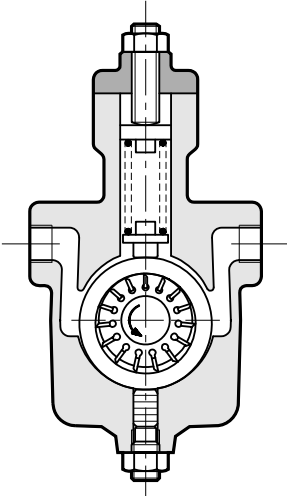


PVE

VARIABLE DISPLACEMENT VANE PUMPS WITH DIRECT PRESSURE ADJUSTMENT

SERIES 30

OPERATING PRINCIPLE



- The PVE pumps are variable displacement vane pumps with direct pressure regulator.
- The pump group is complete with hydrostatic axial compensation distribution plates that improve the volumetric efficiency and reduce wear of the components.
- The pressure regulator adjustable load spring keeps the pump group cam ring in eccentric position.

When the delivery pressure equals the pressure corresponding to the spring setting, the cam ring is moved so to reduce the displacement, adjusting the flow rate to the values required by the plant.

In zero flow demand conditions, the pump delivers oil only to compensate any possible bleedings, keeping the circuit pressure constant.

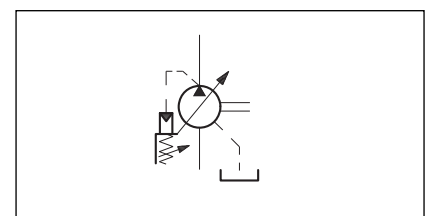
- The PVE pumps are available in four dimensions with maximum displacement from 6,6 to 22,2 cm³/rev and with pressure regulator max setting values up to 35 bar and 70 bar (standard).

TECHNICAL SPECIFICATIONS

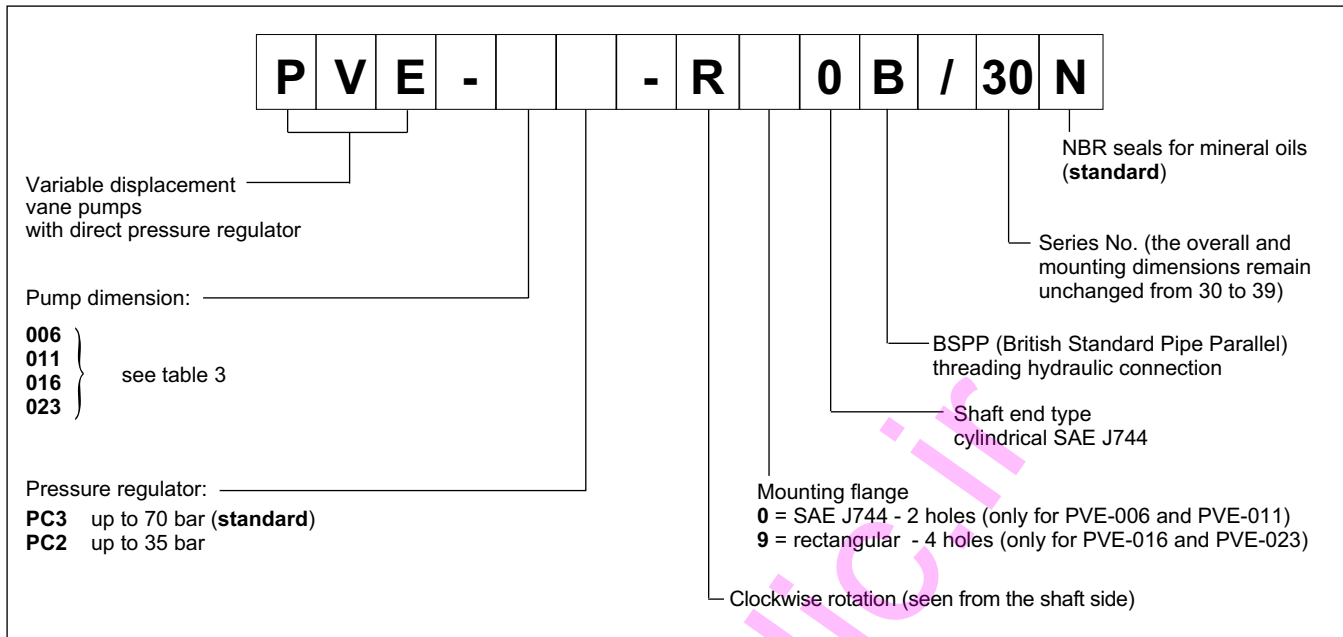
| PUMP SIZE | | 006 | 011 | 016 | 023 |
|--|----------------------|--|------|------------------------------|------|
| Displacement | cm ³ /rev | 6,6 | 11,1 | 16,6 | 22,2 |
| Flow rate (at 1.500 rpm and with 3.5 bar delivery pressure) | l/min | 10,0 | 16,7 | 25,0 | 33,3 |
| Operating pressure | bar | 70 | | | |
| Rotation speed | rpm | min 800 - max 1800 | | | |
| Rotation direction | | clockwise (seen from the shaft side) | | | |
| Shaft loads | N | radial and axial loads are not allowed | | | |
| Hydraulic connection | | BSPP (parallel) threading fittings | | | |
| Type of mounting | | SAE flange J744 - 2 holes | | rectangular flange - 4 holes | |
| Mass | kg | 5 | 6 | 9 | 9 |

| | | |
|----------------------------|-----|-------------------|
| Ambient temperature range | °C | -20 / +50 |
| Fluid temperature range | °C | -10 / +70 |
| Fluid viscosity range | | see paragraph 2.2 |
| Fluid contamination degree | | see paragraph 2.3 |
| Recommended viscosity | cSt | 25 ÷ 50 |

HYDRAULIC SYMBOL



1 - IDENTIFICATION CODE



2 - HYDRAULIC FLUID

2.1 - Fluid type

Use only HL and HLP mineral oil based hydraulic fluids according to ISO 6743/4.

2.2 - Fluid viscosity

The operating fluid viscosity must be within the following range:

| | | |
|-------------------|-------------|--|
| minimum viscosity | 16 cSt | referred to the maximum drainage fluid temperature of 70 °C. |
| optimum viscosity | 25 ÷ 50 cSt | referred to the fluid working temperature in the tank. |
| maximum viscosity | 800 cSt | limited to only the start-up phase of the pump. |

When selecting the fluid type, be sure that the true viscosity is within the range specified above at the operating temperature.

2.3 - Degree of fluid contamination

The maximum degree of fluid contamination must be according to ISO 4406:1999 class 20/18/15; therefore, use of a filter with $\beta_{20} \geq 75$ is recommended. A degree of maximum fluid contamination according to ISO 4406:1999 class 18/16/13 is recommended for optimum endurance of the pump. Hence, use of a filter with $\beta_{10} \geq 100$ is recommended.

The filter must be equipped with a by-pass valve and, if possible, with a clogging indicator.

3 - PERFORMANCES (obtained with viscosity of 46 cSt at 40°C)

| PUMP | REGULATOR | DISPLACEMENT [cm ³ /rev] | MAX FLOW RATE [l/min] | | PRESSURE ADJUSTMENT RANGE [bar] | | ROTATION SPEED [rpm] | |
|---------|------------|--|--------------------------|------------|---------------------------------------|----------|-------------------------|----------|
| | | | 1500 rev | 1800 rev | min | max | min | max |
| | | | PVE-006 | PC2 PC3 | 6,6 | 10 | 12 | 15 50 |
| PVE-011 | PC2 PC3 | 11,1 | 16,7 | 20 | 15 50 | 35 70 | | |
| PVE-016 | PC2 PC3 | 16,6 | 25 | 30 | 15 50 | 35 70 | | |
| PVE-023 | PC2 PC3 | 22,2 | 33,3 | 40 | 15 50 | 35 70 | | |

NOTE: Flow rate values are obtained with delivery pressure = 3.5 bar

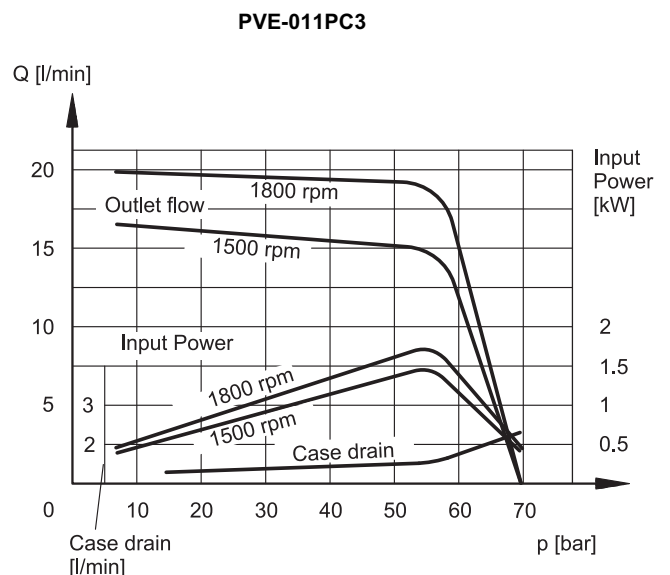
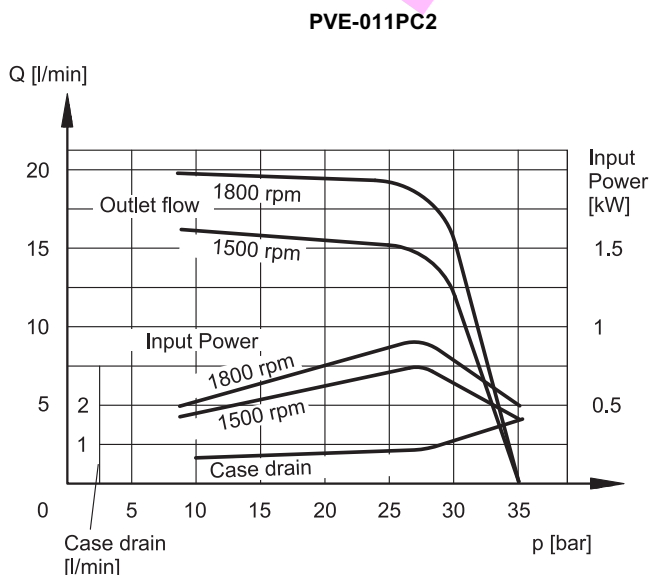
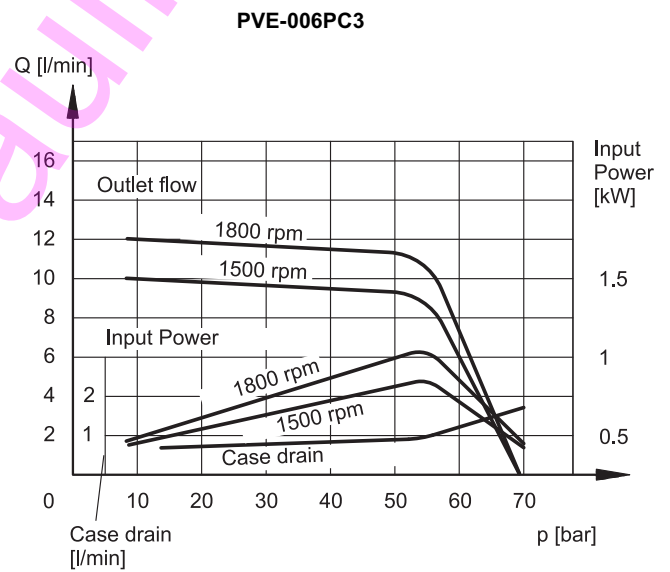
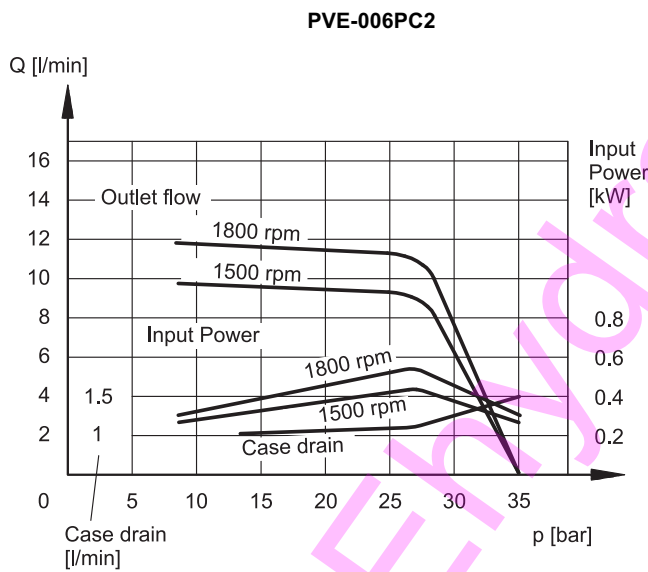
4 - NOISE LEVEL

| PUMP | NOISE LEVEL [dB (A)] | |
|---------|----------------------|-------------------|
| | null displacement | full displacement |
| PVE-006 | 61 | 63 |
| PVE-011 | 62 | 65 |
| PVE-016 | 64 | 68 |
| PVE-023 | 64 | 70 |

The noise pressure levels were measured in a semi-anechoic room, at an axial distance of 1 m from the pump. The values shown must be reduced by 5 dB(A) if they are to be considered in a completely anechoic room.

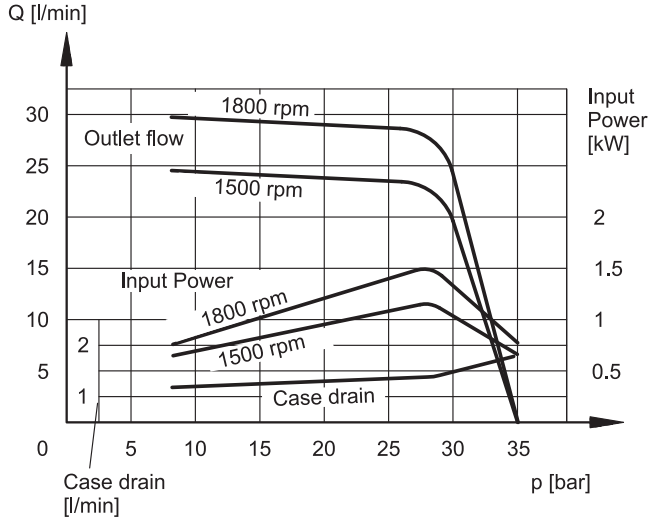
5 - CHARACTERISTIC CURVES (values obtained with mineral oil with viscosity of 46 cSt at 40°C)

The diagram curves were measured with a pump rotation speed of 1500 and 1800 rev/min.

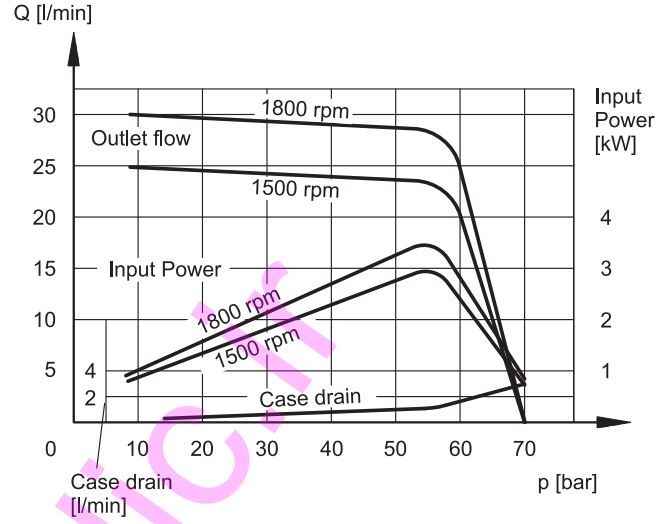




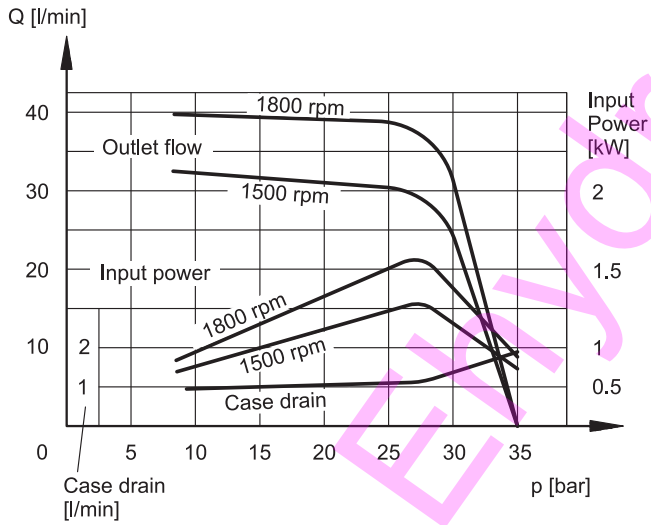
PVE-016PC2



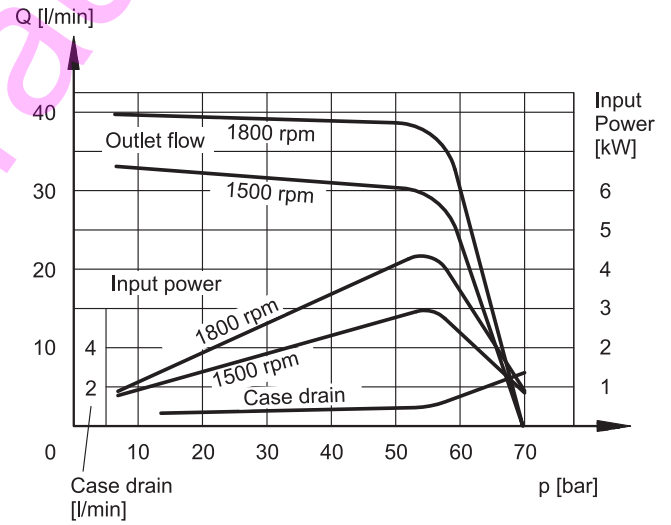
PVE-016PC3



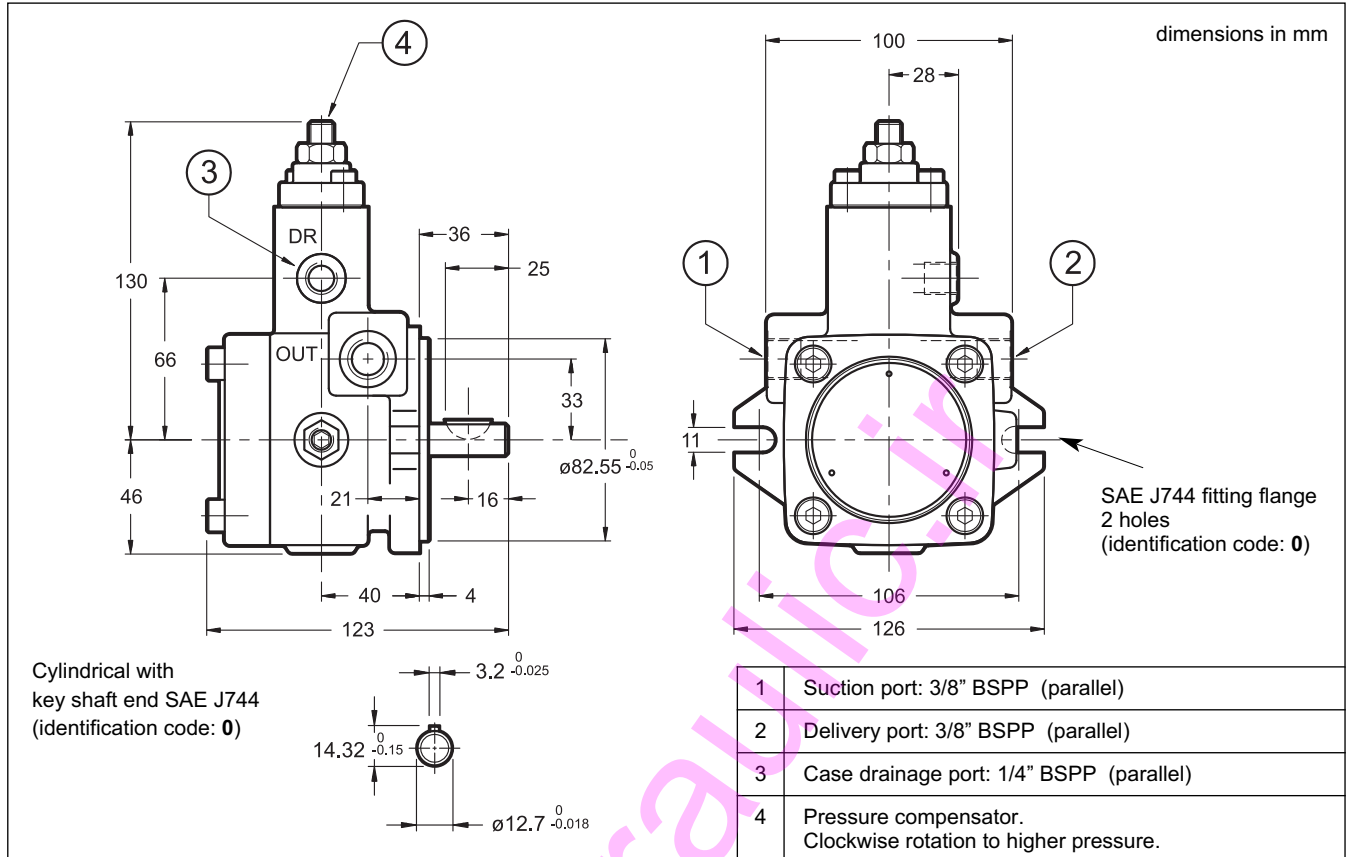
PVE-023PC2



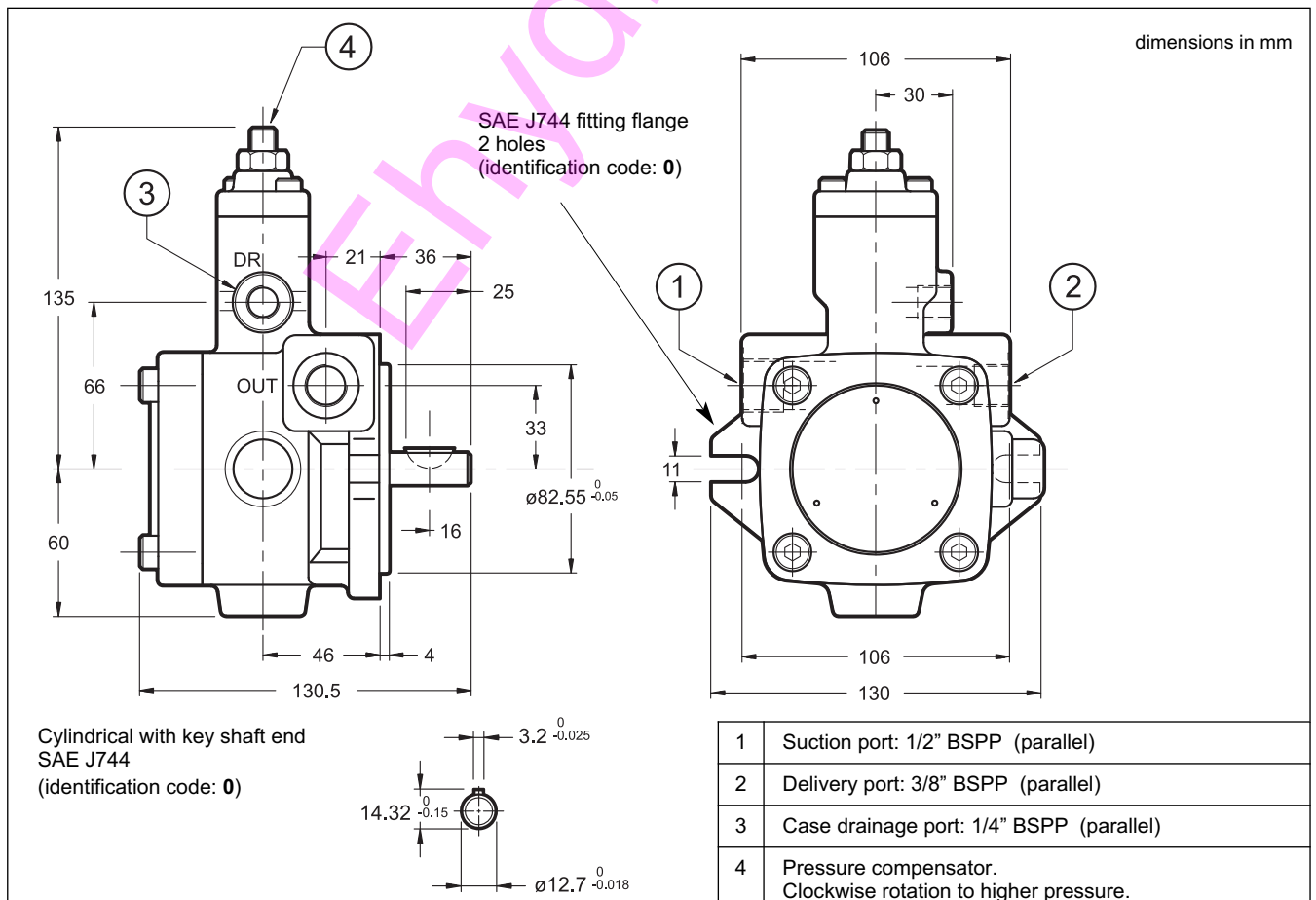
PVE-023PC3



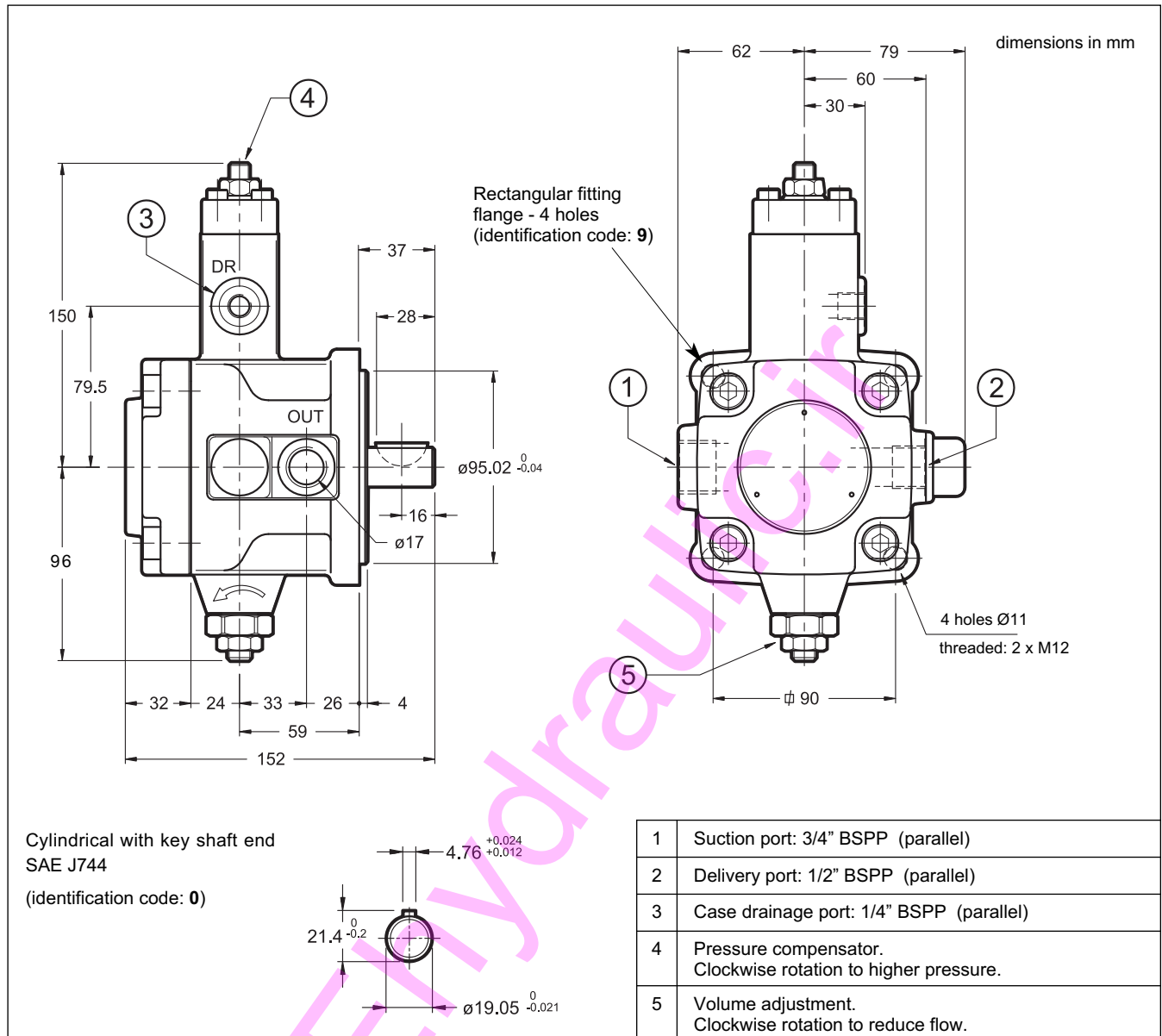
6 - OVERALL AND MOUNTING DIMENSIONS PVE-006



7 - OVERALL AND MOUNTING DIMENSIONS PVE-011



8 - OVERALL AND MOUNTING DIMENSIONS PVE-016 AND PVE-023



9 - INSTALLATION

- The PVE pumps can be installed with the axis oriented in any position.
- The suction tube has to be suitably sized so that the suction pressure is never lower than -0.3 bar (relative). Bends or restrictions or an excessive tube length could further decrease the value of the suction pressure with a following increase in the noise emissions and a decrease in the pump lifetime.
- The drainage port must be connected directly to the tank by a line separate from other discharges, located far from the suction line and lengthened to below the minimum oil level so as to avoid formation of foam.
- **Before starting, the pump body has to be filled with the fluid.** The pump start up, especially at a cold temperature, should occur with the pump unloading. Start and stop motor several time in order to purge the air from pump and pipelines.
- The pumps are normally positioned directly above the oil tank. Flooded suction port installation of the pumps is advisable in the case of circuits with high flow rates and pressures.
- The drainage tube has to be sized so that the pressure inside the pump body is always lower than 0.3 bars (relative), even during the dynamic change and flow rate phases. The drainage tube has to unload inside the tank far from the suction area. We suggest to interpose a screen between the two lines.
- The motor-pump connection must be carried out directly with a flexible coupling. Couplings that generate axial or radial loads on the pump shaft are not allowed.

10 - MULTIPLE PUMPS

PVE-016 and PVE-023 pumps can be connected to external gear pumps (see available displacements in the table at par. 10.3). The possibility to couple two pumps makes possible to create multi-flow groups with independent hydraulic circuits.

10.1 - Maximum applicable torque

While sizing coupled pumps, consider that the shaft of the front pump must bear the torque generated by both pumps when they are loaded simultaneously.

NOTE: The maximum applicable torque at the shaft of the front pump is 62 Nm.

The input torque (M) for each pump is given by the following ratio:

$$M = \frac{9550 \cdot N}{n} = [\text{Nm}] \quad n = \text{rotation speed [rpm]}$$

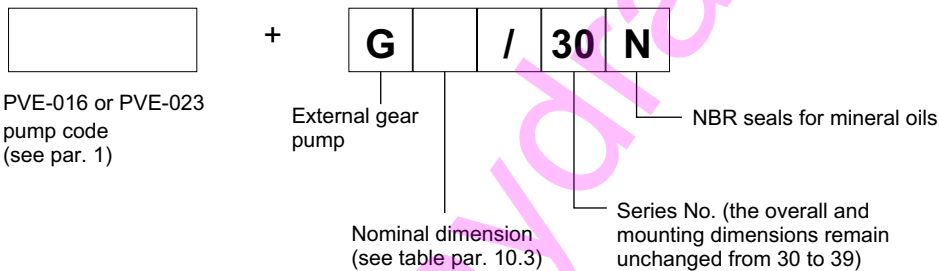
where the absorbed power (N) is given by:

$$N = \frac{Q \cdot \Delta p}{600 \cdot \eta_{\text{tot}}} = [\text{kW}]$$

Q = flow rate [l/min]
 Δp = differential pressure between the pump suction and delivery [bar]
 η_{tot} = total efficiency (coefficient = 0.8)

If the total of the obtained torques is higher than 62 Nm, it is necessary to reduce the working pressure / flow value of one or both the pumps until the total torque becomes lower than the maximum value indicated.

10.2 - Multiple pumps identification code



10.3 - Multiple pumps overall and mounting dimensions

