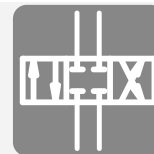


4/2- and 4/3-way directional spool valves type SWPA

Product documentation

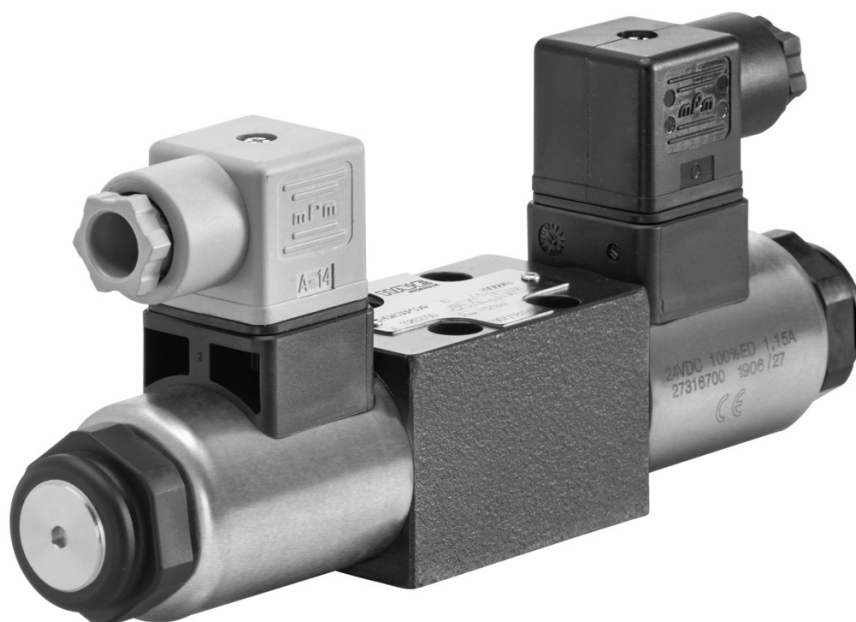


Operating pressure p_{\max} :

320 bar

Flow rate Q_{\max} :

30 l/min



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1 Overview of 4/2- and 4/3-way directional spool valve type SWPA

Directional spool valves are a type of directional valve. They control the direction of movement of single and double-acting hydraulic consumers.

The directional spool valve type SWPA is a 4/2- or 4/3-way directional valve with standard connection pattern NG 4 (CETOP 2). It is directly actuated and a binary valve.

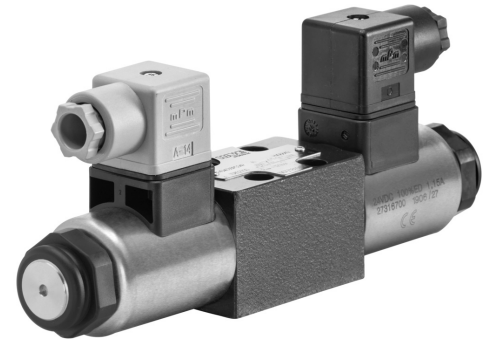
The directional spool valve type SWPA is available as a manifold mounting valve. Intended applications for the directional spool valve type SWPA and SW include industrial hydraulics, in particular machine tools.

Features and advantages

- Universally usable thanks to standard connections NG 4 (CETOP 2)
- Low pressure losses
- High power density
- Directly controlled
- Solenoid can be replaced easily
- Standard hole pattern
- High flexibility by means of a variety of circuit symbols

Intended applications

- Hydraulic power packs
- Industrial hydraulics



4/3-way directional spool valve type SWPA

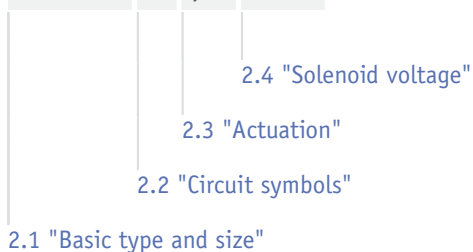


4/2-way directional spool valve type SWPA

2 Available versions

Ordering example

SWPA 04 B /M -X 24



2.1 Basic type and size

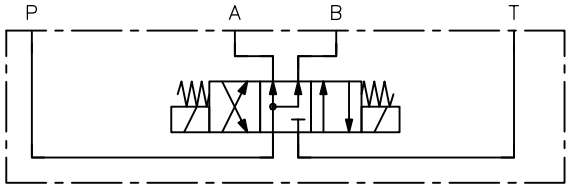
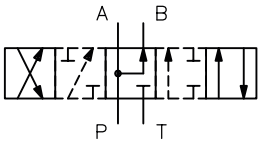
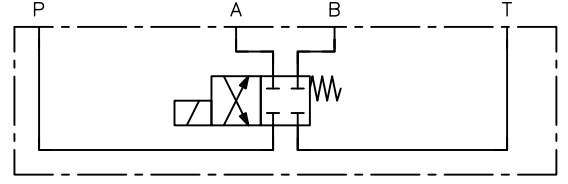
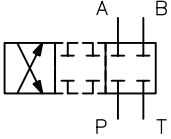
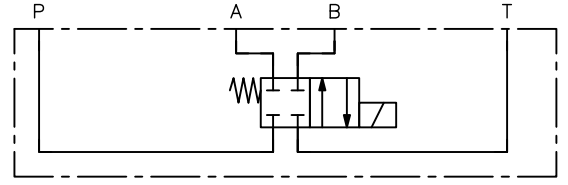
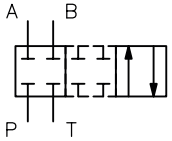
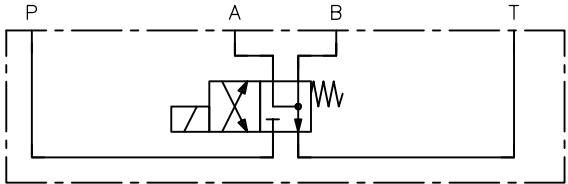
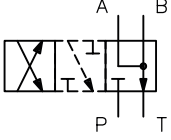
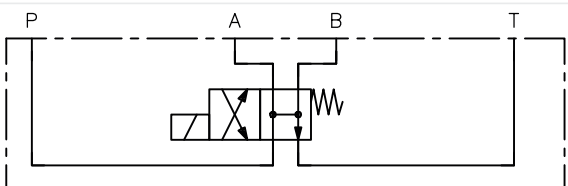
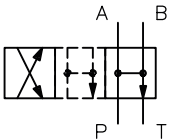
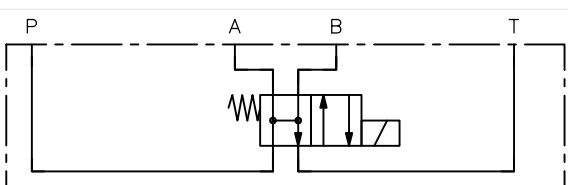
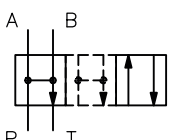
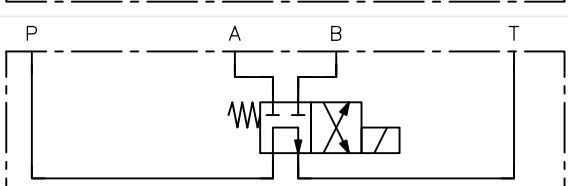
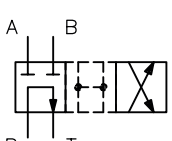
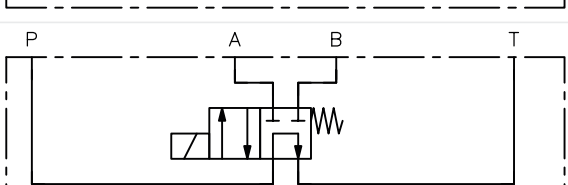
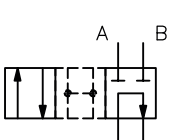
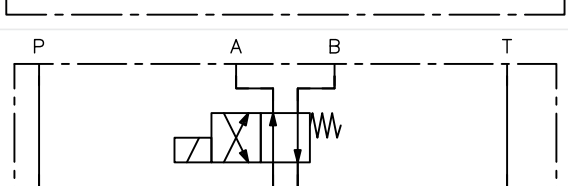
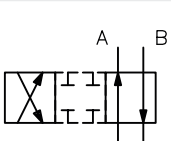
Type	Flow rate Q_{max} (lpm)	Pressure p_{max} (bar)
SWPA 04	30	320

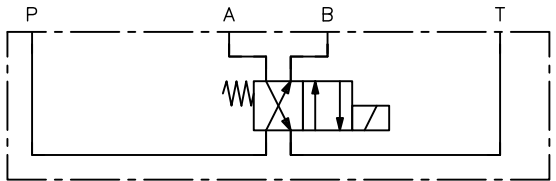
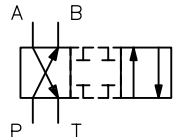
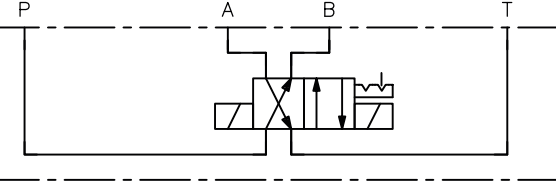
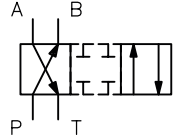
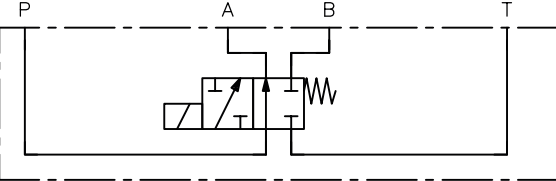
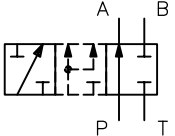
! NOTICE

Depending on the pressure, the maximum switchable flow rate may be lower, see Chapter 3.4, "Characteristic lines".

2.2 Circuit symbols

Coding	Circuit symbol	Overlap
G		
D		
L		
H		

Coding	Circuit symbol	Overlap
M		
GW		
GB		
DW		
HW		
HB		
LW		
LB		
B		

Coding	Circuit symbol	Overlap
W		
K		
VS		

2.3 Actuation

Coding	Description	Circuit symbol
M	electrical actuation with override by tool	

2.4 Solenoid voltage

Coding	Nominal voltage
X 12	12 V DC
X 24	24 V DC
X 230	230 V AC




NOTICE

male connectors need to be ordered separately if required (see Chapter 6, "Other information").

3 Parameters

3.1 General data

Designation	4/3- or 4/2-way directional spool valve
Design	Spool valve, directly actuated
Model	Single valve for manifold mounting
Material	<ul style="list-style-type: none"> ▪ Housing: phosphated ▪ Solenoid: galvanised
Installation position	any (horizontal preferred)
Line connection	Through holes, see Chapter 4, "Dimensions"
Ports/connections	<ul style="list-style-type: none"> ▪ P = Pump ▪ A, B = Consumers ▪ T = Reflux
Flow direction	According to circuit symbol
	<p> NOTICE Observe permissible pressure at reflux T.</p>
Hydraulic fluid	Hydraulic fluid, according to DIN 51 524 Parts 1 to 3; ISO VG 10 to 68 according to DIN ISO 3448 Viscosity range: 10 - 500 mm ² /s Optimal operating range: approx. 20 - 400 mm ² /s Also suitable for biologically degradable hydraulic fluids type HEPG (polyalkylene glycol) and HEES (synthetic ester) at operating temperatures up to approx. +70°C.
Cleanliness level	ISO 4406 <u>21/18/15</u>
Temperatures	Environment: approx. -30 ... +50 °C, hydraulic fluid: -30 ... +80 °C, ensure the correct viscosity range. Biologically degradable hydraulic fluids: note manufacturer specifications. With consideration for the seal compatibility, not above +70°C.

3.2 Pressure and volumetric flow

Operating pressure	$p_{\max} = 320$ bar (ports P, A, B) Return pressure at port T ≤ 210 bar
Flow rate	see Chapter 2.1, "Basic type and size"

3.3 Weight

Circuit symbols

G, D, L, H, M, K = 1.3 kg

GW, GB, HW, HB, LW, LB, DW, B, W, VS = 0.9 kg

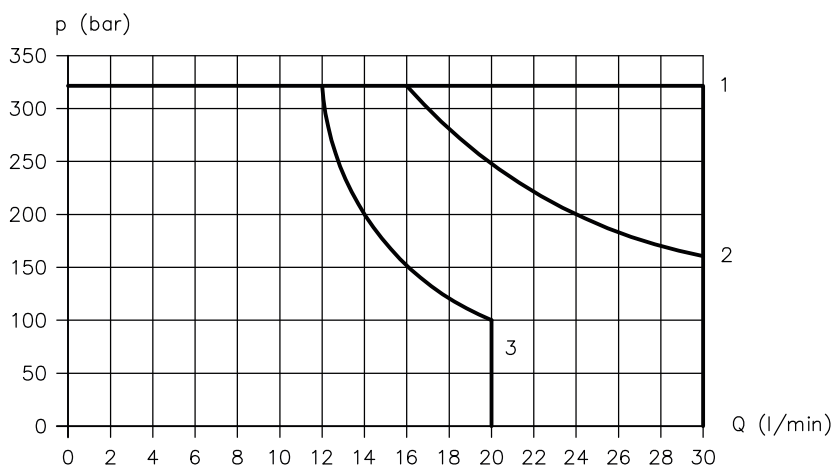
3.4 Characteristic lines

Viscosity of the hydraulic fluid approx. 32 mm²/s

Switchable flow rates

NOTICE

In the event of unilateral flow, values may sometimes be lower than those shown.



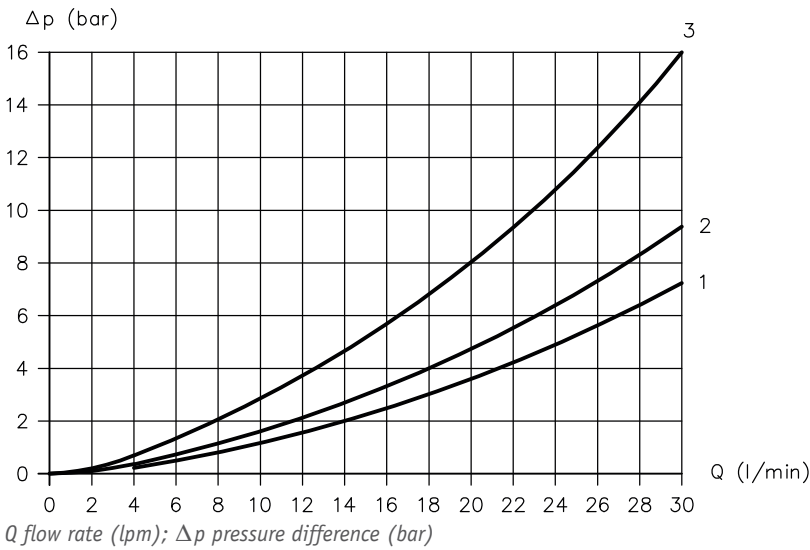
Q flow rate (lpm); p pressure (bar)

1 G, H, D, M, B, W, HB, HW, GW, GB, DW, K

2 L, LB, LW

3 VS

Flow resistance



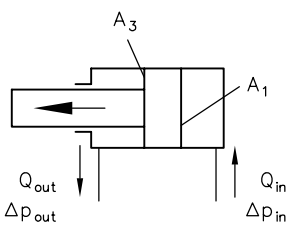
Coding Circuit symbol	Flow direction				
	P → A	P → B	A → T	B → T	P → T
G, GB, M, D	1	1	1	1	
B, W, K	2	2	2	2	
H, HB	1	1	1	1	2
L, LW	3	3	3	3	2
VS	1	1			
LB	3			3	2
DW, GW		1	1		

Flow resistance per control edge:

The characteristic lines always apply to the specified flow direction. For 4/3 or 4/2-way directional spool valves, the overall resistance Δp , measured at input P, is composed of the inflow side element Δp_{in} and the outflow side element Δp_{out} . Here it is to be noted that on consumers with a cylinder area ratio not equal to one φ (differential cylinders) the return flow Q_{out} may be less than or greater than the inflow Q_{in} , depending on the direction of movement!

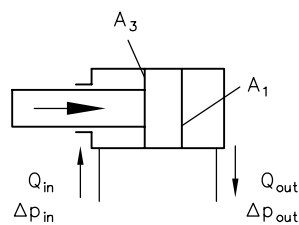
$$\Delta p = \Delta p_{in} + \frac{\Delta p_{out}}{\varphi}$$

$$Q_{out} = \frac{Q_{in}}{\varphi}$$



$$\Delta p = \Delta p_{in} + \Delta p_{out} \cdot \varphi$$

$$Q_{out} = Q_{in} \cdot \varphi$$



$$\varphi = \frac{A_1}{A_3}$$

- Δp = Overall resistance
- Δp_{in} = Pressure loss inflow side
- Δp_{out} = Pressure loss outlet side
- Q_{in} = Flow rate inflow side
- Q_{out} = Flow rate outlet side
- φ = Cylinder area ratio
- A_1 = Area piston side
- A_3 = Area rod side

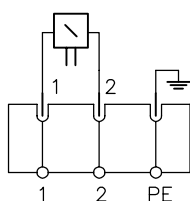
3.5 Electrical data

Coding	X 12	X 24	X 230
Nominal voltage	12 V DC	24 V DC	230 V AC
Permissible voltage deviation	± 10 %		
Nominal current I _N	2.45 A	1.15 A	0.12 A
Nominal power P _N	29.4 W	27.6 W	27.6 W
Solenoid connection	Male connector acc. to EN 175 301-803 A		
Relative duty cycle	100%		
Switching times	on: 30 ms to 50 ms off: AC = 70 to 100 ms; off: DC = 30 to 50 ms		
Switching operations	15,000 switching operations/h		
Protection class IEC 60529	IP 65 (plugs mounted correctly)		
Insulation material class	N		
Contact temperature	max. 100°C at 20°C ambient temperature		
Assembly	In event of electrical fault: 1. Unscrew solenoid's fastening nut 2. Pull solenoid off along axis 3. Install new solenoid		

Electrical connection

EN 175 301-803 A
IP 65 (IEC 60529)

X 12, X 24, X 230



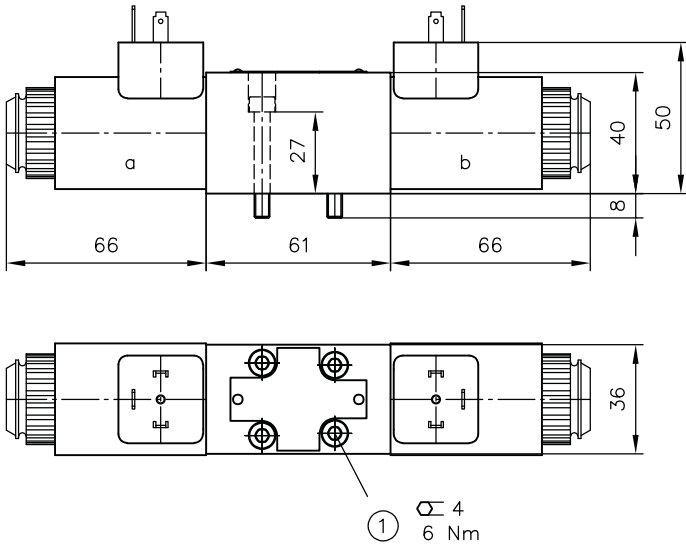
The specifications regarding the IP protection class apply for versions featuring a properly assembled male connector.

4 Dimensions

All dimensions in mm, subject to change.

4/3-way directional spool valve

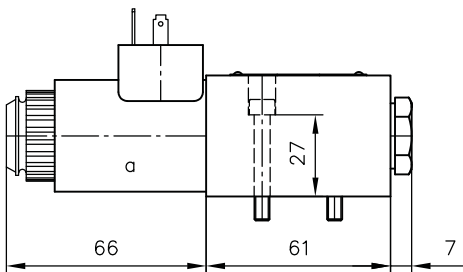
Circuit symbols **G, D, L, H, M, K**



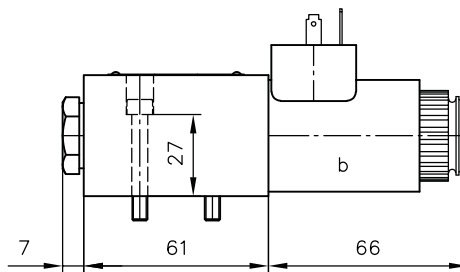
1 Cylinder screw M5x35-10.9 ISO 4762 Mechanically galvanized (not included in scope of delivery)

4/2-way directional spool valve

Circuit symbols **GW, DW, HW, LW, B, VS**

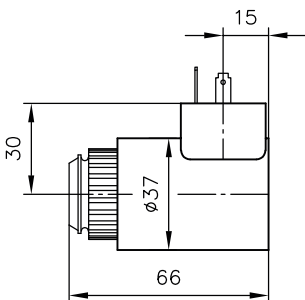


Circuit symbols **GB, HB, LB, W**



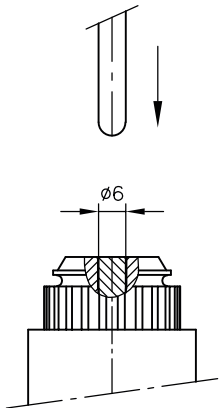
Actuation

Coding **M**



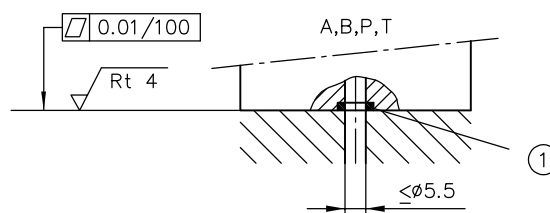
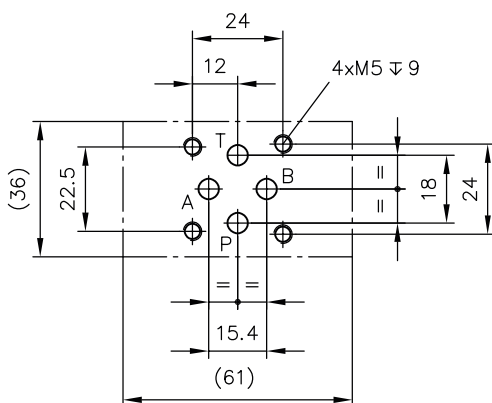
Manual override M

Auxiliary tool for actuation
(do not use any parts with sharp edges)



4.1 Hole pattern of the base plate

Base plate as per ISO 4401-02 or



1 Sealing for ports A, B, P, T: O-ring 7.65x1.78 NBR 90 Sh

Observe the document B 5488 "General operating instructions for assembly, commissioning, and maintenance."

5.1 Intended use

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

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

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 specialist personnel.
- ▶ The product must only be operated within the specified technical parameters described in detail in this document.
- ▶ All components must be suitable for the operating conditions when using an assembly.
- ▶ The operating instructions for 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 (screw fittings, hoses, pipes, fixtures etc.).

The product must be shut down correctly prior to disassembly (in particular in combination with hydraulic accumulators).

DANGER

Sudden movement of the hydraulic drives when disassembled incorrectly

Risk of serious injury or death

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

5.3 Operating instructions

Observe product configuration and pressure/flow rate.

The statements and technical parameters in this document must be strictly observed.

The instructions for the complete technical system must also always be followed.

NOTICE

- ▶ 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

Overloading components due to incorrect pressure settings.

Risk of minor injury.

- Pay attention to the maximum operating pressure of the pump, valves and fittings.
- 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 product. Contamination can cause irreparable damage.

Examples of fine contamination include:

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

! NOTICE

New hydraulic fluid from the manufacturer may not have the required purity.

Damage to the product is possible.

- ▶ Filter new hydraulic fluid to a high quality when filling.
- ▶ Do not mix hydraulic fluids. Always use hydraulic fluid that is from the same manufacturer, of the same type, and with the same viscosity properties.

For smooth operation, pay attention to the cleanliness level of the hydraulic fluid (cleanliness level [see Chapter 3, "Parameters"](#)).

Additionally applicable document: [D 5488/1](#) Oil recommendations

5.4 Maintenance information

Check regularly (at least once a year) by visual inspection whether the hydraulic connections are damaged. If external leakages are found, shut down and repair the system.

Clean the surface of the device regularly (at least once a year) (dust deposits and dirt).

6 Other information

6.1 Accessories, spare and individual parts

To purchase spare parts, please see [HAWE Hydraulik interactive contact map](#).

Line connectors

Version	Order coding	
Line connector (black)	MSD 3-309	6217 0002-00
Line connector (grey)	MSD 3-309 gr	6217 0003-00
Line connector with LED	SVS 3129020	6217 8024-00
Line connector with LED, 5 m cable	L5K	6217 8088-00
Line connector with LED, 10 m cable	L10K	6217 8090-00
Line connector with clamp diode	MSD 3-209 C1	6236 5002-00

Cylinder screws

M5x35-10.9 - ISO 4762 --

Sealing

O-ring 7.65x1.78 NBR 90 Sh 6096 9203-00

References

Additional versions

- Directional spool valve type NSWP 2: D 7451 N
- Directional seated valve type NBVP 16: D 7765 N
- Clamping module type NSMD: D 7787
- Intermediate plate type NZP: D 7788 Z
- Directional spool valve type SWPM: D 6420/1
- Proportional directional valve type SWPL D 6394/1
- Proportional directional valve type SWPH D 6418/1

Application

- Valve bank (nominal size 6) type BA: D 7788
- Chaining modules for hydraulic power packs type VK: D 6475

