Industrial Pressure Transmitter

Ceramic Sensor

accuracy according to IEC 60770: 0.5 % FSO

The industrial pressure transmitter DMK 331 with ceramic sensor has been especially designed for pasty, polluted or aggressive media and for oxygen applications at low pressure range.

As with all industrial pressure transmitters made by BD|SENSORS, you may choose between various electrical and mechanical connections also on DMK 331.

Preferred areas of use are

- Plant and Machine Engineering
- Energy Industry
- Environmental Engineering (water - sewage - recycling)
- Medical Technology

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**Nominal pressure:**

- from 0 ... 400 mbar
- up to 0 ... 600 bar

**Output signals:**

- 2-wire: 4 ... 20 mA
- 3-wire: 0 ... 20 mA / 0 ... 10 V
- others on request

**Special characteristics:**

- pressure port G 1/2" flush for pasty and polluted media
- pressure port G 1/2" open port PVDF for aggressive media
- oxygen application

**Optional versions:**

- IS-version
  Ex ia = intrinsically safe for gases and dusts
- SIL 2
  according to IEC 61508 / IEC 61511
- customer specific versions
### Technical Data

#### Input Pressure Range

<table>
<thead>
<tr>
<th>Range</th>
<th>1 bar</th>
<th>0.4 bar</th>
<th>0.6 bar</th>
<th>1 bar</th>
<th>1.6 bar</th>
<th>2.5 bar</th>
<th>4 bar</th>
<th>6 bar</th>
<th>10 bar</th>
<th>16 bar</th>
<th>25 bar</th>
<th>40 bar</th>
<th>60 bar</th>
<th>100 bar</th>
<th>160 bar</th>
<th>250 bar</th>
<th>400 bar</th>
<th>600 bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure</td>
<td>-1</td>
<td>0.6</td>
<td>1</td>
<td>1.6</td>
<td>2.5</td>
<td>4</td>
<td>6</td>
<td>10</td>
<td>16</td>
<td>25</td>
<td>40</td>
<td>60</td>
<td>100</td>
<td>160</td>
<td>250</td>
<td>400</td>
<td>600</td>
<td>900</td>
</tr>
<tr>
<td>Nominal Pressure</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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</tr>
</tbody>
</table>

#### Overpressure

| Pressure       | 4     | 1      | 2      | 2      | 4      | 4      | 10    | 10    | 20     | 40     | 40     | 100    | 100    | 200     | 200     | 400     | 600     | 800     |
|----------------|------|-------|-------|-------|-------|-------|------ |------ |------- |------- |------- |------ |------ |------ |-------- |-------- |-------- |-------- |-------- |-------- |

#### Burst Pressure

| Pressure       | 7     | 2      | 4      | 4      | 5      | 5      | 12    | 12    | 25     | 50     | 50     | 120    | 120    | 250     | 250     | 500     | 500     | 650     | 880     |
|----------------|------|-------|-------|-------|-------|-------|------ |------ |------- |------- |------- |------ |------ |------ |-------- |-------- |-------- |-------- |-------- |-------- |

#### Vacuum Resistance

- \( P_{\text{vac}} \geq 1 \text{ bar: unlimited vacuum resistance} \)
- \( P_{\text{vac}} < 1 \text{ bar: on request} \)

#### Output Signal / Supply

- **Standard**
  - 2-wire: 4 ... 20 mA / \( V_S = 8 ... 32 \text{ VDC} \)
  - 3-wire: 0 ... 20 mA / \( V_S = 14 ... 30 \text{ VDC} \)
  - 0 ... 10 V / \( V_S = 14 ... 30 \text{ VDC} \)

- **Option IS-protection**
  - 2-wire: 4 ... 20 mA / \( V_S = 10 ... 28 \text{ VDC} \)
  - 3-wire: 0 ... 20 mA / \( V_S = 14 ... 30 \text{ VDC} \)
  - 0 ... 10 V / \( V_S = 14 ... 30 \text{ VDC} \)

#### Performance

- **Accuracy**
  - \( \leq \pm 0.5 \% \text{ FSO} \)

- **Permissible Load**
  - current 2-wire: \( R_{\text{max}} = \left( V_S - V_{\text{S min}} \right) / 0.02 \Omega \)
  - current 3-wire: \( R_{\text{max}} = 500 \Omega \)

- **Influence Effects**
  - supply: \( 0.05 \% \text{ FSO} / 10 \text{ V} \)
  - load: \( 0.05 \% \text{ FSO} / k\Omega \)

- **Long Term Stability**
  - \( \leq \pm 0.3 \% \text{ FSO} / \text{ year} \)

- **Response Time**
  - 2-wire: \( \leq 10 \text{ msec} \)
  - 3-wire: \( \leq 3 \text{ msec} \)

#### Thermal Effects

- **Thermal Error**
  - \( \leq \pm 0.2 \% \text{ FSO} / 10 \text{ K} \)

- **Permissible Temperatures**
  - medium: -40 ... 125 °C
  - electronics / environment: -40 ... 85 °C
  - storage: -40 ... 100 °C

#### Electrical Protection

- **Short-Circuit Protection**
  - Permanent

- **Reverse Polarity Protection**
  - No damage, but also no function

- **Electromagnetic Compatibility**
  - Emission and immunity according to EN 61326

#### Mechanical Stability

- **Vibration**
  - 10 g RMS (25 ... 2000 Hz) according to DIN EN 60068-2-6

- **Shock**
  - 500 g / 1 msec according to DIN EN 60068-2-27

#### Materials

- **Pressure Port**
  - standard: Stainless steel 1.4404 (316 L)
  - optional for G1/2" open port with nominal pressure range up to 60 bar: PVDF others on request

- **Housing**
  - Stainless steel 1.4404 (316 L)

- **Option Compact Field Housing**
  - Stainless steel 1.4305 (303) with cable gland brass, nickel plated others on request

- **Seals (media wetted)**
  - Standard: FKM
  - Options: EPDM (for \( P_m \leq 160 \text{ bar} \)), NBR others on request

- **Diaphragm**
  - Ceramic \( \text{Al}_2\text{O}_3 \), 96 %

- **Media Wetted Parts**
  - Pressure port, seals, diaphragm

#### Explosion Protection (with option IS-protection)

- **Approval DX19-DMK 331**
  - IBEExU 10 ATEX 1068 X
  - Stainless steel pressure port: zone 0: II 1G Ex ia IIC T4 Ga
  - zone 20: II 1D Ex ta IIIIC T 85 °C, IP6x in preparation
  - Plastic pressure port: zone 1: II 2G Ex Ia IIC T4 Ga
  - zone 21: II 2D Ex tD A21 IP6x T 85 °C in preparation

- **Safety Technical Maximum Values**
  - \( U_i = 28 \text{ VDC} \), \( I_i = 93 \text{ mA} \), \( P_i = 660 \text{ mW} \), \( C_i = 0 \text{ nF} \), \( L_i = 0 \mu\text{H} \)

- **Permissible Temperatures for Environment**
  - in zone 0: -20 ... 60 °C with \( p_{\text{amb}} \leq 0.8 \text{ bar} \)
  - in zone 1 or higher: -20 ... 70 °C

- **Connecting Cables**
  - By factory
  - Cable capacitance: signal line/shield also signal line/signal line: 160 pF/m
  - Cable inductance: signal line/shield also signal line/signal line: 1 µH/m

#### Miscellaneous

- **Option SIL 2**
  - according to IEC 61508 / IEC 61511

- **Option Oxygen Application**
  - for \( P_m \leq 25 \text{ bar} \): O-ring in special material with oxygen-approval (FKM)

- **Current Consumption**
  - Signal output current: max. 25 mA
  - Signal output voltage: typ. 5 mA

- **Weight**
  - Approx. 140 g

- **Installation Position**
  - Any

- **Operational Life**
  - > 100 x 10^6 pressure cycles

- **CE-conformity**
  - Pressure Equipment Directive: 97/23/EC (module A)

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1. This directive is only valid for devices with maximum permissible overpressure > 200 bar.
Wiring diagrams

2-wire-system (current)

3-wire-system (current / voltage)

Pin configuration

<table>
<thead>
<tr>
<th>Electrical connection</th>
<th>ISO 4400</th>
<th>Binder 723 (5-pin)</th>
<th>M12x1 / metal (4-pin)</th>
<th>field housing</th>
<th>cable colours (DIN 47100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply +</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>IN +</td>
<td>wh (white)</td>
</tr>
<tr>
<td>Supply –</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>IN -</td>
<td>bn (brown)</td>
</tr>
<tr>
<td>Signal + (for 3-wire)</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>OUT+</td>
<td>gn (green)</td>
</tr>
<tr>
<td>Shield ground pin</td>
<td>5</td>
<td>4</td>
<td></td>
<td></td>
<td>gn/ye (green/yellow)</td>
</tr>
</tbody>
</table>

Electrical connections (dimensions in mm)

- ISO 4400
- Binder Series 723 5-pin
- M12x1 4-pin
- Universal field housing stainless steel 1.4404 (316 L) with cable gland M20x1.5 (ordering code 880)

- Compact field housing
- Cable outlet with PVC cable
- Universal field housing stainless steel 1.4404 (316 L) with cable gland M20x1.5 (ordering code 880)

*Standard: 2 m PVC cable without ventilation tube (permissible temperature: -5 ... 70°C)
*Different cable types and lengths available, permissible temperature depends on kind of cable.
**Mechanical connection (dimensions in mm)**

**standard**

- G1/2" DIN 3852 with ISO 4400

**option**

- G1/2" EN 837
- G1/2" open port
- G1/2" semi-flush DIN 3852; M20x1.5

**standard for SIL- and SIL-IS-version**

- G1/2" DIN 3852 with ISO 4400

metric threads and other versions on request

*possible for nominal pressure ranges $P_N \leq 25$ bar*
## Ordering code DMK 331

<table>
<thead>
<tr>
<th>Pressure</th>
<th>250</th>
<th>251</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>0.40</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td>4 0</td>
<td>6 0</td>
</tr>
<tr>
<td>Output</td>
<td>4 ... 20 mA / 2-wire</td>
<td>0 ... 20 mA / 2-wire</td>
</tr>
<tr>
<td>Accuracy</td>
<td>0.5%</td>
<td>customer</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>Male and female plug ISO 4400</td>
<td>Male plug Binder series 723 (5-pin)</td>
</tr>
<tr>
<td></td>
<td>G1/2&quot; DIN 3852</td>
<td>G1/2&quot; EN 837</td>
</tr>
<tr>
<td></td>
<td>1 0 0</td>
<td>2 0 0</td>
</tr>
<tr>
<td></td>
<td>9 9 9</td>
<td>9 9 9</td>
</tr>
<tr>
<td>Seals</td>
<td>FKM</td>
<td>EPDM</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Pressure port</td>
<td>Stainless steel 1.4404 (316L)</td>
<td>PVDF</td>
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<tr>
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<td>8</td>
</tr>
<tr>
<td>Diaphragm</td>
<td>Ceramics Al2O3 96%</td>
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</tr>
<tr>
<td></td>
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</tr>
<tr>
<td>Special version</td>
<td>standard</td>
<td>oxygen application</td>
</tr>
<tr>
<td></td>
<td>0 0 0</td>
<td>0 0 7</td>
</tr>
</tbody>
</table>

1 standard: 2 m PVC cable without ventilation tube (permissible temperature: -5 ... 70°C)
2 metric threads and others on request
3 possible for nominal pressure ranges Pn ≤ 40 bar
4 PVDF only with G1/2" DIN 3852 open pressure port (up to 60 bar)
5 oxygen application possible up to 25 bar
6 oxygen application possible up to 25 bar

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