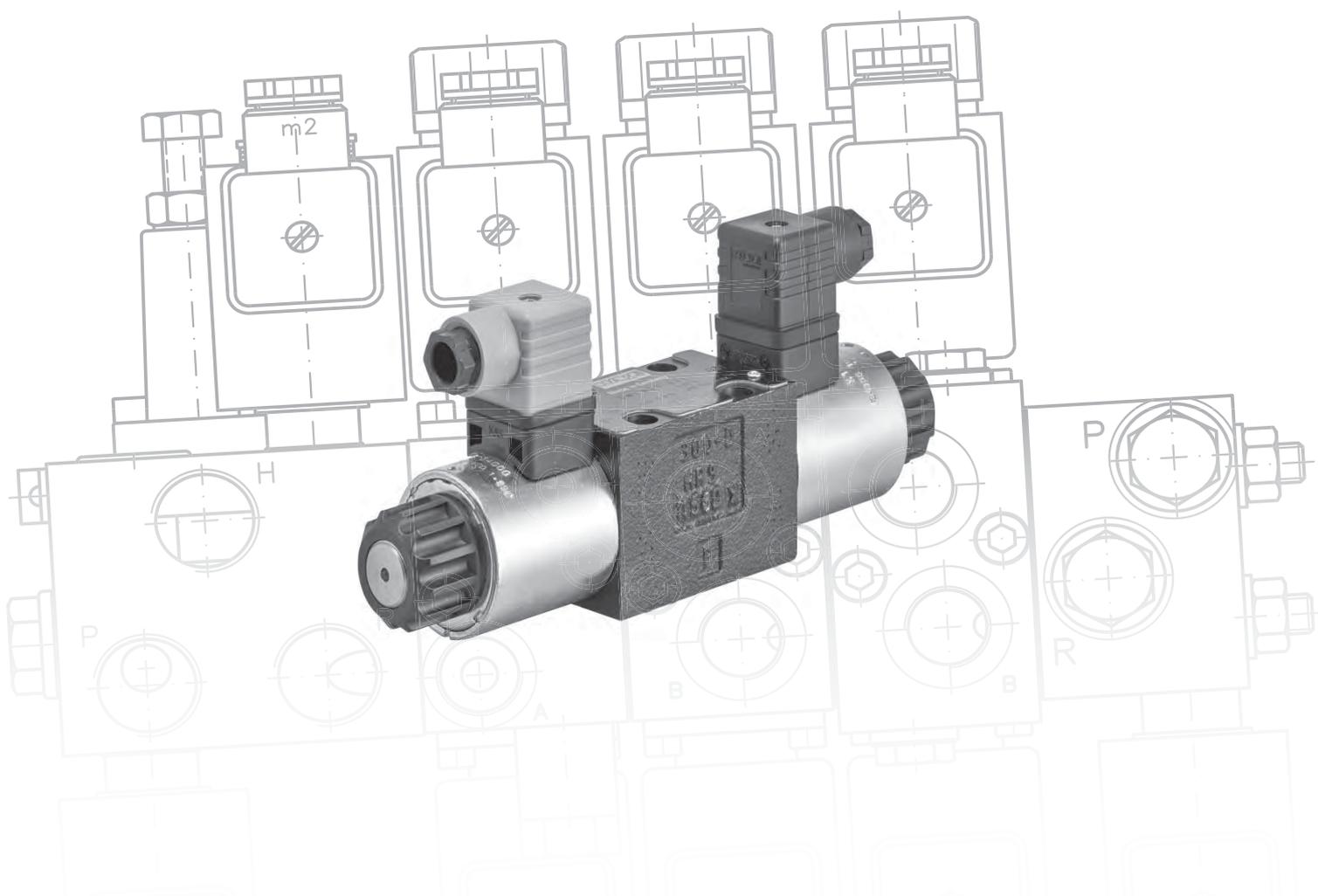


Directional spool valves type SWPN

Nominal size 6 or 10 according to DIN 24 340

Pressure p_{\max} : 350 bar
Flow V_{\max} : 150 lpm



Product documentation

D 7451 AT

12-2013-1.2

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1**Overview directional spool valve type SWPN**

The valves illustrated here are directly actuated directional spool valves with connection hole pattern conforming to DIN 24 340-A6 or A10. The valves type SWPN 21 may be combined as valve banks via the sub-plate system type BA 2 acc. to D 7788. This enables direct mounting onto hydraulic power packs type HC (D 7900), HCG (D 7900 G), MP (D 7200 H), and HK (D 7600 ++) or combination with directional seated valve banks type BWN(H) 1 + 2 (D 7470 B/1), BVZP 1 (D 7785 B) and VB 01, 11 and 21 (D 7302).

Features and benefits:

- Standard hole pattern
- Various switching symbols

Intended applications:

- Hydraulic power packs
- Industrial use

Designs:

- Manifold mounting



Figure 1: Directional spool valve type SWPN

2 Versions available, main data

Order examples:

SWPN 21	G	- X 24
	Actuation solenoid	Table 3 Actuation solenoid
	Symbol	Table 2 Symbol
Basic type and size	Table 1 Basic type and size	

Table 1 Basic type and size

Basic type and size	Description / Port size	Flow Q_p (lpm)	Pressure p_{max} (bar)			
			P, A, B (DC)	T (DC)	P, A, B (AC)	T (AC)
SWPN 21	Nominal size 6	80	350	210	350	160
SWPN 81	Nominal size 10	150	350	210	350	160

Table 2 Symbols

Coding	Symbol	Coding	Symbol	Coding	Symbol
G		O		V	
D		W		L	
C		B		H	
E		R		K	
				HW	

Table 3 Actuating solenoid

Without device connector	Nominal voltage	Without device connector	Nominal voltage
X 12	12 V DC	X 110	110 V AC 50/60 Hz
X 24	24 V DC	X 230	230 V AC 50/60 Hz

Device connectors are to be ordered separately if required, see [Chapter 6, "Other information"](#)

3.1 General

General information

Nomenclature	4/3- and 4/2-way directional valve, directional spool valve		
Design	Piston spool valves, operated directly		
Model	Manifold mounting		
Material	Steel; valve housing galvanized zinc plated; hardened and ground functional inner parts Surface treatment (magnet): DIN 50961-Fe/Zn 12 bk cC		
Attachment	4 x M5 x 30 (SWPN 21), 4 x M6 x 40 (SWPN 81)		
Installation position	Any, preferably horizontal		
Port	<ul style="list-style-type: none"> ■ P = Inlet (pump) ■ A, B = Consumer ■ T = Return, tank 		
Direction of flow	According to arrow direction in switching symbols Chapter 2, "Versions available, main data"		
Hydraulic fluid	Hydraulic oil: according to DIN 51 524 Part 1 to 3; ISO VG 15 to 68 according to DIN 51 519 Viscosity range: min. approx. 2,8, max. approx. 400 mm ² /s Optimal operating range: approx. 10 ... 300 mm ² /s Also suitable for biologically degradable pressure fluids type HEPG (polyalkalene glycol) and HEES (synthetic ester) at operating temperatures up to approx. +70°C.		
Purity class	ISO 4406	NAS 1638	SAE T 490
	21/19/16	10	≥6
Temperatures	Ambient: approx. -20 ... +70°C, Öl: -20 ... +60°C, Note the viscosity range! Biologically degradable pressure fluids: Observe manufacturer's specifications. By consideration of the compatibility with seal material not over +70°C.		

Pressure and flow

Permissible pressure	See Chapter 2, "Versions available, main data" table 1
Static overload capacity	Approx. 2x p _{max}
Flow	See Chapter 2, "Versions available, main data" and characteristic curves

Mass

Type	AC	DC	Symbol
SWPN 21	= 1.6 kg	= 2.0 kg	G, D, C, E, O, L, H, K
	= 1.3 kg	= 1.75 kg	B, W, V, R, HW
SWPN 81	= 4.3 kg	= 5.7 kg	G, D, C, E, O, L, H, K
	= 3.6 kg	= 4.2 kg	B, W, V, R, HW

Curves

Switchable flow

Δp -Q characteristic curves

In the event of unilateral flow, values may be significantly lower than those shown. Switchable flows (guide line) for SWPN 21

Type SWPN 21 (DC)

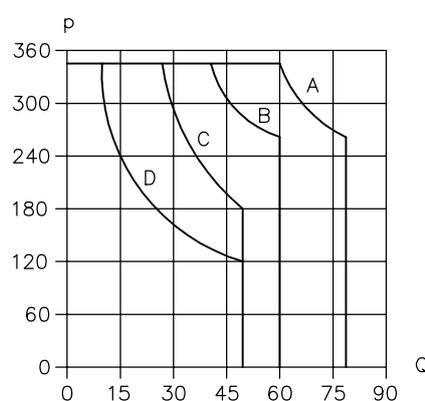


Figure 2: Q flow (l/min);
p operating pressure (bar)

Type SWPN 21 (AC)

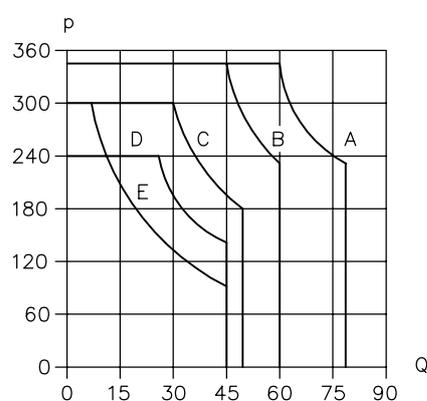


Figure 3: Q flow (l/min);
p operating pressure (bar)

Curve	AC	DC
A	B, G, K, W	G, D, W, B, H, K, HW
B	H, HW	E, O, R
C	D	C, L
D	C, E, L, O, R	V
E	V	

Switchable flows (guide line) for SWPN 81

Type SWPN 81 (DC)

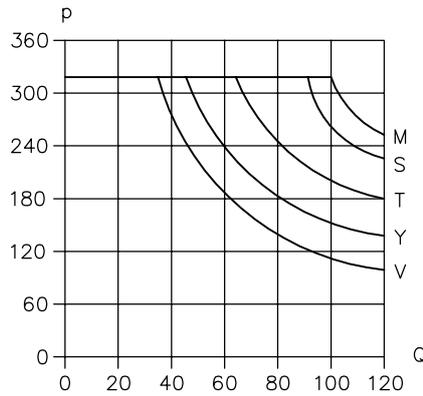


Figure 4: Q flow (l/min);
p operating pressure (bar)

Type SWPN 81 (AC)

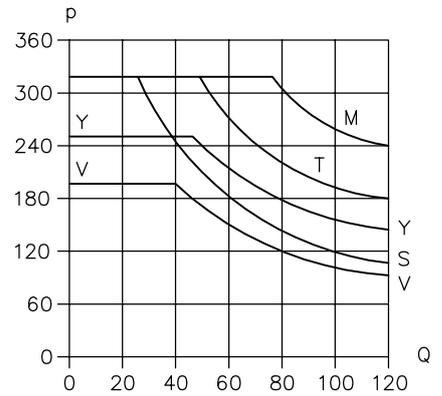


Figure 5: Q flow (l/min);
p operating pressure (bar)

Curve	AC	DC
M		B, D, G, H, K, W, HW
S	C, L	E, O, R
Y	B, G, K, W	L
V	E, O, R, V	V
T	D, H, HW	C

Back pressure

Type SWPN 21

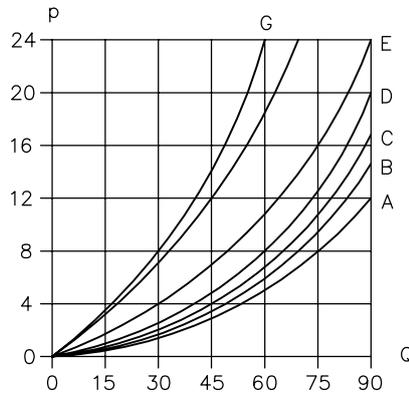


Figure 6: Q flow (l/min);
Δp back pressure (bar)

Type SWPN 81

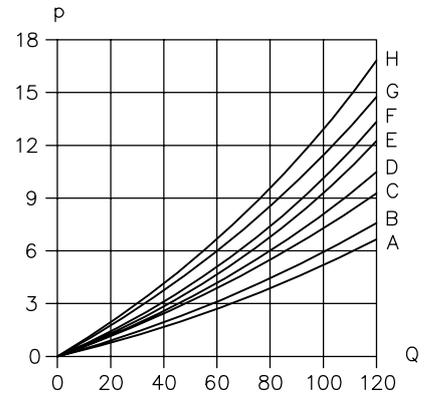


Figure 7: Q Flow (lpm);
Δp Back pressure (bar)

Symbol	Flow direction				
	P→A	P→B	A→T	B→T	P→T
H, HW	A	A	C	C	D
G	D	C	C	C	
D	D	D	A	A	
L	F	F	C	C	E
B, K, W	D	D	D	D	
E, O, R	D	D	D	D	
V	F	F			

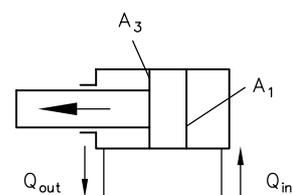
Symbol	Flow direction					
	P→A	P→B	A→T	B→T	P→T	B→A
H, V, HW	A	A	B	B		
G, O, R	A	A	D	C		
D, E	A	A	C	D		
L	B	B	B	B	F	
B, K, W	B	C	C	B		
C	A	D	C			H

Flow resistance per control edge type SWPN 21 / SWPN 81

The characteristic curves always apply to the specified flow direction. For 4/3 or 4/2 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 loads 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!

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

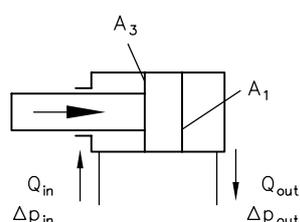
$$Q_{out} = \frac{Q_{in}}{\varphi}$$



- 1 A_{ab} = area piston side
- 2 A_{zu} = area rod side
- 3 Q_{zu} = inflow side
- 4 $Q_{rück}$ = outflow side

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

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



- 1 A_{zu} = area rod side
- 2 A_{ab} = area piston side
- 3 $Q_{rück}$ = outflow side
- 4 Q_{zu} = inflow side

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

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

3.2 Electrical data

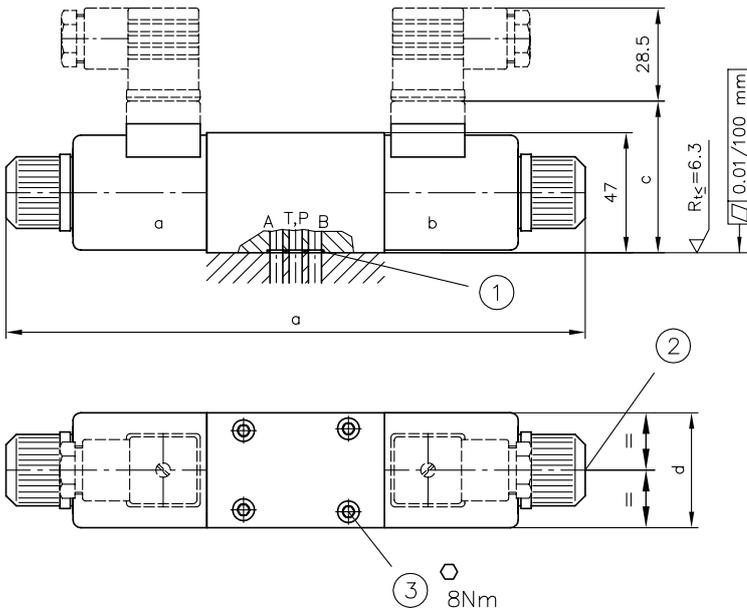
Voltage type		X 12	X 24	X 110	X 230
Nom. voltage (V)		12V DC	24V DC	110V AC	230V AC
Tolerance supply voltage (%)		± 10	± 10	± 10	± 10
Nom. current (A)	SWPN 21	2.5	1.25	0.53	0.25
	SWPN 81	3	1.5	0.77	0.37
Nom. power (W)	SWPN 21	30 W	30 W	58 VA	58 VA
	SWPN 81	36 W	36 W	85 VA	85 VA
Electrical connection		Plug conf. DIN EN 175 301-803			
Relative duty cycle		100% ED, stamping on the solenoid			
Switching times (SWPN 21)		Coding G.. = on: approx. 50 ms off: approx. 80 ms			
Switching times (SWPN 81)		Coding G.. = on: approx. 60 ms off: approx. 35 ms			
Switching operations (SWPN 21)		approx. 15 000 switchings / h			
Switching operations (SWPN 81)		approx. 10 000 switchings / h			
Protection class DIN 40050		IP 65 (plug properly mounted), IEC 60529			
Insulation material class		H for DC coils F for AC coils			
Surface temperature		Approx. 100°C at 20°C ambient temperature			
Mounting		The solenoid can be simply removed after loosening the mounting nut, easing replacement in case of an electrical defect.			

4 Dimensions

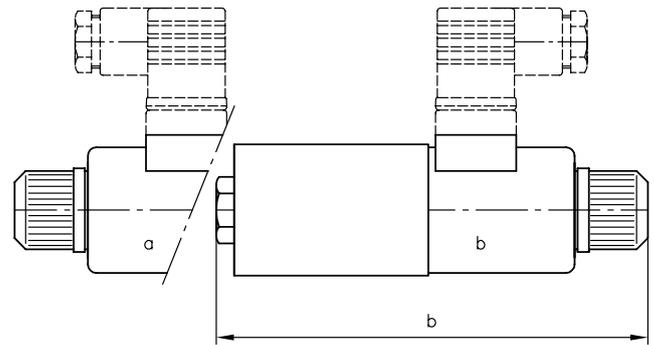
All dimensions in mm, subject to change!

Type SWPN 21

4/3-way directional valve
Coding **G, D, C, E, O, F, L, H, K**



4/2-way directional valve
Coding **B, V, HW**



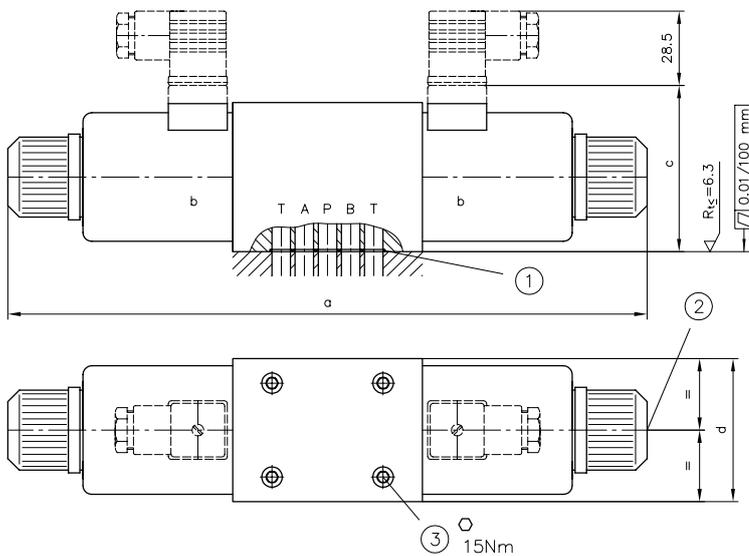
4/2-way directional valve
Coding **W, R**

- 1 Sealing of ports A, B, P and T via O-rings 8,73x1,78 NBR 90 Sh
- 2 Manually emergency actuation (approx. 35 N)
- 3 Skt.-head screws M5x30 -12.9 M5x30-12.9 ISO 4762 zinc plated (not scope of delivery)

Basic type		a	b	c	d
SWPN 21	DC	215	149.7	53	45
	AC	206.4	145.4	54.5	45

Type SWPN 81

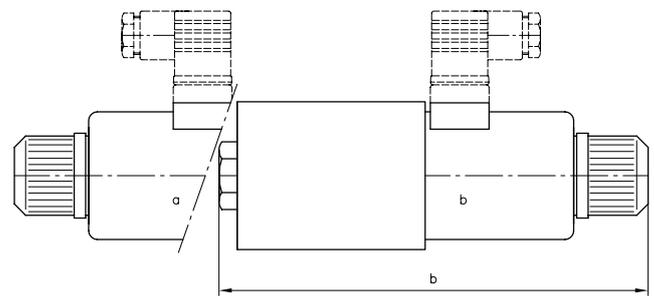
4/3-way directional valve
Coding G, D, C, E, O, F, L, H, K



- 1 Sealing of ports A, B, P and T via O-rings 12,42x1,78 NBR 90Sh
- 2 Manually emergency actuation (approx. 35 N)
- 3 Skt.-head screws M6x40-12.9 ISO 4762 zinc plated (not scope of delivery)

Basic type		a	b	c	d
SWPN 81	DC	292.2	202.2	76.5	70
	AC	238.2	175.2	83.5	70

4/2-way directional valve
Coding B, V, HW

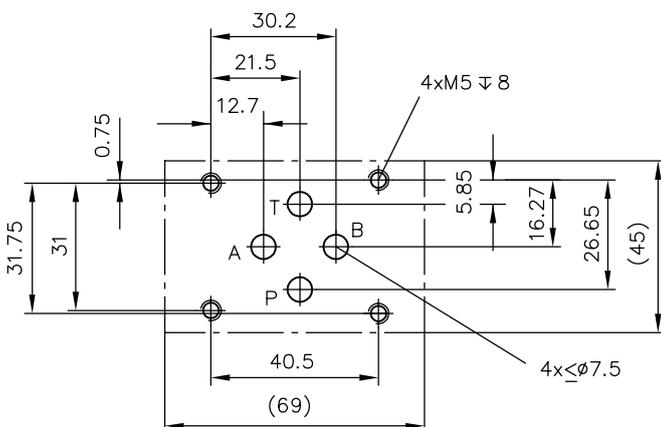


4/2-way directional valve
Coding W, R

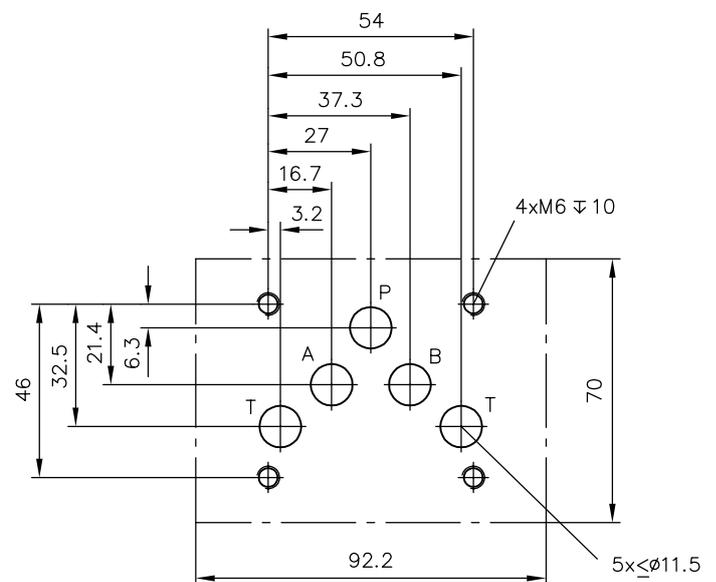
Base plate hole pattern

Version for base plate

Type SWPN 21



Type SWPN 81



5.1 Designated use

This fluid-power product has been designed, manufactured and tested using standards and regulations generally applicable in the European Union and left the plant in a safe and fault-free condition.

To maintain this condition and ensure safe operation, operators must observe the information and warnings in this documentation.

This fluid-power product must be installed and integrated in a hydraulic system by a qualified specialist who is familiar with and adheres to general engineering principles and relevant applicable regulations and standards.

In addition, application-specific features of the system or installation location must be taken into account if relevant.

This product may only be used within oil-hydraulic systems.

The product must be operated within the specified technical parameters. This documentation contains the technical parameters for various product versions.

**Note**

Non-compliance will void any warranty claims made against HAWE Hydraulik.

5.2 Assembly information

The hydraulic system must be integrated in the equipment with standard connection components that comply with market requirements (screw fittings, hoses, pipes, etc.). The hydraulic system must be shut down as a precautionary measure prior to dismounting; this applies in particular to systems with hydrostatic accumulators.

5.3 Operating instructions

Product, pressure and/or flow settings

All statements in this documentation must be observed for all product, pressure and/or flow settings on or in the hydraulic system.

Filtering and purity of the hydraulic fluid

Fine contamination (e.g. grit and dust) or contamination in the macro range (e.g. filings, rubber particles from hoses and seals) can significantly impair the function of a hydraulic system. It should also be noted that new hydraulic fluid straight from the container does not necessarily meet the highest purity standards.

Attention must therefore be paid to the purity of the hydraulic fluid to ensure smooth operation (see also "Purity class" in [Chapter 3, "Parameters"](#)).

5.4 Maintenance information

This product is largely maintenance-free.

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

Check the device surfaces for dust deposits at regular intervals (but at least once per year) and clean the device if required.

6 Other information

6.1 Accessories, spare parts and separate components

Sockets devices

black: 62170002-00

grey: 62170003-00

Cylinder screws

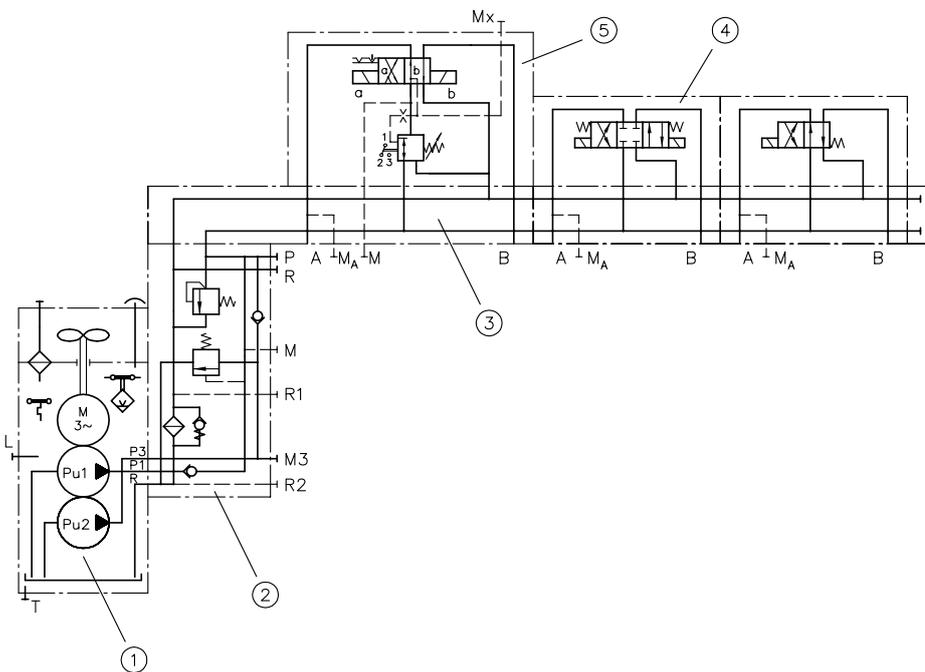
M5 x 30-12.9 - ISO 4762 6005 0485-00

M6 x 40-12.9 - ISO 4762 6005 0106-00

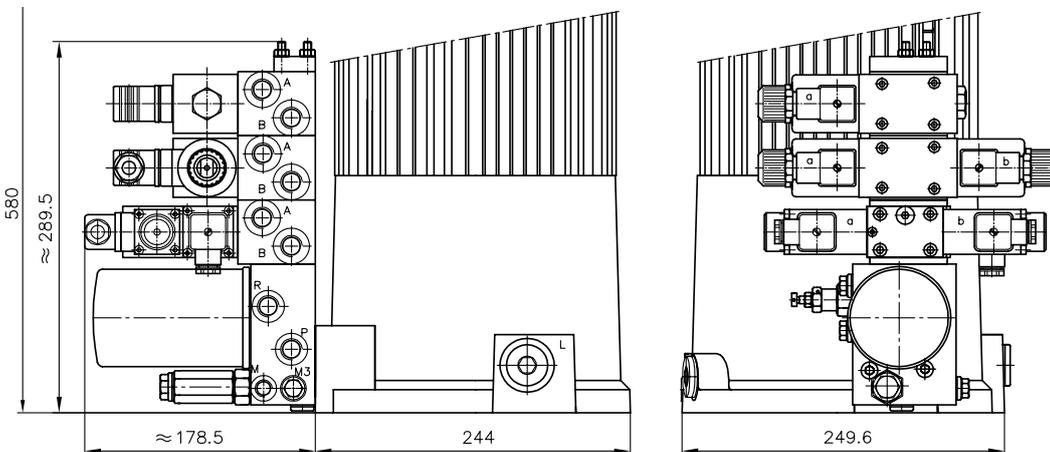
6.2 Planning information

Circuit examples

HK 43LDT/1M -Z Z2,7/9,8	- AN 21F2 - D45 - F50
	- BA 2
	- NSMD 2 K/GRK/0
	- SWPN 21 G/0
	- SWPN 21 B/0
	- 1 - 2 - G 24



- 1 Compact-hydraulic power pack type HK acc. to 7600-4 ($Q_{pu} \approx 2.7 / 9.8$ lpm)
- 2 Connection block type A with return filter acc. to D 6905 AF/1 ($p_{max} \approx 45/50$ bar)
- 3 Valve bank type BA in accordance with D 7788
- 4 Directional spool valve type SWPN 21
- 5 Clamping modul type NSMD 2 acc. to D 7787



Additional versions

- [Directional spool valve type NSWP 2: D 7451 N](#)
- [2/2-, 3/2-, and 4/3-way seated valves type NBVP 16: D 7765 N](#)
- [Clamping modules, type SMD 2 and NSMD 2: D 7787](#)
- [Intermediate plate type NZP hole pattern conforming NG 6 \(DIN 24 340-A6\): D 7788 Z](#)

For use in

- [Valve bank type BA: D 7788](#)

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