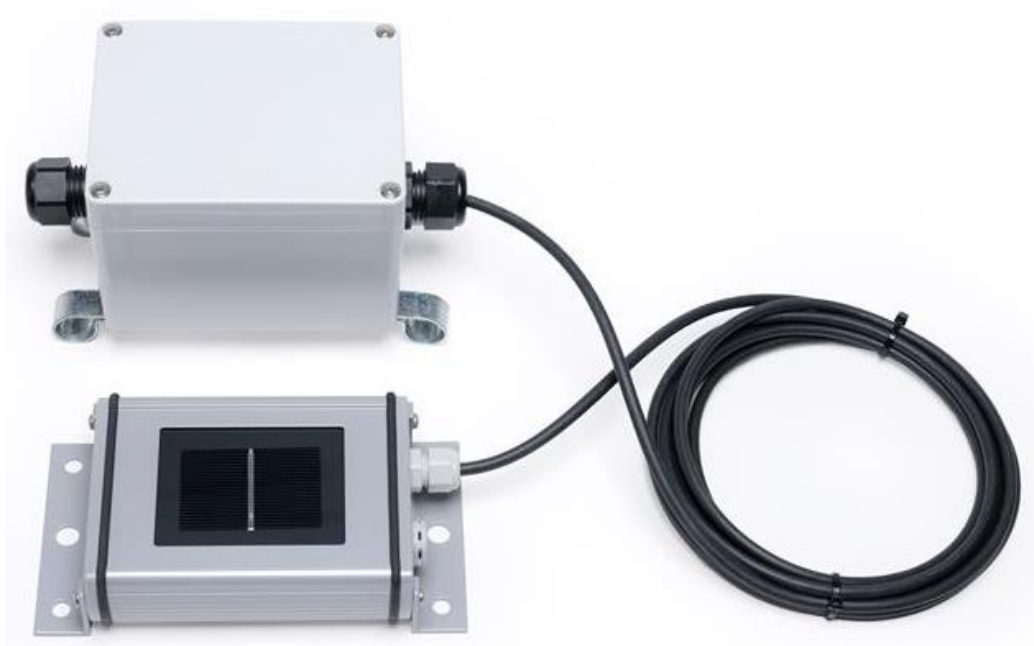




INTRODUCTION

This document provides guidance on the installation, and configuration of the IMT Analog Reference Cell Sensor (**IMT Si-V-1.5VTC-T**) 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 #**18671**) or a 35m cable (Kit #**18672**).

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-V-1.5TC-T 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
15496	Sensor	PV Sensor, Reference Cell, IMT, Analog	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

Additional Parts Necessary for SymphoniePRO

NRG Part Number	Part Description	Part Specification	Qty
9132	P-SCM Card	PCBAssy- P-SCM, 0 to 5V SE Input, Constant 12V Exc, Tested, Sealed	2



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

Additional Tools Required for SymphoniePRO:

- USB-A to USB-B Cable
- 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](#).

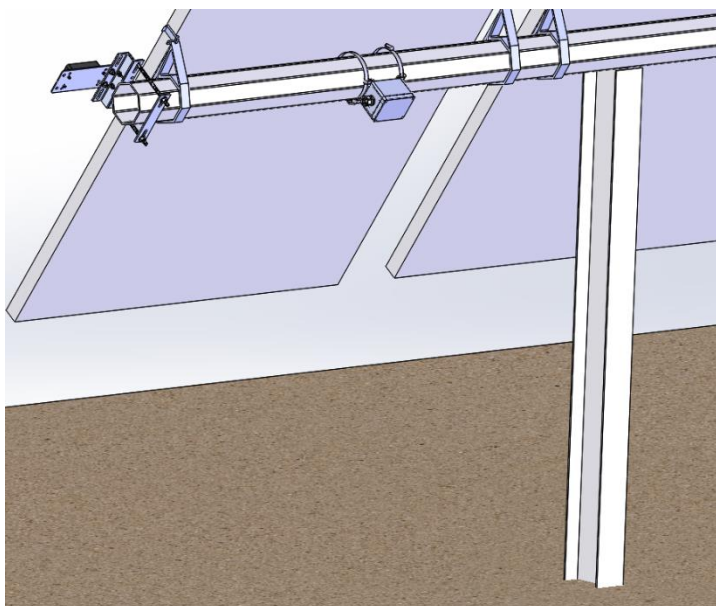
Hardware kit **#17763** was designed to mount a reference cell sensor onto a standard 1.66" diameter **tower boom**, either in upward GHI position, or downward RHI orientation. Instructions for installation can be found [here](#).

**J-Box Mounting:**

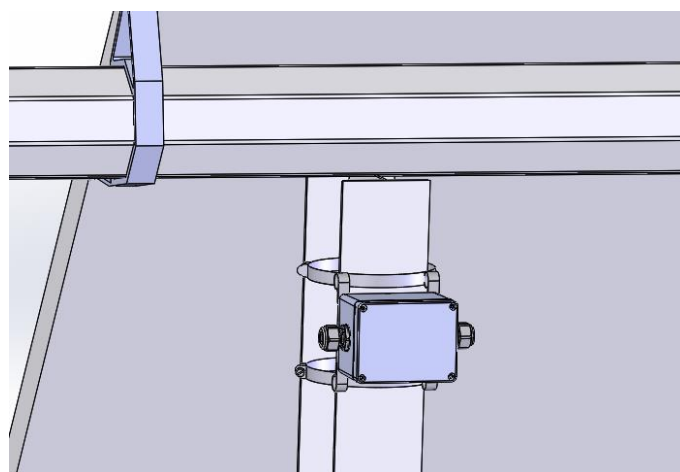
For array mounted sensors, test the length of the cable run to the desired junction box location. The J-box can be mounted either on the array torque tube or on a pile depending on which is more accessible and causes the least cable strain.

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

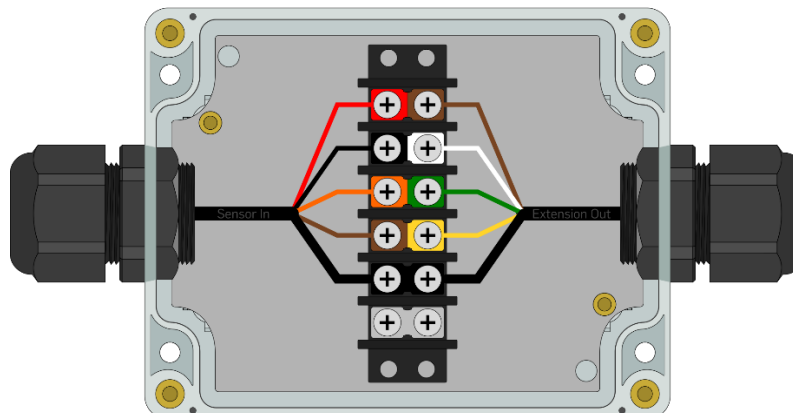


Pile Mounted J-box

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	Irradiance	Green	
	Brown	Cell Temp	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

This IMT Reference Cell sensor requires two channels to function properly. It can be installed on Analog 5V or 12V Excitation channels 16-19 (two channels), or on Analog P-SCM channels 20-16 (two channels).

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 channel and begin configuration.

Configuration on Analog 5V or 12V Excitation Channels 16-19:

Two channels are required and should be configured as follows:

First channel: **Irradiance**

- Data Logging Mode: Statistics
- Channel Type: Analog
- Description: IMT Ref Irradiance
- Input Serial Number
- Scale Factor: 1000
- Offset: 0



Solar | IMT Analog Reference Cell Sensor Instructions

- Units: W/m^2
- Excitation Mode: Constant On
- Voltage: 12V

Second channel: **Cell Temperature**

- Data Logging Mode: Statistics
- Channel Type: Analog
- Description: IMT Ref Temp
- Input Serial Number
- Scale Factor: 65
- Offset: -40
- Units: C
- Excitation Mode: Off

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

The screenshot displays two configuration panels for analog channels. The top panel is for Channel 16, 'IMT Ref Irradiance', with a scale factor of 1000 and units of W/m^2 . The bottom panel is for Channel 17, 'IMT Ref Temp', with a scale factor of 65, an offset of -40, and units of C.

Channel	Description	Serial Number	Height (Meters)	Boom Bearing (Degrees)	Scale Factor	Offset	Units	Excitation Mode	Excitation Voltage
16	IMT Ref Irradiance				1000	0	W/m^2	Constant On	12 V
17	IMT Ref Temp				65	-40	C	Off	5 V

Configuration on Analog P-SCM Channels 20-26:

Two channels are required as well as two #9132 P-SCM cards. The channels should be configured as follows:

First channel: **Irradiance**

- Data Logging Mode: Statistics



Solar | IMT Analog Reference Cell Sensor Instructions

- Channel Type: Analog
- Description: IMT Ref Irradiance
- Input Serial Number
- Scale Factor: 1000
- Offset: 0
- Units: W/m²
- **P-SCM: #9132**

Second channel: **Cell Temperature**

- Data Logging Mode: Statistics
- Channel Type: Analog
- Description: IMT Ref Temp
- Input Serial Number
- Scale Factor: 65
- Offset: -40
- Units: C
- **P-SCM: #9132**

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

The image displays two screenshots of the NRG sensor configuration interface. The top screenshot shows the configuration for 'IMT Ref Irradiance' with a scale factor of 1000 and units of W/m². The bottom screenshot shows the configuration for 'IMT Ref Temp' with a scale factor of 65, an offset of -40, and units of C. Both screenshots show the 'SymphoniePRO Signal Conditioning Module (P-SCM)' set to 'P-SCM #9132, (0 to 5) V, SE Input, Constant 12V EXC'.



Connecting the Sensor to the Wiring Panel:

Match the analog channels configured within the SymphoniePRO Desktop Application.

Wiring Table – Sensor Pinout			
Sensor Wire Color	Function	Extension Cable Wire Color	Termination
Red	5.5 – 28 VDC	Brown	EXC
Black	Power Ground	White	GND
Orange	Irradiance	Green	First Channel SIG
Brown	Cell Temperature	Yellow	Second Channel SIG
Thick Black	Shield	Thick Black	SHD

Connecting to Analog 5V or 12V Excitation Channels 16-19:

First channel: **Irradiance:**

EXC	Red
GND	Black
SIG	Orange
SHD	Thick Black

Second channel: **Cell Temperature**

EXC	N/A
GND	N/A
SIG	Brown
SHD	N/A

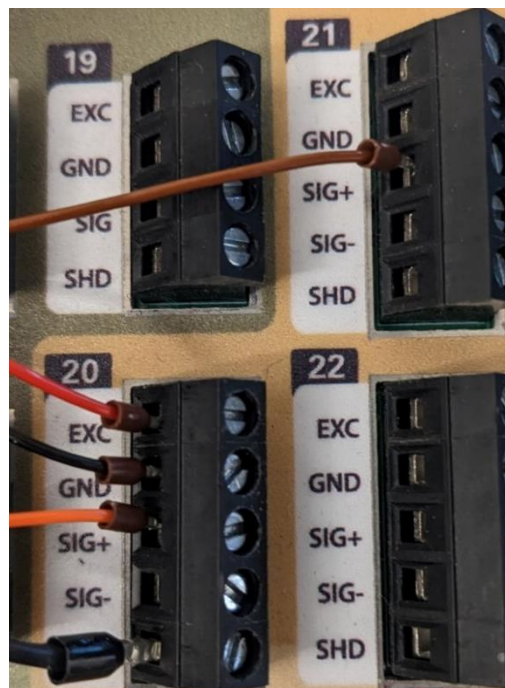




Connecting to Analog P-SCM Channels 20-26:

First channel: **Irradiance:**

EXC	Red
GND	Black
SIG+	Orange
SIG-	N/A
SHD	Thick Black



Second channel: **Cell Temperature**

EXC	N/A
GND	N/A
SIG+	Brown
SIG-	N/A
SHD	N/A

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.



SETTING UP WITH LOGR

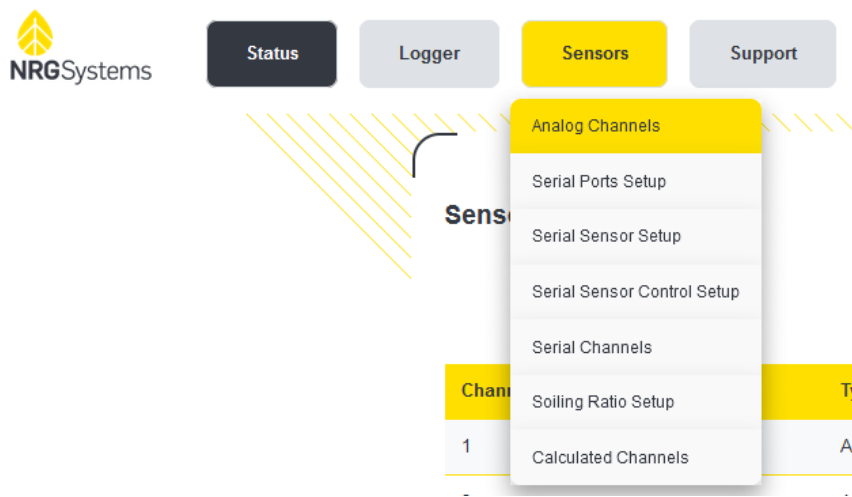
This IMT Reference Cell sensor **requires two analog channels on the same terminal port** to function properly.

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.

Analog Channel Configuration:

Navigate to the **Sensor** tab on the top of the page and select **Analog Channels** from the drop-down menu.



Two channels are required for this sensor to properly function. Click the **Configure** button next to the desired channel to configure as follows:

First channel: **Irradiance**

- Sensor Type: (-10 to 10) V SE
- Description: IMT Ref Irradiance
- Units: W/m²
- Slope: 1000
- Offset: 0
- Input Serial Number

Sensor Type	Description	Units	Slope	Offset
<input type="text" value="(-10 to +10) V SE"/>	<input type="text" value="IMT Ref Irradiance"/>	<input type="text" value="W/m^2"/>	<input type="text" value="1000.00000"/>	<input type="text" value="0.00000"/>



Second channel: **Cell Temperature**

- Sensor Type: (-10 to 10) V SE
- Description: IMT Ref Irradiance
- Units: C
- Slope: 65
- Offset: -40
- Input Serial Number

Sensor Type	Description	Units	Slope	Offset
<input type="text" value="(-10 to +10) V SE"/>	<input type="text" value="IMT Ref Temp"/>	<input type="text" value="C"/>	<input type="text" value="65.00000"/>	<input type="text" value="-40.00000"/>

When both channels have completed configuration, ensure the channels are saved by scrolling to the bottom of the **Analog 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 analog terminal port to the channels configured within the LOGR web UI. For example, if analog channels 5 and 6 were configured in the web UI, the sensor would need to be wired to LOGR analog port A3.

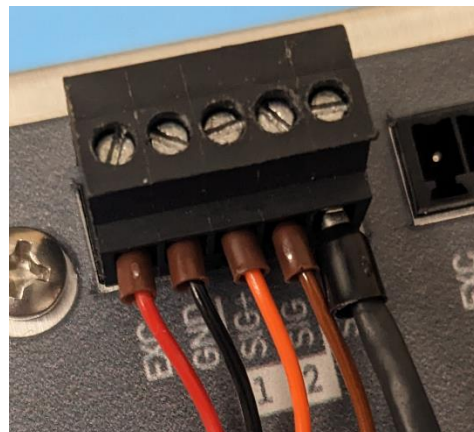
Note that the conductor colors are different between the sensor cable and the extension cable.

Wiring Table – Sensor Pinout			
Sensor Wire Color	Function	Extension Cable Wire Color	Termination
Red	5.5 – 28 VDC	Brown	EXC
Black	Power Ground	White	GND
Orange	Irradiance	Green	SIG+
Brown	Cell Temperature	Yellow	SIG
Thick Black	Shield	Thick Black	SHD



Connecting the sensor *WITHOUT* the extension cable:

EXC	Red
GND	Black
SIG+	Orange
SIG	Brown
SHD	Thick Black



Connecting the sensor *WITH* the extension cable:

EXC	Brown
GND	White
SIG+	Green
SIG	Yellow
SHD	Thick Black



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.

Description	Data
IMT Ref Irradiance	102.66 W/m ²
IMT Ref Temp	22.98 C