

I. Description

The ULM-55 ultrasonic level meter is designed for continuous non-contact measurement of the level of liquids and mushy and paste-like substances in open and closed vessels, reservoirs, sumps etc. Depending on the working area, the N type can be applied in environments not exposed to the danger of explosion, whereas the Xi type is intended for use in explosive environments.

Table 1 contains classification of the environments.

The adjusting elements of the level meter are situated on the rear side of the sensor, under the cap nut (see chapter V).

Table 1: Meter type and description of working areas (according to the Norms EN 60079-14, EN 60079-10)

ULM-55N			non-explosive area
ULM-55Xi	II 1/2G Ex ia IIBT5	with isolating repeater (e.g. IRU-420)	complete level meter zone 1 front part of head zone 0

The level meter ULM-55 transmits by electro-acoustic transducer the series of ultrasonic pulses, which propagate towards to the level. Reflected acoustic waves are received back by the transducer and processed in the electronic module. The echos are traced in the floating time window, the time of the waves flight are filtered and averaged. Further is made the thermal compensation and the signal is transferred to the output current 4-20 mA. If continuing echo fault happens, the current of the level meter slowly falls down to the value <3,8 mA. When the level is moving in the dead zone (see the catalogue's data) the output current rises up to the alarm value >21 mA. This value is kept, until the level meter doesn't register the continuous motion of the level away from the dead zone to the nominal measuring range (jumping distance is evaluated as a permanent fault).

II. Assembly and disassembly

Level meters are installed in vertical position into the upper lid of a reservoir or a vessel, using welded-on piece, nut or flange. The axis of the level meter must be perpendicular to the surface of the liquid being measured. The installation point must be chosen in such way so that the emitted acoustic signal is not affected by near objects (reinforcements, ladders, mixing devices etc), liquid being poured inside, air flow etc. If in doubt, we advise to consult it with the producer. The level meter housing need not to be grounded. Recommended dimensional parameters for the level meter installation are shown in figure 1.

III. Installation

Terminals for electric connection are inside the dismountable GDM connector. Connect the positive pole (+)

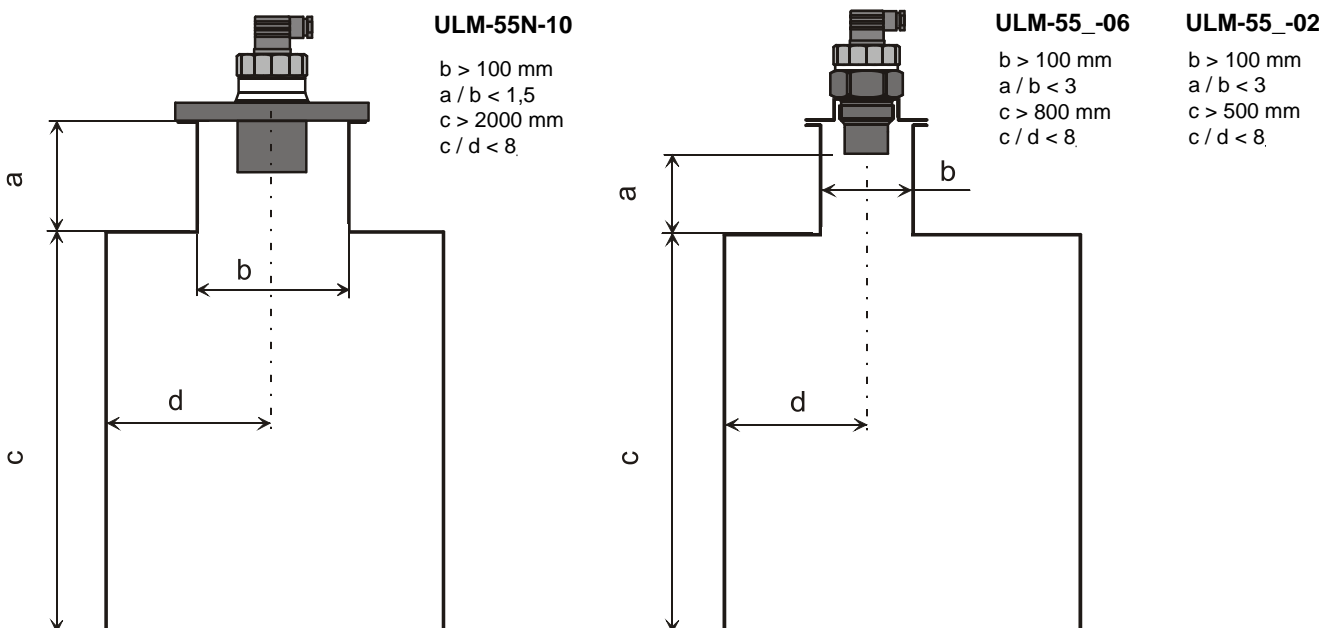


Figure 1: Recommended dimensional parameters - dimension "a" must be as minimal as possible

to terminal 1 and the negative pole (0 V) to terminal 2 – see figure 2 and 3. While making the connections the cable must not be energised!

The level meter is connected to an evaluating device using a suitable two-core cable with an external diameter of 6-8 mm (recommended cross section of cores: 0,5 – 0,75 mm²). A shielded cable must only be used if the lead is longer than 30 m or in the case of parallel lead together with power lines.

For supplying we advice a stabilized supply unit of safe voltage 12-30 VDC (SELV type), which can be part of the connected evaluating device (for the ULM-55N type) or through an intrinsically-safe isolating repeater with supply voltage 12-30 VDC, e.g. IRU-420 (for the ULM-55Xi type).

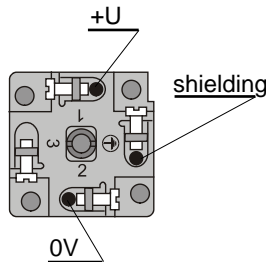


Figure 2: The inside of the GDM connector

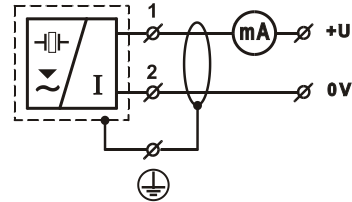


Figure 3: Connection scheme

IV. Putting the unit into operation

The ULM-55N type: switch on the power supply (12-30 VDC).

The ULM-55Xi type: switch on the intrinsically safe isoating repeater (IRU-420).

V. Setting up

The level meter is set up by following steps. Use the adjusting elements located under the cap nut to set the unit up – see figure 4.

Procedure:

1. Level meter is connected to the supply line via a miliampere meter (controller, etc.).
2. Disconnect the connector for access to adjusting elements and unscrew the cap nut (mind the internal wires). Connect again the connector.
3. Empty the tank to the minimum level or put the level meter to the corresponding distance. Set the static current by "**4 mA**" trimer to 4 mA.*
Turning to the right (clockwise) increases the current, while turning to the left decreases the current.
4. Fulfill the tank to the maximum level or put the level meter to the corresponding distance. Set the static current by "**20 mA**" trimer to 20 mA.*
When it is impossible to fulfill the maximum level, then can be used any known (detectable) level and then set appropriate current by next calculation:
 $I_{out} = 4 + (0,16 \times \text{the level height in } \%) \text{ [mA]}$
5. To achieve maximum accuracy, it is advisable to re-check the setting of both limit values.

* The trimmers do not have stop pieces – they can be turned approximately 15 times.

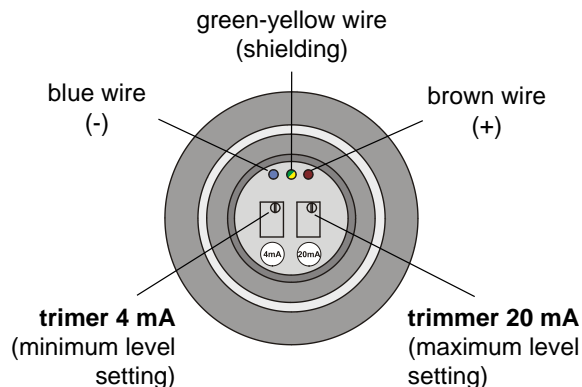


Figure 4: Adjusting elements (top view of the internal electronic part)

Setting the level meter up inside the measured vessel (cesspit) is also possible and we recommend it especially:

- if accurate data of individual distances are not available
- if it is necessary to measure hot media (the meter must be tempered for about 1 hour before adjusting it; the meter is equipped with temperature compensation)
- if it is necessary to measure a rippled surface (e.g. due to a nearby inflow)

Note:

- 1) Set up the level meter is possible to proceed by simpler way outside of the measured tank. For example opposite a wall or opposite a flat surface (sized approx. 1 x 1m). Level meter must be perpendicularly targeted to the measured surface (wall). While moving the level meter please avoid jumping distance changes (control logic in ULM presupposes smooth level movement, jumping distance can be incorrectly evaluated).
- 2) If you don't succeed in the level meter's setting, or you don't know at which distance the level meter is set then first set the level meter to the basic stage by turning the trimer "**20 mA**" fully to the left (approximately 15 turn anti-clockwise).
- 3) If the level (reflected surface) comes to the dead zone (see the catalogue's data) during the setting, then the current increases to the alarm value >21mA. This value is kept, until the level meter doesn't register the continuous motion of the level away from the dead zone to the nominal measuring range (jumping distance is evaluated as a permanent fault). If the alarm signaling continues and it is impossible to put the current back by any motion of the level, then it is necessary to make "Reset" of the level meter (disconnection and connection of the power supply). The level meter makes level detection again.
- 4) Depending on the type, the level meter is set up by default for the following ranges:
 - ULM-55_-02 - 0,5 m (20 mA) to 2 m (4 mA)
 - ULM-55_-06 - 1 m (20 mA) to 4 m (4 mA)
 - ULM-55_-10 - 1 m (20 mA) to 8 m (4 mA)

VI. Usage, operation and maintenance

The level meter requires no operating personnel. In the case of operation, the optional local connected display informs operating personnel about the measured level.

The maintenance of the unit includes a check-up on the good condition of the level meter and the supply cable. Depending on the nature of the measured substance, we recommend to inspect the cleanliness of the emitting surface at least once per year, and clean it if necessary, if detecting any visible damage. Contact the producer or dealer immediately.

It is forbidden to modify or tamper in any way the ULM-55 unit without the approval of the producer. Repairs may only be carried out by the producer or a service organisation authorised by the producer.

The ULM-55 unit must be assembled, installed, put into operation, operated and maintained in accordance with these instructions, and the provisions of valid standards concerning electrical equipment installation must comply with the ULM-55 features.

VII. Protection, safety, compatibility and non-explosiveness

The level meter is equipped with a protection against a reversal of polarity of supply voltage and against current overload. Safety low voltage according to the Czech State Norm CSN 33 2000-4-41 protects against dangerous touch. Electromagnetic compatibility is ensured in accordance with the Norms EN 55022/B, EN 61326-1, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6. The non-explosiveness of the ULM-55Xi type is certified by FTZÚ-AO210 Ostrava-Radvanice, certificate number FTZÚ 02 ATEX 0263.

VIII. Labelling

The cap nut of the ULM-55N type contains the following information:

- Producer's/ label and contact information
- Type of the level meter ULM-55N-__ (old version) or ULM-55N-__A (new version)
- Year of production (first two digits) and serial number (remaining three digits) xx-xxx
- Supply voltage: $U = 12\div 30$ VDC
- Range of output current $I = 4\div 20$ mA
- Range of head working temperatures $t_a = -30 \dots +70$ °C (or $t_a = -30 \dots +60$ °C for ULM-55N-10)
- Protection: IP65 / IP67
- CE labelling
- mark of electronic device waste (bin)

The cap nut of the ULM-55Xi type contains the following information:

- Producer's label and contact information
- Type of the level meter ULM-55Xi-__ (old version) or ULM-55Xi-__A (new version)
- Year of production (first two digits) and serial number (remaining three digits) xx-xxx
- Ex labelling in the hexagon
- rgerhgType II1/2GExialIBT5
- Number of the spark safety certificate
- Limit operating parameters $U_i = 30$ VDC, $I_i = 132$ mA, $P_i = 0,99$ W, $C_i = 370$ nF, $L_i = 0,9$ mH
- Range of head working temperatures $t_a = -30 \dots +70$ °C, $t_a = -20 \dots +60$ °C zone 0
- Protection: IP65 / IP67
- CE labelling
- Number of the authorised person inspecting the quality system
- mark of electronic device waste (bin)

IX. Standard accessories

For each sensor - 1 connecting GDM connector

For each delivery (per each 5 pieces)

- 1 adjusting screwdriver

For more detailed information about the product see www.dinel.cz

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