Hygienic pressure transmitter with flush welded diaphragm

- Wide variety thanks to modular design
- SIP/CIP compatible
- Hygienic process connections
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1.1 Pressure transmitter for industrial hygienic processes

The **OPTIBAR P 2010 C** pressure transmitter was specifically designed with the requirements of both the food and pharmaceutical industries in mind.

It is perfectly suited for cavity-free instrumentation, providing a repeatable measuring signal that is stable over the long term, even with regular SIP/CIP cleaning, while simultaneously guaranteeing a high degree of chemical resistance to process and cleaning solutions.

The modular design of the device makes it possible to combine a wide range of fully welded process connections with a variety of filling media and electrical connections in a way that can accommodate virtually any industrial hygienic process technology requirement. Additional cooling fins can be added at any time for process temperatures higher than 150°C / 302°F.

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**Highlights**

- Large selection of hygienic process connections, e.g. 3A conformity
- Fully welded flush diaphragm with surface roughness of Ra < 0.4 μm
- Measuring accuracy: ±0.25%
- Measuring range: 0.1...40 bar / 4...580 psi
- Outstanding temperature stability at zero point
- SIP/CIP compatible
- Ingress protection up to IP68

**Industries**

- Food & Beverage
- Pharmaceutical industry
- Viscous and crystallising media
- General sterile process technology

**Applications**

- Absolute and gauge pressure measurement, without cavities, in gases and liquids
1.2 Options and variants

- M12 connector with ISO 228 G½” DIN 3852 flush process connection
- Cable output with ISO 228 G½” DIN 3852 flush process connection
- Valve plug and cable connector acc. to ISO 4400 with ISO 228 G½” DIN 3852 flush process connection
- Field housing with cooling fins and 1½” ISO 2852 clamp
2.1 Technical data

- The following data is provided for general applications. If you require data that is more relevant to your specific application, please contact us or your local sales office.
- Additional information (certificates, special tools, software,...) and complete product documentation can be downloaded free of charge from the website [Download Center].

**Measuring system**

<table>
<thead>
<tr>
<th>Measuring principle</th>
<th>Piezoresistive measuring cell</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application range</td>
<td>Measurement of gauge and absolute pressure in gases and liquids</td>
</tr>
<tr>
<td>Measuring range</td>
<td>-1...40 bar / -14.5...580 psi; refer also to chapter “Measuring ranges”</td>
</tr>
</tbody>
</table>

**Measuring accuracy**

<table>
<thead>
<tr>
<th>Reference conditions</th>
<th>Medium: air</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Temperature: ambient temperature</td>
</tr>
<tr>
<td></td>
<td>Ambient pressure: 1013 mbar / 14.7 psi</td>
</tr>
<tr>
<td></td>
<td>Nominal position: vertical, pressure port down</td>
</tr>
<tr>
<td></td>
<td>Power supply: 24 VDC</td>
</tr>
<tr>
<td>Pressure type</td>
<td>Gauge pressure / absolute pressure</td>
</tr>
<tr>
<td>Measuring accuracy according to IEC 60770 (terminal based) (Hysteresis, non-linearity, non-repeatability)</td>
<td>Nominal pressure ( P_N ) &lt; 0.4 bar / 5.8 psi: ( \leq 0.5% ) of URL</td>
</tr>
<tr>
<td></td>
<td>Nominal pressure ( P_N ) &gt; 0.4 bar / 5.8 psi: ( \leq 0.25% ) of URL</td>
</tr>
<tr>
<td></td>
<td>(URL = Upper Range Limit)</td>
</tr>
<tr>
<td>Ambient temperature effect on zero and span</td>
<td>Nominal pressure ( P_N ) &lt; 0.4 bar / 5.8 psi: ( \leq 1.5% ) of URL in compensated range of 0...+50°C / +32...+122°F</td>
</tr>
<tr>
<td></td>
<td>Nominal pressure ( P_N ) &gt; 0.4 bar / 5.8 psi: ( \leq 0.75% ) of URL in compensated range of -10...+85°C / +14...+185°F</td>
</tr>
<tr>
<td></td>
<td>Nominal pressure ( P_N ) = -1...0 bar / -14.5...0 psi: ( \leq 0.75% ) of URL</td>
</tr>
<tr>
<td>Long-term stability</td>
<td>( \leq 0.1% ) of URL within one year under reference conditions</td>
</tr>
<tr>
<td>Step response time</td>
<td>(&lt; 10 \text{ ms} ) (T90)</td>
</tr>
<tr>
<td>Vacuum resistance</td>
<td>( P_N \geq 1 \text{ bar} / 14.5 \text{ psi}: ) vacuum resistant</td>
</tr>
<tr>
<td></td>
<td>( P_N &lt; 1 \text{ bar} / 14.5 \text{ psi}: ) on request</td>
</tr>
</tbody>
</table>
## Operating conditions

### Temperature

<table>
<thead>
<tr>
<th><strong>Nominal temperature</strong></th>
<th>-20...+80°C / -4...+176°F</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ambient temperature</strong></td>
<td>-40...+85°C / -40...+185°F</td>
</tr>
</tbody>
</table>

Ex i zone 0: -20...+60°C / -4...+140°F at pabs = 0.8...1.1 bar
Ex i from zone 1: -20...+70°C / -4...+158°F

<table>
<thead>
<tr>
<th><strong>Storage temperature</strong></th>
<th>-40...+100°C / -40...+212°F</th>
</tr>
</thead>
</table>

### Medium temperature

<table>
<thead>
<tr>
<th><strong>Silicone oil</strong></th>
<th>-40...+125°C / -40...+257°F</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Food grade oil</strong></td>
<td>-10...+125°C / +14...+257°F</td>
</tr>
</tbody>
</table>

With cooling fins (optional):

<table>
<thead>
<tr>
<th><strong>Silicone oil</strong></th>
<th>PN &gt; 0 barg: -40...+300°C / -40...+572°F; PN &lt; 0 barg: -40...+150°C / -40...+302°F</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Food grade oil</strong></td>
<td>PN &gt; 0 barg: -10...+250°C / +14...+482°F; PN &lt; 0 barg: -10...+150°C / +14...+301°F</td>
</tr>
</tbody>
</table>

### CIP/SIP

Max. medium temperature for gauge pressure range p > 0 bar is +150°C / +302°F for 60 minutes at max. ambient temperature of +50°C / +122°F

### Other conditions

<table>
<thead>
<tr>
<th><strong>Ingress protection acc. to IEC 529 / EN 60529</strong></th>
<th>Connector M16 ISO 4400: IP65</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Connector M12x1, 4-pin</strong></td>
<td>IP67</td>
</tr>
<tr>
<td><strong>Cable PUR</strong></td>
<td>IP67</td>
</tr>
<tr>
<td><strong>Cable PUR with venting</strong></td>
<td>IP68 (1mWS / 24h)</td>
</tr>
<tr>
<td><strong>Thread M12, housing in 1.4404 / AISI 316L</strong></td>
<td>IP67</td>
</tr>
</tbody>
</table>

### Installation conditions

<table>
<thead>
<tr>
<th><strong>Mounting position</strong></th>
<th>Any - factory calibration carried out with pressure port down.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dimensions</strong></td>
<td>For detailed information refer to chapter “Dimensions and weights”.</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>Min. 200 g / 0.44 lb (depending on pressure port)</td>
</tr>
</tbody>
</table>

### Materials

<table>
<thead>
<tr>
<th><strong>Housing</strong></th>
<th>Stainless steel 1.4404 / AISI 316L</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Field housing (optional): stainless steel 1.4301 / AISI 304</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Cable gland</strong></td>
<td>Nickel-plated brass</td>
</tr>
<tr>
<td><strong>Fill fluid</strong></td>
<td>Silicone oil</td>
</tr>
<tr>
<td><strong>Food grade oil with FDA approval [Mobil DTE FM 32; Category Code: H1; NSF Registration No.: 130662]</strong></td>
<td></td>
</tr>
</tbody>
</table>

### Wetted parts

<table>
<thead>
<tr>
<th><strong>Pressure port</strong></th>
<th>Stainless steel 1.4404 / AISI 316L</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Separating diaphragm</strong></td>
<td>Stainless steel 1.4435 / AISI 316L; 2.4819 / Hastelloy® C-276</td>
</tr>
<tr>
<td><strong>Gasket</strong></td>
<td>Optional and only for DIN threads</td>
</tr>
<tr>
<td><strong>FKM (medium temperature ≤ +200°C / +392°F)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>FFKM (medium temperature &gt; +200°C / +392°F)</strong></td>
<td></td>
</tr>
</tbody>
</table>
### Surface roughness

<table>
<thead>
<tr>
<th>Component</th>
<th>Ra ≤</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turning parts</td>
<td>0.8 µm</td>
</tr>
<tr>
<td>Diaphragm</td>
<td>0.4 µm</td>
</tr>
<tr>
<td>Weld seams</td>
<td>Approx. 1.5 µm</td>
</tr>
</tbody>
</table>

### Process connections

<table>
<thead>
<tr>
<th>Component</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thread</td>
<td>Thread ISO 228 G½&quot;, DIN 3852 (PN ≥ 1 bar / 14.5 psi)</td>
</tr>
<tr>
<td></td>
<td>Thread ISO 228 G¾&quot;, DIN 3852 (PN ≥ 600 mbar / 8.7 psi); thread ISO 228 G¹&quot;, DIN 3852; Thread ISO 228 G¹&quot;, cone</td>
</tr>
<tr>
<td>Clamp</td>
<td>Clamp DN25 ISO 2852; clamp DN38 ISO 2852; clamp DN51 ISO 2852; dairy pipe DN25 DIN 11851; dairy pipe DN40 DIN 11851; dairy pipe DN50 DIN 11851; others on request</td>
</tr>
</tbody>
</table>

### Electrical connection

<table>
<thead>
<tr>
<th>Component</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output signal</td>
<td>4...20 mA current output; 2-wire</td>
</tr>
<tr>
<td>Power supply</td>
<td>Standard: U_b = 8...32 VDC</td>
</tr>
<tr>
<td></td>
<td>Ex i: U_b = 10...28 VDC</td>
</tr>
<tr>
<td>Safety max values (Ex i)</td>
<td>U_i = 28 V, I_i = 93 mA, P_i = 660 mW, C_i = 0 nF, L_i = 0 µH;</td>
</tr>
<tr>
<td></td>
<td>The supply connections have a maximum internal capacity of 27 nF to the housing.</td>
</tr>
<tr>
<td>Load</td>
<td>R_{i_{max}} ≤ (U_b - U_{b_{min}}) / 0.02 A [Ohm]</td>
</tr>
<tr>
<td>Short circuit protection</td>
<td>Continuously</td>
</tr>
<tr>
<td>Reverse polarity protection</td>
<td>In the event of reversed connections there is no damage but also no function.</td>
</tr>
<tr>
<td>Ripple</td>
<td>0.05% of URL / 10 V</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>Connector M16 ISO 4400</td>
</tr>
<tr>
<td></td>
<td>Connector M12x1, 4-pin</td>
</tr>
<tr>
<td></td>
<td>Cable PUR</td>
</tr>
<tr>
<td></td>
<td>Cable PUR with venting</td>
</tr>
<tr>
<td></td>
<td>Thread M12, housing 316L</td>
</tr>
</tbody>
</table>

### Approvals and certificates

<table>
<thead>
<tr>
<th>Certification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE</td>
<td>The device fulfils the statutory requirements of the EC directives. The manufacturer certifies that these requirements have been met by applying the CE marking.</td>
</tr>
<tr>
<td>Electromagnetic compatibility (EMC) acc. to EN 61326</td>
<td>EMC Directive: 2004/108/EC</td>
</tr>
<tr>
<td>Pressure equipment directive</td>
<td>97/23/EC</td>
</tr>
<tr>
<td>ATEX</td>
<td>II 1G Ex ia IIC T4 or II 1D Ex ia T85°C</td>
</tr>
<tr>
<td>IECEx</td>
<td>Ex ia IIC T4 Ga ot Ex ia IIC T85°C Da</td>
</tr>
</tbody>
</table>
### Other standards and approvals

<table>
<thead>
<tr>
<th>Description</th>
<th>Standard</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vibration resistance acc. to EN 60068-2-6</td>
<td>G½&quot;</td>
<td>20g RMS (25...2000 Hz)</td>
</tr>
<tr>
<td></td>
<td>All except G½&quot;</td>
<td>10g RMS (25...2000 Hz)</td>
</tr>
<tr>
<td>Shock resistant (impact) according to EN 60068-2-27</td>
<td>G½&quot;</td>
<td>500g / 1 ms</td>
</tr>
<tr>
<td></td>
<td>All except G½&quot;</td>
<td>100g / 1 ms</td>
</tr>
<tr>
<td>Hygiene</td>
<td></td>
<td>3-A approved; FDA approved materials</td>
</tr>
</tbody>
</table>

#### 2.2 Dimensions and weights

##### Connection plug and field housing

- **ISO 4400 (cable connector is part of delivery)**
- **M12x1 (4-pin)**
- **Cable output**
- **Cable output, cable with venting**
- **Field housing**

![Dimensions diagram](image)

**Figure 2-1: Dimensions for connection plug and field housing**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>10.5</td>
<td>0.4</td>
<td>10.5</td>
<td>0.4</td>
<td>10.5</td>
</tr>
<tr>
<td>b</td>
<td>12</td>
<td>0.47</td>
<td>10</td>
<td>0.39</td>
<td>Ø4.3</td>
</tr>
<tr>
<td>c</td>
<td>Ø34.5</td>
<td>Ø1.36</td>
<td>Ø34.5</td>
<td>Ø1.36</td>
<td>Ø35</td>
</tr>
<tr>
<td>d</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>15</td>
</tr>
</tbody>
</table>
Pressure transmitter with threaded connection

![Diagram of pressure transmitter with threaded connection]

Figure 2-2: Dimensions for pressure transmitter with threaded connection

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>e</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>f</td>
<td>026.5</td>
<td>01.04</td>
<td>026.5</td>
<td>01.04</td>
<td>026.5</td>
<td>01.04</td>
</tr>
<tr>
<td>g</td>
<td>WS27</td>
<td>WS34</td>
<td>WS44</td>
<td>WS27</td>
<td>WS44</td>
<td>WS41</td>
</tr>
<tr>
<td>h</td>
<td>G½”</td>
<td>G¾”</td>
<td>G1”</td>
<td>G½”</td>
<td>G1”</td>
<td>G1”</td>
</tr>
<tr>
<td>k</td>
<td>18</td>
<td>0.71</td>
<td>20</td>
<td>0.79</td>
<td>22</td>
<td>0.87</td>
</tr>
<tr>
<td>m</td>
<td>15</td>
<td>0.59</td>
<td>17</td>
<td>0.67</td>
<td>19</td>
<td>0.75</td>
</tr>
<tr>
<td>n</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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</tr>
</tbody>
</table>

The entire length of the device is made up of the electrical connection [a], the transmitter housing [e] and the process connection [k]. With cooling fins [optional] additional 32 mm / 1.26".
Pressure transmitter with cooling fins and hygienic process connections

![Dimensions](image)

**Figure 2-3: Dimensions for pressure transmitter with cooling fins and hygienic process connections**

1. Cooling fins (optional)
2. Dairy pipe DIN 11851
3. Clamp DIN 32678 / ISO 2852, 3-A approved
4. Varivent® DN40/50, 3-A approved

<table>
<thead>
<tr>
<th></th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[mm]</td>
</tr>
<tr>
<td>1</td>
<td>e</td>
</tr>
<tr>
<td>2</td>
<td>f</td>
</tr>
<tr>
<td>3</td>
<td>h</td>
</tr>
<tr>
<td>4</td>
<td>k</td>
</tr>
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</tbody>
</table>

The entire length of the device is made up of the electrical connection [a], the transmitter housing [e] and the process connection [k].

With cooling fins [optional] additional 32 mm / 1.26”.

*Other hygienic connections are available on request.*
### 2.3 Measuring ranges

#### Pressure in bar

<table>
<thead>
<tr>
<th>Nominal pressure (gauge/abs.)</th>
<th>-1...0</th>
<th>0.10</th>
<th>0.16</th>
<th>0.25</th>
<th>0.40</th>
<th>0.60</th>
<th>1</th>
<th>1.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. working pressure (MWP)</td>
<td>5</td>
<td>0.5</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Burst pressure (OPL)</td>
<td>7.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>3</td>
<td>7.5</td>
<td>7.5</td>
<td>15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nominal pressure (gauge/abs.)</th>
<th>2.5</th>
<th>4</th>
<th>6</th>
<th>10</th>
<th>16</th>
<th>25</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. working pressure (MWP)</td>
<td>10</td>
<td>20</td>
<td>40</td>
<td>40</td>
<td>80</td>
<td>80</td>
<td>105</td>
</tr>
<tr>
<td>Burst pressure (OPL)</td>
<td>15</td>
<td>25</td>
<td>50</td>
<td>50</td>
<td>120</td>
<td>120</td>
<td>210</td>
</tr>
</tbody>
</table>

#### Pressure in psi

<table>
<thead>
<tr>
<th>Nominal pressure (gauge/abs.)</th>
<th>-14.5...0</th>
<th>1.45</th>
<th>2.32</th>
<th>3.63</th>
<th>5.80</th>
<th>8.70</th>
<th>14.5</th>
<th>23.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. working pressure (MWP)</td>
<td>72.5</td>
<td>7.3</td>
<td>14.5</td>
<td>14.5</td>
<td>29</td>
<td>72.5</td>
<td>72.5</td>
<td>145</td>
</tr>
<tr>
<td>Burst pressure (OPL)</td>
<td>108.8</td>
<td>21.8</td>
<td>21.8</td>
<td>21.8</td>
<td>43.5</td>
<td>108.8</td>
<td>108.8</td>
<td>217.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nominal pressure (gauge/abs.)</th>
<th>36.3</th>
<th>58.0</th>
<th>87.0</th>
<th>145</th>
<th>232.1</th>
<th>362.6</th>
<th>580</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. working pressure (MWP)</td>
<td>145</td>
<td>290</td>
<td>580</td>
<td>580</td>
<td>1160</td>
<td>1160</td>
<td>1523</td>
</tr>
<tr>
<td>Burst pressure (OPL)</td>
<td>217.6</td>
<td>362.6</td>
<td>725</td>
<td>725</td>
<td>1740</td>
<td>1740</td>
<td>3046</td>
</tr>
</tbody>
</table>
3.1 General notes on installation

Inspect the packaging carefully for damages or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.

Do a check of the packing list to make sure that you have all the elements given in the order.

Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

3.2 Intended use

Responsibility for the use of the measuring devices with regard to suitability, intended use and corrosion resistance of the used materials against the measured fluid lies solely with the operator.

The manufacturer is not liable for any damage resulting from improper use or use for other than the intended purpose.

The OPTIBAR P 2010 C pressure transmitter is designed to measure the absolute pressure and gauge pressure of gases and liquids.

3.3 Technical limits

The device was constructed solely for use within the technical limits indicated on the nameplate and in the technical data. Applications outside of these limits are not permitted and could lead to significant risk of accident. For this reason, observe the following limits:

- Do not exceed the maximum working pressure (MWP).
- Do not exceed the indicated permissible operating temperature range.
- The permissible ambient temperatures given may not be exceeded or undershot.
- Observe the ingress protection of the housing during use.
3.4 Installation specifications

Install the device only when depressurised and without power!

For installation the respective regulations for explosion protection have to be fulfilled.

For installations outdoor and in damp areas, the following points must be observed:
- To ensure that no moisture can get into the connector, the device should be connected electrically immediately after installation. Otherwise a moisture admission has to be prevented e.g. by using a suitable protection cap.
- Select an installation if possible, where a mounting position allows draining of spray and condensate. Sealing surfaces should not be submerged!
- When using devices with cable glands or output, the cable should be looped facing down so that any liquid that collects on the cable can drip off.
- Install the device so it is protected from direct sunlight. In the worst case scenario, the permissible operating temperature will be exceeded in the presence of direct sunlight. This can negatively affect or damage the functionality of the device. In addition, it can lead to temporary measuring errors if the internal pressure of the device increases due to the sunlight.
- When installing outside where the risk of lightning or overvoltage may exist and damage the device, we recommend installing suitable overvoltage protection between the supply device or control cabinet and the device.
- Handle this highly sensitive electronic measuring device with care, both in and out of the packaging!
- Only remove the packaging and any protection cap from the device immediately before installing to prevent damage to the diaphragm! Keep the supplied protection cap! Remove the protection cap slowly and carefully to avoid any negative pressure on the diaphragm.
- Handle the unprotected diaphragm with extreme care; it is very easily damaged.
- A device with a gauge reference in the housing (small hole next to the electrical connection) must be installed so that the gauge reference necessary for measurement is protected from dirt and moisture. Should the pressure transmitter be exposed to fluid admission, the air pressure compensation is blocked by the gauge reference. Accurate measurement in this state is not possible. It can also result in damage to the pressure transmitter.
- Ensure that no mechanical stress is applied to the pressure port during installation as this may result in a shift in the characteristic curve. This applies in particular to very small pressure ranges as well as to devices with plastic pressure ports.
- With hydraulic systems, arrange the device so that the pressure port faces up (venting).
- Provide cooling fins when using on steam lines.

3.5 Mounting

- Prior to installing the pressure transmitter, it is essential to verify whether the version of the device on hand completely fulfils the technical and safety requirements of the measuring point. This applies in particular to the measuring range, overpressure resistance, temperature, explosion protection and operating voltage.
- Check the materials used for the wetted parts (e.g. gasket, process connection, separating diaphragm etc.) for suitability as regards process compatibility.
4.1 Safety instructions

All work on the electrical connections may only be carried out with the power disconnected. Take note of the voltage data on the nameplate!

Observe the national regulations for electrical installations!

For devices used in hazardous areas, additional safety notes apply; please refer to the Ex documentation.

Observe without fail the local occupational health and safety regulations. Any work done on the electrical components of the measuring device may only be carried out by properly trained specialists.

Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

4.2 Terminal assignment

Install the device only when depressurised and without power!

<table>
<thead>
<tr>
<th>Electrical connections</th>
<th>ISO 4400</th>
<th>M12x1 (4-pin)</th>
<th>Field housing</th>
<th>Cable colours [DIN 47100]</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Supply +</td>
<td>1</td>
<td>1</td>
<td>IN +</td>
<td>wh (white)</td>
</tr>
<tr>
<td>Supply -</td>
<td>2</td>
<td>2</td>
<td>IN -</td>
<td>bn (brown)</td>
</tr>
<tr>
<td>Shielding</td>
<td>Ground contact</td>
<td>4</td>
<td>-</td>
<td>gn/ye (green/yellow)</td>
</tr>
</tbody>
</table>

4.3 Electrical connection diagram

![Electrical connection diagram]

Figure 4-1: Electrical connection diagram

1. Supply +
2. Supply -
3. Shielding
4. Supply voltage $V_S$
The characters of the order code highlighted in light grey describe the standard.

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>VGK2</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Version</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Absolute pressure</td>
</tr>
<tr>
<td>R</td>
<td>Gauge pressure</td>
</tr>
<tr>
<td>N</td>
<td>Gauge pressure with negative nominal measuring range (-1...x)</td>
</tr>
</tbody>
</table>

**Measuring range**

<table>
<thead>
<tr>
<th>Number</th>
<th>Measuring range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100 mbar / 10 kPa / 1.5 psi</td>
</tr>
<tr>
<td>2</td>
<td>160 mbar / 16 kPa / 2.3 psi</td>
</tr>
<tr>
<td>4</td>
<td>250 mbar / 25 kPa / 3.6 psi</td>
</tr>
<tr>
<td>5</td>
<td>400 mbar / 40 kPa / 6 psi</td>
</tr>
<tr>
<td>6</td>
<td>500 mbar / 50 kPa / 7.5 psi</td>
</tr>
<tr>
<td>7</td>
<td>600 mbar / 60 kPa / 8.7 psi</td>
</tr>
<tr>
<td>A</td>
<td>1.0 bar / 100 kPa / 15 psi</td>
</tr>
<tr>
<td>B</td>
<td>1.6 bar / 160 kPa / 23 psi</td>
</tr>
<tr>
<td>C</td>
<td>2.0 bar / 200 kPa / 30 psi</td>
</tr>
<tr>
<td>D</td>
<td>2.5 bar / 250 kPa / 36 psi</td>
</tr>
<tr>
<td>E</td>
<td>4.0 bar / 40 kPa / 60 psi</td>
</tr>
<tr>
<td>F</td>
<td>5.0 bar / 500 kPa / 75 psi</td>
</tr>
<tr>
<td>G</td>
<td>6.0 bar / 600 kPa / 87 psi</td>
</tr>
<tr>
<td>H</td>
<td>10 bar / 1 MPa / 150 psi</td>
</tr>
<tr>
<td>K</td>
<td>16 bar / 1.6 MPa / 232 psi</td>
</tr>
<tr>
<td>M</td>
<td>25 bar / 2.5 MPa / 375 psi</td>
</tr>
<tr>
<td>N</td>
<td>40 bar / 4 MPa / 600 psi</td>
</tr>
<tr>
<td>Z</td>
<td>Customer specific measuring range (on request)</td>
</tr>
</tbody>
</table>

**Process connection**

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Thread ISO 228 G¾&quot;, DIN 3852 [PN ≥ 1 bar]</td>
</tr>
<tr>
<td>1</td>
<td>Thread ISO 228 G¾&quot;, DIN 3852 [PN ≥ 600 mbar]</td>
</tr>
<tr>
<td>2</td>
<td>Thread ISO 228 G1&quot;, DIN 3852</td>
</tr>
<tr>
<td>A</td>
<td>Clamp DN20 (½”); DIN 32676 / ISO 2852 [PN ≥ 2.5 bar]; 3-A approved</td>
</tr>
<tr>
<td>B</td>
<td>Clamp DN25 (1”); DIN 32676 / ISO 2852 [PN ≥ 250 mbar]; 3-A approved</td>
</tr>
<tr>
<td>C</td>
<td>Clamp DN38 (1½”); DIN 32676 / ISO 2852; 3-A approved</td>
</tr>
<tr>
<td>D</td>
<td>Clamp DN51 (2”); DIN 32676 / ISO 2852; 3-A approved</td>
</tr>
<tr>
<td>E</td>
<td>DN25 DIN 11851 (dairy pipe) [PN ≥ 250 mbar]</td>
</tr>
<tr>
<td>F</td>
<td>DN40 DIN 11851 (dairy pipe)</td>
</tr>
<tr>
<td>G</td>
<td>DN50 DIN 11851 (dairy pipe)</td>
</tr>
<tr>
<td>K</td>
<td>Thread ISO 228 G1”, cone [PN ≥ 600 mbar]</td>
</tr>
<tr>
<td>R</td>
<td>Flange DRD</td>
</tr>
<tr>
<td>S</td>
<td>SMS 1145 DN38</td>
</tr>
<tr>
<td>V</td>
<td>Varivent® DN40/50; 3-A approved</td>
</tr>
<tr>
<td>Z</td>
<td>Customer specific process connection</td>
</tr>
<tr>
<td>Diaphragm / Fill fluid</td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td>---</td>
</tr>
<tr>
<td>H Hastelloy® C-276 / silicone oil</td>
<td></td>
</tr>
<tr>
<td>K Hastelloy® C-276 / FDA approved food grade oil</td>
<td></td>
</tr>
<tr>
<td>S Stainless steel 1.4435 [AIISI 316L] / silicone oil [standard for process connections 0, 1, 2]</td>
<td></td>
</tr>
<tr>
<td>T Stainless steel 1.4435 [AIISI 316L] / FDA approved food grade oil [standard for process connections A...D, S, V]</td>
<td></td>
</tr>
<tr>
<td>Accuracy</td>
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</tr>
<tr>
<td>2 0.25%</td>
<td></td>
</tr>
<tr>
<td>5 0.5% [(P_N &lt; 400) mbar; measuring range code: 0...4]</td>
<td></td>
</tr>
<tr>
<td>Special versions</td>
<td></td>
</tr>
<tr>
<td>0 Without</td>
<td></td>
</tr>
<tr>
<td>C Cooling fins (up to +300°C / +572°F)</td>
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</tr>
<tr>
<td>Sealing [sensor / process connection]</td>
<td></td>
</tr>
<tr>
<td>0 Without</td>
<td></td>
</tr>
<tr>
<td>V FKM (T_{\text{Process}} \leq +200°C / +392°F); DIN 3852</td>
<td></td>
</tr>
<tr>
<td>F FFKM (T_{\text{Process}} &gt; +200°C / +392°F); DIN 3852</td>
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<tr>
<td>Approval</td>
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<tr>
<td>0 Without</td>
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<tr>
<td>1 ATEX/IECEx group II, category 1G + 1D, intrinsic safety Ex ia</td>
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</tr>
<tr>
<td>SIL</td>
<td></td>
</tr>
<tr>
<td>0 Without</td>
<td></td>
</tr>
<tr>
<td>1 SIL 2 [in preparation]</td>
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<tr>
<td>Output</td>
<td></td>
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<tr>
<td>0 2-wire 4...20 mA</td>
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<tr>
<td>Electrical connection</td>
<td></td>
</tr>
<tr>
<td>M Connector M12x1, 4-pin; IP67</td>
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</tr>
<tr>
<td>V Connector ISO 4400, M16; IP65</td>
<td></td>
</tr>
<tr>
<td>2 Cable 2 m / 6 ft PUR; IP67</td>
<td></td>
</tr>
<tr>
<td>A Cable 2 m / 6 ft PUR, vented; IP68</td>
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</tr>
<tr>
<td>F Field housing, M12x1.5, 1.4301 [AIISI 304]; IP67</td>
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<tr>
<td>Language</td>
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<tr>
<td>1 English</td>
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<tr>
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<tr>
<td>Services</td>
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<tr>
<td>5 5-point factory calibration certificate</td>
<td></td>
</tr>
<tr>
<td>D DAkkS calibration certificate</td>
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</tr>
<tr>
<td>C Oil and fat-free cleaning</td>
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</tr>
<tr>
<td>Marking</td>
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</tr>
<tr>
<td>0 Without</td>
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</tr>
<tr>
<td>T Tag Plate (30 x 19mm)</td>
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<tr>
<td>Accessories</td>
<td></td>
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<tr>
<td>0 Without</td>
<td></td>
</tr>
<tr>
<td>Order code</td>
<td></td>
</tr>
</tbody>
</table>

Order code: VGK2 4 0 0
KROHNE product overview

- Electromagnetic flowmeters
- Variable area flowmeters
- Ultrasonic flowmeters
- Mass flowmeters
- Vortex flowmeters
- Flow controllers
- Level meters
- Temperature assemblies
- Pressure transmitters
- Analysis products
- Products and systems for the oil & gas industry
- Measuring systems for the marine industry

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