

# Using the SPN1 Pyranometer on NRG Symphonie Loggers

## Introduction

Symphonie loggers support several pyranometers using a choice of optional Signal Conditioning Modules (SCMs). The Delta-T SPN1 Thermopile based pyranometer provides signals for Global Horizontal Irradiance (GHI), Diffuse Irradiance (DIF) and Sunshine Duration (SUN). The GHI and DIF outputs are proportional to the solar radiation, measured in Watts per square meter ( $W/m^2$ ). The Sunshine Duration output is a switch, which closes when the WMO 120 Watt / $m^2$  sunshine threshold has been met.

The NRG logger collects and stores data in raw format; a scale factor needs to be calculated to convert the raw data to engineering units. This application note explains which SCM and scale factor to use for the SPN1, and also how to connect the sensor to Symphonie.

## SCM Selection

NRG provides SCM cards compatible with the SPN1 analog outputs. A separate SCM card is required for each output (GHI, DIF, and SUN). For GHI and DIF, use SCM item 7757, and for SUN use SCM item 7759. In order to use all three SPN1 outputs, it is necessary to install two item 7757 SCMs and one item 7759 SCM.

## Pyranometer Calibration and Scale Factor

Each SPN1 sensor is factory calibrated and internally trimmed such that  $1\text{ mV} = 1\text{ W}/m^2$ . The Symphonie logger samples the sensor output voltage and converts it to a raw value in counts. The real-time display and the scaled data generated by SDR require a scale factor be applied to the raw value to obtain values in meaningful units (such as in  $W/m^2$  or minutes).

Measurement	SCM item	Symphonie Logger Channel Type	Slope	Offset	Units
Global Horizontal Irradiance (GHI)	7757	Analog or flex	1.467	0	$W/m^2$
Diffuse Irradiance (DIF)	7757	Analog or flex	1.467	0	$W/m^2$
Sunshine Duration (SUN)	7759	Analog or flex	0.009775	0	minutes spent above WMO threshold

## Entering Sensor Information into the Logger

As with all sensors, the Symphonie logger calculates and stores pyranometer data in raw units; no scaling is applied to the data in the logger. The logger uses the descriptive and scaling information that you enter to

display present values, and stores the information in the data file headers for later use. Refer to your logger's User Guide for more details on entering values into the Symphonie logger.

When the logger is started, it will identify the pyranometer channel as an NRG 110S temperature sensor. Press [Home][4][2][9], then press [F1] to change channel 9 settings, for example.

Press [F1] and select "custom"; press [SET] to accept, and then edit the sensor description. Press [SET] to see the current scale factor setting; enter the Scale Factor 1.467. Press [SET] to see the current Offset, 0.0; leave this unchanged. Press [SET] to see the current Units setting, and enter "W/sqm". Press [SET]. Enter the sensor mounting height if desired, and then press [SET]. Enter the sensor serial number if desired. Press [SET] to complete the settings for channel 9.

Once these parameters are entered, press [Home][1], then use the [F1] key to display instantaneous sensor readings.

## Data Processing

When importing data into Symphonie Data Retriever (SDR) software for the first time, the site parameters entered at the logger will be imported automatically. If the calculated scale factor was not entered into the logger, you should enter the scale factor for your sensor into the Site Information Editor before importing the site data.

## Wiring

SPN1 sensors are equipped with a multi-conductor cable, which carries signals from the sensor as well as power to the sensor. Please consult the documentation which came with the pyranometer. Note wire colors vary between manufacturers and sometimes change over time, so please cross check the pin out shown here with the SPN1 manual.

SPN1 Signal	Pin	color	Symphonie and SymphoniePLUS Logger	SymphoniePLUS3 Logger
Total (GHI)	1	White	sig	sig
Diffuse (DIF)	2	Brown	sig	sig
Signal Ground	3	Green	connect to "-" on first SPN1 SCM Channel	connect to "GND" on first SPN1 SCM Channel
Sunshine Duration	4	Yellow	sig	sig
DataLogger Ground	5	Grey	connect to "-" on second SPN1 SCM Channel	connect to "GND" on second SPN1 SCM Channel
DataLogger Power	6	Pink	connect to "+" on one SPN1 SCM Channel	connect to "EXC" on one SPN1 SCM Channel
Heater (-)	7	Blue	no connect	no connect
Heater (+)	8	Red	no connect	no connect
Screen	-	Screen	logger ground stud	logger ground stud