

4/3-, 4/2- and 3/2- directional valves with switching time adjustment, Model 5-.WE 10 (5-chamber version)

Nominal size 10

Series 3X

Maximum operating pressure 4569 PSI (315 bar)

Maximum flow 31.7 GPM (120 L/min)



Model 5-.WE 10 E3X/CG24N9K4 with plug-in connector

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Features

- Direct solenoid operated spool type directional control valve
- With “5th chamber” for dampened adjustable spool shifting time
- Mounts on standard ISO 4401-5, NFPA/ANSI T3.5.1 M R1 **D 05**, ANSI B 93.7 **D 05** interface
- For subplates, see data sheet RA 45 054
- Wet pin DC solenoids (AC possible with rectifier)
- Removable coils for quick replacement, or conversion, in AC or DC voltages
- Individual solenoid plug-in connectors, or central wiring box to NEMA 4 specifications (see data sheet RA 08 002)
- Optional manual overrides
- 53 standard spool configurations available

Important!

The length of the mounting bolt in series 3X/... is 1-1/2" (40 mm) [formerly 2" (50 mm)]

Ordering code

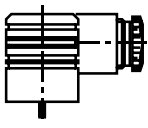
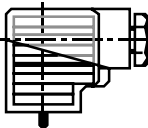
	1	2	3	4	6	7	9	10	11	12	15	18	19	22	23
	5	—	WE	10		3X	/	C			/				*
3 actuator ports	= 3														
4 actuator ports	= 4														
Nominal size 10			= 10												
Symbol e.g. C, E, EA, EB etc. – for possible versions, see page 3															
Series 30 to 39 (30 to 39: unchanged installation and connection dimensions)			= 3X												
With spring return			= No code												
Without spring return with detent			= OF												
Without spring return			= 0												
Wet pin solenoid (oil immersed) with removable coil			= C												
12 V DC			= G12												
24 V DC			= G24												
96 V DC			= G96 ¹⁾												
For further ordering details regarding other voltages and frequencies, see page 6.															
With protected manual override (standard)			= N9												
Without hand override			= No code												
Hand override with protective cap			= N												
Model of electrical connection															
Individual connection; with component plug			= K4 ²⁾												
DIN 43 650-AM2, without plug-in connector															
Without switching time adjustment			= No code												
With adjustable screw (throttle)			= C												
Orifice Ø 0.0236 in (0.6 mm)			= A06												
Orifice Ø 0.0276 in (0.7 mm)			= A07												
Orifice Ø 0.0315 in (0.8 mm)			= A08												
Without cartridge throttle			= No code												
Throttle Ø 0.0315 in (0.8 mm)			= B08												
Throttle Ø 0.0394 in (1.0 mm)			= B10												
Throttle Ø 0.0472 in (1.2 mm)			= B12												
Throttle Ø 0.0591 in (1.5 mm)			= B15												
Throttle Ø 0.118 in (3.0 mm)			= B30												
			Used for flows > performance limits of the valve, effective in the P channel												
NBR seals			= No code												
FKM seals			= V												
(other seals on request)															
⚠ Attention!															
The compatibility of the seals and pressure fluid has to be taken into account!															
Further details in clear text															

AC supply (permissible voltage tolerance ± 10%)	Nominal voltage of the DC solenoid when used with an AC voltage	Order code
110 V - 50/60 Hz	96 V	G96
120 V - 60 Hz	110 V	G110
230 V - 50/60 Hz	205 V	G205

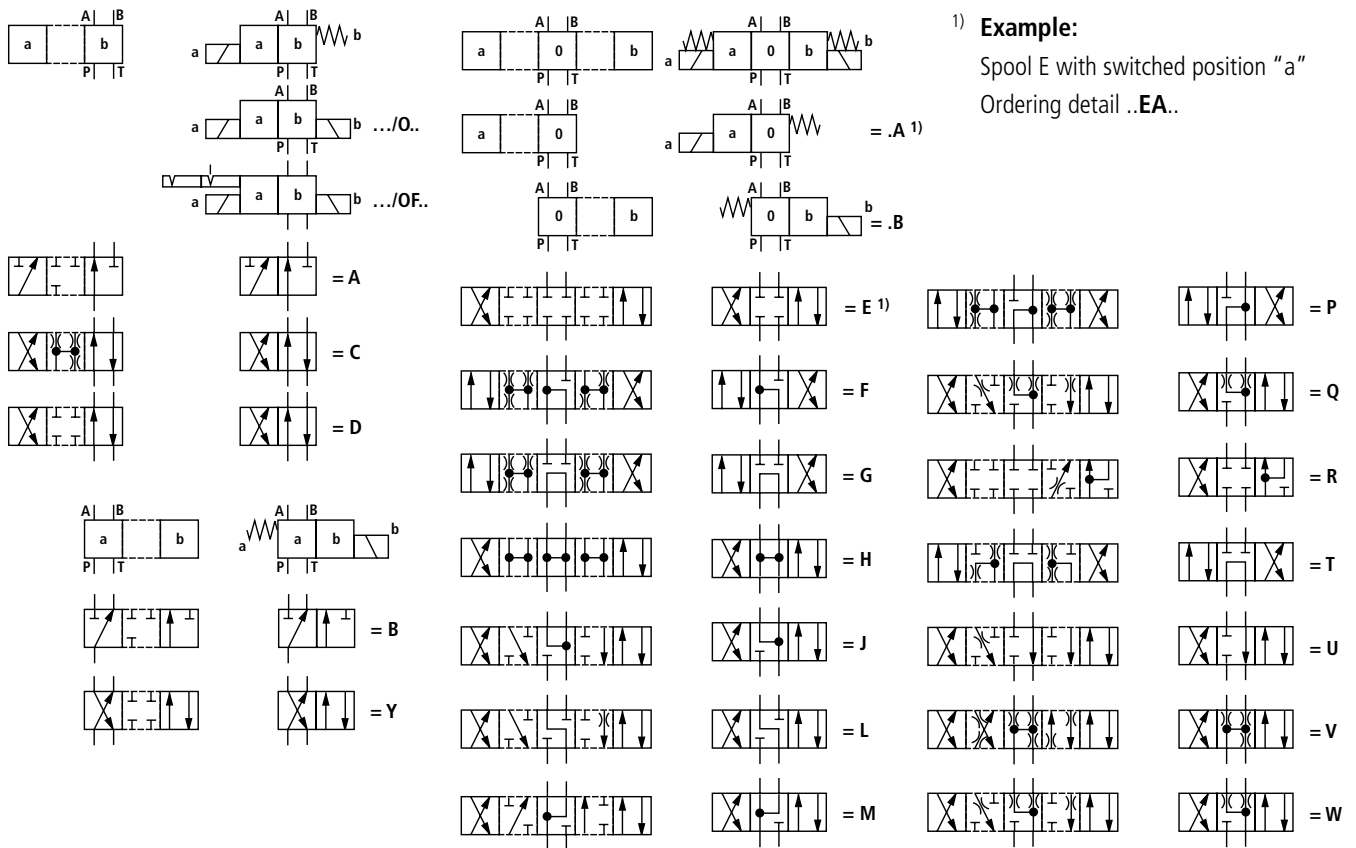
- 1) For the connection to an AC supply a DC solenoid **must** be used which is controlled via a rectifier (see table on the left). For individual connections a large plug-in connector with integrated recifier can be used (separate order, see page 3).
- 2) Plug-in connectors must be ordered separately (see page 3).

⚠ Attention!
The performance limits on page 7 must be taken into account!

Ordering code, plug-in connectors to DIN 43 650 A and ISO 4400 for component plug "K4"

For further plug-in connectors see RA 08 006							
		Material no.					
Valve side	Color	Without circuitry	With indicator light 12 ... 240 V	With LED & rectifier 24 ... 240 V	With rectifier 12 ... 240 V	With indicator light and Z diode protective circuit 24 V	Thread
a	grey	RR00 074683	–	–	–	–	Pg 11
b	black	RR00 074684	–	–	–	–	Pg 11
a/b	black	–	RR00 057292	RR00 057423	RR00 313933	RR00 310995	Pg 11
a	red/brown	RR00 004823	–	–	–	–	1/2" NPT
b	black	RR00 011039	–	–	–	–	1/2" NPT
a/b	black	–	RR00 057453	RR00 057455	RR00 842566	–	1/2" NPT

Symbols



Functional description, section

5-chamber directional valves of model 5-WE are solenoid operated directional spool valves. They control the start, stop and direction of flow with the additional option of adjusting the spool switching time.

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).

Two spring chambers are connected by a drilling (5). As the spool switches, the flow is displaced from one spring chamber to the other via this passage. If the area of this connecting bore is reduced by an orifice, the switching time changes accordingly.

The T channels are isolated from the spring chambers. Switching pulses do not affect control spool (3) and thus, soft switching of the spool can be achieved.

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

In order to ensure correct functioning, care must be taken to ensure that the pressure chamber of the solenoid is filled with oil.

The force of solenoid (2) acts on control spool (3) and switches it from its rest position to the required end position. This then permits flow from P to A and B to T or P to B and A to T.

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

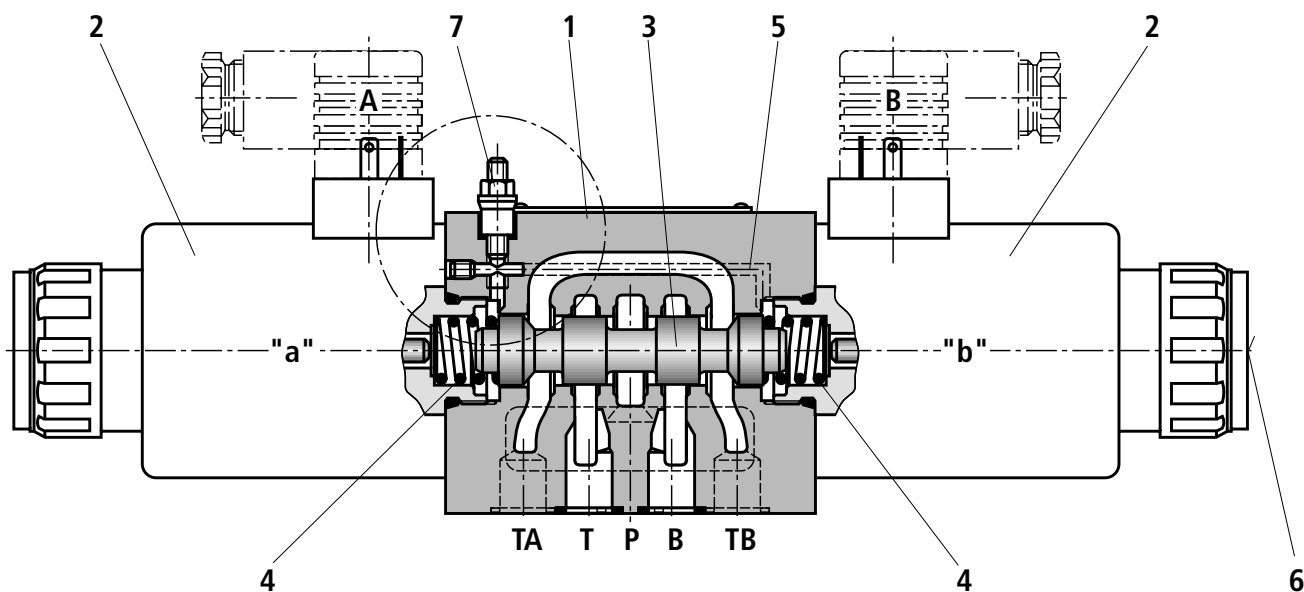
A manual override (6), optional, enables the control spool (3) to be moved without energization of the solenoids.

Adjustable spool switching time (only with DC solenoids)

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

- with throttle screw model 5-WE 10 ../..CG../C.. (7)

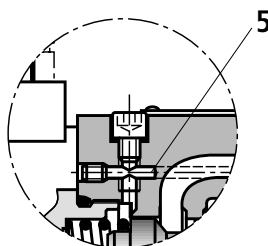
- with orifice model 5-WE 10 ../..CG../A.. (8)



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

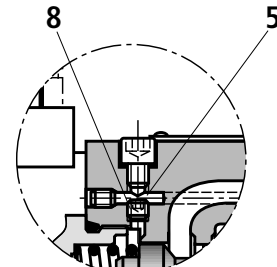
With the installation of orifices, spool switching time may be lengthened by more than 100 ms. The actual time is dependent upon individual system parameters (e.g. pressure, flow and viscosity).

When re-to-fitting or modifying a throttling system, care must be taken that the fluid volume in the spring chambers and the connecting bore (5) is retained, as this is a prerequisite for the smooth operation of the switching time adjustment.



**Without throttle screw/
without orifice**

Model 5-WE 10 ../..CG../..



With orifice

Model 5-WE 10 ../..CG../A..

Functional description, section

Model 5-WE 10.3X/OC....

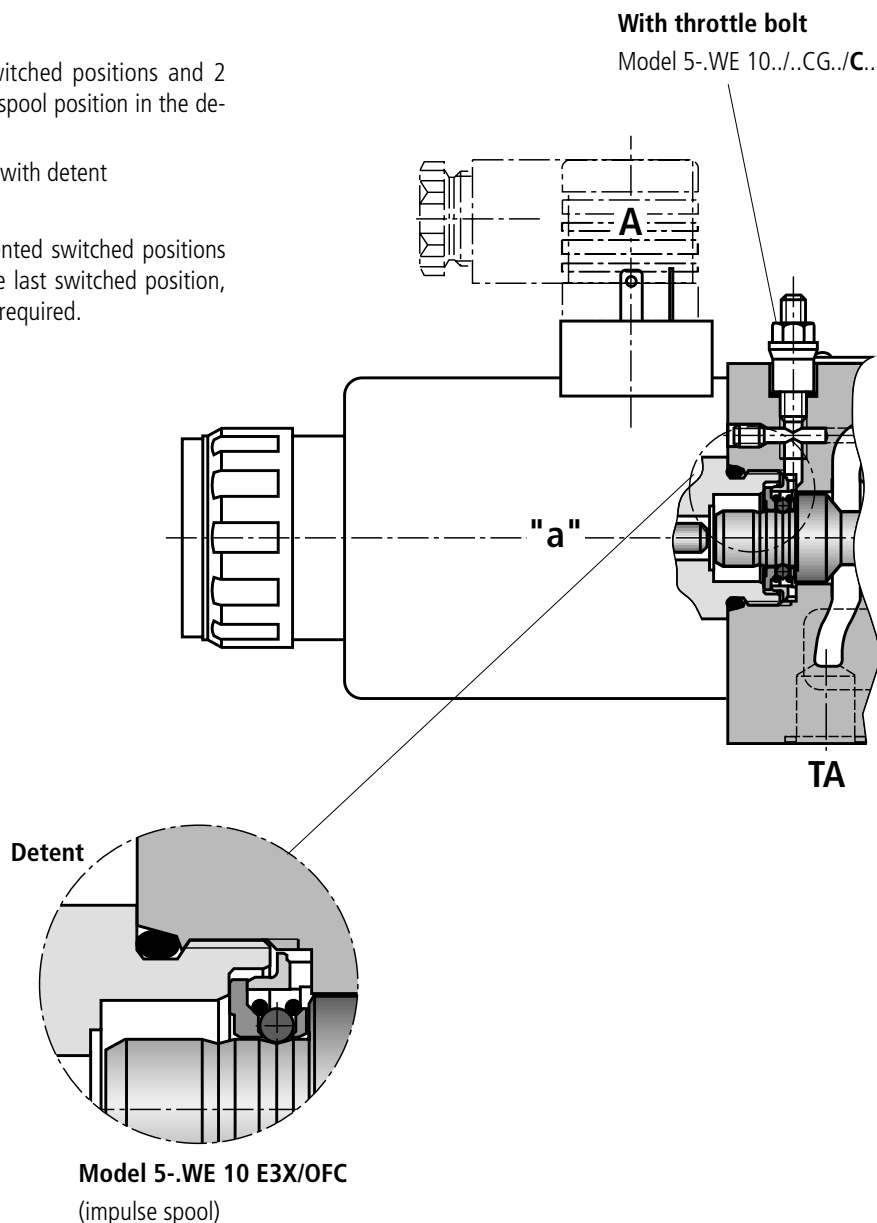
(only possible with symbols A, C and D)

This version is a directional valve with 2 switched positions and 2 solenoids without detent. There is **no** defined spool position in the de-energized condition.

Model 5-WE 10.3X/OFC... (impulse spool), with detent

(only possible with symbols A, C and D)

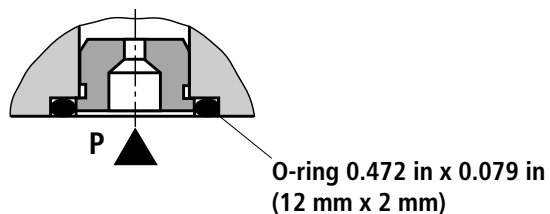
This version is a directional valve with 2 detented switched positions and 2 solenoids. Thus, the spool is held in the last switched position, permanent energization of the solenoid is not required.



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

The use of a throttle insert is required if, due to the operating conditions, flows can occur during the switching process which are larger than the performance limits of the valve allow.

The orifice is to be inserted into the P channel of the directional valve.



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

Installation			optional
Max. ambient temperature		°F (°C)	122 (50)
Weight	Valve with 1 solenoid	lbs (kg)	10.4 (4.7)
	Valve with 2 solenoids	lbs (kg)	13.9 (6.3)

Hydraulic data

Max. operating pressure	Ports A, B, P	PSI (bar)	4569 (315)	with symbols A and B, port T must be used as drain port, if the operating pressure is higher than the permissible tank pressure.
	Port T	PSI (bar)	3046 (210)	
than				
Max. flow		GPM (L/min)	31.7 (120)	
Flow cross-section (switched position 0)	For symbol V	in ² (mm ²)	0.0171 (11) (A/B → T); 0.016 (10.3) (P → A/B)	
	For symbol W	in ² (mm ²)	0.0039 (2.5) (A/B → T)	
	For symbol Q	in ² (mm ²)	0.0085 (5.5) (A/B → T)	
Pressure fluid	Mineral oil (HL, HLP) to DIN 51 524 ¹⁾ ; Fast bio-degradable pressure fluids to VDMA 24 568 (also see RA 90 221); HETG (rape seed oil) ¹⁾ ; HEPG (Polyglycols) ²⁾ ; HEES (synthetic ester) ²⁾ ; other pressure fluids on request			
Pressure fluid temperature range		°F (°C)	-22 to +176 (-30 to +80) (with NBR seals)	
			-4 to +176 (-20 to +80) (with FPM seals)	
Viscosity range		SUS (mm ² /s)	35 to 2318 (2.8 to 500)	
Degree of contamination	Maximum permissible degree of contamination of the pressure fluid is to NAS 1638 class 9. We, therefore, recommend a filter with a minimum retention rate of $\beta_{10} \geq 75$.			

Electrical data

Model of voltage			DC
Available voltages ³⁾	V		12, 24, 42, 60, 96, 110, 180, 205, 230
Voltage tolerance (nominal voltage)	%		±10
Power consumption	W		35
Duty			continuous
Switching time to ISO 6403 (without switching time adjustment)	ON	ms	45 to 70
	OFF	ms	35 to 45
Switching frequency		cycles/h	15000
Protection to DIN 40 050			IP 65
Insulation class VDE 0580			F
Max. coil temperature ⁴⁾		°F (°C)	302 (150)

¹⁾ suitable for NBR **and** FPM seals

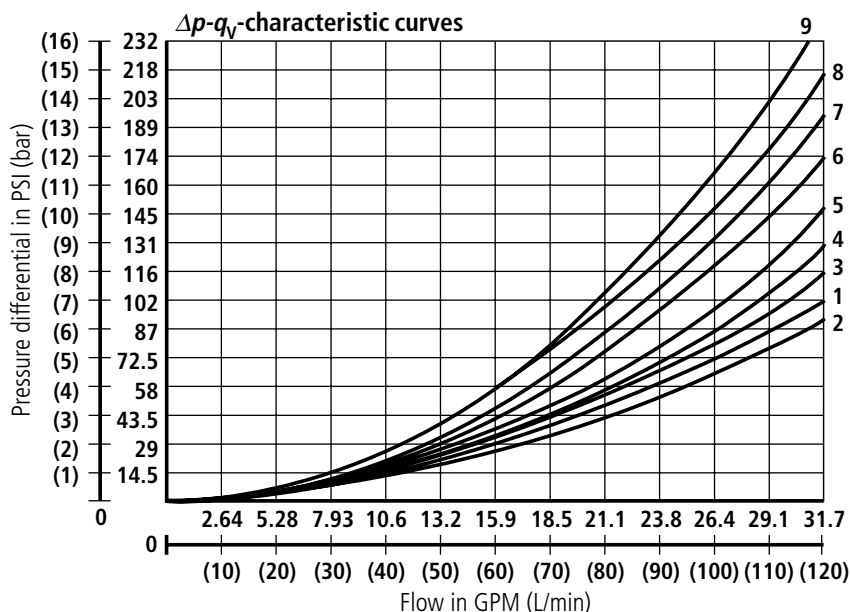
²⁾ **only** suitable for FPM seals

³⁾ special voltages on request

⁴⁾ Due to the surface temperatures which occur on the solenoid coils, the European standards EN563 and EN982 must be taken into account!

When connecting the electrics, the protective conductor (PE \perp) must be connected according to the relevant regulations.

Characteristic curves, measured at $v = 190 \text{ SUS}$ ($41 \text{ mm}^2/\text{s}$) and $t = 122 \text{ }^\circ\text{F}$ ($50 \text{ }^\circ\text{C}$)



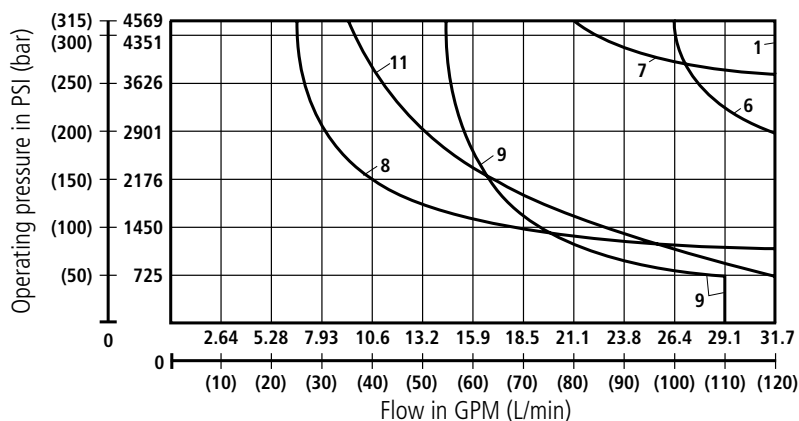
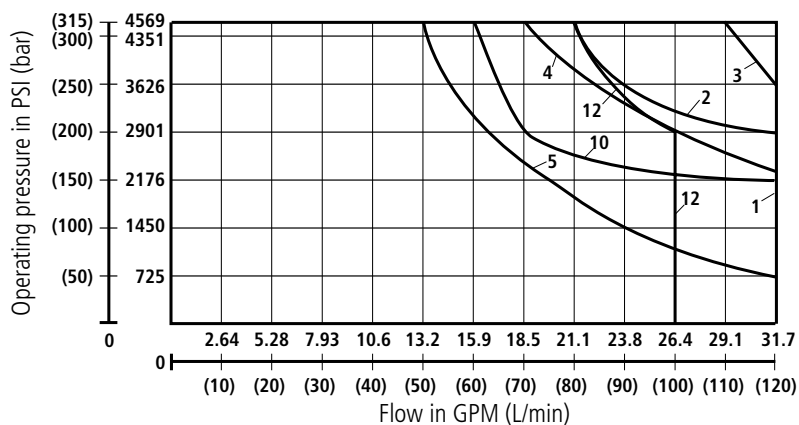
Symbols	Direction of flow			
	P - A	P - B	A - T	B - T
A, B	1	1	-	-
C	1	3	1	3
D, Y	2	2	1	3
E	2	2	3	4
F	2	1	4	7
G	4	4	6	8
H	2	2	1	3
J, L	1	1	4	4
M	2	2	3	4
P	2	1	1	7
Q, V	1	1	3	4
R	1	4	3	-
T	4	4	5	7
U	1	1	3	3
W	1	1	3	5
Switch. pos.		B - A		
R	-	9	-	-
Centr. pos.		B - T	A - T	P - T
F	-	-	4	4
G, T	-	-	-	8
P	-	8	-	6

Performance limits: DC, measured at $v = 190 \text{ SUS}$ ($41 \text{ mm}^2/\text{s}$) and $t = 122 \text{ }^\circ\text{F}$ ($50 \text{ }^\circ\text{C}$)

Because of silting, the shifting function of the valves is dependent upon filtration. To obtain the maximum flow values shown, full filtration of $25 \mu\text{m}$ is recommended. The flow forces acting within the valve also influence performance. In 4-way valves, the data provided is for applications with 2 directions of flow (flow from P to A and an equal, simultaneous return from B to T), (see table).

If only one direction of flow is required, for example, when a 4-way valve has one port plugged, or with unbalanced flows from large rod cylinders, the permissible flow in critical cases can be considerably lower. The A or B spool (3-way) can be used as an approximation of the limited flow performance.

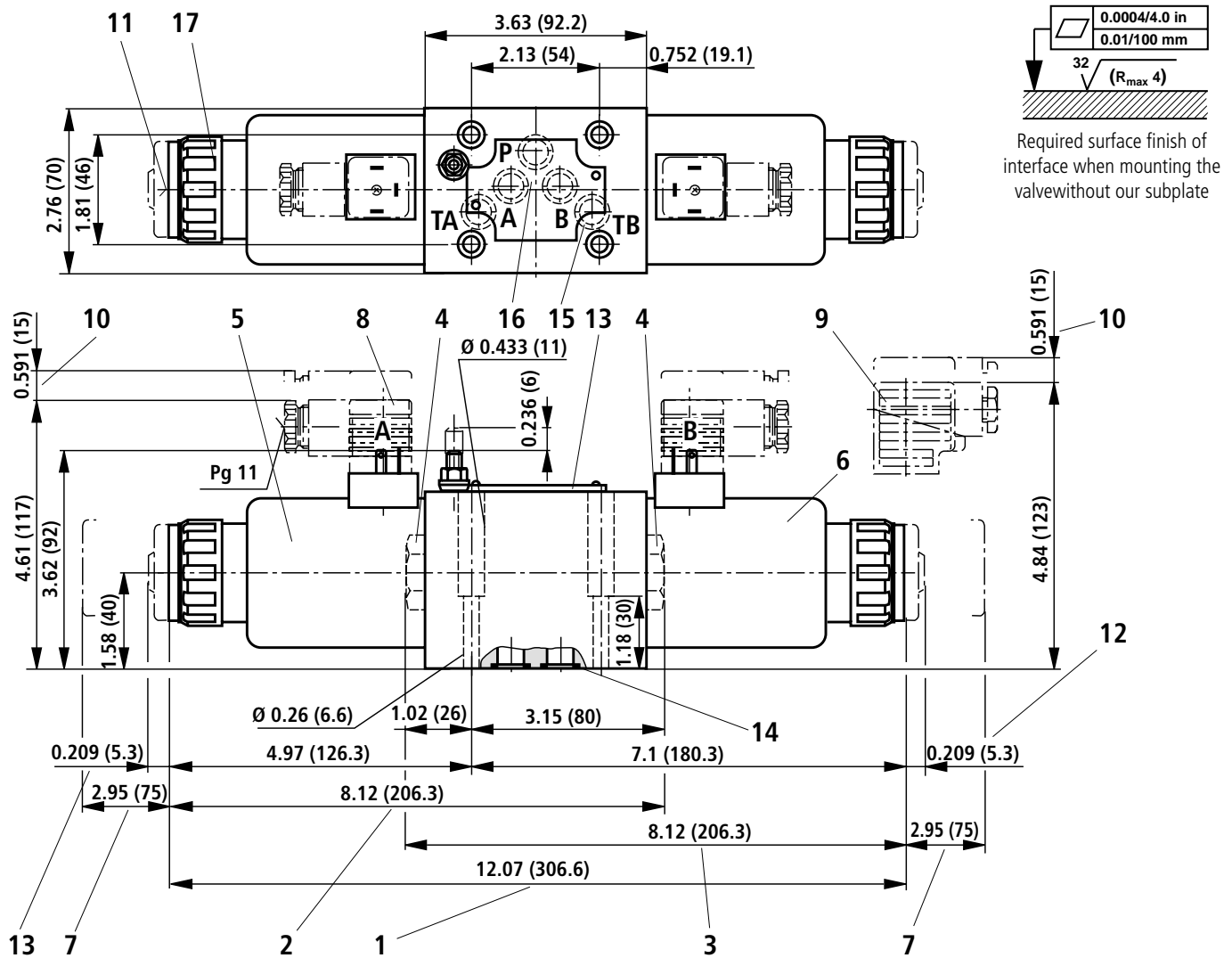
Performance limits measured with solenoids at operating temperature, 10% undervoltage and without tank port pressure.



Char. curve	Symbols
With orifice $\varnothing 0.0236 \text{ in}$ (0.6 mm) („A06“)	
3	D, Y
12	C
With and without orifice	
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

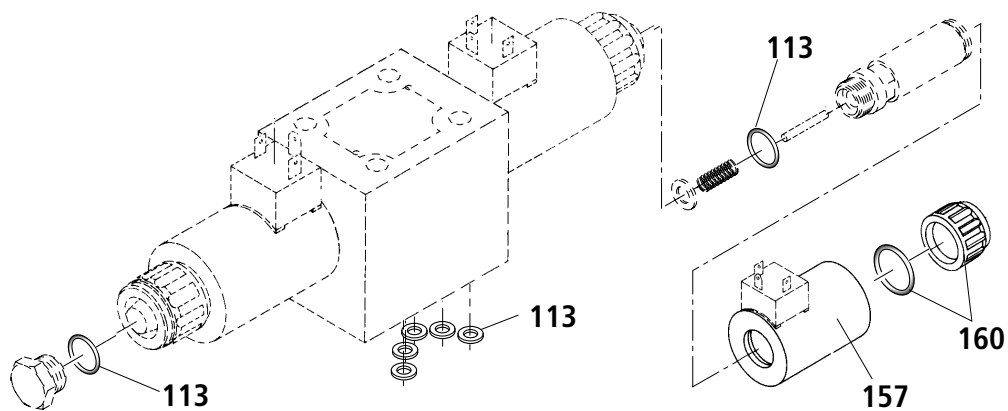
Char. curve	Symbols
Without orifice	
1	D, Y
6	C
7	R
8	T
9	V
11	A, B

Unit dimensions: dimensions in inches (millimeters)



- 1 3-position valve ¹⁾
- 2 2-position valve with 1 solenoid (A, C, D, EA...) ¹⁾
- 3 2-position valve with 1 solenoid (B, Y, EB...) ¹⁾
- 4 Plug for valve with 1 solenoid
- 5 Solenoid "a" (plug-in connector colour grey)
- 6 Solenoid "b" (plug-in connector colour black)
- 7 Space required to remove the coil
- 8 Plug-in connector **without** circuitry to DIN 43 650 ²⁾ (Z4, Z45)
- 9 Plug-in connector **with** circuitry to DIN 43 650 ²⁾ (Z5, Z55)
- 10 Space required to remove plug-in connector
- 11 Manual override "N9" (standard) – Actuation of the manual override is only possible up to a max. tank pressure of 725 PSI (50 bar) – Avoid damage to the manual override pin bore!
- 12 Dim. for manual override "N"
- 13 Name plate
- 14 R-ring 0.512 in x 0.063 in x 0.079 in (13 mm x 1.6 mm x 2 mm) (for valve with throttle insert: O-ring 0.472 in x 0.079 in (12 mm x 2 mm))
- 15 Additional T port (TB) may optionally be used in conjunction with drilled blocks.
- 16 Porting pattern to ISO 4401-5, NFPA T3.5.1M R1 and ANSI B 93.7 **D 05 Subplates**
 G 66/05 (3/8" NPT);
 G 66/12 (SAE-6; 9/16-18);
 G 67/05 (1/2" NPT);
 G 646/12 (SAE-10; 7/8-14);
 G 534/05 (3/4" NPT);
 G 534/12 (SAE-12; 1-1/16-12)
- 17 Valve Mounting Bolts
 4) 1/4 - 20 UNC x 1-1/2" (M6 x 40 mm) socket head cap screws (SAE grade 8 or better)
 Tightening torque 11.4 lb-ft (15.5 Nm)
 Subplate and valve mounting bolts must be ordered separately, see RA 45 054

¹⁾ Dimension without manual override and with protected manual override "N9"
²⁾ must be ordered separately, see page 3.

Ordering code, available spare parts and seals**Spare parts – solenoid**

Item	Designation	Voltage	Material no.
157	Coil for individual connection	12 V	RR00 019792
		24 V	RR00 019793
160	Seal kit – nut for pressure tube without manual override and pressure tube with protected manual override		RR00 874529
	Seal kit – nut for pressure tube with manual override		RR00 874528

Seal kit – valve

Item	Sealing material	Material no.
113	NBR seals	RR00 312582
	FPM seals	RR00 312583

Notes



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