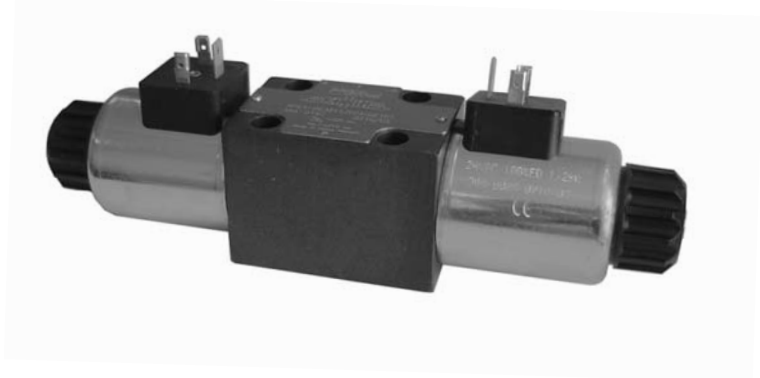
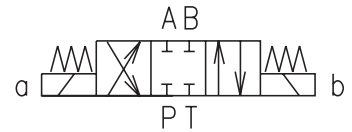


- 4/3-, 4/2- way directional control valves
- Solenoids can be turned around their axis to any position
- Four-land spool - reduced functional dependence on fluid viscosity
- Push button manual override
- Installation dimensions to DIN 24 340 / ISO 4401 / CETOP RP121-H
- Subplates see data sheet HU 0002
- CSA Upon request



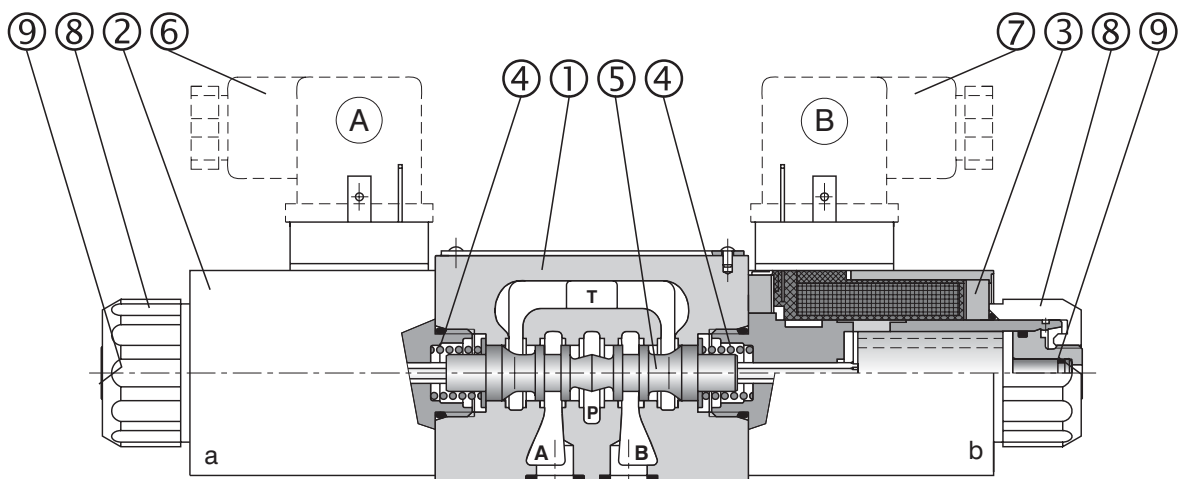
## Functional Description

The RPE3 directional control valves consist of housing (1), a control spool (5) with two centering springs (4) and cylindrical operating solenoids (2, 3).

The three-position directional control valves are fitted with two solenoids and two springs. Two-position directional control valves have either one solenoid and one return spring or two solenoids and a detent assembly.

The operating solenoids are DC solenoids. For AC supply the solenoids are provided with a rectifiers which

are integrated in the DIN connector socket as part of the solenoid. The connectors (6, 7) can be turned by 90°. By loosening the nut (8), the solenoids can be turned or replaced without interfering with any seals of the valve. In the case of solenoid malfunction or power failure, the spool of the valve can be shifted by manual override (9), provided the pressure in T-port does not exceed 25 bar. The valve housing (1) is phosphate coated and the solenoids (2, 3) are zinc coated.



# Order Code

**RPE3-06**   /

**Directional Control Valves Solenoid Operated**

**Valve size**

**Number of valve positions**

two positions **2**  
three positions **3**

**Spool symbols**

see the table spool symbols

**Rated supply voltage of solenoids \***

(at the coil terminals)

12 V DC / 2.72 A

24 V DC / 1.29 A

120 V AC / 60 Hz

 **01200**  
 **02400**  
 **12060**

The AC coils correspond with E5 type

\*Other voltages per request

CSA Upon request 

**Type of solenoid coil**

with terminal for the connector, EN 1745301-803 **E1**

with integrated quenching diode and terminal **E2**

for the connector, EN 1745301-803

with integrated rectifier and terminal **E5**

for the connector, EN 1745301-803

**Sensing of the end position**

**no designation** without sensor

**S1** normally-open sensor to 50bar

**S2** normally-open sensor to 210bar

**S4** normally-closed sensor to 50bar

**no designation**

**Seals**

NBR

**V**

FPM (Viton)

**no designation**

**Orifice in P port**

without orifice

**D1** Ø0.039 inch (1.0 mm)

**D2** Ø0.059 inch (1.5 mm)

**D3** Ø0.079 inch (2.0 mm)

**D4** Ø0.087 inch (2.2 mm)

**D5** Ø0.098 inch (2.5 mm)

**no designation**

**Soft Shift - Spool speed control orifice**

without damping

**T1** orifice Ø0.03 inch (0.7 mm) in solenoid

**no designation**

**Manual override**

tandard

**N1** covered with retaining nut

**N2** covered with rubber boot

**N3** with detent assembly

**Note:** Connector of the position sensor **is not supplied**  
(see ordering number on page 10)

# Technical Data

Valve size	US (mm)	D 03 (06)	
Maximum flow	GPM (L/min)	see p-Q characteristics	
Max. operating pressure at porte P, A, B	PSI (bar)	4600 (320)	
Max. operating pressure at port T	PSI (bar)	3000 (210), 725(50) for version <b>S1, S2</b> and 3000(210) for version <b>S4</b>	
Pressure drop	PSI (bar)	see Δp-Q characteristics	
Hydraulic fluid		Petroleum oils (HM, HL, HLP) Phosphate ester fluids (HFD-R)	
Fluid temperature range for NBR seals	°F (°C)	-22 ... +176 (-30 ... +80)	
Fluid temperature range for FPM seals	°F (°C)	-4 ... +176(-20 ... +80)	
Ambient temperature max.	°F (°C)	+122 (+50)	
Viscosity range	SUS (mm <sup>2</sup> /s)	98 ... 1840 (20 ... 400)	
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999)	
Max. allowable voltage variation	%	DC: ±10	AC: ±10
Max. switching frequency	1/h	15 000	
Switching time, on: at v=156 SUS (32 mm <sup>2</sup> /s)	ms	DC: 30 ... 50	AC: 30 ... 40
Switching time, off: at v=156 SUS (32 mm <sup>2</sup> /s)	ms	DC: 10 ... 50	AC: 30 ... 70
Duty cycle	%	100	
Service life	cycles	10 <sup>7</sup>	
Enclosure type to EN 60 529		IP 65	
Weight - valve with 1 solenoid	lbs (kg)	3.52 (1.6)	
- valve with 2 solenoids		4.84 (2.2)	
Mounting position		any	

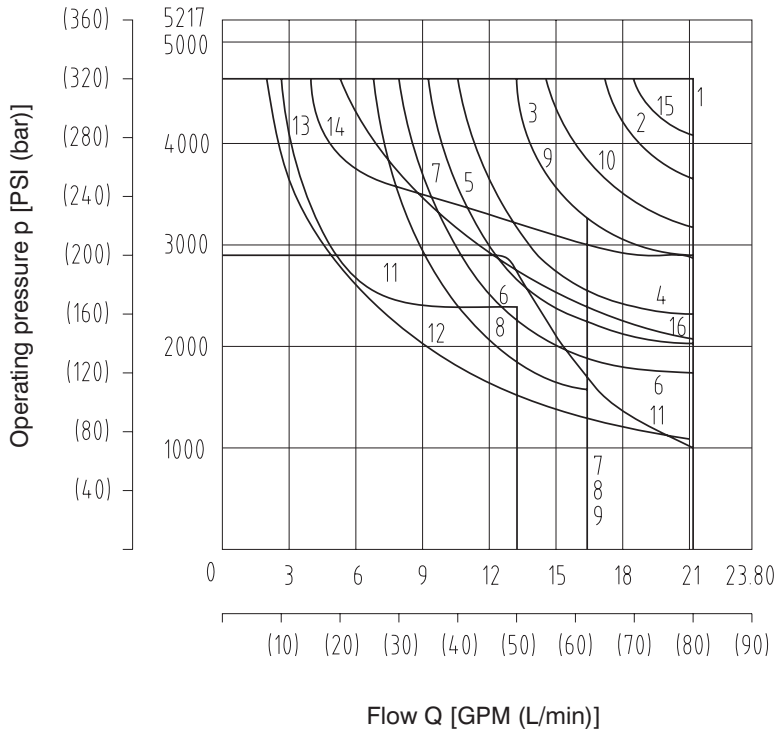
# Spool Symbols

Type	Symbol	Crossover	Type	Symbol	Crossover
Z11			Z51		
C11			Z71		
H11			Z81		
P11			Z91		
Y11			R31		
L21			H51		
B11			F51		
Y41			Z11		
Z21			X11		
C41			C11		
F11			H11		
R11			K11		
R21			N11		
A51			F11		
P51			X25		
Y51			J15		
C51			J75		

# p-Q Characteristics

Measured at  $v = 156 \text{ SUS (32 mm}^2/\text{s)}$

Operating limits for maximum hydraulic power transferred by the directional valve.  
For respective spool type - see spool symbols.

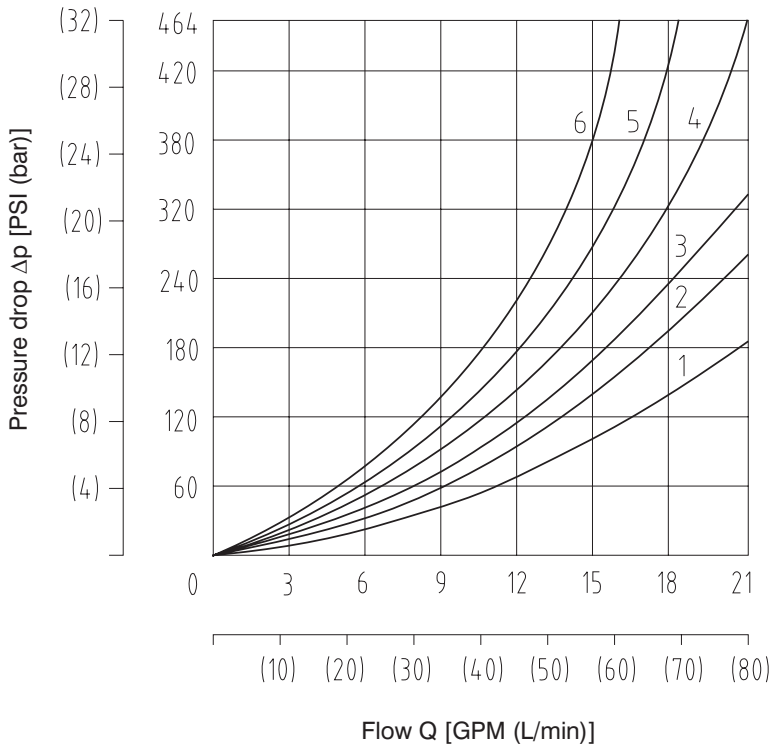


Z11	1
C11	7
H11	4
P11	1
Y11	3
L21	6
B11	9
Y41	7
Z21	1
C41	6
F11	6
R11	4
R21	5
A51	6
P51	1
Y51	3
C51	7
Z51	1
Z71	8
Z81	8
Z91	8
R31	6
H51	8
F51	8
X11	4
K11	8
N11	8
X25	11
J15	1
J75	10

# $\Delta p$ -Q Characteristics

Measured at  $v = 156 \text{ SUS (32 mm}^2/\text{s)}$

Pressure drop  $\Delta p$  related to flow rate.

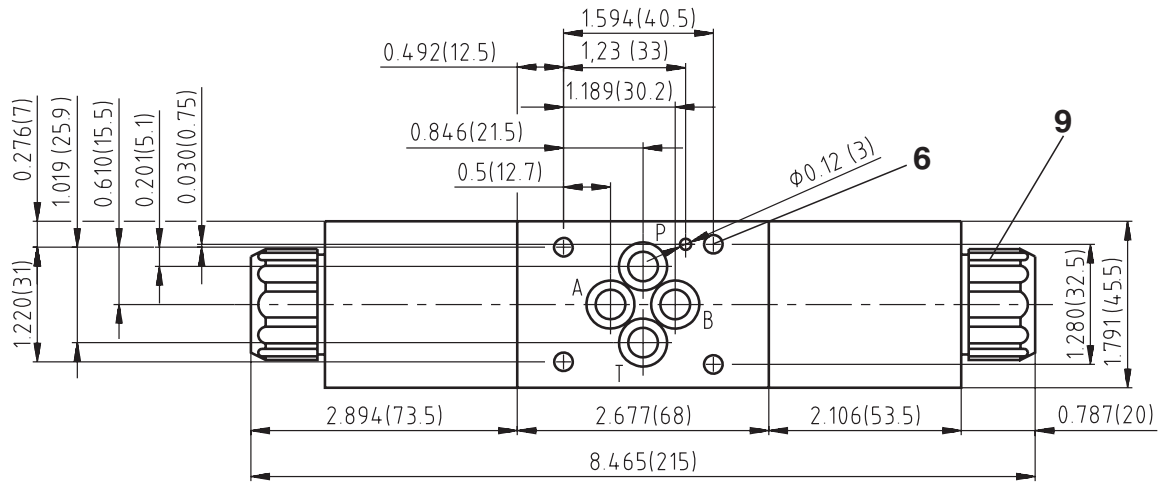
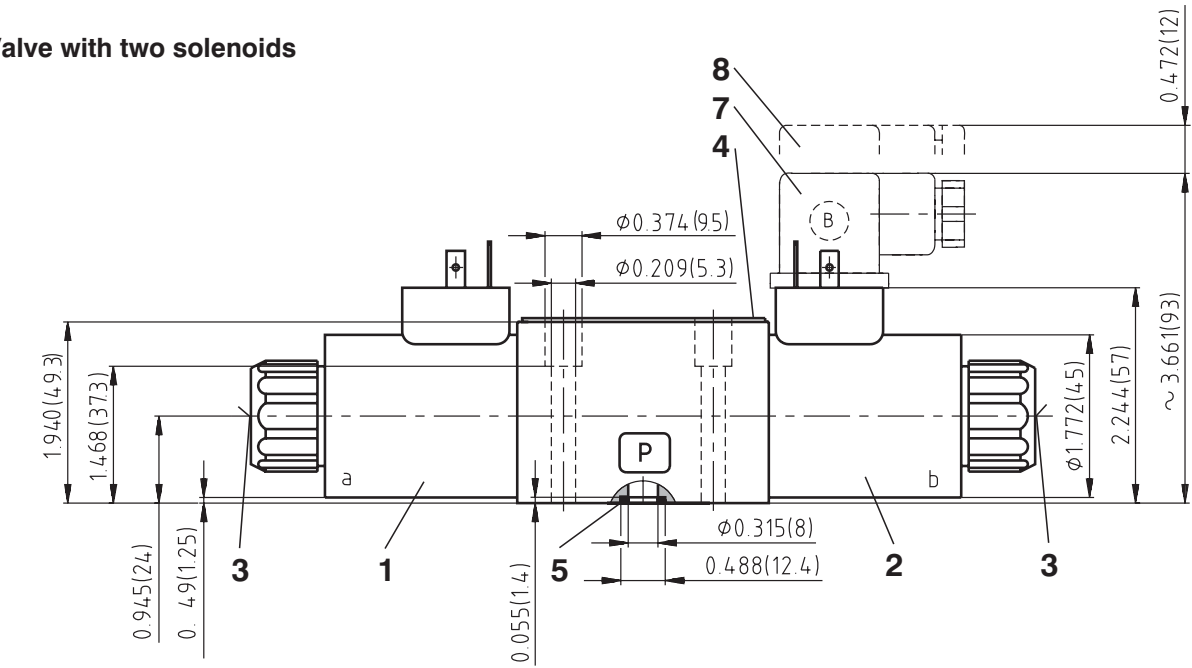


	P-A	P-B	A-T	B-T	P-T
Z11	2	2	3	3	
C11	5	5	5	6	3
H11	2	2	2	3	3
P11	1	1	3	3	
Y11	2	2	2	2	
L21	2	2	3	3	
B11	2	2	3	3	
Y41	3	3	3	3	
Z21		2	3		
C41	4	4			5
F11	1	2		3	3
R11	2	2	3	3	
R21	2	2	3	3	
A51	2	2			
P51		1	3		
Y51		2	2		
C51	2			3	4
Z51		2	3		
Z71	3	3			
Z81			3	3	
Z91	3			3	3
R31	2			3	
H51		2	3		
F51		2	3		
X11	2	2	3	3	
K11		2	3		
N11	2	2	3	3	
X25	3	3	3		
J15	2	2	3	3	
J75	2	2			

# Valve Dimensions

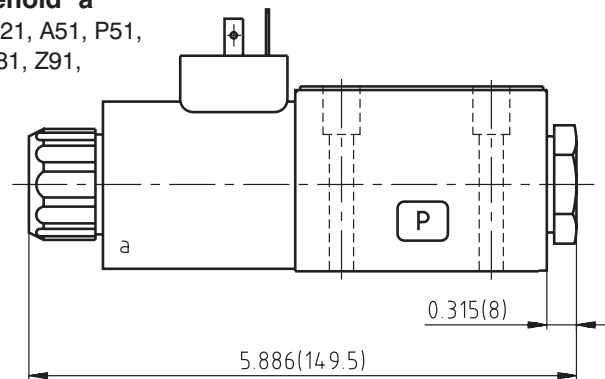
Dimensions in inches and millimeters

## Valve with two solenoids



## Valve with one solenoid "a"

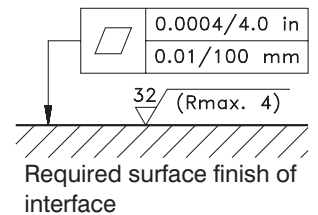
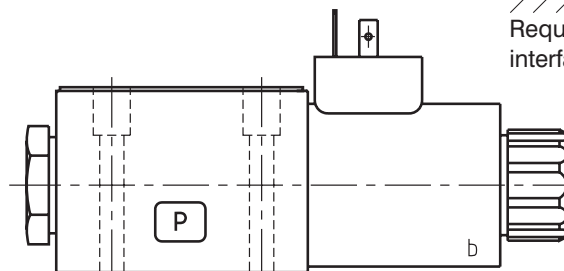
Spool symbols R11, R21, A51, P51, Y51, Z51, C51, Z71, Z81, Z91, R31, H51, F51, X25



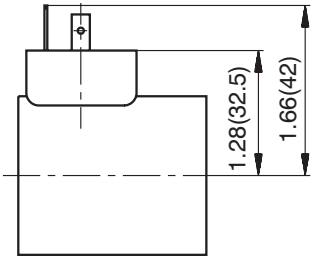
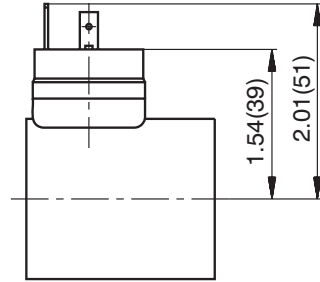
- 1 Solenoid a
- 2 Solenoid b
- 3 Manual override
- 4 Name plate
- 5 Square ring (4 pcs.)  
9.25 x 1.68 supplied with valve
- 6 4 mounting holes
- 7 Electrical connecto, EN 1745301-803
- 8 Space required to remove connector
- 9 Solenoid fixing nut  
[Nut torque 2.95 ft-lbs (4 Nm)]

## Valve with one solenoid "b"

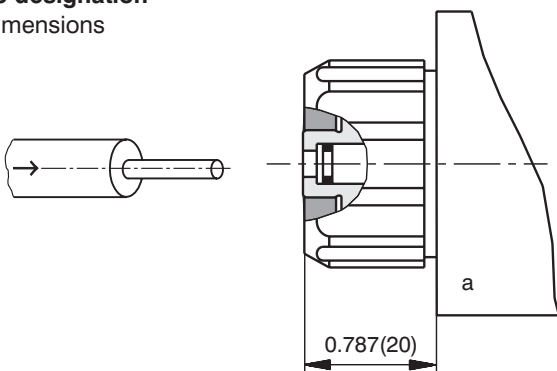
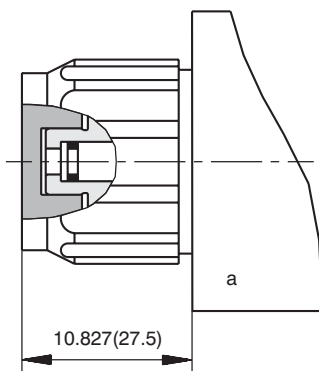
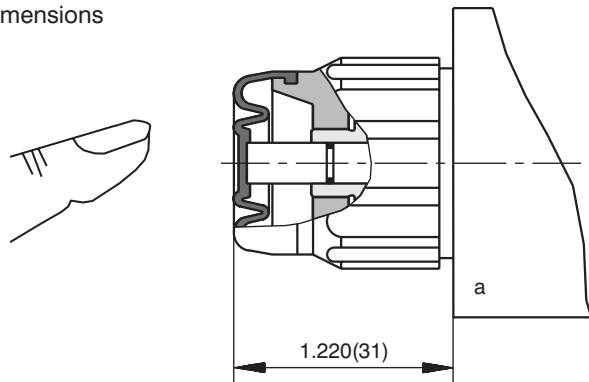
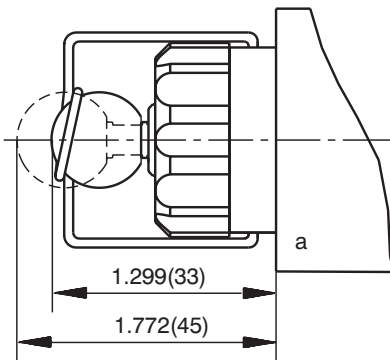
Spool symbols X11, Z11, C11, H11, K11, N11, F11



## Type of the Solenoid Coil

Type	Dimensions	Description
<b>E1</b>		Solenoid coil with terminal for the electrical connector, EN 1745301-803.
<b>E2</b>		Solenoid coil with integrated quenching diode and terminal for the electrical connector, EN 1745301-803.
<b>E5</b>		Solenoid coil with integrated rectifier and terminal for the electrical connector, EN 1745301-803.

## Manual Override

STANDARD	CLOSED NUT
<p><b>no designation</b> Dimensions</p>  <p>Standard model of the manual override. Standard retaining nut of the solenoid.</p>	<p><b>Type N1</b> Dimensions</p>  <p>Manual override with retaining nut. Can be used after removing nut.</p>
RUBBER BOOT	DETENT ASSEMBLY
<p><b>Type N2</b> Dimensions</p>  <p>Manual override protected by rubber boot.</p>	<p><b>Type N3</b> Dimensions</p>  <p>Manual override holds the spool in the shifted position.</p>

## Spool Speed Control Orifice

Type	Dimension	Description
T1		<p>Important: This directional valve provides control spool soft shifting by means of orifice situated in the solenoid armature. To ensure the proper function of the valve, perfect air bleeding of the solenoid is required (by us of bleeding plug (1). The plugs are accessible after removing the rubber boot (2) from the solenoid retaining nut (3).</p>

### Switching times

Switching time, on and off	ms	300 ... 800
----------------------------	----	-------------

The switching times shown are valid for viscosity  $\nu = 156 \text{ SUS}$  ( $32 \text{ mm}^2/\text{s}$ ) and nominal voltage. They are dependent upon working pressure and flow rate of the directional control valve

## Orifice in P-Port

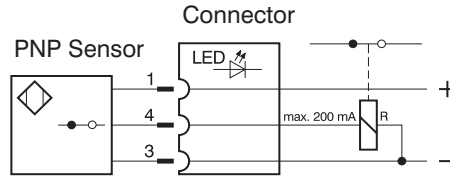
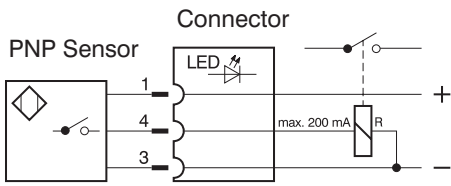
Type	ØD inch (mm)	Dimensions	Description
D1	0.039 (1.0)		<p>P-port orifices limit the flow into the directional control valve.</p> <p><b>Attention:</b> When the orifice in P port is additionally mounted the standard used square ring NBR is replaced with O-ring from Viton.</p>
D2	0.059 (1.5)		
D3	0.079 (2.0)		
D4	0.087 (2.2)		
D5	0.098 (2.5)		

# Spool Ship Position Sensor

**S1, S2** - Circuit diagram of the normally-open sensor

**S4** - Circuit diagram of the normally-closed sensor

The proximity sensor transforms the spool position into an electrical step signal. It can be used with directional control valves with one or two solenoids.



**Technical Data of the Sensor**

		<b>S1, S4</b>	<b>S2</b>
Rated power supply voltage	V	24 DC	
Power supply voltage range	V	10 ... 30 DC	
Rated current	mA	200	
Enclosure type of sensor to EN 60529		IP 67	
Max. operating pressure	bar	725 (50)	3046 (210)
Switching frequency	Hz	1000	
Ambient temperature range	°C	-13 ... +176 (-25 ... +80)	

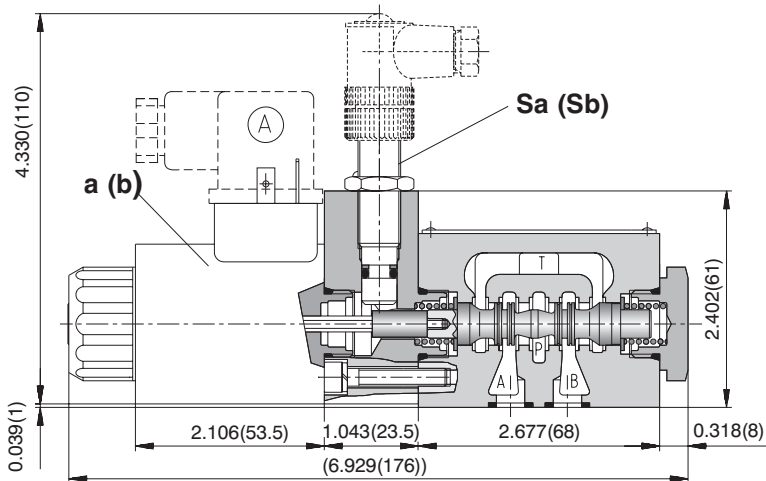
**Technical Data of the Connector**

Power supply voltage range	V	10 ... 30 DC	
Ambient temperature range	°F (°C)	-13 ... +176 (-25 ... +80)	
Indication		yellow LED	

**Two-Position Directional Control Valve**

Dimensions in millimeters

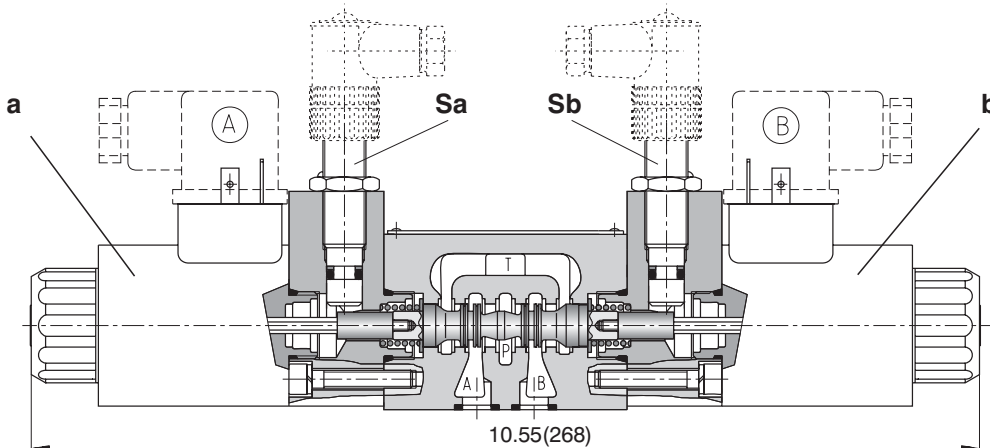
Signal of solenoid a (b)		Signal of sensor Sa (Sb)		LED	
		<b>S1, S2 - normally-open</b>	<b>S4 - normally-closed</b>	<b>S1, S2</b>	<b>S4</b>
0		1	0	ON	OFF
1		0	1	OFF	ON



**Three-Position Directional Control Valve**

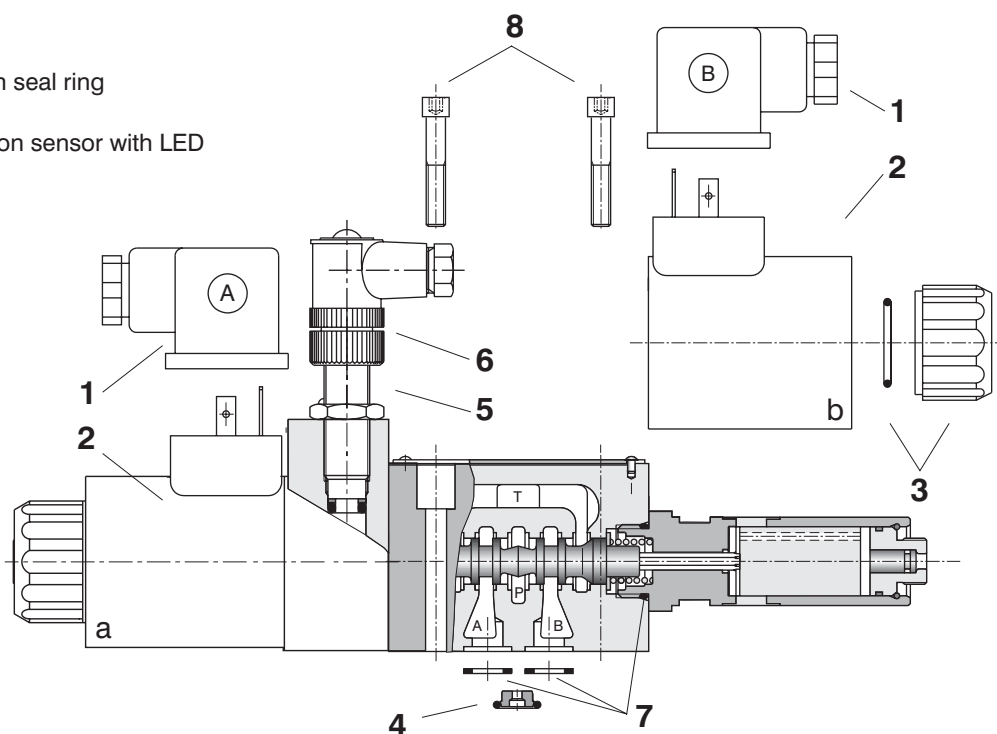
Dimensions in millimeters

Signal of solenoid		Signal of sensor Sa (Sb)				LED			
		<b>S1, S2 - normally-open</b>		<b>S4 - normally-closed</b>		<b>S1, S2</b>		<b>S4</b>	
a	b	Sa	Sb	Sa	Sb	Sa - LED	Sb - LED	Sa - LED	Sb - LED
0	0	1	1	0	0	ON	ON	OFF	OFF
1	0	0	1	1	0	OFF	ON	ON	OFF



# Spare Parts

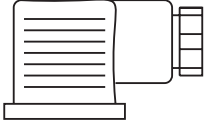
- 1 Electrical connector
- 2 Solenoid coil
- 3 Nut with seal
- 4 Orifice in P port with seal ring
- 5 Sensor
- 6 Connector of position sensor with LED
- 7 Seal kit
- 8 Mounting bolts



<b>Solenoid coil</b>			
Solenoid type	Coil type		
	E1	E2	E5
Order number			
01200	944-0012	944-0013	
01200	944-0001		
02400	944-0024	944-0025	
02400	944-0002		
12060			936-2380
<b>Solenoid retaining nut with seal</b>			
Type of the nut	Seal ring		Order number
Standard nut	22 x 2		484-9951
Closed nut			484-9952
Nut with rubber boot			484-9953
Nut with detent assembly			484-9954
<b>Connector of position sensor</b>			
Type designation	Model	Max. input voltage	Ordering number
K02	connector of position sensor with LED	10...30 V DC	936-9940
S1	normally-open sensor	10...30 V DC	405111129213
S2	normally-open sensor	10...30 V DC	18838900
S4	normally-closed sensor	10...30 V DC	20725300
<b>Orifice in P-port</b>			
Type	∅D inch (mm)	Seal ring	Order number
D1	0.039 (1.0)	9.25 x 1.75	484-9973
D2	0.059 (1.5)		484-9974
D3	0.079 (2.0)		484-9975
D4	0.087 (2.2)		484-9977
D5	0.098 (2.5)		484-9976
<b>Seal kit</b>			
Type	Dimensions, quantity		Order number
Standard - NBR70	9.25 x 1.68 x 1.68 (4 pcs.)	17 x 1.8 (2 pcs.)	484-9961
Viton	9.25 x 1.78 (4 pcs.)	17.17 x 1.78 (2 pcs.)	484-9971

Bolt kit (for studs see HU 0030)		
Dimensions, quantity	Bolt torque	Order number
M5 x 45 DIN 912-10.9 (4 pcs.)	6.6 ft-lbs (8.9 Nm)	484-9958
10-24 UNC x 1.75 (4 pcs.)		2 000 107

Electrical connector, EN 1745301-803			
Type	Max. input voltage	Connector A grey	Connector B black
		Ordering number	
K1	230 V AC/DC	936-9902	936-9901
K5	230 V AC/DC	936-9906	936-9905
K11	230 V AC/DC	936-9925	936-9926
K2	230 V AC/DC	936-9918	936-9919
K2	12 V DC/24 V DC	936-9908	936-9907
K2	120 V AC	936-9916	936-9917
K12	12 V DC/24 V DC	936-9927	936-9933

Electrical Connector, EN 1745301-803				
Type	Description	Max. input voltage	Solenoid connections	
K1	connector - B (black)	230 V AC/DC	M16x1.5 bushing bore $\varnothing$ 0.24-0.31 in ( $\varnothing$ 6-8 mm)	
	connector - A (gray)			
K5	connector - B (black)	230 V AC/DC	M16x1.5 bushing bore $\varnothing$ 0.16-0.24 in ( $\varnothing$ 4-6 mm)	
	connector - A (gray)			
K11	connector - B (black)	230 V AC/DC	1/2 NPTF bushing bore $\varnothing$ 0.24-0.31 in ( $\varnothing$ 6-8 mm)	
	connector - A (gray)			
K2	connector with LED and guenching diode - B (black)	230 V AC/DC	M16x1.5 bushing bore $\varnothing$ 0.24-0.31 in ( $\varnothing$ 6-8 mm)	
	connector with LED and guenching diode - A (gray)			
K12	connector with LED and guenching diode - B (black)	12/24 V DC	1/2 NPTF bushing bore $\varnothing$ 0.24-0.31 in ( $\varnothing$ 6-8 mm)	
	connector with LED and guenching diode - A (gray)			

Recommended solenoid coils used with electrical connector with rectifiers - **type designation K3, K4**

Rated supply source voltage (permissible rated voltage variation $\pm 10\%$ )	Type designation of the solenoid voltage
230 V AC / 0.17 A / 50 (60) Hz	20500

## Caution!

- For applications outside the given parameters, please consult us.
- For directional control valves with two solenoids, one solenoids must be without power before the other solenoid can be powered charged. Switching time for directional valves with detent assembly (impulse control) should not be shorter than 60 ms. With directional valves with cushioned spool shifting, the switching time must correspond with the shifting time.
- Other spool symbols on request.
- The plastic packaging foil is recyclable.
- Mounting bolts, studs and EN-connectors must be ordered separately.
- Certified documentation is available per request.

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