Rexroth
Bosch Group

4/3, 4/2 and 3/2 directional valves with adjustable switching time

RE 23351/08.08 1/12
Replaces: 02.03

Type 5-.WE (5-chamber design)

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


H5960

Table of contents

Features

- Direct operated directional spool valve with solenoid actuation
- Porting pattern to ISO 4401-05-04-0-05 and NFPA T3.5.1 R2 D05
- Subplates see data sheet RE 45054 (separate order)
- Wet-pin DC solenoids with detachable coil (AC voltage possible using a rectifier)
- Solenoid coil can be rotated 90°
- The coil can be changed without having to open the pressure-tight chamber
- Electrical connection as individual connection
- Manual override, optional
- Operating time adjustment, optional
- Inductive position switches and proximity sensors (contact-free), see RE 24830
- For further electrical connections, see RE 08010

Informationen zu lieferbaren Ersatzteilen:
www.boschrexroth.com/spc

Ordering code

5	–	WE	10		3X	/	C				

5-chamber design

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

Size 10 **= 10**

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

Component series 30 to 39 – individual connection **= 3X**
(30 to 39: 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**
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**

Spool position monitoring
without position switch **= No code**
Monitored spool position “a“ **= QMAG24**
Monitored spool position “b“ **= QMBG24**
Monitored rest position **= QM0G24**
For further details, see RE 24830

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

In the case of individual connection, a mating connector with integrated rectifier can be used (separate order, see page 3).

[2)] For mating connectors, separate order, see page 3.

[3)] Also available with M12 x 1 plug-in connection (only variant “...G24...“); for ordering code and mating connectors, see RE 08010

AC voltage mains (permissible voltage tolerance ±10%)	**Nominal voltage of DC solenoids 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**

⚠ Attention!
Please observe performance limits on page 9!

Standard types and components can be found in the EPS (standard price list).

K4				*

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]*

B15 = Throttle Ø 1.5 mm *[0.059 inch]*

B30 = Throttle Ø 3.0 mm *[0.118 inch]*

To be used in the case of flows that exceed the performance limit of the valve, effective in channel P (see page 6).

No code = Without operating time adjustment

C = With throttling screw

A06 = Orifice Ø 0.6 mm *[0.024 inch]*

A07 = Orifice Ø 0.7 mm *[0.028 inch]*

A08 = Orifice Ø 0.8 mm *[0.031 inch]*

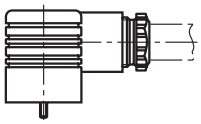
Electrical connection [2]

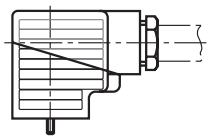
Individual connection

K4 [3] **=** **Without** mating connector, with component plug DIN EN 175301-803

Mating connectors to DIN EN 175301-803

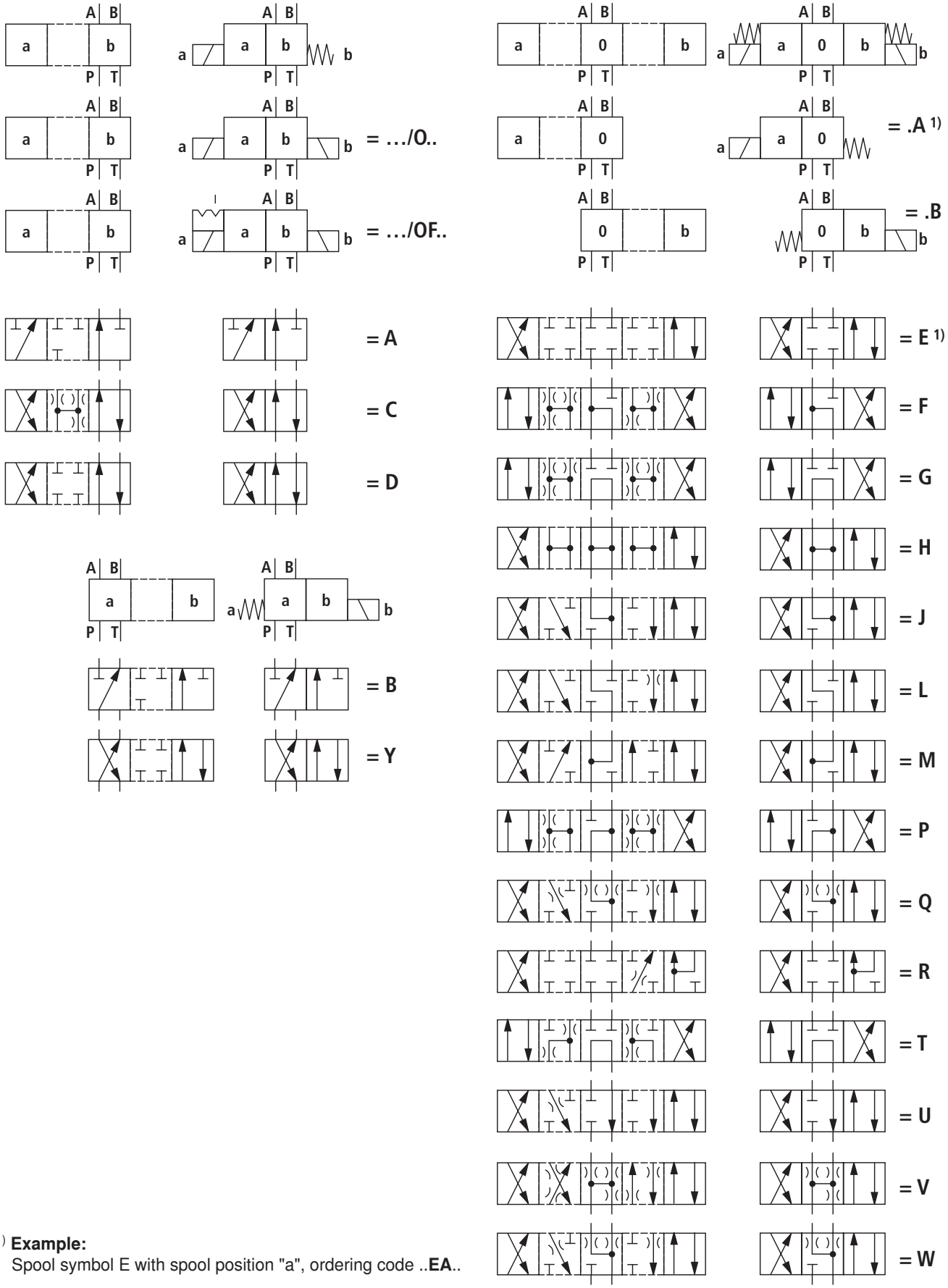
For details and further mating connectors, see RE 08006





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

These 5-chamber directional valves of type 5-.WE are solenoid operated directional spool valves. They control the start, stop and direction of a flow with the possibility of adjusting the switching time.

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

The two spring chambers are connected to each other via a connection bore (5). During the switching process, the fluid volume is displaced from one spring chamber into the other. When the cross-section of this bore is reduced by a throttle, the switching time changes.

The T-channels are isolated towards the spring chambers. This means that any switching pulses cannot act on control spool (3), which results in a smooth switching behavior.

In the de-energized condition, control spool (3) is held by return springs (4) in the central or 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 on control spool (3) and pushes the latter from its rest position to the required end position. This opens the necessary flow passage 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) back to its rest position.

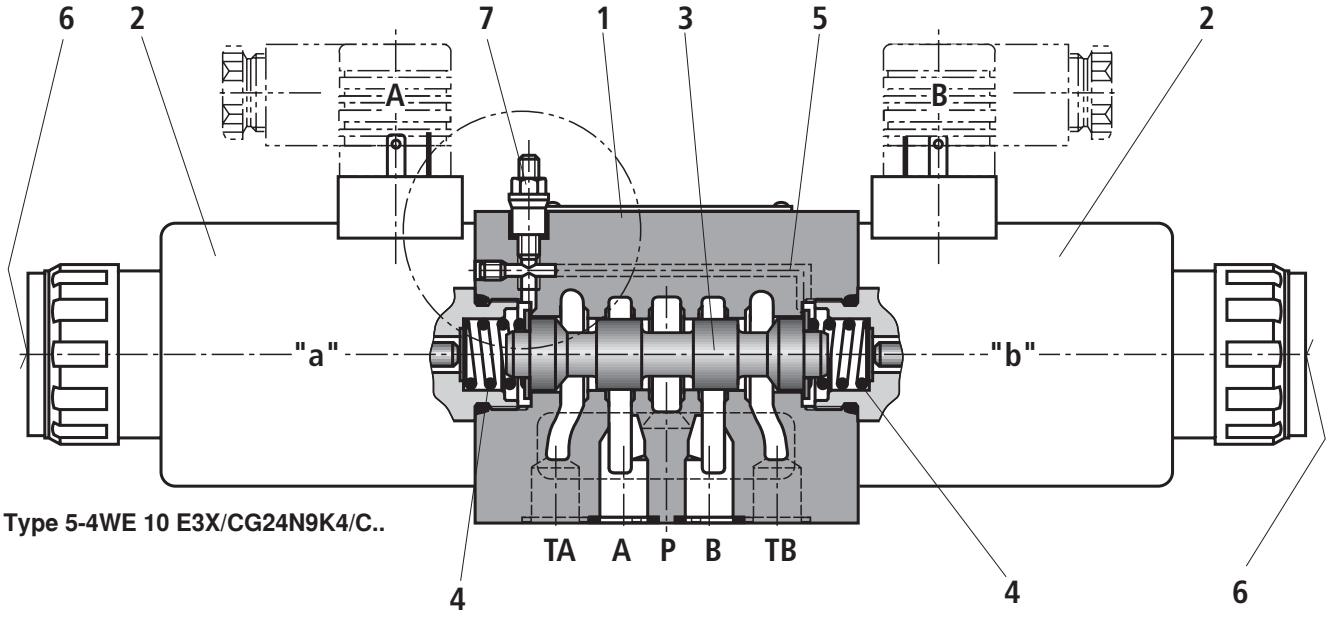
An optional manual override (6), allows control spool (3) to be moved without energization of the solenoid.

Switching time adjustment (only with DC voltage)

The installation of a throttle screw (7) or optional orifice (8) offers the possibility of increasing the switching time

– with throttle screw type 5-.WE 10 ../..CG../**C**..

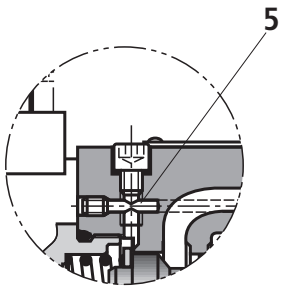
– with orifice type 5-.WE 10 ../..CG../**A**..



Type 5-4WE 10 E3X/CG24N9K4/C..

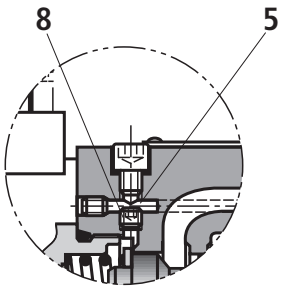
With the help of orifices, switching time extensions of 100 ms and above are possible. The switching time extension depends on the system (e.g. pressure, flow and viscosity).

When retrofitting or converting the throttling feature, care must be taken that the existing fluid value is maintained in the spring chambers and connection bore (5), since this is a precondition for proper functioning of switching time adjustment.



Without throttle screw/ without orifice

Type 5-.WE 10../..CG../..



With orifice

Type 5-.WE 10../..CG../**A**..

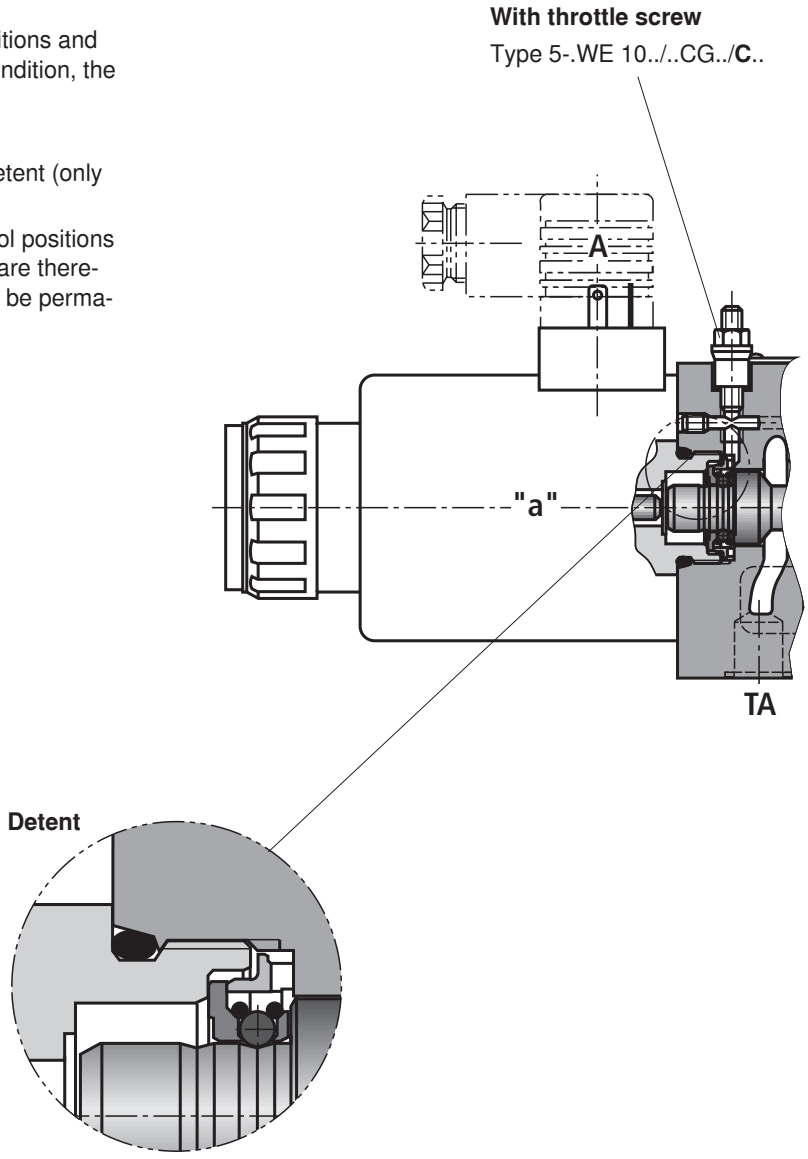
Function, section

Type 5-.WE 10.3X/OC… (only possible with spool symbols A, C and D)

This variant is a directional valve with 2 spool positions and 2 solenoids without detent. In the de-energized condition, the spool position is not defined.

Type 5-.WE 10.3X/OFC... (impulse spool), with detent (only possible with spool symbols A, C and D)

This variant is a directional spool valve with 2 spool positions with detent and 2 solenoids. Both spool positions are therefore locked in place and the solenoid needs not to be permanently energized.

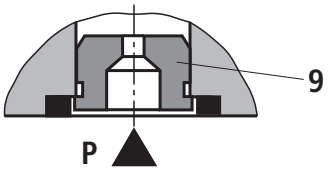


Type 5-.WE 10 E3X/OFC
(impulse spool)

Throttle insert (type 5-.WE 10.3X/.../**B**..)

The use of a throttle insert (9) is required, when, due to the given operating conditions, flows can occur during the switching processes, which exceed the performance limit of the valve.

Throttle insert (9) is to be inserted in channel P of the pilot valve.



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

General

Weight	– Valve with 1 solenoid	kg *[lbs]*	4.7 *[10.4]*
	– Valve with 2 solenoids	kg *[lbs]*	6.3 *[13.9]*
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]* With symbol A and B, port T must be used as leakage port, if the operating pressure is higher than the permissible tank pressure.
Maximum flow		l/min *[US gpm]*	120 *[31.7]*
Flow cross-section (spool position 0)	– Spool symbol V	mm^2 *[in^2]*	11 *[0.0171]* A/B → T; 10.3 *[0.016]* P → A/B
	– Spool symbol W	mm^2 *[in^2]*	2.5 *[0.0039]* A/B → T
	– Spool symbol Q	mm^2 *[in^2]*	5.5 *[0.0085]* A/B → T
Hydraulic fluid			Mineral oil (HL, HLP) to DIN 51524 [1]; fast bio-degradable hydraulic fluids to VDMA 24568 (see also RE 90221); HETG (rape seed oil) [1]; HEPG (polyglycols) [2]; HEES (synthetic esters) [2]; 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 [3]

Electrical

Type of voltage			DC voltage
Available voltages		V	12; 24; 96; 205
Voltage tolerance (nominal voltage)		%	±10
Power consumption		W	35
Duty cycle		%	100
Switching time ISO 6403	ON	ms	45 to 70
	OFF	ms	35 to 45
Maximum switching frequency		1/h	15000
Maximum coil temperature [4]		°C *[°F]*	150 *[302]*
Type of protection to EN 60529			IP 65 with mating connector mounted and locked
Insulation class VDE 0580			F

[1] Suitable for NBR and FKM seals

[2] Suitable only for FKM seals

[3] 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.

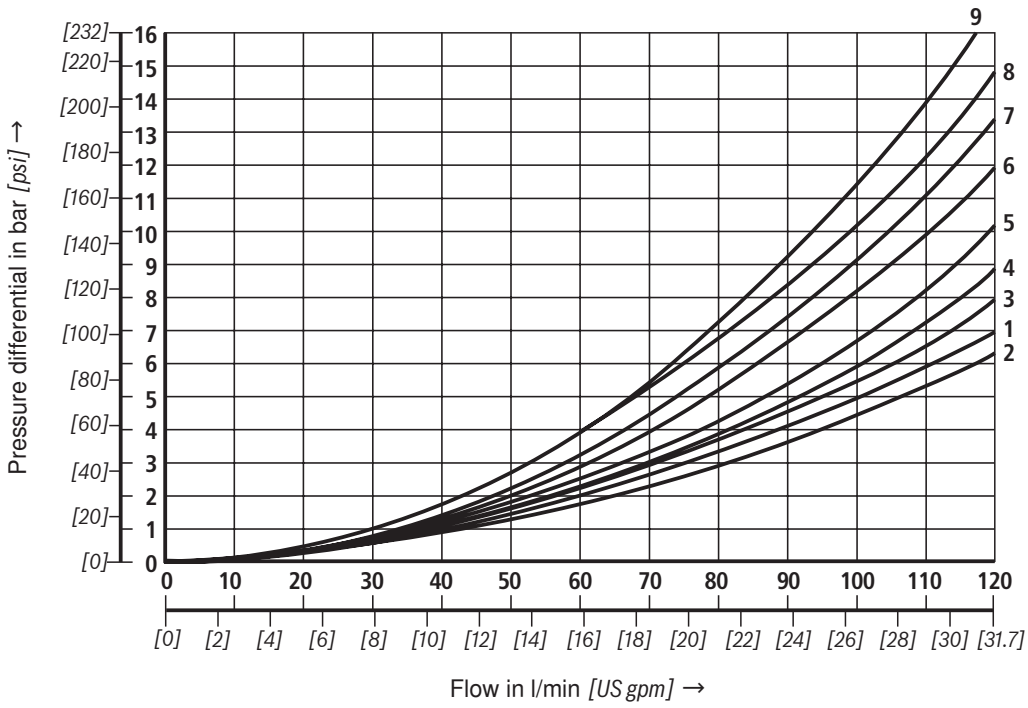
For the selection of filters, see data sheets RE 50070, RE 50076, RE 50081, RE 50086, RE 50087 and RE 50088.

[4] Due to the surface temperatures of solenoid coils, standards ISO 13732-1 and EN 982 must be observed!

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



Spool symbol	Direction of flow			
	P – A	P – B	A – T	B – T
A, B	1	1	–	–
C	1	3	1	3
D, Y	2	2	1	3
E	2	2	3	4
F	2	1	4	7
G	4	4	6	8
H	2	2	1	3
J, L	1	1	4	4
M	2	2	3	4
P	2	1	1	7
Q, V	1	1	3	4
R	1	4	3	–
T	4	4	5	7
U	1	1	3	3
W	1	1	3	5

Spool position:

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

Central position:

Spool symbol	Direction of flow			
		B – T	A – T	P – T
F	–	–	4	4
G, T	–	–	–	8
P	–	8	–	6

Performance limits (measured with HLP46, $\vartheta_{Öl}$ = 40 °C ±5 °C *[104 °F ±9 °F]*)

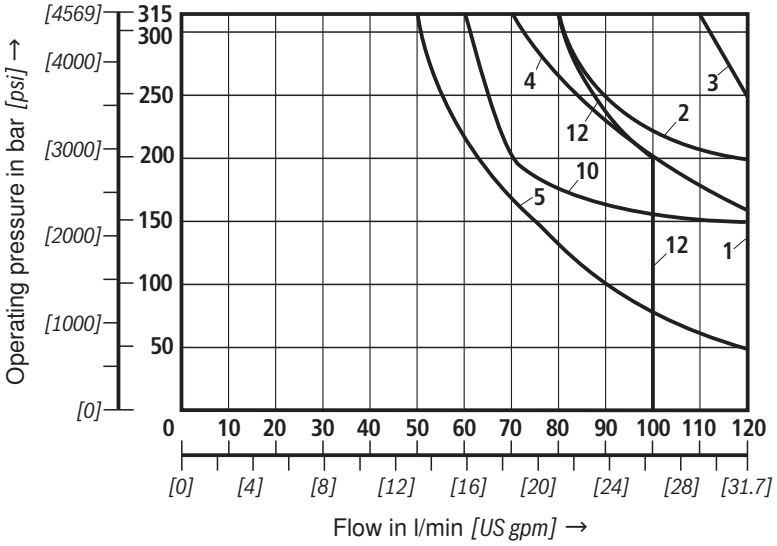
⚠ Attention!

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 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 were at operating temperature, at 10% undervoltage and without tank pre-loading.

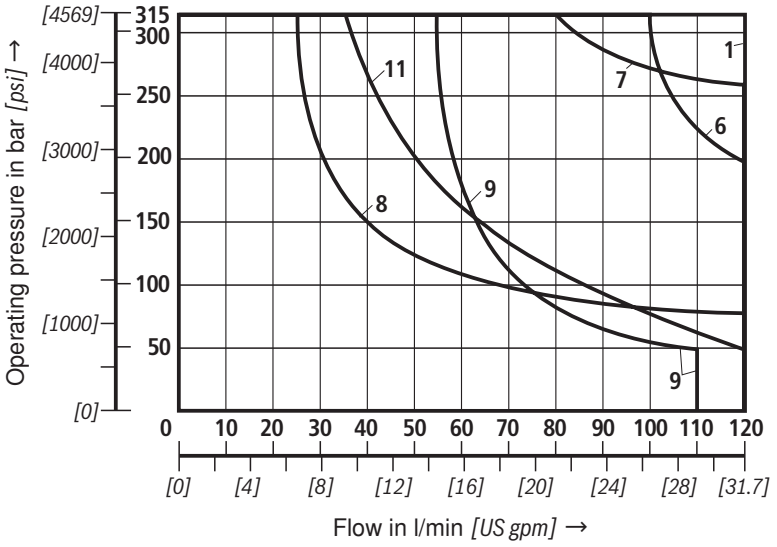


– With orifice Ø 0.6 mm *[0.024 inch]* **(“A06“)**

Curve	Spool symbol
3	D, Y
12	C

– With and without orifice

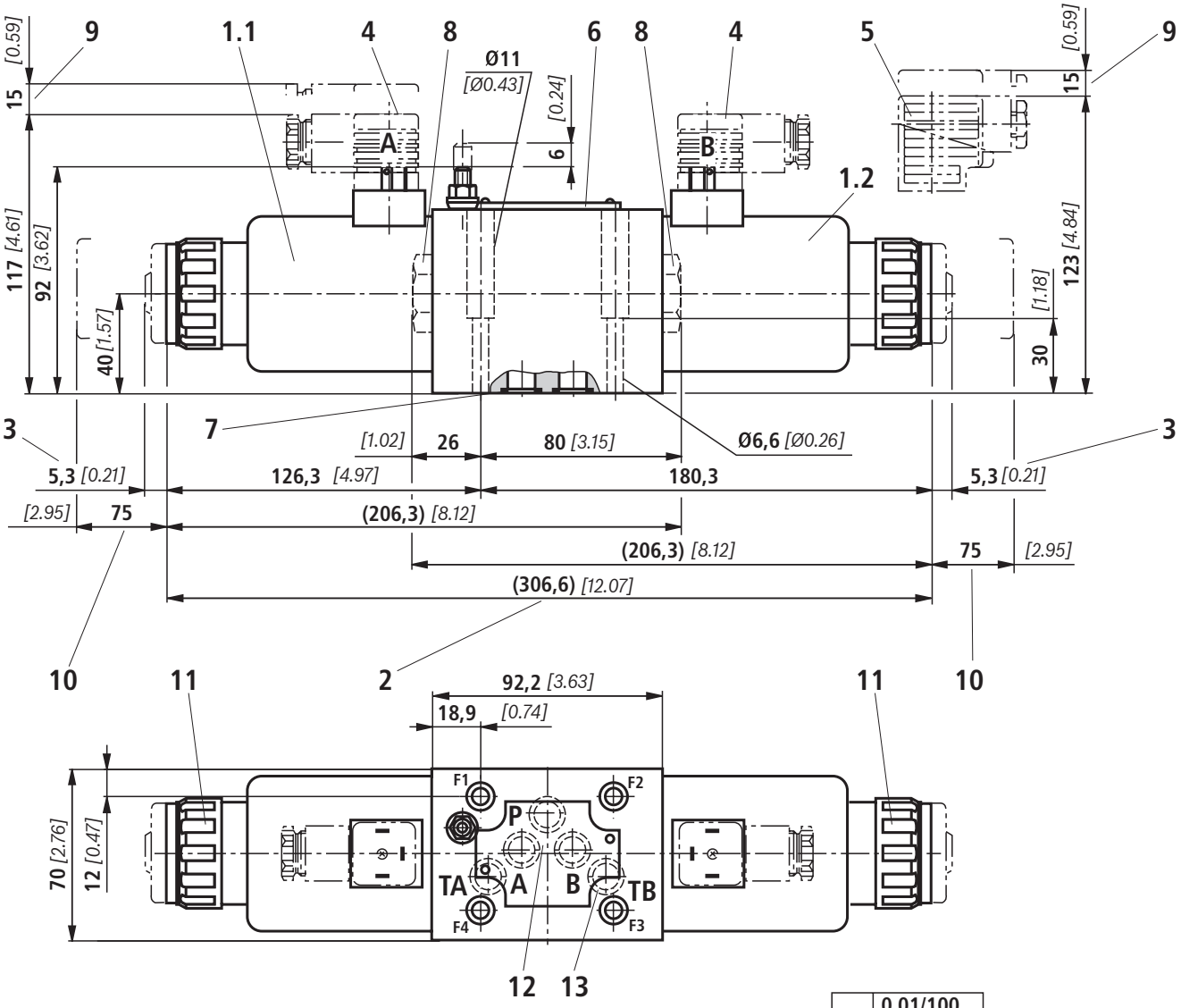
Curve	Spool symbol
1	C/O, C/OF, D/O, D/OF, M
2	A/O, A/OF, E, J, L, U, Q, W
4	G
5	F, P
10	H

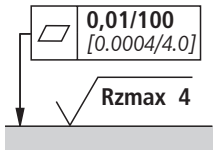


– Without orifice

Curve	Spool symbol
1	D, Y
6	C
7	R
8	T
9	V
11	A, B

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





Required surface quality of valve mounting face

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

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

6 Nameplate

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

8 Plug screw for valves with one solenoid

9 Space required to remove mating connector

10 Space required to remove coil

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

12 Porting pattern to ISO 4401-05-04-0-05, NFPA T3.5.1 R2 D05 (without port TB)

13 Port TB can only be used in conjunction with a separate bore.

For subplates and valve mounting screws, see page 11.

Unit dimensions

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 $\boldsymbol{M}_T$ = 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 (own procurement)
(Friction coefficient μ_{total} = 0.12 to 0.17);
tightening torque $\boldsymbol{M}_T$ = 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 $\boldsymbol{M}_T$ = 20 Nm *[14.7 ft-lbs]* ±15%,
(Friction coefficient μ_{total} = 0.12 to 0.17);
tightening torque $\boldsymbol{M}_T$ = 14 Nm *[10.3 ft-lbs]* ±10%,
Material no. **R978800710**

Notes

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