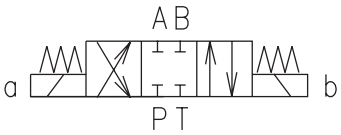
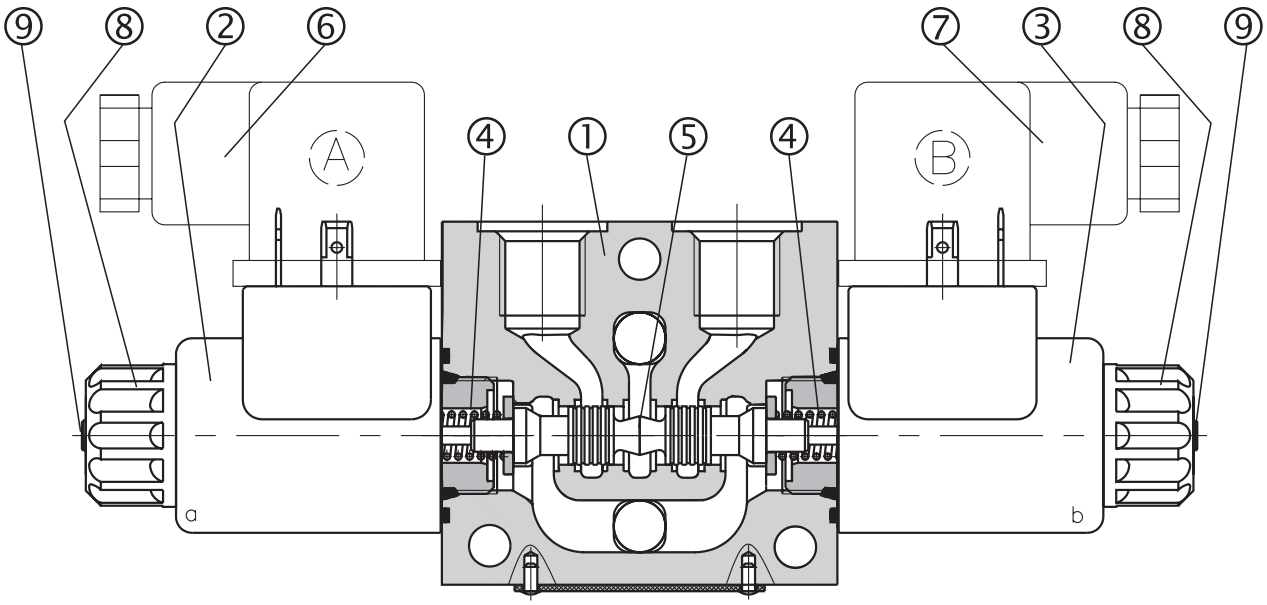


- **4/3-, 4/2 way directional control valves with solenoid control**
- **Solenoids can be turned around their axis to any position**
- **Push button manual override**

Functional Description

The RPEK1-03 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 rectifiers, which are integrated directly into the connectors A, B (6, 7) or inside the coil. 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 363 PSI (25 bar).
The basic surface treatment of the valve housing (1) is phosphate coated and the solenoids (2, 3) are zinc coated.



Ordering Code

RPEK1-03 □□□/□□□□

Solenoid operated directional control valve

Nominal size

Type of connection
G1/4 **G**

Number of valve positions
two positions **2**
three positions **3**

Functional symbols
see the table functional symbols

Rated supply voltage of solenoids
(at the coil terminals)

12 V DC / 1,83 A	**01200**
24 V DC / 0,92 A	**02400**
*205 V DC / 0,08 A	**20500**
Other voltages per request	

Type of solenoid coil
E1 with DIN connector

Manual override
no designation standard

Seals
no designation NBR
V FPM (Viton)

Note: Electrical connectors in DIN 43 650 have to be ordered separately. See page 10.

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

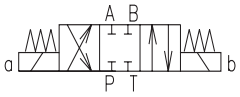
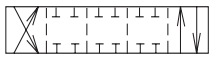
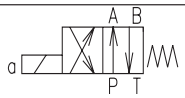
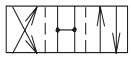
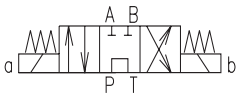
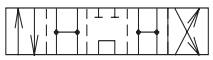
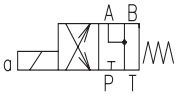
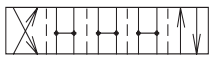
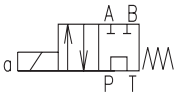
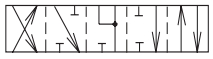
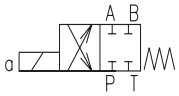
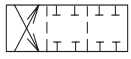
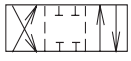
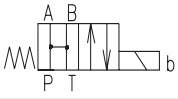
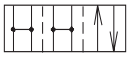
*Recommended solenoid coils used with elektrical connector with rectifiers - type designation K3, K4, see page 6.

Rated supply source voltage (permissible rated voltage variation ± 10 %)	Type designation of the solenoid voltage
230 V AC / 0,08 A / 50 (60) Hz	20500

Technical Data

Nominal size	mm	03
Maximum flow	L/min	see p-Q characteristics
Maximum operating pressure at ports P, A, B	bar	250
Maximum operating pressure at port T	bar	210
Pressure drop	bar	see Δp-Q characteristics
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 and 68.
Fluid temperature range (NBR / FMP (Viton)	°C	-30 ... +80 / -20 ... +80
Ambient temperature, max.	°C	up to +50
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Maximum allowable voltage variation	%	AC: ± 10 DC: ± 10
Maximum switching frequency	1/h	15 000
Switching time, ON; at ν = 32 mm^2/s	ms	30 ... 50
Switching time, OFF; at ν = 32 mm^2/s	ms	AC: 70 ... 100 DC: 30 ... 50
Duty cycle	%	100
Service life	cycles	10^7
Enclosure type to DIN 40 050		IP 65
Weight - valve with 1 solenoid - valve with 2 solenoid	kg	0.90 1,05
Mounting position		optional

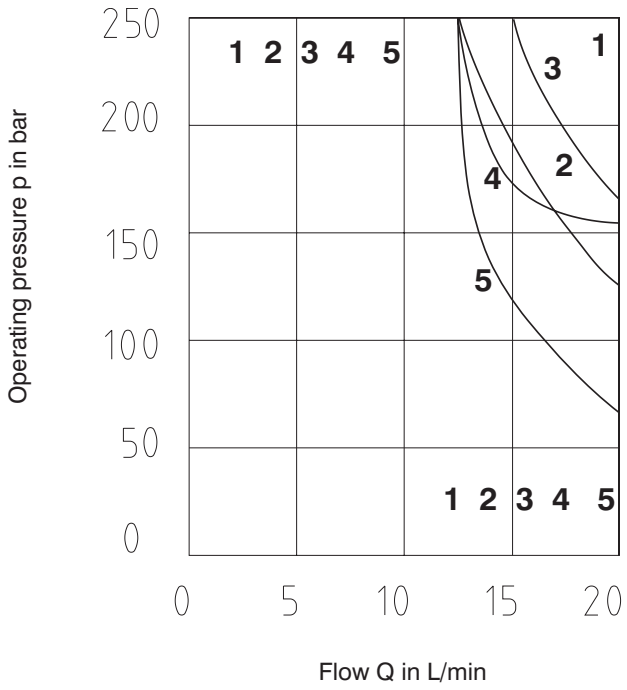
Functional Symbols

Designation	Symbol	Interposition	Designation	Symbol	Interposition
Z11			R21		
C11			Y51		
H11			C51		
Y11			Z51		
R11			H11		

p-Q Characteristic

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

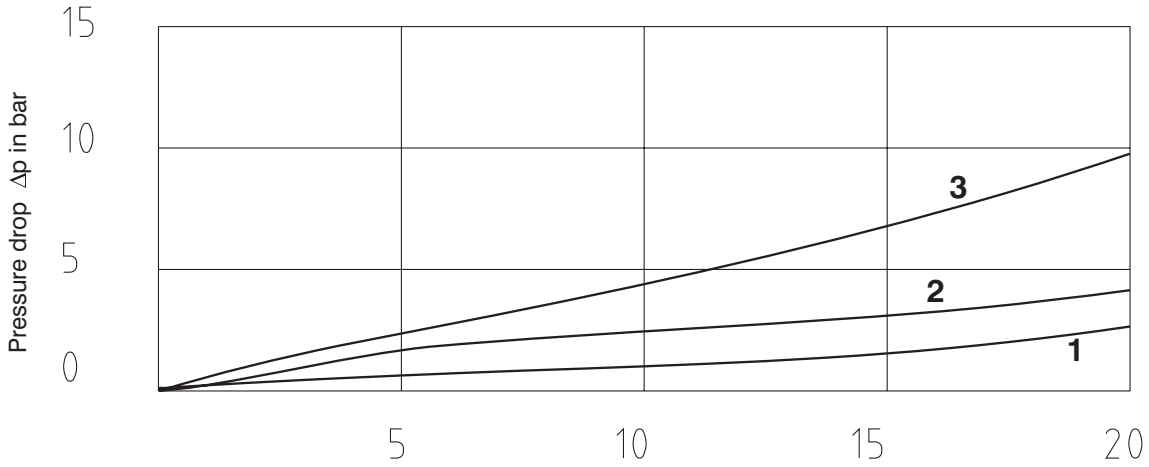
Operating limits for maximum hydraulic power transferred by the directional valve.



Z11	Z51	R11	R21	C11	C51	H11	Y11	Y51
1	1	1	5	2	2	3	4	4

Δp-Q Characteristic

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

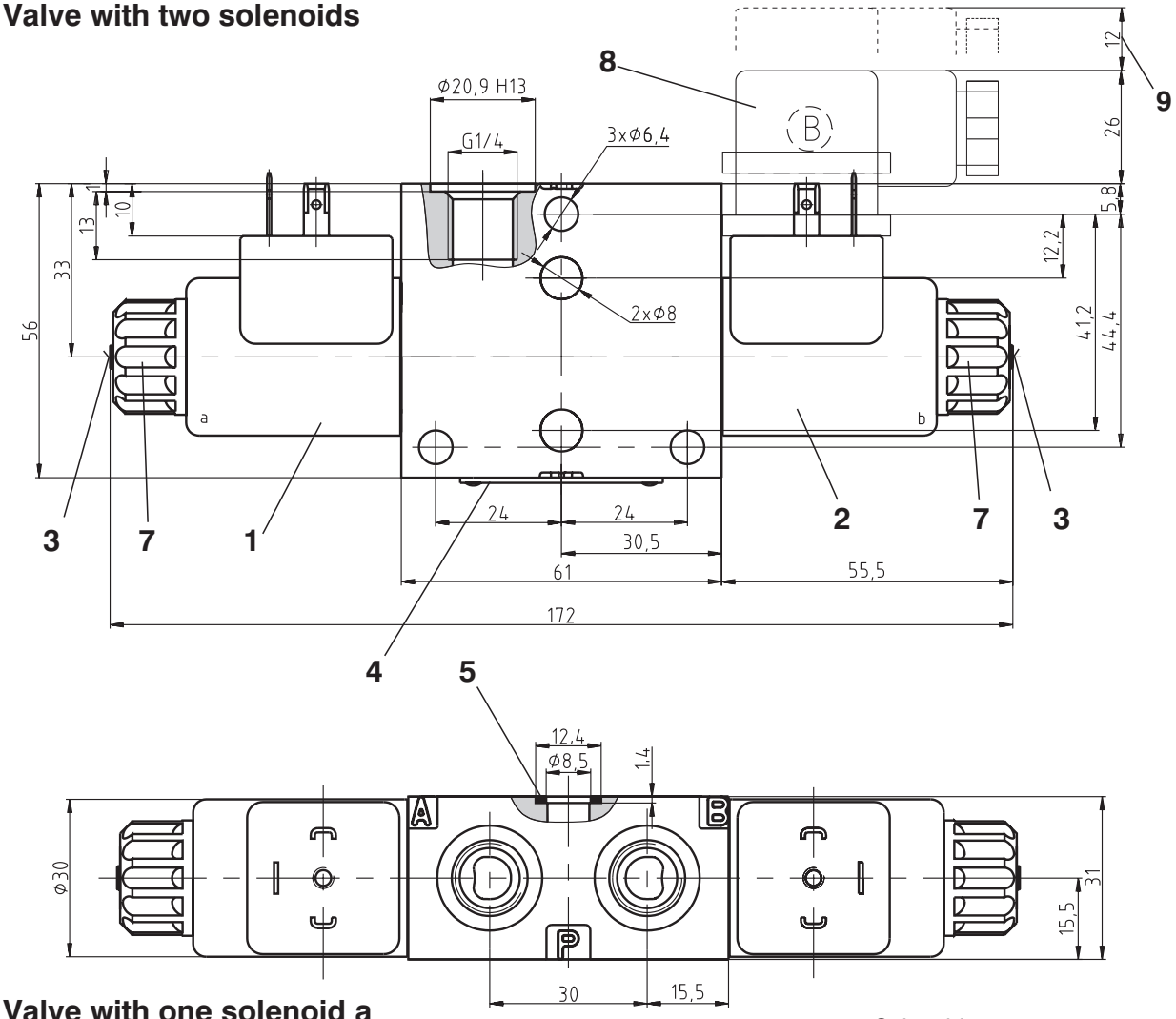


	Z11	C11	H11	Y11	R11	R21	Y51	C51	Z51
P-A	1	3	1	1	2	2		3	
P-B	1	3	1	1	2	2	1		1
A-T	1	3	1	1	2	2	1		1
B-T	1	3	1	1	2	2		3	
P-T		2	2					2	

Valve Dimensions

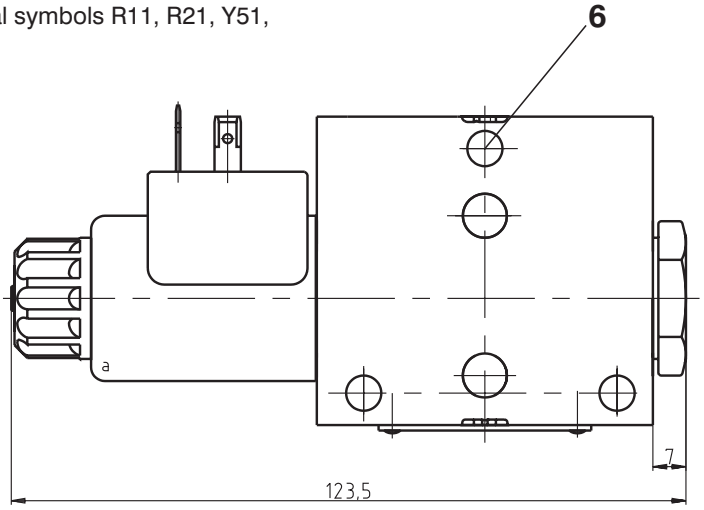
Dimensions in millimeters

Valve with two solenoids

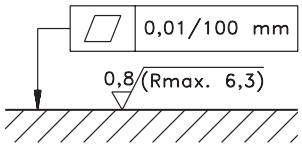


Valve with one solenoid a

Functional symbols R11, R21, Y51, C51, Z51



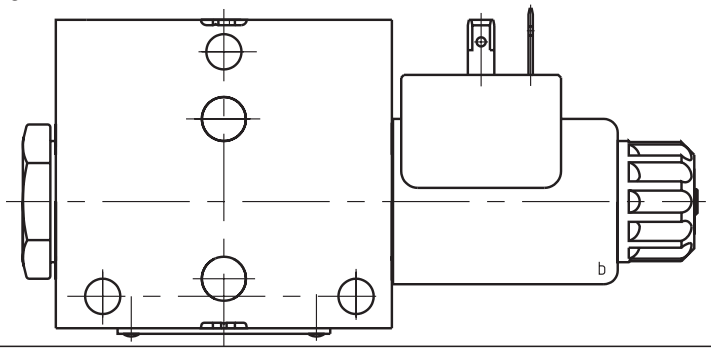
1 Solenoid a
2 Solenoid b
3 Manual override
4 Name plate
5 Square ring 9,25 x 1,68 (2 pcs.) supplied with valve
6 3 mounting holes
7 Retaining nut of the solenoid
8 Electrical connector, DIN 43 650
9 Space required to remove connector



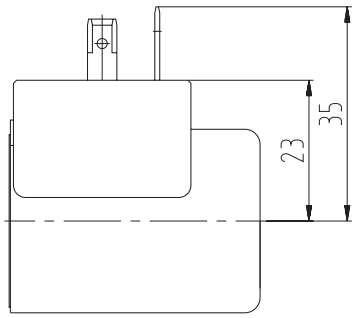
Required surface finish of interface

Valve with one solenoid b

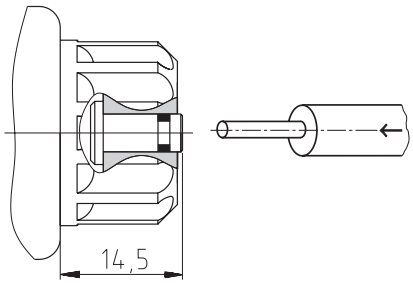
Functional symbols H11



Type of the Solenoid Coil

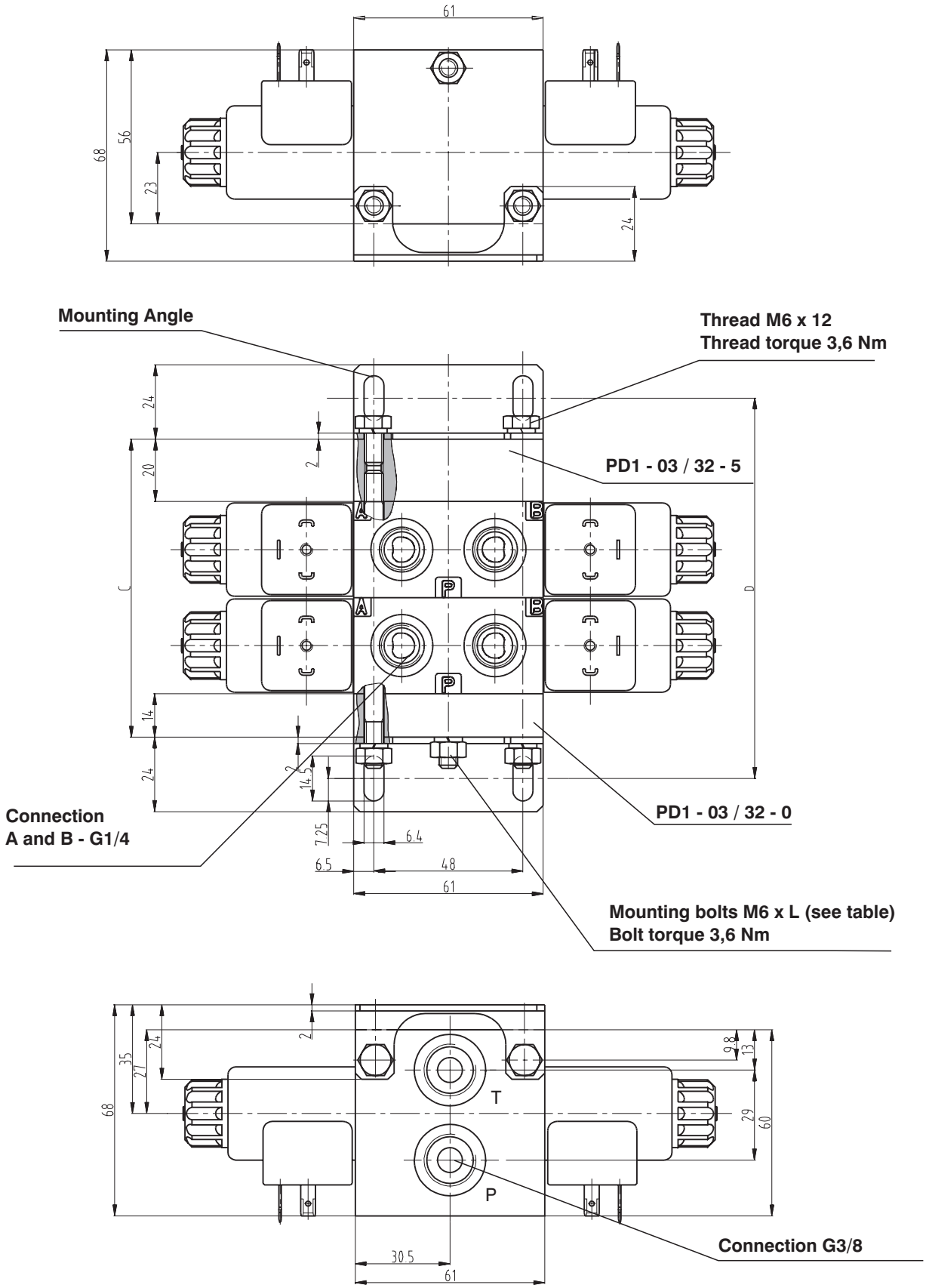
Designation	Dimensional sketch	Description
E1		Solenoid coil with terminal for the electrical connector, DIN 43 650.

Manual Override

STANDARD	
Without designation Dimensional sketch  Description Standard model of the manual override. Standard retaining nut of the solenoid.	

Block Assembly

Dimensions in millimeters

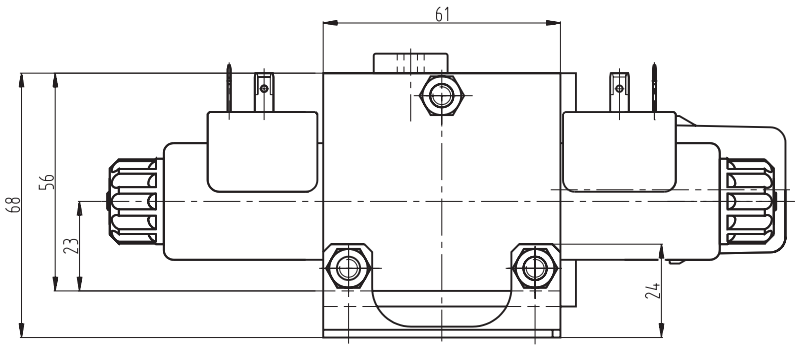


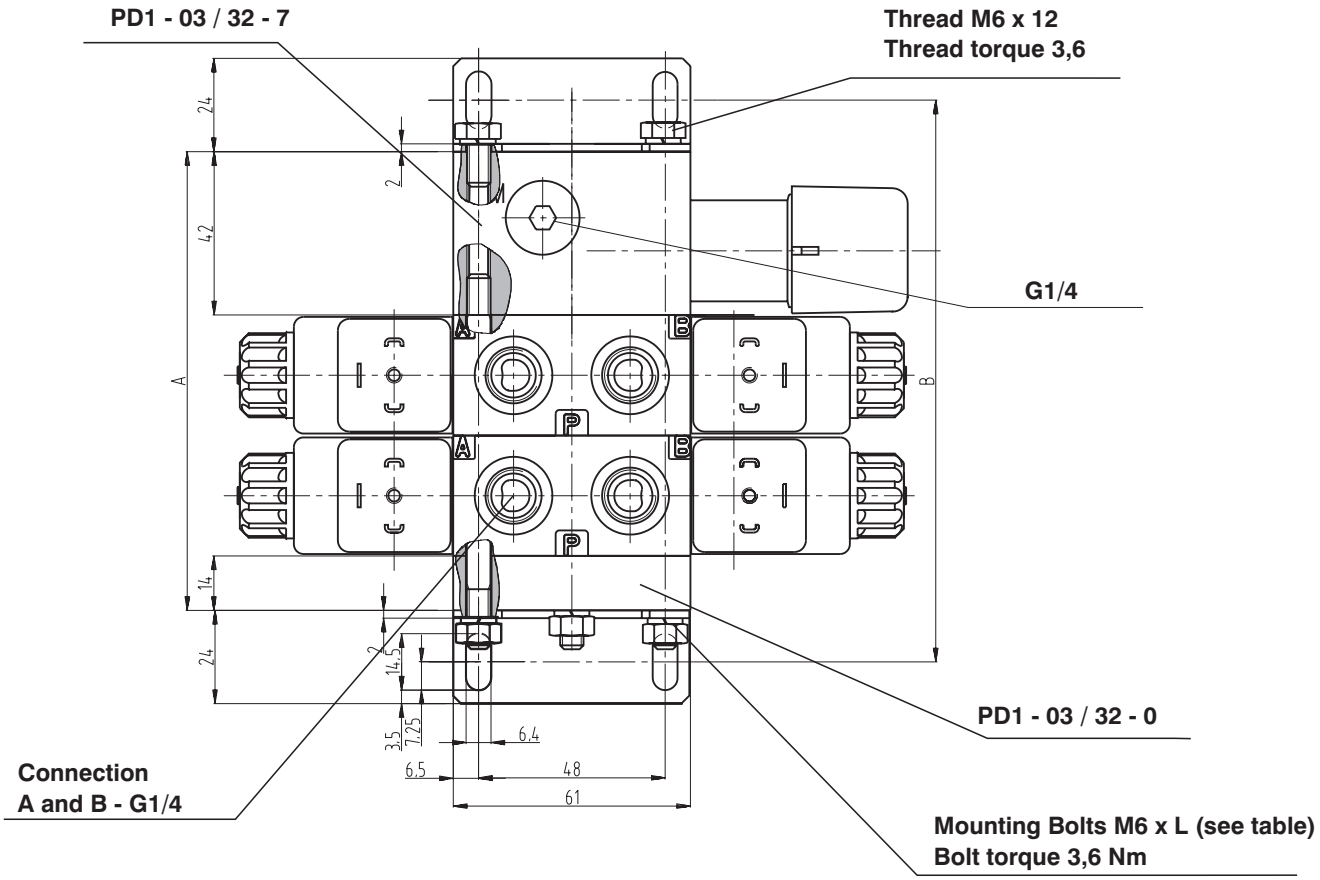
Dimensions

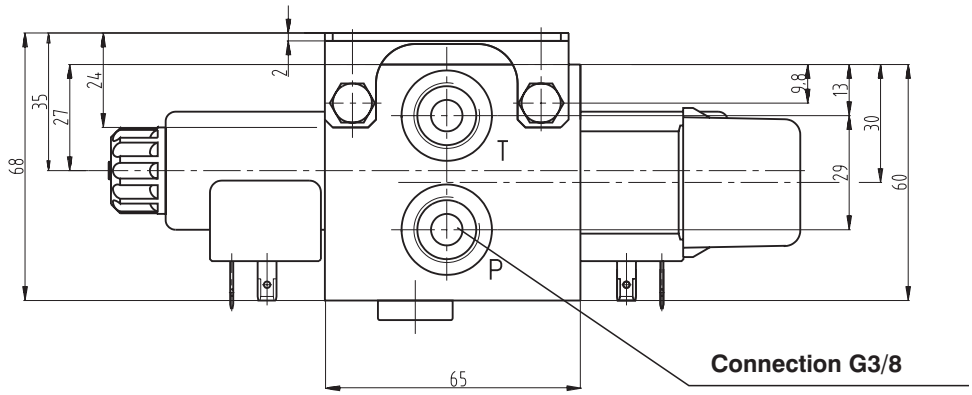
Number of section	1	2	3	4	5	6	7	8
Dimension C [mm]	65	96	127	158	189	220	251	282
Dimension D [mm]	91,5	122,5	153,5	184,5	215,5	264,5	277,5	308,5
Dimension L [mm]	55	100	133	163	194	224	256	287

Block Assembly

Dimensions in millimeters





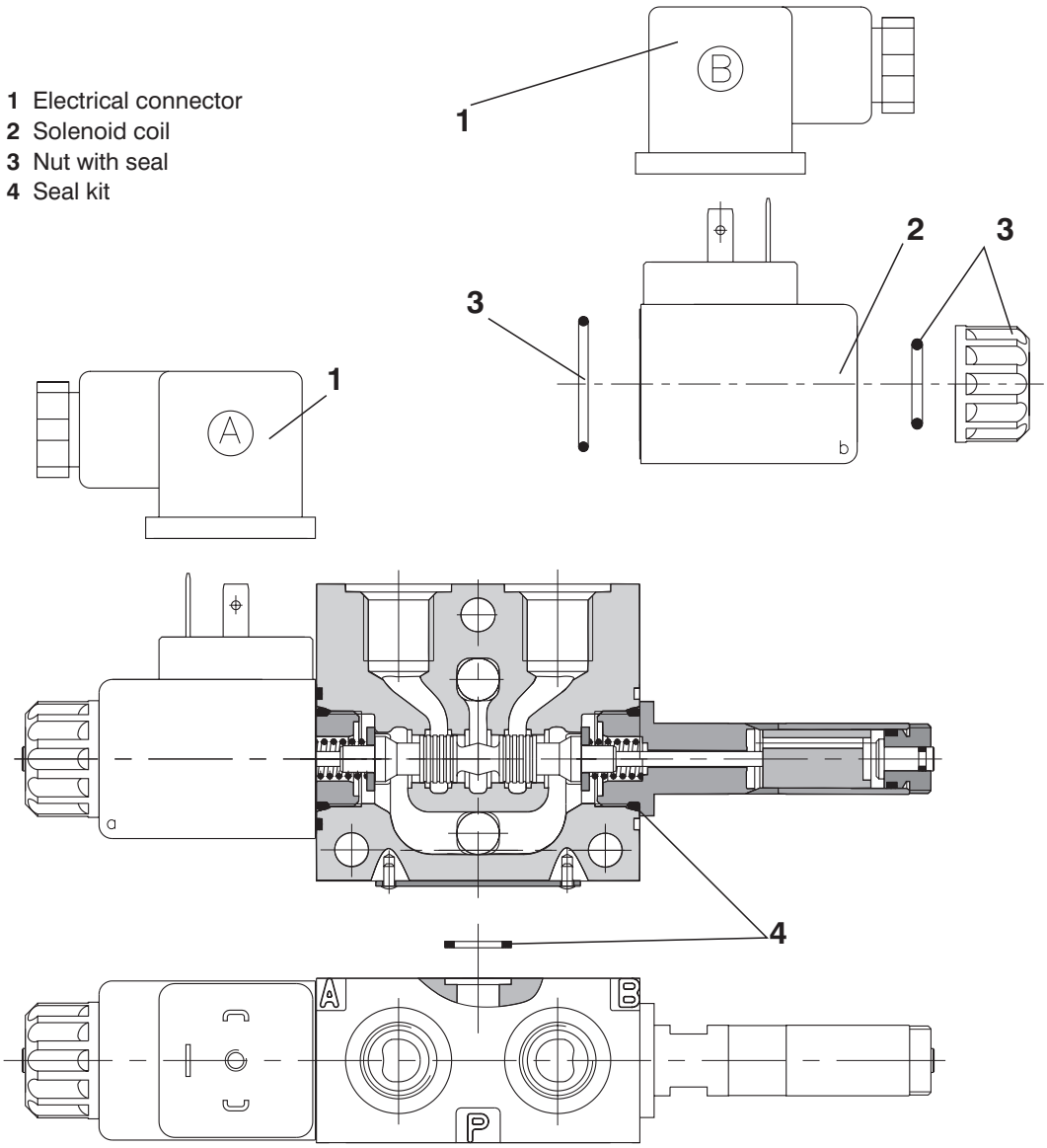


Dimensions

Number of section	1	2	3	4	5	6	7	8
Dimension A [mm]	87	118	149	180	211	242	273	304
Dimension B [mm]	113,5	144,5	175,5	206,5	237,5	268,5	299,5	330,5
Dimension L [mm]	55	100	133	163	194	224	256	287

Spare Parts

1 Electrical connector
2 Solenoid coil
3 Nut with seal
4 Seal kit



Subplates and connecting material

Subplates

Number	Type	Ordering number
Subplate No 5	PD1- 03 / 32 - 5 (G3/8)	479-9105
Subplate No 7	PD1 - 03 / 32 - 7 (G3/8 VPP2-04/S-32S)*	479-9107
Endplate No 0	PD1 - 03 / 32 - 0	479-9102

Connecting material + Mounting Angle

Number of section	3 pcs. Bolt + 3 pcs. Nut + 3 pcs. Washer (thread torque 3,6 Nm)	Ordering number
1	M6 x 55	479-9001
2	M6 x 100	479-9002
3	M6 x 133	479-9003
4	M6 x 163	479-9004
5	M6 x 194	479-9005
6	M6 x 224	479-9006
7	M6 x 256	479-9007
8	M6 x 287	479-9008
	2 pcs. Mounting angle + 2 pcs. Thread (M6 x 12) + 2 pcs. Washer (thread torque 3,6 Nm)	479-9900

Spare parts

Solenoid retaining nut with seal

Type of the nut	Seal ring		Ordering number
Standard nut	13 x 2	21,95 x 1,78	479-9502

Electrical connector, DIN 43 650

Type designation	Model	Max. input voltage	Connector A grey	Connector B black
			Ordering number	
K1	without rectifier - M16x1,5 (bushing bore ∅ 6-8 mm)	230 V AC/DC	936-9902	936-9901
K2	without rectifier with LED and quenching diode -M16x1,5 (bushing bore ∅ 6-8 mm)	12...24 V DC	936-9908	936-9907
K3	with rectifier-M16x1,5 (bushing bore ∅ 6-8 mm)	230 V AC	936-9904	936-9903
K4	with rectifier with LED and quenching diode -M16x1,5 (bushing bore ∅ 6-8 mm)	230 V AC	936-9910	936-9909
K5	without rectifier - M16x1,5 (bushing bore ∅ 4-6 mm)	230 V AC/DC	936-9906	936-9905

Seal kit

Type	Dimensions, number		Ordering number
	Square ring	O-ring	
Standard NBR70	9,25 x 1,68 (2 pcs.)	16 x 1,8 (2 pcs.)	479-9500
Viton	9,25 x 1,78 (2 pcs.)	16 x 2 (2 pcs.)	479-9501

Solenoids

Type	E1	E1	E1
Voltage	01200	02400	20500
Ordering number	941-1005	941-1007	941-1009

* For other pressure steps see ARGO-HYTOS data sheet HA 5093.

Preferred Types of Valves

Type	Ordering number	Type	Ordering number
RPEK1-03G2Z11/01200E1	479-0007	RPEK1-03G3Y11/02400E1	479-0016
RPEK1-03G2R11/01200E1	479-0005	PD1-03/32-5(G3/8)	479-9105
RPEK1-03G3Y11/01200E1	479-0048	PD1-03/32-7(G3/8VPP2-04/S-32S)	479-9107
RPEK1-03G2Z11/20500E1	479-0080	PD1-03/32-0	479-9102
RPEK1-03G2R11/20500E1	479-0081	M6 x 133	479-9003
RPEK1-03G3Y11/20500E1	479-0082	M6 x 194	479-9005
RPEK1-03G2Z11/02400E1	479-0052	M6 x 256	479-9007
RPEK1-03G2R11/02400E1	479-0045	2 pcs. Mounting angle + 2 pcs. Thread (M6 x 12) + 2 pcs. Washer (thread torque 3,6 Nm)	479-9900

Caution!

- For directional valves with two solenoids, one solenoid must be without power before the other solenoid can be powered.
- Other functional symbols on request.
- 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.

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www.argo-hytos.com

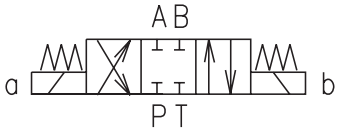
Solenoid - operated directional control valves

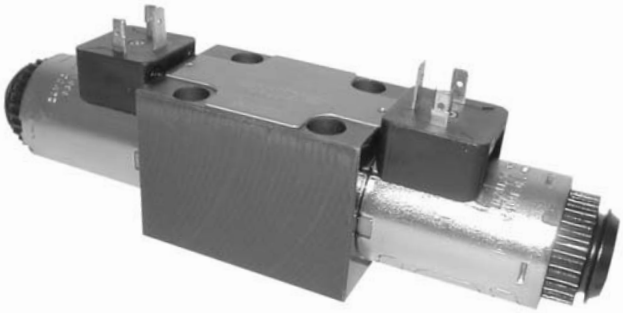
RPES3-06

HA 4036
12/2006

Size 06 • p_{max} up to 250 bar • Q_{max} up to 50 L/min

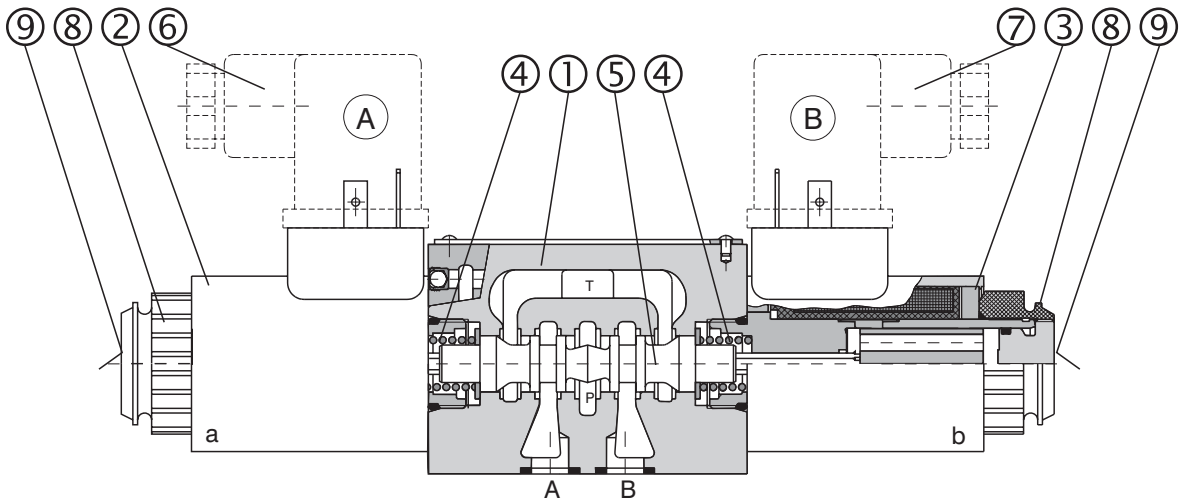
- **4/3-, 4/2- and 3/2- way directional control valves**
- **Cylindrical AC or DC, solenoids with removable coils - Elektrical connector can be rotated in either direction by 90°**
- **Four-land spool - reduced functional dependence on fluid viscosity**
- **Wet pin core tubes**
- **Push button manual override**
- **Installation dimensions to DIN 24 340 / ISO 4401 / CETOP RP121-H**
- **Subplates see data sheet HA 0002**





Functional Description

The RPES3 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 rectifier, which is integrated directly into the connectors A, B (6, 7) or inside the coil. 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.



Ordering Code

RPES3-06 □ □ / □ □ □ □ □

Solenoid operated directional control valves

Nominal size

Number of operating positions

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

Functional symbols
see the table Functional symbols

Rated supply voltage of solenoids
(at the coil terminals)

12 V DC / 2.41 A	**01200**
24 V DC / 1.16 A	**02400**
230 V AC / 0.14 A / 50 (60) Hz	**23050**

The AC coils correspond with E5 type.

Type of solenoid coil

with terminal for the connector, EN 1745301-803-A	E1
with integrated quenching diode and terminal for the connector, EN 1745301-803-A	E2
with AMP-Junior-Timer-connector	E3
with integrated quenching diode and terminal for AMP-Junior-Timer connector	E4
with integrated rectifier and terminal for the connector, EN 1745301-803-A	E5

Orifice in P port

no designation	without orifice
D1	∅1.0 mm
D2	∅1.5 mm
D3	∅2.0 mm
D4	∅2.2 mm
D5	∅2.5 mm

Manual overide

no designation	standard
N2	covered with rubber boot

Seals

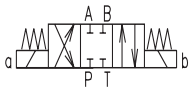
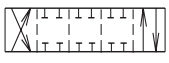
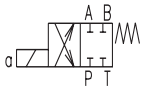
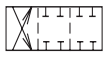
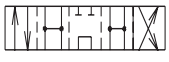
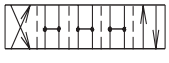
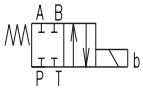
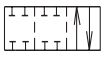
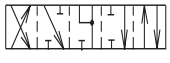
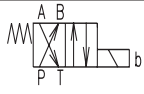
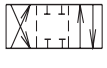
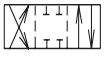
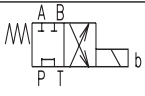
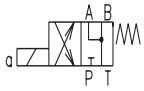
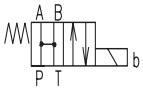
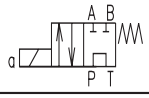
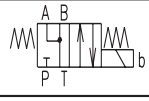
no designation	NBR
V	FPM (Viton)

Note: Connector of the position sensor **is not supplied**
(see ordering number on page 8)

Technical Data

Nominal size	mm	06	
Maximum flow	L/min	see p-Q characteristics	
Max. operating pressure at porte P, A, B	bar	250	
Max. operating pressure at port T	bar	210	
Pressure drop	bar	see Δp-Q characteristics	
Hydraulic fluid		Hydraulic oils of power classes (HL, HLP) to DIN 51524	
Fluid temperature range for NBR seals	°C	-30 ... +80	
Fluid temperature range for FPM seals	°C	-20 ... +80	
Ambient temperature, max.	°C	up to +50	
Viscosity range	mm^2/s	20 ... 400	
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999)	
Max. allowable voltage variation	%	DC: ±10	AC: ±10
Max. switching frequency	1/h	15 000	
Switching time, on: at ν=32 mm^2/s	ms	DC: 30 ... 50	AC: 30 ... 40
Switching time, off: at ν=32 mm^2/s	ms	DC: 10 ... 50	AC: 30 ... 70
Duty cycle	%	100	
Service life	cycles	10^7	
Enclosure type to EN 60529		IP 65	
Weigt - valve with 1 solenoid - valve with 2 solenoids	kg	1.4 1.6	
Mounting position		optional	

Functional Symbols

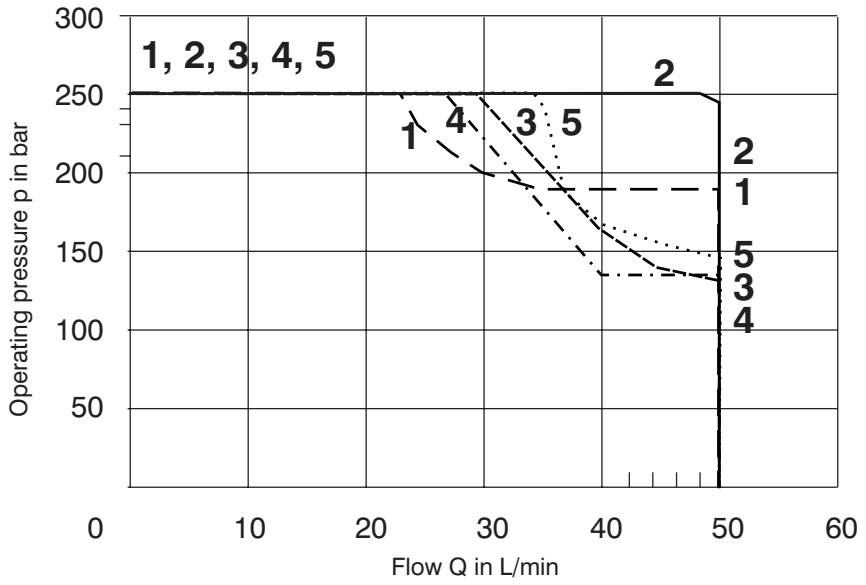
Designation	Symbol	Interposition	Designation	Symbol	Interposition
Z11			Z51		
C11			H51		
H11			Z11		
Y11			X11		
R11			C11		
Y51			H11		
C51			Y11		

p-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

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

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

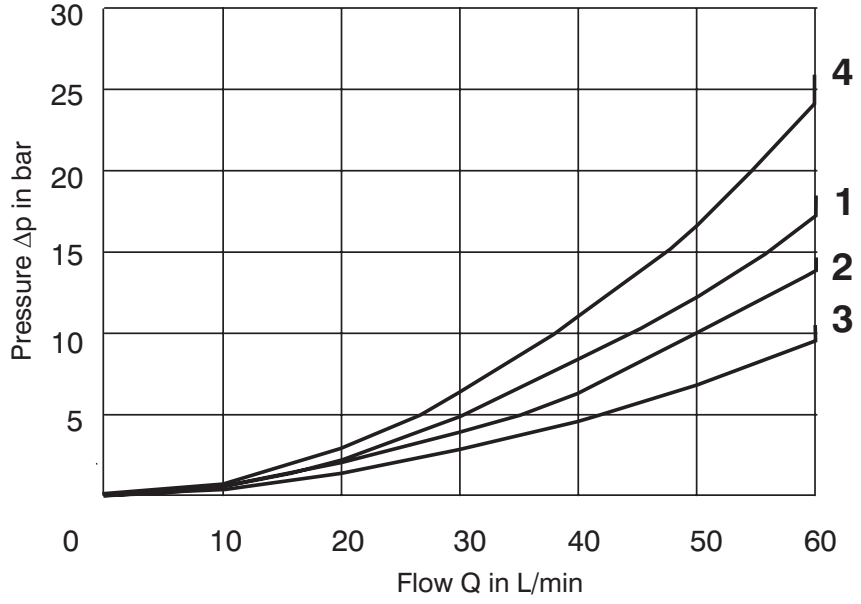


Δp-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

Pressure drop Δp related to flow rate.

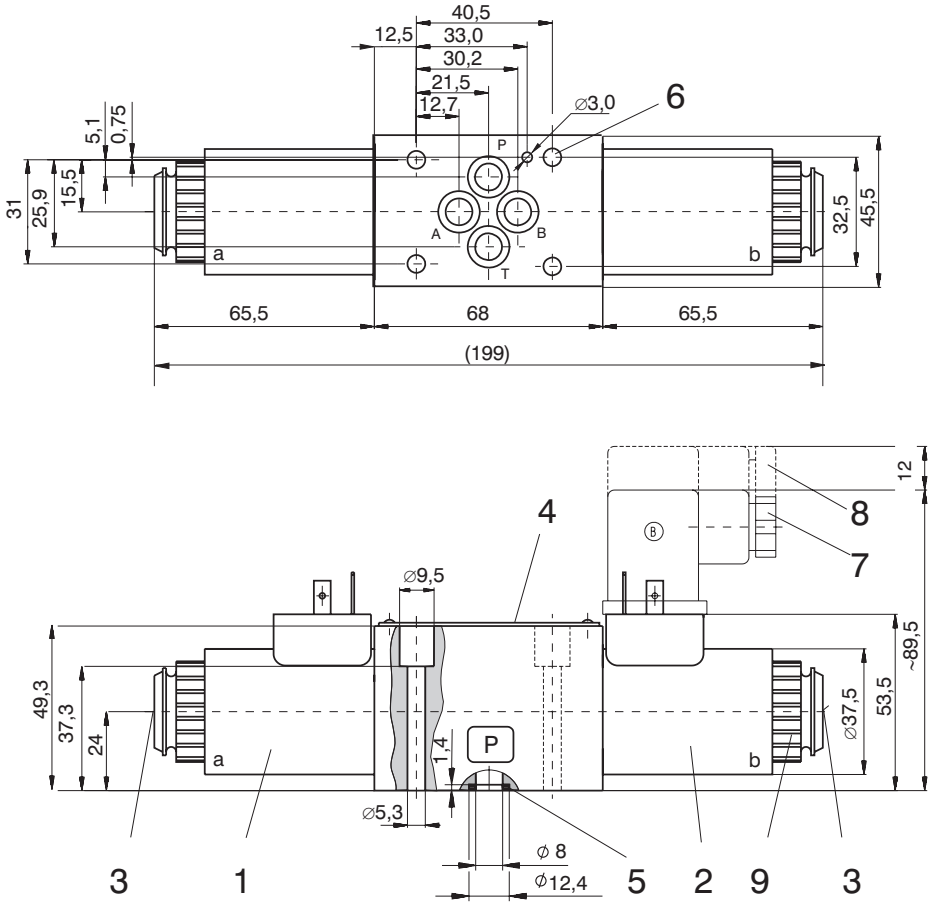
	P-A	P-B	A-T	B-T	P-T
Z11	1	-	1	1	-
C11	2	2	2	2	2
H11	3	3	3	3	2
Y11	2	2	3	3	
R11	3	4	4	2	
X11	3	4	4	2	
Z51		2	2		
C51	2			2	3
H51		1	1		
Y51		2	2		



Valve Dimensions

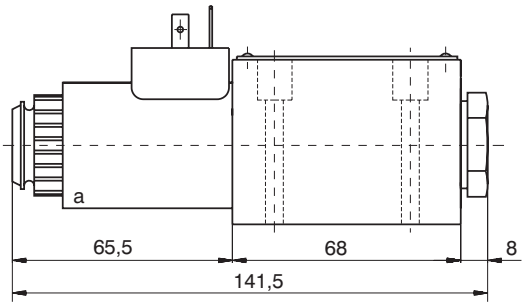
Dimensions in millimetres

Valve with two solenoids



Valve with one solenoid "a"

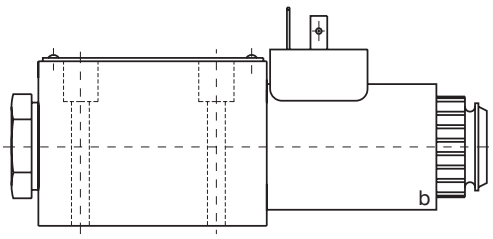
Spool symbols R11, Z51, C51, H51, Y51

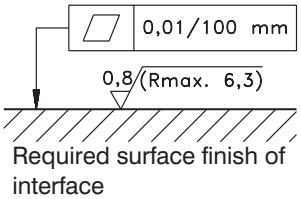


1 Solenoid a
2 Solenoid b
3 Manual override
4 Name plate
5 Square ring (4 pcs.)
9.25 x 1.68 supplied with valve
6 4 mounting holes
7 Electrical connector, EN 1745301-803-A
8 Space required to remove connector
9 Retaining nut of the solenoid

Valve with one solenoid "b"

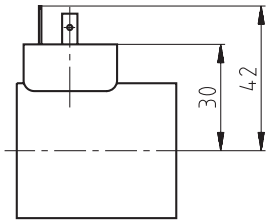
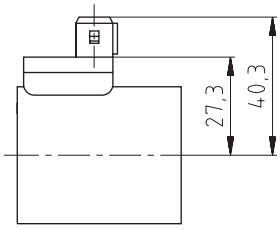
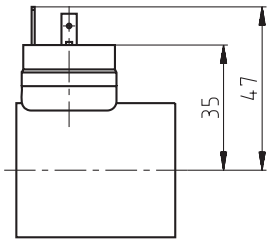
Spool symbols Z11, X11, C11, H11, Y11





Required surface finish of interface

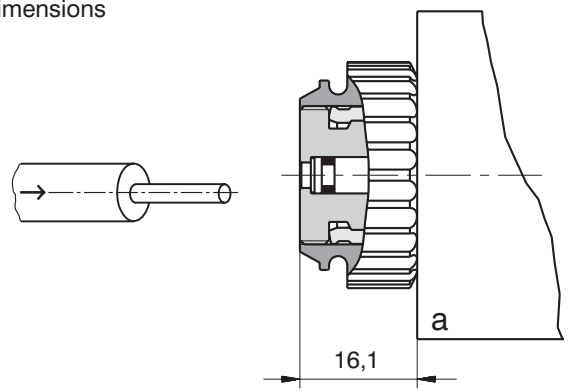
Type of the Solenoid Coil

Designation	Dimensional sketch	Description
E1		Solenoid coil with terminal for the electrical connector, EN 1745301-803-A.
E2		Solenoid coil with integrated quenching diode (bipolar transil diode) and terminal for the electrical connector, EN 1745301-803-A.
E3		Solenoid coil with terminal for AMP-Junior-Timer electrical connector.
E4		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-A.

Manual Override

STANDARD

Dimensions

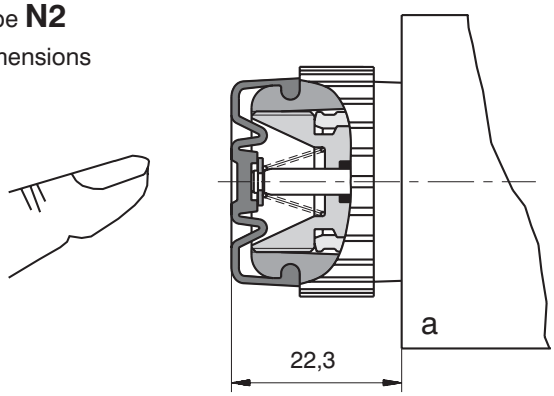


Standard model of the manual override.
Standard retaining nut of the solenoid.

RUBBER BOOT

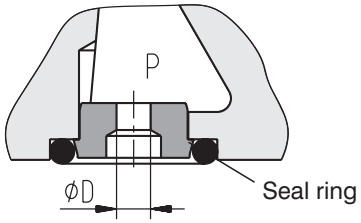
Type **N2**

Dimensions



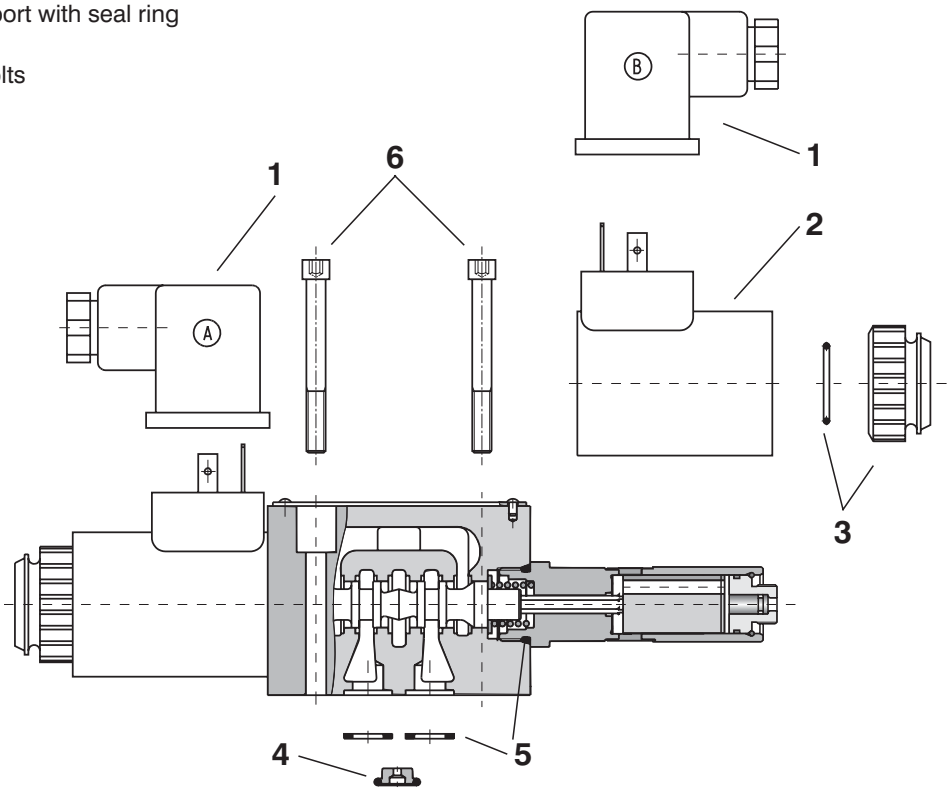
Manual override protected by rubber boot.

Orifice in P-Port

Type	∅D (mm)	Dimensions	Description
D1	1.0		P-Port orifices limit the flow into the directional control valve.
D2	1.5		
D3	2.0		
D4	2.2		
D5	2.5		

Spare Parts

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



Solenoid coil

Solenoid type	Coil type				
	E1	E2	E3	E4	E5
	Ordering number				
01200	936-0022	936-0690	936-0670	936-0680	
02400	936-0026	936-0693	936-0672	936-0683	
23050					936-2185

Solenoid retaining nut with seal

Type of the nut	Seal ring	Ordering number
Standard nut	18 x 1.5	486-9010
Nut with rubber boot		486-9013

Orifice in P port

Type	∅D (mm)	Seal ring	Ordering number
D1	1.0	9.25 x 1.75	484-9973
D2	1.5		484-9974
D3	2.0		484-9975
D4	2.2		484-9977
D5	2.5		484-9976

Seal kit

Type	Dimensions, number		Ordering number
Standard - NBR70	9.25 x 1.68 (4 pcs.)	17 x 1.8 (2 pcs.)	484-9961
Viton	9.25 x 1.78 (4 pcs.)	17.17 x 1.78 (2 pcs.)	484-9971

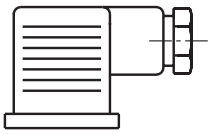
Mounting bolts

Dimensions, number	Tightening torque	Ordering number
M5 x 45 DIN 912-10.9 (4 pcs.)	8.9 Nm	484-9958

Electrical connector, EN 1745301-803

Type designation	Connector A grey	Connector B black
	Ordering number	
K1	936-9902	936-9901
K5	936-9906	936-9905
K2	936-9908	936-9907
K3	936-9904	936-9903
K4	936-9910	936-9909

Electrical Connector, EN 1745301-803

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

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

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

Caution!

- For applications outside the given parameters, please consult us.
- For directional control valves with two solenoids, one solenoids must be without power before the other solenoid can be powered charged. Switching time for directional valves with detent assembly (impulse control) should not be shorter than 60 ms. With directional valves with cushioned spool shifting, the switching time must correspond with the shifting time.
- Other for 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.

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www.argo-hytos.com

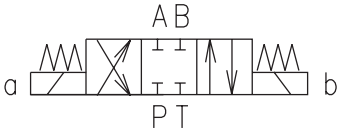
Solenoid - operated directional control valves

RPE3-04

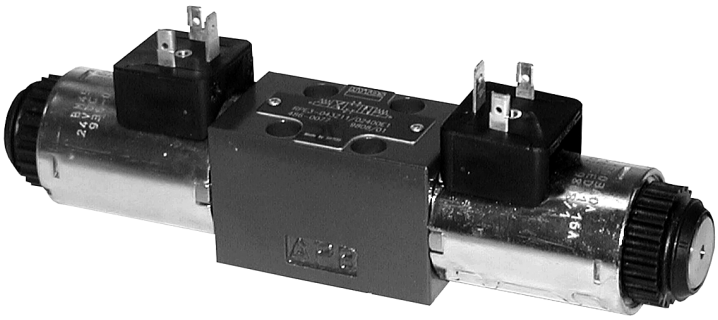
Size 04 • p_{max} up to 320 bar • Q_{max} up to 30 L/min

HA 4014
2/2005

Replaces
HA 4014 1/2003

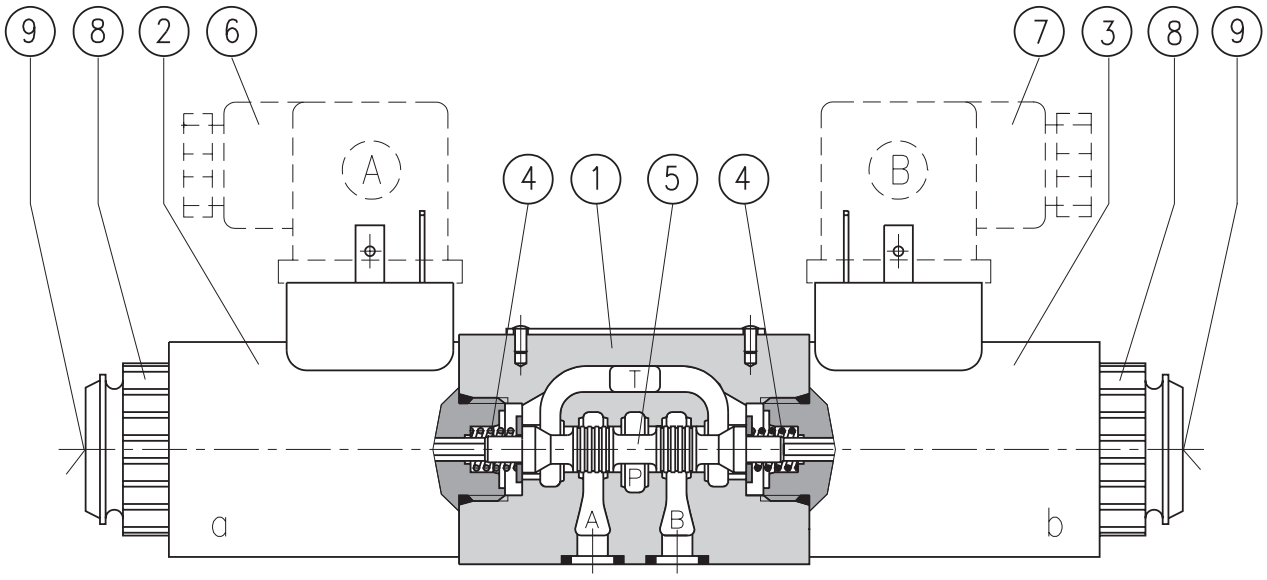


- **4/3-, 4/2- and 3/2-way directional control valves with solenoid control**
- **Solenoids can be turned around their axis to any position**
- **Push button manual override**
- **Installation dimensions acording to ISO 4401 CETOP - RP 121H**
- **Subplates see data sheet HA 0002**
- **CSA Upon request**



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 rectifiers, which are integrated directly into the connectors A, B (6, 7) or inside the coil. 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 363 PSI (25 bar).
The basic surface treatment of the valve housing (1) is phosphate coated and the solenoids (2, 3) are zinc coated.



Ordering Code

RPE3-04 ☐☐/☐☐☐☐☐☐☐

Solenoid operated directional control valve

Nominal size

Number of valve positions

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

Functional symbols
see the table functional symbols

Rated supply voltage of solenoids
(at the coil terminals)

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
115V AC / 0.26 A / 50 (60) Hz	11550
230 V AC / 0.14 A / 50 (60) Hz	**23050**

The AC coils correspond with E5 type.

CSA Upon request

***Electrical connector, DIN 43 650**

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

Type of solenoid coil

E1	with DIN connector
E2	with DIN connector and quenching diode
E3	with AMP connector
E4	with AMP connector and quenching diode
E5	with integrated rectifier and DIN connector
E6	with Kostal connector
E7	with Kostal connector and quenching diode

Manual override

no designation	standard
N2	covered with rubber protective boot

Orifice in P-Port

no designation	without orifice
D1	∅0.8 mm
D2	∅1.0 mm
D3	∅1.2 mm
D4	∅1.5 mm
D5	∅0.7 mm

Seals

no designation	NBR
V	FPM (Viton)

*other information on pages 6 and 8

FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE, FUNCTIONAL SYMBOLS AND TABLE OF PREFERRED TYPES ON PAGE 9

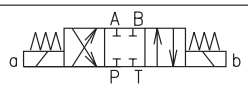
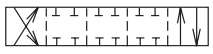
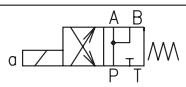
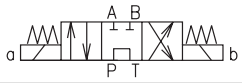
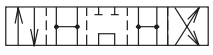
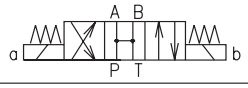
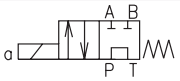
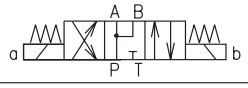
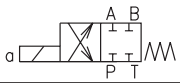
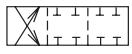
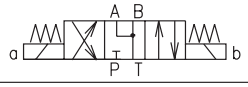
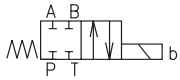
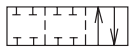
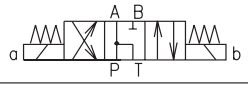
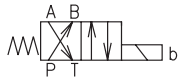
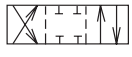
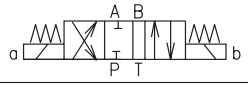
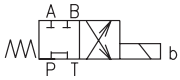
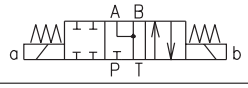
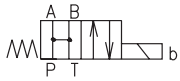
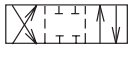
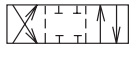
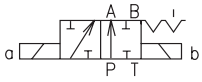
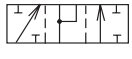
Recommended solenoid coils used with elektrical connector with rectifiers - type designation K3, K4

Rated supply source voltage (permissible rated voltage variation ±10 %)	Type designation of the solenoid voltage
24 V AC / 1.44 A / 50 (60) Hz	02100
115 V AC / 0.26 A / 50 (60) Hz	10200
230 V AC / 0.14 A / 50 (60) Hz	20500

Technical Data

Nominal size	mm	04	
Maximum flow	L/min	see p-Q characteristics	
Maximum operating pressure at ports P, A, B	bar	320	
Maximum operating pressure at port T	bar	100	
Pressure drop	bar	see Δp-Q characteristics	
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 and 68.	
Fluid temperature range (NBR / Viton)	°C	-30 ... +80	-20 ... +80
Ambient temperature, max.	°C	up to +50	
Viscosity range	mm^2/s	20 ... 400	
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).	
Maximum allowable voltage variation	%	AC: ±10	DC: ±10
Maximum switching frequency	1/h	15 000	
Switching time, ON; at ν = 32 mm^2/s	ms	30 ... 50	
Switching time, OFF; at ν = 32 mm^2/s	ms	AC: 70 ... 100	DC: 30 ... 50
Duty cycle	%	100	
Service life	cycles	10^7	
Enclosure type to DIN 40 050		IP 65	
Weight - valve with 1 solenoid - valve with 2 solenoid	kg	0.9 1.25	
Mounting position		optional	

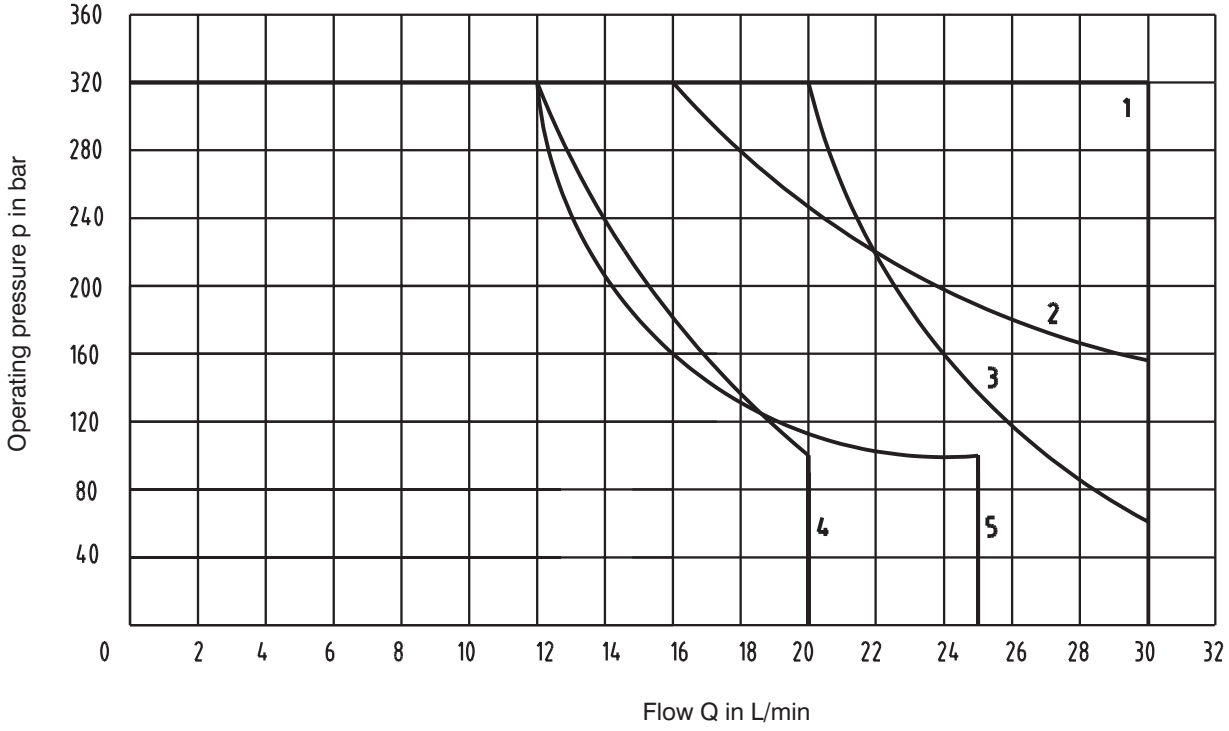
Functional Symbols

Designation	Symbol	Interposition	Designation	Symbol	Interposition
Z11			P51		
C11			**Y51**		
H11			C51		
P11			Z51		
Y11			**Z11**		
L21			X11		
B11			C11		
Y71			H11		
R11			**J15**		
R21			J75		
A51					

p-Q Characteristic

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

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

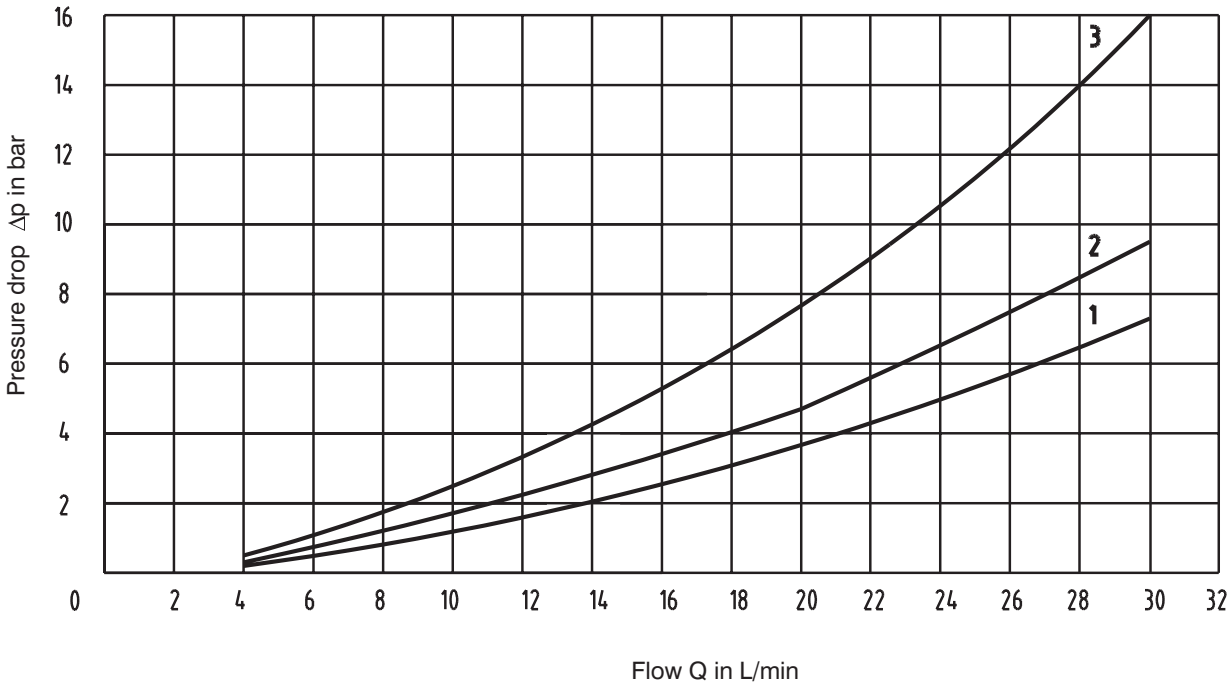


Z11	C11	H11	P11	Y11	L21	B11	Y71	R11	R21	A51	P51	Y51	C51	Z51	X11	J15	J75
1	2	1	1	1	4	1	5	1	3	4	1	1	2	1	1	1	4

Δp-Q Characteristic

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

Pressure drop Δp ralated to flow rate.

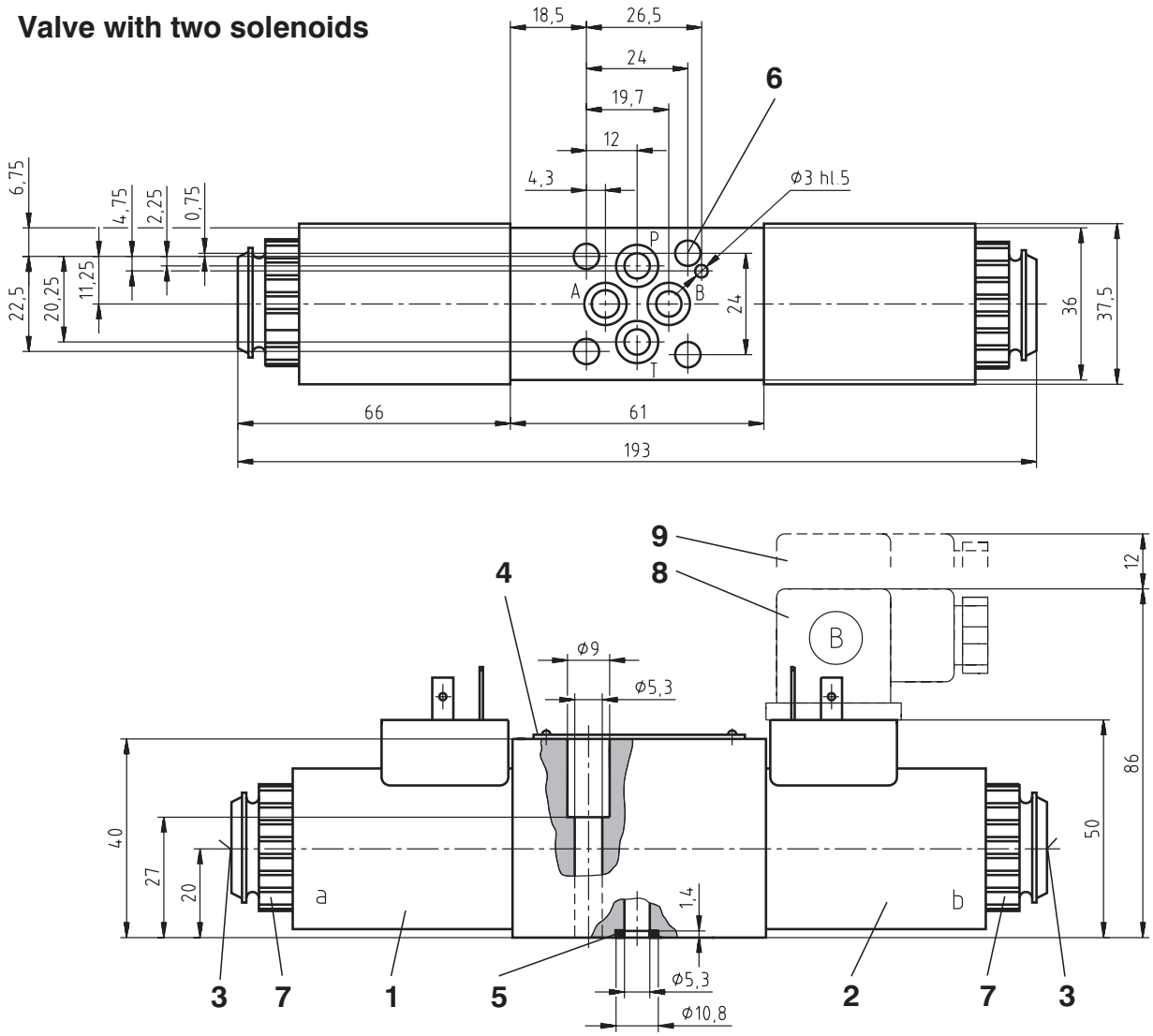


	Z11	C11	H11	P11	Y11	L21	B11	Y71	R11	R21	A51	P51	Y51	C51	Z51	X11	J15	J75
P-A	1	3	1	1	1	1	1	2	2	2	1			3		2	2	1
P-B	1	3	1	1	1	1	1		2	2	1	1	1		1	2	2	1
A-T	1	3	1	1	1	1	1	2	2	2		1	1		1	2	2	
B-T	1	3	1	1	1	1	1	1	2	2				3		2	2	
P-T		2	2											2				

Valve Dimensions

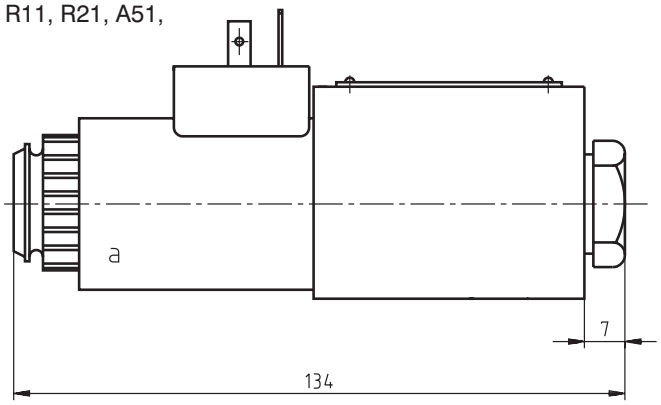
Dimensions in millimeters

Valve with two solenoids

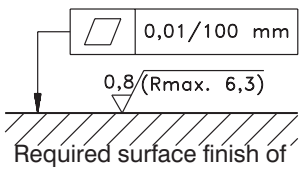


Valve with one solenoid a

Functional symbols R11, R21, A51, P51, Y51, C51, Z51



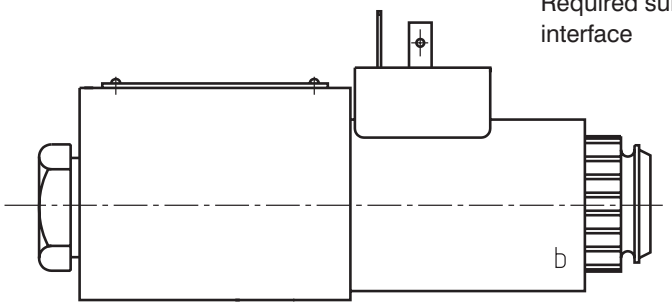
1 Solenoid a
2 Solenoid b
3 Manual override
4 Name plate
5 Square ring 7.65 x 1.68 (4 pcs.) supplied with valve
6 4 mounting holes
7 Retaining nut of the solenoid
8 Electrical connector, DIN 43 650
9 Space required to remove connector



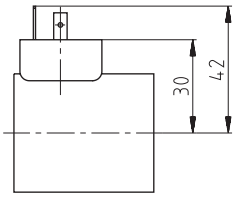
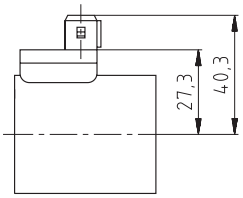
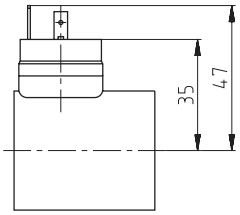
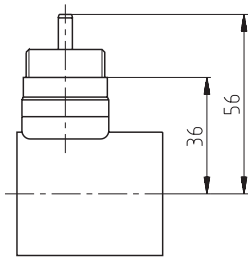
Required surface finish of interface

Valve with one solenoid b

Functional symbols Z11, X11, C11, H11

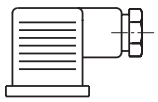


Type of the Solenoid Coil

Designation	Dimensional sketch	Description
E1		Solenoid coil with terminal for the electrical connector, DIN 43 650.
E2		Solenoid coil with integrated quenching diode (bipolar transil diode) and terminal for the electrical connector, DIN 43 650.
E3		Solenoid coil with terminal for AMP electrical connector.
E4		Solenoid coil with integrated quenching diode (bipolar transil diode) and terminal for AMP electrical connector.
E5		Solenoid coil with integrated rectifier and terminal for the electrical connector, DIN 43 650.
E6		Solenoid coil with terminal for Kostal electrical connector.
E7		Solenoid coil with integrated quenching diode (bipolar transil diode) and terminal for Kostal electrical connector.

Electrical Connector, DIN 43 650

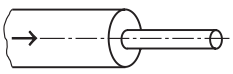
Designation	Type	Model	Max. input voltage
K1	Connector B (black)	without rectifier - M16x1.5 (bushing bore ∅ 6-8 mm)	230 V DC
	Connector A (grey)		230 V AC
K5	Connector B (black)	without rectifier - M16x1.5 (bushing bore ∅ 4-6 mm)	230 V DC
	Connector A (grey)		230 V AC
K2	Connector B (black)	without rectifier with LED and quenching diode - M16x1.5 (bushing bore ∅ 6-8 mm)	12...24 V DC
	Connector A (grey)		
K3	Connector B (black)	with rectifier - M16x1.5 (bushing bore ∅ 6-8 mm)	230 V AC
	Connector A (grey)		
K4	Connector B (black)	with rectifier with LED and quenching diode - M16x1.5 (bushing bore ∅ 6-8 mm)	230 V AC
	Connector A (grey)		

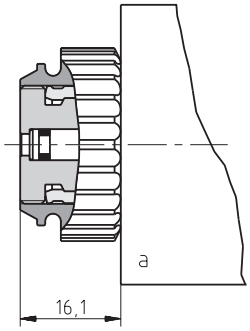


Manual Override

STANDARD

Without designation
Dimensional sketch

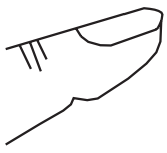


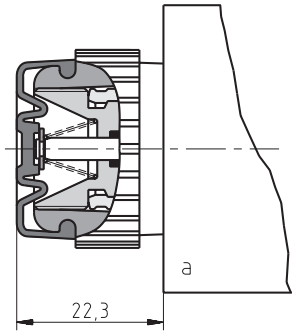


Description
Standard model of the manual override.
Standard retaining nut of the solenoid.

RUBBER BOOT

Designation **N2**
Dimensional sketch

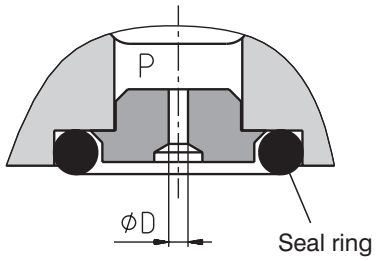




Description
Manual override protected by rubber boot.

Orifice in P-Port

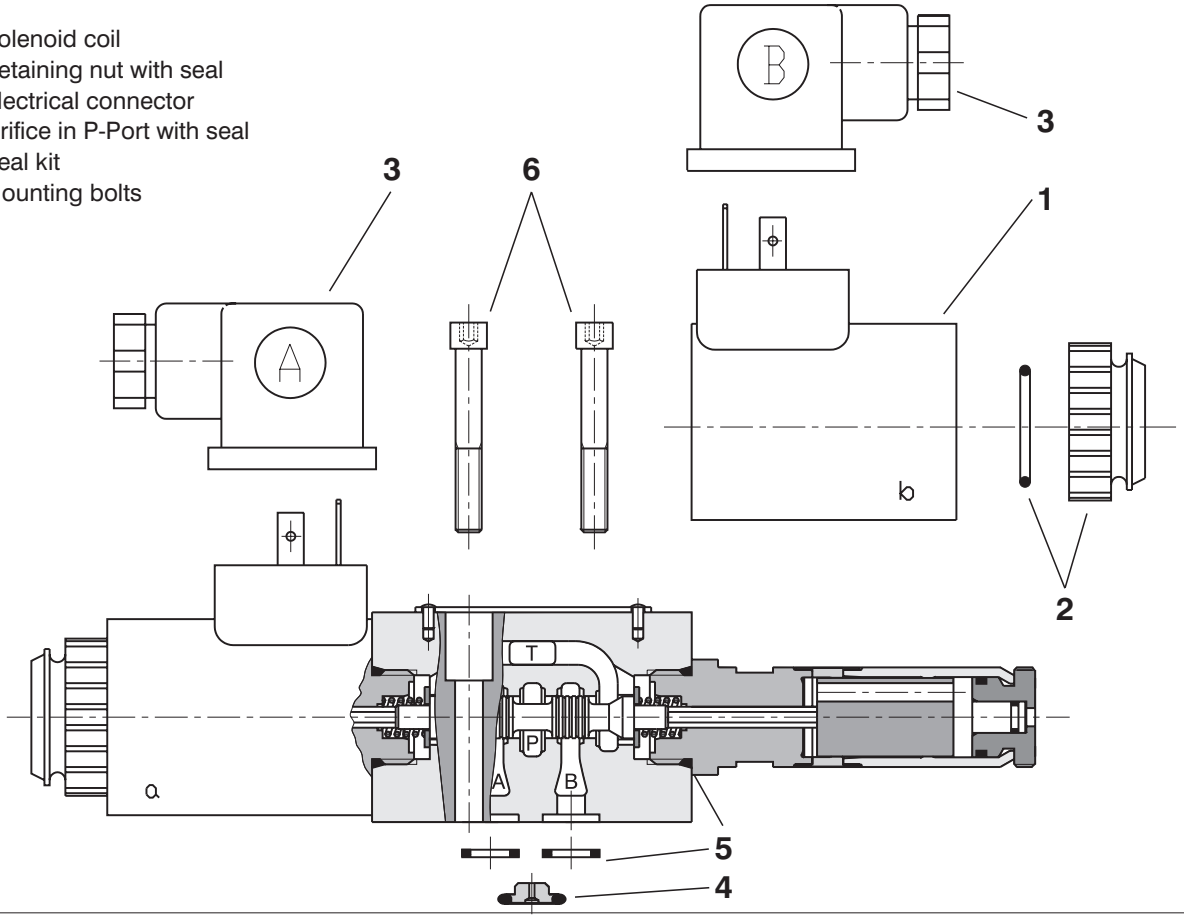
Type	∅D (mm)
D1	0.8
D2	1.0
D3	1.2
D4	1.5
D5	0.7



P-Port orifices limits the flow into the directional control valve.

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 of the coil voltage	Type of the coil						
	E1	E2	E3	E4	E5	E6	E7
	Ordering number						
01200	936-0022	936-0690	936-0670	936-0680		936-4880	936-4882
*01200	493-0001						
01400	936-0650	936-0691	936-0673	936-0681		-	-
02100	936-0651	936-0692	936-0674	936-0682		-	-
02400	936-0026	936-0693	936-0672	936-0683		936-4881	936-4883
*02400	493-0002						
04200	936-0653	936-0695	936-0676	936-0685		-	-
04800	936-0031	936-0696	936-0677	936-0686		-	-
06000	936-0654	-	-	-		-	-
10200	936-0655	-	-	-		-	-
20500	936-0036	-	-	-		-	-
02450					936-2125		
11550					936-2175		
*11550					493-0003		
23050					936-2185		
*23050					493-0004		

* CSA Upon request

Solenoid retaining nut with seal

Type of the nut	Seal ring	Ordering number
Standard nut	18 x 1.5	486-9010
Nut with rubber boot		486-9013

Electrical connector, DIN 43 650

Type designation	Connector A grey	Connector B black
	Ordering number	
K1	936-9902	936-9901
K5	936-9906	936-9905
K2	936-9908	936-9907
K3	936-9904	936-9903
K4	936-9910	936-9909

Orifice in P-Port

Type designation	∅D (mm)	Seal ring	Ordering number
D1	0.8	7.65 x 1.78	486-9005
D2	1.0		486-9006
D3	1.2		486-9007
D4	1.5		486-9008
D5	0.7		486-9014

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.)	486-9002
Viton	7.65 x 1.78 (4 pcs.)	16 x 2 (2 pcs.)	486-9009

Mounting bolts

Dimensions, number	Tightening torque	Ordering number
M5 x 35 DIN 912-10.9 (4 pcs.)	5 Nm	486-9011

Preferred Types of Valves

Type	Ordering Number	Type	Ordering Number
RPE3-042Z11/01200E1	486-0017	RPE3-042R11/02400E1	486-0091
RPE3-043Z11/01200E1	486-0001	RPE3-042R21/02400E1	486-0092
RPE3-043C11/01200E1	486-0002	RPE3-042A51/02400E1	486-0090
RPE3-043H11/01200E1	486-0003	RPE3-042Y51/02400E1	486-0088
RPE3-043Y11/01200E1	486-0005	RPE3-042J15/02400E1	486-0100
RPE3-042R11/01200E1	486-0015	RPE3-042Z11/23050E5	486-0230
RPE3-042R21/01200E1	486-0016	RPE3-043Z11/23050E5	486-0258
RPE3-042A51/01200E1	486-0014	RPE3-043C11/23050E5	486-0262
RPE3-042Y51/01200E1	486-0012	RPE3-043H11/23050E5	486-0257
RPE3-042J15/01200E1	486-0024	RPE3-043Y11/23050E5	486-0260
RPE3-042Z11/02400E1	486-0093	RPE3-042R11/23050E5	486-0259
RPE3-043Z11/02400E1	486-0077	RPE3-042R21/23050E5	486-0622
RPE3-043C11/02400E1	486-0078	RPE3-042A51/23050E5	486-0261
RPE3-043H11/02400E1	486-0079	RPE3-042Y51/23050E5	486-0781
RPE3-043Y11/02400E1	486-0081	RPE3-042J15/23050E5	486-0782

Caution!

- With functional symbols A51 and J75 for pressures exceeding 100 bar, the T-port should de connected directly to the tank.
- For directional valves with two solenoids, one solenoid must be without power before the other solenoid can be powered. Switching time for directional valves with detent assembly (impulse control) should not be shorter than 60 ms.
- Other functional symbols on request.
- The packing foil is recyclable.
- The protecting plate can be returned to the manufacturer.
- Mounting bolts M5 x 35 DIN 912-10.9 or studs must be ordered separately.
- Tightening torque of the bolts is 5 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.

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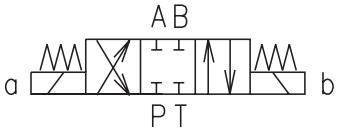
Solenoid - operated directional control valves

RPE3-06

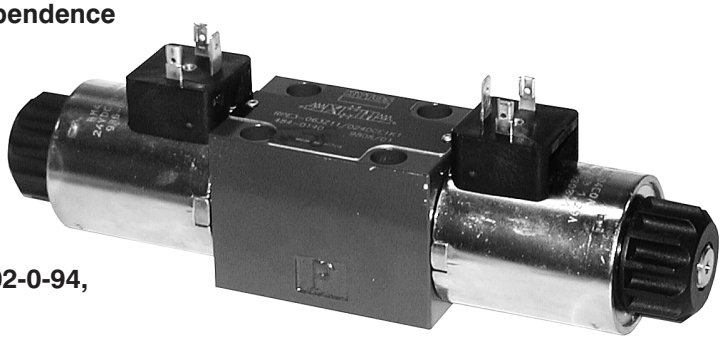
Size 06 • p_{max} up to 320 bar • Q_{max} up to 80 L/min

HA 4010
11/2005

Replaces
HA 4010 2/2005

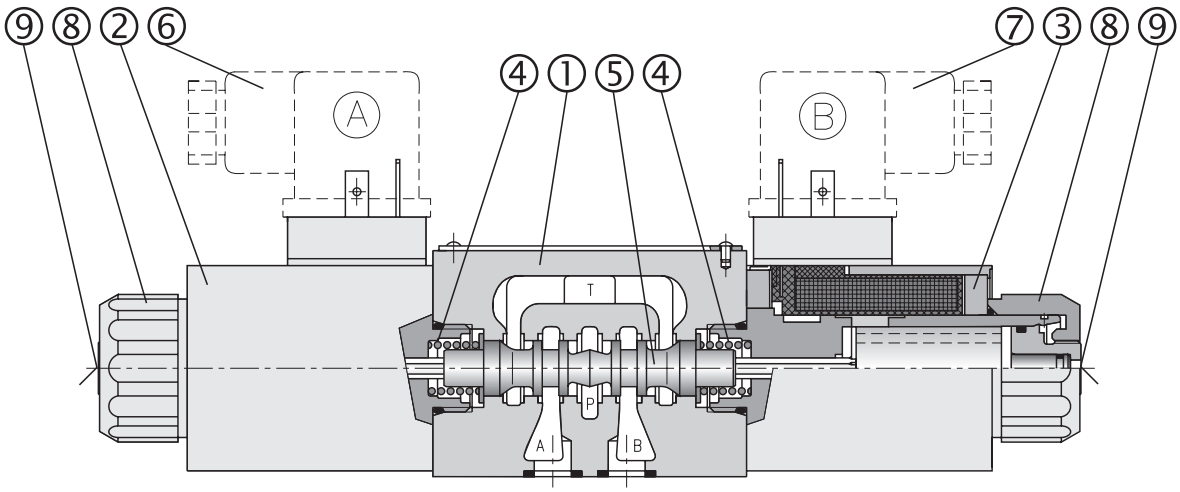


- **4/3-, 4/2- and 3/2- way directional control valves**
- **Cylindrical AC or DC, solenoids with removable coils - Elektrical connector can be rotated in either direction by 90°**
- **Four-land spool - reduced functional dependence on fluid viscosity**
- **Wet pin core tubes**
- **Push button manual override**
- **Installation dimensions to ISO 4401-03-02-0-94, DIN 24 340-A6**
- **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 rectifier, which is integrated directly into the connectors A, B (6, 7) or inside the coil. 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 basic surface treatment of the valve housing (1) is phosphate coated and the solenoids (2, 3) are zinc coated.



Ordering Code

RPE3-06 □ □ / □ □ □ □ □ □ □ □ □

Solenoid operated directional control valves

Nominal size

Number of operating positions
two positions **2**
three positions **3**

Functional symbols
see the table Functional symbols

Rated supply voltage of solenoids
(at the coil terminals)

12 V DC / 2.72 A	**01200**
14 V DC / 1.93 A	01400
21 V DC / 1.54 A	02100
24 V DC / 1.29 A	**02400**
42 V DC / 0.80 A	04200
48 V DC / 0.61 A	04800
60 V DC / 0.49 A	06000
102 V DC / 0.30 A	10200
205 V DC / 0.15 A	20500
24 V AC / 1.54 A / 50 (60) Hz	02450
115 V AC / 0.35 A / 50 (60) Hz	11550
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 DIN connector	**E1**
with DIN connector and quenching diode	E2
with AMP connector	E3
with AMP connector and quenching diode	E4
with integrated rectifier and DIN connector	**E5**
with Deutsch connector	E12
with Deutsch connector and quenching diode	E13

Sensing of the end position

no designation	without sensing
S1	sensing of the end position

Seals

no designation	NBR
V	FPM (Viton)

Orifice in P port

no designation	without orifice
D1	∅1.0 mm
D2	∅1.5 mm
D3	∅2.0 mm
D4	∅2.2 mm
D5	∅2.5 mm

Spool speed control orifice

no designation	without damping
T1	orifice ∅0.7 mm in solenoid

Manual overide

no designation	standard
N1	covered with retaining nut
N2	covered with rubber boot
N3	with detent assembly

***Electrical connector, EN 1745301-803-A**

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

*other information on pages 6 and 9

Note: Connector of the position sensor is not supplied (see ordering number on page 9)

FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE, FUNCTIONAL SYMBOLS AND TABLE OF PREFERRED TYPES ON PAGE 11

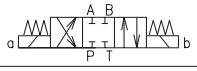
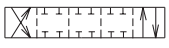
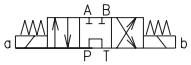
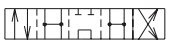
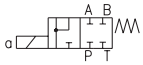
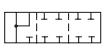
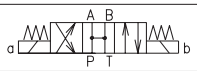
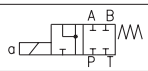
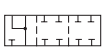
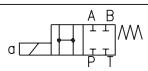
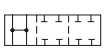
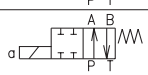
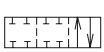
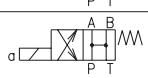
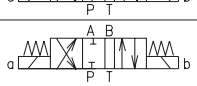
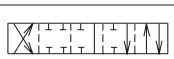
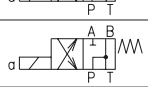
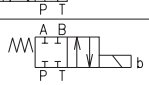
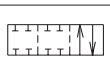
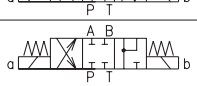
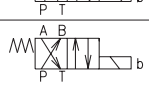
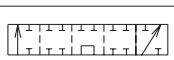
Recommended solenoid coils used with elektrical connector with rectifiers - type designation K3, K4

Rated supply source voltage (permissible rated voltage variation ±10 %)	Type designation of the solenoid voltage
24 V AC / 1.54 A / 50 (60) Hz	02100
115 V AC / 0.35 A / 50 (60) Hz	10200
230 V AC / 0.17 A / 50 (60) Hz	20500

Technical Data

Nominal size	mm	06	
Maximum flow	L/min	see p-Q characteristics	
Max. operating pressure at porte P, A, B	bar	320	
Max. operating pressure at port T	bar	210	
Pressure drop	bar	see Δp-Q characteristics	
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP-RP 91H in viscosity classes ISO VG 32, 46 and 68.	
Fluid temperature range for NBR seals	°C	-30 ... +80	
Fluid temperature range for FPM seals	°C	-20 ... +80	
Ambient temperature, max.	°C	up to +50	
Viscosity range	mm^2/s	20 ... 400	
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999)	
Max. allowable voltage variation	%	DC: ±10	AC: ±10
Max. switching frequency	1/h	15 000	
Switching time, on: at ν=32 mm^2/s	ms	DC: 30 ... 50	AC: 30 ... 40
Switching time, off: at ν=32 mm^2/s	ms	DC: 10 ... 50	AC: 30 ... 70
Duty cycle	%	100	
Service life	cycles	10^7	
Enclosure type to DIN 40 050		IP 65	
Weigt - valve with 1 solenoid - valve with 2 solenoids	kg	1.6 2.2	
Mounting position		optional	

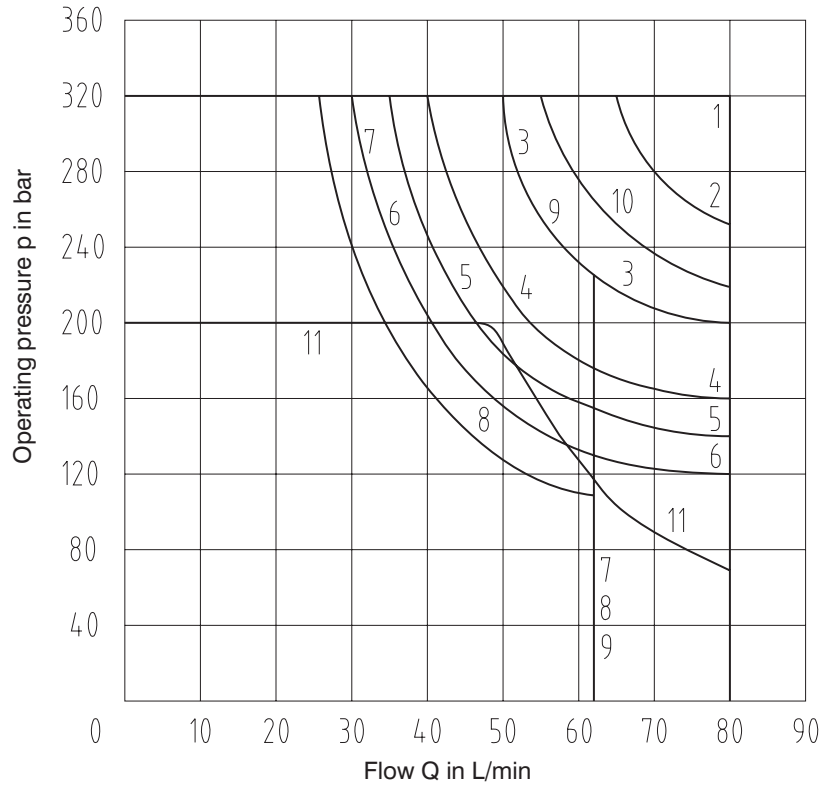
Functional Symbols

Designation	Symbol	Interposition	Designation	Symbol	Interposition
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 $\nu = 32\ mm^2/s$ and $t = 40\ °C$

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

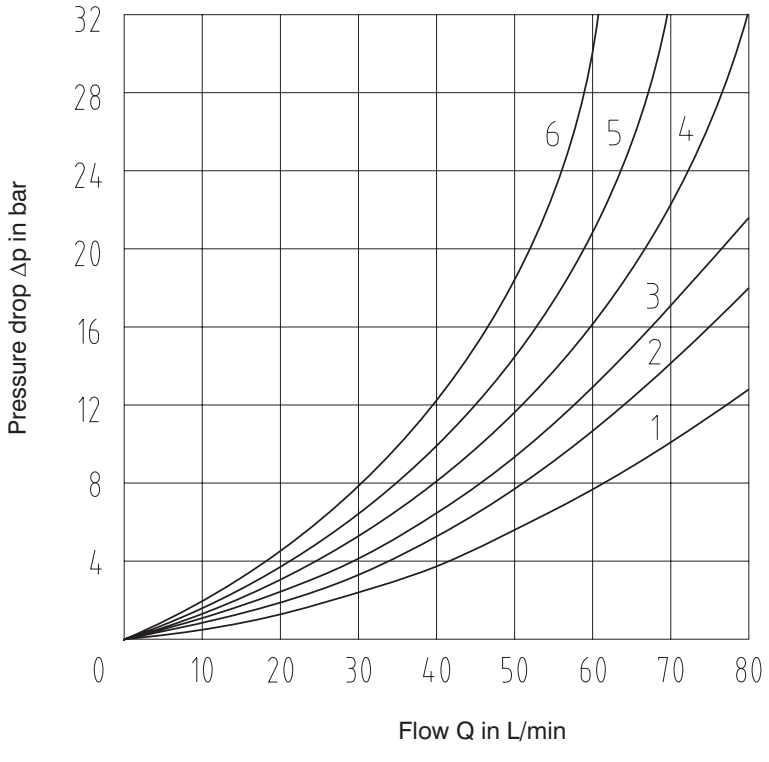


Z11	1
C11	7
H11	4
P11	1
Y11	3
L21	6
B11	9
Y41	7
Z21	1
C41	6
F11	6
R11	4
R21	5
A51	6
P51	1
Y51	3
C51	7
Z51	1
Z71	8
Z81	8
Z91	8
R31	6
H51	8
F51	8
X11	4
K11	8
N11	8
X25	11
J15	1
J75	10

Δp-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

Pressure drop Δp related to flow rate.

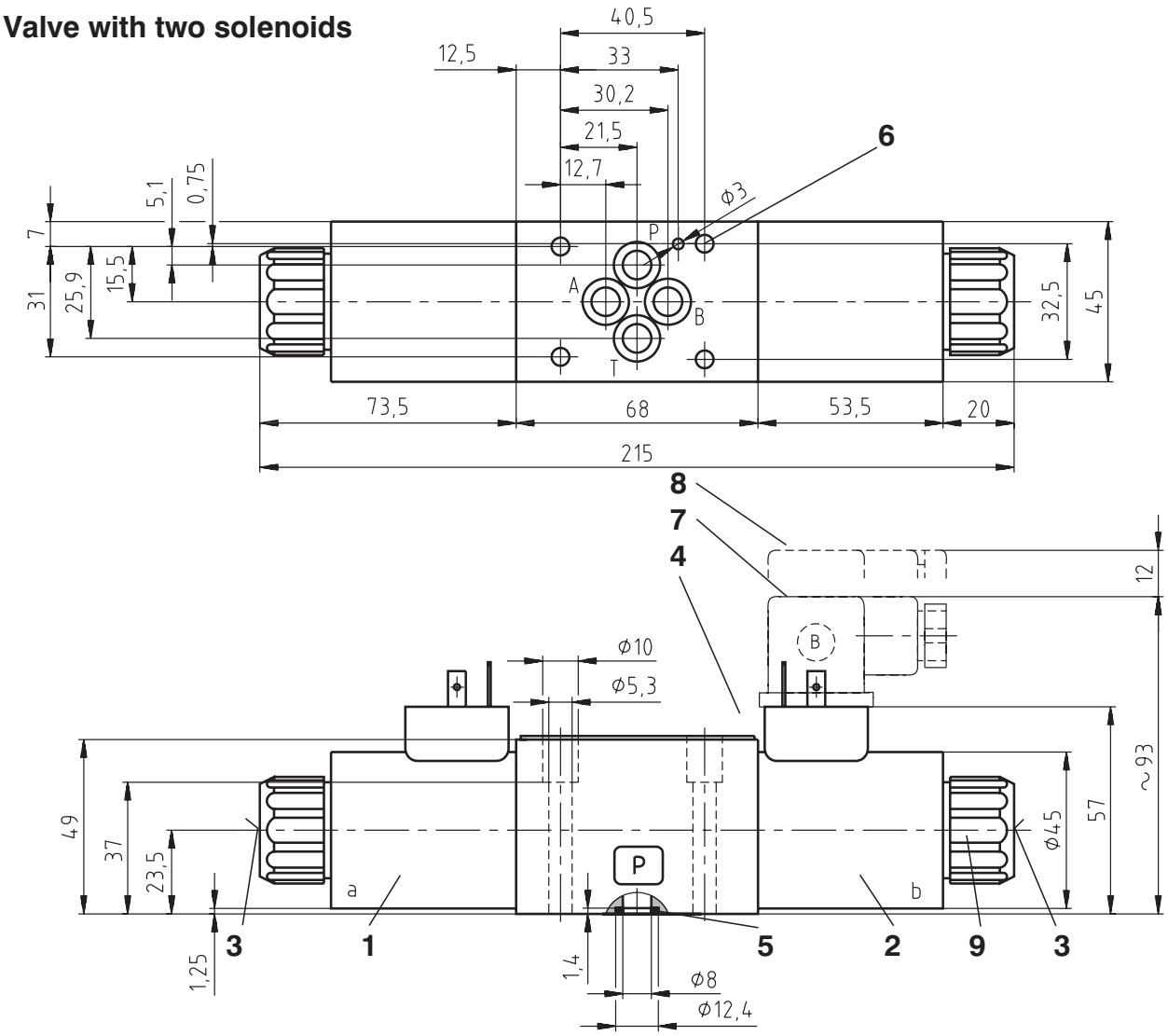


	P-A	P-B	A-T	B-T	P-T
Z11	2	2	3	3	
C11	5	5	5	6	3
H11	2	2	2	3	3
P11	1	1	3	3	
Y11	2	2	2	2	
L21	2	2	3	3	
B11	2	2	3	3	
Y41	3	3	3	3	
Z21		2	3		
C41	4	4			5
F11	1	2		3	3
R11	2	2	3	3	
R21	2	2	3	3	
A51	2	2			
P51		1	3		
Y51		2	2		
C51	2			3	4
Z51		2	3		
Z71	3	3			
Z81			3	3	
Z91	3			3	3
R31	2			3	
H51		2	3		
F51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

Valve Dimensions

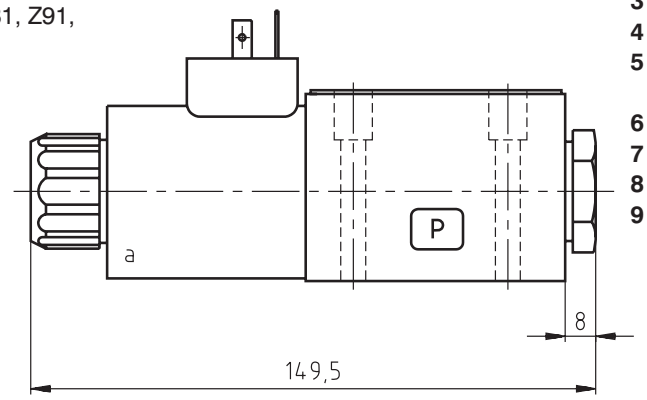
Dimensions in millimetres

Valve with two solenoids

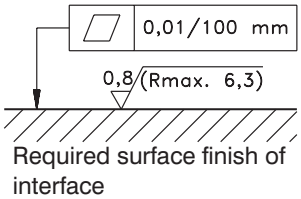


Valve with one solenoid a

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



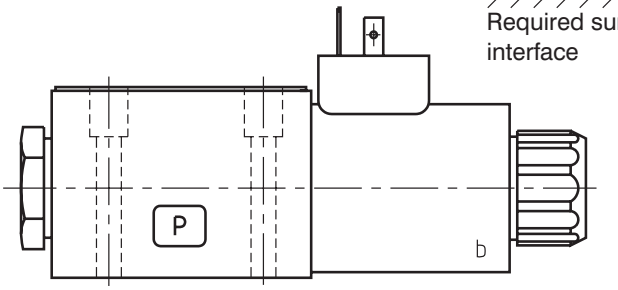
1 Solenoid a
2 Solenoid b
3 Manual override
4 Name plate
5 Square ring (4 pcs.)
9.25 x 1.68 supplied with valve
6 4 mounting holes
7 Electrical connector, DIN 43 650
8 Space required to remove connector
9 Retaining nut of the solenoid



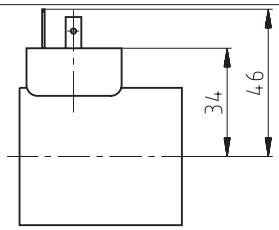
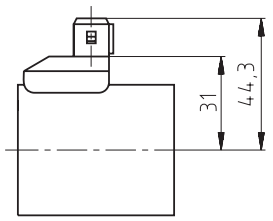
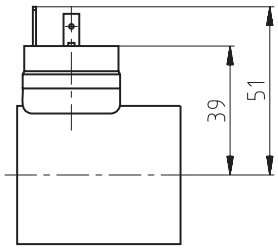
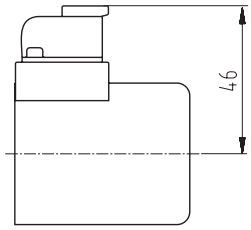
Required surface finish of interface

Valve with one solenoid b

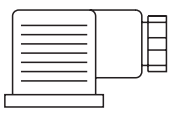
Spool symbols X11, Z11, C11, H11, K11, N11, F11



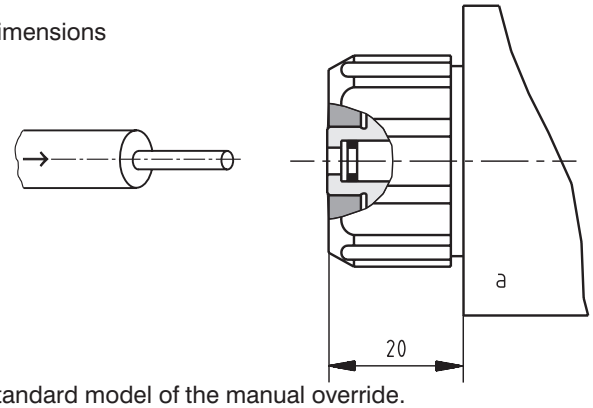
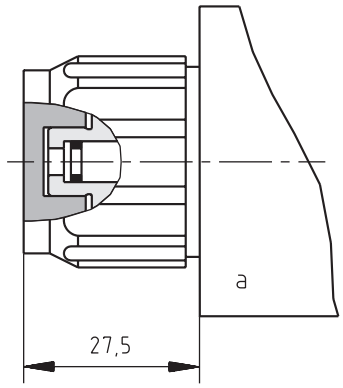
Type of the Solenoid Coil

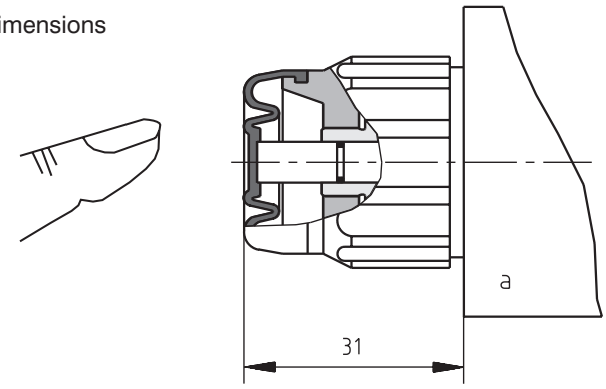
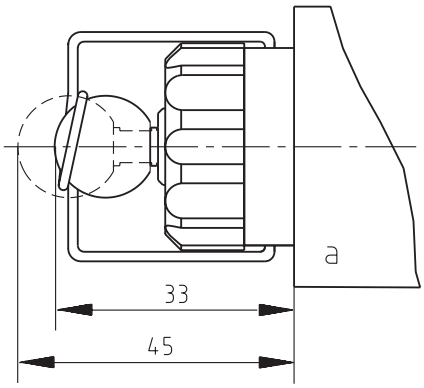
Designation	Dimensional sketch	Description
E1		Solenoid coil with terminal for the electrical connector, EN 1745301-803-A.
E2		Solenoid coil with integrated quenching diode (bipolar transil diode) and terminal for the electrical connector, EN 1745301-803-A.
E3		Solenoid coil with terminal for AMP electrical connector.
E4		Solenoid coil with integrated quenching diode (bipolar transil diode) and terminal for AMP electrical connector.
E5		Solenoid coil with integrated rectifier and terminal for the electrical connector, EN 1745301-803-A.
E12		Solenoid coil with terminal with Deutsch-DT04-2P electrical connector.
E13		Solenoid coil with terminal with Deutsch-DT04-2P electrical connector and integrated quenching diode (bipolar transil diode).

Electrical Connector, EN 1745301-803-A

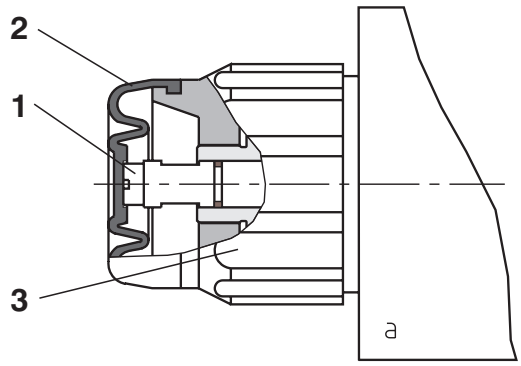
Designation	Type	Model	Max. input voltage	
K1	Connector B (black)	without rectifier - M16x1.5 (bushing bore ∅ 6-8 mm)	230 V DC	
	Connector A (grey)		230 V AC	
K5	Connector B (black)	without rectifier - M16x1.5 (bushing bore ∅ 4-6 mm)	230 V DC	
	Connector A (grey)		230 V AC	
K2	Connector B (black)	without rectifier with LED and quenching diode - M16x1.5 (bushing bore ∅ 6-8)	12...24 V DC	
	Connector A (grey)		12...24 V DC	
K3	Connector B (black)	with rectifier - M16x1.5 (bushing bore ∅ 6-8 mm)	230 V AC	
	Connector A (grey)		230 V AC	
K4	Connector B (black)	with rectifier with LED and quenching diode - M16x1.5 (bushing bore ∅ 6-8 mm)	230 V AC	
	Connector A (grey)		230 V AC	

Manual Override

STANDARD	CLOSED NUT
Dimensions  Standard model of the manual override. Standard retaining nut of the solenoid.	Type **N1** Dimensions  Manual override with retaining nut. Can be used after removing nut.

RUBBER BOOT	DETENT ASSEMBLY
Type **N2** Dimensions  Manual override protected by rubber boot.	Type **N3** Dimensions  Manual override holds the spool in the shiftet position.

Spool Speed Control Orifice

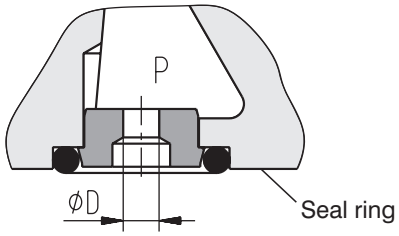
Type	Dimension	Description
T1		This direstional valve provides control spool soft shifting by means of orifice situated in the solenoid armature.To ensure the proper function of the valve, perfect air bleeding of the solenoid is required (byus of bleeding plug (1)). The plugs are accessible after removing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

Switching times

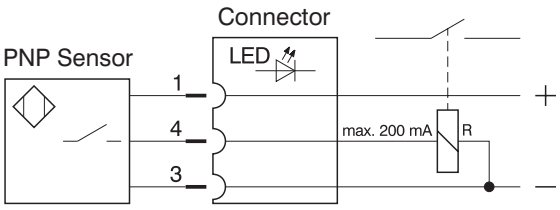
Total switching time, on	ms	300 ... 500
Total switching time, off	ms	400 ... 800
Time of the pressure change, switching on	ms	80 ... 200
Time of the pressure change, switching off	ms	80 ... 400

The switching times shown are valid for viscosity $\nu = 32\ mm^2/s$, valve temperature $t = 40\ °C$ and nominal voltage. They are dependent upon working pressure and flow rate of the directional control valve.

Orifice in P-Port

Type	∅D (mm)	Dimensions	Description
D1	1.0		P-Port orifices limit the flow into the directional control valve.
D2	1.5		
D3	2.0		
D4	2.2		
D5	2.5		

Sensing of the Spool End Position

Type	Circuit diagram of the sensor	Description
S1		The proximity sensor transforms the spool position into an electrical step signal. Can be used with directional control valves with one or two solenoids.

Technical Data of the Sensor

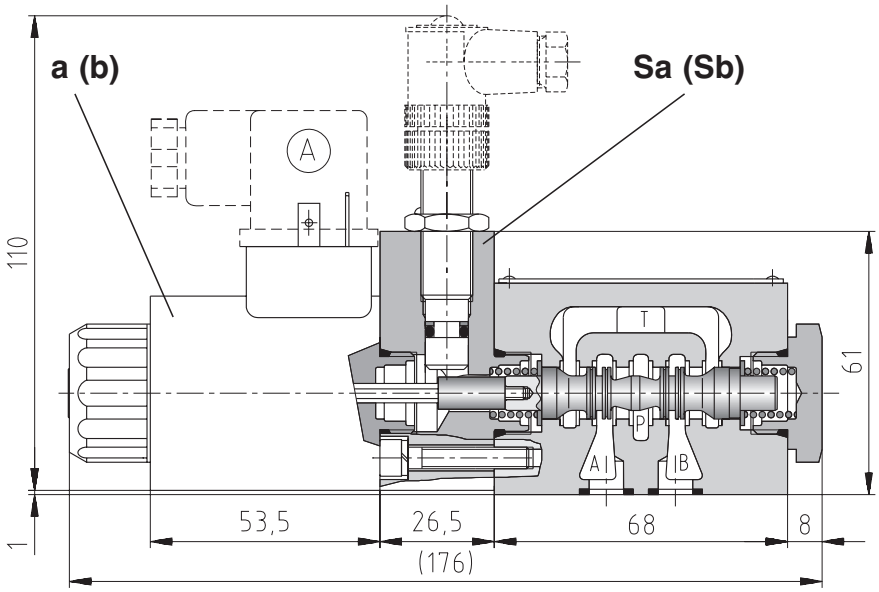
Rared voltage	V	24 DC
Power supply voltage range	V	10 ... 30 DC
Rated current	mA	200
Max. operating pressure	bar	up to 50
Switching frequency	Hz	1000
Ambient temperature range	°C	-25 ... +80

Technical Data of the Connector

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

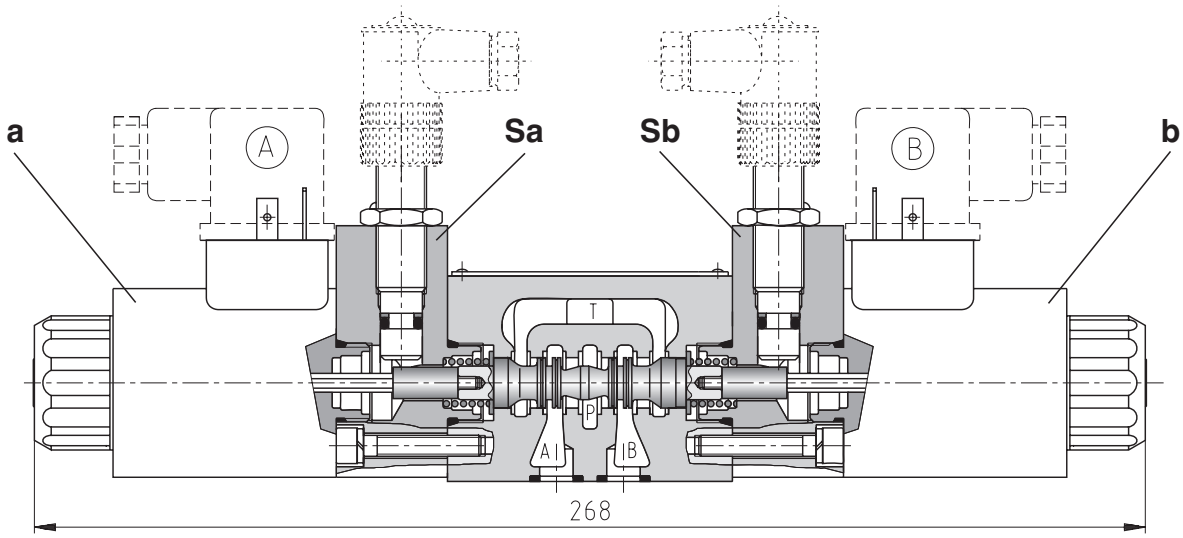
Two Positions Directional Control Valve

Signal of solenoid a (b)	Signal of sensor Sa (Sb)	LED
0	1	ON
1	0	OFF



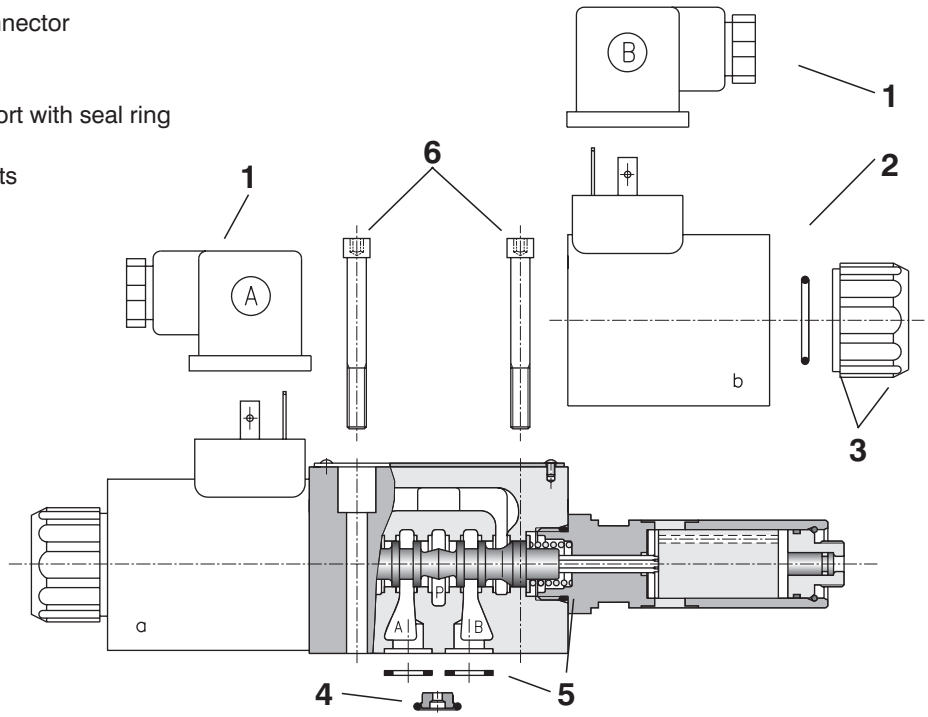
Three Positions Directional Control Valve

Signal of solenoids		Signal of sensors		LED	
a	b	Sa	Sb	Sa - LED	Sb - LED
0	0	1	1	ON	ON
0	1	1	0	ON	OFF
1	0	0	1	OFF	ON



Spare Parts

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



Electrical connector, EN 1745301-803-A

Type designation	Connector A grey	Connector B black
	Ordering number	
K1	936-9902	936-9901
K5	936-9906	936-9905
K2	936-9908	936-9907
K3	936-9904	936-9903
K4	936-9910	936-9909

Connector of position sensor

Type designation	Model	Max. input voltage	Ordering number
K02	connector of position sensor with LED	10...30 V DC	936-9940

Solenoid coil

Solenoid type	Coil type						
	E1	E2	E3	E4	E5	E12	E13
	Ordering number						
01200	936-0062	936-6200	936-4306	936-4305		937-0716	937-0723
*01200	944-0001	-	-	-		-	-
01400	936-0063	936-6201	-	-		-	-
02400	936-0066	936-6204	936-4327	936-4325		937-0715	937-0722
*02400	944-0002	-	-	-		-	-
04800	936-0071	936-6208	-	-		-	-
06000	936-0073	-	-	-		-	-
10200	936-0076	-	-	-		-	-
20500	936-0078	-	-	-		-	-
02450					936-2325		
11550					936-2375		
*11550					944-0003		
23050					936-2385		
*23050					944-0004		

Solenoid retaining nut with seal

Type of the nut	Seal ring	Ordering number
Standard nut	22 x 2	484-9951
Closed nut		484-9952
Nut with rubber boot		484-9953
Nut with detent assembly		484-9954

Orifice in P port

Type	∅D (mm)	Seal ring	Ordering number
D1	1.0	9.25 x 1.75	484-9973
D2	1.5		484-9974
D3	2.0		484-9975
D4	2.2		484-9977
D5	2.5		484-9976

Seal kit

Type	Dimensions, number		Ordering number
Standard - NBR70	9.25 x 1.68 (4 pcs.)	17 x 1.8 (2 pcs.)	484-9961
Viton	9.25 x 1.78 (4 pcs.)	17.17 x 1.78 (2 pcs.)	484-9971

Mounting bolts

Dimensions, number	Tightening torque	Ordering number
M5 x 45 DIN 912-10.9 (4 pcs.)	8.9 Nm	484-9958

•

* CSA Upon request

Preferred Types of Valves

Type	Ordering Number	Type	Ordering Number
RPE3-062Z11/01200E1	484-0703	RPE3-063Y11/02400E1	484-0785
RPE3-063Z11/01200E1	484-0677	RPE3-062R11/02400E1	484-0788
RPE3-062Z51/01200E1	484-0699	RPE3-062R21/02400E1	484-0793
RPE3-063C11/01200E1	484-0678	RPE3-062A51/02400E1	484-0789
RPE3-062C51/01200E1	484-0700	RPE3-062Y51/02400E1	484-0801
RPE3-063H11/01200E1	484-0679	RPE3-062J15/02400E1	484-0790
RPE3-063Y11/01200E1	484-0681	RPE3-062Z11/23050E5	484-1107
RPE3-062R11/01200E1	484-0684	RPE3-063Z11/23050E5	484-1034
RPE3-062R21/01200E1	484-0689	RPE3-062Z51/23050E5	484-1115
RPE3-062A51/01200E1	484-0685	RPE3-063C11/23050E5	484-1042
RPE3-062Y51/01200E1	484-0697	RPE3-062C51/23050E5	484-1066
RPE3-062J15/01200E1	484-0686	RPE3-063H11/23050E5	484-1043
RPE3-062Z11/02400E1	484-0807	RPE3-063Y11/23050E5	484-1044
RPE3-063Z11/02400E1	484-0781	RPE3-062R11/23050E5	484-1047
RPE3-062Z51/02400E1	484-0803	RPE3-062R21/23050E5	484-1113
RPE3-063C11/02400E1	484-0782	RPE3-062A51/23050E5	484-1048
RPE3-062C51/02400E1	484-0804	RPE3-062Y51/23050E5	484-1249
RPE3-063H11/02400E1	484-0783	RPE3-062J15/23050E5	484-1035

Caution!

- For applications outside the given parameters, please consult us.
- With spool symbols A51 and J75 for pressures exceeding 210 bar, the T-port should be connected directly to the tank.
- 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 for 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.

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www.argo-hytos.com

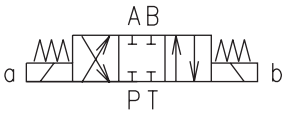
Solenoid - operated directional control valves with 8W coil

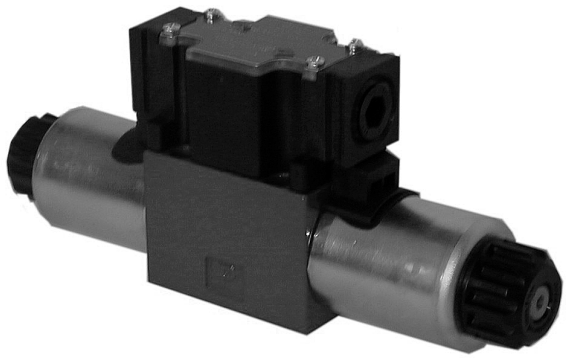
RPEA3-06

HA 4029
3/2003

Size 06 • p_{max} up to 320 bar • Q_{max} up to 80 L/min

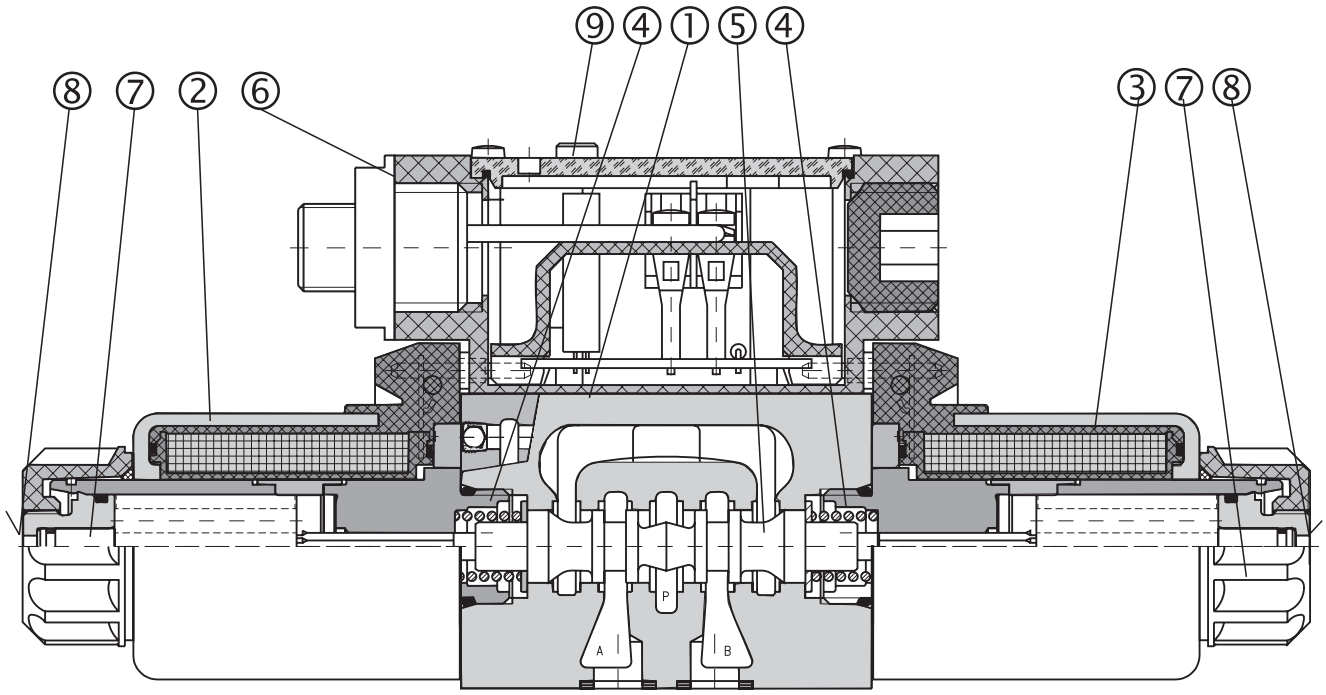
- 4/3-, 4/2- and 3/2- way directional control valves
- Enclosure type to IP65
- Four-land spool - reduced functional dependence on fluid viscosity
- Wet pin core tubes
- DC solenoids with removable coils
- Push button manual override
- Installation dimensions to ISO 4401-03-02-0-94, DIN 24 340-A6
- Subplates see data sheet HA 0002





Functional Description

The RPEA3 directional control valves consist of housing (1), a control spool (5) with two centering springs (4), cylindrical operating solenoids (2, 3), electric wirebox (9) and connector (6).
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 solenoids are supplied with DC voltage through the Ports on the wirebox optional on both sides or through Connector Item (5 - Pin) M12, see wiring diagram (page 6). The wires are connected to a terminal plate inside the wirebox. Optional lights are installed on this terminal plate for shift indication. The lights are visible as raised arrows on the valve label. The solenoids are retained by the Nut (7) and plug-in to the wirebox. Plug -in design allows easy removal without wire change.
In the case of solenoid malfunction or power failure, the spool of the valve can be shifted by manual override (8), 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

RPEA3-06 ☐ ☐ / ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

Solenoid Operated Directional Control Valves with 8W Spool

Nominal Size

Number of Valve Positions

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

Spool Symbols
see the table spool symbols

Rated Supply Voltage of Solenoids

24 V DC / 0.33 A	**02400**

Note: Valve with DIN plug on request.

Type of Solenoid Coil

EW1	DC solenoid 8W

Type of Wirebox

omit	standard
R	With LED diode

Manual Override

omit	standard
N1	covered with retaining nut
N2	covered with rubber boot

Orifice in P Port

omit	without orifice
D1	∅1.0 mm
D2	∅1.5 mm
D3	∅2.0 mm
D4	∅2.2 mm
D5	∅2.5 mm

Seals

omit	NBR
V	FPM (Viton)

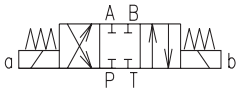
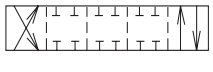
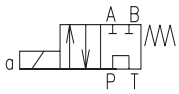
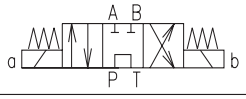
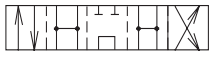
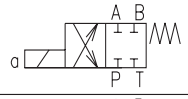
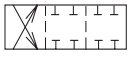
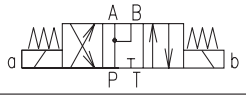
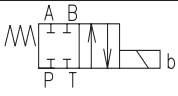
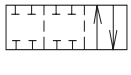
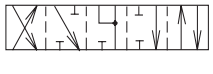
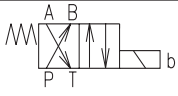
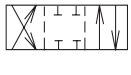
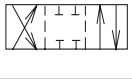
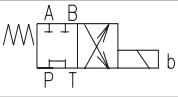
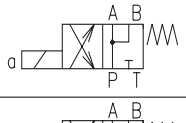
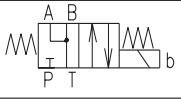
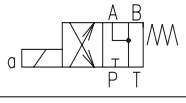
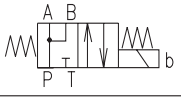
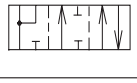
Solenoid identification

Omit	standard ISO
A	US Standard ANSI-B93.9

Technical Data

Nominal size	mm	06
Maximum flow	L/min	see p-Q characteristics
Max. operating pressure at porte P, A, B	bar	320
Max. operating pressure at port T	bar	210
Pressure drop	bar	see Δp-Q characteristics
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP-RP 91H in viscosity classes ISO VG 32, 46 and 68.
Fluid temperature range for NBR seals	°C	-30 ... +80
Fluid temperature range for FPM seals	°C	-20 ... +80
Ambient temperature, max.	°C	up to +50
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Max. allowable voltage variation	%	DC: ± 10%
Max. switching frequency	1/h	15 000
Switching time, on: at ν=32 mm^2/s	ms	DC: 30 ... 50
Switching time, off: at ν=32 mm^2/s	ms	DC: 10 ... 50
Duty cycle	%	100
Service life	cycles	10^7
Enclosure type to DIN 40 050		IP 65
Weigt - valve with 1 solenoid - valve with 2 solenoids	kg	1.3 1.9
Mounting position		optional

Functional Symbols

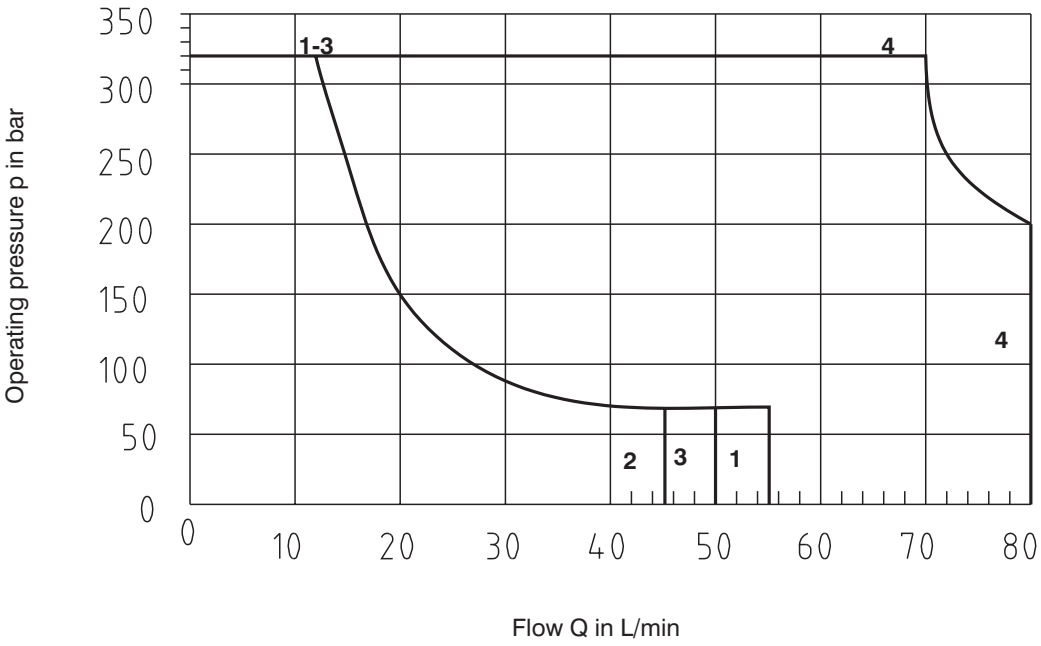
Designation	Symbol	Interposition	Designation	Symbol	Interposition
Z11			C51		
C11			Z51		
P11			Z11		
Y11			X11		
R11			C11		
P51			Y11		
Y51			P11		

Note: Contrary to the European Norm, the US Standard ANSI-B93.9 states that the solenoid routing on energizing the oil flow to port A be marked with a, and the solenoid routing on energizing the oil flow to port B be marked with b. This rule is valid independently from the solenoid lay-out.

p-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

Operating limits for maximum hydraulic power transferred by the directional valve.

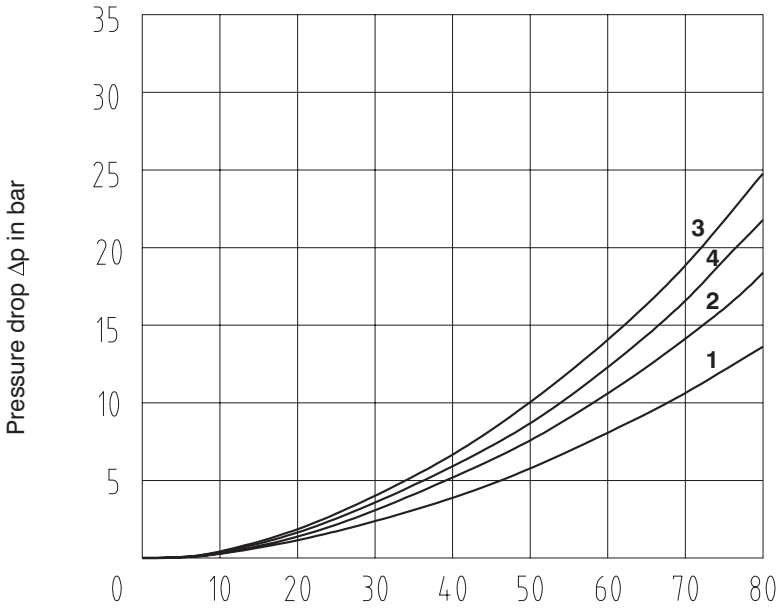


Z11	C11	P11	Y11	R11	P51	Z51	C51	X11	Y51
1	3	4	1	2	4	1	3	2	1

Δp-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

Pressure drop Δp related to flow rate.

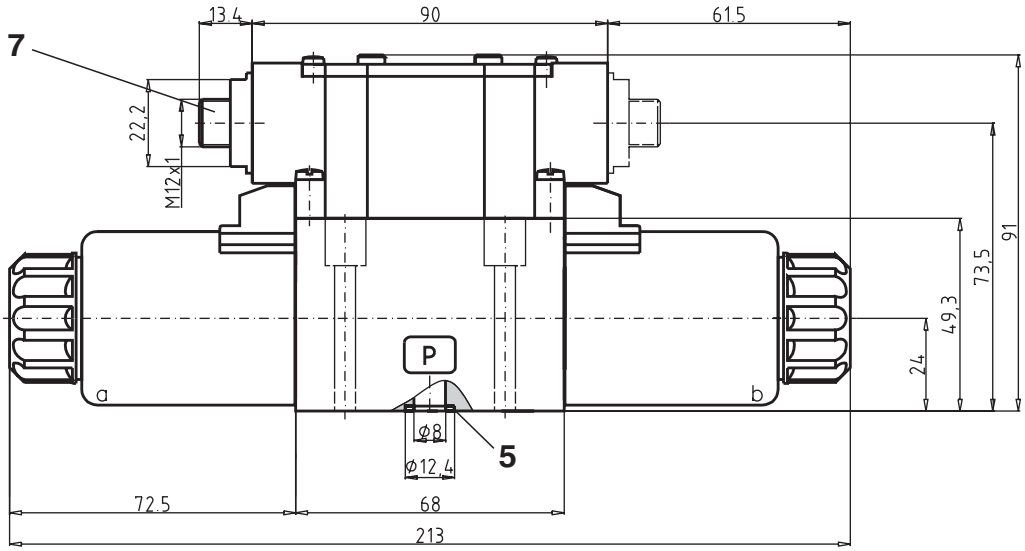


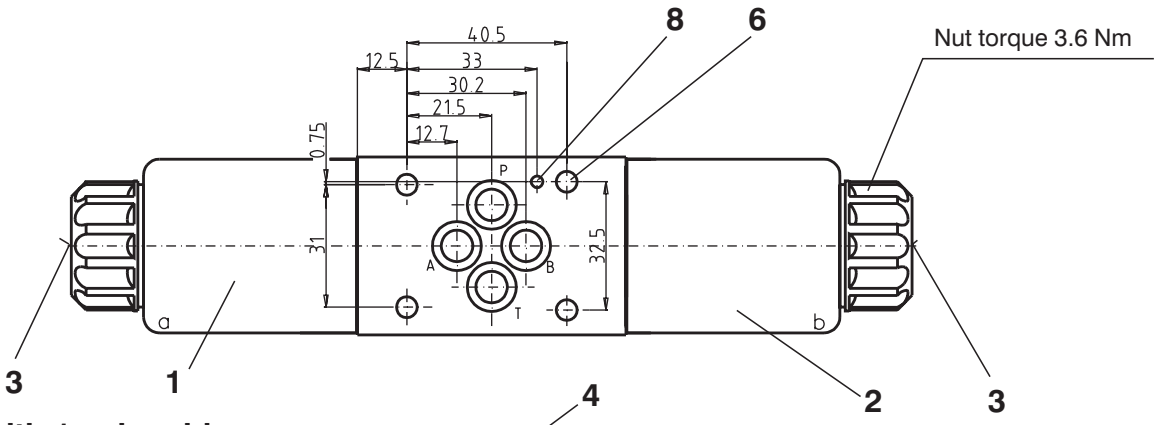
	P-A	P-B	A-T	B-T	P-T
Z11	2	2	2	2	
C11	2	2	2	2	3
P11	2	2	4	4	
Y11	2	2	1		
R11	2	2	4	2	
X11	2	2	4	2	
Z51		2	2		
C51	2			2	3
P51		1	1		
Y51		2	4		

Valve Dimensions

Dimensions in millimetres

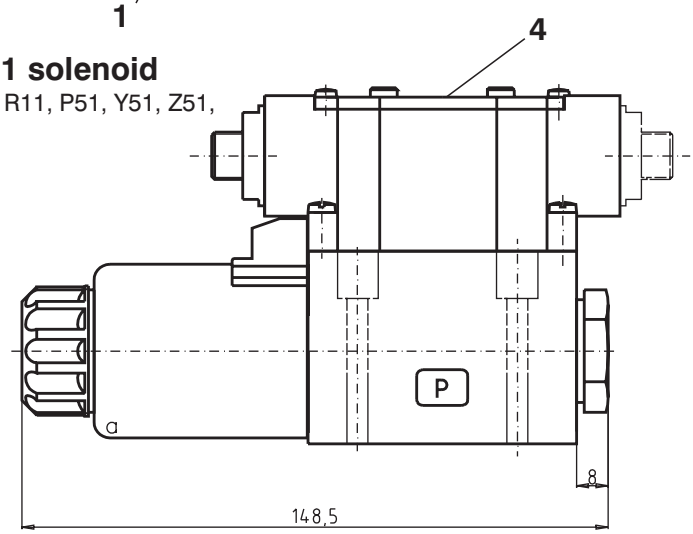
Valve with 2 solenoids





Valve with 1 solenoid

Spool symbols R11, P51, Y51, Z51, C51

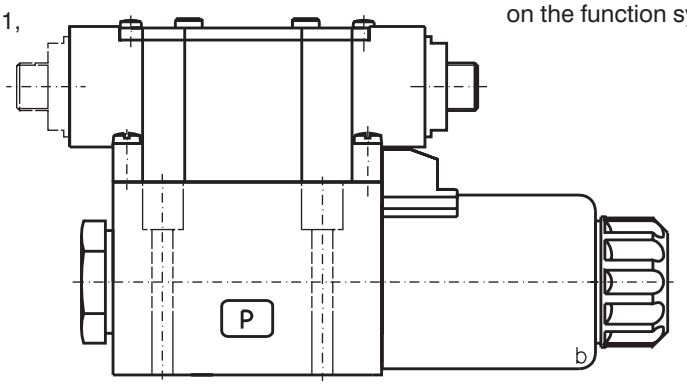


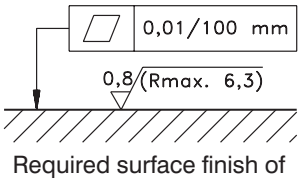
1 Solenoid a*
2 Solenoid b*
3 Manual override
4 Name plate
5 Square ring 9.25 x 1.68 (4 pcs.) supplied with valve
6 4 mounting holes
7 Electrical connector
8 Pin hole

***Note:** On valves with solenoid identification according to US Standard ANSI-B93.9 can the solenoid designation vary from this arangement, this is based on the function symbol.

Valve with 1 solenoid

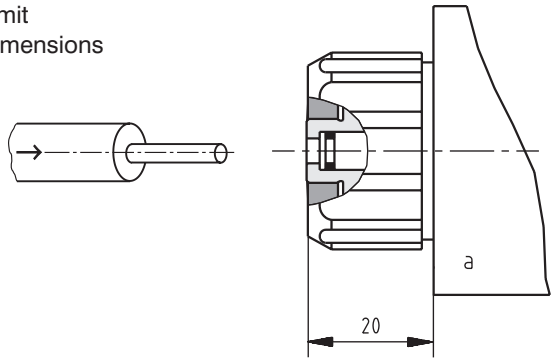
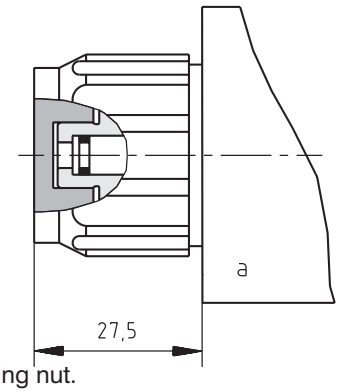
Spool symbols X11, Z11, C11, Y11, P11

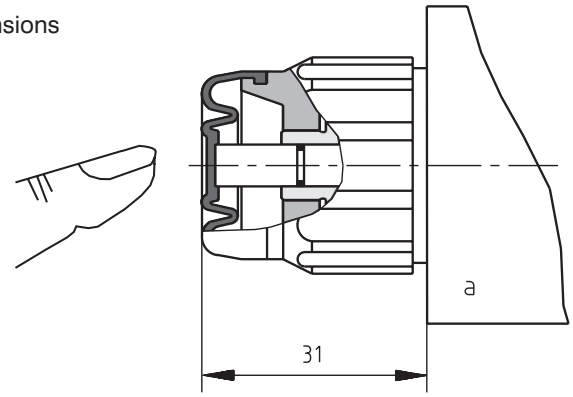




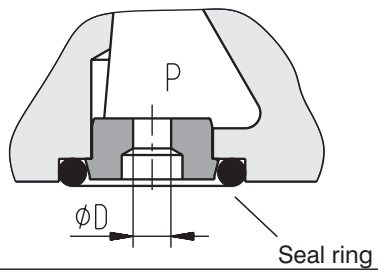
Required surface finish of interface

Manual Override

STANDARD	CLOSED NUT
Omit Dimensions  Standard model of the manual override. Standard retaining nut of the solenoid.	Type **N1** Dimensions  Manual override with retaining nut. Can be used after removing nut.

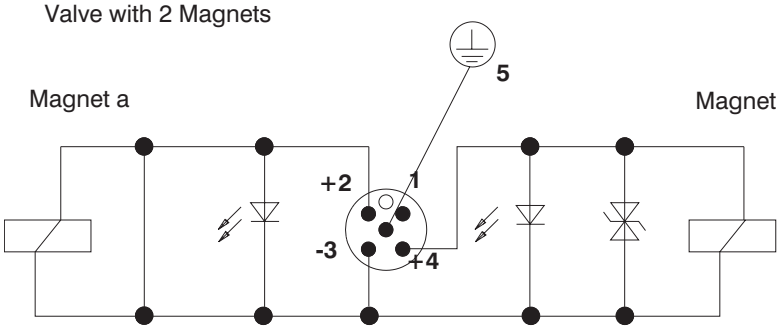
RUBBER BOOT	
Type **N2** Dimensions  Manual override protected by rubber boot.	

Orifice in P-Port

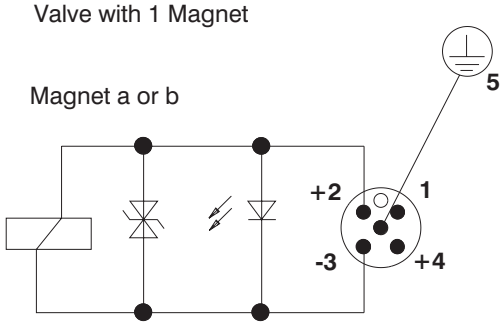
Type	∅D mm	Dimensions	Description
D1	1.0	 	P-Port orifices limit the flow into the directional control valve.
D2	1.5		
D3	2.0		
D4	2.2		
D5	2.5		

Connector - M12

Pin - location
Valve with 2 Magnets



Pin - location
Valve with 1 Magnet



Note: On valves with solenoid identification according to US Standard ANSI-B93.9 wiring will be different from above: on valves with one (1) solenoid always Pin 2 for the a-Solenoid and Pin 4 for the b-Solenoid. This is independent from the actual physical location of the solenoid.

Spare Parts

Wiringbox

Type	Ordering number
Wiring box without terminal plate	937-0608

Terminal Plates

Type	Ordering number
Terminal plate 24V - preventive A+B	937-0642
Terminal plate 24V - preventive A	937-0643
Terminal plate 24V - preventive B	937-0644
Terminal plate 24V - rectifier and preventive A+B	937-0645
Terminal plate 24V - rectifier and preventive A	937-0646
Terminal plate 24V - rectifier and preventive B	937-0647

Solenoid Coil

Voltage rating	Type	Ordering number
02400	EW1	937-0728

Solenoid Retaining Nut with Seal

Type of the nut	Seal ring	Ordering number
Standard nut	22 x 2	484-9951
Closed nut		484-9952
Nut with rubber boot		484-9953

Connector M12

Type	Ordering number
5 PIN	937-0648

Orifice in P-Port

Type	∅D mm	Seal ring	Ordering number
D1	1.0	9.25 x 1.75	484-9973
D2	1.5		484-9974
D3	2.0		484-9975
D4	2.2		484-9977
D5	2.5		484-9976

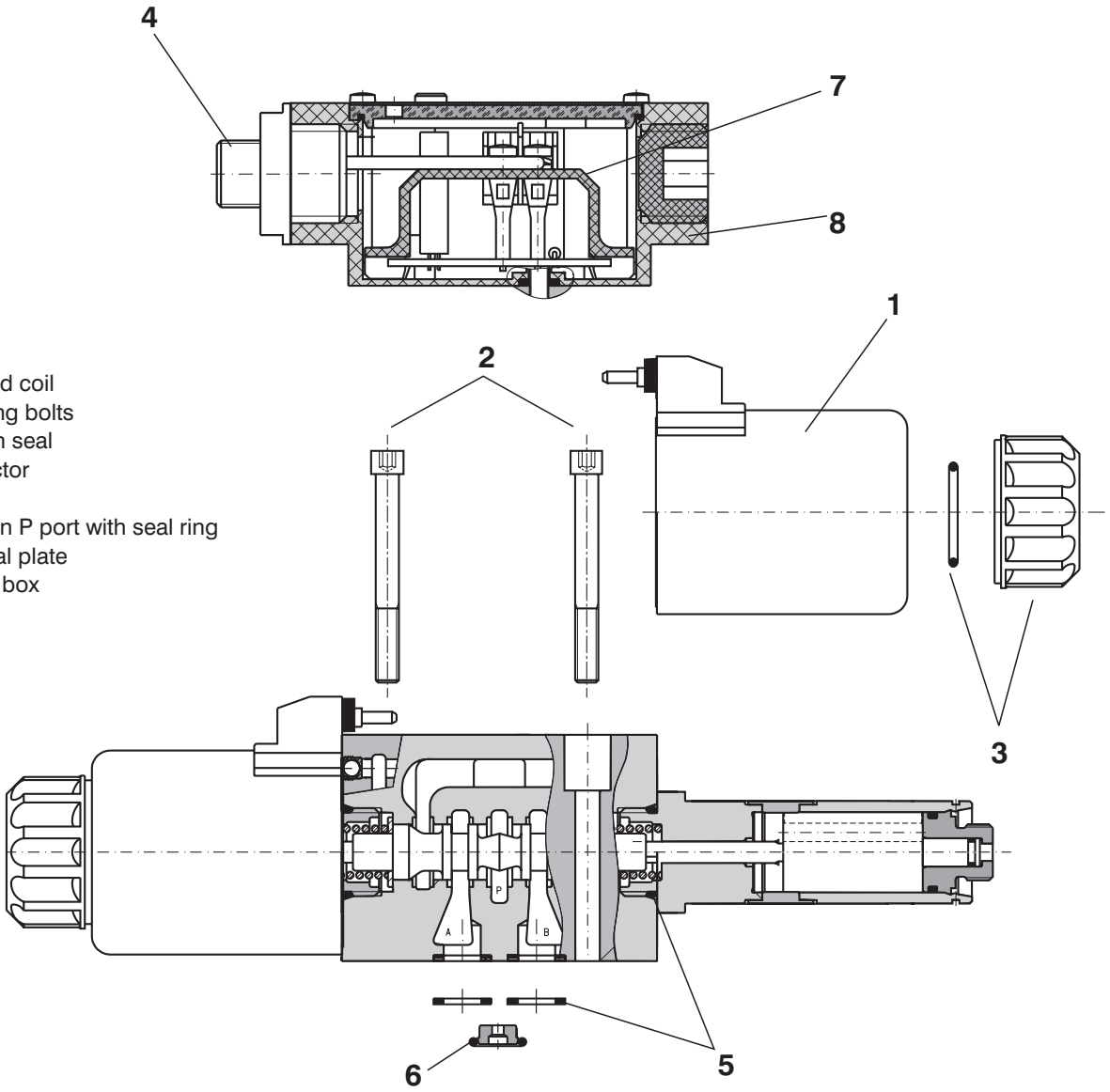
Seal Kit

Type	Dimensions, quantity			Ordering number
Standard - NBR70	9.25 x 1.68 (4 pcs.)	17 x 1.8 (2 pcs.)	9.25 x 1.75 (1 pc)	484-9965
Viton	9.25 x 1.78 (4 pcs.)	17.17 x 1.78 (2 pcs.)		484-9971

Bolt Kit

Dimensions, quantity	Bolt torque	Ordering number
M5 x 45 DIN 912-10.9 (4 pcs.)	8.9 Nm	484-9958

Spare Parts



1 Solenoid coil
2 Mounting bolts
3 Nut with seal
4 Connector
5 Seal kit
6 Orifice in P port with seal ring
7 Terminal plate
8 - Wiring box

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.
- 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.

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www.argo-hytos.com

Directional Control Valves Solenoid Operated

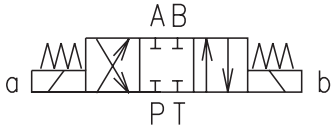
RPE4-10

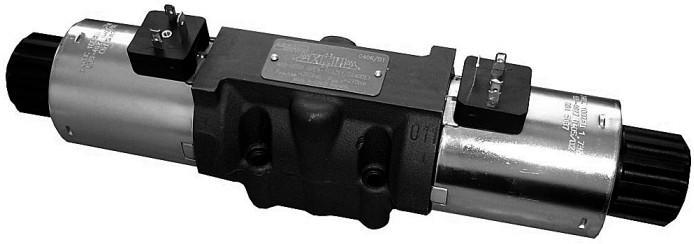
Size 10 • p_{max} up to 350 bar • Q_{max} up to 140 L/min

HA 4039
5/2005

Replaces
HA 4039 6/2004

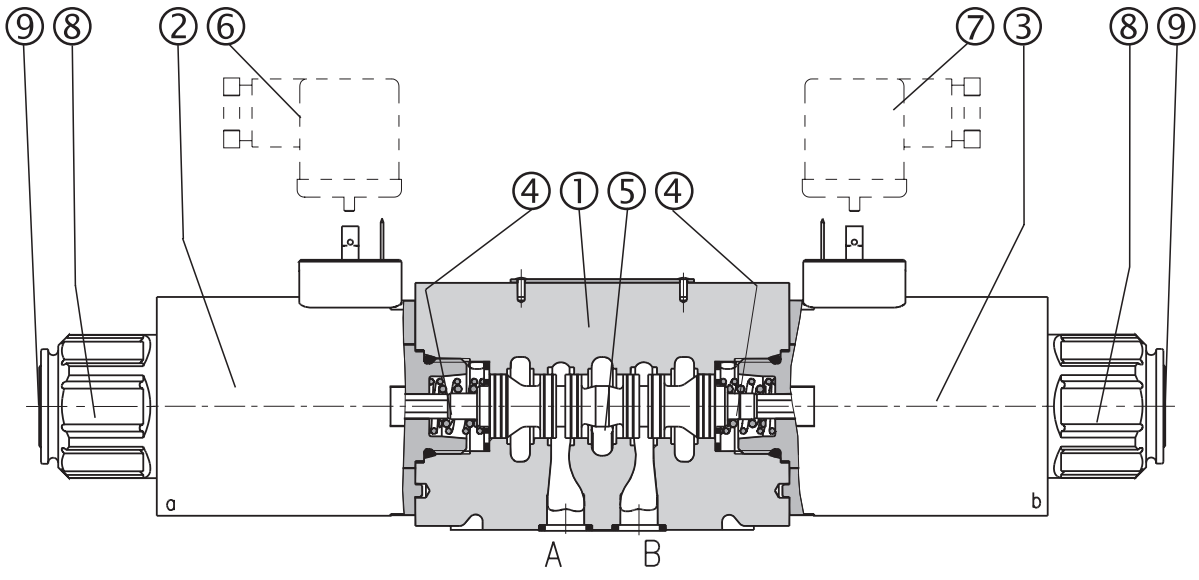
- ❑ **4/3-, 4/2- and 3/2-way directional control valves**
- ❑ **Cylindrical DC solenoids with removable coils. Electrical connectors can be rotated in three positions 90° apart**
- ❑ **Dual frequency solenoids, AC voltage 50/60 Hz**
- ❑ **Wet pin core tubes**
- ❑ **Push button manual override**
- ❑ **With soft shifting option**
- ❑ **Installation dimensions to DIN 24 340, ISO 4401**
- ❑ **Subplates see data sheet HA 0002**





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 363 PSI (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

RPE4-10 □ □ / □ □ □ □ □

Solenoid operated directional control valves

Nominal size 10

Number of operating positions
two positions **2**
three positions **3**

Functional symbols
see the table functional symbols

Rated supply voltage of solenoids
(at the coil terminals)

12 V DC / 3.17 A	**01200**
24 V DC / 1.73 A	**02400**
106 V DC / 0.35 A	10600
205 V DC / 0.20 A	20500
120 V AC / 0.35 A / 60 Hz	12060
230 V AC / 0.20 A / 50 (60) Hz	**23050**

The AC coils correspond with E5 type.

Type of the solenoid coil

with DIN connector	**E1**
with integrated rectifier and DIN connector	**E5**

Seals

no designation	NBR
V	FPM (Viton)

Damping

no designation	without damping
T2	nozzle
T3	throttle screw

Manual override

no designation	standard
N2	covered with rubber boot

Note: Connectors are to be ordered separately, see pages 6 and 8.

FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE, FUNCTIONAL SYMBOLS AND TABLE OF PREFERRED TYPES ON PAGE 11

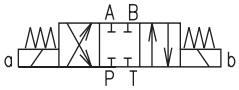
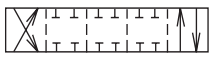
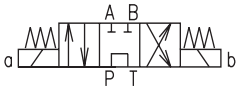
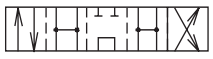
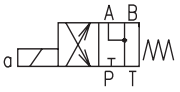
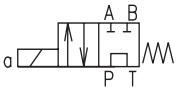
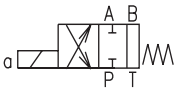
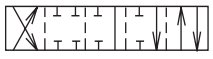
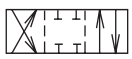
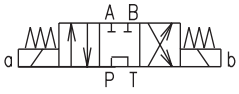
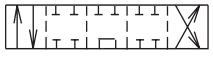
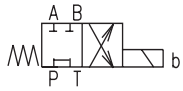
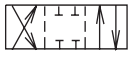
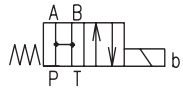
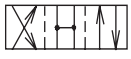
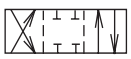
Voltage of Recommended solenoid coils used with electrical connector with rectifiers - see page 6

Rated supply source voltage (permissible rated voltage variation ±10 %)	Type designation of the solenoid voltage
120 V AC / 0.35 A / 50 (60) Hz	10600
230 V AC / 0.20 A / 50 (60) Hz	20500

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	210	
Pressure drop	bar	see Δp-Q characteristics	
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 and 68.	
Fluid temperature range (NBR / Viton)	°C	-30 ... +80	-20 ... +80
Ambient temperature max.	°C	up to +50	
Viscosity range	mm^2/s	20 ... 400	
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999)	
Maximum allowable voltage variation	%	AC: ±10	DC: ±10
Maximum switching frequency	1/h	15 000	
Switching time, ON; at $\nu = 32\ mm^2/s$	ms	AC: 80 ... 330	DC: 50 ...12
Switching time, OFF; at $\nu = 32\ mm^2/s$	ms	AC: 100 ... 280	DC: 30 ... 90
Duty cycle	%	100	
Service life	cycles	10^7	
Enclosure type to DIN 40 050		IP 65 (Connector to DIN 43 650)	
Weight - valve with 1 solenoid - valve with 2 solenoids	kg	3.9 5.4	
Mounting position		optional	

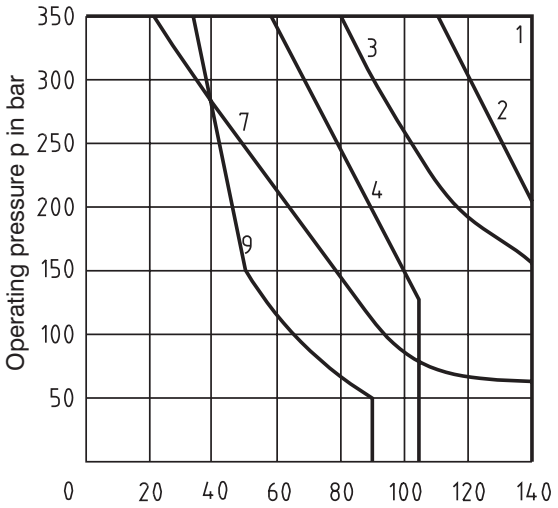
Functional Symbols

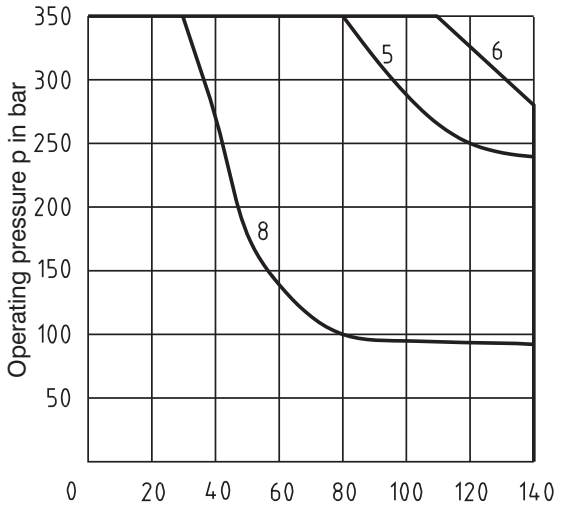
Designation	Symbol	Interposition	Designation	Symbol	Interposition
Z11			P51		
C11			**Y51**		
H11			**C51**		
P11			B51		
Y11			**Z51**		
L21			H51		
B11			X11		
C21			C11		
R11			H11		
R21			J15		
A51			J75		

p-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

Operating limits for maximum hydraulic power transferred by the directional valve. For respective spool type - see functional symbols. The power curves hold true for symmetrical valve flows (e.g. flows in directions P-A and B-T are identical). In case of an asymmetric flow, the power curves can lie substantially lower. In such cases we highly recommend to consult the respective power curve with the valve manufacture.



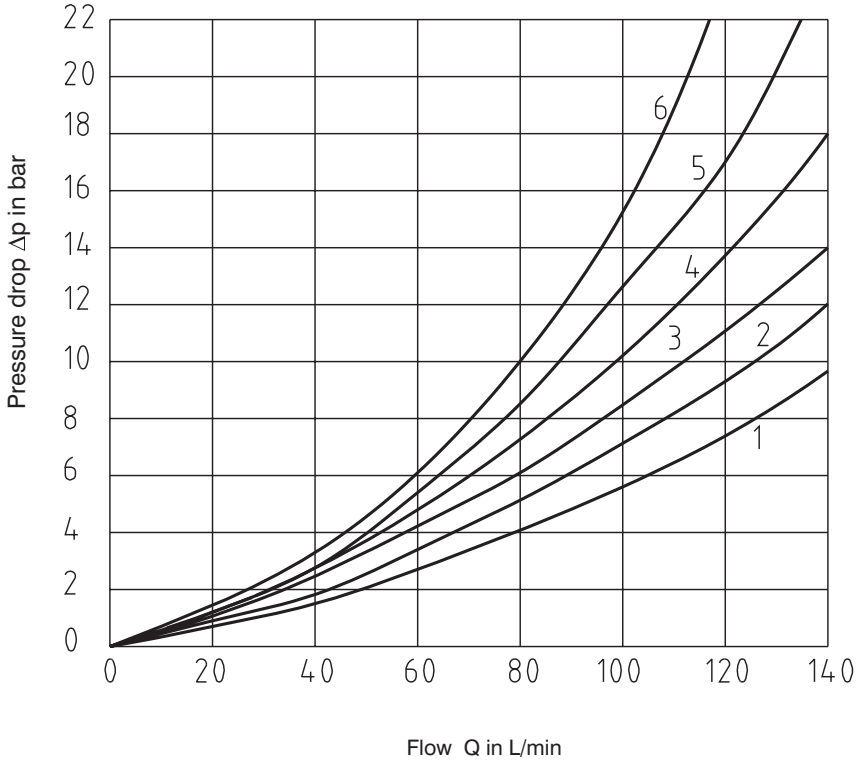


Z11	Z51	H11	H51	P11	P51	Y11	Y51	C11	C51	R11	X11	B11	B51	L21	R21	J15	J75	A51	C21
1	1	1	1	1	1	5	5	3	3	2	2	4	4	7	2	6	6	8	9

Δp-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

Pressure drop Δp related to flow rate.

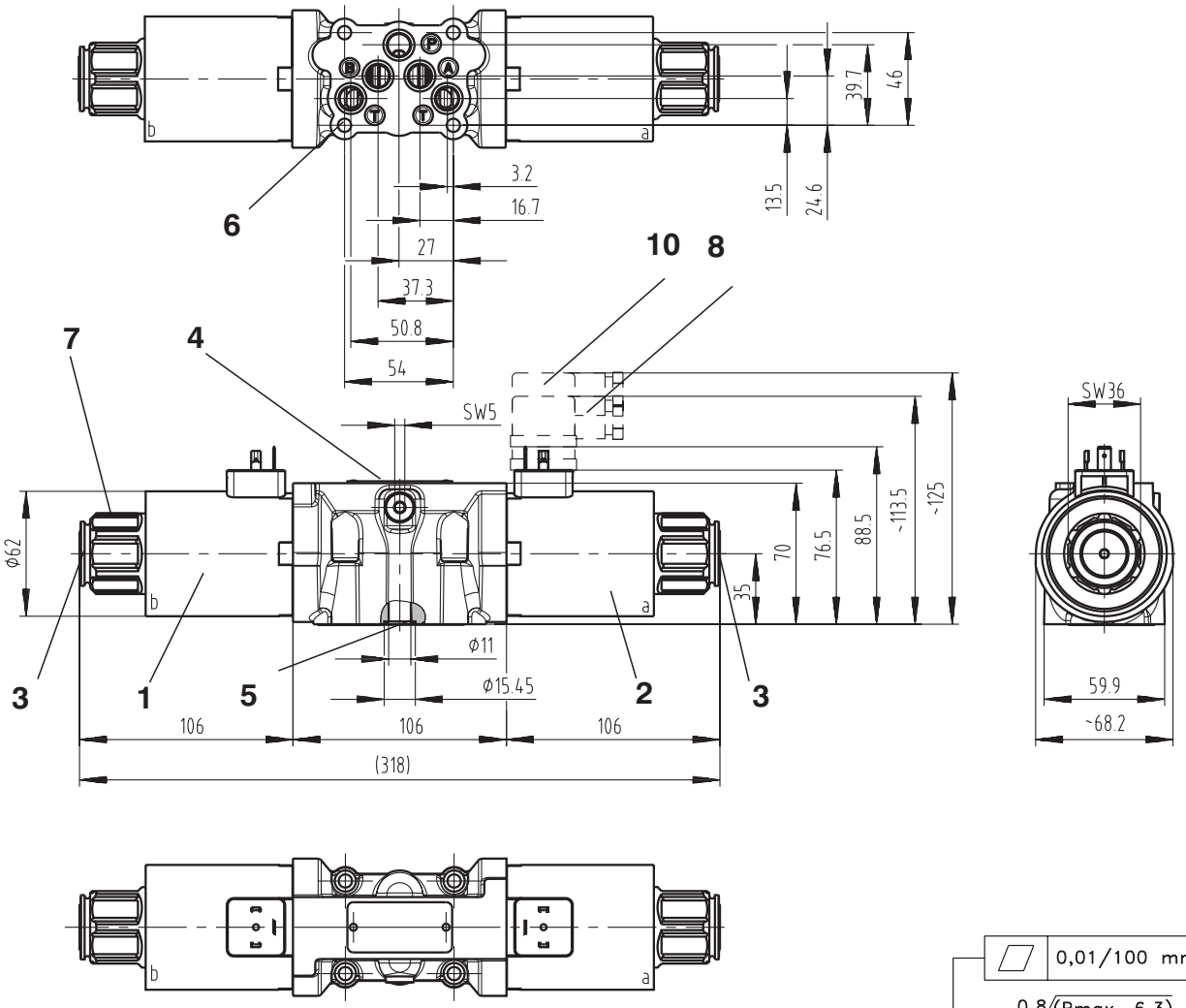


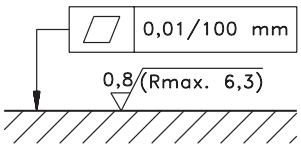
	P-A	P-B	A-T	B-T	P-T
Z11	1	1	2	2	
Z51		1	2		
H11	1	1	2	2	1
H51		1	2		1
P11	1	1	2	2	
P51		1	2		
Y11	1	1	2	2	
Y51		1	2		
C11	4	3	4	5	1
C51	4			5	1
R11	1	1	2	2	
X11	1	1	2	2	
B11	1	1	2	2	
B51		1	2		
L21	1	1	1	2	2
R21	1	1	1	3	
J15	1	1	2	3	
J75	1	1			
A51	1	1			
C21	6	6	6	6	4

Valve Dimensions

Dimensions in millimetres

Valve with two solenoids

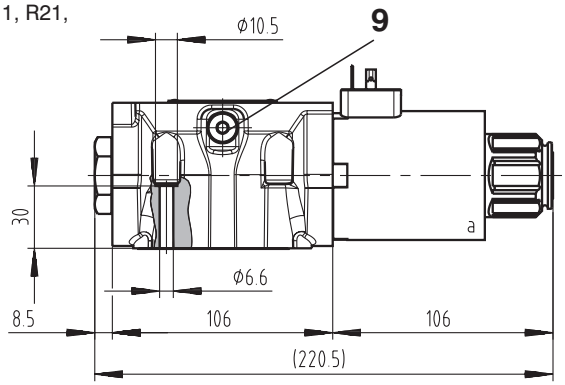


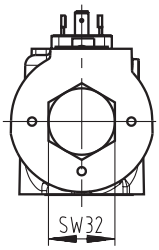


Required surface finish of interface.

Valve with one solenoid a

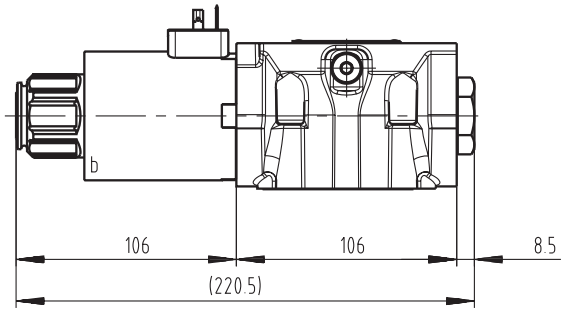
Functional symbols R11, R21, Y51, C51, Z51, H51,





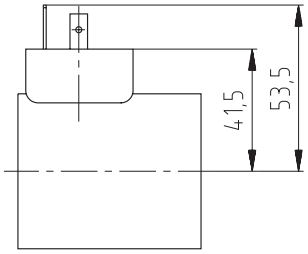
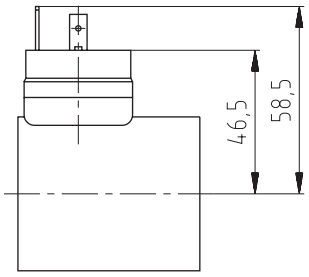
Valve with one solenoid b

Functional symbols C11, H11



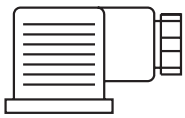
1 Solenoid a
2 Solenoid b
3 Manual override
4 Name plate
5 Square ring 12.42 x 1.68 (5 pcs.) supplied with valve
6 4 mounting holes
7 Retaining nut of the solenoid
8 Electrical connector, DIN 43 650
9 Throttle screw
10 Space reguired to remove connector

Type of the Solenoid Coil

Designation	Dimensional sketch	Description
E1		Solenoid coil with terminal for the electrical connector, DIN 43 650.
E5		Solenoid coil with integrated rectifier and terminal for electrical connector, DIN 43 650.

Electrical Connector, DIN 43 650

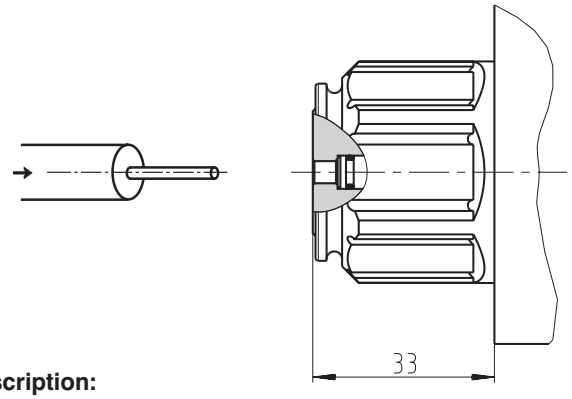
Designation	Type	Model	Max input voltage
K1	Connector B (black)	without rectifier - M16x1.5 (bushing bore ∅ 6-8 mm)	230 V DC
	Connector A (grey)		230 V AC
K5	Connector B (black)	without rectifier - M16x1.5 (bushing bore ∅ 4-6 mm)	230 V DC
	Connector A (grey)		230 V AC
K2	Connector B (black)	without rectifier with LED and quenching diode - M16x1.5 (bushing bore ∅ 6-8 mm)	12 ... 24 V DC
	Connector A (grey)		
K3	Connector B (black)	with rectifier - M16x1.5 (bushing bore ∅ 6-8 mm)	230 V AC
	Connector A (grey)		
K4	Connector B (black)	with rectifier with LED and quenching diode - M16x1.5 (bushing bore ∅ 6-8 mm)	230 V AC
	Connector A (grey)		



Manual Override

Standard

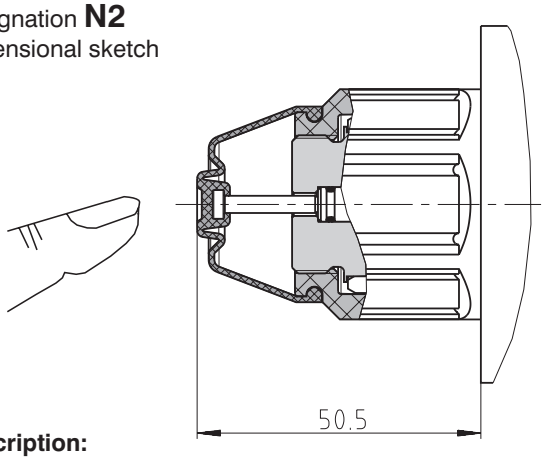
Without designation
Dimensional sketch



Description:
Standard model of the manual override.
Standard retaining nut of the solenoid.

Rubber boot

Designation **N2**
Dimensional sketch

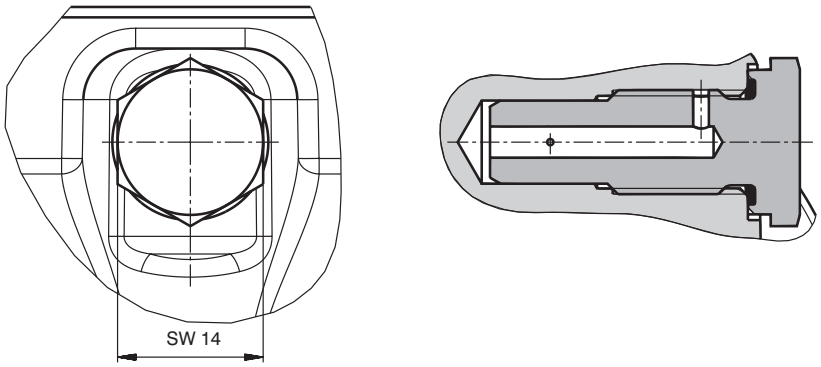


Description:
Manual override protected by rubber boot.

Soft Shifting Spool Options Delay Time

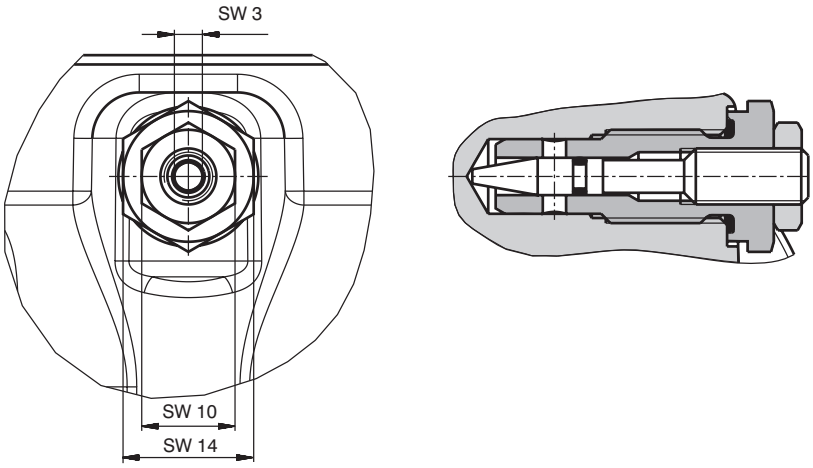
T2 - Noozle ∅ 0,6

The orifice extends the valve shifting time.



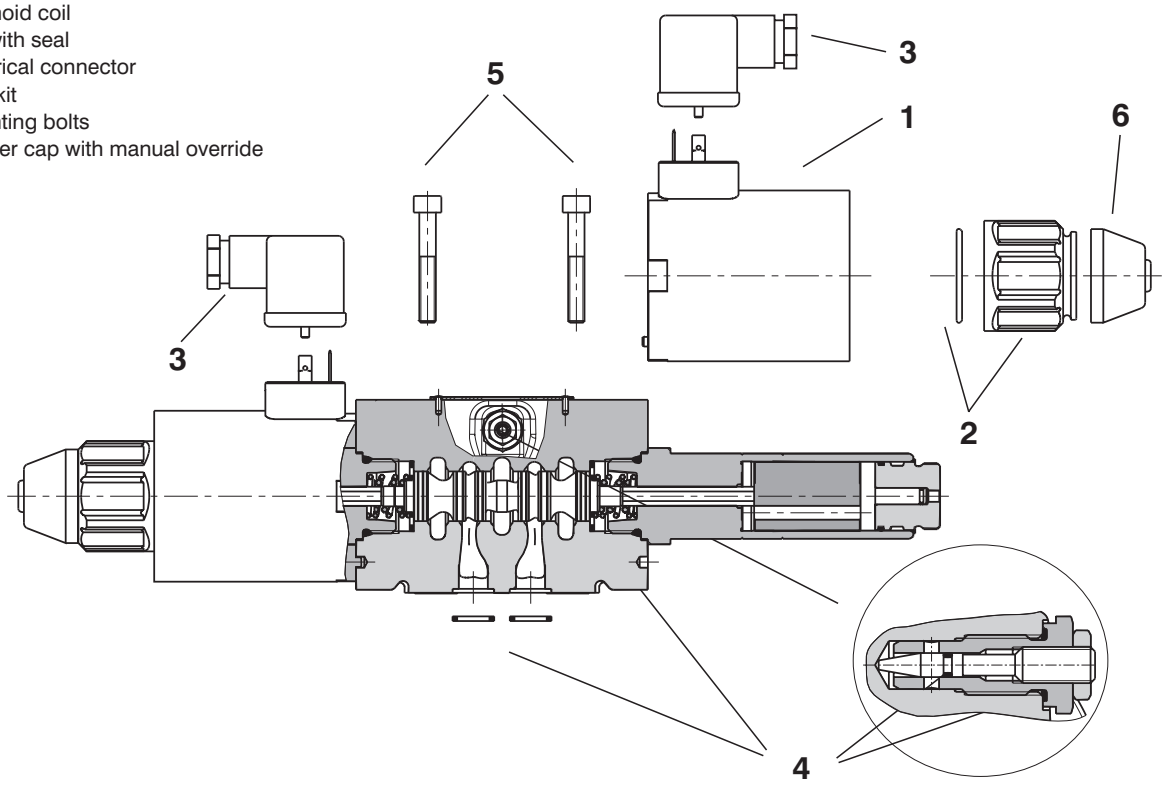
T3 - Throttle Screw

The control orifice allows for stepless adjustment of the valve shifting time.



Spare Parts

1 Solenoid coil
2 Nut with seal
3 Electrical connector
4 Seal kit
5 Mounting bolts
6 Rubber cap with manual override



Solenoid coil

Type designation of the coil voltage	Type of the coil	
	E1	E5
	Ordering number	
01200	936-4610	
02400	936-4627	
10600	936-4679	
20500	936-4685	
12060		936-3480
23050		936-3485

Solenoid retaining nut with seal

Type of the nut	Seal ring	Ordering number
Standard nut	30 x 2	489-9900
Rubber cap with manual override		489-9901

Electrical connector, DIN 43 650

Type designation	Connector A grey	Connector B black
	Ordering number	
K1	936-9902	936-9901
K5	936-9906	936-9905
K2	936-9908	936-9907
K3	936-9904	936-9903
K4	936-9910	936-9909

Seal kit

Type	Dimensions, number		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.)	489-9902
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.)	489-9903

Mounting bolts

Dimensions, number	Tightening torque	Ordering number
M6 x 40 DIN 912-10.9 (4 pcs.)	14+2 Nm	485-9964

Soft Shifting Spool Optionst

T2	10 Nm	489-9905
T3	10 Nm	489-9906

Preffered Types

Type	Ordering number	Type	Ordering number
RPE4-103Z11	489-0001	RPE4-103Z11/02400E1	489-0009
RPE4-102Z51	489-0024	RPE4-102Z51/02400E1	489-0027
RPE4-103C11	489-0002	RPE4-103C11/02400E1	489-0010
RPE4-102C51	489-0025	RPE4-102C51/02400E1	489-0028
RPE4-103H11	489-0004	RPE4-103H11/02400E1	489-0029
RPE4-103Y11	489-0003	RPE4-103Y11/02400E1	489-0030
RPE4-102R11	489-0005	RPE4-102R11/02400E1	489-0013
RPE4-102R21	489-0006	RPE4-102R21/02400E1	489-0031
RPE4-102Y51	489-0026	RPE4-102Y51/02400E1	489-0032
RPE4-103Z11/01200E1	489-0021	RPE4-103Z11/23050E5	489-0033
RPE4-102Z51/01200E1	489-0015	RPE4-102Z51/23050E5	489-0034
RPE4-103C11/01200E1	489-0022	RPE4-103C11/23050E5	489-0035
RPE4-102C51/01200E1	489-0019	RPE4-102C51/23050E5	489-0036
RPE4-103H11/01200E1	489-0014	RPE4-103H11/23050E5	489-0020
RPE4-103Y11/01200E1	489-0011	RPE4-103Y11/23050E5	489-0037
RPE4-102R11/01200E1	489-0023	RPE4-102R11/23050E5	489-0038
RPE4-102R21/01200E1	489-0016	RPE4-102R21/23050E5	489-0039
RPE4-102Y51/01200E1	489-0018	RPE4-102Z51/23050E5	489-0040

Caution!

- 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

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Solenoid - Operated Directional Control Valves with Wirebox

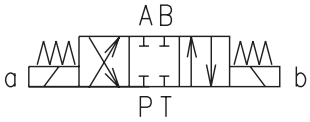
RPEW4-06

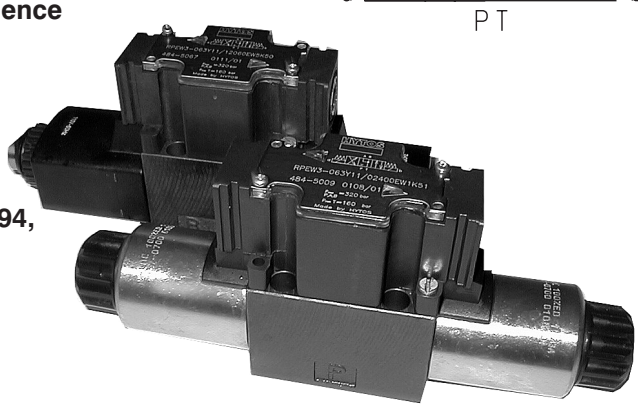
Size 06 • p_{max} up to 320 bar • Q_{max} up to 80 L/min

HA 4035
2/2005

Replaces
HA 4035 2/2004

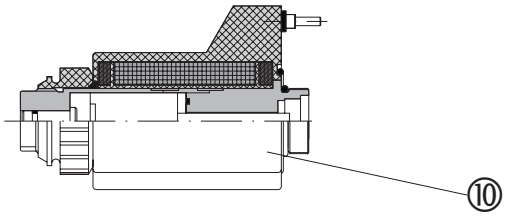
- ❑ **4/3-, 4/2- and 3/2- way directional control valves**
- ❑ **Four-land spool - reduced functional dependence on fluid viscosity**
- ❑ **Wet pin core tubes**
- ❑ **Push button manual override**
- ❑ **Installation dimensions to ISO 4401-03-02-0-94, DIN 24 340-A6**
- ❑ **Subplates see Data Sheet HA 0002**
- ❑ **CSA Upon request**

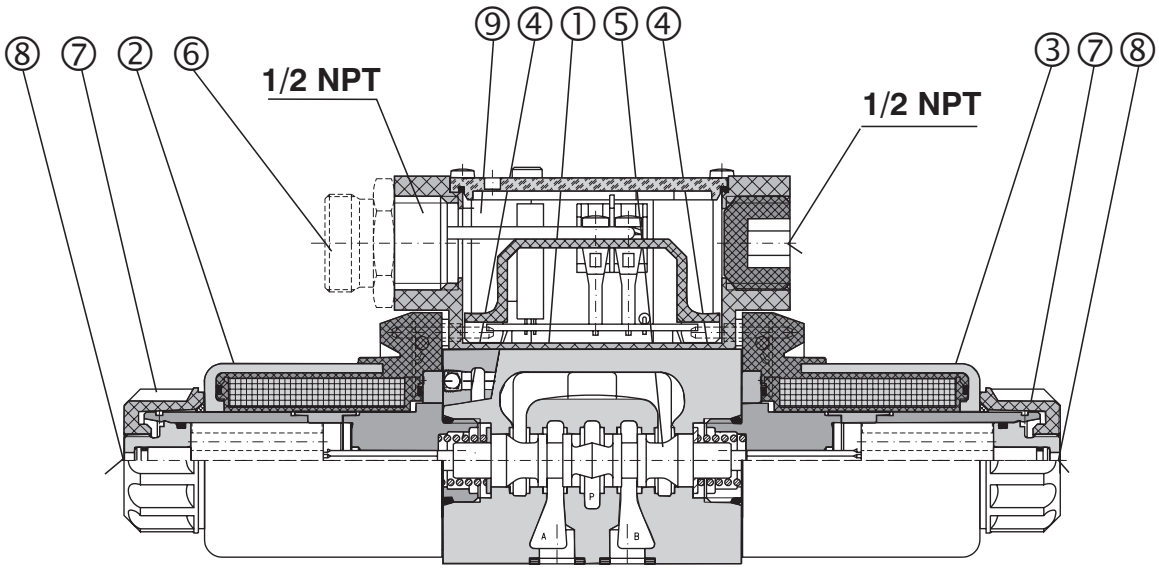




Functional Description

The RPEW4 directional control valves consist of housing (1), a control spool (5) with two centering springs (4) and cylindrical operating solenoids (2, 3), electric wirebox (9) and connector (6).
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 solenoids are supplied with DC and AC (10) - voltage through the 1/2 NPT Ports on the wirebox (optional on both sides) or through Connector Item (3 - Pin single solenoid, 5 - Pin - double solenoid) see wiring diagram (page 7). The wires are connected to a terminal plate inside the wirebox. Optional lights are installed on this terminal plate for shift indication. The lights are visible as raised arrows on the valve label. The solenoids are retained by the Nut (7) and plug-in to the wirebox. Plug -in design allows easy removal without wire change.
In the case of solenoid malfunction or power failure, the spool of the valve can be shifted by manual override (8), 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

RPEW4-06 ☐ ☐ / ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

Solenoid Operated Directional Control Valves with Wirebox

Nominal 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 wirebox terminals)

12 V DC / 2.64 A	**01200**
24 V DC / 1.32 A	**02400**
120V AC/60Hz*	**12060**

*AC coils
or
DC coils with rectifier in wirebox

CSA Upon request

Note: For other voltages consult factory

Type of Solenoid Coil for Wiring Box (Plug-In-Coil)

DC solenoid	**EW1**
DC solenoid with quenching diode	**EW2**
AC solenoid	**EW5**

Type of Wirebox

Wirebox for DC and AC	**K**
Wirebox AC rectified (rectifier in wirebox)	**R**

Seals

omit	NBR
V	FPM (Viton)

Orifice in P Port

omit	without orifice
D1	∅1.0 mm
D2	∅1.5 mm
D3	∅2.0 mm
D4	∅2.2 mm
D5	∅2.5 mm

Spool Speed Control Orifice

omit	without damping
T1	orifice ∅0.7 mm in solenoid*

* for DC voltage only

Manual Override

omit	standard
N1	covered with retaining nut*
N2	covered with rubber boot*

* for DC voltage only

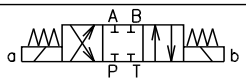
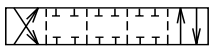
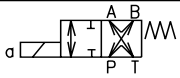
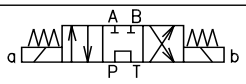
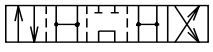
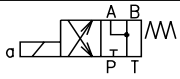
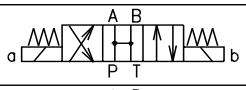
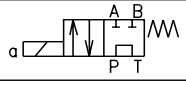
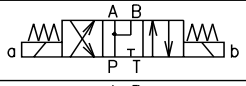
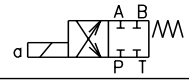
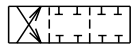
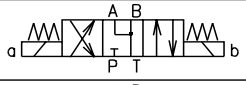
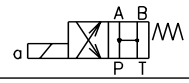
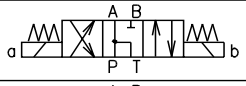
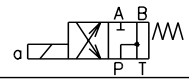
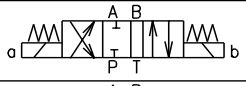
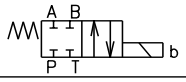
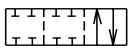
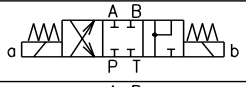
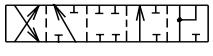
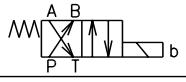
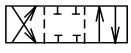
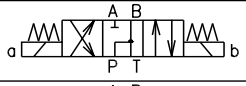
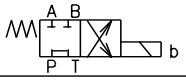
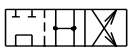
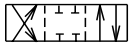
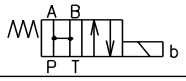
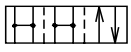
Wirebox Configurations:

50	Standard wiring box with 1/2 NPT both ends (Either side can be used for wiring, Remove cover -plug accordingly)
51	Standard wiring box with 1/2 NPT both ends and lights (B- side pluged, A - side covert for shipping)
52	Wiring box with 3 PIN connector ANSI/B93.55M mounted on A-side (B-side pluged, only for single solenoid valves)
53	Wiring box with 3 PIN connector ANSI/B93.55M mounted on B-side (A-side pluged, only for single solenoid valves)
54	Wiring box with 3 PIN connector ANSI/B93.55M mounted on A-side with light (B-side pluged, only for single solenoid valves)
55	Wiring box with 3 PIN connector ANSI/B93.55M mounted on B-side with light (A-side pluged, only for single solenoid valves)
56	Wiring box with 5 PIN connector ANSI/B93.55M mounted on A-side (B-side pluged, only for double solenoid valves)
57	Wiring box with 5 PIN connector ANSI/B93.55M mounted on B-side (A-side pluged, only for double solenoid valves)
58	Wiring box with 5 PIN connector ANSI/B93.55M mounted on A-side with light (B-side pluged, only for double solenoid valves)
59	Wiring box with 5 PIN connector ANSI/B93.55M mounted on B-side with light (A-side pluged, only for double solenoid valves)

Technical Data

Nominal size	mm	06		
Maximum flow	L/min	see p-Q characteristics		
Max. operating pressure at porte P, A, B	bar	320		
Max. operating pressure at port T	bar	210		
Pressure drop	bar	see Δp-Q characteristics		
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP-RP 91H in viscosity classes ISO VG 32, 46 and 68.		
Fluid temperature range for NBR seals	°C	-30 ... +80		
Fluid temperature range for FPM seals	°C	-20 ... +80		
Ambient temperature, max.	°C	up to +50		
Viscosity range	mm^2/s	20 ... 400		
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).		
Max. allowable voltage variation	%	DC: ± 10%	AC: ±10%	
Max. switching frequency	1/h	15 000		
Switching time, on: at ν=32 mm^2/s	ms	DC: 30 ... 50	AC direct: CF	AC rec.: 30 ... 40
Switching time, off: at ν=32 mm^2/s	ms	DC: 10 ... 50	AC direct: CF	AC rec.: 30 ... 70
Duty cycle	%	100		
Service life	cycles	10^7		
Enclosure type to DIN 40 050		IP 65		
Weigt - valve with 1 solenoid - valve with 2 solenoids	kg	1.3 1.9		
Mounting position		optional		

Functional Symbols

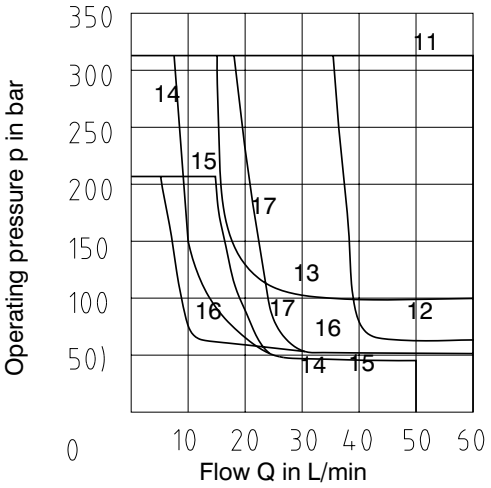
Designation	Symbol	Interposition	Designation	Symbol	Interposition
Z11			X25		
C11			Y51		
H11			C51		
P11			Z51		
Y11			H51		
L21			F51		
B11			Z11		
Z21			X11		
F11			C11		
R11			H11		
R21			N11		
A51			F11		
P51			J15		
			J75		

p-Q Characteristics

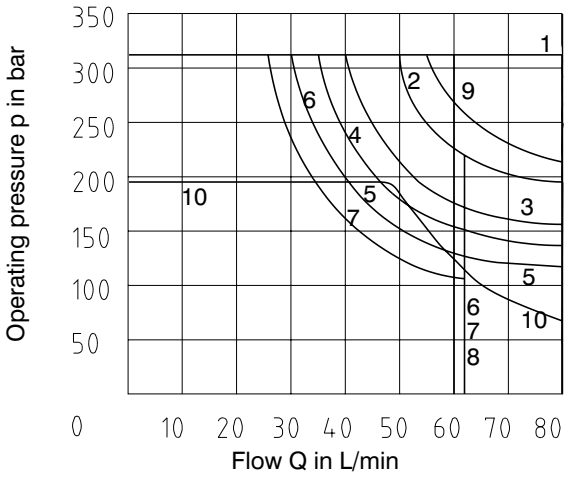
Measured at ν = 32 mm^2/s and t = 40 °C

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

AC characteristics



DC characteristics



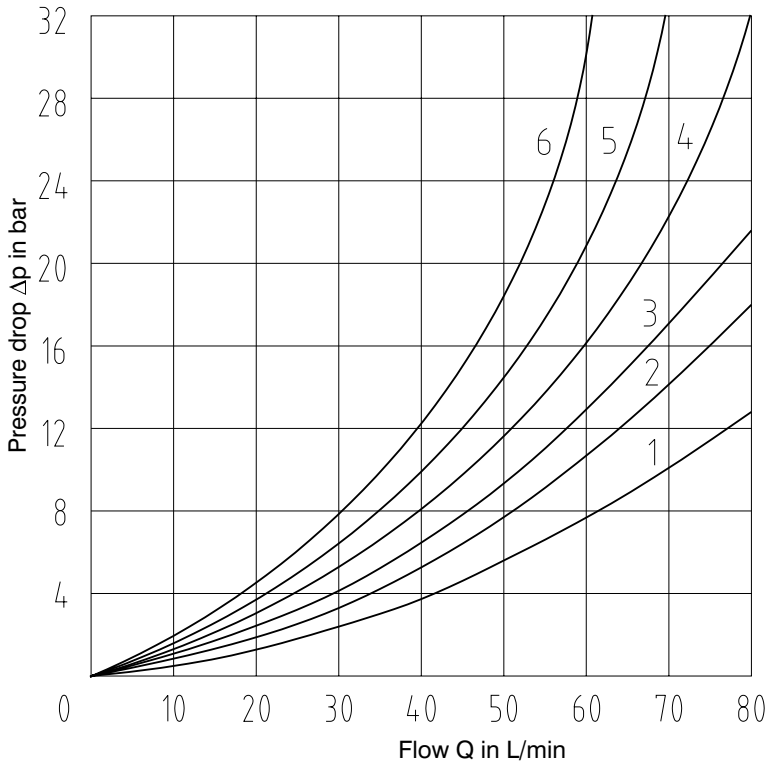
AC		AC		AC	
Z51	12	Z11	12	J15	11
Y11	12	C11	13	R21	15
Y51	12	X11	17	R11	17
C51	13	P11	11		
H11	14	L21	14		
H51	14	F11	14		
B11	12	F51	14		
N11	12	A51	16		
P51	11	J75	16		

DC		DC		DC	
Z11	1	J75	9	H51	7
C11	6	F11	5	F51	7
H11	3	R11	3	X11	3
P11	1	R21	4	N11	7
Y11	2	A51	5	X25	10
L21	5	P51	1		
B11	8	Y51	2		
J15	1	C51	6		
Z21	1	Z51	1		

Δp-Q Characteristics

Measured at ν = 32 mm^2/s and t = 40 °C

Pressure drop Δp related to flow rate.

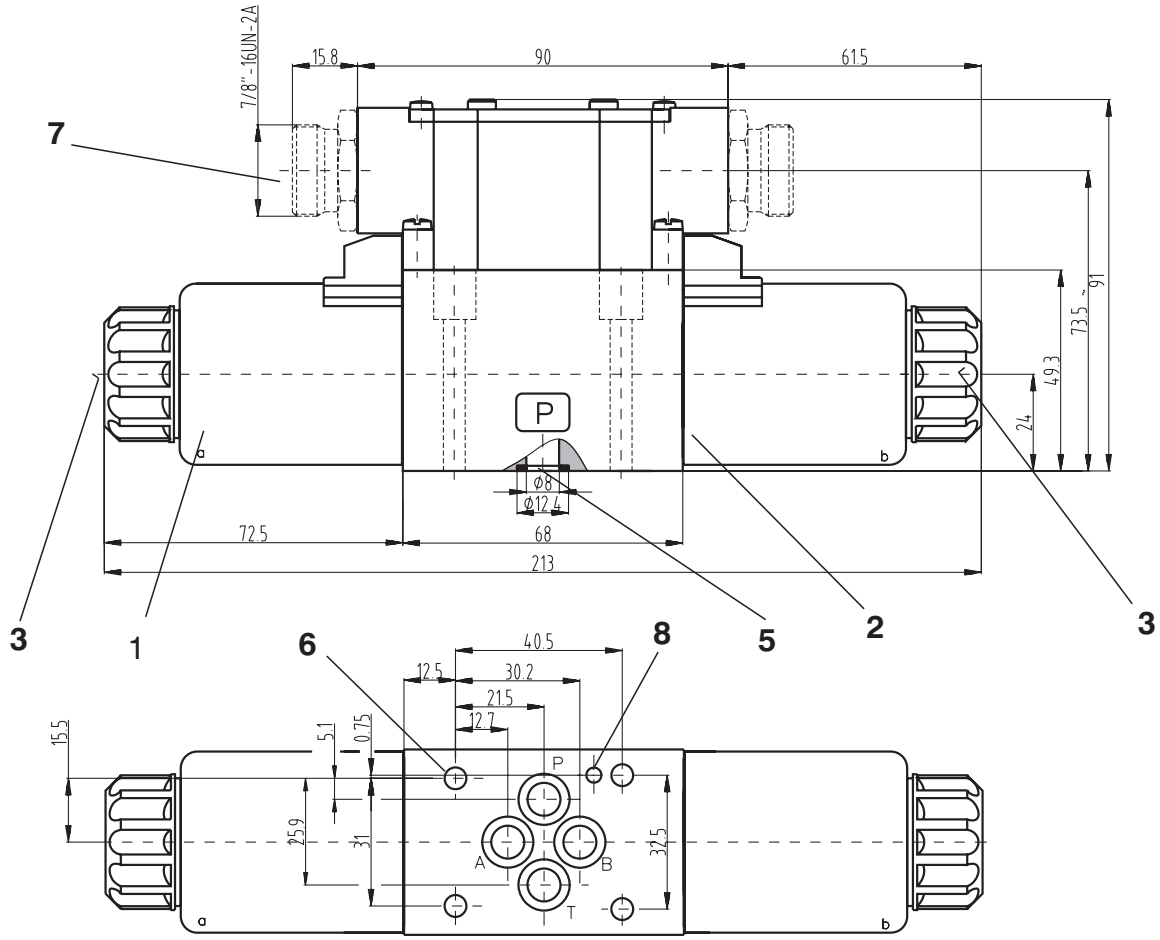


	P-A	P-B	A-T	B-T	P-T
Z11	2	2	3	3	
C11	5	5	5	6	3
H11	2	2	2	3	3
P11	1	1	3	3	
Y11	2	2	2	2	
L21	2	2	3	3	
B11	2	2	3	3	
Z21		2	3		
F11	1	2		3	3
R11	2	2	3	3	
R21	2	2	3	3	
A51	2	2			
P51		1	3		
Y51		2	2		
C51	2			3	4
Z51		2	3		
H51		2	3		
F51		2	3		
X11	2	2	3	3	
N11	2	2	3	3	
J15	2	2	3	3	
J75	2	2			

Valve Dimensions

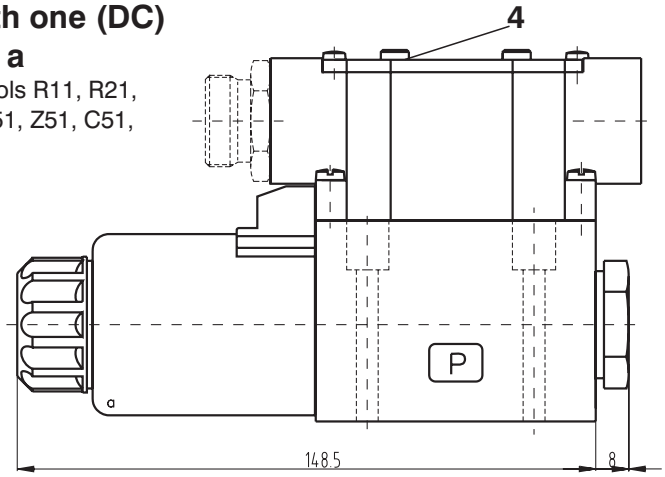
Dimensions in millimetres

Valve with two DC voltage supplied solenoids and AC rectified (Code R)



Valve with one (DC) solenoid a

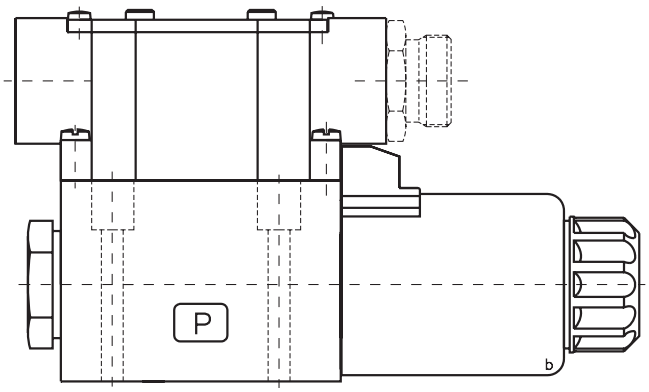
Spool symbols R11, R21, A51,P51, Y51, Z51, C51, H51, F51

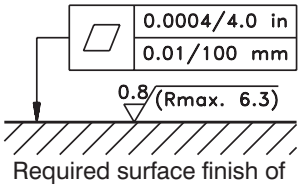


1 Solenoid a (Nut torque 3Nm)
2 Solenoid b (Nut torque 3Nm)
3 Manual override
4 Name plate
5 Square ring (4 pcs.) 0,36 x 0,66 supplied with valve
6 4 mounting holes
7 Electrical connector
8 Pin hole

Valve with one (DC) solenoid b

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



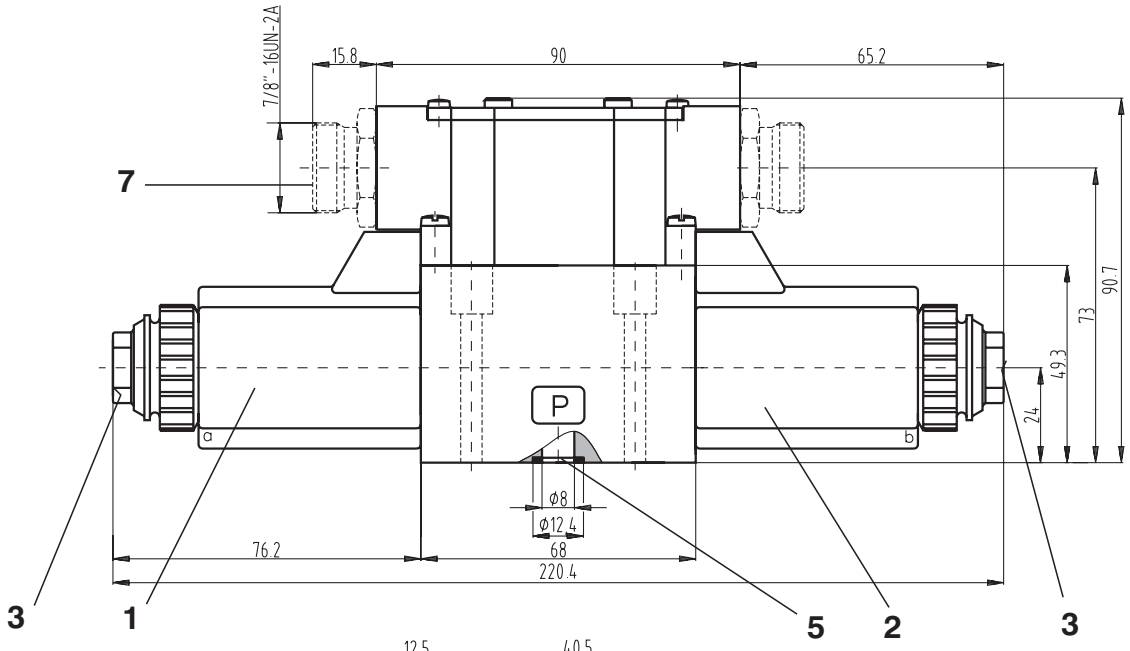


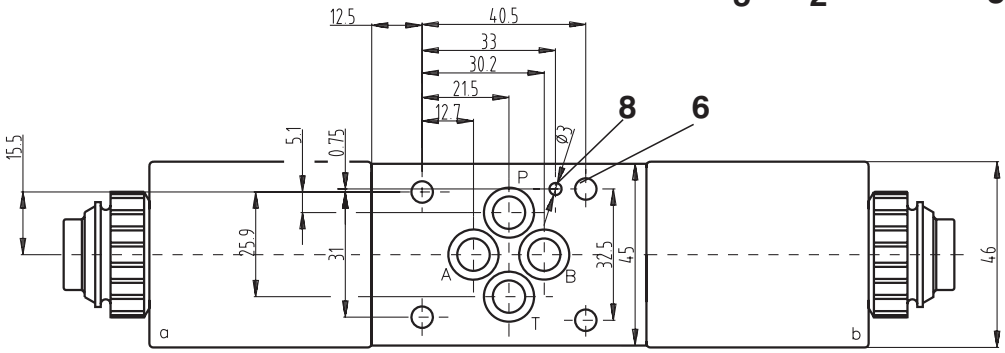
Required surface finish of interface

Valve Dimensions

Dimensions in millimetres

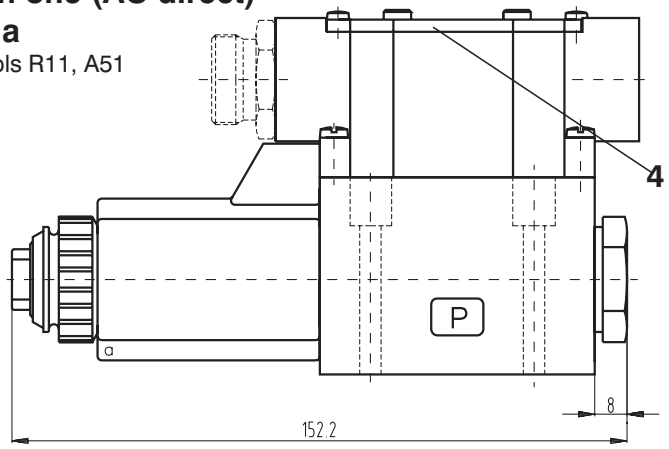
Valve with two AC direct voltage supplied solenoids





Valve with one (AC direct) solenoid a

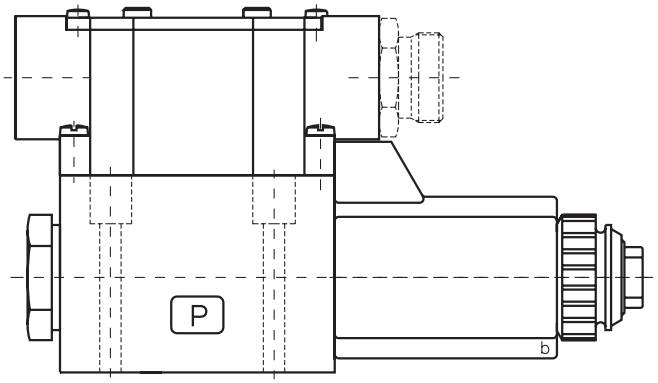
Spool symbols R11, A51

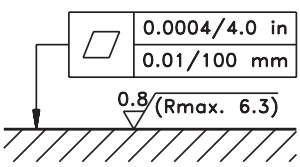


1 Solenoid a (Nut torque 3Nm)
2 Solenoid b (Nut torque 3Nm)
3 Manual override
4 Name plate
5 Square ring (4 pcs.)
0.36 x 0.66 supplied with valve
6 4 mounting holes
7 Electrical connector
8 Pin hole

Valve with one (AC) solenoid b

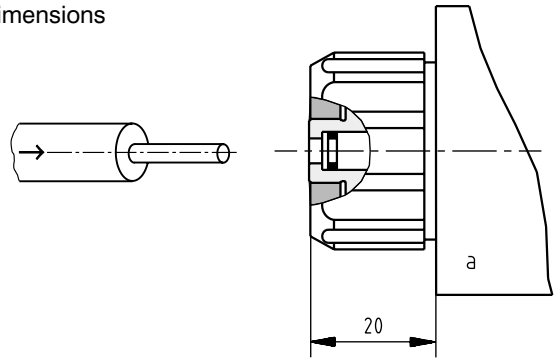
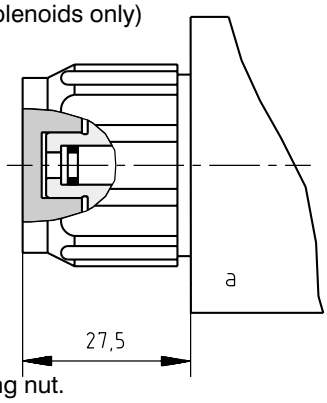
Spool symbols Z11, C11, H11

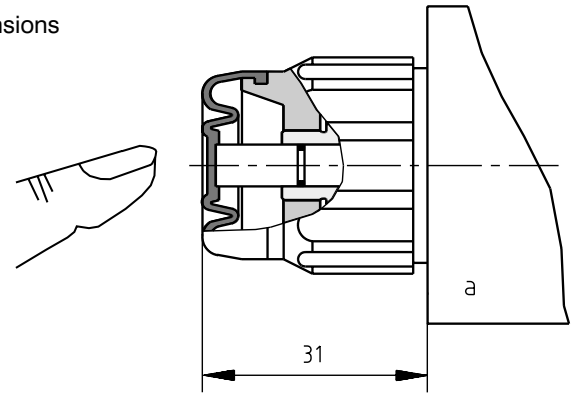




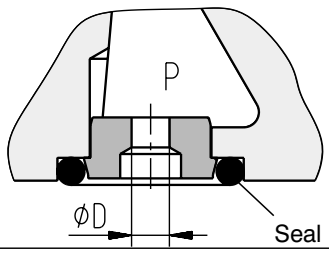
Required surface finish of interface

Manual Override

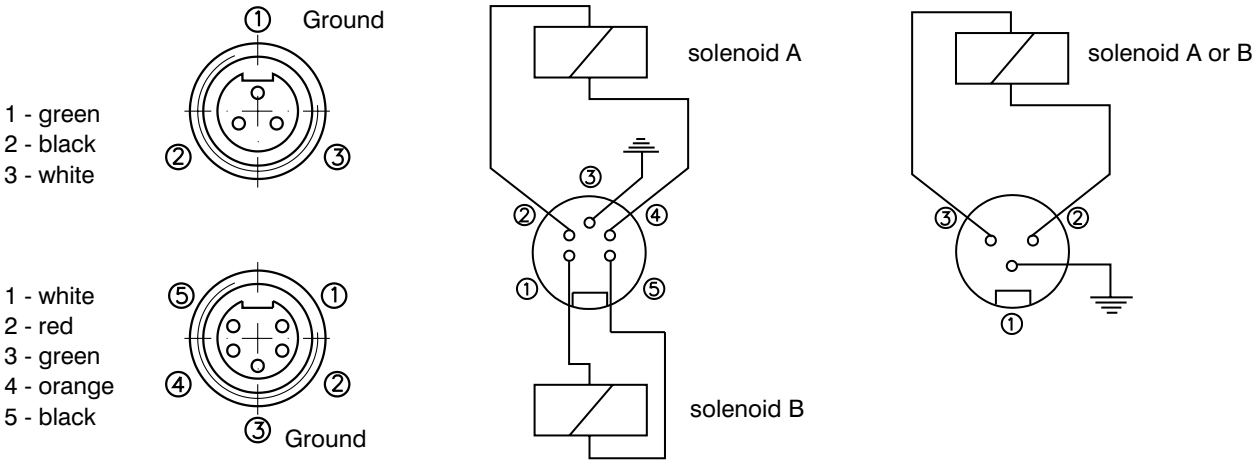
STANDARD	CLOSED NUT
Dimensions  Standard model of the manual override. Standard retaining nut of the solenoid.	Type **N1** (For DC voltage solenoids only) Dimensions  Manual override with retaining nut. Can be used after removing nut.

RUBBER BOOT	
Type **N2** (For DC voltage solenoids only) Dimensions  Manual override protected by rubber boot.	

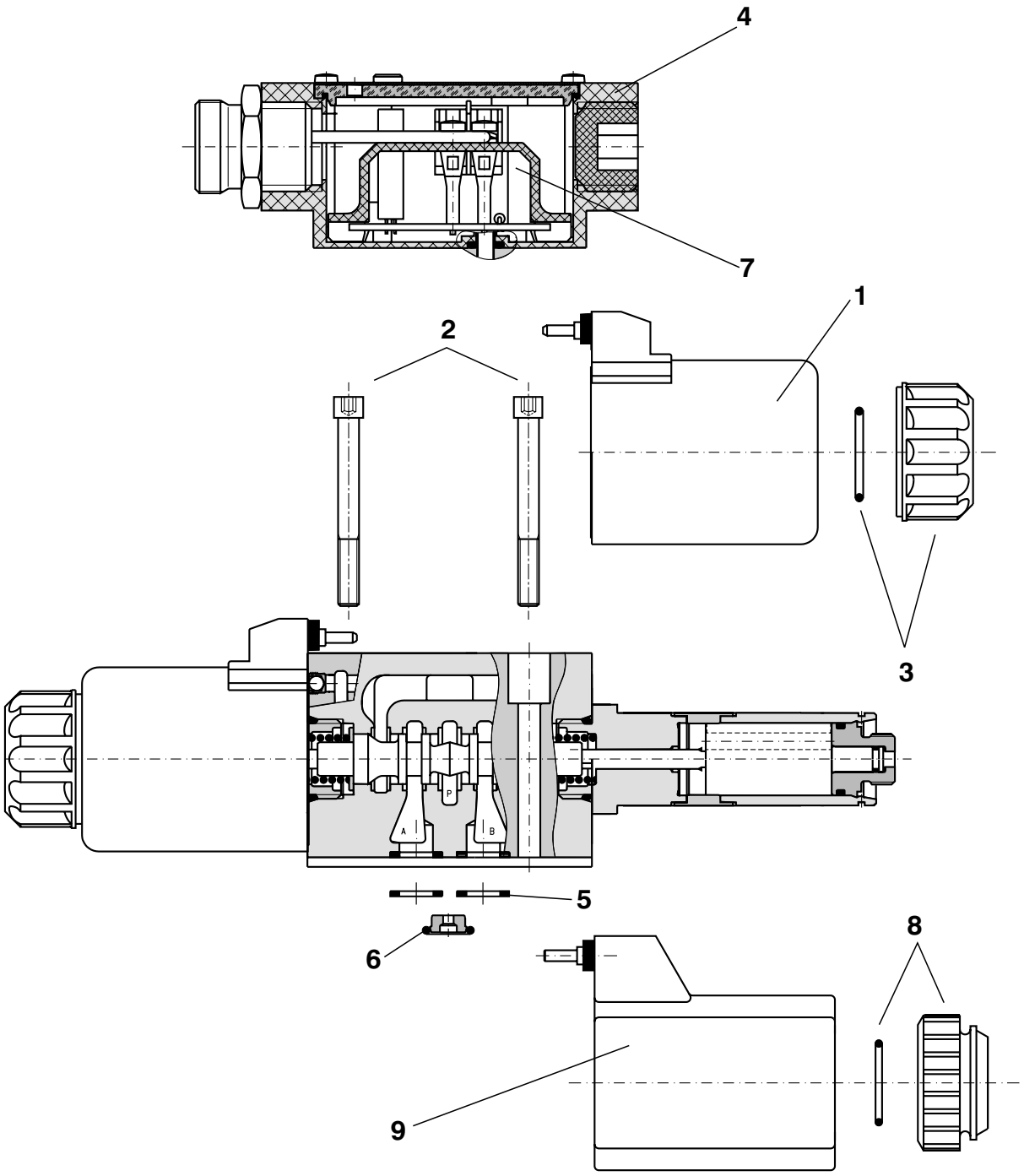
Orifice in P-Port

Type	∅D mm	Dimensions	Description
D1	1.0		P-Port orifices limit the flow into the directional control valve.
D2	1.5		
D3	2.0		
D4	2.2		
D5	2.5		

Connector - US - Standard - ANSI/B93.55M



Spare Parts



1 Solenoid coil (DC solenoid)
2 Mounting bolts
3 Nut with seal (Nut torque 3Nm)
4 Wiring box + connector
5 Seal kit
6 Orifice in P port with seal ring
7 Terminal plate
8 Nut with seal (AC solenoid)
9 AC voltage supplied solenoid

Spare Parts

Wiringbox	
Type	Ordering number
Wiring box without terminal plate	937-0668
Terminal Plates	
Type	Ordering number
Terminal plate - basic design A+B	937-0669
Terminal plate A - basic design	937-0696
Terminal plate B - basic design	937-0671
Terminal plate 12V DC - lights A+B	937-0672
Terminal plate 24V DC - lights A+B	937-0675
Terminal plate 12V DC - light A	937-0673
Terminal plate 12V DC - light B	937-0674
Terminal plate 24V DC - light A	937-0676
Terminal plate 24V DC - light B	937-0677
Terminal plate 120V AC - lights A+B	937-0678
Terminal plate 120V AC - light A	937-0679
Terminal plate 120V AC - light B	937-0680
Terminal plate 120V AC - rectifier A+B	937-0684
Terminal plate 120V AC - rectifier A	937-0685
Terminal plate 120V AC - rectifier B	937-0686
Terminal plate 120V AC - rectifier A+B and lights A+B	937-0687
Terminal plate 120V AC - rectifier and light A	937-0688
Terminal plate 120V AC - rectifier and light B	937-0689

Solenoid Coil		
Voltage rating	Type	Ordering number
01200 DC	EW1	937-0701
*01200 DC	EW1	944-0005
02400 DC	EW1	937-0700
*02400 DC	EW1	944-0006
10600 DC (120V/60Hz rectifier)	EW1	937-0702
12060 AC	EW5	937-0703
01200 DC	EW2	937-0710
02400 DC	EW2	937-0711

Solenoid Retaining Nut with Seal		
Type of the nut	Seal ring	Ordering number
Standard nut	22 x 2	484-9951
Nut with detent assembly (DC only)		484-9954
Closed nut (DC only)		484-9952
Nut with rubber boot (DC only)		484-9953
Standard nut for AC voltage supplied solenoid	18 x 1,5	486-9010

Electrical Connector, ANSI/B93.55M	
Type	Ordering number
3 PIN	937-0616
5 PIN	937-0617

* CSA Upon request

Orifice in P-Port

Type	∅D mm	Seal ring	Ordering number
D1	1.0	9.25 x 1.75	484-9973
D2	1.5		484-9974
D3	2.0		484-9975
D4	2.2		484-9977
D5	2.5		484-9976

Seal Kit

Type	Dimensions, quantity			Ordering number
Standard - NBR70	9.25 x 1.68 (4 pcs.)	17 x 1.8 (2 pcs.)	9.25 x 1.75 (1 pc)	484-9965
Viton	9.25 x 1.78 (4 pcs.)	17.17 x 1.78 (2 pcs.)		484-9971

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	484-9958

Caution!

- For applications outside the given parameters, please consult us.
- With spool symbols A51 and J75 for pressures exceeding 160 bar, the T-port should be connected directly to the tank.
- 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 for 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.

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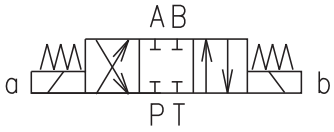
Solenoid Operated Directional Control Valves with Wirebox

RPEW4-10

HA 4044
02/2006

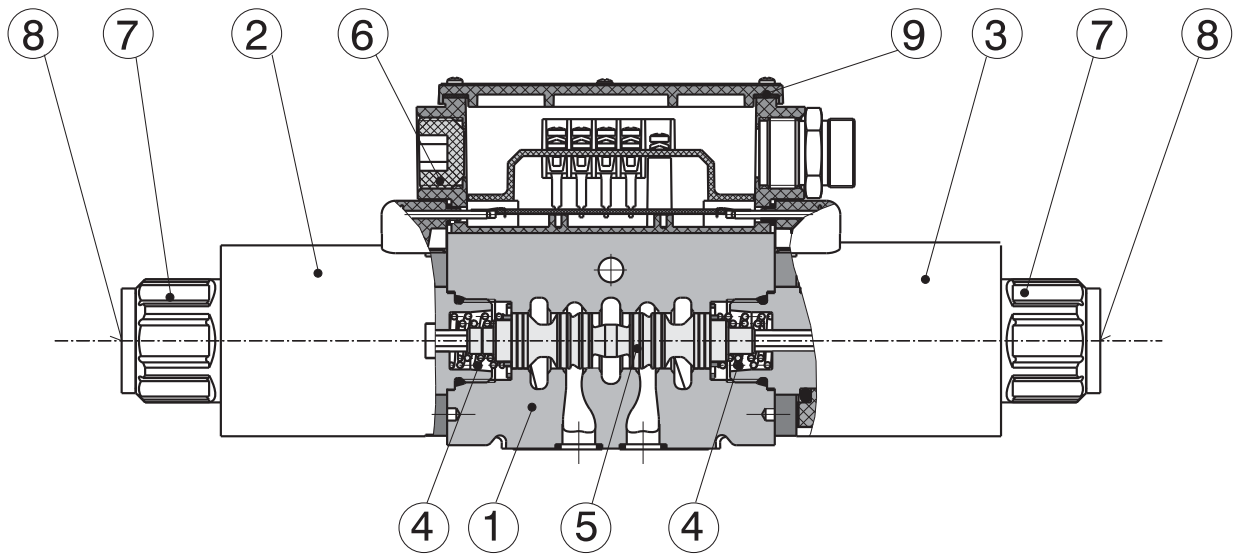
Size 10 (D 05) • ... 350 bar (5076 PSI) • ...140 L/min (37 GPM)

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



Functional Description

The RPEW4 directional control valves consist of housing (1), a control spool (5) with two centering springs (4) and cylindrical operating solenoids (2, 3), electric wirebox (9) and connector (6).
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 solenoids are supplied with DC and AC - voltage through the 1/2 NPT Ports on the wirebox (optional on both sides) or through Connector Item (3 - Pin single solenoid, 5 - Pin - double solenoid) see wiring diagram (page 7). The wires are connected to a terminal plate inside the wirebox. Optional lights are installed on this terminal plate for shift indication. The lights are visible as raised arrows on the valve label. The solenoids are retained by the Nut (7) and plug-in to the wirebox. Plug -in design allows easy removal without wire change.
In the case of solenoid malfunction or power failure, the spool of the valve can be shifted by manual override (8), provided the pressure in 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

RPEW4 - 10 □ □ / □ □ □ □ □ □ □

Solenoid Operated Directional Control Valve with Wirebox

Valve Size **10 (05)**

Number of Valve Positions
two positions **2**
three positions **3**

Functional symbols
see the table functional symbols

Rated Supply Voltage of Wirebox (at the wirebox terminals)
12 V DC / 2.64 A **01200**
24 V DC / 1.32 A **02400**
120V AC / 60Hz* **12060**

* DC coils with rectifier in wirebox only type of Wirebox R

Note: For other voltages consult factory

Type of Solenoid Coil for Wiring Box (Plug-In-Coil)

DC solenoid (DC and AC - rectified) **EW1**

Type of Wirebox
Wirebox for DC **K**
Wirebox AC rectified (rectifier in wirebox) **R**

Damping
no designation without damping nozzle
T2 throttle screw
T3 throttle screw

Manual override
no designation standard
N2 covered with rubber boot

Seals
no designation NBR
V FPM (Viton)

Wirebox Configurations:

50 Standard wiring box with 1/2 NPT both ends (Either side can be used for wiring, Remove cover -plug accordingly)

51 Standard wiring box with 1/2 NPT both ends and LED diodes (B- side plugged, A - side covert for shipping)

52 Wiring box with 3 PIN connector ANSI/B93.55M mounted on A-side (B-side plugged, only for single solenoid valves)

53 Wiring box with 3 PIN connector ANSI/B93.55M mounted on B-side (A-side plugged, only for single solenoid valves)

54 Wiring box with 3 PIN connector ANSI/B93.55M mounted on A-side with LED diode (B-side plugged, only for single solenoid valves)

55 Wiring box with 3 PIN connector ANSI/B93.55M mounted on B-side with LED diode (A-side plugged, only for single solenoid valves)

56 Wiring box with 5 PIN connector ANSI/B93.55M mounted on A-side (B-side plugged, only for double solenoid valves)

57 Wiring box with 5 PIN connector ANSI/B93.55M mounted on B-side (A-side plugged, only for double solenoid valves)

58 Wiring box with 5 PIN connector ANSI/B93.55M mounted on A-side with lLED diode (B-side plugged, only for double solenoid valves)

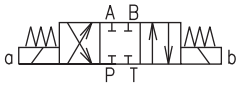
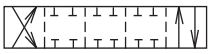
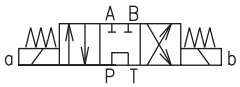
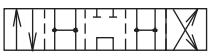
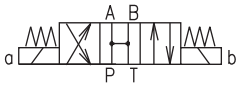
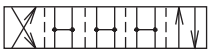
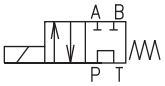
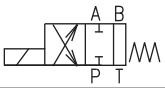
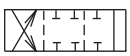
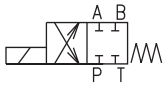
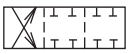
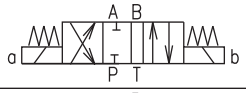
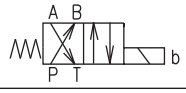
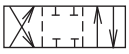
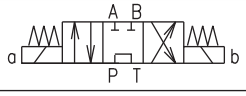
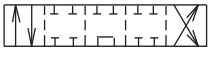
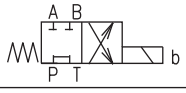
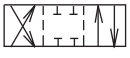
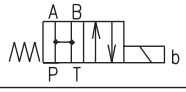
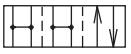
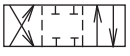
59 Wiring box with 5 PIN connector ANSI/B93.55M mounted on B-side with LED diode (A-side plugged, only for double solenoid valves)

CSA Upon request

Technical Data

Valve size	mm (US)	10 (D 05)	
Maximum flow	L/min (GPM)	see p-Q characteristics	
Maximum operating pressure at ports P, A, B	bar (PSI)	350 (5076)	
Maximum operating pressure at port T	bar (PSI)	210 (3050)	
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 (98 ... 1840)	
Maximum degree of fluid contamination		Class 18/15 to ISO 4406. A filter with a retention rate $\beta_{10} \geq 75$ is recommended.	
Maximum allowable voltage variation	%	AC: ±10	DC: ±10
Maximum switching frequency	1/h	15 000	
Switching time, ON; at ν = 32 mm^2/s (156 SUS)	ms	AC: 50 ... 330	DC: 50 ... 120
Switching time, OFF; at ν =32 mm^2/s (156 SUS)	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 - valve with 2 solenoids	kg (lbs)	3.9 (8.60) 5.4 (11.90)	
Mounting position		any	

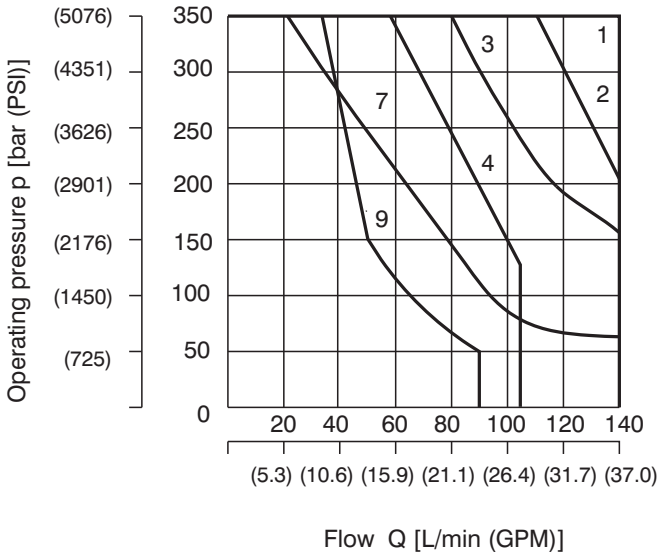
Spool Symbols

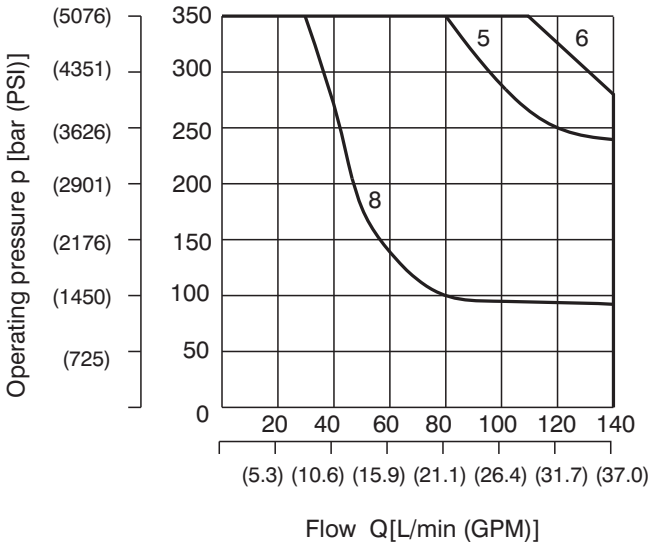
Designation	Symbol	Interposition	Designation	Symbol	Interposition
Z11			P51		
C11			Y51		
H11			C51		
P11			B51		
Y11			Z51		
L21			H51		
B11			X11		
C21			C11		
R11			H11		
R21			J15		
A51			J75		

p-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ (156 SUS)

Operating limits for maximum hydraulic power transferred by the directional valve. For respective spool type - see spool symbols.The power curves hold true for symmetrical valve flows (e.g. flows in directions P-A and B-T are identical). In case of an asymmetric flow, the power curves can lie substantially lower. In such cases we highly recommend to consult the respective power curve with the valve manufacture.



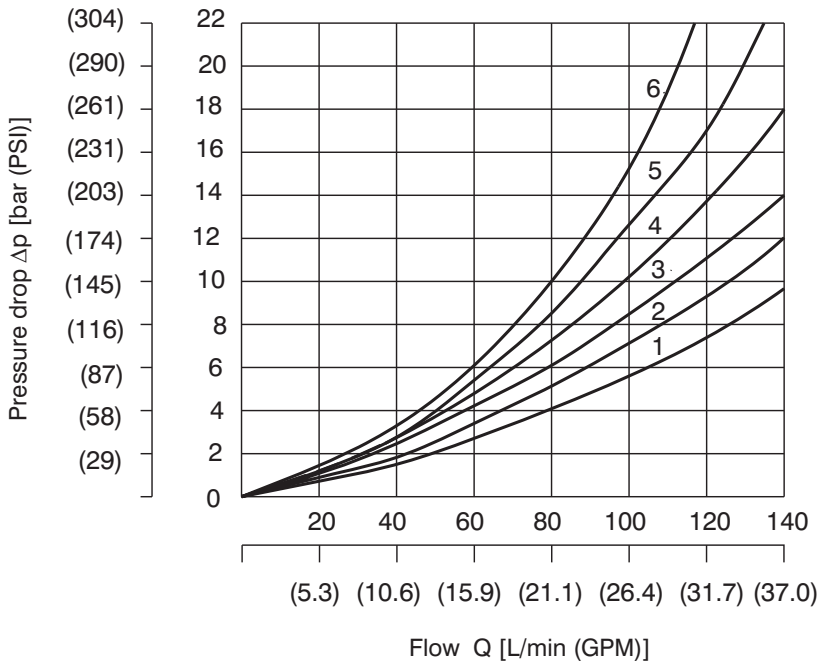


Z11	Z51	H11	H51	P11	P51	Y11	Y51	C11	C51	R11	X11	B11	B51	L21	R21	J15	J75	A51	C21
1	1	1	1	1	1	5	5	3	3	2	2	4	4	7	2	6	6	8	9

Δp-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ (156 SUS)

Pressure drop Δp related to flow rate.

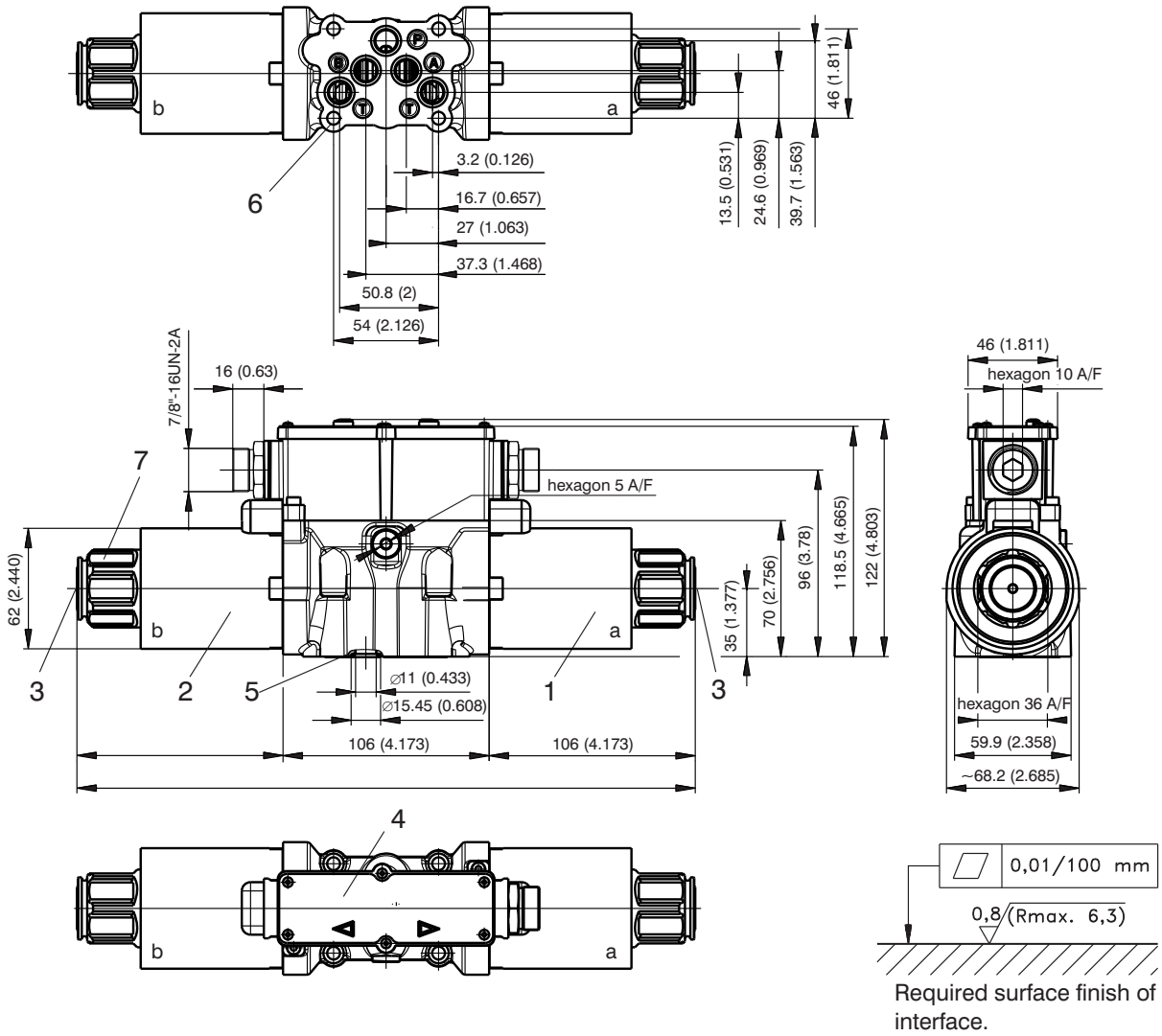


	P-A	P-B	A-T	B-T	P-T
Z11	1	1	2	2	
Z51		1	2		
H11	1	1	2	2	1
H51		1	2		1
P11	1	1	2	2	
P51		1	2		
Y11	1	1	2	2	
Y51		1	2		
C11	4	3	4	5	1
C51	4			5	1
R11	1	1	2	2	
X11	1	1	2	2	
B11	1	1	2	2	
B51		1	2		
L21	1	1	1	2	2
R21	1	1	1	3	
J15	1	2	2	3	
J75	1	1			
A51	1	1			
C21	6	6	6	6	4

Valve Dimensions

Dimensions in millimeters and inches

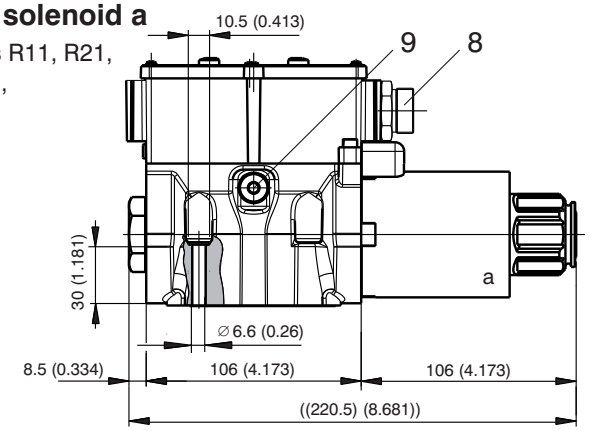
Valve with two solenoids

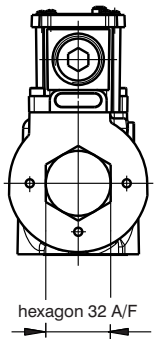


Required surface finish of interface.

Valve with one solenoid a

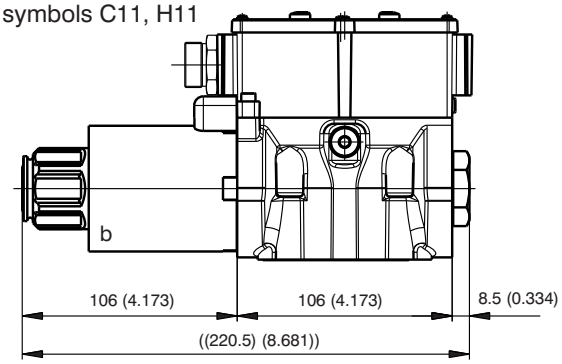
Functional symbols R11, R21, Y51, C51, Z51, H51,





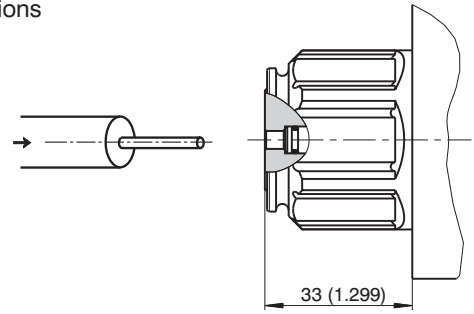
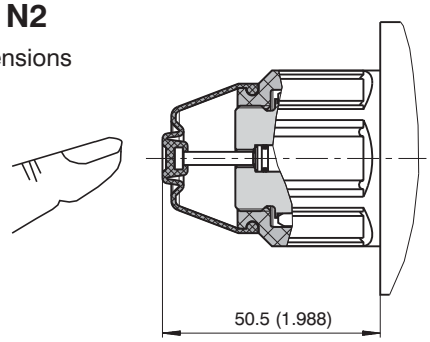
Valve with one solenoid b

Functional symbols C11, H11



1 Solenoid a (Nut torque 6Nm)
2 Solenoid b (Nut torque 6Nm)
3 Manual override
4 Name plate
5 Square ring 12.42 x 1.68 (5 pcs.) supplied with valve
6 4 mounting holes
7 Retaining nut of the solenoid
8 Electrical connector

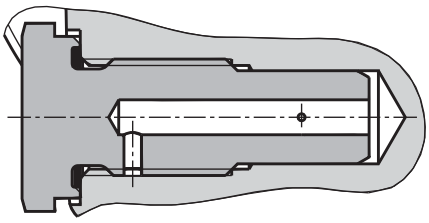
Manual Override

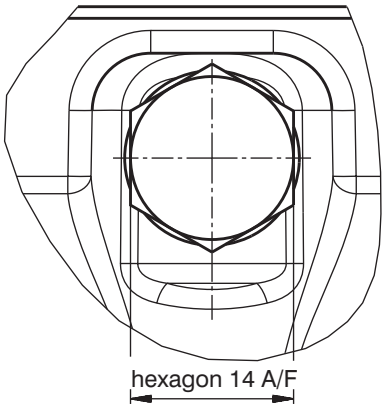
Sandard	Rubber boot
No designation Dimensions  Standard model of the manual override. Standard retaining nut of the solenoid.	Type **N2** Dimensions  Manual override protectedby the rubber boot.

Soft Shifting Spool Options Delay Time

T2 - Noozle ∅ 0.157 (0.6)

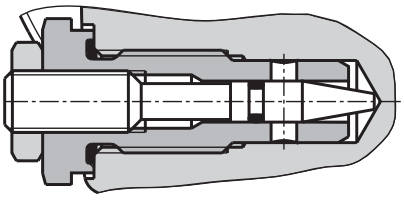
The orifice extends the valve shifting time.

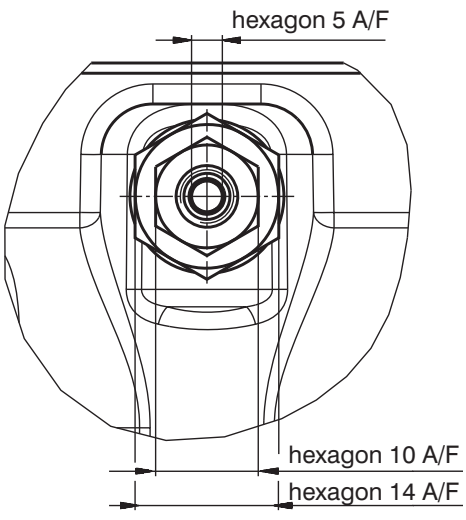




T3 - Throttle Screw

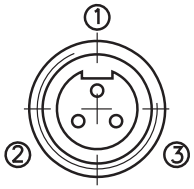
The control orifice allows for stepless adjustment of the valve shifting time.



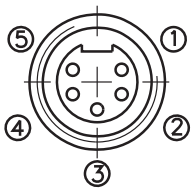


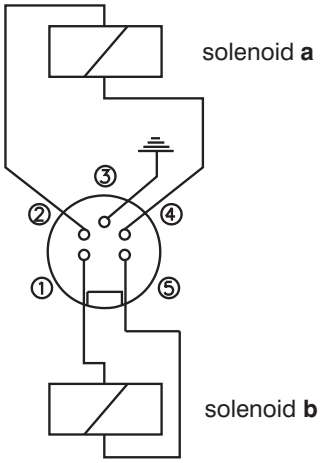
Connector - US - Standard - ANSI/B93.55M

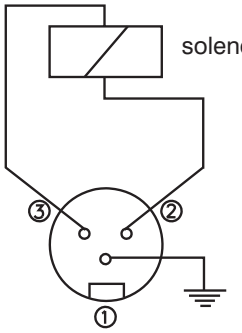
1 - green
2 - black
3 - white



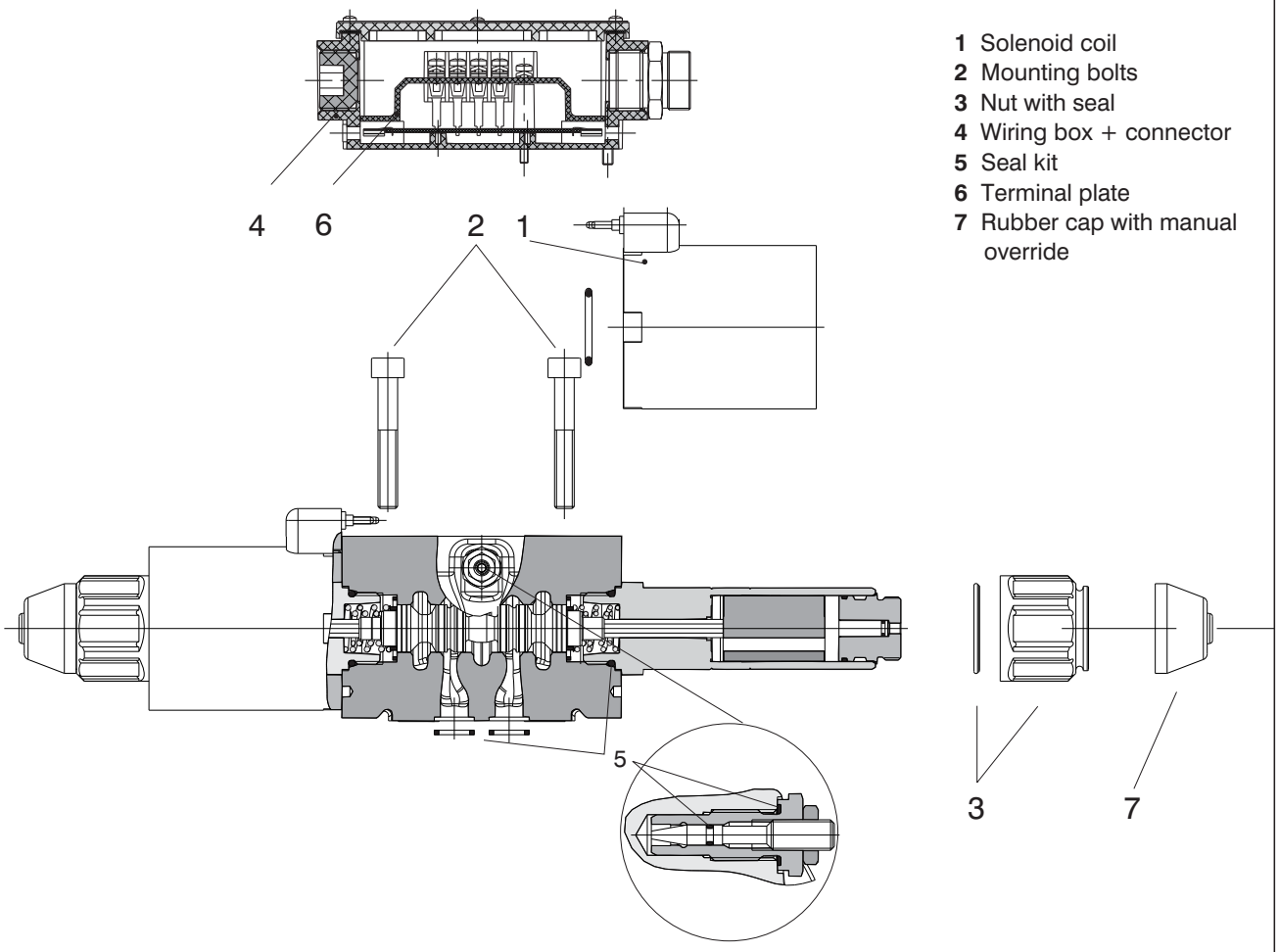
1 - white
2 - red
3 - green
4 - orange
5 - black







Spare Parts



1 Solenoid coil
2 Mounting bolts
3 Nut with seal
4 Wiring box + connector
5 Seal kit
6 Terminal plate
7 Rubber cap with manual override

Wiringbox	
Type	Order number
Wiring box without terminal plate	945-8025
Terminal Plates	
Type	Order number
Terminal plate - basic design A+B	945-8000
Terminal plate 12V DC -LED diodes A+B	945-8001
Terminal plate 24V DC - LED diodes A+B	945-8002
*Terminal plate 120V AC - rectifier A+B	945-8003
*Terminal plate 120V AC - rectifier A+B and LED diodes A+B	945-8004

* CSA Upon request

Solenoid Coil		
Voltage rating	Type	Order number
01200 DC	EW1	945-0005
02400 DC	EW1	945-0006
10600 DC (120V/60Hz rectified)	EW1	945-0007

Solenoid Retaining Nut with Seal		
Type of the nut	Seal ring	Order number
Standard nut	30 x 2	489-9900
Nut with rubber boot		489-9901

Electrical Connector, ANSI/B93.55M	
Type	Order number
3 PIN	937-0616
5 PIN	937-0617

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.)	489-9902
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.)	489-9903

Mounting bolts

Dimensions	Tightening torque	Ordering number
M6 x 40 DIN 912-10.9 (4 pcs.)	14+2 Nm (10.33+1.48 lbf.ft)	485-9964

Soft Shift Conversion Kit

T2	10 Nm (7.376 lbf.ft)	489-9905
T3	10 Nm (7.376 lbf.ft)	489-9906

Caution!

- In the case of directional control valves with two solenoids, any of the solenoids may be energized, but only after powering off the other.
- For directional control valves with other spool symbols as those shown in the table, please consult with the manufacturer.
- Other spool symbols on request.
- The plastic packaging is recyclable.
- The protective plate can be returned to manufacturer.
- Mounting bolts, studs and DIN-connectors must be ordered separately.
  Certified documentation is available per request.

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Tel.: +420-499-403111, Fax: +420-499-403421
E-mail: sales.cz@argo-hytos.com
www.argo-hytos.com

4/2- and 4/3- way directional control valves pilot operated

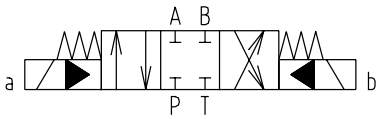
RPEH4-16

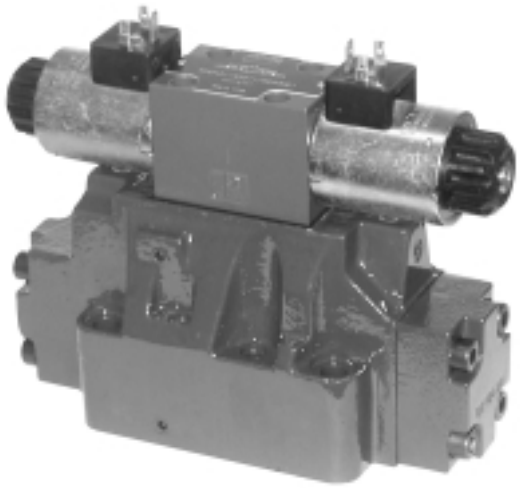
Size 16 • p_{max} up to 320 bar • Q_{max} up to 300 L/min

HA 4023
2/2003

Replaces
HA 4023 2/2002

- ❑ **Solenoid pilot operated directional valves (RPEH)**
- ❑ **Hydraulic pilot operated directional valves (RPH)**
- ❑ **Small energy input**
- ❑ **Wet pin core tubes**
- ❑ **Manual overrides optional (only for RPEH)**
- ❑ **Installation dimensions to DIN 24 340, ISO 4401 and CETOP - RP 121H**

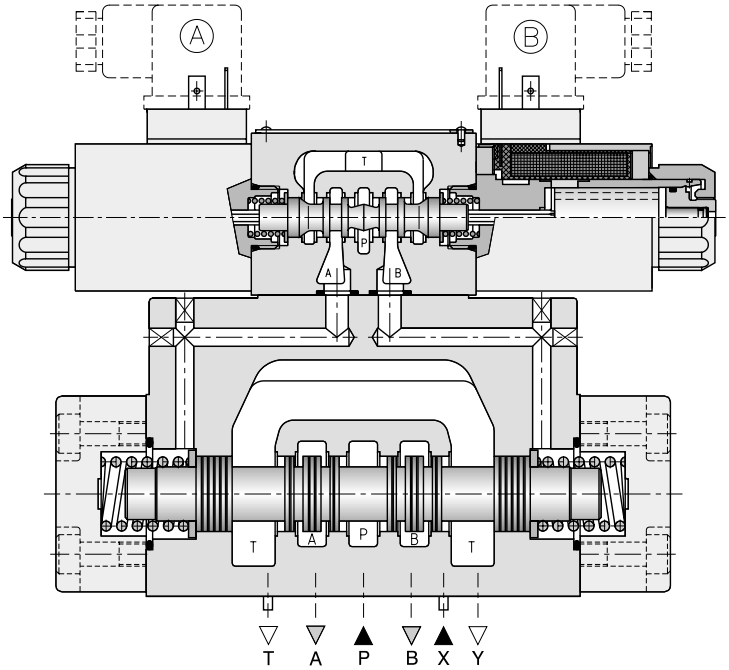




Functional Description

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 CETOP 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.



Wiringbox	
Type	Order number
Wiring box without terminal plate	945-8025
Terminal Plates	
Type	Order number
Terminal plate - basic design A+B	945-8000
Terminal plate 12V DC -LED diodes A+B	945-8001
Terminal plate 24V DC - LED diodes A+B	945-8002
*Terminal plate 120V AC - rectifier A+B	945-8003
*Terminal plate 120V AC - rectifier A+B and LED diodes A+B	945-8004

* CSA Upon request

Solenoid Coil		
Voltage rating	Type	Order number
01200 DC	EW1	945-0005
02400 DC	EW1	945-0006
10600 DC (120V/60Hz rectified)	EW1	945-0007

Solenoid Retaining Nut with Seal		
Type of the nut	Seal ring	Order number
Standard nut	30 x 2	489-9900
Nut with rubber boot		489-9901

Electrical Connector, ANSI/B93.55M	
Type	Order number
3 PIN	937-0616
5 PIN	937-0617

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.)	489-9902
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.)	489-9903

Mounting bolts

Dimensions	Tightening torque	Ordering number
M6 x 40 DIN 912-10.9 (4 pcs.)	14+2 Nm (10.33+1.48 lbf.ft)	485-9964

Soft Shift Conversion Kit

T2	10 Nm (7.376 lbf.ft)	489-9905
T3	10 Nm (7.376 lbf.ft)	489-9906

Caution!

- In the case of directional control valves with two solenoids, any of the solenoids may be energized, but only after powering off the other.
- For directional control valves with other spool symbols as those shown in the table, please consult with the manufacturer.
- Other spool symbols on request.
- The plastic packaging is recyclable.
- The protective plate can be returned to manufacturer.
- Mounting bolts, studs and DIN-connectors must be ordered separately.
  Certified documentation is available per request.

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www.argo-hytos.com

Ordering Code

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

Directional control valve, pilot operated

Type of control
electrohydraulically operated **EH**
hydraulically operated **H**

Design series

Valve size

Number of operating positions
two positions **2**
three positions **3**

Functional symbols
see the table functional symbols

Controls
if not required omit
main spool shifting speed control **D**
shifting speed control, with orifice (0.8 mm) in port P of solenoid pilot valve **PF**

Piloting
if not required omit
external piloting (see note herebelow) **E**

Seals
omit NBR
V FPM (Viton)

Manual overide
omit standard
N1 covered with retaining nut
N2 covered with rubber boot

Type of solenoid coil
E1 with DIN connector socket
E2 with DIN connector socket and quenching diode
E5 with integrated rectifier and DIN connector socket

Rated supply voltage of solenoids *
(at the coil terminals)

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

The AC coils correspond with E5 type.
* Other voltages per request.

Series number

Check valve incorporated in P-line
omit if not required
C3 with check valve (see page 7)

Drain
omit external drain which is recommended when the valve is used with back pressure on the outlet
I internal drain

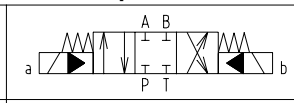
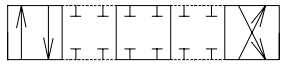
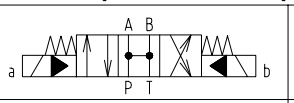
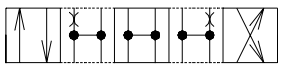
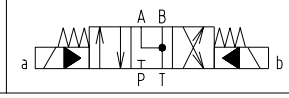
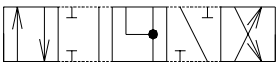
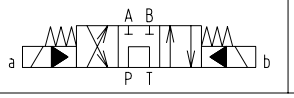
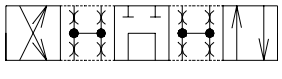
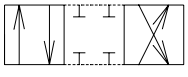
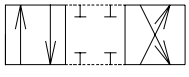
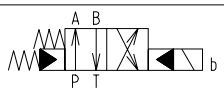
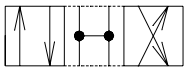
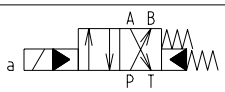
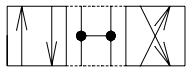
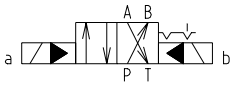
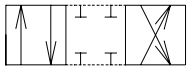
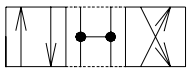
Note:
Piloting must always be external for valves with the H11 type pilot valve (available on request). Also valve must have external piloting for spools with P and T connected in the center position. Internal piloting is possible only with a C3 version valve (see page 7), or by installing a check valve 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	16
Maximum flow rate from port P to A, B, T	L/min	300
Max. operating pressure ports P, A, B port T port T (external drain version)	bar	 320 210 250
Pressure drop	bar	see Pressure Drop Δp-Q
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP-RP 91H in viscosity classes ISO VG 32, 46 and 68.
Fluid temperature range for NBR seals	°C	-30 ... +80
Fluid temperature range for FPM seals	°C	-20 ... +80
Ambient temperature max.	°C	up to +50
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Weigt - RPEH4-162 - RPEH4-163	kg	8.5 9.1

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.

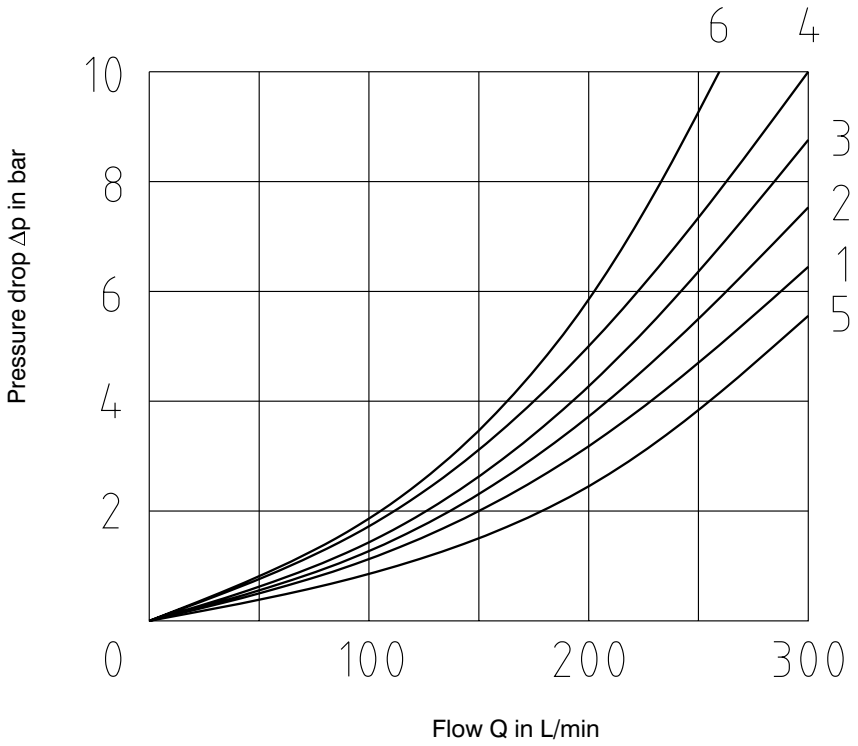
Performance Characteristic

Pressures in bar)	MIN.	MAX.
Pilot pressure	5	210
Pressure on line T with internal drainage	-	140
Pressure on line T with external drainage	-	250

Maximum flow rates in L/min	PRESSURES	
	210 bar	320 bar
Spool type C11	250	200
All other spools	300	250

Pressure Drop Δp-Q

Measured at $\nu = 35\ mm^2/s$ and $t = 50\ °C$



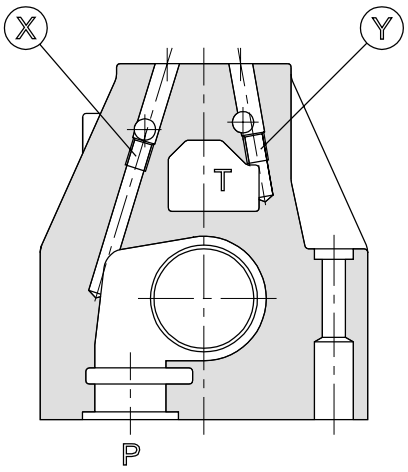
Spool type	Spool position	Connections				
		P - A	P - B	A - T	B - T	P - T
		Curves on graph				
Z11	Energized	1	1	2	3	
H11	De-energized Energized	5	5	1	2	6*
Y11	De-energized Energized	1	1	4• 1	4° 2	
C11	De-energized Energized	6	6	3	4	6
R51, R52, X51, X52	De-energized Energized	1	1	2	3	
J17, J27	Energized	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.

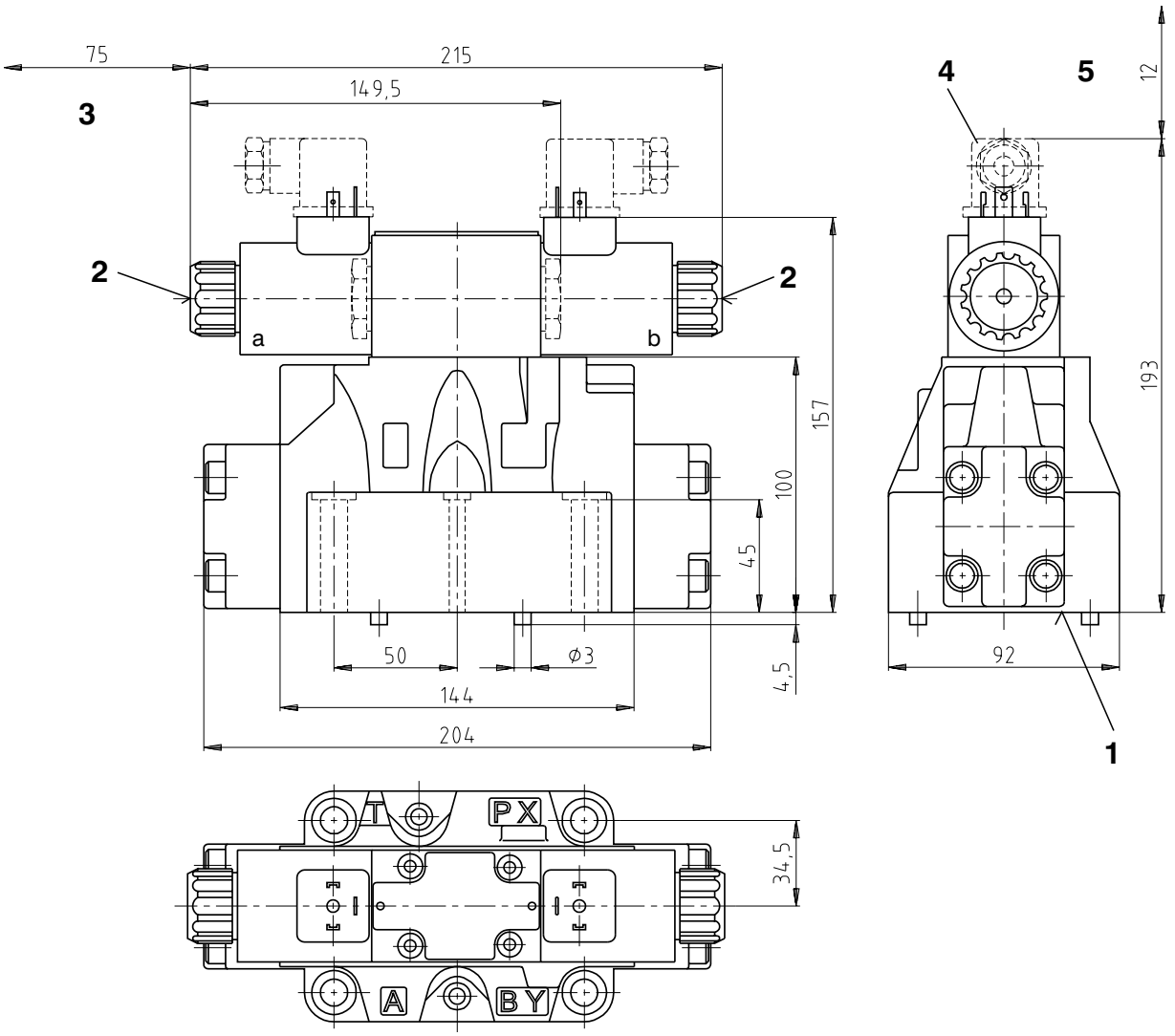
		DC solenoid	AC solenoid
Max. allowable voltage variation	%	-10 ... +6	±10
Max. switching frequency	1/h	10 000	
Switching times ±10 %, energizing (two position)	ms	70	60
Switching times ±10 %, de-energizing (two position)	ms	80	80
Switching times ±10 %, energizing (three position)	ms	50	80
Switching times ±10 %, de-energizing (three position)	ms	60	60
Duty cycle	%	100	
Service life	cycles	10^7	
Enclosure type to DIN 40 050		IP 65	

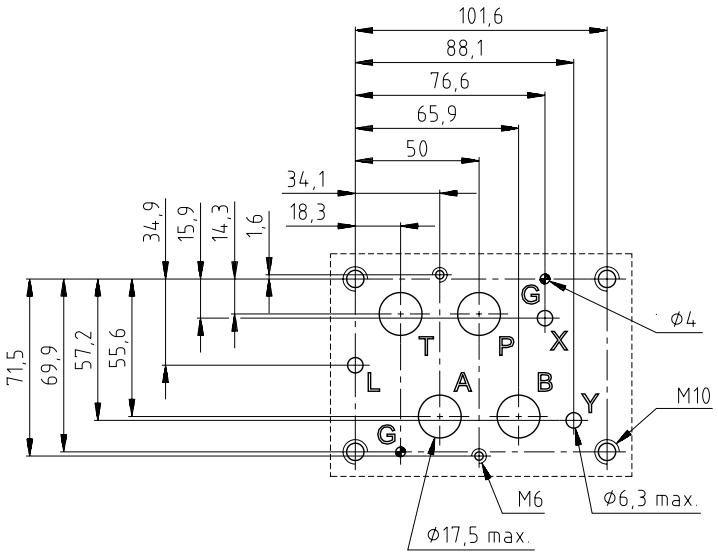
The values indicated refer to a solenoid valve operating with piloting pressure 100 bar, with mineral oil at a temperature of 50 °C, a viscosity of 35 mm^2/s and with PA and BT connections. The switch on times are obtained from the time the spool switches over. The switch off times are measured at the time pressure variation occurs in the line.

Valve Dimensions

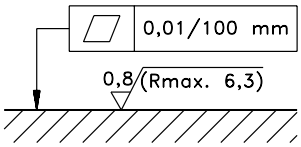
Dimensions in millimetres

RPEH4-162, RPEH4-163





1 Mounting surface with seal rings
2 Manual override
3 Space required to remove coil
4 Electrical connector
(must be ordered separately)
5 Space required to remove connector



Required surface finish of interface

Single valve fastening: 4 bolts M10 x 60
2 bolts M6 x 60

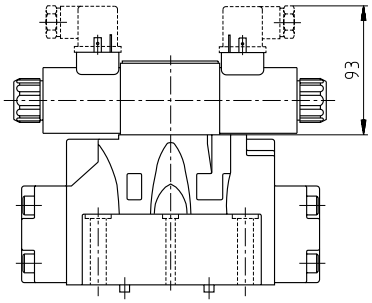
Bolt torque: M10 x 60: 40 Nm - bolts A 8.8
M6 x 60: 8 Nm - bolts A 8.8

Threads of mounting holes: M6 x 18; M10 x 18

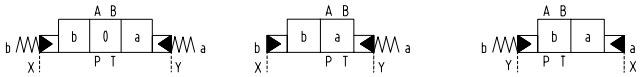
Seal rings: 4 O-rings type 22.22 x 2.62
2 O-rings type 10.82 x 1.78

Type of Command

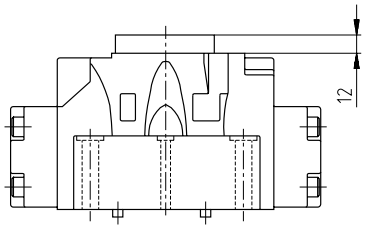
Solenoid control: RPEH
The valve is supplied with a pilot solenoid valve type RPE3-06.



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.

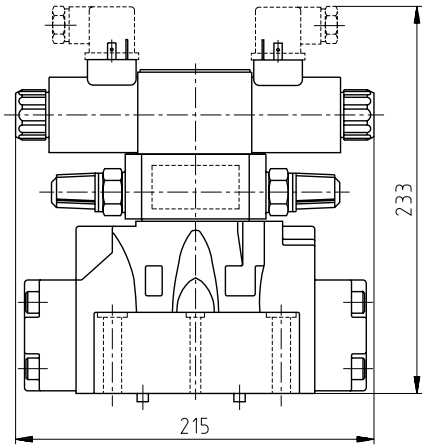


RPH4-163 RPH4-162 RPH4-162



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

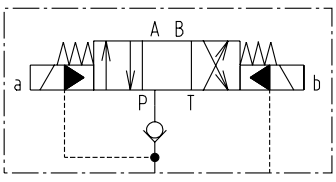
Whenever the solenoid valve installation may involve exposure to atmospheric agents or be used in tropical climates, the manual override, boot protection is recommended. Add the suffix **N1** or **N2** to request this device.

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.



Installation

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.

Spare parts

Seal kit

Design		Dimensions, number			Ordering number
		O-ring	Square ring	Back-up ring	
Head valve size 16	Standard - NBR	22.22 x 2.62 (4 pcs.)	-	-	487-9901
		10.82 x 1.78 (2 pcs.)			
		31.42 x 2.62 (2 pcs.)			
	Viton	22.22 x 2.62 (4 pcs.)			487-9902
		10.82 x 1.78 (2 pcs.)			
		31.42 x 2.62 (2 pcs.)			
Throttle valve 2VS3-06-CS type number 525-0023	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.)	525-9900
		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.)	525-9940
		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	DIN 912-10.9 (4pcs.)	8.9 Nm	484-9958
	Bolt M5 x 98 - 8G	(4 pcs.)		760-0072
	Nut M5			

Other

	Design	
Cover plate	PA, BT	525-0084
	PB, TA	525-0079

Caution!

- Service valve without range stated parameter consultation with manufacturer.
- Detaile information at control vavle - see data sheet RPE3-06, HA 4010
- The packing foil is recyclable.
- 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.

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www.argo-hytos.com

4/2- and 4/3- way directional control valves pilot operated

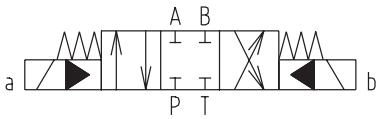
RPEH4-25

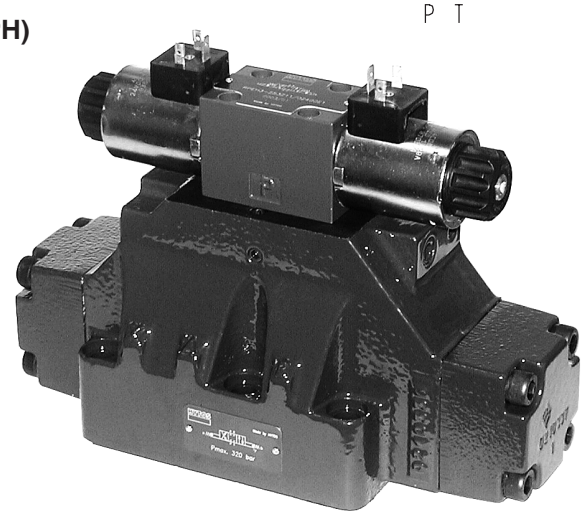
Size 25 • p_{max} up to 320 bar • Q_{max} up to 600 L/min

HA 4024
2/2003

Replaces
HA 4024 2/2002

- ❑ **Solenoid pilot operated directional valves (RPEH)**
- ❑ **Hydraulic pilot operated directional valves (RPH)**
- ❑ **Small energy input**
- ❑ **Wet pin core tubes**
- ❑ **Manual overrides optional (only for RPEH)**
- ❑ **Installation dimensions to DIN 24 340, ISO 4401 and CETOP - RP 121H**

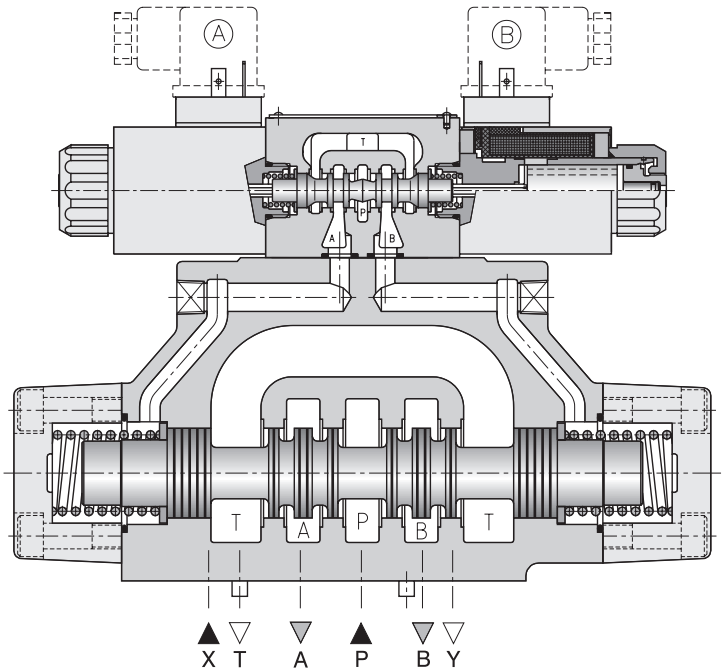




Functional Description

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 CETOP 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.



Ordering Code

RP ☐ **4-25** ☐ ☐ / ☐ ☐ ☐ / ☐ /**33-** ☐ ☐ ☐ / ☐

Directional control valve, pilot operated

Type of control
electrohydraulically operated **EH**
hydraulically operated **H**

Design series

Valve size

Number of operating positions
two positions **2**
three positions **3**

Functional symbols
see the table Functional Symbols

Controls
if not required omit
main spool shifting speed control **D**
shifting speed control, with orifice (0.8 mm) in port P of solenoid pilot valve **PF**

Piloting
if not required omit
external piloting (see note herebelow) **E**

Seals
omit NBR
V FPM (Viton)

Manual overide
omit standard
N1 covered with retaining nut
N2 covered with rubber boot

Type of solenoid coil
E1 with DIN connector socket
E2 with DIN connector socket and quenching diode
E5 with integrated rectifier and DIN connector socket

Rated supply voltage of solenoids *
(at the coil terminals)

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

The AC coils correspond with E5 type.
* Other voltages per request.

Series number

Check valve incorporated on P-line
omit if not required
C3 with check valve (see page 7)

Drain
omit external drain which is recommended when the valve is used with back pressure on the outlet
I internal drain

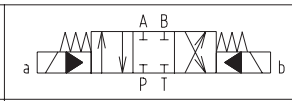
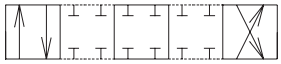
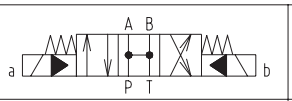
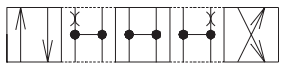
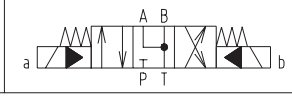
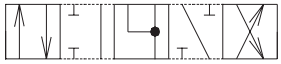
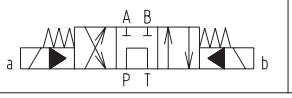
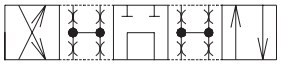
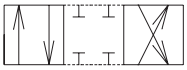
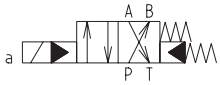
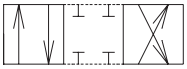
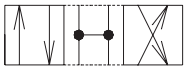
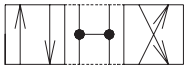
Note:
Piloting must always be external for valves with the H11 type pilot valve (available on request). Also valve must have external piloting for spools with P and T connected in the center position. Internal piloting is possible only with a C3 version valve (see page 7), or by installing a check valve 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).

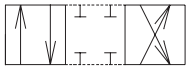
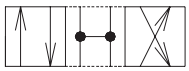
Technical Data

Valve size	mm	25
Maximum flow rate from port P to A, B, T	L/min	600
Max. operating pressure ports P, A, B port T port T (external drain version)	bar	 320 210 250
Pressure drop	bar	see Pressure Drop Δp-Q
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP-RP 91H in viscosity classes ISO VG 32, 46 and 68.
Fluid temperature range for NBR seals	°C	-30 ... +80
Fluid temperature range for FPM seals	°C	-20 ... +80
Ambient temperature max.	°C	up to +50
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Weigt - RPEH4-252 - RPEH4-253	kg	15 15.6

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.

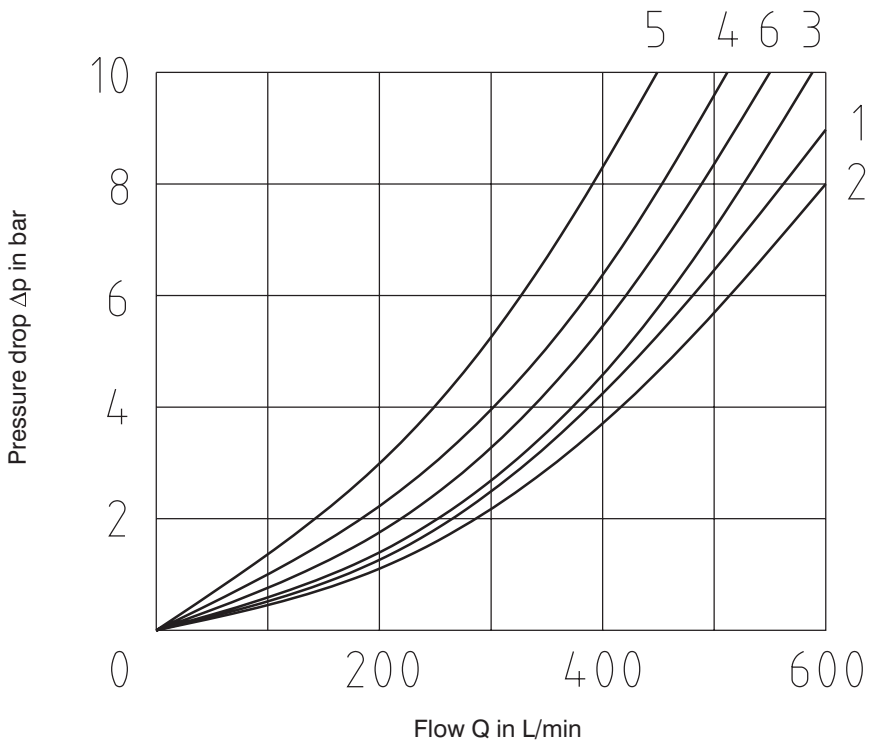
Performance Characteristic

Pressures in bar	MIN.	MAX.
Pilot pressure	5	210
Pressure on line T with internal drain	-	140
Pressure on line T with external drain	-	250

Maximum flow rates in L/min	PRESSURES	
	210 bar	320 bar
Spool type C11	500	450
All other spools	600	500

Pressure Drop Δp-Q

Measured at $\nu = 35\ mm^2/s$ and $t = 50\ °C$



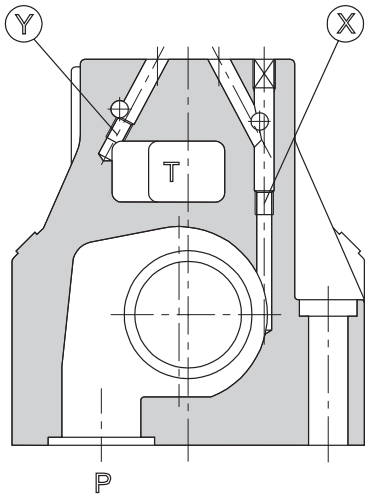
Spool type	Spool position	Connections				
		P - A	P - B	A - T	B - T	P - T
		Curves on graph				
Z11	Energized	1	1	2	3	
H11	De-energized Energized	2	2	1	2	6*
Y11	De-energized Energized	1	1	4• 1	4° 2	
C11	De-energized Energized	6	6	3	4	5
R51, R52, X51, X52,	De-energized Energized	1	1	2	3	
J17, J27	Energized	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



* Plug **Y** must always be present, version C3.

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.

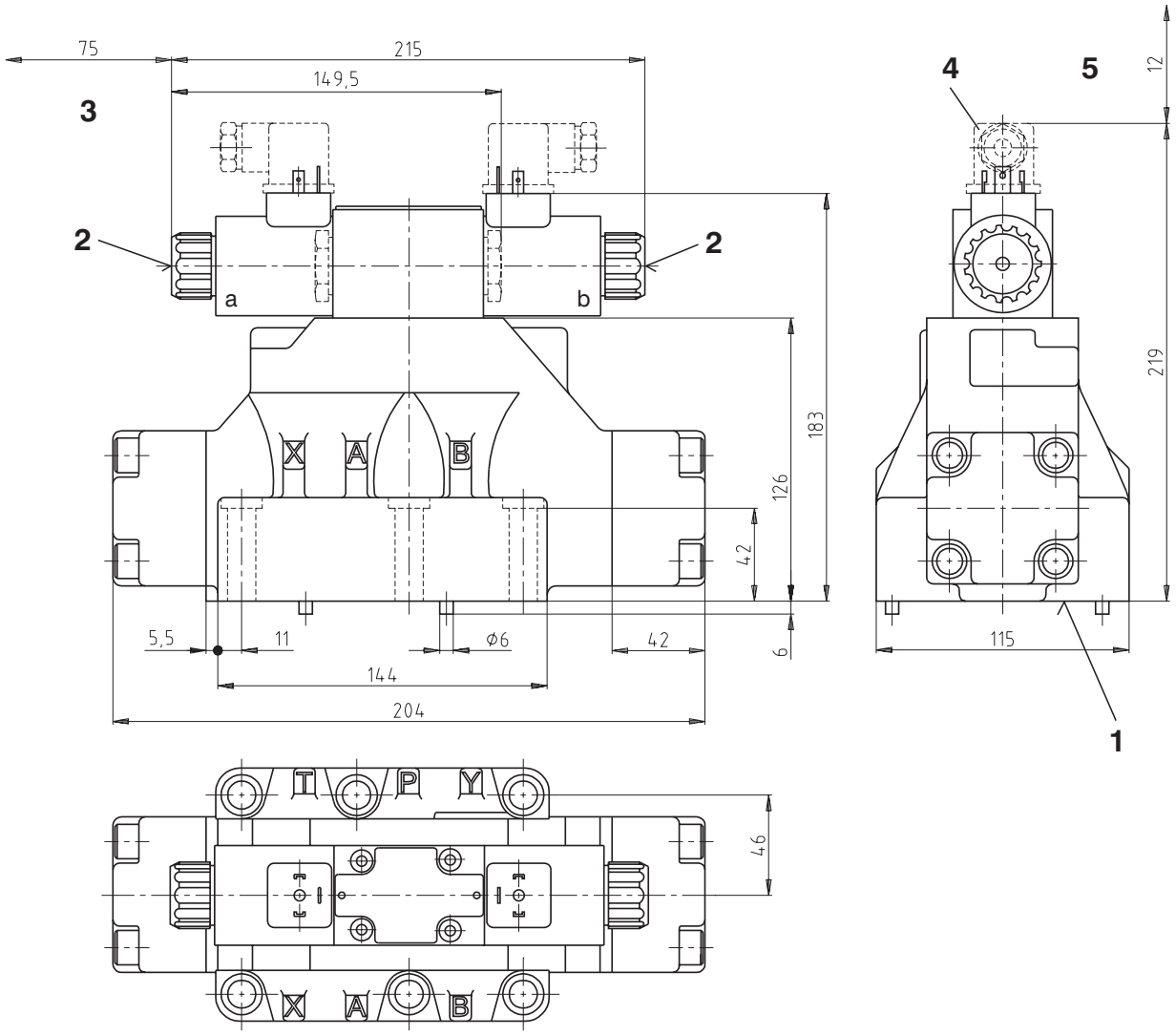
		DC solenoid	AC solenoid
Max. allowable voltage variation	%	-10 ... +6	±10
Max. switching frequency	1/h	8 000	
Switching times ±10 %, energizing (two position)	ms	75	60
Switching times ±10 %, de-energizing (two position)	ms	90	90
Switching times ±10 %, energizing (three position)	ms	55	45
Switching times ±10 %, de-energizing (three position)	ms	60	60
Duty cycle	%	100	
Service life	cycles	10^7	
Enclosure type to DIN 40 050		IP 65	

The values indicated refer to a solenoid valve operating with piloting pressure 100 bar, with mineral oil at a temperature of 50 °C, a viscosity of 35 mm^2/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.

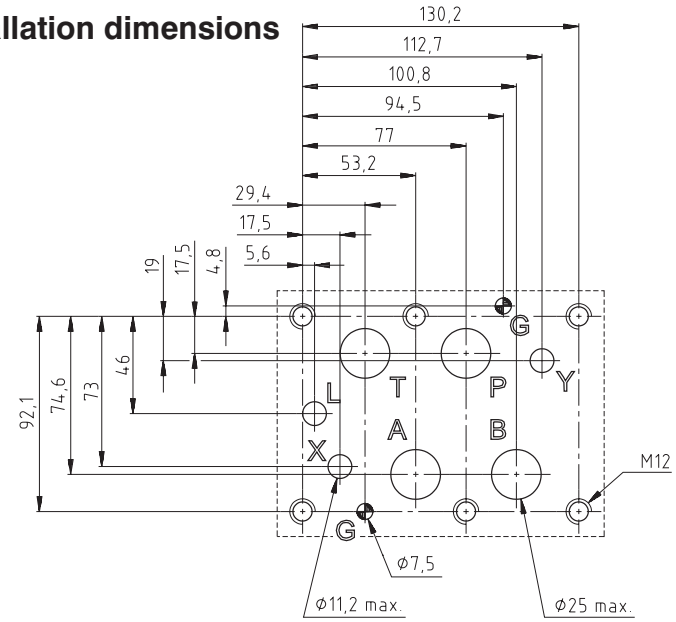
Valve Dimensions

Dimensions in millimetres

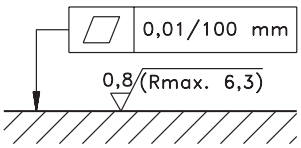
RPEH4-252, RPEH4-253



Installation dimensions



1 Mounting surface with seal rings
2 Manual override
3 Space required to remove coil
4 Electrical connector
(must be ordered separately)
5 Space required to remove connector

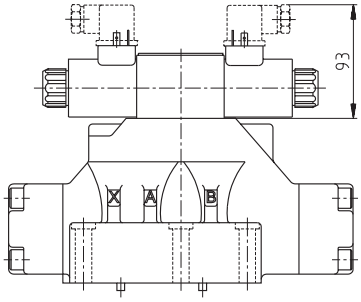


Required surface finish of interface

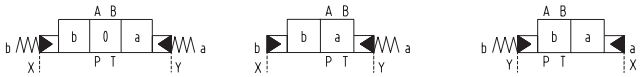
Single valve fastening: 6 bolts M12 x 60
Bolt torque: 69 Nm - bolts A 8.8
Threads of mounting holes: M12 x 20
Seal rings: 4 O-rings 29.82 x 2.62 2 O-rings 20.29 x 2.62

Type of Command

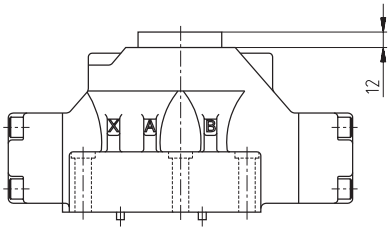
Solenoid control: RPEH
The valve is supplied with a pilot solenoid valve type RPE3-06.



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.

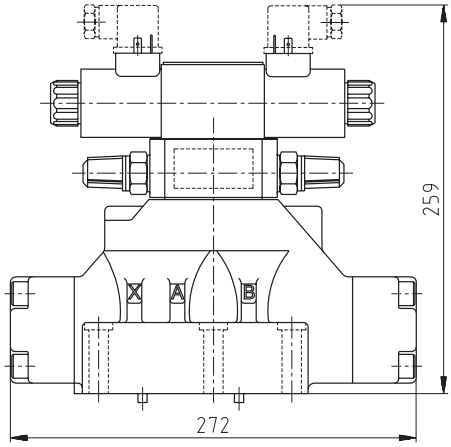


RPH4-253 RPH4-252 RPH4-252



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

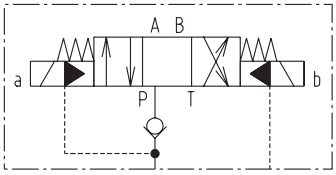
Whenever the solenoid valve installation may involve exposure to atmospheric agents or be used in tropical climates, the manual override, boot protection is recommended. Add the suffix **N1**or **N2** to request this device.

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

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.

Spare parts

Seal kit

Design		Dimensions, number			Ordering number
		O-ring	Square ring	Back-up ring	
Head vavle size 25	Standard - NBR	29.82 x 2.62 (4 pcs.)	-	-	488-9901
		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.)			488-9902
		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 525-0023	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.)	525-9900
		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.)	525-9940
		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	DIN 912-10.9 (4 pcs.)	8.9 Nm	484-9958
	Bolt M5 x 98 - 8G	(4 pcs.)		760-0072
	Nut M5			

Other

	Design	
Cover plate	PA, BT	525-0084
	PB, TA	525-0079

Caution!

- Service valve without range stated parameter consultation with manufacturer.
- Detaile information at control vavle - see data sheet RPE3-06, HA 4010
- The packing foil is recyclable.
- 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.

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www.argo-hytos.com

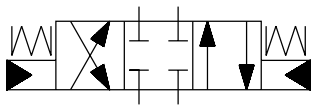
Hydraulic operated directional control valves

RPH2-06

Size 06 • p_{max} up to 320 bar • Q_{max} up to 80 L/min

HA 4005
3/2002

Replaces
HA 4005 2/2000

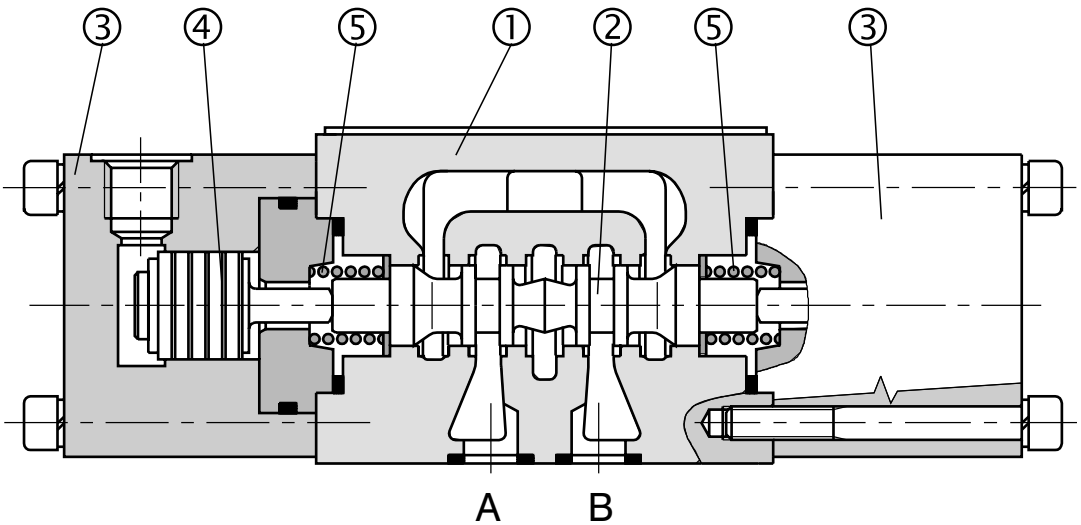


- **4/3-, 4/2- and 3/2- way spool type directional valves hydraulic operated**
- **Installation dimensions to ISO 4401-03-02-0-94 and DIN 24 340-A6**

Functional Description

The directional control valves are of modular design and comprise a housing (1) with a cylidrical spool (2) and one or two operating elements (3) consisting of hydraulic pistons (4) and return springs (5).

Three-position directional valves are fitted with two hydraulic operating elements and two centering springs. Two-position directional valves have only one hydraulic operating element and one springs.



Ordering Code

RPH2-06 ☐ ☐ / ☐ **-1** ☐

Hydraulic pilot operated directional valves

Nominal size

Number of operating positions
two positions **2**
three positions **3**

Functional symbols
see the table functional symbols

Seals
omit NBR
V FPM (Viton)

Model

Connecting threads
1 M10x1
2 G1/8

Technical Data

Valve size	mm	06
Maximum flow (according to pressure and functional symbols)	L/min	see p-Q characteristics
Maximum operating pressure at ports P, A, B	bar	320
Maximum operating pressure at port T	bar	120
Minimum pilot pressure	bar	30 + pressure at port T
Maximum pilot pressure	bar	160
Pilot volume	cm^3	0.5
Pressure drop	bar	see Δp-Q characteristics
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP RP 91H in viscosity classes ISO VG 32, 46 and 68
Fluid temperature range for standard sealing (NBR)	°C	-30 ... +80
Fluid temperature range for Viton seals (FPM)	°C	-20 ... +80
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Service life	cycles	10^7
Weight valve with 1 actuatop valve with 2 actuators	kg	1.8 2.5
Mounting position		optional

Spare Parts

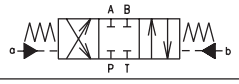
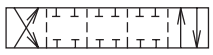
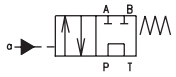
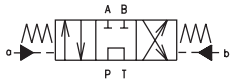
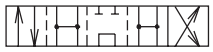
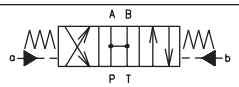
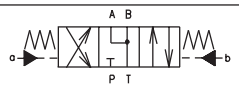
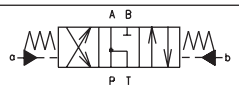
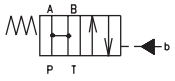
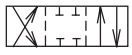
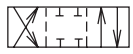
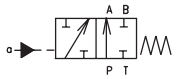
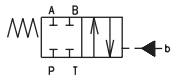
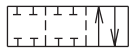
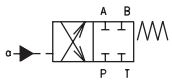
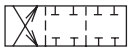
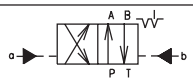
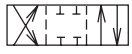
Bolt kit

Dimensions,number	Tightening torque	Ordering number
M5 x 45 DIN 912-10.9	8.9 Nm	484-9958

Seal kit

Type	Dimensions, number		Ordering number
	O-ring	Square ring	
Standard NBR	22 x 2 NBR90 (2 pcs.)	9.25 x 1.68 NBR70 (4 pcs.)	482-9000
	28 x 2 (2 pcs.)	-	
Viton	22 x 2 (2 pcs.)	9.25 x 1.78 (4 pcs.)	482-9001
	28 x 2 (2 pcs.)	-	

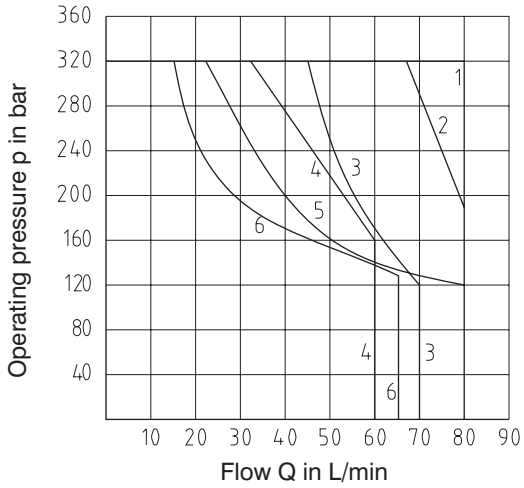
Functional Symbols

Type	Symbol	Crossover	Type	Symbol	Crossover
Z11			C51		
C11			H51		
H11			Y51		
Y11			Y11		
L21			H11		
R11			X11		
A51			Z11		
Z51			J15		

p-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

Operating limits for maximum hydraulic power tfansferred by the directional valve. For respective spool type - see Functional Symbols.

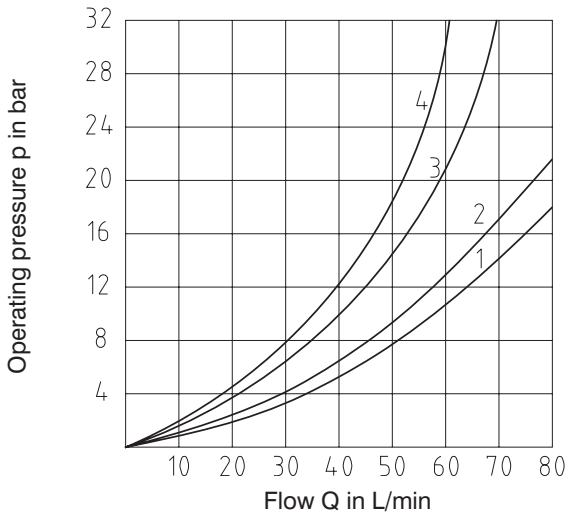


H11	1
H51	1
C11	1
C51	1
Z11	2
Z51	2
J15	3
R11	4
X11	4
A51	5
Y11	6
Y51	6

Δp-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

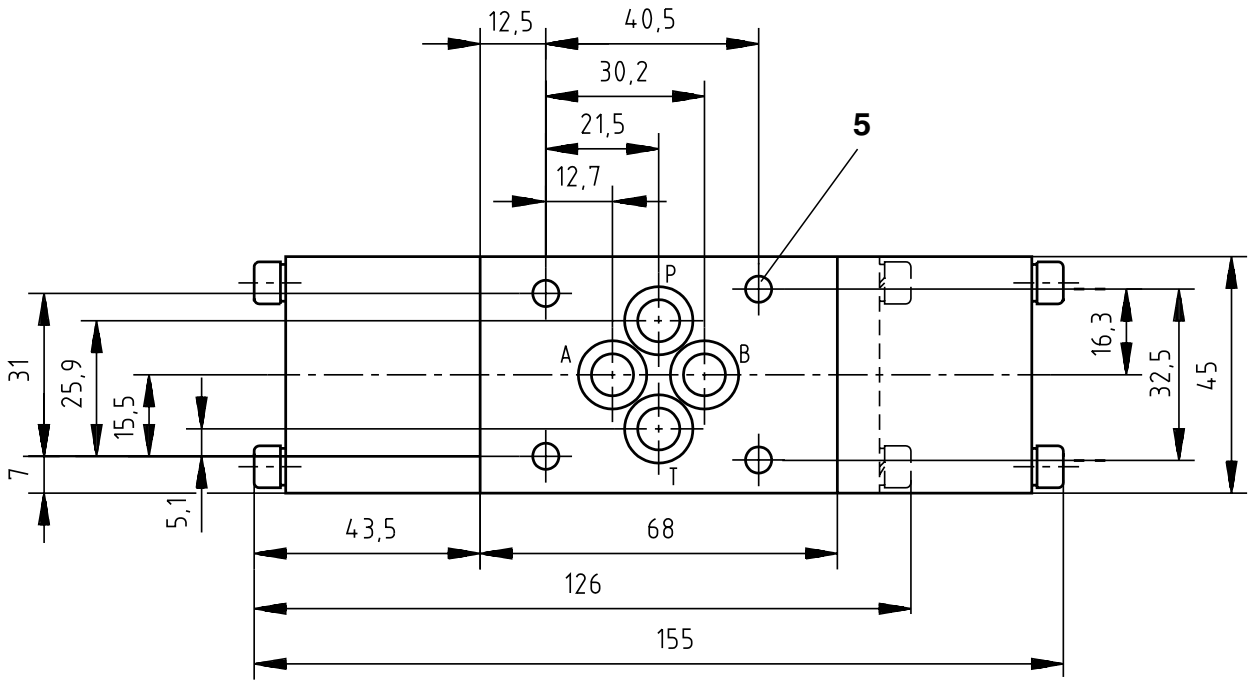
Pressure drop Δp related to flow rate.

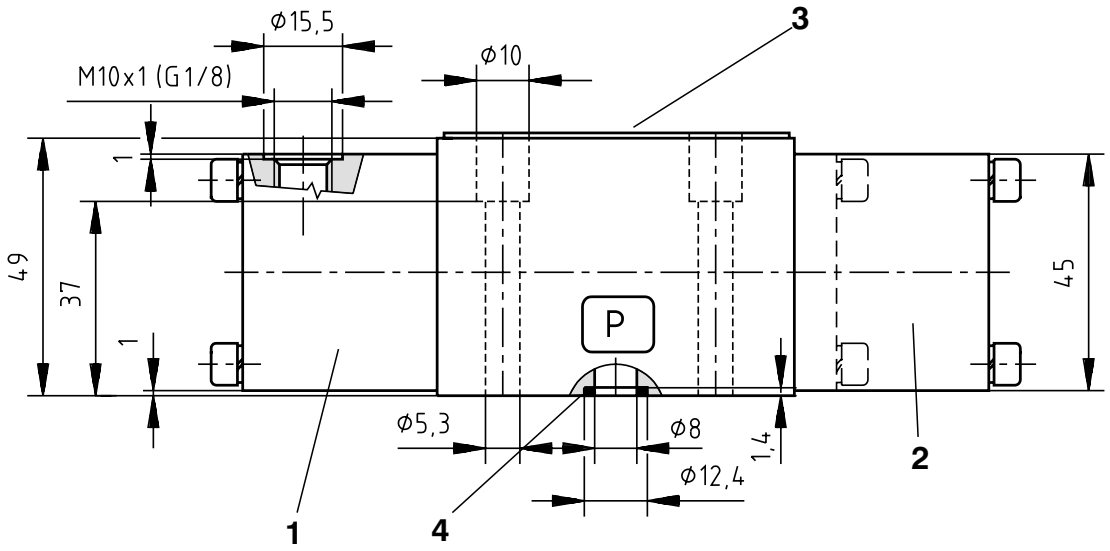


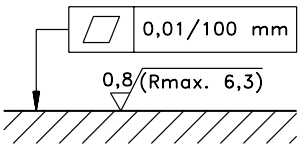
	P-A	P-B	A-T	B-T	P-T
Z11	1	1	2	2	
C11	3	3	3	4	2
H11	1	1	1	1	2
H51	1	1	1	1	2
Y11	1	1	1	1	
C51	3			4	2
Z51		1	2		
R11	1	1	2	2	
A51	1	1			
Y51		1	1		
X11	1	1	2	2	
J15	1	1	2	2	

Valve Dimensions

Dimensions in millimetres







Required surface finish of interface

1 Operating element 1
2 Operating element 2
3 Name plate
4 Square ring 9.25 x 1.68 (4 pcs.) supplied with each valve
5 4 mounting holes

Caution!

- With functional symbol A51 for pressures exceeding 100 bar, the T-port should be connected directly to the tank. Other functional symbols on request.
- The packing foil is recyclable.
- The transport plate is to be returned to the supplier.
- 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.

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ARGO HYTOS

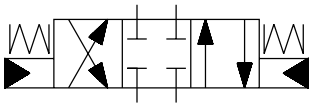
Hydraulic operated directional control valves

RPH3-06

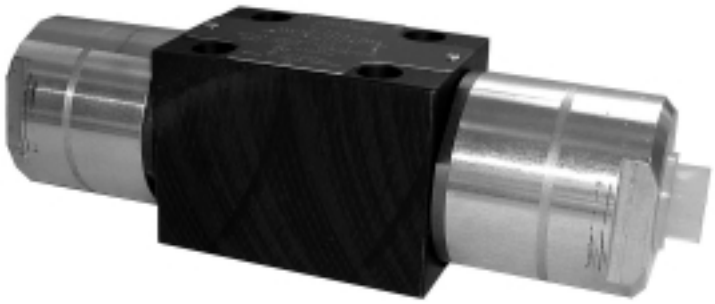
HA 4006
01/2005

Size 06 • p_{max} up to 320 bar • Q_{max} up to 80 L/min

Preliminary technical information

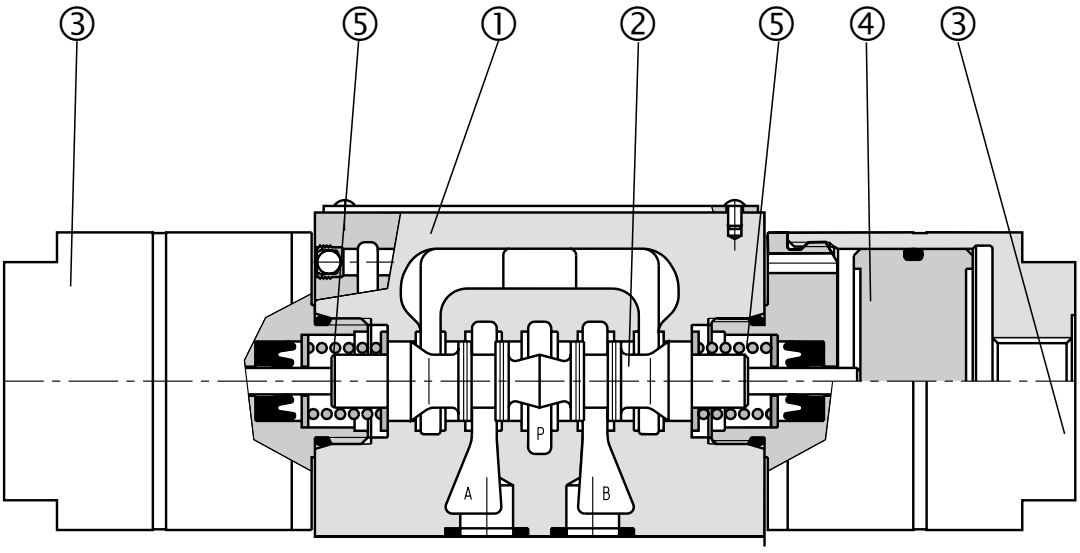


- **4/3-, 4/2- and 3/2- way spool type directional valves hydraulic operated**
- **Installation dimensions to ISO 4401-03-02-0-94 and DIN 24 340-A6**



Functional Description

The directional control valves are of modular design and comprise a housing (1) with a cylidrical spool (2) and one or two operating elements (3) consisting of hydraulic pistons (4) and return springs (5).
Three-position directional valves are fitted with two hydraulic operating elements and two centering springs. Two-position directional valves have only one hydraulic operating element and one springs.
The basic surface treatment of the valve housing is phosphate.



Ordering Code

RPH3-06 □ □ / □ □ □

Hydraulic pilot operated directional valves

Nominal size

Number of operating positions
two positions **2**
three positions **3**

Functional symbols
see the table functional symbols

Connecting threads
1 M10x1
2 G1/8

Model
1 Hydraulic
2 Pneumatic

Seals
omit NBR
V FPM (Viton)

Technical Data

Valve size	mm	06
Maximum flow (according to pressure and functional symbols)	L/min	see p-Q characteristics
Maximum operating pressure at ports P, A, B	bar	320
Maximum operating pressure at port T	bar	160
Minimum pilot pressure	bar	2
Maximum pilot pressure	bar	25
Pilot volume	cm^3	6,2
Pressure drop	bar	see Δp-Q characteristics
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP RP 91H in viscosity classes ISO VG 32, 46 and 68
Fluid temperature range for standard sealing (NBR)	°C	-30 ... +80
Fluid temperature range for Viton seals (FPM)	°C	-20 ... +80
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Service life	cycles	10^7
Weight valve with 1 actuatop valve with 2 actuators	kg	1,8 2,5

Spare Parts

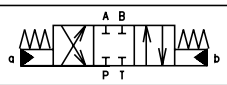
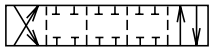
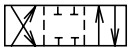
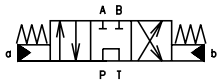
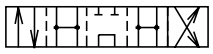
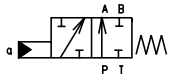
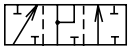
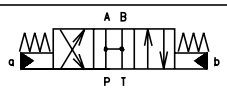
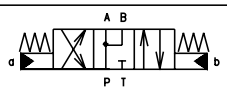
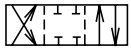
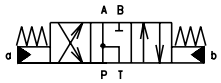
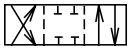
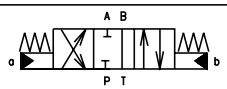
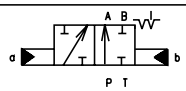
Seal kit

Type	Dimansions, number		Ordering number
Standard NBR	9,25 x 1,68 NBR70 (4 Stk.)	17 x 1,8 (2 Stk.)	484-9961
Viton	9,25 x 1,78 (4 Stk.)	17,17 x 1,78 (2 Stk.)	484-9971

Mounting bolts

Dimensions, numberl	Tightening torque	Ordering number
M5 x 45 DIN 912-10.9 (4 Stk.)	8,9 Nm	484-9958

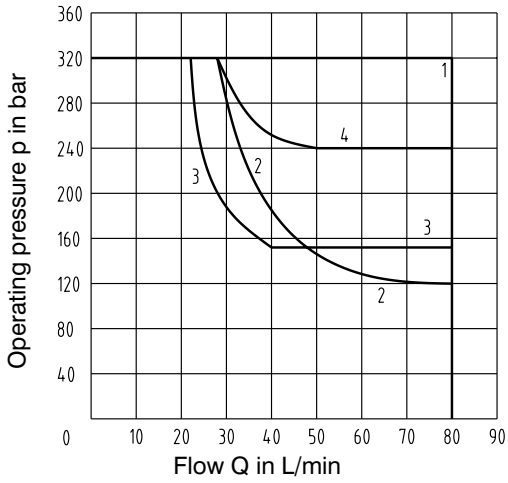
Functional Symbols

Three position directional valves RPH2-063			Two position directional valves RPH2-062		
Type	Symbol	Crossover	Type	Symbol	Crossover
Z11			R11		
C11			A51		
H11			P51		
P11			Y51		
Y11			X11		
L21			J15		
B11			J75		

p-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

Operating limits for maximum hydraulic power tfansferred by the directional valve. For respective spool type - see Functional Symbols.

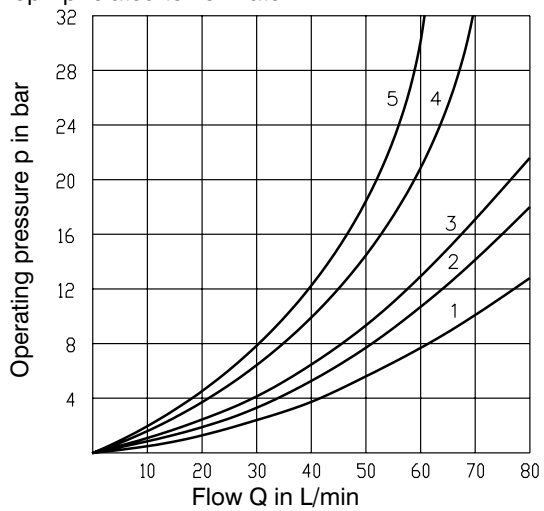


Z11	1
C11	2
H11	3
P11	1
Y11	1
L21	4
B11	1
R11	1
A51	1
P51	1
Y51	2
X11	1
J15	1
J75	1

Δp-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

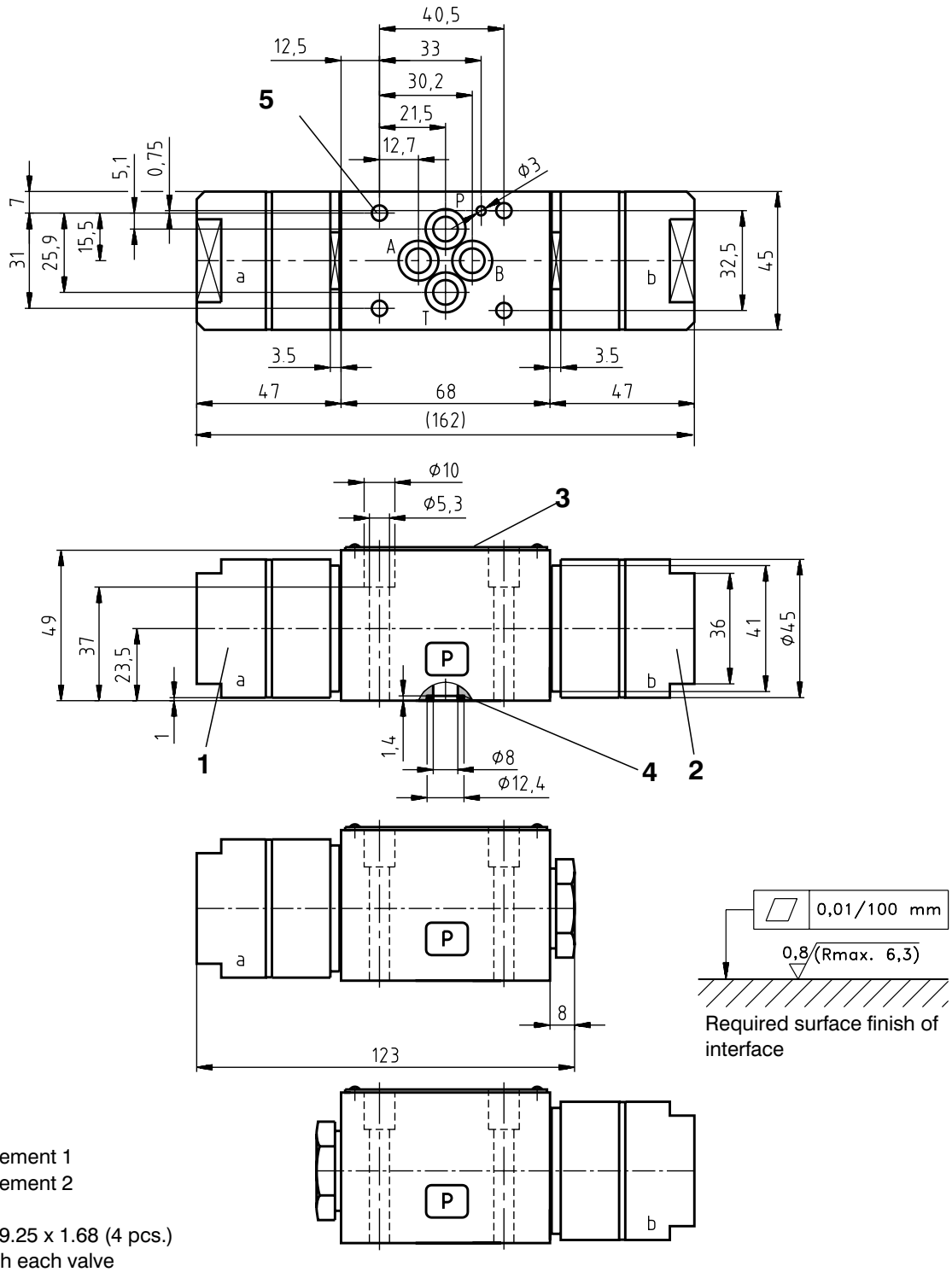
Pressure drop Δp related to flow rate.



	P-A	P-B	A-T	B-T	P-T
Z11	2	2	3	3	
C11	4	4	4	5	3
H11	2	2	2	2	3
P11	1	1	3	3	
Y11	2	2	2	2	
L21	2	2	3	3	
B11	2	2	3	3	
R11	2	2	3	3	
A51	2	2			
P51		1	3		
Y51		2	2		
X11	2	2	3	3	
J15	2	2	3	3	
J75	2	2			

Valve Dimensions

Dimensions in millimetres



Required surface finish of interface

1 Operating element 1
2 Operating element 2
3 Name plate
4 Square ring 9.25 x 1.68 (4 pcs.) supplied with each valve
5 4 mounting holes

Caution!

- For applications outside the given parameters, please consult us.
- With spool symbols A51 and J75 for pressures exceeding 160 bar, the T-port should be connected directly to the tank.
- Other for 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.

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4/2- and 4/3- way directional control valves pilot operated

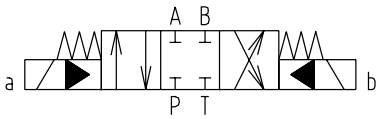
RPEH4-16

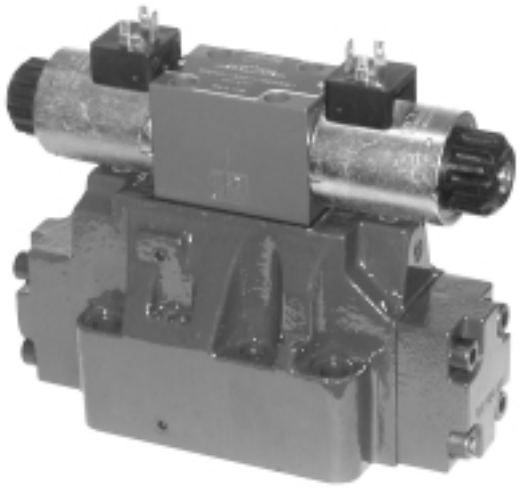
Size 16 • p_{max} up to 320 bar • Q_{max} up to 300 L/min

HA 4023
2/2003

Replaces
HA 4023 2/2002

- ❑ **Solenoid pilot operated directional valves (RPEH)**
- ❑ **Hydraulic pilot operated directional valves (RPH)**
- ❑ **Small energy input**
- ❑ **Wet pin core tubes**
- ❑ **Manual overrides optional (only for RPEH)**
- ❑ **Installation dimensions to DIN 24 340, ISO 4401 and CETOP - RP 121H**

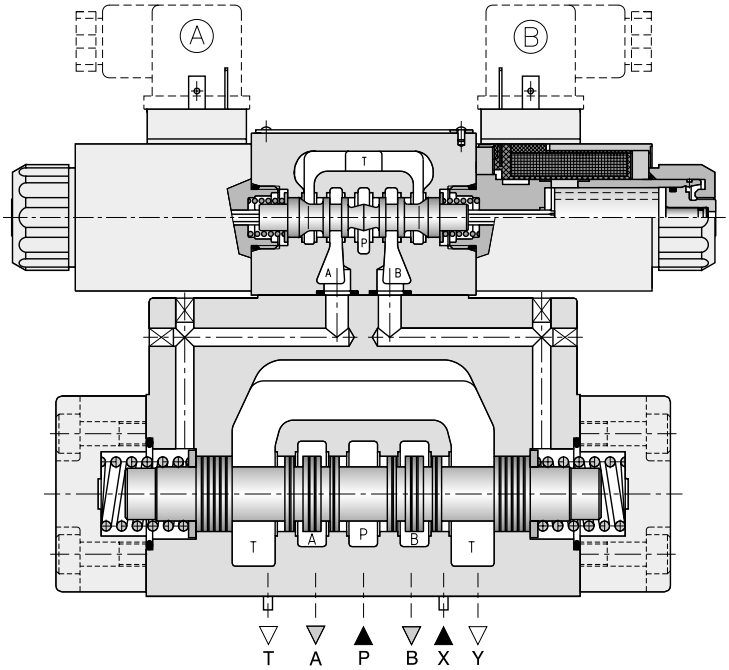




Functional Description

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 CETOP 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.



Ordering Code

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

Directional control valve, pilot operated

Type of control
electrohydraulically operated **EH**
hydraulically operated **H**

Design series

Valve size

Number of operating positions
two positions **2**
three positions **3**

Functional symbols
see the table functional symbols

Controls
if not required omit
main spool shifting speed control **D**
shifting speed control, with orifice (0.8 mm) in port P of solenoid pilot valve **PF**

Piloting
if not required omit
external piloting (see note herebelow) **E**

Seals
omit NBR
V FPM (Viton)

Manual overide
omit standard
N1 covered with retaining nut
N2 covered with rubber boot

Type of solenoid coil
E1 with DIN connector socket
E2 with DIN connector socket and quenching diode
E5 with integrated rectifier and DIN connector socket

Rated supply voltage of solenoids *
(at the coil terminals)

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

The AC coils correspond with E5 type.
* Other voltages per request.

Series number

Check valve incorporated in P-line
omit if not required
C3 with check valve (see page 7)

Drain
omit external drain which is recommended when the valve is used with back pressure on the outlet
I internal drain

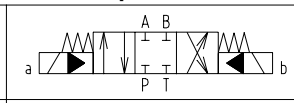
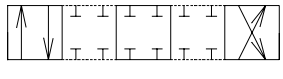
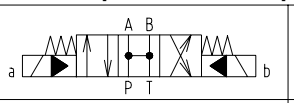
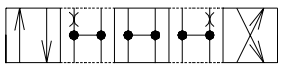
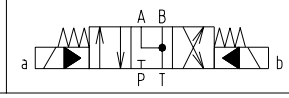
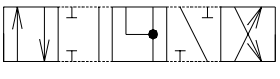
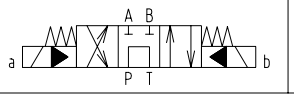
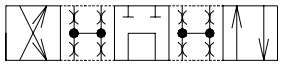
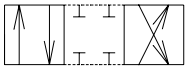
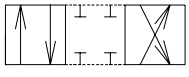
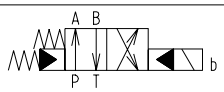
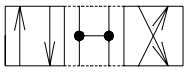
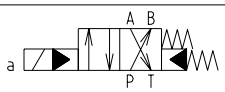
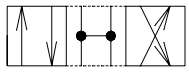
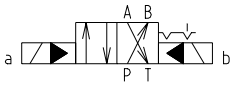
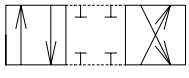
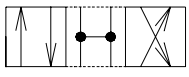
Note:
Piloting must always be external for valves with the H11 type pilot valve (available on request). Also valve must have external piloting for spools with P and T connected in the center position. Internal piloting is possible only with a C3 version valve (see page 7), or by installing a check valve 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	16
Maximum flow rate from port P to A, B, T	L/min	300
Max. operating pressure ports P, A, B port T port T (external drain version)	bar	 320 210 250
Pressure drop	bar	see Pressure Drop Δp-Q
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP-RP 91H in viscosity classes ISO VG 32, 46 and 68.
Fluid temperature range for NBR seals	°C	-30 ... +80
Fluid temperature range for FPM seals	°C	-20 ... +80
Ambient temperature max.	°C	up to +50
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Weigt - RPEH4-162 - RPEH4-163	kg	8.5 9.1

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.

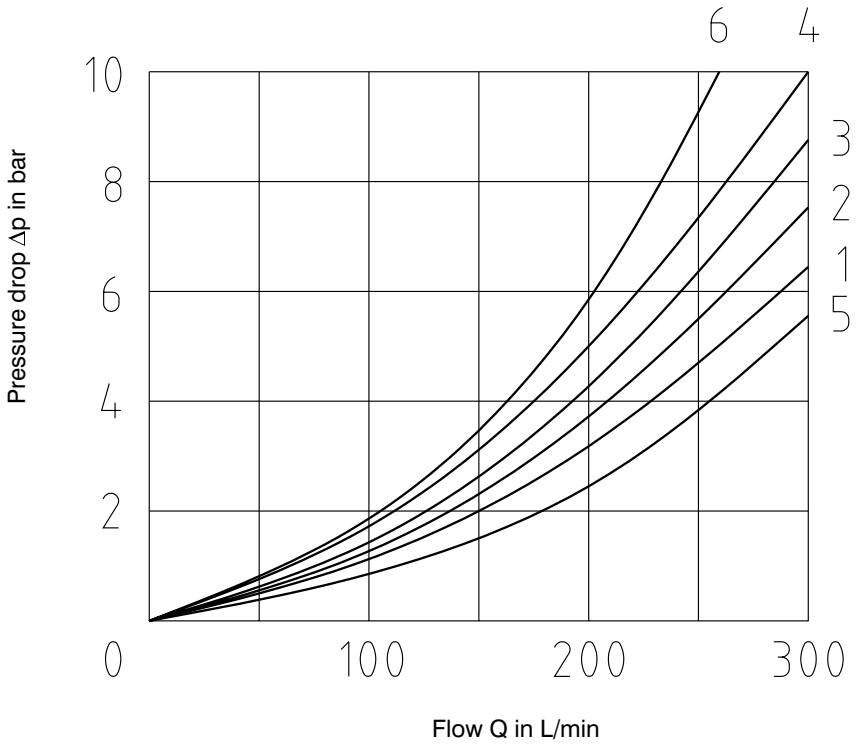
Performance Characteristic

Pressures in bar)	MIN.	MAX.
Pilot pressure	5	210
Pressure on line T with internal drainage	-	140
Pressure on line T with external drainage	-	250

Maximum flow rates in L/min	PRESSURES	
	210 bar	320 bar
Spool type C11	250	200
All other spools	300	250

Pressure Drop Δp-Q

Measured at $\nu = 35\ mm^2/s$ and $t = 50\ °C$



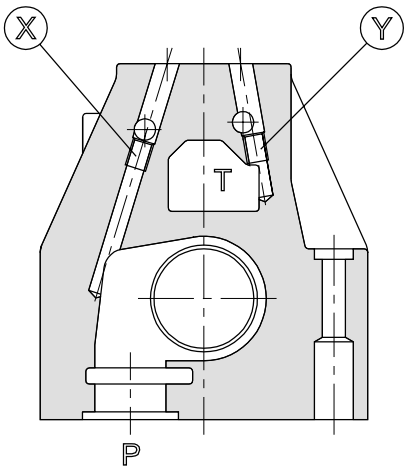
Spool type	Spool position	Connections				
		P - A	P - B	A - T	B - T	P - T
		Curves on graph				
Z11	Energized	1	1	2	3	
H11	De-energized Energized	5	5	1	2	6*
Y11	De-energized Energized	1	1	4• 1	4° 2	
C11	De-energized Energized	6	6	3	4	6
R51, R52, X51, X52	De-energized Energized	1	1	2	3	
J17, J27	Energized	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.

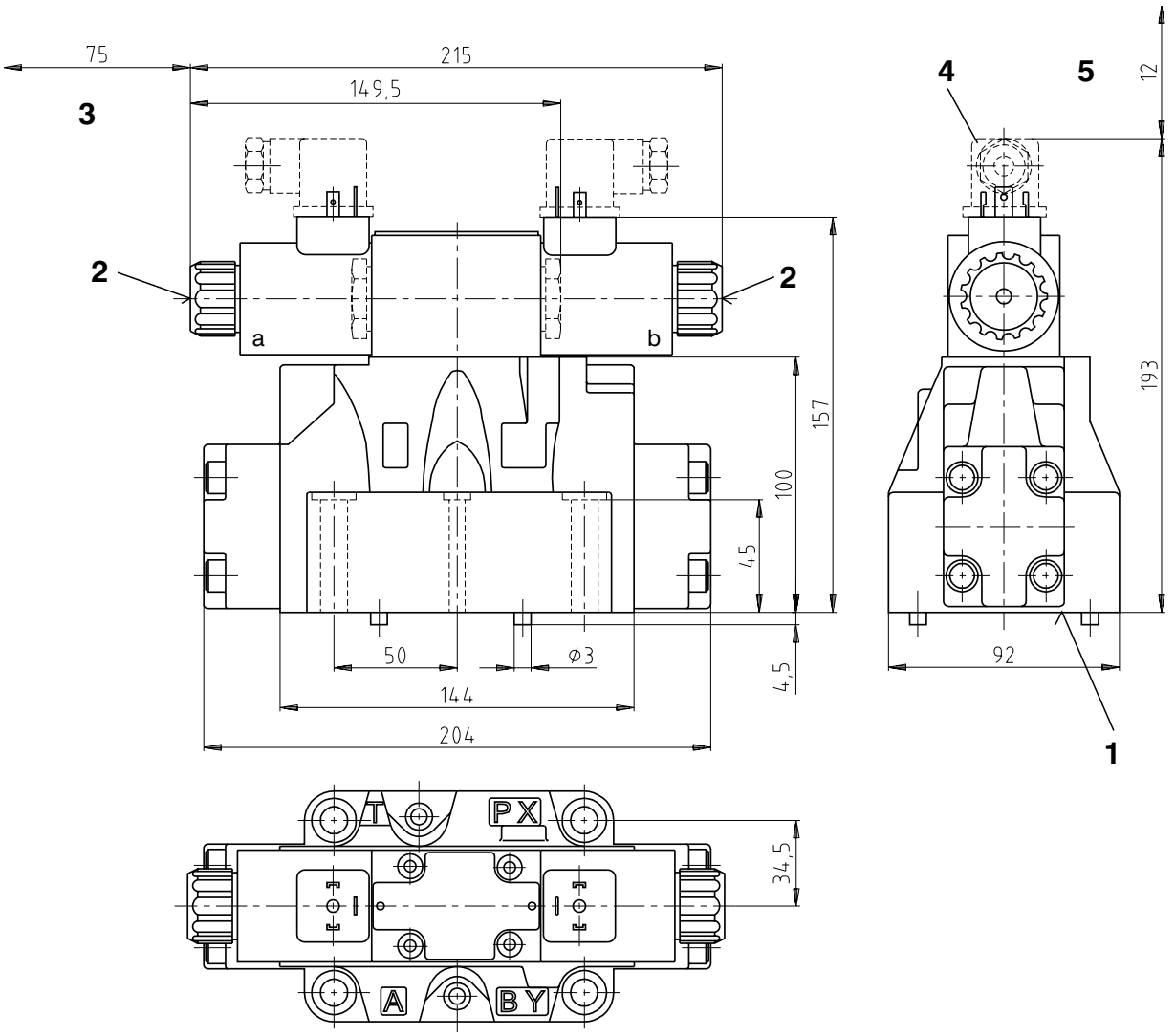
		DC solenoid	AC solenoid
Max. allowable voltage variation	%	-10 ... +6	±10
Max. switching frequency	1/h	10 000	
Switching times ±10 %, energizing (two position)	ms	70	60
Switching times ±10 %, de-energizing (two position)	ms	80	80
Switching times ±10 %, energizing (three position)	ms	50	80
Switching times ±10 %, de-energizing (three position)	ms	60	60
Duty cycle	%	100	
Service life	cycles	10^7	
Enclosure type to DIN 40 050		IP 65	

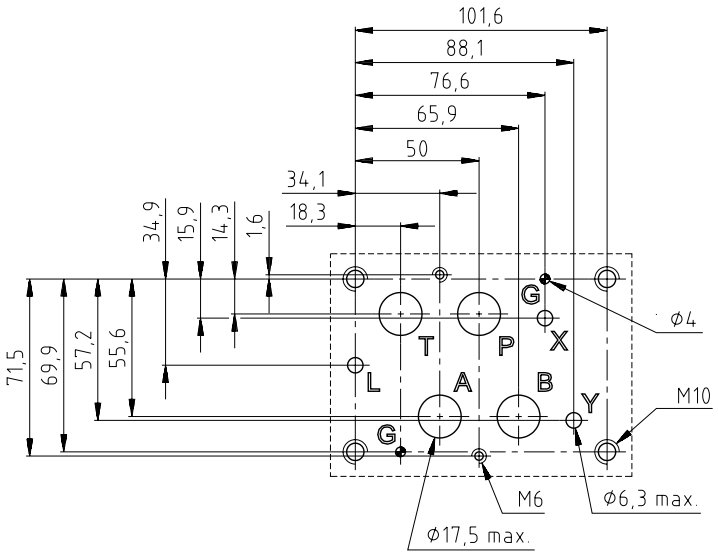
The values indicated refer to a solenoid valve operating with piloting pressure 100 bar, with mineral oil at a temperature of 50 °C, a viscosity of 35 mm^2/s and with PA and BT connections. The switch on times are obtained from the time the spool switches over. The switch off times are measured at the time pressure variation occurs in the line.

Valve Dimensions

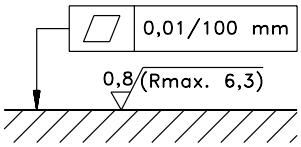
Dimensions in millimetres

RPEH4-162, RPEH4-163





1 Mounting surface with seal rings
2 Manual override
3 Space required to remove coil
4 Electrical connector
(must be ordered separately)
5 Space required to remove connector



Required surface finish of interface

Single valve fastening: 4 bolts M10 x 60
2 bolts M6 x 60

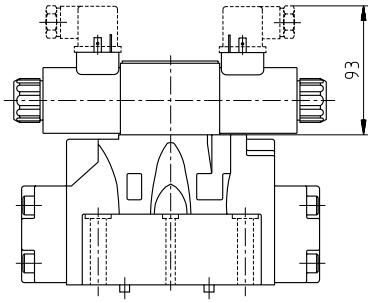
Bolt torque: M10 x 60: 40 Nm - bolts A 8.8
M6 x 60: 8 Nm - bolts A 8.8

Threads of mounting holes: M6 x 18; M10 x 18

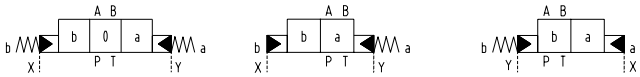
Seal rings: 4 O-rings type 22.22 x 2.62
2 O-rings type 10.82 x 1.78

Type of Command

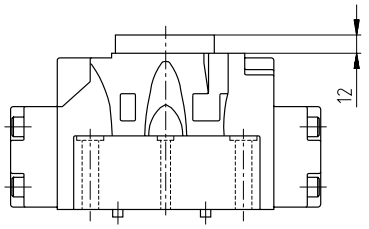
Solenoid control: RPEH
The valve is supplied with a pilot solenoid valve type RPE3-06.



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.

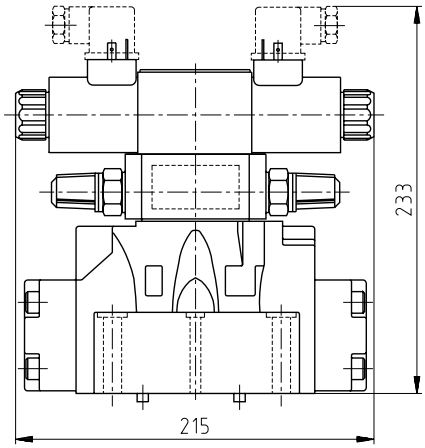


RPH4-163 RPH4-162 RPH4-162



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

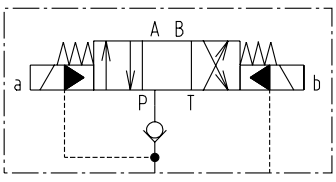
Whenever the solenoid valve installation may involve exposure to atmospheric agents or be used in tropical climates, the manual override, boot protection is recommended. Add the suffix **N1** or **N2** to request this device.

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.



Installation

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.

Spare parts

Seal kit

Design		Dimensions, number			Ordering number
		O-ring	Square ring	Back-up ring	
Head valve size 16	Standard - NBR	22.22 x 2.62 (4 pcs.)	-	-	487-9901
		10.82 x 1.78 (2 pcs.)			
		31.42 x 2.62 (2 pcs.)			
	Viton	22.22 x 2.62 (4 pcs.)			487-9902
		10.82 x 1.78 (2 pcs.)			
		31.42 x 2.62 (2 pcs.)			
Throttle valve 2VS3-06-CS type number 525-0023	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.)	525-9900
		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.)	525-9940
		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	DIN 912-10.9 (4pcs.)	8.9 Nm	484-9958
	Bolt M5 x 98 - 8G	(4 pcs.)		760-0072
	Nut M5			

Other

	Design	
Cover plate	PA, BT	525-0084
	PB, TA	525-0079

Caution!

- Service valve without range stated parameter consultation with manufacturer.
- Detaile information at control vavle - see data sheet RPE3-06, HA 4010
- The packing foil is recyclable.
- 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.

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www.argo-hytos.com

4/2- and 4/3- way directional control valves pilot operated

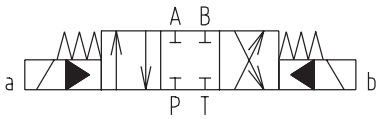
RPEH4-25

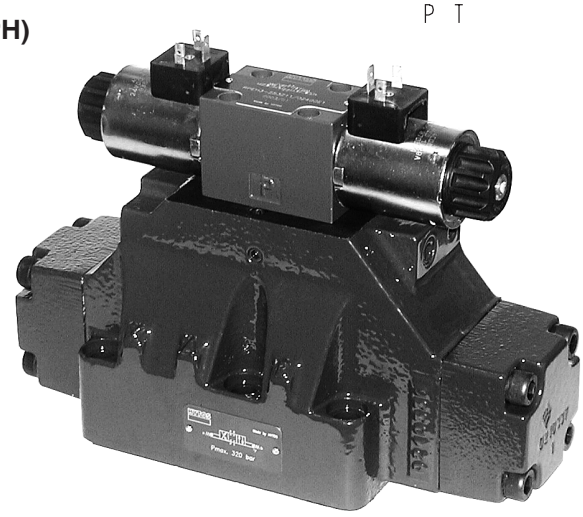
Size 25 • p_{max} up to 320 bar • Q_{max} up to 600 L/min

HA 4024
2/2003

Replaces
HA 4024 2/2002

- ❑ **Solenoid pilot operated directional valves (RPEH)**
- ❑ **Hydraulic pilot operated directional valves (RPH)**
- ❑ **Small energy input**
- ❑ **Wet pin core tubes**
- ❑ **Manual overrides optional (only for RPEH)**
- ❑ **Installation dimensions to DIN 24 340, ISO 4401 and CETOP - RP 121H**

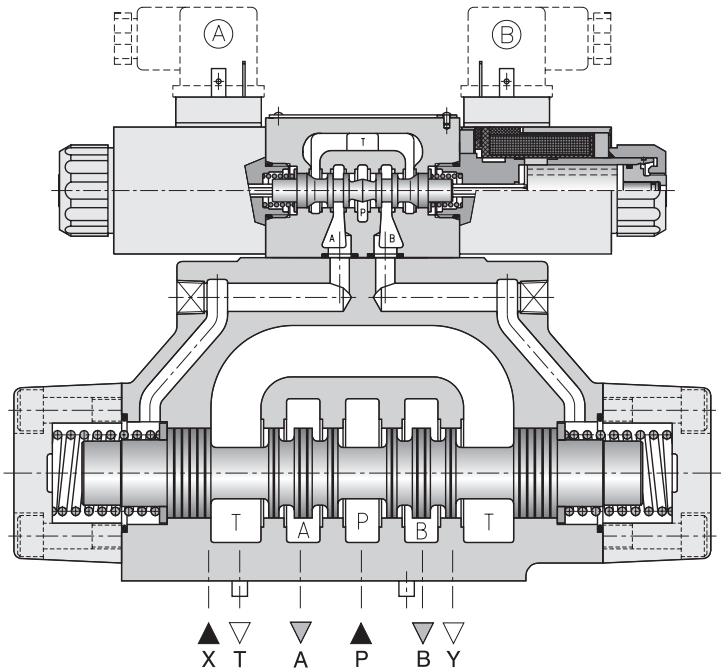




Functional Description

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 CETOP 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.



Ordering Code

RP ☐ **4-25** ☐ ☐ / ☐ ☐ ☐ / ☐ /**33-** ☐ ☐ ☐ / ☐

Directional control valve, pilot operated

Type of control
electrohydraulically operated **EH**
hydraulically operated **H**

Design series

Valve size

Number of operating positions
two positions **2**
three positions **3**

Functional symbols
see the table Functional Symbols

Controls
if not required omit
main spool shifting speed control **D**
shifting speed control, with orifice (0.8 mm) in port P of solenoid pilot valve **PF**

Piloting
if not required omit
external piloting (see note herebelow) **E**

Seals
omit NBR
V FPM (Viton)

Manual overide
omit standard
N1 covered with retaining nut
N2 covered with rubber boot

Type of solenoid coil
E1 with DIN connector socket
E2 with DIN connector socket and quenching diode
E5 with integrated rectifier and DIN connector socket

Rated supply voltage of solenoids *
(at the coil terminals)

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

The AC coils correspond with E5 type.
* Other voltages per request.

Series number

Check valve incorporated on P-line
omit if not required
C3 with check valve (see page 7)

Drain
omit external drain which is recommended when the valve is used with back pressure on the outlet
I internal drain

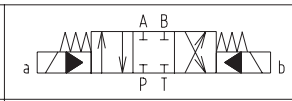
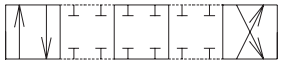
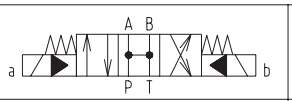
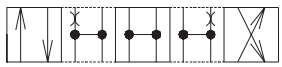
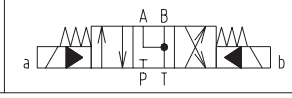
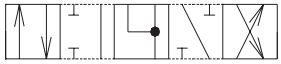
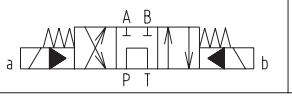
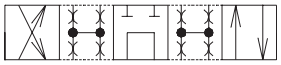
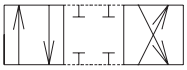
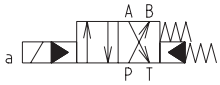
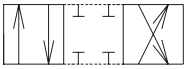
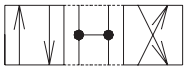
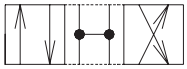
Note:
Piloting must always be external for valves with the H11 type pilot valve (available on request). Also valve must have external piloting for spools with P and T connected in the center position. Internal piloting is possible only with a C3 version valve (see page 7), or by installing a check valve 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).

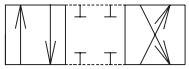
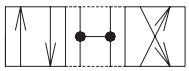
Technical Data

Valve size	mm	25
Maximum flow rate from port P to A, B, T	L/min	600
Max. operating pressure ports P, A, B port T port T (external drain version)	bar	 320 210 250
Pressure drop	bar	see Pressure Drop Δp-Q
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP-RP 91H in viscosity classes ISO VG 32, 46 and 68.
Fluid temperature range for NBR seals	°C	-30 ... +80
Fluid temperature range for FPM seals	°C	-20 ... +80
Ambient temperature max.	°C	up to +50
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Weigt - RPEH4-252 - RPEH4-253	kg	15 15.6

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.

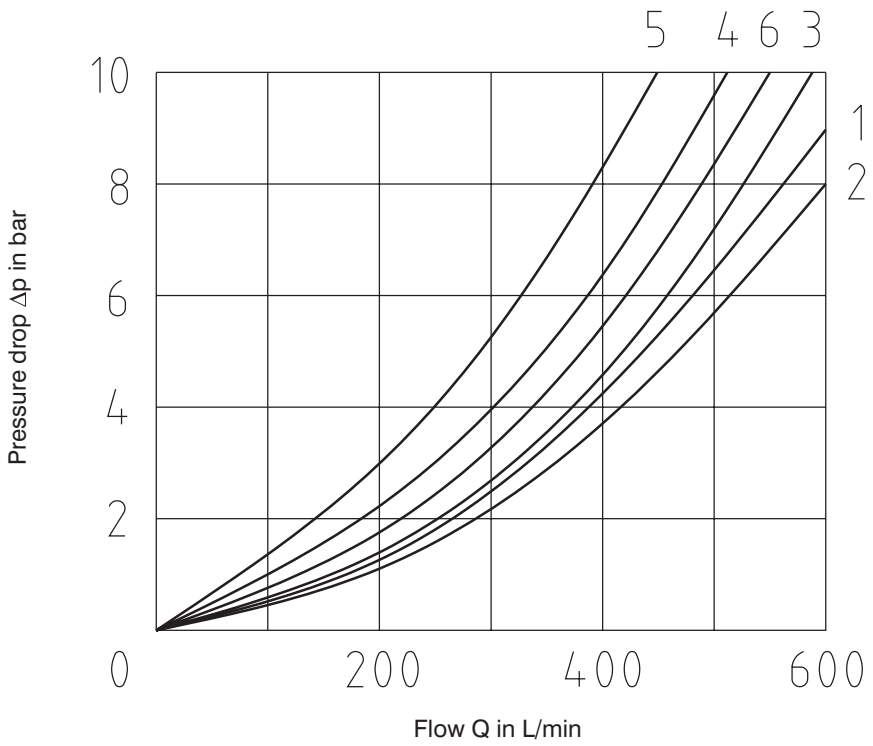
Performance Characteristic

Pressures in bar	MIN.	MAX.
Pilot pressure	5	210
Pressure on line T with internal drain	-	140
Pressure on line T with external drain	-	250

Maximum flow rates in L/min	PRESSURES	
	210 bar	320 bar
Spool type C11	500	450
All other spools	600	500

Pressure Drop Δp-Q

Measured at $\nu = 35\ mm^2/s$ and $t = 50\ °C$



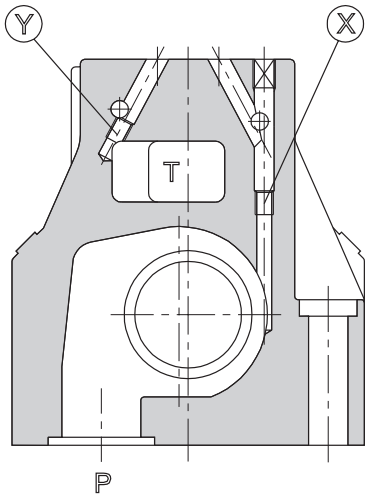
Spool type	Spool position	Connections				
		P - A	P - B	A - T	B - T	P - T
		Curves on graph				
Z11	Energized	1	1	2	3	
H11	De-energized Energized	2	2	1	2	6*
Y11	De-energized Energized	1	1	4• 1	4° 2	
C11	De-energized Energized	6	6	3	4	5
R51, R52, X51, X52,	De-energized Energized	1	1	2	3	
J17, J27	Energized	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



* Plug **Y** must always be present, version C3.

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.

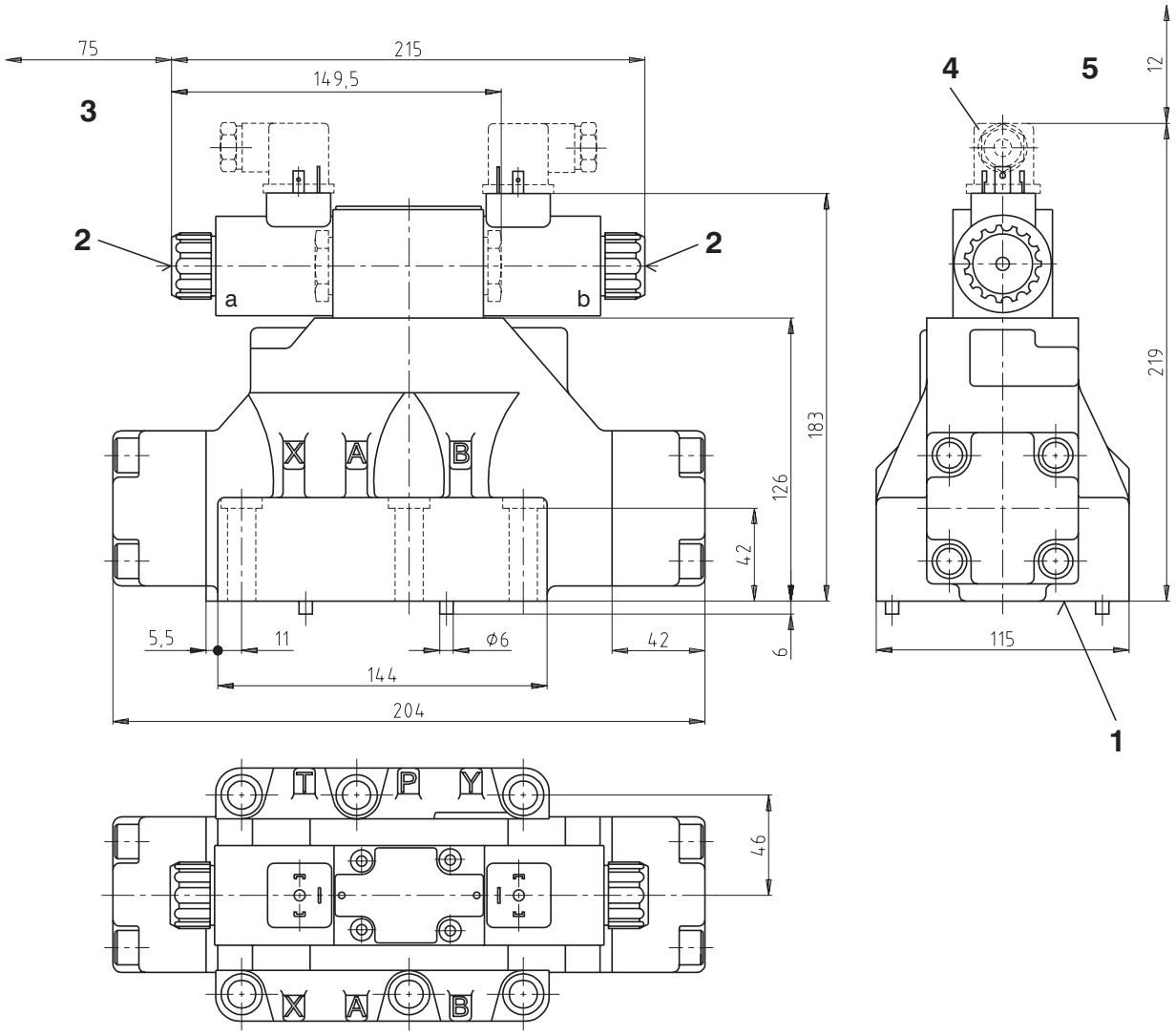
		DC solenoid	AC solenoid
Max. allowable voltage variation	%	-10 ... +6	±10
Max. switching frequency	1/h	8 000	
Switching times ±10 %, energizing (two position)	ms	75	60
Switching times ±10 %, de-energizing (two position)	ms	90	90
Switching times ±10 %, energizing (three position)	ms	55	45
Switching times ±10 %, de-energizing (three position)	ms	60	60
Duty cycle	%	100	
Service life	cycles	10^7	
Enclosure type to DIN 40 050		IP 65	

The values indicated refer to a solenoid valve operating with piloting pressure 100 bar, with mineral oil at a temperature of 50 °C, a viscosity of 35 mm^2/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.

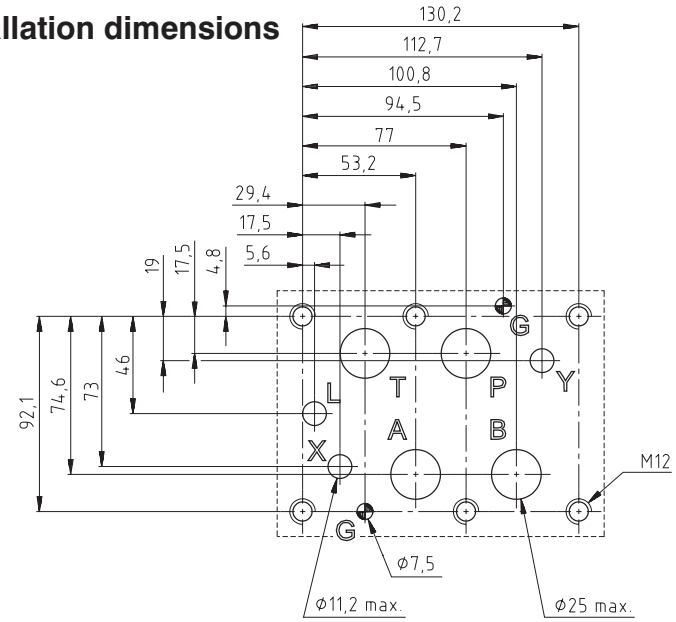
Valve Dimensions

Dimensions in millimetres

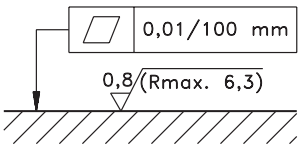
RPEH4-252, RPEH4-253



Installation dimensions



1 Mounting surface with seal rings
2 Manual override
3 Space required to remove coil
4 Electrical connector
(must be ordered separately)
5 Space required to remove connector

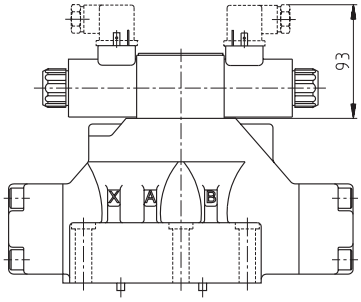


Required surface finish of interface

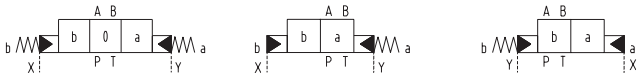
Single valve fastening: 6 bolts M12 x 60
Bolt torque: 69 Nm - bolts A 8.8
Threads of mounting holes: M12 x 20
Seal rings: 4 O-rings 29.82 x 2.62 2 O-rings 20.29 x 2.62

Type of Command

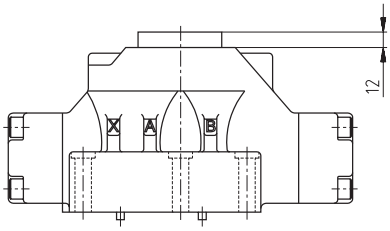
Solenoid control: RPEH
The valve is supplied with a pilot solenoid valve type RPE3-06.



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.

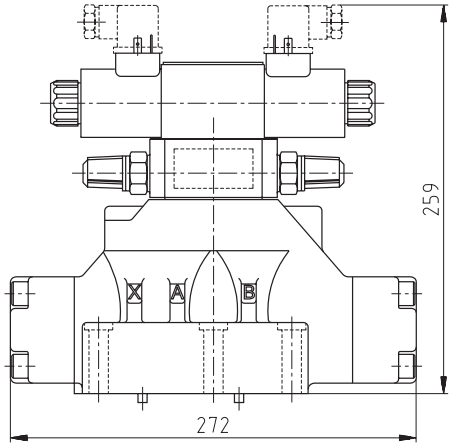


RPH4-253 RPH4-252 RPH4-252



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

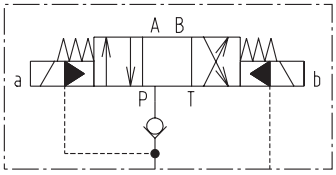
Whenever the solenoid valve installation may involve exposure to atmospheric agents or be used in tropical climates, the manual override, boot protection is recommended. Add the suffix **N1**or **N2** to request this device.

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

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.

Spare parts

Seal kit

Design		Dimensions, number			Ordering number
		O-ring	Square ring	Back-up ring	
Head vavle size 25	Standard - NBR	29.82 x 2.62 (4 pcs.)	-	-	488-9901
		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.)			488-9902
		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 525-0023	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.)	525-9900
		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.)	525-9940
		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	DIN 912-10.9 (4 pcs.)	8.9 Nm	484-9958
	Bolt M5 x 98 - 8G	(4 pcs.)		760-0072
	Nut M5			

Other

	Design	
Cover plate	PA, BT	525-0084
	PB, TA	525-0079

Caution!

- Service valve without range stated parameter consultation with manufacturer.
- Detaile information at control vavle - see data sheet RPE3-06, HA 4010
- The packing foil is recyclable.
- 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.

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E-mail: sales.cz@argo-hytos.com
www.argo-hytos.com

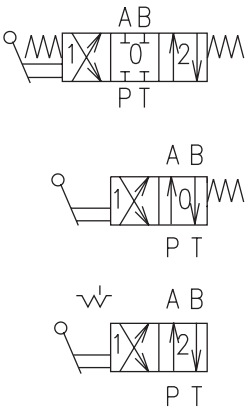
Hand-operated directional control valves

RPR3-04

Size 04 • p_{max} up to 320 bar • Q_{max} up to 30 L/min

HA 4018
3/2002

Replaces
HA 4018 6/2001

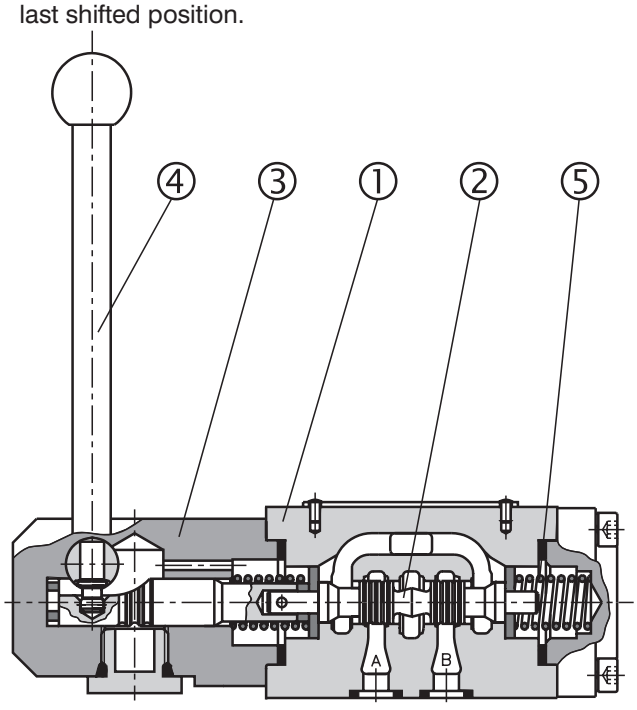


- **4/3 and 4/2 - way spool type directional control valves**
- **Hand-lever operated**
- **Actuating section can be rotated in four positions 90° apart**
- **Installation dimensions acording to ISO 4401 CETOP - RP 121H**

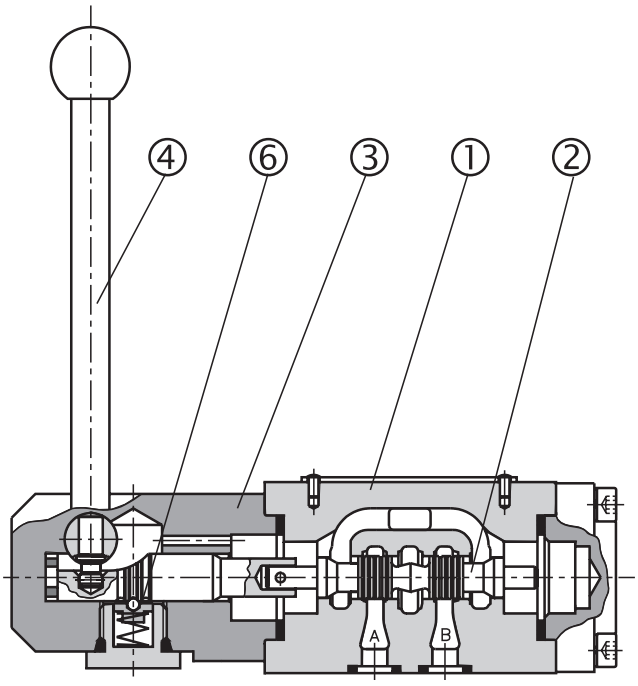
Functional Description

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 springs (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 detent assembly

Ordering Code

RPR3-04 □ □ - □

Hand operated directional control valves

Nominal size

Number of operating positions
two positions **2**
three positions **3**

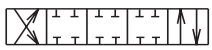
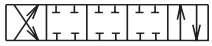
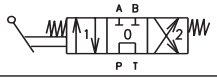
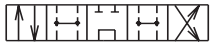
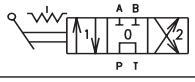
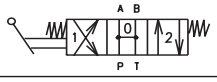
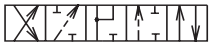
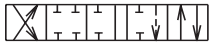
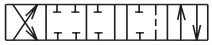
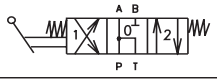
Spool symbols
see table spool symbols

Seals
without designation NBR
V FPM (Viton)

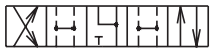
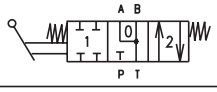
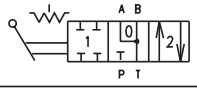
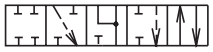
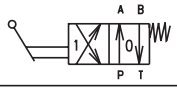
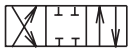
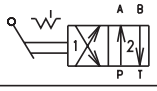
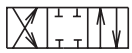
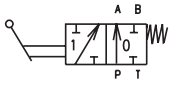
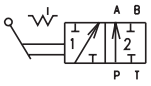
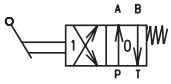
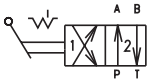
Technical Data

Valve size	mm	04
Maximum flow	L/min	30
Maximum operating pressure at ports P, A, B	bar	320
Maximum operating pressure at port T	bar	100
Pressure losses	bar	see p-Q characteristics
Hydraulic fluid		Hydraulic fluids of power clsses HM, HV to CETOP RP 91 H in viscosity classes ISO VG 32, 46 and 68
Fluid temperature range for standard seal (NBR)	°C	-30 ... +80
Fluid temperature range for Viton sealing (FPM)	°C	-20 ... +80
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Operating force on lever	N	< 40
Weight	kg	1.0
Mounting position		optional

Spool Symbols

Type	Symbol	Crossover	Type	Symbol	Crossover
Z11			Z15		
C11			C15		
H11			H15		
P11			P15		
Y11			Y15		
B11			B15		
L11			L15		
L21			L25		

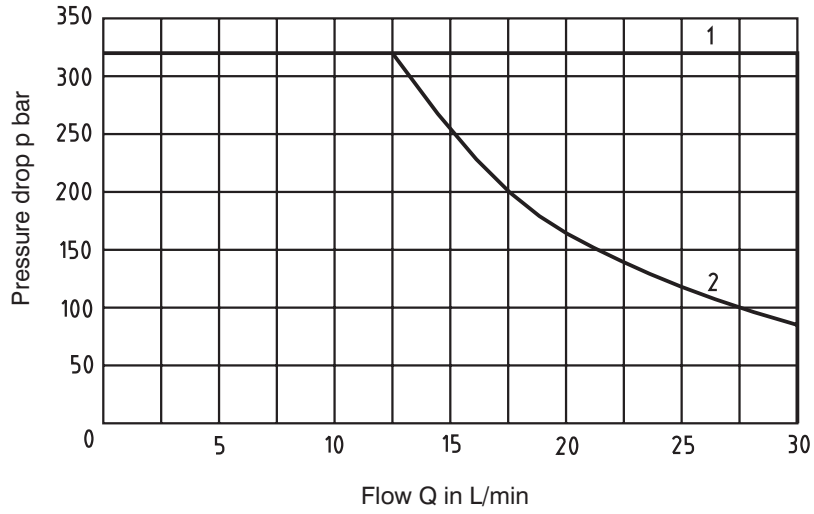
Spool Symbols

Type	Symbol	Crossover	Type	Symbol	Crossover
Y31			Y35		
Y71			Y75		
R11			J15		
A51			J75		
R21			R25		

p-Q Characteristics

Measured at ν = 32 mm^2/s and t = 40 °C

Operating limits for maximum hydraulic power transferred by the directional valve.

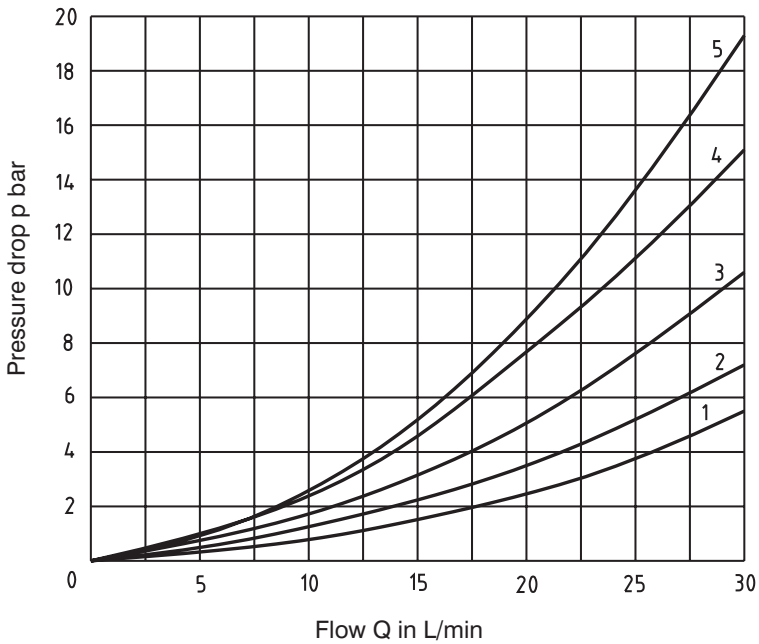


Z11	1	Z15	1
C11	1	C15	1
H11	1	H15	1
P11	1	P15	1
Y11	1	Y15	1
B11	1	B15	1
L11	2	L15	1
L21	2	L25	1
Y31	1	Y35	1
Y71	1	Y75	1
R11	1	J15	1
A51	1	J75	1
R21	1	R25	1

Δp-Q Characteristics

Measured at ν = 32 mm^2/s and t = 40 °C

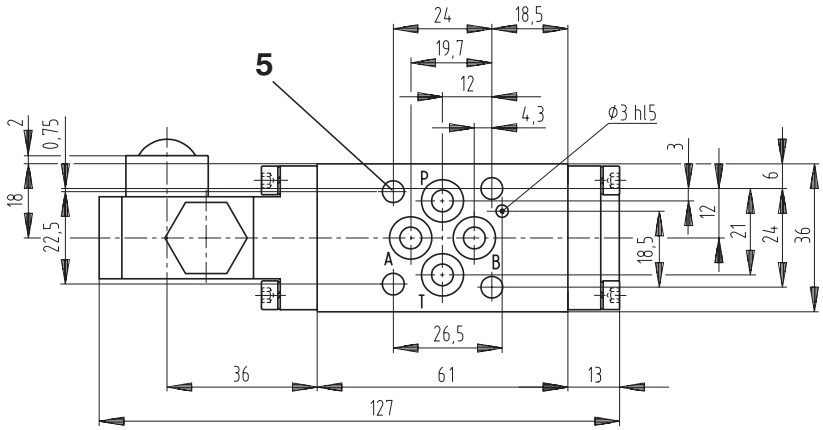
Pressure drop Δp related to flow rate.

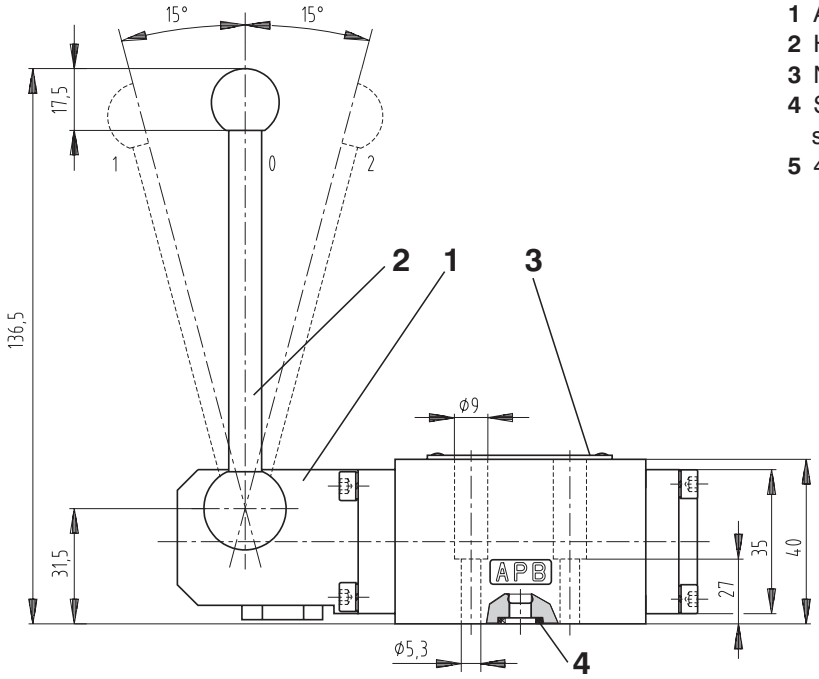


	P-A	P-B	A-T	B-T	P-T
Z11, Z15	3	2	2	2	
C11, C15	5	5	4	4	3
H11, H15	3	3	2	2	3
P11, P15	1	1	1	3	
Y11, Y15	3	3	1	1	
B11, B15	3	3	2	1	
L11, L15	3	2	1	2	4
L21, L25	2	2	3	3	4
Y31, Y35	3	3	2	2	
Y71, Y75	3	1			
R11, J15	3	3	2	2	
A51, J75	2	2			
R21, R25	3	3	2	2	

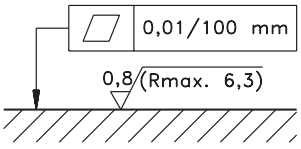
Valve Dimensions

Dimensions in millimeters





1 Actuating section
2 Hand lever
3 Name plate
4 Square ring 7.65 x 1.68 (4 pcs.) supplied with valve
5 4 mounting holes



Required surface finish of interface

Spare Parts

Seal kit

Type	Dimensions, quantity				Ordering number
	O-ring	Square ring	O-ring	O-ring	
Standard NBR70	22 x 2 (2 pcs.)	7.65 x 1.68 (4 pcs.)	11 x 1.5 (2 pcs.)	11.3 x 2.4 (1 pc.)	475-9000
Viton	22 x 2 (2 pcs.)	7.65 x 1.68 (4 pcs.)	11 x 1.5 (2 pcs.)	11.3 x 2.4 (1 pc.)	475-9001

Bolt kit (for studs see HA 0020)

Dimensions, quantity	Bolt torque	Ordering number
M5x35 DIN 912-10.9 (4 pcs.)	3.7 ft-lbs (5 Nm)	486-9011

Caution!

- With functional symbols A51 and J75 for pressures exceeding 100 bar, the T-port or must be connected directly to the tank.
- Directional valves with other functional symbols as those shown in the table above can be delivered 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.

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Hand-operated directional control valves

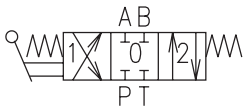
RPR3-06

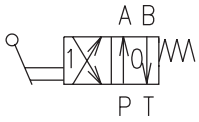
Size 06 • p_{max} up to 320 bar • Q_{max} up to 80 L/min

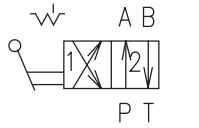
HA 4004
3/2002

Replaces
HA 4004 3/2001

- **4/3 and 4/2 - way spool type directional control valves**
- **Hand-lever operated**
- **Actuating section can be rotated in four positions 90° apart**
- **Four-land spool - reduced functional dependence on fluid viscosity**
- **16 standard spool configurations**
- **Installation dimensions to ISO 4401-03-02-0-94 and DIN 24 340-A6**



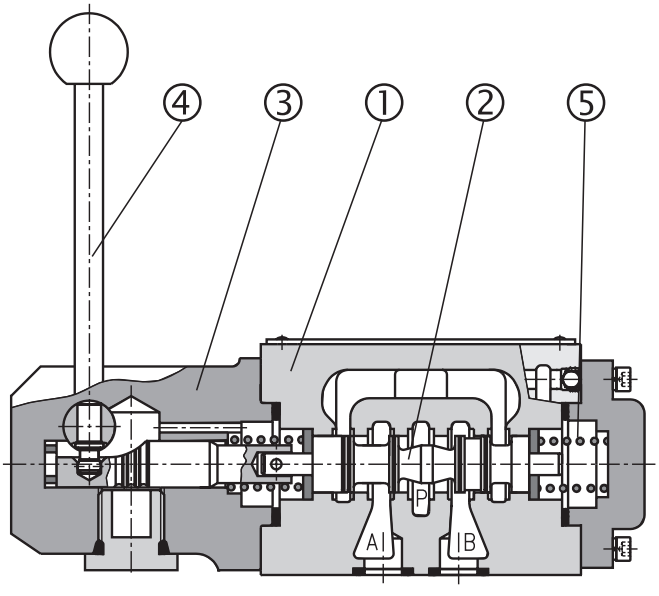




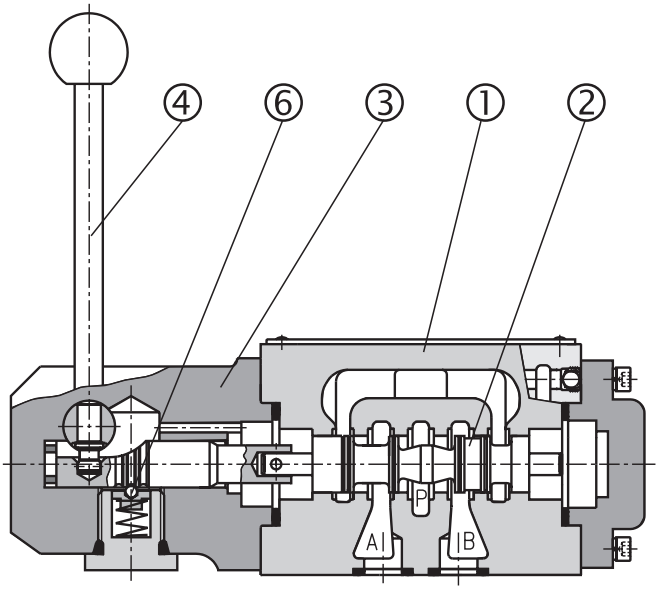
Functional Description

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 springs (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 detent assembly

Ordering Code

RPR3-06 [ ] [ ] - [ ]

Hand operated directional control valves

Valve size

Number of valve positions
two positions **2**
three positions **3**

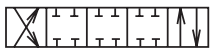
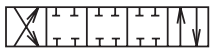
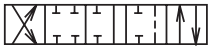
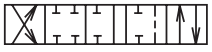
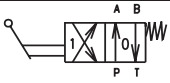
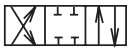
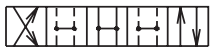
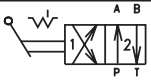
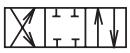
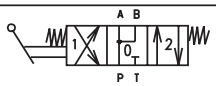
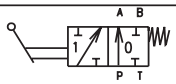
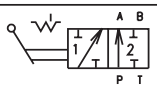
Seals
without designation NBR
V FPM (Viton)

Spool symbols
see the table Spool symbols

Technical Data

Valve size	mm	06
Maximum flow	L/min	80
Maximum operating pressure at ports P, A, B	bar	320
Maximum operating pressure at port T	bar	100
Pressure drop	bar	see Δp -Q characteristics
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP RP 91H in viscosity classes ISO VG 32,46 and 68
Fluid temperature range - NBR	°C	-30 ... +80
Fluid temperature range - Viton	°C	-20 ... +80
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Operating force on lever	N	< 50
Weight	kg	1.6
Mounting position		optional

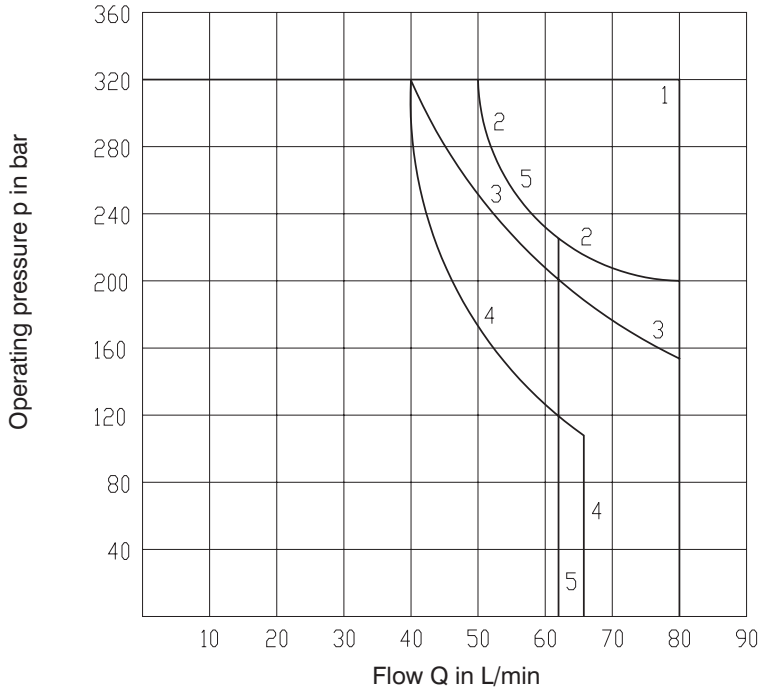
Spool Symbols

Type	Symbol	Crossover	Type	Symbol	Crossover
Z11			Y11		
Z15			Y15		
C11			B11		
C15			B15		
H11			R11		
H15			J15		
P11			A51		
P15			J75		

p-Q Characteristics

Measured at ν = 32 mm^2/s and t = 40 °C

Operating limits for maximum hydraulic power tfansferred by the directional valve.

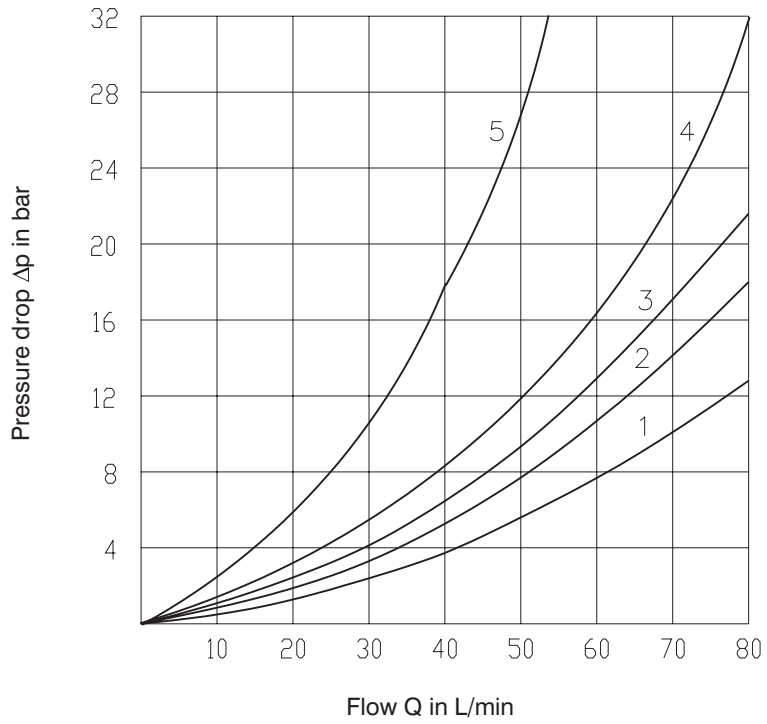


Z11	1	Z15	1
C11	4	C15	1
H11	3	H15	1
P11	1	P15	1
Y11	2	Y15	1
B11	5	B15	1
R11	1	J15	1
A51	3	J75	1

Δp-Q Characteristics

Measured at ν = 32 mm^2/s and t = 40 °C

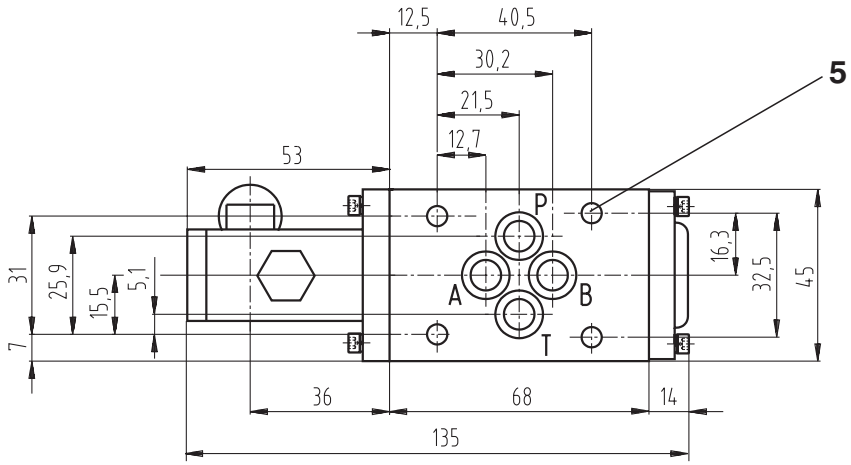
Pressure drop Δp related to flow rate.

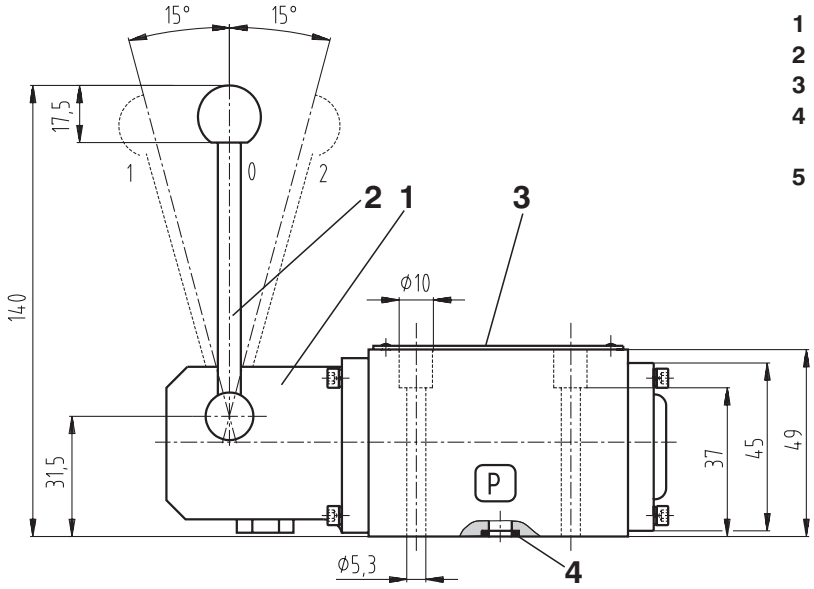


	P-A	P-B	A-T	B-T	P-T
Z11, Z15	2	2	3	3	
C11, C15	3	3	4	3	5
H11, H15	2	2	2	2	3
P11, P15	1	1	3	3	
Y11, Y15	2	2	2	2	
B11, B15	2	2	3	3	
R11, J15	2	2	3	3	
A51, J75	2	2			

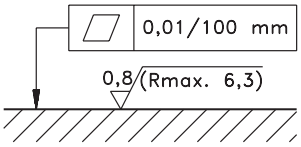
Valve Dimensions

Dimensions in millimeters





1 Actuating section
2 Hand lever
3 Name plate
4 Square ring (4 pcs.) 9.25 x 1.68 (ore compatible) supplied with valve
5 4 mounting holes



Required surface finish of interface

Spare Parts

Seal kit

Type	Dimensions, quantity	Ordering number
O-ring - NBR90	22 x 2 (2 pcs.)	483-9000
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	484-9958

Caution!

- With functional symbols A51 and J75 for pressures exceeding 100 bar, the T-port should be connected directly to the tank.
- Directional valves with other functional symbols as those shown in the table above can be delivered on request.
- The packing foil is recyclable.
- The protective plate can be returned to manufacturer.
- Mounting bolts M5x45 DIN 912-10.9 or studs must be ordered separately. Tightening torgue 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.

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Roller-operated directional control valves

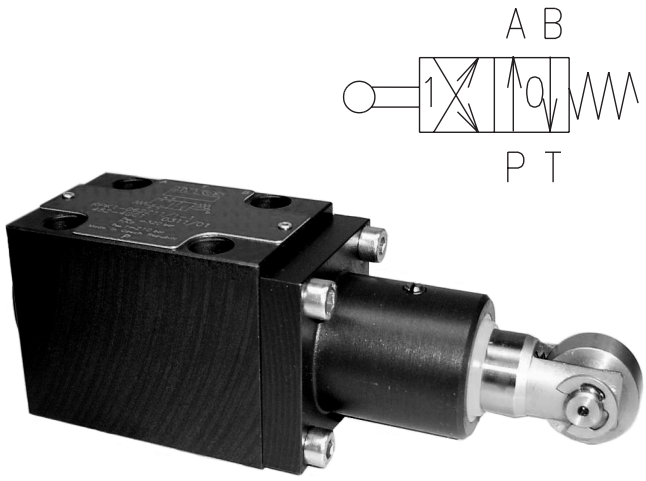
RPK1-06

Size 06 • p_{max} up to 320 bar • Q_{max} up to 80 L/min

HA 4038
5/2004

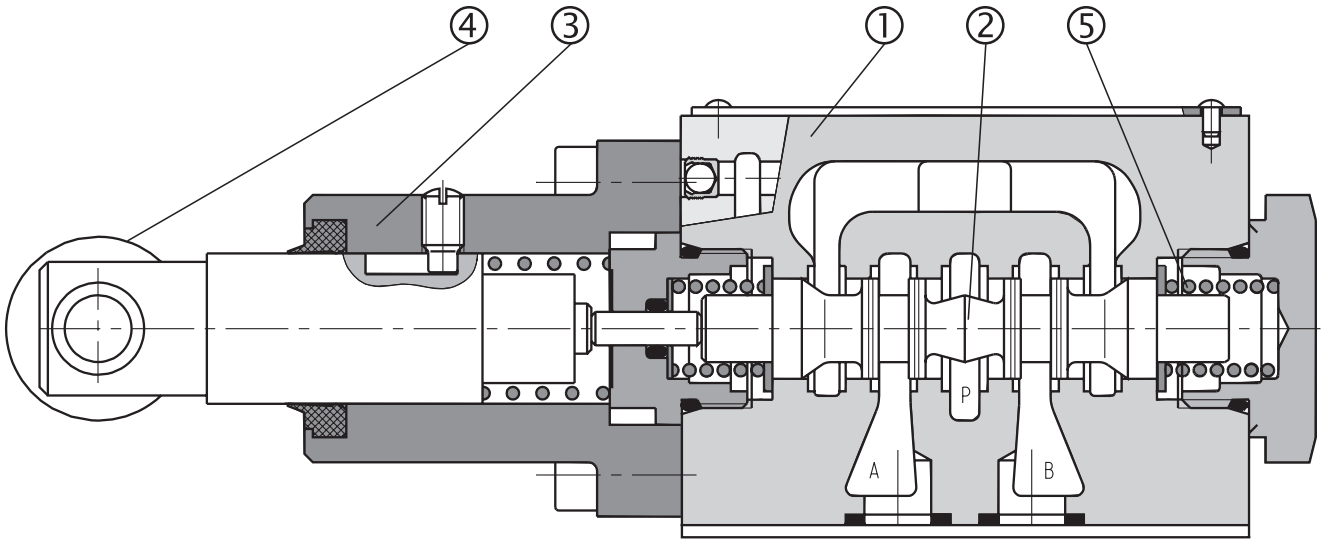
Replaces
HA 4038 11/2003

- ❑ **4/2 - way spool type directional control valves**
- ❑ **Roller operated**
- ❑ **Actuating section can be rotated in four positions 90° apart**
- ❑ **12 standard spool configurations**
- ❑ **Installation dimensions to ISO 4401-03-02-0-94 and DIN 24 340-A6**



Functional Description

The roller 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 of the roller- pin (4) and of one return spring (5). The directional control valves are being manufactured as two-position (see table with functional symbols).
The valve housing (1) is phosphate coated.



Ordering Code

RPK1-06 □ □ - □

Hand operated directional control valves

Valve size

Number of valve positions
two positions **2**

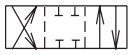
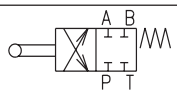
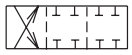
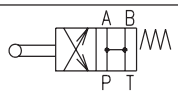
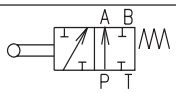
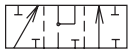
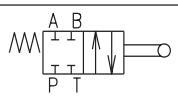
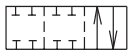
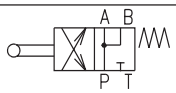
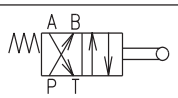
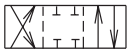
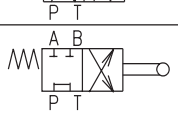
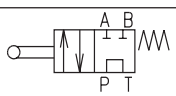
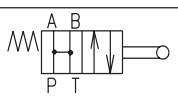
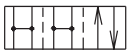
Seals
without designation NBR
V FPM (Viton)

Spool symbols
see the table Spool symbols

Technical Data

Valve size	mm	06
Maximum flow	L/min	80
Maximum operating pressure at ports P, A, B	bar	320
Maximum operating pressure at port T	bar	20
Pressure drop	bar	see Δp -Q characteristics
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP RP 91H in viscosity classes ISO VG 32,46 and 68
Fluid temperature range - NBR	°C	-30 ... +80
Fluid temperature range - Viton	°C	-20 ... +80
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Weight	kg	1,6
Mounting position		optional

Spool Symbols

Type	Symbol	Crossover	Type	Symbol	Crossover
R11			Z51		
R21			H51		
A51			Z11		
P51			X11		
Y51			C11		
C51			H11		

Operating Power

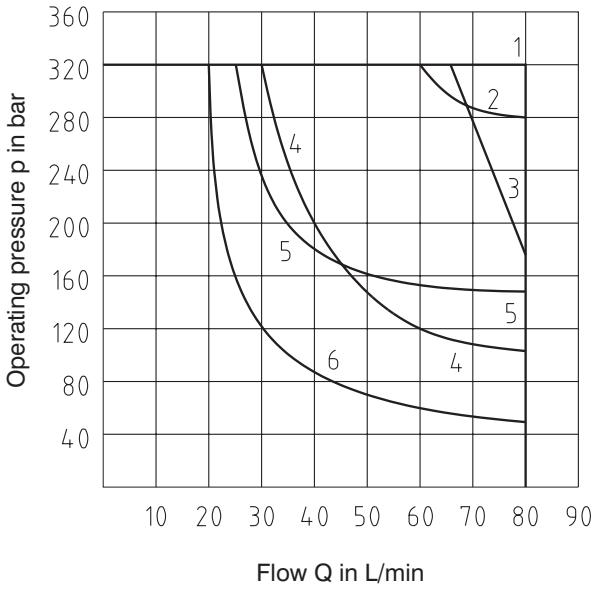
max. Pressure in T port 20 bar

	for 0 bar pressure in T port			for 20 bar pressure in T port		
Operating press.	Stroke begg.	Oper. stroke	Total stroke	Stroke begg.	Oper. stroke	Total stroke
100 bar	35 N	135 N	195 N	60 N	160 N	220 N
200 bar	35 N	135 N	195 N	60 N	160 N	220 N
300 bar	35 N	135 N	195 N	60 N	160 N	220 N

p-Q Characteristics

Measured at ν = 32 mm^2/s and t = 40 °C

Operating limits for maximum hydraulic power tfansferred by the directional valve.

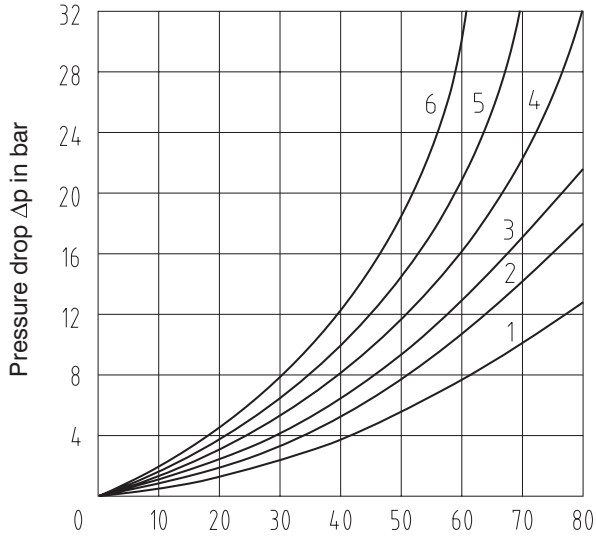


Y11	1
Y51	1
R11	2
Z11	3
Z51	3
C11	4
C51	4
R21	5
H11	6
H51	6

Δp-Q Characteristics

Measured at ν = 32 mm^2/s and t = 40 °C

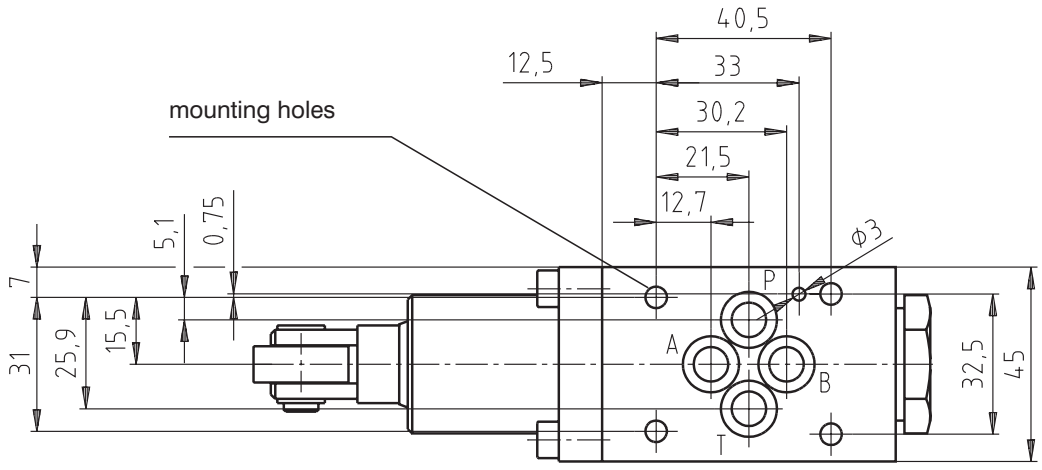
Pressure drop Δp related to flow rate.



	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	2	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		
H51		2	3		
X11	2	2	3	3	

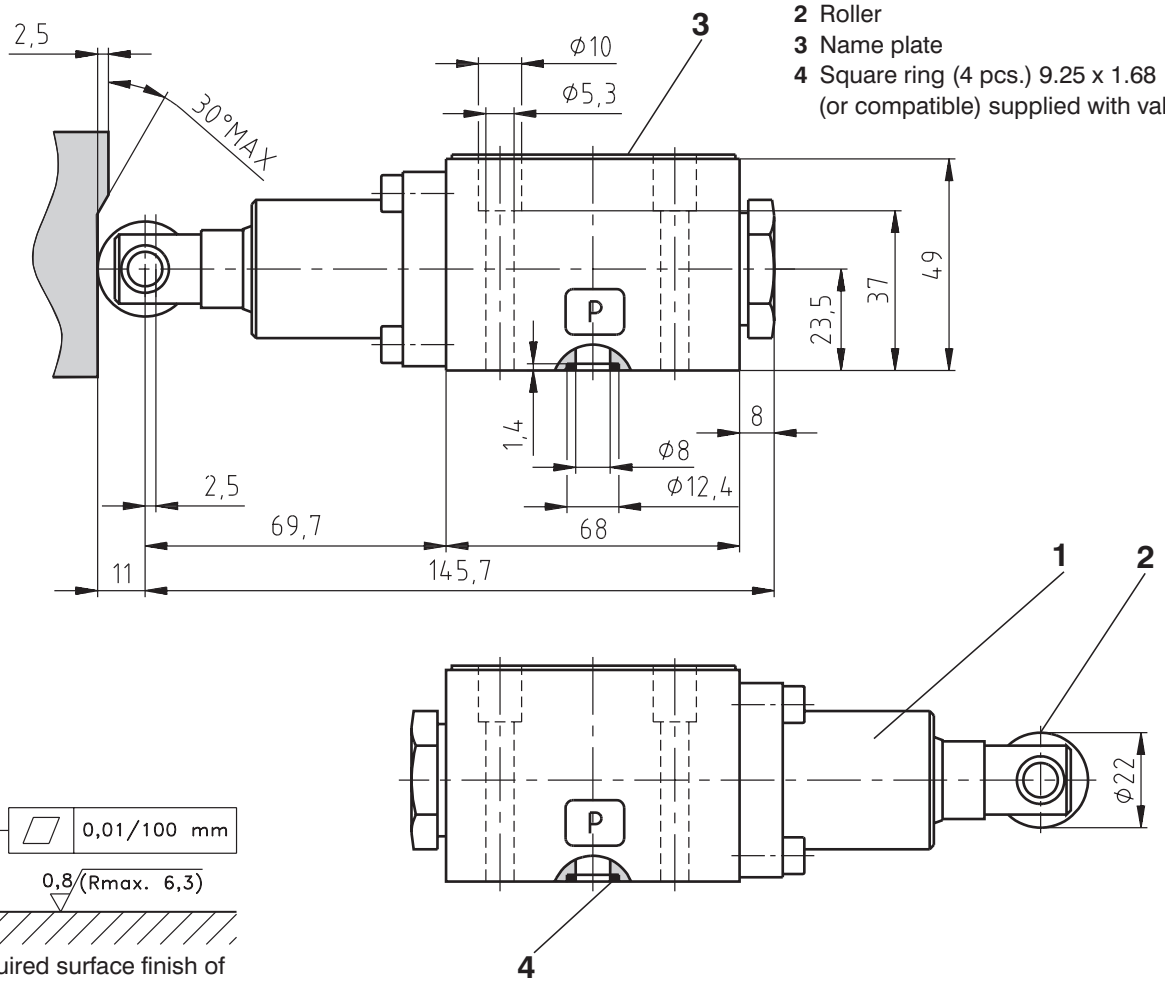
Valve Dimensions

Dimensions in millimeters



Valve Dimensions

Dimensions in millimeters



Required surface finish of interface

Spare Parts

Seal kit

Type	Dimensions, quantity	Ordering number
O-ring - NBR90	17 x 1,8 (2 Pcs.)	482-9004
Square ring - NBR70	9,25 x 1,68 (4 Pcs.)	
O-ring - NBR70	3,68 x 1,78 (1 Pc.)	
Wiper ring	WSW 000180 ASW (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	484-9958

Caution!

- With functional symbols A51 and J75 for pressures exceeding 100 bar, the T-port should be connected directly to the tank.
- Directional valves with other functional symbols as those shown in the table above can be delivered on request.
- The packing foil is recyclable.
- The protective plate can be returned to manufacturer.
- Mounting bolts M5x45 DIN 912-10,9 or studs must be ordered separately. Tightening torgue 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.

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www.argo-hytos.com

Proportional Directional Control Valves

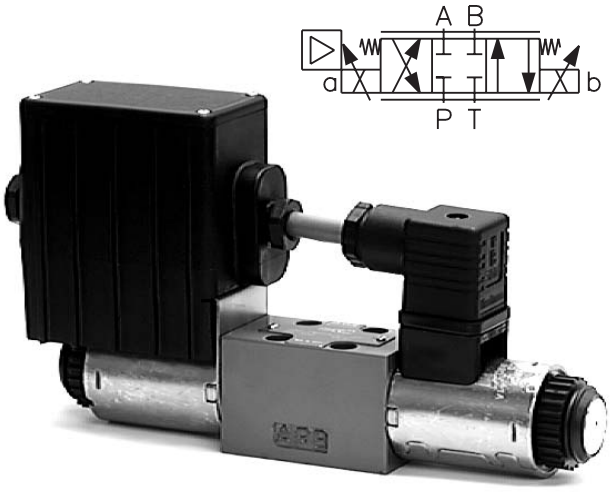
PRM2-04

Size 04 • p_{max} up to 320 bar • Q_{max} up to 20 L/min

HA 5105
5/2009

Replaces
HA 5105 1/2005

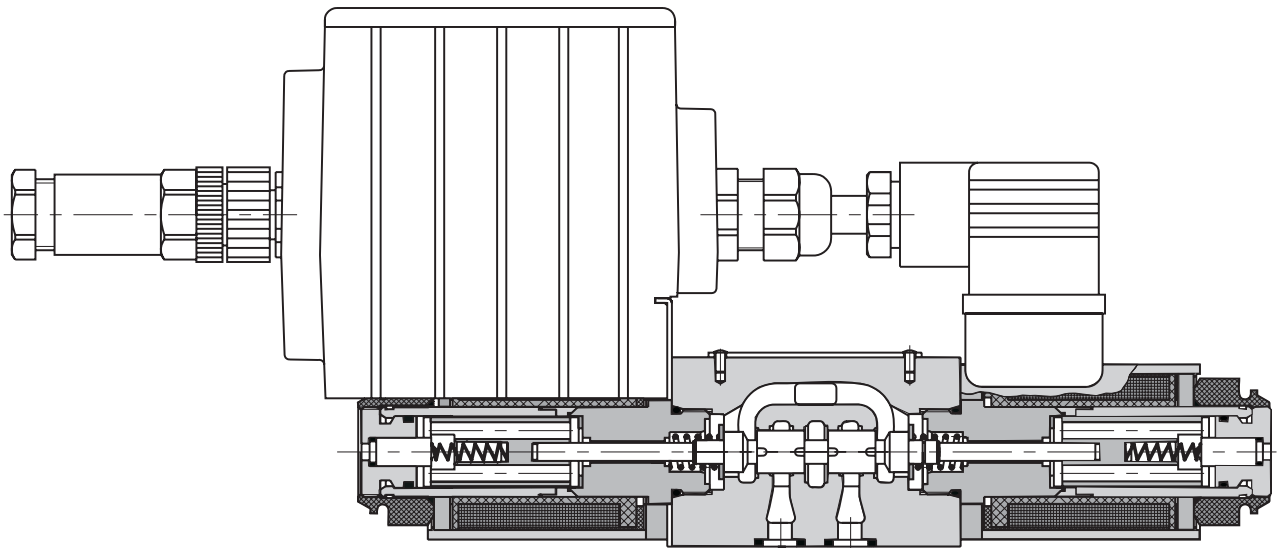
- **Compact design with integrated electronics**
- **High reliability**
- **Simple replacement of the exciting coils including electronics without opening the hydraulic circuits**
- **Continuous flow control in both directions**
- **Installation dimensions to DIN 24 340 / ISO 4401 / CETOP RP121-H**



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 apposite 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 $\pm 90^{o}$.
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 12V voltage) is also available for the user. By the use of this voltage, a voltage control signal can be made by means of a potentiometer $\geq 1\ k\Omega$.
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 and the operating solenoids are zinc coated.

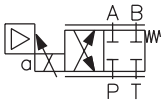
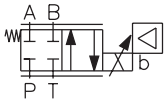
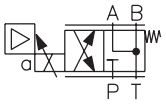
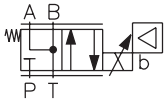
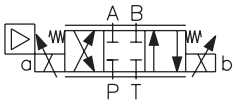
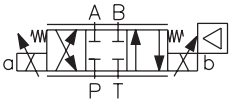
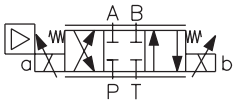
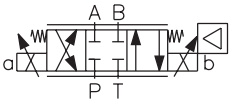
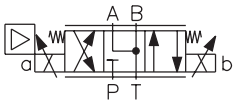
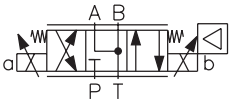
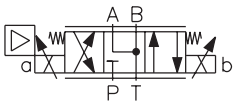
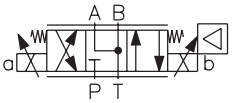


Ordering Code

PRM2-04 □ / □ - □ □ □

Proportional Directional Control Valve

Nominal size

	**2Z51**
	**2Z11**
	**2Y51**
	**2Y11**
	**3Z11**
	**3Z11B**
 $\frac{q_A}{q_B} = \frac{1}{2}$*	**3Z12**
 $\frac{q_A}{q_B} = \frac{1}{2}$*	**3Z12B**
	**3Y11**
	**3Y11B**
 $\frac{q_A}{q_B} = \frac{1}{2}$*	**3Y12**
 $\frac{q_A}{q_B} = \frac{1}{2}$*	**3Y12B**

Seals

without designation	NBR
V	FPM (Viton)

Electronics

without designation	without electronics
EK	connection by connector M12 x 1 (4-pin connector) (supplied with counterpart)

Nominal supply voltage

12	12 V DC
24	24 V DC

Nominal flow rate at Δp = 10 bar

4	4 L/min
8	8 L/min
12	12 L/min

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

Technical Data

Nominal size	mm	04
Maximum operating pressure at ports P, A, B	bar	320
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 (1999).
Nominal flow rate Q_n at Δp = 10 bar (ν = 32 $mm^2 \cdot s^{-1}$)	L/min	4, 8, 12
Hysteresis	%	≤ 6
Weight PRM2-042 PRM2-043	kg	0.9 1.25
Mounting position		any, preferably horizontal
Enclosure type EN 60 529		IP65

Technical Data of the Proportional Solenoid

Nominal supply voltage	V	12 DC	24 DC
Limit current	A	1.7	0.8
Mean resistance value at 20°C	Ω	5	21

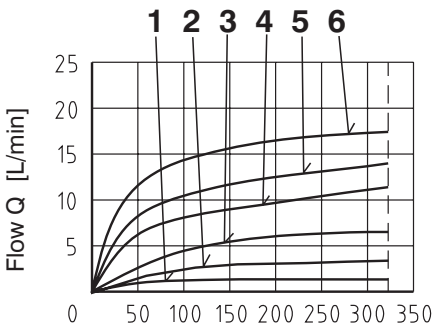
Technical Data of the Electronics

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 ≥ 1 kΩ)
Control signal		see table of switches configuration (page 6)	
Maximum output current	A	2.4 for R < 4Ω	1.5 for R < 10Ω
Ramp adjustment range	s	0.05 ... 3	
Dither frequency	Hz	90/60	
Dither amplitude	%	0 ... 30	

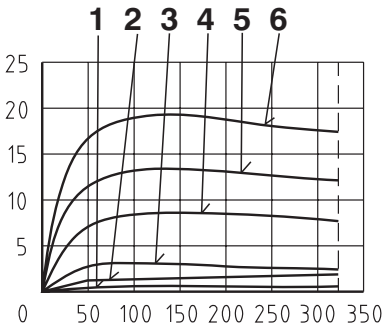
Limit Power

Measured at ν = 32 mm^2/s P → A / B → T or P → B / A → T

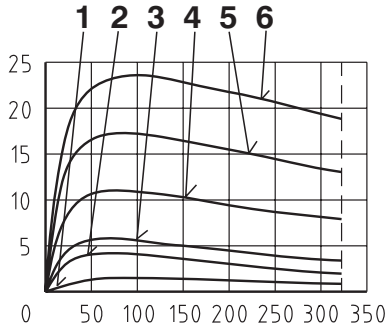
Nominal flow 4[L/min]



Nominal flow [8 L/min]



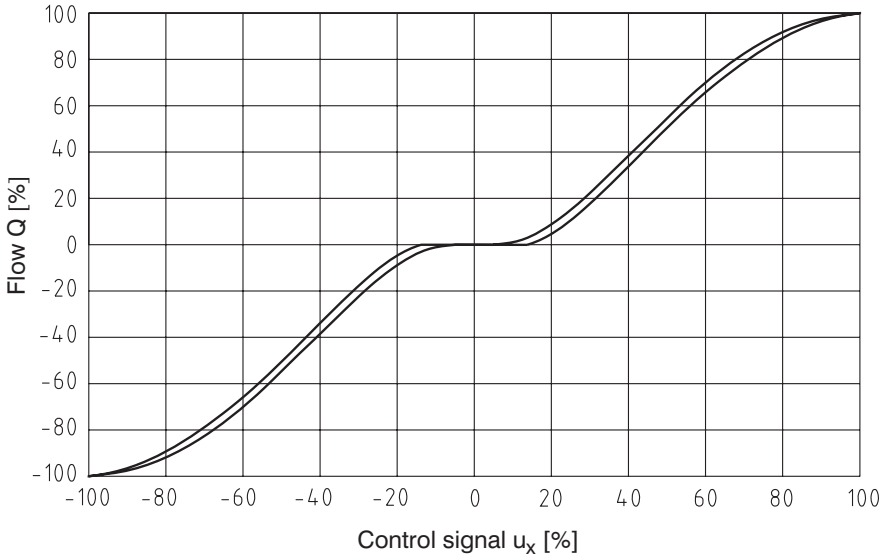
Nominal flow 12 [L/min]



Solenoid current:
1 = 50%
2 = 60%
3 = 70%
4 = 80%
5 = 90%
6 =100%

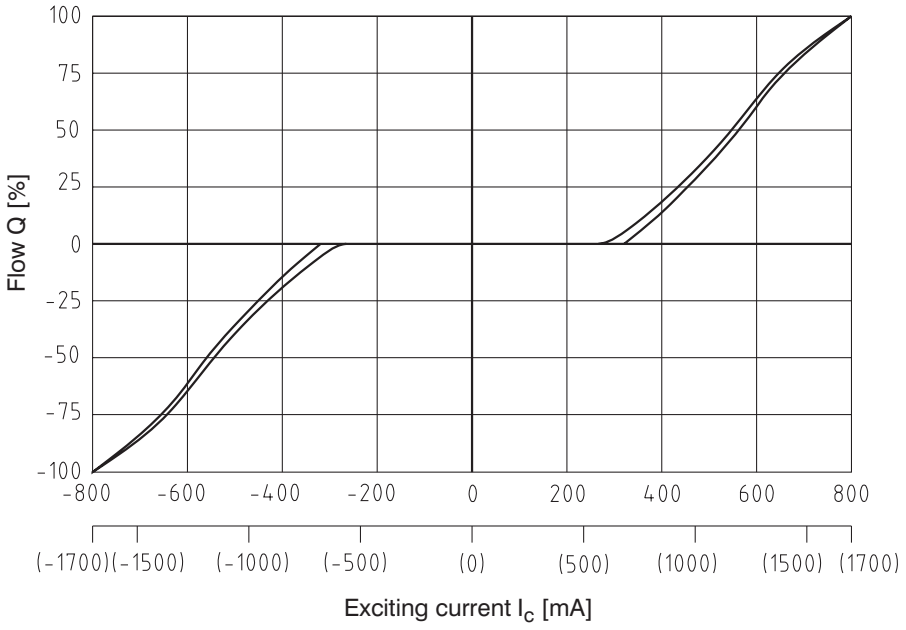
Flow Characteristic with Integrated Electronics

Measured at Δp = 10 bar, ν = 32 mm^2/s



Flow Characteristic without Integrated Electronics

Measured at Δp = 10 bar, ν = 32 mm^2/s,

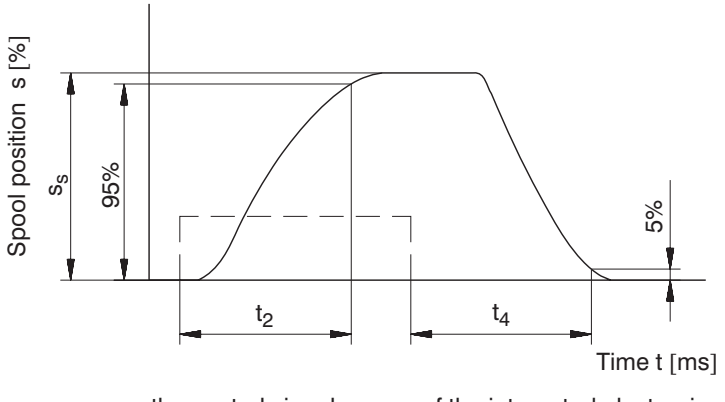


Values in parenthesis are valid for the supply voltage 12 V.

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

Transient Characteristic

Measured at Δp = 10 bar, ν = 32 mm^2/s; Q = 80 %Q_n

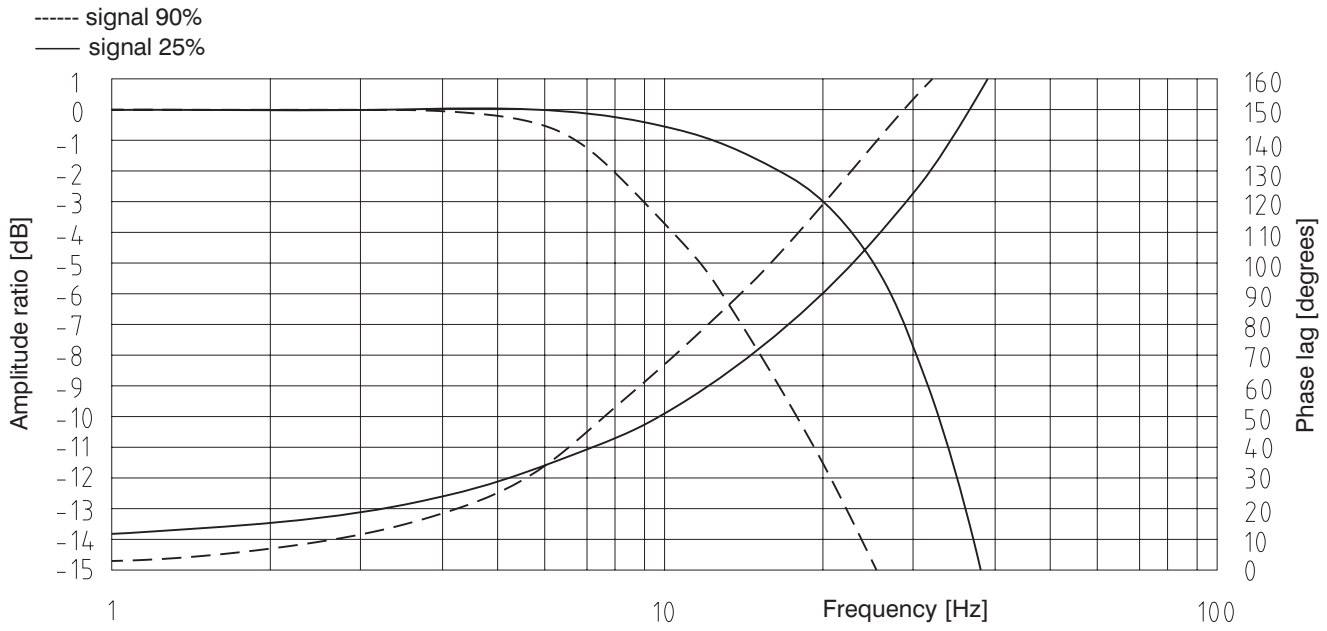


— — — the control signal course of the integrated electronics

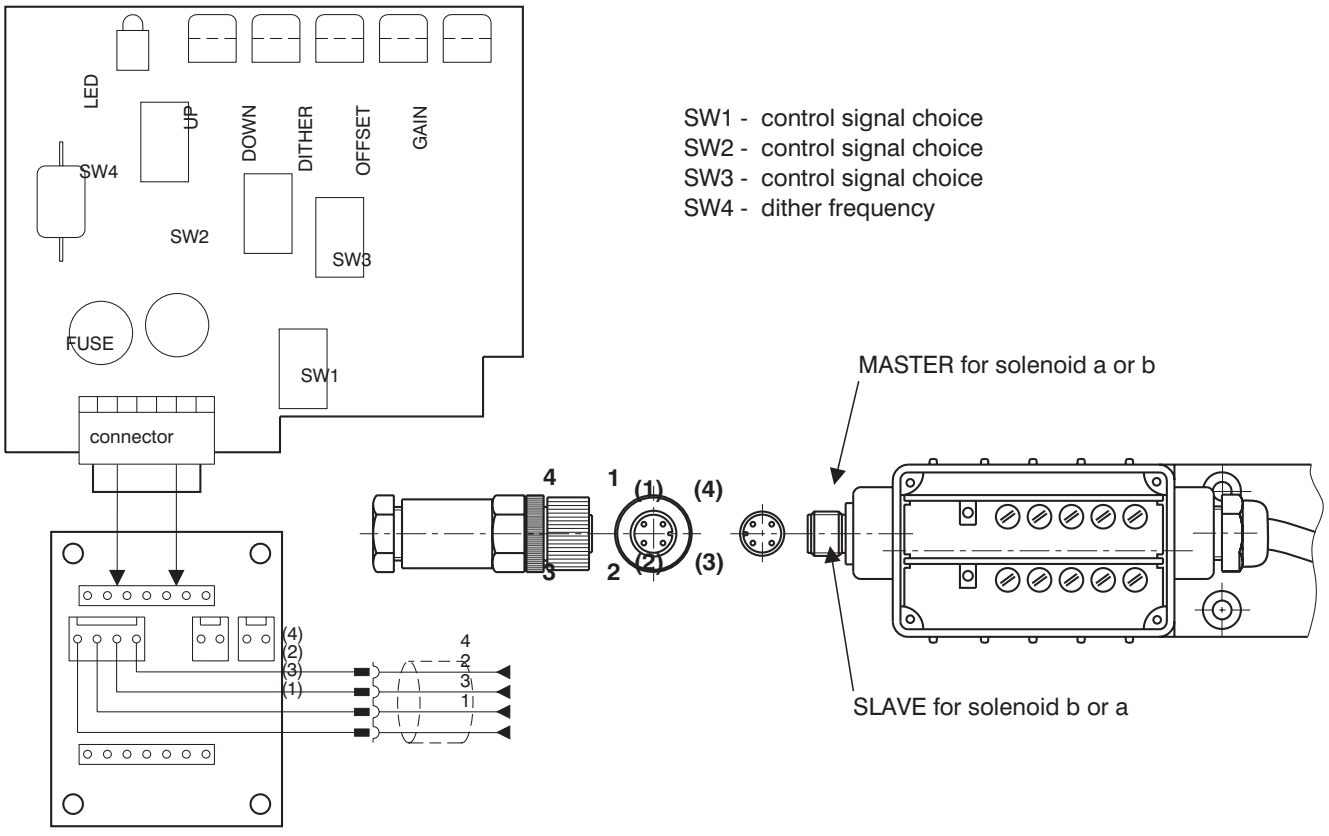
Steady spool position s_s [%]	t_2 [ms]	t_4 [ms]
100	75	70
75	70	55
50	50	40
25	35	25

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.

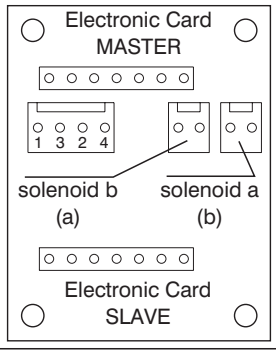
Frequency Reponse



Component Arrangement on the Electronic Card



Description basic subplatte



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

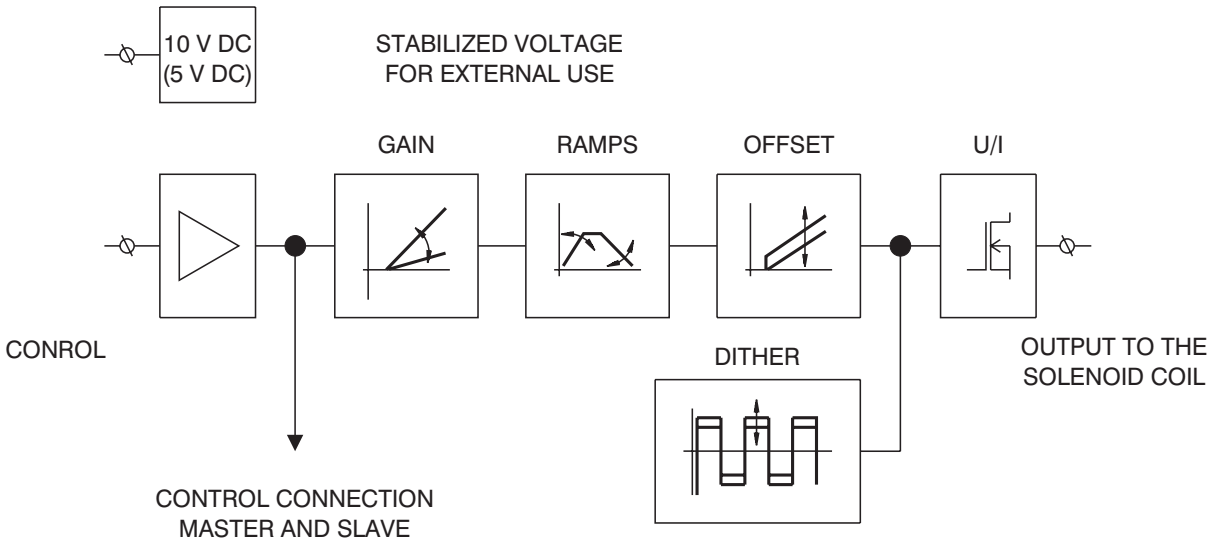
Table of the Switch Configuration for the Control Signal Choices

		PRM2-042				PRM2-043	
		0 ... 5 V	0 ... 10 V (0 ... 5 V)*	0 ... 20 mA	4 ... 20 mA	$U_{cc}/2$ ± 10 V (± 5 V)*	± 10 V (± 5 V)*
MASTER M	SW1	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2
	SW2	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2
	SW3	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2
	SW4	90 Hz ON 1 2			60 Hz ON 1 2		
SLAVE S	SW1					ON 1 2	ON 1 2
	SW2					ON 1 2	ON 1 2
	SW3					ON 1 2	ON 1 2
	SW4					90 Hz ON 1 2	60 Hz ON 1 2

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



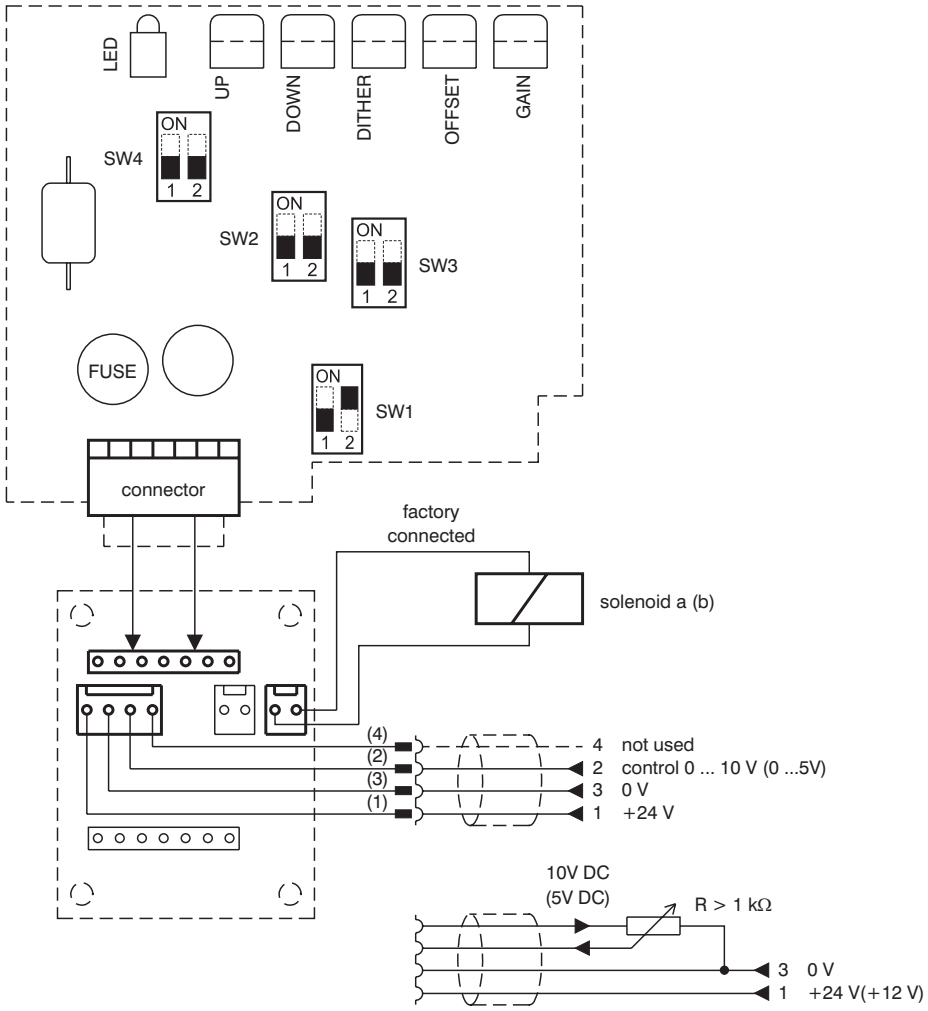
Valve PRM2-042 (with one solenoid)

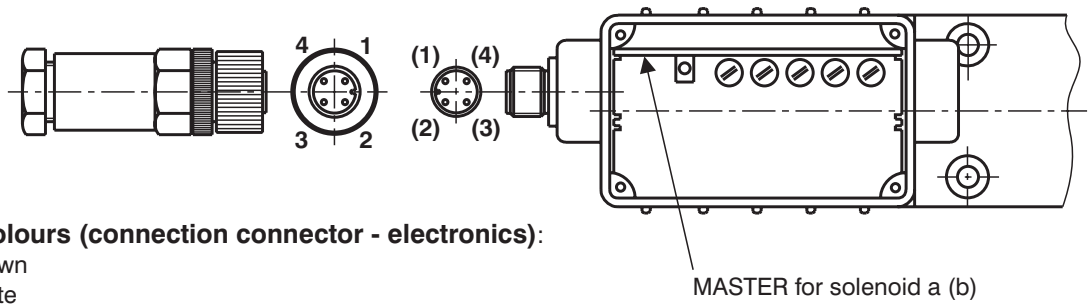
1 Factory setting

1.1 Control with external voltage source 0 ... 10 V (0 ... 5 V) or with external potentiometer R >1 kΩ

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

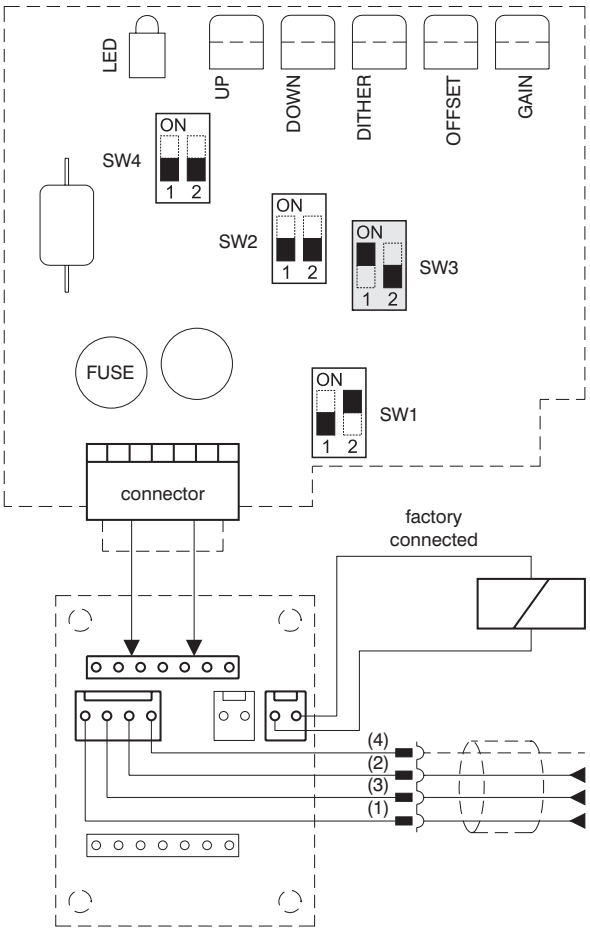
Valve PRM2-042 (with one solenoid)

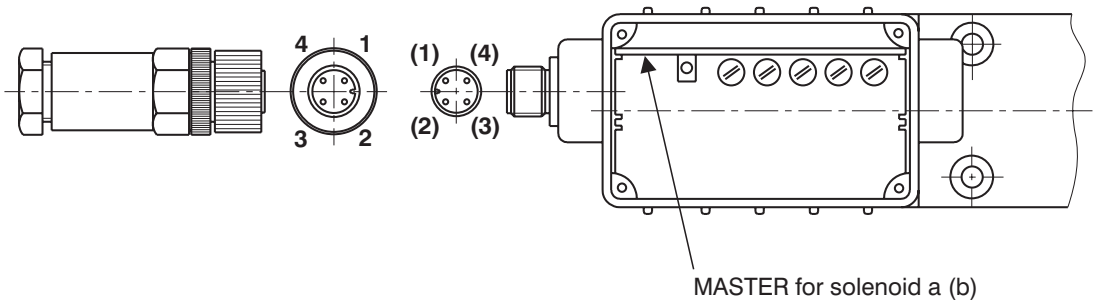
2 Other control possibilities

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:

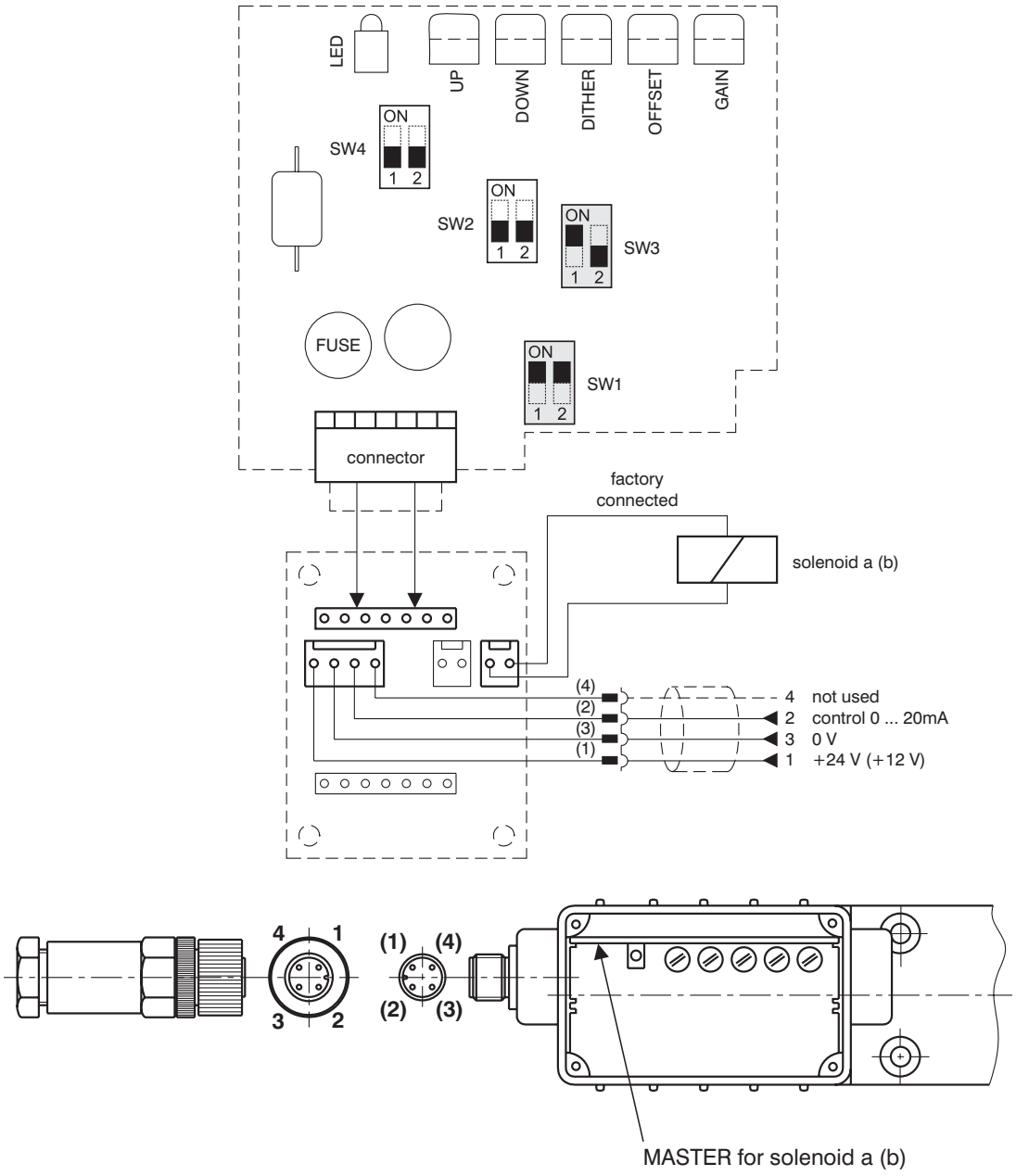
1. Unscrew the electronics cover
2. Carefully remove the Master card
3. Flip the switch SW3 in position shown in the picture
4. Put in the Master card and fix the electronics cover
5. Connect the voltage +24 V from an external supply source to terminals 1 and 3 of the connector
6. Connect the control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

Valve PRM2-042 (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:

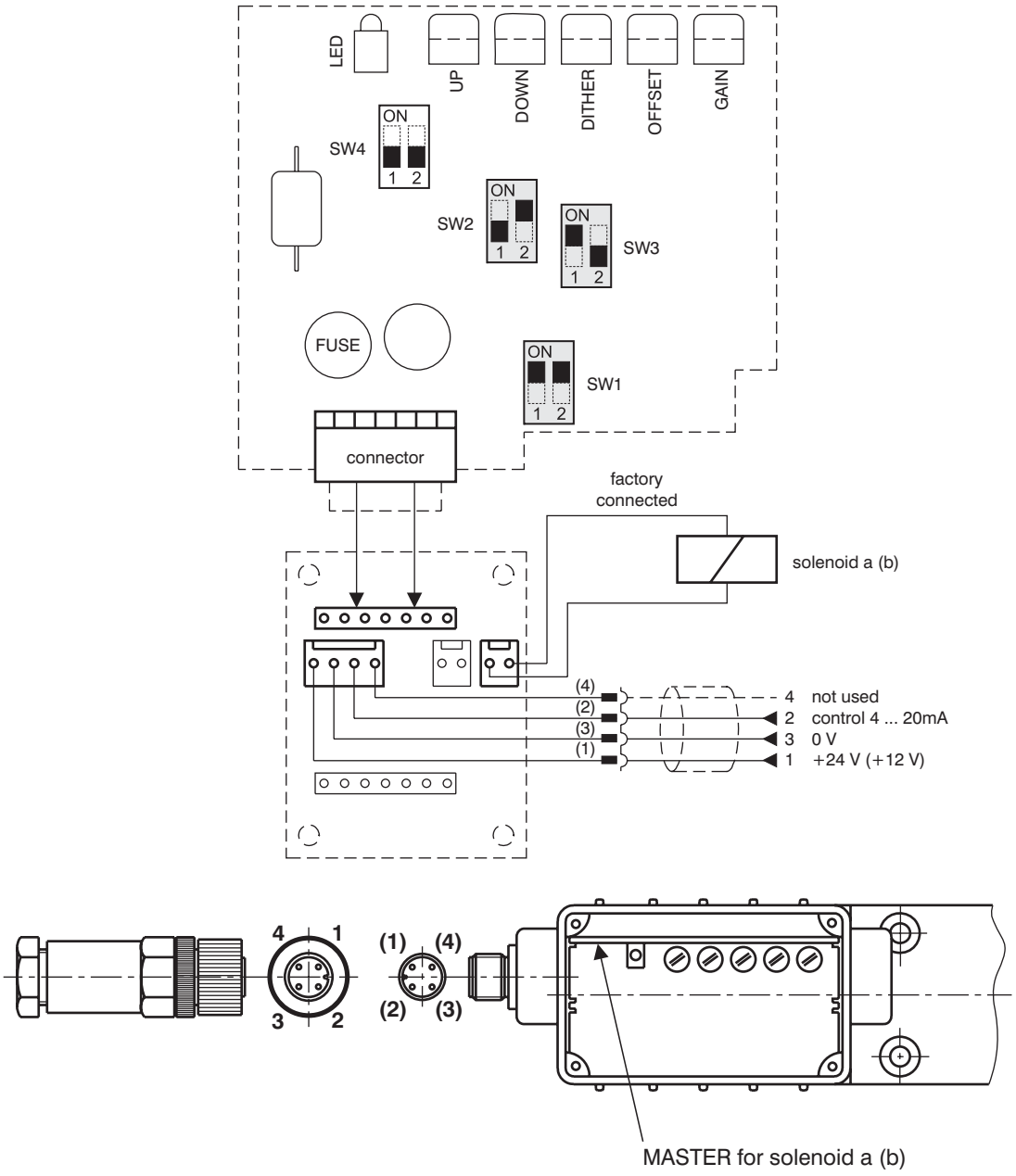
1. Unscrew the electronics cover
2. Carefully remove the Master card
3. Flip the switch SW1 and SW3 in position shown in the picture
4. Put in the Master card and fix the electronics cover
5. Connect the voltage +24 V (+12 V) from an external supply source to terminals 1 and 3 of the connector
6. Bring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

Valve PRM2-042 (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

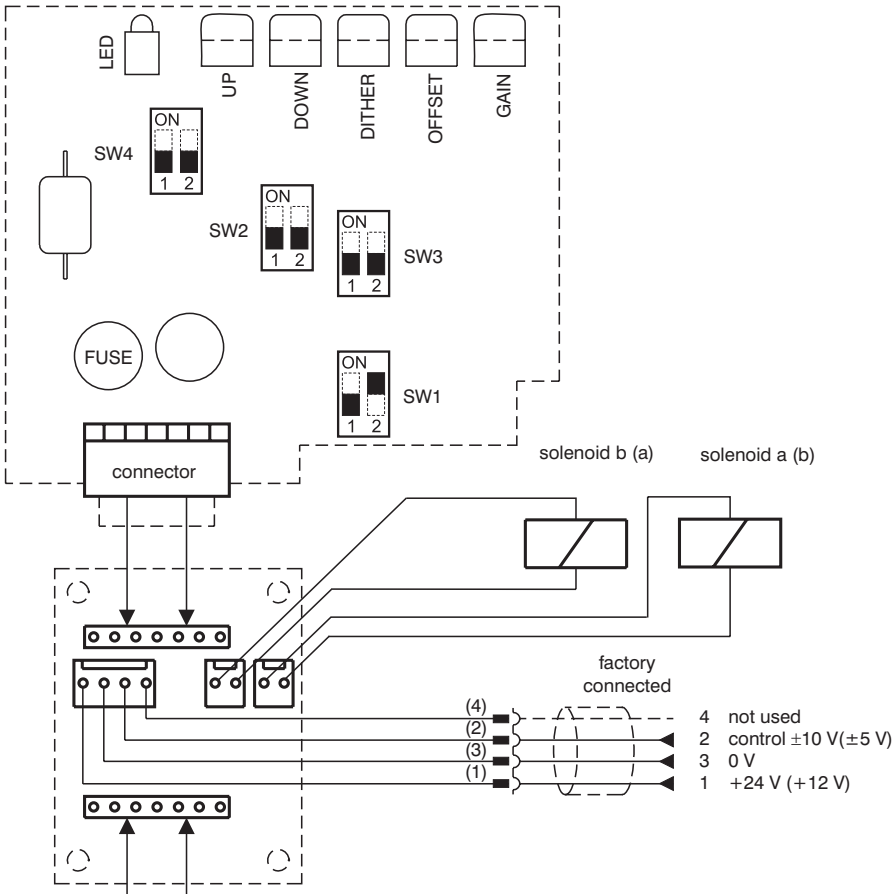
Valve PRM2-043 (with two solenoids)

3 Factory setting

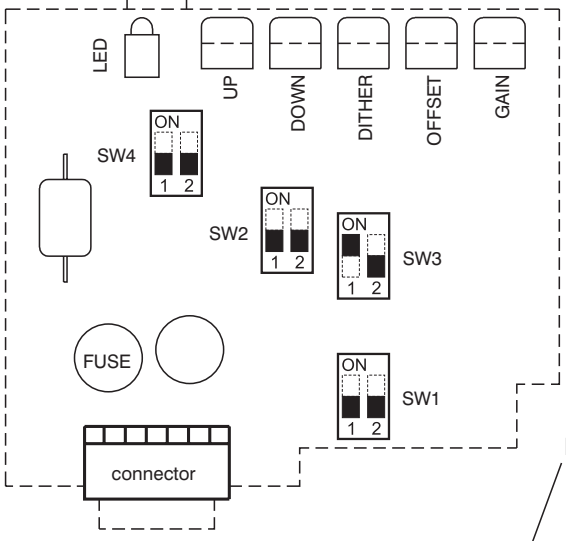
3.1 Control with external source 0 ± 10 V (0 ± 5 V)

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

Master card for solenoid a (b)

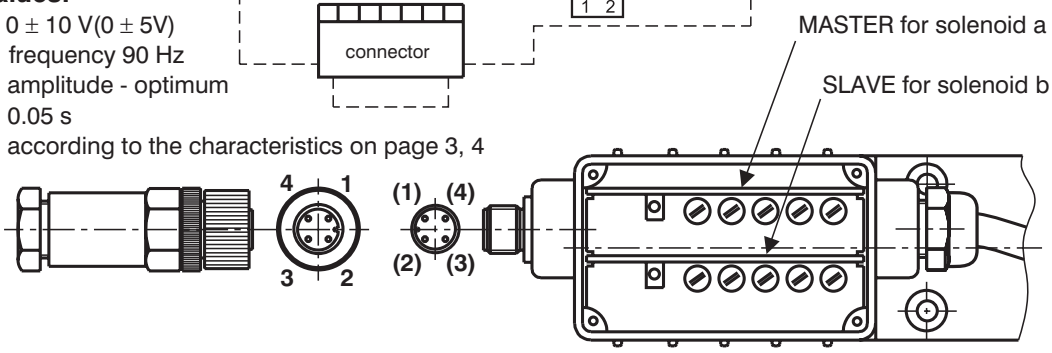


Slave card for solenoid b (a)



Factory set values:

Control signal: 0 ± 10 V(0 ± 5V)
Dither: frequency 90 Hz
amplitude - optimum
Ramps: 0.05 s
Offset, Gain: according to the characteristics on page 3, 4

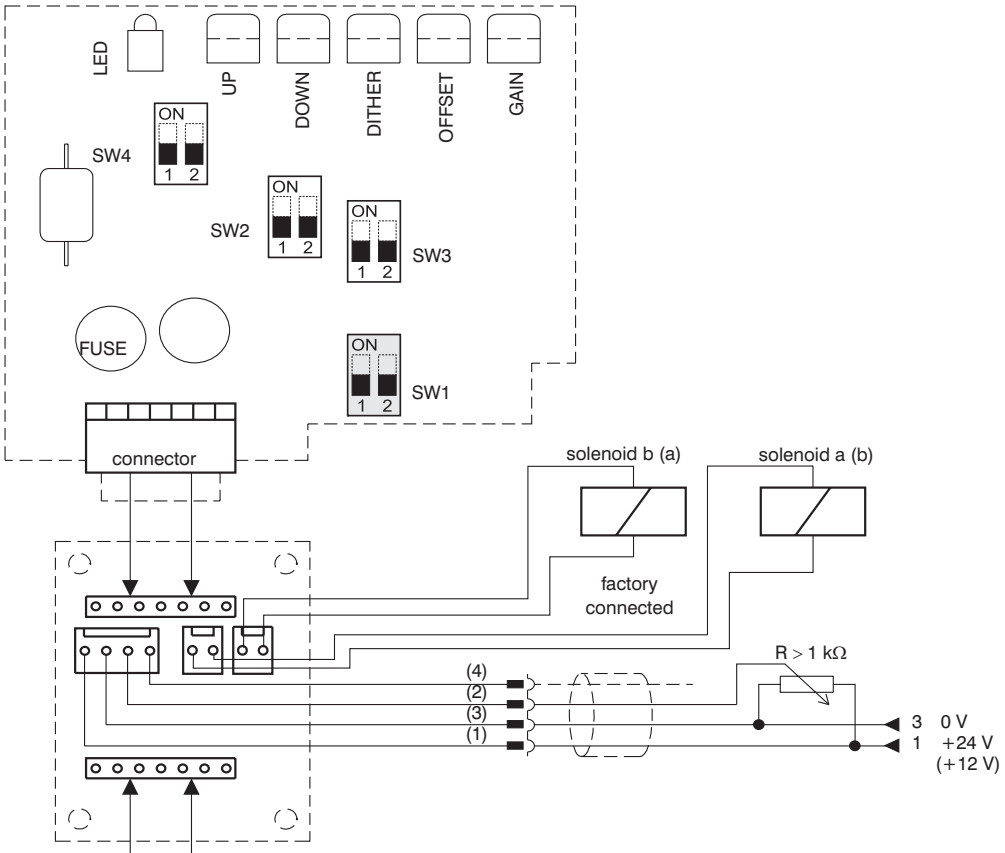


Valve PRM2-043 (with two solenoids)

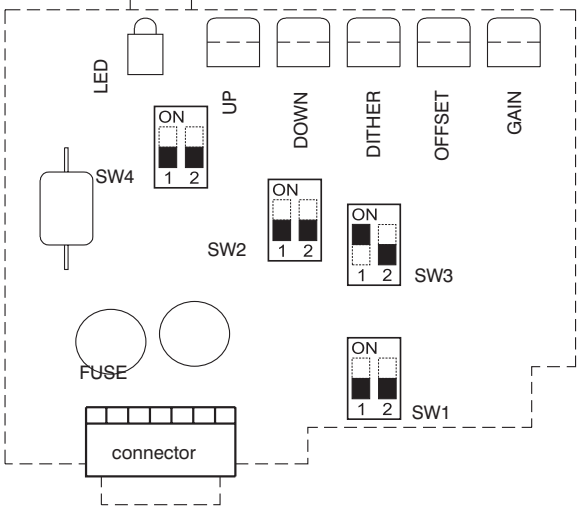
3.2 Other control possibilities

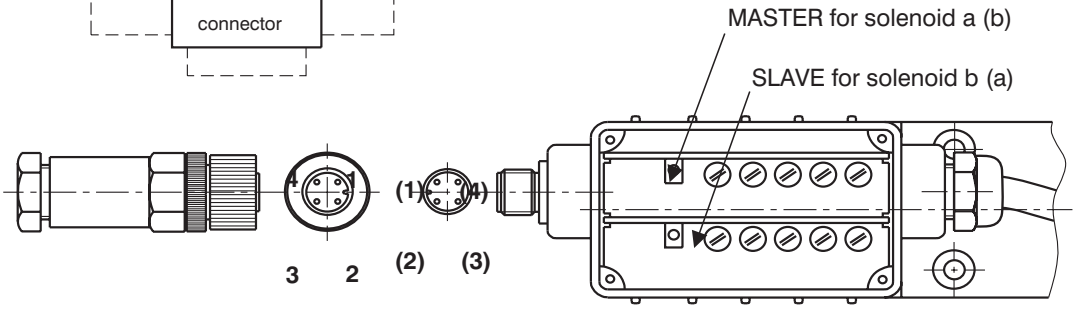
Control $U_{cc}/2 \pm 10$ V($U_{cc}/2 \pm 5$V) external potentiometer R > 1 kΩ

Master card for solenoid a (b)



Slave card for solenoid b (a)



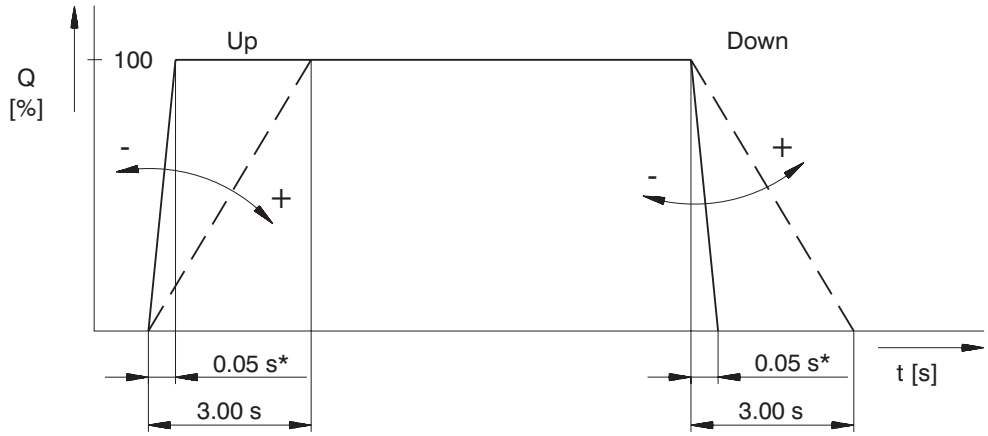


For the factory setting modification for this case of application, the following steps are required:

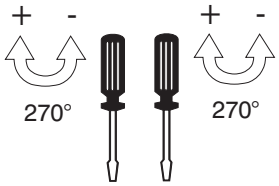
1. Unscrew the electronics cover
2. Carefully remove the Master card
3. Flip the switch SW1 in position shown in the picture
4. Put in the Master card and fix the electronics cover
5. Connect the voltage +24 V (+12 V) from an external supply source to terminals 1 and 3 of the connector

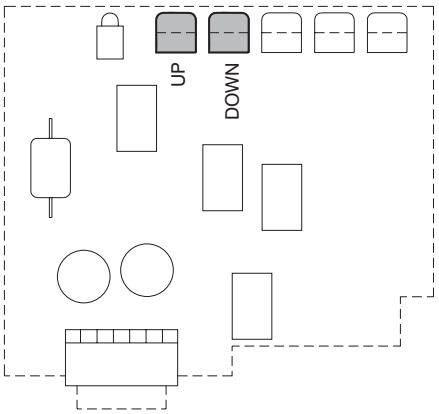
Ramp Adjustment (Up, Down)

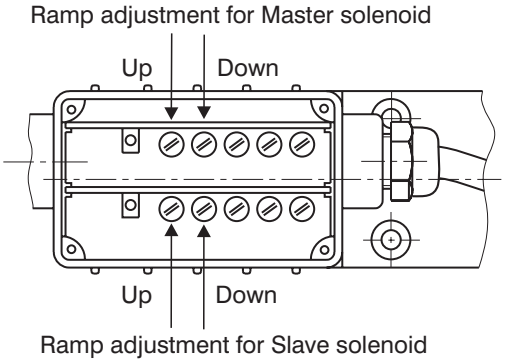
Notice: The factory setting of the ramp functions is to the minimum values.



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



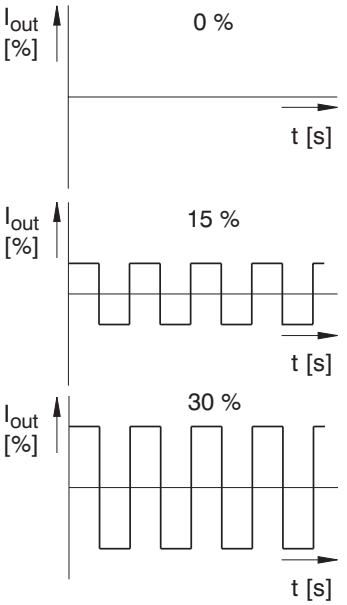


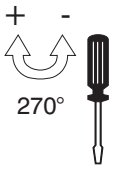


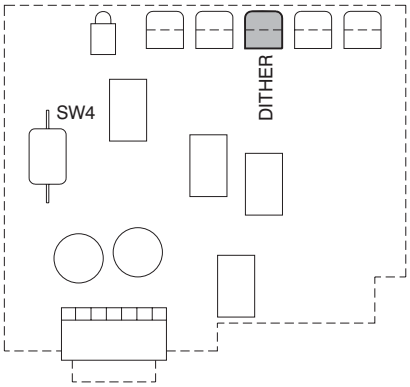
Dither Adjustment

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

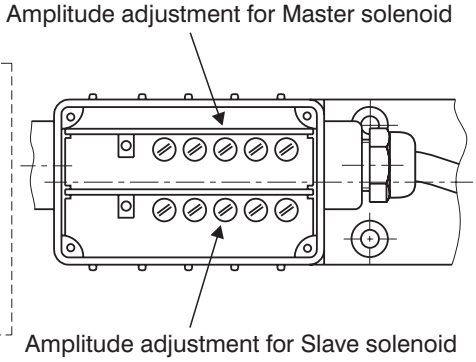
Amplitude - potentiometer (dither) (0 - 30 %)





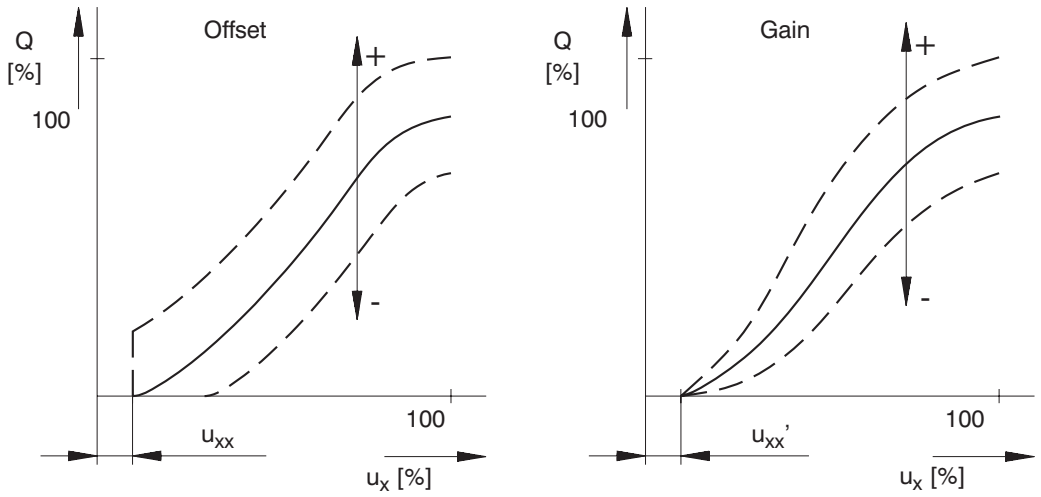


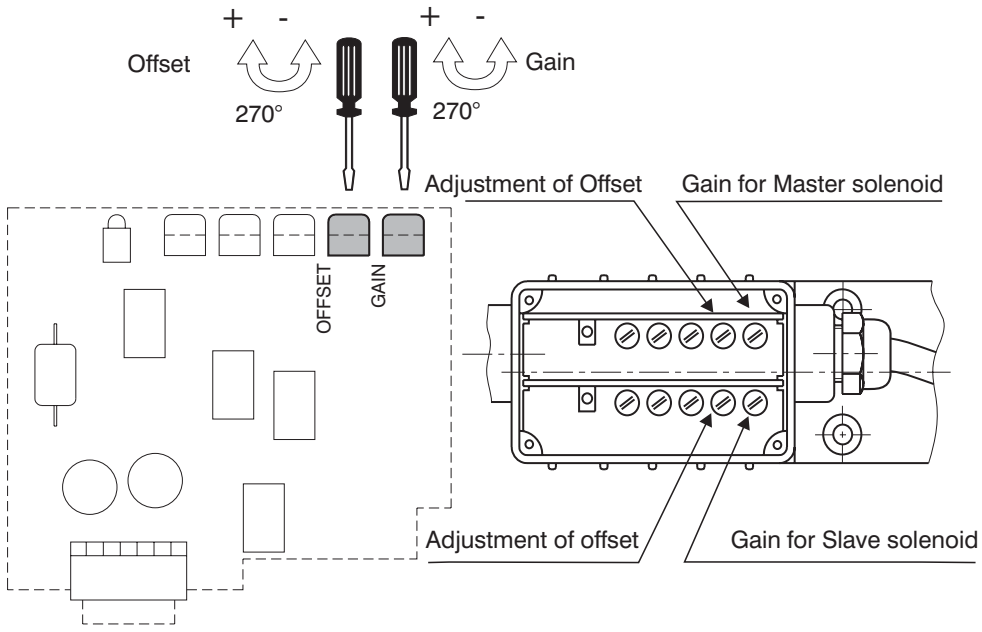
Frequency - switch SW4



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.



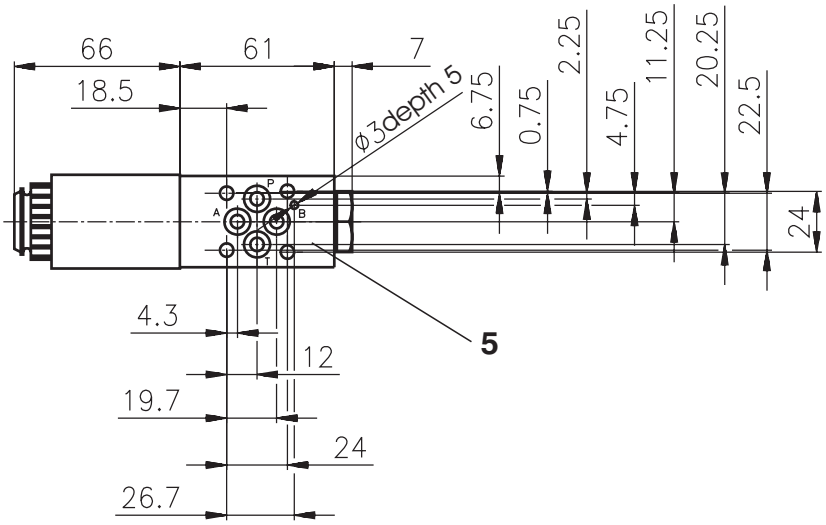


Nominal supply voltage of electronics [V]	Area insensible to control signal u_{xx} [%]
12	1 ... 3
24	0.5 ... 2

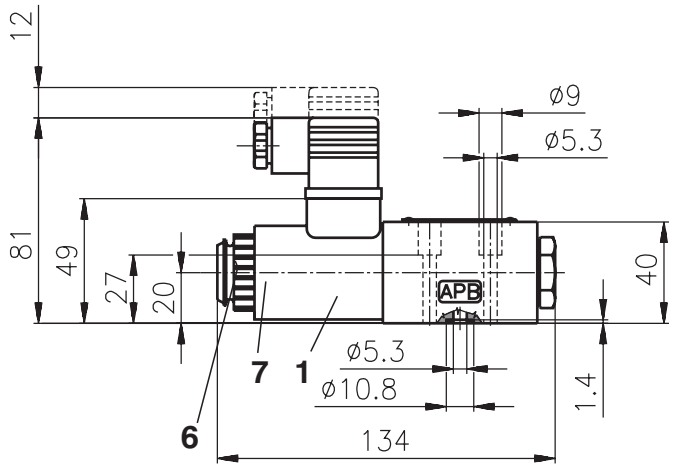
Valve Dimensions

Dimensions in millimetres

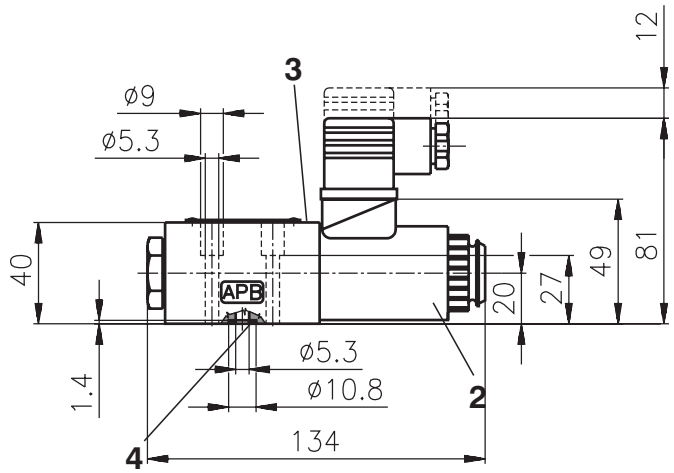
PRM2-042..../..-...



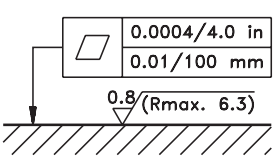
Functional symbols
2Z51, 2Y51



Functional symbols
2Z11, 2Y11



1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 7.65 x 1.68 (4 pcs.) supplied in delivery packet
5 4 mounting holes
6 Manual override
7 Solenoid fixing nut (Nut torque 3 Nm)

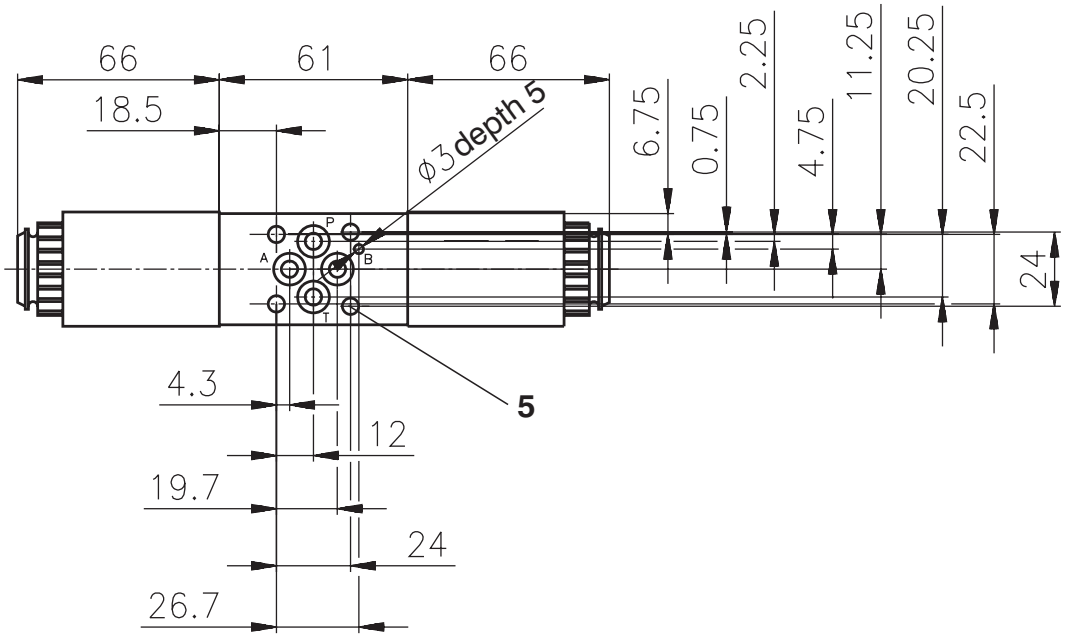


Required surface finish of interface.

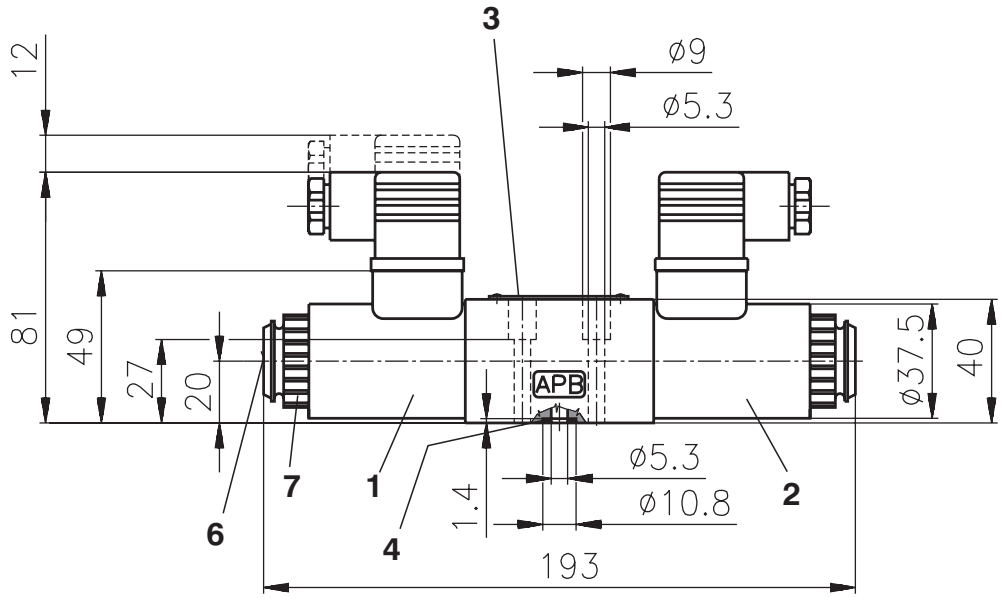
Valve Dimensions

Dimensions in millimetres

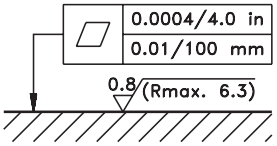
PRM2-043..../..-...



Functional symbols
3Z11, 3Z12, 3Y11, 3Y12



1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 7.65 x 1.68 (4 pcs.) supplied in delivery packet
5 4 mounting holes
6 Manual override
7 Solenoid fixing nut (Nut torque 3 Nm)

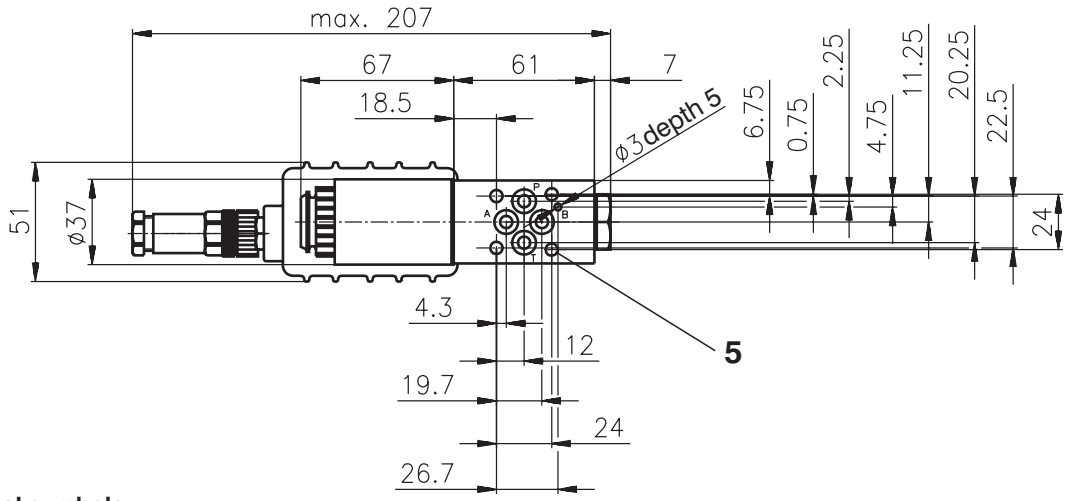


Required surface finish of interface.

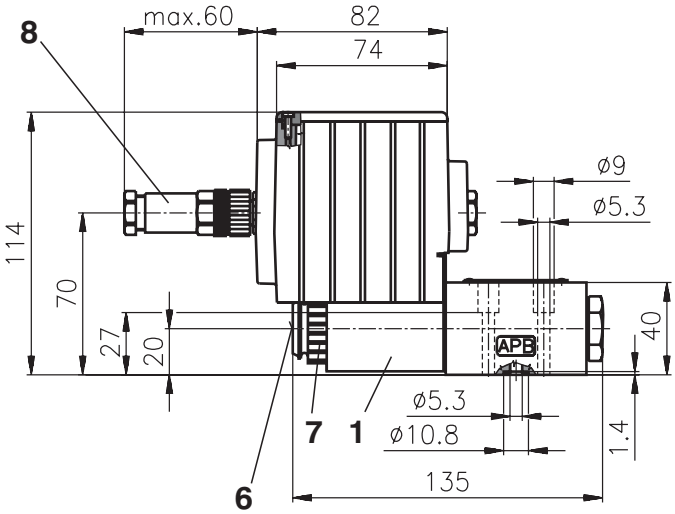
Valve Dimensions

Dimensions in millimetres

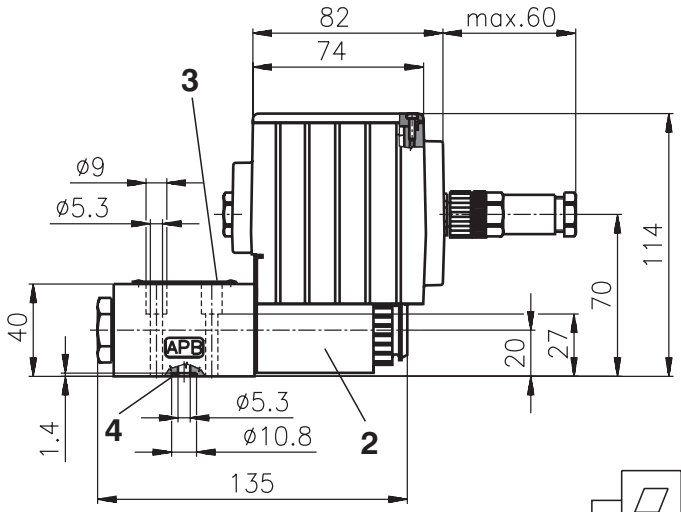
PRM2-042..../..-..EK.



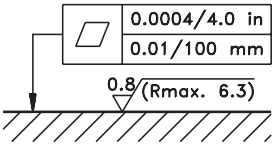
Functional symbols
2Z51, 2Y51



Functional symbols
2Z11, 2Y11



1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 7.65 x 1.68 (4 pcs.) supplied in delivery packet
5 4 mounting holes
6 Manual override
7 Solenoid fixing nut (Nut torque 3 Nm)
8 4-pin connector M12 x 1 for external supply voltage

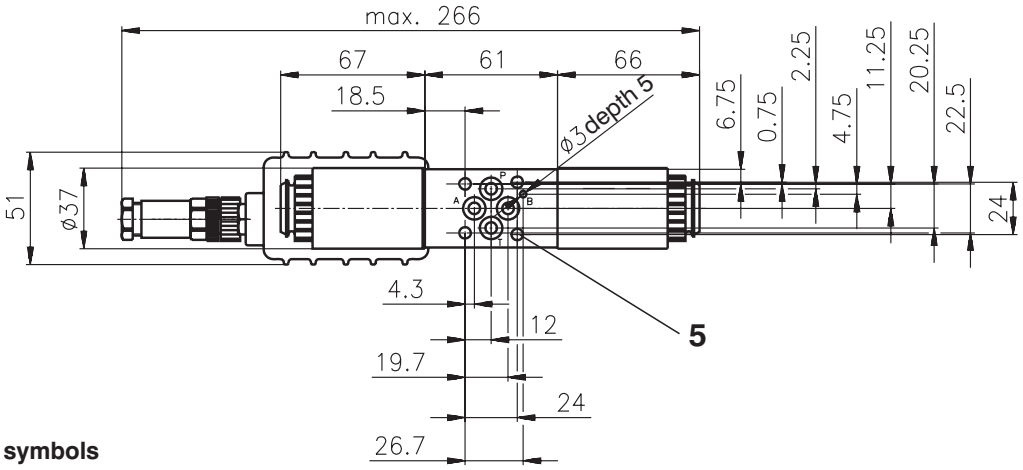


Required surface finish of interface.

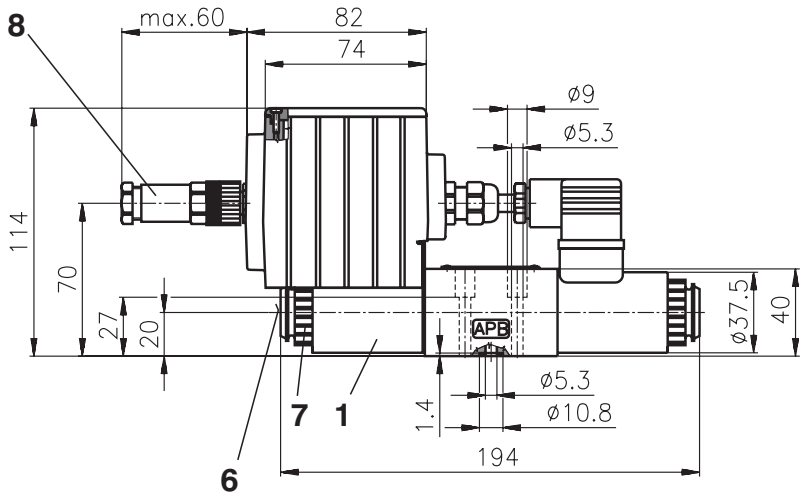
Valve Dimensions

Dimensions in millimetres

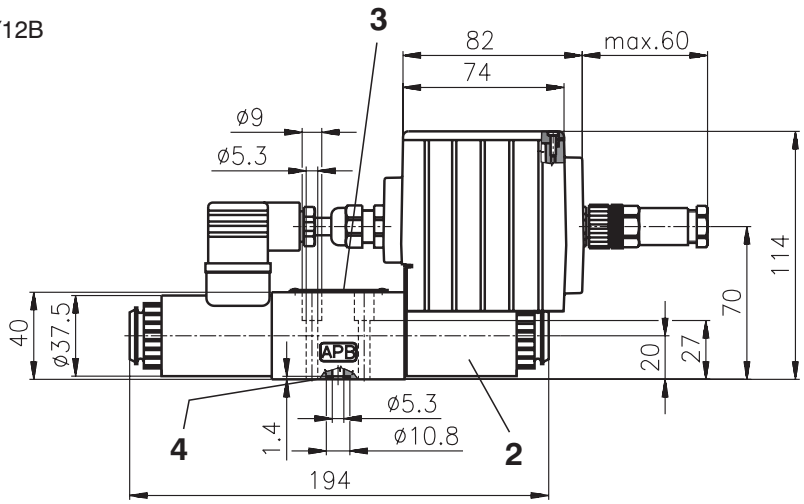
PRM2-043..../..-..EK.



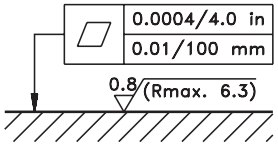
Functional symbols
3Z11, 3Z12, 3Y11, 3Y12



Functional symbols
3Z11B, 3Z12B, 3Y11B, 3Y12B



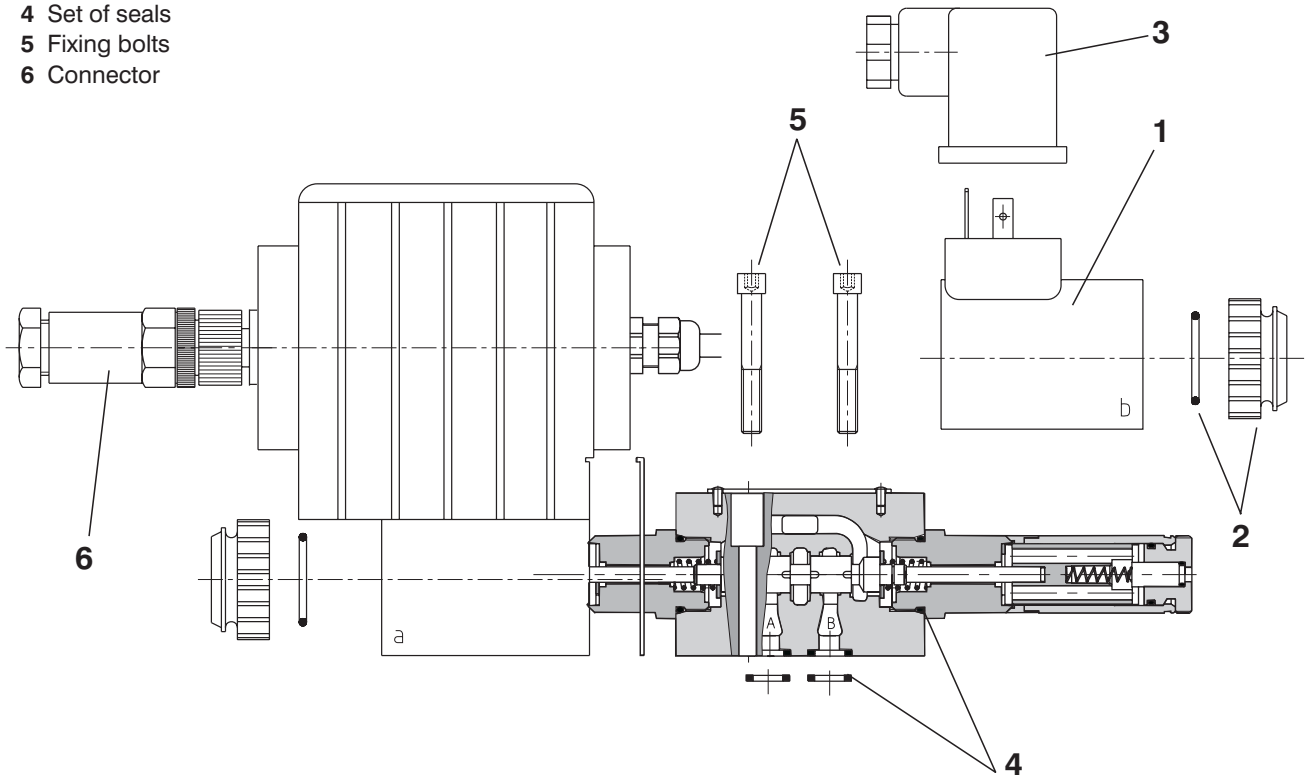
1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 7.65 x 1.68 (4 pcs.) supplied in delivery packet
5 4 mounting holes
6 Manual override
7 Solenoid fixing nut (Nut torque 3 Nm)
8 4- pin connector M12 x 1 for external supply voltage



Required surface finish of interface.

Spare Parts

1 Solenoid coil
2 Nut + sealing ring
3 Connector plug EN 175301-803
4 Set of seals
5 Fixing bolts
6 Connector



1. Solenoid coil

Nominal supply voltage [V]	Ordering number
12	936-0033
24	936-0034

2. Solenoid fixing nut + sealing ring

Model of the nut	Sealing ring	Ordering number
Standard nut	18 x 1,5	486-9010

3. Connector plug to EN 175301-803

Type designation	Type	Maximum input voltage	Connector plug A gray	Connector plug B black
			Ordering number	
K5	without rectifier - M16x1.5, (bushing bore ∅ 4-6 mm)	230 V DC	936-9906	936-9905

4. Set of seals

Type	Dimensions, number		Ordering number
Standard - NBR 70	7.65 x 1.68 (4 pcs)	16 x 1.8 (2 pcs)	486-9002
Viton	7.65 x 1.68 (4 pcs)	16 x 2 (2 pcs)	486-9009

5. Fixing bolts - set

Dimensions, number	Tightening torque	Ordering number
M5 x 35 DIN 912-10.9 (4 pcs)	5 Nm	486-9011

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

Caution!

- The packing foil is recyclable.
- The protective plate can be returned to manufacturer.
- Mounting bolts M5 x 35 DIN 912-10.9 or studs must be ordered separately.
  Tightening torque of the bolts is 5 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 law.

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Proportional directional control valve

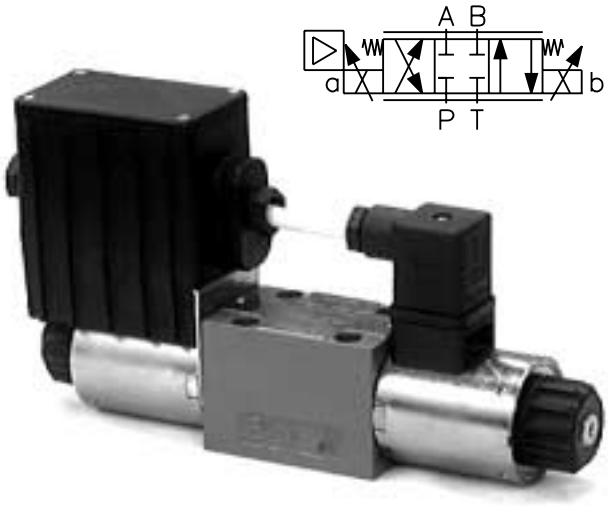
PRM2-06

Size 06 • p_{max} up to 320 bar • Q_{max} up to 40 L/min

HA 5104
1/2005

Replaces
HA 5104 9/2003

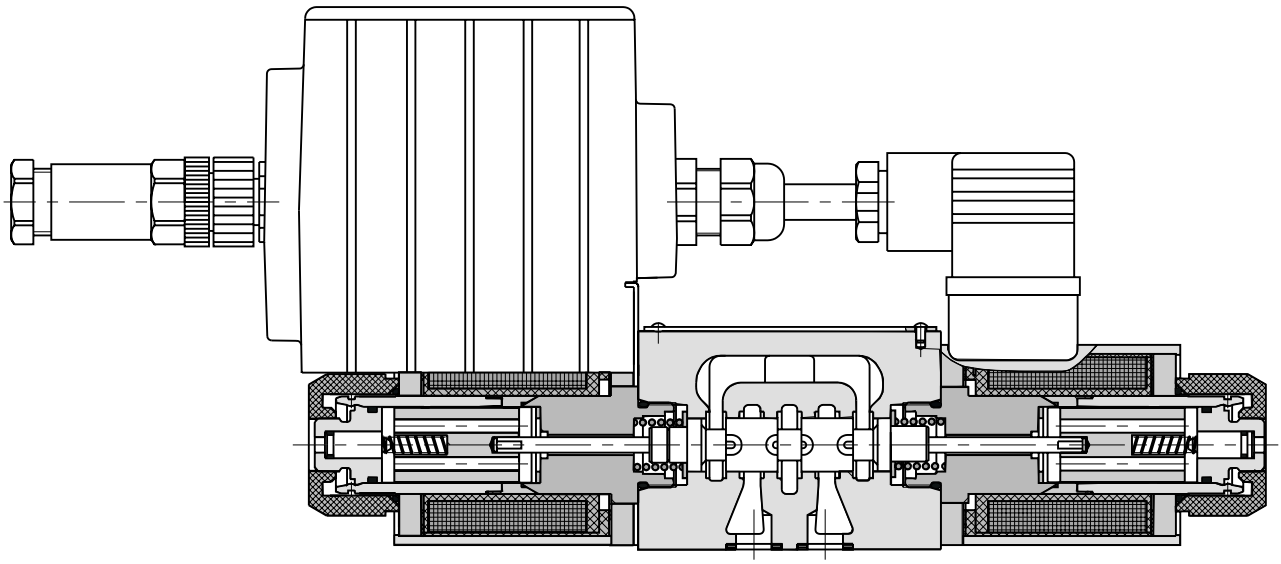
- ❑ **Compact design with integrated electronics**
- ❑ **High reliability**
- ❑ **Simple replacement of the exciting coils including electronics without opening the hydraulic circuits**
- ❑ **Continuous flow control in both directions**
- ❑ **Installation dimensions to DIN 24 340-A6 and ISO 4401-AB-03-4-A**



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 apposite 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 $\pm 90^{o}$.
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 ≥ 1 kΩ.
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.

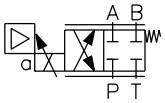
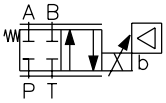
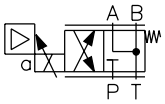
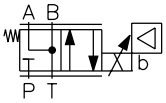
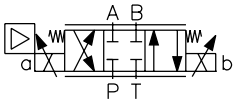
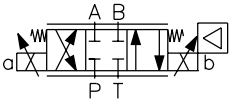
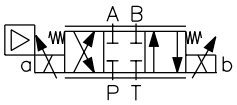
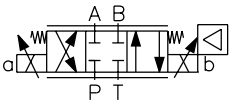
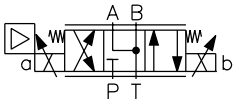
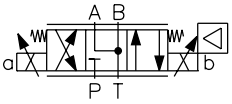
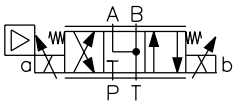
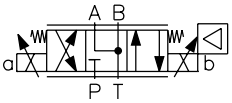


Ordering Code

PRM2-06 □ / □ - □ □ □

Proportional directional valve

Nominal size **06**

	**2Z51**
	**2Z11**
	**2Y51**
	**2Y11**
	**3Z11**
	**3Z11B**
 $\frac{q_A}{q_B} = \frac{1}{2}$*	**3Z12**
 $\frac{q_A}{q_B} = \frac{1}{2}$*	**3Z12B**
	**3Y11**
	**3Y11B**
 $\frac{q_A}{q_B} = \frac{1}{2}$*	**3Y12**
 $\frac{q_A}{q_B} = \frac{1}{2}$*	**3Y12B**

Seals

without designation	NBR
V	FPM (Viton)

Electronics

without designation	without electronics
EK	connection by connector M12 x 1 (4-pin connector) (supplied with counterpart)

Nominal supply voltage

12	12 V DC
24	24 V DC

Nominal flow rate at Δp = 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	320	
Maximum operating pressure at port T	bar	160	
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 and 68	
Fluid temperature range (NBR/Viton)	°C	-30 ... +80	-20 ... +80
Ambient temperature, max.	°C	up to +50	
Viscosity range	mm^2/s	20 ... 400	
Maximum degree of fluid contamination		Class 21/18/15 according to ISO 4406 (1999).	
Nominal flow rate Q_n at Δp = 10 bar (ν = 35 $mm^2 \cdot s^{-1}$)	L/min	15	30
Hysteresis	%	≤ 6	
Weight PRM2-062 PRM2-063	kg	1.9 2.40	
Mounting position		any, preferably horizontal	
Enclosure type		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

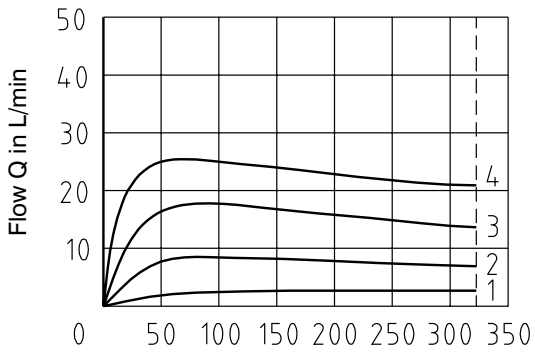
Technical Data of the Electronics

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 < 4Ω	1.5 for R < 10Ω
Ramp adjustment range	s	0.05 ... 3	
Dither frequency	Hz	90/60	

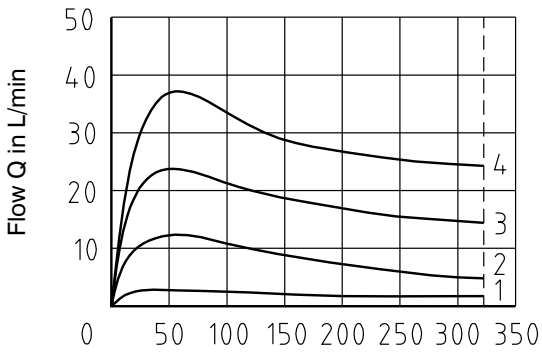
Limit power

Measured at ν = 35 mm^2/s P → A / B → T or P → B / A → T

Nominal flow 15 L/min



Nominal flow 30 L/min

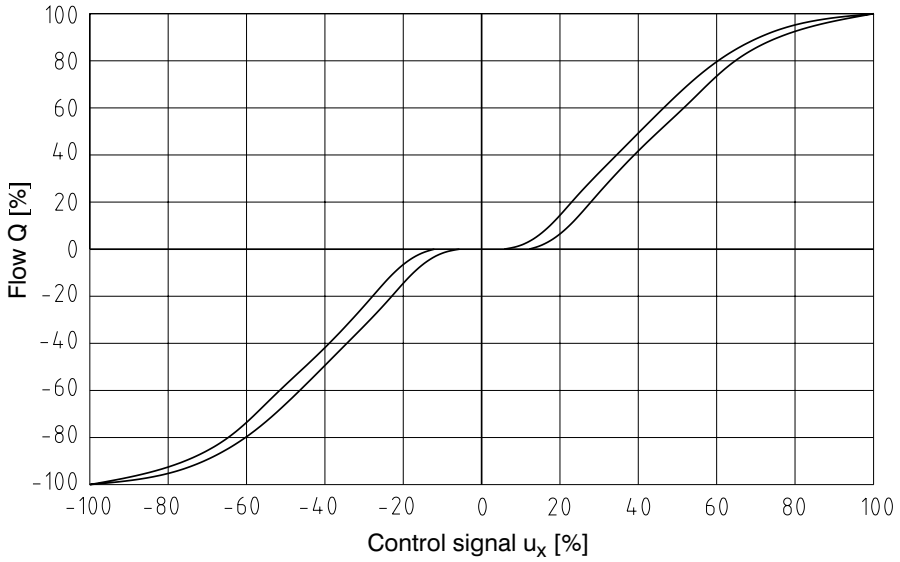


Solenoid current:

1 = 40%
2 = 60%
3 = 80%
4 = 100%

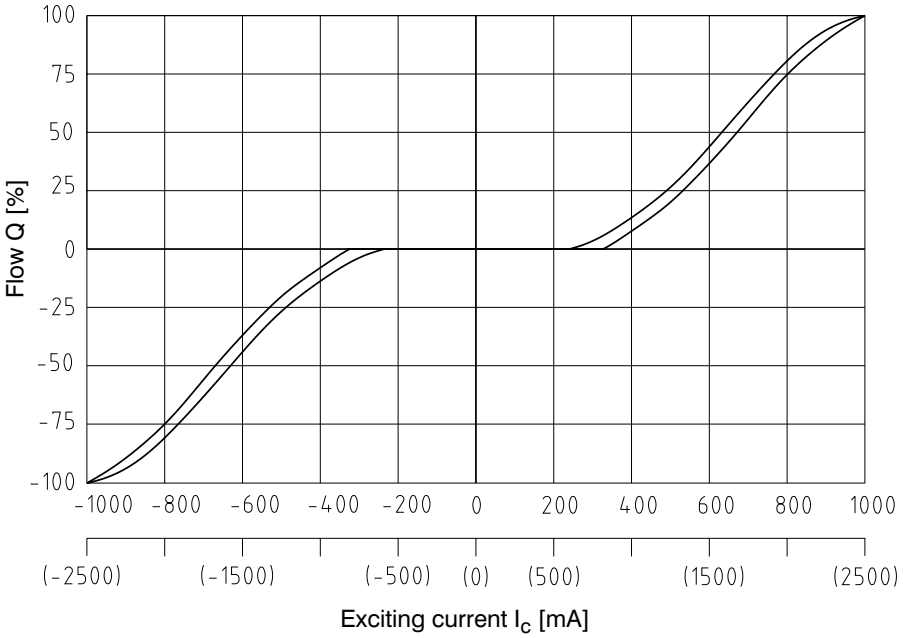
Flow characteristic with integrated electronics

Measured at $\Delta p = 10$ bar, $\nu = 35$ mm^2/s



Flow characteristic without integrated electronics

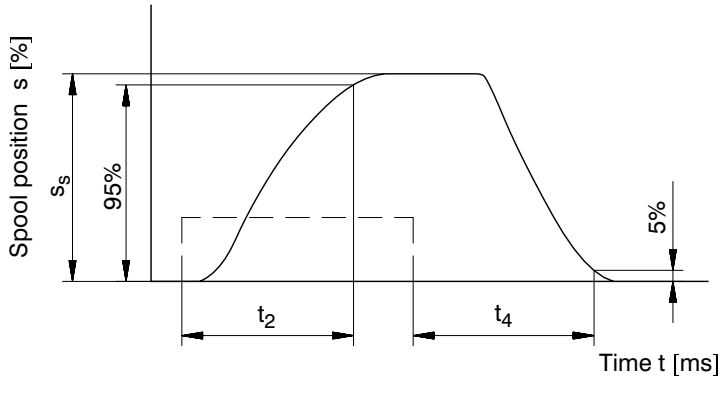
Measured at $\Delta p = 10$ bar, $\nu = 35$ mm^2/s, values in parenthesis are valid for the supply voltage 12 V



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

Transient characteristic

Measured at $\Delta p = 10$ bar, $\nu = 35$ mm^2/s; $Q = 80\ \%Q_n$

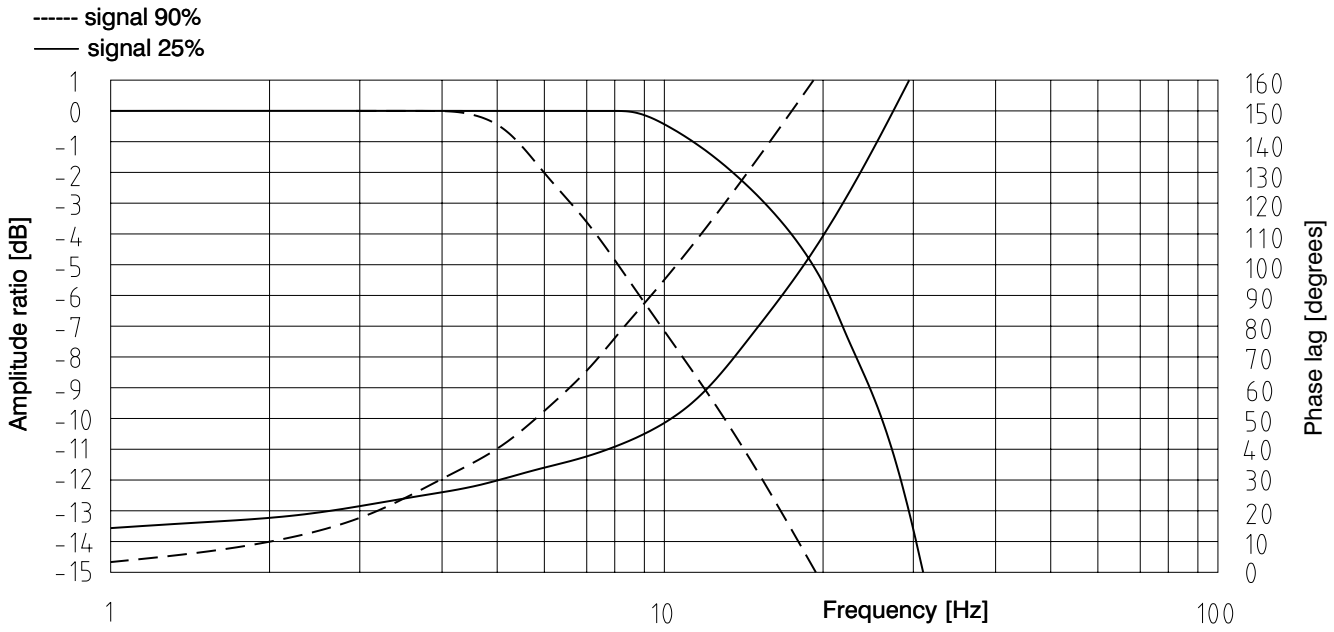


— — — the control signal course of the integrated electronics

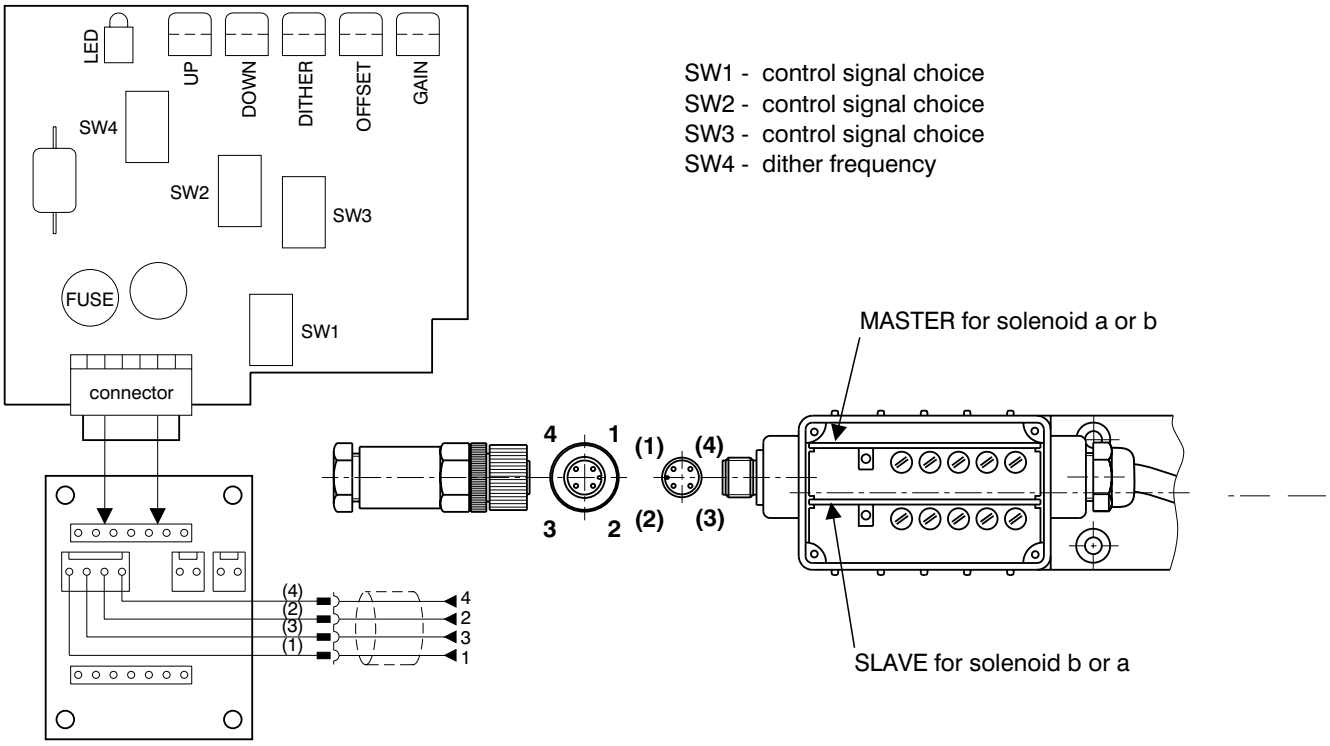
Steady spool position s_s [%]	t_2 [ms]	t_4 [ms]
100	85	100
75	70	85
50	55	75
25	45	55

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.

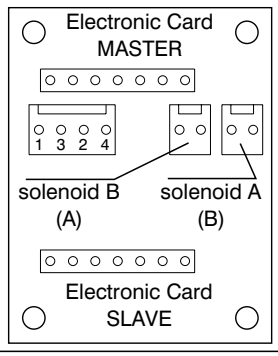
Frequency Reponse



Component Arrangement on the Electronic Card



Description basic subplatte



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

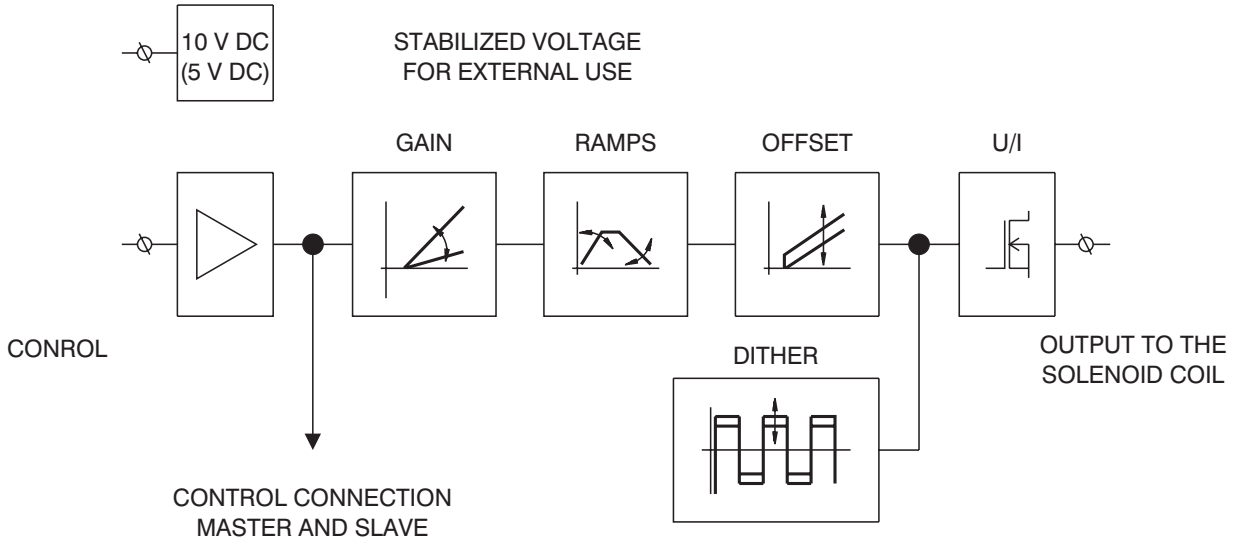
Table of the Switch Configuration for the Control Signal Choices

		PRM2-062				PRM2-063	
		0 ... 5 V	0 ... 10 V (0 ... 5 V)*	0 ... 20 mA	4 ... 20 mA	$U_{cc}/2$ ± 10 V (± 5 V)*	± 10 V (± 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



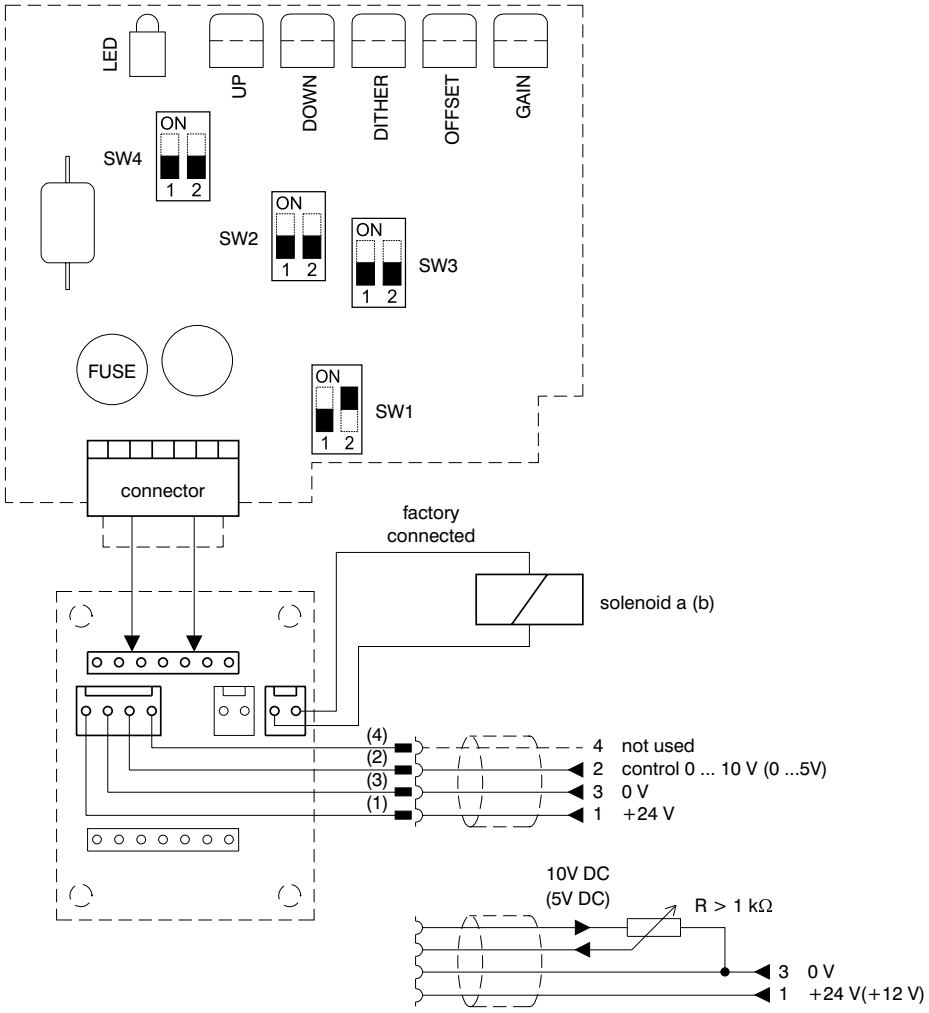
Valve PRM2-062 (with one solenoid)

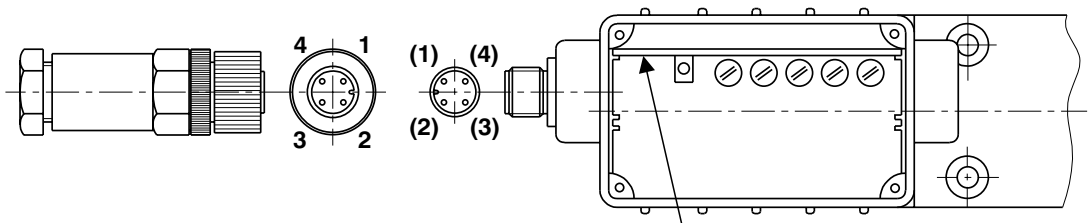
1 Factory setting

1.1 Control with external voltage source 0 ... 10 V (0 ... 5 V) or with external potentiometer R >1 kΩ

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

Master card for solenoid a (b)





MASTER 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

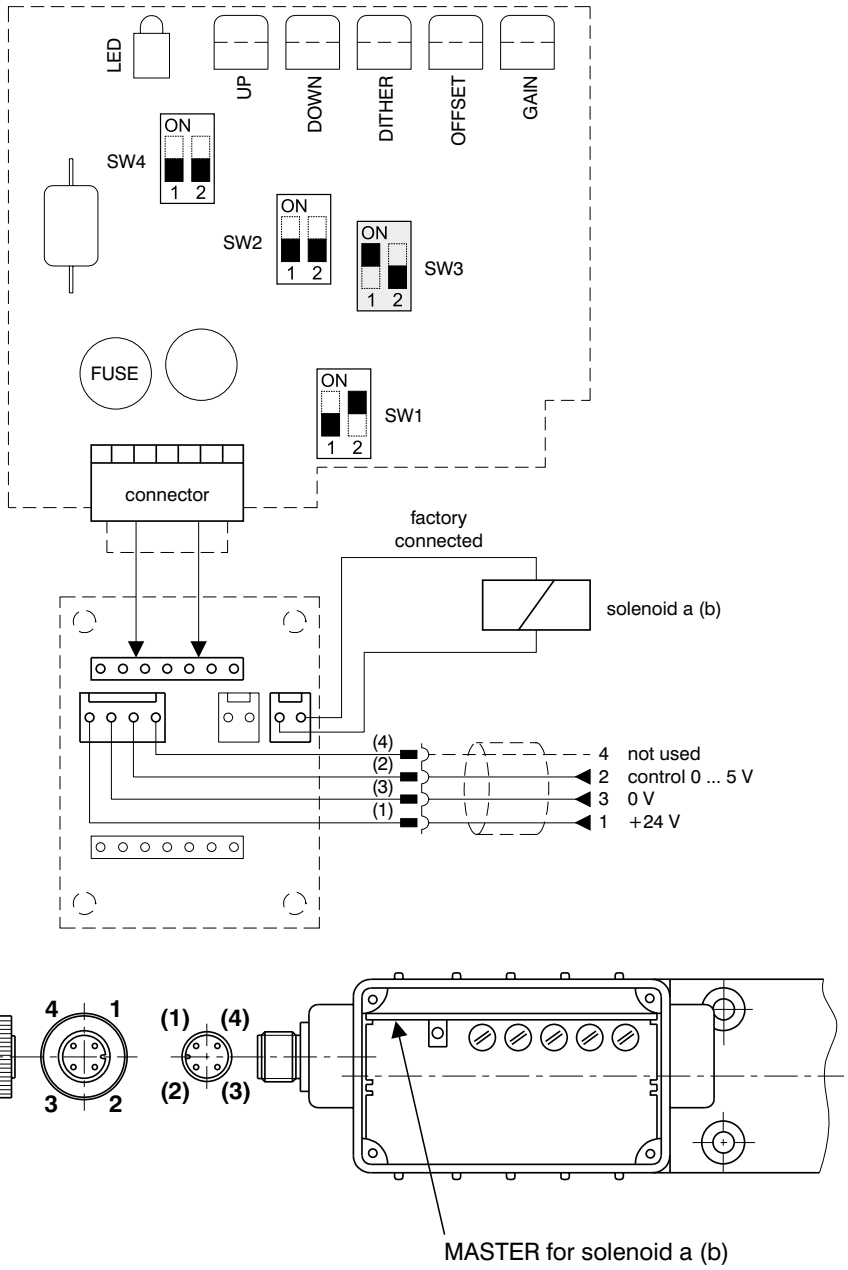
Valve PRM2-062 (with one solenoid)

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:

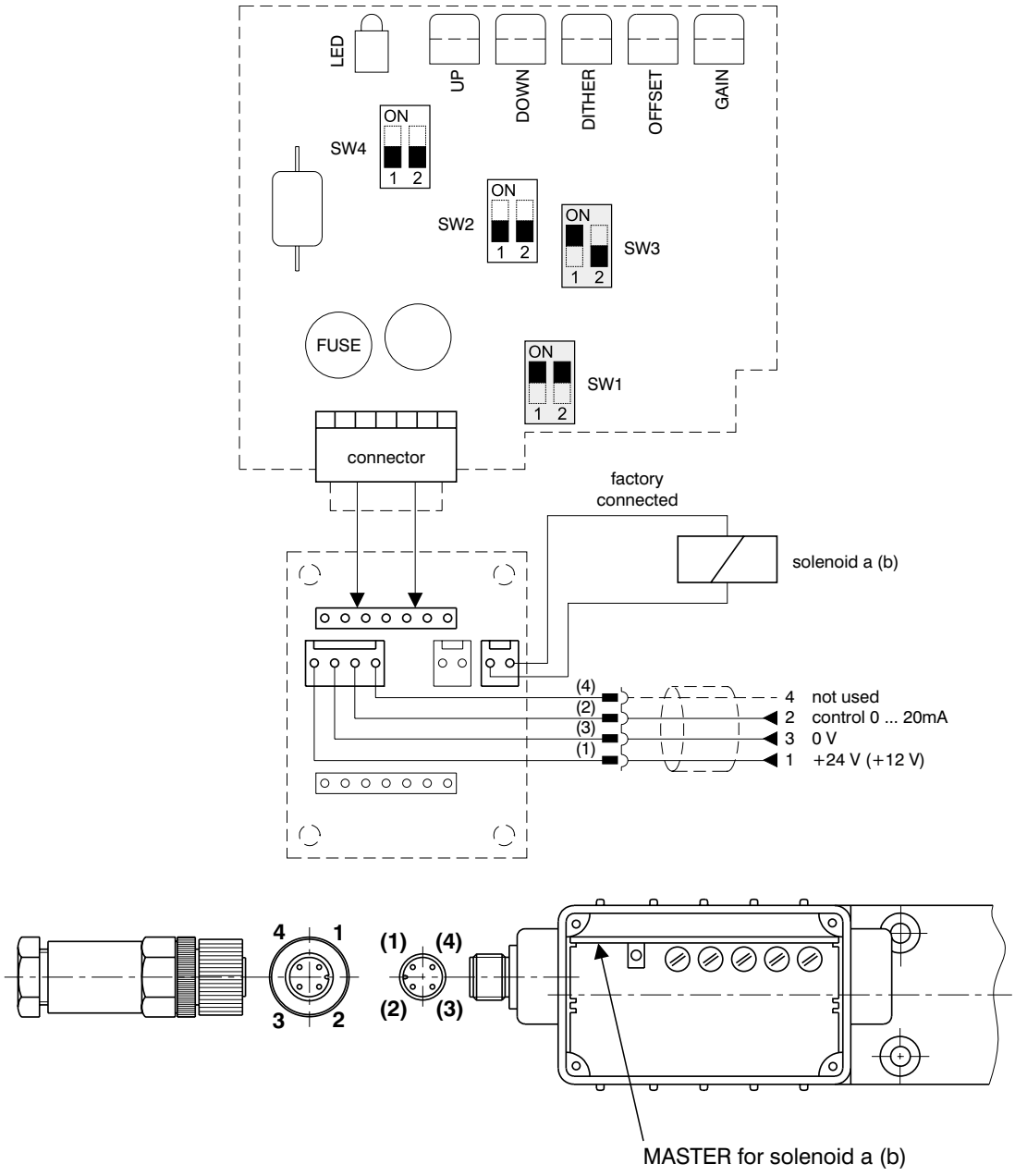
1. Unscrew the electronics cover
2. Carefully remove the Master card
3. Flip the switch SW3 in position shown in the picture
4. Put in the Master card and fix the electronics cover
5. Connect the voltage +24 V from an external supply source to terminals 1 and 3 of the connector
6. Connect the control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

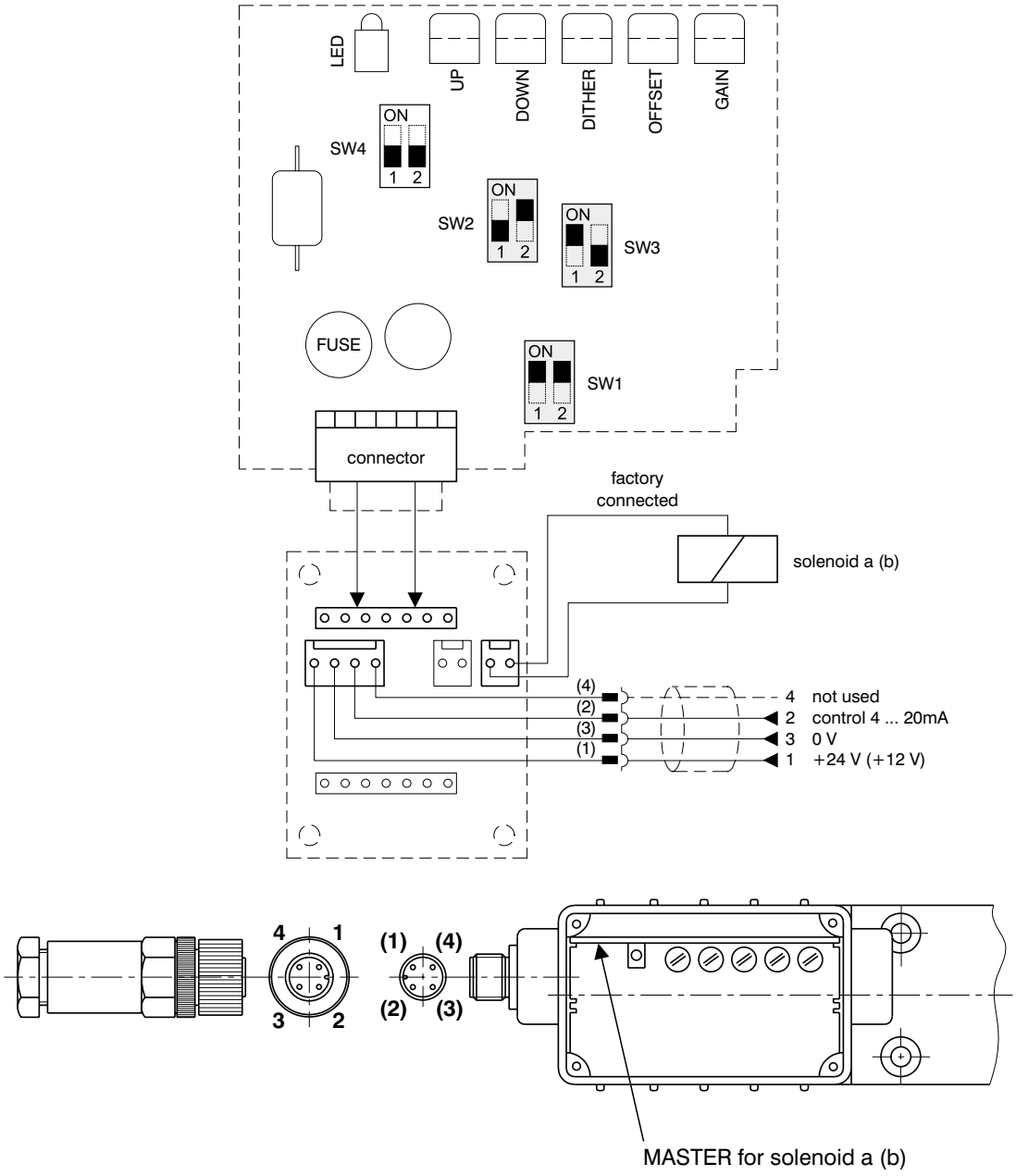
1. Unscrew the electronics cover
2. Carefully remove the Master card
3. Flip the switch SW1 and SW3 in position shown in the picture
4. Put in the Master card and fix the electronics cover
5. Connect the voltage +24 V (+12 V) from an external supply source to terminals 1 and 3 of the connector
6. Bring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

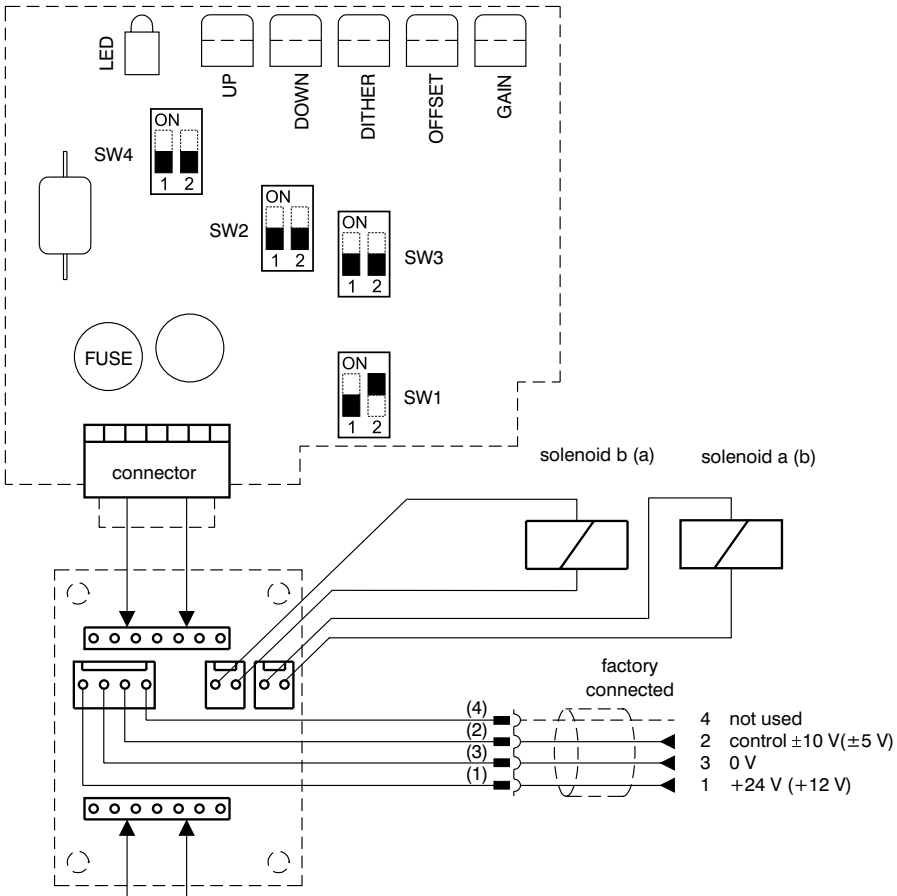
Valve PRM2-063 (with two solenoids)

3 Factory setting

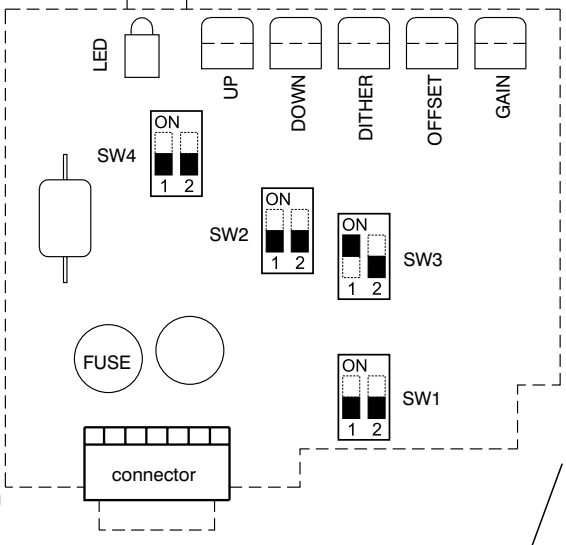
3.1 Control with external source 0 ± 10 V (0 ± 5 V)

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

Master card for solenoid a (b)

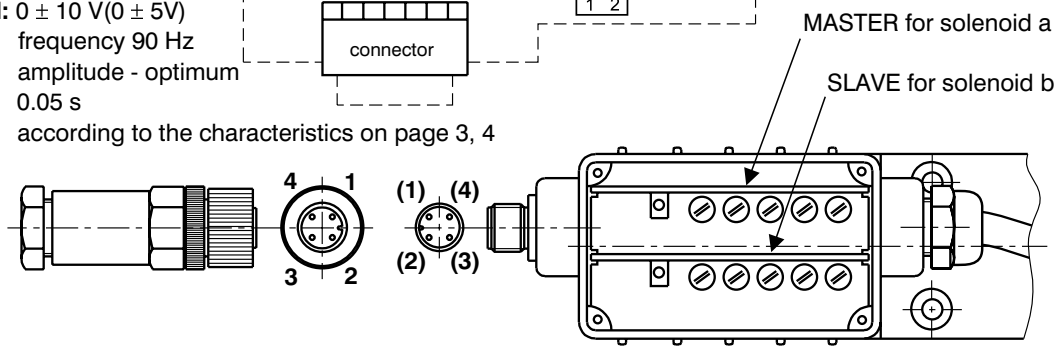


Slave card for solenoid b (a)



Factory set values:

Control signal: 0 ± 10 V(0 ± 5V)
Dither: frequency 90 Hz
amplitude - optimum
Ramps: 0.05 s
Offset, Gain: according to the characteristics on page 3, 4

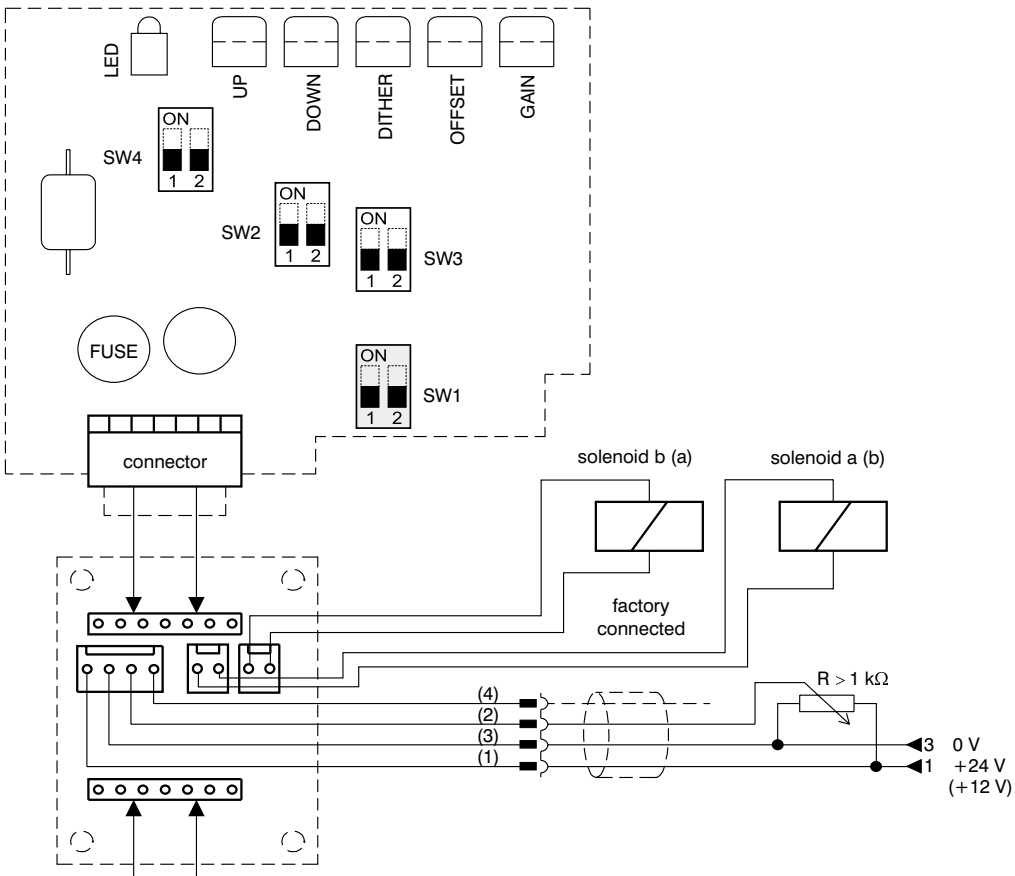


Valve PRM2-063 (with two solenoids)

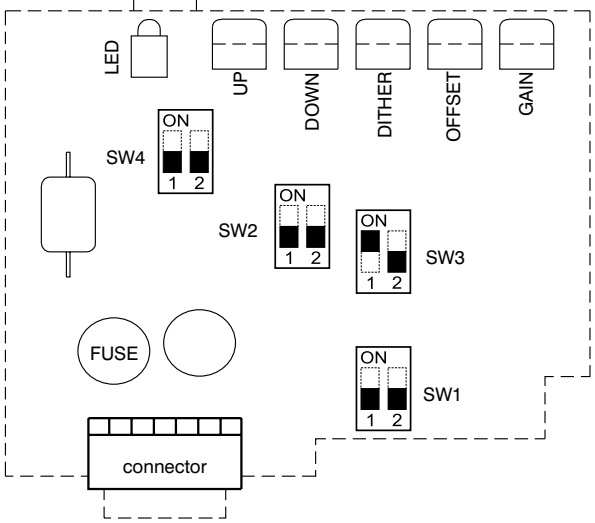
3.2 Other control possibilities

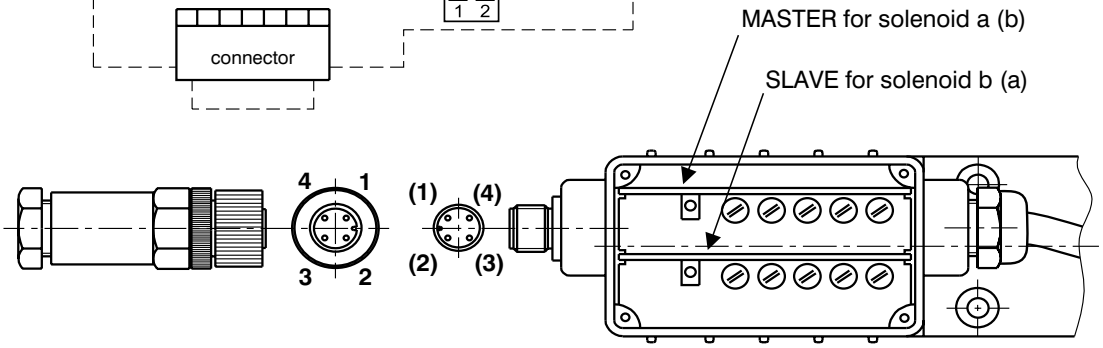
Control $U_{cc}/2 \pm 10$ V($U_{cc}/2 \pm 5$V) external potentiometer R > 1 kΩ

Master card for solenoid a (b)



Slave card for solenoid b (a)



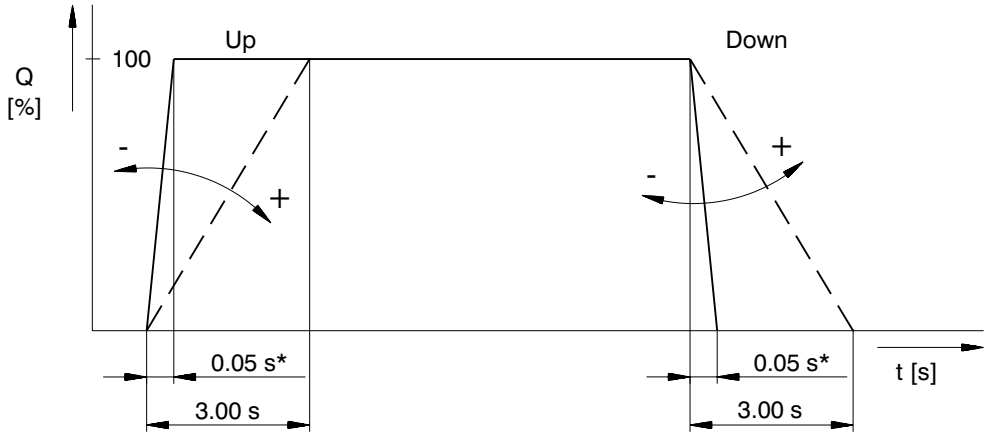


For the factory setting modification for this case of application, the following steps are required:

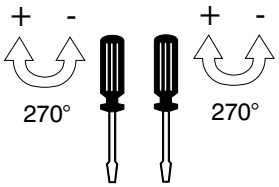
1. Unscrew the electronics cover
2. Carefully remove the Master card
3. Flip the switch SW1 in position shown in the picture
4. Put in the Master card and fix the electronics cover
5. Connect the voltage +24 V (+12 V) from an external supply source to terminals 1 and 3 of the connector

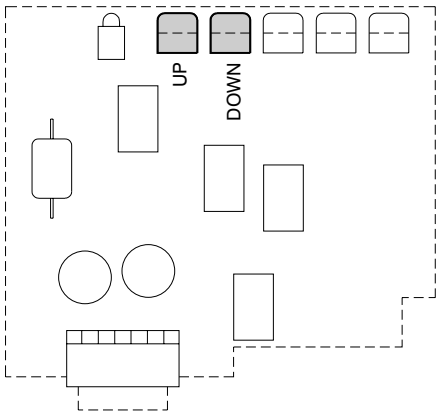
Ramp Adjustment (Up, Down)

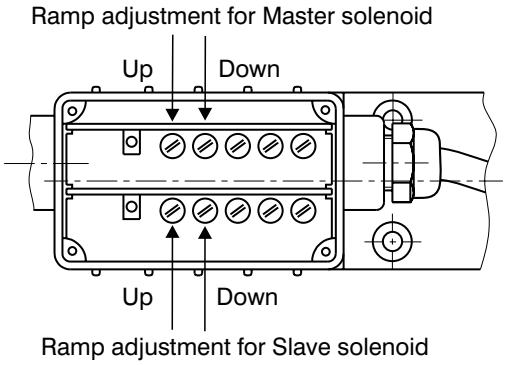
Notice: The factory setting of the ramp functions is to the minimum values.



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



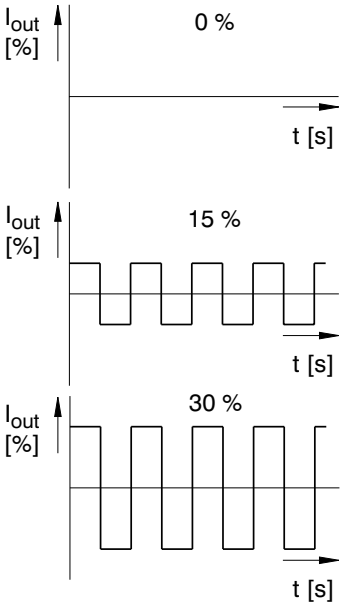


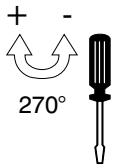


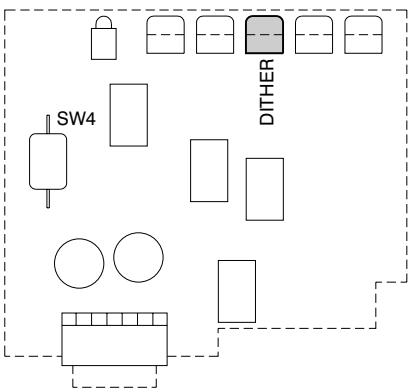
Dither Adjustment

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

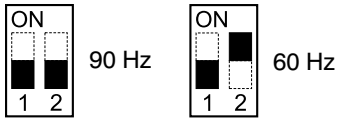
Amplitude - potentiometer (dither) (0 - 30 %)

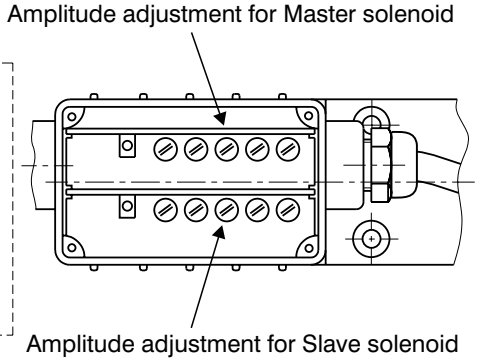






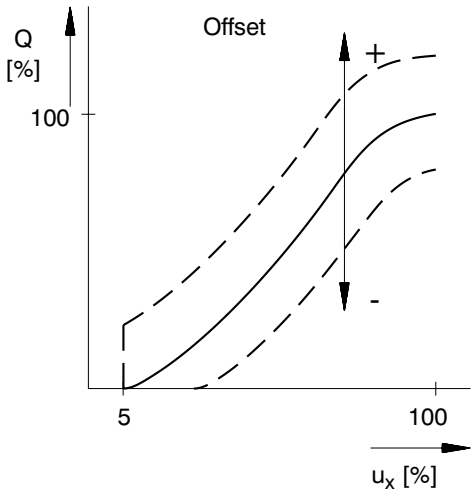
Frequency - switch SW4

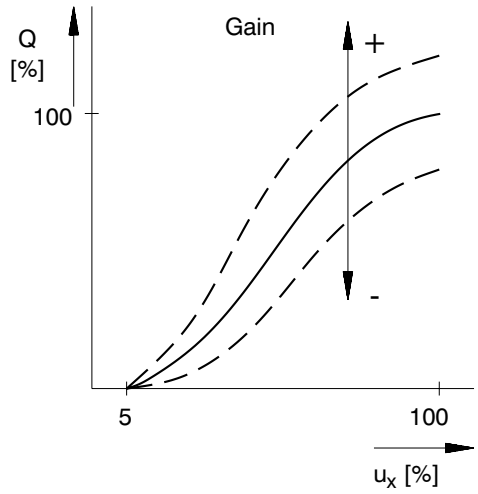


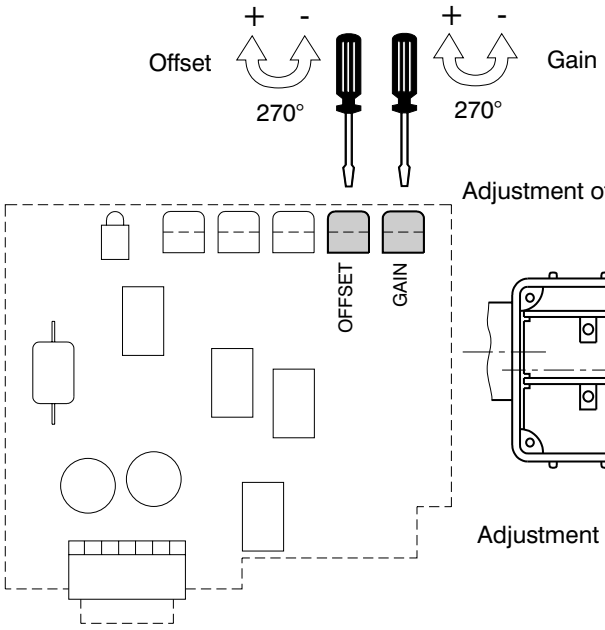


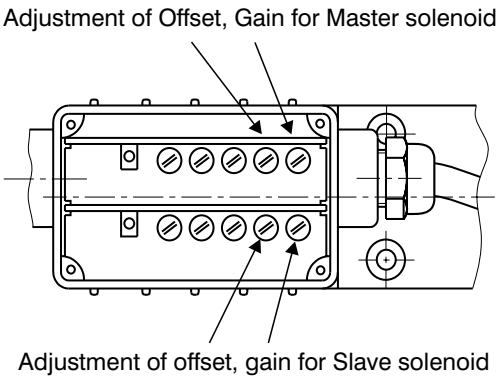
Adjustment of Offset, Gain Parameters

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.





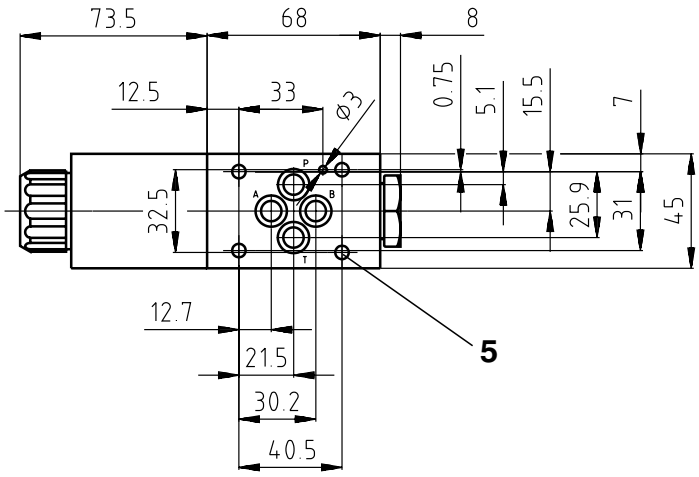




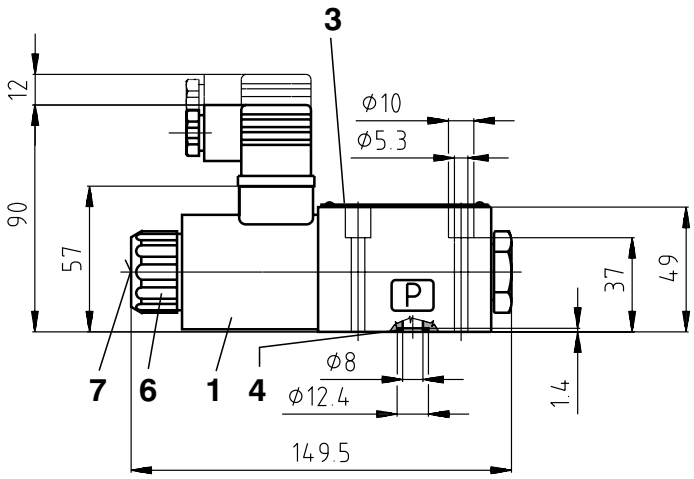
Valve Dimensions

Dimensions in millimetres

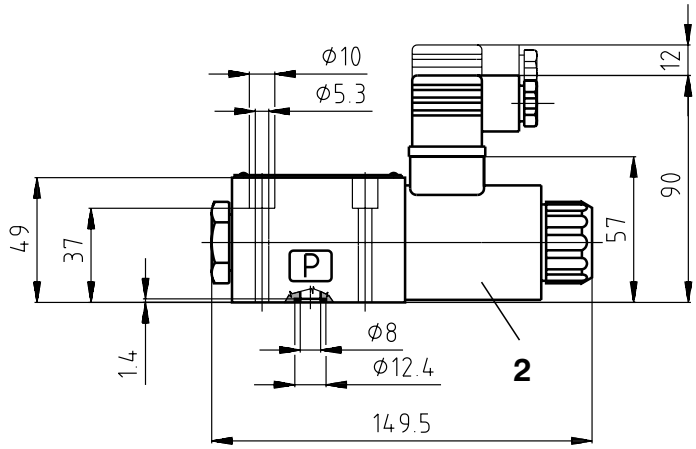
PRM2-062..../..-...



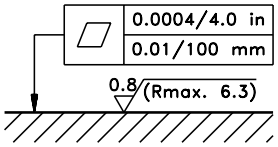
Functional symbols
2Z51, 2Y51



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

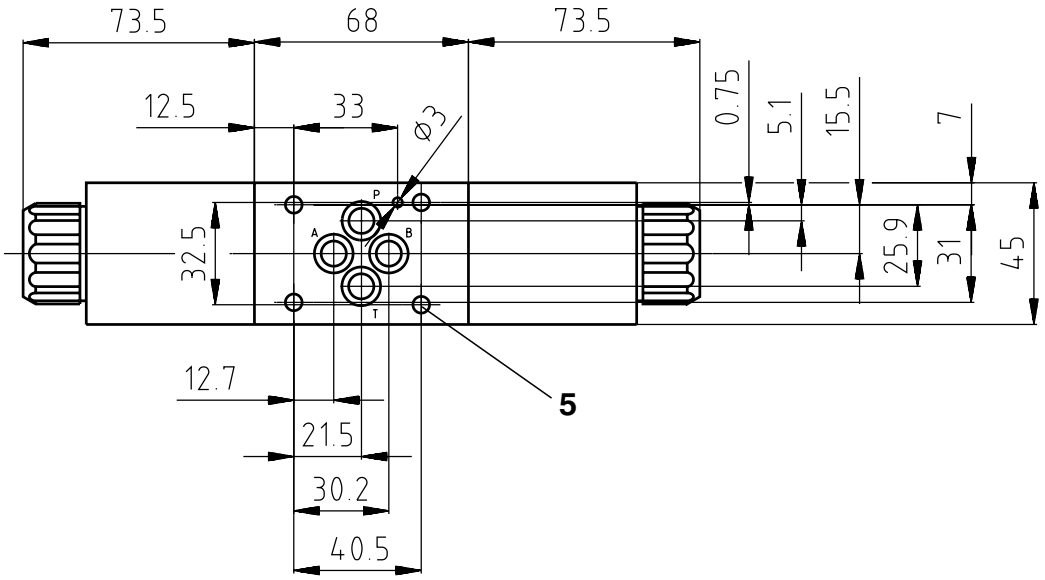


Required surface finish of interface.

Valve Dimensions

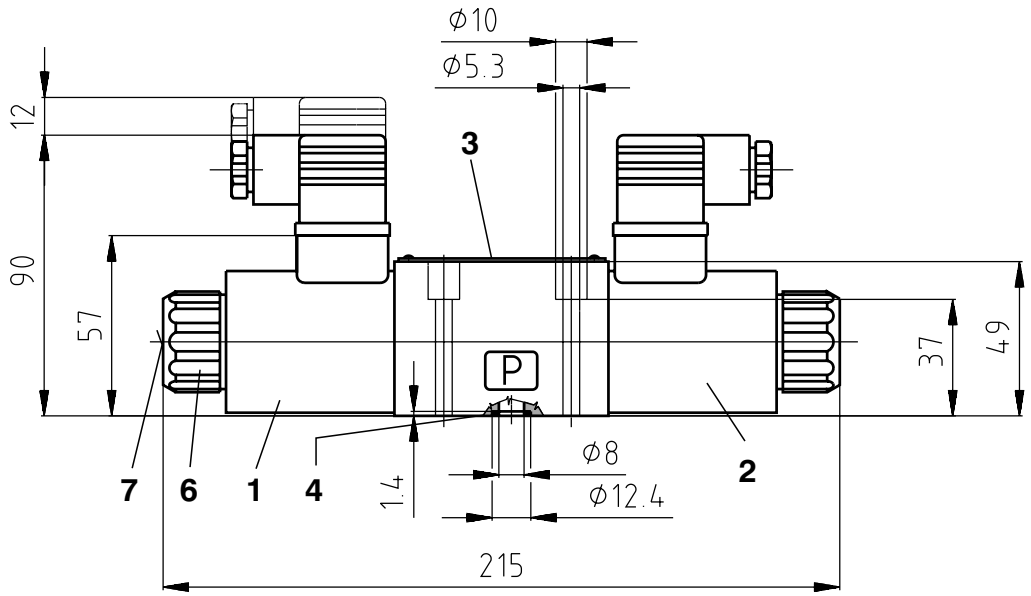
Dimensions in millimetres

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

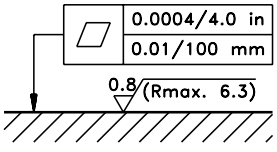


Functional symbols

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

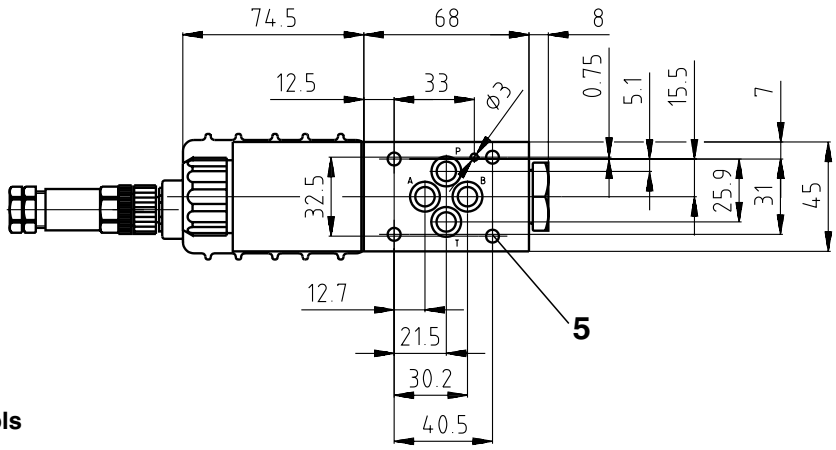


Required surface finish of interface.

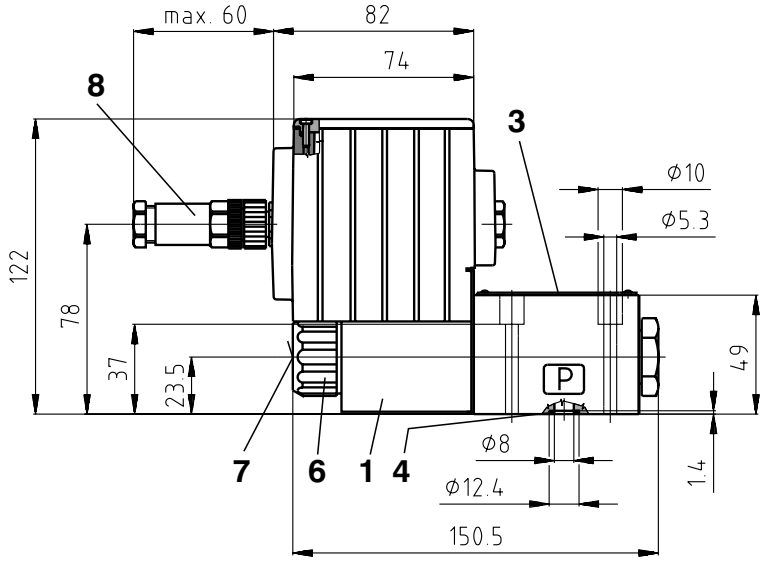
Valve Dimensions

Dimensions in millimetres

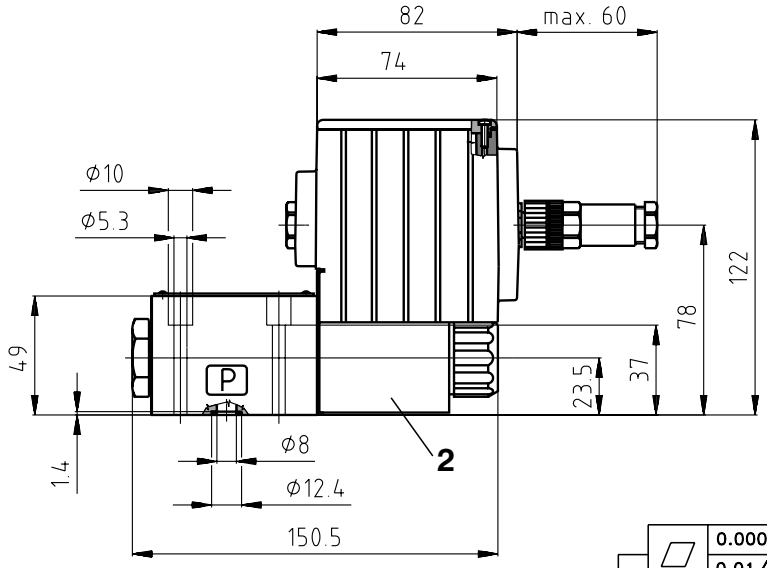
PRM2-062..../..-..EK.



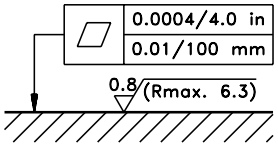
Functional symbols
2Z51, 2Y51



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

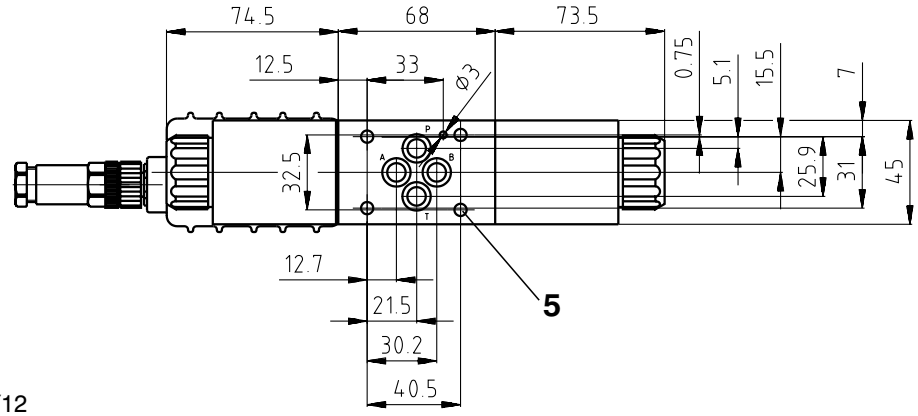


Required surface finish of interface.

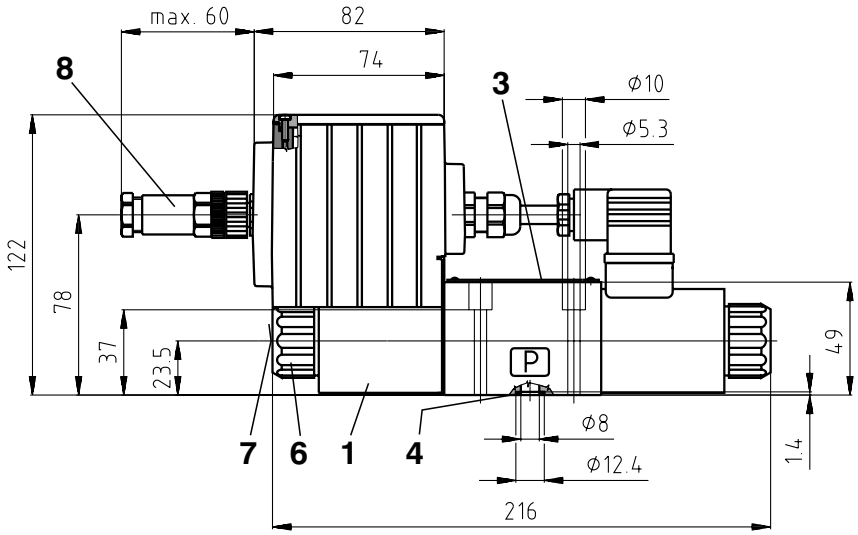
Valve Dimensions

Dimensions in millimetres

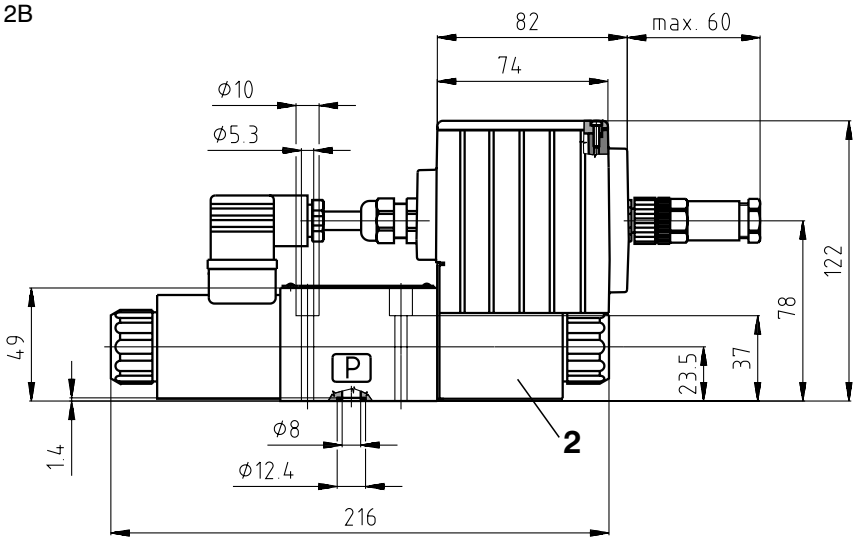
PRM2-063..../..-..EK.



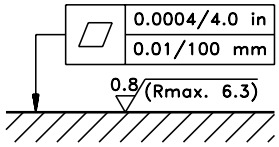
Functional symbols
3Z11, 3Z12, 3Y11, 3Y12



Functional symbols
3Z11B, 3Z12B, 3Y11B, 3Y12B



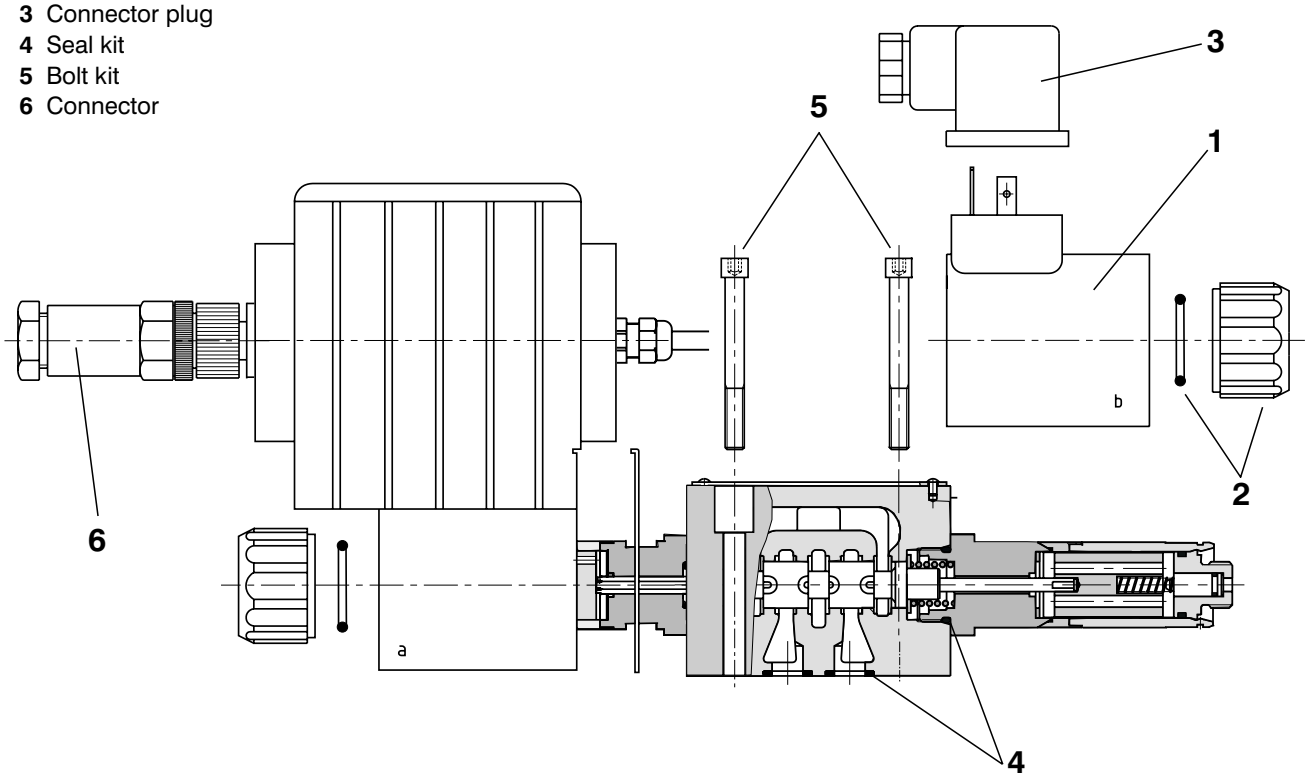
1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 9.25 x 1.68 (4 pcs.) supplied in delivery packet
5 4 through mounting holes
6 Solenoid fixing nut (Nut torque 4 Nm)
7 Manual override
8 4- pin connector (M12 x 1) for external supply voltage



Required surface finish of interface.

Spare Parts

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



1. Solenoid coil

Nominal supply voltage[V]	Ordering number
12	936-0061
12	936-0107 (1,6A) (for 12V electronic unit integrated)
24	936-0067

2. Solenoid retaining nut with seal ring

Model of the nut	Seal ring	Ordering number
Standard nut	22 x 2	484-9951

3. Connector plug to DIN 43 650

Type designation	Type	Maximum input voltage	Connector plug A gray	Connector plug B black
			Ordering number	
K5	without rectifier - M16x1.5 (bushing bore ∅ 4-6 mm)	230 V DC	936-9906	936-9905

4. Seal kit

Type	Dimensions, number		Ordering number
Standard - NBR 70	9.25 x 1.68 (4 pcs.)	17 x 1.8 (2 pcs.)	484-9961
Viton	9.25 x 1.78 (4 pcs.)	17.17 x 1.78 (2 pcs.)	484-9971

5. Bolt kit

Dimensions, number	Tightening torque	Ordering number
M5 x 45 DIN 912-10.9 (4 pcs.)	8.9 Nm	484-9958

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

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 6.6 ft-lbs (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 law.

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E-mail: sales.cz@argo-hytos.com
www.argo-hytos.com

ARGO HYTOS

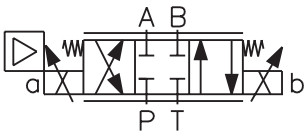
Proportional Directional Control Valves

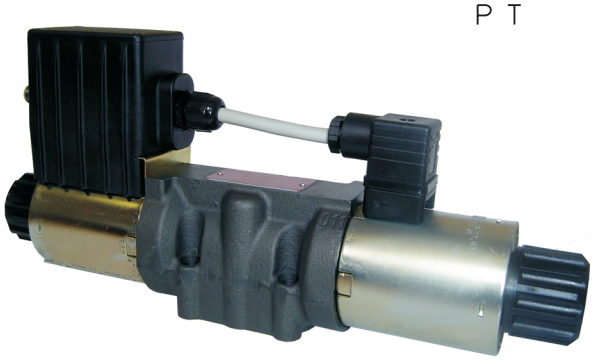
PRM6-10

Size D 05 (10) • ...4600 PSI (320 bar) • ...21 GPM (80 L/min)

HA 5115
8/2005

- ❑ **Compact design with integrated electronics**
- ❑ **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-A10 and ISO 4401:1994**

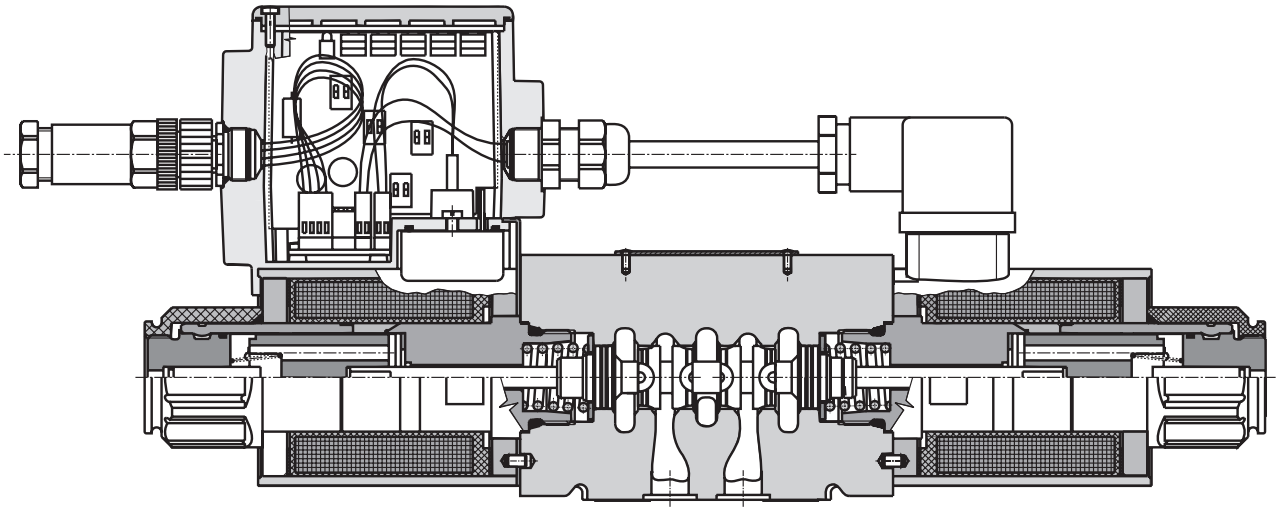




Functional Description

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 apposite 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 $\pm 90^{o}$.
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 12V voltage) is also available for the user. By the use of this voltage, a voltage control signal can be made by means of a potentiometer $\geq 1\ k\Omega$.
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.

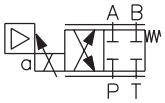
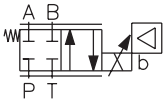
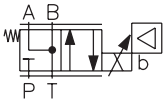
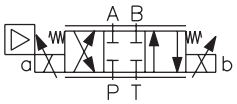
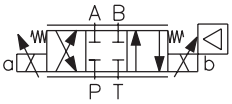
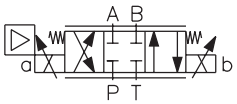
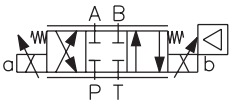
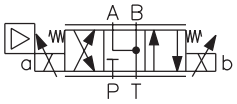
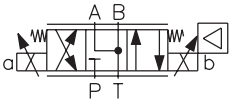
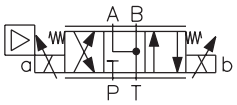
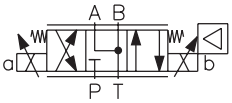


Ordering Code

PRM6-10 □ / □ - □ □ □

Proportional directional valve

Nominal size **10**

	**2Z51**
	**2Z11**
	**2Y51**
	**2Y11**
	**3Z11**
	**3Z11B**
 $\frac{q_A}{q_B} = \frac{1}{2}^*$	**3Z12**
 $\frac{q_A}{q_B} = \frac{1}{2}^*$	**3Z12B**
	**3Y11**
	**3Y11B**
 $\frac{q_A}{q_B} = \frac{1}{2}^*$	**3Y12**
 $\frac{q_A}{q_B} = \frac{1}{2}^*$	**3Y12B**

Seals

without designation	NBR
V	FPM (Viton)

Electronics

without designation	without electronics
EK	connection by connector M12 x 1 (4-pin connector) (supplied with counterpart)

Nominal supply voltage

12	12 V DC
24	24 V DC

Nominal flow rate at Δp = 10 bar

30	30 L/min
60	60 L/min

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

Technical Data

Valve size	US (mm)	D 05 (10)	
Maximum operating pressure at ports P, A, B	PSI (bar)	4600 (320)	
Maximum operating pressure at port T	PSI (bar)	2300 (160)	
Hydraulic fluid		Petroleum oils (HM, HL, HLP) Phosphate ester fluids (HFD-R)	
Fluid temperature range NBR/Viton	°F (°C)	-22 ... +176 (-30 ... +80) / -4 ... +176 (-20 ... +80)	
Ambient temperature, max.	°F (°C)	up to +122 (+50)	
Viscosity range	SUS (mm^2/s)	98 ... 1840 (20 ... 400)	
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).	
Nominal flow rate Q_n at Δp = 145 PSI (10 bar) ν = 166 SUS (ν = 35 $mm^2 \cdot s^{-1}$)	GPM (L/min)	7.93 (30)	15.85 (60)
Hysteresis	%	≤ 6	
Weight PRM2-102 PRM2-103	lbs (kg)	9.48 (4.3) 12.78 (5.8)	
Mounting position		any, preferably horizontal	
Enclosure type		IP65	

Technical Data of the Proportional Solenoid

Nominal supply voltage	V	12 DC ±10 %	24 DC ±10 %
Limit current	A	1.9	1.1
Mean resistance value at 20°C	Ω	4.7	13.9

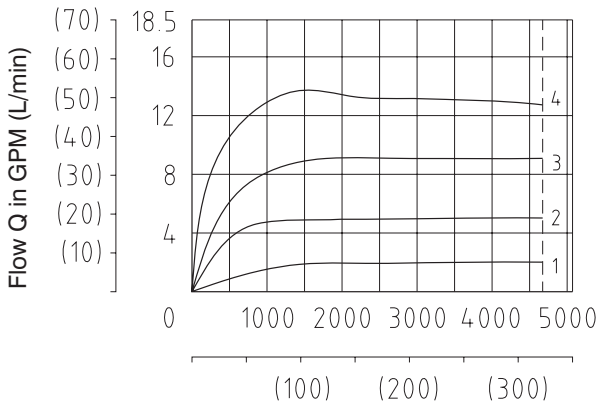
Technical Data of the Electronics

Nominal supply voltage U_{cc}	V	12 DC	24 DC
Supply voltage range	V	11.2 ... 14.7 DC	20 ... 30 DC
Stabilized voltage for control	V	5 DC (R > 1 kΩ)	10 DC (R ≥ 1 kΩ)
Control signal		see table of switches configuration (page 6)	
Maximum output current	A	2.4 for R < 4Ω	1.5 for R < 10Ω
Ramp adjustment range	s	0.05 ... 3	
Dither frequency	Hz	90 / 60	
Dither amplitude	%	0 ... 30	

Limit Power

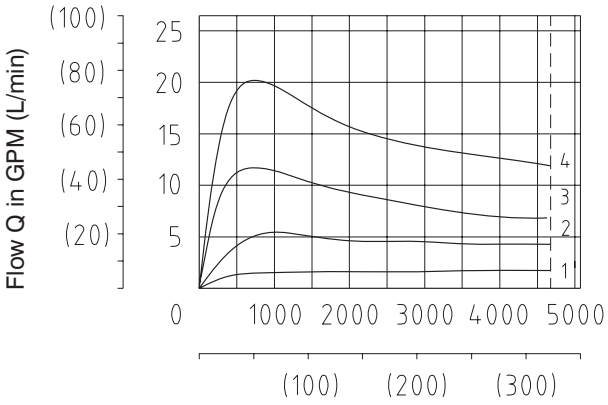
Measured at ν = 166 SUS (35 mm^2/s) P → A / B → T or P → B / A → T

Nominal flow 7.93 GPM (30 L/min)



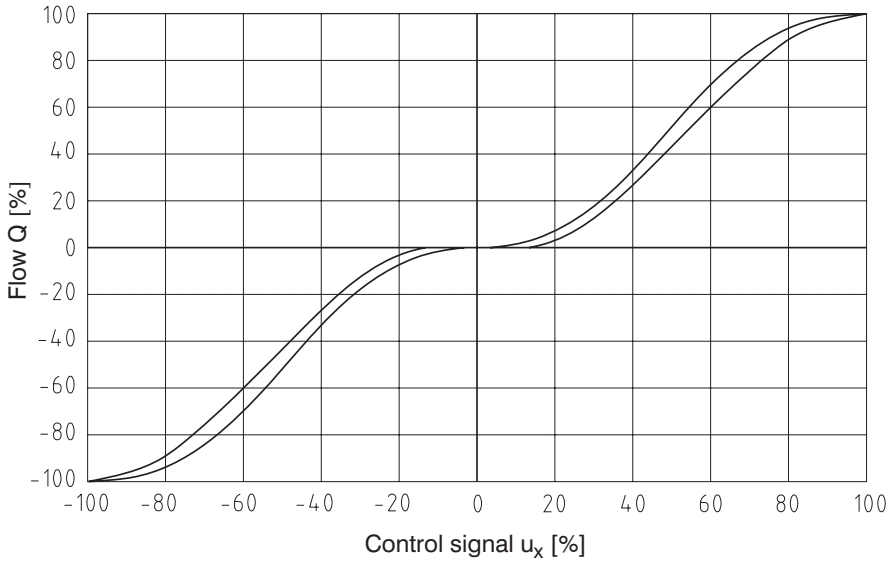
Solenoid current:
(24 V DC)
1 = 40%
2 = 60%
3 = 80%
4 = 100%

Nominal flow 15.85 GPM (60 L/min)



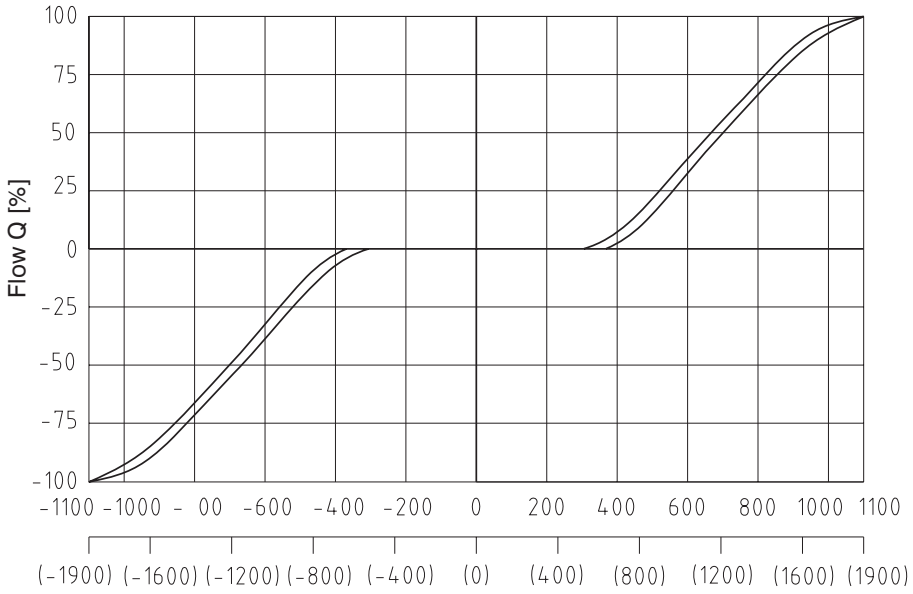
Flow Characteristic with Integrated Electronics

Measured at Δp = 145 PSI (10 bar), ν = 166 SUS (35 mm^2/s)



Flow Characteristic without Integrated Electronics

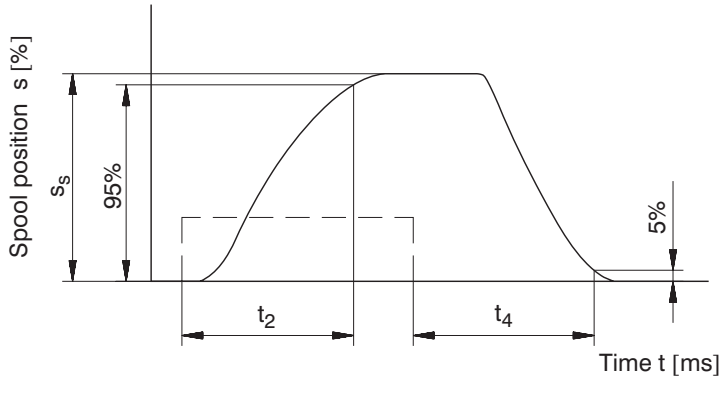
Measured at Δp = 145 PSI (10 bar), ν = 166 SUS (35 mm^2/s), values in parenthesis are valid for the supply voltage 12 V



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

Transient Characteristic

Measured at Δp = 145 PSI (10 bar), ν = 166 SUS (35 mm^2/s); Q = 80 %Q_n

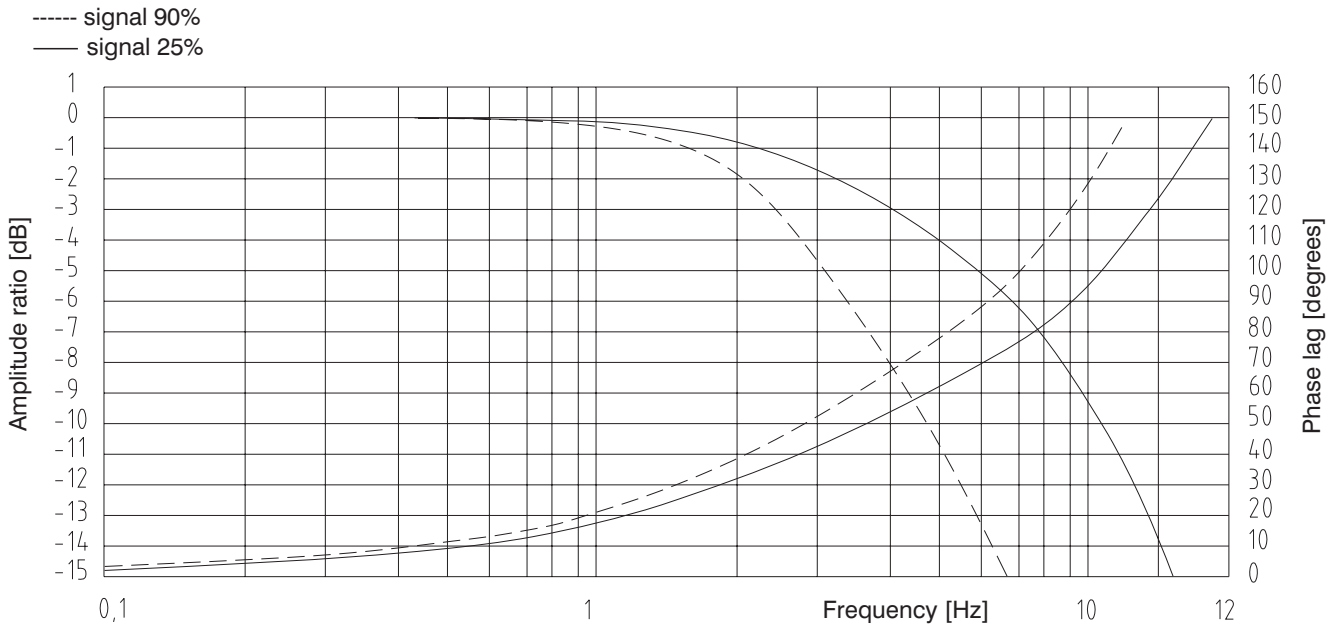


— — — the control signal course of the integrated electronics

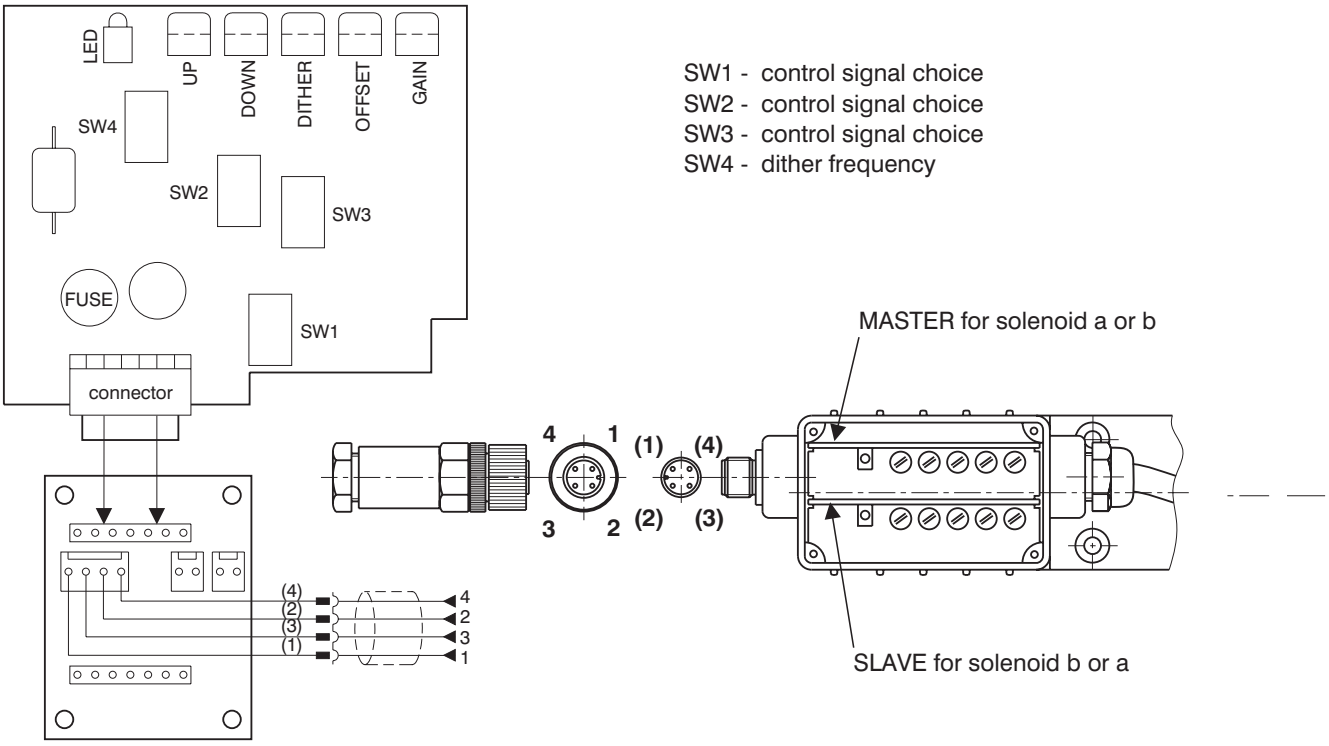
Steady spool position s_s [%]	t_2 [ms]	t_4 [ms]
100	160	145
75	135	130
50	85	105
25	50	70

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.

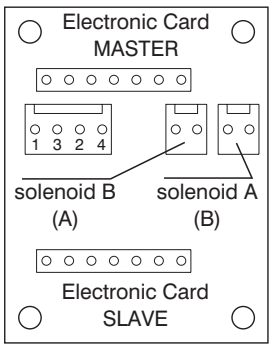
Frequency Reponse



Component Arrangement on the Electronic Card



Description basic subplatte



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

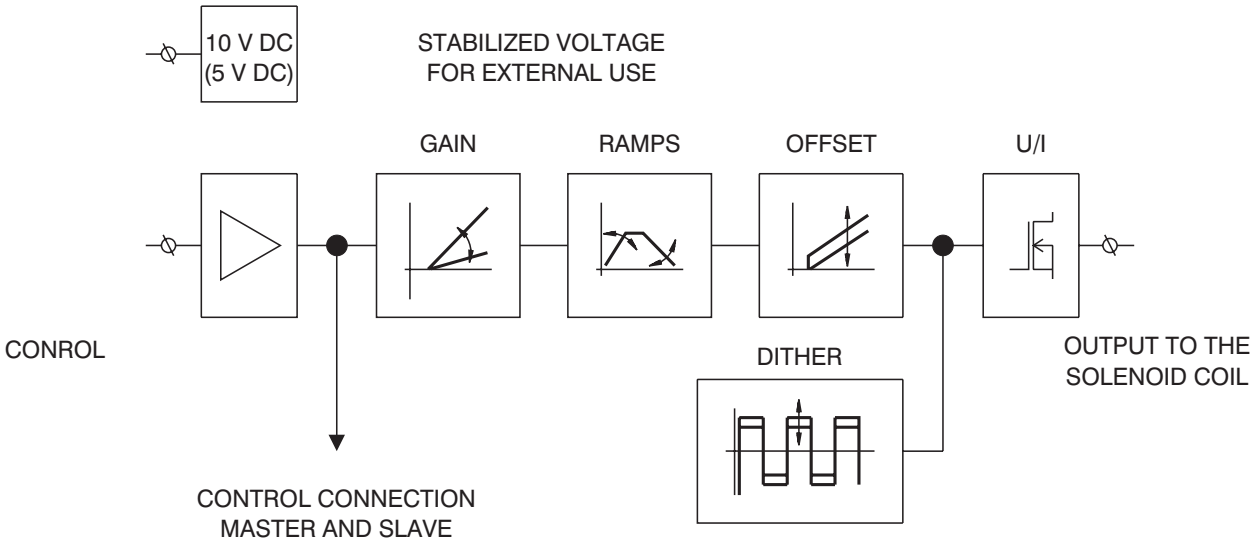
Table of the Switch Configuration for the Control Signal Choices

		PRM6-102				PRM6-103	
		0 ... 5 V	0 ... 10 V (0 ... 5 V)*	0 ... 20 mA	4 ... 20 mA	$U_{cc}/2$ ± 10 V (± 5 V)*	± 10 V (± 5 V)*
MASTER M	SW1	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2
	SW2	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2
	SW3	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2
	SW4	90 Hz ON 1 2			60 Hz ON 1 2		
SLAVE S	SW1					ON 1 2	ON 1 2
	SW2					ON 1 2	ON 1 2
	SW3					ON 1 2	ON 1 2
	SW4					90 Hz ON 1 2	60 Hz ON 1 2

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



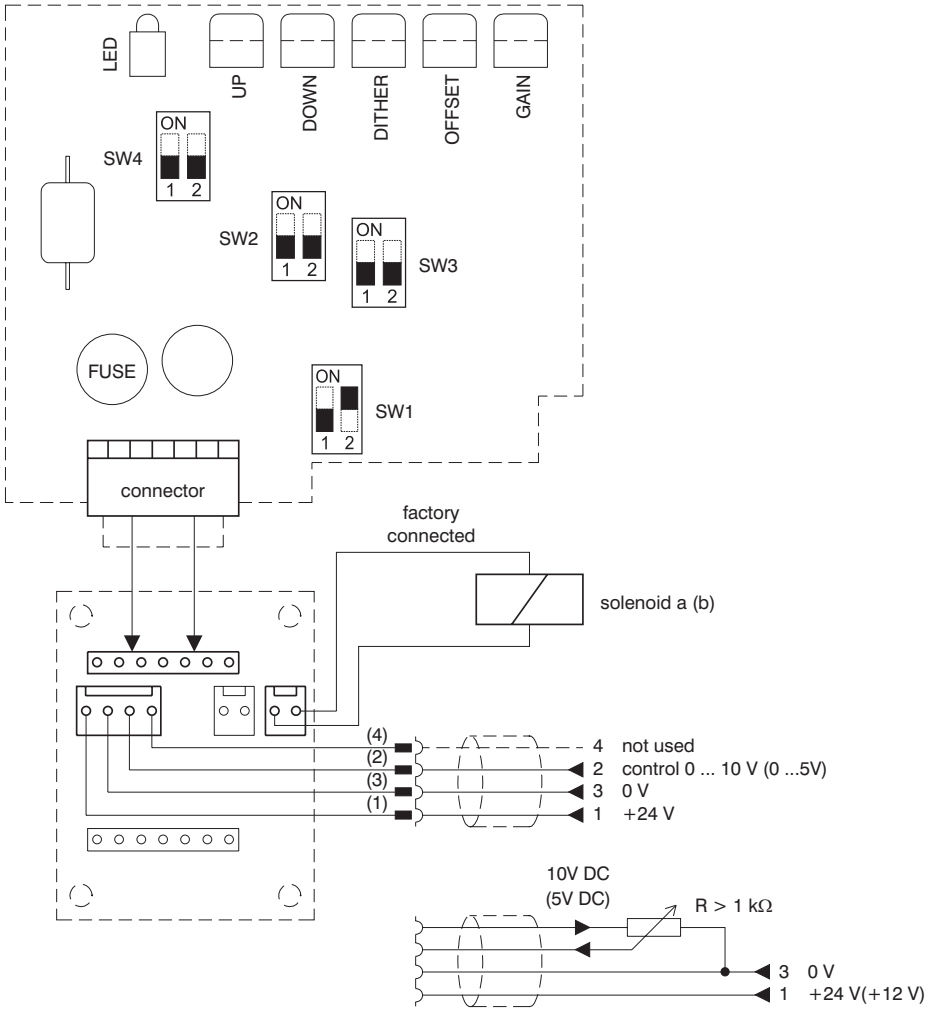
Valve PRM6-102 (with one solenoid)

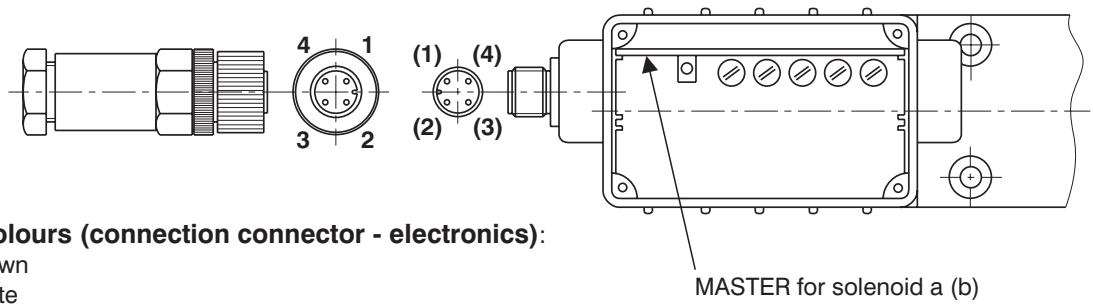
1 Factory setting

1.1 Control with external voltage source 0 ... 10 V (0 ... 5 V) or with external potentiometer R >1 kΩ

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

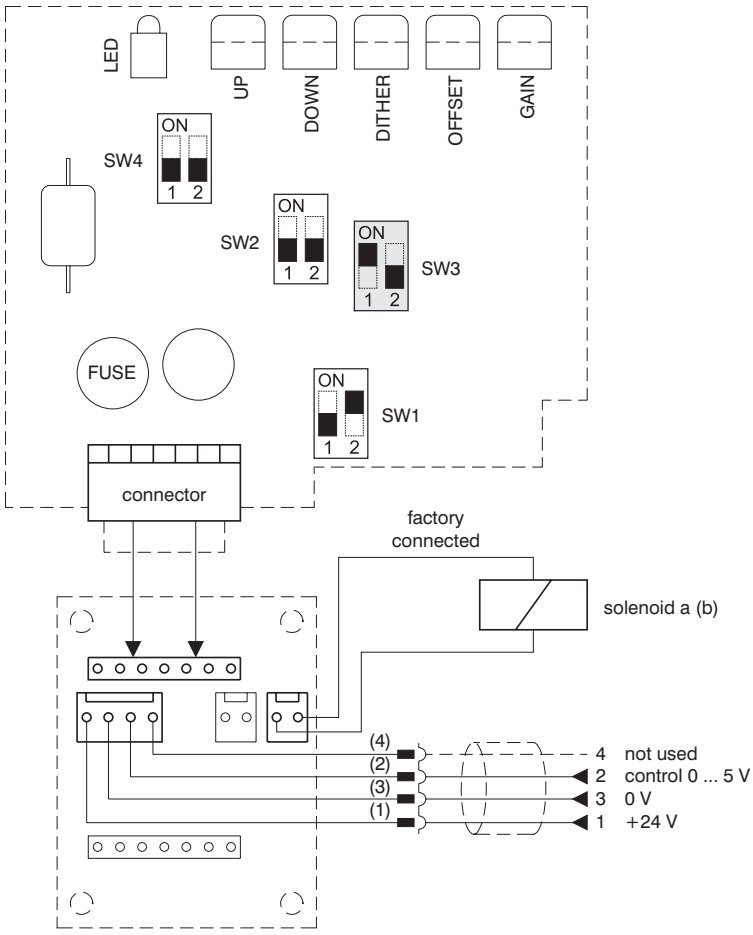
Valve PRM6-102 (with one solenoid)

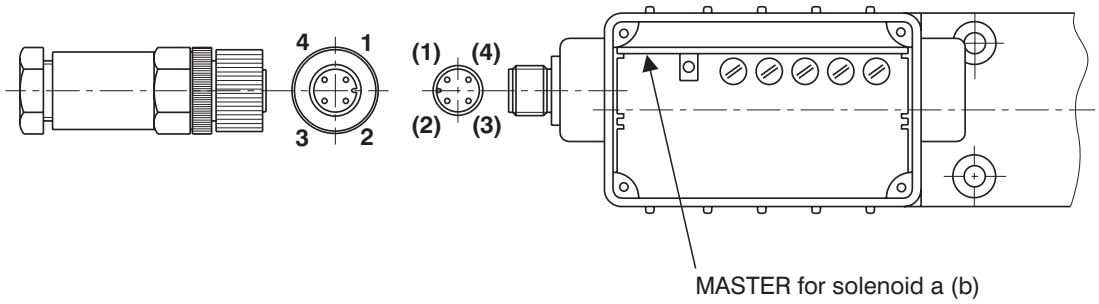
2 Other control possibilities

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:

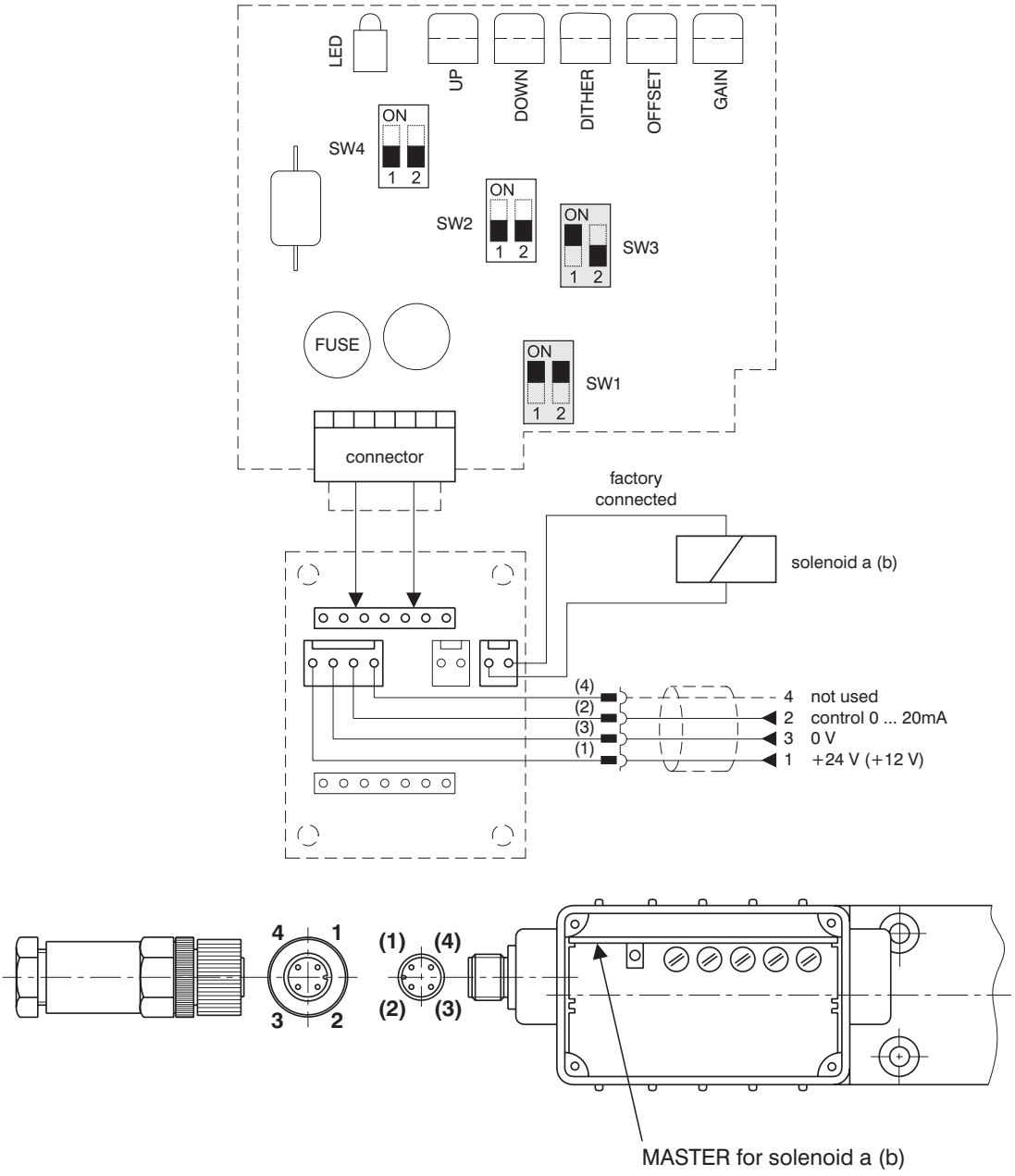
1. Unscrew the electronics cover
2. Carefully remove the Master card
3. Flip the switch SW3 in position shown in the picture
4. Put in the Master card and fix the electronics cover
5. Connect the voltage +24 V from an external supply source to terminals 1 and 3 of the connector
6. Connect the control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

Valve PRM6-102 (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:

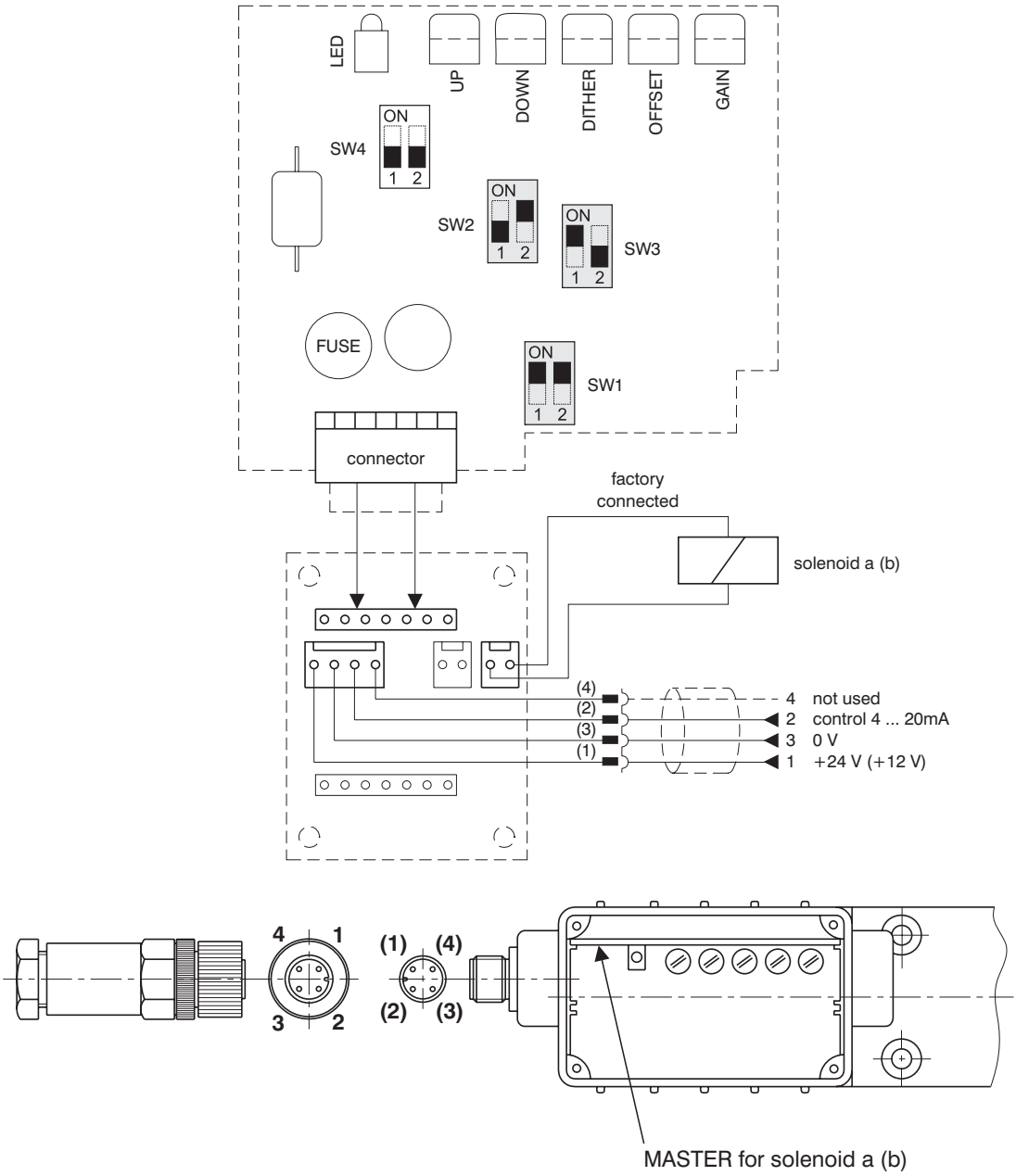
1. Unscrew the electronics cover
2. Carefully remove the Master card
3. Flip the switch SW1 and SW3 in position shown in the picture
4. Put in the Master card and fix the electronics cover
5. Connect the voltage +24 V (+12 V) from an external supply source to terminals 1 and 3 of the connector
6. Bring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

Valve PRM6-102 (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

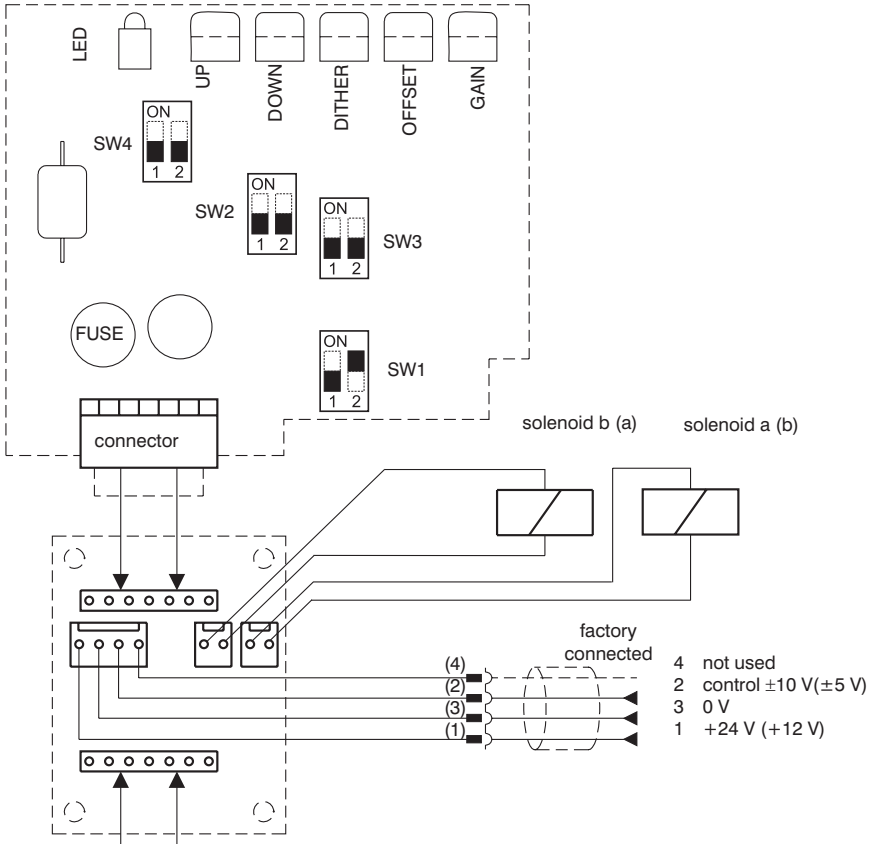
Valve PRM6-103 (with two solenoids)

3 Factory setting

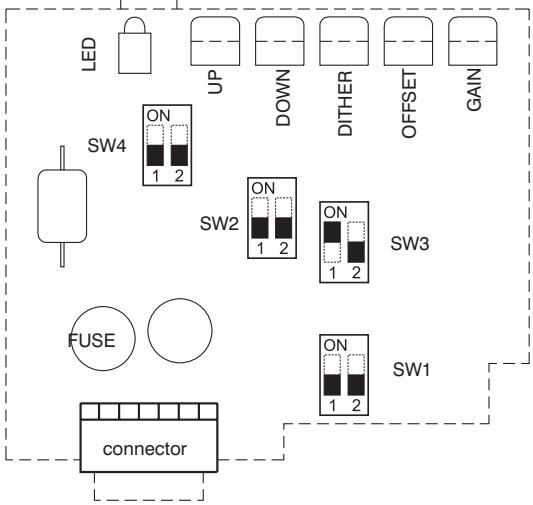
3.1 Control with external source 0 ± 10 V (0 ± 5 V)

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

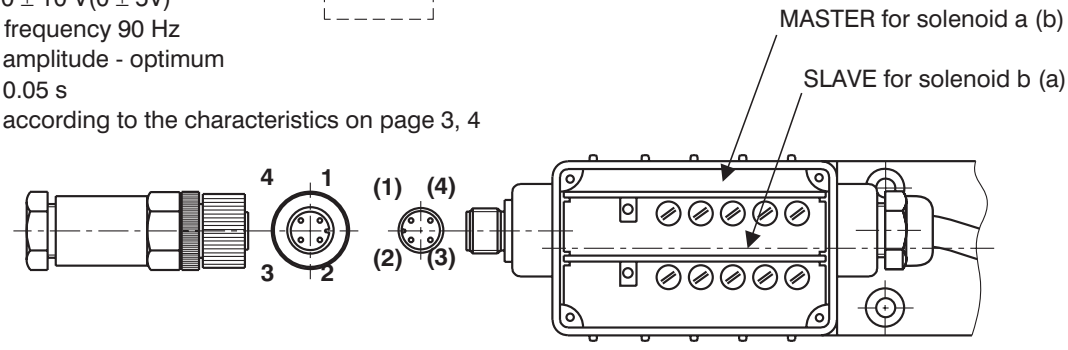
Master card for solenoid a (b)



Slave card for solenoid b (a)



Factory set values:
Control signal: 0 ± 10 V(0 ± 5V)
Dither: frequency 90 Hz
amplitude - optimum
Ramps: 0.05 s
Offset, Gain: according to the characteristics on page 3, 4

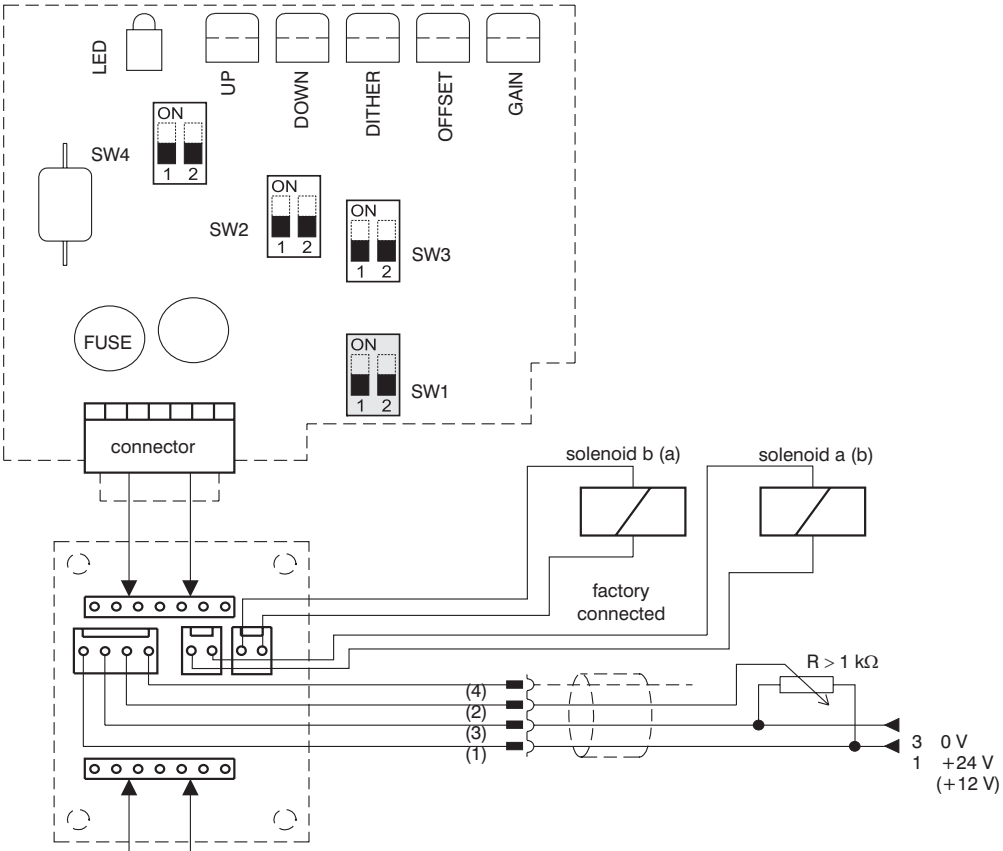


Valve PRM6-103 (with two solenoids)

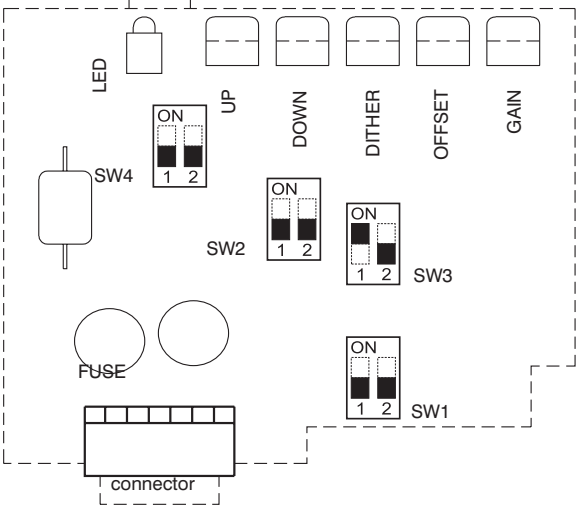
3.2 Other control possibilities

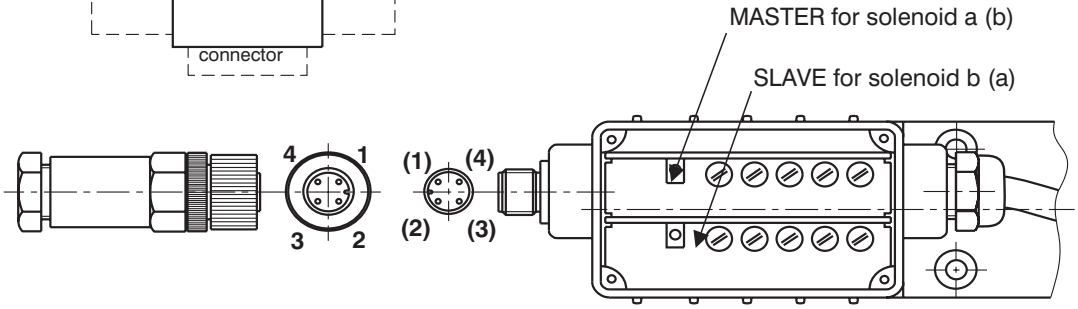
Control $U_{cc}/2 \pm 10$ V($U_{cc}/2 \pm 5$V) external potentiometer R > 1 kΩ

Master card for solenoid a (b)



Slave card for solenoid b (a)



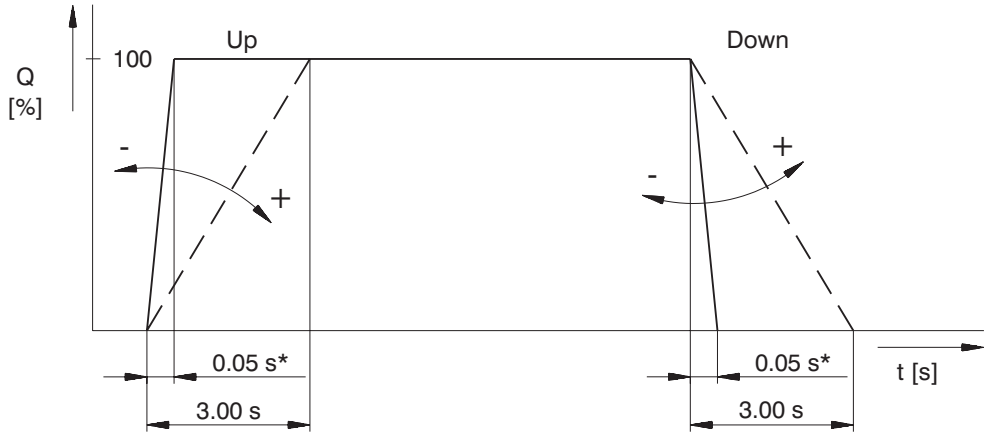


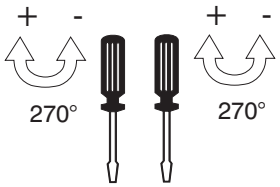
For the factory setting modification for this case of application, the following steps are required:

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

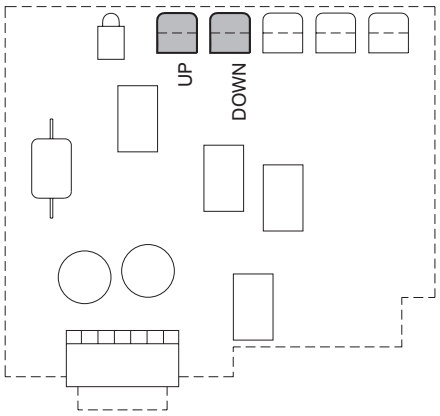
Ramp Adjustment (up, down)

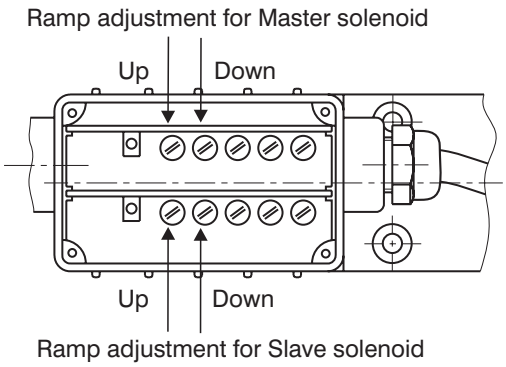
Notice: The factory setting of the ramp functions is to the minimum values.





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

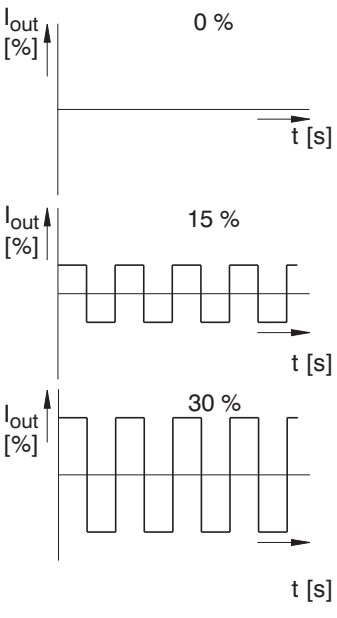


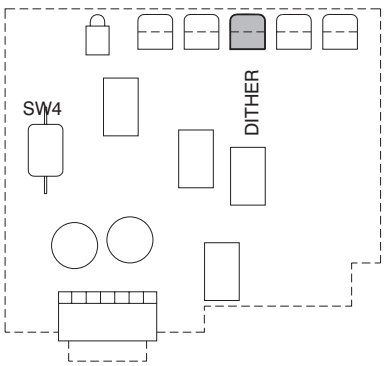


Dither Adjustment

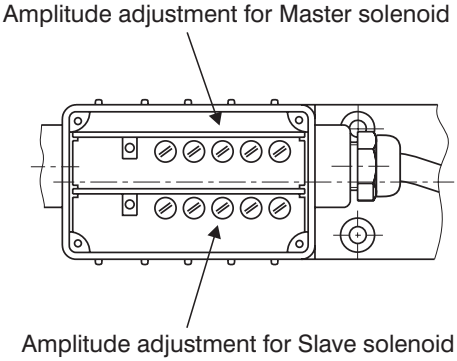
Notice: The dither is adjusted with regard to the minimum hysteresis.

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



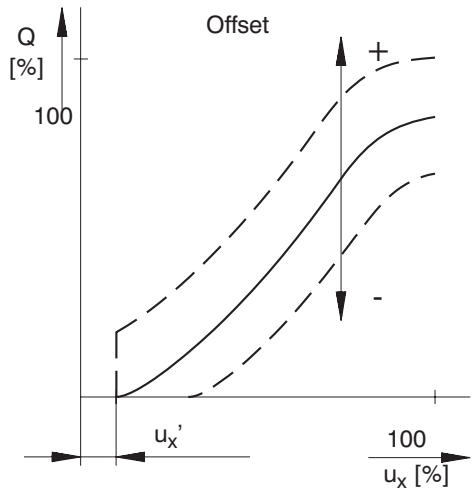


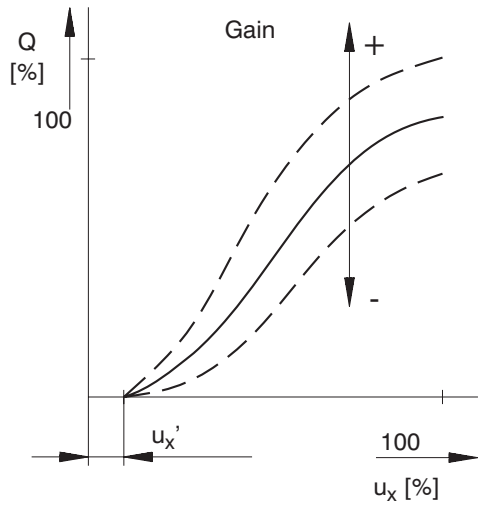
Frequency - switch SW4

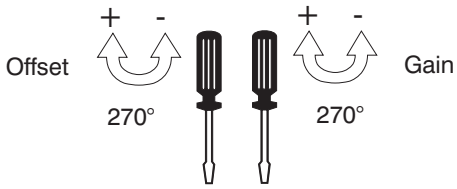


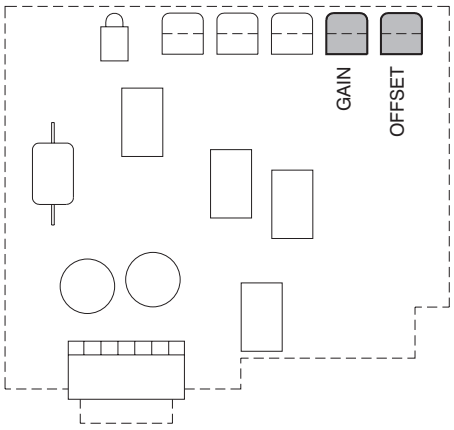
Adjustment of Offset, Gain Parameters

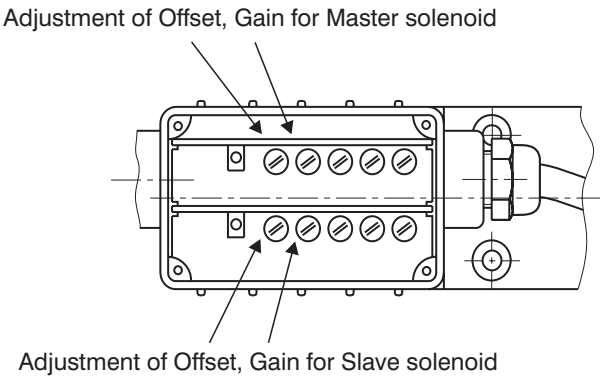
Notice: The factory setting of the Offset and Gain parameters is specific for the solenoids used.
The manufacturer does not recommend this setting to be changed.











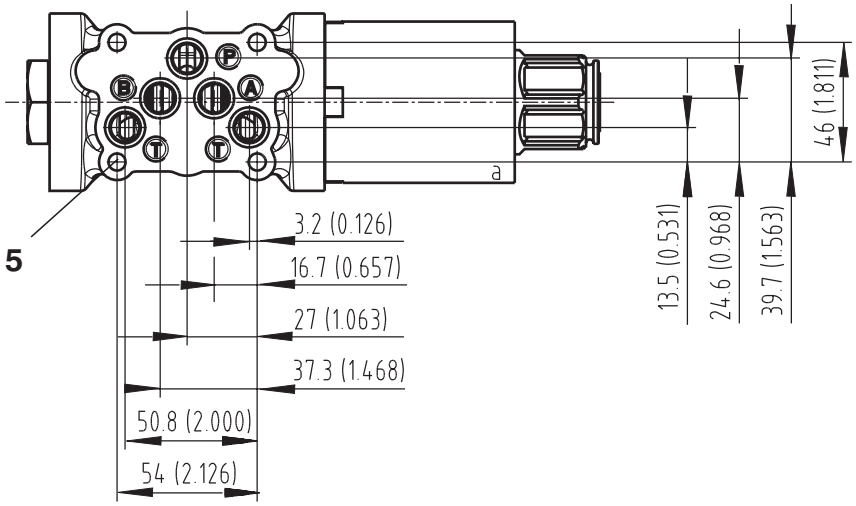
Nominal supply voltage of electronics [V]	Area insensible to control signal u_x' [%]
12	1 ... 3
24	0.5 ... 2

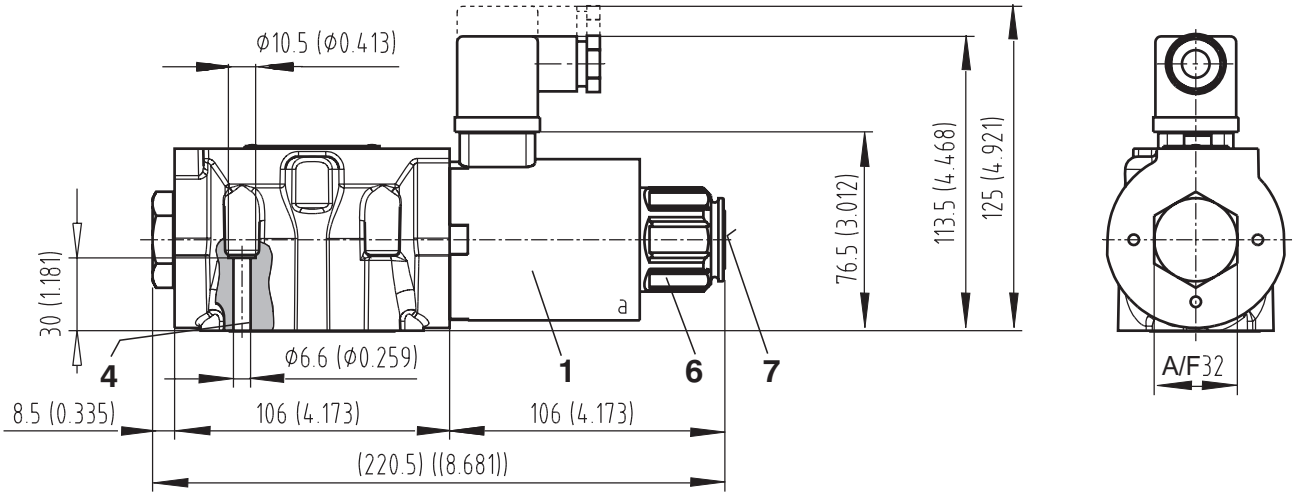
Valve Dimensions

Dimensions in millimetres

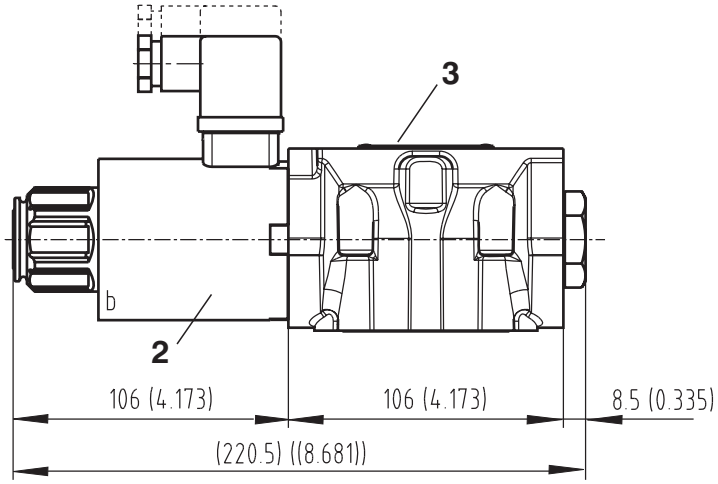
PRM2-102..../..-...

Functional symbols
2Z51, 2Y51

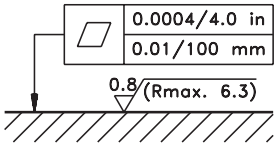




Functional symbols
2Z11, 2Y11



1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 12.42 x 1.68 (5 pcs.) supplied in delivery packet
5 4 through mounting holes
6 Solenoid fixing nut (Nut torque 6 Nm)
7 Manual override



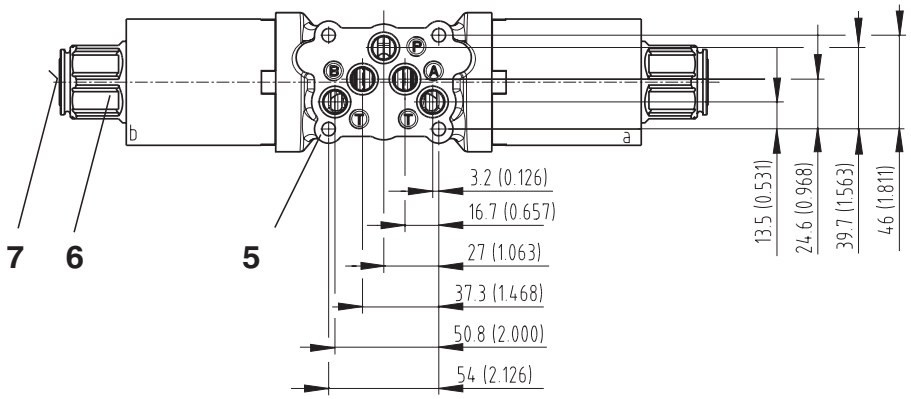
Required surface finish of interface.

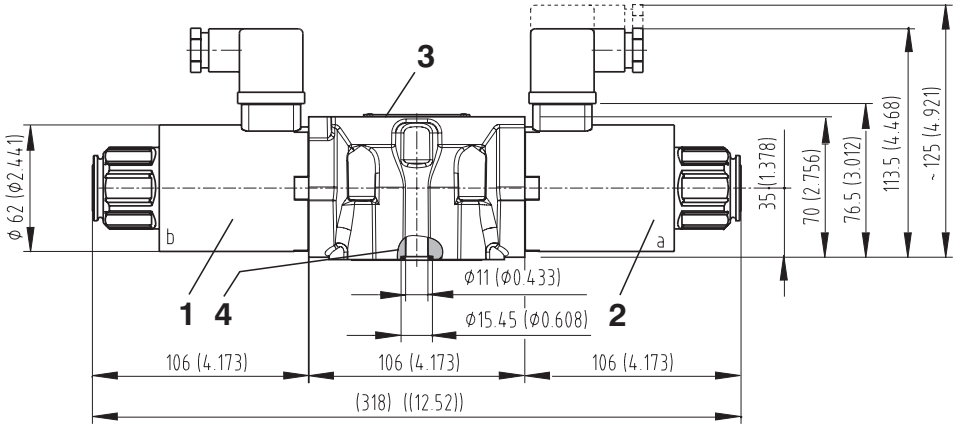
Valve Dimensions

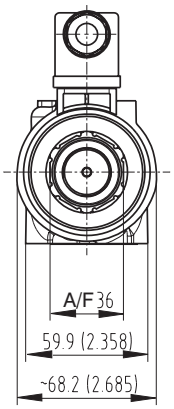
Dimensions in millimetres

PRM6-103..../..-...

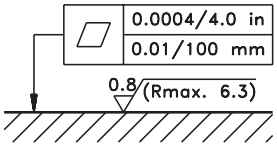
Functional symbols
3Z11, 3Z12, 3Y11, 3Y12







1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 12.42 x 1.68 (5 pcs.) supplied in delivery packet
5 4 through mounting holes
6 Solenoid fixing nut (Nut torque 6 Nm)
7 Manual override



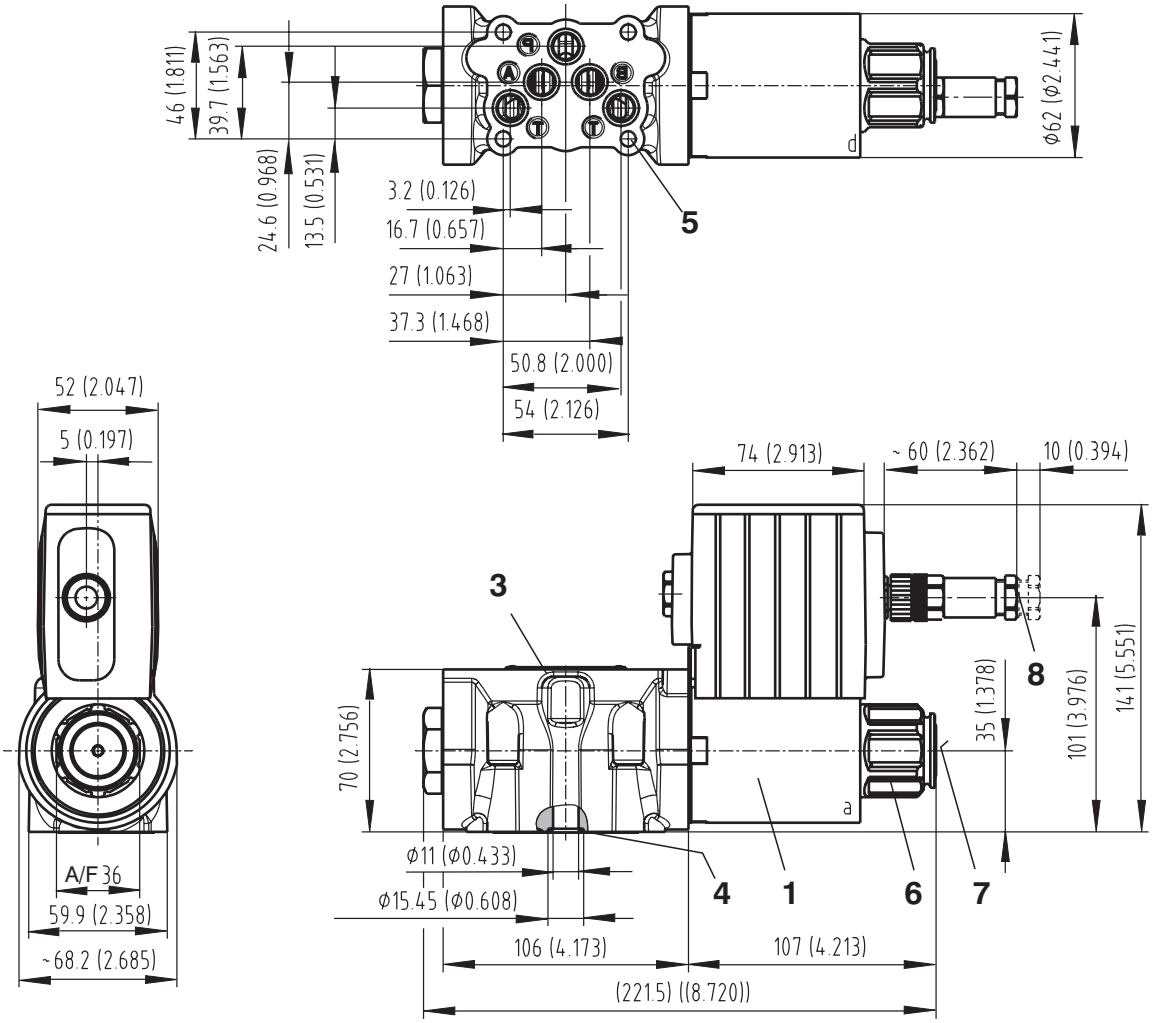
Required surface finish of interface.

Valve Dimensions

Dimensions in millimetres

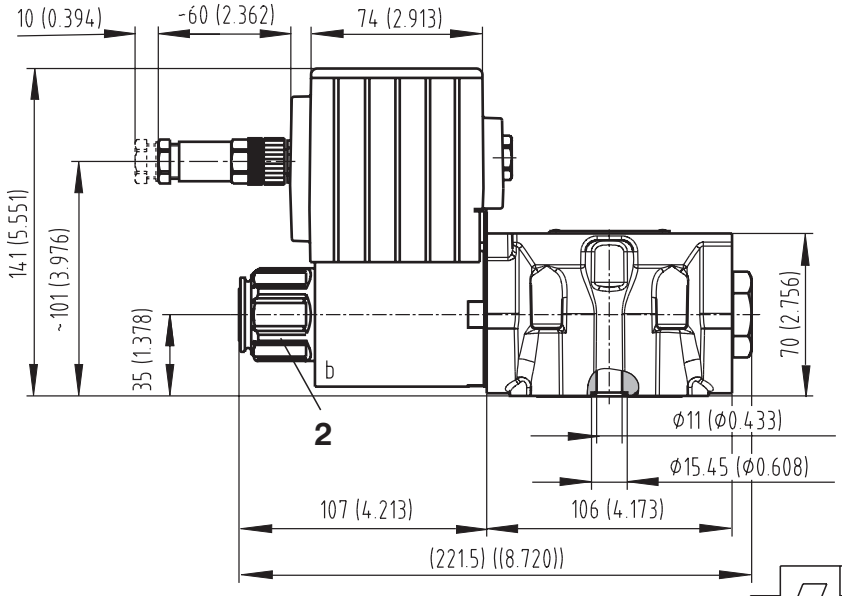
PRM6-102..../..-..EK..

Functional symbols
2Z51, 2Y51

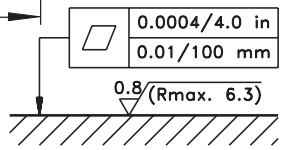


PRM6-102...B/..-..EK..

Functional symbols
2Z11, 2Y11



1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 12.42 x 1.68 (5 pcs.) supplied in delivery packet
5 4 through mounting holes
6 Solenoid fixing nut (Nut torque 6 Nm)
7 Manual override
8 4- pin connector M12 x 1 for external supply voltage



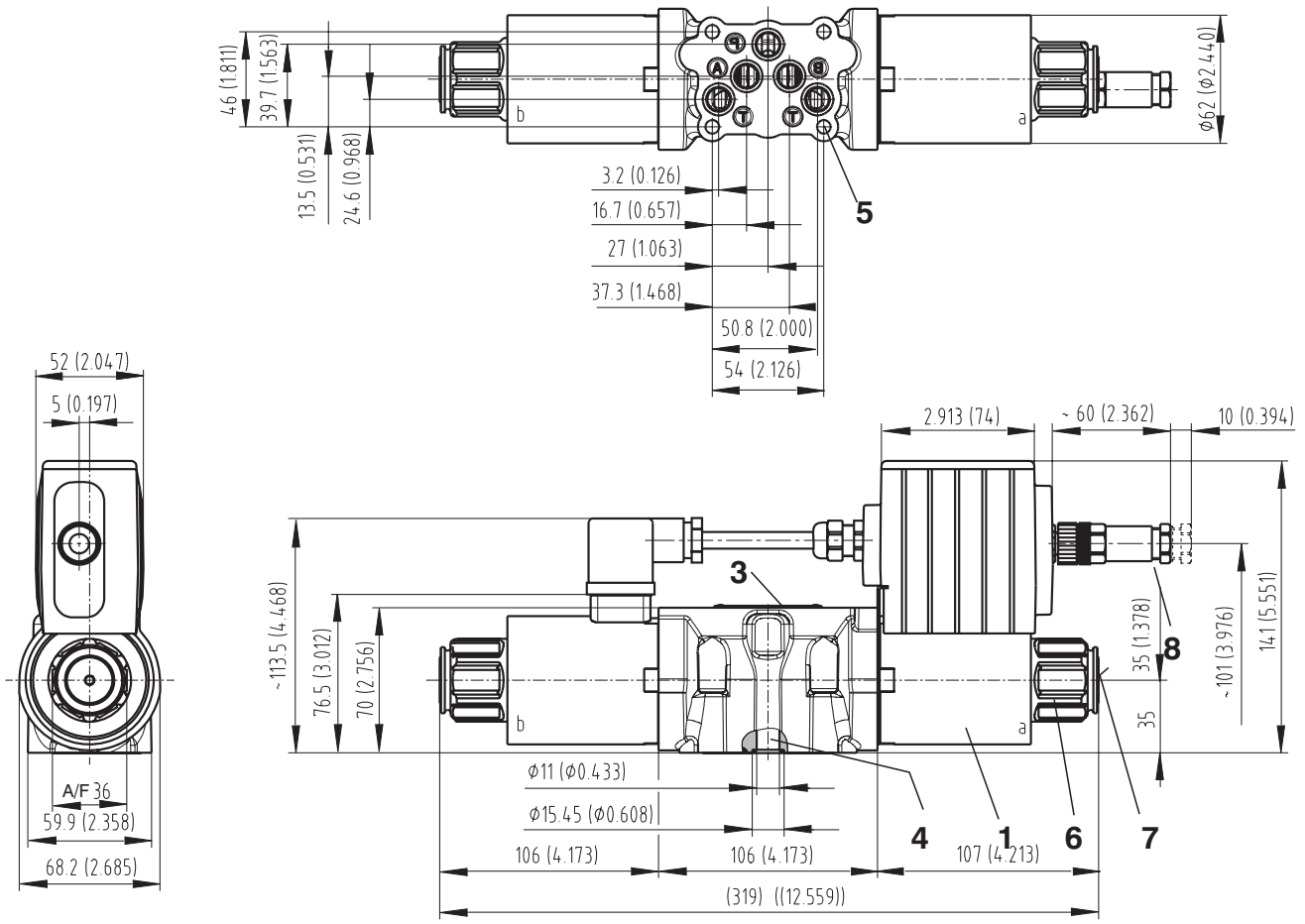
Required surface finish of interface.

Valve Dimensions

Dimensions in millimetres

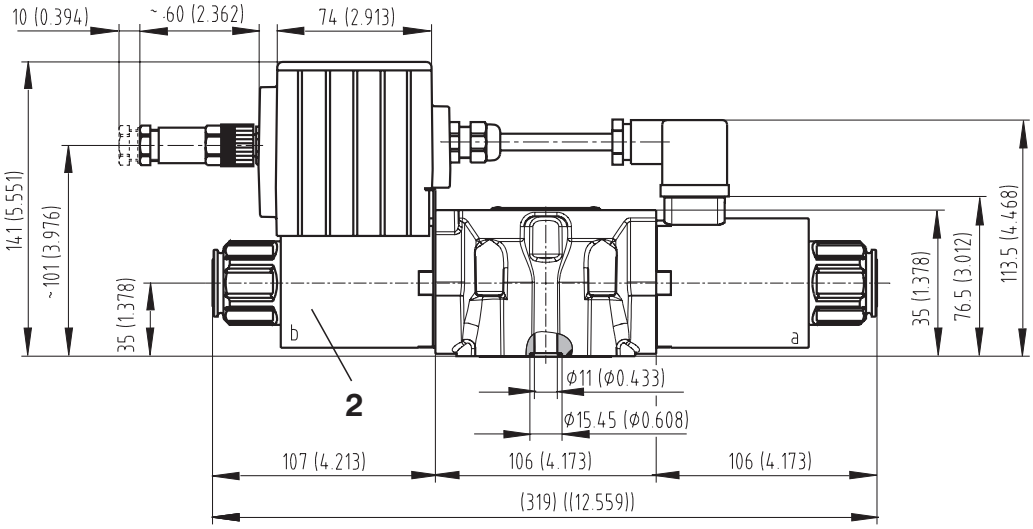
PRM6-103..../..-..EK..

Functional symbols
3Z11, 3Z12, 3Y11, 3Y12

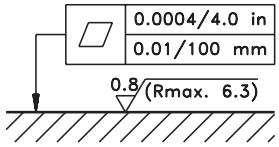


PRM6-103...B/..-..EK..

Functional symbols
3Z11B, 3Z12B, 3Y11B, 3Y12B



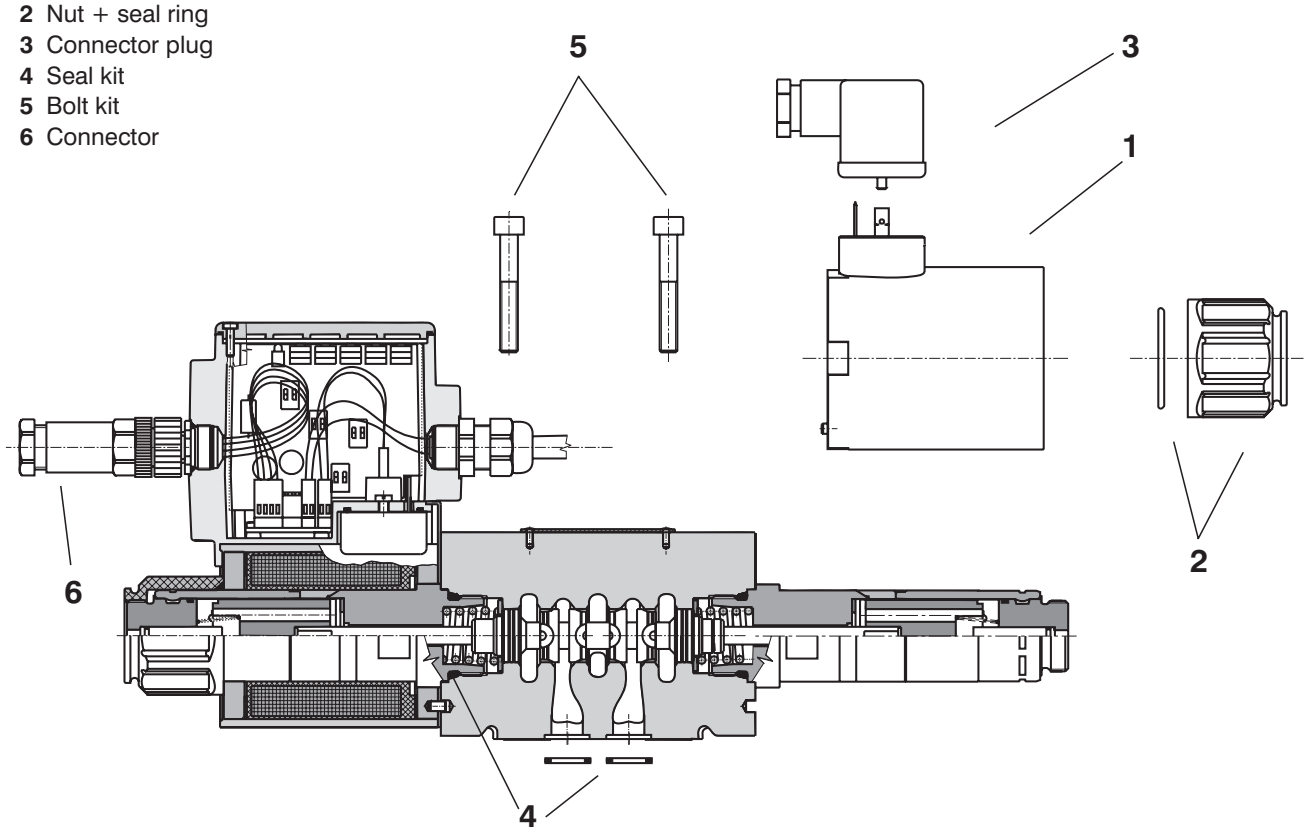
1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 12.42 x 1.68 (5 pcs.) supplied in delivery packet
5 4 through mounting holes
6 Solenoid fixing nut (Nut torque 6 Nm)
7 Manual override
8 4- pin connector M12 x 1 for external supply voltage



Required surface finish of interface.

Spare Parts

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



1. Solenoid coil

Nominal supply voltage [V]	Ordering number
12	936-4614
24	936-4629

2. Solenoid retaining nut + seal ring

Model of the nut	Seal ring	Ordering number
Standard nut	30 x 2	489-9900

3. Connector plug to DIN 43 650

Type designation	Type	Maximum input voltage	Connector plug A gray	Connector plug B black
			Ordering number	
K5	without rectifier - M16x1.5, bushing bore ∅ 0.16-0.24 in (∅ 4-6 mm)	230 V DC	936-9906	936-9905

4. Seal kit

Type	Dimensions, number		Ordering number
Standard - NBR 70	12.42 x 1.68 (5 pcs.)	23.81 x 2.62 (2 pcs.)	568-0098
Viton	12.42 x 1.68 (5 pcs.)	23.81 x 2.62 (2 pcs.)	568-0099

5. Bolt kit

Dimensions, number	Tightening torque	Ordering number
M6 x 40 DIN 912-10.9 (4 pcs.)	14 Nm	485-9964

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

Caution!

- The packing foil is recyclable.
- Mounting bolts M6 x 40 DIN 912-10.9 or studs must be ordered separately.
  Tightening torque of the bolts is 14 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 law.

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ARGO HYTOS

Proportional Directional Control Valves

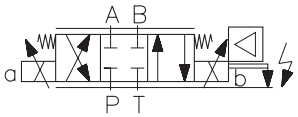
PRM7-04

Size D 04 (02) • ... 320 bar (4600 PSI) • ...20 L/min (5.3 GPM)

HA 5120
5/2009

Replaces
HA 5120 11/2006

- ❑ **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

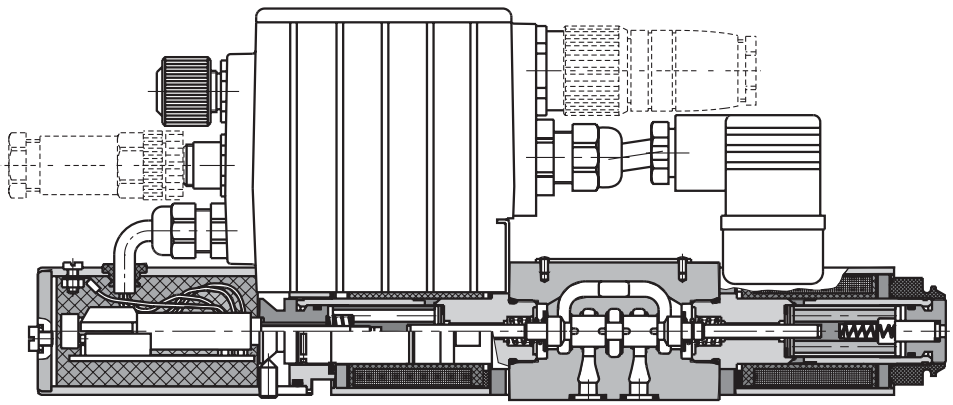
The proportional directional valve PRM7 consists of a cast iron housing, a special control spool, two centering springs with supporting washers, one or two proportional solenoids, a position sensor or, if need be, of a control box with digital electronics.
The measuring system of the position sensor 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 ± 90°.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 dither 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

PRM7-04 ☐ / ☐ - ☐ ☐ ☐

Proportional Directional Control Valve

Nominal size **04 (D 02)**

Seals

without designation	NBR
V	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

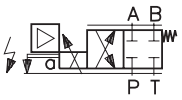
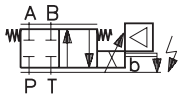
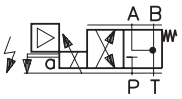
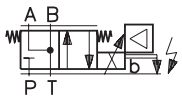
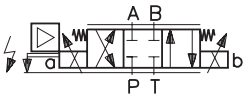
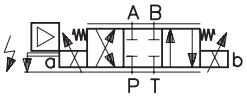
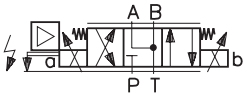
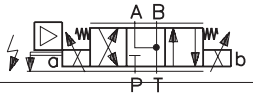
12	**supply voltage 12 V DC
24	supply voltage 24 V DC

** Cannot be supplied as Variant S2

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

4	flow 4 L/min (1.1 GPM)
8	flow 8 L/min (2.1 GPM)
12	flow 12 L/min (3.2 GPM)

Spool Symbols

2Z51		
2Z11		
3Y51		
2Y11		
3Z11		
3Z12		$\frac{q_A}{q_B} = \frac{1}{2}$*
3Y11		
3Y12		$\frac{q_A}{q_B} = \frac{1}{2}$*

* 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)	04 (D 02)
Max. operating pressure at ports P, A, B	bar (PSI)	320 (4600)
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 Δp = 10 bar (145 PSI)	L/min (GPM)	4 (1.1) /8 (2.1)/ 12 (3.2)
Hysteresis - open loop	%	< 6
Hysteresis - closed position loop	%	< 0.5
Weight - PRM7-042 - PRM7-043	kg (lbs)	1.5 (3.30) 1.8 (3.96)
Mounting position		optional
Enclosure type to EN 60529		IP65

Technical Data of Position Sensor - Voltage Outlet

Operating pressure	bar (PSI)	max. 320 (4600), 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 1 solenoid - stroke 1.8 mm (0.07 in) 2 solenoids - stroke ± 1.8 mm (0.07 in)	V	 2.5 0.375 - 2.5 0.375 - 3.625
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) Between 0 ... -25 °C (32 ...-13 °F) Load change from 0 to 2 mA		 typical < 0.2% / 10K max. 0.5% / 10K max. 0.5% / 10K 0.1%
Input voltage change from 9.6 V to 14.4 V from 14.4 V to 30 V	%	 < 0.1 < 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 320 (4600), static
Electrical connection		electrical connector G4W1F Hirschmann *
Contact assigment		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 1.8 mm (0.07 in) 2 solenoids - stroke ± 1.8 mm (0.07 in)	mA	 12 8.4 ... 12 8..4 ... 15.6
Additional output signal error: - at temperature change from +10 ... 55 °C (50 ...131 °F) - at imjpedance 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	≥ 800

* Only for S01 and S02 model.

Technical Data of Proportional Solenoid

Type of coil	V	12 DC	24 DC
Limiting current	A	1.7	0.8
Resistance at 20 °C (68 °F)	Ω	4.9	21

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
566-9500	Connecting cable to PC - length 2m (6.56ft), CD-ROM with program PRM7Conf and user manual.
566-9501	Connecting cable to PC - length 5m (16.40ft), CD-ROM with program PRM7Conf and user manual.
566-9502	Connecting cable to PC - length size 2m (6.56ft).
566-9503	Connecting cable to PC - length size 5m (16.40ft).

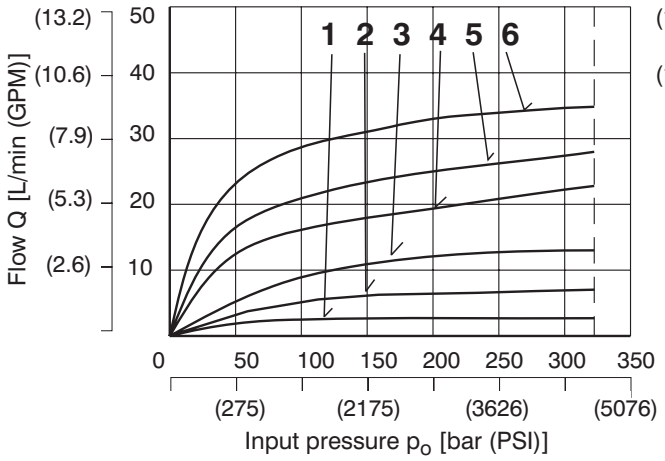
Limit Power

Measured at ν = 32 mm^2/s (156 SUS)

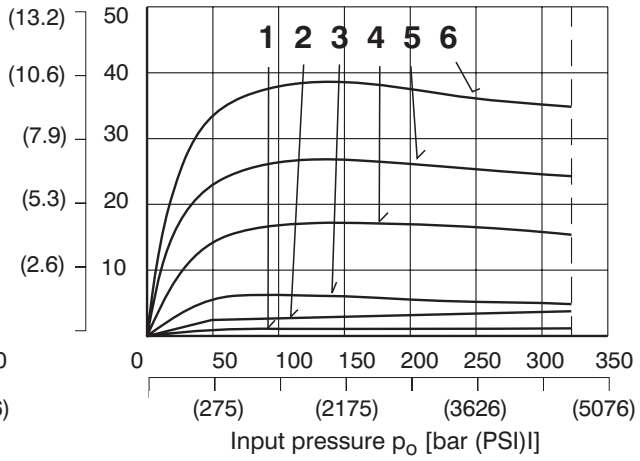
Only for E01 model

P → A / B → T or P → B / A → T

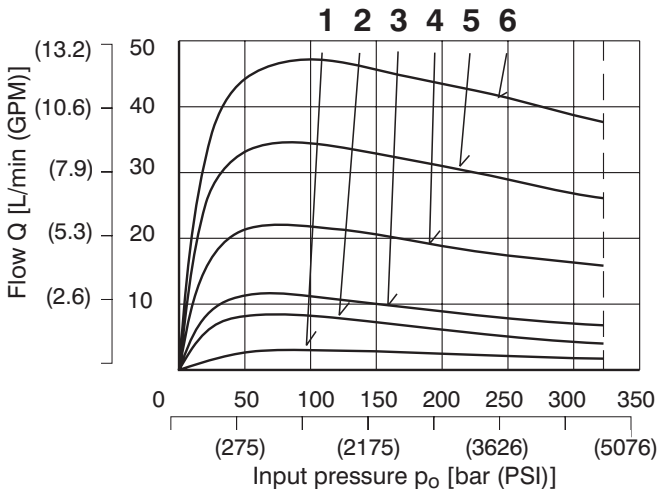
Nominal flow 4 L/min (1.1 GPM)



Nominal flow 8 L/min (2.1 GPM)



Nominal flow 12 L/min (3.2 GPM)

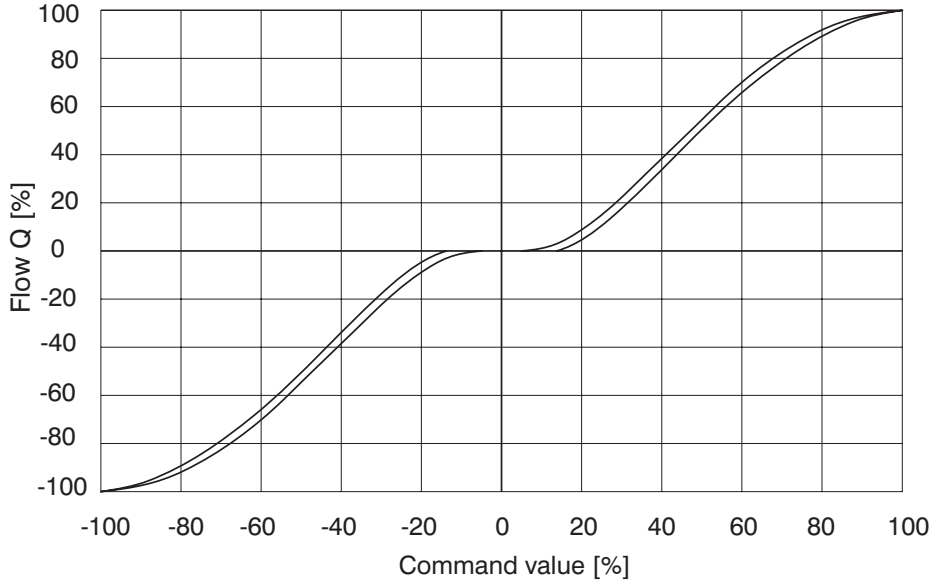


Solenoid current:
1 = 50%
2 = 60%
3 = 70%
4 = 80%
5 = 90%
6 = 100%

Flow Characteristics

Measured at input pressure Δp =10 bar (145 PSI), ν = 32 mm^2/s (156 SUS)

Only for E01 model



Flow Characteristics

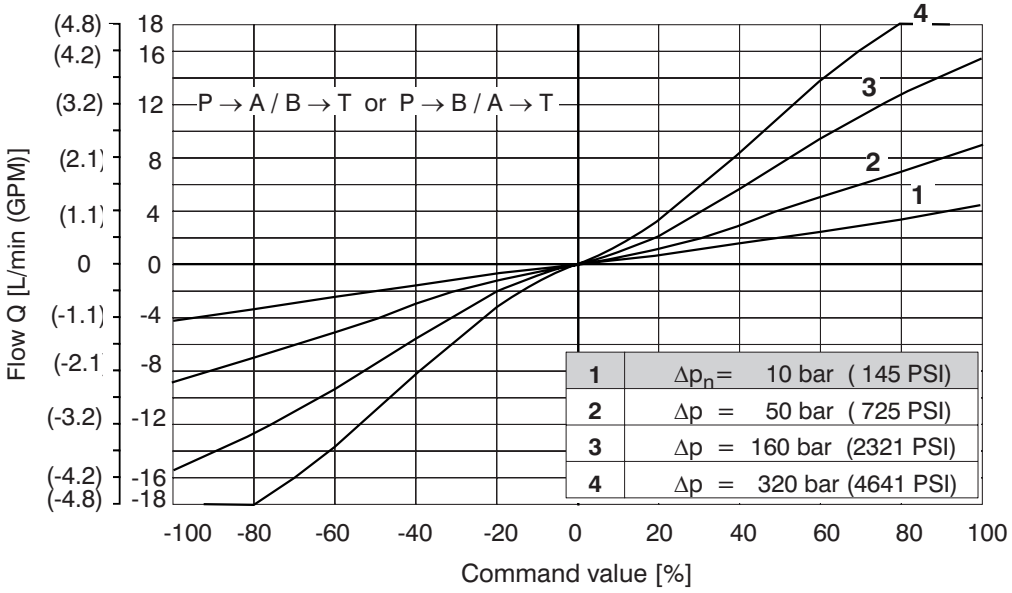
Measured at ν = 32 mm^2/s (156 SUS)

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

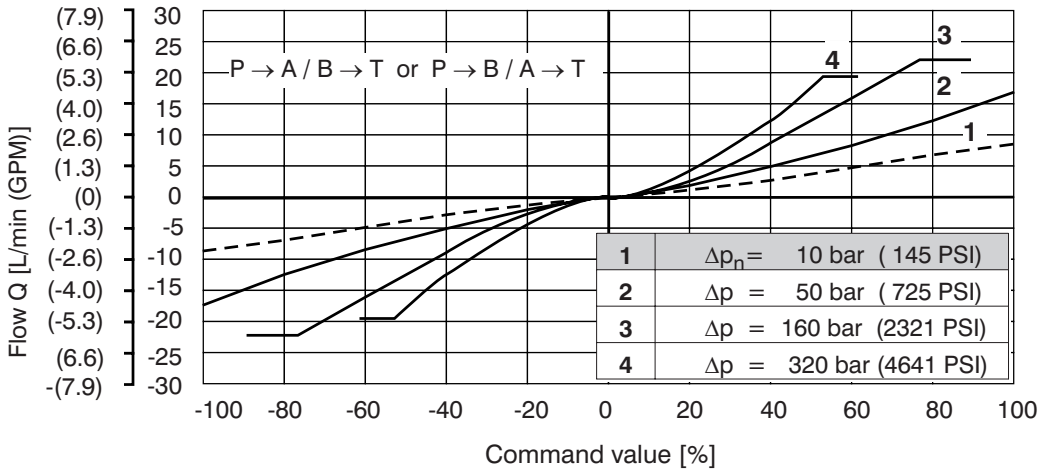
Only for E02S01 model

Q_n= 4 L/min (1.1 GPM) by Δp = 10 bar (145 PSI)



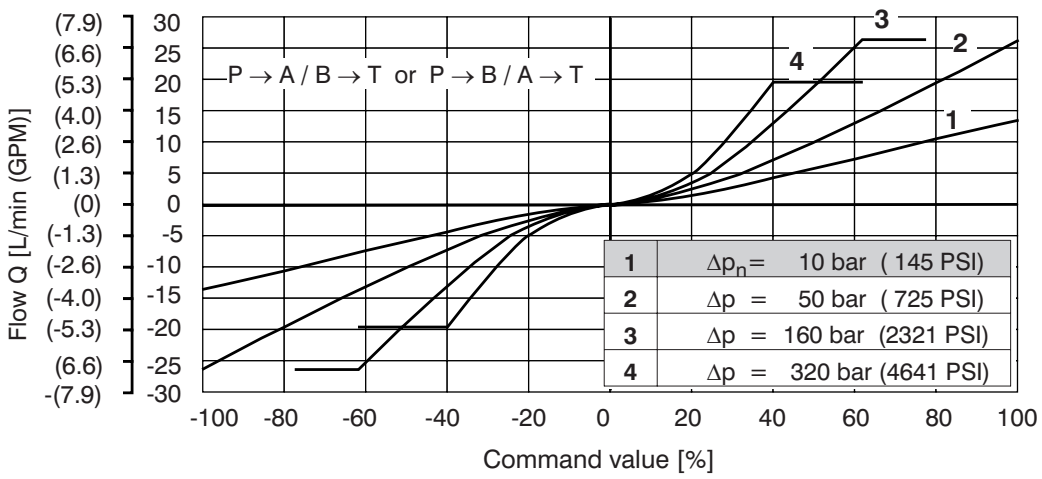
Only for E02S01 model

Q_n= 8 L/min (2.1GPM) by Δp = 10 bar (145 PSI)



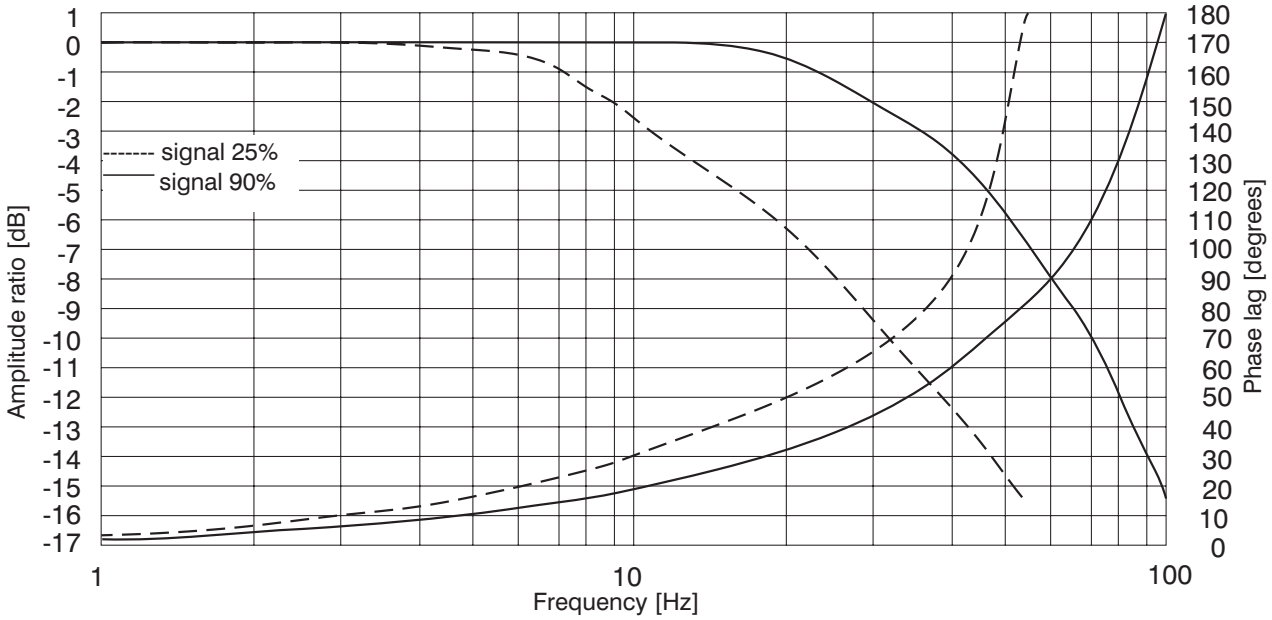
Only for E02S01 model

Q_n= 12 L/min (3.2 GPM)by Δp = 10 bar (145 PSI)



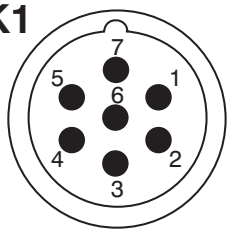
Frequency Reponse

closed position loop, for E02S01 model



Connector Connection

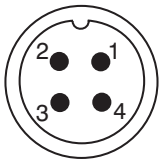
K1



Connector K1- type M23 (male)		
PIN	**Technical data**	**Description**
1	* Power supply input	11.2 .... 28V DC
2	* Ground (power supply)	0V
3	Control signal	according to configuration
4	Ground (signal)	0V
5	Power reference signal	+10V DC/max.10mA
6	Control signal of position sensor spool	0 ....5V
7	* Protection earth lead (PE)	---

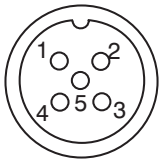
* Recommended min. lead cross section 0.75mm^2

K2



Connector K2 - type M12x1 (male)		
PIN	**Technical data**	**Description**
1	TxD	standard
2	RxD	RS 232
3	Ground (signal)	0V
4	Not used	

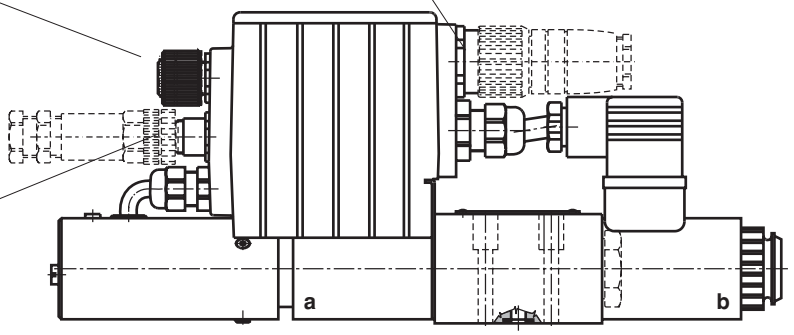
K3



Connector K3 - type M12x1 (female)		
PIN	**Technical data**	**Description**
1	Power supply output	11.2 .... 28V DC/max.100mA
2	Signal of external feedback	according to configuration
3	Ground	0V
4	Not used	
5	Not used	

K2 - Connection RS232 M12x1 (4 PIN)
For programing the electronics.

K1 - Main inplut connector M23 (7PIN)
Cable diameter 8 ...12mm (0.31...0.47in).



K3 - Conektor M12x1 (5PIN)
External feedback signal (it presented only for E03 and E04S01configurations).

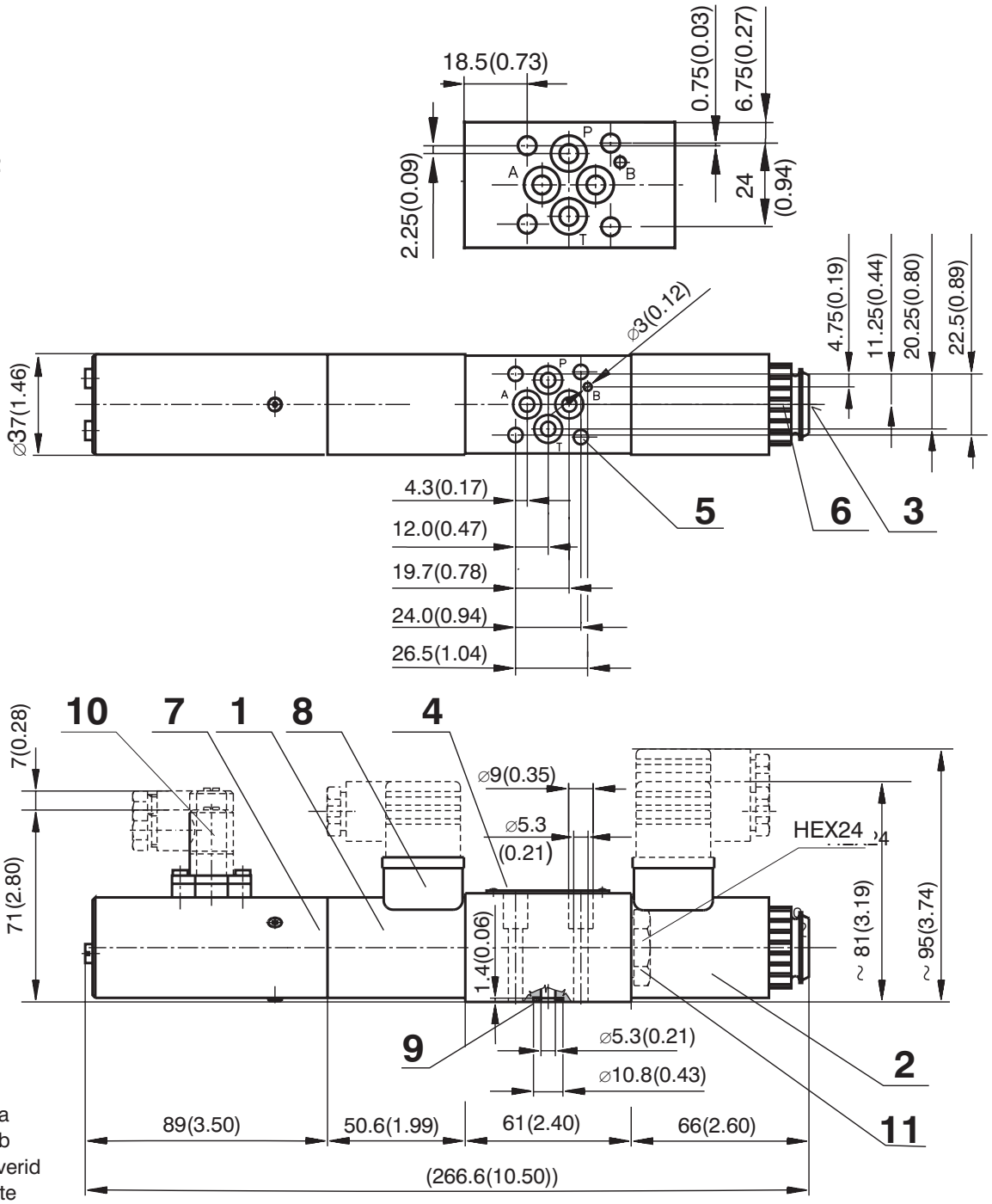
Factory Settings

Item	Model							
	E01		E02S01		E03		E04S01	
	1 Magnet	2 Magnet	1 Magnet	2 Magnet	1 Magnet	2 Magnet	1 Magnet	2 Magnet
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	

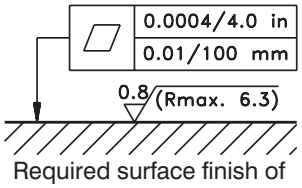
Valve Dimensions

Dimensions in millimeters and inches

043 ... S01
043 ... S02



1 Solenoid a
2 Solenoid b
3 Manual overid
4 Name plate
5 4 mounting holes
6 Solenoid fixing nut
7 Position sensor
8 Solenoid supply connector
9 Square ring 7.65 x 1.68 (4 pcs.), supplied in delivery packet
10 Position sensor connector
11 Plug screw for valve with one solenoid, HEX 24, configurations 2Z51, 2Z11



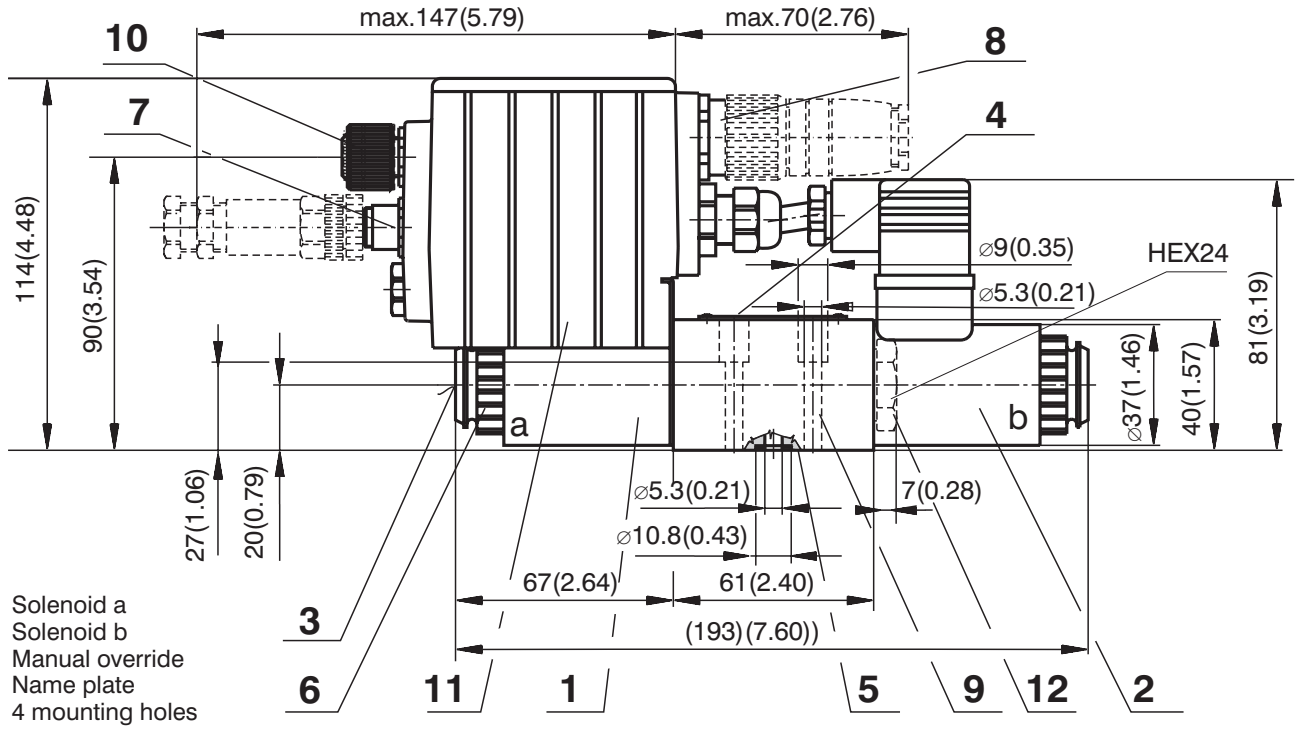
Required surface finish of interface

Valve Dimensions

Dimensions in millimeters and inches

043 ... E01 - without connector plug for spool position feedback

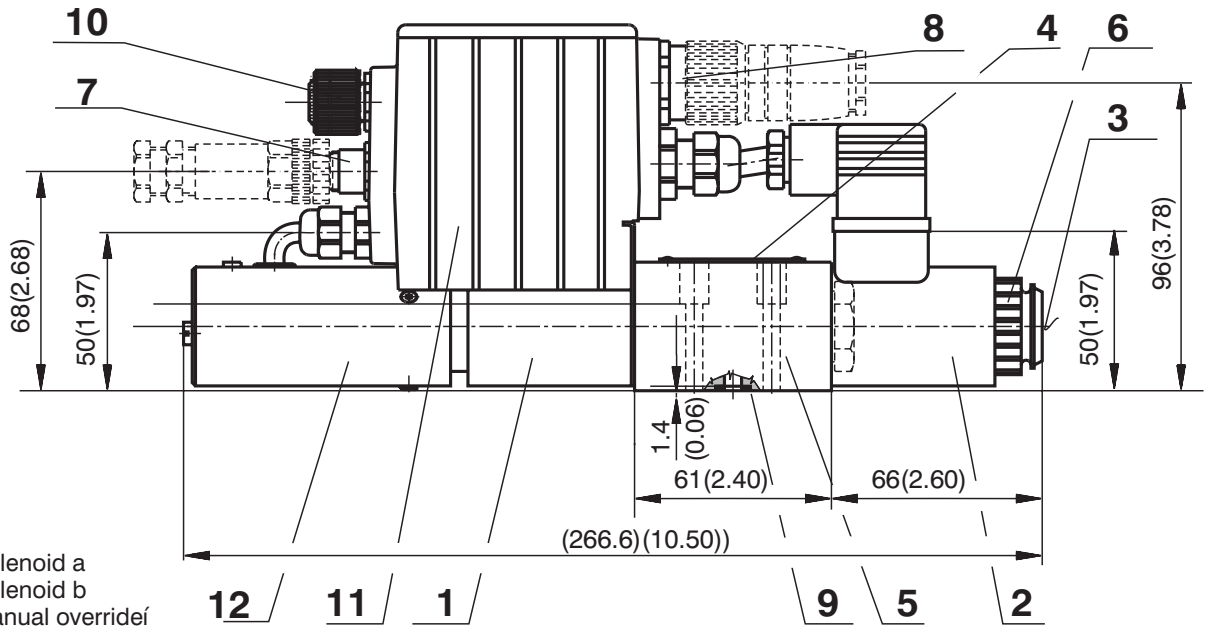
043 ... E03



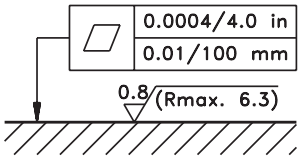
1 Solenoid a
2 Solenoid b
3 Manual override
4 Name plate
5 4 mounting holes
6 Solenoid fixing nut
7 Connector M12x1 for connection of external feedback
8 Main supply connector M23
9 Square ring 7.65 x 1.68 (4 pcs.), supplied in delivery packet
10 Cover of connector M12x1 for programming
11 Plastic box with integrated electronics
12 Plug screw for valve with one solenoid, HEX24, configurations 2Z51, 2Z11

043 ... E02S01 - without connector plug for spool position feedback

043 ... E04S01

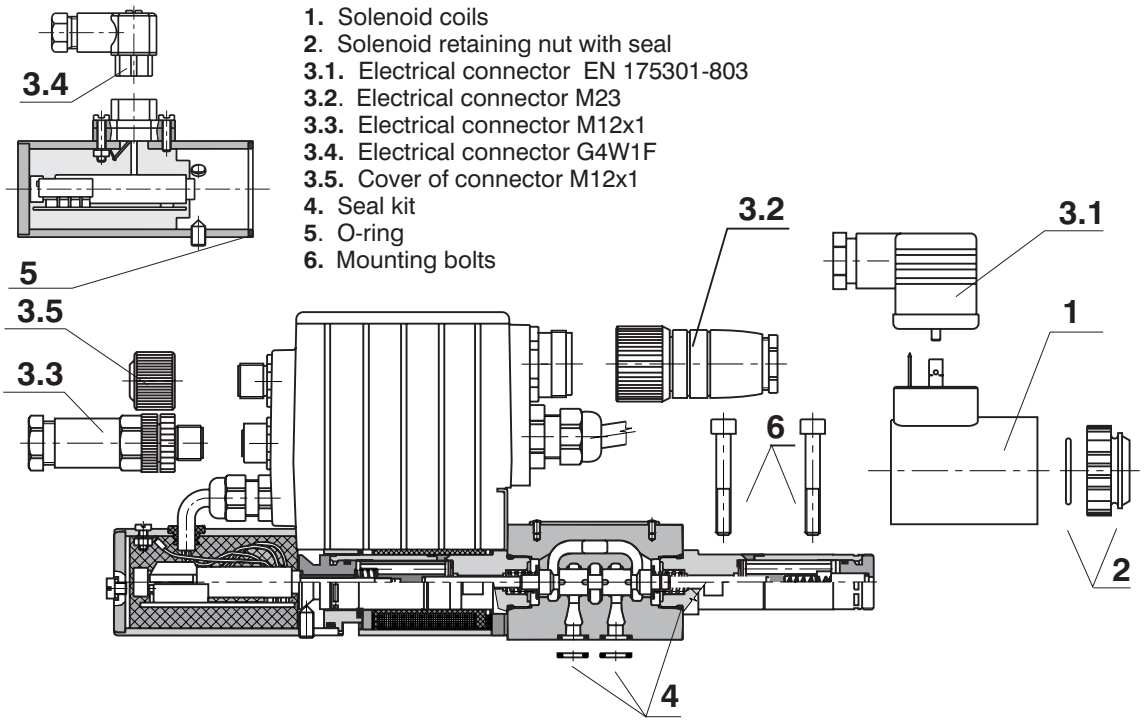


1 Solenoid a
2 Solenoid b
3 Manual overrideí
4 Name plate
5 4 mounting holes
6 Solenoid fixing nut
7 Connector M12x1 for connection of external feedback
8 Main supply connector M23
9 Square ring 7.65 x 1.68 (4 pcs.), supplied in delivery packet
10 Cover of connector M12x1 for programming
11 Plastic box with integrated electronics
12 Position sensor



Required surface finish of interface

Spare Parts



1. Solenoid coils
2. Solenoid retaining nut with seal
3.1. Electrical connector EN 175301-803
3.2. Electrical connector M23
3.3. Electrical connector M12x1
3.4. Electrical connector G4W1F
3.5. Cover of connector M12x1
4. Seal kit
5. O-ring
6. Mounting bolts

1. Solenoid coil

Solenoid type	Ordering number
01200	936-0033
02400	936-0034

2. Solenoid retaining nut with seal

Type of the nut	Seal ring	Ordering number
Standard nut	18 x 1.5	486-9010

3.1. Electrical connector EN 175301-803

Type designation	Type	Maximum input voltage	Connector A grey	Connector B black
			Ordering number	
K5	without rectifier - M16x1.5 (bushing bore ⌀ 4-6 mm)	230 V DC	936-9906	936-9905

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	358358932157

3.5. Cover of connector M12x1

Ordering number	566-7400

4. Seal kit

Type	Dimensions, number		Order number
	Square ring	O-ring	
Standard - NBR70	7.65 x 1.68 (4 pcs.)	16 x 1.8 (2 pcs.)	486-9002
Viton	7.65 x 1.68 (4 pcs.)	16 x 2.0 (2 pcs.)	486-9009

5. O-ring

Standard - NBR70	28 x 2 (1 pc.)	273111014120

6. Mounting bolts

Dimensions, number	Tightening torque	Ordering number
M5 x 35 DIN 912-10.9 (4 pcs.)	5 Nm (3.7 ft-lbs)	486 -9011

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.

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www.argo-hytos.com

ARGO HYTOS

Proportional Directional Control Valves

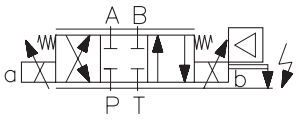
PRM7-06

Size D 03 (06) • ...4600 PSI (320 bar) • ...10.6 GPM (40 L/min)

HA 5119
12/2006

Replaces
HA 5107 2/2002

- ❑ **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

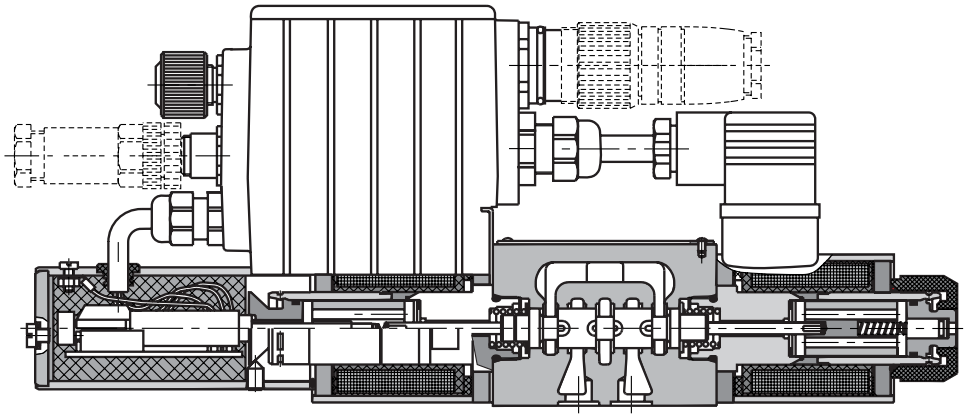
The proportional directional valve PRM7 consists of a cast iron housing, a special control spool, two centering springs with supporting washers, one or two proportional solenoids, a position sensor or, if need be, of a control box with digital electronics.
The measuring system of the position sensor 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 ± 90°.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 dither 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)**

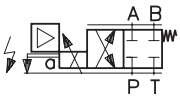
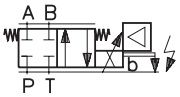
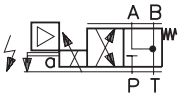
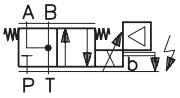
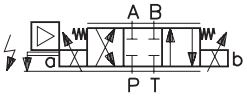
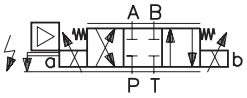
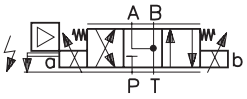
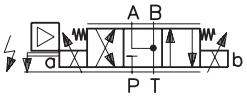
Seals

without designation	NBR
V	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

Spool Symbols

		**2Z51**
		**2Z11**
		**3Y51**
		**2Y11**
		**3Z11**
	$\frac{q_A}{q_B} = \frac{1}{2}$*	**3Z12**
		**3Y11**
	$\frac{q_A}{q_B} = \frac{1}{2}$*	**3Y12**

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)	320 (4600)
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 Δp = 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. 320 (4600), 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 1 solenoid - stroke 2.8 mm (0.11 in) solenoids - stroke ± 2.8 mm (0.11 in)	V	 2.5 0.125 - 2.5 0.125 - 4.875
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) Between 0 ... -25 °C (32 ...-13 °F) Load change from 0 to 2 mA		 typical < 0.2% / 10K max. 0.5% / 10K max. 0.5% / 10K 0.1%
Input voltage change from 9.6 V to 14.4 V from 14.4 V to 30 V	%	 < 0.1 < 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 320 (4600), static
Electrical connection		electrical connector G4W1F Hirschmann *
Contact assigment		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 imjpedance 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	≥ 800

* 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

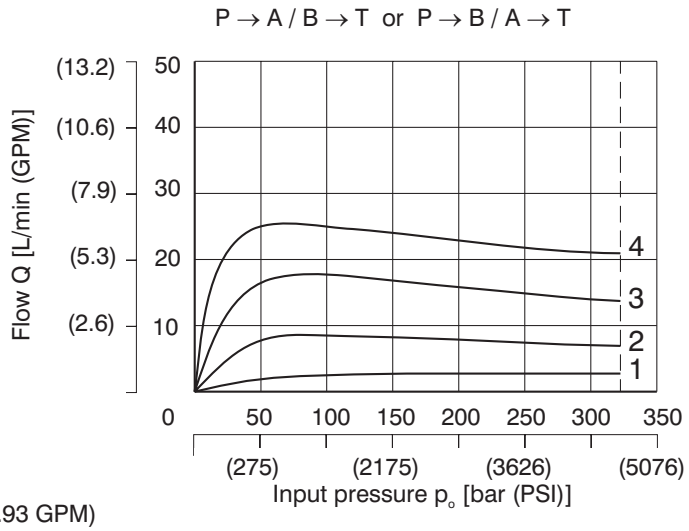
Order number	Content
566-9500	Connecting cable to PC - length 2m (6.56ft), CD-ROM with program PRM7Conf and user manual.
566-9501	Connecting cable to PC - length 5m (16.40ft), CD-ROM with program PRM7Conf and user manual.
566-9502	Connecting cable to PC - length size 2m (6.56ft).
566-9503	Connecting cable to PC - length size 5m (16.40ft).

Limit Power

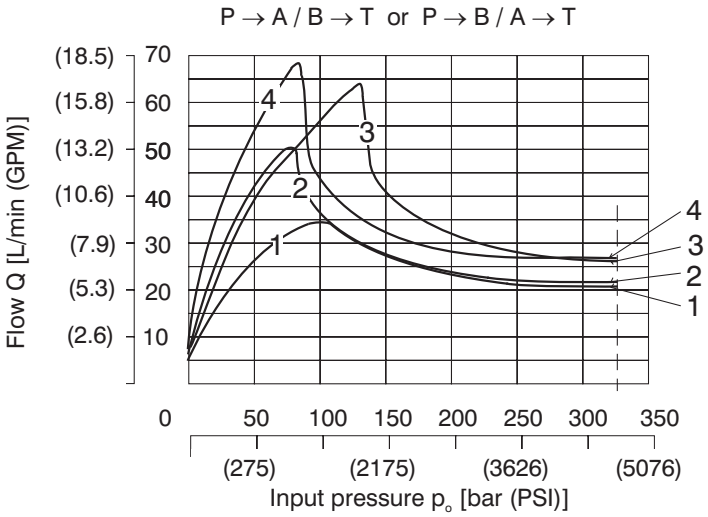
Measured at ν = 32 mm^2/s (156 SUS)

Only for E01 model

Nominal flow 15 L/min (3.96 GPM)



Nominal flow 30 L/min (7.93 GPM)

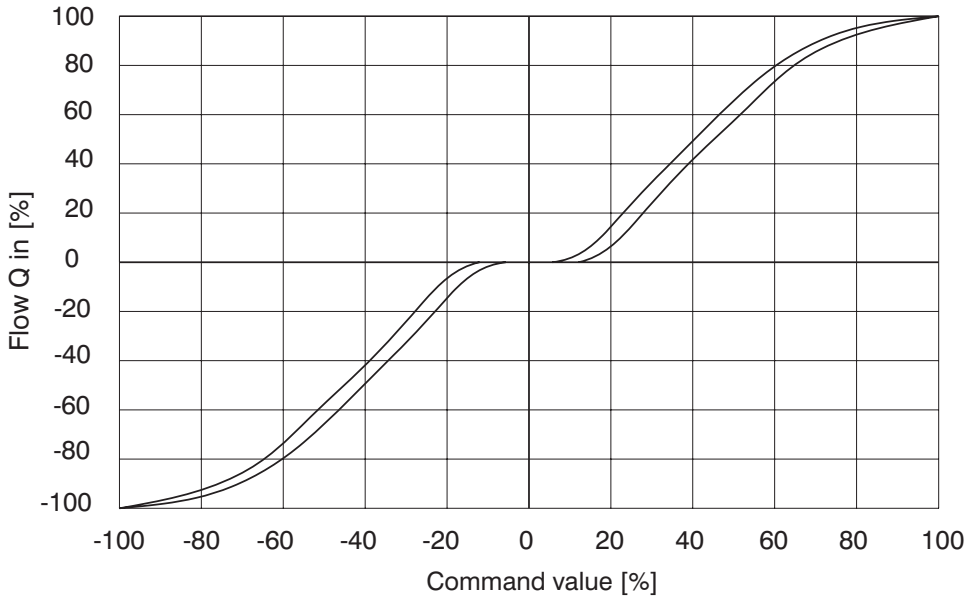


Solenoid current:
1 = 40 %
2 = 60 %
3 = 80 %
4 = 100 %

Flow Characteristics

Measured at input pressure Δ p =10 bar (145 PSI) , ν = 32 mm^2/s (156 SUS)

Only for E01 model



Flow Characteristics

Measured at ν = 32 mm^2/s (156 SUS)

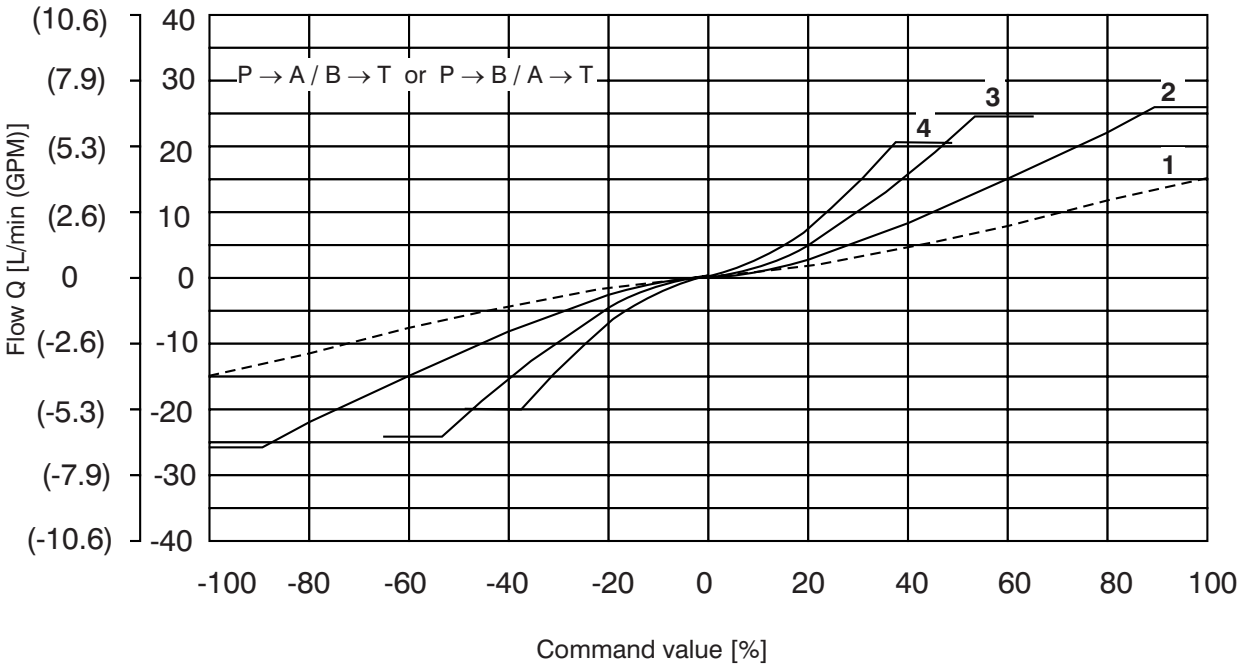
Only for E02S01 model

Q_n = 15 L/min (3.96 GPM) by Δp = 10 bar (145 PSI)

$\Delta \mathbf{p}$ = Valve pressure differential (inlet pressure p_V minus load pressure and return pressure p_T)

$\Delta \mathbf{p_n}$ = Valve pressure differential for nominal flow Q_n

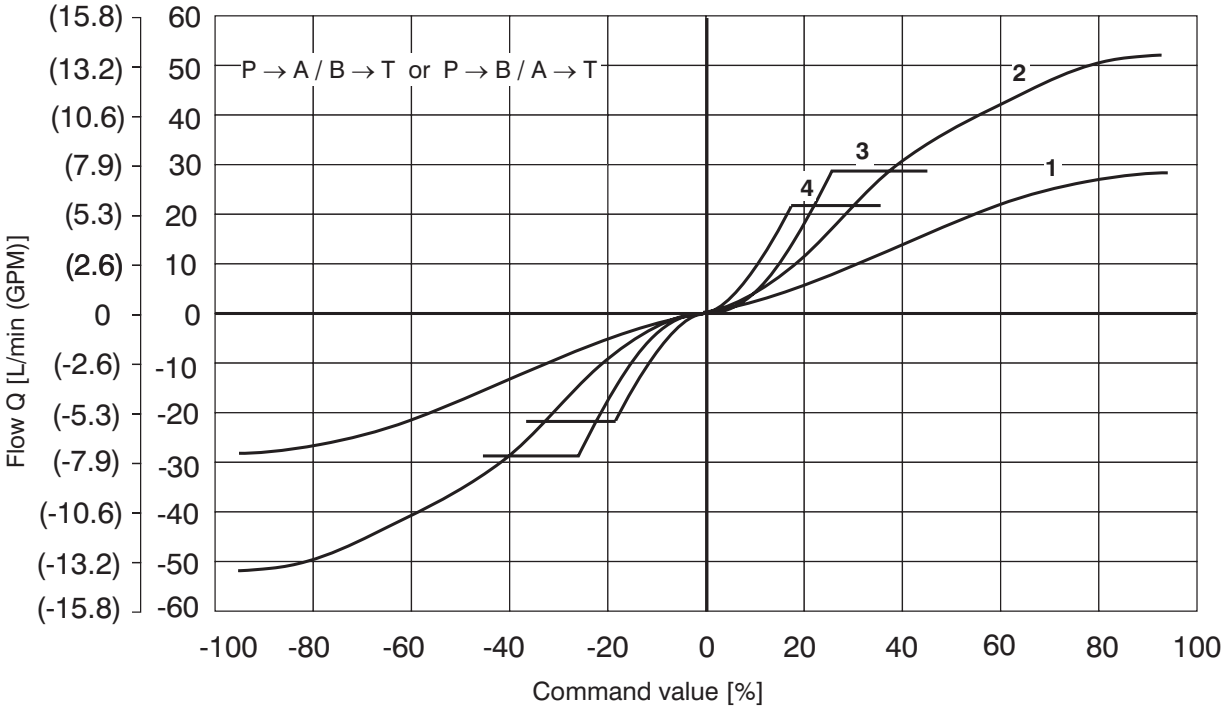
1	Δp_n = 10 bar (145 PSI)
2	Δp = 50 bar (725 PSI)
3	Δp = 160 bar (2321 PSI)
4	Δp = 320 bar (4641 PSI)



Only for E02S01 model

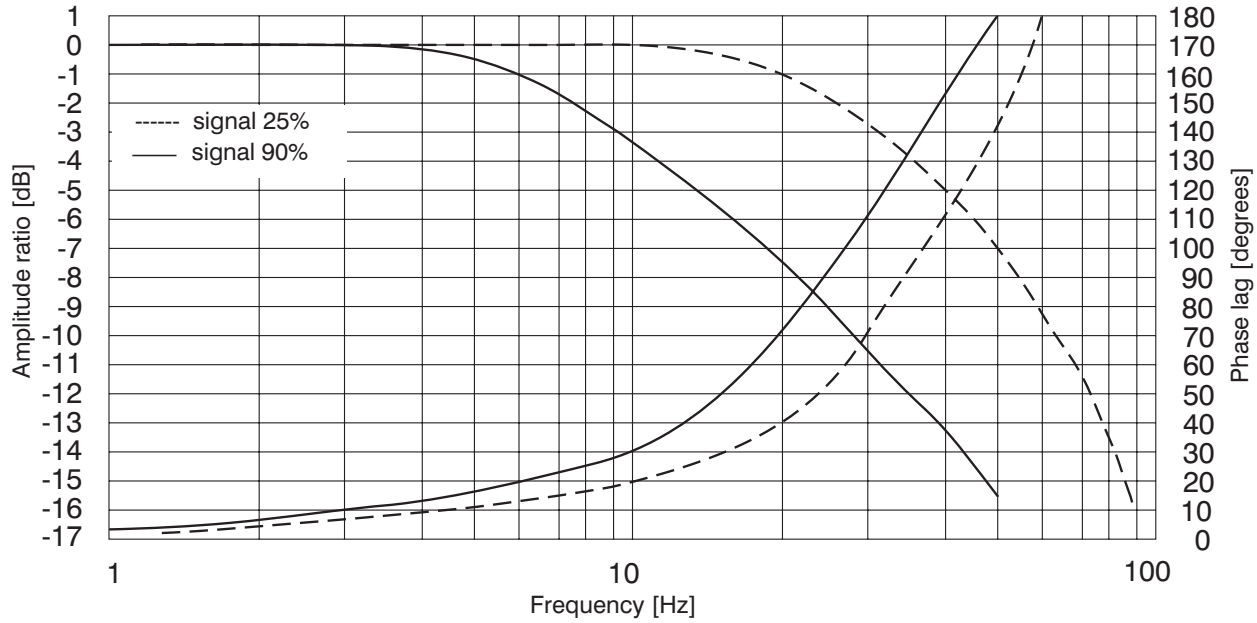
Q_n = 30 L/min (7.93 GPM) by Δp = 10 bar (145 PSI)

1	Δp_n = 10 bar (145 PSI)
2	Δp = 50 bar (725 PSI)
3	Δp = 160 bar (2321 PSI)
4	Δp = 320 bar (4641 PSI)



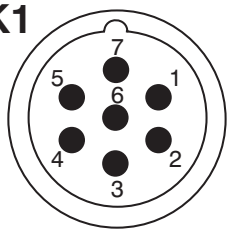
Frequency Reponse

closed position loop, for E02S01 model



Connector Connection

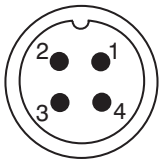
K1



Connector K1- type M23 (male)		
PIN	**Technical data**	**Description**
1	* Power supply input	11.2 .... 28V DC
2	* Ground (power supply)	0V
3	Control signal	according to configuration
4	Ground (signal)	0V
5	Power reference signal	+10V DC/max.10mA
6	Control signal of position sensor spool	0 ....5V
7	* Protection earth lead (PE)	---

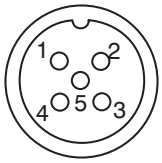
* Recommended min. lead cross section 0.75mm^2

K2



Connector K2 - type M12x1 (male)		
PIN	**Technical data**	**Description**
1	TxD	standard
2	RxD	RS 232
3	Ground (signal)	0V
4	Not used	

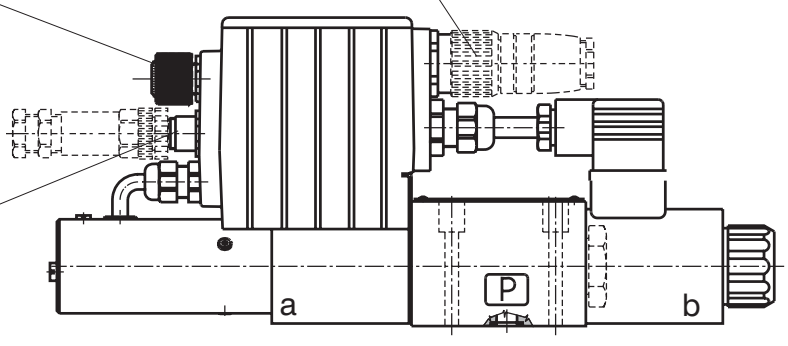
K3



Connector K3 - type M12x1 (female)		
PIN	**Technical data**	**Description**
1	Power supply output	11.2 .... 28V DC/max.100mA
2	Signal of external feedback	according to configuration
3	Ground	0V
4	Not used	
5	Not used	

K2 - Connection RS232 M12x1 (4 PIN)
For programing the electronics.

K1 - Main inplut connector M23 (7PIN)
Whole cable diameter 8 ...12mm (0.31...0.47in).



K3 - Conektor M12x1 (5PIN)
External feedback signal (it presented only for E03 and E04S01configurations).

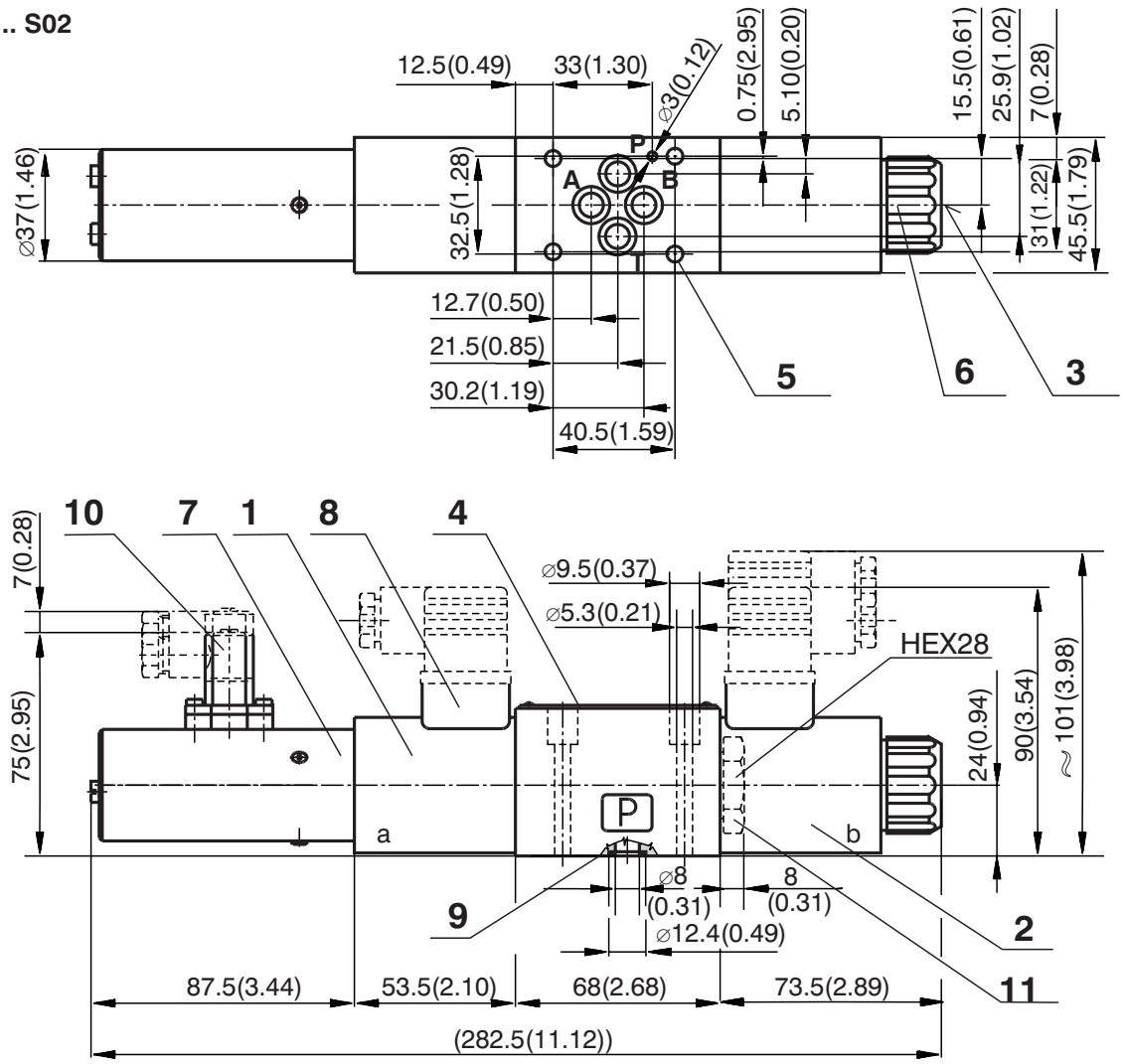
Manufactory valve configuration

Item	Model							
	E01		E02S01		E03		E04S01	
	1 Magnet	2 Magnet	1 Magnet	2 Magnet	1 Magnet	2 Magnet	1 Magnet	2 Magnet
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	

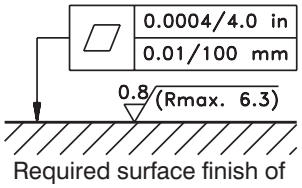
Valve Dimensions

Dimensions in millimeters and inches

063 ... S01
063 ... S02



1 Solenoid a
2 Solenoid b
3 Manual overid
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 2Z51, 2Z11



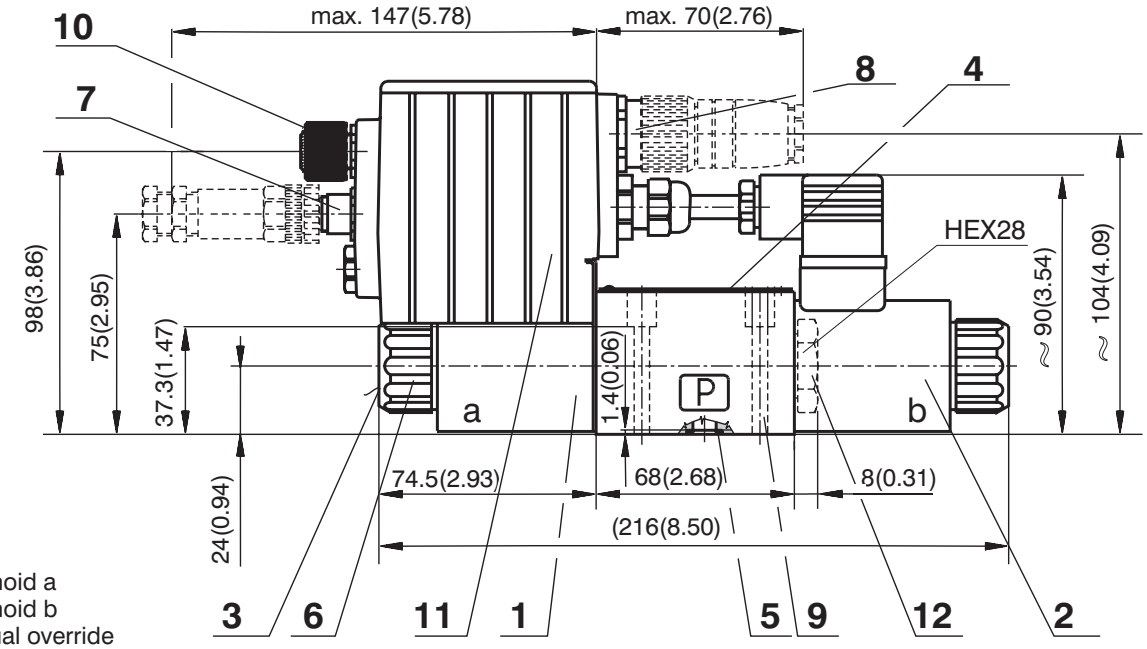
Required surface finish of interface

Valve Dimensions

Dimensions in millimeters and inches

063 ... E01 - without connector plug for spool possition feedback

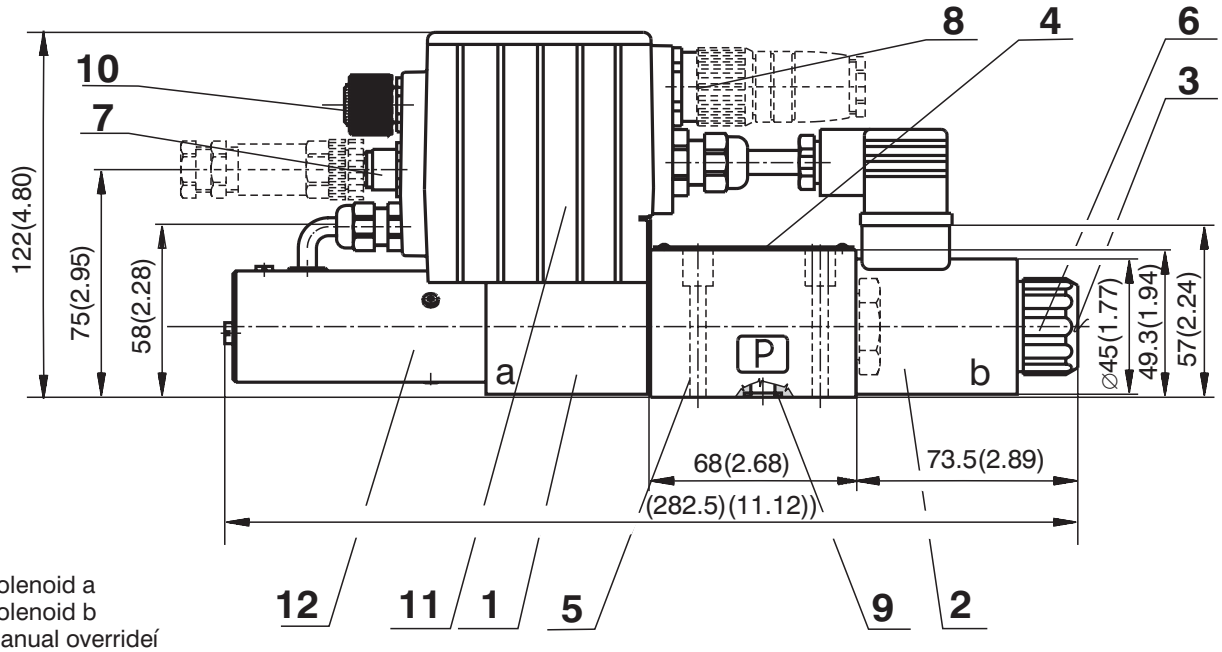
063 ... E03



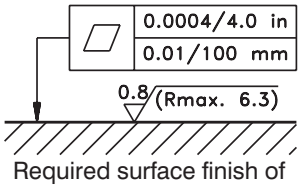
1 Solenoid a
2 Solenoid b
3 Manual override
4 Name plate
5 4 mounting holes
6 Solenoid fixing nut
7 Connector M12x1 for connection of external feedback
8 Main supply connector M23
9 Square ring 9.25 x 1.68 (4 pcs.), supplied in delivery packet
10 Cover of connector M12x1 for programming
11 Plastic box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

063 ... E02S01 - without connector plug for spool possition feedback

063 ... E04S01

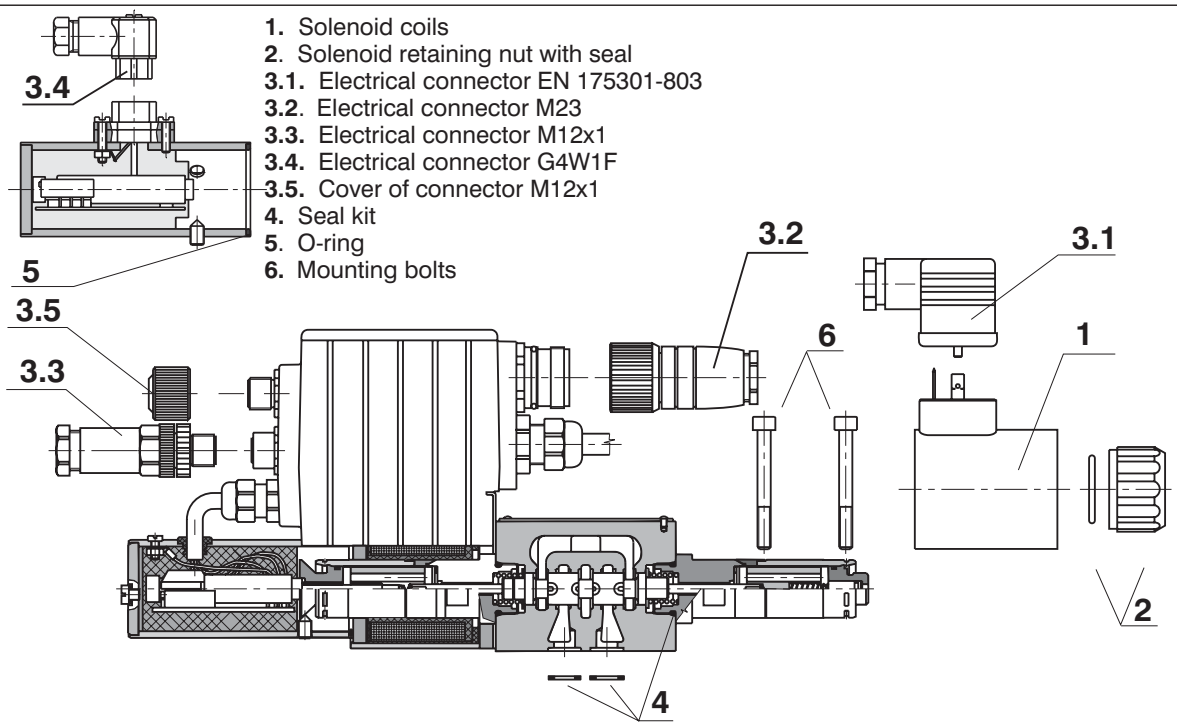


1 Solenoid a
2 Solenoid b
3 Manual overrideí
4 Name plate
5 4 mounting holes
6 Solenoid fixing nut
7 Connector M12x1 for connection of external feedback
8 Main supply connector M23
9 Square ring 9.25 x 1.68 (4 pcs.), supplied in delivery packet
10 Cover of connector M12x1 for programming
11 Plastic box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



Required surface finish of interface

Spare Parts



1. Solenoid coils
2. Solenoid retaining nut with seal
3.1. Electrical connector EN 175301-803
3.2. Electrical connector M23
3.3. Electrical connector M12x1
3.4. Electrical connector G4W1F
3.5. Cover of connector M12x1
4. Seal kit
5. O-ring
6. Mounting bolts

1. Solenoid coil

Solenoid type	Ordering number
01200	936-0061
02400	936-0067

2. Solenoid retaining nut with seal

Type of the nut	Seal ring	Ordering number
Standard nut	22 x 2	484-9951

3.1. Electrical connector EN 175301-803

Type designation	Type	Maximum input voltage	Connector A grey	Connector B black
			Ordering number	
K5	without rectifier - M16x1.5 (bushing bore ⌀ 4-6 mm)	230 V DC	936-9906	936-9905

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	358358932157

3.5. Cover of connector M12x1

Ordering number	566-7400

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.)	484-9961
Viton	9.25 x 1.78 (4 pcs.)	17.17 x 1.78 (2 pcs.)	484-9971

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 (6.6 ft-lbs)	484-9958

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.

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www.argo-hytos.com

ARGO HYTOS

Proportional Directional Control Valves

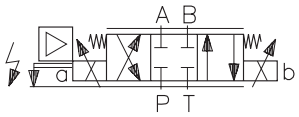
PRM7-10

Size 10 (D 05) • ... 320 bar (4600 PSI) • ...80 L/min (21 GPM)

HA 5116
11/2006

Replaces
HA 5116 5/2006

- ❑ **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

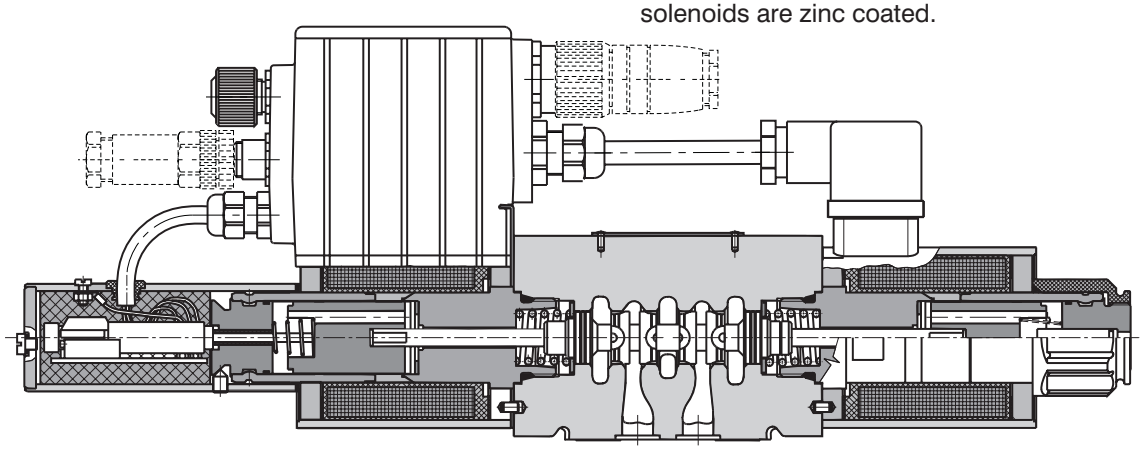
The proportional directional valve PRM7 consists of a cast iron housing, a special control spool, two centering springs with supporting washers, one or two proportional solenoids, a position sensor or, if need be, of a control box with digital electronics.
The measuring system of the position sensor 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 ± 90°.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 dither 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

PRM7-10 ☐ / ☐ - ☐ ☐ ☐

Proportional Directional Control Valve

Nominal size **10 (D 05)**

Seals

without designation	NBR
V	FPM (Viton)

Model

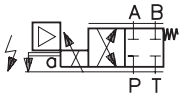
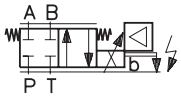
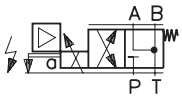
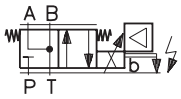
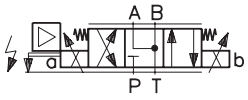
S01	position sensor with voltage outlet
S02	position sensor with current outlet
E01	proportional directional valve without feedback
E02S01	proportional directional valve with position feedback
E03	proportional directional valve with external feedback
E04S01	proportional directional valve with position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

Nominal solenoid supply voltage

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

** Cannot be supplied as Variant S2

Spool Symbols

		**2Z51**
		**2Z11**
		**3Y51**
		**2Y11**
		**3Z11**
	$\frac{q_A}{q_B} = \frac{1}{2}^*$	**3Z12**
		**3Y11**
	$\frac{q_A}{q_B} = \frac{1}{2}^*$	**3Y12**

Spool SymbolsNominal flow rate at Δp =10 bar (145 PSI)

30	flow 30 L/min (7.925 GPM)
60	flow 60 L/min (15.850 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)	10 (D 05)
Max. operating pressure at ports P, A, B	bar (PSI)	320 (4600)
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 Δp = 10 bar (145 PSI)	L/min (GPM)	30 (7.93) / 60 (15.85)
Hysteresis - open loop	%	< 6
Hysteresis - closed position loop	%	< 0.5
Weight - PRM7-102 - PRM7-103	kg (lbs)	4.4 (9.70) 5.9 (13.01)
Mounting position		optional
Enclosure type EN 60529		IP65

Technical Data of Position Sensor - Voltage Outlet

Operating pressure	bar (PSI)	max. 320 (4600), 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 1 solenoid - stroke 3.8 mm (0.15 in) 2 solenoids - stroke ± 3.8 mm (0.15 in)	V	 2.5 0.125 - 2.5 0.125 - 4.875
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) Between 0 ... -25 °C (32 ... -13 °F) Load change from 0 to 2 mA		 typical < 0.2% / 10K max. 0.5% / 10K max. 0.5% / 10K 0.1%
Input voltage change from 9.6 V to 14.4 V from 14.4 V to 30 V	%	 < 0.1 < 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 320 (4600), static
Electrical connection		electrical connector G4W1F Hirschmann *
Contact assigment		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 3.8 mm (0.15 in) 2 solenoids - stroke ± 3.8 mm (0.15 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 imjpedance 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	≥ 800

* Only for S01 and S02 model.

Technical Data of Proportional Solenoid

Type of coil	V	12 DC	24 DC
Limiting current	A	1.9	1.1
Resistance at 20 °C	Ω	4.7	13.9

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

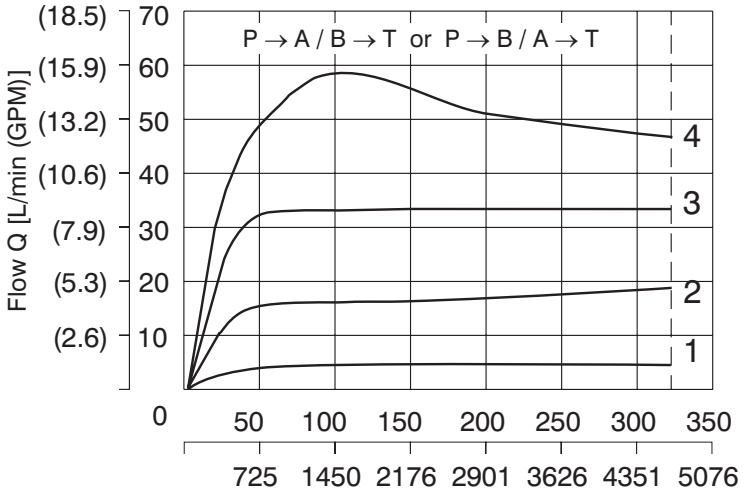
Order number	Content
566-9500	Connecting cable to PC - length 2m (6.56ft), CD-ROM with program PRM7Conf and user manual.
566-9501	Connecting cable to PC - length 5m (16.40ft), CD-ROM with program PRM7Conf and user manual.
566-9502	Connecting cable to PC - length size 2m (6.56ft).
566-9503	Connecting cable to PC - length size 5m (16.40ft).

Limit Power

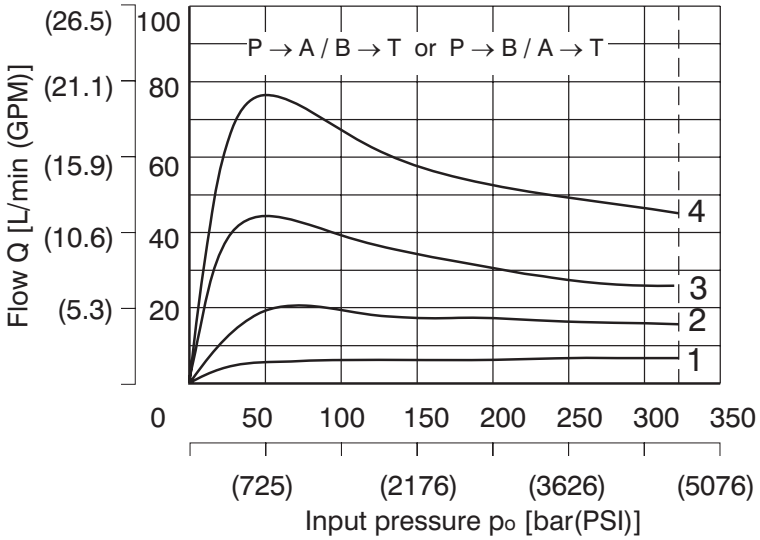
Measured at ν = 32 mm^2/s (156 SUS)

Only for E01 model

Nominal flow 30 L/min (7.93 GPM)



Nominal flow 60 L/min (15.85 GPM)

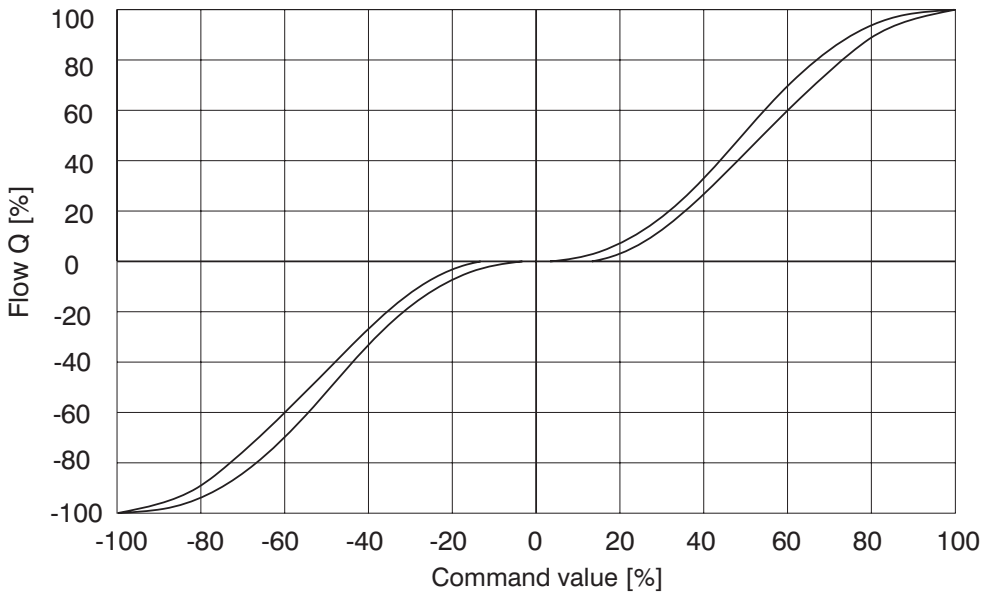


Solenoid current:
1 = 40 %
2 = 60 %
3 = 80 %
4 = 100 %

Flow Characteristics

Measured at input pressure Δp =10 bar (145 PSI), ν = 32 mm^2/s (156 SUS)

Only for E01 model



Flow Characteristics

Measured at ν = 32 mm^2/s (156 SUS)

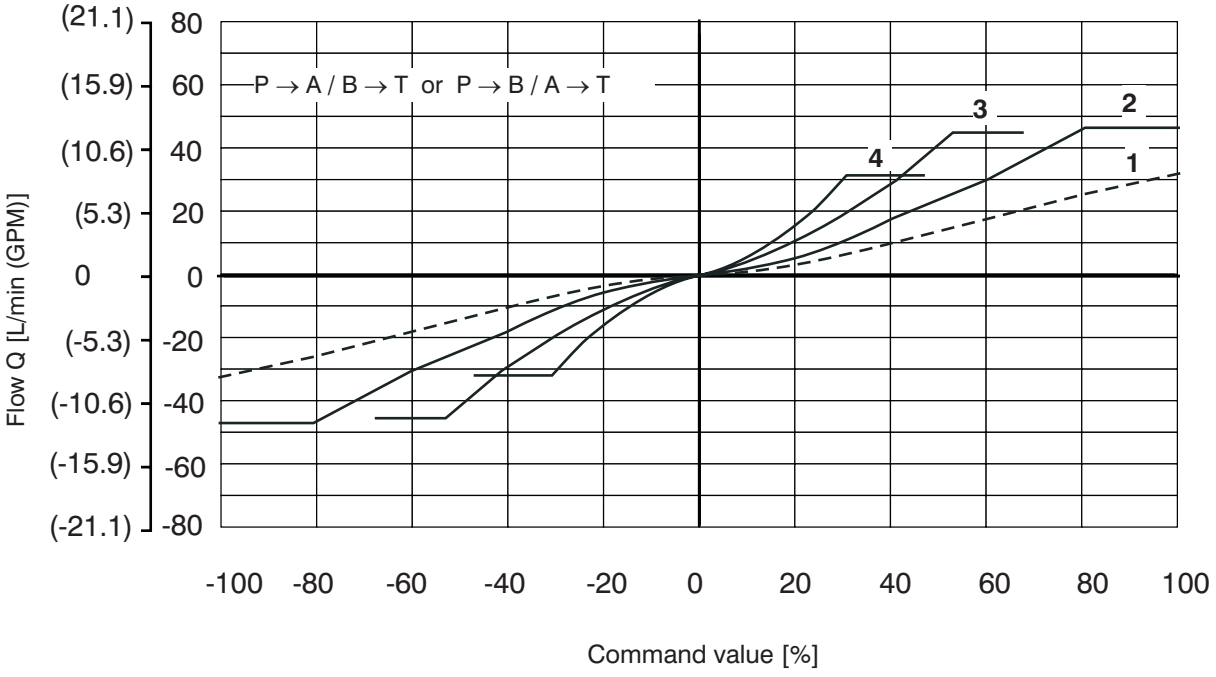
Only for E02S01 model

Q_n = 30 L/min (7.93 GPM) by Δp = 10 bar (145 PSI)

$\Delta \mathbf{p}$ = Valve pressure differential (inlet pressure p_V minus load pressure and return pressure p_T)

$\Delta \mathbf{p_n}$ = Valve pressure differential for nominal flow Q_n

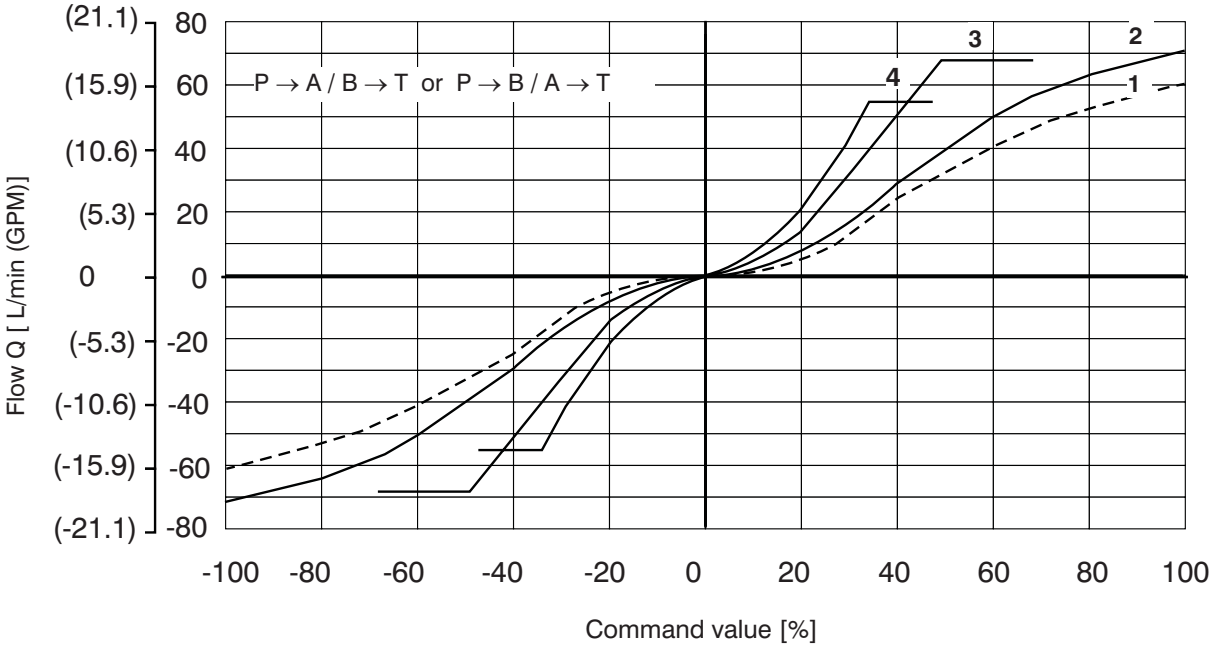
1	Δp_n = 10 bar (145 PSI)
2	Δp = 50 bar (725 PSI)
3	Δp = 160 bar (2321 PSI)
4	Δp = 320 bar (4641 PSI)



Only for E02S01 model

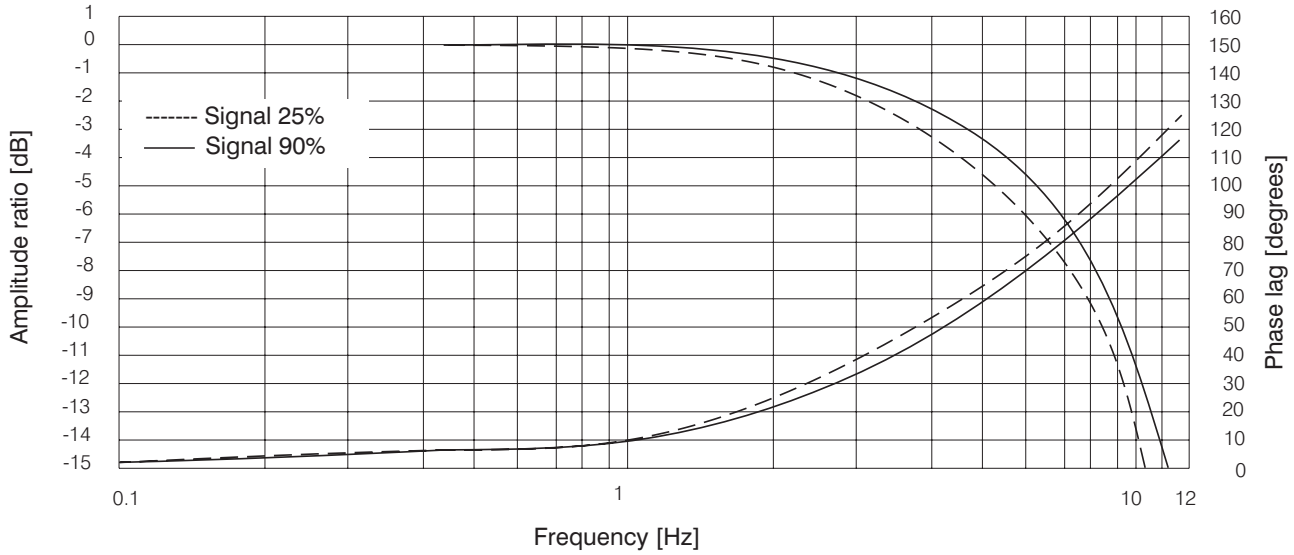
Q_n = 60 L/min (15.85 GPM) by Δp = 10 bar (145 PSI)

1	Δp_n = 10 bar (145 PSI)
2	Δp = 50 bar (725 PSI)
3	Δp = 160 bar (2321 PSI)
4	Δp = 320 bar (4641 PSI)



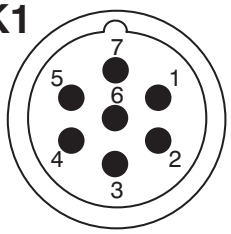
Frequency Reponse

closed position loop. for E02S01 model



Connector Connection

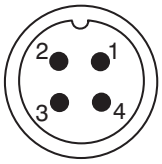
K1



Connector K1- type M 23 (male)		
PIN	**Technical data**	**Description**
1	* Power supply input	11.2 .... 28V DC
2	* Ground (power supply)	0V
3	Control signal	according to configuration
4	Ground (signal)	0V
5	Power reference signal	+10V DC/max.10mA
6	Control signal of position sensor spool	0 ....5V
7	* Protection earth lead (PE)	---

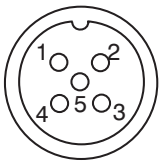
* Recommended min. lead cross section 0.75mm^2

K2



Connector K2 - type M12x1 (male)		
PIN	**Technical data**	**Description**
1	TxD	standard
2	RxD	RS 232
3	Ground (signal)	0V
4	Not used	

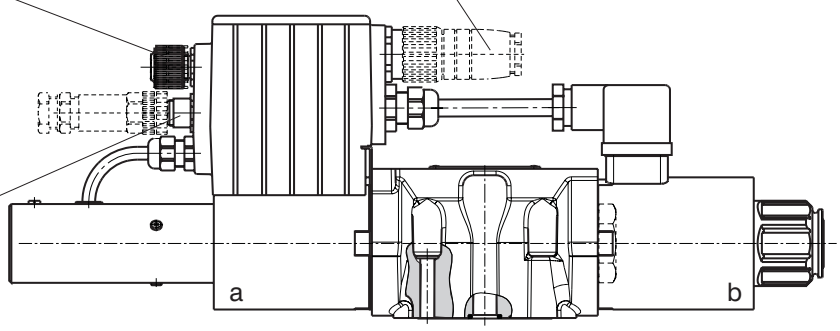
K3



Connector K3 - type M12x1 (female)		
PIN	**Technical data**	**Description**
1	Power supply output	11.2 .... 28V DC/max.100mA
2	Signal of external feedback	according to configuration
3	Ground	0V
4	Not used	
5	Not used	

K2 - Connection RS232 M12x1 (4 PIN)
For programing the electronics.

K1 - Main inplut connector M23 (7PIN)
Cable diameter 8 ...12mm.



K3 - Conektor M12x1 (5PIN)
External feedback signal (it presented only for E03 and E04S01configurations).

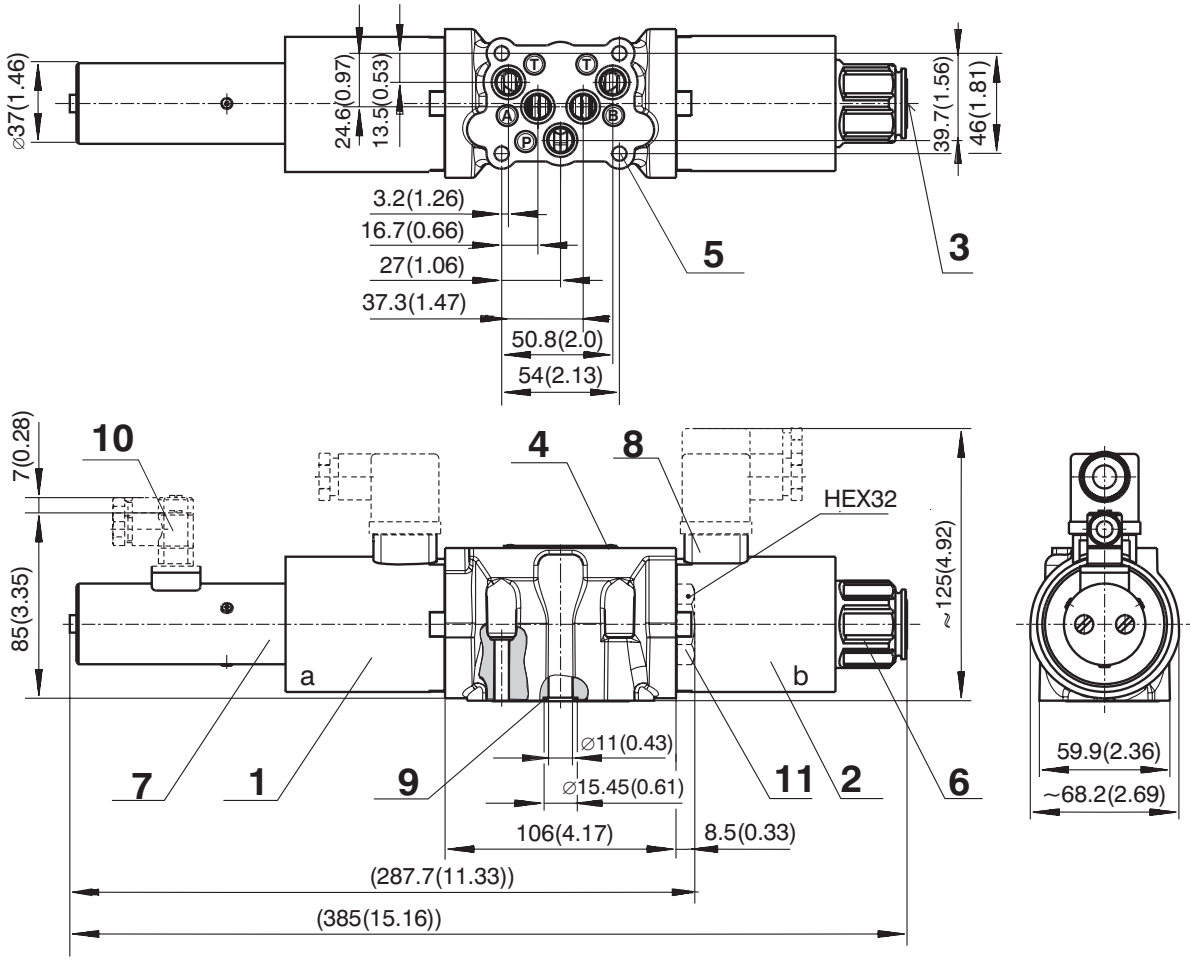
Factory Settings

Item	Model							
	E01		E02S01		E03		E04S01	
	1 Magnet	2 Magnet	1 Magnet	2 Magnet	1 Magnet	2 Magnet	1 Magnet	2 Magnet
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	

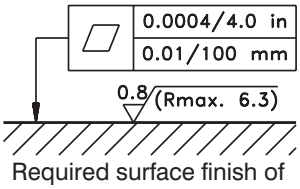
Valve Dimensions

Dimensions in millimeters and inches (in brackets)

102, 103 ... S01
102, 103 ... S02



1 Solenoid a
2 Solenoid b
3 Manual overid
4 Name plate
5 4 mounting holes
6 Solenoid fixing nut
7 Position sensor
8 Solenoid supply connector
9 Square ring 12.42 x 1.68 (5 pcs.), supplied in delivery packet
10 Position sensor connector
11 Plug screw for valve with one solenoid, HEX 32, configurations 2Z51, 2Z11



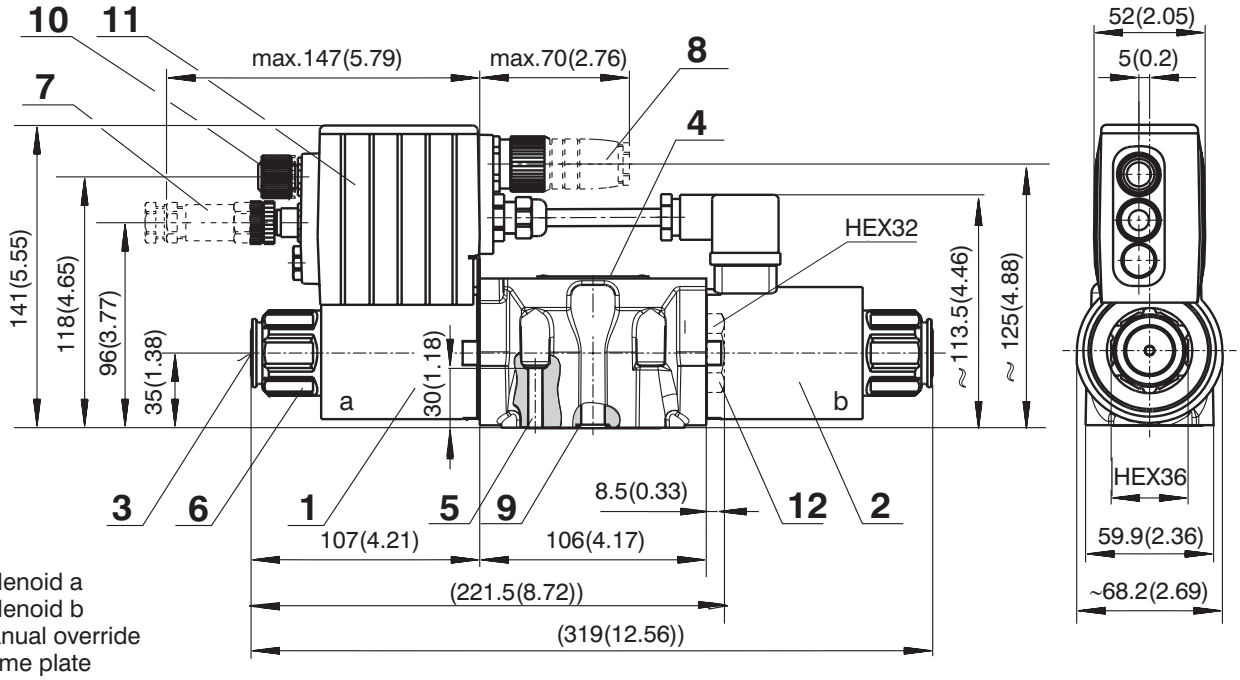
Required surface finish of interface

Valve Dimensions

Dimensions in millimeters and inches (in brackets)

102, 103 ... E01 - without connector plug for spool position feedback

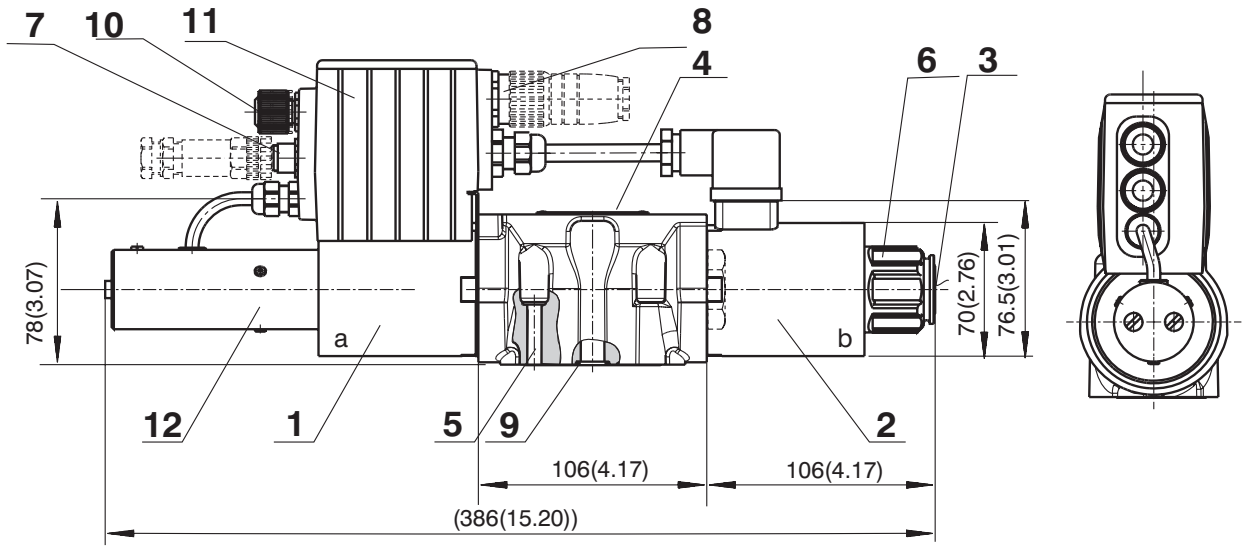
102, 103 ... E03



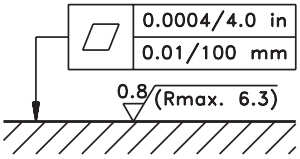
1 Solenoid a
2 Solenoid b
3 Manual override
4 Name plate
5 4 mounting holes
6 Solenoid fixing nut
7 Connector M12x1 for connection of external feedback
8 Main supply connector M23
9 Square ring 12.42 x 1.68 (5 pcs.), supplied in delivery packet
10 Cover of connector M12x1 for programming
11 Plastic box with integrated electronics
12 Plug screw for valve with one solenoid, HEX 32, configurations 2Z51, 2Z11

102, 103 ... E02S01 - without connector plug for spool position feedback

102, 103 ... E04S01

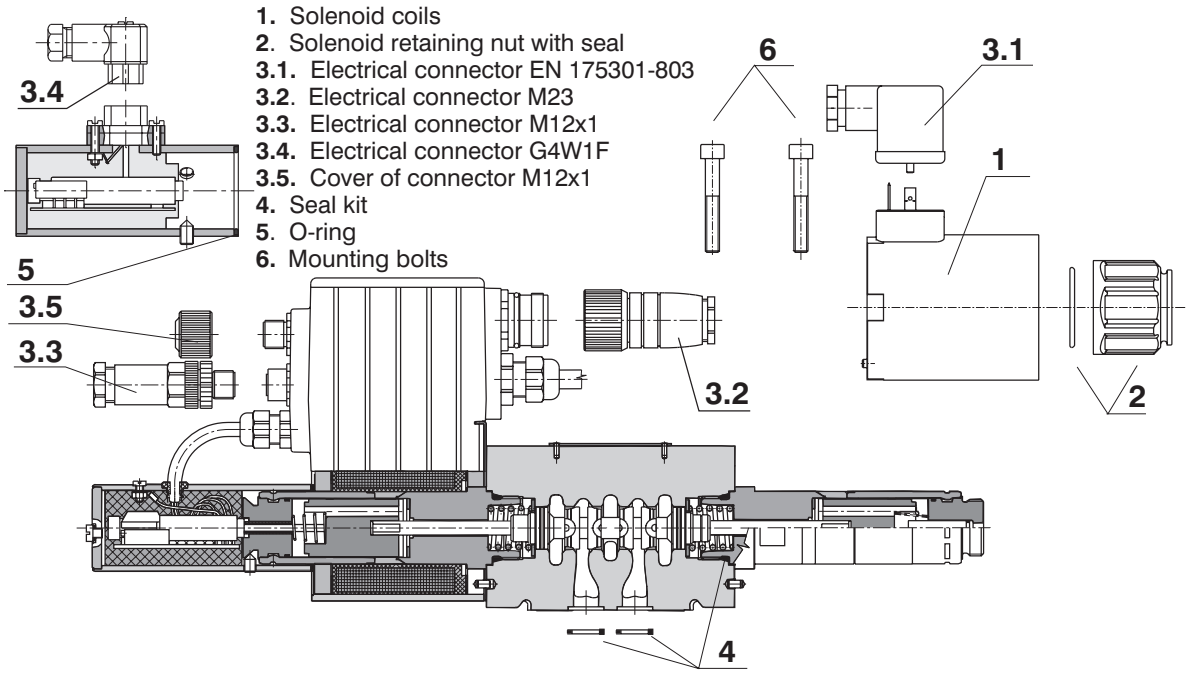


1 Solenoid a
2 Solenoid b
3 Manual overrideí
4 Name plate
5 4 mounting holes
6 Solenoid fixing nut
7 Connector M12x1 for connection of external feedback
8 Main supply connector M23
9 Square ring 12.42 x 1.68 (5 pcs.), supplied in delivery packet
10 Cover of connector M12x1 for programming
11 Plastic box with integrated electronics
12 Position sensor



Required surface finish of interface

Spare Parts



1. Solenoid coil

Solenoid type	Ordering number
01200	936-4614
02400	936-4629

2. Solenoid retaining nut with seal

Type of the nut	Seal ring	Ordering number
Standard nut	30 x 2	489-9900

3.1. Electrical connector EN 175301-803

Type designation	Type	Maximum input voltage	Connector A grey	Connector B black
			Ordering number	
K5	without rectifier - M16x1.5 (bushing bore ⌀ 4-6 mm)	230 V DC	936-9906	936-9905

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	358358932157

3.5. Cover of connector M12x1

Ordering number	566-7400

4. Seal kit

Type	Dimensions, number		Order number
	Square ring	O-ring	
Standard - NBR70	12.42 x 1.68 (5 pcs.)	23.81 x 2.62 (2 pcs.)	489-9902
Viton	12.42 x 1.68 (5 pcs.)	23.47 x 2.62 (2 pcs.)	489-9903

5. O-ring

Standard - NBR70	32 x 2 (1 pc.)	273111014140

6. Mounting bolts

Dimensions, number	Tightening torque	Ordering number
M6 x 40 DIN 912-10.9 (4 pcs.)	14 Nm (10.33 lbf.ft)	485-9964

Caution!

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External analoque electronics for controlling PRM2

EL3E-12
EL3E-24

HA 9145
12/2005

Replaces
HA 9145 3/2003

- Electronic control units developed to control proportional valves PRM2
- Nominal size 04, 06,10 of proportional valves
- Compact units mounted on a strip 35/7.5 to DIN 50 022
- Enclosure type - IP20

EL3E-24A EL3E-24AB

Functional Description

The external model of the analogue electronics EL3E-12 and EL3E-24 have been developed for controlling the proportional directional valves of the series PRM2 with one solenoid (EL3E-xxA) or two solenoids (EL3E-xxAB). The electronics performs the function of an amplifier and former of the input control signals with the defined transfer characteristic. The main advantages of the external electronics model are the possibility of its mounting, together with the other electronic components, on a strip 35,7x7, 5mm to DIN 50 022 and situating into a determined space, the reduction of the necessary mounting space thanks to the absence of the box with the integrated electronics and protection of the electronics against undesirable vibrations.
The easy accessibility of the electronics setting elements (trims) enables a more operative changing of the adjustable parameters of the controlled proportional directional valves.
The electric design of the external electronics is identical with the design of the integrated electronics situated directly on the solenoid coil. The arrangement of the setting elements and the electric connection is adapted for building into a standardized box to DIN 50 022.

Order Code

EL3E- ☐ ☐

External analoque electronics

Rated supply voltage

12V	**12**
24V	**24**

Type

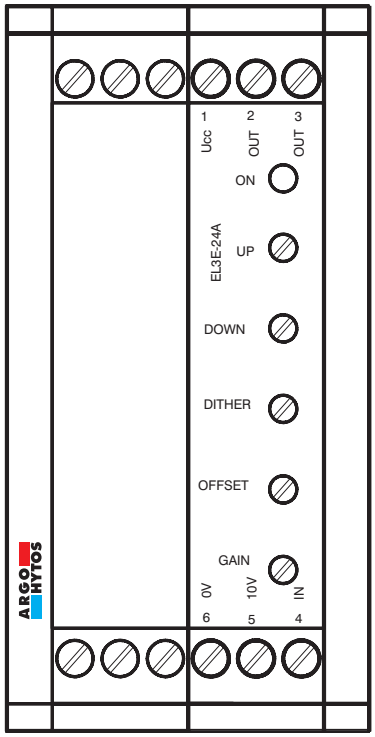
A	External electronics for proportional directional valves with one solenoid
AB	External electronics for proportional directional valves with two solenoid

Technical parameters

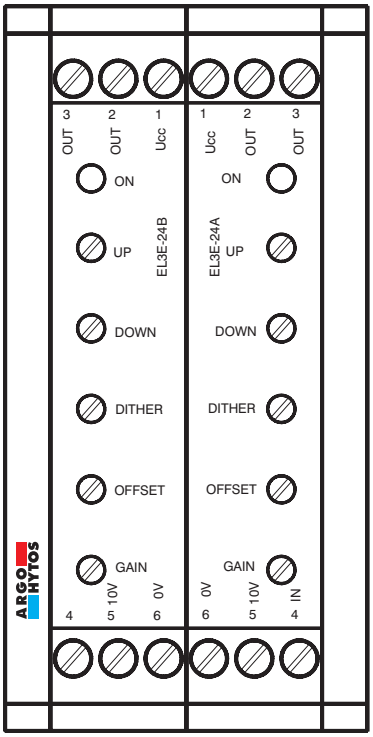
Technical parameters EL3E-12	Specification
Nominal supply voltage	12 V DC
Range of the supply voltage	11,2...14,7 V DC
Maximum output current	2,4 A for R<4 Ω
Input power	max. 25 W
Stabilized voltage for potentiometer control	5 V DC/100 mA
Control signal type	0...20 mA 4...20 mA +/-5 V 0...+5 V $U_{cc}/2 \pm 5$ V
Setting range of ramp functions	0,05...3 s
Dither frequency	60/90 Hz
Dither amplitude	0...30 %
Enclosure type	IP 20
Operating ambient temperature	-20 °C...+50 °C
External dimensions	40 x 79 x 85,5 mm
Attachment	On a strip 35,7x7,5 mm to DIN 50 022
Weight	125 g
Technical parameters EL3E- 24	**Specification**
Nominal supply voltage	24 V DC
Range of the supply voltage	20...30 V DC
Maximum output current	1,5 A for R<10 Ω
Input power	max. 25 W
Stabilized voltage for potentiometer control	10 V DC/100 mA
Control signal type	0...20 mA 4...20 mA +/-10 V 0...+10 V 0...+5 V $U_{cc}/2 \pm 10$ V
Setting range of ramp functions	0,05...3 s
Dither frequency	60/90 Hz
Dither amplitude	0...30 %
Enclosure type	IP 20
Operating ambient temperature	-20 °C...+50 °C
External dimensions	40 x 79 x 85,5 mm
Attachment	On a strip 35,7x7,5 mm to DIN 50 022
Weight	125 g

Design models

Front panel
of the one-solenoid version

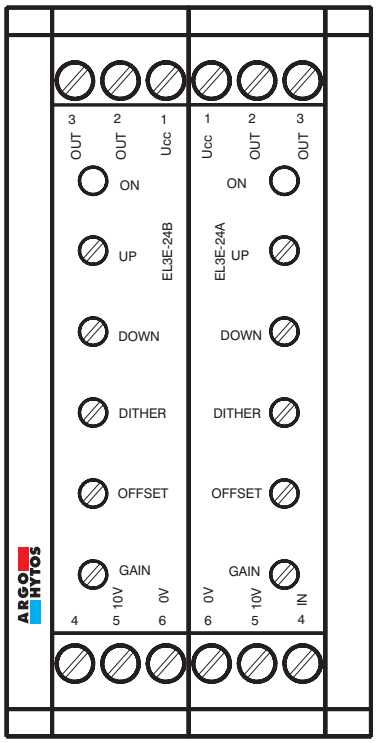


Front panel
of the two-solenoid version



The external electronics EL3E is built into a standard plastic box of dimensions 85,5x79x40mm enabling the grouping on a strip 35,7x7,5 mm and providing the IP 20 electric enclosure. Situated on the front panel are the trims for setting the individual parameters of the electronics and a control LED signaling the presence of the power supply as well as the connection of the electronics output to the solenoid coil of the directional valve controlled.
Two models of the electronics with one or two solenoids are available. The models differ in the inner electric circuitry and in arrangement of the setting elements situated on the front panel as well as in wiring the terminal strips.

Electronics for controlling the directional valves with two solenoids



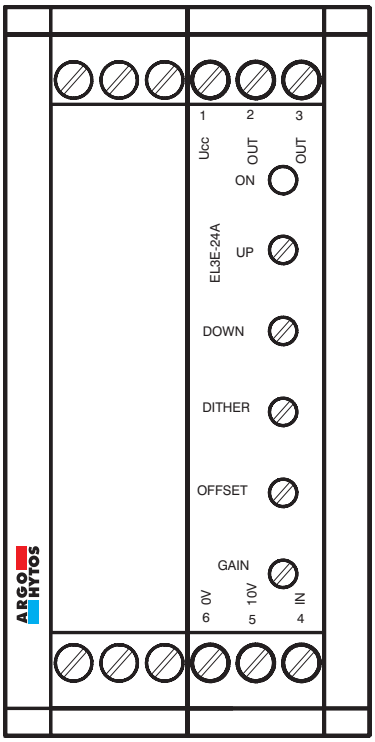
Wiring of connection clamps

Clamp	Description	
	Card MASTER EL3E-XXA	**Card SLAVE EL3E-XXB**
1	$+U_{CC}$ 24 V (12 V)*	$+U_{CC}$ 24 V (12 V)*
2	Output to the solenoid coil	Output to the solenoid coil
3		
4	Control signal input	-
5	Output of the stabilized voltage +10V/100mA (+5V/100mA)*	Output of the stabilized voltage +10V/100mA (+5V/100mA)*
6	0 V	0 V

*Values in parenthesis are valid for the supply voltage 12 V

The electronics for directional valves with two solenoids consists of two identical electronic cards mutually interconnected. The card designated at its specification end with character A (EL3E-xxA) works as the so-called MASTER; the other card designated with character B (EL3E-xxB) works as the so-called SLAVE. The distinction of the cards is necessary because of the different setting of the changeover switches on both cards serving the configuration of the selected operational parameters, such as the type of the control signal and the dither frequency.

Electronic for controlling the proportional valves with one solenoid



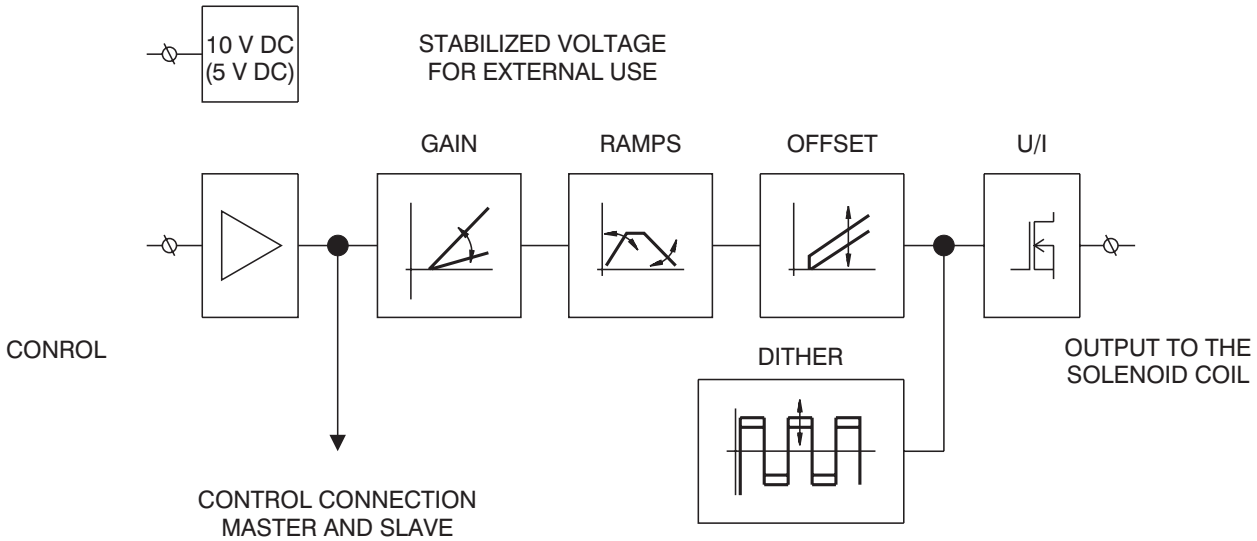
Wiring of connection clamps

Clamp	Description Card MASTER EL3E-XXA
1	$+U_{cc}$ 24 V (12 V)*
2	Output to the solenoid coil
3	
4	Control signal input
5	Output of the stabilized voltage +10V/100mA (+5V/100mA)*
6	0 V

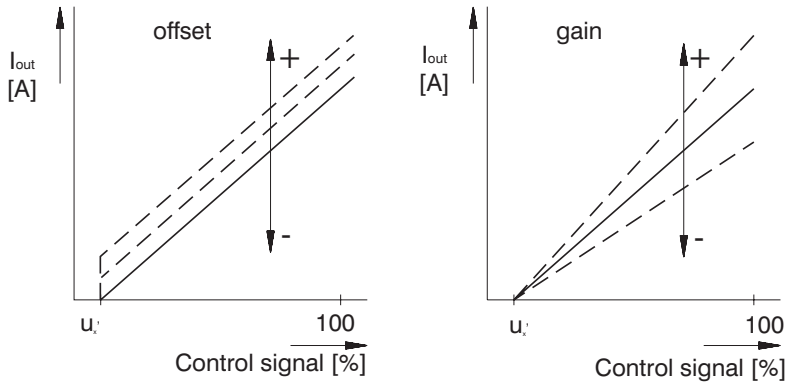
*Values in parenthesis are valid for the supply voltage 12 V

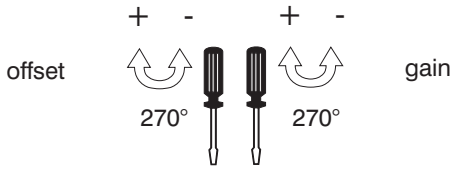
The electronics for controlling the proportional directional valves with one solenoid is built into a box with dimensions corresponding with the previous configuration, but only a part of the electronic is fitted with components. The electric wiring of the clamps is identical with the arrangement of the MASTER card in the previous two-magnet configuration.

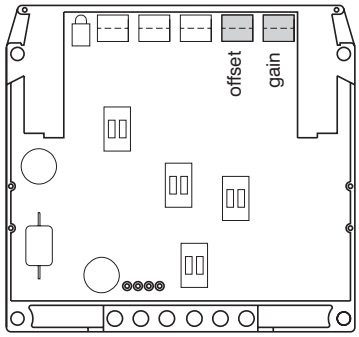
Block Diagram



Adjustment of Offset, Gain Parameters

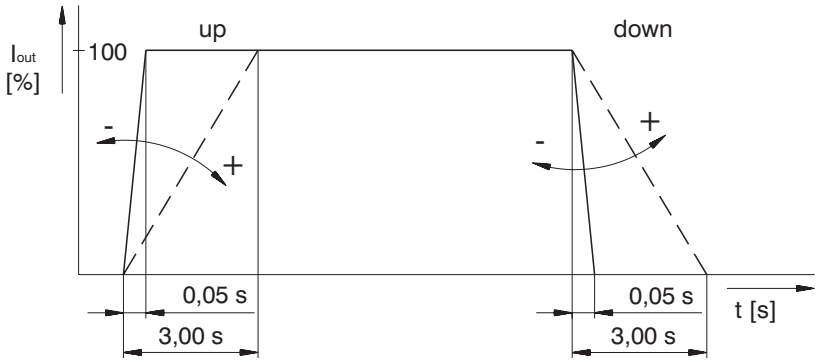


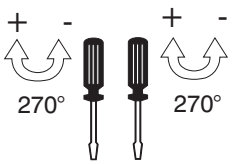


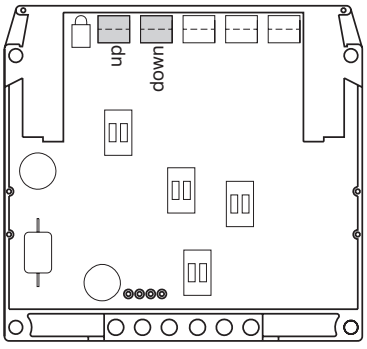


Nominal supply voltage of electronics [V]	Area insensible to control signal u_x' [%]
12	1 ... 3
24	0.5 ... 2

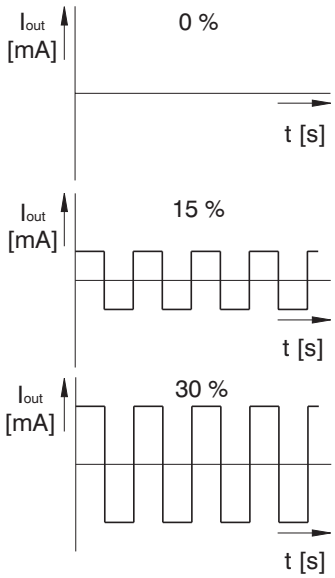
Ramp Adjustment (up,down)

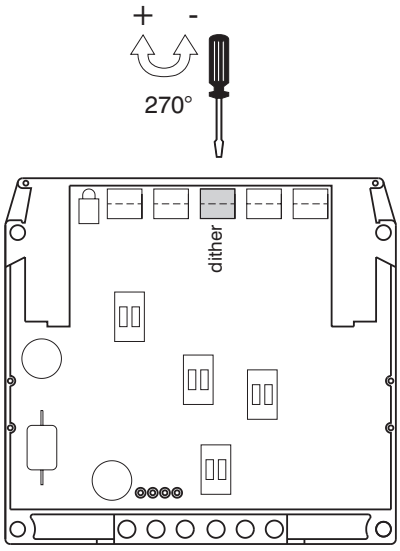


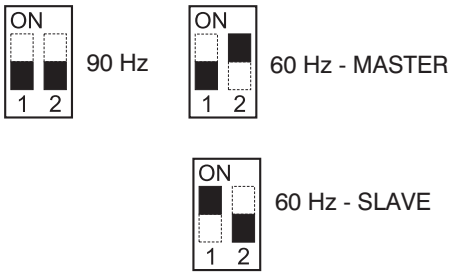




Dither Adjustment







Frequency - dither switch

Limit coil exciting current of proportional directional valves ARGO-HYTOS

Valve nominal size	Nominal supply voltage			
	12 V		24 V	
	Coil type	I_{lim} [A]*	Coil type	I_{lim} [A]*
NG04	936-0033	1,7	936-0034	0,8
NG06	936-0107	1,6	936-0067	1,0
NG10	936-4614	1,9	936-4629	1,1

*for load factor 100 %. Values must not exceed 5 %.

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	$U_{cc}/2$ ± 10 V (± 5 V)*	± 10 V (± 5 V)*
MASTER M	SW1	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2
	SW2	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2
	SW3	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2
	SW4	90 Hz ON 1 2			60 Hz ON 1 2		
SLAVE S	SW1					ON 1 2	ON 1 2
	SW2					ON 1 2	ON 1 2
	SW3					ON 1 2	ON 1 2
	SW4	90 Hz ON 1 2			60 Hz ON 1 2		

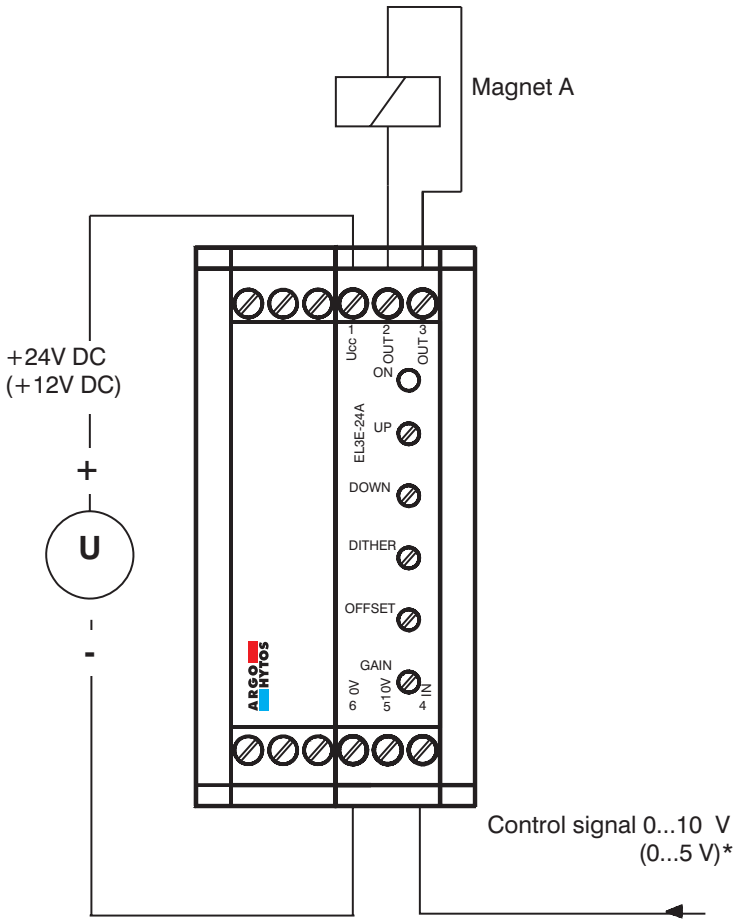
Designation of the basic manufacture setting.

*Values in parenthesis are valid for the supply voltage 12 V

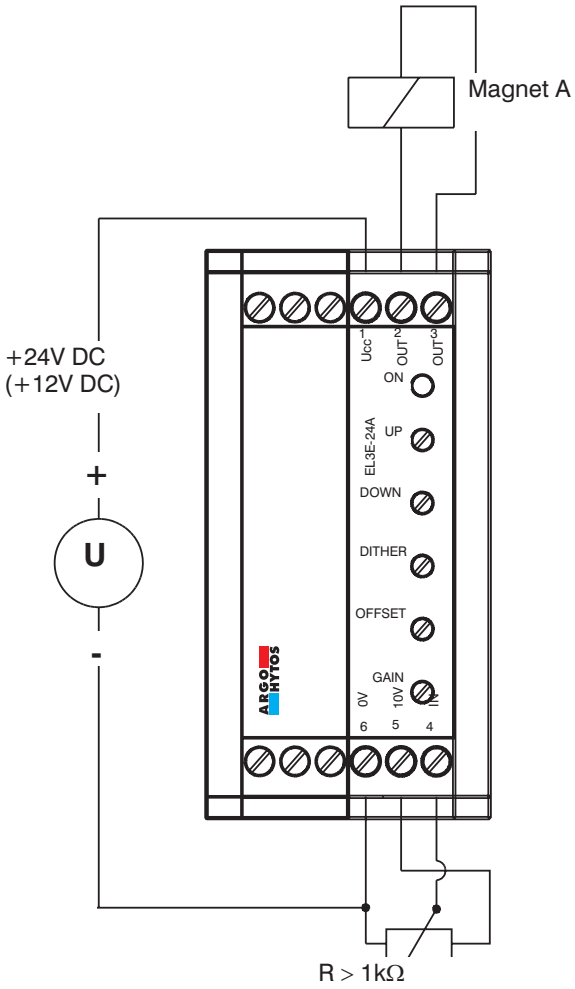
Configuration of changeover switches on the electronics card according to the proportional valve model and the control signal type used

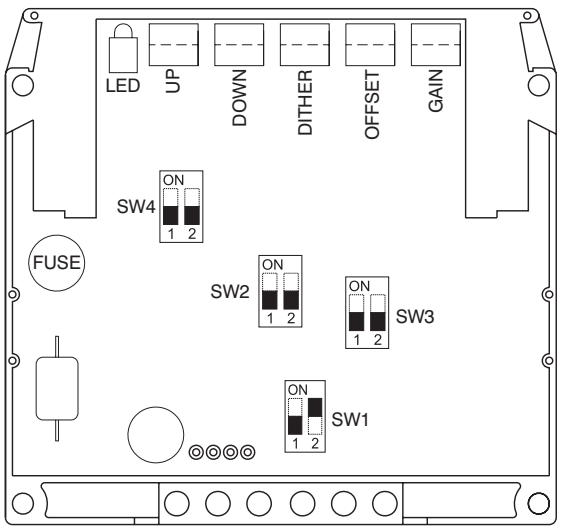
The null potential of the control signal must be the same as the null potential of the supply voltage

Proportional directional valve with one solenoid, control signal 0...10V (0…5V)* or controlling by an external potentiometer R > 1kΩ



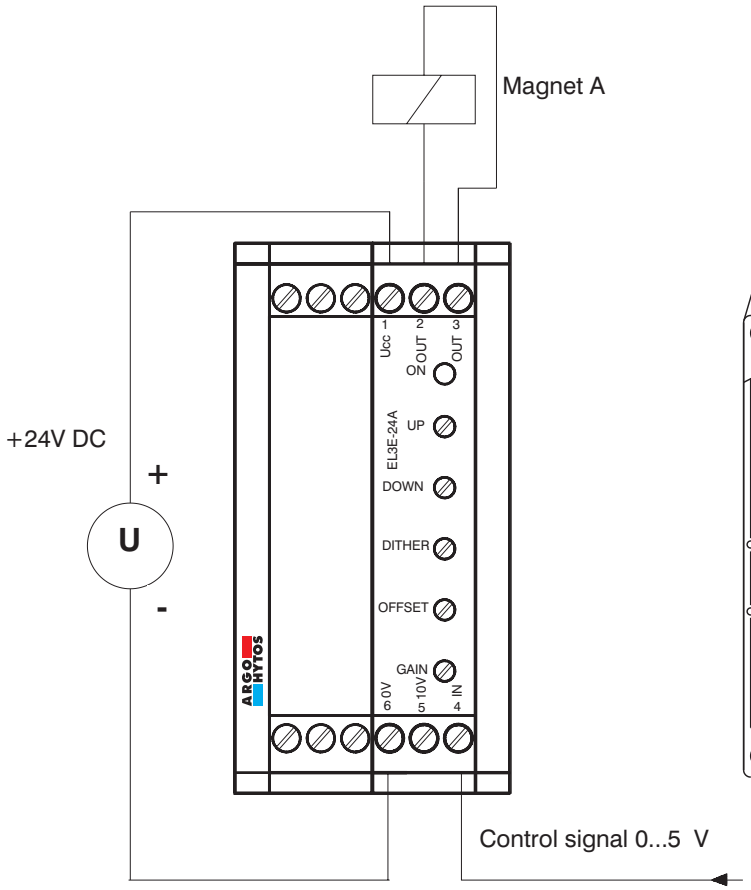
MASTER card for solenoid A





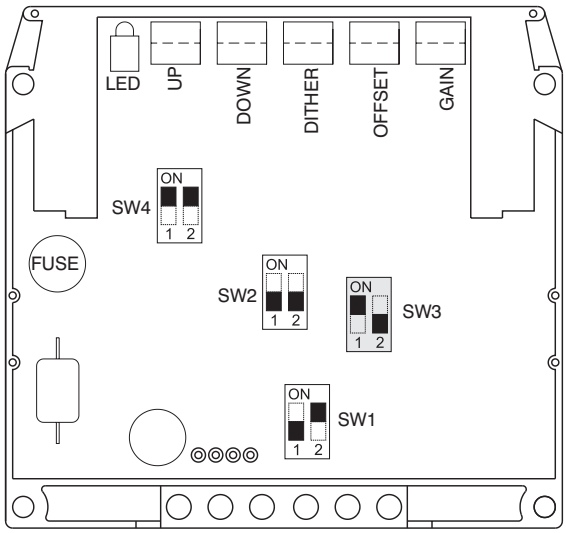
SW1 - Control signal choice
SW2 - Control signal choice
SW3 - Control signal choice
SW4 - Dither frequency

Proportional directional valve with one solenoid, control signal 0..5V (external)

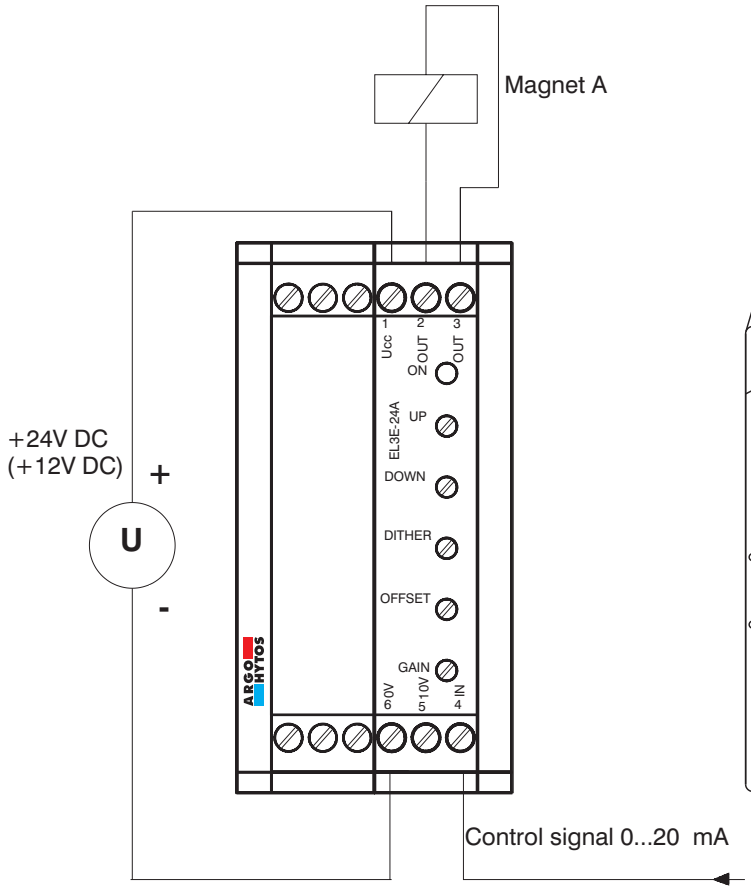


MASTER card for solenoid A

SW1 - Control signal choice
SW2 - Control signal choice
SW3 - Control signal choice
SW4 - Dither frequency

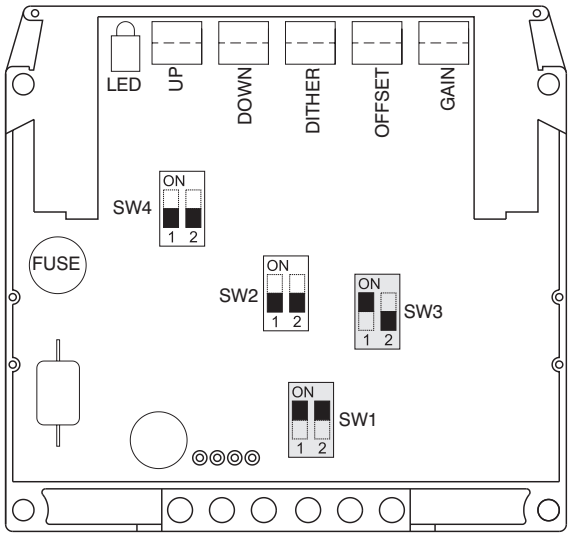


Proportional directional valve with one solenoid, control signal 0…20mA

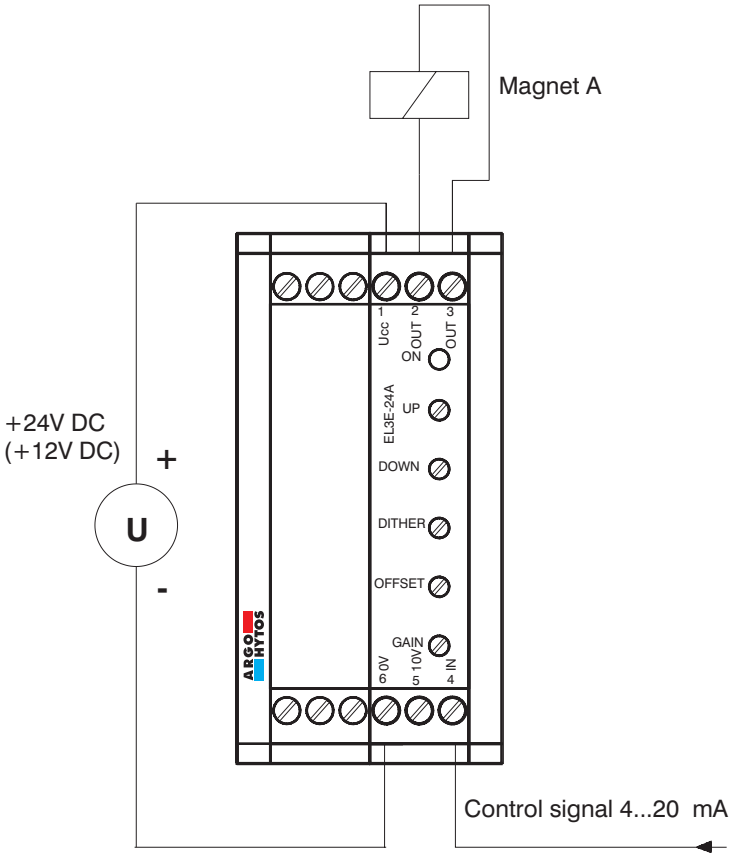


MASTER card for solenoid A

SW1 - Control signal choice
SW2 - Control signal choice
SW3 - Control signal choice
SW4 - Dither frequency

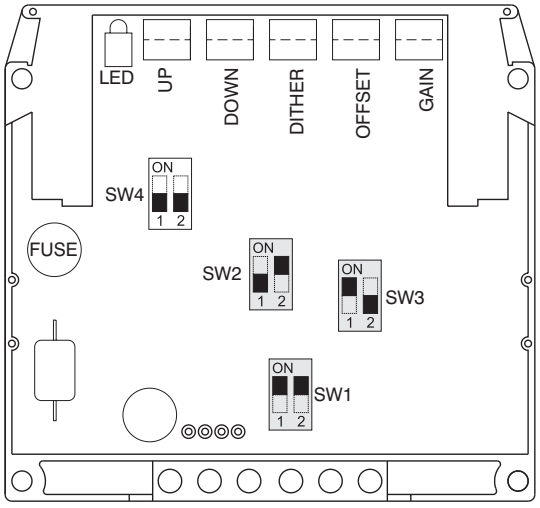


Proportional directional valve with one solenoid, control signal 4…20mA

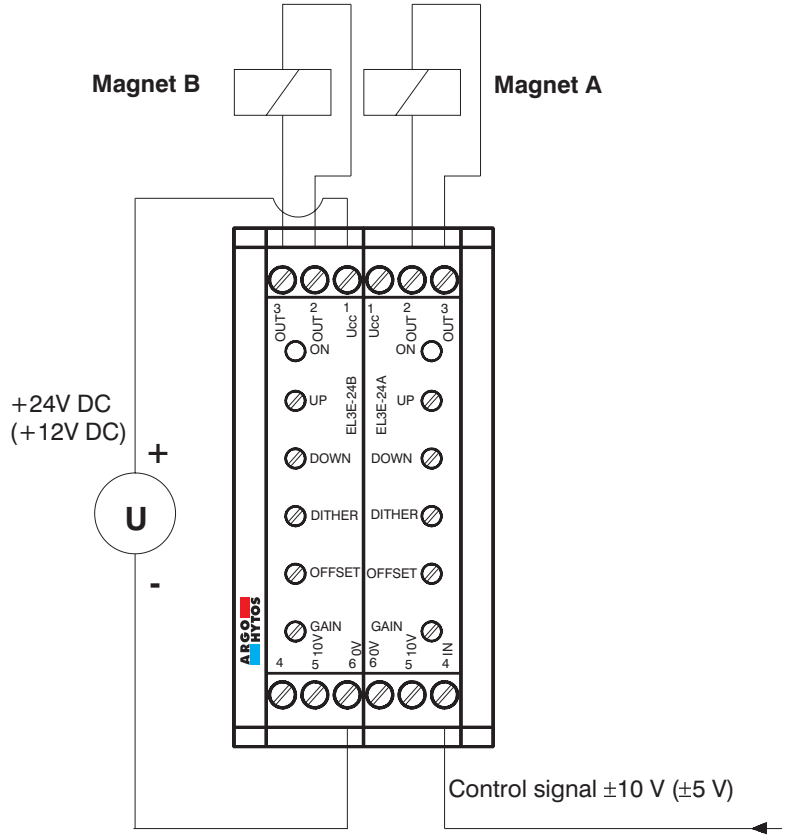


MASTER card for solenoid A

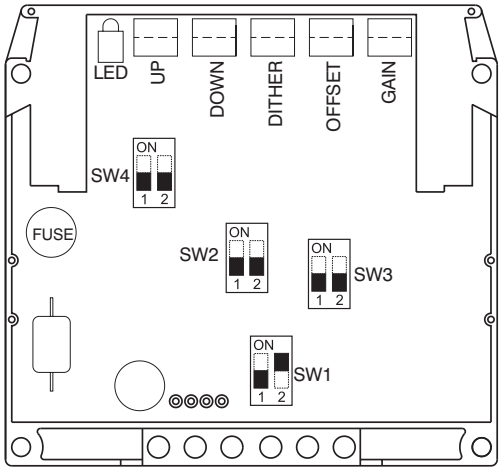
SW1 - Control signal choice
SW2 - Control signal choice
SW3 - Control signal choice
SW4 - Dither frequency



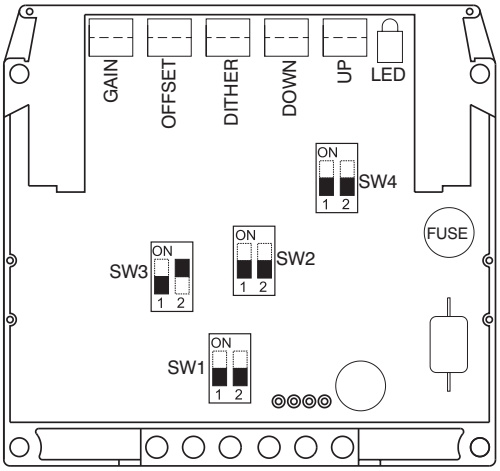
Proportional directional valve with two solenoids, control signal ±10V (±5V)*



MASTER card for solenoid A

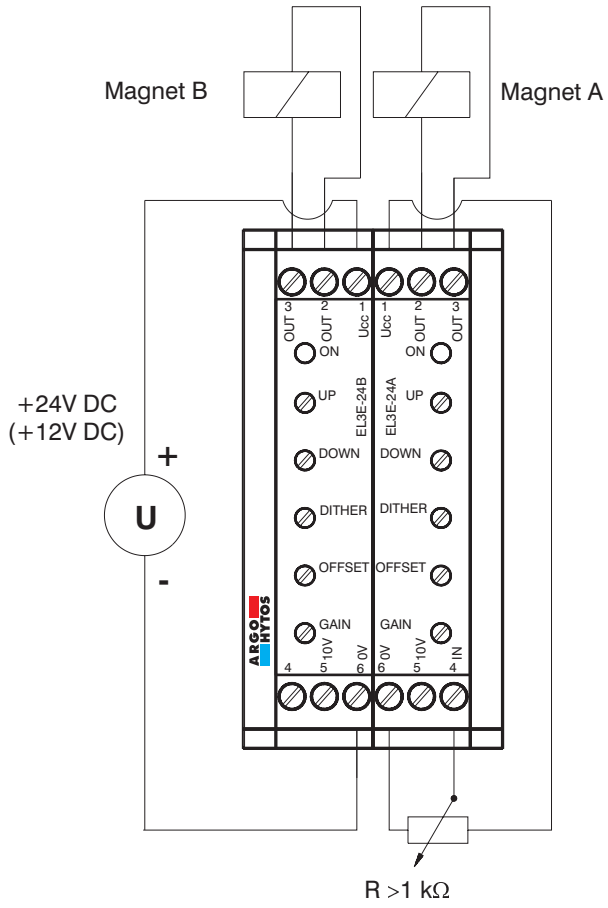


SLAVE card for solenoid B



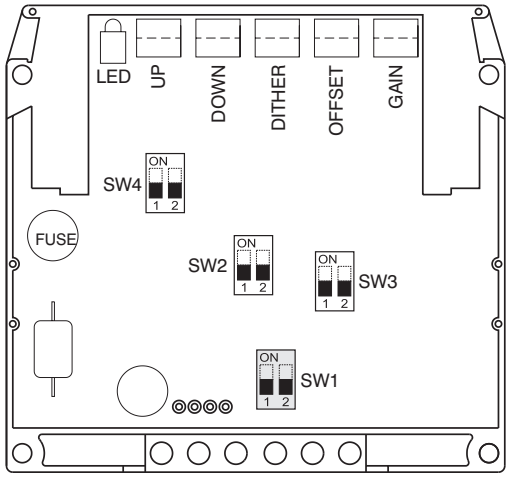
SW1 - Control signal choice
SW2 - Control signal choice
SW3 - Control signal choice
SW4 - Dither frequency

Proportional directional valve with two solenoids, control signal $U_{cc}/2 \pm 10V$ ($U_{cc}/2 \pm 5V$)* with an external potentiometer R > 1kΩ

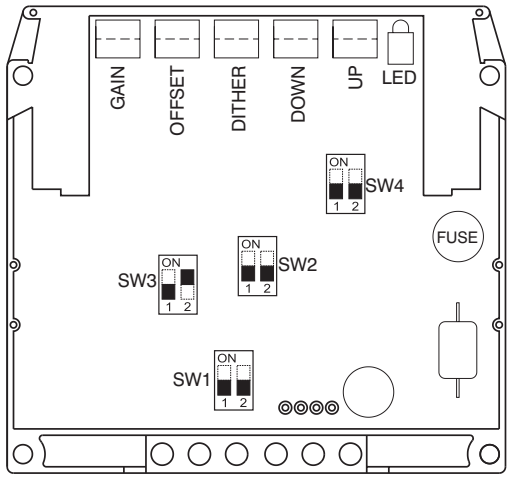


SW1 - Control signal choice
SW2 - Control signal choice
SW3 - Control signal choice
SW4 - Dither frequency

MASTER card for solenoid A



SLAVE card for solenoid B



*Values in parenthesis are valid for the supply voltage 12 V

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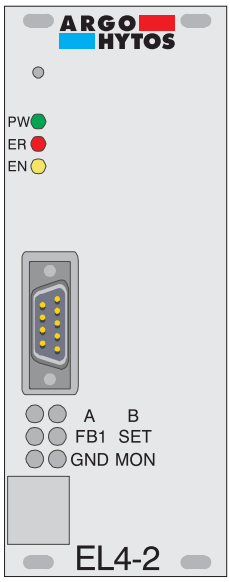
www.argo-hytos.com

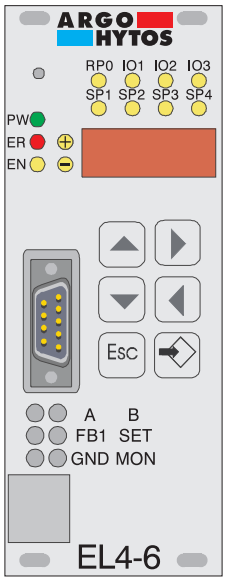
Digital amplifier and controller for proportional and servo valves

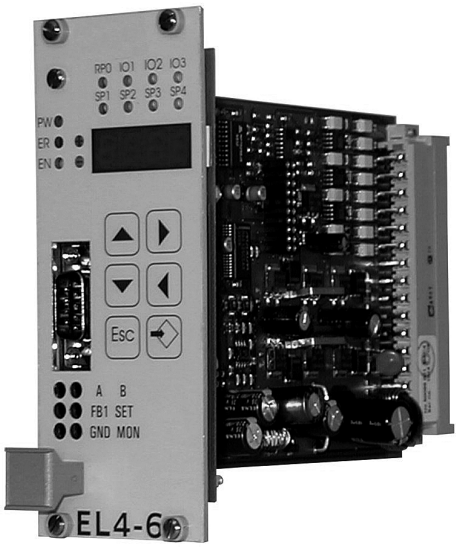
EL4

HA 9140
4/2004

Replaces
HA 9140 4/2000







General Applications

The amplifier card EL4 is used for:

- With or without electrical feedback transducers:
  - proportional directional valves direct and pilot operated
  - proportional flow control valves
  - proportional pressure reducing valves
  - proportional pressure regulating valves
  - cartridge valves
  - servo valves with torque motors

- Controlling of hydraulic motors, installations and systems, e.g.:
  - position
  - speed
  - pressure
  - revolutions per minute
  - torque
  - power etc.

- Volume flow control and pressure control of pumps (if the occasion arrives: limitation in weight, controlling valve spool position)

- Controlling of different process values:
  - P/Q controlling
  - pump controlling
  - controlling of pressures
  - controlling of pilot- and main stage
  - cascade controlling of components etc.

Features

- Fully digitized amplifier and controller with the advantage of:
  - no on-board potentiometer
  - no jumpers settings required
  - digital setting and display of all parameters
  - user safety when programming
  - no potentiometer adjustment for measurement of solenoid current

- Flexible and reliable system:
  - use of a modern 16 Bit µC
  - high power reserve
  - hardware and software extensions available following client's needs (e.g. bus interface, special output stages like H-bridges for servo valves or direct current motors, optional RAM on request)
  - easy software update by use of a Flash-EPROM; adaptations and extensions can be made without change to EPROM (download from PC via RS232)
  - high reliability and safety through the use of a hardware watch-dog and reset module
  - variable settings for magnetic systems and sensor signals making high flexibility possible

- Functional use of the interface (partly still in development):
  - change of selected parameters "on-the-fly" without interference or interrupting the controller
  - analyzation of system performance through selection of display parameters with the PC
  - a monitoring program allows direct access to amplifier with the use of external system controllers (e.g. programmable logic controllers / PLC)
  - in development: accessing different amplifiers from a PC or a controller by addressing them (using option RS485) and sending data from amplifier to amplifier (copy parameter settings)

Ordering Code

EL4- □ **-** □ **-** □ **-S000**

Amplifier card

Board Version

no display	**2**
with display	**6**

Operation mode

one valve, open loop (2 solenoids)	**01**
two valves, open loop (1 solenoid each)	**02**
one valve (spool position feedback), (2 solenoids)	**03**
one process control loop system (2 solenoids)	**04**
reserved	**05**
one valve with one spool and one process control loop system (2 solenoids)	**06**
two valves with spool position feedback each (1 solenoid each)	**07**
two valves with 1 process control loop each (2 solenoids)	**08**
reserved	**09**
single process controller without valve	**10**
cascade controller without valve	**11**

Solenoid type

004	size 04
006	size 06
010	size 10

Specific options

Technical Data

Parameters	**Range, characteristics**
Supply voltage	DC (12) 18 ... 30 V, residual ripple < 10 %, (12 V on request)
Solenoid systems selection	0.8 A / 1.1A / 1.3 A / 1.6 A / 2.4 A / 2.7 A / 3.5 A (others on request)
Power input	Max. 50 VA
Applicable fuse (quick)	3.15 A
Auxiliary voltage	± 10 V, max. load 10 mA.
Control voltage for external recallable set point	24 V ± 10 %, residual ripple ≤ 10 % current input ≤ 20 mA each
Ambient temperature	32 °F ... 122 °F (0 °C ... 50 °C) (other range on request)
Storage temperature	-4 °F ... 140 °F (- 20 °C ... 60 °C)
Plug connection	DIN 41 612, 48 pol. form F gold plated
EMC	
Protection	Burst on wires as per EN 61000-4-4 HF-Field as per EN 61000-4-3 ESD as per EN 61000-4-2
Emissions	Emissions depending on power as per EN 50011 Radiated emissions as per EN 55011
Dimensions	
Front panel/ PCB	1.988 x 5.055 in. (50.5 x 128.4 mm); 10 TE / 3 HE / 3.937 x 6.299 in. (100 x 160 mm) Euro format

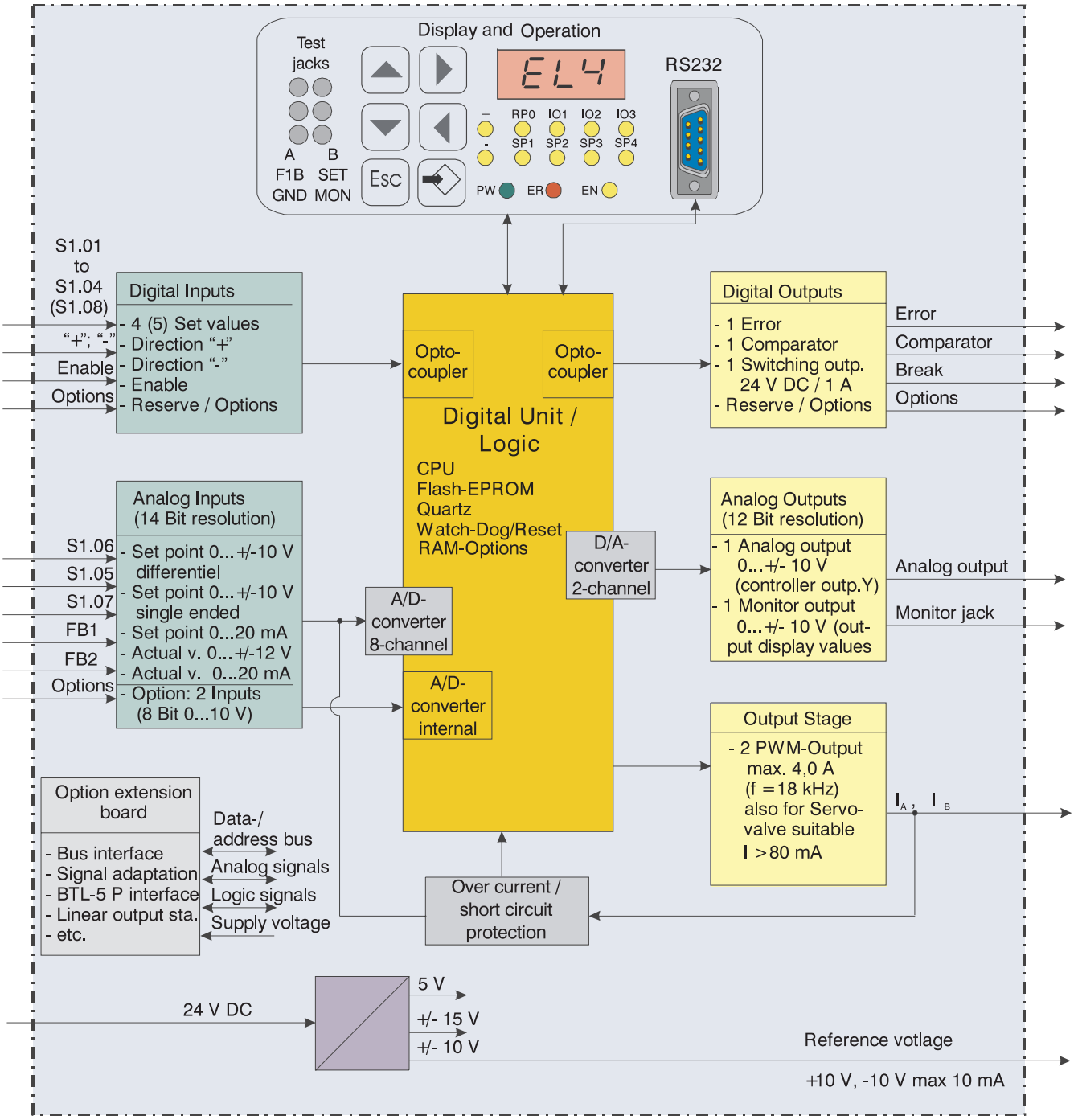
Technical Data

Parameters	Range, characteristics
Input signals	
Analogue set values	1 input, differential 14 Bit resolution, 0 ... ± 10 V 1 input, single ended 14 Bit resolution, 0 ... ± 10 V 1 input, single ended 14 Bit resolution, 0 or 4 ... 20 mA (R = 250 Ohm)
Analogue feedback (sensor input)	1 input, 14 Bit resolution, 0 ... ± 12 V, 0 ... 20 mA / 4 ... 20 mA, Offset: 3 ... 10 V, Gain: ca. 0 ...14 (R=100 Ohm) 1 input, 14 Bit resolution, 0 ... ± 10 V
Digital inputs	8 inputs, voltage level 0 V / 24 V, 10 mA (Set point 1 ... 4, ENABLE, RAMP, SIGN +, SIGN -)
Output signals	
Solenoid current	2 output stages for up to 3.5 A; with over-energization and quick de-energization
Analog output	1 output, 12 Bit resolution, 0 ... ± 10 V; for controlling of subsequent electronic
Monitor output	1 output, 12 Bit resolution, 0 ... ± 10 V; for monitoring of internal values
Digital outputs	2 outputs, voltage level 0 V / 24 V, 10 mA (Error, Comparator)
Test jacks	Solenoid current, sensor 1, set value, Monitor and GND
Auxiliary voltage	± 10 V, max. load 10 mA
Optional I/O signals	3 in or outputs, output level 24 V, input level 5 V or 24 V (5 V level for incremental sensors on request)
Interface	RS232 or RS485 with 9-pol Sub-D connector at front panel; RS485 also at back connector available (RS485 functions in preparation)
Display and operation	
Only at EL4-6	4 digit display, 6 buttons (up, down, left, right, enter and Esc) Status-LED's: PW (Power), ER (Error), EN (Enable), SP1 ... SP4 (S1.01 ... S1.04), RP0 (Ramp = 0), IO1 ... IO3
Only at EL4-2	Status-LED's: PW (Power), ER (Error), EN (Enable)
Frequencies and cycle times	
PWM Frequency	18 kHz
Cycle times	Current controller ca. 0.22 msec, inner closed loop controller ca. 0.22 msec (for valve feedback), external closed loop controller 2 ca. 0.44 msec

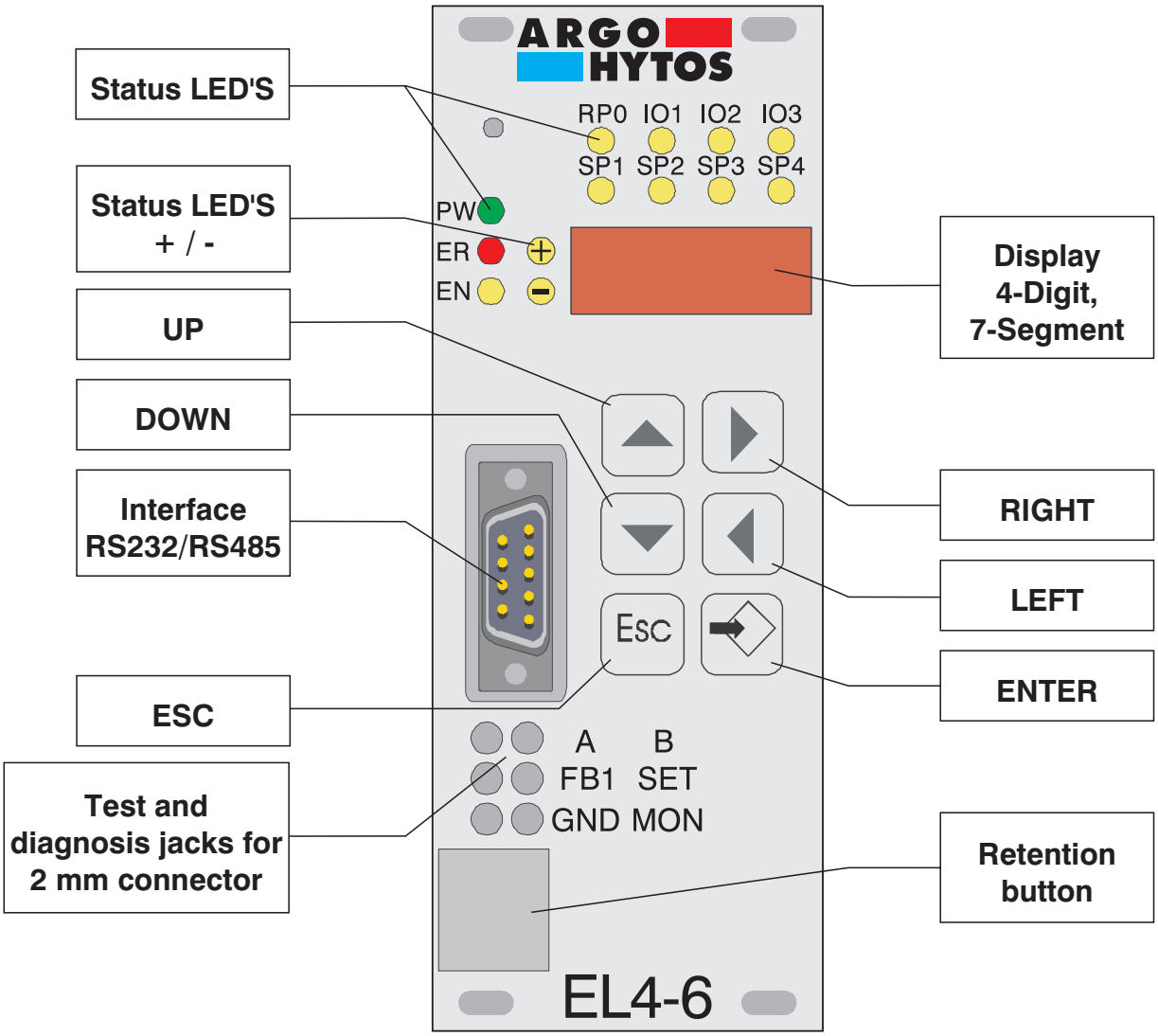
Accessories

Ordering number	Content
625-0463	Connecting cable to PC and EL4 (2,5 m)
625-0464	Connecting cable to PC and EL4 (5 m)
625-0462	CD - ROM with software and manual (hd, ha version), connecting cable (5 m)

Hardware-Block Diagram

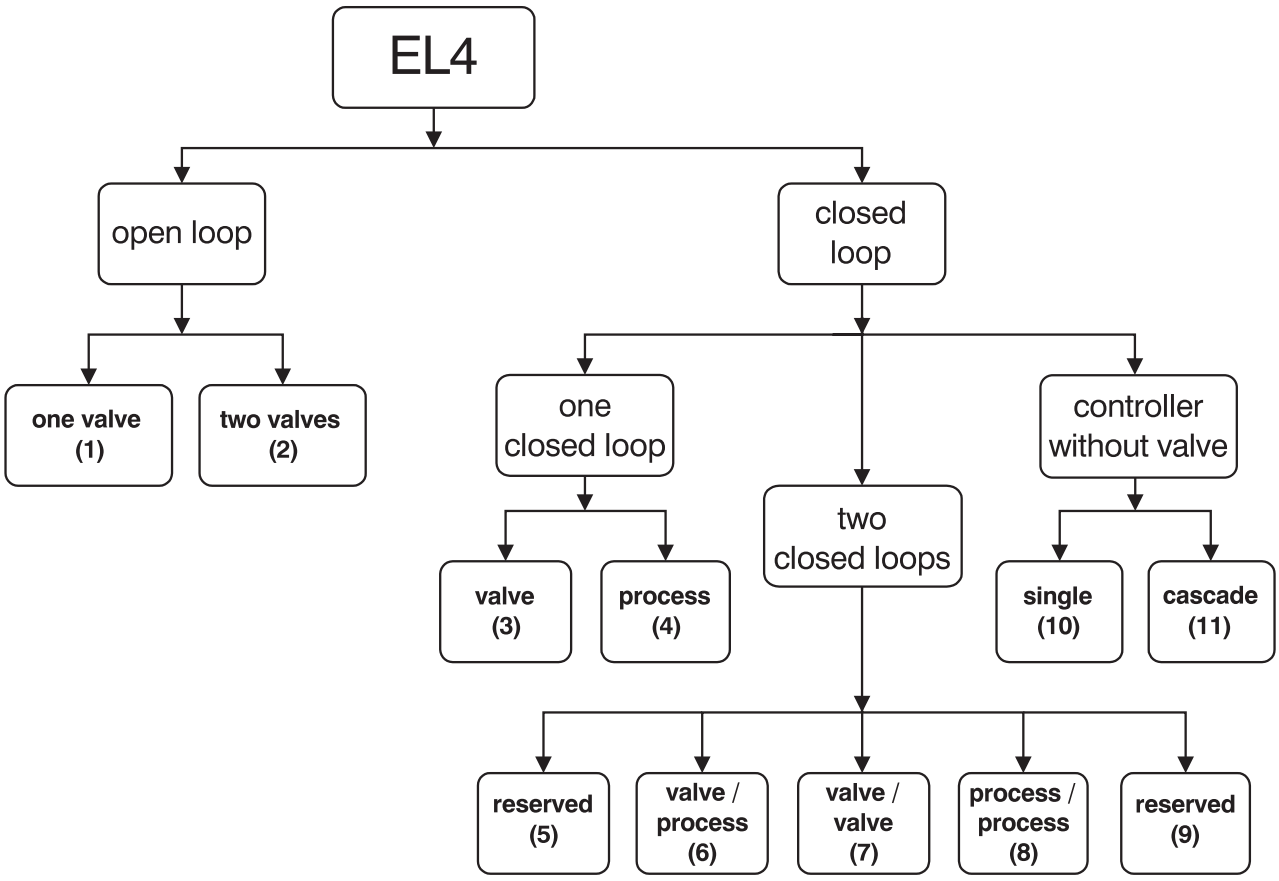


Display and Keypad



Element	Function
Status LED's	display of status and signals at the digital inputs and outputs
Status LED's + / -	display of set point direction through polarity signs for parameters and measured values
Display	4-digit display of parameters and measured values
Buttons UP, DOWN, LEFT, RIGHT, ESC and ENTER	all operating, programming and saving may be performed with the buttons UP, DOWN, LEFT, RIGHT, ESC and ENTER
Serial interface	RS232/RS485 (optional), trough which programming and accessing parameters via PC or communications to machine, or from amplifier to amplifier
Measuring and test jacks	direct measurement of set point, actual value, solenoid currents and internal values via the monitor output. Use 2 mm sockets (S1.06, FB1, A, B, d1.01 ... d2.13)

Diagram of Operation Modes

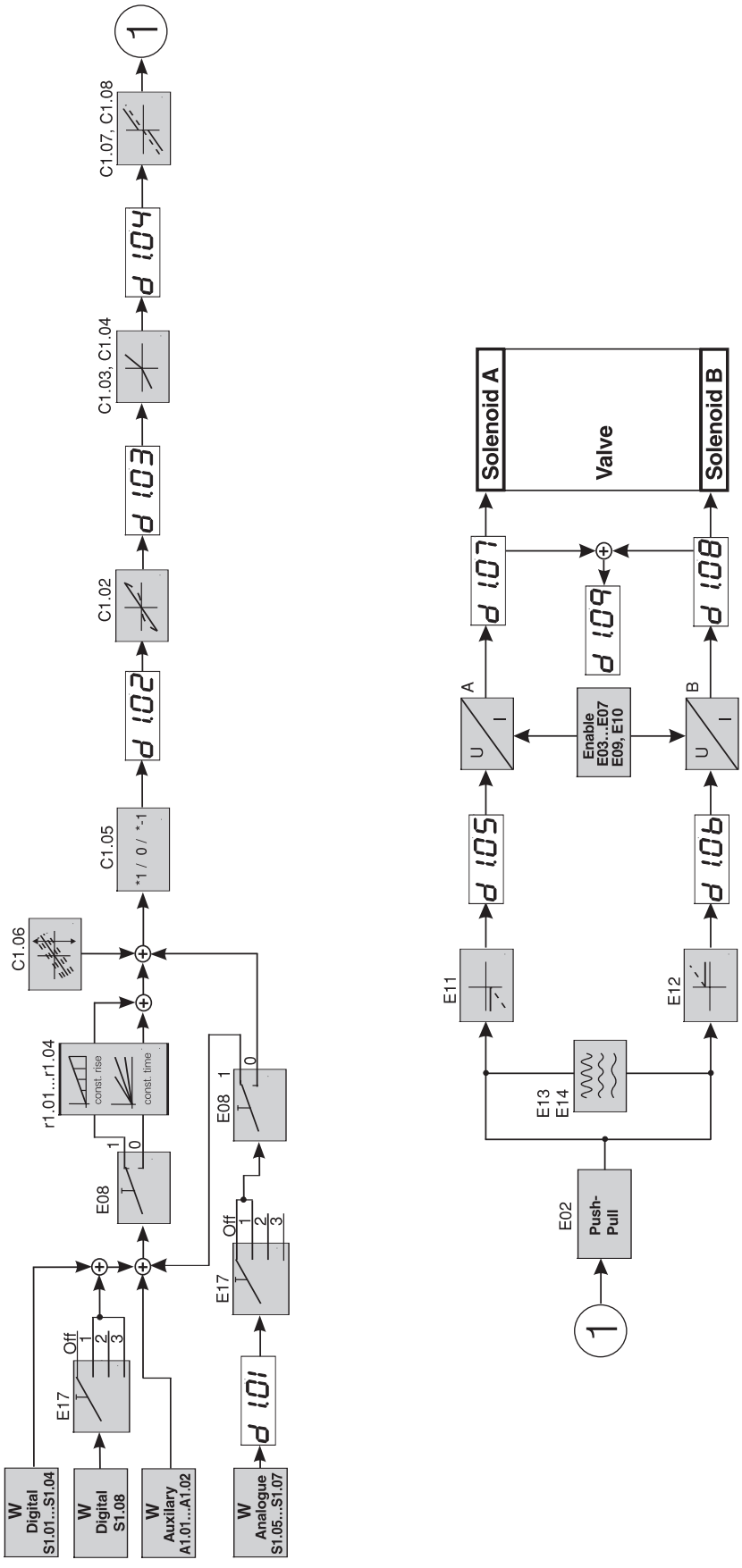


Mode	Description
1	Open loop, 1 proportional valve with 2 solenoids without feedback
2	Open loop, 2 proportional valves with 1 solenoid each without feedback
3	Closed loop valve, single, 1 proportional valve with 2 solenoids and feedback of spool position
4	Closed loop process, single, 1 proportional valve with 2 solenoids and feedback of process value (position, velocity, pressure, force, torque etc.)
5	Reserved
6	Closed loop valve and process, double, 1 proportional valve with 2 solenoids and feedback of spool position and additional feedback of process value (cascaded controller)
7	Closed loop valves, double, 2 independent proportional valve with 1 solenoid each and feedback of spool position of each valve
8	Closed loop processes, double, 2 independent proportional valve with 1 solenoid each and feedback of two independent process values (e.g. two pressure control systems)
9	Reserved
10	Controller function without valve, control of 1 process value; provide set value to follow up electronics (e.g. valve with integrated electronics, frequency converter for AC motor etc.)
11	Controller function without valve, control of 2 process values (cascaded controller, e.g. position and velocity controller); provide set value to follow up electronics (e.g. valve with integrated electronics, frequency converter for AC motor etc.)

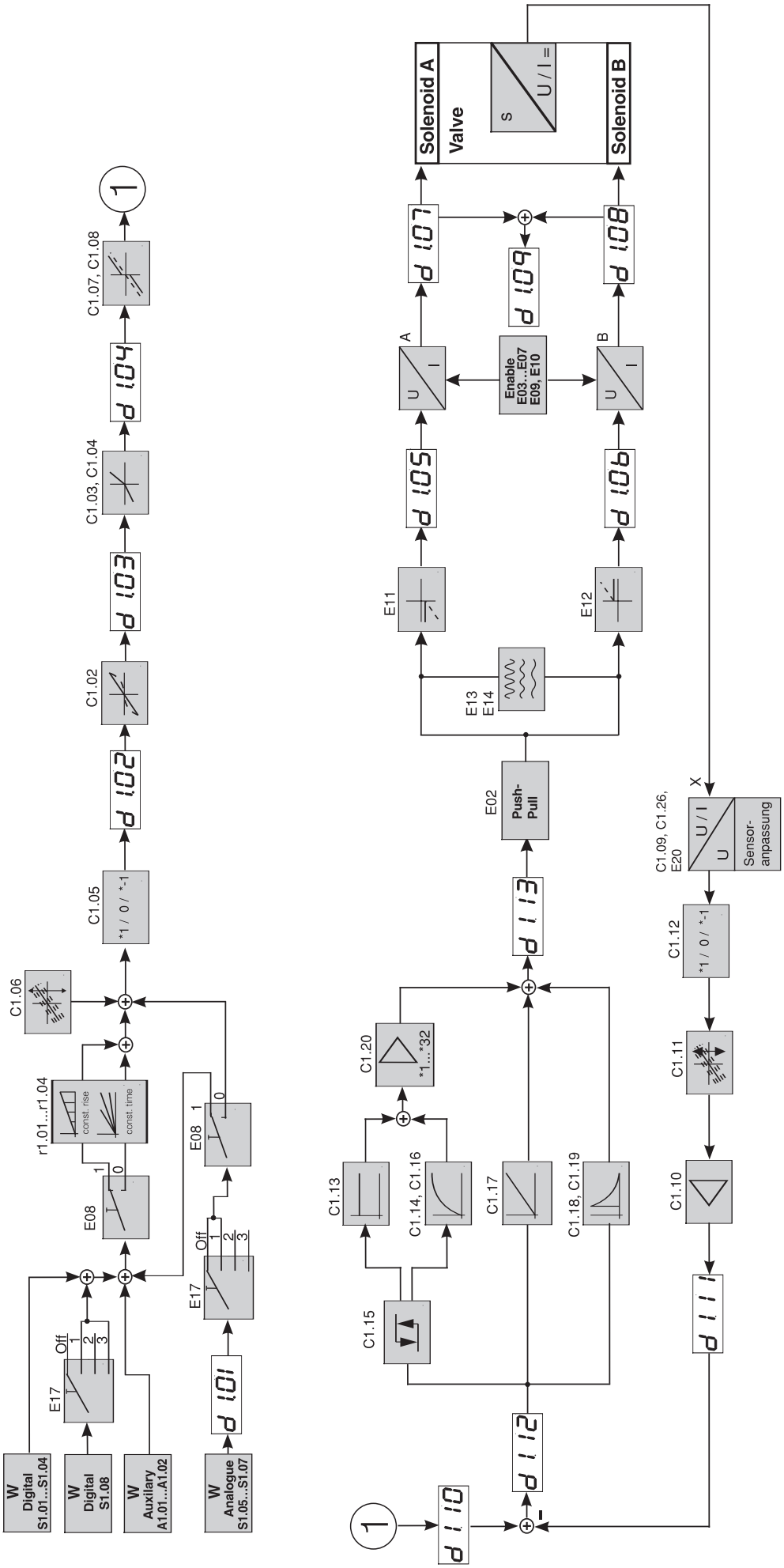
Software Structure Diagrams

Parameter setting	
d *.** : **d**isplay	A *.** : **A**uxiliary
S *.** : **S**et point	C *.** : **C**ontroller
r *.** : **r**amps	E ** : **E**xtended

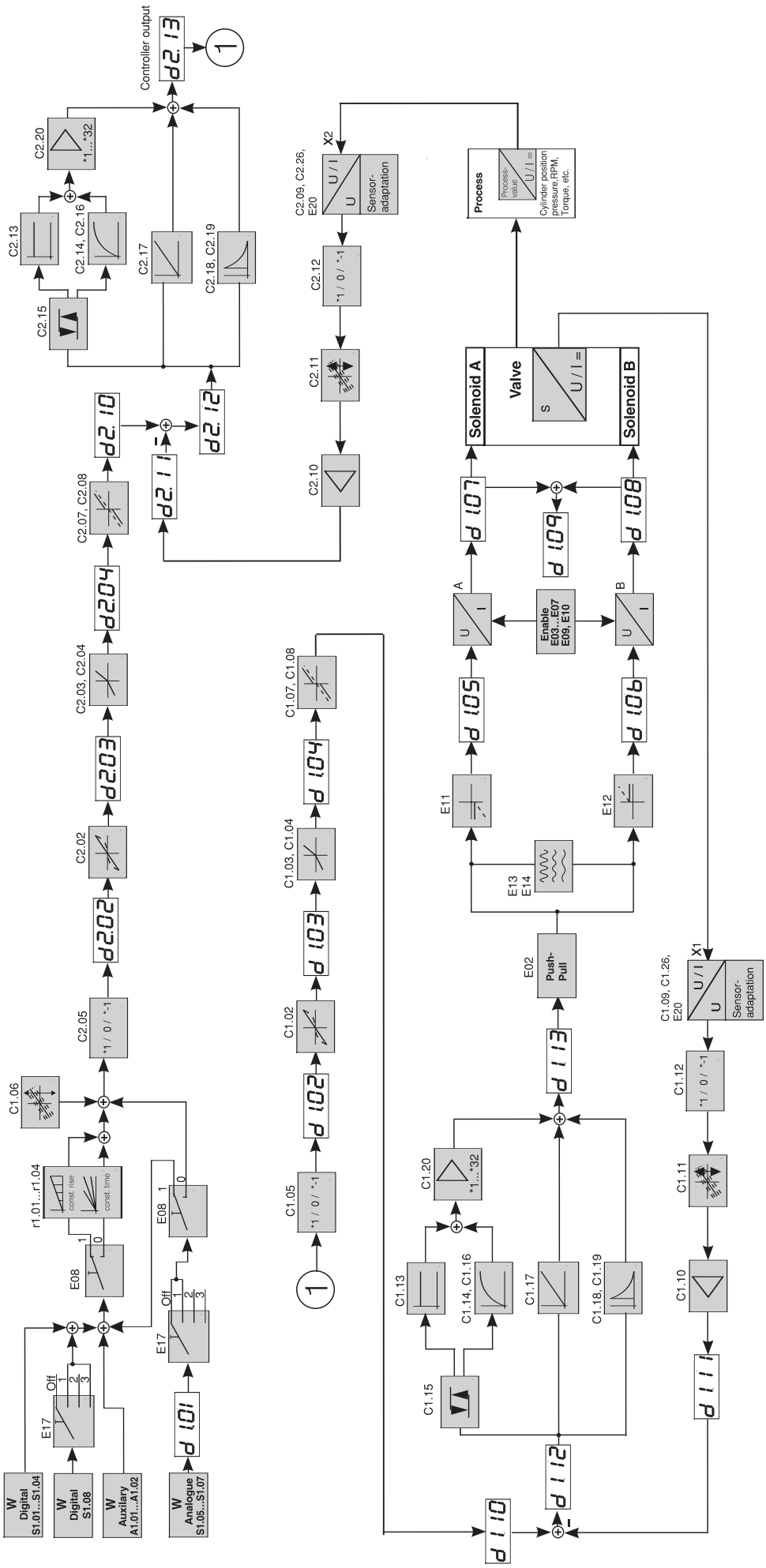
Mode 1; open loop, one valve



Mode 3, single closed loop, valve feedback (spool position feedback)



Mode 6, double closed loop, one spool and one process control loop system



Caution!

- The packing foil is recyclable.
- 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.

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