

# 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.

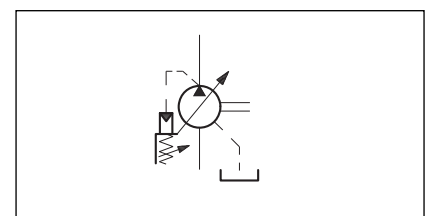
- The PVE pumps are available in four dimensions with maximum displacement from 6,6 to 22,2 cm<sup>3</sup>/rev and with pressure regulator max setting values up to 35 bar and 70 bar (standard).

### TECHNICAL SPECIFICATIONS

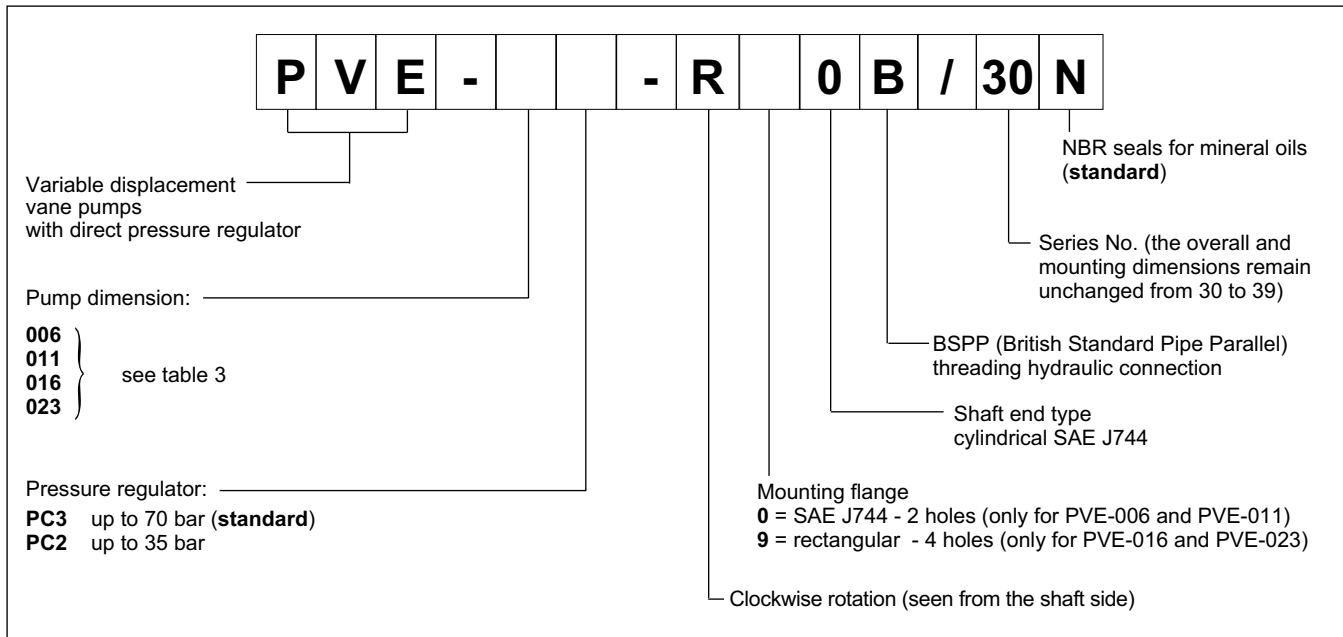
PUMP SIZE		006	011	016	023
Displacement	cm <sup>3</sup> /rev	6,6	11,1	16,6	22,2
Flow rate (at 1.500 rpm and with 3.5 bar delivery pressure)	l/min	10,0	16,7	25,0	33,3
Operating pressure	bar	70			
Rotation speed	rpm	min 800 - max 1800			
Rotation direction		clockwise (seen from the shaft side)			
Shaft 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 <sup>3</sup> /rev]	MAX FLOW RATE [l/min]		PRESSURE ADJUSTMENT RANGE [bar]		ROTATION SPEED [rpm]	
			1500 rev	1800 rev	min	max	min	max
PVE-006	PC2	6,6	10	12	15	35	800	1800
	PC3				50	70		
PVE-011	PC2	11,1	16,7	20	15	35		
	PC3				50	70		
PVE-016	PC2	16,6	25	30	15	35		
	PC3				50	70		
PVE-023	PC2	22,2	33,3	40	15	35		
	PC3				50	70		

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

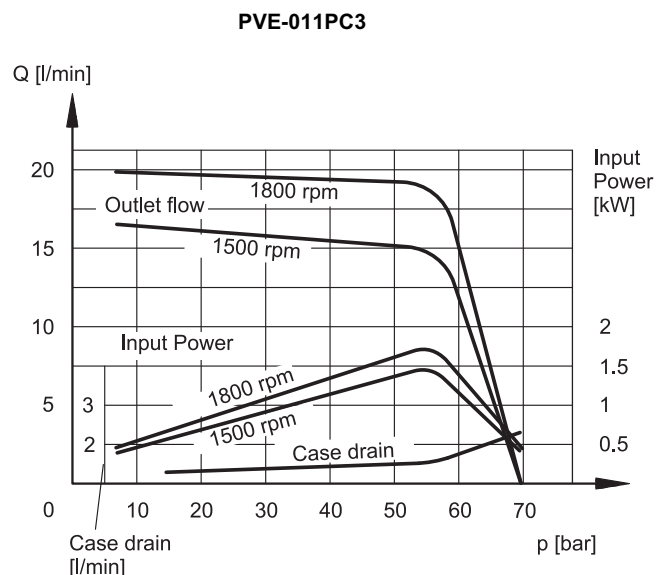
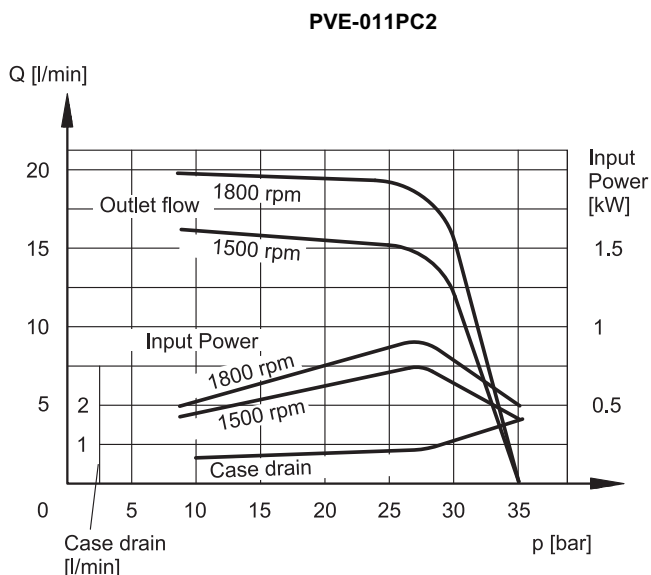
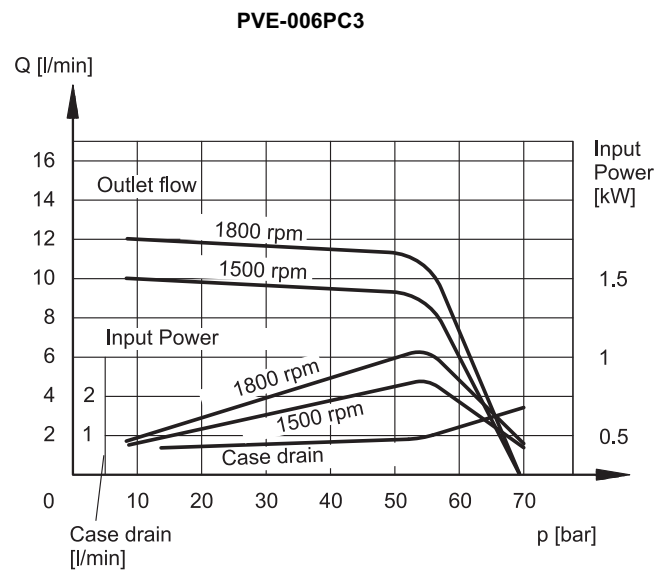
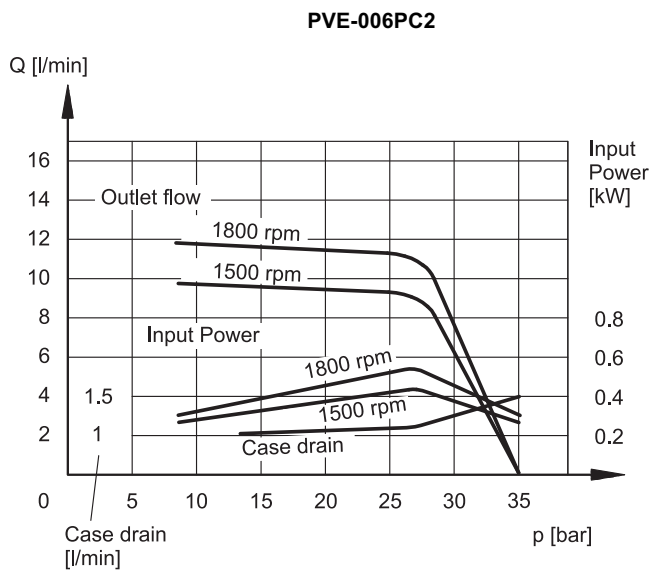
### 4 - NOISE LEVEL

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.

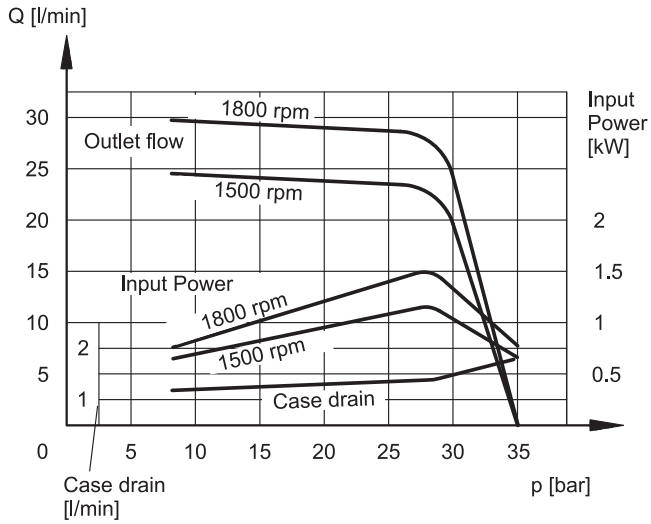
### 5 - CHARACTERISTIC CURVES (values obtained with mineral oil with viscosity of 46 cSt at 40°C)

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

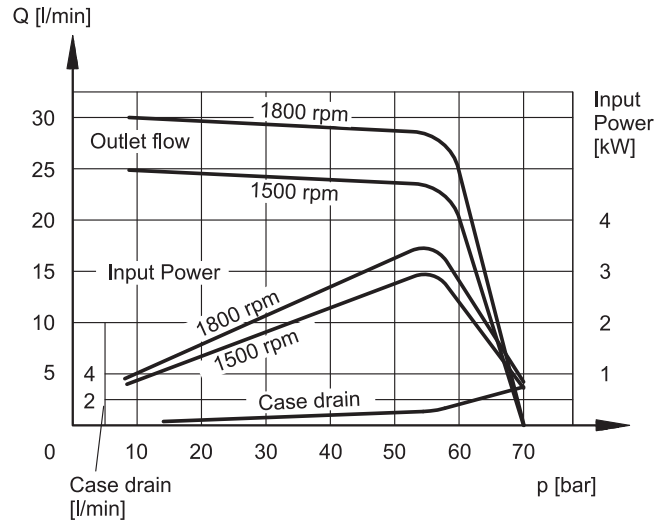




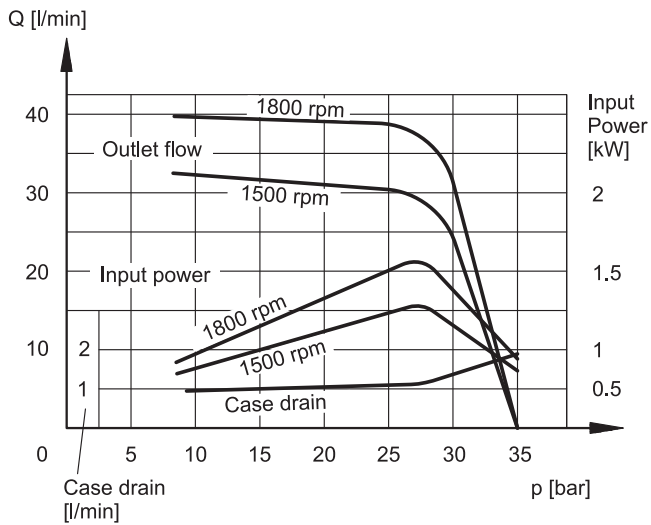
**PVE-016PC2**



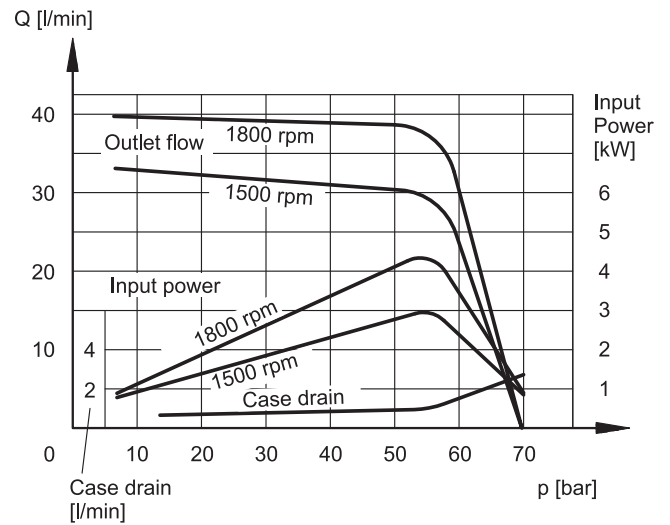
**PVE-016PC3**



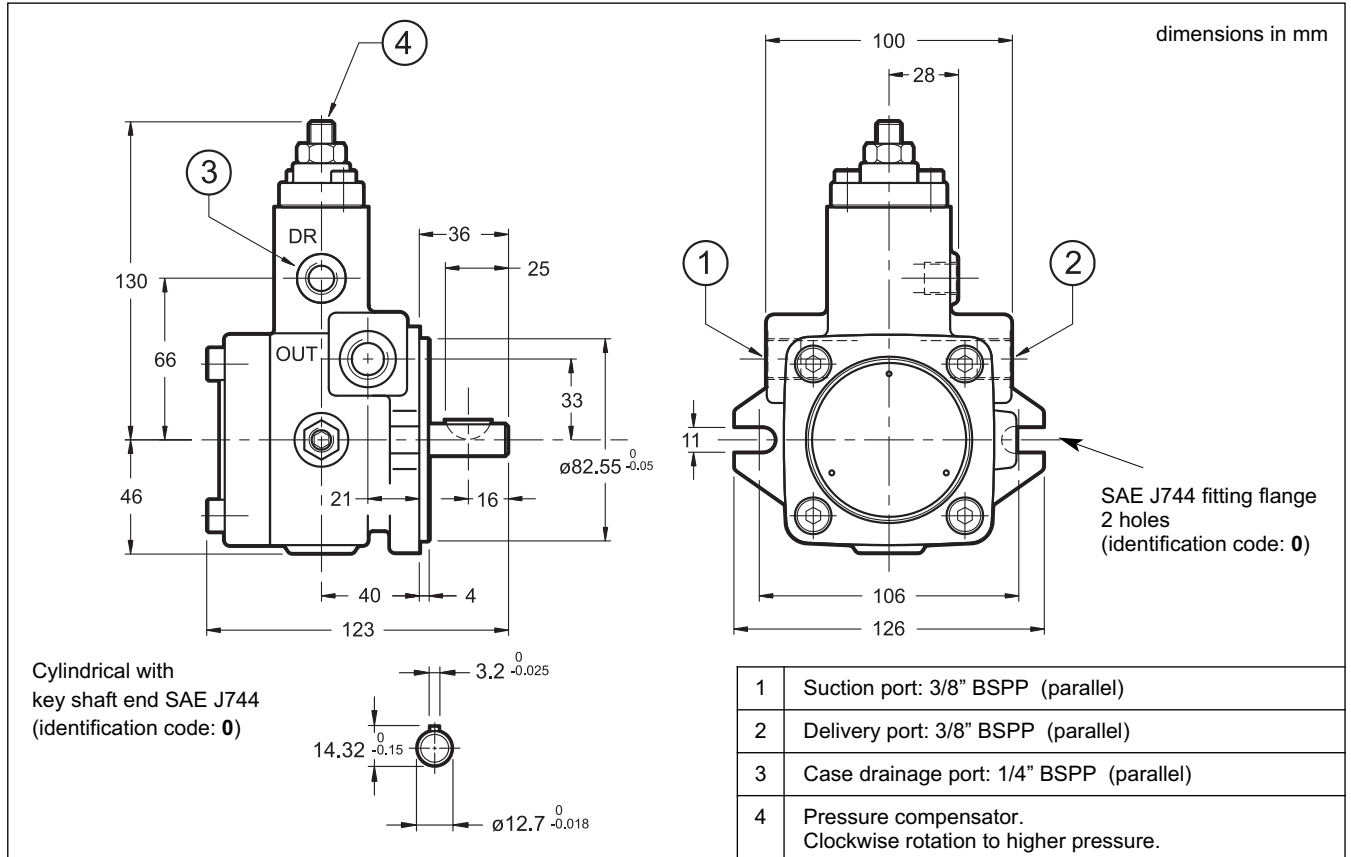
**PVE-023PC2**



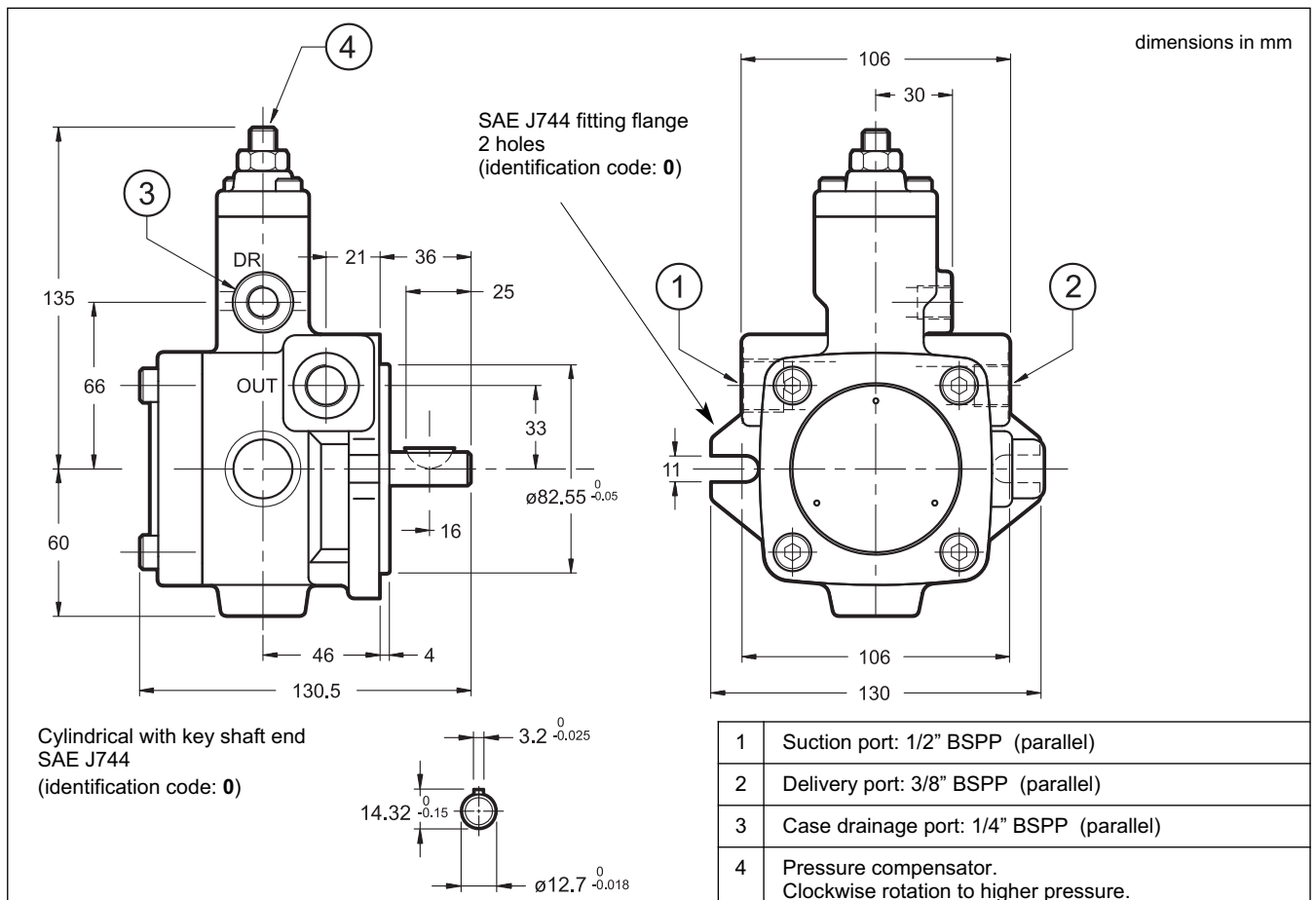
**PVE-023PC3**



### 6 - OVERALL AND MOUNTING DIMENSIONS PVE-006



### 7 - OVERALL AND MOUNTING DIMENSIONS PVE-011





## 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:

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

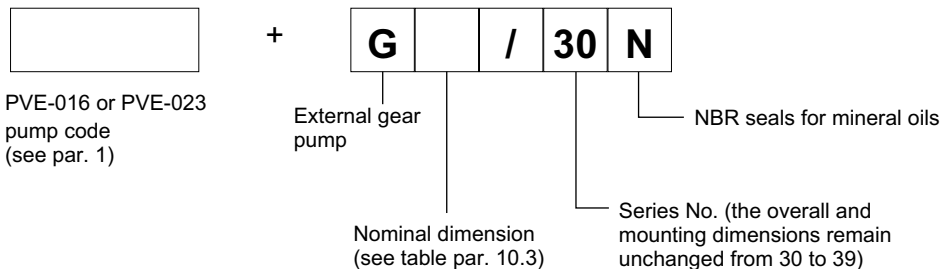
where the absorbed power (N) is given by:

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

$Q$  = flow rate [l/min]  
 $\Delta p$  = differential pressure between the pump suction and delivery [bar]  
 $\eta_{\text{tot}}$  = 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

dimensions in mm

Technical drawings showing dimensions in mm. The side view (left) shows a total width of 102.5 mm and a height of 60 mm. The front view (right) shows a total width of 106.5 mm and a height of 96 mm. Callouts 1-5 identify key features: 1 (Suction port), 2 (Delivery port), 3 (Case drainage port), 4 (Pressure compensator), and 5 (Volume adjustment). A detail drawing of the shaft end shows a diameter of  $\phi 19.05^{0}_{-0.021}$  mm and a key width of  $4.76^{+0.024}_{+0.012}$  mm.

Cylindrical with key shaft end  
SAE J744  
(identification code: 0)

**AVAILABLE GEAR PUMPS**

Nominal dimension	Displacement [cm <sup>3</sup> /rev]	Max working pressure [bar]	Peak pressure [bar]	Min speed [rev/min]
0020	2	210	250	900
0025	2.5			850
0030	3			800
0040	4			
0050	5			
0060	6			
0075	7.5	175	210	
0090	9			
0105	10.5			
0120	12			

Gear pump weight: 1.7 kg

1	Suction port: 3/4" BSPP (parallel)
2	Delivery port: 1/2" BSPP (parallel)
3	Case drainage port: 1/4" BSPP (parallel)
4	Pressure compensator. Clockwise rotation to higher pressure.
5	Volume adjustment. Clockwise rotation to reduce flow.