



**ELETTRO-
VALVOLE
A-q**



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INDICE

Pagina	Codice	Schema
1	RPE3-04	
9	RPE3-06	
13	RPEL1-06	
19	RPH3-06	
29	RPE4-10	
39	RPEH4-16	
47	RPEH4-25	

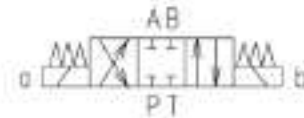
55	MVJ3-06	
59	MVJ3-10	
63	2RVJ1-06	
67	VJR2-06/M	
71	VJR2-10/M	
75	VRN2-06	

81	VRN2-10	
88	2VS3-06	
92	VSO2-10/M	
94	PRM2-06	
112	PRM7-06	
122	PRM8-06	

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		

Directional Control Valves Solenoid Operated Size 04 (D 02) • 320 bar (4600 PSI) • 30 L/min (8.0 GPM)	RPE3-04	HA 4014 10/2010 Replaces HA 4014 12/2007
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- 4/3-, 4/2- way directional control valves with solenoid control
- Solenoids can be turned around their axis to any position
- Push button manual override
- Installation dimensions according to DIN 24 340 / ISO 4401 / CETOP RP121-H
- Subplates see data sheet HA 0002
- CSA Upon request



Functional Description

The RPE3-04 directional control valves consist of cast iron housing (1), control spool (5) with two centering springs (4) and operating solenoids (2, 3).

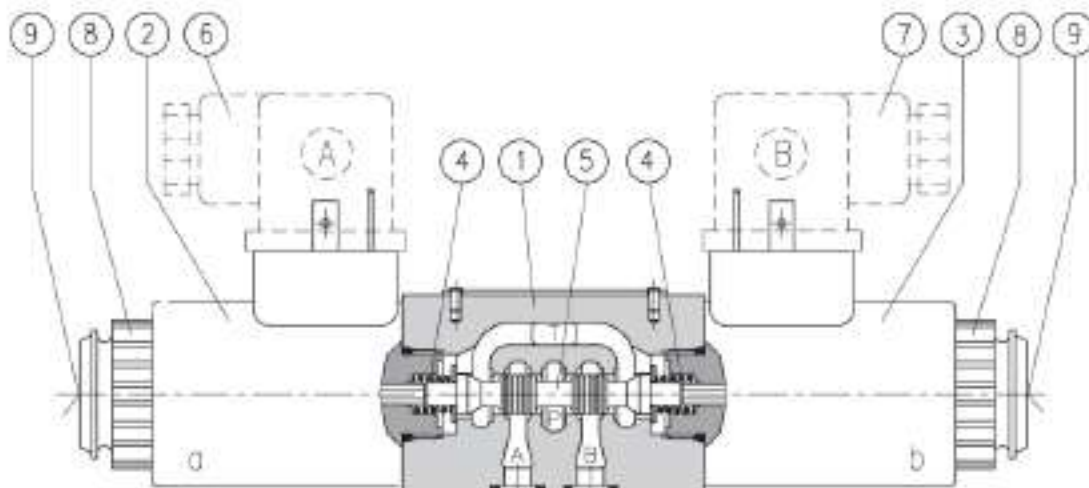
The three-position directional valves are fitted with two solenoids and two springs. Two-position directional valves have either one solenoid and one return spring or two solenoids and a detent assembly.

The operating solenoids are DC solenoids supplied through connectors A, B (6, 7). For AC supply the solenoids are provided with a rectifiers which are

integrated in the DIN connector socket as part of the solenoid. By loosening the nut (8), the solenoid can be turned around its axis up to 360°.

In the case of solenoid malfunction or power failure, the spool of the valve can be repositioned by manual override (9), provided the pressure in the T-port does not exceed 25 bar (363 PSI).

The valve housing (1) is phosphate coated and the solenoids (2, 3) are zinc coated.

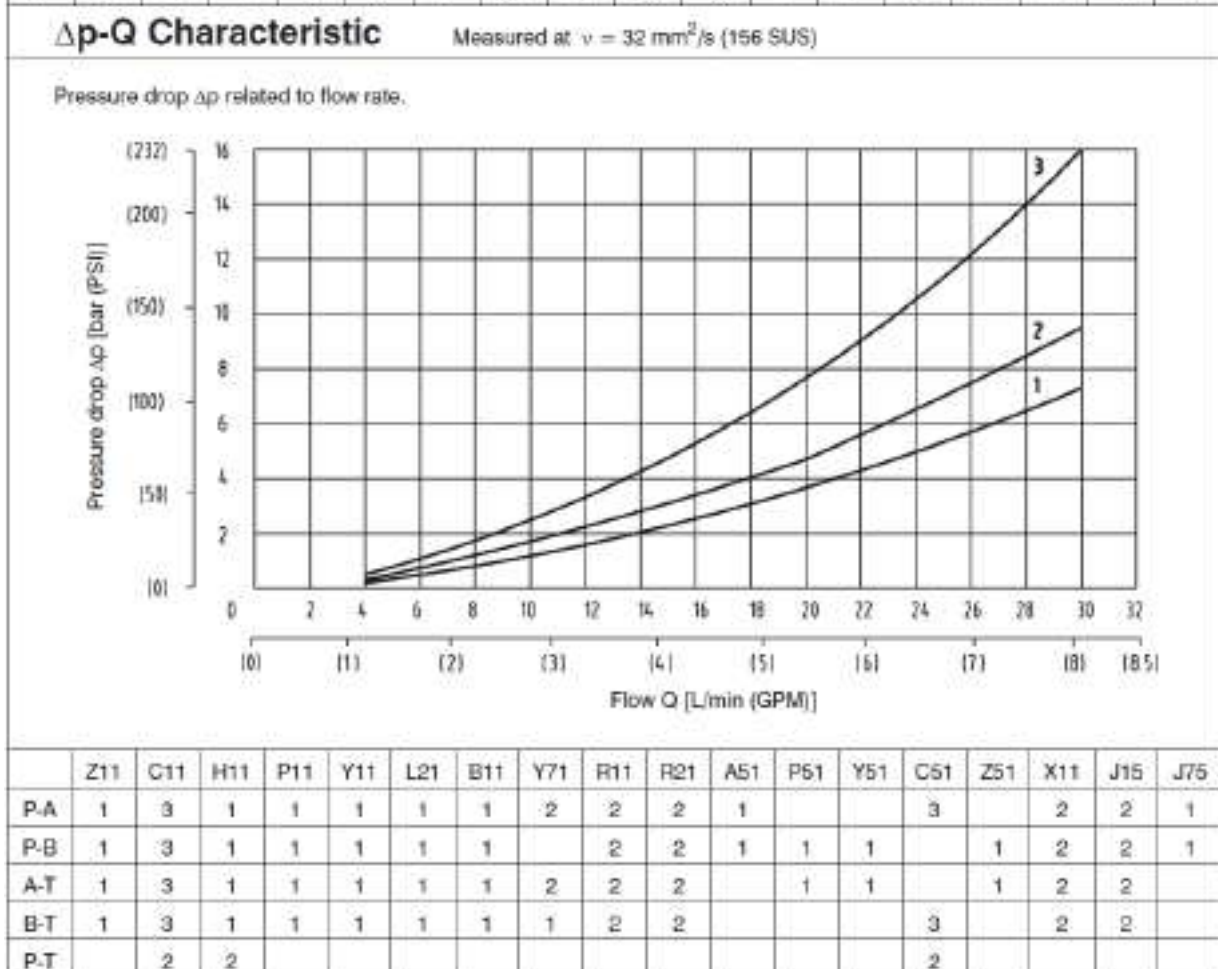
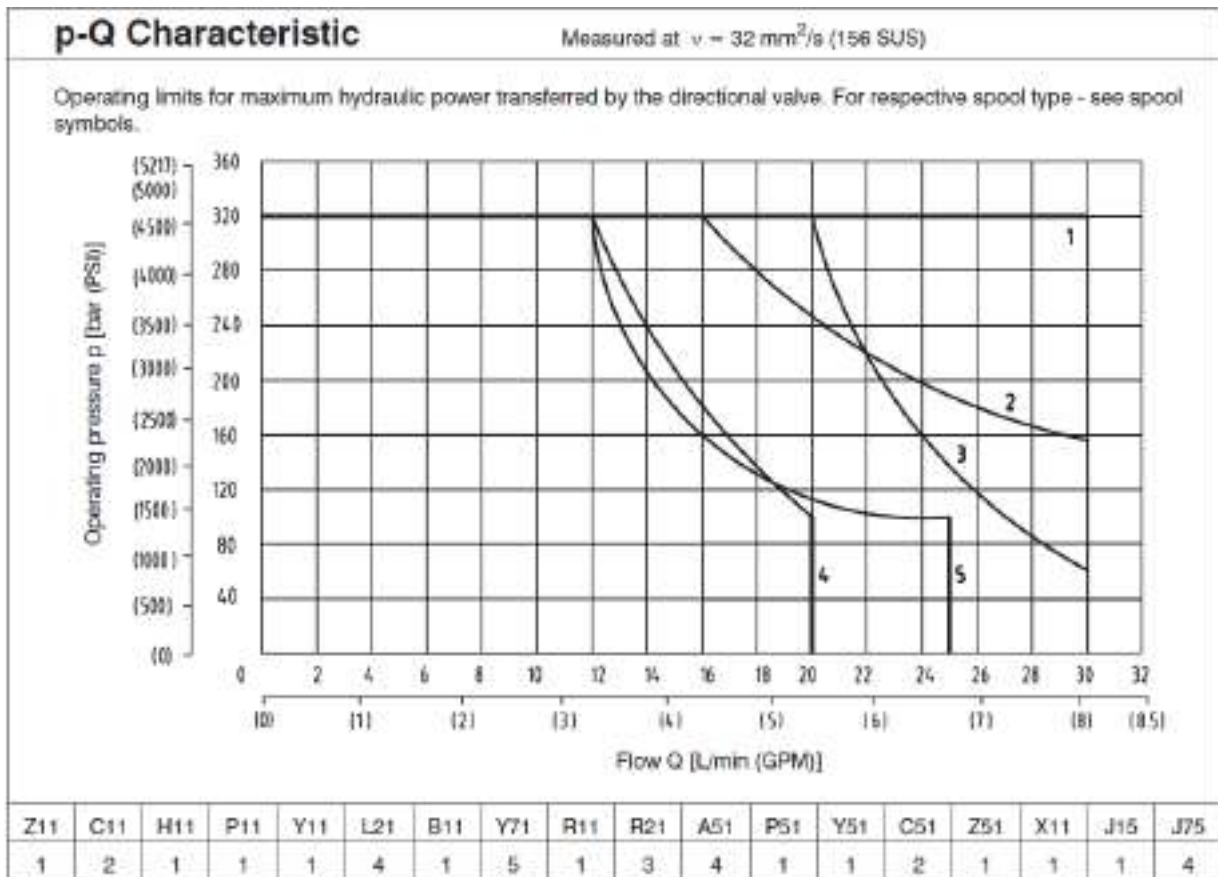


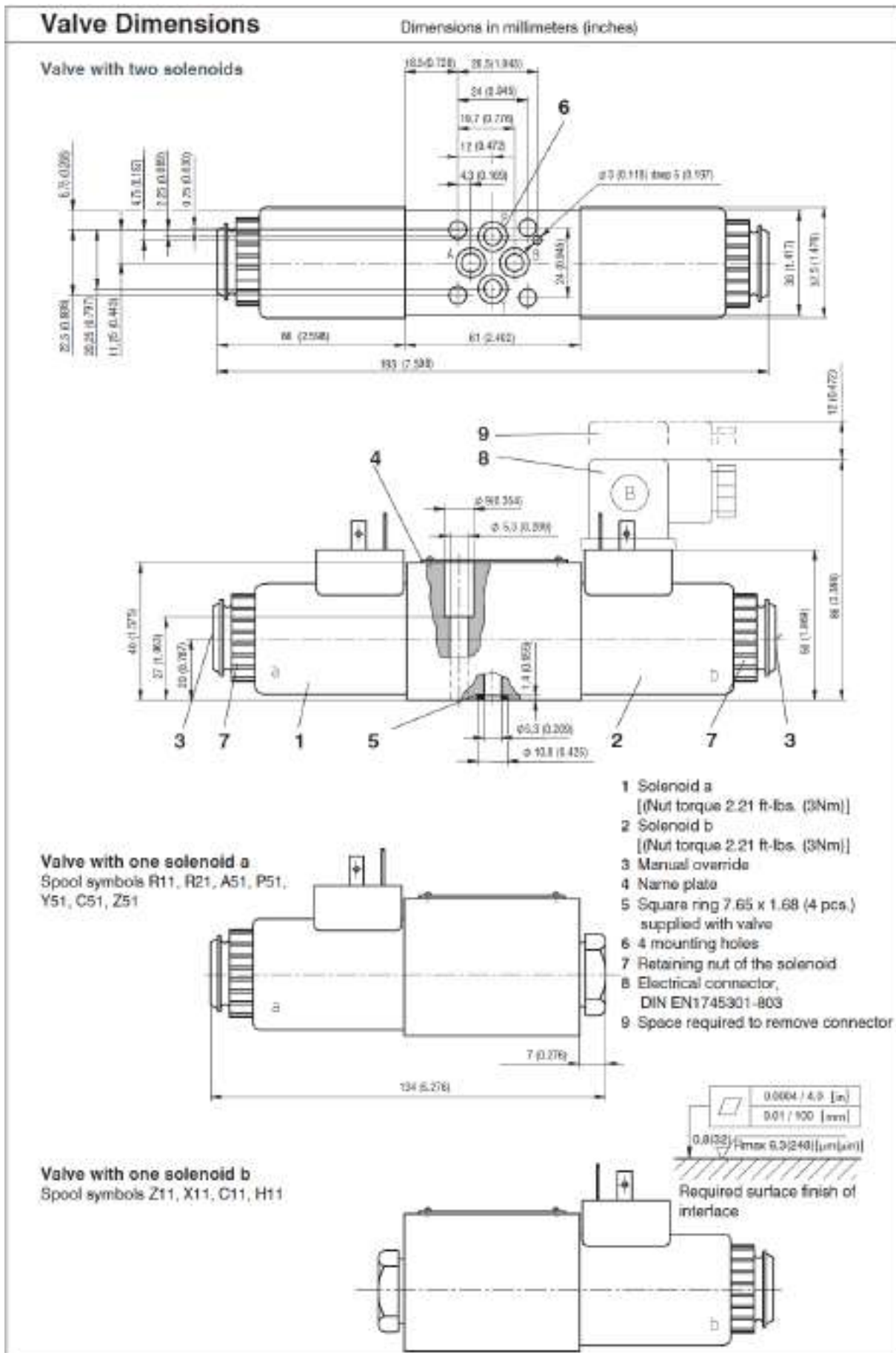
Ordering Code																																															
<p>RPE3-04 <input type="checkbox"/> <input type="checkbox"/> / <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>Solenoid Operated Directional Control Valve</p> <hr/> <p>Nominal size 04(D02)</p> <hr/> <p>Number of valve positions two positions 2 three positions 3</p> <hr/> <p>Functional symbols see the table functional symbols</p> <hr/> <p>Rated supply voltage of solenoids (at the coil terminals)</p> <table style="width: 100%; border: none;"> <tr><td>12 V DC / 2.41 A</td><td>01200</td></tr> <tr><td>14 V DC / 1.66 A</td><td>01400</td></tr> <tr><td>21 V DC / 1.14 A</td><td>02100</td></tr> <tr><td>24 V DC / 1.16 A</td><td>02400</td></tr> <tr><td>42 V DC / 0.59 A</td><td>04200</td></tr> <tr><td>48 V DC / 0.56 A</td><td>04800</td></tr> <tr><td>60 V DC / 0.41 A</td><td>06000</td></tr> <tr><td>102 V DC / 0.24 A</td><td>10200</td></tr> <tr><td>205 V DC / 0.12 A</td><td>20500</td></tr> <tr><td>24 V AC / 1.44 A / 50 (60) Hz</td><td>02450</td></tr> <tr><td>115 V AC / 0.26 A / 50 (60) Hz</td><td>11550</td></tr> <tr><td>230 V AC / 0.14 A / 50 (60) Hz</td><td>23050</td></tr> </table> <p>The AC coils correspond with E5 type. CSA Upon request </p>	12 V DC / 2.41 A	01200	14 V DC / 1.66 A	01400	21 V DC / 1.14 A	02100	24 V DC / 1.16 A	02400	42 V DC / 0.59 A	04200	48 V DC / 0.56 A	04800	60 V DC / 0.41 A	06000	102 V DC / 0.24 A	10200	205 V DC / 0.12 A	20500	24 V AC / 1.44 A / 50 (60) Hz	02450	115 V AC / 0.26 A / 50 (60) Hz	11550	230 V AC / 0.14 A / 50 (60) Hz	23050	<p>no designation V Seals NBR FPM (Viton)</p> <hr/> <p>no designation Orifice in P-Port without orifice</p> <table style="width: 100%; border: none;"> <tr><td>D1</td><td>∅0.8 mm (0.031 in)</td></tr> <tr><td>D2</td><td>∅1.0 mm (0.039 in)</td></tr> <tr><td>D3</td><td>∅1.2 mm (0.047 in)</td></tr> <tr><td>D4</td><td>∅1.5 mm (0.059 in)</td></tr> <tr><td>D5</td><td>∅0.7 mm (0.027 in)</td></tr> </table> <hr/> <p>no designation N2 Manual override standard covered with rubber protective boot</p> <hr/> <p>*Electrical connector, EN 1745301-803</p> <table style="width: 100%; border: none;"> <tr><td>no designation</td><td>without connector</td></tr> <tr><td>K1</td><td>connector without rectifier</td></tr> <tr><td>K2</td><td>connector without rectifier with LED and quenching diode</td></tr> <tr><td>K3</td><td>connector with rectifier</td></tr> <tr><td>K4</td><td>connector with rectifier with LED and quenching diode</td></tr> <tr><td>K5</td><td>connector without rectifier</td></tr> </table> <hr/> <p>E1 Type of solenoid coil with terminal for the connector, EN 1745301-803</p> <p>E2 with terminal for the connector, EN 1745301-803 and quenching diode</p> <p>E3 with AMP-Junior-Timer-connector</p> <p>E4 with AMP-Junior-Timer-connector and quenching diode</p> <p>E5 with integrated rectifier and with terminal for the connector, EN 1745301-803</p> <p style="text-align: center;">Other coils on demand see catalog HA 8007</p>	D1	∅0.8 mm (0.031 in)	D2	∅1.0 mm (0.039 in)	D3	∅1.2 mm (0.047 in)	D4	∅1.5 mm (0.059 in)	D5	∅0.7 mm (0.027 in)	no designation	without connector	K1	connector without rectifier	K2	connector without rectifier with LED and quenching diode	K3	connector with rectifier	K4	connector with rectifier with LED and quenching diode	K5	connector without rectifier
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<p>Note: Electrical connectors have to be ordered separately. See see pages 6 and 8.</p>																																															
<p>Recommended solenoid coils used with electrical connector with rectifiers - type designation K3, K4</p>																																															
<p>Rated supply source voltage (permissible rated voltage variation ± 10 %)</p>	<p>Type designation of the solenoid voltage</p>																																														
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<p>FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE, FUNCTIONAL SYMBOLS AND TABLE OF PREFERRED TYPES ON PAGE 8</p>																																															

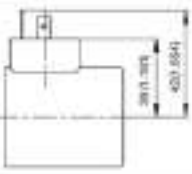
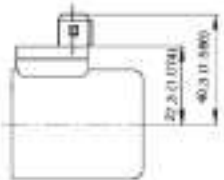
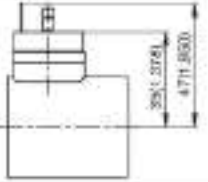
Technical Data		
Valve size	mm (US)	04 (D 02)
Maximum flow	L/min (GPM)	see p-Q characteristics
Maximum operating pressure at ports P, A, B	bar (PSI)	320 (4600)
Maximum operating pressure at port T	bar (PSI)	210 (3045)
Pressure drop	bar (PSI)	see Δp -Q characteristics
Hydraulic fluid	Hydraulic oils of power classes (HL, HLP) to DIN 51524	
Fluid temperature range (NBR / Viton)	°C (°F)	-30 ... +80 (-22 ... +176) / -20 ... +80 (-4 ... +176)
Ambient temperature, max.	°C (°F)	+50 (122)
Viscosity range	mm ² /s (SUS)	20 ... 400 (96 ... 1840)
Maximum degree of fluid contamination	Class 21/18/15 to ISO 4406	
Maximum allowable voltage variation	%	AC: ± 10 DC: ± 10
Maximum switching frequency	h ⁻¹	15 000
Switching time, ON; at v = 156 SUS (32 mm ² /s)	ms	30 ... 50
Switching time, OFF; at v = 156 SUS (32 mm ² /s)	ms	AC: 70 ... 100 DC: 30 ... 50
Duty cycle	%	100
Service life	cycles	10 ⁷
Enclosure type to EN 60 529	IP 65	
Weight - valve with 1 solenoid - valve with 2 solenoid	kg (lbs)	0.9 (1.978) 1.25 (2.747)
Mounting position	unrestricted	

Spool Symbols

Type	Symbol	Crossover	Type	Symbol	Crossover
Z11			P51		
C11			Y51		
H11			C51		
P11			Z51		
Y11			Z11		
L21			X11		
B11			C11		
Y71			H11		
R11			J15		
R21			J75		
A51					



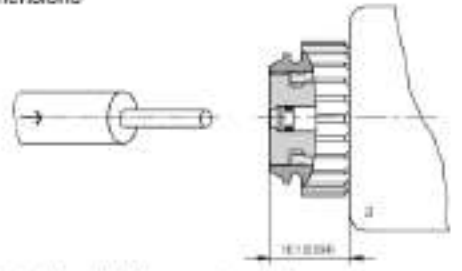
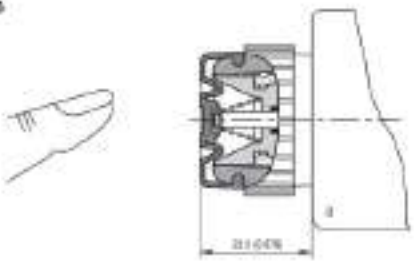


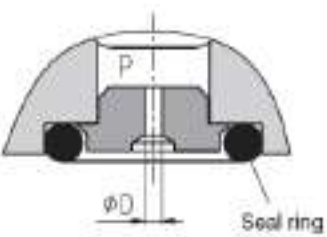
Type of the Solenoid Coil		
Type	Dimensions	Description
E1		Solenoid coil with terminal for the electrical connector, EN 1745301-803.
E2		Solenoid coil with integrated quenching diode (bipolar transit diode) and terminal for the electrical connector, EN 1745301-803.
E3		Solenoid coil with terminal for AMP-Junior-Timer electrical connector.
E4		Solenoid coil with integrated quenching diode (bipolar transit diode) and terminal for AMP-Junior-Timer electrical connector.
E5		Solenoid coil with integrated rectifier and terminal for the electrical connector, EN 1745301-803.

Electrical connector, EN1745301-803

K1	Connector B (black)	without rectifier - M16x1.5 (bushing bore \varnothing 6-8 mm)	230 V AC/DC	
	Connector A (grey)			
K5	Connector B (black)	without rectifier - M16x1.5 (bushing bore \varnothing 4-6 mm)	230 V AC/DC	
	Connector A (grey)			
K2	Connector B (black)	without rectifier with LED and quenching diode - M16x1.5 (bushing bore \varnothing 6-8 mm)	12... 24 V DC	
	Connector A (grey)			
K3	Connector B (black)	with rectifier - M16x1.5 (bushing bore \varnothing 6-8 mm)	230 V AC	
	Connector A (grey)			
K4	Connector B (black)	with rectifier with LED and quenching diode - M16x1.5 (bushing bore \varnothing 6-8 mm)	230 V AC	

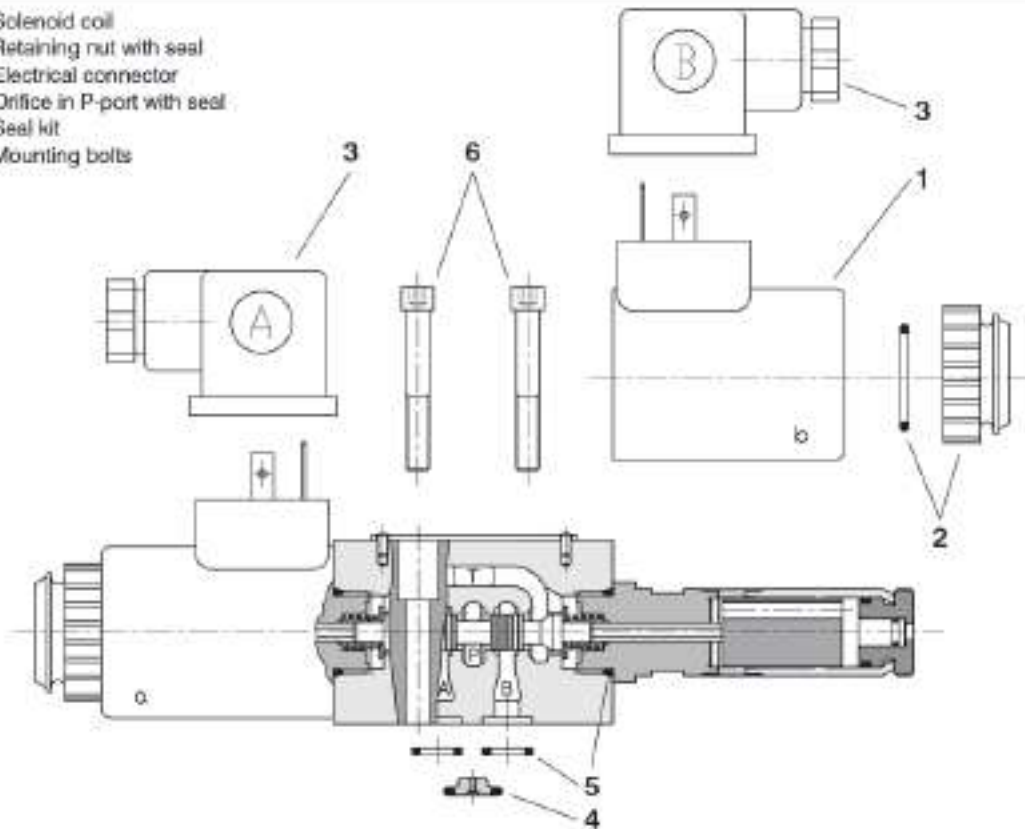
Manual override

STANDARD	RUBBER BOOT
<p>no designation Dimensions</p>  <p>Standard model of manual override. Standard retaining nut of the solenoid.</p>	<p>Type N2 Dimensions</p>  <p>Manual override protected by rubber boot.</p>

Orifice in P-Port			<p>P-port orifices limits the flow into the directional control valve. Attention: When the orifice in P port is additionally mounted the standard used square ring NBR is replaced with O-ring from Viton.</p>
Type	∅D mm (inch)		
D1	0,8 (0.032)		
D2	1,0 (0.040)		
D3	1,2 (0.047)		
D4	1,5 (0.069)		
D5	0,7 (0.028)		

Spare Parts

- 1 Solenoid coil
- 2 Retaining nut with seal
- 3 Electrical connector
- 4 Orifice in P-port with seal
- 5 Seal kit
- 6 Mounting bolts




Solenoid coil

Type designation	Type of the coil				
	E1	E2	E3	E4	E5
	Ordering number				
01200	27316600	27631400	27330200	27631600	
*01200	24140700				
02400	27316700	27632400	27449700	27633400	
*02400	24140800				
20500	27382400	-	-	-	
23050					27449900
*23050					24141000

Solenoid retaining nut with seal

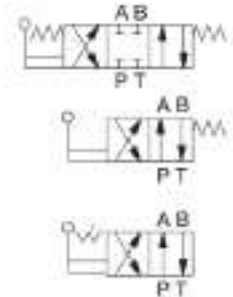
Type of the nut	Seal ring	Ordering number
Standard nut	18 x 1.5	15874500
Nut with rubber boot		15874800

* CSA Upon request 

Electrical connector, EN 175301-803			
Type designation	Connector A grey		Connector B black
	Ordering number		
K1	16202200		16202100
K5	16202600		16202500
K2	16202800		16202700
K3	16202400		16202300
K4	16203000		16202900
Orifice in P-Port			
Type designation	∅D mm (in)	Seal ring	Ordering number
D1	0.8 (0.031)	7.65 x 1.78	15874000
D2	1.0 (0.039)		15874100
D3	1.2 (0.047)		15874200
D4	1.5 (0.059)		15874300
D5	0.7 (0.027)		15874900
Seal kit			
Type	Dimensions, number		Ordering number
	Square ring	O-ring	
Standard NBR70	7.65 x 1.68 (4 pcs.)	16 x 2 (2 pcs.)	15873800
Viton	7.65 x 1.78 (4 pcs.)	16 x 2 (2 pcs.)	15874400
Mounting bolts			
Dimensions, number		Tightening torque	Ordering number
M5 x 35 DIN 912-10.9 (4 pcs.)		5 Nm (3.68 lbf . ft)	15874600
Preferred Types of Valves			
Type	Ordering number	Type	Ordering number
RPE3-042Z11/01200E1	16711100	RPE3-042R11/02400E1	15855300
RPE3-043Z11/01200E1	15849000	RPE3-042R21/02400E1	15855700
RPE3-043C11/01200E1	15849900	RPE3-042A51/02400E1	15855200
RPE3-043H11/01200E1	15850300	RPE3-042Y51/02400E1	15855100
RPE3-043Y11/01200E1	15850500	RPE3-042J15/02400E1	15856600
RPE3-042R11/01200E1	15851900	RPE3-042Z11/23050E5	21714900
RPE3-042R21/01200E1	16711000	RPE3-043Z11/23050E5	16712400
RPE3-042A51/01200E1	16710900	RPE3-043C11/23050E5	16712700
RPE3-042Y51/01200E1	15851800	RPE3-043H11/23050E5	15858800
RPE3-042J15/01200E1	16711400	RPE3-043Y11/23050E5	16712500
RPE3-042Z11/02400E1	15855900	RPE3-042R11/23050E5	15859100
RPE3-043Z11/02400E1	15852200	RPE3-042R21/23050E5	21764800
RPE3-043C11/02400E1	15852800	RPE3-042A51/23050E5	16712600
RPE3-043H11/02400E1	15853200	RPE3-042Y51/23050E5	21785500
RPE3-043Y11/02400E1	15853600	RPE3-042J15/23050E5	21785600
Caution!			
<ul style="list-style-type: none"> When the distributor contains two electromagnets any of the two electromagnets can be switched on only after the other one switches off. The electromagnets switching time on distributors with locking arrangement must not be shorter than 60 ms. Distributors with other interconnections than those shown in the catalogue can be supplied on request. The packaging foil can be recycled The transport base plate can be returned to the manufacturer. Mounting screws M5 x 35 DIN 912-10.9 or bolts must be ordered separately. The screws tightening torque is 5 Nm (3.68 lbf . ft). The mentioned data only serve to describe the product and in no case are to be understood in terms of law as guaranteed characteristics. 			

	<p>Directional Control Valves Manually Operated</p> <p>Size 06 (D 03) • 350 bar (5076 PSI) • 80 L/min (21 GPM)</p>	<p>RPR3-06</p>	<p>HA 4004 04/2011</p> <p>Replaces: HA 4004 1/2008</p>
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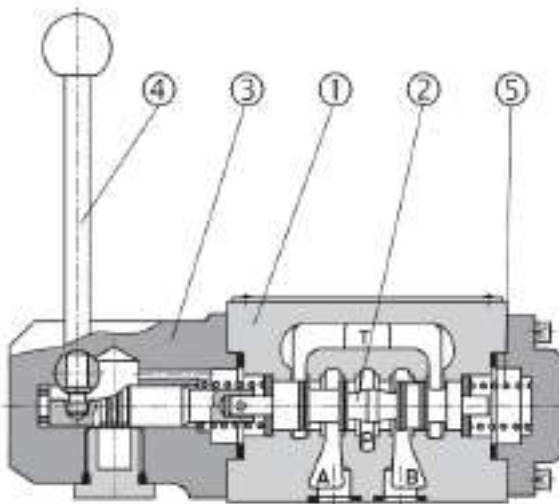
- 4/3 and 4/2 - way spool type directional control valves
- Hand-lever operated
- Actuating section can be rotated in four positions 90° apart
- Installation dimensions to DIN 24 340 / ISO 4401 / CETOP RP121-H



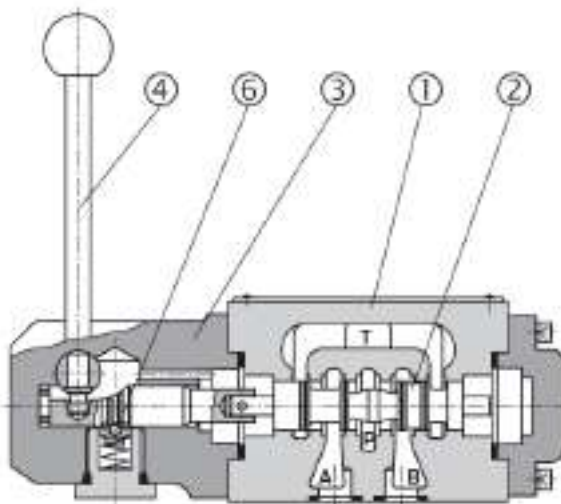
Functional Description

The hand operated directional control valves are used mainly to control start, stop and direction of fluid. The valves consist of housing (1) with control spool (2) and the actuating section (3). The actuating section consists either of the hand lever (4) and of one or two return spring (5), or of the hand lever (4) and the detent assembly (6). The detent assembly holds the spool in its last shifted position.

The directional control valves are being manufactured as two-position and three-position valves (see table with functional symbols). The valve housing (1) is phosphate coated, the components of the actuating section (3) are zinc coated.

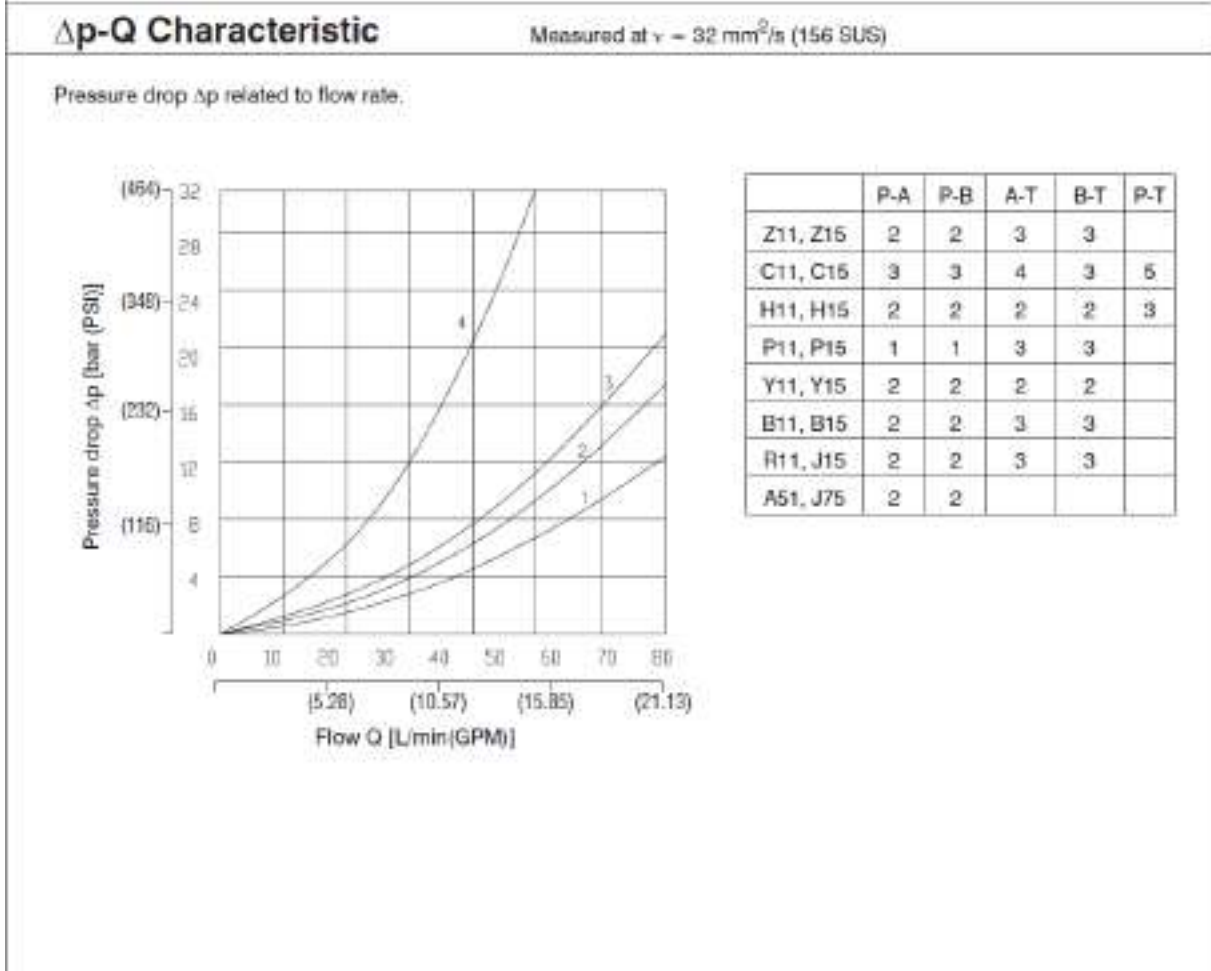
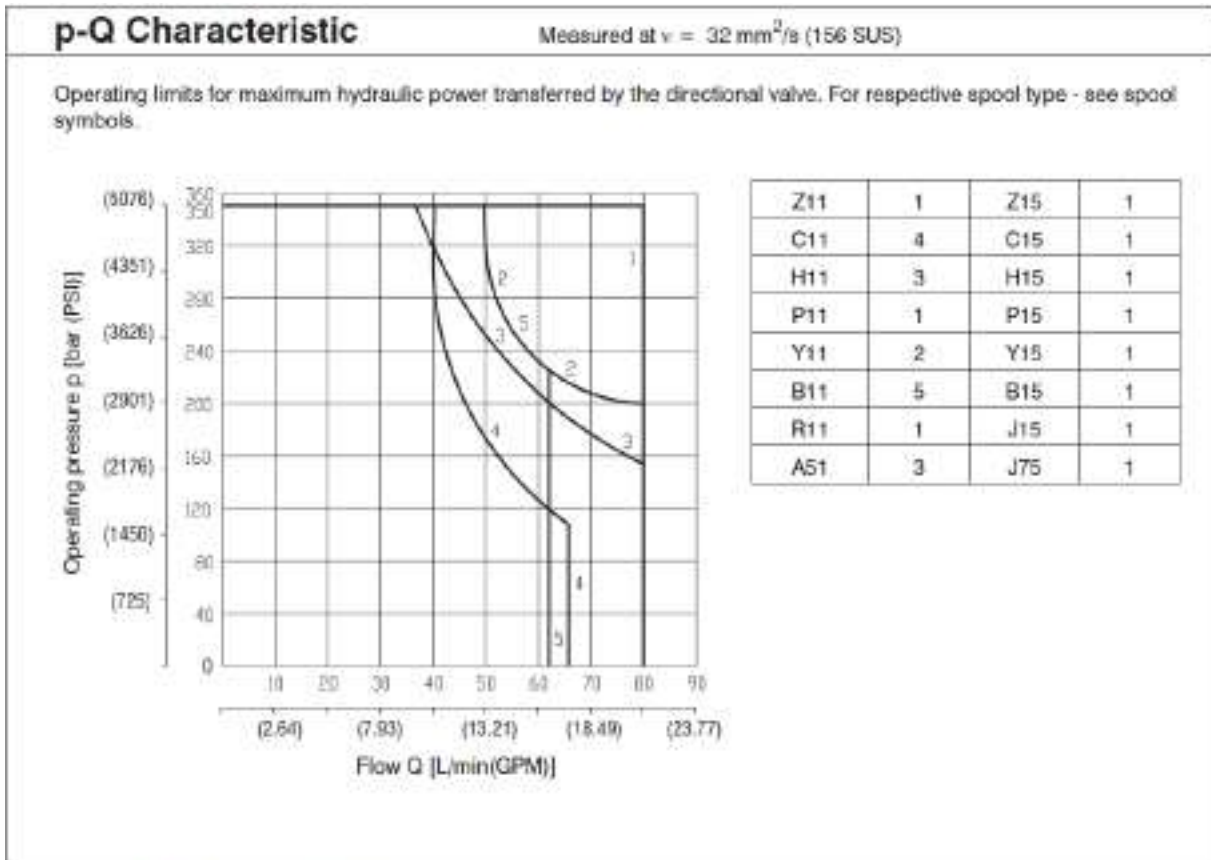


Type with return springs



Type with detant assembly

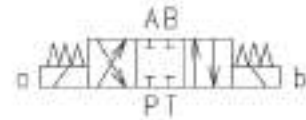
Ordering Code					
<div style="display: flex; justify-content: space-around; align-items: center;"> RPR3-06 - </div>					
Directional Control Valves Manually Operated		Seals NBR FPM (Viton)			
Valve size		no designation V			
Number of valve positions two positions three positions	2 3	Spool symbols see the table spool symbols			
Technical Data					
Valve size	mm (US)	06 (D 03)			
Maximum flow	L/min (GPM)	80 (21)			
Maximum operating pressure at ports P, A, B	bar (PSI)	350 (5076)			
Maximum operating pressure at port T	bar (PSI)	100 (1450)			
Pressure drop	bar (PSI)	see Δp -Q characteristics			
Hydraulic fluid	Hydraulic oils of power classes (HL, HLP) to DIN 51524				
Fluid temperature range - NBR	°C (°F)	-30 ... +100 (-22 ... +21)			
Fluid temperature range - Viton	°C (°F)	-20 ... +120 (-4 ... +248)			
Viscosity range	mm ² /s (SUS)	20 ... 400 (98 ... 1840)			
Maximum degree of fluid contamination	Class 21/18/15 to ISO 4406				
Operating force on lever	Nm (lbf)	< 50 (< 10.6)			
Service life	cycles	10 ⁶			
Weight	kg (lbf)	1,6 (3.53)			
Mounting position	unrestricted				
Spool Symbols					
Type	Symbol	Crossover	Type	Symbol	Crossover
Z11			Y11		
Z15			Y15		
C11			B11		
C15			B15		
H11			R11		
H15			J15		
P11			A51		
P15			J75		



Valve Dimensions		Dimensions in millimeters (inches)	
<p>1 Actuating section 2 Hand lever 3 Name plate 4 Square ring (4 pcs.) 9.25 x 1.68 supplied with valve 5 4 mounting holes</p>			
<p>Required surface finish of interface</p>			
Spare Parts		Dimensions in millimeters	
Seal kit			
Type	Dimensions, quantity	Ordering number	
O-ring - NBR90	22 x 2 (2 pcs.)	15700300	
Square ring - NBR70	9.25 x 1.68 (4 pcs.)		
O-ring - NBR70	11 x 1.5 (2 pcs.)		
O-ring - NBR70	11.3 x 2.4 (1 pc.)		
Bolt kit (for studs see HA 0030)			
Dimensions, quantity	Bolt torque	Ordering number	
M5 x 45 DIN 912-10.9 (4 pcs.)	8.9 Nm (6.6 ft-lbs)	15645100	
10-24 UNCx1.75 (4 pcs.)		2 000 107	
Caution!			
<ul style="list-style-type: none"> • Directional valves with other functional symbols as those shown in the table above can be delivered on request. • The plastic packaging is recyclable. • Mounting bolts or studs must be ordered separately. • Certified documentation is available per request. 			

	Solenoid - Operated Directional Control Valves RPEL1-06 Size 06 • p_{max} 250 bar (3626 PSI) • Q_{max} 50 L/min (13.2 GPM)	HA 4056 10/2012
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- 4/3 - and 4/2- way directional control valves
- Solenoids with removable coils - electrical connector can be rotated in direction by 90°
- Push button manual override
- Installation dimensions to DIN 24 340 / ISO 4401 / CETOP RP121-H



Functional Description

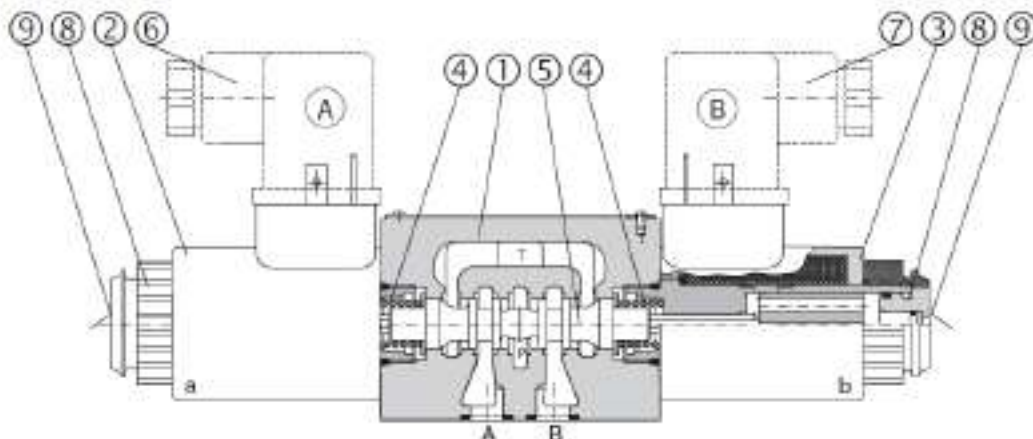
The RPEL1 directional control valves consist of housing (1), a control spool (5) with two centering springs (4) and cylindrical operating solenoids (2, 3).

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.

The operating solenoids are DC solenoids. 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 25bar.

The basic surface treatment of the valve housing (1) is phosphate coated and the solenoids (2, 3) are zinc coated.

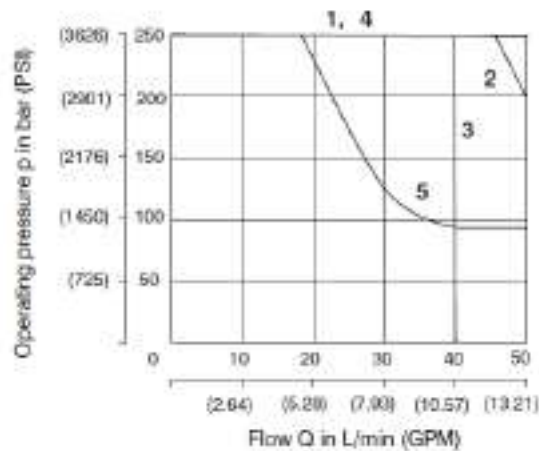


Functional Symbols					
Designation	Symbol	Ints	Designation	Symbol	Interposition
Označení	Symbol	Mezipoložky	Označení	Symbol	Mezipoložky
Z11			Z51		
C11			H51		
H11			Z11		
Y11			X11		
R11			C11		
Y51			H11		
C51			Y11		

p-Q Characteristics

Measured at $v = 32 \text{ mm}^2/\text{s}$ (156 SUS) and $t = 40 \text{ }^\circ\text{C}$ (104 °F)

Coil C19B-02400E1-20,8 NA
Test current = 80% I nominal

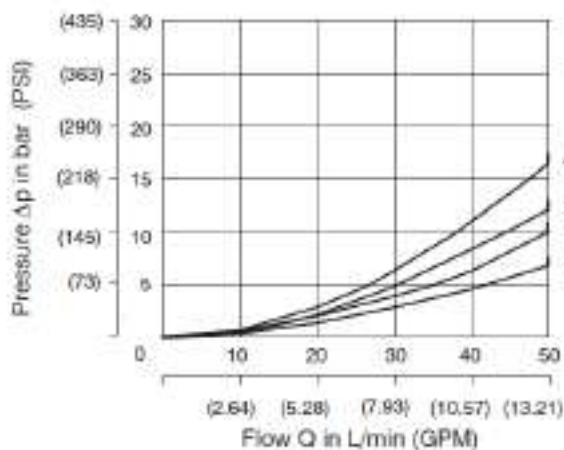


Z11	2	Z51	2
C11	5	C51	5
H11	1	H51	1
R11	4	Y51	3
Y11	3		
X11	4		

Dp-Q Characteristics

Measured at $v = 32 \text{ mm}^2/\text{s}$ (156 SUS) and $t = 40 \text{ }^\circ\text{C}$ (104 °F)

Pressure drop Δp related to flow rate:



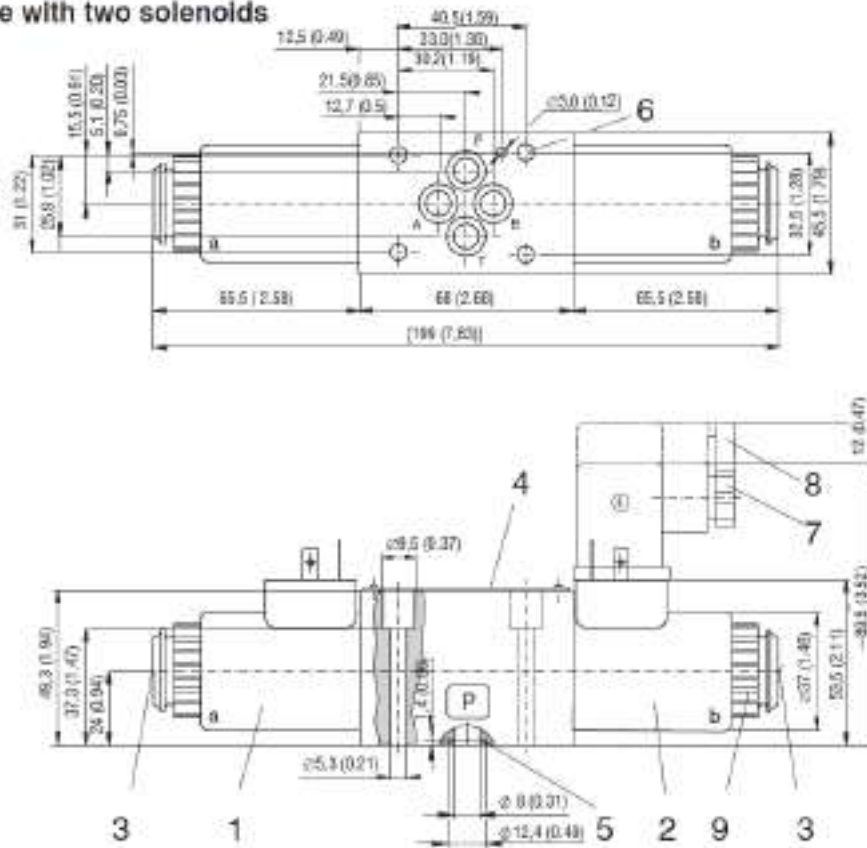
	P-A	P-B	A-T	B-T	P-T
Z11	2	2	2	2	
C11	2	2	2	2	3
H11	1	1	1	1	2
Y11	2	2	1		
R11	2	2	4	2	
X11	2	2	4	2	
Z51		2	2		
C51	2			2	3
H51		1	1		
Y51		2	2		

Type of the Solenoid Coil		Dimensions in millimeters (inches)
Designation	Dimensional sketch	Description
E1		Solenoid coil with the connector to EN 1745301-803-A. Type of protection to EN 60 529 - IP 65.
E2		Solenoid coil with the integrated quenching diode (bipolar transit diode) and the connector to EN 1745301-803-A. Type of protection to EN 60 529 - IP 65.
E3		Solenoid coil with the connector AMP- Junior-Timer 2 PIN. Type of protection to EN 60 529 - IP 65.
E4		Solenoid coil with the integrated quenching diode (bipolar transit diode) and the connector AMP- Junior-Timer 2 PIN. Type of protection to EN 60 529 - IP 65.
E12		Solenoid coil with the connector Deutsch DT04-2P. Type of protection to EN 60 529 - IP 67 / IP 69K.
E13		Solenoid coil with the integrated quenching diode (bipolar transit diode) and the connector Deutsch DT04-2P. Type of protection to EN 60 529 - IP 67 / IP 69K.
<h3>Manual Override</h3> <p>Dimensions in millimeters (inches)</p>		
<p>STANDARD</p> <p>Dimensions</p> <p>Standard model of the manual override. Standard retaining nut of the solenoid.</p>		<p>RUBBER BOOT</p> <p>Type M2 Dimensions</p> <p>Manual override protected by rubber boot.</p>

Valve Dimensions

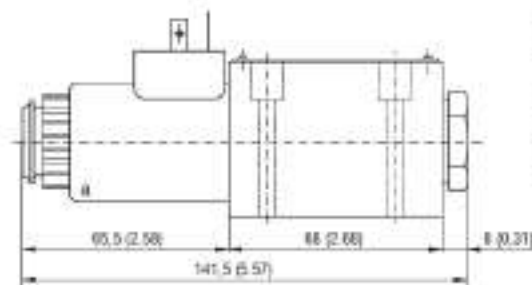
Dimensions in millimeters (inches)

Valve with two solenoids



Valve with one solenoid "a"

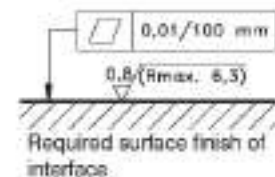
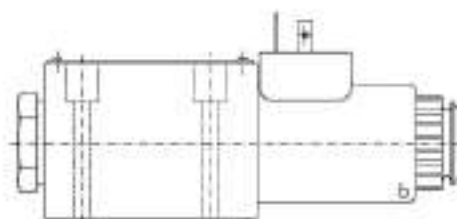
Spool symbols R11, Z51, C51, H51, Y51



- 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 connector, EN 1745301-803-A
- 8 Space required to remove connector
- 9 Retaining nut of the solenoid

Valve with one solenoid "b"

Spool symbols Z11, X11, C11, H11, Y11



Spare Parts

- 1 Solenoid coil
- 2 Nut with seal
- 3 Kit M2
- 4 Orifice in P port with seal ring
- 5 Seal kit
- 6 Mounting bolts
- 7 Electrical connector

1. Solenoid coil		For selection of solenoid coil and terminal box type use catalogue HA 8007.				
Solenoid type	Coil type					
	E1	E2	E3	E4	E12	E13
	Ordering number					
01200	27316600	27631400	27330200	27631600	27351400	27632000
02400	27316700	27632400	27449700	27633400	27330500	27633500

2. Solenoid retaining nut with seal		
Type of the nut	Seal ring	Ordering number
Standard nut	18 x 1,5	15874500

3. Kit M2		
Rubber boot with pin		
	Ordering number	
	24142800	

4. Orifice in P port			
Type	∅D [mm]	Seal ring	Ordering number
D1	1,0	9,25 x 1,78	15845600
D2	1,5		15845700
D3	2,0		15845800
D4	2,2		15846000
D5	2,5		15845900

5. Seal kit			
Type	Dimensions, number		Ordering number
Standard - NBR70	9,25 x 1,68 (4 pcs.)	17 x 1,8 (2 pcs.)	15845200

6. Mounting bolts			
Dimensions, number	Tightening torque		Ordering number
M5 x 45 DIN 912-10.9 (4 pcs.)	8,9 Nm		15845100

7. Electrical connector, EN 175301-803				
Type designation	Type	Model	Max. input voltage	Ordering number
K1	Connector B (black)	without rectifier - M16x1.5 (bushing bore ∅ 6-8 mm)	230 V AC/DC	16202100
	Connector A (gray)			16202200
K2	Connector B (black)	without rectifier with LED and quenching diode - M16x1.5 (bushing bore ∅ 6-8)	12...24 V DC	16202700
	Connector A (gray)			16202800

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 packing foil is recyclable.
- Mounting bolts or studs must be ordered separately.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

	<p>Directional Control Valves Solenoid Operated</p> <p>Size D 06 (03) • 350 bar (5076 PSI) • 80 L/min(21 GPM) Size D 06 (03) • P_{max} 320 bar (4641PSI) according to CSA @ 80 L/min(21 GPM)</p>	<p>RPE3-06</p>	<p>HA 4010 11/2011</p> <p>Replaces HA 4010 12/2009</p>
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- 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 HA 0002
- CSA Upon request 



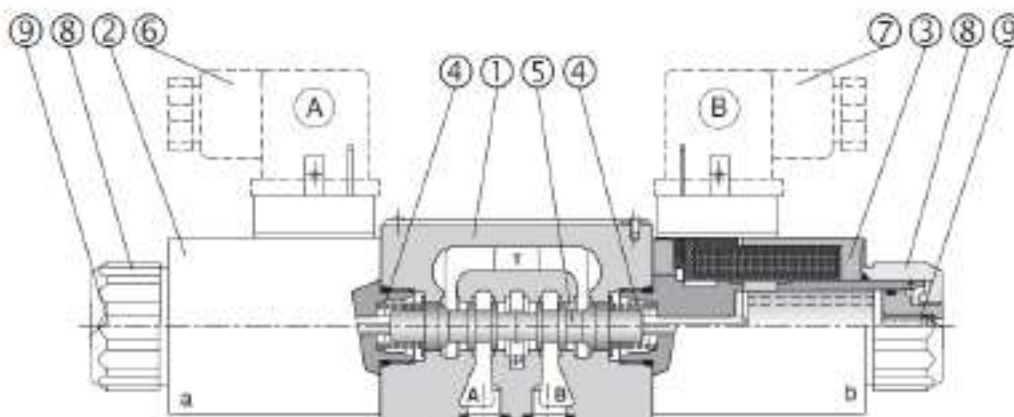
Functional Description

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.



Ordering 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	01200
24 V DC / 1.29 A	02400
205 V DC / 0.15 A	20500
230 V AC / 0.17 A / 50 (60) Hz	23050

The AC coils correspond with E5 type
 CSA Upon request

Type of solenoid coil

with terminal for the connector, EN 1745301-803	E1
with integrated quenching diode and terminal for the connector, EN 1745301-803	E2
with AMP-Junior-Timer-connector	E3A
with integrated quenching diode and terminal for AMP-Junior-Timer connector	E4A
with integrated rectifier and terminal for the connector, EN 1745301-803	E5

Other coils on demand see catalog HA9007

Sensing of the end position

no designation	without sensor	
S1	normally-open sensor to 50 bar (725PSI)	
S2	normally-open sensor to 210bar (3045 PSI)	
S4	normally-closed sensor to 50bar (725 PSI)	

Seals

no designation	NBR	
V	FPM (Viton)	

Orifice in P port

no designation	without orifice	
D1	∅1.0 mm (0.039 inch)	
D2	∅1.5 mm (0.059 inch)	
D3	∅2.0 mm (0.079 inch)	
D4	∅2.2 mm (0.087 inch)	
D5	∅2.5 mm (0.098 inch)	

Soft Shift - Spool speed control orifice

no designation	without damping	
T1	orifice ∅ 0.7 mm (0.03 inch) in solenoid	

Manual override

no designation	Standard	
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)

FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE, FUNCTIONAL SYMBOLS AND TABLE OF PREFERRED TYPES ON PAGE 10

Technical Data		
Valve size	mm (US)	D 06 (03)
Maximum flow	L/min (GPM)	see p-Q characteristics
Max. operating pressure at ports P, A, B	bar (PSI)	standard 350 (5076), according to CSA 320 bar (4641PSI)
Max. operating pressure at port T	bar (PSI)	50 (725) for version S1, S4 and 210 (3000) for version S2
Pressure drop	bar (PSI)	see Δp-Q characteristics
Hydraulic fluid		Hydraulic oils of power classes (HL, HLP) to DIN 51524
Fluid temperature range for NBR seals	°C (°F)	-30 ... +80 (-22 ... +176)
Fluid temperature range for FPM seals	°C (°F)	-20 ... +80 (-4 ... +176)
Ambient temperature max.	°C (°F)	+50 (+122)
Viscosity range	mm ² /s (SUS)	20 ... 400 (98 ... 1840)
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406
Max. allowable voltage variation	%	DC: ±10 AC: ±10
Max. switching frequency	h ⁻¹	15 000
Switching time, on: at v=32 mm ² ·s ⁻¹ (156 SUS)	ms	DC: 30 ... 50 AC: 30 ... 40
Switching time, off: at v=32 mm ² ·s ⁻¹ (156 SUS)	ms	DC: 10 ... 50 AC: 30 ... 70
Duty cycle	%	100
Service life	cycles	10 ⁷
Enclosure type to EN 60 529		IP 65
Weight - valve with 1 solenoid - valve with 2 solenoids	kg (lbs)	1.6 (3.52) 2.2 (4.84)
Mounting position		unrestricted

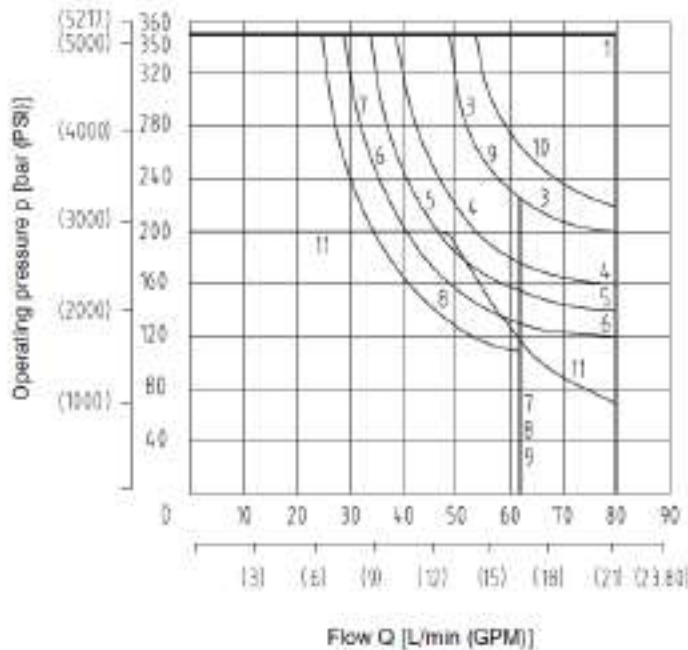
Spool Symbols

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

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

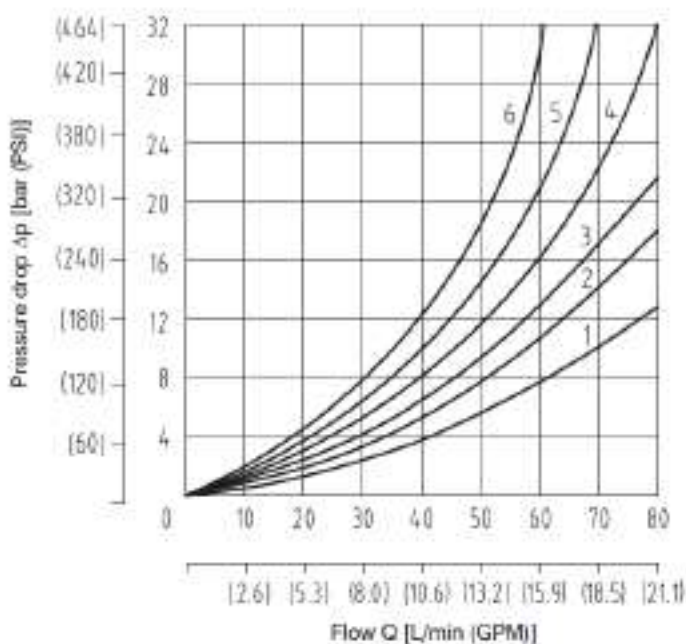


Z11	1
C11	7
H11	4
P11	1
Y11	3
L21	6
B11	9
Y41	7
Z21	1
C41	6
F11	6
R11	4
R21	5
A51	6
P51	1
Y51	3
C51	7
Z51	1
Z71	8
Z81	8
Z91	8
R31	6
H51	8
F51	8
X11	4
K11	8
N11	8
X25	11
J15	1
J75	10

Δp -Q Characteristics

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

Pressure drop Δp related to flow rate.

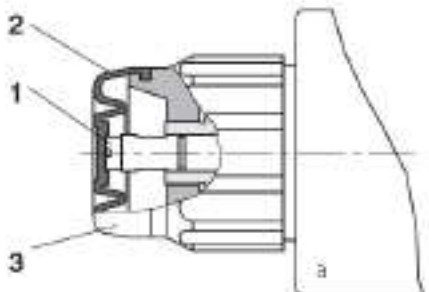
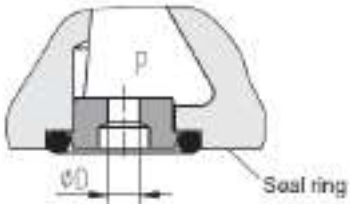


	P-A	P-B	A-T	B-T	P-T
Z11	2	2	3	3	
C11	5	5	5	6	3
H11	2	2	2	3	3
P11	1	1	3	3	
Y11	2	2	2	2	
L21	2	2	3	3	
B11	2	2	3	3	
Y41	3	3	3	3	
Z21		2	3		
C41	4	4			5
F11	1	2		3	3
R11	2	2	3	3	
R21	2	2	3	3	
A51	2	2			
P51		1	3		
Y51		2	2		
C51	2			3	4
Z51		2	3		
Z71	3	3			
Z81			3	3	
Z91	3			3	3
R31	2			3	
H51		2	3		
F51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

Type of the Solenoid Coil		
Designation	Dimensional sketch	Description
E1		Solenoid coil with terminal for the electrical connector, EN 1745301-803.
E2		Solenoid coil with integrated quenching diode (bipolar transil diode) and terminal for the electrical connector, EN 1745301-803.
E3A		Solenoid coil with terminal for AMP-Junior-Timer electrical connector.
E4A		Solenoid coil with integrated quenching diode (bipolar transil diode) and terminal for AMP-Junior-Timer electrical connector.
E5		Solenoid coil with integrated rectifier and terminal for the electrical connector, EN 1745301-803.

Manual Override

STANDARD	CLOSED NUT
<p>no designation Dimensions</p> <p>Standard model of the manual override. Standard retaining nut of the solenoid.</p>	<p>Type N1 Dimensions</p> <p>Manual override with retaining nut. Can be used after removing nut.</p>
RUBBER BOOT	DETENT ASSEMBLY
<p>Type N2 Dimensions</p> <p>Manual override protected by rubber boot.</p>	<p>Type N3 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
<p>The switching times shown are valid for viscosity $\nu = 32 \text{ mm}^2/\text{s}$ (156 SUS) and nominal voltage. They are dependent upon working pressure and flow rate of the directional control valve</p>		
Orifice in P-Port		
Type	∅D mm (inch)	Description
D1	1,0 (0.039)	
D2	1,5 (0.059)	
D3	2,0 (0.079)	
D4	2,0 (0.087)	
D5	2,0 (0.098)	
<p>P-port orifices limit the flow into the directional control valve.</p> <p>Attention: When the orifice in P port is additionally mounted the standard used square ring NBR is replaced with O-ring from Viton.</p>		

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.

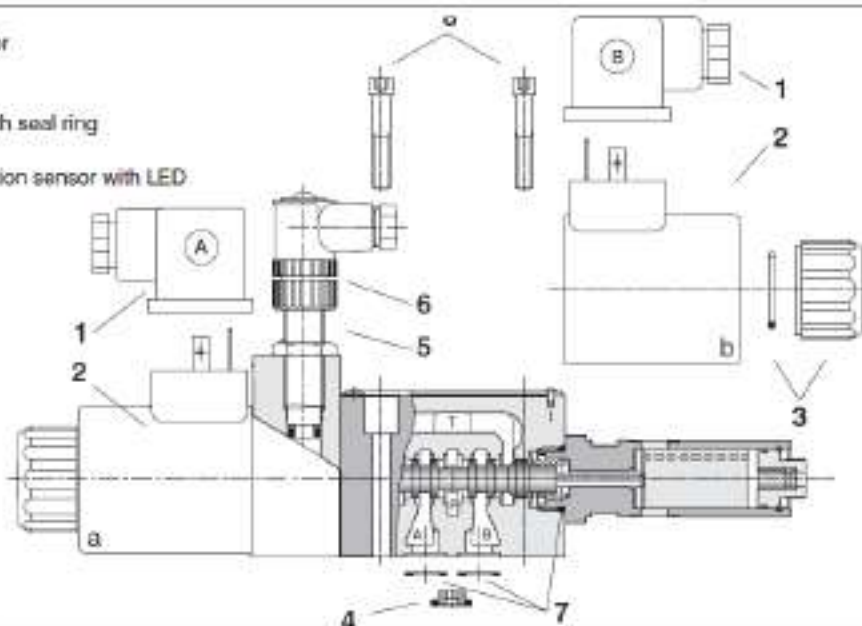
Technical Data of the Sensor		S1, S4	S2
Rated power supply voltage	V	24 DC	
Power supply voltage range	V	10 ... 30 DC	
Rated current	mA	200	
Enclosure type of sensor to EN 60529		IP 67	
Max. operating pressure	bar (PSI)	50 (725)	210 (3046)
Switching frequency	Hz	1000	
Ambient temperature range	°C (°F)	-25 ... +80 (-13 ... +176)	
Technical Data of the Connector			
Power supply voltage range	V	10 ... 30 DC	
Ambient temperature range	°C (°F)	-25 ... +80 (-13 ... +176)	
Indication		yellow LED	

Two-Position Directional Control Valve		Signal of sensor Sa (Sb)		LED	
Signal of solenoid a (b)		S1, S2 - normally-open	S4 - normally-closed	S1, S2	S4
0	0	1	0	ON	OFF
1	1	0	1	OFF	ON

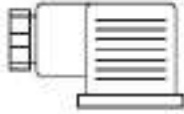
Three-Position Directional Control Valve		Signal of sensor Sa (Sb)				LED			
Signal of solenoid		S1, S2 - normally-open		S4 - normally-closed		S1, S2		S4	
a	b	Sa	Sb	Sa	Sb	Sa - LED	Sb - LED	Sa - LED	Sb - LED
0	0	1	1	0	0	ON	ON	OFF	OFF
1	0	0	1	1	0	OFF	ON	ON	OFF

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



Solenoid coil					
Solenoid type	Coil type				
	E1	E2	E3A	E4A	E5
Order number					
01200	16211400	24156100	24159600	24159700	
01200*	24154300	-	-	-	
02400	-	24157400	24159600	24159900	
02400*	24154400				
20500	-				
23500					18849000
23500*					24154600
*CSA Upon request					
Solenoid retaining nut with seal					
Type of the nut	Seal ring				Order number
Standard nut	22 x 2				15844600
Closed nut					15844700
Nut with rubber boot					15844800
Nut with detent assembly					15844900
Connector of position sensor					
Type designation	Model	Max. input voltage		Ordering number	
K02	connector of position sensor with LED	10...30 V DC		17384900	
S1	normally-open sensor	10...30 V DC		16888500	
S2	normally-open sensor	10...30 V DC		18961900	
S4	normally-closed sensor	10...30 V DC		20725300	
Orifice in P-port					
Type	∅D mm (inch)	Seal ring		Order number	
D1	1,0 (0.039)	9,25 x 1,75		15845600	
D2	1,5 (0.059)			15845700	
D3	2,0 (0.079)			15845800	
D4	2,2 (0.087)			15846000	
D5	2,5 (0.098)			15845900	
Bolt kit					
Dimensions, quantity	Bolt torque			Order number	
M5 x 45 DIN 912-10.9 (4 pcs.)	8,9 Nm (6,6 ft-lbs)			15845100	
Seal kit					
Type	Dimensions, quantity			Order number	
Standard - NBR70	9,25 x 1,66 x 1,66 (4 pcs.)	17 x 1,8 (2 pcs.)		15845200	
Viton	9,25 x 1,78 (4 pcs.)	17,17 x 1,78 (2 pcs.)		15845400	

Electrical connector, EN 1745301-803				
Type	Connector A grey		Connector B black	
	Ordering number			
K1	16202200		16202100	
K5	16202600		16202500	
K2	16202800		16202700	
K3	16202400		16202300	
K4	16203000		16202900	
Electrical Connector, EN 175301-803				
K1	Connector B (black)	without rectifier - M16x1.5 (bushing bore \varnothing 6-8 mm)	230 V AC/DC	
	Connector A (grey)			
K5	Connector B (black)	without rectifier - M16x1.5 (bushing bore \varnothing 4-6 mm)	230 V AC/DC	
	Connector A (grey)			
K2	Connector B (black)	without rectifier with LED and quenching diode - M16x1.5 (bushing bore \varnothing 6-8 mm)	12 ... 24 V DC	
	Connector A (grey)			
K3	Connector B (black)	with rectifier - M16x1.5 (bushing bore \varnothing 6-8 mm)	230 V AC	
	Connector A (grey)			
K4	Connector B (black)	with rectifier with LED and quenching diode - M16x1.5 (bushing bore \varnothing 6-8 mm)	230 V AC	
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	
Preferred Types of Valves				
Type	Ordering Number	Type	Ordering Number	
RPE3-062Z11/01200E1	15720300	RPE3-063Y11/02400E1	15728400	
RPE3-063Z11/01200E1	15711300	RPE3-062R11/02400E1	15731100	
RPE3-062Z51/01200E1	15719300	RPE3-062R21/02400E1	15734500	
RPE3-063C11/01200E1	15712600	RPE3-062A51/02400E1	15732800	
RPE3-062C51/01200E1	15719600	RPE3-062Y51/02400E1	15737400	
RPE3-063H11/01200E1	15713500	RPE3-062J15/02400E1	15733500	
RPE3-063Y11/01200E1	15714300	RPE3-062Z11/23050E5	15768800	
RPE3-062R11/01200E1	15716000	RPE3-063Z11/23050E5	15747100	
RPE3-062R21/01200E1	15717100	RPE3-062Z51/23050E5	21262800	
RPE3-062A51/01200E1	15716700	RPE3-063C11/23050E5	15748900	
Caution!				
<ul style="list-style-type: none"> When the distributor contains two electromagnets any of the two electromagnets can be switched on only after the other one switches off. The electromagnets switching time on distributors with locking arrangement must not be shorter than 60 ms. With directional valves with cushioned spool shifting, the switching time must correspond with the shifting time. Distributors with other interconnections than those shown in the catalogue can be supplied on request. The packaging foil can be recycled The transport base plate can be returned to the manufacturer. Mounting screws M5 x 45 DIN 912-10.9 or bolts must be ordered separately. The screws tightening torque is 8.9 Nm (6.6 ft-lbs). The mentioned data only serve to describe the product and in no case are to be understood in terms of law as guaranteed characteristics. 				

Directional Control Valves Solenoid Operated	RPE4-10	HA 4039 07/2009
Size 10 • P_{max} 350 bar • Q_{max} 140 L/min		Replaces HA 4039 10/2008

- 4/3, 4/2 way directional control valves
- Cylindrical DC solenoids with removable coils. Electrical connectors can be rotated in three positions 90° apart
- Spool-position sensor optional
- 4 chamber spool - reducing
- Push button manual override
- Installation dimensions to DIN 24 340 / ISO 4401 / CETOP RP121-H
- Subplates see data sheet HA 0002
- CSA Upon request



Functional Description

The RPE4-10 directional control valves consist of housing (1), control spool (5), centering springs (4) and operating solenoids (2, 3).

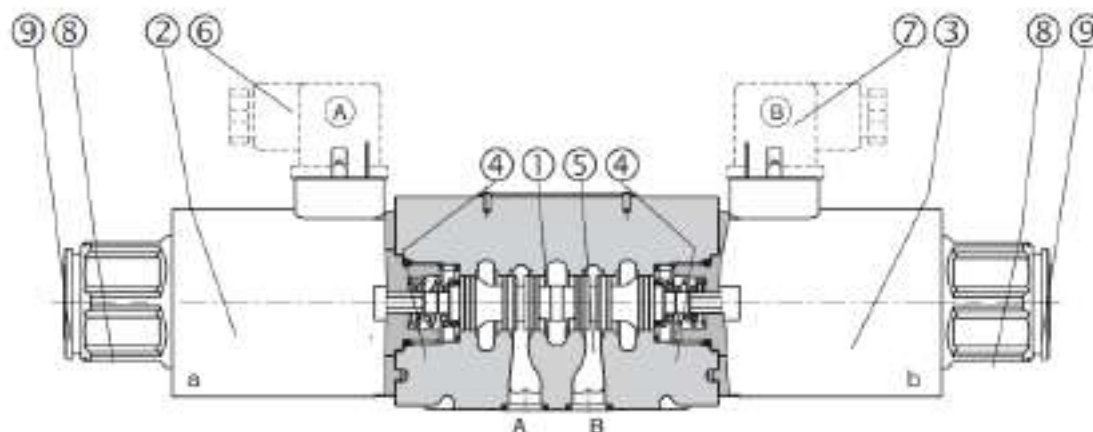
The three-position directional control valves are fitted with two solenoids and two springs. The two position directional control valves have one solenoid and one return spring.

The operating solenoids are DC solenoids and are supplied through connectors (6, 7) without rectifiers. For AC supply the solenoids are provided with rectifiers,

which are integrated directly into the connectors (6, 7) or inside the coil.

By loosening the retaining nut (8), the solenoid can be turned on its axis and locked in three positions 90° apart. Provided that the pressure in T-port does not exceed (25 bar), the spool of the valve can be shifted by manual override (9).

The basic surface treatment of the valve housing (1) is phosphate coated, the operating solenoids (2, 3) are zinc coated.

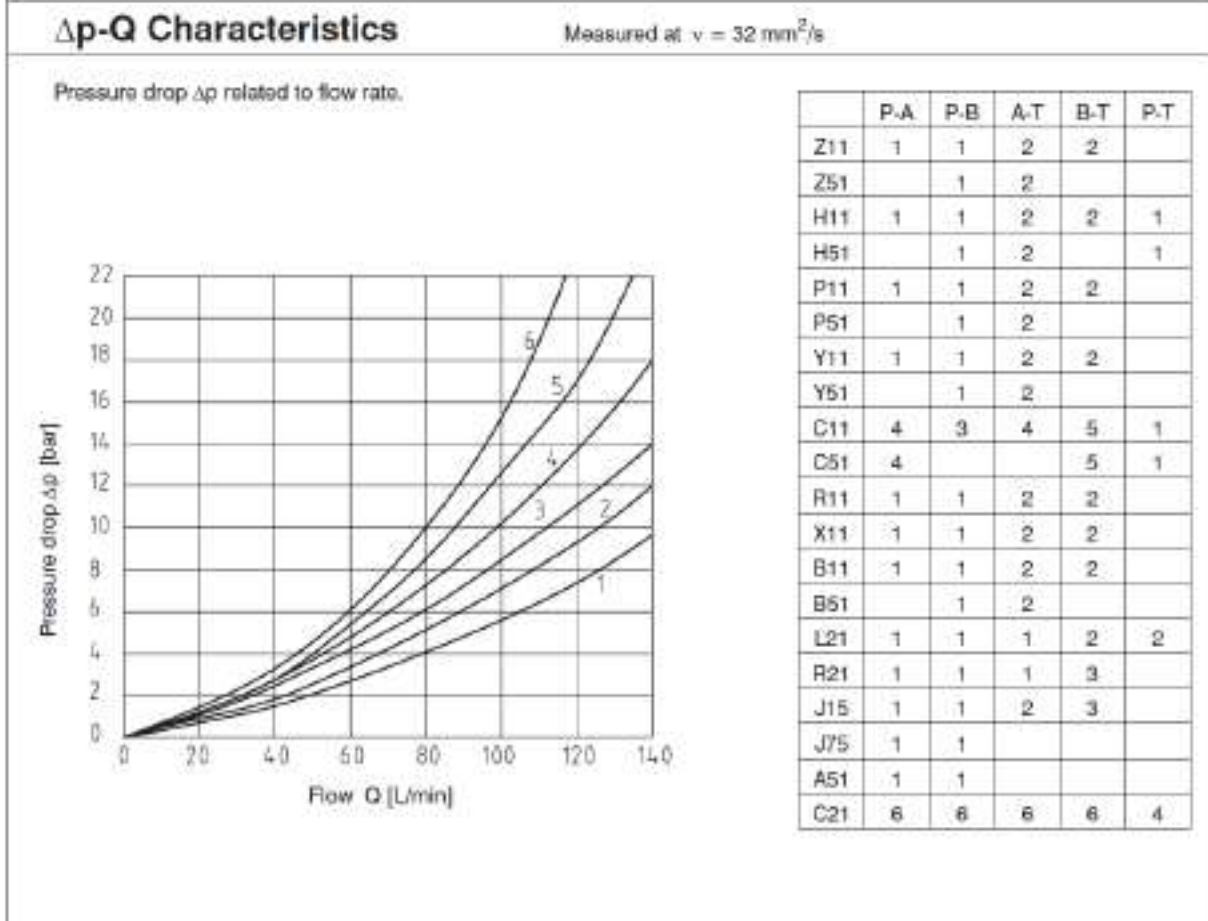
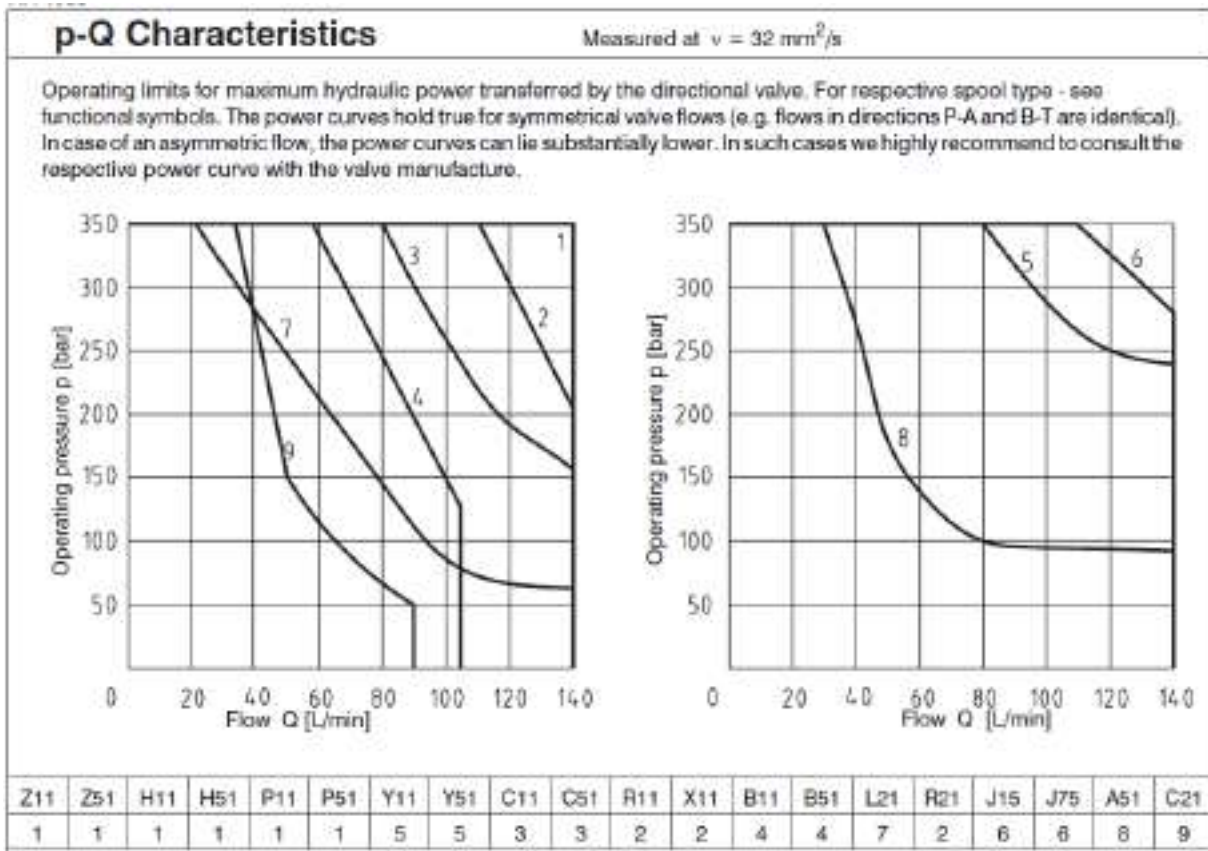


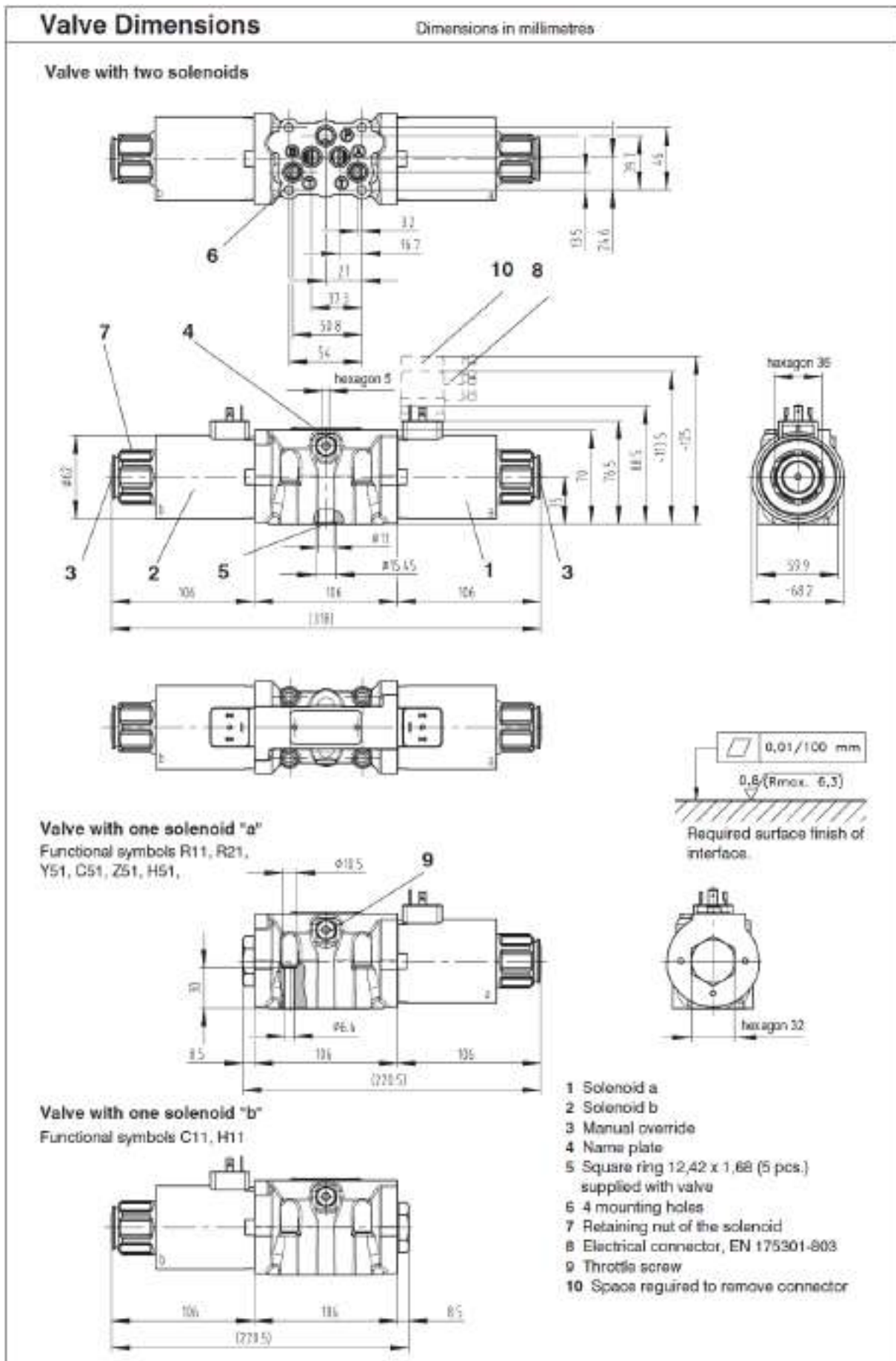
Ordering Code											
<p style="margin: 0;">RPE4-10 / </p>											
<p>Directional Control Valve Solenoid Operated</p>											
<p>Nominal size</p>											
<p>Number of operating positions two positions 2 three positions 3</p>											
<p>Functional symbols see the table functional symbols</p>											
<p>Rated supply voltage of solenoids (at the coil terminals)</p> <table style="width: 100%; border: none;"> <tr> <td style="padding: 2px;">12 V DC / 3.17 A</td> <td style="text-align: right; padding: 2px;">01200</td> </tr> <tr> <td style="padding: 2px;">24 V DC / 1.73 A</td> <td style="text-align: right; padding: 2px;">02400</td> </tr> <tr> <td style="padding: 2px;">205 V DC / 0.20 A</td> <td style="text-align: right; padding: 2px;">20500</td> </tr> <tr> <td style="padding: 2px;">230 V AC / 0.20 A / 50 (60) Hz</td> <td style="text-align: right; padding: 2px;">23050</td> </tr> <tr> <td style="padding: 2px;">120V AC / 60Hz*</td> <td style="text-align: right; padding: 2px;">Ⓢ 12060</td> </tr> </table> <p>The AC coils correspond with E5 type. CSA Upon request Ⓢ</p>	12 V DC / 3.17 A	01200	24 V DC / 1.73 A	02400	205 V DC / 0.20 A	20500	230 V AC / 0.20 A / 50 (60) Hz	23050	120V AC / 60Hz*	Ⓢ 12060	
12 V DC / 3.17 A	01200										
24 V DC / 1.73 A	02400										
205 V DC / 0.20 A	20500										
230 V AC / 0.20 A / 50 (60) Hz	23050										
120V AC / 60Hz*	Ⓢ 12060										
<p>Type of the solenoid coil with for the electrical connector, EN 175301-803 E1 with integrated rectifier and for the electrical connector EN 175301-803 E5</p>											
	<p>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</p>										
	<p>no designation Seals V standard (NBR) Viton (FPM)</p>										
	<p>no designation Damping T2 without damping T3 with orifice with throttle screw</p>										
	<p>no designation Manual override N2 standard covered with rubber boot</p>										
<p>Note: Connector of the position sensor is not supplied (see ordering number on page 9)</p>											
<p>FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE, FUNCTIONAL SYMBOLS AND TABLE OF PREFERRED TYPES ON PAGE 10</p>											

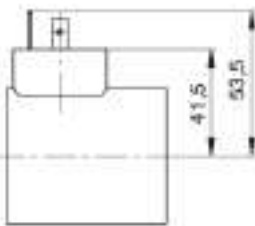
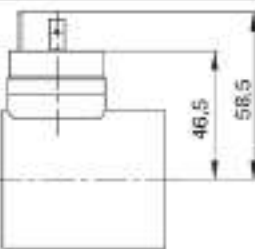
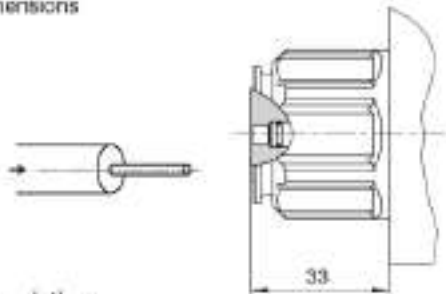
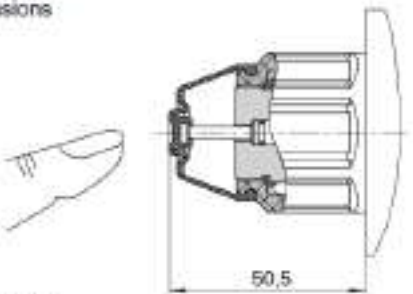
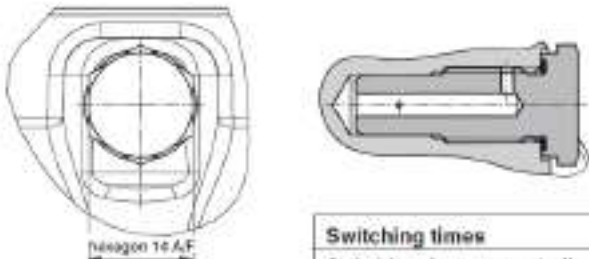
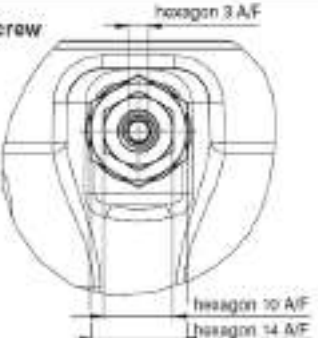
Technical Data		
Nominal size	mm	10
Maximum flow	L/min	see p-Q characteristics
Maximum operating pressure at ports P, A, B	bar	350
Maximum operating pressure at port T	bar	50 for version S1, S4 and 210 for version S2
Pressure drop	bar	see Δp -Q characteristics
Hydraulic fluid		Hydraulic oils of power classes (HL, HLP) to DIN 51524
Fluid temperature range (NBR / Viton)	°C	-30 ... +80 / -20 ... +80
Ambient temperature max.	°C	+50
Viscosity range	mm ² /s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406
Maximum allowable voltage variation	%	AC: ± 10 DC: ± 10
Maximum switching frequency	1/h	15 000
Switching time, ON; at $v = 32$ mm ² /s	ms	AC: 50 ... 330 DC: 50 ... 120
Switching time, OFF; at $v = 32$ mm ² /s	ms	AC: 100 ... 300 DC: 30 ... 90
Duty cycle	%	100
Service life	cycles	10 ⁷
Enclosure type to EN 60529		IP 65
Weight - valve with 1 solenoid	kg	3.9
- valve with 2 solenoids		5.4
Mounting position		unrestricted

Functional Symbols

Designation	Symbol	Interposition	Designation	Symbol	Interposition
Z11			P51		
C11			Y51		
H11			C51		
P11			B51		
Y11			Z51		
L21			H51		
B11			X11		
C21			C11		
R11			H11		
R21			J15		
A51			J75		





Type of the Solenoid Coil							
E1	 <p>Solenoid coil with terminal for the electrical connector, EN 175301-803</p>						
E5	 <p>Solenoid coil with integrated rectifier and terminal for electrical connector, EN 175301-803</p>						
Manual Override							
Standard	Rubber boot						
<p>Without designation Dimensions</p>  <p>Description: Standard model of the manual override. Standard retaining nut of the solenoid.</p>	<p>Designation N2 Dimensions</p>  <p>Description: Manual override protected by rubber boot.</p>						
Soft Shifting Spool Options Delay Time							
<p>T2 - Nozzle $\varnothing 0,6$</p> 	<p>The orifice extends the valve shifting time.</p> <table border="1" data-bbox="750 1668 1380 1736"> <thead> <tr> <th colspan="3">Switching times</th> </tr> </thead> <tbody> <tr> <td>Switching time, on and off</td> <td>ms</td> <td>120 ... 350</td> </tr> </tbody> </table>	Switching times			Switching time, on and off	ms	120 ... 350
Switching times							
Switching time, on and off	ms	120 ... 350					
<p>T3 - Throttle Screw</p> 	<p>The control orifice allows for stepless adjustment of the valve shifting time.</p> <table border="1" data-bbox="750 2027 1380 2094"> <thead> <tr> <th colspan="3">Switching times</th> </tr> </thead> <tbody> <tr> <td>Switching time, on and off</td> <td>ms</td> <td>30 ... 2000</td> </tr> </tbody> </table>	Switching times			Switching time, on and off	ms	30 ... 2000
Switching times							
Switching time, on and off	ms	30 ... 2000					

Spool Position Sensor

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

S4 - Circuit diagram of the normally-closed sensor

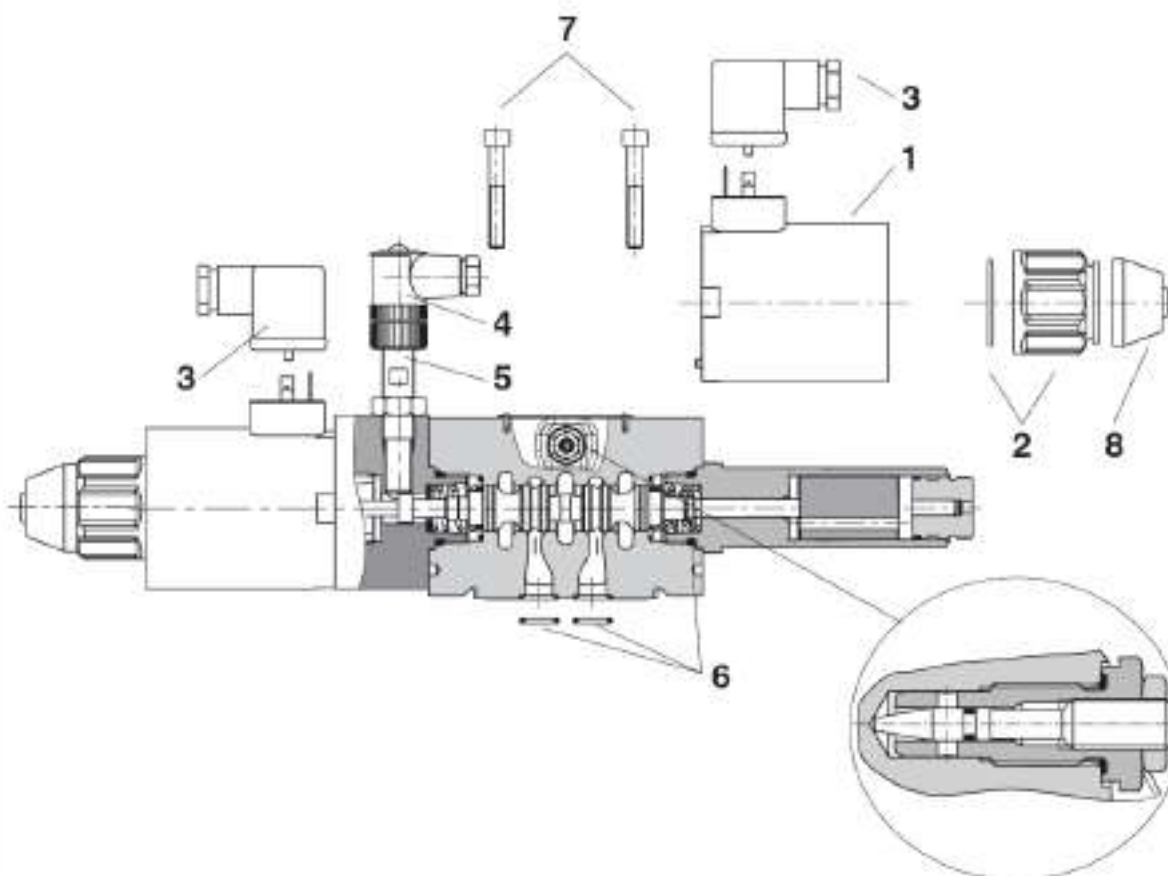
The proximity sensor transforms the spool position into an electrical step signal. It can be used with directional control valves with one or two solenoids.

Technical Data of the Sensor		S1, S4		S2	
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	50	210		
Switching frequency	Hz	1000			
Ambient temperature range	°C	-25 ... +80			
Technical Data of the Connector					
Power supply voltage range	V	10 ... 30 DC			
Ambient temperature range	°C	-25 ... +80			
Indication		yellow LED			

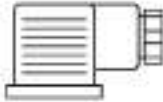
Two-Position Directional Control Valve		Signal of sensor Sa (Sb)		LED	
Signal of solenoid a (b)		S1, S2 - normally-open	S4 - normally-closed	S1, S2	S4
0		1	0	ON	OFF
1		0	1	OFF	ON

Three-Position Directional Control Valve		Signal of sensor Sa (Sb)		LED					
Signal of solenoid		S1, S2 - normally-open		S4 - normally-closed		S1, S2		S4	
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 Solenoid coil
- 2 Nut with seal
- 3 Electrical connector
- 4 Connector of position sensor with LED
- 5 Sensor
- 6 Seal kit
- 7 Mounting bolts
- 8 Rubber cap with manual override

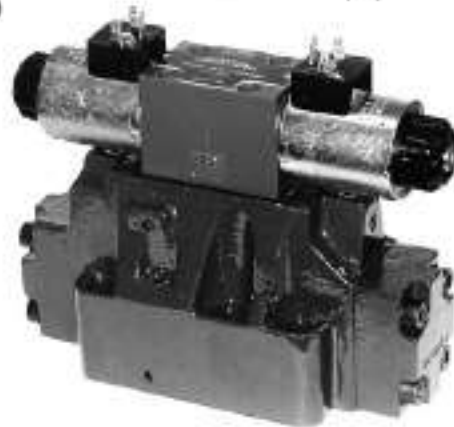
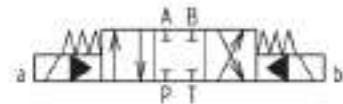
Solenoid coil				
Type designation of the coil voltage	Type of the coil			
	E1		E5	
	Ordering number			
01200	16195700		16195100 16195000	
02400	16196100			
20500	23896000			
23050				
12060				
Solenoid retaining nut with seal				
Type of the nut	Seal ring	Ordering number		
Standard nut	30 x 2	15900800		
Rubber cap with manual override		15900900		
Connector of position sensor				
Type designation	Model	Max. input voltage	Ordering number	
K02	connector of position sensor with LED	10...30 V DC	17364800	
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	
Seal kit				
Type	Dimensions		Ordering number	
	Square ring	O-ring		
Standard NBR70	12,42 x 1,68 (5 pcs.), 11,9 x 8,4 x 1 (1 pc.)	23,81 x 2,62 (2 pcs.), 1,8 x 1 (1 pc.)	15847500	
Viton	12,42 x 1,68 (5 pcs.), 11,9 x 8,4 x 1 (1 pc.)	23,47 x 2,62 (2 pcs.), 1,8 x 1 (1 pc.)	15847800	
Mounting bolts				
Dimensions	Tightening torque	Ordering number		
M6 x 40 DIN 912-10.9 (4 pcs.)	14+2 Nm	15847700		
Soft Shift Conversion Kit				
T2	10 Nm	15901200		
T3	10 Nm	15901300		
Electrical connector, EN 175301-803				
Type designation	Connector A grey	Connector B black		
	Ordering number			
K1	16202200	16202100		
K5	16202600	16202500		
K2	16202800	16202700		
K3	16202400	16202300		
K4	16203000	16202900		
Electrical Connector, EN 175301-803				
K1	Connector B (black)	without rectifier - M16x1.5 (bushing bore \varnothing 6-8 mm)	230 V AC/DC	
	Connector A (grey)			
K5	Connector B (black)	without rectifier - M16x1.5 (bushing bore \varnothing 4-6 mm)	230 V AC/DC	
	Connector A (grey)			
K2	Connector B (black)	without rectifier with LED and quenching diode - M16x1.5 (bushing bore \varnothing 6-8 mm)	12 ... 24 V DC	
	Connector A (grey)			
K3	Connector B (black)	with rectifier - M16x1.5 (bushing bore \varnothing 6-8 mm)	230 V AC	
	Connector A (grey)			
K4	Connector B (black)	with rectifier with LED and quenching diode - M16x1.5 (bushing bore \varnothing 6-8 mm)	230 V AC	
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		

Preferred Types			
Type	Ordering number	Type	Ordering number
RPE4-103Z11	15888500	RPE4-103Z11/02400E1	15889500
RPE4-102Z51	15892000	RPE4-102Z51/02400E1	15892300
RPE4-103C11	15888700	RPE4-103C11/02400E1	15890000
RPE4-102C51	15892100	RPE4-102C51/02400E1	15892500
RPE4-103H11	15889000	RPE4-103H11/02400E1	15892700
RPE4-103Y11	15888900	RPE4-103Y11/02400E1	15893100
RPE4-102R11	15889100	RPE4-102R11/02400E1	15890700
RPE4-102R21	15889200	RPE4-102R21/02400E1	15893400
RPE4-102Y51	15892200	RPE4-102Y51/02400E1	15893700
RPE4-103Z11/01200E1	15891600	RPE4-103Z11/23050E5	21867800
RPE4-102Z51/01200E1	15891200	RPE4-102Z51/23050E5	21868300
RPE4-103C11/01200E1	15891700	RPE4-103C11/23050E5	21868500
RPE4-102C51/01200E1	15891500	RPE4-102C51/23050E5	21868800
RPE4-103H11/01200E1	15891000	RPE4-103H11/23050E5	21862100
RPE4-103Y11/01200E1	15890400	RPE4-103Y11/23050E5	21868900
RPE4-102R11/01200E1	15891900	RPE4-102R11/23050E5	21869400
RPE4-102R21/01200E1	15891300	RPE4-102R21/23050E5	21869900
RPE4-102Y51/01200E1	15891400	RPE4-102Z51/23050E5	21870100

Caution!
<ul style="list-style-type: none"> • In the case of directional valves with two solenoids, any of the solenoids may be energized, but only after switching off the other. • Directional valves with other functional symbols as those shown in the table, please consult with the manufacturer. • The packing foil is recyclable. • The protective plate can be returned to manufacturer. • Mounting bolts M6 x 40 DIN 912-10.9 or studs must be ordered separately. • The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law. • For RPEW4-10 with CSA only: Use supply wires suitable for at least 75°C.

4/2 and 4/3 Way Directional Control Valves Pilot Operated Size 16 (D 07) • 320 bar (4600 PSI) • 300 L/min (80 GPM)	RPEH4-16	HA 4023 12/2007 Replaces HA 4023 2/2003
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- Solenoid pilot operated directional valves (RPEH)
- Hydraulic pilot operated directional valves (RPH)
- Small energy input
- Manual overrides optional (only for RPEH)
- Installation dimensions to DIN 24 340 / ISO 4401 / CETOP RP121-H



Functional Description

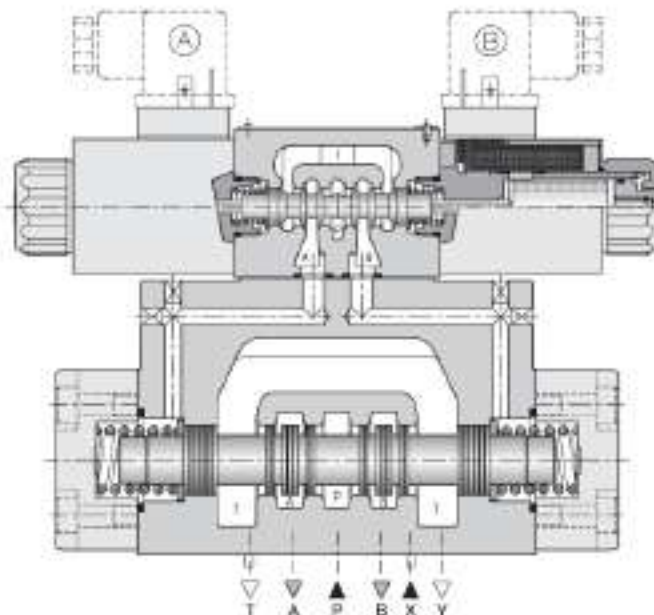
The RPEH solenoid operated - hydropiloted valves are consisting of an RPE3-06 type solenoid operated directional control valve (see data sheet HA 4010) that operates a 4-way hydropiloted control valve with a connection surface in accordance with the ISO 4401 standards. They are available in various configurations and spool types.

The pilot and the drain connections can be made internal or external by inserting or removing the accordant threaded plugs located in the main directional control valve.

A wide range of configurations and different solenoid operated - hydropiloted directional control valve spool positions are available:

- 4-way, 3-position directional control valve, with two solenoids; positioning of the spool in center position is obtained with centering springs.
- 4-way, 2-position directional valve, with one solenoid and one return spring or two solenoids and detent of the spool position.

The basic surface treatment of the valve housing is phosphates coated and the solenoids are zinc coated.



Ordering Code

RP 4-16 / / / / 13- / / /

<p>Directional Control Valve Pilot Operated</p> <hr/> <p>Type of control electrohydraulically operated EH hydraulically operated H</p> <hr/> <p>Design series</p> <hr/> <p>Valve size</p> <hr/> <p>Number of operating positions two positions 2 three positions 3</p> <hr/> <p>Functional symbols see the table functional symbols</p> <hr/> <p>Controls if not required no designation main spool shifting speed control D shifting speed control, with orifice (0.8 mm) PF in port P of solenoid pilot valve</p> <hr/> <p>Piloting if not required no designation external piloting (see note herebelow) E</p>	<p style="text-align: right;">Seals no designation NBR V FPM (Viton)</p> <hr/> <p>Manual override no designation standard N1 covered with retaining nut N2 covered with rubber boot</p> <hr/> <p>Type of solenoid coil E1 with terminal for the connector* E2 with integrated quenching diode and terminal for the connector* E5 with integrated rectifier and terminal for the connector* * from EN 1745301-803-A</p> <hr/> <p>Rated supply voltage of solenoids * (at the coil terminals)</p> <table style="width: 100%; border: none;"> <tr> <td style="border: none;">01200</td> <td style="border: none;">12 V DC / 2.72 A</td> </tr> <tr> <td style="border: none;">02400</td> <td style="border: none;">24 V DC / 1.29 A</td> </tr> <tr> <td style="border: none;">12060</td> <td style="border: none;">120 V AC / 0.35 A / 50 (60) Hz</td> </tr> <tr> <td style="border: none;">23050</td> <td style="border: none;">230 V AC / 0.17 A / 50 (60) Hz</td> </tr> </table> <p style="text-align: center;">The AC coils correspond with E5 type. * Other voltages per request.</p> <hr/> <p style="text-align: right;">Series number</p> <hr/> <p>Check valve incorporated in P-line no designation if not required C3 with check valve (see page 7)</p> <hr/> <p style="text-align: right;">Drain no designation external drain which is recommended I when the valve is used with back pressure on the outlet internal drain</p>	01200	12 V DC / 2.72 A	02400	24 V DC / 1.29 A	12060	120 V AC / 0.35 A / 50 (60) Hz	23050	230 V AC / 0.17 A / 50 (60) Hz
01200	12 V DC / 2.72 A								
02400	24 V DC / 1.29 A								
12060	120 V AC / 0.35 A / 50 (60) Hz								
23050	230 V AC / 0.17 A / 50 (60) Hz								

Note:
 Piloting must always be external for valves with the H11 type pilot valve (available on request). Also valve must have external piloting for spools with P and T connected in the center position. Internal piloting is possible only with a C3 version valve (see page 7), or by installing a check valve with a setting of min. 5 bar on the outlet line. In this case the valve must have external drainage.
 Piloting must always be external for valves with the RPH type hydraulic control valve (available on request).

Technical Data		
Valve size	mm (US)	16 (D 07)
Maximum flow rate from port P to A, B, T	L/min (GPM)	300 (80)
Max. operating pressure ports P, A, B port T port T (external drain version)	bar (PSI)	320 (4600) 210 (3000) 250 (3600)
Pressure drop	bar (PSI)	see Pressure Drop $\Delta p-Q$
Hydraulic fluid		Hydraulic oils of power classes (HL, HLP) to DIN 51524
Fluid temperature range for NBR seals	°C (°F)	-30 ... +80 (-22 ... +176)
Fluid temperature range for FPM seals	°C (°F)	-20 ... +80 (-4 ... +176)
Ambient temperature max.	°C (°F)	+50 (+122)
Viscosity range	mm ² /s (SUS)	20 ... 400 (98 ... 1840)
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406
Service life	cycles	10 ⁷
Enclosure type to EN 60529		IP 65
Weight - RPEH4-162 - RPEH4-163	kg (lbs)	8,5 (19) 9,1 (20)

Functional Symbols

Symbols are referred to the solenoid valve RPEH. For the hydraulic control version RPH please verify the connection scheme (see page 7).

Three positions with spring centering		Three positions with spring centering	
Z11		H11	
Y11		C11	
Two positions with return spring		Two positions with return spring	
R51		X51	
R52		X52	
Two positions with mechanical detent on pilot valve			
J17			
J27			

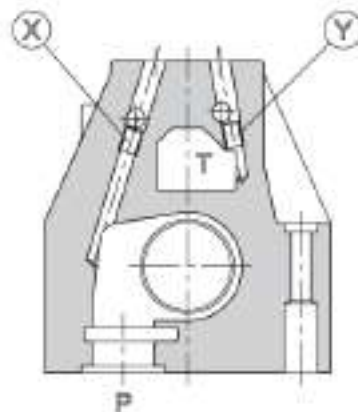
Besides the diagrams shown, which are the most frequently used, other special versions are available: consult our technical department for their identification, feasibility and operating limits.

Performance Characteristic						
Pressures in bar (PSI)		MIN.		MAX.		
Pilot pressure		5 (72.5)		210 (3043)		
Pressure on line T with internal drainage		-		140 (2029)		
Pressure on line T with external drainage		-		250 (3623)		
Maximum flow rates in L/min (GPM)		PRESSURES				
		210 bar (3045 PSI)		320 bar (4640 PSI)		
Spool type C11		250 (66)		200 (53)		
All other spools		300 (80)		250 (66)		
Pressure Drop Δp-Q		Measured at $v = 32 \text{ mm}^2/\text{s}$ (156 SUS) and $t = 40^\circ\text{C}$ (104 °F)				
Pressure drop Δp related to flow rate.						
<p>The graph plots Pressure drop Δp [bar(PSI)] on the y-axis (0 to 14.0) against Flow Q [L/min(GPM)] on the x-axis (0 to 300). Six curves, labeled 1 through 6, show an increasing, non-linear relationship between flow rate and pressure drop. Curve 6 is the steepest, while curve 1 is the least steep.</p>						
Spool type	Spool position	Connections				
		P - A	P - B	A - T	B - T	P - T
Curves on graph						
Z11	Energized	1	1	2	3	
H11	De-energized					6*
	Energized	5	5	1	2	
Y11	De-energized			4*	4*	
	Energized	1	1	1	2	
C11	De-energized					6
	Energized	6	6	3	4	
R51, R52, X51, X52	De-energized	1			1	
	Energized		1	2		
J17, J27	Energized	1	1	2	3	
* A-B blocked * B blocked * A blocked						

Pilot and Drain

The RPEH valves are available with pilot and drain, both internal and external. The version with external drain allows for a higher back pressure on the outlet.

Type of valve		Plug assembly	
		X	Y
RPEH4-16**/*	Internal pilot and external drain	NO	YES
RPEH4-16**/*I	Internal pilot and internal drain	NO	NO
RPEH4-16**/*E	External pilot and external drain	YES	YES
RPEH4-16**/*EI	External pilot and internal drain	YES	NO



X: plug M6 x 8 for external pilot
Y: plug M6 x 8 for external drain

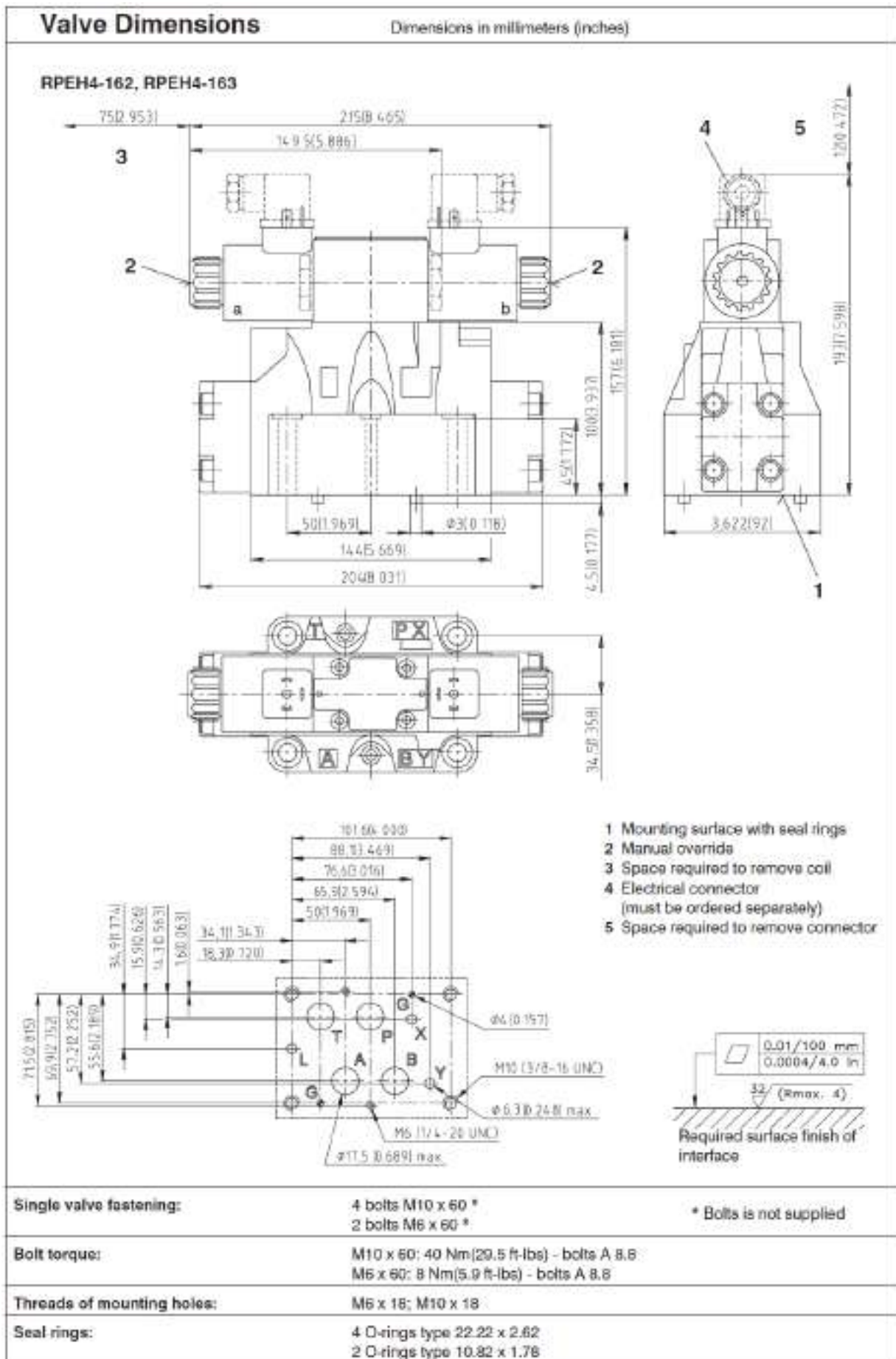
Electrical Features

Solenoids

The operating solenoids are DC solenoids. For AC supply the solenoids are provided with rectifier which are integrated in the DIN connector socket as part of the solenoid. The connectors can be turned by 90°. By loosening the nut, 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, provided the pressure in T-port does not exceed 25 bar.

		DC solenoid	AC solenoid
Max. allowable voltage variation	%	-10 ... +6	±10
Max. switching frequency	1/h	10 000	
Switching times ± 10 %, energizing (two position)	ms	70	60
Switching times ± 10 %, de-energizing (two position)	ms	80	80
Switching times ± 10 %, energizing (three position)	ms	50	80
Switching times ± 10 %, de-energizing (three position)	ms	60	60
Duty cycle	%	100	
Service life	cycles	10 ⁷	
Enclosure type to EN 60 529		IP 65	

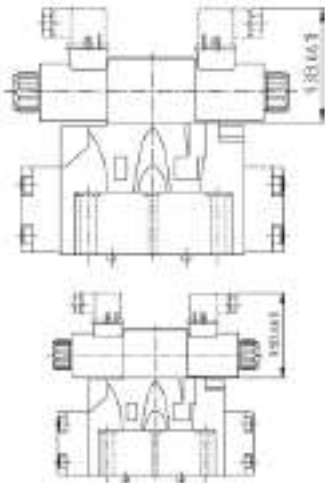
The values indicated refer to a solenoid valve operating with piloting pressure 100 bar, viscosity of 32 mm²/s and with PA and BT connections. The switch on times are obtained from the time the spool switches over. The switch off times are measured at the time pressure variation occurs in the line.



Type of Command

Solenoid control: RPEH

The valve is supplied with a pilot solenoid valve type RPE3-06.



Hydraulic control: RPH

The valve is supplied with a cross-connection cover-plate.

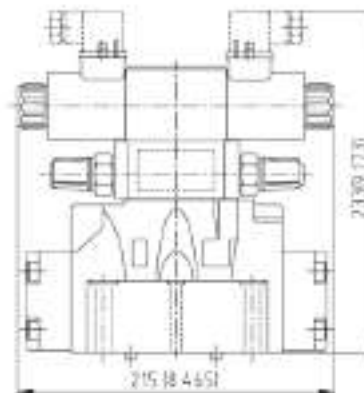
X and Y connections are used for the hydraulic control of the valve.



Controls

Control of the main spool shifting speed: D

By placing a 2VS3-06 type double flow control valve between the pilot solenoid valve and the hydro-piloted valve, the piloted flow rate can be controlled and therefore the shifting speed can be varied. Add the letter D to the identification code to request this device.



Manual Override

Whenever the solenoid valve installation may involve exposure to atmospheric agents or be used in tropical climates, the manual override, boot protection is recommended. Add the suffix N1 or N2 to request this device.

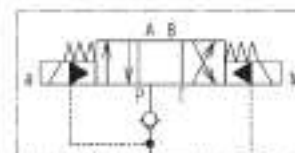
Electrical Connector

The solenoid valves are never supplied with connector. Connectors must be ordered separately.

Special Configurations C3

Check valve incorporated on line P: C3

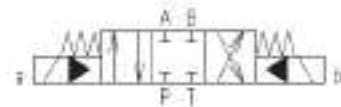
Valve RPEH is available upon request with check valve incorporated on line P. This is particularly useful to obtain the necessary piloting pressure when the main control valve, in the rest position, has line P connected to the T outlet. The cracking pressure is 5 bar. Add C3 to the identification code for this request.



Installation					
<p>Configurations with centering and recall springs can be mounted in any position; type J17, J27 valves - without springs and with mechanical retention must be mounted with the longitudinal axis horizontal. Valve fastening takes place by means of screws or tie rods, placing the valve on a flat surface, with values of planarity and smoothness that are equal to or better than those indicated in the drawing. If the minimum values of planarity or smoothness are not met, fluid leakages between valve and mounting surface can easily occur.</p>					
Spare Parts					
Seal kit					
	Design	Dimensions, number			Ordering number
		O-ring	Square ring	Back-up ring	
Head valve size 16 (D 07)	Standard - NBR	22.22 x 2.62 (4 pcs.)			21833700
		10.82 x 1.78 (2 pcs.)			
		31.42 x 2.62 (2 pcs.)			
	Viton	22.22 x 2.62 (4 pcs.)			21833800
		10.82 x 1.78 (2 pcs.)			
		31.42 x 2.62 (2 pcs.)			
Throttle valve ZVS3-06-CS type number 15929600	Standard - NBR	18 x 2.65 (2 pcs.)	9.25 x 1.68 (4 pcs.)	6.73 x 9.43 x 1.14 (2 pcs.)	15936300
		6.9 x 1.8 (2 pcs.)		17.83 x 22.19 x 1.14 (2 pcs.)	
	Viton	17.12 x 2.62 (2 pcs.)		9.43 x 6.73 x 1.14 (2 pcs.)	15936600
		9.25 x 1.78 (4 pcs.)		17.83 x 22.19 x 1.14 (2 pcs.)	
		6.75 x 1.78 (2 pcs.)			
Control valve	see data sheet ARGO-HYTOS - HA 4010 - RPE3-06				
Mounting bolt					
	Dimensions, number		Tightening torque	Ordering number	
Fixation of extension of valve	Bolt M5 x 45		8.9 Nm (6.6 ft-lbs)	15845100	
	Bolt M5 x 98 - 8G			16103700	
	Nut M5				
Other					
Cover plate	Design				
	PA, BT			15934200	
	PB, TA			15933700	
Caution!					
<ul style="list-style-type: none"> • Service valve without range stated parameter consultation with manufacturer. • Details information at control valve - see data sheet RPE3-06, HA 4010. • The packing foil is recyclable. • The protective plate can be returned to manufacturer. • The technical information regarding the product presented in this data sheet is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law. 					

	4/2 and 4/3 Way Directional Control Valves Pilot Operated Size 25 (D 06) • 320 bar (4600 PSI) • 600 L/min (159 GPM)	RPEH4-25	HA 4024 6/2012 Replaces HA 4024 12/2007
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- Solenoid pilot operated directional valves (RPEH)
- Hydraulic pilot operated directional valves (RPH)
- Small energy input
- Manual overrides optional (only for RPEH)
- Installation dimensions to DIN 24 340 / ISO 4401 / CETOP RP121-H



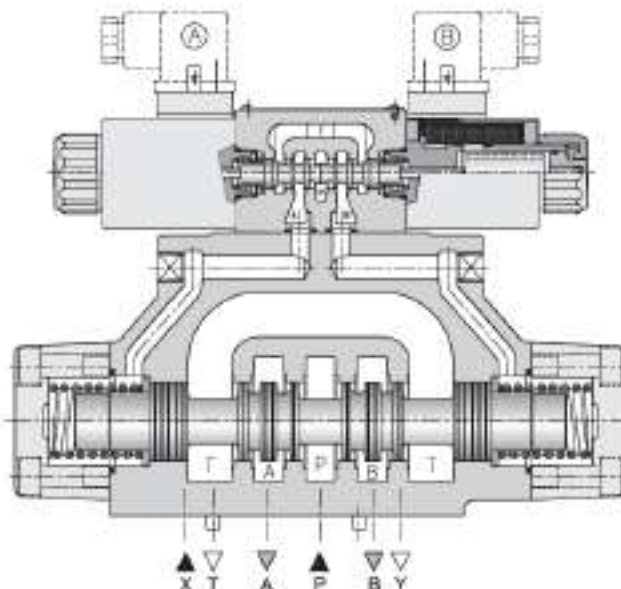
Functional Description

The RPEH solenoid operated - hydropiloted valves are consisting of an RPE3-06 type solenoid operated directional control valve (see data sheet HA 4010) that operates a 4-way hydropiloted control valve with a connection surface in accordance with the ISO 4401 standards. They are available in various configurations and spool types.

The pilot and the drain connections can be made internal or external by inserting or removing the accordant threaded plugs located in the main directional control valve.

A wide range of configurations and different solenoid operated - hydropiloted directional control valve spool positions are available:

- 4-way, 3-position directional control valve, with two solenoids; positioning of the spool in center position is obtained with centering springs.
 - 4-way, 2-position directional valve, with one solenoid and one return spring or two solenoids and detent of the spool position.
- The basic surface treatment of the valve housing is phosphate coated and the solenoids are zinc coated.



Technical Data		
Valve size	mm (US)	25 (D 08)
Maximum flow rate from port P to A, B, T	L/min (GPM)	600 (159)
Max. operating pressure ports P, A, B port T port T (external drain version)	bar (PSI)	320 (4600) 210 (3000) 250 (3600)
Pressure drop	bar (PSI)	see Pressure Drop $\Delta p-Q$
Hydraulic fluid		Hydraulic oils of power classes (HL, HLP) to DIN 51 524
Fluid temperature range for NBR seals	°C (°F)	-30 ... +80 (-22 ... +176)
Fluid temperature range for FPM seals	°C (°F)	-20 ... +80 (-4 ... +176)
Ambient temperature max.	°C (°F)	+50 (+122)
Viscosity range	mm ² /s (SUS)	20 ... 400 (98 ... 1840)
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406
Service life	cycles	10 ⁷
Enclosure type to EN 60 529		IP 65
Weight - RPEH4-252 - RPEH4-253	kg (lbs)	15 (33) 15.6 (34.3)

Functional Symbols

Symbols are referred to the solenoid valve RPEH. For the hydraulic control version RPH please verify the connection scheme (see page 7).

Three positions with spring centering		Three positions with spring centering	
Z11		H11	
Y11		C11	
Two positions with return spring		Two positions with return spring	
R51		X51	
R52		X52	
Two positions with mechanical detent on pilot valve			
J17			
J27			

Besides the diagrams shown, which are the most frequently used, other special versions are available: consult our technical department for their identification, feasibility and operating limits.

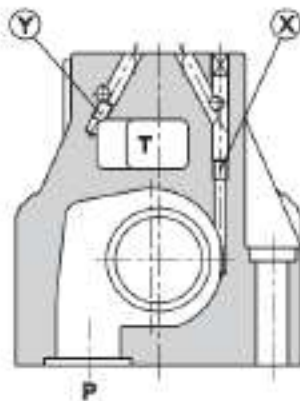
Performance Characteristic						
Pressures in bar (PSI)		MIN.		MAX.		
Pilot pressure		5 (72.5)		210 (3045)		
Pressure on line T with internal drain		-		140 (2030)		
Pressure on line T with external drain		-		250 (3625)		
Maximum flow rates in L/min (GPM)		PRESSURES				
		210 bar (3045 PSI)		320 bar (4640 PSI)		
Spool type C11		500 (133)		450 (119)		
All other spools		600 (159)		500 (133)		
Pressure Drop Δp -Q		Measured at $\nu = 32 \text{ mm}^2/\text{s}$ (156 SUS) and $t = 40 \text{ }^\circ\text{C}$ (104 $^\circ\text{F}$)				
Pressure drop Δp related to flow rate.						
Spool type	Spool position	Connections				
		P - A	P - B	A - T	B - T	P - T
Curves on graph						
Z11	Energized	1	1	2	3	
H11	De-energized					6*
	Energized	5	5	1	2	
Y11	De-energized			4*	4*	
	Energized	1	1	1	2	
C11	De-energized					6
	Energized	6	6	3	4	
R51, R52, X51, X52	De-energized	1			1	
	Energized		1	2		
J17, J27	Energized	1	1	2	3	
* A-B blocked * B blocked ◊ A blocked						

Pilot and Drain

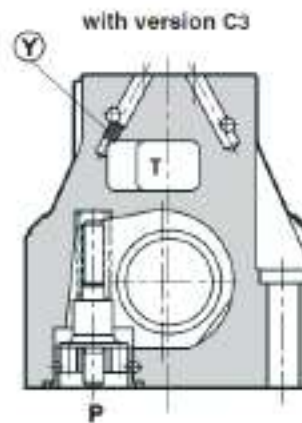
The RPEH valves are available with pilot and drain, both internal and external. The version with external drain allows for a higher back pressure on the outlet.

Type of valve		Plug assembly	
		X	Y
RPEH4-25**/*	Internal pilot and external drain	NO*	YES
RPEH4-25**/*I	Internal pilot and internal drain	NO*	NO
RPEH4-25**/*E	External pilot and external drain	YES	YES
RPEH4-25**/*EI	External pilot and internal drain	YES	NO

* C3 version is available only with internal pilot.



X: plug M6 x 8 for external pilot
Y: plug M8 x 8 for external drain



Y: plug M6 x 8 for external drain

Electrical Features

Solenoids

The operating solenoids are DC solenoids. For AC supply the solenoids are provided with rectifier which are integrated in the EN connector socket as part of the solenoid. The connectors can be turned by 90°. By loosening the nut, 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, provided the pressure in T-port does not exceed 25 bar.

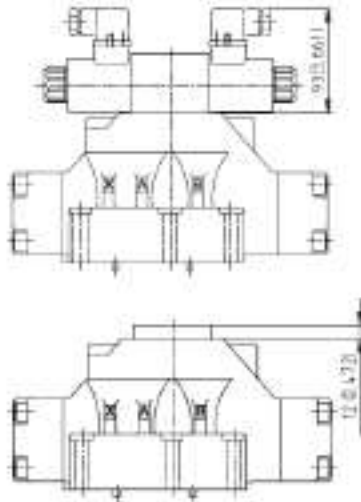
		DC solenoid	AC solenoid
Max. allowable voltage variation	%	-10 ... +6	±10
Max. switching frequency	1/h	8 000	
Switching times ±10 %, energizing (two position)	ms	75	60
Switching times ±10 %, de-energizing (two position)	ms	90	90
Switching times ±10 %, energizing (three position)	ms	55	45
Switching times ±10 %, de-energizing (three position)	ms	60	60
Duty cycle	%	100	
Service life	cycles	10 ⁷	
Enclosure type to EN 60 529		IP 65	

The values indicated refer to a solenoid valve operating with piloting pressure 100 bar, with mineral oil at a temperature of 40 °C, a viscosity of 32 mm²/s and with PA and BT connectors. The switch on times are obtained from the time the spool switches over. The switch off times are measured at the time pressure variation occurs in the line.

Type of Command

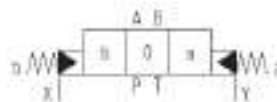
Solenoid control: RPEH

The valve is supplied with a pilot solenoid valve type RPE3-06.

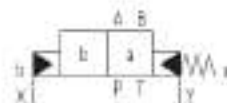


Hydraulic control: RPH

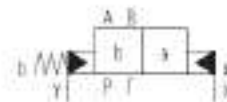
The valve is supplied with a cross-connection cover-plate. X and Y connections are used for the hydraulic control of the valve.



RPH4-253



RPH4-252

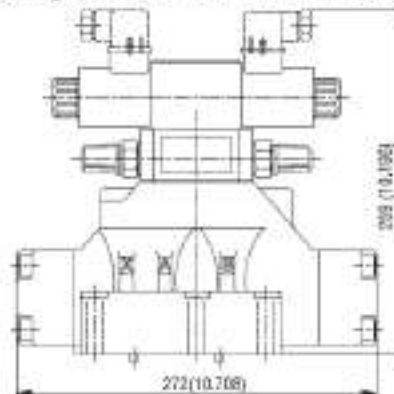


RPH4-252

Controls

Control of the main spool shifting speed: D

By placing a 2VS3-06 type double flow control valve between the pilot solenoid valve and the hydropiloted valve, the piloted flow rate can be controlled and therefore the shifting speed can be varied. Add the letter **D** to the identification code to request this device.



Manual Override

Whenever the solenoid valve installation may involve exposure to atmospheric agents or be used in tropical climates, the manual override, boot protection is recommended. Add the suffix **N1** or **N2** to request this device.

Electrical Connector

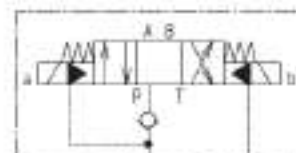
The solenoid valves are never supplied with connector. Connectors must be ordered separately.

Special Configurations C3

Check valve incorporated on line P: C3

Valve RPEH is available upon request with check valve incorporated on line P. This is particularly useful to obtain the necessary piloting pressure when the main control valve, in the rest position, has line P connected to the T outlet. The cracking pressure is 5 bar. Add **C3** to the identification code for this request.

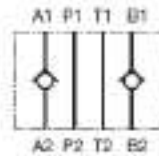
C3 version is available only with internal pilot.



Installation							
<p>Configurations with centering and recall springs can be mounted in any position; type J17, J27 valves - without springs and with mechanical retention must be mounted with the longitudinal axis horizontal. Valve fastening takes place by means of screws or tie rods, placing the valve on a flat surface, with values of planarity and smoothness that are equal to or better than those indicated in the drawing. If the minimum values of planarity or smoothness are not met, fluid leakages between valve and mounting surface can easily occur.</p>							
Spare Parts							
Seal kit							
	Design	Dimensions, number			Ordering number		
		O-ring	Square ring	Back-up ring			
Head valve size 25 (D 08)	Standard - NBR	29,82 x 2,62 (4 pcs.)	-	-	21850300		
		20,29 x 2,62 (2 pcs.)					
		40,94 x 2,62 (2 pcs.)					
		34,59 x 2,62* (1 pc.)					
	Viton	29,82 x 2,62 (4 pcs.)			-	-	21850400
		20,29 x 2,62 (2 pcs.)					
		40,94 x 2,62 (2 pcs.)					
		34,59 x 2,62* (1 pc.)					
Throttle valve 2VS3-06-CS type number 15929600	Standard - NBR	18 x 2,65 (2 pcs.)	9,25 x 1,68 (4 pcs.)	6,73 x 9,43 x 1,14 (2 pcs.)	15936300		
		6,9 x 1,8 (2 pcs.)		17,83 x 22,19 x 1,14 (2 pcs.)			
	Viton	17,12 x 2,62 (2 pcs.)	-	9,43 x 6,73 x 1,14 (2 pcs.)	15936600		
		9,25 x 1,78 (4 pcs.)		17,83 x 22,19 x 1,14 (2 pcs.)			
		6,75 x 1,78 (2 pcs.)		-			
		-		-			
Control valve	see data sheet ARGO-HYTOS - RPE3-06						
Mounting bolt							
	Dimensions, number		Tightening torque	Ordering number			
Fixation of extension of valve	Bolt M5 x 45		8,9 Nm (6,6 ft-lbf)	15845100			
	Bolt M5 x 96 - 8G			16103700			
	Nut M5						
Other							
	Design			Ordering number			
Cover plate	PA, BT			15934200			
	PB, TA			15933700			
Caution!							
<ul style="list-style-type: none"> • Service valve without range stated parameter consultation with manufacturer. • Detailed information at control valve - see data sheet RPE3-05, HA 4010 • The packing foil is recyclable. • The protective plate can be returned to manufacturer. • The technical information regarding the product presented in this data sheet is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law. 							

	Check Valves Sandwich Plates MVJ3-06 Size 06 (D 03) • 350 bar (5076 PSI) • 50 L/min (13.2 GPM)	HA 5018 6/2012 Replaces HA 5018 10/2010
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- Sandwich plate design for use in vertical stacking assemblies
- Poppet design
- Leakfree closure in one or two service ports
- 8 different models
- Installation dimensions to ISO 4401/ DN 24 340



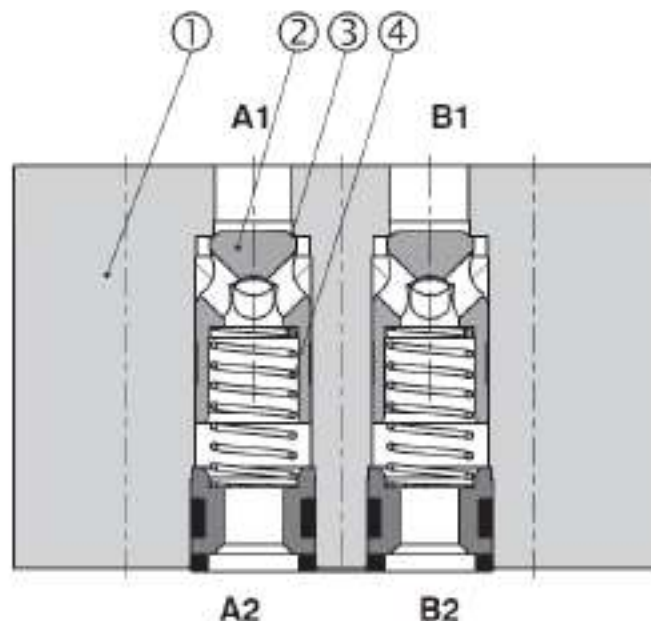
Functional Description

The check valve sandwich plates are used to allow flow in one direction and prevent flow in the other one. The sandwich design enables vertical stacking with other components of the same size. The check elements can be built into one or two ports, the other ports being through-holes.

The seat (3) is machined directly in the housing (1) and the poppet (2) is pushed onto the seat by compression spring (4). The cracking pressure depends on the spring used, on its preload and on the pressurized poppet surface area.

The valve housing surface is phosphate coated.

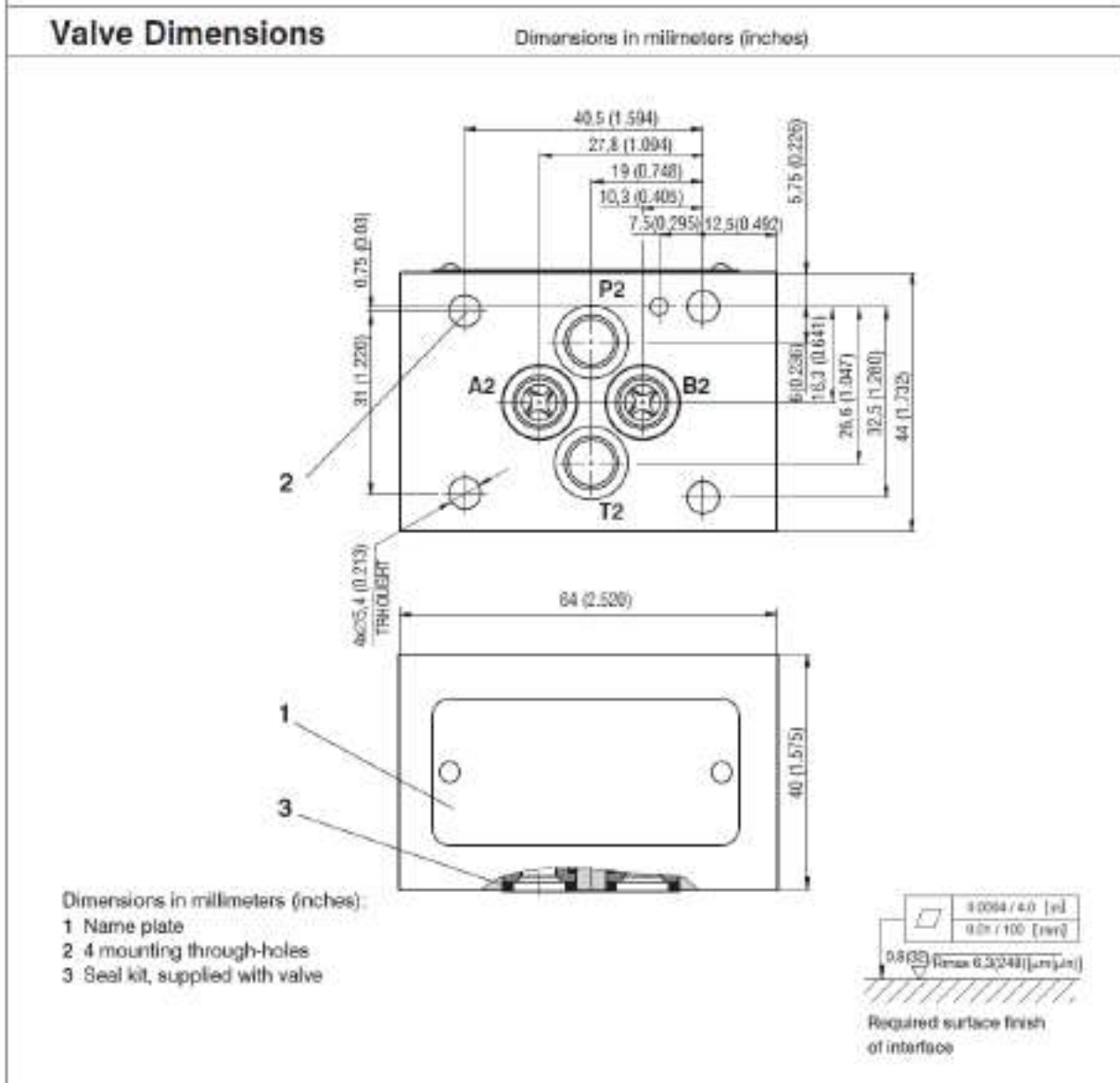
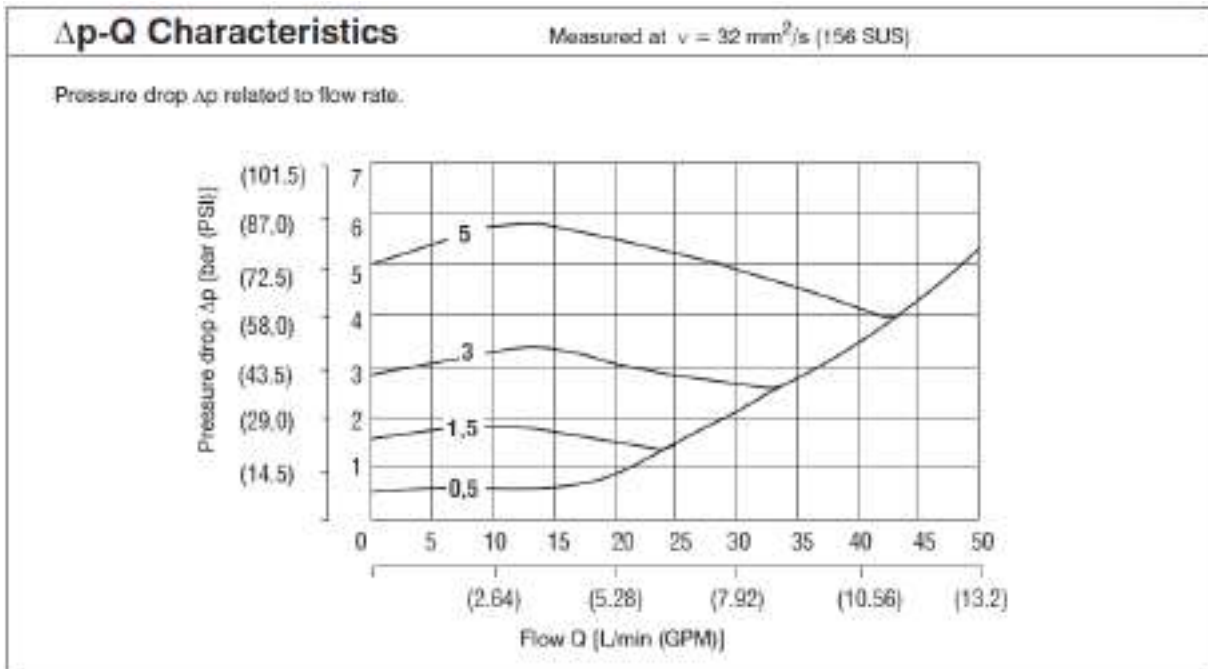
MODEL AB



Ordering Code	
MVJ3-06 <input type="text"/> - <input type="text"/> - <input type="text"/> <input type="text"/>	
Sandwich Check Valve Plate for Stacking Assemblies	Seals NBR FPM (Viton)
Nominal size	Surface finishing Phosphate PO-A
Functional symbols Check valve in line P* Check valve in line T* Check valve in line A* Check valve in line B* Check valve in line A* Check valve in line B* Check valve in line A a B* Check valve in line P a T* * see the table Functional symbols	Cracking pressure 005 0,5 bar (7.25 PSI) 015 1,5 bar (21.75 PSI) 030 3,0 bar (43.51 PSI) 050 5,0 bar (72.51 PSI)
P T A B C D AB PT	no designation V no designation A

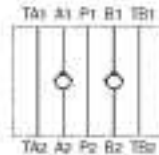
Functional symbols	
Notes: The orientation of the symbol on the name plate corresponds with the valve function.	① valve side ② subplate or manifold side

Technical Data	
Valve size	mm (US) 06 (D 03)
Maximal flow	L/min (GPM) 50 (13.2)
Maximum operating pressure	bar (PSI) 350 (5076)
Cracking pressure	bar (PSI) 0,5 (7.25) 1,5 (21.75) 3 (43.51) 5 (72.51)
Hydraulic fluid	Hydraulic oils of power classes (HL, HLP) to DIN 51524
Fluid temperature range for standard sealing (NBR)	°C (°F) -30 ... +80 (-22 ... +176)
Fluid temperature range for Viton seals (FPM)	°C (°F) -20 ... +60 (-4 ... +176)
Viscosity range	mm ² /s (SUS) 20 ... 400 (98 ... 1840)
Maximum degree of fluid contamination	Class 21/18/15 to ISO 4406
Weight	kg (lbs) 0.8 (1.8)
Mounting position	unrestricted



	Check Valves Sandwich Plates MVJ3-10 Size 10 (D 05) • 350 bar (5076 PSI) • 100 L/min (26.4 GPM)	HA 5020 10/2010
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- Sandwich plate design for use in vertical stacking assemblies
- Poppet design
- Leakfree closure in one or two service ports
- 8 different models
- Installation dimensions to ISO 4401 / DN 24 340



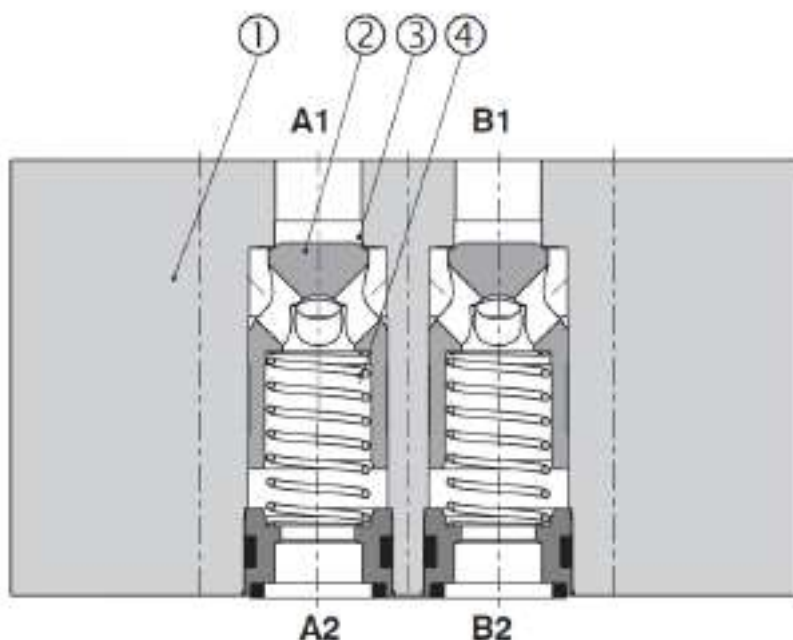
Functional Description

The check valve sandwich plates are used to allow flow in one direction and prevent flow in the other one. The sandwich design enables vertical stacking with other components of the same size. The check elements can be built into one or two ports, the other ports being through-holes.

The seat (3) is machined directly in the housing (1) and the poppet (2) is pushed onto the seat by compression spring (4). The cracking pressure depends on the spring used, on its preload and on the pressurized poppet surface area.

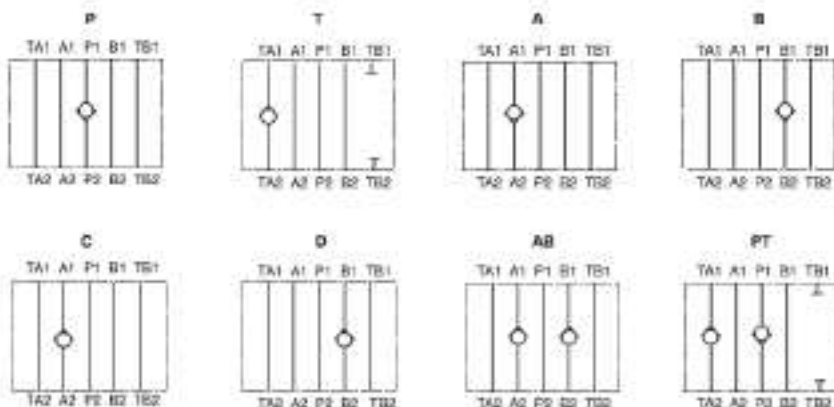
The valve housing surface is phosphate coated.

MODEL AB



Ordering Code	
MVJ3-10 <input type="text"/> - <input type="text"/> - <input type="text"/> <input type="text"/>	
Sandwich Check Valve Plate for Stacking Assemblies	no designation V
Nominal size	Seals NBR FPM (Viton)
Functional symbols Check valve in line P* Check valve in line T* Check valve in line A* Check valve in line B* Check valve in line A* Check valve in line B* Check valve in line A a B* Check valve in line P a T* * see the table Functional symbols	no designation A
P T A B C D AB PT	Surface finishing Phosphate PO-A
	Cracking pressure 0,5 bar (7.25 PSI) 3,0 bar (43.51 PSI) 5,0 bar (72.51 PSI)
	005 030 050

Functional symbols

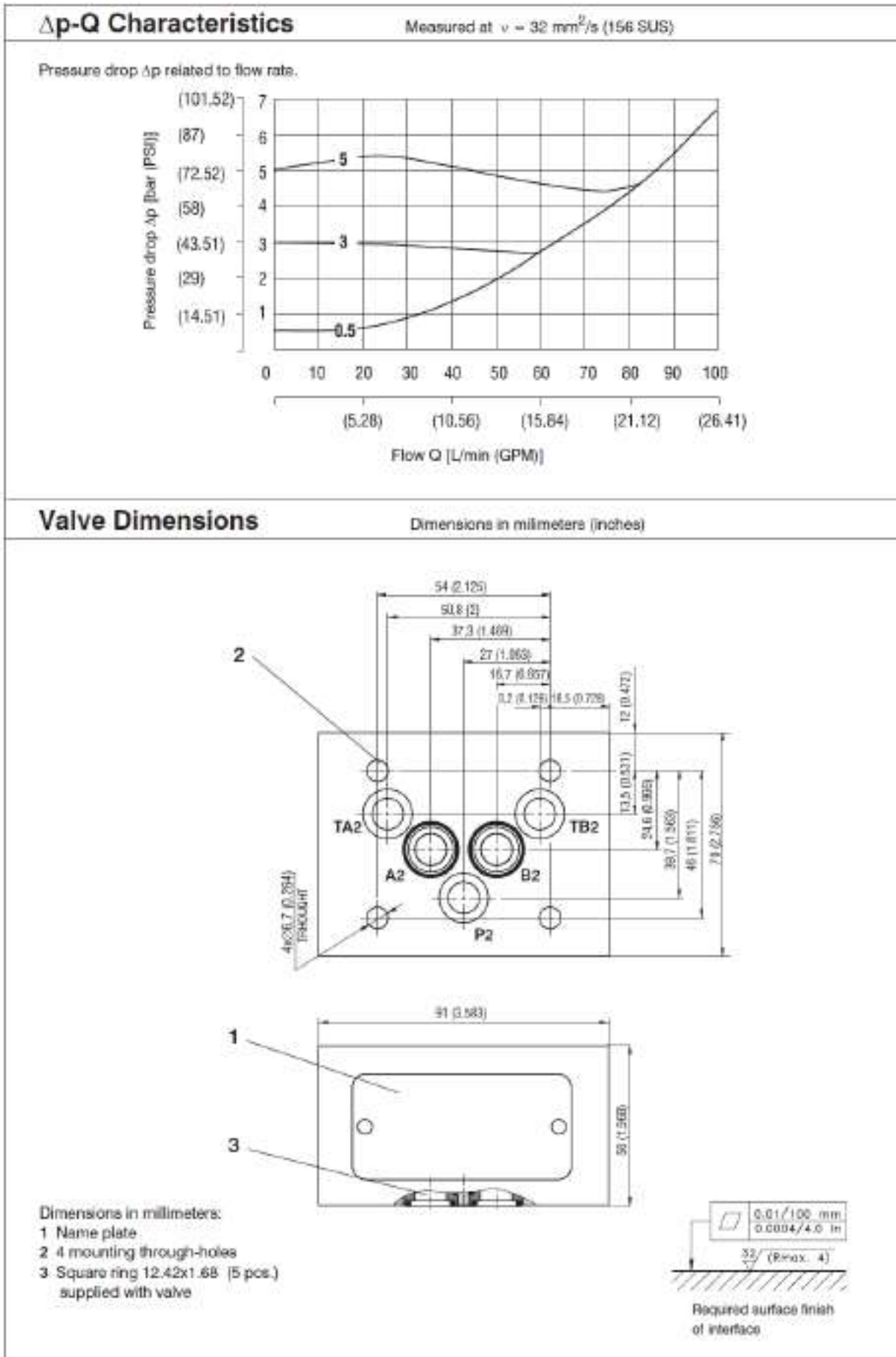


Notes: The orientation of the symbol on the name plate corresponds with the valve function.
Port TB is closed with models T and PT.

- ① valve side
- ② subplate or manifold side

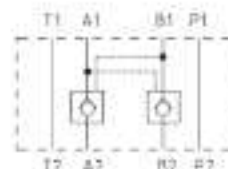
Technical Data

Valve size	mm (US)	10 (D 05)
Maximal flow	L/min (GPM)	100 (26.4)
Maximum operating pressure	bar (PSI)	350 (5076)
Cracking pressure	bar (PSI)	0,5 (7.25) 3 (43.51) 5 (72.51)
Hydraulic fluid		Hydraulic oils of power classes (HL, HLP) to DIN 51524
Fluid temperature range for standard sealing (NBR)	°C (°F)	-30 ... +80 (-22 ... +176)
Fluid temperature range for Viton seals (FPM)	°C (°F)	-20 ... +80 (-4 ... +176)
Viscosity range	mm ² /s (SUS)	20 ... 400 (98 ... 1840)
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406
Weight	kg (lbs)	2.25 (4.96)
Mounting position		unrestricted



	Pilot Operated Check Valves Sandwich Plates	2RJV1-06	HA 5021 7/2012 Replaces HA 5021 5/2008
Size 06 (D 03) • 320 bar (4600 PSI) • 60 L/min (15.9GPM)			

- Sandwich plate design for use in vertical stacking assemblies
- Three models:
 - leakfree closure in lines A and B
 - leakfree closure in line A
 - leakfree closure in line B
- Installation dimensions to ISO 4401 / DIN 24 340



Functional Description

Model 2RJV1-06 are pilot operated check valves in a sandwich plate design used to give leakfree closure of one or two actuator ports under pressure, even during long idle periods.

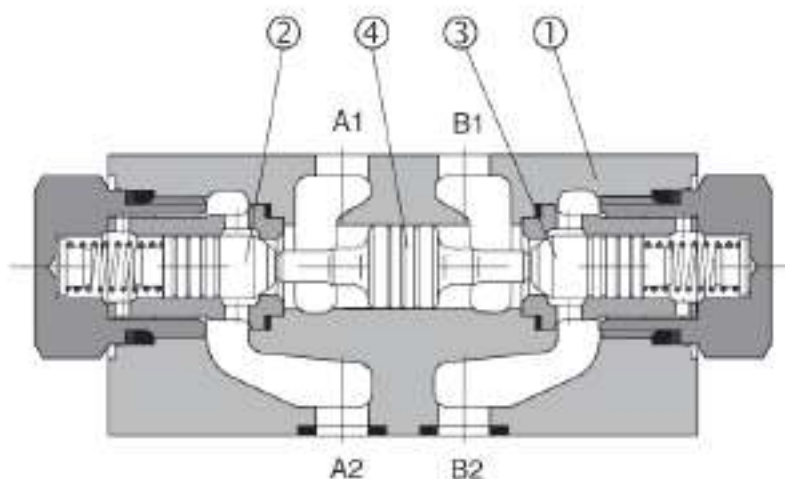
The valve consists of the cast iron housing (1), one or two check valves (2), (3) and the pilot piston (4).

When fluid flows from A1 (B1) to A2 (B2) it opens the check valve (2), (3) and at the same time shifts the pilot piston (4) to the right (left), thus opening the way B2 → B1 (A2 → A1). When the pressure drops (i. e. after shifting

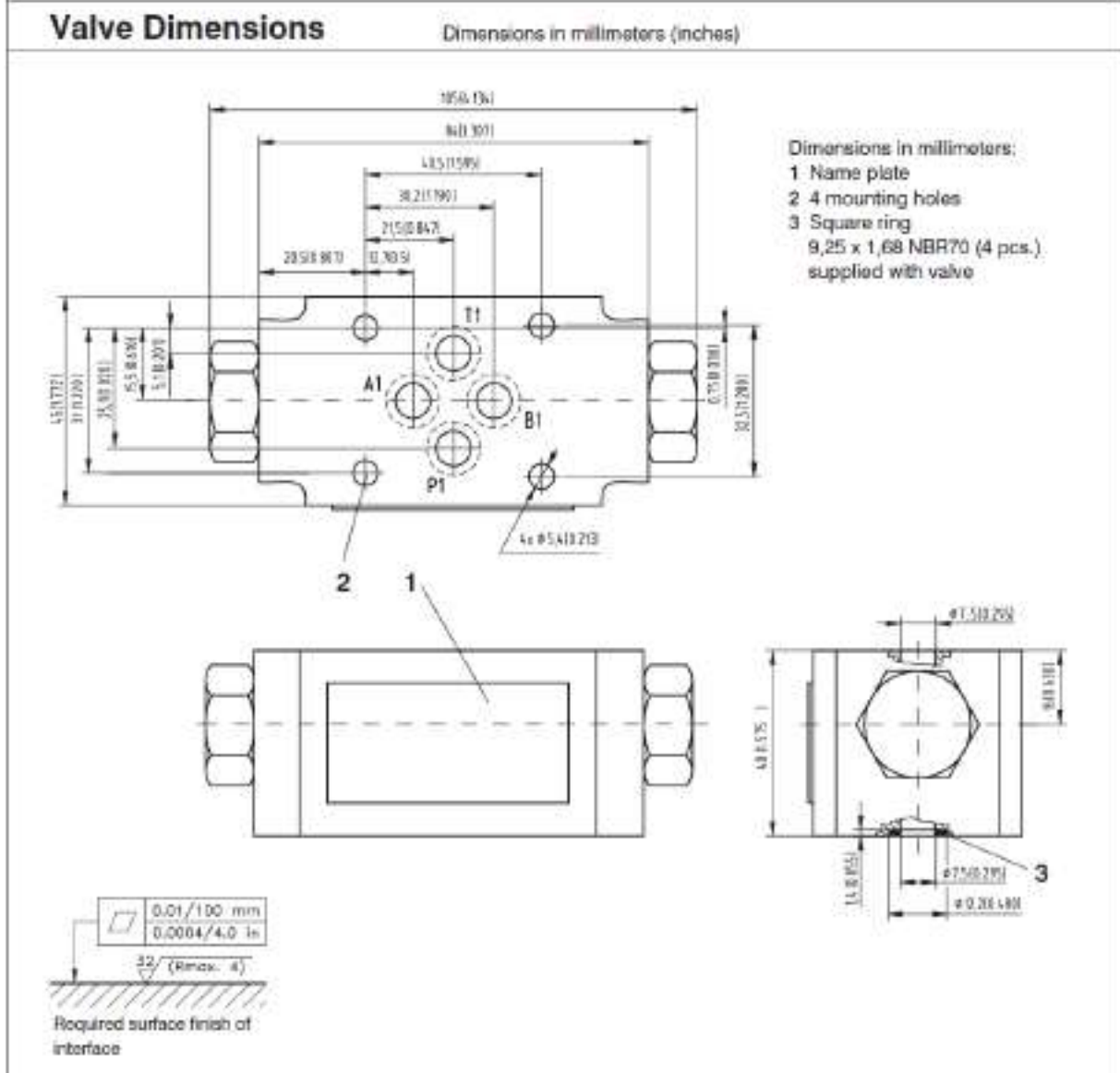
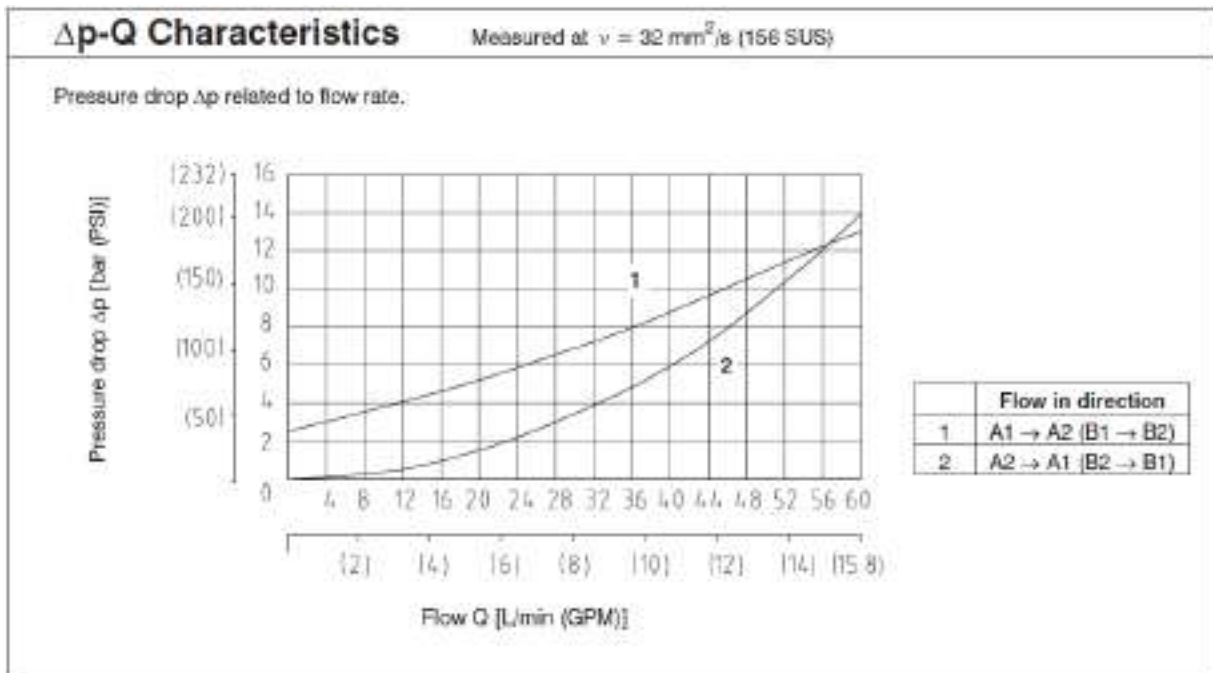
the directional valve into its middle position), the springs push the poppets onto the seats and the circuit between the check valve and the cylinder is closed.

To ensure that the poppet valves seat properly, the actuator ports A2 and B2 of the directional valve should be connected to tank T in neutral position (functional symbol Y).

The valve body is phosphate coated, the surfaces of the other parts are zinc coated.



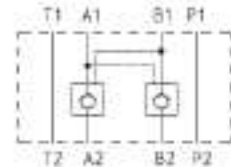
Ordering Code			
2RJV1-06-M 			
Pilot Operated Check Valve Sandwich Plate	no designation V	Seals NBR Viton	
Nominal size	06 (D 03)	Functional Symbols Check valve in line A* Check valve in line B* Check valves in lines A and B* * see the table Functional symbols	
Modular design	A B C		
Functional Symbols			
Arrangement of the check valves in the valve body			
<p>2RJV1-06-MA</p>	<p>2RJV1-06-MB</p>	<p>2RJV1-06-MC</p>	<p>Typical circuit with pilot operated check valve</p>
<p>① valve side ② subplate side</p>			
Technical Data			
Valve size	mm (US)	06 (D 03)	
Maximum flow	L/min (GPM)	60 (15.9)	
Max. operating pressure	bar (PSI)	320 (4600)	
Cracking pressure	bar (PSI)	see the Performance Curves	
Hydraulic fluid		Hydraulic oils of power classes (HL, HLP) to DIN 51524	
Fluid temperature range (NBR)	°C (°F)	-30 ... +100 (-22 ... +212)	
Fluid temperature range (Viton)	°C (°F)	-20 ... +120 (-4 ... +248)	
Viscosity range	mm ² /s (SUS)	20 ... 400 (98 ... 1840)	
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406	
Area ratio (pilot piston/poppet)		3 : 1	
Mounting position		unrestricted	
Weight	kg (lbs)	0,8 (1.8)	



Spare Parts		Dimensions in millimeters	
Seal kit			
Type	Dimensions, quantity		Ordering number
	Square ring	O-ring	
Standard NBR 70	9,25 x 1,68 (4 pcs.)	-	28551800
Viton	-	9,25 x 1,78 (4 pcs.)	28551900
Caution!			
<ul style="list-style-type: none">• The plastic packaging is recyclable.• Studs bolt must be ordered separately. For stud kits see data sheet HU 0030.• Certified documentation is available per request.			

	Pilot Operated Check Valves Sandwich Plates	VJR2-06/M	HA 5024 7/2012 Replaces HA 5024 5/2008
	Size 06 (D 03) • 320 bar (4600 PSI) • 45 L/min(11.8 GPM)		

- Pilot operated check valve sandwich plate for use in stacking assemblies
- 3 models
 - double valve with check valves in lines A and B
 - single valve with check valve in line A
 - single valve with check valve in line B
- Installation dimensions to ISO 4401, CETOP - RP 121H and NFPA T3.5.1 - D 02

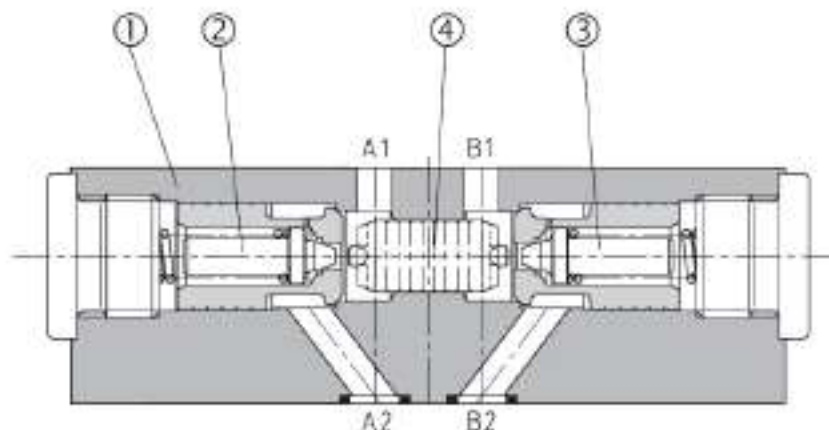


Functional Description

A pilot operated check valve closes tightly the hydraulic circuit between the valve and the actuator. The valve consists of the steel housing (1), one or two check valves (2), (3) and the pilot piston (4). The main poppets of the check valves are provided with pilot poppets (5) which enable opening the check valve under pressure. When fluid flows from A1 to A2 it opens the check valve (2) and at the same time shifts the pilot piston (4) which opens by means of the pilot poppet (5) the check valve (3). When the pressure in channels A1 and B1 drops, the

springs push the poppets onto the seats and the circuit between the check valve and the actuator is closed under pressure.

To ensure that the check valves close tightly, a directional valve with functional symbol Y is to be used, which connects in its middle position the ports A1 and B1 with tank T (see the typical circuit diagram). The valve housing (1) is phosphate coated, the surfaces of the other parts are zinc coated.

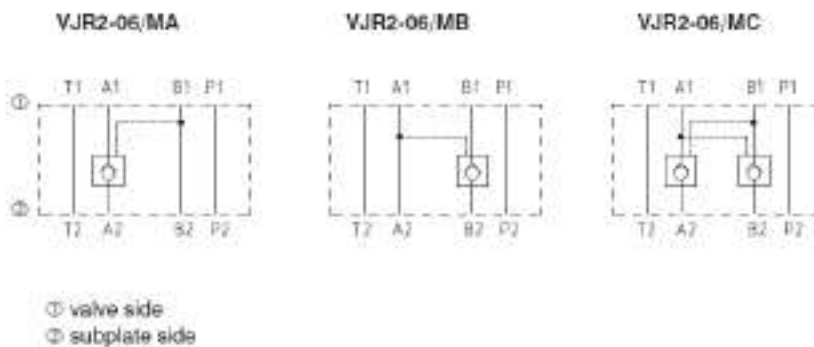


Ordering Code

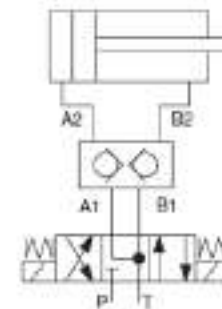
VJR2-06/M <input type="checkbox"/> <input type="checkbox"/>	
<p>Pilot Operated Check Valve Sandwich Plate</p> <hr/> <p>Valve size 06 (D 03)</p> <hr/> <p>Modular design</p>	<p style="text-align: right;">Seals NBR Viton</p> <hr/> <p>no designation V</p> <hr/> <p style="text-align: right;">Functional Symbols check valve in line A* check valve in line B* check valves in lines A and B* * see the table Functional symbols</p>

Functional Symbols

Arrangement of the check valves in the valve body

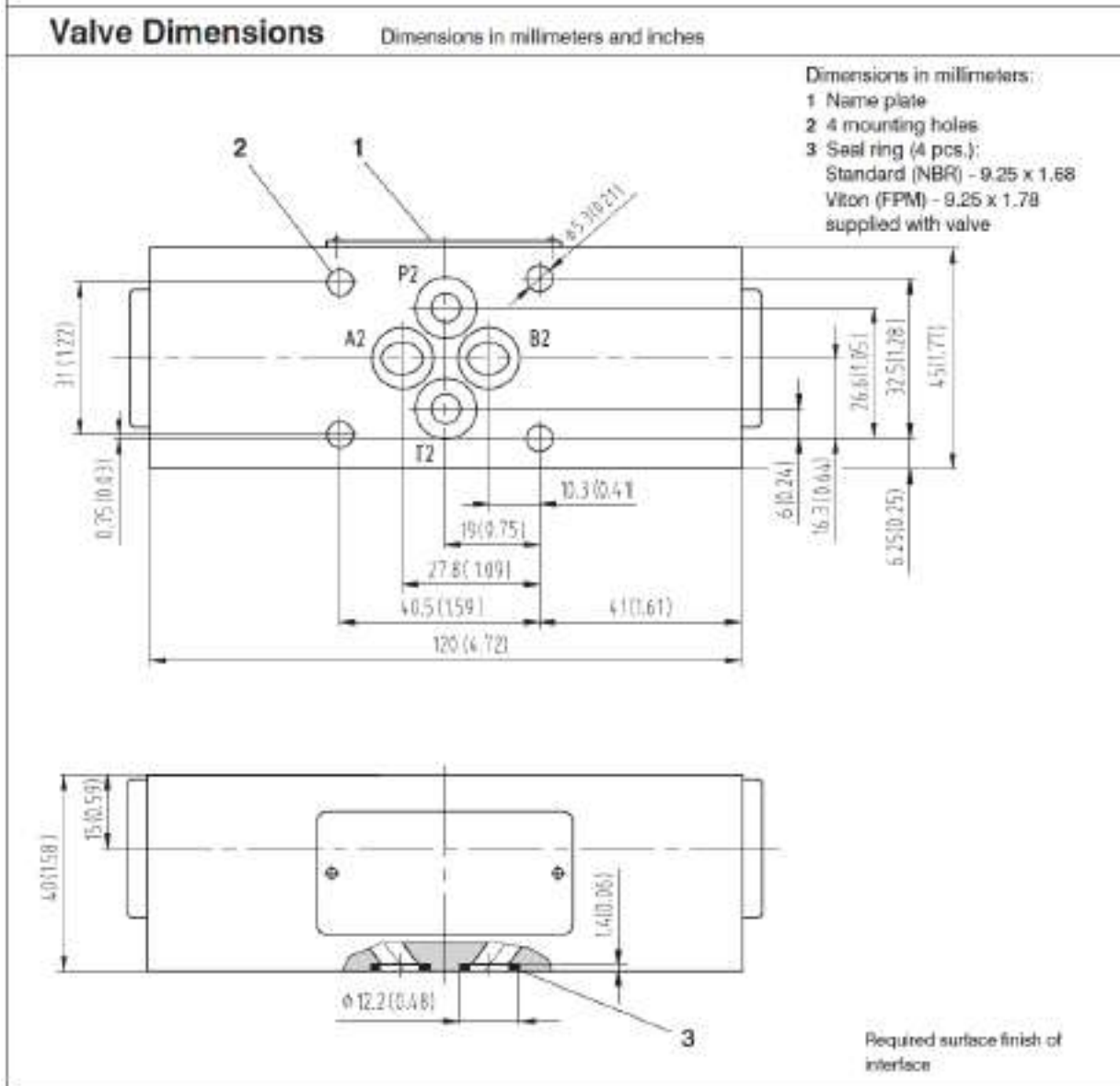
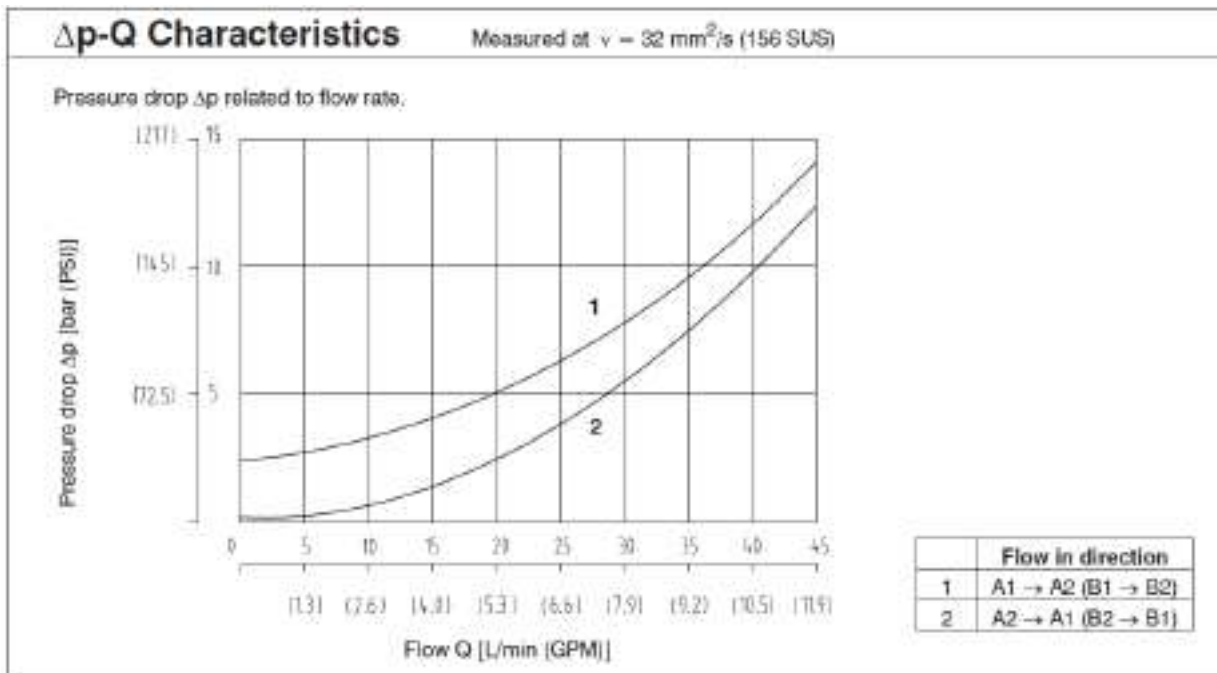


Typical circuit with pilot operated check valve



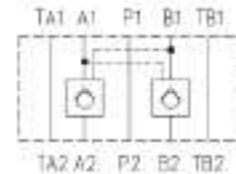
Technical Data

Valve size	mm (US)	06 (D 03)
Maximum flow	L/min (GPM)	45 (11.8)
Maximum operating pressure	bar (PSI)	320 (4600)
Cracking pressure	bar (PSI)	2(29)
Hydraulic fluid	Hydraulic oils of power classes (HL, HLP) to DIN 51524	
Fluid temperature range (NBR)	°C (°F)	-30 ... +100 (-22...+212)
Fluid temperature range (Viton)	°C (°F)	-20 ... +120 (-4...+248)
Viscosity range	mm ² /s (SUS)	20 ... 400 (98...1840)
Maximum degree of fluid contamination	Class 21/18/15 to ISO 4406	
Area ration (pilot piston / seat)	8,16 : 1	
Mounting position	unrestricted	
Weight	kg (lbs)	1,6



	<p>Pilot Operated Check Valves Sandwich Plates</p> <p>VJR2-10/M</p> <p>Size 10 (D 05) • 350 bar (5076 PSI) • 100L/min (26.4 GPM)</p>	<p>HA 5025 6/2012</p> <p>Replaces HA 5025 2/2008</p>
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- Pilot operated check valve sandwich plate for use in stacking assemblies
- 3 models
 - double valve with check valves in lines A and B
 - single valve with check valve in line A
 - single valve with check valve in line B
- Installation dimensions to SO 4401
CETOP - RP 121H and NFPA T3.5.1 - D 02



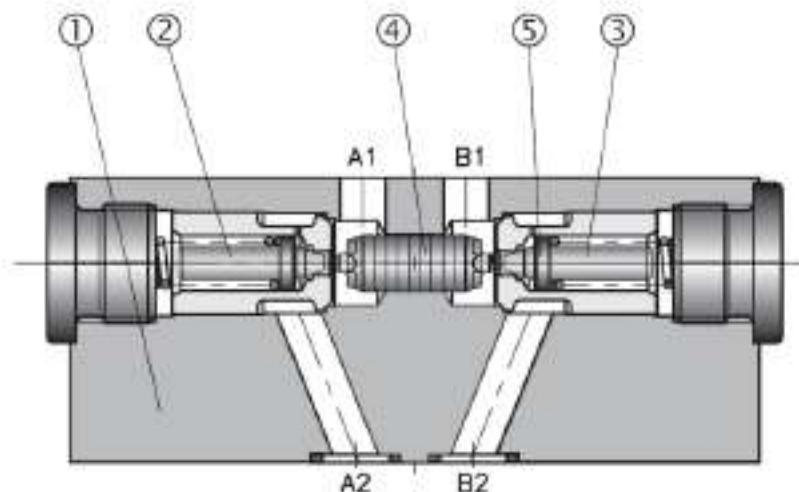
Functional Description

A pilot operated check valve closes tightly the hydraulic circuit between the valve and the actuator. The valve consists of the housing (1), one or two check valves (2), (3) and the pilot piston (4). The main poppets of the check valves are provided with pilot poppets (5) which enable opening the check valve under pressure. When fluid flows from A1 to A2 it opens the check valve (2) and at the same time shifts the pilot piston (4) which opens by means of the pilot poppet (5) the check valve (3). When the pressure in channels A1 and B1 drops, the

springs push the poppets onto the seats and the circuit between the check valve and the actuator is closed under pressure.

To ensure that the check valves close tightly, a directional valve with functional symbol Y is to be used, which connects in its middle position the ports A1 and B1 with tank T (see the typical circuit diagram).

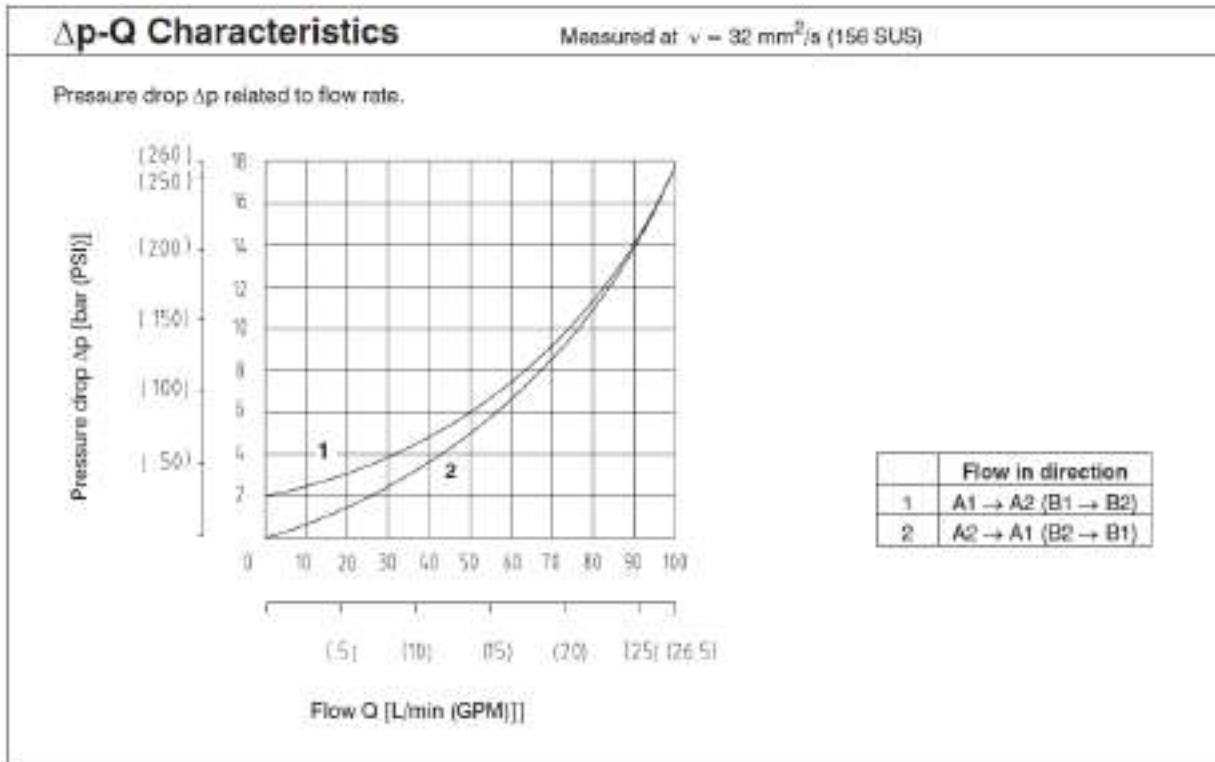
The valve housing (1) is phosphate coated, the surfaces of the other parts are zinc coated.



Ordering Code	
VJR2-10/M	□ □
Pilot Operated Check Valve Sandwich Plate	no designation V
Valve size	10 (D 05)
Modular design	
	Seals NBR Viton Functional Symbols Check valve in line A* Check valve in line B* Check valves in lines A and B* * see the table Functional symbols
	A B C

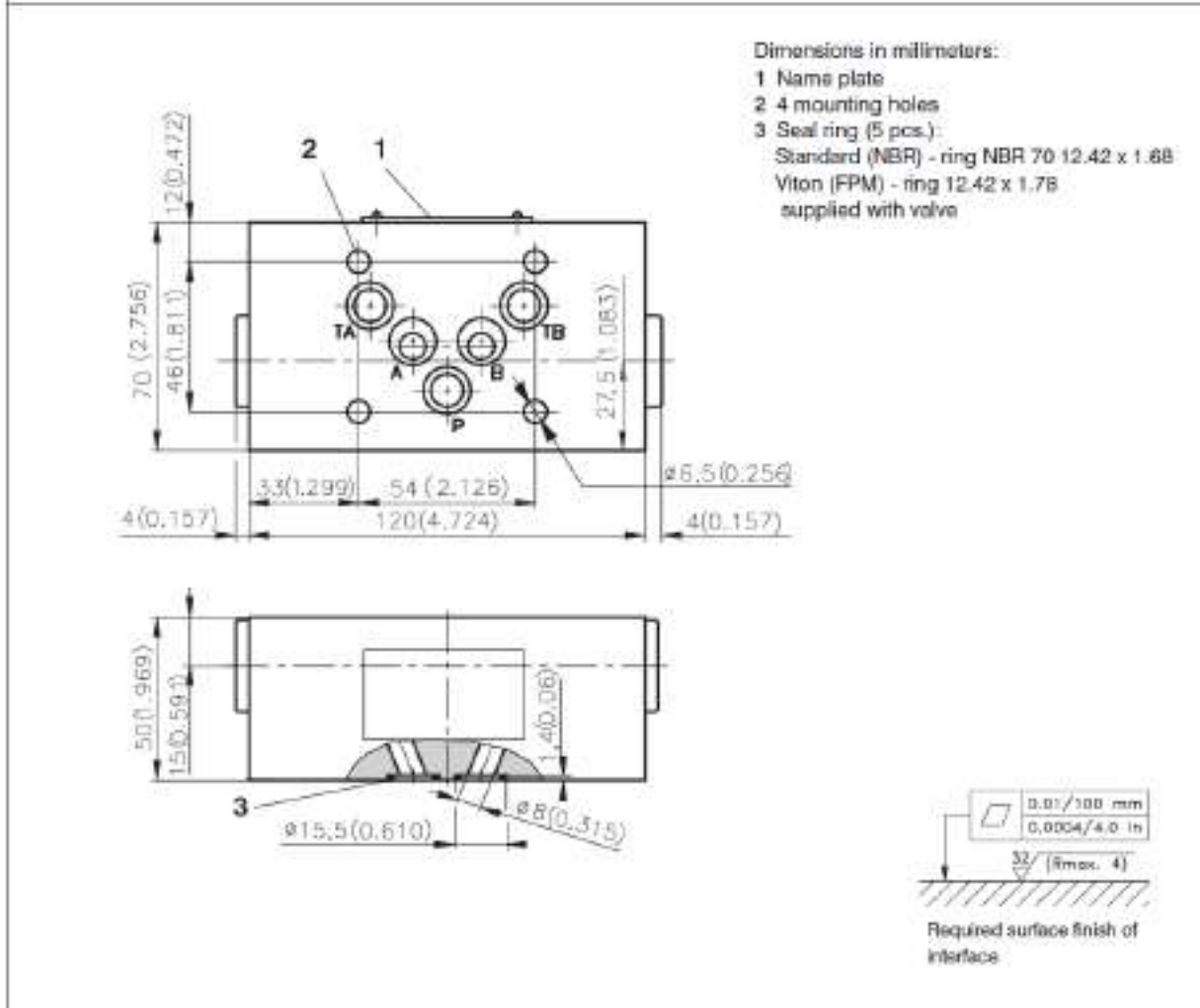
Functional Symbols	
Arrangement of the check valves in the valve body	
VJR2-10/MA	VJR2-10/MB
VJR2-10/MC	
① valve side	
② subplate side	
Typical circuit with pilot operated check valve	

Technical Data		
Valve size	mm (US)	10 (D 05)
Maximum flow	L/min (GPM)	100(26.42)
Maximum operating pressure	bar (PSI)	350 (5076)
Cracking pressure	bar (PSI)	2 (29)
Hydraulic fluid		Hydraulic oils of power classes (HL, HLP) to DIN 51524
Fluid temperature range (NBR)	°C (°F)	-30... +100 (-22 ... +212)
Fluid temperature range (Viton)	°C (°F)	-20... +120 (-4 ... +248)
Viscosity range	mm ² /s (SUS)	20...400 (98 ... 1840)
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406
Area ration (pilot piston / seat)		5,6 : 1
Mounting position		unrestricted
Weight	kg (lbs)	3 (6.61)



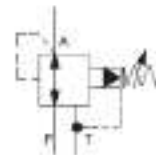
Valve Dimensions

Dimensions in millimeters and inches



	Pilot Operated Pressure Reducing Valve VRN2-06 Size 06 • p_{max} up to 320 bar • Q_{max} up to 40 L/min	HA 5153 4/2008 Replaces HA 5153 -2/2007
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- Screw-in cartridge valve for manifold mounting and stacking assemblies
- 4 pressure ranges
- Two pressure adjustment options
- Pressure reduction in ports A or P
- Model MA with check valve
- Installation dimensions to ISO 4401-AB-03-4-A and DIN 24 340-A6



Functional Description

The pressure valves VRN2 are pilot operated screw-in cartridge pressure reducing valves designed as 3 way valves, i.e. with pressure protection of the secondary circuit. For the use in vertical stacking assemblies, two models of valve bodies are available, with pressure reduction in ports A and P, incorporated into the valve bodies MA are the check valves which enable the reverse flow to pass through the valve.

The reducing valve consists of a cartridge (1) with thread M22x1.5, control spool (2), spring (3) and the adjustment element (4). With the models for stacking assemblies also the respective valve body (5) and alternatively a check valve (6) complete the valve.

Screw-in cartridge valve

The flow from the primary circuit flows to the first metering edge, where its pressure is reduced. The reduced pressure corresponds with the adjustment of the control spring of the ball pilot valve. The reduced pressure is continuously controlled and compared with the pressure preset. If any control error appears, the respective control action takes place and the reduced pressure returns to its preset value. After the pressure reduction, the fluid flows through the spool bore and is

then routed to the output port of the module valve body. If pressure behind the valve increases due to the effect of external load acting on the user, the control spool shifts further against the spring, the reducing metering edge closes and the second metering edge opens. The fluid passes through the „third way“ to port T. The control flow of the pilot valve (from the spring room) is also routed to port T.

Model MA

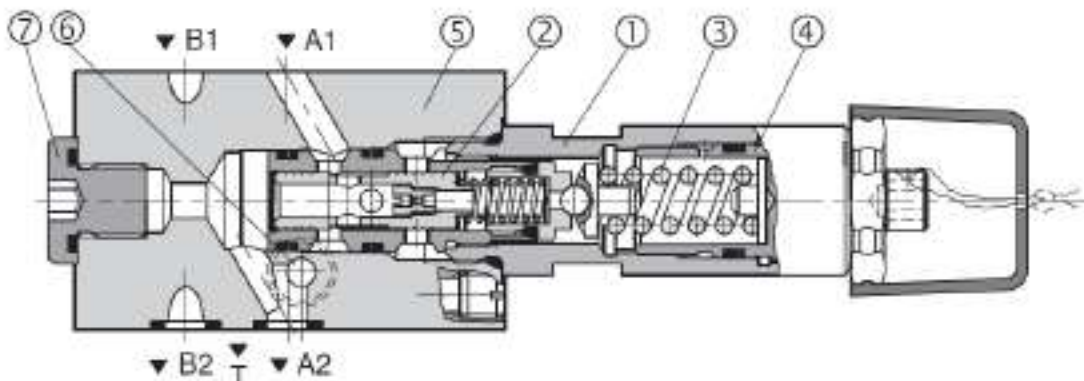
With this model, the flow enter into the valve body through port A1. The input pressure is reduced, routed to port A2 and further to the user. The reverse flow passes through a check valve which is connected parallel to the metering edge.

Model MP

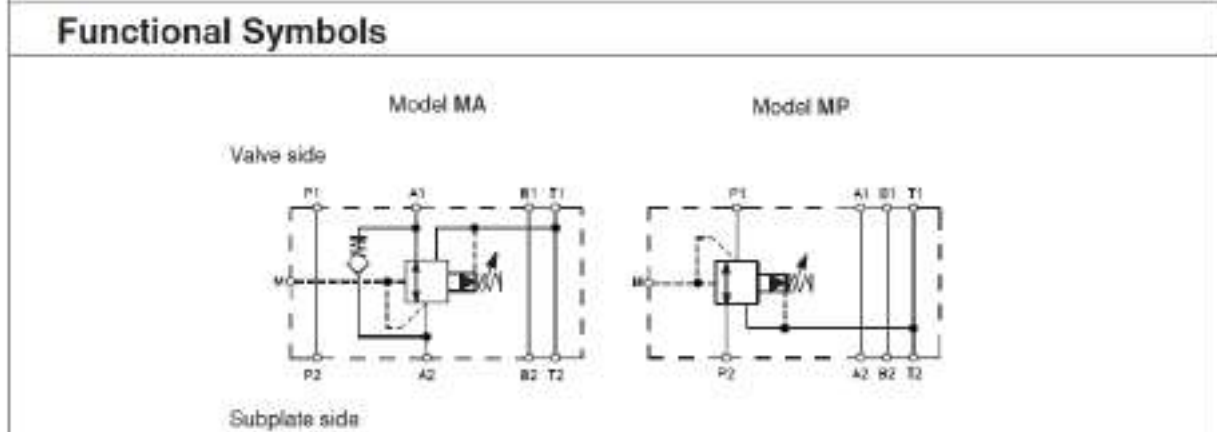
With the model MP, the pressure is reduced from port P2 to port P1.

With all models, a control pressure gauge can be connected to port G 1/4 (7).

The valve body and the adjustment screw are zinc coated. With model M the valve bodies are phosphate coated.



Ordering Code			
VRN2-06/ <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			
Pilot Operated Pressure Reducing Valve		without designation V	Sealing NBR Viton
Nominal size		S R	Adjustment element screw with internal hexagon 6 mm hand knob
Model		6 10 16 21	Pressure range up to 63 bar up to 100 bar up to 160 bar up to 210 bar
screw in cartridge	S		
modular valve, pressure reduction in port A	MA		
modular valve, pressure reduction in port P	MP		
FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE AND TABLE OF PREFERRED TYPES ON PAGE 6			

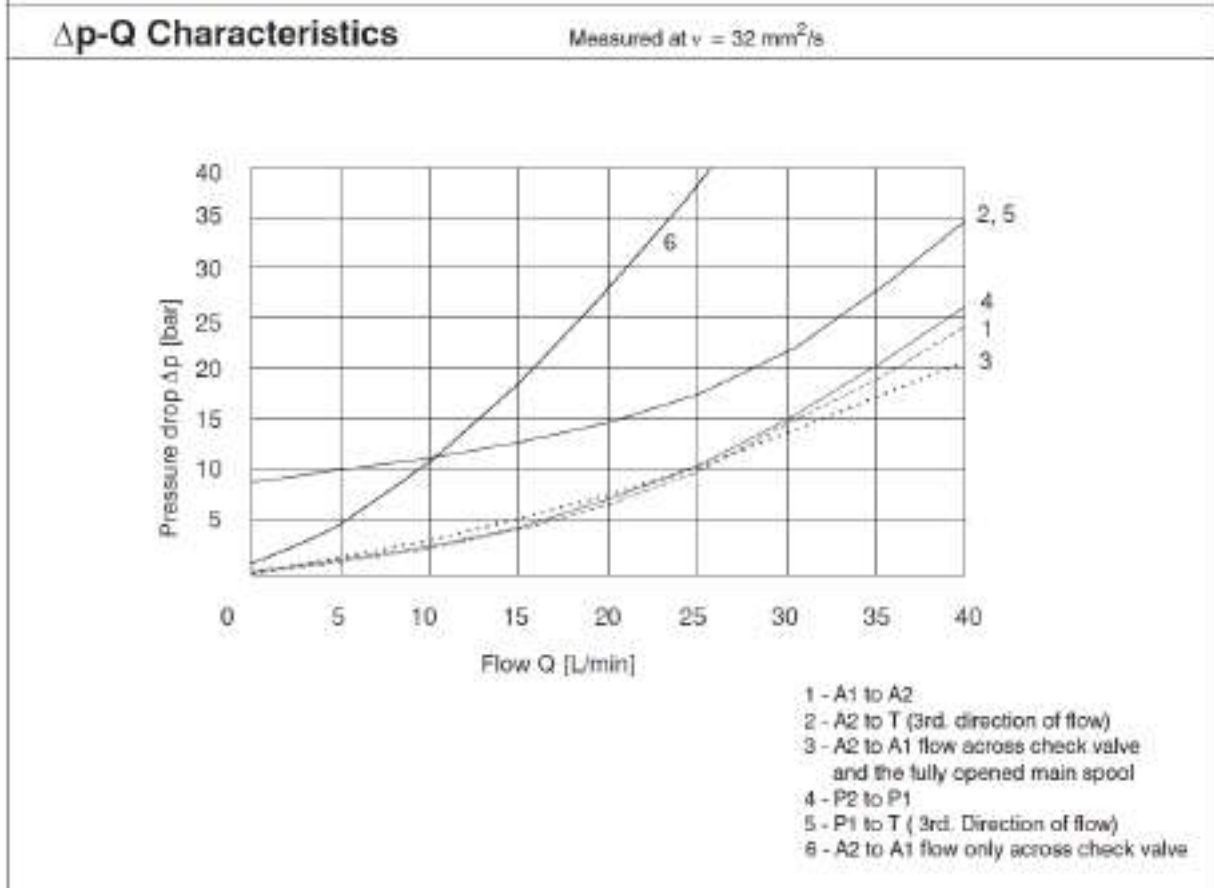
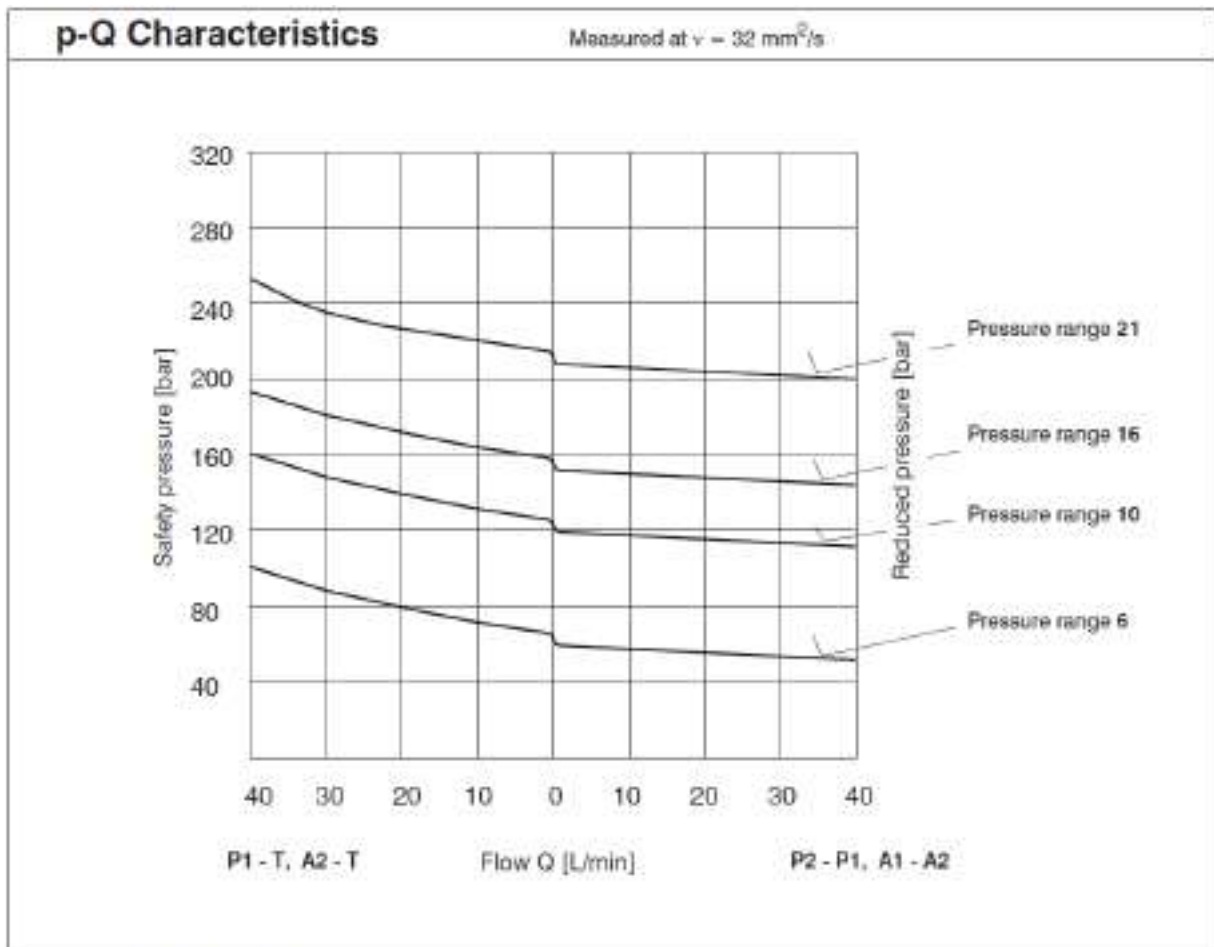


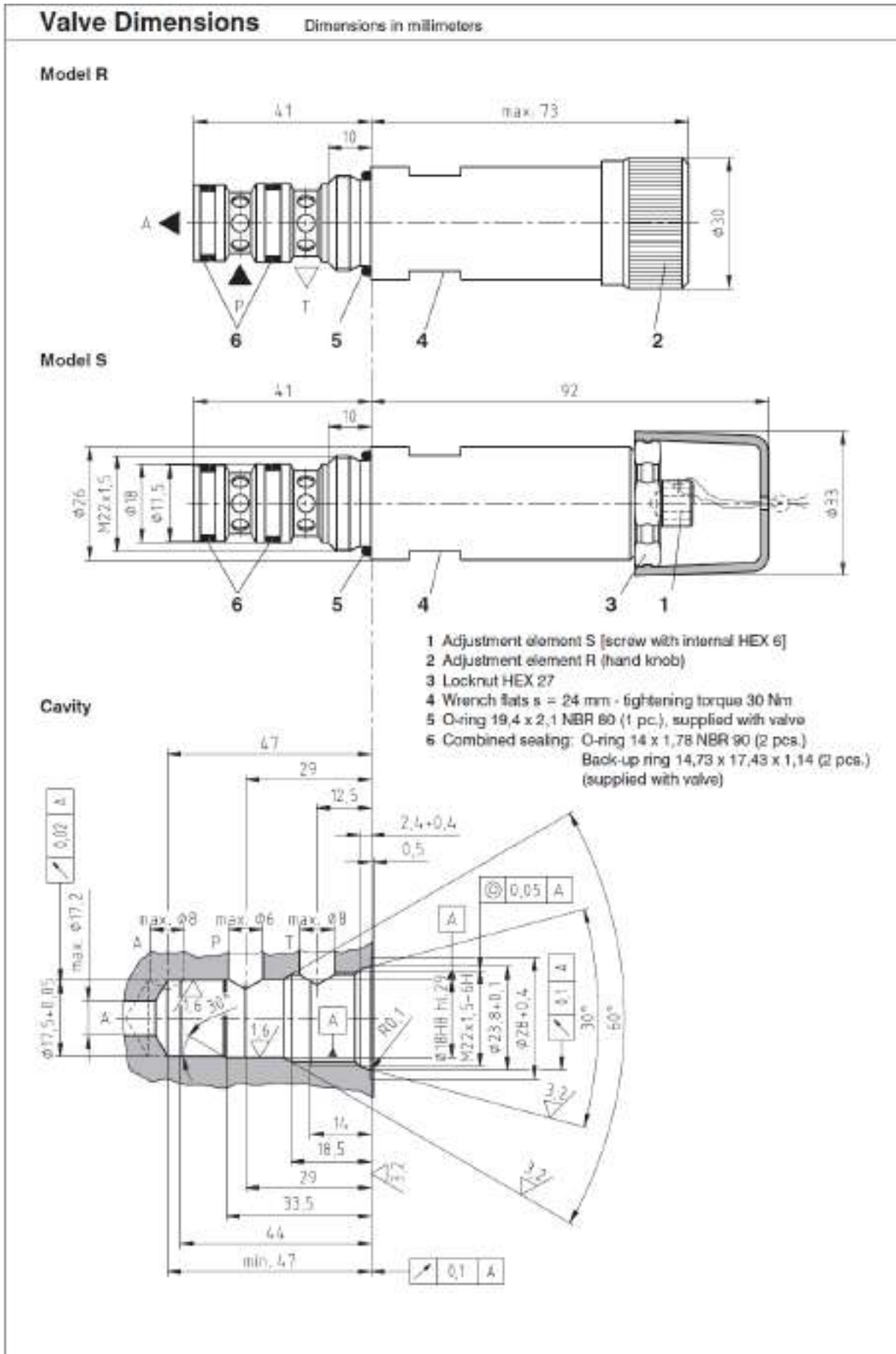
Ordering Numbers of Sandwich / Valve Bodies (without screw-in cartridge)

Valve body for modular valve - NBR	Ordering number	Valve body for modular valve - Viton	Ordering number
MA06-VRN2	16002400	MA06-VRN2/V	22995500
MP06-VRN2	16002200	MP06-VRN2/V	22995000

Technical Data

Nominal size	mm	06
Maximal flow rate	L/min	40
Maximum pilot flow	L/min	0,25
Max. input pressure (port P)	bar	320
Max. output pressure (port T)	bar	160
Working pressure related to flow	bar	see p-Q characteristics
Hydraulic fluid		Hydraulic oils of power classes (HL, HLP) to DIN 51524
Fluid temperature range (NBR / Viton)	°C	-30 ... +100 / -20 ... +120
Viscosity range	mm ² /s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 according to ISO 4406
Weight: model S model MA model MP	kg	0,22 1,20 1,10
Mounting position		unrestricted

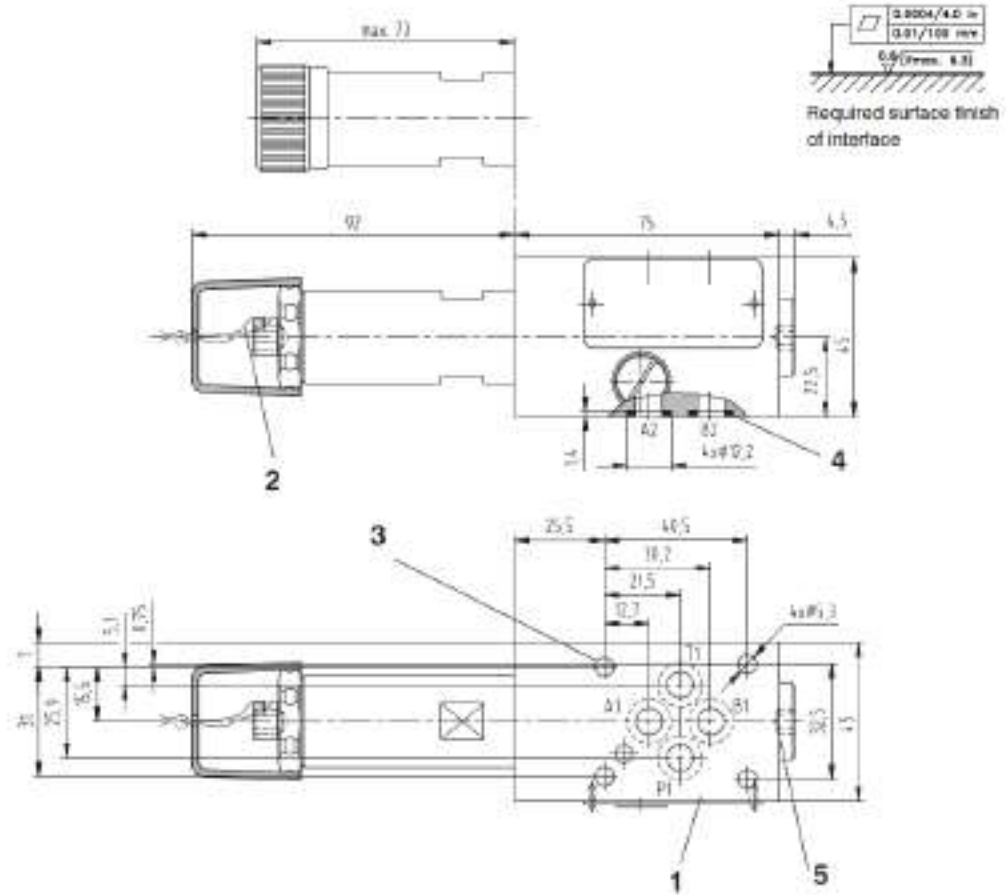




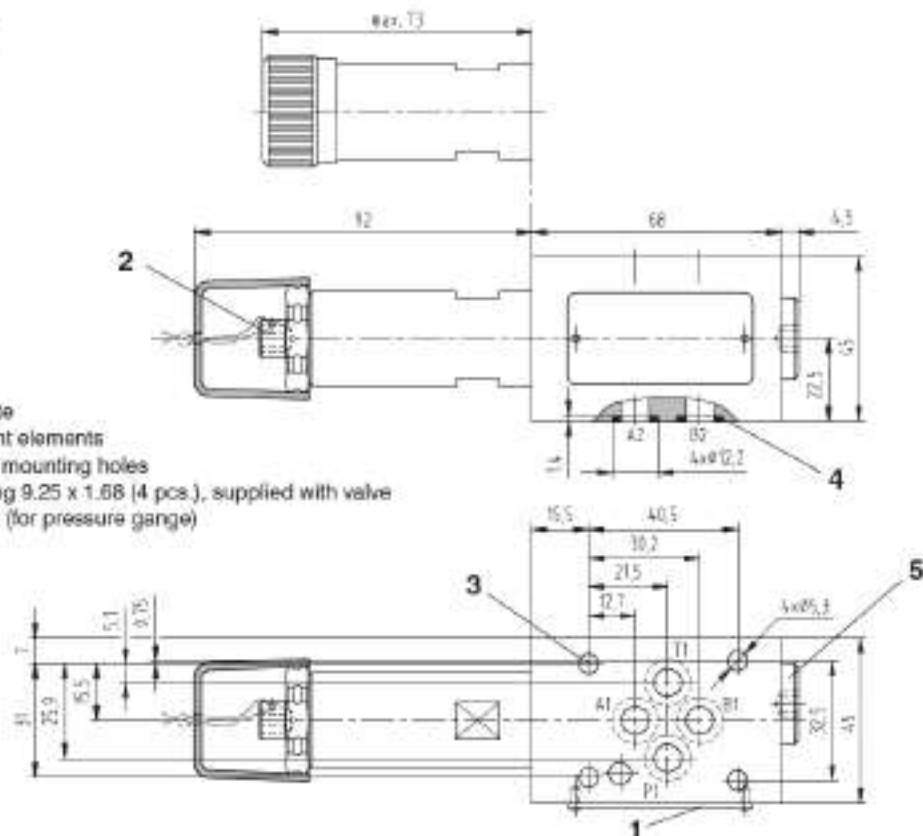
Valve Dimensions

Dimensions in millimeters

Model MA



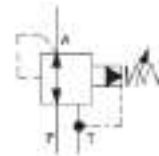
Model MP



Spare Parts		
Model	Dimensions, quantity	Ordering number
Screw-in cartridge - NBR	O-ring 9 x 1,8 NBR 70 (1 pc.)	17363800
	O-ring 14 x 1,78 NBR 90 (2 pc.)	
	O-ring 17 x 1,8 NBR 70 (1 pc.)	
	O-ring 19,4 x 2,1 NBR 80 (1 pc.)	
	Back-up ring BBP80B015-N9 14,73 x 17,43 x 1,14 (2 pcs.)	
	Back-up ring BBP80-B-016-N9 16,33 x 19,03 x 1,14 (1 pc.)	
Screw-in cartridge - Viton	O-ring 9,25 x 1,78 (1 pc.)	22925500
	O-ring 14 x 1,78 (2 pcs.)	
	O-ring 17,17 x 1,78 (1 pc.)	
	O-ring 19,4 x 2,1 (1 pc.)	
	Back-up ring 14,73 x 17,43 x 1,14 (2 pcs.)	
Model	Dimensions, quantity	Ordering number
Modular valve - NBR	O-ring 9 x 1,8 (1 pc.)	15987200
	O-ring 14 x 1,78 (2 pcs.)	
	O-ring 17 x 1,8 (1 pc.)	
	O-ring 9,75 x 1,78 (1 pc.)	
	O-ring 19,4 x 2,1 (1 pc.)	
	Back-up ring 14,73 x 17,43 x 1,14 (2 pcs.)	
	Back-up ring 16,33 x 19,03 x 1,14 (1 pc.)	
	Square ring 9,25 x 1,68 (4 pcs.)	
Modular valve - Viton	O-ring 9,25 x 1,78 (5 pcs.)	22925600
	O-ring 14 x 1,78 (2 pcs.)	
	O-ring 17,17 x 1,78 (1 pc.)	
	O-ring 19,4 x 2,1 (1 pc.)	
	Back-up ring 14,73 x 17,43 x 1,14 (2 pcs.)	
	Back-up ring 17,4 x 1,3 (1 pc.)	
Preferred Types of Valves		
Type	Ordering Number	
VRN2-06/S-10S	15997200	
VRN2-06/S-21S	15997500	
VRN2-06/MP-10S	15998400	
VRN2-06/MP-21S	15999000	
Caution!		
<ul style="list-style-type: none"> • The packing foil is recyclable. • The protecting plate can be returned to the manufacturer. • Mounting studs must be ordered separately. Tightening torque is 8.9 Nm. • The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law. 		

	Pilot Operated Pressure Reducing Valves VRN2-10 Size 10 • p_{max} up to 320 bar • Q_{max} up to 150 L/min	HA 5154 6/2012 Replaces HA 5154 11/2011
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- Screw-in cartridge valve for manifold mounting and stacking assemblies
- 4 pressure ranges
- Two pressure adjustment options
- Pressure reduction in ports A, B or P
- Model MA a MB with check valve
- Installation dimensions to ISO 4401 and DIN 24 340-A10



Functional Description

The pressure valves VRN2 are pilot operated screw-in cartridge pressure reducing valves designed as 3 way valves. For the use in vertical stacking assemblies, three models of valve bodies are available, with pressure reduction in ports A, B and P. Incorporated into the valve bodies MA, MB are the check valves which enable the reverse flow to pass through the valve.

The reducing valve consists of a cartridge (1) with thread M27x2, control spool (2), spring (3) and the adjustment element (4). With the models for stacking assemblies also the respective valve body (5) and alternatively a check valve (6) complete the valve.

Screw-in cartridge valve

At rest, the valves are open, i.e. oil can flow from input line via the main spool to output line. At the same time there is pressure from output line via the main spool with bore and jets and at the spring-loaded side of the main spool and at the side opposite the spring. If pressure in output line exceeds the value set at the spring the pilot poppet opens. Oil now flows from the spring loaded side of the main spool via the jet and pilot poppet into the chamber. The main spool moves into

control position and holds the value set at the spring in output line constant. If pressure behind the valve increases due to the effect of external load acting on the user, the control spool shifts further against the spring, the input line closes and the flow from output line to port T opens. The control flow of the pilot valve (from the spring room) is also routed to port T.

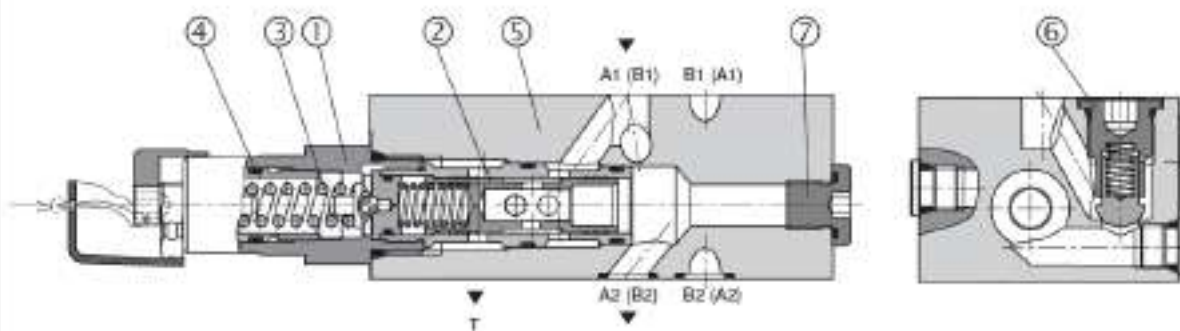
Model MA and MB

With these models, the flow enters into the valve body through port A1 (B1). The input pressure is reduced, routed to port A2 (B2) and further to the user. The reverse flow passes through a check valve which is connected parallel to the metering edge.

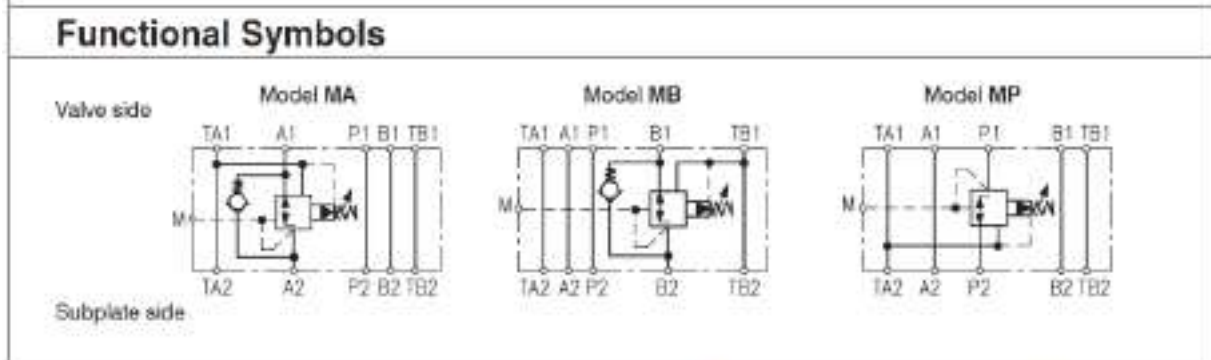
Model MP

With the model MP, the pressure is reduced from port P2 to port P1. With all models, a control pressure gauge can be connected to port G 1/4 (7).

The screw-in cartridge valve body and the adjustment screw are zinc coated. With models for stacking assemblies the valve bodies are phosphate coated.



Ordering Code	
VRN2-10/ <input type="text"/> - <input type="text"/> <input type="text"/> <input type="text"/>	
Pilot Operated Pressure Reducing Valve	Sealing NBR Viton
Nominal size	without designation V
Model	Adjustment element screw with internal hexagon 6 mm hand knob
screw in cartridge	S
modular valve, pressure reduction in port A	MA
modular valve, pressure reduction in port B	MB
modular valve, pressure reduction in port P	MP
	Pressure range
	up to 63 bar
	up to 100 bar
	up to 160 bar
	up to 210 bar
FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE AND TABLE OF PREFERRED TYPES ON PAGE 7	

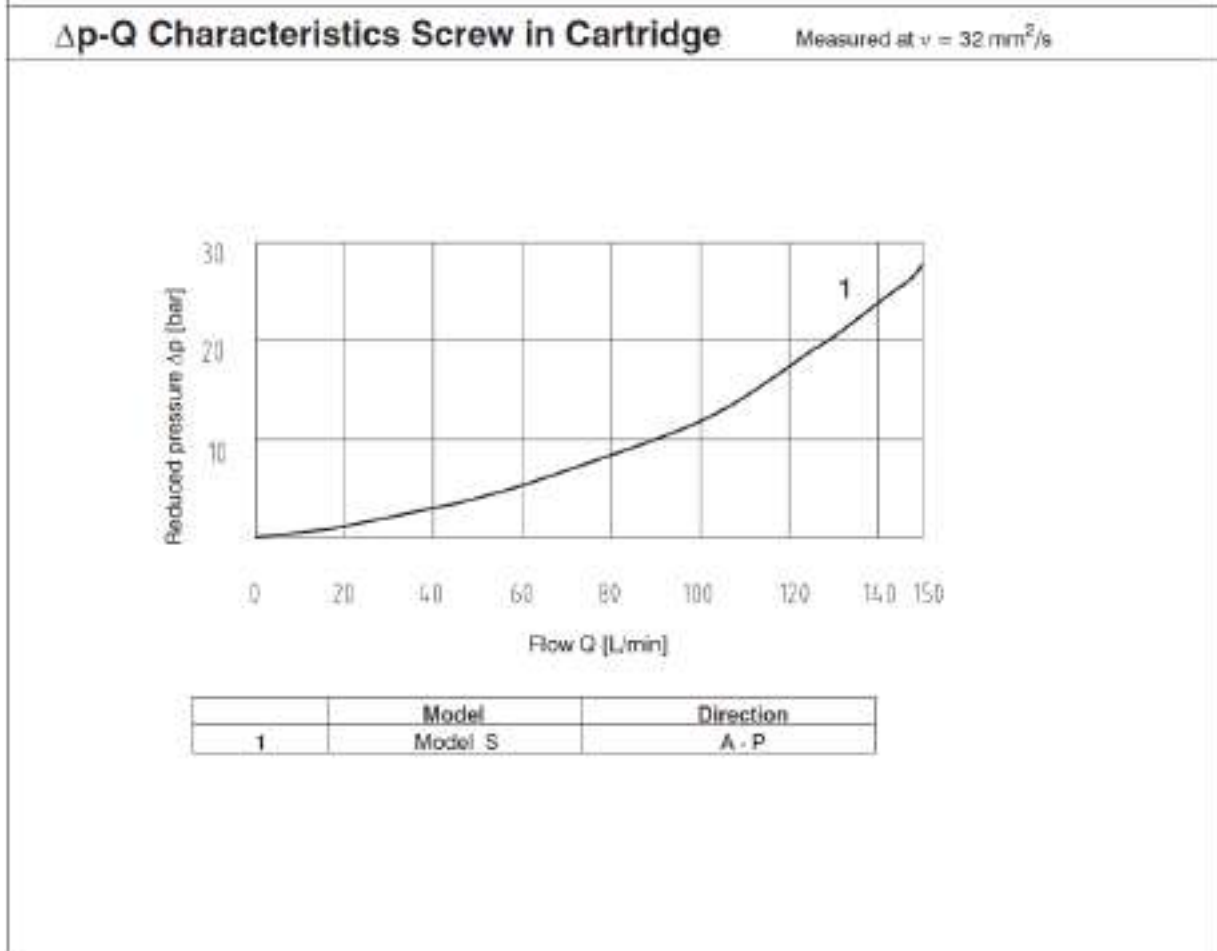
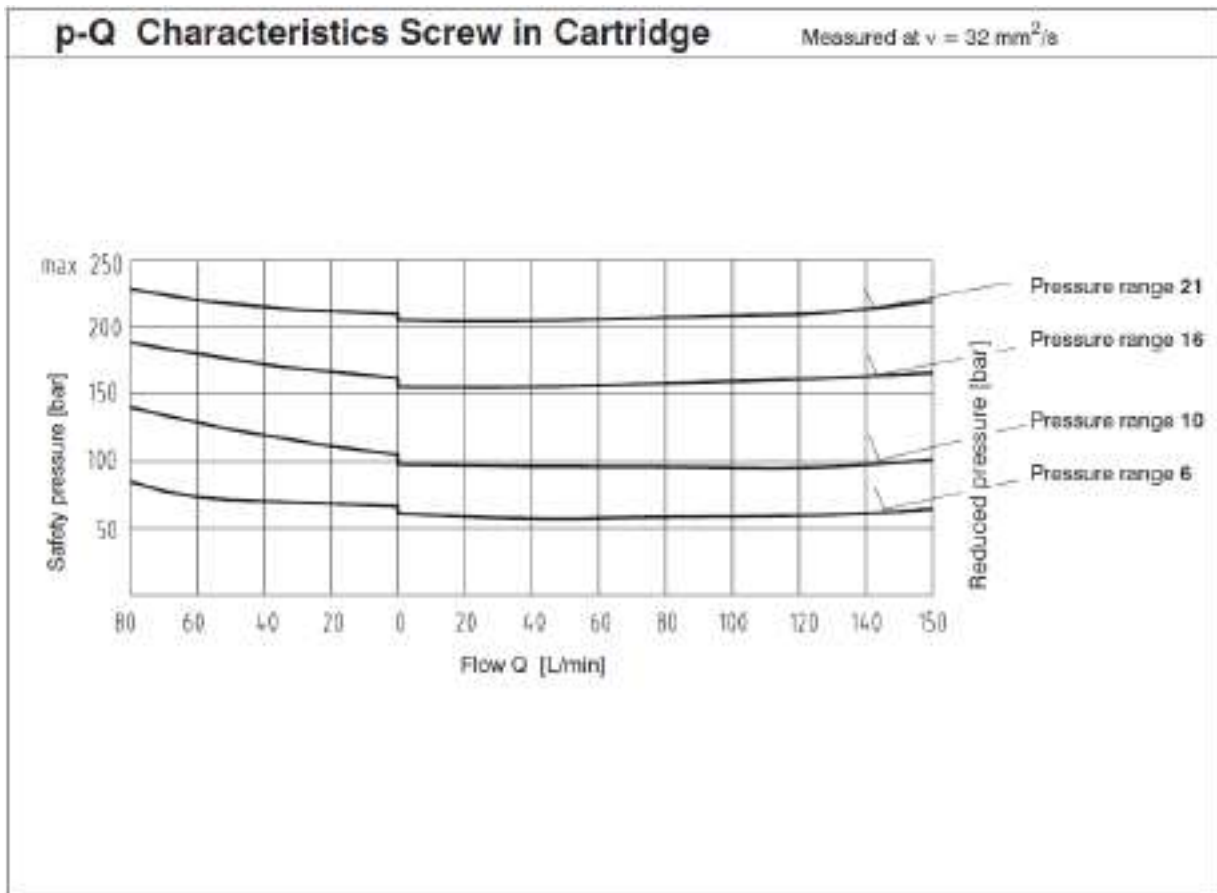


Ordering Numbers of Sandwich / Valve Bodies (without screw-in cartridge)

Valve body for modular valve - NBR	Ordering number	Valve body for modular valve - Viton	Ordering number
MA10-VR	15964300	MA10-VR/V	22909700
MB10-VR	15964400	MB10-VR/V	22909800
MP10-VR	15964500	MP10-VR/V	22909900

Technical Data

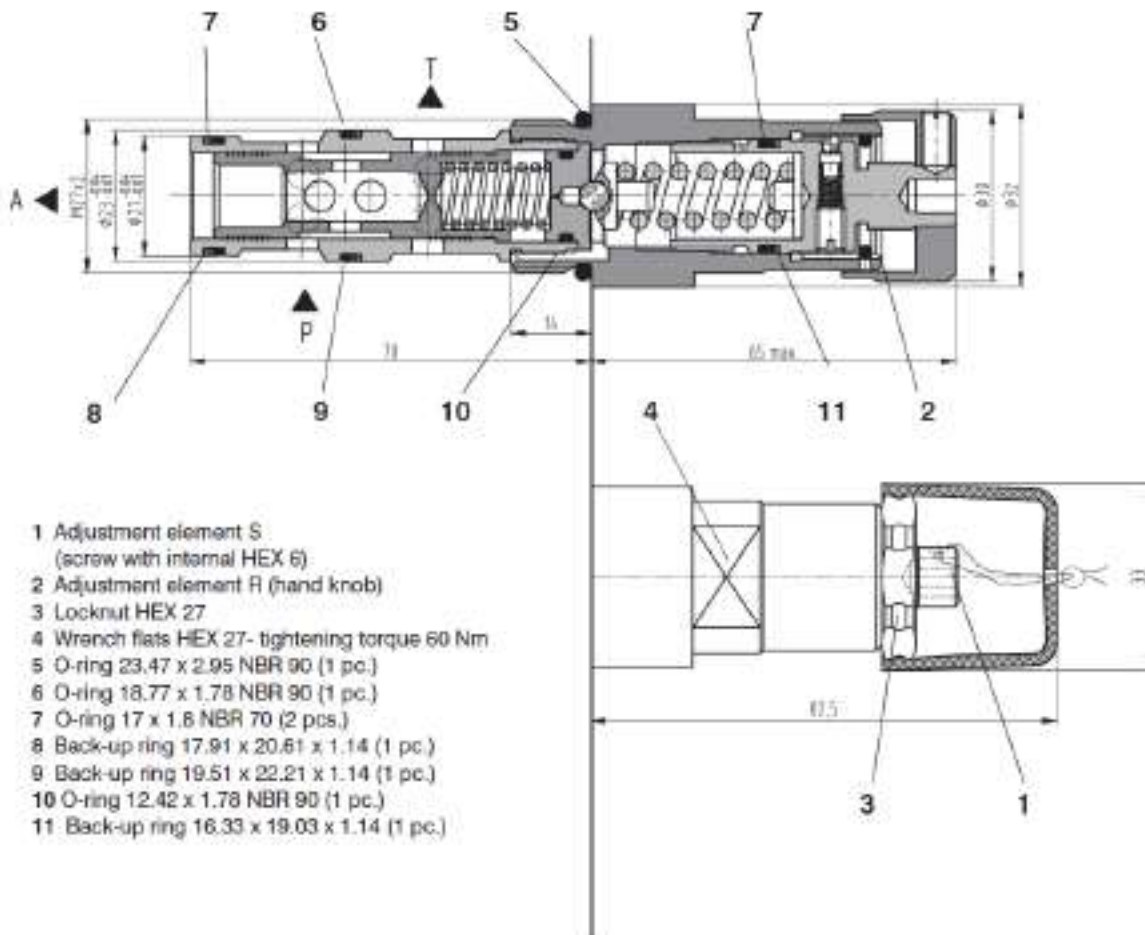
Nominal size	mm	10
Maximum flow rate - screw in cartridge	L/min	150
Maximum flow rate - modular valve	L/min	80
Maximum pilot flow	L/min	0.65
Max. input pressure (port P)	bar	320
Max. output pressure (port T)	bar	160
Working pressure related to flow	bar	see p-Q characteristics
Hydraulic fluid		Hydraulic oils of power classes (HL, HLP) to DIN 51524
Fluid temperature range (NBR)	°C	-30 ... +100
Fluid temperature range (Viton)	°C	-20 ... +120
Viscosity range	mm ² /s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 according to ISO 4406
Weight: model S	kg	0.35
model MA, MB		3.20
model MP		2.85
Mounting position		unrestricted



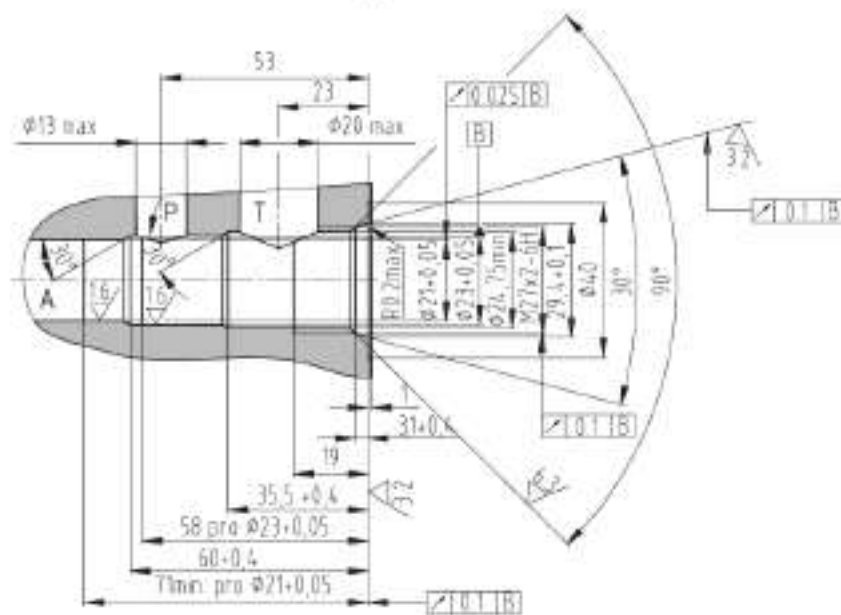
Valve Dimensions

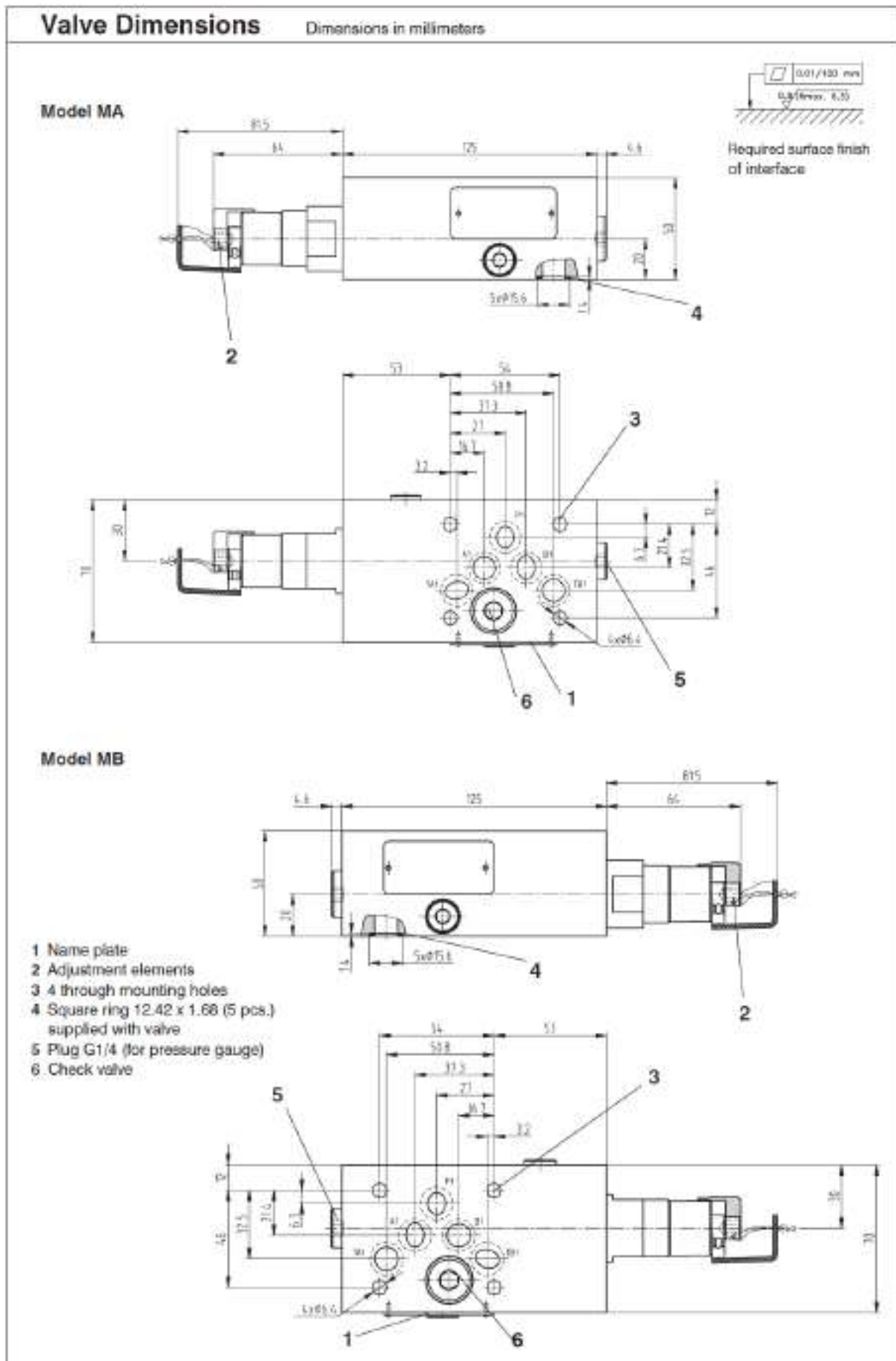
Dimensions in millimeters

Model S



- 1 Adjustment element S (screw with internal HEX 6)
- 2 Adjustment element R (hand knob)
- 3 Locknut HEX 27
- 4 Wrench flats HEX 27- tightening torque 60 Nm
- 5 O-ring 23.47 x 2.95 NBR 90 (1 pc.)
- 6 O-ring 18.77 x 1.78 NBR 90 (1 pc.)
- 7 O-ring 17 x 1.6 NBR 70 (2 pcs.)
- 8 Back-up ring 17.91 x 20.61 x 1.14 (1 pc.)
- 9 Back-up ring 19.51 x 22.21 x 1.14 (1 pc.)
- 10 O-ring 12.42 x 1.78 NBR 90 (1 pc.)
- 11 Back-up ring 16.33 x 19.03 x 1.14 (1 pc.)





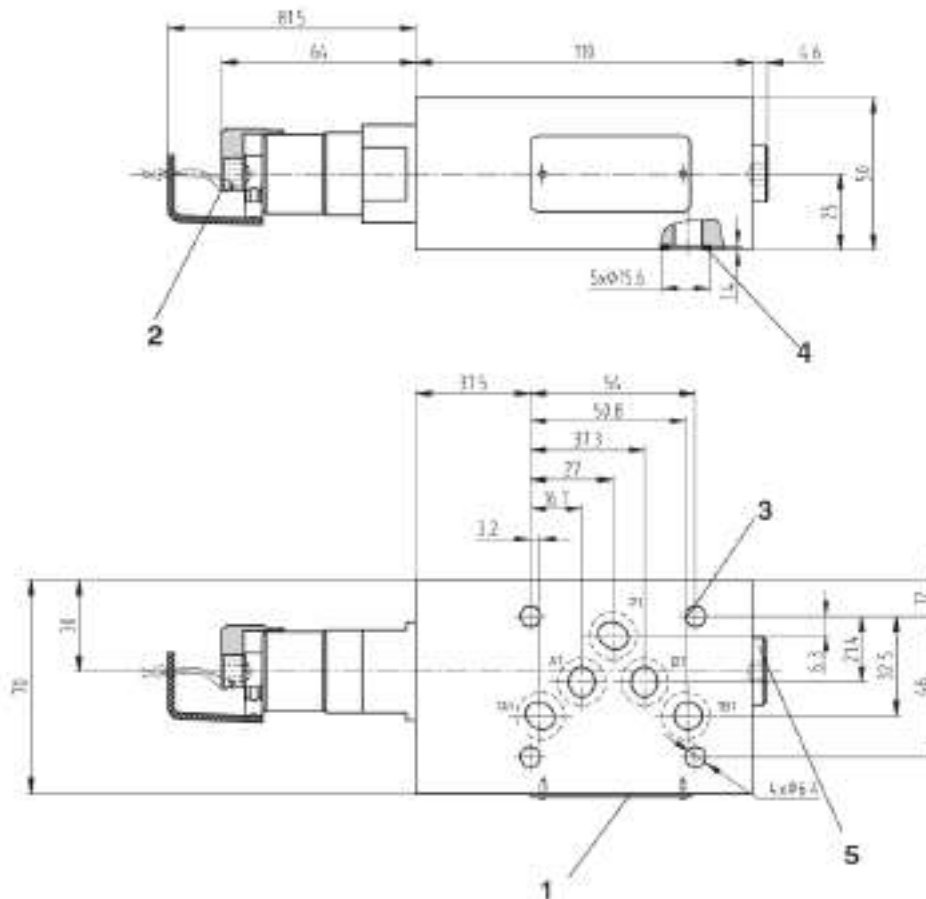
Valve Dimensions

Dimensions in millimeters

Model MP



Required surface finish of interface

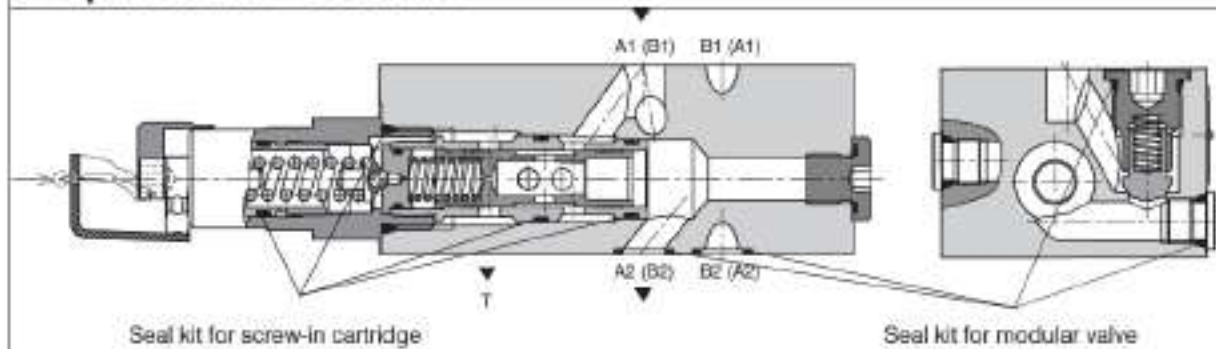


- 1 Name plate
- 2 Adjustment elements
- 3 4 through mounting holes
- 4 Square ring 12.42 x 1.68 (5 pcs.), supplied with valve
- 5 Plug G1/4 (for pressure gauge)

Preferred Types of Valves

Type	Ordering Number
VRN2-10/S-10S	15983800
VRN2-10/S-21S	15984000
VRN2-10/MP-10S	22915100
VRN2-10/MP-21S	15986200

Spare Parts - Seal Kits



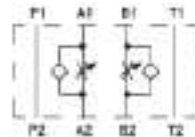
Model	Dimensions, quantity	Ordering number
Screw-in cartridge - NBR	O-ring 17 x 1.8 NBR 70 (2 pcs.)	22916600
	O-ring 12.42 x 1.78 NBR 90 (1 pc.)	
	O-ring 18.77 x 1.78 NBR 90 (1 pc.)	
	O-ring 23.47 x 2.95 NBR 90 (1 pc.)	
	Back-up ring BBP80B018N962N 19.51 x 22.21 x 1.14 (1 pc.)	
	Back-up ring BBP80B017N962N 17.91 x 20.61 x 1.14 (1 pc.)	
	Back-up ring BBP80B016N9 16.33 x 19.03 x 1.14 (1 pc.)	
Screw-in cartridge - Viton	O-ring 17.17 x 1.78 (2 pcs.)	22916700
	O-ring 12.42 x 1.78 (1 pc.)	
	O-ring 18.77 x 1.78 (1 pc.)	
	O-ring 23.47 x 2.95 (1 pc.)	
	Back-up ring BBP80B017V96E1 17.91 x 20.61 x 1.14 (1 pc.)	
	Back-up ring BG1300174-PT00 17.4 x 20 x 1.4 (1 pc.)	
	Back-up ring BBP80B018V9 19.51 x 22.21 x 1.14 (1 pc.)	
Modular valve - NBR	O-ring 15.4 x 2.1 (1 pc.)	22916800
	O-ring 10 x 1.8 (2 pcs.)	
	O-ring 17 x 1.8 (2 pcs.)	
	O-ring 12.42 x 1.78 (1 pc.)	
	O-ring 18.77 x 1.78 (1 pc.)	
	O-ring 23.47 x 2.95 (1 pc.)	
	Back-up ring BBP80B016N9 16.33 x 19.03 x 1.14 (1 pc.)	
	Back-up ring BBP80B018N962N 19.51 x 22.21 x 1.14 (1 pc.)	
	Back-up ring BBP80B017N962N 17.91 x 20.61 x 1.14 (1 pc.)	
	Square ring 12.42 x 1.68 (5 pcs.)	
Modular valve - Viton	O-ring 15.4 x 2.1 (1 pc.)	22916900
	O-ring 9.75 x 1.78 (2 pcs.)	
	O-ring 12.42 x 1.78 (6 pcs.)	
	O-ring 17.17 x 1.78 (2 pcs.)	
	O-ring 18.77 x 1.78 (1 pc.)	
	O-ring 23.47 x 2.95 (1 pc.)	
	Back-up ring BBP80B017V96E1 17.91 x 20.61 x 1.14 (1 pc.)	
	Back-up ring BG1300174-PT00 17.4 x 20 x 1.4 (1 pc.)	
Back-up ring BBP80B18-V9 19.51 x 22.21 x 1.14 (1 pc.)		

Caution!

- The packing foil is recyclable. The protecting plate can be returned to the manufacturer.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

	Double Throttle Check Valves Sandwich Plates	2VS3-06	HA 5051 7/2012 Replaces HA 5051 5/2008
Size 06 • p_{max} up to 320 bar • Q_{max} up to 80 L/min			

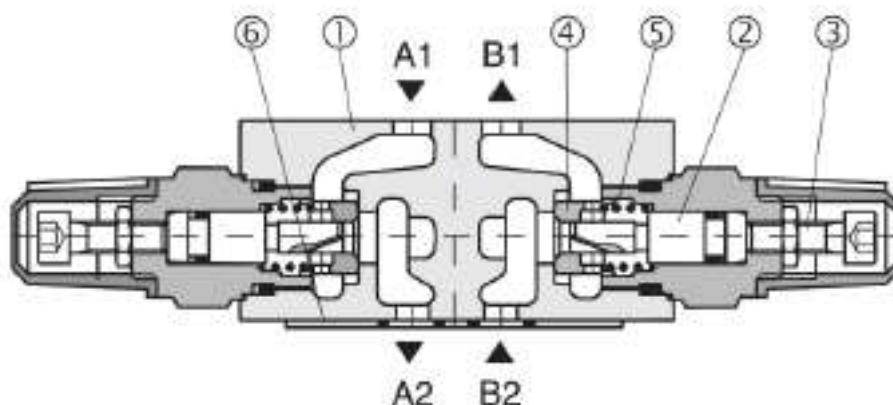
- Sandwich plate design for use in vertical stacking assemblies
- Meter-in or meter-out control as required
- Three possible arrangements:
 - throttle valve in channel A
 - throttle valve in channel B
 - throttle valves in channels A and B
- Flow adjustment - three adjustment elements
- Installation dimensions to ISO 4401:1994 and DIN 24 340-A6
- Subplates - see Catalogue HA 0002



Functional Description

Double throttle valves are used to control flow rates in two separate lines (A, B) of a hydraulic circuit. The modular design provides six functional symbols. The throttle valve is built into channel A or B or into channels A and B. The valve restricts the fluid flow in one direction while providing reverse free-flow in the opposite direction. The throttling spool (2) is adjusted by means of a set screw (3) and each spool position corresponds with a certain passage area. Fluid entering port A1 is throttled to port A2 via a groove and an annulus area. Fluid returning from port B2 shifts the valve seal (4) against the spring (5), thus creating a passage which allows reverse free-flow to port B1 (function as a check valve).

The sandwich design enables simple stacking with other components of the same size. The separate O-ring plate (6) with fitted O-rings provides sealing of the valve connecting surface. According to the valve arrangement, the meter-in or meter-out control is provided. Changing the meter-in mode into the meter-out mode can be done by turning the valve by 180° around its horizontal axis. The orientation of the throttle check valves in the valve body corresponds with the symbols shown on the name plate. The set screw can be operated by a key, by a hand knob or by a hand knob with keylock. The basic surface treatment of the valve housing is phosphate coated, whereas the surfaces of the other parts are zinc coated.



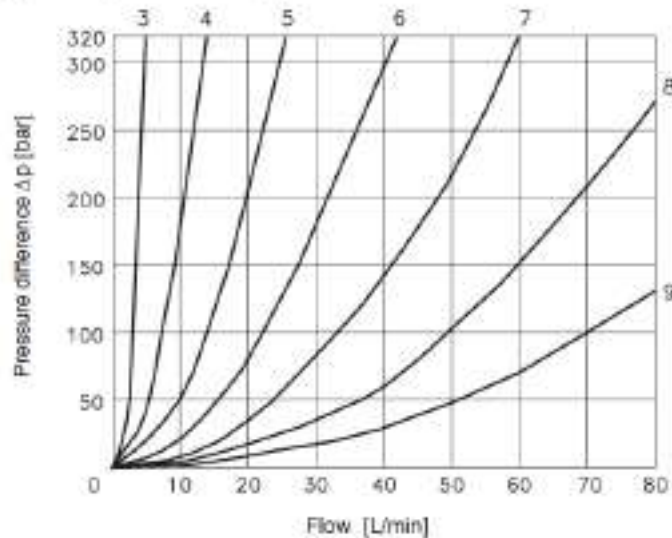
Δp -Q Characteristics

Measured at $v = 32 \text{ mm}^2/\text{s}$

Throttle valve

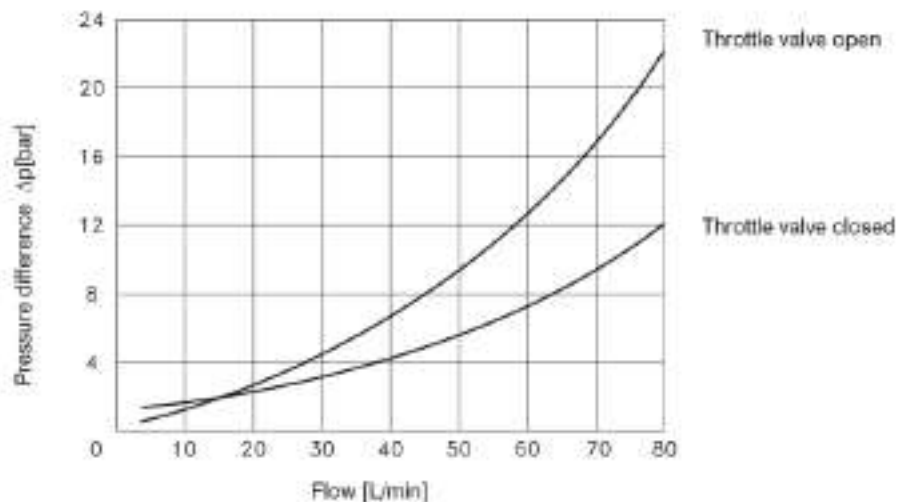
Pressure difference Δp related to flow from A1 to A2, (from B1 to B2)

- Throttle setting in turns (from the end stop)



Check valve

Pressure difference Δp related to flow from A2 to A1, (from B2 to B1)



Preferred Types of Valves

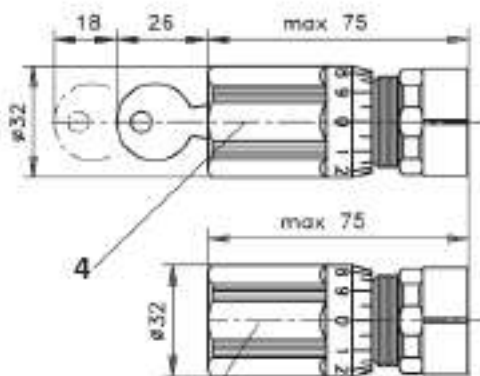
Type	Ordering Number
2VS3-06-CS	15929600

Caution!

- The packing foil is recyclable. The protective plate can be returned to manufacturer.
- Mounting bolts must be ordered separately. Tightening torque is 8.9 Nm.
- If the valve is used separately without a directional valve, a cover plate DK1-06/32-1 is to be ordered. This plate connects port A1 with B1 and A2 with B2 respectively (suitable for models 2VS3-06-Ax and 2VS3-06-Bx) - see catalogue Cover Plates and Crossover Cover Plates HA 0003.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

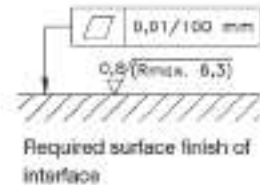
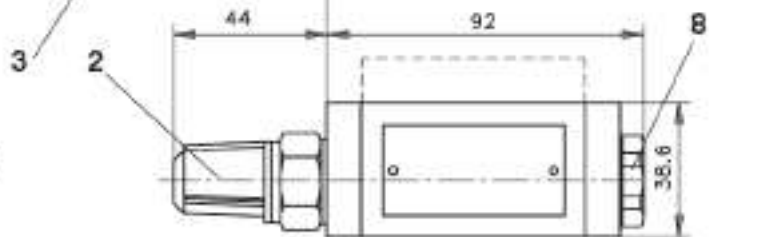
Valve Dimensions

Dimensions in millimetres

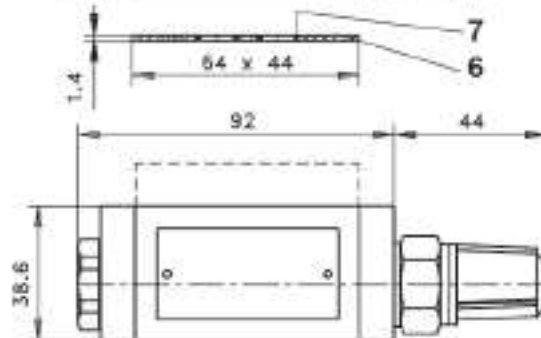


- 1 Name plate
 - 2 Adjustment element - Inside HEX 5 with lock nut and protective cup
 - 3 Adjustment element - hand knob with scale
 - 4 Adjustment element - hand knob with scale and keylock
- With all adjustment elements:
clockwise rotation reduces flow
counter - clockwise rotation increases flow
- 5 Locknut HEX10
 - 6 O-ring plate - supplied in delivery packet
 - 7 Square ring 9.25x1.68 (4 pcs.) - supplied in delivery packet
 - 8 Closing screw

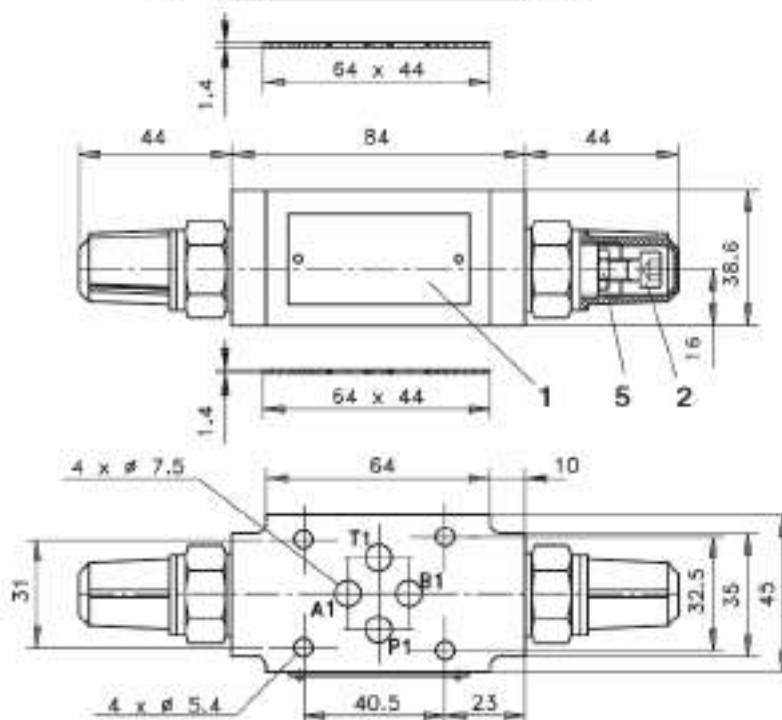
2VS3-06A



2VS3-06B

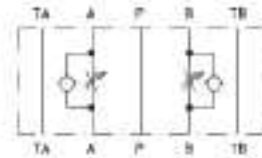


2VS3-06C



	Double Throttle Check Valves Sandwich Plates	VSO2-10/M	HA 5056 6/2012 Replaces HA 5056 5/2008
Size 10 • p_{max} 350 bar • Q_{max} 100 L/min			

- Modular design for use in vertical stacking assemblies
- Meter-in or meter-out control
- Three functional symbols:
 - throttle valve in line A
 - throttle valve in line B
 - throttle valves in lines A and B
- Flow adjustment - hexagon set screw with locknut and protective cap
- Installation dimensions to ISO 4401-05-04-0-94 and DIN 24 340-A10



Functional Description

Double throttle valves are used to control flow rates in two separate lines (A, B) of a hydraulic circuit.

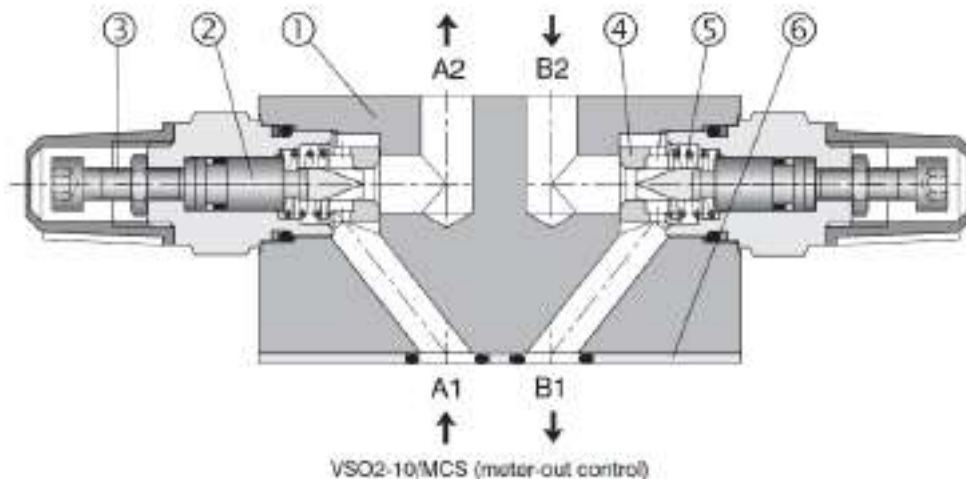
The valve body (1) has drilled channels and the throttle valve is built into channel A or B or into channels A and B. They restrict the fluid flow in one direction while providing reverse free-flow in the opposite direction. The throttling spool (2) is adjusted by means of set screw (3) and each spool position corresponds with a certain area of the flow passage.

Fluid entering port A1 is throttled to port A2 via a groove and an annulus area. Fluid entering port B2 shifts the valve seat (4) against the spring (5), thus creating a passage which allows reverse free-flow to port B1 (function of a check valve).

The modular design enables simple vertical stacking with other components of the same size. A separate O-ring plate (6) with fitted O-rings is mounted underneath the valve body, thus providing its sealing. According to the valve arrangement, the meter-in or meter-out control is provided. Changing the meter-in mode into the meter-out mode can be done by turning the valve body by 180° around its x-axis.

The orientation of the throttle/check valves in the valve body corresponds with the symbols shown on the name plate.

The basic surface treatment of the valve housing (1) is phosphate coated, whereas the surfaces of the other parts are zinc coated.



Ordering Code		
<p>VSO2-10/M </p> <p>Double Throttle Check Valve</p> <p>Nominal size</p> <p>Modular design</p>	<p>no designation V</p> <p>S</p> <p>A B C</p>	<p>Seals Standard (NBR) Viton (FPM)</p> <p>Adjustment element Set screw with inside hexagon</p> <p>Functional Symbols check valve in line A* check valve in line B* check valves in lines A and B* * see Functional Symbols</p>
Functional Symbols		
<p>A</p>	<p>B</p>	<p>C</p>
<p>Notes: ① valve side ② subplate or manifold side The orientation of the symbol shown on the name plate corresponds with the function of the valve (meter-out control).</p>		
Technical Data		
Nominal size	mm	10
Maximum flow rate	L/min	100
Maximum operating pressure	bar	350
Hydraulic fluid	Hydraulic oils of power classes (HL, HLP) to DIN 51524	
Fluid temperature range for (NBR)	°C	-30 ... +100
Fluid temperature range for (Viton)	°C	-20 ... +120
Viscosity range	mm ² /s	20 ... 400
Maximum degree of fluid contamination	Class 21/18/15 according to ISO 4406	
Weight	kg	2.15
Mounting position	unrestricted	
Caution!		
<ul style="list-style-type: none"> The packing foil is recyclable. The protective plate can be returned to manufacturer. Mounting bolts must be ordered separately. Tightening torque of the screws is 15 Nm. The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law. 		

Proportional Directional Control Valves Size 06 • p_{max} 350 bar • Q_{max} 40 L/min	PRM2-06	HA 5104 2/2013 Replaces HA 5104 6/2012
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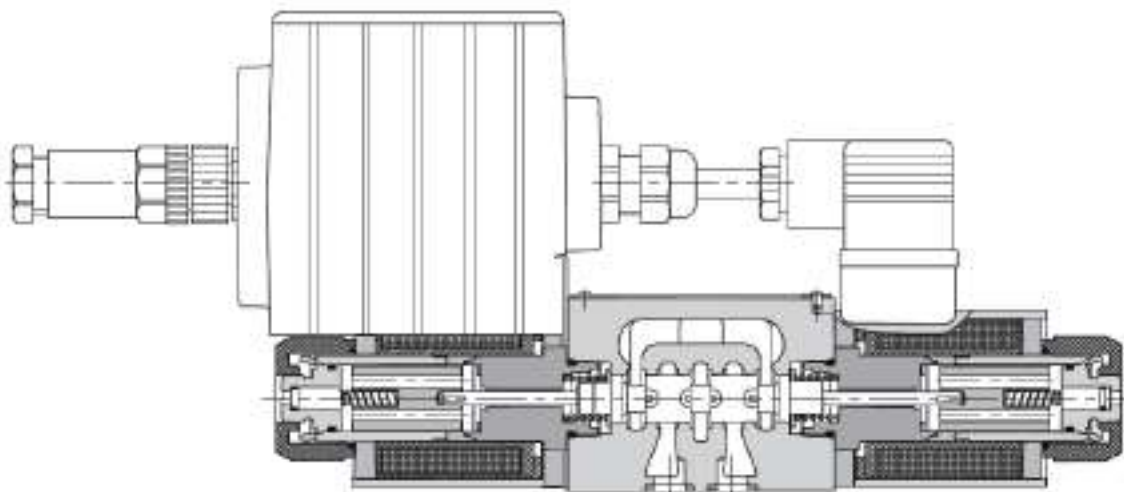
- Compact design with integrated
- High reliability
- Simple replacement of the exciting coils including electronics without opening the hydraulic circuits
- Continuous flow control in both directions
- Installation dimensions to DIN 24 340 / ISO 4401 / CETOP RP121-H

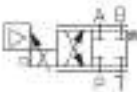
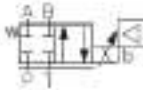
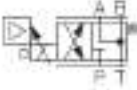
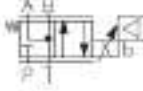

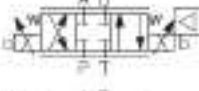
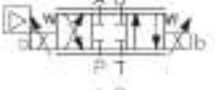
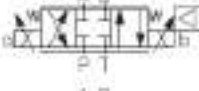



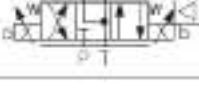


Functional Description

The proportional directional valve consists of a cast-iron housing, a special control spool, two centering springs with supporting washers and one or two proportional solenoids. A control box, which comprises one or two electronic control cards, depending on the number of the controlled solenoids, can be mounted onto either solenoid. With the model with two solenoids, the solenoid mounted opposite the control box is connected with the box by means of a DIN connector, a two-cored cable and a bushing. The connection of the control box with the supply source and with the control signal is realized by means of a 4-pin connector, type M12 x 1. The solenoid coils, including the control box, can be turned in the range of $\pm 90^\circ$. The electric control unit supplies the solenoid with current, which varies with the control signal. The solenoid shifts the control spool to the required position, proportional to the control current.

The electronic control unit provides the following adjustment possibilities: Offset, Gain, rise and drop-out time of the ramp generator, frequency (2 frequencies) and amplitude of the dither signal generator. The correct function of the control unit is signaled by LED-diodes. Stabilized voltage +10V (+5V for voltage 12V) is also available for the user. By the use of this voltage, a voltage control signal can be made by means of a potentiometer $\geq 1 \text{ k}\Omega$. The electronic control card enables voltage or current control to be used, according to the positions of the switches SW1 to SW3 (see table on page 6). The basic surface treatment of the valve housing is phosphate coated, the operating solenoids are zinc coated.



Ordering Code	
PRM2-06 <input type="checkbox"/> / <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Proportional Directional Control Valve	Seals without designation NBR V FPM (Viton)
Nominal size	Electronics without designation without electronics EK connection by connector M12 x 1 (4-pin connector) (supplied with counterpart)
 2Z51	
 2Z11	
 2Y51	
 2Y11	
 3Z11	
 3Z11B	
 3Z12 $\frac{q_A}{q_B} = \frac{1}{2}^*$	
 3Z12B $\frac{q_A}{q_B} = \frac{1}{2}^*$	
 3Y11	
 3Y11B	
 3Y12 $\frac{q_A}{q_B} = \frac{1}{2}^*$	
 3Y12B $\frac{q_A}{q_B} = \frac{1}{2}^*$	
	Nominal supply voltage 12 12 V DC 24 24 V DC
	Nominal flow rate at $\Delta p = 10$ bar 15 15 L/min 30 30 L/min
* Model for cylinders with asymmetric piston rod, piston area ratio 1:2	

Technical Data		
Nominal size	mm	06
Maximum operating pressure at ports P, A, B	bar	350
Maximum operating pressure at port T	bar	210
Hydraulic fluid	Hydraulic oils of power classes (HL, HLP) to DIN 51524	
Fluid temperature range (NBR / Viton)	°C	-30 ... +80 / -20 ... +80
Ambient temperature, max.	°C	+50
Viscosity range	mm ² /s	20 ... 400
Maximum degree of fluid contamination	Class 21/18/15 according to ISO 4406	
Nominal flow rate Q_n at $\Delta p = 10$ bar ($v = 32$ mm ² s ⁻¹)	L/min	15 / 30
Hysteresis	%	≤ 6
Weight PRM2-062 PRM2-063	kg	1.9 2.40
Mounting position	unrestricted, preferably horizontal	
Enclosure type EN 60 529	IP65	

Technical Data of the Proportional Solenoid

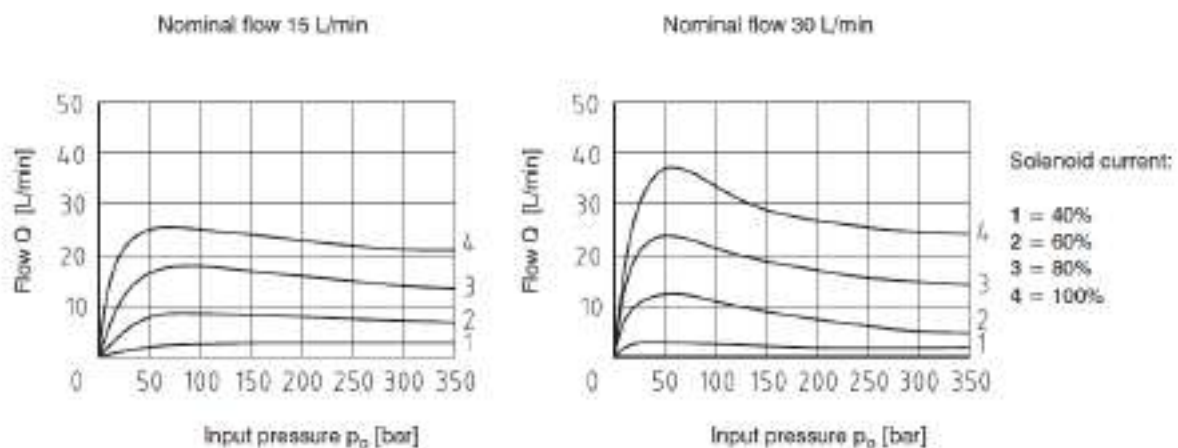
Type of coil	V	12 DC		24 DC
Limit current	A	2.5	1.6 (12 V electronic)	1.0
Resistance at 20 °C	Ω	2.3	5.2 (12 V electronic)	13.4

Technical Data of the Electronics

Nominal supply voltage U_{cc}	V	12 DC	24 DC
Supply voltage range	V	11.2 ... 14.7	20 ... 30 DC
Stabilized voltage for control	V	5 DC (R > 1kΩ)	10 DC (R ≥ 1kΩ)
Control signal	see table of switches configuration (page 6)		
Maximum output current	A	2.4 for R < 40	1.5 for R < 100
Ramp adjustment range	s	0.05 ... 3	
Dither frequency	Hz	90/60	
Dither amplitude	%	0 ... 30	

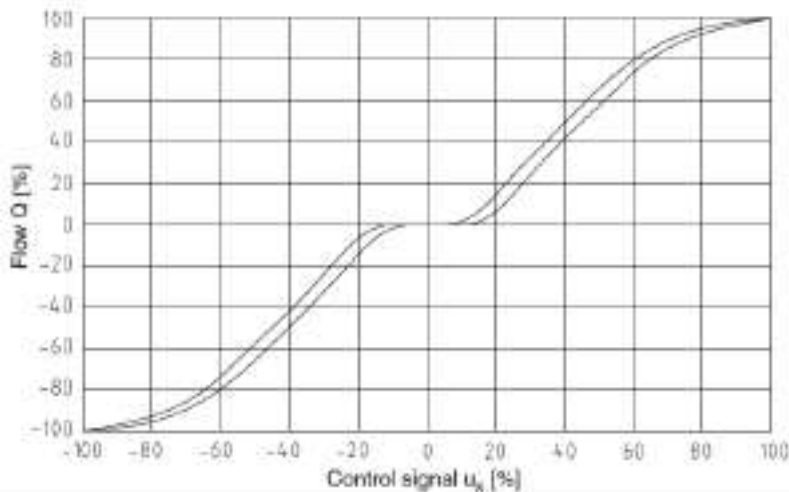
Limit power

Measured at $v = 32$ mm²/s P → A / B → T or P → B / A → T



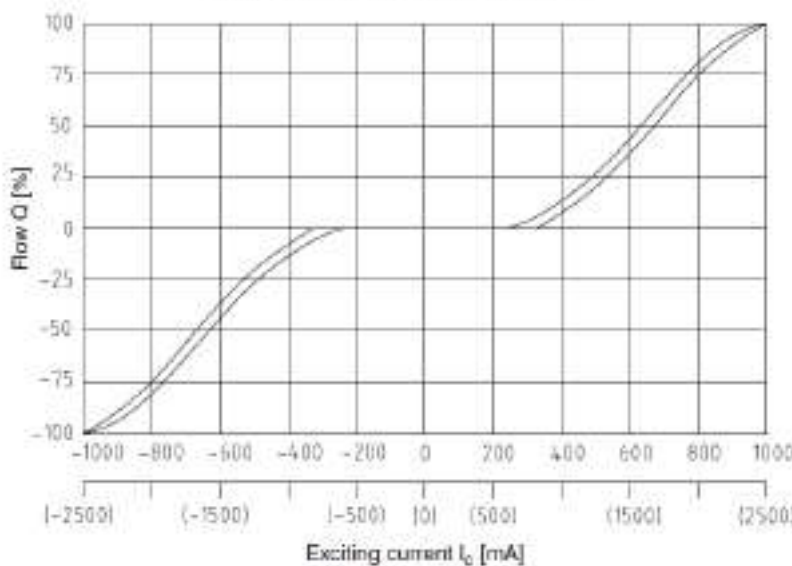
Flow Characteristic with Integrated Electronics

Measured at $\Delta p = 10 \text{ bar}$, $v = 32 \text{ mm}^2/\text{s}$



Flow Characteristic without Integrated Electronics

Measured at $\Delta p = 10 \text{ bar}$, $v = 32 \text{ mm}^2/\text{s}$

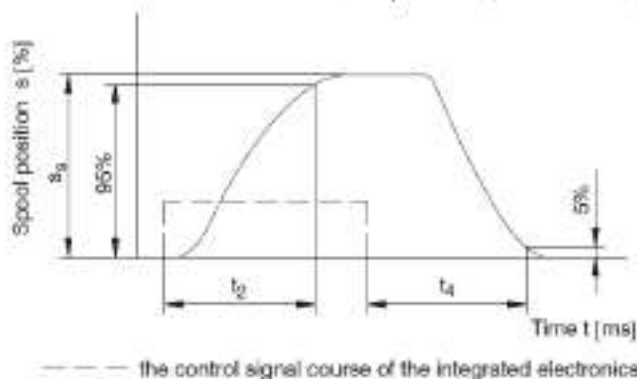


Values in parenthesis are valid for the supply voltage 12 V

The coil current which initializes the flow through the proportional directional valve can differ due to the production tolerances about in a range of $\pm 6\%$ of the limit current.

Transient Characteristic

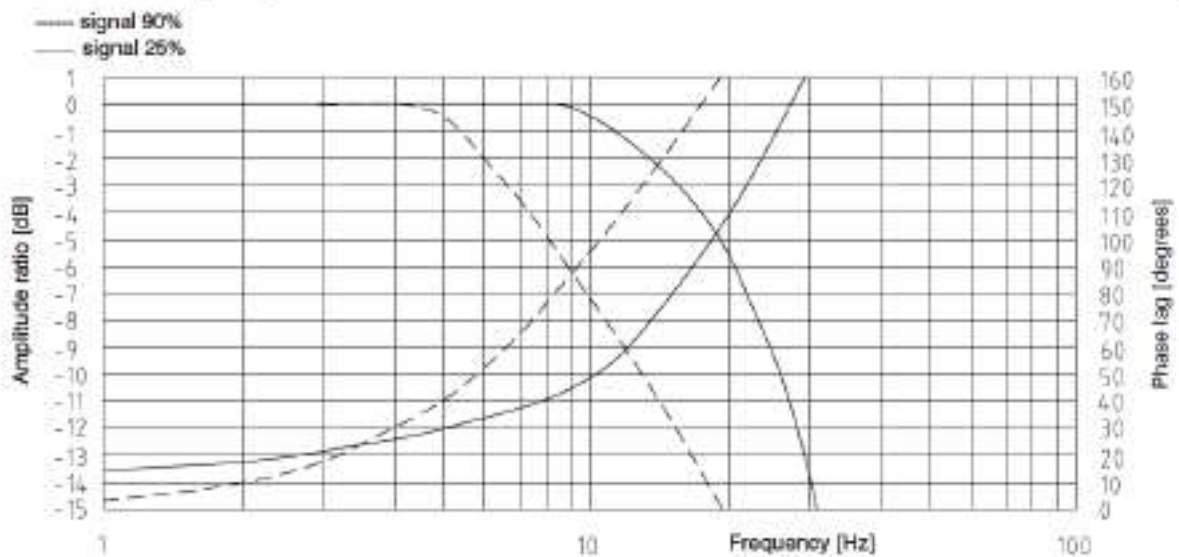
Measured at $\Delta p = 10 \text{ bar}$, $v = 32 \text{ mm}^2/\text{s}$; $Q = 80\%Q_n$



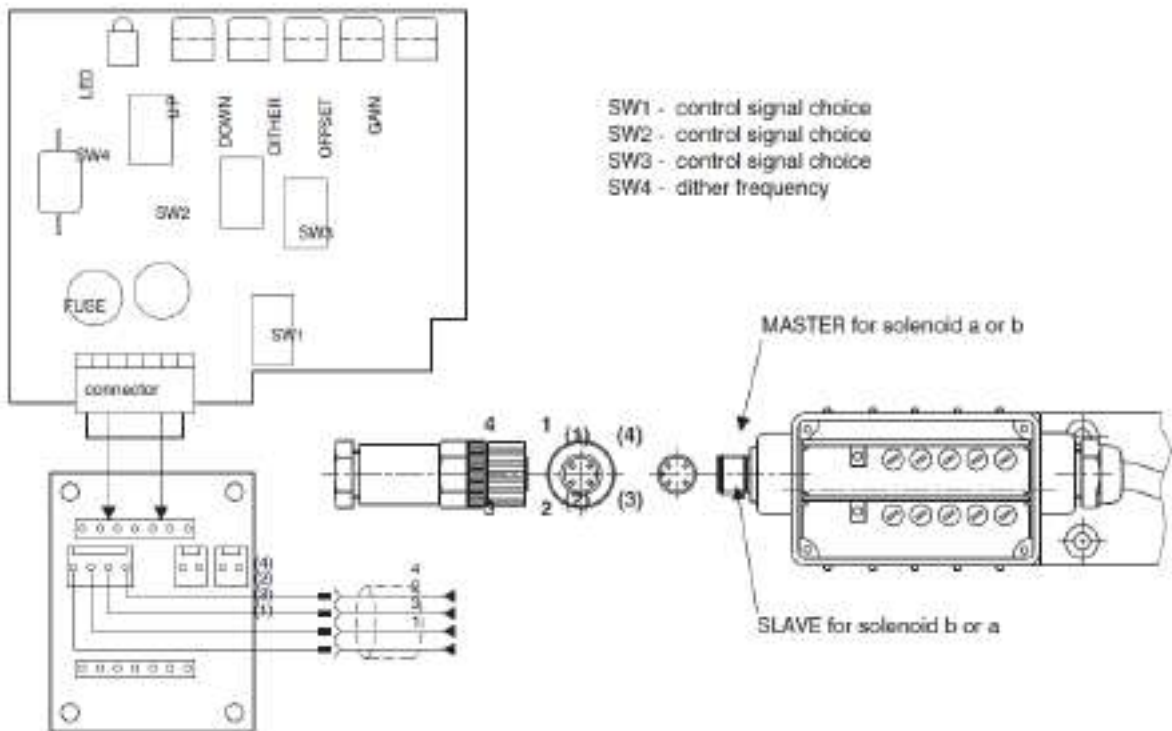
Steady spool position s_g [%]	t_2 [ms]	t_4 [ms]
100	85	100
75	70	85
50	55	75
25	45	55

The values in table have only an informative character.
The times of the transient characteristics at pressure or flow control will be in a particular hydraulic circuit always longer.

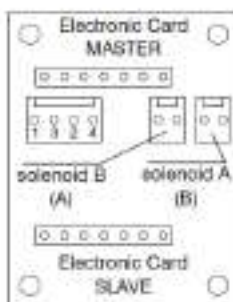
Frequency Reponse



Component Arrangement on the Electronic Card



Description basic subplate



PIN	Description
1	+24 V (U_{-}) (+12 V)
2	control
3	0 V
4	+10 V (+5 V)

Table of the Switch Configuration for the Control Signal Choices

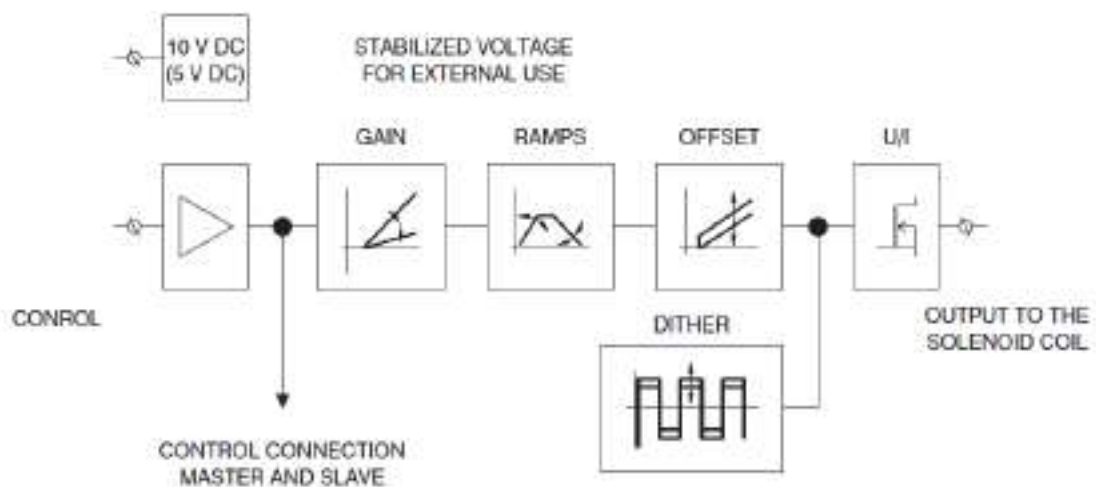
		PRM2-062				PRM2-063	
		0 ... 5 V	0 ... 10 V (0 ... 5 V)*	0 ... 20 mA	4 ... 20 mA	$U_{i/2}$ $\pm 10 V (\pm 5 V)^*$	$\pm 10 V$ $(\pm 5 V)^*$
MASTER M	SW1						
	SW2						
	SW3						
	SW4	90 Hz			60 Hz		
SLAVE S	SW1						
	SW2						
	SW3						
	SW4					90 Hz	60 Hz

Designation of the basic manufacture setting.

The ramp functions are adjusted on their minimum values, the dither is set to the optimal value with respect to hysteresis. Offset and Gain are adjusted according to the characteristic on page 3 and 4. The manufacturer does not recommend these adjusted values to be changed.

* Input signal level for the 12 V electronic unit.

Block Diagram



Valve PRM2-062 (with one solenoid)

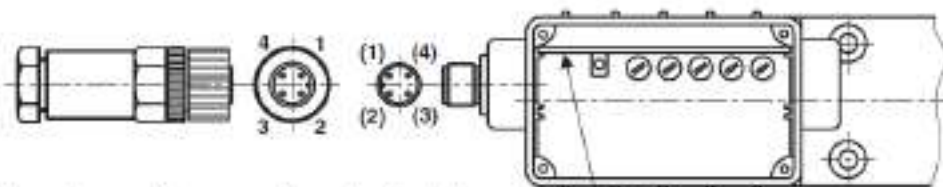
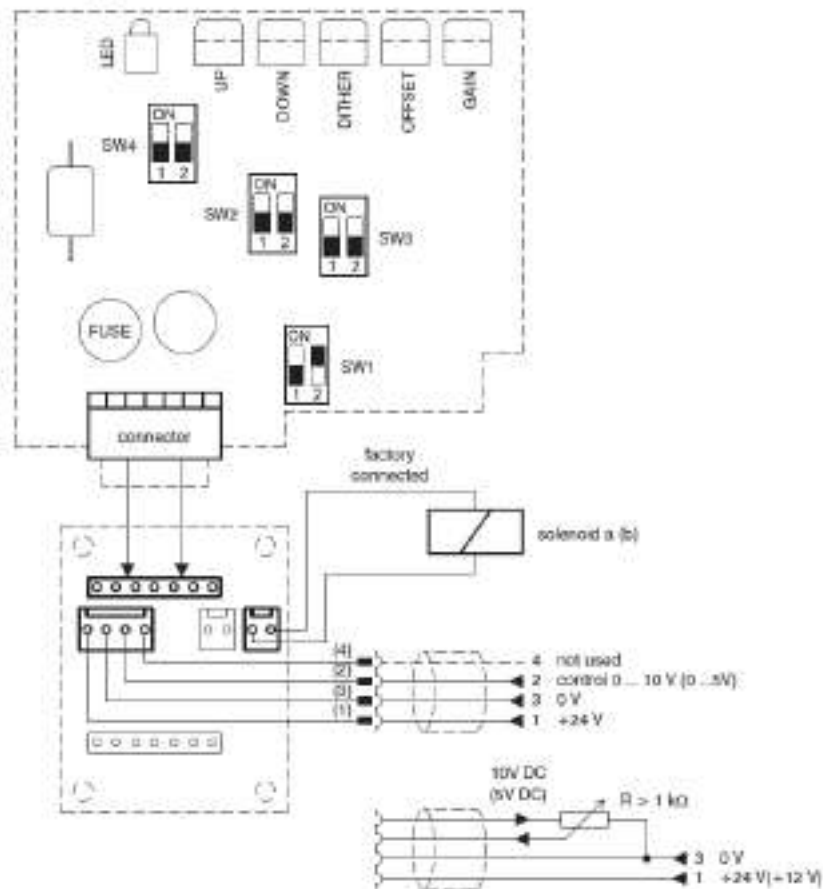
1 Factory setting

1.1 Control with external voltage source 0 ... 10 V (0 ... 5 V) or with external potentiometer $R > 1 \text{ k}\Omega$

Notice:

The control signal must have the same ground potential as the supply source.

Master card for solenoid a (b)



Wire colours (connection connector - electronics):

- (1) - brown
- (2) - white
- (3) - blue
- (4) - black

Factory set values:

Control signal: 0 - 10 V (0 - 5V)

Dither: frequency 90Hz
amplitude - optimum

Ramps: 0.05 s

Offset, Gain: according to the characteristics on page 3, 4

Valve PRM2-062 (with one solenoid)

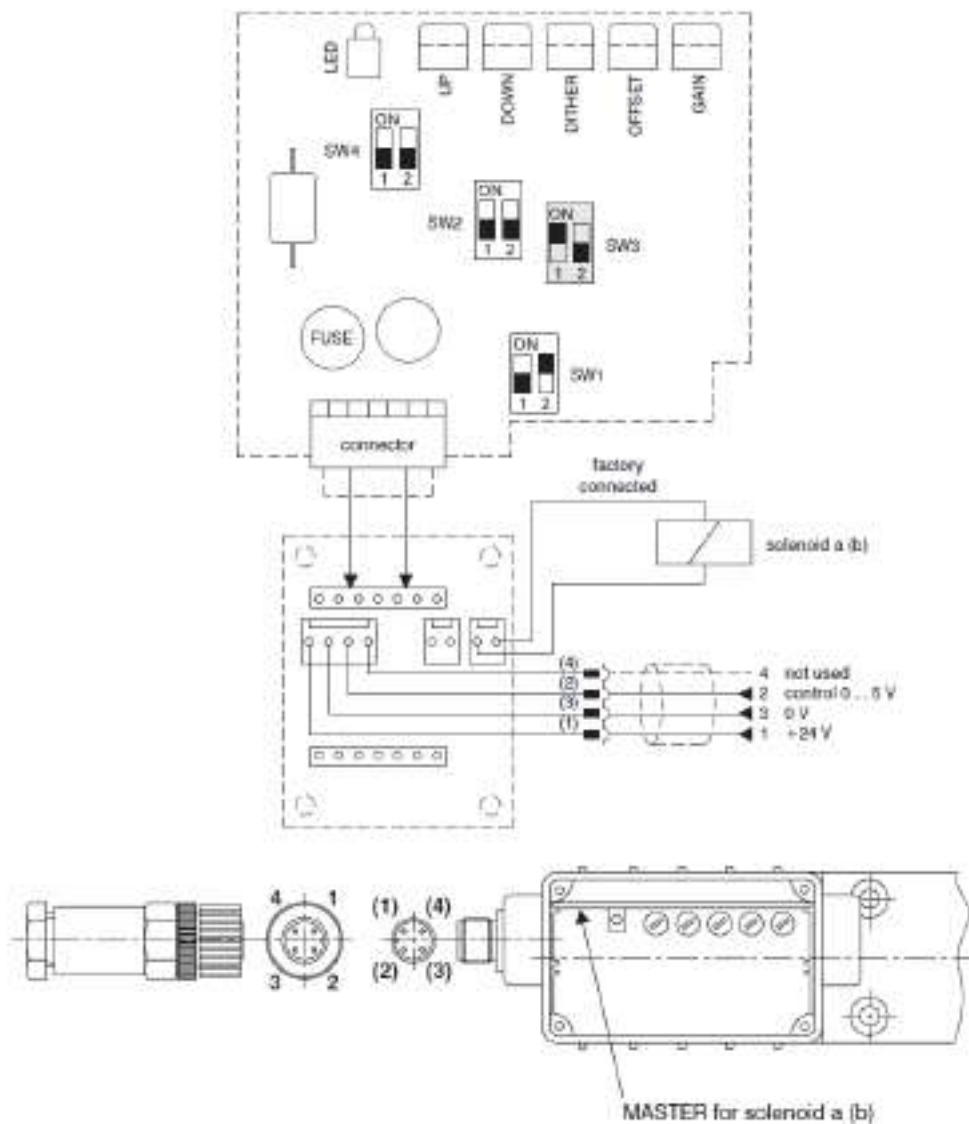
2 Other control possibilities

2.1 Control with external source 0 ... 5 V

Notice:

The control signal must have the same ground potential as the supply source.

Master card for solenoid a (b)



For the factory setting modification for this case of application, the following steps are required:

1. Unscrew the electronics cover
2. Carefully remove the Master card
3. Flip the switch SW3 in position shown in the picture
4. Put in the Master card and fix the electronics cover
5. Connect the voltage +24 V from an external supply source to terminals 1 and 3 of the connector
6. Connect the control voltage 0 ... 5 V from an external source to terminals 2 and 3 of the connector

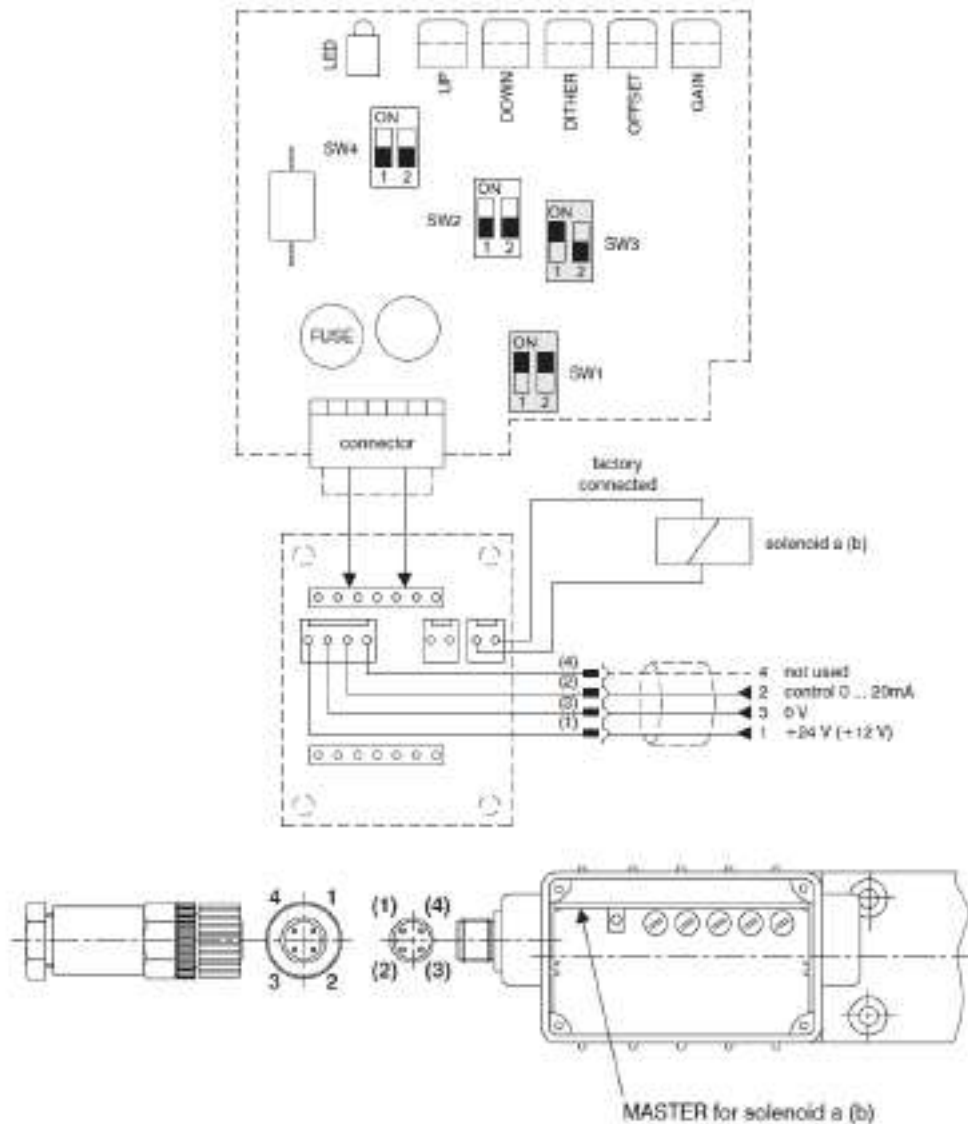
Valve PRM2-062 (with one solenoid)

2.2 Control with external source 0 ... 20 mA

Notice:

The control signal must have the same ground potential as the supply source.

Master card for solenoid a (b)



For the factory setting modification for this case of application, the following steps are required:

1. Unscrew the electronics cover
2. Carefully remove the Master card
3. Flip the switch SW1 and SW3 in position shown in the picture
4. Put in the Master card and fix the electronics cover
5. Connect the voltage +24 V (+12 V) from an external supply source to terminals 1 and 3 of the connector
6. Bring the control current 0 ... 20 mA from an external source to terminals 2 and 3 of the connector

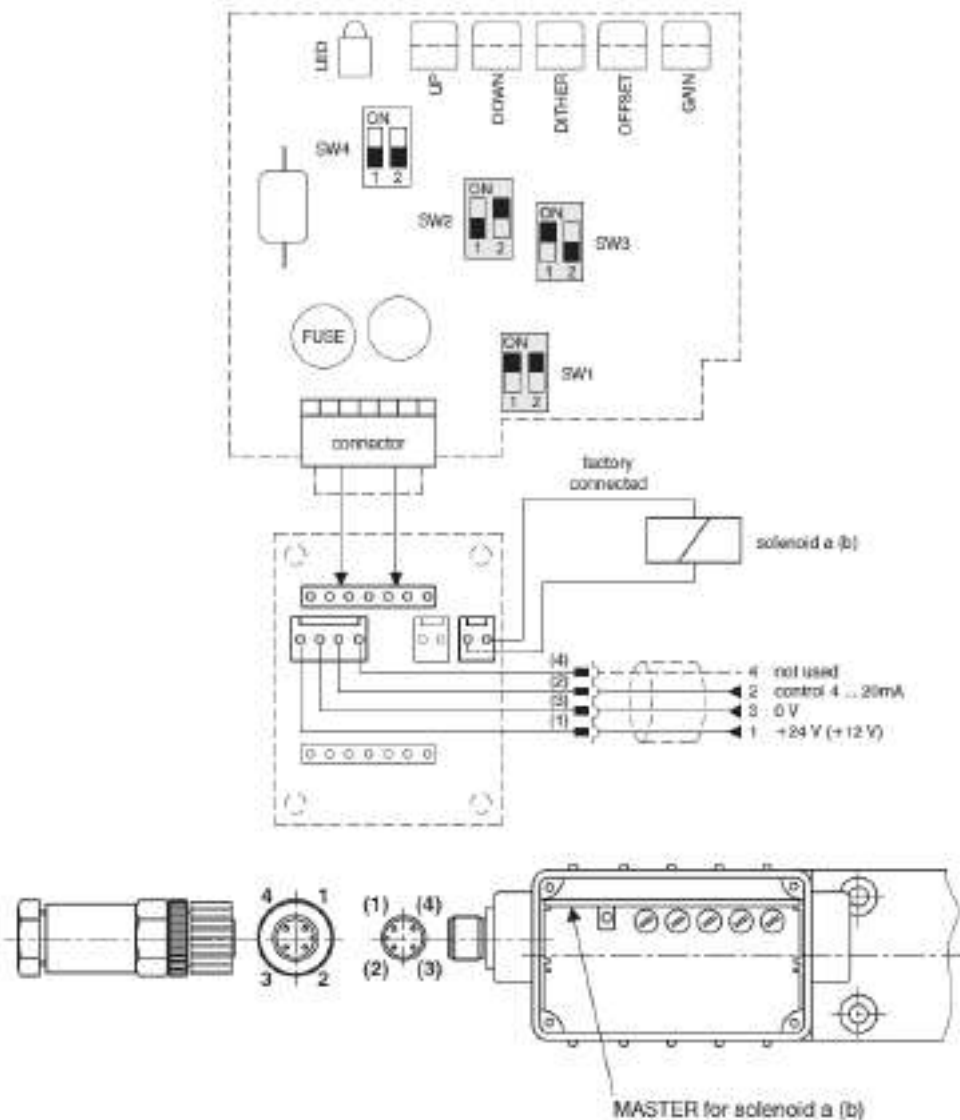
Valve PRM2-062 (with one solenoid)

2.3 Control with external source 4 ... 20 mA

Notice:

The control signal must have the same ground potential as the supply source.

Master card for solenoid a (b)



For the factory setting modification for this case of application, the following steps are required:

1. Unscrew the electronics cover
2. Carefully remove the Master card
3. Flip the switch SW1, SW2 and SW3 in position shown in the picture
4. Put in the Master card and fix the electronics cover
5. Connect the voltage +24 V (+12 V) from an external supply source to terminals 1 and 3 of the connector
6. Bring the control current 4 ... 20 mA from an external source to terminals 2 and 3 of the connector

Valve PRM2-063 (with two solenoids)

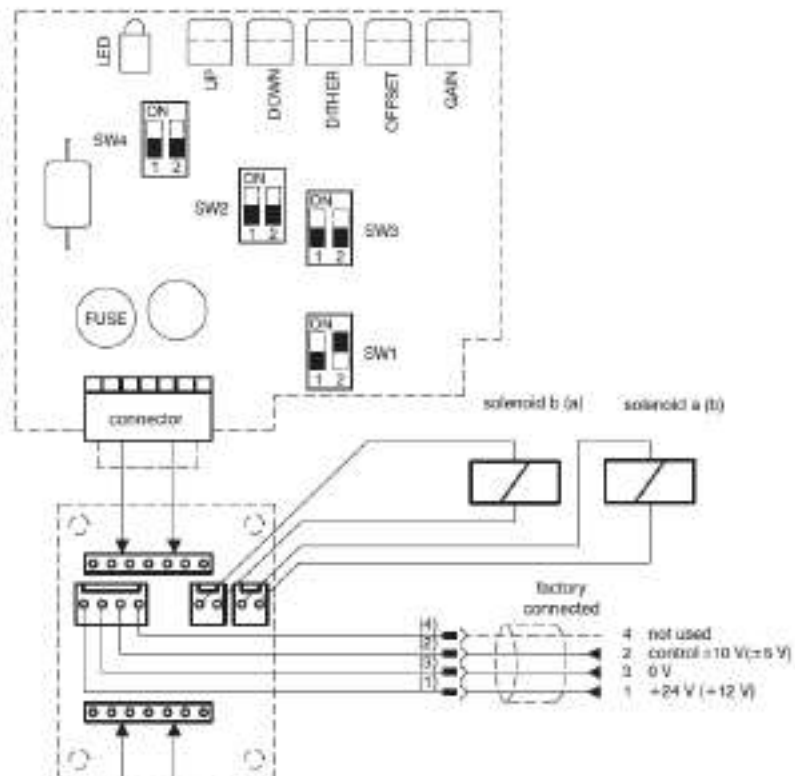
3 Factory setting

3.1 Control with external source $0 \pm 10\text{ V}$ ($0 \pm 5\text{ V}$)

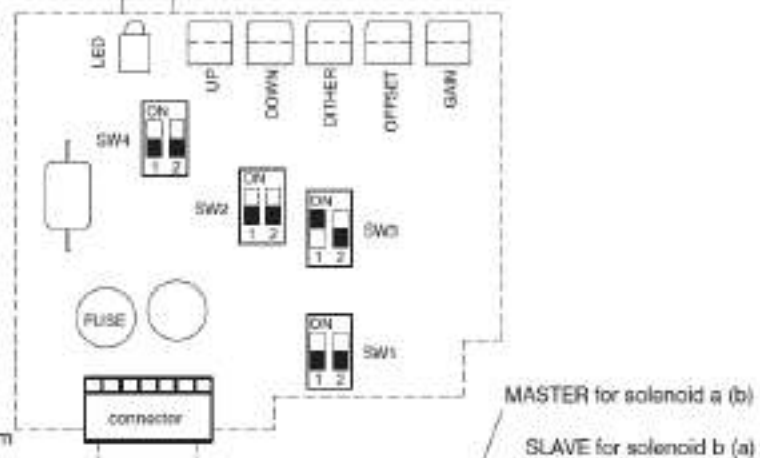
Notice:

The control signal must have the same ground potential as the supply source.

Master card for solenoid a (b)



Slave card for solenoid b (a)



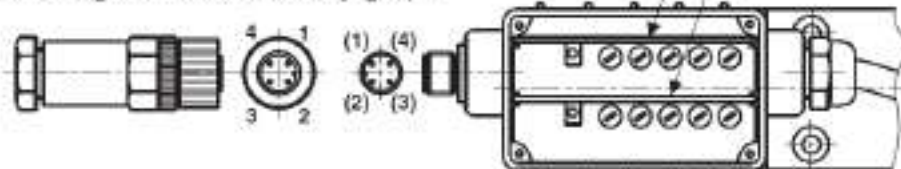
Factory set values:

Control signal: $0 \pm 10\text{ V}$ ($0 \pm 5\text{ V}$)

Dither: frequency 90 Hz
amplitude - optimum

Ramps: 0.05 s

Offset, Gain: according to the characteristics on page 3, 4

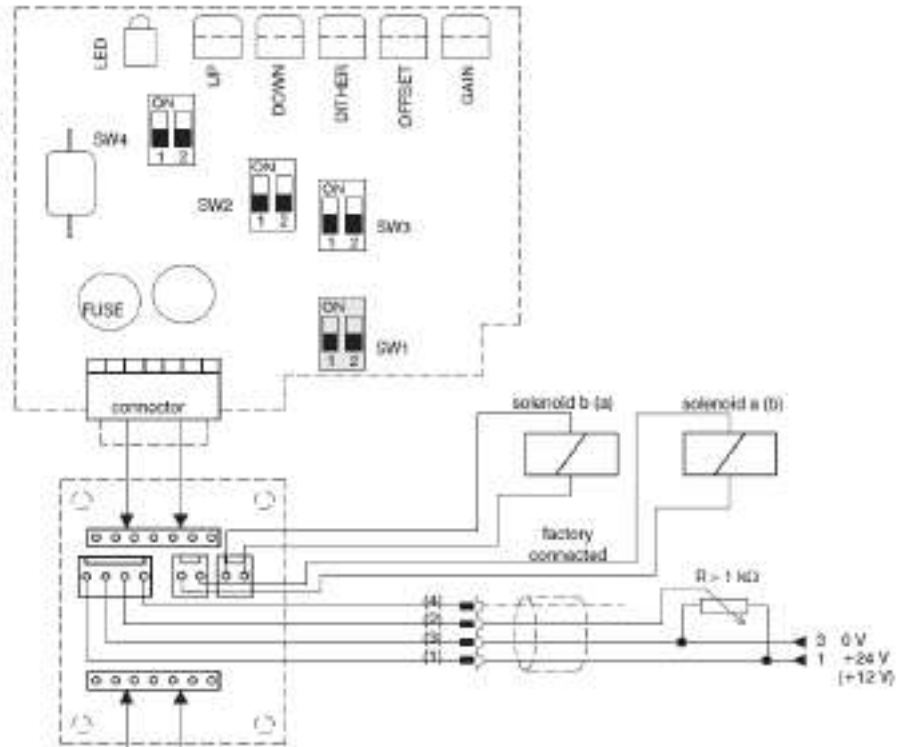


Valve PRM2-063 (with two solenoids)

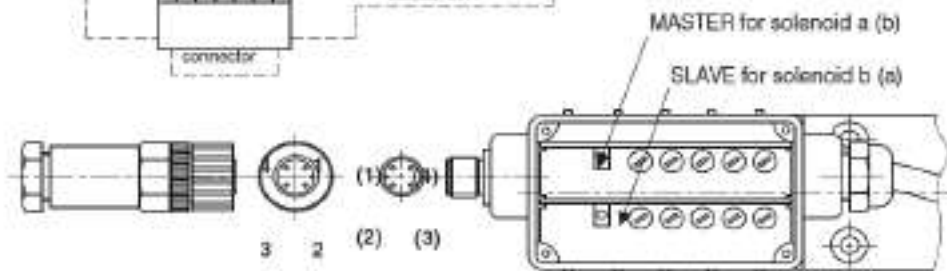
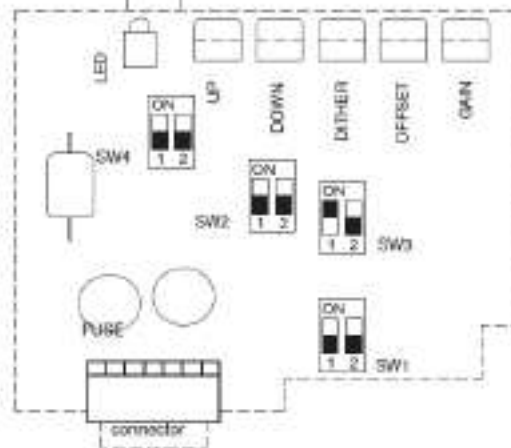
3.2 Other control possibilities

Control $U_{co}/2 \pm 10 V (U_{co}/2 \pm 5V)$ external potentiometer $R > 1 k\Omega$

Master card for solenoid a (b)



Slave card for solenoid b (a)

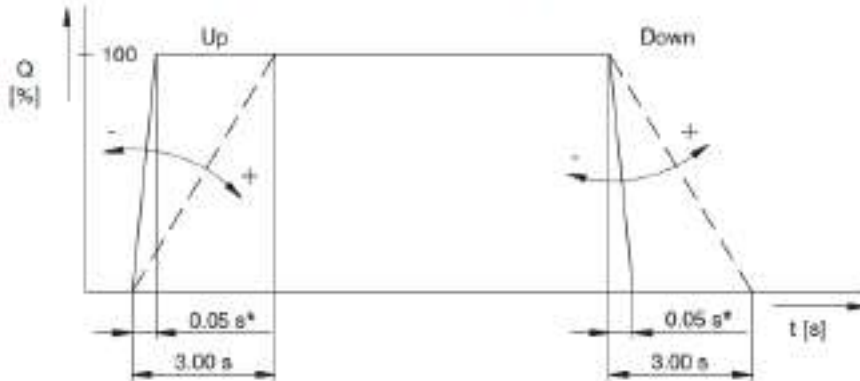


For the factory setting modification for this case of application, the following steps are required:

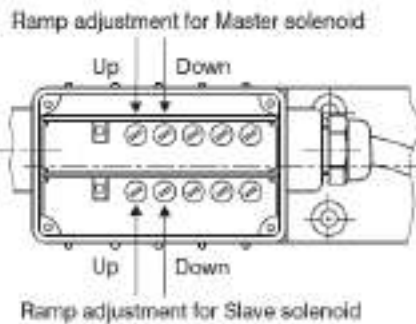
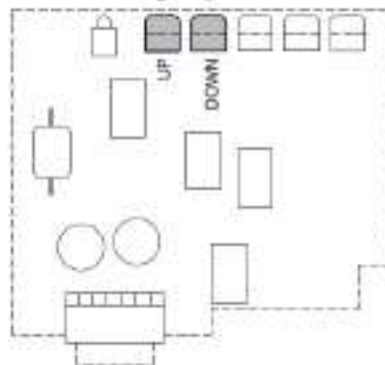
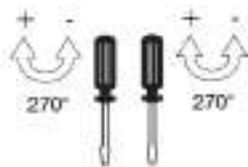
1. Unscrew the electronics cover
2. Carefully remove the Master card
3. Flip the switch SW1 in position shown in the picture
4. Put in the Master card and fix the electronics cover
5. Connect the voltage +24 V (+12 V) from an external supply source to terminals 1 and 3 of the connector

Ramp Adjustment (Up, Down)

Notice: The factory setting of the ramp functions is to the minimum values.



*The value has only an informative character with respect to the particular type of the proportional directional valve (see page 4)

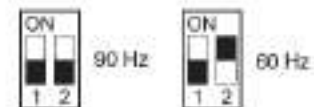
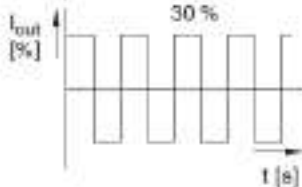
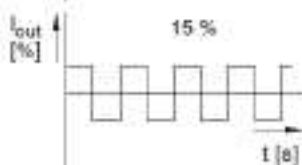


Dither Adjustment

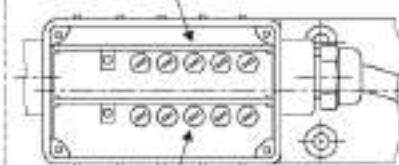
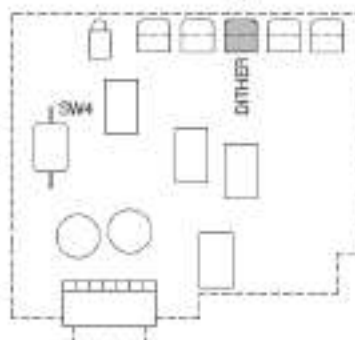
Notice: The dither is adjusted with regard to the minimum hysteresis.

Amplitude - potentiometer (dither) (0 - 30 %)

Frequency - switch SW4



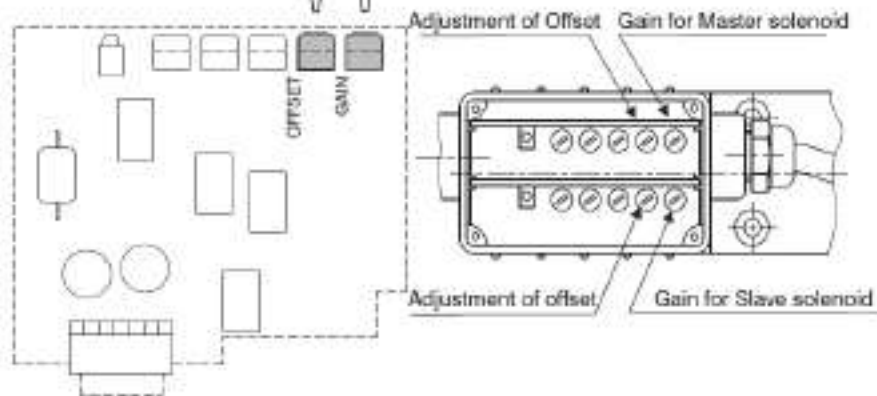
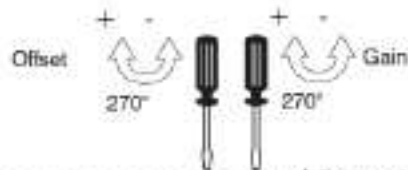
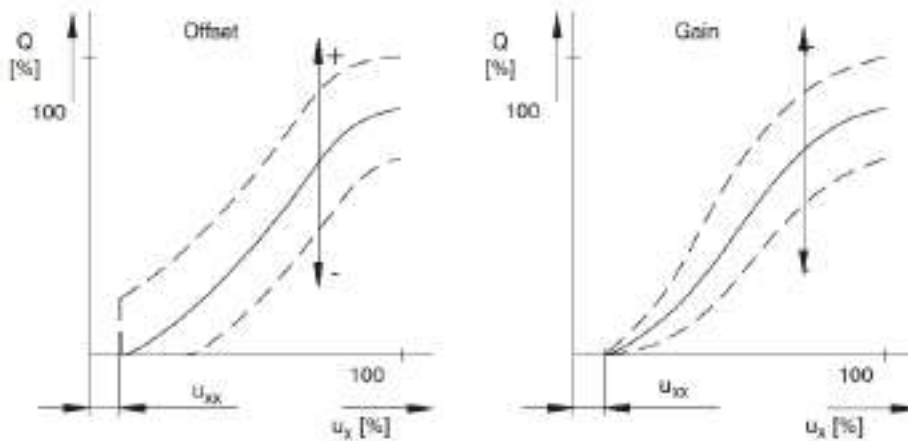
Amplitude adjustment for Master solenoid



Amplitude adjustment for Slave solenoid

Adjustment of Offset, Gain Parameters

Notice: The factory setting of the Offset and Gain parameters is specific for the solenoids used.
The manufacturer does not recommend this setting to be changed.

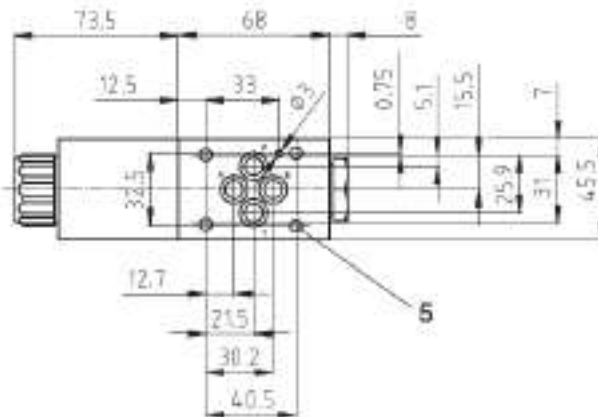


Nominal supply voltage of electronics [V]	Area insensible to control signal u_{xx} [%]
12	1 ... 3
24	0.5 ... 2

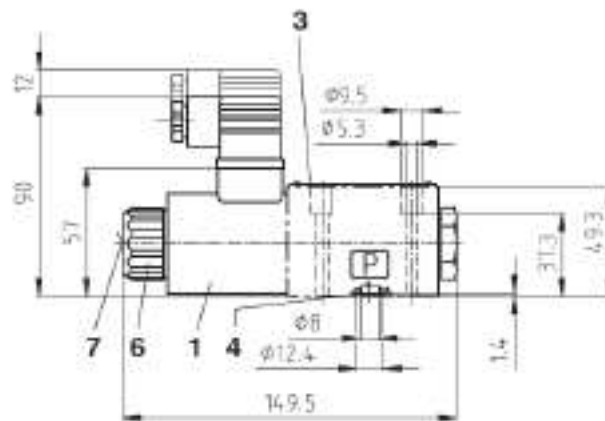
Valve Dimensions

Dimensions in millimetres

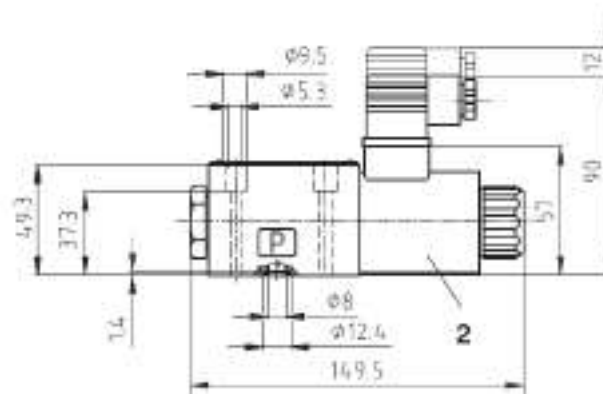
PRM2-062.....



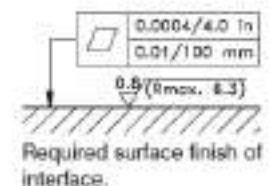
Functional symbols
2Z51, 2Y51



Functional symbols
2Z11, 2Y11



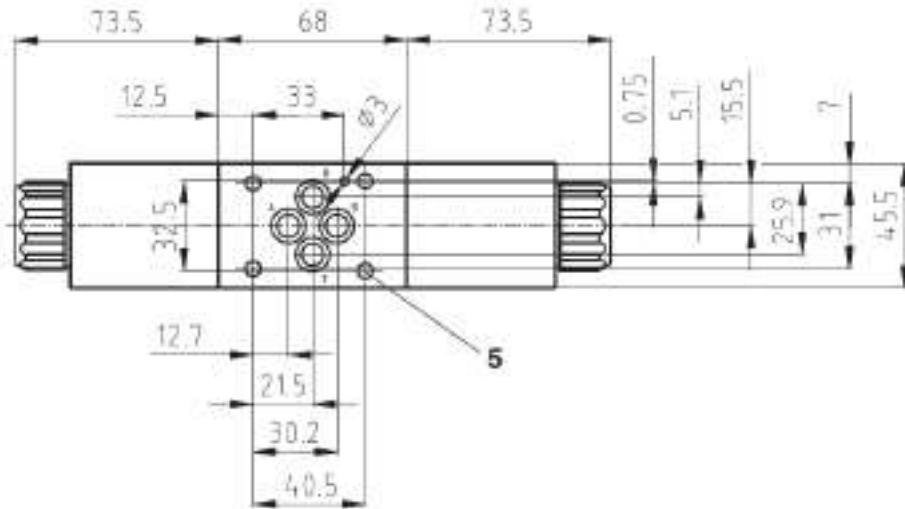
- 1 Solenoid a
- 2 Solenoid b
- 3 Name plate
- 4 Square ring 9.25 x 1.68 (4 pcs.)
supplied in delivery packet
- 5 4 through mounting holes
- 6 Solenoid fixing nut (Nut torque 4 Nm)
- 7 Manual override



Valve Dimensions

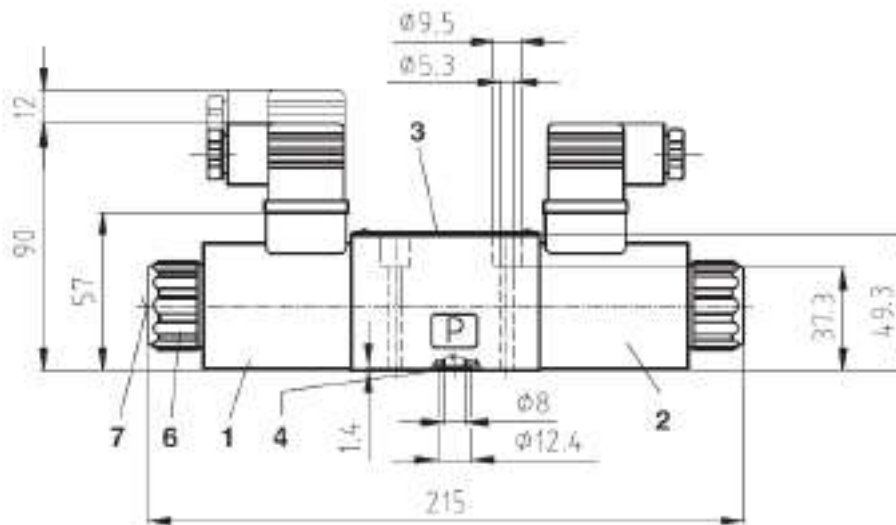
Dimensions in millimetres

PRM2-063.../.../...

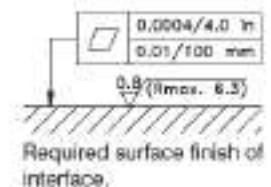


Functional symbols

3Z11, 3Z12, 3Y11, 3Y12



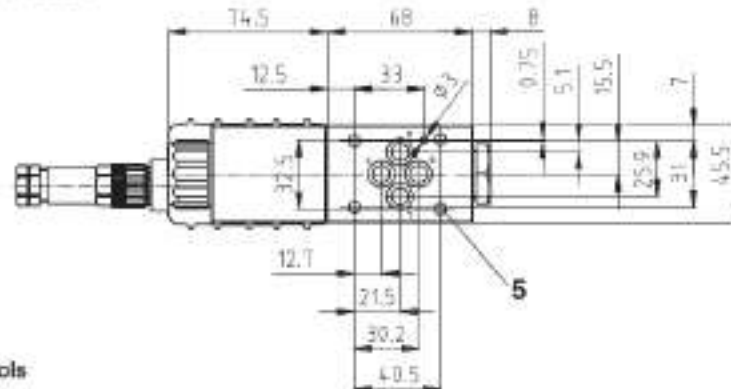
- 1 Solenoid a
- 2 Solenoid b
- 3 Name plate
- 4 Square ring 9.25 x 1.68 (4 pcs.)
supplied in delivery packet
- 5 4 through mounting holes
- 6 Solenoid fixing nut (Nut torque 4 Nm)
- 7 Manual override



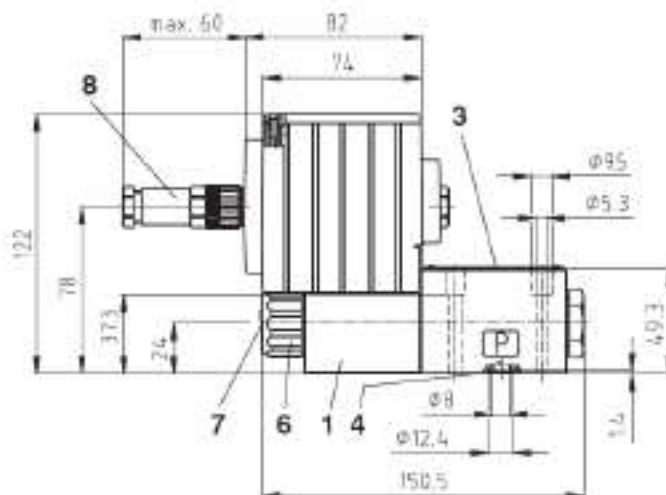
Valve Dimensions

Dimensions in millimetres

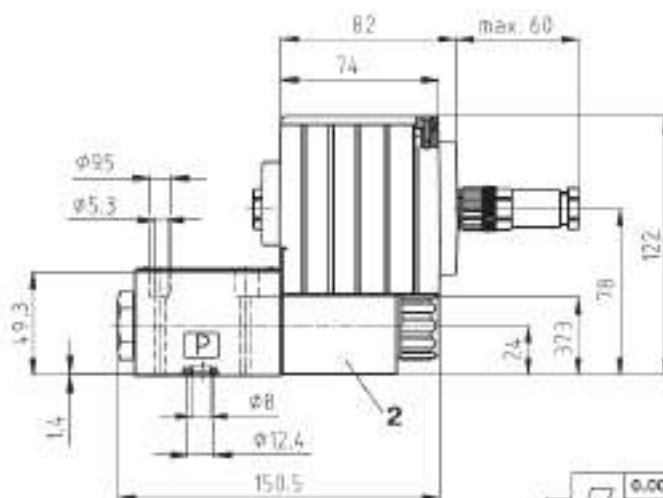
PRM2-062..../-...EK.



Functional symbols
2Z51, 2Y51



Functional symbols
2Z11, 2Y11

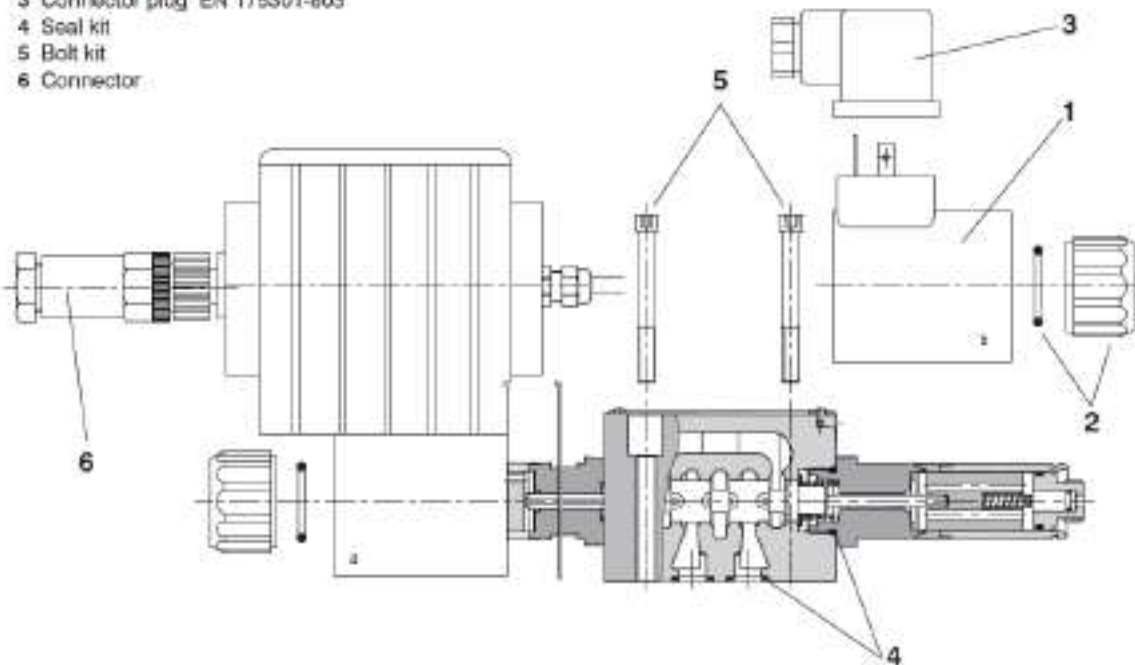


- 1 Solenoid a
- 2 Solenoid b
- 3 Name plate
- 4 Square ring 9.25 x 1.68 (4 pcs.)
supplied in delivery packet
- 5 4 through mounting holes
- 6 Solenoid fixing nut (Nut torque 4 Nm)
- 7 Manual override
- 8 4-pin connector (M12 x 1) for external supply voltage

0.0004/4.0 In
0.01/100 mm
0.5 (Rmax. 6.3)
Required surface finish of interface.

Spare Parts

- 1 Solenoid coil
- 2 Nut + seal ring
- 3 Connector plug EN 175301-803
- 4 Seal kit
- 5 Bolt kit
- 6 Connector



1. Solenoid coil

Nominal supply voltage[V]	Ordering number
12	16186400
12	16187500 (1,6A) (for 12V electronic unit integrated)
24	16186800

2. Solenoid retaining nut with seal ring

Model of the nut	Seal ring	Ordering number
Standard nut	22 x 2	15844600

3. Connector plug to EN 175301-803

Type designation	Type	Maximum input voltage	Connector plug	Connector plug
			A gray	B black
			Ordering number	
K5	without rectifier - M16x1.5 (bushing bore \varnothing 4-6 mm)	230 V DC	16202600	16202500

4. Seal kit

Type	Dimensions, number		Ordering number
Standard - NBR 70	9.25 x 1.69 (4 pcs.)	17 x 1.8 (2 pcs.)	15845200
Viton	9.25 x 1.78 (4 pcs.)	17.17 x 1.78 (2 pcs.)	15845400

5. Bolt kit

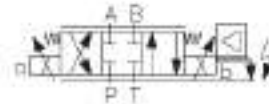
Dimensions, number	Tightening torque	Ordering number
M5 x 45 DIN 912-10.9 (4 pcs.)	8.9 Nm	15845100

6. Connector

	Ordering number
M12 x 1 (4-pin connector)	358358904012

	Proportional Directional Control Valves	PRM7-06	HA 5119 2/2013
	Size 06 (D 03) • 350 bar (5076 PSI) • 40 L/min (10.6 GPM)		Replaces HA 5107 6/2012

- Digital control
- Compact design
- Operated by proportional solenoids
- High sensitivity and slight hysteresis
- Installation dimensions to DIN 24 340 / ISO 4401 / CETOP RP121-H



Functional Description

The proportional directional valve PRM7 consists of a cast iron housing, a special control spool, two centering springs with supporting washers, one or two proportional solenoids, a position sensor or, if need be, of a control box with digital electronics.

The measuring system of the position sensor consists of a differential transformer with core and from the evaluating electronic unit realized in hybrid technique.

With the model without integrated electronic unit, the electric connection of the solenoids is realized by the connector plug to EN 175301-803, with the position sensor output being connected by the G4W1F connector plug. Both connectors are supplied.

The proportional valve with the integrated electronic unit comprises an electronic control box that is mounted, together with the position sensor, on either of the solenoids. The connection of the position sensor with the control box is provided by a cable. With the model with two solenoids, the solenoid mounted opposite the control box is connected with the control box by means of a EN 175301-803, connector. The connection of the supply voltage, control signal, program input and external output of the position sensor is realized by a 5-pin connector (ELKA 5012). The connection of the external feedback is provided by a 5-pin connector, which also has three supply voltages +24 V, +10V and -5V for an external sensor available. The solenoid coils, including the control box, can be turned in a range of $\pm 90^\circ$. The digital control unit enables the proportional valve to be controlled on the basis of data required from two feedback circuits.

In this case the proportional valve can be used as follows:

1. Proportional directional valve
2. Only with the internal feedback from the spool position sensor.
3. Only with the external feedback (pressure sensor, position sensor, etc.).
4. With internal and external feedback.

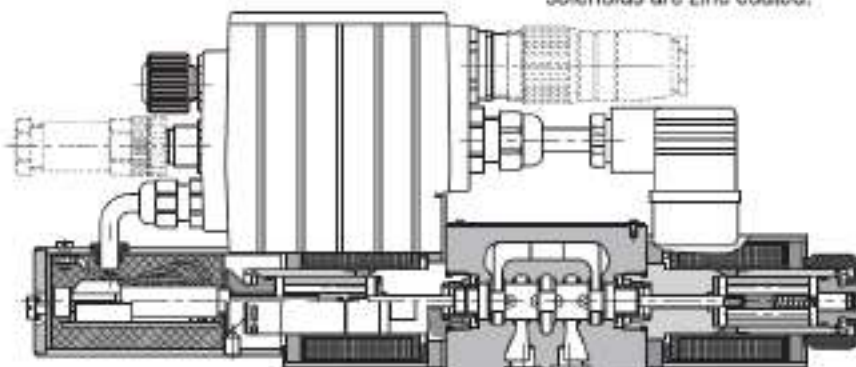
The outlet current to the electromagnet coils is controlled with the help of PWM. The electronic system is equipped with an internal current feedback. The outlet current in case of need may be modulated with the use of a signal of dynamic lubrication. Single function parameters are set up with the use of appropriate software with the help of a computer connected to the proportional switchboard through a serial interface RS 232.

It is necessary to order a cable in accordance with appropriate ordering number as mentioned on page 4.

The digital control unit utilizes the pulse-with-modulation (PWM) and supplies the solenoids with current proportional to the control signal. The supply current is additionally modulated with a differ frequency. The individual functional parameters are adjusted through software by means of a special programmer, or by means of a computer through the RS 232 interface. The correct function of the digital control unit is signaled by a green LED. The incorrect function (failure) is indicated by a red LED.

As a standard, the proportional valve is delivered with factory setting. The model including also an external feedback shall be consulted with the manufacturer.

With the basic surface treatment, the valve housing is phosphate coated, whereas the surfaces of the solenoids are zinc coated.



Ordering Code

PRM7-06 / -

Proportional directional control valve

Nominal size **06 (D 03)**

Spool Symbols

	2Z51
	2Z11
	3Y51
	2Y11
	3Z11
	3Z12
	3Y11
	3Y12

without designation
V

Seals
NBR
FPM (Viton)

Model

S01 position sensor with voltage outlet
S02 position sensor with current outlet
E01 proportional directional valve without feedback
E02S01 proportional directional valve with position feedback
E03 proportional directional valve with external feedback
E04S01 proportional directional valve with position and external feedback

Nominal solenoid supply voltage

12 **supply voltage 12V DC
24 supply voltage 24V DC

** Cannot be supplied as Variant S2

Nominal flow rate at Δp = 10 bar (145 PSI)

15 flow 15 L/min (3.96 GPM)
30 flow 30 L/min (7.93 GPM)

* Model for cylinders with asymmetric piston rod, piston area ratio 1:2

Connectors are to be ordered **separately**,
see ordering number on page 10

Technical Data		
Nominal size	mm (US)	06 (D 03)
Max. operating pressure at ports P, A, B	bar (PSI)	350 (5076)
Max. operating pressure at port T	bar (PSI)	210 (3046)
Hydraulic fluid	Hydraulic oils of power classes (HL, HLP) to DIN 51524	
Fluid temperature range (NBR / Viton)	°C (°F)	-30 ... +80 (-22 ... +176) / -20 ... +80 (-4 ... +176)
Ambient temperature max.	°C (°F)	+50 (+122)
Viscosity range	mm ² /s (SUS)	20 ... 400 (98 ... 1840)
Maximum degree of fluid contamination	Class 21/18/15 to ISO 4406 (1999)	
Nominal flow at $\Delta p = 10$ bar (145 PSI)	L/min (GPM)	15 (3.96) / 30 (7.93)
Hysteresis - open loop	%	< 6
Hysteresis - closed position loop	%	< 0.5
Weight - PRM7-062 - PRM7-063	kg (lbs)	2.3 (5.07) 2.8 (6.17)
Mounting position	optional	
Enclosure type to EN 60 529	IP65	
Technical Data of Position Sensor - Voltage Outlet		
Operating pressure	bar (PSI)	max. 350 (5076), static
Electric connection	electrical connector G4W1F Hirschmann *	
Contact assignment	1 - Power supply 2 - Command signal 3 - GND 4 - not used	
Enclosure type to EN 60529	IP65	
Measured distance	mm (in)	8 (0.315)
Operating voltage	V	9.6 ... 30 DC
Linearity error	%	< 1
Current consumption at load current of 2 mA	mA	< 15
Output voltage	V	0 ... 5
Output signal range used: 0 Position	V	2.5
1 solenoid - stroke 2.8 mm (0.11 in)		0.75 - 2.5
solenoids - stroke ± 2.8 mm (0.11 in)		0.75 - 4.025
Max. load current	mA	2
Noise voltage - at load current 0 - at load current of 2 mA	mV _{p-p}	< 20 < 15
Additional output signal error at: Temperature change between 0 ... 80 °C (32 ... 176 °F)	typical < 0.2% / 10K max. 0.5% / 10K	
Between 0 ... -25 °C (32 ... -13 °F)	max. 0.5% / 10K	
Load change from 0 to 2 mA	0.1%	
Input voltage change from 9.6 V to 14.4 V	%	< 0.1
from 14.4 V to 30 V		< 0.25
Long-term drift (30 days)	%	< 0.25
Cut-off frequency 3 dB fall in amplitude Frequency 90°	Hz	> 600 > 600
* Only for S01 and S02 model.		

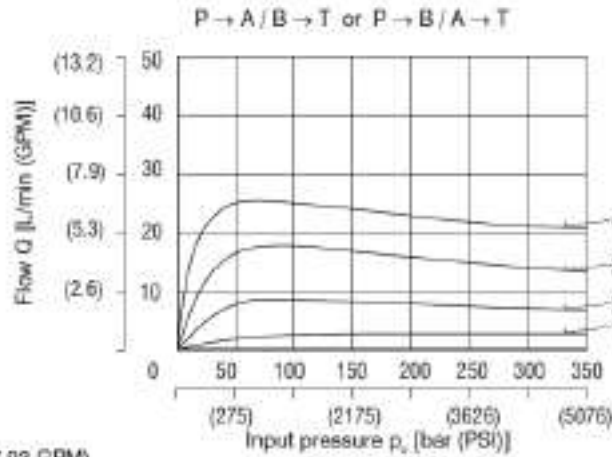
Technical Data of Position Sensor - Current Outlet			
Linearity	%	< 1	
Operating pressure	bar (PSI)	to 350 (5076), static	
Electrical connection		electrical connector G4W1F Hirschmann *	
Contact assignment		1 - Power supply 2 - Command signal 3 - GND 4 - not used	
Enclosure type to EN 60529		IP65	
Operatin voltage	V	20 ... 30 DC	
Current	mA	< 35	
Output signal range	mA	4 ... 20	
Output signal range used: 0 position 1 solenoid - stroke: 2.8 mm (0.11 in) 2 solenoids - stroke: ± 2.8 mm (0.11 in)	mA	12 4.4 ... 12 4.4 ... 19.6	
Additional output signal error: - at temperature change from +10 ... 55 °C (50 ... 131 °F) - at impedance change from 50% - at input voltage change in the range of operating voltage		0.2% / 10K ≤ 0.1% ≤ 0.05%	
Impedance	Ω	≤ 500	
Output signal ripple	mA R.M.S.	≤ 0.02	
Limit frequency at 3 dB amplitude decrease	Hz	≥ 600	
* Only for S01 and S02 model.			
Technical Data of Proportional Solenoid			
Type of coil	V	12 DC	24 DC
Limiting current	A	2.4	1.0
Resistance at 20 °C (68 °F)	Ω	2.3	13.4
Electronics Data			
Supply voltage with polarity inversion protection	V	11.2 ... 28 VDC (residual ripple < 10%)	
Input: command signal / according to customer setting		± 10V, 0 ... 10V, ± 10mA, 4 ... 20mA, 0 ... 20mA, 12mA ± 8mA	
Input: spool position sensor signal		0 ... 5V	
Input: external feedback signal		0 ... 10V, 4 ... 20mA, 0 ... 20mA,	
Resolution of the A/D converter		12 bit	
Output: solenoids		Two PWM output stages up to max. 3.5 A	
PWM frequency	kHz	18	
Adjustment of parameters	μs	170	
EMC	Interference resistance	61000 - 6 - 2 : 2005	
	Radiation resistance	55011 : 1998 class A	
Parameter setting	Serial port RS 232 (zero modem), 19200 bauds, 8 data bits, 1 stop bit, no parity. Special software PRM7Conf.		
Accessories			
Order number	Content		
23093400	Connecting cable to PC - length 2m (6.56ft), CD-ROM with program PRM7Conf and user manual.		
23093500	Connecting cable to PC - length 5m (16.40ft), CD-ROM with program PRM7Conf and user manual.		
24523400	Connecting cable to PC - length size 2m (6.56ft).		
24523500	Connecting cable to PC - length size 5m (16.40ft).		

Limit Power

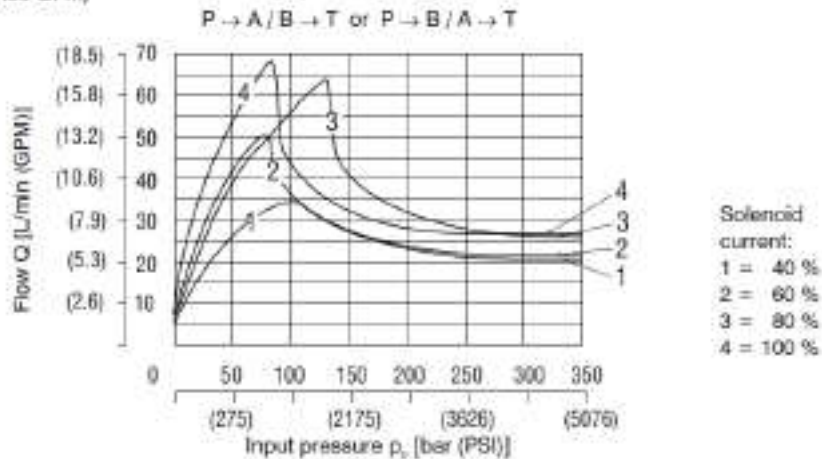
Measured at $v = 32 \text{ mm}^2/\text{s}$ (156 SUS)

Only for E01 model

Nominal flow 15 L/min (3.96 GPM)



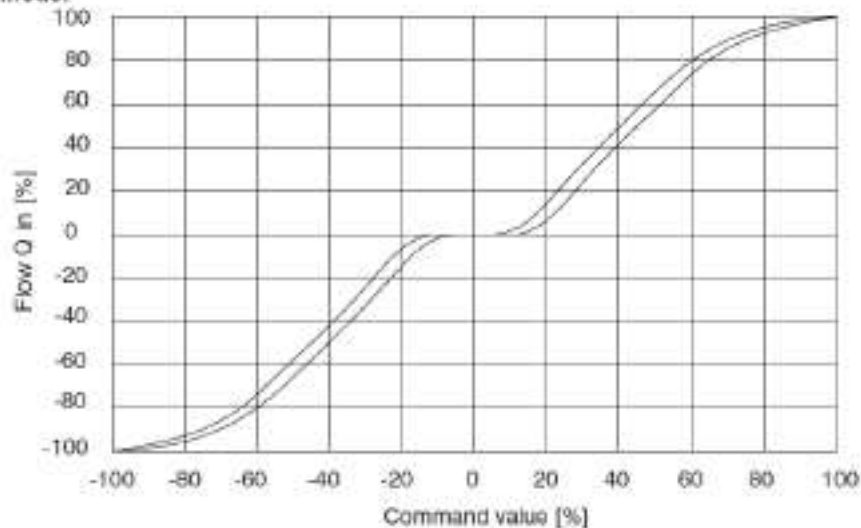
Nominal flow 30 L/min (7.93 GPM)



Flow Characteristics

Measured at input pressure $\Delta p = 10 \text{ bar}$ (145 PSI), $v = 32 \text{ mm}^2/\text{s}$ (156 SUS)

Only for E01 model



Flow Characteristics

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

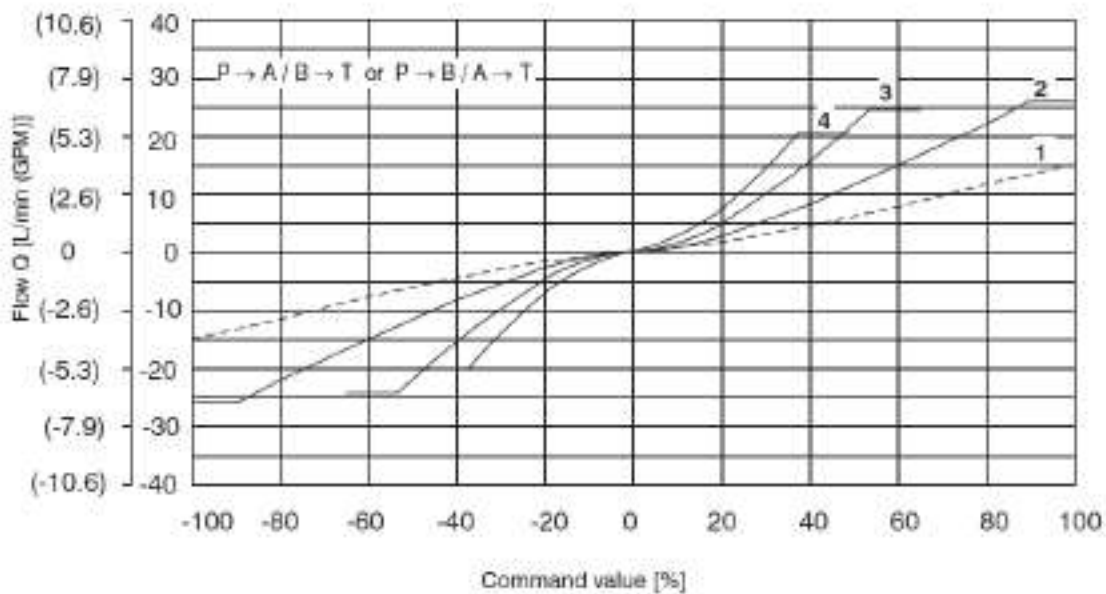
Only for E02S01 model

$Q_n = 15 \text{ L/min}$ (3.96 GPM) by $\Delta p = 10 \text{ bar}$ (145 PSI)

Δp = Valve pressure differential (inlet pressure p_V minus load pressure and return pressure p_T)

Δp_n = Valve pressure differential for nominal flow Q_n

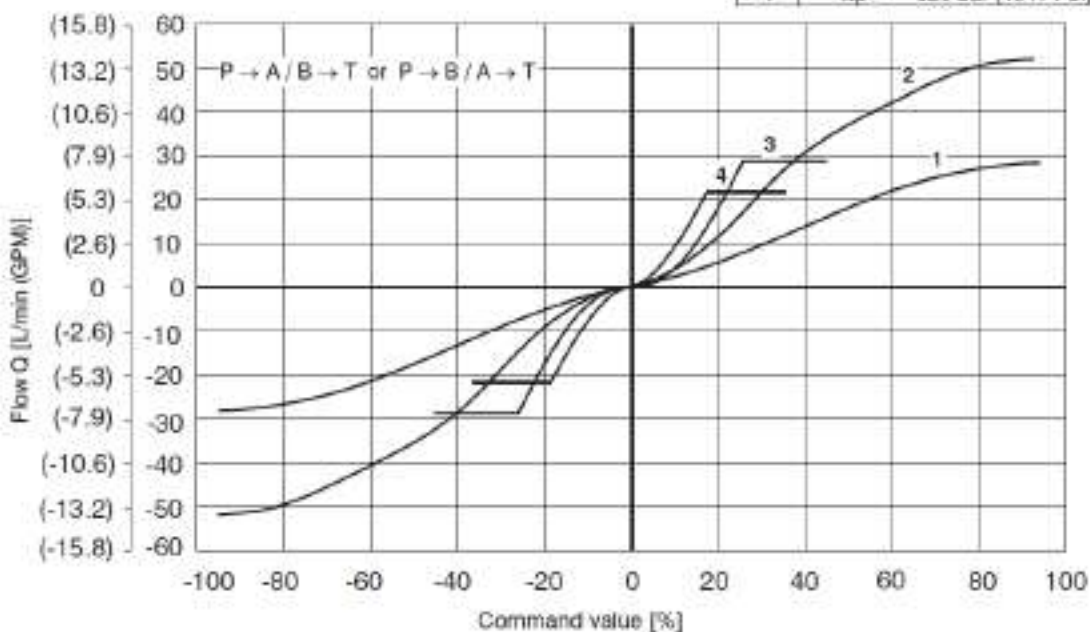
1	$\Delta p_n = 10 \text{ bar}$ (145 PSI)
2	$\Delta p = 50 \text{ bar}$ (725 PSI)
3	$\Delta p = 160 \text{ bar}$ (2321 PSI)
4	$\Delta p = 320 \text{ bar}$ (4641 PSI)

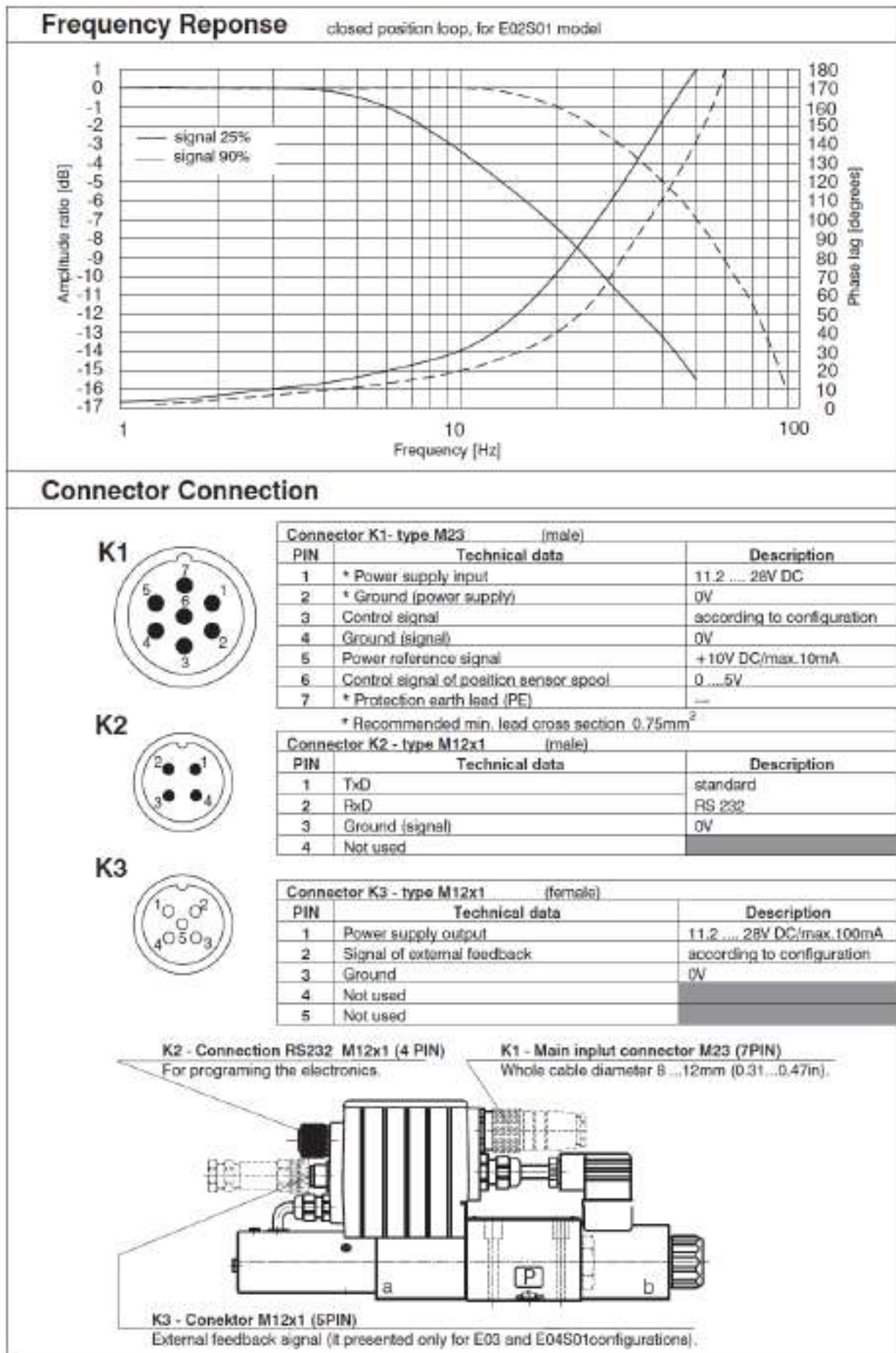


Only for E02S01 model

$Q_n = 30 \text{ L/min}$ (7.93 GPM) by $\Delta p = 10 \text{ bar}$ (145 PSI)

1	$\Delta p_n = 10 \text{ bar}$ (145 PSI)
2	$\Delta p = 50 \text{ bar}$ (725 PSI)
3	$\Delta p = 160 \text{ bar}$ (2321 PSI)
4	$\Delta p = 320 \text{ bar}$ (4641 PSI)





Manufactory valve configuration

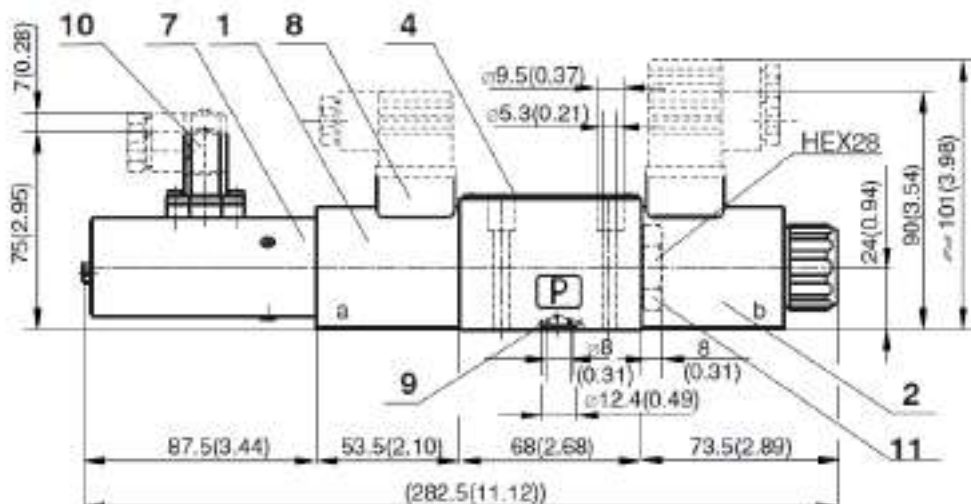
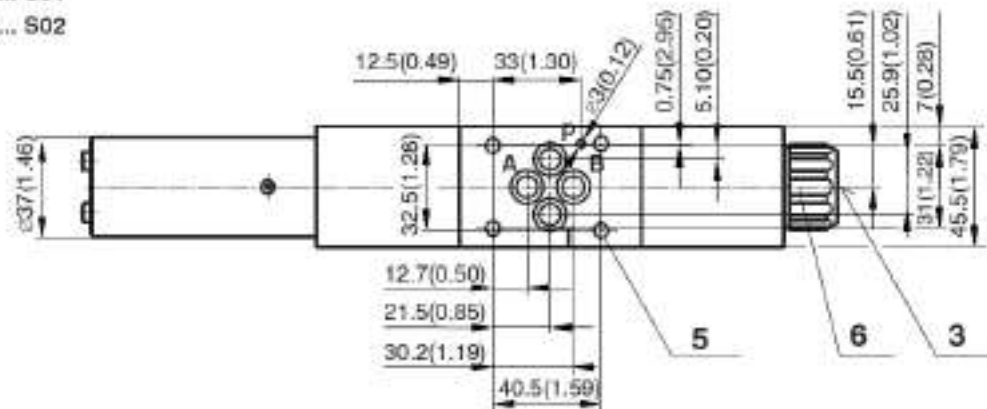
Item	Model							
	E01		E02S01		E03		E04S01	
	1	2	1	2	1	2	1	2
Control signal	0...10 V	± 10 V	0...10 V	± 10 V	0...10 V	± 10 V	0...10V	± 10 V
Signal external feedback	-	-	-	-	0...10 V			
Output position sensor spool	-	-	0...5 V		-		0...5 V	

Valve Dimensions

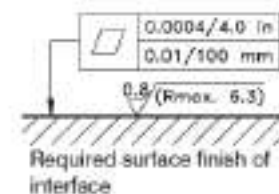
Dimensions in millimeters and inches

063 ... S01

063 ... S02



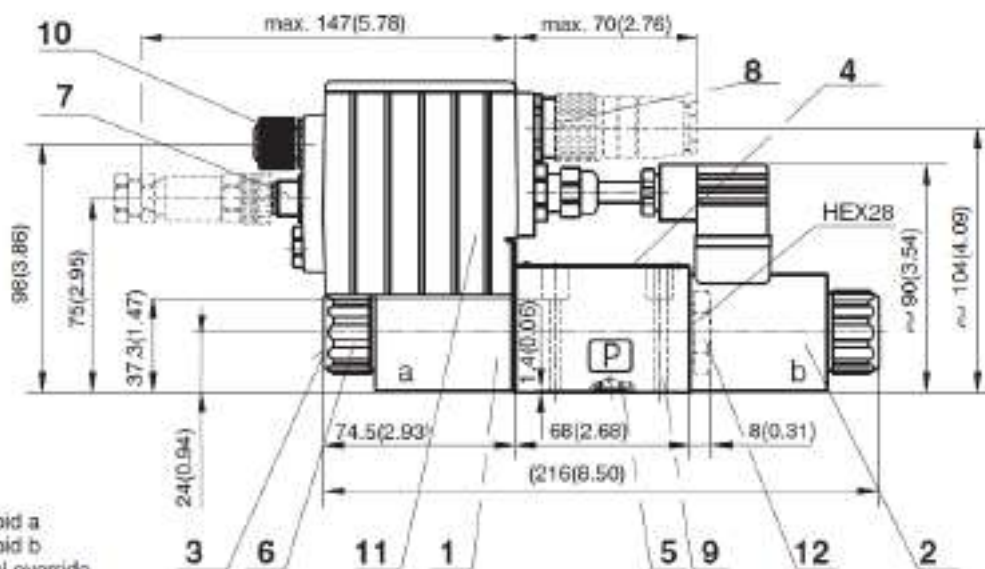
- 1 Solenoid a
- 2 Solenoid b
- 3 Manual overrid
- 4 Name plate
- 5 4 mounting holes
- 6 Solenoid fixing nut
- 7 Position sensor
- 8 Solenoid supply connector
- 9 Square ring 9.25 x 1.68 (4 pcs.), supplied in delivery packet
- 10 Position sensor connector
- 11 Plug screw for valve with one solenoid, HEX 28, configurations 2251, 2211



Valve Dimensions

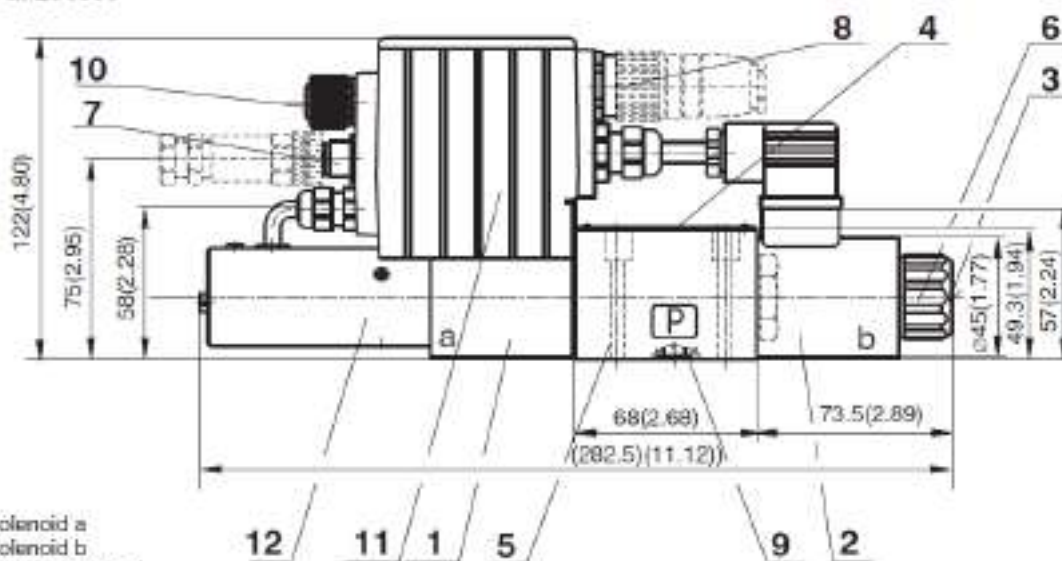
Dimensions in millimeters and inches

063 ... E01 - without connector plug for spool position feedback
063 ... E03

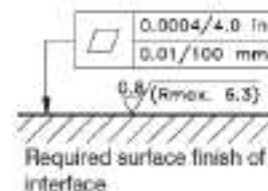


- 1 Solenoid a
- 2 Solenoid b
- 3 Manual override
- 4 Name plate
- 5 4 mounting holes
- 6 Solenoid fixing nut
- 7 Connector M12x1 for connection of external feedback
- 8 Main supply connector M23
- 9 Square ring 9.25 x 1.68 (4 pcs.), supplied in delivery packet
- 10 Cover of connector M12x1 for programming
- 11 Plastic box with integrated electronics
- 12 Plug screw for valve with one solenoid, HEX 28, configurations 2Z51, 2Z11

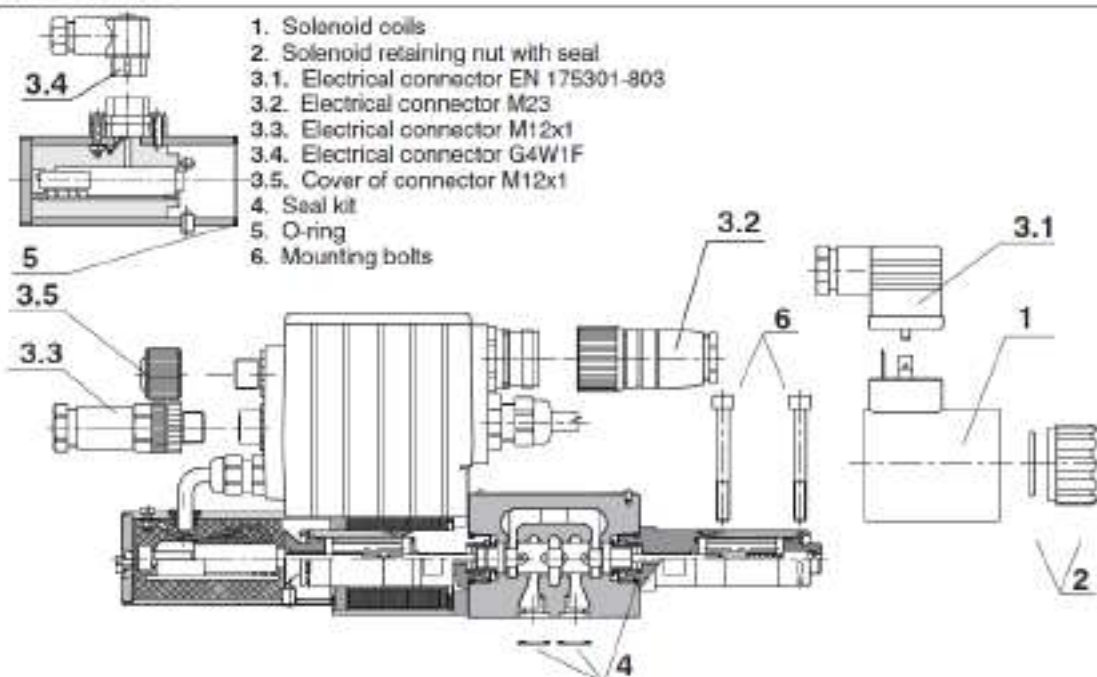
063 ... E02S01 - without connector plug for spool position feedback
063 ... E04S01



- 1 Solenoid a
- 2 Solenoid b
- 3 Manual override
- 4 Name plate
- 5 4 mounting holes
- 6 Solenoid fixing nut
- 7 Connector M12x1 for connection of external feedback
- 8 Main supply connector M23
- 9 Square ring 9.25 x 1.68 (4 pcs.), supplied in delivery packet
- 10 Cover of connector M12x1 for programming
- 11 Plastic box with integrated electronics
- 12 Position sensor



Spare Parts



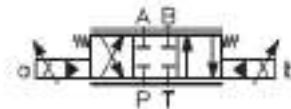
1. Solenoid coil				
Solenoid type			Ordering number	
			01200	16186400
			02400	16186800
2. Solenoid retaining nut with seal				
Type of the nut		Seal ring		Ordering number
Standard nut		22 x 2		15844600
3.1. Electrical connector EN 175301-803				
Type designation	Type	Maximum input voltage	Connector A grey	Connector B black
K5	without rectifier - M16x1.5 (bushing bore \varnothing 4-6 mm)	230 V DC	16202600	16202500
3.2. Electrical connector M23 - 7PIN (female)				
Ordering number			345579500001	
3.3. Electrical connector M12x1- 5PIN (male), it presented only for E03 and E04S01 configurations				
Ordering number			358359000002	
3.4. Electrical connector G4W1F				
Ordering number			358358632157	
3.5. Cover of connector M12x1				
Ordering number			23090600	
4. Seal kit				
Type	Dimensions, number			Order number
	Square ring	O-ring		
Standard - NBR70	9.25 x 1.68 (4 pcs.)	17 x 1.8 (2 pcs.)		15845200
Viton	9.25 x 1.78 (4 pcs.)	17.17 x 1.78 (2 pcs.)		15845400
5. O-ring				
Standard - NBR70	32 x 2 (1 pc.)			273111014140
6. Mounting bolts				
Dimensions, number		Tightening torque		Ordering number
M5 x 45 DIN 912-10.9 (4 pcs.)		8.9 Nm (5.6 ft-lbs)		15845100

Caution!

- The packing foil is recyclable. The protective plate can be returned to manufacturer
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

	Proportional Directional Control Valves PRM8-06 D_n 06 • P_{max} 350 bar (5076 PSI) • Q_{max} 140 l/min (37 GPM)	HA 5178 11/2012
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- High parameters of controlled flow rates
- Continuous control of both flow rate directions
- High reliability
- Indirect control concept with a floating spool
- Installation dimensions to DIN 24 340 / ISO 4401 / CETOP RP121-H



Functional Description

The proportional directional control valve consists of a cast-iron body (1), main spool (2), control spool (3), two auxiliary centring springs (4), two main return springs (5) and two proportional solenoids (6).

The pilot controlled main spool valve copies the control spool position, which is given the control current of the solenoid.

The central position of the main spool is defined by the auxiliary centring springs.

The solenoids are supplied from an external source, which should be provided with a current feedback.

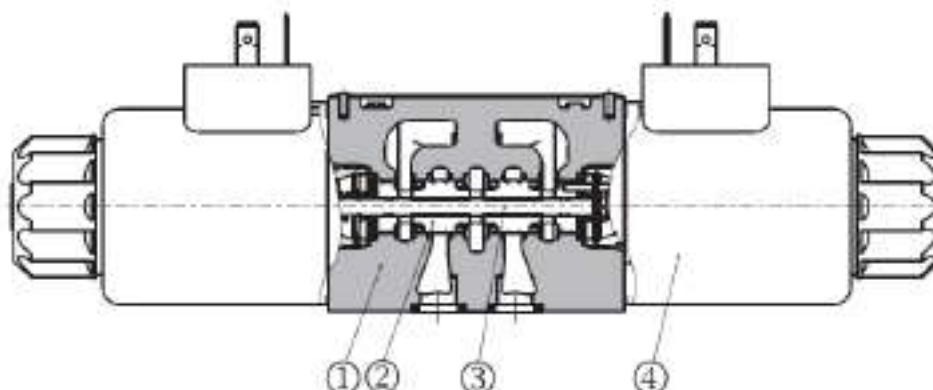
In order to achieve optimum operating parameters the external electronics should be able to generate an additional dither - signal. The proportional valve can be used within the whole range of input pressure, where

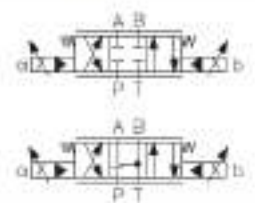
within the required continuity of the flow-rate characteristics and minimum hysteresis is achieved.

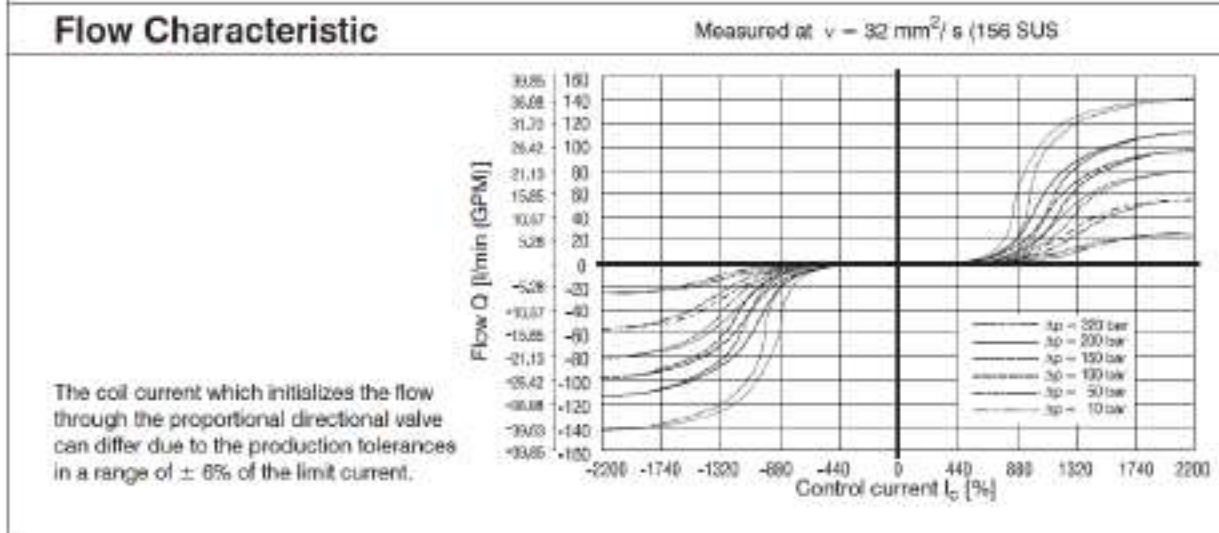
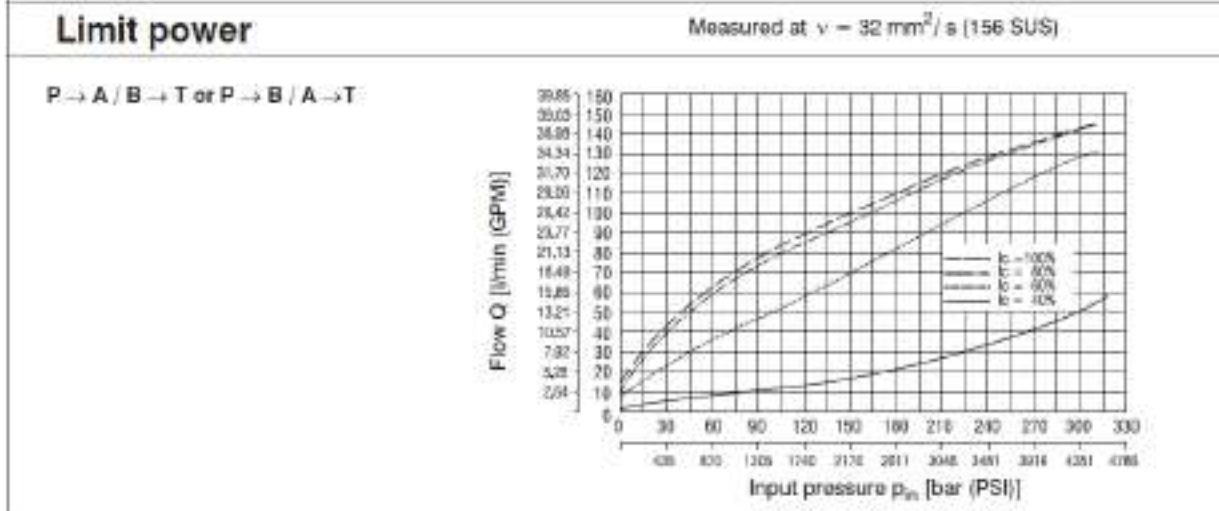
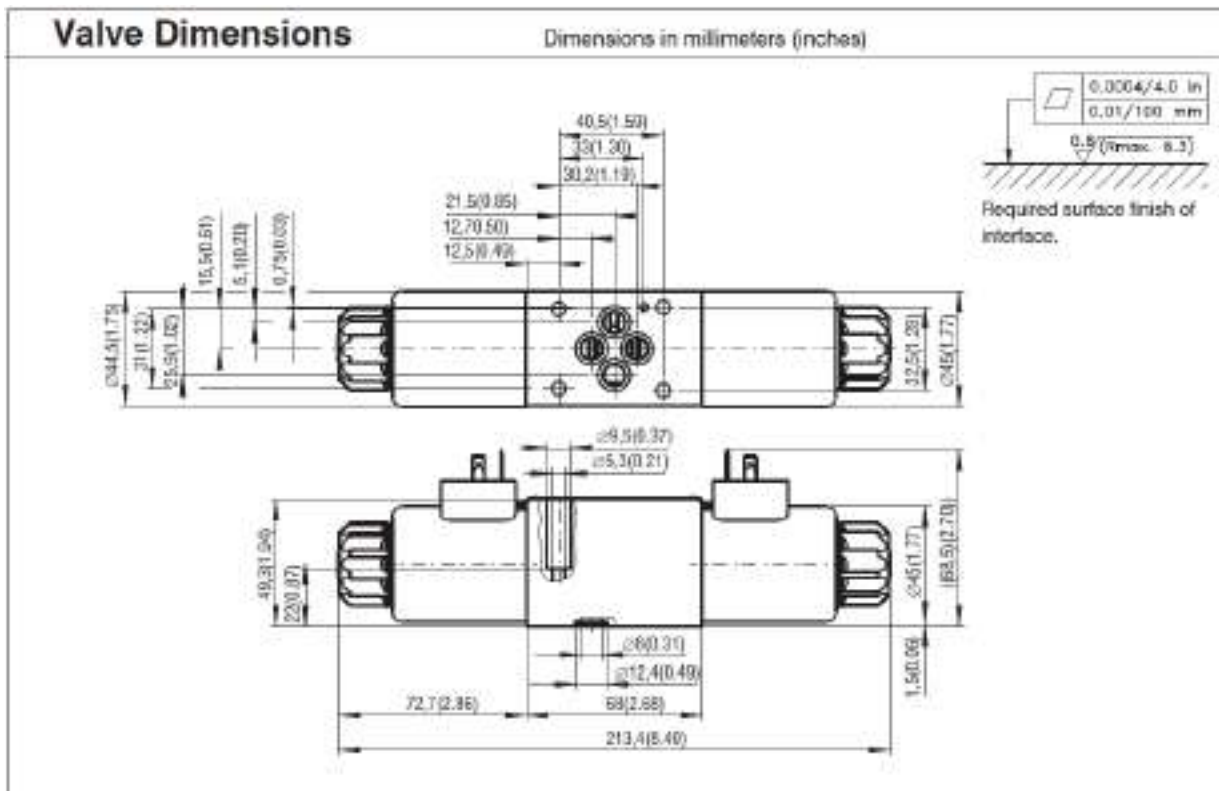
The selected concept increases the achieved output parameters of the proportional valve in comparison to direct controlled proportional valve. Further on the valve shows a monotone increasing relation between pressure gradient and flow rate by constant control current.

Proper functions of the valve are guaranteed only, if the supply pressure in the "P" channel is present; this pressure must be always higher than the pressure in the "T" channel.

The basic surface treatment of the valve housing is phosphate coated and the operating solenoids are zinc coated.

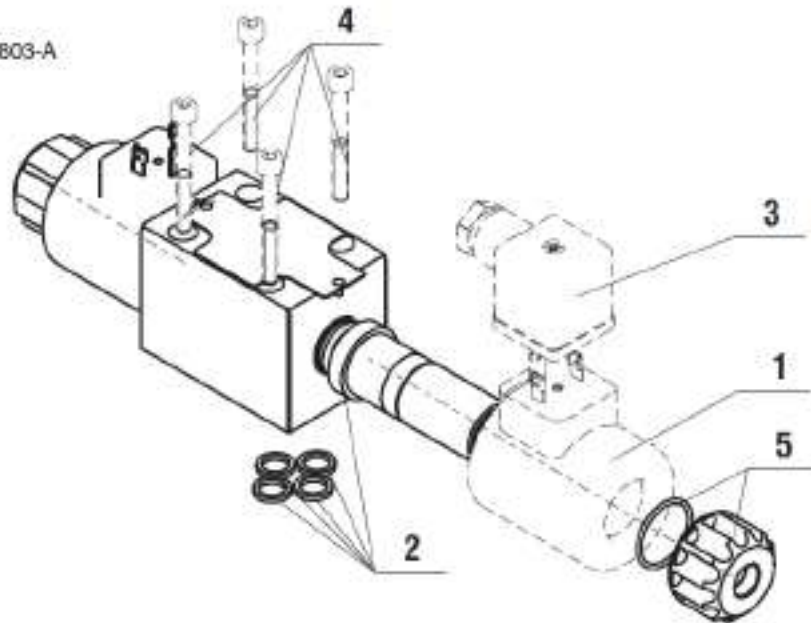


Ordering Code			
<p>PRM8-06 <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>Proportional Directional Control Valve</p> <p>Nominal size</p>  <p>3Z11</p> <p>3Y11</p> <p>Nominal supply voltage</p> <p>12 V DC 12</p> <p>24 V DC 24</p>		<p>no designation</p> <p>Seals NBR FPM (Viton)</p> <p>Type of solenoid coil and Electronics</p> <p>- Type of solenoid coil</p> <p>E1 Connector EN 175301-803-A</p> <p>E2 Connector EN 175301-803-A with quenching diode</p> <p>E3A Axial connector AMP Junior Timer (2 pins; male)</p> <p>E4A Axial connector AMP Junior Timer with quenching diode</p> <p>E12 Connector Deutsch DT04-2P (2 pins; male)</p> <p>E13 Connector Deutsch DT04-2P with quenching diode</p> <p>Other coils on demand see catalog HA 8007.</p>	
<p>Electronics for controlling proportional valves is possible to order separately, see catalog HA 9150.</p>			
Technical Data			
Nominal size	mm (US)	06	
Maximum operating pressure at ports P, A, B	bar (PSI)	350 (5076)	
Maximum flow at pressure 320 bar (4641PSI)	l/min (GPM)	140 (37)	
Maximum operating pressure at port T	bar (PSI)	210 (3046)	
Hydraulic fluid	Hydraulic oils of power classes (HL, HLP) to DIN 51524		
Fluid temperature range (NBR / Viton)	°C (°F)	-30 ... +80 (-22 ... +176) / -20 ... +80 (-4 ... +176)	
Ambient temperature, max.	°C (°F)	+50 (+122)	
Viscosity range	mm ² /s (SUS)	20 ... 400 (98 ... 1840)	
Maximum degree of fluid contamination	Class 21/18/15 according to ISO 4406		
Nominal flow rate Q _n at Δp = 10 bar (145PSI) (v = 32 m ² m.s ⁻¹ (156 SUS))	l/min (GPM)	25 (6.60)	
Hysteresis	%	≤ 6	
Weight PRM8-063	kg (lbs)	2,4 (5.29)	
Mounting position	unrestricted, preferably horizontal		
Enclosure type EN 60 529	IP 65		
Technical Data of the Proportional Solenoid			
Type of coil	V	12 DC	24 DC
Limit current	A	2,5	1,0 (12 V electronic)
Resistance at 20 °C (68 °F)	Ω	2,3	5,2 (12 V electronic)
			13,4
Technical Data of the Electronics			
Nominal supply voltage U _{cc}	V	12 DC	24 DC
Supply voltage range	V	11,2 ... 14,7	20 ... 30 DC
Stabilized voltage for control	V	5 DC (R > 1 kΩ)	10 DC (R ≥ 1 kΩ)
Maximum output current	A	2,4 for R < 4 Ω	1,5 for R < 10 Ω
Ramp adjustment range	s	0,05...3	
Dither frequency	Hz	90 / 60	
Dither amplitude	%	0...30	



Spare Parts

- 1 Solenoid coil
- 2 Seal kit
- 3 Connector plug EN 175301-803-A
- 4 Bolt kit
- 5 Nut + seal ring



1. Solenoid coil	Ordering number				
	E1	E3A	E12	E13	
Nominal supply voltage [V]	Ordering number				
12	18838500	19744700	19696100	19909300	
24	18838300	19744300	19696200	28811200	
2. Seal kit					
Type	Dimensions, number		Ordering number		
Viton	9,25 x 1,78 (4 pcs)	17,17 x 1,78 (2pcs)	15845400		
3. Connector plug EN 175301-803-A					
Type designation	Type	Model	Max. input voltage	Ordering number	
K1	Connector B (černá) Connector A (šedá)	bez usměrňovače - M16x1,5 (otvor průchodky \varnothing 6-8 mm)	230 V AC/DC	18202100 18202200	
4. Bolt kit					
Dimensions, number		Tightening torque		Ordering number	
M5 x 45 DIN 912-10.9 (4 pcs)		8,9 Nm (6.56 lbf.ft)		15845100	
5. Nut + seal ring					
Type of the nut		Seal ring		Ordering number	
Standard nut		22 x 2		15844600	

Caution !

- The packing foil is recyclable.
- The protective plate can be returned to manufacturer.
- Mounting bolts M5 x 45 DIN 912-10.9 or studs must be ordered separately. Tightening torque of the bolts is 8,9 Nm (6.6 ft-lbs).
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of law.



COPE

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