

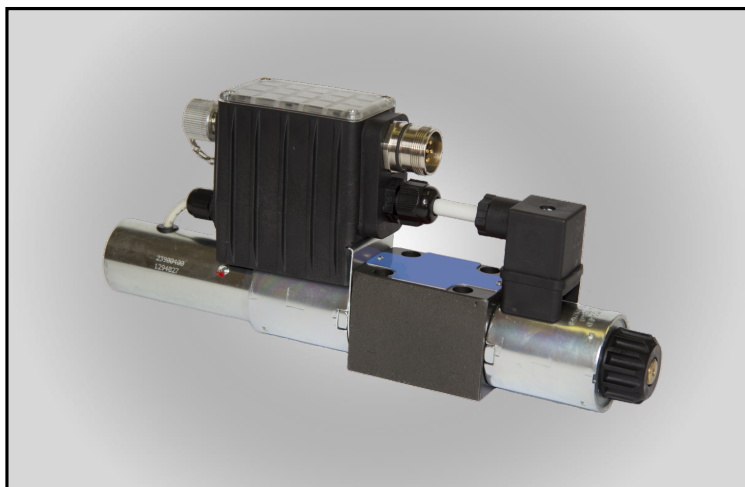


QSE4 - 06

PROPORTIONAL DIRECTIONAL CONTROL VALVES

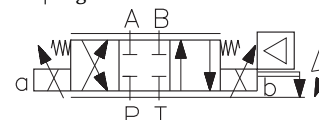
| KE 6008 | 07/14 |

D_n 06 | p_{max} 35 MPa | Q_{max} 40dm³/min



Proportional directional control valves QSE4-06 with inductive spool position sensor are used to control flow of fluid in hydraulic circuit in both directions.

Dn 06, NG 06 | Installation dimensions according to DIN 24 340, ISO 4401, CETOP 3 | Compact design | High sensitivity | tiny hysteresis | Digital control



DESCRIPTION

Proportional directional control valves QSE4-06 with inductive spool position sensor are used to control flow of fluid in hydraulic circuit in both directions and comprises of cast iron housing, special control spool, two centering springs with supporting washers, one or two proportional solenoids, position sensor and (according to the desired version) a box with digital control unit. In the version without the control unit the solenoids and the position sensor are connected through EN 175301-803 and G4W1F connector plug respectively. In the version with the integrated control unit is the valve equipped with electronic control box that can be (together with position sensor) mounted on both solenoids. The connection between the sensor and the control unit is provided by a cable. In the two solenoids version, the solenoid mounted on the opposite side of the electronic control box is connected through EN 175301-803 connector. The supply voltage, control signal, position sensor check output (if available) and output voltage +10VDC is connected through 7-pin connector M23. The valve housing is phosphate coated, solenoids and position sensor are zinc coated.

ORDERING CODE

QSE 4 - 06 /

<p>QSE Proportional directional control valve</p> <p>4 innovation stage</p> <p>06 Nominal size</p> <p>SPOOL TYPE AND CROSSOVERS</p> <p>2Z51 </p> <p>2Z11 </p> <p>2Y51 </p> <p>2Y11 </p> <p>3Z11 </p> <p>3Z12 $\frac{q_A}{q_B} = \frac{1}{2}$ (*) </p> <p>3Y11 </p> <p>3Y12 $\frac{q_A}{q_B} = \frac{1}{2}$ (*) </p>	<p>SEAL TYPE</p> <p>- NBR</p> <p>V Viton</p> <p>MODEL</p> <p>S01 with position sensor with voltage outlet</p> <p>S02 with position sensor with current outlet</p> <p>E01 proportional directional valve without feedback</p> <p>E02S01 prop. dir. valve with position feedback</p> <p>E03 prop. dir. valve with external feedback</p> <p>E04S01 prop. dir. valve with position and external feedback</p> <p>NOMINAL SOLENOID SUPPLY VOLTAGE</p> <p>012S 12VDC (**)</p> <p>024S 24VDC</p> <p>NOMINAL FLOW RATE AT Δp = 1 MPa</p> <p>05 5 dm³/min</p> <p>08 8 dm³/min</p> <p>15 15 dm³/min</p> <p>30 30 dm³/min</p>
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Note:

(*) Model for cylinders with asymmetric piston rod - piston area ration 1:2

(**) Cannot be delivered as model S02

Connectors must be ordered **separately**



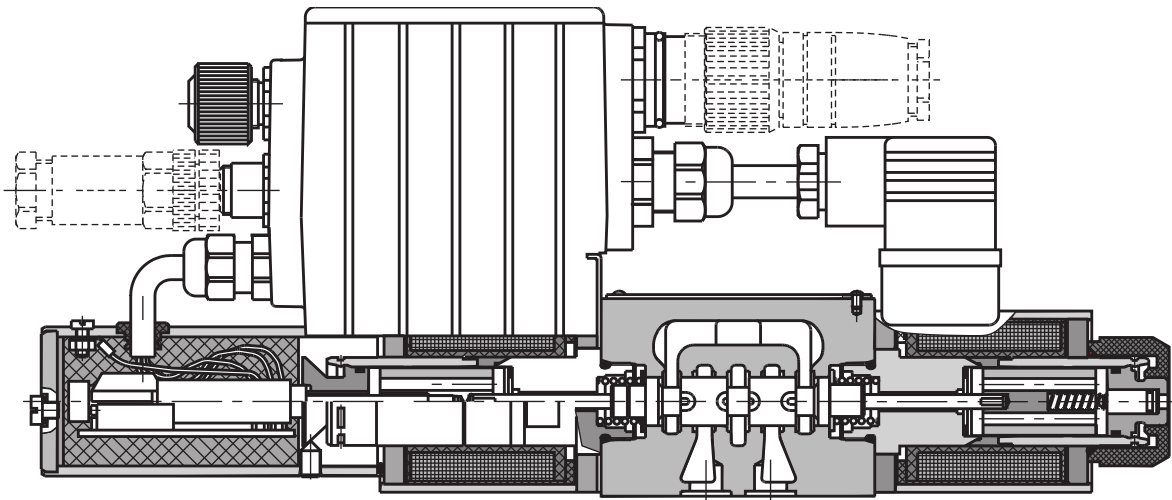
ELEKTRONICS

Measuring system of the position control consist of a differential transformer with core and the evaluating electronic unit. External feedback can be connected using 5-pin connector M12x1 that also provides supply voltage (+24VDC | +12VDC | -5VDC) for external sensor.

Digital control unit allows the proportional valve to be controlled on the basis of the data acquired from two feedback circuits. The propotional valve can be used as follows:

- 1) Proportional directional valve (no feedback) - E01,
- 2) With the internal feedback from the spool position sensor - E02S01,
- 3) With the external feedback (pressure sensor, pocition sensor, etc.) - E03,
- 4) With the internal and external feedback - E04S01.

Solenoid control current is controlled using PWM. Control unit is equipped with an internal current feedback, Controll current can (in case of need) be modulated by signal of dynamic lubrication. Particular function parameters can be software set using RS232 interface. Green and red LED indicate propper and improper function respectively. Valve factory settings depends on the ordered version. Please note that the version of the valve with the external feedback is recommended to be consulted with the manufacturer.



INSTALLATION, SERVICE AND MAINTENANCE

Proportional directional control valves QSE4-06 are designed for panel installation. They are being mounted by four screws M5x45 DIN 912-10.9 with torque 8.9Nm. The reliability of the valves is conditional upon use of prescribed working fluid, especially its parameters such as cleanness and temperature. It is required that the contact surfaces of the valve and the subplate must be clear and intact before installation. O-rings must not be disshaped or damaged by any means. Flatness deviation and roughness of the subplate shall not exceed 0,01/100 mm and Ra = 1,6 µm respectively. Proportional directional valves can be installed in any position and do not require any special maintenance.

DELIVERY

Directional control valves QSE4-06 are delivered assembled including O-rings and solenoids with connector plugs. Spare parts and mounting screws are not included in the package. These must be ordered separately.

TECHNICAL DATA

Technical data	Symbol	Unit	Value
Nominal size	Dn	mm	6
Max. operating pressure in ports P, A, B	p_{MAX}	Mpa	35
Max. operating pressure in port T	$p_{MAX,T}$	MPa	21
Hydraulic fluid	Hydraulic oils of power classes (HL, HLP) according to DIN 51524		
Fluid temperature range NBR (Viton)	t_{PO}	°C	-30+80 (-20...+80)
Max. ambient temperature	t_A	°C	+50
Viscosity range	ν	mm ² /s	20 ... 400
Maximum degree of fluid contamination	Class 21/18/15 according to ISO 4406 (1999)		
Nominal flow at $\Delta p = 1\text{MPa}$	Q	dm ³ /min	15 / 30
Hysteresis - open loop	H_O	%	< 6
Hysteresis - closed loop (position)	H_C	%	< 0.5
Weight - QSE4-062	m	kg	2.3
- QSE4-062			2.8
Mounting position			optional
Enclosure type according to EN 60 529			IP65

TECHNICAL DATA OF POSITION SENSOR - VOLTAGE OUTLET

Technical data	Symbol	Unit	Value
Operating pressure	p	Mpa	max. 35, static
Electric connection	Electrical connector G4W1F Hirschmann (*)		
Contact assignment	1 - power supply 2 - output signal 3 - ground GND 4 - not used		
Enclosure according to EN 60 529			IP65
Measured distance	l	mm	8
Operating voltage	U	V (DC)	9.6 - 30
Linearity error		%	<1
Output voltage	U_{OUT}	V (DC)	0 - 5
Output signal range			
- position 0	U_{OUT}	V (DC)	2,5
- 1 solenoid (stroke 2.8mm)			0.75 - 2.5
- 2 solenoids (stroke $\pm 2.8\text{mm}$)			0.75 - 4.025
Max. load current	I_{MAX}	mA	2
Output signal ripple			
- at load current 0 mA		mV _{P-P}	<20
- at load current 2 mA			<15
Additional signal error at			
- Temperature change between 0...80°C	typical <0.2% / 10K, max 0.5% / 10K		
- Between 0...-25°C	max 0.5% / 10K		
- Load current change from 0 to 2 mA	0.1%		
Input voltage change			
- from 9,6 to 14,4 V	ΔU_{OUT}	%	<0.1
- from 14,4 to 30 V			<0.25
long-term drift (drift/30days)		%	<0.25
Cut-off frequency			
- 3dB amplitude fall	f	Hz	>600
- frequency (phase 90°)			>600

(*) Only for S01 and S02 model

TECHNICAL DATA OF POSITION SENSOR - CURRENT OUTLET

Technical data	Symbol	Unit	Value
Linearity		%	<1
Operating pressure	p	MPa	max. 35, static
Electrical connection	Electrical connector G4W1F Hirschmann (*)		
Contact assignment	1 - power supply 2 - output signal 3 - ground (GND) 4 - not used		
Enclosure type according to EN 60 529			IP65
Operating voltage	U_{CC}	V (DC)	20 - 30
Load current	I_Z	mA	<35
Output signal range		mA	4 - 20
Output signal range			
- position 0	I_{OUT}	mA (DC)	12
- 1 solenoid (stroke 2.8mm)			6,6 - 12
- 2 solenoids (stroke ± 2.8 mm)			6,6 - 17
Additional output signal error at			
- Temperature change from +10...55°C			0,2% / 10K
- 50% impedance change			<0,1% / 10K
- Input voltage change in the range of operating voltage			<0,05%
Load impedance	R_Z		<500
Output signal ripple		mA RMS	<0,02
Cut-off frequency - 3dB amplitude fall	f	Hz	>800

(*) Only for S01 and S02 model

TECHNICAL DATA OF SOLENOIDS

Technical data	Symbol	Unit	Value
Coil nominal voltage	U_S	V (DC)	12 24
Limiting current	I_{S-MAX}	A	2,4 1,0
Resisistance at 20°C	R_{S20}	Ω	2,3 13,4

TECHNICAL DATA OF ELECTRONIC

Technical data	Symbol	Unit	Value
Supply voltage with polarity inversion protection	U_S	V (DC)	11,2 - 28 (residual ripple <10%)
Input: setpoint / control signal	$\pm 10V, 0 - 10V, \pm 10mA, 4 - 20mA, 0 - 20mA, 12mA \pm 8mA$		
Input: spool position sensor signal	0 - 5 V		
Input external feedback signal	0 - 10V, 4 - 20mA, 0 - 20mA		
A/D resolution	12bits		
Output: solenoids	2 PWM outputs (max 3.5 A)		
PWM frequency	f_{PWM}	Hz	18000
Parameter adjustment period	T_R	μs	170
EMC interference resistance	61000 - 6 - 2 : 2005		
EMC radiation resistance	55011 : 1998 class A		
Parameter settings	Serial port RS 232 (zero modem), 19200 Bauds 8 data bits, 1 stopbit, no parity, Special SW		

ACCESSORIES

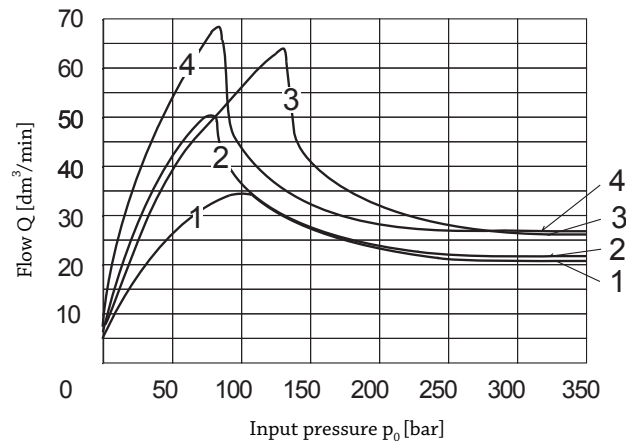
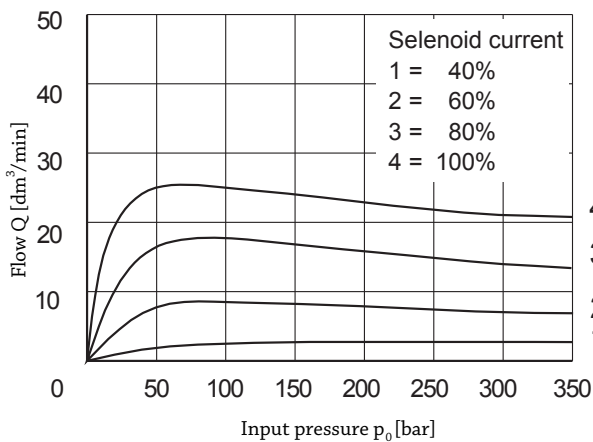
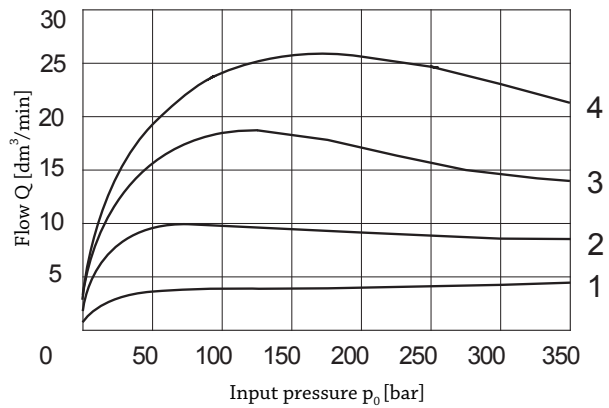
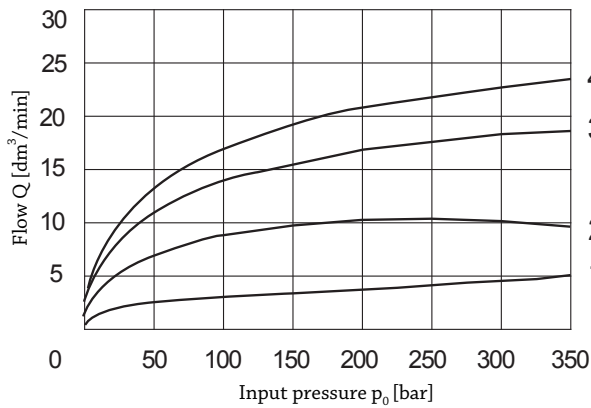
1	Connecting cable to PC (2m), CD with SW and manual
2	Connecting cable to PC (5m), CD with SW and manual
3	Connecting cable to PC (2m)
4	Connecting cable to PC (1m)

OPERATING LIMITS

Only for E01 version P→A / B→T nebo P→B / A→T

Nominal flow 5 dm³/min]

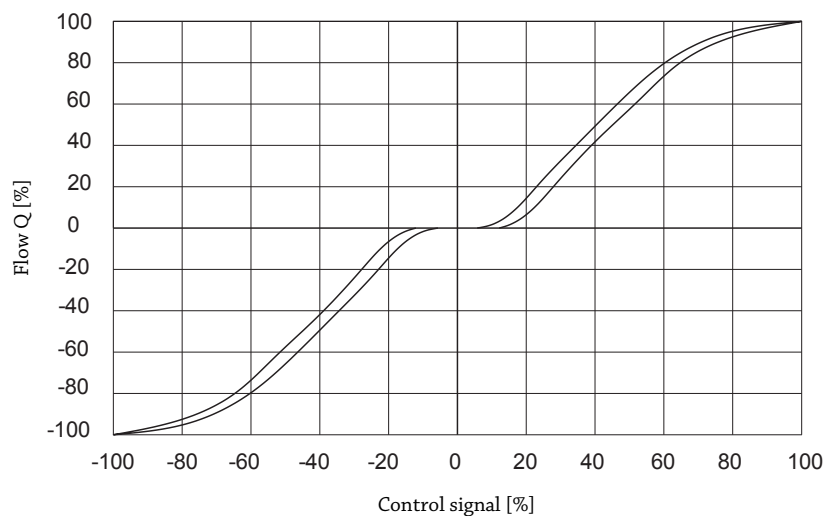
Nominal flow 8 dm³/min]



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

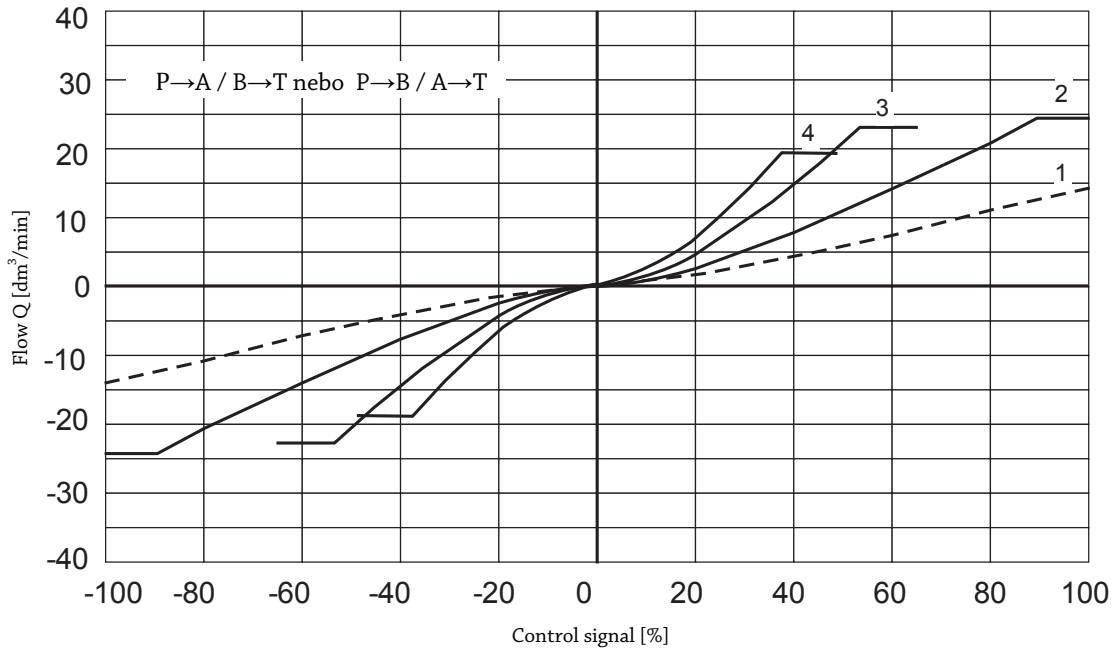
FLOW CHARACTERISTICS

Only for E01 version



Note: Measured at input pressure $\Delta p = 1 \text{ MPa}$, $v = 32 \text{ mm}^2/\text{s}$

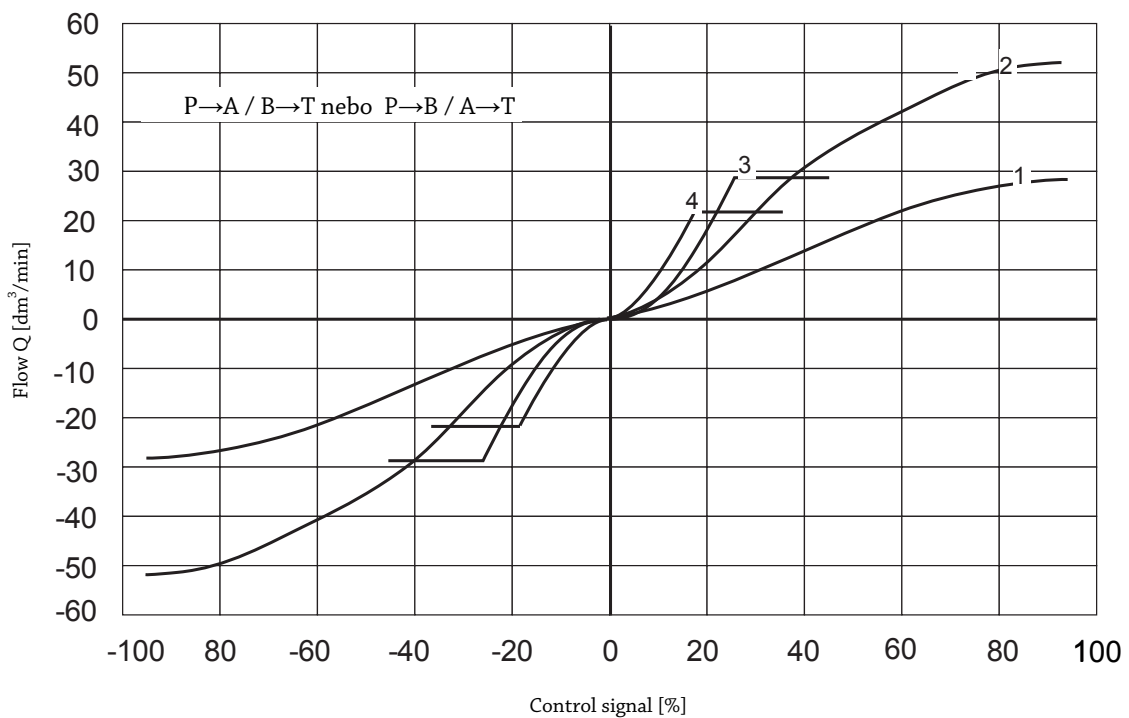
FLOW CHARACTERISTICS
Only for E02S01 version
 $Q_n = 15 \text{ dm}^3/\text{min}$ at $\Delta p = 1 \text{ MPa}$

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


1	$\Delta p_n = 10 \text{ bar}$
2	$\Delta p = 50 \text{ bar}$
3	$\Delta p = 160 \text{ bar}$
4	$\Delta p = 320 \text{ bar}$

 Δp - differential valve pressure (inlet pressure p_v minus load pressure Δp and return pressure p_T)

 Δp_n - differential valve pressure at nominal flow Q_n
Only for E02S01 version
 $Q_n = 30 \text{ dm}^3/\text{min}$ at $\Delta p = 1 \text{ MPa}$

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


1	$\Delta p_n = 10 \text{ bar}$
2	$\Delta p = 50 \text{ bar}$
3	$\Delta p = 160 \text{ bar}$
4	$\Delta p = 320 \text{ bar}$

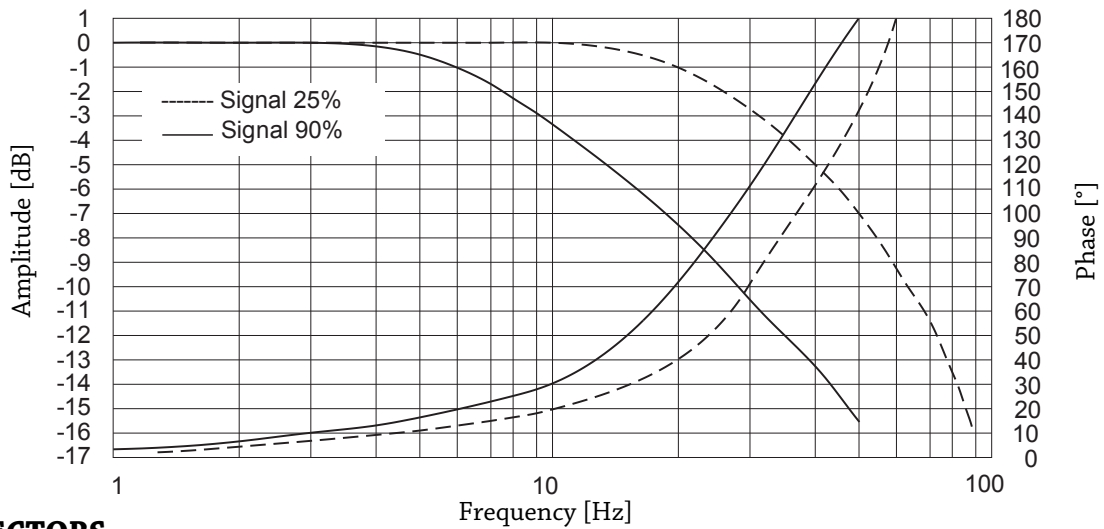
 Δp - differential valve pressure (inlet pressure p minus load pressure Δp and return pressure p_T)

 Δp_n - differential valve pressure at nominal flow Q_n

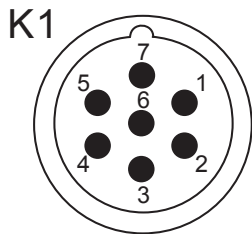
FREQUENCY RESPONSE

Only for E02S01 version

Closed loop - position feedback

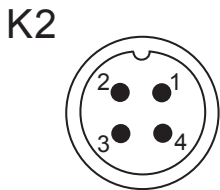


CONNECTORS

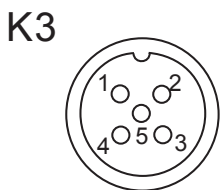


Connector K1 - M23		
PIN	Technical data	Value
1	* Power supply input	11.2 ... 28V DC
2	* Ground (GND - power supply)	0V
3	Control signal	according to the configuration
4	Ground (signal)	0V
5	Power reference signal	+10VDC/max. 10mA
6	Control signal of spool position sensor	0 ... 5V
7	*Protective earth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

*Recommended min. lead cross section 0.75mm²



Connector K2 - M12x1 (male)		
PIN	Technical data	Value
1	TxD	according to the RS 232 standard
2	RxD	
3	Ground (signal)	0V
4	Not used	



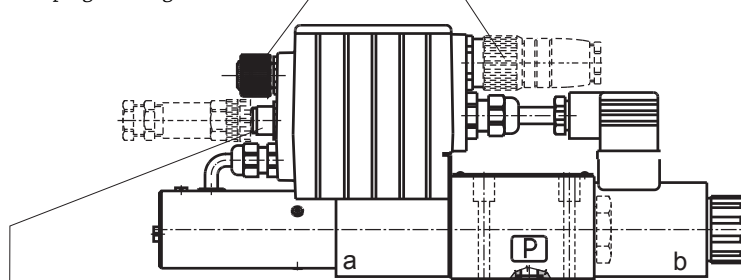
Connector K3- M12x1 (female)		
PIN	Technical data	Value
1	Power supply (output)	11.2 ... 28VDC/max.
2	External feedback signal	dle nastavení
3	Ground	0V
4	Not used	
5	Not used	

K2 - RS232 connector M12x1 (4 pins)

For programming the electronics

K1 - Main input connector M23 (7 pins)

Cable diameter 8...12mm



K3 - Connector M12x1 (5 pins)

External feedback signal (only for E03 and E04S01 version)

VALVE FACTORY SETTINGS

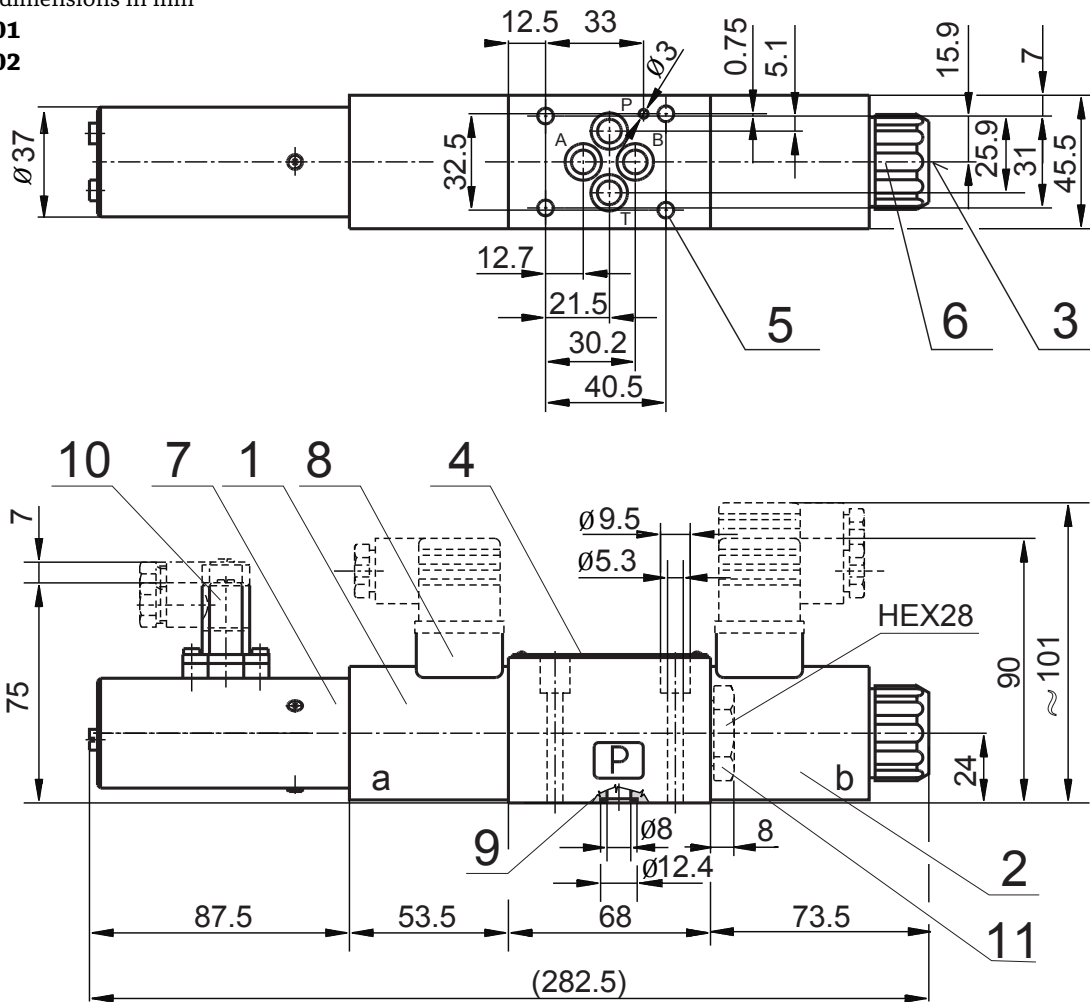
Signal	Model							
	E01		E02S01		E03		E04S01	
	1 solenoid	2 solenoids	1 solenoid	2 solenoids	1 solenoid	2 solenoids	1 solenoid	2 solenoids
Control signal	0...10V	± 10V	0...10V	± 10V	0...10V	± 10V	0...10V	± 10V
External feedback signal	-	-	-	-	0...10V			
Spool position sensor signal	-	-	0...5V		-		0...5V	

VALVE DIMENSIONS

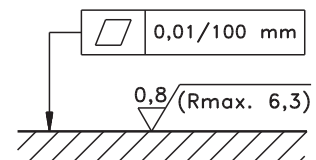
Note: All dimensions in mm

063 ... S01

063 ... S02



- 1 Solenoid a
- 2 Solenoid b
- 3 Manual override
- 4 Type and version plate
- 5 4 Mounting holes
- 6 Solenoid fixing nut
- 7 Spool position sensor
- 8 Solenoid supply connector
- 9 Square ring 9.25 x 1.68 (4pcs) - supplied in the package
- 10 Position sensor connectors
- 11 Plug screw - only for the valve with one solenoid, HEX 28, spool 2Z51 a 2Z11



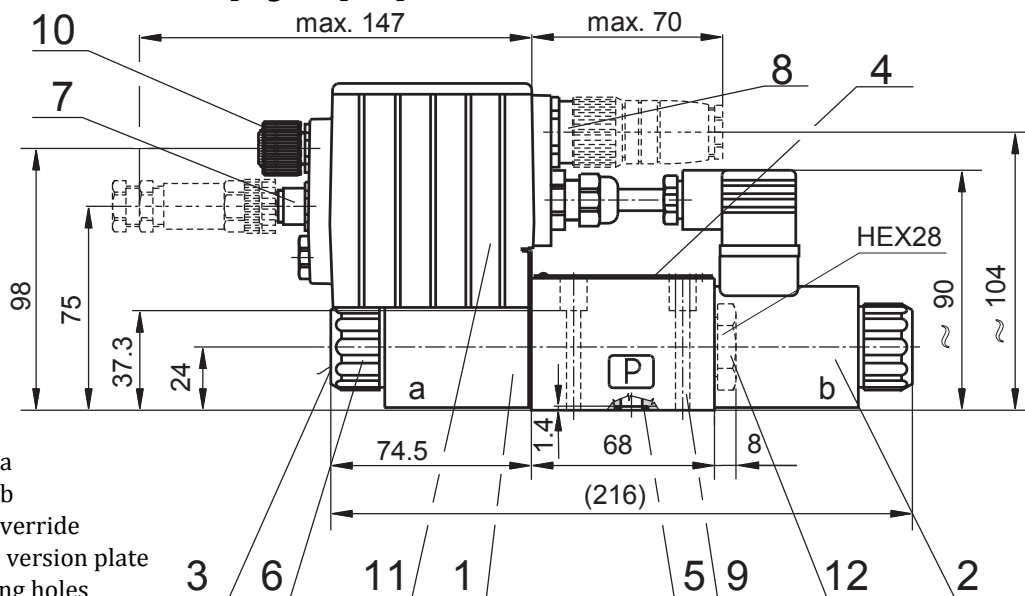
Required surface finish of the interface

VALVE DIMENSIONS

Pozn: All dimensions in mm

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

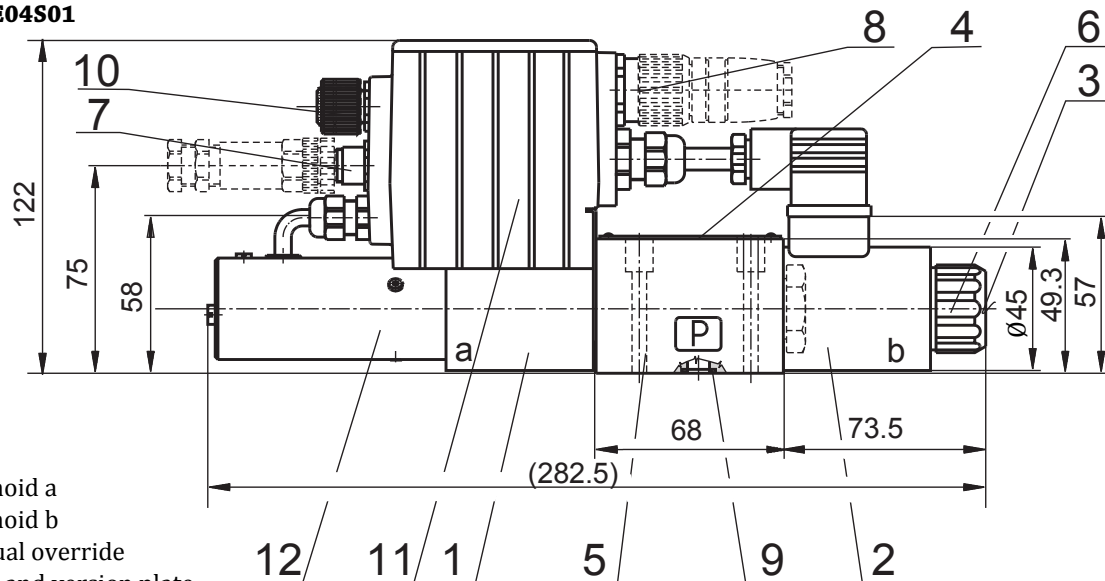
063 ... E03



- 1 Solenoid a
- 2 Solenoid b
- 3 Manual override
- 4 Type and version plate
- 5 4 mounting holes
- 6 Solenoid fixing nut
- 7 Connector M12x1 for connection of external feedback
- 8 Main supply connector M23
- 9 Square rings 9.25 x 1.68 (4pcs) - supplied in the package
- 10 Connector cover M12x1 for programming
- 11 Plastic box with integrated electronics
- 12 Plug screw - only for the valves with one solenoid, HEX 28 spool 2Z51 and 2Z11

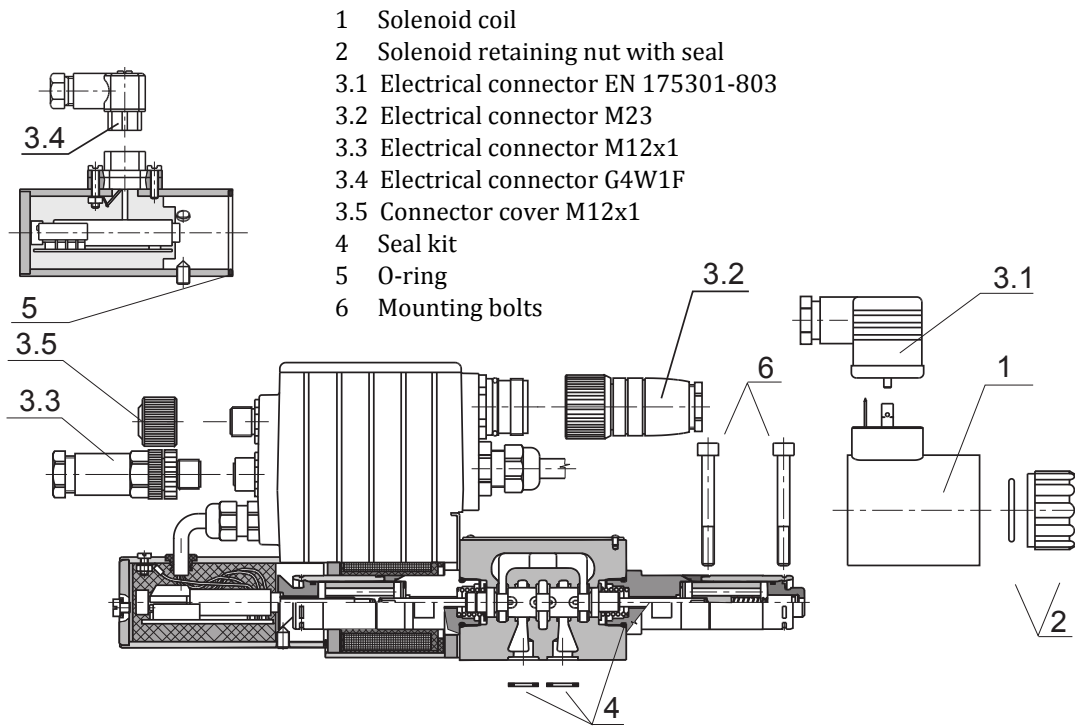
063 ... E02S01 - without connector plug for spool position feedback

063 ... E04S01



- 1 Solenoid a
- 2 Solenoid b
- 3 Manual override
- 4 Type and version plate
- 5 4 mounting holes
- 6 Solenoid fixing nut
- 7 Connector M12x1 for connection of external feedback
- 8 Main supply connector M23
- 9 Square rings 9.25 x 1.68 (4pcs) - supplied in the package
- 10 Connector cover M12x1 for programming
- 11 Plastic box with integrated electronics
- 12 Spool position sensor

SPARE PARTS



- 1 Solenoid coil
- 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 Connector cover M12x1
- 4 Seal kit
- 5 O-ring
- 6 Mounting bolts

1. Solenoid coil			
2. Solenoid retaining nut with seal		Standard nut, seal ring 22 x 2	
3.1. Electrical connector EN 175301-803 (solenoid A: grey)		Without rectifier M16x1.5 (bushing bore Ø4-6mm)	
3.1. Electrical connector EN 175301-803 (solenoid B: black)		Without rectifier M16x1.5 (bushing bore Ø4-6mm)	
3.2. Electrical connector M23		7 pins (female)	
3.3. Electrical connector M12x1		5 pins (male), only for E03 and E04S01 version	
3.4. Electrical connector G4W1F			
3.5. Connector cover M12x1			
4. Seal kit	Type	Dimensions (number)	
		Square ring	O-ring
		Standard NBR70	9.25 x 1.68 (4pcs)
	Viton	9.25 x 1.78 (4pcs)	17.17 x 1.78 (2pcs)
5. O-rings		Standard NBR70, 32 x 2 (2ks)	
6. Mounting bolts (sada)		Dimensions (number)	Tightening torque [Nm]
		M5 x 45 DIN 912-10.9 (4pcs)	8.9

NOTES

Consultancy service is provided by: **PQS Technology, Ltd.**

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