

USER'S GUIDE

Installation & Operation

Instructions

Ultrasonic Level Meter

Model ALIT-TIF

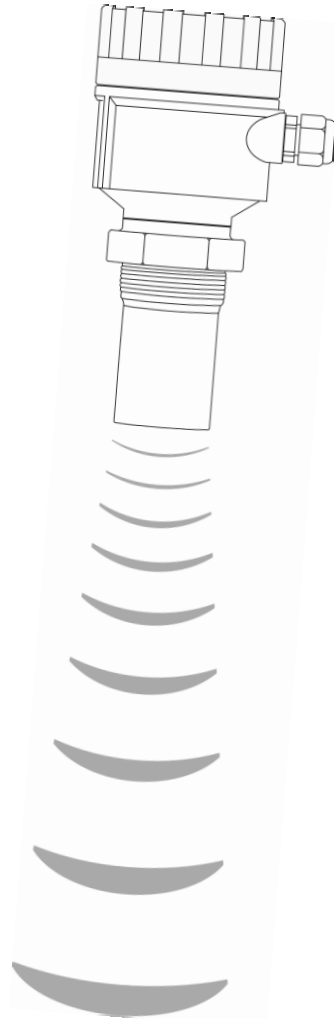


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1.Introduction

1.1 Application:

The series is an compact 2-wire series ultrasonic level meter for continuous non-contact level measurement in liquids and solids. It consists of probe and electronic units, both of which are leak-proof structure. This series can be widely applied to the metallurgical, chemical, electricity and oil industries, particularly suitable for explosion-proof environment.

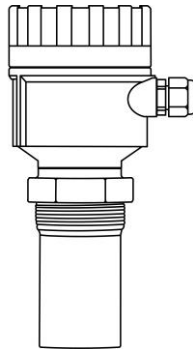
1.2 Features:

Continuous non-contact level measurement with compact version;

- Integrated design, installed conveniently;
- With the explosion-proof grade: ExiaIICT6;
- Protected in the excessive voltage and current , protected in the thunder and lightning;
- The big show window of LCD is easy to debug and observe;
- Excellent anti-interference capability;
- 4-20mA output;
- Intellectual signal treatment technology, guarantee that the instrument meets various kinds of operating occasion
- All metal outer cover (IP67), airproof and alkali-resisting, meet the abominable environment.

1.3 Structure:

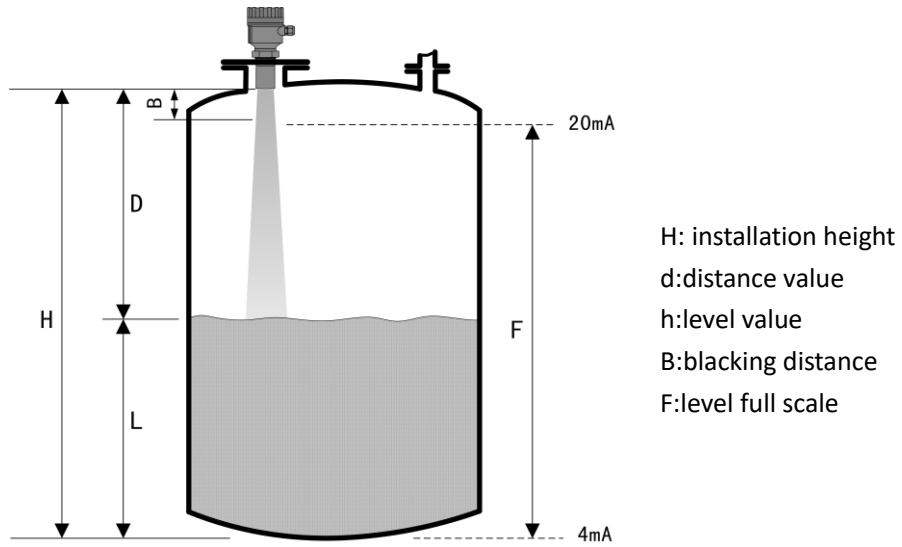
The series is consists of sensor and electronic unit.



1.4 Measuring principle: Time-of-flight method

The sensor of the meter pulses in the direction of the product surface. There, they are reflected back and received by the sensor. The meter measures the time t between pulse transmission and reception. The meter uses the time t (and the velocity of sound c) to calculate the distance D between the sensor membrane and the product surface: $D = c \cdot t/2$. As the device knows the empty distance H from a user entry, it can calculate the level as follows:

$$h = H - d .$$



An integrated temperature sensor compensates for changes in the velocity of sound caused by temperature changes. Calibration Enter the empty distance H and the span F to calibrate the device.

Blanking distance: Span F may not extend into the blanking distance B . Level echo from the blanking distance cannot be evaluated due to the transient characteristics of the sensor.

1.5 Technical data:

1.5.1 Basic data

Range: ALIT4: 4m
ALIT8: 8m

Blocking distance : ALIT4:0.20m (PVC -probe) 0.30m (PTFE-probe)
ALIT8: 0.30m (PVC-probe) 0.40m (PTFE-probe)

Accuracy : 0.2% of span in air (with standard signal strength)

Resolution : 1mm

Display type : 4 segment LCD

Signal output : 4-20mA

Output load : 0 - 600Ω (See the load with the supply curve on next page)

Output resolution ratio : 0.03% of the actual range

Parameter set up: 3 induction buttons

Temperature range: -40°C- 70°C

Temperature compensation : automatic in the whole range

Pressure range : ±0.2MP

Power supply : DC24V (allowed power range : DC21v - DC27v), 35mA

Signal wire diameter ; Φ6-Φ12mm

Single wire diameter : Φ0.5Φ-1.78mm

Cable fix : PG13.5 gland

Beam angle : 8° (3db)

Measure cycle : 1.0-2.0 seconds

Crust material : **Electrical unit :** Cast aluminum, surface spray

probe (transmitter): PVC / PTFE

probe of the intrinsically safe explosion-proof instrument :
the common type : PVC, with aluminum tube
the anticorrosive type : PTFE , with stainless steel tube

Enclosure rating : IP67

Mounting mode : thread 、 flange

Butt joint flange dimension (Airtight container):
min inner diameter: 65mm, **max** length: 500mm.

1.5.2 data of the intrinsically safe explosion-proof type:

explosion-proof grade: ExiaIICT6

1. technical parameter : U_i : 27v
 I_i : 120mA
 P_i : 3.24W
 C_i : 0.0005uF
 L_i : 0mH

2. associated apparatus: S2022 I.S. barrier

Explosion-proof grade: ExialIC

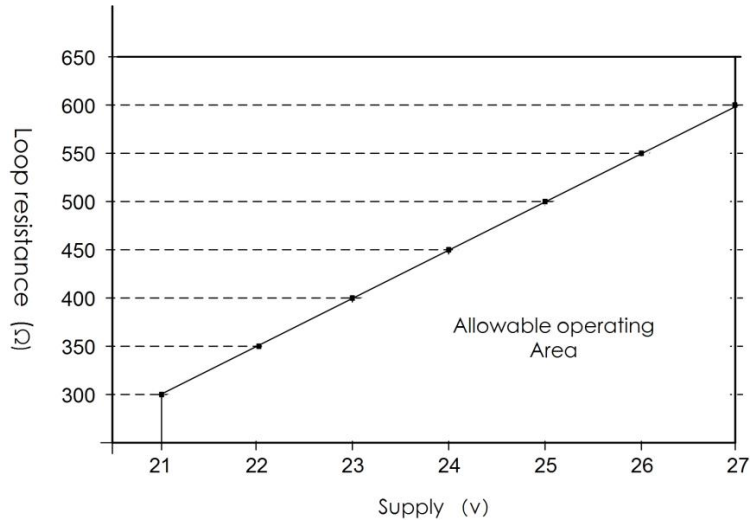
Uo: 24v

Io: 26mA

Co: 0.04uF

Lo: 0.5mH

the series resistance and supply voltage curve:



2. Installation

Reasonable installation is critical factor of the instrument's normal working.

2.1 Installation considerations

2.1.1 general hints

- Installation must be carried out by trained person in accordance with the manual.
- The temperature of the process may not exceed 60°C, and the pressure may not exceed ± 0.1 MPa.
- The use of metallic fittings or flanges is not recommended.
- For exposed or sunny locations a protective hood is recommended.
- Make sure the distance between the probe and the maximum level exceeds the blanking distance, because the probe cannot detect any liquid or solid surface closer than the blanking distance to the probe's face.
- Install the instrument at right angles to the surface of the measuring material.
- Obstructions within the beam angle generate strong false echoes. Wherever possible, the transmitter should be positioned to avoid false echoes.
- The beam angle is 8°, in order to avoid large echo loss and false echo, the probe should not be mounted closer than 1 m to the wall. it is advisable to maintain a distance of at least 0.6m from the center line of the probe for every foot (10cm per meter) range to the obstruction.

2.1.2 hints for liquid surface conditions

- Foaming liquids can reduce the size of the returned echo because foam is a poor ultrasonic reflector. Mount an ultrasonic transmitter over an area of clear liquid, such as near the inlet to a tank or well. In extreme conditions, or where this is not possible, the transmitter may be mounted in a vented stilling tube provided that the inside measurement of the stilling tube is at least 4 in. (100 mm) and is smooth and free from joints or protrusions. It is important that the bottom of the stilling tube stays covered to prevent the ingress of foams.
- Avoid mounting the probe directly over any inlet stream.
- Liquid surface turbulence is not normally a problem unless it is excessive. The effects of turbulence are minor, but excessive turbulence can be

dealt with by advising the technical parameters or a stilling tube.

2.1.3 hints for solid surface conditions

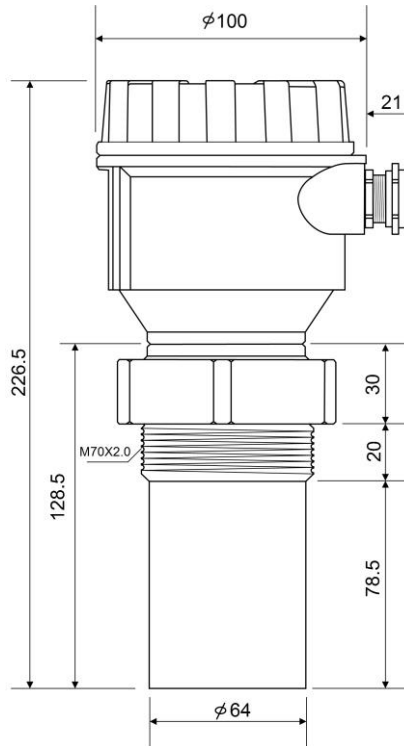
- For fine-grained solids, the sensor must be aligned with the product surface.

2.1.4 hints for in-tank effects

- Stirrers or agitators can cause a vortex. Mount the transmitter off-center of any vortex to maximize the return echo.
- In non-linear tanks with rounded or conical bottoms, mount the transmitter off-center. If needed, a perforated reflector plate can be installed on the tank bottom directly under the transmitter center line to ensure a satisfactory return echo.
- Avoid mounting the transmitter directly above pumps because the transmitter will detect the pump casing as the liquid falls away.
- When install to the cold area, should choose the lengthen sensor of the level meter , make the sensor extend into the container, shun frost and icing .

2.2 Mounting

2.2.1 dimensions



2.2.2 mounting measures

There are several methods of mounting the instrument.

- Screw mounted

Hints: Always use the nut to screw the probe.

- Flange mounted

If the maximum level to be measured falls within the blocking distance, the transmitter must be mounted on a nozzle using an adapter flange.

Hints:

a) Select as big a nozzle diameter as possible, but keep the height as small as possible.

b) The inner surface of the nozzle should be as smooth as possible (no edges or welding seams).

c) The limit of nozzle as follow:

Measuring range	Min diameter	Max length
4m、 8m	65mm	400mm

- Bracket mounted

The mounting bracket can be used on open tanks or above conveyor belts. The sensor is screwed into the socket provided.

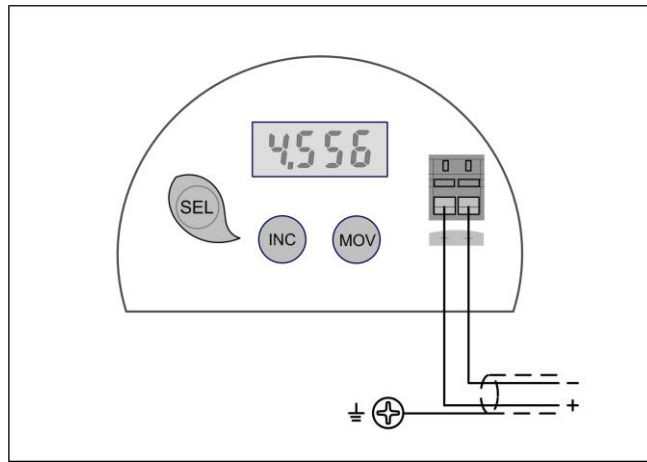
Hints: Always use the nut to screw the probe.

3. Wiring

The series has one LCD and three keys and some terminal blocks, they are located within the host housing and can be operated when the cover is open.

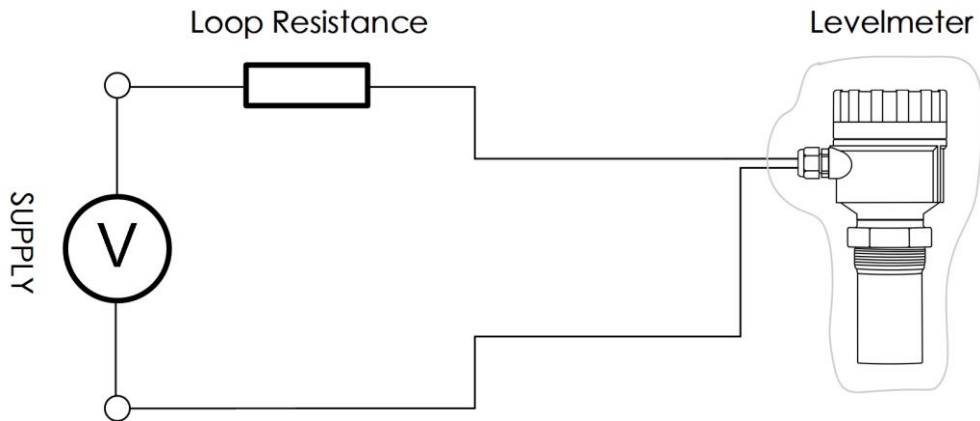
3.1 Wiring diagram

Remove the cover of the connection box, the terminal blocks are shown .



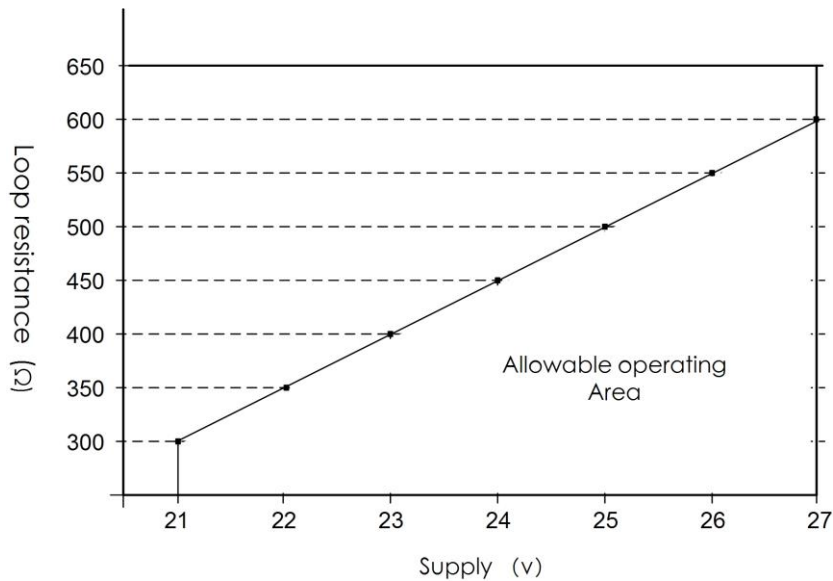
3.2 The power supply

The power supply should be DC24V (DC21V--DC27V), and the current should be 35mA at least. Ultrasonic level meter should be sampling the load resistor in series with power supply.



3.3 The load resistance

Load resistance and supply voltage diagram

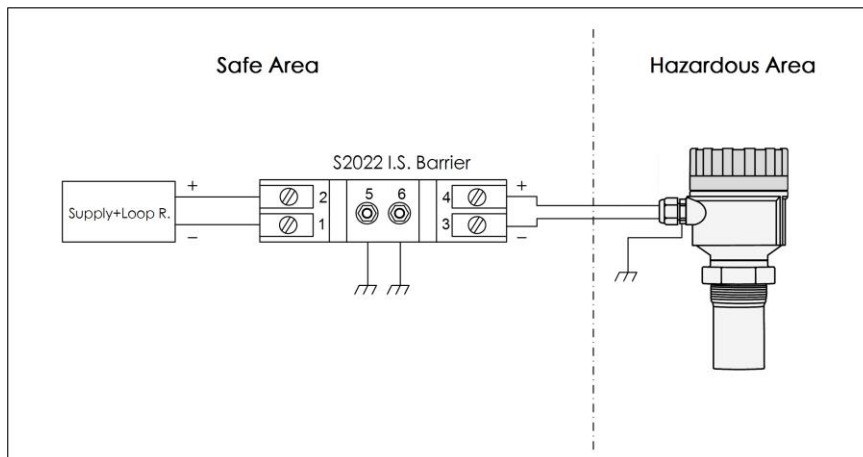


3.4 The cable

A cable comprising screened, twisted pairs is recommended, the diameter should be between 5-9mm, the distributed capacitance of the cable should be less than 0.0395uF, distributed inductance should be less than 0.5mH. The cable shield must be grounded.

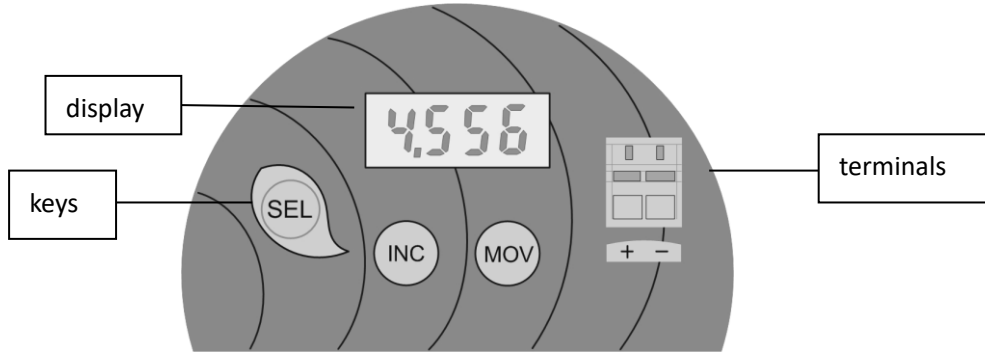
3.5 The explosion-proof connection

The explosion-proof type is intrinsically safe, the grade is ExialICT6. The instrument should be connected with barrier when using. S2022 I.S. barrier is the associated apparatus of the instrument, and its explosion-proof grade is ExialIC, power supply is DC24V ($\pm 10\%$).



4. Operation

4.1 display and keys



The series is displayed with 4 digit LCD.

The series has three keys, with its functions as follow:

Keys	Functions
SEL	Selection of the display content or parameter
INC	Changing the value of the certain digit from 0 to 9 in turn
MOV	Selection of the digit to be changed

4.2 Two working mode

The instrument has two working mode: running state and operating state. In running mode, the measurement is displayed. In programming mode, data is displayed to assist with programming.

4.2.1 running mode

When the power is turned on, the instrument takes several seconds to initialize and then show the running status. The level value, the empty value and the temperature value will be shown in turn. Choose the wanted shown value through the SEL key.

The unit of the level value and the empty value is meter (m), the unit of the temperature is Degrees Celsius (°C).

The output current is always corresponding to the level value, no matter which value disappears on the panel.

Push the buttons firmly, but not too hard, to avoid damaging the circuit boards. Also, to avoid entering incorrect data, do not push the buttons too fast.

The instrument will show the measuring value in turn as follows in running mode.

display	LCD
The level value	first shown: second:
The empty value	first shown: second:
Temperature	

4.2.2 operating mode

In the operating mode data is displayed to assist with programming. When SEL and MOV keys are pressed simultaneously, the instrument can enter or exit of the mode. Press SEL key to select the content. And the changeable contents and parameters will be shown in turn in operating mode, please pay attention to the alphabet in the following examples.

Display Mode	LCD
Installation height	first shown: press SEL then shown:
Level full scale	first shown: press SEL then shown:
Zero Scale	first shown: press SEL then shown:
	first shown: press SEL then shown:
Inner password	

Notes:

- Push the buttons firmly, but not too hard, to avoid damaging the circuit boards. Also, to avoid entering incorrect data, do not push the buttons too fast.
- The operating modes are shown in turn. Press SEL to choose the parameter, and then shown the symbol P1 or P2, press SEL and then shown the value of chosen parameter.
- Press SEL one more time after changing the value of parameter with

MOV and INC, in order to store the data.

- The installation height and the full distance value are parameters must be set up by users, and others are optional ones.
- Press SEL and MOV simultaneously to exit the operating status and store the settings.

Significance of the alphabet and the corresponding operating mode:

The operating mode	Significance
Installation height	The distance from the surface of the probe to the bottom of the container
Level full scale	The full range corresponding to the output 20mA
The inner password	The password for inner parameter's operating. Users do not need to set up this parameter.

5. Calibration

The level meter should be calibrate indoor before installation to ensure the normal performance.

General consideration

- Let the probe be perpendicular to a wall, and make sure the measuring distance is larger than the blacking distance, and no barriers within the beam angle zone.
- Wiring and connecting the instrument correctly according to the guideline.
- Turn on the power and after a few seconds the instrument will enter the running mode. And check the level value , the empty value and the temperature value in turn through SEL key.
- Move the probe slowly, the level value and the empty value should change slowly accordingly.
- Press SEL and MOV keys simultaneously and then enter the operating mode. Advise the installation height value, the displayed level value and empty value should change accordingly.
- Advise the full distance value , and the output current should change, too. Because the output current is always in accordance with the level value.
- Advise the limit value, and test with a multi-meter whether the relays act in correct time delay.

6. Trouble-shooting

Trouble Phenomenon	Trouble Reason	Solution
The instrument does not show, and does not work.	Power supply error. Wiring error.	Check the power supply. Check the wiring.
The instrument doesn't work but with show.	The sensor doesn't aim at the liquid or the material. The surface has great fluctuations. Liquid surface with lots of foam. The container is empty and the bottom is not flat. Over the range.	Adjust the sensor and aim at the material. Add a tube to the container. Add a tube to the container Use instrument with a lager range. Use instrument with a lager range.
The instrument shows unstable or the measured value has a great deviation.	The level enters the blanking distance. There is strong electromagnetic interference There is Obstruction of the ultrasonic wave.	Increase the installation height of the instrument. or prevent the level too high. Increase shielding to the instrument. Change the installation site or using a plastic tube.



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