ELT Ultrasonic LoRa

LoRaWAN® WirelessSensor

ELT Ultrasonic LoRa is a series of LoRaWAN® sensors for ultrasonic distance measurement. The series includes ELT Ultrasonic 5m LoRa, ELT Ultrasonic 10m LoRa and ELT Ultrasonic Snow LoRa.

The devices are IP67-rated, battery-powered and designed for both indoor and outdoor use. They combine distance measurement with internal sensors for temperature, relative humidity, atmospheric pressure and acceleration.

Product features

- Compatible with LoRaWAN® 1.0.3
- Measures distance with ultrasonic sensing
- Three variants: 5 m, 10 m and Snow
- Measures temperature, humidity and atmospheric pressure
- Detects acceleration / motion
- IP67-rated enclosure
- Battery-powered with up to 10 years of battery life*
- NFC configuration and over-the-air configuration

*Battery life depends on settings and environmental factors.

Applications

- Smart cities and infrastructure
- Agriculture and level measurement
- Industrial installations
- Bins, silos, tanks and containers
- Snow-depth and surface measurement
- Exposed outdoor environments

Device specifications

Mechanical specifications	
Weight	Approx. 95 g incl. battery
Dimensions	94 x 59 x 93 mm
Enclosure	Polycarbonate
IP rating	IP67
Mounting	Screws / double-sided tape

Operating conditions	
Temperature	-40 to 60 °C
Humidity	0 to 100% RH
Usage environment	Indoor/outdoor
Operating voltage	3.6 V DC
Battery type	1 × AA 14505, 3.6 V Li-SOCl2

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Device Power Supply	
Battery Type	1 × 3.6 V AA Lithium Battery (AA 14505 / Li-SOCl2)
Expected Battery Life	Up to 10 years depending on configuration and environment
Operating Voltage	3.6 V DC

Radio / Wireless	
Wireless Technology	LoRaWAN® 1.0.3
Wireless Security	LoRaWAN® End-to-End encryption (AES-CTR), Data Integrity Protection (AES-CMAC)
LoRaWAN® Device Type	Configurable as Class A, B or C end-device
Supported LoRaWAN® features	OTAA, ABP, ADR, Adaptive Channel Setup
Link Budget	137 dBm (SF7) to 151 dBm (SF12)
RF Transmit Power	Max 14 dBm EIRP
Supported LoRaWAN® regions	EU863-870, IN865, US902-928, AU915-928, AS923, KR920-923, HK923

Configuration / Device Logging Function	
Sampling Interval	Configurable via NFC and downlink configuration
Data Upload Interval	Configurable via NFC and downlink configuration
NFC Configuration	ELSYS Sensor Settings app with NFC-enabled smartphone or tablet
Over-the-Air Configuration	Supported through LoRaWAN infrastructure and downlink data

Data / Payload

Area	Reported as	Comment
Sensor payload format	Standard ELSYS payload format	See the ELSYS payload documentation for exact type IDs and decoding
Internal sensors	Temperature, relative humidity, atmospheric pressure, acceleration	
Distance	Ultrasonic distance	Measurement range depends on the selected variant: 5 m or 10 m
Sensor settings	Sent at startup	Sensor settings are sent according to the standard format

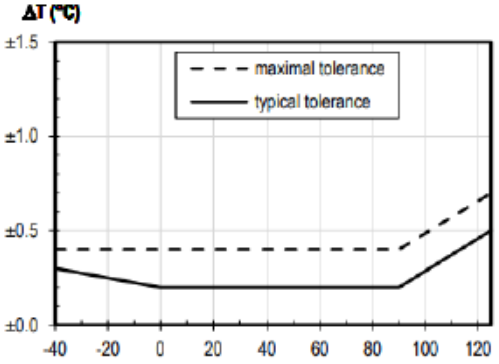
Ultrasonic specification

Variant	Ultrasonic module	Intended use	Distance range	Resolution	Note
ELT Ultrasonic 5m LoRa	MaxBotix MB7389	General distance and level measurement	30-500 cm	1 mm	Targets closer than 30 cm typically range as 30 cm
ELT Ultrasonic 10m LoRa	MaxBotix MB7386	Longer distances / larger containers	30-1000 cm	1 mm	Targets closer than 30 cm typically range as 30 cm
ELT Ultrasonic Snow LoRa	MaxBotix MB7374	Measurement against snow	50-500 cm	1 mm	Sensor tuned for measuring against snow

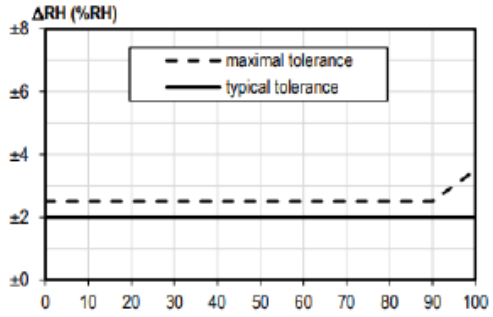
Internal sensors

The following internal sensors are included in ELT Ultrasonic 5m LoRa, ELT Ultrasonic 10m LoRa and ELT Ultrasonic Snow LoRa according to the model table in the manual.

Sensor	Parameter	Specification
Temperature	Resolution	0.1 °C
Temperature	Accuracy	0.2 °C typical, see figure
Humidity	Resolution	1 % RH
Humidity	Accuracy at 25 °C	± 2 % RH, see figure
Atmospheric pressure	Range	260-1260 hPa
Atmospheric pressure	Accuracy	± 1 hPa
Accelerometer	Range	± 2.0 g
Accelerometer	Sensitivity	16 mg/digit
Accelerometer	Data rate	10 Hz



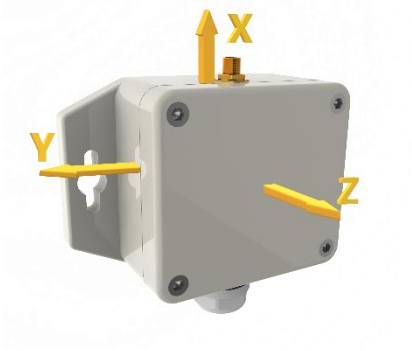
Temperature tolerance



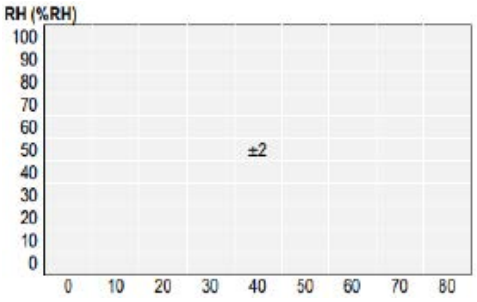
RH tolerance at 25 °C

The accelerometer reports X, Y and Z direction depending on sensor orientation and can be configured for triggered messages when an acceleration threshold is exceeded.

Note: the internal humidity sensor reacts slowly to external humidity changes because the sensor is located inside the enclosure.



Accelerometer directions



RH over temperature

Mounting guideline for Ultrasonic / Snow

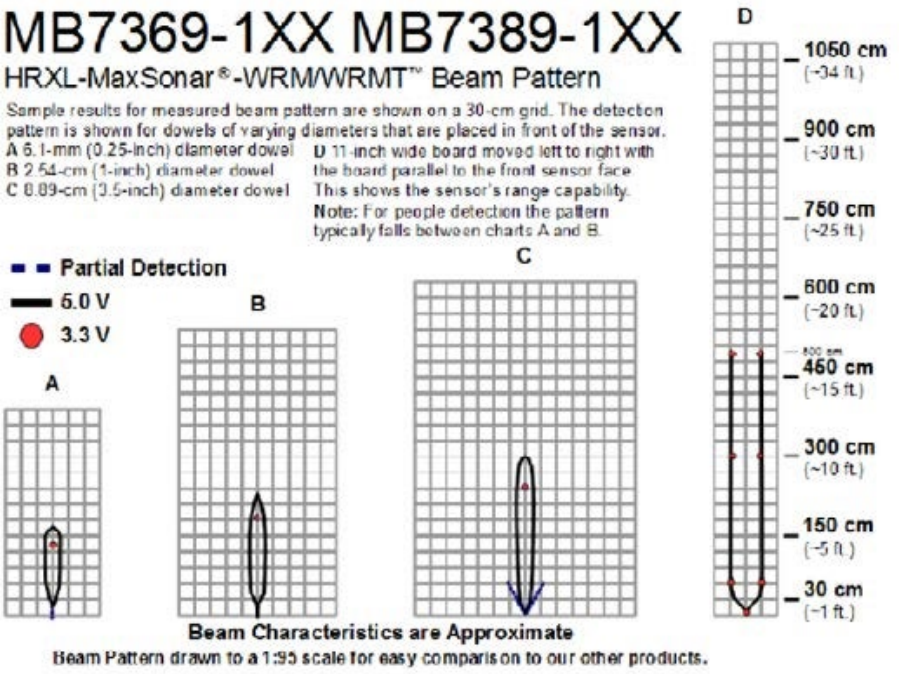
Sensor orientation	Point the sonar nozzle toward the surface to be measured.
Clearance	Ensure at least 30 cm of clearance from the measurement line to the nearest object.
Surface / target	Measurement results are affected by the target surface, geometry, obstacles and the beam pattern of the selected sensor variant.

Ultrasonic beam patterns

The beam patterns below are taken from the MaxBotix diagrams in the manual. They should be used as guidance for placement and when assessing the risk of side reflections.

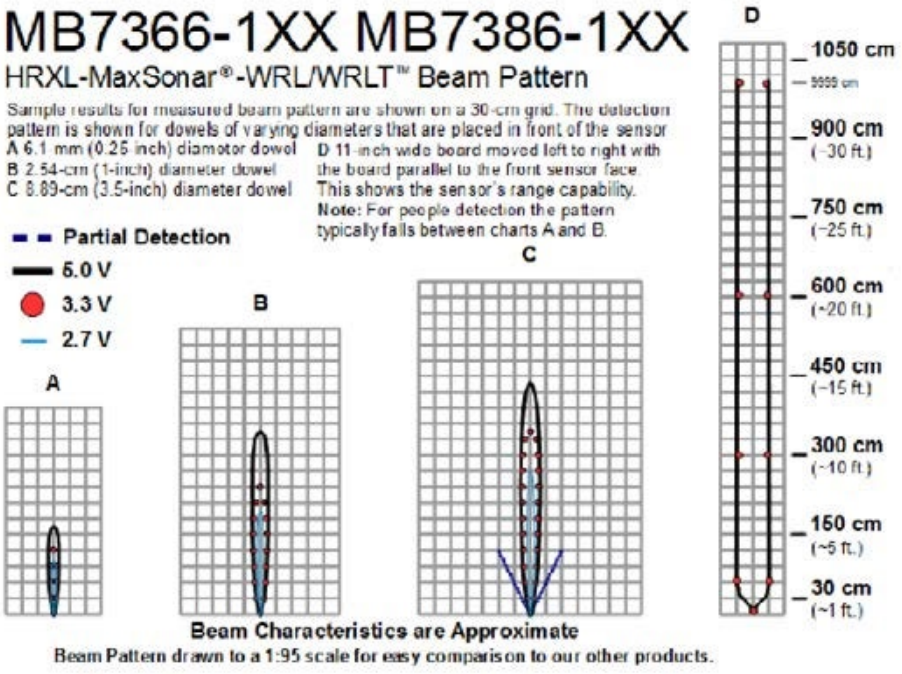
ELT Ultrasonic 5m LoRa

MaxBotix MB7389 - Distance range 30-500 cm - Resolution 1 mm



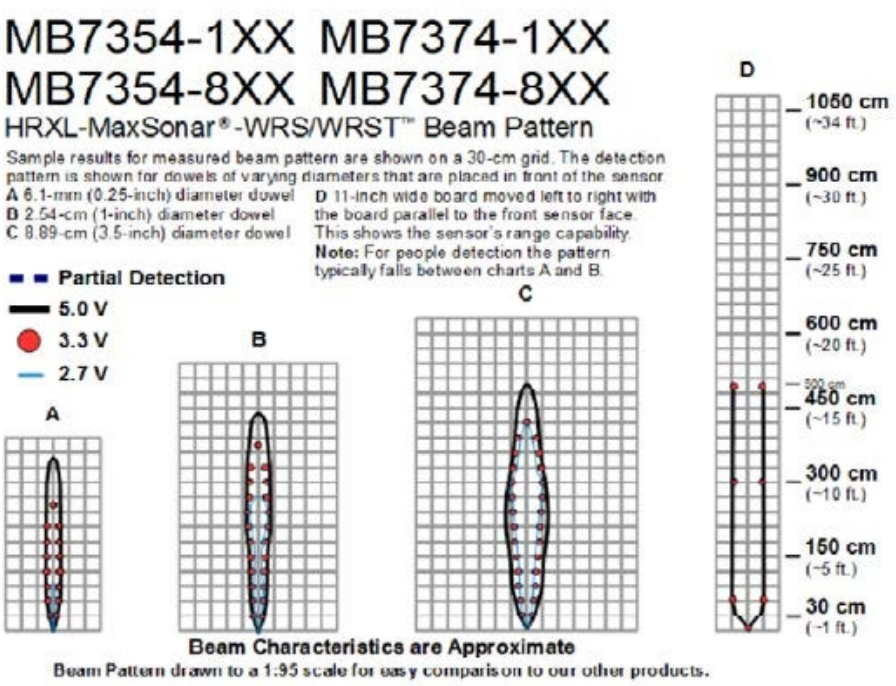
ELT Ultrasonic 10m LoRa

MaxBotix MB7386 - Distance range 30-1000 cm - Resolution 1 mm



Ultrasonic Snow variant

ELT Ultrasonic Snow LoRa MaxBotix MB7374 - Distance range 50-500 cm - tuned for snow measurement



Variant summary

Variant	Sensor	Measurement range	Comment
ELT Ultrasonic 5m LoRa	MB7389	30-500 cm	General ultrasonic measurement up to 5 m
ELT Ultrasonic 10m LoRa	MB7386	30-1000 cm	Longer distance measurement up to 10 m
ELT Ultrasonic Snow LoRa	MB7374	50-500 cm	Tuned for measurement against snow

Installation notes

- Mount the sensor so that the sonar nozzle points directly toward the surface to be measured.
- Keep at least 30 cm of clearance from the measurement line to the nearest object to reduce the risk of false echoes.
- Targets inside the minimum distance for each sensor can produce clipped or limited distance values.
- Select the 5m, 10m or Snow variant based on measurement distance, target material and environment.

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