



## NRG INSTRUCTIONS

---

# NRG Albedometer Tripod

*Setup & Sensor Installation*

Authors:  
Technical Services

AlbedometerTripod\_Instructions  
Rev. 1.0



## TABLE OF CONTENTS

INTRODUCTION .....	3
TOOLS & MATERIALS .....	4
In the Kit .....	4
Required Tools .....	4
SymphoniePRO Logger Programming .....	4
Recommended Documentation .....	4
ASSEMBLY & SETUP .....	5
Tripod Tower Setup.....	5
Plumbing & Leveling .....	10
Stake Tripod Legs in Place. ....	11
Mounting Sensors .....	12
<i>Hukseflux SR30 Pyranometers .....</i>	<i>12</i>
<i>Hukseflux SRA01 Albedometer .....</i>	<i>14</i>
SYMPHONIEPRO WIRING & PROGRAMMING .....	15
Hukseflux SR30 .....	15
Hukseflux SRA01 .....	15
<i>Connecting to the PRO Wiring Panel.....</i>	<i>15</i>
<i>Programming the PRO Logger .....</i>	<i>15</i>
Other Pyranometers .....	16



## NRG Albedometer Tripod

### INTRODUCTION

Albedo measurements are important when considering solar energy or when monitoring existing solar farm installations. An albedometer configuration or sensor consists of two identical pyranometers, mounted 180 degrees opposite each other. These are used to measure the global solar radiation (upward sensor) and reflected solar radiation (downward sensor). In turn, this can give the user the solar albedo, or solar reflectance, at a given location.

There are different ways to achieve this setup, and the details depend on your specific needs and the conditions of the installation site.

In order to properly incorporate albedo measurement capability into the NRG portfolio of solar equipment, a mounting tripod and boom were created. These instructions explain how to set up the tripod, mount the instrument, and properly program the SymphoniePRO logger.



## NRG Albedometer Tripod

### TOOLS & MATERIALS

#### In the Kit

- Tripod assembly
- Albedometer boom assembly
- (3) grounding stakes

#### Required Tools

Item	Use
<b>Tripod Assembly</b>	
<b>1/8" Hex key (Included)</b>	Albedometer boom set screws
<b>1/2" Wrench</b>	Boom mounting plate U-bolts
<b>9/16" Wrenches (2)</b>	Tripod leg pivots
<b>Adjustable wrench (6" or 8")</b>	Spare wrench
<b>Diagonal cutters</b>	Unpacking tripod assembly
<b>Tape Measure</b>	Boom length; Tripod placement
<b>Compass</b>	Boom/tripod orientation
<b>Torpedo level</b>	Tripod plumbing/Boom leveling
<b>5 lb Sledgehammer</b>	Grounding rods
<b>Small stepladder (or Tall human)</b>	Boom & sensor mounting
<b>Threadlocker compound (Included)</b>	Albedometer boom set screws
<b>Using (2) SR30 Pyranometers</b>	
<b>SR30 Albedo mount</b>	For mounting (2) SR30 Pyranometers in an albedo configuration. NRG part #14396   NRG design NRG part #14247   Hukseflux design
<b>1/8" Hex key (Included with tripod kit)</b>	Albedo mount set screws
<b>4mm Hex key (Included with NRG #14396)</b>	SR30 mounting
<b>Using (1) SRA01 Albedometer</b>	
<b>3mm Hex key (Included with SRA01)</b>	SRA01 Mounting
<b>Tape</b>	SRA01 Wires

#### SymphoniePRO Logger Programming

- Laptop with SymphoniePRO Desktop App installed
- USB-A to USB-B cable

#### Recommended Documentation

- NRG SymphoniePRO User Manual
- NRG SR30 Programming Instructions



## ASSEMBLY & SETUP

### Tripod Tower Setup

#### 1 Diagonal cutters

Carefully unpack the equipment by cutting the cable ties joining the tripod and boom.

The rest of the hardware is packed in a separate bag.



#### 2 Determine a suitable location for the tripod, taking into account the following factors:

- Suitability/grade of the ground
- Orientation of albedometer boom on tripod
- Albedometer cable length
- Potential shading/equipment interference

#### 3 Lay the tripod assembly flat with one leg on top.

Remove the wingnut on the upward-facing leg and press the bolt out until the end of the threads are about flush with the outer washer.

*Ensure that the washers are oriented such that the rubber sides are facing outwards.*





## NRG Albedometer Tripod

---

4

Swing the leg upwards and fold the support strut out. Line up the bolt hole and press the bolt through.

Reattach the wingnut and hand tighten enough that the square shoulder of the carriage bolt is seated in the channel on the leg.



5

Repeat steps 3-4 for the remaining two legs.

6

With the legs unfolded and hand-tightened in place, stand the tripod up. Ensure that the wingnuts are tight enough to prevent the tripod from falling over.

*Final adjustments should be made after the boom is mounted.*





## NRG Albedometer Tripod

- 7 Remove 4 U-bolts with nuts and the boom mounting plate from the hardware bag.

Feed the U-bolts through the appropriate holes in the plate. Loosely attach the nuts.

- 1 U-bolt goes near each edge of the mounting plate.
- The appropriate holes are located in the center of each plate edge.
- Opposite pairs of U-bolts are fed through the plate in the same direction.

*See the images to the left to see the appropriate holes & U-bolt orientation.*



- 8 **1/2" Wrench**  
**Tape Measure**

Take note of the desired height of your albedometer (1.5-2.0 m from ground-to-sensor is recommended). Mark the tripod tower appropriately, if desired.

*If the ground is uneven in the tripod location, you will need to take into account that the grade may cause the sensor height to differ from the boom mounting height on the tripod tower.*

Slide the mounting plate assembly over the top of the tower and down to the desired location on the tower.

Tighten U-bolts with the 1/2" wrench. Do not overtighten.





## NRG Albedometer Tripod

**9** **Tape Measure  
Compass**

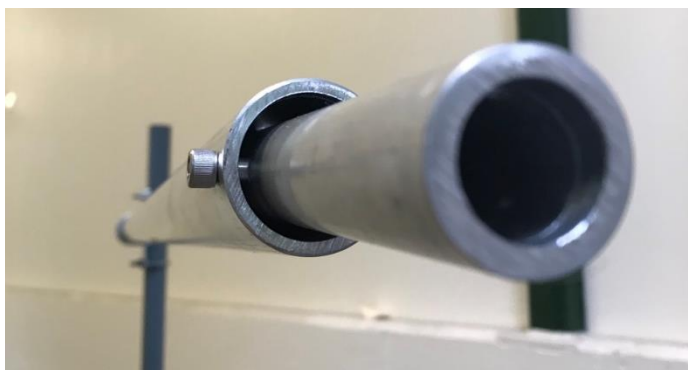
Slide the boom through the appropriate U-bolts on the mounting plate.

Make sure that the bolt holding the small pipe to the end of the boom is horizontal and that the set-screw holes are facing upwards.

Use the tape measure to determine the appropriate boom length for your application.

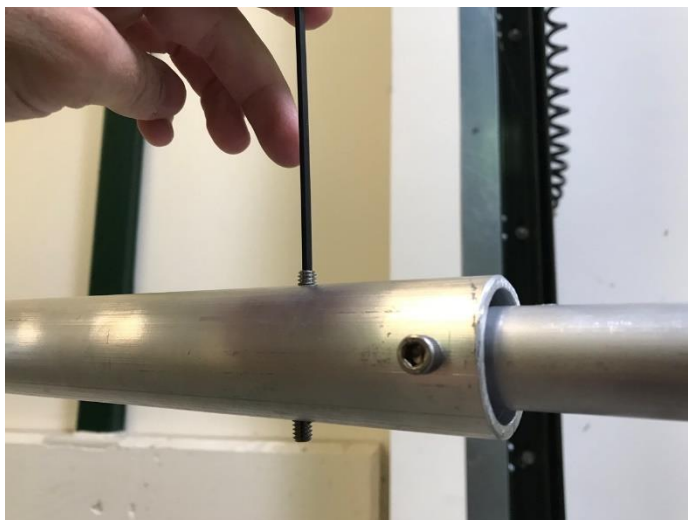
*Do not extend the boom far enough that the short end is inside the edge of the mounting plate.*

*Doing so may cause the boom to fall and damage the sensors.*

**10** **1/8" Hex key  
Loctite**

Apply blue Loctite to the threads of two set screws included in the hardware bag.

Use the 1/8" hex key to thread the two set screws into the holes on the top & bottom of the boom end.







## NRG Albedometer Tripod

---

### 11 **1/2" Wrench**

---

Once satisfied with the boom length and orientation, tighten all four U-bolts with the 1/2" wrench.





## Plumbing & Leveling

At this point, the tower should be vertical and the boom should be mounted, oriented appropriately, and set to the desired length.

---

### 1 Torpedo Level

Use the torpedo level to plumb the tower. Make adjustments in the legs as necessary.



---

### 2 Torpedo Level

Use the torpedo level to level the boom.



---

### 3 9/16" Wrenches (2)

Tighten the 3/8" bolts & nuts that connect the legs to the tower using 9/16" wrenches (6 bolts total; 2 per leg assembly).





## NRG Albedometer Tripod

### 4 **Adjustable Wrench**

Tighten the wingnuts on the tripod legs using an adjustable wrench.

Once sufficiently tight, check again that the boom is level.



### **Stake Tripod Legs in Place.**

Use the 5 lb sledgehammer and copper-clad stakes to secure the tripod legs to the ground. Drive the stakes into the ground through the holes in each leg base.

Check that the tower is still plumb and make adjustments if necessary.



## NRG Albedometer Tripod

### Mounting Sensors

As noted in the introduction, the NRG Albedometer Tripod is designed to work with different sensors, depending on the desires of the end-user.

#### *Hukseflux SR30 Pyranometers*

##### 1 **Adjustable wrench** **4mm Hex key**

Unpack the SR30 sensors from their boxes. Make note of the sensor serial numbers.

Remove the three feet from the bottom of each SR30 sensor. Use an adjustable wrench for the non-leveling foot.

Mount the SR30s to the NRG albedo plate. Hardware (M5-0.8 x 10 screws) and a 4mm short-arm hex key are included with the NRG albedo plate.



##### 2 **1/8" Hex key** **Loctite** **Torpedo level**

Apply blue Loctite to the threads of the remaining three set screws.

Thread the set screws into the holes in the top of the mounting adapter at the end of the boom.

Slide the SR30 albedo mount into the end of the boom.

Place the torpedo level in the space between the SR30 mounting plates. Use the topside of the albedo measurement plate to level the mounting plate assembly side-to-side.

Once level, tighten the three set screws with the 1/8" hex key.





## NRG Albedometer Tripod

**3** **Tape**

Connect the sensor cables to each pyranometer. Be careful not to bend the pins inside the connector and not to overtighten the screw collar.

Run the sensor wires to the data logger. Spiral wrap them around the boom and tripod tower & secure them with tape.

**4** **1/8" Hex key  
Torpedo level**

Check that the SR30s are level on the mount. Each sensor has a bubble level, but a torpedo level can also be used.

Adjust by using the two set screws threaded into the end of the boom (NOT the three set screws in the mounting adapter).





## NRG Albedometer Tripod

### *Hukseflux SRA01 Albedometer*

#### 1 Tape

Tape the loose wires together so they can be fed through the boom.

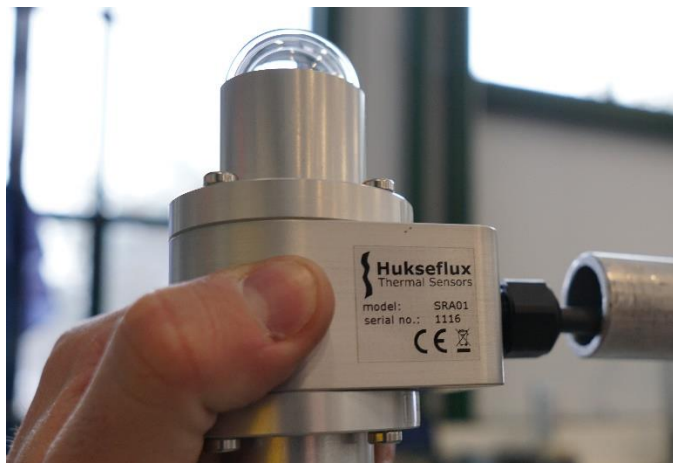


#### 2 3mm Hex key

Push the taped wires into the end of the boom, then feed through until they come out the end near the tripod tower.

Make sure that the sensor set screws are loose enough, then slide the albedometer onto the end of the boom, following the cable.

Attach to the boom using the 3mm hex key.



#### 3 1/8" Hex key

Use the bubble level on the sensor to verify that it is level.

Make adjustments as needed using the set screws on the boom end.





## SYMPHONIEPRO WIRING & PROGRAMMING

### Hukseflux SR30

The Hukseflux SR30 pyranometer uses RS-485 communication. For complete instructions about programming the SR30 pyranometer and connecting it to the Symphonie PRO logger, see the [SR30 instructions from NRG](#).

### Hukseflux SRA01

#### *Connecting to the PRO Wiring Panel*

The SRA01 comes with an integrated cable. Connect the wires to the PRO wiring panel according to the information in Table 1 below.

*Table 1 | SRA01 Wiring Harness Key*

Pin	Wire Color	Wire Use	PRO WP Connection	Channel   P-SCM
1	Blue	SR01 ↓	SIG (+)	Ch. 20-26   #9128
2	Red	SR01 ↓	SIG (-)	
3	Yellow	Not Connected	-	-
4	Brown	Not Connected	-	-
5	Grey	Not Connected	-	-
6	Pink	Not Connected	-	-
7	Green	SR01 ↑	SIG (-)	Ch. 20-26   #9128
8	White	SR01 ↑	SIG (+)	
11	Black	Shield	SHD	Ch. 20-26   N/A

#### *Programming the PRO Logger*

As outlined in Table 1, the SRA01 must be used in PRO channels 20-26 and with the corresponding pyranometer P-SCM #9128 (one P-SCM per channel). Now use the Desktop App to program the logger channels.

- Select “Hukseflux SR11” from the default sensor list.  
*Edit the description to best suit your needs.*
- uses “GHI” & “RSI” to differentiate between the upward (Global Horizontal Irradiance) and downward (Reflected Solar Irradiance) pyranometers in the SRA01 as an example.



## NRG Albedometer Tripod

- Enter the serial number, height, & boom bearing into the appropriate fields.
- Use the calibration sheet to obtain the appropriate scale factor value. **Hover your cursor over the green “I” icon next to the scale factor field for information on how to properly scale the sensitivity for the PRO logger.**
- Repeat these steps on another P-SCM channel for the second SRA01 pyranometer.

Channel	Mode	Type	Description	Serial Number	Height	Boom Bearing
Analog (P-SCM)						
20	Statistics	Analog	Hukseflux SRA01 GHI	1116 SKY	1.50m	180.0° (S)
Data Logging Mode: <input type="button" value="Load From Defaults"/> <input checked="" type="button" value="Statistics"/> Channel Type: <input checked="" type="button" value="Analog"/>		Description: <input type="text" value="Hukseflux SRA01 GHI"/> Serial Number: <input type="text" value="1116 SKY"/>		SymphoniePRO Signal Conditioning Module (P-SCM) <input type="text" value="P-SCM #9128, (-6 to 58) mV, Diff Input, No EXC"/>		
A channel of type Analog records the following statistical information: <ul style="list-style-type: none"> <li>• Average</li> <li>• Standard Deviation</li> <li>• Min</li> <li>• Max</li> </ul>		Height: <input type="text" value="1.5"/> Meters Boom Bearing: <input type="text" value="180"/> Degrees ⓘ		Sensor Transfer Function Scale Factor: <input type="text" value="47303.69"/> W/sqm per V ⓘ Offset: <input type="text" value="0"/> W/sqm Units: <input type="text" value="W/sqm"/>		
Analog (P-SCM)						
21	Statistics	Analog	Hukseflux SRA01 RSI	1116 EARTH	1.50m	180.0° (S)
Data Logging Mode: <input type="button" value="Load From Defaults"/> <input checked="" type="button" value="Statistics"/> Channel Type: <input checked="" type="button" value="Analog"/>		Description: <input type="text" value="Hukseflux SRA01 RSI"/> Serial Number: <input type="text" value="1116 EARTH"/>		SymphoniePRO Signal Conditioning Module (P-SCM) <input type="text" value="P-SCM #9128, (-6 to 58) mV, Diff Input, No EXC"/>		
A channel of type Analog records the following statistical information: <ul style="list-style-type: none"> <li>• Average</li> <li>• Standard Deviation</li> <li>• Min</li> <li>• Max</li> </ul>		Height: <input type="text" value="1.5"/> Meters Boom Bearing: <input type="text" value="180"/> Degrees ⓘ		Sensor Transfer Function Scale Factor: <input type="text" value="50479.56"/> W/sqm per V ⓘ Offset: <input type="text" value="0"/> W/sqm Units: <input type="text" value="W/sqm"/>		

### Programming the SRA01 on the Desktop App

Save the settings to the logger. Once successful, you can verify the readings using “View live data” on the Desktop App, or by scrolling through the logger measurement screens to the appropriate channels.

### Other Pyranometers

The tripod may be compatible with other pyranometers not covered in these instructions. The NRG SymphoniePRO logger is compatible with a number of other pyranometers, which can be found in the SymphoniePRO Desktop app as default sensor options. Contact NRG Support if you have any questions.