### Technical Features

- Proportional directional control spool valve with subplate mounting surface acc. to ISO 4401 (size 10) and DIN 24340 (CETOP 05)
- The valve is designed for control of movement direction of actuator and continuous speed regulation in the given range.
- The volumetric flow through the valve is proportional to the electrical input command signal.
- Valve control with the help of external or internal electronic control unit (ECU) in the form of connector plug.
- Manual override of valve spool.
- Optional type of electric connector for the valve without integrated ECU.
- Adjustable position of coil connector suitable for mounting, achievable by turning the coil after loosening the fastening nut.
- 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 control spool valve is designed to control the movement direction (double solenoid valve), stop, control the speed and position of the piston rod of hydraulic cylinder or shaft of hydraulic motor. The speed of movement is proportional to the volumetric flow through the valve, which is continuously regulated by throttling at the control edges of spool, proportionally to the input command signal. An electronic control unit (ECU) EL7 is used for the valve control. The ECU converts the input command signal into an output current control PWM signal for solenoid coils. The ECU EL7 is available as external for connection to the DIN rail (EL7-E, see datasheet HA 9152) or integrated on the valve in the form of connector plug (EL7-I, see datasheet HA 9151).

### Technical Data

**ISO 4401-05-04-0-05**

- **Valve size**: 10 (D05)
- **Max. operating pressure at port P, A, B**: 350 (5080) bar (PSI)
- **Max. operating pressure at port T**: 210 (3050) bar (PSI)
- **Fluid temperature range (NBR)**: -30 ... +80 (-22 ... +176) °C (°F)
- **Fluid temperature range (FPM)**: -20 ... +80 (-4 ... +176) °C (°F)
- **Ambient temperature range**: -30 ... +50 (-22 ... +122) °C (°F)
- **Nominal flow rate Qmax at Δp=10 bar (145 PSI)**: 30 (7.9) / 60 (15.9) / 80 (21.13) l/min (GPM)
- **Hysteresis**: < 6%
- **Weight - valve with 1 solenoid**: 4.3 (9.48) kg (lbs)
- **Weight - valve with 2 solenoids**: 5.8 (12.78) kg (lbs)
- **Min. protection degree acc. to EN 60529 (see page 4 - coil types)**: IP65

#### Technical data of proportional solenoid

- **Nominal supply voltage**: V 12 DC 24 DC
- **Limit current**: A 1.9 1.1
- **Mean resistance value at 20 °C (68 °F)**: Ω 4.7 13.9

#### Technical data of electronic control unit EL-7

- **Operating supply voltage Ucc**: V DC 9 ... 32
- **Reference voltage Uref**: V DC 5
- **Max. current at Uref**: mA 20
- **Types of input command signal, when EL7 is used**: see datasheet EL7*
- **Max. output current / 1 coil**: A 3
- **PWM frequency**: Hz 80 ... 1 000
- **Resolution of A/D converters**: bit 12
- **Ramp function**: s 0 ... 45
- **Dither – amplitude***: % from Imax 0 ... 30 % from Imax
- **Dither – frequency***: Hz 60 ... 300

* When the dither is activated, the PWM frequency is automatically set to 15 kHz

### Datasheet

- **General information**: GI_0060
- **Coil types / Connectors**: C_8007 / K_8008
- **Mounting interface**: SMT_0019
- **Spare parts**: SP_8010
- **Subplates**: DP_0002

Subject to change · PRM6-10_5115_5en_08/2021

www.argo-hytos.com
- For proportional valves with two solenoids, single solenoid must be de-energized before the other solenoid can be charged.
- Mounting bolts M6 x 45 DIN 912-10.9 or studs must be ordered separately. Tightening torque is 14+1 Nm (10.3+0.7 Ibf.ft).
- Besides the shown, commonly used valve versions other special models are available.
- Contact our technical support for their identification, feasibility and operating limits.

**Ordering Code**

| PRM6-10 | / | - | - |

**Proportional directional control spool valve**

**Valve size**

**Spool symbols**

see table „Spool Symbols“

**Nominal flow rate at \( \Delta p = 10 \text{ bar (145 PSI)} \)**

<table>
<thead>
<tr>
<th>Flow (l/min)</th>
<th>30</th>
<th>60</th>
<th>80</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow (GPM)</td>
<td>7.9</td>
<td>15.9</td>
<td>21.9</td>
</tr>
</tbody>
</table>

**Rated supply voltage of solenoid**

(at the coil terminal)

<table>
<thead>
<tr>
<th>Voltage</th>
<th>12 V DC</th>
<th>24 V DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>12</td>
<td>24</td>
</tr>
</tbody>
</table>

**Integrated electronic control unit**

(standardly on the solenoid „a“)

- Electronic control unit EL7-IA with an analogue input command signal
- Electronic control unit EL7-IC for connection to the CAN bus

**Seals**

NBR

FPM (Viton)

**Manual override**

- standard (operated by pin)
- cap nut covered
- rubber boot protected

**Connector (only for valves without EL7-I)**

- E1: EN 175301-803-A
- E2: E1 with quenching diode
- E3: AMP Junior Timer - radial direction (2 pins; male)
- E4: E3 with quenching diode
- E8: E8 with quenching diode
- E9: Deutsch DT04-2P - axial direction (2 pins; male)
- E12A: E12A with quenching diode

**Connector plug acc. to EN 175301-803-A**

- with integrated electronic control unit
- connector plug EN 175301-803-A without rectifier for the valve without integrated ECU and with coils E1 or E2

**Typ **

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Typ</th>
</tr>
</thead>
<tbody>
<tr>
<td>2Z51</td>
<td>3Z11</td>
</tr>
<tr>
<td>2Z11</td>
<td>3Z12</td>
</tr>
<tr>
<td>2Y51</td>
<td>3Y11</td>
</tr>
<tr>
<td>2Y11</td>
<td>3Y12</td>
</tr>
</tbody>
</table>

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

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

**Operating limits:** Flow direction \( P \rightarrow A / B \rightarrow T \) or \( P \rightarrow B / A \rightarrow T \)

**Nominal flow 30 l/min (7.95 GPM)**

<table>
<thead>
<tr>
<th>Flow Q [l/min (GPM)]</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input pressure ( p_0 ) [bar (PSI)]</td>
<td>(0.8)</td>
<td>(5.3)</td>
<td>(15.9)</td>
</tr>
</tbody>
</table>

**Nominal flow 60 l/min (15.85 GPM)**

<table>
<thead>
<tr>
<th>Flow Q [l/min (GPM)]</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input pressure ( p_0 ) [bar (PSI)]</td>
<td>(0.6)</td>
<td>(5.3)</td>
<td>(15.9)</td>
<td>(21.8)</td>
</tr>
</tbody>
</table>

**Solenoid current:**

<table>
<thead>
<tr>
<th>Current</th>
<th>1 = 40 %</th>
<th>2 = 60 %</th>
<th>3 = 80 %</th>
<th>4 = 100 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>(725) (1450)</td>
<td>(2180) (2900)</td>
<td>(3630) (4350)</td>
<td>(5080) (5800)</td>
</tr>
</tbody>
</table>

www.argo-hytos.com

Subject to change · PRM6-10_5115_5en_08/2021
**Characteristics** measured at $v = 32 \text{ mm/s} \ (156 \text{ SUS})$

Nominal flow 80 l/min (21.13 GPM)

![Flow rate graph](image)

Solenoid current:
1. $I_1 = 40 \%$
2. $I_2 = 60 \%$
3. $I_3 = 80 \%$
4. $I_4 = 100 \%$

Input pressure $p_0 \ \text{[bar (PSI)]}$

Flow $Q \ \text{[l/min (GPM)]}$

Spool position $s \ \text{[%]}$

Control signal $u \ \text{[%]}$

**Regulated flow related to control signal**

$\Delta p = 10 \text{ bar (145 PSI)}$

![Flow rate comparison graph](image)

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 $v = 32 \text{ mm/s} \ (156 \text{ SUS}), \ \Delta p = 10 \text{ bar (145 PSI)}$

![Steady Spool Position](image)

<table>
<thead>
<tr>
<th>Steady Spool Position $S_s \ \text{[%]}$</th>
<th>$t_2 \ \text{[ms]}$</th>
<th>$t_4 \ \text{[ms]}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>85</td>
<td>100</td>
</tr>
<tr>
<td>75</td>
<td>70</td>
<td>85</td>
</tr>
<tr>
<td>50</td>
<td>55</td>
<td>75</td>
</tr>
<tr>
<td>25</td>
<td>45</td>
<td>55</td>
</tr>
</tbody>
</table>

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.

--- the control signal course of the integrated electronics

**Frequency Response**

![Frequency response graph](image)

**Electronic control unit EL7**

The ECU EL7 allows direct independent control of the valve with an analogue input command signal or connection of the valve to the CANBus control system of machine.

**Proportional valve with external electronic control unit EL7-E**

The valve can be controlled by external ECU EL7-E designed for connection to a DIN rail. The user electrically connects the ECU to the valve with a cable. The ECU EL7-E can be used for control of single solenoid or two solenoid valves.

Selection and setting of ECU parameters is described in datasheet HA 9152

**Valve with single solenoid and integrated ECU EL7-I*-1**

The ECU in the form of connector plug is simply mounted on the socket of connector EN 175301-803-A of solenoid coil and fastened with a fixing screw.

**Valve with two solenoids and integrated ECU EL7-I*-2-105**

The ECU in the form of connector plug is simply mounted on the socket of connector EN 175301-803-A of solenoid coil and fastened with a fixing screw. The second solenoid is connected to the ECU with a cable. If the integrated ECU EL7-I is ordered separately, the length of cable must be specified. The length of cable is defined as a distance between fastening screws of ECU and connector plug.

Selection and setting of ECU parameters is described in datasheet HA 9151
# Solenoid Coil in millimeters (inches)

<table>
<thead>
<tr>
<th>E1, E2</th>
<th>E3, E4</th>
<th>E8, E9</th>
<th>E12A, E13A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection Degree IP65</td>
<td>Protection Degree IP67</td>
<td>Protection Degree IP67</td>
<td>Protection Degree IP67 / 69K</td>
</tr>
</tbody>
</table>

The indicated IP protection level is only achieved if the connector is properly mounted.

## Manual Override in millimeters (inches)

<table>
<thead>
<tr>
<th>No Designation</th>
<th>Designation N1</th>
<th>Designation N2</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Standard (operated by pin)</td>
<td>- Cap Nut Covered</td>
<td>- Rubber Boot Protected</td>
</tr>
</tbody>
</table>

In case of solenoid malfunction or power failure, the spool of the valve can be shifted by manual override as long as the pressure in port T does not exceed 25 bar (363 PSI). For alternative manual overrides contact our technical support.

## Dimensions in millimeters (inches)

### PRM6-103x/x-xxx-x
- Valve with two solenoids
- Example with electrical terminal EN 175301-803-A (E1, E2)

### PRM6-102x/x-xxx-x
- Valve with single solenoid “b”
- Spool type 2Z11, 2Y11

### PRM6-103*/*/-*EL7*...
- Valve with two solenoids and integrated electronic control unit EL-I*-2-105

### PRM6-102*/*/-*EL7*...
- Valve with single solenoid “a” and integrated electronic control unit EL-I*-1