

# Guided Level Radar Pulscon LTC

**SMART transmitter for continuous level measurement in liquids and bulk solids.**



## Application

Continuous level measurement of powdery to granular bulk solids e. g. plastic granulate and liquids.

- Measurement independent of density or bulk weight, conductivity, dielectric constant, temperature and dust e. g. during pneumatic filling.
- Measurement is also possible in the event of foam or if the surface is very turbulent.
- The HART with 4 to 20 mA analog and PROFIBUS PA protocols are available for system integration.
- Application in safety related systems (overspill protection) with requirements for functional safety up to SIL2 in accordance with IEC 61508/IEC 61511-1.
- WHG approval

## Features

Probes are available with threaded process connections from  $\frac{3}{4}$ " and flanges from DN40/1 $\frac{1}{2}$ ".

- Rope probes, above all for measurement in bulk solids, measuring range up to 35 m
- Rod probes, above all for liquids
- Coax probes, for liquids
- Simple, menu-guided onsite operation with four-line plain text display
- Onsite envelope curve on the display for easy diagnosis
- Easy remote operation, diagnosis and measuring point documentation with the free operating program supplied
- Optional remote display and operation
- With coax probes the measurement is independent of internals in the tank and of the installation in the nozzle.
- Probe rod and probe rope can be replaced/shortened.
- Approvals: ATEX, FM, CSA

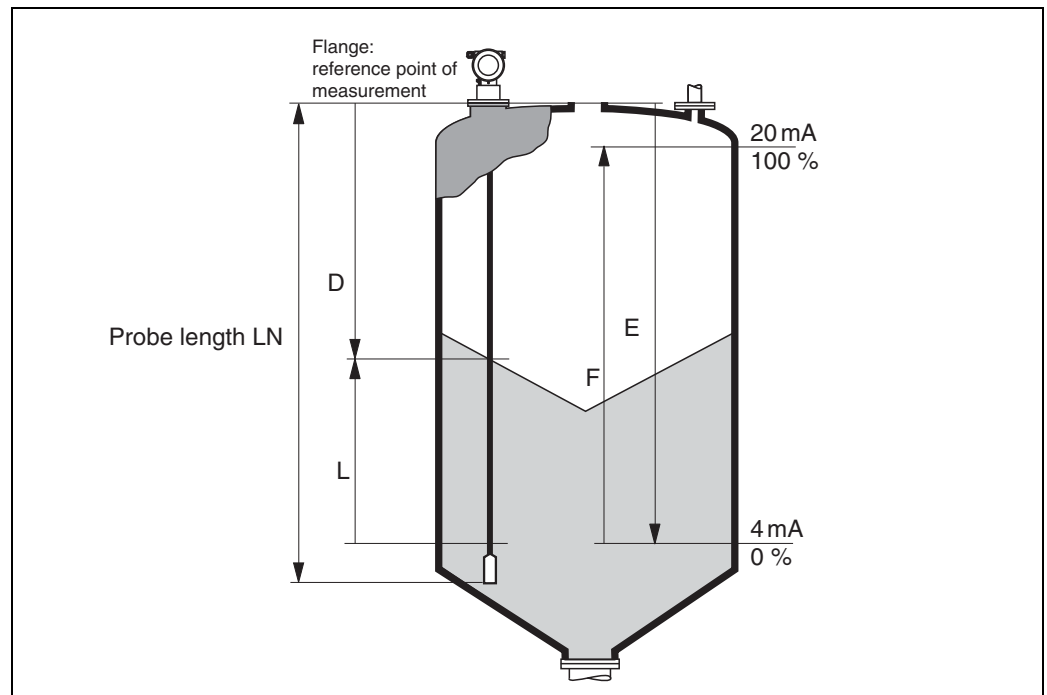
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## Function and system design

### Measuring principle

The Pulscon LTC is a "downward-looking" measuring system that functions according to the ToF method (ToF = Time of Flight). The distance from the reference point (process connection of the measuring device see page 33) to the product surface is measured. High-frequency pulses are injected to a probe and led along the probe. The pulses are reflected by the product surface, received by the electronic evaluation unit and converted into level information. This method is also known as TDR (Time Domain Reflectometry).



Reference point of measurement, details see page 33

### Dielectric constant

The dielectric constant (DC) of the medium has a direct impact on the degree of reflection of the high-frequency pulses. In the case of large DC values, such as for water or ammonia, there is strong pulse reflection while, with low DC values, such as for hydrocarbons, weak pulse reflection is experienced.

### Input

The reflected pulses are transmitted from the probe to the electronics. There, a microprocessor analyses the signals and identifies the level echo which was generated by the reflection of the high-frequency pulses at the product surface.

The distance  $D$  to the product surface is proportional to the time of flight  $t$  of the impulse:

$D = c \times t/2$ , with  $c$  being the speed of light.

Based on the known empty distance  $E$ , the level  $L$  is calculated:

$$L = E - D$$

Reference point for  $E$  see above diagram.

The Pulscon possesses functions for the interference echo suppression that can be activated by the user. They guarantee that interference echoes from e. g. internals and struts are not interpreted as level echoes.

### Output

The Pulscon is preset at the factory to the probe length ordered so that in most cases only the application parameters that automatically adapt the device to the measuring conditions need to be entered. For models with a current output, the factory adjustment for zero point **E** and span **F** is 4 mA and 20 mA, for digital outputs and the display module 0 % and 100 %.






A linearization function with max. 32 points, which is based on a table entered manually or semi-automatically, can be activated on site or via remote operation. This function allows the level to be converted into units of volume or mass, for example.

### Measuring system

#### Probe selection

The various types of probe in combination with the process connections are suitable for the following applications:




#### Probes with 1½" threaded connection or flange

Version:	LTC1	LTC2	LTC4	LTC5	LTC8
Type of probe:	4 mm/0.16" rope probe	16 mm/0.63" rod probe	coax probe	6 mm/0.24" rope probe	6 mm/0.24" rope probe PA-coated
					
Tensile strength (min.): Collapse load (max.) <sup>1)</sup> :	12 kN 16 kN	not relevant	not relevant	30 kN 35 kN	30 kN 35 kN
Sideways capacity:	not relevant	30 Nm	300 Nm	not relevant	not relevant
For application:	<ul style="list-style-type: none"> <li>liquids measuring range &gt; 4 m/157"</li> </ul>	<ul style="list-style-type: none"> <li>liquids</li> <li>bulk solids on short measuring ranges and sideways mounting</li> </ul>	<ul style="list-style-type: none"> <li>liquids</li> </ul>	<ul style="list-style-type: none"> <li>bulk solids</li> </ul>	<ul style="list-style-type: none"> <li>bulk solids, especially cereal, flour</li> </ul>
Max. probe length:	liquids: 35 m/32 yd bulk solids: 15 m/13.7 yd	4 m/3.6 yd	4 m/3.6 yd	35 m/32 yd <sup>2)</sup>	35 m/32 yd <sup>2)</sup>

<sup>1)</sup> Max. load of silo ceiling. If overloaded, the rope tears; the bushing remains air-tight.

<sup>2)</sup> Greater lengths available on request.

#### Probes with ¾" threaded connection

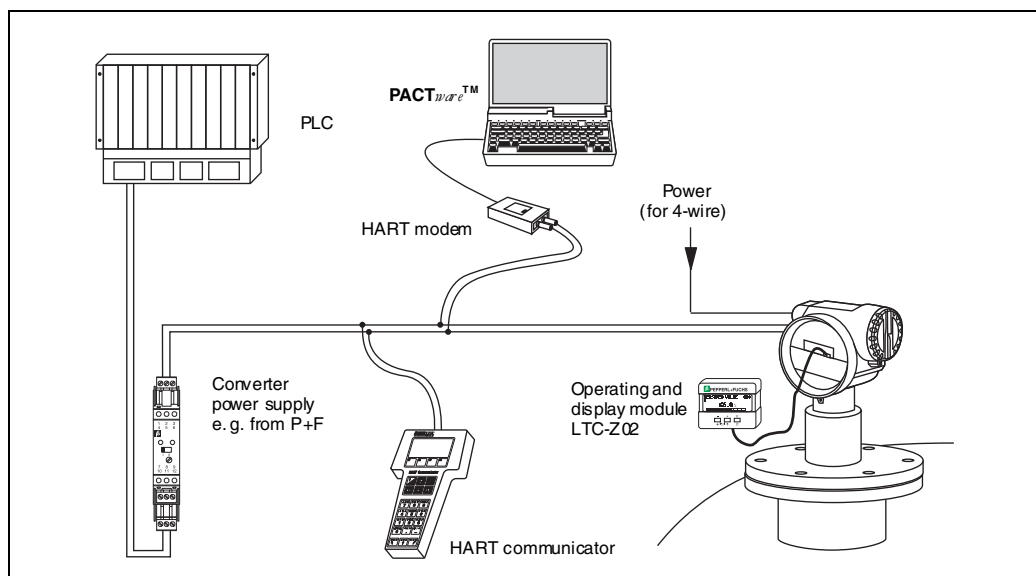
Version:	LTC1	LTC3	LTC4
Type of probe:	4 mm/0.16" rope probe	6 mm/0.63" rod probe	coax probe
			
Tensile strength (min.): Collapse load (max.) <sup>1)</sup> :	5 kN 12 kN	not relevant	not relevant
Sideways capacity:	not relevant	4 Nm	60 Nm
For application:	<ul style="list-style-type: none"> <li>liquids</li> </ul>	<ul style="list-style-type: none"> <li>liquids</li> </ul>	<ul style="list-style-type: none"> <li>liquids</li> </ul>
Max. probe length	35 m/32 yd <sup>2)</sup>	2 m/1.8 yd	4 m/3.6 yd

<sup>1)</sup> Max. load of silo ceiling. If overloaded, the rope tears; the bushing remains air-tight.

<sup>2)</sup> Greater lengths available on request.

### Stand-alone

- Power supply directly from power line (4-wire) or from transmitter power supply unit (2-wire).
- Onsite operation with integrated display or remote operation with HART protocol.

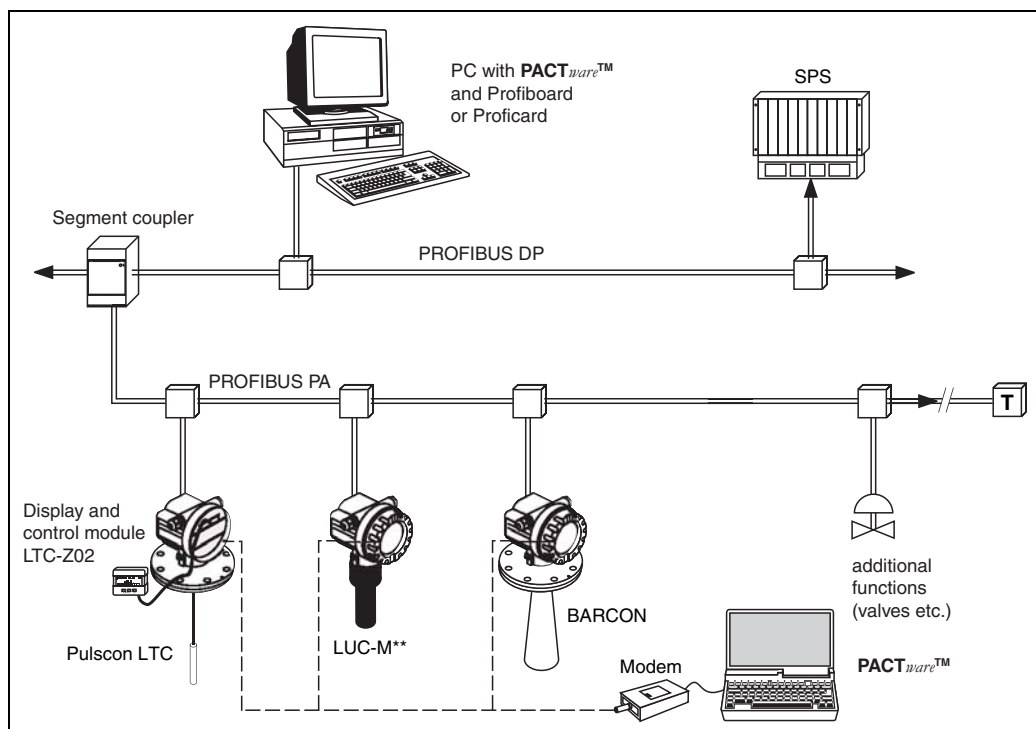


If the HART communication resistor is not installed in the supply device and HART protocol communication is to be carried out, it is necessary to insert a 250  $\Omega$  communication resistor into the 2-wire line.

### System integration via PROFIBUS PA

Maximum 32 transmitters (depending on the segment coupler, 10 in the Ex ia IIC hazardous area according to the FISCO model) can be connected to the bus. The bus voltage is supplied by the segment coupler. Both on-site as well as remote operation are possible.

The complete measuring system consists of:



## Input

**Measured variable** The measured variable is the distance between the reference point (see figure on page 33) and the product surface.  
Subject to the input zero point empty distance (**E**, see figure on page 3) the level is calculated.  
Alternatively, the level can be converted into other variables (volume, mass) by means of linearization (32 points).

**Measuring range** The following table describes the media groups and the possible measuring range as a function of the media group.

Media group	DC (εr)	Typical bulk solids	Typical liquids	Measuring range	
				bare metallic probes	PA-coated rope probes
1	1.4 ... 1.6	–	– Condensed gases, e. g. N <sub>2</sub> , CO <sub>2</sub>	4 m/3.6 yd, only coax probe	–
2	1.6 ... 1.9	– Plastic granulate – White lime, special cement – Sugar	– Liquified gas, e. g. propane – Solvent – Frigen/Freon – Palm oil	25 m ... 30 m/ 22.3 yd ... 27.4 yd	12.5 m ... 15 m/ 11.4 yd ... 13.7 yd
3	1.9 ... 2.5	– Portland cement, plaster	– Mineral oils, fuels	30 m ... 35 m/ 27.4 yd ... 32 yd	–
		– Flour	–	–	15 m ... 25 m/ 13.7 yd ... 22.3 yd
4	2.5 ... 4	– Grain, seeds	–	–	25 m ... 30 m/ 22.3 yd ... 27.4 yd
		– Ground stones – Sand	– Benzene, styrene, toluene – Furan – Naphthalene	35 m/32 yd	25 m ... 30 m/ 22.3 yd ... 27.4 yd
5	4 ... 7	– Naturally moist (ground) stones, ores – Salt	– Chlorobenzene, chloroform – Cellulose spray – Isocyanate, aniline	35 m/32 yd	35 m/32 yd
6	> 7	– Metallic powder – Carbon block – Coal	– Aqueous solutions – Alcohols – Ammonia	35 m/32 yd	35 m/32 yd

The respective lower group applies for very loose or loosened bulk solids.

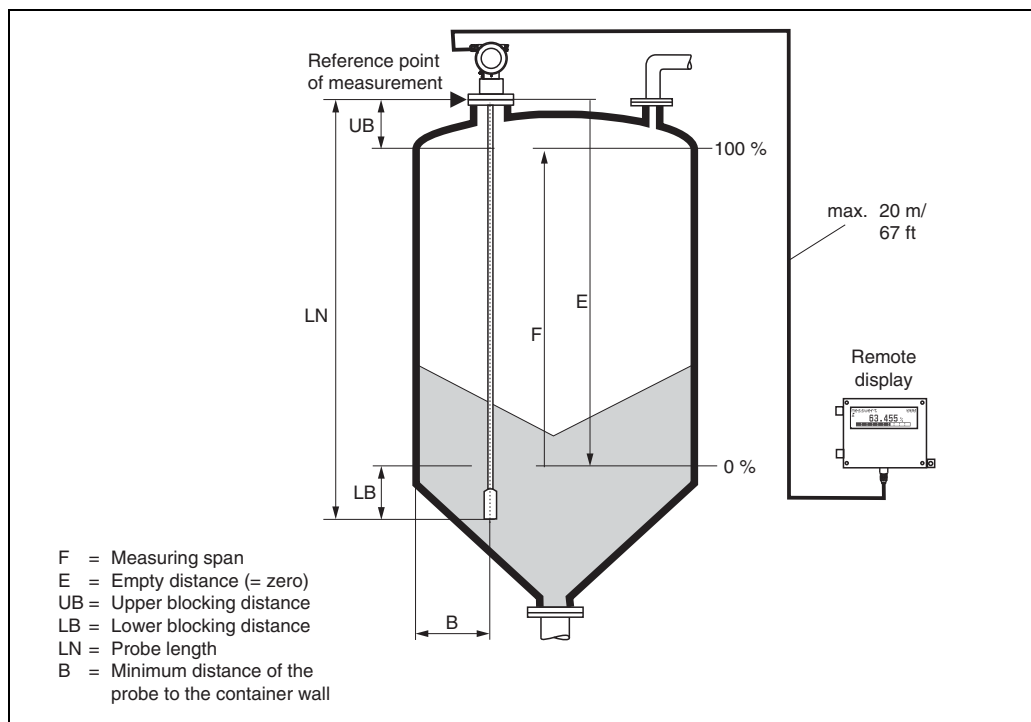
Reduction of the max. possible measuring range through:

- Extremely loose surfaces of bulk solids, e. g. bulk solids with low bulk weight for pneumatic filling.
- Build-up, above all of moist products.

### Blocking distance

The upper blocking distance (= UB) is the minimum distance from the reference point of the measurement (mounting flange) to the maximum level.

At the lowest part of the probe an exact measurement is not possible, see "Performance characteristics" on page 13.



Reference point of measurement, details see page 33

### Blocking distance and measuring range:

LTC	LN [m/yd]		UB [m/"]
	min.	max.	min.
Rope probe	1/1.09	35/32 <sup>1)</sup>	0.2/0.18 <sup>2)</sup>
6 mm rod probe	0.3/0.27	2/1.8	0.2/0.18 <sup>2)</sup>
16 mm rod probe	0.3/0.27	4/3.6	0.2/0.18 <sup>2)</sup>
Coax probe	0.3/0.27	4/3.6	0/0

<sup>1)</sup> Larger measuring range available on request.

<sup>2)</sup> The indicated blocking distances are preset. At media with DC > 7, the upper blocking distance UB can be reduced for rod and rope probes on 0.1 m/3.9". The upper blocking distance UB can be entered manually.



### Note!

Within the blocking distance, a reliable measurement can not be guaranteed.

Used frequency spectrum 100 MHz ... 1.5 GHz



### Output

<b>Output signal</b>	<ul style="list-style-type: none"><li>• 4 mA ... 20 mA with HART protocol</li><li>• PROFIBUS PA</li></ul>
<b>Signal on alarm</b>	<p>Error information can be accessed via the following interfaces:</p> <ul style="list-style-type: none"><li>• Local display:<ul style="list-style-type: none"><li>– Error symbol</li><li>– Plain text display</li></ul></li><li>• Current output, fail-safe mode can be selected (e. g. according to NAMUR Recommendation NE43)</li><li>• Digital interface</li></ul>
<b>Linearization</b>	<p>The Pulscon LTC linearization function enables the measured value to be converted into any desired length or volume units and mass or %. Linearization tables for volume calculation in cylindrical tanks are pre-programmed. Any other table from up to 32 value pairs can be input manually or semi-automatically.</p>



## Auxiliary energy

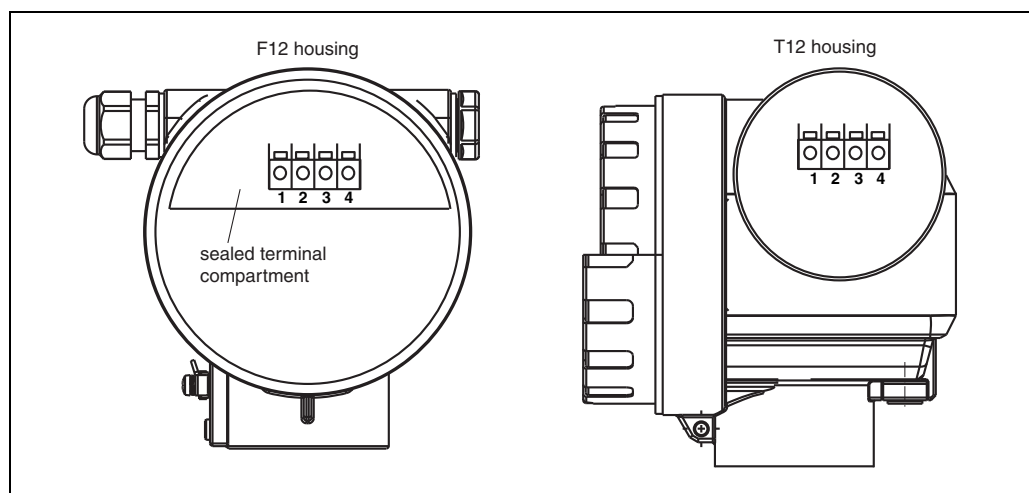
### Electrical connection

#### Connection compartment

Two housings are available:

- Aluminium housing F12 with additionally sealed connection compartment for:
  - Standard,
  - EEx ia,
  - Dust ignition proof
- Aluminium housing T12 with separate connection compartment for:
  - Standard,
  - EEx e,
  - EEx d
  - EEx ia (with overvoltage protection),
  - Dust ignition proof

After mounting, the housing can be turned 350° in order to make it easier to access the display and the connection compartment.



### Ground connection

It is necessary to make a good ground connection to the ground terminal on the outside of the housing, in order to achieve EMC security.

### Cable gland

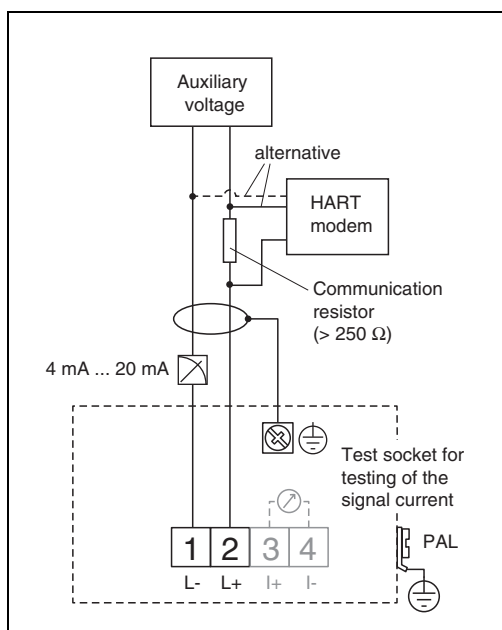
	Type	Cable diameter
Standard, EEx ia, IS	M20 x 1.5, plastic	5 mm ...10 mm (0.2" ... 0.4")
EEx em, EEx nA	M20 x 1.5, metal	7 mm ...10.5 mm (0.28" ... 0.4")

### Terminals

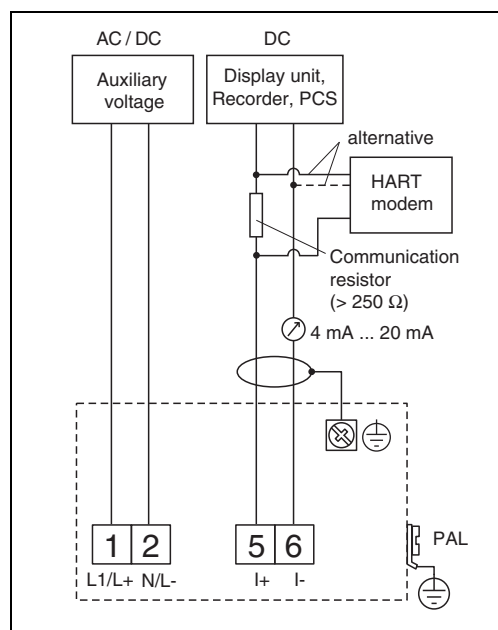
for wire cross-sections of 0.5 mm<sup>2</sup> ... 2.5 mm<sup>2</sup>

### Terminal assignment

#### 4 mA ... 20 mA with HART, 2-wire



#### 4 mA ... 20 mA with HART, active, 4-wire



#### Note!

If 4-wire for dust-Ex-applications is used, the current output is intrinsically safe.

Connect the connecting line to the screw terminals in the connection compartment.

Cable specification:

A standard installation cable is sufficient if only the analogue signal is used. Use a shielded cable when working with a superimposed communications signal (HART).

#### Note!

Protective circuitry against reverse polarity, RFI and over-voltage peaks is built into the device.

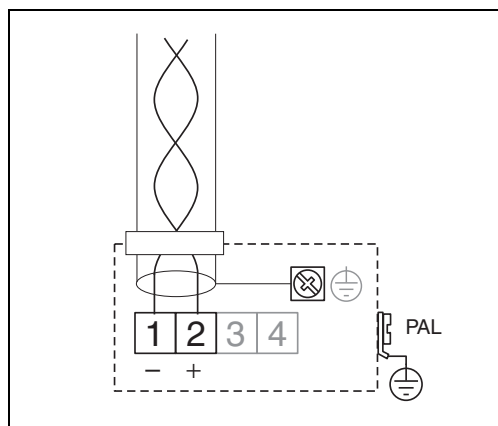
### PROFIBUS PA

The digital communication signal is transmitted to the bus via a 2-wire connection. The bus also provides the auxiliary energy.

For further information on the network structure and earthing and for further bus system components such as bus cables, see the relevant documentation, e. g. the PNO guideline.

Cable specification:

- Use a twisted, screened two-wire cable, preferably cable type A

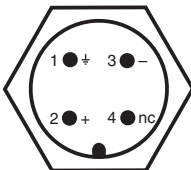


#### Note!

For further information on the cable specifications, see PNO guideline 2.092 "PROFIBUS PA User and Installation Guideline" and IEC 61158-2 (MBP).

**Fieldbus plug connectors** For the versions with fieldbus plug connector (M12), the signal line can be connected without opening the housing.

### Pin assignment of the M12 plug connector (PROFIBUS PA plug)

	Pin	Meaning
	1	Ground
	2	Signal +
	3	Signal -
	4	not connected

**Load HART** min. load for HART communication: 250 Ω

### Supply voltage

#### HART, 2-wire

All the following values are the terminal voltages directly at the device:

Communication		Current consumption	Terminal voltage	
			minimum	maximum
HART	Standard	4 mA	16 V	36 V
		20 mA	7.5 V	36 V
	EEx ia	4 mA	16 V	30 V
		20 mA	7.5 V	30 V
	EEx em EEx d	4 mA	16 V	30 V
		20 mA	11 V	30 V
Fixed current, adjustable e. g. for solar power operation (measured value transferred at HART)	Standard	11 mA	10 V	36 V
	EEx ia	11 mA	10 V	30 V
Fixed current for HART Multidrop mode	Standard	4 mA <sup>1)</sup>	16 V	36 V
	EEx ia	4 mA <sup>1)</sup>	16 V	30 V

<sup>1)</sup> Start-up current 11 mA

HART residual ripple, 2-wire:  $U_{ss} \leq 200 \text{ mV}$

#### HART, 4-wire active

Version	Voltage	Max. load
DC	10.5 V ... 32 V	600 Ω
AC, 50/60 Hz	90 V ... 253 V	600 Ω

HART residual ripple, 4-wire, DC version:  $U_{ss} \leq 2 \text{ V}$ , voltage incl. ripple within the permitted voltage (10.5 V ... 32 V)

### Cable entry

- Cable gland: M20 x 1.5 (only cable entry for EEx d)
- Cable entry: G½ or ½ NPT
- PROFIBUS PA M12 plug

**Power consumption** min. 60 mW, max. 900 mW

### Current consumption

Communication	Output current	Current consumption Power consumption
HART, 2-wire	3.6 mA ... 22 mA	–
HART, 4-wire (90 V AC ... 250 V AC)	2.4 mA ... 22 mA	~3 mA ... 6 mA/~3.5 VA
HART, 4-wire (10.5 V DC ... 32 V DC)	2.4 mA ... 22 mA	~100 mA/~1 W
PROFIBUS PA	–	max. 11 mA



### Overvoltage protection

If the measuring device is used for level measurement in flammable liquids which requires the use of overvoltage protection according to DIN EN 60079-14, standard for test procedures 60060-1 (10 kA, pulse 8/20  $\mu$ s), it has to be ensured that:

- the measuring device with integrated overvoltage protection with 600 V gas discharge tubes within the T12-enclosure is used, refer to product overview ordering information on page 40  
**or**
- this protection is achieved by the use of other appropriate measures.

## Performance characteristics

### Reference operating conditions

- Temperature = +20 °C (293 K) ± 5 K
- Pressure = 1013 mbar abs. (14.7 psi) ± 20 mbar (0.3 psi)
- Humidity = 65 % ± 20 %
- Reflection factor ≥ 0.8 (surface of water for coax probe, metal plate for rod and rope probe with min. 1 m/1.09 yd Ø)
- Flange for rod or rope probe ≥ 30 cm/0.27 yd Ø
- Distance to obstructions ≥ 1 m/1.09 yd

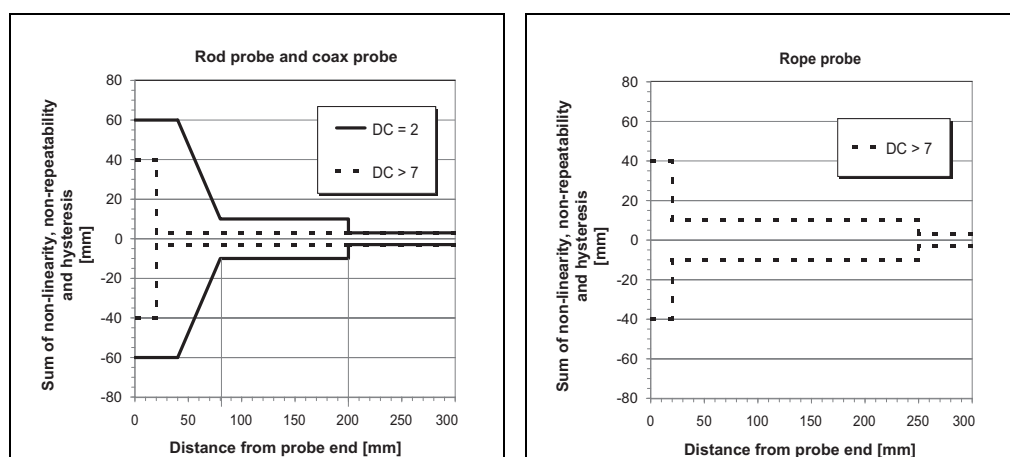
### Maximum measured error

Typical statements for reference conditions: DIN EN 61298-2, percentage values in relation to the span

Output	digital	analog
Sum of non-linearity, non-repeatability and hysteresis	<b>Measuring range:</b> – up to 10 m /9.1 yd: ± 3 mm/0.12" – > 10 m/9.1 yd: ± 0.03 % <b>for PA coated rope measuring range:</b> – up to 5 m/4.6 yd: ± 5 mm/0.2" – > 5 m/4.6 yd: ± 0.1 %	± 0.06 %
Offset/zero	± 4 mm/0.16"	± 0.03 %

If the reference conditions are not met, the offset/zero arising from the mounting situation may be up to ± 12 mm/0.47". This additional offset/zero can be compensated for by entering a correction (offset function) during commissioning.

**Differing from this, the following measuring error is present in the vicinity of the level:**



If for rope probes the DC value is less than 7, then measurement is not possible in the area of the straining weight (0 mm ... 250 mm/9.8") from end of probe; lower blocking distance).

### Resolution

- digital: 1mm/0.04"
- analog: 0.03 % of measuring range

### Reaction time

The reaction time depends on the configuration.

Shortest time:

- 2-wire electronics: 1 s
- 4-wire electronics: 0.7 s

### Influence of ambient temperature

The measurements are carried out in accordance with EN 61298-3:

- digital output (HART, PROFIBUSPA):
  - **LTC**  
average  $T_K$ : 0.6 mm/10 K, max.  $\pm 3.5$  mm/0.14" over the entire temperature range  
-40 °C ... +80 °C (233 K ... 353 K)

#### 2-wire:

- current output (additional error, in reference to the span of 16 mA):
  - **Zero point (4 mA)**  
average  $T_K$ : 0.032 %/10 K, max. 0.35 % over the entire temperature range  
-40 °C ... +80 °C (233 K ... 353 K)
  - **Span (20 mA)**  
average  $T_K$ : 0.05 %/10 K, max. 0.5 % over the entire temperature range  
-40 °C ... +80 °C (233 K ... 353 K)

#### 4-wire:

- current output (additional error, in reference to the span of 16 mA):
  - **Zero point (4 mA)**  
average  $T_K$ : 0.02 %/10 K, max. 0.29 % over the entire temperature range  
-40 °C ... +80 °C (233 K ... 353 K)
  - **Span (20 mA)**  
average  $T_K$ : 0.06 %/10 K, max. 0.89 % over the entire temperature range  
-40 °C ... +80 °C (233 K ... 353 K)

## Operating conditions: installation

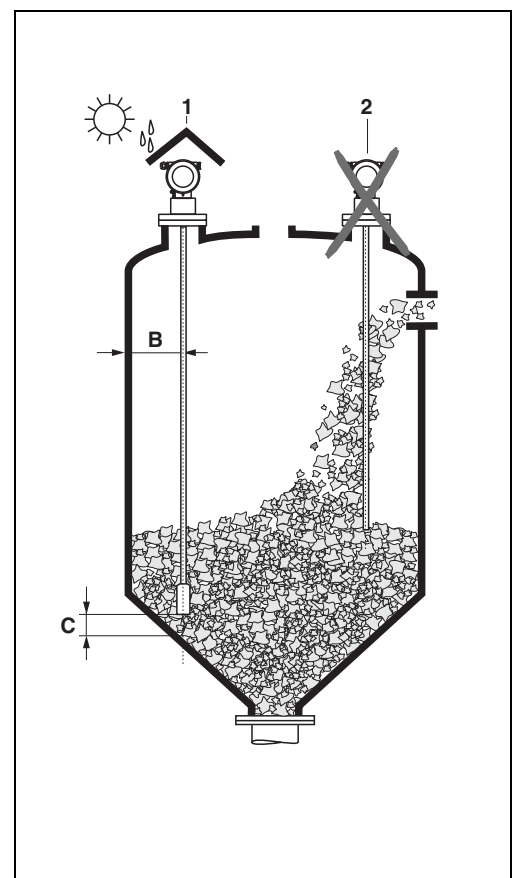
### General installation instructions (for bulk solids and fluids)

#### Probe selection (see overview on page 4)

- Normally, rope probes should be used for bulk solids, rod probes are only suitable for short measuring ranges up to approx. 2 m/1.8 yd in bulk solids. This applies above all to applications in which the probe is installed laterally at an angle and for light and pourable bulk solids.
- Normally use rod or coax probes for liquids. Rope probes are used in liquids for measuring ranges  $> 4$  m/3.6 yd and with restricted ceiling clearance which does not allow the installation of rigid probes.
- Coax probes are suited to liquids with viscosities of up to approx. 500 cst. Coax probes can measure most liquefied gases, as of dielectric constant of 1.4. Moreover, installation conditions, such as nozzles, tank internal fittings etc., have no effect on the measurement when a coax probe is used. A coax probe offers maximum EMC security when used in plastic tanks.
- In the case of large silos, the lateral pressure on the rope can be so high that a rope with plastic jacketing must be used. We recommend PA coated ropes be used for cereal products, wheat, flour etc.

#### Mounting location

- Do not mount rod or rope probes in the filling curtain (2).
- Mount rod and rope probes away from the wall (B) at such a distance that, in the event of build-up on the wall, there is still a minimum distance of 100 mm/3.9" between the probe and the build-up.
- Mount rod and rope probes as far away as possible from installed fittings. "Mapping" must be carried out during commissioning in the event of distances  $< 300$  mm/11.8").
- When installing rod and rope probes in plastic containers, the minimum distance of 300 mm/11.8") also applies to metallic parts outside the container.
- Rod and rope probes may not, at times, contact metallic container walls or floors.
- Minimum distance of probe end to the container floor (C):
  - rope probe: 150 mm/5.9"
  - rod probe: 50 mm/1.98"
  - coax probe: 10 mm/0.4"
- When installing outdoors, it is recommended that you use a protective cover (1) see "Accessories" on page 42.
- Avoid buckling the rope probe during installation or operation (e. g. through product movement against silo wall) by selecting a suitable mounting location.

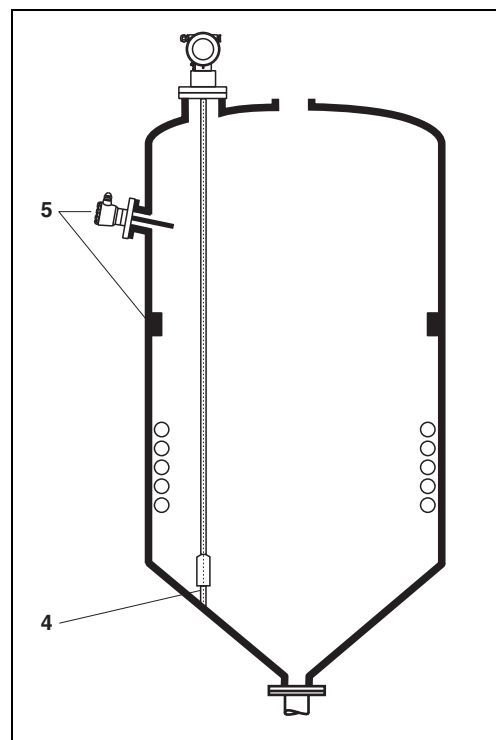


### Other installations

- Select the mounting location such that the distance to internals (5) (e. g. limit switch, struts) is  $> 300 \text{ mm}/11.8''$  over the entire length of the probe, also during operation.
- Probe must within the measuring span not touch any internals during operation.  
If necessary: when using rope probes the probe end (4) may be fixed to secure it (see page 18)!

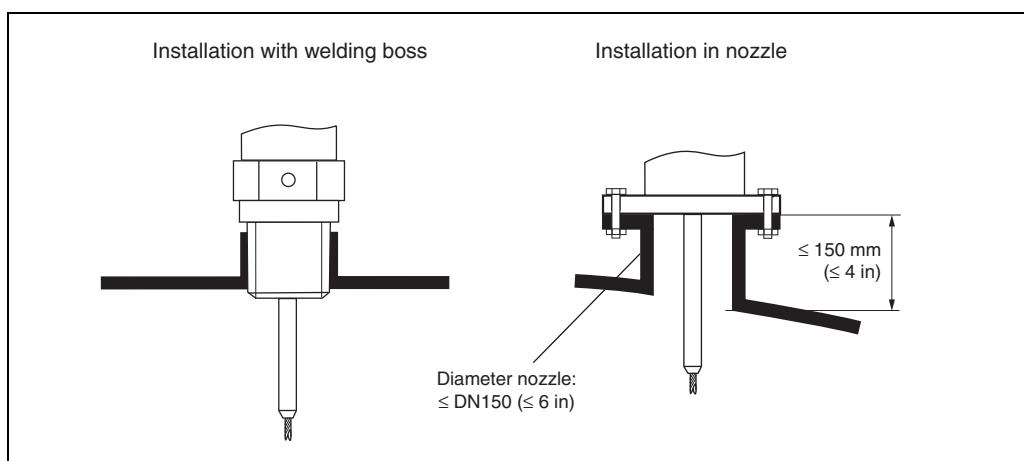
### Optimization options

- Interference echo suppression: measurement can be optimized by electronically tuning out interference echoes.



### Type of probe installation

- Probes are mounted to the process connection with threaded connections or flanges and are usually also secured with these. If during this installation there is the danger that the probe end moves so much that it touches the tank floor or cone at times, the probe must, if necessary, be shortened and fixed down. The easiest way to fix the rope probes is to screw them to the internal thread on the lower end of the weight. Thread size, see page 18.
- The ideal installation is mounting in a screwed joint/screw-in sleeve which is internally flush with the container ceiling.
- If installation takes place in a nozzle, the nozzle should be  $50 \text{ mm} \dots 150 \text{ mm}$  ( $2'' \dots 6''$ ) in diameter and should not be more than  $150 \text{ mm}/6''$  high. Installation adapters are available for other dimensions, see page 24.



### Welding the probe into the vessel



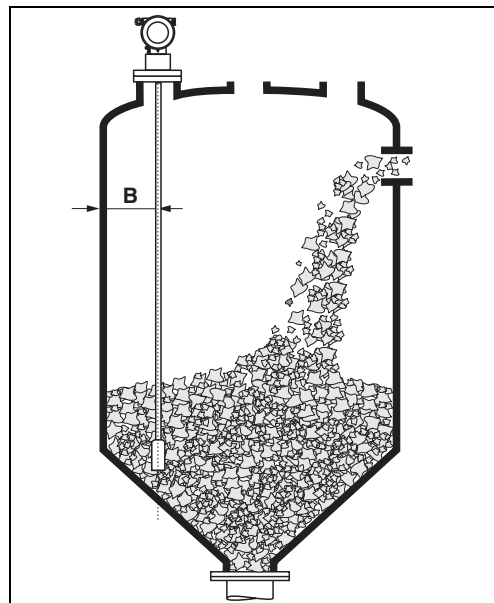
#### Caution!

Before welding the probe into the vessel, it must be grounded by a low-resistive connection. If this is not possible, the electronics as well as the HF module must be disconnected. Otherwise the electronics may be damaged.



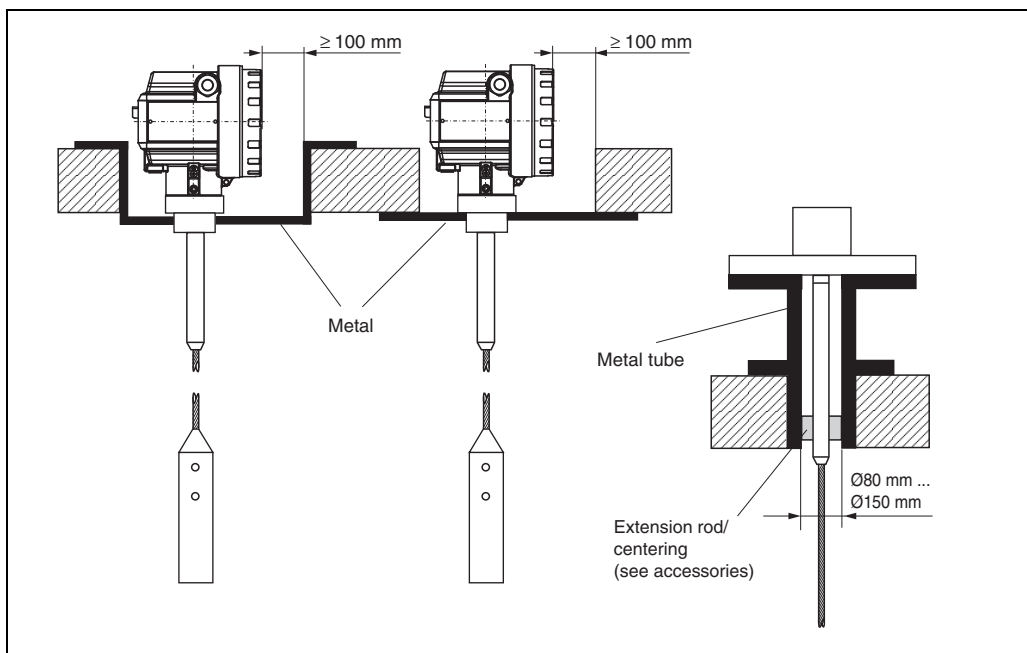
### Special notes for bulk solids

- In the case of bulk solids, as great a distance as possible from the filling curtain is especially important to avoid wear.
- In concrete silos, a **large distance (B)** should be observed between the probe and the concrete wall, if possible  $\geq 1 \text{ m}/0.91 \text{ yd}$ , but at least  $0.5 \text{ m}/0.45 \text{ yd}$ .
- The installation of rope probes must be carried out carefully. The rope should not be buckled. If possible, installation should be carried out when the silo is empty.
- Check the probe regularly for defect.



### Installation in concrete silos

Installation, for example, into a thick concrete ceiling should be made flush with the lower edge. Alternatively, the probe can also be installed into a pipe that must not protrude over the lower edge of the silo ceiling. The pipe should kept at a minimum length. Installation suggestions see diagram.

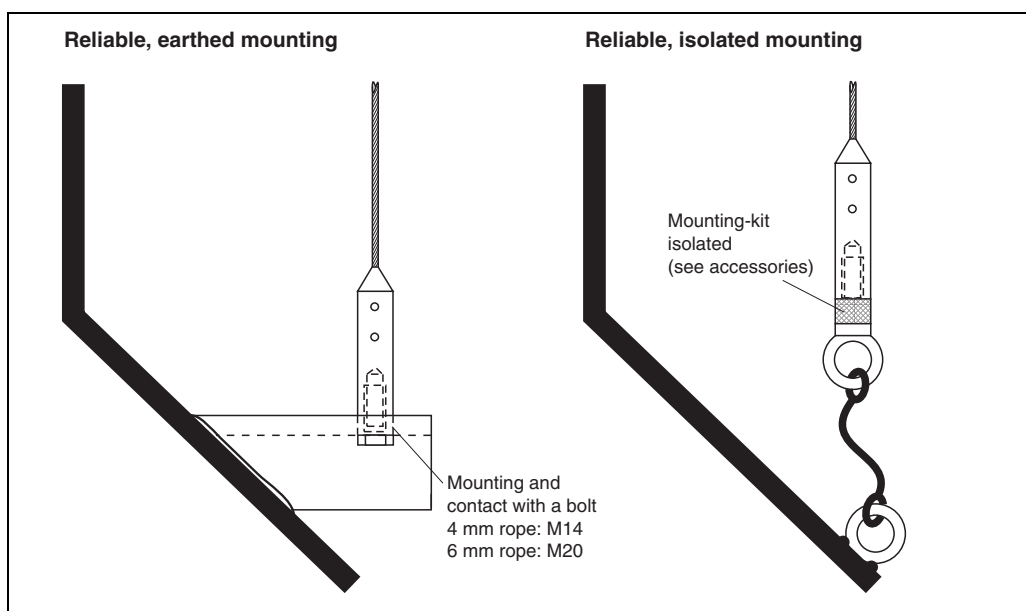
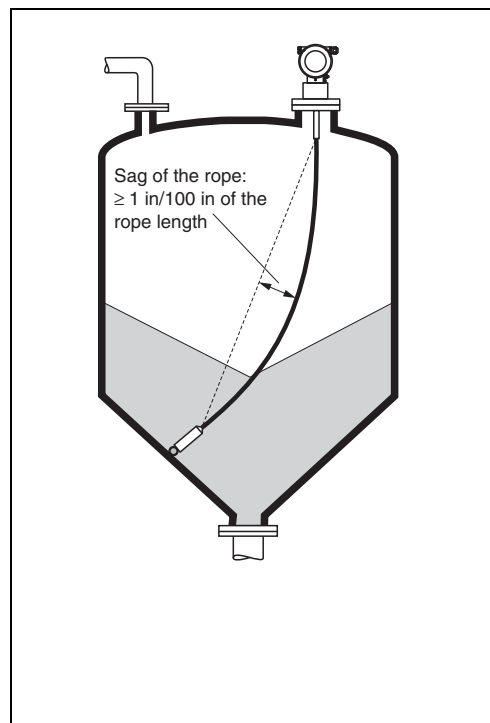


### Note for installations with rod extension/center washer (accessories):

Strong dust generation can lead to build-up behind the center washer. This can cause an interference signal. For other installation possibilities please contact Pepperl+Fuchs.

### Fixing rope probe

- The end of the probe needs to be secured if the probe would otherwise touch the silo wall, the cone or another part, or the probe comes closer than 0.5 m/0.45 yd to a concrete wall. This is what the internal thread in the probe weight is intended for:
  - for 4 mm rope: M14
  - for 6 mm rope: M20
- Preferably use the 6 mm rope probe due to the higher tensile strength when fixing a rope probe
- The fixing must be either reliably grounded or reliably insulated (see accessories on page 45). If it is not possible to mount the probe weight with a safe earthed connection, it can be secured using an isolated eyelet, which is available as an accessory (page 45).
- In order to prevent an extremely high tensile load and the risk of rope crack, the rope has to be slack. Make the rope longer than the required measuring range such that there is a sag in the middle of the rope that is  $\geq 1 \text{ cm/m}$  ( $1''/100''$ ) of the rope length.



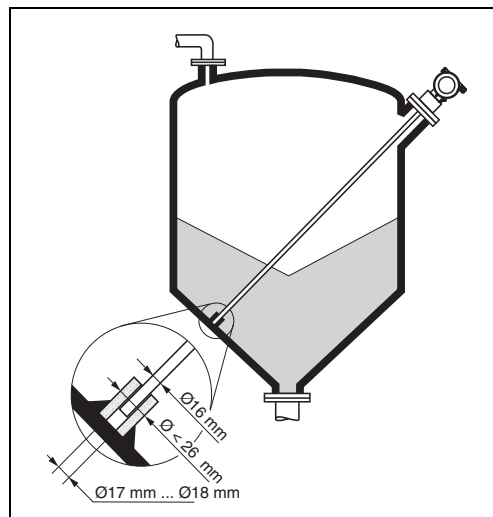
### Installation from the side

- If installation from above is not possible, the Pulscon LTC can also be mounted from the side.
- In this case, always fix the rope probe (see page 18).
- Support rod and coax probe if the lateral load-bearing capacity is exceeded (see table page 4). Only fix rod probes at the probe end.



### Caution!

Remove the electronics when welding the sleeve as the device will otherwise be destroyed!



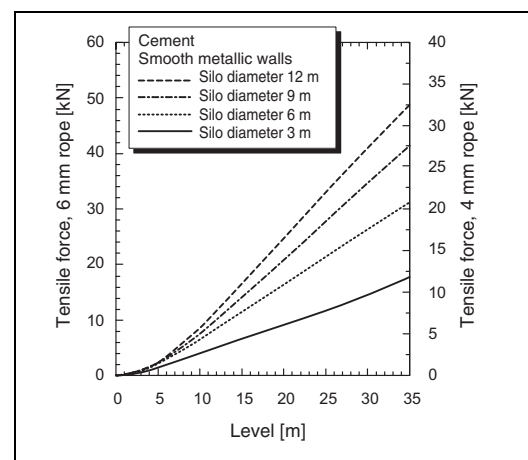
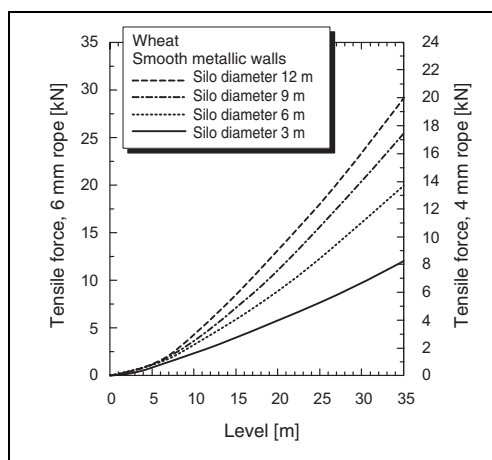
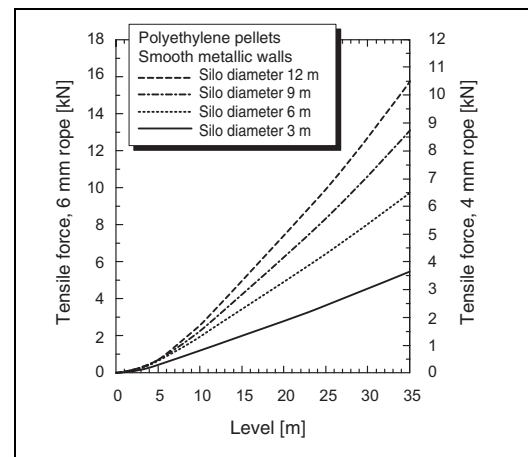
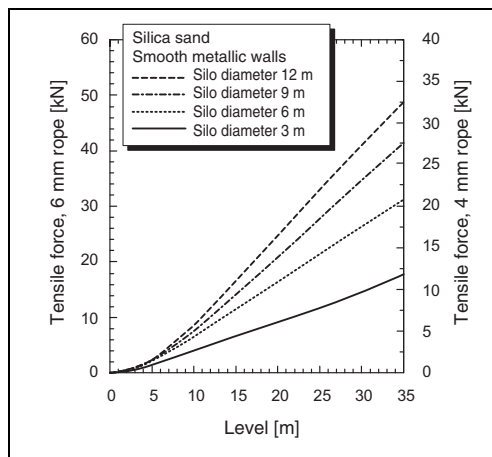
### Tensile load

Bulk solids exert tensile forces (maximum admissible values see page 4) on rope probes whose height increases with:

- the length of the probe, i. e. max. cover,
- the bulk density of the product,
- the silo diameter and
- the diameter of the probe rope

The following diagrams show typical loads for frequently occurring bulk solids as reference values. The calculation is performed for the following conditions:

- Suspended probe (probe end not fixed at the bottom)
- Free-flowing bulk solid, i. e. mass flow. A calculation for core flow is not possible. In the event of collapsing cornices, considerably higher loads can occur.
- The specification for tensile forces contains the safety factor 2, which compensates for the normal fluctuation range in pourable bulk solids.



Since the tensile forces are also heavily dependent on the viscosity of the product, a higher safety factor is necessary for highly viscous products and if there is a risk of cornice build-up. In critical cases it is better to use a 6 mm/0.24" rope instead of a 4 mm/0.16" one.

The same forces also act on the silo cover. On a fixed rope, the tensile forces are definitely greater, but this can not be calculated. Observe the tensile strength of the probes or ensure that the tensile strength of the probes is not exceeded (see table page 4).

Options for reducing the tensile forces:

- Shorten the probe.
- If the maximum tensile load is exceeded, check whether it would be possible to use a non-contact ultrasonic device or level radar device.

## Special notes for liquids

- When installing in agitation units, check whether a no-contact process (ultrasonic or level radar) would be better suited, especially if the agitator generates large mechanical loads on the probe.
- If Pulscon is, nevertheless, installed in tanks with agitators, it is better to use coax probes which have a greater lateral loading capacity, see page 4. Additionally the coax probe can be protected against warping, see page 23.

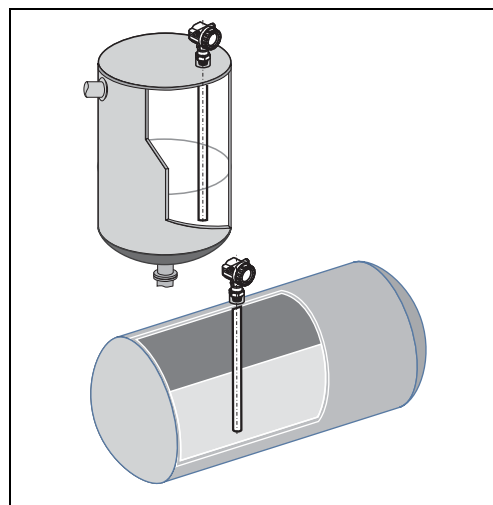
## Standard installation

Using a coax probe offers great advantages when the viscosity of the product is  $< 500$  cst and it is certain that the product does not accumulate build-up:

- Greater reliability:  
As of dielectric constant = 1.4, measurement functions independently of all electrical properties in all liquids.
- Internals in the tank and nozzle dimensions do not have any influence on measurement.
- Higher lateral load-bearing capacity than rod probes.
- For higher viscosity a rod probe is recommended, or using a non-contact measuring principle.

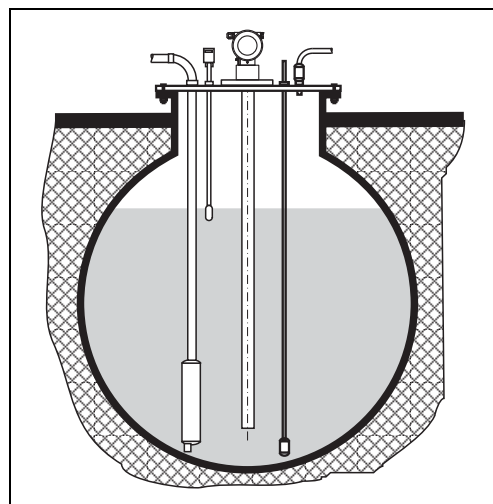
## Installation in horizontal cylindrical and standing tanks

- Use a coax or rod probe for measuring ranges up to 4 m/3.6 yd. For longer measuring ranges, a separable probe is available as special version, or the use of a 4 mm rope probe is recommended.
- Installation and possible fixing as with bulk solids.
- Any distance from wall, as long as occasional contact is prevented.
- When installing in tanks with a lot of internals or internals situated close to the probe: use a coax probe.



## Installation in underground tanks

- Use coax probe for nozzles with large diameters in order to avoid reflections at the nozzle wall.

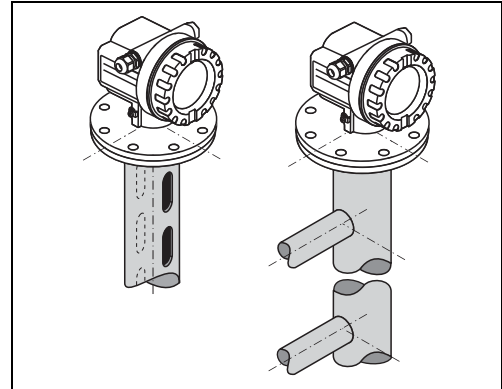


### Measurement in corrosive fluids

When using plastic tanks it is possible to mount the probe on the outside of the tank (see Installation in plastic containers). Pulscon LTC measures the level of aqueous media through the plastic.

### Installation in stilling well or bypass

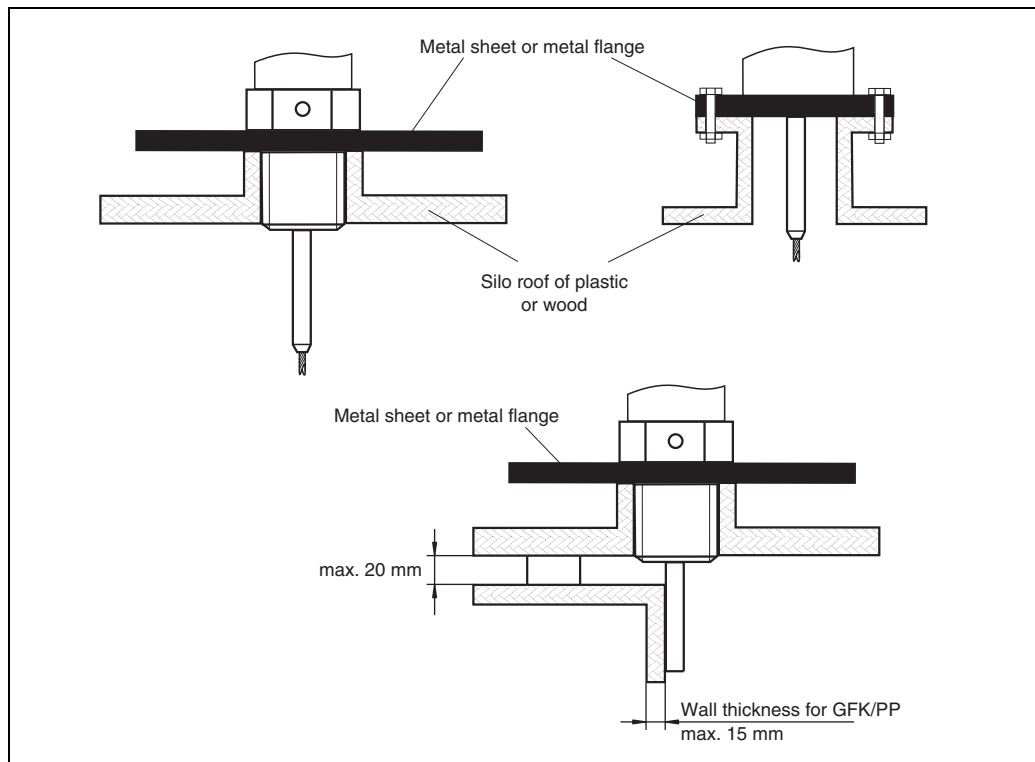
- A rod probe can be used for pipe diameters bigger than 40 mm/1.6".
- When installing a rod probe into a metallic pipe with internal diameter of up to 150 mm/5.9", you have all the advantages of a coax probe.
- Welded joints that protrude up to approx. 5 mm/0.2" inwards do not influence measurement.



### Installation in plastic containers

Please note that the "guided level radar" measuring principle requires a metallic surface at the process connection!

When installing the rod and rope probes in plastic silos, whose silo cover is also made of plastic or silos with wood cover, the probes must either be mounted in a  $\geq \text{DN}50/2"$  metallic flange, or a metal sheet with diameter of  $\geq 200 \text{ mm}/8"$  must be mounted under the screw-in piece.



- It is also possible to mount the probe externally on the tank wall for measuring in aqueous solutions. Measurement then takes place through the tank wall without contacting the medium. If people are in the vicinity of the probe mounting location, a plastic half pipe with a diameter of approx. 200 mm/8", or some other protective unit, must be affixed externally to the probe to prevent any influences on the measurement.
- There must not be any metallic reinforcement rings secured to the tank.
- The wall thickness should be  $< 15 \text{ mm}/0.6"$  for at GFR/PP.
- There must be no open space between the tank wall and the probe.

### Supporting probes against warping

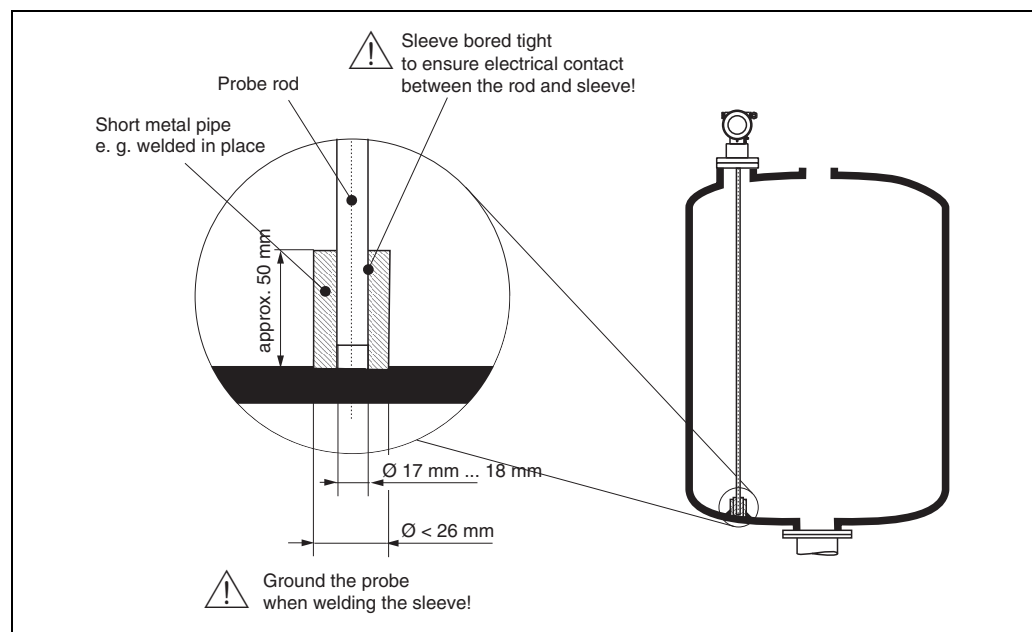
For WHG or Ex approval:

- For probe lengths  $\geq 3$  m (2.75 yd) a support is required (see figure).

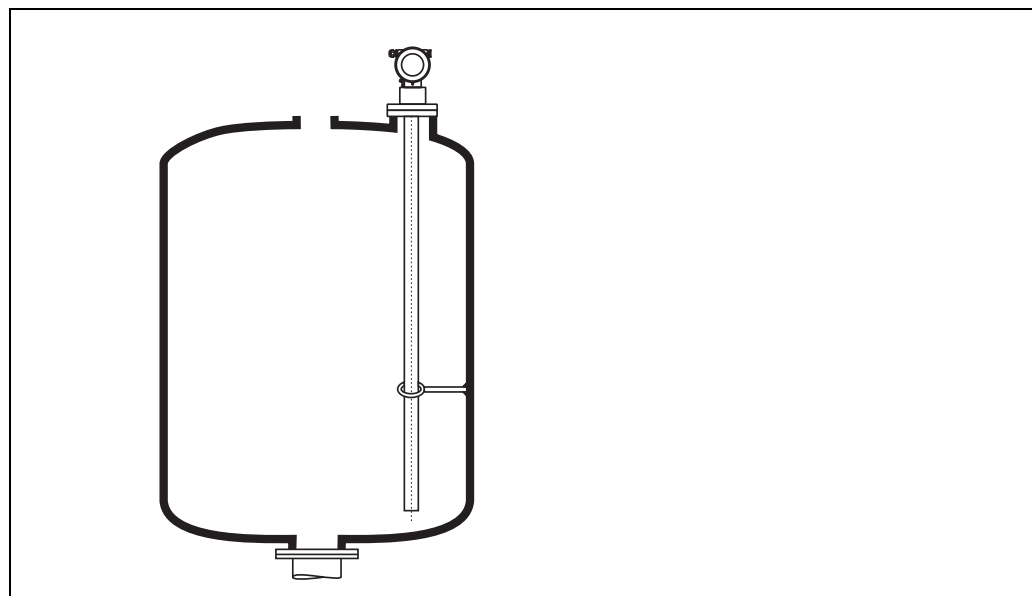
For GL/ABS approval:

- Rod probes  $\varnothing 16$  mm/0.63"  $\leq 1$  m (0.91 yd) permissible, rod probes  $\varnothing 6$  mm/0.24" not permissible.
- For coax probes  $\geq 1$  m (0.91 yd) a support is required (see figure).

#### 1. Rod probes



#### 2. Coax probes



## Operating conditions: installation – special installation situations

### Probe length

The measuring range is directly dependent on the probe length.

It is better to order probes too long than too short since it is possible to shorten the probe if necessary. In the case of the rope probe with a rod weight, shortening at the probe end weight is only possible in exceptional cases. Please contact Pepperl+Fuchs.

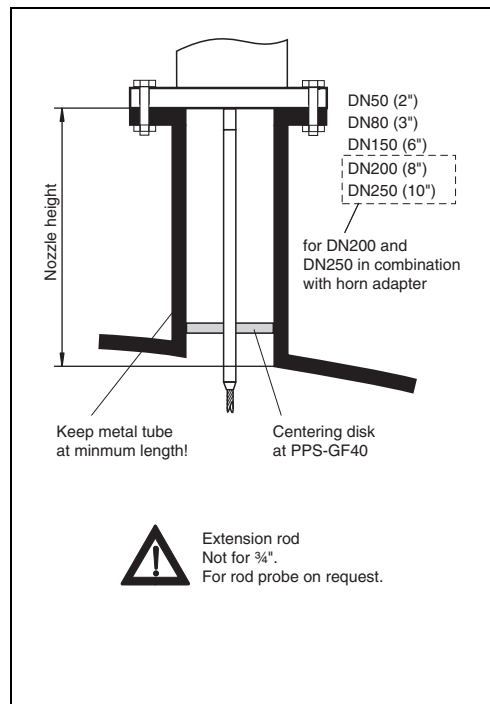
### Installation in nozzles > 150 mm/6" high

If, when installing probes in nozzles DN40 ... DN250/1½" ... 10" with nozzle height of > 150 mm/6", the probe could touch the lower edge of the nozzle due to moving materials in the container, we recommend using an extension rod with or without centering disk.

This accessory consists of the extension rod corresponding to the nozzle height, on which a centering disk is also mounted if the nozzles are narrow or when working in bulk solids. This component is delivered separately from the device. Please order the probe length correspondingly shorter. For the exact length of the rod see "Extension rod/centering" on page 43.

Order codes for specific nozzle nominal diameters and heights can be found on page 41.

Only use centering disks with small diameters (DN40 and DN50) if there is no significant build-up in the nozzle above the disk. The nozzle must not become clogged with product.



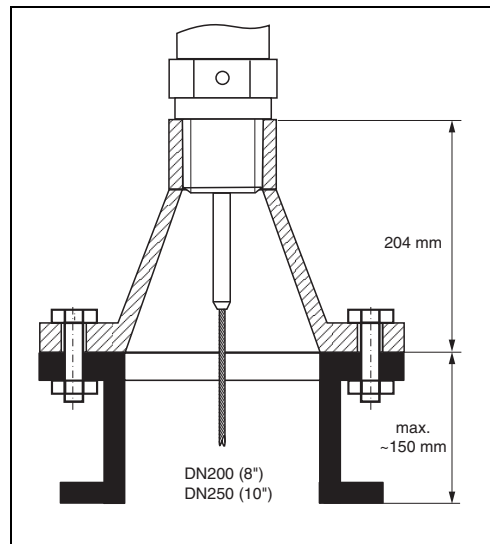
### Installation in DN200/8" and DN250/10" nozzles

When installing the Pulscon LTC in nozzles of > 200 mm/8", signals are generated by reflections on the nozzle wall, which can sometimes lead to faulty measurements in the case of products with small dielectric constants.

With nozzle diameters of 200 mm/8" or 250 mm/10", therefore, a special flange with a "horn adapter" must be fitted.

Nozzles with nominal diameters greater than DN250/10" should be avoided.

If the rope probe is strongly deflected: use an extension rod/centering LTC-Z30, additionally.

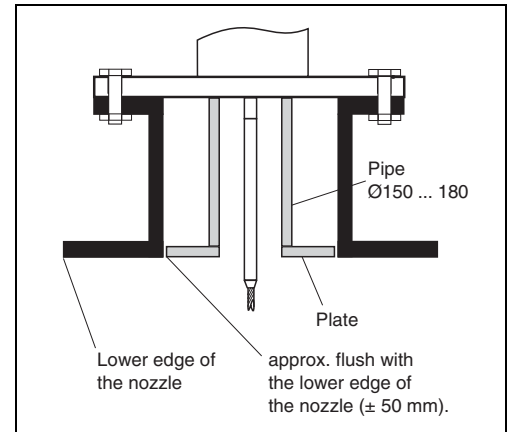




### Installation in $\geq$ DN300/12" nozzle

If installation in  $\geq$  300 mm/12" nozzles is unavoidable, installation must be carried out in accordance with the sketch on the right.

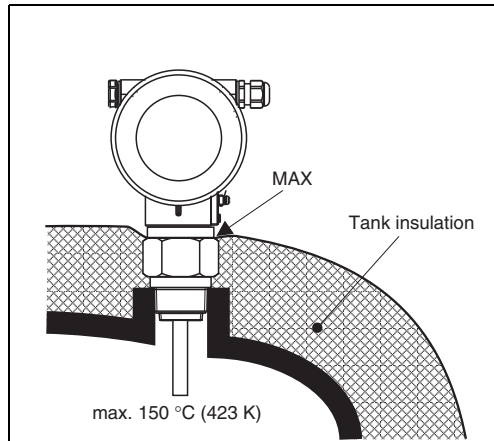
Nozzle diameter	Plate diameter
DN300/12"	280/11"
$\geq$ DN400/16"	$\geq$ 350/14"



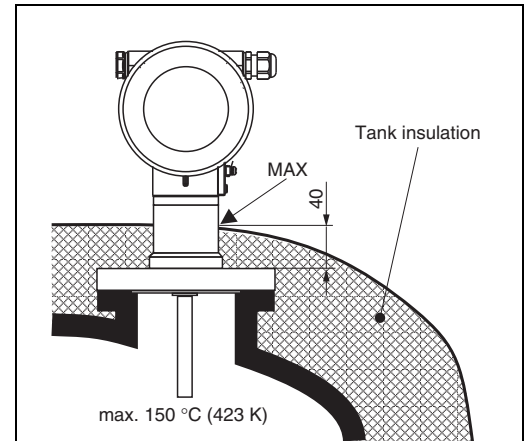
### Installation with heat insulation

- If process temperatures are high, Pulscon LTC must be included in normal tank insulation to prevent the electronics heating up as a result of heat radiation or convection.
- The insulation may not exceed beyond the points labelled **MAX** in the drawing.

#### Process connection with adapter G $\frac{3}{4}$ , G1 $\frac{1}{2}$ , $\frac{3}{4}$ NPT or 1 $\frac{1}{2}$ NPT

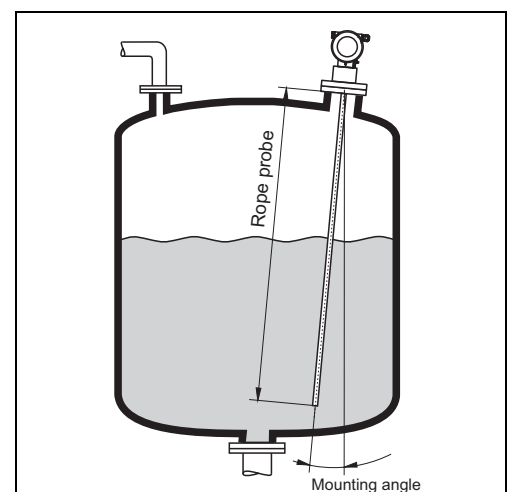


#### Process connection with flange DN40 ... DN200



### Installation at an angle

- For mechanical reasons, the probe should be installed as vertically as possible.
- With inclined installations the probe length has to be adjusted in dependence to the installation angle.
  - up to 1 m/1.09 yd = 30°
  - up to 2 m/1.8 yd = 10°
  - up to 4 m/3.6 yd = 5°.



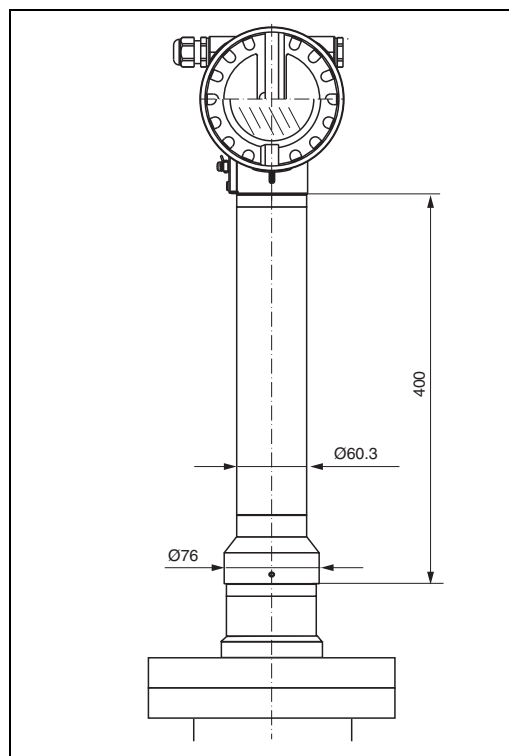
### Install for difficult to access process connections

For tight spaces or temperatures above that in the graphic (see page 29), the electronics housing can be ordered with distance pipe or connecting cable (separate housing).

#### Installation with spacer tube

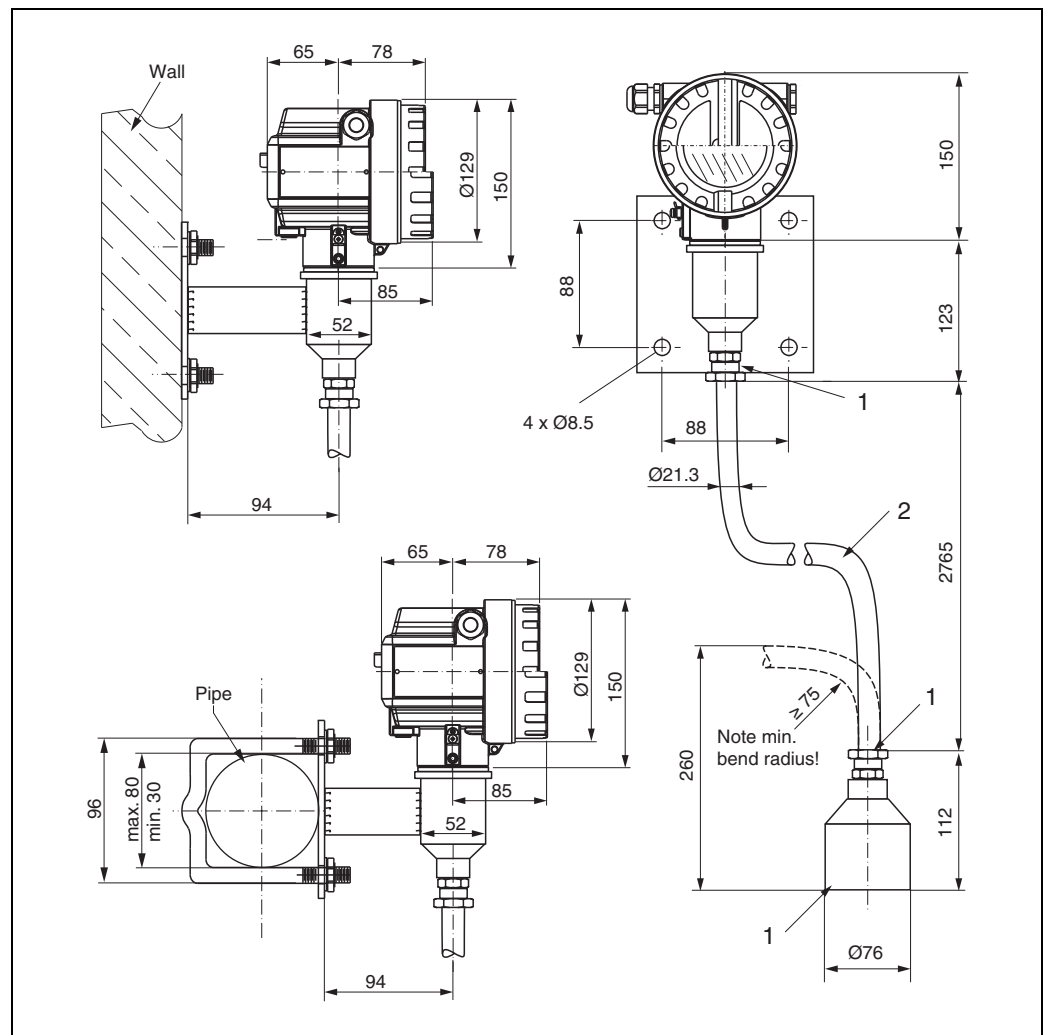
When mounting please observe engineering hints on page 15 the following points:

- After mounting, the housing can be turned 350° in order to make it easier to access the display and the connection compartment.
- The max. measuring range is reduced to 34 m/31 yd.



### Installation with remote electronics

- When installing, follow the instructions on page 15.
- Mount housing on a wall or pipe (vertically or horizontally) as shown in the diagram.



### Note!

The protective hose cannot be disassembled at these points (1).

The ambient temperature for the connecting line (2) between the probe and electronics can be max. 105 °C (378 K).

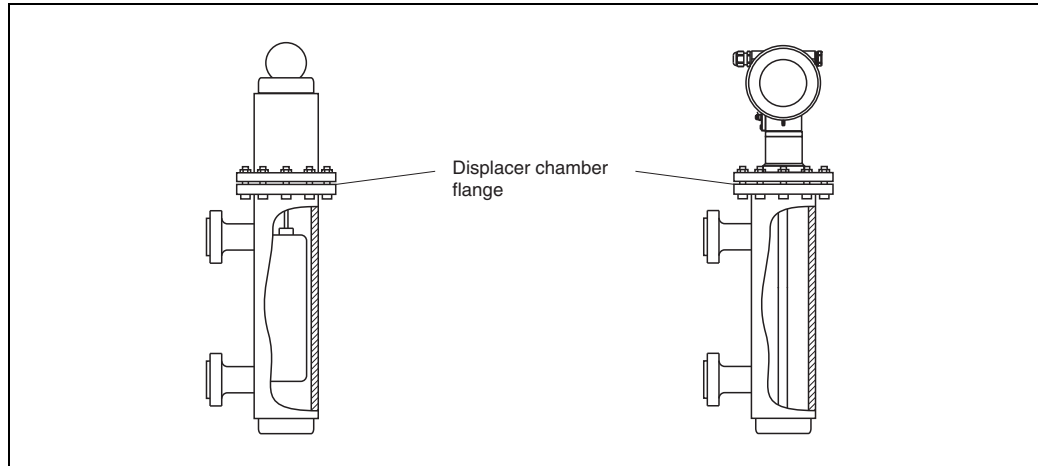
The version with remote electronics consists of the probe, a connecting cable and the housing. If they are ordered as a set, they are assembled when delivered.

### Replacing a displacer system in an existing displacer

The Pulscon LTC is a perfect replacement for a conventional displacer system in an existing displacer chamber. Thanks to menu-guided local operation, commissioning the Pulscon LTC only takes a few minutes. Replacement is also possible when partially filled, and wet calibration is not required.

Your benefits:

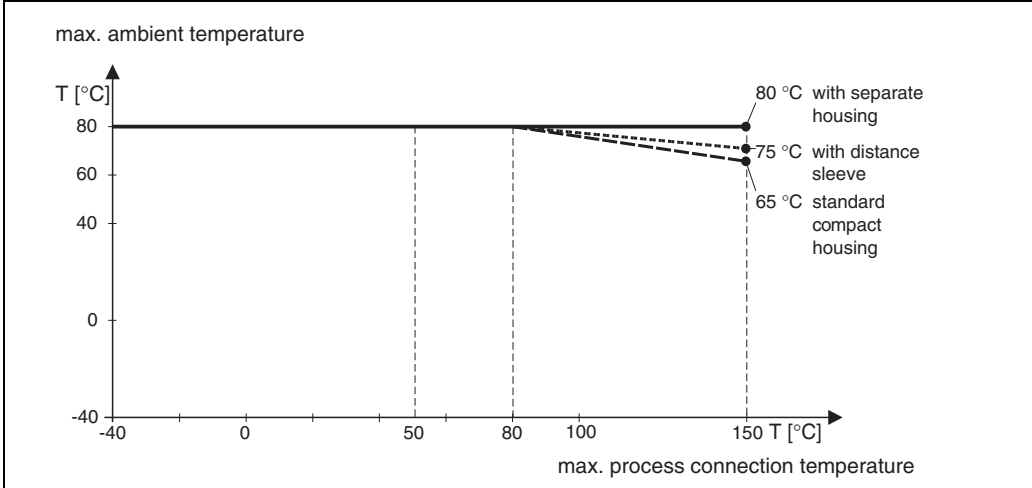
- No moving parts, thus zero-maintenance operation.
- Not sensitive to process influences such as temperature, density, turbulence and vibrations.
- The rod probes can be shortened or replaced easily. In this way, the probe can be easily adjusted on site.



### Planning instructions

- In normal cases, use a rod probe. When installing into a metallic displacer chamber up to 150 mm/5.9", you have all the advantages of a coax probe (see probe selection page 4).
- It must be ensured that the probe does not come into contact with the side wall. Where necessary, use a centering disk at the lower end of the probe (special product).
- A centering disk must be adapted as accurately as possible to the internal diameter of the displacer chamber to also ensure perfect operation in the area of the probe end.

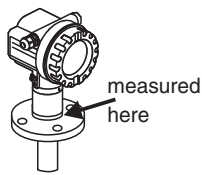
## Operating conditions: environment

<b>Ambient temperature range</b>	<p>Ambient temperature at the electronic: -40 °C ... +80 °C (233 K ... 353 K)</p> <p>The function of the LC display is restricted at <math>T_a &lt; -20</math> °C (253 K) and <math>T_a &gt; +60</math> °C (333 K).</p> <p>A weather protection cover should be used for outdoor operation if the instrument is exposed to direct sunlight.</p>
<b>Ambient temperature limits</b>	<p>If temperatures above 80 °C (353 K) are present at the process connection, the permitted ambient temperature is reduced according to the following diagram (temperature derating):</p>  <p>max. ambient temperature</p> <p>max. process connection temperature</p>
<b>Storage temperature</b>	-40 °C ... +80 °C (233 K ... 353 K)
<b>Climate class</b>	EN 60068-2-38 (test Z/AD)
<b>Degree of protection</b>	<ul style="list-style-type: none"> <li>with closed housing tested according to <ul style="list-style-type: none"> <li>IP68, NEMA 6P (24 h at 1.83 m/1.7 yd under water)</li> <li>IP66, NEMA 4X</li> </ul> </li> <li>with open housing: IP20, NEMA 1 (also ingress protection of the display)</li> </ul>
	<p><b>Caution!</b></p> <p>Degree of protection IP68 NEMA 6P applies for M12 PROFIBUS PA plugs only when the PROFIBUS cable is plugged in.</p>
<b>Vibration resistance</b>	EN 60068-2-64/IEC 68-2-64: 20 Hz ... 2000 Hz, 1 (m/s <sup>2</sup> ) <sup>2</sup> /Hz
<b>Cleaning of the probe</b>	<p>Depending on the application, contamination or buildup can accumulate on the probe. A thin, even layer only influences measurement slightly. Thick layers can dampen the signal and then reduce the measuring range. Severe, uneven buildup, adhesion e.g. through crystallization, can lead to incorrect measurement. In this case, we recommend that you use a non-contact measuring principle, or check the probe regularly for soiling.</p>
<b>Electromagnetic compatibility (EMC)</b>	<p>Electromagnetic compatibility to EN 61326 and NAMUR Recommendation EMC (NE21). Details are provided in the Declaration of Conformity. A standard installation cable is sufficient if only the analog signal is used. Use a shielded cable when working with a superimposed communications signal (HART).</p> <p>When installing the probes in metal and concrete tanks and when using a coax probe:</p> <ul style="list-style-type: none"> <li>Interference emission to EN 61326-X series, electrical equipment Class B.</li> <li>Interference immunity to EN 61326-X series, requirements for industrial areas and NAMUR Recommendation NE21 (EMC)</li> </ul> <p>The measured value can be affected by strong electromagnetic fields when installing rod and rope probes without a shielding/metallic wall, e. g. plastic, and in wooden silos.</p> <ul style="list-style-type: none"> <li>Interference emission to EN 61326-X series, electrical equipment Class A.</li> <li>Interference Immunity: the measured value can be affected by strong electromagnetic fields.</li> </ul>

## Operating conditions: process

### Process temperature range

The maximum permitted temperature at the process connection (see figure measuring point) is determined by the O-ring version ordered:

O-ring material	Min. temperature	Max. temperature <sup>1)</sup>	
FKM (Viton)	-30 °C/243 K	+150 °C/423 K	
EPDM	-40 °C/233 K	+120 °C/393 K	
FFKM (Kalrez)	-5 °C/268 K <sup>2)</sup>	+150 °C/423 K	

<sup>1)</sup> For PA-coated probes, the maximal admissible temperature is 100 °C (373 K).

<sup>2)</sup> The min. temperature of FFKM may be -15 °C (258 K) if the max. temperature of +80 °C (353 K) is not exceeded.

### Note!

The medium temperature can be higher.

However, when using rope probes the stability of the probe rope is reduced by structural changes at temperatures over 350 °C (623 K).

### Process pressure limits

All models: -1 bar ... 40 bar/585.9 psi.

This range may be reduced by the selected process connection.

The pressure rating (PN) specified on the flanges refers to a reference temperature of 20 °C (293 K), for ASME flanges to 100 °F (38 °C (311 K)). Pay attention to pressure-temperature dependencies.

Please refer to the following standards for the pressure values permitted for higher temperatures:

- EN 1092-1: 2001 table 18  
With regard to their temperature stability properties, the materials 1.4435 and 1.4404 are grouped under 13E0 in EN 1092-1 table 18. The chemical composition of the two materials can be identical.
- ASME B 16.5a - 1998 table 2-2.2 F316
- ASME B 16.5a - 1998 table 2.3.8 N10276
- JIS B 2220

### Note!

All Pulscon probes have two levels of sealing. There is an O-ring seal and a moulded seal behind that.

### Materials in contact with process

Part	Material
Seal	see "ordering information" on page 40
Process connection	see "ordering information" on page 40
Feed through rod	1.4462, Duplex CR22
NordLock washers	1.4547
Rope probe	Rope probe, uninsulated: 1.4401, weight: 1.4435
	Rope probe coated: galv. steel PA 12 (Vestamid L 1940), suitable for use in food
Rod probe	see "ordering information" on page 40
Coax probe	see "ordering information" on page 40, centring stars: PFA
all probes with 1½" and flange connection	on the lower edge of the process connections: PTFE (Dyneon Hostaflon TFM 1600)
all probes with ¾" connection	Lower edge of the process connections: PPS-GF 40



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**Dielectric constant**

- with coax probe:  $\epsilon_r \geq 1.4$
  - Rod and rope probe:  $\epsilon_r \geq 1.6$
- 

**Extension of the rope probes through tension and temperature**

6 mm rope:

- Elongation through tension: at max. permitted tensile load (30 kN): 13 mm/m rope length
- Elongation through temperature increase from 30 °C (303 K) to 150 °C (423 K): 2 mm/m rope length

4 mm rope:

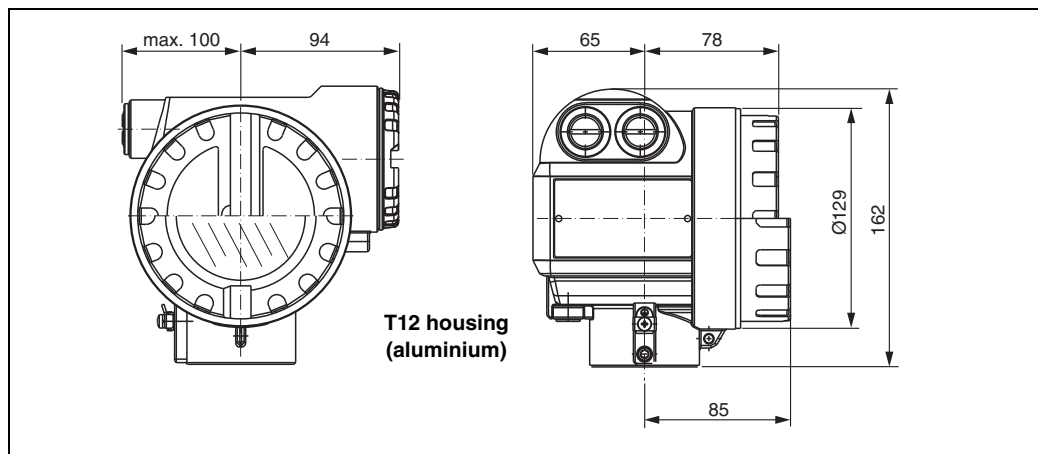
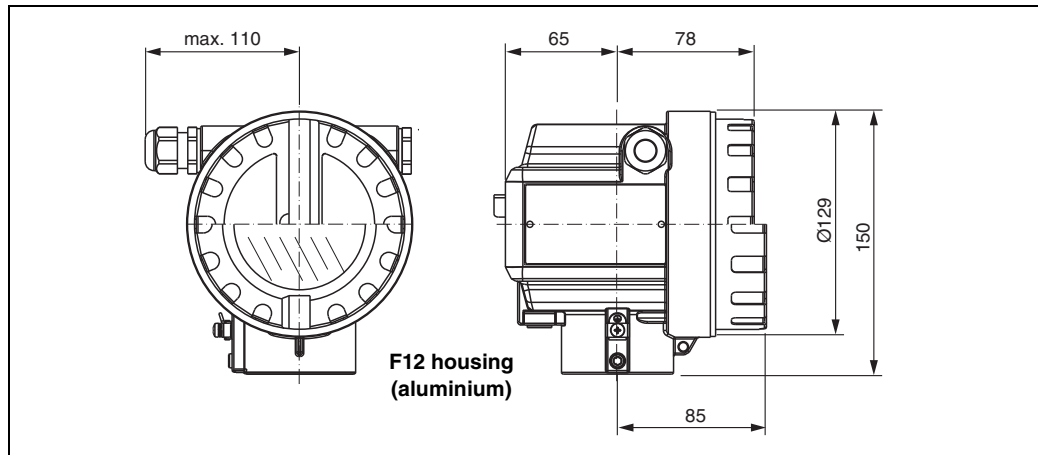
- Elongation through tension: at max. permitted tensile load (12 kN): 11 mm/m rope length
- Elongation through temperature increase from 30 °C (303 K) to 150 °C (423 K): 2 mm/m rope length

## Mechanical construction

### Design, dimensions

### Housing dimensions

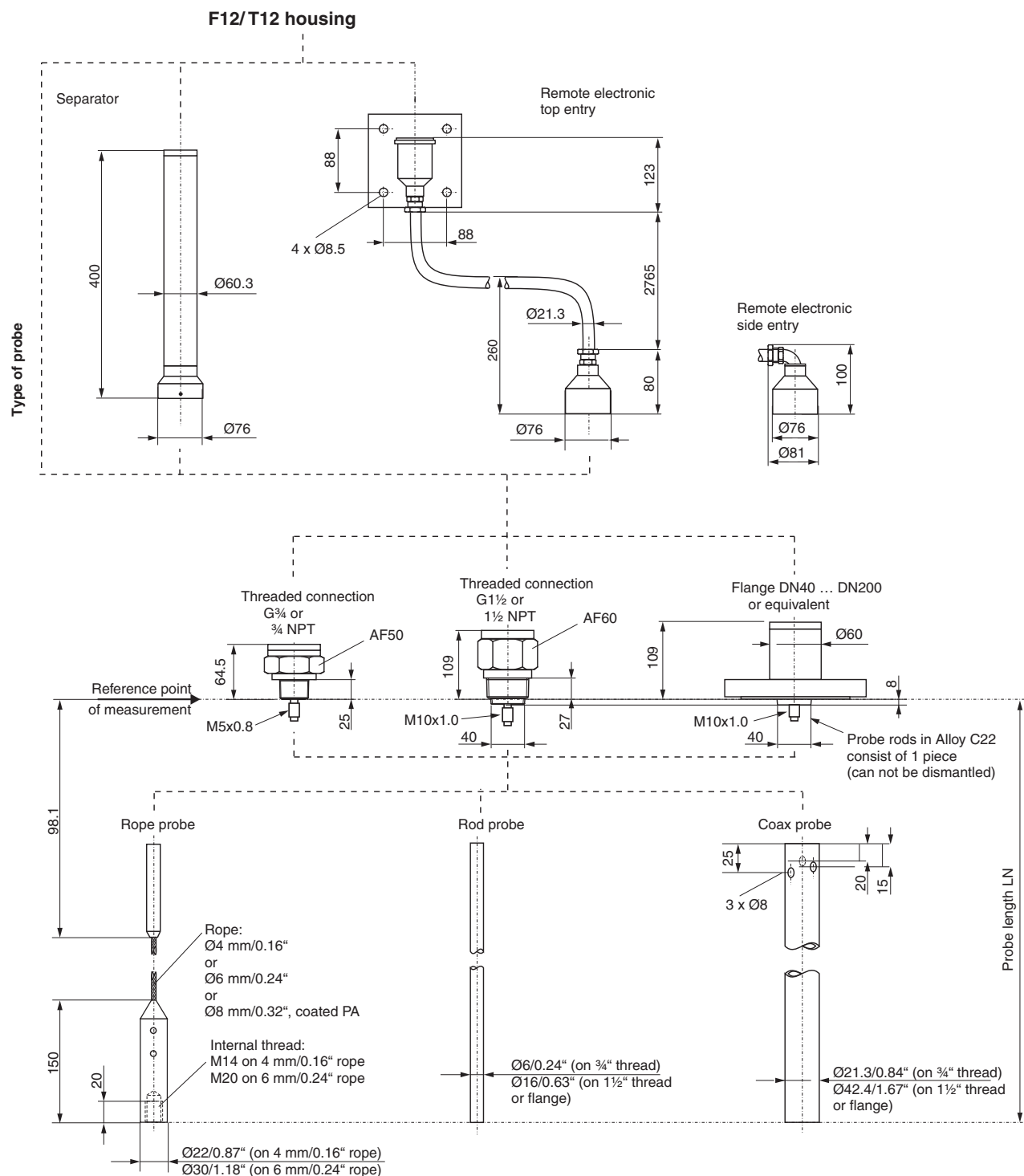
Dimensions for process connection and type of probe see page 33.





### Process connection, type of probe

Housing dimensions see page 32.



**Tolerance of probe length**

Rod probes/coax probes				
over		1 m/0.91 yd	3 m/2.7 yd	6 m/5.5 yd
up to	1 m/0.91 yd	3 m/2.7 yd	6 m/5.5 yd	
admissible tolerance (mm/")	-5/0.2	-10/0.4	-20/0.8	-30/1.2

Rope probes				
over		1 m/0.91 yd	3 m/2.7 yd	6 m/5.5 yd
up to	1 m/0.91 yd	3 m/2.7 yd	6 m/5.5 yd	
admissible tolerance (mm/")	-10/0.4	-20/0.8	-30/1.2	-40/1.6

**Weight**

Pulscon	LTC and rope probe 4 mm	LTC and rod or rope probe 6 mm	LTC and rod probe 16 mm	LTC and coax probe
Weight for housing F12 or T12	approx. 4 kg + approx. 0.1 kg/m probe length + weight of flange	approx. 4 kg + approx. 0.2 kg/m probe length + weight of flange	approx. 4 kg + approx. 1.6 kg/m probe length + weight of flange	approx. 4 kg + approx. 3.5 kg/m probe length + weight of flange

**Housing design**

- F12 housing with sealed terminal compartment for standard or EEx ia applications
- T12 housing with separate terminal compartment and explosion proof encapsulation

**Material**

Housing: aluminium (AlSi10Mg), seawater resistant, chromed, powder-coated  
Transparent window: glass

**Process connection**

see ordering information on page 40

**Seal**

see ordering information on page 40

**Probe**

see ordering information on page 40

## Human interface

### Operating concept

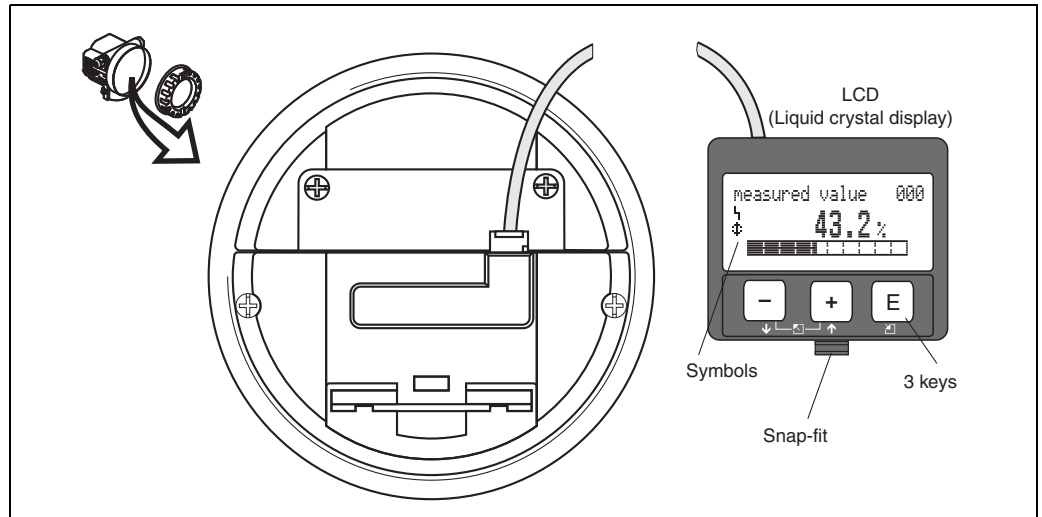
The display of the process value and the configuration of the Pulscon LTC occur locally by means of a large 4-line alphanumeric display with plain text information. The guided menu system with integrated help texts ensures a quick and safe commissioning.

To access the display the cover of the electronic compartment may be removed even in hazardous area (EEx ia, EEx em, EEx d, IS and XP).

### Display elements

#### Liquid crystal display (LCD):

Four lines with 20 characters each. Display contrast adjustable through key combination.



The LTC-Z02 LC display can be removed to ease operation by simply pressing the snap-fit (see graphic above). It is connected to the device by means of a 500 mm/0.45 yd) cable.





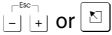









The following table describes the symbols that appear on the LC display:

Symbols	Meaning
	<b>ALARM_SYMBOL</b> This alarm symbol appears when the instrument is in an alarm state. If the symbol flashes, this indicates a warning.
	<b>LOCK-SYMBOL</b> This lock symbol appears when the instrument is locked, i. e. if no input is possible.
	<b>COM_SYMBOL</b> This communication symbol appears when a data transmission via e. g. HART or PROFIBUSPA is in progress.

### Operating elements

The operating elements are located inside the housing and are accessible for operation by opening the lid of the housing.

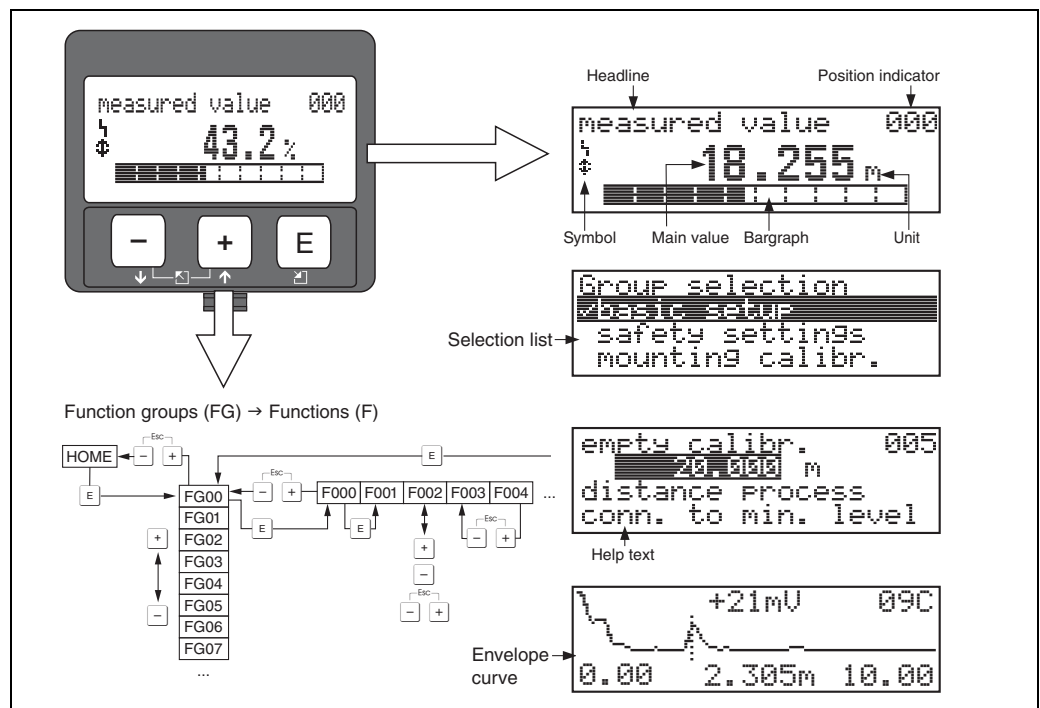
### Function of the keys

Key(s)	Meaning
 or 	Navigate upwards in the selection list Edit numeric value within a function
 or 	Navigate downwards in the selection list Edit numeric value within a function
 or 	Navigate to the left within a function group
	Navigate to the right within a function group, confirmation
 and  or  and 	Contrast settings of the LCD
 and  and 	Hardware lock/unlock After a hardware lock, an operation of the instrument via display or communication is not possible! The hardware can only be unlocked via the display. An release code must be entered to do so.

### Local operation

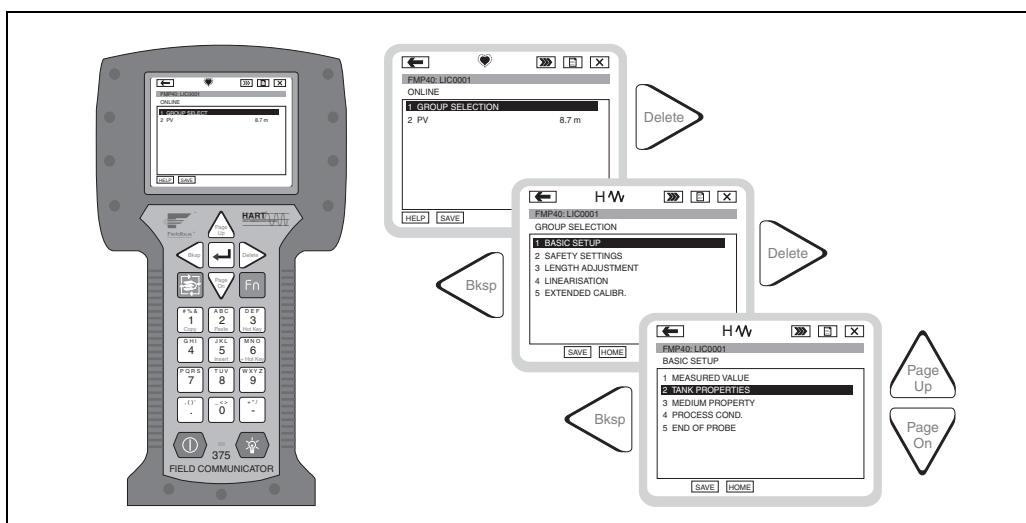
### Operation with LTC-Z02

The LC display LTC-Z02 allows configuration via 3 keys directly at the instrument. All device functions can be set through a menu system. The menu consists of function groups and functions. Within a function, application parameters can be read or adjusted. The user is guided through a complete configuration procedure.



### Operation with handheld terminal Field Communicator 375

With the handheld terminal 375, you can configure all the device functions via menu operation.



#### Note!



Further information on the HART handheld terminal is given in the appropriate operating instructions included in the carrying case of the 375.

### Remote operation

#### Operation with PACT<sup>ware</sup>™ (for communication variants HART or PROFIBUS PA)

PACT<sup>ware</sup>™ is an operating software with graphical support (MS Windows) for intelligent transmitters with the communication protocols HART and PROFIBUS PA.

PACT<sup>ware</sup>™ supports the following functions:

- On-line configuration of transmitters
- Loading and saving of instrument data (upload/download)
- orderly visualization of measured values and limit values
- Display and recording of measured values with a line recorder

It is not possible to display envelope curves with PACT<sup>ware</sup>™. To display them, please use the supplied program.

Connections:

- HART with HART modem (available as accessory)
- PROFIBUS PA

## Certificates and approvals

### CE approval

The measuring system meets the legal requirements of the EC-guidelines. These are listed in the corresponding EC Declaration of Conformity together with the standards applied. Pepperl+Fuchs confirms successful testing of the device by affixing to it the CE mark.

### Ex approval

see ordering information on page 40

The devices are certified for use in hazardous areas. The safety instructions to be observed are enclosed and referenced on the nameplate:

- Europe: EC type-examination certificate, safety instructions SI

Certificate	Ignition protection	Output	Communication	Housing	Safety information	WHG
NA	non-Ex	AH, DH, IH	HART, 4 mA ... 20 mA	A*, T*	–	–
		PA	PROFIBUS PA	A*, T*	–	–
EA	II 1/2 G EEx ia II C T6 and WHG	IH	HART, 4 mA ... 20 mA	A*	SI 164O-D	ZE 256O-A
		PA	PROFIBUS PA	A*	SI 165O-D	ZE 256O-A
ED	II 1/2 G EEx d [ia] IIC T6	IH	HART, 4 mA ... 20 mA	T*	SI 166O-B	–
		PA	PROFIBUS PA	T*	SI 166O-B	–
ES	II 1/2 G EEx ia IIC T6 II 1/3 D transparent cover	IH	HART, 4 mA ... 20 mA	A*	SI 172O-B	–
		PA	PROFIBUS PA	A*	SI 172O-B	–
EW	II 1/2 G EEx ia IIC T6 II 1/3 D transparent cover and WHG	IH	HART, 4 mA ... 20 mA	A*	SI 172O-B	ZE 256O-A
		PA	PROFIBUS PA	A*	SI 172O-B	ZE 256O-A
EX	II 1/2 G EEx ia II C T6	IH	HART, 4 mA ... 20 mA	A*	SI 164O-D	–
		PA	PROFIBUS PA	A*	SI 165O-D	–
E1	II 2 G EEx em [ia] IIC T6	IH	HART, 4 mA ... 20 mA	T*	SI 167O-D	–
		PA	PROFIBUS PA	T*	SI 167O-D	–
SX	II 1/2 D dummy cover, dust-Ex	AH, DH, IH	HART, 4 mA ... 20 mA	A*	SI 168O-B	–
S2	II 1/3 D transparent cover, dust-Ex	AH, DH, IH	HART, 4 mA ... 20 mA	A*	SI 168O-B	–
WH	WHG	AH, DH, IH	HART, 4 mA ... 20 mA	A*, T*	–	ZE 256O-A
		PA	PROFIBUS PA	A*, T*	–	ZE 256O-A
–	II 1/2 D dummy cover, dust-Ex II 1/3 D transparent cover, dust-Ex	IH	HART, 4 mA ... 20 mA	T*	SI 173O-B	–
		PA	PROFIBUS PA	T*	SI 173O-B	–
–	II 1/2 G EEx ia IIC T6	AH, DH, IH	HART, 4 mA ... 20 mA	T*	SI 215O-C	–
–	II 1/2 G EEx ia II C T6	PA	PROFIBUS PA	T*	SI 216O-C	–

- USA: FM Approval, Control Drawing  
Canada: CSA Certificate of Compliance, Control Drawing

Certificate	Ignition protection	Output	Communication	ZD
FM	FM DIP, Cl. II, Div. 1, Gr. E-G, N.I.	AH, DH	HART, 4 mA ... 20 mA	ZD 078O
F1	FM IS, Cl. I/II/III, Div. 1, Gr. A-G, N.I.	IH	HART, 4 mA ... 20 mA	ZD 075O
		PA	PROFIBUS PA	ZD 076O
F2	FM XP, Cl. I/II/III, Div. 1, Gr. A-G	IH	HART, 4 mA ... 20 mA	ZD 077O
		PA	PROFIBUS PA	ZD 077O
CS	CSA DIP, Cl. II, Div. 1, Gr. G + coal dust, N.I.	AH, DH	HART, 4 mA ... 20 mA	ZD 083O
C1	CSA IS, Cl. I/II/III, Div. 1, Gr. A-D, G + coal dust, N.I.	IH	HART, 4 mA ... 20 mA	ZD 080O
		PA	PROFIBUS PA	ZD 081O
C2	CSA XP, Cl. I/II/III, Div. 1, Gr. A-D, G + coal dust, N.I.	IH	HART, 4 mA ... 20 mA	ZD 082O
		PA	PROFIBUS PA	ZD 082O

### SIL classification

up to SIL2 according to IEC 61508, for 4 mA ... 20 mA output (see SIL manual).

### Overspill protection

Z-65.16-368 (WHG), see "ordering information" on page 40

### Telecommunications

Complies with part 15 of the FCC rules for an unintentional radiator. All probes meet the requirements for a class A digital device.

Coax probes and probes mounted in closed metallic vessels also meet the requirement for a class B digital device (residential environment).

---

**Standards and guidelines applied**

The European directives and standards applied can be taken from the associated EC Declarations of Conformity. In addition, the following also applied for Pulscon LTC:

**EN 60529**

Protection class of housing (IP code)

**EN 61010**

Safety regulations for electrical devices for measurement, control, regulation and laboratory use

**EN 61326**

Emissions (equipment class B), compatibility (appendix A – industrial area)

**NAMUR**

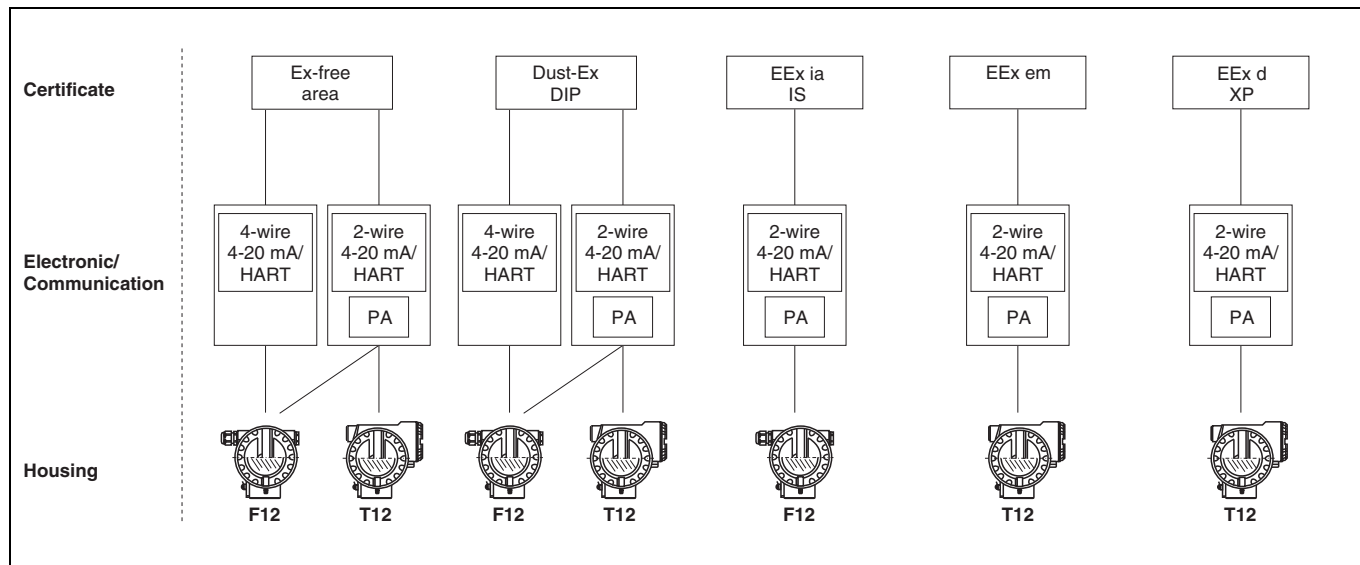
international user association of automation technology in process industries

- NE21 – Electromagnetic compatibility (EMC) of industrial process and laboratory control equipment
- NE43 – Standardization of the signal level for the failure information of digital transmitters

## Ordering information

### Pulscon LTC

### Instrument selection



<b>Temperature</b> (depend on O-ring)	V Viton, -30 °C ... +150 °C (243 K ... 423 K)	
	E EPDM, -40 °C ... +120 °C (233 K ... 393 K)	
	K Kalrez, -5 °C ... +150 °C (268 K ... 423 K)	
<b>Pressure</b> (all types)	-1 bar ... 40 bar	
<b>Wetted parts</b>	Rope probes: Process connection: 1.4435 (SS316L), 1.4462 Rope: 1.4401 (SS316) Weight: 1.4435 (SS316L)	Rod probes: Process connection: 1.4435 (SS316L), 1.4462 Rod and coax pipe: 1.4435 (SS316L)

The metallic uninsulated probes are only insulated in the area of the bushing. Thus there is no danger of electrostatic charging. The PA-coated rope has been tested and there is no dangerous electrostatic charging. As a result, there are no restrictions on use in Ex areas for any of the probes.

#### Note!



For orders with a display, the housing cover is delivered with an inspection glass. For orders without a display, a dummy cover is delivered.

Exception: For orders with the ATEX II 1/2 D dust ignition-proof certificate, a dummy cover is always delivered, even for orders with a built-in display.

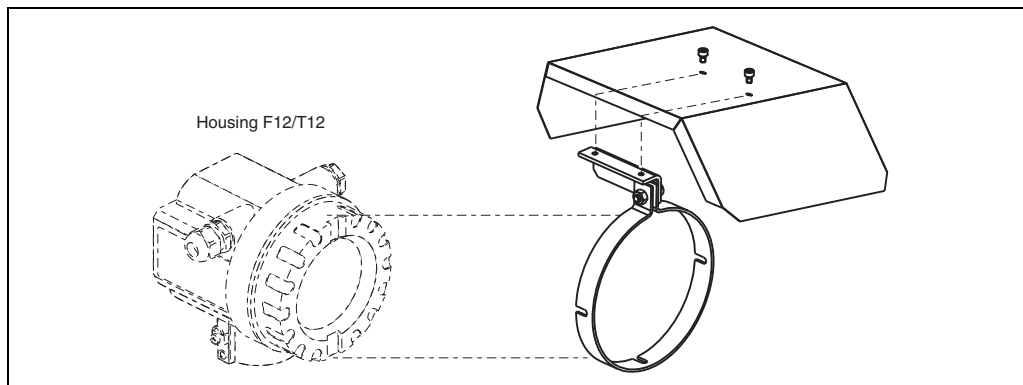


[illegible]

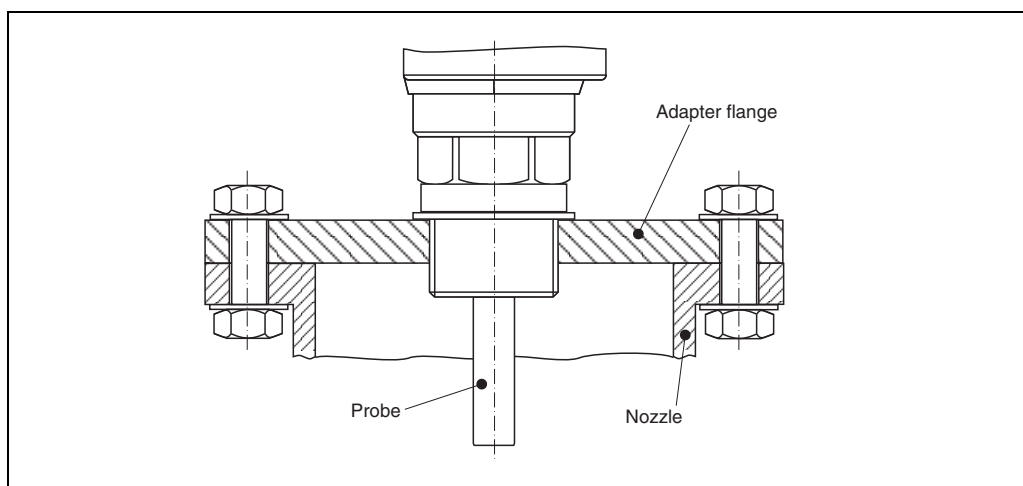
## Accessories

### Weather protection cover

A weather protection cover made of stainless steel (LTC-Z01) is recommended for outdoor mounting. The shipment includes the protective cover and tension clamp.



### Adapter flange



#### Version with metrical thread

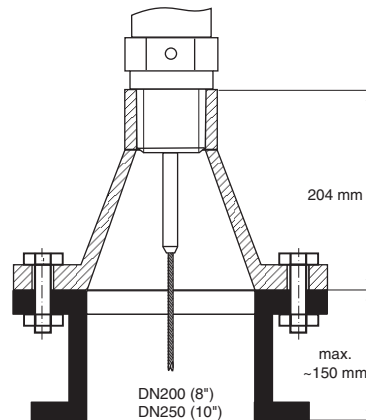
		<b>Process connection</b>	
D73		DN50 PN16	
D93		DN80 PN16	
DA3		DN100 PN16	
XXX		other process connections	
		<b>Sensor thread</b>	
G5		G1½, ISO 228	
		<b>Material</b>	
S		stainless steel 1.4435 (316L)	
LTC-Z-		Product designation	

#### Version with conical thread

		<b>Process connection</b>	
A61		ANSI 2", 150 psi	
A81		ANSI 3", 150 psi	
A91		ANSI 4", 150 psi	
XXX		other process connections	
		<b>Sensor thread</b>	
5		NPT 1½-11.5	
		<b>Material</b>	
S		stainless steel 1.4435 (316L)	
LTC-Z-		Product designation	

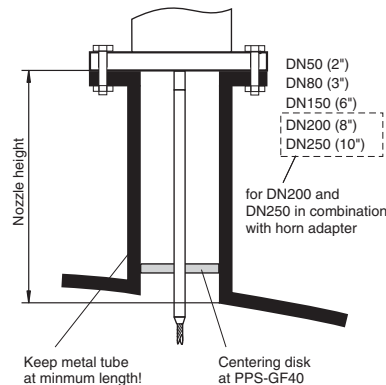
DOCT-0206A 06/2009 119697

Flange with horn adapter  
to adapt on the following  
nozzles



Version	Material	Ordering code
G1½ at DN200 PN16	stainless steel 1.4435 (316L)	LTC-Z20-10
G1½ a DN250 PN16		LTC-Z20-20
1½ NPT a 8"/150 psi		LTC-Z20-30
1½ NPT at 10"/150 psi		LTC-Z20-40

Extension rod/centering



Extension rod  
Not for ¾\".

### Certificates

A	non-hazardous area
2	ATEX II 1D

### Extension rod

1	115 mm/4.5\" rod for nozzle height 150 mm ... 250 mm (5.9\" ... 9.8\")
2	215 mm/8.5\" rod for nozzle height 250 mm ... 350 mm (9.8\" ... 13.8\")
3	315 mm/12.4\" rod for nozzle height 350 mm ... 450 mm (13.8\" ... 17.7\")
4	415 mm/16.3\" rod for nozzle height 450 mm ... 550 mm (17.7\" ... 21.7\")
9	other version

### Centering disk

A	without centering disk
B	Disk for DN40/1½\", internal diameter 40 mm ... 45 mm (1.6\" ... 1.8\")
C	Disk for DN50/2\", internal diameter 50 mm ... 57 mm (2\" ... 2.2\")
D	Disk for DN80, internal diameter 80 mm ... 85 mm (3.15\" ... 3.3\")
E	Disk for 3\", internal diameter 76 mm ... 78 mm (3\" ... 3.1\"), PPS-GF40
G	Disk for DN100/4\", internal diameter 100 mm ... 110 mm (3.9\" ... 4.3\")
H	Disk for DN150/6\", internal diameter 152 mm ... 164 mm (6\" ... 6.5\"), PPS-GF40
J	Disk for DN200/8\", internal diameter 201 mm ... 215 mm (7.9\" ... 8.5\")
K	Disk for DN250/10\", internal diameter 253 mm ... 269 mm (10\" ... 10.6\")
Y	other version

LTC-Z30-

Product designation

## Center washers

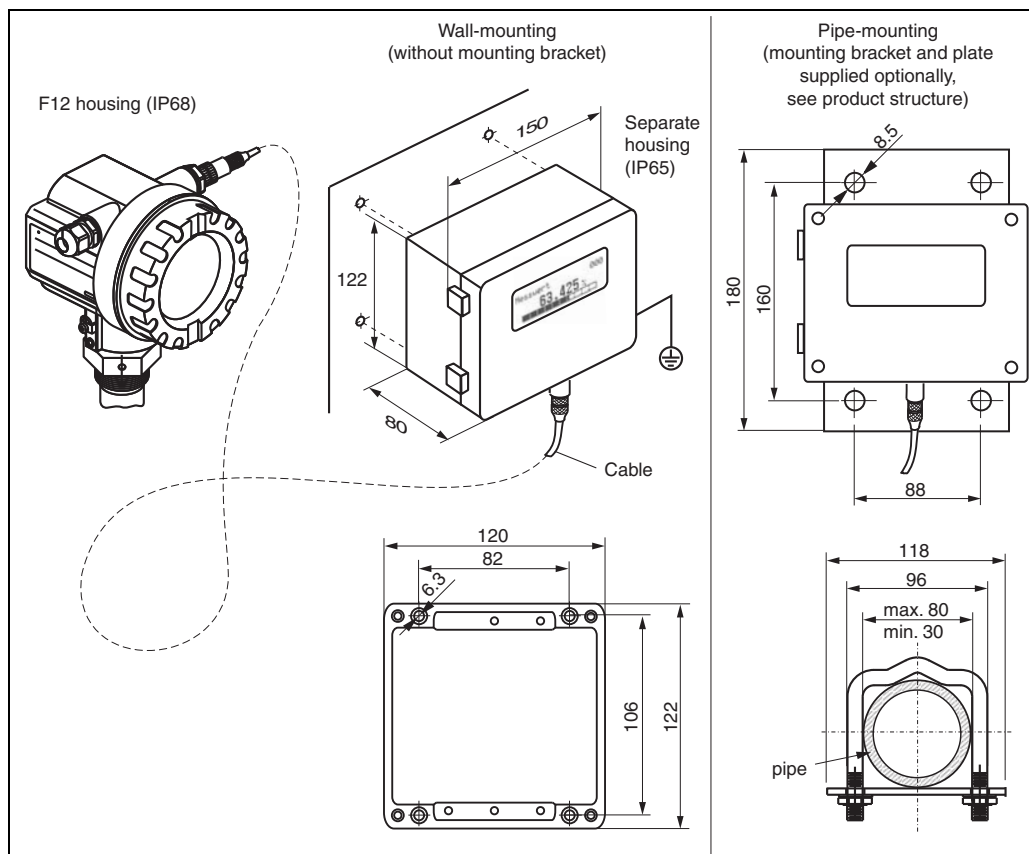
### Center Washer PEEK 48 mm ... 95 mm (1.9" ... 3.7")

- statically dissipative
- $T_{\max} = 200^{\circ}\text{C}/392^{\circ}\text{F}$
- Diameter adaptable

### Center Washer PFA 37 mm/1.46"

- $T_{\max} = 150^{\circ}\text{C}/302^{\circ}\text{F}$

## Remote display and operation



### Technical data

Cable length	20 m/18.2 yd (fixed length with cast-on connection plugs)
Temperature range	-30 °C ... +70 °C (243 K ... 343 K)
Degree of protection	IP65 acc. to EN 60529
Material	Housing: aluminium AISi12 Cable glands: nickel plated brass
Dimensions (H x B x T)	122 mm x 150 mm x 80 mm (4.8" x 5.9" x 3.2")

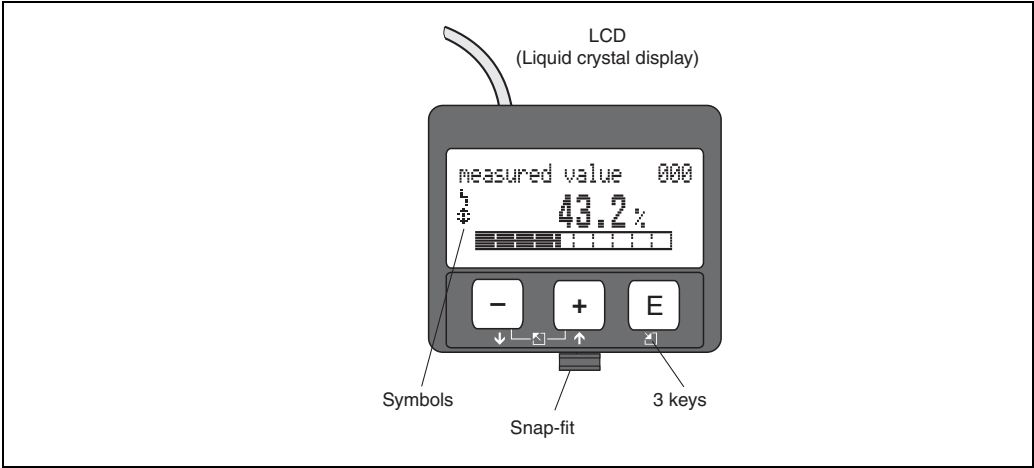
Version	Order code
Remote display with on-site operation, cable 20 m/18.2 yd	LTC-Z40-NA1A
Remote display with on-site operation, cable 20 m/18.2 yd, with mounting bracket 2"	LTC-Z40-NA1B
Remote display with on-site operation, cable 20 m/18.2 yd, 2G EEx ia, 3D	LTC-Z40-EX1A
Remote display with on-site operation, cable 20 m/18.2 yd, with mounting bracket 2", 2G EEx ia, 3D	LTC-Z40-EX1B

To connect the remote display LTC-Z40-\*\*\*, use the appropriate cables provided for the communication version of the device.



Display and operating  
module LTC-Z02

LC display for on-site operation of the Pulscon LTC (LTC-Z02)



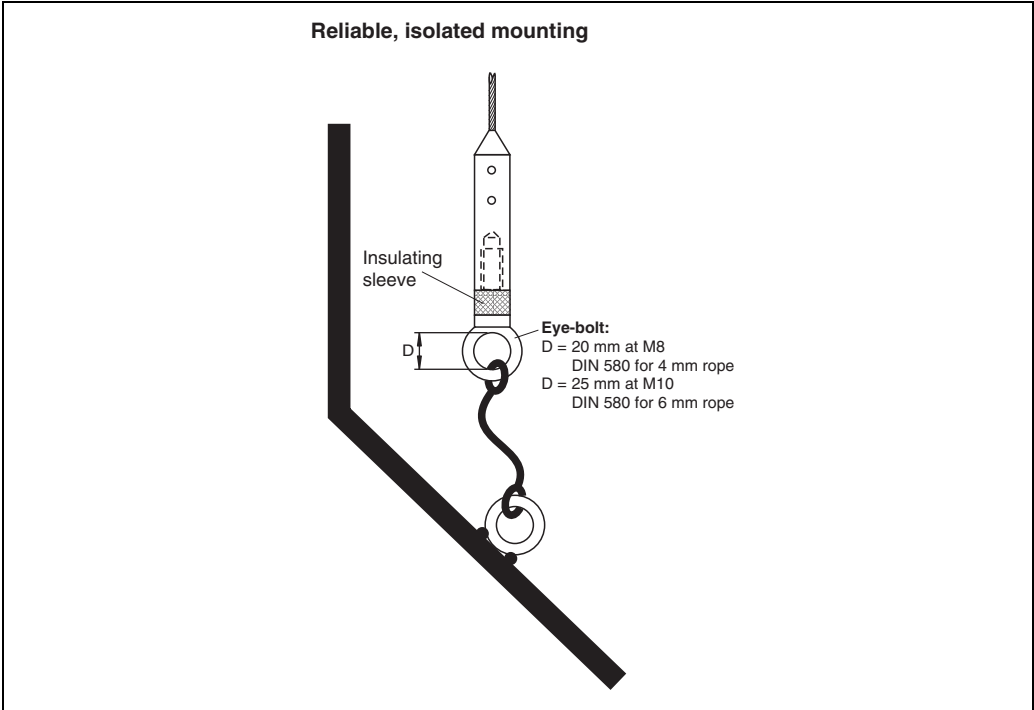
Mounting kit isolated

If a rope probe has to be fixed and a secure grounded mounting is not possible, we recommend using the insulating sleeve made of PEEK-GF30 with accompanying DIN 580 eye-bolt made of stainless steel.



Note!

Due to the risk of electrostatic charge, the insulating sleeve is not suitable for use in hazardous areas! In these cases the fixing must be reliably grounded (see page 18)



Mounting kit	Process temperature	Order code
for 4 mm rope probe	max. 150 °C (423 K)	LTC-Z50-10
for 6 mm rope probe		LTC-Z50-20

Service adapter

for communication with **PACTware™**, on request.

Profiboard

for connection to a PC at PROFIBUS

Proficard

for connection to a Laptop at PROFIBUS



### Supplementary documentation

This supplementary documentation can be found on our product pages on [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com).

#### Operating manual

Depending on the communication variant ordered, the following operating manuals are supplied with the device:

Communication	Operating manual
4 mA ... 20mA, HART	BA 242O
PROFIBUS PA	BA 243O

These instructions describe the installation and first commissioning of the Pulscon LTC. From the operating menu, all functions are included, which are required for standard measurement tasks. Additional functions are **not** contained in the manual.

#### Description of device functions

##### BA 245O

This contains a detailed description of **all** the functions of the Pulscon LTC and is valid for all communication variants. This document is located on the supplied documentation CD-ROM in the form of a PDF file. It is also available on the Internet at [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com).

#### Short instructions

##### KA 189O

can be found under the device housing cover.

The most important menu functions are summarized on this sheet. It is intended primarily as a memory jogger for users who are familiar with the operating concept of Pepperl+Fuchs time-of-flight instruments.

#### Safety Instructions

The following safety instructions are supplied with ATEX-certified device versions. If the devices are used in explosive areas, comply with all the specifications in these safety instructions (see also page 38).

- safety information SI164O (HART devices)
- safety information SI165O (PROFIBUS PA devices)
- safety information SI166O (PROFIBUS PA devices)
- safety information SI167O
- safety information SI168O (HART devices)
- safety information SI172O
- safety information SI173O
- safety information SI211O (HART devices)
- safety information SI212O (PROFIBUS PA devices)
- safety information SI213O
- safety information SI214O (HART devices)
- safety information SI215O (HART devices)
- safety information SI216O (PROFIBUS PA devices)
- safety information SI217O

#### Control drawings/ installation drawings

The following control or installation drawings are supplied with the FM and CSA certified device versions (see also page 38):

- FM control drawing ZD075O (HART devices, F12 housing)
- FM control drawing ZD076O (PROFIBUS PA devices, F12 housing)
- FM control drawing ZD077O (T12 housing)
- FM control drawing ZD077O (F12 housing)
- CSA control drawing ZD080O (HART devices, F12 housing)
- CSA control drawing ZD081O (PROFIBUS PA devices, F12 housing)
- CSA control drawing ZD082O (T12 housing)
- CSA control drawing ZD083O (F12 housing)

#### Approval for overspill protection

The following approval are supplied with the WHG certified device versions (see also page 38):

- approval ZE256O overspill protection acc. to WHG (Z-65.16-368)

With regard to the supply of products, the current issue of the following document is applicable: The General Terms of Delivery for Products and Services of the Electrical Industry, published by the Central Association of the "Elektrotechnik und Elektroindustrie (ZVEI) e.V." including the supplementary clause: "Erweiterter Eigentumsvorbehalt".

We at Pepperl+Fuchs recognise a duty to make a contribution to the future,  
For this reason, this printed matter is produced on paper bleached without the use of chlorine.

# PROCESS AUTOMATION – PROTECTING YOUR PROCESS



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