



## Purpose

The **ULM-3D-5** radar level transmitter is designed for non-contact measurement of **level and volume** of bulk materials in tanks and open storages. The level transmitter has several measuring channels (measuring beams), enabling it to measure 3D level and volume of bulk material.

The level transmitter is perfect for measuring 3D level and **volume** of grain, soybeans, rice, sugar, cake, meal, seeds, coal, ore, cement, crushed stone, alumina.

Extremely high operating frequency (**up to 140 GHz**) ensures high accuracy and maximum reliability of measurements, and the presence of several measuring channels allows evaluating the product level at **multiple points** (up to 5) simultaneously, visualizing a **three-dimensional profile** (3D-level) of the product surface and calculate the **volume** of the controlled material (requires "MULTI BEAM RADAR SURFACE PLOTTER" software). The level transmitter has a protected sealed antenna and is not in contact with the measured medium, which allows it to be used in dusty environments. Explosion-proof design.

The ULM-3D-5 level transmitter meets all modern requirements and safety standards.

Radiation power of the level transmitter does not exceed 8 mW, which is well below the maximum allowable values and is completely safe for living organisms and humans.

## Operating principle

The level transmitter contains five identical measuring channels - the emission direction of the central channel is coaxial with the longitudinal axis of

the transmitter. Beam pattern width of each channel - 2 degrees. The ULM-3D-5 level transmitter emits a continuous frequency-modulated electromagnetic wave in the direction of the measured product in the millimeter range and receives the reflected wave from the product, which is mixed with the emitted wave. The allocated resulting frequency corresponds to the distance to the measured product via the current measurement channel. Information from each measuring channel of the level transmitter can be transmitted to the MULTI BEAM RADAR SURFACE PLOTTER software, which builds a model of the product surface profile and calculates the volume and mass (with known product density) of the measured material taking into account the shape and dimensions of the tank.

The MULTI BEAM RADAR SURFACE PLOTTER software allows creating a measurement system that includes several ULM-3D-5 or ULM-3D-1 level transmitters (with one measurement beam), which allows reducing the error of **volume** measurement **to 0.5%** or increase the measurement area.

The circuitry and design solutions used as well as special algorithms for signal processing enable accurate and reliable level measurement regardless of the product reflection coefficient and mobility of its surface.

## Advantages

- Extra high operating frequency: up to **140 GHz**
- **Five** measuring channels allowing obtaining information about the material surface's relief
- **Narrow measuring beams** give a more detailed picture of the material surface.
- No **direct physical contact** of the level transmitter with product
- **Protection of antenna** from external factors (high humidity, aggressive media fumes, dust) allows you to use the level transmitter in the most severe environments
- The highest **sensitivity and stability** of measurements ensure operation with a variety of products
- High measurement **accuracy** and **low temperature error** enables to obtain objective product data regardless of external climatic conditions

- The level transmitter **does not require maintenance** during operation

## General specifications

Range of measurement .....	0.6 – 30 m
Absolute error of level measurement measurement via one channel .....	±5 mm
Accuracy of volume measurement (depends on the number of level transmitters and silo size)... up to 0.5%	
Measuring beam width .....	2°
Controllable range (viewing angle) .....	40°
Operating frequency .....	up to 140 GHz
Output power .....	max 8 mW
Max. power consumption .....	15 W
Connection .....	flanged
Ambient temperature .....	-40.. +60°C
Product temperature .....	unlimited
Electrical connection .....	4-wire

Digital interface .....	RS485 (ModbusRTU)
Analog interface .....	4-20 mA
Wireless interface .....	Bluetooth
Supply voltage .....	18-36 V DC
Explosion-proof design .....	Ex tb IIIC T85°C Db, IP65
Weight without flange .....	11 kg max

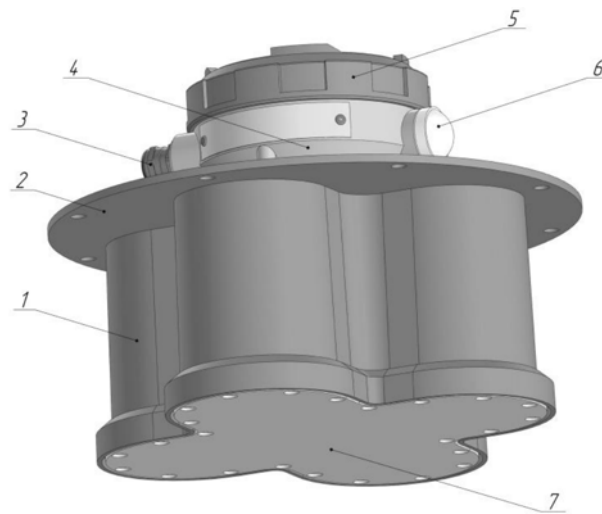
## Housing

The housing is made of powder-coated anodized aluminum. Explosion-proof design Ex tb IIIC T85°C Db. Dust and water protection rate: IP65.

## Materials

The level transmitter parts in contact with the tank environment are made of PTFE and stainless steel.

## ULM-3D-5 level transmitter. Location of the main elements

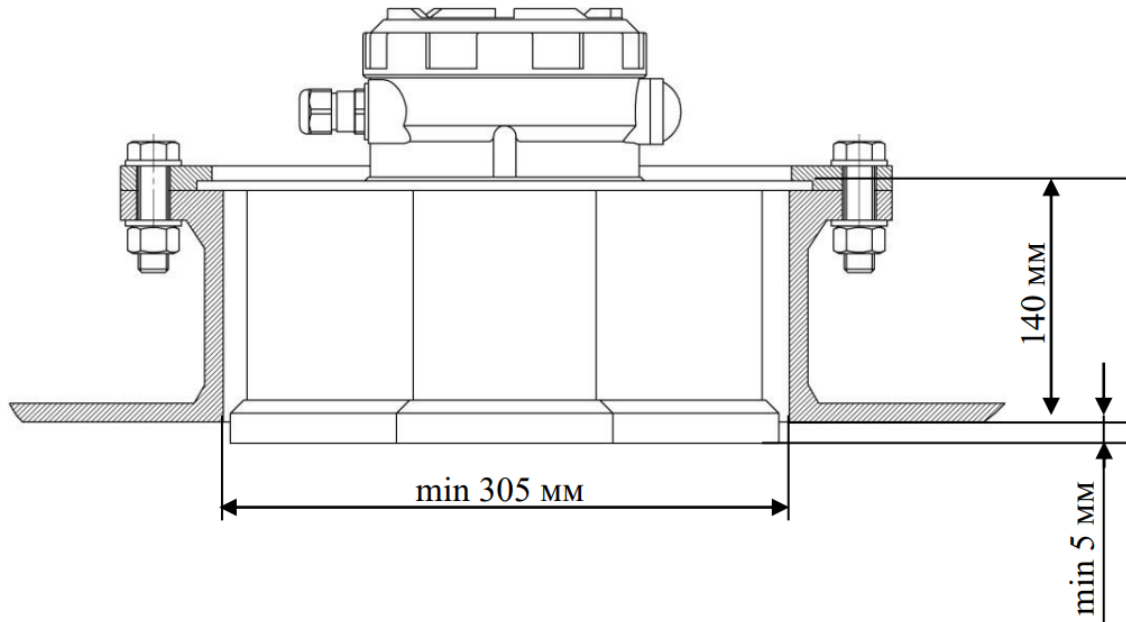


1 – aerial unit housing; 2 – mounting flange; 3 – cable gland or cable gland plug; 4 – electronic module housing; 5 – electronic module cover; 6 – Bluetooth module plug; 7 – antenna unit shield.

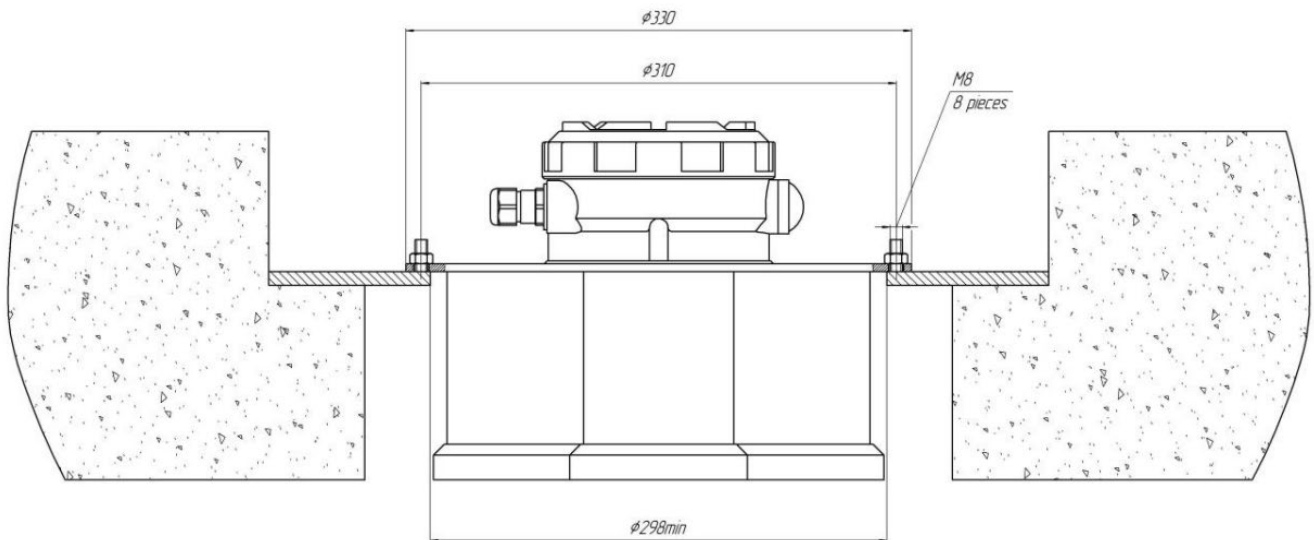


## Mounting options for the ULM-3D-5 level transmitters on tanks

Device installation on the mounting nozzle



Installation on the concrete tank roof



## The software package of the volume measurement system

The software package of the bulk volume measurement system based on ULM-3D-5 or ULM-3D-1 level transmitters allows:

- **configuring** the measuring system taking into account its design parameters and hardware implementation;
- calculating **levels for all channels** of the level transmitters comprising the system and automatically calculating the current volume of bulk materials in the tank;

- providing data on **minimum, maximum** and **average levels** of bulk material in the tank;
- calculating bulk material **mass** based on the measured volume using the density set or obtained from the table by the average level;
- displaying **three-dimensional model** of bulk material **surface**;
- keeping **logs** containing data on measured and calculated parameters in the past moments of time, and view them in graphic form.

The mandatory software package includes the following:

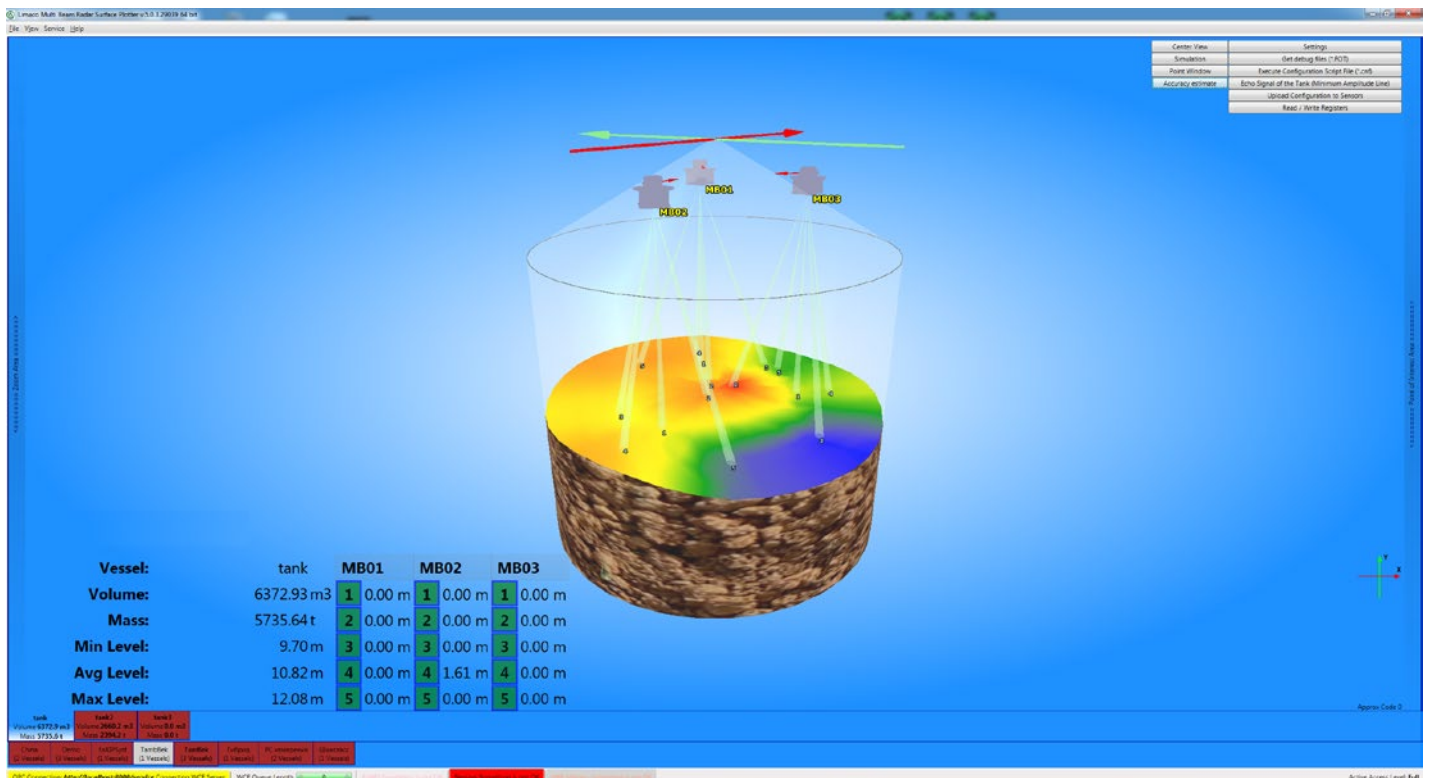
- MULTI BEAM RADAR SURFACE PLOTTER software for **visualizing** the measuring system and **calculating** product volumes;

- LIMACO OPC SERVER software for **exchanging data** between the system components and storing it.

The software package additionally requires the following software for full functionality:

- ULMCFG software for **setting up** and **configuring** the system;
- TRENDVIEWER software for **viewing statistics** for the reporting period.

## MULTI BEAM RADAR SURFACE PLOTTER interface



\* - the appearance of the tank, the number of installed level transmitters and measuring channels is determined by the current configuration of the measuring system

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