


# SmartSonic Ultrasonic Sensor


## Non-contact. Highly accurate. Continuous level sensor.

- Continuous level measurement for tanks, bins, silos and conveyors
- Measures liquids and solids
- Advanced narrow beam design eliminates false echoes
- 4-20 mA output and RS-485 / Modbus RTU communication
- PC utility and diagnostic software
- Rugged NEMA 4X enclosure for harsh environments
- Built-in compensation for temperature changes
- Sanitary models for food grade applications
- Self-cleaning operation for minimal maintenance

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# Non-Contact Level Measurement

***The BinMaster SmartSonic ultrasonic sensor is used for continuous non-contact level measurement in tanks, bins, silos and conveyors. It works by transmitting an ultrasonic pulse of pressurized air to the surface of the material in a vessel. The pulse reflects off the material and returns to the sensor in the form of an echo that is received by a microphone. The sensor then sends a 4 –20 mA analog output signal to record the measurement directly to an existing control system or display module, and can send data to a PC running utility and diagnostic software. For those users who routinely utilize Modbus in their operation, Modbus RTU communications are available.***

*Measuring liquids in food processing tanks.*

## Eliminates False Echoes

The SmartSonic ultrasonic level sensor features high efficiency, narrow beam design technology using a wide frequency bandwidth to enhance operation in difficult applications. The sensor performs particularly well in harsh environments where vessel temperatures vary. Also, SmartSonic uses smart signal processing to eliminate unwanted echoes from tank walls, standpipes, and other tank structures that often cause error readings by other ultrasonic devices. The unit's transducer uses a built-in, self-cleaning operation to eliminate buildup or condensation that can impair performance.

## Auto-Adjusts for Higher Accuracy

SmartSonic sensors are designed to adapt to the internal tank conditions, automatically adjusting power and receiver sensitivity to any distance and reflecting surface. This technology ensures the same echo is maintained over the entire operating range which enhances measurement accuracy. The net benefit is the SmartSonic ultrasonic sensor has a low incidence of false echoes, which are common among competitive ultrasonic products. The SmartSonic beam is very uniform and automatically controlled in the advanced electronics of the sensor design, allowing the sensor to perform where some competitive ultrasonic devices have failed.

*Ultrasonic is often used in chemical processing plants.*

*SmartSonic can be installed on belt conveyors.*

## Works in Liquids or Solids

The SmartSonic ultrasonic level sensor can be used in a wide range of materials including oil, water, municipal waste, acids, aggregates and solids. There are many models featuring different operating ranges dependent on the size of the tank in which the device will be installed. SmartSonic is applied in most all types of liquids, from simple substances like water to more challenging liquid applications such as oils and syrups. For solids applications, the 25UC and 45UC models may be used in smaller vessels with a solids measuring range of approximately half the distance for that of liquids. Simple push-button calibration makes SmartSonic easy to program and highly accurate. Built-in temperature compensation and self-cleaning operation of the sensor face make SmartSonic highly reliable, while requiring minimal maintenance.

# SmartSonic's Advanced Features

## Flexible, Scalable System Design

Configurable for a flexible number of sensors, relays, current loops, and PC or PLC interfaces

## Multiple Voltage and Range Options

Sensor power options include 115 VAC, 230 VAC and 12 to 30 VDC and variable measuring range options to fit each application

## Simple Calibration

Calibration is performed via simple push button, or with a communication port using a PC

## Machined Enclosure

The electronics enclosure is precision machined, not molded, to ensure it does not have voids that can interfere with operation

## Temperature Compensation

A built-in temperature sensor automatically compensates for temperature changes, ensuring consistent measurement accuracy

## RS-485 Communications

Sensors can interface directly with a PC allowing for data monitoring, parameter changes, and sensor diagnostics

## Self-Cleaning Operation

High energy cleaning pulses eliminate buildup or condensation on the sensor's transducers

## Models for Sanitary Applications

A sanitary model with higher temperature tolerances and a stainless steel face is available for applications where sanitary standards apply


# Level Applications for SmartSonic

## Liquids

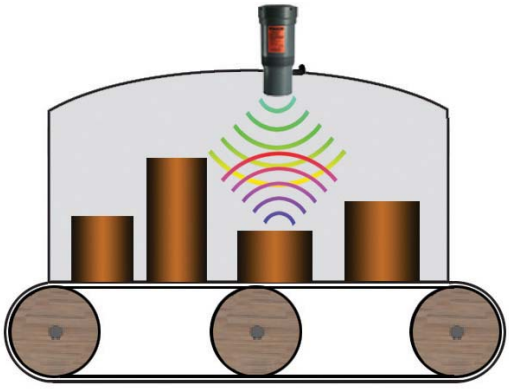
Due to their even surface, liquids are generally simple to measure with a SmartSonic ultrasonic sensor. SmartSonic has been proven to work in simple liquids like water and wastewater as well as more challenging liquids. SmartSonic's advanced design with its narrow beam and ability to eliminate false echoes allows for success in challenging applications such as when the sensor must be mounted close to a wall or there are tank obstructions that must be blocked out to avoid measuring inaccuracies.

## Solids

SmartSonic is suited to a variety of solids applications. The sensor can be installed in a bin, tank, silo or over a conveyor. SmartSonic's fast response time allows for materials moving by on a conveyor to be monitored to ensure proper feeding of material and to detect blockages. Its built-in temperature compensation ensures accurate measurements in variable conditions.

### Applications for Ultrasonic Devices

- Water without foam
- Liquids without methane and $CO_2$
- Water and solid mixtures
- Diesel fuel or oil
- Inks and water-based paint containers (low fume)
- Solids with limited dust (divide maximum sensor range by 2)
- Object detection, fast moving objects
- Material detection on belt conveyers
- Sanitary applications with CIP
- High temperature environments
- Applications where there is up to 5 bars of pressure (no vacuums)
- As an anti-collision system
- Pharmaceutical applications (small tanks)
- Top of foam detection for short distances (divide maximum sensor range by 6)

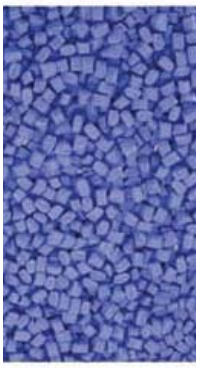


# Standard SmartSonic Models

| 115 VAC (4-Wire) Models | | | |
|---|---|---|---|
| Model | Operating Range | Resolution | Mounting |
| SS400-25UC | 1.4 to 90 ft.<br>0.40 to 27.4 m | 0.41”<br>10 mm | 6.0” or 1.0” NPT |
| SS400-45UC | 1.0 to 60 ft.<br>0.30 to 18.2 m | 0.27”<br>6.8 mm | 3.0” NPT |
| SS400-52UC | 0.9 to 50 ft.<br>0.27 to 15.2 m | 0.23”<br>5.7 mm | 3.0” or 2.0” NPT |
| SS400-70UC | 0.8 to 30 ft.<br>0.24 to 9.1 m | 0.13”<br>3.4 mm | 3.0” or 2.0” NPT |
| SS400-80UC | 0.7 to 20 ft<br>0.21 to 6.1 m | 0.088”<br>2.2 mm | 3.0” or 2.0” NPT |
| SS400-81UC | 0.6 to16 ft.<br>0.18 to 4.9 m | 0.07”<br>1.8 mm | 3.0” or 1.5” NPT |
| SS400-148UC | 0.4 to 9 ft.<br>0.12 to 2.7 m | 0.04”<br>.98 mm | 3.0” or 1.0” NPT |
| **12 to 30 VDC (3-Wire) Models** | | | |
| Model | Operating Range | Resolution | Mounting |
| SS300-25UC | 1.4 to 90 ft.<br>0.40 to 27.4 m | 0.41”<br>10 mm | 6.0” or 1.0” NPT |
| SS300-45UC | 1.0 to 60 ft.<br>0.30 to 18.2 m | 0.27”<br>6.8 mm | 3.0” NPT |
| SS300-52UC | 0.9 to 50 ft.<br>0.27 to 15.2 m | 0.23”<br>5.7 mm | 3.0” or 2.0” NPT |
| SS300-70UC | 0.8 to 30 ft.<br>0.24 to 9.1 m | 0.13”<br>3.4 mm | 3.0” or 2.0” NPT |
| SS300-80UC | 0.7 to 20 ft<br>0.21 to 6.1 m | 0.088”<br>2.2 mm | 3.0” or 2.0” NPT |
| SS300-81UC | 0.6 to16 ft.<br>0.18 to 4.9 m | 0.07”<br>1.8 mm | 3.0” or 1.5” NPT |
| SS300-148U & UC | 0.4 to 9 ft.<br>0.12 to 2.7 m | 0.04”<br>.98 mm | 3.0” or 1.0” NPT |

# Specifications

| Mechanical | |
|---|---|
| Conduit Entry | ½” NPT (PVC conduit only) |
| Enclosure | PVC-94V0 |
| Enclosure Rating | NEMA 4X (IP65) |
| **Environmental** | |
| Standard Temperature | -4°F to 140°F (-40°C to 60°C) |
| High Temperature | -4°F to 266°F (-40°C to 130°C) |
| Pressure | Maximum 2 bars |
| Approvals | Entela – CSA/UL |
| **Operational** | |
| Accuracy | +/-0.1% of maximum range |
| Beam Angle | 6° to 12° conical at -3dB |
| Loss of Echo | Hold 1 minute, 22 mA or 2 mA output |
| Temperature Compensation | In transducer |
| Calibration | Push-button or programmable via optional communications port |
| Diagnostics | Echo profile via communications port |




# SmartSonic Sanitary Sensors


The sanitary models are designed specifically for applications where sanitary standards apply such as in water treatment plants, food and beverage manufacturing, or pharmaceutical processing. These sensors are appropriate for measuring ranges from five inches to 30 feet by using different operating frequencies. The 300 series features a stainless steel mounting adapter and transducer face that is self cleaning to automatically remove any buildup for ease of maintenance.

The sanitary sensor can withstand temperatures up to 266°F (130°C) for up to one-half hour for a steam cleaning cycle in the tank. The sanitary models feature the same easy push-button calibration, built-in temperature compensation, and RS-485 communications built into all SmartSonic sensors.

| 115 VAC (4-Wire) Models | | | |
|---|---|---|---|
| Model | Operating Range | Resolution | Mounting Adapter |
| SS400-70UCS | 0.8 to 30 ft.<br>0.24 to 9.1 m | 0.13”<br>3.4 mm | 2.0” |
| SS400-80UCS | 0.8 to 20 ft.<br>0.24 to 6.1 m | 0.088”<br>2.2 mm | 2.0” |
| SS400-81UCS | 0.6 to 16 ft.<br>0.18 to 4.9 m | 0.07”<br>1.8 mm | 2.0” or 1.5” |
| SS400-148UCS | 0.4 to 9 ft.<br>0.12 to 2.7 m | 0.04”<br>0.98 mm | 2.0” or 1.5” |
| 12 to 30 VDC (3-Wire) Models | | | |
| Model | Operating Range | Resolution | Mounting Adapter |
| SS300-70UCS | 0.8 to 30 ft.<br>0.24 to 9.1 m | 0.13”<br>3.4 mm | 2.0” |
| SS300-80UCS | 0.8 to 20 ft.<br>0.24 to 6.1 m | 0.088”<br>2.2 mm | 2.0” |
| SS300-81UCS | 0.6 to 16 ft.<br>0.18 to 4.9 m | 0.07”<br>1.8 mm | 2.0” or 1.5” |
| SS300-148UCS | 0.4 to 9 ft.<br>0.12 to 2.7 m | 0.04”<br>0.98 mm | 2.0” or 1.5” |

*Square or rectangular tanks pose no challenge.*

*Water treatment facilities utilize SmartSonic.*

# Two-Wire SmartSonic Sensors

***If only a simple 4 – 20 mA output is required, a two-wire SmartSonic ultrasonic sensor may be utilized. Available in both standard and sanitary models, the two-wire model offers all of the design benefits of SmartSonic technology, but with more limited communications options. Programming is done on the sensor versus via PC software.***

| Mini 12 to 30 VDC (3-Wire) Models | | | |
|---|---|---|---|
| Model | Operating Range | Resolution | Mounting |
| SS200-52U | 0.9 to 50 ft.<br>0.27 to 15.2 m | 0.23”<br>5.7 mm | 2.0” NPT<br>1.8”Ø x 2.25”H |
| SS200-70U | 0.8 to 30 ft.<br>0.24 to 9.1 m | 0.13”<br>3.4 mm | 2.0” NPT<br>1.8”Ø x 2.25”H |
| SS200-80U | 0.7 to 20 ft.<br>0.21 to 6.1 m | 0.088”<br>2.2 mm | 2.0” NPT<br>1.8”Ø x 2.25”H |
| SS200-81U | 0.6 to 16 ft.<br>0.18 to 4.9 m | 0.07”<br>1.8 mm | 2.0” NPT<br>1.8”Ø x 2.25”H |
| SS200-148U | 0.4 to 9 ft.<br>0.12 to 2.7 m | 0.088”<br>2.2 mm | 2.0” NPT<br>1.8”Ø x 2.25”H |

## SmartSonic Mini Sensor

The SmartSonic mini ultrasonic sensor is especially designed for smaller liquid tanks up to six feet tall. Most often applied in the food, beverage, water and pharmaceutical industries, it features a standard 4 – 20 mA output and optional RS-485 communication with calibration, diagnostics and logging software. It also offers an optional high level alarm relay with adjustable time delay. Like other SmartSonic models, it has built-in temperature compensation and simple push-button calibration.

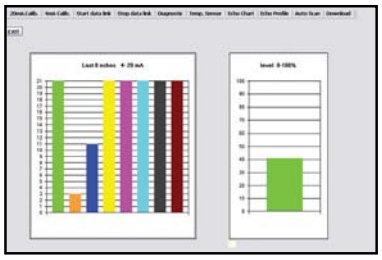
For sanitary applications, the SmartSonic sanitary mini ultrasonic sensor is available in measuring ranges up to 16 feet. It features a stainless steel 316L transducer face and mounting adapter so it can be used in food, beverage, water and pharmaceutical processing where stringent sanitary requirements must be met.

| Mini 12 to 30 VDC (3-Wire) Models | | | |
|---|---|---|---|
| Model | Operating Range | Resolution | Mounting |
| SS300-148UMC | 0.33 to 6 ft.<br>0.10 to 1.8 m | 0.03”<br>0.7 mm | 1.0” NPT |
| SS300-148UMCX | 0.33 to 6 ft.<br>0.10 to 1.8 m | 0.03”<br>0.7 mm | 1.5” Ferrule |
| SS300-81UMCX | 0.6 to 16 ft.<br>0.18 to 4.9 m | 0.088”<br>2.2 mm | 1.5” Ferrule |

# SmartSonic Accessories

## PC-Based Software

The SmartSonic ultrasonic sensor comes equipped with standard software that allows for monitoring of the tank level for up to 30 SmartSonic sensors from a personal computer using RS-485 communications. This utility software is used to view the current tank level and other parameters such as the echo profiles and echo stability chart and allows for changing parameters including full and empty tank calibration. The software also provides the tools to perform a full diagnostic check for loss of echo, temperature sensor failure, noise error and other conditions.



## Display Modules

Optional display modules can be used with the SmartSonic sensors for remote viewing of the tank level. Dependent on the model selected, the display module will display the percentage full on a bar graph or display the information via an LED display. Other features include optional dual set points that allow for easy adjustment from the front of the display. The display modules are available with optional relay outputs to provide process control or local alarms. Alternatively, process loop analog output modules can be used to transmit the measurement data to a PLC, DCS or other analog device.

The display modules can be panel mounted in the control room, or an optional display module enclosure can house either five, seven or eleven display modules. The enclosure cabinet is constructed of high impact polycarbonate and is NEMA 4X rated to withstand harsh industrial environments.

## Ball & Socket Mounting Flange

If the sensor is being mounted on a dome or angled rooftop, the SmartSonic ultrasonic sensor can be mounted using an optional self-aligning, carbon steel, 3” ball and socket flange. This flange provides a vertical connection and enables easy aiming flexibility in reduce the risk of false echoes.

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