

Technical Features

- › Proportional control valve controlled by integrated digital electronics with the external feedback or proportional control valve controlled by external digital electronics with a spool position sensor
- › Control valve with subplate mounting surface acc. to ISO 4401, DIN 24340 (CETOP 02) standards
- › The valve opening and resulting flow rate can be modulated continuously in proportion to the reference signal
- › Digital converter card allows fine control of the valve spool position, reducing hysteresis and response time and optimizing the performance of the valve
- ›
- › Used for directional and speed control of hydraulic actuators
- › Wide range of interchangeable spools available
- › For versions without integrated digital electronic unit wide range of solenoid electrical terminal versions available
- › The driver directly manages digital settings. It's possible to customize the settings for special applications using the optional kit
- › In the standard version, the valve housing is phosphated for basic surface corrosion protection and as preparation for painting. Steel parts are zinc-coated for 240 h salt spray protection acc. to ISO 9227
- › Enhanced surface protection for mobile sector available for the valve housing and steel parts (ISO 9227, 520 h salt spray)

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 and 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.

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. Connection of supply voltage, connection of the control signal, output signal of spool position sensor (if present) and the +10V DC output voltage is realized by a seven-pole connector M23. The connection of the external feedback is made via the five-pole connector M12x1, where in addition to the input from the external feedback there is also additional supply voltage available for the external sensor.

The coils, including the electronics box, can be rotated around the longitudinal axis by $\pm 90^\circ$.

The digital control unit enables the proportional valve to be controlled on the basis of data required from two feedback circuits. In this case the proportional valve can be used as follows:

1. Proportional directional valve - E01.
2. Only with the internal feedback from the spool position sensor - E02S01.
3. Only with the external feedback (pressure sensor, position sensor, etc.) - E03.
4. With internal and external feedback - E04S01.

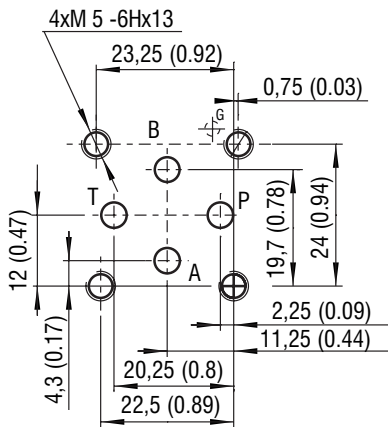
The outlet current to the electromagnet coils is controlled with the help of PWM. The electronic system is equipped with an internal current feedback. The outlet current in case of need may be modulated with the use of a signal of dynamic lubrication. Single function parameters are set up with the use 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 3. 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.

Technical Data

ISO 4401-02-01-0-05



Ports P, A, B, T - max Ø4.5 mm (0.18 in)

Valve Size	04 (D02)	
Max. operating pressure at ports P, A, B	bar (PSI)	320 (4600)
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)	-30 ... +50 (-22 ... +122)
Nominal flow at Δp = 10 bar (145 PSI)	l/min (GPM)	4 (1.1) 8 (2.1) 12 (3.2)
Hysteresis	%	< 6
Hysteresis - closed position loop	%	< 0.5
Protection degree EN 60529		IP 65
Weight - valve with 1 solenoid	kg (lbs)	1.5 (3.30)
- valve with 2 solenoids		1.8 (3.96)
	Data Sheet	Type
General information	GI_0060	Products and operating conditions
Coil types / Connectors	C_8007 / K_8008	C19B* / K*
Mounting interface	SMT_0019	Size 04
Spare parts	SP_8010	
Subplates	DP_0002	DP*-04

Ordering Code

PRM7-04 / - - - - -

Proportional Directional Control Valve Controlled by Digital Electronics

Valve size

Spool symbols

see the table „Spool symbols“

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

flow 4 l/min (1.1 GPM) **04**
flow 8 l/min (2.1 GPM) **08**
flow 12 l/min (3.2 GPM) **12**

Nominal solenoid supply voltage

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

Surface treatment

No designation standard
A zinc-coated (ZnCr-3), ISO 9227 (240 h)
B zinc-coated (ZnNi), ISO 9227 (520 h)

Seals

No designation NBR
V FPM (Viton)

Installation side of electronic unit and position sensor

No designation of port A (case with two solenoids)

Model with integrated electronic

E01 proportional directional valve without feedback
E03 proportional directional valve with external feedback
E02S01 proportional directional valve with position feedback
E04S01 proportional directional valve with position and external feedback

- For proportional valves with two solenoids, one solenoid must be de-energized before the other solenoid can be charged.
- Mounting bolts M5 x 35 DIN 912-10.9 or studs must be ordered separately. Tightening torque is 5 Nm (3.7 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		3Z12	
2Y51		3Y11	
2Y11		3Y12	

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

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 V DC (residual ripple < 10 %)
Input: command signal / according to customer setting		±10 V, 0...10 V, ±10 mA, 4...20 mA, 0...20 mA, 12 mA ±8 mA
Input: spool position sensor signal		0...5 V
Input: external feedback signal		0...10 V, 4...20 mA, 0...20 mA
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 PRM7 Conf.	

Accessories

Order number	Content
24523400	Connecting cable to PC - length 2 m (6.56 ft)
24523500	Connecting cable to PC - length 5 m (16.40 ft)

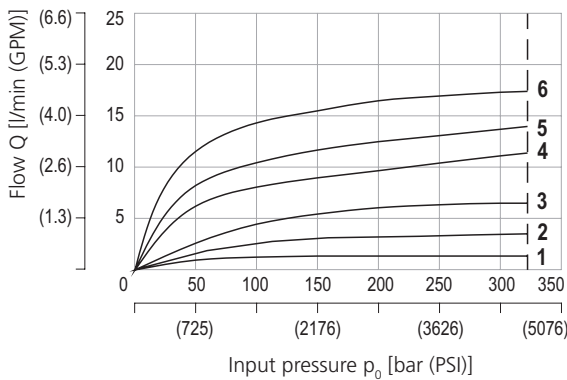
Parametrization software is free to download on argo hytos website in section „Downloads“.

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

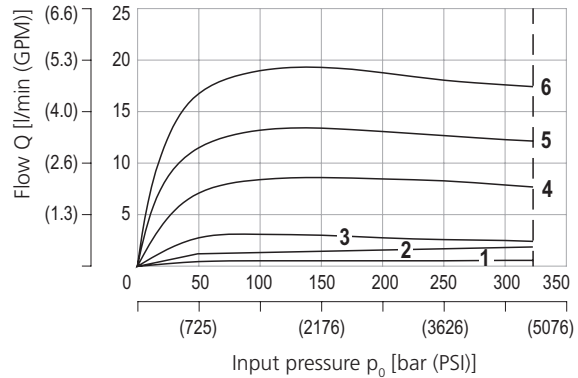
Operating limits: Flow direction P → A / B → T or P → B / A → T

Operating limits (E01 model only)

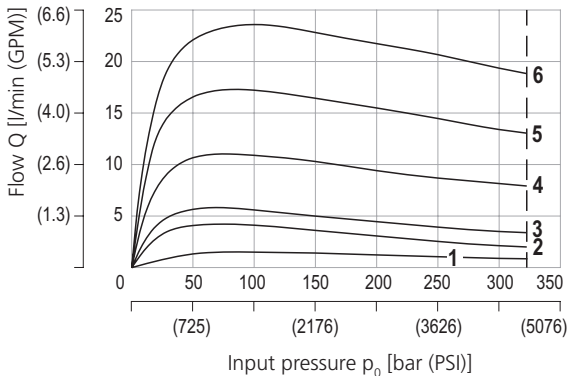
Nominal flow 4 l/min (1.1 GPM)



Nominal flow 8 l/min (2.1 GPM)



Nominal flow 12 l/min (3.2 GPM)

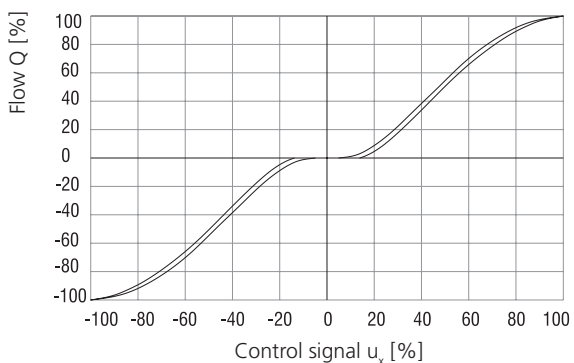


Solenoid current:

- 1 = 50 %
- 2 = 60 %
- 3 = 70 %
- 4 = 80 %
- 5 = 90 %
- 6 = 100 %

Regulated flow related to control signal

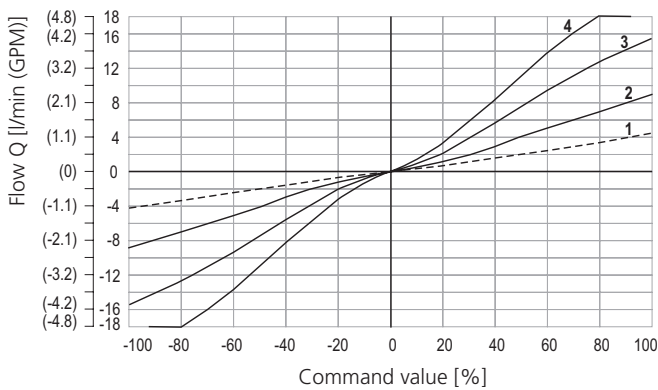
Flow characteristics (E01 model only) $\Delta p = 10 \text{ bar}$ (145 PSI)



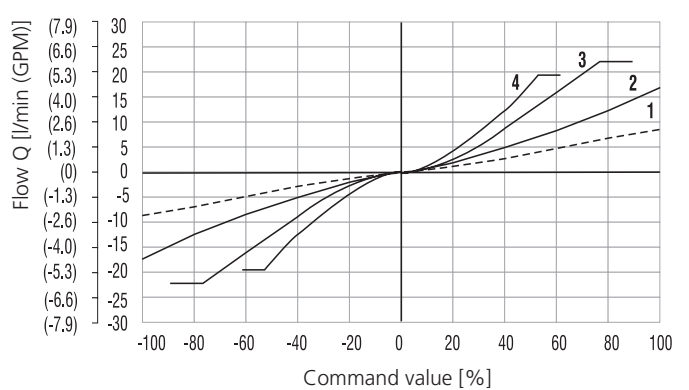
Flow Characteristics measured at $v = 32 \text{ mm}^2/\text{s}$ (156 SUS)

Flow characteristics: (E02S01 model only)

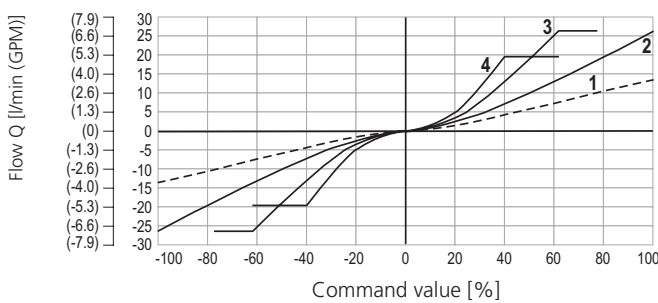
$Q_n = 4 \text{ l/min}$ (1.1 GPM) by $\Delta p = 10 \text{ bar}$ (145 PSI)



$Q_n = 8 \text{ l/min}$ (2.1 GPM) by $\Delta p = 10 \text{ bar}$ (145 PSI)



$Q_n = 12 \text{ l/min}$ (3.2 GPM) by $\Delta p = 10 \text{ bar}$ (145 PSI)



Δp = Valve pressure differential (inlet pressure p_v minus load pressure and return pressure p_r)

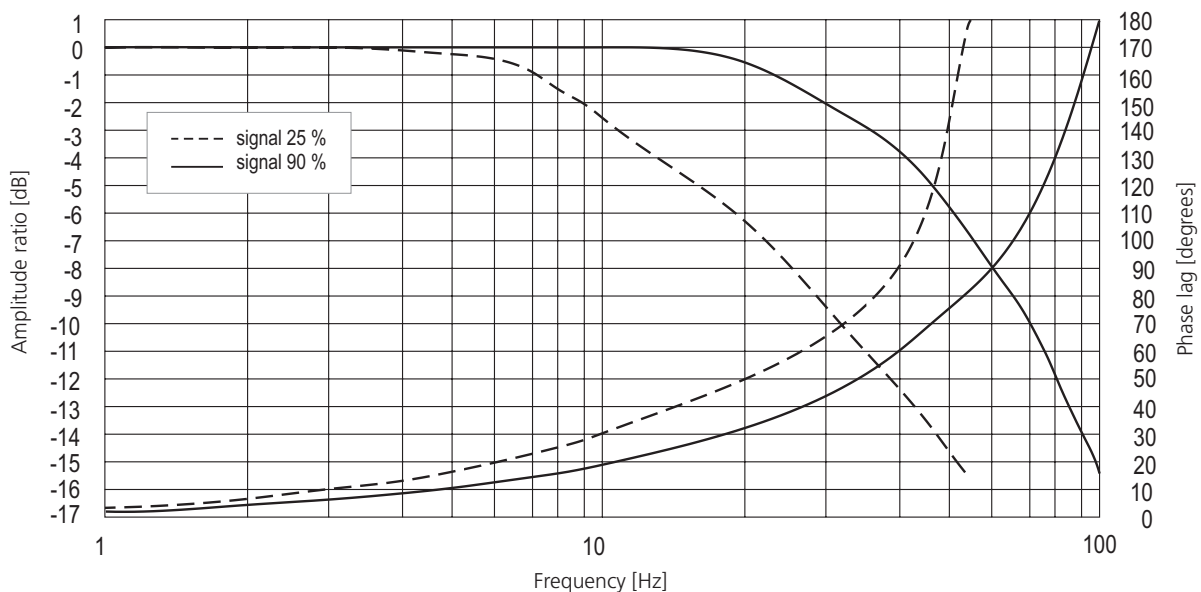
Δp_n = Valve pressure differential for nominal flow Q_n

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

Factory Settings

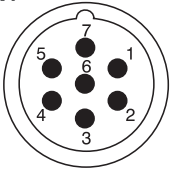
Item	E01		E02S01		E03		E04S01	
	1 Magnet	2 Magnets	1 Magnet	2 Magnets	1 Magnet	2 Magnets	1 Magnet	2 Magnets
Control signal	0 ... 10 V	$\pm 10 \text{ V}$	0 ... 10 V	$\pm 10 \text{ V}$	0 ... 10 V	$\pm 10 \text{ V}$	0 ... 10 V	$\pm 10 \text{ V}$
Signal external feedback	-		-		0 ... 10 V			
Output spool position sensor	-		0 ... 5 V		-		0 ... 5 V	

Frequency Response closed position loop, for E02S01 model



Connectors

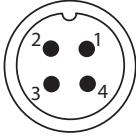
KN1



Connector KN1 - type M23 (male)	
PIN	Technical data
1	*Power supply input
2	*Ground (power supply)
3	Control signal
4	Ground (signal)
5	Power reference signal
6	Control signal of position sensor spool
7	*Protective earth lead (PE)

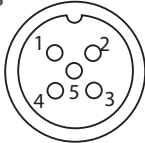
*Recommended min. lead cross section 0.75 mm²

KN2



Connector KN2 - type M12x1 (male)	
PIN	Technical data
1	TxD
2	RxD
3	Ground (signal)
4	Not used

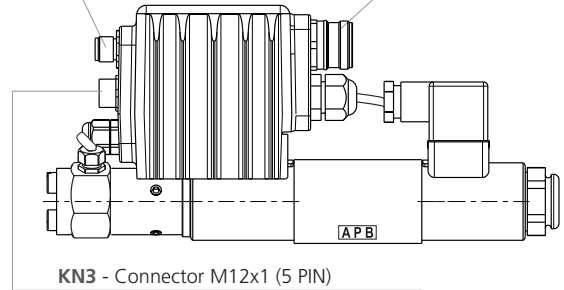
KN3



Connector KN3 - type M12x1 (female)	
PIN	Technical data
1	Power supply output
2	Signal of external feedback
3	Ground
4	Not used
5	Not used

KN1 - Main input connector M23 (7 PIN)
Cable diameter 8 ...12 mm (0.31...0.47 in)

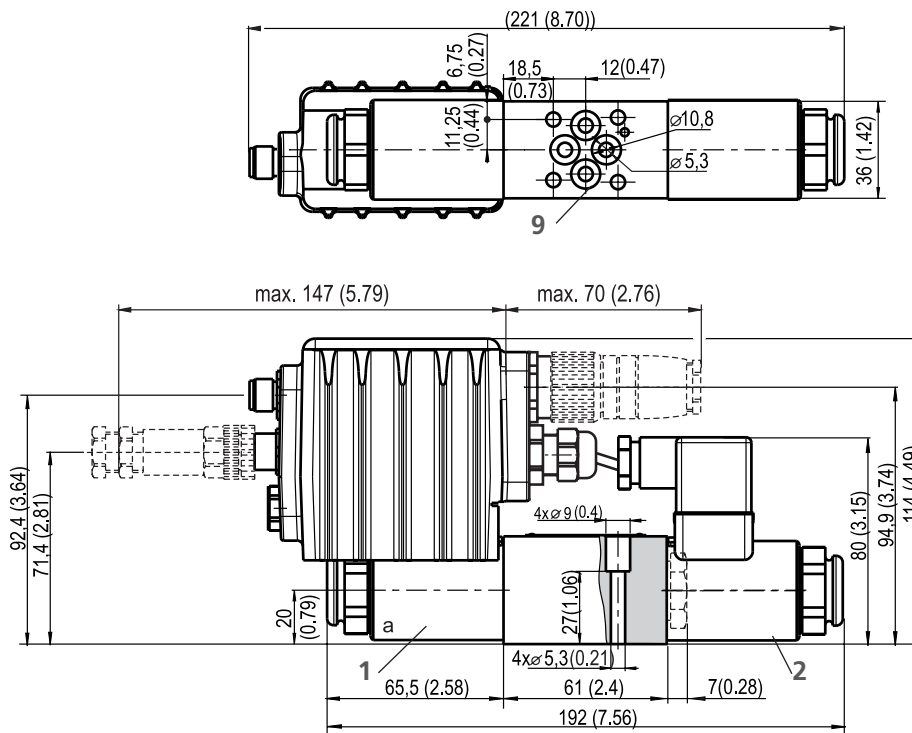
KN2 - Connection RS232 M12x1 (4 PIN)
to program the electronics



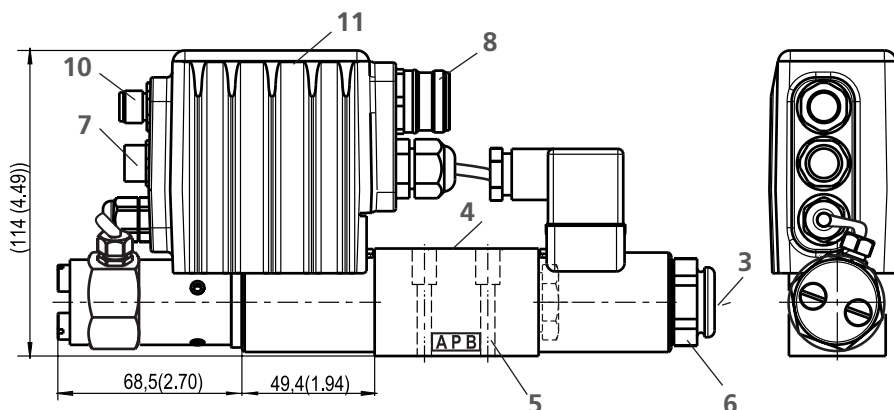
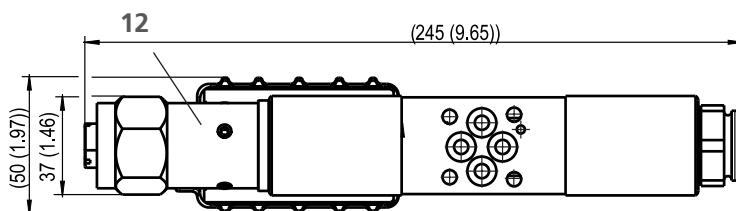
KN3 - Connector M12x1 (5 PIN)
Signal of external feedback
(for configurations E03 and E04S01 only)

Dimensions in millimeters (inches)

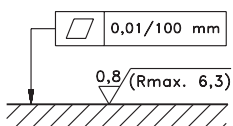
PRM7-043 ... E02S01 - without connector plug for spool position feedback
PRM7-043 ... E04S01



PRM7-063 ... E02S01
PRM7-063 ... E04S01



- 1 Solenoid a
- 2 Solenoid b
- 3 Manual override
- 4 Name plate
- 5 4 mounting holes
- 6 Solenoid fixing nut
- 7 Connector M12x1 for connection of external feedback
- 8 Main supply connector M23
- 9 Square ring 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 quality of the counterpart