For liquids in narrow tanks with internal obstructions
This device is a non-contact radar level transmitter that uses FMCW technology. It measures distance, level and volume of liquids and pastes. It has an empty spectrum function that filters false reflections caused by equipment inside the tank.

- Large measuring range from the antenna up to 100 m / 328 ft
- Small beam angle due to 80 GHz and process connections starting from ¾” thread
- PEEK Lens antenna insensitive to deposits

Features

- FMCW radar level measurement and has more than 28 years of experience with this technology
- Accuracy ±2 mm / ±0.08”
- PEEK Lens antenna measures distances from 0.3 m up to 100 m / 328.1 ft at +150°C / +302°F and 40 barg / 580 psig
- Small dead zone and beam angle (4° with DN70 / 2¾” Lens and 8° with DN40 / 1½” Lens antennas)
- 112 mm / 4.4” antenna extension for long nozzles
- Extensive choice of process connections: threaded ≥¾”, flange ≥DN50 / 2” as well as PEEK flange plate protections for corrosive media.
- One user interface for all applications
- Empty tank spectrum function eliminates false reflections caused by tank internals
- Diagnosis functions according to NAMUR NE 107
- Conforms to NAMUR Recommendations NE 21, NE 43 and NE 53
- Can measure in fast moving processes (≤60 m/min / ≤196.85 ft/min)

Industries

- Oil & Gas
- Chemical market
- Environment
- Power
Applications

- Small and narrow tanks with tank internals (e.g. heating coils, agitators etc.)
- River, tide or dam level measurement
- Tanks with floating roofs

1. Level measurement of liquids

![Level measurement of liquids](image1)

The level transmitter can measure the level of a wide range of liquid products on a large variety of installations within the stated pressure and temperature range. It does not require any calibration: it is only necessary to do a short configuration procedure.

2. Volume (mass) measurement

![Volume (mass) measurement](image2)

A strapping table function is available in the configuration menu for volume or mass measurement. Up to 50 volume (mass) values can be related to level values. For example:

- Level 1) = 2 m / Volume 1) = e.g. 0.7 m³
- Level 2) = 10 m / Volume 2) = e.g. 5 m³
- Level 3) = 20 m / Volume 3) = e.g. 17 m³

This data permits the device to calculate (by linear interpolation) volume or mass between strapping table entries.

PACTware™ software and a DTM (Device Type Manager) is supplied free of charge with the device. This software permits the user to easily configure the device with a computer. It has a conversion table function with a large number of tank shapes.
Measuring principle

A radar signal is emitted via an antenna, reflected from the product surface and received after a time $t$. The radar principle used is FMCW (Frequency Modulated Continuous Wave).

The FMCW-radar transmits a high frequency signal whose frequency increases linearly during the measurement phase (called the frequency sweep). The signal is emitted, reflected on the measuring surface and received with a time delay, $t$. Delay time, $t=\frac{2d}{c}$, where $d$ is the distance to the product surface and $c$ is the speed of light in the gas above the product.

For further signal processing the difference $\Delta f$ is calculated from the actual transmitted frequency and the received frequency. The difference is directly proportional to the distance. A large frequency difference corresponds to a large distance and vice versa. The frequency difference $\Delta f$ is transformed via a Fast Fourier Transform (FFT) into a frequency spectrum and then the distance is calculated from the spectrum. The level results from the difference between the tank height and the measured distance.

![Figure 2: Measuring principle of FMCW radar](image)

1) Transmitter
2) Mixer
3) Antenna
4) Distance to product surface, where change in frequency is proportional to distance
5) Differential time delay, $\Delta t$
6) Differential frequency, $\Delta f$
7) Frequency transmitted
8) Frequency received
9) Frequency
10) Time
Measurement modes

"Direct" mode
If the dielectric constant of the liquid is high ($\varepsilon_r \geq 1.4$), the level signal is the reflection on the surface of the liquid.

"TBF Auto" mode
If the dielectric constant of the liquid is low ($\varepsilon_r 1.4...1.5$, for long-distance measurement), you must use "TBF Auto" mode to measure level correctly. "TBF Auto" is an automatic mode that lets the device make a selection between "Direct" mode and "TBF" mode. If the device finds a large radar reflection above the "tank bottom area" (the bottom 20% of the tank height), the device will use "Direct" mode. If the device finds a large radar reflection in the "tank bottom area", the device uses TBF mode. This mode can be used only in tanks with flat bottoms or in stilling wells with a reference plate at the bottom.

"Full TBF" mode
TBF = Tank Bottom Following. If the dielectric constant of the liquid is very low ($\varepsilon_r <1.4$), you must use "TBF Full" mode to measure level correctly. The device uses the radar reflection on the bottom of the tank (the signal goes through the liquid). This mode can be used only in tanks with flat bottoms or in stilling wells with a reference plate at the bottom.
**TECHNICAL DATA**

**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. Refer to the back page.

**Measuring system**

<table>
<thead>
<tr>
<th>Measuring principle</th>
<th>2-wire loop-powered level transmitter; FMCW radar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency range</td>
<td>W-band (78...82 GHz)</td>
</tr>
<tr>
<td>Max. radiated power (EIRP)</td>
<td>&lt; -41.3 dBm according to ETSI EN 307 372 (TLPR) and ETSI EN 302 729 (LPR)</td>
</tr>
<tr>
<td>Application range</td>
<td>Level measurement of liquids, pastes and slurries</td>
</tr>
<tr>
<td>Primary measured value</td>
<td>Distance and reflection</td>
</tr>
<tr>
<td>Secondary measured value</td>
<td>Level, volume and mass</td>
</tr>
</tbody>
</table>

**Design**

<table>
<thead>
<tr>
<th>Construction</th>
<th>The measurement system consists of a measuring sensor (antenna) and a signal converter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Options</td>
<td>Integrated LCD display (-20..+70°C / -4...+158°F); if the ambient temperature is not in these limits, then this condition can stop the display</td>
</tr>
<tr>
<td></td>
<td>Distance piece (for process temperature: +150...+200°C / +302...+392°F)</td>
</tr>
<tr>
<td></td>
<td>Antenna purging system (supplied with a G 1/4 connection)</td>
</tr>
<tr>
<td></td>
<td>Weather protection</td>
</tr>
<tr>
<td>Max. measuring range (antenna)</td>
<td>Lens, DN20 (¾¨): 10 m / 32.8 ft</td>
</tr>
<tr>
<td></td>
<td>Lens, DN25 (1¨): 25 m / 82 ft</td>
</tr>
<tr>
<td></td>
<td>Lens, DN40 (1½¨): 50 m / 164 ft</td>
</tr>
<tr>
<td></td>
<td>Lens, DN70 (2¾¨): 100 m / 328.1 ft</td>
</tr>
<tr>
<td></td>
<td>Refer also to &quot;Measuring accuracy&quot; on page 6</td>
</tr>
<tr>
<td>Min. tank height</td>
<td>0.2 m / 12¨</td>
</tr>
<tr>
<td>Recommended minimum blocking distance</td>
<td>0.1 m / 4¨ (add 112 mm / 4.4¨ if the DN40 Lens antenna has antenna extension)</td>
</tr>
<tr>
<td>Min. distance for reflection measurement</td>
<td>1 m / 3.3 ft</td>
</tr>
<tr>
<td>Beam angle (antenna)</td>
<td>Lens, DN20 (¾¨): 15°</td>
</tr>
<tr>
<td></td>
<td>Lens, DN25 (1¨): 10°</td>
</tr>
<tr>
<td></td>
<td>Lens, DN40 (1½¨): 8°</td>
</tr>
<tr>
<td></td>
<td>Lens, DN70 (2¾¨): 4°</td>
</tr>
<tr>
<td>Display and user interface</td>
<td>Backlit LCD display</td>
</tr>
<tr>
<td>Display</td>
<td>128 × 64 pixels in 64-step greyscale with 4-button keypad</td>
</tr>
<tr>
<td>Interface languages</td>
<td>English, French, German, Italian, Spanish, Portuguese, Chinese (simplified), Japanese, Russian, Czech, Polish and Turkish</td>
</tr>
</tbody>
</table>
## Measuring accuracy

<table>
<thead>
<tr>
<th>Resolution</th>
<th>1 mm / 0.04&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeatability</td>
<td>±1 mm / ±0.04&quot;</td>
</tr>
<tr>
<td>Accuracy</td>
<td>Standard: ±2 mm / ±0.08&quot;, when distance ≤ 10 m / 33 ft; ±0.02% of measured distance, when distance &gt; 10 m / 33 ft. For more data, refer to &quot;Measuring accuracy&quot; on page 6</td>
</tr>
</tbody>
</table>

## Reference conditions acc. to EN 61298-1

<table>
<thead>
<tr>
<th>Temperature</th>
<th>+15...+25°C / +59...+77°F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure</td>
<td>1013 mbar ±50 mbar / 14.69 psia ±0.73 psi</td>
</tr>
<tr>
<td>Relative air humidity</td>
<td>60% ±15%</td>
</tr>
<tr>
<td>Target</td>
<td>Metal plate in an anechoic chamber</td>
</tr>
</tbody>
</table>

## Operating conditions

### Temperature

<table>
<thead>
<tr>
<th>Ambient temperature</th>
<th>-40...+80°C / -40...+176°F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative humidity</td>
<td>0...99%</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40...+85°C / -40...+185°F</td>
</tr>
<tr>
<td>Process connection temperature (higher temperature on request)</td>
<td>Metallic Horn antenna: -50...+150°C / -58...+302°F</td>
</tr>
<tr>
<td></td>
<td>The process connection temperature must agree with the temperature limits of the gasket material. Refer to &quot;Materials&quot; in this table. Ex: see supplementary operating instructions or approval certificates</td>
</tr>
</tbody>
</table>

### Pressure

| Process pressure | Drop antenna (PTFE): -1...40 barg / -14.5...580 psig |

### Other conditions

| Dielectric constant ($\varepsilon_r$) | Direct mode: ≥1.4 TBF mode: ≥1.1 |
| Ingress protection | IEC 60529: IP66 / IP68 (0.1 barg / 1.45 psig) |
| | NEMA 250: NEMA type 4X - 6 (housing) and type 6P (antenna) |
| Maximum rate of change | 60 m/min / 196 ft/min |

## Installation conditions

| Process connection size | The nominal diameter (DN) should be equal to or larger than the antenna diameter. |
| Process connection position | Make sure that there are not any obstructions directly below the process connection for the device. For more data, refer to Installation on page 27 |
| Dimensions and weights | For dimensions and weights data, refer to Dimensions and weights on page 19 |
## TECHNICAL DATA

### Materials

| Housing | Polyester-coated aluminium
|         | Option: Stainless steel (1.4404 / 316L) – non-Ex devices only. Ex approvals will be available in the second quarter of 2018.
| Wetted parts, including antenna | PEEK
| Process connection | Stainless steel (1.4404 / 316L)
| Gaskets | FKM/FPM (-40...+150°C/-40...+302°F); Kalrez® 6375 (-20...+150°C/-4...+302°F); EPDM (-50°C...+150°C/-58...+302°F)
| Cable gland | Standard: none
|         | Options: Plastic (Non-Ex: black, Ex i-approved: blue); nickel-plated brass; stainless steel; M12 (4-pin connector)
| Weather protection (Option) | Stainless steel (1.4404 / 316L)

### Process connections

**DN20 (½”) Lens antenna**

| Thread | G 1½ (ISO 228); 1½ NPT (ASME B1.20.1)
| Flange, EN 1092-1 | Low-pressure flanges: DN50...200 in PN01; Standard flanges: DN50 in PN40; DN80...200 in PN10, PN16 and PN40 (Type B1); others on request
|         | Optional flange facing for standard flanges: Type A

**Flange, ASME B16.5**

| Low-pressure flanges: 2"...8" in 150 lb (max. 15 psig); Standard flanges: 2"...8" in 150 lb RF and 300 lb RF; others on request
|         | Optional flange facing for standard flanges: FF (Flat Face)

**JIS B2220**

| 40...200A in 10K RF; others on request

**DN25 (1”) Lens antenna**

| Thread | G 1 A (ISO 228); 1 NPT (ASME B1.20.1)
| Flange, EN 1092-1 | Low-pressure flanges: DN50...200 in PN01; Standard flanges: DN50 in PN40; DN80...200 in PN10, PN16 and PN40 (Type B1); others on request
|         | Optional flange facing for standard flanges: Type A

**Flange, ASME B16.5**

| Low-pressure flanges: 2"...8" in 150 lb (max. 15 psig); Standard flanges: 2"...8" in 150 lb RF and 300 lb RF; others on request
|         | Optional flange facing for standard flanges: FF (Flat Face)

**JIS B2220**

| 40...200A in 10K RF; others on request

**DN40 (1 ½”) Lens antenna**

| Thread | G 1½ A (ISO 228); 1½ NPT (ASME B1.20.1)
| Flange, EN 1092-1 | Low-pressure flanges: DN50...200 in PN01; Standard flanges: DN50 in PN40; DN80...200 in PN10, PN16 and PN40 (Type B1); others on request
|         | Optional flange facing for standard flanges: Type A

**Flange, ASME B16.5**

| Low-pressure flanges: 2"...8" in 150 lb (max. 15 psig); Standard flanges: 2"...8" in 150 lb RF and 300 lb RF; others on request
|         | Optional flange facing for standard flanges: FF (Flat Face)

**JIS B2220**

| 40...200A in 10K RF; others on request

### TECHNICAL DATA

<table>
<thead>
<tr>
<th>DN70 (2 ¾”) Lens antenna</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Thread</strong></td>
</tr>
<tr>
<td><strong>Flange, EN 1092-1</strong></td>
</tr>
<tr>
<td><strong>Flange, ASME B16.5</strong></td>
</tr>
<tr>
<td><strong>JIS B2220</strong></td>
</tr>
</tbody>
</table>

### Electrical connections

| **Power supply**         | Terminals output – Non-Ex / Ex i: 12...30 V DC; min./max. value for an output of 21.5 mA at the terminals |
|                         | Terminals output – Ex d: 16...36 V DC; min./max. value for an output of 21.5 mA at the terminals |
| **Maximum current**      | 21.5 mA |
| **Current output load**  | Non-Ex / Ex i: $R_L [\Omega] \leq (U_{ext} -12 V)/21.5 mA$. For more data, refer to Minimum power supply voltage on page 16 |
|                         | Ex d: $R_L [\Omega] \leq (U_{ext} -16 V)/21.5 mA$. For more data, refer to Minimum power supply voltage on page 13 |
| **Cable entry**          | Standard: M20×1.5; Options: ½ NPT; 4-pin male M12 connector |
| **Cable gland**          | Standard: none |
|                         | Options: M20×1.5 (cable diameter: 7…12 mm / 0.28…0.47”); others are available on request |
| **Cable entry capacity** (terminal) | 0.5…3.31 mm² (AWG 20…12) |

### Input and output

<table>
<thead>
<tr>
<th><strong>Current output</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Output signal</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Output type</strong></td>
</tr>
<tr>
<td><strong>Resolution</strong></td>
</tr>
<tr>
<td><strong>Temperature drift</strong></td>
</tr>
<tr>
<td><strong>Error signal</strong></td>
</tr>
<tr>
<td><strong>HART®</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Load</strong></td>
</tr>
<tr>
<td><strong>Digital temperature drift</strong></td>
</tr>
<tr>
<td><strong>Multi-drop operation</strong></td>
</tr>
<tr>
<td><strong>Available drivers</strong></td>
</tr>
</tbody>
</table>
### PROFIBUS PA (pending)

<table>
<thead>
<tr>
<th><strong>Type</strong></th>
<th>PROFIBUS MBP interface that agrees with IEC 61158-2 with 31.25 kbit/s; voltage mode (MBP = Manchester-Coded, Bus-Powered)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Function blocks</strong></td>
<td>1 × Transducer Block Level (TB-Level), 1 × Physical Block (PB), 4 × Analog Input Block (AI), 1 × Totalizer Function Block (TOT)</td>
</tr>
<tr>
<td><strong>Device power supply</strong></td>
<td>9...32 V DC – bus powered; no additional power supply required</td>
</tr>
<tr>
<td><strong>Polarity sensitivity</strong></td>
<td>No</td>
</tr>
<tr>
<td><strong>Basic current</strong></td>
<td>18 mA</td>
</tr>
</tbody>
</table>

### FOUNDATION™ fieldbus (pending)

| **Physical layer** | FOUNDATION™ fieldbus protocol that agrees with IEC 61158-2 and FISCO model; galvanically isolated |
| **Communication standard** | H1 |
| **ITK version** | 6.3 |
| **Function blocks** | 1 × Enhanced Resource Block (RB), 1 × Customer Level Transducer Block (LEVELTB), 1 × Customer Converter Transducer Block (CONVTB), 1 × Customer Diagnosis Transducer Block (DIAGTB), 4 × Analog Input Block (AI), 1 × Digital Input (DI), 1 × Integrator Block (IT), 1 × Proportional Integral Derivate Block (PID), 1 × Arithmetic Block (AR) |
| **Device power supply** | Not intrinsically safe: 9...32 V DC  
Intrinsically safe: 9...24 V DC |
| **Basic current** | 18 mA |
| **Maximum error current FDE** | 25.5 mA (= basic current + error current = 18 mA + 7.5 mA) |
| **Polarity sensitivity** | No |
| **Minimum cycle time** | 250 ms |
| **Output data** | Level, distance, volume, ullage volume, mass, ullage mass |
| **Input data** | None |
| **Link Active Scheduler** | Supported |
| **NAMUR NE 107 data** | Supported with FF field diagnosis (FF-891) |
## Approvals and certification

### CE
The device meets the essential requirements of the EU Directives. The manufacturer certifies successful testing of the product by applying the CE marking. For more data about the EU Directives and European Standards related to this device, refer to the EU Declaration of Conformity. You can download this document free of charge from the website (Download Center).

### Vibration resistance
EN 60068-2-6 and EN 60721-3-4 (1...9 Hz: 3 mm / 10...200 Hz: 1g, 10g shock ½ sinus: 11 ms)

### Explosion protection

#### ATEX (EU Type Approval)
- I 1/2 G Ex ia IIC T6...T3 Ga/Gb;
- I 1/2 G Ex db ia IIC T85°C...T**°C Da/Db; ③
- I 1/2 D Ex ia tb IIC T85°C...T**°C Da/Db ③

#### ATEX (Type Approval)
- I 3 G Ex ic IIC T6...T3 Gc;
- I 3 D Ex ic IIC T85°C...T**°C Dc ③

#### IECEx
- Ex ia IIC T6...T3 Ga/Gb;
- Ex ia IIC T85°C...T**°C Da/Db; ③
- Ex db ia IIC T6...T3 Ga/Gb;
- Ex ia tb IIC T85°C...T**°C Da/Db; ③
- Ex ic IIC T6...T3 Gc;
- Ex ic IIC T85°C...T**°C Gc ③

#### cQPSus

**Division ratings**
- XP-IS, Class I, Div 1, GPS ABCD, T6...T3;
- DIP, Class II, III, Div 1, GPS EFG, T85°C...T**°C; ③
- IS, Class I, Div 1, GPS ABCD, T6...T3;
- IS, Class II, III, Div 1, GPS EFG, T85°C...T**°C; ③
- NI, Class I, Div 2, GPS ABCD, T6...T3;
- NI, Class II, III, Div 2, GPS FG, T85°C...T**°C ③

**Zone ratings**
- Class I, Zone 1, AEx db ia [ia Ga] IIC T6...T3 Gb (US) – antenna suitable for Zone 0; Ex db ia [ia Ga] IIC T6...T3 Gb (Canada) – antenna suitable for Zone 0;
- Class I, Zone 0, AEx ia IIC T6...T3 Ga (US); Ex ia IIC T6...T3 Ga (Canada);
- Zone 20, AEx ia IIC T85°C...T**°C Da (US);
- Ex ia IIC T85°C...T**°C Da (Canada); ③
- Zone 21, AEx ia tb [ia Da] IIC T85°C...T**°C Db (US) – antenna suitable for Zone 20 Ex ia tb [ia Da] IIC T85°C...T**°C Db (Canada) – antenna suitable for zone 20 ③

### Other standards and approvals

#### Electromagnetic compatibility
EU: Electromagnetic Compatibility directive (EMC)

#### Radio approvals
EU: Radio Equipment directive (RED)
FCC Rules: Part 15
Industry Canada: RSS-211

#### Electrical safety
EU: Agrees with the safety part of the Low Voltage directive (LVD)
USA and Canada: Agrees with NEC and CEC requirements for installation in ordinary locations
## TECHNICAL DATA

<table>
<thead>
<tr>
<th>NAMUR</th>
<th>NAMUR NE 21 Electromagnetic Compatibility (EMC) of Industrial Process and Laboratory Control Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NAMUR NE 43 Standardization of the Signal Level for the Failure Information of Digital Transmitters</td>
</tr>
<tr>
<td></td>
<td>NAMUR NE 53 Software and Hardware of Field Devices and Signal Processing Devices with Digital Electronics</td>
</tr>
<tr>
<td></td>
<td>NAMUR NE 107 Self-Monitoring and Diagnosis of Field Devices</td>
</tr>
<tr>
<td>CRN</td>
<td>Pending. This certification is applicable for all Canadian provinces and territories. For more data, refer to the website.</td>
</tr>
<tr>
<td><strong>Construction code</strong></td>
<td>Option: NACE MR 0175 / MR 0103 / ISO 15156</td>
</tr>
</tbody>
</table>

1 Kalrez® is a registered trademark of DuPont Performance Elastomers L.L.C.  
2 HART® is a registered trademark of the HART Communication Foundation  
3 $T^\text{**C} = 150^\circ\text{C}$ or $200^\circ\text{C}$. For more data, refer to the related Ex approval certificate.  
4 $T^* = 150^\circ\text{C}$ or $200^\circ\text{C}$. For more data, refer to the related Ex approval certificate.
Measuring accuracy

Use these graphs to find the measuring accuracy for a given distance from the transmitter.

DN20 (¾"") Lens antenna

Figure 3: DN20 (¾"") Lens antenna: measuring accuracy (graph of measuring accuracy in mm against measuring distance in m)

X: Measuring distance from the thread stop or flange facing of the process connection [m]
Y: Measuring accuracy [+yy mm / -yy mm]
1) 100 mm

Figure 4: DN20 (¾"") Lens antenna: measuring accuracy (graph of measuring accuracy in inches against measuring distance in ft)

X: Measuring distance from the thread stop or flange facing of the process connection [ft]
Y: Measuring accuracy [+yy inches / -yy inches]
1) 3.94"

To calculate the accuracy at a given distance from the antenna, refer to Technical data on page 5 (measuring accuracy).
DN25 (1”) Lens antenna

Figure 5: DN25 (1”) Lens antenna: measuring accuracy (graph of measuring accuracy in mm against measuring distance in m)

X: Measuring distance from the thread stop or flange facing of the process connection [m]
Y: Measuring accuracy [+yy mm / -yy mm]
1) 100 mm

Figure 6: DN25 (1”) Lens antenna: measuring accuracy (graph of measuring accuracy in inches against measuring distance in ft)

X: Measuring distance from the thread stop or flange facing of the process connection [ft]
Y: Measuring accuracy [+yy inches / -yy inches]
1) 3.94”

To calculate the accuracy at a given distance from the antenna, refer to Technical data on page 5 (measuring accuracy).
TECHNICAL DATA

DN40 (1½") Lens antenna

Figure 7: DN40 (1½") Lens antenna: measuring accuracy (graph of measuring accuracy in mm against measuring distance in m)

X: Measuring distance from the thread stop or flange facing of the process connection [m]
Y: Measuring accuracy [+yy mm / -yy mm]
   1) 50 mm
   2) 200 mm

Figure 8: DN40 (1½") Lens antenna: measuring accuracy (graph of measuring accuracy in inches against measuring distance in ft)

X: Measuring distance from the thread stop or flange facing of the process connection [ft]
Y: Measuring accuracy [+yy inches / -yy inches]
   1) 1.97"
   2) 7.87"

To calculate the accuracy at a given distance from the antenna, refer to Technical data on page 5 (measuring accuracy).
DN70 (2¾") Lens antenna

Figure 9: DN70 (2¾") Lens antenna: measuring accuracy (graph of measuring accuracy in mm against measuring distance in m)

X: Measuring distance from the thread stop or flange facing of the process connection [m]
Y: Measuring accuracy [+yy mm / -yy mm]
1 100 mm

Figure 10: DN70 (1½") Lens antenna: measuring accuracy (graph of measuring accuracy in inches against measuring distance in ft)

X: Measuring distance from the thread stop or flange facing of the process connection [ft]
Y: Measuring accuracy [+yy inches / -yy inches]
1 3.94"

To calculate the accuracy at a given distance from the antenna, refer to Technical data on page 5 (measuring accuracy).
Minimum power supply voltage

Use these graphs to find the minimum power supply voltage for a given current output load.

Non-Ex and Hazardous Location approved (Ex i / IS) devices

![Graph 1](image1.png)

Figure 11: Minimum power supply voltage for an output of 21.5 mA at the terminals (Non-Ex and Hazardous Location approval (Ex i / IS))

X: Power supply U [V DC]
Y: Current output load \( R_L \) [Ω]

Hazardous Location (Ex d / XP/NI) approved devices

![Graph 2](image2.png)

Figure 12: Minimum power supply voltage for an output of 21.5 mA at the terminals (Hazardous Location approval (Ex d / XP/NI))

X: Power supply U [V DC]
Y: Current output load \( R_L \) [Ω]
Guidelines for maximum operating pressure

Make sure that the devices are used within their operating limits.

Figure 13: Pressure / temperature de-rating (EN 1092-1), flange and threaded connection, in °C and barg

Figure 14: Pressure / temperature de-rating (EN 1092-1), flange and threaded connections, in °F and psig

1) Process pressure, p [barg]
2) Process connection temperature, T [°C]
3) Process pressure, p [psig]
4) Process connection temperature, T [°F]
5) Threaded connection, G (ISO 228-1)
6) Threaded connection, G (ISO 228-1).
7) Flange connection, PN40.
8) Flange connection, PN16
**CRN certification (pending)**

There is a CRN certification option for devices with process connections that agree with ASME standards. This certification is necessary for all devices that are installed on a pressure vessel and used in Canada.

---

1) Process pressure, $p$ [barg]
2) Process connection temperature, $T$ [°C]
3) Process pressure, $p$ [psig]
4) Process connection temperature, $T$ [°F]
5) Flange connection, Class 900 and Class 1500. Threaded connection, NPT (ASME B1.20.1).
6) Flange connection, Class 600
7) Flange connection, Class 300.
8) Flange connection, Class 150
Dimensions and weights

DN20 / ¾” Lens antenna versions

1) DN20 / ¾” Lens antenna with a G ¾ A or ¾ NPT threaded connection
2) DN20 / ¾” Lens antenna with a low-pressure flange attached to a threaded connection

The diameter of the outer sheath of the cable must be 7…12 mm or 0.28…0.47”.
Cable glands for cQPSus-approved devices must be supplied by the customer.
A weather protection cover is available as an accessory with all devices.

**DN20 / ¾” Lens antenna: Dimensions in mm**

<table>
<thead>
<tr>
<th>Type of process connection</th>
<th>Dimensions [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
</tr>
<tr>
<td>Thread connection</td>
<td>151</td>
</tr>
<tr>
<td>Low-pressure flange connection</td>
<td>151</td>
</tr>
</tbody>
</table>

1) If the process temperature is more than +150°C, add 112 mm to this value

**DN20 / ¾” Lens antenna: Dimensions in inches**

<table>
<thead>
<tr>
<th>Type of process connection</th>
<th>Dimensions [inches]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
</tr>
<tr>
<td>Thread connection</td>
<td>5.94</td>
</tr>
<tr>
<td>Low-pressure flange connection</td>
<td>5.94</td>
</tr>
</tbody>
</table>

1) If the process temperature is more than +302°F, add 4.41” to this value
**Figure 18: DN25 / 1” Lens antenna versions**

1) DN25 / 1” Lens antenna with a G 1 A or 1 NPT threaded connection
2) DN25 / 1” Lens antenna with a low-pressure flange attached to a threaded connection

- The diameter of the outer sheath of the cable must be 7…12 mm or 0.28…0.47”.
- Cable glands for cQPSus-approved devices must be supplied by the customer.
- A weather protection cover is available as an accessory with all devices.

### DN25 / 1” Lens antenna: Dimensions in mm

<table>
<thead>
<tr>
<th>Type of process connection</th>
<th>Dimensions [mm]</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
<td>b</td>
<td>c</td>
<td>d</td>
<td>e</td>
<td>f</td>
</tr>
<tr>
<td>Thread connection</td>
<td>151</td>
<td>160</td>
<td>189</td>
<td>215</td>
<td>28.8</td>
<td>25.7</td>
</tr>
<tr>
<td>Low-pressure flange connection</td>
<td>151</td>
<td>160</td>
<td>192</td>
<td>215</td>
<td>31.8</td>
<td>22.7</td>
</tr>
</tbody>
</table>

1) If the process temperature is more than +150°C, add 112 mm to this value

### DN25 / 1” Lens antenna: Dimensions in inches

<table>
<thead>
<tr>
<th>Type of process connection</th>
<th>Dimensions [inches]</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
<td>b</td>
<td>c</td>
<td>d</td>
<td>e</td>
<td>f</td>
</tr>
<tr>
<td>Thread connection</td>
<td>5.94</td>
<td>6.30</td>
<td>7.44</td>
<td>8.46</td>
<td>1.13</td>
<td>1.01</td>
</tr>
<tr>
<td>Low-pressure flange connection</td>
<td>5.94</td>
<td>6.30</td>
<td>7.56</td>
<td>8.46</td>
<td>1.25</td>
<td>0.89</td>
</tr>
</tbody>
</table>

1) If the process temperature is more than +302°F, add 4.41” to this value
DN40 / 1½” Lens antenna versions

1) DN40 / 1½” Lens antenna with a G 1½A or 1½ NPT threaded connection
2) DN40 / 1½” Lens antenna with a flange connection
3) DN40 / 1½” Lens antenna with a low-pressure flange attached to a threaded connection

- The diameter of the outer sheath of the cable must be 7…12 mm or 0.28…0.47”.
- Cable glands for cQPSus-approved devices must be supplied by the customer.
- A weather protection cover is available as an accessory with all devices.

DN40 / 1½” Lens antenna: Dimensions in mm

<table>
<thead>
<tr>
<th>Type of process connection</th>
<th>Dimensions [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
</tr>
<tr>
<td>Thread connection</td>
<td>151</td>
</tr>
<tr>
<td>Flange connection</td>
<td>151</td>
</tr>
<tr>
<td>Low-pressure flange connection</td>
<td>151</td>
</tr>
</tbody>
</table>

1) If the process temperature is more than +150°C, add 112 mm to this value
2) If the process temperature is more than +150°C, add 112 mm to this value. If the device has the antenna extension option, add 112 mm to this value.
3) If the device has the antenna extension option, add 112 mm to this value.

DN40 / 1½” Lens antenna: Dimensions in inches

<table>
<thead>
<tr>
<th>Type of process connection</th>
<th>Dimensions [inches]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
</tr>
<tr>
<td>Thread connection</td>
<td>5.94</td>
</tr>
<tr>
<td>Flange connection</td>
<td>5.94</td>
</tr>
<tr>
<td>Low-pressure flange connection</td>
<td>5.94</td>
</tr>
</tbody>
</table>

1) If the process temperature is more than +302°F, add 4.41” to this value
2) If the process temperature is more than +302°F, add 4.41” to this value. If the device has the antenna extension option, add 4.41” to this value.
3) If the device has the antenna extension option, add 4.41” to this value.
### DN70 / 2¾” Lens antenna versions

1) DN70 / 2¾” Lens antenna with a G 3A or 3 NPT threaded connection
2) DN70 / 2¾” Lens antenna with a flange connection
3) DN70 / 2¾” Lens antenna with a low-pressure flange attached to a threaded connection

- The diameter of the outer sheath of the cable must be 7…12 mm or 0.28…0.47”.
- Cable glands for cQPSus-approved devices must be supplied by the customer.
- A weather protection cover is available as an accessory with all devices.

### DN70 / 2¾” Lens antenna: Dimensions in mm

<table>
<thead>
<tr>
<th>Type of process connection</th>
<th>Dimensions [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
</tr>
<tr>
<td>Thread connection</td>
<td>151</td>
</tr>
<tr>
<td>Flange connection</td>
<td>151</td>
</tr>
<tr>
<td>Low-pressure flange connection</td>
<td>151</td>
</tr>
</tbody>
</table>

1) If the device has a G 3 process connection, then c = 209.8 mm. If the device has a 3 NPT process connection, then c = 207.8 mm. If the process temperature is more than +150°C, add 112 mm to this value.
2) If the device has a G 3 process connection, then d = 233.2 mm. If the device has a 3 NPT process connection, then d = 239.9 mm. If the process temperature is more than +150°C, add 112 mm to this value.
3) If the device has a G 3 process connection, then e = 49 mm. If the device has a 3 NPT process connection, then e = 47 mm. If the process temperature is more than +150°C, add 112 mm to this value.
4) If the device has a G 3 process connection, then f = 23.3 mm. If the device has a 3 NPT process connection, then f = 30 mm.
5) If the process temperature is more than +150°C, add 112 mm to this value.
DN70 / 2¾¨ Lens antenna: Dimensions in inches

<table>
<thead>
<tr>
<th>Type of process connection</th>
<th>Dimensions [inches]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
</tr>
<tr>
<td>Thread connection</td>
<td>5.94</td>
</tr>
<tr>
<td>Flange connection</td>
<td>5.94</td>
</tr>
<tr>
<td>Low-pressure flange connection</td>
<td>5.94</td>
</tr>
</tbody>
</table>

1) If the device has a G 3 process connection, then c = 8.26¨. If the device has a 3 NPT process connection, then c = 8.18¨. If the process temperature is more than +302°F, add 4.41¨ to this value.
2) If the device has a G 3 process connection, then d = 9.18¨. If the device has a 3 NPT process connection, then d = 9.44¨. If the process temperature is more than +302°F, add 4.41¨ to this value.
3) If the device has a G 3 process connection, then e = 1.93¨. If the device has a 3 NPT process connection, then e = 1.85¨. If the process temperature is more than +302°F, add 4.41¨ to this value.
4) If the device has a G 3 process connection, then f = 0.92¨. If the device has a 3 NPT process connection, then f = 1.18¨.
5) If the process temperature is more than +302°F, add 4.41¨ to this value.
Purging option

![Purging options](image)

Figure 21: Purging options

1) G 1/4 threaded connection for purging system (the plug is supplied by the manufacturer)

Purging system
Flange connections must have a pressure rating of PN10 (EN 1092-1), PN16 (EN 1092-1), Class 150 (ASME B16.5) or be a low-pressure flange (PN01 / 15 psig). A purging system adaptor is also available as an accessory for devices with threaded connections that do not have a purging system.

Weather protection option

![Weather protection option](image)

Figure 22: Weather protection option

1) Front view (with weather protection closed)
2) Left side (with weather protection closed)
3) Rear view (with weather protection closed)

Weather protection: Dimensions and weights

<table>
<thead>
<tr>
<th></th>
<th>Dimensions</th>
<th>Weights [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
<td>b</td>
</tr>
<tr>
<td>Weather protection</td>
<td>177</td>
<td>6.97</td>
</tr>
</tbody>
</table>
**Converter weight**

<table>
<thead>
<tr>
<th>Type of housing</th>
<th>Weights</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compact aluminium housing</td>
<td>2.1 / 4.6</td>
</tr>
<tr>
<td>Compact aluminium housing with distance piece 1</td>
<td>3.0 / 6.6</td>
</tr>
<tr>
<td>Compact stainless steel housing</td>
<td>4.5 / 9.9</td>
</tr>
<tr>
<td>Compact stainless steel housing with distance piece 1</td>
<td>5.4 / 11.9</td>
</tr>
</tbody>
</table>

1) If the process temperature is more than +150°C / +302°F, the housing has a distance piece. For more data about the overall dimensions of the device, refer to the "Dimensions and weights section."

**Antenna option weights**

<table>
<thead>
<tr>
<th>Antenna options</th>
<th>Min./Max. weights</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard options, with converter</td>
<td></td>
</tr>
<tr>
<td>DN40 (1½&quot;) Lens antenna with G 1½ or 1½ NPT threaded connection</td>
<td>2.5 / 5.5</td>
</tr>
<tr>
<td>DN70 (2¾&quot;) Lens antenna with G 3 or 3 NPT threaded connection</td>
<td>4.3 / 9.5</td>
</tr>
<tr>
<td>DN40 (1½&quot;) Lens antenna with G 1½ or 1½ NPT threaded connection and low-pressure flange</td>
<td>3.1 / 6.8</td>
</tr>
<tr>
<td>DN70 (2¾&quot;) Lens antenna with G 3 or 3 NPT threaded connection and low-pressure flange</td>
<td>4.8 / 10.6</td>
</tr>
<tr>
<td>DN40 (1½&quot;) Lens antenna with DN80 PN16 / B1 or 3” 150 lb / RF flange</td>
<td>6.7 / 14.8</td>
</tr>
<tr>
<td>DN70 (2¾&quot;) Lens antenna with DN80 PN16 / B1 or 3” 150 lb / RF flange</td>
<td>7.0 / 15.4</td>
</tr>
<tr>
<td>DN40 (1½&quot;) Lens antenna with DN80 PN16 / B1 or 3” 150 lb / RF flange and flange plate protection</td>
<td>7.5 / 16.5</td>
</tr>
<tr>
<td>DN40 (1½&quot;) Lens antenna with DN80 PN16 / B1 or 3” 150 lb / RF flange and antenna extension (length 112 mm / 4.4&quot;)</td>
<td>7.8 / 17.2</td>
</tr>
</tbody>
</table>
**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.

This radar level transmitter measures distance, level, mass, volume and reflectivity of liquids, pastes and slurries. It can be installed on tanks, reactors, open channels and open water.

**Pre-installation requirements**

Obey the precautions that follow to make sure that the device is correctly installed.

- Make sure that there is sufficient space on all sides.
- Protect the signal converter from direct sunlight. If necessary, install the weather protection accessory.
- Do not subject the signal converter to heavy vibrations. The devices are tested for vibration and agree with EN 50178 and IEC 60068-2-6.
Installation

Pressure and temperature ranges

The process connection temperature range must agree with the temperature limits of the gasket material. The operating pressure range is subject to the process connection used and the flange temperature.

![Figure 23: Pressure and temperature ranges](image)

1) Temperature at the process connection
   Non-Ex devices: The temperature range depends on the type of antenna, process connection and the seal material. Refer to the table that follows. Devices with Hazardous Location approvals: see supplementary instructions
2) Ambient temperature for operation of the display
   -20...+70°C / -4...+158°F. If the ambient temperature is not between these limits, then it is possible that the display screen will not operate temporarily. The device continues to measure level and send an output signal.
3) Ambient temperature.
   Non-Ex devices: -40...+80°C / -40...+176°F. Devices with Hazardous Location approvals: see supplementary instructions
4) Process pressure.
   Depends on the type of antenna and process connection. Refer to the table that follows.

### Maximum process connection temperature and operating pressure

<table>
<thead>
<tr>
<th>Antenna type</th>
<th>Maximum process connection temperature</th>
<th>Maximum operating pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[°C] [°F]</td>
<td>[barg] [psig]</td>
</tr>
</tbody>
</table>

1) The maximum process connection temperature must agree with the temperature limits of the gasket material

For more data on pressure ratings, refer to Guidelines for maximum operating pressure on page 17.
Recommended mounting position

Follow these recommendations to make sure that the device measures correctly. They have an effect on the performance of the device.
We recommend that you prepare the installation when the tank is empty.

*Recommended nozzle position for liquids, pastes and slurries*

**Figure 24: Recommended nozzle position for liquids, pastes and slurries**

1) Nozzle or socket for the DN40 or DN50 Metallic Horn antennas
2) Nozzle or socket for the DN80 or DN100 Metallic Horn antenna, and the DN80 Drop antenna
3) Nozzle or socket for the DN150 or DN200 Metallic Horn antenna, and the DN100 or DN150 Drop antenna
4) Tank diameter
5) Minimum distance of the nozzle or socket from the tank wall (depends on the antenna type and size – refer to items 1, 2 and 3 in this list):
   - DN40 or DN50 Metallic Horn: 1/5 × tank height
   - DN80 or DN100 Metallic Horn: 1/10 × tank height
   - DN80 Drop: 1/10 × tank height
   - DN150 or DN200 Metallic Horn: 1/20 × tank height
   - DN100 or DN150 Drop: 1/20 × tank height
   Maximum distance of the nozzle or socket from the tank wall (depends on the antenna type and size – refer to items 1, 2 and 3 in this list):
   - Metallic Horn or Drop: 1/3 × tank diameter
6) Tank height

If there is a nozzle on the tank before installation, the nozzle must be a minimum of 200mm/ 7.9” from the tank wall. The tank wall must be flat and there must not be obstacles adjacent to the nozzle or on the tank wall.
Number of devices that can be operated in a tank

Figure 25: There is no maximum limit to the number of devices that can be operated in the same tank

There is no maximum limit to the number of devices that can be operated in the same tank. They can be installed adjacent to other radar level transmitters.

Mounting restrictions

LPR and TLPR devices

LPR (Level Probing Radar) devices measure level in the open air or in a closed space (a metallic tank etc.). TLPR (Tank Level Probing Radar) devices measure level in a closed space only. You can use LPR devices for TLPR applications. For more data, refer to Order code on page 43, antenna options.

Causes of interference signals

- Objects in the tank or pit.
- Sharp corners that are perpendicular to the path of the radar beam.
- Sudden changes in tank diameter in the path of the radar beam.

Do not install the device above objects in the tank (agitator etc.) or pit. Objects in the tank or pit can cause interference signals. If there are interference signals, the device will not measure correctly. If it is not possible to install the device on another part of the tank or pit, do an empty spectrum scan. For more data, refer to the handbook.

Equipment and obstacles: how to prevent measurement of interference signals

Do not put the device immediately above equipment and obstacles in a tank or pit. This can have an effect on the performance of the device.

If possible, do not install a nozzle on the tank centerline.
Figure 26: Equipment and obstacles: how to prevent measurement of interference signals

1) Do not tilt the device more than 2°
2) We recommend that you do an empty spectrum recording if there are too many obstacles in the radar beam (refer to the handbook).
3) Beam radius of the antenna: refer to the table below. The beam radius increases by increments of "x" mm for each metre of distance from the antenna.

### Beam radius of the antenna

<table>
<thead>
<tr>
<th>Antenna type</th>
<th>Beam angle</th>
<th>Beam radius, x</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[mm/m]</td>
<td>[in/ft]</td>
</tr>
<tr>
<td>Metallic Horn, DN40 (1½&quot;)</td>
<td>17°</td>
<td>150</td>
</tr>
<tr>
<td>Metallic Horn, DN50 (2&quot;)</td>
<td>16°</td>
<td>141</td>
</tr>
<tr>
<td>Metallic Horn, DN65 (2½&quot;)</td>
<td>10° ¹</td>
<td>1</td>
</tr>
<tr>
<td>Metallic Horn, DN80 (3&quot;)</td>
<td>9°</td>
<td>79</td>
</tr>
<tr>
<td>Metallic Horn, DN100 (4&quot;)</td>
<td>8°</td>
<td>70</td>
</tr>
<tr>
<td>Metallic Horn, DN150 (6&quot;)</td>
<td>6°</td>
<td>53</td>
</tr>
<tr>
<td>Metallic Horn, DN200 (8&quot;)</td>
<td>5°</td>
<td>44</td>
</tr>
<tr>
<td>PTFE Drop DN80 (3&quot;)</td>
<td>8°</td>
<td>70</td>
</tr>
<tr>
<td>PTFE Drop, DN100 (4&quot;)</td>
<td>7°</td>
<td>61</td>
</tr>
<tr>
<td>PTFE Drop, DN150 (6&quot;)</td>
<td>4°</td>
<td>35</td>
</tr>
<tr>
<td>PEEK Drop, DN80 (3&quot;)</td>
<td>9°</td>
<td>79</td>
</tr>
</tbody>
</table>

¹) This antenna option is specially made for the BM 26 A
Product inlets

![Figure 27: Product Inlets](image)

1) The device is in the correct position
2) The device is too near to the product inlet.

Do not put the device near to the product inlet. If the product that enters the tank touches the antenna, the device will measure incorrectly. If the product fills the tank directly below the antenna, the device will also measure incorrectly.

For more data about the measuring range of each type of antenna, refer to Measuring accuracy on page 12.
Process connections
All the procedures that follow are applicable to Metallic Horn and Drop antennas.

Flange connections

![Flange connections diagram]

Figure 28: Flange connections

$\text{d} = \text{nozzle diameter}

h = \text{nozzle height}

Recommended nozzle size for flange connections

The nozzle must be as short as possible. Refer to the table below for the maximum height of the nozzle:

<table>
<thead>
<tr>
<th>Nozzle and antenna diameter, $\text{d}$</th>
<th>Maximum nozzle height, $h$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Metallic Horn antenna</td>
</tr>
<tr>
<td>[mm] [inch]</td>
<td>[mm] [inch]</td>
</tr>
<tr>
<td>40 1½</td>
<td>140 5.51</td>
</tr>
<tr>
<td>50 2</td>
<td>150 5.91</td>
</tr>
<tr>
<td>80 3</td>
<td>260 10.24</td>
</tr>
<tr>
<td>100 4</td>
<td>330 12.99</td>
</tr>
<tr>
<td>150 6</td>
<td>490 19.29</td>
</tr>
<tr>
<td>200 8</td>
<td>660 25.98</td>
</tr>
</tbody>
</table>

1) If the device has antenna extensions, this option extends the maximum nozzle height. Add the length of the antenna extensions attached to the device to this value.
**Threaded connections**

![Figure 29: Threaded connections](image)

**Recommended socket size for threaded connections**

The socket must be as short as possible. If the socket is in a recess, then use the maximum limits for nozzle dimensions (flange connections) in this section.

If the device has antenna extensions, this option extends the maximum socket height. Add the length of the antenna extensions attached to the device to this value.
LPR devices: recommendations for pits and tanks made of non-conductive materials

These instructions are for LPR equipment only.

Device installation on tanks made of a non-conductive material

Figure 30: Device installation on tanks made of a non-conductive material

1) LPR equipment on a basic support (for indoor installations)
2) LPR equipment on a sealed support
3) LPR equipment on a tank made of conductive material, but with a non-conductive, sealed "window"

If the device cannot go in the tank and the tank is made of a non-conductive material (plastic etc.), you can attach a support to the top of the tank without a hole in the tank roof. We recommend that you put the antenna as near as possible to the top of the tank.

If the tank is outdoors, we recommend that you seal the support. If rain is on the top of the tank and directly below the device, this can have an effect on the device performance.

If device is used in dusty conditions, we recommend that you seal the support. If dust is on the top of the tank and directly below the device, this can have an effect on the device performance.

Open pits

Figure 31: Open pits

If the device must measure the level of product in a pit, you can attach a support to the side of the pit or above the pit.
Electrical installation: output options with cable gland

1) Grounding terminal in the housing 9 (if the electrical cable is shielded)
2) Current output
3) Current output +
4) Location of the external grounding terminal (at the bottom of the converter)

Electrical power to the output terminal energizes the device. The output terminal is also used for HART® communication.

Electrical installation: output options with an M12 male connector

1) Pin 1: current output +
2) Pin 2: not connected
3) Pin 3: current output
4) Pin 4: not connected
5) Grounding terminal (external thread of the connector)
6) Location of the external grounding terminal (at the bottom of the converter)

Electrical power to the output terminal energizes the device. The output terminal is also used for HART® communication.
Non-Ex devices

1) Power
2) Resistor for HART® communication (typically 250 ohms)
3) Optional connection to the grounding terminal
4) Output: 12...30 VDC for an output of 21.5 mA at the terminal
5) Device

Devices for hazardous locations

- For electrical data for device operation in hazardous locations, refer to the related certificates of compliance and supplementary instructions (ATEX, IECEx etc.). This documentation can be downloaded from Honeywell Process website
Networks

General information

The device uses the HART® communication protocol. This protocol agrees with the HART® Communication Foundation standard. The device can be connected point-to-point. It can also have a polling address of 1 to 63 in a multi-drop network.

The device output is factory-set to communicate point-to-point. To change the communication mode from point-to-point to multi-drop, refer to "Network configuration" in the handbook.

Point-to-point connection

Figure 35: Point to point connection (non-Ex)

1) Address of the device (0 for point-to-point connection)
2) 4...20 mA + HART®
3) Resistor for HART® communication (typically 250 ohms)
4) Power supply
5) HART® converter
6) HART® communication software
Multi-drop networks

1) Address of the device (each device must have a different address in multidrop networks)
2) 4mA + HART®
3) Resistor for HART® communication (typically 250 ohms)
4) Power supply
5) HART® converter
6) HART® communication software

Figure 36: Multi-drop network (non-Ex)
For application assistance, current specifications, pricing, or name of the nearest Authorized Distributor, contact one of the offices below.

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Specifications are subject to change without notice.

For more information
Learn more about how Honeywell’s VersaFlow, visit our website https://www.honeywellprocess.com or contact your Honeywell account manager.

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