

PVPC with mechanical controls variable displacement

Axial pistons pump with mechanical controls. Manual or remote pressure compensator, load sensing, constant power



Displacement
29 ÷ 160
cm³/rev

Pmax
250 ÷ 350
bar

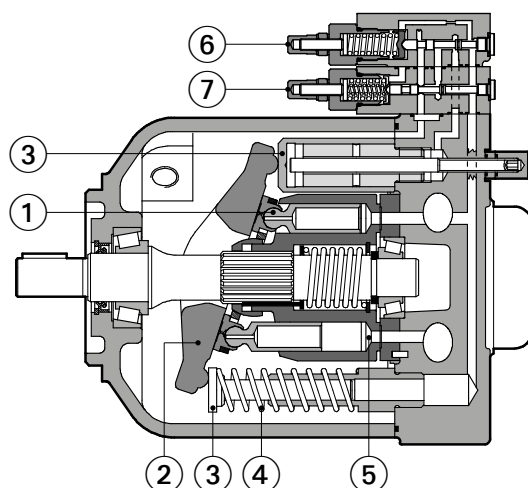
Features

- Variable displacement
- Open circuit
- SAE J744 or ISO 3019 mounting flange
- Keyed or splined shaft
- Optional through shaft

Description

Variable displacement axial piston pumps with swash plate design suited for high pressure, open circuits, industrial application. They are characterized by low noise emission, short response time and flexible operation thanks to the wide range of mechanical controls. For PVPC pumps with electrohydraulic proportional controls, see tech table AS170.

Overview



- 1 - Piston
- 2 - Swash plate
- 3 - Servo-piston
- 4 - Spring
- 5 - Pumping group
- 6 - Max pressure compensator
- 7 - Load sensing compensator
- 8 - Remote pressure transducer

1 MODEL CODE

PVPC	XA	-	CH	-	4046	/	1	D	/	M	-	X	24DC	*	/	*	*	/	*
1	2		3		4		5	6		7		8	9	10		11	12		13

1 - Pump type	
PVPC	Variable displacement axial piston pump
2 - Option for pumps with through shaft	
-	omit if through shaft is not required
XA	intermediate flange SAE A
XB	intermediate flange SAE B
XC	intermediate flange SAE C

See section 18

3 - Type of control	
C	manual pressure compensator
CH	manual pressure compensator, with venting
R	remote pressure compensator (1)
L	load sensing (pressure & flow)
LW	constant power (combined pressure & flow)

See section 13

(1) Not available for PVPC size 6, for which the manual pressure compensator can be also used as remote pressure compensator

4 - Size and max displacement	
3029	size 3 - displacement 029 cm ³ /rev
4046	size 4 - displacement 046 cm ³ /rev
5073	size 5 - displacement 073 cm ³ /rev
5090	size 5 - displacement 090 cm ³ /rev
6140	size 6 - displacement 140 cm ³ /rev
6160	size 6 - displacement 160 cm ³ /rev

5 - Shaft type	
1	keyed
5	splined

6 - Direction of rotation, viewed at the shaft end	
D	clockwise
S	counterclockwise

See section 19

7 - Mounting flange standard	
-	omit for SAE
M	ISO 3019/2 - only for shaft type1

8 - Electrical connector - only for CH version	
X	without connector

See section 4.2 for available connectors, to be ordered separately

9 - Coil voltage - only for CH version	
12DC	See section 4.1
24DC	

10 - Series identification - not required for ordering	
.....	series number

11 - Seals material	
-	NBR
PE	FKM

12 - Power setting - only for LW version		
Specify the power setting value		
.....	4,5 ÷ 30 kW	for 3029
	7 ÷ 45 kW	for 4046
	11 ÷ 75 kW	for 5073
	13,5 ÷ 75 kW	for 5090
	21 ÷ 180 kW	for 6140
	22 ÷ 185 kW	for 6160

Note: specify the power setting value without unit of measure, i.e. 4,5 for 4,5kW

See section 12

13 - Rotational speed setting - only for LW version	
970	970 rpm
1150	1150 rpm
1450	1450 rpm
1750	1750 rpm
2000	2000 rpm

See section 12

2 GENERAL CHARACTERISTICS

Assembly position	Any position, see section 7
Ambient temperature range	Standard = -25°C ÷ +80°C /PE option -15°C ÷ +80°C
Storage temperature range	Standard = -40°C ÷ +70°C /PE option -20°C ÷ +70°C
Surface protection (pump body)	Black painting RAL9005

3 HYDRAULIC CHARACTERISTICS - based on mineral oil ISO VG 46 at 50 °C

PVPC size	3029	4046	5073	5090	6140	6160
Max displacement (cm³/rev)	29	46	73	88	140	160
Theoretical max flow at 1450 rpm (l/min)	42	66,7	105,8	127,6	203	232
Max continuous pressure (bar)	280			250	350	315
Peak pressure (1) (bar)	350			315	420	390
Min/Max inlet pressure (bar abs.)	0,8 / 25					
Max pressure on drain port (bar abs.)	1,5					
Power consumption at 1450 rpm and at max pressure and displacement (kW)	20	32	52	55	120	122
Max torque on the shaft (Nm)	Type 1: 210 Type 5: 270	Type 1: 350 Type 5: 440	Type 1: 670 Type 5: 810		Type 1: 1300 Type 5: 1660	
Max torque at max pressure and displacement (Nm)	128	203	328	350	780	803
Speed rating at max displacement (rpm)	500 ÷ 3000	500 ÷ 2600		500 ÷ 2200		500 ÷ 2000
Moment of inertia (Kgm²)	0,0020	0,0050	0,0030		0,0025	
Body volume (l)	0,7	0,9	1,5		2,8	

(1) Max 50ms

4 ELECTRICAL CHARACTERISTICS - only for CH version

Insulation class	H
Connector protection degree	IP 65
Relative duty factor	100%
Supply voltage tolerance	± 10%

4.1 COIL VOLTAGE - only for CH version

Average values based ambient / coil temperature of 20°C

External supply nominal voltage ±10%		Voltage code	Code of spare coil	Power consumption	Nominal current	Coil characteristics
DIRECT CURRENT	12 DC	12DC	coil CH-PVPC-X 12DC	19,2 W	1,61 A	Insulation Class: H Protection degree: IP65
	24 DC	24DC	coil CH-PVPC-X 24DC		0,80 A	

4.2 ELECTRIC CONNECTORS ACCORDING TO DIN EN 175301-803 - to be ordered separately

Code of connector	Description
666	Connector IP-65
667	Connector IP-65 but with built-in signal led

5 SEALS AND HYDRAULIC FLUIDS - for other fluids not included in below table, consult our technical office

Seals, recommended fluid temperature	NBR seals (standard) = -25°C ÷ +80°C, with HFC hydraulic fluids = -20°C ÷ +50°C FKM seals (/PE option) = -15°C ÷ +80°C		
Recommended viscosity	20÷100 mm²/s - max allowed range 15 ÷ 380 mm²/s		
Max fluid contamination level	ISO4406 class 18/16/13 NAS1638 class 7	ISO4406 class 16/14/11 NAS1638 class 5	see also filter section at www.atos.com or KTF catalog
Hydraulic fluid	Suitable seals type	Classification	Ref. Standard
Mineral oils	NBR, FKM	HL, HLP, HLPD, HVLP, HVLPD	DIN 51524
Flame resistant without water	FKM	HFD-U (glycol based), HFD-R (1)	ISO 12922
	NBR, FKM	HFD-U (ester based)	
Flame resistant with water	NBR	HFC (1)	

(1) See section 6

6 PERFORMANCE RESTRICTIONS WITH FLAME RESISTANT FLUIDS

6.1 HFD-R (Phosphate ester) and HFD-U (glycol based)

PVPC size	3029	4046	5073	5090	6140	6160
Max continous pressure (bar)	200					
Max peak pressure (bar)	240					
Max speed (1) (rpm @ VMAX)	2050	1850	1750	1550	1500	1450
Ambient temperature range (°C)	-10 ÷ +80					
Bearing life (% of bearing life with mineral oil) (%)	90					

(1) With an inlet pressure of 1 bar abs

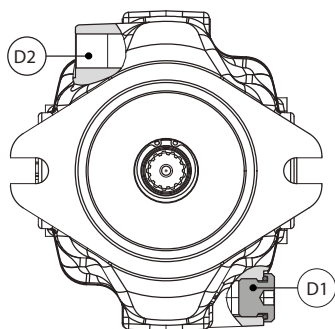
Note: HFD-U (ester based) does not have any restrictions for pressure or rotational speed

6.2 HFC - Water-glycol (35 ÷ 55 % of water)

PVPC size	3029	4046	5073	5090	6140	6160
Max continous pressure (bar)	180					
Max peak pressure (bar)	210					
Max speed (1) (rpm @ VMAX)	2050	1850	1750	1550	1500	1450
Ambient temperature range (°C)	-10 ÷ +60					
Bearing life (% of bearing life with mineral oil) (%)	40					

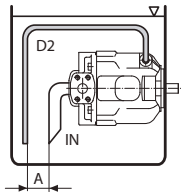
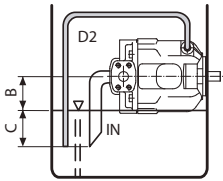
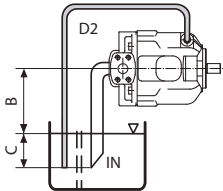
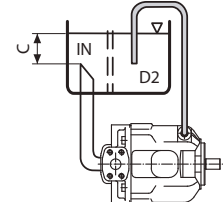
(1) With an inlet pressure of 1 bar abs

7 INSTALLATION POSITION

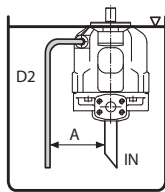
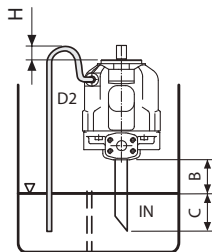
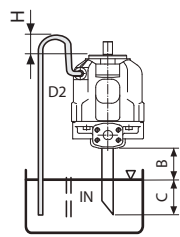
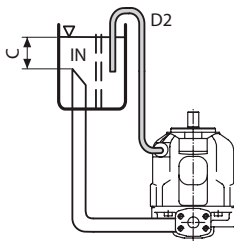


During commissioning the axial piston pump must be bled. This rule must be observed in the event of prolonged down period, as the pump may empty through the hydraulic pipes. The pump is supplied with drain D2 open, and D1 plugged. Before installation fill the pump with hydraulic oil, keeping it in horizontal position. With exception of pump mounted below the oil level, we recommend to interpose a baffle plate between inlet and drain line.

HORIZONTAL INSTALLATION

	INSIDE THE TANK Minimum oil level equal or above the pump mounting surface $A \geq 200\text{mm}$
	INSIDE THE TANK Minimum oil level below the pump mounting surface Minimum inlet pressure = 0.8 bar absolute $B \leq 800\text{mm}$ $C \leq 200\text{mm}$ $H \geq 25\text{mm}$
	OUTSIDE THE TANK above oil level Minimum inlet pressure = 0.8 bar absolute $B = 800\text{mm}$ $C = 200\text{mm}$
	OUTSIDE THE TANK below oil level $C = 200\text{mm}$

VERTICAL INSTALLATION

	INSIDE THE TANK Minimum oil level equal or above the pump mounting surface $A \geq 200\text{mm}$
	INSIDE THE TANK Minimum oil level below the pump mounting surface Minimum inlet pressure = 0.8 bar absolute $B \leq 800\text{mm}$ $C \leq 200\text{mm}$ $H \geq 25\text{mm}$
	OUTSIDE THE TANK above oil level Minimum inlet pressure = 0.8 bar absolute $B = 800\text{mm}$ $C = 200\text{mm}$ $H \geq 25\text{mm}$
	OUTSIDE THE TANK below oil level Minimum inlet pressure = 0.8 bar absolute $C = 200\text{mm}$

IN: inlet line

D2: drain line

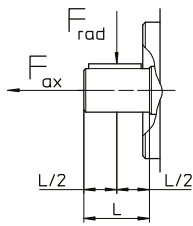
A: minimum distance between inlet and drain line

B÷C: permissible suction height

C: inlet line immersion depth

H: minimum height to avoid pump emptying

8 MAX PERMISSIBLE LOAD ON DRIVE SHAFT



PVPC size	3029	4046	5073	5090	6140	6160
F _{ax} = axial load (N)	±1000	±1500	±2000			
F _{rad} = radial load (N)	1500			3000		

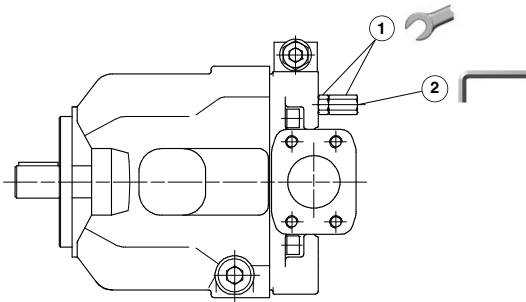
9 VARIATION OF MAX SPEED VS INLET PRESSURE

Inlet pressure	Displacement %					% variation of the max. speed
bar abs.	65	70	80	90	100	
0,8	120	115	105	97	90	
0,9	120	110	103	95		
1,0	120	115	107	100		
1,2	120		113	106		
1,4	120			112		
1,6	120			117		
2,0	120					

Example

Displacement: 80% - Inlet pressure: 1,0 bar - Speed: 115%

10 MAX DISPLACEMENT SETTING



1 = Locking displacement limiter screw

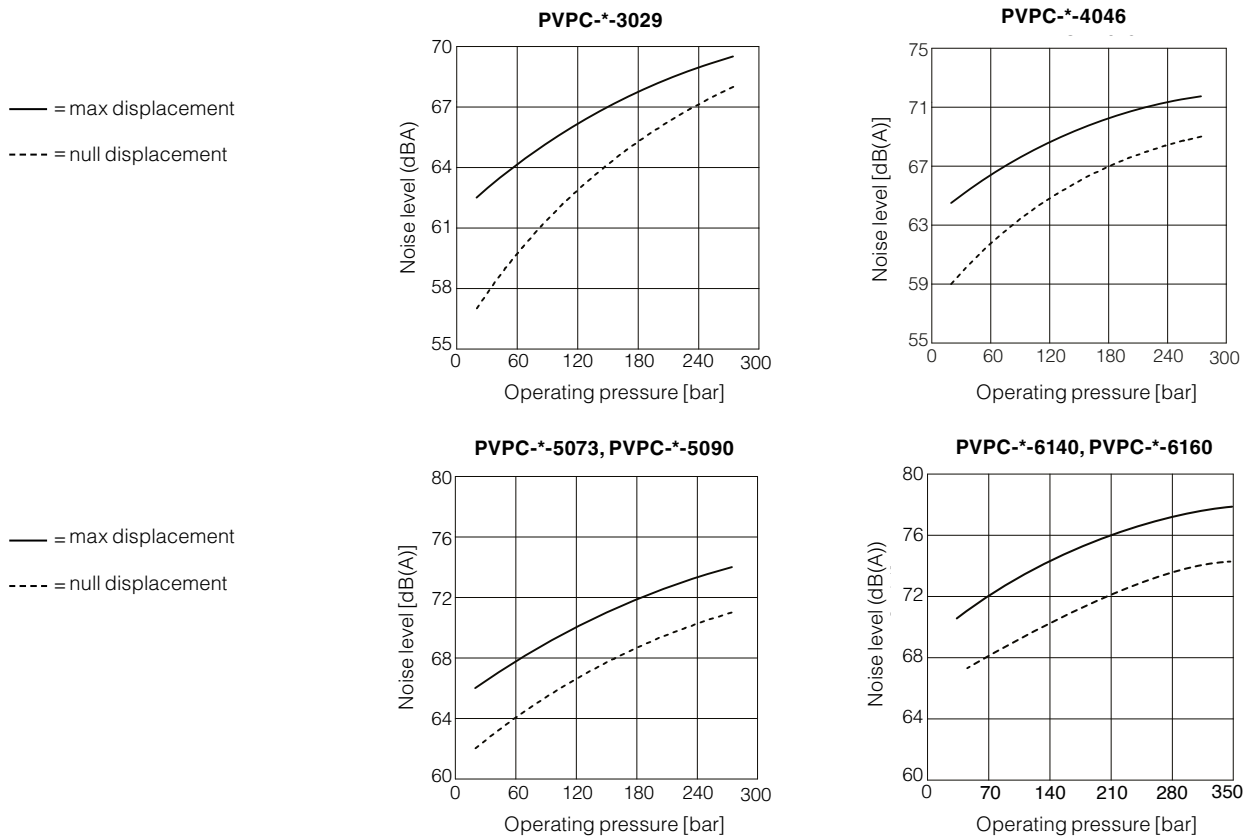
2 = Displacement setting

PVPC size	3029	4046	5073	5090	6140	6160
Displacement setting range	20,1 ÷ 28,7	31,8 ÷ 45,4	36,8 ÷ 73,6	44,0 ÷ 87,9	70 ÷ 140	80 ÷ 160
One turn of screw changes pump displacement by approximately (cm ³ /rev)	1,5	2,2	3,2		6,0	
Key for locking displacement limiter screw (Sw)	14		17		19	
Key for displacement setting (Sw)	4		5		6	
Tightening torque (Nm)	15 ± 1				20 ± 1	

11 DIAGRAMS at 1450 rpm (based on mineral oil ISO VG 46 at 50°C)

11.1 Noise level curves

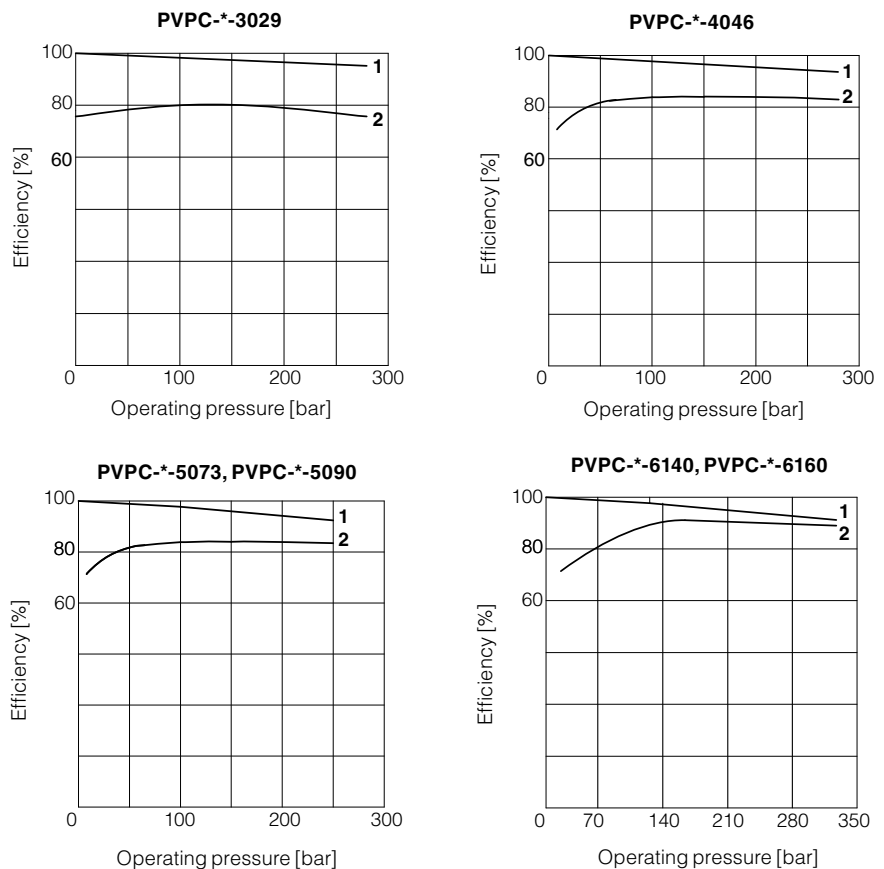
Ambient noise levels measured in compliance with ISO 4412-1 oleohydraulics - Test procedure to define the ambient noise level - Pumps
Shaft speed: 1450 rpm.



11.2 Operating limits

1 = Volumetric efficiency (η_v)

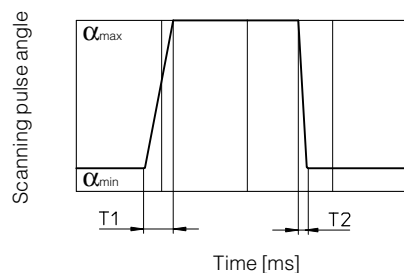
2 = Overall efficiency (η_{TOT})



11.3 Response time for PVPC-C

Response times and pressure peak due to variation 0% to 100% and 100% to 0% of the pump displacement, obtained with an instantaneously opening and shut-off of the delivery line.

Pump type	T1 (ms)	T2 (ms)
PVPC-C-3029	140	36
PVPC-C-4046	140	42
PVPC-C-5073	160	44
PVPC-C-5090	160	44
PVPC-C-6140	170	100
PVPC-C-6160	180	110



12 MINIMUM TORQUE/POWER SETTING FOR PVPC-LW - constant power regulator

For the pump correct operation, the torque / power factory setting has to be higher than the values reported in the below table.

If you have rotational speed different from 1450 rpm, you can calculate the minimum or maximum allowable power using a formula. For example, the minimum power for a PVPC-LW-3029 driven at 1750rpm:

$$\frac{6,7 \text{ kW}}{1450 \text{ rpm}} * 1750 \text{ rpm} = 8,1 \text{ kW}$$

Pump type	Minimum torque (Nm)	Minimum power (kW) at 1450 rpm	Maximum power (kW) at 1450 rpm
PVPC-LW-3029	43	6,7	21,8
PVPC-LW-4046	68	10,7	34,5
PVPC-LW-5073	113	17,8	54,8
PVPC-LW-5090	132	20,7	60,4
PVPC-LW-6140	197	30	131,5
PVPC-LW-6160	220	34	137,4

Power setting below minimum

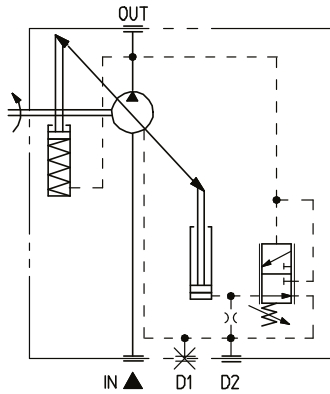
The power can be set below the minimum value; however, the maximum allowable pressure will be lower than the pump's nominal maximum pressure.

In this condition, contact Atos Technical Office specifying: pump code, required power/speed, and maximum system pressure.

13 HYDRAULIC AND ELECTROHYDRAULIC CONTROLS

13.1 For PVPC-3029 to PVPC-5090

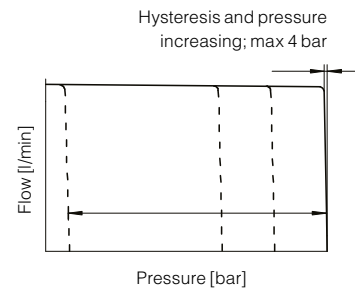
C - Manual pressure compensator



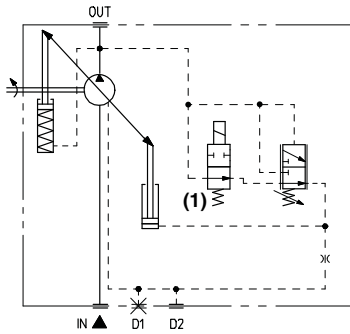
The pump displacement is zeroed when the line pressure approaches the setting pressure of the compensator.

Compensator setting range: 20 ÷ 280 bar for 3029, 4046, 5073; 20 ÷ 250 bar for 5090
Compensator standard setting: 280 bar for 3029, 4046, 5073; 250 bar for 5090

Drain flow rate, approximately 2,5 l/min



CH - Manual pressure compensator with venting

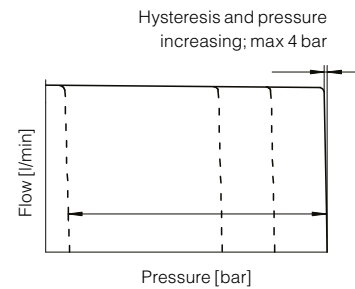


As C plus solenoid venting valve (1), for venting function, when a long unloading time is required and heat generation and noise have to be kept at lowest level.

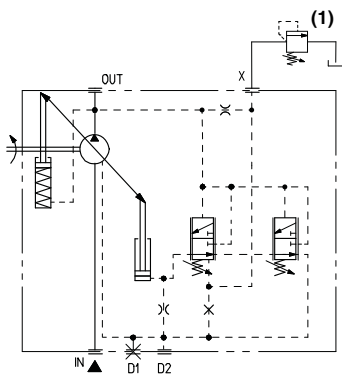
Venting valve solenoid voltage, see section 4
Venting valve OFF = null displacement
Venting valve ON = max displacement

Compensator setting range: 20 ÷ 280 bar for 3029, 4046, 5073; 20 ÷ 250 bar for 5090
Compensator standard setting: 280 bar for 3029, 4046, 5073; 250 bar for 5090

Drain flow rate, approximately 2,5 l/min



R - Remote pressure compensator

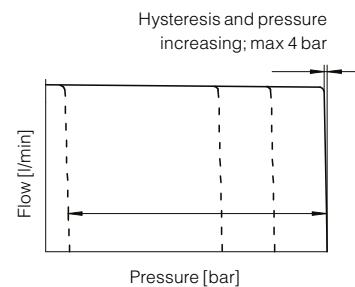


As C, but predisposed with X piloting port for connection of a remote pilot relief valve (1).

Compensator setting range: 20 ÷ 280 bar for 3029, 4046, 5073; 20 ÷ 250 bar for 5090
Compensator standard setting: 280 bar for 3029, 4046, 5073; 250 bar for 5090

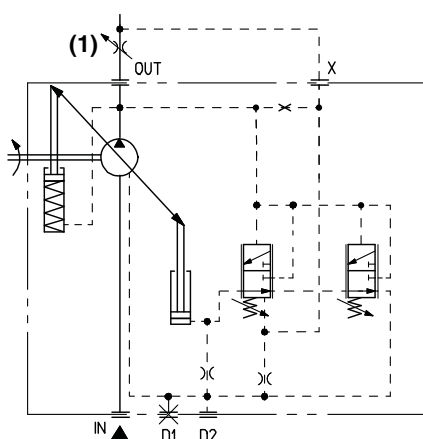
The control flow rate at port X is approximately 1,5 l/min.
It is recommended to use a direct operated valve.

Drain flow rate, approximately 2,5 l/min



(1) not supplied with the pump

L - Load sensing



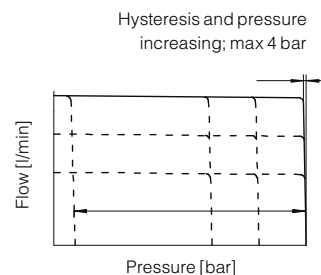
(1) Metering orifice and pipe not supplied with the pump

The pump displacement is automatically adjusted to maintain a constant (load independent) pressure drop across an external throttle. Changing the throttle regulation, the pump flow is consequently adjusted.
Load sensing control always incorporates an hydraulic compensator to limit the maximum pressure.

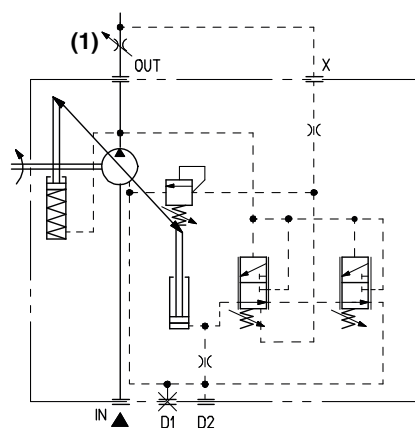
Compensator setting range: 20 ÷ 280 bar for 3029, 4046, 5073; 20 ÷ 250 bar for 5090
Compensator standard setting: 280 bar for 3029, 4046, 5073; 250 bar for 5090

Differential pressure setting range: 10 ÷ 40 bar
Differential pressure standard setting: 14 bar

Drain flow rate, approximately 4 l/min



LW - Constant power

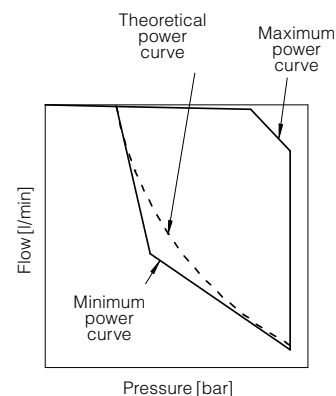


(1) Metering orifice and pipe not supplied with the pump

In order to achieve a constant drive torque with varying operating pressure. The swashing angle and therefore the outlet flow is varied so that the product of flow and pressure remains constant. See section 12 for min power setting

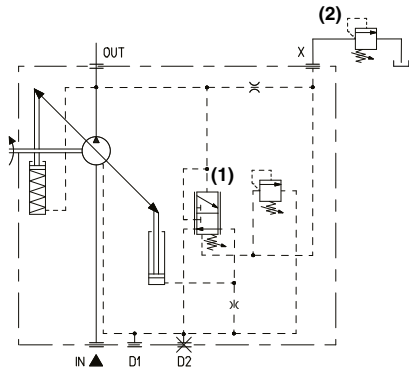
Compensator setting range: 20 ÷ 280 bar for 3029, 4046, 5073; 20 ÷ 250 bar for 5090
Compensator standard setting: 280 bar for 3029, 4046, 5073; 250 bar for 5090

Drain flow rate, approximately 4 l/min



13.2 For PVPC-6140 and PVPC-6160

C - Manual pressure compensator

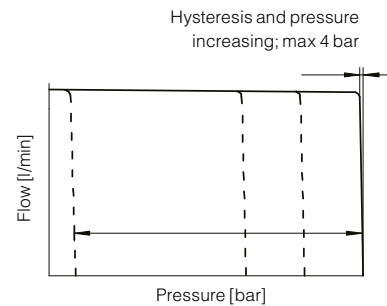


The pump displacement is zeroed when the line pressure approaches the setting pressure of the compensator.

Compensator setting range: 20 ÷ 350 bar for 6140; 20 ÷ 315 bar for 6160
Compensator standard setting: 350 bar for 6140; 315 bar for 6160

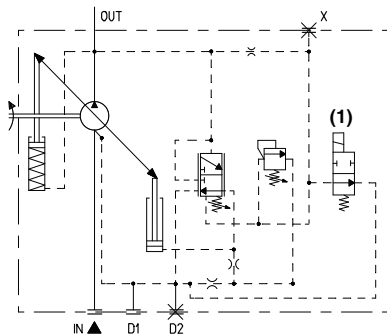
Note: do not modify the setting of differential pressure compensator (1)

Drain flow rate, approximately 7 l/min



(2) The pump max pressure can be remotely controlled as "R" control type, connecting the X port to a pilot relief valve. The control fluid quantity at port X is approx. 1,5 l/min. The valve is not supplied with the pump, it is recommended to use a direct operated valve.

CH - Manual pressure compensator with venting

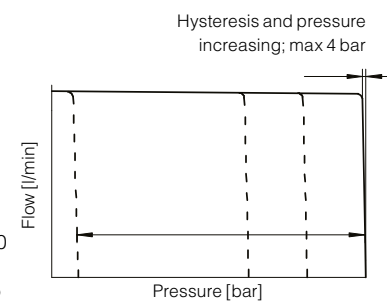


As C plus solenoid venting valve (1), for venting function, when a long unloading time is required and heat generation and noise have to be kept at lowest level.

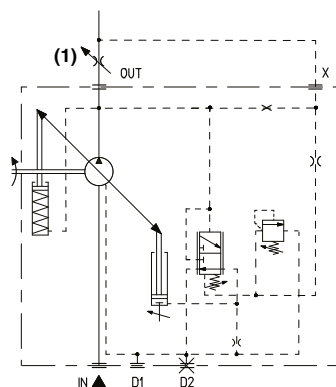
Venting valve OFF = null displacement
Venting valve ON = max displacement

Compensator setting range: 20 ÷ 350 bar for 6140; 20 ÷ 315 bar for 6160
Compensator standard setting: 350 bar for 6140; 315 bar for 6160

Drain flow rate, approximately 7 l/min



L - Load sensing



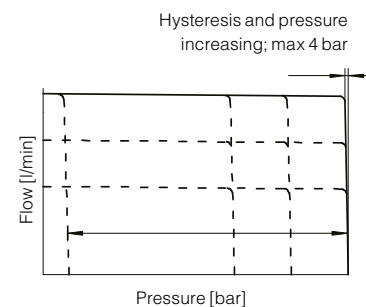
The pump displacement is automatically adjusted to maintain a constant (load independent) pressure drop across an external throttle. Changing the throttle regulation, the pump flow is consequently adjusted.

Load sensing control always incorporates an hydraulic compensator to limit the maximum pressure.

Compensator setting range: 20 ÷ 350 bar for 6140; 20 ÷ 315 bar for 6160
Compensator standard setting: 350 bar for 6140; 315 bar for 6160

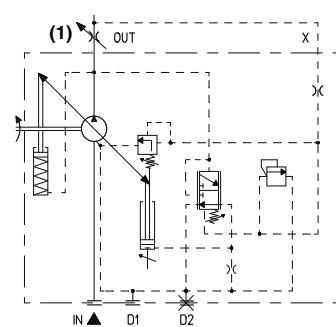
Differential pressure setting range: 10 ÷ 40 bar
Differential pressure standard setting: 14 bar

Drain flow rate, approximately 8,5 l/min



(1) Metering orifice and pipe not supplied with the pump

LW - Constant power

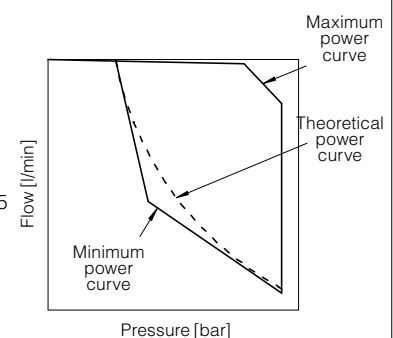


In order to achieve a constant drive torque with varying operating pressure. The swashing angle and therefore the outlet flow is varied so that the product of flow and pressure remains constant.

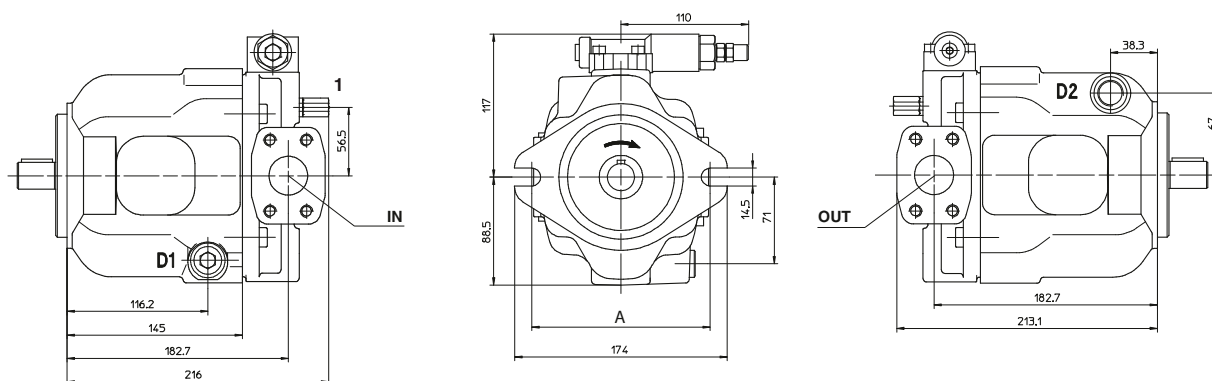
See section 11.4 for min power/torque setting

Compensator setting range: 20 ÷ 350 bar for 6140; 20 ÷ 315 bar for 6160
Compensator standard setting: 350 bar for 6140; 315 bar for 6160

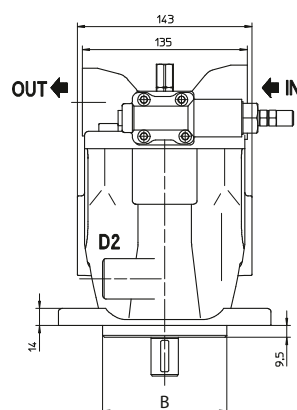
Drain flow rate, approximately 8,5 l/min



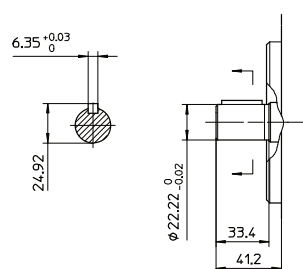
(1) Metering orifice and pipe not supplied with the pump



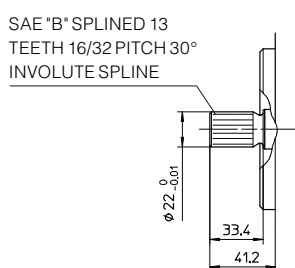
1 = Screw for max displacement limiter.
Not available for version PVPCXB



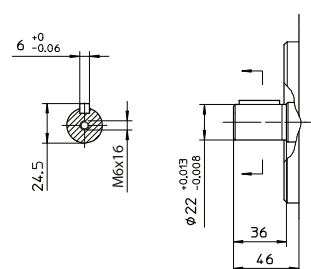
SHAFT TYPE "1"



SHAFT TYPE "5"

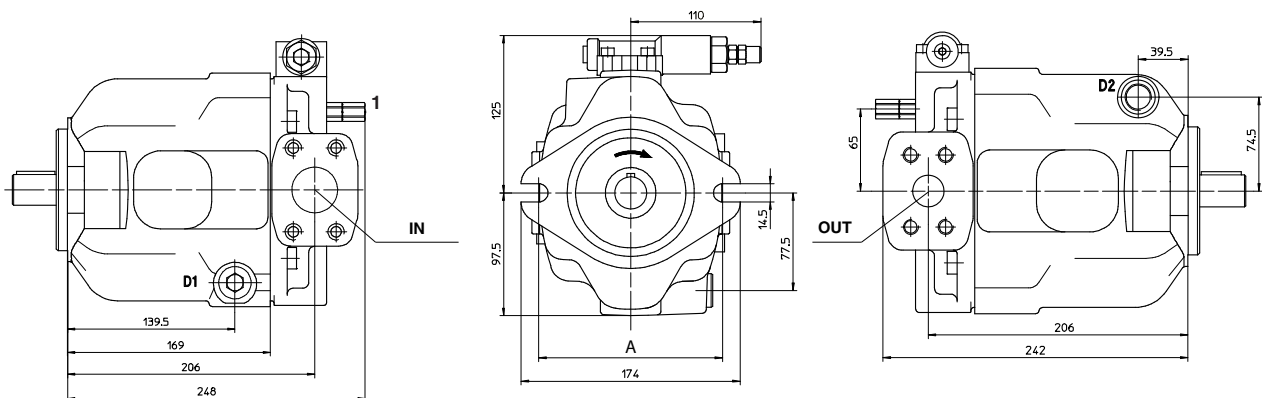


SHAFT TYPE "1/M"

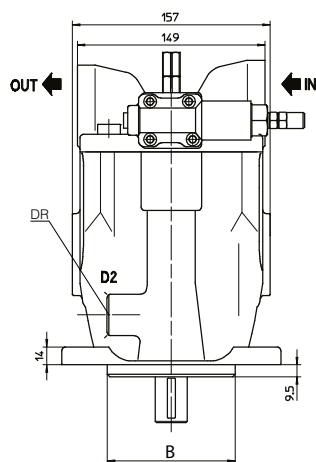


Flange option					IN	OUT	D1, D2	Mass (Kg)
Code	Reference standard	A	B	C	flange SAE 3000 1 1/4" M10x1,5 (20 Nm) deep 28mm	flange SAE 6000 3/4" M10x1,5 (45 Nm) deep 24mm	1/2" BSPP (20 Nm)	18
-	SAE	146	101,6 ^{+0/-0,05}	9,5				
M	ISO	140	100 ^{+0/-0,05}	9				

15 INSTALLATION DIMENSIONS OF PVPC 4046: BASIC VERSION "C" CONTROL - clockwise rotation



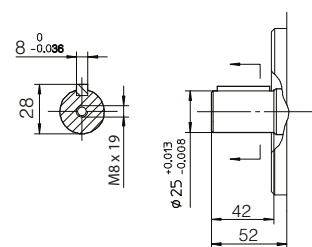
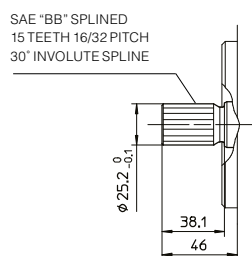
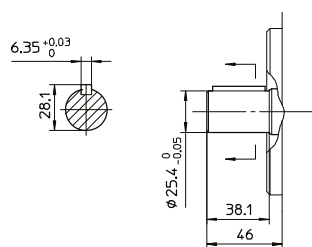
1 = Screw for max displacement limiter.
Not available for version PVPCXB



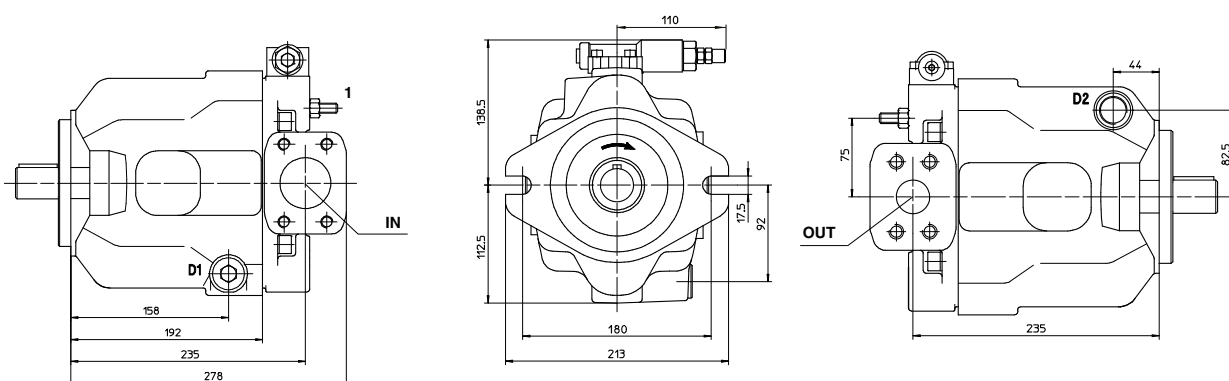
SHAFT TYPE "1"

SHAFT TYPE "5"

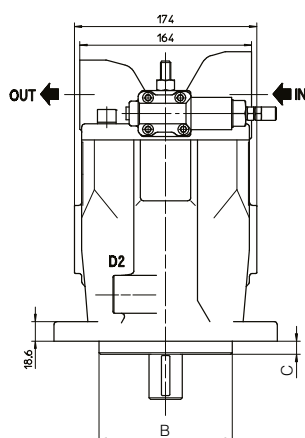
SHAFT TYPE "1/M"



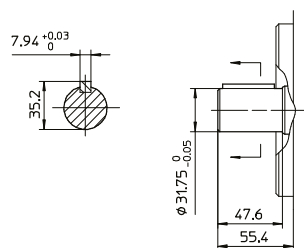
Flange option					IN	OUT	D1, D2	Mass (Kg)
Code	Reference standard	A	B	C	flange SAE 3000 1 1/2" M12x1,75 (30 Nm) deep 26mm	flange SAE 6000 1" M12x1,75 (70 Nm) deep 26mm	1/2" BSPP (20 Nm)	24
-	SAE	146	101,6 ^{+0/-0,05}	9,5				
M	ISO	140	100 ^{+0/-0,05}	9				



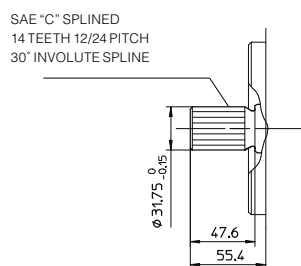
1 = Screw for max displacement limiter.
Not available for PVPCXC



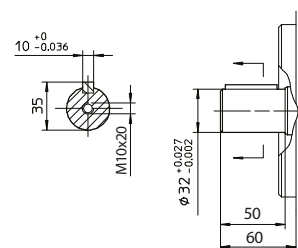
SHAFT TYPE "1"



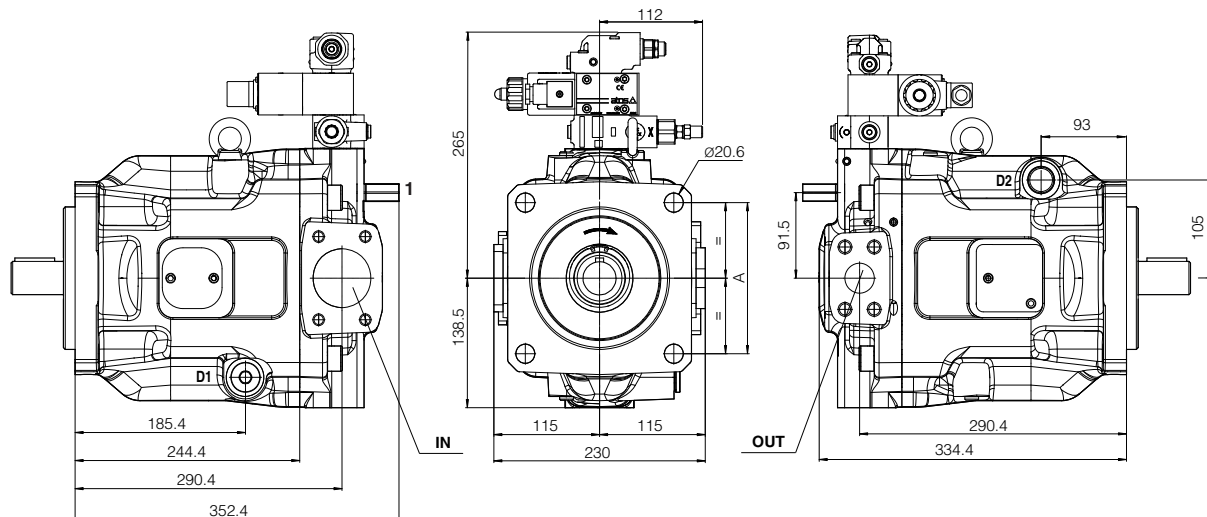
SHAFT TYPE "5"



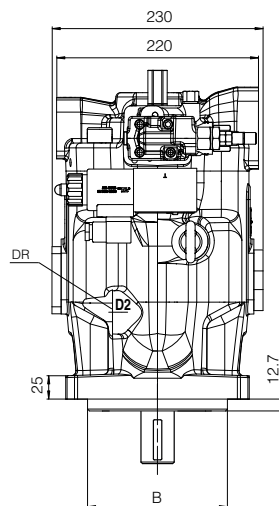
SHAFT TYPE "1/M"



Flange option				IN	OUT	D1, D2	Mass (Kg)
Code	Reference standard	B	C	flange SAE 3000 2" M12x1,75 (30 Nm) deep 25mm	flange SAE 6000 1 1/4" M14x2 (60 Nm) deep 23mm	3/4" BSPP (30 Nm)	33
-	SAE	127 +0/-0,05	12,7				
M	ISO	125 +0/-0,05	9				



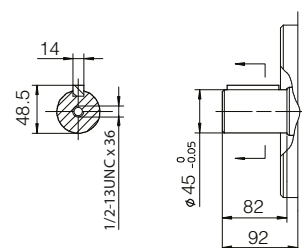
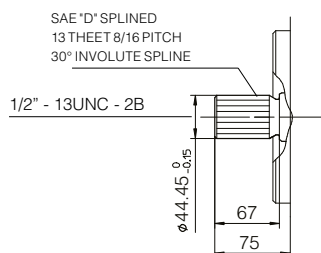
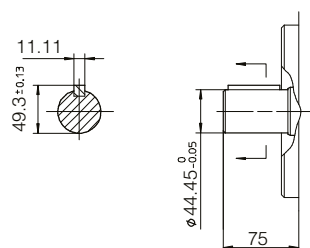
1 = Screw for max displacement limiter



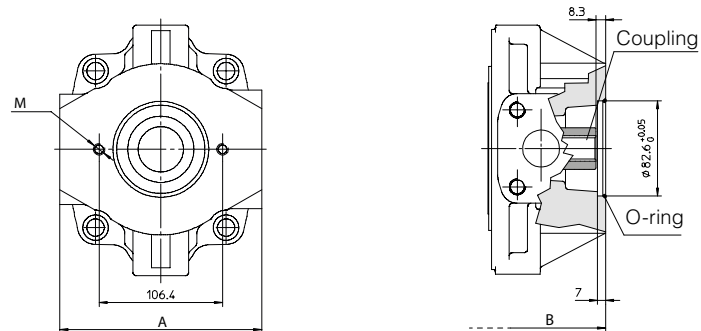
SHAFT TYPE "1"

SHAFT TYPE "5"

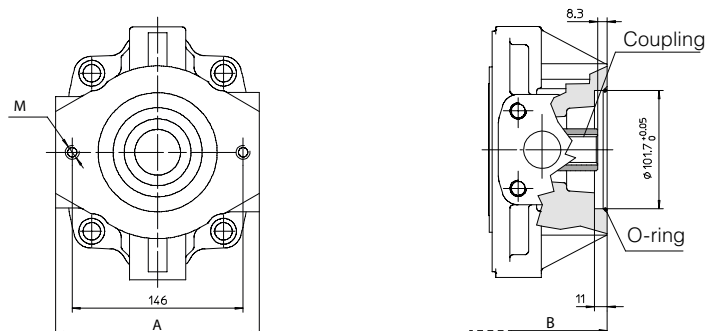
SHAFT TYPE "1/M"



Flange option				IN	OUT	D1, D2	Mass (Kg)
Code	Reference standard	A	B	flange SAE 3000 2 1/2" M12x1,5 (30 Nm) deep 25mm	flange SAE 6000 1 1/4" M10x1,5 (45 Nm) deep 24mm	1 1/16" -12UNF	69
-	SAE	161.6	152,4 $\pm 0/-0,05$				
M	ISO	158.4	180 $\pm 0/-0,05$				

Code XA intermediate flange SAE A

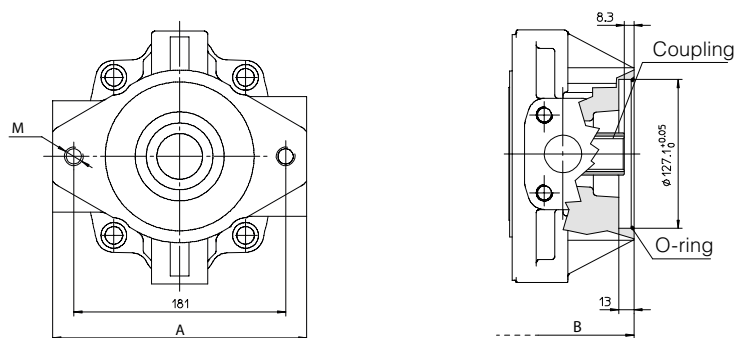
XA intermediate flange SAE "A"						
Pump size	Dimension			Coupling		O-ring
	A	B (to mounting flange)	M	interface	Max torque (Nm)	
3029	135	222	M10x1,25 depth 15	SAE A splined 9 teeth 16/32	100	OR-2325
4046	167	251				
5073, 5090	174	291				

Code XB intermediate flange SAE B

XB intermediate flange SAE "B"						
Pump size	Dimension			Coupling		O-ring
	A	B (to mounting flange)	M	interface	Max torque (Nm)	
3029	170	222	M12x1,75 depth 16	SAE B splined 13 teeth 16/32	100	OR-3400
4046 (1)	167	251			250	
5073, 5090 (2)	174	291			250	

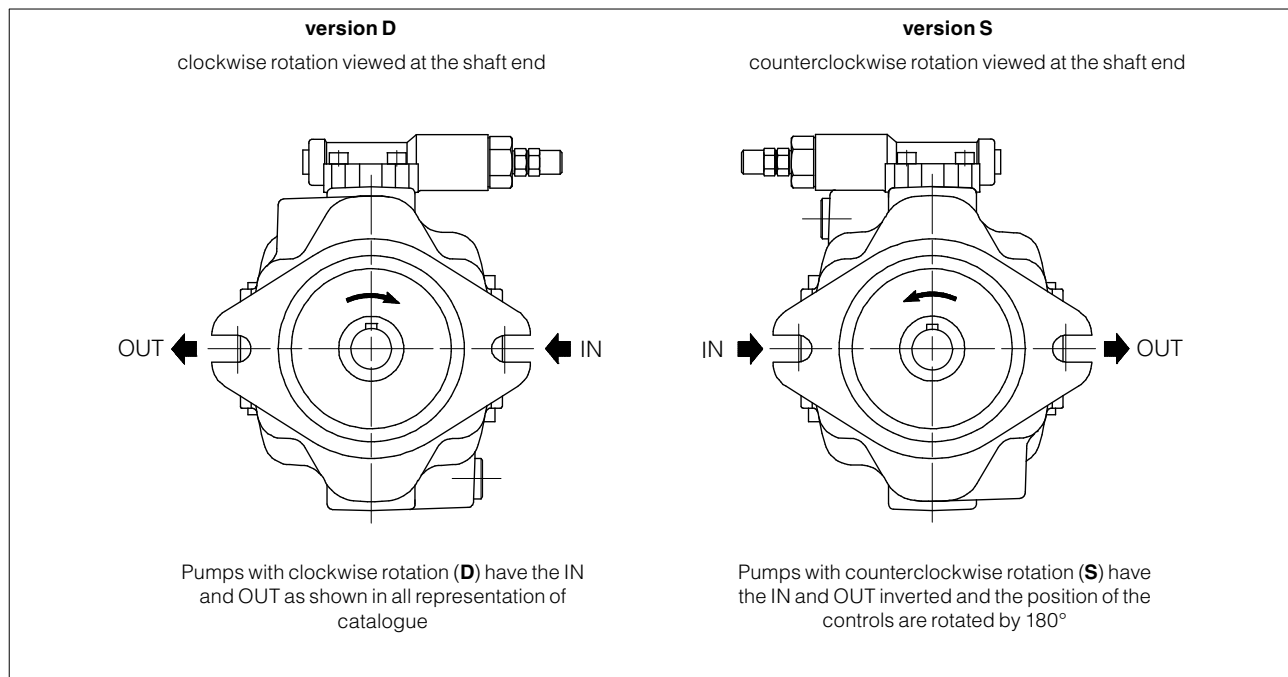
(1) For coupling with PVPC-4046 rear pump, the coupling code G-PVPC-40/46 (SAE BB splined, 15 teeth) max torque 250 Nm, must be ordered separately

(2) For coupling with PVPC-4046 rear pump, the coupling code G-PVPC-73/46 (SAE BB splined, 15 teeth) max torque 430 Nm, must be ordered separately

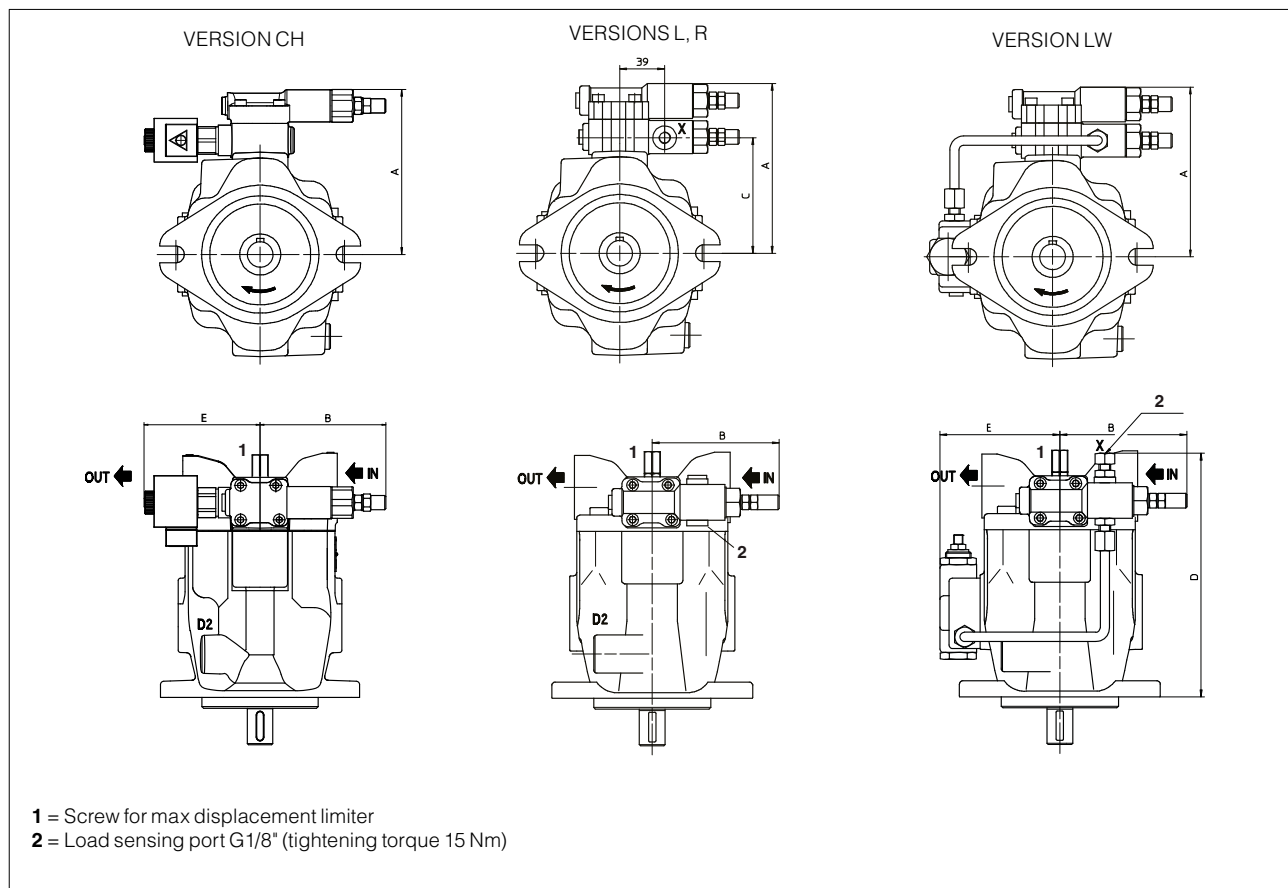
Code XC intermediate flange SAE C

XC intermediate flange SAE "C"						
Pump size	Dimension			Coupling		O-ring
	A	B (to mounting flange)	M	interface	Max torque (Nm)	
5073, 5090	217	296	M16x2 depth 22	SAE B splined 14 teeth 12/24	430	OR-2500

19 DIRECTION OF ROTATION

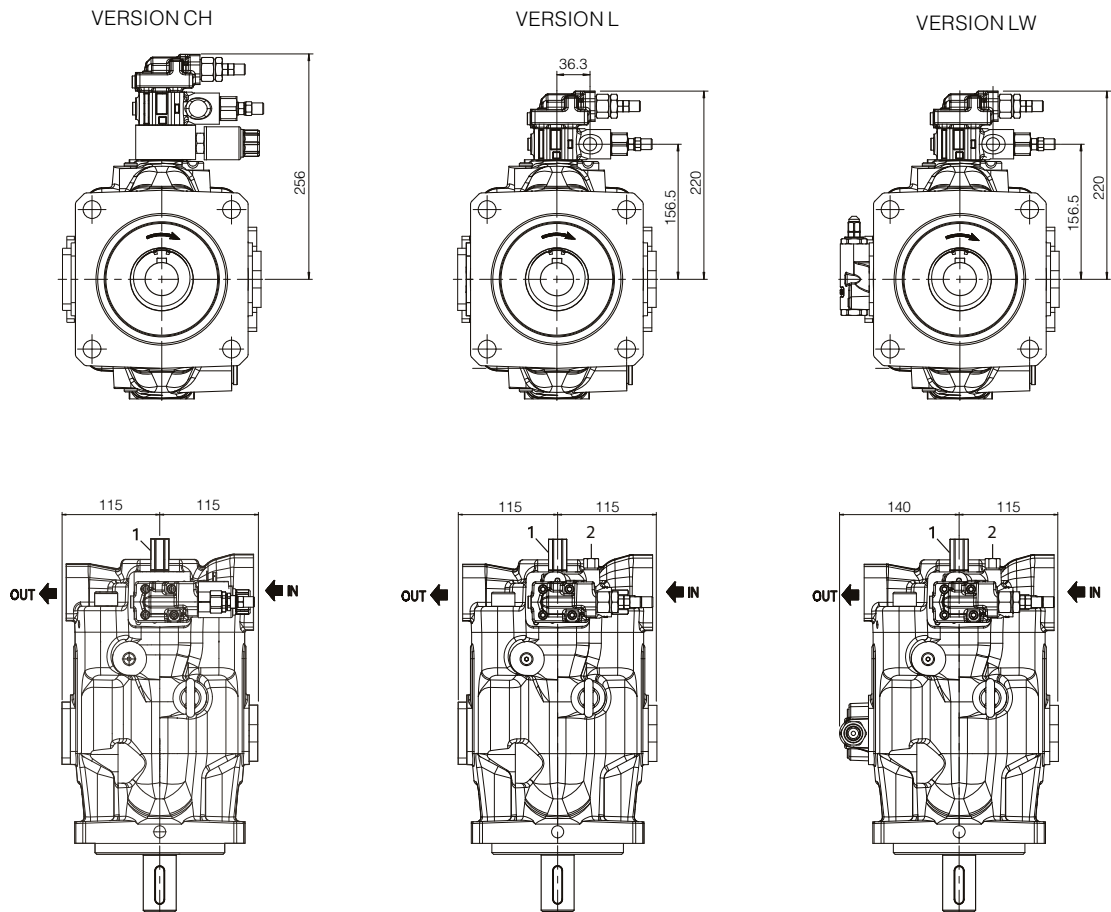


20 INSTALLATION DIMENSIONS OF OTHER CONTROLS OF PVPC SIZES 3, 4, 5 - clockwise rotation



Pump type	Version	A	B	C	D	E	Mass (kg)
PVPC-*-3029	CH	144	111	-	-	102	22
	L, R	144	111	100	-	-	19,2
	LW	144	111	-	211	104	20
PVPC-*-4046	CH	153	111	-	-	102	28
	L, R	153	111	109	-	-	25,2
	LW	153	111	-	235	111	26
PVPC-*-5073 PVPC-*-5090	CH	166	111	-	-	102	36,9
	L, R	166	111	122	-	-	34,2
	LW	166	111	-	258	120	35

21 INSTALLATION DIMENSIONS OF OTHER CONTROLS OF PVPC SIZE 6 - clockwise rotation



Mass [kg]	
PVPC-*-6140	74
PVPC-*-6160	

Mass [kg]	
PVPC-*-6140	70.2
PVPC-*-6160	

Mass [kg]	
PVPC-*-6140	71
PVPC-*-6160	

- 1 = Screw for max displacement limiter
2 = Load sensing port G1/8" (tightening torque 15 Nm)

22 RELATED DOCUMENTATION

- A900** Operating and maintenance information for pumps
K800 Electric and electronic connectors