



Weir Sensor Node User Manual



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Overview

The Weir Sensor Node is the component of the Synertrex hose monitoring system responsible for sampling the hose wear status locally, and transmitting the data to the LoRa Base Station, from where it is passed on to the Synertrex cloud dashboard. The Sensor Node is powered by a 3.6 V Primary lithium-thionyl chloride (Li-SOCl₂) high energy density C-size bobbin cell. Operational battery life is 2 – 10 years, depending on the system configuration and data upload rate.

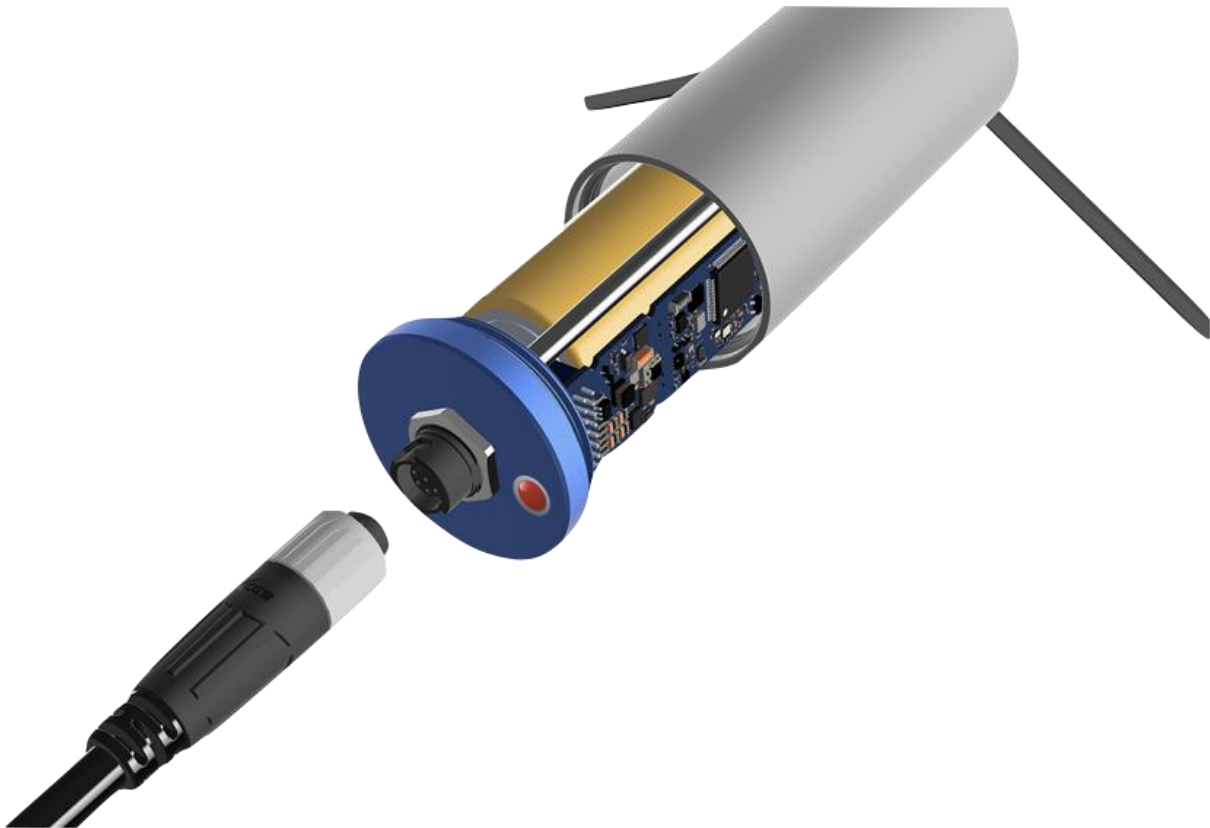


Figure 1 - Sensor Node Internal Detail

The Sensor Node design incorporates a system microcontroller optimised for ultra-low power operation. The microcontroller received the operational parameters from the Cloud Dashboard (via the Base Station and Gateway), and samples the hose wear status via an on-board ADC subsystem. The 1-wire ID device embedded in the hose connector is also read via the same external IO lines.

The microcontroller interfaces with an ultra-low power LoRa radio operating in the 915MHz ISM band, specifically 918MHz – 926MHz, with a 500kHz channel bandwidth. The radio outputs +14dBm and the unit is supplied with a straight RF whip-style antenna 900MHz ~ 935MHz with 1.3dBi antenna gain. Sensor Node transmission rates to the Base Station is configurable, and is typically between one transmission per hour to one transmission per 12 hours.

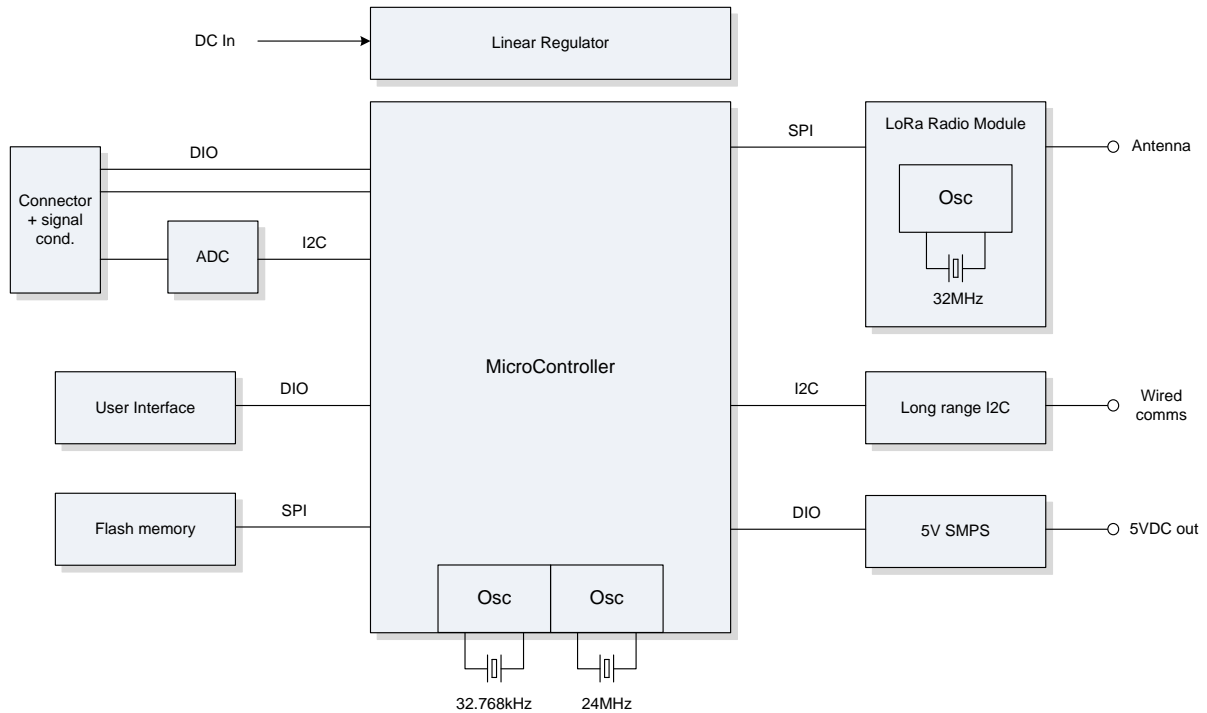


Figure 2 - Sensor Node Block Diagram

What is in the box?

The Weir Sensor Node is delivered with:

1. Sensor Node unit, with internal battery
2. The 1.3dBi straight whip antenna
3. Mounting clamp (optional accessory)
4. User manual

The Sensor Node is equipped with an 8-way circular connector with pinouts as follows:



Figure 3 - Sensor Node External Connector Pinouts



Figure 4 - Sensor Node Hose Interface Cable

Setup and Configuration

The solution has been designed for minimal in-field touch points and effort required for deployment and configuration.

Physical Installation

The Sensor Node body is secured using the optional mounting clamp or equivalent mechanism. The Sensor Node needs to be location within 5m of the hose wear connector, as this is the maximum length of interface cable supported. The interface cable is provided by the customer, based on specification provided.

Installation Notice: Ensure that the Sensor Node is installed on a permanent structure so that a minimum separation distance of 20cm is maintained at all times between the antenna and all persons.

Power On / Off

The Sensor Node is automatically powered on when the external interface cable is connected. The unit will remain powered on while the cable stays connected, but will enter deep sleep mode whenever it is not sampling the wear sensor, or transmitting the data via LoRa to the Base Station. To maximise battery life, do not leave the interface cable connected if the Sensor Node is not in use.

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Configuration

All relevant configuration settings are made in the factory prior to shipment, except the following operation parameters, which are pushed down to the Sensor Node via the Base Station:

1. Sample period
2. Configuration request interval
3. LoRa transmission retry count

Specifications

| Capability | value | Comment |
|--|--|--|
| Maximum # of nodes | 200 | Reporting once an hour |
| Radio range (direct line of sight) | 15 km 7.5 km | With optimised antenna on node Standard antennae |
| Battery life | 6 years | One transmission every 2 hours, temperature range 0 to 50 °C, hose wear sensor only |
| | 4 years | One transmission per hour, temperature range 0 to 50 °C, hose wear sensor only |
| | 2 years | One transmission per hour, temperature range -20 to 70°C, hose wear sensor only |
| | 10 years | One transmission per day, temperature range 0 to 50 °C |
| | 2 years | One transmission per hour, temperature range 0 to 50 °C, hose wear sensor and accelerometer (sampled every 10 minutes) |
| Unit mass | 500 g | Node only excluding cable and bracket |
| Node Ingress protection rating | Designed for IP67 | |
| Node IK rating | Designed for IK07 | IK07 for cylindrical enclosure only |
| Temperature rating | -40 to +70°C | |
| Metrics reported (Standard Wear Indicator) | Hose wear status Battery status Internal temperature Signal strength Hose ID | |
| Regions supported | USA, Canada, Australia | Certified for global regional support. |

Figure 5 - System Specifications

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Compliance Statement – FCC and ISED (English)

This device complies with Part 15 of the FCC Rules and Innovation, Science and Economic Development (ISED) Canada's licence-exempt RSS standards. Operation is subject to the following two conditions:

- (1) This device may not cause interference; and*
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.*

Note: 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.*

Compliance Statement – FCC and ISED (French)

Cet appareil est conforme avec Partie 15 des règlements de la FCC et Innovation, Sciences et Développement économique Canada RSS standard exempts de licence(s).

Son utilisation est soumise à Les deux conditions suivantes:

- 1. cet appareil ne peut pas provoquer d'interférences et*
- 2. cet appareil doit accepter Toute interférence, y compris les interférences qui peuvent causer un mauvais fonctionnement du dispositif.*

RF Exposure Statement

To comply with FCC/IC RF exposure limits for general population / uncontrolled exposure, the antenna used for this transmitter must be installed on outdoor permanent structures to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

Modification Warning

Any changes or modifications not expressly approved by LX, or any of its subsidiaries, or Weir Minerals, or any of its subsidiaries, could void the user's authority to operate this equipment.