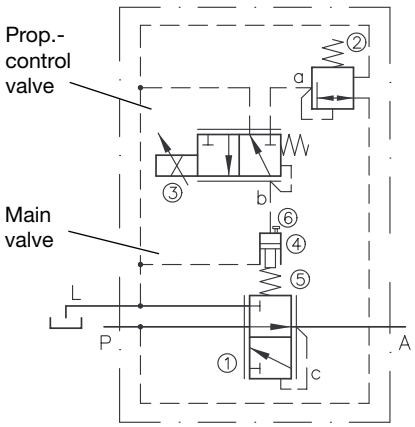
Proportional pressure reducing valve Type PDM and PDMP

Pressure p_{max} = 320 bar
Flow Q_{max} = 20 lpm

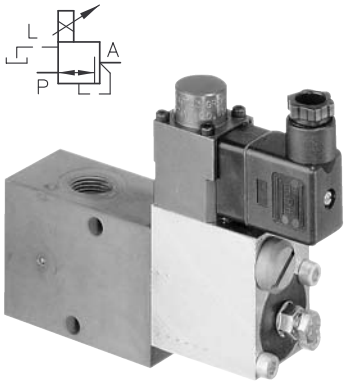
1. Design and function



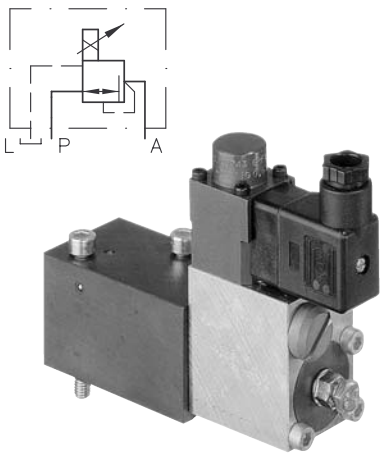
Type PDM is a indirectly actuated proportional pressure reducing valve, which produces a rather constant pressure (port A) according to the electrical input signal. Additionally it acts also as a safety valve (setting like the one for the reducing function) for the connected consumers due to its design (A → L).
It consists out of a main valve (spool valve ①, spring ⑤, and operation piston ④) and the directly mounted proportional control section (prop. pressure reducing valve ③ and a primary stage pressure reducing valve ②).
The system pressure is picked-up from the pressure inlet port P and reduced at the primary stage ② (outlet a) down to a lower, constant pressure for the control valve ③. The control valve ③ converts this pressure into an electro-proportional control pressure (outlet b) which is then conducted to the operating piston ④. The piston accordingly charges again the valve ① via the spring ②. This means that the system pressure apparent at port A is achieved via a balance of forces (control pressure (at b) x piston area ④ = downstream pressure (at c) x piston area ①).
The various pressure ranges are determined by the prop. pressure reducing valve ③ and the size of the main valve ①.
The pre-load of the spring ⑤ can be adjusted via the set screw ⑥. This allows the adjustment of a min. figure p_{min} for the proportionally adjustable pressure range upwards from 5 bar. This set min. pressure is the figure to which the pressure will drop even if the control current is reduced down to zero Ampere (apart of flow related fluctuations, see also sect 3.3).
A min. pressure of 5 bar or more is necessary for the flawless function of the proportional pressure reducing valve type PMV(P).
A proportional amplifier (e.g. EV1M2 acc. to D 7831/1 or EV1G1 acc. to D 7837) is necessary for the electric control of these valves.

2. Type coding, main data

Type PDM



Type PDMP



Coding example:

Valve for pipe mounting **PDM 21 - 43 /24**

Valve for manifold mounting **PDMP 22 - 43 /12**

Nominal voltage
Proportional solenoid

Mains	24V DC	12V DC
Coding	**/ 24**	**/ 12**

Version	Coding, basic type, size, and connection size	Main valve: Connection Thread DIN ISO 228/1 (BSPP) or nominal width P a. A	Main valve: Connection Thread DIN ISO 228/1 (BSPP) or nominal width L	Flow Q_{max} [2] guide-line (lpm)	Proportional control section [3] Coding for pressure reducing section - 41	- 42	- 43	- 44
					prop. controllable pressure range (bar) p_{min} ··· p_{max} [1]			
For pipe mounting	**PDM 11**	G 1/4	G 1/4	12	5 ... 80	5 ... 130	5 ... 200	5 ... 320
	PDM 21	G 1/4	G 1/4	20	5 ... 45	5 ... 70	5 ... 110	5 ... 180
	PDM 22	G 3/8	G 1/4	20				
For manifold mounting	**PDMP 11**	6		12	5 ... 80	5 ... 130	5 ... 200	5 ... 320
	PDMP 22	8		20	5 ... 45	5 ... 70	5 ... 110	5 ... 180

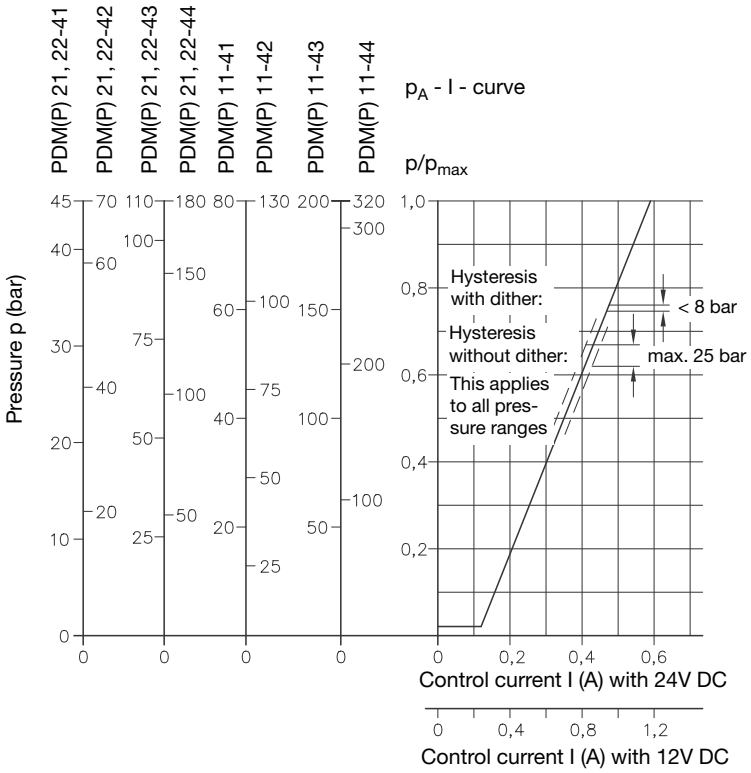
[1] 5 bar is the minimum response pressure for the primary stage
[2] Back pressure during max. flow approx. 10 bar, with 5 bar being set at 10% of Q_{max}
[3] Coding: **-2, -3, -4**:
Version with solenoid ⌀35 (ancestor) corresponds to current coding -42, -43, -44.
The main valve body is identical, enabling exchange of old to new design.
Observe the insignificantly differing data of the solenoid as well as the slimmer plug design (DIN VDE 0470)!

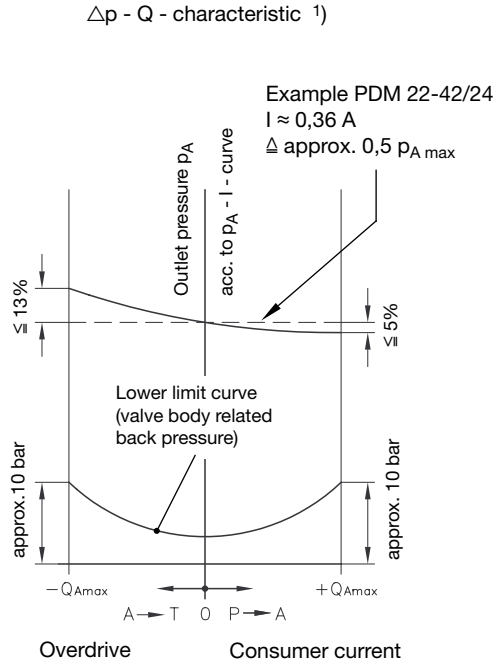
3. Other characteristic data

3.1 General and hydraulic data

Nomenclature, design	Proportional pressure reducing valve, directly controlled by operating piston, spool valve design
Mounting	Through-hole (type PDM) or manifold mounting (type PDMP). See dimensional drawings, sect. 4
Surface coating	Main valve: tuffrided Prop. control section: Zinc galvanized (solenoid zinc galvanized and olive passivized)
Mass (weight)	Type PDM 11 = approx. 1.4 kg Type PDMP 11 = approx. 1.3 kg PDM 21(22) = approx. 1.5 kg PDMP 22 = approx. 1.2 kg
Installed position	Any
Connection	Pipe thread DIN ISO 228/1 (BSPP) (depending on size) or manifold mounting (see dimensional drawings, sect. 4) Ports: P = Pressurized oil inlet L = Non-pressurized outlet (return, tank) A = Consumer
Operation pressure	Port P p_{max} 350 bar Port A p_{max} according to pressure range Port L ≤ 20 bar (Reflow, tank)
Pressure fluid	Hydraulic fluid (DIN 51524 part 1 to 3): ISO VG 10 to 68 conforming (DIN 51519) Viscosity range: min. 4, max. 1500 mm²/s; Opt. operation range: 10... 500 mm²/s. Also suitable for biodegradable pressure fluids types HEPG (Polyalkylenglycol) and HEES (Synth. Ester) at service temperatures up to +70°C.
Temperature	Ambient: -40 ... +80°C Fluid: -25 ... +80°C, Note the viscosity range! Permissible temperature during start: -40°C (Note start-viscosity!), as long as the service temperature is at least 20K (Kelvin) higher for the following operation. Biodegradable pressure fluids: Note manufacturer's specifications. By consideration of the compatibility with seal material not over +70°C.
Rec. cleanliness level	ISO 4406 17/15/12
Internal control oil consumption	max. approx. 0.5 lpm

Curves





Viscosity during measurement approx. 60 mm²/s

1) If the pressure corresponding to a certain control current is set at Q_A = 0 lpm (consumer in end position), it will drop slightly when there is a consumer flow P→A direction (+ $Q_A \neq 0$) and the control current is not altered, or it will rise slightly if the consumer is forced back by outside forces (overdrive - $Q_A \neq 0$) resulting in flow A→T .

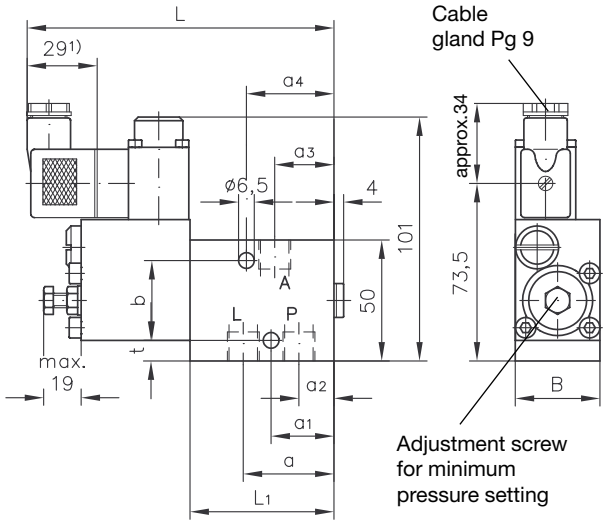
3.2 Electrical data (proportional solenoid)

Nom. voltage	U_N	12V DC	24V DC
Coil resistance	R_{20} +5%	6Ω	24Ω
Current, cold	I_{20}	2A	1A
Rated current	I_N	1,26A	0,63A
Power, cold	P_{20}	24W	24W
Rated power	P_N	9,5W	9,5W
Relative duty cycle		100% duty cycle (ref. temp. ϑ_{11} = 50°C)	
Electrical connection		Industrial standard (similar DIN 43650 B)	
Protection connection DIN 40050		IP 65 (with correctly fitted plug)	
Required dither frequency		60 ... 150 Hz	
Dither amplitude		20 ... 40% of I_{20}	

4. Dimensions of units

All dimensions are in mm, subject to without notice!

Type PDM

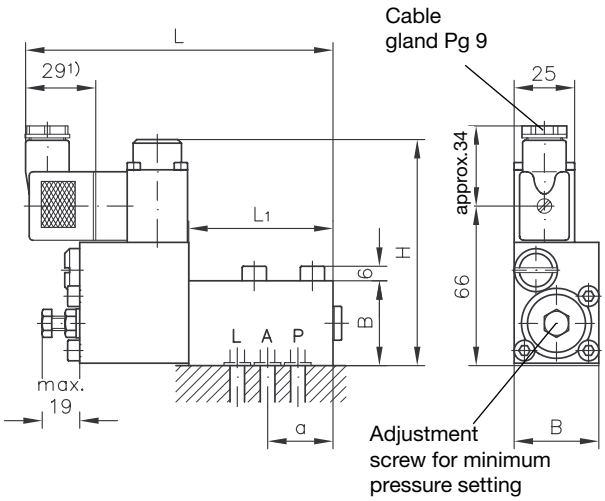


Type	L	L1	a	a1	a2	a3	a4	b	t
PDM 11	150	59	38	26,5	15	25	36,5	33	8,5
PDM 21 PDM 22	157	66	44	32	18	28	42	38	6

Ports DIN ISO 228/1 (BSPP):

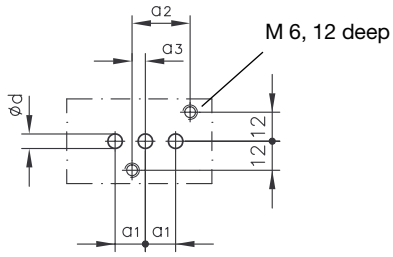
A and P = G 1/4 (PDM 11, PDM 21)
= G 3/8 (PDM 22)
L = G 1/4

Type PDMP



Connections A, L and P sealed by:
O-rings 7,65x1,78 NBR 90 Sh (PDMP 11)
O-rings 9,25x1,78 NBR 90 Sh (PDMP 22)

Hole pattern of the manifold



Type	B	H	L	L1	a	a1	a2	a3	d
PDMP 11	35	93,5	150	59	27,5	12,5	24	5,5	6
PDMP 22	40	96	157	66	32	14	26	6	8

[1]) This dimension depends on the plug make (here Firma K+B GmbH, D-84056 Rottenburg a.d.L.), and can be up to 40 mm in accordance with DIN 43 650 !