EPP3 Series
Electropneumatic pressure regulator
with digital control signal

FLUIDS UNDER CONTROL
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INTRODUCTION

The product
A range of electropneumatic pressure regulators G1/4 and G1/2 which, by means of an integrated electronic control system and pulse width modulated solenoid valves, controls the output pressure proportionally to a digital electrical signal. A high precision is achieved by means of an internal feedback through an integrated pressure sensor.

Applications
Pressure control independent of flow in electropneumatic control systems, particularly in the following industries:
- Robotics: welding, painting lines, etc.
- Paper and printing: tension regulations, speed- and brake control for rolls
- Machine Tools: Plastic moulding, laser welding, presses, polishing, etc.
- Trucks and Trains: control of adaptive suspensions.

Benefits
- Simplification of control systems by reducing the number of components
- More flexibility of the controls
- Very fast response times
- Excellent linearity and hysteresis
- No air consumption in rest position
- Increase of the productivity (performances, quality, reliability)
- Direct interface to programmable controllers.

THE REGULATOR EPP3 - DESCRIPTION OF OPERATION

The EPP3 Series is a family of electrically remote-controlled pneumatic pressure regulators with closed loop integrated electronic control. It allows to regulate the outlet pressure proportionally to an electrical control signal.

The EPP3 regulator comprises a traditional servo-operated pneumatic pressure regulator, where the pilot chamber is fed by one or the other of two pulse width modulated 2-way solenoid valves. The pressure sensor measures the outlet pressure of the regulator and provides a feedback signal to the amplifier. Any difference between the control signal and the feedback signal is converted to a digital signal to energize the coil of one or the other 2-way valves to correct the position of the regulator.

The control signal is digital (6 bit + parity + enable).

The inlet of the “filling valve” is connected directly to the main inlet P of the regulator; when energized, this valve will fill the servo-chamber for increasing the pressure at the outlet A of the regulator.

When the other “exhaust valve” is energized (reduction of pressure at the outlet A of the regulator), the pressure of the servo-chamber will be exhausted through a discharge orifice located between the cover and the body and directly fed to the atmosphere without silencer.

The exhaust of the main regulated pressure will be made through the quick exhaust R. The use of a conventional silencer is recommended. Both solenoid valves assure the filling or emptying of the servo-chamber in order to increase or decrease the pressure at the outlet of the regulator. In rest position of the valves all ports are blocked.
**TECHNICAL DATA**

**Fluid:** Lubricated or non lubricated air and neutral gases (recommended filtration: 25-50 µ).

**Temperature range:**
- Ambient: 0 to 50°C
- Fluid: 0 to 50°C

**Inlet pressure range:** up to 12 bar (the inlet pressure must always be at least 1 bar above the regulated pressure).

**Outlet pressure range:** 0.2 to 10 bar, ≈ 160 mbar/step.

**Hysteresis:** ≈ 200 mbar (Factory set up).

**Air consumption at constant control signal:** 0

**Supply voltage:** 24 V DC ± 15% (Max. ripple 1 V).

**Power consumption:** max. 6 W with 24 V DC and constant changes of the control signal.

**Control signal:** Digital 6 bits.

**Parity signal:** Sent by user at the same time as the control signal. Parity + data must be even.

**Enable signal:** Sent by user after control signal and parity. Ramp-up part of the signal is considered active (signal duration = 10 ms mini).

**Electronic level:**
- Level 0 = 0 to 6 V
- Level 1 = 10 to 26 V
- Impedance 4.2 KΩ.

**Alarm signal:**
- 24 V if parity and output pressure are correct
- 0 V if there is something wrong
- I = 100 mA maxi.

**Indicative response time:** With a volume of 330 cm³ at the outlet of the regulator:
- Filling: 2 to 4 bar - 2 to 8 bar
- Step response: ≈ 60 ms - ≈ 120 ms
- Emptying: 4 to 2 bar - 8 to 2 bar
- Step response: ≈ 70 ms - ≈ 130 ms.

**Safety position:** In case of voltage supply failure, the regulated pressure will be kept constant (with eventual discrepancy due to loss of pressure in the servo-chamber).

**Electrical connection:** Connector (11 P +E).

**Life expectancy:** > 50 Mio changes of control signal steps.

**Mounting position:** Indifferent (recommended position: upright; electronic part on top).

**Resistance to vibrations:** 30 g in all directions.

**Degree of protection:** IP 65.

**Assembly:** Silicone free.

**Electromagnetic compatibility:** In accordance with IEC 801-4 part 4 standards.

**Installation and setting instructions:** See publication MI-9202 and appendix supplied with the product.
**HYSTERESIS DIAGRAM**

Control signal frequency (Hz) vs. Outlet pressure (bar)

- ~ 200 mbar (factory set up)

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**TRANSFER DIAGRAM**

Amplitude damping (dB) vs. Control signal frequency (Hz)

Phase shift, \( \Phi \), between set value and control signal

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**FLOW DATA - OUTLET PRESSURE IN FUNCTION OF FLOW AT CONSTANT CONTROL SIGNAL (P1 = 10 bar)**

- EPP 3 G 1/2
- EPP 3 G 1/4

Outlet pressure vs. Flow rate - m³/h
**EPP3 - BLOCK DIAGRAMS**

The microprocessor receives first datas and parity, then an enable signal (ramp-up transient). After a validity checking of the datas, the microprocessor generates an analogic signal which is compared to the feedback signal sent by the pressure sensor in the differential amplifier of the electronic control unit.

Any difference between both amplifier inputs results in a corresponding output which drives the appropriate 2-way pulse width modulated solenoid valve so that the pilot piston moves to correct the pressure.

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**CONNECTOR**

Type: Hirschmann N 11 R AM/N 11 R FF

<table>
<thead>
<tr>
<th>Pins</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0 Volt</td>
</tr>
<tr>
<td>2</td>
<td>24 Volt DC</td>
</tr>
<tr>
<td>3(LSB)</td>
<td>D3</td>
</tr>
<tr>
<td>4</td>
<td>D4</td>
</tr>
<tr>
<td>5</td>
<td>D5</td>
</tr>
<tr>
<td>6</td>
<td>D6</td>
</tr>
<tr>
<td>7</td>
<td>D7</td>
</tr>
<tr>
<td>8(MSB)</td>
<td>D8</td>
</tr>
<tr>
<td>9(PB)</td>
<td>Parity bit</td>
</tr>
<tr>
<td>10(E)</td>
<td>Enable</td>
</tr>
<tr>
<td>11</td>
<td>“24V-0V”</td>
</tr>
<tr>
<td></td>
<td>not connected</td>
</tr>
</tbody>
</table>

* Alarm voltage = supply voltage - 15% /+0%
DIMENSIONS - TORQUES

For self tapping screws M4 max. 2 Nm

Socket for HIRSCHMANN N11 R FF Connector

Inlet G 1/2" max. 2 Nm for G 1/2

Outlet G 1/2" max. 42 Nm for G 1/2

Exhaust G 1/2" max. 24 Nm for G 1/4

ACCESSORIES

Mounting brackets
Supplied with 4 x M4 screws
**DESIGNATION CODE**

EPP3 J C 41 D A06 10 ...

- **Manufacturing date**
- **Max. regulated pressure value**
  10 = up to 10 bar
- **Special design reference**
- **Digital control signal (6 bits)**
- **Integrated pressure sensor**
- **Port size reference**
  2 = 1/4", 4 = 1/2"
- **Port thread**
  C = BSP
  O = NPT
- **Body type**
  J = plastic body with aluminium jacket

**MAINTENANCE KIT**

Kit n° 481203-193
Plungers and seals for pilot valves

**Torques**

- 1...1.2 Nm
- 3.5...4 Nm
- 1.4...1.8 Nm

No. 481203-193