Rexroth
Bosch Group

4/3, 4/2 and 3/2 directional valve with wet-pin DC or AC voltage solenoids

RE 23178/04.09 1/16
Replaces: 08.08

Type WE


H5909

Size 6
Component series 6X
Maximum operating pressure 350 bar *[5076 psi]*
Maximum flow: 80 l/min *[21 US gpm]* – DC
60 l/min *[15.8 US gpm]* – AC

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Information on available spare parts:
www.boschrexroth.com/spc

Features

- Direct operated directional spool valve with solenoid actuation in high-performance design
- Porting pattern according to DIN 24340 form A
- Porting pattern according to ISO 4401-03-02-05 and NFPA T3.5.1 R2-2002 D03
- Subplates see data sheet RE 45052
- Wet-pin DC or AC voltage solenoids with detachable coil
- Solenoid coil can be rotated by 90°
- The coil can be changed without having to open the pressure-tight chamber
- Electrical connection as individual or central connection (for more electrical connections see RE 08010)
- Manual override, optional
- For smoothly switching variant, see RE 23183
- Inductive position switch and proximity sensor (contactless), see RE 24830
- Supplementary documentation:
  - "General product information on hydraulic products" RE 07008
  - "Installation, commissioning and maintenance of industrial valves" RE 07300

Ordering code

	WE	6		6X/		E				

3 main ports **= 3**
4 main ports **= 4**

Size 6 **= 6**

Spool symbols e.g. C, E, EA, EB, etc; possible variants see page 4

Component series 60 to 69 **= 6X**
(60 to 69: unchanged installation and connection dimensions)

With spring return **= No code**
Without spring return **= O**
Without spring return with detent **= OF**

High-performance wet-pin solenoid with detachable coil **= E**

DC voltage 24 V **= G24**
AC voltage 230 V 50/60 Hz **= W230**
AC voltage 120 V or 110 V 50/60 Hz **= W110**
= W + voltage
DC voltage 205 V **= G205** [1]
DC voltage solenoid with rectifier for AC voltage **= W110R**
(not frequency-related; only available with plug-in connection with D cover, page 14)
For further ordering codes for other voltages and frequencies, see page 7

With concealed manual override (standard) **= N9**
With manual override **= N**
Without manual override **= No code**

Electrical connection

Individual connection

Without mating connector with connector DIN EN 175301-803 **= K4** [3]
Without mating connector with connector AMP Junior Timer **= C4** [3]
Without mating connector with connector DT 04-2PA (Deutsch plug) **= K40** [3]
Without mating connector with M12x1 plug-in connection with operating display LED **= K72L** [4]
Without mating connector with M12x1 plug-in connection with operating display LED
(no connection pin 1 to pin 2) **= K73L** [4]

Central connection

Cable entry at the cover, with indicator light **= DL**
Central plug-in connection at the cover, with indicator light (without mating connector) **= DKL** [5]
For further electrical connections, see RE 08010

[1] For the connection to AC voltage mains, a DC voltage solenoid **must** be used, which is controlled via a rectifier (see table below).

In the case of individual connection, a large mating connector with integrated rectifier can be used (separate order).

[2] Locating pin ISO 8752-3x8-St,
material no. **R900005694** (separate order)

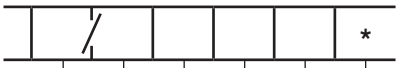
[3] Mating connectors, separate order, see page 16 and RE 08006.

[4] Only version "G24", see RE 08010

[5] Mating connectors, separate order,
material no. **R900005538**

AC voltage mains (permissible voltage tolerance ± 10%)	**Nominal voltage of the DC solenoid when operated with AC voltage**	**Ordering code**
110 V - 50/60 Hz	96 V	**G96**
230 V - 50/60 Hz	205 V	**G205**

Standard types and components are contained in the EPS (standard price list).



Further details in the plain text

No code = **Without** locating hole
/60 [2] **=** **With** locating hole
/62 = **With** locating hole and locating pin ISO 8752-3x8-St

Seal material

No code = NBR seals
V = FKM seals
(other seals upon request)
Attention!
Observe compatibility of seals with the hydraulic fluids used!

Clamping length

No code = 42 mm *[1.65 inch]* (Standard)
Z = 22 mm *[0.87 inch]*

No code = Without throttle insert
With throttle insert see table:

Connection	Throttle Ø in mm *[inch]*		
	0.8 *[0.031]*	1.0 *[0.039]*	1.2 *[0.047]*
P	**= B08**	**= B10**	**= B12**
A	**= H08**	**= H10**	**= H12**
B	**= R08**	**= R10**	**= R12**
A and B	**= N08**	**= N10**	**= N12**
T	**= X08**	**= X10**	**= X12**

Use at flows which exceed the performance limit of the valve (see page 5).

Spool position monitoring

No code = Without position switch

– Inductive position switch type QM

QMAG24 = Monitored spool position "a"
QMBG24 = Monitored spool position "b"
QM0G24 = Monitored rest position

– Inductive position switch type QR

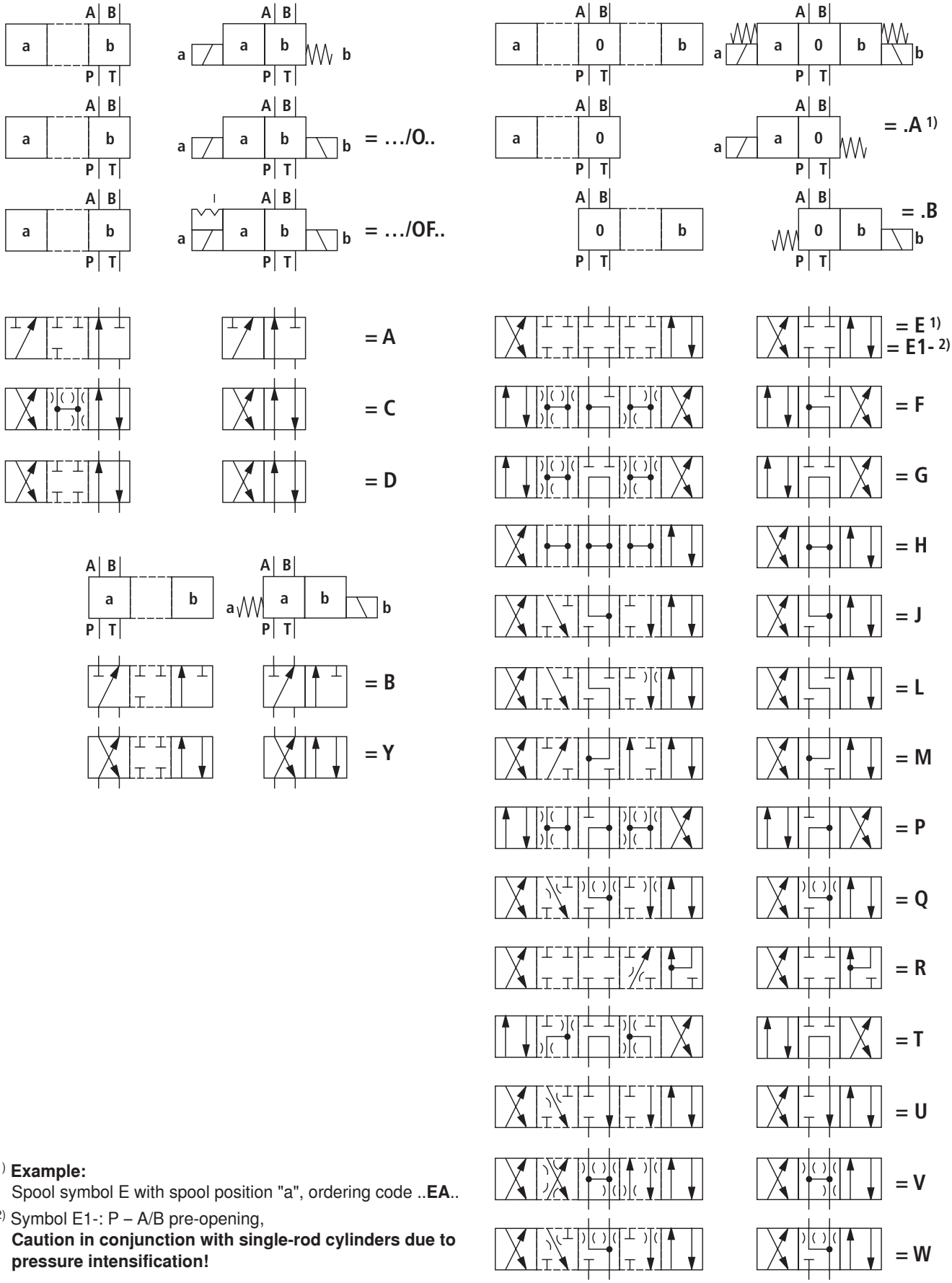
QR0G24S = Monitored rest position
QRABG24E = Monitored spool position "a" and "b"

– Inductive proximity sensor type QS

QSAG24W = Monitored spool position "a"
QSBG24W = Monitored spool position "b"
QS0G24W = Monitored spool position "0"
QS0AG24W = Monitored spool position "0" and "a"
QS0BG24W = Monitored spool position "0" and "b"
QSABG24W = Monitored spool position "a" and "b"

For further details, see RE 24830

Spool symbols



1) **Example:**
Spool symbol E with spool position "a", ordering code ..**EA**..

2) Symbol E1-: P – A/B pre-opening,
Caution in conjunction with single-rod cylinders due to pressure intensification!

Function, section

Directional valves of type WE are solenoid operated directional spool valves. They control the start, stop and direction of a flow.

The directional valves basically consist of housing (1), one or two solenoids (2), control spool (3), and one or two return springs (4).

In the de-energized condition, control spool (3) is held in the central position or in the initial position by the return springs (4) (except for impulse spool). Control spool (3) is actuated by wet-pin solenoids (2).

To ensure proper functioning, care must be taken that the pressure chamber of the solenoid is filled with oil.

The force of solenoid (2) acts via plunger (5) on control spool (3) and pushes the latter from its rest position to the required end position. This enables the necessary direction of flow from P to A and B to T or P to B and A to T.

After solenoid (2) was de-energized, return spring (4) pushes control spool (3) again back to its rest position.

An optional manual override (6) allows control spool (3) to be moved without energization of the solenoid.

Type .WE 6 .6X/O… (only possible with symbols A, C and D)

This variant is a directional valve with two spool positions and two solenoids without detent. In the de-energized condition, there is no defined spool position.

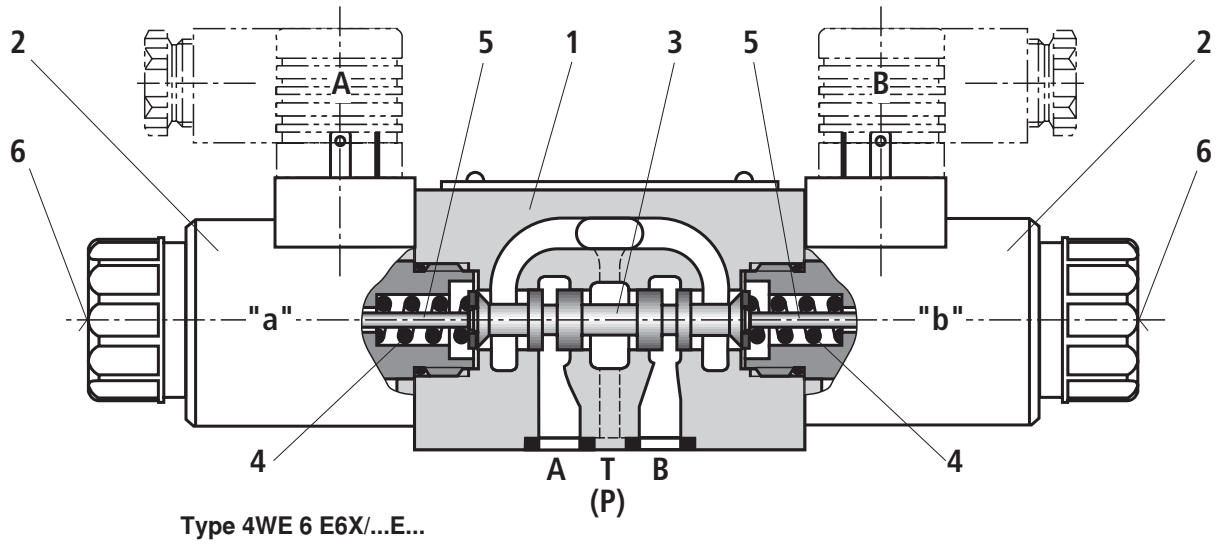
Type .WE 6 .6X/OF… (impulse spool, only possible with symbols A, C and D)

This variant is a directional valve with two spool positions, two solenoids and one detent. It alternately locks the two spools in position and the solenoid therefore needs not to be permanently energized.

☞ **Notes!**

Pressure peaks in the tank line to two or several valves can result in unwanted spool movements in the case of valves with detent! We therefore recommend that separate return lines be provided or a check valve installed in the tank line.

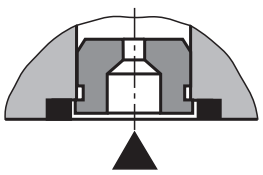
Internal leakage of a directional spool valve changes in the course of time for component-inherent reasons.



Type 4WE 6 E6X/...E...

Throttle insert

The use of a throttle insert is required when, due to prevailing operating conditions, flows can occur during the switching processes, which exceed the performance limit of the valve.



Technical data (For applications outside these parameters, please consult us!)

general

Weight	– Valve with one solenoid	kg *[lbs]*	1.45 *[3.2]*
	– Valve with two solenoids	kg *[lbs]*	1.95 *[4.3]*
Installation position			any
Ambient temperature range		°C *[°F]*	–30 to +50 *[–22 to +122]* (NBR seals) –20 to +50 *[–4 to +122]* (FKM seals)

hydraulic

Maximum operating pressure	– Port A, B, P	bar *[psi]*	350 *[5076]*
	– Port T	bar *[psi]*	210 *[3050]* (DC); 160 *[2320]* (AC) With symbols A and B, port T must be used as leakage port.
Maximum flow		l/min *[US gpm]*	80 *[21]* (DC); 60 *[15.8]* (AC)
Flow cross-section (Spool position 0)	– Spool symbol Q	mm^2	ca. 6 % of nominal cross-section
	– Spool symbol W	mm^2	ca. 3 % of nominal cross-section
Hydraulic fluid [1]			Mineral oil (HL, HLP) according to DIN 51524[2]; quickly bio-degradable hydraulic fluids according to VDMA 24568 (see also RE 90221); HETG (rape seed oil) [2]; HEPG (polyglycols) [3]; HEES (synthetic esters) [3]; other hydraulic fluids upon request
Hydraulic fluid temperature range		°C *[°F]*	–30 to +80 *[–22 to +176]* (NBR seals) –15 to +80 *[–4 to +176]* (FKM seals)
Viscosity range		mm^2/s *[SUS]*	2.8 to 500 *[35 to 2320]*
Maximum permitted degree of contamination of the hydraulic fluid - cleanliness class according to ISO 4406 (c)			Class 20/18/15 [4]

[1] The flashpoint of the process and operating medium used must be 15 K higher than the maximum solenoid surface temperature.

[2] Suitable for NBR and FKM seals

[3] Only suitable for FKM seals

[4] The cleanliness classes specified for the components must be adhered to in hydraulic systems. Efficient filtration prevents malfunctions and at the same time prolongs the service life of components.

For maintenance requirements of the hydraulic fluid and contamination limit values, see data sheet RE 07300.

For the selection of the filters, see data sheets RE 50070, RE 50076, RE 50081, RE 50086, RE 50087 and RE 50088.

Technical data (For applications outside these parameters, please consult us!)

electrical

Type of voltage			Direct voltage	Alternating voltage 50/60 Hz
Available voltages [5] (For ordering code for AC voltage solenoids, see below)		V	12, 24, 96, 205	110, 230
Voltage tolerance (nominal voltage)		%	±10	
Power consumption		W	30	–
Holding power		VA	–	50
Switch-on power		VA	–	220
Duty cycle (ED)		%	100	
Switching time according to ISO 6403 [6]	– ON	ms	25 to 45	10 to 20
	– OFF	ms	10 to 25	15 to 40
Maximum switching frequency		1/h	15000	7200
Maximum surface temperature of the coil [7]		°C *[°F]*	120 *[248]*	180 *[356]*
Type of protection according to DIN EN 60529	– with connector "K4", "K72L", "K73L"		IP 65 (with mating connector mounted and locked)	
	– with connector "C4"		IP 66A (with mating connector mounted and locked)	
	– with connector "K40"		IP 69K (with mating connector mounted and locked)	

[5] Special voltages upon request

[6] The switching times were established at a hydraulic fluid temperature of 40 °C *[104 °F]* and a viscosity of 46 cSt. Deviating hydraulic fluid temperatures can result in different switching times! Switching times change in dependence on the operating time and operating conditions.

[7] Due to the temperatures occurring on the surfaces of the solenoid coils, the standards ISO 13732-1 and EN 982 need to be adhered to!
The specified surface temperature in AC voltage solenoids is valid for the faultless operation. In case of faults (e.g. blocking of the control spool), the surface temperature may rise to above 180 °C *[356 °F]*. Thus, the system must be checked for possible hazards considering the flashpoint (see footnote [1] page 6).
As fuse protection, circuit breakers (see table page 16) must be used unless the creation of an ignitable atmosphere can be excluded in a different way. Thus, the surface temperature can - in case of fault - be limited to maximally 220 °C *[428 °F]*.
The tripping current must be 8 to 10 times higher than the nominal power consumption over a time span of 0.6 s. (tripping characteristics "K").
The necessary non-tripping current of the fuse must not fall below the value I_1 (see table page 16). The maximum tripping current of the fuse must not exceed the value I_2 (see table page 16).
The temperature dependence of the tripping behavior of the circuit breakers has to be considered according to the manufacturer's specifications.

☞ **Notes!**

- Operation of the manual override is only possible up to a tank pressure of ca. 50 bar *[725 psi]*. Avoid damage to the bore for the manual override! (Special tool for actuation, separate order, material no. **R900024943**). When the manual override is blocked, the operation of the solenoid must be ruled out!
- The simultaneous operation of the solenoids must be ruled out!

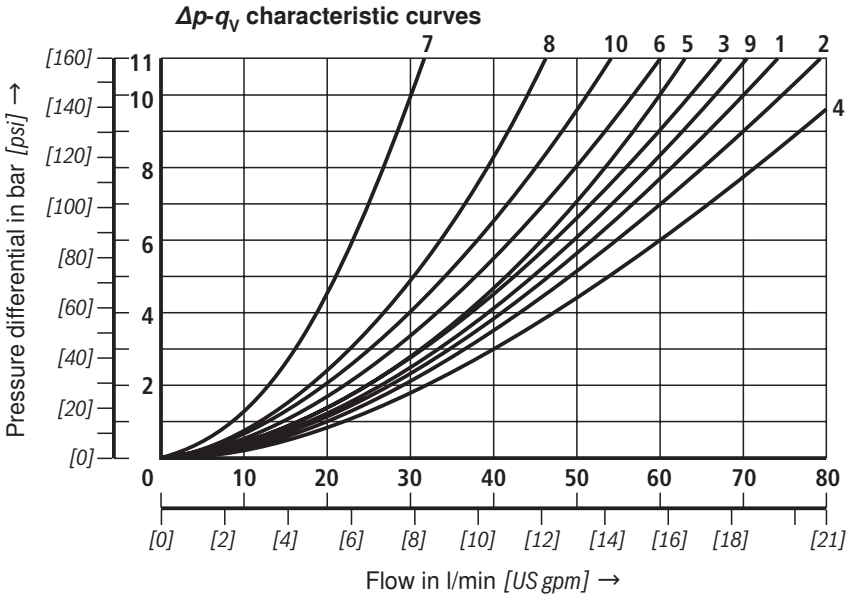
When establishing the electrical connection, properly connect the protective earth conductor (PE ⏚).

☞ **Note!**

AC voltage solenoids can be used for 2 or 3 mains;
e. g. solenoid type **W110** for:
110 V, 50 Hz; 110 V, 60 Hz; 120 V, 60 Hz

Ordering code	Mains
W110	110 V, 50 Hz 110 V, 60 Hz 120 V, 60 Hz
W230	230 V, 50 Hz 230 V, 60 Hz

Characteristic curves (measured with HLP46, ϑ_{Oil} = 40 °C ±5 °C *[104 °F ±9 °F]*)



7 Spool symbol "R" in spool position B – A

8 Spool symbol "G" and "T" in central position P – T

9 Spool symbol "H" in central position P – T

Spool symbol	Flow direction			
	P – A	P – B	A – T	B – T
A; B	3	3	–	–
C	1	1	3	1
D; Y	5	5	3	3
E	3	3	1	1
F	1	3	1	1
T	10	10	9	9
H	2	4	2	2
J; Q	1	1	2	1
L	3	3	4	9
M	2	4	3	3
P	3	1	1	1
R	5	5	4	–
V	1	2	1	1
W	1	1	2	2
U	3	3	9	4
G	6	6	9	9

Performance limits (measured with HLP46, ϑ_{Oil} = 40 °C ±5 °C *[104 °F ±9 °F]*)

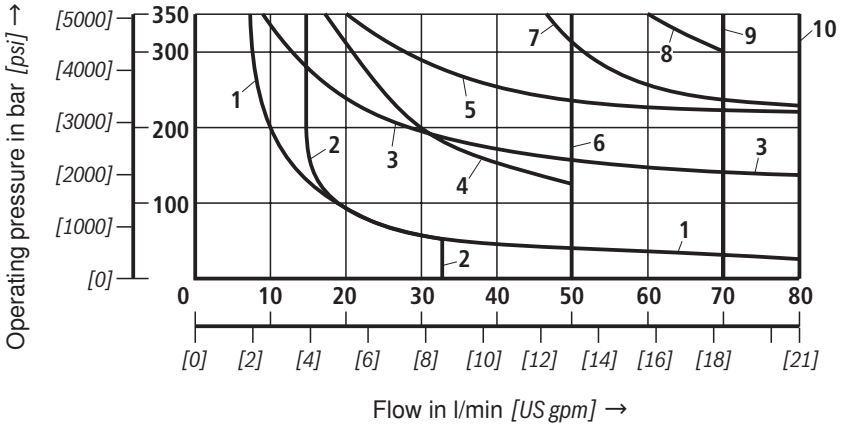
Attention!

The specified switching performance limits are valid for operation with two directions of flow (e.g. from P to A and simultaneous return flow from B to T).

Due to the flow forces acting within the valves, the permissible switching performance limits may be considerably lower with only one direction of flow (e.g. from P to A while port B is blocked)!

In such cases, please consult us!

The switching performance limit was established while the solenoids were at operating temperature, at 10% undervoltage and without tank pre-loading.



DC solenoid Solenoid voltage
12; 24; 48; 96; 125; 205 V

(other voltages see page 10)

DC solenoid	
Characteristic curve	Spool symbol
1	A; B[1)]
2	V
3	A; B
4	F; P
5	J
6	G; H; T
7	A/O; A/OF; L; U
8	C; D; Y
9	M
10	E; E1–[2)]; R[3)]; C/O; C/OF D/O; D/OF; Q; W

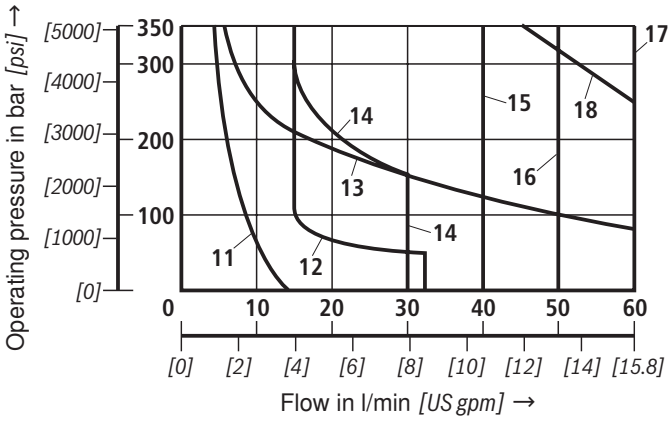
[1)] With manual override

[2)] P – A/B pre-opening

[3)] Return flow from actuator to tank

Performance limits (measured with HLP46, ϑ_{Oil} = 40 °C ±5 °C *[104 °F ±9 °F]*)

see note on page 8.



AC solenoid Solenoid voltage	
W110	110 V; 50 Hz 120 V; 60 Hz
W230	230 V; 50 Hz

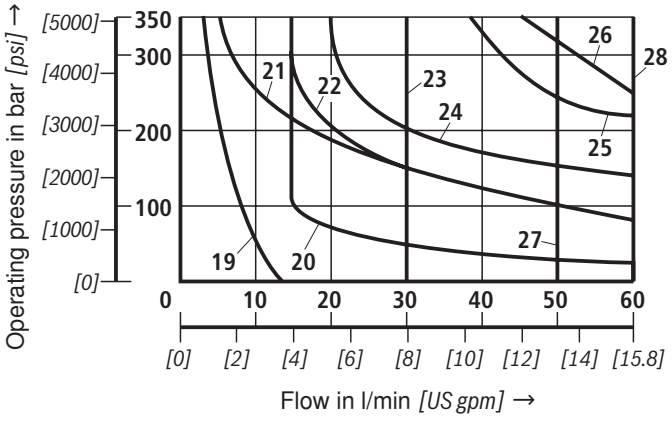
(other voltages upon request)

AC solenoid – 50 Hz	
Character-istic curve	**Spool symbol**
11	A; B[1]
12	V
13	A; B
14	F; P
15	G; T
16	H
17	A/O; A/OF; C/O; C/OF; D/O; D/OF; E; E1–[2]; J; L; M; Q; R[3]; U; W
18	C; D; Y

[1] With manual override

[2] P – A/B pre-opening

[3] Return flow from actuator to tank



AC solenoid Solenoid voltage	
W110	110 V; 60 Hz
W230	230 V; 60 Hz

(other voltages upon request)

AC solenoid – 60 Hz	
Character-istic curve	**Spool symbol**
19	A; B[1]
20	V
21	A; B
22	F; P
23	G; T
24	J; L; U
25	A/O; A/OF; Q; W
26	C; D; Y
27	H
28	C/O; C/OF; D/O; D/OF; E E1–[2]; M; R[3]

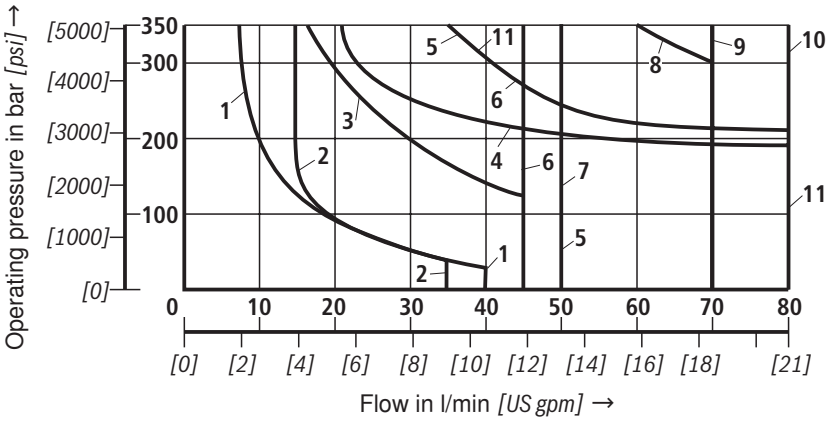
[1] With manual override

[2] P – A/B pre-opening

[3] Return flow from actuator to tank

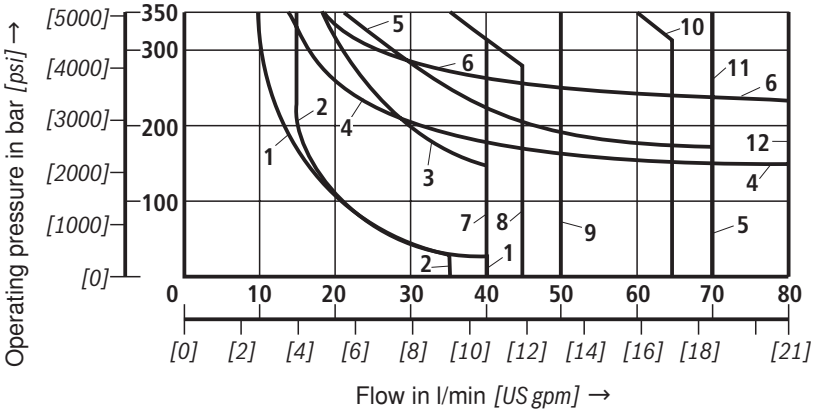
Performance limits (measured with HLP46, ϑ_{Oil} = 40 °C ±5 °C *[104 °F ±9 °F]*)

see note on page 8.



DC solenoid Solenoid voltage
110; 180 V

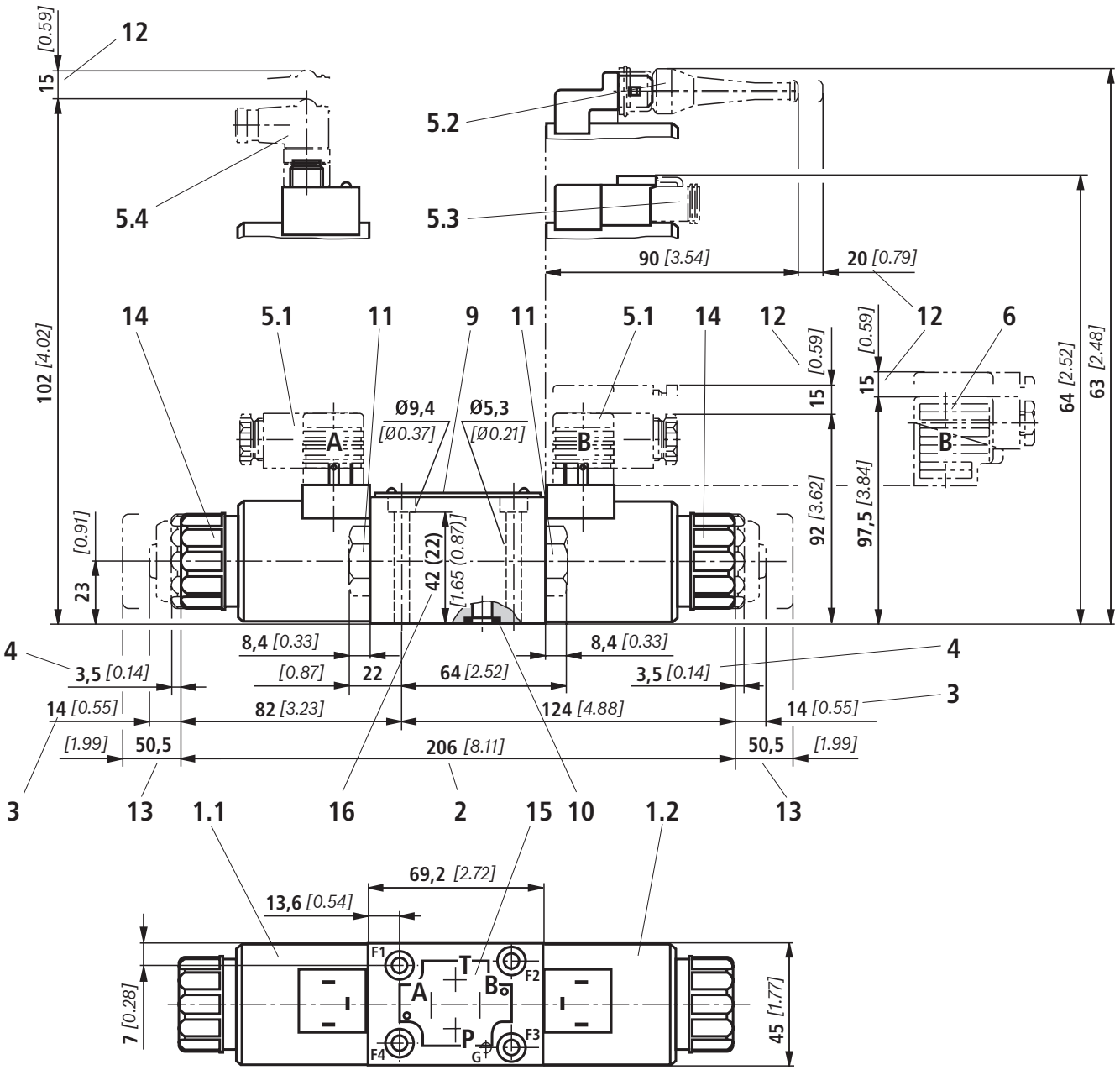
DC solenoid	
Character-istic curve	Spool symbol
1	A; B
2	V
3	F; P
4	J; L; U
5	G
6	T
7	H
8	D; C
9	M
10	C/O; C/OF; D/O; D/OF; E; E1–; R, Q; W
11	A/O; A/OF

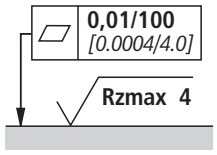


DC solenoid Solenoid voltage
42; 80; 220 V

DC solenoid	
Character-istic curve	Spool symbol
1	A; B
2	V
3	F; P
4	J; L; U
5	A/O; A/OF
6	E
7	T
8	G
9	H
10	D; C
11	M
12	C/O; C/OF; D/O; D/OF; E1–; R, Q; W

Unit dimensions: Valve with DC solenoid – **Individual connection**
(dimensions in mm *[inch]*)

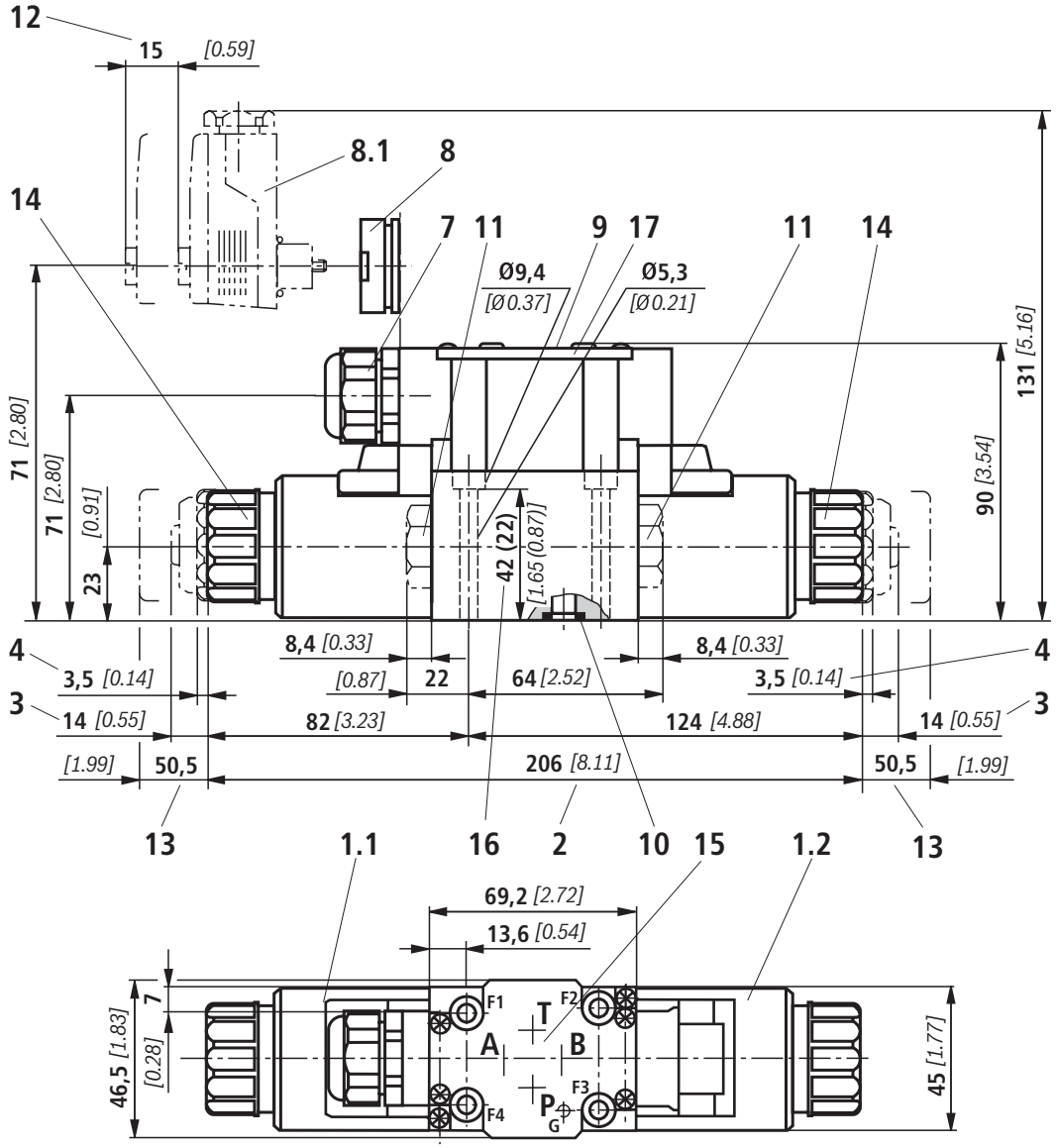


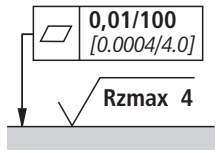


Required surface quality
of the valve mounting face

Item explanations, valve mounting screws and **subplates**
see page 15.

Unit dimensions: Valve with DC solenoid – **Central connection**
(dimensions in mm *[inch]*)





Required surface quality
of the valve mounting face

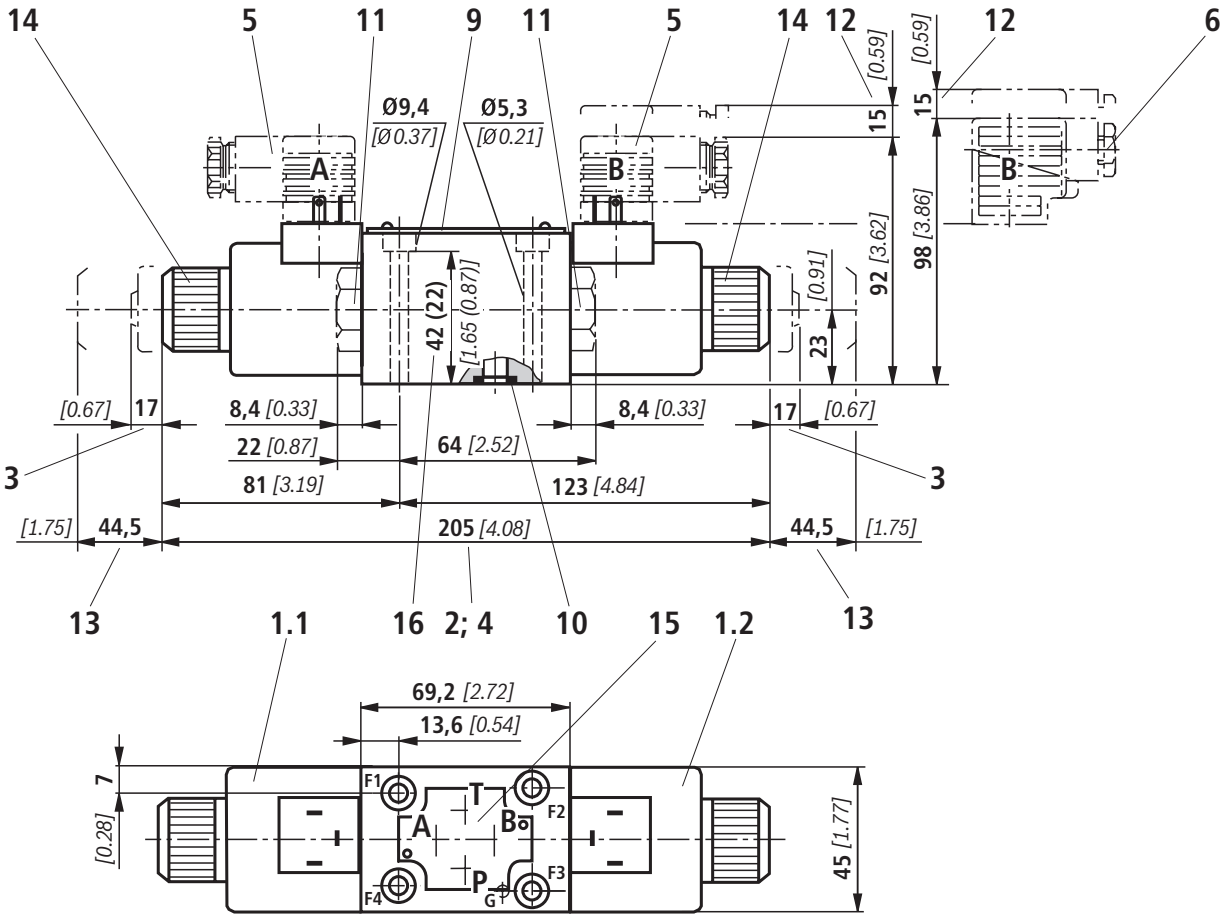
Terminal assignment with central connection:

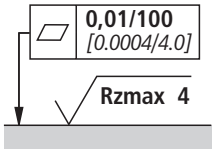
– **1 solenoid:**
Solenoid always to terminals 1 and 2,
protective earth conductor to terminal ⏚ PE

– **2 solenoids:**
Solenoid "a" to terminals 1 and 2,
solenoid "b" to terminals 3 and 4,
protective earth conductor to terminal ⏚ PE

Item explanations, valve mounting screws and **subplates**
see page 15.

Unit dimensions: Valve with AC solenoid – **Individual connection**
(dimensions in mm *[inch]*)

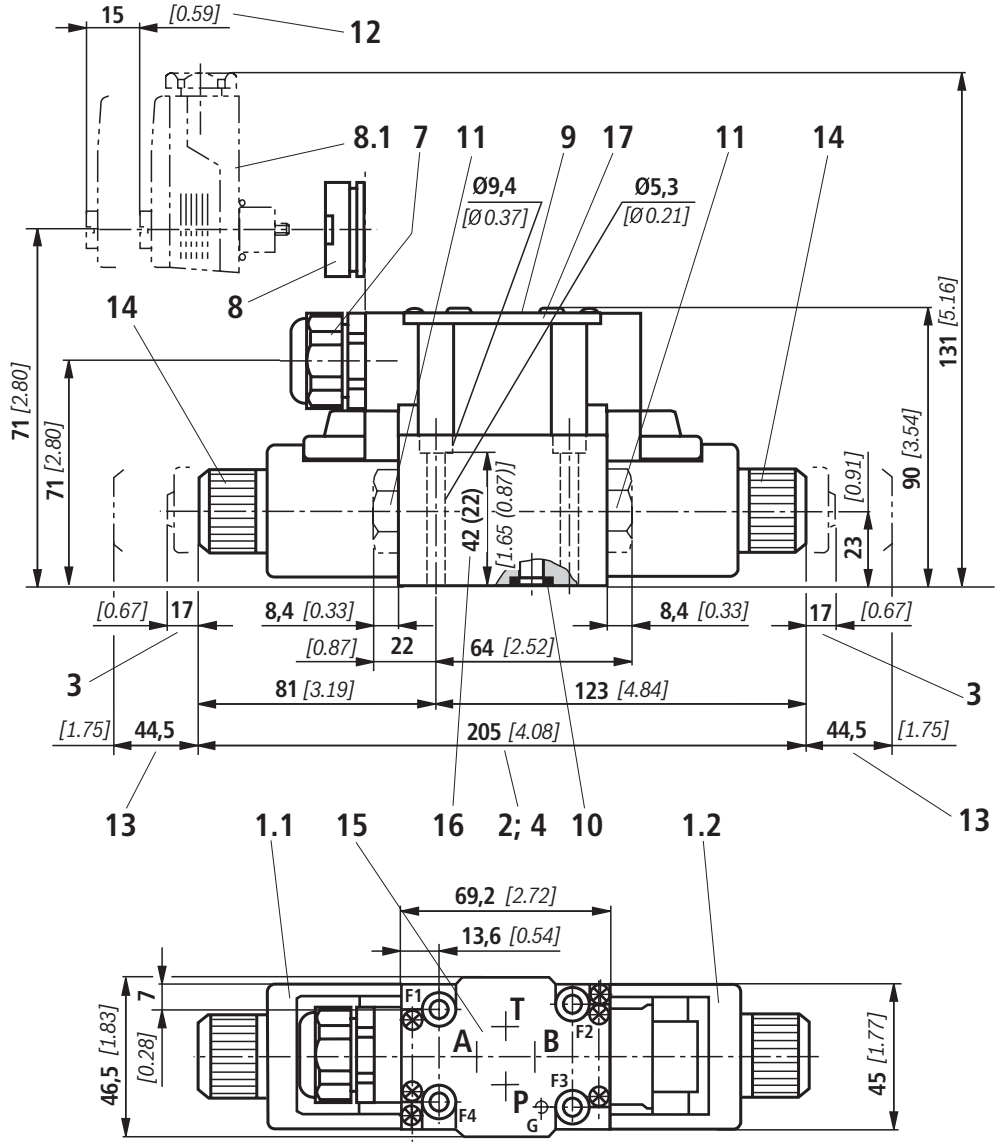


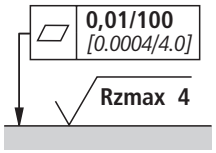


Required surface quality
of the valve mounting face

Item explanations, valve mounting screws and **subplates**
see page 15.

Unit dimensions: Valve with AC solenoid – **Central connection**
(dimensions in mm *[inch]*)





Required surface quality
of the valve mounting face

Terminal assignment with central connection:

– **1 solenoid:**
Solenoid always to terminals 1 and 2,
protective earth conductor to terminal ⏚ PE

– **2 solenoids:**
Solenoid "a" to terminals 1 and 2,
solenoid "b" to terminals 3 and 4,
protective earth conductor to terminal ⏚ PE

Item explanations, valve mounting screws and **subplates**
see page 15.

Unit dimensions

1.1 Solenoid "a"

1.2 Solenoid "b"

2 Dimension for solenoid **with concealed** manual override "**N9**" (standard)

3 Dimension for solenoid **with** manual override "**N9**"

4 Dimension for solenoid **without** manual override

5.1 Mating connector **without** circuitry for connector "K4" (separate order, see page 16 and RE 08006)

5.2 Mating connector (AMP Junior Timer) with connector "C4"(separate order, see RE 08006)

5.3 Mating connector DT 04-2PA (Deutsch plug) with connector "K40" (separate order, see RE 08006)

5.4 Mating connector angled with M12x1 plug-in connection with operating display LED "K33L" (separate order, see RE 08006)

6 Mating connector **with** circuitry for connector "K4" (separate order, see page 16 and RE 08006)

7 Cable gland Pg 16 *[1/2" NPT]* "DL"

8 Central plug-in connection "DKL"

8.1 Angled socket (color red, separate order) material no. **R900005538**)

9 Nameplate

10 Identical seal rings for ports A, B, P, T

☞ **Note!** The ports are clearly determined according to their tasks and must not be arbitrarily interchanged or closed.

11 Plug screw for valves with one solenoid

12 Space required for removing the mating connector/angled socket

13 Space required for removing the coil

14 Lock nut, tightening torque $M_A = 4^{+1}$ Nm *[2.95$^{+0.74}$ ft-lbs]*

15 Position of the connections according to DIN 24340 form A (**without** locating hole), or ISO 4401-03-02-0-05 and NFPA T3.5.1 R2-2002 D03 (**with** locating hole for locating pin ISO 8752-3x8-St, material no. **R900005694**, separate order)

16 Alternative clamping length (): 22 mm *[0.87 inch]*

17 Cover

Attention!
The valve may only be operated with properly mounted cover!

Subplates according to data sheet RE 45052
(separate order)

(**without** locating hole)	G 341/01 (G1/4) G 342/01 (G3/8) G 502/01 (G1/2)
(**with** locating hole)	G 341/60 (G1/4) G 342/60 (G3/8) G 502/60 (G1/2)
	G 341/12 (SAE-6) [1)] *G 342/12 (SAE-8)* [1)] *G 502/12 (SAE-10)* [1)]

[1)] on request

Valve mounting screws (separate order)

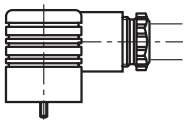
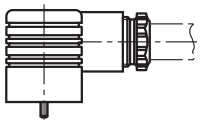
– Clamping length 42 mm:
4 hexagon socket head cap screws, metric ISO 4762 - M5 x 50 - 10.9-flZn-240h-L
(friction coefficient μ_{total} = 0.09 to 0.14);
tightening torque M_A = 7 Nm *[5.2 ft-lbs]* ±10%,
material no. **R913000064**
or
4 hexagon socket head cap screws ISO 4762 - M5 x 50 - 10.9 (own procurement)
(friction coefficient μ_{total} = 0.12 to 0.17);
tightening torque M_A = 8.1 Nm *[6 ft-lbs]* ±10%

4 hexagon socket head cap screws UNC 10-24 UNC x 2" ASTM-A574
(friction coefficient μ_{total} = 0.19 to 0.24);
tightening torque M_A = 11 Nm *[8.2 ft-lbs]* ±15%,
(friction coefficient μ_{total} = 0.12 to 0.17);
tightening torque M_A = 8 Nm *[5.9 ft-lbs]* ±10%,
material no. **R978800693**

– Clamping length 22 mm:
4 hexagon socket head cap screws, metric ISO 4762 - M5 x 30 - 10.9-flZn-240h-L
(friction coefficient μ_{total} = 0.09 to 0.14);
tightening torque M_A = 7 Nm *[5.2 ft-lbs]* ±10%,
material no. **R913000316**
or
4 hexagon socket head cap screws ISO 4762 - M5 x 30 - 10.9 (own procurement)
(friction coefficient μ_{total} = 0.12 to 0.17);
tightening torque M_A = 8.1 Nm *[6 ft-lbs]* ±10%

4 hexagon socket head cap screws UNC 10-24 UNC x 1 1/4"
(friction coefficient μ_{total} = 0.19 to 0.24);
tightening torque M_A = 11 Nm *[8.2 ft-lbs]* ±15%,
(friction coefficient μ_{total} = 0.12 to 0.17);
tightening torque M_A = 8 Nm *[5.9 ft-lbs]* ±10%,
material no. **R978802879**

Mating connectors according to DIN EN 175301-803

Details and more mating connectors see RE 08006							
			Material number				
Connection	**Valve side**	**Color**	without circuitry	with indicator light 12 … 240 V	with indicator light and rectifier 12 … 240 V	with rectifier 12 ... 240 V	with indicator light and Zener diode suppression circuit 24 V
M16 x 1.5	a	gray	**R901017010**	–	–	–	–
	b	black	**R901017011**	–	–	–	–
	a/b	black	–	**R901017022**	**R901017029**	**R901017025**	**R901017026**
1/2“ NPT (Pg 16)	a	red/ brown	**R900004823**	–	–	–	–
	b	black	**R900011039**	–	–	–	–
	a/b	black	–	**R900057453**	**R900057455**	**R900842566**	–

Circuit breakers with tripping characteristic "K"
according to EN 60898-1 (VDE 0641-11), EN 60947-2 (VDE 0660-101), IEC 60898 and IEC 60947-2

AC solenoid, 50 Hz	**Lower rated current** I_1 in A	**Upper rated current** I_2 in A
W24	2.30	3.60
W42	1.45	1.92
W48	1.15	1.92
W100	0.64	0.90
W110	0.60	0.90
W115	0.52	0.90
W127	0.48	0.60
W200	0.33	0.60
W220	0.31	0.60
W230	0.26	0.36
W240	0.26	0.36

AC solenoid, 60 Hz	**Lower rated current** I_1 in A	**Upper rated current** I_2 in A
W24	1.73	2.40
W42	1.13	1.92
W48	1.09	1.92
W100	0.58	0.90
W110	0.52	0.90
W115	0.43	0.90
W127	0.37	0.60
W200	0.30	0.60
W220	0.26	0.36
W230	0.20	0.36
W240	0.22	0.36

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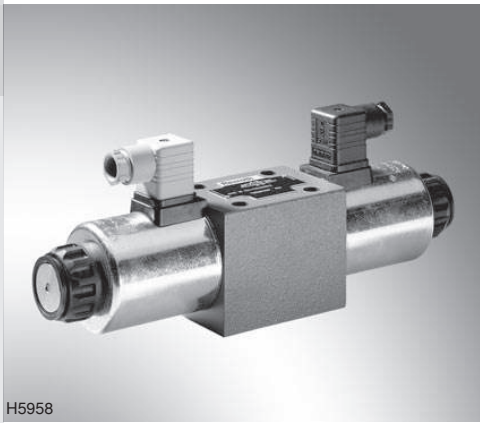
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The data specified above only serve to describe the product. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification. It must be remembered that our products are subject to a natural process of wear and aging.

Rexroth
Bosch Group

4/3, 4/2 and 3/2 directional valve with wet-pin AC or DC solenoids

RE 23327/08.08 1/14
Replaces: 02.03

Type WE


H5958

Size 10
Component series 3X; 4X
Maximum operating pressure 315 bar *[4569 psi]*
Maximum flow 120 l/min *[31.7 US gpm]*

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Unit dimensions	11 to 13

Notes on available spare parts:
www.boschrexroth.com/spc

Features

- Direct operated directional spool valve with solenoid actuation in heavy-duty design
- Porting pattern to ISO 4401-05-04-0-05 and NFPA T3.5.1 R2-2002 D05
- Subplates, see data sheet RE 45054 (separate order)
- Wet-pin DC or AC solenoids with detachable coil
- Solenoid coil can be rotated 90°
- The pressure-tight chamber needs not to be opened for changing the coil
- Electrical connection as individual or central connection
- Manual override, optional
- Smoothly switching version, see RE 23183
- Inductive position switches and proximity sensors (contactless), see RE 24830
- For further electrical connections, see RE 08010

Ordering code

	WE	10		/	C				

3 main ports = **3**
4 main ports = **4**

Size 10 = **10**

Spool symbols e.g. C, E, EA, EB, etc.; for possible versions, see page 4

Component series 30 to 39 – individual connection = **3X**
(30 to 39: unchanged installation and connection dimensions)
Component series 40 to 49 – central connection = **4X**
(40 to 49: unchanged installation and connection dimensions)

With spring return = **No code**
Without spring return = **O**
Without spring return with detent = **OF**

(Wet-pin) solenoid with detachable coil = **C**

DC voltage 24 V = **G24**
AC voltage 230 V 50/60 Hz = **W230**
DC voltage 205 V = **G205** [1]
For further ordering codes for other voltages and frequencies, see page 7

With concealed manual override (standard) = **N9**
With manual override = **N**
Without manual override = **No code**

Electrical connection [2]
individual connection
Without mating connector with component plug DIN EN 175301-803 = **K4** [3]
Central connection
Cable entry on cover, with indicator lamp = **DL**
Central plug-in connection on cover, with indicator lamp (without mating connector) = **DKL** [4]
For further electrical connections, see RE 08010

[1] For connection to the AC voltage mains a DC solenoid **must** be used, which is controlled via a rectifier, (see table below).

In the case of individual connection, a large mating connector with integrated rectifier can be used (separate order).

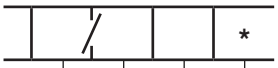
[2] Also available with M12x1 plug-in connection (version “G24“ only), see RE 08010

[3] Mating connectors, separate order, see page 3.

[4] Mating connector, separate order, Material no. **R900005538**

Standard types and components are shown in the EPS (standard price list).

AC voltage mains (permissible voltage tolerance ±10%)	**Nominal voltage of the DC voltage solenoid when operated with AC voltage**	**Ordering code**
110 V - 50/60 Hz	96 V	**G96**
120 V - 60 Hz	110 V	**G110**
230 V - 50/60 Hz	205 V	**G205**



Further details in clear text

Seal material

No code = NBR seals

V = FKM seals

(other seals on request)

Attention!

Observe compatibility of seals with hydraulic fluid used!

No code = Without Throttle insert

B08 = Throttle Ø 0.8 mm *[0.031 inch]*

B10 = Throttle Ø 1.0 mm *[0.039 inch]*

B12 = Throttle Ø 1.2 mm *[0.047 inch]*

Use in the case of flows that exceed the performance limit of the valve; effective in channel P (see page 5).

Spool position monitoring

No code = Without limit switch

QMAG24 = Monitored spool position “a“

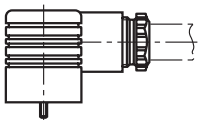
QMBG24 = Monitored spool position “b“

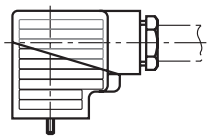
QM0G24 = Monitored rest position

For further details, see RE 24830

Mating connectors to DIN EN 175301-803

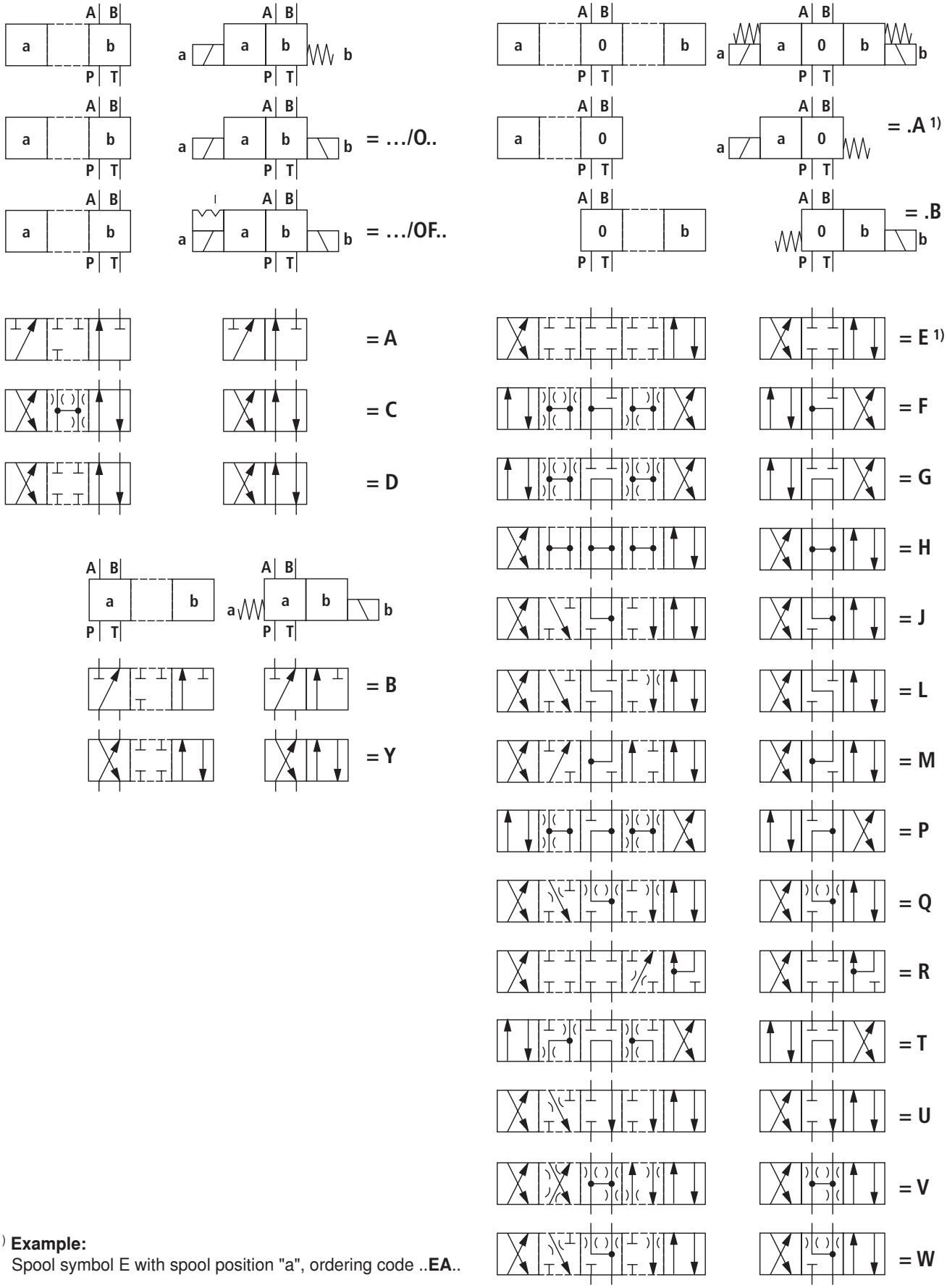
For details and further mating connectors, see RE 08006





Connection	Valve side	Color	Material number: Without circuitry	With indicator lamp 12 … 240 V	With indicator lamp and rectifier 12 … 240 V	With rectifier 12 … 240 V	With indicator lamp and Zener-diode suppressor circuit 24 V
M16 x 1.5	a	Gray	**R901017010**	–	–	–	–
	b	Black	**R901017011**	–	–	–	–
	a/b	Black	–	**R901017022**	**R901017029**	**R901017025**	**R901017026**
1/2“ NPT (Pg 16)	a	Red/ brown	**R900004823**	–	–	–	–
	b	Black	**R900011039**	–	–	–	–
	a/b	Black	–	**R900057453**	**R900057455**	**R900842566**	–

Spool symbols



1) **Example:**
Spool symbol E with spool position "a", ordering code ..**EA**..

Function, section

Directional valves of type WE are solenoid operated directional spool valves. They control the start, stop and direction of a flow.

These directional valves basically consist of housing (1), one or two solenoids (2), control spool (3), as well as one or two return springs (4).

In the non-operated condition, control spool (3) is held by return springs (4) in the central position or the initial position (except for impulse spool). Control spool (3) is actuated by wet-pin solenoids (2).

To ensure proper functioning, care must be taken that the pressure chamber of the solenoid is filled with oil.

The force of solenoid (2) acts via plunger (5) on control spool (3) and pushes it from its rest position to the desired end position. As a result of this, the required direction of flow from P to A and from B to T or P to B and A to T opens.

After solenoid (2) was de-energized, control spool (3) is returned to its rest position by return spring (4).

An optional manual override (6) allows control spool (3) to be operated without energization of the solenoid.

Type .WE 10 ..O… (only possible with symbols A, C and D)

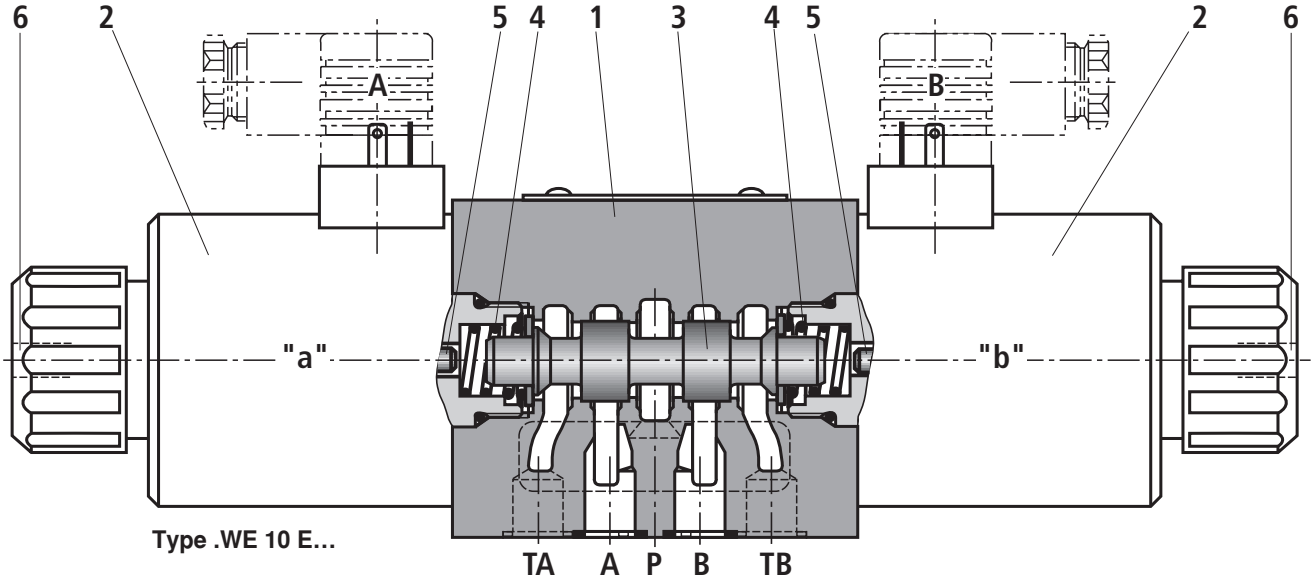
This version is a directional valve with two spool positions and two solenoids without detent. There is no defined spool position in the de-energized condition.

Type .WE 10 ..OF… (impulse spool, only possible with symbols A, C and D)

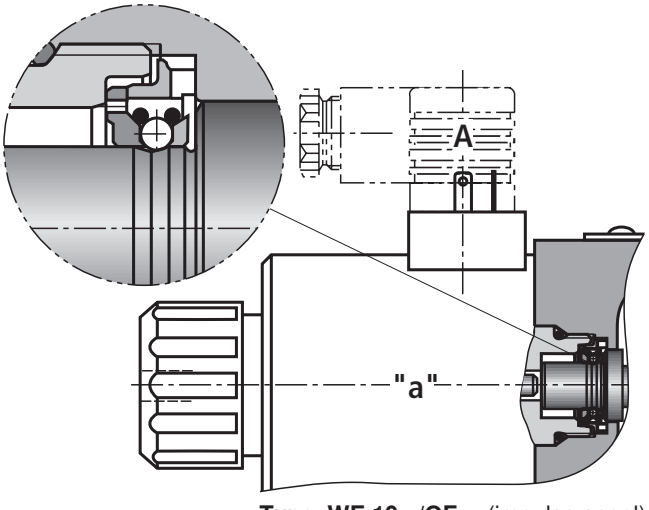
This version is a directional valve with two spool positions and two solenoids and a detent. It alternatingly holds both spool positions, and a permanent energization of the solenoid is therefore not required.

☞ **Note!**

In conjunction with valves with detent, pressure peaks in the tank line to two or more valves can cause unwanted spool movements! We recommend that separate return lines be provided or a check valve installed in the tank line.



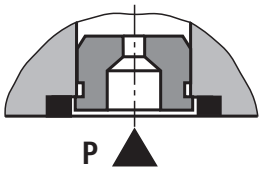
Type .WE 10 E…



Type .WE 10 ../OF… (impulse spool)

Throttle insert

The use of a throttle insert is required, if, due to the given operating consitions, flows can occur during the switching processes, which exceed the performance limit of the valve.



Technical data (for applications outside these parameters, please consult us!)

General

Weight			Individual connection	Central connection
	– Valve with one solenoid	kg *[lbs]*	4.4 *[9.7]* (DC); 3.6 *[7.9]* (AC)	4.3 *[9.5]* (DC); 3.5 *[7.7]* (AC)
	– Valve with two solenoids	kg *[lbs]*	6.0 *[13.2]* (DC); 4.4 *[9.7]* (AC)	5.9 *[13.0]* (DC); 4.3 *[9.5]* (AC)
Installation position			Optional	
Ambient temperature range		°C *[°F]*	–30 to +50 *[–22 to +122]* (NBR seals) –20 to +50 *[–4 to +122]* (FKM seals)	

Hydraulic

Maximum operating pressure	– Ports A, B, P	bar *[psi]*	315 *[4569]*
	– Port T	bar *[psi]*	210 *[3050]* (DC); 160 *[2320]* (AC) With symbols A and B, port T must be used as leakage oil port, if the operating pressure is higher than the tank pressure.
Maximum flow		l/min *[US gpm]*	120 *[31.7]*
Flow cross-section (spool position 0)	– Spool symbol V	mm^2 *[$inch^2$]*	11 *[0.017]* (A/B to T); 10,3 *[0.016]* (P to A/B)
	– Spool symbol W	mm^2 *[$inch^2$]*	2.5 *[0.004]* (A/B to T)
	– Spool symbol Q	mm^2 *[$inch^2$]*	5.5 *[0.009]* (A/B to T)
Hydraulic fluid [1]			Mineral oil (HL, HLP) to DIN 51524 [2]; fast bio-degradable hydraulic fluids to VDMA 24568 (see also RE 90221); HETG (rape seed oil) [2]; HEPG (polyglycols) [3]; HEES (synthetic esters) [3]; other hydraulic fluids on request
Hydraulic fluid temperature range		°C *[°F]*	–30 to +80 *[–22 to +176]* (NBR seals) –20 to +80 *[–4 to +176]* (FKM seals)
Viscosity range		mm^2/s *[SUS]*	2.8 to 500 *[35 to 2320]*
Permissible max. degree of contamination of the hydraulic fluid - cleanliness class to ISO 4406 (c)			Class 20/18/15 [4]

[1] The ignition temperature of the process and operating medium used must be higher than the maximum solenoid surface temperature.

[2] Suitable for NBR and FKM seals

[3] Suitable only for FKM seals

[4] The cleanliness classes specified for components must be adhered to in hydraulic systems. Effective filtration prevents malfunction and, at the same time, prolongs the service life of components.

For the selection of filters, see data sheets RE 50070, RE 50076, RE 50081, RE 50086, RE 50087 and RE 50088.

Technical data (for applications outside these parameters, please consult us!)

Electrical

Type of voltage			DC voltage	AC voltage 50/60 Hz
Available voltages [5] (Ordering code for AC solenoids, see below)		V	12, 24, 42, 60, 96, 110, 180, 205, 220	42, 110, 230
Voltage tolerance (nominal voltage)		%	±10	
Power consumption		W	35	–
Holding power		VA	–	90
Making capacity		VA	–	550
Duty cycle		%	100	
Switching time to ISO 6403	– ON	ms	45 to 60	15 to 25
	– OFF	ms	20 to 30	20 to 30
Maximum switching frequency		1/h	15000	7200
Maximum coil temperature [6]		°C *[°F]*	150 *[302]*	180 *[356]*
Type of protection to DIN EN 60529			IP 65 with mating connector mounted and locked	
Insulation class VDE 0580			F	H
Electrical protection			Each solenoid must be protected separately with a suitable fuse with tripping characteristic K (inductive loads).	
Behavior in the event of a fault (solenoid is not enabled)			The solenoid surface temperature can be exceeded.	

[5] Special voltages on request

[6] Due to the surface temperatures of the solenoid coils, observe standards ISO 13732-1 and EN 982!

☞ **Notes!**

– The manual override can only be operated up to a tank pressure of ca. 50 bar. Avoid damage to the bore for the manual override! (Special tool for operation, separate order, Material no. **R900024943**). When the manual override is blocked, the operation of the opposite solenoid must be ruled out!

– The simultaneous operation of the solenoids must be ruled out!

☞ **Note!**

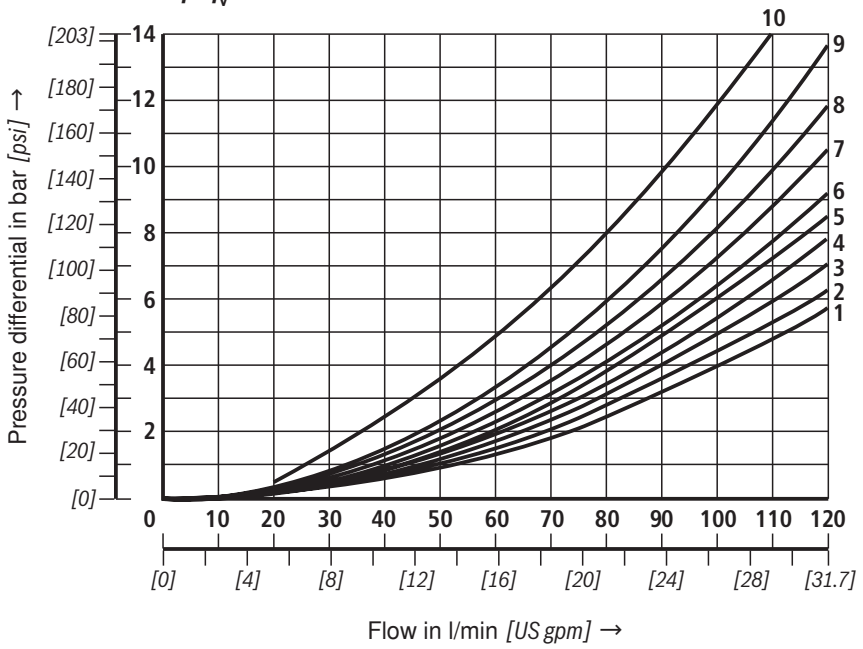
AC solenoids can be used for 2 or 3 mains;
e.g. solenoid type **W110** for:
110 V, 50 Hz; 110 V, 60 Hz; 120 V, 60 Hz

Ordering code	Mains
W42	42 V, 50 Hz 42 V, 60 Hz
W110	110 V, 50 Hz 110 V, 60 Hz 120 V, 60 Hz
W230	230 V, 50 Hz 230 V, 60 Hz

When establishing the electrical connection, properly connect the protective earth conductor (PE ⏚).

Characteristic curves (measured with HLP46, ϑ_{oil} = 40 °C ±5 °C *[104 °F ±9 °F]*)

***Δp-q*$_V$ characteristic curves**



Central position:

Spool symbol	Direction of flow				
	P – A	P – B	B – T	A – T	P – T
F	4	–	–	9	9
P	–	5	8	–	10
G, T	–	–	–	–	9
H	–	–	–	–	3

Spool symbol	Direction of flow			
	P – A	P – B	A – T	B – T
A; B	3	3	–	–
C	3	3	4	5
D; Y	5	5	6	6
E	1	1	4	4
F	2	3	7	4
G	3	3	6	7
H	1	1	6	7
J	1	1	3	3
L	2	2	3	5
M	1	1	4	5
P	4	2	5	7
Q	1	2	1	3
R	3	6	4	–
T	3	3	6	7
U; V	2	2	3	3
W	2	2	4	5

Spool position:

Spool symbol	Direction of flow			
	P – A	B – A	A – T	P – T
R	–	9	–	–

Performance limits (measured with HLP46, ϑ_{oil} = 40 °C ±5 °C *[104 °F ±9 °F]*)

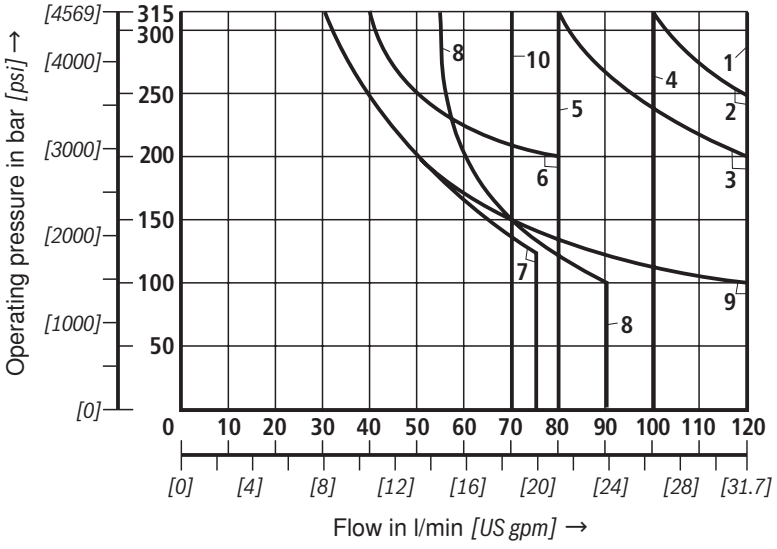
Attention!

The specified switching performance limits are valid for operation with two directions of flows (e.g. from P to A and simultaneous return flow from B to T).

Due to the flow forces acting within the valves, the permissible switching performance limit may be considerably lower with only one direction of flow (e.g. from P to A while port B is blocked)!

In the case of such applications, please consult us!

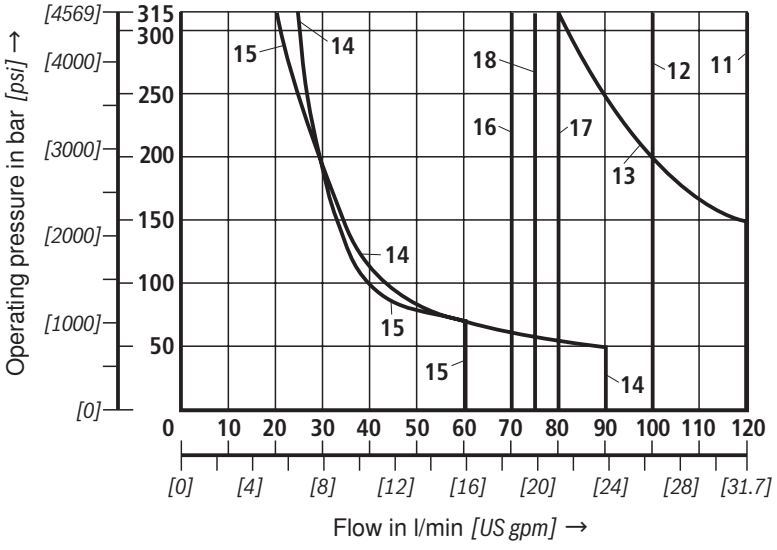
The switching performance limit was established while the solenoids had reached operating temperature, at 10% undervoltage and without tank preloading.



DC voltage	
Curve	**Spool symbol**
1	C; C/O; C/OF; D; D/O; D/OF; Y; M
2	E
3	A/O; A/OF; L; U; J; Q; W
4	H
5 [1)]	R; L[2)]; U[2)]
6	G
7	T
8	F; P
9	A; B
10	V

[1)] Return flow from actuator to tank (irrespecitve of the area ratio)

[2)] Central position only



AC voltage	
Curve	**Spool symbol**
11	C; C/O; C/OF; D; D/O; D/OF; Y
12	E; L; U; Q; W
13	A/O; A/OF; J
14	F; P
15	T
16	H
17	R
18 [2)]	L; U
19	M

[2)] Central position only

42 V, 50 Hz; 110 V, 50 Hz; 120 V, 60 Hz; 127 V, 50 Hz; 220 V, 50 Hz; 240 V, 60 Hz

Performance limits (measured with HLP46, ϑ_{oil} = 40 °C ± 5 °C *[104 °F ± 9 °F]*)

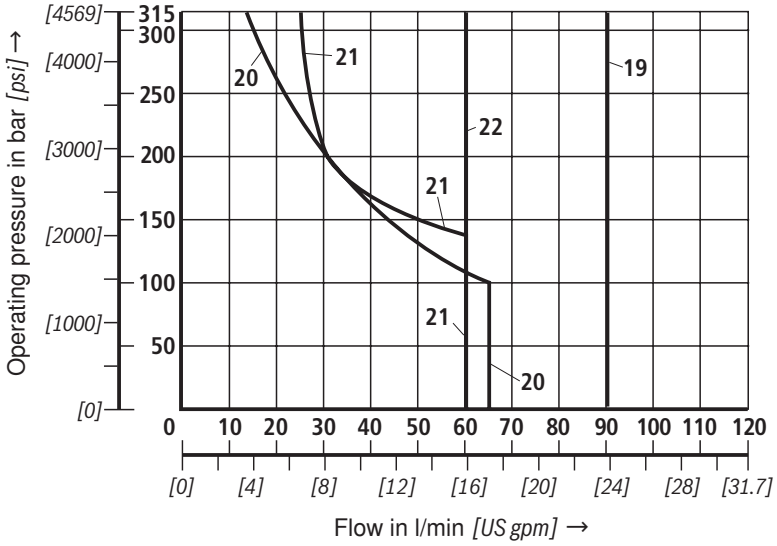
Attention!

The specified switching performance limits are valid for operation with two directions of flows (e.g. from P to A and simultaneous return flow from B to T).

Due to the flow forces acting within the valves, the permissible switching performance limit may be considerably lower with only one direction of flow (e.g. from P to A while port B is blocked)!

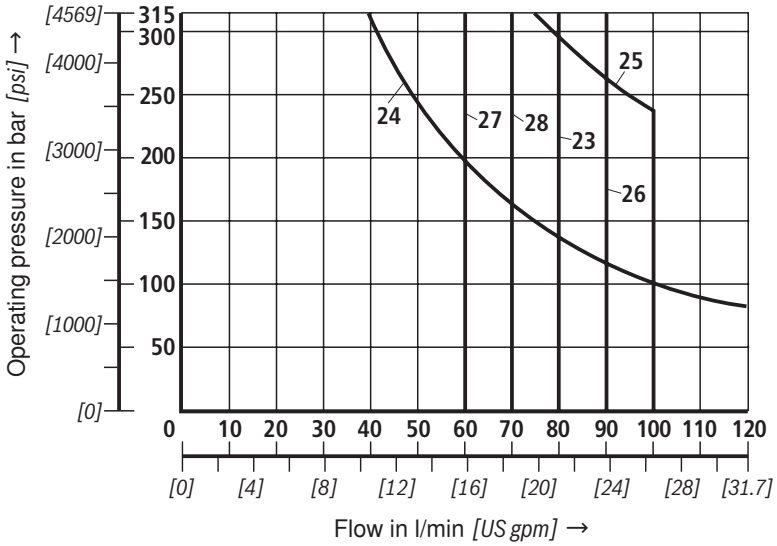
In the case of such applications, please consult us!

The switching performance limit was established while the solenoids had reached operating temperature, at 10% undervoltage and without tank preloading.



AC voltage	
Curve	**Spool symbol**
19	M
20	A, B
21	G
22	V

42 V, 50 Hz; 110 V, 50 Hz; 120 V, 60 Hz;
127 V, 50 Hz; 220 V, 50 Hz; 240 V, 60 Hz



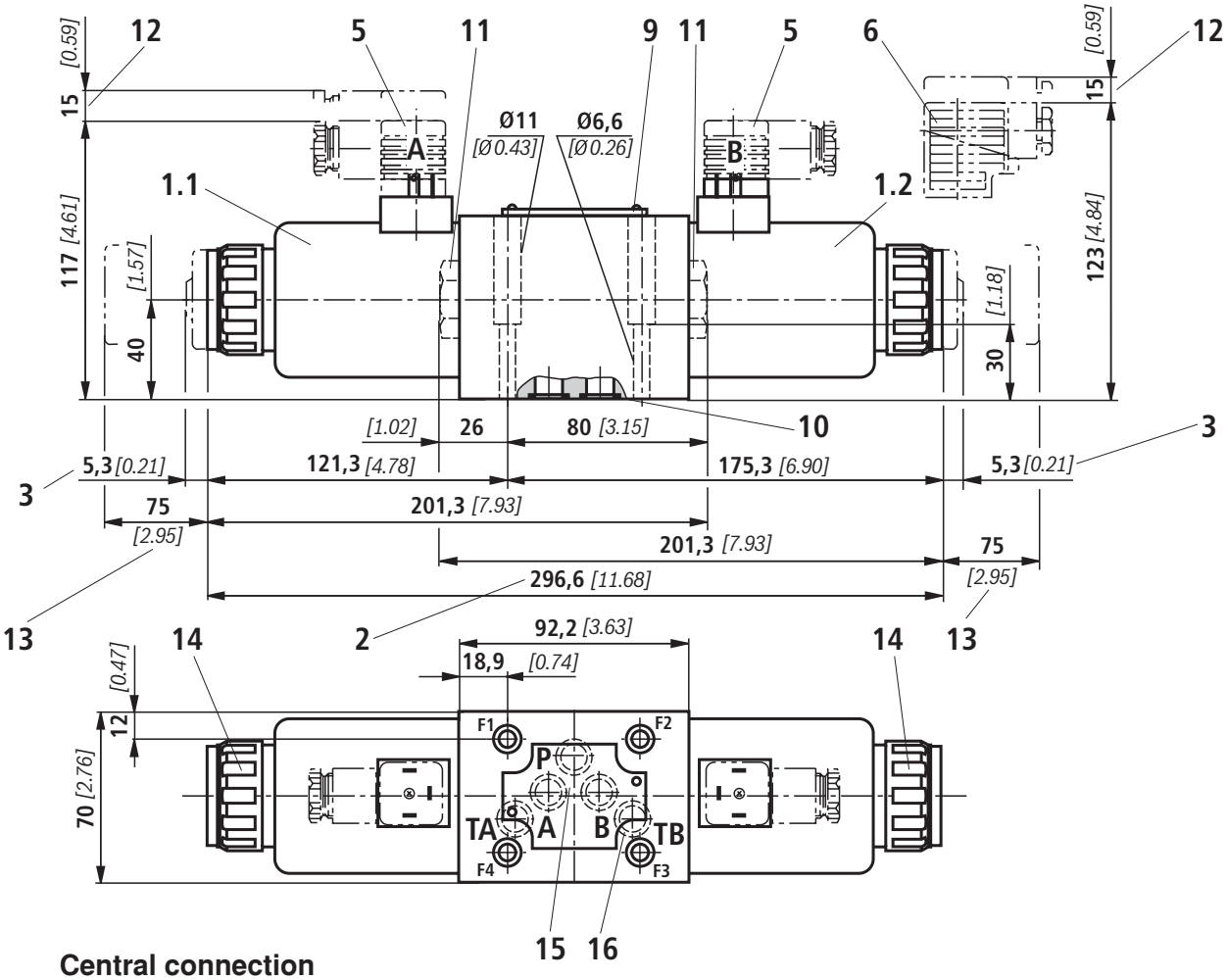
AC voltage	
Curve	**Spool symbol**
23	C; C/O; C/OF; D; D/O; D/OF; Y
24	A/O; A/OF
25	E
26	M
27	V
28	H

42 V, 60 Hz; 110 V, 60 Hz;
127 V, 60 Hz; 220 V, 60 Hz

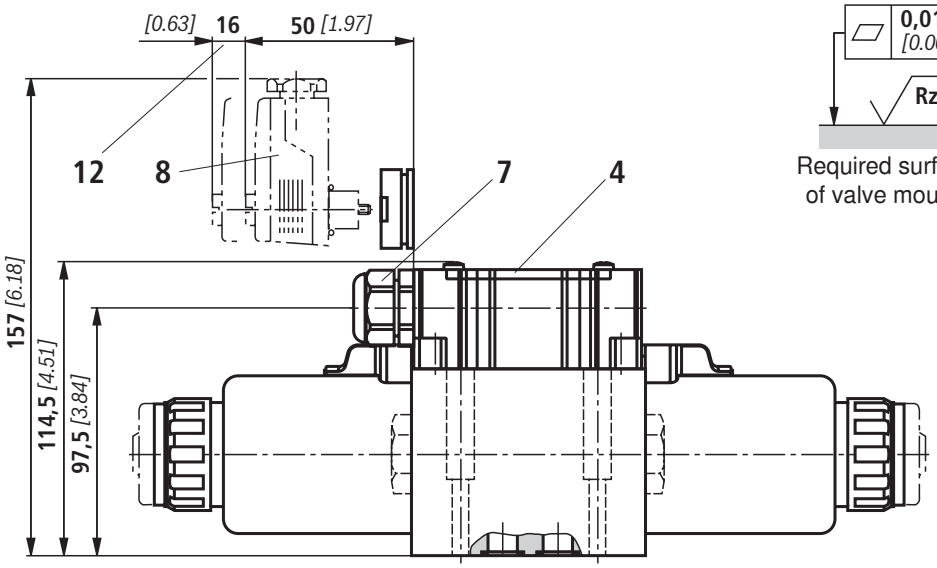
For performance limits of other spools, please consult us!

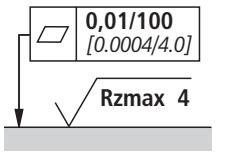
Unit dimensions: Valve with DC solenoid (dimensions in mm *[inch]*)

Individual connection



Central connection



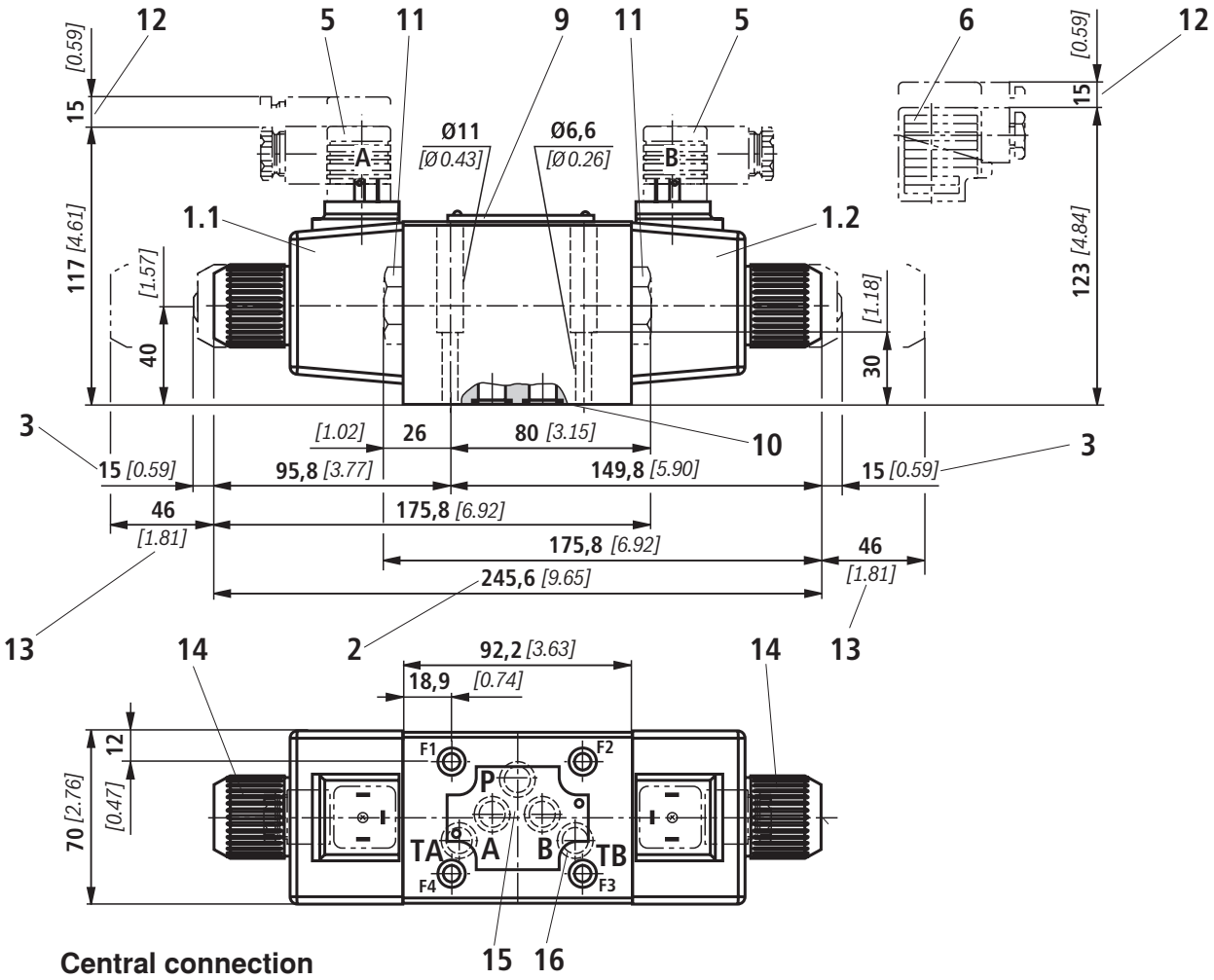


Required surface quality of valve mounting face

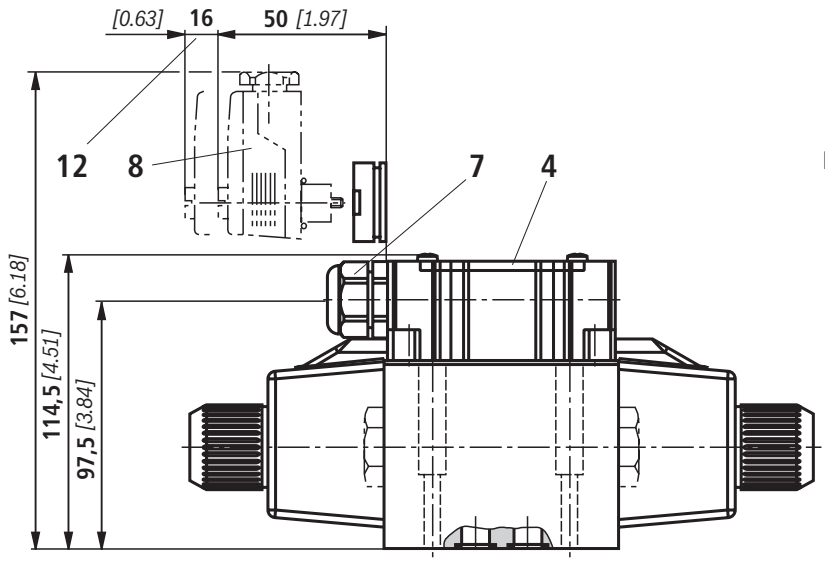
For explanations of items, valve mounting screws and **subplates,** see page 13.

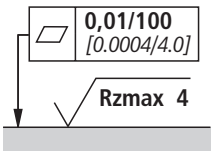
Unit dimensions: Valve with AC solenoid (dimensions in mm *[inch]*)

Individual connection



Central connection





Required surface quality of valve mounting face

For explanations of items, valve mounting screws and **subplates,** see page 13.

Unit dimensions

1.1 Solenoid "a"

1.2 Solenoid "b"

2 Dimension for solenoid **without** and **with concealed** manual override "**N9**" (standard)

3 Dimension for solenoid **with** Manual override "**N**"

4 Cover

Attention!
The valve may only be operated with properly mounted cover!

5 Mating connector **without** circuitry (separate order, see page 3 and RE 08006)

6 Mating connector **with** circuitry (separate order, see page 3 and RE 08006)

7 Cable gland Pg 16 *[1/2" NPT]* "DL"

8 Angled mating connector (color: red, separate order) Material no. **R900005538**)

9 Nameplate

10 Identical seal rings for ports A, B, P, TA, TB (for valve with throttle insert, O-ring in channel P)

11 Plug screw for valves with one solenoid

12 Space required to remove mating connector/angled mating connector

13 Space required to remove coil

14 Locknut, tightening torque $M_T = 6^{+2}$ Nm *[4.43$^{+1.48}$ ft-lbs]*

15 Position of ports to ISO 4401-05-04-0-05 and NFPA T3.5.1 R2-2002 D05

16 Port TB can only be used in conjunction with a bore to be provided separately.

Terminal assignment for central connection:

– **1 solenoid:**
Solenoid always to terminals 1 and 2,
protective earth conductor to terminal ⏚ PE

– **2 solenoids:**
Solenoid "a" to terminals 1 and 2,
solenoid "b" to terminals 3 and 4,
protective earth conductor to terminal ⏚ PE

Subplates to data sheet RE 45054
(separate order)

G 66/01 (G3/8)
G 67/01 (G1/2)
G 534/01 (G3/4)

G 66/12 (SAE-6; 9/16-18) [1)]
G 67/12 (SAE-8; 3/4-16) [1)]
G 534/12 (SAE-12; 1-1/16-12) [1)]

[1)] on request

Valve mounting screws (separate order)

4 hexagon socket head cap screws, metric
ISO 4762 - M6 x 40 - 10.9-flZn-240h-L
(Friction coefficient μ_{total} = 0.09 to 0.14);
tightening torque M_T = 12.5 Nm *[9.2 ft-lbs]* ±10%,
Material no. **R913000058**

or

4 hexagon socket head cap screws
ISO 4762 - M6 x 40 - 10.9 (to be provided by customer)
(Friction coefficient μ_{total} = 0.12 to 0.17);
tightening torque M_T = 15.5 Nm *[11.4 ft-lbs]* ±10%

4 hexagon socket head cap screws, UNC
1/4-20 UNC x 1-1/2" ASTM-A574
(Friction coefficient μ_{total} = 0.19 to 0.24);
tightening torque M_T = 20 Nm *[14.7 ft-lbs]* ±15%,
(Friction coefficient μ_{total} = 0.12 to 0.17);
tightening torque M_T = 14 Nm *[10.3 ft-lbs]* ±10%,
Material no. **R978800710**

Notes

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Rexroth
Bosch Group

3/2, 4/2 and 4/3 directional valves, internally pilot operated, externally pilot operated

RE 24751/08.08 1/38
Replaces: 02.03

Types 4WEH and 4WH


H6092+5589

Sizes 10 to 32
Component series 4X; 6X; 7X
Maximum operating pressure 350 bar *[5076 psi]*
Maximum flow 1100 l/min *[290 US gpm]*

Table of contents

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Technical data	14 to 16
Switching times	16
Characteristic curves, performance limits	17 to 26
Unit dimensions	27 to 33
Stroke adjustment, attachment options	34, 35
Switching time adjustment	36
Pressure reducing valve “D3“	36
Pre-load valve	37

Information on available spare parts:
www.boschrexroth.com/spc

Features

- 2 types of actuation:
  - Electrohydraulic (type WEH)
  - Hydraulic (type WH)
- For subplate mounting
- Porting pattern to ISO 4401 and NFPA T3.5.1 R2
- For subplates to data sheets RE 45054 to RE 45060 (separate order), see page 32
- Spring- or pressure-centering, spring end position or hydraulic end position
- Wet-pin DC or AC voltage solenoids, optional
- Manual override, optional
- Electrical connection as individual or central connection, see RE 23178 and RE 08010
- Switching time adjustment, optional
- Pre-load valve in channel P of main valve, optional
- Stroke adjustment of main spool, optional
- Stroke adjustment and/or end position control, optional
- Inductive position switches and proximity sensors (contactless), see RE 24830

Ordering code

						/					

Up to 280 bar **= No code**
Up to 350 bar **= H –**

3-way design **= 3**
4-way design **= 4**

Types of actuation
Electrohydraulic **= WEH**
Hydraulic **= WH**

Size
NG10 **= 10**
NG16 **= 16**
NG25 (type 4W.H 22 .7X/…) **= 22**
NG25 (type 4W.H 25 .6X/…) **= 25**
NG32 **= 32**

Spool return in main valve
By springs **= No code**
Hydraulic [1] **= H**

For spool symbols, see pages 4 and 5

Component series
40 to 49 – NG10 **= 4X**
(40 to 49: unchanged installation and connection dimensions)
60 to 69 – NG25 (4W.H 25.) and NG32 **= 6X**
(60 to 69: unchanged installation and connection dimensions)
70 to 79 – NG16 (series 72 or higher) and NG25 (4W.H 22.) **= 7X**
(70 to 79: unchanged installation and connection dimensions)

Spool return in pilot valve with 2 spool positions and 2 solenoids
Only possible with spools A, B, C, D, K, Z and hydraulic spool return in main valve:
With spring return **= No code**
Without spring return **= O**
Without spring return **with** detent [2] **= OF**

Pilot valve [2]
High-performance valve (RE 23178) **= 6E**

DC voltage 24 V [2] **= G24**
AC voltage 230 V 50/60 Hz [2] **= W230**
For further voltages, frequencies and electric data, see data sheet RE 23178

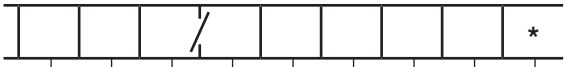
Without manual override **= No code**
With manual override **= N**
With concealed manual override **= N9**

External pilot oil supply, external pilot oil drain [3] **= No code**
Internal pilot oil supply, external pilot oil drain [3; 4] **= E**
Internal pilot oil supply, internal pilot oil drain [4] **= ET**
External pilot oil supply, internal pilot oil drain [3] **= T**
(for type 4WH… **only "No code"** possible!)
(Variants "ET" and "T" for 3-position valve, pressure-centering **only** possible, if $p_{St} \geq 2 \times p_{Tank} + p_{St\,min}$!)

p_{St} = pilot pressure
$p_{St\,min}$ = pilot pressure, min,
p_{Tank} = tank pressure
$p_{ö}$ = cracking pressure

Standard types and components are shown in the EPS (standard price list).

For explanation of footnotes, see page 3!



Further details in clear text

Seal material

No code = NBR seals
V = FKM seals
(other seals on request)

⚠ Attention!
Observe compatibility of seals with hydraulic fluid used!

No code = **Without** pressure reducing valve
D3 [5] **=** **With** pressure reducing valve

Pre-load valve (not for NG10) [2; 5]

No code = **Without** pre-load valve
P4,5 = **With** pre-load valve ($p_{ö}$ = 4.5 bar *[65 psi]*)

Throttle insert [2]

No code = Without throttle insert
B08 = Throttle Ø 0.8 mm *[0.0315 inch]*
B10 = Throttle Ø 1.0 mm *[0.0394 inch]*
B12 = Throttle Ø 1.2 mm *[0.0472 inch]*
B15 = Throttle Ø 1.5 mm *[0.0591 inch]*
B20 = Throttle Ø 2.0 mm *[0.0787 inch]*
B25 = Throttle Ø 2.5 mm *[0.0984 inch]*

Stroke adjustment
For ordering code, see pages 34 and 35

Spool position monitoring

No code = Without position switch
QMAG24 = Monitored spool position “a“
QMBG24 = Monitored spool position “b“
QMABG24 = Monitored spool positions “a“ and “b“
QM0G24 = Monitored rest position
For further details, see RE 24830

Electrical connection [2]

K4 [6] **=** Without mating connector, individual connection with component plug to DIN EN 175301-803
For further electrical connections, see RE 23178 and RE 08010

No code = **Without** switching time adjustment
S = Switching time adjustment as meter-in control
S2 = Switching time adjustment as meter-out control

[1] – 2 spool positions (hydraulic end position): Spools C, D, K, Z, Y only
– 3 spool positions (hydraulically centered): Only with NG16, NG25 (type 4W.H **25** …) and NG32

[2] Only with electrohydraulic actuation

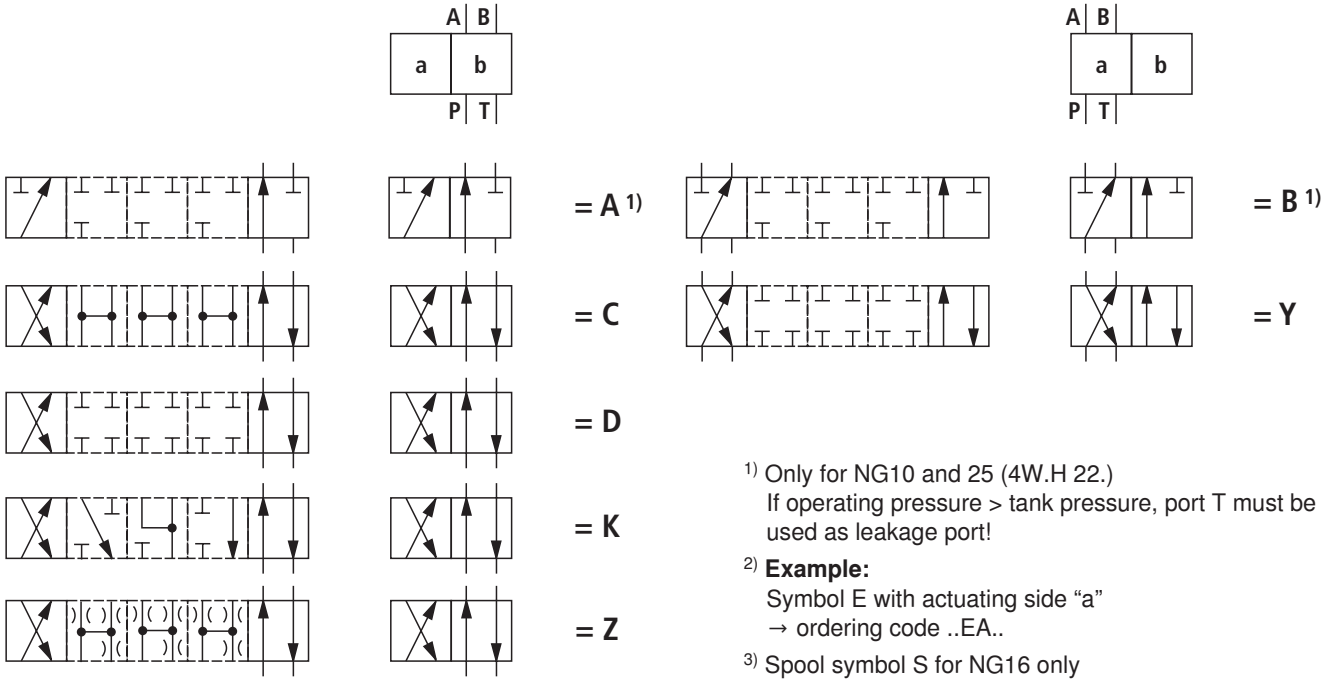
[3] Pilot oil supply X or drain Y **external**:
– In the case of NG10, variant SO30 must be provided for the use of sandwich plates. Code SO30 must be entered at the end of the type code (sandwich plate).
– Make sure that the permissible operating parameters of the pilot oil are not exceeded (see RE 23178)!
– Maximum pilot pressure: Please observe page 14!

[4] Internal pilot oil **supply** (version “ET“ and “E“):
– Minimum pilot pressure: Please observe page 15!
– To avoid impermissibly high pressure peaks, a **throttle insert “B10“** must be provided in the P port of the pilot valve (see page 13).
– In conjunction with version “H-“, **pressure reducing valve “D3“** must be provided additionally.

[5] Only in conjunction with throttle insert **“B10“**

[6] Mating connectors, separate order, see RE 23178

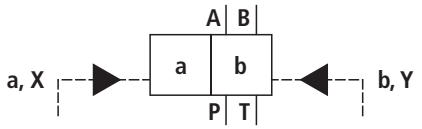
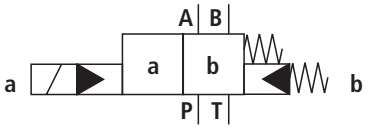
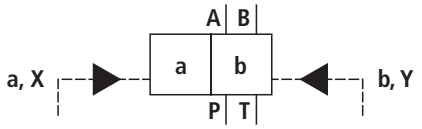
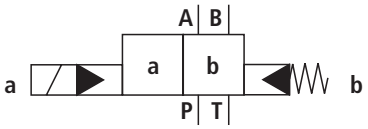
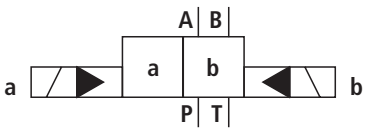
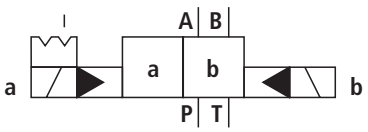
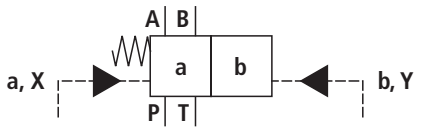
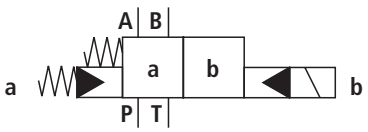
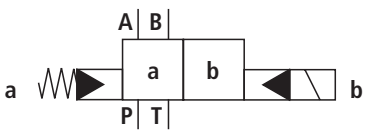
Spool symbols: 2 spool positions



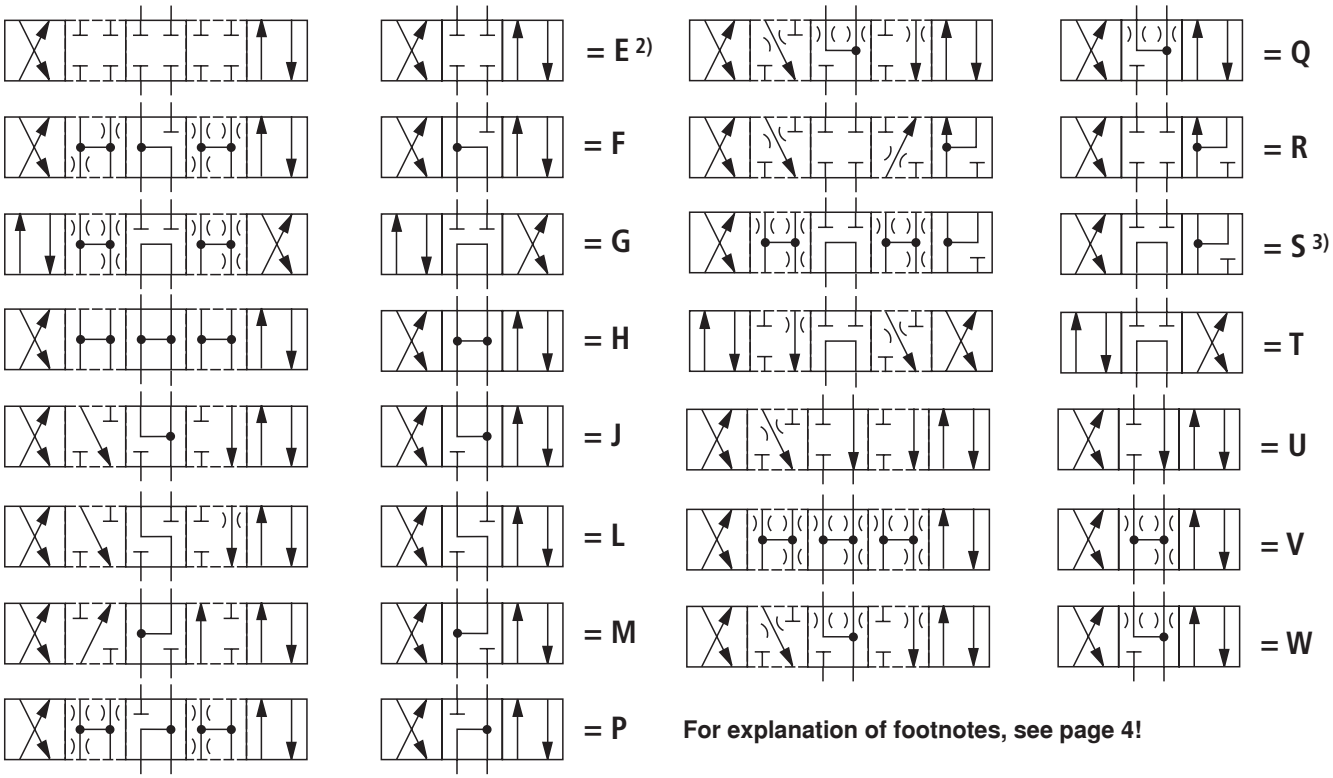
1) Only for NG10 and 25 (4W.H 22.)
If operating pressure > tank pressure, port T must be used as leakage port!

2) **Example:**
Symbol E with actuating side “a”
→ ordering code ..EA..

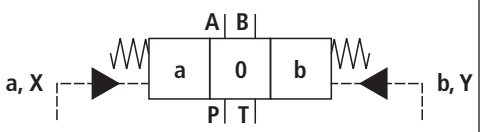
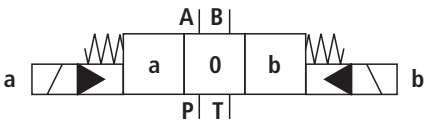
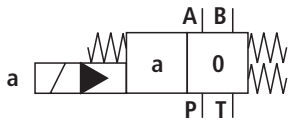
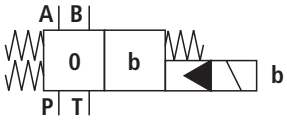
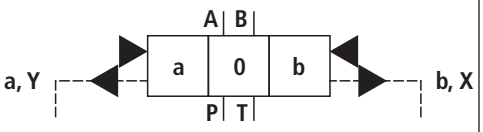
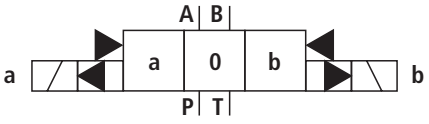
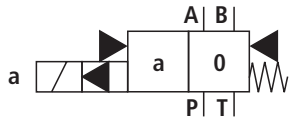
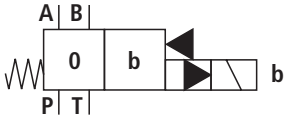
3) Spool symbol S for NG16 only

Ordering code		Type of actuation	
Spool symbol	Spool return	Hydraulic Type WH	Electrohydraulic Type WEH
A, C, D, K, Z	../..		
	..H../..		
	..H../O		
	..H../OF		
B, Y	../..		
	..H../..		

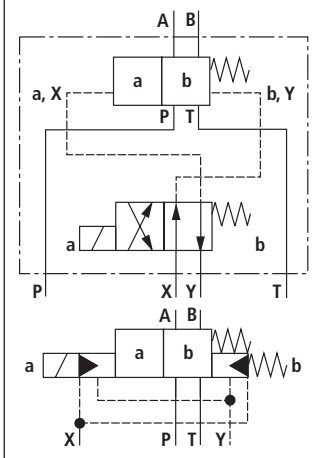
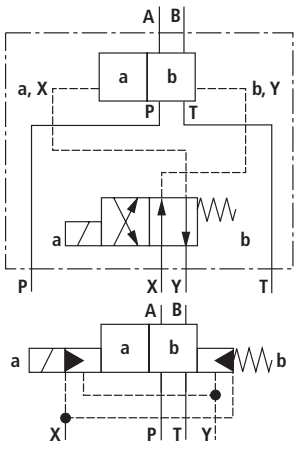
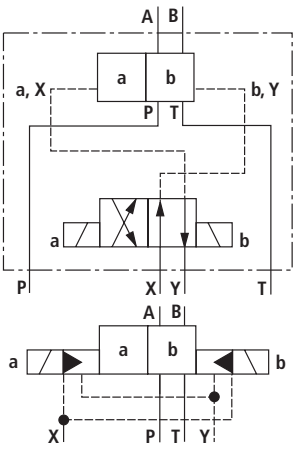
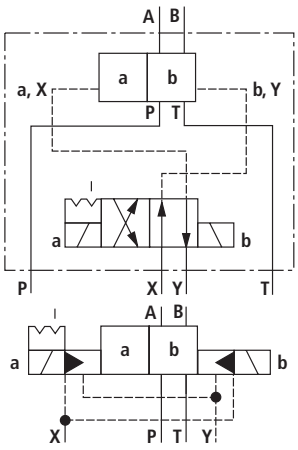
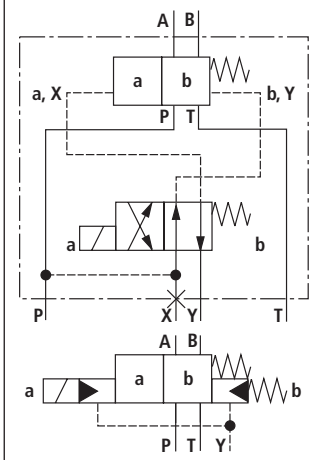
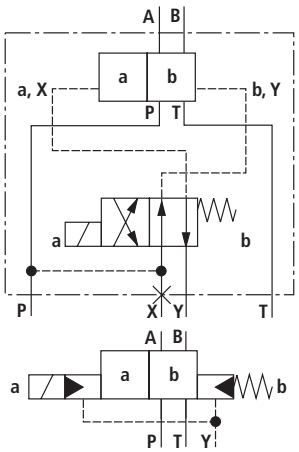
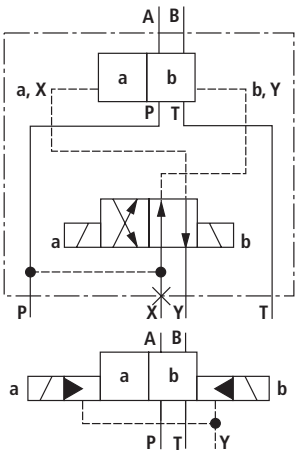
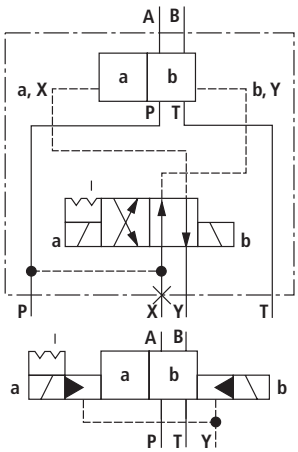
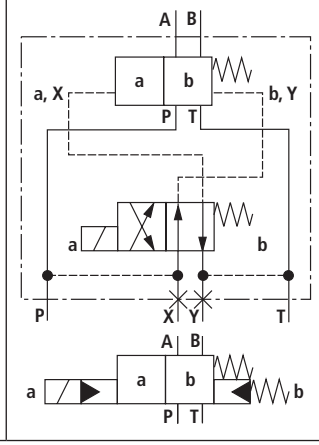
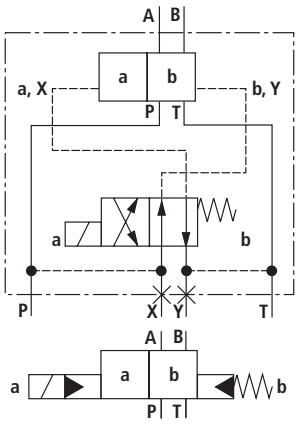
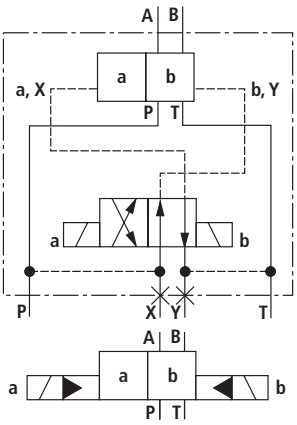
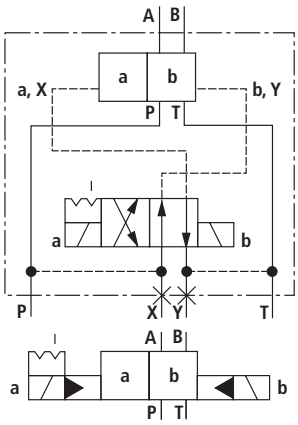
Spool symbols: 3 spool positions



For explanation of footnotes, see page 4!

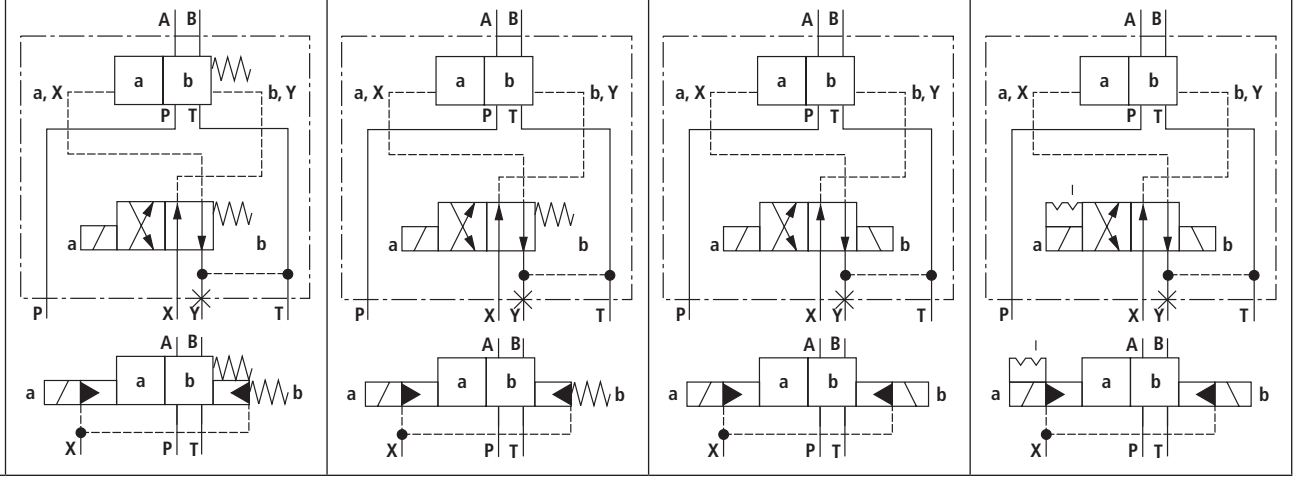
Ordering code			Type of actuation	
Spool symbol	Actuating side	Spool return	Hydraulic Type WH	Electrohydraulic Type WEH
E, F, G, H, J, L, M, Q, R, S, T, U, V, W		../..		
	.A			
	.B			
		..H../..		
		H.A		
		H.B		

Symbols for valves with 2 spool positions

	Valve with spring end position	Valve with hydraulic end position		
	Type 4WEH…/..	Type 4WEH . H../...	Type 4WEH . H../O...	Type 4WEH . H../OF...
X = external; **Y** = external				
	Type 4WEH…/…E…	Type 4WEH . H../…E…	Type 4WEH . H../O…E…	Type 4WEH . H../OF…E…
X = internal; **Y** = external				
	Type 4WEH…/…ET…	Type 4WEH . H../…ET…	Type 4WEH . H../O…ET…	Type 4WEH . H../OF…ET…
X = internal; **Y** = internal				

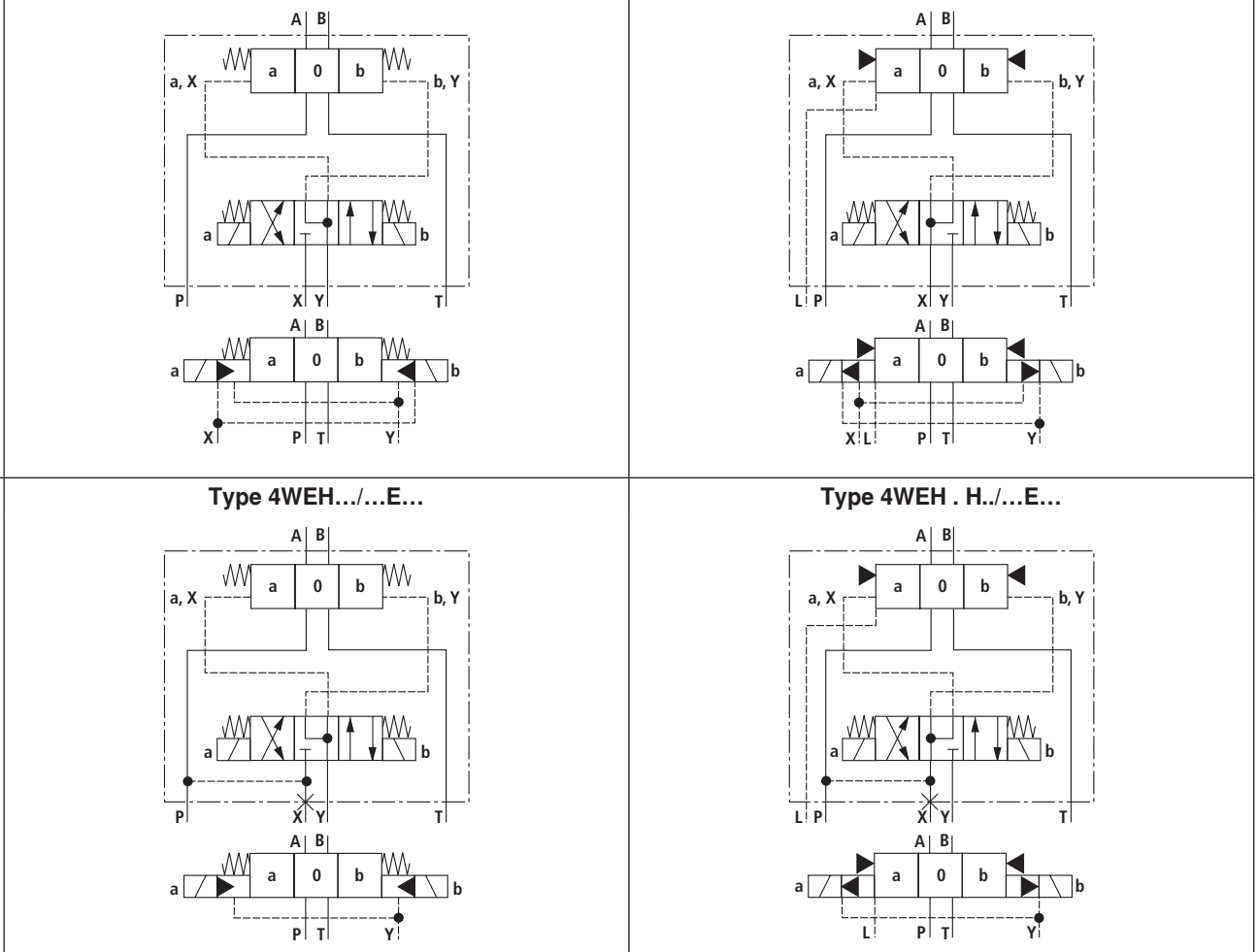
Symbols for valves with 2 spool positions

Valve with spring end position	Valve with hydraulic end position		
Type 4WEH…/…T…	Type 4WEH . H../…T…	Type 4WEH . H../O…T…	Type 4WEH . H../OF…T…
X = external; Y = internal			

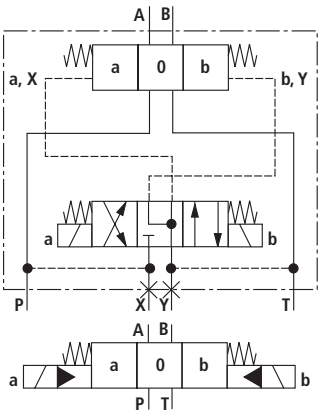
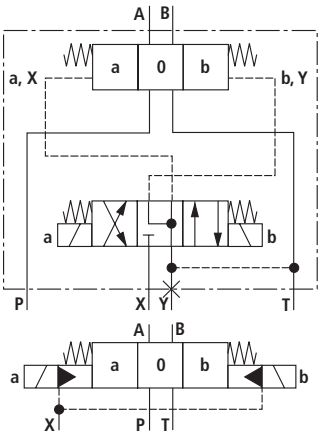


Symbols for valves with 3 spool positions

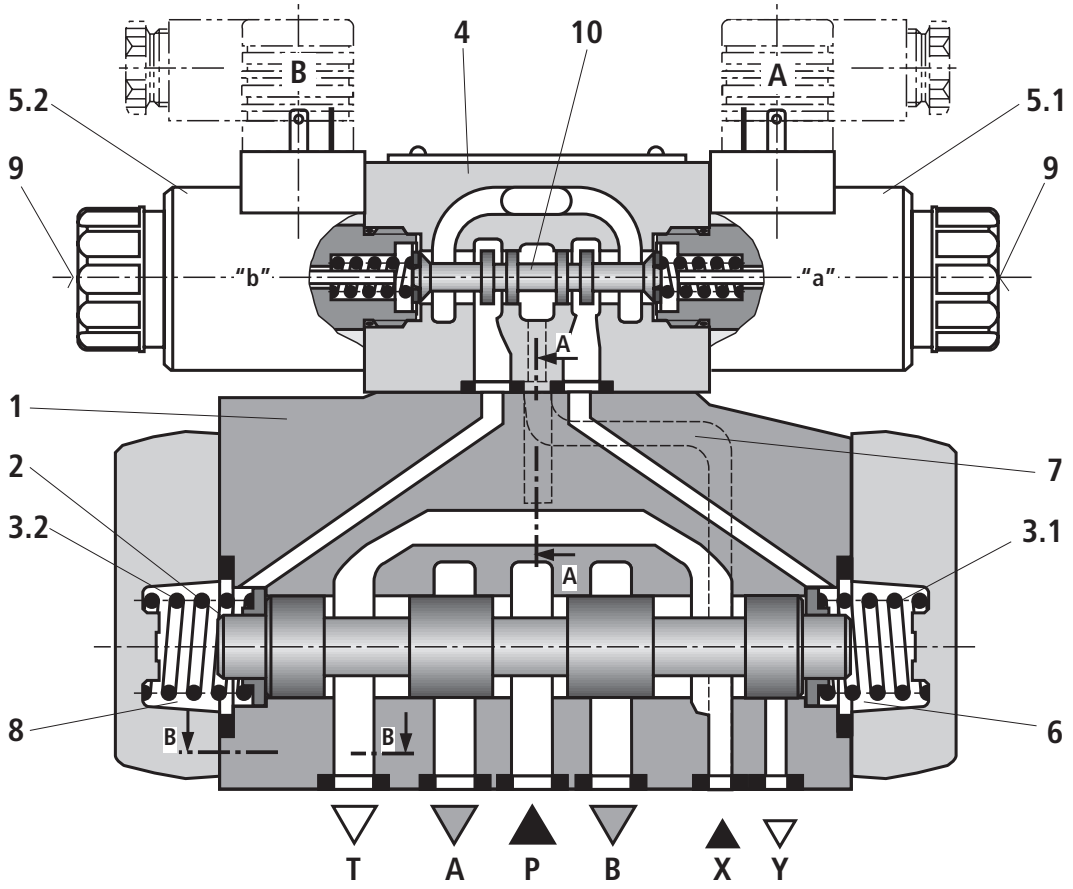
Valve with spring-centered zero position	Valve with pressure-centered zero position only NG16, 25 (type 4W.H **25** .6X/…) and 32
Type 4WEH…/…	Type 4WEH . H../…
X = external; Y = external	
Type 4WEH…/…E…	Type 4WEH . H../…E…
X = internal; Y = external	



Symbols for valves with 3 spool positions

<table>
<tr><th colspan="2">Valve with spring-centered zero position</th><th>Valve with pressure-centered zero position
nur NG16, 25 (Type 4W.H 25 .6X/…) and 32</th></tr>
<tr><td rowspan="2">X = internal; Y = internal</td><td>Type 4WEH…/…ET…

</td><td rowspan="2">3-position valves, pressure-centered, preferably with external pilot oil supply and/or drain (“No code“, “E“)
For the preconditions for internal pilot oil supply and/or drain (“ET“, “T“), see pages 4 and 15.</td></tr>
<tr><td>X = external; Y = internal</td><td>Type 4WEH…/…T…

</td></tr>
</table>

Function, section: Type 4WEH



Directional valves of type 4WEH…

Valves of type WEH are directional spool valves with electro-hydraulic actuation. The control the start, stop and direction of a flow.

These directional valves basically consist of the main valve with housing (1), main control spool (2), one or two return springs (3.1) and (3.2), as well as pilot valve (4) with one or two solenoids “a“ (5.1) and/or “b“ (5.2).

Main control spool (2) in the main valve is held in the zero or initial position by springs or through pressurization. In the de-pressurized condition, the two spring chambers (6) and (8) are pressureless connected to the tank via pilot valve (4). The pilot valve is supplied with pilot oil via pilot line (7). The supply can be provided internally or externally (externally via port X).

When the pilot valve is operated, e.g. solenoid “a“, pilot spool (10) is pushed to the left and spring chamber (8) is therefore pressurized to pilot pressure. Spring chamber (6) remains pressureless.

The pilot pressure acts on the left side of main control spool (2) and shifts the latter against spring (3.1). In the main valve, port P is consequently connected to B and A to T.

When the solenoid is de-energized, pilot spool (10) returns to its starting position (except for impulse spool). Spring chamber (8) is unloaded to the tank.

The pilot oil is drained internally (via channel T) or externally (via channel Y).

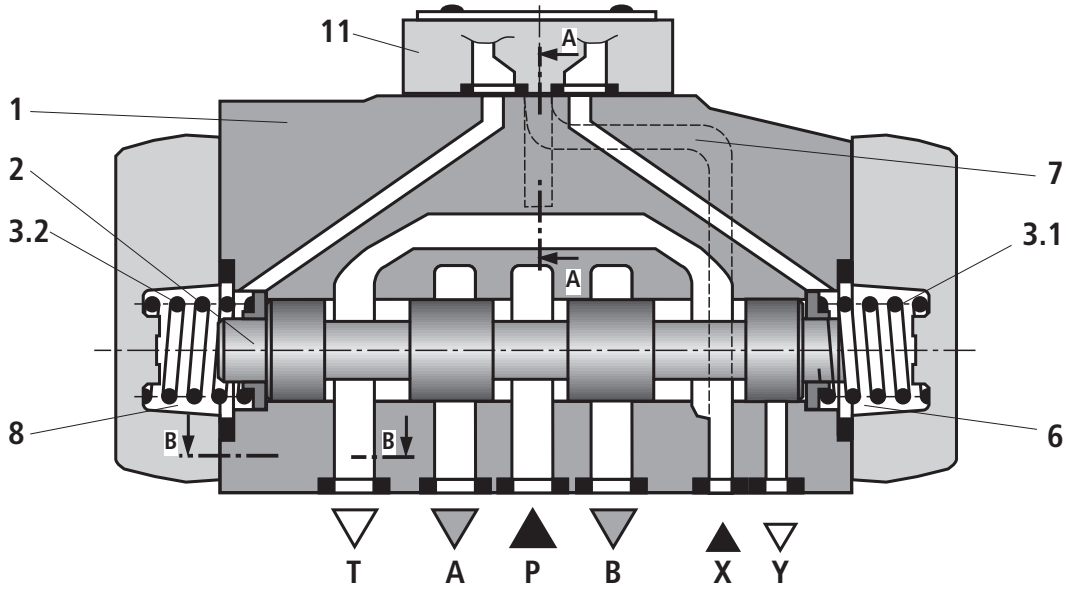
An optional manual override (9) allows pilot spool (10) to be moved without energization of the solenoid.

☞ **Note!**

Return springs (3.1) and (3.2) in spring chambers (6) and (8) hold the main control spool (2) in the central position, even if the valve is arranged, for example, vertically.

Pilot oil supply (sections A – A and B – B), **see pages 12 and 13.**

Function, section: Type 4WH



Directional valves of type 4WH…

Valves of type WH are directional spool valves with hydraulic actuation. They control the start, stop and direction of a flow.

These directional valves basically consist of valve housing (1), main control spool (2), one or two return springs (3.1) and (3.2) on valves with spring return or spring centering, as well as reconnection plate (11).

The main control spool (2) is actuated directly through pressurization.

Main control spool (2) is held in the zero or initial position by springs or through pressurization. The pilot oil is supplied and drained externally (see page 12).

4/3 directional valve with spring centering of the pilot spool

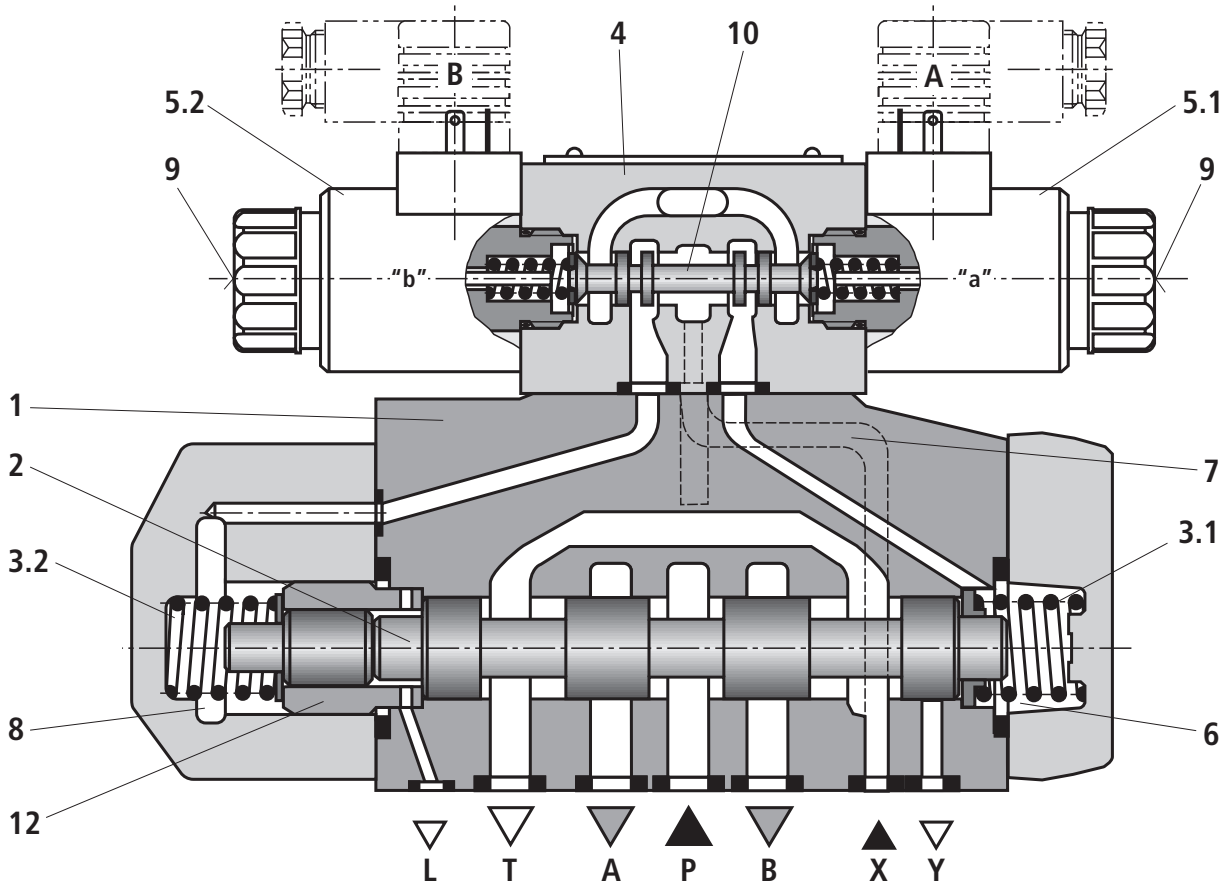
With this version, main control spool (2) is held by two return springs (3.1) and (3.2) in the zero position. The two spring chambers (6) and (8) are connected via reconnection plate (11) to ports X and Y.

When main control spool (2) is pressurized to pilot pressure on one of the two front faces, it is pushed to the operated position. The connections within the valve are established as required.

When the pressurized spool is depressurized, the spring on the opposite side causes the spool to be returned to the zero or initial position.

Pilot oil supply (sections A – A and B – B),
see pages 12 and 13.

Function, section: Type 4WEH…H



4/3 directional valves with pressure-centering of the main control spool, type 4WEH…H

Main control spool (2) in the main valve is held in the zero position through pressurization of the two spool faces. Centering bushing (12) is supported within the housing and holds the spool in position.

By depressurization of one spool face, main control spool (2) is brought to the operated position.

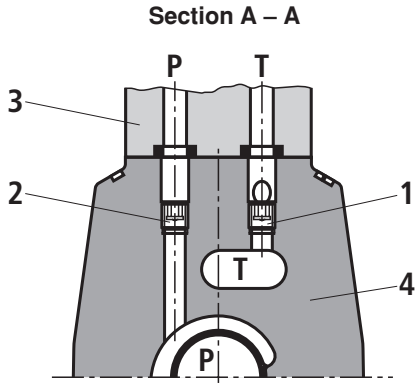
The unloaded spool area displaces the returning pilot oil via the pilot valve into channel Y (external).

☞ **Note!**

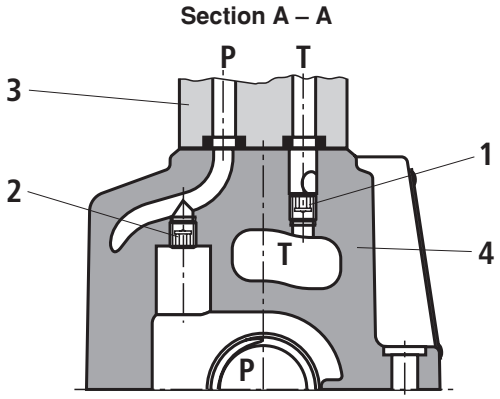
In this variant, springs (3.1) and (3.2) do not assume a return function. The hold the horizontally installed main control spool (2) in the central position when de-pressurized.

Pilot oil supply

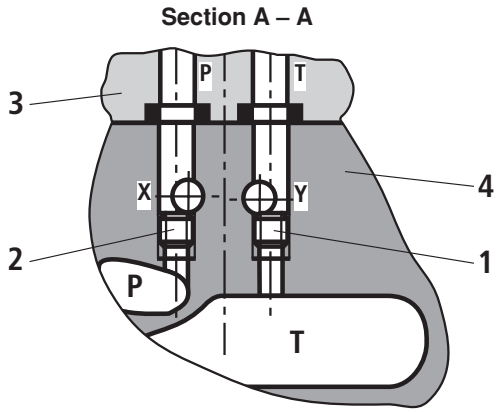
NG10



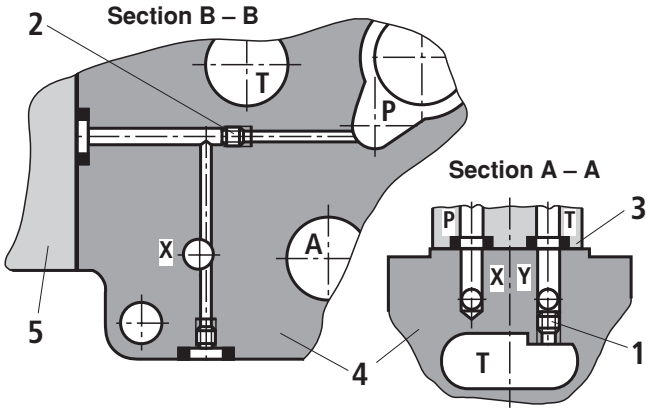
NG16



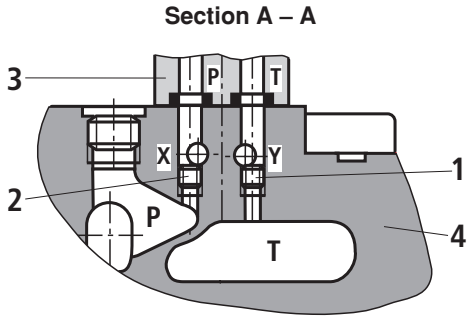
NG25 (type 4W.H **22** .7X/…)



NG25 (type 4W.H **25** .6X/…)



NG32



PIlot oil supply		**Pilot oil drain**	
External:	**2** closed	External:	**1** closed
internal:	**2** open	Internal:	**1** open

For further details and explanations of items, see next page.

Pilot oil supply

Type 4WH…

The pilot oil is supplied and drained **externally** via channels X and Y.

Type 4WEH…

The pilot oil is supplied **externally** - via channel X - from a separate pressure supply.

The pilot oil is drained **externally** - via channel Y - to the tank.

Type 4WEH…E…

The pilot oil is supplied **internally** from channel P of the main valve. (See page 15, footnotes [8] and [9])

The pilot oil is drained **externally** - via channel Y - to the tank. Port X in the subplate is plugged.

Type 4WEH…ET…

The pilot oil is supplied **internally** from channel P of the main valve.

The pilot oil is drained **internally** - via channel T - to the tank. Ports X and Y in the subplate are plugged.

Type 4WEH…T…

The pilot oil is supplied **externally** - via channel X - from a separate pressure supply.

The pilot oil is drained **internally** - via channel T - to the tank. Port Y in the subplate is plugged.

1 Plug screw M6, 3 A/F – pilot oil drain

2 Plug screw M6, 3 A/F – pilot oil supply

3 Pilot valve

4 Main valve

5 Cover

6 Throttle insert

Tightening torques M_T for cover mounting screws:

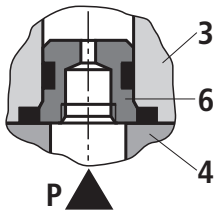
NG16: 35 Nm *[25.8 ft-lbs]*; **NG25**: 68 Nm *[50.2 ft-lbs]*

Tightening torques M_T for mounting screws of the pilot valve: **NG10 to 32**: 9 Nm *[6.6 ft-lbs]*

Throttle insert

The use of throttle insert (6) is required, if the pilot oil supply in channel P of the pilot valve is to be restricted (see below).

Throttle insert (6) is to be installed in channel P of the pilot valve.



⚠ Attention!

The pilot oil supply may only be changed by authorized specialists or in the factory!

– **External** pilot oil supply X or drain Y:
  - For NG10, version SO30 must be provided for the use of sandwich plates. Code SO30 must be entered at the end of the type designation (sandwich plate).
  - Make sure that the permissible maximum parameters of the pilot valve are not exceeded (see RE 23178)!
  - Maximum pilot pressure: Please observe page 14!

– Internal pilot oil **supply** (versions “ET“ and “E“):
  - Minimum pilot pressure: Please observe page 15!
  - To avoid impermissibly high pressure peaks, a **throttle insert “B10“** must be provided in port P of the pilot valve (see above) .
  - In conjunction with version “H-“, **pressure reducing valve “D3“** must be provided additionally (see page 36).

Technical data (for applications outside these parameters, please consult us!)

General

Sizes			NG	**10**	**16**	**25** 4W.H **22**	**25** 4W.H **25**	**32**
Weight, ca.	– Valve with one solenoid		kg *[lbs]*	6.4 *[14.1]*	8.5 *[18.7]*	11.5 *[25.3]*	17.6 *[38.8]*	17.6 *[38.8]*
	– Valve with two solenoids, spring-centered		kg *[lbs]*	6.8 *[15.0]*	8.9 *[19.6]*	11.9 *[26.2]*	19.0 *[41.9]*	41.0 *[90.4]*
	– Valve with two solenoids, pressure-centered		kg *[lbs]*	6.8 *[15.0]*	8.9 *[19.6]*	11.9 *[26.2]*	19.0 *[41.9]*	41.0 *[90.4]*
	– Valve with hydraulic actuation (type 4WH…)		kg *[lbs]*	5.5 *[12.1]*	7.3 *[16.1]*	10.5 *[23.1]*	16.5 *[36.4]*	39.5 *[87.1]*
	– Switching time adjustment		kg *[lbs]*	0.8 *[1.8]*	0.8 *[1.8]*	0.8 *[1.8]*	0.8 *[1.8]*	0.8 *[1.8]*
	– Pressure reducing valve		kg *[lbs]*	0.4 *[0.9]*	0.4 *[0.9]*	0.4 *[0.9]*	0.4 *[0.9]*	0.4 *[0.9]*
Installation position				Optional; horizontal in the case of valves with hydraulic spool return “H“ and spool symbols A, B, C, D, K, Z, Y				
Ambient temperature range			°C *[°F]*	–30 to +50 *[–22 to +122]*				
Storage temperature range			°C *[°F]*	–20 to +70 *[–4 to +158]*				
Surface protection (valve body)				Paint-coating, layer thickness max. 100 µm				

Hydraulic

Maximum operating pressure								
– Ports P, A, B	Type 4WEH		bar *[psi]*	280 *[4061]*	280 *[4061]*	280 *[4061]*	280 *[4061]*	280 *[4061]*
	Type H-4WEH		bar *[psi]*	350 *[5076]*	350 *[5076]*	350 *[5076]*	350 *[5076]*	350 *[5076]*
– Port T	Pilot oil drain Y external	Type 4WEH	bar *[psi]*	280 *[4061]*	250 *[3626]*	250 *[3626]*	250 *[3626]*	250 *[3626]*
		Type H-4WEH		315 *[4568]*	250 *[3626]*	250 *[3626]*	250 *[3626]*	250 *[3626]*
	Pilot oil drain Y internal [1]		bar *[psi]*	210 *[3046]* with DC voltage; 160 *[2320]* with AC voltage				
– Port Y	External pilot oil drain		bar *[psi]*	210 *[3046]* with DC voltage; 160 *[2320]* with AC voltage				
	Type 4WH		bar *[psi]*	250 *[3626]*	250 *[3626]*	210 *[3046]*	250 *[3626]*	250 *[3626]*
	Type H-4WH		bar *[psi]*	315 *[4568]*	315 *[4568]*	270 *[3916]*	315 *[4568]*	315 *[4568]*
Hydraulic fluid [2]				Mineral oil (HL, HLP) to DIN 51524 [3]; fast bio-degradable hydraulic fluids to VDMA 24568 (see also RE 90221); HETG (rape seed oil) [3]; HEPG (polyglycols) [4]; HEES (synthetic esters) [4]; other hydraulic fluids on request				
Hydraulic fluid temperature range			°C *[°F]*	–30 to +80 *[–22 to +176]* (NBR seals) –20 to +80 *[–4 to +176]* (FKM seals)				
Viscosity range			mm^2/s *[SUS]*	2,8 to 500 *[35 to 2320]*				
Permissible max. degree of contamination of the hydraulic fluid - cleanliness class to ISO 4406 (c)				Class 20/18/15 [5]				
Maximum pilot pressure [6]			bar *[psi]*	250 *[3626]*	250 *[3626]*	210 *[3046]*	250 *[3626]*	250 *[3626]*

Technical data (for applications outside these parameters, please consult us!)

Hydraulic

Size		NG	10	16	25 4W.H 22	25 4W.H 25	32
Minimum pilot pressure (see also characteristic curves on page 17)							
– Pilot oil supply X external, pilot oil supply X internal (with spools: D, K, E, J, L, M, Q, R, U, W)							
3-position valve, spring-centered	Type H-4WEH…	bar *[psi]*	10 *[145]*	14 *[203]*	12,5 *[181]*	13 *[188]*	8,5 *[123]*
	Type 4WEH…	bar *[psi]*	10 *[145]*	14 *[203]*	10,5 *[152]*	13 *[188]*	8,5 *[123]*
3-position valve, pressure-centered		bar *[psi]*	–	14 *[203]*	–	18 *[261]*	8,5 *[123]*
2-position valve with spring end position	Type H-4WEH…	bar *[psi]*	10 *[145]*	14 *[203]*	14 *[203]*	13 *[188]*	10 *[145]*
	Type 4WEH…	bar *[psi]*	10 *[145]*	14 *[203]*	11 *[159]*	13 *[188]*	10 *[145]*
2-position valve with hydraulic end position		bar *[psi]*	7 *[101]*	14 *[203]*	8 *[116]*	8 *[116]*	5 *[72]*
– Pilot oil supply X internal (with spools C, F, G, H, P, T, V, Z, S [7])		bar *[psi]*	4.5 *[65]* [8]	4.5 *[65]* [9]	4.5 *[65]* [9]	4.5 *[65]* [9]	4.5 *[65]* [9]

[1] With 3-position valve, pressure-centering is only possible, if $p_{St} \geq 2 \times p_{Tank} + p_{St\,min}$.

[2] The ignition temperature of the process and operating medium used must be higher than the maximum solenoid surface temperature.

[3] Suitable for NBR **and** FKM seals

[4] Suitable **only** for FKM seals

[5] The cleanliness classes specified for components must be adhered to in hydraulic systems. Effective filtration prevents malfunction and, at the same time, prolongs the service life of components.

For the selection of filters, see data sheets RE 50070, RE 50076, RE 50081, RE 50086, RE 50087 and RE 50088.

[6] – Internal pilot oil **supply**:

- In the case of a higher pilot pressure, a pressure reducing valve “D3“ must be used.
- In conjunction with version “H-“, **pressure reducing valve “D3“** must be provided additionally. (If not used, pilot pressure = operating pressure in the port)

– External pilot oil **supply**:

- In conjunction with version “H-“, the adherence to the maximum pilot pressure must be ensured by taking suitable measures (e.g. installation of a pressure relief valve to protect the separate pilot oil circuit)!

[7] Spool S only for NG16

[8] With symbols C, F, G, H, P, T, V, Z, an internal pilot oil supply is only possible, if the flow from P to T in the central position (with 3-position valve) or while passing the central position (with 2-position valve) is so high that the pressure differential from P to T reaches a value of at least 6.5 bar *[94 psi]*.

[9] For spools C, F, G, J, H, P, T, V, Z, S [7] – by means of pre-load valve (not NG10) or correspondingly greater flow. (For the establishment of the required flow, see characteristic curves “Pre-load valve“ on page 37.)

Technical data (for applications outside these parameters, please consult us!)

Hydraulic

Size			NG	**10**	**16**	**25** 4W.H **22**	**25** 4W.H **25**	**32**
Pilot oil volume for switching process								
– 3-position valve, spring-centered			cm³ *[inch³]*	2.04 *[0.124]*	5.72 *[0.349]*	7.64 *[0.466]*	14.2 *[0.866]*	29.4 *[1.794]*
– 2-position valve			cm³ *[inch³]*	4.08 *[0.249]*	11.45 *[0.699]*	15.28 *[0.932]*	28.4 *[1.733]*	58.8 *[3.588]*
– 3-position valve, pressure-centered								
from zero position to spool position “a“	Type WH		cm³ *[inch³]*	–	2.83 *[0.173]*	–	7.15 *[0.436]*	14.4 *[0.879]*
	Type WEH		cm³ *[inch³]*	–	2.83 *[0.173]*	–	7.15 *[0.436]*	14.4 *[0.879]*
from spool position “a“ to zero position	Type WH		cm³ *[inch³]*	–	5.72 *[0.349]*	–	14.18 *[0.865]*	29.4 *[1.794]*
	Type WEH		cm³ *[inch³]*	–	2.9 *[0.177]*	–	7.0 *[0.427]*	15.1 *[0.921]*
from zero position to spool position “b“	Type WH		cm³ *[inch³]*	–	5.72 *[0.349]*	–	14.18 *[0.865]*	29.4 *[1.794]*
	Type WEH		cm³ *[inch³]*	–	5.72 *[0.349]*	–	14.15 *[0.863]*	29.4 *[1.794]*
from spool position “b“ to zero position	Type WH		cm³ *[inch³]*	–	8.55 *[0.522]*	–	19.88 *[1.213]*	43.8 *[2.673]*
	Type WEH		cm³ *[inch³]*	–	2.83 *[0.173]*	–	5.73 *[0.349]*	14.4 *[0.879]*
Pilot oil flow for shortest switching time, ca.			l/min *[US gpm]*	35 *[9.2]*	35 *[9.2]*	35 *[9.2]*	35 *[9.2]*	45 *[11.9]*

Switching times (= closing of contact on the pilot valve until the control land starts to open in the main valve and change of spool stroke by 95%)

Pilot pressure		bar *[psi]*	70 *[1015]*	210 *[3046]*	250 *[3626]*	Spring
			ON			OFF
NG10	– Without throttle insert	ms	40 to 60	–	40 to 60	20 to 30
	– With throttle insert	ms	60 to 90	–	50 to 70	20 to 30
NG16	– Without throttle insert	ms	50 to 80	–	40 to 60	50 to 80
	– With throttle insert	ms	110 to 130	–	80 to 100	50 to 80
NG25 (4W.H **22)**	– Without throttle insert	ms	40 to 70	40 to 60	–	50 to 70
	– With throttle insert	ms	140 to 160	80 to 110	–	50 to 70
NG25 (4W.H **25)**	– Without throttle insert	ms	70 to 100	–	50 to 70	100 to 130
	– With throttle insert	ms	200 to 250	–	120 to 150	100 to 130
NG32	– Without throttle insert	ms	80 to 130	–	70 to 100	140 to 160
	– With throttle insert	ms	420 to 560	–	230 to 350	140 to 160

☞ **Notes!**

– The switching times are measured in accordance with ISO 6403 with HLP46, ϑ_{oil} = 40 °C ±5 °C *[104 °F ±9 °F]*. At different oil temperatures, deviations are possible!

– The switching times were established using DC voltage solenoids. They are reduced by ca. 20 ms when AC voltage solenoids are used.

– The de-energization of the solenoid generates voltage peaks, which can be prevented by installing suitable diodes.

– When pressure reducing valve “D3“ is used, the switching times increase by ca. 30 ms.

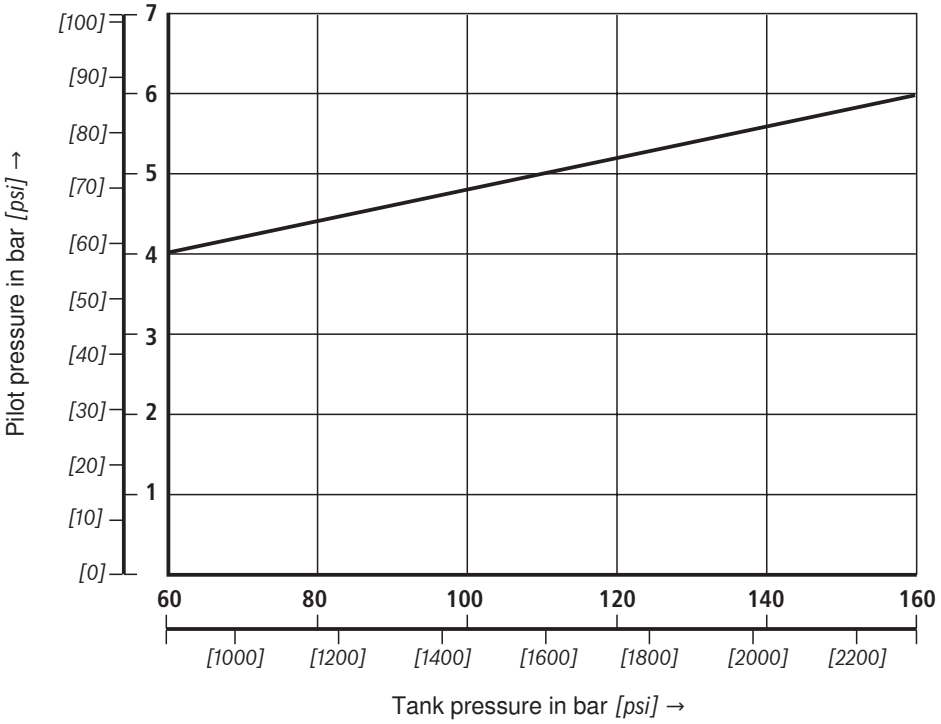
– The switching times were established under ideal conditions and can deviate within the system depending on the operating conditions.

Free flow cross-sections in zero position with spools Q, V and W

Size		NG	**10**	**16**	**25** 4W.H **22**	**25** 4W.H **25**	**32**
Spool **Q**	A – T; B – T	mm² *[inch²]*	13 *[0.02]*	32 *[0.05]*	78 *[0.121]*	83 *[0.129]*	78 *[0.121]*
Spool **V**	P – A; P – B	mm² *[inch²]*	13 *[0.02]*	32 *[0.05]*	73 *[0.113]*	83 *[0.129]*	73 *[0.113]*
	A – T; B – T	mm² *[inch²]*	13 *[0.02]*	32 *[0.05]*	84 *[0.13]*	83 *[0.129]*	84 *[0.13]*
Spool **W**	A – T; B – T	mm² *[inch²]*	2,4 *[0.004]*	6 *[0.009]*	10 *[0.015]*	14 *[0.022]*	20 *[0.031]*

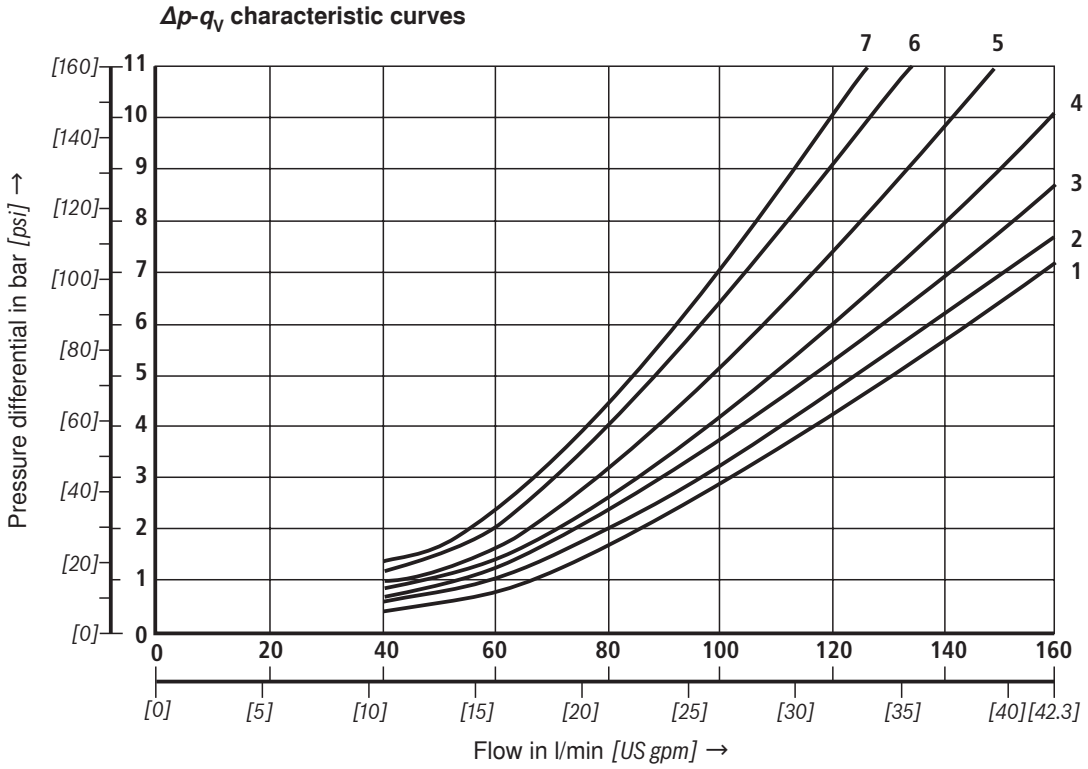
Characteristic curves (measured with HLP46, ϑ_{oil} = 40 °C ±5 °C *[104 °F ±9 °F]*)

Minimum pilot pressure in dependence on tank pressure



At a higher tank pressure the minimum pilot pressure must be raised in accordance with this diagram.

Characteristic curves: NG10 (measured with HLP46, ϑ_{oil} = 40 °C ±5 °C *[104 °F ±9 °F]*)



Spool	Spool position				Spool	Zero position		
	P – A	P – B	A – T	B – T		A – T	B – T	P – T
E, Y, D	2	2	4	5				
F	1	4	1	4	**F**	3	–	6
G, T	4	2	2	6	**G, T**	–	–	7
H, C	4	4	1	4	**H**	1	3	5
J, K	1	2	1	3				
L	2	3	1	4	**L**	3	–	–
M	4	4	3	4				
P	4	1	3	4	**P**	–	7	5
Q, V, W, Z	2	2	3	5				
R	2	2	3	–				
U	3	3	3	4	**U**	–	4	–
A, B	2	2	–	–				

Performance limits: NG10 (measured with HLP46, ϑ_{oil} = 40 °C ±5 °C *[104 °F ±9 °F]*)

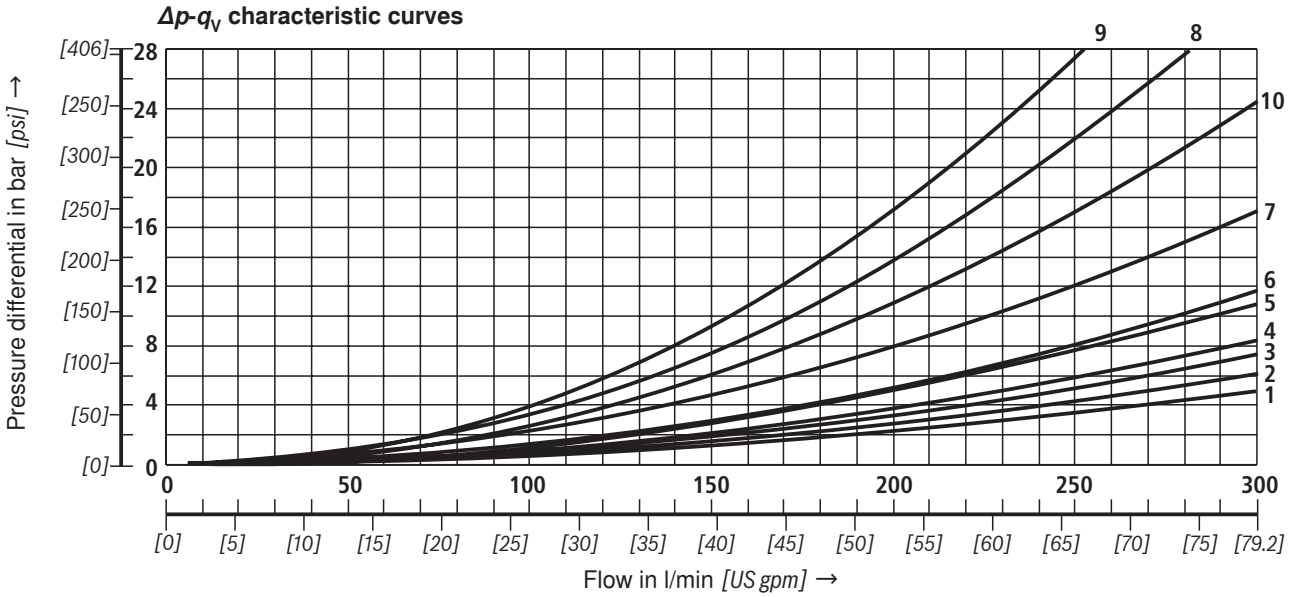
2-position valves – $q_{V\,max}$ in l/min *[US gpm]*

Spool	Operating pressure p_{max} in bar *[psi]*		
	200 *[2900]*	**250** *[3626]*	**315** *[4568]*
E, J, L, M, Q, R, U, V, W, C, D, K, Z, Y	160 *[42]*	160 *[42]*	160 *[42]*
H	160 *[42]*	150 *[39]*	120 *[32]*
G, T	160 *[42]*	160 *[42]*	140 *[37]*
F, P	160 *[42]*	140 *[37]*	120 *[32]*

⚠ **Attention!**

Important notes - see page 26!

Characteristic curves: NG16 (measured with HLP46, ϑ_{oil} = 40 °C ±5 °C *[104 °F ±9 °F]*)



Spool	Spool position				Zero position		
	P – A	P – B	A – T	B – T	P – T	A – T	B – T
D, E	1	1	3	3			
F	1	2	5	5	4	3	–
G	4	1	5	5	7	–	–
C, H	1	1	5	6	2	4	4
K, J	2	2	6	6	–	3	–
L	2	2	5	4	–	3	–
M	1	1	3	4			
P	2	1	3	6	5	–	–

Spool	Spool position				Zero position		
	P – A	P – B	A – T	B – T	P – T	A – T	B – T
Q	1	1	6	6			
R	2	4	7	–			
S	3	3	3	–	9	–	–
T	4	1	5	5	7	–	–
U	2	2	3	6			
V, Z	1	1	6	6	10	8	8
W	1	1	3	4			

Performance limits: NG16 (measured with HLP46, ϑ_{oil} = 40 °C ±5 °C *[104 °F ±9 °F]*)

2-position valves – $q_{V\,max}$ in l/min *[US gpm]*

Spool	Operating pressure p_{max} in bar *[psi]*				
	70 *[1015]*	140 *[2030]*	210 *[3046]*	280 *[4061]*	350 *[5076]*
X external – spring end position in main valve (at $p_{St\,min}$ = 12 bar *[174 psi]*)					
C, D, K, Y, Z	300 *[79]*	300 *[79]*	300 *[79]*	300 *[79]*	300 *[79]*
X external – spring end position in main valve [1]					
C	300 *[79]*	300 *[79]*	300 *[79]*	300 *[79]*	300 *[79]*
D, Y	300 *[79]*	270 *[71]*	260 *[68]*	250 *[66]*	230 *[60]*
K	300 *[79]*	250 *[66]*	240 *[63]*	230 *[60]*	210 *[55]*
Z	300 *[79]*	260 *[68]*	190 *[50]*	180 *[47]*	160 *[42]*
X external – hydraulic end position in main valve					
HC, HD, HK, HZ, HY	300 *[79]*	300 *[79]*	300 *[79]*	300 *[79]*	300 *[79]*

3-position valves – $q_{V\,max}$ in l/min *[US gpm]*

Spool	Operating pressure p_{max} in bar *[psi]*				
	70 *[1015]*	140 *[2030]*	210 *[3046]*	280 *[4061]*	350 *[5076]*
X external – spring-centered					
E, H, J, L, M, Q, U, W, R	300 *[79]*	300 *[79]*	300 *[79]*	300 *[79]*	300 *[79]*
F, P	300 *[79]*	250 *[66]*	180 *[47]*	170 *[45]*	150 *[39]*
G, T	300 *[79]*	300 *[79]*	240 *[63]*	210 *[55]*	190 *[50]*
S	300 *[79]*	300 *[79]*	300 *[79]*	250 *[66]*	220 *[58]*
V	300 *[79]*	250 *[66]*	210 *[55]*	200 *[53]*	180 *[47]*
X external – pressure-centered (at minimum pilot pressure of 16 bar *[232 psi]*)					
All spools [2]	300 *[79]*	300 *[79]*	300 *[79]*	300 *[79]*	300 *[79]*

⚠ Attention!

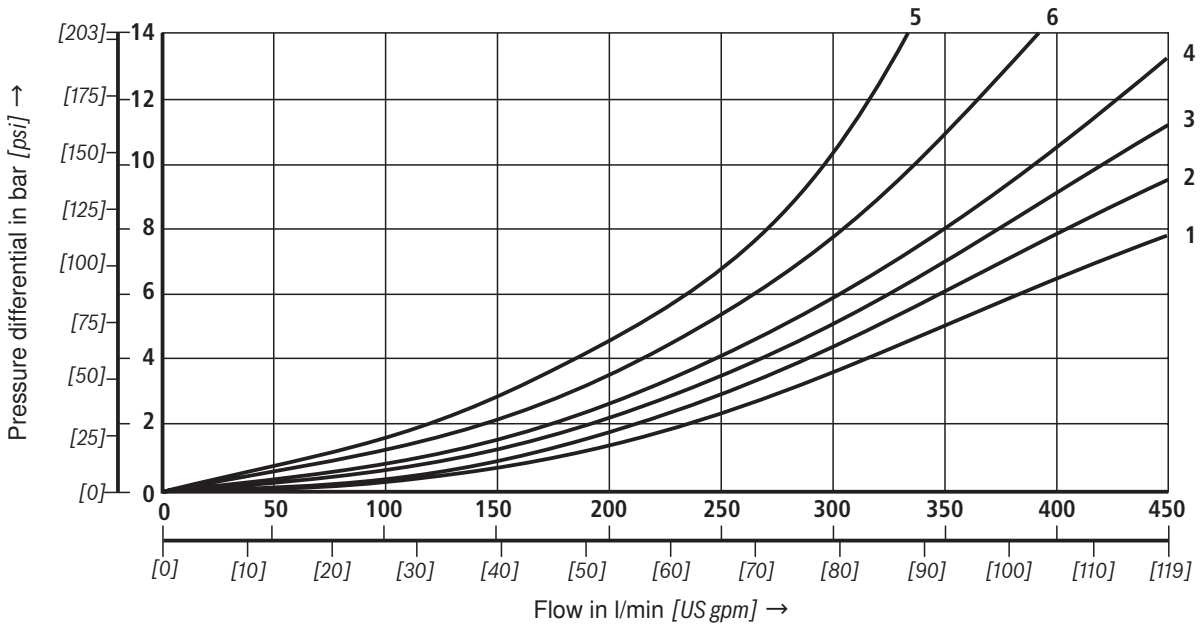
[1] When the specified flow values are exceeded, the function of the return springs can no longer be guaranteed in the event of a pilot pressure failure!

[2] With spool V , the pilot valve is not required in the case of flows > 160 l/min *[42 US gpm]*.

For further important notes, see page 26!

Characteristic curves: NG25 (type W.H **22**)
(measured with HLP46, ϑ_{oil} = 40 °C ±5 °C *[104 °F ±9 °F]*)

***Δp-q*$_V$ characteristic curves**



Spool	Spool position				
	P – A	P – B	A – T	B – T	B – A
E, M, P, Q, U, V, Z, C	2	2	1	4	–
F	1	2	1	2	–
G, T	2	2	2	4	–
H, J, W, K, D	2	2	1	3	–
L	2	2	1	2	–
R	1	2	1	–	5
A, B	2	2	–	–	–

Spool	Zero position		
	A – T	B – T	P – T
F	–	–	4
G, P	–	–	6
H	–	–	2
L	4	–	–
T	–	–	5
U	–	6	–

Performance limits: NG25 (type W.H 22)
(measured with HLP46, ϑ_{oil} = 40 °C ±5 °C *[104 °F ±9 °F]*)

2-position valves – $q_{V\,max}$ in l/min *[US gpm]*

Spool	Operating pressure p_{max} in bar *[psi]*				
	70 *[1015]*	**140** *[2030]*	**210** *[3046]*	**280** *[4061]*	**350** *[5076]*
X external – spring end position in main valve (at $p_{St\,min}$ = 11 bar / 14 bar *[159 / 203 psi]*)					
C, D, K, Y, Z	450 *[119]*	450 *[119]*	450 *[119]*	450 *[119]*	450 *[119]*
X external – spring end position in main valve [1]					
C	450 *[119]*	450 *[119]*	320 *[84]*	250 *[66]*	200 *[53]*
D, Y	450 *[119]*	450 *[119]*	450 *[119]*	400 *[105]*	320 *[84]*
K	450 *[119]*	215 *[57]*	150 *[39]*	120 *[32]*	100 *[26]*
Z	350 *[92]*	300 *[79]*	290 *[76]*	260 *[68]*	160 *[42]*
X external – hydraulic end position in main valve					
HC, HD, HK, HZ, HY	450 *[119]*	450 *[119]*	450 *[119]*	450 *[119]*	450 *[119]*
HC./O…, HD./O…, HK./O…, HZ./O…	450 *[119]*	450 *[119]*	450 *[119]*	450 *[119]*	450 *[119]*
HC./OF…, HD./OF…, HK./OF…, HZ./OF…	450 *[119]*	450 *[119]*	450 *[119]*	450 *[119]*	450 *[119]*

3-position valves – $q_{V\,max}$ in l/min *[US gpm]*

Spool	Operating pressure p_{max} in bar *[psi]*				
	70 *[1015]*	**140** *[2030]*	**210** *[3046]*	**280** *[4061]*	**350** *[5076]*
X external – spring-centered					
E, J, L, M, Q, U, W, R	450 *[119]*	450 *[119]*	450 *[119]*	450 *[119]*	450 *[119]*
H	450 *[119]*	450 *[119]*	300 *[79]*	260 *[68]*	230 *[61]*
G	400 *[105]*	350 *[92]*	250 *[66]*	200 *[53]*	180 *[47]*
F	450 *[119]*	270 *[71]*	175 *[46]*	130 *[34]*	110 *[29]*
V	450 *[119]*	300 *[79]*	240 *[63]*	220 *[58]*	160 *[42]*
T	400 *[105]*	300 *[79]*	240 *[63]*	200 *[53]*	160 *[42]*
P	450 *[119]*	270 *[71]*	180 *[47]*	170 *[45]*	110 *[29]*

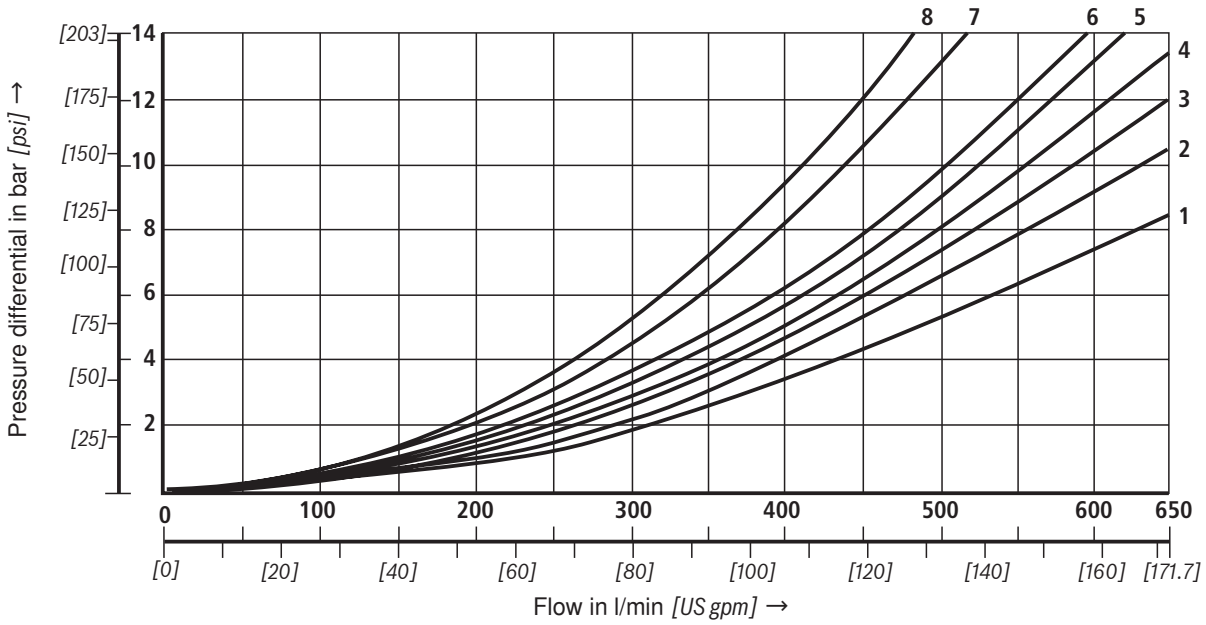
⚠ Attention!

[1] When the specified flow values are exceeded, the function of the return springs can no longer be guaranteed in the event of a pilot pressure failure!

For further important notes, see page 26!

Characteristic curves: NG25 (type W.H **25**)
(measured with HLP46, ϑ_{oil} = 40 °C ±5 °C *[104 °F ±9 °F]*)

***Δp-q*$_V$ characteristic curves**



Spool	Spool position			
	P – A	P – B	A – T	B – T
E, C	1	1	1	3
F	1	4	3	3
G	3	1	2	4
H, D	4	4	3	4
J, Q, K	2	2	3	5
L	2	2	3	3
M	4	4	1	4

Spool	Spool position				
	P – A	P – B	A – T	B – T	B – A
P	4	1	1	5	–
R	2	1	1	–	8
U	4	1	1	6	–
V, Z	2	4	3	6	–
W	1	1	1	3	–
T	3	1	2	4	–

7 Spool G, central position P – T

8 Spool T, central position P – T

Performance limits: NG25 (type W.H **25**)
(measured with HLP46, ϑ_{oil} = 40 °C ±5 °C *[104 °F ±9 °F]*)

2-position valves – $q_{V\,max}$ in l/min *[US gpm]*

Spool	Operating pressure p_{max} in bar *[psi]*				
	70 *[1015]*	**140** *[2030]*	**210** *[3046]*	**280** *[4061]*	**350** *[5076]*
X external – spring end position in main valve (at $p_{St\,min}$ = 13 bar *[188 psi]*)					
C, D, K, Y, Z	700 *[185]*	700 *[185]*	700 *[185]*	700 *[185]*	650 *[172]*
X external – spring end position in main valve [1]					
C	700 *[185]*	700 *[185]*	700 *[185]*	700 *[185]*	650 *[172]*
D, Y	700 *[185]*	650 *[172]*	400 *[105]*	350 *[92]*	300 *[79]*
K	700 *[185]*	650 *[172]*	420 *[111]*	370 *[98]*	320 *[84]*
Z	700 *[185]*	700 *[185]*	650 *[172]*	480 *[127]*	400 *[105]*
X external – hydraulic end position in main valve					
HC, HD, HK, HZ, HY	700 *[185]*	700 *[185]*	700 *[185]*	700 *[185]*	700 *[185]*
HC./O…, HD./O…, HK./O…, HZ./O…	700 *[185]*	700 *[185]*	700 *[185]*	700 *[185]*	700 *[185]*
HC./OF…, HD./OF…, HK./OF…, HZ./OF…	700 *[185]*	700 *[185]*	700 *[185]*	700 *[185]*	700 *[185]*

3-position valves – $q_{V\,max}$ in l/min *[US gpm]*

Spool	Operating pressure p_{max} in bar *[psi]*				
	70 *[1015]*	**140** *[2030]*	**210** *[3046]*	**280** *[4061]*	**350** *[5076]*
X external – spring-centered					
E, L, M, Q, U, W	700 *[185]*	700 *[185]*	700 *[185]*	700 *[185]*	650 *[172]*
G, T	400 *[105]*	400 *[105]*	400 *[105]*	400 *[105]*	400 *[105]*
F	650 *[172]*	550 *[145]*	430 *[113]*	330 *[87]*	300 *[79]*
H	700 *[185]*	650 *[172]*	550 *[145]*	400 *[105]*	360 *[95]*
J	700 *[185]*	700 *[185]*	650 *[172]*	600 *[158]*	520 *[137]*
P	650 *[172]*	550 *[145]*	430 *[113]*	330 *[87]*	300 *[79]*
V	650 *[172]*	550 *[145]*	400 *[105]*	350 *[92]*	310 *[82]*
R	700 *[185]*	700 *[185]*	700 *[185]*	650 *[172]*	580 *[153]*
X external – pressure-centered (at minimum pilot pressure of 18 bar *[261 psi]*)					
E, F, H, J, L, M, P, Q, R, U, V, W	700 *[185]*	700 *[185]*	700 *[185]*	700 *[185]*	650 *[172]*
G, T	400 *[105]*	400 *[105]*	400 *[105]*	400 *[105]*	400 *[105]*
X external – pressure-centered (at pilot pressure > 30 bar *[435 psi]*)					
G, T	700 *[185]*	700 *[185]*	700 *[185]*	700 *[185]*	650 *[172]*

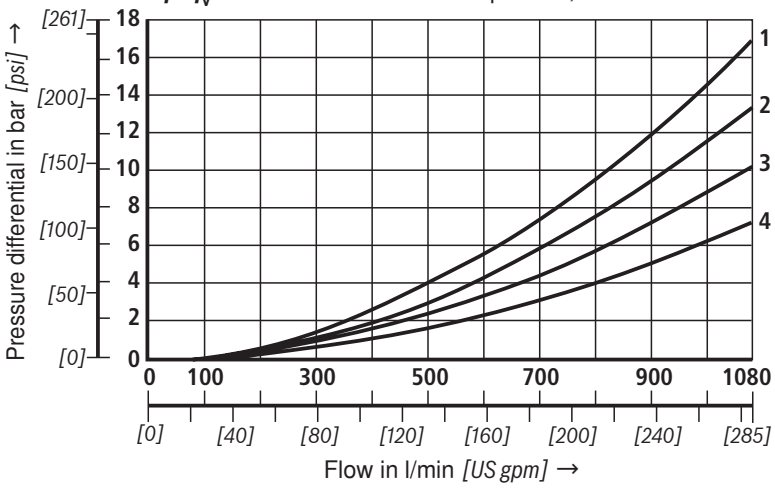
⚠ Attention!

[1] When the specified flow values are exceeded, the function of the return springs can no longer be guaranteed in the event of a pilot pressure failure!

For further important notes, see page 26!

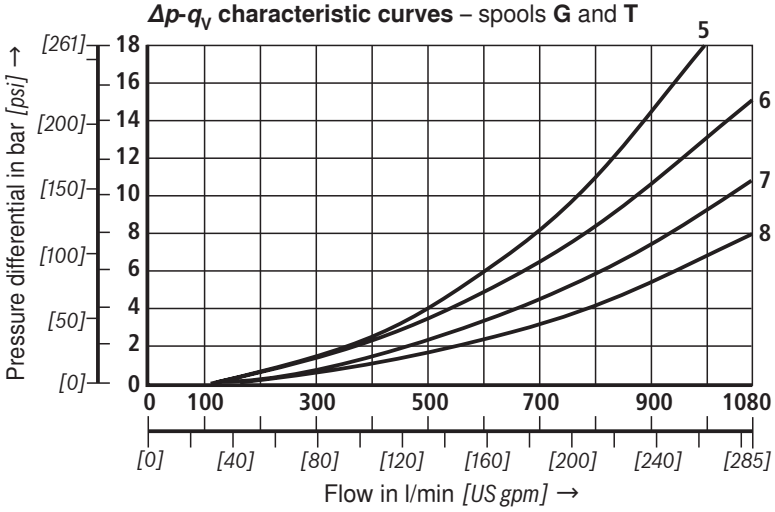
Characteristic curves: NG32 (measured with HLP46, ϑ_{oil} = 40 °C ±5 °C *[104 °F ±9 °F]*)

***Δp-q*$_V$ characteristic curves** – spools **E**, **R** and **W**



Spool	Spool position				
	P – A	P – B	A – T	B – T	B – A
E	4	4	3	2	–
R	4	4	3	–	1
W	4	4	3	2	–

***Δp-q*$_V$ characteristic curves** – spools **G** and **T**



Spool	Spool position				
	P – A	P – B	A – T	B – T	P – T
G	7	8	7	5	6
T	7	8	7	5	6

Performance limits: NG32 (measured with HLP46, ϑ_{oil} = 40 °C ±5 °C *[104 °F ±9 °F]*)

2-position valves – $q_{V\,max}$ in l/min *[US gpm]*

Spool	Operating pressure p_{max} in bar *[psi]*				
	70 *[1015]*	**140** *[2030]*	**210** *[3046]*	**280** *[4061]*	**350** *[5076]*
X external – spring end position in main valve (at $p_{St\,min}$ = 10 bar *[145 psi]*)					
C, D, K, Y, Z	1100 *[290]*	1040 *[275]*	860 *[227]*	750 *[198]*	680 *[179]*
X external – spring end position in main valve [1]					
C	1100 *[290]*	1040 *[275]*	860 *[227]*	800 *[211]*	700 *[185]*
D, Y	1100 *[290]*	1040 *[275]*	540 *[142]*	480 *[127]*	420 *[111]*
K	1100 *[290]*	1040 *[275]*	860 *[227]*	500 *[132]*	450 *[119]*
Z	1100 *[290]*	1040 *[275]*	860 *[227]*	700 *[185]*	650 *[172]*
X external – hydraulic end position in main valve					
HC, HD, HK, HZ, HY	1100 *[290]*	1040 *[275]*	860 *[227]*	750 *[198]*	680 *[179]*

3-position valves – $q_{V\,max}$ in l/min *[US gpm]*

Spool	Operating pressure p_{max} in bar *[psi]*				
	70 *[1015]*	**140** *[2030]*	**210** *[3046]*	**280** *[4061]*	**350** *[5076]*
X external – spring-centered					
E, J, L, M, Q, R, U, W	1100 *[290]*	1040 *[275]*	860 *[227]*	750 *[198]*	680 *[179]*
G, T, H, F, P	900 *[238]*	900 *[238]*	800 *[211]*	650 *[172]*	450 *[119]*
V	1100 *[290]*	1000 *[264]*	680 *[179]*	500 *[132]*	450 *[119]*
X external – pressure-centered (at minimum pilot pressure 8,5 bar *[123 psi]*)					
All spools	1100 *[290]*	1040 *[275]*	860 *[227]*	750 *[198]*	680 *[179]*

⚠ Attention!

[1] When the specified flow values are exceeded, the function of the return springs can no longer be guaranteed in the event of a pilot pressure failure!

For further important notes, see page 26!

Performance limits: Important notes

General:

⚠ Attention!

The specified switching performance limits are valid for operation with two directions of flow (e.g. from P to A and simultaneous return flow from B to T in the ratio of 1:1).

Due to the flow forces acting within the valve, the permissible switching performance limits may be considerably lower with only one direction of flow (e.g. from P to A while port B is blocked with flow in only one direction or different flows)!

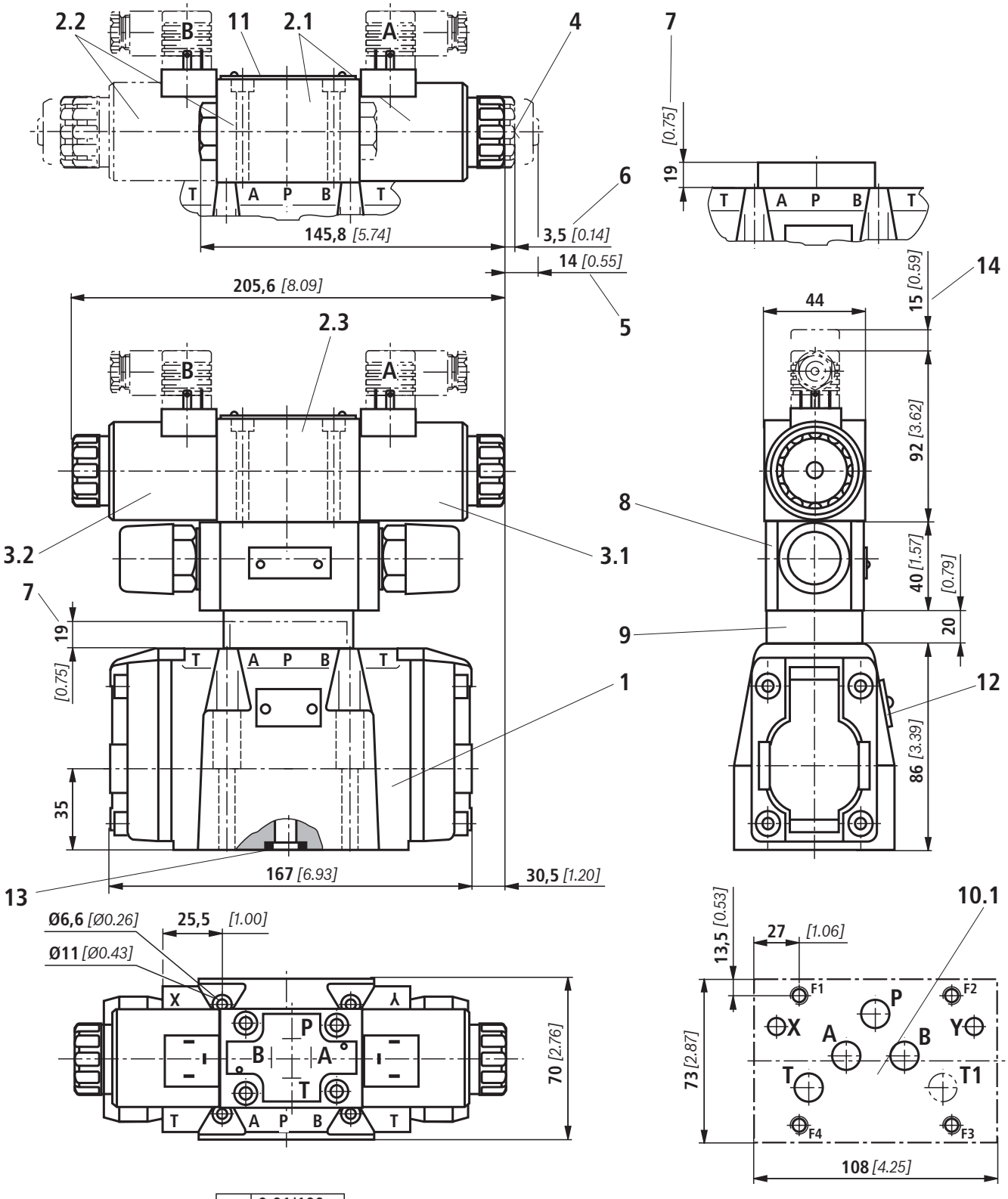
In the case of such applications, please consult us!

The switching performance limit was established when the solenoids were at operating temperature, at 10% undervoltage and without tank pre-loading.

⚠ Attention!

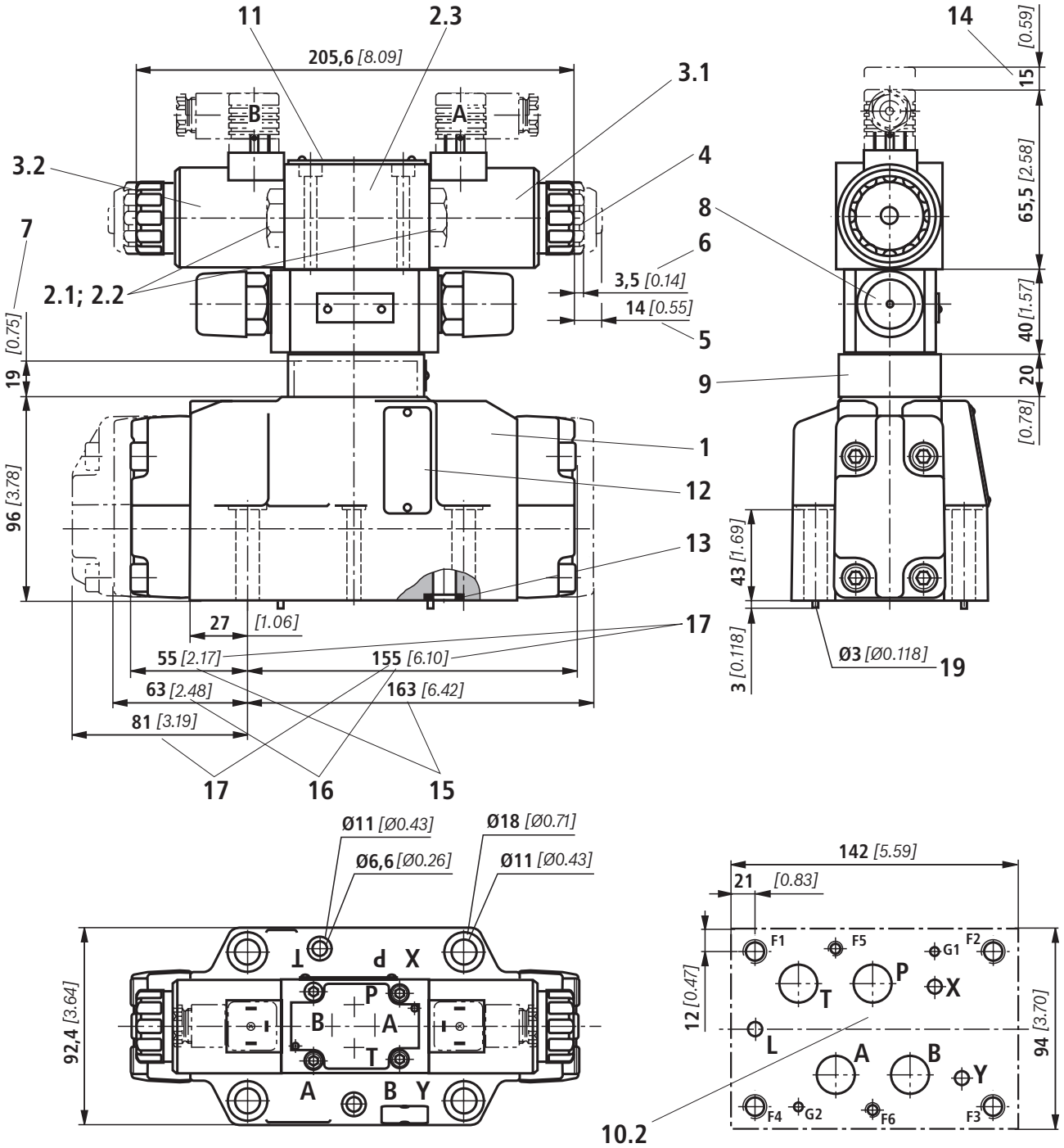
NG16	– With **X internal** pilot oil supply, a pre-load valve must be used at flows < 160 l/min *[42 US gpm]* due to the negative overlap of spools C, Z and HC, HZ. – When 4/3 directional valves with pressure-centered control spool in the main valve are used beyond the specified performance limit, a higher pilot pressure is required. At, for example, an operating pressure of p_{max} = 350 bar *[5076 psi]* and a flow of q_V = 300 l/min *[79 US gpm]* a pilot pressure of 16 bar *[232 psi]* is required. The maximum flow for these valves therefore depends on the Δp value, which is acceptable for the system. – With **X internal** pilot oil supply, a pre-load valve must generally be used (see page 37) due to the negative overlap of spools F, G, H, J, P, S, and T.
NG25	– With **X internal** pilot oil supply, a pre-load valve must be used at flows < 180 l/min *[47.5 US gpm]* due to the negative overlap of spools Z, HZ, and V. – With **X internal** pilot oil supply, a pre-load valve must generally be used due to the negative overlap of spools C, HC, F, G, H, P, and T.
NG32	– With **X internal** pilot oil supply, a pre-load valve must be used at flows < 180 l/min *[47.5 US gpm]* due to the negative overlap of spools Z, HZ, and V. – When 4/3 directional valves with pressure-centered control spool in the main valve are used beyond the specified performance limit, a higher pilot pressure is required. At, for example, an operating pressure of p_{max} = 350 bar *[5076 psi]* and a flow of q_V = 1100 l/min *[290 US gpm]* a pilot pressure of 15 bar *[217 psi]* is required. The maximum flow for these valves therefore depends on the Δp value, which is acceptable for the system. – With **X internal** pilot oil supply, a pre-load valve must generally be used due to the negative overlap of spools C, HC, F, G, H, P and T.

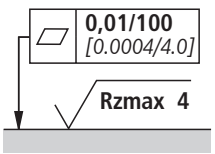
Unit dimensions: NG10 (dimensions in mm *[inch]*)



For the explanation of items and subplates, see page 32.
For valve mounting screws, see page 33.

Unit dimensions: NG16 (dimensions in mm *[inch]*)

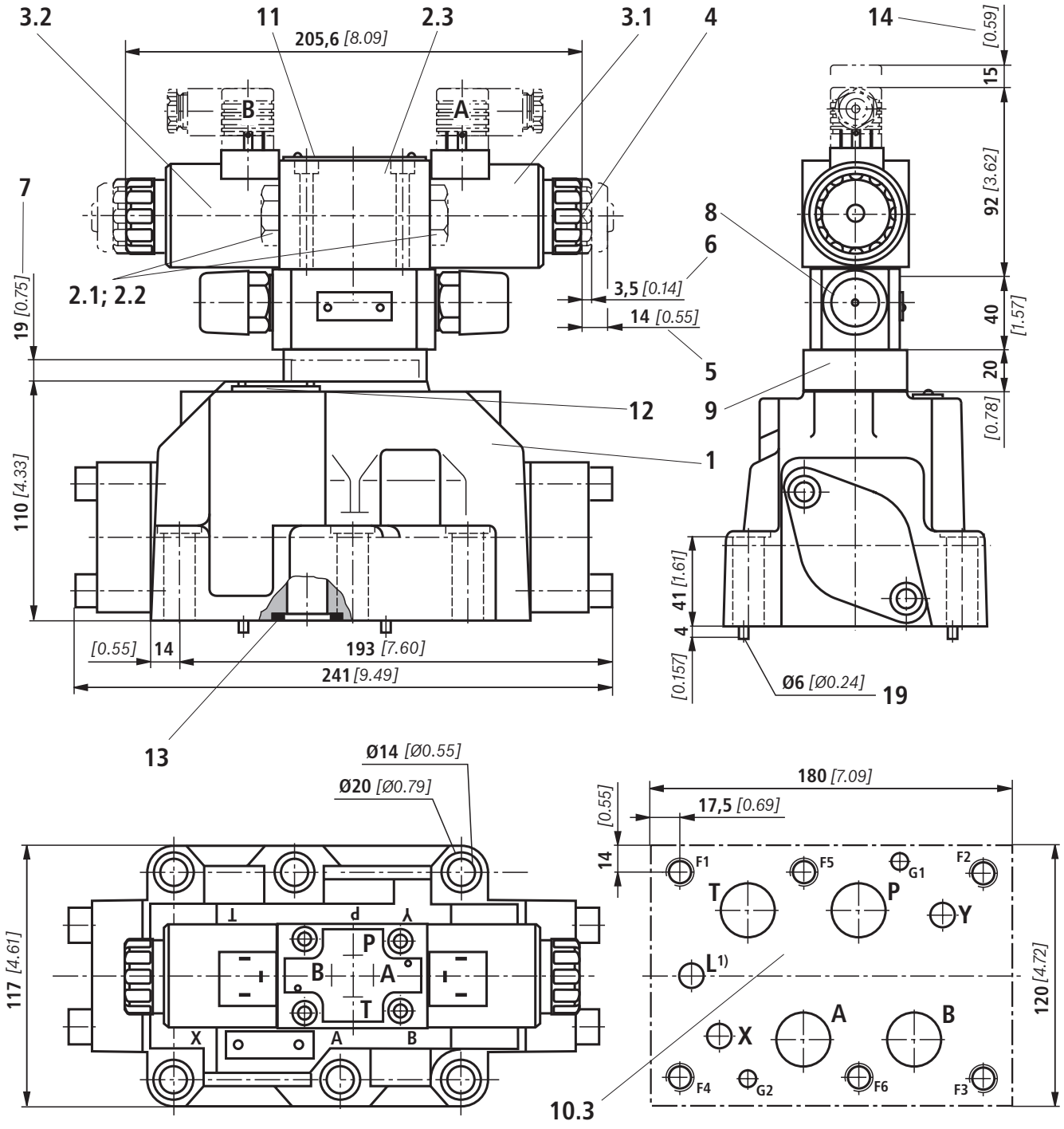




Required surface quality
of the valve mounting face

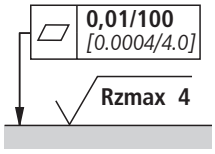
For the explanation of items and subplates, see page 32.
For valve mounting screws, see page 33.

Unit dimensions: NG25 (type W.H **22**) (dimensions in mm *[inch]*)



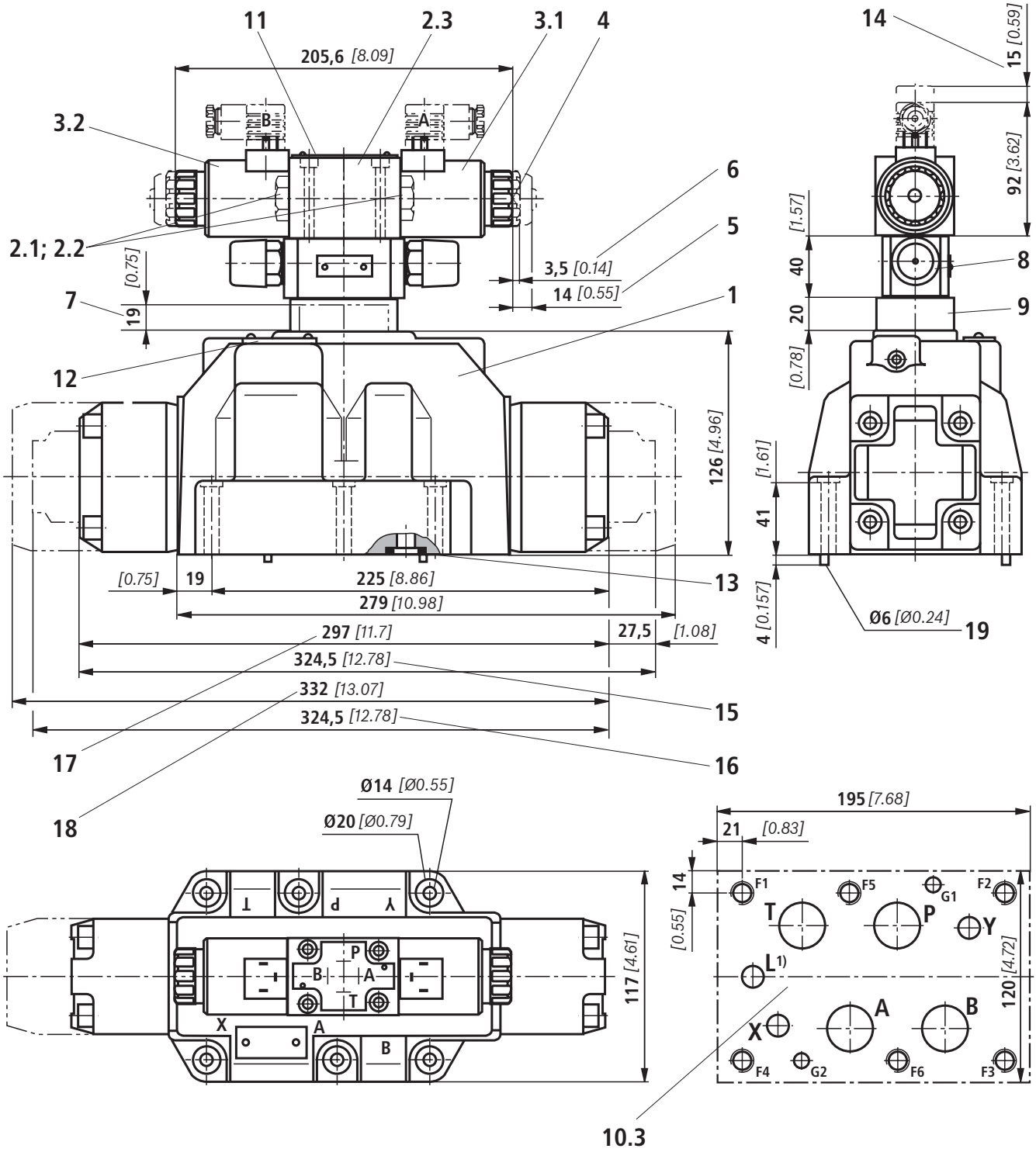
1) Port L only on valves with pressure-centered zero position

For the explanation of items and subplates, see page 32.
For valve mounting screws, see page 33.



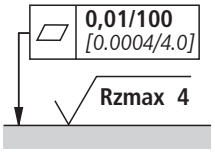
Required surface quality
of the valve mounting face

Unit dimensions: NG25 (type W.H **25**) (dimensions in mm *[inch]*)



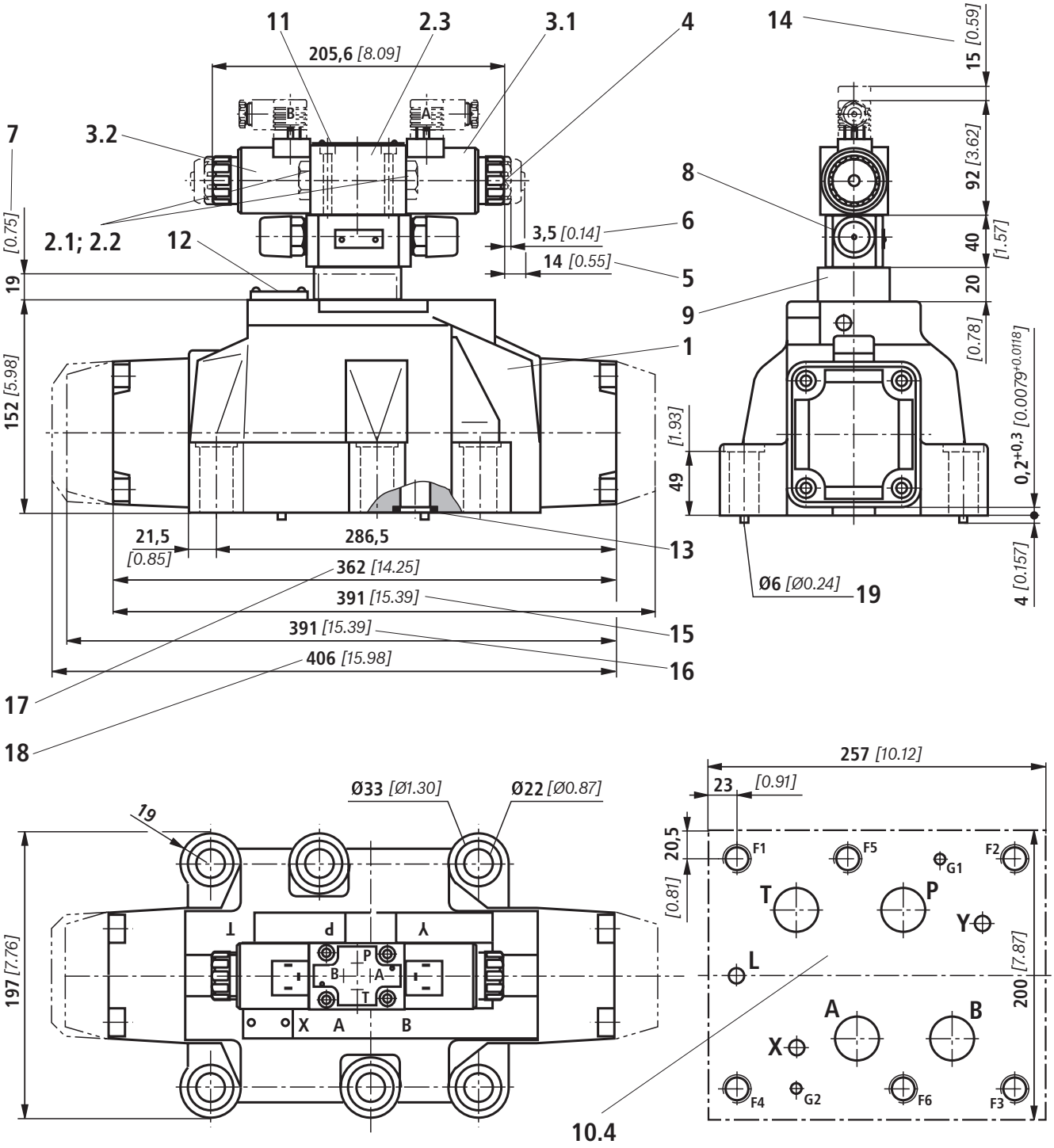
1) Port L only on valves with pressure-centered zero position

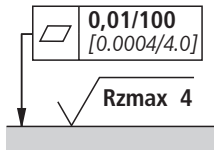
For the explanation of items and subplates, see page 32.
For valve mounting screws, see page 33.



Required surface quality
of the valve mounting face

Unit dimensions: NG32 (dimensions in mm *[inch]*)





Required surface quality
of the valve mounting face

For the explanation of items and subplates, see page 32.
For valve mounting screws, see page 33.

Unit dimensions

1 Main valve

2 Pilot valve type 4WE 6 …
to data sheet RE 23178:

2.1 – Pilot valve type 4WE 6 D… (1 solenoid)
for main valves with spools C, D, K, Z
spools HC, HD, HK, HZ

– Pilot valve type 4WE 6 JA… (1 solenoid “a“)
for main valves with spools EA, FA, etc.,
spring return

– Pilot valve type 4WE 6 MT… (1 solenoid “a“)
for main valves with spools HEA, HFA, etc.,
hydraulic Spool return

2.2 – Pilot valve type 4WE 6 Y… (1 solenoid)
for main valves with spool Y
spool HY

– Pilot valve type 4WE 6 JB… (1 solenoid “b“)
for main valves with spools EB, FB, etc.,
spring return

– Pilot valve type 4WE 6 MB… (1 solenoid “b“)
for main valves with spools HEB, HFB, etc.,
hydraulic spool return

2.3 – Pilot valve type 4WE 6 J… (2 solenoids)
for main valves with 3 spool positions, spring-centered

– Pilot valve type 4WE 6 M… (2 solenoids)
for main valves with 3 spool positions,
pressure-centered

3.1 Solenoid “a“

3.2 Solenoid “b“

4 Manual override “N“, optional

– The manual override can only be actuated up to a tank pressure of ca. 50 bar. Avoid damage to the bore for the manual override! (Special tool for operation, separate order, Material no. **R900024943**). When the manual override is blocked, operation of the solenoids must be ruled out!

– The simultaneous operation of the solenoids must be ruled out!

5 Solenoid **without** manual override

6 Solenoid **with** manual override

7 Height of reconnection plate for hydraulic operation (type 4WH…)

8 Switching time adjustment (6 A/F), optional

9 Pressure reducing valve, optional

10.1 Machined valve mounting face; porting pattern to ISO 4401-05-05-0-05 and NFPA T3.5.1 R2-D05

10.2 Machined valve mounting face; porting pattern to ISO 4401-07-07-0-05 and NFPA T3.5.1 R2-D07

10.3 Machined valve mounting face; porting pattern to ISO 4401-08-08-0-05 and NFPA T3.5.1 R2-D08

10.4 Machined valve mounting face; porting pattern to ISO 4401-10-09-0-05 and NFPA T3.5.1 R2-D10

11 Nameplate of pilot valve

12 Nameplate of complete valve

13 Seal rings

14 Space required to remove mating connector

15 2-position valves with spring end position in main valve (spool symbols A, C, D, K, Z)

16 2-position valves with spring end position in main valve (spool symbols B, Y)

17 3-position valves, spring-centered;
2-position valves with hydraulic end position in main valve

18 3-position valves, pressure-centered

19 Locating pin

Subplates (separate order)

– NG10 (to data sheet RE 45054)
• **Without** ports X, Y: G 534/01 (G3/4)
G 534/12 (SAE-12; 1 1/16-12) [1)]
• **With** port X, Y: G 535/01 (G3/4)
G 536/01 (G1)
G 535/12 (SAE-12; 1 1/16-12) [1)]
G 536/12 (SAE-16; 1 5/16-12) [1)]

– NG16 (to data sheet RE 45056)
G 172/01 (G3/4)
G 172/02 (M27 x 2)
G 174/01 (G1)
G 174/02 (M33 x 2)
G 174/08 (flange)
G 172/12 (SAE-12; 1 1/16-12) [1)]
G 174/12 (SAE-16; 1 5/16-12) [1)]

– NG25 (type W.H 22 to data sheet RE 45058)
G 151/01 (G1)
G 154/01 (G1 1/4)
G 156/01 (G1 1/2)
G 155/12 (SAE-16; 1 5/16-12) [1)]
G 154/12 (SAE-20; 1 5/8-20) [1)]
G 156/12 (SAE-24; 1 7/8-20) [1)]

– NG25 (type W.H 25 to data sheet RE 45058)
G 151/01 (G1)
G 153/01 (G1), for valves with pressure-centered zero position
G 154/01 (G1 1/4)
G 154/08 (flange)
G 156/01 (G1 1/2)
G 153/12 (SAE-16; 1 5/16-12) [1)]
G 154/12 (SAE-20; 1 5/8-20) [1)]
G 156/12 (SAE-24; 1 7/8-20) [1)]

– NG32 (to data sheet RE 45060)
G 157/01 (G1 1/2)
G 157/02 (M48 x 2)
G 158/10 (flange)
G 157/12 (SAE-24; 1 7/8-12) [1)]

[1)] on request

For valve mounting screws, see page 33.

Unit dimensions

Valve mounting screws (separate order)

– NG10:
4 hexagon socket head cap screws, metric
ISO 4762 - M6 x 45 - 10.9-flZn-240h-L
(Friction coefficient μ_{total} = 0.09 to 0.14);
tightening torque M_T = 12.5 Nm *[9.2 ft-lbs]* ±10%,
Material no. **R913000258**

4 hexagon socket head cap screws, UNC
1/4-20 UNC x 1 3/4" ASTM-A574
on request

– NG16:
4 hexagon socket head cap screws, metric
ISO 4762 - M10 x 60 - 10.9-flZn-240h-L
(Friction coefficient μ_{total} = 0.09 to 0.14);
tightening torque M_T = 75 Nm *[55.3 ft-lbs]* ±10%,
Material no. **R913000116**

2 hexagon socket head cap screws metric
ISO 4762 - M6 x 60 - 10.9-flZn-240h-L
(Friction coefficient μ_{total} = 0.09 to 0.14);
tightening torque M_T = 12.5 Nm *[9.2 ft-lbs]* ±10%,
Material no. **R913000115**

4 hexagon socket head cap screws, UNC
3/8-16 UNC x 2 1/4" ASTM-A574
on request

2 hexagon socket head cap screws, UNC
1/4-20 UNC x 2 1/4" ASTM-A574
on request

– NG25:
6 hexagon socket head cap screws, metric
ISO 4762 - M12 x 60 - 10.9-flZn-240h-L
(Friction coefficient μ_{total} = 0.09 to 0.14);
tightening torque M_T = 130 Nm *[95.9 ft-lbs]* ±10%,
Material no. **R913000121**

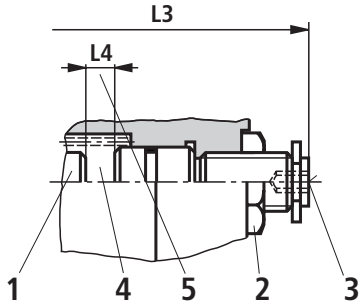
6 hexagon socket head cap screws, UNC
1/2-13 UNC x 2 1/2" ASTM-A574
on request

– NG32:
6 hexagon socket head cap screws, metric
ISO 4762 - M20 x 80 - 10.9-flZn-240h-L
(Friction coefficient μ_{total} = 0.09 to 0.14);
tightening torque M_T = 430 Nm *[317.2 ft-lbs]* ±10%,
Material no. **R901035246**

6 hexagon socket head cap screws, UNC
3/4-10 UNC x 3 1/4" ASTM-A574
on request

Stroke adjustment, attachment options (dimensions in mm *[inch]*)

The stroke adjustment feature limits the stroke of control spool (1). To reduce the spool stroke, loosen locknut (2) and turn adjustment screw (3) clockwise. Control chamber (4) must be depressurized during this process.

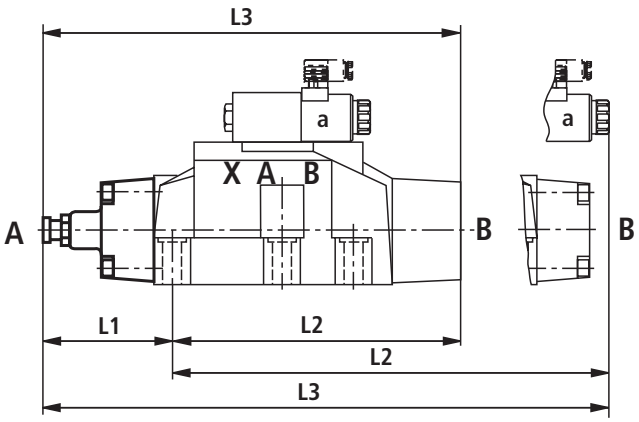


NG	L4
10	6,5 *[0.26]*
16	10 *[0.39]*
25 (type 4W.H 22)	9,5 *[0.37]*
25 (type 4W.H 25)	12,5 *[0.49]*
32	15 *[0.59]*

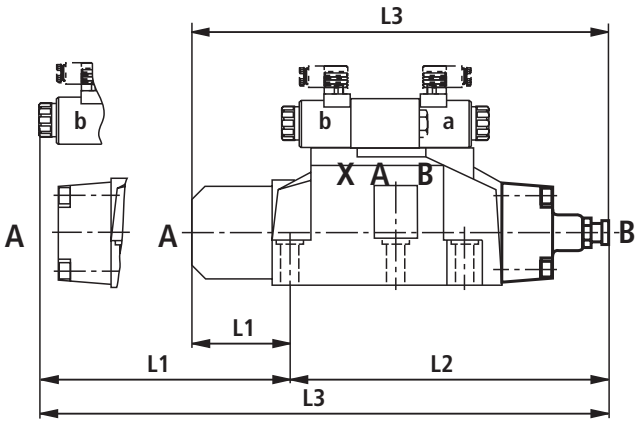
For further dimensions, see below and page 35.

5 Adjustment range
- NG10:
  1 turn = 1 mm *[0.0394 inch]* adjustment travel
- NG16 and 32:
  1 turn = 1.5 mm *[0.0591 inch]* adjustment travel

Stroke limitation on side A



Stroke limitation on side B



Attachment options	Ordering code	NG	3-position valve [1] Spring-centered L1	L2	L3	Pressure-centered L1	L2	L3
Stroke adjustment on valve sides A and B	**10**	10	90 *[3.54]*	144 *[5.67]*	234 *[9.21]*			
		16	100 *[3.94]*	200 *[7.87]*	300 *[11.81]*			
		25 [1]	96 *[3.77]*	241 *[9.49]*	337 *[13.27]*			
		25 [2]	123 *[4.84]*	276 *[10.87]*	399 *[15.71]*			
		32	133 *[5.24]*	344 *[13.54]*	477 *[18.78]*			
Stroke adjustment on valve side A	**11**	10	90 *[3.54]*	106 *[4.17]*	196 *[7.72]*			
		16	100 *[3.94]*	156 *[6.14]*	256 *[10.08]*			
		25 [1]	96 *[3.77]*	193 *[7.60]*	289 *[11.38]*			
		25 [2]	123 *[4.84]*	225 *[8.86]*	348 *[13.70]*			
		32	133 *[5.24]*	287 *[11.30]*	420 *[16.54]*			
Stroke adjustment on valve side B	**12**	10	52 *[2.05]*	144 *[5.67]*	196 *[7.72]*	–	–	–
		16	56 *[2.20]*	200 *[7.87]*	256 *[10.08]*	81 *[3.19]*	200 *[7.87]*	281 *[11.06]*
		25 [1]	48 *[1.89]*	241 *[9.49]*	289 *[11.38]*	–	–	–
		25 [2]	72 *[2.83]*	276 *[10.87]*	348 *[13.70]*	107 *[4.21]*	276 *[10.87]*	283 *[11.14]*
		32	76 *[2.99]*	344 *[13.54]*	420 *[16.54]*	120 *[4.72]*	344 *[13.54]*	464 *[18.27]*

[1] With spool symbol A, only version “11“ possible, with spool symbol B, only version “12“ .

Stroke adjustment, attachment options (dimensions in mm *[inch]*)

Attachment options	Ordering code	NG	2-position valve								
			Spring end position						Hydraulic end position		
			A, C, D, K, Z			B, Y			HC, HD, HK, HZ, HY		
			L1	L2	L3	L1	L2	L3	L1	L2	L3
Stroke adjustment on valve sides A and B	**10**	10	–	–	–	–	–	–	90 *[3.54]*	144 *[5.67]*	234 *[9.21]*
		16	–	–	–	–	–	–	100 *[3.94]*	200 *[7.87]*	300 *[11.81]*
		25 [1]	96 *[3.78]*	241 *[9.49]*	337 *[13.27]*	96 *[3.78]*	241 *[9.49]*	337 *[13.27]*	96 *[3.78]*	241 *[9.49]*	337 *[13.27]*
		25 [2]	–	–	–	–	–	–	123 *[4.84]*	276 *[10.87]*	399 *[15.71]*
		32	–	–	–	–	–	–	133 *[5.24]*	344 *[13.54]*	477 *[18.78]*
Stroke adjustment on valve side A	**11**	10	90 *[3.54]*	106 *[4.17]*	196 *[7.72]*	–	–	–	90 *[3.54]*	106 *[4.17]*	196 *[7.72]*
		16	100 *[3.94]*	180 *[7.09]*	280 *[11.02]*	–	–	–	100 *[3.94]*	156 *[6.14]*	256 *[10.08]*
		25 [1]	96 *[3.78]*	193 *[7.60]*	289 *[11.38]*	96 *[3.78]*	193 *[7.60]*	289 *[11.38]*	96 *[3.78]*	193 *[7.60]*	289 *[11.38]*
		25 [2]	123 *[4.84]*	253 *[9.96]*	376 *[14.8]*	–	–	–	123 *[4.84]*	225 *[8.86]*	348 *[13.70]*
		32	133 *[5.24]*	316 *[12.44]*	449 *[17.68]*	–	–	–	133 *[5.24]*	287 *[11.30]*	420 *[16.53]*
Stroke adjustment on valve side B	**12**	10	–	–	–	52 *[2.05]*	144 *[5.67]*	196 *[7.72]*	52 *[2.05]*	144 *[5.67]*	196 *[7.72]*
		16	–	–	–	80 *[3.15]*	200 *[7.87]*	280 *[11.02]*	56 *[2.21]*	200 *[7.87]*	256 *[10.08]*
		25 [1]	48 *[1.89]*	241 *[9.49]*	289 *[11.38]*	48 *[1.89]*	241 *[9.49]*	289 *[11.38]*	48 *[1.89]*	241 *[9.49]*	289 *[11.38]*
		25 [2]	–	–	–	100 *[3.94]*	276 *[10.87]*	376 *[14.80]*	72 *[2.84]*	276 *[10.87]*	348 *[13.70]*
		32	–	–	–	105 *[4.13]*	344 *[13.54]*	449 *[17.68]*	76 *[2.99]*	344 *[13.54]*	420 *[16.53]*

[1] Types 4WEH 22… and 4WH 22…

[2] Types 4WEH 25… and 4WH 25…

Switching time adjustment

The switching time of main valve (1) can be influenced by using a double throttle check valve (2)
(type Z2FS 6 to data sheet RE 27506).

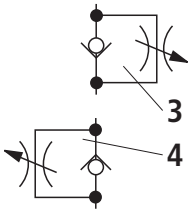
Conversion of meter-in (3) into meter-out control (4):

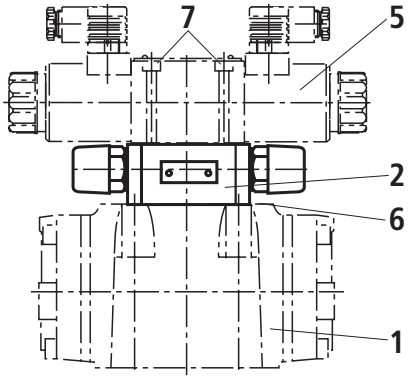
Remove pilot valve (5) – plate (6) for accommodating the seal rings remains in place – turn switching time adjustment feature (2) around its longitudinal axis and put it down again, re-mount pilot valve (5) .

Tightening torque of screws (7) M_T = 9 Nm *[6.6 ft-lbs]*.

⚠ Attention!

The conversion may only be carried out by authorized specialists or in the factory!





Type 4WEH 10 ..4X/…S
Type 4WEH 10 ..4X/…S2

Pressure reducing valve “D3“

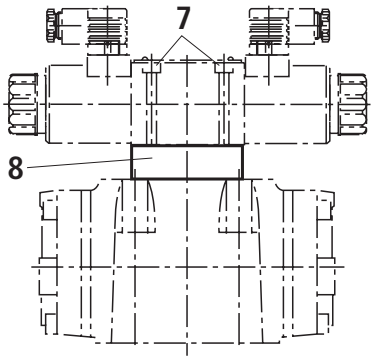
Pressure reducing valve (8) must be used in the case of a pilot pressure above 250 bar *[3626 psi]* (with type 4WEH 22 …: 210 bar *[3046 psi]*) and version “H-“.

The secondary pressure is held constant at 45 bar *[652 psi]*.

⚠ Attention!

When a pressure reducing valve “D3“ (8) is used, a throttle insert “B10“ must be provided in the P channel of the pilot valve.

Tightening torque of screws (7) M_T = 9 Nm *[6.6 ft-lbs]*.



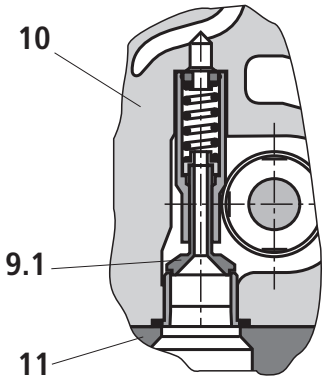
Type 4WEH 10 ..4X/…/..D3

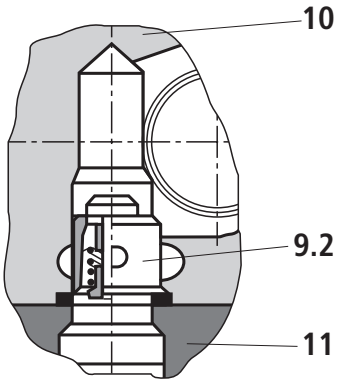
Pre-load valve (not for NG10)

For valves with pressureless circulation and internal pilot oil supply, a pre-load valve (9) must be installed in channel P of the main valve to build up the minimum pilot pressure.

The pressure differential of the pre-load valve must be added to the pressure differential of the main valve (see characteristic curves) to obtain a total value.

The cracking pressure is ca. 4.5 bar *[65 psi]*.

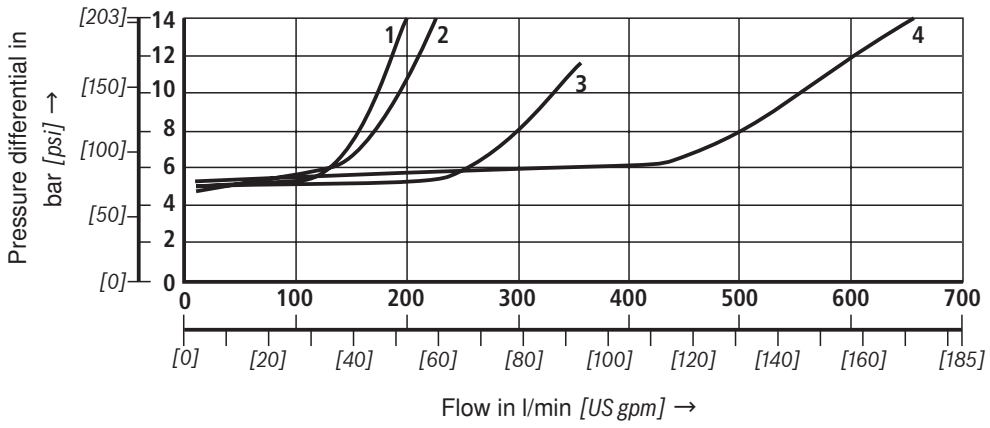




9.1 Pre-load valve NG16
9.2 Pre-load valve NG25 and NG32
10 Main valve
11 Suplate

Type	**Material number P4,5**
4W.H **16** …	R901002365
4W.H **22** …	R900315596
4W.H **25** …	R900303717
4W.H **32** …	R900317066

***Δp–q*$_V$ characteristic curve** (measured with HLP46, ϑ_{oil} = 40 °C ± 5 °C *[104 °F ±9 °F]*)



1 **NG16**
2 **NG25** (type 4W.H **25** …)
3 **NG25** (type 4W.H **22** …)
4 **NG32**

Notes

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