

User Guide

External Temperature Sensors

Version 2.0

REVISION HISTORY

Version	Date	Notes	Contributors	Approver
1.0	07 Jan 2019	Initial Release	Robert Gosewehr	Chris Hofmeister
1.1	28 Aug 2019	Reflect new part numbers and modified probe specification	Chris Boorman	Jonathan Kaye
2.0	14 July 2020	Updates to incorporate new RTD ext. temp sensor	Chris Boorman	Jonathan Kaye

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1 INTRODUCTION

This user guide explains how to properly install both the original RS1xx External Temperature Probe, with its 1-Wire integrated digital thermometer, along with the latest RS1xx External RTD Temperature Probe, with a Class A PT100 RTD. The guide also explains how to view sampled data using the Sentries Sensor Mobile App.

Both variants of the Sentries RS1xx series of LoRa / BLE Sensors enable use of an external cabled temperature probe, in place of the integrated temperature sensor. Each of the sensors are IP67 rated cable assemblies with a stainless-steel probe, the difference in physical probe dimensions and supported operational temperature is outlined below. The cabled probes connect into the main body of the Sentries Sensor via a CAT5 IP67 rated RJ45 connector.

Note: This guide only contains a brief walkthrough. Refer to the RS1xx Guide for further details on sensor functionality and the mobile app capabilities. To access the RS1xx Guide, navigate to the [RS1xx product page](#), click Documentation, and select the *Sentries RS1xx User Guide*.

2 PRODUCT OVERVIEW



Figure 1: Sentries sensor enclosure with external digital temperature probe

Reference	Description
Left	IP67-rated, 1-Wire integrated digital sensor, -55° to +125°C range, 1520 mm cable length, 213 mm probe length, 6.0 mm dia. stainless steel temperature probe CAT5 RJ45 connector
Right	Sentries™ RS1xx LoRaWAN Ext. Port Temp Sensor



Figure 2: Sentries sensor enclosure with external RTD temperature probe

Reference	Description
Left	IP67-rated, Class A PT100 RTD sensor, -40° to +180°C range, 1320 mm cable length, 100 mm probe length, 4.0 mm dia. stainless steel temperature probe CAT5 RJ45 connector
Right	Sentries™ RS1xx LoRaWAN Ext. Port Temp Sensor

The external temperature probe is ordered **separately** from the Sensor body, in single or bulk. See the Laird [RS1xx product page](#) for ordering information.

3 INSTALLATION

To install the external temperature sensor, refer to [Figure 3](#) and follow these steps:

1. Unscrew the Ethernet cap (1) from the Sentries Sensor.
2. Connect the RJ45 connector from the cable assembly into the external port of the Sentries Sensor.
3. Screw on (by hand) the top portion of the cable gland – the screw nut (3) – until tight.
4. Visually check to ensure the lower portion of the cable gland – the pressing screw (2) – is also tight.



Figure 3: Installing the external temperature sensor

Note: Ensure that references (2) and (3) in [Figure 3](#) are tight when installing the external temperature probe into the Sentries Sensor. If these areas are not sufficiently tightened, this could lead to a potential leak and cause damage to the sensor's external port connector or to the temperature probe cable assembly.

3.1 Illustrations

3.1.1 External Temperature Probe Cable Assemblies

3.1.1.1 1-Wire Digital Thermometer Probe with RJ45 Cable Assembly

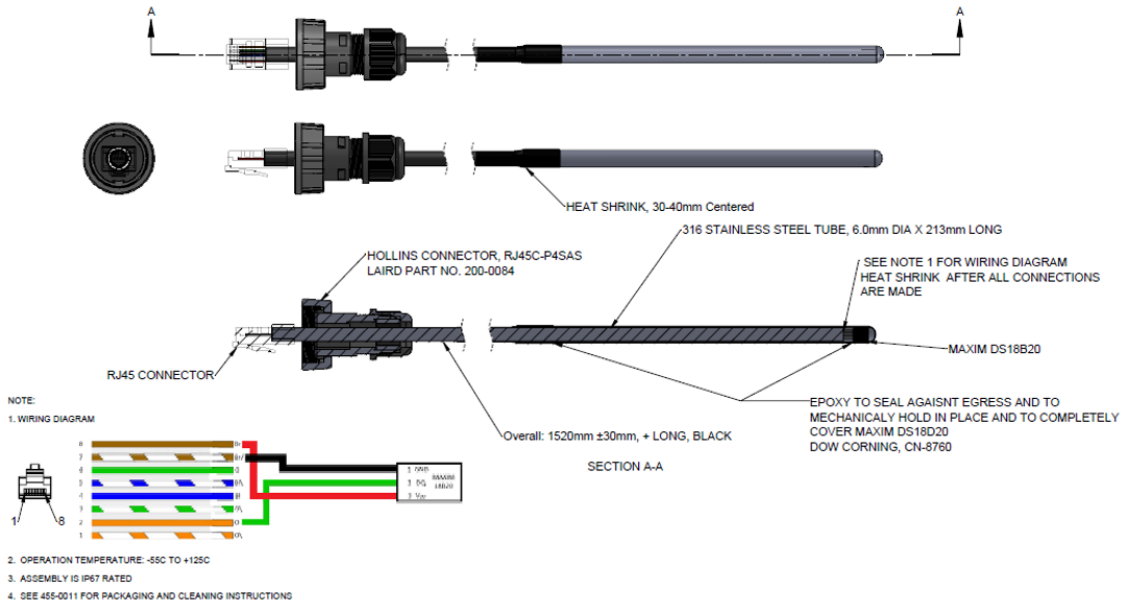


Figure 4: 1-Wire Digital Thermometer Probe cable assembly

3.1.1.2 RTD Temperature Probe with RJ45 Cable Assembly

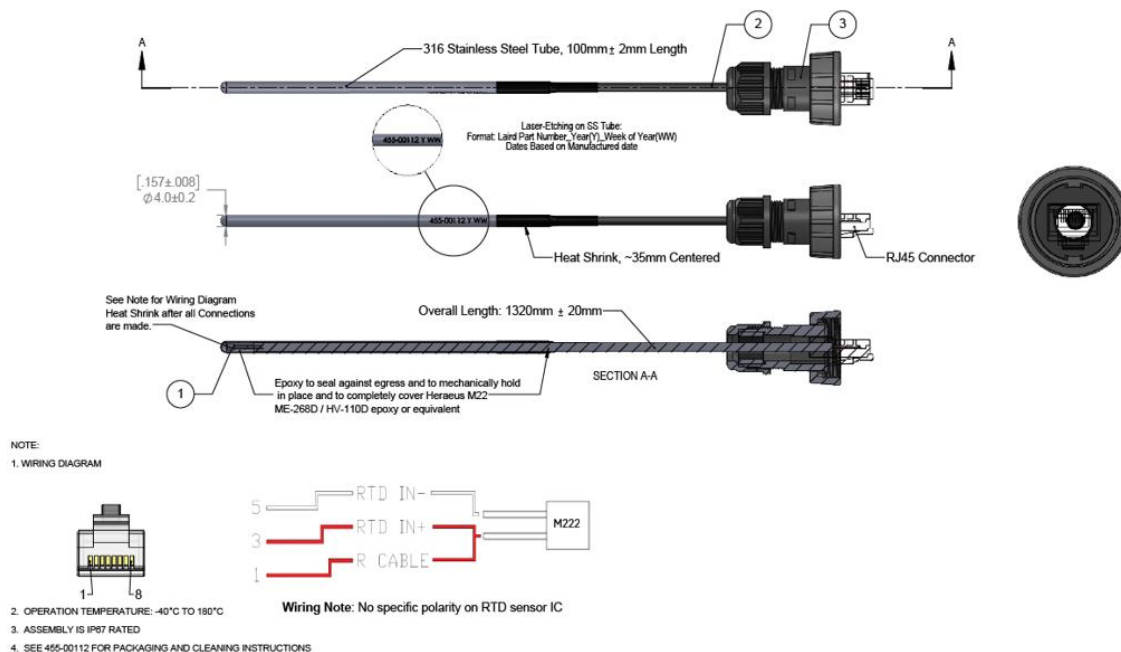
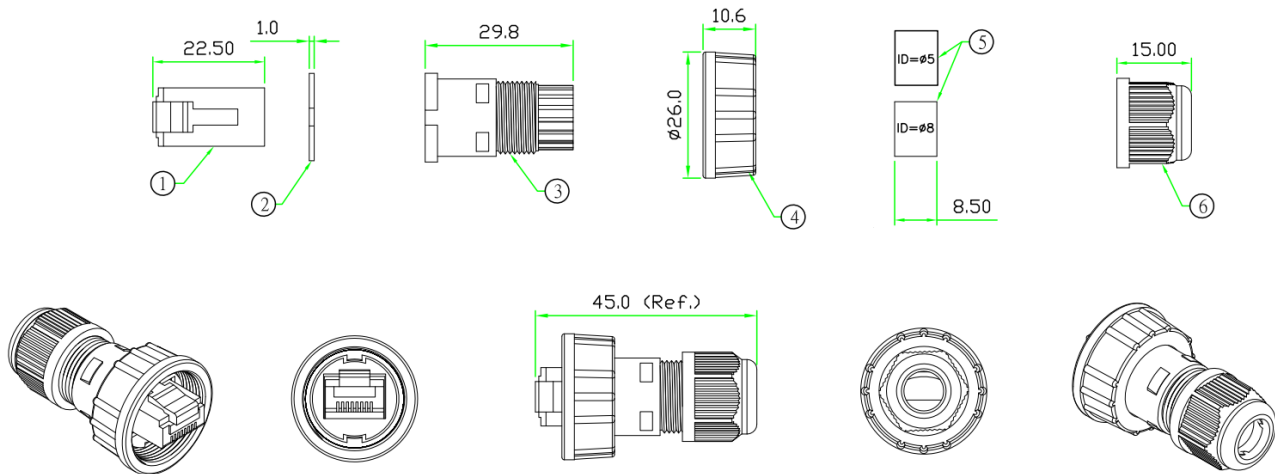


Figure 5: RTD Temperature Probe cable assembly

3.1.2 RJ45 Cable Gland

(DIM in millimeters)



6	SCREW	PRESSING SCREW, NYLON.	BLACK	1
5	SEAL	SANTOPRENE. for cable OD: 3~5mm & 5~8mm.	BLACK	2
4	SCREW NUT	SCREW NUT, NYLON+GF.	BLACK	1
3	SLEEVE	CABLE SLEEVE, NYLON.	BLACK	1
2	GASKET	RUBBER	BLACK	1
1	RJ-45 PLUG	RJ-45 8P8C SHIELDED PLUG.		1

Figure 6: RJ45 cable gland

4 CONNECTION STATUS

When the external probe is connected properly to the sensor, the sensor will operate “normally” once powered up. Normal operation of the sensor is indicated by the left LED flashing either an “orange” or “green” color to indicate the connection status to a network.


With the 1-Wire Digital Thermometer Probe, a connection problem at power up is indicated by both LEDs on the front panel being constantly on. This is a visual indicator to the user that there is a communication issue between the sensor and the probe.

With RTD Temperature Probe firmware implementation being a little different the LED function is not currently enabled, however, both sensors support the feature where the 'sensor fault' bit is set in the LoRa messages when disconnected. For more information to check this bit, refer to the 'RS1xx LoRa Protocol Application Note' available under 'Application Note' tab in the documentation section on the [RS1xx product page](#).

In either case, if the sensor cannot detect the external probe it will not function properly.

To remedy this, follow these steps:

1. Retry the steps from the [Installation](#) section. Make sure the sensor has the latest firmware installed to ensure the sensor has all the latest capabilities. The firmware can be updated using the mobile app. Reference the RS1xx operational guide for more details, available on the [RS1xx product page](#).
2. The time it takes for the sensor to detect a probe depends on the sensor's settings, in particular, the read period and aggregate count. This means that the time to auto detect a probe can fluctuate between 30 seconds or likely much longer.

To speed up the auto detect process of the sensor, press and hold the Bluetooth button  on the top of the sensor for five seconds after reconnecting the external probe. This will restart the sensor, and on startup the sensor will check for the externally connected cable assembly.

3. If you continue to experience an issue, contact [Laird Support](#). There could be damage to the Sentries sensor or probe.



Figure 7: Front panel LEDs are lit

5 DATA VISUALIZATION



5.1 Sentries Sensor Mobile App

The Sentries mobile application allows a user to configure a device, troubleshoot a device, see real-time sensor data, and update firmware. Search the appropriate app store ([Google Play Store](#), [Apple Store](#), or the [Microsoft Store](#)) for the Sentries Sensor App and install it on your device.

Note: This guide only contains a brief walkthrough. Refer to the RS1xx Guide for further details on sensor functionality and the mobile app capabilities. To access the RS1xx Guide, navigate to the [RS1xx product page](#), click Documentation, and select the **Sentries RS1xx User Guide**.

The Sentries sensor mobile app displays real-time sensor data collected from the external temperature probes once a good cable connection is established.

To view real-time sensor data, follow these steps:

1. Press the BLE button  on the front panel of the sensor to start BLE advertising on the device.
2. Select the corresponding DEV EUI on the connection screen of the mobile app. The DEV EUI of the sensor can be found on the back label of the sensor.
3. Once connected to the mobile app, click the Temperature Reading icon  under the Temperature/Humidity section to see real-time sensor data from the temperature probe.

From this screen, the temperature probe can be validated by confirming the temperature measurements are accurate. Place your hand on the probe to fluctuate the temperature.

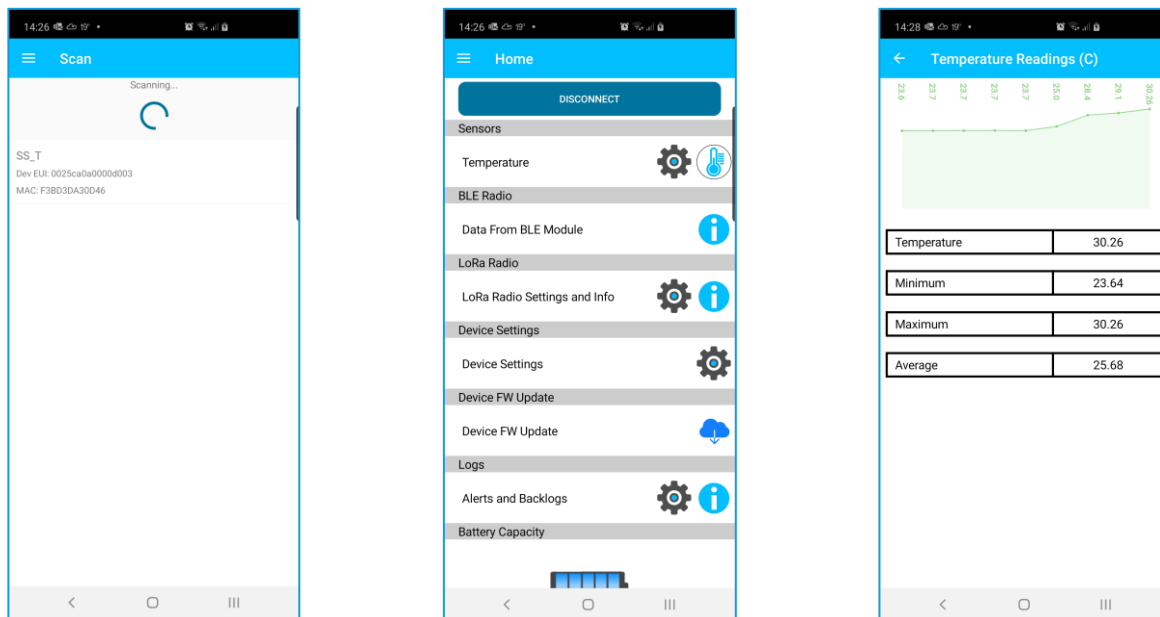



Figure 8: Sentries sensor mobile app displays

Update the sensor settings on the main screen  to define a shorter read interval if the temperature readings are taking too long to update on the graph. The shortest read interval which can be defined thirty seconds (30s).

6 BATTERY CONSUMPTION

A RS186 was configured for a read period of 300 seconds with an aggregate of three.

A power analysis was performed for 32 minutes to ensure two LoRa transmit events were captured.

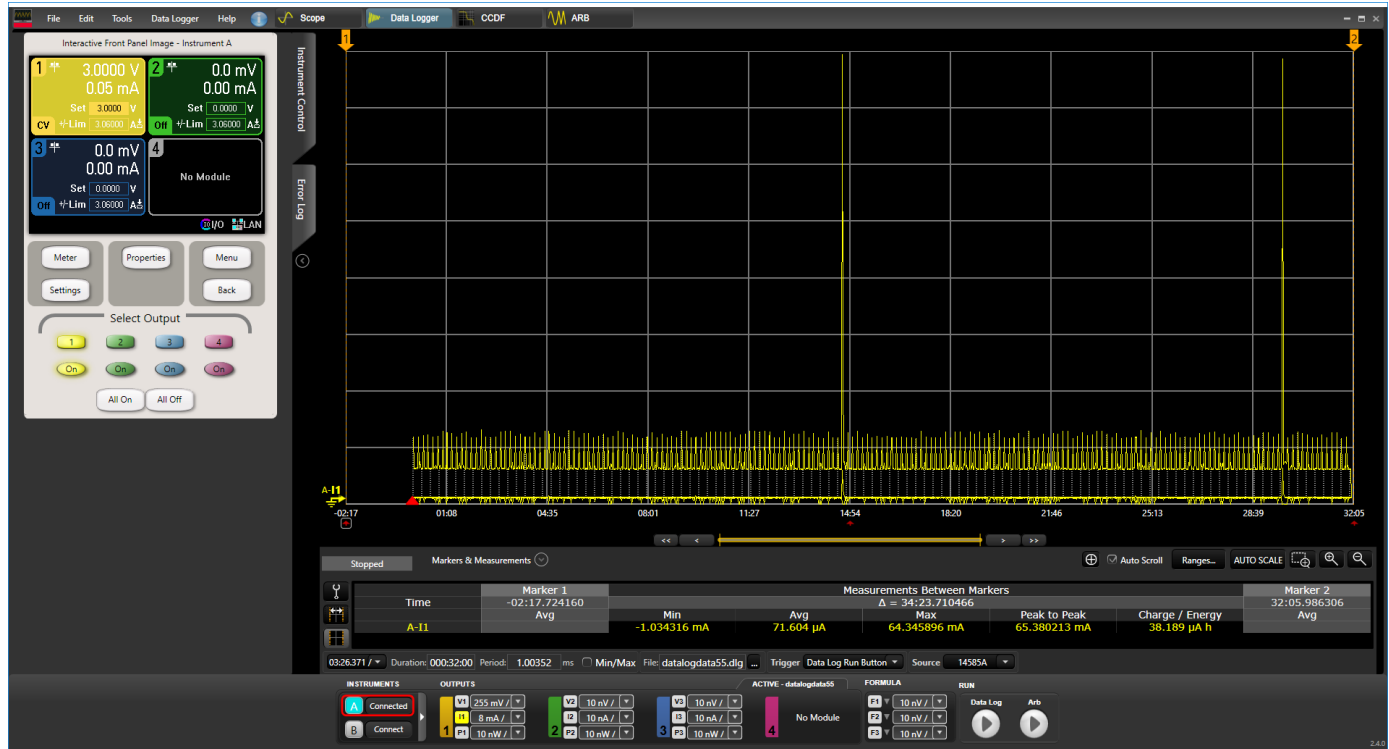


Figure 9: RS186 power consumption

The average current consumption was 72uA over 32 minutes. The data rate that the RS186 transmitted at was SF7BW125.

7 SANITATION AND CLEANLINESS

Every external temperature probe is cleaned with an alcoholic wipe and placed in an individual bag before leaving the supplier. A label is included with every bag warning the end-user to clean the probe before use.

It is up to the end-user to ensure that every temperature probe is cleaned and sanitary for consumer use prior to be deployed. Laird Connectivity will not be held liable for any issues pertaining to the cleanliness of the probes.