TECFLUID
The art of measuring

Level transmitters
Series LTDR

TDR guided radar level transmitter for liquids and solids

- Level measurement independent of changing process conditions (density, conductivity, temperature, pressure,…)
- Innovative signal analysis and disturbance signal suppression
- Almost no installation restrictions
- Different types of probes: single rod, coaxial and rope probe, interchangeable thanks to its modular design
- Suitable for almost every liquid. Exceptional performance in liquids with low dielectric constant (i.e. low reflectivity) such as oils and hydrocarbons
- Suitable for solids, mainly with rope probe version
- Unmatched price / performance ratio
- Measuring range:
  - Single rod probe: 100 ... 3000 mm
  - Coaxial probe: 100 ... 6000 mm
  - Rope probe: 1000 ... 20000 mm
- Connections:
  - Rosca G¾A or G1A threaded connection
  - EN 1092-1 DN40 flange or bigger
- Materials: EN 1.4404 (AISI 316L), PEEK™
- 4-20 mA output
- 1 x programmable transistor output for level detection
- Optional:
  - ATEX version
  - Extended temperature version
  - Single rod PTFE coated

Working principle

LTDR uses TDR (Time Domain Reflectometry) technology.

Low-energy, high-frequency electromagnetic impulses, generated by the sensor's circuitry, are propagated along the probe which is immerged in the liquid to be measured. When these impulses hit the surface of the liquid, part of the impulse energy is reflected back up the probe to the circuitry which then calculates the fluid level from the time difference between the impulses sent and the impulses reflected. The sensor can output the analyzed level as a continuous measurement reading through its analog output, or it can convert the values into freely positionable switching output signals.

LTDR Sensors are also known as Guided Radars or Guided Wave Radars.

Applications

- Level measurement in tanks/storage silos
- Water and waste water treatment
- Food and beverage industry
- Chemical, petrochemical and car industry

Models

- LTDR single rod probe:
  - 6 mm, G¾ connection
  - 8 mm, G1 connection
- LTDR rope probe:
  - 4 mm, G¾ connection
  - 6 mm, G1 connection

Suitable for a very wide range of applications with both liquids and solids (single rod 8 mm and rope probe are specifically indicated for the level measurement of solids).

The signal has wider detection radius around the rod. Thus, it is more responsive for measuring signal disturbances which can be easily overcome by observing a few mounting considerations and making simple configuration adjustments to the sensor.

These are also recommended for installation in metallic bypass chambers, which basically act together with the rod as a big coaxial probe.

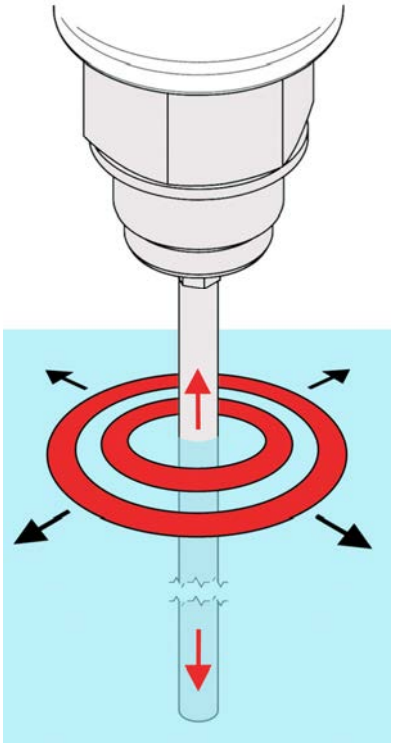
- LTDR coaxial probe: G¾ connection

The high frequency measurement signal is completely contained within the outer tube, which provides immunity against any external conditions and interfering objects outside its tube.

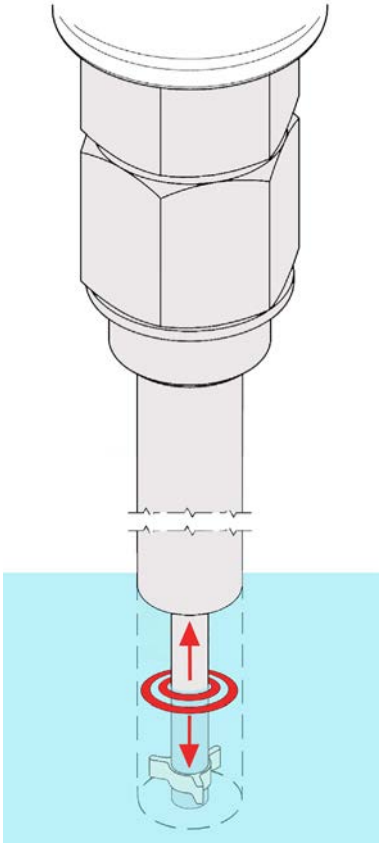
Ideal solution for a hassle-free "drop-in anywhere" installation, ensuring reliable measurement under almost any application condition. Ideal choice for measuring low reflectivity liquids (i.e. low dielectric constant) such as oils and hydrocarbons.

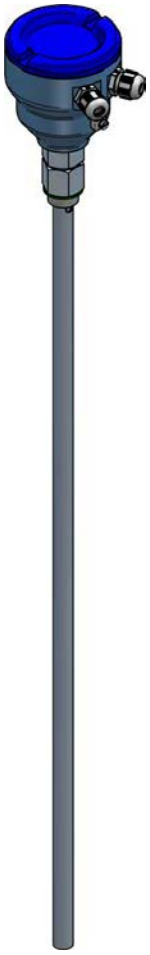
Recommended for the use with clean liquids only. NOT recommended with viscous, crystallizing, adhesive, coating or sticky liquids, fibrous liquids, sludge, slurry, pulp or any liquids containing solid particles. Such liquids might cause build-up, bridging or clogging inside the coaxial probe.

LTDR single rod probe



LTDR coaxial probe





Technical data

- **Accuracy:** ±3 mm
- **Repeatability:** < 2 mm
- **Resolution:** < 1 mm
- **Probe type:**
  - Single rod Ø6 or Ø8 mm
  - Coaxial Ø17.2 mm (standard tube: NPS ⅜ 10S)
  - Rope Ø4 or Ø6 mm
- **Probe length** (L):
  - Single rod probe: 100 … 3000 mm
  - Coaxial probe: 100 … 6000 mm
  - Rope probe: 1000 … 20000 mm
- **Inactive area:**
  - Top (I1):
    - Single rod probe: ε_r=80: 50 mm / ε_r=2: 80 mm
    - Coaxial probe: ε_r=80: 30 mm / ε_r=2: 50 mm
    - Rope probe: ε_r=80: 50 mm / ε_r=2: 80 mm
  - Bottom (I2):
    - Single rod probe: ε_r=80: 10 mm / ε_r=2: 50 mm
    - Coaxial probe: ε_r=80: 10 mm / ε_r=2: 50 mm
    - Rope probe: ε_r=20: 10 mm / ε_r=2: 50 mm
- **Measuring range** (M): probe length less both inactive areas at top and bottom
- **Switching point** (S): freely positionable within measuring range
- **Dielectric constant** (ε_r):
  - Single rod probe: > 1.8
  - Coaxial probe: > 1.4
  - Rope probe: > 1.8
- **Conductivity & density:** no restrictions
- **Dynamic viscosity:**
  - Single rod probe: < 5000 mPa·s = 5000 cP
  - Coaxial probe: < 500 mPa·s = 500 cP
  - Rope probe: < 5000 mPa·s = 5000 cP
- **Fluid temperature:**
  - Single rod / rope probe: -40°C … +150°C
  - Single rod PTFE coated: -15°C … +100°C
  - Coaxial probe EPDM seal: -40°C … +130°C
  - Coaxial probe VITON® seal: -15°C … +150°C
  - Special version: -200°C … +250°C
    Available for single rod and coaxial probe up to 1000 mm (-150°C … +250°C with VITON® seal)
- **Ambient temperature:** -25°C … +80°C
  (storage: -40°C … +85°C)
- **Working pressure:** -1 bar … 40 bar
  (single rod PTFE coated 0 ... 4 bar)
- **Material exposed to tank atmosphere:**
  - Single rod probe:
    - EN 1.4404 (AISI 316L), PEEK™
    - PTFE coating (VITON® seal)
  - Coaxial probe: EN 1.4404 (AISI 316L), PEEK™
    O-ring seal: EPDM or VITON®
    (other o-ring materials on request)
  - Rope probe: EN 1.4404 (AISI 316L), PEEK™

  Gasket at connection thread: BELPA® CSA-50, 2 mm thick
- **Housing materials:**
  - Housing body and cover: coated aluminium alloy (epoxy coated for ATEX version)
  - Cover o-ring seal: NBR or silicone (ATEX version)

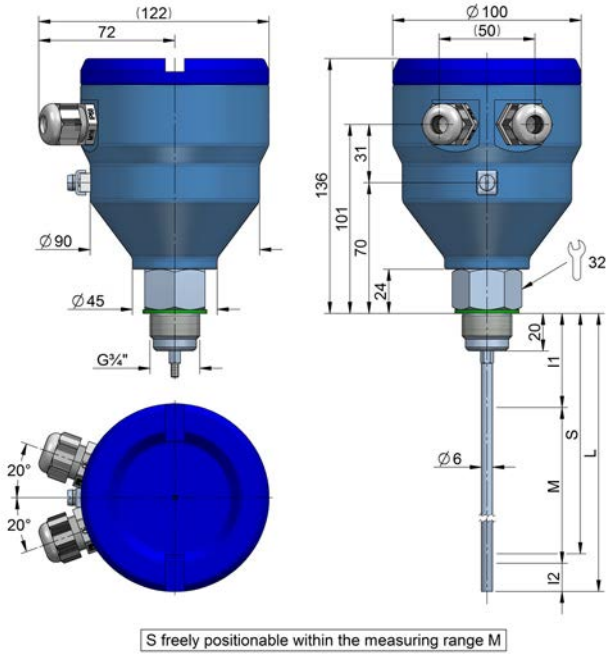
  Other materials on request
- **Ingress protection:** IP65 (standard housing) / IP68 10 m H_2O, NEMA6P (ATEX version)
- **Cable entries:**
  - Standard version: 2 cable entries M16x1.5
  - ATEX version: 2 cable entries M20x1.5

  Other sizes on request
- **Connection thread** (CT), according to selected probe:
  - G¾A: single rod 6 mm, rope probe 4 mm and coaxial probe
  - G1A: single rod 8 mm and rope probe 6 mm

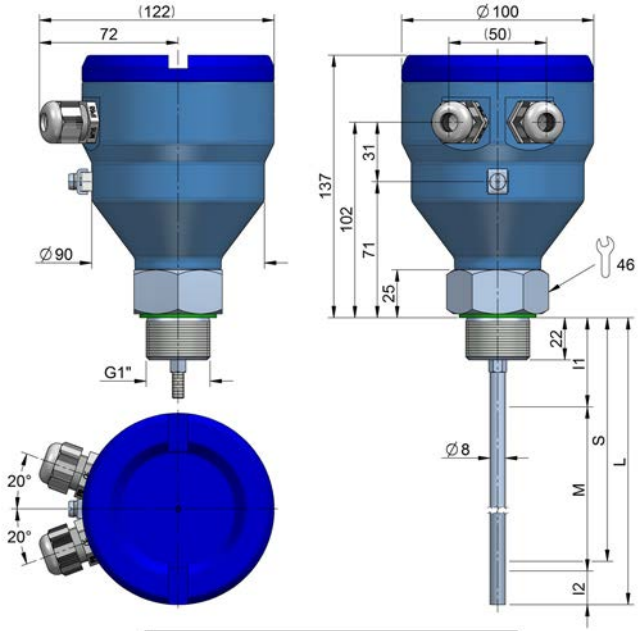
  EN 1092-1 flange or other connections on request
- **Power supply:** 12 … 30VDC (reverse-polarity protected), 4-wire system
- **Power consumption:** < 70 mA at 24VDC (no burden)
- **Electronics completely galvanically insulated** from inputs/outputs and tank potential, thus avoiding any problems from electrochemical corrosion protection of the tank
- **Analog output** (active): current output 4-20mA
  - Total load resistance: < 500 Ω: HART resistor approx. 250 Ω + load resistance approx. 250 Ω.
  - Response time: 0.5 s, 2 s and 5 s (selectable)
  - Temperature drift: < 0.2 mm/K in ambient temperature
- **Switching output DC PNP** (active): NC or NO (shortcircuit protected)
  - Load current: < 200 mA
  - Signal voltage HIGH: supply voltage -2V
  - Signal voltage LOW: 0V … 1V
  - Response time: < 100 ms
- **Start up time:** < 6 s
- **Cable terminals:**
  - Screwless, cage clamp terminal block for tranded and solid wires 0.5 … 2 mm²
  - The usage of cable and sleeves with insulation collar is not recommended
- **ATEX certification**

Dimensions

Single rod, threaded connection

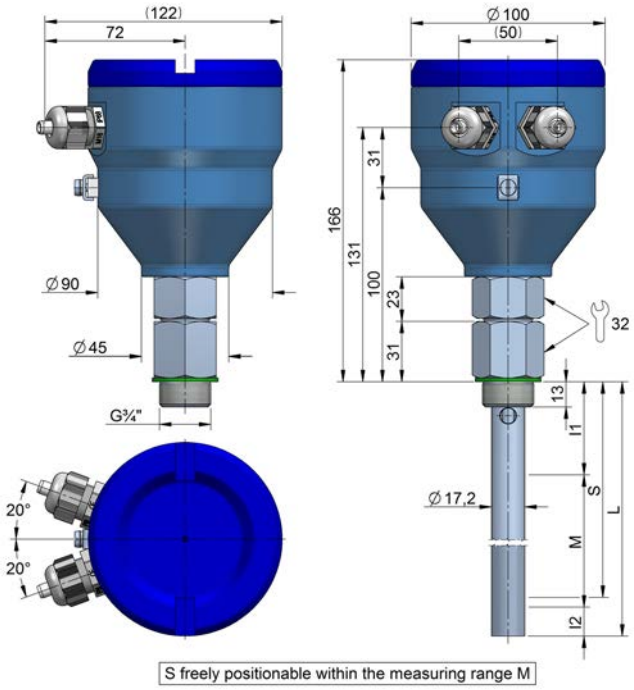


S freely positionable within the measuring range M



S freely positionable within the measuring range M

Coaxial probe, threaded connection

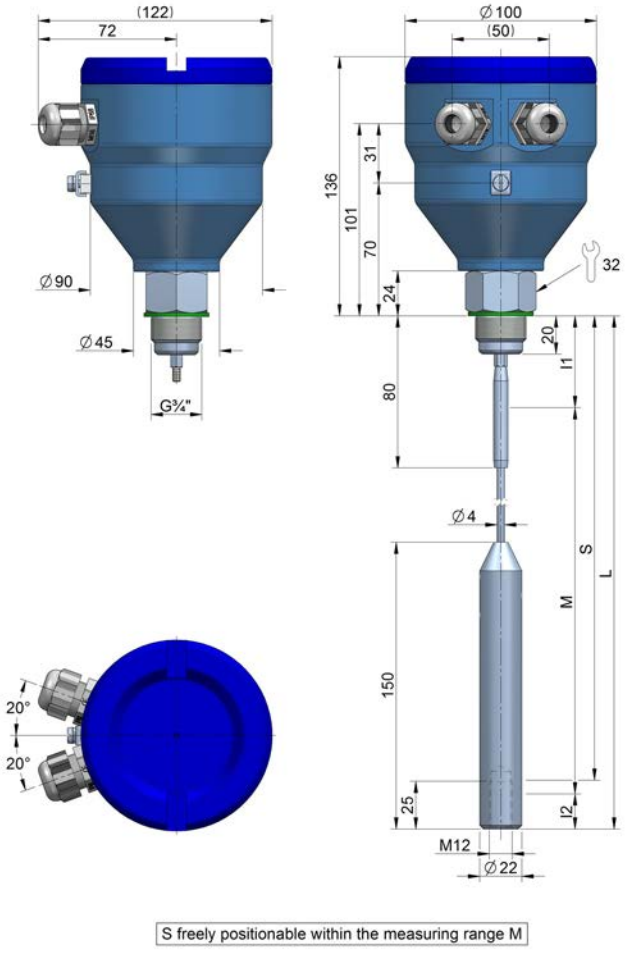


S freely positionable within the measuring range M

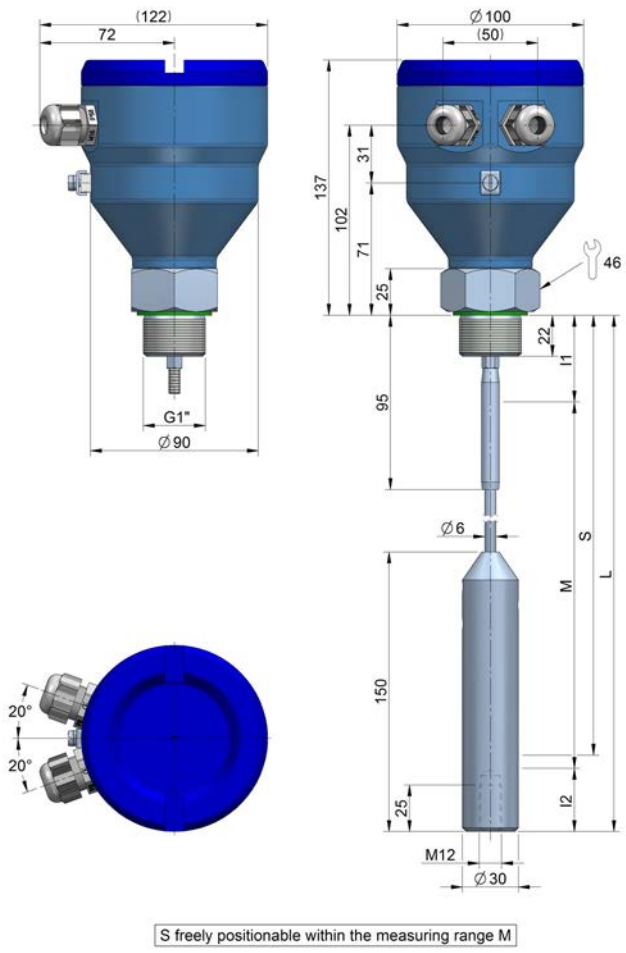
Weight of the components:

- Standard housing: 1240 g
- ATEX housing: 950 g
- Single rod probe, 1m: 230 g
- Complete coaxial probe, 1m: 770 g

Rope probe, threaded connection

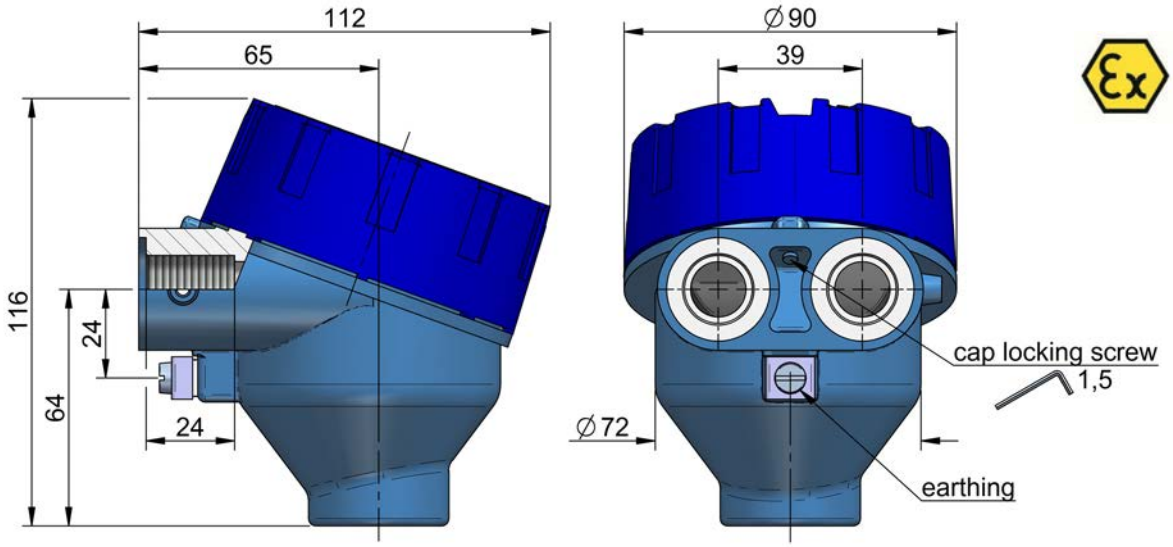


S freely positionable within the measuring range M

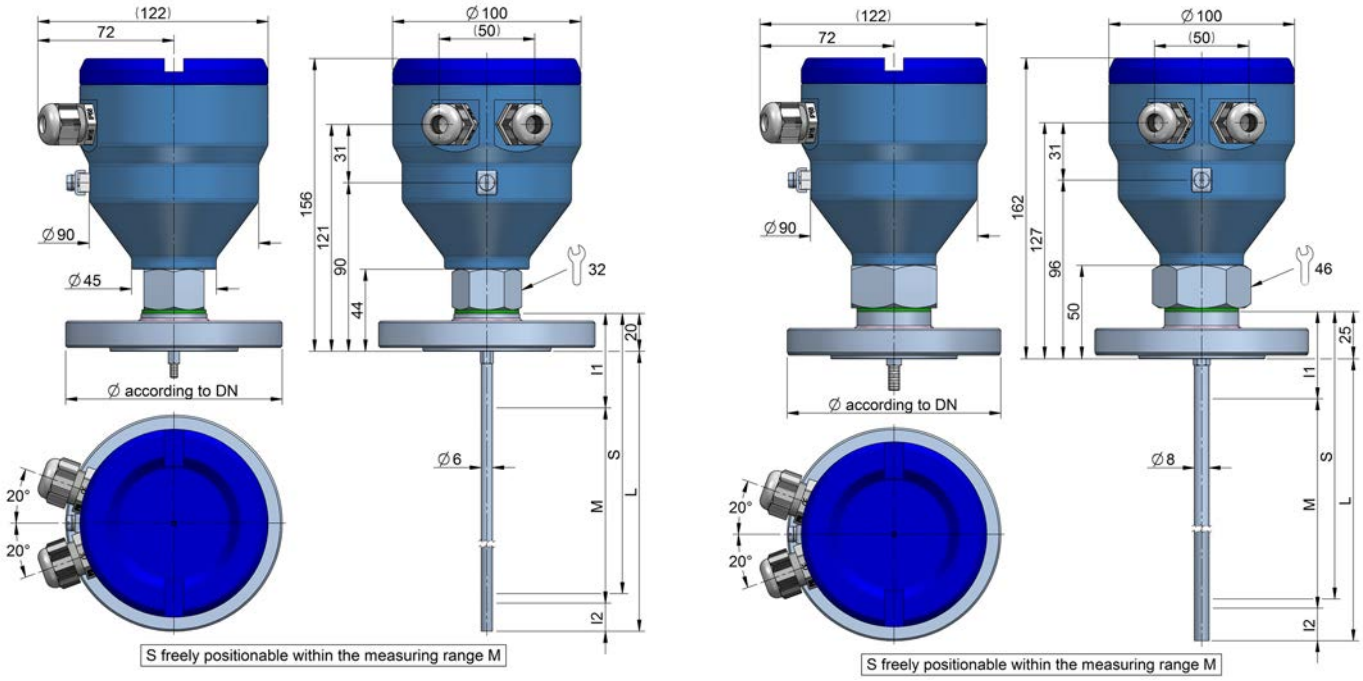


S freely positionable within the measuring range M

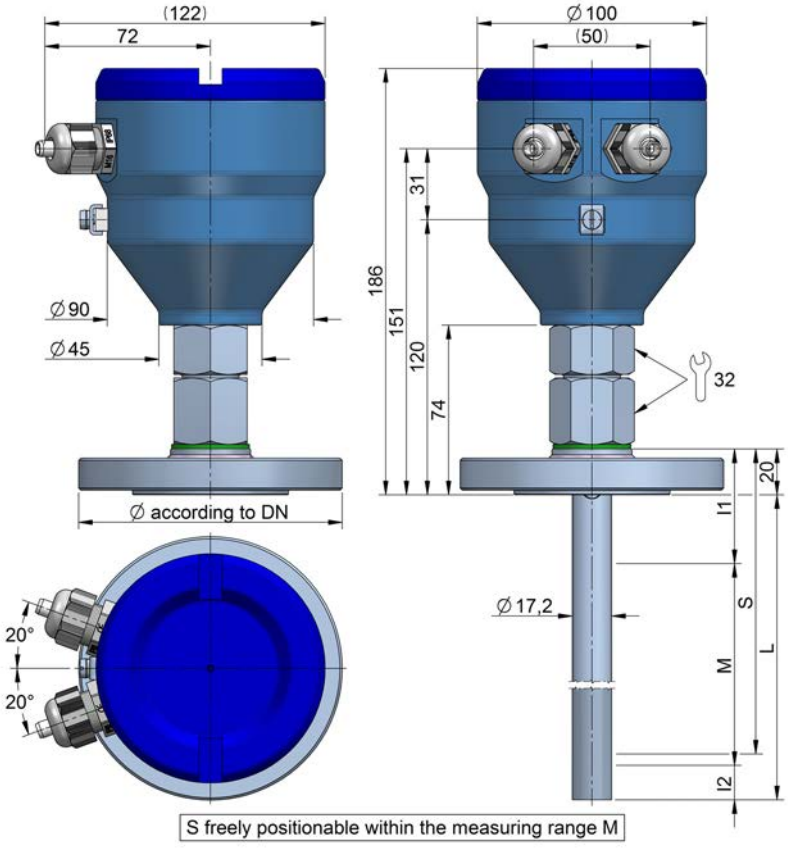
ATEX version



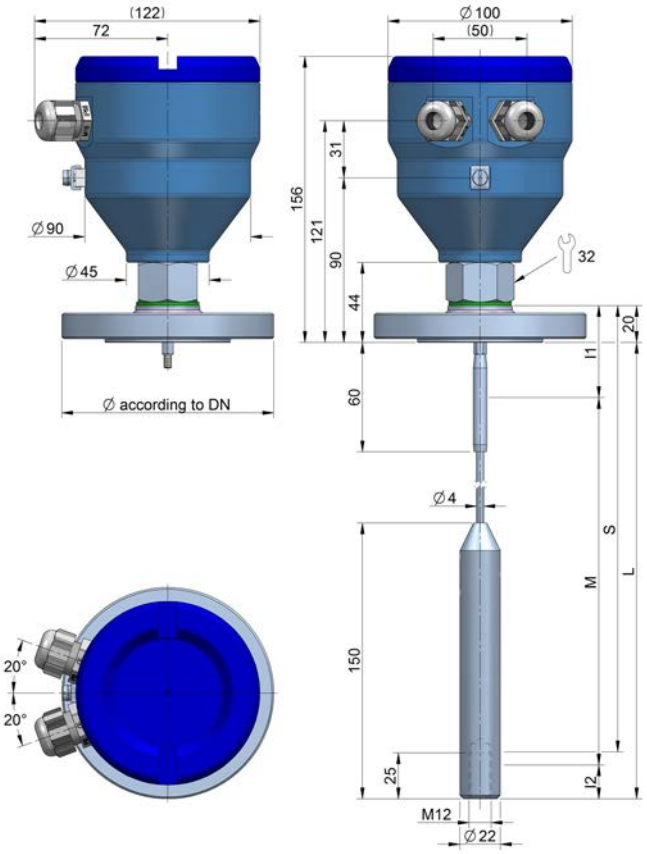
Single rod, flanged connection



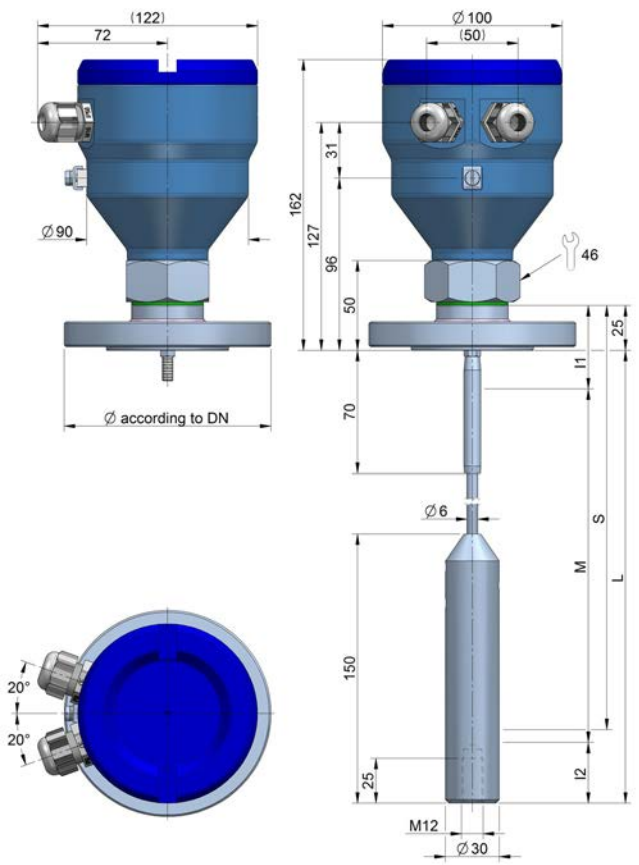
Coaxial probe, flanged connection



Rope probe, flanged connection

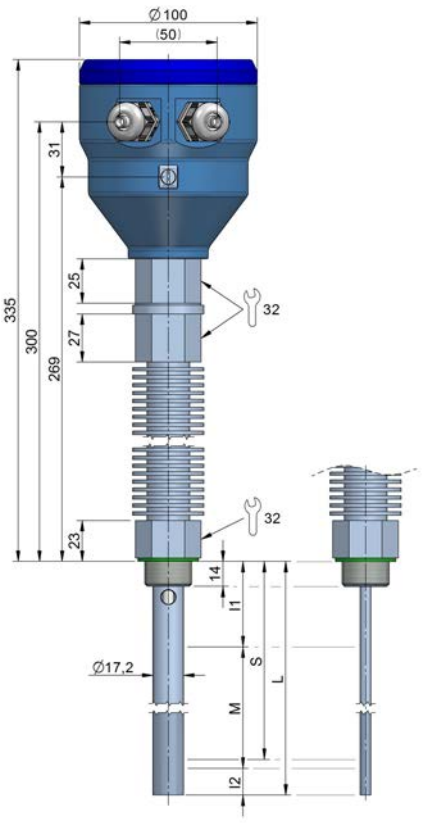


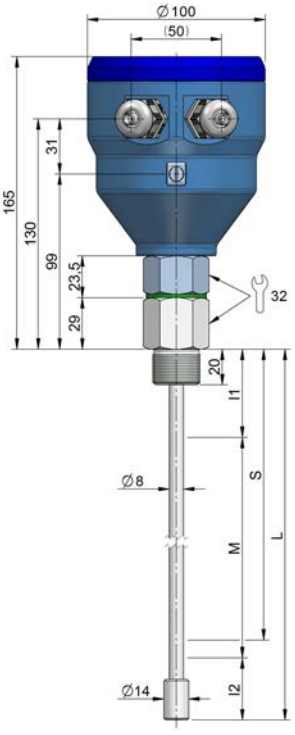
S freely positionable within the measuring range M

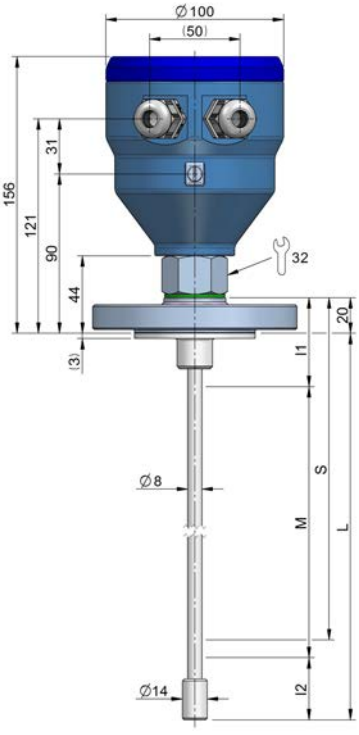


S freely positionable within the measuring range M

Extended temperature version, threaded connection, and PTFE coated, threaded and flanged connection







The model LTDR PTFE coated with threaded connection must be mounted using standard plastic connectors. Do not mount in metallic flanges.

ATEX version

The ATEX version of the LTDR is suitable for applications with hazardous gas or dust atmospheres, for applications requiring instruments of category 1/2G, 1/2D or 2G, 2D.

The installation of electrical equipment in hazardous areas must always be carried out by qualified personnel.

The approval certificate is in accordance to:

CE 0158 SEV 09 ATEX 0171 X

and the different markings are:

- II 1/2G Ex ia/d IIC T6
- II 1/2D Ex iaD/tD A20/21 IP68 T86°C
- II 2G Ex ia d IIC T6
- II 2D Ex iaD tD A21 IP68 T86°C
- II 1/2G Ex ia/d IIC T6 Ga/Gb
- II 1/2D Ex ia/t IIIC T86°C Da/Db
- II 2G Ex ia d IIC T6 Gb
- II 2D Ex ia t IIIC T86°C Db

Technical data

- Power supply: U = 12…30 VDC ; U_m = 250 VAC
- Analog output: I = 4-20 mA ; U_m = 250 VAC
- Switch output: U_s = 0…U ; U_m = 250 VAC

Temperatures

Temperature class	Application temperature	Ambient temperature
	CATEGORY 1/2G	
T1 ... T6	-20ºC ... +60ºC	-40ºC ...+70ºC
	CATEGORY 2G	
T6	-40ºC ... +85ºC	-40ºC ...+70ºC
T5	-40ºC ... +100ºC	
T4	-40ºC ... +135ºC	
T1 ... T3	-40ºC ... +150ºC	
	CATEGORY 1/2D Y 2D	
Max. temperature: +86ºC		-40ºC ... +70ºC

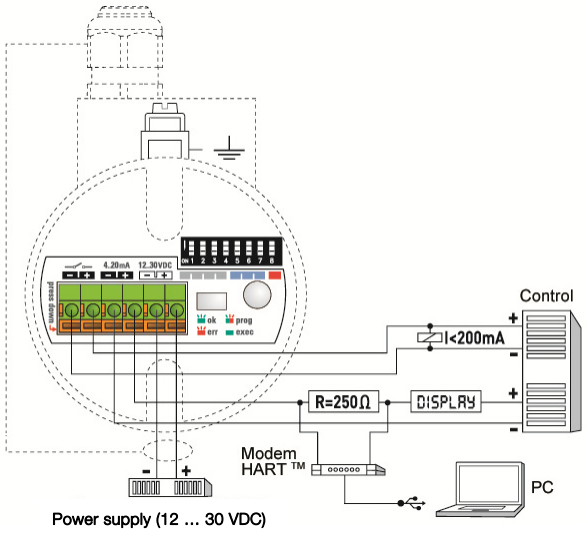
Configuration

Basic configuration of LTDR can be done directly on the device via a DIP switch, a single push button and visual feedback from a LED.

All settings required to get LTDR fully operational can be performed directly on the device. The LTDR can also be ordered completely pre-configured.

For greater convenience, remote configuration, and extensive diagnostics, a simple spread sheet can be provided through which the configuration can be done.

A standard HART modem is required for communication between computer and sensor. Communication is done via a digital HART signal that is superimposed onto the analog 4-20 mA signal of the current output.

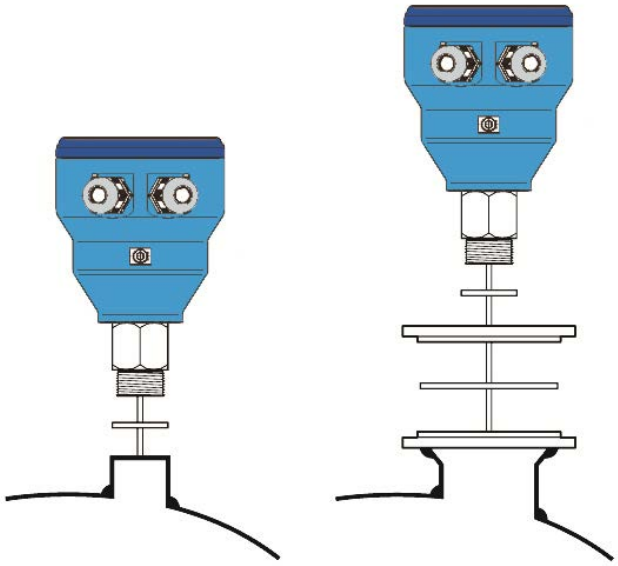


Installation

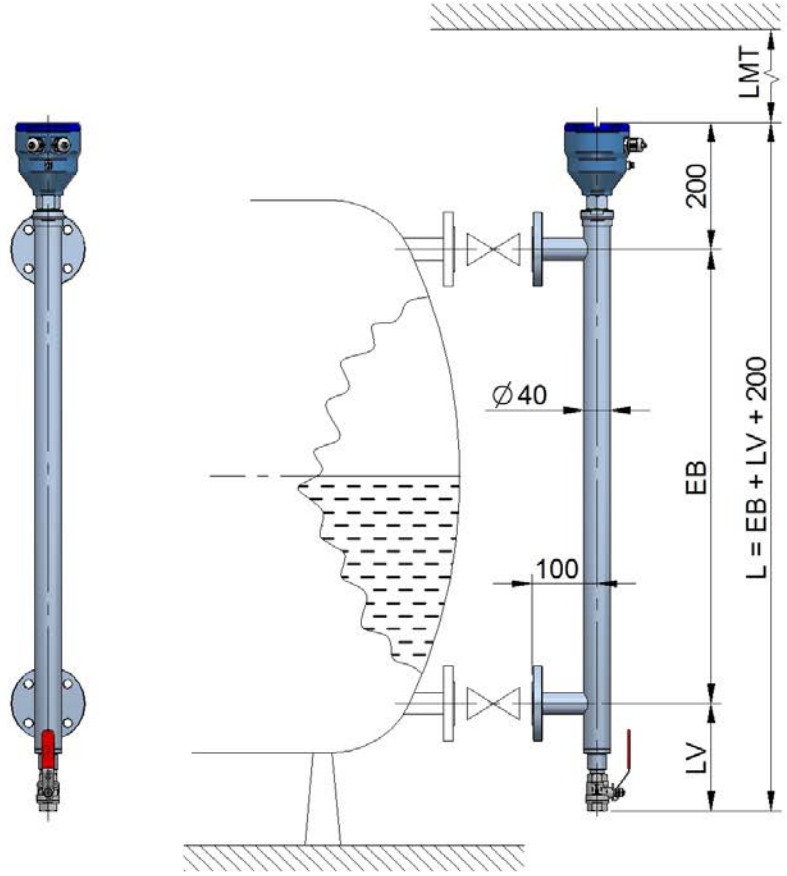
LTDR is mounted vertically to the tank via its connection thread, which is screwed directly into a standard threaded tank connection, i.e. weld in socket, or it can be screwed into a flange, which is then connected to a tank nozzle.

The customer has to ensure proper temperature and pressure ratings for his application and has to select the appropriate seal to connect the sensor (LTDR standard seal material is BELPA® CSA-50 for G¾A connection thread).

LTDR is well suited for side mounting into a tank. In addition, LTDR is also the ideal combination with TECFLUID series LT level gauges, SS models, in order to have a local indication of the level and an associated transmitter. In these cases the recommended probe type is the single rod probe. The chamber acts as an external tube of a coaxial probe (see figures page 9).

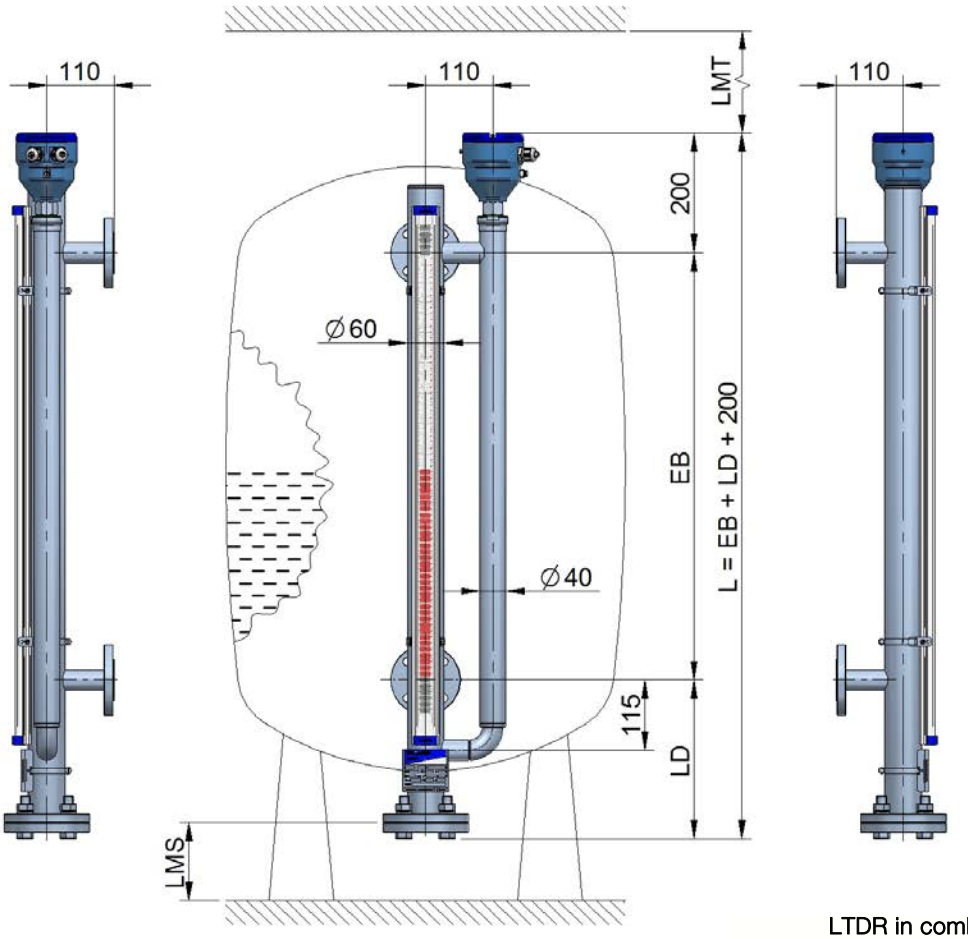


Standard installation LTDR transmitter



LMT = EB + 275 mm
LV standard = 170 (Ball valve G½)

Side mounting



LMT = EB + 275 mm
LMS = L. Float + 10 mm

LTDR in combination with level gauge type LT/SS

For more information, please refer to series LT datasheet

PRESENCE IN MORE THAN 50 COUNTRIES ALL OVER THE WORLD

Tecfluid
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Pressure Equipment Directive 97/23/CE certified by Lloyd's Register

ATEX European Directive 94/9/CE certified by LOM

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