Level sensing relative and absolute pressure transmitter
Type 712

The level sensing pressure transmitter Type 712 is manufactured using an relative or absolute pressure measuring cell with an adjusted and amplified sensor signal and is available with various cable lengths from 2 to 30 meters. The Type 712 offers Ex protection as well as versions with integrated temperature measurement.

In addition to voltage and current outputs the Type 712 is available with ratiometric outputs.

Pressure range
0 ... 0.3 - 3 bar

+ suitable for drinking water
+ intrinsically safe execution with voltage- and current output
+ suitable for fitting in 1-inch pipe
+ with integrated temperature measurement
### Pressure and flow

**Technical overview**

#### Pressure range
- **Relative**: 0.0 ... 0.3 – 2.5 bar
- **Absolute**: 0.8 ... 1.4 – 3.0 bar

#### Operating conditions
- **Medium**: Fuel oil, ultra light 1) SN 181 160-2
- **Fuel oil, heavy 1) SN 181 160-2**
- **Diesel oil 1)**
- **Benzine 1)**
- **Drinking water (with EPDM O-ring)**

#### Temperature
- **Medium and ambient**
- **Storage**: -20 ... +80 ºC
- **40 ... +80 ºC**

#### Overload
- **3x fs; max. 3 bar at 0.3 bar version**

#### Materials in contact with medium
- **Case**: Stainless steel 1.4404 / AISI 316L
- **Sensor**: Ceramic Al 2O3
- **Cable**: PE-HD
- **Protection cover**: PPE
- **Sealing material**: FPM, EPDM (for drinking water)

#### Electrical overview

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Power supply</th>
<th>Load</th>
<th>Current consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 wire</td>
<td></td>
<td>4 ... 20 mA</td>
<td>10 ... 30 VDC</td>
<td>5 ... 10 mA / &lt; 100 Ohm / &lt; 10 mA</td>
</tr>
<tr>
<td>3 wire</td>
<td></td>
<td>0 ... 10 V</td>
<td>12 ... 30 VDC</td>
<td>5 ... 10 mA / &lt; 100 Ohm / &lt; 5 mA</td>
</tr>
<tr>
<td>4 wire (with temperature)</td>
<td></td>
<td>5 ... 10 %</td>
<td>5 VDC / ±10%</td>
<td>&gt; 5 kOhm / &lt; 100 m</td>
</tr>
<tr>
<td>Polarity reversal protection</td>
<td></td>
<td>Short-circuit proof and protected against polarity reversal.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overvoltage protection</td>
<td></td>
<td>4 ... 20 mA / 10 ... 30 V</td>
<td>5 VDC / ±10%</td>
<td>&gt; 5 kOhm / &lt; 100 m</td>
</tr>
<tr>
<td>Electric strength towards case</td>
<td>500 VDC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature output</td>
<td></td>
<td>&gt; 1 MOhm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Dynamic response
- **Response time**: < 2 ms

#### Runtime
- **Time starts at the moment of application of minimal supply voltage**: < 10 ms

#### Electrical connection
- **Cable PE-HD length**: 2, 5, 10, 15, 20, 30 m
- **Protection standard**: IP 68

#### Test / Admissions
- **Electromagnetic compatibility**: CE-conform acc. to EN 61326-2-3
- **UL**: ANSI/UL 61010-1 acc. to E325110
- **Drinking water approval**: ACS
- **Drinking water verification certificate for plastic parts**: UBA guidance (KTW and elastomer)

#### Ex-protection
- **IECEx SEV 12.IEB6**: Ex ia IIC T4 Ga
- **SEV 12 ATEX 0138**: II 1 G Ex ia IIC T4 Ga

#### Weight
- **Without cable**: ~ 200 g

#### Packaging
- **Single packaging**

### Accuracy

#### Standard

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. deviation at 25 ºC</td>
<td>% fs</td>
<td>± 0.8</td>
</tr>
<tr>
<td>Resolution ⁴</td>
<td>% fs</td>
<td>0.1</td>
</tr>
<tr>
<td>Thermal characteristic ⁵, ⁶</td>
<td>% fs/10K</td>
<td>± 0.2</td>
</tr>
<tr>
<td>Long term stability acc. IEC EN 60770-1 max.</td>
<td>% fs</td>
<td>± 0.25</td>
</tr>
</tbody>
</table>

#### Higher accuracy (only with ratiometric execution and pressure range > 1 bar)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. deviation at compensated temperature range ⁷ at -10 ... +60 ºC</td>
<td>% fs</td>
<td>± 0.5</td>
</tr>
<tr>
<td>Resolution ⁸</td>
<td>% fs</td>
<td>0.1</td>
</tr>
<tr>
<td>Long term stability acc. IEC EN 60770-1 max.</td>
<td>% fs</td>
<td>± 0.25</td>
</tr>
</tbody>
</table>

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1) Ex-protection to attention!  
2) Non-congealing media  
3) Includes zero point, full scale, linearity, hysteresis and repeatability  
4) Pressure range 0.3 bar < 0.2 % fs  
5) ±0.3 bar type with output 4 ... 20 mA = ±0.5% fs/10K
### Order code selection table

#### Pressure mode

<table>
<thead>
<tr>
<th>Pressure mode</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Relative</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absolute with higher accuracy</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relative with higher accuracy</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</table>

#### Pressure range

<table>
<thead>
<tr>
<th>Pressure range 1)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 ... 0.2 bar</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>0.0 ... 1.0 bar</td>
<td></td>
<td></td>
<td></td>
<td>9</td>
<td>1</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.0 ... 1.6 bar</td>
<td></td>
<td></td>
<td>9</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.0 ... 2.5 bar</td>
<td></td>
<td></td>
<td>9</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Pressure range variation (optional)

- Full scale signal at these pressures
  - P"baro" = 1060 mbar (high pressure on sea level)
  - P"baro" = 740 mbar (low pressure at 2000 meters above sea level)

<table>
<thead>
<tr>
<th>Sealing material</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>FPM Fluoro-elastomer</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPDM Ethylene propylene (for drinking water)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

#### Output / power supply

<table>
<thead>
<tr>
<th>Output / power supply</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 ... 20 mA</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 ... 30 VDC</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ratiom. 10 ... 90%</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 VDC ±10%</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ratiom. 10 ... 90%</td>
<td>1</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 VDC ±10% (with temperature)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 ... 10 V</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 ... 30 VDC</td>
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<td></td>
<td></td>
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<td></td>
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</table>

#### Electrical connection 2)

<table>
<thead>
<tr>
<th>Electrical connection 2)</th>
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<th>4</th>
<th>5</th>
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<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable</td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 m</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 m</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 m</td>
<td>2</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 m</td>
<td>2</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 m</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 m</td>
<td>2</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Protection cover

<table>
<thead>
<tr>
<th>Protection cover</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>without protection cover</td>
<td></td>
<td>2</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>with protection cover</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Ex-protection

<table>
<thead>
<tr>
<th>Ex-protection</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>without ex-protection</td>
<td></td>
<td>2</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>with ex-protection</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Dimensions in mm / Electrical connections

- h - Fluid level
- A - Measurement reference height
- B - Distance from protection cover to the position of measuring diaphragm
- C - Distance from beginning of thread to the position of measuring diaphragm

![Dimensions Diagram]

#### Output / Power Supply

- 4 ... 20 mA ratiom. 10 ... 90%, 0 ... 10 V
- ratiom. 10 ... 90% with temperature

![Output Diagram]

#### Protection

- Device design with explosion protection: 4 ... 20 mA
- The grounding connection is conductively connected to the level transmitter housing. The GND conductor of level transmitter must be connected to the equipotential bonding system of the plant.

![Protection Diagram]

#### Other pressure range on request 2)
- Other cable length on request 3)

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Huba Control Type 712 | Technical data subject to change | Edition 09/2020
Pressure and flow

### Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>Order number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable hanger</td>
<td>118025</td>
</tr>
<tr>
<td>Connection box</td>
<td>118001</td>
</tr>
<tr>
<td>Test adapter</td>
<td>118028</td>
</tr>
<tr>
<td>Protection cover (pack of 10)</td>
<td>118067</td>
</tr>
<tr>
<td>Humidity protection element</td>
<td>118068</td>
</tr>
<tr>
<td>Additional weight</td>
<td>118093</td>
</tr>
<tr>
<td>Calibration certificate</td>
<td>104551</td>
</tr>
</tbody>
</table>

**Connection box**

- Mounting hole
- Vent valve
- Measuring value process
- Vent pipe
- To the transmitter

**Additional weight**

- ~200 g

**Test adapter**

**Cable hanger**

- Hot-dip galvanized steel – PA6 glass fibre reinforced
- Cable Ø 4.5 ... 6.5

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Accessories: 118026 118001 118028 118067 118068 118093 104551
Calculation of level

General level with relative pressure sensor:

\[ h = \frac{\Delta p}{\rho \cdot g} \]

General level with absolute pressure sensor:

\[ h = \frac{P_{TS} - P_{Baro}}{\rho \cdot g} \]

which

\[ P_{TS} = \frac{U_{TS} - U_{TS\_NP}}{U_{TS\_EW} - U_{TS\_NP}} \cdot (P_{TS\_EW} - P_{TS\_NP}) + P_{TS\_NP} \]

and

\[ P_{Baro} = \frac{U_{Baro} - U_{Baro\_NP}}{U_{Baro\_EW} - U_{Baro\_NP}} \cdot (P_{Baro\_EW} - P_{Baro\_NP}) + P_{Baro\_NP} \]

For level sensor with current output use nominal signal values for \( U_{TS} \) instead of \( \Delta U_{TS} \) (resp. \( U_{Baro} \) instead of \( \Delta U_{Baro} \)).

Simplification of formula for level sensor with ratiometric output:

\[ P_{TS} = \frac{U_{TS} - 0.1 \cdot U_{IN}}{0.8 \cdot U_{IN}} \cdot (P_{TS\_EW} - P_{TS\_NP}) + P_{TS\_NP} \]

\[ P_{Baro} = \frac{U_{Baro} - 0.1 \cdot U_{IN}}{0.8 \cdot U_{IN}} \cdot (P_{Baro\_EW} - P_{Baro\_NP}) + P_{Baro\_NP} \]

Legend:

- \( h \) level [m]
- \( \rho \) density of media [kg/m³]
- \( g \) acceleration of fall 9.80665 [m/s²]
- \( \Delta p \) measured relative pressure [Pa]
- \( P_{TS} \) measured pressure of level sensor [Pa]
- \( P_{Baro} \) measured pressure of barometer [Pa]
- \( P_{TS\_NP} \) minimal nominal pressure of level sensor [Pa]
- \( P_{TS\_EW} \) maximum nominal pressure of level sensor [Pa]
- \( P_{Baro\_NP} \) minimal nominal pressure of barometer [Pa]
- \( P_{Baro\_EW} \) maximum nominal pressure of barometer [Pa]
- \( U_{TS} \) signal on level sensor output [V or mA]
- \( U_{Baro} \) Signal on barometer output [V or mA]
- \( U_{TS\_NP} \) minimal nominal signal of level sensor [V or mA]
- \( U_{TS\_EW} \) maximum nominal signal of level sensor [V or mA]
- \( U_{Baro\_NP} \) minimal nominal signal of barometer [V or mA]
- \( U_{Baro\_EW} \) maximum nominal signal of barometer [V or mA]

Specification temperature output

\[ T_{TEMP} = T_0 + f \left( \frac{R_1 \cdot U_{IN}}{R_2 \cdot \left( \frac{U_{IN}}{OUT\_T} - 1 \right)} \right) \]

\[ \frac{a}{b} = \frac{R_1}{R_2} \]

\[ R_1 = 20\,000 \quad R_2 = 1 \]

\[ a = 0.000000294 \]

\[ b = 0.000000775 \]

\[ c = 0.000000011 \]

\[ T_{TEMP} (ºC) @ U_{IN} = 4.5 \text{ V} \]

\[ T_{TEMP} (ºC) @ U_{IN} = 5.0 \text{ V} \]

\[ T_{TEMP} (ºC) @ U_{IN} = 5.5 \text{ V} \]

Max. error of the temperature output

\[ \text{Max. error} = \frac{T_{TEMP} - T_{TEMP\_REF}}{T_{TEMP\_REF}} \cdot 100\% \]
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