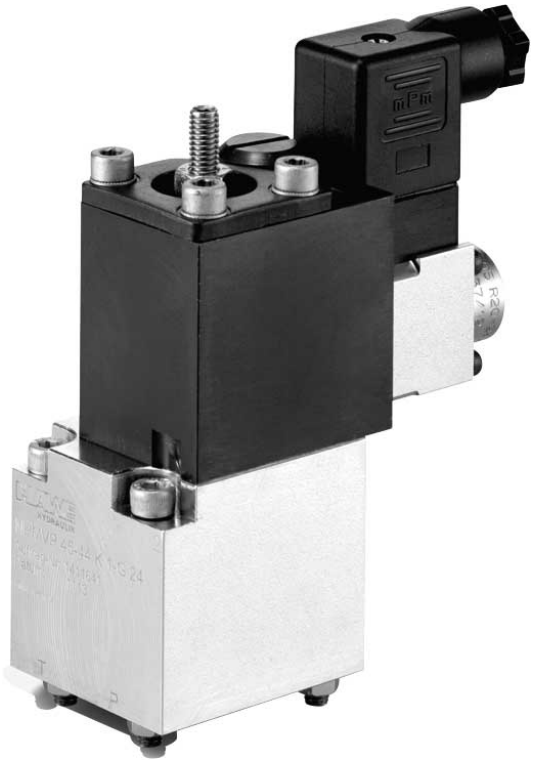
Proportional pressure-limiting valve type NPMVP

Product documentation

Operating pressure p_{max}:	700 bar
Flow rate Q_{max}:	16 lpm



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HAWE HYDRAULIK

Contents

1 Overview of proportional pressure-limiting valve type NPMVP

Proportional pressure-limiting valves are a type of pressure control valve. They remotely control the pressure in hydraulic systems continuously and electrically. The pressure-limiting valve type NPMVP is a directly actuated valve in a spring-loaded ball version. The pressure can be set to up to 700 bar.
The proportional pressure-limiting valve type NPMVP is designed as a manifold mounting valve with flange pattern NG 6.
The proportional pressure-limiting valve is particularly suitable for maximum pressure limitation in hydraulic systems.

Proportional pressure-limiting valve type NPMVP

Features and benefits:

- Operating pressures up to 700 bar
- Precise control
- Can be integrated into valve bank type BA and BNG

Intended applications:

- General hydraulics
- Test benches

2 Available versions, main data

2.1 Single valve, manifold mounting

Circuit symbol:

Order coding examples:

NPMVP 4	- 41	- X 24
NPMVP 45	- 44	- X 12

Solenoid voltage Table 3 Solenoid voltage

Proportional actuator Table 2 Proportional actuator

Basic type and size Table 1 Basic type and size

Table 1 Basic type and size

Main valve		
Basic type and size	**Port**	**Flow rate Q_{max} (lpm)**
NPMVP 4	NG 6	16
NPMVP 45	NG 6	16

Table 2 Proportional actuator

Coding	**Proportionally controllable pressure range (bar) p_{min} to p_{max} *)**	
	NPMVP 4	**NPMVP 45**
- 41	5 to 180	5 to 110
- 42	5 to 290	5 to 180
- 43	5 to 440	5 to 270
- 44	5 to 700	5 to 450

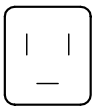
*) Pressure value p_{min} of below 5 bar can only be achieved under approx. (0.1 to 0.2) Q_{max}

Table 3 Solenoid voltage

Coding	Electrical connection	Nominal voltage	Protection class (IEC 60529)
X 12 **X 24**	Industry standard, 11 mm contact gap (Coding G.. with line connector, coding L.. with line connector with LED)	12 V DC 24 V DC	IP 65

Connection pattern

G .., X .., L ..



The specifications regarding the IP protection class apply for versions featuring a properly assembled line connector.

2.2 Version with connection block for pipe connection

Order coding examples:

NPMVP 4 - 44 - X 24	- 3/8

Single connection block for pipe connection Table 4 Single connection block for pipe connection

Single valve Chapter 2.1, "Single valve, manifold mounting"

Table 4 Single connection block for pipe connection

Coding	Ports (ISO 228-1) (BSPP)
- 1/4	G 1/4
- 3/8	G 3/8

3 Parameters

3.1 General and hydraulic

Designation	Proportional pressure-limiting valve
Design	Directly controlled, ball seat
Model	Manifold mounting valve
Material	Electrogalvanised
Installation position	As desired
Ports	P: Pump pressure, system pressure R, T: Reflux, tank
Hydraulic fluid	Hydraulic oil: according to DIN 51 524 Part 1 to 3; ISO VG 10 to 68 according to DIN 51 519 Viscosity range: min. approx. 4; max. approx. 1500 mm^2/s Optimal operating range: approx. 10 to 500 mm^2/s Also suitable for biologically degradable pressure fluids type HEPG (polyalkylene glycol) and HEES (synthetic ester) at operating temperatures up to approx. +70°C.
Cleanliness level	**ISO 4406** 20/17/14...18/15/12
Temperatures	Ambient: approx. -40 ... +80°C, Fluid: -25 ... +80°C, Note the viscosity range! Permissible temperature during start: -40°C (observe start-viscosity!), as long as the service temperature is at least 20K higher for the following operation. Biologically degradable pressure fluids: Observe manufacturer's specifications. By consideration of the compatibility with seal material not over +70°C.

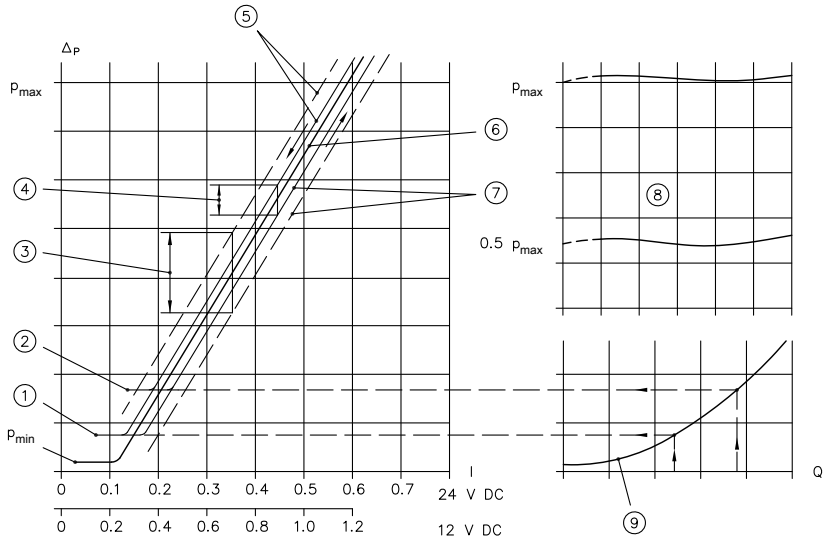
Pressure and flow rate

Operating pressure	P: p_{max} according to pressure range R, T: $p_{max\ R} \leq 20$ bar; see Δp-Q characteristics
Internal control oil consumption	Max. approx. 1.0 lpm

Characteristics

Δp-Q characteristics (reference values)

The lowest usable control point depends on the flow rate and can be estimated from the Δp_0-Q characteristics for I = 0 A.



Q flow rate (lpm); I control current (A); Δp controlled pressure (bar)

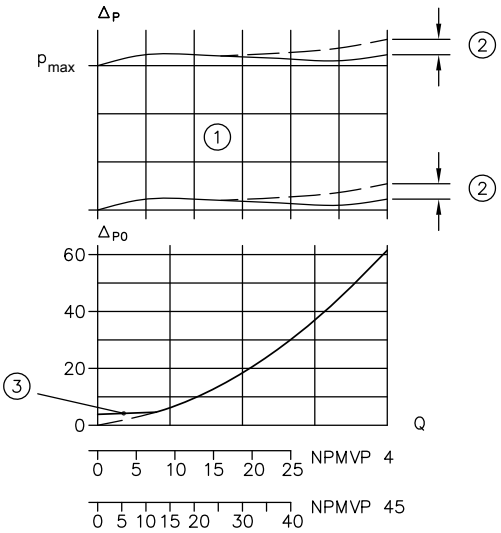
1 Start of control for low flow rate
2 Start of control for high flow rate
3 Hysteresis without dither: approx. 30 bar (smooth supply)
4 Hysteresis with dither: approx. 10 bar
5 Control current, falling
6 Centre lines according to diagram, page 5
7 Control current, rising
8 Δp-Q characteristics for selected control position largely independent of flow rate
9 Flow resistance Δp_0 at I = 0 A (inherent resistance)

Characteristics

Oil viscosity approx. 60 mm²/s

Δp-Q characteristics (reference values)

The pressure is largely independent of the flow rate.



Q flow rate (lpm); Δp_0 flow resistance (bar) at I = 0 A; Δp controlled pressure (bar) according to the control current I (A)

1 Δp-Q characteristics for selected control position largely independent of flow rate

2 In the case of return pressure > 3 bar Δp = + 6 to 15 bar at Q_{max}

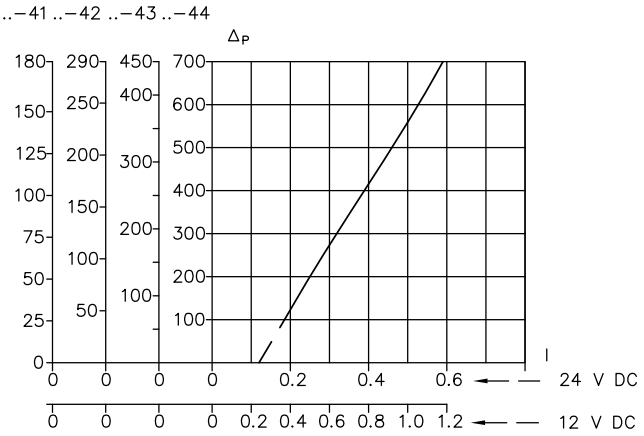
3 Minimum pre-load at the adjusting screw ≙ approx. 3 to 5 bar

Characteristics

Oil viscosity approx. 60 mm²/s

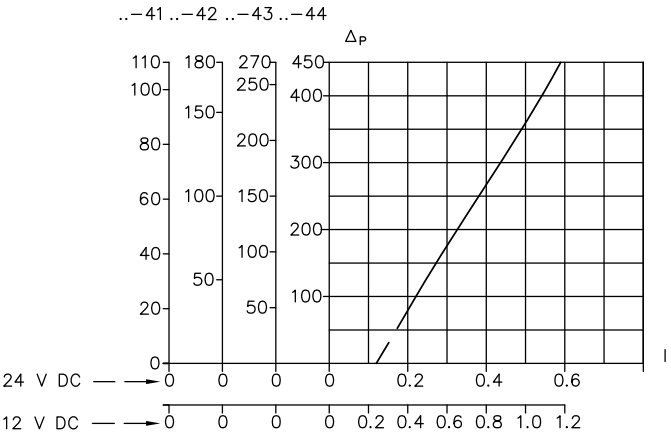
Δp-Q characteristics (reference values)

NPMVP 4



I control current (A); Δp controlled pressure (bar)

NPMVP 45



I control current (A); Δp controlled pressure (bar)

Type	Average pressure change (bar/0.1 A)
NPMVP 4-41	Approx. 38
NPMVP 4-42	Approx. 62
NPMVP 4-43	Approx. 96
NPMVP 4-44	Approx. 150
NPMVP 45-41	Approx. 23
NPMVP 45-42	Approx. 38
NPMVP 45-43	Approx. 58
NPMVP 45-44	Approx. 94

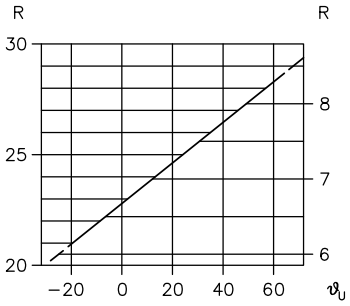
Weight

Type	
NPMVP 4	= 1.1 kg
NPMVP 45	= 1.1 kg

3.2 Electrical data

Cooling power P_{20}	**12 V DC**	**24 V DC**
	24 W	24 W
Nominal power P_N	9.5 W	9.5 W
Current, cold I_{20}	2 A	1 A
Nominal current I_N	1.26 A	0.63 A
Coil resistance R_{20} ±5%	6 Ω	24 Ω
Relative duty cycle (ED) 100% ED	Reference temperature ϑ_{11} = 50°C	
Protection class	see Chapter 2.1, "Single valve, manifold mounting", Table 3	
Electrical connection	Industry standard (11 mm contact gap)	
Required dither frequency	60 to 150 Hz	
Dither amplitude	20 to 40% of I_{20}	

Reference value for the cold resistance



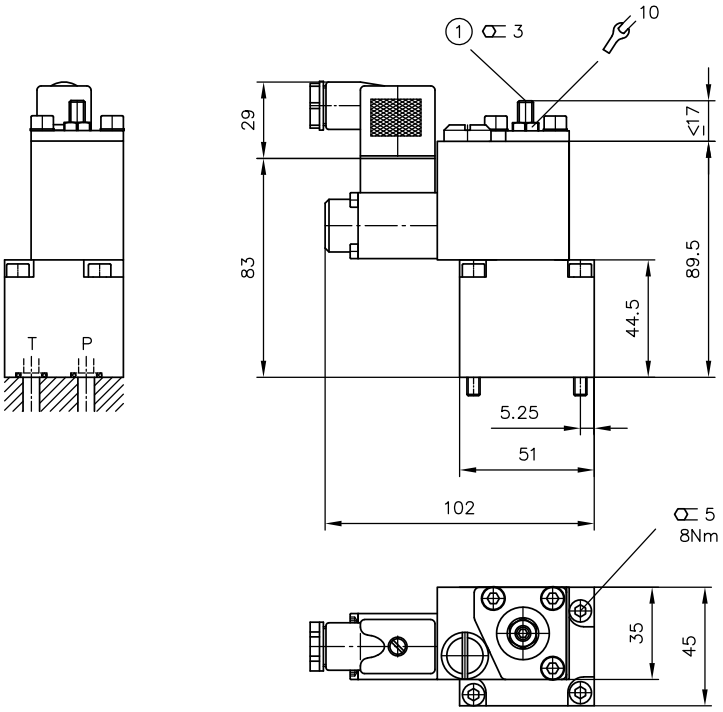
ϑ_U ambient temperature (°C); R cold resistance (Ω) solenoid 24 V DC; R cold resistance (Ω) solenoid 12 V DC

4 Dimensions

All dimensions in mm, subject to change.

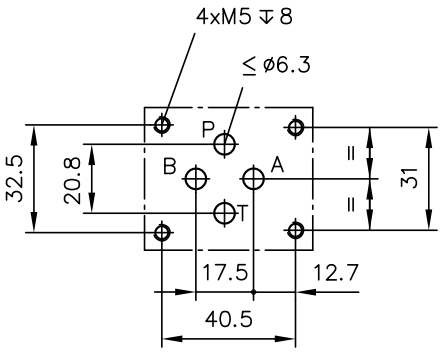
4.1 Single valve

NPMVP



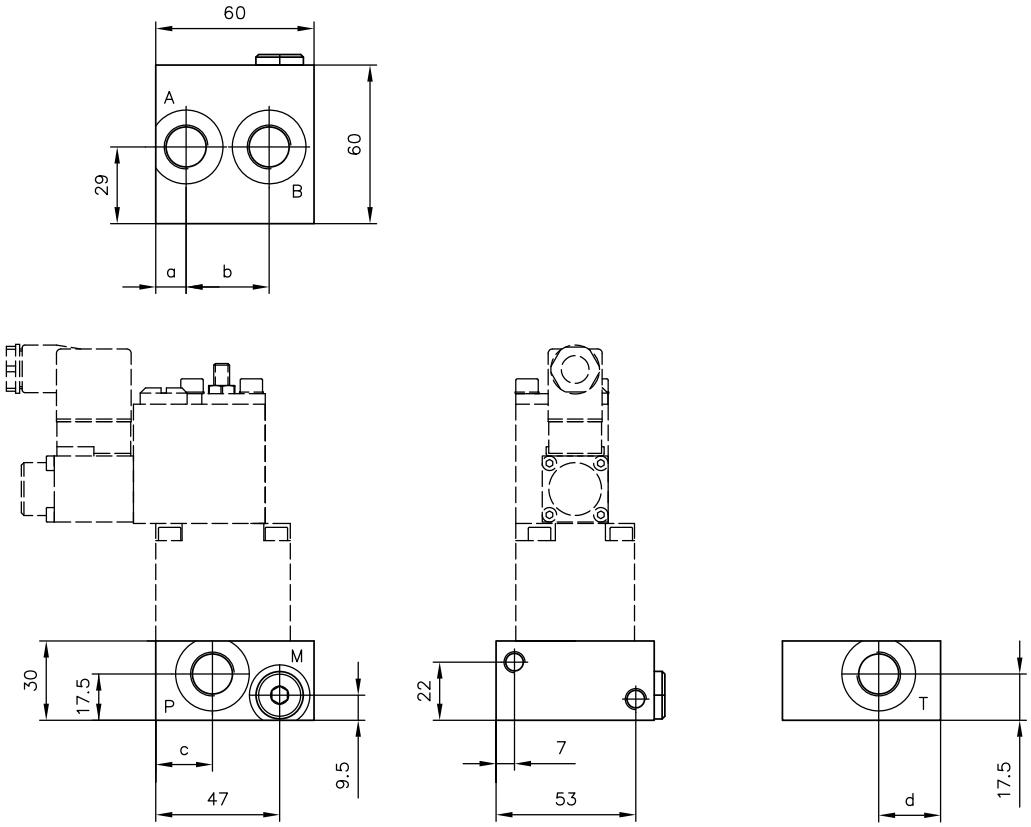
1 Adjusting screw p_{min}

Base plate hole pattern



4.2 Single connection block

Coding **- 1/4**, **- 3/8**



Coding	a	b	c	d
- 1/4	25	28	25	25
- 3/8	11.5	31.5	21.5	23.5

	Ports (ISO 228-1) (BSPP)	
- 1/4	P, T, A, B	G 1/4 (A, B not functional)
- 3/8	P, T, A, B	G 3/8 (A, B not functional)
- 1/4 - 3/8	M	G 1/4 (sealed, not functional)

5 Assembly, operation and maintenance recommendations

5.1 Intended use

This valve is intended exclusively for hydraulic applications (fluid technology).

The user must observe the safety measures and warnings in this documentation.

Essential requirements for the product to function correctly and safely:

- All information in this documentation must be observed. This applies in particular to all safety measures and warnings.
- The product must only be assembled and put into operation by qualified personnel.
- The product must only be operated within the specified technical parameters. The technical parameters are described in detail in this documentation.
- The operating and maintenance manual of the components, assemblies and the specific complete system must also always be observed.

If the product can no longer be operated safely:

1. Remove the product from operation and mark it accordingly.

✓ It is then not permitted to continue using or operating the product.

5.2 Assembly information

The product must only be installed in the complete system with standard and compliant connection components (fittings, hoses, pipes, fixtures, etc.).

Reaction forces and reaction torques must not influence the valve.

The hydraulic power pack must be shut down correctly prior to dismounting; this applies in particular to power packs with hydraulic accumulators.

Danger

Risk to life caused by sudden movement of the hydraulic drives when dismantled incorrectly!

Risk of serious injury or death.

- Depressurise the hydraulic system.
- Perform safety measures in preparation for maintenance.

5.2.1 Creating the mounting hole

See description in Chapter 4, "Dimensions".

5.3 Operating instructions

Product configuration and setting the pressure and flow rate

The statements and technical parameters in this documentation must be strictly observed.
The instructions for the complete technical system must also always be followed.

Note

- Read the documentation carefully before usage.
- The documentation must be accessible to the operating and maintenance staff at all times.
- Keep documentation up to date after every addition or update.

Caution

Risk of injury on overloading components due to incorrect pressure settings!

Risk of minor injury.

- Always monitor the pressure gauge when setting and changing the pressure.

Purity and filtering of the hydraulic fluid

Fine contamination can significantly impair the function of the hydraulic component. Contamination can cause irreparable damage.

Examples of fine contamination include:

- Metal chips
- Rubber particles from hoses and seals
- Dirt due to assembly and maintenance
- Mechanical debris
- Chemical ageing of the hydraulic fluid

Note

Fresh hydraulic fluid from the drum does not always have the highest degree of purity. Under some circumstances the fresh hydraulic fluid must be filtered before use.

Pay attention to the cleanliness level of the hydraulic fluid in order to maintain faultless operation.
(Also see cleanliness level in Chapter 3, "Parameters".)
(also see cleanliness level in

5.4 Maintenance information

This product is largely maintenance-free.

Conduct a visual inspection at regular intervals, but at least once per year, to check if the hydraulic connections are damaged. If external leakages are found, shut down and repair the system.

Clean the device surface of dust deposits and dirt at regular intervals, but at least once per year.

6 Other information

6.1 Basic design

The proportional pressure-limiting valves type NPMVP are directly actuated devices consisting of the main valve (ball seated valve **1**, spring **2** and set piston **3** and the flange-mounted proportional control part (proportional pressure-reducing valve **4** and pressure reducing valve preliminary stage **5**).

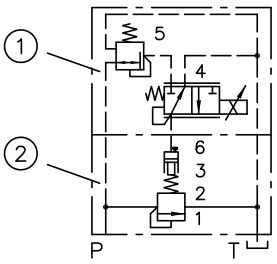
The system pressure tapped in the main valve, port P, is reduced in the preliminary stage **3** to a low, constant inlet pressure for the control valve **4**. In the control valve **4**, this pressure is converted into the electrical-proportional pilot pressure and directed to the set piston **3**, which loads the valve **1** accordingly via the spring **2**. This results in the current system pressure at inlet P. The various pressure ranges are determined by the size of the proportional pressure-reducing valve **4** and main valve.

Adjusting screw **6** for pre-loading the spring **2**. As a result, the lower threshold value p_{min} of the proportionally controllable pressure range of approx. 3 bar can be raised. This means that, when below the corresponding control current, this increased pressure value remains constant, even in the case of a reduction to 0 A, apart from the flow-related deviation (Chapter 3.1, "General and hydraulic", see characteristics).

A minimum pressure of 3 bar or more is required for proper functioning of the proportional pressure-reducing valve type NPMVP **4**.

Detailed circuit symbols

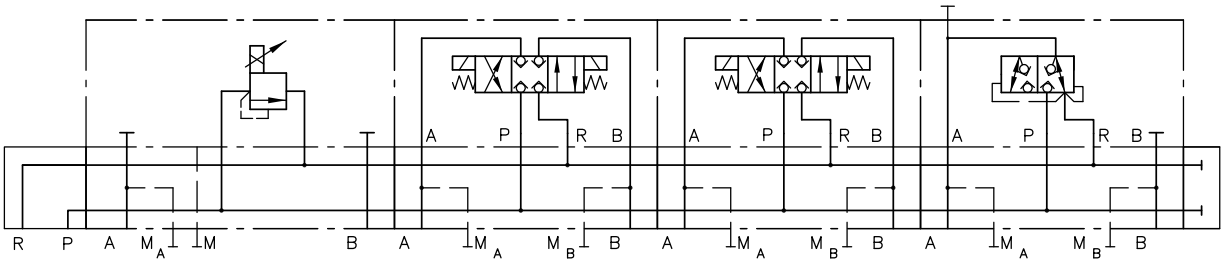
NPMVP



1 Proportional control valve
2 Main valve

6.2 Circuit example

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



6.3 Accessories, spare parts and separate components

Line connector

Description	Type	Material number
No additional function	MSD 6-209	6236 5004-00
With LED	SVS 3129720	6217 8027-00
Adapter for DIN EN 175 301-803 A	--	6217 0238-00

Further information

Additional versions

- Proportional pressure-limiting valve type PMV and PMVP: D 7485/1
- Proportional pressure-limiting valve type PDV and PDM: D 7486
- Connection blocks type A for hydraulic power packs: D 6905 A/1
- Valve bank (nominal size 6) type BA: D 7788
- Valve bank type BNG: D 7788 BNG
- Proportional amplifier type EV1M3: D 7831/2
- Proportional amplifier type EV1D: D 7831 D
- Proportional amplifier type EV2S: D 7818/1

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