



INTRODUCTION

Legacy Symphonie loggers support thermopile pyranometers using a choice of two Signal Conditioning Modules (SCMs), depending on the type of pyranometer.

Thermopile pyranometers provide a signal output proportional to the total solar radiation, measured in Watts per square meter (W/m^2). Each pyranometer includes a calibration sheet which specifies the sensitivity for that individual sensor.

The logger collects and stores data in raw format; and a scale factor needs to be calculated to convert the raw data to usable values. These instructions explain how to calculate the correct scale factor based on your individual pyranometer calibration value (sensitivity).

Applicable Logger Models

These instructions deal with the Symphonie Classic (#3090), SymphoniePLUS (#4280), and SymphoniePLUS3 (#4941) models of loggers.

Pyranometer Calibration Value

Thermopile pyranometers output a voltage signal in microvolts proportional to the total solar radiation. Each sensor is typically factory calibrated, and the calibration value is given on the sensor calibration sheet as sensitivity in “microvolts per W/m^2 ”.

SCM SELECTION

NRG provides two SCMs compatible with common thermopile based pyranometers.

SCM #6646 is compatible with the Hukseflux LP02, SR11, SR12, SR20, and Kipp & Zonen CMP3 and CMP6 pyranometers.

SCM #6946 is compatible with the Kipp & Zonen CMP11 pyranometer.

Be sure to confirm both the SCM type and pyranometer model prior to ordering and installation.



Using Thermopile Pyranometers With Symphonie Loggers

CALCULATE SCALE FACTOR

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 require a scale factor be applied to the raw value to obtain a value in W/m^2 .

To do this, find your SCM and pyranometer on the following table and divide the corresponding “SCM Constant” by your sensor’s calibration (sensitivity) value.

SCM	Pyranometers	SCM Constant
SCM #6646	LP02	29.875
	SR11	
	SR12	
	SR20	
	CMP3	
	CMP6	
SCM #6946	CMP11	20.536

Scale Factor = SCM Constant / Sensitivity

Example calculation:

From the sensor calibration report, the sensitivity of your Hukseflux LP02 pyranometer is found to be 10.4 microvolts per W/m^2 . To obtain the Symphonie scale factor, find the SCM Constant corresponding to the LP02 SCM in the table above and divide by 10.4.

Scale = $29.875 / 10.4$

Scale = 2.873



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 [▼] to change channel 9 settings, for example.

- Press [▼] 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 you calculated. 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 [▼] 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.



Using Thermopile Pyranometers With Symphonie Loggers

WIRING

Thermopile sensors have 3 connections to the logger: “+”, “-”, and “shield”. Please consult the documentation which came with the pyranometer as the number of wires and the wire colors vary between manufacturers and sometimes change over time.

Hukseflux SR11, SR12, SR20

Wire	Symphonie & SymphoniePLUS	SymphoniePLUS3
+ (white)	+	EXC
- (green)	sig	sig
Shield (black)	shield	shield

Hukseflux LP02

LP02 w/ fixed cable		LP02 w/ detachable cable*	
Symphonie & SymphoniePLUS	SymphoniePLUS3	Symphonie & SymphoniePLUS	SymphoniePLUS3
+ (white)	EXC (white)	+ (white)	EXC (white)
- (green)	Sig (green)	- (blue)	Sig (blue)
Shield (black)	Shield (black)	Shield (yellow)	Shield (yellow)

**The LP02 with detachable cable has a brown and black lead for the 12 v DC case heater. The data logger cannot provide the wattage needed to power the heater. An external power supply is required to use the case heater. If unused either snip the leads off or tape them individually and then tape them out of the way.*

Kipp & Zonen CMP3, CMP6, CMP11

Wire	Symphonie & SymphoniePLUS	SymphoniePLUS3
+ (red)	+	EXC
- (blue)	sig	sig
Shield (black)	shield	shield