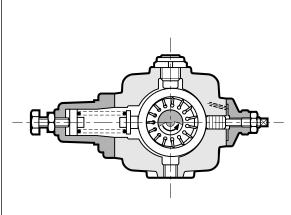




VARIABLE DISPLACEMENT **VANE PUMPS WITH DIRECT** PRESSURE ADJUSTER

OPERATING PRINCIPLE



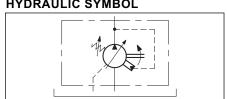
- The PVD pumps are variable displacement vane pumps with a mechanical type of pressure compensator.
- They allow instantaneous adjustment of the flow rate according to the circuit requirements. The consequence is that energy consumption is reduced and adequate in every phase of the cycle.
- The pump group is complete with hydrostatic axial compensation distribution plates that improve the volumetric efficiency and reduce wear of the components.
- The pressure compensator keeps the cam ring of the pumping group in the eccentric position with use of an adjustable load spring. When the delivery pressure equals the pressure corresponding to the spring setting, the cam ring is moved toward the center, 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 and pilotings, keeping the circuit pressure constant.
- The compensator response times are very low such as to allow elimination of the pressure relief valve.

PERFORMANCE RATINGS (measured with mineral oil with viscosity of 36 cSt at 50°C)

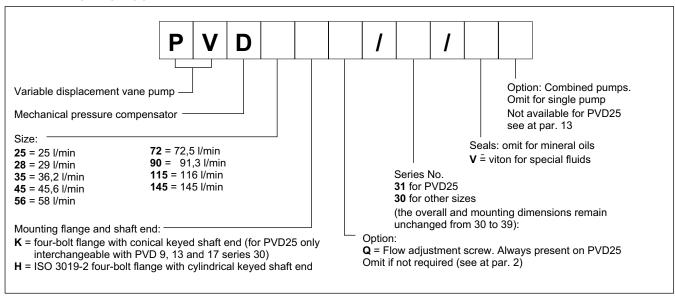
PVD sizes		25	28	35	45	56	72	90	115	145
Geometric displacement (UNI ISO 3662)	cm³/rev	16	20	25	31,5	40	50	63	80	100
Actual displacement	cm³/rev	17,9	22,1	26,9	34,5	42,8	53,1	69	86,2	105,5
Maximum flow at 1450 rpm and p = 80 bar	l/min	25	29	36,2	45,6	58	72,5	91,3	116	145
Max working pressure	bar	120	120 100 100		80					
Pressure adjustment range	bar	20 ÷ 120	30 ÷	100	30 ÷ 100 30 ÷			30 ÷ 80		
Maximum drain port pressure allowed	bar	1								
Rotation speed range	rpm	800 ÷ 1800								
Rotation direction		clockwise (seen from the outlet shaft side)								
Shaft loads		radial and axial loads are not allowed								
Max applicable torque on shaft: version H	Nm	110	19	97		400			740	
version K	14111	70		-		-			-	
Mass	kg	7,3	1	2		32			44	

Ambient temperature range	°C -20 / +50		
Fluid temperature range	°C	-10 / +50	
Fluid viscosity range	see paragraph 3.2		
Recommended viscosity	cSt	22 ÷ 68	
Degree of fluid contamination	see paragraph 3.3		

HYDRAULIC SYMBOL



1 - IDENTIFICATION CODE



2 - VOLUME ADJUSTMENT SCREW - PVD*Q

The volume adjuster is fitted as standard on PVD25 pumps, while is optional on the other sizes .It 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 maximum flow is reduced by turning the adjustment screw clockwise.

Size		25	28	35	45	56	72	90	115	145
Reduced displacement for screw turn	cm ³	9,7	9,7	9,7	16,4	16,4	16,4	23,8	23,8	23,8
MIN displacement	cm³/rev	3,1	7,6	11,7	1,6	9,9	20,9	9,7	26,9	45,5

Tools required for adjustment:

PVD 25: adjustment screw hexagon socket key 5. Locking nut spanner 17.

PVD 28 to 145: square head screw, spanner 7, tooth retainer KM1 type, to loosen with hook wrench.

3 - HYDRAULIC FLUID

3.1 - 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 approval.

FLUID TYPE	NOTES
HFC (water glycol solutions with proportion of water ≤ 40%)	-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 Use NBR seals only
HFD (phosphate esters)	There are no particular limitations with this kinds of fluids. Operation with a fluid viscosity as close as possible to the optimum viscosity range specified in par. 3.2 is recommended. - Use FPM (Viton) seals only

3.2 - Fluid viscosity

The operating fluid viscosity must be within the following range:

minimum viscosity 16 cSt referred to the maximum drainage fluid temperature of 50 $^{\circ}$ C optimum viscosity 22 \div 68 cSt referred to the fluid working temperature in the tank maximum viscosity 400 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.

3.3 - 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 $\beta_{20} \ge 75$ is recommended. A degree of maximum fluid contamination according to ISO 4406:1999 class 18/16/13 is recommended for optimum endurance

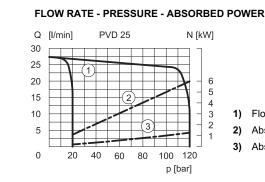
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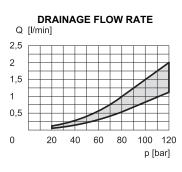
of the pump. Hence, use of a filter with $\beta_{10} \ge 100$ is recommended.

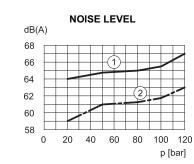
If there is a filter installed on the suction line, be sure that the pressure at the pump inlet is not lower than the values specified in paragraph 12. The suction filter must be equipped with a by-pass valve and, if possible, with a clogging indicator.

4 - PVD25 CHARACTERISTIC CURVES (obtained with viscosity of 36 cSt at 50°C)



- 1) Flow rate pressure curves, measured at 1500 rpm
- 2) Absorbed power at the maximum flow rate
- 3) Absorbed power at zero flow rate

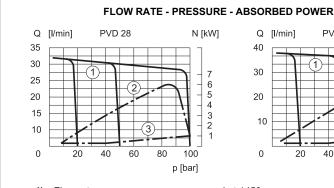


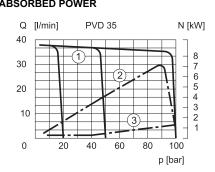


Approximate maximum values of noise level to minimum and maximum flow rate measured with the sound-level meter placed at one meter from pump coupling with flexible coupling.

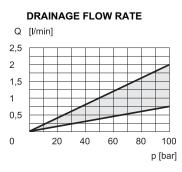
- 1) noise at max flow
- 2) noise with zero flow

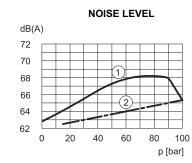
5 - PVD28, PVD35 CHARACTERISTIC CURVES (obtained with viscosity of 36 cSt at 50°C)





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





Approximate maximum values of noise level to minimum and maximum flow rate measured with the sound-level meter placed at one meter from pump coupling with flexible coupling.

- 1) noise at max flow
- 2) noise with zero flow

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6 - PVD45, PVD56 and PVD72 CHARACTERISTIC CURVES (values obtained with mineral oil with viscosity of 36 cSt at 50°C)

N [kW]

14

12

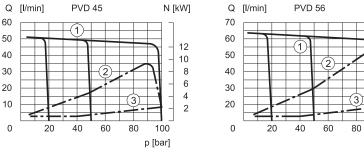
10

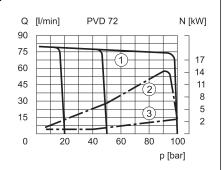
8

100

p [bar]

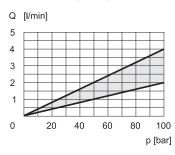
FLOW RATE - PRESSURE - ABSORBED POWER PVD 45 N [kW] Q [l/min] Q [l/min] 60 70 (1)50 60 12



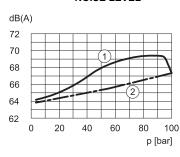


- 1) Flow rate - pressure curves, measured at 1450 rpm
- Absorbed power at the maximum flow rate
- Absorbed power at zero flow rate

DRAINAGE FLOW RATE



NOISE LEVEL

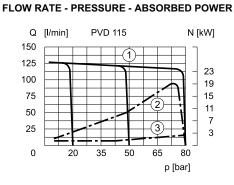


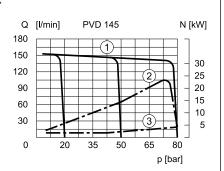
Approximate maximum values of noise level to minimum and maximum flow rate measured with the sound-level meter placed at one meter from pump coupling with flexible coupling.

- noise at max flow
- noise with zero flow

7 - PVD90, PVD115 and PVD145 CHARACTERISTIC CURVES (values obtained with viscosity of 36 cSt at 50°C)

PVD 90 N [kW] Q [l/min] 120 100 18 80 15 60 12 40 20 0 35 50 65 80



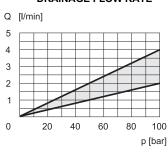


1) Flow rate - pressure curves, measured at 1450 rpm

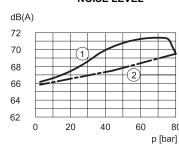
p [bar]

- Absorbed power at the maximum flow rate
- Absorbed power at zero flow rate

DRAINAGE FLOW RATE



NOISE LEVEL

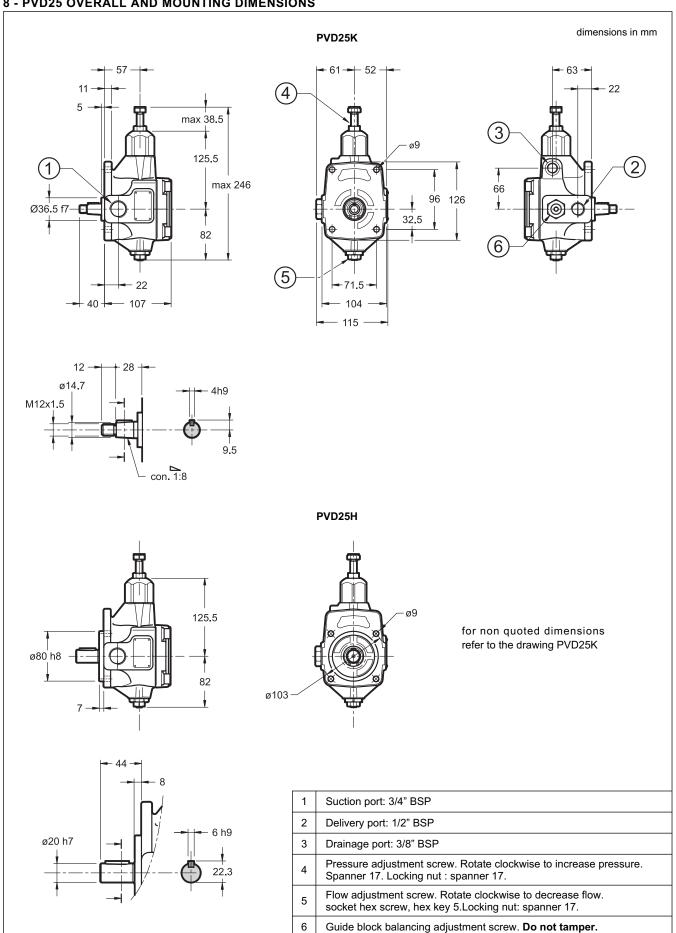


Approximate maximum values of noise level to minimum and maximum flow rate measured with the sound-level meter placed at one meter from pump coupling with flexible coupling.

- noise at max flow
- noise with zero flow

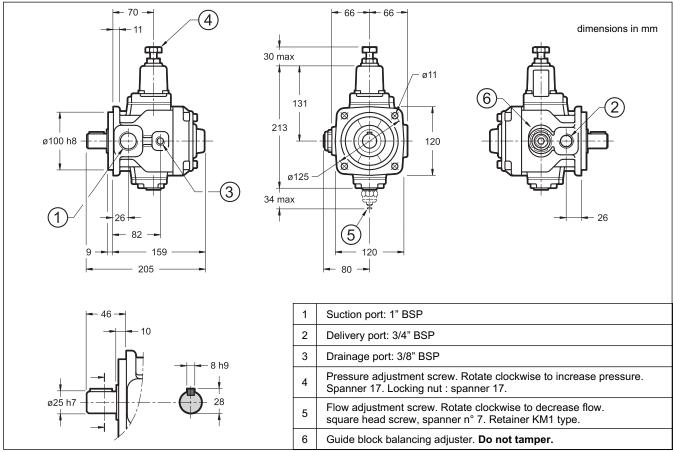
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8 - PVD25 OVERALL AND MOUNTING DIMENSIONS

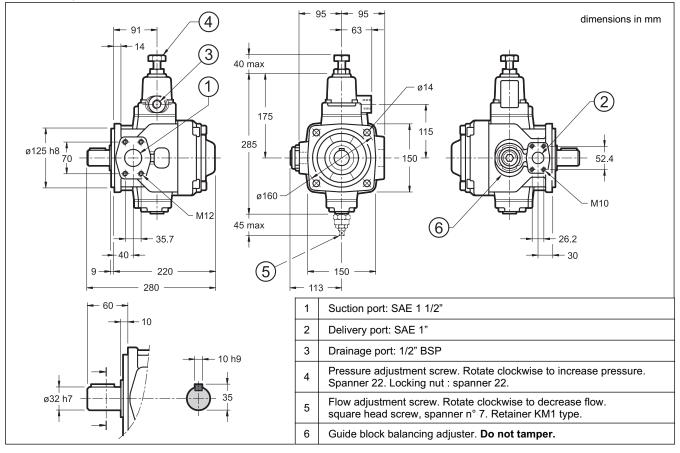


14 100/114 ED

9 - PVD28, PVD35 OVERALL AND MOUNTING DIMENSIONS

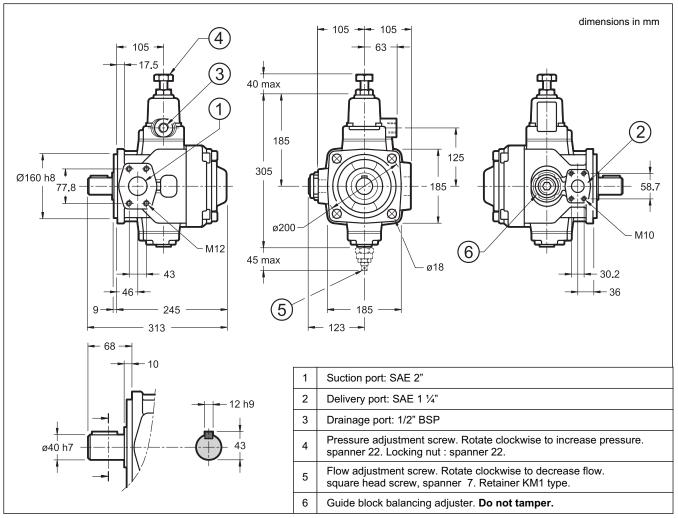


10 - PVD45, PVD56 AND PVD72 OVERALL AND MOUNTING DIMENSIONS



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11 - PVD90, PVD115 AND PVD145 OVERALL AND MOUNTING DIMENSIONS



12 - INSTALLATION

- The instruction manual for the installation and commissioning of the pumps is always included in the packaging with the pump.
 Observe restrictions in this document and follow the instructions.
- 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 and with the pressure compensator upward.
- 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.
- The suction line must be short, with end pipe cut at 45 ° and suitably sized: the minimum cross-section of the tube should reflect that of the thread on the inlet port of the pump to facilitate the oil flow. Bends and restrictions or an excessive line length can impair correct operation of the pump.
 - Suction pressure should be between 0.8 and 1.5 bar absolute

- The drainage pipe must be connected directly to the tank by a line separate from other discharges, located as far as possible from the suction line and lengthened to below the minimum oil level in order to avoid foaming.
- The tank must be suitably sized in order to allow the cooling of the fluid. It should be good that the fluid in the tank do not exceed 50°C. If necessary, consider the installation of a heat exchanger on the drain line.
- The pump start up must be done in full displacement (P→T) with flow to the tank, to purge the air.
- It's essential that the difference between the fluid temperature and the ambient (pump body) temperature doesn't exceed 20°C
- The pumps are usually placed directly upon the oil tank. Flooded suction port installation of the pumps is recommended in the case of circuits with high flow rates and pressures.

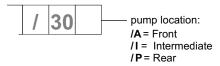
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13 - MULTIPLE PUMPS

The PVD pumps from size 28 and up are designed to be connected one to the other in decreasing order of displacement. They can be combined also with PVA type pumps (see catalogue 14 200) 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 this type of applications.

IDENTIFICATION CODE FOR MULTIPLE PUMPS

Fill the ordering code, following the coupling sequence of the pumps. Insert the suffix that shows the pump position at the end of each PVD pump identification code.

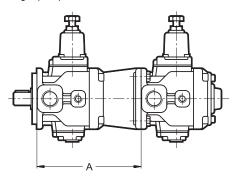


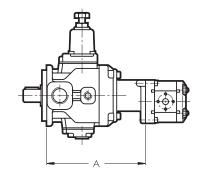
identification code 1st pump identification code 2nd pump

identification code 3rd pump (omit for single pumps)

Double pump identification example: PVD35HQ/30/V/A + PVD28H/30/V/P
Triple pump identification example: PVD90H/30/A + PVD35HQ/30/I + PVD28H/30/P
PVD pump + GP pump identification example: PVD35HQ/30/A + GP1-0061R97F/20N

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





Max. torque applied to the shaft of the second pump (Nm)						
size group Primary pump	Second pump (same size group)	Second pump (smaller size group)				
PVD 28/35	43	-				
PVD 45/56/72	113	113				
PVD 90/115/145	186	113				

dimension A (mm)						
with PVD pump (same size group)	With gear pump type:					
207	GP1 and GP2	196				
275	GP1 and GP2	262				
315	GP1 and GP2	287				

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0610713

0610720

0610714

0610721

SAE - 1"

SAE - 1 1/4"

SAE - 1 1/2"

SAE - 2"

345

276

207

207

1" BSP

1 1/4" BSP

1 1/2" BSP

2" BSP

25

32

38

51

18

21

25

25

PVD

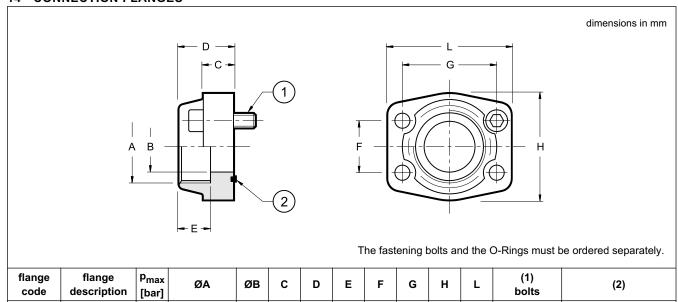
OR 4131 (32.93x3.53)

OR 4187 (47.22x3.53)

OR 4225 (56.74x3.53)

SHC M10x35 OR 4150 (37.69x3.53)

14 - CONNECTION FLANGES



22

22

24

30

38

41

44

45

26.2

30.2

35.7

43

52.4

58.7

70

77.8

22

68

78

90

70

79

93

102

N. 4

N. 4 SHC M12x45

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