Directional seated valve type WN, WH

Product documentation

Zero leakage

Operating pressure p_{max}:	450 bar
Flow rate Q_{max}:	30 l/min



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1 Overview of directional seated valves type WN, WH

Directional seated valves are a type of directional valve. Their function is to direct the flow of hydraulic medium in certain directions, therefore connecting the relevant connections, or shutting off the flow with zero leakage. By this means they control the movement of the actuators in a hydraulic system.

The directional seated valves type WN and WH are manifold mounting valves. 2/2 and 3/2-way directional seated valves are available. These are also available combined as 3/3 and 4/3-way directional seated valves. They are ball seated valves. Type WH has an internal pressure balance function. As a result, the permissible operating pressure is higher than the type WN.

Appropriate connection blocks enable direct pipe connection. The directional seated valves are available as chained valves in valve bank type BWN and BWH.

Features and advantages

- Compact design
- Directional seated valves with zero leakage

Intended applications

- Machines for forestry and agricultural purposes
- Clamping, punching and jigs
- Clamping equipment, punching tools, jigs
- Process engineering systems



Directional seated valve type WN

2 Available versions

2.1 Single valve for manifold mounting

Ordering example

WN 1	H	1 /B 0,4	-G 24

2.1.4 "Solenoid voltage and connector"

2.1.3 "Additional elements"

2.1.2 "Circuit symbol"

2.1.1 "Basic type and size"

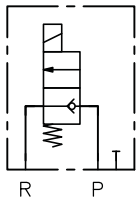
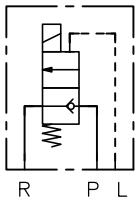
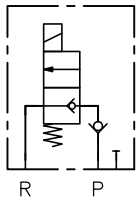
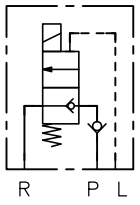
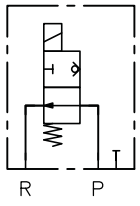
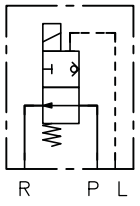
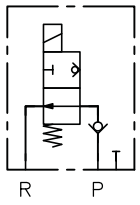
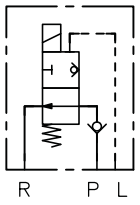
2.1.1 Basic type and size

Type	Pressure p_{max} (bar)	Flow rate Q_{max} (l/min)
WN 1	350	5
WH 1	450	8
WH 2	350	15
WH 3	350	30

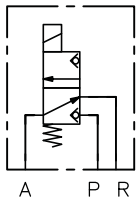
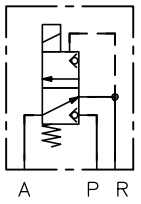
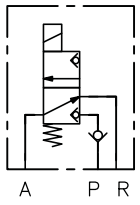
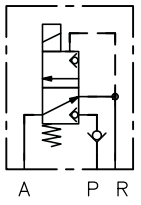
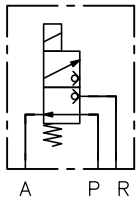
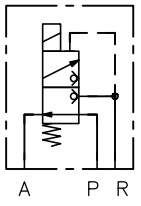
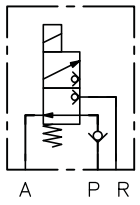
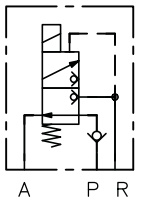
NOTICE
Type WN 1, for details on max. operating pressure see Chapter 3, "Parameters"

2.1.2 Circuit symbol

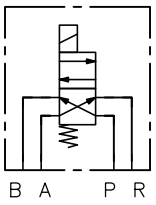
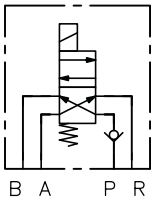
2/2-way directional valve (directional seated valve)

Coding	WN 1	WH 1, WH 2, WH 3
D		
Q		
F		
E		

3/2-way directional valve (directional seated valve)

Coding	WN 1	WH 1, WH 2, WH 3
H		
N		
M		
R		

4/2-way directional valve (directional spool valve)

Coding	Pressure p_{max} (bar)	Flow rate Q_{max} (l/min)	WN 1	WH 1, WH 2, WH 3
W	300	6		--
WX	300	6		--

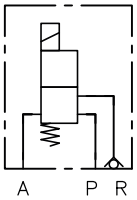
NOTICE

- **Type Q, E, N, R, WX:** If the straight-way opening has been switched, the additional check valve on the P-side prevents the pressure being balanced/the flow direction being reversed if other switching procedures cause the pressure at P to fall below the pressure at A (B, R) see Chapter 2.2.1, "Connection block for single valves type WN 1"
- **Type WN 1, WH 1:** the check valve can be retrofitted and can be ordered as an individual element type EK 01. For all other sizes: retrofits can only be performed in the factory. see Chapter 5.2, "Assembly information"

2.1.3 Additional elements

3/2-way directional valves with additional return pressure stop in the reflux

Only for WN 1, WH 1, WH 2, for circuit symbols H, N, M, R; in the case of WN 1, WH 1 also circuit symbols D, F

Coding	Circuit symbol
without coding	without return pressure stop
1	

Application: the return pressure stop prevents pressure surges from the shared return line from affecting non-actuated, easily moved consumers with no load and thus causing uncontrolled advancing in systems where several valves are connected in parallel and there is a connection from A → R. Such pressure surges can occur as a result of switching procedures.

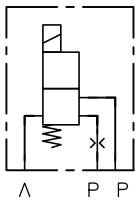
The return pressure stop may occasionally be required on WN 1 valves as the force of the return spring is kept lower than WH 1 and WH 2.

The check valves are not suitable for blocking off the flow of hydraulic oil, which can occur as a result of switching combinations with other valves at R. A switching circuit with an external check valve would be required in this case.

NOTICE
For retrofits, see Chapter 6.1.2, "Order coding for individual parts"

2/2 and 3/2-way directional valves with additional orifice in the P gallery

Only for WN 1, WH 1, for circuit symbol D, F, H, M and W

Coding	Orifice ∅ (mm)	Circuit symbol
without coding	without orifice	-
B 0.4	0.4	
B 0.6	0.6	
B 0.7	0.7	
B 0.8	0.8	
B 1.2	1.2	

Function: to limit the flow, see Chapter 3.4, "Characteristic lines"

Application: to reduce the flow rate to ≦ Q_{max}.
If the flow rate exceeds Q_{max} when switching P → A(R) (see Chapter 2.1.1, "Basic type and size"), e.g. hydraulic accumulator on the pump side P or when providing hydraulic pilot control for directional spool valves and supplying control oil from the main line with a high flow rate.

NOTICE
For retrofits, see Chapter 6.1.2, "Order coding for individual parts"

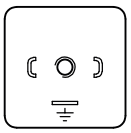
2.1.4 Solenoid voltage and connector

Coding	Electrical connection	Nominal voltage		Protection class (IEC 60529)	WN 1 WH 1	WH 2	WH 3
		V AC	V DC				
X 12, G 12	EN 175 301-803 A ▪ Coding X without plug ▪ Coding G with line connector MSD3-309 ▪ Coding L with LED plug ▪ Coding WG with alternating rectifier in line connector ▪ Coding 5k with cast-on cable 5 m long ▪ Coding S with Schlemmer connector		12 V DC	IP 65	●	●	●
X 24, G 24			24 V DC		●	●	●
X 98, G 98			98 V DC		●	●	●
X 205, G 205			205 V DC		●	●	●
L 12			12 V DC		●	●	●
L 24			24 V DC		●	●	●
S 24			24 V DC	IP 67	●		
L5K 12			12 V DC	IP 65	●	●	●
L5K 24			24 V DC		●	●	●
WG 110		110 V AC 50/60 Hz	98 V DC		●	●	●
WG 230		230 V AC 50/60 Hz	205 V DC		●	●	●

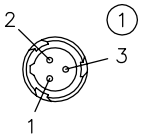
NOTICE
Special voltages available on request

Connection pattern

G .., X .., L .., WG ..



S ..



1 dummy

NOTICE
Circuit diagrams see Chapter 3.5, "Electrical data"

2.2 Single valve with connection block

Ordering example 1

WN 1	**D**	**1**	**-1/4 V**	**50**	**-G 24**
WH 3	**H**	**1**	**-3/8 SR**	**200**	**-G 24**

2.1.4 "Solenoid voltage and connector"

Pressure setting of pressure-limiting valve see page 11

- 2.2.1 "Connection block for single valves type WN 1"
- 2.2.2 "Connection block for directional valve combinations type WN 1"
- 2.2.3 "Connection block for single valves type WH 1, WH 2, WH 3"
- 2.2.4 "Connection block for directional valve combinations type WH 1, WH 2, WH 3"

2.1.3 "Additional elements"

2.1.2 "Circuit symbol"

2.1.1 "Basic type and size"

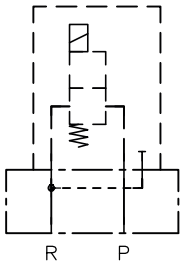
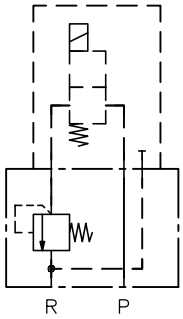
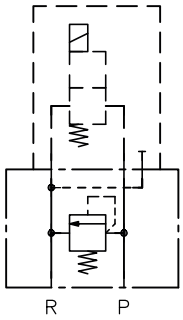
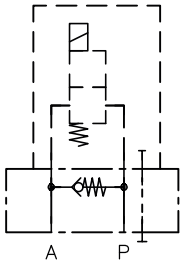
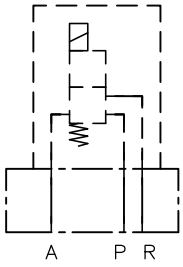
Ordering example 2

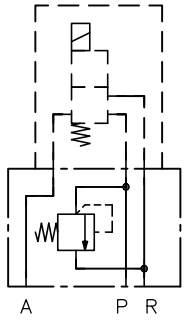
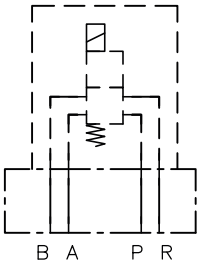
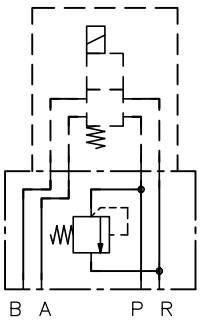
WN 1	**H**	**/N**	-1/4 - G 24
WN 1	**J**		-1/4 - G 24

Port B

Port A

2.2.1 Connection block for single valves type WN 1

Coding	Description	Suitable for circuit symbol	Ports (ISO 228-1) P, A, B, R	Circuit symbol
2/2-way directional valves				
-1/4	Connection block for pipe connection	D, F, Q, E	G 1/4	
-1/4 V ... **-1/4 VR ...**	Connection block with pressure-limiting valve in series P → R ▪ **V:** fixed ▪ **VR:** adjustable	D, F	G 1/4	
-1/4 S ... **-1/4 SR ...**	Connection block with pressure-limiting valve in parallel P → R ▪ **S:** fixed ▪ **SR:** adjustable	D, F, Q, E	G 1/4	
-1/4 C	Connection block with bypass check valve	D, F	G 1/4	
3/2-way directional valves				
-1/4	Connection block for pipe connection	H, N, M, R	G 1/4	

Coding	Description	Suitable for circuit symbol	Ports (ISO 228-1) P, A, B, R	Circuit symbol
-1/4 S ... **-1/4 SR ...**	Connection block with pressure-limiting valve in parallel P → R ▪ **S:** fixed ▪ **SR:** adjustable		G 1/4	
4/2-way directional spool valve				
-1/4	Connection block for pipe connection	W, WX	G 1/4	
-1/4 S ... **-1/4 SR ...**	Connection block with pressure-limiting valve in parallel P → R ▪ **S:** fixed ▪ **SR:** adjustable		G 1/4	

Pressure setting of pressure-limiting valve

Coding	Pressure p_{max} (bar)
...	▪ (0) to 80 ▪ (0) to 160 ▪ (0) to 350 ▪ (0) to 450 only for WH 1

NOTICE

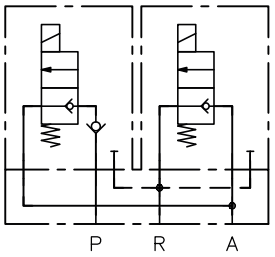
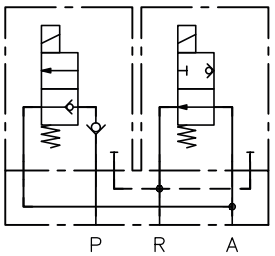
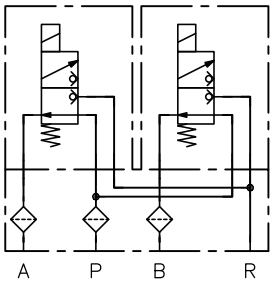
- In the case of coding -1/4 and -1/4 S(R), there is usually no need for 2/2-way directional valves coding E and Q for bypass circuits to the reflux; a return pressure stop can be provided if required, see Chapter 2.1.3, "Additional elements".
- Coding -1/4 V(R) as a second pressure stage that can be switched arbitrarily, e.g. for proportional directional spool valve type PSL, PSV as per D 7700-2, D 7700-3, D 7700-5 or as a means of switching pressure stages for pilot-controlled pressure valves, e.g. types DV as per D 4350 or AL. as per D 6170.

NOTICE

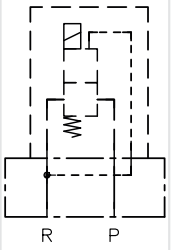
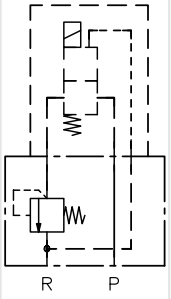
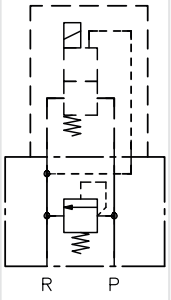
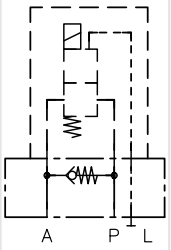
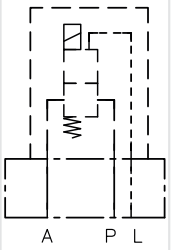
In the case of coding -1/4 V(R), -1/4 S(R), permissible pressure in the reflux R: $p_{R\ max}$ = 20 bar

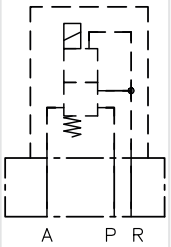
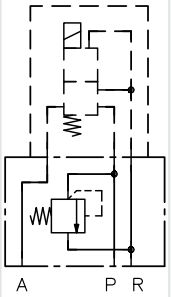
If there are pressure surges in the reflux of > 20 bar, e.g. as a result of decompression surges relating to larger consumers acting like an accumulator, a steel spring housing can be selected; please state this in the plain text.
For permissible operating pressures for ports P, R, A and B see Chapter 3.2, "Pressure and volumetric flow"

2.2.2 Connection block for directional valve combinations type WN 1

Type	Description	Ports (ISO 228-1)	Circuit symbol
		P, A, B, R	
WN 1 J -1/4 - ..	▪ 2/2-way directional seated valve combination with WN 1 D, Q or F ▪ Consumer – held in any intermediate position ▪ 3/3-way function	G 1/4	 Example: WN 1 J - 1/4 - G 24
WN 1 U -1/4 - ..		G 1/4	 Example: WN 1 U - 1/4 - WG 230
WN 1 ../.. -1/4 - ..	▪ Dual directional valve block for pipe connection ▪ Used as a compact means of providing two separate 3/2-way functions ▪ Circuit symbol H(1), N(1), M(1), R(1) on port A, B	G 1/4	 Example: WN 1 M/M - 1/4 - G 12

2.2.3 Connection block for single valves type WH 1, WH 2, WH 3

Coding	Description	Suitable for circuit symbol	Ports (ISO 228-1) P, R, A, L	Circuit symbol	WH 1	WH 2	WH 3
2/2-way directional valves							
-1/4 **-3/8**	Connection block for pipe connection	D, F	G 1/4 G 3/8		● ●	● ●	
-1/4 V.. **-1/4 VR..**	Connection block with pressure-limiting valve in series P → R ▪ **V:** fixed ▪ **VR:** adjustable	D, F	G 1/4		● ●		
-1/4 S.. **-1/4 SR..** **-3/8 S..** **-3/8 SR..**	Connection block with pressure-limiting valve in parallel P → R ▪ **S:** fixed ▪ **SR:** adjustable	D, F	G 1/4 G 1/4 G 3/8 G 3/8		● ●	● ●	 ● ●
-1/4 C	Connection block with bypass check valve	D, F	G 1/4		●		
-1/4 L **-3/8 L**	Connection block for pipe connection	D, Q, F, E	G 1/4 G 3/8		●	●	 ●

Coding	Description	Suitable for circuit symbol	Ports (ISO 228-1) P, R, A, L	Circuit symbol	WH 1	WH 2	WH 3
3/2-way directional valves							
-1/4 **-3/8**	Connection block for pipe connection	H, N, M, R	G 1/4 G 3/8		● 	● 	 ●
-1/4 S.. **-1/4 SR..** **-3/8 S..** **-3/8 SR..**	Connection block with pressure-limiting valve in parallel P → R ▪ **S:** fixed ▪ **SR:** adjustable	H, N, M, R	G 1/4 G 1/4 G 3/8 G 3/8		● ●	● ●	 ● ●

Pressure setting of pressure-limiting valve

Coding	Pressure p_{max} (bar)
...	▪ (0) to 80 ▪ (0) to 160 ▪ (0) to 350 ▪ (0) to 450 only for WH 1

NOTICE

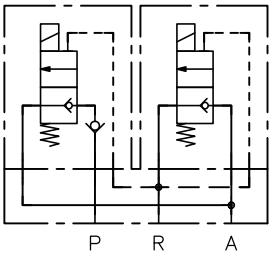
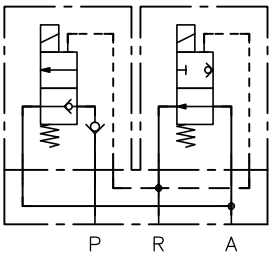
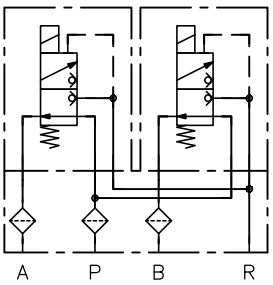
- Connection plate coding -1/4, -3/8, -1/4V(R), -1/4S(R), -3/8S(R) with relief port L connected internally to R, for idle circulation only.
- In the case of coding -1/4 L, -3/8L, relief port L runs externally to the tank in depressurised form. To switch the straight-way opening in the pressure line, outlet A can be pressurised.

NOTICE

In the case of coding -1/4 V(R), -1/4 S(R), permissible pressure in the reflux R: $p_{R\ max}$ = 20 bar

If there are pressure surges in the reflux of > 20 bar, e.g. as a result of decompression surges relating to larger consumers acting like an accumulator, a steel spring housing can be selected; please state this in the plain text.
For permissible operating pressures for ports P, R, A and B see Chapter 3.2, "Pressure and volumetric flow"

2.2.4 Connection block for directional valve combinations type WH 1, WH 2, WH 3

Type	Description	Ports (ISO 228-1)	Circuit symbol
		P, R, A, B	
WH 1 J -1/4 - .. **WH 2 J -1/4 - ..** **WH 3 J -3/8 - ..**	• 2/2-way directional seated valve combination with WN 1 D, Q or F • Consumer – held in any intermediate position • 3/3-way function	G 1/4 G 1/4 G 3/8	 Example: WH 1 J - 1/4 - G 24
WH 1 U -1/4 - .. **WH 2 U -1/4 - ..** **WH 3 U -3/8 - ..**		G 1/4 G 1/4 G 3/8	 Example: WH 1 U - 1/4 - WG 230
WH 1 ../.. -1/4 - ..	• Dual directional valve block for pipe connection • Used as a compact means of providing two separate 3/2-way functions • Circuit symbol H(1), N(1), M(1), R(1) on port A, B	G 1/4	 Example: WH 1 M/M - 1/4 - G 12

2.2.5 Intermediate plates type WN 1, WH 1

2/2-way directional valves with pressure-limiting valve in the intermediate plate

The pressure-limiting valve (available in fixed form only) which is integrated into the intermediate plate provides a very simple and compact means of switching pressure stages in pilot control circuits.

Application: on proportional directional spool valves type PSL/PSV (as per D 7700 et seqq.) for switching a second pressure stage in the LS gallery.

Combinations with a connection block, see Chapter 2.2, "Single valve with connection block" coding ..-1/4 or ..-1/4 L are possible. If the flow rate is low, the module can also be used as an alternative to version ..-1/4 V.

Ordering examples

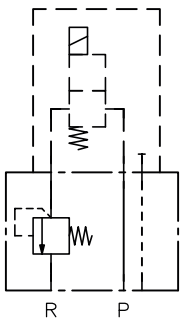
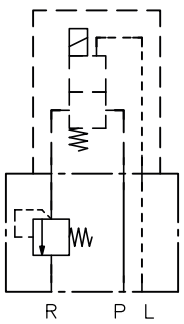
WN 1 D	/250		- G 24
WH 1 D	/80	- 1/4	- G 24

2.1.4 "Solenoid voltage and connector"

Individual connection block
- 2.2.1 "Connection block for single valves type WN 1"
- 2.2.3 "Connection block for single valves type WH 1, WH 2, WH 3"

Intermediate plate, pressure setting of pressure-limiting valve

2/2-way directional valve
- 2.1.1 "Basic type and size"
- 2.1.2 "Circuit symbol"

Coding	Pressure p_{max} (bar)	Flow rate Q_{max} (l/min)	Description	Circuit symbol
/...	400 (adjustment range 50 to 400 bar)	2	for type ▪ WN 1 F(D) ▪ WH 1 F(D)	WN 1  WH 1 

NOTICE
For order coding for intermediate plate see Chapter 6.1.2, "Order coding for individual parts"

3 Parameters

3.1 General data

Designation	Directional seated valves
Design	Ball seated valve in 2/2 and 3/2-way version, or piston valve in 4/2-way version, depending on the type
Model	Individual valve for manifold mounting, combination with connection block for pipe connection
Material	Steel; Hardened and ground functional inner parts, zinc/nickel-coated valve housing, nitrided in the case of WH 2, WH 3, zinc/nickel-coated solenoid housing, electro-galvanised sub-plates
Tightening torque	see Chapter 4, "Dimensions"
Installation position	As desired
Line connection	▪ Basic valve: manifold mounting ▪ Connection blocks: for pipe connection
Ports/connections	▪ **P** = Pump ▪ **A, B** = Consumers ▪ **R** = Reflux ▪ **L** = Relief port, must always be directed to the tank in depressurised form (reflux)
Flow direction	▪ Seated valve: only in the direction of the arrow as per the circuit symbol ▪ Directional spool valve: can also go in the opposite direction of the arrow in exceptional cases, pay attention to the pressure resistance at R, see Chapter 2.1.2, "Circuit symbol"
Overlap	▪ Directional seated valve: negative The changeover from one flow direction to the other is not complete until the end of the stroke, i.e. all straight-way openings are connected during the switching procedure. However, the switching procedure remains unaffected on account of the fast switching time. ▪ Directional spool valve: zero
Hydraulic fluid	Hydraulic fluid, according to DIN 51524 Parts 1 to 3; ISO VG 10 to 68 according to DIN ISO 3448 Viscosity range: 4 - 800 mm²/s Optimal operating range: approx. 10 - 200 mm²/s Also suitable for biologically degradable hydraulic fluids type HEPG (polyalkylene glycol) and HEES (synthetic ester) at operating temperatures up to approx. +70°C. A version for glycol-based brake fluid (as per DOT 4) is available (type WN 1, WH 1, WH 2), append -AT to order coding.
Cleanliness level	**ISO 4406** 21/18/15
Temperatures	Environment: approx. -40 to +80°C, ambient temperature up to 80°C only with restricted duty cycle, hydraulic fluid: -25 ... +80°C, ensure the correct viscosity range. Start temperature: down to -40 °C is permissible (take account of the start viscosities!), as long as the steady-state temperature is at least 20 K higher during subsequent operation. 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} (bar)

Ports P, A and B:

Type	Circuit symbols	Switchable pressure (bar)				
		Voltage applied	Relative duty cycle %ED			
			100	50	10	Ambient temperature
Directional seated valve						
WN 1	D, Q, R, H, N, M, J	U_N	230	250	350	Reference value for 20°C At 40°C, approx. 10 to 15% lower
		0.75 U_N	110	160	200	
		0.5 U_N	100	100	120	
	F, E	U_N to 0.5 U_N		350		Reference value for 40°C, for restrictions also see Chapter 3.5, "Electrical data"
WH 1	all	U_N		450		
WH 2 WH 3				350		
Directional spool valve						
WN 1	W, WX	U_N		300		Reference value for 40°C, for restrictions also see Chapter 3.5, "Electrical data"

- WH: undervoltage of < 90% of U_N is not permissible
- WN 1: for the most part, the required solenoid force is directly proportional to the operating pressure to be switched.
  The supply voltage can be reduced (for undervoltage see table above: 0.75 U_N and 0.5 U_N) if the operating pressures have been restricted to values below the max. permissible ones.

  Advantages:
  - Solenoid heats up less
  - Improved winding service life
  - Less heat is dissipated to directly adjacent components (valve body with seals)
  - Adjacent solenoids in block banks do not heat up one another as much
- Economy circuits are advantageous in the case of a high duty cycle,
  see Chapter 3.5, "Electrical data"

Permissible pressure in the reflux

- WN 1:
  - $p_R \leqq 350$ bar, observe the pressure drop $p_R \leqq p_A \leqq p_P$!
  - Only use coding F and E as a straight-way valve up to 320 bar!
- WH 1(2, 3):
  - Circuit symbols H, N, M, R: $p_R \leqq 20$ bar
  - Circuit symbols D, Q, F, E: $p_R \leqq 350$ bar, $p_L \leqq 20$ bar, observe the pressure drop $p_R \leqq p_A \leqq p_P$!
- Connection blocks:
  - Version ..S(SR) or ..V(VR) $p_R \leqq 20$ bar

Flow rate Q_{max} (l/min)

see Chapter 2.1.1, "Basic type and size"

- WN 1: different flow rate for directional spool valve circuit symbol W, WX: Q_{max} = 6 l/min

3.3 Weight

Single valve

Type	D, Q, F, E	H, N, M, R, H1, N1, M1, R1	W, WX
WN 1, WH 1	0.6 kg	0.6 kg	0.6 kg
WH 2	0.7 kg	1.2 kg	--
WH 3	0.7 kg	1.3 kg	--

Single valve with connection block

without pressure-limiting valve:

Type	WN 1 - 1/4 (C) WH .. - 1/4 (C, L)				WN 1 ../.. - 1/4 WH 1 ../.. - 1/4
	D, Q, F, E	H, N, M, R, H1, N1, M1, R1	W, WX	U, J	H, N, M, R, H1, N1, M1, R1
WN 1, WH 1	0.9 kg	0.9 kg	1.0 kg	1.1 kg	1.7 kg
WH 2	1.0 kg	1.0 kg	--	1.9 kg	--
WH 3	1.8 kg	1.8 kg	--	3.5 kg	--

with pressure-limiting valve:

Type	WN 1 - 1/4 S WH .. - 1/4 SR		WN 1 - 1/4 V WH 1 - 1/4 VR
	Q, F, E, H, N, M, R, R1	W, WX	F, D
WN 1, WH 1	1.0 kg	1.2 kg	1.7 kg
WH 2	1.2 kg	--	--
WH 3	2.1 kg	--	--

Intermediate plate

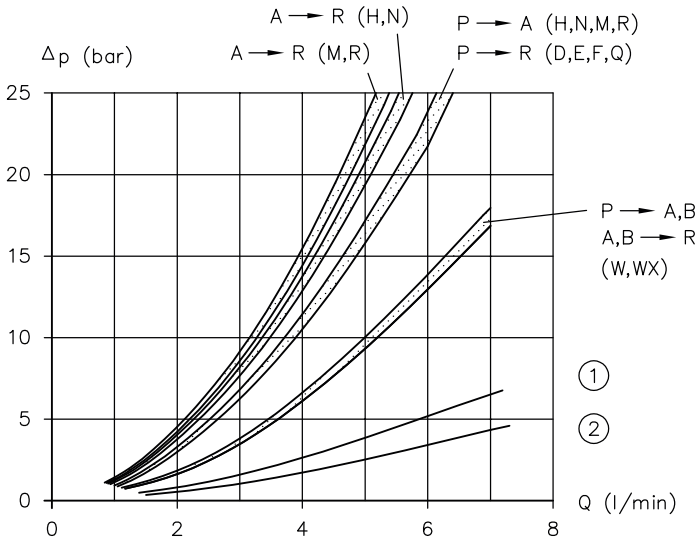
Coding	
/...	= 0.15 kg

3.4 Characteristic lines

Δp-Q characteristic lines

Viscosity of the hydraulic fluid approx. 60 mm²/s

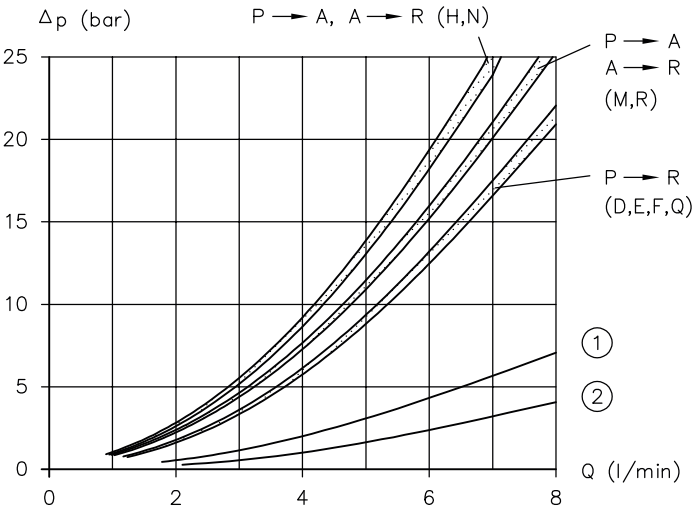
WN 1



Q flow rate (l/min); Δp flow resistance (bar)

1 Check valve for P (E, Q, N, R)
2 Return pressure stop (D1, H1 etc.)

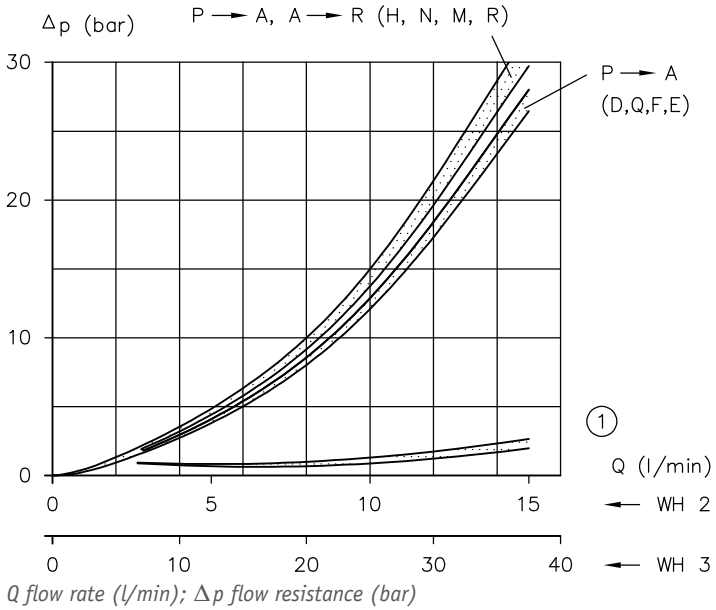
WH 1



Q flow rate (l/min); Δp flow resistance (bar)

1 Check valve for P (E, Q, N, R)
2 Return pressure stop (D1, H1 etc.)

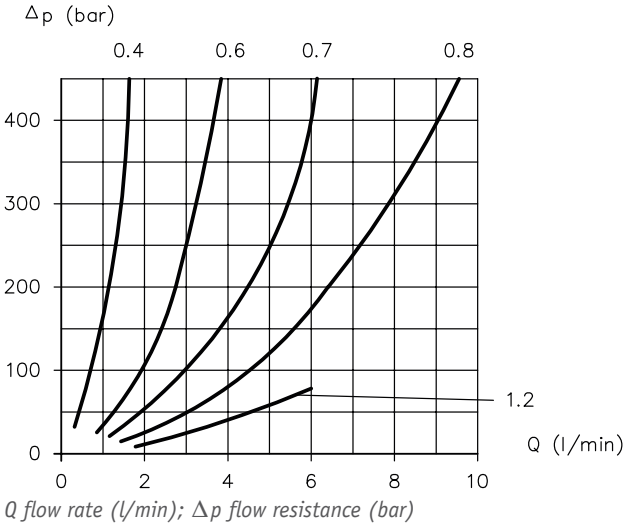
WH 2, WH 3



Q flow rate (l/min); Δp flow resistance (bar)

1 Check valve for P (E, Q, N, R)

Orifice inserts



Q flow rate (l/min); Δp flow resistance (bar)

NOTICE
1 Check valve or 2 Return pressure stop if provided, add to valve flow resistance in flow direction.

3.5 Electrical data

Solenoid	Built and tested according to DIN VDE 0580, pressure-tight switching in oil

Nominal power P_N

	12 V DC	24 V DC	98 V DC (110 V AC)	205 V DC (230 V AC)
X, G, L, WG, S				
WN 1, WH 1, WH 2	25.7 W	24.5 W	26.8 W	31.4 W
WH 3	30 W	30 W	30 W	30 W

Nominal current I_N

	12 V DC	24 V DC	98 V DC (110 V AC)	205 V DC (230 V AC)
X, G, L, WG, S				
WN 1, WH 1, WH 2	2.14 A	1.02 A	0.27 A	0.15 A
WH 3	2.72 A	1.36 A	0.3 A	0.16 A

NOTICE
The electrical data for the solenoids are reference values and may vary slightly depending on the values stipulated by the manufacturer.

Switching times

WN 1, WH 1:	on 60 to 70 ms off 30 to 60 ms	WH 2:	on 50 ms off 65 ms	WH 3:	on 50 ms off 40 ms

In the case of version WG.., approx. 2 to 3 x larger

Switching operations

Approx. 2000/h, distributed roughly evenly, type WN 1 = approx. 3600/h

Insulation material class

F

Relative duty cycle 100% duty cycle (specified on solenoid)

During operation, depending on the ambient temperature

At ambient temperature (°C)	< 40	60	< 80
Duty cycle (%ED)	100	approx. 60	approx. 40

Protection class IEC 70 (Co) 13

IP 65 (IEC 60529) if the male connector is properly fitted
IP 67 in the case of a Schlemmer connector

Cut-off energy

Approx. < 0.5 Ws of maximum reference value + approx. 10% from measurements at nominal voltage U_N

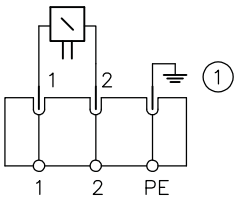
Assembly

In the event of an electrical fault:
After undoing four fastening screws, the solenoid can be simply pulled off axially and replaced with a new one (see Chapter 5.2.2, "Turning the solenoids").

For circuit diagrams

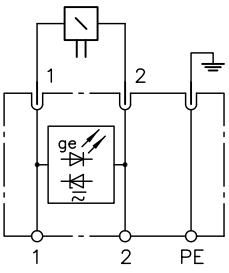
DC voltage

X.., G.., S..



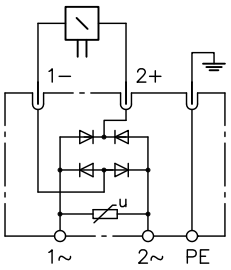
1 Coding S in the case of a Schlemmer connector
Blank grounding terminal lug

L.., with LED



AC voltage

WG..



For the required connection parts, see Chapter 6.1.2, "Order coding for individual parts"

NOTICE

For versions G 24 and WG 230, male connectors with economy circuits can also be used (further information is provided in D 7163, D 7813, D 7833/1). These economy circuits enable the final force of the solenoid after interconnecting to be reduced by decreasing the voltage level originally intended. This significantly reduces the excess temperature of the coil, particularly in the case of long duty cycles or valves arranged adjacent to one another. The service life is also extended.

NOTICE

Layout instructions

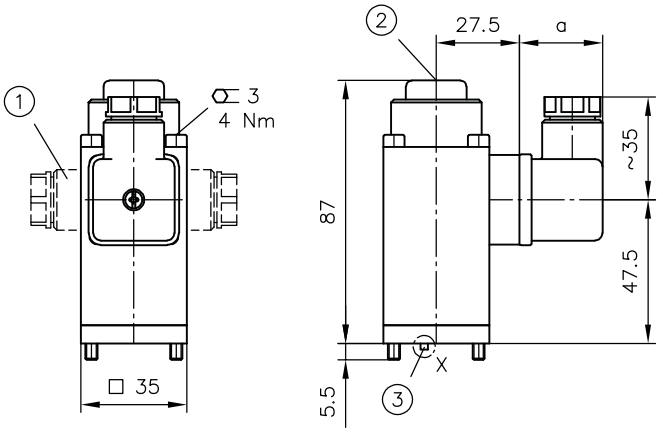
- Direct current voltage (DC):
  The voltage particulars (solenoid specification) should match the supply voltage actually available (a lower supply voltage will lead to a reduction of force, a higher supply voltage will lead to an unacceptably high temperature at the solenoid, tolerance ± 5 to 10%). Type WN 1 (see Chapter 2.1.1, "Basic type and size") is an exception to this.
- Alternating current voltage (AC):
  The voltage particulars should match the supply voltage actually available (50/60 Hz).
  The use of a corresponding rectifier connector results in a solenoid voltage of approx. 0.9 U_{AC} - 2 V. The direct current solenoids used in each case can be found in the table (e.g. for 110 V AC 50 Hz solenoid with U_N = 98 V DC ≙ stamped on it).

4 Dimensions

All dimensions in mm, subject to change.

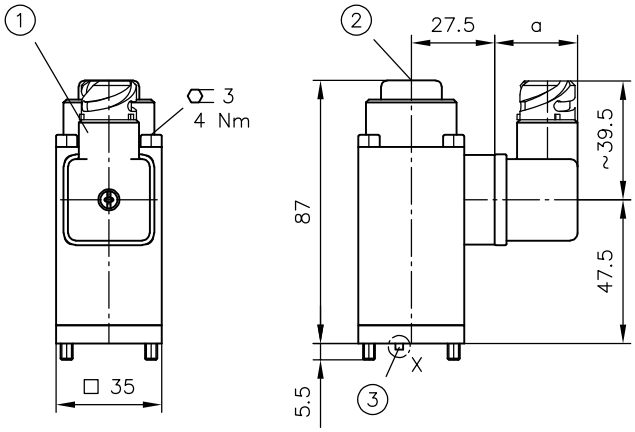
4.1 Single valve for manifold mounting

4.1.1 Type WN 1 and WH 1



1 Male connector can be mounted offset by 3x 90°, cable fitting
2 Manual override
3 Mounting centring pin

with Schlemmer connector

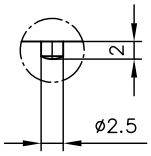


1 Schlemmer connector encased, cannot be dismantled

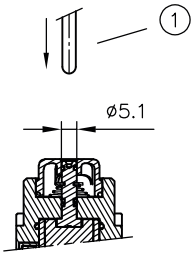
Version	a
G	28 *
WG	35 *

* This dimension is stipulated by the manufacturer (male connector) and according to EN 175 301-803 A it can be max. 40 mm!

Detail X



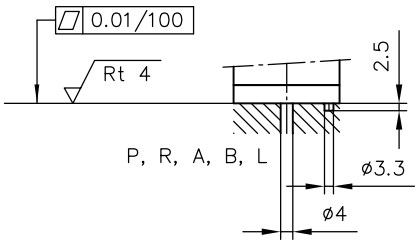
Manual override



1 Auxiliary tool for actuation
Do not use any parts with sharp edges!

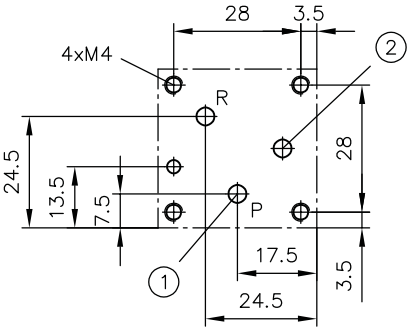
In the case of WN 1 valves (not WH 1), higher actuation forces are required if the valve output leads to a pressurised consumer. Circuit symbols D, Q, F, E as well as J, U, L (solenoid a in each case).

Holes in the base plate

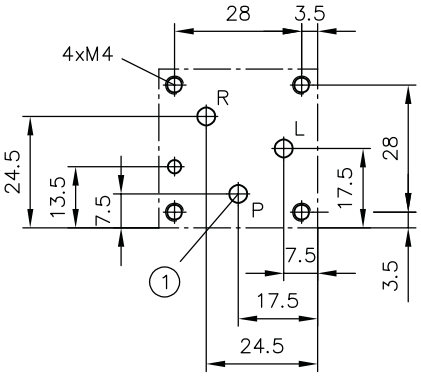


Hole patterns of the base plate

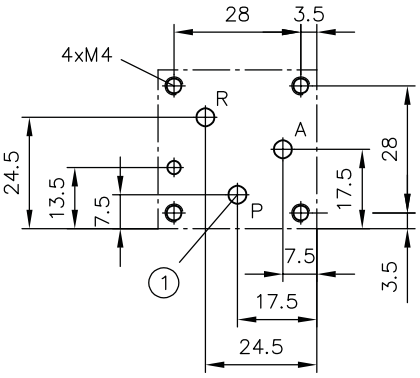
WN 1 D(Q, F, E)



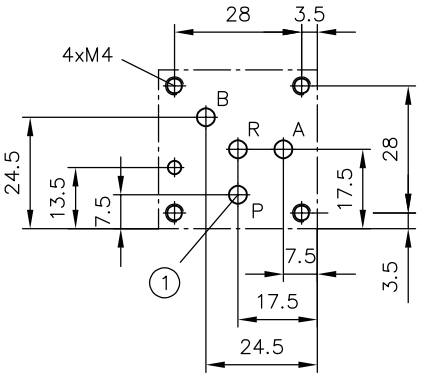
WH 1 D(Q, F, E)



WN 1 H(N, M, R)
WH 1 H(N, M, R)



WN 1 W, WX



1 Dirt filter (mesh size 0.25 mm) inserted in port P of the directional seated valve

2 Blanking counterbore with O-ring 6x1.5 in directional valve WN 1.

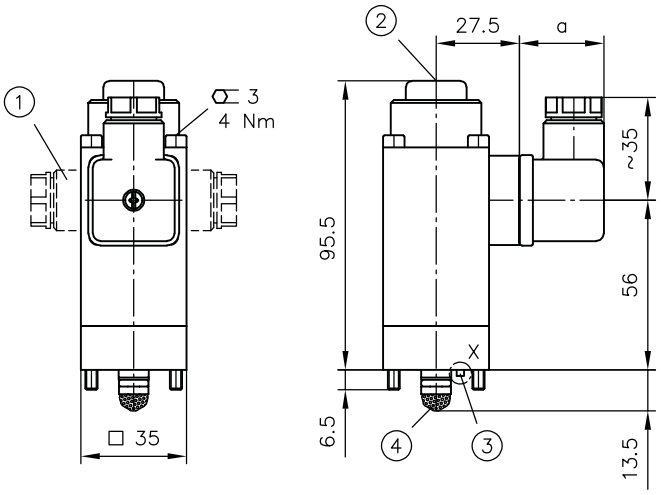
	O-ring NBR 90 Sh
A, B, P, R, L	6x1.5

NOTICE

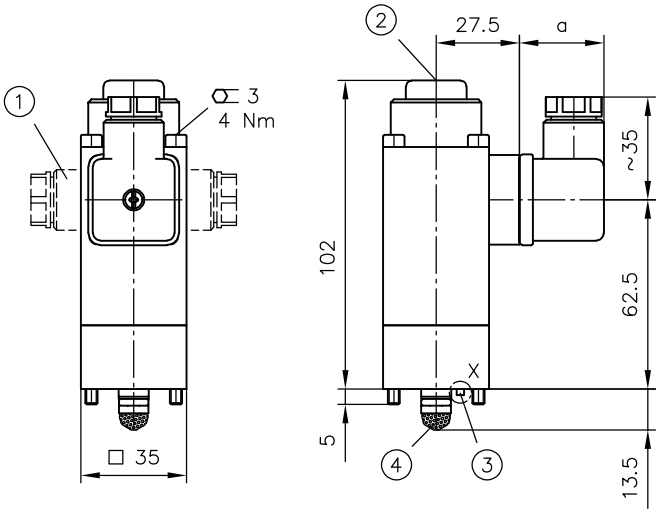
The blanking counterbore is merely used to close off the oil compensation hole in the sub-plates used jointly with the WH 1 valves (see volume change compensation for the armature area on WH 1 valves). If sub-plates for 2/2-way WN 1 valves have been manufactured in house, this counterbore is irrelevant because such a hole is not provided.

4.1.2 Type WH 2

WH 2 D(F, Q, E)



WH 2 H(N, M, R)
WH 2 H1(N1, M1, R1)

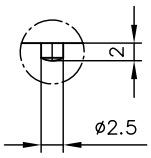


1 Male connector can be mounted offset by 3x 90°, cable fitting
2 Manual override
3 Mounting centring pin
4 Dirt filter (∅0.9 perforated sheet steel basket)

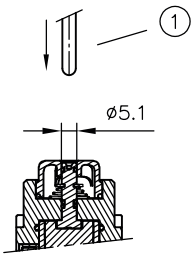
Version	a
G	28 *
WG	35 *

* This dimension is stipulated by the manufacturer (male connector) and according to EN 175 301-803 A it can be max. 40 mm!

Detail X

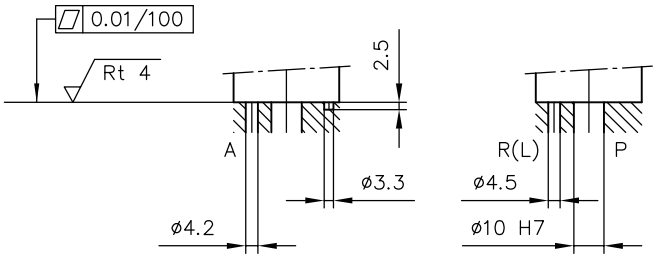


Manual override



1 Auxiliary tool for actuation
Do not use any parts with sharp edges!

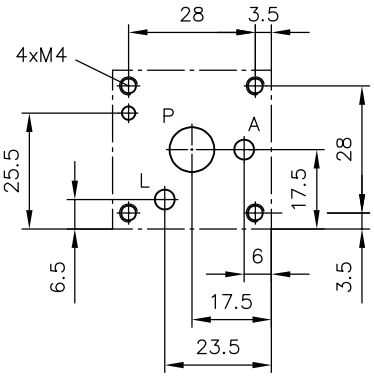
Holes in the base plate



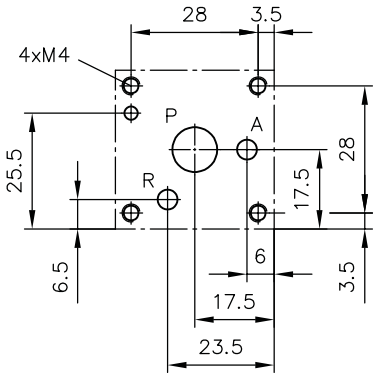
NOTICE
Channel layout (connecting holes) in the base plate, see Chapter 4.1.4, "Connecting holes and channel layout in the base plate, type WH 2 and WH 3 "

Hole patterns of the base plate

WH 2 D(E, F, Q)



WH 2 H(N, M, R)
WH 2 H1(N1, M1, R1)

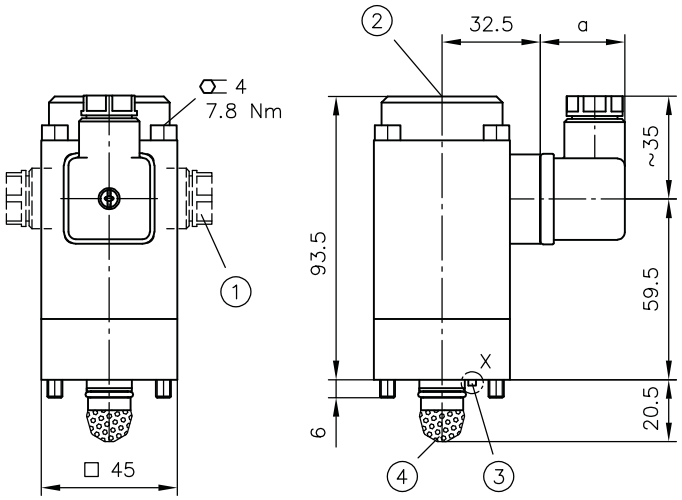


Connecting hole for A, P, R, L and receptacle for mounting centring pin

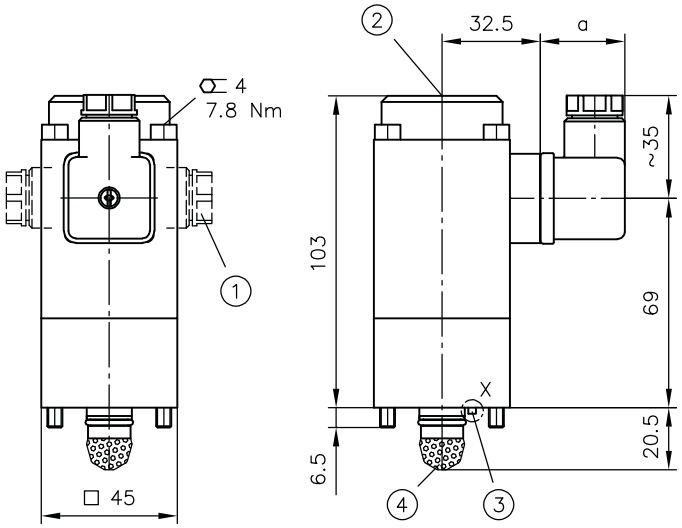
	O-ring NBR 90 Sh
A, P, L	6.07x1.78
R	7.65x1.78

4.1.3 Type WH 3

WH 3 D(E, F, Q)



WH 3 H(N, M, R)
WH 3 H1(N1, M1, R1)

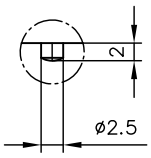


1 Male connector can be mounted offset by 3x 90°, cable fitting
2 Manual override
3 Mounting centring pin
4 Dirt filter (∅0.9 perforated sheet steel basket)

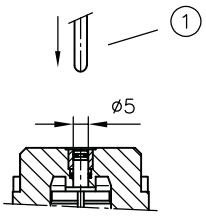
Version	a
G	28 *
WG	35 *

* This dimension is stipulated by the manufacturer (male connector) and according to EN 175 301-803 A it can be max. 40 mm!

Detail X



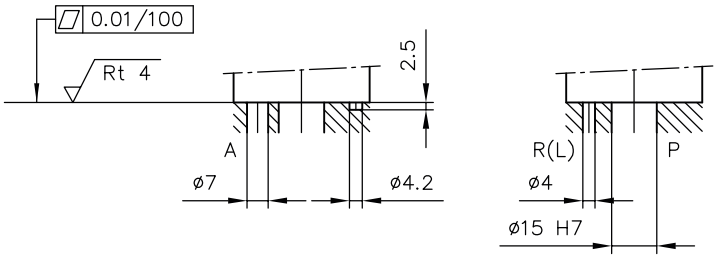
Manual override



Actuation force of approx. 40 N at a pressure of 20 bar in R(L)

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

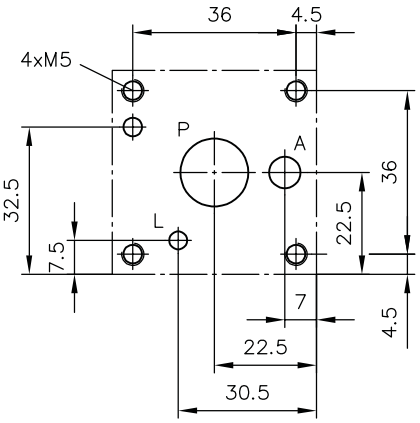
Holes in the base plate



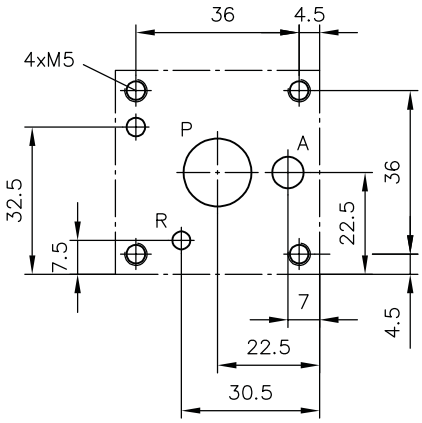
NOTICE
Channel layout (connecting holes) in the base plate, see Chapter 4.1.4, "Connecting holes and channel layout in the base plate, type WH 2 and WH 3 "

Hole patterns of the base plate

WH 3 D(E, F, Q)



WH 3 H(N, M, R)
WH 3 H1(N1, M1, R1)



Connecting hole for A, P, R, L and receptacle for mounting centring pin

	O-ring NBR 90 Sh
A, R, L	7.65x1.78
P	11.1x1.78

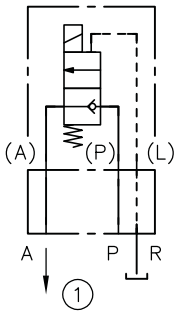
4.1.4 Connecting holes and channel layout in the base plate, type WH 2 and WH 3

Type WH .. D, E, F, Q

2/2-way directional valves can either be inserted directly in the pressurised line (P and A can be pressurised) or in a bypass line that goes back to the tank (e.g. to relieve the pressure of a consumer or for pump idle circulation). The channel layout in the base plate must be designed accordingly.

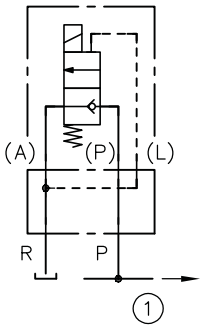
Circuit symbol

Straight-way valve,
valve directly in the pressure line



1 Downstream pressure line

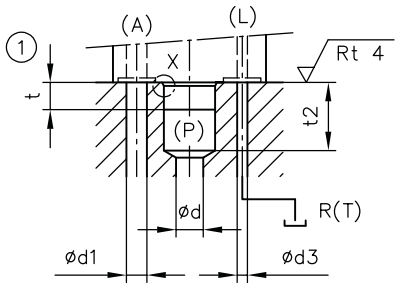
Bypass circuit,
port A connected to reflux



1 Pressure line

Mounting hole

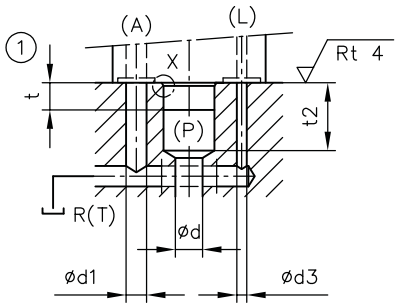
Straight-way valve,
valve directly in the pressure line



A and P side pressurised,
L depressurised to the tank

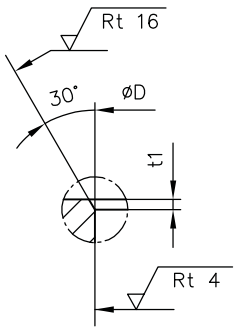
1 Reaming depth

Bypass circuit,
port A connected to reflux



1 Reaming depth

Detail X



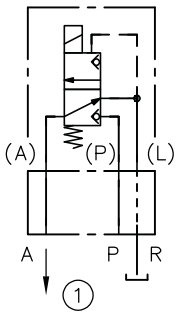
Type	∅D	∅d	∅d1	∅d3	t	t1	t2 *
WH 2	10^{H7}	7	5	3	10	1	13
WH 3	15^{H7}	8	6	3	8	1,5	20

* Minimum dimension

The L side can be combined with the A outlet in the base plate to become a shared outlet R(T) and directed to the tank (for the permissible pressures in L and R see Chapter 3.2, "Pressure and volumetric flow").

Circuit symbol

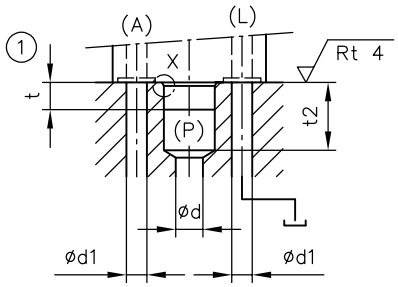
Straight-way valve, valve directly in the pressure line



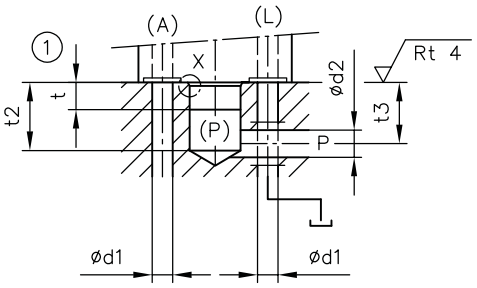
1 Downstream pressure line

Mounting hole

Straight-way valve, valve directly in the pressure line



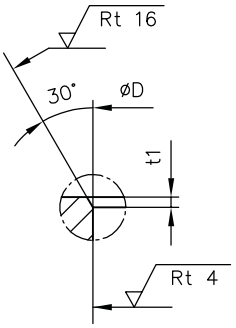
P port at bottom (example)



P port at side (example)

1 Reaming depth

Detail X



Type	∅D	∅d	∅d1	∅d2	t	t1	t2 *	t3 *
WH 2	10^{H7}	7	5	6	10	1	13	11
WH 3	15^{H7}	8	6	8	8	1,5	20	18

* Minimum dimension

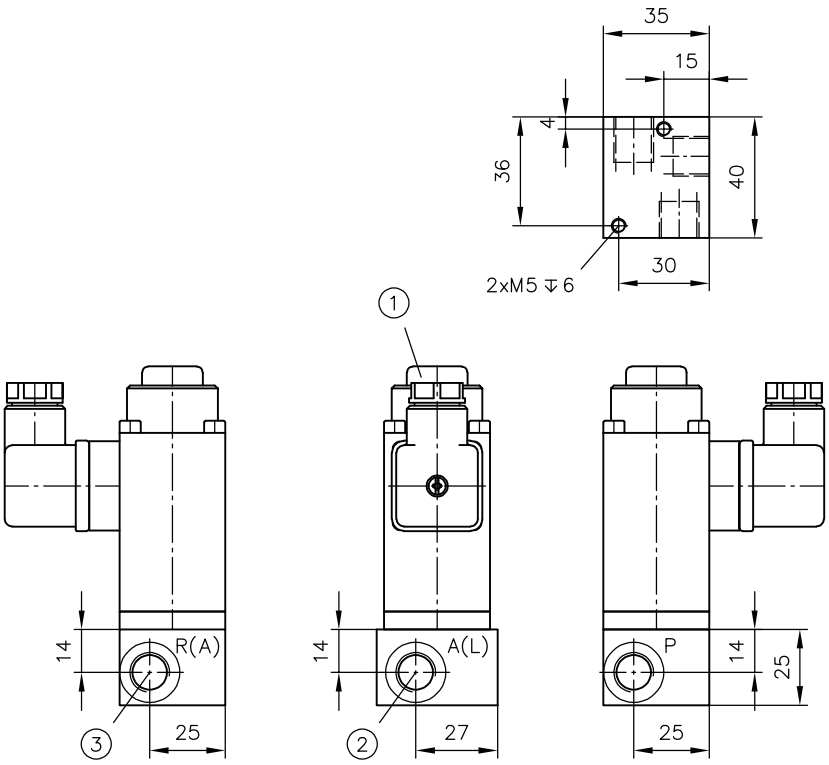
Valve inlet P is protected against coarse contamination by a dirt filter (perforated sheet steel basket). The dirt filter prevents malfunctions caused by dirt particles becoming trapped on the valve seat. It is advantageous to also protect outlet A on the base plate (provided by the customer) against any coarse dirt particles coming back from the consumer using screen or filter discs (e.g. type HFC as per D 7235).

Screen discs are screwed into the connection blocks for type WN 1, WH 2 and WH 3 as standard,
see Chapter 6.1.1, "Filter elements installed as standard".

4.2 Single valves and directional valve combinations with connection block

4.2.1 Connection blocks for single valves type WN 1, WH 1

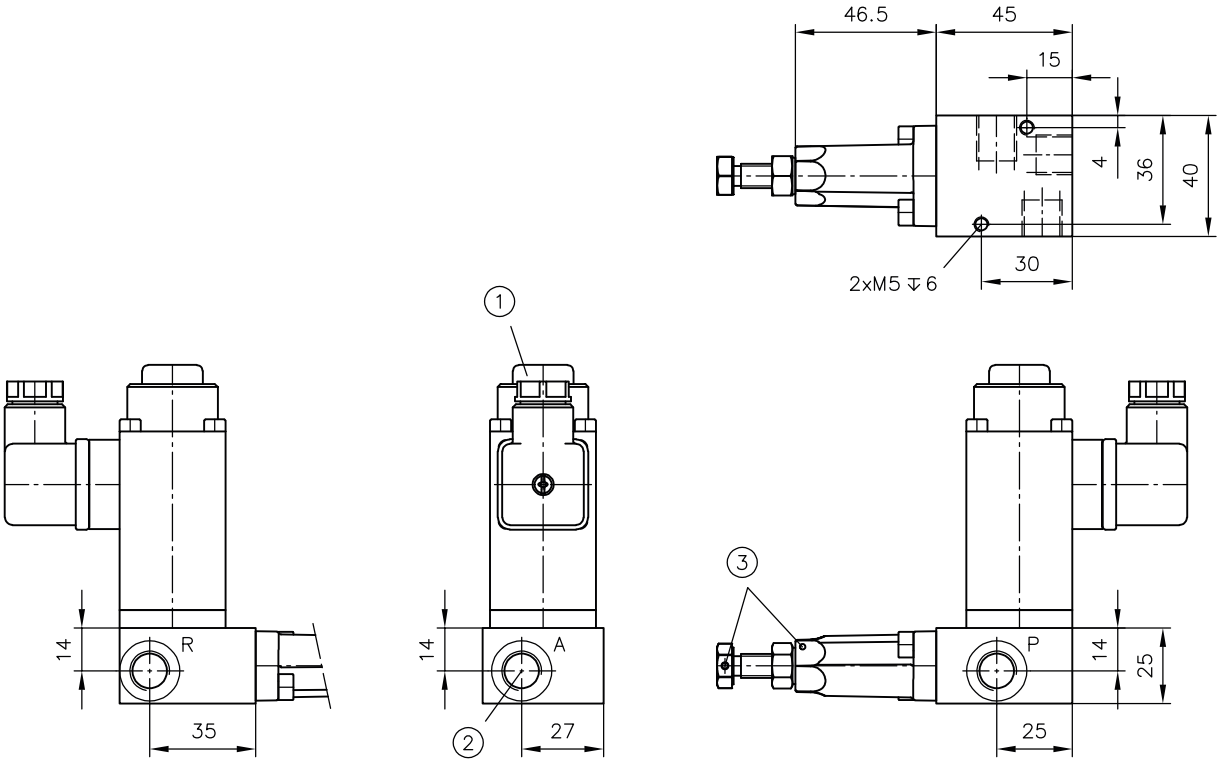
WN 1 ... - 1/4 (L)
WH 1 ... - 1/4 (L)



1 see Chapter 4.1.1, "Type WN 1 and WH 1"
2 Is port A on type WN(H) 1 H(N, M, R) - **1/4** and port L on WH 1 D(Q, F, E) - **1/4 L**
3 Is port R on WN(H) 1 D(F, Q, E) - **1/4**; is port A on WH 1 D(F, Q, E) - **1/4 L**

	Ports (ISO 228-1)
A, L, P, R	G 1/4

WN 1 ... - 1/4 S(SR)
WH 1 ... - 1/4 S(SR)

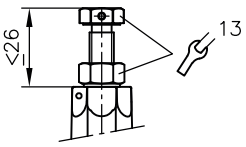


1 see Chapter 4.1.1, "Type WN 1 and WH 1"
2 Only on type WN(H) 1 H(N, M, R) - **1/4 S(SR)**
3 Sealing option

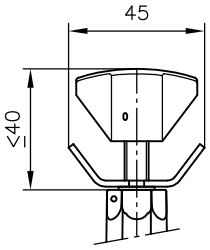
	Ports (ISO 228-1)
A, P, R	G 1/4

Adjustment

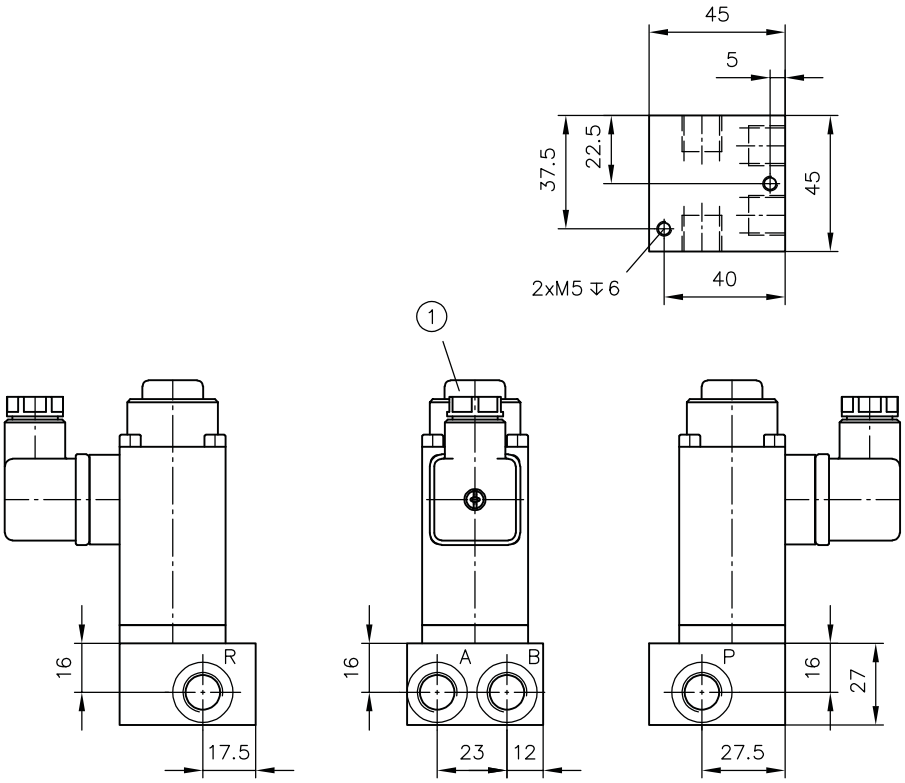
- 1/4 S (fixed)



- 1/4 SR (adjustable)



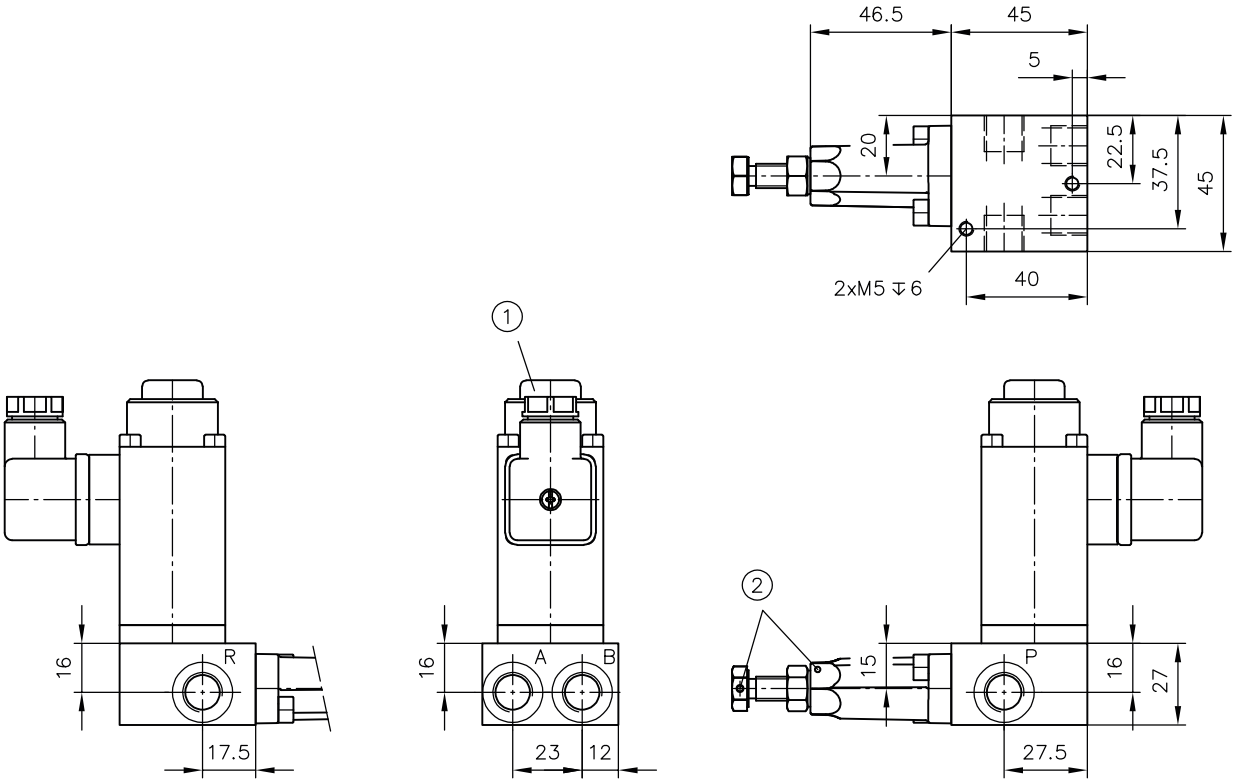
WN 1 W(WX) - 1/4



1 see Chapter 4.1.1, "Type WN 1 and WH 1"

	Ports (ISO 228-1)
A, B, P, R	G 1/4

WN 1 W(WX) - 1/4 S(SR)



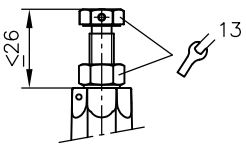
1 see Chapter 4.1.1, "Type WN 1 and WH 1"

2 Sealing option

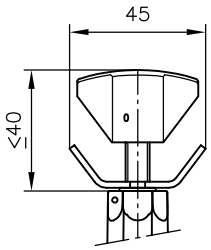
	Ports (ISO 228-1)
A, B, P, R	G 1/4

Adjustment

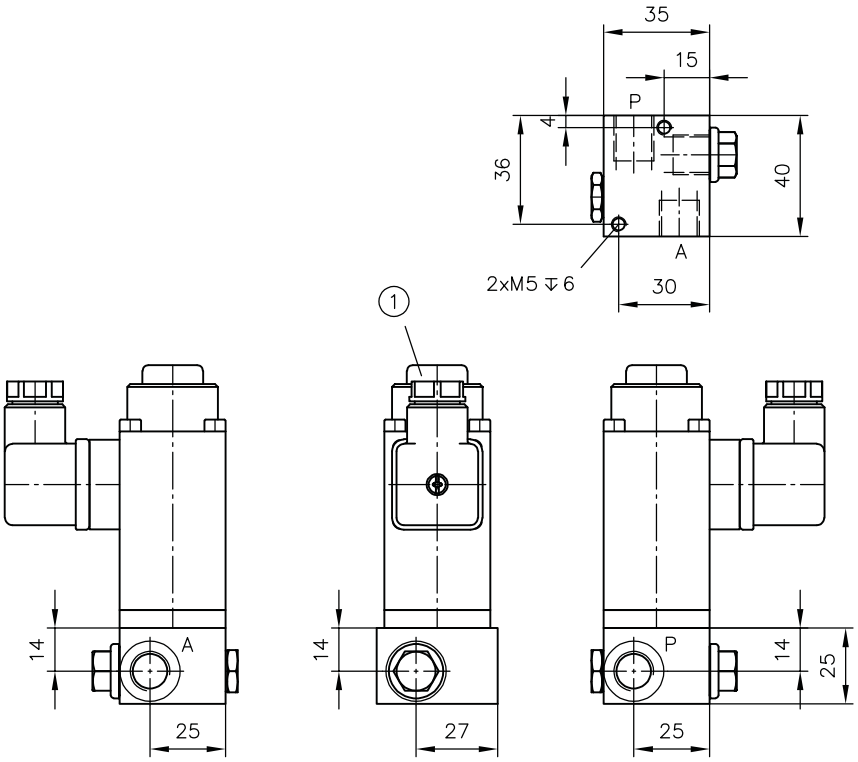
- 1/4 S (fixed)



- 1/4 SR (adjustable)



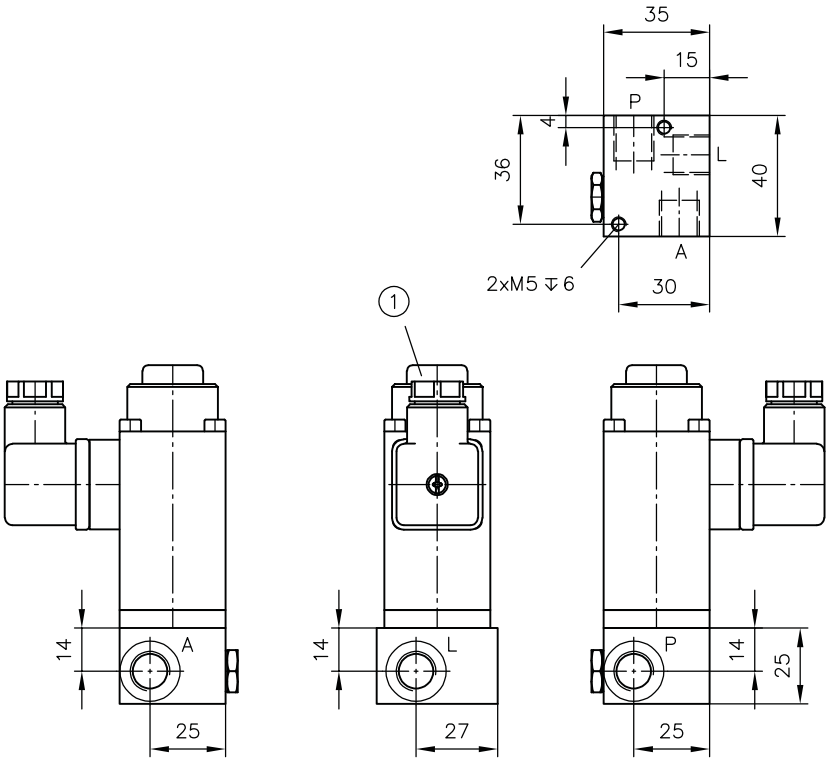
WN 1 D(F) - 1/4 C



1 see Chapter 4.1.1, "Type WN 1 and WH 1"

	Ports (ISO 228-1)
A, P	G 1/4

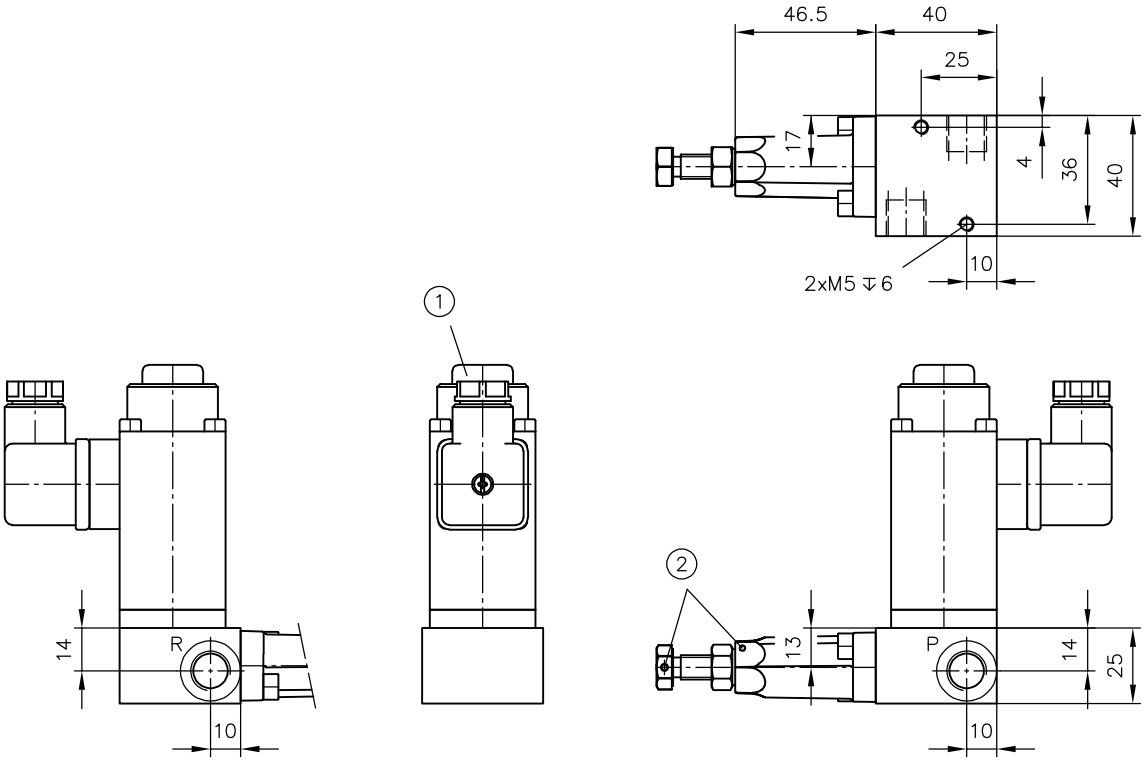
WH 1 D(F) - 1/4 C



1 see Chapter 4.1.1, "Type WN 1 and WH 1"

	Ports (ISO 228-1)
A, L, P	G 1/4

WN 1 D(F) - 1/4 V(VR)
WH 1 D(F) - 1/4 V(VR)

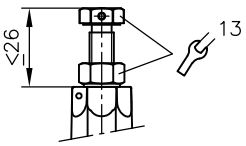


1 see Chapter 4.1.1, "Type WN 1 and WH 1"
2 Sealing option

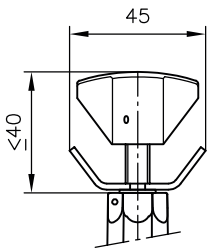
	Ports (ISO 228-1)
P, R	G 1/4

Adjustment

- 1/4 V (fixed)

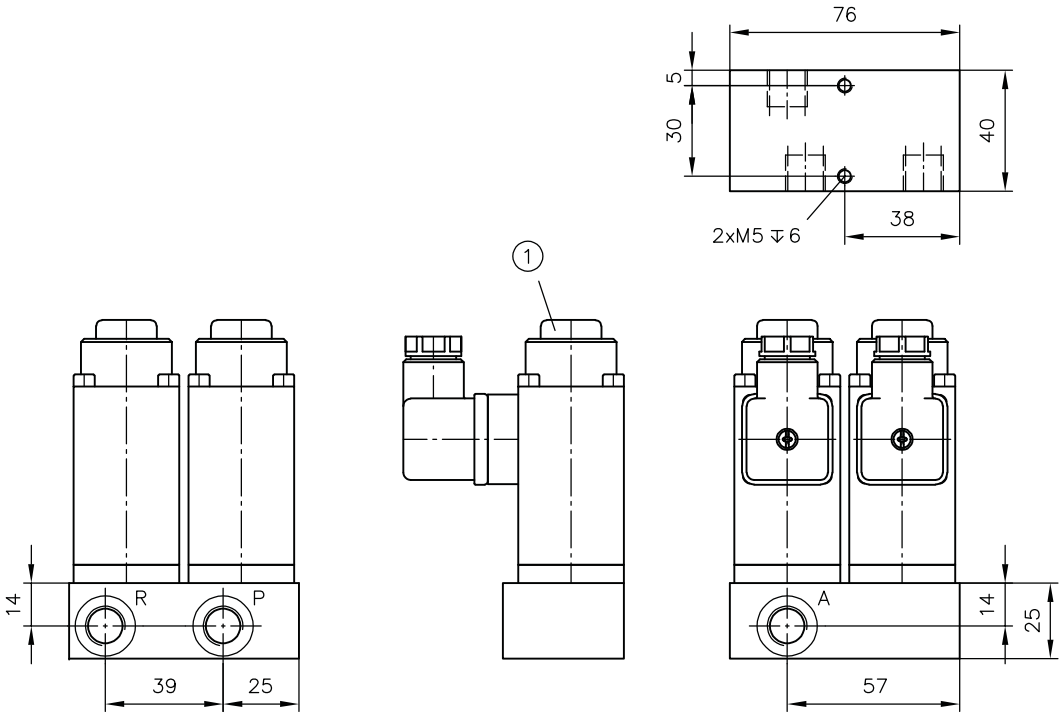


- 1/4 VR (adjustable)



4.2.2 Connection blocks for directional valve combinations type WN 1, WH 1

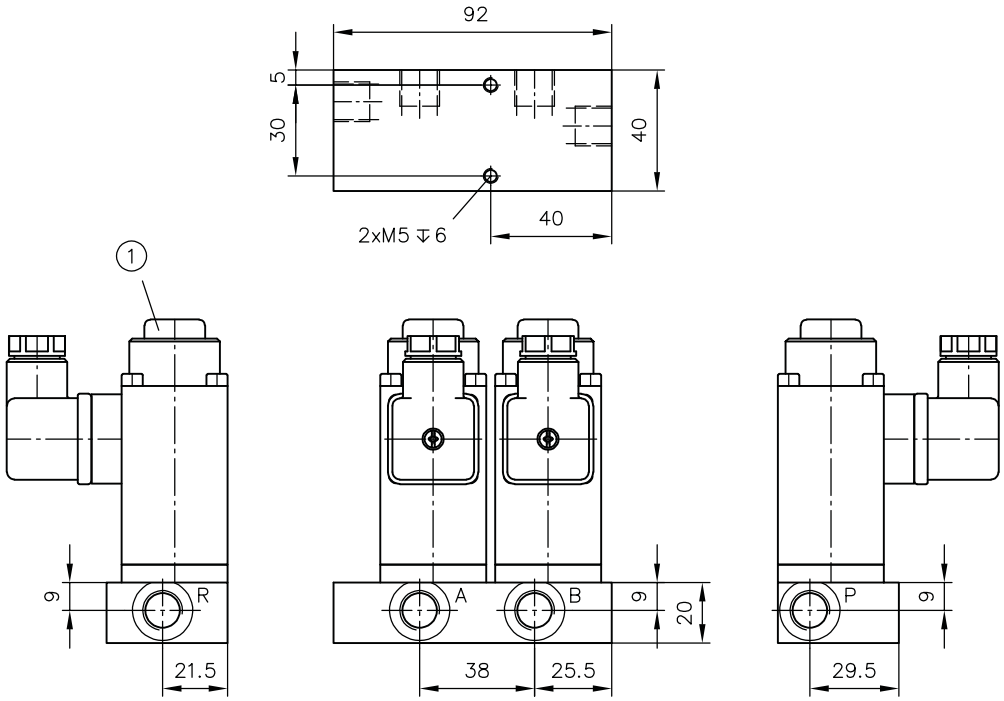
WN 1 J(U) - 1/4
WH 1 J(U) - 1/4



1 see Chapter 4.1.1, "Type WN 1 and WH 1"

	Ports (ISO 228-1)
A, P, R	G 1/4

WN 1 .../... - 1/4
WH 1 .../... - 1/4

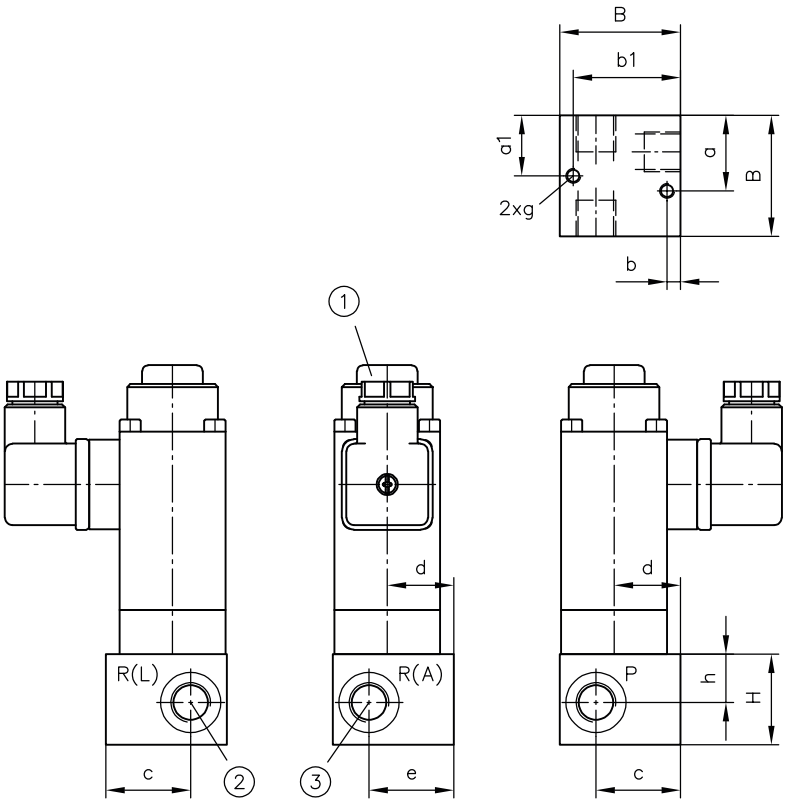


1 see Chapter 4.1.1, "Type WN 1 and WH 1"

	Ports (ISO 228-1)
A, B, P, R	G 1/4

4.2.3 Connection blocks for single valves type WH 2, WH 3

WH 2 .. - 1/4 (L)
WH 3 .. - 3/8 (L)



1 see Chapter 4.1.2, "Type WH 2" and Chapter 4.1.3, "Type WH 3"

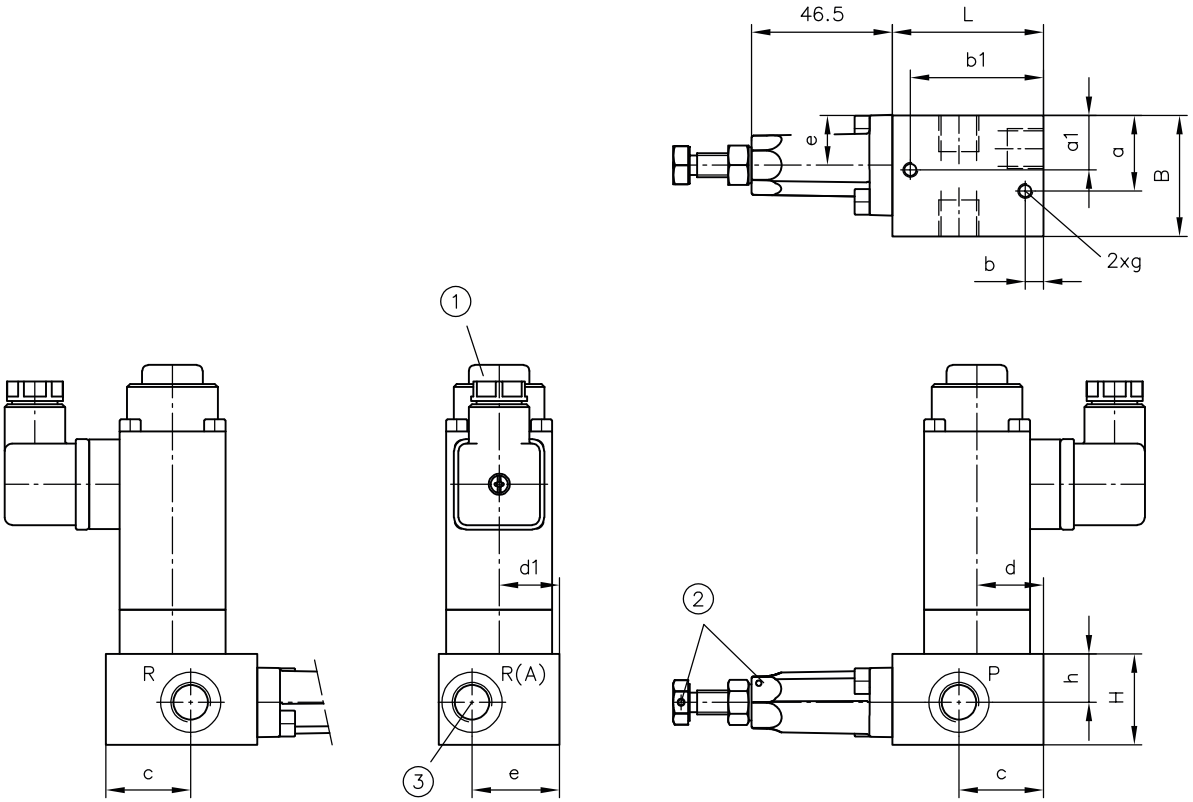
2 Is port L on type WH 2(3) D(Q, F, E) **- 1/4 L (- 3/8 L)** and port R on WH 2(3) H(N, M, R) **- 1/4 (- 3/8)**
Port not provided on WH 2(3) D(F) **- 1/4(3/8)**

3 Is port A on type WH 2(3) H(N, M, R) **- 1/4 (- 3/8)** and WH 2(3) D(Q, F, E) **- 1/4 L (- 3/8 L)**

Type	a	a1	⌀ B	b	b1	c	d	e	g	H	h
WH 2	25	20	40	4,5	35,5	28	22	28	M5, 8 deep	30	16
WH 3	29	29	50	5	45	36	25	39	M6, 8 deep	35	20

	Ports (ISO 228-1)
	A, L, P, R
WH 2	G 1/4
WH 3	G 3/8

WH 2 .. - 1/4 S(SR), WH 3 .. - 3/8 S(SR)



1 see Chapter 4.1.2, "Type WH 2" and Chapter 4.1.3, "Type WH 3"

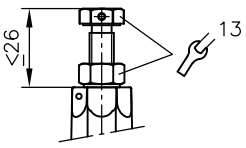
2 Sealing option

3 Is port R on WH 2(3) D(F, E, Q) - **1/4(3/8)S(R)** and port A on WH 2(3) H(N, M, R) - **1/4(3/8)S(R)**

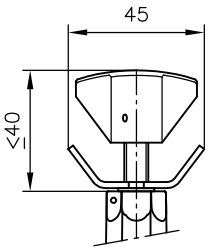
Type	a	a1	B	b	b1	c	d	d1	e	g	H	h	L	Ports (ISO 228-1) A, P, R
WH 2	25	18	40	6	44	28	22	20	29	M5, 8 deep	30	16	50	G 1/4
WH 3	27,5	27,5	50	7	56	39	25	25	39	M6, 8 deep	32	20	63	G 3/8

Adjustment

- 1/4, - 3/8 (fixed)

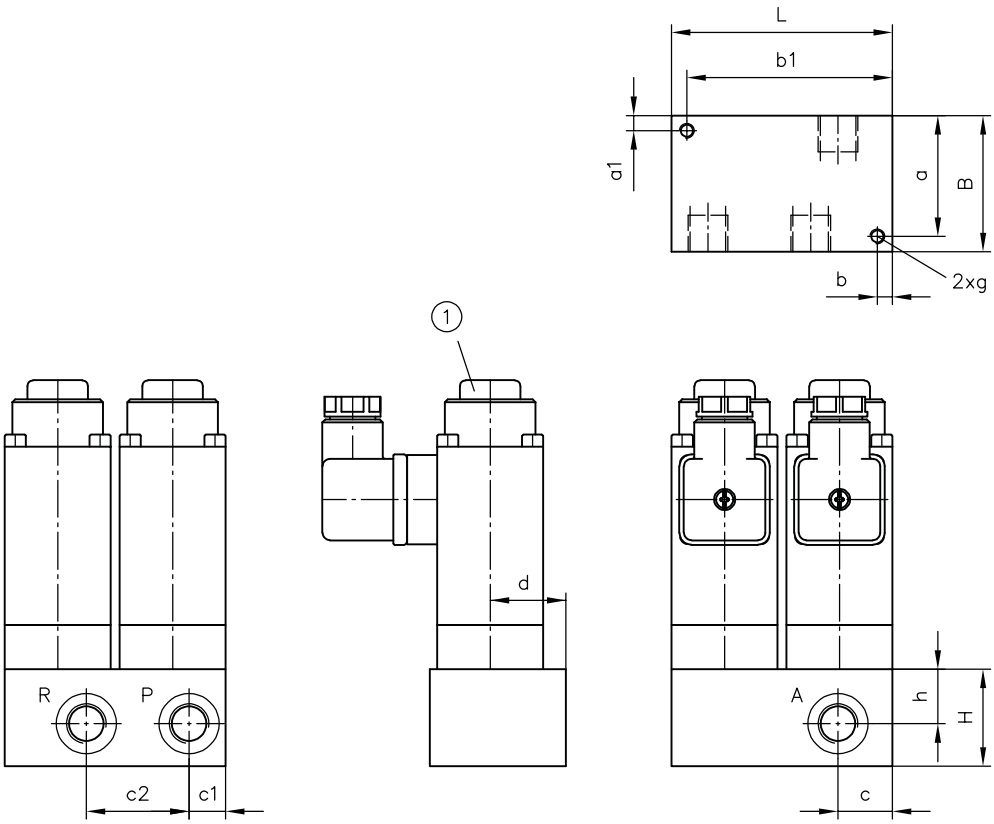


- 1/4, - 3/8 (adjustable)



4.2.4 Connection blocks for directional valve combinations type WH 2, WH 3

WH 2 J(U) - 1/4
WH 3 J(U) - 3/8



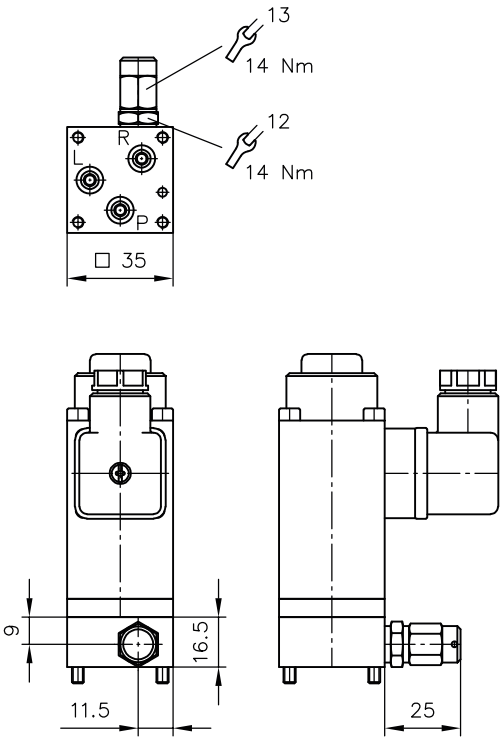
1 see Chapter 4.1.2, "Type WH 2" and Chapter 4.1.3, "Type WH 3"

Type	a	a1	B	b	b1	c	c1	c2	g	H	h	L
WH 2	40	5	45	5	68	18	12	34	M5, 8 deep	32	18	73
WH 3	45	5	50	5	92	23,5	19	41	M6, 8 deep	35	20	97

	Ports (ISO 228-1) A, P, R
WH 2	G 1/4
WH 3	G 3/8

4.3 Intermediate plates type WN 1, WH 1

2/2-way directional seated valve with pressure-limiting valve in the intermediate plate



5 Installation, operation and maintenance information

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.

5.2.1 Insert check valve EK 01

Only for type WN 1 with circuit symbol Q and N.

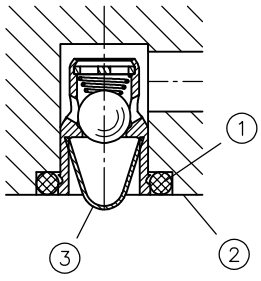
The flexing of the O-ring can cause a shift in position of a few tenths of a mm, meaning the check valve may protrude slightly.

If the WN 1.. valve has been filled with oil (e.g. as a result of function testing on a test bench):

- ► Press the manual override during the screwing-in process.
- ► Or energise the solenoid via the connector.

Reason: the screwing-in process may compress the trapped oil volume to such an extent that the switchable pressure for the solenoid is exceeded.

On valves type WH 1, the hydraulic relief means that any compression has no effect in terms of the switching force.



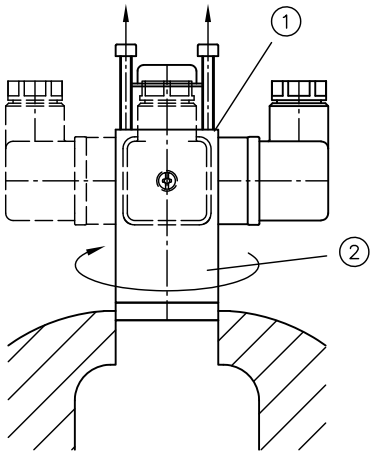
1 O-ring 6x1.5 NBR 90 Sh
2 Mounting side
3 Dirt filter

5.2.2 Turning the solenoids

If required, the solenoid can be turned by a further 3x 90° compared against the standard mounting position relative to the valve body:

- ► Carefully clamp the valve body in a vice
- ► Pull the screws up and out
- ► Turn the solenoid to the desired position
- ► Reinsert the screws

Incorrect mounting on the sub-plate (e.g. if it is replaced and only the mounting position of the solenoid is taken into account) can be avoided using the centring pin on the bottom of the valve, which is inserted in a hole in the sub-plate.



1 Solenoid body
2 Visible valve body

5.2.3 Mounting the solenoids

In the case of an electrical defect, after undoing four fastening screws the solenoid can be simply pulled off axially and replaced with a new one.

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. Parts may burst or fly off, and uncontrolled leakage of hydraulic fluid.

- 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 parts and individual parts

6.1.1 Filter elements installed as standard

To protect against malfunctions, the directional seated valves and connection blocks are equipped with filter elements.

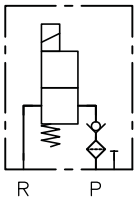
Malfunctions may be caused by coarse contamination that occasionally arrives in the oil flow (particles that have come loose from hoses or cuffs, scale, metallic swarf).

For single valves:

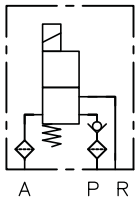
- Directional seated valves type WN, WH are equipped with filter elements in the inlets and outlets P and A.
- Directional spool valves type WN 1 are **not** equipped with filter elements due to the design of the channel layout in the housing. However, they are more resistant to contamination.

Single valves
see Chapter 2.1.2, "Circuit symbol"

2/2-way directional valve



3/2-way directional valve

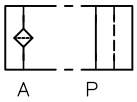


For connection blocks:

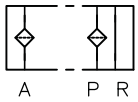
- Screen discs type HFC 1/4 F / HFC 3/8 (as per D 7235) are screwed into the connection blocks of the single valves at A and P. They can also be found in outlet P in the case of connection blocks without a pressure-limiting valve.

Connection blocks
see Chapter 2.2, "Single valve with connection block", page 9

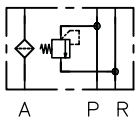
without pressure-limiting valve



without pressure-limiting valve



with pressure-limiting valve



NOTICE

The filter elements are no substitute for conventional hydraulic filters. However, in practice they have proven to be sufficient for small hydraulic systems in order to protect against malfunctions. In the case of malfunctions, check the filter elements. For the sake of simplicity, the filter elements are not shown in the circuit symbols in Chapter 2, "Available versions".

6.1.2 Order coding for individual parts

Return pressure stop

Type	Designation	Drawing no.
WN 1 WH 1	Valve plate	7470 021
WH 2	Cage	7545 019
	Ball 3/16" DIN 5401	--

Connection block

for self-assembly of a dual block

Type	Designation	Order no.
WN 1 .../... -1/4 - .. WH 1 .../... -1/4 - ..	Block, mounted with filter discs HFC 1/4 F in P, A and B	7470 061 complete

Seal kits

Type	Order no.
WN 1 ..	DS 7470 A-11
WH 1 ..	DS 7470 A-12
WH 2 ..	DS 7470 A-20
WH 3 ..	DS 7470 A-30

Orifice insert (only type WN 1 and WH 1)

Available versions		Drawing no. for single order
Coding	∅ of orifice (mm)	
B 0.4	0.4	7470 075 A
B 0.6	0.6	7470 075 D
B 0.7	0.7	7470 075 B
B 0.8	0.8	7470 075 E
B 1.2	1,2	7470 075 C

Ordering example: WN 1 H / **B 0.7** - G 24
WH 1 H / **B 0.4** - WG 230

Intermediate plate (only type WN 1 D(F) and WH 1 D(F))

Type	Designation	Order no.
WN 1 D(F) WH 1 D(F)	Intermediate plate as an individual section Complete with pressure-limiting valve and 4 cylinder screws ISO 4762-M4x85-12.9- mech. galvanised	7470 104 A

Line connector

Excitation system:			Male connector:	
	Coding	Order no.	Coding	Order no.
Solenoid	G 12, L 12, X 12, L5K 12	4704 8564-00	G ..	6217 0002-00
	G 24, L 24, X 24, L5K 24	4704 8559-00	L ..	6217 8024-00
	S 24	4704 4001-00	WG ..	6217 6002-00
	G 98, X 98, WG 110	4704 4508-00	L5K ..	6217 8088-00
	G 205, X 205, WG 230	4704 4510-00		

6.2 Type overview

Single valve for manifold mounting

	Description	Size		
		1	2	3
Type				
WN 1, WH 1	--	●		
WH 2	--		●	
WH 3	--			●
Circuit symbol				
D, Q, F, E	2/2-way function (seated valve)	●	●	●
H, N, M R	3/2-way function (seated valve)	●	●	●
W, WX	Only type WN 1: 4/2-way function (directional spool valve)	●		
Additional element				
1	Return pressure stop (for 2/2 and 3/2-way functions)	●	●	
/B ...	Orifice insert ∅ 0.4 to 1.2 mm (only for circuit symbol D, F, H, M, W)	●		
...	Pressure-limiting valve in the intermediate plate (only for circuit symbol D, F) see Chapter 4.3, "Intermediate plates type WN 1, WH 1"	●		
Solenoid voltage				
G 12 **G 24** **WG 110** **WG 230** **...**	see Chapter 2.1.4, "Solenoid voltage and connector"	●	●	●

Single valve with connection block

	Description	Size		
		1	2	3
Type				
WN 1, WH 1	--	●		
WH 2	--		●	
WH 3	--			●
Circuit symbol				
D, Q, F, E	2/2-way function (seated valve)	●	●	●
H, N, M R	3/2-way function (seated valve)	●	●	●
W, WX	4/2-way function (directional spool valve)	●		
J, U	3/3-way function (seated valve combination)	●	●	●
M. / R.	Twin valve, two 3/2-way functions that can be switched separately (only circuit symbols H(1), N(1), M(1), R(1) see Chapter 2.2.4, "Connection block for directional valve combinations type WH 1, WH 2, WH 3")	●		
Additional element				
1	Return pressure stop (for 2/2, 3/2, 3/3-way functions)	●	●	
/B ...	Orifice insert ∅ 0.4 to 1.2 mm (only circuit symbol D, F, H, M, W)	●		
/...	Pressure-limiting valve in the intermediate plate, e.g. in combination with connection block - 1/4(L) (only circuit symbol D and F) see Chapter 2.2.5, "Intermediate plates type WN 1, WH 1"	●		
Connection block (threaded connections (ISO 228-1))				
- 1/4	G 1/4	●	●	
- 3/8	G 3/8			●
Connection block (additional element)				
without coding	No additional elements in the connection block	●	●	●
L	Only for type WH: external drain port for 2/2-way directional valves	●	●	●
S, SR	Pressure-limiting valve (fixed or adjustable) with pressure specification, in parallel with 3/2 or 4/2-way directional valve (P → R) see Chapter 2.2.1, "Connection block for single valves type WN 1"	●	●	●
V, VR	Pressure-limiting valve (fixed or adjustable) with pressure specification, in series downstream of the 2/2-way directional seated valve (only circuit symbol D and F) see Chapter 2.2.1, "Connection block for single valves type WN 1"	●		
C	Bypass check valve (see Chapter 2.2.1, "Connection block for single valves type WN 1")	●		
Nominal voltage				
G 12 **G 24** **WG 110** **WG 230** **...**	see Chapter 2.1.4, "Solenoid voltage and connector"	●	●	●

References

Additional versions

- Valve bank (directional seated valve) type BWN and BWH: D 7470 B/1
- Valve bank (directional seated valve) type VB: D 7302, D 7302-22
- Directional seated valve type G, WG and others: D 7300
- Directional seated valve type G with interchangeable solenoid: D 7300-12

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