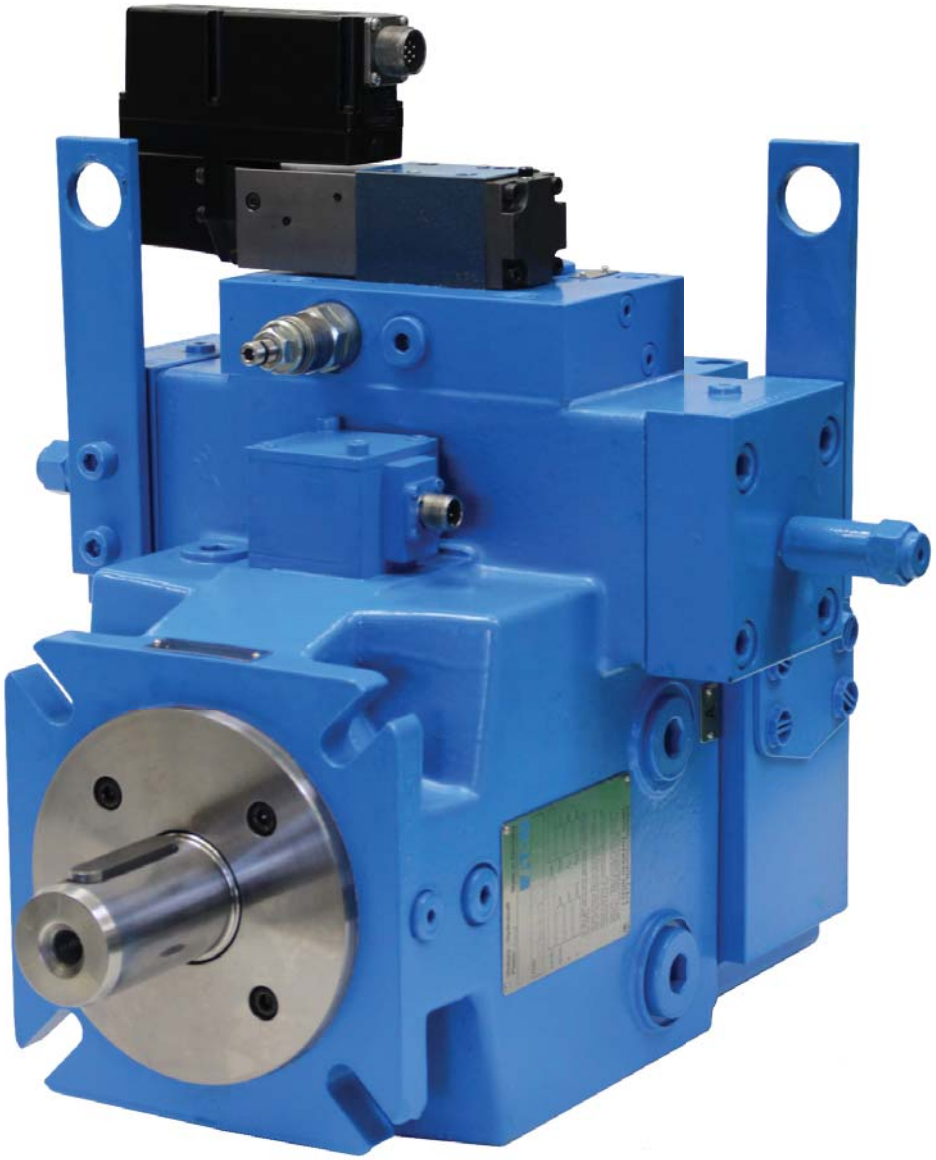
Eaton®
Hydrokraft Open Loop Piston Pumps

W Series



Powering Business Worldwide

Contents

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

DP - Displacement proportional to pressure signal

PQ - Digital controller

ES - Displacement adjustment via electric motor

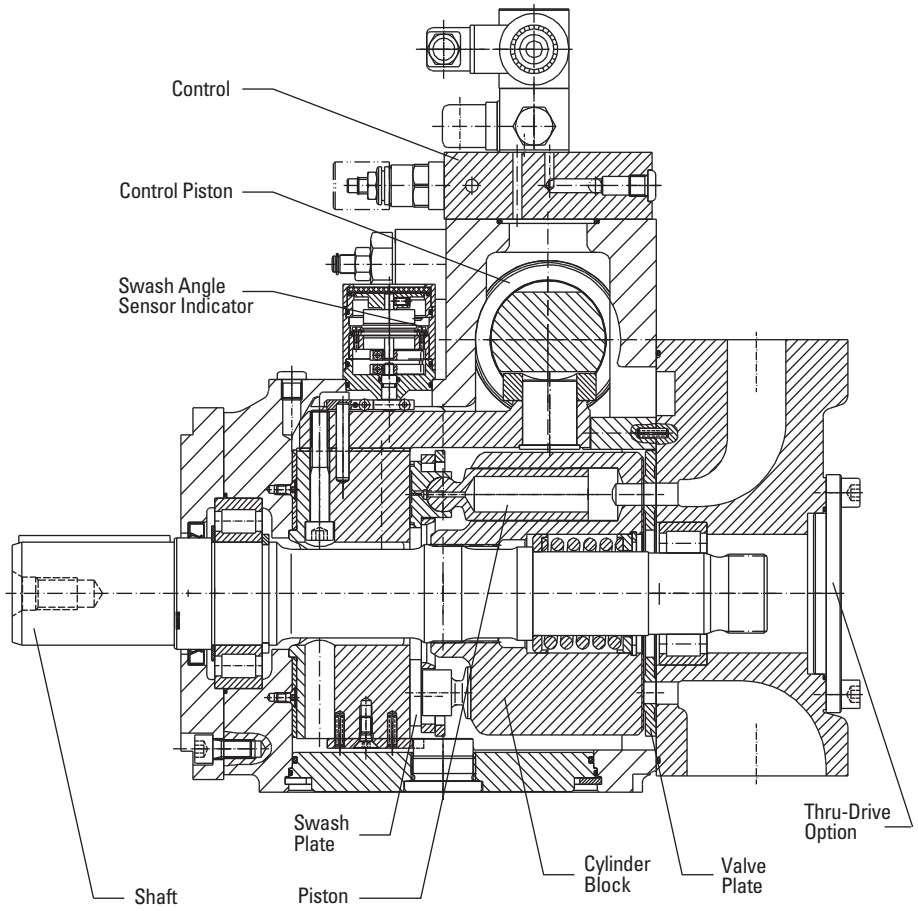
Extra functions available for DP & SP:

Pressure limitation and/or power control overriding function.

Note

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

Typical Section of Open Loop PVW Pump



Model Code

Open Loop Pumps
W Series - Basic Pumps

● Preferred standard option
◉ Other standard option
○ Special option on request
× Not available

P * W * – * * * M * * * * * * 1 R * * S * * * #

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

		Pump Size	130	180	250	360	500	750
1		**Pump**						
P	–	Open loop pump	●	●	●	●	●	●
2		**Displacement**						
F	–	Fixed	×	×	●	●	●	●
V	–	Variable	●	●	●	●	●	●
3		**Pump Series**						
W	–	"W" series (ex-30 design)	●	●	●	●	●	●
4		**Configuration**						
S	–	Single unit	●	●	●	●	●	●
F	–	Front unit	○	○	○	○	○	○
M	–	Middle unit	○	○	○	○	○	○
R	–	Rear unit	○	○	○	○	○	○
5		**Separator**	●	●	●	●	●	●
6 7 8		**Displacement cm³/rev (in³/rev)**						
130	–	130 cm³/rev (8 in³/rev)	●	×	×	×	×	×
180	–	180 cm³/rev (11 in³/rev)	×	●	×	×	×	×
250	–	250 cm³/rev (15.3 in³/rev)	×	×	●	×	×	×
360	–	360 cm³/rev (22.0 in³/rev)	×	×	×	●	×	×
500	–	500 cm³/rev (30.5 in³/rev)	×	×	×	×	●	×
750	–	750 cm³/rev (45.8 in³/rev)	×	×	×	×	×	●
***	–	Non-standard (PFW only) ◆	×	×	○	○	○	○
◆ *Non-standard displacements (cm³/rev):*								
250		**220/200**						
360		**310**						
500		**465/365**						
750		**710**						
9		**Basic Standard**						
M	–	Metric	●	●	●	●	●	●
10 11		**Mounting Flange**						
05	–	ISO 3019/2-160B4HW	●	●	×	×	×	×
07	–	ISO 3019/2-200B4HW	×	×	●	●	×	×
08	–	ISO 3019/2 8 bolt metric	×	×	×	×	●	●
09	–	Special 8-bolt flange	×	×	×	×	○	×
0D	–	SAE D 4-hole flange	○	○	×	×	×	×
0E	–	SAE E 4-hole flange	×	×	○	○	×	×
0F	–	SAE F 4-hole flange	×	×	○	○	×	×
12		**Rotation**						
R	–	Clockwise	●	●	●	●	●	●
L	–	Counter-clockwise	○	○	○	○	○	○
13		**Maximum Displacement Screws**						
0	–	Displacement adjusting screw						
		With control DF/LR	●	●	●	●	●	●
		With control DP/SP/PQ	×	×	●	●	●	×
		With control DP or SP + DF	×	×	●	●	●	×
		With control DP or SP (+ DF) + LR/ES	×	×	×	×	×	×
4	–	Fixed mechanical stop ring side A	○	○	○	○	○	○
5	–	Fixed mechanical stop ring side B	○	○	○	○	○	○
		Continued next column						
		Pump Size	**130**	**180**	**250**	**360**	**500**	**750**

		Pump Size	130	180	250	360	500	750
		Maximum Displacement Screws (cont.)						
6	–	Fixed mech. stop ring sides A & B	○	○	○	○	○	○
Note: *Customer adjustment required*								
4 *used as max. volume adjustment side A*								
5 *used as min. volume stop side A*								
14 15		**Thru-Drive Options**						
00	–	None	●	●	●	●	●	●
0A	–	SAE A	○	○	○	○	○	○
0B	–	SAE B	○	○	○	○	○	○
0C	–	SAE C	○	○	○	○	○	○
0P	–	Pilot pump (8 cm³/rev)	○	○	○	○	○	○
0*	–	* assigned by Engineering	○	○	○	○	○	○
16		**Main Ports**						
1	–	SAE ports - Metric bolts	●	●	●	●	●	●
17		**Main Port Orientation**						
R	–	Radial (side ports)	●	●	●	●	●	●
A	–	Axial (rear ports)	×	×	○	×	○	○
18 19		**Main Drive Shaft End**						
01	–	ISO straight key	●	●	●	●	●	×
02	–	ISO splines	●	●	●	●	●	●
05	–	ISO special splines	○	○	○	○	◉	×
D1	–	SAE D keyed 1 3/4"	◉	◉	×	×	×	×
D2	–	SAE D splined 8/16 13T	◉	◉	×	×	×	×
E1	–	SAE E keyed 1 3/4"	×	×	◉	◉	×	×
E2	–	SAE E splined 8/16 13T	×	×	◉	◉	×	×
F1	–	SAE F keyed 2"	×	×	○	○	×	×
F2	–	SAE F splines 8/16 15T	×	×	○	○	×	×
20		**Drive Shaft Seal Configuration**						
S	–	Single shaft seal	●	●	●	●	●	●
21		**Seal Material**						
V	–	FKM	●	●	●	●	●	●
C	–	Special shaft seal, for HFC fluids	◉	◉	◉	◉	◉	◉
F	–	FKM + front bearing flushing prepared	◉	◉	◉	◉	◉	◉
K	–	FKM with HP lubrication	◉	◉	◉	◉	◉	◉
22		**Yoke Position Indicator**						
0	–	No position indicator	●	●	●	●	●	●
V	–	Visual indicator	●	●	●	●	●	●
P	–	Voltage indicator	◉	◉	◉	◉	◉	◉
M	–	Voltage + visual indicator	●	●	●	●	●	●
R	–	Current indicator	◉	◉	◉	◉	◉	◉
S	–	Current + visual indicator	◉	◉	◉	◉	◉	◉
Other options on request.								
23		**Surface Coating**						
A	–	Primer blue ▼	●	●	●	●	●	●
0	–	Rust inhibitor oil	○	○	○	○	○	○
▼ *Other finishes on request.*								
24		**Control Model Code**						
See fields 24 to 48 on following pages.								
		Pump Size	**130**	**180**	**250**	**360**	**500**	**750**

Model Code

Open Loop Pumps
W Series - **DF** Control

● Preferred standard option
◉ Other standard option
○ Special option on request
× Not available

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 Δp = 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)	●	●	●	●	●	●
F	–	Remote port without pilot valve	◉	◉	◉	◉	◉	◉
K	–	Electro-proportional relief valve, complete with electronic card	◉	◉	◉	◉	◉	◉
S	–	Slow upstroke screw adjustment	◉	◉	◉	◉	◉	◉
32 33 34		**Power Control**						
000	–	Not applicable						
35		**Pilot Oil Filter**						
0	–	Not applicable						
36		**Venting Valve**						
0	–	None	●	●	●	●	●	●
1	–	Solenoid valve ▲	◉	◉	◉	◉	◉	◉
▲ *Specify voltage in* 39								
37		**Position Monitoring**						
0	–	None						
38		**Electric Motor Type**						
0	–	None						
		Pump Size	**130**	**180**	**250**	**360**	**500**	**750**

		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	●	●	●	●	●	●
********	–	Eaton assigned number as per data specified in table below ◆	○	○	○	○	○	○
44 45 46		**Special Features**						
000	–	None	●	●	●	●	●	●
*******	–	Defined by Eaton	○	○	○	○	○	○
47 48		**Design Number**						
******	–	10-99 assigned by Eaton	●	●	●	●	●	●
		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 displacment 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
× 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 Δp = 15 bar) ▲	●	●	●	●	●	●
▲ *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)	●	●	●	●	●	●
F	–	Remote port without pilot valve	◉	◉	◉	◉	◉	◉
K	–	Electro-proportional relief valve, complete with electronic card	◉	◉	◉	◉	◉	◉
S	–	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 ▼	◉	◉	◉	◉	◉	◉
▼ *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**

		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	●	●	●	●	●	●
****	–	Eaton assigned number as per data specified in table below ◆	○	○	○	○	○	○
44 45 46		**Special Features**						
000	–	None	●	●	●	●	●	●
***	–	Defined by Eaton	○	○	○	○	○	○
47 48		**Design Number**						
**	–	10-99 assigned by Eaton	●	●	●	●	●	●
		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 displacment adjustments are the most common reasons for using this option.*

Model Code

● Preferred standard option
◍ Other standard option
○ Special option on request
× 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)		●	●	●	●	●	●
F	–	Remote port without pilot valve		◍	◍	◍	◍	◍	◍
K	–	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		●	●	●	●	●	●
****	–	Eaton assigned number as per data specified in table below ◆		○	○	○	○	○	○
44 45 46			**Special Features**						
000	–	None		●	●	●	●	●	●
***	–	Defined by Eaton		○	○	○	○	○	○
47 48			**Design Number**						
**	–	10-99 assigned by Eaton		●	●	●	●	●	●
			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 displacment adjustments are the most common reasons for using this option.*

Model Code

Open Loop Pumps
W Series - **DP** Control

● Preferred standard option
◉ Other standard option
○ Special option on request
× Not available

D P * 0 0 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**						
DP	–	Displacement adjustment proportional to pilot pressure	●	●	●	●	●	●
26		**Displacement Adjustment Options**						
G	–	CETOP 3 interface only	●	●	●	●	●	●
H	–	Remote port G1/4"	●	●	●	●	●	●
J	–	Proportional KCG relief valve including EEA-PAM amplifier card	●	●	●	●	●	●
27 28		**Control Electronics**						
00	–	Not applicable						
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)	●	●	●	●	●	●
F	–	Remote port without pilot valve	◉	◉	◉	◉	◉	◉
K	–	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		In-line filter with visual indicator	○	○	○	○	○	○
E		In-line filter with electrical indicator	○	○	○	○	○	○
36		**Venting Valve**						
0	–	Not applicable						
37		**Position Monitoring**						
0	–	Not applicable						
		Pump Size	130	180	250	360	500	750

		Pump Size	130	180	250	360	500	750
38		**Electric Motor Type**						
0	–	Not applicable						
39		**Venting Valve Control Voltage**						
0	–	Not applicable						
40 41 42 43		**Customer Adjustment Specification**						
0000	–	None (standard)	●	●	●	●	●	●
****	–	Eaton assigned number as per data specified in table below ◆	○	○	○	○	○	○
44 45 46		**Special Features**						
000	–	None	●	●	●	●	●	●
***	–	Defined by Eaton	○	○	○	○	○	○
47 48		**Design Number**						
**	–	10-99 assigned by Eaton	●	●	●	●	●	●
		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 displacment adjustments are the most common reasons for using this option.*

Model Code

● Preferred standard option
◉ Other standard option
○ Special option on request
× Not available

Open Loop Pumps
W Series - **PQ** Control
22 = **P, M, R or S** mandatory
(electrical yoke position indicator)

PQ * 00 * 0 0 000000 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

		Pump Size	130	180	250	360	500	750
24 25		**Control Type**						
PQ	–	Proportional valve multifunctional control (PpQ controller)	●	●	●	●	●	●
26		**Displacement Adjustment Options**						
D	–	CETOP 3 proportional valve + OBE	●	●	●	●	●	●
E	–	CETOP 5 proportional valve + OBE	◉	◉	◉	◉	◉	◉
27 28		**Control Electronic**						
00	–	Without electronics (to be ordered separately)	●	●	●	●	●	●
29		**Yoke Displacement Zone**						
A	–	No pressure sensor one side ▲	◉	◉	◉	◉	◉	◉
C		No pressure sensor either side ▲	◉	◉	◉	◉	◉	◉
D		Pressure sensor 4-20 mA one side	◉	◉	◉	◉	◉	◉
E		Pressure sensor 4-20 mA both sides	●	●	●	●	●	●
▲ *Without pressure sensor but with G1/2" thread to fit user-provided pressure sensor.*								
30		**Additional Functions**						
0	–	Not required	●	●	●	●	●	●
31		**Pressure Control Options**						
0	–	Not required for this control type	●	●	●	●	●	●
32 33 34 35 36 37		**Power Control Specification**						
000 000	–	Not applicable for this control type						
38		**Pilot Oil Filter**						
0	–	No filter (standard)	●	●	●	●	●	●
39		**Failsafe Valve**						
0	–	Not applicable						
Note: *Not required, integrated in proportional valve with OBE.*								
		Pump Size	**130**	**180**	**250**	**360**	**500**	**750**

		Pump Size	130	180	250	360	500	750
40		**Position Monitoring**						
0	–	Not applicable						
41		**Electric Motor Type**						
0	–	Not required for this control type	●	●	●	●	●	●
42		**Failsafe Valve Control Voltage**						
0	–	Not applicable						
43 44 45 46		**Customer Adjustment Specification**						
0000	–	None	●	●	●	●	●	●
********	–	Eaton assigned number as per data specified in table below ◆	○	○	○	○	○	○
		Pump Size	**130**	**180**	**250**	**360**	**500**	**750**

◆ Example for Customer Adjustment Specifications

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 displacment adjustments are the most common reasons for using this option.*

Model Code

Open Loop Pumps
W Series - **ES** Control
Available to special order only

● Preferred standard option
◉ Other standard option
○ Special option on request
× Not available

E S * 0 0 A 0 0 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**						
ES	–	Displacement adjustment via electric motor	○	○	○	○	○	○
26		**Displacement Adjustment Options**						
M	–	Electric motor, fast response	○	○	○	○	○	○
N	–	Electric motor, medium response	○	○	○	○	○	○
P	–	Electric motor, slow response	○	○	○	○	○	○
27 28		**Control Electronics**						
00	–	Not applicable						
29		**Yoke Displacement Zone**						
A	–	Single side of centre "A"	○	○	○	○	○	○
30		**Additional Functions**						
0	–	Not applicable						
31		**Pressure Control Options**						
0	–	Not applicable						
32 33 34		**Power Control Specification**						
000	–	Not applicable						
35		**Pilot Oil Filter**						
0	–	Not applicable						
36		**Venting Valve**						
0	–	Not applicable						
37		**Position Monitoring**						
A	–	4 limit switches	○	○	○	○	○	○
B	–	8 limit switches	○	○	○	○	○	○
P	–	4 limit switches with sensor	○	○	○	○	○	○
T	–	8 limit switches with sensor	○	○	○	○	○	○
38		**Electric Motor Type**						
2	–	Motor with brake (IP54)	○	○	○	○	○	○
3	–	Motor without brake (explosion-proof)	○	○	○	○	○	○
		Pump Size	**130**	**180**	**250**	**360**	**500**	**750**

		Pump Size	130	180	250	360	500	750
39		**Venting Valve Control Voltage**						
0	–	Not applicable						
40 41 42 43		**Customer Adjustment Specification**						
0000	–	None (standard)	○	○	○	○	○	○
********	–	Eaton assigned number as per data specified in table below ◆	○	○	○	○	○	○
44 45 46		**Special Features**						
000	–	None	○	○	○	○	○	○
*******	–	Defined by Eaton	○	○	○	○	○	○
47 48		**Design Number**						
******	–	10-99 assigned by Eaton	○	○	○	○	○	○
		Pump Size	**130**	**180**	**250**	**360**	**500**	**750**

◆ Example for Customer Adjustment Specifications

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

Note: *Special response times (**see table in ES section of Control Options**) and/or maximum displacment adjustments are the most common reasons for using this option.*

Model Code

● Preferred standard option
● Other standard option
○ Special option on request
× Not available

Open Loop Pumps
W Series - No control: 2 = **F**
Fixed Displacement PFW Models

0 0 0 0 0 A 0 0 0 0 0 0 0 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**						
00	–	No control (P**F**W only, not available on sizes 130 & 180)			●	●	●	●
26		**Displacement Adjustment Options**						
0	–	Not applicable						
27 28		**Control Electronics**						
0	–	Not applicable						
29		**Yoke Displacement Zone**						
A	–	Single side of centre "A"			●	●	●	●
30		**Additional Functions**						
0	–	Not applicable						
31		**Pressure Control Options**						
0	–	Not applicable						
32 33 34		**Power Control Specification**						
000	–	Not applicable						
35		**Pilot Oil Filter**						
0	–	Not applicable						
		Pump Size	**130**	**180**	**250**	**360**	**500**	**750**

		Pump Size	130	180	250	360	500	750
36		**Bypass/Venting Valve**						
0	–	Not applicable						
37		**Position Monitoring**						
0	–	Not applicable						
38		**Electric Motor Type**						
0	–	Not applicable						
39		**Control Voltage**						
0	–	Not applicable						
40 41 42 43		**Customer Adjustment Specification**						
0000		Not applicable						
44 45 46		**Special Features**						
000	–	None			●	●	●	●
***	–	Defined by Eaton			●	●	●	●
47 48		**Design Number**						
**	–	10-99 assigned by Eaton			●	●	●	●
		Pump Size	**130**	**180**	**250**	**360**	**500**	**750**

Model Code

Combination Pump Unit

● Preferred standard option
● Other standard option
○ Special option on request
× Not available

P * W C – * H C 8 1 * * * * * * * * * * *

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39

Unit Position			1	2	3	4
1		**Combination Unit**				
P	–	Pump	●	●	●	●
2		**Displacement**				
F	–	Fixed	●	●	●	●
V	–	Variable	●	●	●	●
3		**Pump Series**				
W	–	W series (ex-30 design)	●	●	●	●
4		**Unit Type**				
C	–	Combination unit	●	●	●	●
5		**Separator**				
–	–	Beginning of displacement and control specifications				
6 7 8		**First Displacement cm³/rev (in³/rev)** ▲				
130	—	130 (7.9)	●			
180	–	180 (11.0)	●			
250	–	250 (15.3)	●			
360	–	360 (22.0)	●			
500	–	500 (30.5)	●			
750	–	750 (45.8)	●			
▲ *For special displacements, see basic pump model code*						
9 10		**First Control Type**				
00	–	No control (fixed displacement only)	●			
DF	–	Pressure compensator	●			
LR	–	Power control	●			
SP	–	Proportional valve	●			
DP	–	Pressure signal	●			
PQ	–	Digital controller	○			
ES	–	Electric motor	○			
		Unit Position	**1**	**2**	**3**	**4**

Unit Position			1	2	3	4
11 12 13		**Second Displacement cm³/rev (in³/rev)**				
066	–	66 (4.0)		●		
090	–	90 (5.5)		●		
130	–	130 (7.9)		●		
180	–	180 (11.0)		●		
250	–	250 (15.3)		●		
360	–	360 (22.0)		●		
500	–	500 (30.5)		●		
750	–	750 (45.8)		●		
14 15		**Second Control Type**				
00	–	No control (fixed displacement only)		●		
DF	–	Pressure compensator		●		
LR	–	Power control		●		
SP	–	Proportional valve		●		
DP	–	Pressure signal		●		
PQ	–	Digital controller		○		
ES	–	Electric motor		○		
16 17 18		**Third Displacement**				
		Options as second displacement			●	
19 20		**Third Control Type**				
		Options as second control			●	
21 22 23		**Fourth Displacement**				
		Options as second displacement				●
24 25		**Fourth Control Type**				
		Options as second control				●
26 27 28 29		**Assembly Numbers**				
HC81		Defined by Eaton	●	●	●	●
30 31 32 33 34 35 36 37 38		**Assembly Numbers**				
*** *** ***		Defined by Eaton	●	●	●	●
		Unit Position	**1**	**2**	**3**	**4**

Typical Combination Units

		Model Code
2 open-loop pumps	Front Unit	PVWF-500M08R0041R02SVMASPC03A0000000000000000010
	Rear Unit	PVWR-250M07R0001R02SVMASPC03A0000000000000000010
	Combination Unit	**PVWC-500SP250SP0000000000HC81**********
1 closed-loop pump	Front Unit	TVWF-500M08R0000H1R02SVMA20SPC03C00000000E000H000000010
+	Middle Unit	PVWM-250M07R00E1R02SV0ADF000A0000000000000000010
2 open-loop pumps	Rear Unit	PFXR-130M02R00P1A02SV0A00000A0000000000000000010
	Combination Unit	**TVWC-500SP250DF1300000000HC81**********

Note: *ISO spline shafts should be specified for combination units due to their higher torque capability.*

For model codes of other individual units, see relevant catalogs.

Specifying Combination Pumps

- For a combination of two or more units, a Combination Model Code should be compiled in addition to the individual Model Codes of each unit.
- The first displacement represents the largest unit, and so on.
- For each unit included in the combination, a separate Model Code should be compiled using the Form page at the beginning of the Model Codes section.
- Characters 26 to 39 of the Combination Model Code will be part number of the combination, defined by Eaton and stated on the order acknowledgement.
- Front and middle units must each feature the through-drive option of the following unit in the combination.

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 Eaton 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 23
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

Pump Specifications

Metric

Model			PF/VW 130/180	PF/VW 250	PF/VW 360	PF/VW 500	PF/VW 750
Design			Swashplate – Axial piston pump				
Type of mounting			Flange or foot-mounted - Combination units foot mounted only				
Pipe connection ISO 6162-1 (SAE J518) SAE Flange ISO 6162-2 (SAE J518)	B A	psi	P64M (2 1/2" - 500) P32M (1 1/4" - 6000)	P89M (3 1/2" - 500) P32M (1 1/4" - 6000)	P89M (3 1/2" - 500) P32M (1 1/4" - 6000)	P127M (5" - 500) P51M (2" - 6000	P127M (5" - 500) P51M (2" - 6000)
Direction of rotation			Clockwise or counterclockwise				
Mounting attitude			Optional, see relevant Dimensions page				
Ambient temperature range	min max	°C	-20 +50				
Mass	m	kg	130 / 140	212	220	340	395
Moment of inertia	J	kg m²	0,045	0,146	0,152	0,5	0,55

Hydraulic Characteristics			PF/VW 130/180	PF/VW 250	PF/VW 360	PF/VW 500	PF/VW 750
Rated pressure (100% duty cycle)	p_N	bar	350				
Inlet pressure	$p1_{min}$ $p1_{max}$	bar	1 abs 20				
Max. pressure to ISO 5598:2008	$p2_{max}$	bar	420				
Hydraulic fluid			Hydraulic oil to DIN 51524 part 2 See Fluid Recommendations in Application Data				
Hydraulic fluid temperature range	min max	°C	-25 +90				
Viscosity range for continuous operation	min max	cSt	10 75				
Maximum permissible start viscosity	max	cSt	1000				
Cleanliness	ISO 4406		18/15/13				
Maximum geometric displacement at shaft speed n = 1200 rev/min n = 1500 rev/min n = 1800 rev/min	Vg	cm³/rev	 130 / 180 130 / 180 130 / 180	 250 250 250	 360 360 270	 500 500 410/500 ▲	 750 625/750 ▲ –
Case pressure (overpressure) n = 1200 rev/min n = 1500 rev/min n = 1800 rev/min	p_{case}	bar	 3,2 2,6 2,0	 2,8 2,2 1,6	 2,8 2,2 1,6	 2,35 1,85 1,35	 2,1 1,7 –

Drive			PF/VW 130/180	PF/VW 250	PF/VW 360	PF/VW 500	PF/VW 750
Driving torque (p_N = 350 bar, Vg at 1500 rev/min, η = 100%)	$M1_{single}$	Nm	724/1002	1392	2005	2785	3481/4177
Power consumption (p_N = 350 bar, Vg at 1500 rev/min, η = 100%)	$P1_{single}$	kW	113 / 157	218	315	437	546/656

Combination Units			PF/VW 130/180	PF/VW 250	PF/VW 360	PF/VW 500	PF/VW 750
Maximum driving torque ISO splined shaft only	M1	Nm	2x870/2x1204	2 x 1670	2 x 2405	5000	5000

▲ *Larger displacement / higher speed on request only. Contact Eaton Technical Support.*

Pump Specifications

US

Model			PF/VW 130/180	PF/VW 250	PF/VW 360	PF/VW 500	PF/VW 750
Design			Swashplate – Axial piston pump				
Type of mounting			Flange or foot-mounted - Combination units foot mounted only				
Pipe connection ISO 6162-1 (SAE J518) SAE Flange ISO 6162-2 (SAE J518)	B A	psi	P64M (2 1/2" - 500) P32M (1 1/4" - 6000)	P89M (3 1/2" - 500) P32M (1 1/4" - 6000)	P89M (3 1/2" - 500) P32M (1 1/4" - 6000)	P127M (5" - 500) P51M (2" - 6000	P127M (5" - 500) P51M (2" - 6000)
Direction of rotation			Clockwise or counterclockwise				
Mounting attitude			Optional, see relevant Dimensions page				
Ambient temperature range	min max	°F	-4 +122				
Mass	m	lb	215	467	485	750	871
Moment of inertia	J	lb ft²	3.46	3.46	3.61	11.9	13.1

Hydraulic Characteristics			PF/VW 130/180	PF/VW 250	PF/VW 360	PF/VW 500	PF/VW 750
Rated pressure (100% duty cycle)	p_N	psi	5075				
Inlet pressure	$p1_{min}$ $p1_{max}$	psi	14.5 abs 290				
Max. pressure to ISO 5598:2008	$p2_{max}$	psi	6090				
Hydraulic fluid			Hydraulic oil to DIN 51524 part 2 See Fluid Recommendations in Application Data				
Hydraulic fluid temperature range	min max	°F	-13 +194				
Viscosity range for continuous operation	min max	cSt	10 75				
Maximum permissible start viscosity	max	cSt	1000				
Cleanliness	ISO 4406		18/15/13				
Maximum geometric displacement at shaft speed n = 1200 rev/min n = 1500 rev/min n = 1800 rev/min	Vg	in³/rev	 7.9 / 11 7.9 / 11 7.9 / 11	 15.2 15.2 15.2	 22 22 16.4	 30.5 30.5 25/30.5 ▲	 45.7 38.1/45.7 ▲ –
Case pressure (overpressure) n = 1200 rev/min n = 1500 rev/min n = 1800 rev/min	p_{case}	psi	 46 38 29	 40 32 23	 40 32 23	 34 27 20	 30 25 –

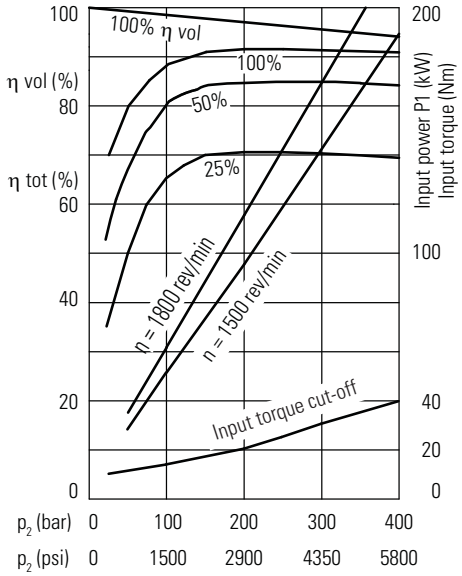
Drive			PF/VW 130/180	PF/VW 250	PF/VW 360	PF/VW 500	PF/VW 750
Driving torque (p_N = 5075 psi, Vg at 1500 rev/min, η = 100%)	$M1_{single}$	lbf ft	534/739	1027	1479	2054	2567/3081
Power consumption (p_N = 5075 psi, Vg at 1500 rev/min, η = 100%)	$P1_{single}$	hp	152/211	293	422	586	733/880

Combination Units			PF/VW 130/180	PF/VW 250	PF/VW 360	PF/VW 500	PF/VW 750
Maximum driving torque ISO splined shaft only	M1	lbf ft	2x642/2x888	2 x 1232	2 x 1774	3688	3688

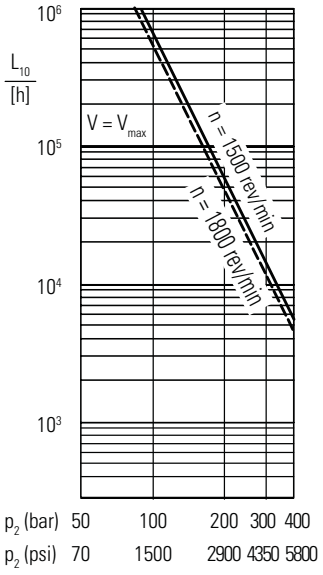
▲ *Larger displacement / higher speed on request only. Contact Eaton Technical Support.*

Performance Curves
130 & 180 Series

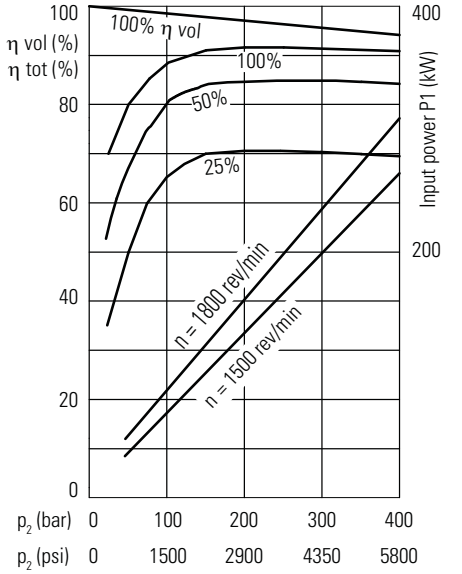
Power Efficiency Performance Curve Size130



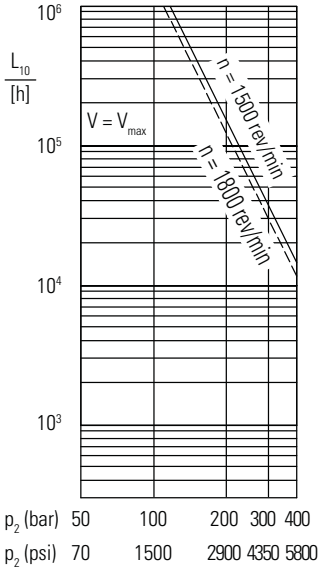
Roller Bearing Life Size 130



Power Efficiency Performance Curve Size180



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

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

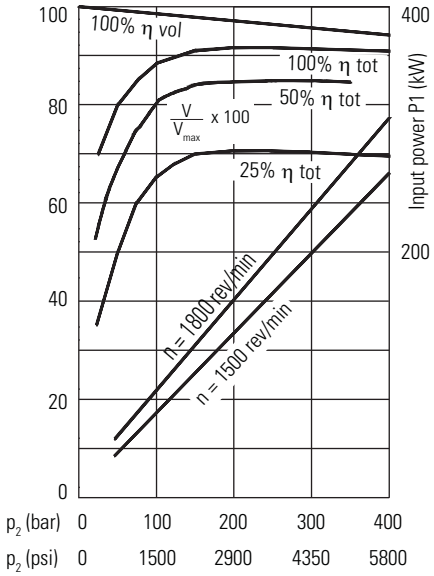
Note

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

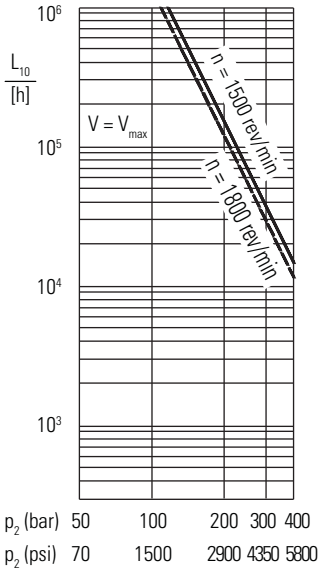
Eaton therefore shall not be held legally reponsible for any deviation from published figures.

Performance Curves
250 & 360 Series

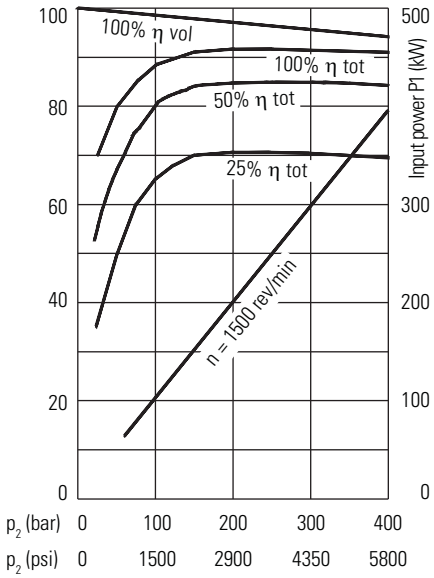
Power Efficiency Performance Curve Size250



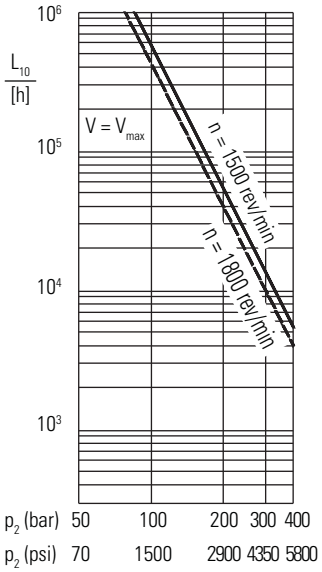
Roller Bearing Life Size 250



Power Efficiency Performance Curve Size360



Roller Bearing Life Size 360



Combination units

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

For reduced swash angle

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

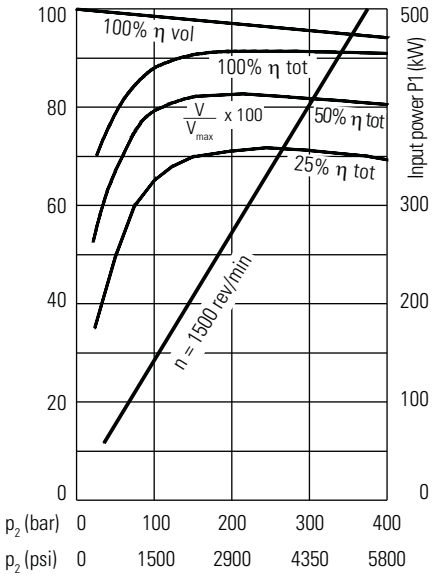
Note

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

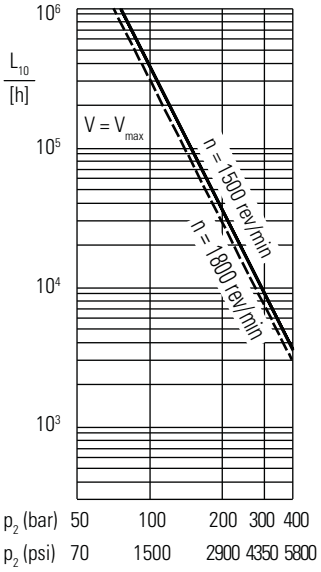
Eaton therefore shall not be held legally reponsible for any deviation from published figures.

Performance Curves
500 & 750 Series

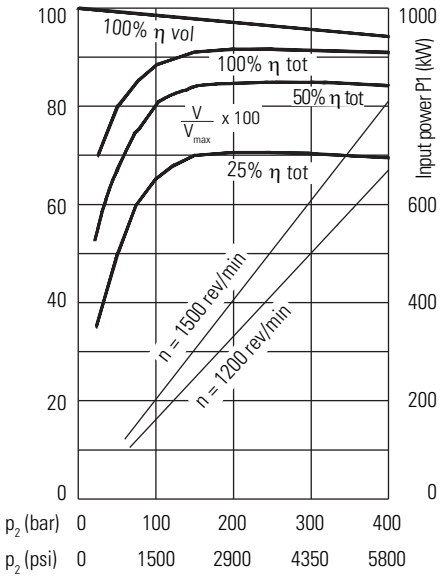
Power Efficiency Performance Curve Size500



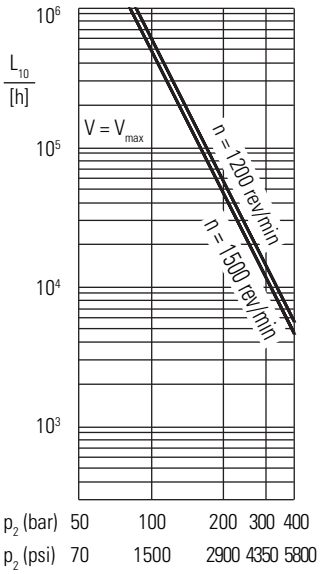
Roller Bearing Life Size 500



Power Efficiency Performance Curve Size750



Roller Bearing Life Size 750



Combination units

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

For reduced swash angle

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

Note

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

Eaton therefore shall not be held legally reponsible for any deviation from published figures.

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Powering Business Worldwide

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 Eaton 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 Eaton 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 Eaton 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 Eaton Representative for specific duty cycle recommendation.

Eaton 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 satisfac tory 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 Eaton publication 561 "Eaton Guide to Systemic Contamination Control" available from your local Eaton 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 cm³	250 &360 cm³	500 & 750 cm³			
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 c*ontact your Eaton 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 continuosly 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 Eaton 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 (cm³/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 Eaton Representative.

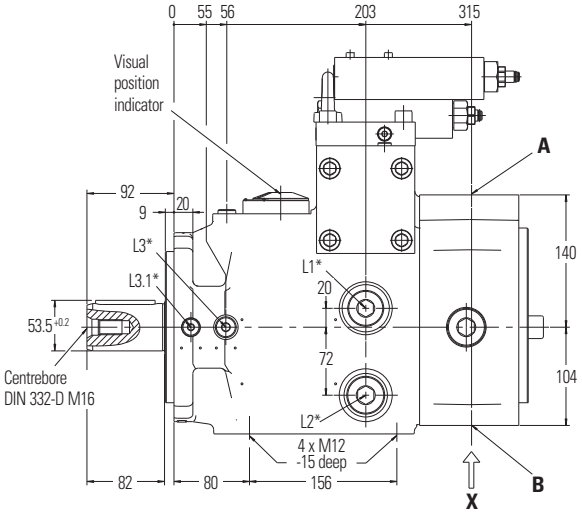
High pressure lubrication / Hydrostatic Balancing for Yoke Bearings (half-cup bearings)

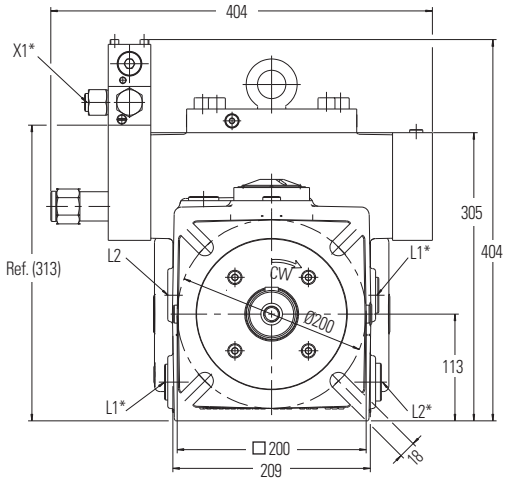
High-pressure bearing lubrication and balancing (Model Code 21 = "K") is recommeded for operating conditions with either high cycle frequencies (very short up/downstroke times) and/or where the swashplate is constantly maintained at a certain angle for long periods of time (compensated mode).

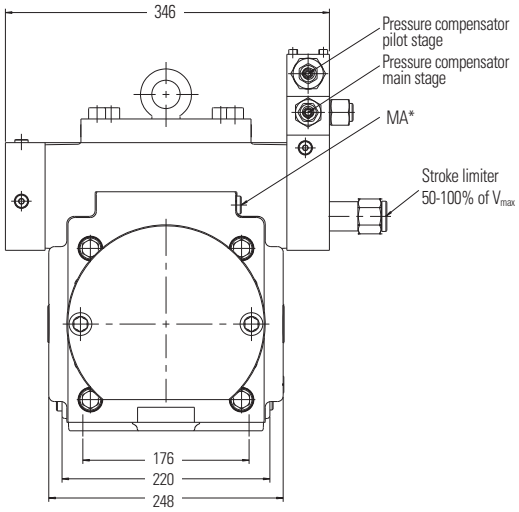
For details and additional information, please refer to the "Hydrokraft Application Guideline Presentation" available from your Eaton Representative.

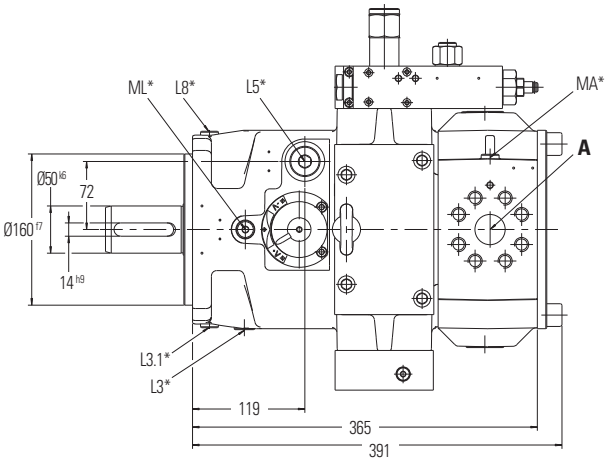
General Dimensions
PVW 130 Pumps

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)





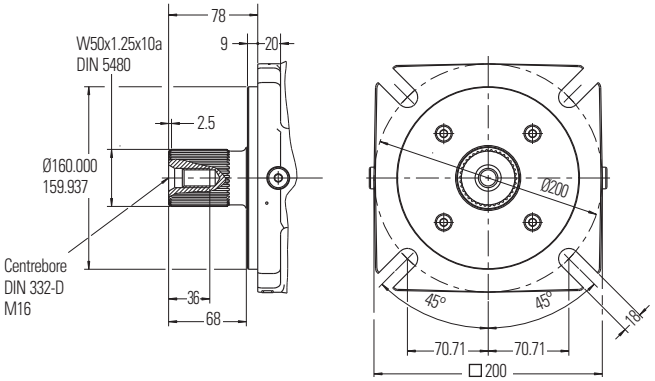




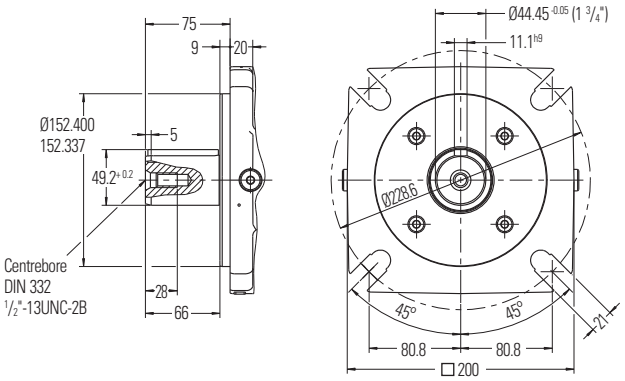
A	–	System pressure port ISO 6162-2 P32M (SAE J518 code 62, 1¼", 6000 psi)
B	–	Inlet port ISO 6162-1 P64M (SAE J518 code 62, 2½", 500 psi)
L1	–	Drain port 1 5/16"-12 UNF-2B (depending on mounting position, use upper port)
L2	–	Drain port G1" (depending on mounting position, use upper port)
L3	–	Vent port for vertical mounting G⅜" (shaft upward)
L3.1	–	Port G¼"
L5	–	Oil filling plug 1 1/16"-12 UNF-2B
L8	–	Air bleed port G¼"
MA	–	System pressure gauge port G¼"
ML	–	Case pressure gauge port G¼"
X1	–	Remote port pressure compensator G¼"-12.5 deep
...*	–	Connection with plug

Shaft and Mounting Options PVW 130 Pumps

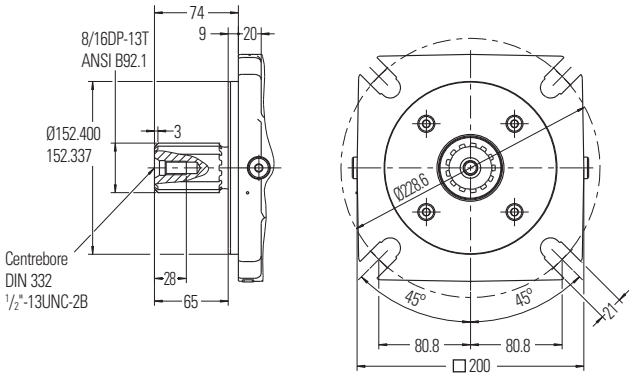
Mounting Flanges & Shaft Ends



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

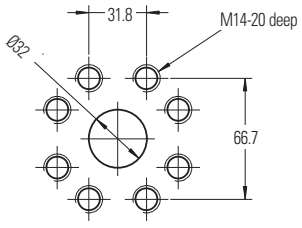


SAE D keyed shaft: 10 11 = 0D & 18 19 = D1

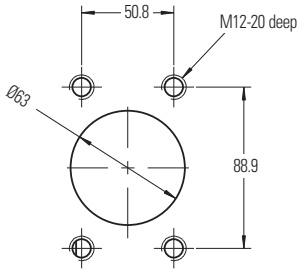


SAE D splined shaft: 10 11 = 0D & 18 19 = D2

Main Ports



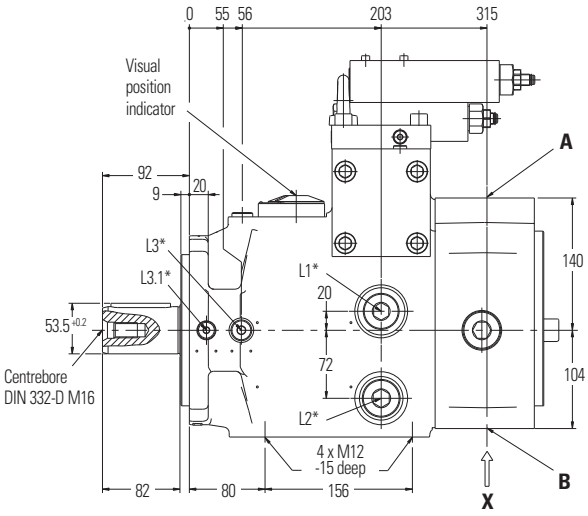
Port A

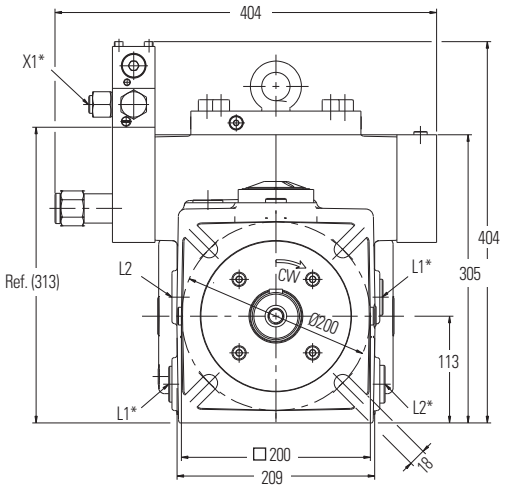


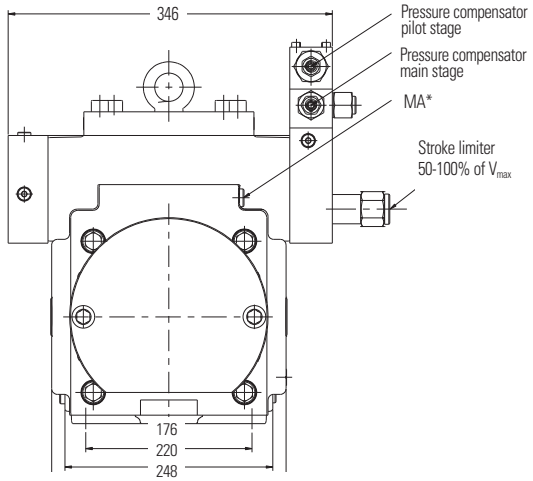
Port B
View X

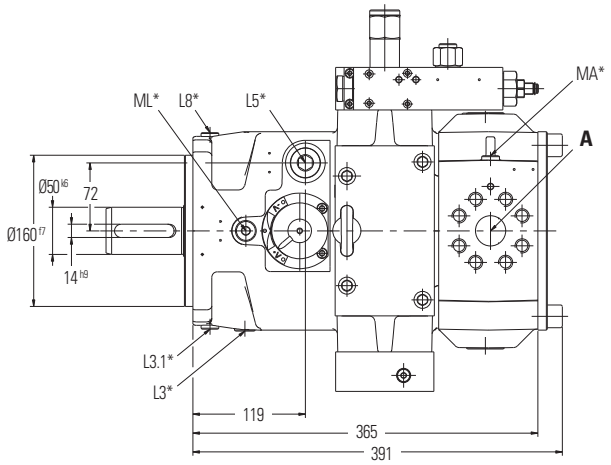
General Dimensions
PVW 180 Pumps

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)





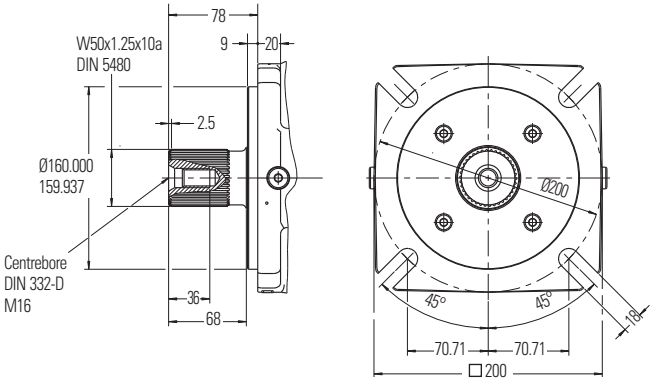




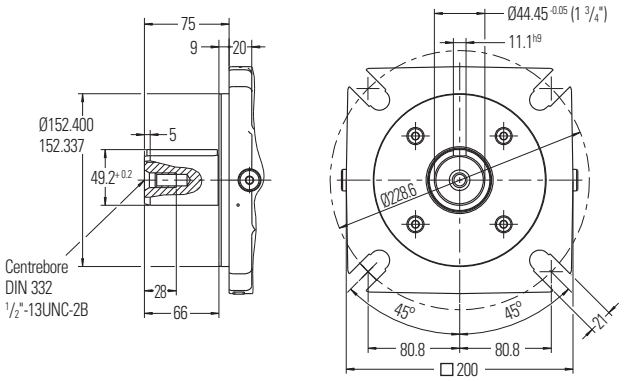
A	–	System pressure port ISO 6162-2 P32M (SAE J518 code 62, 1¼", 6000 psi)
B	–	Inlet port ISO 6162-1 P64M (SAE J518 code 62, 2½", 500 psi)
L1	–	Drain port 1 5/16"-12 UNF-2B (depending on mounting position, use upper port)
L2	–	Drain port G1" (depending on mounting position, use upper port)
L3	–	Vent port for vertical mounting G⅜" (shaft upward)
L3.1	–	Port G¼"
L5	–	Oil filling plug 1 1/16"-12 UNF-2B
L8	–	Air bleed port G¼"
MA	–	System pressure gauge port G¼"
ML	–	Case pressure gauge port G¼"
X1	–	Remote port pressure compensator G¼"-12.5 deep
...*	–	Connection with plug

Shaft and Mounting Options PVW 180 Pumps

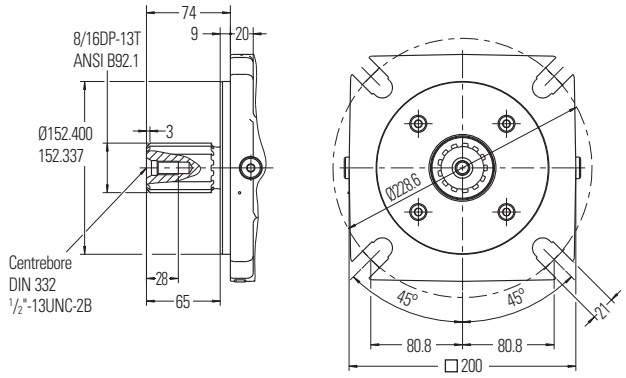
Mounting Flanges and Shaft Ends



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

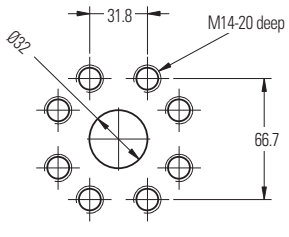


SAE D keyed shaft: 10 11 = 0D & 18 19 = D1

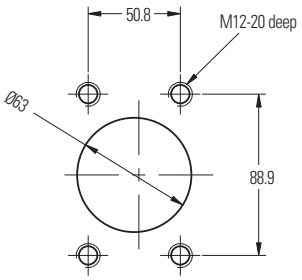


SAE D splined shaft: 10 11 = 0D & 18 19 = D2

Main Ports



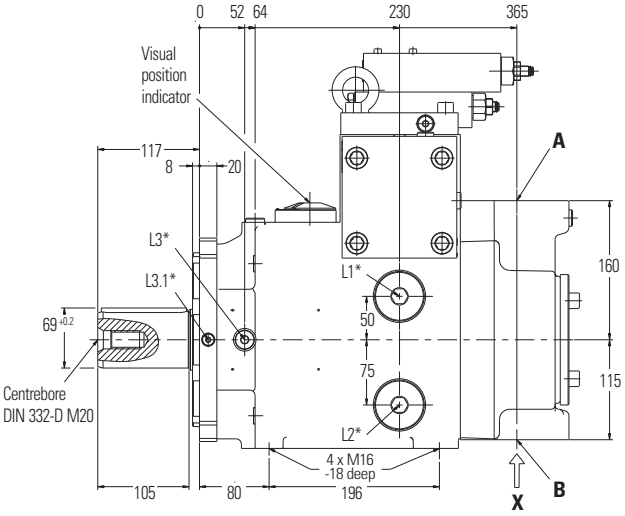
Port A

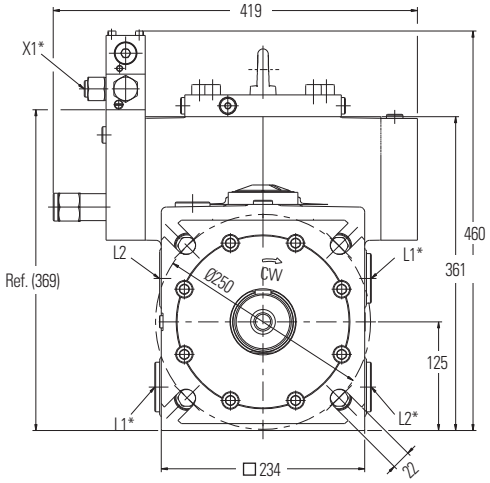


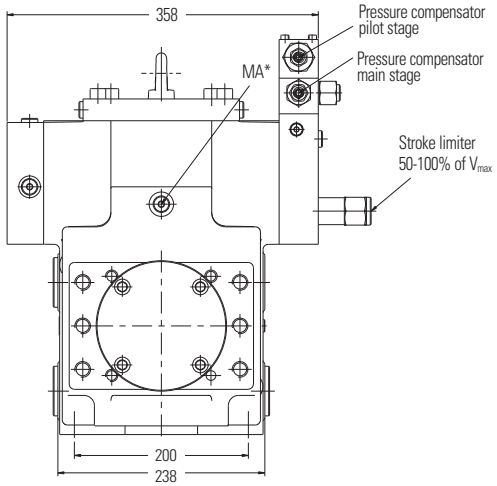
Port B
View X

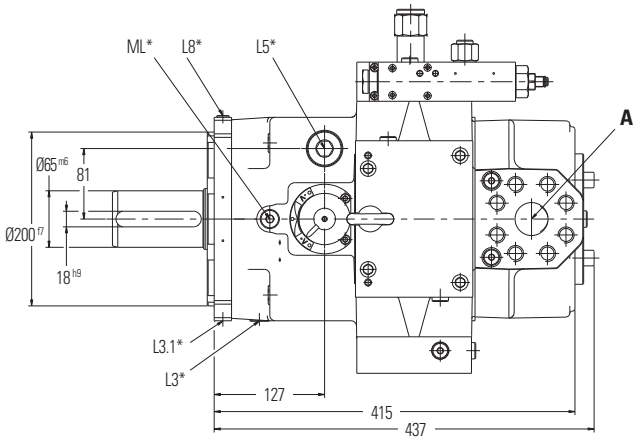
General Dimensions
PVW 250 Pumps

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)





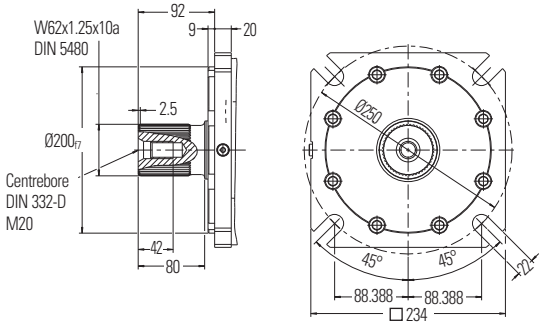




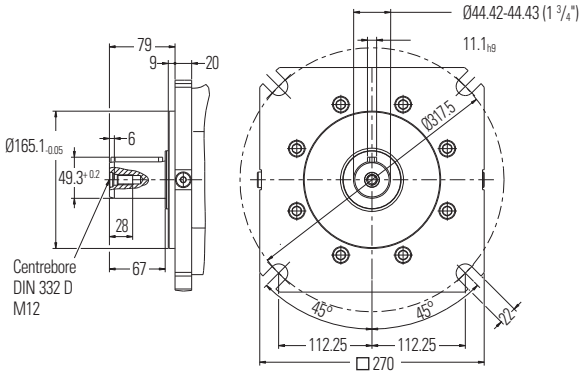
A	–	System pressure port ISO 6162-2 P38M (SAE J518 code 62, 1 1/2", 6000 psi)
B	–	Inlet pressure port ISO 6162-1 P89M (SAE J518 code 61, 3 1/2", 500 psi)
L1	–	Drain port 1 5/8"-12 UNF-2B (depending on mounting position, use upper port)
L2	–	Drain port G1 1/4" (depending on mounting position, use upper 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 250 Pumps

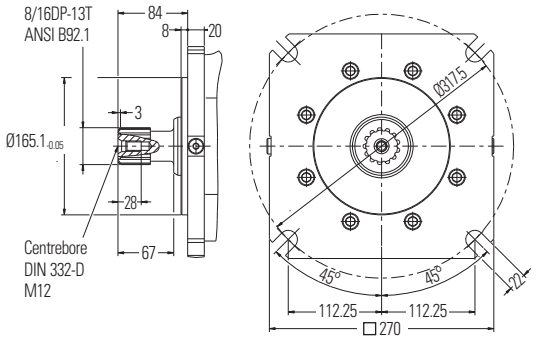
Mounting Flanges and Shaft Ends



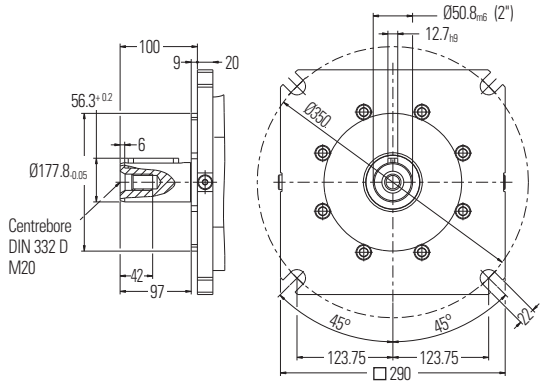
ISO splined shaft: 10 11 = 07 & 18 19 = 02



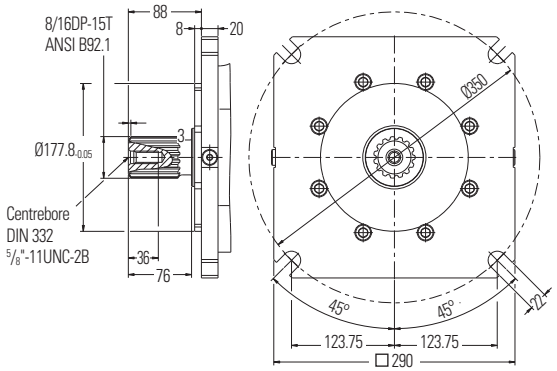
SAE E keyed shaft: 10 11 = 0E & 18 19 = E1



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

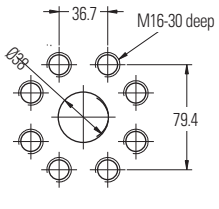


SAE E keyed shaft: 10 11 = 0F & 18 19 = F1

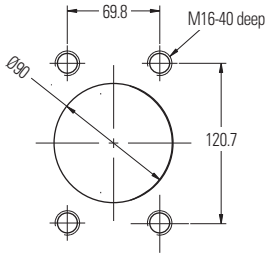


SAE F splined shaft: 10 11 = 0F & 18 19 = F2

Main Ports



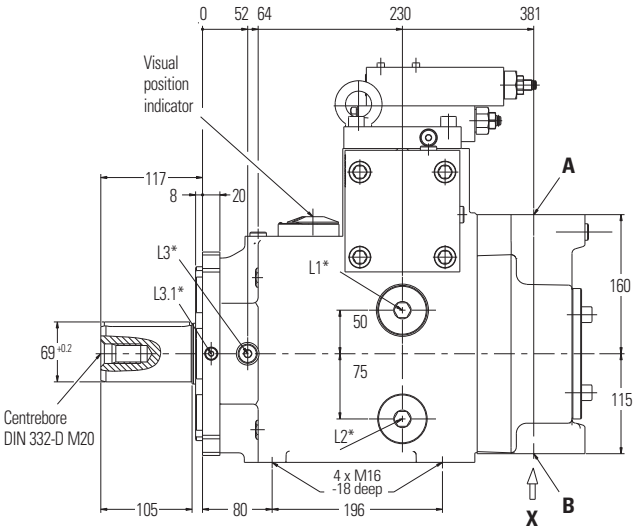
Port A

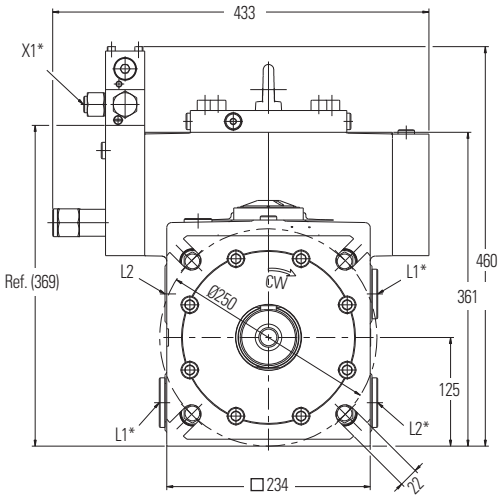


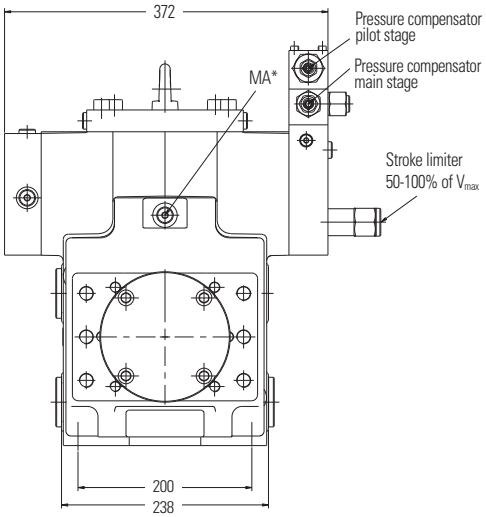
Port B
View X

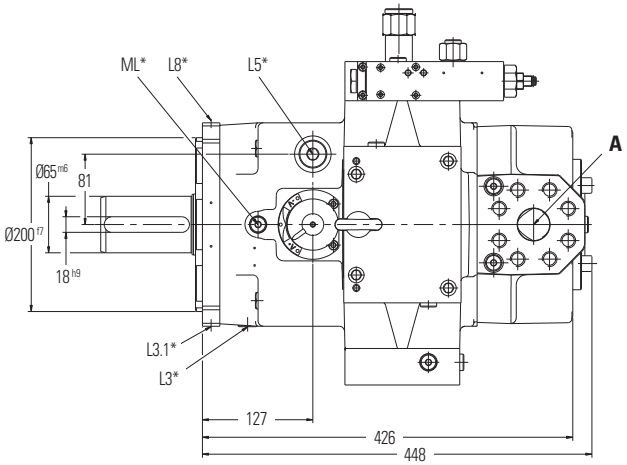
General Dimensions
PVW 360 Pumps

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)





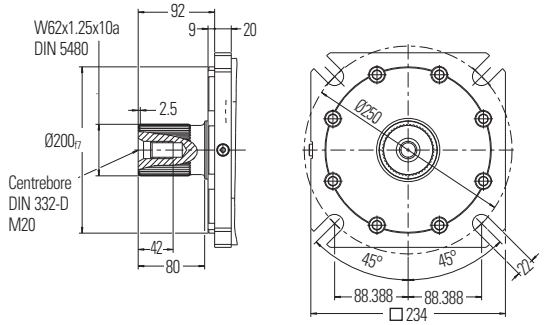




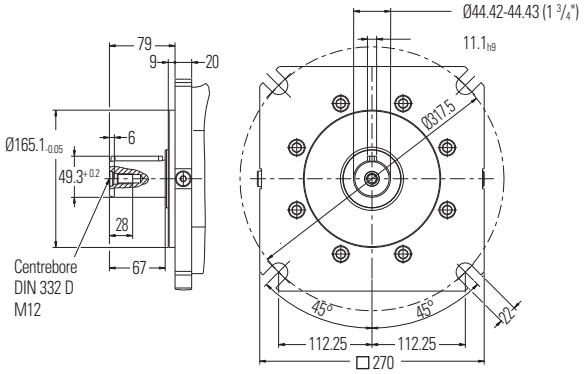
A	–	System pressure port ISO 6162-2 P38M (SAE J518 code 62, $1^1/_2$", 6000 psi)
B	–	Inlet pressure port ISO 6162-1 P89M (SAE J518 code 61, $3^1/_2$", 500 psi)
L1	–	Drain port $1^5/_8$"-12 UNF-2B (depending on mounting position, use upper port)
L2	–	Drain port $G1^1/_4$" (depending on mounting position, use upper port)
L3	–	Vent port for vertical mounting $G^3/_8$" (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 360 Pumps

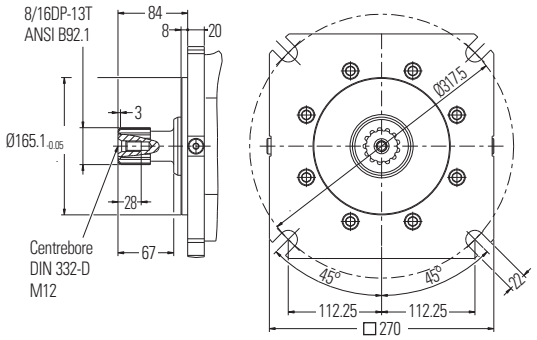
Mounting Flanges and Shaft Ends



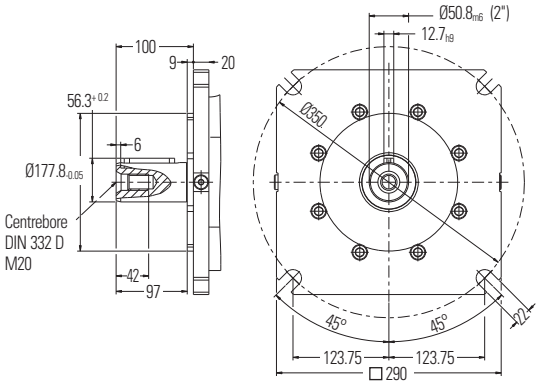
ISO splined shaft: 10 11 = 07 & 18 19 = 02



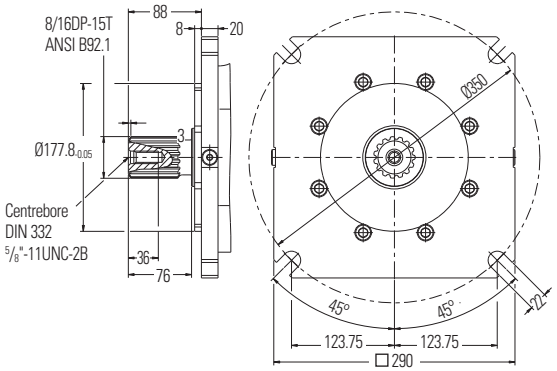
SAE E keyed shaft: 10 11 = 0E & 18 19 = E1



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

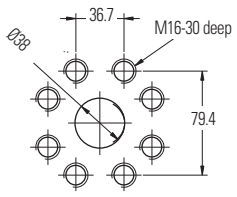


SAE E keyed shaft: 10 11 = 0F & 18 19 = F1

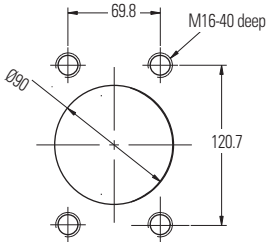


SAE F splined shaft: 10 11 = 0F & 18 19 = F2

Main Ports



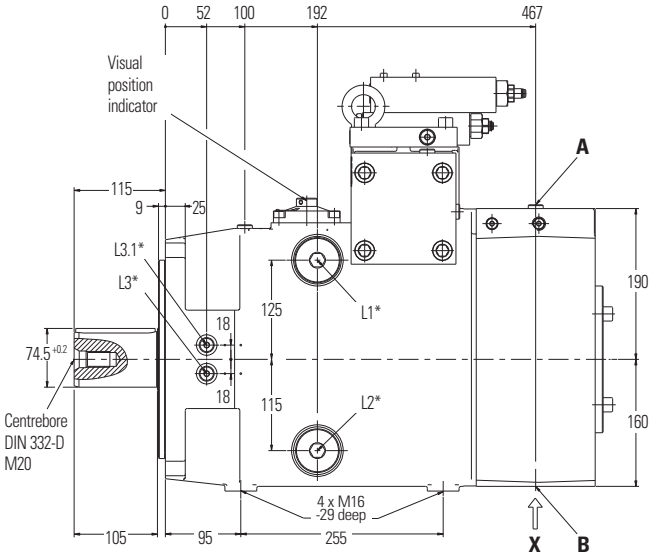
Port A

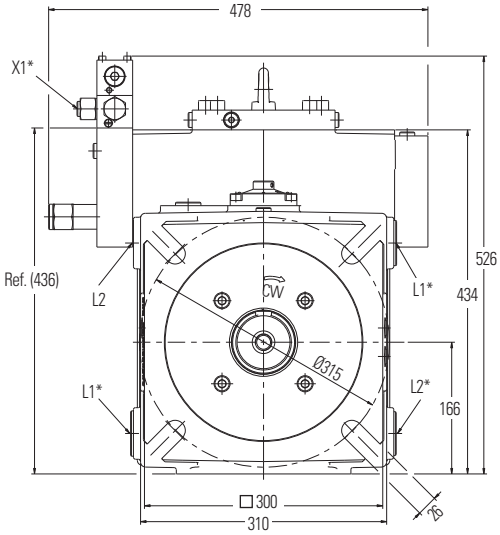


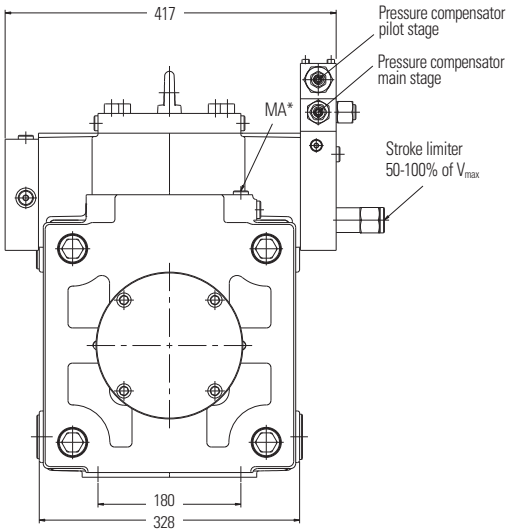
Port B
View X

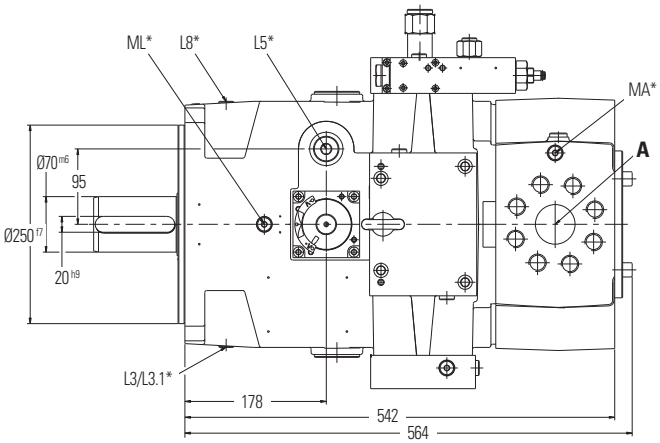
General Dimensions
PVW 500 Pumps

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)





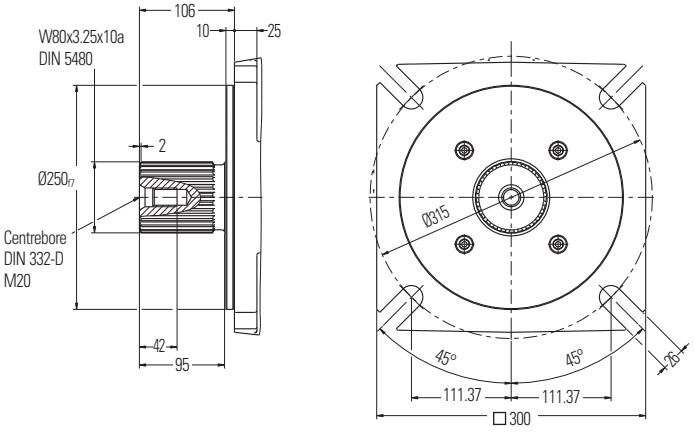


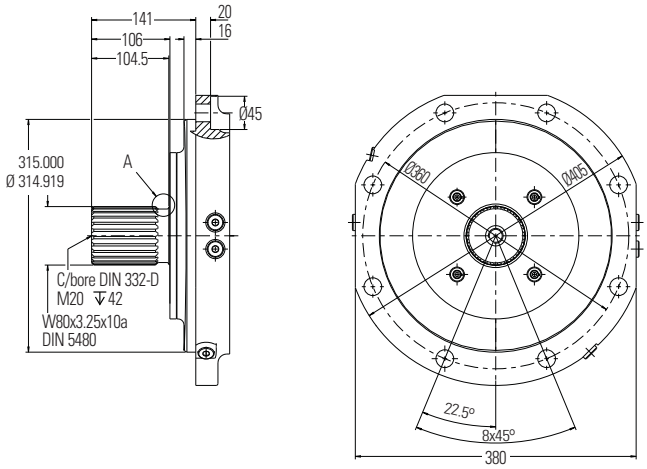


A	–	System pressure port ISO 6162-2 P51M (SAE J518 code 62, 2", 6000 psi)
B	–	System pressure port ISO 6162-1 P127M (SAE J518 code 61, 5", 500 psi)
L1	–	Drain port $1^5/_8$"-12 UNF-2B (depending on mounting position, use upper port)
L2	–	Drain port $G1^1/_2$" (depending on mounting position, use upper 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

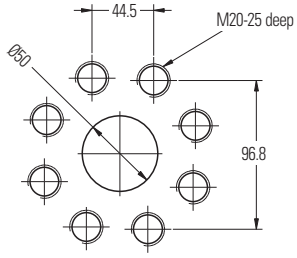




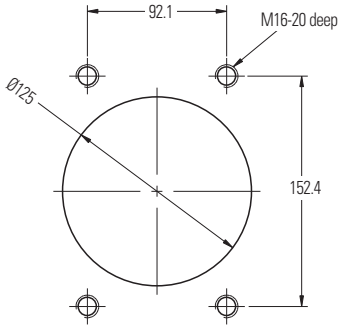
ISO splined shaft: 10 11 **= 08 &** 18 19 **= 02**

ISO special splined shaft: 10 11 **= 09 &** 18 19 **= 05**

Main Ports



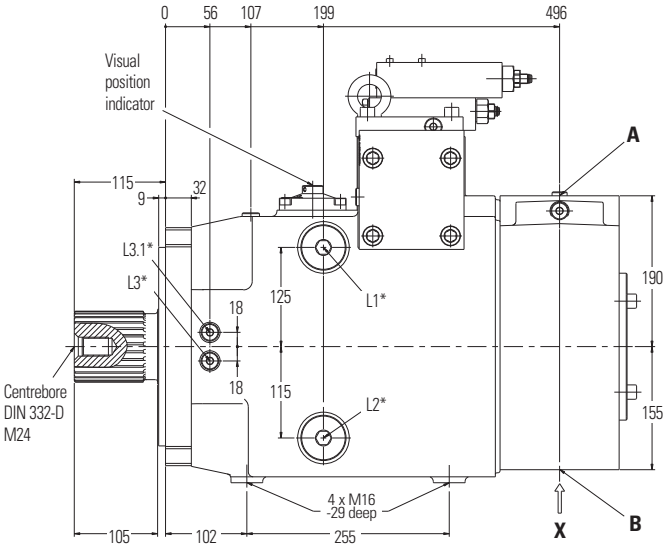
Port A

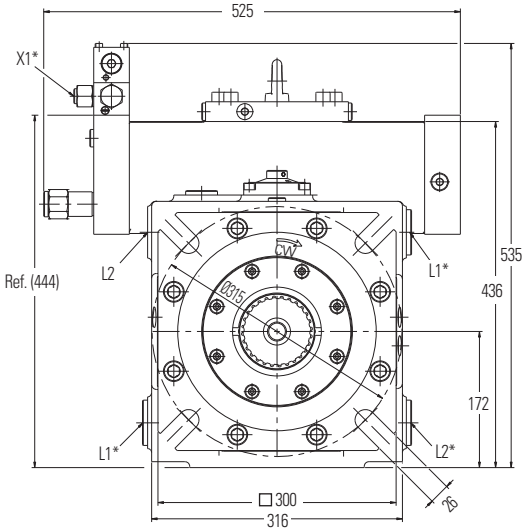


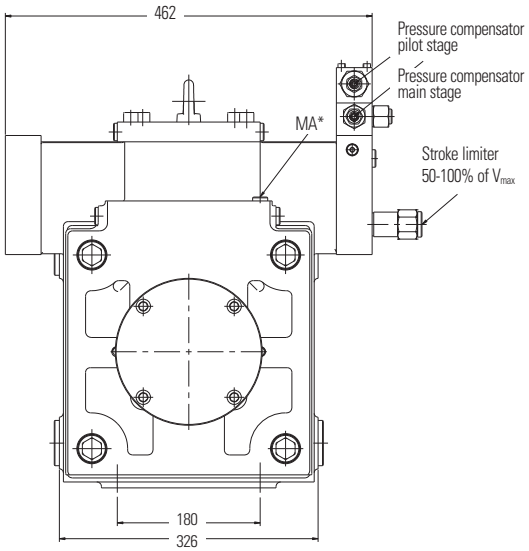
Port B
View X

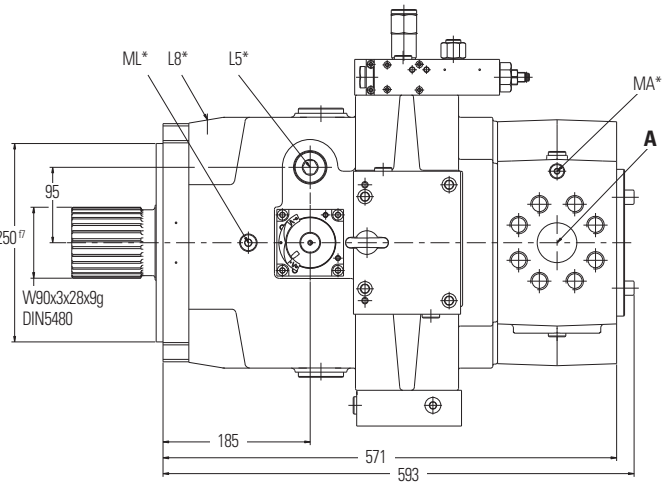
General Dimensions
PVW 750 Pumps

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 $1^5/_8$"-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

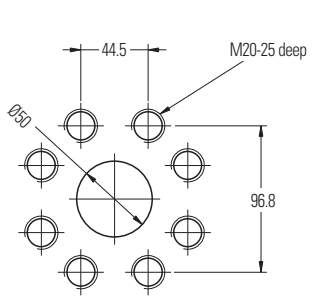
Shaft and Mounting Options PVW 750 Pumps

Mounting Flanges and Shaft Ends

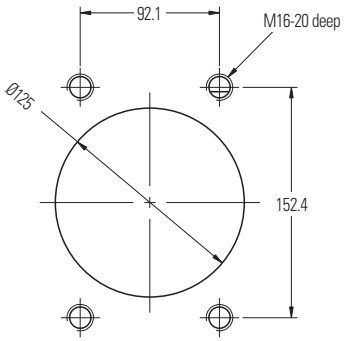
ISO splined shaft: 10 11 = 08 & 18 19 = 02

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

Main Ports



Port A



Port B
View X

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.

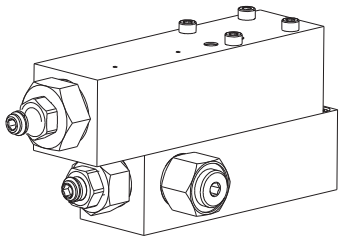
Maximum pump flow can be limited mechanically to between 50% and 100% by a screw.

As an additional option, maximum (or minimum) flow can also be limited by a spacer inside the control cylinder (Model Code position 13 , options **4**, **5** or **6**, in combination with customer adjustment specified in positions 40 to 43).

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.

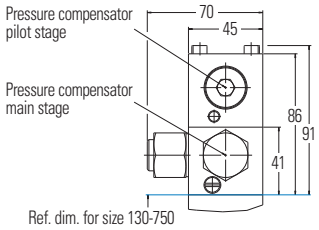


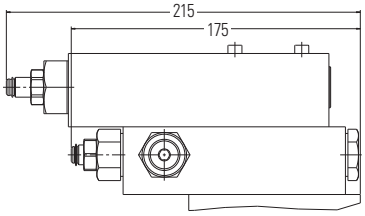
DF000A0

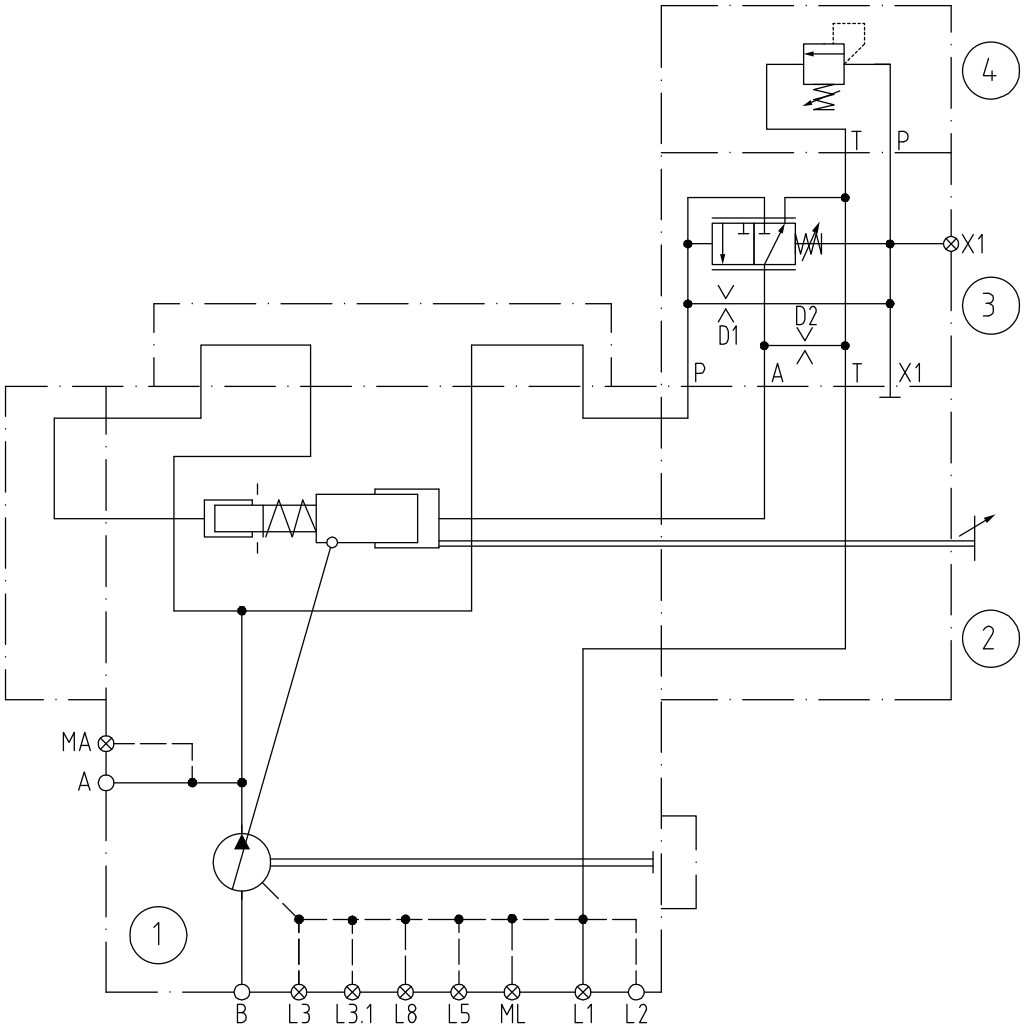
Options illustrated:

24 25 = **DF** (pressure compensator)
29 = **A** (yoke angle 1 side of centre)

For pump details, see general Installation Dimensions.





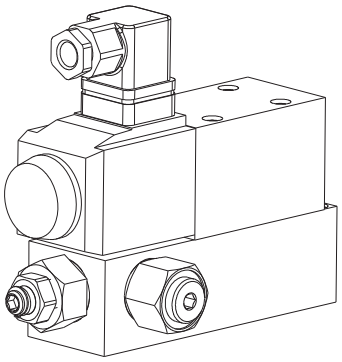


A	–	System port
B	–	Inlet port
L1, L2	–	Drain port
L3	–	Vent port for vertical mounting
L3.1, L8	–	Air bleed port
L5	–	Oil filling plug
MA	–	Gauge port, system pressure
ML	–	Gauge port, case pressure
X1	–	Remote port pressure compensator

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

Control Options DF (cont.)

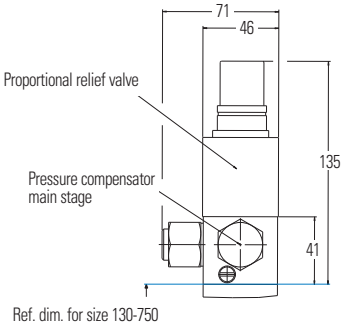
For pump details, see general Installation Dimensions.

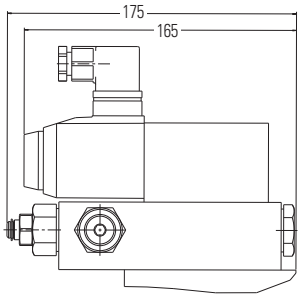


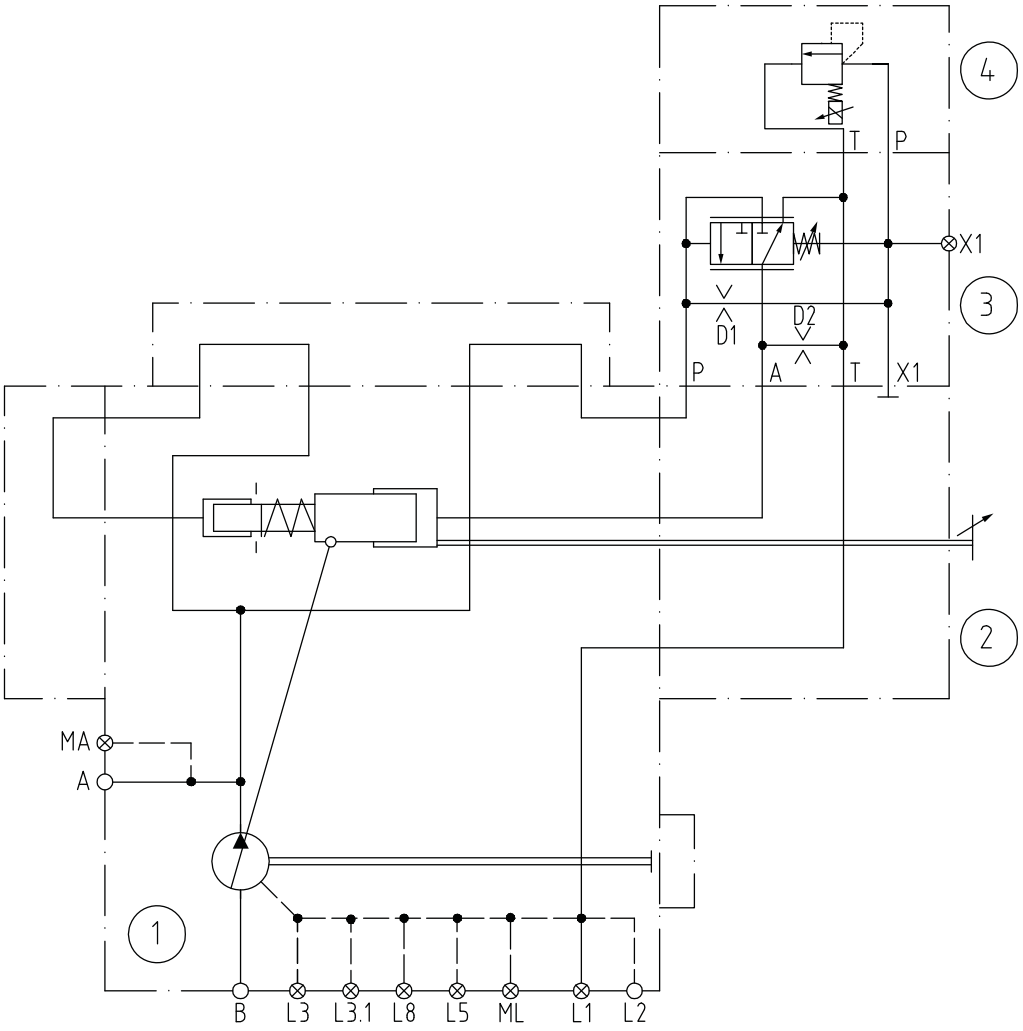
DF000A0K

Options illustrated:

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





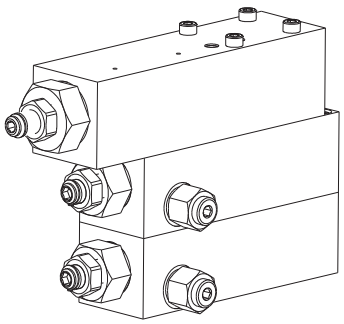


A	–	System port
B	–	Inlet port
L1, L2	–	Drain port
L3	–	Vent port for vertical mounting
L3.1, L8	–	Air bleed port
L5	–	Oil filling plug
MA	–	Gauge port, system pressure
ML	–	Gauge port, case pressure
X1	–	Remote port pressure compensator

1	–	Basic pump
2	–	Connection plate for DF-control
3	–	Pressure compensator, lmain stage
4	–	Proportional relief valve

Control Options DF (cont.)

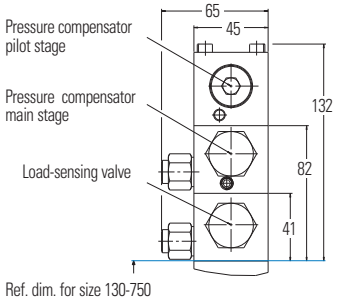
For pump details, see general Installation Dimensions.

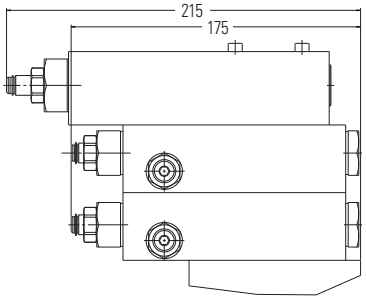


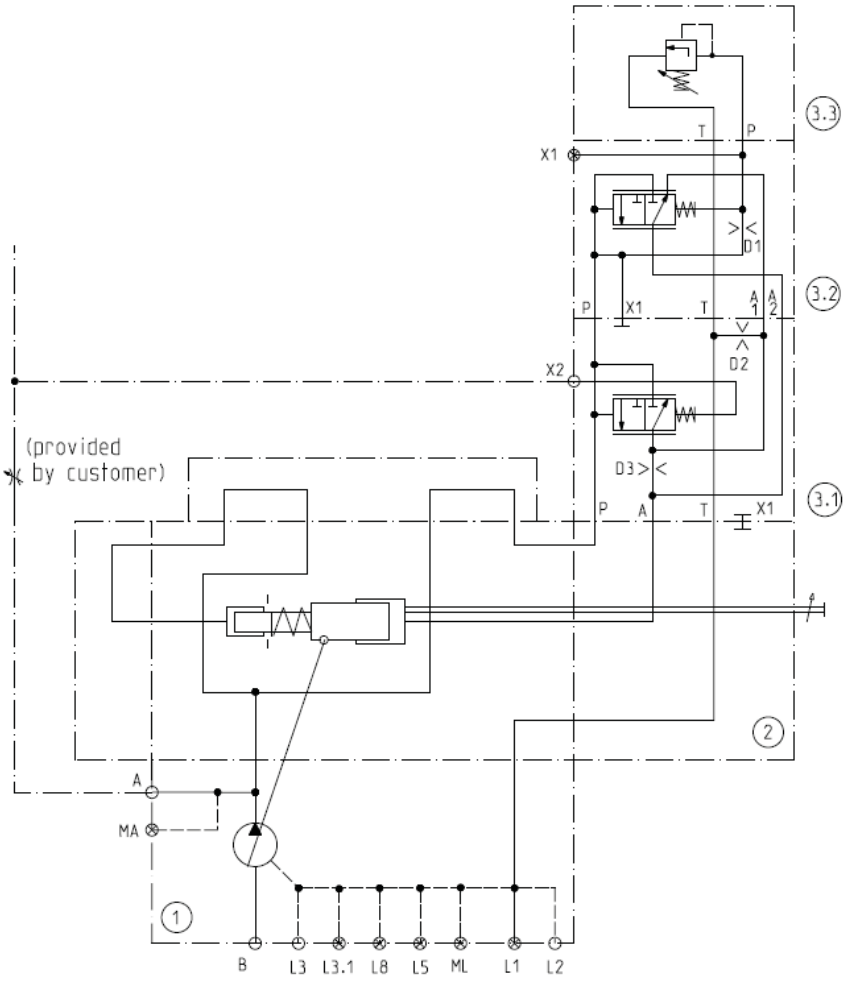
DF000A1

Options illustrated:

24 25 = **DF** (pressure compensator)
29 = **A** (yoke angle 1 side of centre)
30 = **1** (load sensing)





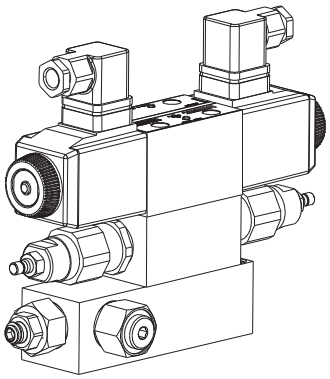


A, B	–	System port
L1, L2	–	Drain port
L3	–	Port for front bearing flushing (vent port for vertical mounting)
L3.1, L8	–	Air bleed port
L5	–	Oil filling plug
MA	–	Gauge port, system pressure
ML	–	Gauge port, case pressure
X1	–	Remote port pressure limiter override $G^1/_4$
X2	–	Remote port, load sense

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.)

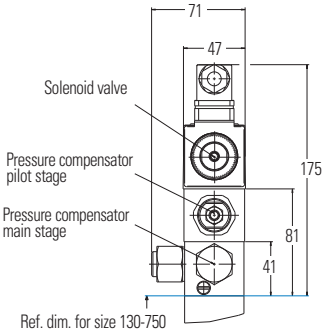
For pump details, see general Installation Dimensions.

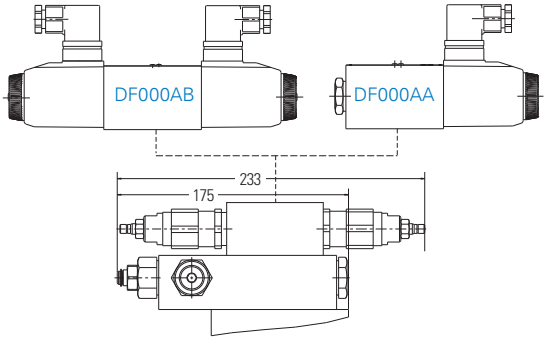


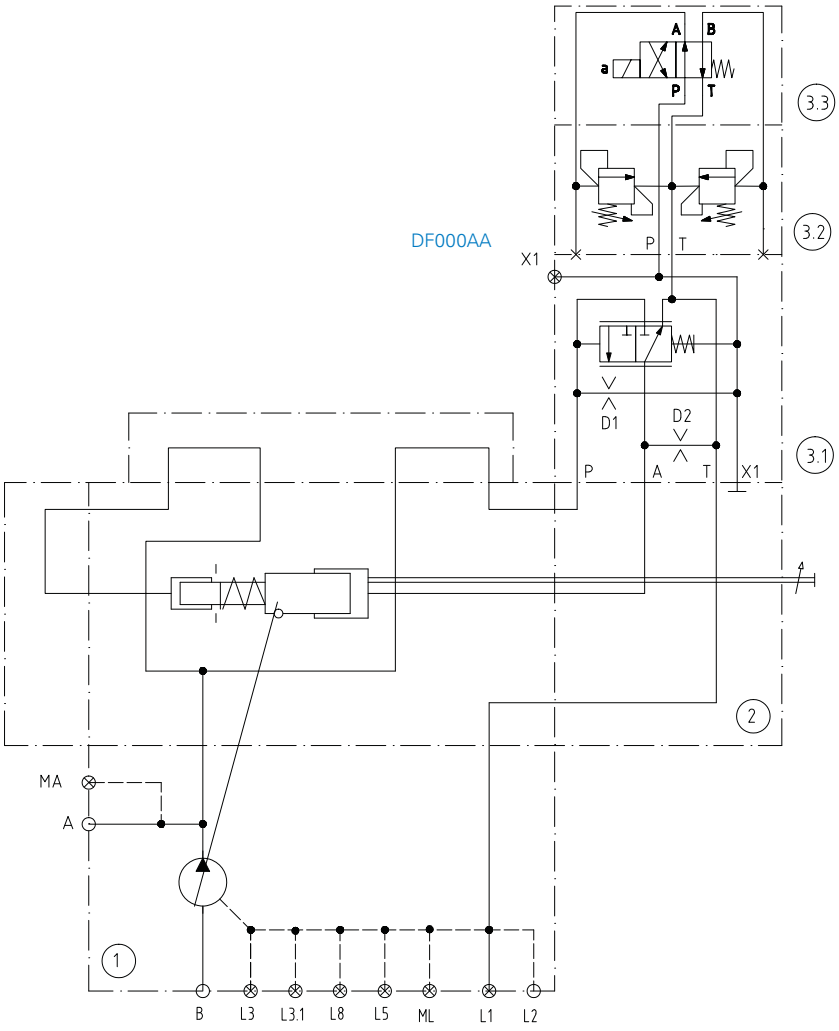
DF000AA/DF000AB

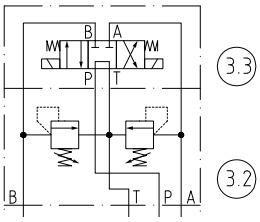
Options illustrated:

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









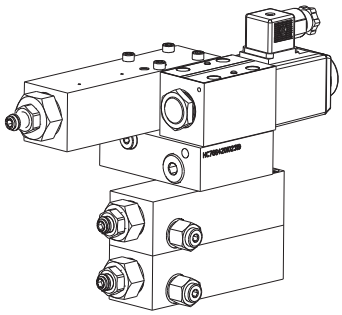
DF000AB

A, B	–	System 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 limiter override $G^1/_4$

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.)

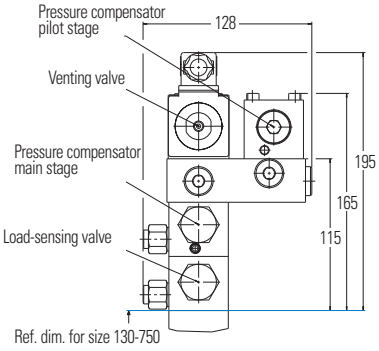
For pump details, see general Installation Dimensions.

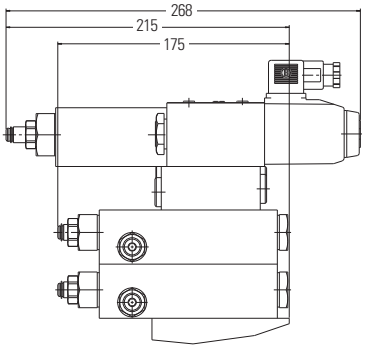


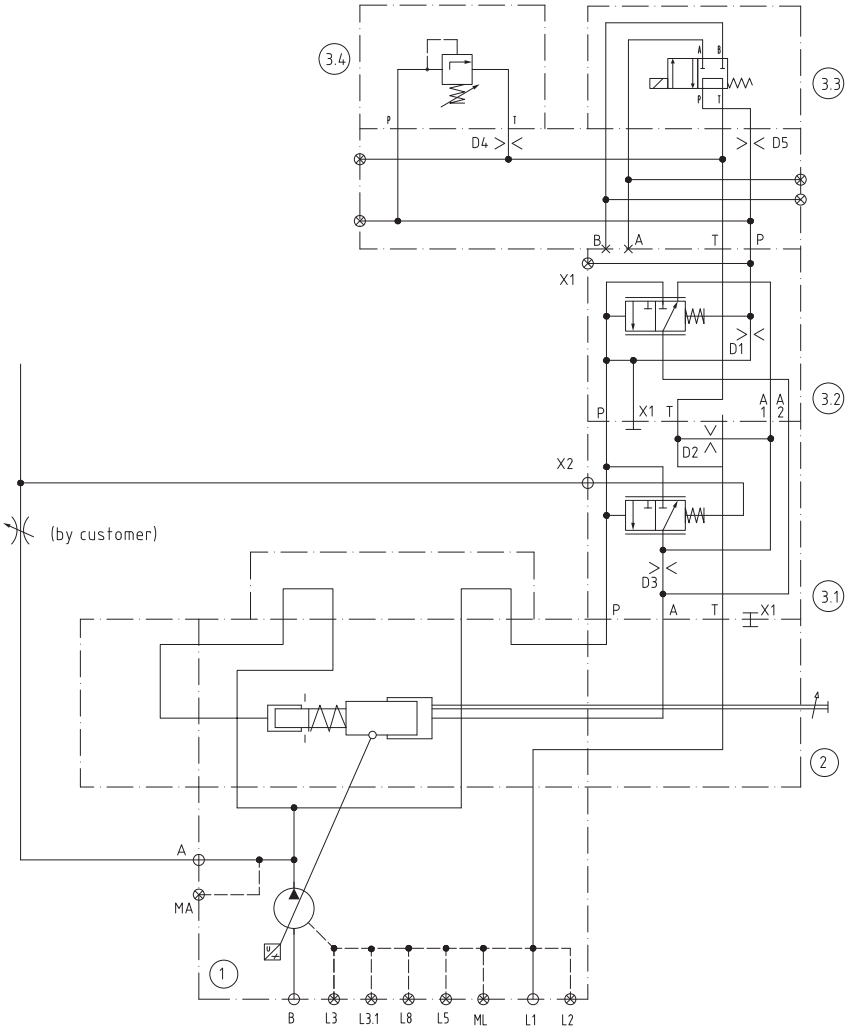
DF000A1-100H

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)





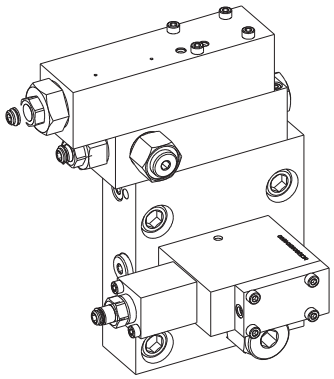


A, B	–	System port
L1, L2	–	Drain port
L3	–	Vent port for vertical mounting
L3.1, L8	–	Air bleed port
L5	–	Oil filling plug
MA	–	Gauge port, system pressure
ML	–	Gauge port, case pressure
X1	–	Remote port pressure limiter override $G^1/_4$
X2	–	Remote portload sense

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

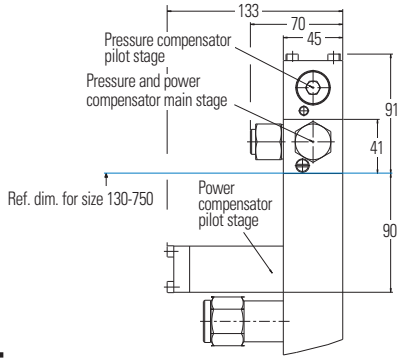
For pump details, see general Installation Dimensions.

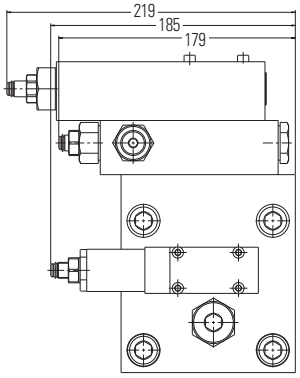


LR00A20

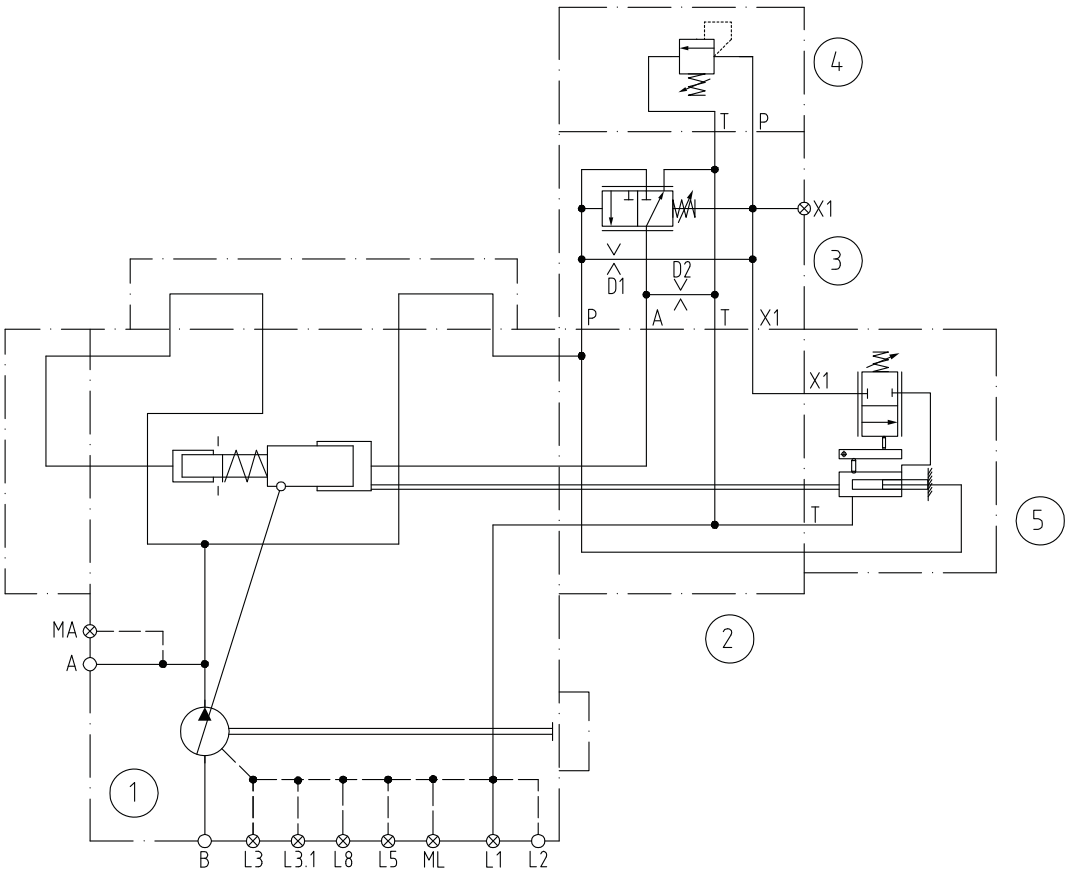
Options illustrated:

24 25 = **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	219
	A2F	188	188	185	185	185	185
	A30	215	215	219	219	219	219

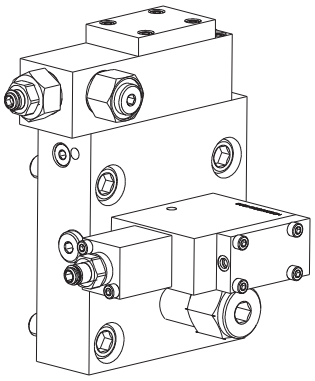


A	–	System port
B	–	Inlet port
L1, L2	–	Drain port
L3	–	Vent port for vertical mounting
L3.1, L8	–	Air bleed port
L5	–	Oil filling plug
MA	–	Gauge port, system pressure
ML	–	Gauge port, case pressure
X1	–	Remote port pressure compensator

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.)

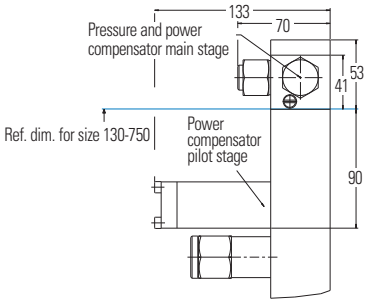
For pump details, see general Installation Dimensions.

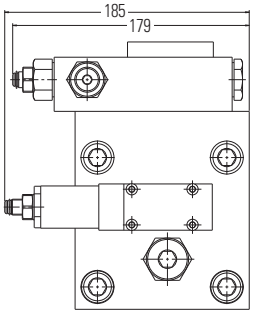


LR00A2F

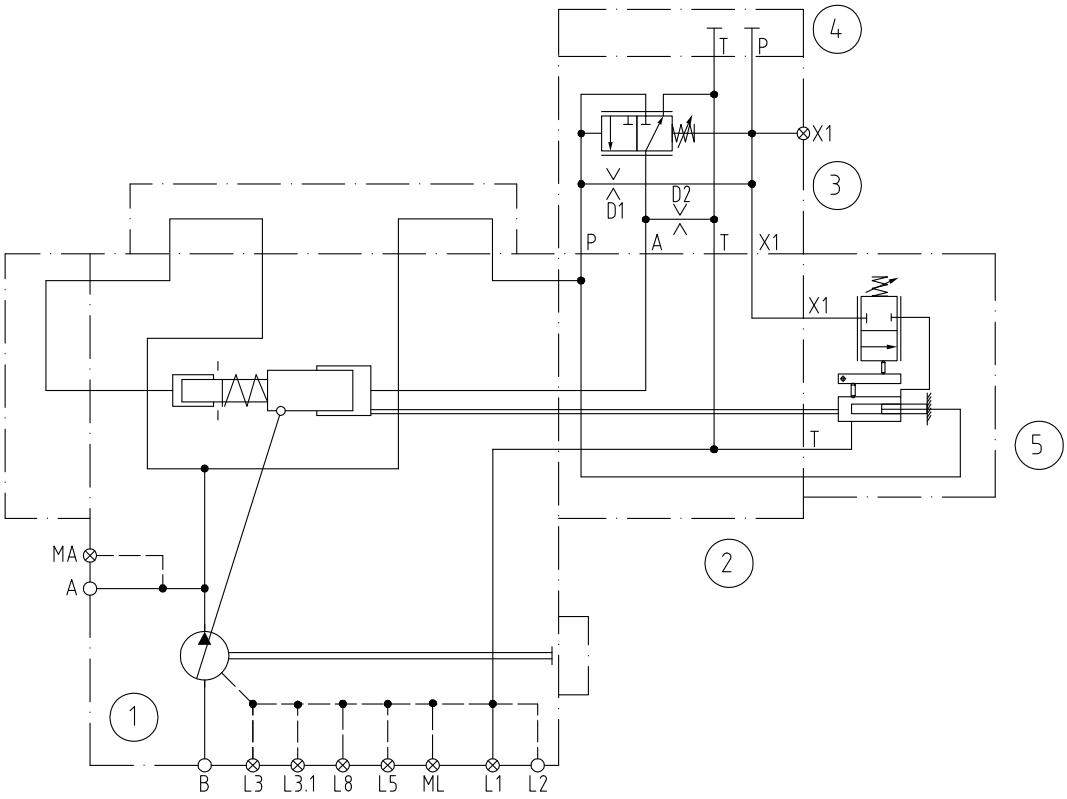
Options illustrated:

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	219
	A2F	188	188	185	185	185	185
	A30	215	215	219	219	219	219

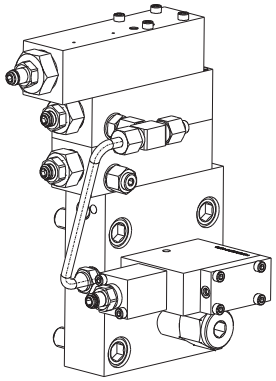


A	–	System port
B	–	Inlet port
L1, L2	–	Drain port
L3	–	Vent port for vertical mounting
L3.1, L8	–	Air bleed port
L5	–	Oil filling plug
MA	–	Gauge port, system pressure
ML	–	Gauge port, case pressure
X1	–	Remote port pressure compensator

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.)

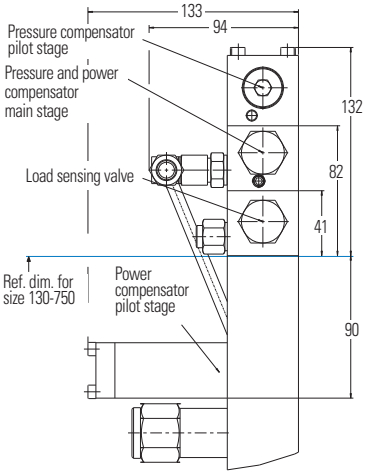
For pump details, see general Installation Dimensions.

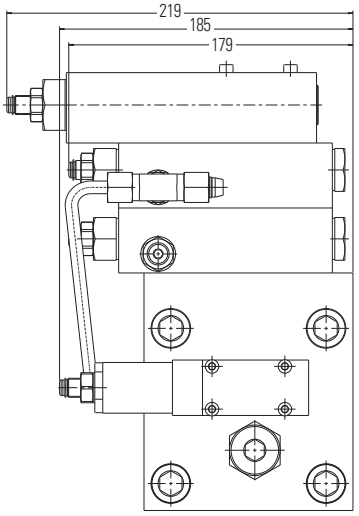


LR00A30

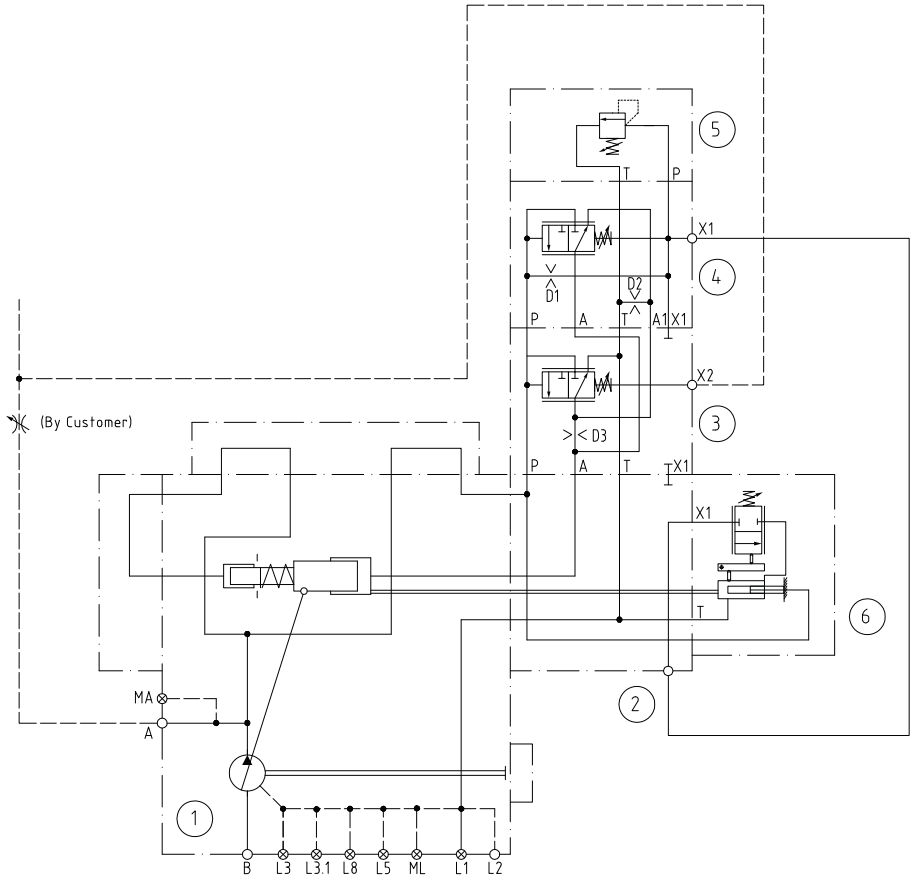
Options illustrated:

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]).

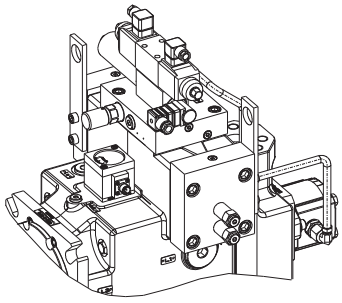
This solution is recommended for severe operating conditions and the need for high repeatability over a long period of time. The setting must be defined before ordering since it cannot be modified in operation..

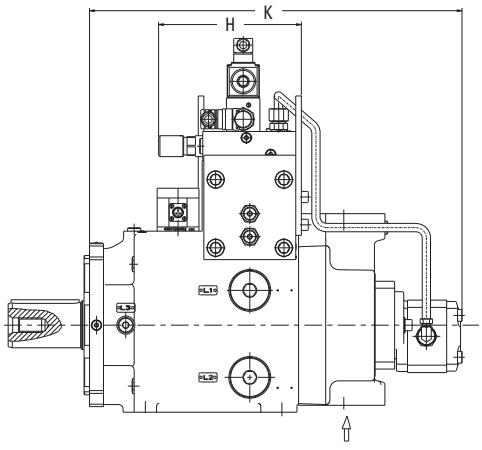
Pump Dimensions with SPC03A0 Control

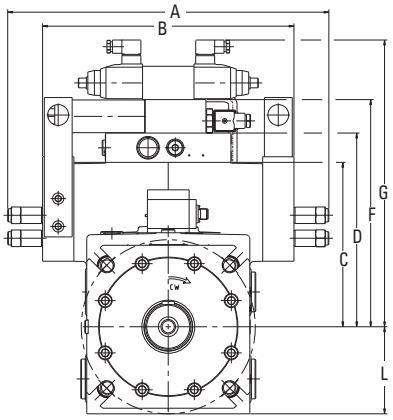
For basic pump details, see general Installation Dimensions.

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)

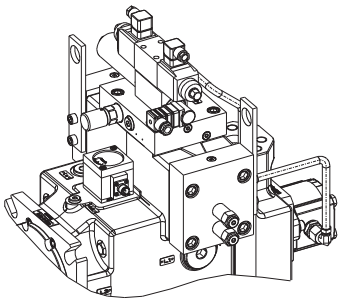
Pump Size	A	B	C	D	F	G	H	K	L
130	446	346	192	234	282	368	183	490	113
180	446	346	192	234	282	368	183	490	113
250	461	361	236	278	326	412	212	535	125
360	475	375	236	278	326	412	212	551	125
500	520	420	268	310	358	444	212	659	166
750	562	462	270	312	460	446	212	689	166

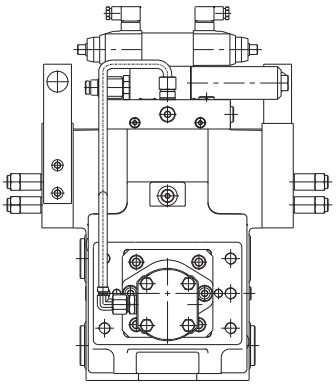
Response Time @ 1500 rev/min, SP Control with Pilot Pump Option (...OOP)

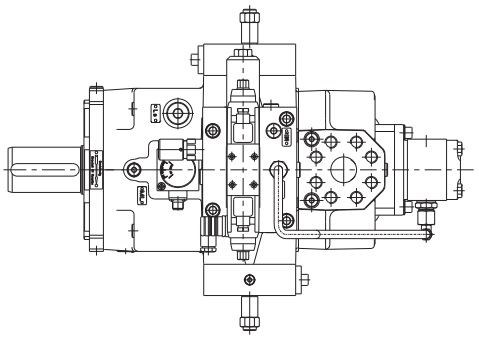
Main Pump Size	Pilot Pump Size (cm^3/rev)	Pilot Pressure (bar)	Up/Downstroke time 0-100% displ. (ms) approx.
130	8	60	450
180	8	60	450
250	8	60	550
360	8	60	700
500	8	90	650
750	8	90	850

Control Options SP (cont.)

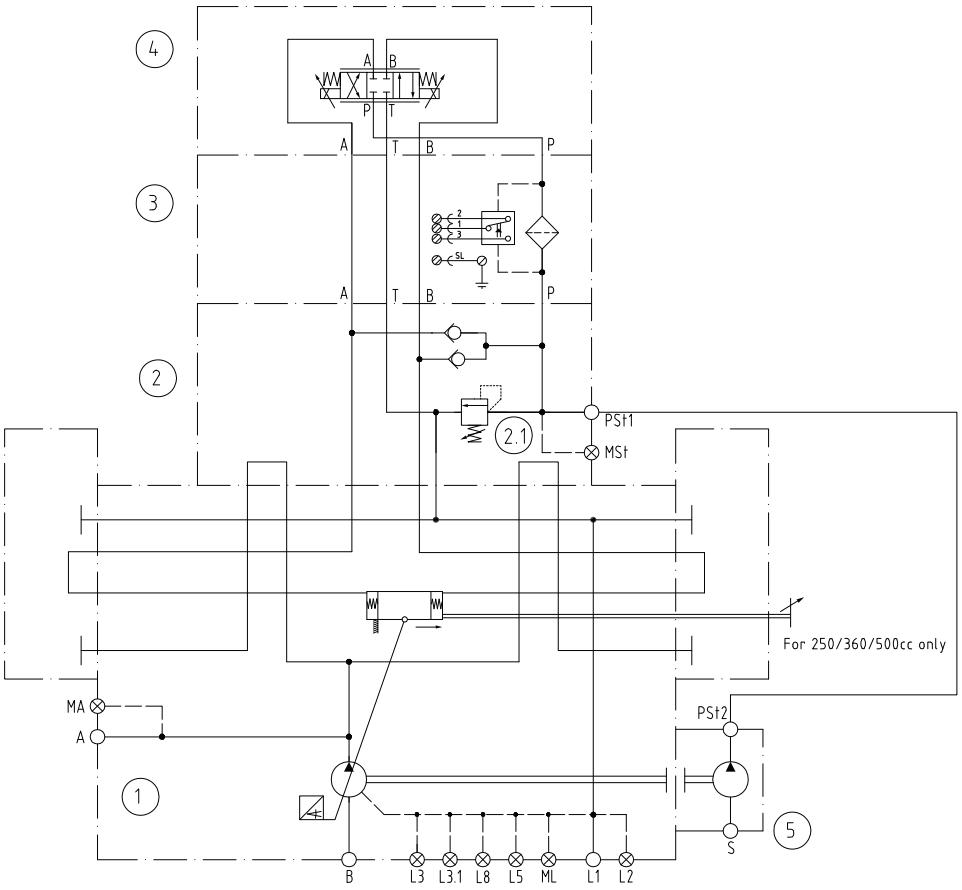
For basic pump details,
see general Installation Dimensions.







Pump dimensions with SPC03A0 control (cont.)

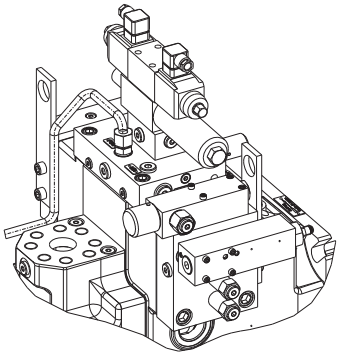


A	–	System port
B	–	Inlet port
L1, L2	–	Drain port
L3	–	Vent port for vertical mounting
L3.1, L8	–	Air bleed port
L5	–	Oil filling plug
MA	–	Gauge port, system pressure
ML	–	Gauge port, case pressure
PSt1	–	Pilot pressure inlet port
PSt2	–	Pilot pump outlet port
MSt	–	Pilot pressure gauge port
S	–	Pilot 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

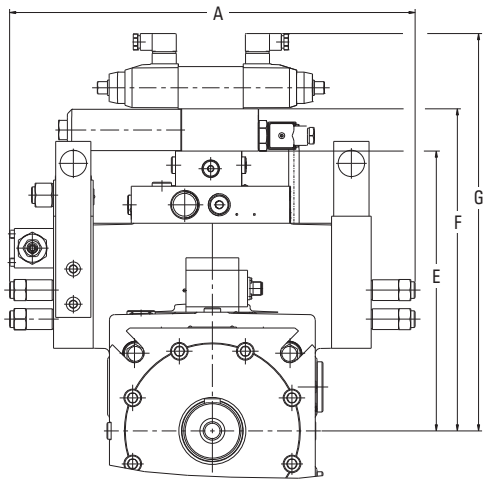
Control Options SP (cont.)

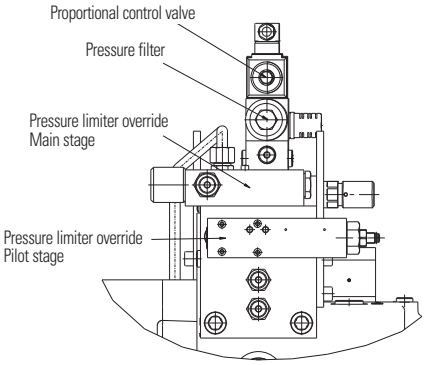
For basic pump details,
see general Installation Dimensions.



SPC03A4

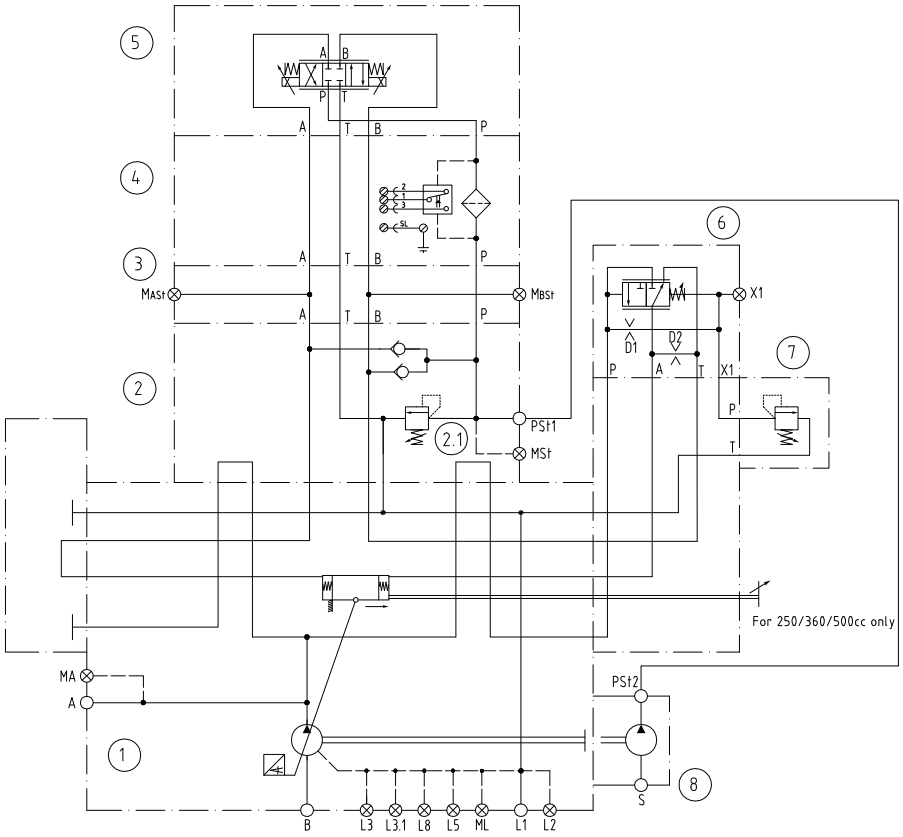
Options illustrated:
24 25 = **SP** (displacement adjustment via proportional valve)
26 = **C** (CETOP 3 proportional valve KDG4V-3)
30 = **4** (pressure limiter override)
35 = **E** (filter with electrical indicator)
36 = **0** (no venting valve)





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

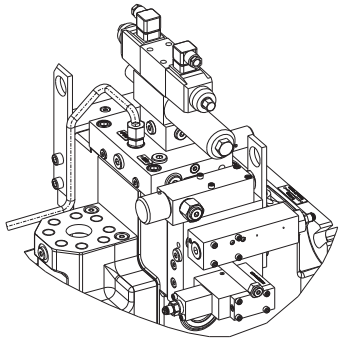


A	–	System port
B	–	Inlet port
L1, L2	–	Drain port
L3	–	Vent port for vertical mounting
L3.1, L8	–	Air bleed port
L5	–	Oil filling plug
MA	–	Gauge port, system pressure
ML	–	Gauge port, case pressure
PSt1	–	Pilot pressure inlet port
PSt2	–	Pilot pump outlet port
MSt	–	Pilot pressure gauge port
X1	–	Remote 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

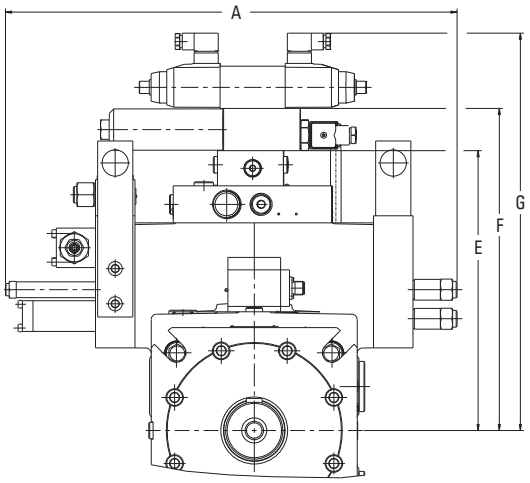
Control Options SP (cont.)

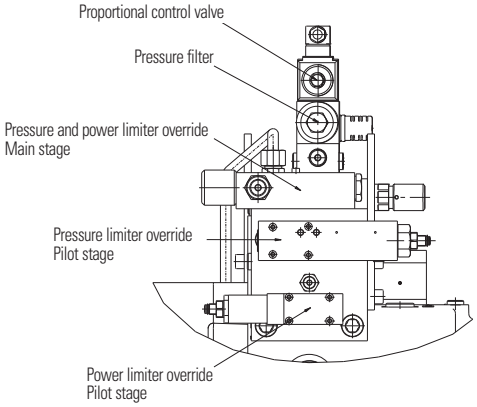
For basic pump details,
see general Installation Dimensions.



SPC03A5

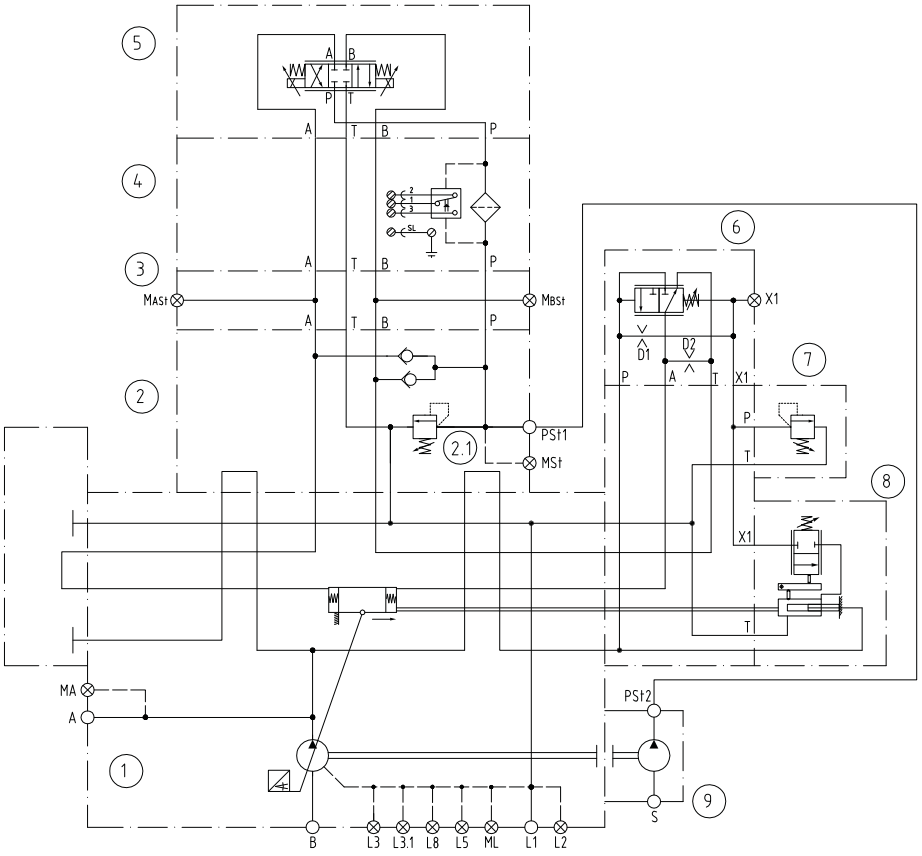
Options illustrated:
24 25 = **SP** (displacement adjustment via proportional valve)
26 = **C** (CETOP 3 proportional valve KDG4V-3)
30 = **5** (pressure and power limiter override)
35 = **E** (filter with electrical indicator)
36 = **0** (no venting valve)





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

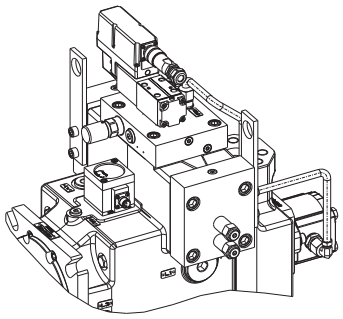


A	–	System port
B	–	Inlet port
L1, L2	–	Drain port
L3	–	Vent port for vertical mounting
L3.1, L8	–	Air bleed port
L5	–	Oil filling plug
MA	–	Gauge port, system pressure
ML	–	Gauge port, case pressure
PSt1	–	Pilot pressure inlet port
PSt2	–	Pilot pump outlet port
MSt	–	Pilot pressure gauge port
X1	–	Remote 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

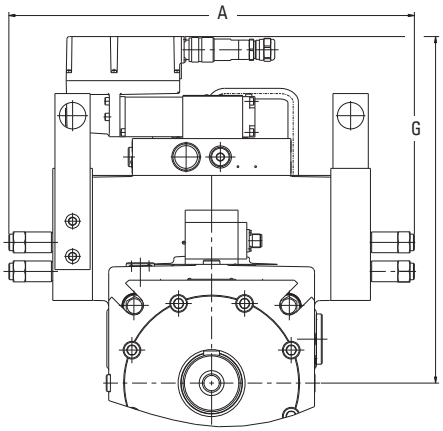
Control Options SP (cont.)

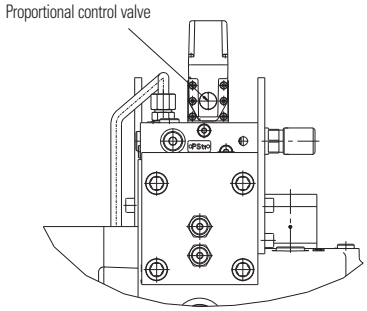
For basic pump details,
see general Installation Dimensions.



SPD0

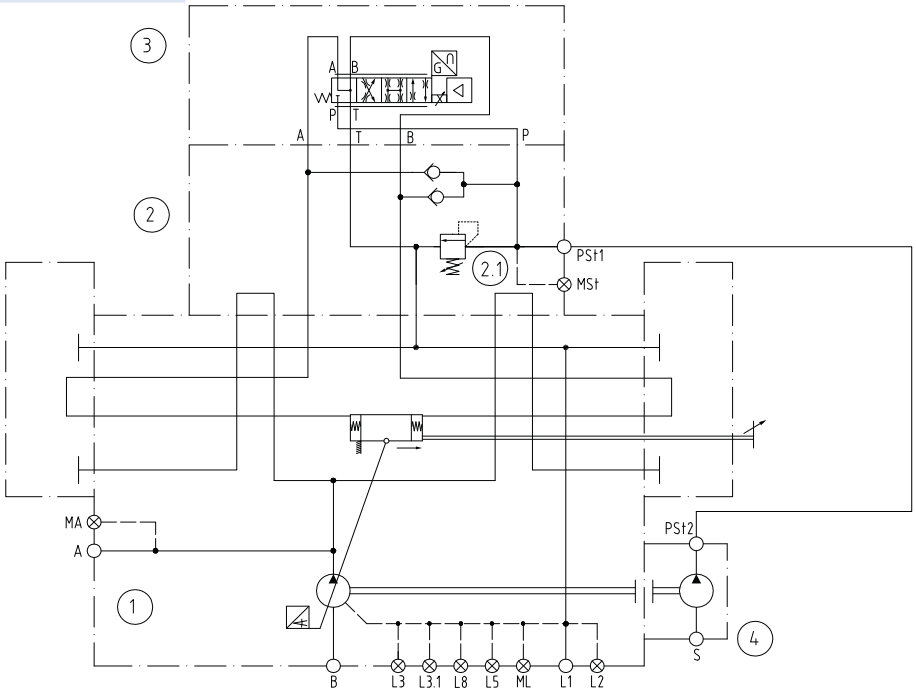
Options illustrated:
24 25 = **SP** (displacement adjustment via proportional valve)
26 = **D** (CETOP 3 proportional valve KBS-3 with OBE)
30 = **0** (no additional function)
35 = **0** (no pilot oil filter)
36 = **0** (no venting valve)





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	–	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
PSt1	–	Pilot pressure inlet port
PSt2	–	Pilot pump outlet port
MSt	–	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 DP

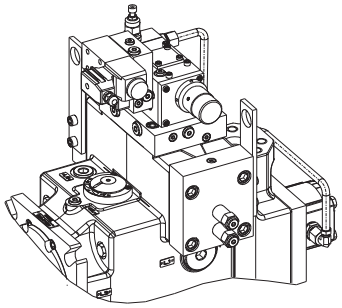
General Description

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, Ø 0,8 (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..

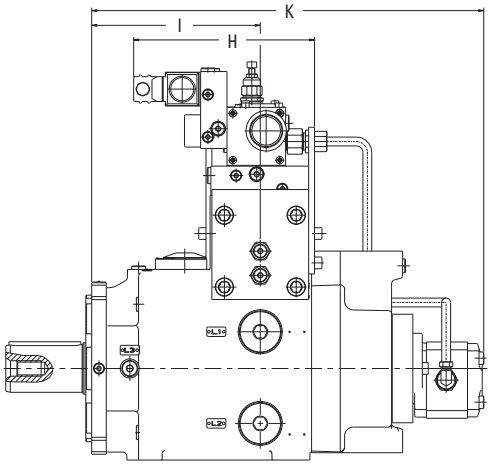


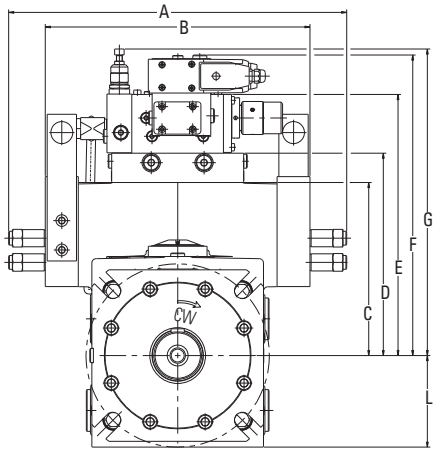
Pump Dimensions with DPJ...A0 Control

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)

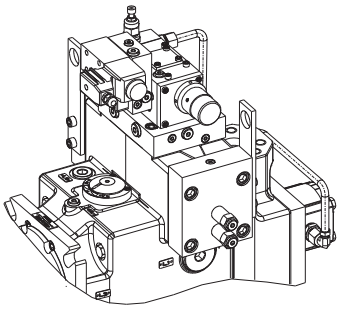
Pump Size	A	B	C	D	E	F	G	H	I	K	L
130	446	346	192	232	312	366	374	247	203	490	113
180	446	346	192	232	312	366	374	247	203	490	113
250	461	361	236	276	356	410	418	247	230	535	125
360	475	375	236	276	356	410	418	247	230	551	125
500	520	420	268	308	388	442	450	247	300	659	166
750	562	462	270	310	390	444	452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

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

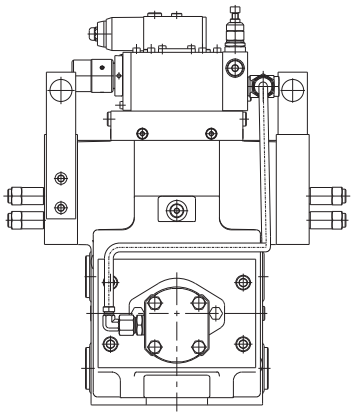
Main Pump Size	Pilot Pump Size (cm^3/rev)	Pilot Pressure (bar)	Up/Downstroke time 0-100% displ. (ms) approx.
130	8	60	1100
180	8	60	1100
250	8	60	1200
360	8	60	1600
500	8	90	1600
750	8	90	2000

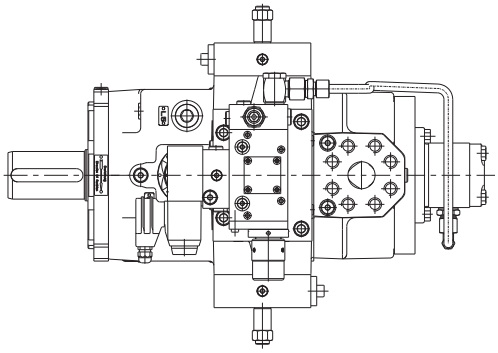
Control Options DP (cont.)

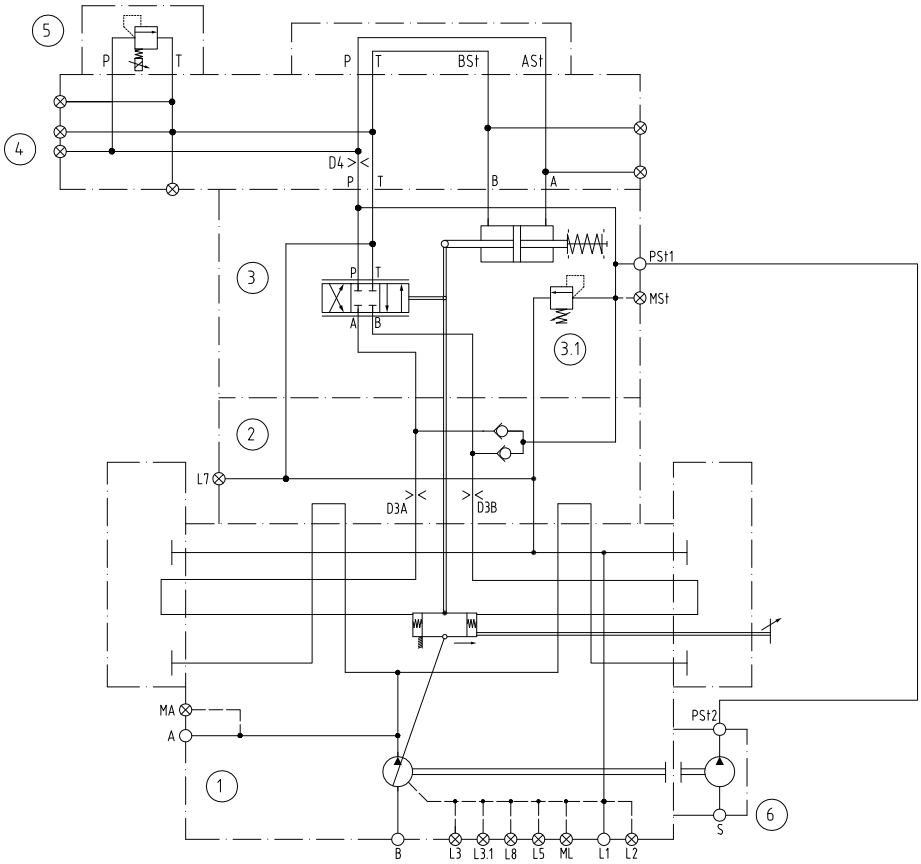
For basic pump details,
see general Installation Dimensions.



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





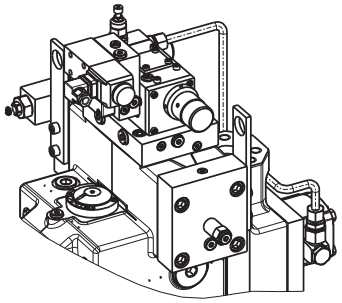


A, B	–	System port
L1, L2	–	Drain port
L3	–	Vent port for vertical mounting
L3.1, L8	–	Air bleed port
L5	–	Oil filling plug
L7	–	External port oil return line (optional)
MA	–	Gauge port, system pressure
ML	–	Gauge port, case pressure
PSt1	–	Pilot pressure inlet port
PSt2	–	Pilot pump outlet port
MSt	–	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.

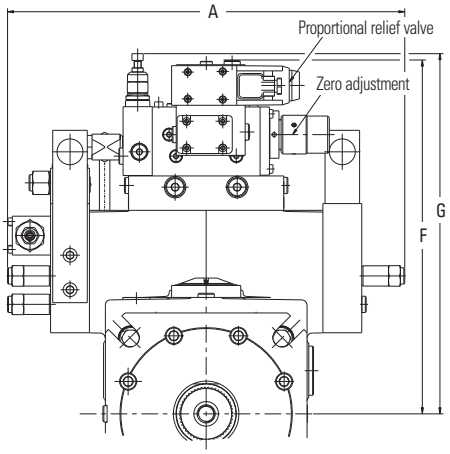


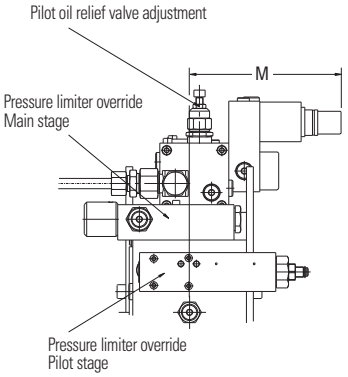
DPJ...A4

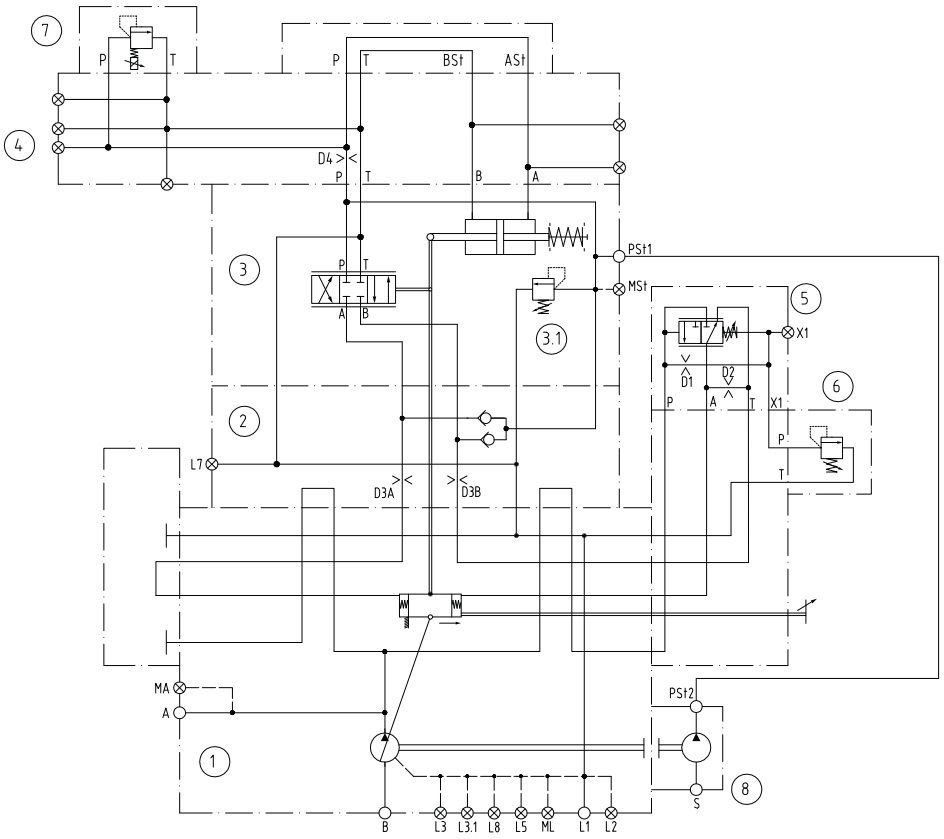
Options illustrated:
24 25 = **DP** (pilot pressure adjusted displacement)
26 = **J** (proportional KCG relief valve)
30 = **4** (pressure limiter override)
35 = **0** (no pilot oil filter)

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





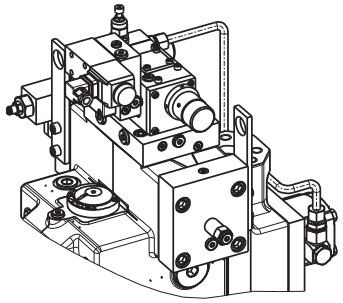


A, B	–	System port
L1, L2	–	Drain port
L3	–	Vent port for vertical mounting
L3.1, L8	–	Air bleed port
L5	–	Oil filling plug
L7	–	External port oil return line (Optional)
MA	–	Gauge port, system pressure
ML	–	Gauge port, case pressure
PSt1	–	Pilot pressure inlet port
PSt2	–	Pilot pump outlet port
MSt	–	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

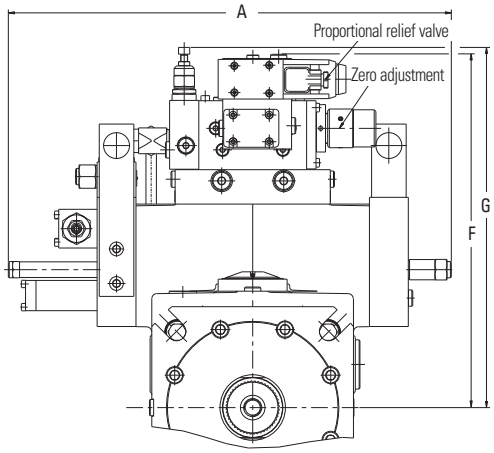
Control Options DP (cont.)

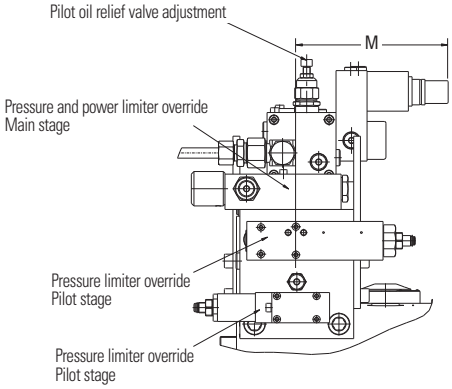
For basic pump details,
see general Installation Dimensions.



DPJ...A5

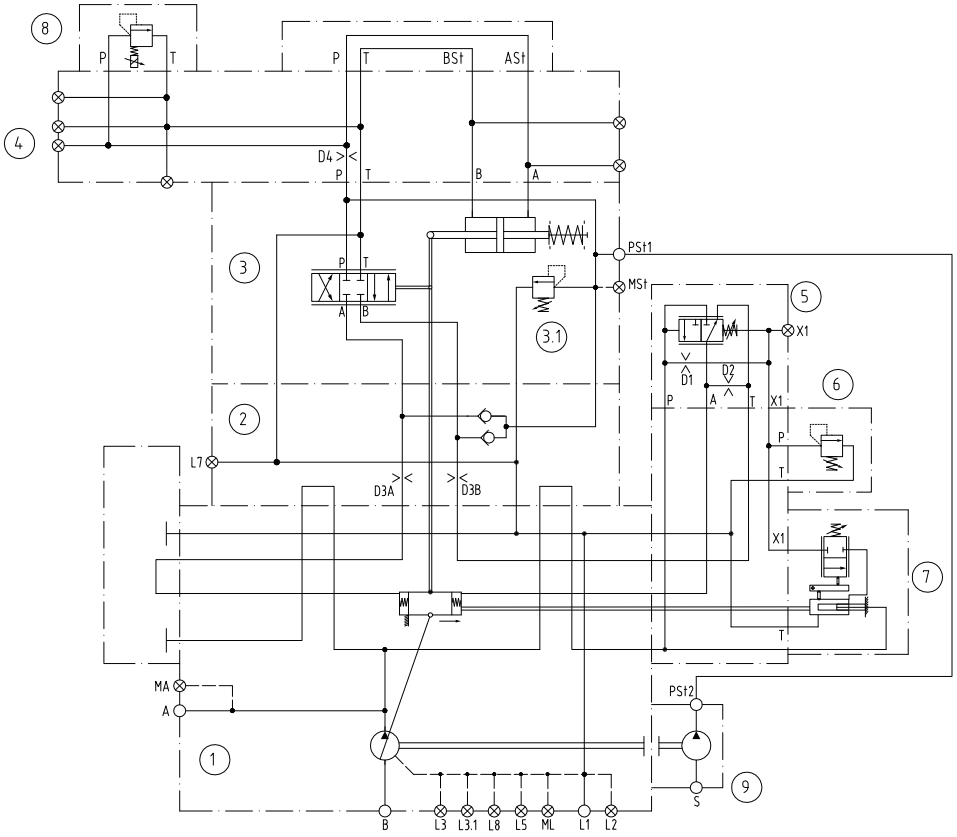
Options illustrated:
24 25 = **DP** (pilot pressure adjusted displacement)
26 = **J** (proportional KCG relief valve)
30 = **5** (pressure and power limiter override)
35 = **0** (no pilot oil filter)





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

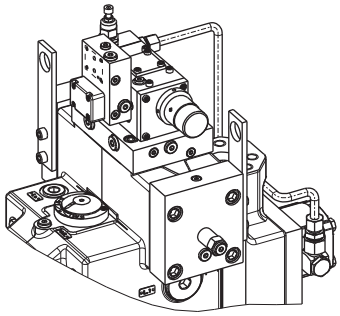


A, B	–	System port
L1, L2	–	Drain port
L3	–	Vent port for vertical mounting
L3.1, L8	–	Air bleed port
L5	–	Oil filling plug
L7	–	External port oil return line (Optional)
MA	–	Gauge port, system pressure
ML	–	Gauge port, case pressure
PSt1	–	Pilot pressure inlet port
PSt2	–	Pilot pump outlet port
MSt	–	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

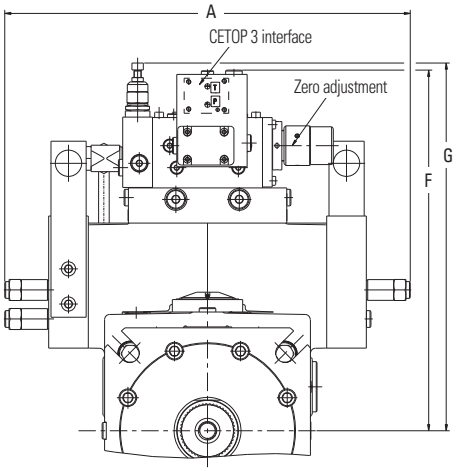
Control Options DP (cont.)

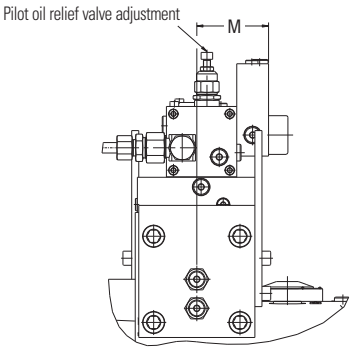
For basic pump details,
see general Installation Dimensions.



DPG...A0

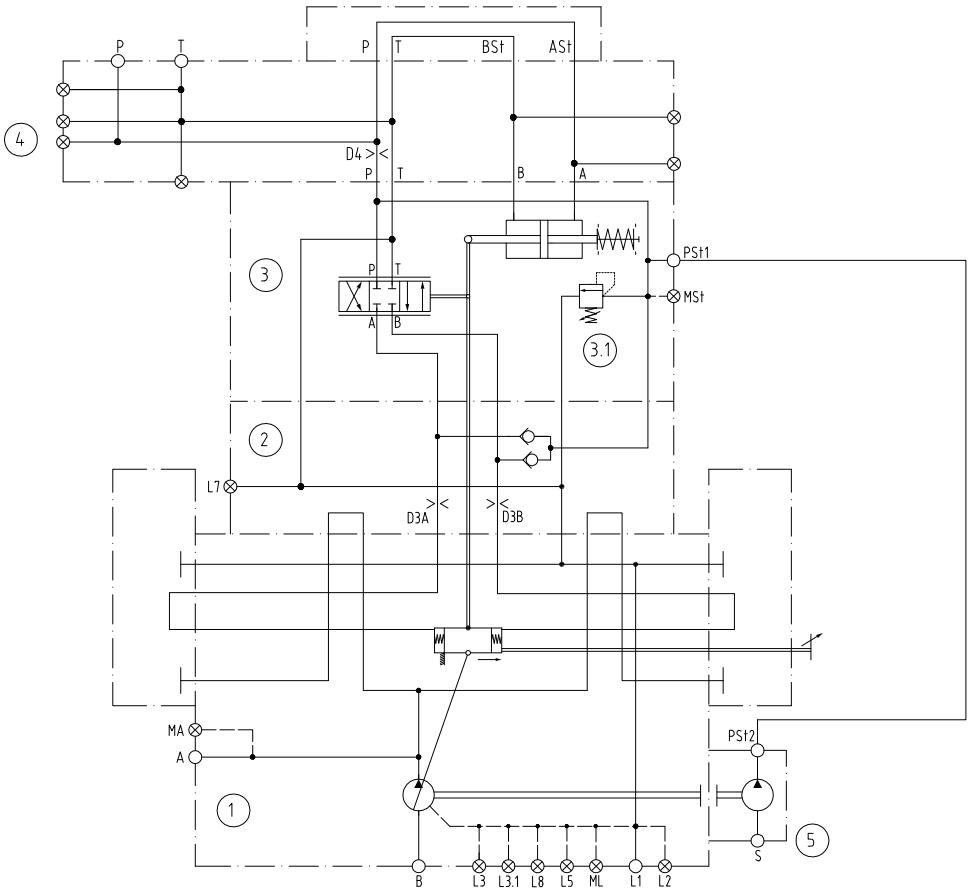
Options illustrated:
24 25 = **DP** (pilot pressure adjusted displacement)
26 = **G** (CETOP 3 interface)
30 = **0** (no additional function)
35 = **0** (no pilot oil filter)





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

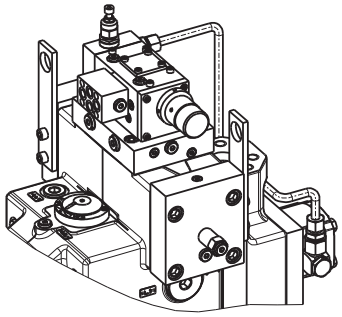


A, B	–	System port
L1, L2	–	Drain port
L3	–	Vent port for vertical mounting
L3.1, L8	–	Air bleed port
L5	–	Oil filling plug
L7	–	External port oil return line (optional)
MA	–	Gauge port, system pressure
ML	–	Gauge port, case pressure
PSt1	–	Pilot pressure inlet port
PSt2	–	Pilot pump outlet port
MSt	–	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	–	Pilot pump

Control Options DP (cont.)

For basic pump details,
see general Installation Dimensions.

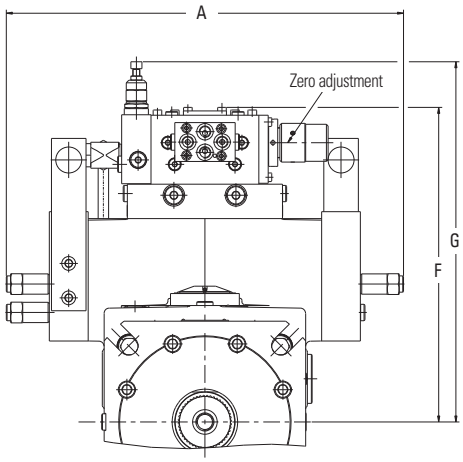


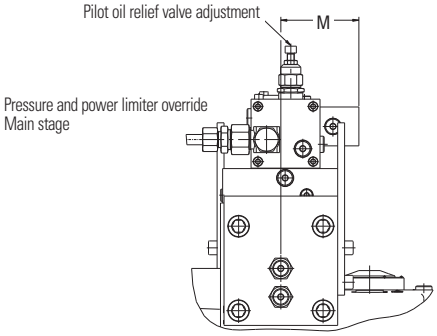
DPH...A0

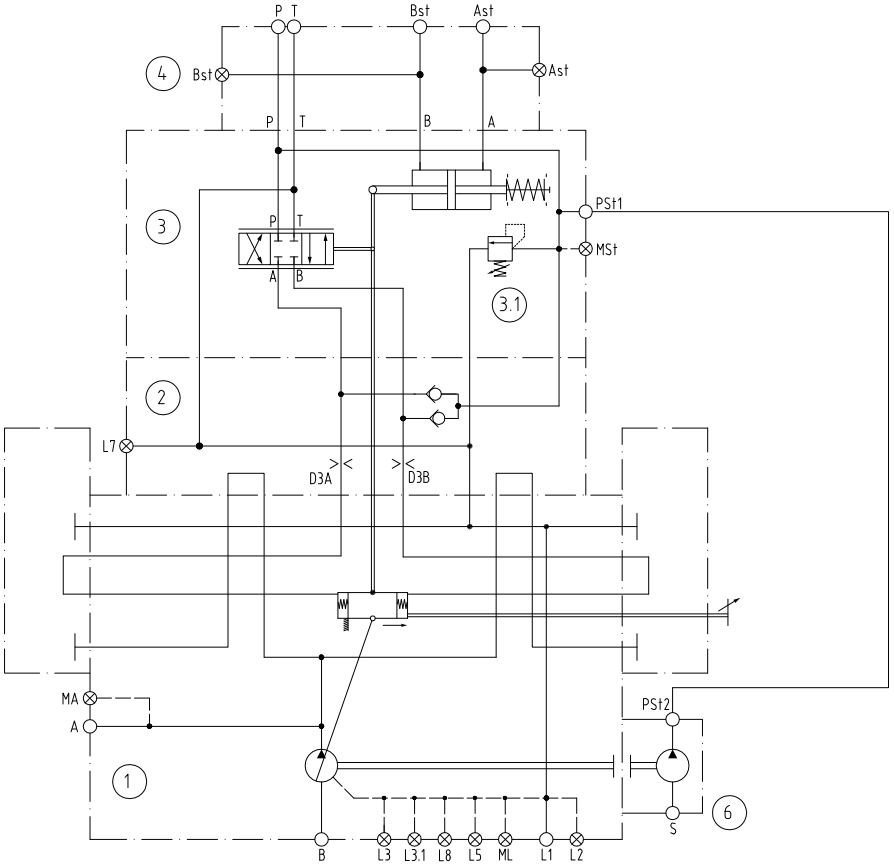
Options illustrated:
24 25 = **DP** (pilot pressure adjusted displacement)
26 = **H** (Remote port G1/4")
30 = **0** (no aditional function)
35 = **0** (no pilot oil filter)

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	–	System 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
PSt1	–	Pilot pressure inlet port
PSt2	–	Pilot pump outlet port
MSt	–	Pilot pressure gauge port
S	–	Pilot pump inlet port
ASt	–	G 1/4"
BSt	–	G 1/4"
P	–	G 1/4"
T	–	G 1/4"

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

ER9.X - 0000 - *00 - 10

1 – 5 | 6 – 10 | 11 – 14 | 15 – 18

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

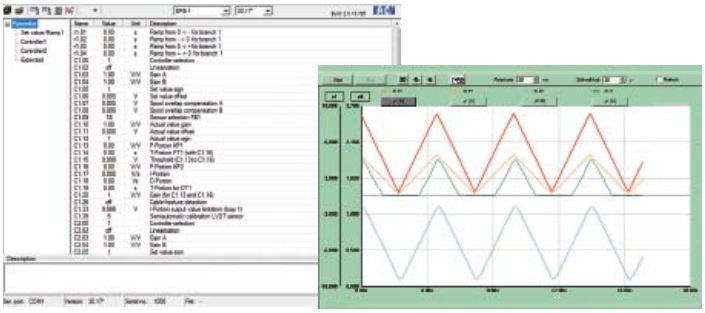
11 - 14 Special Features for Special Design Options
000 – Standard features
P00 – ProfiBus version

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

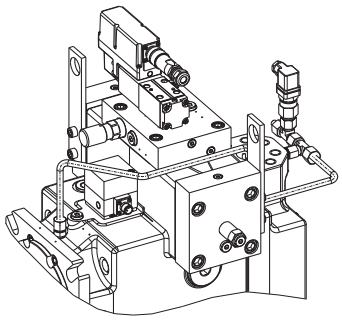
The digital amplifier and controller card assembly ER9.X-10 is used for the electronic PpQ control of displacement, pressure and power on Eaton PVW variable piston pumps (W design). The swash plate is positioned by either an Eaton KBS proportional valve or one of a range of suitable servovalves. The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

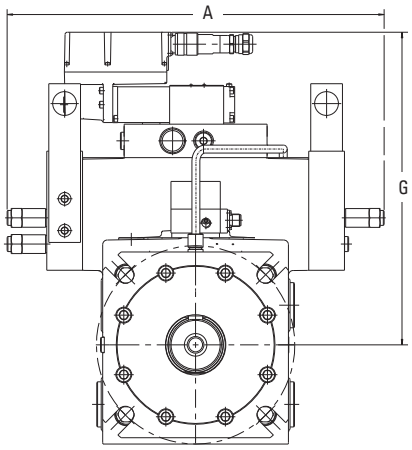
Control Options PQ (cont.)

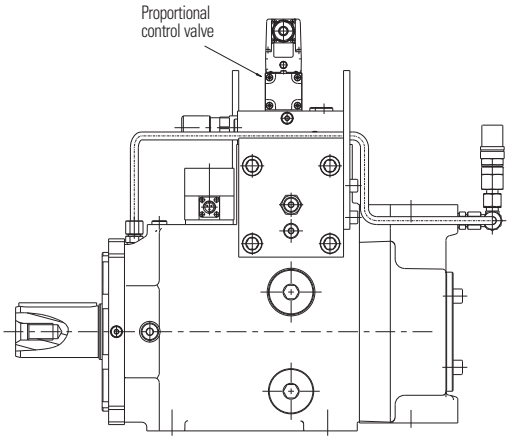
For basic pump details,
see general Installation Dimensions.



Pump Dimensions with PQD0 Control

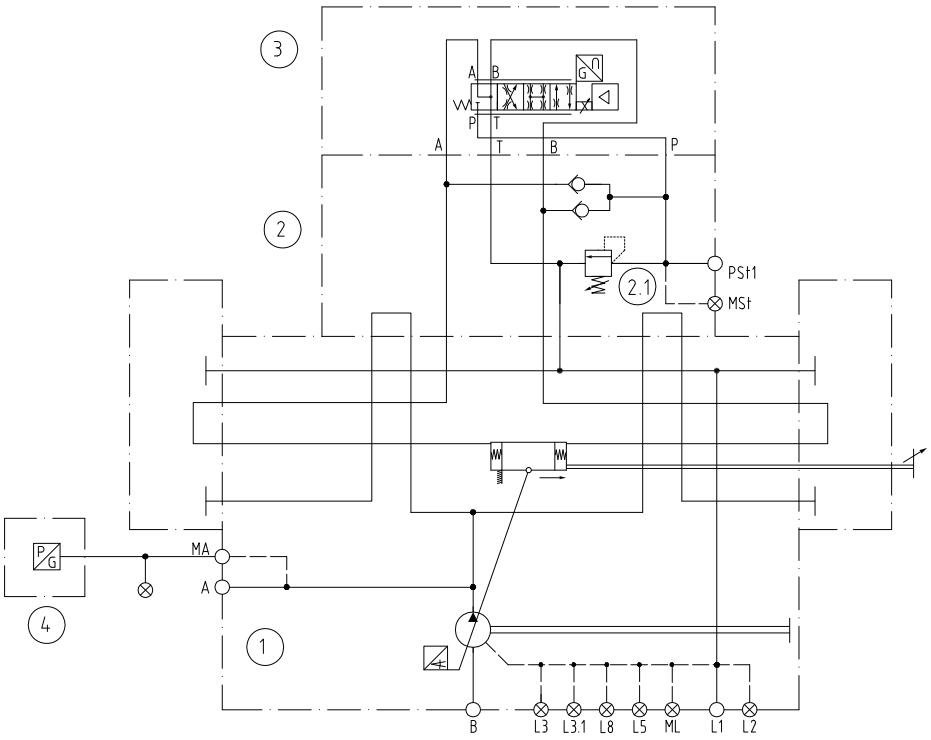
Options illustrated:
24 25 = **PQ** (displacement adjustment via proportional valve)
26 = **D** (CETOP 3 proportional valve KBS-3 with OBE)
30 = **0** (no additional function)
35 = **0** (no pilot oil filter)
36 = **0** (no venting valve)





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	–	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
PSt1	–	Pilot pressure inlet port
MSt	–	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.

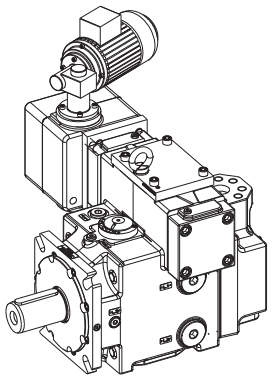
No Pressure/Power Limiter possible!

Pump Dimensions with ESN...A2 Control

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

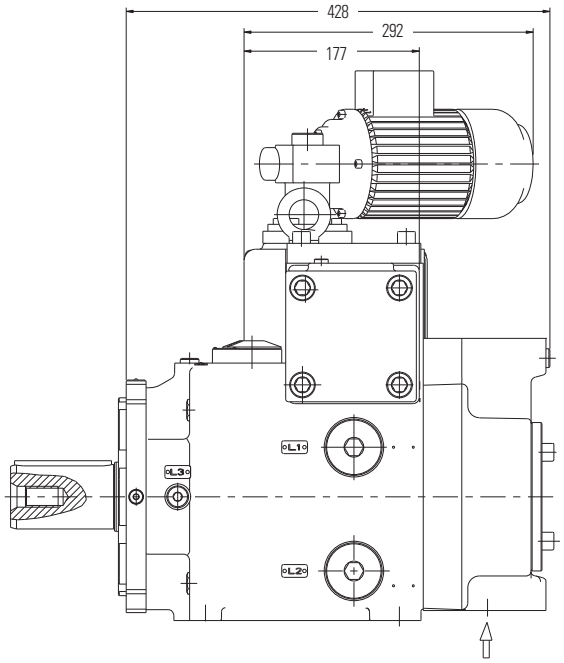
Options illustrated:

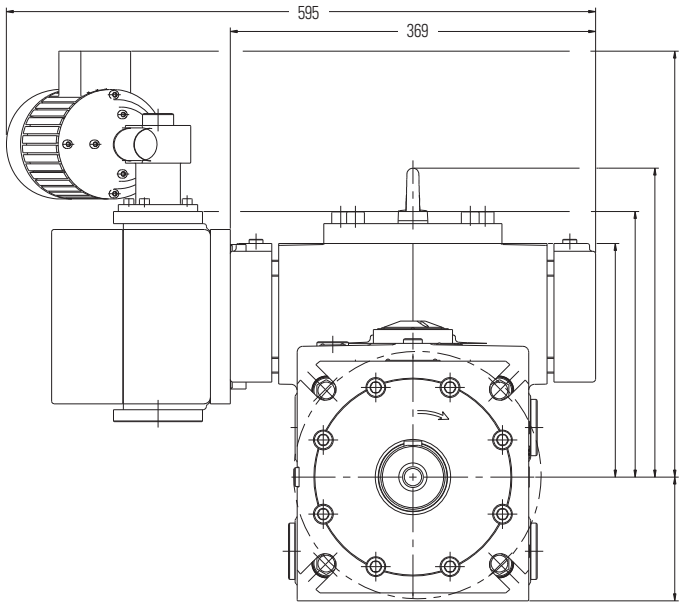
24 25 = **ES** (electric motor adjusted displacement)
26 = **N** (electric motor, medium response)
37 = **A** (4 limit switches)
38 = **2** (motor with brake, IP54)



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 Eaton Technical Support for details.



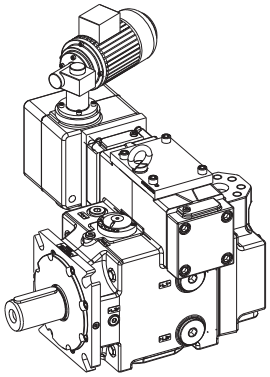


Dimensions shown for PVW 250 only.

Control Options ES (cont.)

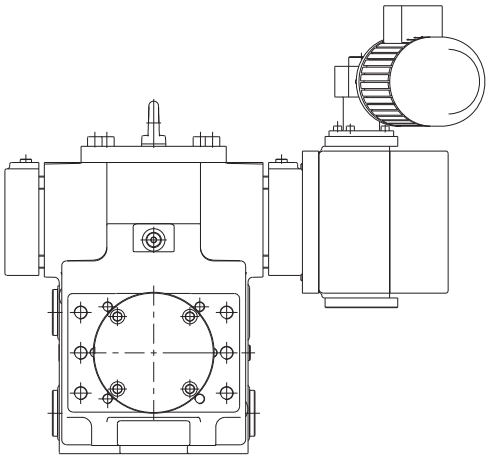
Available to special order only.

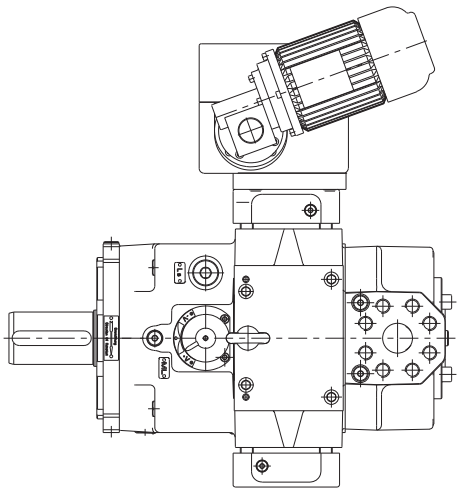
For basic pump details,
see general Installation Dimensions.

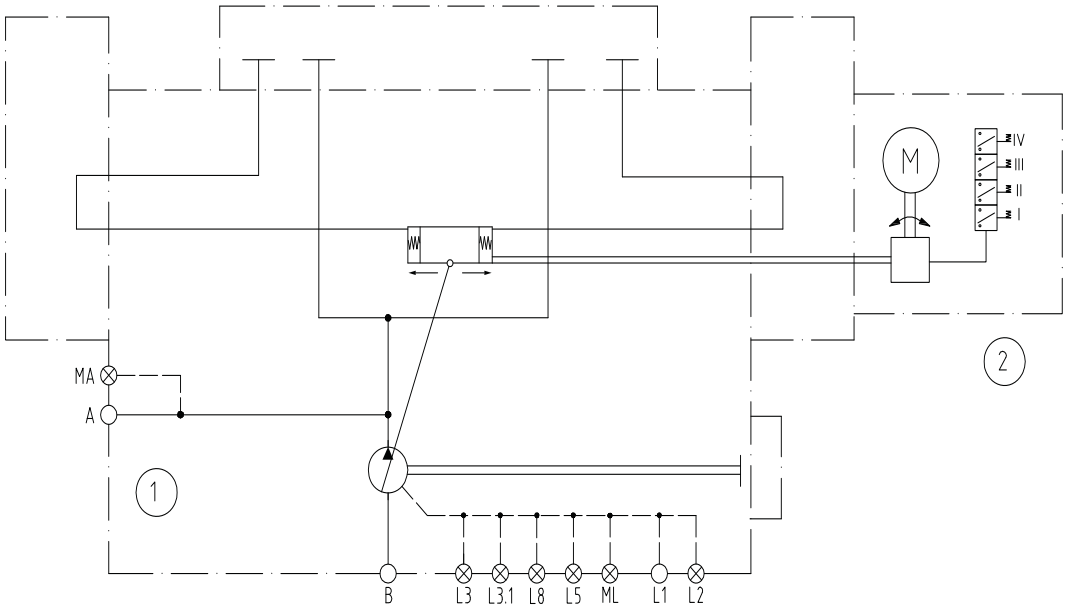


Pump Dimensions with ESN...A2 Control (cont.)

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





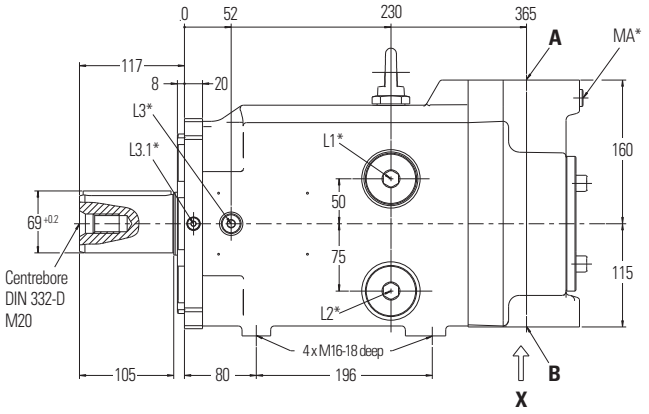


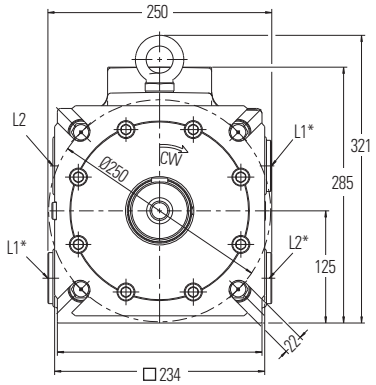
A	–	System port
B	–	Inlet port
L1, L2	–	Drain port
L3	–	Vent port for vertical mounting
L3.1, L8	–	Air bleed port
L5	–	Oil filling plug
MA	–	Gauge port, system pressure
ML	–	Gauge port, case pressure

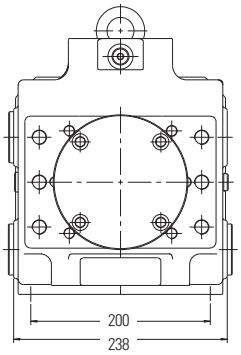
1	–	Basic pump
2	–	Electric Motor for ES-control

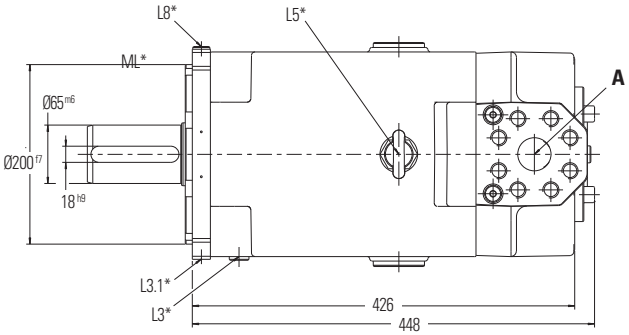
General Dimensions
PFW 250 Pumps

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)







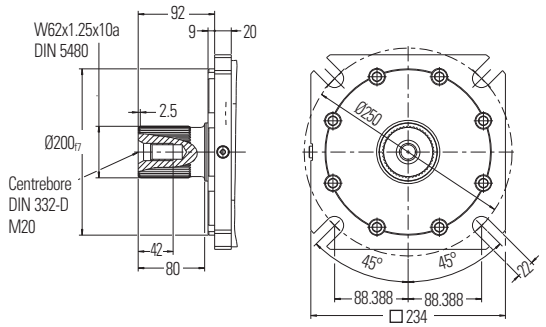


A	–	System pressure port ISO 6162-2 P38M (SAE J518 code 62, 1 1/2", 6000 psi)
B	–	Inlet pressure port ISO 6162-1 P89M (SAE J518 code 61, 3 1/2", 500 psi)
L1	–	Drain port 1 5/8"-12 UNF-2B (depending on mounting position, use upper port)
L2	–	Drain port G1 1/4" (depending on mounting position, use upper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

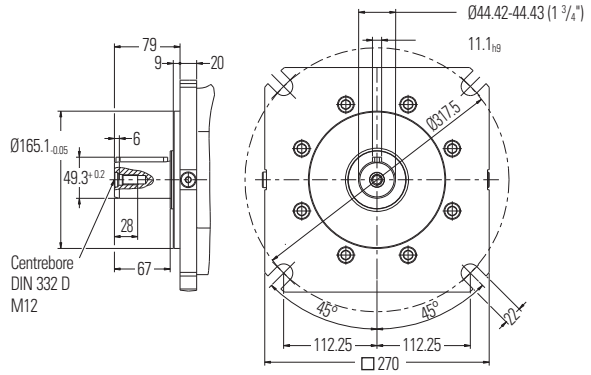
L3.1	–	Port G1/8"
L5	–	Oil filling plug 1 1/16"-12 UNF-2B
L8	–	Air bleed port G1/4"
MA	–	System pressure gauge port G1/4"
...*	–	Connection with plug

Shaft and Mounting Options PFW 250 Pumps

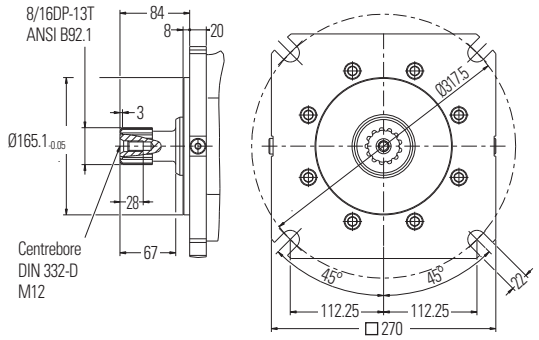
Mounting Flanges and Shaft Ends



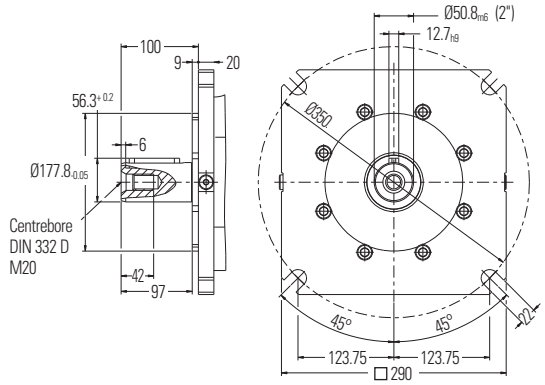
ISO splined shaft: 10 11 **= 07 &** 18 19 **= 02**



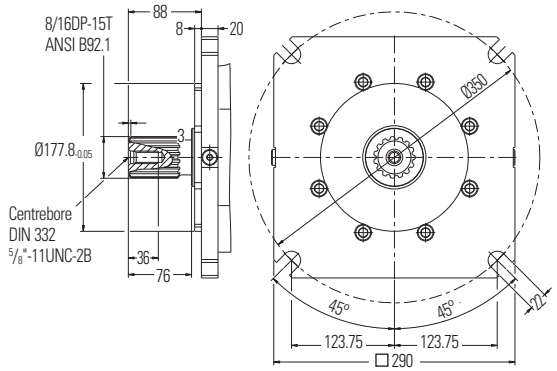
SAE E keyed shaft: 10 11 **= 0E &** 18 19 **= E1**



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

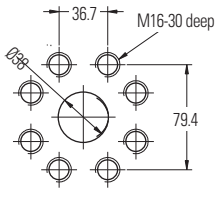


SAE E keyed shaft: 10 11 **= 0F &** 18 19 **= F1**

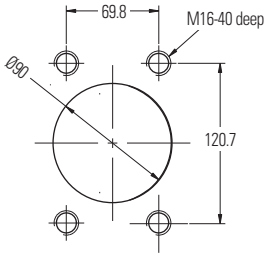


SAE F splined shaft: 10 11 **= 0F &** 18 19 **= F2**

Main Ports



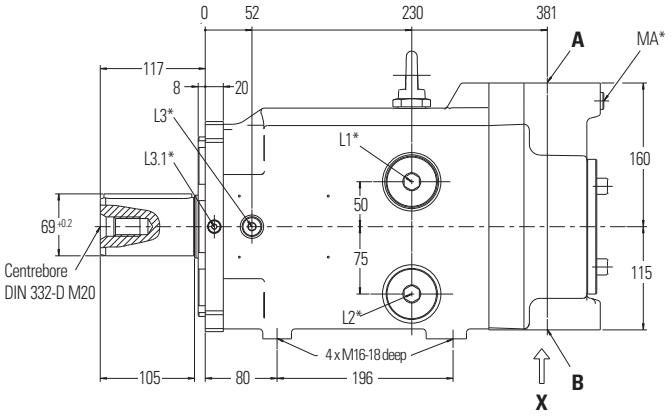
Port A

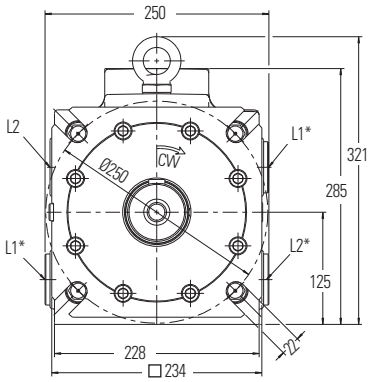


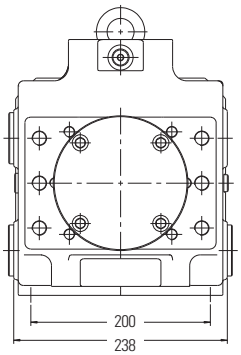
Port B
View X

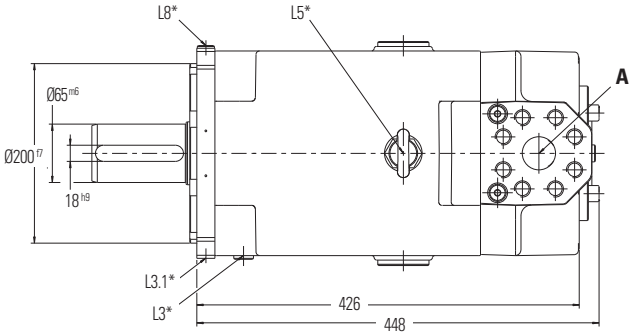
General Dimensions
PFW 360 Pumps

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)







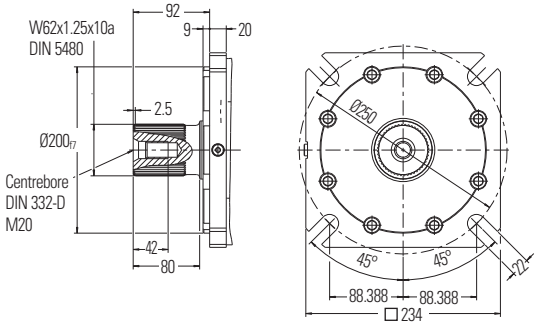


A	–	System pressure port ISO 6162-2 P38M (SAE J518 code 62, 1 1/2", 6000 psi)
B	–	Inlet pressure port ISO 6162-1 P89M (SAE J518 code 61, 3 1/2", 500 psi)
L1	–	Drain port 1 5/8"-12 UNF-2B (depending on mounting position, use upper port)
L2	–	Drain port G1 1/4" (depending on mounting position, use upper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

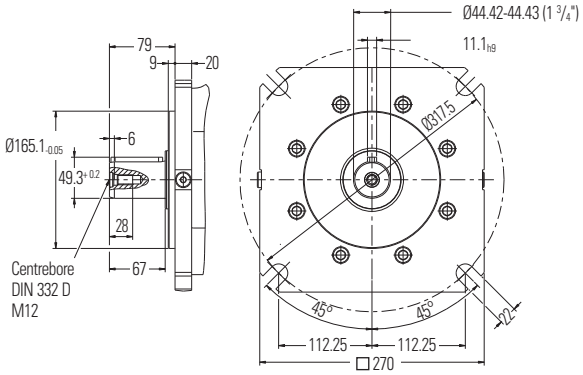
L3.1	–	Port G1/8"
L5	–	Oil filling plug 1 1/16"-12 UNF-2B
L8	–	Air bleed port G1/4"
MA	–	System pressure gauge port G1/4"
...*	–	Connection with plug

Shaft and Mounting Options PFW 360 Pumps

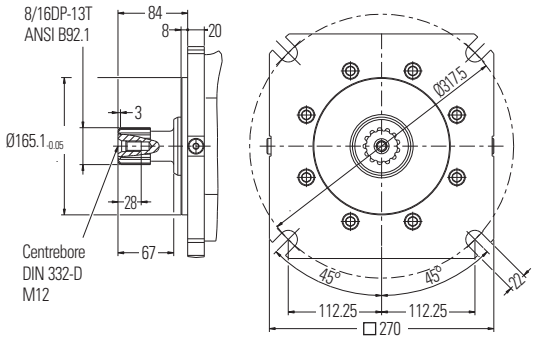
Mounting Flanges and Shaft Ends



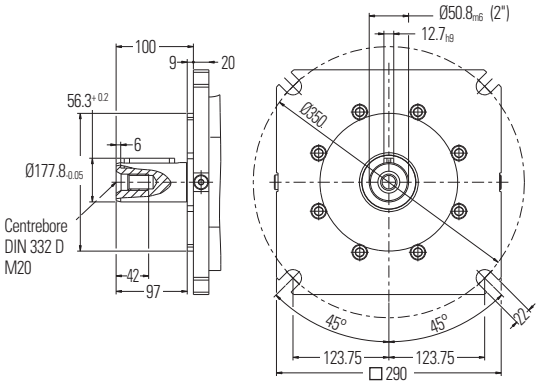
ISO splined shaft: 10 11 = 07 & 18 19 = 02



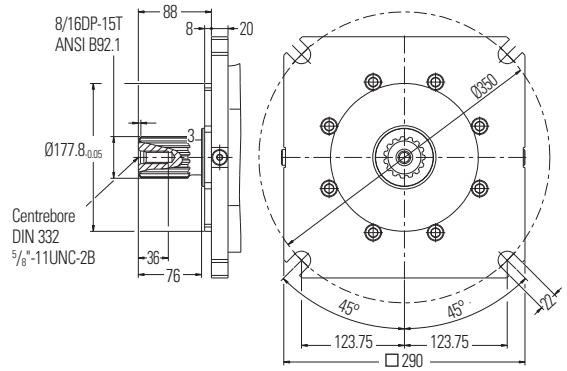
SAE E keyed shaft: 10 11 = 0E & 18 19 = E1



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

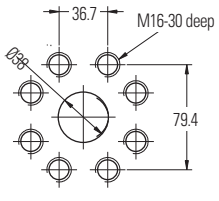


SAE E keyed shaft: 10 11 = 0F & 18 19 = F1

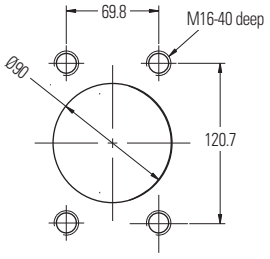


SAE F splined shaft: 10 11 = 0F & 18 19 = F2

Main Ports



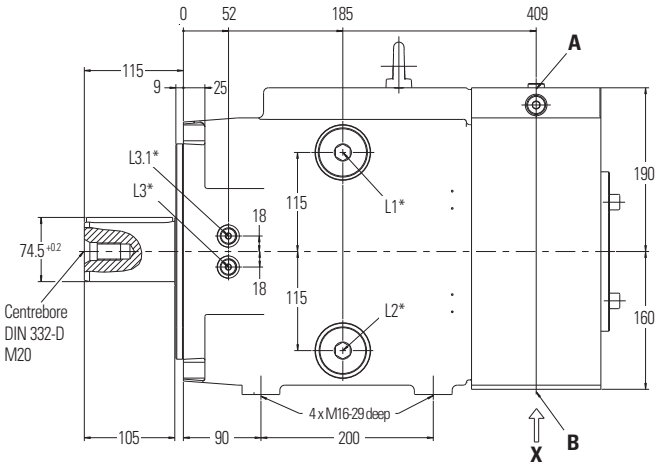
Port A

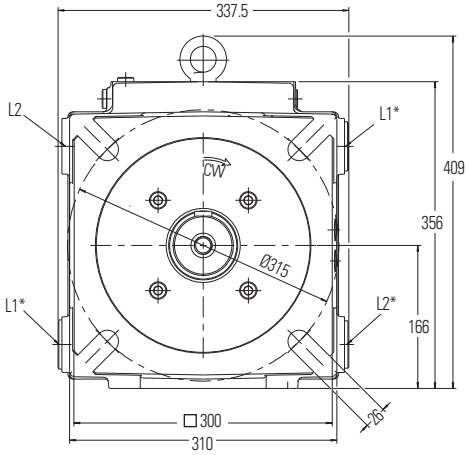


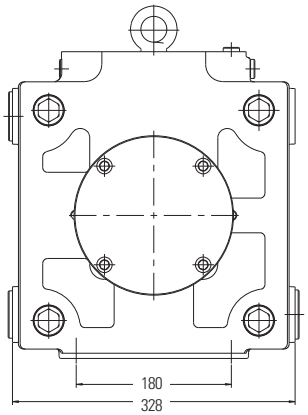
Port B
View X

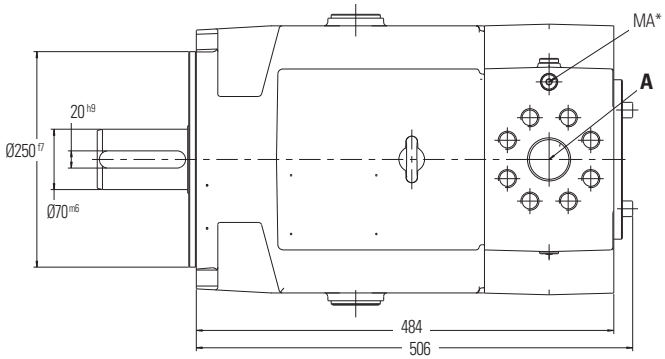
General Dimensions
PFW 500 Pumps

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)l





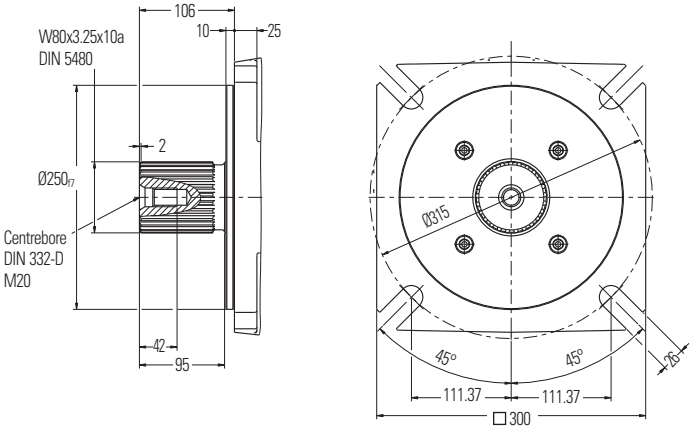




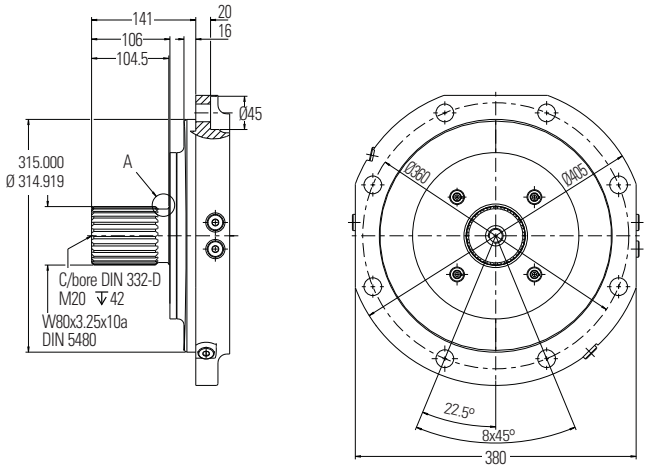
A	–	System pressure port ISO 6162-2 P51M (SAE J518 code 62, 2", 6000 psi)
B	–	System pressure port ISO 6162-1 P127M (SAE J518 code 61, 5", 500 psi)
L1	–	Drain port $1^5/_8$"-12 UNF-2B (depending on mounting position, use upper port)
L2	–	Drain port $G1^1/_2$" (depending on mounting position, use upper 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

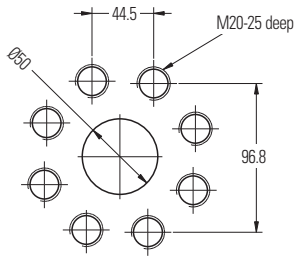


ISO splined shaft: 10 11 **= 08 &** 18 19 **= 02**

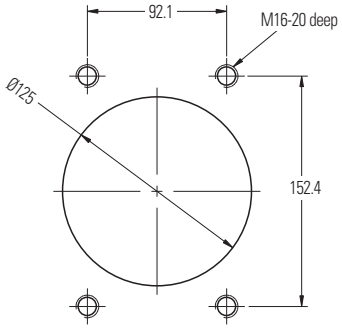


ISO special splined shaft: 10 11 **= 09 &** 18 19 **= 05**

Main Ports



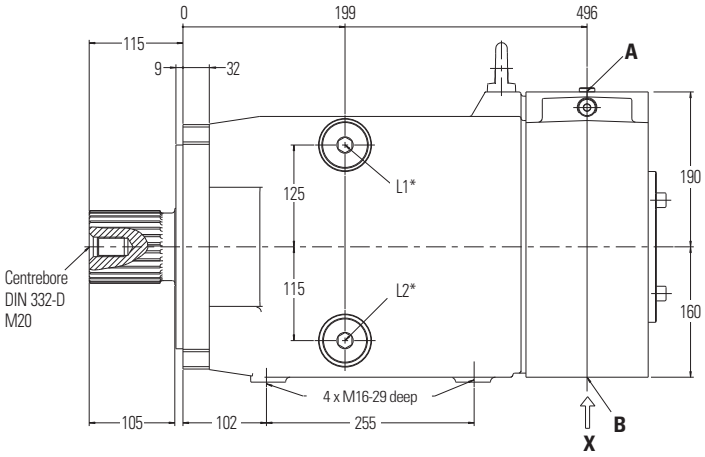
Port A

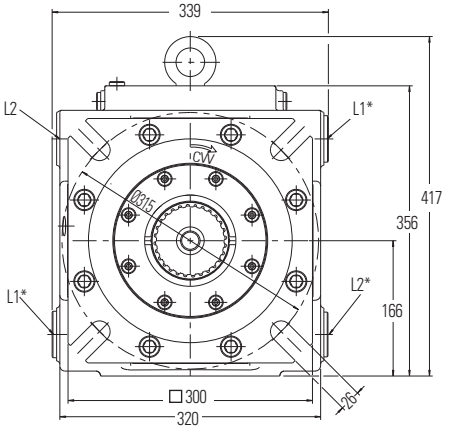


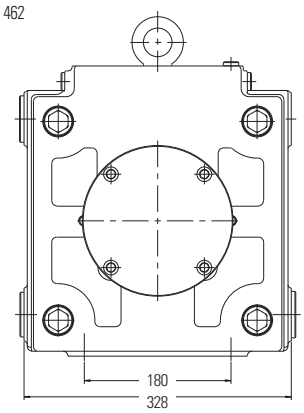
Port B
View X

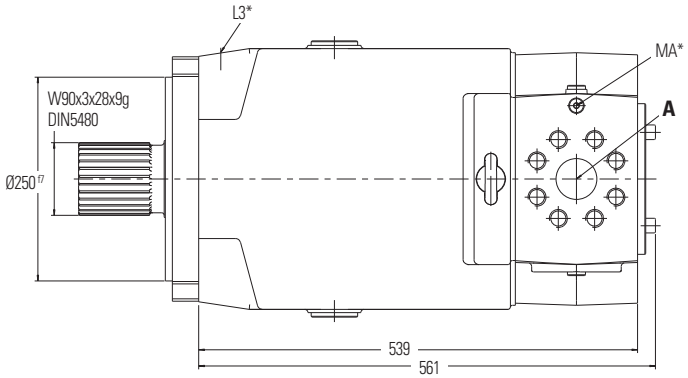
General Dimensions
PFW 750 Pumps

Options illustrated:
12 = **R** (clockwise rotation)
14 15 = **00** (no thru drive)
18 19 = **02** (ISO splined 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)
MA	–	System pressure gauge port $G^1/_4$"
...*	–	Connection with plug

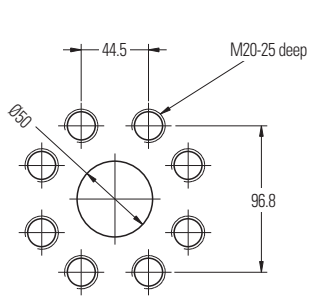
Shaft and Mounting Options PFW 750 Pumps

Mounting Flanges and Shaft Ends

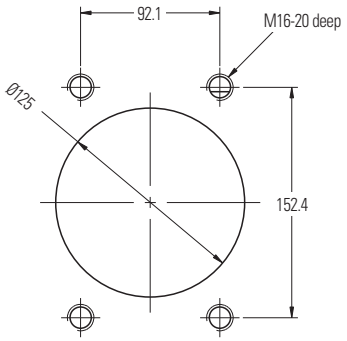
ISO splined shaft: 10 11 = 08 & 18 19 = 02

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

Main Ports



Port A



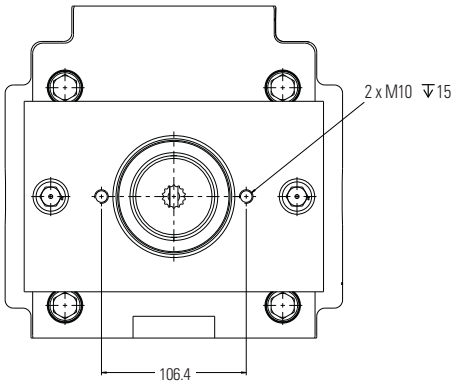
Port B
View X

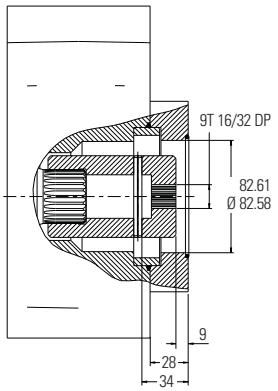
Thru-Drive Options
130 and 180 Series

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:

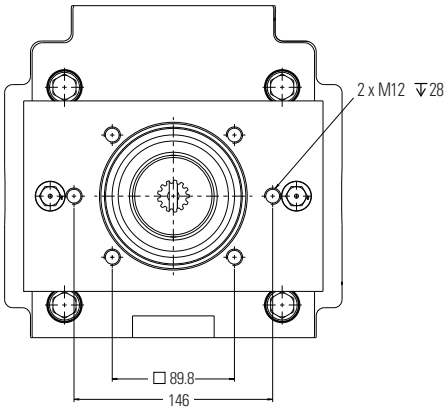
14 15 = **0A** (SAE A)

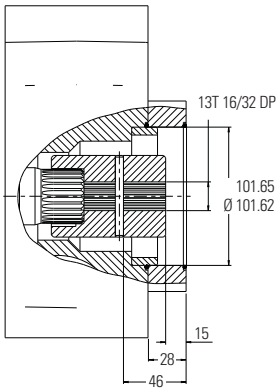




Option illustrated:

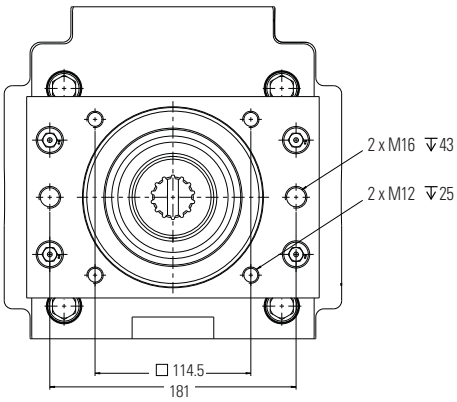
14 15 = **0B** (SAE B)

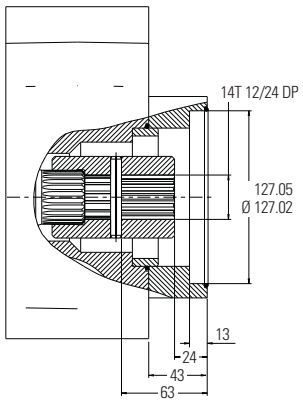




Option illustrated:

14 15 = **0C** (SAE C)



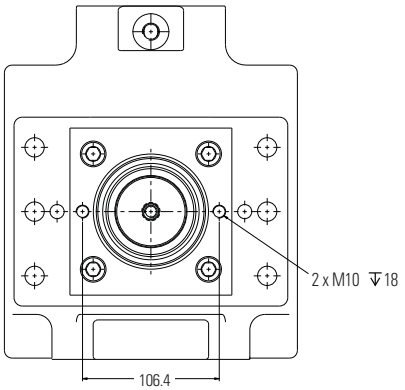


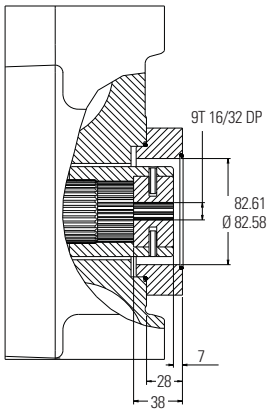
Thru-Drive Options
250 and 360 Series

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:

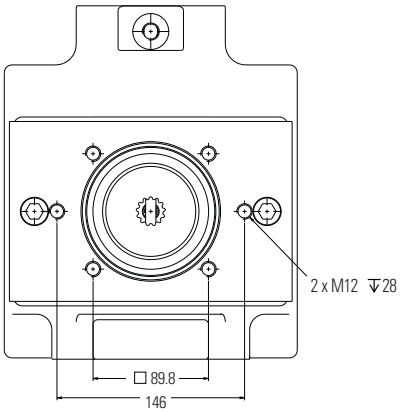
14 15 = **0A** (SAE A)

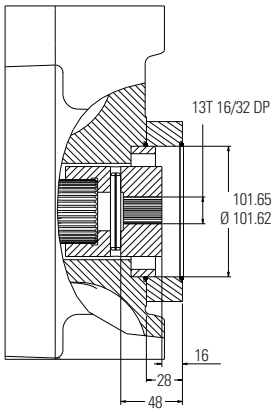




Option illustrated:

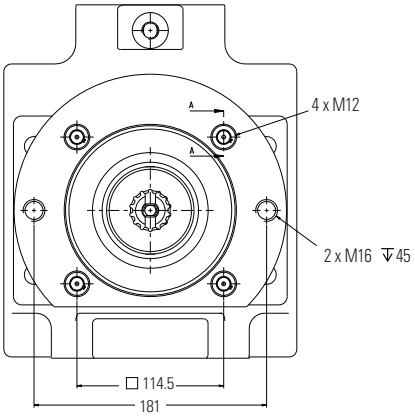
14 15 = **0B** (SAE B)

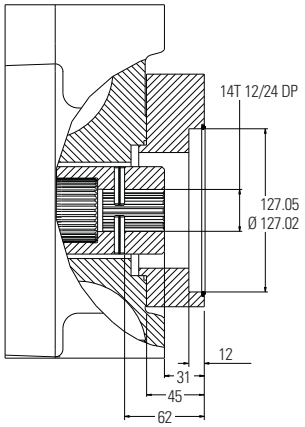




Option illustrated:

14 15 = **0C** (SAE C)



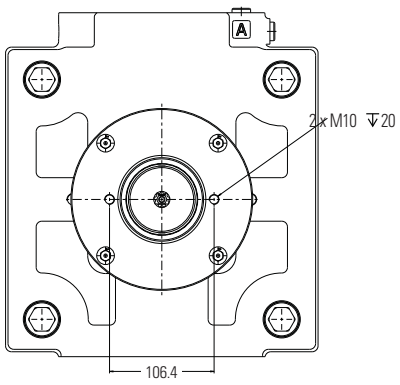


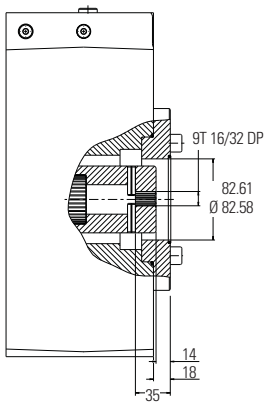
Thru-Drive Options
500 Series

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:

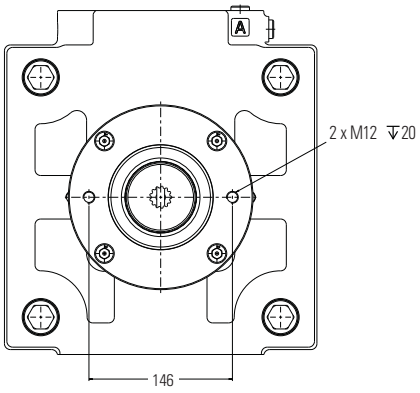
14 15 = **0A** (SAE A)

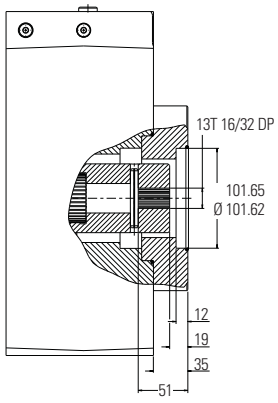




Option illustrated:

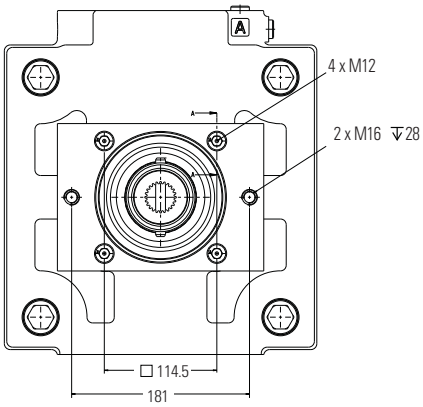
14 15 = **0B** (SAE B)

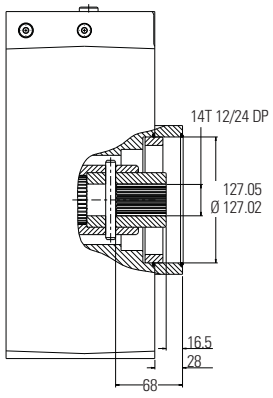




Option illustrated:

14 15 = **0C** (SAE C)



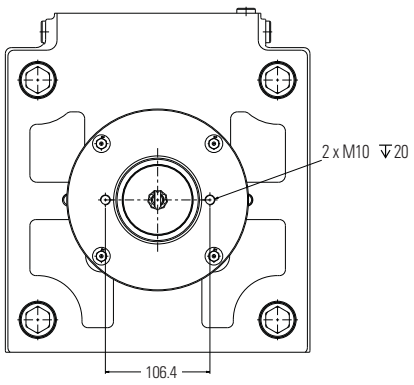


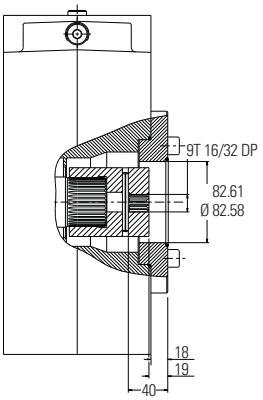
Thru-Drive Options
750 Series

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:

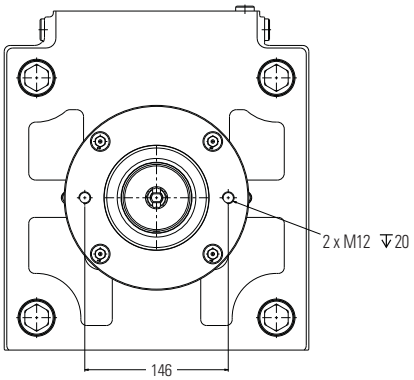
14 15 = **0A** (SAE A)

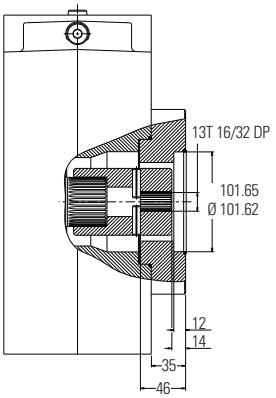




Option illustrated:

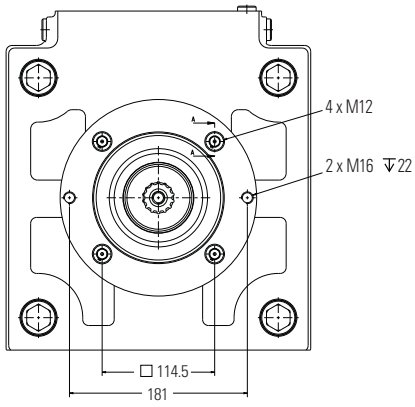
14 15 = **0B** (SAE B)

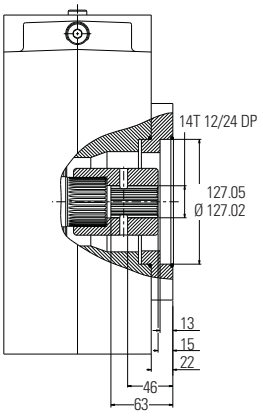




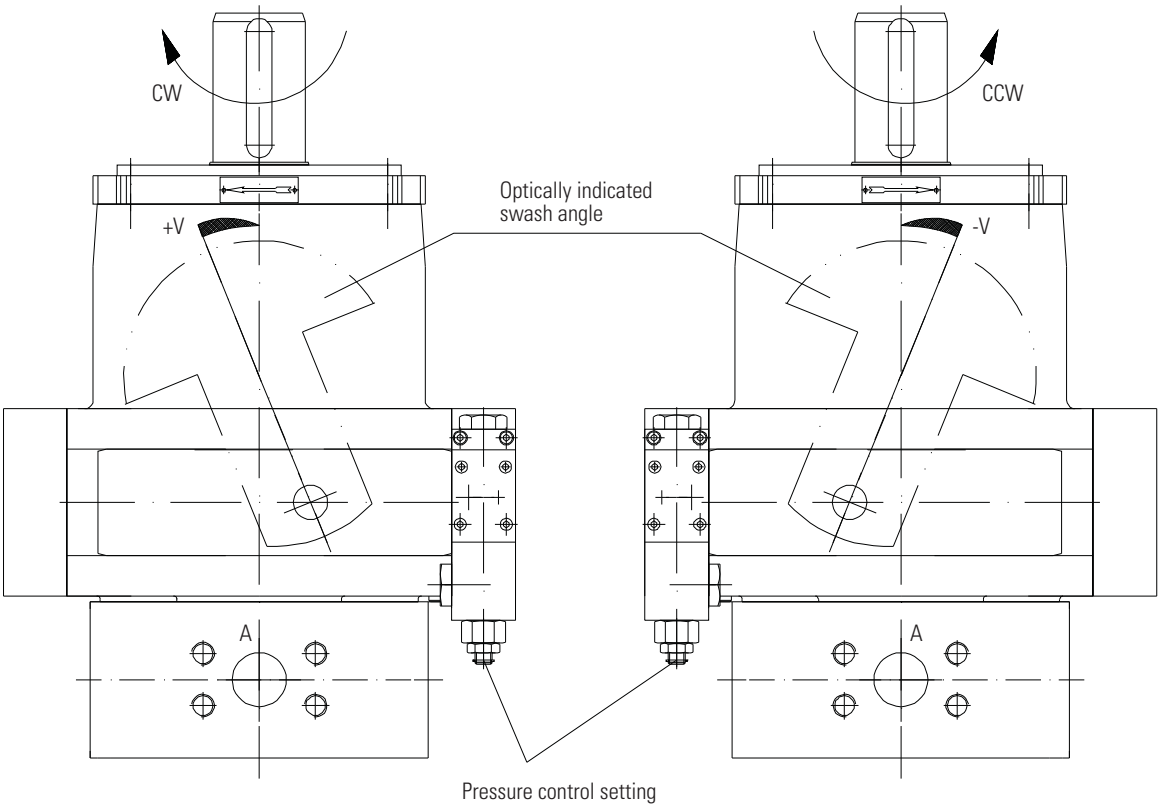
Option illustrated:

14 15 = **0C** (SAE C)





Swash Angle and Flow Direction



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