



### Technical Features

- › Direct acting proportional control valve with integrated digital onboard electronics (OBE), proportional control, spool and process feedback
- › Control valve with subplate mounting surface acc. to ISO 4401, DIN 24340 (CETOP 05) standards
- › High hydraulic power limits and smooth running characteristic
- › Used for e.g. position and speed control of hydraulic actuators
- › A wide selection of spools available
- › The valve opening and resulting flow rate can be modulated continuously in proportion to the reference signal
- › LVDT sensor with high resolution and high temperature stability
- › Digital electronics allows fine control of the valve spool position, reducing hysteresis and response time and optimizing the performance of the valve
- › Galvanically isolated analog input
- › Galvanically isolated CANopen bus
- › Galvanically isolated USB-C connector
- › Galvanically isolated +/-10V monitoring output, with fixed 5V reference setting (can be used for potentiometer valve control)
- › Easy to connect via USB ↔ USB-C
- › The settings of electronics can individually be adjusted by a parametrization software
- › Access levels to individual valve functions, password protection (technician and user mode)
- › Manual valve control from the application, independent of the control signal
- › Integrated function generator (sine, square, saw) in manual control
- › Fast acquisition and high resolution oscilloscope, 4 channels can be displayed at once
- › Optical feedback of valve status through three LEDs
- › Improved shock and vibration behavior
- › The valve is zinc-coated with the enhanced surface corrosion protection 520 h in NSS acc. to ISO 9227
- › CANopen connectivity

### Functional Description

The proportional valve PRM9 consists of a cast iron housing, a specially shaped control spool, two centering springs with support washers, one or two proportional solenoids, a spool position sensor and digital on-board electronics.

The position sensor measurement system is based on the principle of a linear variable differential transformer (LVDT). The sensor core is mechanically connected to the coil.

The digital control electronics are housed in an aluminum housing mounted on the valve body.

While the sensor is connected to the electronics via a cable, the solenoids are connected directly, without the use of cables.

For the basic electrical connection, a MIL-C5015 connector (6 + PE) is used, which provides power supply, control signal input and signal output from the spool position sensor. Other connector equipment is related to the selection of the valve type and function.

A 5-pole connector plug with M12x1 thread is used for connection to the CANopen bus.

The digital electronic unit uses a pulse width modulated signal (PWM) to control the proportional solenoids.

The electronics are equipped with internal current feedback, the output current can be modulated by a dynamic lubrication signal if necessary.

Dynamic lubrication significantly reduces the effects of adhesion forces.

Other functional parameters can be easily set using the PRM9 software after connecting the valve to a computer via the USB (PC) ↔ USB-C (valve) inputs. This allows you to easily set, for example, ramp functions, deadband, offset, coil current limit, feedback parameters, etc.

The software is freely downloadable from the ARGO-HYTOS website. The program does not require installation.

There are two access levels:

- after entering the password\* **1234**, entry into **technician** mode is possible
- without entering the password, entry into **user** mode is possible

\*The password can be changed at will.

**The PRM9 is available with following model options:**

**Models with standard OBE**

**E02S02** internal spool position feedback

**Models with OBE and CANopen connectivity**

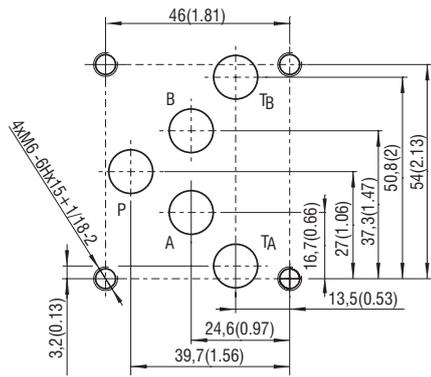
**E02S02-CA** internal spool position feedback, CANopen connectivity

All models are equipped with an optical feedback (standard: 2 LEDs; with CANopen: 3 LEDs).

As a standard, the proportional valve is delivered with factory setting.

**Technical Data**

ISO 4401-05-04-0-05



Ports P, A, B, T - max. Ø11.2 mm (0.44 in)

Valve size		10 (D05)
Max. operating pressure at ports P, A, B	bar (PSI)	350 (5100)
Max. operating pressure at port T	bar (PSI)	210 (3050)
Fluid temperature range (NBR)	°C (°F)	-30 ... +80 (-22 ... +176)
Fluid temperature range (FPM)	°C (°F)	-20 ... +80 (-4 ... +176)
Ambient temperature max.	°C (°F)	-40 ... +50 (-40... +122)
Nominal flow rate $Q_N$ at $\Delta p=10$ bar (145 PSI)	l/min (GPM)	30 (7.9) / 60 (15.9)
Hysteresis - closed position loop	%	< 0.5
Protection degree EN 60 529		IP65 / IP67
Weight - valve with 1 solenoid - valve with 2 solenoids	kg (lbs)	5.1 (11.2) 6.6 (14.6)
Shock & vibration		Sinus 10 g, max. ampl. 0.75 mm, 10-2000 Hz, Shock 30 g, half sinus 11ms
Electromagnetic compatibility (EMC)		DIN EN 61000-4-2 DIN EN 61000-4-3 DIN EN 61000-4-4 DIN EN 61000-4-5 DIN EN 61000-4-6 DIN EN 61000-4-8
	Data Sheet	Type
General information	HA 0060	Products and operating conditions
Coil types / Connectors	HA 8007 / HA 8008	
Mounting interface	HA 0019	Size 10
Spare parts	HA 8010	
Subplates	HA 0002	DP*-10

**Ordering Code**

PRM9-10 / - 24 - B

Proportional Directional Control Valve, with Digital Onboard Electronics and Internal Feedback

Valve size

Spool symbols see the table „Spool Symbols“

Nominal flow rate at  $\Delta p = 10$  bar (145 PSI)

flow 30 l/min (7.9 GPM)  
flow 60 l/min (15.6 GPM)

30  
60

Nominal solenoid supply voltage

24 V DC

Surface treatment  
zinc-coated (ZnNi), ISO 9227 (520 h)

No designation  
V

Seals  
NBR  
FPM (Viton)

A  
B

Installation side of position transducer  
spool position transducer at side of port „A“  
spool position transducer at side of port „B“

Standard installation side of position transducer acc. of Spool Symbols table.

E02S02  
E02S02-CA

Model  
OBE, spool position transducer  
OBE CANopen, spool position transducer

- For proportional valves with two solenoids, one solenoid must be de-energized before the other solenoid can be charged.
- Mounting bolts M6x40 DIN 912-10.9 or studs must be ordered separately. Tightening torque is 14+1 Nm (10.3+0.7 lbf.ft).
- Besides the shown, commonly used valve versions other special models are available.
- Contact our technical support for their identification, feasibility and operating limits.

**Spool Symbols**

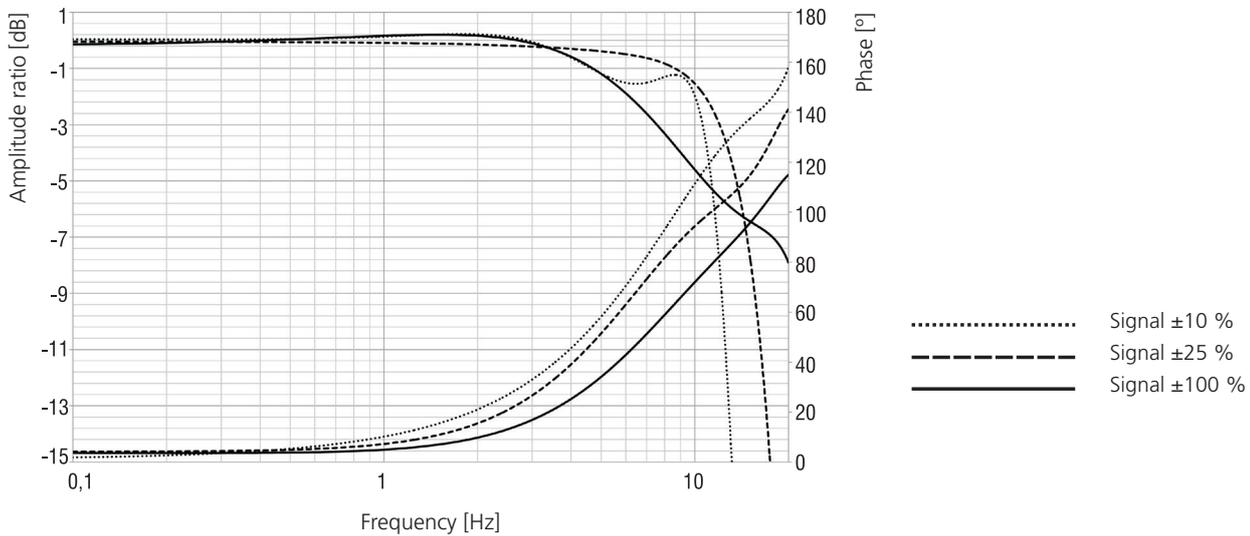
Type	Symbol	Type	Symbol
2Z51		3Z11	
2Z11			
2Y51		3Y11	
2Y11			

**Technical Data of Proportional Directional Control Valve**

Solenoid data		
Type of coil	V DC	24
Limiting current	A	2.5
Resistance at 20 °C (68 °F)	Ω	4.73

Electronics Data		
Supply voltage with polarity inversion protection	V DC	9 ... 32*
*If the supply voltage drops below 15 V DC, the valve may not achieve the performance specified in the catalog.		
Input		
Command signal (according to customer setting)	V	±10; 5±5; 0...10; 0...24; 12±12; 2.5±2.5; U <sub>cc</sub> /2±10; U <sub>cc</sub> /2±5
	mA	±10; 12±8; 10±10; 0...20; 4...20
Output		
Spool position of monitoring signal	V	±10
Output current to solenoids	A	2x PWM output stages up to 4 A
Resolution of the A/D converter	bit	12
PWM frequency	kHz	15
Cycle time	μs	50
Parameter setting: By SPRM9 parametrization software. Connection via USB ↔ USB-C cable		

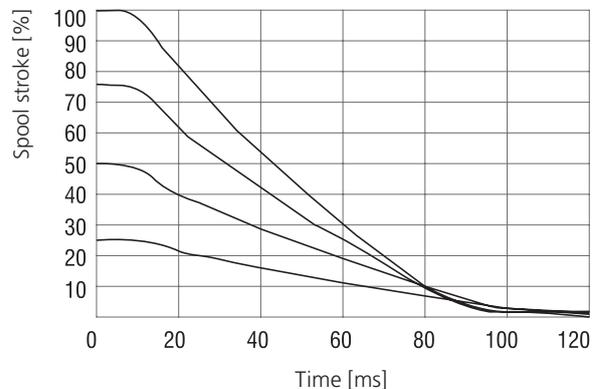
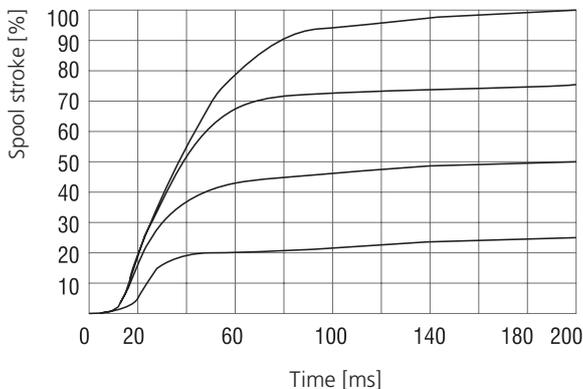
**Frequency Response** closed position loop, for E02S02 model



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

**Step response**

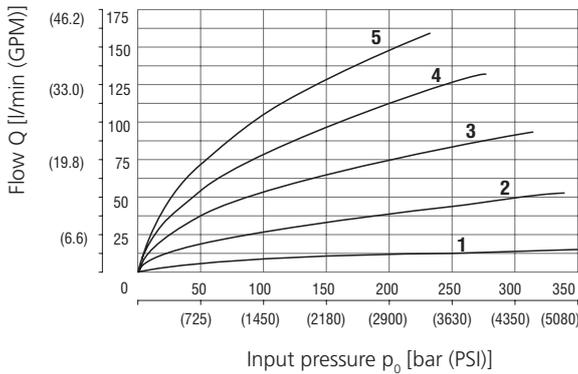
- E02S02 model only (internal position feedback)



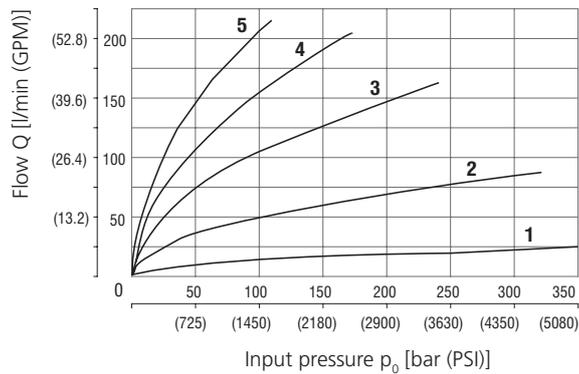
**Characteristics** measured at  $v = 32 \text{ mm}^2/\text{s}$  (156 SUS)

**Operating limits:** Flow direction  $P \rightarrow A / B \rightarrow T$  or  $P \rightarrow B / A \rightarrow T$   
- E02S02 model only

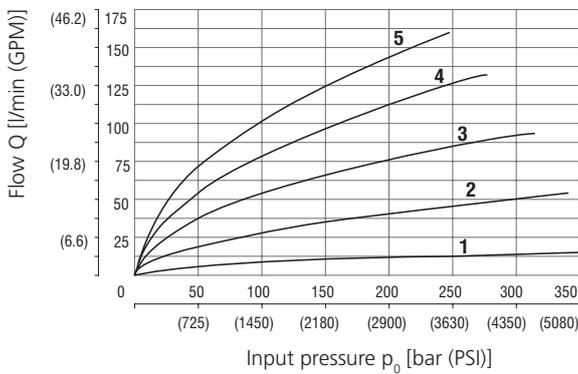
**Z11/30** Nominal flow 30 l/min (7.9 GPM)



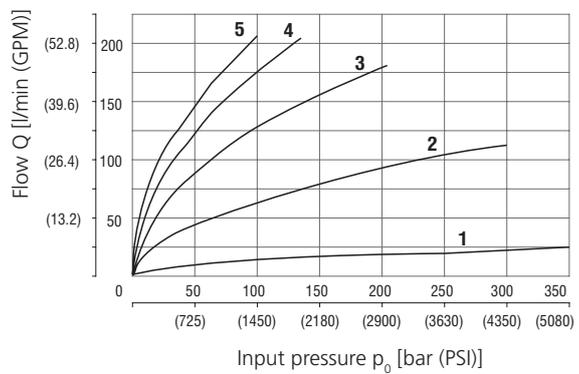
**Z11/60** Nominal flow 60 l/min (15.9 GPM)



**Y11/30** Nominal flow 30 l/min (7.9 GPM)



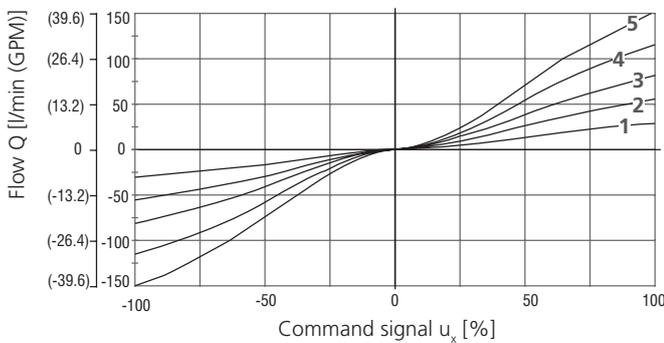
**Y11/60** Nominal flow 60 l/min (15.9 GPM)



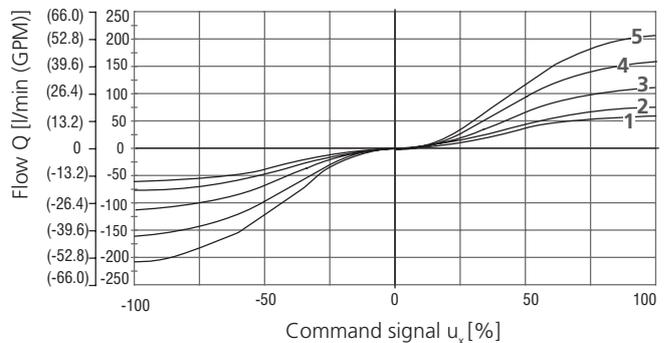
**Command signal:**  
1 = 20 %  
2 = 40 %  
3 = 60 %  
4 = 80 %  
5 = 100 %

**Flow characteristics:** Flow direction  $P \rightarrow A / B \rightarrow T$  or  $P \rightarrow B / A \rightarrow T$   
- E02S02 model only

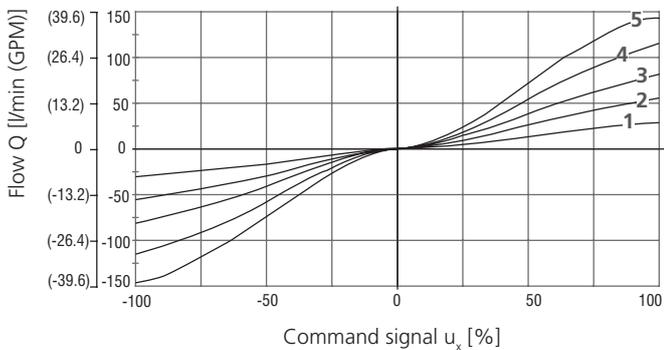
**Z11/30** Nominal flow 30 l/min (7.9 GPM) at  $\Delta p = 10 \text{ bar}$  (145 PSI)



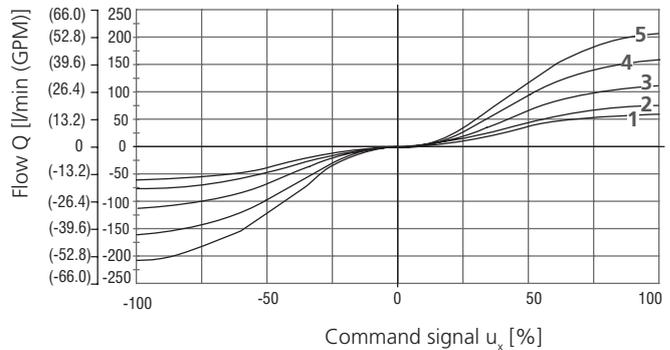
**Z11/60** Nominal flow 60 l/min (15.9 GPM) at  $\Delta p = 10 \text{ bar}$  (145 PSI)



**Y11/30** Nominal flow 30 l/min (7.9 GPM) at  $\Delta p = 10 \text{ bar}$  (145 PSI)



**Y11/60** Nominal flow 60 l/min (15.9 GPM) at  $\Delta p = 10 \text{ bar}$  (145 PSI)



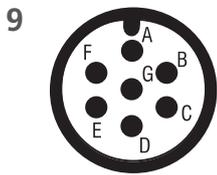
$\Delta p$  = Valve pressure differential  
(input pressure  $p_0$  minus load pressure and return pressure  $p_r$ )

1	$\Delta p = 10 \text{ bar}$ (145 PSI)	4	$p_0 = 200 \text{ bar}$ (2900 PSI)
2	$p_0 = 50 \text{ bar}$ (725 PSI)	5	$p_0 = 350 \text{ bar}$ (5076 PSI)
3	$p_0 = 100 \text{ bar}$ (1450 PSI)		

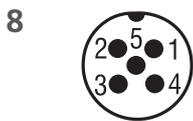
**Factory Settings**

Item	Model			
	E02S02		E02S02-CA	
	1 Magnet	2 Magnets	1 Magnet	2 Magnets
Command signal	0...10 V	±10 V	0...10 V	±10 V
Spool position of monitoring signal	0...10 V	±10 V	0...10 V	±10 V

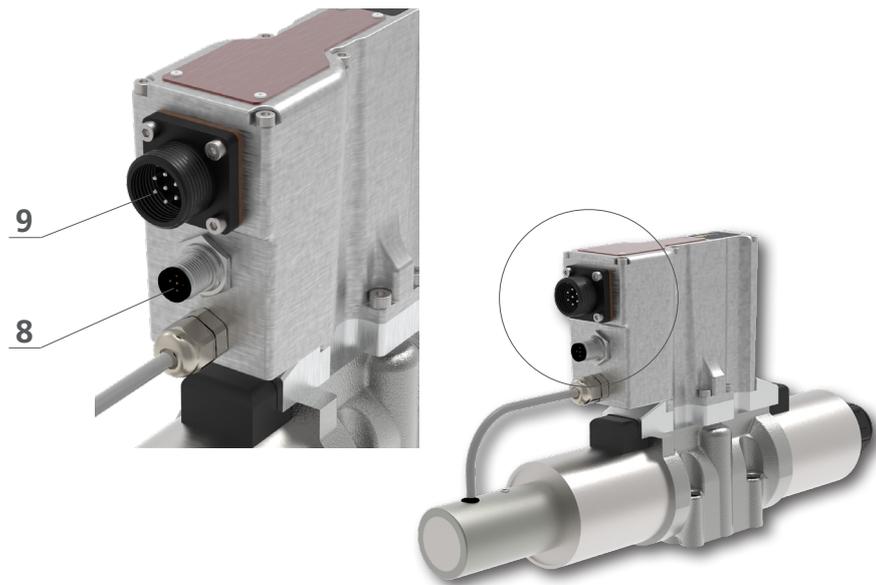
**Connectors**

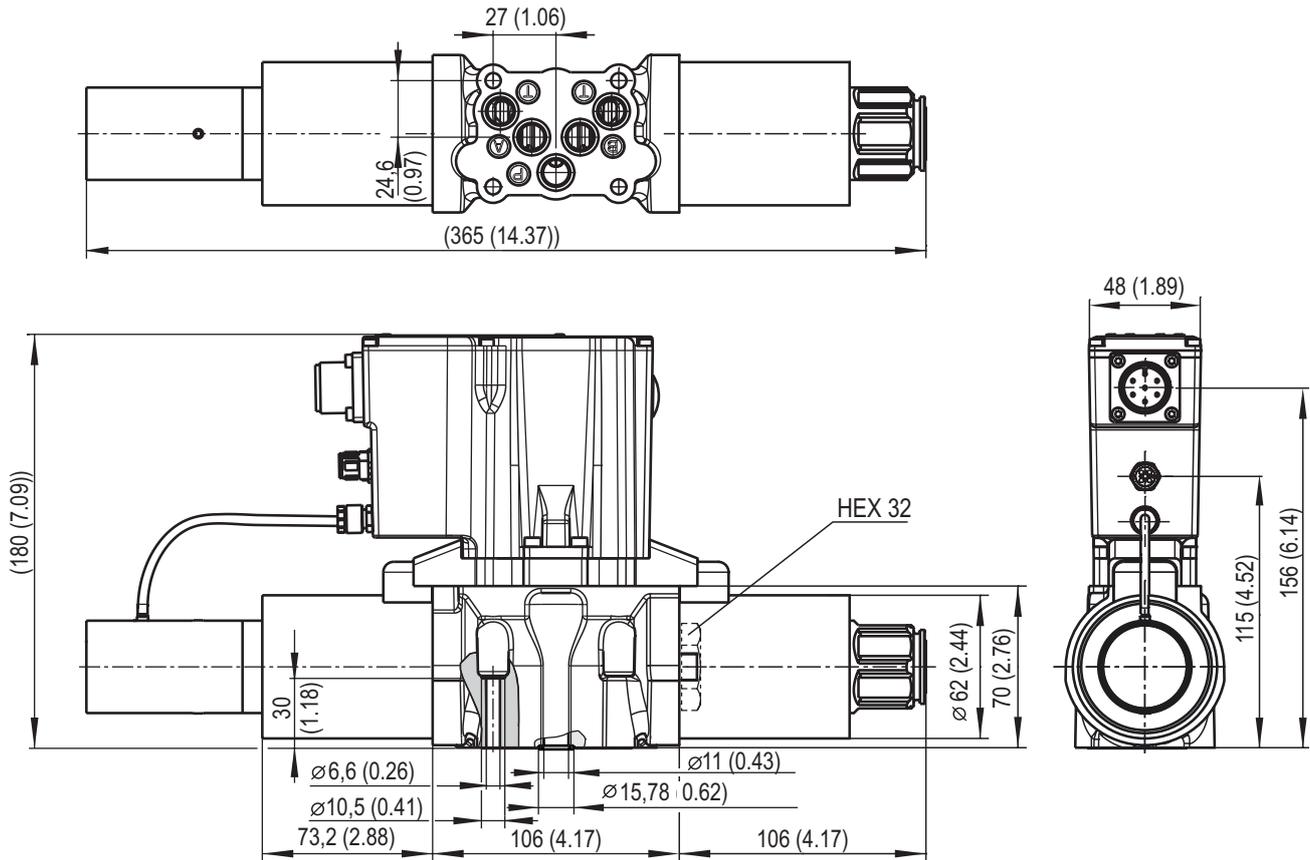


Main supply connector 6+PE MIL (EN 175201-804)		Ordering No.: <b>40375000</b>
PIN	Technical data	
A	Supply 24 V DC	
B	GND (Supply)	
C	GND (Monitor)	
D	INPUT	
E	GND (Input)	
F	Monitor	
G	PE	

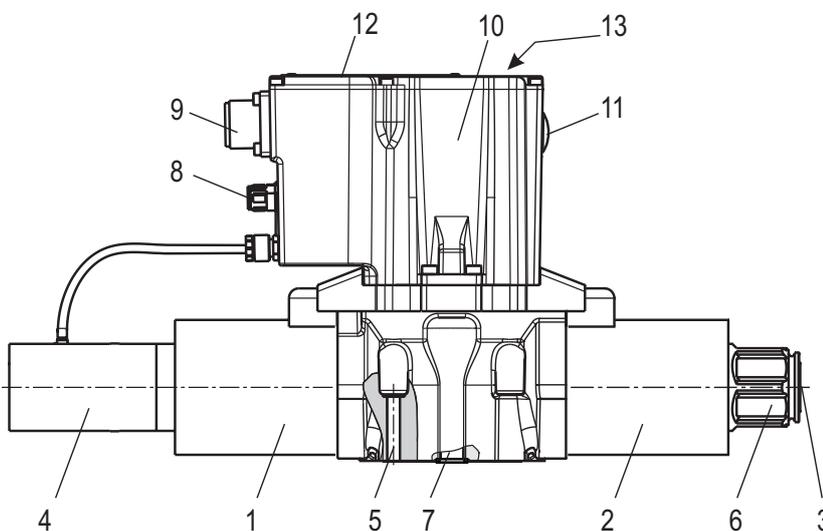


Connector M12x1, plug (5-pol, A-Code), CANopen (optional)		Ordering No.: <b>33997300</b>
PIN	Technical data	
1	nc	
2	nc	
3	CAN GND	
4	CAN HIGH	
5	CAN LOW	





- 1 Solenoid a
- 2 Solenoid b
- 3 Manual override
- 4 Position sensor
- 5 4 mounting holes
- 6 Solenoid fixing nut
- 7 Square ring 12.42x1.68 (5. pcs.), supplied in delivery pack
- 8 Connector M12x1, plug (5-pol, A-Code), CANopen (optional)
- 9 Main supply connector 6+PE MIL (EN 175201-804)
- 10 Aluminium housing with integrated digital electronics
- 11 USB-C connection
- 12 Name plate
- 13 Status LEDs



0,01/100 mm

0,8 (Rmax. 6,3)

Required surface quality of the counterpart