Ultrasonic level measuring device

The type 8177 is a non-contact ultrasonic level measuring device, designed for continuous level measurement in open or closed vessels. The unit is suitable for liquids, but also for solids, in virtually all industries, particularly in water and waste water management.

- For level measurement up to 8 m
- 4…20 mA/HART - 2 wires
- Suitable for solids
- ATEX certification

**General data**

<table>
<thead>
<tr>
<th>Materials</th>
<th>PBT, Stainless steel 316L (1.4404)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>PC</td>
</tr>
<tr>
<td>Cover</td>
<td>EPDM</td>
</tr>
<tr>
<td>Seal ring</td>
<td>Stainless steel 316Ti/316L (1.4571/1.4435)</td>
</tr>
<tr>
<td>Ground terminal</td>
<td>PVDF</td>
</tr>
<tr>
<td>Wetted parts</td>
<td>EPDM</td>
</tr>
<tr>
<td>Process connection, transducer</td>
<td>Process connection, transducer</td>
</tr>
<tr>
<td>Process seal</td>
<td></td>
</tr>
<tr>
<td>Display</td>
<td>LCD in full dot matrix</td>
</tr>
<tr>
<td>Process connection</td>
<td>Thread G 2&quot; or NPT 2&quot;</td>
</tr>
<tr>
<td>Max. torque mounting boss</td>
<td>25 Nm</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>Cable glands M20 x 1.5</td>
</tr>
<tr>
<td>Measuring value</td>
<td>Distance between lower edge of the transducer and product surface</td>
</tr>
<tr>
<td>Dead zone</td>
<td>0.4 m</td>
</tr>
<tr>
<td>Measuring range</td>
<td>0.4…8 m (for liquids)</td>
</tr>
<tr>
<td></td>
<td>0.4…3.5 m (for solids)</td>
</tr>
<tr>
<td>Process temperature</td>
<td>-40…+80 °C (&lt;-40…176 °F)</td>
</tr>
<tr>
<td>Vessel pressure</td>
<td>-0.2…2 bar (&lt;-20…29.02 PSI)</td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>Mechanical vibrations with 4 g and 5…100 Hz</td>
</tr>
<tr>
<td>Temperature coefficient</td>
<td>0.06 %/10K (Average temperature coefficient of the zero signal - temperature error)</td>
</tr>
<tr>
<td>Resolution</td>
<td>Max. 1 mm</td>
</tr>
<tr>
<td>Frequency</td>
<td>55 kHz</td>
</tr>
<tr>
<td>Interval</td>
<td>&gt;2 s (dependent on the parameter adjustment)</td>
</tr>
<tr>
<td>Beam angle at 3 dB</td>
<td>11°</td>
</tr>
<tr>
<td>Adjustment time</td>
<td>&gt;3 s (dependent on the parameter adjustment)</td>
</tr>
<tr>
<td>Measurement deviation†</td>
<td>&lt;0.2 % or ±4 mm (see diagram)</td>
</tr>
</tbody>
</table>

†Time to output the correct level (with max. 10% deviation) after a sudden level change.

§"measurement bias" as defined in the standard JCGM 200:2012
Electrical data

Operating voltage: 14…36 V DC or 14…30 V DC (Ex ia instrument)

Permissible residual ripple:
- < 100 Hz: Uss < 1 V
- 100 Hz…10 kHz: Uss < 10 mV

Output signal: 4…20 mA/HART

Resolution: 1.6 µA

Fault signal: Current output unchanged; 20.5 mA; 22 mA < 3.6 mA (adjustable)

Current limitation: 22 mA

Load: See load diagram

Damping (83% of the input variable): 0…999 s, adjustable

Environment

Ambient temperature:
- with display, adjustment elements: -20…+70 °C (-4…+158 °F) (operation and storage)

Relative humidity:
- Max. 75% (operation), max. 85% (storage); without condensation

Standards, directives and certifications

Protection: IP66/IP67 with M20 × 1.5 gland mounted and tightened

Overvoltage category: III

Protection class: II

Standards and directives:

The applied standards, which verify conformity with the EU Directives, can be found on the EU Type Examination Certificate and/or the EU Declaration of conformity (if applicable)

NAMUR
- NE 21; NE 43

Certification:

ATEX®: EN 50014; EN 50020; EN 50284

Specifications Ex

- Protection: Categories 1/2G or 2G
- Certification: Ex ia IIC T6

Conformity specifications:

- Operating voltage Ui: 30 V
- Short circuit rating li: 131 mA
- Power limitation Pi: 983 mW
- Ambient temperature: -20…+41 °C (-4…+105.8 °F) (dependent on categories)
- Internal capacity Ci: negligible
- Internal inductivity Li: negligible

Measurement deviation diagram

Load diagram

1: HART load
2: Voltage limit Ex ia instrument
3: Voltage limit non-Ex instrument
4: Operating voltage
Target applications

Continuous level measuring for fluids and solids

A typical application for the 8177 ultrasonic measuring device is level measurement in open basins. Products such as rain water or sewage water, i.e. with impurities. Here is where the advantages of non-contact measurement with the 8177 come into their own: simple and maintenance-free. The degree of pollution of water or an accumulation of mud in the basin is not important, because the 8177 measures the surface.

Distance measuring

Open basins

Sludge container

In sewage treatment plants, the accumulated sludge is dewatered and transported via conveyor belts to containers. The 8177 measuring device measures the filling of the container. An empty container can thus be readied in good time before the max. level is reached.

Principle of operation

The transducer of the ultrasonic measuring device emits short ultrasonic pulses, at 55 kHz to the measured product. These pulses are reflected by the medium surface and received by the transducer as echoes. The running time of the ultrasonic pulses from emission to reception is proportional to the distance and hence to the level. An integrated temperature sensor detects the temperature in the vessel and compensates the influence of temperature on the signal running time. The determined level is converted into an output signal and transmitted as a measured value.

The measuring device is adjusted with the display/configuration module. The entered parameters are generally saved in the measuring device, type 8177. Optionally, parameters may also be uploaded and downloaded with the display/configuration module.

Set up with display/configuration module:

The display/configuration module can be inserted into the measuring device and removed again at any time. It is not necessary to interrupt the power supply. The measuring device is adjusted via the four keys of the display/configuration module.

Display/configuration module

- LCD Display
- Interrupt input
- Change value of parameter
- Indicating of the menu article no.
- Move to the menu overview
- Confirm selected menu
- Edit parameter
- Save value
- Menu change
- Selecting from a list
- Select editing position
Dimensions [mm]

- ø 91
- ø 74
- ø 50
- ø 80.5
- ø 91
- 123
- 190
- 22
- 84

SW60

Cable gland
M20 x 1.5

Closing screw
M20 x 1.5

G 2"
NPT 2"
Ordering chart for compact 8177 measuring device

<table>
<thead>
<tr>
<th>Specification</th>
<th>Operating voltage</th>
<th>Output</th>
<th>Electrical connection</th>
<th>Article no. (with display / configuration module)</th>
<th>Article no. (without display / configuration module)</th>
</tr>
</thead>
<tbody>
<tr>
<td>G 2” mounting thread</td>
<td>14…36 V DC</td>
<td>4…20 mA/HART (2 wires)</td>
<td>Cable gland M20 × 1.5</td>
<td>558224</td>
<td>559243</td>
</tr>
<tr>
<td>NPT 2” mounting thread</td>
<td>14…36 V DC</td>
<td>4…20 mA/HART (2 wires)</td>
<td>Cable gland M20 × 1.5</td>
<td>558225</td>
<td>559244</td>
</tr>
<tr>
<td>Ex version – ATEX certification G 2” mounting thread</td>
<td>14…30 V DC</td>
<td>4…20 mA/HART (2 wires)</td>
<td>Cable gland M20 × 1.5</td>
<td>558226</td>
<td>559245</td>
</tr>
</tbody>
</table>

Ordering chart - accessories for 8177 measuring device (has to be ordered separately)

<table>
<thead>
<tr>
<th>Specification</th>
<th>Article no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set with 2 reductions M20 × 1.5/NPT1½” + 2 neoprene flat seals for cable gland + 2 screw-plugs M20 × 1.5</td>
<td>551782</td>
</tr>
<tr>
<td>Set with a display/configuration module, a transparent cover and a seal ring</td>
<td>559279</td>
</tr>
<tr>
<td>Set with a transparent cover and a seal ring</td>
<td>561006</td>
</tr>
</tbody>
</table>

Interconnection possibilities with other Bürkert devices

To find your nearest Bürkert facility, click on the orange box - www.burkert.com

In case of special application conditions, please consult for advice.

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