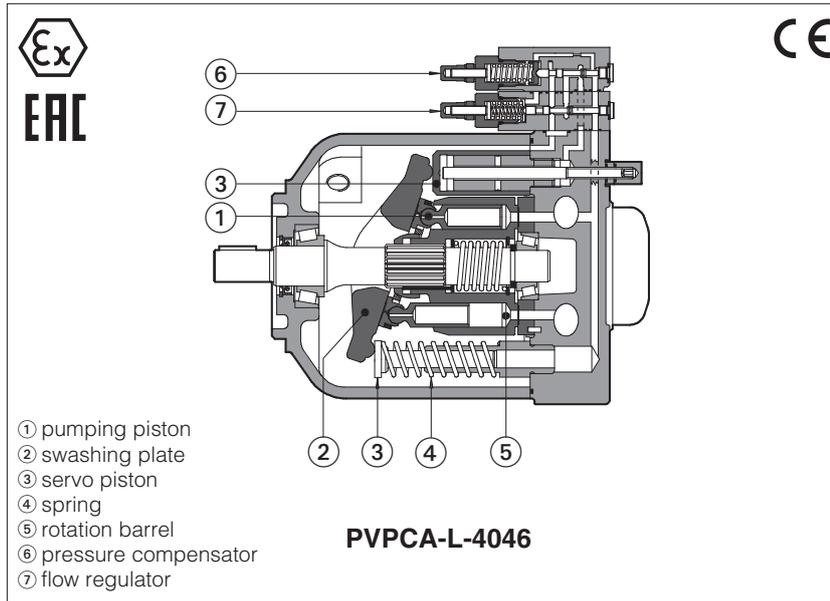




Table AX050-1/E

# Ex-proof axial piston pumps type PVPCA

for potentially explosive atmospheres - ATEX, EAC



**PVPCA** are variable displacement axial piston pumps for high pressure operation, and low noise level, available in a wide range of hydraulic and proportional controls.

They are certified for application in potentially explosive atmospheres according to ATEX, EAC protection mode Ex II 2/2G Ex h IIC T5, T4 Gb, and Ex II 2/2D Ex h IIC T100°C, T135°C Db (group II for surface plants with gas, vapours and dust environment, category 2, zone 1, 2, 21 and 22).

The external surface temperature of the pump is in accordance with the certified class, to avoid the self ignition of the explosive mixture present in the environment.

Displacement: **29-46-73-88 cm³/rev.**

Pressure: **280 bar working**  
**350 bar peak**

**1 MODEL CODE**

<b>PVPCA</b>	<b>XA</b>	-	<b>C</b>	-	<b>4</b>	<b>046</b>	/	<b>31044</b>	/	<b>1</b>	<b>D</b>	-	<b>GK</b>	/	<b>7</b>	<b>24DC</b>	*	/	*	
Variable displacement vane pump with ex-proof certification																				
Additional suffix for pumps with through shaft, for coupling with 2nd pump type PFEA: <b>XA</b> =for coupling with PFEA-3* (only for PVPCA*-3*) <b>XB</b> =for coupling with PFEA-4* (only for PVPCA*-4*) <b>XC</b> =for coupling with PFEA-5* (only for PVPCA*-5*)																				<b>Seals material:</b> omit for NBR (mineral oil & water glycol) <b>PE</b> = FKM (3)
Type of control (1): <b>C</b> = manual pressure compensator <b>CH</b> = manual pressure compensator with venting <b>R</b> = remote pressure compensator <b>L</b> = load sensing (pressure & flow) <b>LW</b> = constant power (combined pressure & flow) <b>For proportional controls see note (2)</b>																				Series number
Size: <b>3</b> = for displacement 029 <b>4</b> = for displacement 046 <b>5</b> = for displacement 073 and 090																				<b>Voltage code</b> , only for CH: see tech table EX010
<b>Max displacement</b> of axial piston pump: <b>029</b> = 29 cm³/rev <b>046</b> = 46 cm³/rev <b>073</b> = 73 cm³/rev <b>090</b> = 88 cm³/rev																				<b>Option:</b> <b>7</b> = for ambient temperature up to 70°C (3) Only for CH control: <b>O</b> = horizontal cable entrance <b>WP</b> = prolonged manual override protected by metallic cap
Type of PVPCA (for double pumps), see tech table A160																				<b>Solenoid threaded connection</b> (only for CH control): <b>GK</b> = GK-1/2" ISO/UNI-6125 (tapered) <b>NPT</b> = 1/2" NPT ANSI B2.1 (tapered) <b>M</b> = M20x1,5 UNI-4535
																				<b>Direction of rotation</b> (viewed at the shaft end): <b>D</b> = clockwise <b>S</b> = counterclockwise
																				<b>Shaft</b> (SAE Standard): <b>1</b> = keyed (7/8" for 029 - 1" for 046 - 1 1/4" for 073 and 090) <b>5</b> = splined (13 teeth for 029 - 15 for 046 - 14 for 073 and 090)

(1) Pumps CH, CZ, LQZ, PES and PERS are supplied with two certificates, one for the pump, and one for control valve

(2) Pumps with proportional controls type: CZ, LQZ, PES and PERS are available on request.

For the technical characteristics of PVPCA pumps with proportional controls, see tech table AS170

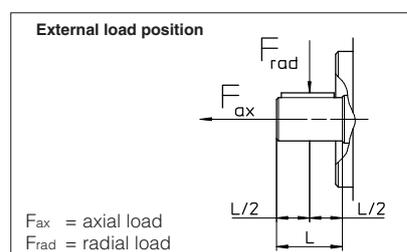
(3) Pumps with option /7 are always equipped with seals FKM

**2 GENERAL CHARACTERISTICS**

Assembly position	Any position. The drain port must be on the top of the pump. Drain line must be separated and unrestricted to the reservoir and extended below the oil level as far from the inlet as possible. Suggested maximum line length is 3 m.
Ambient temperature range	-20°C to +70°C
Compliance	Explosion proof protection "Ex h", see section <b>6</b> RoHs Directive 2011/65/EU as last update by 2015/65/EU (only PVPCA-CH) REACH Regulation (EC) n°1907/2006

**3 OPERATING CHARACTERISTICS**

Pump model	PVPCA*-3029	PVPCA*-4046	PVPCA*-5073	PVPCA*-5090
Displacement [cm³/rev]	29	46	73	88
Theoretical max flow at 1450 rpm [l/min]	42	66,7	105,8	127,6
Max working pressure / Peak pressure [bar]	280/350	280/350	280/350	250/315
Min/Max inlet pressure [bar abs.]	0,8 / 25	0,8 / 25	0,8 / 25	0,8 / 25
Max pressure on drain port [bar abs.]	1,5	1,5	1,5	1,5
Power consumption at 1450 rpm and at maximum pressure and displacement [kW]	19,9	31,6	50,1	54,1
Max torque on the first shaft [Nm]	Type 1 210	Type 5 270	Type 1 350	Type 5 440
Max permissible load on drive shaft [N]	$F_{ax}$ 1000	$F_{rad}$ 1500	2000	3000
Speed rating [rpm]	500 ÷ 3000	500 ÷ 2600	500 ÷ 2600	500 ÷ 2200



**Notes:** For speeds over 1800 rpm the inlet port must be under oil level with adequate pipes. Maximum pressure for all models with water glycol fluid is 160 bar, with option /PE is 190 bar. Max speed with options /PE and for water glycol fluid is 2000/1900/1600/1500 rpm respectively for the four sizes.

**4 ELECTRICAL CHARACTERISTICS FOR VERSION CH**

Valve type	DHA
Voltage code <b>(1)</b> VDC ±10%	<b>12DC, 24DC, 28DC, 48DC, 110DC, 125DC, 220DC</b>
VAC 50/60 Hz ±10%	<b>12AC, 24AC, 110AC, 230AC</b>
Power consumption at 20°C	8W
Coil insulation	class H
Protection degree with relevant cable gland	IP66/67 to DIN EN60529
Duty factor	100%

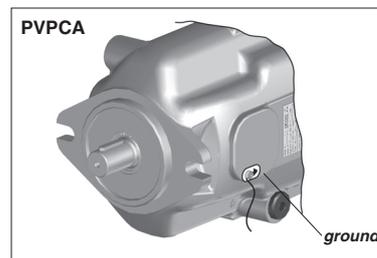
**(1)** For alternating current supply a rectifier bridge is provided built-in the solenoid  
For power supply frequency 60 Hz, the nominal supply voltage of solenoids 110AC and 230AC must be 115/60 and 240/60 respectively

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

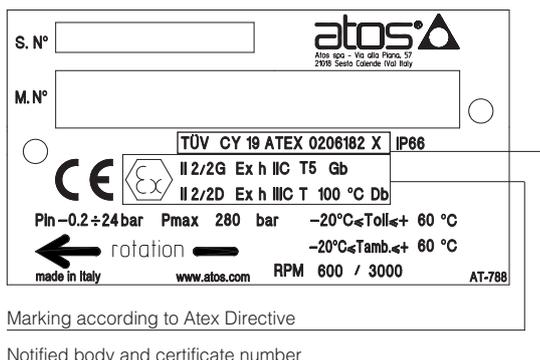
Seals, recommended fluid temperature	NBR seals (standard) = -20°C ÷ +60°C, with HFC hydraulic fluids = -20°C ÷ +50°C FKM seals (/PE option) = -20°C ÷ +80°C		
Recommended viscosity	15÷100 mm²/s - max start-up viscosity = 1000 mm²/s		
Max fluid contamination level	normal operation	ISO4406 class 20/18/15	NAS1638 class 9
	longer life	ISO4406 class 18/16/13	NAS1638 class 7
		see also filter section at <a href="http://www.atos.com">www.atos.com</a> or KTF catalog	
<b>Hydraulic fluid</b>	<b>Suitable seals type</b>	<b>Classification</b>	<b>Ref. Standard</b>
Mineral oils	NBR, FKM	HL, HLP, HLPD, HVL, HVLDP	DIN 51524
Flame resistant without water	FKM	HFDR, HFDR	ISO 12922
Flame resistant with water	NBR	HFC	

6 CERTIFICATION DATA

Certification	<b>ATEX, EAC</b>	
Protection mode	Ex II 2/2G Ex h IIC T5, T4 Gb, Ex II 2/2D Ex h IIIC T100°C, T135°C Db	
Type examination certificate	TUV CY 19 ATEX 026182X	
Pump version	(std and /PE)	/7 /PE
Temperature class	T5	T4
Surface temperature	≤ 100 °C	≤ 135 °C
Ambient temperature	-20 ÷ +60 °C	-20 ÷ +70 °C
Max inlet fluid temperature	+60 °C	+80 °C
Protection degree	IP 66	



6.1 EXAMPLE OF PVPCA NAMEPLATE MARKING



- Ex** = Equipment for explosive atmospheres
- II** = Group II for surfaces plants
- 2/2** = Pump category
- G** = For gas and vapours
- D** = For dust
- h** = Marking includes one or more of the following types of protection ("c", "b", "k")
- IIC** = Gas group (acetylene, hydrogen)
- IIIC** = Conduictive dust
- T\*** = Temperature class (T6, T5, T4)
- T\*\*°C** = Max surface temperature (85, 100, 135)
- Zone 1 (gas) and 21 (dust)** = Possibility of explosive atmosphere during normal functioning
- Zone 2 (gas) and 22 (dust)** = Low probability of explosive atmosphere

Marking according to Atex Directive

Notified body and certificate number

7 INSTALLATION POSITION

<p>The pump is supplied whit drain D2 open, and D1 plugged. Before installation fill the pump with hydraulic oil for at least 3/4 of its volume, keeping it in horizontal position. With exception of pump mounted below the oil level, we recomend to interpose a baffle plate between inlet and drain line.</p>	<b>VERTICAL INSTALLATION</b>		
	<p><b>INSIDE THE TANK</b> Minimum oil level equal or above the pump mounting surface. A ≥ 200mm</p>	<p><b>INSIDE THE TANK</b> Minimum oil level below the pump mounting surface. Minimum inlet pressure = 0,8 bar absolute B ≤ 800mm, C= 200mm</p>	<p><b>OUTSIDE THE TANK, above oil level</b> Minimum inlet pressure = 0,8 bar absolute B ≤ 800mm, C= 200mm</p>
<b>HORIZONTAL INSTALLATION</b>			
<p><b>INSIDE THE TANK</b> Minimum oil level equal or above the pump mounting surface. A ≥ 200mm</p>	<p><b>INSIDE THE TANK</b> Minimum oil level below the pump mounting surface. Minimum inlet pressure = 0,8 bar (absolute) B ≤ 800mm, C= 200mm</p>	<p><b>OUTSIDE THE TANK, above oil level</b> Minimum inlet pressure = 0,8 bar (absolute) B ≤ 800mm, C= 200mm</p>	<p><b>OUTSIDE THE TANK, below oil level</b> C= 200mm</p>

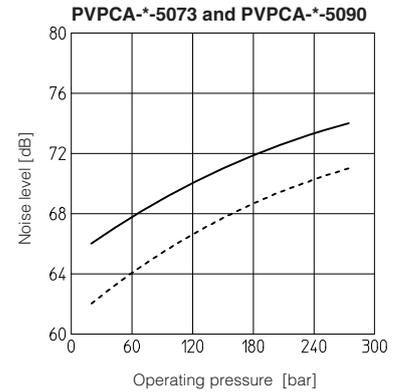
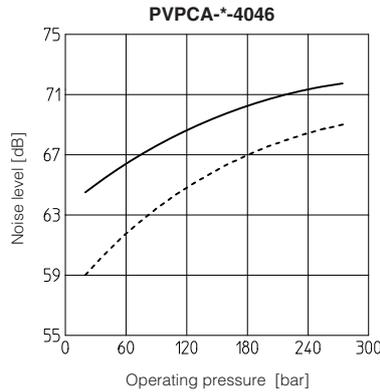
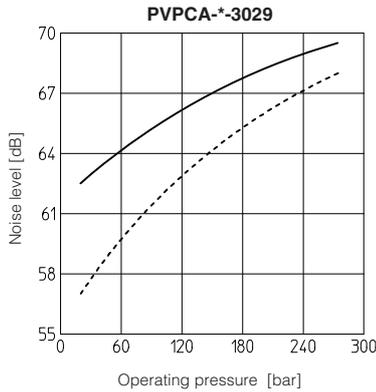
IN: inlet line - D1: drain line - A: minimum distance between inlet and drain line - B+C: permissible suction height - C: inlet line immersion dept

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

**8.1 Noise level curves**

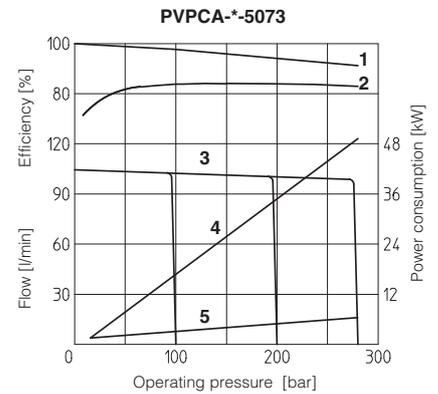
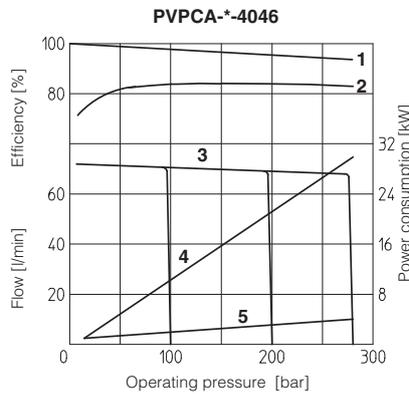
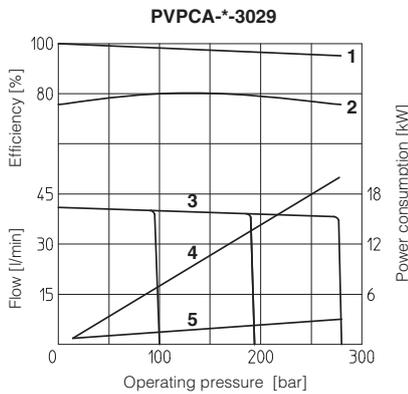
Ambient noise levels measured in compliance with ISO 4412-1 oleohydraulics -Test procedure to define the ambient noise level - Pumps  
Shaft speed: 1450 rpm.

— = Qmax      - - - - - = Qmin



**8.2 Operating limits**

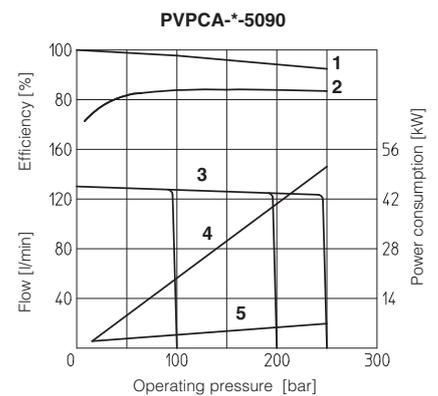
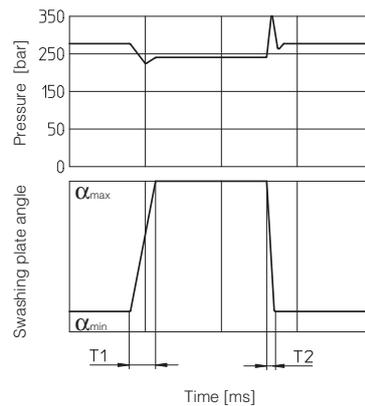
- 1 = Volumetric efficiency
- 2 = Overall efficiency
- 3 = Flow versus pressure curve
- 4 = Power consumption with full flow
- 5 = Power consumption at pressure compensation



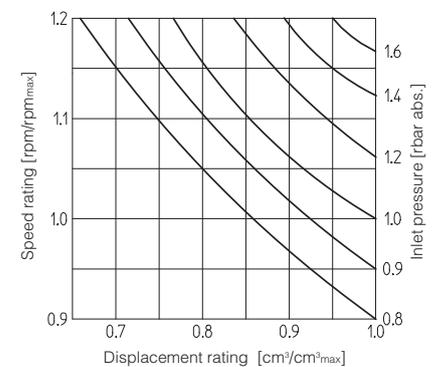
**8.3 Response times**

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

Pump type	T1 (ms)	T2 (ms)
PVPCA-*-3029	31	19
PVPCA-*-4046	44	20
PVPCA-*-5073	50	25
PVPCA-*-5090	53	28



**8.3.2** Variation of inlet pressure and reduction of displacement with increasing speed rating



9 HYDRAULIC AND ELECTROHYDRAULIC CONTROLS

	<p><b>C Manual pressure compensator</b></p> <p>The pump displacement decreases when the line pressure approaches the setting pressure of the compensator. The pump supplies only the fluid required by the system. Pressure may be steplessly adjusted at the pilot valve.</p> <p>Compensator setting range: 20 ÷ 350 bar (315 bar for 090) Compensator standard setting: 280 bar (250 bar for 090)</p>	
	<p><b>CH Manual pressure compensator with venting</b></p> <p>As C plus venting function, when a long unloading time is required and heat generation and noise have to be kept at lowest level.</p> <p>Venting valve solenoid voltage, see section 5 Venting valve OFF = null displacement Venting valve ON = max displacement</p> <p>Compensator setting range: 20 ÷ 350 bar (315 bar for 090) Compensator standard setting: 280 bar (250 bar for 090)</p> <p>① solenoid venting valve</p>	
	<p><b>R Remote pressure compensator</b></p> <p>As C, but with remote setting of the compensator by means of a pressure relief valve on the piloting line X.</p> <p>This version can be obtained from version L using a blind plug UNI 5923 M4x12 in pos. ① and a restrictor M4 drilled <math>\varnothing</math> 0,75 mm in pos. ②.</p> <p>Compensator setting range: 20 ÷ 350 bar (315 bar for 090) Compensator standard setting: 280 bar (250 bar for 090)</p>	
	<p><b>L Load sensing</b></p> <p>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.</p> <p>Load sensing control always incorporates an hydraulic compensator to limit the maximum pressure.</p> <p>Compensator setting range: 20 ÷ 350 bar (315 bar for 090) Compensator standard setting: 280 bar (250 bar for 090) Differential pressure setting range: 10 ÷ 40 bar Differential pressure standard setting: 14 bar</p>	
	<p><b>LW Constant power</b></p> <p>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.</p> <p>For the best regulation, minimum working pressure is 80 bar.</p> <p>While selecting LW control, the required value of power must be communicated with the order (ex. 10 kW at 1450 rpm).</p>	

10 DIMENSIONS OF PVPCA-<sup>-</sup>3029: BASIC VERSION "C" CONTROL

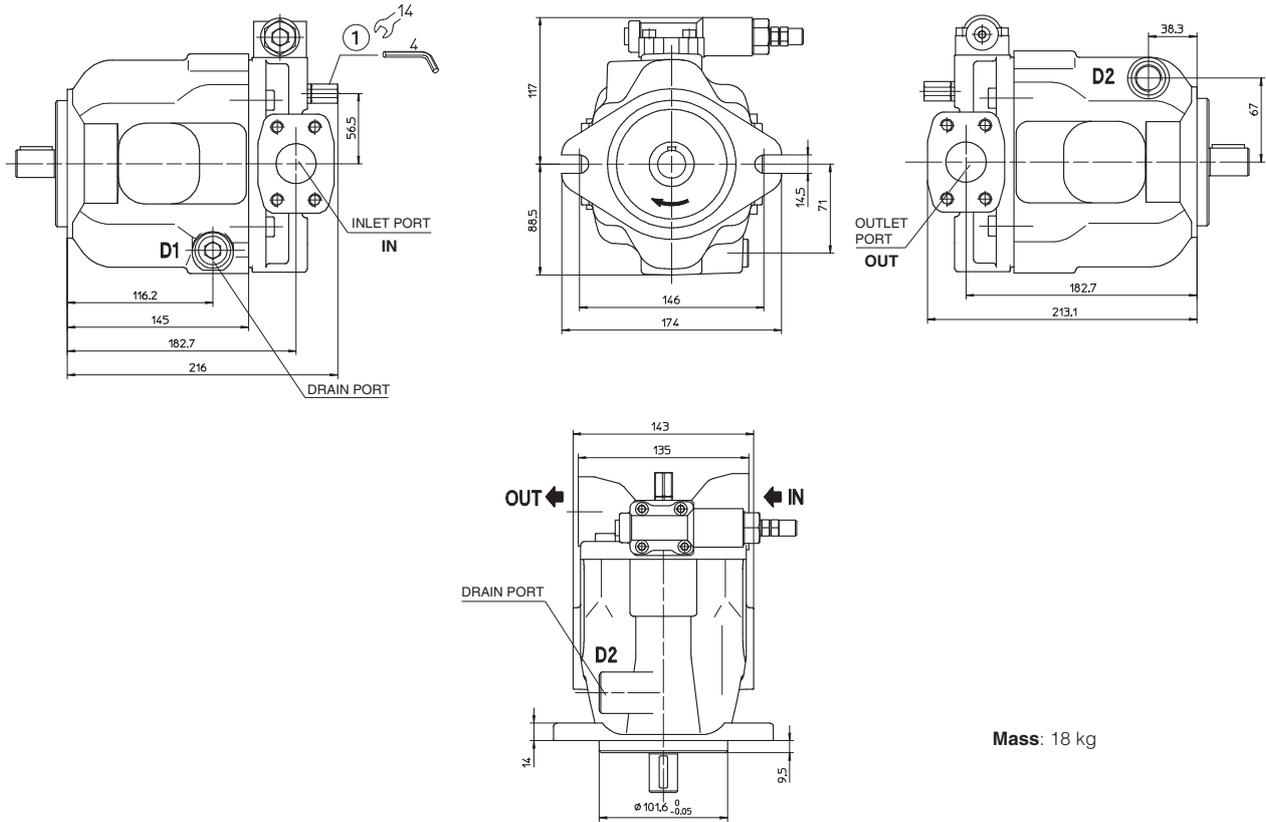
PORTS DIMENSION

IN = Flange SAE 3000 1 1/4"

OUT = Flange SAE 6000 3/4"

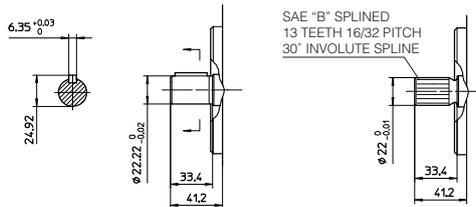
D1, D2 = 1/2" BSP

① = Regulation screw for max displacement 1,5 cm<sup>3</sup>/rev per turn. Adjustable range 20 to 29 cm<sup>3</sup>/rev.  
In case of double pump the regulation screw is not always available, please contact our technical office.



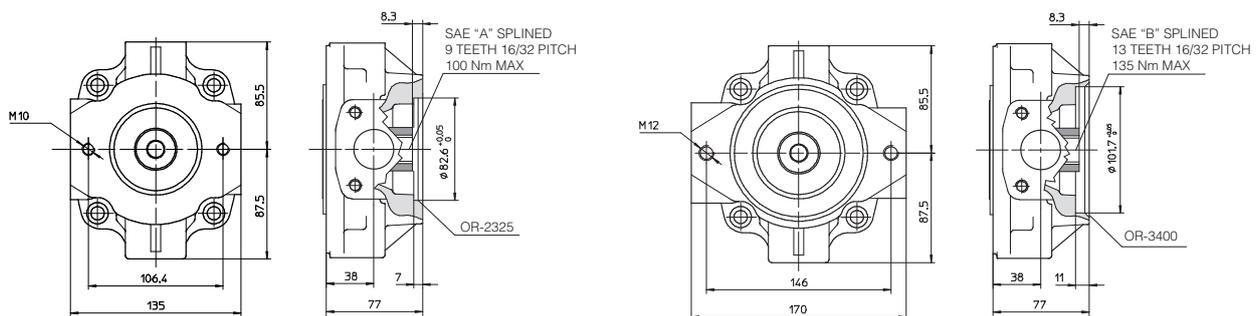
SHAFT TYPE "1"

SHAFT TYPE "5"



INTERMEDIATE FLANGE SAE "A" FOR PFEA-31

INTERMEDIATE FLANGE SAE "B" FOR PFEA-41



Drawing shows pumps with clockwise rotation (option D): pumps with counterclockwise rotation (option S) will have inlet and outlet ports inverted

11 DIMENSIONS OF PVPCA-4-4046: BASIC VERSION "C" CONTROL

PORTS DIMENSION

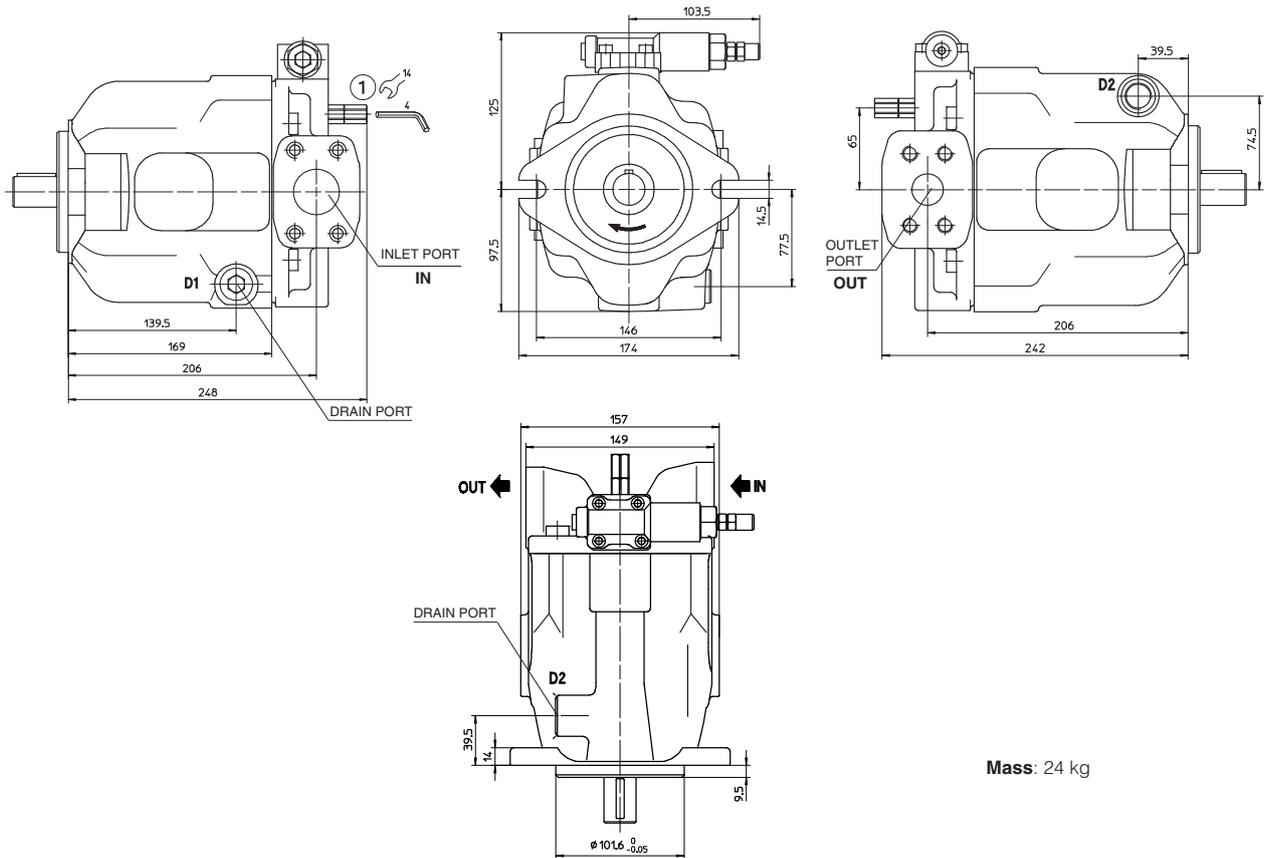
**IN** = Flange SAE 3000 1 1/2"

**OUT** = Flange SAE 6000 1"

**D1, D2** = 1/2" BSPP

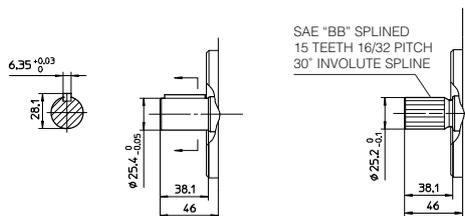
① = Regulation screw for max displacement 2,2 cm<sup>3</sup>/rev per turn. Adjustable range 31,8 to 46 cm<sup>3</sup>/rev.

In case of double pump the regulation screw is not always available, please contact our technical office.



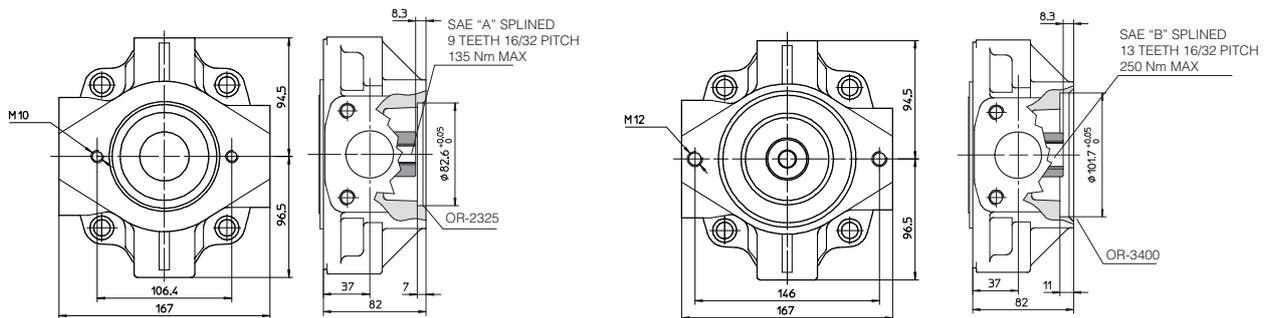
SHAFT TYPE "1"

SHAFT TYPE "5"



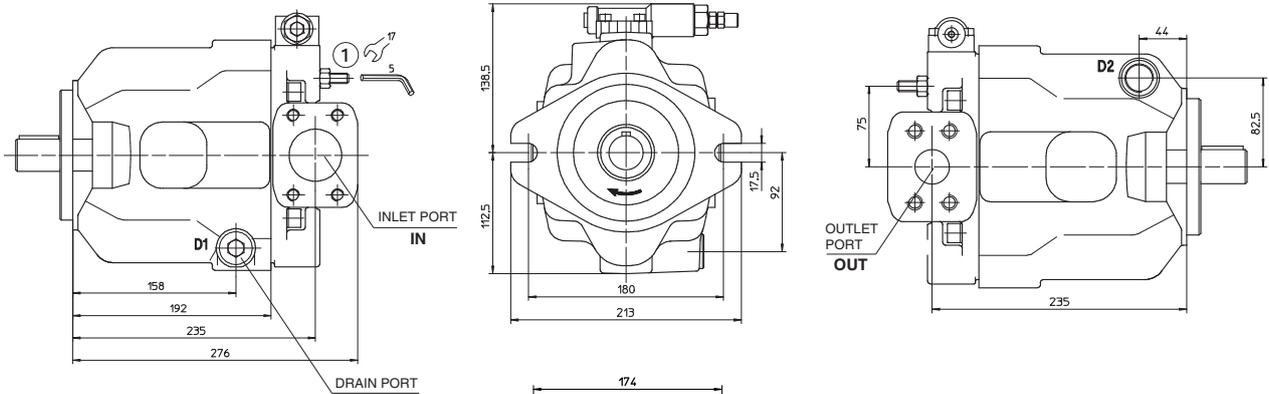
INTERMEDIATE FLANGE SAE "A" FOR PFEA-31

INTERMEDIATE FLANGE SAE "B" FOR PFEA-41



Drawing shows pumps with clockwise rotation (option D): pumps with counterclockwise rotation (option S) will have inlet and outlet ports inverted

12 DIMENSIONS OF PVPCA-5073 and PVPC-5090: BASIC VERSION "C" CONTROL



PORTS DIMENSION

IN = Flange SAE 3000 2"

OUT = Flange SAE 6000 1 1/4"

D1, D2 = 3/4" BSPP

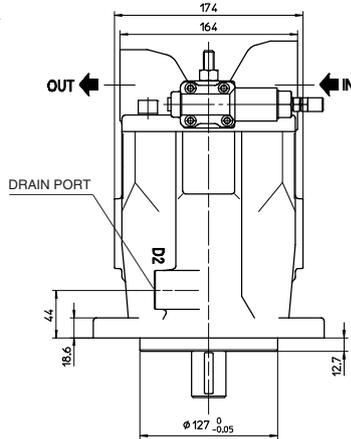
⓪ = Regulation screw for max displacement  
3,2 cm<sup>3</sup>/rev per turn.

Adjustable range:

PVPC-5073 = 36,8 to 46 cm<sup>3</sup>/rev

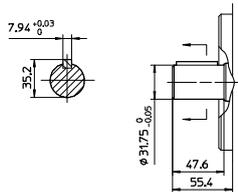
PVPC-5073 = 44 to 88 cm<sup>3</sup>/rev.

In case of double pump the regulation screw is not always available, please contact our technical office.

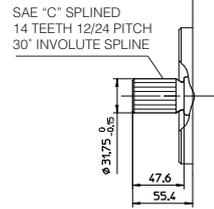


Mass: 33 kg

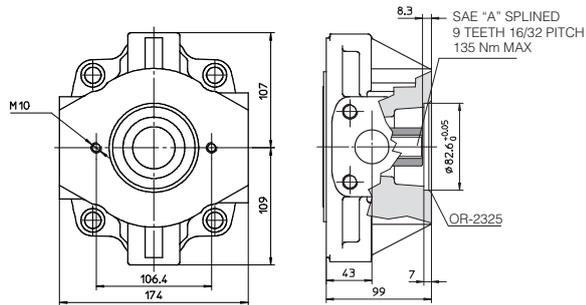
SHAFT TYPE "1"



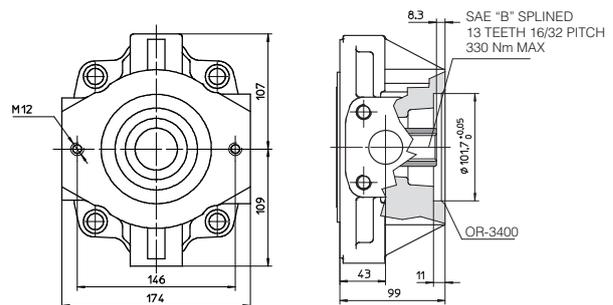
SHAFT TYPE "5"



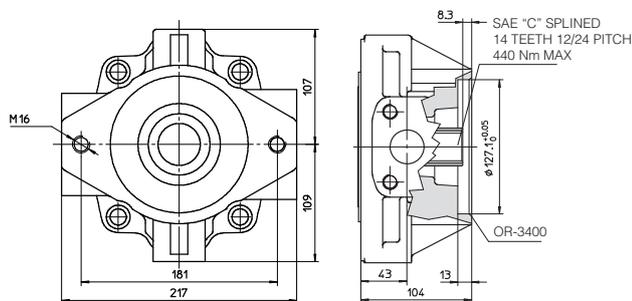
INTERMEDIATE FLANGE SAE "A" FOR PFEA-31



INTERMEDIATE FLANGE SAE "B" FOR PFEA-41

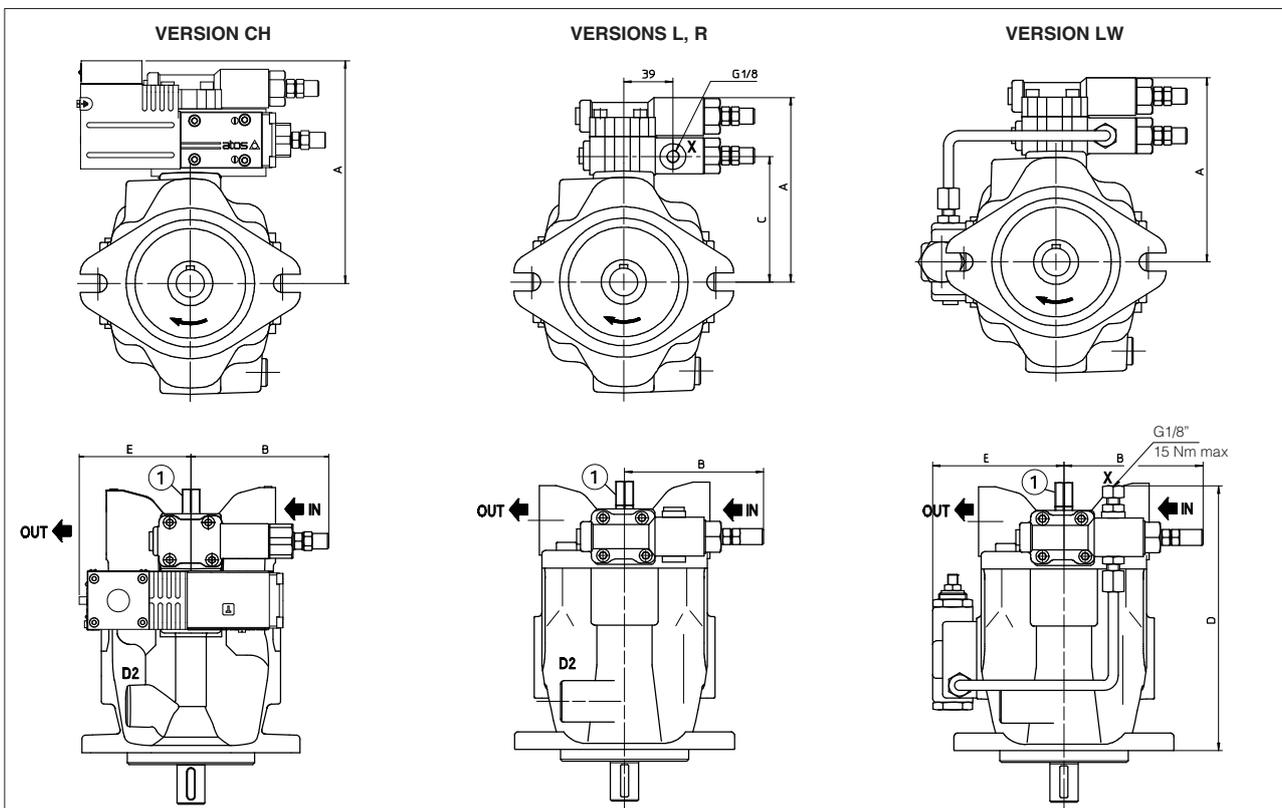


INTERMEDIATE FLANGE SAE "C" FOR PFEA-51



Drawing show pumps with clockwise rotation (option D); pumps with counterclockwise rotation (option S) will have inlet and outlet ports inverted

13 DIMENSIONS OF PVPCA: OTHER CONTROLS



① = Regulation screw for max displacement. Adjustable range 50% to 100% of max displacement).  
 In case of double pump the regulation screw is not always available, please contact our technical office.

Drawing shows pumps with clockwise rotation (option D): pumps with counterclockwise rotation (option S) will have inlet and outlet ports inverted and also the consequently position of the control groups

Pump type	Version	A	B	C	D	E	Mass (kg)
PVPCA-*-3029	CH	144	111	-	-	92	22
	L-R	144	111	100	-	-	19,2
	LW	144	111	-	211	104	20
PVPCA-*-4046	CH	153	111	-	-	92	28
	L-R	153	111	109	-	-	25,2
	LW	153	111	-	235	111	26
PVPCA-*-5073	CH	166	111	-	-	92	36,9
PVPCA-*-5090	L-R	166	111	122	-	-	34,2
	LW	166	111	-	258	120	35

14 RELATED DOCUMENTATION

<b>X010</b>	Basics for electrohydraulics in hazardous environments
<b>X020</b>	Summary of Atos ex-proof components certified to ATEX, IECEx, EAC, PESO
<b>AX900</b>	Operating and maintenance information for ex-proof pumps