# Цилиндры, насосы взрывозащищенные ATOS

## Технические характеристики


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Кострома (4942)77-07-48
Краснодар (861 )203-40-90
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Курган (3522)50-90-47
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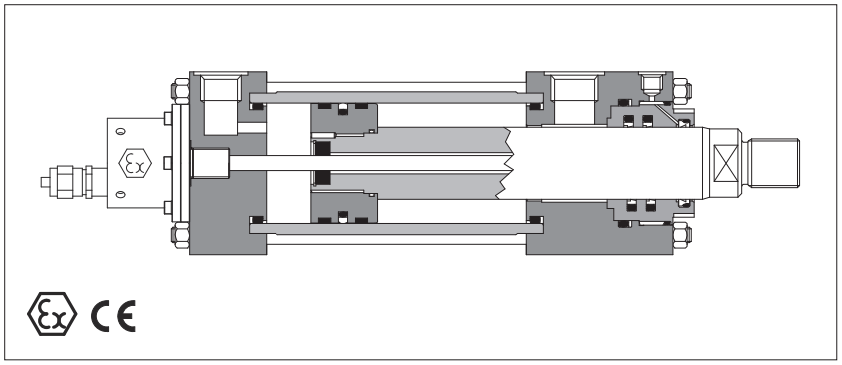
# INDEX

## CYLINDERS & PUMPS

**Ex-h**

# Hydraulic cylinders type CKA - for potentially explosive atmospheres

**ATEX** - ISO 6020-2 - nominal pressure 16 MPa (160 bar) - max 25 MPa (250 bar)



CKA cylinders are derived from standard CK (tab.B137) with certification according to ATEX 2014/34/EU. They are designed to limit the external surface temperature, according to the certified class, to avoid the self-ignition of the explosive mixtures potentially present in the environment. CKAM servocylinders are equipped with ex-proof built-in digital magnetostrictive position transducer, ATEX certified.

- Optional ex-proof proximity sensors, ATEX certified
- Bore sizes from **25** to **200** mm
- Up to **3** rod diameters per bore
- Strokes up to **5000** mm
- Single or double rod
- **15** standard mounting styles
- **5** seals options
- Attachments for rods and mounting styles, **see tab. B800**

For cylinder's dimensions and options **see tab B.137**

For cylinder's choice and sizing criteria **see tab. B015**

## 1 ATEX CERTIFICATION

| Cylinder type | Group | Equipment category | Gas/dust group | Temperature class (1) | Zone |
|---|---|---|---|---|---|
| CKA | II | 2 GD | II C/III C | T85°C(T6) / T135 °C(T4) | 1,2,21,22 |
| CKA + ex-proof rod position transducer **(2)** | II | 2 G | II B | T6/T5 | 1,2 |
| | II | 2 D | III C | T85°C/T100°C | 21,22 |
| CKA + ex-proof proximity sensors | II | 3 G | II | T4 | 2 |

**(1)** Temperature class depends to the max fluid temperature and sealing system
**(2)** The rod position transducer is certified to work with explosive gas (cat. 2G) and dust (cat. 2D)

## 2 MODEL CODE

| CKA | M | / | 10 | - | 50 | / | 22 | / | 22 | * | 0500 | - | S | 3 | 0 | 1 | - | A | - | B1E3X1Z3 | ** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

**Cylinder series**
**CKA** to ATEX 2014/34/EU dimensions to ISO 6020 - 2

**Ex-proof position transducer**
See section 5
**-** = omit if not requested
**M**= Digital magnetostrictive

**Incorporated subplate (1)**
**-** = omit if subplate is not requested
**10** = size 06
**20** = size 10
**30** = size 16
**40** = size 25

**Bore size (1)**
from **25** to **200** mm

**Rod diameter (1)**
from **12** to **140** mm

**Second rod diameter** for double rod **(1)**
from **12** to **140** mm, omit for single rod

**Stroke (1)**
up to **5000** mm ( **4000** mm for **CKAM** )

**Mounting style (1)**

| | | REF. ISO |
|---|---|---|
| **C** | fixed clevis | MP1 **(4)** |
| **D** | fixed eye | MP3 **(4)** |
| **E** | feet | MS2 |
| **G** | front trunnion | MT1 |
| **H** | rear trunnion | MT2 **(4)** |
| **L** | intermediate trunnion | MT4 **(5)** |
| **N** | front flange | ME5 |
| **P** | rear flange | ME6 **(4)** |
| **S** | fixed eye + spherical bearing | MP5 **(4)** |
| **T** | threaded hole+tie rods extended | MX7 |
| **V** | rear tie rods extended | MX2 |
| **W** | both end tie rods extended | MX1 |
| **X** | basic execution | - |
| **Y** | front tie rods extended | MX3 |
| **Z** | front threaded holes | MX5 |

**Cushioning (1)**
**0** = none

| Fast adjustable | Slow adjustable | Fast fixed |
|---|---|---|
| **1** = rear only | **4** = rear only | **7** = rear only |
| **2** = front only | **5** = front only | **8** = front only |
| **3** = front and rear | **6** = front and rear | **9** = front and rear |

**Spacer (1)**
**0** = none **2** = 50 mm **4** = 100 mm **6** = 150 mm **8** = 200 mm

**Sealing system**, see section 7
**1** = (NBR + POLYURETHANE) high static and dynamic sealing
**2** = (FKM + PTFE) very low friction and high temperatures
**4** = (NBR + PTFE) very low friction and high speeds
**6** = (NBR + PTFE) very low friction, single acting - pushing
**7** = (NBR + PTFE) very low friction, single acting - pulling

**Options (1)(3)**:
Rod end
**F** = female thread
**G** = light female thread
**H** = light male thread
Oversized oil ports
**D** = front oversized oil port
**Y** = rear oversized oil port
Ex-proof proximity sensors, see section 8
**R** = front sensor
**S** = rear sensor
Rod treatment
**K** = nickel and chrome plating
**T** = induction surface hardening and chrome plating
Air bleeds
**A** = front air bleed
**W** = rear air bleed
Draining
**L** = rod side draining

**Heads' configuration (1)(3)**
Oil ports positions
**B*** = front head
**X*** = rear head
Cushioning adjustments positions, to be entered only if adjustable cushioning are selected
**E*** = front head
**Z*** = rear head
***** = selected position (1, 2, 3 or 4)

Series number **(2)**

**(1)** For details see table **B137**
**(2)** For spare parts request indicate the series number printed on the nameplate only for series < 30
**(3)** To be entered in alphabetical order
**(4)** Not available for double rod
**(5)** XV dimension must be indicated in the model code

## 3 CERTIFICATION

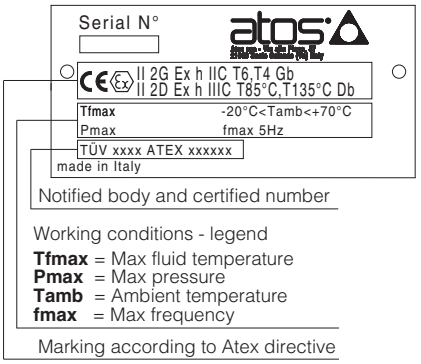
In the following are resumed the cylinders marking according to Atex certification.
Reference norm ISO 80079-36, ISO 80079-37.

**II 2G Ex h IIC T6, T4 Gb (gas)** **II 2D Ex h IIIC T85°C, T135°C Db (dust)**

**GROUP II, Atex**

**II** = Group II for surface plants
**2** = High protection (equipment category)
**G** = For gas, vapours
**D** = For dust
**Ex** = Equipment for explosive atmospheres
**IIC** = Gas group
**IIIC** = Dust group
**T85°C/T135°C** = Surface temperature class for dust, see section 6
**T6/T4** = Surface temperature class for gas, see section 6
**Gb/Db** = EPL Equipment group

Compliance RoHS Directive 2011/65/EU as last update by 2015/65/EU (only CKAM)
REACH Regulation (EC) no.1907/2006




## 4 INSTALLATION NOTES

**Before installation and start-up refer to tab. BX900**

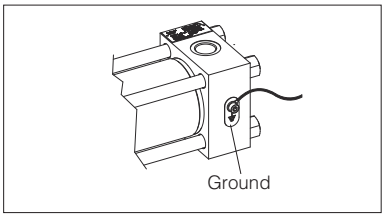
- The max surface temperature indicated in the nameplate must be lower than the following values:

GAS - **80% of gas ignition temperature**

DUST - max value between **dust ignition temperature - 75°C** and **2/3 of dust ignition temperature**

- The ignition temperature of the fluid must be 50°C greater than the maximum surface temperature indicated in the nameplate
- The cylinder must be grounded using the threaded hole on the rear head, evidenced by the nameplate with ground symbol. The hydraulic cylinder must be put at the same electric potential of the machine

**GROUNDING**




## 5 EX-PROOF ROD POSITION TRANSDUCER

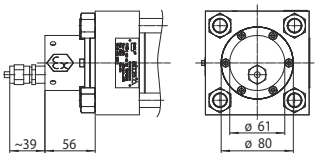
CODE: **M**
CKA cylinders are available with "Balluff" Ex-proof rod position transducer, ATEX certified to **II 1/2 G Ex d IIC T6/T5 Ga/Gb** for gas and **II 2D Ex tb IIIC T85°C/T100°C Db IP 67 -40°C Ta +65°C (T6) -40°C Ta +80°C (T5)** for dust. Ex-proof transducers meet the requirements of the following european standard documentations:

| **II 1/2 G Ex d IIC T6/T5 Ga/Gb** | **II 2D Ex tb IIIC T85°C/T100°C Db IP 67** |
|---|---|
| EN 60079-0 | EN 61241-0 |
| EN 60079-1 | EN 61241-0/AA |
| EN 60079-26 | EN 61241-1 |

The transducer housing is made in AISI 303.
For dimensions and details, contact our technical office.

**For certification and start-up refer to the user's guide included in the supply**
**The transducer is available with SIL certified on request**

**CKAM WITH ROD POSITION TRANSDUCER**




cable connection with protection degree IP 67

## 6 MAIN CHARACTERISTICS AND FLUID REQUIREMENTS

| | |
|---|---|
| Ambient temperature | -20÷+70°C; -40 ÷ +65°C for **CKAM** |
| Fluid temperature | -20÷+70°C (**T6**); -20÷+120°C (**T4**) for seals type **2** (*) |
| Max surface temperature | ≤ +85 °C (**T6**); ≤ +135 °C (**T4**) for seals type **2** (*) |
| Max working pressure | 16 MPa (160 bar) |
| Max pressure | 25 MPa (250 bar) |
| Max frequency | 5 Hz |
| Max speed (see section 7 ) | 1 m/s (seals type 2, 4, 6, 7); 0,5 m/s (seals type 1) |
| Recommended viscosity | 15 ÷ 100 mm²/s |
| Max fluid contamination level | ISO4406 20/18/15 NAS1638 class 9, see also filter section at or KTF catalog |

**Note:** (*) Cylinders with seals type **2** may also be certified **T6** limiting the max fluid temperature to 70°C

CKA cylinders are suitable for operation with mineral oils with or without additives (**HH, HL, HLP, HLP-D, HM, HV**), fire resistant fluids (**HFA** oil in water emulsion, 90-95% water and 5-10% oil; **HFB** water in oil emulsion, 40% water; **HFC** water glycol, max 45% water) and synthetic fluids (**HFD-U** organic esters, **HFD-R** phosphate esters) depending to the sealing system.

## 7 SEALING SYSTEM FEATURES

The sealing system must be choosen according to the working conditions of the system: speed, operating frequencies, fluid type and temperature. Additional verifications about minimum in/out rod speed ratio, static and dynamic sealing friction are warmly suggested, see **tab. B015**
When single acting seals are selected (types **6** and **7**), the not pressurized cylinder's chamber must be connected to the tank. Contact our technical office for the compatibility with other fluids not mentioned below and specify type and composition.

| Sealing system | Material | Features | Max speed [m/s] | Fluid temperature range | Fluids compatibility | ISO Standards for seals | |
|---|---|---|---|---|---|---|---|
| | | | | | | Piston | Rod |
| **1** | NBR + POLYURETHANE | **high static and dynamic sealing** | 0.5 | -20°C to 70°C | Mineral oils HH, HL, HLP, HLP-D, HM, HV | ISO 7425/1 | ISO 5597/1 |
| **2** | FKM + PTFE | **very low friction and high temperatures** | 1 | -20°C to 120°C | Mineral oils HH, HL, HLP, HLP-D, HM, HV, fire resistance fluids HFA, HFB, HFD-U,HFD-R | ISO 7425/1 | ISO 7425/2 |
| **4** | NBR + PTFE | **very low friction and high speeds** | 1 | -20°C to 70°C | Mineral oils HH, HL, HLP, HLP-D, HM, HV, MIL-H-5606 fire resistance fluids HFA, HFC (water max 45%), HFD-U | ISO 7425/1 | ISO 7425/2 |
| **6 - 7** | NBR + PTFE | **very low friction single acting - pushing/pulling** | 1 | -20°C to 70°C | Mineral oils HH, HL, HLP, HLP-D, HM, HV, fire resistance fluids HFA, HFC (water max 45%), HFD-U | ISO 7425/1 | ISO 7425/2 |

## 8 EX-PROOF PROXIMITY SENSORS

CODES: **R** = front sensor; **S** = rear sensor
CKA cylinders are available with ex-proof proximity sensors, ATEX certified to **Ex II 3G Ex nA II T4 -25≤Ta≤80°C**. They meet the requirements of the following european standard documentations: EN 60079-0, EN 60079-15.
Their functioning is based on the variation of the magnetic field, generated by the sensor itself, when the cushioning piston enters on its influence area, causing a change of state (on/off) of the sensors. The sensor housing is made in stainless steel.
For dimensions and details, contact our technical office.

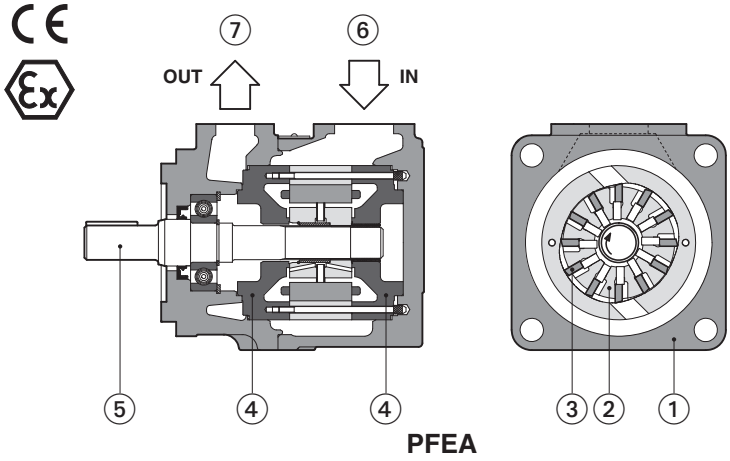
**For certification and start-up refer to the user's guide included in the supply**

**SENSORS TECHNICAL DATA**

| | |
|---|---|
| Ambient temperature | -25 ÷ +80°C |
| Nominal voltage | 24 VDC |
| Operating voltage | 10 ÷ 30 VDC |
| Max load | 200 mA |
| Repeatability | <5% |
| Protection degree | IP 68 |
| Max frequency | 1000 Hz |
| Max pressure | 25 MPa |

# Ex-proof vane pumps type PFEA

fixed displacement - for potentialy explosive atmospheres - **ATEX**




**PFEA**

① body
②③ rotor with vanes
④ balanced plates
⑤ shaft
⑥ inlet port
⑦ outlet port

**PFEA** are fixed displacement-twelve-vane pumps available in threebody sizes and two different executions.
They are certified for application in potentially explosive atmospheres according to ATEX 2014/34/EU, protection mode

Ex II 2/2G Ex h IIC T5, T4 Gb, and
Ex II 2/2D Ex h IIIC 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.

PFEA are available in two executions:

**PFEA-*1** max pressure **210** bar

**PFEA-*2** max pressure **300** bar

Displacements up to **150** cm³/rev.

## 1 MODEL CODE

| PFEA | XA | - | 31 | 036 | / | 1 | D | T | / | 7 | * | / | * |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

**PFEA**: Fixed displacement vane pump with ex-proof certification

**XA**: Additional suffix for pumps with through shaft, for coupling with 2nd pump type PFEA:
**XA** = for coupling with PFEA-31
**XB** = for coupling with PFEA-41 (only for PFEA-41, 42 and PFEA-51, 52)
**XC** = for coupling with PFEA-51 (only for PFEA-51 and 52)
**XO** = with through shaft, without rear flange

**31**: **Size**:
**31, 41, 51** (standard)
**32, 42, 52** (high pressure and low noise)

**036**: **Displacement** of **PFEA-31, 41, 51** [cm³/rev]
for PFEA-31: **010, 016, 022, 028, 036, 044**
for PFEA-41: **029, 037, 045, 056, 070, 085**
for PFEA-51: **090, 110, 129, 150**

**Displacement** of **PFEA-32, 42, 52** [cm³/rev]
for PFEA-32: **016, 022, 028, 036**
for PFEA-42: **045, 056, 070, 085**
for PFEA-52: **090, 110, 129, 150**

**1**: **Drive shaft**:
cylindrical, keyed (not for PFEA rear pumps to be coupled with PFEAX*)
**1** = standard (only for PFEA 31, 41, 51)
**2** = long version (only for PFEA-41 and PFEA-51)
**3** = for high torque applications

splined
**5** = for signal and through-shift pumps (1)
**6** = for signal and through-shift pumps (only first position)
**7** = for signal and through-shift pumps (only second and third position)
(only PFEA-31,42 / PFEA-32,42)

**D**: **Direction of rotation** (viewed from the shaft end):
**D** = clockwise
**S** = counterclockwise
Note: PFEA* are not reversible

**T**: **Port orientation**, see section 8:
**T** = standard
**U, V, W** = on request

**7**: **Option**:
**7** = for ambient temperature up to 70°C **(2)**

*****: Series number

*****: **Seals material**:
omit for NBR (mineral oil & water glycol)
**PE** = FKM **(2)**

**(1)** Shaft type 5 has to be selected for PFEA rear pumps to be coupled with PFEAX* first pumps
**(2)** Pumps with option **/7** are always equipped with seals FKM

## 2 GENERAL CHARACTERISTICS

| | |
|---|---|
| Assembly position | Any position |
| Loads on the shaft | Axial and radial loads are not allowed on the shaft.<br>The coupling should be sized to absorb the power peak. |
| Ambient temperature range | -20°C to +70°C |
| Recommended pressure on inlet port | from -0,15 to 1,5 bar for speed up to 1800 rpm; from 0 to +1,5 bar for speed over 1800 rpm |
| Compliance | Explosion proof protection "Ex h", see section 6<br>RoHs Directive 2011/65/EU as last update by 2015/65/EU<br>REACH Regulation (EC) n°1907/2006 |

## 3 OPERATING CHARACTERISTICS of PFEA - 31,41,51 at 1450 rpm (based on mineral oil ISO VG 46 at 50°C)

| Model | Displacement cm³/rev | Max pressure (1) | Speed range rpm (2) | 7 bar (3) | | 140 bar (3) | | 210 bar (3) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | l/min | kW | l/min | kW | l/min | kW |
| PFEA-31010 | 10,5 | 160 | 800-2400 | 15 | 0,2 | 12 | 5 | - | - |
| PFEA-31016 | 16,5 | 210 bar | 800-2800 | 23 | 0,5 | 19 | 5 | 16 | 8,3 |
| PFEA-31022 | 21,6 | | | 30 | 0,6 | 26 | 7 | 23 | 10,8 |
| PFEA-31028 | 28,1 | | | 40 | 0,8 | 36 | 10 | 33 | 14 |
| PFEA-31036 | 35,6 | | | 51 | 1 | 46 | 12,5 | 43 | 17,8 |
| PFEA-31044 | 43,7 | | 800-2500 | 63 | 1,3 | 58 | 15,5 | 55 | 22 |
| PFEA-41029 | 29,3 | | | 41 | 0,8 | 37 | 10 | 34 | 14,7 |
| PFEA-41037 | 36,6 | | | 52 | 1 | 48 | 12,5 | 45 | 18,3 |
| PFEA-41045 | 45,0 | | | 64 | 1,3 | 60 | 16 | 57 | 22,6 |
| PFEA-41056 | 55,8 | | | 80 | 1,6 | 75 | 21 | 72 | 28 |
| PFEA-41070 | 69,9 | | | 101 | 2 | 95 | 26 | 91 | 35 |
| PFEA-41085 | 85,3 | | 800-2000 | 124 | 2,4 | 118 | 32 | 114 | 43 |
| PFEA-51090 | 90,0 | | 800-2200 | 128 | 2,7 | 119 | 33 | 114 | 45 |
| PFEA-51110 | 109,6 | | | 157 | 3,2 | 147 | 40 | 141 | 55 |
| PFEA-51129 | 129,2 | | | 186 | 3,7 | 174 | 47 | 168 | 65 |
| PFEA-51150 | 150,2 | | 800-1800 | 215 | 4,2 | 204 | 55 | 197 | 75 |

(1) Max pressure is 160 bar for /PE version and water glycol fluid
(2) Max speed is 1800 rpm for /PE versions; 1500 rpm for water glycol fluid
(3) Flow rate and power consumption are proportional to the rotation speed

## 4 OPERATING CHARACTERISTICS of PFEA - 32, 42, 52 at 1450 rpm (based on mineral oil ISO VG 46 at 50°C)

| Model | Displacement cm³/rev | Max pressure (1) | Speed range rpm (2) | 7 bar (3) | | 140 bar (3) | | at max. pressure (3) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | l/min | kW | l/min | kW | l/min | kW |
| PFEA-32016 | 16,5 | 210 bar | 1000-2500 | 23 | 0,35 | 20 | 6 | 16 | 10 |
| PFEA-32022 | 21,6 | 300 bar | 1200-2500 | 30 | 0,6 | 26 | 7 | 20 | 16 |
| PFEA-32028 | 28,1 | | | 40 | 0,8 | 36 | 10 | 30 | 20 |
| PFEA-32036 | 35,6 | | | 51 | 1 | 46 | 12,5 | 40 | 26 |
| PFEA-42045 | 45 | 280 bar | 1000-2200 | 64 | 1,3 | 60 | 16 | 56 | 31 |
| PFEA-42056 | 55,8 | | | 80 | 1,6 | 75 | 21 | 70 | 40 |
| PFEA-42070 | 69,9 | 250 bar | | 101 | 2 | 95 | 26 | 90 | 42 |
| PFEA-42085 | 85,3 | 210 bar | 800-2000 | 124 | 2,4 | 118 | 32 | 114 | 43 |
| PFEA-52090 | 90 | 250 bar | 1000-2000 | 128 | 2,7 | 119 | 33 | 111 | 54 |
| PFEA-52110 | 109,6 | | | 157 | 3,2 | 147 | 40 | 138 | 66 |
| PFEA-52129 | 129,2 | | | 186 | 3,7 | 174 | 47 | 163 | 78 |
| PFEA-52150 | 150,2 | 210 bar | 800-1800 | 215 | 4,2 | 204 | 55 | 197 | 80 |

(1) Max pressure is 160 bar for /PE version and water glycol fluid
(2) Max speed is 1800 rpm for /PE versions; 1500 rpm for water glycol fluid
(3) Flow rate and power consumption are proportional to the rotation speed

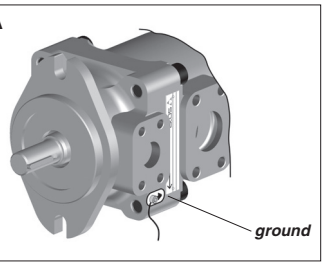
## 5 SEALS AND HYDRAULIC FLUIDS - for other fluids not included in below table, consult our technical office

| | | | | |
|---|---|---|---|---|
| Seals, recommended fluid temperature | | NBR seals (standard) = -20°C ÷ +60°C, with HFC hydraulic fluids = -20°C ÷ +50°C<br>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 21/19/16 NAS1638 class 10 | | see also filter section at or KTF catalog |
| | longer life | ISO4406 class 19/17/14 NAS1638 class 8 | | |
| **Hydraulic fluid** | | **Suitable seals type** | **Classification** | **Ref. Standard** |
| Mineral oils | | NBR, FKM | HL, HLP, HLPD, HVLP, HVLPD | DIN 51524 |
| Flame resistant without water | | FKM | HFDU, HFDR | ISO 12922 |
| Flame resistant with water | | NBR | HFC | |

## 6 CERTIFICATION MAIN DATA

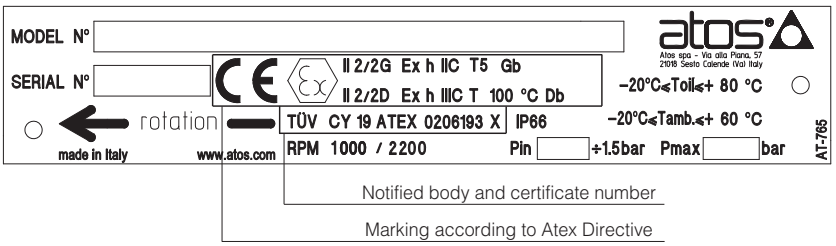
| Certification | **ATEX** | |
|---|---|---|
| Protection mode | Ex II 2/2G Ex h IIC T5, T4 Gb,<br>Ex II 2/2D Ex h IIIC T100°C, T135°C Db | |
| Type examination certificate | TUV CY 19 ATEX 026182X | |
| Pump version | (**std** and **/PE**) | **/7 /PE** |
| Temperature class | T6 | T5 |
| Surface temperature | ≤ 85 °C | ≤ 100 °C |
| Ambient temperature | -20 ÷ +60 °C | -20 ÷ +70 °C |
| Max inlet fluid temperature | +60 °C | +80 °C |
| Protection degree | IP 66 | |

**PFEA**




### 6.1 EXAMPLE OF PFEA NAMEPLATE MARKING

At side are resumed the pumps marking according to Atex certification




**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 on more of the following types of protection ("c", "b", "k")
**IIC** = Gas group (acetylene, hydrogen)
**IIIC** = Conduictive dust
**T*** = Temperature class (T6, T5)
**T**°C** = Max surface temperature (85, 100)
**Zone 1** (gas) **and 21** (dust) = Possibility of explosive atmosphere during normal functioning
**Zone 2** (gas) **and 22** (dust) = Low probability of explosive atmosphere

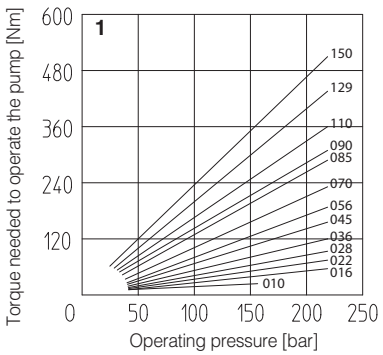
### 6.2 Related documentation

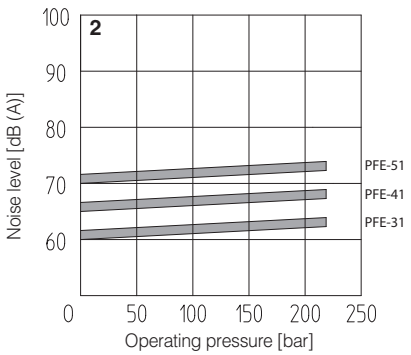
| | |
|---|---|
| **X010** | Basics for electrohydraulics in hazardous environments |
| **X020** | Summary of Atos ex-proof components certified to ATEX, IECEx, EAC, PESO |
| **AX900** | Operating and maintenance information for ex-proof pumps |

## 7 DIAGRAMS for PFEA -31, 41, 51 (Fbased on mineral oil ISO VG 46 at 50°C)

**1 = Torque versus pressure diagram**

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

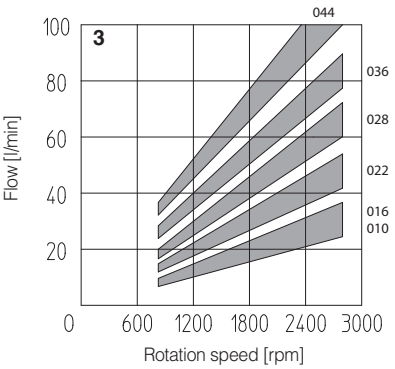


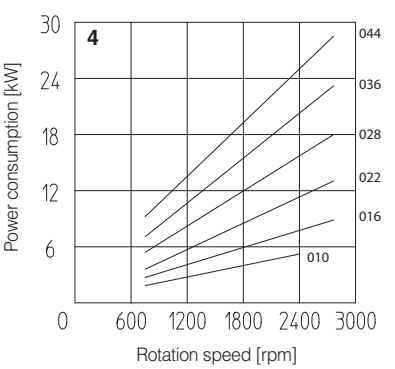




**PFE-31:**

**3 = Flow versus speed diagram** with pressure variation from 7 bar to 210 bar.

**4 = Power consumption versus speed diagram** at 140 bar. Power consumption is proportional to operating pressure.

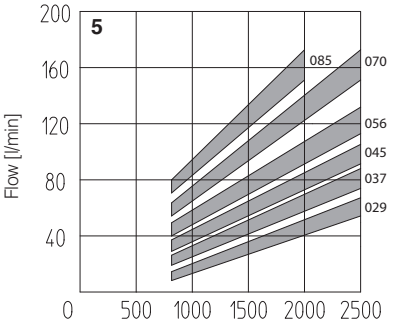


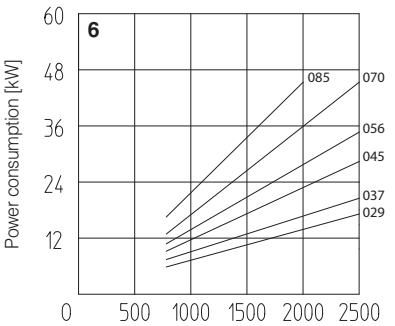




**PFE-41:**

**5 = Flow versus speed diagram** with pressure variation from 7 bar to 210 bar.

**6 = Power consumption versus speed diagram** at 140 bar. Power consumption is proportional to operating pressure.

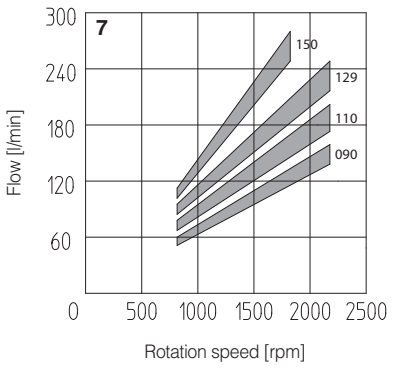


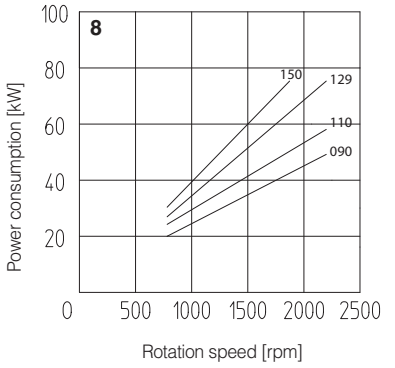




**PFE-51:**

**7 = Flow versus speed diagram** with pressure variation from 7 bar to 210 bar.

**8 = Power consumption versus speed diagram** at 140 bar. Power consumption is proportional to operating pressure.

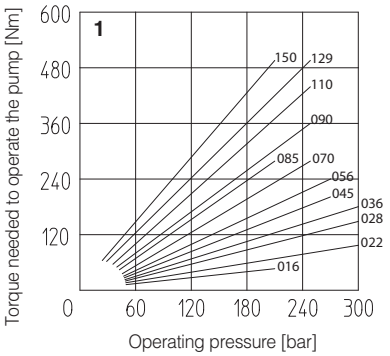


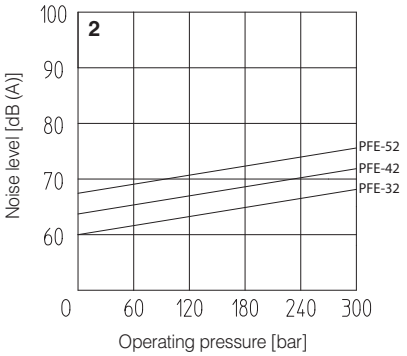



**8** **DIAGRAMS** for PFEA -32, 42, 52 (based on mineral oil ISO VG 46 at 50°C)

**1 = Torque versus pressure diagram**

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

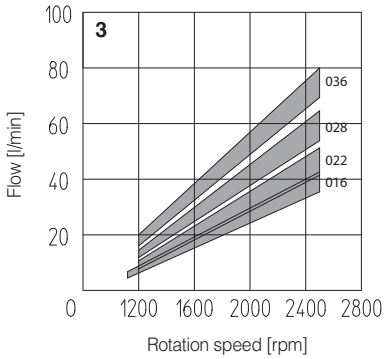


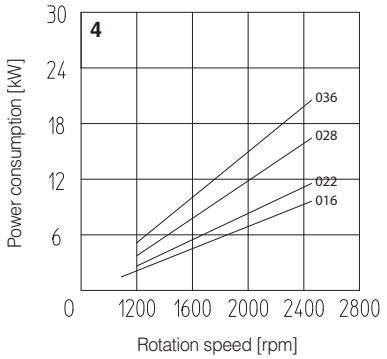




**PFE-32:**

**3 = Flow versus speed diagram** with pressure variation from 7 bar to 210 bar.

**4 = Power consumption versus speed diagram** at 140 bar. Power consumption is proportional to operating pressure.

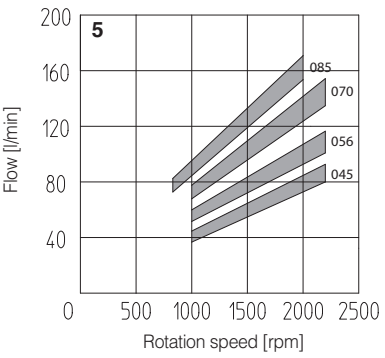


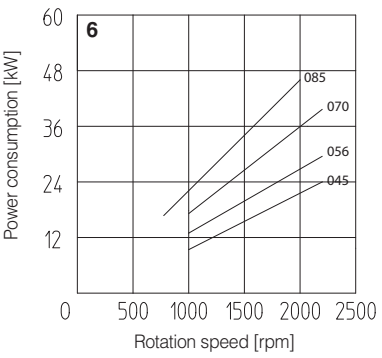




**PFE-42:**

**5 = Flow versus speed diagram** with pressure variation from 7 bar to 210 bar.

**6 = Power consumption versus speed diagram** at 140 bar. Power consumption is proportional to operating pressure.

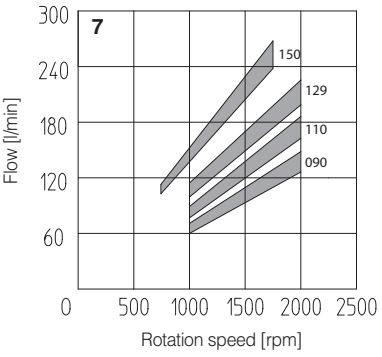


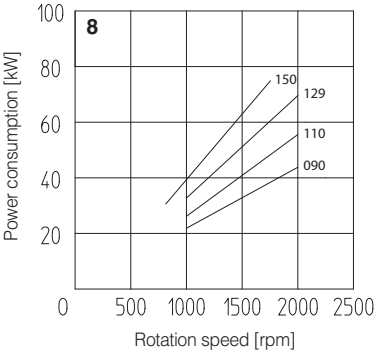




**PFE-52:**

**7 = Flow versus speed diagram** with pressure variation from 7 bar to 210 bar.

**8 = Power consumption versus speed diagram** at 140 bar. Power consumption is proportional to operating pressure.



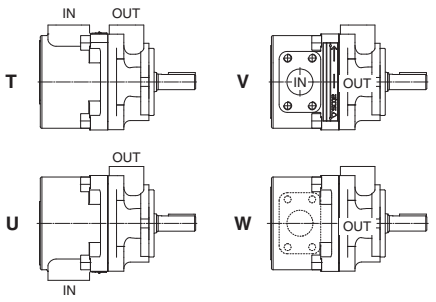



## 9 PORT ORIENTATION

Single pumps can be supplied with oil ports oriented in different configuration in relation to the drive shaft, as follows (wiewed from the shaft end);

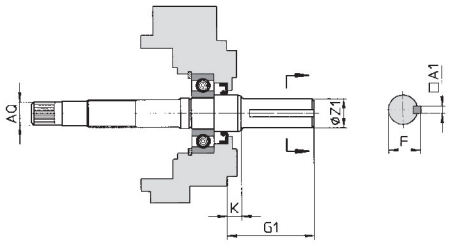
**T** = inlet and outlet ports on the same axis (standard)
**U** = outlet orientated 180° with respect to the inlet
**V** = outlet oriented 90° with respect to the inlet
**W** = outlet oriented 270° with respect to the inlet

In multiple pumps inlet ports and outlet ports are in line.
Ports orientation can be easily changed by rotating the pump body that carries inlet port.



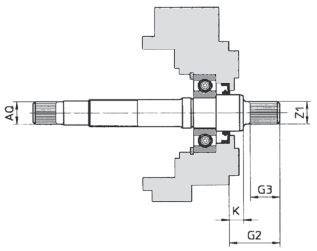

## 10 DRIVE SHAFT

**CYLINDRICAL SHAFT KEYED**




| PFEA Model | PFEA - 31,41,51 | | | | | | PFEA - 41,51 | | | | | | ALL VERSIONS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Keyed shaft type 1 (only PFEA - 31,41,51) | | | | | | Keyed shaft type 2 (only PFEA - 41,51) | | | | | | Keyed shaft type 3 | | | | | |
| | A1 | F | G1 | K | ØZ1 | Only for through shaft execution Ø AQ | A1 | F | G1 | K | ØZ1 | Only for through shaft execution Ø AQ | A1 | F | G1 | K | ØZ1 | Only for through shaft execution Ø AQ |
| **31,32** | 4,78 | 21,11 | 56,00 | 8,00 | 19,05 | SAE 16/32-9T | – | – | – | – | – | – | 4,78 | 24,54 | 56,00 | 8,00 | 22,22 | SAE 16/32-9T |
| | 4,75 | 20,94 | | | 19,00 | | | | | | | | 4,75 | 24,41 | | | 22,20 | |
| **41,42** | 4,78 | 24,54 | 59,00 | 11,40 | 22,22 | SAE 32/64-24T | 6,36 | 25,03 | 71,00 | 8,00 | 22,22 | SAE 32/64-24T | 6,38 | 28,30 | 78,00 | 11,40 | 25,38 | SAE 32/64-24T |
| | 4,75 | 24,41 | | | 22,20 | | 6,35 | 24,77 | | | 22,20 | | 6,35 | 28,10 | | | 25,36 | |
| **51,52** | 7,97 | 35,33 | 73,00 | 14 | 31,75 | SAE 16/32-13T | 7,95 | 35,33 | 84,00 | 8,10 | 31,75 | SAE 16/32-13T | 7,97 | 38,58 | 84,00 | 14 | 34,90 | SAE 16/32-13T |
| | 7,94 | 35,07 | | | 31,70 | | 7,94 | 35,07 | | | 31,70 | | 7,94 | 38,46 | | | 34,88 | |

**SPLINED SHAFT**




| PFEA Model | Splined shaft type 5 | | | | | Splined shaft type 6 | | | | | Splined shaft type 7 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | G2 | G3 | K | Z1 | Only for through shaft execution Ø AQ | G2 | G3 | K | Z1 | Only for through shaft execution Ø AQ | G2 | G3 | K | Z1 | Only for through shaft execution Ø AQ |
| **31,32** | 32,00 | 19,50 | 6,50 | SAE 16/32-9T | SAE 16/32-9T | 41,00 | 28 | 8,00 | SAE 16/32-13T | SAE 16/32-9T | 32,00 | 19 | 8,00 | SAE 16/32-13T | SAE 16/32-9T |
| **41,42** | 41,25 | 28 | 8,00 | SAE 16/32-13T | SAE 32/64-24T | 55,60 | 42 | 8,00 | SAE 12/24-14T | SAE 32/64-24T | 41,60 | 28 | 8,00 | SAE 12/24-14T | SAE 32/64-24T |
| **51,52** | 56,00 | 42 | 8,10 | SAE 12/24-14T | SAE 16/32-13T | – | – | – | – | – | – | – | – | – | – |

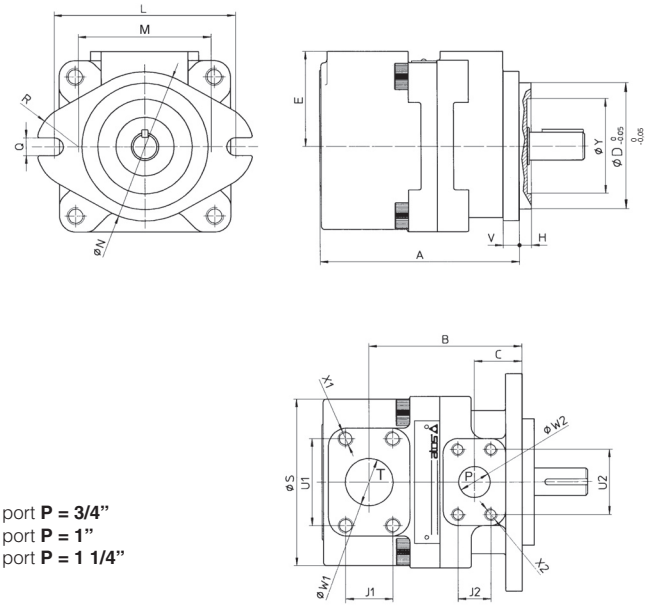
## 11 LIMITS OF SHAFT TORQUE

| PFEA Model | Maximum driving torque [Nm] | | | | | | Maximum torque available at the end of the through shaft [Nm] |
|---|---|---|---|---|---|---|---|
| | Shaft type 1 | Shaft type 2 | Shaft type 3 | Shaft type 5 | Shaft type 6 | Shaft type 7 | Any type of shaft |
| **31,32** | 160 | – | 240 | 110 | 240 | 240 | 130 |
| **41,42** | 250 | 250 | 400 | 200 | 400 | 400 | 250 |
| **-51,52** | 500 | 500 | 850 | 450 | – | – | 400 |

The values of torque required to operate the pumps are shown for each type on the “torque versus pressure” diagram at section 4.
In multiple pumps the total torque applied to the shaft of the first element (drive shaft) is the sum of the single torque needed for operating each single pump and it is necessary to verify that this total torque applied to the drive shaft is not higher than the values indicated in the table.

## 12 DIMENSIONS OF PFEA - 31, 41, 51 SINGLE PUMPS [mm]

**T** = inlet port
**P** = outlet port




**SAE FLANGES**
**PFEA-31**: port **T = 1 1/4”**; port **P = 3/4”**
**PFEA-41**: port **T = 1 1/2”**; port **P = 1”**
**PFEA-51**: port **T = 2**; port **P = 1 1/4”**

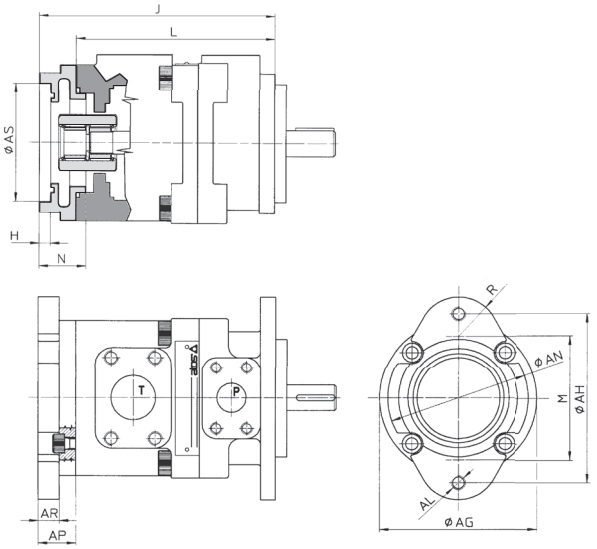
**Mass**:
PFE-31 = 9 kg
PFE-41 = 14 kg
PFE-51 = 25,5 kg

SAE flanges can be supplied with the pump

| Model | A | B | C | ØD | E | H | L | M | ØN | Q | R |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **PFEA-31** | 136 | 100 | 28 | 82,55 | 70 | 6,4 | 106 | 73 | 95 | 11,1 | 28,5 |
| **PFEA-41** | 160 | 120 | 38 | 101,6 | 76,2 | 9,7 | 146 | 107 | 120 | 14,3 | 34 |
| **PFEA-51** | 186,5 | 125 | 38 | 127 | 82,6 | 12,7 | 181 | 143,5 | 148 | 17,5 | 35 |
| **Model** | **ØS** | **U1** | **U2** | **V** | **ØW1** | **ØW2** | **J1** | **J2** | **X1** | **X2** | **ØY** |
| **PFEA-31** | 114 | 58,7 | 47,6 | 10 | 32 | 19 | 30,2 | 22,2 | M10X20 | M10X17 | 47 |
| **PFEA-41** | 134 | 70 | 52,4 | 13 | 38 | 25 | 35,7 | 26,2 | M12X20 | M10X17 | 76 |
| **PFEA-51** | 160 | 77,8 | 58 | 15 | 51 | 32 | 42,9 | 30,2 | M12X20 | M10X20 | 76 |

## 13 DIMENSIONS OF PFEA-31, 41, 51 WITH THROUGH-SHAFT [mm]

**T** = inlet port
**P** = outlet port




**SAE FLANGES**
**PFEAX-31**: port **T = 1 1/4”**; port **P = 3/4”**
**PFEAX-41**: port **T = 1 1/2”**; port **P = 1”**
**PFEAX-51**: port **T = 2**; port **P = 1 1/4”**

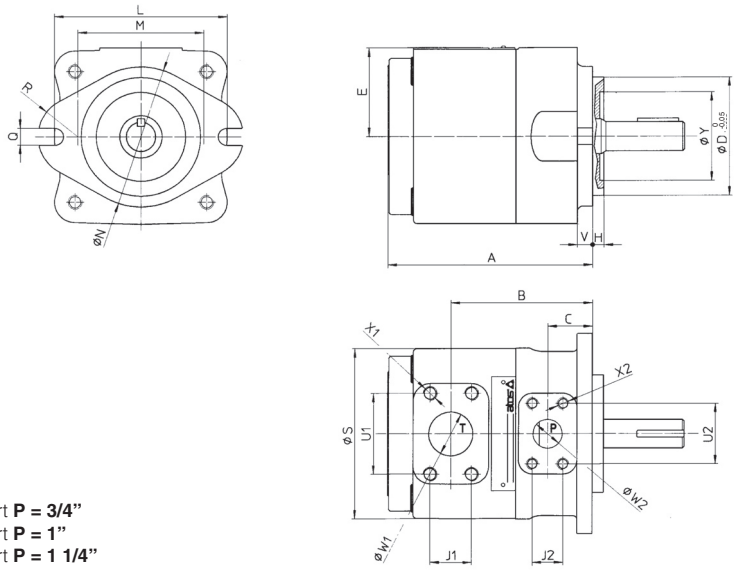
For other dimensions, see section 8

| Model | Ø AG | Ø AH | AL | Tightening torque (Nm)(1) | Ø AN | AP | AR | Ø AS | H | J | L | M | N | R |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PFEXA-31** | 114 | 106 | M10X17 | 70 | 95 | 33 | 25 | 82,57<br>82,63 | 6,42<br>6,47 | 165,5 | 132,5 | 79 | 32 | 28,5 |
| **PFEXA-41** | 134 | 106 | M10X17 | 70 | 95 | 23 | 11 | 82,57<br>82,63 | 6,42<br>6,47 | 194 | 171 | 73 | 32 | 28,5 |
| **PFEXB-41** | 134 | 146 | M12 | 125 | 120 | 32 | 18 | 101,62<br>101,68 | 9,73<br>9,78 | 203 | 171 | 107 | 41 | 34 |
| **PFEXA-51** | 134 | 106 | M10X17 | 70 | 95 | 22,7 | 11 | 82,57<br>82,63 | 6,42<br>6,47 | 206,2 | 183,5 | 73 | 32 | 28,5 |
| **PFEXB-51** | 134 | 146 | M12 | 125 | 120 | 32 | 18 | 101,62<br>101,68 | 9,73<br>9,78 | 215,5 | 183,5 | 107 | 41 | 34 |
| **PFEXC-51** | 134 | 181 | M16 | 300 | 148 | 46,5 | 30,7 | 127,02<br>127,02 | 12,73<br>12,78 | 230 | 183,5 | 143,5 | 56 | 35 |

**(1)** Tightening torque for screw class 12.9

## 14 DIMENSIONS OF PFEA -32, 42, 52 SINGLE PUMPS [mm]

**T** = inlet port
**P** = outlet port



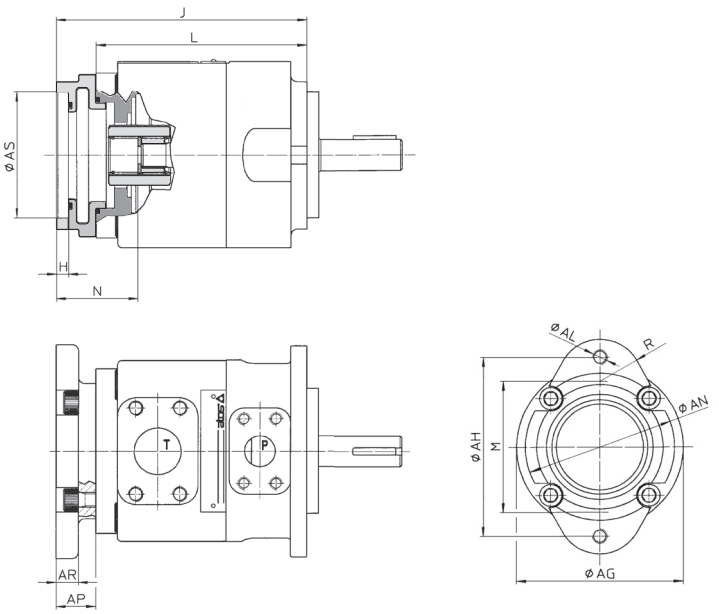

**SAE FLANGES**
**PFEA-32**: port **T = 1 1/4”**; port **P = 3/4”**
**PFEA-42**: port **T = 1 1/2”**; port **P = 1”**
**PFEA-52**: port **T = 2**; port **P = 1 1/4”**

**Mass**:
PFE-32 = 9 kg
PFE-42 = 20,5 kg
PFE-52 = 32,1 kg

| Model | A | B | C | ØD | E | H | L | M | ØN | Q | R |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PFEA-32 | 136 | 100 | 28 | 82,5 | 70 | 6,4 | 106 | 73 | 95 | 11 | 28,5 |
| PFEA-42 | 175,5 | 121 | 38 | 101,6 | 78 | 9,7 | 146 | 107 | 121 | 14,3 | 34 |
| PFEA-52 | 189 | 125 | 38 | 127 | 89 | 12,7 | 181 | 143,5 | 148 | 17,5 | 35 |
| **Model** | **ØS** | **U1** | **U2** | **V** | **ØW1** | **ØW2** | **J1** | **J2** | **X1** | **X2** | **ØY** |
| PFEA-32 | 114 | 58,7 | 47,6 | 10 | 32 | 19 | 30,2 | 22,2 | M10X20 | M10X17 | 47 |
| PFEA-42 | 148 | 70 | 52,4 | 13 | 38 | 25 | 35,7 | 26,2 | M12X20 | M10X17 | 76 |
| PFEA-52 | 174 | 77,8 | 58,7 | 16,3 | 50 | 50 | 42,9 | 30,2 | M12X20 | M10X20 | 76 |

## 15 DIMENSIONS OF PFEA - 32, 42, 52 WITH THROUGH-SHAFT [mm]

**T** = inlet port
**P** = outlet port




**SAE FLANGES**
**PFEAX-32**: port **T = 1 1/4”**; port **P = 3/4”**
**PFEAX-42**: port **T = 1 1/2”**; port **P = 1”**
**PFEAX-52**: port **T = 2**; port **P = 1 1/4”**

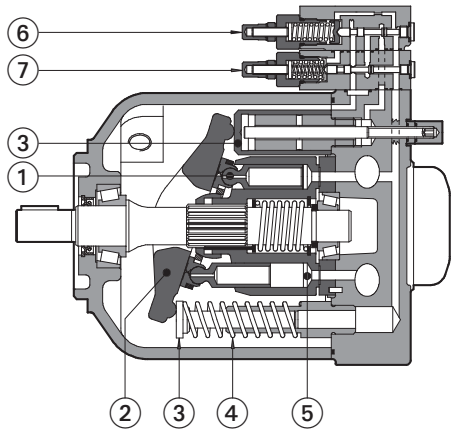
For other dimensions, see section 8

| Model | Ø AG | Ø AH | AL | Tightening torque (Nm)(1) | Ø AN | AP | AR | Ø AS | H | J | L | M | N | R |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PFEXA-32 | 114 | 106 | M10X17 | 70 | 95 | 33 | 25 | 82,57<br>82,63 | 6,42<br>6,47 | 193,7 | 132,5 | 79 | 32 | 28,5 |
| PFEXA-42 | 134 | 106 | M10X17 | 70 | 95 | 22,7 | 11 | 82,57<br>82,63 | 6,42<br>6,47 | 194 | 171 | 73 | 34 | 28,5 |
| PFEXB-42 | 134 | 146 | M12 | 125 | 120 | 32 | 18 | 101,62<br>101,68 | 9,73<br>9,78 | 203 | 171 | 107 | 43 | 34 |
| PFEXA-52 | 134 | 106 | M10X17 | 70 | 95 | 22,7 | 11 | 82,57<br>82,63 | 6,42<br>6,47 | 206,2 | 183,5 | 73 | 34,5 | 28,5 |
| PFEXB-52 | 134 | 146 | M12 | 125 | 120 | 32 | 18 | 101,62<br>101,68 | 9,73<br>9,78 | 215,5 | 183,5 | 107 | 43,8 | 34 |
| PFEXC-52 | 134 | 181 | M16 | 300 | 148 | 46,7 | 30,7 | 127,02<br>127,02 | 12,73<br>12,78 | 230,2 | 183,5 | 143,5 | 58,5 | 35 |

**(1)** Tightening torque for screw class 12.9

# Ex-proof axial piston pumps type PVPCA

for potentially explosive atmospheres - **ATEX**




① pumping piston
② swashing plate
③ servo piston
④ spring
⑤ rotation barrel
⑥ pressure compensator
⑦ flow regulator

**PVPCA-L-4046**

**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 2014/34/EU, protection mode Ex II 2/2G Ex h IIC T5, T4 Gb, and Ex II 2/2D Ex h IIIC 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**

| PVPCA | XA | - | C | - | 4 | 046 | / | 31044 | / | 1 | D | - | GK | / | 7 | 24DC | * | / | * |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

Variable displacement vane pump with ex-proof certification

Additional suffix for pumps with through shaft, for coupling with 2nd pump type PFEA:
**XA** =for coupling with PFEA-3* (only for PVPCA*-3*)
**XB** =for coupling with PFEA-4* (only for PVPCA*-4*)
**XC** =for coupling with PFEA-5* (only for PVPCA*-5*)

Type of control **(1)**:
**C** = manual pressure compensator
**CH**= manual pressure compensator with venting
**R** = remote pressure compensator
**L** = load sensing (pressure & flow)
**LW**= constant power (combined pressure & flow)
**For proportional controls see note (2)**

Size:
**3** = for displacement 029
**4** = for displacement 046
**5** = for displacement 073 and 090

**Max displacement** of axial piston pump:
**029** = 29 cm³/rev
**046** = 46 cm³/rev
**073** = 73 cm³/rev
**090** = 88 cm³/rev

Type of PVPCA (for double pumps), see tech table A160

**Shaft** (SAE Standard):
**1** = keyed (7/8" for 029 - 1" for 046 - 1 1/4" for 073 and 090)
**5** = splined (13 teeth for 029 - 15 for 046 - 14 for 073 and 090)

**Direction of rotation** (viewed at the shaft end):
**D** = clockwise
**S** = counterclockwise

**Solenoid threaded connection** (only for CH control):
**GK** = GK-1/2" ISO/UNI-6125 (tapered)
**NPT**= 1/2" NPT ANSI B2.1 (tapered)
**M** = M20x1,5 UNI-4535

**Option**:
**7** = for ambient temperature up to 70°C **(3)**
Only for CH control:
**O** = horizontal cable entrance
**WP** = prolongued manual override protected by metallic cap

**Voltage code**, only for CH: see tech table EX010

Series number

**Seals material**: omit for NBR (mineral oil & water glycol)
**PE** = FKM **(3)**

**(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

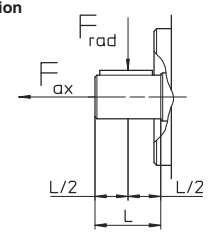
## 2 GENERAL CHARACTERISTICS

| | |
|---|---|
| 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 lenght is 3 m. |
| Ambient temperature range | -20°C to +70°C |
| Compliance | Explosion proof protection "Ex h", see section 6<br>RoHs Directive 2011/65/EU as last update by 2015/65/EU (only PVPCA-CH)<br>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 | Type 1 670 / Type 5 810 | Type 1 670 / Type 5 810 |
| Max permissible load on drive shaft | [N] Fax | 1000 | 1500 | 2000 | 2000 |
| | Frad | 1500 | 1500 | 3000 | 3000 |
| Speed rating | [rpm] | 500 ÷ 3000 | 500 ÷ 2600 | 500 ÷ 2600 | 500 ÷ 2200 |

**External load position**




Fax = axial load
Frad = radial load

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

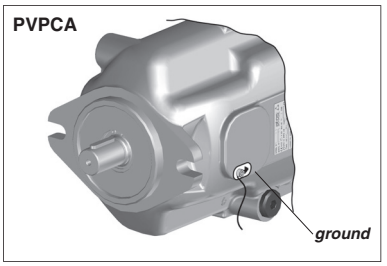
**(1)** For alternating current supply a rectifier bridge is provided built-in the solenoid
For power supply frequency 60 Hz, the nominal supply voltage of solenoids 110AC and 230AC must be 115/60 and 240/60 respectively

## 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<br>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 | | see also filter section at or KTF catalog |
| Max fluid contamination level — longer life | ISO4406 class 18/16/13 NAS1638 class 7 | | |
| **Hydraulic fluid** | **Suitable seals type** | **Classification** | **Ref. Standard** |
| Mineral oils | NBR, FKM | HL, HLP, HLPD, HVLP, HVLPD | DIN 51524 |
| Flame resistant without water | FKM | HFDU, HFDR | ISO 12922 |
| Flame resistant with water | NBR | HFC | |

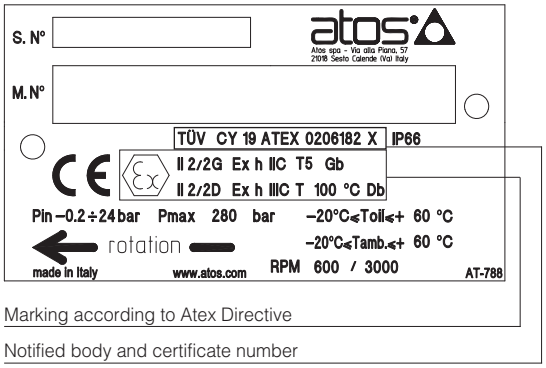
## 6 CERTIFICATION DATA

| Certification | **ATEX** | |
|---|---|---|
| Protection mode | Ex II 2/2G Ex h IIC T5, T4 Gb,<br>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

At side are resumed the pumps marking according to Atex certification

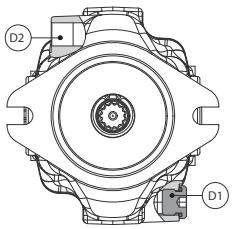



Marking according to Atex Directive

Notified body and certificate number

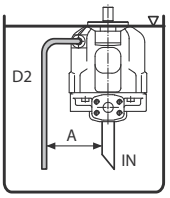
**Ex** = Equipment for explosive atmospheres
**II** = Group II for surfaces plants
**2/2** = Pump category
**G** = For gas and vapours
**D** = For dust
**h** = Marking includes one on more of the following types of protection ("c", "b", "k")
**IIC** = Gas group (acetylene, hydrogen)
**IIIC** = Conduictive 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

## 7 INSTALLATION POSITION

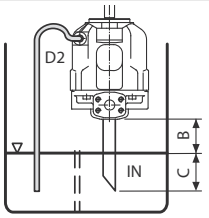



The pump is supplyed whit drain D2 open, and D1 plugged.
Before installation fill the pump with hydraulic oil for at least 3/4 of its volume, keeping it in horizontal position.
With exception of pump mounted below the oil level, we recomend to interpose a baffle plate between inlet and drain line.

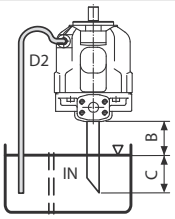
**VERTICAL INSTALLATION**




**INSIDE THE TANK**
Minimum oil level equal or above the pump mounting surface.
A ≥ 200mm

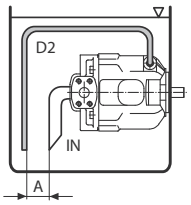



**INSIDE THE TANK**
Minimum oil level below the pump mounting surface.
Minimum inlet pressure = 0,8 bar absolute
B ≤ 800mm, C= 200mm

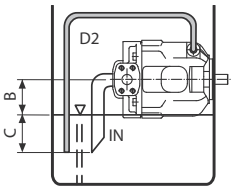



**OUTSIDE THE TANK,**
**above oil level**
Minimum inlet pressure = 0,8 bar absolute
B ≤ 800mm, C= 200mm

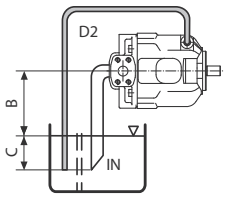
**HORIZONTAL INSTALLATION**



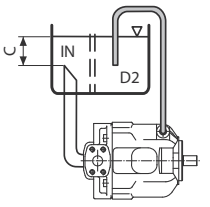

**INSIDE THE TANK**
Minimum oil level equal or above the pump mounting surface.
A ≥ 200mm




**INSIDE THE TANK**
Minimum oil level below the pump mounting surface.
Minimum inlet pressure = 0,8 bar (absolute)
B ≤ 800mm, C= 200mm




**OUTSIDE THE TANK,**
**above oil level**
Minimum inlet pressure = 0,8 bar (absolute)
B ≤ 800mm, C= 200mm




**OUTSIDE THE TANK,**
**below oil level**
C= 200mm

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

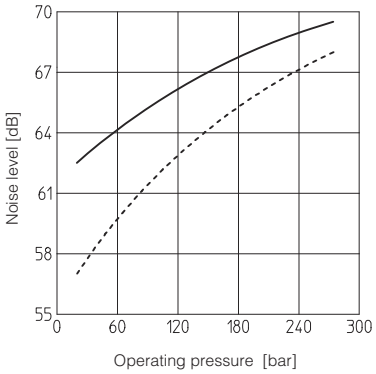
## 8 DIAGRAMS at 1450 rpm (based on mineral oil ISO VG 46 at 50°C)

### 8.1 Noise level curves

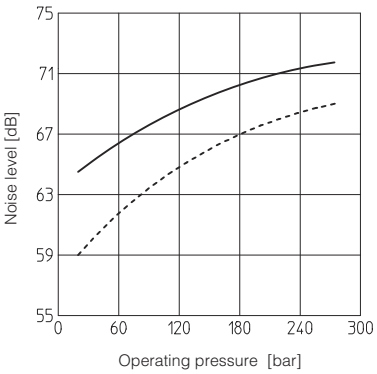
Ambient noise levels measured in compliance with ISO 4412-1 oleohydraulics -Test procedure to define the ambient noise level - Pumps
Shaft speed: 1450 rpm.

—— = Qmax ------ = Qmin

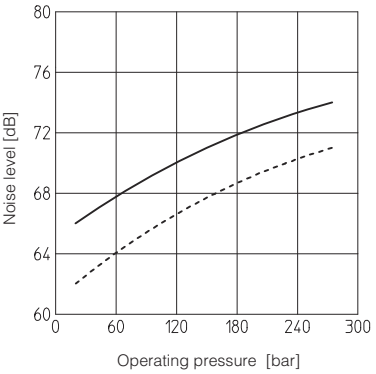
**PVPCA-*-3029**




**PVPCA-*-4046**



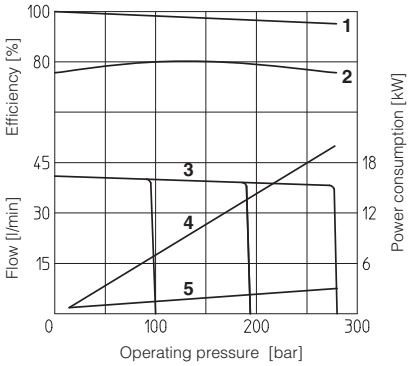

**PVPCA-*-5073 and PVPCA-*-5090**



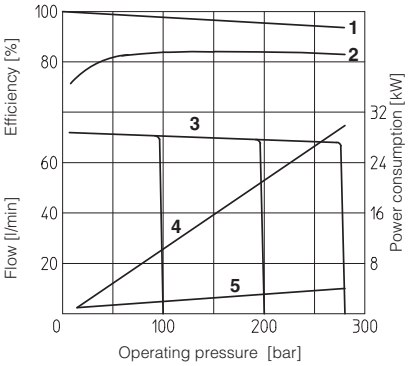

### 8.2 Operating limits

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

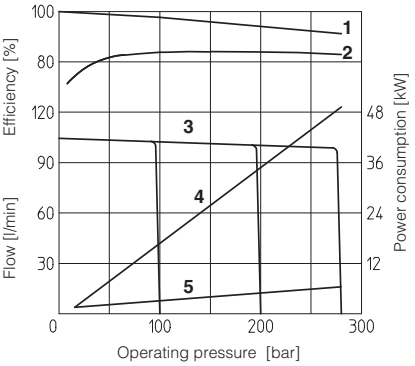
**PVPCA-*-3029**




**PVPCA-*-4046**



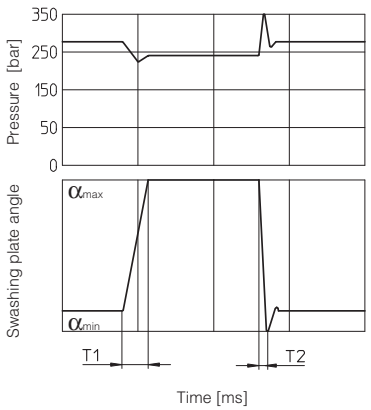

**PVPCA-*-5073**



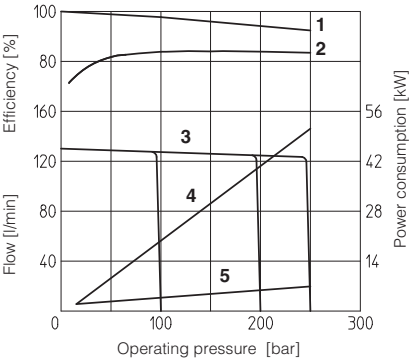

### 8.3 Response times

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

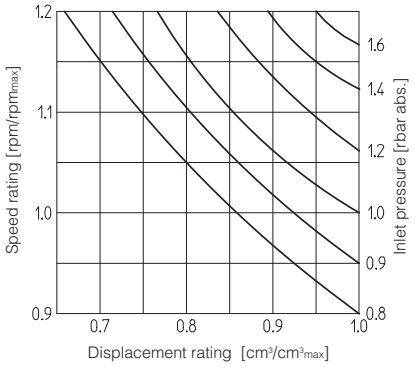
| **Pump type** | **T1** (ms) | **T2** (ms) |
|---|---|---|
| PVPCA-*-3029 | 31 | 19 |
| PVPCA-*-4046 | 44 | 20 |
| PVPCA-*-5073 | 50 | 25 |
| PVPCA-*-5090 | 53 | 28 |

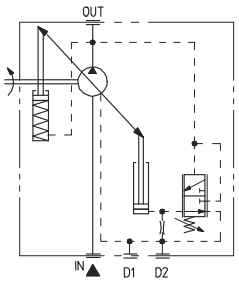



**PVPCA-*-5090**




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

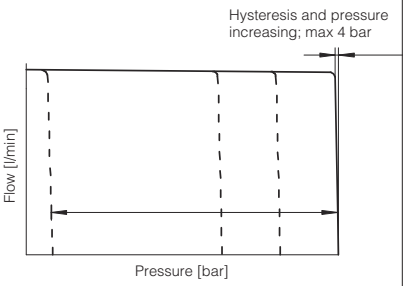


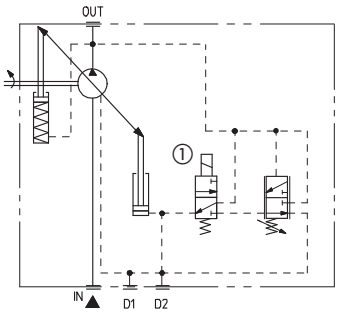



**C**

**Manual pressure compensator**

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.
Compensator setting range: 20 ÷ 350 bar (315 bar for 090)
Compensator standard setting: 280 bar (250 bar for 090)



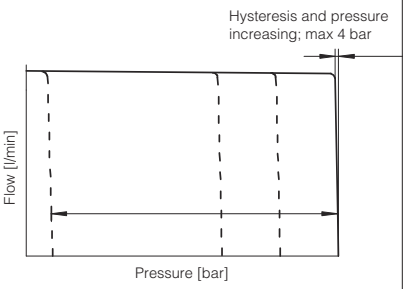



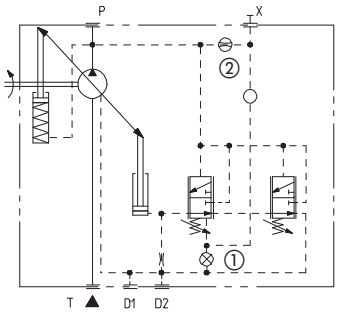

① solenoid venting valve

**CH**

**Manual pressure compensator with venting**

As C plus 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 5
Venting valve OFF = null displacement
Venting valve ON = max displacement
Compensator setting range: 20 ÷ 350 bar (315 bar for 090)
Compensator standard setting: 280 bar (250 bar for 090)

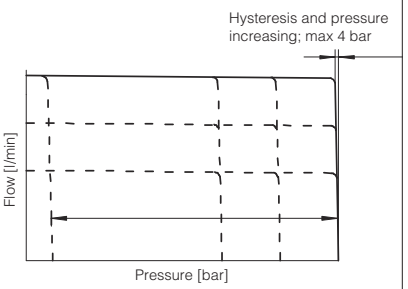


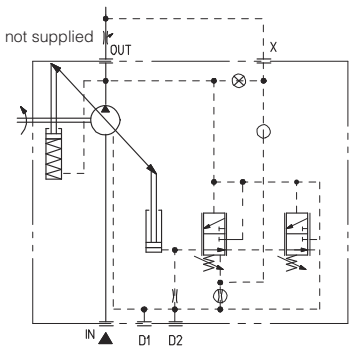




**R**

**Remote pressure compensator**

As C, but with remote setting of the compensator by means of a pressure relief valve on the piloting line X.
This version can be obtained from version L using a blind plug UNI 5923 M4x12 in pos. ① and a restrictor M4 drilled ø 0,75 mm in pos. ②.
Compensator setting range: 20 ÷ 350 bar (315 bar for 090)
Compensator standard setting: 280 bar (250 bar for 090)

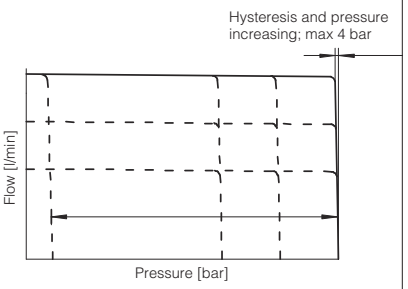


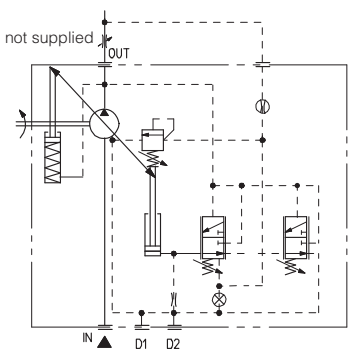




**L**

**Load sensing**

The pump displacement is automatically adjusted to maintain a constant (load indipendent) 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 (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

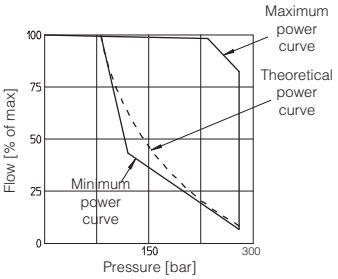



**LW**

**Constant power**

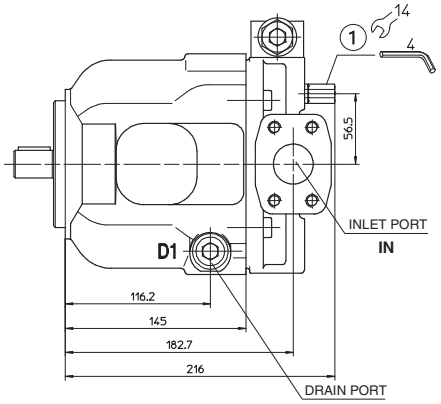
In order to achieve a constant drive torque with varying operating pressure. The swashing angle and therefore the outlet flow is varied so that the product of flow and pressure remains constant.
For the best regulation, minimum working pressure is 80 bar.
While selecting LW control, the required value of power must be communicated with the order (ex. 10 kW at 1450 rpm).

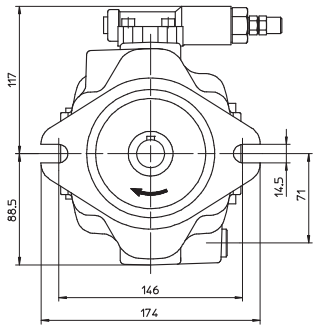


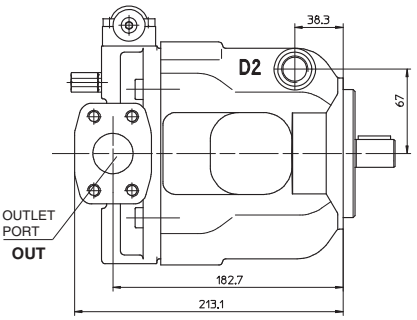
## 10 DIMENSIONS OF PVPCA-*-3029: BASIC VERSION "C" CONTROL

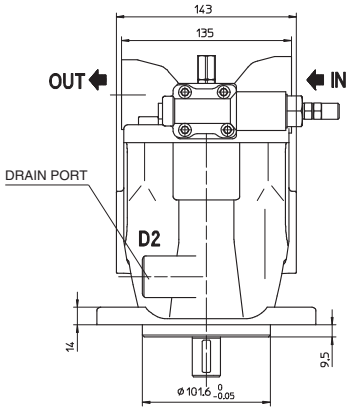
**PORTS DIMENSION**

**IN** = Flange SAE 3000 1 1/4"
**OUT** = Flange SAE 6000 3/4"
**D1, D2** = 1/2" BSPP
① = Regulation screw for max displacement 1,5 cm³/rev per turn. Adjustable range 20 to 29 cm³/rev.
In case of double pump the regulation screw is not always available, please contact our technical office.



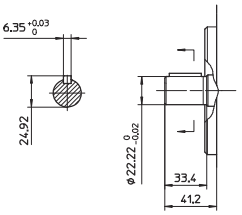



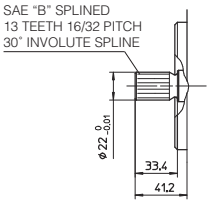




**Mass**: 18 kg

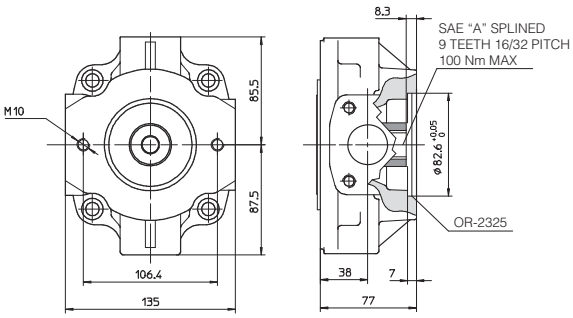
**SHAFT TYPE "1"**



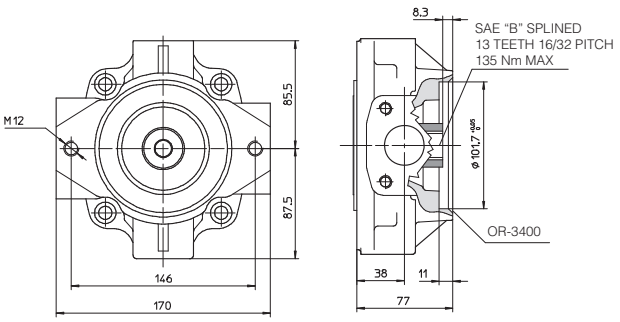

**SHAFT TYPE "5"**




**INTERMEDIATE FLANGE SAE "A" FOR PFEA-31**




**INTERMEDIATE FLANGE SAE "B" FOR PFEA-41**

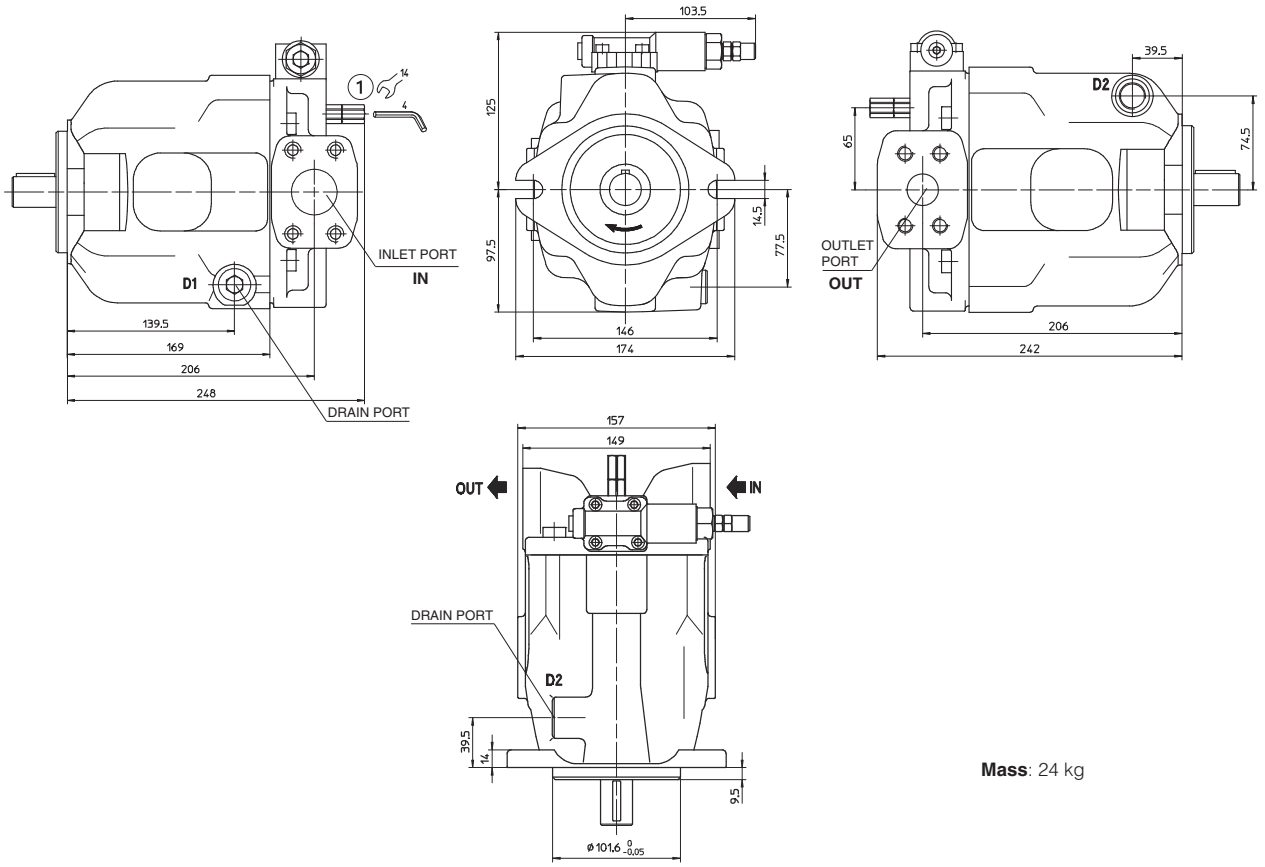



Drawing shows pumps with clockwise rotation (option D): pumps with counterclockwise rotation (option S) will have inlet and outlet ports inverted

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

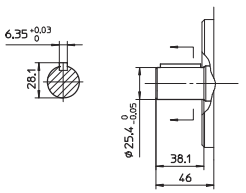
**PORTS DIMENSION**

**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 cm³/rev per turn. Adjustable range 31,8 to 46 cm³/rev.
In case of double pump the regulation screw is not always available, please contact our technical office.

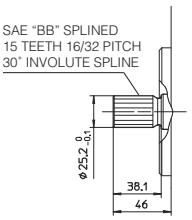



**Mass**: 24 kg

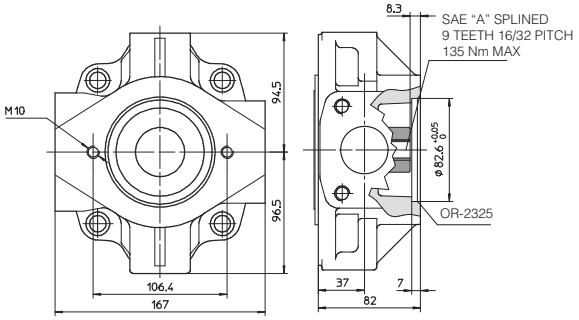
**SHAFT TYPE "1"**



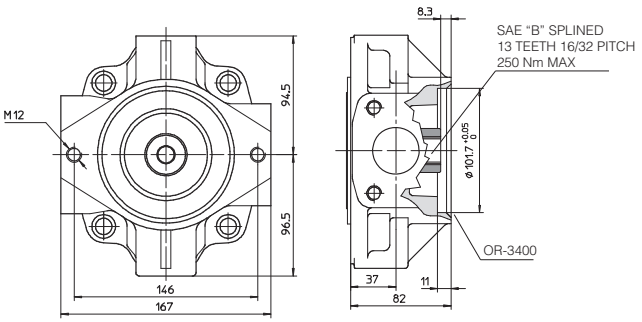

**SHAFT TYPE "5"**




**INTERMEDIATE FLANGE SAE "A" FOR PFEA-31**

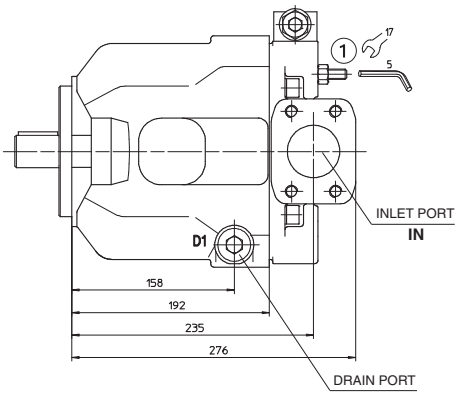


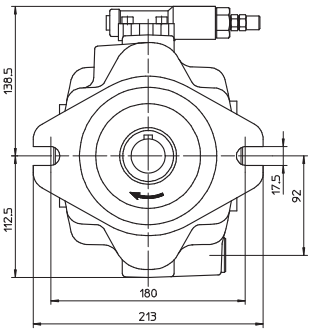

**INTERMEDIATE FLANGE SAE "B" FOR PFEA-41**

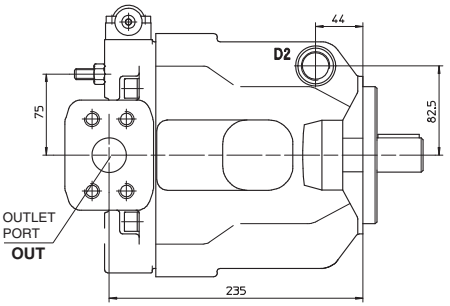



Drawing shows pumps with clockwise rotation (option D): pumps with counterclockwise rotation (option S) will have inlet and outlet ports inverted

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

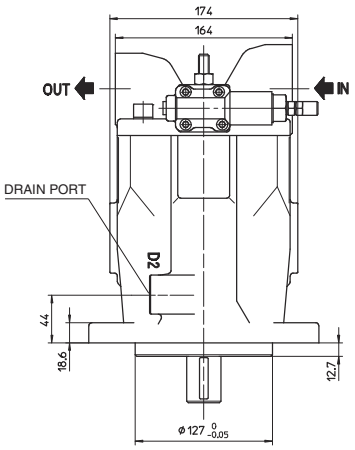


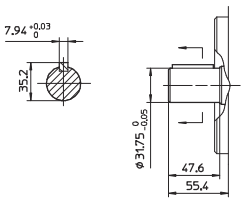

**PORTS DIMENSION**

IN = Flange SAE 3000 2"
OUT = Flange SAE 6000 1 1/4"
D1, D2 = 3/4" BSPP
① = Regulation screw for max displacement
3,2 cm³/rev per turn.
Adjustable range :
PVPC-5073 = 36,8 to 46 cm³/rev
PVPC-5073 = 44 to 88 cm³/rev.
In case of double pump the regulation screw is not always available, please contact our technical office.

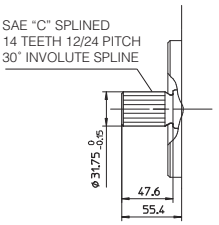



**Mass**: 33 kg

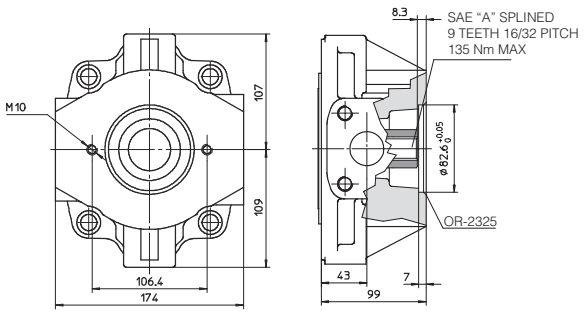
**SHAFT TYPE "1"**



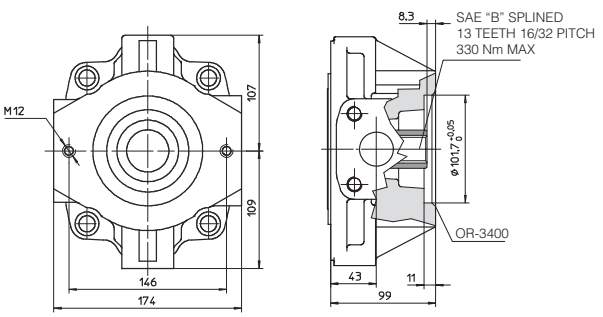

**SHAFT TYPE "5"**



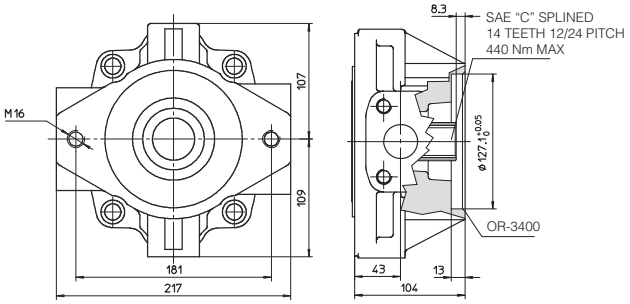

**INTERMEDIATE FLANGE SAE "A" FOR PFEA-31**




**INTERMEDIATE FLANGE SAE "B" FOR PFEA-41**



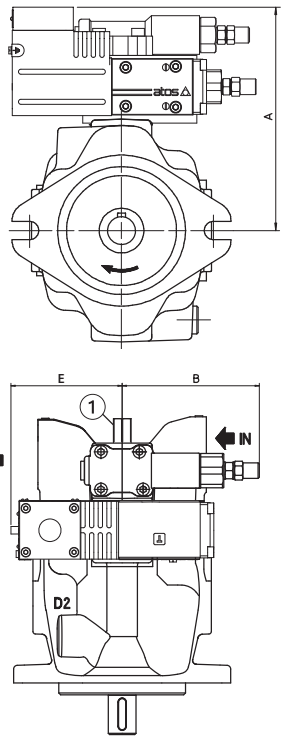

**INTERMEDIATE FLANGE SAE "C" FOR PFEA-51**



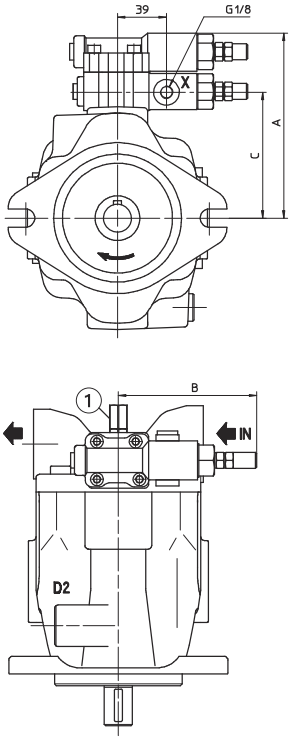

Drawing show pumps with clockwise rotation (option D): pumps with counterclockwise rotation (option S) will have inlet and outlet ports inverted

## 13 DIMENSIONS OF PVPCA: OTHER CONTROLS

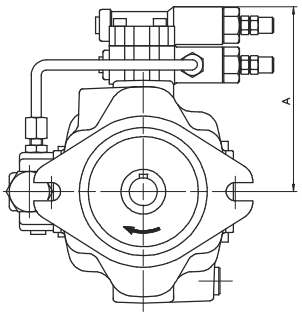
**VERSION CH**

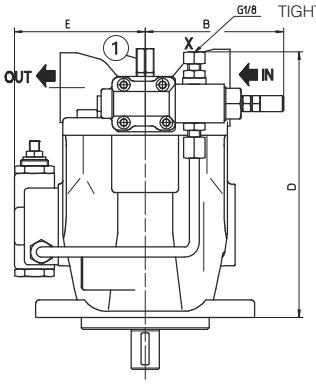



**VERSIONS L, R**




**VERSION LW**




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 PVPCA-*-5090 | **CH** | 166 | 111 | - | - | 92 | 36,9 |
| | **L -R** | 166 | 111 | 122 | - | - | 34,2 |
| | **LW** | 166 | 111 | - | 258 | 120 | 35 |

## 14 RELATED DOCUMENTATION

| | |
|---|---|
| **X010** | Basics for electrohydraulics in hazardous environments |
| **X020** | Summary of Atos ex-proof components certified to ATEX, IECEx, EAC, PESO |
| **AX900** | Operating and maintenance information for ex-proof pumps |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**Архангельск** (8182)63-90-72
**Астрахань** (8512)99-46-04
**Барнаул** (3852)73-04-60
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