

iCastSense User Guide

Revision 2022-03-09A

Solution Overview

Designed for deployment at massive scale, the iCastSense offers end-to-end real time remote condition monitoring and predictive maintenance of legacy industrial assets. Stick-on smart IoT sensors on-board to Shoreline IoT Cloud within a few minutes with direct sensor-to-cloud architecture. No wires, gateways, access points, power or custom software required. Immediately start remote condition monitoring of rotating machines and other outdoor and indoor industrial assets and access live oscilloscope view of sensor data from anywhere. Identify anomalies and detect real-time machine failures using Edge ML inference deployed onto sensors with Shoreline AI Workflow.



Key Features

Battery-powered Compact Wireless Sensor: Battery-powered sensor with up to 5-yr battery life, greatly simplifies deployment.

Direct Connection to Cloud using LTE-M/NB-IoT: Using LTE cat M1 and cat NB2 long-range low-power connectivity allows hassle-free secure connectivity directly to the cloud.

Complete Auto-Configuration of Asset: Asset is automatically configured in the cloud, machine baselines are automatically generated from Physics-Based Models and AI/ML analytics are set up automatically removing any need for expert consultants.

Actionable Intelligence Without Historical Data: Shoreline's physics-based models and AI/ML analytics don't require historical data and can provide machine health-related intelligence almost immediately.

Configuration and Status Monitoring Using Smartphone: Using a mobile app and Bluetooth interface makes configuration and status monitoring of sensors simple and intuitive. Any field engineer can install these sensors without training.

Installable in Outdoor & Hazardous Location: This sensor can be installed outdoors or in hazardous areas, such as oil & gas facilities, chemical & petrochemical plants, and metal factories. You can install this sensor anywhere you want over a vast area.

Complete Asset Management Services on Cloud: Cloud platform offers extensive Asset Management solutions starting from Remote Health Monitoring, Condition Based Maintenance, Predictive Maintenance, and Overall Equipment Effectiveness.

Hardware Specifications

Size	104 mm x 72 mm x 33 mm (4.1 in x 2.8 in x 1.3 in)
Weight	240g
Color	Teal
Construction	Steel 316, PC, Buna rubber O-rings
Protection	IP67, Outdoor use type 4x enclosure
Mount	Stainless steel 316 puck & stainless steel 304 screw

Operational & Storage Environment

	Operation	Storage
Temp. Range	-40°C to 85 °C	-45 to 105 °C
Humidity	95% RH (non-condensing)	100% RH (non-condensing)
Vibration	Sustained vibration force of up to $\pm 50g$	Maximum 100g

Battery and Power

Battery Type	Two 3000mAH, Lithium thionyl chloride batteries; replaceable
External Power	Optional 9-26V external industrial power source, 400mA **

Connectivity

Cellular	LTE Cat M1, Cat NB2 & EGPRS (fallback)
Bluetooth	Bluetooth® 5.1, IEEE 802.15.4-2006 BLE/BLE LR
Analog Input	4-20mA, 0-10V
Digital Input	4.5V to 30VDC

Box Content

- 1x iCastSense unit*

(* Includes 1x stainless steel 316 puck and 1x #10-32 x 7/8" stainless steel socket head cap screw)

** Please refer to **external device connection guideline in page 6**

Preparation Before Installation

Mobile App Installation

An intuitive mobile app interface enables shoreline users to quickly provision and configure using just a few finger-taps. The live view feature helps to check the operation of the sensors. The dashboard features help to visualize alarms in the field.

Download the mobile app by scanning QR codes below or by searching the "Shoreline Cloud Portal" in respective app stores (below):



App Icon



Cloud Software Account Setup

Shoreline cloud service offers a complete set of tools and services for asset health management and maintenance. The service offers intuitive and user-configurable dashboards for asset configurations, alarms, drill-down, and analysis of data. Services include Remote Health Monitoring, Condition Based Maintenance (CBM), Predictive Maintenance (PDM), and Overall Equipment Effectiveness (OEE).

Please contact your sales representative to provide you access or contact support@shorelineiot.com.

Installation Kit

Shoreline provides an installation kit to install the iCastSense units on the industrial assets. Additional installation kits can be purchased separately..

Content

- SS316 Pucks (Spare) x5
- #10-32 x 7/8" shoulder bolt (Spare) x5
- 5/32" Ball end wrench
- Loctite AA 325 adhesive bottle (50ml)
- Loctite SF 7387 activator bottle (52ml)

Installation Process

Step 1:

Identify the mounting location to glue the flat part of the stainless steel puck onto the machine surface with the screw hole in sight

Step 2:

If the mounting surface is curved, use a grinder or spotface tool to create a 1 inch diameter flat surface. Using a portable grinder, a spotface tool, or flat file to remove all paint from the area where the puck will attach to the machine housing.

Step 3:

- Using a dry rag and a degreaser (acetone, lacquer thinner), clean the machine housing area where the stainless steel puck will be attached ensuring a dry, oil free, & clean surface.
- Use a dry rag and degreaser to clean the flat surface of the stainless steel puck that will mate with the mounting surface.
- Apply the activator / catalyst (Loctite 7387) to entirely coat both the stainless steel puck flat surface and the machine surface prepared; Allow to dry for 30 seconds.
- Apply a liberal drop of adhesive (Loctite 325) to the flat surface of the stainless steel puck & immediately press the puck onto the machine surface in the proper orientation. Hold the puck in place for about 30 sec to 1 minute.
- After 1 hour, wipe up any excess adhesive that dripped from the puck. The bond needs 24 hours to fully cure. However, It is ok to attach the iCastSense unit to the puck after 1 hour.

Step 4:

- Position the iCastSense over the stainless steel puck such that the steel post at the bottom aligns with the notch on the stainless steel puck
- Screw the iCastSense onto the stainless steel puck to index with the locator pin using the #10-32 screw & ball end wrench with a torque spec of 1.5-2.2 ft-lb or 2-3 nm.

WARNING: Over tightening the mounting screw may damage the sensor. Do not exceed the specified torque.

External Device Connection



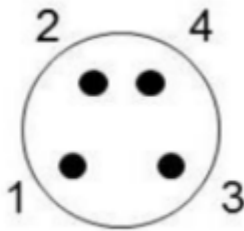


WARNING: Failure to follow these instructions may result in unsafe conditions. In case of any abnormality contact the manufacturer. Users must follow these instructions to maintain safety when hazardous conditions are present.

- Always turn off and lock out circuits for all devices attached to the M8 cable
- M8 cable must be completely de-energized before attaching or detaching from the M8 connector of the iCastSense
- The iCastSense shall be wired using one of the wiring methods listed in Article 501.10(B) of the NEC.

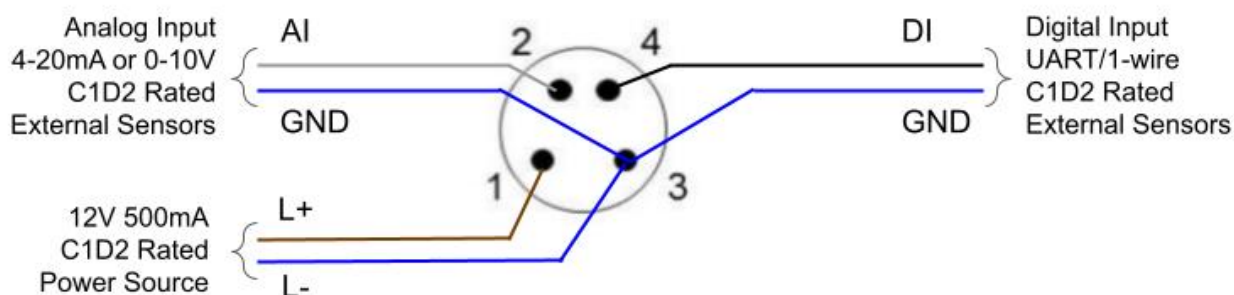
External Connector: M8 screw type

PIN	Signal	Wire	Description
1 (L+, or +24V)	V+	Brown	9-26V Input
3 (L-, or GND)	GND	Blue	Ground
2 (NC, DI, or DO)	AI	White	4-20mA / 0-10V Analog Input
4 (Switching)	DI or TX/RX	Black	Digital input or Serial 1-Wire UART

Note: No pin has any power at open state.

Connectivity diagram



Accessory Cable

Customers must procure appropriate accessory cable to meet requirements shown in the table below and wiring methods listed in Article 501.10(B) of the NEC.

Operating Temperature Range	-25 °C ... 90 °C (Plug / socket) These cables may be used at lower temperatures if the installation prevents the cable from flexing or bending. Flexing these cables at temperatures below -20 °C (-4 °F) may damage the cables
Construction	4-conductor, 22 AWG with braided shield and drain wire (85% coverage, minimum), PVC outer jacket. Nickel-plated coupling nuts.
Seal	Connectors provide an IP67 seal to transducers and mating hardware. Connectors are molded to the cable. The addition of DC4 electrical insulating compound in the connectors provides additional protection against moisture during a thermal shock.

Changing Battery



WARNING: Failure to follow these instructions may result in unsafe conditions. In case of any abnormality contact the manufacturer

- Always turn off and lock out circuits for all devices attached to the M8 cable before disconnecting the cable
 - Remove the iCastSense from the steel puck and take to a non-hazardous location
 - Must use an approved battery* or procure replacement from the manufacturer
 - Used batteries must be recycled or disposed of safely. ***DO NOT TRASH***
 - Over tightening screws may damage the sensor. Do not exceed the specified torque.
 - Make sure the O-ring and sealing surfaces are clean and smooth. .
- Remove iCastSense from equipment using 5/32" ball end hex wrench to remove #10-32 18-8 stainless screw, keep screw in safe place
 - Open the rear cover by removing two screws using a #1 Phillips screwdriver and store the screws in a safe place
 - Grip near bottom with thumb and fingers and pull outwards to disengage snaps and remove rear cover
 - Remove the old batteries by gently pulling them out from the battery clips
 - Install new batteries in the battery clips, note the correct polarity +/- before installing the cells.
 - Confirm the green LED illuminates after the batteries are installed, the LED will turn off after about 10 seconds
 - Close the rear cover and press until fully closed
 - Install the two screws and tighten them to 3-4nm torque
 - Visually confirm gap <0.5mm between rear cover and housing to guarantee IP67 seal
 - Mount back on monitored equipment using #10-32 18-8 stainless steel screw using 5/32" ball end hex wrench to 2-3nm torque

*Approved Batteries

Manufacturer	Model	Manufacturer	Model
Titus	ER18505M	Ultralife	UHR-ER18505
Omnicell	ER18505HD	Saft	LM17500

Certifications

Regulatory Compliance: IEC 61000-6-4, IEC 61000-4-3 level 3, EN300328

Telecommunication Compliance: FCC, PTCRB*, GCF* (*Pre-Certified Module Quectel BG95-M3)

Ordinary & Hazardous Location Safety: UL 61010-1, - Part 1: General Requirements, Edition 3, Revision Date 07/19/2019; CSA C22.2 No. 61010-1, - Part 1: General Requirements, Edition 3, Revision Date 11/2018; UL 121201, Nonincendive Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations, Edition 9, Revision Date 04/01/2021; CSA C22.2 No. 213-17, Nonincendive Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations, Edition 3, Revision Date 04/01/2021

Federal Communications Commission (FCC) Statement

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

- 1) this device may not cause harmful interference and
- 2) this device must accept any interference received, including interference that may cause undesired operation of the device.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

You are cautioned that changes or modifications not expressly approved by the part responsible for compliance could void the user's authority to operate the equipment.

1. This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
2. This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

CONSULT USER MANUAL FOR ADDITIONAL INFORMATION



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