

Teflon® 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® Coated Stainless Steel Rod or Rope
- Electrode Measuring Range up to 40m
- Explosion Proof | ATEX (Optional)
- Current Output (4-20mA) | HART® 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®) for level measurement of aggressive liquids. Maximum electrode length 2 m

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

BASIC TECHNICAL DATA	
Supply voltage MLR-70N-__	18 ... 36VDC
Output	4 ... 20mA HART®
Current consumption	4 ... 20mA max. 22mA
Basic error ¹⁾ (for reference reflector) - MLR-70_-20 in area 0,1 – 0,2 m 0,2 – 2,0 m 2,0 – 40 m - other types in area 0,1 – 0,2 m 0,2 – 2,0 m 2,0 – 40 m	± 5 mm ± 3 mm ± 2 mm ± 10 mm ± 4 mm ± 2 mm
Resolution	1 mm
Maximal length of measuring electrode MLR-70_-11 (12) MLR-70_-32	2 m 12 m
Dead zone ²⁾ - for measur. sensitivity - low, medium, user (1 - 4) - high, user (5) - user (6, 7) - user (8)	100 0 mm ³⁾ 150 50 mm ³⁾ 200 50 mm ³⁾ 250 50 mm ³⁾
Electrical parameters for variants Xi (XiT) – max. internal values	U _i =30 VDC; I _i =132 mA; P _i =0,99W; C _i =370 nF; L _i =0,9 mH
Measurement sensitivity (8 degrees)	low (1) - medium (3) - high (5) - user (1 - 8)
Failure indication (echo loss, internal failure)	Adjustable in modes: 3,75mA, 4mA, 20mA, 22mA, LAST ⁴⁾
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 U = 24VDC U = 22VDC U = 20VDC	R _{max} = 270 Ω ⁵⁾ R _{max} = 180 Ω R _{max} = 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 ²
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 beginning | 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

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 MLR-70_-32	St. Steel W. Nr. 1.4301 (AISI 304) St. Steel W. Nr. 1.4404 (AISI 316 L)
Electrode coating	MLR-70_-12 MLR-70_-32	FEP (TEFLON®) FEP (TEFLON®)
Display module	MLR-70_-30	POM

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

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

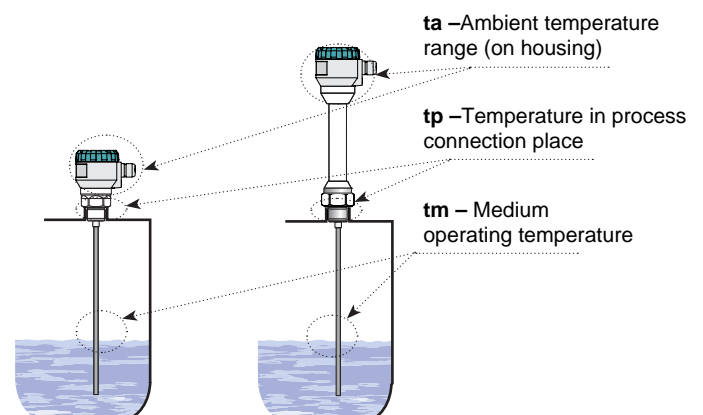
Temperature

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 1 d

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

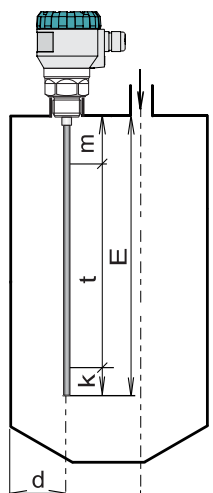
If visible defects are discovered, please contact the manufacturer of reseller immediately.

Installation

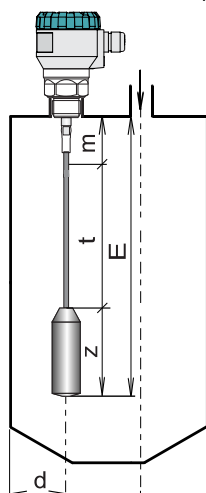
We recommend to keep the specified distances from the tank wall.

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)

$$E = m + t + k$$



$$E = m + t + z$$



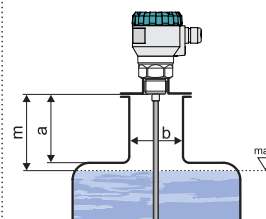
type of wall	d (without ref. tube)	d (with ref. tube)
metal	≥ 300 mm	any distance
non-metal	≥ 500 mm	any distance

E – The length of rope electrode
t – Measuring range
m – Dead zone on the beginning of electrode
k – Dead zone on the end of electrode
z – The length of weight (110 mm)
d – The distance from the tank wall (see Table)

Valid for :
all type

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

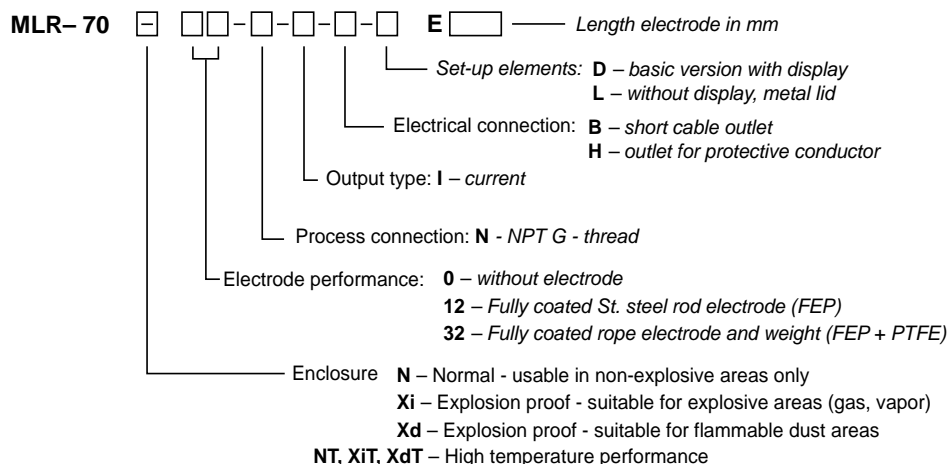
$a \leq b$
 $b \geq 50 \text{ mm}$
a – Neck height
b – Neck width



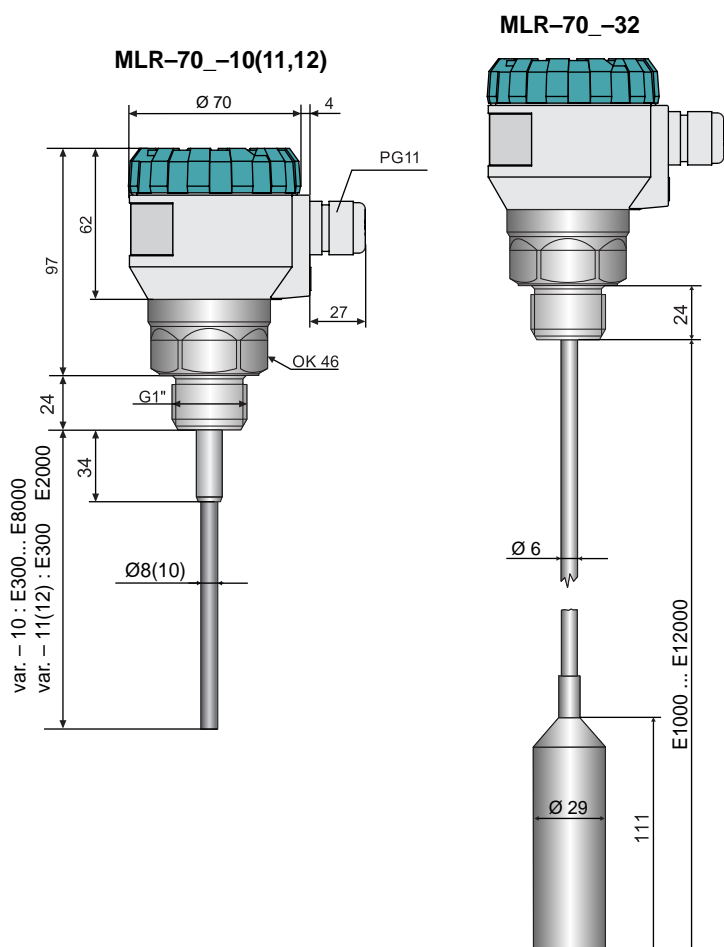
If you can not eliminate all interference, which could affect the measurement of level, it is recommended to use the procedure "TEACHING" (see Instruction manual). This procedure sets the level meter to a mode, which suppresses false reflections.

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.

