



Solar IMT Back-of-Module Temperature Sensor

INTRODUCTION

This document provides guidance on the installation and configuration of the IMT Back-of-Module Temperature Sensor (**IMT Tm-RS485-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 4C shielded cable (Kit #**19085**) or a 35m 4C shielded cable (Kit #**19086**). This sensor requires the NRG Config Mounting Hardware kit for installation (Kit #**19033**).

The IMT Back-of-Module Temperature Sensor is used for long term performance monitoring of solar photovoltaic (PV) modules and systems. The sensor utilizes RS485 Modbus output to communicate and has a temperature range of -40 to +90 °C.



Parts

NRG Part Number	Part Description	Part Specification	Qty
18956	Sensor	Sensor, IMT RS485 Back of Module Temperature Sensor	1
18570	J-Box	Assy, Junction Box, IMT	1
19033	Hardware	Assembly, IMT BOMT, NRG Config, Mounting HW	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)
- Isopropyl alcohol wipes (to prep attachment surface)

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 Back-of-Module Temperature Sensor Mounting:

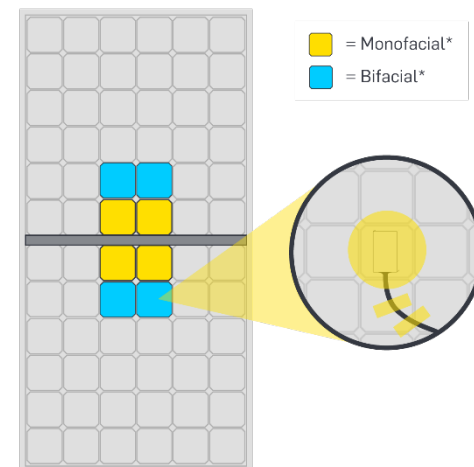
The sensor element is installed directly to the back of the desired PV panel.

1. Identify the desired location for the sensor block placement on the back of a PV panel.

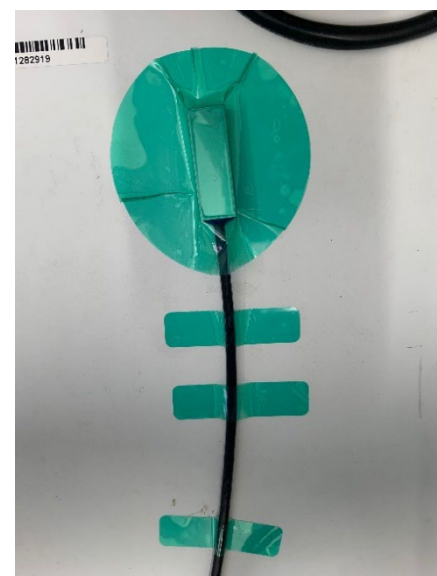
Monofacial module: Install sensor on module back sheet located in center of a cell nearest the center of the module. Any yellow highlighted cell will suffice.

Bifacial module: Unless otherwise specified, place the sensor in the center of one of the blue highlighted cells.

2. Thoroughly clean the surface with an isopropyl alcohol wipe (**do not use glass cleaner**) and allow to dry, taking care to degrease the attachment area if necessary.
3. Peel the backing off the sensor block and affix to the desired location on the panel back. Hold in place for 15 seconds.
4. Place the green circular sticker over the sensor block and secure it around the block.
5. Use the four green strain relief stickers to secure the cable to the back of the panel.
6. Use a hose clamp and zip ties mounting bracket to attach the IMT junction box to the torque tube. Place the IMT j-box in a location that will not strain the cable attachment to the mounted sensor block.



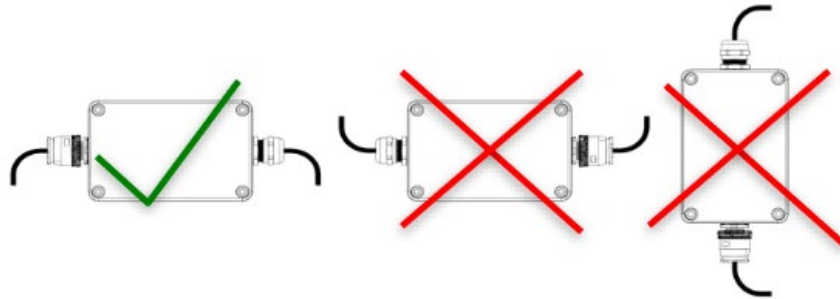
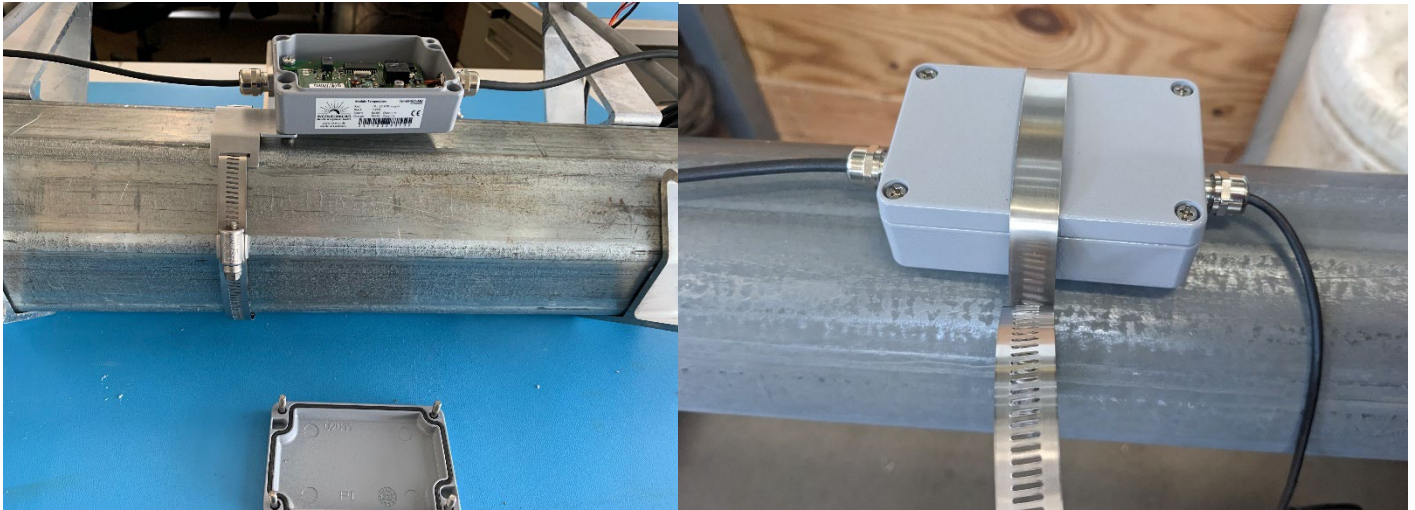
*Typical placement shown – contact PV module OEM for model-specific recommendations.





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Note that the box should always be mounted horizontally to prevent water intrusion into the box.





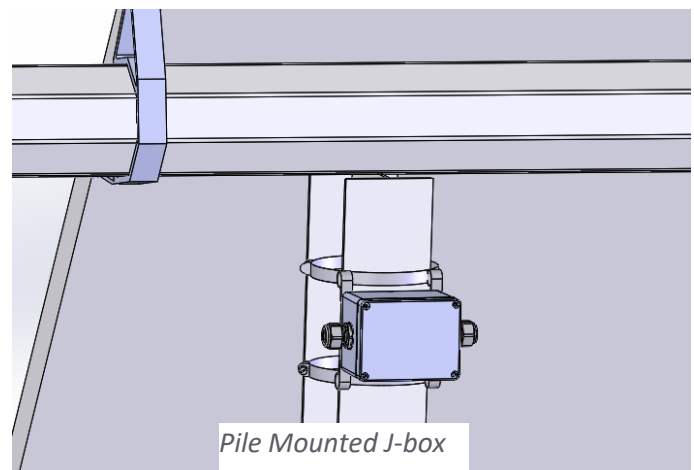
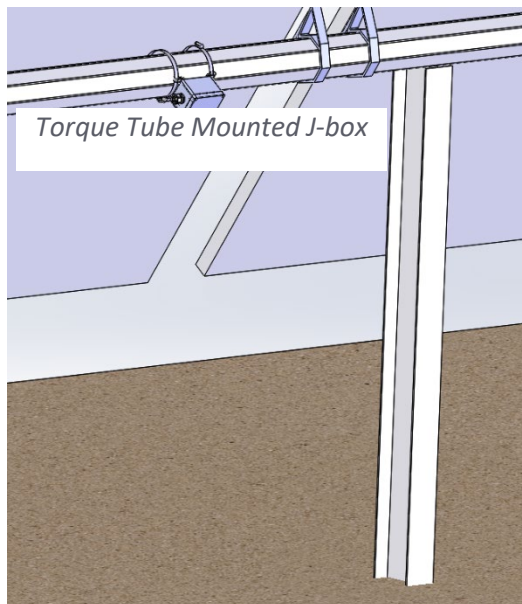
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NRG J-Box Mounting:

Test the length of the cable run to the desired NRG junction box location. This 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.

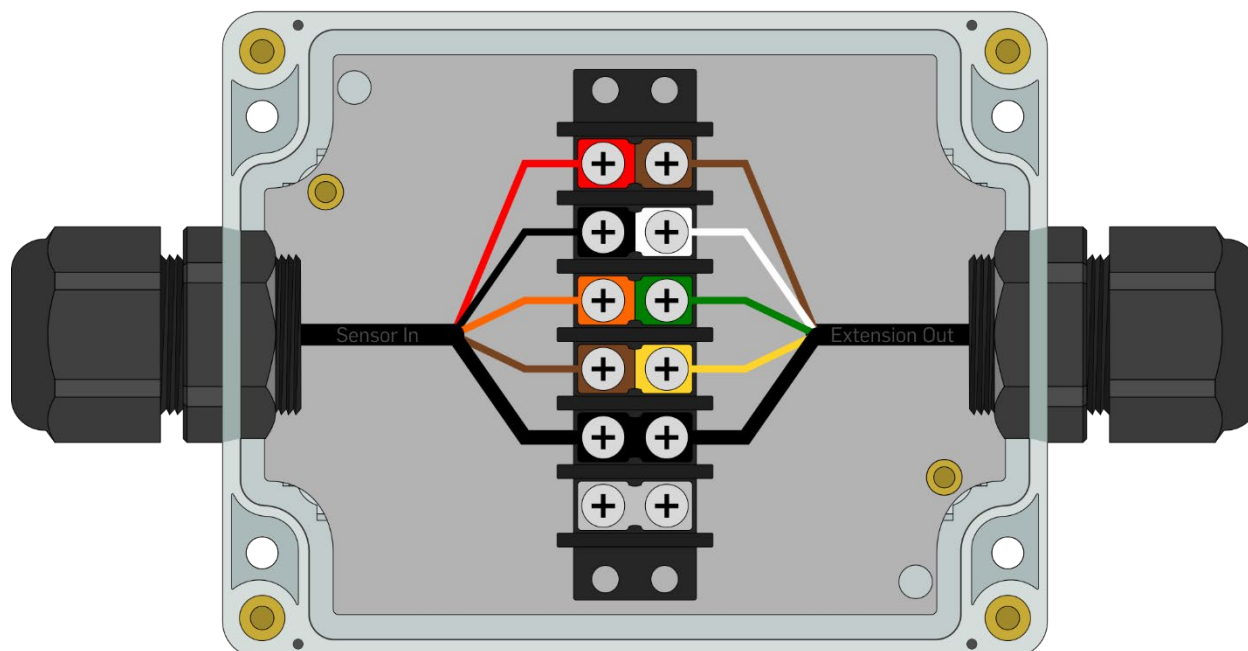
Note that the cable glands should always exit horizontally. This reduces the possibility of water intrusion into the box.



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.**



NRG 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	

4. 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 **Tm-RS485-MB.config.json** file which will allow for configuration of the IMT BoM-T 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.



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Configuration on Serial Channels 27-50:

The IMT BoM-T sensor measurand channel should be configured as follows:

- COM Port: A or B
- Slave Address: Last two digits of the sensor serial number (ex. 24)
- Device: Tm-RS485-MB BOP Temp
- Measurand: Module 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 channel is saved.**

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.

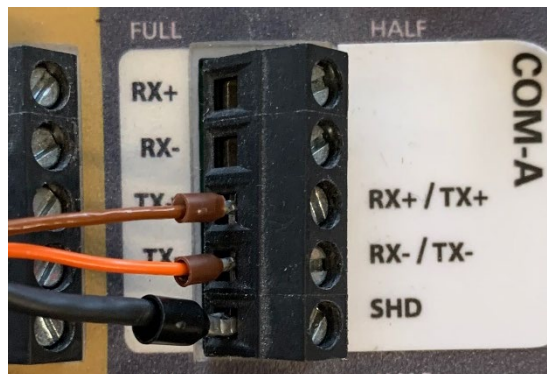


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Connecting to SymphoniePRO Wiring panel COM Port A or B:

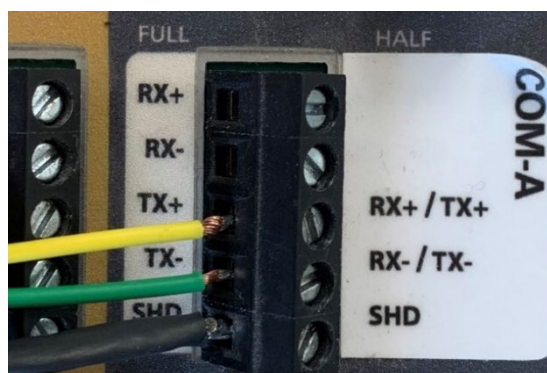
Connecting the sensor **without** Extension Cable:

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, reseal, 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. At the very least, check that live data values are reasonable at room temperature. Export and view a sample of data to check data is being stored properly.





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SETTING UP WITH LOGR

The IMT BoM-T sensor can be configured on either of the LOGR Modbus COM ports.

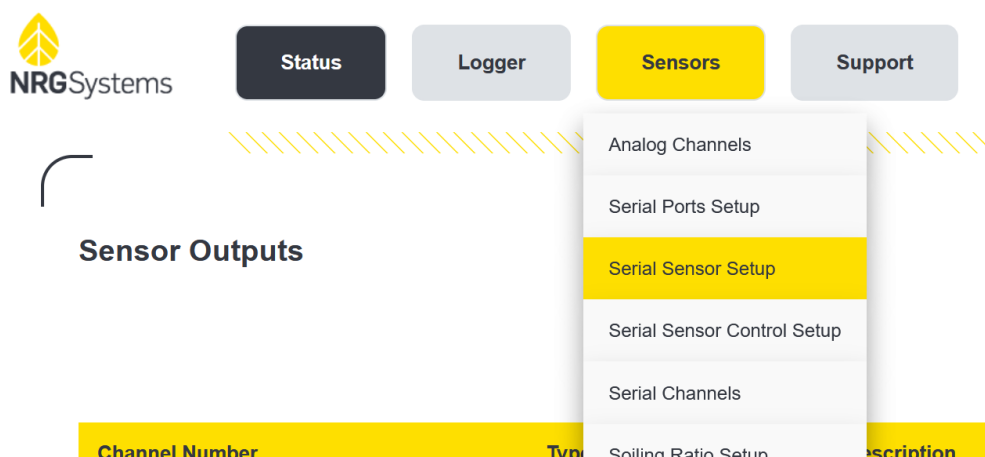
Programming the logger:

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 1.06.07 or newer. This will allow for configuration of the IMT Back of Module Temperature 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 Tm-RS485-MB
- 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 Tm-RS485-MB	IMT Tm-RS485-MB	47	251-23090447	No Control



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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 BoM-T sensor has one measurand option called “**Module Temperature**”. In the row corresponding with the desired channel, configure as follows:

- Sensor: Select the IMT Tm-RS485-MB sensor previously configured
- Measurand: Module Temperature
- Slope: 0.1
- Offset: 0

Enabled	Channel	Sensor	Measurand	Slope	Offset
<input checked="" type="checkbox"/>	101	IMT Tm-RS485-MB	Module Temperature	0.10000	0.00000

When the channel has completed configuration, ensure the channel is 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.



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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. At the very least, check that live data values are reasonable at room temperature. Export and view a sample of data to check data is being stored properly.

Channel Number	Type	Description	Data
101	Serial	IMT Tm-RS485-MB-Module Temperature	24.30 deg_C