



**DIPLOMATIC
HYDRAULICS**

14 200/107 ED

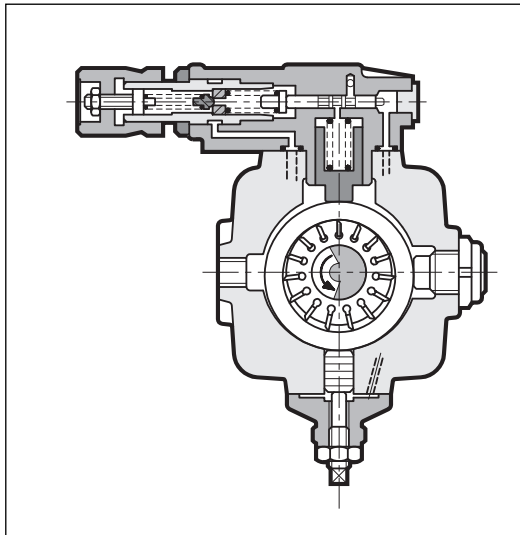


PVA

VARIABLE DISPLACEMENT VANE PUMPS

SERIES 30

OPERATING PRINCIPLE

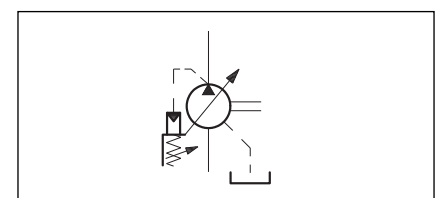


- The PVA pumps are variable displacement vane pumps with piloted type hydraulic pressure compensator.
- They permit instantaneous adjustment of the flow rate according to the circuit requirements. The consequence is that energy consumption is reduced and adequate in every cycle phase.
- The pumping group is complete with hydrostatic axial compensation distribution plates that improve the volumetric efficiency and reduce wear of the components.
- The pressure compensator operates with the principle of keeping the cam ring of the pumping group in the eccentric position with use of a piston controlled hydraulically by a pressure pilot stage.
- When the delivery pressure equals the pressure corresponding to the pilot stage setting, the cam ring is moved toward the center adjusting the flow rate to the plant requirements.
- In zero flow demand conditions, the pump delivers oil only to compensate any possible bleedings and pilotings, keeping the circuit pressure constant.
- The compensator response times are very restrained and such as to allow elimination of the pressure relief valve.
- Also available are the versions with maximum flow adjustment PVA***Q and with the device for selection of two independent pressure values with solenoid valve PVA***M.

TECHNICAL SPECIFICATIONS (measured with mineral oil with viscosity of 36 cSt at 50°C)

| PUMP SIZE | | 22 | 28 | 35 | 45 | 56 | 72 | 90 | 115 | 145 |
|---------------------------------|----------------------|---|----|------|------|----|------|----------|-----|-----|
| Displacement | cm ³ /rev | 16 | 20 | 25 | 31,5 | 40 | 50 | 63 | 80 | 100 |
| Nominal flow rate (at 1450 rpm) | l/min | 23,2 | 29 | 36,2 | 45,6 | 58 | 72,5 | 91,3 | 116 | 145 |
| Maximum operating range | bar | 160 | | | | | | 150 | | |
| Pressure adjustment range | bar | 30 ÷ 160 | | | | | | 30 ÷ 150 | | |
| Maximum pressure on drain port | bar | 1 | | | | | | | | |
| Rotation speed range | rpm | 800 ÷ 1800 | | | | | | | | |
| Rotation direction | | clockwise (seen from the outlet shaft side) | | | | | | | | |
| Loads on the shaft: | | loads radial and axial not allowed | | | | | | | | |
| Maximum applicable shaft torque | Nm | 197 | | | 400 | | | 740 | | |
| Mass | kg | 13 | | | 33 | | | 45 | | |

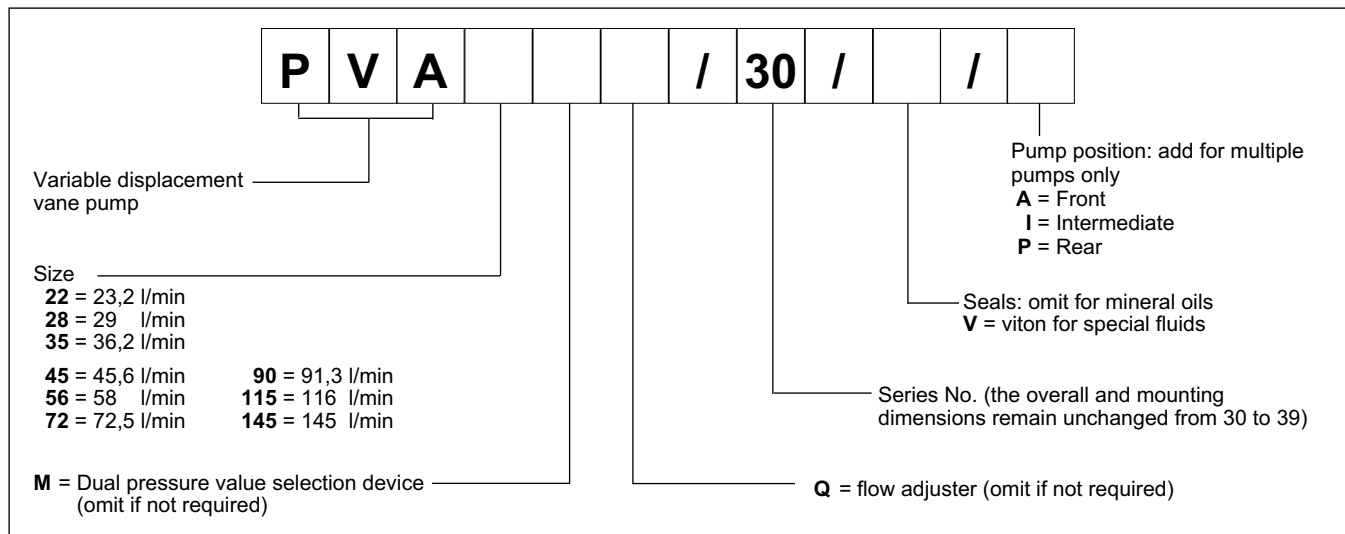
HYDRAULIC SYMBOL



| | | |
|----------------------------|-------------------|-----------|
| 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 |



1 - IDENTIFICATION CODE



2 - HYDRAULIC FLUID

2.1 - Fluid type

Use mineral oil based hydraulic fluids with anti-foam and antioxidant additives. For use of other types of fluid, keep in mind the limitations shown in the following table or consult our technical department for authorization of use.

| FLUID TYPE | NOTES |
|--|--|
| HFC (water glycol solutions with proportion of water ≤ 40 %) | <ul style="list-style-type: none"> - The values shown in the performance ratings table must be reduced by at least 50% . - The pump rotation speed must be limited to 1000 rpm. - The maximum fluid temperature must be less than 50°C. |
| HFD (phosphate esters) | There are no particular limitations with respect to the values shown in the performance ratings table. Operation with a fluid viscosity as close as possible to the optimum viscosity range specified in par. 2.2 is recommended. |

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

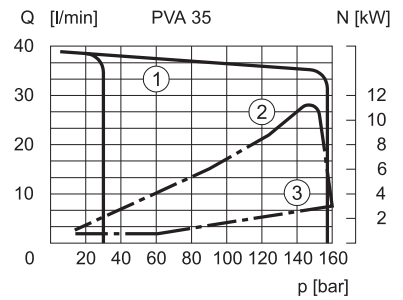
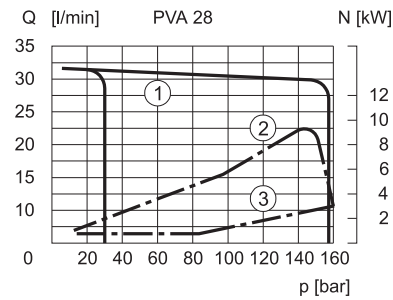
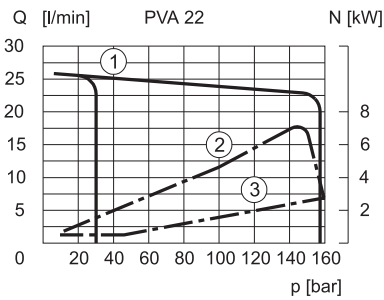
The maximum degree of fluid contamination must be according to ISO 4406:1999 class 20/18/15; therefore, use of a filter with $\beta_{20} \geq 75$ is recommended. A degree of maximum fluid contamination according to ISO 4406:1999 class 18/16/13 is recommended for optimum endurance of the pump. Hence,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



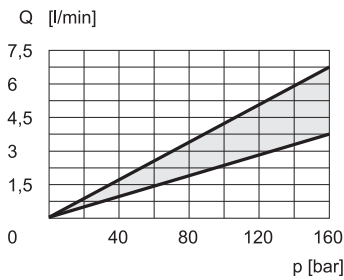
3 - PVA - 22/28/35 CHARACTERISTIC CURVES (obtained with viscosity of 36 cSt at 50°C)

FLOW RATE - PRESSURE - ABSORBED POWER



- ① Flow rate - pressure curves, measured at 1450 rpm
- ② Absorbed power at the maximum flow rate
- ③ Absorbed power at the zero flow rate

DRAINAGE FLOW RATE



RESPONSE TIMES AND PRESSURE PEAK

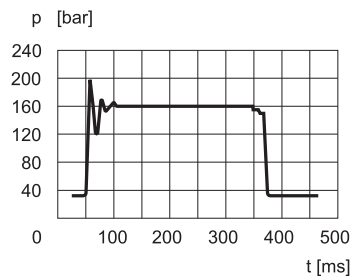
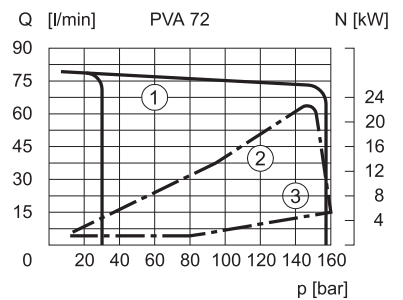
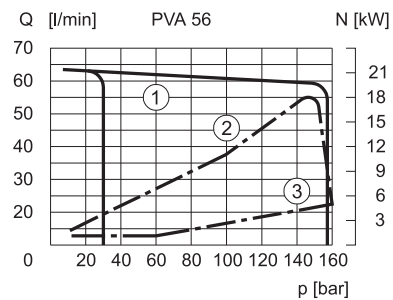
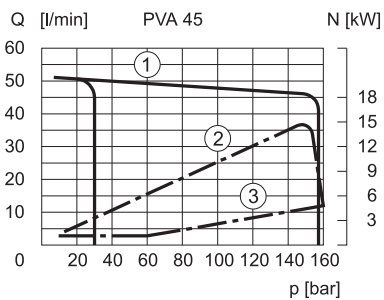


Diagram noted passing from maximum flow rate to zero flow rate and vice versa

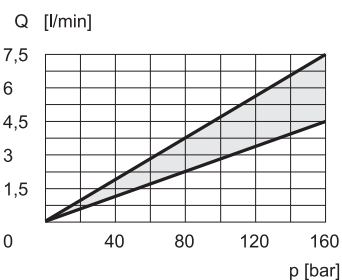
4 - PVA - 45/56/72 CHARACTERISTIC CURVES (obtained with viscosity of 36 cSt at 50°C)

FLOW RATE - PRESSURE - ABSORBED POWER



- ① Flow rate - pressure curves, measured at 1450 rpm
- ② Absorbed power at the maximum flow rate
- ③ Absorbed power at the zero flow rate

DRAINAGE FLOW RATE



RESPONSE TIMES AND PRESSURE PEAK

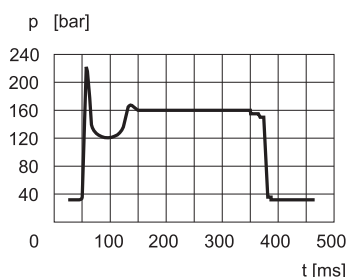
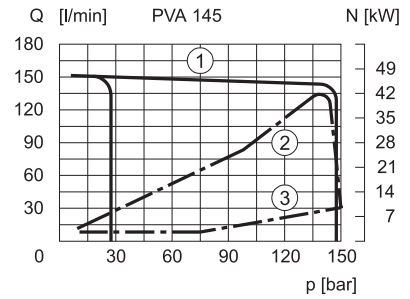
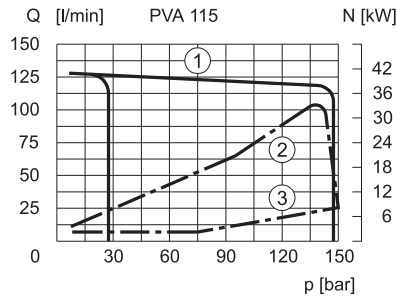
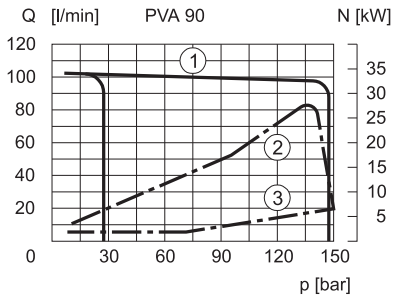


Diagram noted passing from maximum flow rate to zero flow rate and vice versa



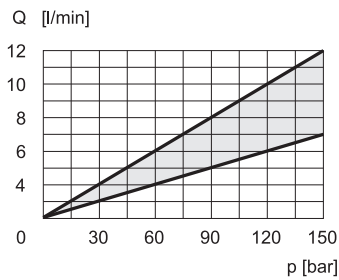
5 - PVA - 90/115/145 CHARACTERISTIC CURVES (values obtained with viscosity of 36 cSt at 50°C)

FLOW RATE - PRESSURE - ABSORBED POWER



- ① Flow rate - pressure curves, measured at 1450 rpm
- ② Absorbed power at the maximum flow rate
- ③ Absorbed power at zero flow rate

DRAINAGE FLOW RATE



RESPONSE TIMES AND PRESSURE PEAK

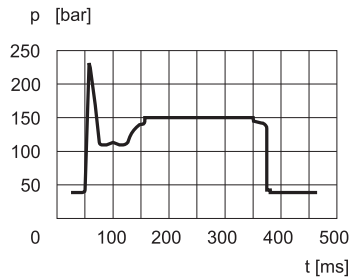
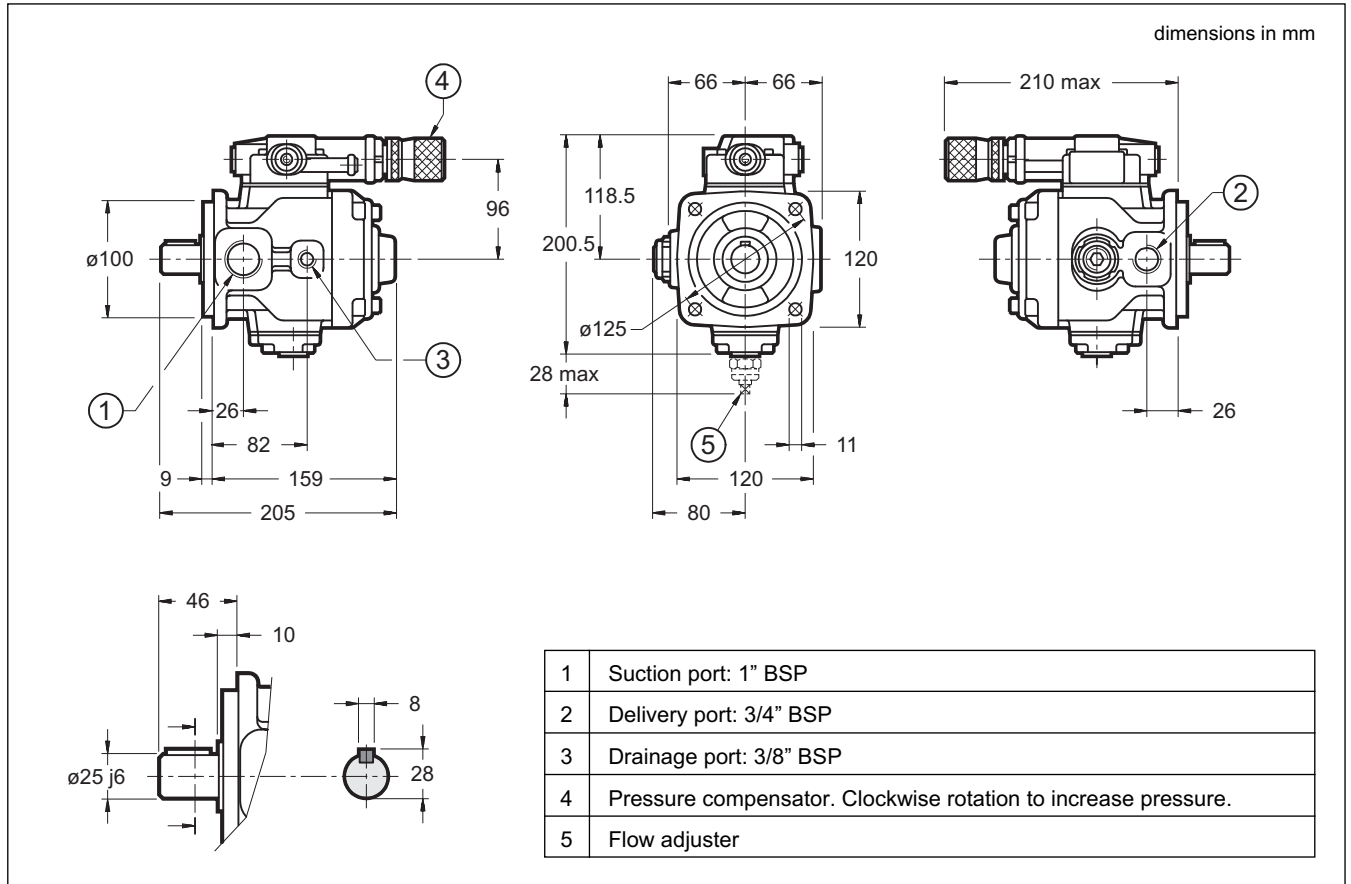


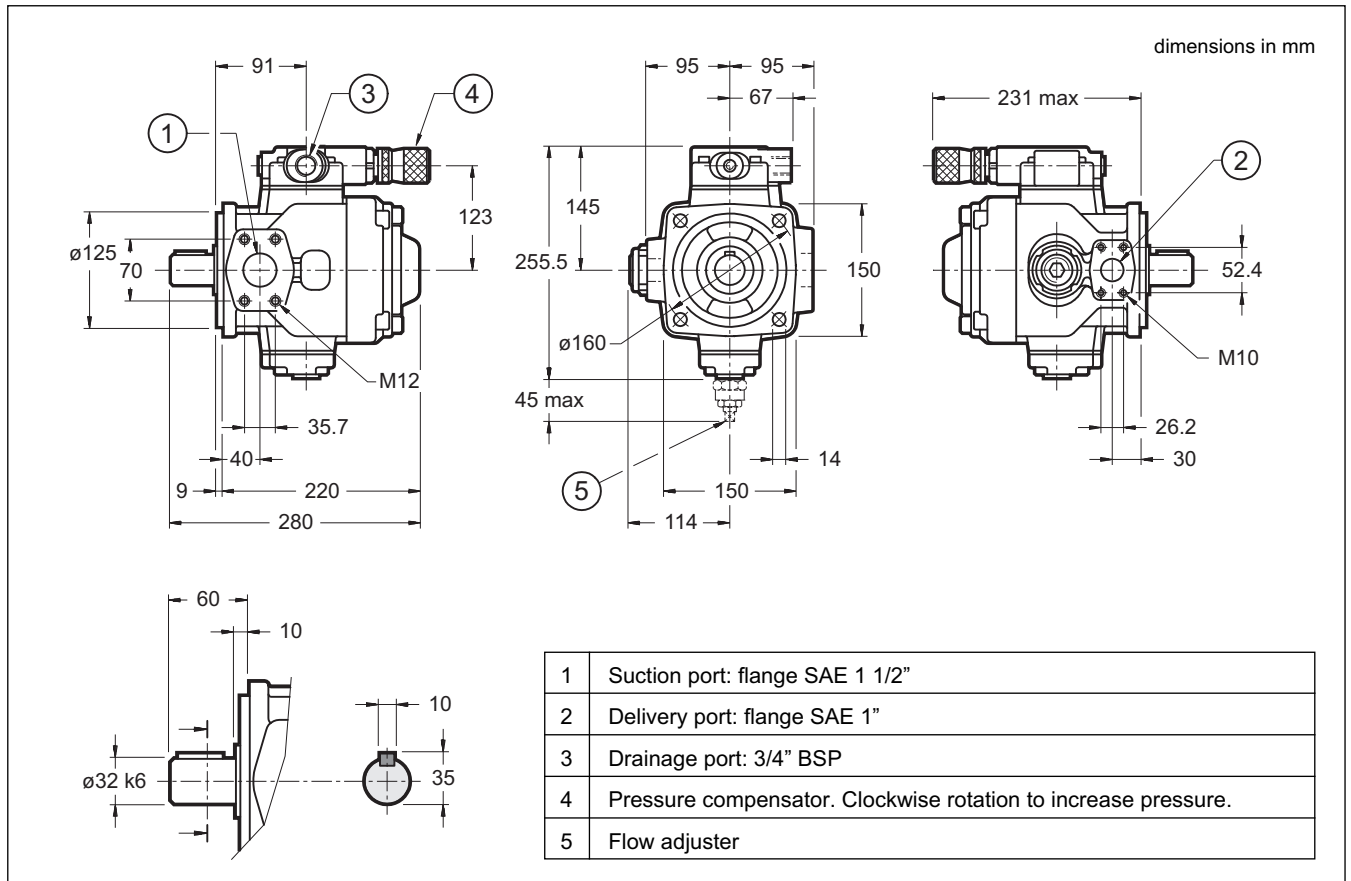
Diagram noted passing from maximum flow rate to zero flow rate and vice versa



6 - PVA - 22/28/35 OVERALL AND MOUNTING DIMENSIONS

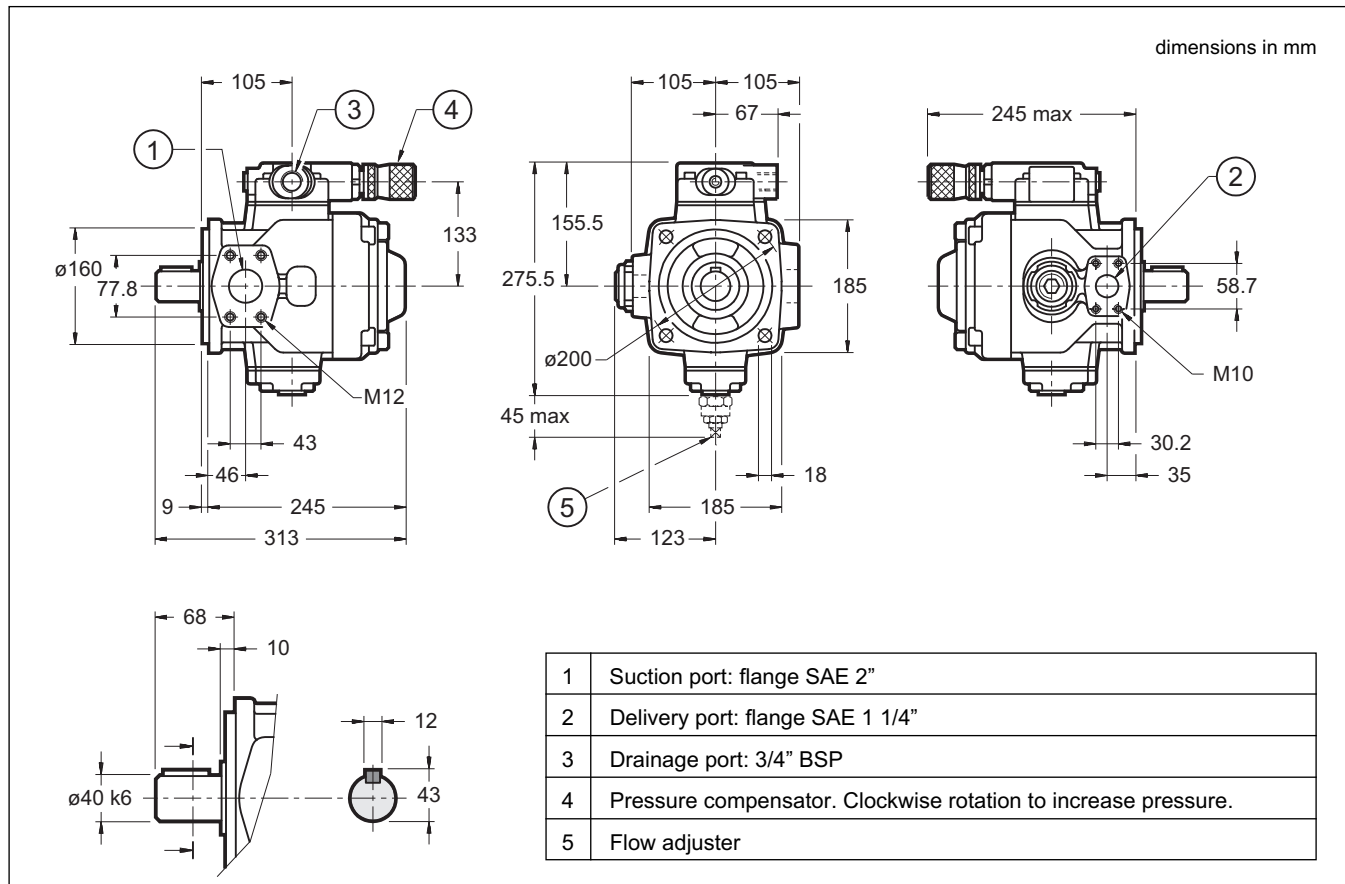


7 - PVA - 45/56/72 OVERALL AND MOUNTING DIMENSIONS





8 - PVA - 90/115/145 OVERALL AND MOUNTING DIMENSIONS



9 - INSTALLATION

- The PVD pumps up to size 35 can be installed with the axis oriented in any position. For other sizes the pump must be installed with the axis in horizontal position.
- The suction line must be suitably sized to facilitate the flow of oil.
Bends and restrictions or an excessive line length can impair correct operation of the pump.
- 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.
- The pump start up, especially at a cold temperature, should occur with the pump unloading.
- 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 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 - PVA*Q FLOW ADJUSTER**

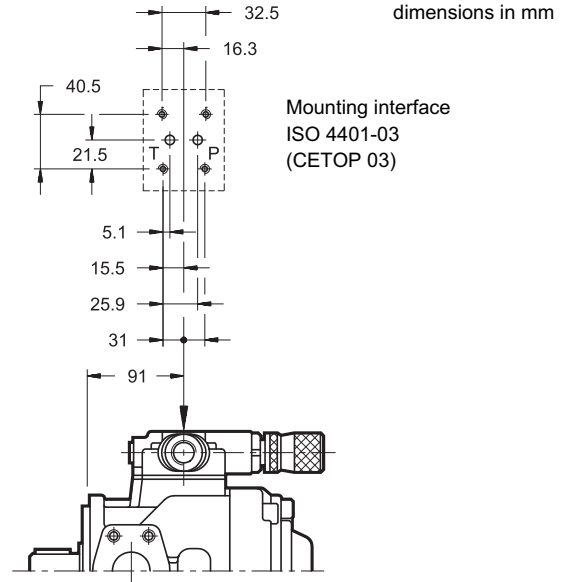
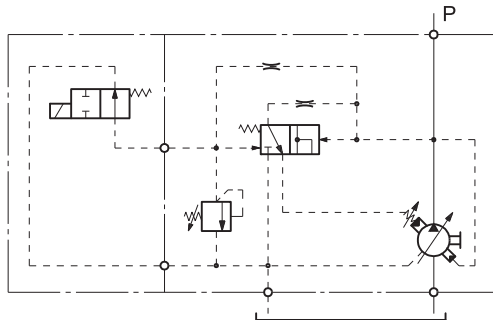
The flow adjustment group, supplied upon request, consists of an adjustment screw and a small balanced piston that limit the maximum eccentricity of the pumping group cam ring, changing the displacement.
The screw is supplied with square head, spanner 7, that allows assembly of an adjustment handwheel or the attachment for remote control.
The maximum flow is reduced by turning the adjustment screw clockwise.



11 - PVA**M DUAL PRESSURE VALUE SELECTION DEVICE

This version permits selection of two different set pump pressure values with a solenoid valve.
 The main pressure compensator is equipped with a ISO 4401-03 (CETOP 03) mounting interface for mounting the control valve of the second pressure value and of the selection solenoid valve. **NOTE:** The valves are not included in the supply.
 It is possible to make different pump set pressure control circuits and some examples are outlined in paragraph 13.

DUAL PRESSURE VALUE PUMP OPERATING DIAGRAM



12 - MULTIPLE PUMPS

The PVA pumps are designed to be connected one to the other in descending order of displacement. They can be connected also with PVD type pumps (see catalogue 14 100) and with GP1 and GP2 size gear pumps (see catalogue 11 100).

The torque on the shaft must be further reduced after the second pump.

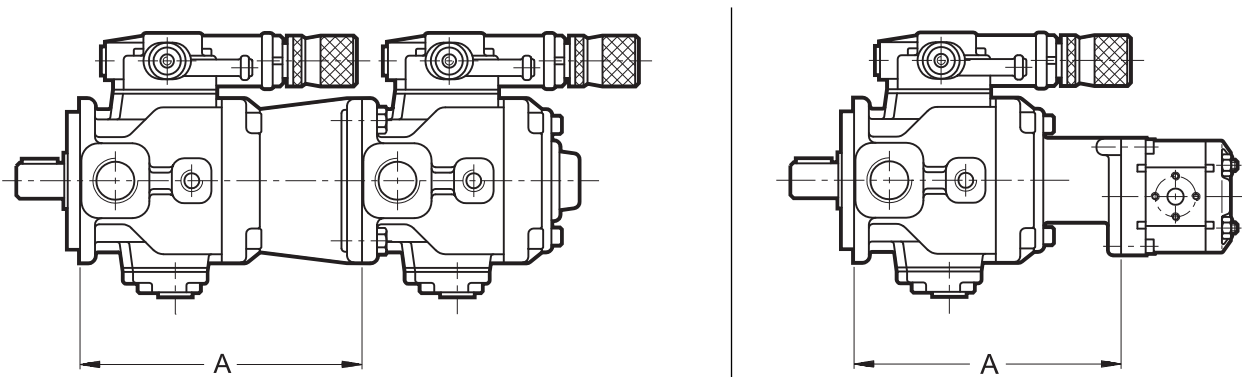
Consult our technical department for applications of this type.

IDENTIFICATION CODE FOR MULTIPLE PUMPS

identification code + identification code + identification code
 1st pump 2nd pump 3rd pump
 (omit for double pumps)

Double pump identification example: **PVA 35 Q / 30 A + PVA 22 / 30/P**
 Triple pump identification example: **PVA 56 / 30 / A + PVA 35 Q / 30/I + PVD 22 H/30/P**
 PVA pump + GP pump identification example: **PVA35Q/30/A + GP1-0061R97F/20N**

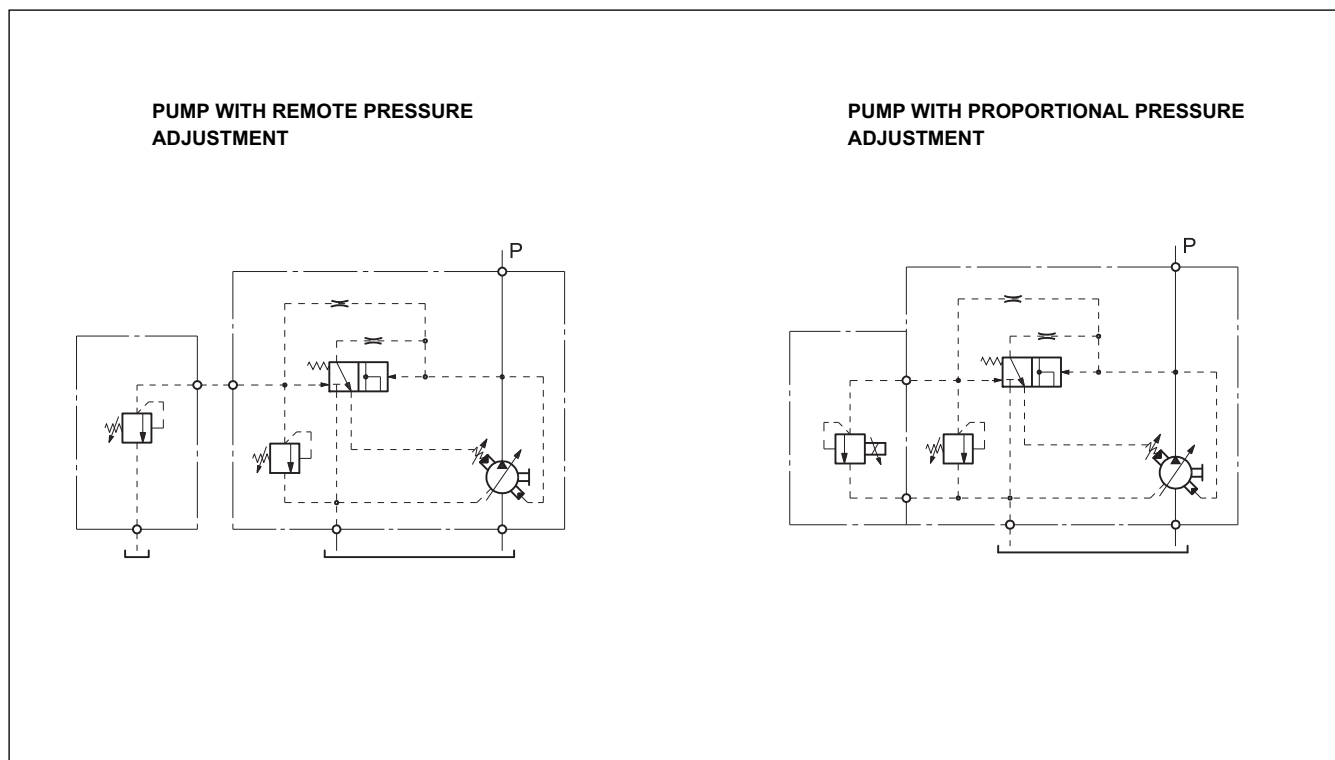
NOTE: for the identification codes of the single pumps see:
 cat. 11 100 par. 1 for GP pumps
 cat. 14 100 par. 1 for PVD pumps
 cat. 14 200 par. 1 for PVA pumps



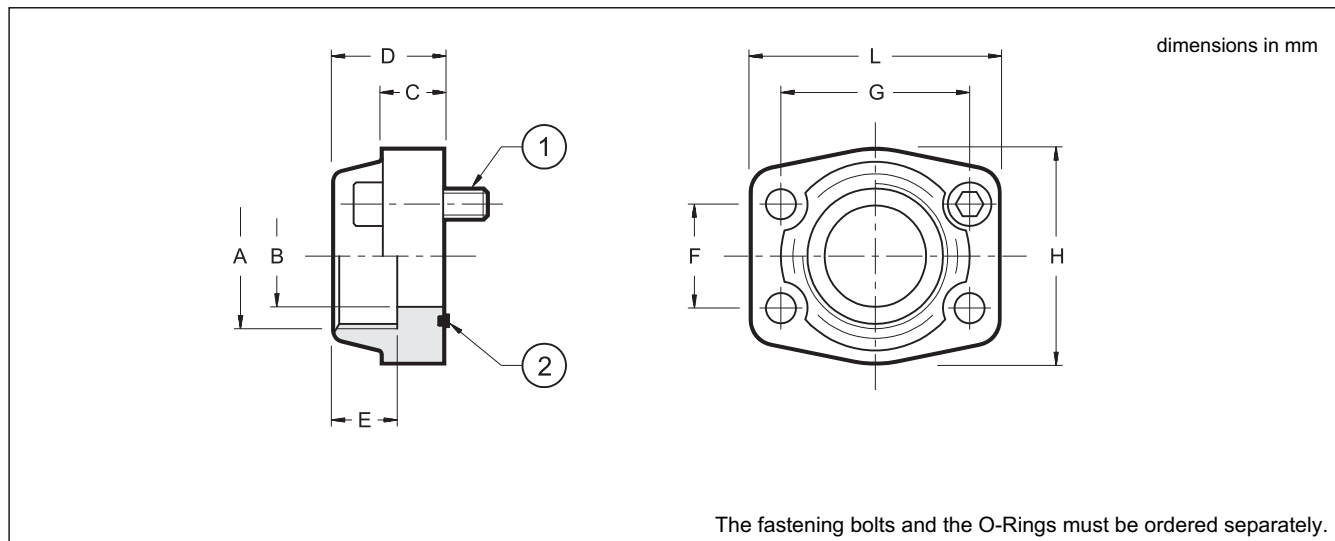
| Max. torque applied to the shaft of the second pump (Nm) | | | Dimension A (mm) | | |
|--|----------------------------------|-------------------------------------|------------------------------------|-------------------------|-----|
| Size Group First pump | Second pump (same size group) | Second pump (smaller size group) | With PVA pump (same size group) | With gear pump type: | |
| PVA 22/28/35 | 43 | - | 207 | GP1 | 203 |
| PVA 45/56/72 | 113 | 113 | 275 | GP1 and GP2 | 262 |
| PVA 90/115/145 | 186 | 113 | 315 | GP1 and GP2 | 287 |



13 - SET PRESSURE CONTROL CIRCUIT EXAMPLES



14 - CONNECTION FLANGES



| Flange code | Flange description | p_{max} [bar] | $\varnothing A$ | $\varnothing B$ | C | D | E | F | G | H | L | ① | ② |
|-------------|--------------------|-----------------|-----------------|-----------------|----|----|----|------|------|----|-----|---------------------|----------------------|
| 0610713 | SAE - 1" | 345 | 1" BSP | 25 | 18 | 38 | 22 | 26.2 | 52.4 | 22 | 70 | N. 4 TCEI M10x35 | OR 4131 (32.93x3.53) |
| 0610720 | SAE - 1 1/4" | 276 | 1 1/4" BSP | 32 | 21 | 41 | 22 | 30.2 | 58.7 | 68 | 79 | | OR 4150 (37.69x3.53) |
| 0610714 | SAE - 1 1/2" | 207 | 1 1/2" BSP | 38 | 25 | 44 | 24 | 35.7 | 70 | 78 | 93 | N. 4 TCEI M12x45 | OR 4187 (47.22x3.53) |
| 0610721 | SAE - 2" | 207 | 2" BSP | 51 | 25 | 45 | 30 | 43 | 77.8 | 90 | 102 | | OR 4225 (56.74x3.53) |

| | |
|--|--|
| | <p>DIPLOMATIC OLEODINAMICA SpA 20025 LEGNANO (MI) - P.le Bozzi, 1 / Via Edison Tel. 0331/472111 - Fax 0331/548328</p> |
|--|--|