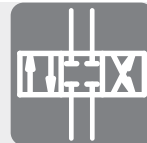


Directional spool valve type SWPN

Product documentation



Manifold mounting valve, nominal size 6 and 10

Operating pressure p_{\max} : 350 bar

Flow rate Q_{\max} : 150 lpm



© by HAWE Hydraulik SE.

The reproduction and distribution of this document as well as the use and communication of its contents to others without explicit authorisation is prohibited.

Offenders will be held liable for the payment of damages.

All rights reserved in the event of patent or utility model applications.

Brand names, product names and trademarks are not specifically indicated. In particular with regard to registered and protected names and trademarks, usage is subject to legal provisions.

HAWE Hydraulik respects these legal provisions in all cases.

Printing date / document generated on: 14.09.2017

1	Overview directional spool valve type SWPN.....	4
2	Available versions, main data.....	5
3	Parameters.....	6
3.1	General.....	6
3.2	Electrical data.....	10
4	Dimensions.....	11
5	Assembly, operation and maintenance recommendations.....	13
5.1	Intended use.....	13
5.2	Assembly information.....	13
5.3	Directives.....	14
5.4	Maintenance information.....	14
6	Other information.....	15
6.1	Accessories, spare parts and separate components.....	15
6.2	Planning information.....	16

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

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

Features and benefits:

- Standard hole pattern
- High flexibility by means of a variety of circuit symbols

Intended applications:

- Hydraulic power packs
- Industry



Directional spool valves type SWPN

2 Available versions, 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	volumetric 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	120	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 male connector	Nominal voltage	Without male 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

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

3 Parameters

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		
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	<div style="border: 1px solid gray; padding: 5px;"> <p> Note In accordance with circuit symbol, carry out general and random checks to ensure permitted pressure is present at T!</p> </div>		
Hydraulic fluid	<p>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 mm²/s Optimal operating range: approx. 10 ... 300 mm²/s Also suitable for biologically degradable pressure fluids type HEPG (polyalkalene glycol) and HEES (synthetic ester) at operating temperatures up to approx. +70°C.</p>		
cleanliness level	ISO 4406 21/19/16	NAS 1638 10	SAE T 490 ≥6
Temperatures	<p>Environment: approx. -30 to +70°C, oil: -20 to +60°C, pay attention to the viscosity range. Biologically degradable pressure fluids: Observe manufacturer's specifications. By consideration of the compatibility with seal material not over +70°C.</p>		

Pressure and flow

Permissible pressure	See Chapter 2, "Available versions, main data" table 1
Static overload nominal volume	Approx. 2x p _{max}
Flow	See Chapter 2, "Available versions, main data" and characteristic curves

Weight

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

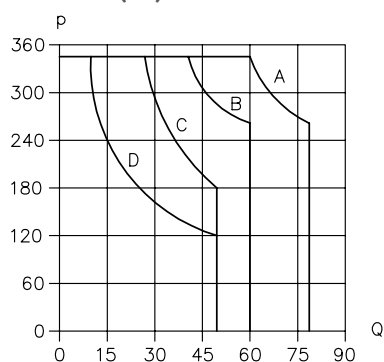
Curves

Switchable flow

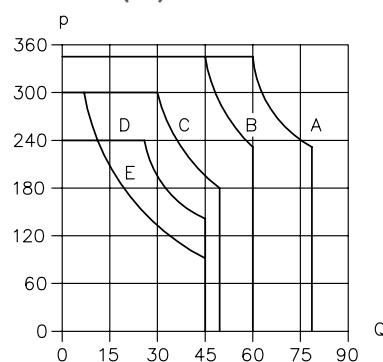
Δp -Q characteristic curves

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

SWPN 21 (DC)



SWPN 21 (AC)

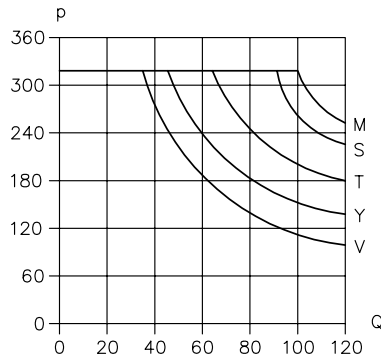


Q flow rate (lpm); p operating pressure (bar)

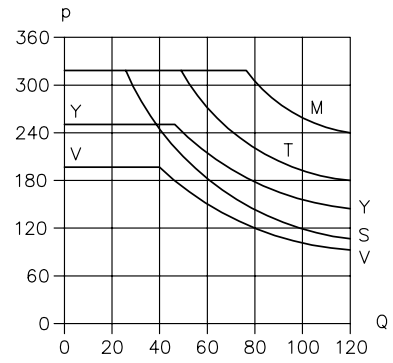
Curve	AC	DC
A	B, G, K, W	G, D, W, B, H, K, HW
B	H, HW	E, O, R
C	D	C, L
D	C, E, L, O, R	V
E	V	

Switchable flows (guide line) for SWPN 81

SWPN 81 (DC)



SWPN 81 (AC)

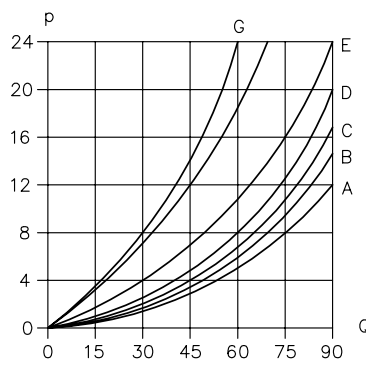


Q flow rate (lpm); p operating pressure (bar)

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

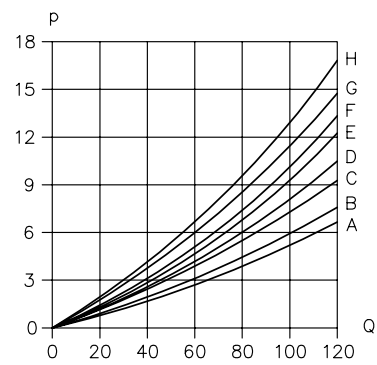
Flow resistance

SWPN 21



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

SWPN 81



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!

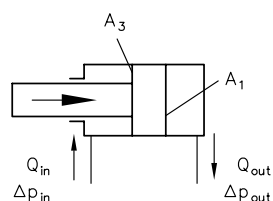
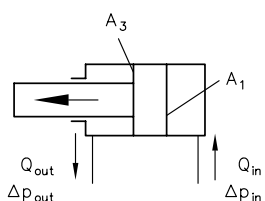
$$\Delta p = \Delta p_{in} + \frac{\Delta p_{out}}{\varphi}$$

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

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

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

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



Δp = Overall resistance

Δp_{in} = Pressure loss inflow side

Δp_{out} = Pressure loss 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

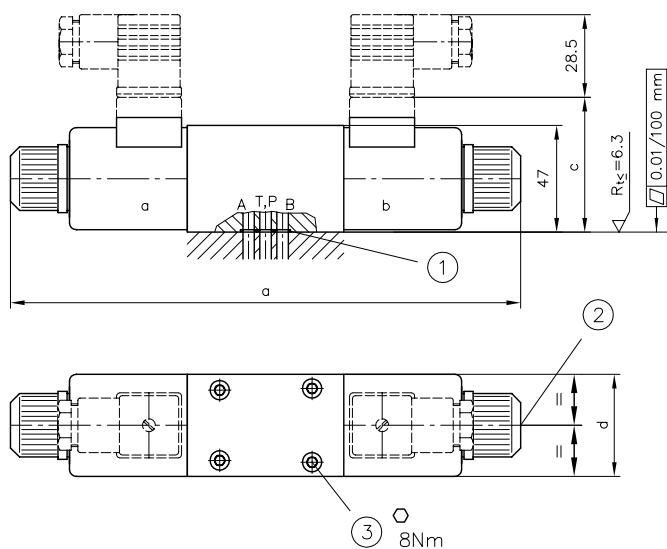
Voltage type		X 12	X 24	X 110	X 230
Nom. voltage (V)		12 V DC	24 V DC	110 V AC	230 V AC
Tolerance supply voltage (%)		± 10	± 10	± 10	± 10
Nom. current (A)	SWPN 21	2.5	1.25	0.53	0.25
	SWPN 81	3	1.5	0.77	0.37
Nom. power (W)	SWPN 21	30 W	30 W	58 VA	58 VA
	SWPN 81	36 W	36 W	85 VA	85 VA
Electrical connection		Male connector re. 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			
	SWPN 81	Coding G.. = on: approx. 60 ms off: approx. 35 ms			
Switching frequency	SWPN 21	approx. 15 000 switchings / h			
	SWPN 81	approx. 10,000 shifts per hour			
Protection class IEC 60529		IP 65 (plugs mounted correctly)			
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.

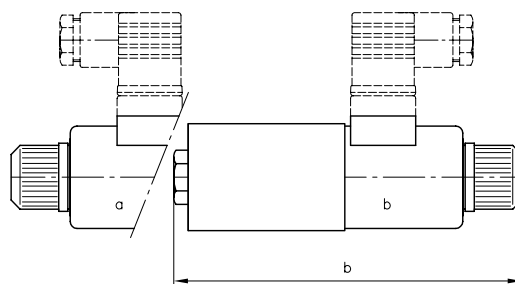
Type SWPN 21

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 connections A, B, P and T via O-rings 8.73x1.78 NBR 90Sh
- 2 Manual override (approx. 35 N)
- 3 Cylinder screw M5x30-12.9 DIN EN ISO 4762 Mechanically galvanized (not included in scope of supply)

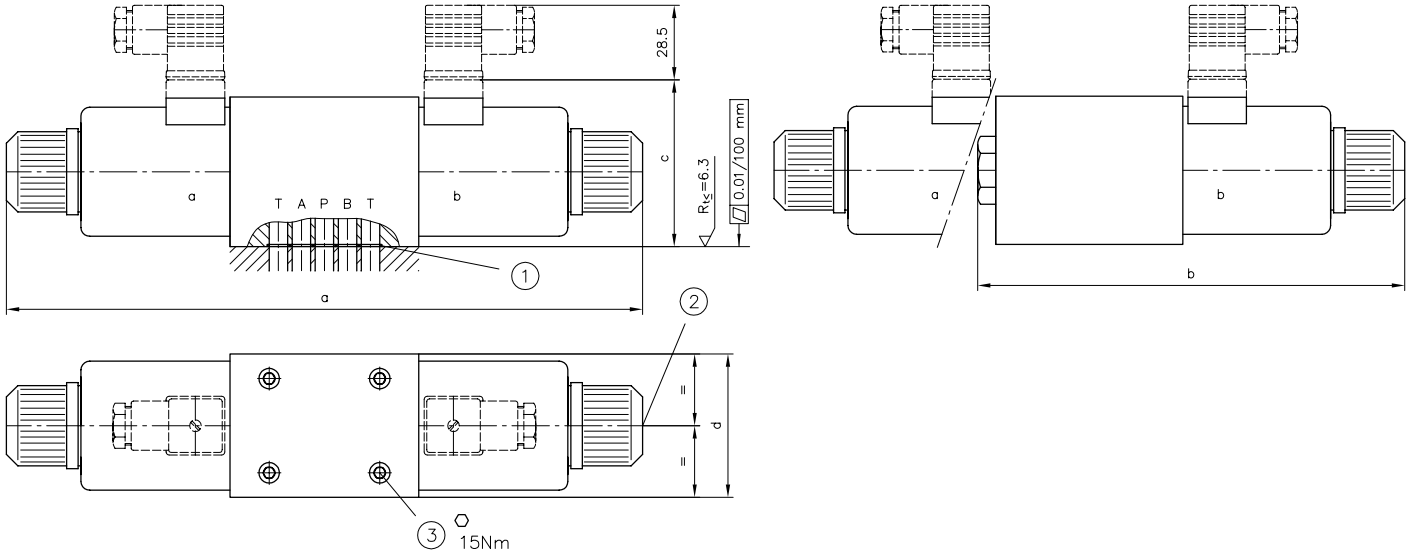
Basic type		a	b	c	d
SWPN 21	DC	215	149.7	53	45
	AC	206.4	145.4	54.5	45

Type SWPN 81

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

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

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

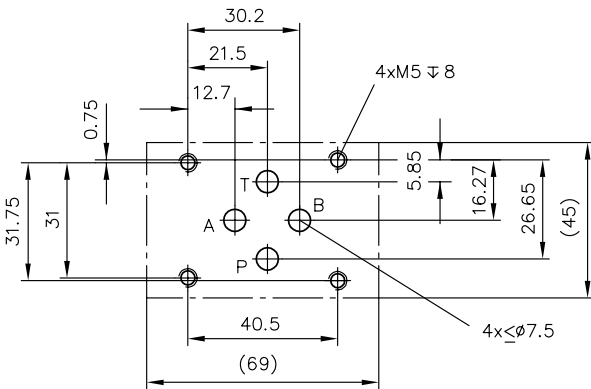


- 1 Sealing of connections A, B, P and T via O-rings 12.42x1.78 NBR 90Sh
- 2 Manual override (approx. 35 N)
- 3 Cylinder screw M6x40-12.9 DIN EN ISO 4762 Mechanically galvanised (not included in scope of supply)

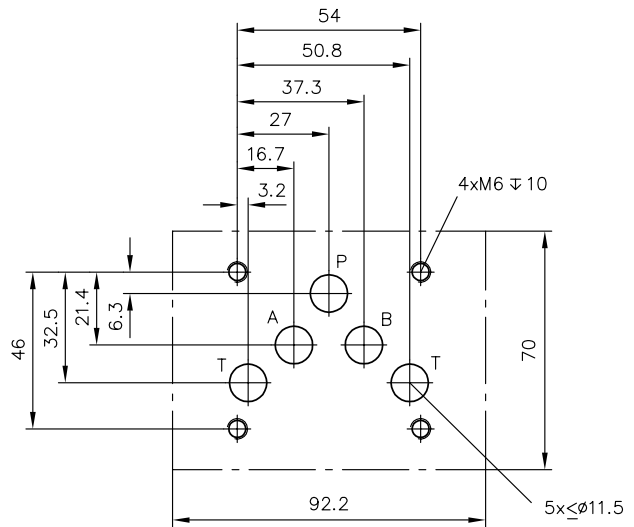
Basic type		a	b	c	d
SWPN 81	DC	292.2	202.2	76.5	70
	AC	238.2	175.2	83.5	70

Base plate hole pattern

SWPN 21



SWPN 81



5 Assembly, operation and maintenance recommendations

5.1 Intended use

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

The valve demands high technical safety standards and regulations for fluid engineering and electrical engineering.

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 specific complete system must also always be observed.

If the product can no longer be operated safely:

⇒ 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, etc.).

The hydraulic power pack must be shut down correctly prior to dismantling; 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.

5.3 Directives

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.

Adhere to the cleanliness level of the hydraulic fluid in order to maintain faultless operation.
(Also see cleanliness level in [Chapter 3, "Parameters"](#)).

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 Accessories, spare parts and separate components

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

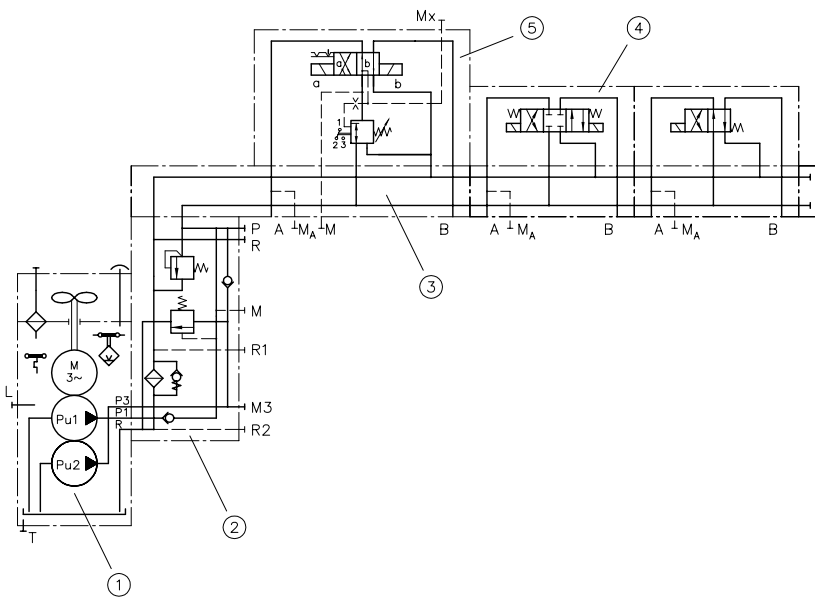
Cylinder screws

M5x30-12.9 - DIN EN ISO 4762	6005 0485-00
M6x40-12.9 - DIN EN ISO 4762	6005 0106-00

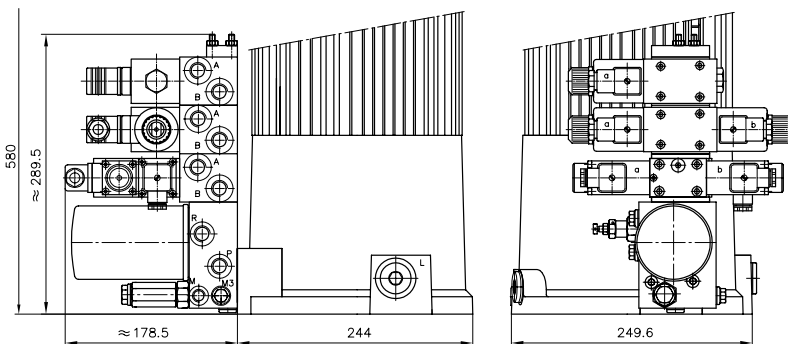
6.2 Planning information

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 in accordance with [D 7600-4](#) ($Q_{Pu} \approx 2.7 / 9.8$ lpm)
- 2 Connection block type A with return line filter in accordance with [D 6905 A/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 module type NSMD 2 in accordance with [D 7787](#)



Further information

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

Application

- Valve bank (nominal size 6) type BA: D 7788