176
750	624	444	452	176



- A, B** - System port
 - L1, L2** - Drain port
 - L3** - Vent port for vertical mounting
 - L3.1, L8** - Air bleed port
 - L5** - Oil filling plug
 - L7** - External port oil return line (Optional)
 - MA** - Gauge port, system pressure
 - ML** - Gauge port, case pressure
 - PS1** - Pilot pressure inlet port
 - PS12** - Pilot pump outlet port
 - MS1** - Pilot pressure gauge port
 - X1** - Remote port pressure limiter override
 - S** - Pilot pump inlet port
-
- 1** - Basic pump
 - 2** - Connection plate for DP-control
 - 3** - DP control
 - 3.1** - Pilot pressure relief valve
 - 4** - Connection plate for proportional valve
 - 5** - Pressure and power limiter limiter override, main stage
 - 6** - Pressure limiter override, pilot stage
 - 7** - Power limiter override, pilot stage
 - 8** - Proportional relief valve
 - 9** - Pilot pump

Control Options DP (cont.)

For basic pump details, see general Installation Dimensions.



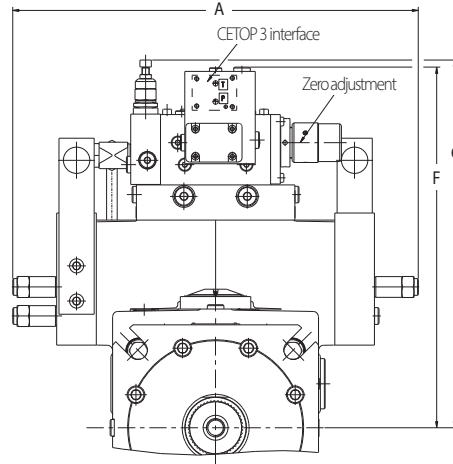
DPG...A0

Options illustrated:

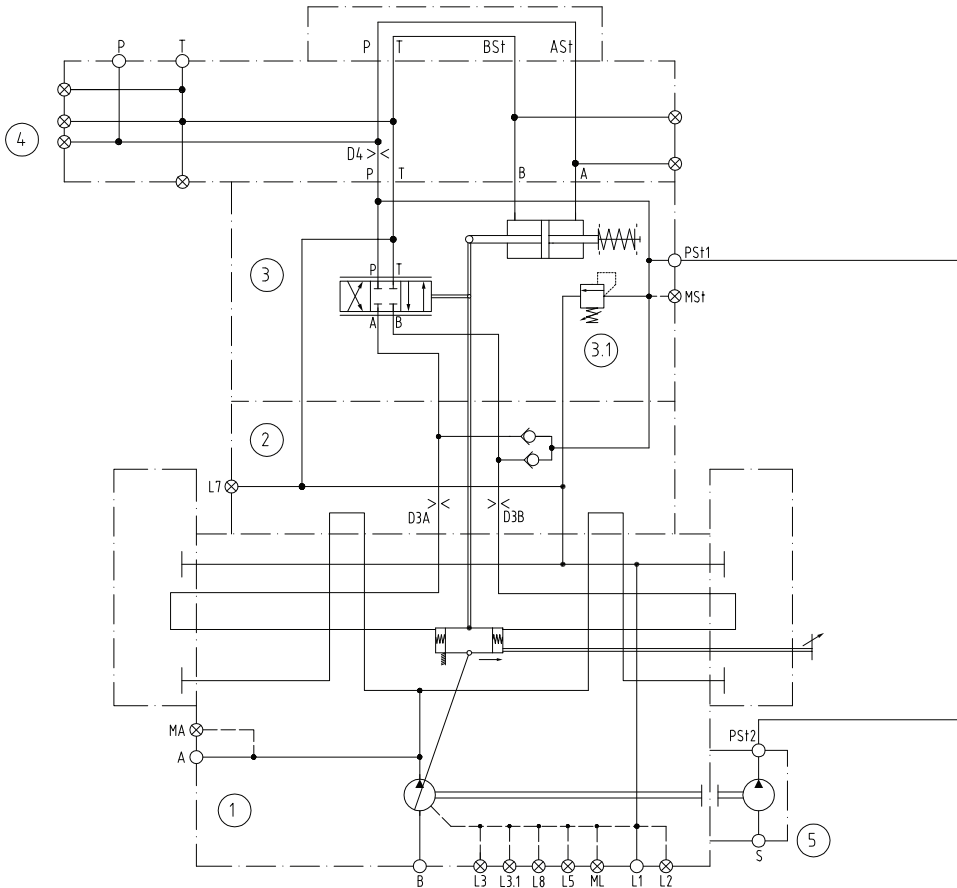
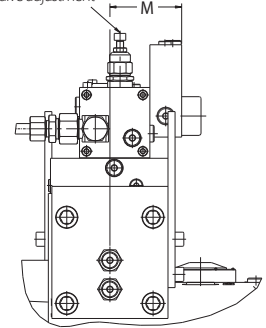
- 24|25** = **DP** (pilot pressure adjusted displacement)
- 26** = **G** (CETOP 3 interface)
- 30** = **0** (no additional function)
- 35** = **0** (no pilot oil filter)

Pump Overall Dimensions with Control DPG (mm)

Pump Size	A	F	G	M
130	446	361	374	82
180	446	361	374	82
250	461	405	418	82
360	475	405	418	82
500	520	437	450	82
750	562	439	452	82



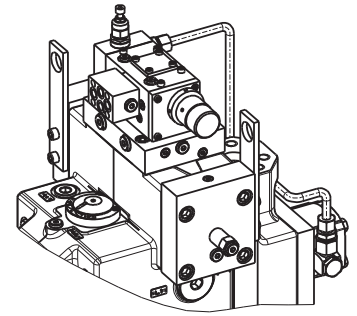
Pilot oil relief valve adjustment



- A, B** – Systemport
 - L1, L2** – Drain port
 - L3** – Vent port for vertical mounting
 - L3.1, L8** – Air bleed port
 - L5** – Oil filling plug
 - L7** – External port oil return line (optional)
 - MA** – Gauge port, system pressure
 - ML** – Gauge port, case pressure
 - PS1** – Pilot pressure inlet port
 - PS2** – Pilot pump outlet port
 - MS1** – Pilot pressure gauge port
 - S** – Pilot pump inlet port
-
- 1** – Basic pump
 - 2** – Connection plate for DP-control
 - 3** – DP control
 - 3.1** – Pilot pressure relief valve
 - 4** – Connection plate for proportional valve
 - 5** – Pilot pump

Control Options DP (cont.)

For basic pump details, see general Installation Dimensions.



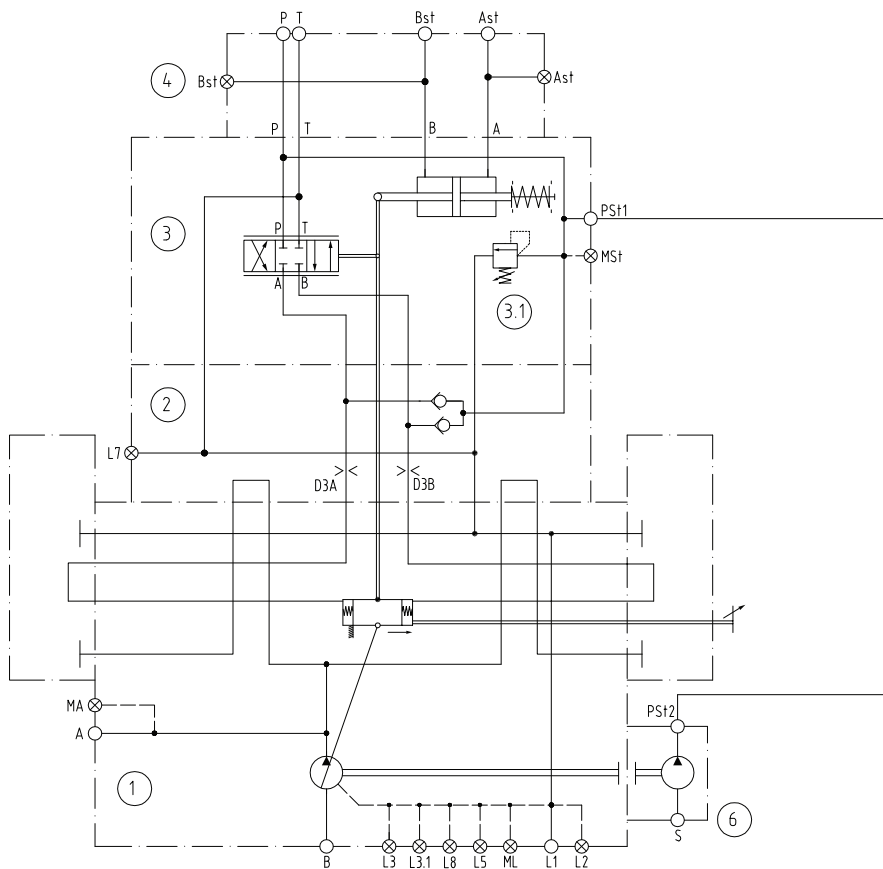
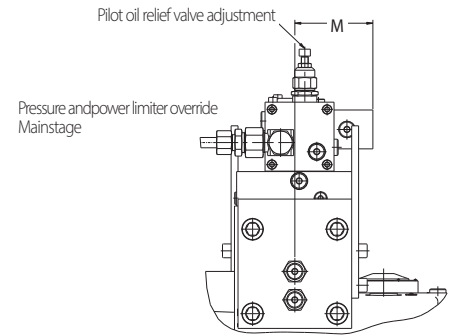
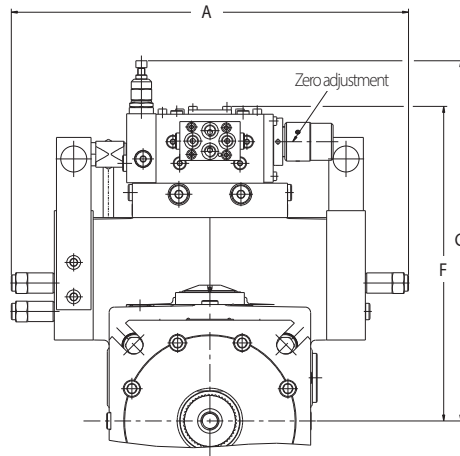
DPH...A0

Options illustrated:

- 24|25 = **DP** (pilot pressure adjusted displacement)
- 26 = **H** (Remote port G¹/₄")
- 30 = **0** (no additional function)
- 35 = **0** (no pilot oil filter)

Pump Overall Dimensions with Control DPG (mm)

Pump Size	A	F	G	M
130	446	361	374	82
180	446	361	374	82
250	461	405	418	82
360	475	405	418	82
500	520	437	450	82
750	562	439	452	82



- A, B** - Systemport
 - L1, L2** - Drain port
 - L3** - Vent port for vertical mounting
 - L3.1, L8** - Air bleed port
 - L5** - Oil filling plug
 - MA** - Gauge port, system pressure
 - ML** - Gauge port, case pressure
 - PS1** - Pilot pressure inlet port
 - PS2** - Pilot pump outlet port
 - MS1** - Pilot pressure gauge port
 - S** - Pilot pump inlet port
 - ASt** - G¹/₄"
 - BSt** - G¹/₄"
 - P** - G¹/₄"
 - T** - G¹/₄"
-
- 1** - Basic pump
 - 2** - Connection plate for DP-control
 - 3** - DP control
 - 3.1** - Pilot pressure relief valve
 - 4** - Plate with 4x G¹/₄" ports
 - 5** - Pilot pump

Control Options PQ

General Description

Flow Control

The ER9.X-10 digital controller measures the actual swash-plate position from sensor data, comparing the swash-plate angle with the set value and driving the servo or proportional valve accordingly. Swash plate angle as well as pump displacement and outlet flow are regulated to match set values.

Pressure Cut-Off Control

The ER9.X-10 controller measures pressure in both lines, as indicated by pressure sensors, reducing output levels in the event of actual pressure exceeding the command signal.

Power Cut-Off Control

The ER9.X-10 calculates actual power by measuring pressures and swash plate angle, which is

directly proportional to flow. Should power exceed command signal levels, the controller generates a maximum internal flow command signal in line with maximum input power.

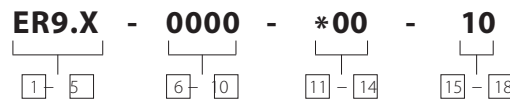
Mooring Control (on request only)

Pressure Cut-Off control is designed to operate to full 100% overcentre. This allows for intelligent Mooring Control.

Master-Slave Function

A number of pumps operate in parallel, one set as master and the others as slaves. The master pump is fitted with a fully active PpQ controller, while the slave units, running in flow-control mode, follow the displacement response of the master unit.

PpQ Controller Model Code



1 - 5 Digital Controller Series

ER9.X – Amplifier card for PpQ control functions

6 - 10 Customer Adjustment Specification for Customized Parameter Settings

0000 – Standard parameters

11 - 14 Special Features for Special Design Options

000 – Standard features
P00 – ProfiBus version

15 - 18 Design Number

10 – Subject to change

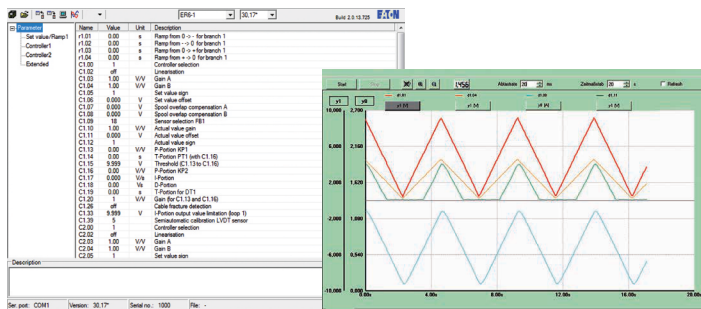
Note: ER9.X-10 Digital Controllers must be ordered as separate items from pumps.

ER9.X Controller Card Functionality

The digital amplifier and controller card assembly ER9.X-10 is used for the electronic PpQ control of displacement, pressure and power on Danfoss PVW variable piston pumps (W design). The swash plate is positioned by either an Danfoss KBS proportional valve or one of a range of suitable servovalves. The digital amplifier and controller card have been designed and tested to comply

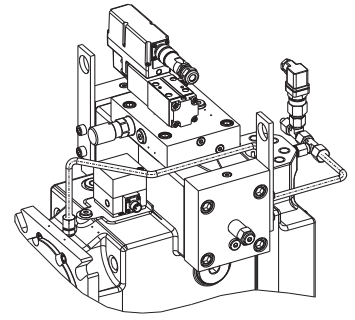
with the provisions of European Directive 2004/108/EC governing Electromagnetic Compatibility (EMC), which ensure high interference immunity coupled with low interference emission. The electronic card is tested to DIN EN 60068-2-6 (vibration) and DIN EN 60068-2-27 (mechanical shock). It features a display and six buttons to adjust card parameters. Configuring the digital amplifier and controller card is also possible via an RS232 serial interface and the ER9.X-Tool software included.

- Controls displacement-Q, power-P and pressure-p.
- Multilingual.
- Easy parameter setting and documentation.
- 4 channel oscilloscope function included.
- Differential amplifier input (flow command) for set points in the range of 0 to ±10V, 14-bit resolution.
- Single ended, independent set point input (pressure command) for the range of 0 to +10V, 14-bit resolution.
- 2 single ended, independent set point inputs (Power command) for the range of 0 to +10V, 14-bit resolution.
- 3 sensor inputs for 0-20 mA or 4-20 mA sensor signals (swashplate feedback, pressure in A+B), 14-bit resolution.
- Integrated reference supply voltage of ±10V (10 mA max), to supply external devices.
- Four storable and adjustable digital set points (one additional point is optional).
- Direction externally set through "+" and "-" inputs.
- Enable signal for output stages.
- Ramp function and Reset-Ramp for fast ramp function zeroing.
- Status outputs: Error and Comparator.
- All digital inputs and outputs are optically isolated for functional security.
- Four 7-segment displays and six buttons for display and functionality ease.
- Function indication through front panel by LEDs.
- Additional switching output (24V, max 1A) to directly disable safety valve.
- Additional front panel test jacks for easy commissioning.
- Serial interface RS232.
- 12/14 bit digital controller.



Control Options PQ (cont.)

For basic pump details, see general Installation Dimensions.



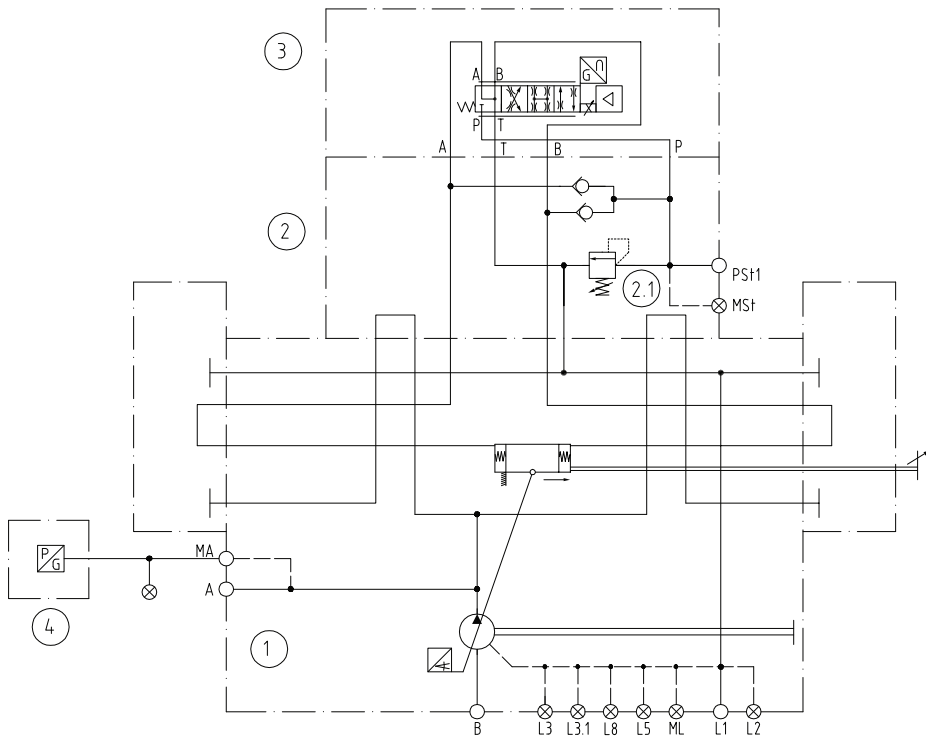
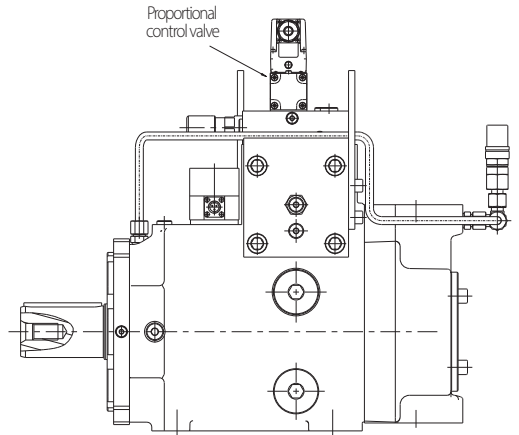
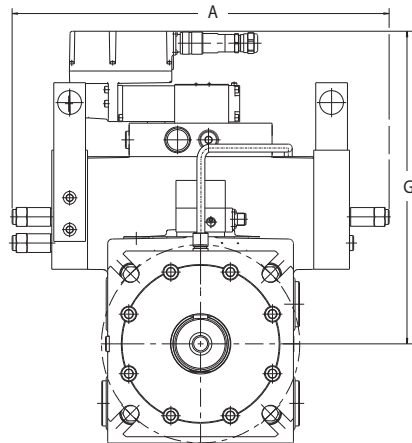
Pump Dimensions with PQD0 Control

Options illustrated:

- 24 25 = PQ (displacement adjustment via proportional valve)
- 26 = D (CETOP 3 proportional valve KBS-3 with OBE)
- 30 = 0 (no additional function)
- 35 = 0 (no pilot oil filter)
- 36 = 0 (no venting valve)

Pump Overall Dimensions with Control PQD0 (mm)

Pump Size	A	G
130	446	350
180	446	350
250	461	394
360	475	394
500	520	426
750	562	428



- A** - Systemport
 - B** - Inlet port
 - L1, L2** - Drain port
 - L3** - Vent port for vertical mounting
 - L3.1, L8** - Air bleed port
 - L5** - Oil filling plug
 - MA** - Gauge port, system pressure
 - ML** - Gauge port, case pressure
 - PS1** - Pilot pressure inlet port
 - MS1** - Pilot pressure gauge port
-
- 1** - Basic pump
 - 2** - Connection plate for PQ-control
 - 2.1** - Pilot pressure relief valve
 - 3** - Proportional control valve
 - 4** - Pressure sensor (optional)

Control Options ES

Available to special order only.

General Description

This unit is used for flow adjustment. It has a 3-phase electric servo-motor, worm-gear and a switchbox with 4 or (optional) 8 limit switches for different positions.

A potentiometer for stepless adjustment and/or position monitoring is also available. Response times from zero to maximum depend on the ratio selected and on the (fixed) speed of the servo-motor,

with the result that once the control is specified and built, response time are not variable in operation. Explosion Protection versions are also available. **No Pressure/Power Limiter possible!**

Pump Dimensions with ESN...A2 Control

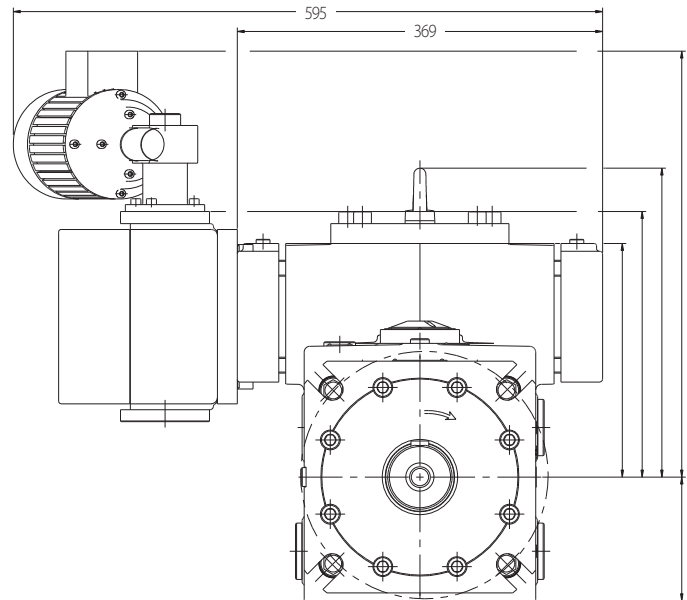
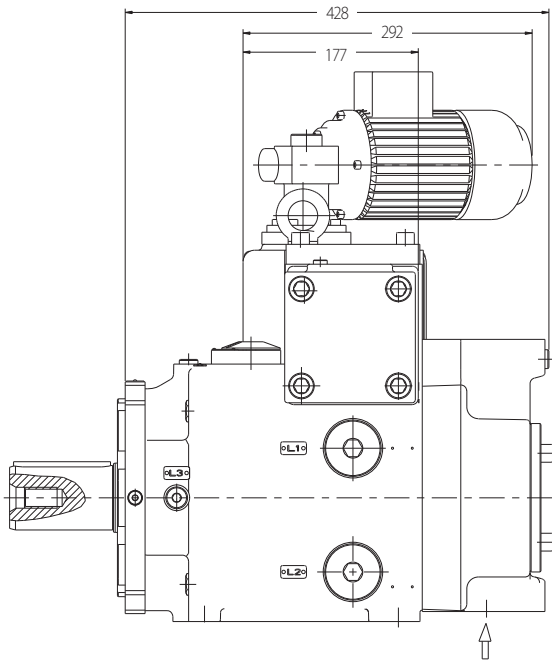
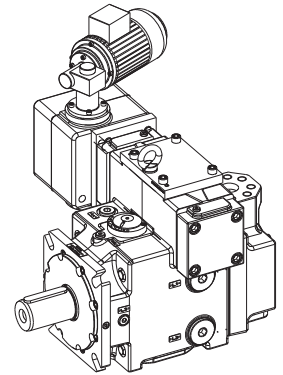
For other options and sizes, please contact Danfoss Technical Support for individual pump drawings.

Options illustrated:

- 24/25 = **ES** (electric motor adjusted displacement)
- 26 = **N** (electric motor, medium response)
- 37 = **A** (4 limit switches)
- 38 = **2** (motor with brake, IP54)

Theoretical Response Time for Maximum Displacement

Response time from 0 to 100% displacement can vary between 5s and 70s depending on pump size, motor type and supply voltage. Contact Danfoss Technical Support for details.

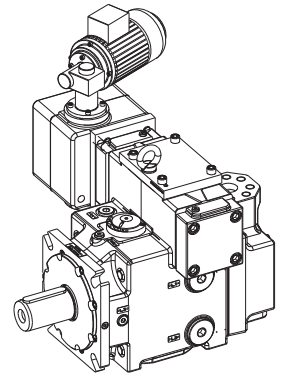


Dimensions shown for PVW 250 only.

Control Options ES (cont.)

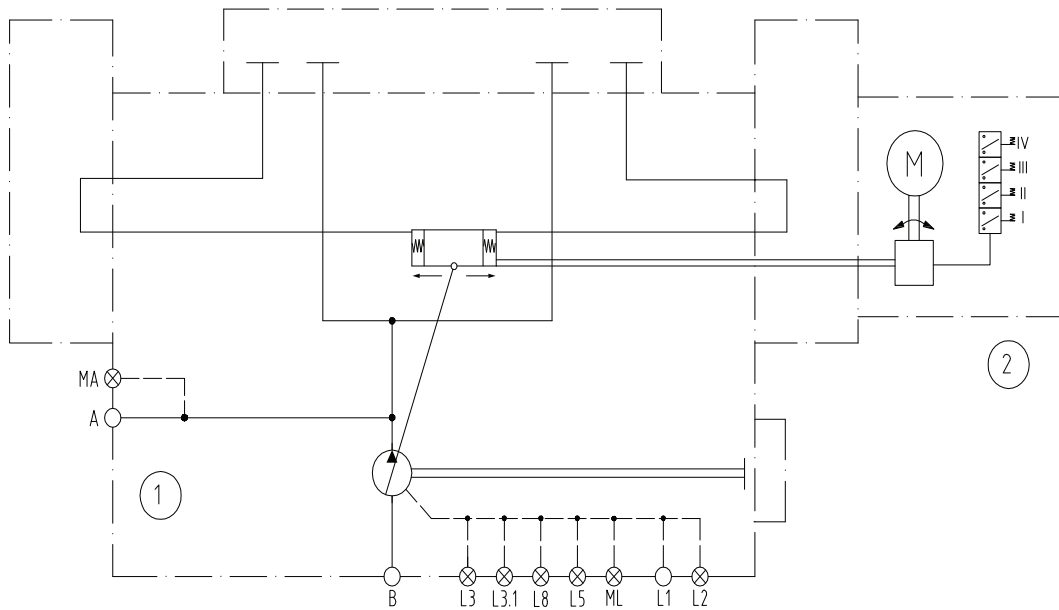
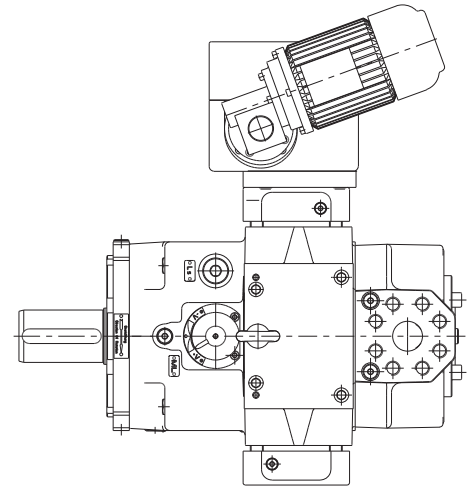
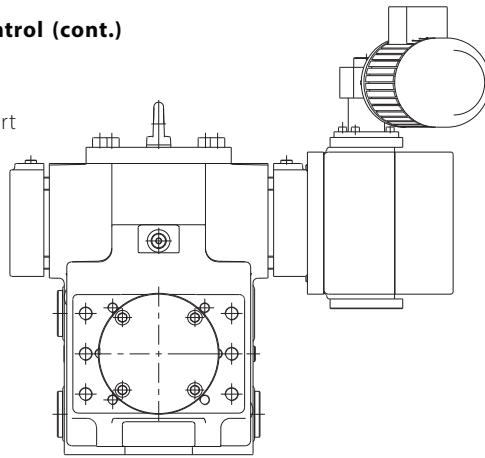
Available to special order only.

For basic pump details, see general Installation Dimensions.



Pump Dimensions with ESN...A2 Control (cont.)

For other options and sizes, please contact Danfoss Technical Support for individual pump drawings.



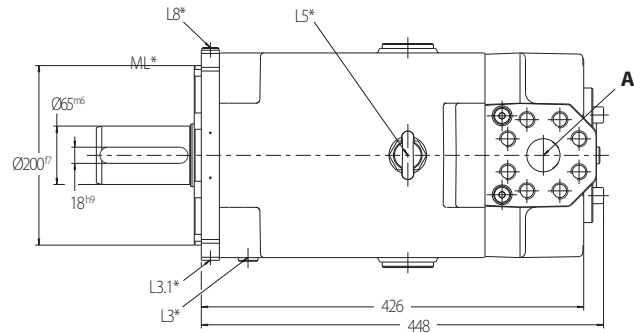
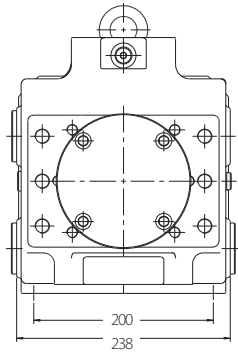
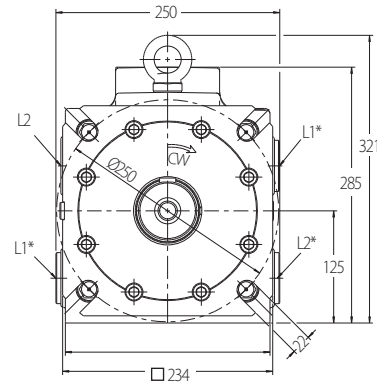
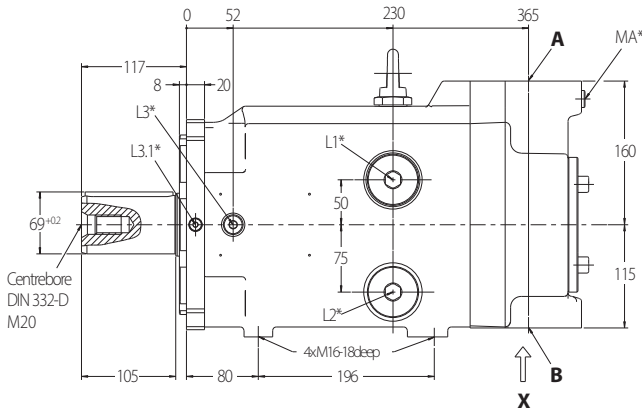
- A** - Systemport
 - B** - Inlet port
 - L1, L2** - Drain port
 - L3** - Vent port for vertical mounting
 - L3.1, L8** - Air bleed port
 - L5** - Oil filling plug
 - MA** - Gauge port, system pressure
 - ML** - Gauge port, case pressure
-
- 1** - Basic pump
 - 2** - Electric Motor for ES-control

General Dimensions

PFW 250 Pumps

Options illustrated:

- 12 = **R** (clockwise rotation)
- 1415 = **00** (no thru drive)
- 1819 = **01** (ISO keyed shaft)
- 22 = **0** (no yoke position indicator)
- 2425 = **00** (without control)

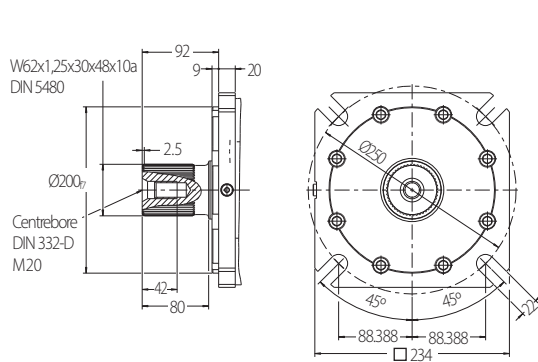


- A** - System pressure port ISO 6162-2 P38M (SAE J518 code 62, 1 1/2", 6000 psi)
- B** - Inlet pressure port ISO 6162-1 P89M (SAE J518 code 61, 3 1/2", 500 psi)
- L1** - Drain port 1 7/8"-12 UNF-2B (depending on mounting position, use upper port)
- L2** - Drain port G1 1/4" (depending on mounting position, use upper port)
- L3** - Vent port for vertical mounting G 3/8" (shaft upward)

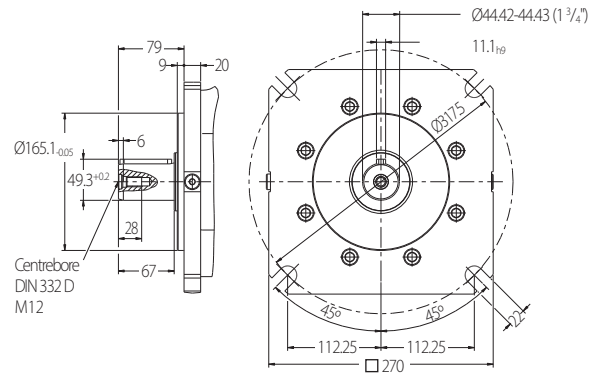
- L3.1** - Port G 1/8"
- L5** - Oil filling plug 1 1/16"-12 UNF-2B
- L8** - Air bleed port G 1/4"
- MA** - System pressure gauge port G 1/4"
- ...*** - Connection with plug

Shaft and Mounting Options PFW 250 Pumps

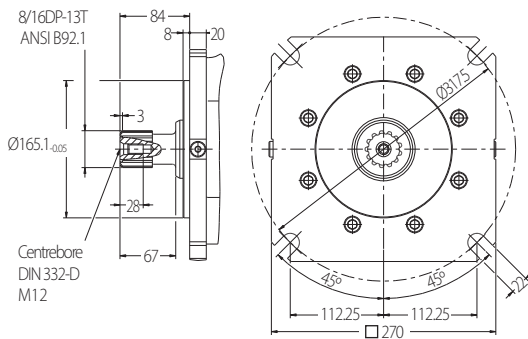
Mounting Flanges and Shaft Ends



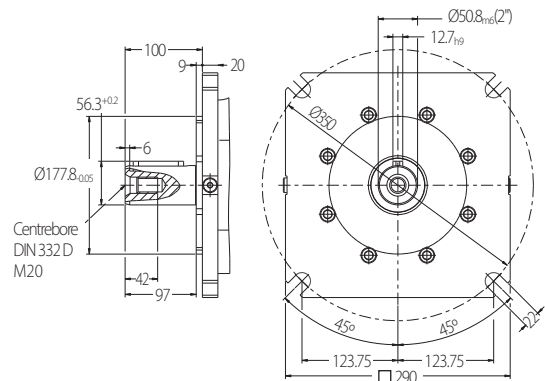
ISO splined shaft: **1011 = 07 & 1819 = 02**



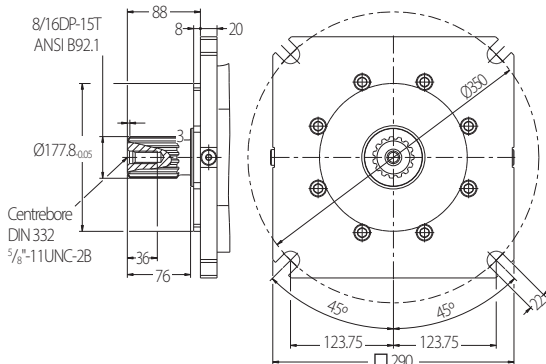
SAE E keyed shaft: **1011 = 0E & 1819 = E1**



SAE E splined shaft: **1011 = 0E & 1819 = E2**

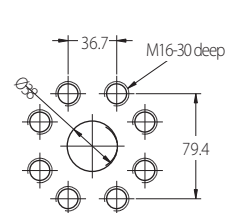


SAE F keyed shaft: **1011 = 0F & 1819 = F1**

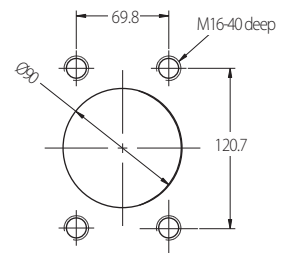


SAE F splined shaft: **1011 = 0F & 1819 = F2**

Main Ports



Port A



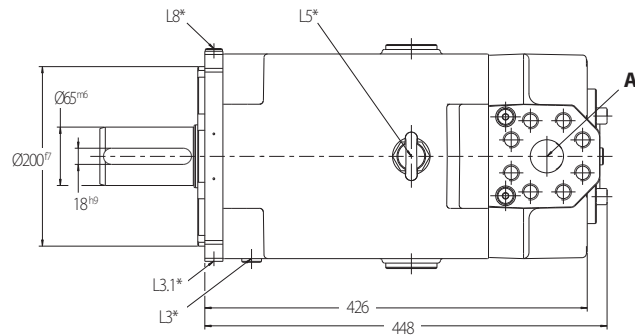
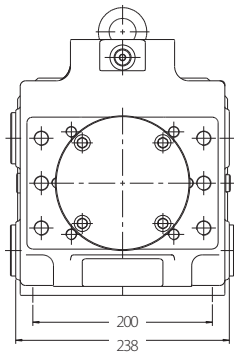
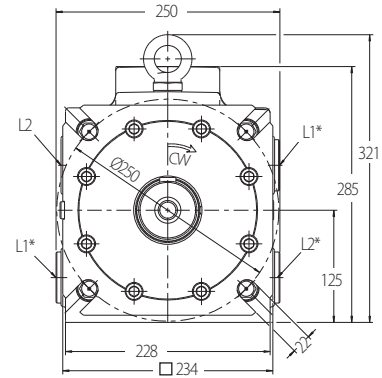
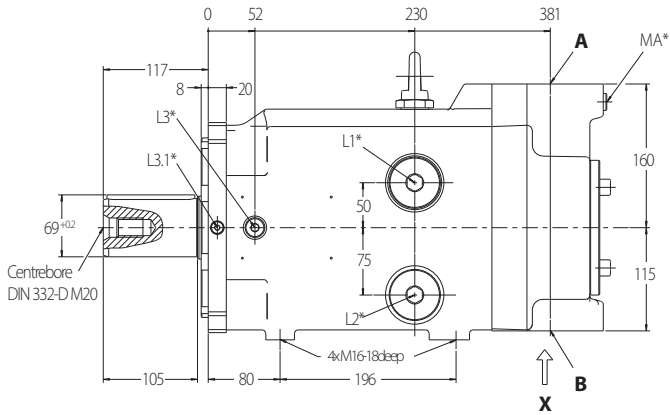
Port B
View X

General Dimensions

PFW 360 Pumps

Options illustrated:

- 12 = **R** (clockwise rotation)
- 1415 = **00** (no thru drive)
- 1819 = **01** (ISO keyed shaft)
- 22 = **0** (no yoke position indicator)
- 2425 = **00** (without control)

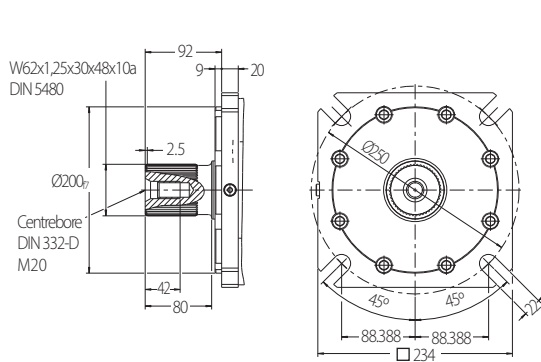


- A** - System pressure port ISO 6162-2 P38M (SAE J518 code 62, 1 1/2", 6000 psi)
- B** - Inlet pressure port ISO 6162-1 P89M (SAE J518 code 61, 3 1/2", 500 psi)
- L1** - Drain port 1 7/8"-12 UNF-2B (depending on mounting position, use upper port)
- L2** - Drain port G1 1/4" (depending on mounting position, use upper port)
- L3** - Vent port for vertical mounting G 3/8" (shaft upward)

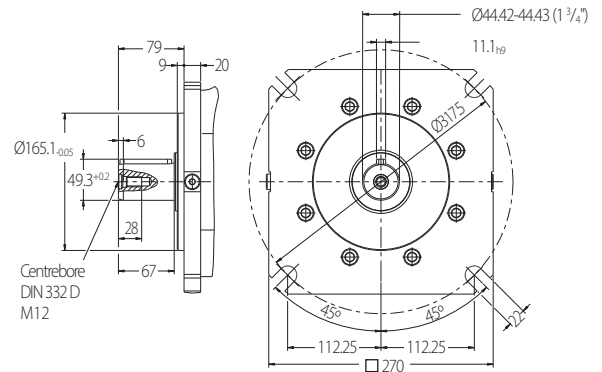
- L3.1** - Port G 1/8"
- L5** - Oil filling plug 1 1/16"-12 UNF-2B
- L8** - Air bleed port G 1/4"
- MA** - System pressure gauge port G 1/4"
- ...*** - Connection with plug

Shaft and Mounting Options PFW 360 Pumps

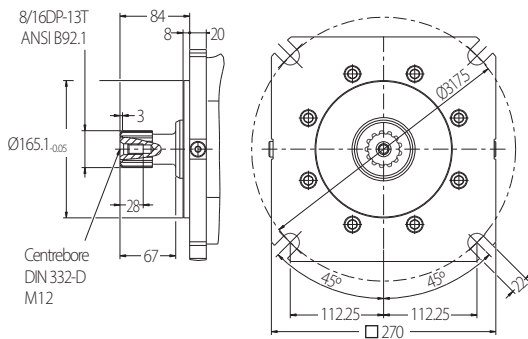
Mounting Flanges and Shaft Ends



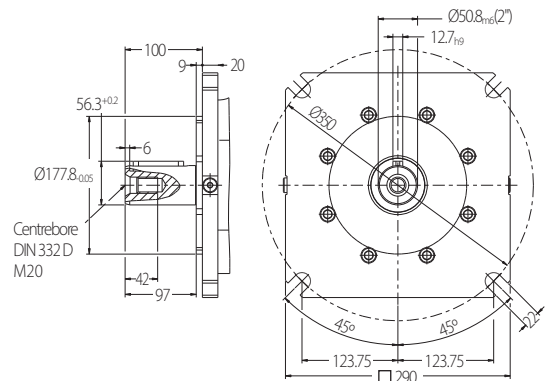
ISO splined shaft: **10|11 = 07 & 18|19 = 02**



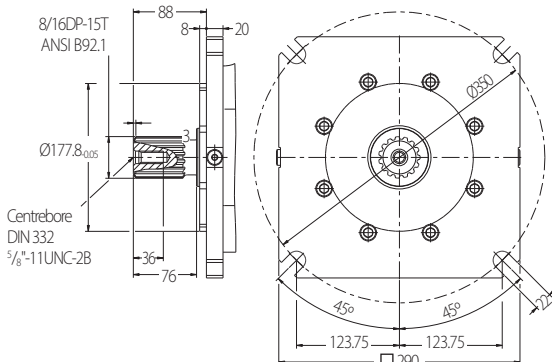
SAE E keyed shaft: **10|11 = 0E & 18|19 = E1**



SAE E splined shaft: **10|11 = 0E & 18|19 = E2**

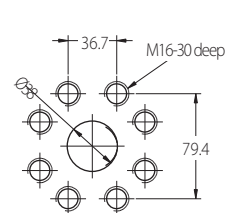


SAE F keyed shaft: **10|11 = 0F & 18|19 = F1**

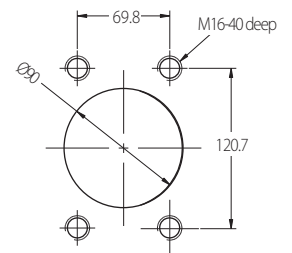


SAE F splined shaft: **10|11 = 0F & 18|19 = F2**

Main Ports



Port A



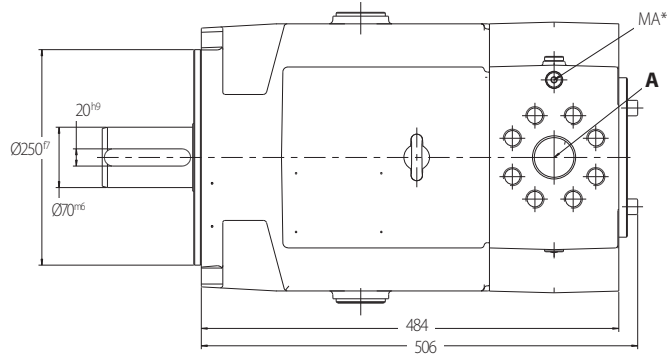
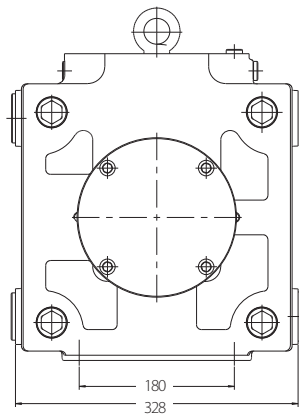
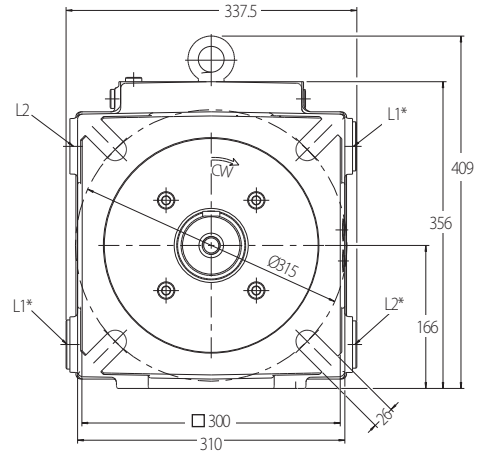
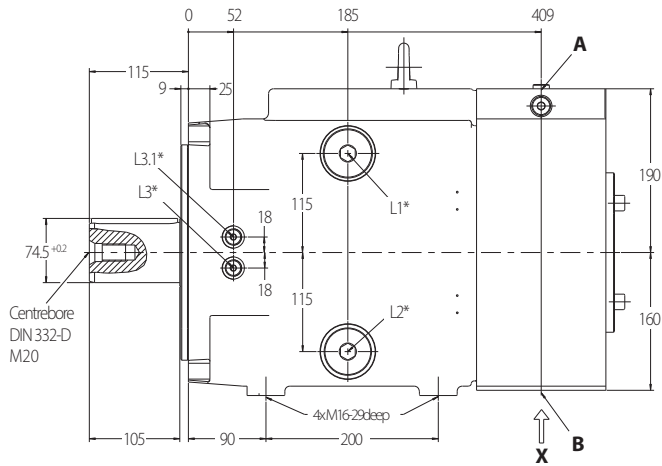
Port B
View X

General Dimensions

PFW 500 Pumps

Options illustrated:

- 12 = **R** (clockwise rotation)
- 14|15 = **00** (no thru drive)
- 18|19 = **01** (ISO keyed shaft)
- 22 = **0** (no yoke position indicator)
- 24|25 = **00** (without control)



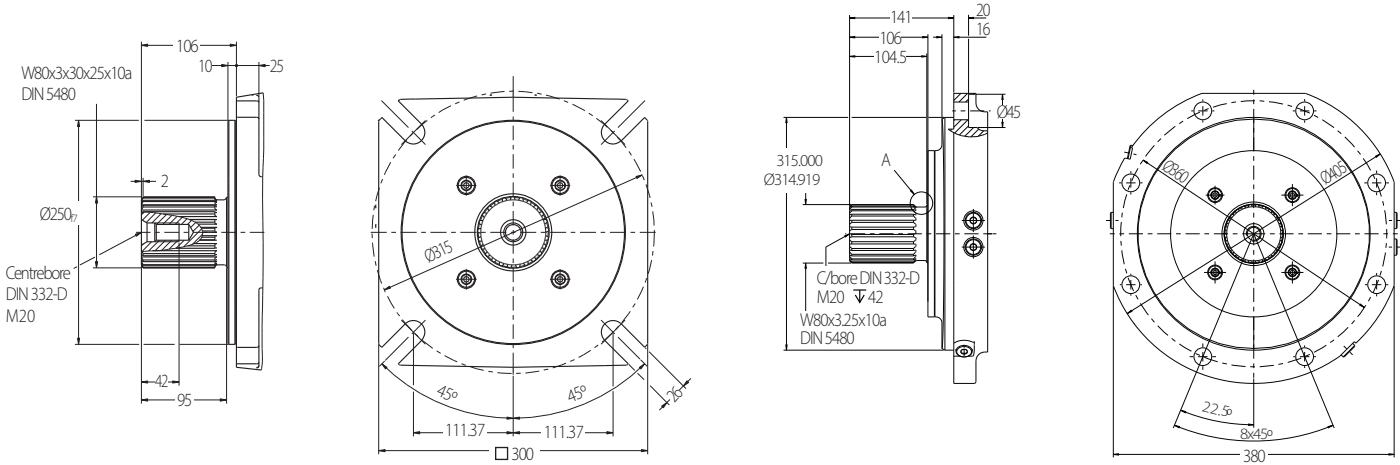
- A** - System pressure port ISO 6162-2 P51M (SAE J518 code 62, 2", 6000 psi)
- B** - System pressure port ISO 6162-1 P127M (SAE J518 code 61, 5", 500 psi)
- L1** - Drain port 1 5/8"-12 UNF-2B (depending on mounting position, use upper port)
- L2** - Drain port G1 1/2" (depending on mounting position, use upper port)

- L3** - Vent port for vertical mounting G 1/4" (shaft upward)
- L3.1** - Port G 1/4"
- MA** - System pressure gauge port G 1/4"
- ...*** - Connection with plug

Shaft and Mounting Options

PFW 500 Pumps

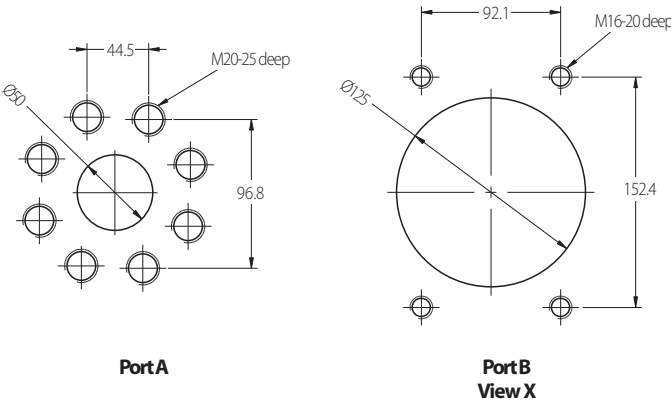
Mounting Flanges and Shaft Ends



ISO splined shaft: $\boxed{10|11} = 08$ & $\boxed{18|19} = 02$

ISO special splined shaft: $\boxed{10|11} = 09$ & $\boxed{18|19} = 05$

Main Ports

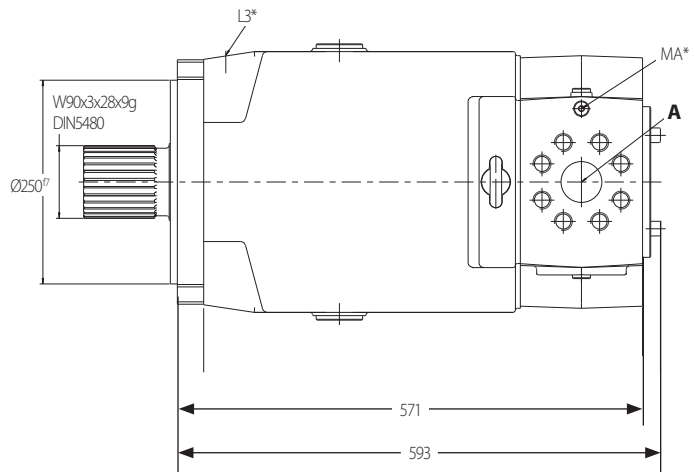
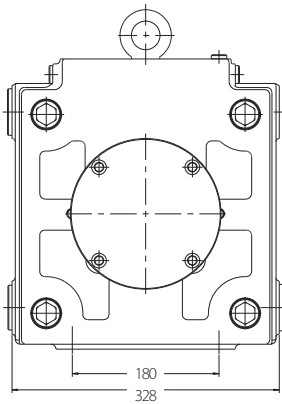
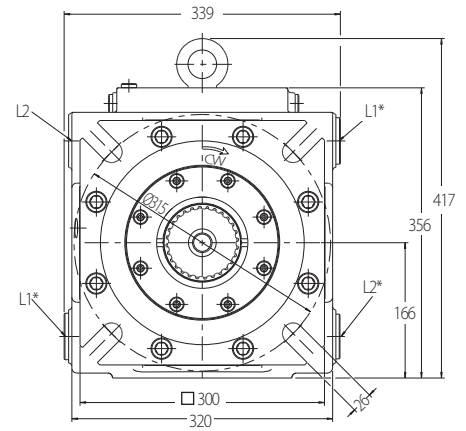
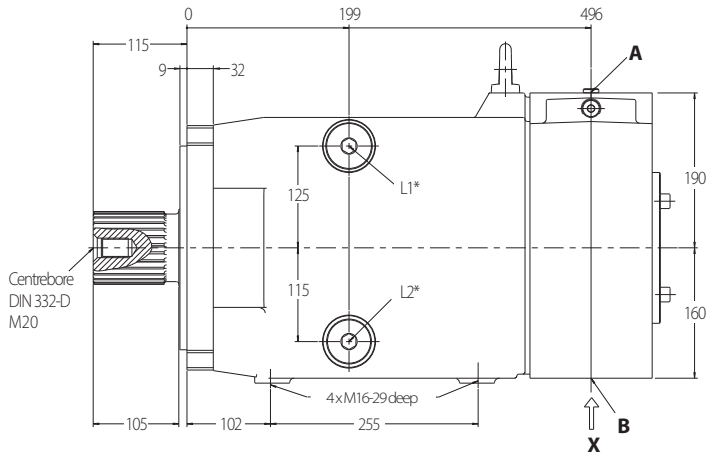


General Dimensions

PFW 750 Pumps

Options illustrated:

- 12 = **R** (clockwise rotation)
- 1415 = **00** (no thru drive)
- 1819 = **02** (ISO splined shaft)
- 22 = **0** (no yoke position indicator)
- 2425 = **00** (without control)



- A** - System pressure port ISO 6162-2 P51M (SAE J518 code 62, 2", 6000 psi)
- B** - System pressure port ISO 6162-1 P127M (SAE J518 code 61, 5", 500 psi)
- L1** - Drain port 1 5/8"-12 UNF-2B (depending on mounting position, use upper port)
- L2** - Drain port G1 1/2" (depending on mounting position, use upper port)

- L3** - Vent port for vertical mounting G 1/4" (shaft upward)
- MA** - System pressure gauge port G 1/4"
- ...*** - Connection with plug

Shaft and Mounting Options

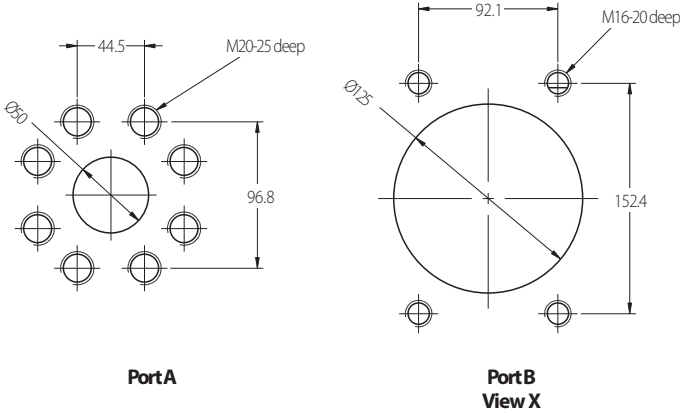
PFW 750 Pumps

Mounting Flanges and Shaft Ends

ISO splined shaft: 1011 = 08 & 1819 = 02

as illustrated on the previous page is the only arrangement suitable for Hydrokraft pumps PFW 750.

Main Ports

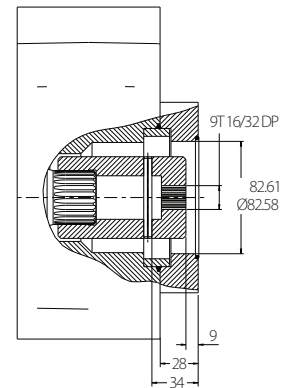
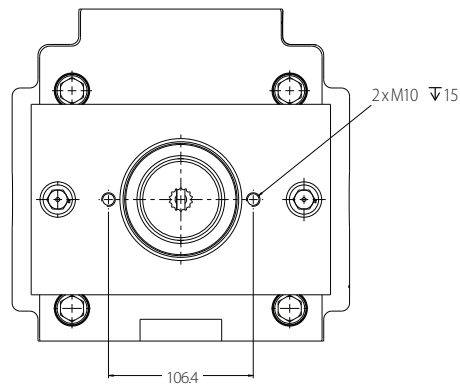


Thru-Drive Options 130 and 180 Series

All thru-drives accept DIN ISO 3019-2 (SAE J744) mounting interface. Other thru-drive interfaces available on request. For basic pump details, see general Installation Dimensions.

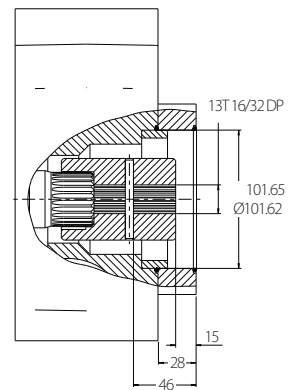
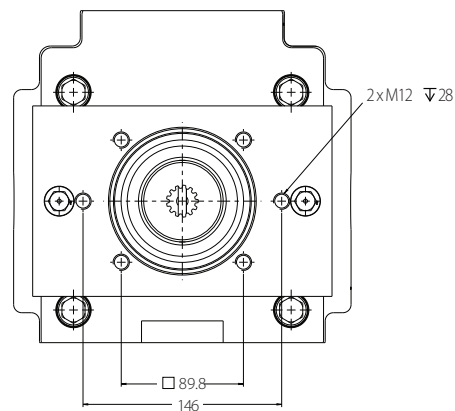
Option illustrated:

14 13 = **0A** (SAE A)



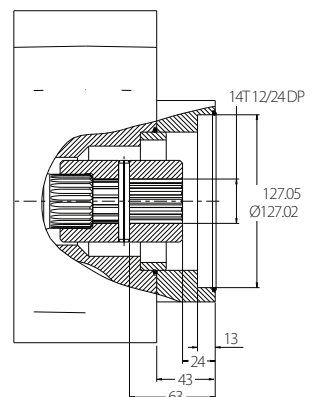
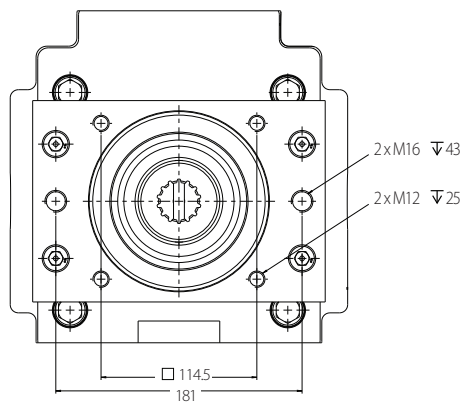
Option illustrated:

14 13 = **0B** (SAE B)



Option illustrated:

14 13 = **0C** (SAE C)

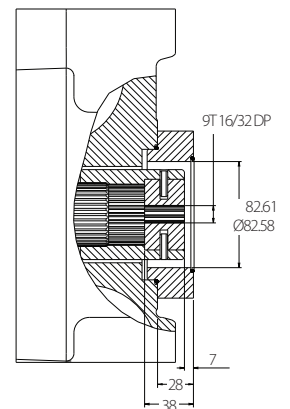
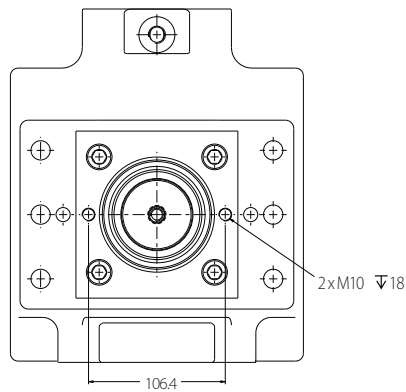


Thru-Drive Options 250 and 360 Series

All thru-drives accept DIN ISO 3019-2 (SAE J744) mounting interface. Other thru-drive interfaces available on request.
For basic pump details, see general Installation Dimensions.

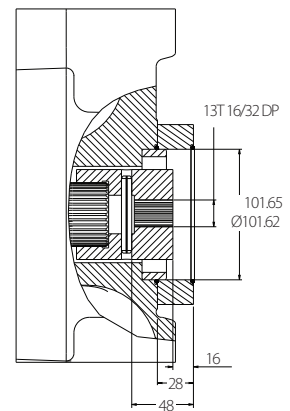
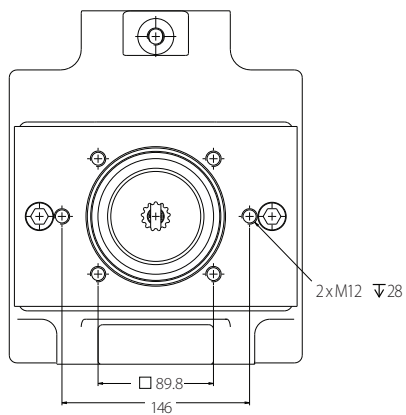
Option illustrated:

14 13 = **0A** (SAE A)



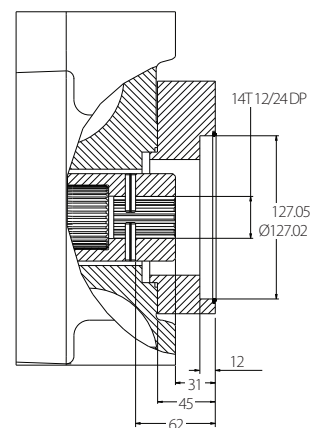
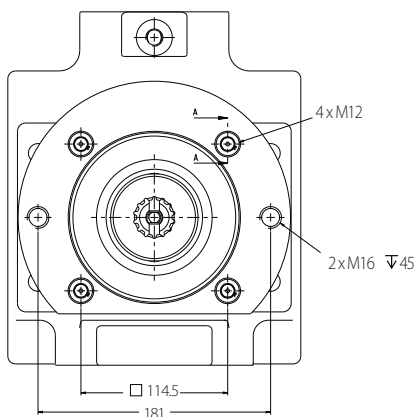
Option illustrated:

14 13 = **0B** (SAE B)



Option illustrated:

14 13 = **0C** (SAE C)



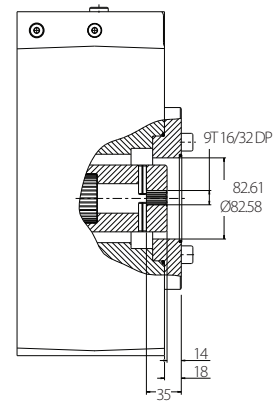
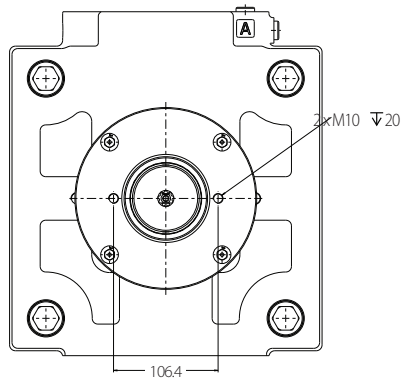
Thru-Drive Options

500 Series

All thru-drives accept DIN ISO 3019-2 (SAE J744) mounting interface. Other thru-drive interfaces available on request. For basic pump details, see general Installation Dimensions.

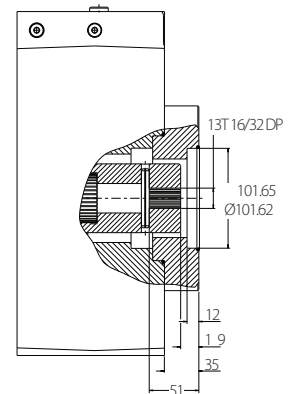
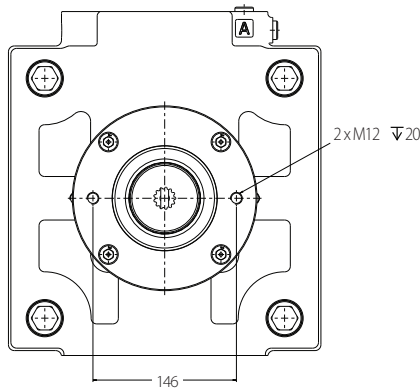
Option illustrated:

14 13 = **0A** (SAE A)



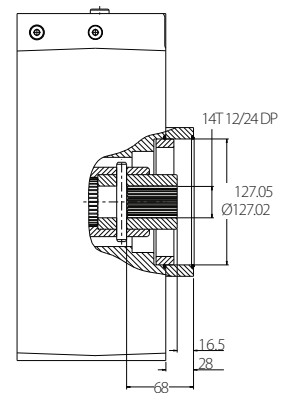
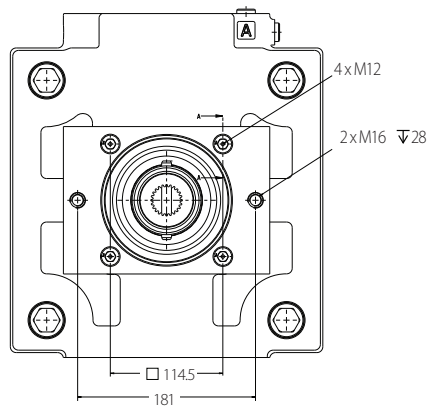
Option illustrated:

14 13 = **0B** (SAE B)



Option illustrated:

14 13 = **0C** (SAE C)



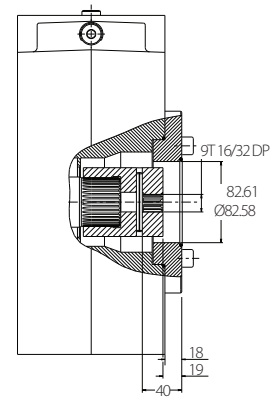
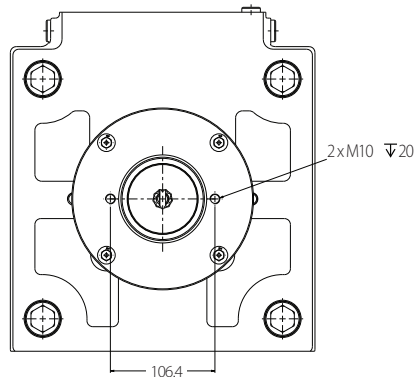
Thru-Drive Options

750 Series

All thru-drives accept DIN ISO 3019-2 (SAE J744) mounting interface. Other thru-drive interfaces available on request. For basic pump details, see general Installation Dimensions.

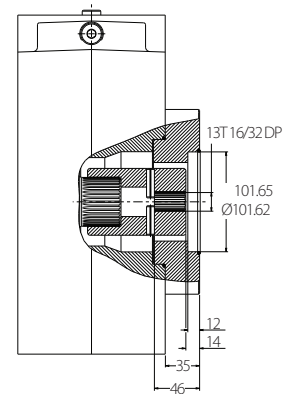
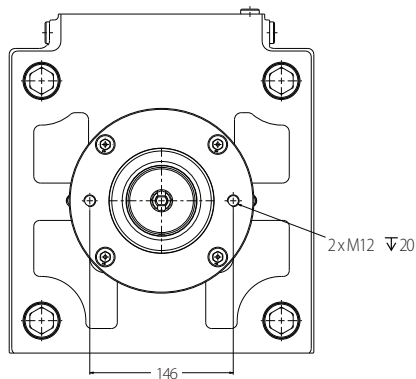
Option illustrated:

14 13 = **0A** (SAE A)



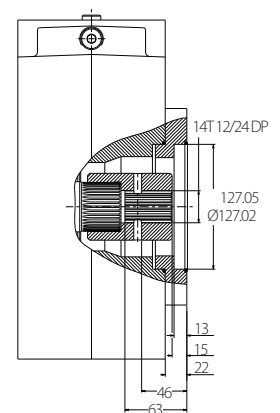
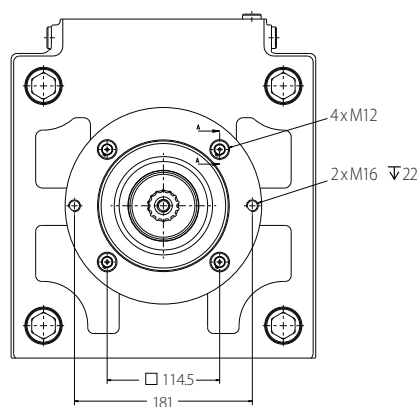
Option illustrated:

14 13 = **0B** (SAE B)



Option illustrated:

14 13 = **0C** (SAE C)



Swash Angle and Flow Direction

