



## Teflon<sup>®</sup> Coated Guided Wave Radar Continuous Liquid Level Meter

### FEATURES

- ✓ Suited for Continuous Level Measurement of various Liquid | Bulk Solids | Viscous Materials
- ✓ View Measured Values on the Display
- ✓ Universal Use | Direct Mounting onto Hoppers | Silos | Tanks | Sumps
- ✓ Teflon<sup>®</sup> Coated Stainless Steel Rod or Rope
- ✓ Electrode Measuring Range up to 40m
- ✓ Explosion Proof | ATEX (Optional)
- ✓ Current Output (4-20mA) | HART<sup>®</sup> Protocol

The MLR radar level meters are compact level measurement device that include a transmitter that emits microwave pulses along a rod or wire rope electrode. The pulse propagates along the electrode in the form of electromagnetic wave toward the level surface, where it is reflected and the signal wave component is returned to the receiving module of the electronic housing. The on-board circuitry measures the time of flight of electromagnetic wave and the distance to the surface level is calculated.

According to the level height, the level meter output is set and the measured value is shown on the display. Radar level meters are resistant against changes in the atmosphere (pressure, temperature, dust, steam) and to changes in medium parameters (change in dielectric constant and conductivity).

### Variants of Sensors

**MLR -70\_-12** Fully coated stainless steel rod electrode FEP (Teflon<sup>®</sup>) for level measurement of aggressive liquids. Maximum electrode length 2 m

**MLR -70\_-32** Fully coated stainless steel rope electrode FEP (Teflon<sup>®</sup>) coated for level measurement of aggressive liquids and very pure liquids. Maximum electrode length 12 m

# MLR-70 Series

## Guided Wave Radar Level Transmitter



| BASIC TECHNICAL DATA                                                                                                                                                                     |                                                                                                                          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Supply voltage MLR-70N-__                                                                                                                                                                | 18 ... 36VDC                                                                                                             |
| Output                                                                                                                                                                                   | 4 ... 20mA   HART®                                                                                                       |
| Current consumption                                                                                                                                                                      | 4 ... 20mA   max. 22mA                                                                                                   |
| Basic error <sup>1)</sup> (for reference reflector)<br>- MLR-70_-20 in area 0,1 – 0,2 m   0,2 – 2,0 m   2,0 – 40 m .....<br>- other types in area 0,1 – 0,2 m   0,2 – 2,0 m   2,0 – 40 m | ± 5 mm   ± 3 mm   ± 2 mm<br>± 10 mm   ± 4 mm   ± 2 mm                                                                    |
| Resolution                                                                                                                                                                               | 1 mm                                                                                                                     |
| Maximal length of measuring electrode MLR-70_-11 (12)<br>MLR-70_-32                                                                                                                      | 2 m<br>12 m                                                                                                              |
| Dead zone <sup>2)</sup> - for measur. sensitivity<br>- low, medium, user (1 - 4)<br>- high, user (5)<br>- user (6, 7)<br>- user (8)                                                      | 100   0 mm <sup>3)</sup><br>150   50 mm <sup>3)</sup><br>200   50 mm <sup>3)</sup><br>250   50 mm <sup>3)</sup>          |
| Electrical parameters for variants Xi (XiT) – max. internal values                                                                                                                       | U <sub>i</sub> =30 VDC; I <sub>i</sub> =132 mA; P <sub>i</sub> =0,99W; C <sub>i</sub> =370 nF;<br>L <sub>i</sub> =0,9 mH |
| Measurement sensitivity (8 degrees)                                                                                                                                                      | low (1) - medium (3) -<br>high (5) - user (1 - 8)                                                                        |
| Failure indication (echo loss, internal failure)                                                                                                                                         | Adjustable in modes: 3,75mA, 4mA, 20mA,<br>22mA, LAST <sup>4)</sup>                                                      |
| Dampening                                                                                                                                                                                | 1 .. 99 s                                                                                                                |
| Warm up time                                                                                                                                                                             | cca 60 s                                                                                                                 |
| Internal resistance   Electric strength (Electrode - Housing)                                                                                                                            | 10 kΩ                                                                                                                    |
| Coupling capacity   Electric strength (Housing - Supply leads)                                                                                                                           | 5 nF   500VAC                                                                                                            |
| Maximal current output load resistance for<br>U = 24VDC<br>U = 22VDC<br>U = 20VDC                                                                                                        | R <sub>max</sub> = 270 Ω <sup>5)</sup><br>R <sub>max</sub> = 180 Ω<br>R <sub>max</sub> = 90 Ω                            |
| Maximum tensile strength of the rope electrode                                                                                                                                           | 1400 kg                                                                                                                  |
| Protection class                                                                                                                                                                         | IP67                                                                                                                     |
| Process connection                                                                                                                                                                       | screwing with thread G1"                                                                                                 |
| Recommended cable                                                                                                                                                                        | PVC 2 x 0,75 mm <sup>2</sup>                                                                                             |
| Weight (without electrode)                                                                                                                                                               | cca 0,5 kg (1 kg variant NT,XiT)                                                                                         |

- 1) Error is larger at the beginning and end of the rod or rope electrode. More detailed informations can be found in the instruction manual.  
2) Dead zone = Blind zone = Blocking distance  
3) The length of dead zone at the beginnig | at the end of the electrode. (The length of dead zone is 110 mm at the end of rope electrode)  
4) Level meter displays last measured value  
5) Including 250R resistor in case of HART connection

| BASIC TECHNICAL DATA                                           |                 |
|----------------------------------------------------------------|-----------------|
| Type of display                                                | LED             |
| Resolution                                                     | 128 x 64 pixels |
| Height of digits   Number of display digits of measured values | 9 mm   5 digits |
| Color of display                                               | Yellow          |
| Type of buttons                                                | Membrane        |
| Ambient temperature range                                      | -30 - 70°C      |
| Weight                                                         | 46 g            |

# MLR-70 Series

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### BASIC TECHNICAL DATA

| Sensor Part        | Variants                 | Standard Material                                                          |
|--------------------|--------------------------|----------------------------------------------------------------------------|
| Lid                | All types                | Epoxy Coated Aluminum                                                      |
| Window             | All types                | Polycarbonate                                                              |
| Body               | All types                | Epoxy Coated Aluminum                                                      |
| Housing c/w Thread | All types                | St. Steel W. Nr. 1.4571 (AISI 316 Ti)                                      |
| Electrode          | MLR-70_-12<br>MLR-70_-32 | St. Steel W. Nr. 1.4301 (AISI 304)<br>St. Steel W. Nr. 1.4404 (AISI 316 L) |
| Electrode coating  | MLR-70_-12<br>MLR-70_-32 | FEP (TEFLON®)<br>FEP (TEFLON®)                                             |
| Display module     | MLR-70_-30               | POM                                                                        |

### Device Classification (according to EN 60079-10-1 and EN 60079-10-2)

|                      |                                                                                                                                                  |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>MLR-70N</b>       | Performance for non-explosive areas                                                                                                              |
| <b>MLR-70NT</b>      | High temperature performance for non-Ex areas (max. 200°C)                                                                                       |
| <b>MLR-70Xi(XiT)</b> | Performance for explosive areas (gases or vapor)<br>⊕ II ½ G Ex ia IIB T6 Ga/Gb with ISSU <sup>1)</sup><br>electrode part zone 0, housing zone 1 |
| <b>MLR-70Xd(XdT)</b> | Performance for flammable dust areas<br>⊕ II 1 D Ex ta IIIC T85°C...T300°C                                                                       |

### Temperature and Pressure

| Variants   Performance | Temperature tp  | Temperature tm   | Temperature ta  | Max. operation pressure for temp. tp |         |
|------------------------|-----------------|------------------|-----------------|--------------------------------------|---------|
|                        |                 |                  |                 | to 30°C                              | to 30°C |
| MLR-70_-11(12)         | -40°C ... +85°C | -40°C ... +200°C | -30°C ... +70°C | 4 MPa                                | 2,5 MPa |
| MLR-70_-32             | -40°C ... +85°C | -40°C ... +130°C | -30°C ... +70°C | 1 MPa                                | 0,5 MPa |

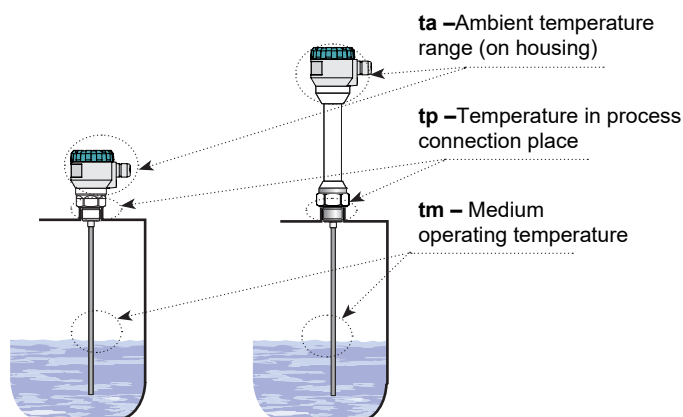
#### Temperature

| Variants   Performance | Temperature tp   | Temperature tm   | Temperature ta  |
|------------------------|------------------|------------------|-----------------|
| MLR-70_-11(12)         | 40°C ... +200°C  | -40°C ... +200°C | -30°C ... +70°C |
| MLR-70_T-32            | -40°C ... +130°C | -40°C ... +130°C | -30°C ... +70°C |

**Note:** For correct function of the level meter must not be exceeded any of the temperature range (tp / tm / ta).

#### Pressure

| Variants   Performance | Max. operation pressure for temp. tp |         |          |          |          |
|------------------------|--------------------------------------|---------|----------|----------|----------|
|                        | to 30°C                              | to 85°C | to 130°C | to 160°C | to 200°C |
| MLR-70_-11(12)         | 4 MPa                                | 2,5 MPa | 2 MPa    | 1,5 MPa  | 0,3 MPa  |
| MLR-70_-32             | 1 MPa                                | 0,5 MPa | 0,1 MPa  | -        | -        |



### Max Temperatures for Performance xi(xit) category ½ g

| temp. class | temperature tp   | temperature tm   | temperature ta  |
|-------------|------------------|------------------|-----------------|
| T5          | -40°C ... +90°C  | -40°C ... +98°C  | -30°C ... +70°C |
| T4          | 40°C ... +125°C  | -40°C ... +133°C | -30°C ... +70°C |
| T3          | -40°C ... +190°C | -40°C ... +198°C | -30°C ... +70°C |
| T2          | -40°C ... +200°C | -40°C ... +298°C | -30°C ... +70°C |
| T1          | -40°C ... +200°C | -40°C ... +300°C | -30°C ... +70°C |

### Device Surface Temperature for Performance xd(xdt) category 1d

| level meter                                                | Device Surface Temperature                                                                   |
|------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| electrode<br>MLR-70_-_-_-I<br>MLR-70_-_-_-M                | medium temp. tm +5°C<br>medium temp. tm +10°C                                                |
| housing, electronic part<br>MLR-70_-_-_-I<br>MLR-70_-_-_-M | temperature tp +15°C<br>temperature ta +15°C<br>temperature tp +30°C<br>temperature ta +30°C |

The maximum allowable temperature of the medium, process connection and ambient temperature depends in MLR-70Xi (XiT) at the desired temperature class (see table). Maximum temperatures for the performance Xi (XiT) category ½G and tab.). The temperature value can not be exceeded as the hot surface of the device could cause ignition of an explosive or flammable atmosphere.

## Installation

Install the level meter into the upper lid of the tank or reservoir using a welding flange or threaded nut.

The min. distance to install the level meter into a lid or a ceiling of a tank from the metal tank wall is 300 mm and from the non-metal tank wall is 500 mm (except MLR-70\_-20).

If installed in an open channel (sumps, reservoirs, etc.) install the level meter as close as you can to the maximum level expected.

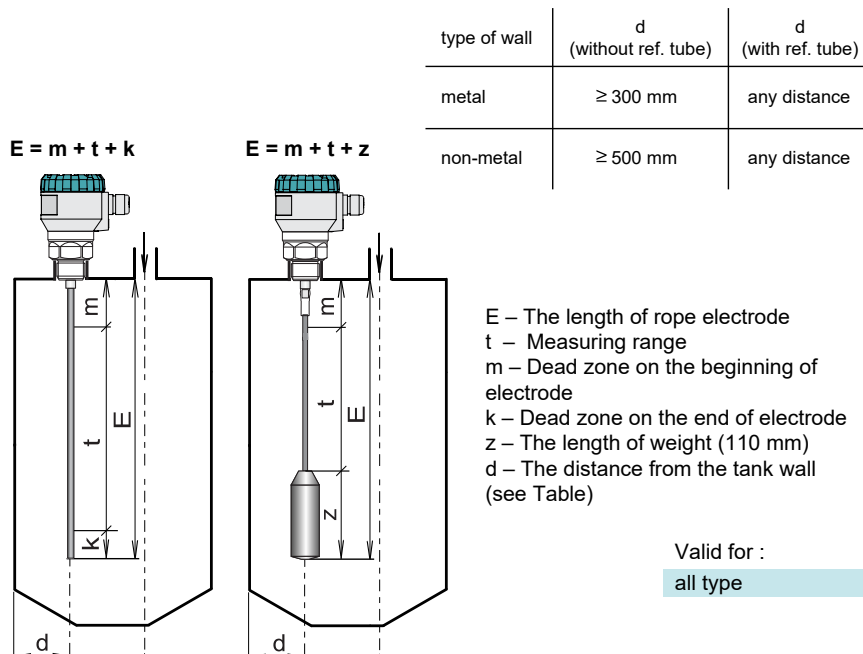
The rope electrode type must be untangled prior to being inserted into the tank.

If visible defects are discovered, please contact the manufacturer of reseller immediately.

## Installation

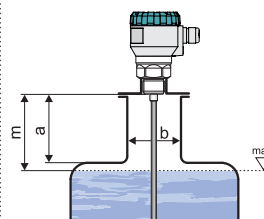
We recommend to keep the specified distances from the tank wall.

In case where the electrodes comes in contact with the bottom of the tank it is necessary that the electrode is attached to the tank bottom (the connection may be conductive or non-conductive)



For correct measurement it is important to avoid installation in the high extended type tank connections

$a \leq b$   
 $b \geq 50 \text{ mm}$   
 a – Neck height  
 b – Neck width

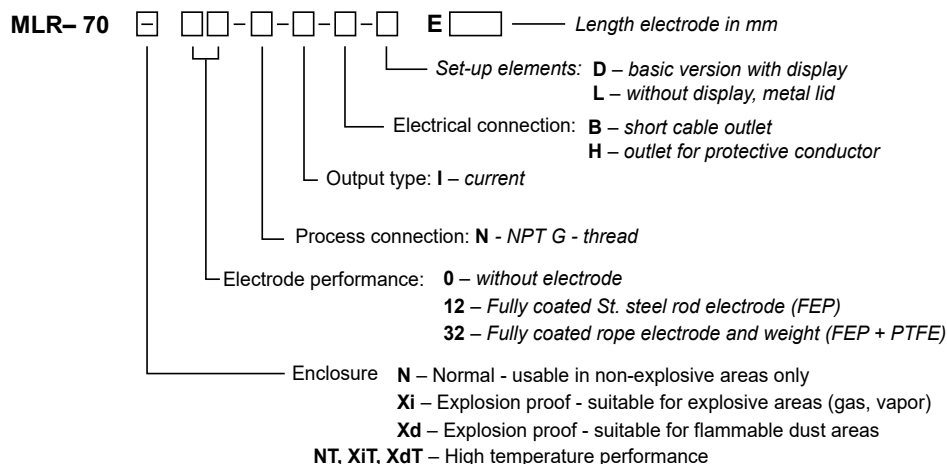


If you can not eliminate all interference, which could affect the measurement of level, it is recommended to use the procedure "TEACHING" (see Instruction manual). This procedure sets the level meter to a mode, which suppresses false reflections.

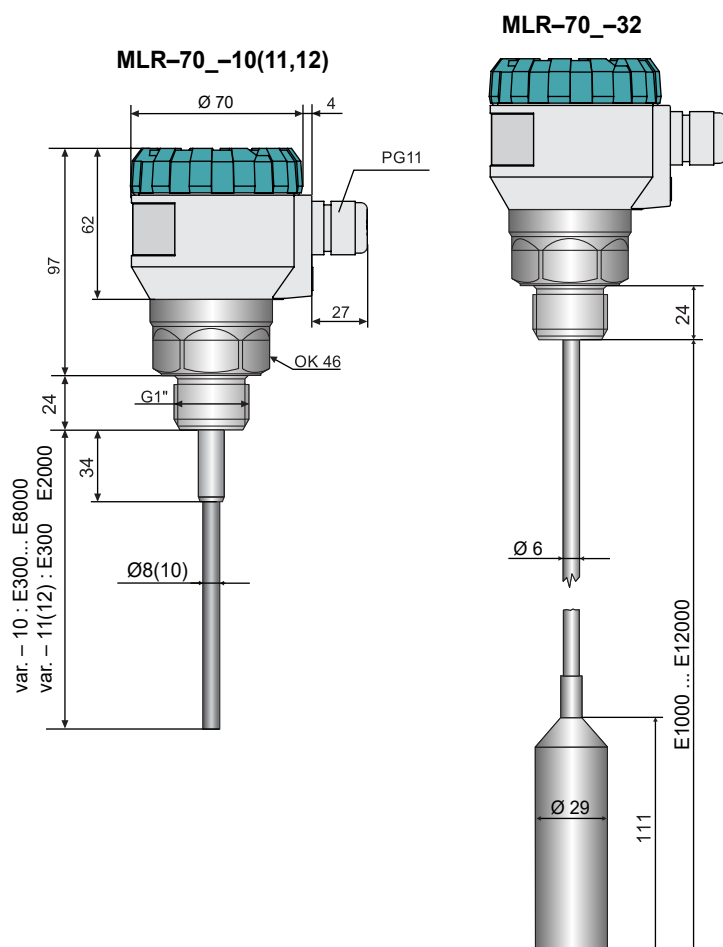
Valid for :

all types  
except MLR-70\_-20

### Order Code



### Dimensional Drawing



### Installation

**Standard – included in the price of the level meter**

- 1 pc. seal

**Optional -**

- Stainless steel nuts NPT | G
- Steel or Stainless steel welding flange
- Other seals (PTFE | Al)

### Safety | Protection | Explosion Proof

The level meter MLR-70 is equipped with protection against reverse polarity and output current overload. Protection against dangerous contact is secured by low safety voltage that complies with EN 33 2000-4-41. Electromagnetic compatibility according to EN 55022/B, EN 61326/Z1 and EN 61000-4-2 to 6.

The explosion proof of MLR-70Xi (XiT) is ensured by compliance with the following standards: EN 60079-0: 2007; EN 60079-11: 2007 and BS EN 60079-26: 2007. Explosion proof of MLR-70Xi (XiT) is proven by FTZÚ-AO 210 Ostrava-Radvanice: certificate No: FTZÚ 13 ATEX 0212X

### Special conditions for safe use of variant MLR-70Xi

Level meters MLR-70Xi (XiT) are designed for connection to intrinsically safe circuits with galvanic isolation. If you use the device without galvanic isolation (Zener barriers) it is necessary to offset a potential between the sensor and the grounding point of the barriers.

