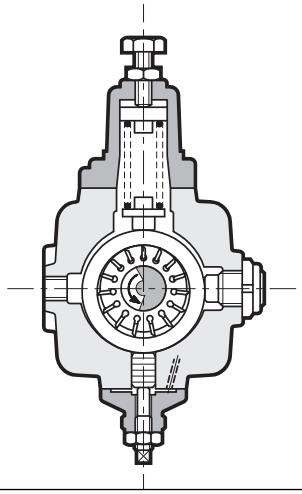
PVD

VARIABLE DISPLACEMENT VANE PUMPS WITH DIRECT PRESSURE ADJUSTER

OPERATING PRINCIPLE



— The PVD pumps are variable displacement vane pumps with mechanical pressure compensator.

— 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 instantaneously, adjusting the flow rate to the values required by the plant.

— Energy consumption is reduced and adequate in every phase of the cycle.

— The pump group has hydrostatic axial compensation distribution plates, that improve the volumetric efficiency and reduce wear of the components.

— In zero flow demand conditions, the pump delivers fluid only to compensate any possible leaks and pilot lines, keeping constant the circuit pressure .

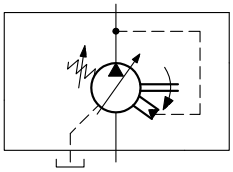
— The compensator response times are very low such as to make unnecessary the pressure relief valve.

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

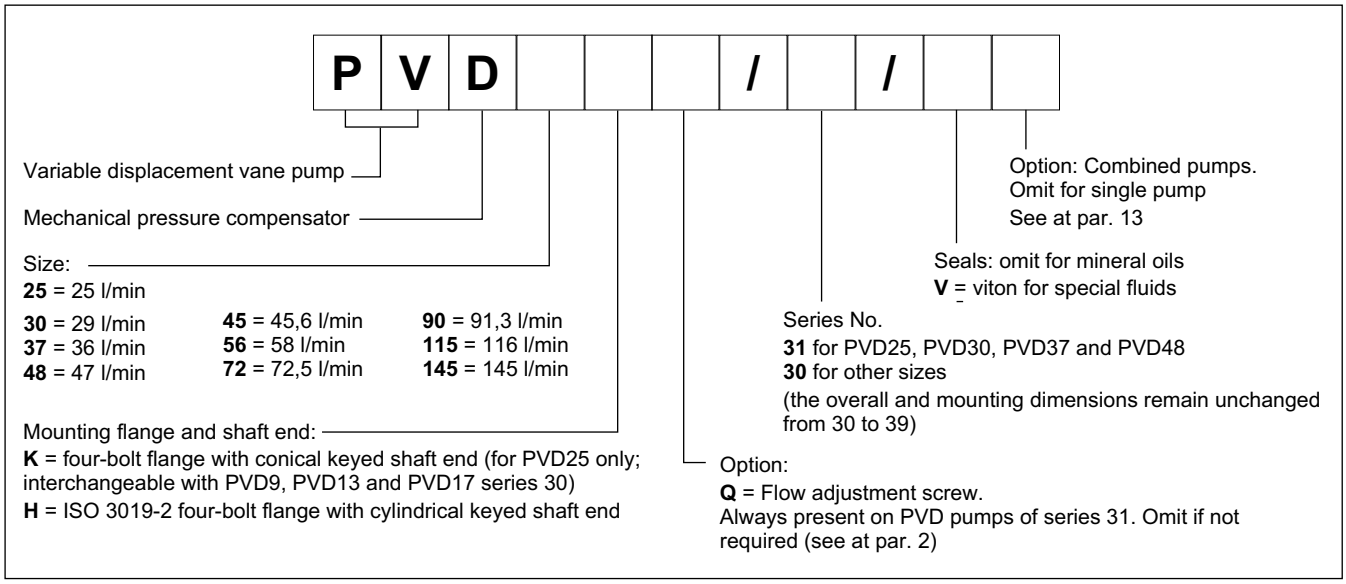
PVD sizes		**25**	**30**	**37**	**48**	**45**	**56**	**72**	**90**	**115**	**145**
Geometric displacement (UNI ISO 3662)	cm^3/rev	16	20	25	32	31,5	40	50	63	80	100
Actual displacement (±3%)	cm^3/rev	17,9	22,8	28,1	34,5	34,5	42,8	53,1	69	86,2	105,5
Maximum flow at 1450 rpm	l/min	25	30	36	47,5	45,6	58	72,5	91,3	116	145
Max working pressure	bar	120	100			100			80		
Pressure adjustment range	bar	20 ÷ 120	30 ÷ 100			30 ÷ 100			30 ÷ 80		
Maximum drain port pressure allowed	bar	1									
Rotation speed range	rpm	800 ÷ 1800									
Rotation direction		clockwise (seen from the shaft side)									
Shaft loads		radial and axial loads are not allowed									
Max applicable torque on shaft: version H version K	Nm	110 70	250 -			400 -			740 -		
Mass	kg	7,3	18,3			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, PVD30, PVD37 and PVD48 pumps, whereas is optional for 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. Indicative data, sensitive to performance tolerances.

Size		**25**	**30**	**37**	**48**	**45**	**56**	**72**	**90**	**115**	**145**
Reduction of displacement per turn	cm^3	9,7	12,8			16,4			23,8		
Minimum possible displacement	cm^3/rev	3,1	14	19,1	24,2	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 30, 37 and 48: adjustment screw hexagon socket key 6. Tooth retainer KM1 type.
PVD 45 and 90 to 145: square head screw, spanner 7. Tooth retainer KM1 type.

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 °C
optimum viscosity	22 ÷ 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.

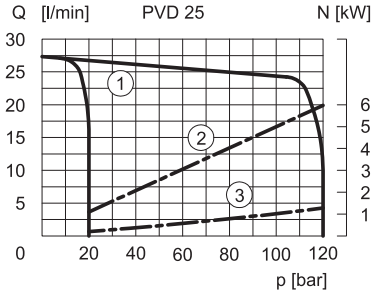
3.3 - Degree of fluid contamination

The maximum degree of fluid contamination must be according to ISO 4406:1999 class 20/18/15; therefore, use of a filter with $\beta_{20} \geq 75$ 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 suction filter must be equipped with a by-pass valve and, if possible, with a clogging indicator. See intallation section for details.

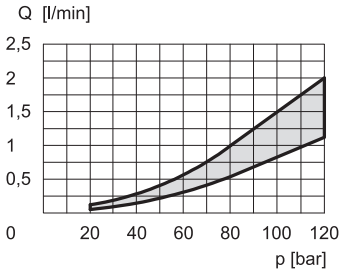
4 - PVD25 CHARACTERISTIC CURVES (obtained with viscosity of 36 cSt at 50°C)

FLOW RATE - PRESSURE - ABSORBED POWER

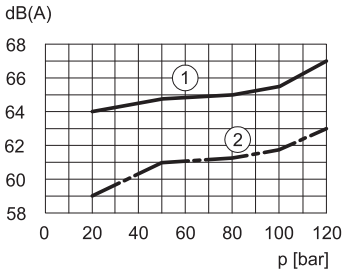


1) Flow rate - pressure curves, measured at 1500 rpm
2) Absorbed power at the maximum flow rate
3) Absorbed power at zero flow rate

DRAINAGE FLOW RATE



NOISE LEVEL

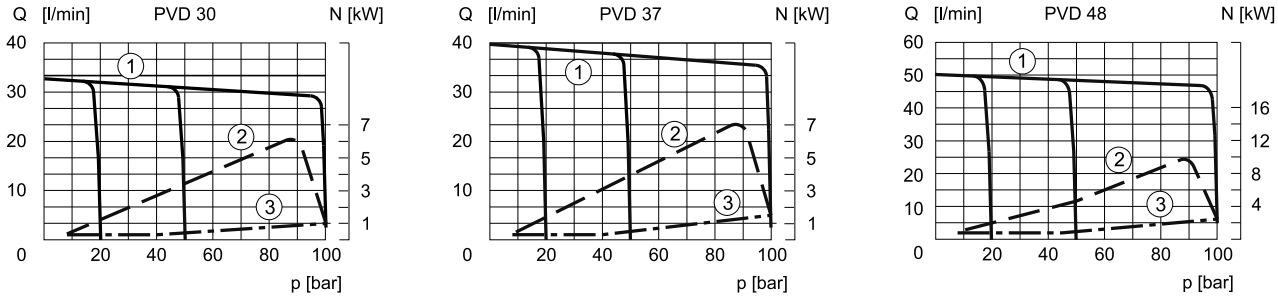


Approximate maximum values of noise level to minimum and maximum flow rate measured with the sound-level meter placed at one meter from pump coupling with flexible coupling.

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

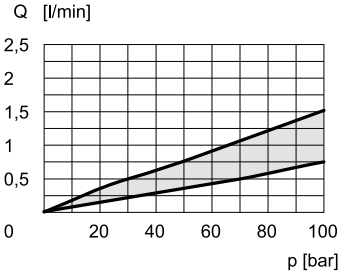
5 - PVD30, PVD37, PVD48 CHARACTERISTIC CURVES (obtained with viscosity of 36 cSt at 50°C)

FLOW RATE - PRESSURE - ABSORBED POWER

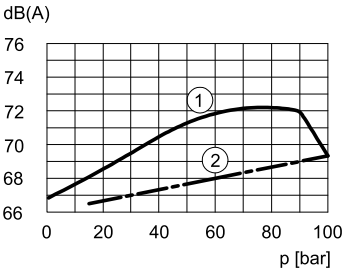


1) Flow rate - pressure curves, measured at 1500 rpm
2) Absorbed power at the maximum flow rate
3) Absorbed power at zero flow rate

DRAINAGE FLOW RATE



NOISE LEVEL

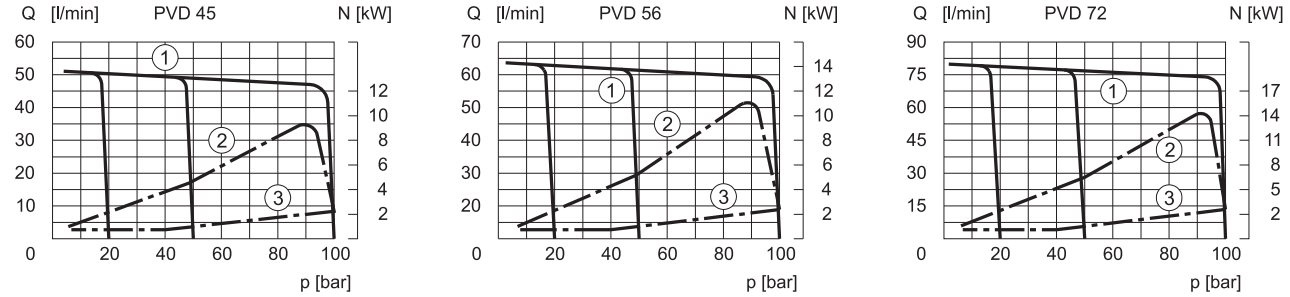


Approximate maximum values of noise level to minimum and maximum flow rate measured with the sound-level meter placed at one meter from pump coupling with flexible coupling.

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

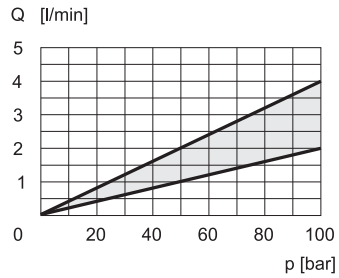
6 - PVD45, PVD56 and PVD72 CHARACTERISTIC CURVES (values obtained with mineral oil with viscosity of 36 cSt at 50°C)

FLOW RATE - PRESSURE - ABSORBED POWER

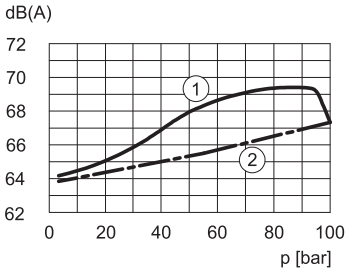


1) Flow rate - pressure curves, measured at 1450 rpm
2) Absorbed power at the maximum flow rate
3) Absorbed power at zero flow rate

DRAINAGE FLOW RATE



NOISE LEVEL

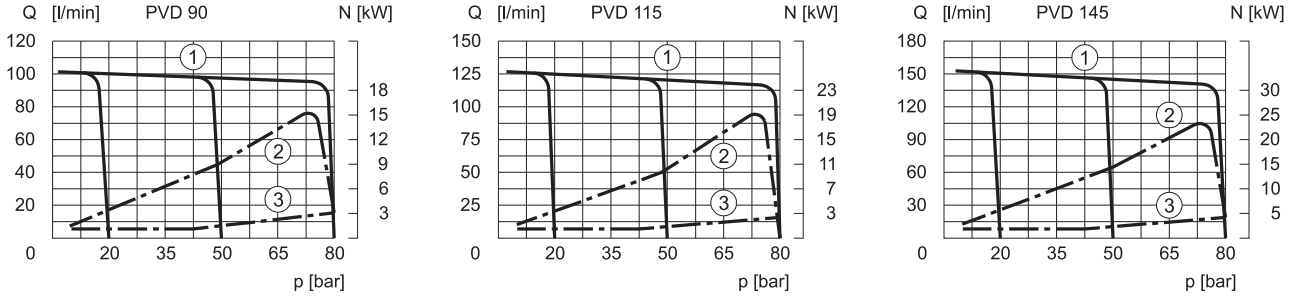


Approximate maximum values of noise level to minimum and maximum flow rate measured with the sound-level meter placed at one meter from pump coupling with flexible coupling.

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

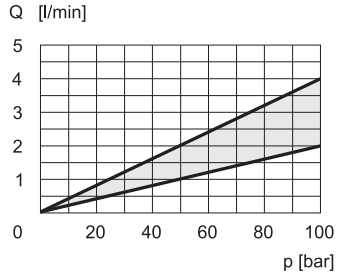
7 - PVD90, PVD115 and PVD145 CHARACTERISTIC CURVES (values obtained with viscosity of 36 cSt at 50°C)

FLOW RATE - PRESSURE - ABSORBED POWER

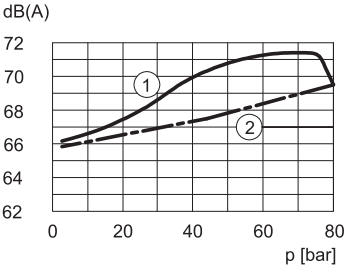


1) Flow rate - pressure curves, measured at 1450 rpm
2) Absorbed power at the maximum flow rate
3) Absorbed power at zero flow rate

DRAINAGE FLOW RATE



NOISE LEVEL



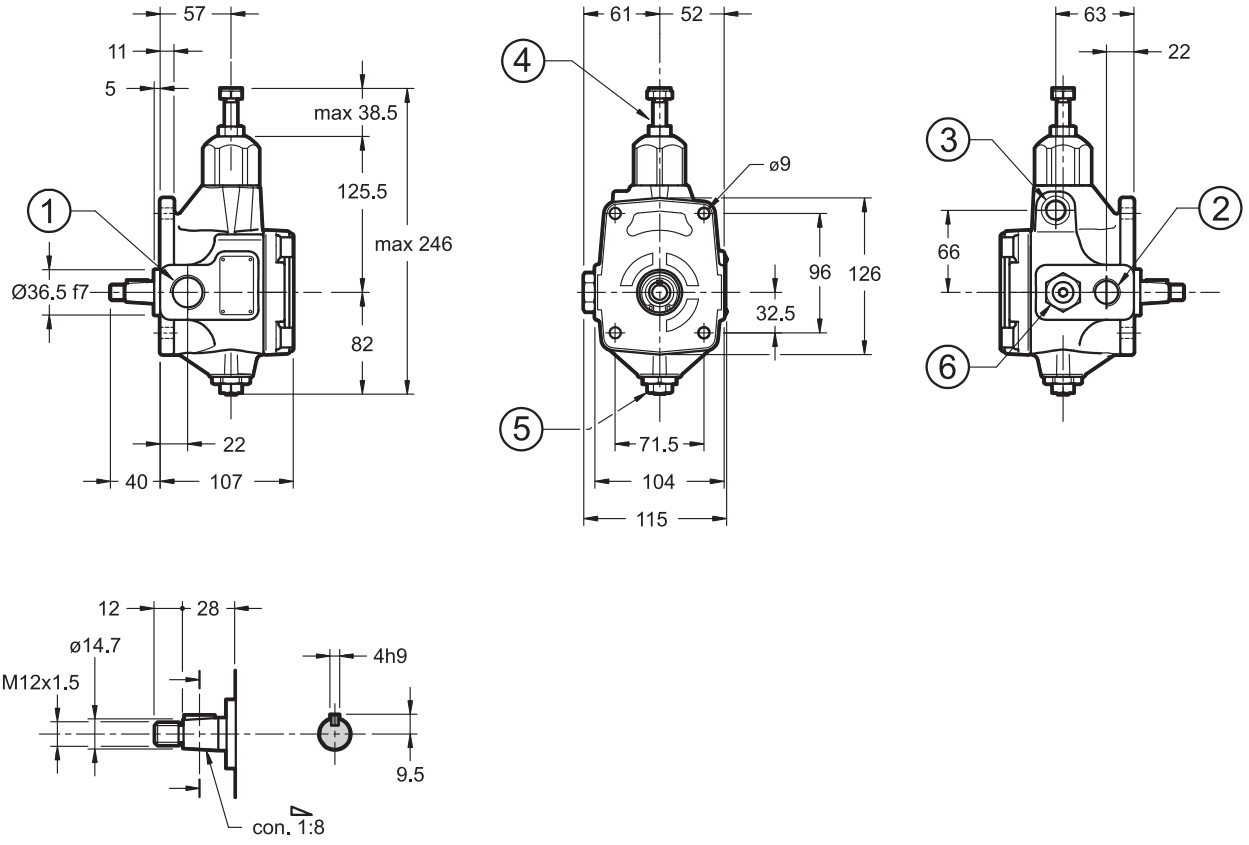
Approximate maximum values of noise level to minimum and maximum flow rate measured with the sound-level meter placed at one meter from pump coupling with flexible coupling.

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

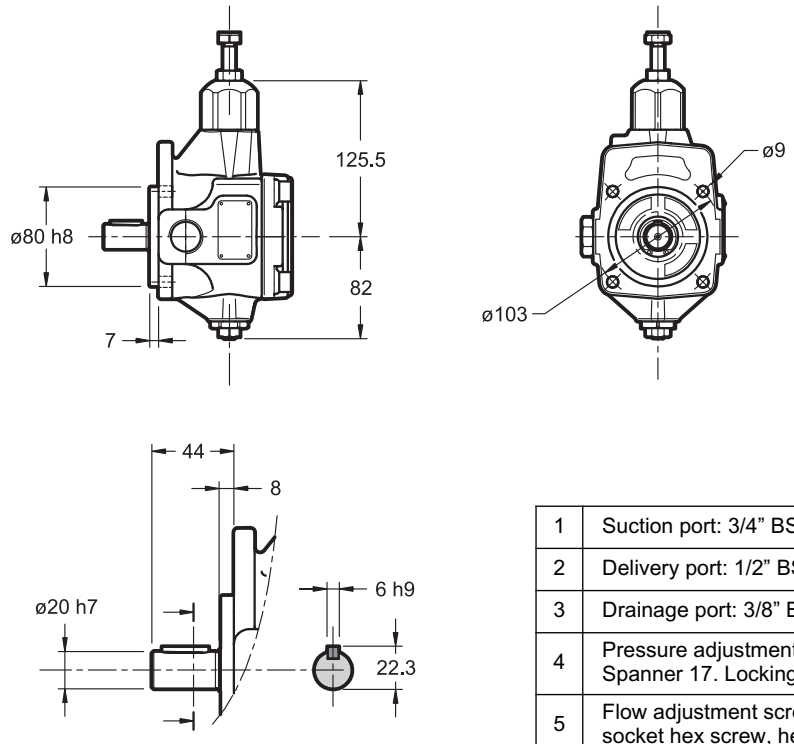
8 - PVD25 OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

PVD25K



PVD25H

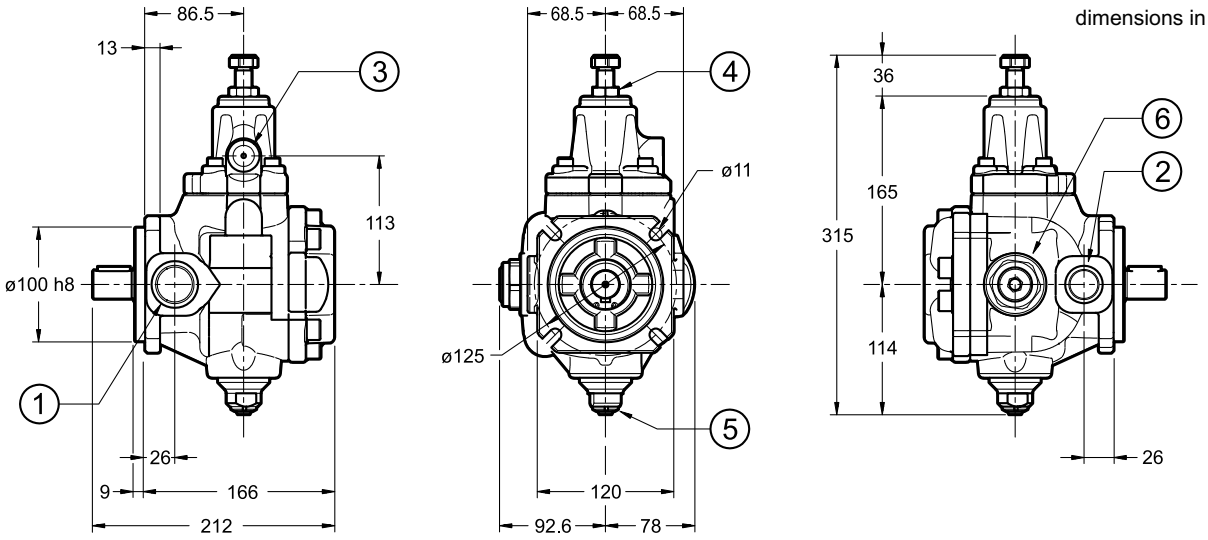


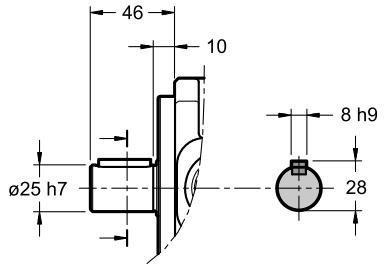
for non quoted dimensions
refer to the drawing PVD25K

1	Suction port: 3/4” BSP
2	Delivery port: 1/2” BSP
3	Drainage port: 3/8” BSP
4	Pressure adjustment screw. Rotate clockwise to increase pressure. Spanner 17. Locking nut : spanner 17.
5	Flow adjustment screw. Rotate clockwise to decrease flow. socket hex screw, hex key 5.Locking nut: spanner 17.
6	Guide block balancing adjustment screw. **Do not tamper.**

9 - PVD30, PVD37 AND 48 OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

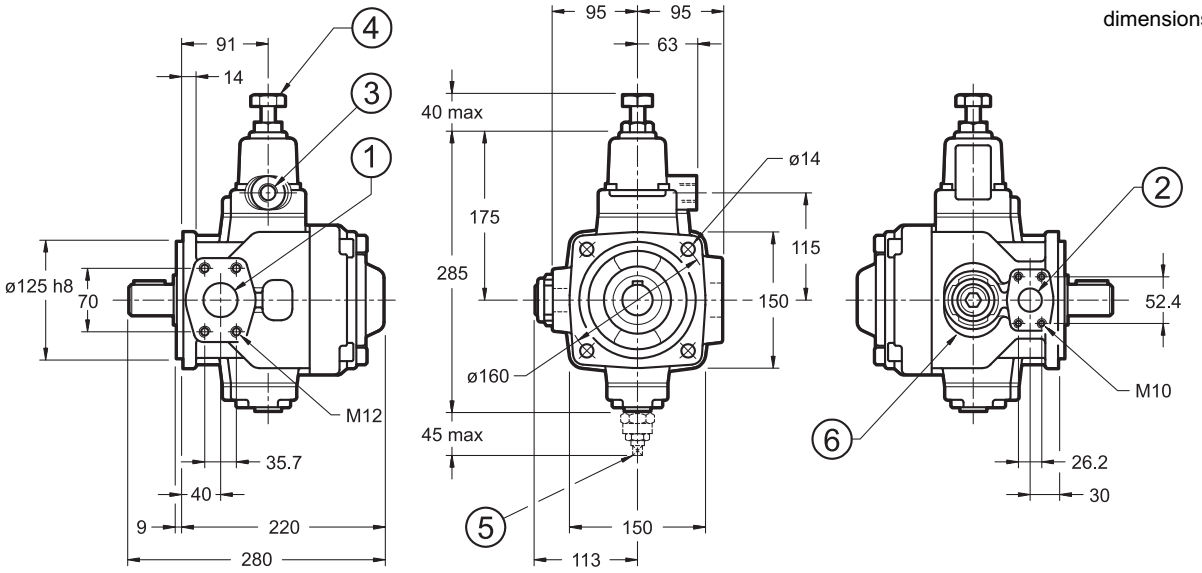


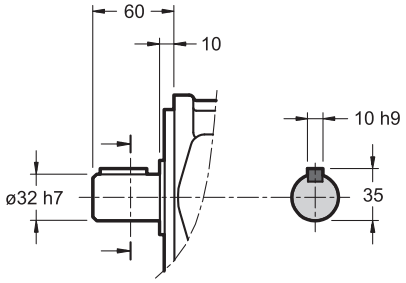


1	Suction port: 1” BSP
2	Delivery port: 3/4” BSP
3	Drainage port: 1/2” BSP
4	Pressure adjustment screw. Rotate clockwise to increase pressure. Spanner 22. Locking nut : spanner 22.
5	Flow adjustment screw. Rotate clockwise to decrease flow. Socket hex screw, Hex key 6. Retainer KM1 type.
6	Guide block balancing adjuster. **Do not tamper.**

10 - PVD45, PVD56 AND PVD72 OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

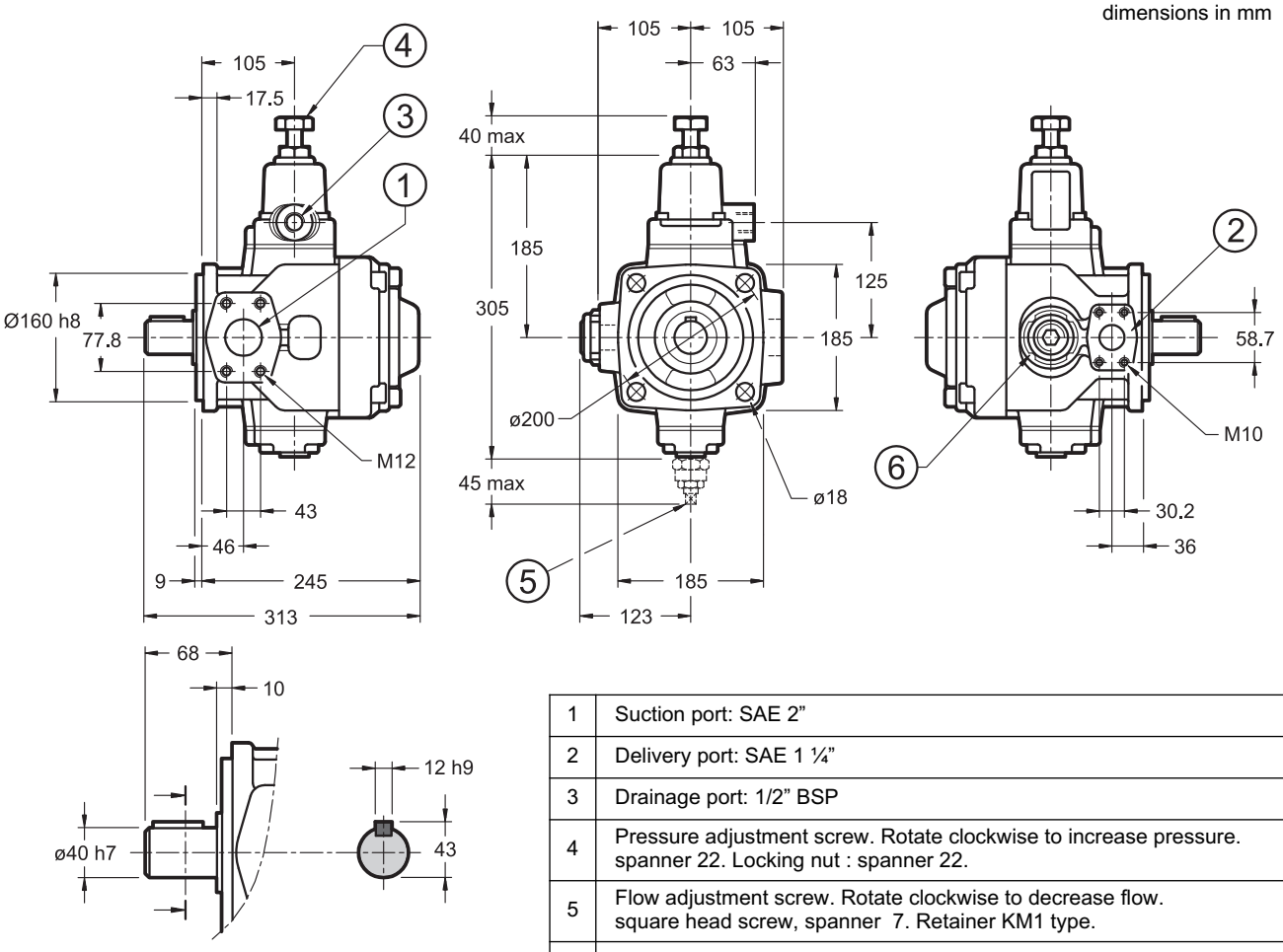




1	Suction port: SAE 1 1/2”
2	Delivery port: SAE 1”
3	Drainage port: 1/2” BSP
4	Pressure adjustment screw. Rotate clockwise to increase pressure. Spanner 22. Locking nut : spanner 22.
5	Flow adjustment screw. Rotate clockwise to decrease flow. square head screw, spanner 7. Retainer KM1 type.
6	Guide block balancing adjuster. **Do not tamper.**

11 - PVD90, PVD115 AND PVD145 OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



1	Suction port: SAE 2”
2	Delivery port: SAE 1 ¼”
3	Drainage port: 1/2” BSP
4	Pressure adjustment screw. Rotate clockwise to increase pressure. spanner 22. Locking nut : spanner 22.
5	Flow adjustment screw. Rotate clockwise to decrease flow. square head screw, spanner 7. Retainer KM1 type.
6	Guide block balancing adjuster. **Do not tamper.**

12 - INSTALLATION

The instruction manual for pumps installation and commissioning is always included in the packaging with the pump. Observe restrictions in this document and follow the instructions.

— PVD25, PVD30, PVD37 and PVD48 can be installed in any position.
PVD45, PVD56, PVD72, PVD90, PVD115 and PVD145 must be installed with the axis in horizontal position and with the pressure compensator upward.

— Motor-pump coupling must be made with a self-aligning flexible coupling with convex teeth and a polyamide cam. 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° with a small number of bends and without internal section changes. The minimum section of the inlet pipe must be equal to the section of the thread of the pump inlet port.

The pipe-end inside the tank should be cut at 45°, should have a minimum distance from the tank bottom of not less than 50 mm, and there should always be a minimum height of suction of 100 mm. The suction pipe should be completely airtight in order to avoid air intake which could be extremely damaging to 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 with no pressure, to purge the air.
The pump should prime within 5 seconds. If it does not, switch it off and investigate the cause. The pump should not run empty.

— If the volume adjuster has been setfor values less than 50% of the nominal flow-rate, start-up is allowed only if provided the system and pump are fully filled of fluid.

— **It’s essential that the difference between the fluid temperature and the ambient (pump body) temperature doesn’t exceed 20 °C.**
If this is the case, the pump should be switched-on only for intervals of about 1-2 seconds (start/stop mode) without pressure, until the temperatures came balanced.

— The pumps are usually placed directly upon the oil tank. Flooded suction port installation of the pump is recommended in the event of circuits with high flow rates and pressures.

13 - MULTIPLE PUMPS

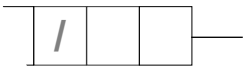
The PVD pumps from size 30 and up are designed to be connected one to the other in decreasing order of displacement.

Only the PVD25H (ISO 3019-2 four-bolt flange with cylindrical keyed shaft end) pump can be coupled.

PVD pumps can be coupled 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.

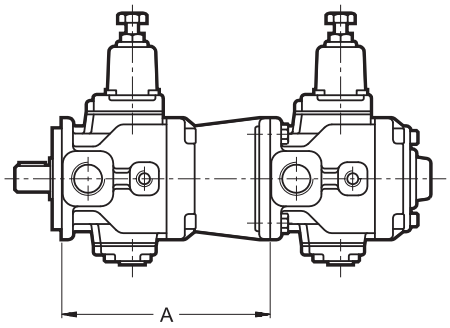


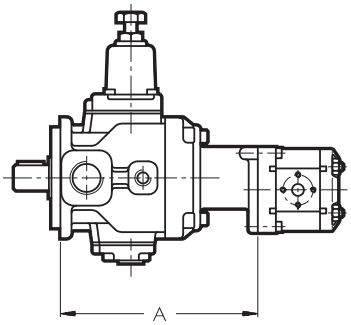
pump location:
/A = Front
/I = Intermediate
/P = Rear

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

Double pump identification example: PVD25HQ/31/V **/A +** PVD25HQ/31/V **/P**
Triple pump identification example: PVD30HQ/31 **/A +** PVD30HQ/31 **/I +** PVD30HQ/31 **/P**
PVD pump + GP pump identification example: PVD56H/30 **/A +** GP2-00208R97F/20N

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

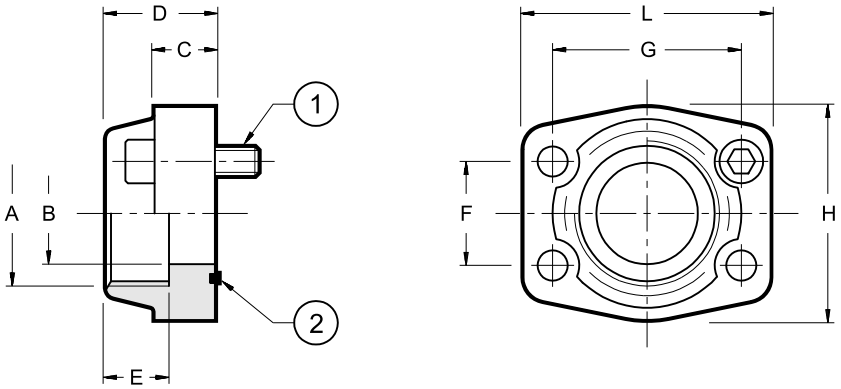




Max. torque applied to the shaft of the second pump (Nm)			dimension A (mm)	
size group Primary pump	Second pump (same size group)	Second pump (smaller size group)	with PVD pump (same size group)	With gear pump type GP1 / GP2
PVD25	55	-	177	168 / 176
PVD 30/37/48	55	55	238	227 / 235
PVD 45/56/72	110	110	275	263 / 263
PVD 90/115/145	180	110	315	288 / 288

14 - CONNECTION FLANGES

dimensions in mm



The fastening bolts and the O-Rings must be ordered separately.

flange code	flange description	p_{max} [bar]	ØA	ØB	C	D	E	F	G	H	L	(1) bolts	(2)
0610713	SAE - 1”	345	1” BSP	25	18	38	22	26.2	52.4	22	70	N. 4 SHC 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 SHC 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)