Proportional pressure limiting valve type NPMVP

With industrial standard hole pattern NG 6 conforming DIN 24 340-A6

Additional valves with identical functionality

● Type PMV, PMVP	D 7485/1	(Q_{max} = 120 lpm, p_{max} = 700 bar)
● Type PDV, PDVE	D 7486	(Q_{max} = 120 lpm, p_{max} = 350 bar)
● Type AP	D 6905 A/1	(Q_{max} = 16 lpm, p_{max} = 700 bar)

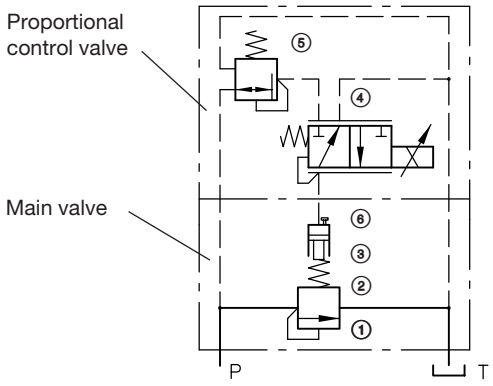
Valve banks

● Type BA	D 7788

Max. pressure = 700 bar
Max. flow = 16 lpm

Detailed flow pattern symbols

Type NPMVP



1. General

The proportional pressure limiting valves, type NPMVP are designed for the electro-proportional adjustment of the system pressure in hydraulic circuits.
A min. pressure will be apparent in the deenergized state. This pressure figure depends on the flow (back pressure) or the min. setting adjusted via a set screw (see also sect. 2).

A proportional amplifier (e.g. EV1M2 acc. to D 7831/1, EV1G1 acc. to D 7837, EV1D1 acc. to D 7831 D, EV1D acc. to D 7831 D) is necessary for the electric control of these valves.

1.1 Design

Type NPMVP are directly actuated proportional pressure limiting valves, which consist out of a main valve (seated ball valve ①, spring ② and control piston ③) and the directly mounted proportional control section (prop. pressure reducing valve ④ and an primary stage pressure reducing valve ⑤).
The system pressure is picked-up from the pressure inlet port P and reduced at the primary stage ⑤ down to a lower, constant pressure for the control valve ④. This pressure is converted into an electro-proportional control pressure by the control valve ④ and conducted to the operating piston ③. This piston accordingly loads again the valve ① via the spring ②. This results in the system pressure apparent at port P. The various pressure ranges are determined by the size of the prop. pressure reducing valve ④ and the main valve.
The pre-load of the spring ② 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 3 bar. This set min. pressure is the figure to which the pressure will drop even if the control current is reduced down to 0 A (apart of flow related fluctuations, see also sect 3.3)
A min. pressure of 3 bar or more is necessary for the flawless function of the proportional pressure reducing valve type NPMVP ④.

For simplified flow pattern symbol see page 2!

2. Type coding, main data

Order example 1: **NPMVP 4 - 41 / G 24**

Order example 2: **NPMVP 45 - 44 / G 24 - 3/8**

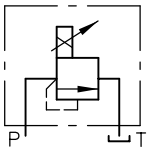
Connection block for pipe connection

Port thread ISO 228/1	G 3/8
Coding	**-3/8**

Nom. voltage proportional solenoid

Actuation solenoid

Standard, with plug	without plug	with plug and LED	Nom. voltage
G 12	**X 12**	**L 12**	12V DC
G 24	**X 24**	**L 24**	24V DC

Version	Flow pattern symbol (simplified)	Main valve: Coding for basic type, size and port size	Port thread ISO 228/1 or nom.	Flow Q_{max} (guide-line) (lpm)	Proportional control section, Coding for pressure reducing section: **- 41**	**- 42**	**- 43**	**- 44**	Mass (weight) approx. (kg)
					prop. controllable pressure range (bar) p_{min} ··· p_{max} [1]				
For manifold mounting		**NPMVP 4**	6	16	5 ... 180	5 ... 290	5 ... 440	5 ... 700	1.1
		NPMVP 45	6	16	5 ... 110	5 ... 180	5 ... 270	5 ... 450	1.1

[1] Pressure figure p_{min} below 5 bar can only be achieved below 10 to 20% of Q_{max}, see sect. 3

3. Other data

3.1 General and hydraulic

Nomenclature	Proportional-pressure limiting valve, directly controlled, seated ball design
Mounting	Manifold mounting with industrial standard hole pattern NG 6 conforming DIN 24 340-A6, see dimensional drawings in sect. 4
Installed position	Any
Ports	see dimensional drawings in sect. 4
Surface coating	Zinc galvanized (solenoid zinc galvanized and olive passivated)

Mass (weight)

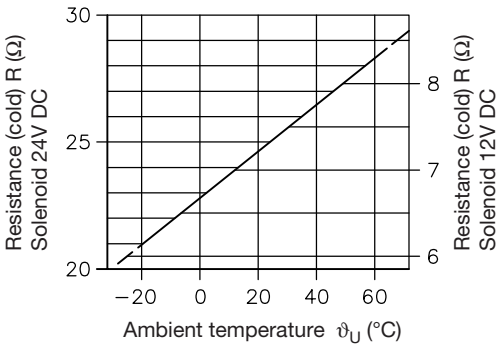
Type	approx. kg
NPMV 4 (45)	1.1

Operation pressure	Port P p_{max} according to pressure range Port R $p_{max\ R} \leq$ 20 bar (Reflow, tank); see Δp-Q-curve on page 6
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. 1.0 lpm

3.2 Electrical (proportional solenoid)

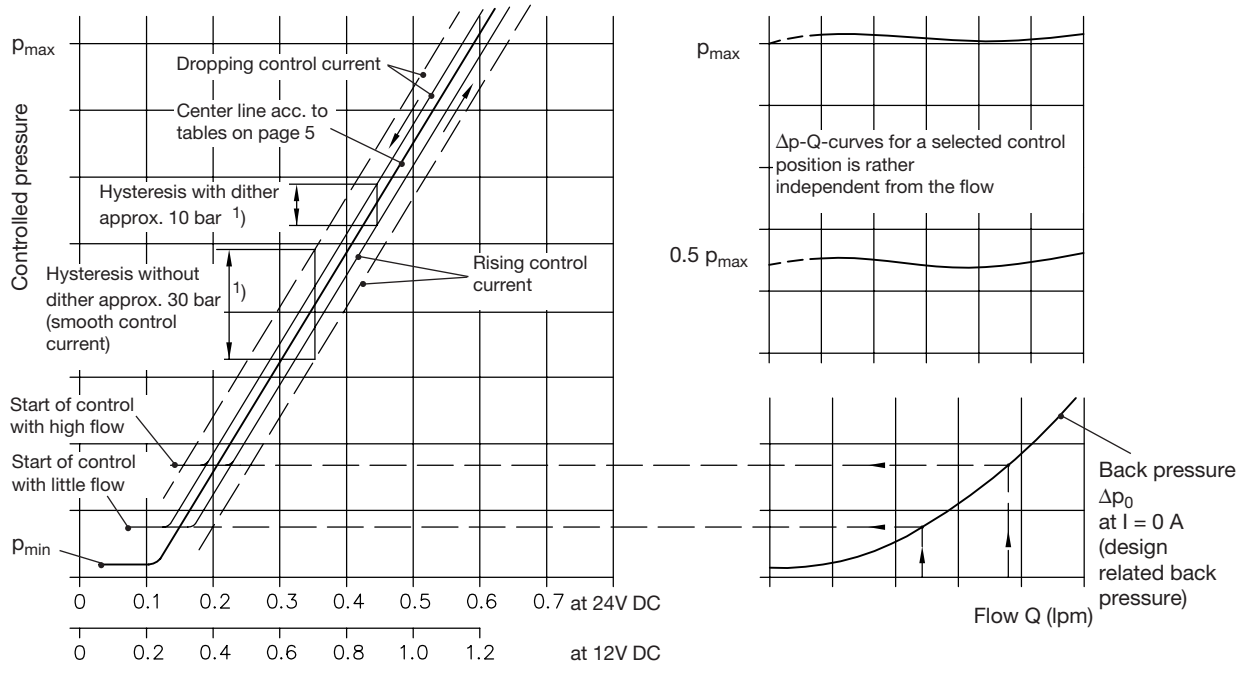
Nom. voltage U_N		12V DC	24V DC
Coil resistance	R_{20} ±5%	6 Ω	24 Ω
Current, cold	I_{20}	2 A	1 A
Nom. current	I_N	1.26 A	0.63 A
Power, cold	P_{20}	24 W	24 W
Nom. power	P_N	9.5 W	9.5 W
Relative duty cycle		100% ED (reference temp. ϑ_{11} = 50°C)	
Electrical connection		Industrial standard (terminal distance 11 mm)	
Protection classification DIN 40050		IP 65 (IEC 60529) (with plug installed as instructed)	
Required dither frequency		60 ... 150 Hz	
Dither amplitude		20 ... 40% of I_{20}	

Reference value for the resistance (cold)



3.3 Curves

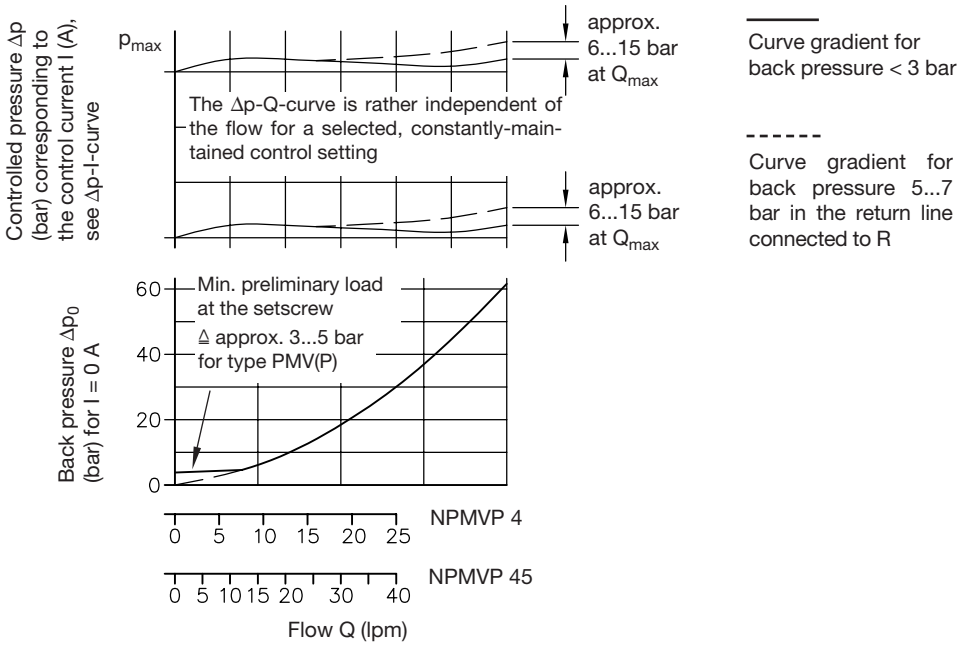
The resulting pressure Δp (bar) from a certain control current I (A), depending on type and size, can be read from the curves below. The control current range stretches from approx. 0.1 to 0.63 A at 24V DC or 0.2 to 1.26 A at 12V DC. The lowest pressure that can be controlled for I = 0 A can only be estimated by these Δp_0-Q-curves.
Example: For the relationship between Δp-I- and Δp-Q-curve, see below



1) Approximately similar for all pressure ranges and types

Δp-Q-curve

The pressure selected via the control current is rather independent of the flow rate. The pressure figure Δp (bar) which corresponds to a specific, constantly maintained control current I (A) remains rather constant, regardless whether the flow rate through the valve increases or decreases (within the perm. flow figures). This applies as long as the back pressure of the return line connected to R does not exceed approx. 2...3 bar (within the perm. flow figures). The Δp-Q-curve will be increased slightly by approx. 6...15 bar for Q_{max}, if the back pressure of the return pipe is approx. 5...7 bar.



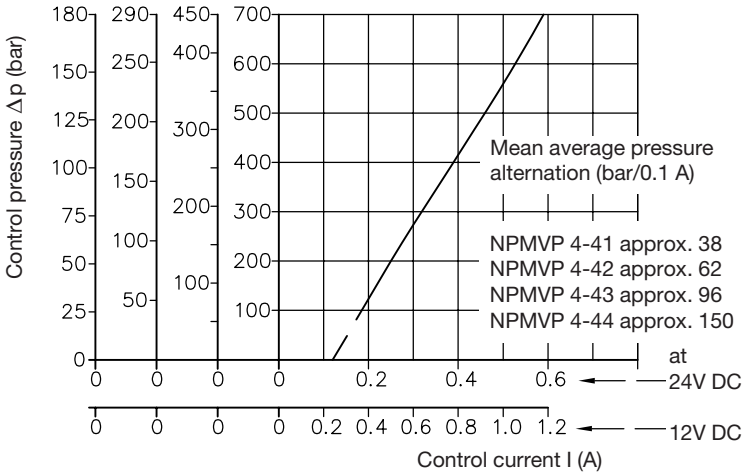
Fluid viscosity during measurement approx. 60 mm^2/s

Δp-I curve

Mean average values without consideration of production or solenoid related spreads. The actual pressure, which is proportional to the control pressure, can be determined with an pressure gauge, if required.

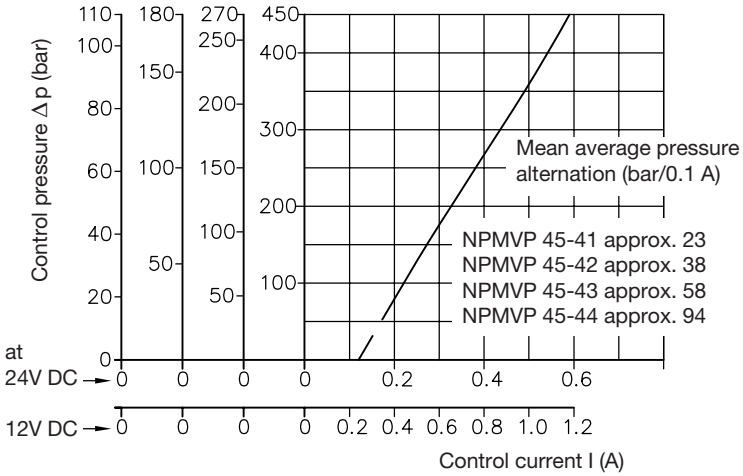
Type NPMVP 4

..-41 ..-42 ..-43 ..-44



Type NPMVP 45

..-41 ..-42 ..-43 ..-44

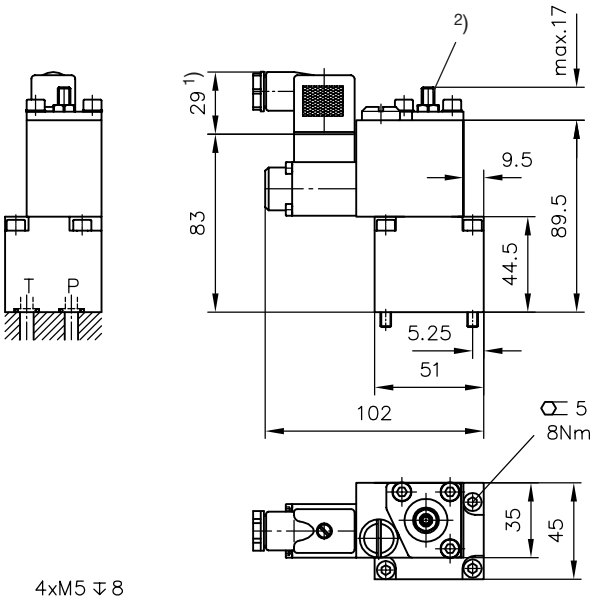


Fluid viscosity during measurement approx. 60 mm^2/s

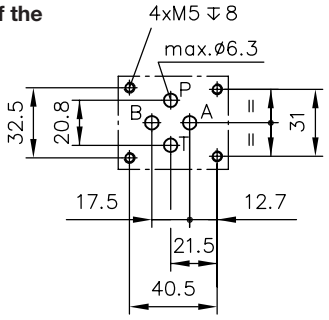
4. Unit dimensions

All dimensions in mm, subject to change without notice!

Type NPMVP

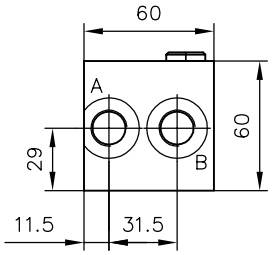


Hole pattern of the manifold

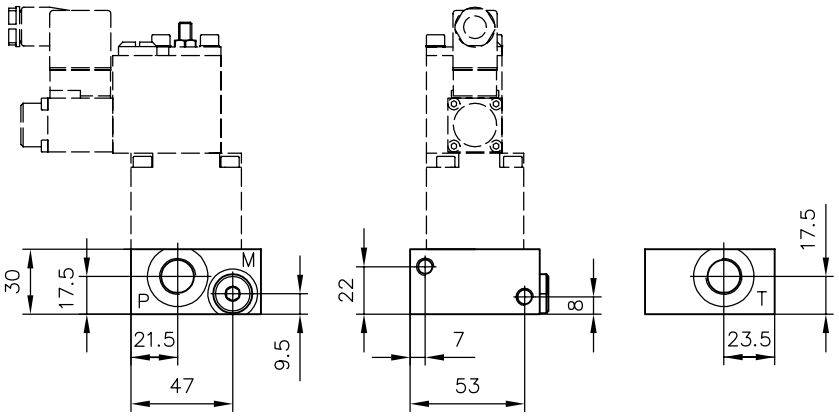


Indiv. Connection block

Coding -3/8



Ports conf. ISO 228/1 (BSPP):
P, T, A, B = G 3/8 (A, B without function)
M = G 1/4 (plugged, without function)



1) This dimension is depending on the manufacturer (illustrated Co. K&B Inc., D-84056 Rottenburg a.d.L.) and may be up to max. 40 mm (acc. to DIN EN 175 301-803 B).

2) The min. pressure p_{min} (sect. 3.1) can be either reduced or increased via this setscrew. This p_{min} setting cannot be reduced further even if the control current is decreased further.
Setting procedure: Slacken the locknut a/f 10 (Seal-Lock-Nut) prior to adjusting the setscrew, thus preventing the vulcanized seal ring to be damaged by the thread. **Attention:** A min. pressure p_{min} of 3...5 bar is required at type NPMVP, due to design.

5. Appendix
Example circuits

Symbol

BA 2 - A 5
- NPMVP 45 - 44 /0
- NBVP 16 G /M /3
- NBVP 16 G /M /3
- NBVP 16 Z /2 /3
- 1 - G 24