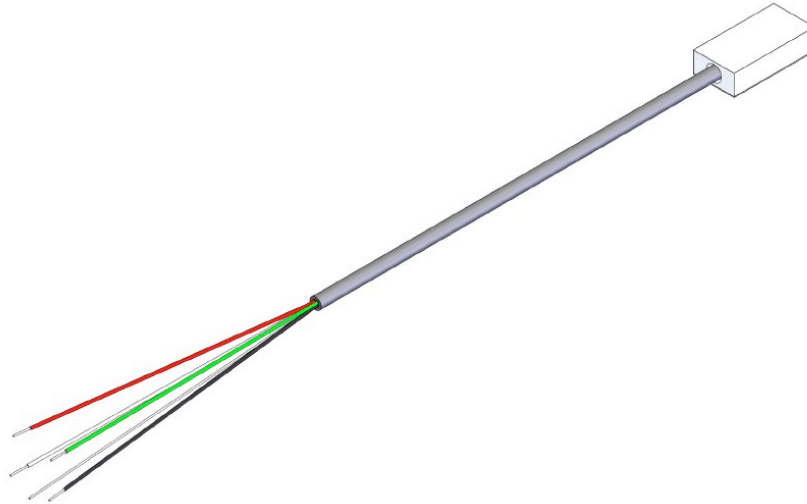




NRG PVT1 PV Module Temperature Sensor



Authors:
Technical Services

© NRG Systems
110 Riggs Road
Hinesburg VT 05461 USA
Tel: 802-482-2255
Fax: 802-482-2272
sales@nrgsystems.com
support@nrgsystems.com
www.nrgsystems.com



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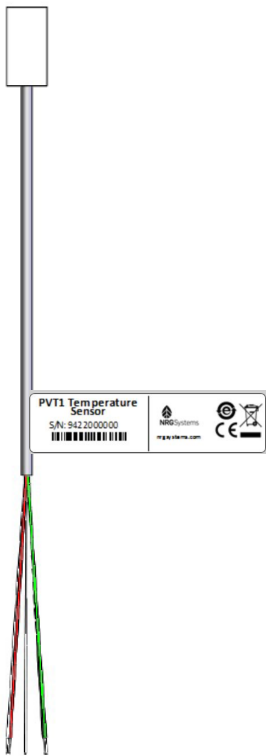


INTRODUCTION

The NRG PVT1 module temperature sensor (introduced June, 2020) provides PV module temperature for PV performance monitoring. The sensor includes an adhesion kit for affixing the sensor to PV modules to ensure proper installation, and is compatible with the NRG SymphoniePRO as well as data acquisition systems which can accept a 2 or 4 wire thermistor input.

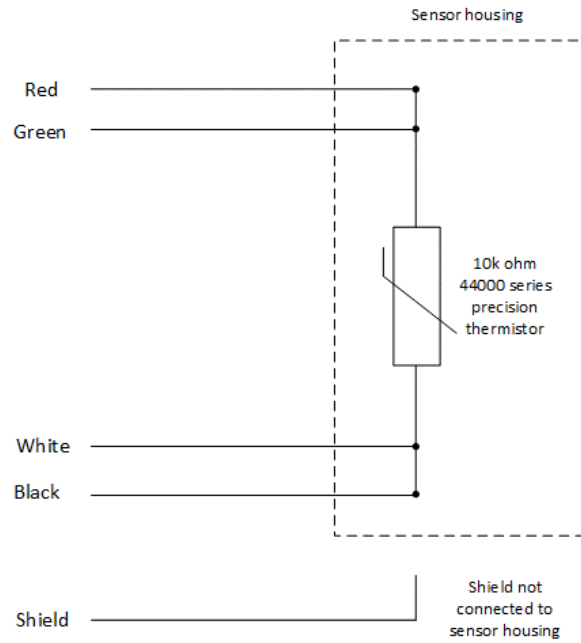
SENSOR IDENTIFICATION

The NRG PVT 1 can be identified by a label that is on the cable.



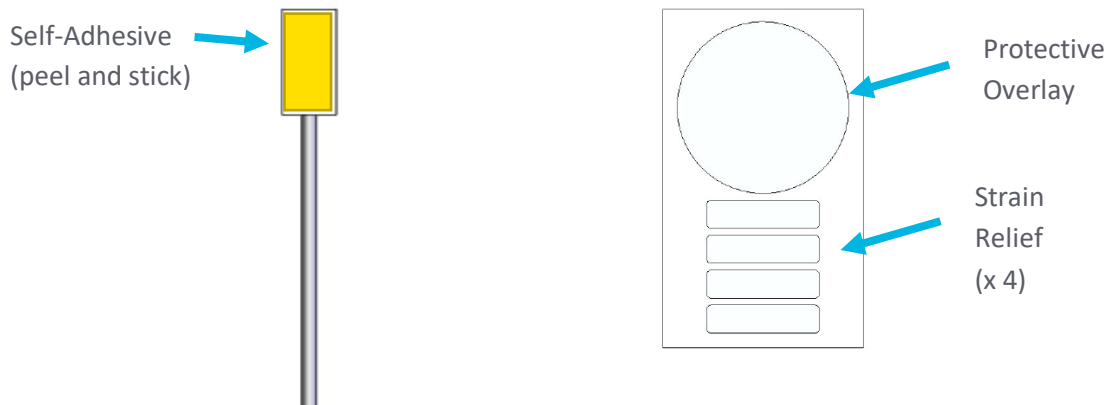
THEORY OF OPERATION

The sensor utilizes a precision 44000 series 10k thermistor connected using a 4-wire scheme; the resistance of the thermistor changes with temperature and follows a curve defined by the Steinhart-Hart coefficients. A constant current source is externally applied to the sensor to create a voltage which can in turn be measured by the data logger or data acquisition system. The sensor may be connected to equipment compatible with either a 2-wire or 4-wire topology. To meet demanding accuracy specifications, it is recommended to run the sensor in a 4-wire configuration, especially with longer wire runs.



MOUNTING

The PVT1 comes with a self-adhesive backing as well as protective overlay and strain relief stickers.



Identify desired mounting location on the PV panel, clean the panel, affix the sensor, affix the additional protective sticker and strain relief.

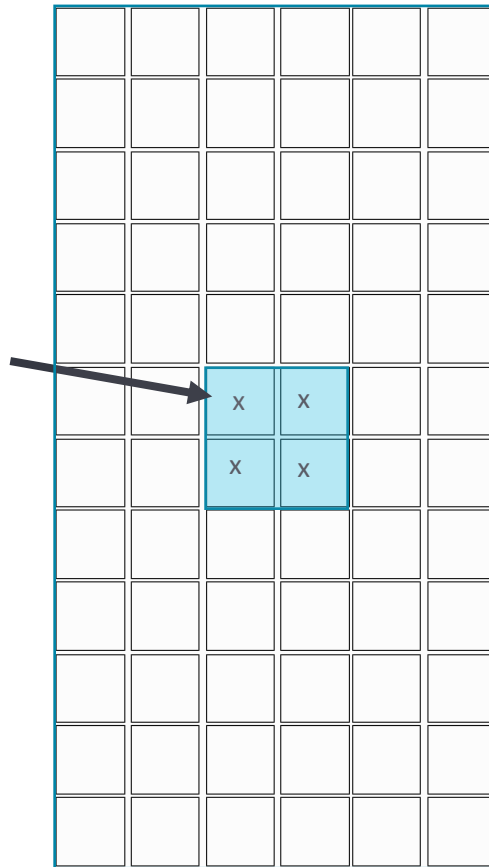


Step 1:

Identify mounting location (typically center of panel, center of cell, 4 useable cells highlighted).

Step 2:

Clean the PV cell with an alcohol wipe.



Typical PV Module (72 cells)

Step 3:

Peel the protective tape cover from the PVT1 and affix to the center of the cell.

Step 4:

Place the adhesive circle over the PVT1, and use the four adhesive strips for cable strain relief and routing.

Note: It is important to clean the PV module surface with an alcohol wipe before affixing the PVT1.

SYMPHONIEPRO

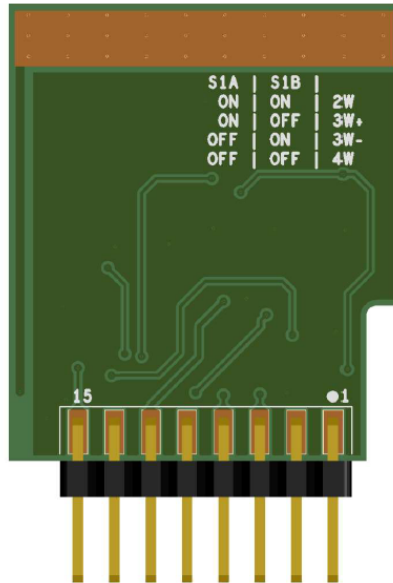
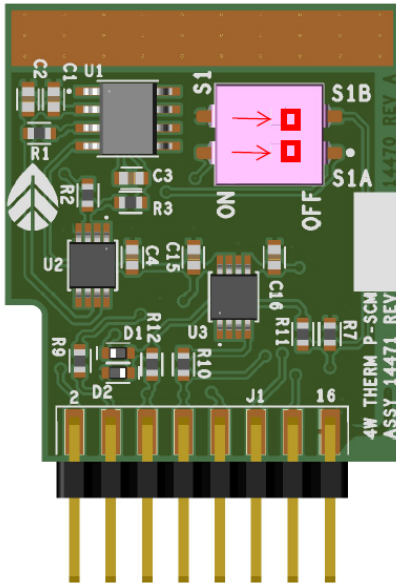
Compatibility

The sensor is compatible with SymphoniePRO loggers running firmware 3.3 or higher, and Desktop Application 3.9 and higher. Additionally, P-SCM 14472 {P-SCM, Thermistor Input, 2 or 4 wire} is required.

NOTE: Please update your desktop software and logger firmware before performing logger configuration and/or data processing tasks. The latest versions of software, firmware and documentation can be downloaded from this page: <https://www.nrgsystems.com/services-support/resources/documentation-and-downloads/>.

Wiring

Wiring the sensor to the SymphoniePRO requires P-SCM 14472 properly installed with P-SCM switches S1A and S1B both set to the OFF position for 4 wire operation.



P-SCM Channels 20-26

Channels 20-26 (P-SCM 14472)		
NRG PVT1 Module Temperature Sensor	Color	SymphoniePRO Logger
Signal +	Red	EXC
Signal +	Green	SIG +
Signal -	White	SIG -
Signal -	Black	GND
Shield	Bare	SHD

Note that prior to June 2020, NRG shipped a 2-wire thermistor P-SCM 9136. To use this P-SCM with the PVT1 sensor, leave the Red and Black wires disconnected.

Channel Configuration

Create the following configuration in the SymphoniePRO Desktop Application (Version 3.9 or later). Note, if you do not see the 200M in the “Load From Defaults” drop-down menu, please update your software from the “Services and Support” section of our website (<https://www.nrgsystems.com>).

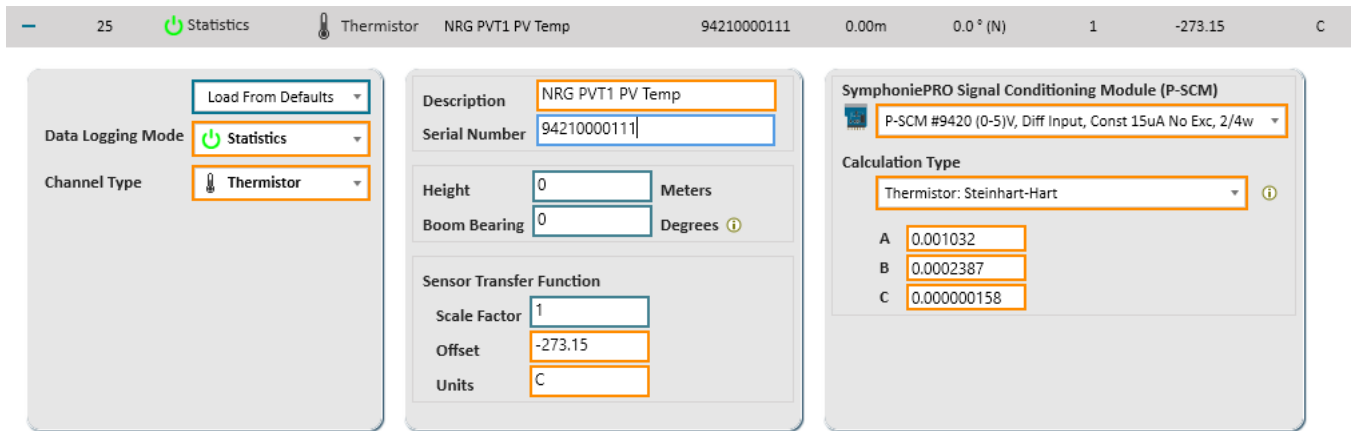
Default Scale Factors (Desktop Application 3.9 and later)



The SymphoniePRO Desktop Application contains default scaling information for the sensor in the form of Steinhart-Hart coefficients.

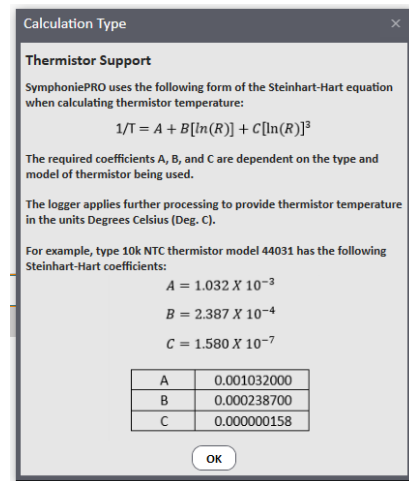
P-SCM Channels 20-26

The sensor can be used on channels 20-26 when the logger is equipped with P-SCM item #14472 { P-SCM, Thermistor Input, 2 or 4 wire }. Choose “NRG PVT1 Module Temp.” from the “Load From Defaults” drop down menu.



The Steinhart-Hart Coefficients for the sensor are:

- a= 0.001032
- b= 0.0002387
- c= 0.000000158





SPECIFICATIONS

Please see nrgsystems.com for up-to-date product specifications.

Description	Sensor type	10 kΩ NTC thermistor	
	Applications	☑ Solar resource monitoring ☑ Surface temperature measurement	
	Sensor range	-55 °C to 150 °C (-67 °F to 302 °F)	
	Instrument compatibility	NRG SymphoniePRO Data Logger	
Output signal	Transfer function	Steinhart-Hart Coefficients: ☑ A = 0.001032 ☑ B = 0.0002387 ☑ C = 0.000000158	
		Beta Value: 3694 K Beta Value Tolerance: 0.80%	
Power requirements	Accuracy	± 0.2 °C from 0 to 70 °C (±0.36 °F from 32 to 158 °F)	
	Supply current	15 µA maximum (supplied by logger)	
Installation	Mounting	Adhere to back of PV module (adhesive tape included)	
Environmental	Operating temperature range	-40 °C to 105 °C (-40 °F to 221 °F)	
	Operating humidity range	0 to 100% RH	
Physical	Connections	Wire leads: ☑ Excitation (red wire) ☑ Ground (black wire) ☑ Signal + (white wire) ☑ Signal - (green wire) ☑ Drain wire for earth ground	
		Cable length	3.0 m (9.8 ft)
		Weight	46.7 g (0.10 lbs)
		Dimensions	Probe only: 25 mm (1") long x 12.7 mm (0.5") width x 6.2 mm (.25") thick
Materials	Cable	4 conductor 28 AWG, with foil shield and drain wire, PUR jacket	
	Probe	Aluminum, epoxy filled	

NRG PVT1 ASSOCIATED ITEMS LIST

Item	Description
9421	Sensor, Temperature, PV Panel, 3 m Cable
9422	Sensor, Temperature, PV Panel, 10 m Cable
9423	Sensor, Temperature, PV Panel, 20 m Cable



9424	Sensor, Temperature, PV Panel, 50 m Cable
14471	PCBAssy- P-SCM, Thermistor Input, 2 or 4 Wire
15151	Matched Pair PV Panels, 3-meter Cable