

LST300

Ultrasonic level transmitter



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LST300
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transmitter

Introduction

The LST300 is a microprocessor-based ultrasonic level transmitter that transmits ultrasonic pulses in the direction of product surface. When some of the energy is reflected and travels back towards the sensor, by measuring the time elapsed between the initial pulse and the reflected one, the electronics can calculate the distance.

Quick Start Guide and Safety Information

The most powerful ultrasonic level transmitter in a compact form

For more information

Detailed operation and safety manual, training material and videos guide are available:
<https://new.abb.com/products/measurement-products/level/ultrasonic-level-transmitters-and-switches/lst300>
or by scanning this code:



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Sales



Service



1 Basic safety

Personnel

⚠ WARNING

Only properly certified and authorized personnel should be charged with the installation, electrical connection, commissioning, operation and maintenance of the instrument.

Any process media released may cause severe injuries.

Carefully plan any installation, modification or repair before proceeding.

Read the LST300 operating instructions carefully before working with the product. For personal and system safety and for optimum performance, make sure you thoroughly understand the contents before installing, using or maintaining this instrument.

Electrical

⚠ WARNING

All connections must be established in a de-energized state. Before working on the circuit, secure the breaker to prevent any accidental power-up.

Electronic components are sensitive to electrostatic discharges. Before performing any connection, operators shall make sure that they have discharged all static electricity from their body before touching electronic components.

Ex relevant specifications

If your application is for explosive purpose (code), please [download](#) detailed operation manual to get Ex and safety related instructions.



LST300 operation and safety manual

IMPORTANT (NOTE)

The name plates shown here are only examples. The name plates attached to the device may be different to what you see here.

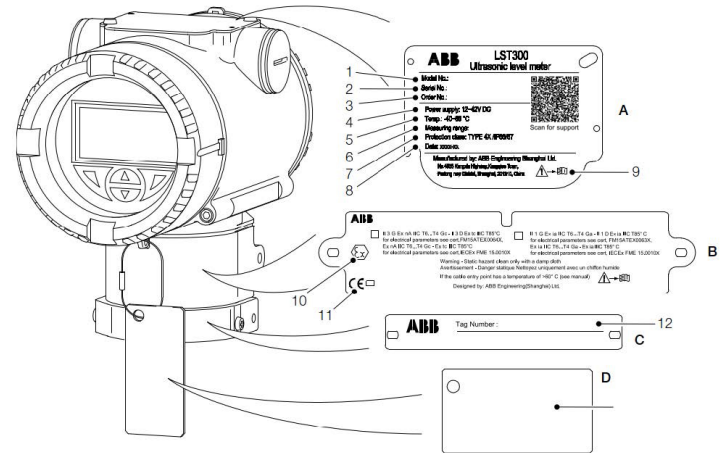


Figure 1 Product labels for LST300

1	Model number
2	Serial number for identification by the manufacturer
3	Order number
4	Power supply
5	Ambient temperature
6	Measuring range
7	Protection type according to EN 60529
8	Year / Month of manufacture
9	Alarm sign (read the instruction before using it)
10	Ex mark (example)
11	CE /UKCA mark
12	Tag number

B	Certification plate
C	Tag plate
D	Wired-On plate

2 Improper use

The following are instances of improper use of the device:

- Measuring in a medium other than air, for example in the presence of heavy gas vapors
- Use as a climbing aid, for example for mounting purposes
- Use as a support for external loads, for example to support the tank.
- Addition of material, for example by painting over the name plate.
- Removal of material, for example by spot drilling the housing

3 Dimensions

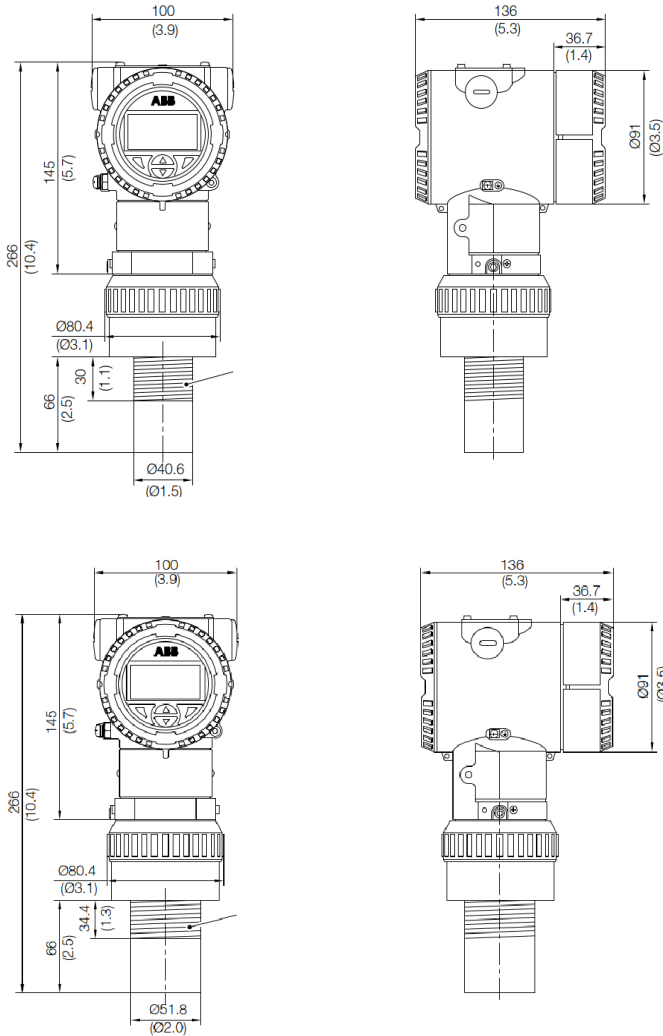
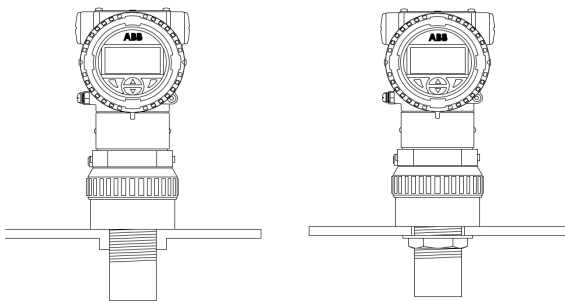


Figure 2 Transmitter with 1.5 or 2 inch thread (NPT/BSP compatible Universal thread)

4 Installation

The LST300 transmitter can be mounted directly on a tank/flange using either a nut or a sleeve.



Using the thread

Using the nut (recommended hole size 60mm for both 1.5 and 2 inch thread)

Figure 3 Direct mounting variations

5 Mounting with bracket

For open channel or basin, mounting bracket may be needed, contact ABB if you need the brackets or further suggestion.

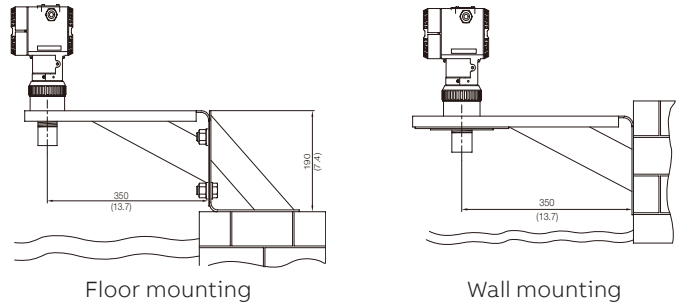


Figure 4 Mounting with bracket

NOTICE

- Try to avoid mounting LST300 in the middle of the tank or too close (less than 200mm) to the wall
- If installed in a conically shaped vessel or cylindrical horizontal tank, ensure that the sensor is installed just above the lowest point in the tank.
- The sensor surface should be in parallel with the product surface
- Avoid two sensors in the same tank, or use sound guide pipes to avoid signals' interference from each other
- Standpipe/nozzle's length L should be as short and the diameter D as large as possible (Suggestion: $L/D < 3$)
- Avoid buildup, weld, couplings, other obstacles like switches, ladders, baffles within the nozzle or sensor beam angle
- The actual Max. measuring range depends on the operating conditions, refer to below table to estimate the actual measuring capability:

Actual operating conditions	Attenuation (% of the ideal range)
Calm liquid surface	0%
Waves or turbulence	0%~20% (strong)
Dust and vapor	0%~20% (heavy)
Hot surface	0%~20% (50°C+ higher than ambient)
Foaming	60%~100% according to the foam size
Solid—Hard surface	0%~40%
Soft/porous surface	60%
Nozzle/Pipe	0%~80% depending on the dimension and inner wall roughness

Note: The attenuation is the feature of ultrasound, not the capability of the device

6 Typical LST300 connection

LST300 can be setup either through the LCD or on a computer and it's a 2-wire loop powered device that can be connected directly with DCS or PLC

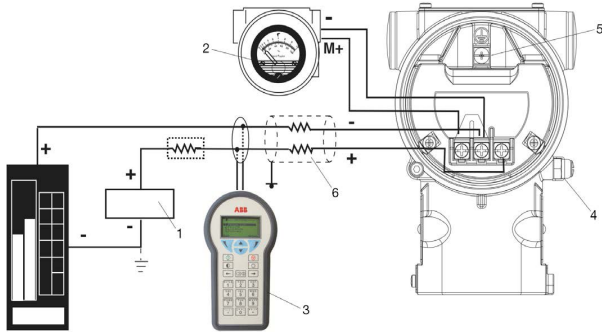


Figure 5 Typical connection

1	Power supply
2	Remote display
3	Handheld terminal
4	External ground connection
5	Internal ground connection
6	Cable entry

7 To connect the LST300 instrument

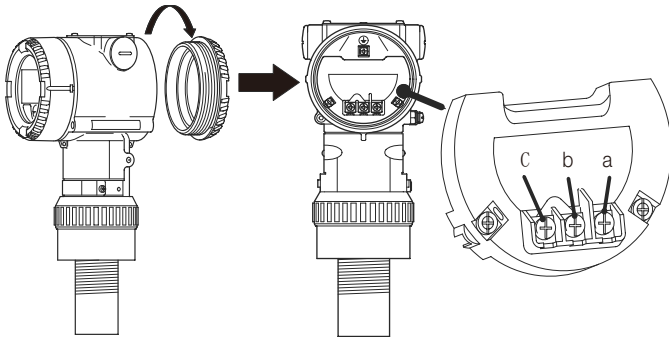


Figure 7 Cable connection

a	Positive polarity of power supply (+)
b	Negative polarity of power supply (-)
c	Extend meter, shorted with b for normal use (Ext)

NOTICE

- The two red plastic covers must be changed to proper plugs and cable glands for IP67/68 or explosion-proof purpose.
- Choose qualified cable gland and route a single cable through it and ensure a drip loop (water trap) is used
- The LST300 provides two connectors for ground (PE). All grounding must comply with anti-explosion regulations if the LST300 transmitter is to be used in hazardous environments (Zone 1 Div 1 and Zone 1 Div 2).

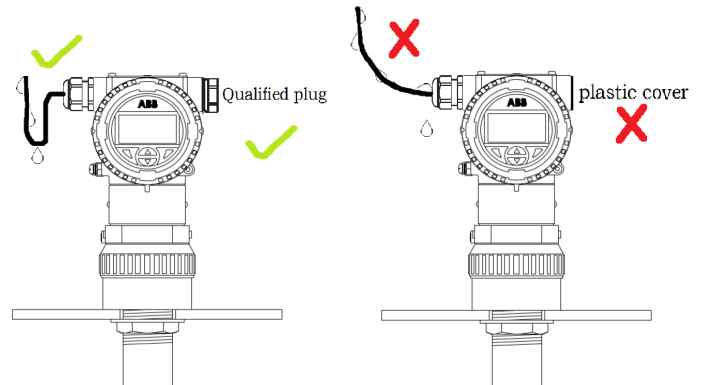


Figure 6 Choose qualified plug and gland to replace the default plastic cover and ensure a drip loop is used

8 Configure using the Easy Setup menu

Your LST300 instrument comes configured with certain default parameters, but you still need to select certain options and set specific values for your instrument to work as you expect.

To start the configuration, you need to understand the parameters below:

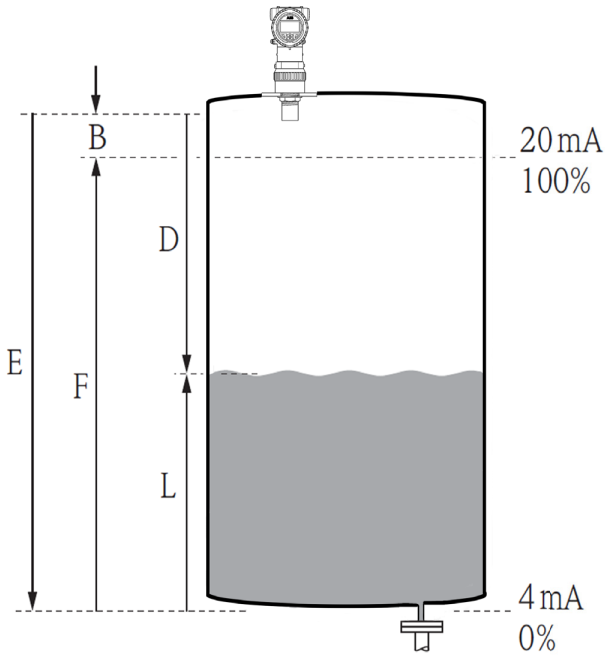


Figure 8 Typical installation and key parameters

B	Blanking area	Should be set >350mm, signals within this area would be ignored Suggested >500mm if the operating condition is not good
D	Distance	Distance from sensor surface
E	Empty distance	Set according to the distance from tank bottom to sensor lower surface
L	Level	Level from tank bottom (defined by empty distance)
F	Full range (Span)	Set according to users' 100% output point Avoid obstructions (Filling water, switches, weld seam) in this range

Before beginning the commissioning procedure, ensure:

- The power supply is OFF.
- The power supply is within the specified range
- The pin assignment matches the connection diagram.
- The transmitter is correctly grounded.
- The transmitter is within temperature limits.
- The transmitter is installed in a location free of vibration.
- The terminal cover, end plug and cable gland are well sealed.

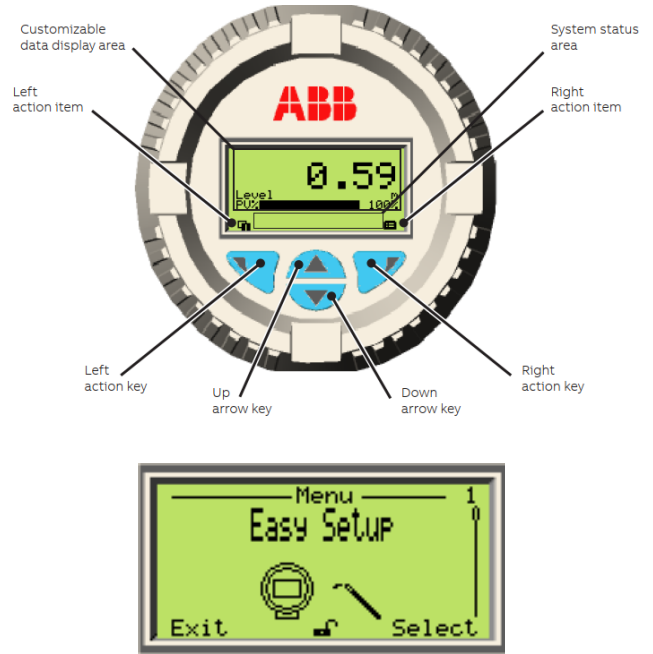


Figure 9 LCD and menu

The most common configuration parameters are summarized in the Easy Setup menu, including:

Menu: Easy Setup

Menu / Parameter	Value range
Easy Setup	
Language	English, Chinese
Operation Mode	Level Mode Flow Mode Volume Mode
Empty Distance	350 to 12000 mm (50 kHz) 250 to 7200 mm (75 kHz)
Span	0 to 12000 mm (50 kHz) 0 to 7200 mm (75 kHz)
Blanking	350 to 12000 mm (50 kHz) 250 to 7000 mm (75 kHz)
Max Change Rate	0 to 720 m/h

Scan for video of installation and setup



LST300 easy setup



How to install and setup

Tips:

- After you set the empty distance and span, the 0% (4 mA point) and 100 % (20 mA point) will link to 0mm (bottom of the tank) and the span value you entered. If you want to change the mapping, go to the “Input/Output” menu.
- Max change rate can help you ignore the sudden level change (the change rate larger than the setting). This could be used when unexpected obstacles and noise randomly occur. Be careful that the real change might be ignored if the value was set too small. Disable this function by setting the value to ‘0’ .
- For your reference: Very Slow: <1 cm/min ,Slow: <5 cm/min ,Medium: <25 cm/min ,Fast: 1 m/min ,Very Fast: <5 m/min
- The blanking is better to be set at a larger value for harsh conditions and the “waveform” function can give you a direct impression if the installation and settings are good or not.

Note: Only the touch screen display (L7) support the waveform function

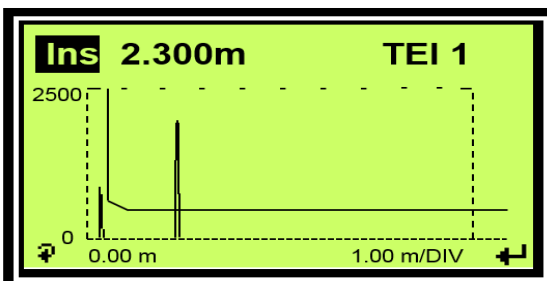


Figure 10 Waveform function under diagnosis menu



Video: Diagnosis using waveform

9 Remote configuration: using the ABB FIM with LST300 FDI package

ABB's Field Information Manager (FIM) software employs Field Device Integration (FDI) technology and is equipped with highperformance and innovative graphical user inter-face that helps technicians to effectively work with the process instrumentation.

The HART protocol is used for digital communication between a process control system / PC, a handheld terminal, and LST300.



Video: Configure using FIM



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