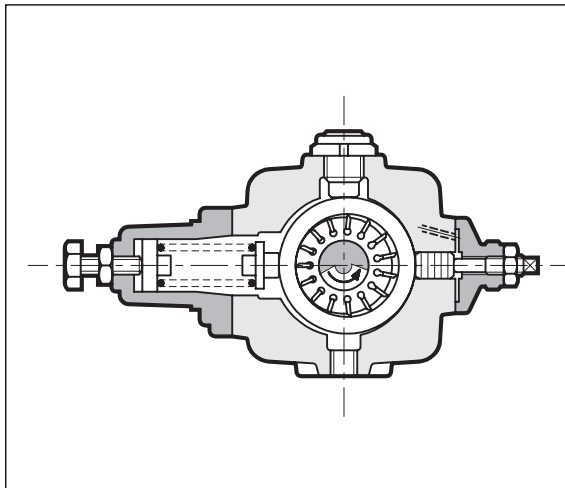**DUPLOMATIC HYDRAULICS**

PVD
VARIABLE DISPLACEMENT VANE PUMPS
SERIES 30

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 operates with the principle of keeping 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.

— Also available is the version with maximum flow adjustment PVD***Q

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

PVD pump nominal dimension			9	13	17	22	28	35	45	56	72	90	115	145
Displacement	cm³/rev		6,3	10	12,5	16	20	25	31,5	40	50	63	80	100
Maximum flow rate (at 1450 rpm)	l/min		8.7	14.5	17.4	23.2	29	36.2	45.6	58	72.5	91.3	116	145
Maximum operating pressure	bar		150			100						80		
Pressure adjustment range	Version H		30 - 100									30 - 80		
	Version K	bar	80-150			–								
Maximum pressure on the drainage port	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											
Maximum applicable torque on shaft	Nm		70			197			400			740		
Mass	kg		6.5			12			32			44		

Ambient temperature range	°C		–20 / +50
Fluid temperature range	°C		–10 / +70
Fluid viscosity range	see par. 2.2		
Recommended viscosity	cSt		25 ÷ 50
Degree of fluid contamination	see par. 2.3		

HYDRAULIC SYMBOL

1 - IDENTIFICATION CODE

P	V	D				/	30	/		/	

Variable displacement vane pump

Size
9 =	8,7 l/min	**45** =	45,6 l/min
13 =	14,5 l/min	**56** =	58 l/min
17 =	17,4 l/min	**72** =	72,5 l/min
22 =	23,2 l/min	**90** =	91,3 l/min
28 =	29 l/min	**115** =	116 l/min
35 =	36,2 l/min	**145** =	145 l/min

Pressure adjustment range
– **H** = 30 ÷ 100 bar (excluded PVD 90/115/145)
     30 ÷ 80 bar (only for PVD 90/115/145)
– **K** = 80 ÷ 150 bar (only for PVD 9/13/17)

Pump position (add for multiple pumps only) :
A = Front
I = Intermediate
P = Rear

Seals: omit for mineral oils
V = viton for special fluids

Series No.
(the overall and mounting dimensions remain unchanged from 30 to 39)

Q = max flow adjuster (omit if not required)

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 %)	- 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.
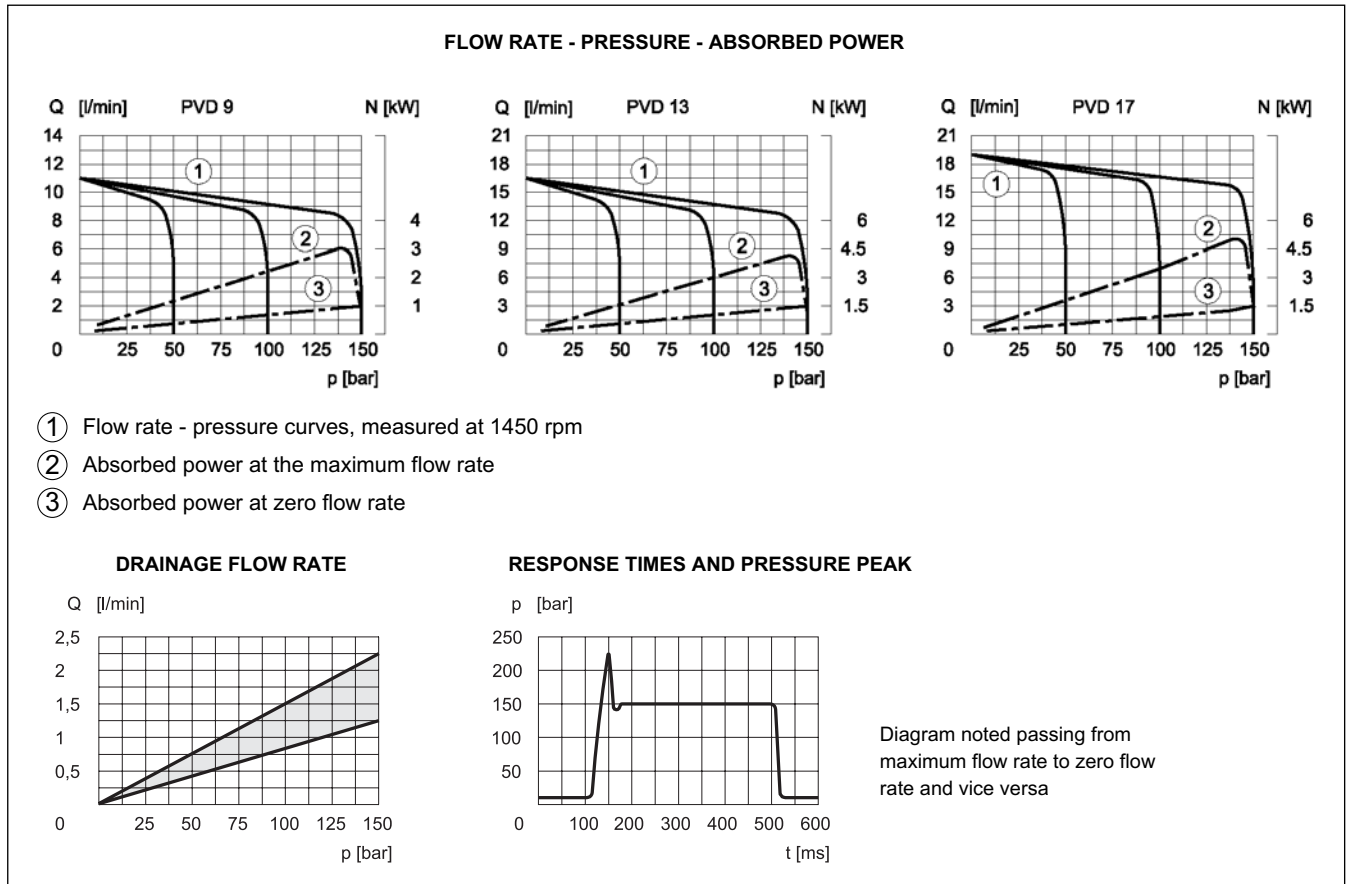
2.3 - Degree of fluid contamination

The maximum degree of fluid contamination must be according to ISO 4406:1999 class 20/18/15; therefore, use of a filter with β_{20} ≥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 β_{10} ≥100 is recommended.
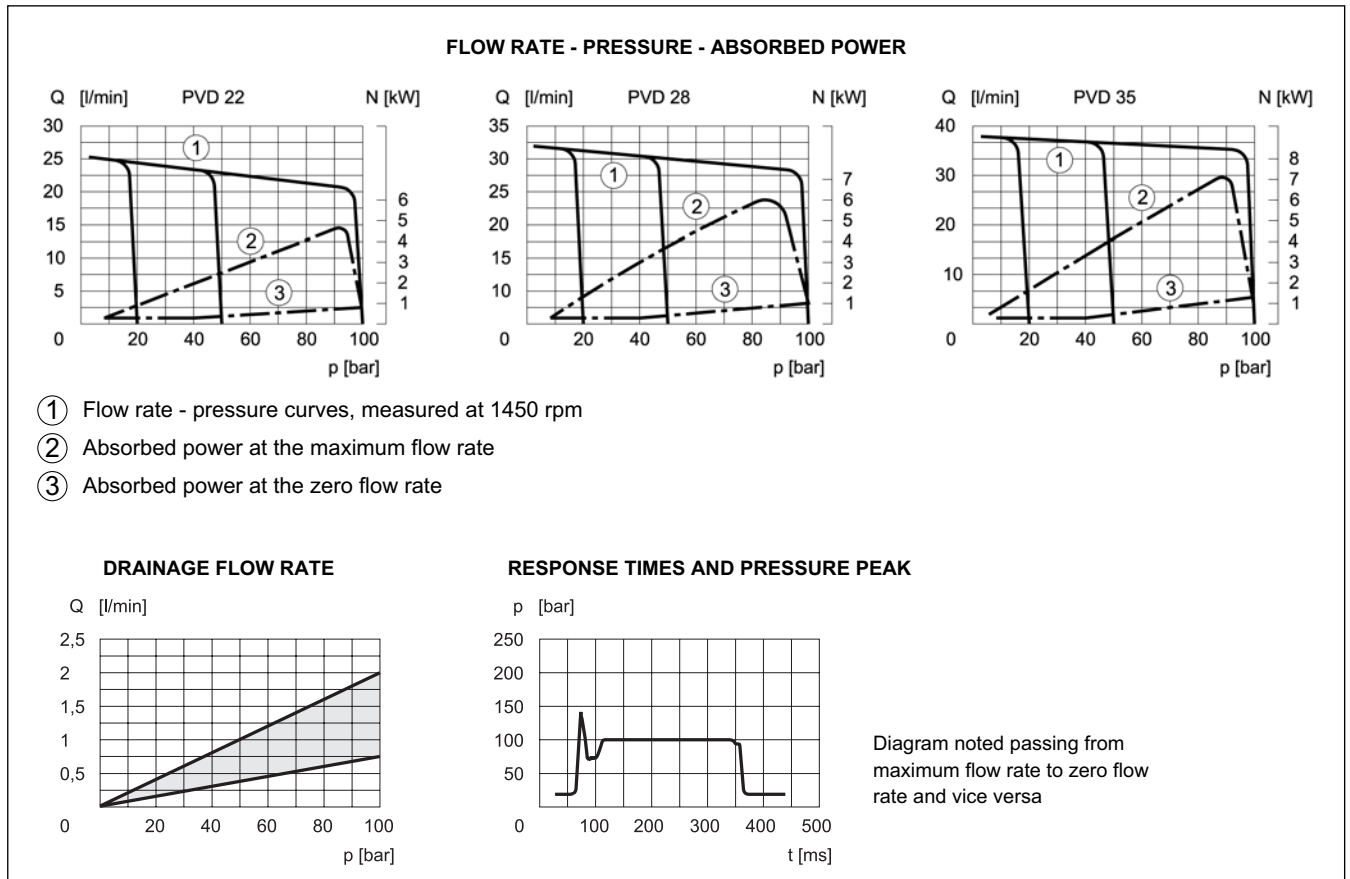
If there is a filter installed on the suction line, be sure that the pressure at the pump inlet is not lower than the values specified in paragraph 13. The suction filter must be equipped with a by-pass valve and, if possible, with a clogging indicator.
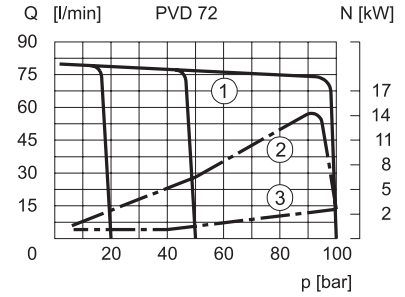
PVD
SERIES 30

3 - PVD - 9/13/17 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 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 - PVD - 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

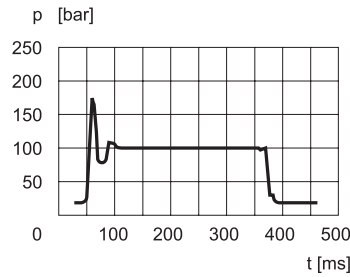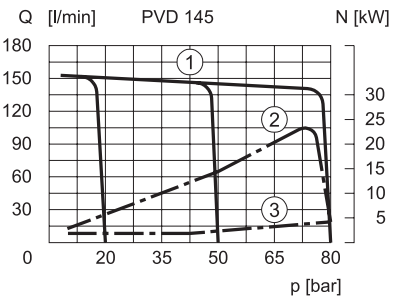**DRAINAGE FLOW RATE**

RESPONSE TIMES AND PRESSURE PEAK

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

14 100/107 ED

5 - PVD - 45/56/72 CHARACTERISTIC CURVES (values obtained with mineral oil with viscosity of 36 cSt at 50°C)
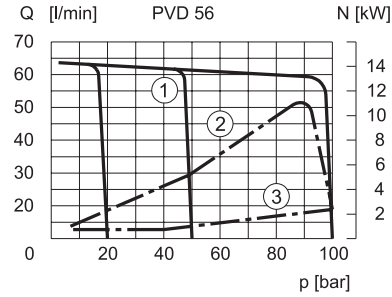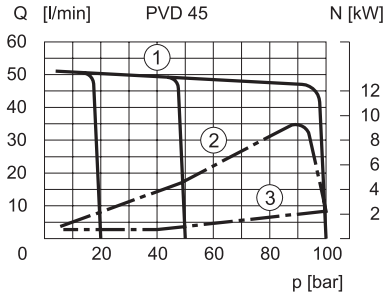
FLOW RATE - PRESSURE - ABSORBED POWER

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
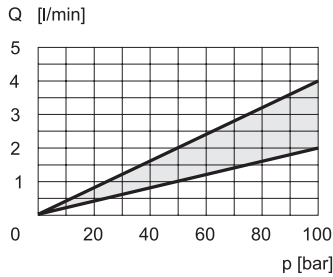
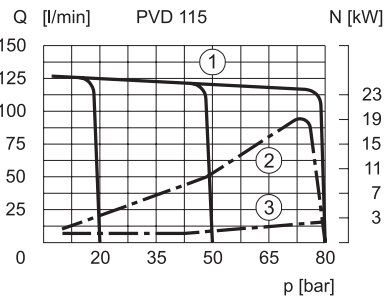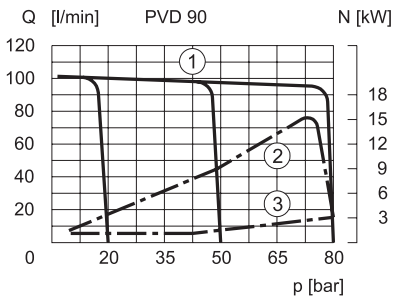**RESPONSE TIMES AND PRESSURE PEAK**

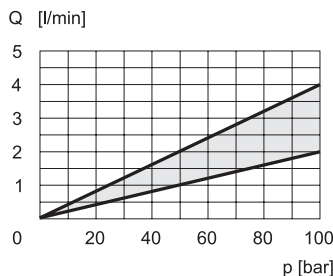Diagram noted passing from maximum flow rate to zero flow rate and vice versa

6 - PVD - 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 pressure at the maximum flow rate

③ Absorbed pressure at zero flow rate

DRAINAGE FLOW RATE
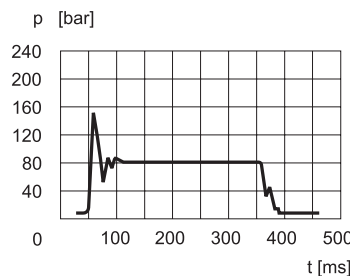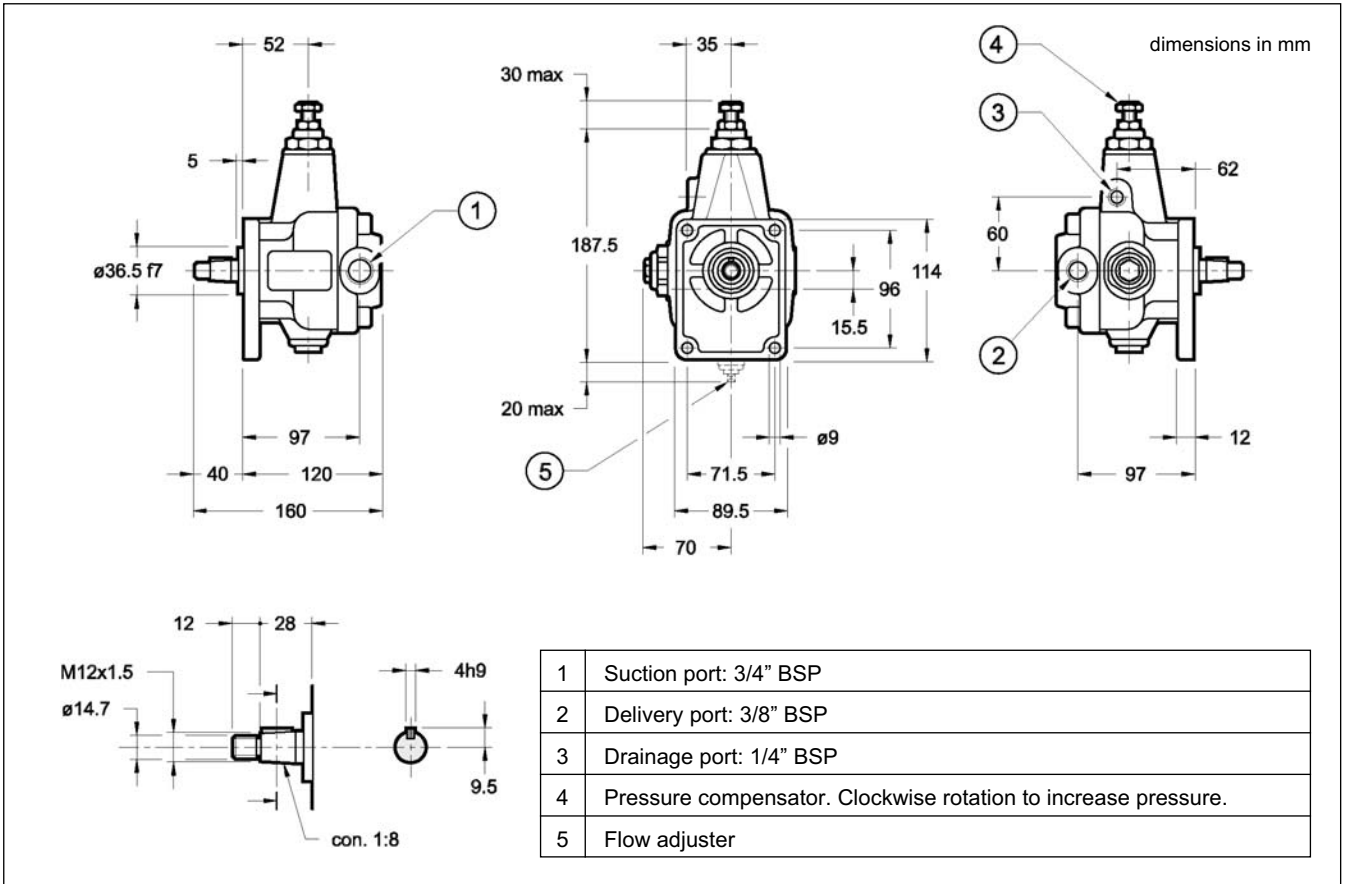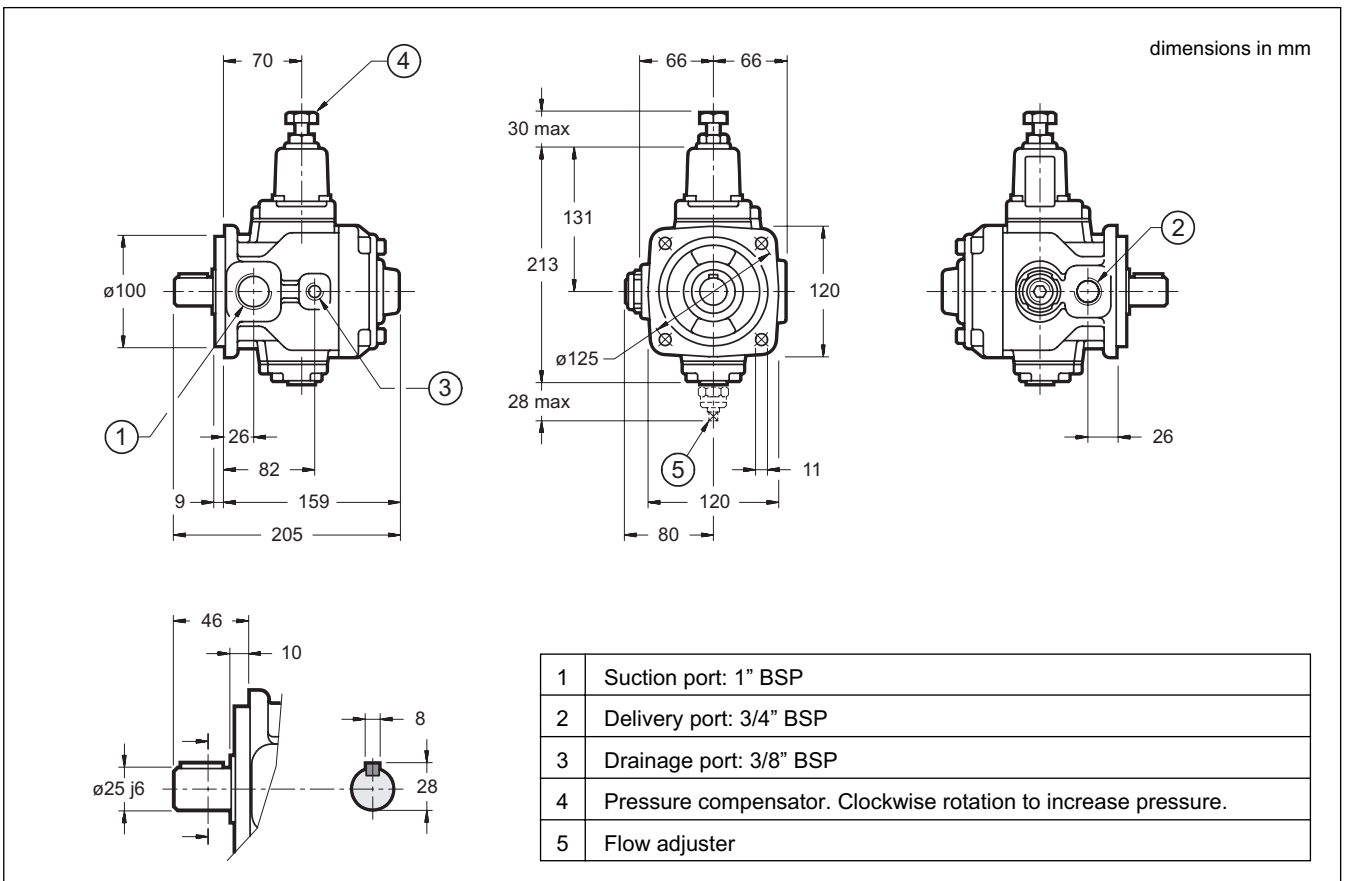

RESPONSE TIMES AND PRESSURE PEAK

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

7 - PVD - 9/13/17 OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

1	Suction port: 3/4" BSP
2	Delivery port: 3/8" BSP
3	Drainage port: 1/4" BSP
4	Pressure compensator. Clockwise rotation to increase pressure.
5	Flow adjuster

8 - PVD - 22/28/35 OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

1	Suction port: 1" BSP
2	Delivery port: 3/4" BSP
3	Drainage port: 3/8" BSP
4	Pressure compensator. Clockwise rotation to increase pressure.
5	Flow adjuster

9 - PVD - 45/56/72 OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

1	Suction port: flange SAE 1 1/2"	
2	Delivery port: flange SAE 1"	
3	Drainage port: 1/2" BSP	
4	Pressure compensator. Clockwise rotation to increase pressure.	
5	Flow adjuster	
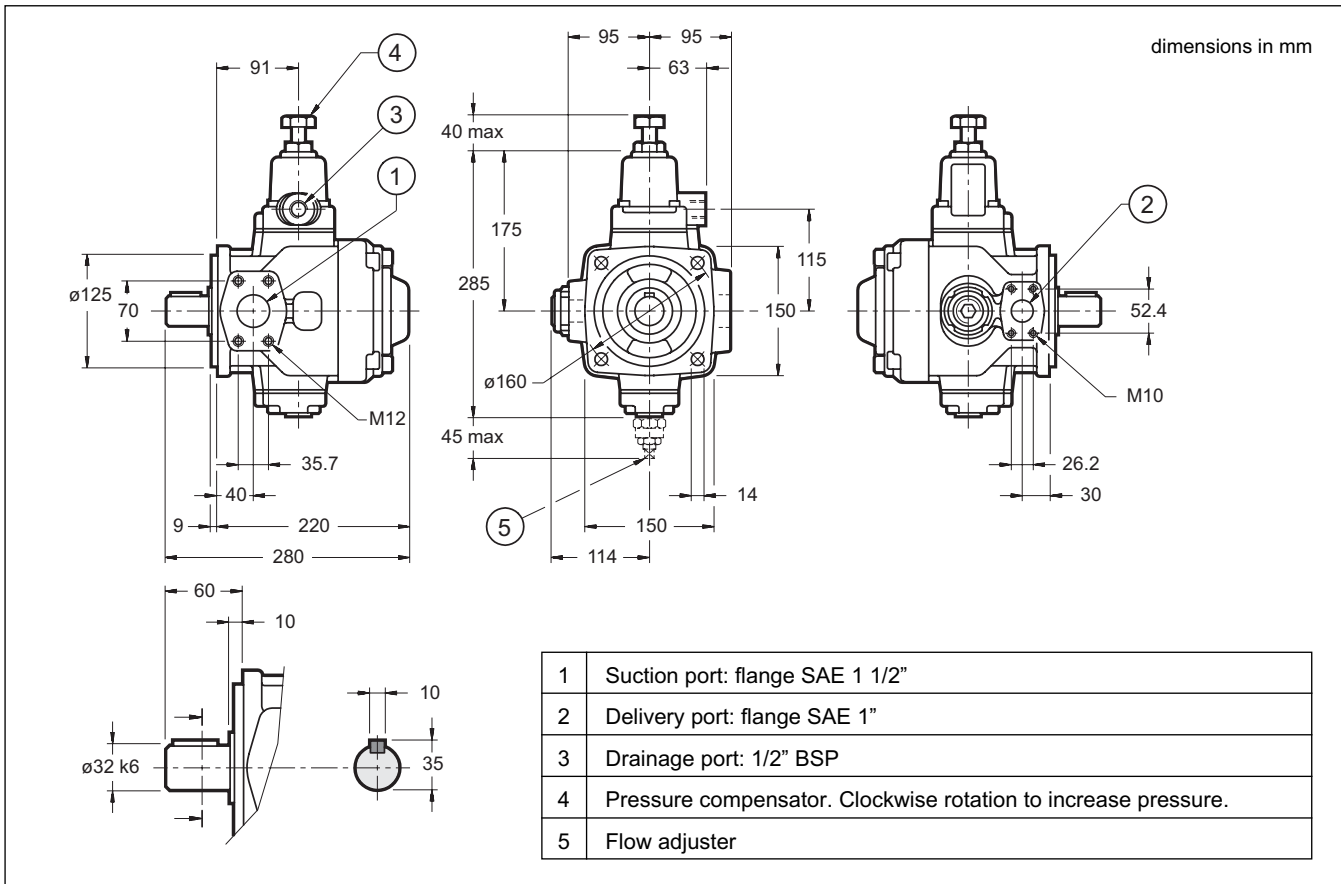
10 - PVD - 90/115/145 OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

1	Suction port: flange SAE 2"	
2	Delivery port: flange SAE 1 1/4"	
3	Drainage port: 1/2" BSP	
4	Pressure compensator. Clockwise rotation to increase pressure.	
5	Flow adjuster	
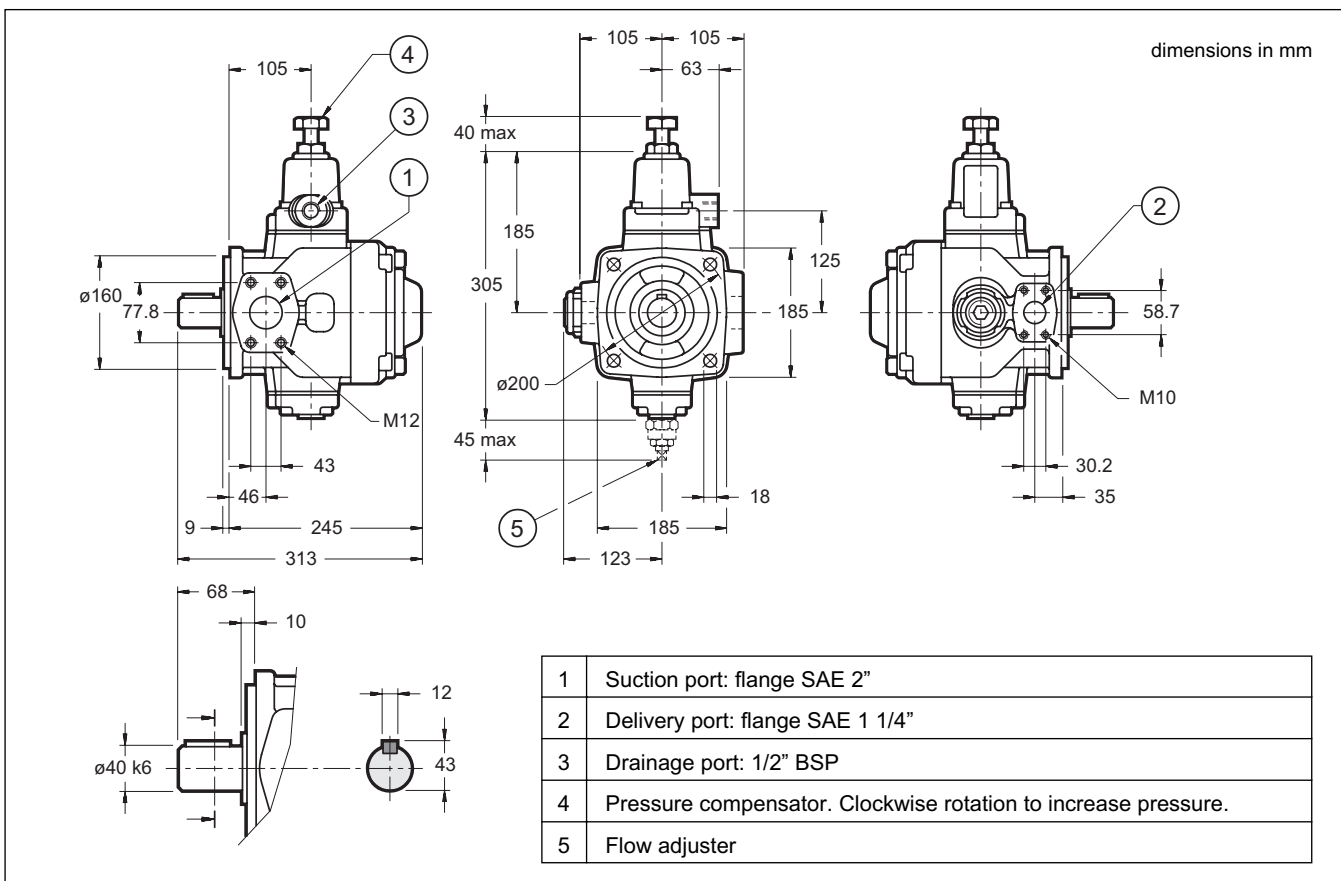
11 - INSTALLATION

— 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.

12 - PVD***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.

13 - MULTIPLE PUMPS

The PVD pumps are designed to be connected one to the other in descending order of displacement. They can be connected 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 applications of this type.

IDENTIFICATION CODE FOR MULTIPLE PUMPS
identification code   +   identification code   +   identification code
   1st pump   2nd pompa   3rd pump
                                                                 (omit for single pumps)
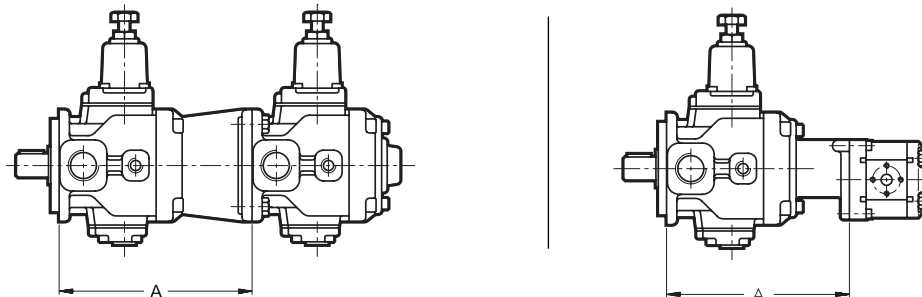
Double pump identification example: **PVD 35 HQ / 30/A + PVD 22 H / 30/P**
Triple pump identification example: **PVD 90H / 30 / A + PVD 35 HQ / 30/I + PVD 22 H/30/P**
PVD pump + GP pump identification example: **PVD 35 HQ/30/A + GP1-0061R97F/20N**

**NOTE:** for the single pump identification codes 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 Primary pump	Second pump (same size group)	Second pump (smaller size group)	With PVD pump (same size group)	With gear pump type:	
PVD 22/28/35	43	-	207	GP1and GP2	196
PVD 45/56/72	113	113	275	GP1and GP2	262
PVD 90/115/145	186	113	315	GP1and GP2	287

14 - CONNECTION FLANGES

dimensions in mm

The fastening bolts and the O-Rings must be ordered separately.
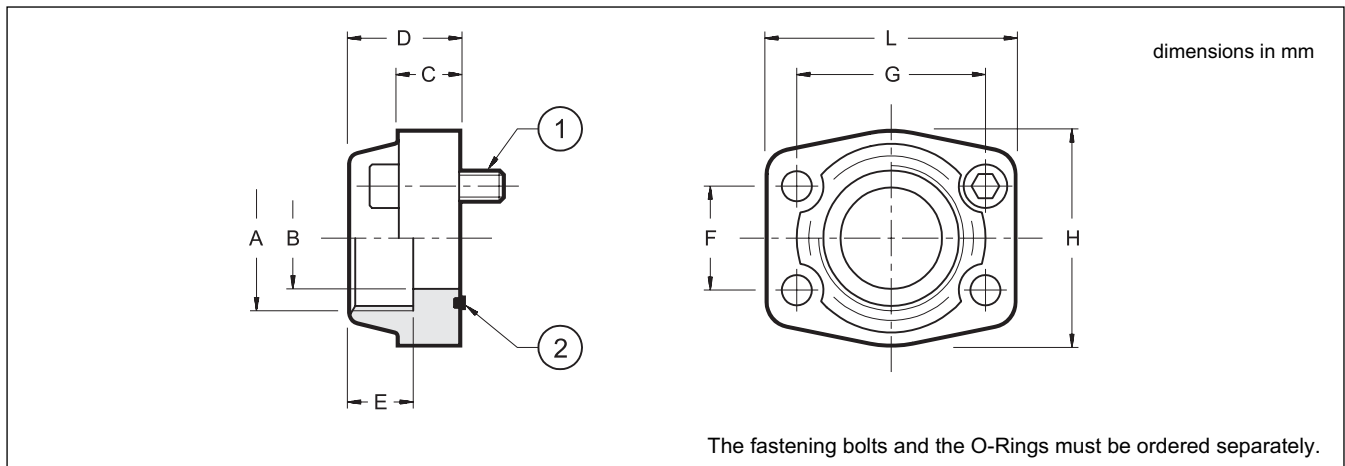
flange code	flange description	p$_{max}$ [bar]	ØA	ØB	C	D	E	F	G	H	L	①	②
0610713	SAE - 1"	345	1" BSP	25	18	38	22	26.2	52.4	22	70	N. 4 TCEI M10x35	OR 4131 (32.93x3.53)
0610720	SAE - 1 1/4"	276	1 1/4" BSP	32	21	41	22	30.2	58.7	68	79	N. 4 TCEI M10x35	OR 4150 (37.69x3.53)
0610714	SAE - 1 1/2"	207	1 1/2" BSP	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	N. 4 TCEI M12x45	OR 4225 (56.74x3.53)