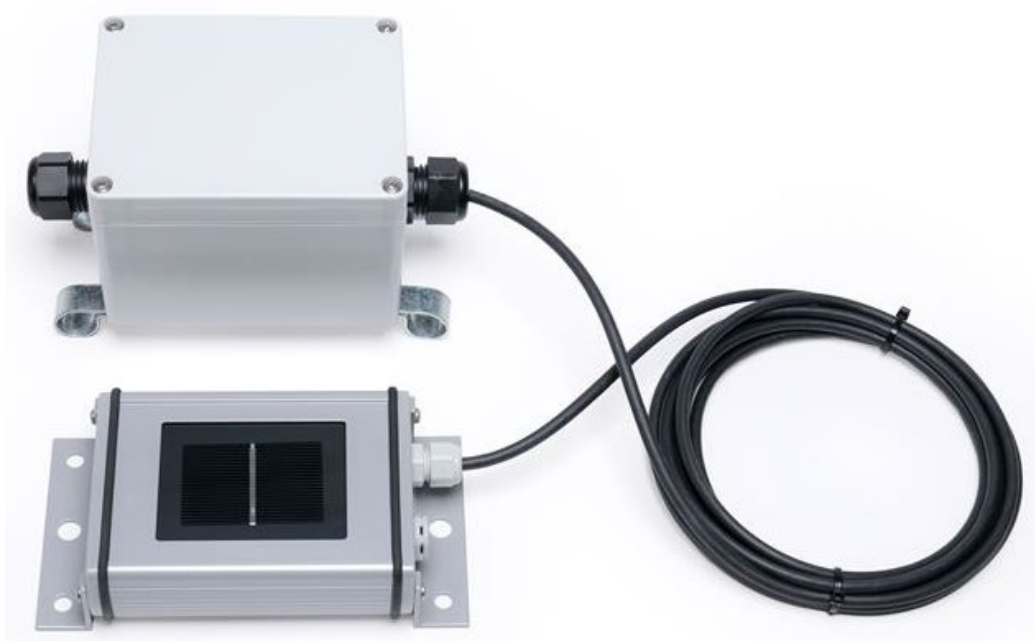




INTRODUCTION

This document provides guidance on the installation, and configuration of the IMT Digital Reference Cell Sensor (**IMT Si-RS485TC-T-MB**) with either a SymphoniePRO logger or a LOGR logger. This sensor is sold as a kit with a cable junction box, and either a 10m cable (Kit #**18862**) or a 35m cable (Kit #**18863**).

Reference cell sensors offer a simple way to measure solar irradiance for use in solar resource assessment and monitoring as the construction of the sensor is essentially a small photovoltaic (PV) cell. The IMT Si-RS485TC-T-MB sensor has an irradiance range of 0 – 1500 W/m², and a cell temperature range of -40 to +90 °C.



Parts

NRG Part Number	Part Description	Part Specification	Qty
18784	Sensor	Sensor, IMT Reference Cell, Digital Version	1
18570	J-Box	Assy, Junction Box, IMT	1
18617	Cable	Cable, 10m, 4C, 20AWG, Drain	1
or			
18561	Cable	Cable, 35m, 4c, 20AWG, Drain	1

Tools Required

- Small flathead screwdriver (NRG screwdriver for logger terminations)
- Standard Philips head screwdriver (to open/close the J-Box and make Barrier Block terminal sensor connections)



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- 5/16" driver (for hose clamp positioning)
- Tin snips (to trim hose clamps)

Additional Tools Required for SymphoniePRO:

- 12 VDC power supply
- Laptop with a USB port, loaded with SymphoniePRO Desktop Application

Additional Tools Required for LOGR:

- Cat5 or Cat6 ethernet cable
- Laptop with an ethernet port and ability to change ethernet adapter settings as necessary (requires PC Admin account credentials)

INSTALLATION

IMT Reference Cell Sensor Mounting:

The IMT Reference Cell Sensor can be mounted in a variety of different positions; upward facing (GHI or POA) or downward facing (RHI or RPOA) on a round or square torque tube as array mounted, on a fixed PV array frame, or boom mounted on a tower.

Hardware kit **#16515** was designed to mount a reference cell sensor on a 5-inch diameter **round torque tube** using Mounting Plate #15756 and a U-bolt. Instructions for installation can be found [here](#).

Hardware kit **#16977** was designed to mount a reference cell sensor to a **square torque tube** using Mounting Plate #16091 and an angle bracket #15821. Instructions for installation can be found [here](#).

Hardware kit **#17830** was designed to **dually mount a reference cell sensor and a pyranometer** using Reference Cell Mounting Plate #15756, the Universal Pyranometer Mounting Plate #15498, and a #17831 adjustable bracket to a square torque tube. Instructions for installation can be found [here](#).

Hardware kit **#17103** was designed to mount a reference cell sensor to the frame of a PV array or another **fixed mounting** location that can be drilled. This bracket allows the sensor to be placed in a global plane-of array (GPOA) orientation. Instructions for installation can be found [here](#).

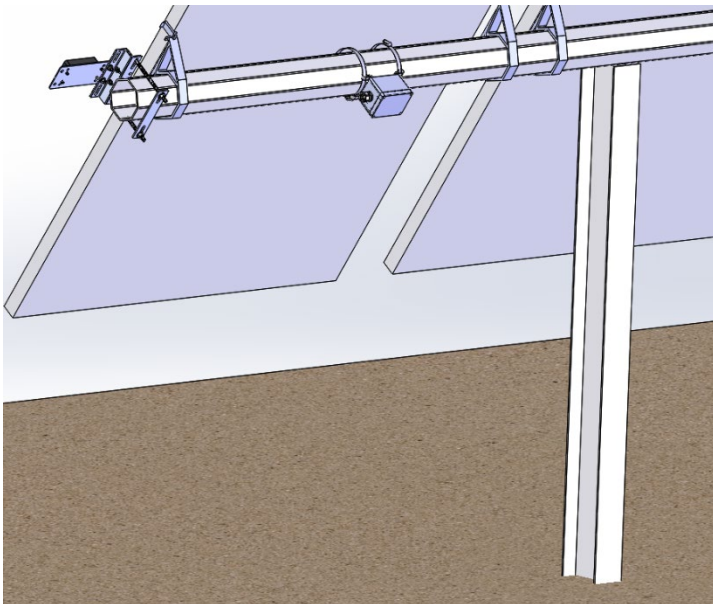
Hardware kit **#17763** was designed to mount a reference cell sensor onto a standard 1.66" diameter **tower boom**, either in upward GHI position, or downward RHI orientation. Instructions for installation can be found [here](#).

**J-Box Mounting:**

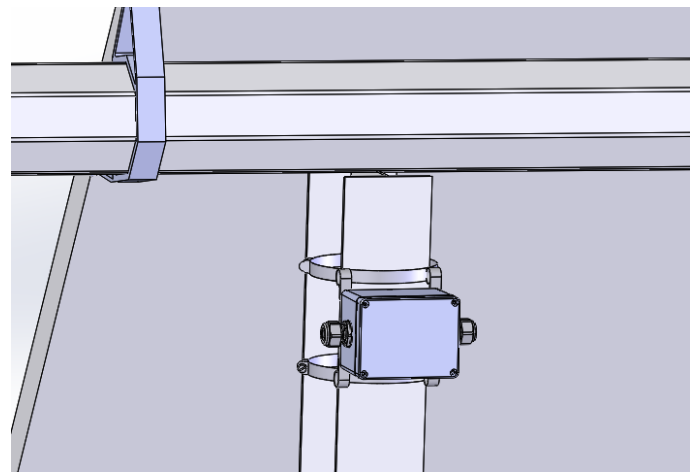
For array mounted sensors, test the length of the cable run to the desired junction box location. The J-box can be mounted either on the array torque tube or on a pile depending on which is more accessible and causes the least cable strain.

The J-box mounting loops that secure the hose clamps to the box can pivot, so the box can be mounted either along the horizontal access (torque tube mounted) or vertically (pile mounted), as seen below.

Note that the cable glands should always exit horizontally. This reduces the possibility of water intrusion into the box.



Torque Tube Mounted J-box

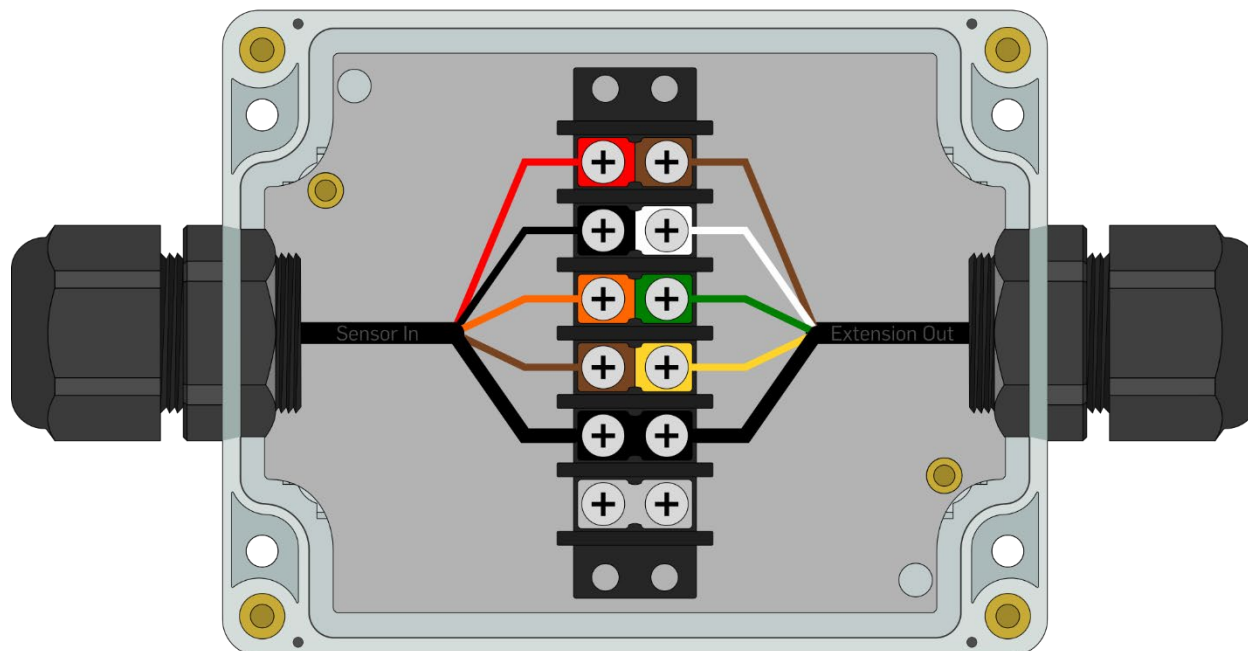


Pile Mounted J-box

1. Using the 5/16" driver, mount the J-box to the desired location using the provided hose clamps. Be sure to not over-tighten the hose clamps. Trim the excess as needed with a pair of tin snips.
2. Wire the sensor cable into the J-box, landing the colored wires to the corresponding terminals as below. **Double check connections are correct and complete a pull-test before proceeding.**
3. Wire the extension cable wires to the opposite side of the terminal block, landing the colored wires to the corresponding terminals as below. **Double check connections are correct and complete a pull-test before proceeding.**



IMT Junction Box



IMT IN	Red	EXC	Brown	EXT OUT
	Black	GND	White	
	Orange	RS-485 Data (-)	Green	
	Brown	RS-485 Data(+)	Yellow	
	Bare	Shield	Bare	

- Run the extension cable (10m (#18617) or 35m (#18561)) to the logger shelter box. Complete connection either with the [SymphoniePRO logger instructions](#) or the [LOGR logger instructions](#) below.

SETTING UP WITH SYMPHONIEPRO LOGGER

Ensure that the SymphoniePRO Desktop Application software is up to date. This will include the **Si-RS485TC-2T-v-MB.config.json** file which will allow for configuration of the digital IMT Reference Cell Sensor.

Programming the logger:

Open the SymphoniePRO Desktop App and connect the logger using a USB cable directly to the laptop or secure a connection via remote Metlink with the iPack static IP address. From the *Fleet View*, enter the logger and navigate to the *Channels* tab located on the left side of the window. Scroll down to the desired Serial channels and begin configuration.



Configuration on Serial Channels 27-50:

The IMT Digital Reference Cell Sensor has two measurand options; Irradiance and Cell Temp. These two channels should be configured as follows:

First Serial Measurand Channel: **Irradiance**

- COM Port: A or B
- Slave Address: Last two digits of the sensor serial number (ex. 24)
- Device: Si-RS485TC-2T-v-MB
- Measurand: Irradiance
- Data Logging Mode: Statistics
- Channel Type: Modbus RTU
- Description: Edit if desired
- Input Serial Number
- Scale Factor: 0.1
- Offset: 0
- Units: W/m²

Second Serial Measurand Channel: **Cell Temperature**

- COM Port: A or B
- Slave Address: Last two digits of the sensor serial number (ex. 24)
- Device: Si-RS485TC-2T-v-MB
- Measurand: Cell Temperature
- Data Logging Mode: Statistics
- Channel Type: Modbus RTU
- Description: Edit if desired
- Input Serial Number
- Scale Factor: 0.1
- Offset: 0
- Units: C

When configuration is complete, **ensure the channels are saved.**



Serial
27 Statistics Modbus RTU Port A: Slave 24; Si-RS485-Irradiance 0.00m 0.0° (N) .1 0 W/m²

COM Port:

Slave Address:

Device:

Measurand:

Data Logging Mode:

Channel Type:

Description:

Serial Number:

Height: Meters

Boom Bearing: Degrees

Sensor Transfer Function

Scale Factor:

Offset:

Units:

Register Address:

Number of Registers:

Baud Rate:

Serial
28 Statistics Modbus RTU Port A: Slave 24; Si-RS485-Cell Temp 0.00m 0.0° (N) .1 0 C

COM Port:

Slave Address:

Device:

Measurand:

Data Logging Mode:

Channel Type:

Description:

Serial Number:

Height: Meters

Boom Bearing: Degrees

Sensor Transfer Function

Scale Factor:

Offset:

Units:

Register Address:

Number of Registers:

Baud Rate:

Connecting the Sensor to the Wiring Panel:

Wiring Table - Modbus			
Sensor Wire Color	Extension Cable Wire Color	Function	Termination
Red	Brown	Power 10 to 28VDC	Exc. (Power Supply)
Black	White	Supply negative	Ground (Power Supply)
Brown	Yellow	RS-485 Data (+)/B	RX+/TX+
Orange	Green	RS-485 Data (-)/A	RX-/TX-
Thick Black	Thick Black	Shield	Shield

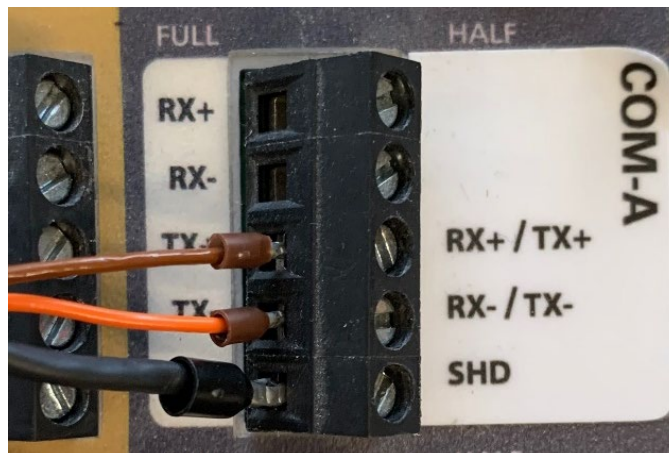
Note that the conductor colors are different between the sensor cable and the extension cable.



Connecting to SymphoniePRO Wiring panel COM Port A or B:

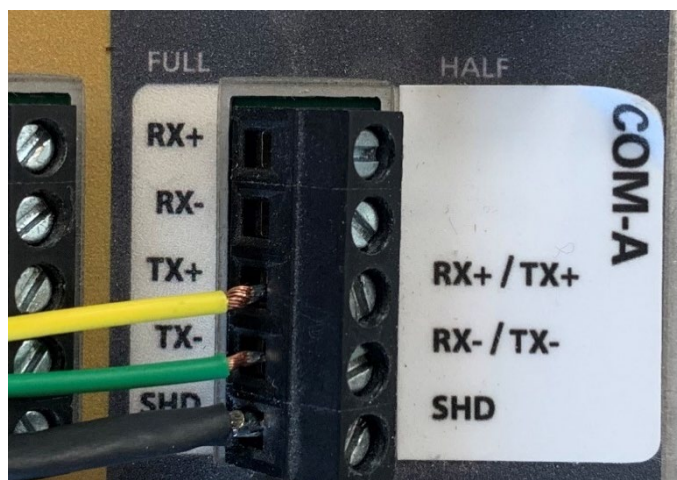
Connecting the sensor **without** Extension Cable:

RX+/TX+	Brown
RX-/TX-	Orange
SHD	Thick Black



Connecting the sensor **with** Extension Cable:

RX+/TX+	Yellow
RX-/TX-	Green
SHD	Thick Black



In most situations the extension cable **will** be utilized when connecting the sensor to the COM port terminal.

Final SymPRO Checks:

Pull-test all wires to ensure proper connection. If any disconnect, reset, and hand-tighten.

View Live Data (either at the logger display, or via SymphoniePRO Desktop Application) and verify that the sensor output is producing reasonable values, and that the units are labeled correctly. If possible, check both ends of the sensor output limits. Export and view a sample of data to check data is being stored properly.

Serial										
+	27	Statistics	Modbus RTU	Port B: Slave 24; SI-RS485-Irradianc	0.00m	0.0 ° (N)	.1	0	W/m ²	99.8 W/m ²
+	28	Statistics	Modbus RTU	Port B: Slave 24; SI-RS485-Cell Temp	0.00m	0.0 ° (N)	.1	0	C	26 C



SETTING UP WITH LOGR

The IMT Digital Reference Cell sensor can be configured on either of the LOGR Modbus COM ports. The sensor has two measurand options; Irradiance and Cell Temp.

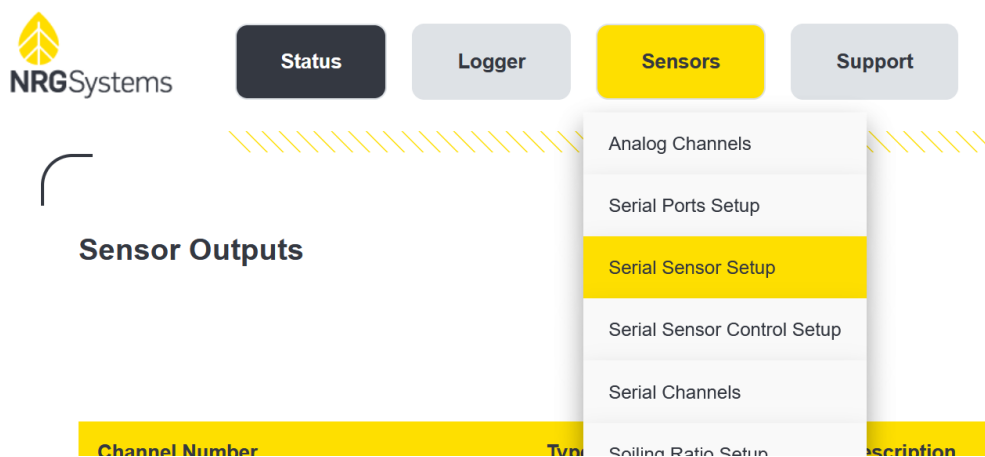
Programming the logger:

Open a web browser and connect the logger using an ethernet cable directly to the laptop or secure a wireless connection via static IP address while connected to the same local network as the logger. Enter the static IP address in the browser URL bar. If this is an unconfigured LOGR, the default IP address is **192.168.1.110**. When connected, the browser will direct to the home Sensor Output page of the specified logger.

Ensure the LOGR is loaded with firmware version 1.06.06 or newer. This will allow for configuration of the digital IMT Reference Cell Sensor.

Serial Sensor Configuration:

Navigate to the **Sensors** tab on the top of the page and select **Serial Sensor Setup** from the drop-down menu.



Configure the sensor as follows:

- Port: COM-A or COM-B
- Sensor Type: IMT Si-RS485TC-T
- Description: Edit as desired
- Client Address: Last two digits of the sensor serial number (ex. 24)
- Input Serial Number
- Control Scheme: No Control

Configured	Port	Sensor Type	Sensor Description	Client Address	Serial Number	Control Scheme
<input checked="" type="checkbox"/>	COM-A	IMT Si-RS485TC-T	IMT Si-RS485TC-T	24	000001	No Control



Solar | IMT Digital Reference Cell Sensor Instructions

When the sensor is set up correctly, scroll down and click the yellow **Save** button. The page will automatically redirect to the **Serial Channels** page where Measurand channels can be configured.

The IMT Digital Reference Cell Sensor has two measurand options; Irradiance and Cell Temp. In the rows corresponding with the desired channels, configure as follows:

First channel: **Irradiance**

- Sensor: Select the IMT Si-RS485TC-T sensor previously configured
- Measurand: Irradiance
- Slope: 0.1
- Offset: 0

Second channel: **Cell Temperature**

- Sensor: Select the IMT Si-RS485TC-T sensor previously configured
- Measurand: Cell Temperature
- Slope: 0.1
- Offset: 0

Enabled	Channel	Sensor	Measurand	Slope	Offset
<input checked="" type="checkbox"/>	101	IMT Si-RS485TC-T	Irradiance	0.10000	0.00000
<input checked="" type="checkbox"/>	102	IMT Si-RS485TC-T	Cell Temperature	0.10000	0.00000

When both channels have completed configuration, ensure the channels are saved by scrolling to the bottom of the **Serial Channels** page and clicking the yellow **Save** button. The page will redirect to the **Sensor Outputs** home page where all active configured channels can be viewed.



Connecting the Sensor to the LOGR Terminal Port:

Match the COM terminal port to the port previously selected within the LOGR web UI. For example, if the sensor were configured on port COM-A within the web UI, the sensor can be wired to either terminal blocks COM A-1, COM A-2, or COM A-3. If the sensor were configured on COM-B within the web UI, the sensor can only be wired to COM B-1.

Wiring Table - Modbus			
Sensor Wire Color	Extension Cable Wire Color	Function	Termination
Red	Brown	Power 10 to 28VDC	EXC
Black	White	Supply negative	GND
Brown	Yellow	RS-485 Data (+)/A	D+
Orange	Green	RS-485 Data (-)/B	D-
Thick Black	Thick Black	Shield	Shield

Note that the conductor colors are different between the sensor cable and the extension cable.

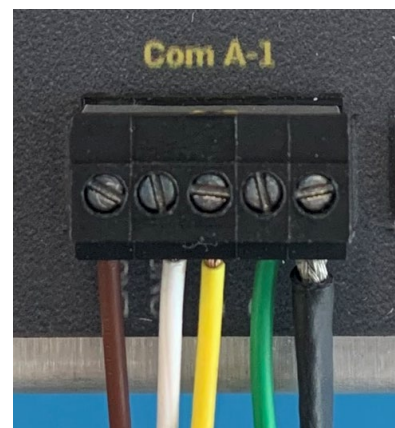
Connecting the sensor WITHOUT the extension cable:

EXC	Red
GND	Black
D+	Brown
D-	Orange
SHD	Thick Black



Connecting the sensor WITH the extension cable:

EXC	Brown
GND	White
D+	Yellow
D-	Green
SHD	Thick Black



In most situations the extension cable **will** be utilized when connecting the sensor to the COM port terminal block.



Final LOGR Checks:

Pull-test all wires to ensure proper connection. If any disconnect, reseal, and hand-tighten.

View live data in the right column (**Data**) of the **Sensor Outputs** home page on the web UI and verify that the sensor output is producing reasonable values, and that the units are labeled correctly. If possible, check both ends of the sensor output limits.

101	Serial	IMT Si-RS485TC-T-Irradiance	1.20 W/m ²
102	Serial	IMT Si-RS485TC-T-Cell Temperature	24.30 deg_C