

## Level transmitters

### Series LR

#### Radar level transmitter for liquids and solids

- Without contact with the product
- Compact design. Remote display available on request
- Excellent resistance in corrosive atmospheres, outdoors...
- Easy configuration by means of Bluetooth or dedicated software for PC
- Low consumption
- Measuring range:
  - VEGAPULS C11: up to 8 m
  - VEGAPULS C21: up to 15 m
- Accuracy:
  - VEGAPULS C11:  $\pm 5$  mm
  - VEGAPULS C21:  $\pm 2$  mm
- Connections:
  - G1½ / 1½ NPT / R 1½
  - G1 / 1 NPT / R 1 for mounting support
- Materials:
  - Body: PVDF
  - Seal: FKM (VITON®)
  - Cable: isolated with PVC (C11) or PUR (C21)
- Continuous level measurement with 4-20 mA output
- HART protocol (model C21)
- MODBUS RTU RS485 protocol optional



**HART**  
COMMUNICATION PROTOCOL

**Modbus**

## Working principle

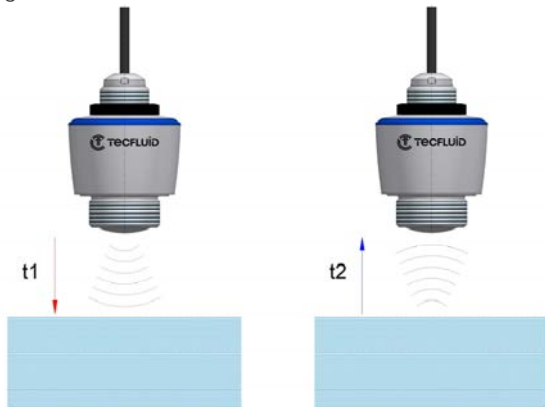
In the non-contact radar level measurement, the device emits a microwave signal towards product. The emitted signal is reflected by the medium and received as an echo by the antenna.

The frequency difference between the emitted and received signal is proportional to the distance and depends on the filling height. This information is converted into a respective output signal.

This type of instrument is suitable for level measurement of liquids and solids.

The transmitters designed with 80 GHz technology allow for a unique focusing of the radar beam and a wide dynamic range. This involves a wider application spectrum and a higher measurement reliability.

Non-contact radar level technology is characterized by its extremely high measurement accuracy. Furthermore, it is not influenced neither by fluctuating product characteristics nor by changing process conditions such as temperature, pressure or dust generation.



## Applications

- Water treatment
- Pumping stations
- Containment tanks
- Rain overflow basins
- Level control
- Flow measurement in open channels

## Models

- VEGAPULS C11                    2-wire system
- VEGAPULS C21                    2-wire system, HART protocol

## Technical data

- **Accuracy:**
  - VEGAPULS C11:     ±5 mm
  - VEGAPULS C21:     ±2 mm
- **Measuring range:**
  - VEGAPULS C11:     up to 8 m
  - VEGAPULS C21:     up to 15 m
- **Frequency range:** W-band (80 GHz technology)

- **Beam angle:** 8°
- **Fluid temperature:**
  - VEGAPULS C11:     -40°C ... +60°C
  - VEGAPULS C21:     -40°C ... +80°C
- **Ambient temperature:**
  - VEGAPULS C11:     -40°C ... +60°C
  - VEGAPULS C21:     -40°C ... +80°C
- **Working pressure:** -1 bar abs ... 3 bar abs
- **Materials:**
  - Body: PVDF
  - Seal: FKM (VITON®)
  - Cable: isolated PVC (C11; 10 m) or PUR (C21; 5 m)
- **Connections:**            G1½ / 1½ NPT / R 1½  
G1 / 1 NPT / R 1 mounting support
- **Ingress protection:** IP66/IP68 (3 bar, 24h)
- **4-20 mA analog output**
- **Power supply:**            12 ... 35 VDC, 2-wire system
- **Consumption:**            < 22 mA (2 wires)
- **HART protocol** (for model VEGAPULS C21)
- **MODBUS RTU RS485 protocol** with MT03L electronic converter
- **Certification** ATEX, UKEX, IECEx, cCSAus, cFMus, NEPSI, EAC, mcerts, INMETRO, KOSHA/KTL, CCOE, EG 1935/2004, FDA, NSF, KTW, WHG, VLAREM, marine industry, on request
- Easy and **wireless start-up** by means of Bluetooth, with smartphones and tablets with iOS/Android system or PCs with Windows system. A download-free app is required. Alternatively it can be made by means of PACTware/DTM software and PC with Windows system.
- **Diagnosis by Bluetooth** with mobile devices (Bluetooth 5.0, range 25 m)
- **Mounting support** for roof or wall optional.

## Installation

The installation of the level transmitter must be carried out making sure that the transducer 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. In case of centered installation in tanks with vault roofs, multiple echoes might occur. These might however be compensated by means of the corresponding adjustment (Fig. 1).

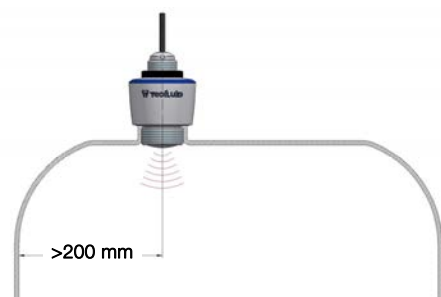


Fig. 1

# Level transmitters and indicators

## Series LR

### Dead zone

The radar level transmitters series LR do not have a dead zone. A zone up to 250 mm from the antenna is established in which the measurement accuracy is  $\pm 10$  mm instead of the usual.

### Nozzles

The length of the sensor must be taken into account and it must be ensured that it protrudes at least  $l > 5$  mm from the edge of the nozzle (Fig. 2). The inner side of the nozzle must be round so that the reflection interferences caused by it are minimal.



Fig. 2

### 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. 3).

In case of open tanks with possible sudden level changes 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. 4).

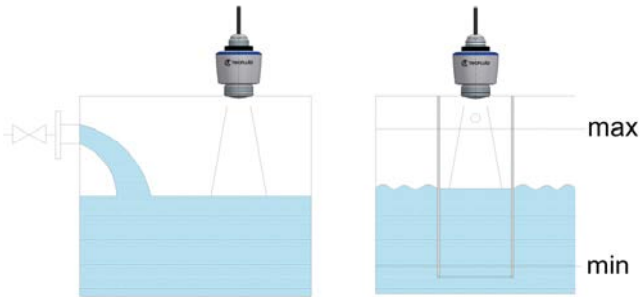


Fig. 3

Fig. 4

### 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. 5).

### 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.

These disturbing echoes can be differentiated by means of software adjustment or 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. 6).

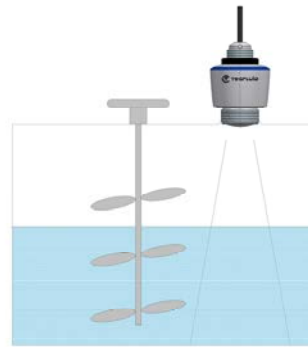


Fig. 5

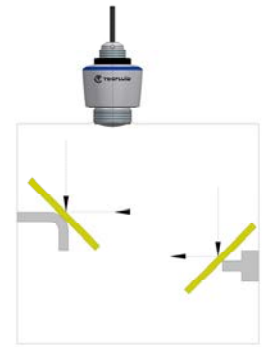


Fig. 6

### 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.

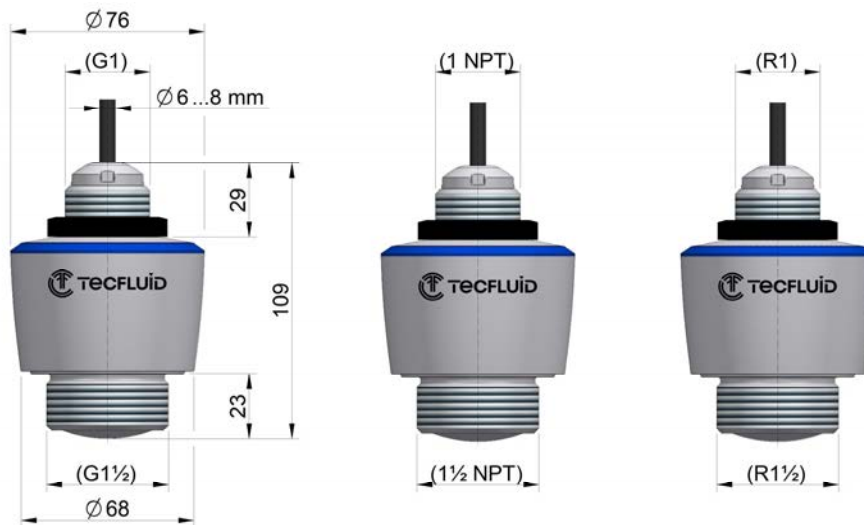
In case of measurement of solids the device shall be aligned so that the radar signal reaches the lowest level in the tank. In case of a cylindrical silo with a conical outlet, the mounting is made in a position that corresponds to between one third and a half of the tank radius.

## Materials



Nº	Description	Materials
1	Radar antenna	PVDF
2	Connection	PVDF
3	Body	PVDF
4	Nut	PP
5	Support connection	PVDF
6	Connecting cable	PVC / PUR

## Dimensions



## HART protocol



The level transmitters series LR are compatible with HART communication protocol. In devices with this characteristic, the configuration of the instrument can also be made by means of the signal line. An interface adaptor and a PC with DTM/PACTware are required. In order to make the HART communication, a 250 Ohm external resistance must be connected to the current loop.

## 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: -20°C ... +60°C
- MODBUS RTU RS485 protocol on request



MT03L



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Pressure Equipment Directive certified by



ATEX European Directive certified by



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