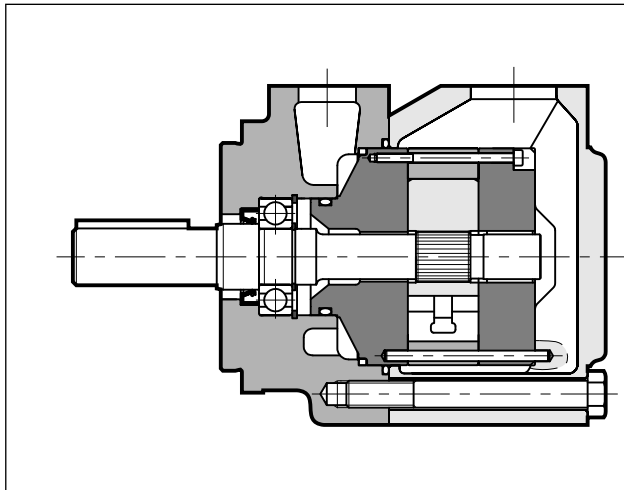




DFP

FIXED DISPLACEMENT VANE PUMPS SERIES 20

OPERATING PRINCIPLE



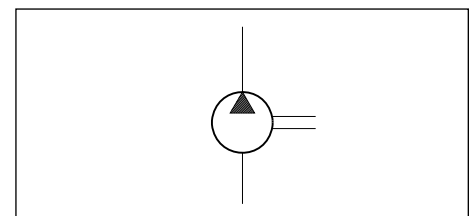
- The DFP pumps are fixed displacement vane pumps available in four sizes, each size having five nominal displacement. They are available with one pumping element (single pump) or with two pumping element (double pump).
- The pumping group consists of a compact cartridge that contains the rotor, the vanes, the cam ring and the head discs. The cartridge is easily removable without the need to disconnect the pump from the hydraulic circuit, thus simplifying the maintenance operations.
- The special elliptical profile of the cam ring with double opposing suction and delivery chambers eliminates the radial thrusts on the rotor, significantly reducing pump wear. The use of a 12-vane rotor reduces the pulsations in the delivery, limiting the vibrations and noise level of the pump.

TECHNICAL SPECIFICATIONS

| PUMP SIZE | | 1 | 2 | 3 | 4 |
|-------------------------------|----------------------|---|---------------|-------------|---------------|
| Displacement range | cm ³ /rev | 18 ÷ 45,9 | 40,1 ÷ 67,5 | 69 ÷ 121,6 | 138,6 ÷ 193,4 |
| Flow rate range (at 1500 rpm) | l/min | 26,1 ÷ 69,6 | 101,4 ÷ 177,3 | 49,6 ÷ 97,3 | 203,4 ÷ 285 |
| Operating pressures | bar | 140 ÷ 210 | 175 | 175 | 175 |
| Rotation speed | rpm | 600 ÷ 1800 | | | |
| Rotation direction | | clockwise or counterclockwise | | | |
| Loads on the shaft | | axial loads are not allowed | | | |
| Hydraulic connections | | SAE J518 c fittings, flanged (see par. 9) | | | |
| Mounting flange type | | SAE J744 | | | |
| Mass (single pump) | kg | 12 | 15 | 23 | 34 |

| | | |
|-------------------------------|-----|---------------|
| Ambient temperature range | °C | -20 / +50 |
| Fluid temperature range | °C | -10 / +70 |
| Fluid viscosity range | | see point 4.2 |
| Degree of fluid contamination | | see point 4.3 |
| Recommended viscosity | cSt | 13 ÷ 54 |

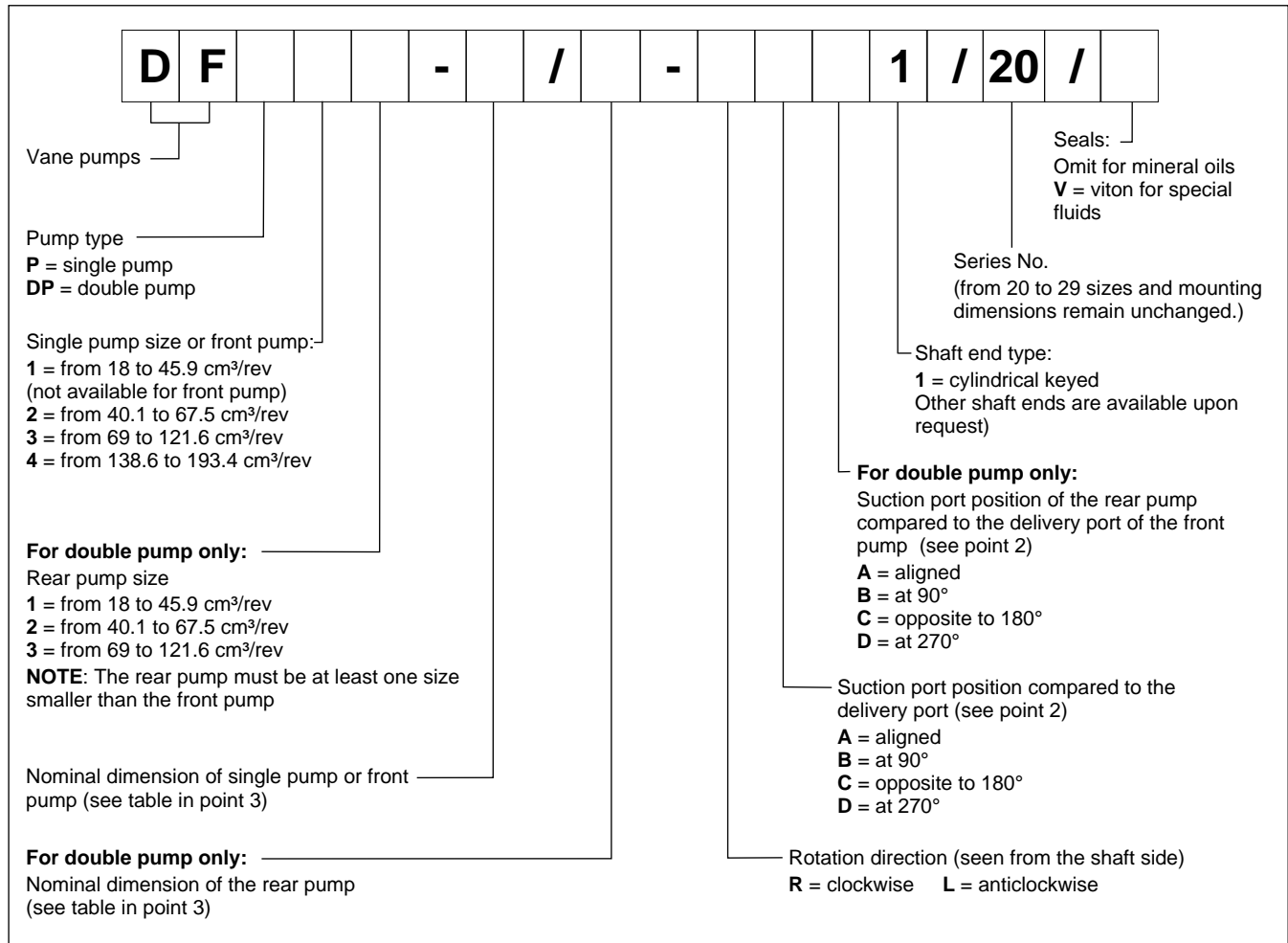
HYDRAULIC SYMBOL



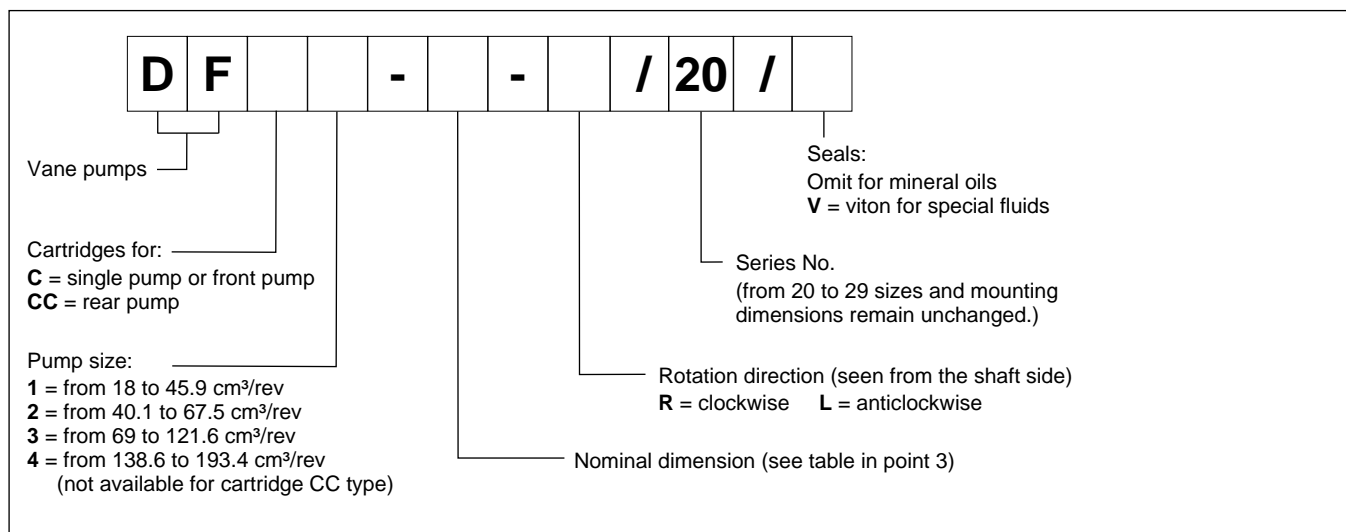


1 - IDENTIFICATION CODE

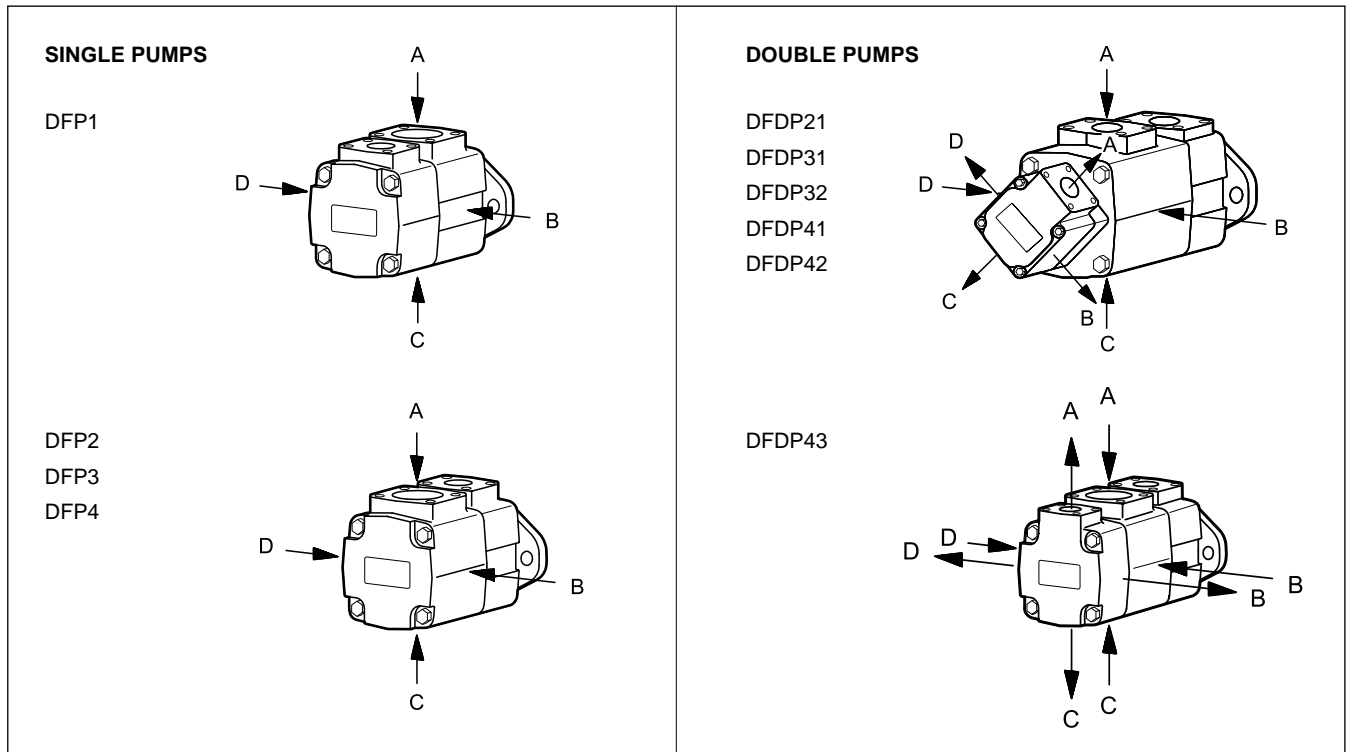
1.1 - Single pump and double pump



1.2 - Cartridges



2 - PORTS POSITIONS



3 - PERFORMANCES

(obtained with mineral oil with viscosity 25 cSt at 45 °C)

| PUMP SIZE | NOMINAL DIMENSION | GEOMETRIC DISPLACEMENT [cm ³ /giro] | NOMINAL FLOW RATE. (at 1500 rpm) [l/min] | MAX PRESSURE (NOTE) [bar] | ROTATION SPEED (see also point 5) [rpm] | |
|-----------|-------------------|---|--|---------------------------------|---|-----|
| | | | | | max | min |
| DPF1 | 05 | 18 | 26.1 | 210 | 1800 | 600 |
| | 08 | 27.4 | 39.4 | | | |
| | 11 | 36.4 | 52.6 | | | |
| | 12 | 39.5 | 58.7 | 160 | | |
| | 14 | 45.9 | 69.6 | 140 | | |
| DFP2 | 12 | 40.1 | 58.8 | 175 | 1800 | 600 |
| | 14 | 45.4 | 65.7 | | | |
| | 17 | 55.2 | 80.2 | | | |
| | 19 | 60.1 | 88.7 | | | |
| | 21 | 67.5 | 99.8 | | | |
| DFP3 | 21 | 69 | 101.4 | 175 | 1800 | 600 |
| | 25 | 81.6 | 120.1 | | | |
| | 30 | 97.7 | 121.4 | | | |
| | 35 | 112.7 | 167.2 | | | |
| | 38 | 121.6 | 177.3 | | | |
| DFP4 | 42 | 138.6 | 203.4 | 175 | 1800 | 600 |
| | 47 | 153.5 | 222.7 | | | |
| | 50 | 162.2 | 234 | | | |
| | 57 | 183.4 | 267 | | | |
| | 60 | 193.4 | 185 | | | |

NOTE: A pressure peak of + 10% is allowed for a time not exceeding 0.5 seconds, if temperature and filtration conditions are optimal)

4 - HYDRAULIC FLUID

4.1 - Fluid type

The maximum suction pressure allowed, with all fluid types, is 1,4 bar. The minimum suction pressure varies from -0,17 bar with mineral oil to -0,1 bar with other fluid types (the pressure values are to be considered relative)..

Pressures, maximum allowed speeds and recommended temperatures are shown in the table according to the hydraulic fluids types.

| FLUID TYPES | p max [bar] | max speed [rpm] | working temperature [°C] |
|--|-----------------|-----------------|--------------------------|
| HFC (NOTE 1) (water-glycol solutions) | 160 (NOTE 2) | 1500 | +15 / +50 |

NOTE 1: Water-glycol solutions are not compatible with Viton seals. The pumps are tested with mineral oil. Provide an adequate cleaning cycle.

NOTE 2: The max allowed pressure is 140 bar for DFP1-14.

4.2 - Fluid viscosity

The operating fluid viscosity must be within the following range:

| | | |
|-------------------|-------------|---|
| minimum viscosity | 13 cSt | referred to the maximum temperature of 70 °C of the fluid |
| optimum viscosity | 13 ÷ 54 cSt | referred to the operating temperature of the fluid in the tank +30 / +60 °C |
| maximum viscosity | 860 cSt | limited to only the pump start-up phase |

When choosing the fluid type, verify that the true viscosity at the operating temperature is within the above range.

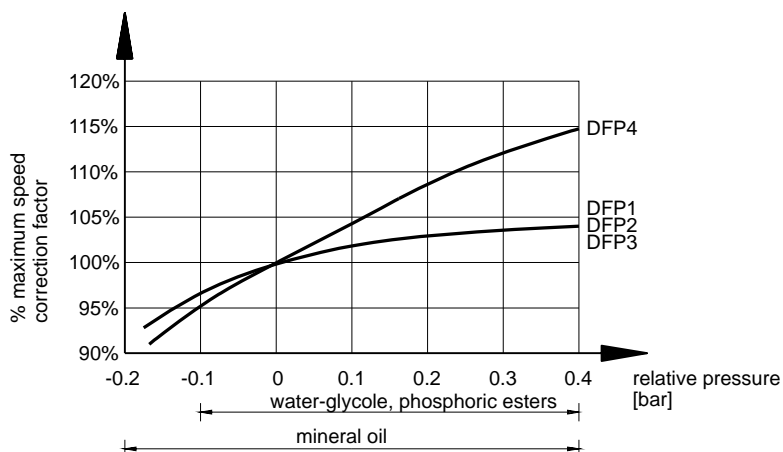
4.3 - Degree of fluid contamination

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.

If there is a filter installed on the suction line, be sure that the pressure at the pump inlet is not lower than the values specified at point 4.1. The suction filter must be equipped with a by-pass valve and, if possible, with a clogging indicator.

5 - MAXIMUM SPEED CORRECTION FACTOR

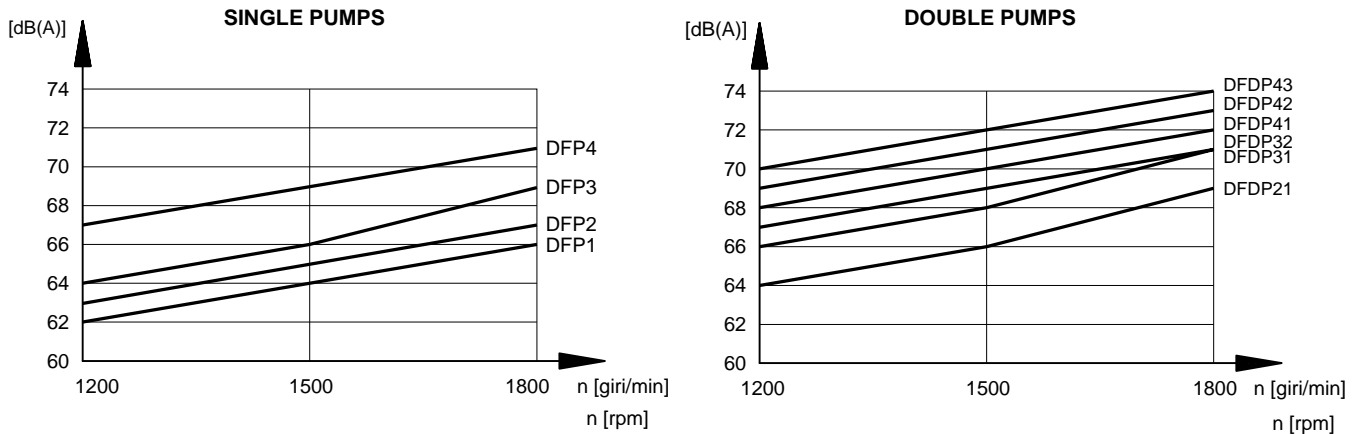
If the pressure in the suction line is different than zero, the maximum rotation speed shown in table 3 must be multiplied by the correction factor obtained from the diagram here below.



6 - NOISE LEVEL

(values obtained with mineral oil with viscosity of 25 cSt at 40°C, delivery pressure 140 bar and suction pressure 0 bar)

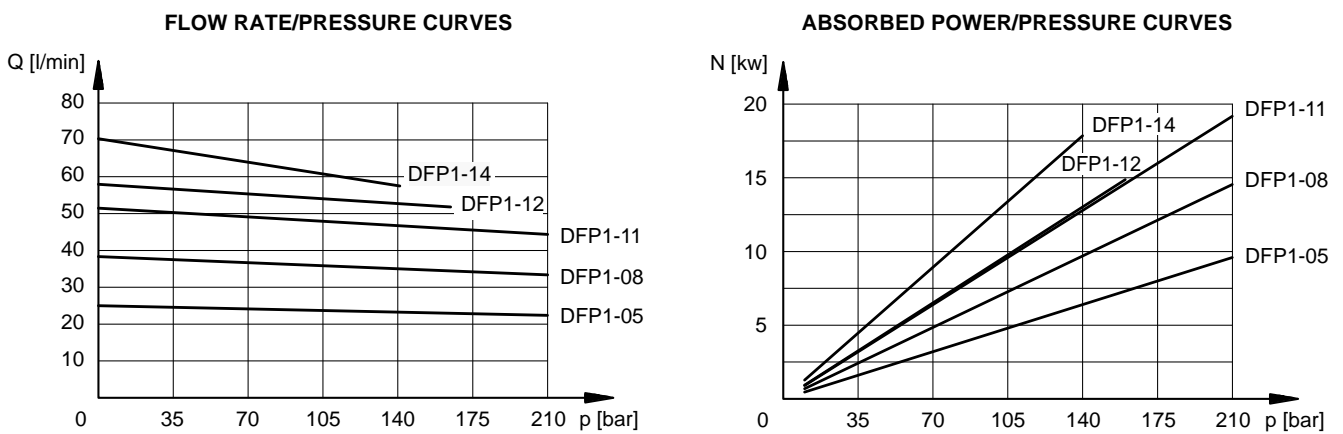
The diagram curves were measured in a semi-anechoic room, at a distance of 1 m from the pump. The shown values must be reduced by 5 dB(A) if they are to be considered in a completely anechoic room.



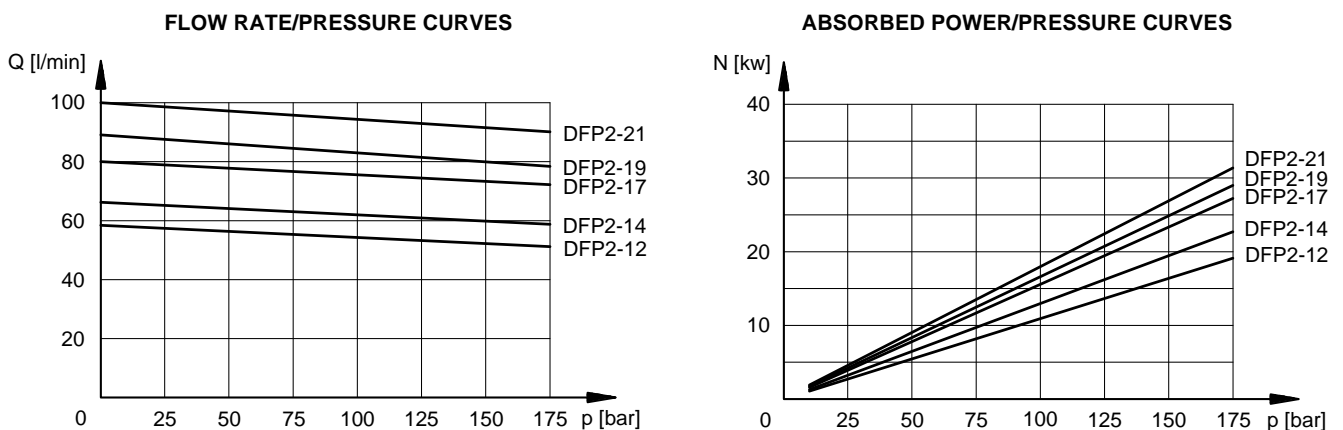
7 - CHARACTERISTIC CURVES

(obtained with mineral oil with viscosity of 25 cSt at 45 °C and 1500 rpm speed)

7.1 - DFP1 pumps



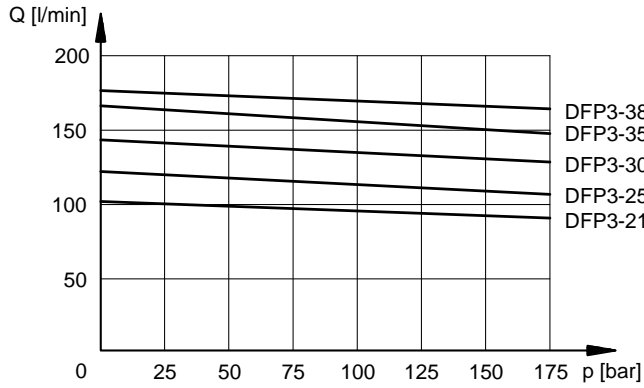
7.2 - DFP2 pumps



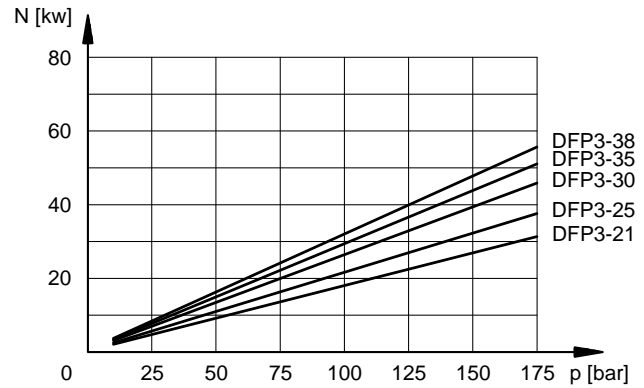


7.3 - DFP3 pumps

FLOW RATE/PRESSURE CURVES

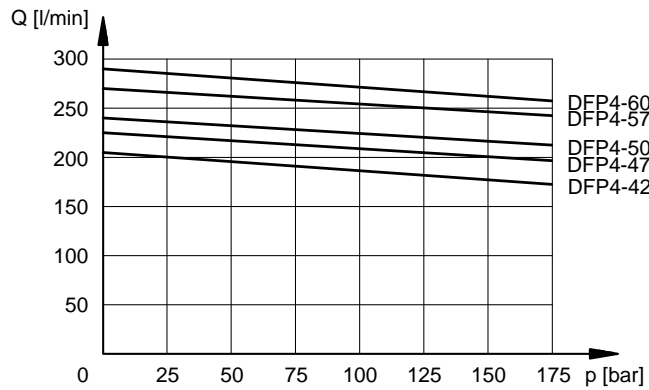


ABSORBED POWER/PRESSURE CURVES

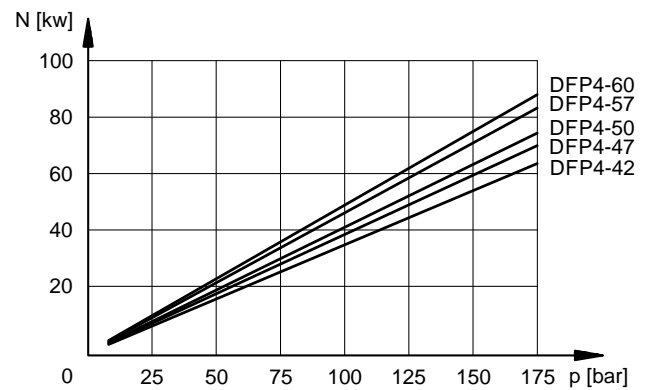


7.4 - DFP4 pumps

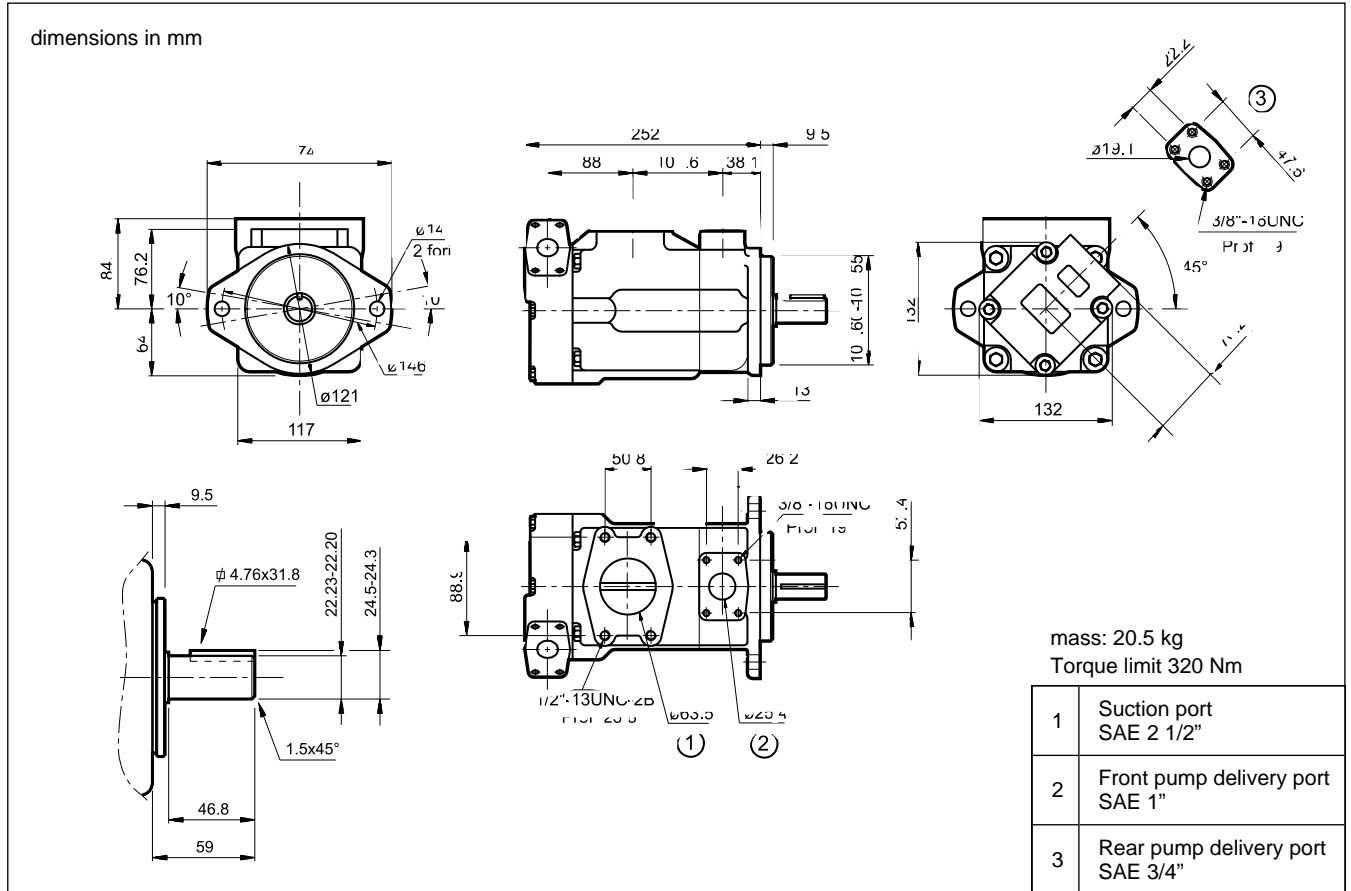
FLOW RATE/PRESSURE CURVES



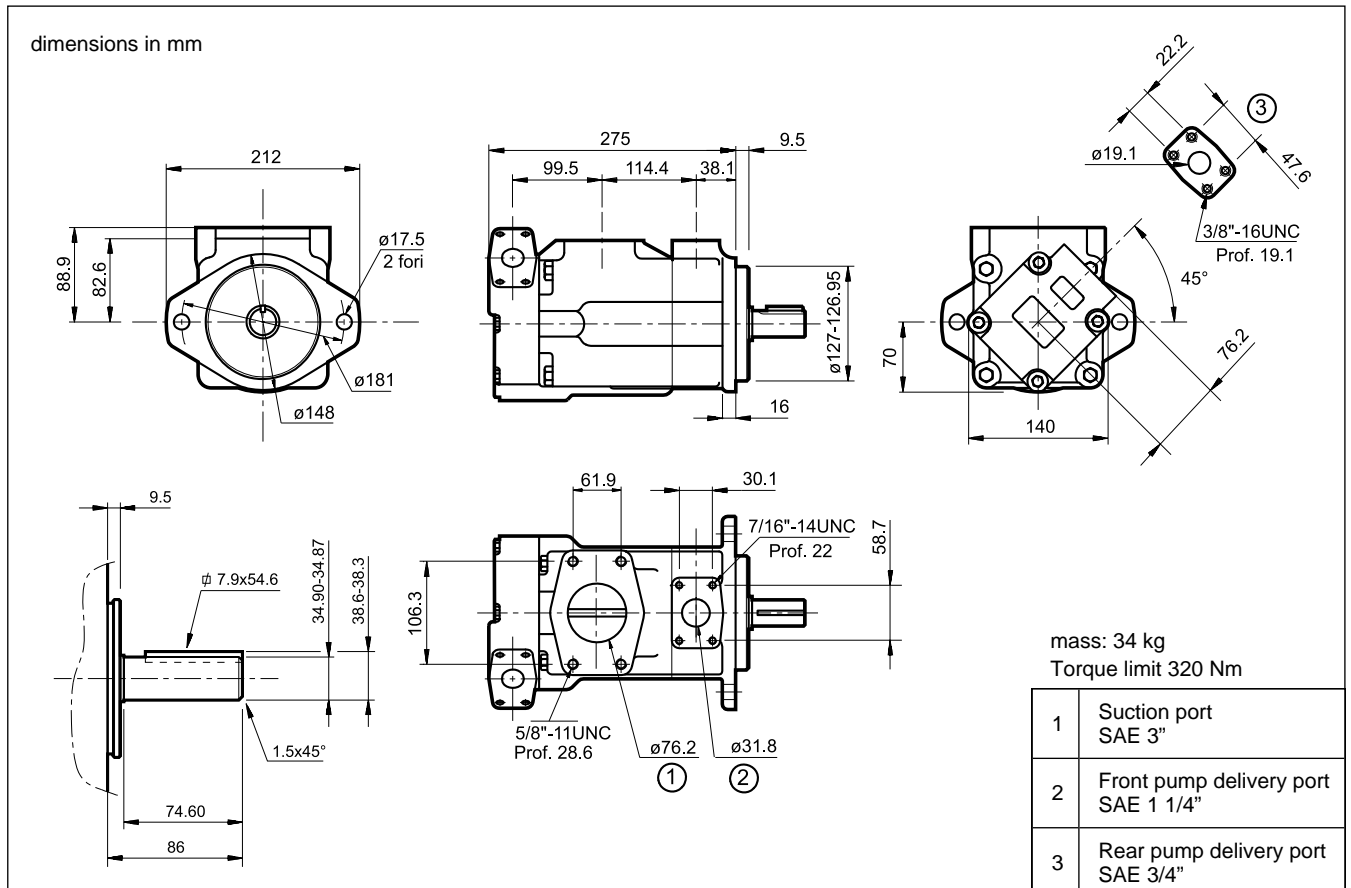
ABSORBED POWER/PRESSURE CURVES



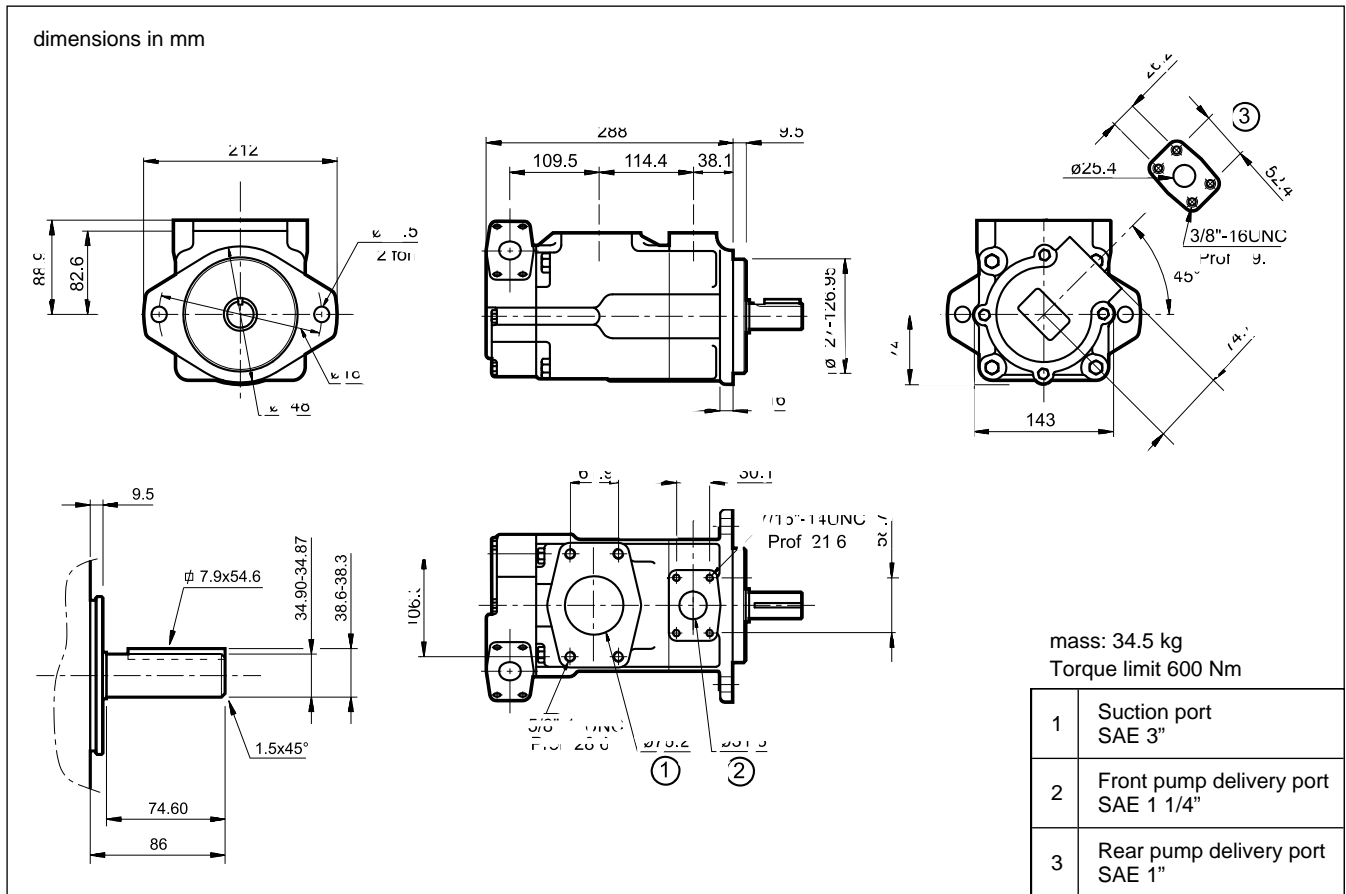
12 - DFDP21 DOUBLE PUMP OVERALL AND MOUNTING DIMENSIONS



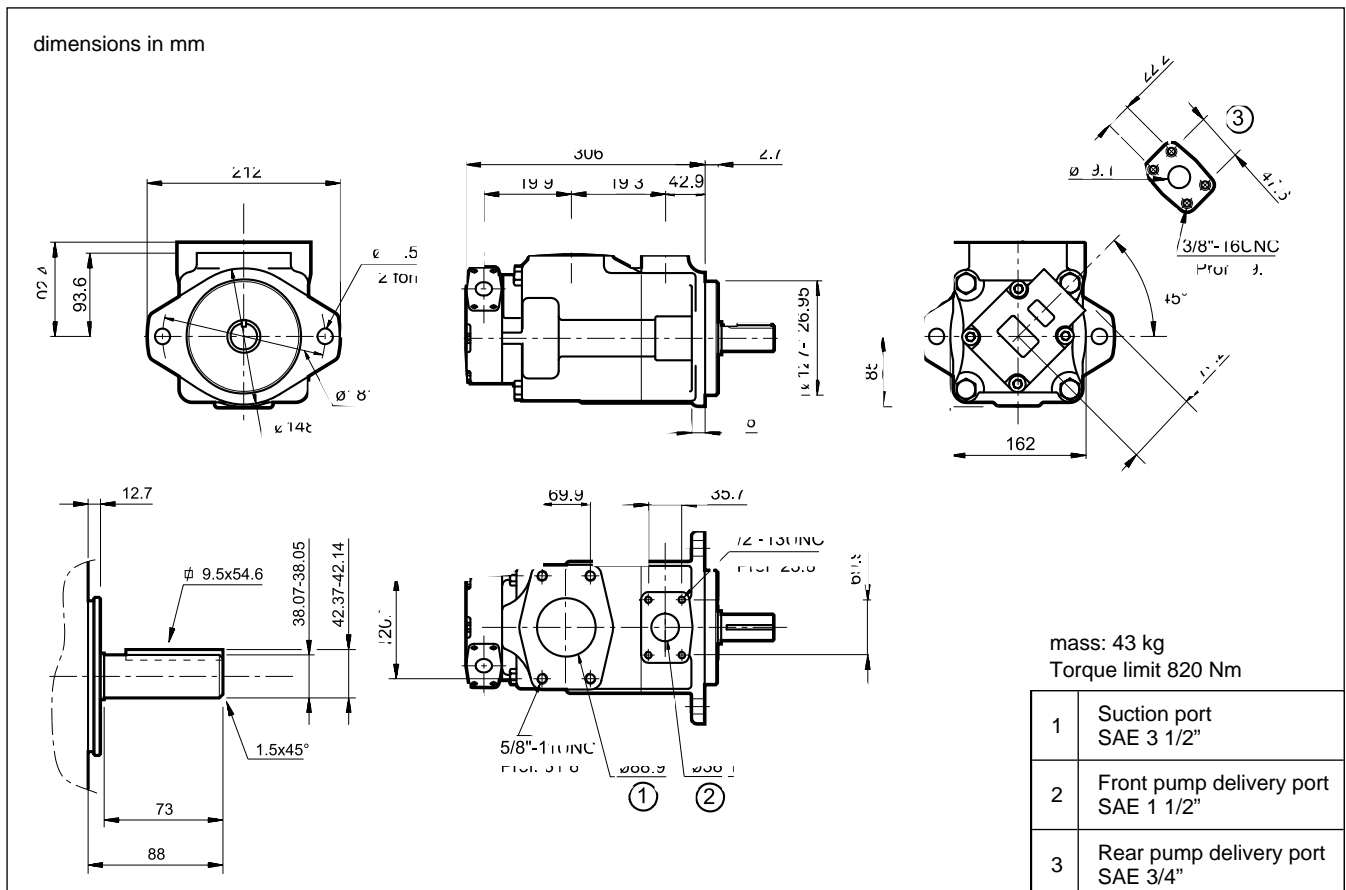
13 - DFDP31 DOUBLE PUMP OVERALL AND MOUNTING DIMENSIONS



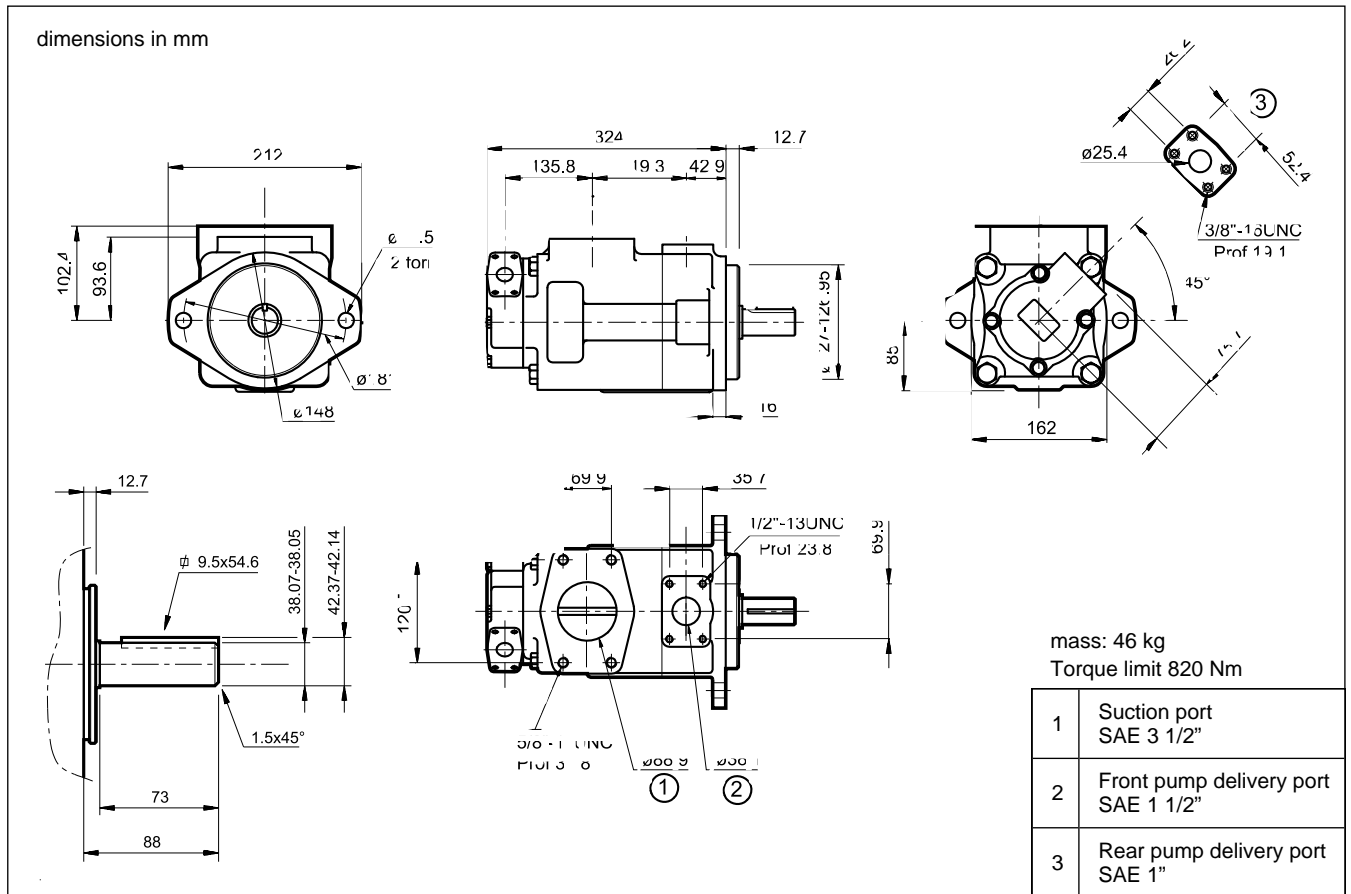
14 - DFDP32 DOUBLE PUMP OVERALL AND MOUNTING DIMENSIONS



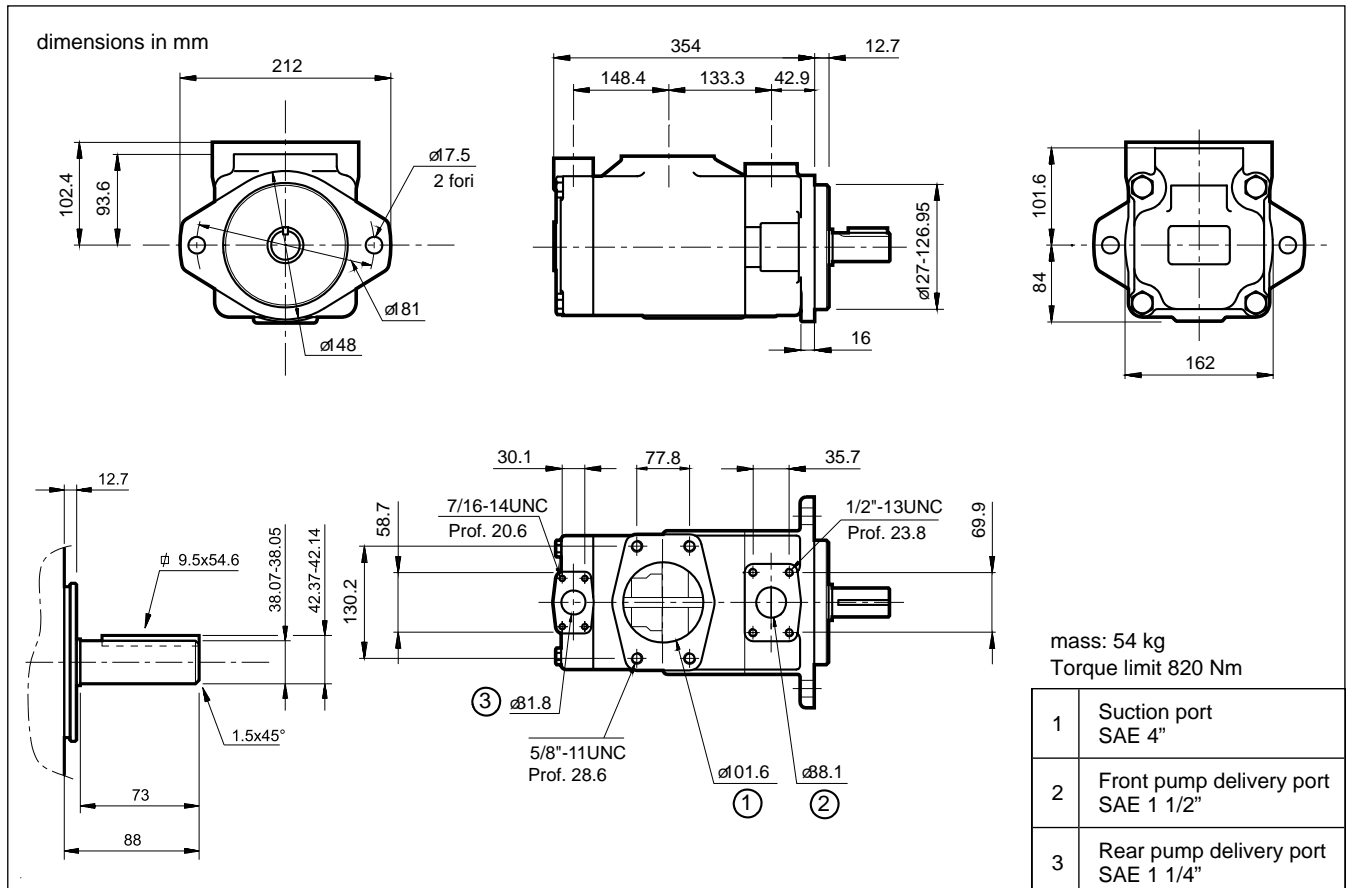
15 - DFDP41 DOUBLE PUMP OVERALL AND MOUNTING DIMENSIONS



16 - DFDP42 DOUBLE PUMP OVERALL AND MOUNTING DIMENSIONS



17 - DFDP43 DOUBLE PUMP OVERALL AND MOUNTING DIMENSIONS



18 - INSTALLATION

The DFP pumps can be installed in any position.

Before starting, check that the direction of rotation of the motor agrees with the direction of rotation of the pump .

The pump start up, especially at a cold temperature, should occur with the pump unloading.

The suction pipe must be suitably sized to facilitate the flow of oil. Any of bends and bottlenecks or an excessive length of the suction line can impair the correct operation of the pump.

It is good to place the pump under the tank. Otherwise, make sure that the minimum level of the fluid is higher than the level of the pump suction line to avoid drain from the suction line with the pump at standstill. In the case of circuits with high flow rate and pressure values, it is advisable to install the pump under the head.

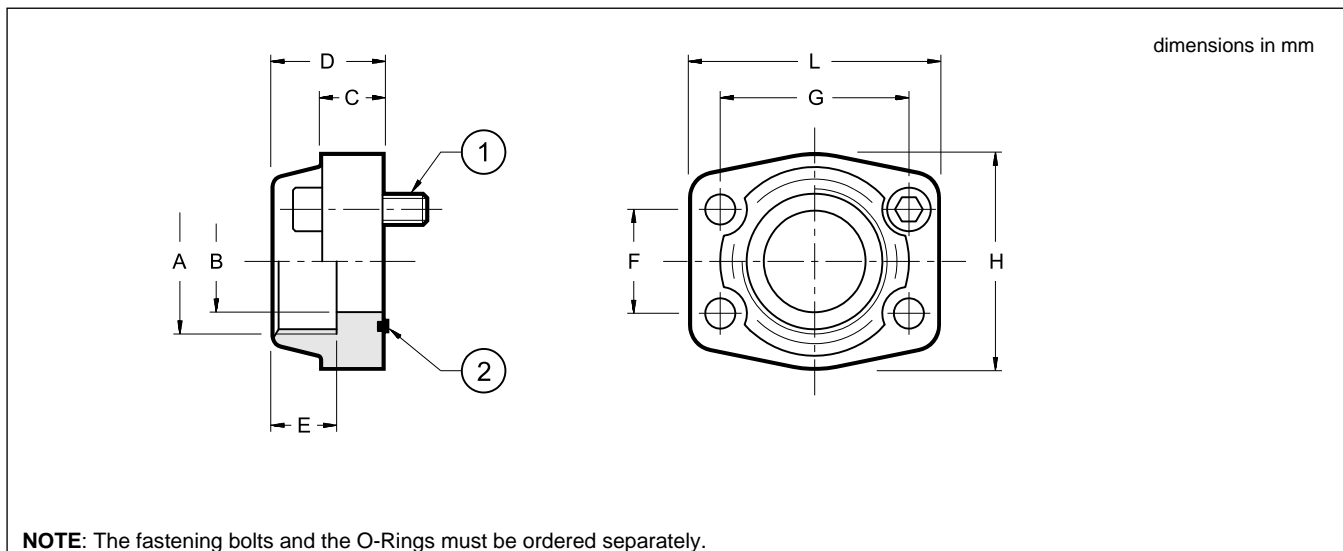
The motor-pump coupling must be made directly with a flexible coupling. Couplings that generate axial or radial loads on the pump shaft are not allowed.

Refer to point 4.3 for the characteristics and installation of the filtering elements.

The pump body and the suction line must be filled with fluid before starting the engine. The pump start-up must take place with minimum pressure in the system especially at low temperatures.

Start the engine several times for about 1 second, at regular intervals of 2-3 seconds, until the pump has been primed. Check with a pressure gauge that the delivery pressure increases slightly. Operate all the system components several times until the air bubbles disappear in the fluid returning to the tank. Only after that, gradually increase the pressure.

19 - SAE J518 CONNECTION FLANGES



| Flange code | Flange description | P _{max} [bar] | ØA | ØB | C | D | E | F | G | H | L | 1 N. 4 SHC bolts | Bolts code | 2 |
|-------------|--------------------|------------------------|------------|----|----|----|----|-------|--------|-----|-----|---------------------|------------|---------|
| 0610719 | SAE - 3/4" | 345 | 3/4" BSP | 19 | 18 | 36 | 19 | 22,2 | 47,6 | 50 | 65 | 3/8" UNC x 1 1/2" | 0530612 | OR 4100 |
| 0610713 | SAE - 1" | 345 | 1" BSP | 25 | 18 | 38 | 22 | 26,2 | 52,4 | 55 | 70 | | | OR 4131 |
| 0610720 | SAE - 1 1/4" | 276 | 1 1/4" BSP | 32 | 21 | 41 | 22 | 30,2 | 58,7 | 68 | 79 | 7/16" UNC x 1 1/2" | 0530613 | OR 4150 |
| 0610714 | SAE - 1 1/2" | 207 | 1 1/2" BSP | 38 | 25 | 45 | 24 | 35,7 | 70 | 78 | 93 | 1/2" UNC x 1 3/4" | 0530638 | OR 4187 |
| 0610721 | SAE - 2" | 207 | 2" BSP | 51 | 25 | 45 | 30 | 43 | 77,8 | 90 | 102 | | | OR 4225 |
| 0610722 | SAE - 2 1/2" | 172 | 2 1/2" BSP | 63 | 25 | 50 | 30 | 50,8 | 89 | 105 | 116 | | | OR 4175 |
| 0610723 | SAE - 3" | 138 | 3" BSP | 73 | 27 | 50 | 34 | 62 | 106,4 | 116 | 134 | 5/8" UNC x 2" | 0530658 | OR 4337 |
| 0610724 | SAE - 3 1/2" | 34 | 3 1/2" BSP | 89 | 27 | 48 | 34 | 69,8 | 120,7 | 136 | 152 | | | OR 4387 |
| 0773528 | SAE - 4" | 34 | 4" BSP | 99 | 27 | 48 | 34 | 77,77 | 130,18 | 146 | 162 | | | OR 4437 |

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