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ABB MEASUREMENT & ANALYTICS | BROCHURE

# Ultrasonic Level Transmitters for Water and Wastewater Treatment Applications









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# Introduction




Measurement is critical to the water industry. Whether it's efficiency, digital operation and maintenance, or even smart cities, equipment accuracy, stability, and low total cost of ownership are what users care about. Therefore, ultrasonic level transmitters with high measurement accuracy, good stability, low maintenance, and high cost efficiency are widely used in all aspects of the water industry.





# Overview of ABB ultrasonic products



Transmitter	Type	Measurement Range (max.)	Enclosure	Materials	Ingress Protection	Explosion-proof Certification
	LST200	8 m	IP66/IP67/IP68 Polycarbonate, compact	Anti-condensing PC	IP66/IP67/IP68	-
	LST300	6 m, 10 m	IP66/IP67/IP68 Aluminum, compact	PVDF	IP66/IP67/IP68 NEMA 4X	cFMus ATEX/IECx NEPSI
	LST400	15 m, 30 m	IP65 ABS separate version	PVDF or Reinforced Resin	IP66/IP67/IP68 NEMA 4X	CSA

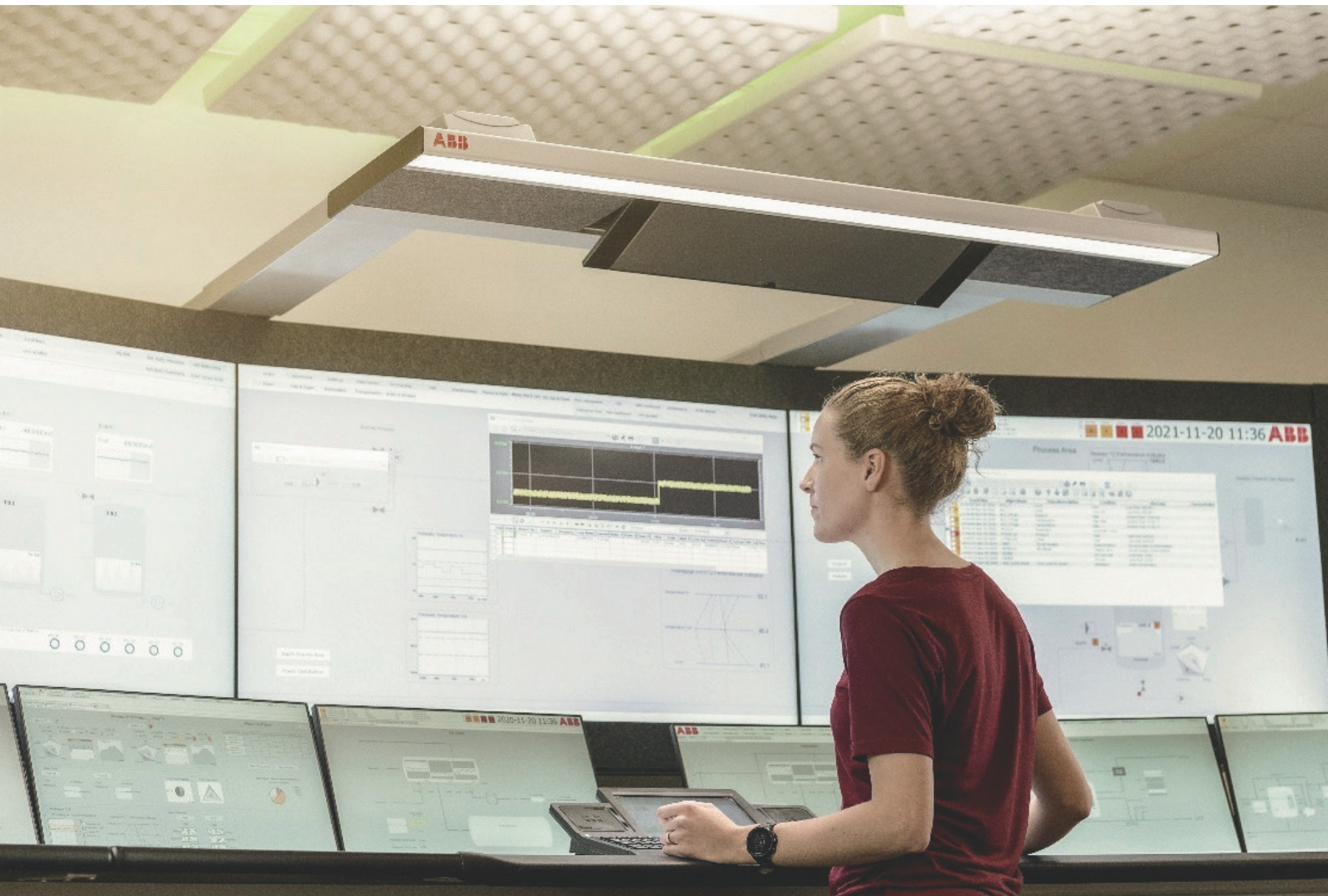
## Typical applications

### Wastewater treatment for smart cities

Separation of rainwater from wastewater is among the most effective methods of wastewater treatment and urban waterlogging mitigation for the time being in cities. The digital and intelligent solutions for separating rainwater from wastewater enable smart and elaborate water treatment. By collecting information including rainfall, water quality, water level and flow rate, it will make a decision and send an instruction – discharge to a wastewater treatment plant, directly into

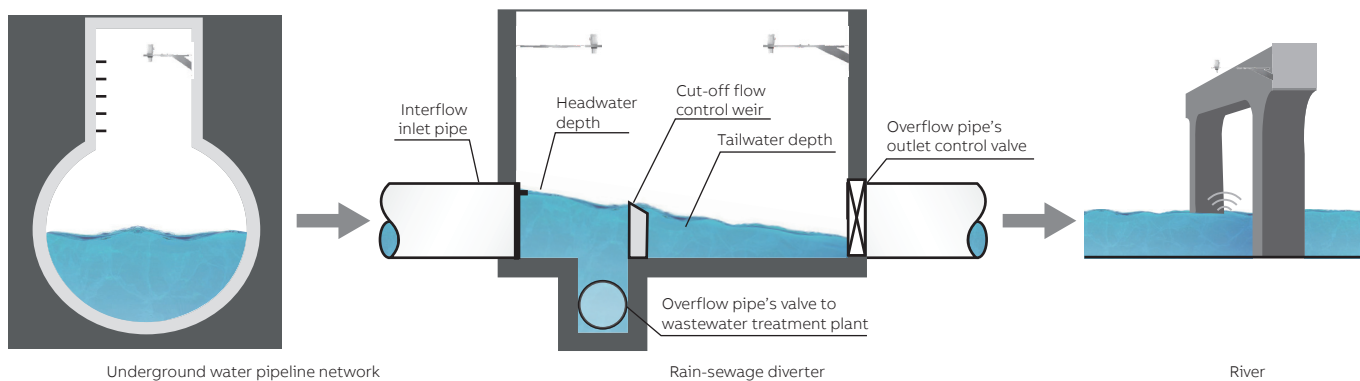
the river, or backflow prevention. It also controls the discharge rate by adjusting the valve opening, weir height, etc.

Ultrasonic level transmitters provide reliable evidence for data analysis of the separation of rainwater from wastewater, including water level in critical points of the pipeline network, the absolute water level in Rain-sewage diverter, water level difference before and after weir, the water level in river, etc.





## Installation diagram



## Recommended products

LST200 integrated ultrasonic level transmitter

The diagram highlights the features of the LST200 integrated ultrasonic level transmitter:

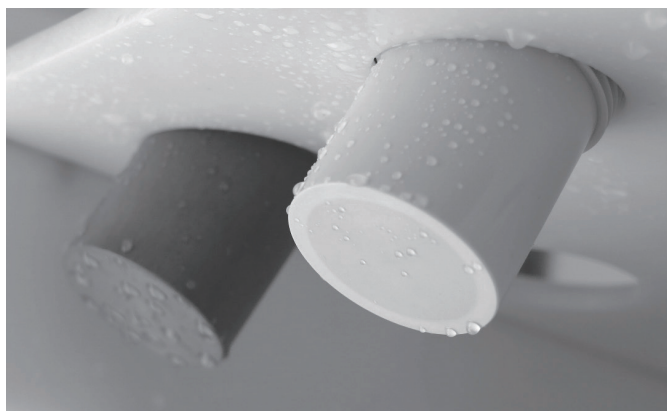
- Easy setup menu and clear backlight for easy configuration within 1 minute:** Indicated by a menu icon and a callout to the device's display.
- Modular design for quick delivery and easy maintenance:** Shown with exploded views of the transmitter's components.
- Embedded real-time waveform and diagnostic messages for quick troubleshooting:** Illustrated with a waveform graph and a magnifying glass icon.
- Intelligent algorithm allows the device to self-adapt to environmental changes:** Represented by a thermometer icon.
- Patented sensor with active surface based on "Lotus Effect", anti-condensation and cleaning maintenance free:** Accompanied by an icon of a lotus leaf and a close-up image of water droplets.
- Winner of Red-dot which only awards "sought-after seal of quality that feature an outstanding design":** Marked with a Red-dot award icon.

**reddot design award**



### Key features

- Corrosion-resistant enclosure with patented anti-condensation sensor design protects against condensation and coatings corrosion, for maintenance-free operation
- Ingress protection certification up to IP68 ensures long term reliable operation in wet environments and withstands temporary flooding
- Backlit display makes on-site inspection and commissioning easier
- Temperature compensation enables accurate field measurement with a large temperature difference
- Intelligent filtering algorithm ensures the stability of the measurement under severe weather conditions such as rain and snow



Anti-condensation sensor (right) vs. conventional sensor (left): comparison of surface water status

### References

A large wastewater treatment system upgrading project in a city with a population of 8 million in China used 600 LST200s in a variety of critical points.



Waveform diagnosis and adaptive adjustment of measurement parameters



# Typical applications

## Pump station

Multi-stage pump stations are required for urban drainage to pump wastewater to the next level. For controlling the start/stop of pumps, continuous monitoring of water level data is essential. In the case of multi-pump coordination, the correct start-stop logic configuration is necessary for managing the discharge rate while improving pump service life.



Installation diagram

### Recommended products

Separate version LST400ultrasonic level transmitter

### Key features

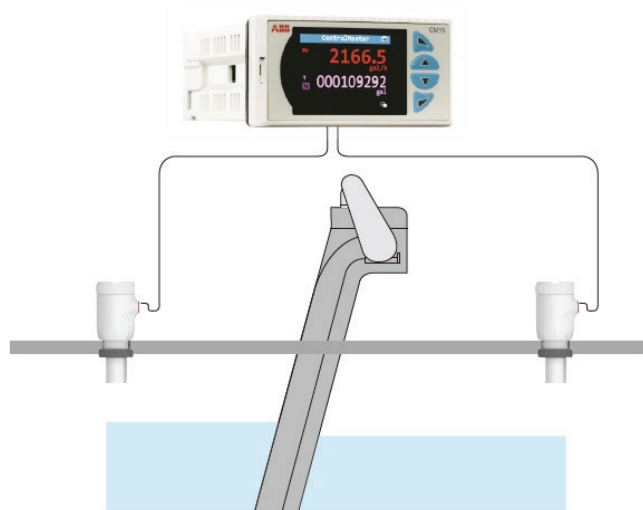
- Powerful four-wire instrument particularly suitable for use cases with high measurement range and strong interference
- Non-contact measurement for easy installation and maintenance-free operation
- With five relays, for controlling the start/stop of pumps while offering counting, alarm, and other functions
- Built-in pump cycling control program for improving the efficiency of setting multi-pump cyclic start-stop logics
- The adaptive algorithm can accurately detect the rapid rise and fall of liquid level and then filter out the resulting interference



## Typical applications

### Wastewater screen's level difference measurement and wireless solutions

Over time, the screen would be blocked, and sediments would be accumulated in the channels both before and after the screen, resulting in increasing water level difference between the channels before and after the screen. The water level difference, therefore, becomes one of the most important process parameters for the screen. By collecting the data on water level differences before and after the screen, the ultrasonic level transmitters provide a basis for the screen cleaning process. Through continuous and real-time data measurement, the change in sediment content could be analyzed to suggest the right maintenance timing or predict the source of failure.



Setup for level difference measurement

LST200 ultrasonic level transmitter+CM15 multi-purpose display +NB-IoT module (optional)

- ABB-approved IoT platform: safe, universal, and efficient
- Enabling simultaneous output of 4~20 mA, Modbus and wireless
- Enabling equipment positioning, real-time data reading and storage, and alarm information push

#### Recommended products

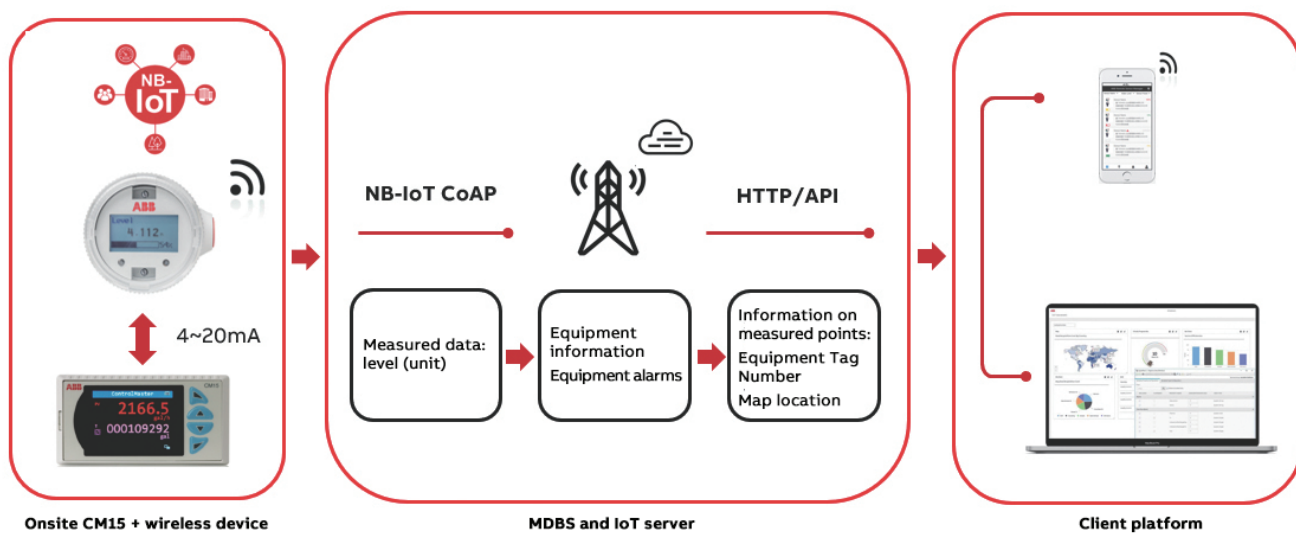
LST200 ultrasonic level transmitter+ CM15 multi-purpose display

#### Key features

The wireless IoT data transmission is achieved through ABB CM15 multi-purpose display with NB-IoT module. The onsite data on the equipment is transmitted wirelessly to the customer's PC or mobile phone, and the reminder message is pushed. It allows for digital upgrading. Customers can learn about the screen's operating status in real time, collect statistics on long-term operations, and finally make predictive cleaning and maintenance plans.





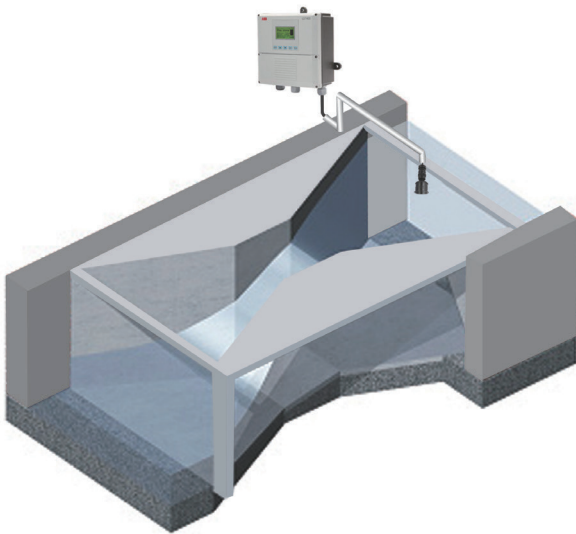


Demonstrations of remote data acquisition scheme based on NB-IoT and of the App on PCs/mobile phones

# Typical applications

## Open channel flow measurement

An open channel is an exposed ditch along which liquid flows freely under atmospheric pressure and by relying on gravity along the slope of the channel. Under the defined channel specifications, the instantaneous flow rate can be determined by simply measuring the liquid level. Thanks to easy measurement, lower cost, maintenance free, high measurement range and immunity to disturbance from external environment, the open channel flow measurement method is widely used in irrigation, water or wastewater treatment and other applications.



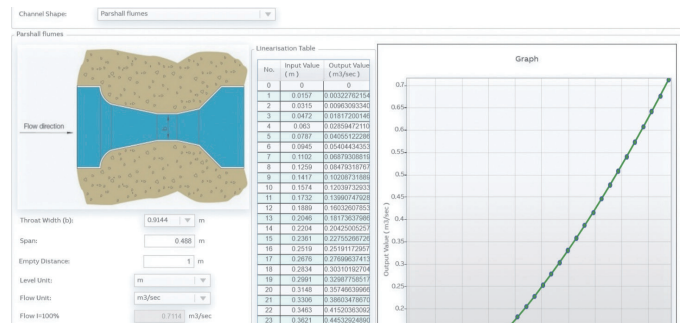
Installation diagram

### Recommended products

ABB's complete portfolio of ultrasonic level transmitters

### Key features

ABB's complete portfolio of ultrasonic level transmitters offers open channel flow measurement with extensive built-in options of standard open channel specifications. Without calculation and configuration by experts, it improves the configuration efficiency and flexibility for users. LST400 ultrasonic level transmitter with storage, counting, relay and other features can be customized to customer needs.

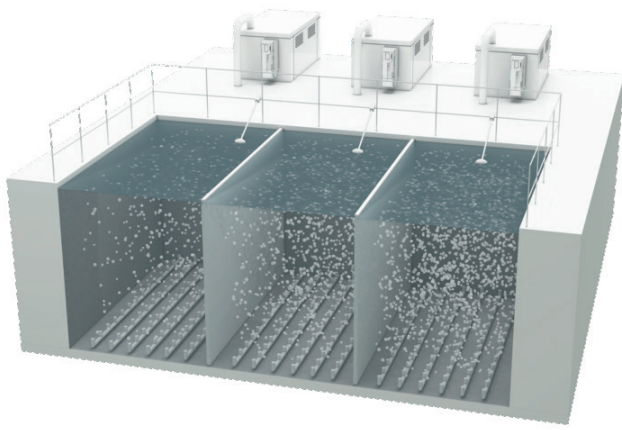




# Typical applications

## Aeration basin

Aeration is the process of introducing air into a body of water to increase its dissolved oxygen level. By providing sufficient oxygen required by aerobic microorganisms and meeting the mixing conditions for full contact between wastewater and activated sludge, it helps degrade organic pollutants through biochemical reactions. An aeration basin, therefore, faces the challenge of turbulence and foam.



### Recommended products

ABB's complete portfolio of ultrasonic level transmitter

### Key features

- The adaptive algorithm makes it work easily in the presence of turbulence and foam, ensuring the stability of the output
- With non-contact measurement, patented anti-condensation design, ingress protection certification up to IP68 and resistance to corrosion, it works reliably for a long time in the field with reduced operation and maintenance costs



## Typical applications

### Storage tank with complex internal conditions



The disturbance from obstacles is avoided using waveguide

#### Recommended products

ABB's complete portfolio of ultrasonic level transmitters

#### Key features

- Highest accuracy up to 2 mm for precise control of stock
- Optional highly corrosion-resistance materials extend the service life
- For storage tanks with complex internal structures or operating conditions (stirring, piping, filling curtain, small blocking distance), the stability of measurement should be improved by ensuring the rationality of instrument installation. For example, the blocking distance for the instrument is avoided by elevating the installation location. The quality of ultrasonic transmission is improved, and the interference is avoided using a waveguide. A short mounting hole with a high diameter is selected as possible. And an appropriate installation location is determined.

The blocking distance for the instrument is avoided by elevating the installation location, which allows for measuring liquid level for even a full tank.



#### Stirring conditions

An appropriate installation location is determined to keep away from the mixing propeller. The ultrasonic reflection loss is reduced by increasing the mounting nozzle with a high diameter or using a pipe as a waveguide.





# Typical applications

## Bulk solids /sludge tank

Bulk solids, especially including loose porous sludge, result in significant absorption of ultrasonic waves. A measuring instrument with high measurement range should be selected to ensure sufficient power for proper measurement. ABB's LST400 ultrasonic level transmitter with max. measurement range of 30 m can be used in most wastewater treatment plants to measure sludge volume.



### Recommended products

Separate version LST400 ultrasonic level transmitter

### Key features

- 4-wire product supplied from separate power, ensuring higher output power and measurement range, to hedge against ultrasonic power loss when facing bulk solids or even sludge
- A separate version instrument transmits sensor signals 50 meters away to the control box, allowing for commissioning next to a tank or in the control room
- Relay outputs support real-time control



## Typical applications

### Storage tank with high measurement range



Storage tanks with high measurement ranges present a challenge to an ultrasonic level transmitter in terms of power and installation rationality. Under favorable operating conditions, a product with a suitable measurement range can be selected. But under unfavorable operating conditions like a nozzle with a small diameter, bulk solids, dust, foam, steam, or turbulence, a higher margin of measurement range is recommended in consideration of the excessive loss of ultrasonic power.

#### Recommended products

- LST300 C10 transmitter with a measurement range of 10 m, 2-wire compact
- LST400 S15/C15/F15 transmitter with a measurement range of 15 m, 2-/4-wire, separate version
- LST400 S30 transmitter with a measurement range of 30 m, 2-/4-wire separate version









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