DMK 456

Pressure Transmitter with Stainless Steel Field Housing

Special application:
Marine and Offshore

accuracy according to IEC 60770:
standard: 0.25 % FSO
option: 0.1 % FSO

Nominal pressure
from 0 ... 40 mbar up to 0 ... 20 bar

Output signals
2-wire: 4 ... 20 mA
others on request

Product characteristics
- LR-certificate (Lloyd’s Register)
- ABS-certificate (American Bureau of Shipping)
- certifikát DNV•GL (Det Norske Veritas • Germanischer Lloyd)
- CCS-certificate (China Classification Society)
- stainless steel field housing
- IS-version (temperature class T6)
  Ex ia = intrinsically safe for gases
- high overpressure resistance

Optional versions
- diaphragm Al₂O₃ 99.9 %
- different inch threads and flush versions

The pressure transmitter DMK 456 has been developed for measuring the pressure in systems and the level in tanks and is certificated for shipbuilding and offshore applications.

Due robust stainless steel field housing and the possibility to use the device in intrinsic safe areas (temperature class T6) enable to measure the pressure of aggressive gases and fluids under extreme operating conditions. The basis for the DMK 456 is a capacitive ceramic sensor element designed by BD SENSORS, which offers a high overload resistance and medium compatibility.

Preferred areas of use are
- Monitoring of the pressure during loading and unloading processes
- Monitoring of a ship’s position and draught
- Use in anti-heeling systems
- Level measurement in ballast and storage tanks
- Monitoring of the internal pressure in liquid gas cargo tanks
### Pressure Transmitter with Stainless Steel Field Housing

#### Pressure ranges

<table>
<thead>
<tr>
<th>Nominal pressure</th>
<th>[bar]</th>
<th>0.04</th>
<th>0.06</th>
<th>0.1</th>
<th>0.16</th>
<th>0.25</th>
<th>0.4</th>
<th>0.6</th>
<th>1</th>
<th>1.6</th>
<th>2.5</th>
<th>4</th>
<th>6</th>
<th>10</th>
<th>16</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permissible overpressure</td>
<td>[bar]</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>6</td>
<td>6</td>
<td>8</td>
<td>8</td>
<td>15</td>
<td>25</td>
<td>25</td>
<td>35</td>
<td>35</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>Permissible vacuum</td>
<td>[bar]</td>
<td>-0.2</td>
<td>-0.3</td>
<td>-0.5</td>
<td>-1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1 available in gauge and absolute; nominal pressure ranges absolute from 1 bar*

#### Output signal / Supply

- Standard: IS-version 4 ... 20 mA / 2-wire
- $V_S = 14 ... 28 \text{ VDC}$
- $V_{S\text{ rated}} = 24 \text{ VDC}$

#### Performance

- **Accuracy**
  - standard: $\leq 0.25 \% \text{ FSO}$
  - options: $P_n \geq 0.6 \text{ bar}$: $\leq 0.1 \% \text{ FSO}$

- **Permissible load**
  - $R_{\text{max}} = (\frac{V_S - V_{S\text{ min}}}{0.02 \text{ A}}) \Omega$

- **Long term stability**
  - $\leq 0.1 \% \text{ FSO} / \text{ year at reference conditions}$

- **Influence effects**
  - supply: $0.05 \% \text{ FSO} / 10 \text{ V}$
  - load: $0.05 \% \text{ FSO} / k\Omega$

- **Turn-on time**
  - 700 msec

- **Mean response time**
  - $< 200 \text{ msec}$

- **Max. response time**
  - 380 msec

*2 accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)*

*3 Under the influence of disturbance burst according to EN 61000-4-4 (2004) $\pm 2 \text{ kV}$ accuracy decreased to $\leq 0.25 \% \text{ FSO}$.

#### Thermal effects / Permissible temperatures

- **Thermal error**
  - $\leq 0.1 \% \text{ FSO} / 10 \text{ K}$ in compensated range -20 ... 80 °C

- **Permissible temperatures**
  - medium: -25 ... 125 °C
  - electronics / environment: -25 ... 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
    - Germanischer Lloyd

#### Mechanical stability

- **Vibration**: 4 g (according to DNV-GL: class B, curve 2 / basis: IEC 60068-2-6)

#### Materials

- **Pressure port**: stainless steel 1.4404 (316 L)
- **Housing**: stainless steel 1.4404 (316 L)
- **Cable gland**: brass, nickel plated
- **Seals**: FKM; others on request
- **Diaphragm**: standard: ceramics $\text{Al}_2\text{O}_3$ 96 %
  - option: ceramics $\text{Al}_2\text{O}_3$ 99.9 %
- **Media wetted parts**: pressure port, seals, diaphragm

#### Environment category

- **Lloyd’s Register (LR)**
  - certification number: 13/20055
- **Det Norske Veritas (DNV-GL)**
  - temperature: D
  - humidity: B
  - vibrations: B
  - housing: D
  - electromagnetic compatibility: B

#### Explosion protection

- **Protection**: DX4A-DMK 456
- **Approval**: IBE\textit{X}U07ATEX1179 X
- **Safety techn. maximum values**: $U = 28 \text{ V}$, $I = 93 \text{ mA}$, $P = 660 \text{ mW}$, $C = 52.3 \text{ nF}$, $L = 0 \mu\text{H}$, the supply connections have an inner capacity of max. 90.2 nF opposite the enclosure

#### Miscellaneous

- **Ingress protection**: IP 67
- **Installation position**: any
- **Current consumption**: $\text{max. } 21 \text{ mA}$
- **Weight**: min. 400 g (depending on housing and mechanical connection)
- **Operational life**: 100 million load cycles
- **CE conformity**: ATEX Directive 2014/34/EU
Wiring diagram

2-wire-system (current)

Pin configuration

Electrical connections

<table>
<thead>
<tr>
<th></th>
<th>field housing (clamp section: 2.5 mm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply +</td>
<td>VS+</td>
</tr>
<tr>
<td>Supply –</td>
<td>VS-</td>
</tr>
<tr>
<td>Ground</td>
<td>GND</td>
</tr>
</tbody>
</table>

Dimensions (in mm/in)

<table>
<thead>
<tr>
<th>Inch thread</th>
<th>Flange</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inch thread</strong></td>
<td><strong>Flange</strong></td>
</tr>
<tr>
<td>M20 x 1.5 for cable Ø 5 ... 14 mm</td>
<td>M20 x 1.5 for cable Ø 5 ... 14 mm</td>
</tr>
<tr>
<td><strong>D</strong></td>
<td><strong>D</strong></td>
</tr>
<tr>
<td>115</td>
<td>152.4</td>
</tr>
<tr>
<td><strong>d</strong></td>
<td><strong>d</strong></td>
</tr>
<tr>
<td>14</td>
<td>19.1</td>
</tr>
<tr>
<td><strong>f</strong></td>
<td><strong>f</strong></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>g</strong></td>
<td><strong>g</strong></td>
</tr>
<tr>
<td>68</td>
<td>91.9</td>
</tr>
<tr>
<td><strong>k</strong></td>
<td><strong>k</strong></td>
</tr>
<tr>
<td>85</td>
<td>120.7</td>
</tr>
<tr>
<td><strong>p [bar]</strong></td>
<td><strong>p [bar]</strong></td>
</tr>
<tr>
<td>≤ 40</td>
<td>≤ 10</td>
</tr>
</tbody>
</table>

Dimensions in mm

<table>
<thead>
<tr>
<th>DIN 2501</th>
<th>ANSI</th>
</tr>
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<tbody>
<tr>
<td>size</td>
<td>DN25/PN40</td>
</tr>
<tr>
<td>b</td>
<td>18</td>
</tr>
<tr>
<td>d</td>
<td>14</td>
</tr>
<tr>
<td>D</td>
<td>115</td>
</tr>
<tr>
<td>f</td>
<td>2</td>
</tr>
<tr>
<td>g</td>
<td>68</td>
</tr>
<tr>
<td>k</td>
<td>85</td>
</tr>
<tr>
<td>p [bar]</td>
<td>≤ 40</td>
</tr>
</tbody>
</table>

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The manufacturer provides the EU declaration of conformity.

Calibration - All production undergoes output control, which is performed by comparison with standards. The traceability of standards and working gauges is ensured in accordance with Act No. 505/1990, as amended, on metrology. The manufacturer offers the possibility to supply sensors calibrated in the calibration laboratory of BD SENSORS, accredited according to ČSN EN ISO / IEC 17025: 2018.