TECFLUID
The art of measuring

Level transmitters and indicators
Series LU

Ultrasonic level transmitter and indicator for liquids and solids

- No contact with the product

- Compact design (electronics and display) with polycarbonate or painted aluminium housing, depending on model. Remote display available on request

- Very good resistance in corrosive environments, outdoors applications,...

- Easy to program

- Modular display for models LU9X2

- Level indication with automatic compensation of temperature changes

- Low power consumption

- Measuring range:

    - Model LU91: 0.35 ... 6 m (solids up to 3.5 m)

    - Model LU93: 0.55 ... 12 m (solids up to 7 m)

    - Model LU912: 0.35 m … 5 m (solids up to 2.5 m)

    - Model LU932: 0.55 m … 10 m (solids up to 5 m)

- Accuracy: ±2 mm (between 0.35 and 2 m)

- Connections:

    - Model LU91 / LU912: G2 thread

    - Model LU93 / LU932: G2½ thread

    Others on request

- Materials:

    - Sensor in PP or PVDF

    - Transducer in PVDF

    - Housing in polycarbonate plastic or in painted aluminium

- Continuous level measurement, with 4-20 mA output

- 2 x alarm outputs, depending on model

- Datalogger for models LU912 ... 932

- HART or MODBUS RTU RS485 communications protocols optional

**HART** COMMUNICATION PROTOCOL

Modbus

Working principle

A transducer sends short ultrasonic pulses to a product surface. The reflection of these pulses is received back by the same transducer.

The ultrasonic waves travel at the speed of sound. The time passed since the emission of the signal until it is reflected on the product surface (T1) plus the time necessary to receive the signal back on the transducer (T2) determines the distance between the sensor and the product. The calculation of this distance is carried out by means of a micro-processor with a powerful and smart software which selects the correct echo level among all the echos produced by the internal elements of the tanks.

A temperature sensor built-in the transducer provides the real working temperature to the micro-processor, that makes the proper calculation corrections of the measured distance.

A change in product does not affect the correct performance of the instrument, so it is not necessary to re-adjust the unit for each new product. The non-invasive level transmitter makes installation and maintenance easier.
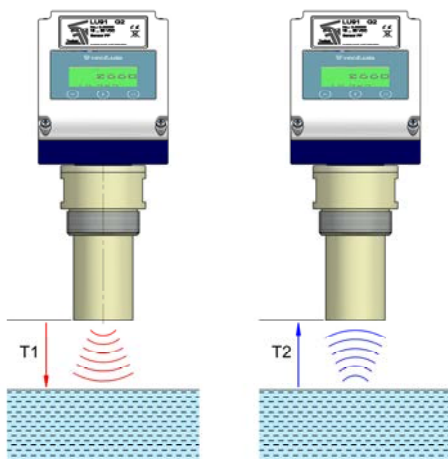
Applications

- Level control in storage tanks of chemical and petrochemical products, treated water, waste water, rainwater,... and food products
- Level control in storage silos of powder, granular products,...
- Flow measurement in open channels, in combination with the electromagnetic sensor series FLOMAT (signal integration software not supplied)
- Control of paper, cardboard, steel and plastic reels
- Level control in intermediate tanks for processes such as pumps start-stop, valve opening-closing, etc.

Models

- **LU91 ... 93 (LU9X)**   4-wire system
- **LU91H ... 93H (LU9XH)**   4-wire system, HART protocol
- **LU912 ... 932 (LU9X2)**   2-wire system

Technical data

- **Accuracy:** ±2 mm (between 0.35 and 2 m)
- **Resolution:** 1 mm
- **Uncertainty:** <0.25% of the spam
- **Repeatability**: <0.25% of the spam
- **Measuring range:**
  - LU91: liquids: 0.35 ... 6 m ; solids: 0.35 ... 3.5 m
  - LU93: liquids: 0.55 ... 12 m ; solids: 0.55 ... 7 m
  - LU912: liquids: 0.35 ... 5 m ; solids: 0.35 ... 2.5 m
  - LU932: liquids: 0.55 ... 10 m ; solids: 0.55 ... 5 m

  Measuring ranges for solids might change depending on solid type. Please consult.
- **Measurement interval:** 200 ms
- **Ultrasonic beam width:** 14° at -3dB
  Reference conditions: Temperature: +18ºC ... +30ºC
  Air relative humidity: 45 ... 75% ; Air pressure: 860 ... 1060 mbar
- **Fluid temperature:**   -40ºC ... +80ºC
- **Ambient temperature:**
  - Plastic or aluminium housing with plastic cover:
                -40ºC ... +60ºC
  - Aluminium housing with aluminium cover:
                -40ºC ... +70ºC
- **Working pressure:** min. 0.7 bar abs ; max. 4 bar abs
- **Materials:** PP and PVDF, with polycarbonate (UV resistant) or aluminium housing
- **Connections:**
  - LU91 / LU912:   G2 or 2" NPT
  - LU93 / LU932:   G2½ or 2 ½" NPT

  Others on request
- **Weight:** from 1.8 to 2.5 kg depending on connection size and model
- **Ingress protection:** IP67 for plastic housing - IP66/IP67 for aluminium housing
- **4-20 mA output** active or passive
- **2 x alarm outputs**, for models LU9X … 9XH … 9X2
- **Power supply:**
  - Models LU9X2:   2-wire: 12 ... 36 VDC
  - Models LU9X: 4-wire: 18 ... 30 VDC
                             (special: 14 ... 25 VDC)
- **Power consumption:** < 22 mA (2-wire) ; < 1,5 W (4-wire)
- **Modular display** and **programming by means of Tecfluid's Winsmeter LU software**, available for download at www.tecfluid.com, for models LU9X2
- **Datalogger** for models LU9X2
- **HART protocol** (models LU9XH)
- **MODBUS RTU RS485 protocol** with electronic converter MT03L

Installation

The installation of the level transmitter must be carried out making sure that the transducer flat face is as parallel as possible to the product surface, in order to guarantee a correct measurement.

The minimum distance with respect to the tank wall must be at least 200 mm, avoiding the sensor to be centred in the tank, especially in cases with agitators or formation of emptying cones (Fig. 1).
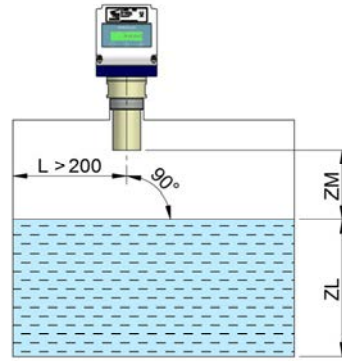

Fig. 1

Dead zone

The dead zone (ZM) is a zone close to the transducer, where the instrument is unable to make any measurement (Fig. 1).

Dead zone has a value between 350 and 550 mm, depending on transmitter model.
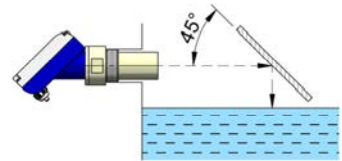
Fig. 2

Reduction of dead zone

In case of being necessary to reduce the dead zone, reflecting elements can be installed. This allows measurements to be made up to the maximum height of the tank (Fig. 2).

Nozzles

The length of the sensor must be taken into account and it must be ensured that it protrudes at least l > 10 mm from the edge of the nozzle (Fig. 3).
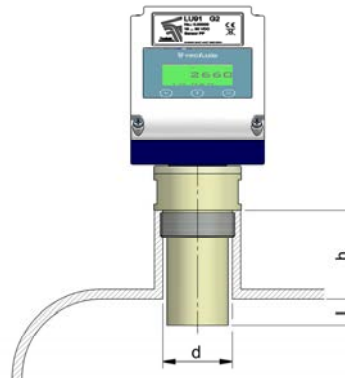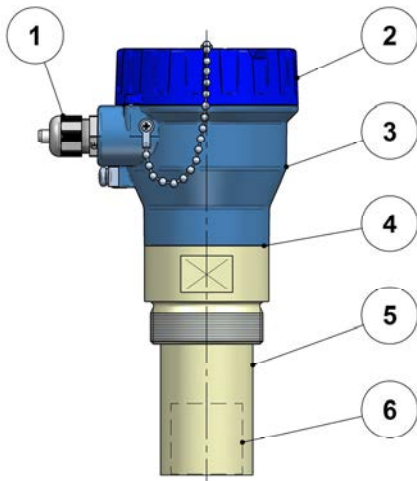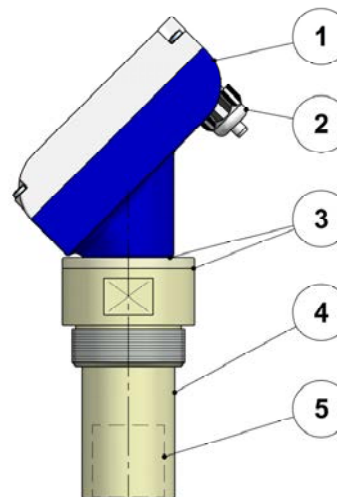

Fig. 3

Materials

LU9X2

Nº	Description	Materials
1	Cable glands	Polyamide
2	Housing cover	Painted aluminium / Polycarbonate *
3	Housing base	Painted aluminium
4	Seal	NBR
5	Sensor	PP / PVDF
6	Transducer	PVDF

LU9X

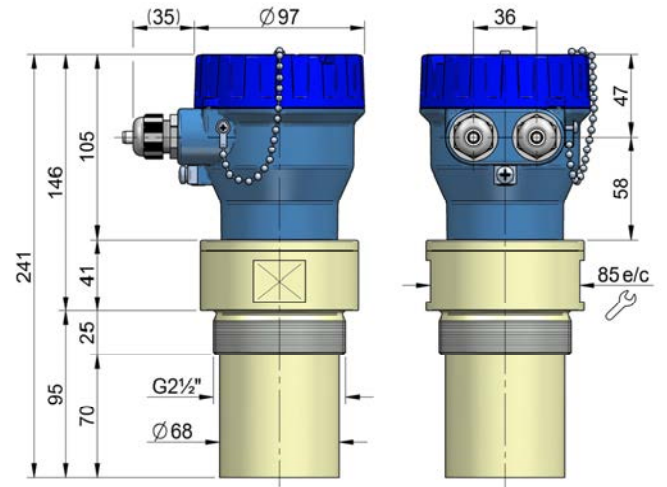| Nº	Description	Materials
1	Housing	Polycarbonate *
2	Cable glands	Polyamide
3	Seal	NBR
4	Sensor	PP / PVDF
5	Transducer	PVDF

* UV resistant
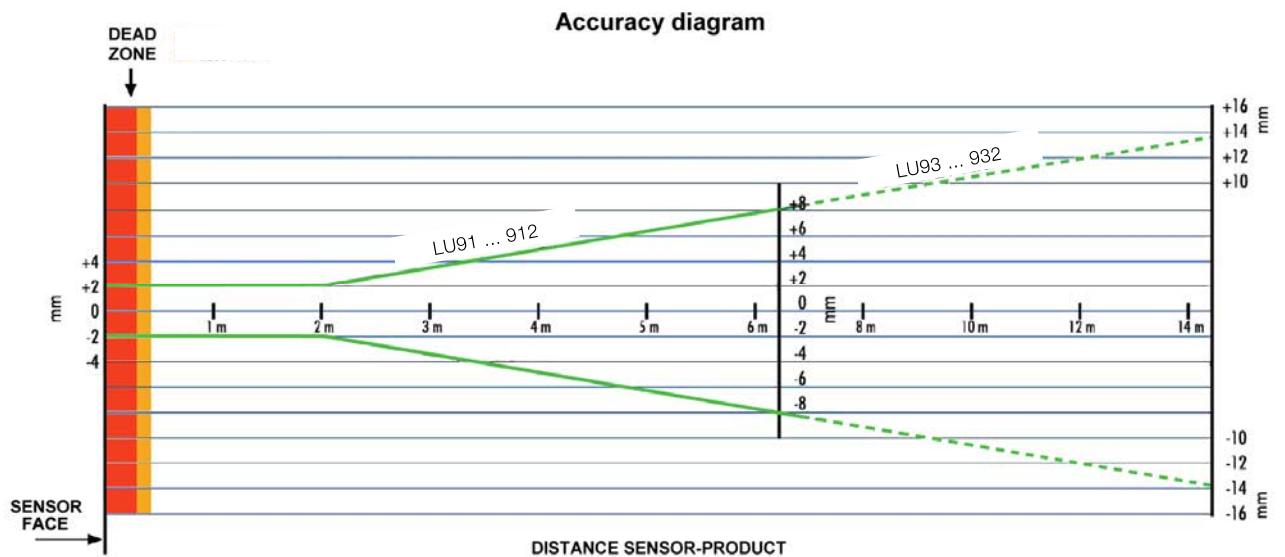
Dimensions

Model LU912
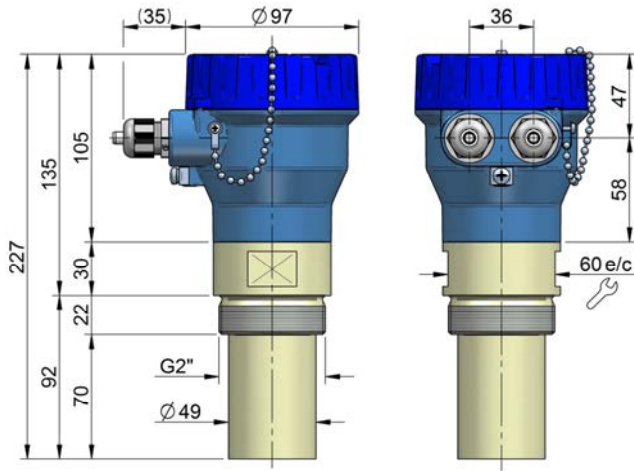
Model LU932

Models LU91
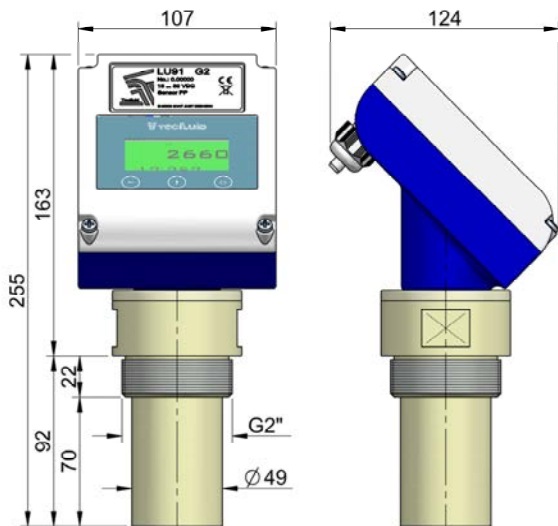
Models LU93
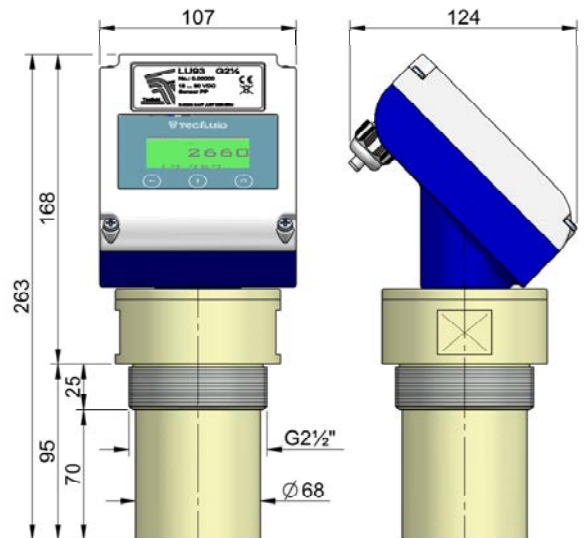
Measuring range and accuracy diagram

Accuracy diagram

Common installations

Open channels

Level measurement in open channels.

Open and pressurized tanks

Classical application of measurement and control of liquid level, even with suspended solid particles (Fig. 4).

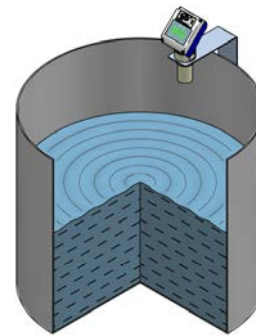Level control of all kind of liquids, with maximum pressure of 4 bar abs and minimum of 0.7 bar abs.

Fig. 4

Tanks with conical bottom

Exceptionally in tanks with conical bottom, it can be advantageous to install the sensor in the centre of the tank, since in almost all the cases it allows to make closer measurements to the bottom of the tank (depending on tank diameter). The formation of emptying cones must be taken into account (Fig. 5).
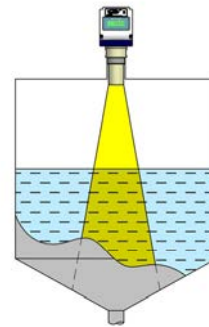

Fig. 5

Mud containers

Control of containers filling, by means of conveyors belts, with mud coming from water treatment processes. The minimum distance to tank walls must be bigger than 200 mm (Fig. 6).
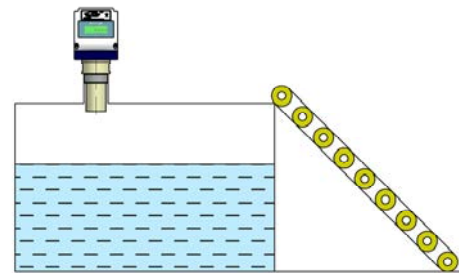

Fig. 6

Product inlets or filling areas

It must be ensured that the sensor is installed above the product surface, and not around the filling area or close to the product inlet (Fig. 7).

In case of partial or total presence of thick foams on the product surface and for open tanks with possible sudden level changes, strong winds or turbulences caused by cyclones, the sensor must be mounted inside a protecting tube with length equal to the minimum measuring level, planning an aeration orifice of around 5 ... 10 mm of diameter (Fig. 8).
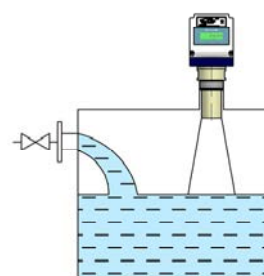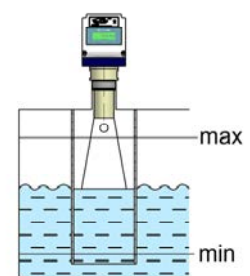
Agitators

The disturbing echo caused by the agitator must be stored into sensor memory, so it is ensured that the reflections due to the agitator will not be taken into account in the following measurements (Fig. 9).

Fig. 7

Fig. 8

Tanks internal structures

In tanks where there are internal structures such as steps, heating-cooling coils, struts, etc. disturbing echoes which might interfere with the correct echo may occur.

If disturbing echoes cannot be avoided, they can at least be minimized by means of small metallic or plastic covers which diffuse the wave reflections, avoiding the direct reception of said waves by the transducer (Fig. 10).
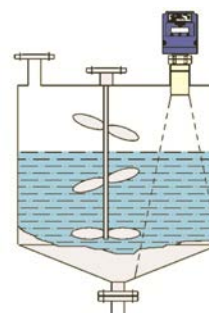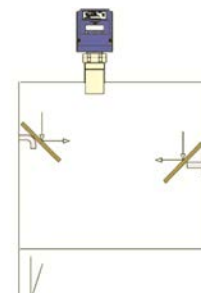

Fig. 9

Fig. 10

HART protocol

The level transmitters series LU are compatible with HART communication protocol. The characteristics details are available in the "Field Device Specification" document. In order to proceed with HART communication, an external resistance (R ext.), of between 200 and 500 Ohm, must be connected to the current loop. The positions where a terminal or a PC with modem HART can be connected are shown in the following figure.
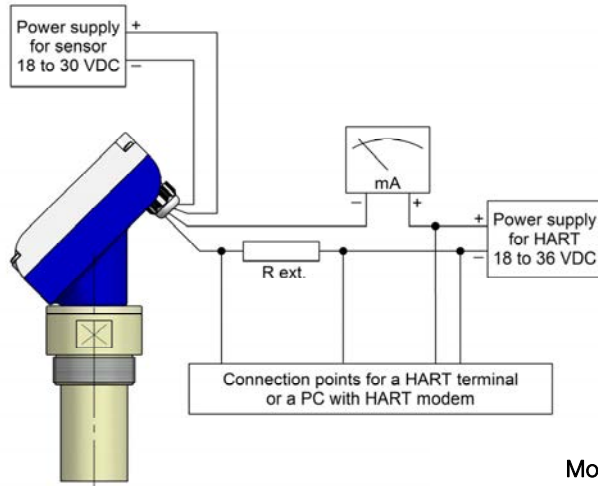
Models LU91H / LU93H

Electronic converter

Model MT03L

- Electronic converter for level applications

- Resistance and current inputs

- Programmable via USB cable by means of Tecfluid S.A. Winsmeter MT03 software or by means of keyboard and graphic display with intuitive menus

- Panel mounting with dimensions 96 x 96 mm DIN 43700

- Power supply: 100 … 240 VAC 50 / 60 Hz
                           18 … 36 VDC

- Full diagnosis. User selectable password protection

- 5 digits level indication

- Programmable 4-20 mA analog output

- 2 x relay outputs programmable as level alarms

- Ingress protection: IP50 front, IP30 back
  (Optional IP65 front with silicone cover)

- Ambient temperature: -20ºC ... +60ºC

- MODBUS RTU RS485 protocol on request

MT03L

The art of measuring

Quality Management System ISO 9001 certified by

Pressure Equipment Directive certified by

ATEX European Directive certified by

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