



Measurement & Analytics | LST300 and LST400

# Level measurement using Ultrasonic Technology

Non-Contact level measurement for liquid and bulk solid applications

# Expertise in technology for more than a century of experience



## The best measurement solution for your needs and the maximum return on your investment

To operate any process efficiently, it is essential to measure, actuate, record and control. When investing in ABB's measurement products and solutions, you are receiving the best technology, reliability and service in the business.

## Research and development, a vital source of ABB's technology leadership

ABB constantly builds on the foundation of existing technologies for new applications, and continues to develop the breakthrough technologies needed to meet the challenges of the future. ABB and its heritage companies have been leaders in innovation and technology for more than 100 years.

## Comprehensive measurement solutions serving any industry

ABB measurement products provide world-class measurement solutions for any industry, utility or municipality for more than a century.

The latest innovations deliver technological solutions to make it easier for you to run your plant. ABB's measurement products are based on common technology, providing a common look and feel and method of operation.

This results in products that are easy to configure, integrate and maintain.

## ABB's measurement products portfolio:

- Analytical measurement
- Flow measurement
- Natural gas measurement
- Valve automation
- Pressure measurement
- Temperature measurement
- Recorders and controllers
- Level measurement
- Device management
- Force measurement
- Service

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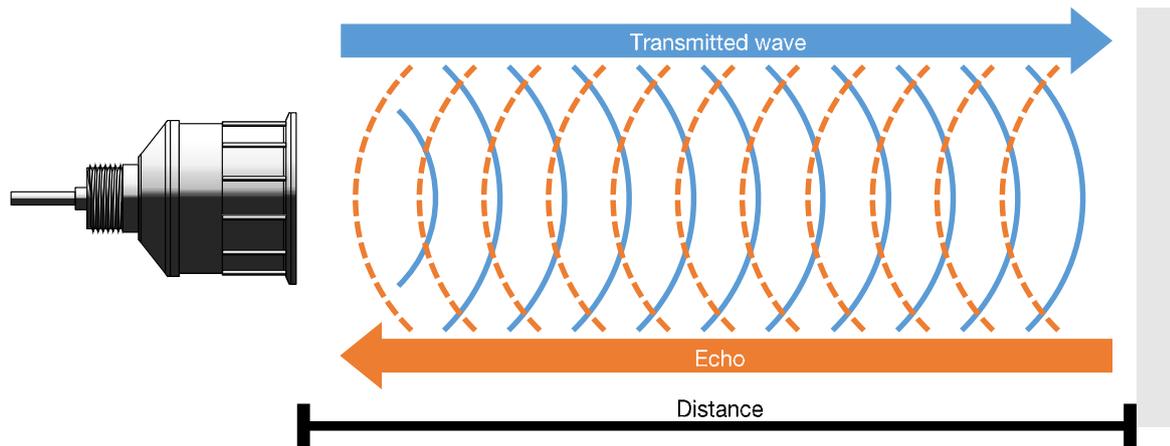
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MEASUREMENT & CONTROL SYSTEMS

# LST series ultrasonic level transmitters



ABB's latest products in the LST series are the most advanced to date in a history of more than 20 years of designing and producing ultrasonic level instruments. LST300 and LST400 provide non-contact level measurement for a range of liquid and bulk solid applications.

## Industries served:

- Water and wastewater
- Power generation
- Chemical
- Oil and gas
- Mining and metals
- Aggregates
- Food and beverage
- Paper and pulp

## Customer benefits:

- Easy installation with easy setup menu and graphic echo display
- Work in various environments where other ultrasonic instruments fail, including narrow areas, turbulent surfaces and surfaces with foam
- Exceptional performance in dusty environments where other ultrasonic level instrument can never work
- Robust products that survive in industrial areas where normal level instruments fail

The on-board microprocessor simultaneously fires an electronic pulse and starts a timer. The transducer converts this electronic pulse to an acoustic pulse, which is directed toward the surface of the material being measured. When the acoustic pulse contacts the surface of the material, energy is reflected back to the transducer, which converts the energy back to an electronic pulse. This pulse is sent back to the microprocessor, which stops the timer and determines the time-of-flight of the signal. By combining the speed of sound through air and the time-of-flight of the pulse, the microprocessor accurately determines the level of the product. Powerful software removes false echoes from the signal and electronic filters remove ambient noise.

## Level measurement with ultrasonic technology

Using a time-of-flight calculation, and knowing the height of the vessel, the LST accurately measures the distance to the target surface using the equation below:

$$\text{Level} = \text{height} - \frac{\text{speed of sound} \times \text{time-of-flight}}{2}$$

Temperature changes the speed of sound, making accurate measurement more challenging. All LST instruments measure and compensate for temperature changes in the background, ensuring accurate measurement over a wide range of ambient conditions.

# LST300 compact ultrasonic level transmitter for liquid applications



LST300 represents the future of level measurement. While using intelligent compact transmitters has always been attractive, certain limitations prevented their use in many applications. LST300 removes those old obstacles.

Whether you have the risk of flooding or corrosive materials in the process, LST300 survive these conditions easily. With metal at the top and PVDF at the bottom, LST300 is the first compact ultrasonic to be resistant to corrosion on the entire instrument. Ingress protection approvals up to IP68 (optional) ensure the entire device can survive flooding.

LST300 combines the most advanced functions found on any ultrasonic in any class, in a compact form. Installation becomes easy thanks to the graphic echo display and advanced diagnostics. The false echo filtering algorithm combined with the best-in-class beam angle ensures easy installation in narrow areas with many obstructions. With the glass technology, you never have to open the cover to configure the instrument. It is hard to believe that all this functionality is available on a device powered by only two-wire loop power.

Whether measuring corrosive chemicals or water, LST300 is the perfect solution for liquid level measurement up to 10 m (32 ft.) range. Robust and reliable with class leading 2 mm accuracy, LST300 provides reliable accurate measurement in your critical applications.

#### Options:

- Through the Glass (TTG) buttons, standard push buttons or without HMI interface
- 6 m (20 ft.) or 10 m (32 ft.) measurement range
- FM, ATEX, IECEx or NEPSI approved, intrinsically safe or non-sparking
- Standard, extendable or floor mounted brackets available for easy installation
- Flange mounting options

# LST400 remote sensor ultrasonic level transmitter for bulk solid and liquid applications



LST400 is built to last in environments where most modern ultrasonic level transmitters fail. LST400 thrives in environments with lots of dust and regions with extreme ambient temperature.

GAP technology controls gain, amplitude and power in the background, ensuring the best performance under any conditions. This unique technology allows LST400 to work in dusty applications where nothing else can.

LST400 saves time by making installation easy. The easy configuration menu allows standard application setup in a minute. The aiming kit and the graphic echo display help you to easily aim LST400 at the surface and away from obstacles.

Functions designed especially for the water industry includes open channel flow and pump control and cycling. LST400 has five relays capable for switching pumps, with preconfigured cycling schemes to ensure equal running time on all pumps.

LST400 is equally comfortable measuring level in large water reservoirs as it is measuring cement in a storage bin. This tough piece of equipment can keep running many years after other systems need replacement, even in your rough industrial environment.

#### Options:

- Standard, corrosion resistant (for chemicals) or foam face (for bulk solids) sensors
- 15 m (50 ft.) or 30 m (100 ft.) measurement range
- Cable length up to 50 m
- Aiming kit for bulk solid installations
- Flange mounting options

# The perfect solution for all your non-contact level measurement needs



ABB LST series meet your needs to measure corrosive liquids, dusty bulk solids or anything in between.

Ultrasonic level technology provides the best performance for liquid level and short range bulk solid level applications. Advances in ultrasonic technology over the last decade has made many measurements possible and even easy, which were previously not possible using the technology. ABB's ultrasonic level transmitters lead the way in the water industry in many ways.

#### Unique benefits:

- Easy to install
- Work in many environments where other ultrasonic instruments fail, including narrow areas, turbulent surfaces and surfaces with some foam
- Industry specific functionalities make ultrasonic the perfect level instrument for the water industry
- Robust instruments that don't fail in tough industrial conditions
- Graphic echo display and diagnostics
- No maintenance needed



# The perfect solution for all your non-contact level measurement needs

	LST300	LST400
<b>Products</b>		
<b>Features</b>	<ul style="list-style-type: none"> <li>— Compact ultrasonic level transmitter</li> <li>— Designed for use in liquid applications</li> <li>— GAP dynamic gain, amplitude and power technology</li> <li>— Graphic echo display for easy installation</li> <li>— Open channel flow with totalizer</li> <li>— Linearizer with volume output</li> <li>— False echo filtering algorithm</li> </ul>	<ul style="list-style-type: none"> <li>— Remote sensor ultrasonic level transmitter</li> <li>— Designed for use in liquid and dusty bulk solid applications</li> <li>— GAP dynamic gain, amplitude and power technology</li> <li>— Graphic echo display for easy installation</li> <li>— Open channel flow with totalizer</li> <li>— Linearizer with volume output</li> <li>— Five relays for pump control and / or alarms</li> </ul>
<b>Sensors</b>	<p><b>C06:</b> Liquid (incl. chemical) applications up to 6 m (20 ft.), blanking distance 0.25 m (10 in.)</p> <p><b>C10:</b> Liquid (incl. chemical) applications up to 10 m (32 ft.), blanking distance 0.35 m (14 in.)</p>	<p><b>S15:</b> Liquid applications up to 15 m (50 ft.), blanking distance 0.5 m (20 in.)</p> <p><b>F15:</b> Bulk solid applications up to 15 m (50 ft.), blanking distance 0.5 m (20 in.)</p> <p><b>C15:</b> Chemical applications up to 15 m (50 ft.), blanking distance 0.5 m (20 in.)</p> <p><b>S30:</b> Long range applications up to 30 m (100 ft.), blanking distance 1 m (40 in.)</p>
<b>Beam angle (@ -3 dB) full angle</b>	<p><b>C06:</b> 7°</p> <p><b>C10:</b> 5°</p>	<p><b>S15 / C15 / F15:</b> 7°</p> <p><b>S30:</b> 6°</p>
<b>Sensor frequency</b>	<p><b>C06:</b> 75 kHz</p> <p><b>C10:</b> 50 kHz</p>	<p><b>S15 / C15 / F15:</b> 41 kHz</p> <p><b>S30:</b> 15 kHz</p>
<b>Accuracy</b>	±0.2 % of full span with best case 2 mm (0.08 in.)	±0.25 % of full span with best case 3 mm (0.15 in.)
<b>Repeatability</b>	±0.2 % of measurement range	±0.25 % of measurement range
<b>Approvals</b>	<p><b>Non incandive:</b></p> <ul style="list-style-type: none"> <li>— cFMus: CL 1/DIV 2 CL II/DIV 2 Zone 2</li> <li>— ATEX/IECEX: II 3 G Exna, II 3 D Exna</li> </ul> <p><b>Intrinsic Safety:</b></p> <ul style="list-style-type: none"> <li>— cFMus: CL 1/DIV 1 CL II/DIV 1 Zone 0</li> <li>— ATEX/IECEX: II 1 G Exia, II 1 D Exia</li> </ul>	CE mark
<b>Power</b>	Two-wire 16 to 42 V DC (loop powered)	110 V AC, 220 V AC or four-wire 20 to 30 V DC
<b>Output</b>	4 to 20 mA with HART	4 to 20 mA with HART 5 relays, 8 A 115/230 V AC, 8 A DC
<b>Temperature</b>	-40 to 85 °C (-40 to 185 °F)	<p><b>Transmitter:</b> -20 to 65 °C (-4 to 150 °F)</p> <p><b>Sensor:</b> -40 to 80 °C (-40 to 175 °F)</p>
<b>Enclosure</b>	IP66/67 or NEMA 4X, PVDF and aluminum alloy	<p><b>Transmitter:</b> IP65 or NEMA 4X, glass loaded polycarbonate</p> <p><b>S15 / F15 sensors:</b> IP68, glass loaded polycarbonate housing with glass reinforced polyester epoxy acoustic window</p> <p><b>C15 sensor:</b> IP68, PVDF</p> <p><b>S30 sensor:</b> IP68, glass loaded polycarbonate and aluminum alloy</p>

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