Datasheet P-702CV
Digital Pressure Controller for Gases and Liquids

> Introduction

Bronkhorst High-Tech model P-702CV digital electronic pressure controllers have a well-proven compact thru-flow design. The instruments include a diaphragm type piezo-resistive pressure sensor for pressure measurement and a direct acting, solenoid control valve. The pressure controller performs with high accuracy and repeatability. EL-PRESS model P-702CV is a "back pressure controller", designed for upstream (P1) pressure control.

> Technical specifications

### Measurement / control system

- **Accuracy**: ± 0,5% of full scale (FS)
- **Pressure control rangeability**: 1 : 5 (with flow range 1 : 50)
- **Response time sensor**: 2 msec
- **Max. Kv-value**: 6,6 x 10^-2
- **Control stability**: ± 0,05% FS (typical for 1 l/min N2 at specified process volume)
- **Operating temperature**: -10…+70°C
- **Temperature sensitivity**: 0,1% FS/°C
- **Leak integrity**: tested < 2 x 10^-9 mbar l/s He
- **Attitude sensitivity**: < 0,3 mbar (at 90° change)
- **Warm-up time**: negligible

### Mechanical parts

- **Material (wetted parts)**: stainless steel 316L or comparable
- **Surface quality (wetted parts)**: Ra = 0,8 μm
- **Process connections**: compression type or face seal couplings
- **Seals**: standard: Viton, options: EPDM, FFKM (Kalrez®)
- **Ingress protection (housing)**: IP40

### Calibration

References verified by an ISO 17025 calibration laboratory, directly traceable to Dutch and international standards.

Although all specifications in this datasheet are believed to be accurate, the right is reserved to make changes without notice or obligation.

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### Electrical properties

- **Power supply**: +15…24 Vdc
- **Power consumption**: Supply at voltage I/O at current I/O
  - 15 V: 200 mA; 223 mA
  - 24 V: 132 mA; 150 mA
- **Extra for fieldbus**: PROFIBUS DP: add 53 mA (15 V supply) or 30 mA (24 V supply)
  - (if applicable) PROFINET: add 77 mA (15 V supply) or 48 mA (24 V supply)
  - EtherCAT®: add 66 mA (15 V supply) or 41 mA (24 V supply)
  - DeviceNet™: add 48 mA (24 V supply)
- **Analog output**: 0…5 (10) Vdc, min. load impedance > 2 kΩ;
  - 0 (4)…20 mA (sourcing), max. load impedance < 375 Ω
- **Analog setpoint**: 0…5 (10) Vdc, min. load impedance > 100 kΩ;
  - 0 (4)…20 mA, load impedance ~250 Ω
- **Digital communication**
  - Standard (9-pin D-conn. male): RS232
  - By optional interface board: PROFIBUS DP, DeviceNet™, Modbus RTU/ASCII, FLOW-BUS, EtherCAT, PROFINET

### Electrical connection

- **Analog/RS232**: 9-pin D-connector (male);
- **PROFIBUS DP**: bus: 9-pin D connector (female); power: 9-pin D-connector (male);
- **DeviceNet™**: 5-pin M12-connector (male);
- **Modbus/FLOW-BUS**: RJ45 modular jack
- **EtherCAT/PROFINET**: 1 x RJ45 modular jack (in/out)

### Sensor codes, ranges and burst pressure

<table>
<thead>
<tr>
<th>Sensor code</th>
<th>Pressure ranges (min/max)</th>
<th>Burst pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>350A (Absolute pressure)</td>
<td>2…100 / 7…350 mbar</td>
<td>1,4 bara</td>
</tr>
<tr>
<td>1K1A .. ..</td>
<td>0.007…0.35 / 0.02…1.1 bar</td>
<td>3,1 bara</td>
</tr>
<tr>
<td>6K1A .. ..</td>
<td>0.02…1.1 / 0.12…6 bar</td>
<td>10,5 bara</td>
</tr>
<tr>
<td>21K1A .. ..</td>
<td>0.12…6 / 0.4…20 bar</td>
<td>62 bara</td>
</tr>
<tr>
<td>M16A .. ..</td>
<td>0.4…20 / 1.28…64 bar</td>
<td>200 bara</td>
</tr>
<tr>
<td>350R (Relative pressure)</td>
<td>2…100 / 7…350 mbar</td>
<td>1,4 barg</td>
</tr>
<tr>
<td>1K1R .. ..</td>
<td>0.007…0.35 / 0.02…1.1 barg</td>
<td>3,1 barg</td>
</tr>
<tr>
<td>6K1R .. ..</td>
<td>0.02…1.1 / 0.12…6 barg</td>
<td>10,5 barg</td>
</tr>
<tr>
<td>21K1R .. ..</td>
<td>0.012…6 / 0.4…20 barg</td>
<td>62 barg</td>
</tr>
</tbody>
</table>
The Bronkhorst High-Tech EL-PRESS pressure sensor is a piezoresistive bridge on the surface of a silicon chip, with a pressure diaphragm, whose thickness determines the pressure range. When a pressure acts on this chip, the diaphragm flexes, and the resistor values of the bridge alter in proportion to the pressure. The measuring cell is separated from the external pressure by a thin, sensitive stainless steel diaphragm, and the sealed off cavity between diaphragm and cell is filled with oil. Since the standard oil filling is flammable, Bronkhorst advises to take precautions when oxygen or any other explosive fluid is used.

**State of the art digital design**

Today’s EL-PRESS series are equipped with a diaphragm type piezoresistive pressure sensor and a digital pc-board, offering high accuracy, excellent temperature stability and fast response. The basic digital pc-board contains all of the general functions needed for measurement and control. In addition to the standard RS232 and RS485 output, the instruments also offer analog I/O. Furthermore, an optionally integrated interface board provides DeviceNet™, PROFIBUS DP, Modbus RTU/ASCII, EtherCAT, PROFINET or FLOW-BUS protocols via a separate connector.

**Model number identification**

- **Base**
  - 7 Back pressure controller
- **Sensor code**
  - Factory selected
- **Analog output**
  - A 0...5 Vdc
  - B 0...10 Vdc
  - F 0...20 mA sourcing
  - G 4...20 mA sourcing
- **Communication (I/O)**
  - A RS232 + analog (n/c control)
  - B RS232 + analog (n/o control)
  - D RS232 + DeviceNet (n/c)
  - E RS232 + DeviceNet (n/o)
  - M RS232 + Modbus (n/c)
  - N RS232 + Modbus (n/o)
  - P RS232 + PROFIBUS DP (n/c)
  - Q RS232 + PROFIBUS DP (n/o)
  - R RS232 + FLOW-BUS (n/c)
  - S RS232 + FLOW-BUS (n/o)
  - T RS232 + EtherCAT (n/c)
  - U RS232 + EtherCAT (n/o)
  - V RS232 + PROFINET (n/c)
  - W RS232 + PROFINET (n/o)
- **Seals**
  - V Viton (factory standard)
  - E EPDM
  - K Kalrez® (FFKM)
- **Supply voltage**
  - D + 15...24 Vdc
- **Pressure rating**
  - 0 64 bar
- **Connections (in/out)**
  - 1 1/8” OD compression type
  - 2 ¼” OD compression type
  - 3 6 mm OD compression type
  - 8 ¼” Face seal male

**Functional scheme of the pressure sensor**

**Functional scheme of the digital PC-board**
Hook-up diagram for analog or RS232 communication

Hook-up diagrams for fieldbus communication

For the available fieldbus options we refer to the various hook-up diagrams as indicated below. If you are viewing this datasheet in digital format, you may use the hyperlink to each of the drawings. Otherwise please visit the download section on www.bronkhorst.com or contact our local representatives.
**> Dimensions (mm) and weight (kg)**

<table>
<thead>
<tr>
<th>Compression type</th>
<th>Size A</th>
</tr>
</thead>
<tbody>
<tr>
<td>adapter 3 mm OD</td>
<td>26.1</td>
</tr>
<tr>
<td>adapter 6 mm OD</td>
<td>26.4</td>
</tr>
<tr>
<td>adapter 8 mm OD</td>
<td>29.4</td>
</tr>
<tr>
<td>adapter 10 mm OD</td>
<td>30.2</td>
</tr>
<tr>
<td>adapter 12 mm OD</td>
<td>32.5</td>
</tr>
<tr>
<td>adapter 1/8 OD</td>
<td>26.1</td>
</tr>
<tr>
<td>adapter 1/4 OD</td>
<td>26.4</td>
</tr>
<tr>
<td>adapter 3/8 OD</td>
<td>29.9</td>
</tr>
<tr>
<td>adapter 1/2 OD</td>
<td>32.7</td>
</tr>
</tbody>
</table>

Face-seal male  Size A
adapter 1/4" inlet  23.2

*) Dimension A is typical finger-tight.

**> Options and accessories**

- Free software support for operation, monitoring, optimizing or to interface between digital instruments and windows software.
- BRIGHT compact local Readout/Control modules
- E-8000 Power Supply
- Interconnecting cables for power and analog/digital communication

**> Alternatives**

- IN-PRESS Pressure Meter with industrial (IP65) housing with close coupled Control Valve
- IQ+FLOW, world's smallest Pressure Controller
- EL-PRESS Metal Sealed Pressure Controller for Semiconductor or other high purity applications
- Pre-assembled multi-channel solutions (mass flow, pressure or combinations): series FLOW-SMS