ToughSonic®
Ultrasonic Sensor

BinMaster ToughSonic ultrasonic level and distance sensors use non-contact technology to measure through the air using ultrasonic sound waves. They provide fast, reliable non-contact measurements at distances up to 50 feet (15.2 meters). ToughSonic sensors measure the level of liquids in open or closed tanks and in outdoor environments.

Applications include inventory management, batch control, high or low alerts, and scheduling the ordering, delivery, pick up, or disposal of liquid products. They are suitable for distance ranging, harmless liquid, and compatible chemical level applications, including agricultural irrigation, flood monitoring, object detection, roll diameter and general industrial automation.

SIMPLE SENSORVIEW™ SETUP

SensorView™ Setup Software is a Windows® compatible application that makes it easy to configure, test, and clone any ToughSonic® ultrasonic sensor. Use your PC on-site or remotely to adjust, validate, and duplicate sensor setup parameters. Measurements can be displayed in metric or English units. Update one sensor or a group of sensors using Group Control.

Easy to Use

Real-time graphics for each sensor parameter. Simply open a parameter to revise it, and then send it to a sensor to update it.

Help tips pop up when you mouse over any screen element or parameter. Tips can be time delayed or turned off.

Reference targets improve temperature compensation with no field calibration necessary.

Repositionable Views

Large character display option to view PC screen measurements when working on equipment up to 100 feet away.

Measurement history graphs show distance over time. Adjust scales manually or automatically. See filtered/ unfiltered data simultaneously in real-time.

Historical Data

Sensor setup can be saved, retrieved, and then recalled and copied to new sensors or shared by email in just seconds.

Powerful Setup

Easily adjust functionally organized parameters. Calibrate and set measurement rates, ranges, filters, and timeouts for unusual conditions.

Multi-sensor management lets you change sensor parameters using Group Control.

Sensor parameter duplication reduces setup and downtime for OEM and MRO maintenance and installation.

Performance Analysis

Easily adjust functionally organized parameters. Calibrate and set measurement rates, ranges, filters, and timeouts for unusual conditions.

Multi-sensor management lets you change sensor parameters using Group Control.

Sensor parameter duplication reduces setup and downtime for OEM and MRO maintenance and installation.

SIMPLE TOUGHSONIC® SETUP

ToughSonic Outputs

ToughSonic sensors require a wired interface for setup and to transmit data to SensorView or BinCloud. The sensors offer a robust RS-485 serial data interface that has high noise immunity and sends data reliably over long cable lengths. RS-485 supports up to 32 addressable sensors connected to a single data bus. Sensors with both RS-485 and Analog outputs are also available.

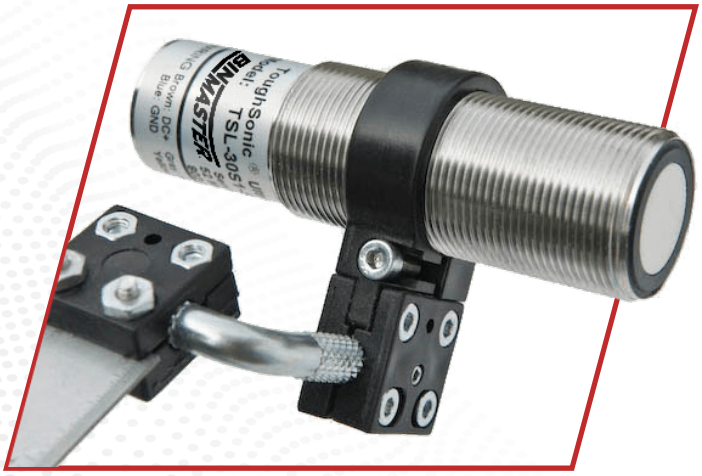
BinCloud for ToughSonics

These ultrasonic sensors can also be integrated into BinCloud inventory management software. All BinMaster continuous level sensors – including ultrasonics – as well as any sensor with a 4-20 mA output can be used with BinCloud for:

- **Alerts & Notifications:** Timely status updates to address critical inventory situations promptly
- **Multiple-Site Management:** See and sort every bin, tank, or silo at every site
- **Historical Data:** Data-driven decision-making to optimize purchasing
- **Reporting Tools:** Track bulk materials by site, identify trends, automate reports
- **Custom Roles:** Tailor BinCloud® for a personalized, secure user experience
- **Effortless Ordering:** Integrate your supply chain with Vendor Managed Inventory

Mounting a ToughSonic

There are multiple mounting options to make installing a ToughSonic sensor simple. For a TS-100 series 30mm threaded sensor use a swivel-style sensor mount, stainless steel mount, block clamp mount, or an adjustable multi-axis sensor clamp. There are also standard and elevated 2" NPT to 30mm thread adapters. For TS-200 series sensors, use the appropriate 1.5", 2" or 2.5" NPT female thread adaptor. Accessories such as 90° adapters and 90° stainless steel sensor mounts allow for installation in tight spaces or along walls.



TOUGHSONIC® 100 SERIES

These rugged, compact ultrasonic sensors live up to the “ToughSonic” name. Made in the USA, The TS-100 features durable construction with heavy-duty electronics epoxy potted into type 316 stainless steel housings. TS-100 series sensors feature permanently attached cables and ruggedized piezoelectric transducers.

They are used for non-contact level measurement in tanks and mixers in liquid processing operations and excel in harsh factory environments. In environmental applications, they are used to monitor and control water and non-volatile liquid levels in storage tanks and open-air conditions.

The TS-100 can protect expensive assets and enhance safety when used for distance monitoring in heavy mining, aggregate, and farm equipment applications. They can measure distances and detect objects on conveyor belts and production lines.

Free Setup Software

TS-100 sensors come with free SensorView™ software to simply set up, manage, and maintain your network of ultrasonics. You can quickly adjust, optimize, save, and clone sensor parameters to each application without time-consuming calibration!

Features of TS-100 Sensors

Distance Measurements

- Up to 14, 30, or 50 range with minimal dead band
- Unaffected by visual factors like color and transparency
- SensorView™ PC software setup
- Adjustable transmit power to optimize performance
- Temperature compensated accuracy

Performance Enhancements

- For indoor and outdoor applications
- Versatile mounting options
- Durable sealed housing for wet or dirty applications
- Input/output short & overload protection
- Multi-sensor measurement synchronization
- Adjustable sensitivity via SensorView™ software
- Rear status indicators visualize current sync status

100 SERIES SPECIFICATIONS

	ToughSonic TS-100.14	ToughSonic TS-100.30	ToughSonic TS-100.50
Maximum/ Optimum Range	14 ft (4.3 m) / 10 ft (3 m)	30 ft (9.1 m) / 20 ft (6.1 m)	50 ft (15.2 m) / 33 ft (10 m)
Deadband	0-4 in (0-102 mm)	0-10 in (0-254 mm)	0-12 in (0-303 mm)
Mounting Options	US: 1 in NPT Metric: 30 x 1.5 mm	US: 1.5 in NPT Threaded both ends	Clamp, or 1.5 in NPT rear, or PVC 2.5 in NPT front & rear
Transducer	Standard, beam width 12 +/-2 degrees	Standard, beam width 15 +/-2 degrees	Standard, beam width 12 +/-2 degrees
Dimensions	Length: 4.062 in (103.2 mm) Diameter: 1.32 in (33.3 mm) max	Length: 4.30 in (109 mm) Diameter: 1.88 in (48 mm)	Refer to data sheets
Selectable Outputs	– Serial data – Voltage/switch – Current/switch *Switch Selectable	– Serial data – Voltage – (2) Current – (2) Switches	– Serial data – Voltage – (2) Current – (2) Switches
Adjustments	SensorView™ & push-button “teachable”	SensorView™ & push-button “teachable”	SensorView™ adjustable only, no push-button
Cable	6.5 ft (2 m) pigtail standard (other lengths available) 4 or 6-wire, + drain	6.5 ft (2 m) pigtail standard (other lengths available) 4 or 9-wire, + drain	6.5 ft (2 m) pigtail standard (other lengths available) 4 or 9-wire, + drain
Serial Data-Only Models	Cable: 4-wire + drain	Cable: 4-wire + drain	Cable: 4-wire + drain

TOUGHSONIC® 200 SERIES

Tough applications call for even tougher ultrasonic sensors. The TS-200 series ultrasonic sensors are resistant to deterioration from chemical exposure. These rugged, compact ultrasonic level sensors measure a wide variety of liquids including tanks in the plastics, wood products, paper, agriculture, and food processing industries.

Heavy duty electronics are epoxy potted into a chemical-resistant plastic housing that physically isolates the transducer and electronics from the target material. TS-200 series sensors are used both indoors and out, and in some of the harshest processing environments. It is ideal for a wide variety of chemicals and can withstand exposure to both acids and bases. TS-200 sensors also excel in liquid level applications where chemical resistance is not required.

TS-200 series sensor housings are made of chemical-resistant polyvinylidene fluoride (PVDF), which is commercially known as Kynar®. This is an excellent housing material for ultrasonic sensors since it is highly resistant to a wide range of chemicals including most inorganic acids, bases, organic acids, alcohols, solvents, and strong oxidizing agents. PVDF is suitable for applications where exposure to harsh chemicals is expected, such as in many processing industries.

3 Range Options

The TS-200 comes in maximum ranges of 14', 20', and 35'.

	ToughSonic TS-100.14	ToughSonic TS-100.30	ToughSonic TS-100.50
Maximum/ Optimum Range	14 ft (4.3 m) / 10 ft (3 m)	30 ft (9.1 m) / 20 ft (6.1 m)	50 ft (15.2 m) / 33 ft (10 m)
Deadband	0-4 in (0-102 mm)	0-10 in (0-254 mm)	0-12 in (0-303 mm)

ToughSonic® 14

ToughSonic® 20

ToughSonic® 35

200 SERIES SPECIFICATIONS

	ToughSonic TS-200.14	ToughSonic TS-200.20	ToughSonic TS-200.35
Maximum / Optimum Range	14 ft (4.3 m) / 10 ft (3 m)	20 ft (6.1 m) / 13 ft (4 m)	35 ft (10.7 m) / 25 ft (7.6 m)
Deadband	0-3.5 in. (0-8.9 cm)	0-8 in (0-20.3cm)	0-12 in (0-30.5cm)
Top Threads	1 in NPT, tapered	1 in NPT, tapered	1 in NPT, tapered
Bottom Threads	1.5 in NPT (tapered threads)	1.5 in, fits NPT or BSP (threads not tapered)	2 in, fits NPT or BSP (threads not tapered)
Body & Transducer	PVDF (Kynar®), Beam Width 12 +/-2 degrees	PVDF (Kynar®), Beam Width 14 +/-2 degrees	PVDF (Kynar®), Beam Width 10 +/-2 degrees
Dimensions (D x L)	3.05 x 4.99 in (77 x 126 mm)	3.05 x 5.62 in (77 x 143 mm)	3.05 x 5.62 in (77 x 143 mm)
Simultaneous Outputs	5 plus serial data Voltage, 2 current, 2 switches	5 plus serial data Voltage, 2 current, 2 switches	5 plus serial data Voltage, 2 current, 2 switches
Adjustment	SensorView™ PC software	SensorView™ PC software	SensorView™ PC software
Cable	6.5 ft (2 m) pigtail 9-wire + drain	6.5 ft (2 m) pigtail 9-wire + drain	6.5 ft (2 m) pigtail 9-wire + drain
Cable, Serial Data-Only Models	6.5 ft (2 m) pigtail 4-wire + drain	6.5 ft (2 m) pigtail 4-wire + drain	6.5 ft (2 m) pigtail 4-wire + drain

ULTRASONIC SENSOR APPLICATIONS

Water Level Monitoring

BinMaster's ultrasonic sensors perform reliably in open-air and stilling tube applications. These non-contact sensors mount above the material with the sensor face pointed to the liquid surface below. The TS-100 general-purpose sensors are suited to rigorous outdoor demands of irrigation or pond, river, stream, lake, and sea level monitoring. In extreme climatic conditions, they provide valuable weather-related data for open channel flow, flood monitoring, tide, wave, and tsunami warnings. Other uses include industrial and commercial wastewater and manure pit monitoring. The 316 stainless steel housings have a long service life under outdoor use, withstanding salt water, wide temperature ranges, and hydrogen sulfide sewer gas.

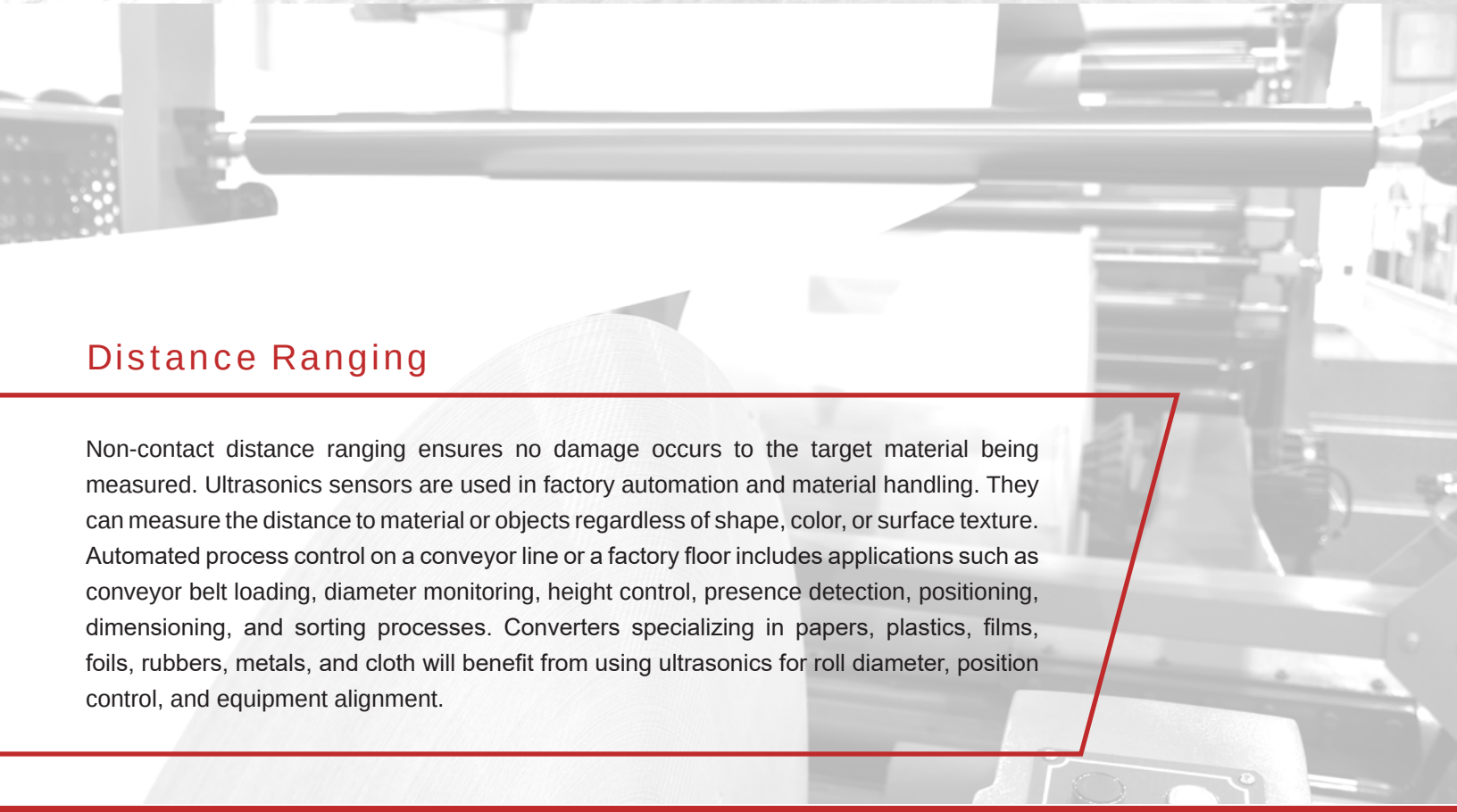
Tank Level Gauging

To measure liquids, ultrasonic sensors mount on top of the tank and send pulses down to the surface. The level or volume is calculated by measuring the distance to the surface and entering the tank height and geometry. TS-100 and TS-200 are used in tanks with tank blanketing or an open top. When integrated with BinCloud inventory software, users can identify full, empty, or reorder levels. Batch, pump, and valve control can be achieved when these sensors are networked to industrial equipment. BinMaster's general-purpose TS-100 sensors measure water and harmless liquids, while the TS-200 in a Kynar® PVDF enclosure is resistant to many chemicals.

ULTRASONIC SENSOR APPLICATIONS

Agriculture & Farming

In agriculture, ultrasonic sensors are used for water and liquid level monitoring, distance, and object detection. They automatically report and update levels in irrigation ponds, open channels, rivers, and other bodies of water. Ultrasonic technology is also ideal for liquids stored in tanks, silos, and other containers. The sensors can monitor levels during fertilizer application, in planters and sprayers, or help monitor crop plant height. Distance detection vehicle applications encapsulate agriculture, construction, and municipal vehicles to protect expensive equipment from costly accidents. Alerting operators before a collision occurs improves safety by detecting obstacles and moving vehicles or equipment in their immediate surroundings.



Distance Ranging

Non-contact distance ranging ensures no damage occurs to the target material being measured. Ultrasonics sensors are used in factory automation and material handling. They can measure the distance to material or objects regardless of shape, color, or surface texture. Automated process control on a conveyor line or a factory floor includes applications such as conveyor belt loading, diameter monitoring, height control, presence detection, positioning, dimensioning, and sorting processes. Converters specializing in papers, plastics, films, foils, rubbers, metals, and cloth will benefit from using ultrasonics for roll diameter, position control, and equipment alignment.

ULTRASONIC SENSOR APPLICATIONS

Object Detection

Sometimes, the simple presence or absence of an object is needed versus distance. Examples of this include applications of material handling on conveyors, in transportation for warnings to avoid collisions such as barges and ferries, for counting and controlling inventory. The measurement can be configured to a set range of distances, allowing the sensor to ignore the presence of objects outside a maximum range.

Food & Beverage

Ultrasonic sensors help food and beverage manufacturers accurately and reliably monitor the level or volume of ingredients inside storage vessels, process tanks, or mixers. They are used in liquids and slurries to continuously measure levels, improve efficiency, and prevent waste. These non-invasive, non-contact level sensors help processors avoid downtime and production losses due to overruns and improper batch control. Ultrasonics combined with BinCloud inventory management software helps processors track inventory on a phone or PC in the plant, office, or remotely. Ultrasonics can be used to detect the height, or distance to products on conveyor belts for consistency, quality control, and production monitoring.

TOUGHSONIC® ACCESSORIES

Configuration Accessories

RS-485 Setup Kit: USB-to-serial converter with attached connection board, setup cable, universal DC modular power supply for bench setup of sensors

Universal Junction Box: Used to network up to 256 ToughSonic RS-485 sensors. NEMA 4X, IP68 rated.

Universal Termination Board: Consolidates all power and interface wiring in color-coded sensor wire terminals.

Termination Board with Two Relays: Includes two Form-C dry contact relays rated 5A@250 VAC or 5A@24VDC with LED status indicators.

RS-485

DPM-500

Digital Displays

DPM-200: One-line display for 4-20 mA sensors, 4-button keypad, large 4-digit LED display

DPM-300: Large format Modbus sensor display, functions as master, slave, or snooper, 2-line, 6-digit LED display

DPM-500: Two-line display for 4-20 mA sensors, 4-button keypad, can power loop if needed

Wiring Accessories

RS-485 Serial Connection Cable: Used to connect terminal boards to the serial port. Six feet.

Isolated Serial to USB Converter: For panel or DIN rail installation, includes 3 feet USB cable.

Serial Cable and Terminal Board: Used for bench testing ToughSonic sensors. Six feet.

Sensor Cable: Sold per foot. 4-wire PUR cable and shield or 9-wire and shield.

Serial Cable & Terminal Board

TOUGHSONIC® IS

THE TOUGHER ULTRASONIC

Non-Contact Technology

Liquid level measurement and target material distances are measured without contaminating, contacting, or damaging the tank contents, stored materials, or a target object. Corrosion, scaling, coating and other contact-related wear or damage are avoided, and the integrity of the target material is maintained. ToughSonic sensors are maintenance-free and have a long service life.

Precise Target Ranging

With ToughSonics, the target distance is measured rather than just the presence or proximity. This benefits operations by detecting the precise location identification of objects, enabling applications like collision avoidance, inventory management, and quality control by measuring the distance to an object with high accuracy. ToughSonics are particularly valuable in scenarios where visual recognition alone might not be sufficient due to lighting conditions or object complexity.

Distance Proportional Output

When using a ToughSonic sensor with analog outputs, the output value directly corresponds to the measured distance, meaning that as the distance increases or decreases, the output signal proportionally changes in the same direction. ToughSonic sensors provide a distance proportional output, making it easy to interpret the measured distance directly from the sensor signal.

High Resolution

A ToughSonic's high resolution allows the sensor to detect very small changes in distance, enabling precise measurements and making ToughSonic suitable for applications where minute variations in position or distance need to be accurately identified. This makes it ideal for liquid level sensing or close-range obstacle detection where small discrepancies matter significantly.

Unaffected by Optical Characteristics

ToughSonic sensors are unaffected by a target's optical characteristics like ambient light, color, transparency, shine, or reflectivity because they "see" or detect objects by reflecting sound waves, not light. This means the visual properties of the target have no influence on how well the sound waves bounce back to the sensor.

Rugged Construction

All ToughSonic sensors are constructed with long-life solid-state electronics, rugged piezoelectric transducers, and full epoxy potting. Housing materials include 316 stainless steel and chemically resistant Kynar® (PVDF) and interface cables are permanently attached. All ToughSonic sensors are sealed to protect against water ingress, operate over a wide range of humidity and temperature ranges, and are NEMA-4X, NEMA-6P, and IP68-rated.