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INTRODUCTION

The SR300-D1 Thermopile Pyranometer (Item # 19864) is the succeeding product from the Hukseflux SR30 pyranometer model. The SR300-D1 maintains Class A standard with Modbus RS-485 output. It is optimized for use on commercial scale PV power plants as it complies with industrial-grade requirements for enhanced sensor surge immunity and installation safety. It features internal heating and ventilation as well as improved tilt measurement functionality and expanded real-time diagnostics. The SR300-D1 is intended for deployment where the highest measurement reliability and data accuracy are required.

The SR300-D1 can be mounted in a variety of locations and positionalities for optimal data collection, such as tower-mounted GHI, RHI, PV-mounted POA, RPOA, albedometer mounts and more.

The instructions below describe how to configure the Hukseflux SR300-D1 pyranometer with either an NRG Systems SymphoniePRO Data Logger or an LOGR Data Logger (any model).

Parts

NRG Part Number	Part Description	Part Specification
19864	Sensor	SR300-D1 Pyranometer
Cable Options:		
14334	Cable	3.5m, M12-A
14236	Cable	5m, M12-A
14239	Cable	10m, M12-A
14240	Cable	20m, M12-A
14241	Cable	30m, M12-A
19532	Cable	40m, M12-A
14242	Cable	50m, M12-A
17671	Cable	Extension, 20m, M12-A
Mounting Options:		
15845	Round TT Mount	Assembly, POA Pyranometer, Round Torque Tube Mounting Hardware
16073	Square/Octo TT Mount	Assembly, POA Pyranometer, Square or Octagonal Torque Tube Adjustable Mounting Hardware
14357	Boom Mount	Assembly, Pyranometer, Pipe Mount Tower Mounting Hardware
18768	Round TT POA Pyranometer + RC Mount	Assembly, POA Pyranometer and Reference Cell Sensor, Round Torque Tube Mounting Hardware
17830	Square/Octo TT POA Pyranometer + RC Mount	Assembly, POA Pyranometer and Reference Cell Sensor, Square or Octagonal Torque Tube Mounting Hardware
14396	Albedometer Mounting Plate	Assembly, Pipe Mount, Albedometer
For use with:		
14487	Albedometer	Kit, Albedometer Measurement, Tripod
18868	Albedometer	Kit, Albedometer Measurement, Pile Mount

Tools Required

- Small flathead screwdriver (for logger terminations)
- 5/32” hex driver/Allen key (for angle bracket assembly)
- 3/16” hex driver/Allen key and 1/2” wrench or socket (for sensor mounting)
- 9/16” wrench or socket (x2 for 20441, for torque tube mounting)

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)

Additional Tools Required for SymphoniePRO

- USB-A to USB-B cable
- Laptop with a USB port, loaded with SymphoniePRO Desktop Application

INSTALLATION

Sensor Mounting

NRG Systems offers a variety of mounting solutions to meet any need. This includes Boom Mounted hardware assemblies for tower installation to support Global Horizontal Irradiance (GHI) measurement (Figure 1), and a variety of torque tube mounting assemblies for Plane of Array (POA) measurements (Figures 2-4). All mounting solutions can be installed in a downward facing position for Reflected Horizontal Irradiance (RHI) and Reflected Plane of Array (RPOA) measurements. Additionally, SR300 pyranometers can be mounted back-to-back for utilization as an albedometer (Figure 5).

NRG Systems also offers purpose-built custom mounting solutions if a standard mount is not applicable.

Note that downward facing sensors should be installed without the provided white sunshield.

Hardware Instructions

Solar Pyranometer Mount | Round Torque Tube (15845)
Solar Pyranometer Mount | Square/Octagonal Torque Tube (16073)
Solar Pyranometer Mount | Tubular Boom Mount (14357)
Solar Pyranometer + Reference Cell Sensor Mount | Square/Octagonal Torque Tube (17830)
Solar Pyranometer Albedometer Mounting Plate (14396) | Tripod Mount (14487) or Pile Mount (18868)

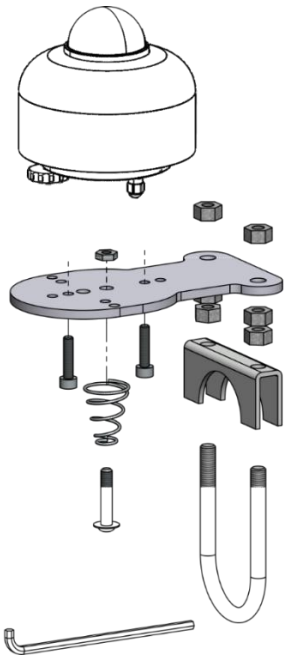


Figure 1: Boom Mount (14357)

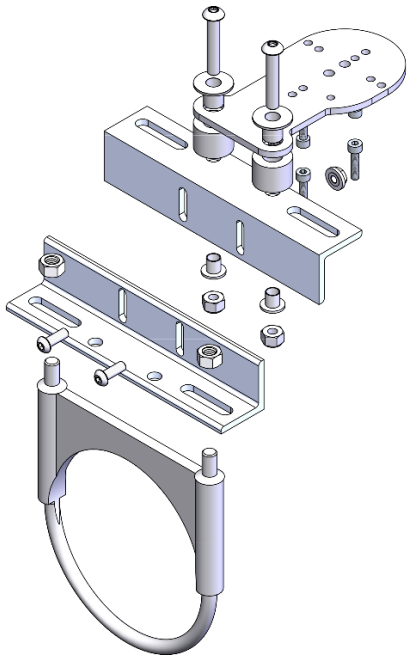


Figure 2: Round Torque Tube Mount (15845)

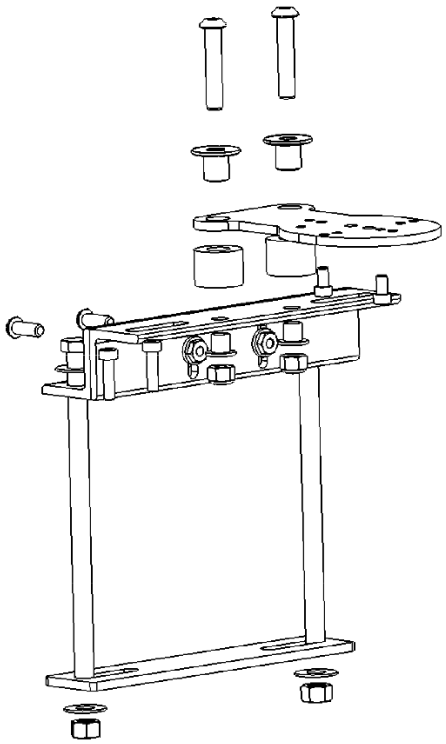


Figure 3: Square/Octagonal Torque Tube Mount (16073)

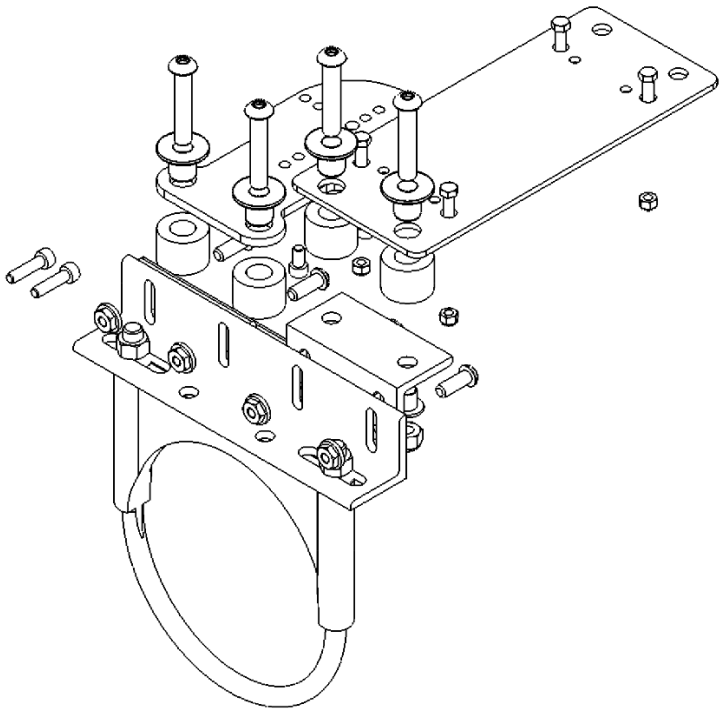


Figure 4: Round Torque Tube Mount with Co-located Reference Cell Sensor (18768)

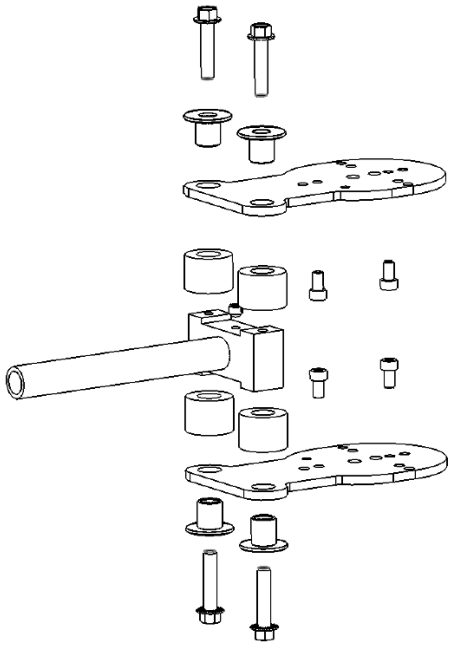


Figure 5: Albedometer Mount (14396)

Sensor Grounding

The Hukseflux SR300 comes equipped with an added earthing terminal at the sensor body to aid in protection from electrical surge damage. A 5-meter green cable is included and should be utilized to ground the unit locally. Resistance between the sensor earthing terminal and the grounding point should be less than 1 ohm.

If the sensor is connected to a surge protection device such as the NRG SP100, the sensor earthing terminal should be connected to the same grounding point as the surge protection device, as shown in Figures 6 and 7 below. The equipotential bonding between the two terminal points is required to avoid significant current flow through the sensor cable shield which can cause issues including physical damage, data unreliability, or data loss. This is true for both array-mounted and tower-mounted sensors.

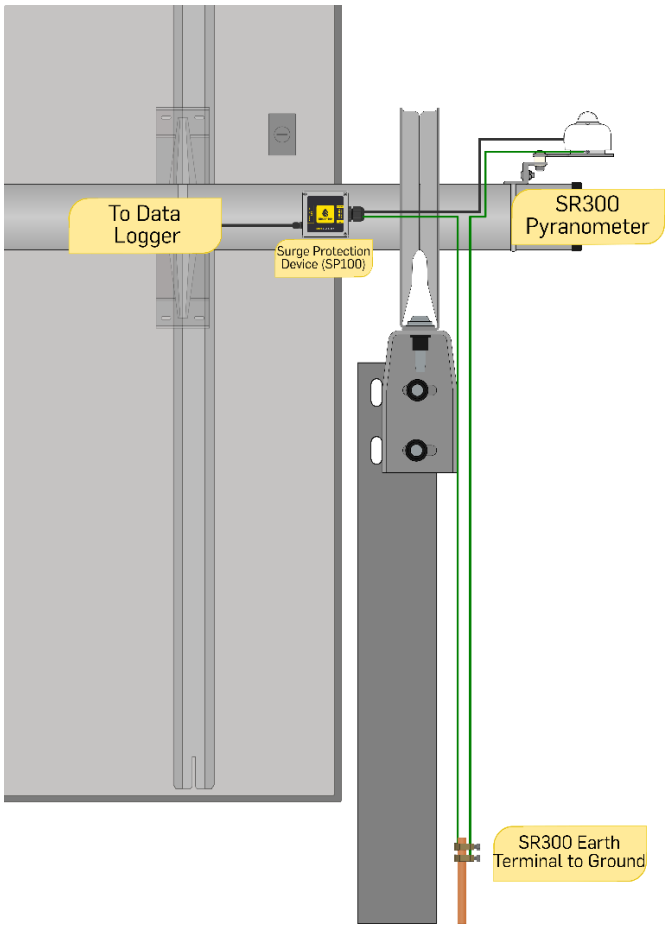


Figure 6: Array-Mounted Sensor Grounding with NRG SP100

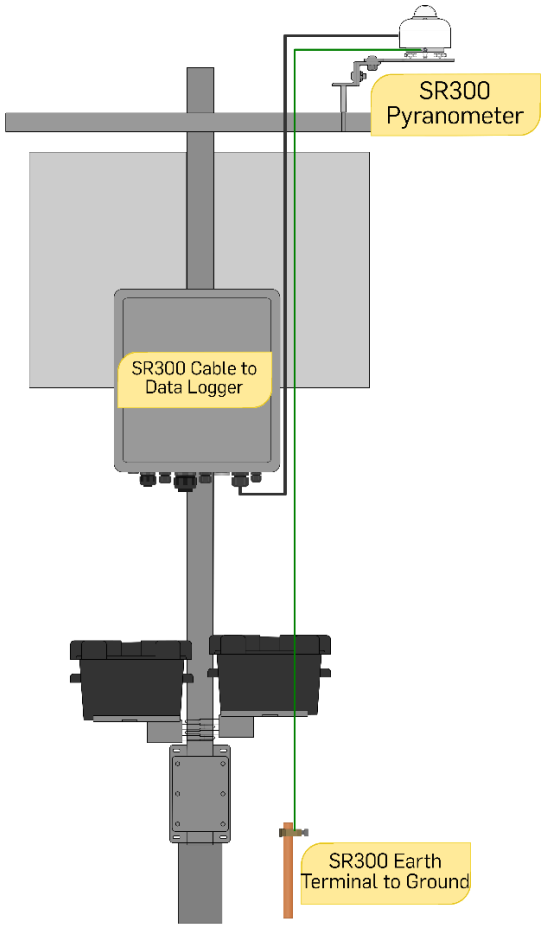


Figure 7: Tower-Mounted Sensor Grounding

INTERNAL SENSOR CONFIGURATION

When installing or replacing a serial communication sensor, you may need to change the sensor's Client ID (also known as a Modbus Address, Device Address, or Slave ID) to allow free communication between the sensor and data logger.

Acceptable Client IDs range from 1 to 247.

Note that no two serial sensors (regardless of type or model) can share both a logger COM port and sensor Client ID and maintain free data communication. For example, if one sensor is configured on COM A with Client ID 1, no other sensor on COM A can use Client ID 1. Acceptable programming for a second serial sensor would be COM A with a Client ID between 2 and 247, or COM B (LOGR|Solar) through D (LOGR|Met exclusive) with any unclaimed Client ID.

Manufacturer Default Internal Sensor Configuration

- Device address: 1
- Baud rate: 19200
- Parity: Even
- Data bits: 8
- Stop bits: 1

Changing Internal Sensor Configurations

Tools Required

- Laptop with USB port
- RS-485 to USB adapter
- Hukseflux Sensor Manager software (free download, must have Java)
- Sensor power supply (8-30 V DC)

Sensor Connection

1. Connect the sensor power wires to an 8-30 V DC power supply:
   Brown → Power +
   Black → Power –
   If the sensor is already mounted to a MET tower or PV array, it can remain in place and the power leads will stay connected to the power source.

2. Connect the sensor signal wires to the RS-485 adapter:
   Grey → A(-)
   White → B(+)
   Yellow → GND

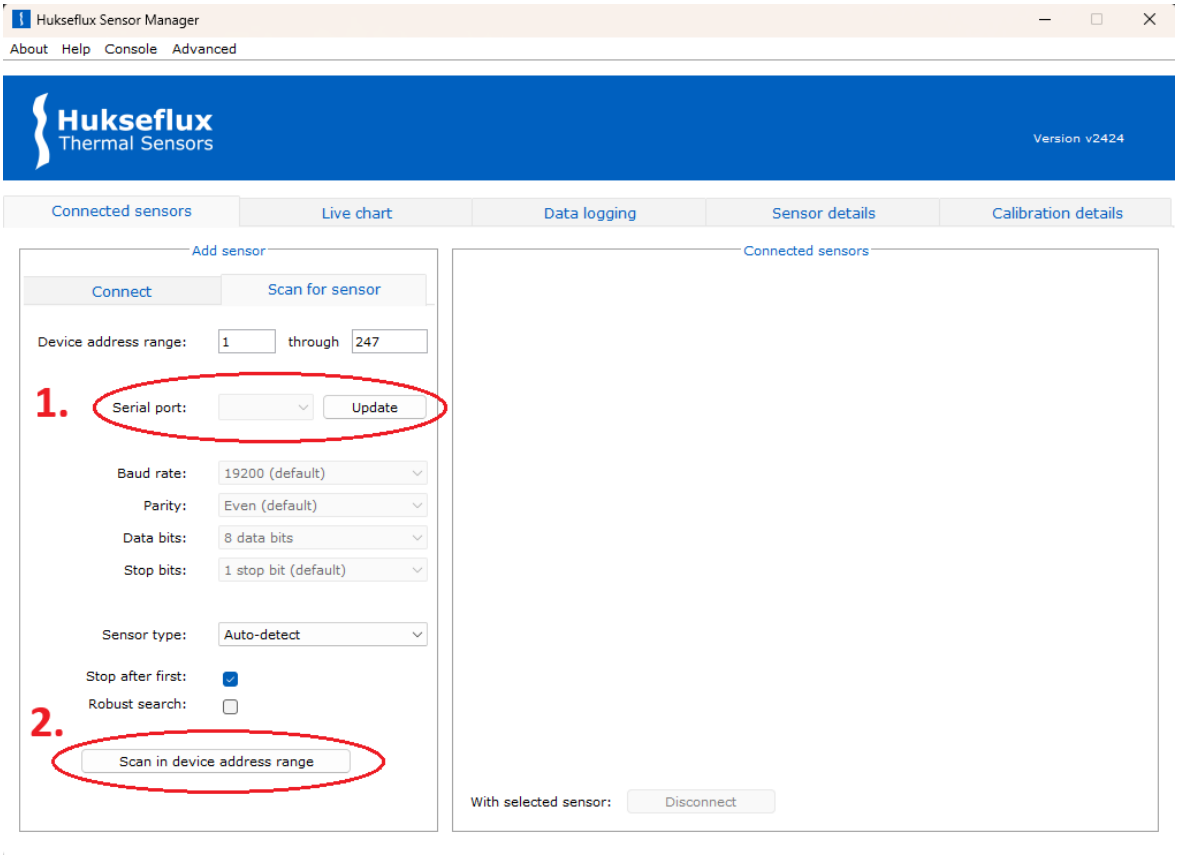
3. Connect the RS-485 adapter to a laptop via USB cable and open the Hukseflux Sensor Manager software.

Internal Configuration Instructions

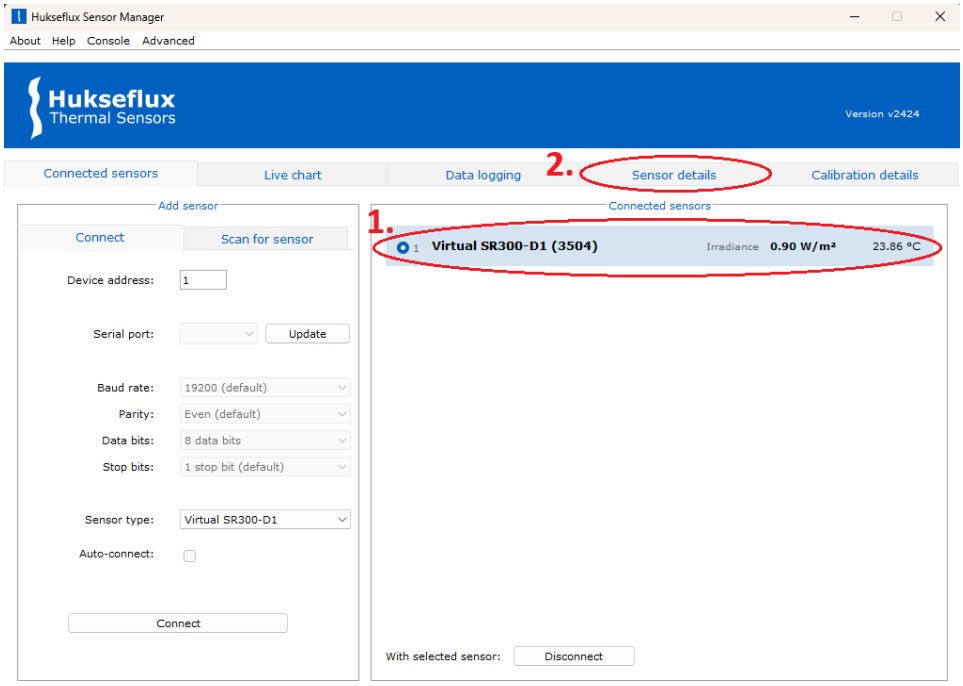
1. Under the “Add sensor” section, select the “Scan for sensor” tab.

   Click the “Update” button next to the “Serial port” field to connect to the laptop COM port associated with the RS-485 adapter.

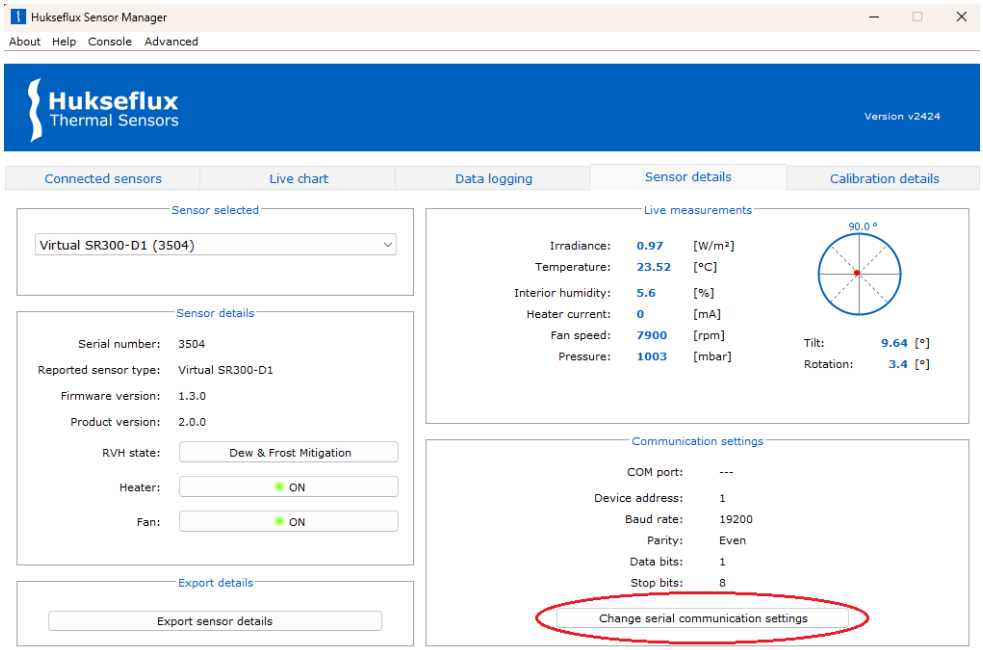
   Click the “Scan in device address range” button to find the sensor connected to the RS-485 adapter. Ensure the “Stop after first” checkbox is enabled. This prevents the software from continuing to scan through the entire device address range (1 through 247) even if the connected sensor is found quickly.



2. When the sensor appears in the “Connected sensors” window, select it, then click into the “Sensor details” tab.



3. The “Communications settings” box displays the current internal configuration of the sensor. To edit these fields, click the “Change serial communications settings” button.

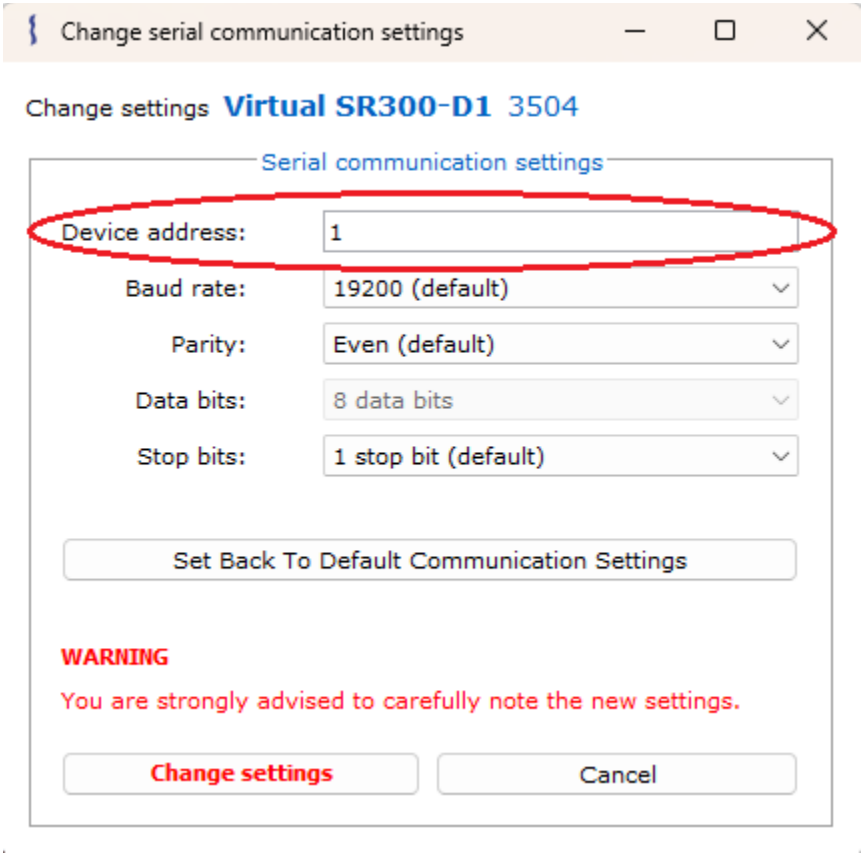


4. A new window will pop up which allows configuration changes to the communications settings of the sensor.

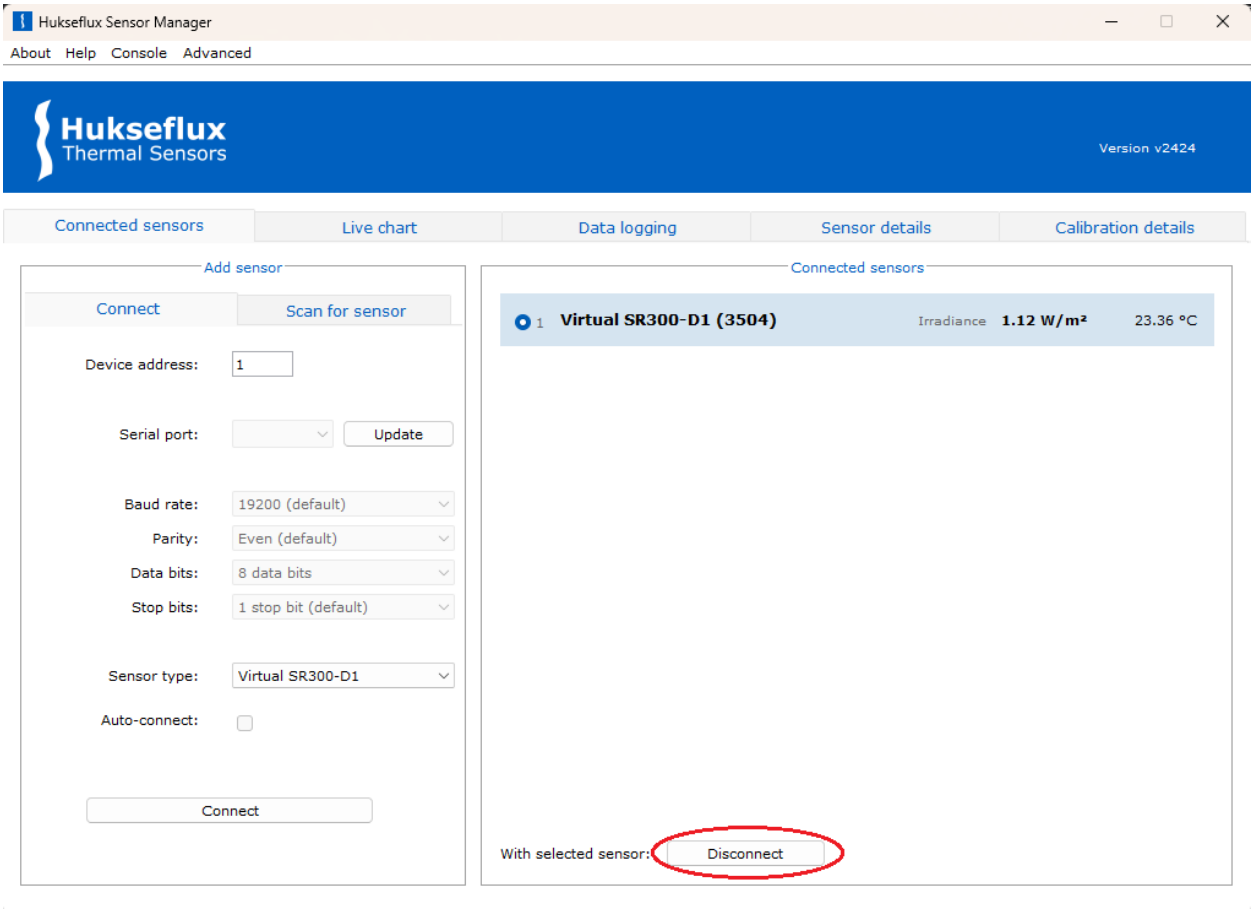
   Edit the “Device address” field to reflect the desired Modbus ID (1 through 247).

   This window also allows for additional communications protocols changes. Hukseflux sensor defaults match NRG logger default configurations, therefore these values will only need altering in specific, unusual configurations.

   Double check any edits before clicking the red “Change settings" button and accepting the following warning pop-up box.



5. When the configuration changes are complete, click the “Disconnect” button at the bottom of the “Connected sensors” window.



6. Disconnect the sensor wires from the RS-485 adapter. If the sensor is MET tower or array mounted, return the sensor data wires to their original locations to re-establish data connectivity.

    a. Verify wiring and pull test to ensure they are secure.

        Brown → EXC
        Black AND Blue → GND
        White → Signal + (D+ or TX/RX+)
        Grey → Signal – (D- or TX/RX-)
        Yellow → SHD

    b. Verify sensor connectivity by viewing logger live data for validity.

LOGGER CONFIGURATION

LOGR Data Logger Setup

The SR300 pyranometer can be configured on any LOGR serial COM port.

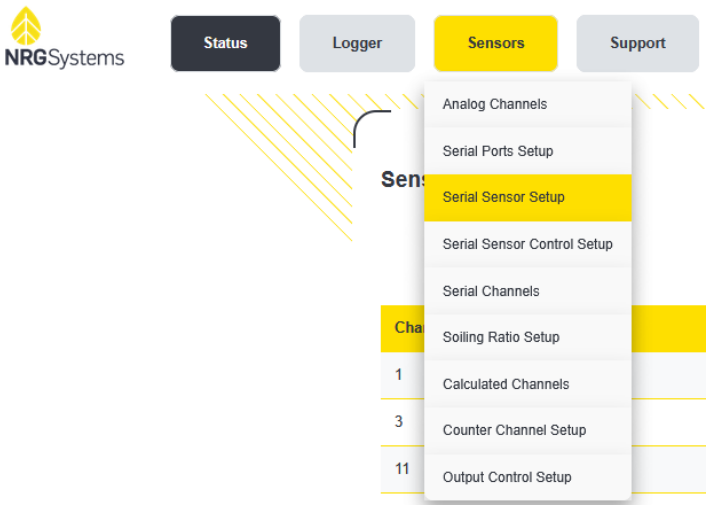
Open a web browser and connect with the logger using an ethernet cable, directly to a laptop or PC. Alternatively secure a wireless connection via static IP address while connected to the same local network as the logger. Enter the LOGR static IP address in the web browser URL bar. If this is an unconfigured LOGR, the default IP address is **192.168.1.110**.

When successfully connected, the browser will direct to the Web UI home page (**Status** > **Sensor Outputs**).

Note, the logger must be updated to firmware version 1.10.09 or newer to configure the Hukseflux SR300 pyranometer.

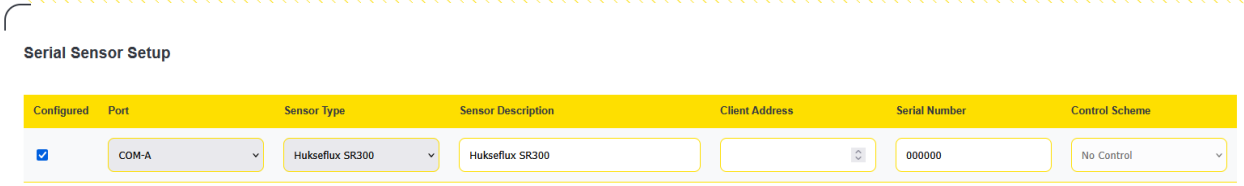
LOGR Sensor and Channel Configuration

Navigate to the **Sensors** dropdown menu at the top of the page and select the **Serial Sensor Setup** option.



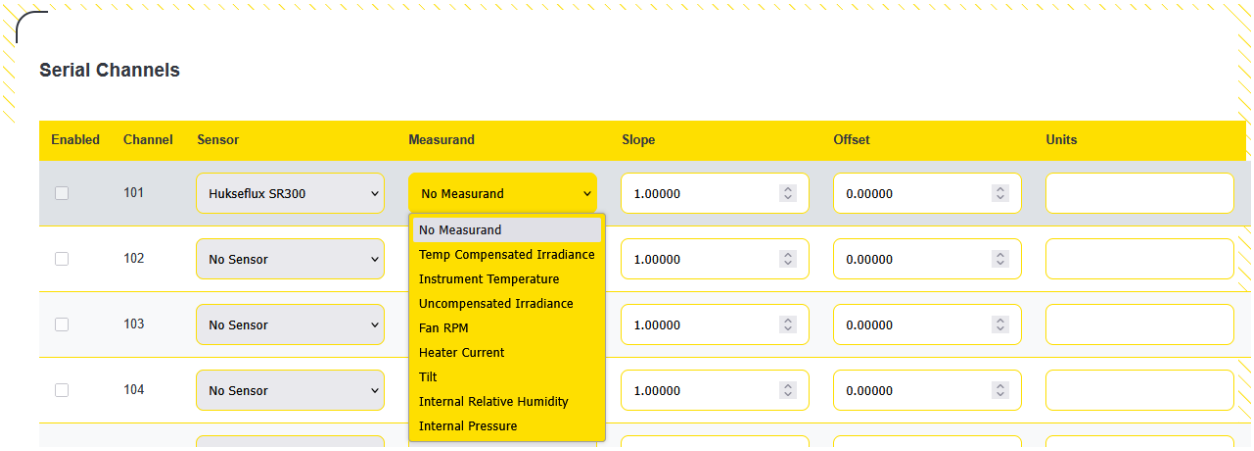
Use the dropdown menus to select the desired **Port**. select **Hukseflux SR300** from the **Sensor Type** options. Edit the **Sensor Description** as needed to provide a distinct name for each sensor, such as including the position or location of the sensor (e.g., GHI, POA, RPOA, etc.). The default **Client Address**

for SR300 pyranometers is **1**, but this must match the internal sensor configuration (see the Internal Sensor Configuration section for further details and instructions). Enter the sensor **Serial Number**. For information regarding internal sensor heater configuration, see the Control Scheme Setup section.



When configuration is complete, scroll down and click the yellow **Save** button. The page will automatically redirect to the **Serial Channels** configuration window where all Measurands are programmed.

Locate the desired channels and use the **Sensor** dropdown menu to select the SR300 pyranometer, then select the desired **Measurand.**. The logger will automatically populate the relevant **Slope**, **Offset**, and **Units** for each Measurand. These values should not be changed unless otherwise directed.



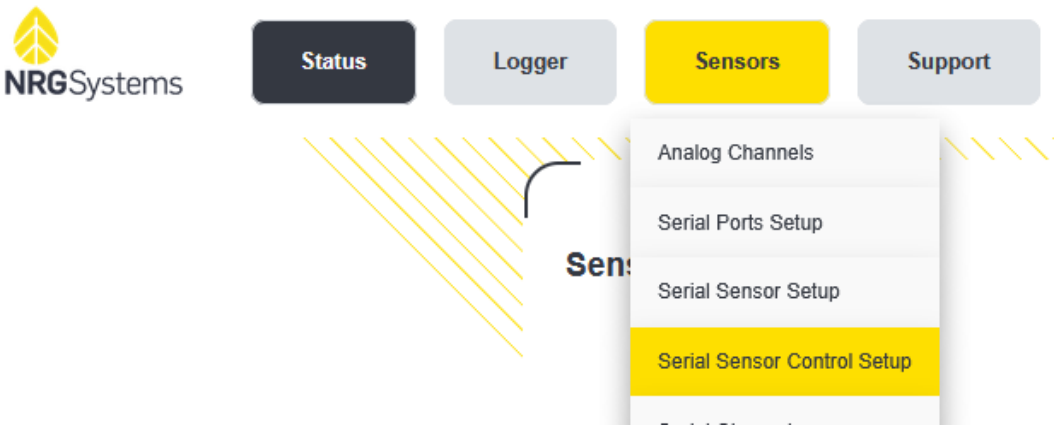
When all desired channels have been configured with Measurands, scroll down and click the yellow **Save** button. The page will automatically redirect to the **Sensor Outputs** home page where all configured channels are displayed. Live data values appear in the righthand column.

Sensor Heater Control Schemes

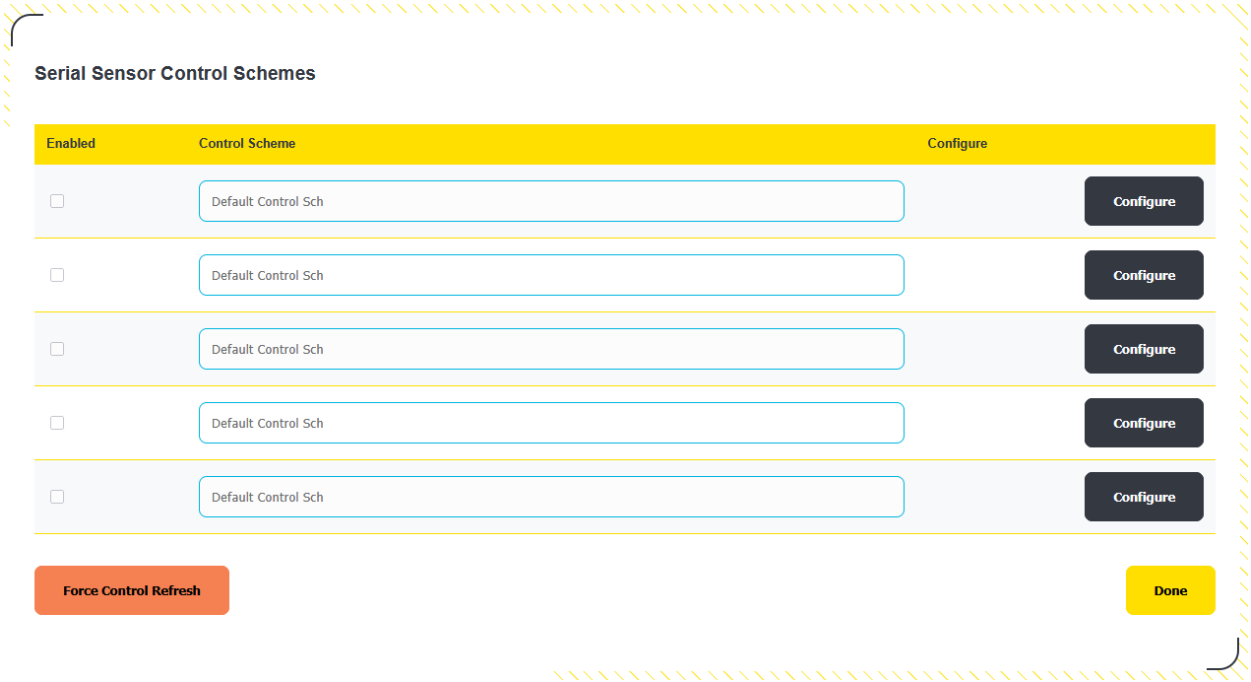
Control Schemes create pre-set actions for the Hukseflux SR300 pyranometer based on parameters. Up to five different schemes can be configured and enabled per logger, such as turning on the internal heater of a sensor at a given temperature threshold. To enable and control the internal heater of the

SR300 pyranometer the logger must first have an ambient temperature sensor programmed onto a channel.

Navigate to the **Sensors** dropdown menu at the top of the page and select the **Serial Sensor Control Setup** option.



Click the grey **Configure** button to create a new control scheme.

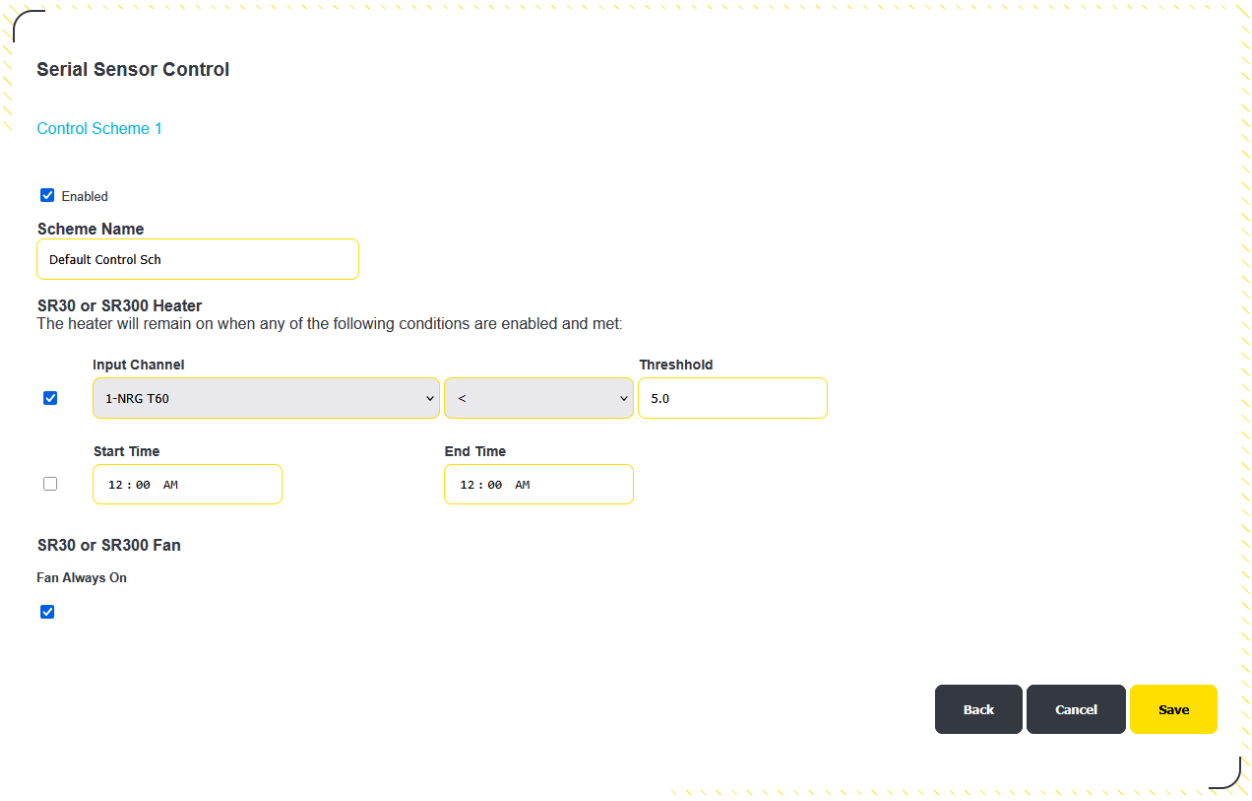


Click the **Enabled** checkbox to activate the control scheme. Edit the **Scheme Name** as needed. To enable the internal heater at a given temperature, select the ambient temperature sensor channel from the **Input Channel** dropdown menu and edit the temperature **Threshold** (in degrees Celsius) as needed.

Alternatively, or additionally, a **Start Time** and **End Time** can be enabled with the checkbox if the heater is only desired during a particular local time such as during the morning dew period.

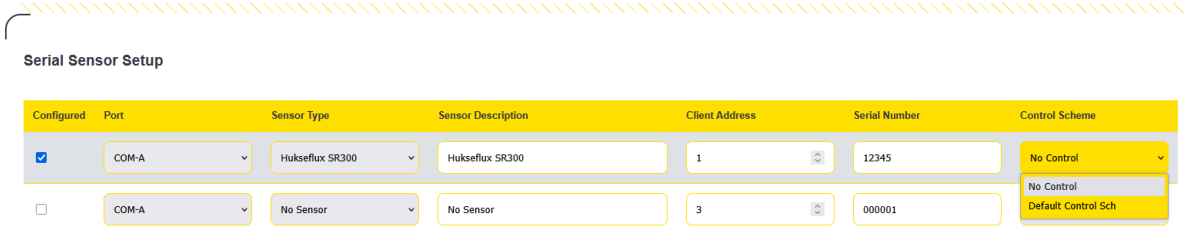
Note that the SR300 internal fan will always run if/when the heater is enabled. The fan can only be disabled if the heater is not in use and the **Fan Always On** checkbox is unchecked.

Click the yellow **Save** button to complete the setup and return to the **Serial Sensor Control Schemes** page.



Configure additional control schemes as needed, then click the yellow **Done** button to continue automatically to the **Serial Sensor Setup** page.

In the far-right column, use the **Control Scheme** dropdown menu to select the desired sensor control scheme, previously configured.



Scroll down and click the yellow **Save** button to enable changes. The page will automatically redirect to the Serial Channels page; scroll down and click the yellow **Save** button again. The page will automatically redirect to the **Sensor Outputs** home page where configured channels are viewable.

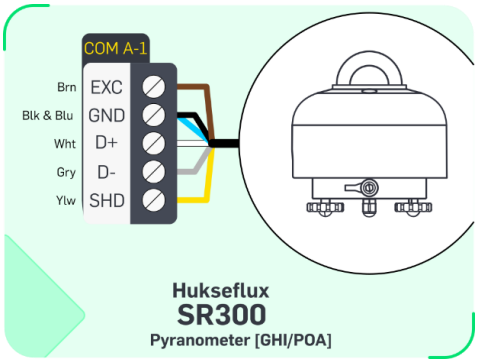
LOGR Wiring Connection

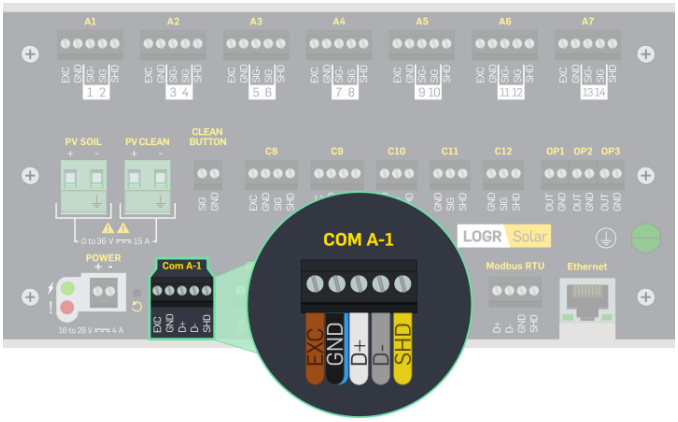
At the logger, wire the sensor to the terminal of the COM Port previously programmed within the web UI. For example, if the sensor was configured in the web UI to COM-B, the sensor must be wired to the logger COM-B terminal port.

Wiring Connections—LOGR Serial:

Wire Color	Function	Termination
Blue	RS485 Ground	GND
Black	Power Ground	GND
Grey	RS485-	D-
White	RS485+	D+
Brown	Power Excitation	EXC
Yellow	Cable Shield	SHD

LOGR Wiring Diagram:





LOGR Final Checks

Pull-test all wire connections to ensure they are secure. If any wires disconnect, reseat and retighten.

Ensure the blue status LED under the sensor dome is lit (see image below). This provides visual feedback indicating sensor power stability.

Ensure sensor grounding is sufficient to protect the unit from electrical surge events (see Sensor Grounding).

On the **Sensor Outputs** home page, verify that the sensor reports reasonable values and the units are labeled correctly.

Sensor Outputs

Active

Channel Number	Type	Description	Data
101	Serial	Hukseflux SR300-Temp Compensated Irradiance	41.82 W/m^2
102	Serial	Hukseflux SR300-Instrument Temperature	26.49 deg_C
103	Serial	Hukseflux SR300-Uncompensated Irradiance	41.69 W/m^2
104	Serial	Hukseflux SR300-Fan RPM	9080.00 RPM
105	Serial	Hukseflux SR300-Heater Current	313.00 mA
106	Serial	Hukseflux SR300-Tilt	0.38 deg
107	Serial	Hukseflux SR300-Internal Relative Humidity	5.43 %

SymphoniePRO Data Logger Setup

Before using the Hukseflux SR300 pyranometer with a SymphoniePRO logger, the following prerequisites must be met:

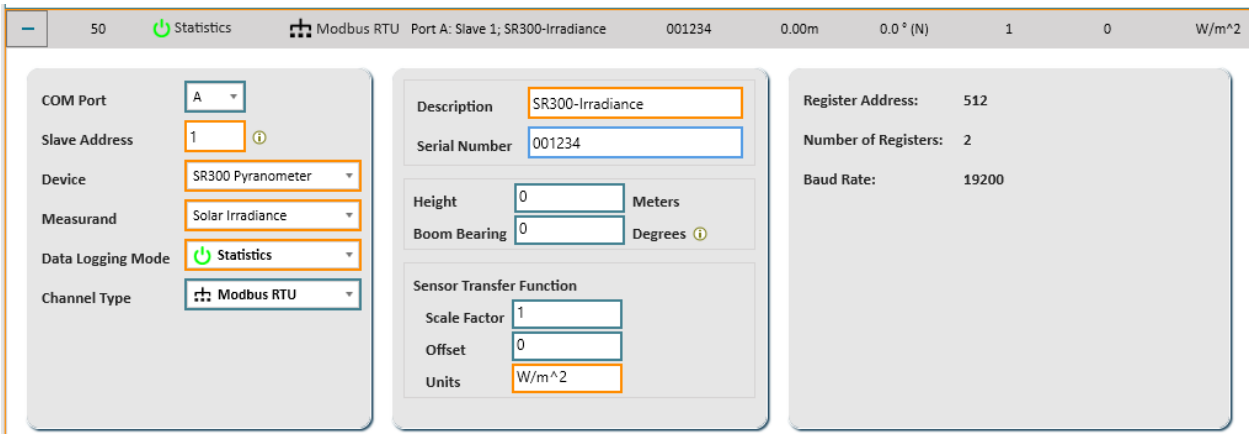
- The SymphoniePRO Desktop Application software must be version 3.17.0 or higher. Download the newest version from the NRG Systems website here.
- The SymphoniePRO logger firmware must be version 3.4.12 or higher. Download the newest version from the NRG Systems website here.

These updates allow the SR300 pyranometer configuration file (.json) to be added to the SymphoniePRO logger. This configuration file **MUST** be loaded onto the PC being used to program the logger. If the configuration file is not present and in the correct folder, the user will be unable to select the sensor from the dropdown menu in the Serial Channels section.

To verify the SR300 configuration file, navigate to: **C:\Users*UserName*\Documents\Renewable NRG Systems\Sensor Configurations** and confirm that ***"SR300_Pyranometer.config.json"*** is present. If it is missing from this folder, contact NRG Technical Support (support@nrgsystems.com) to request a copy.

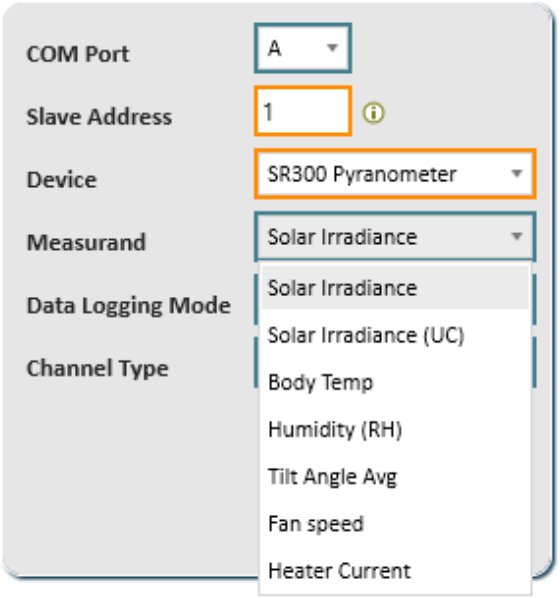
SymphoniePRO Channel Configuration

1. Open the **Channels** tab in the SymphoniePRO Desktop App and scroll down to the Serial Channels section.
2. Click on the **+** icon at the left to expand the rows of the desired channels.

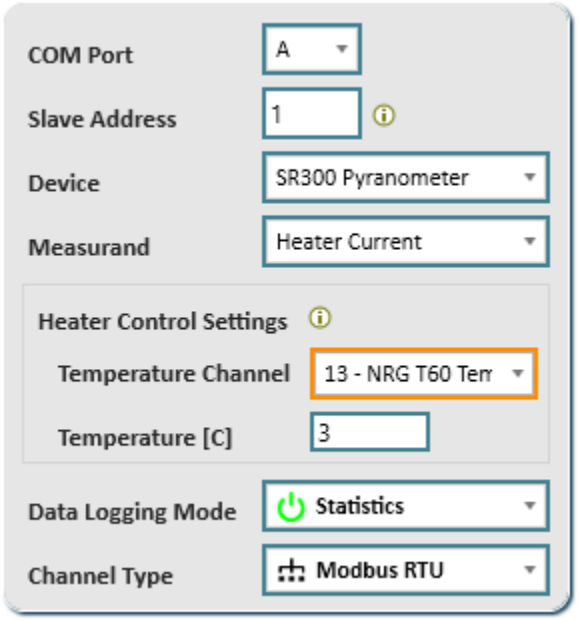


3. Select the proper COM **Port** (corresponding to the wiring panel terminal connection).
4. Enter the **Slave Address** (matching the Device Client ID configured internally to the sensor).
5. Select "SR300 Pyranometer" from the **Device** dropdown menu.

6. Select the desired **Measurand** from the dropdown menu.



Note that for the **Heater Current** measurand, which controls the internal heater of the sensor, an ambient temperature sensor must be already configured on another channel. Under the **Heater Control Settings** box select the ambient temperature sensor channel from the dropdown menu and enter a temperature threshold (degrees Celsius) which will turn on the heater on and off.



7. Select “Statistics” or “Stats & Samples” from the **Data Logging Mode** dropdown menu.

8. Complete or edit the **Description**, **Serial Number**, **Height**, and **Boom Bearing** fields, as appropriate.

   Note: Sensor best practice is to add the pyranometer position (e.g., "POA" or "GHI") to the **Description** field to differentiate one pyranometer from any others connected to the same logger.
9. The **Scale Factor**, **Offset**, and **Units** default values listed in the **Sensor Transfer Function** section are correct values for each measurand and should not be changed.
10. Save all changes to activate the newly configured channels.

SymphoniePRO Wiring Connection

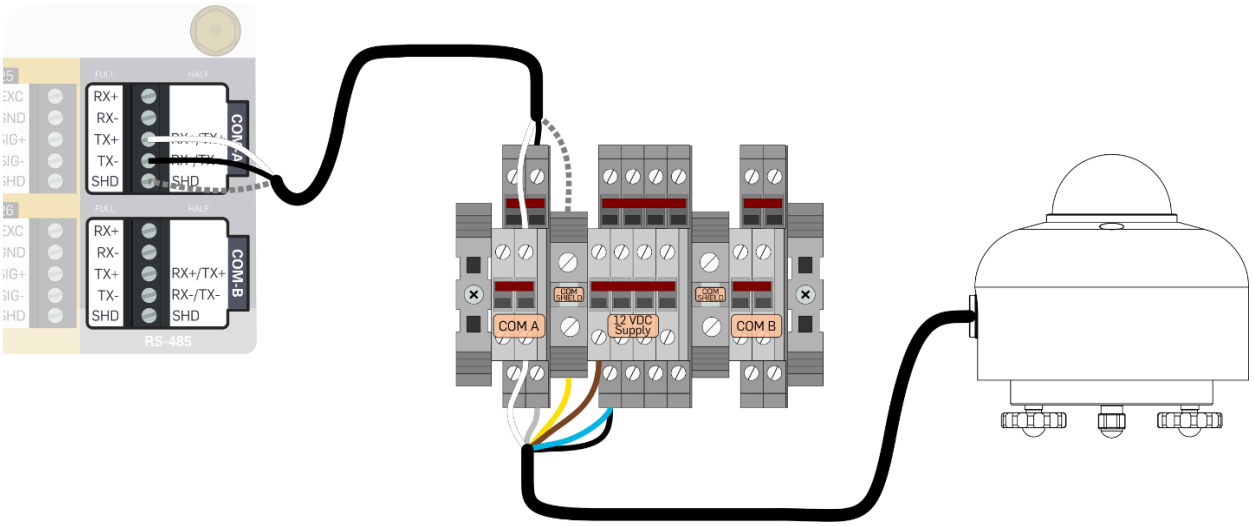
At the logger, match the sensor to the appropriate COM port terminal. For example, if the sensor was configured in the SPD app to COM-B, the sensor must be wired to the COM-B logger terminal port.

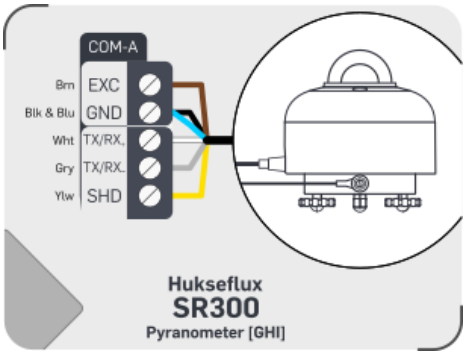
Note, the serial terminals on the SymphoniePRO wiring panel do not provide excitation or grounding. Serial sensors are connected directly to terminal blocks in a power supply shelter box; the communications terminals are then jumpered to the logger wiring panel (see diagrams below).

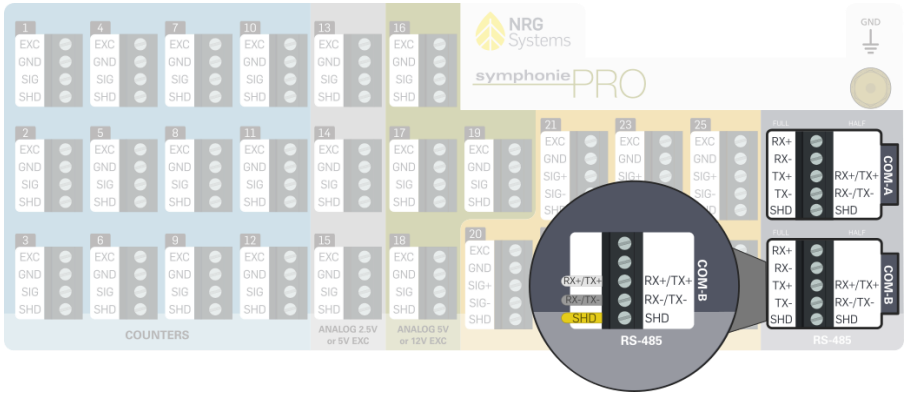
Wiring Connections—SymphoniePRO Serial:

Wire Color	Function	Termination
Blue	RS485 Ground	12 V DC -
Black	Power Ground	12 V DC -
Grey	RS485-	TX/RX-
White	RS485+	TX/RX+
Brown	Power Excitation	12 V DC +
Yellow	Cable Shield	SHD

SymphoniePRO Wiring Panel and Power Supply Connections Diagrams:







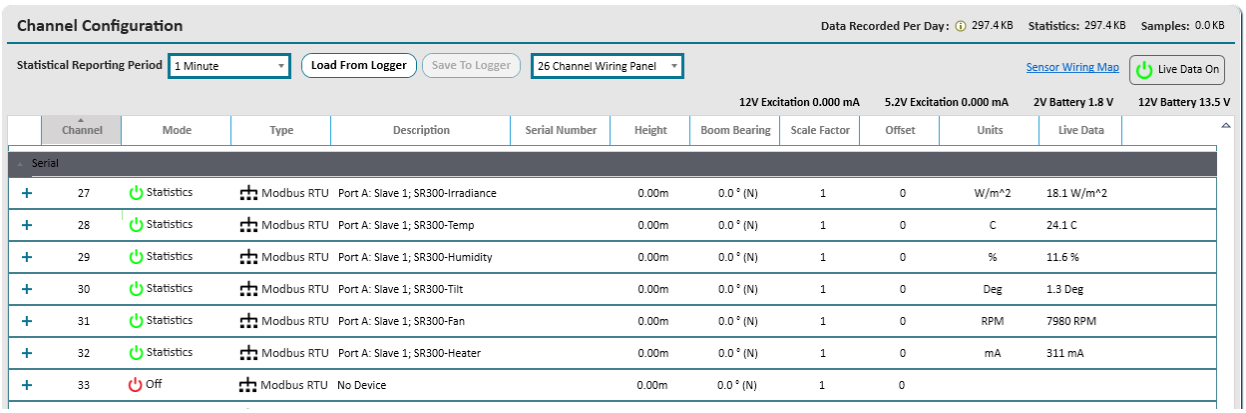
SymphoniePRO Final Checks

Pull-test all wire connections at the logger and power supply to ensure proper security. If any wires disconnect, reseat and retighten.

Ensure the blue status LED under the sensor dome is lit (see image below). This provides visual feedback indicating sensor power stability.

Ensure sensor grounding is sufficient to protect the unit from electrical surge events (see Sensor Grounding).

While connected to the station via SymphoniePRO Desktop App, select the **Channels** tab. Next, click the red **Live Data Off** button in the top right corner of the page to change it to a green **Live Data On** button and add the *Live Data* column on the far right of the channel rows. Verify that the sensor is reporting reasonable values and the units are labeled correctly for the specified Measurand.



ADDITIONAL MANUFACTURER RESOURCES

Datasheet

https://www.hukseflux.com/uploads/product-documents/SR300-D1_v2429.pdf

User Manual

https://www.hukseflux.com/uploads/product-documents/SR300-D1_SR200-D1_SR100-D1_manual_v2418.pdf

Modbus Register List

https://www.hukseflux.com/uploads/product-documents/SR300-D1_register_list_v2404.pdf

Sensor Manager Software User Manual

https://www.hukseflux.com/uploads/product-documents/Sensor_Manager_manual_v2424.pdf