User Manual

Solar Radiation Sensor

Solar Radiation Sensor

Controller Accessory

Ag/MIS/UmGb-2814-07/21 Rev 1.2

P/N: 116854

Munters

Solar Radiation Sensor

User Manual

Revision: N.1.2 of 05.2022
Product Software: N/A

This manual for use and maintenance is an integral part of the apparatus together with the attached technical documentation.

Munters reserves the right to effect modifications to the apparatus in accordance with technical and legal developments.

Index

1 Introduction

1.1 Disclaimer

Munters reserves the right to make alterations to specifications, quantities, dimensions etc. for production or other reasons, subsequent to publication. The information contained herein has been prepared by qualified experts within Munters. While we believe the information is accurate and complete, we make no warranty or representation for any particular purposes. The information is offered in good faith and with the understanding that any use of the units or accessories in breach of the directions and warnings in this document is at the sole discretion and risk of the user.

1.2 Introduction

Congratulations on your excellent choice of purchasing a Solar Radiation Sensor!

In order to realize the full benefit from this product it is important that it is installed, commissioned and operated correctly. Before installation or using the unit, this manual should be studied carefully. It is also recommended that it is kept safely for future reference. The manual is intended as a reference for installation, commissioning and day-to-day operation of the Munters equipment.

1.3 Notes

Date of release: June 2021

Munters cannot guarantee to inform users about the changes or to distribute new manuals to them.

2 SRS Introduction

The Munters Solar Radiation Sensor (SRS) is a precision instrument that detects radiation at wavelengths of 300 to 1100 nanometers. The spectral response of the silicon photodiode detector is a good match to the spectrum of solar irradiance.

Avoid touching the small white diffuser at the top of the sensor. Any skin oil on this surface will degrade the sensitivity of the sensor. To remove any oil present, clean the diffuser with a clean swab and ethyl (denatured) alcohol. Do NOT use rubbing alcohol.

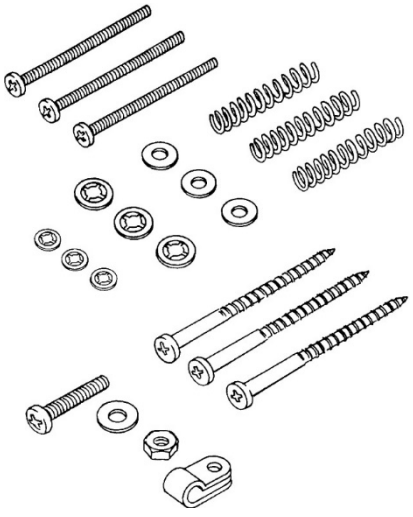
The sensor is made up of the following components:

- **Shield**: The outer shell shields the sensor body from thermal radiation and pro- vides a path for convection cooling of the body, minimizing heating of the sensor interior. It provides a cutoff ring for cosine response, a level indicator, and fins to aid in aligning the sensor with the sun's rays.
- **Body**: The body houses the following components:
    - **Diffuser**: Welded to the body for a weather-tight seal. Provides excellent cosine response.
    - **Detector**: An hermetically-sealed silicon photodiode.
    - **Amplifier**: The amplifier converts the detector current into a O to +2.5V signal.
    - **Cable**: The standard version of the sensor includes an attached 40' (I 2 m) standard cable. The industrial version includes a 16' (5 m) shielded cable. The Vantage Pro version comes with a 3' (0.9 m) standard cable.

2.1 Mounting Hardware

Please make sure you have all components listed below before continuing.

- Shield
- Body with cable attached
- Mounting hardware Enables installation and leveling of the sensor.
    - Three #6-32 x 1-1/2" (38 mm) machine screws
    - Three springs
    - Three #6 flat washers
    - Three #6 screw retainers
    - Three #4 screw retainers
    - Three wood screws
    - One#8-32x3/4"(19mm) machine screw
    - One #8-32 hex nut
    - One #8 flat washer
    - One 3/16" (5 mm) cable clamp



2.2 Tools and Materials Needed

You may need some of the following tools and materials in order to complete your installation. Please be sure you have everything you need before beginning.

- Medium Phillips screwdriver
- Scissors
- Center punch or nail (if mounting on wood surface)
- Drill with 7/8" (22 mm) and #36 (2.7 mm) drill bits (if mounting on wood surface)
- Wire cutters and stripper (industrial version only)

3 Installation

3.1 Testing the Sensor

Before installing the unit in the field:

1. Attach the sensor cable to the controller (refer to Wiring Diagram, page 18).
2. Press the appropriate key to make sure you are getting a solar radiation reading on the console. Consult the controller manual for instructions on displaying solar radiation.
3. Shade the sensor and make sure the reading changes.

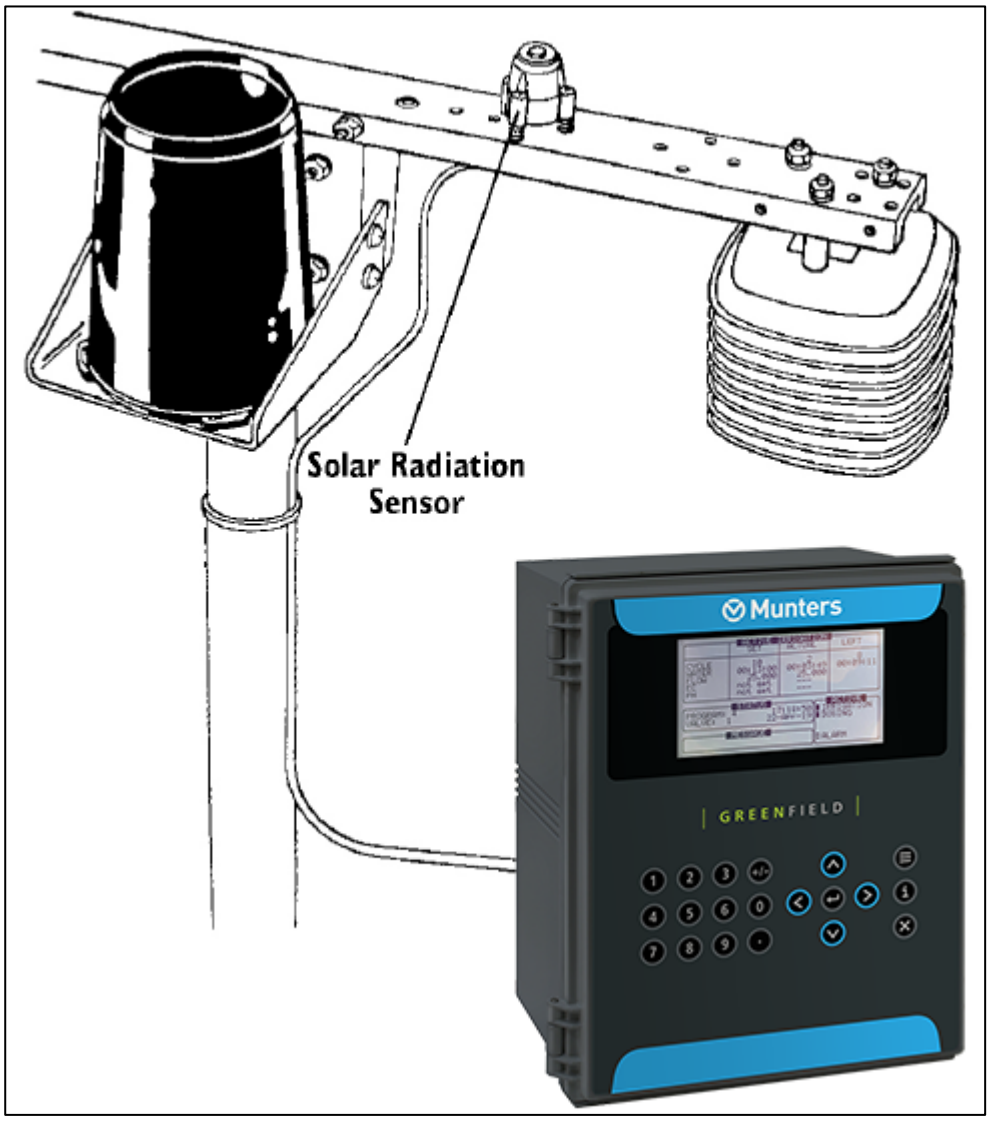
3.2 Installing the Sensor

Follow the instructions in this section to install your sensor. For evapotranspiration (ET) or scientific measurements, the sensor can be mounted on the Sensor Mounting Arm (SMA) or any level surface.

- Typical Installation
- Mounting the Sensor on the Sensor Mounting Arm
- Mounting the Sensor on the Sensor Tilting Bracket
- Mounting the Sensor on a Wood Surface
- Routing Sensor Cable

3.2.1 TYPICAL INSTALLATION

The illustration below shows a typical solar radiation installation.

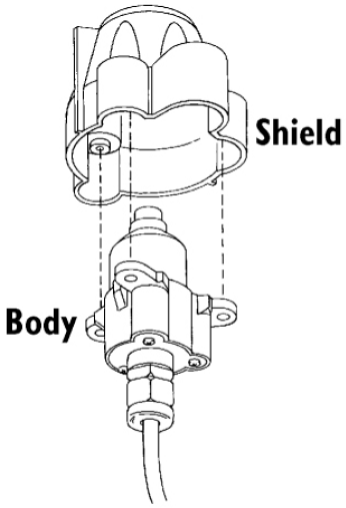


Standard Installation

3.2.2 MOUNTING THE SENSOR ON THE SENSOR MOUNTING ARM

Follow the instructions below to mount the sensor on the Sensor Mounting Arm (SMA).

1. Route the cable through the large hole in the mounting arm if desired.
2. Place the shield onto the body as shown below.

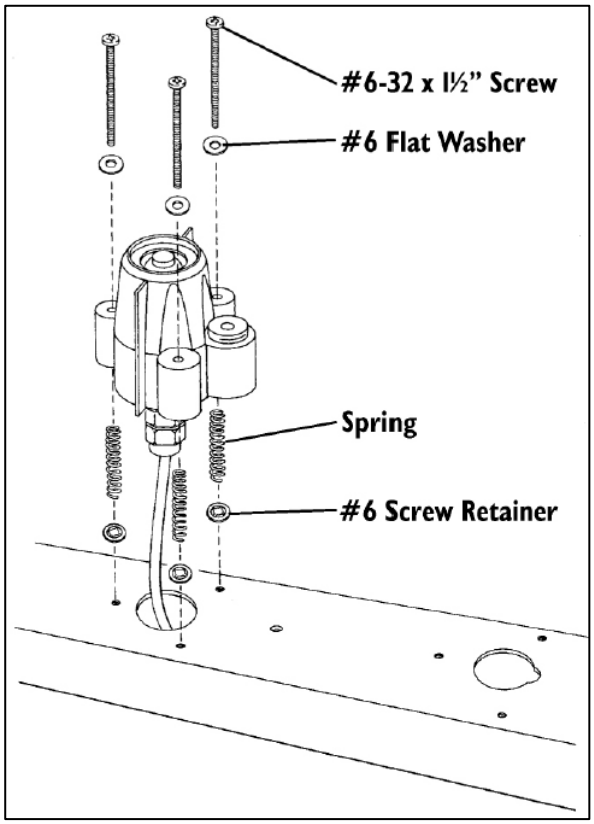


Placing Shield Onto Body

3. Place a flat washer over the end of each screw and insert it into the body.

4. Place a spring over the end of each screw and hold the springs in place using a #6 screw retainer.

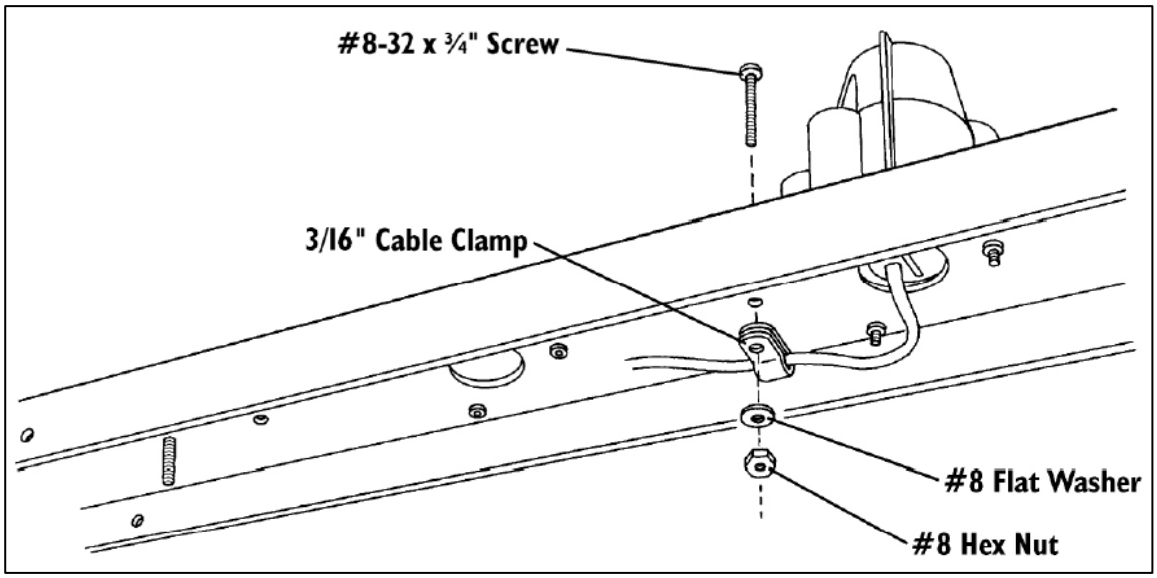
5. Secure the sensor to the mounting arm by driving the screws into the appropriate holes as shown below.



Mounting the Solar Radiation Sensor on the SMA

6. Using the bubble level on the sensor as a guide, adjust the sensor until it is level by tightening or loosening the levelling screws as necessary.

7. Secure the sensor cable to the underside of the mounting arm using the 3/16" cable clamp, #8-32 x 3/4" screw, #8 hex nut, and #8 flat washer as shown below.

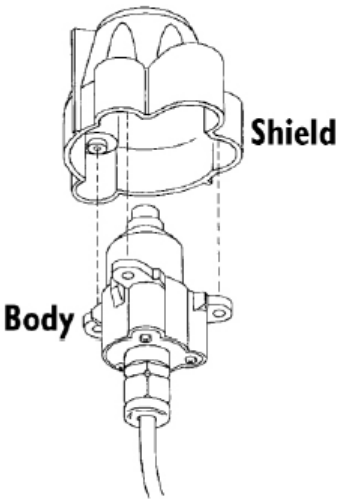


Securing Sensor Cable

3.2.3 MOUNTING THE SENSOR ON THE SENSOR TILTING BRACKET

Follow the instructions below to mount the sensor on the Sensor Tilting Bracket. Do not install the bracket onto the mounting arm until instructed to do so below.

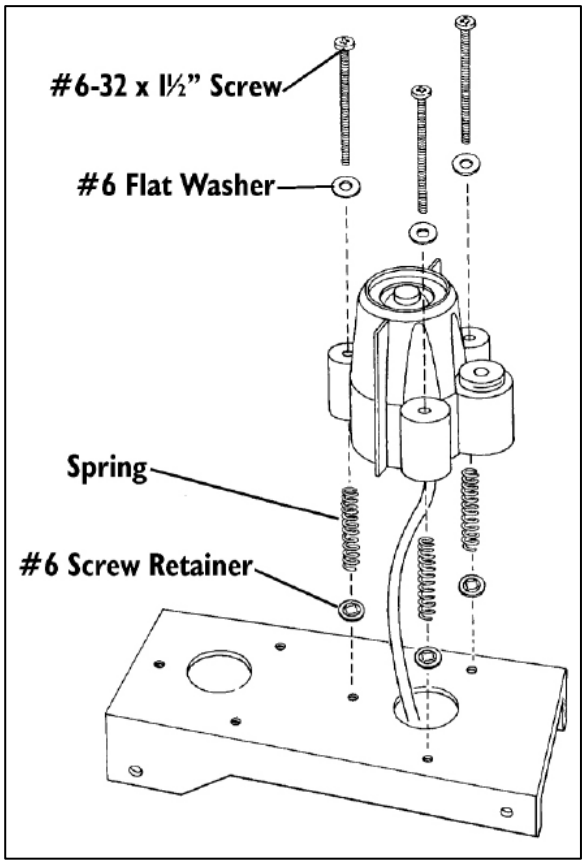
1. Route the cable through the large hole in the bracket if desired.
2. Place the shield onto the body as shown below.



Placing Shield Onto Body

3. Place a flat washer over the end of each screw and insert it into the body.
4. Place a spring over the end of each screw and hold the springs in place using a #6 screw retainer.
5. Secure the sensor to the bracket by driving the screws into the appropriate holes as shown below.

If mounting the sensor on the tilting bracket in a location under 46° latitude or in a situation which requires the angle of the tilting bracket to be less than 28°, you will need to use the standoffs supplied with the tilting bracket. Consult the Sensor Tilting Bracket manual for details.



Mounting the Solar Radiation Sensor on the Sensor Tilting Bracket

6. Position the Sensor Mounting Arm so it is pointed in the direction of the sun at solar noon.

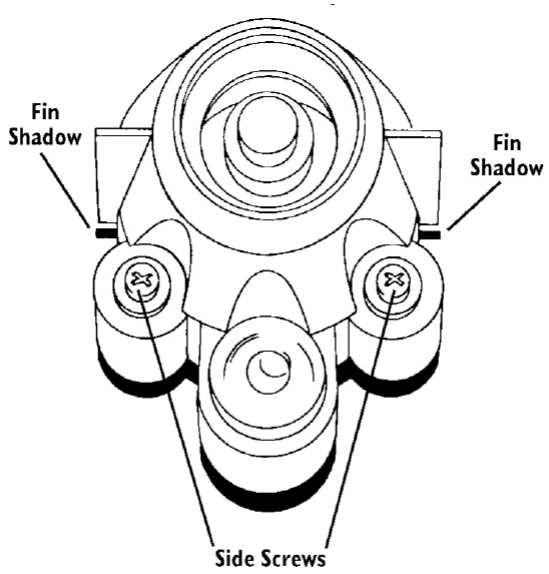
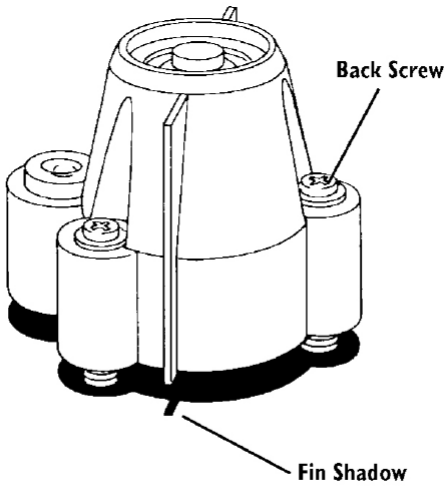
Solar noon occurs halfway between sunrise and sunset; consult your local paper or the web for sunrise and sunset times. To correctly align the arm, screw a mounting screw part way into any of the sensor's screw positions on the mounting arm and rotate the arm until the shadow from the screw is parallel to the edge of the sensor arm at solar noon.

7. Attach the bracket to the mounting arm as described in the Sensor Tilting Bracket instruction manual.

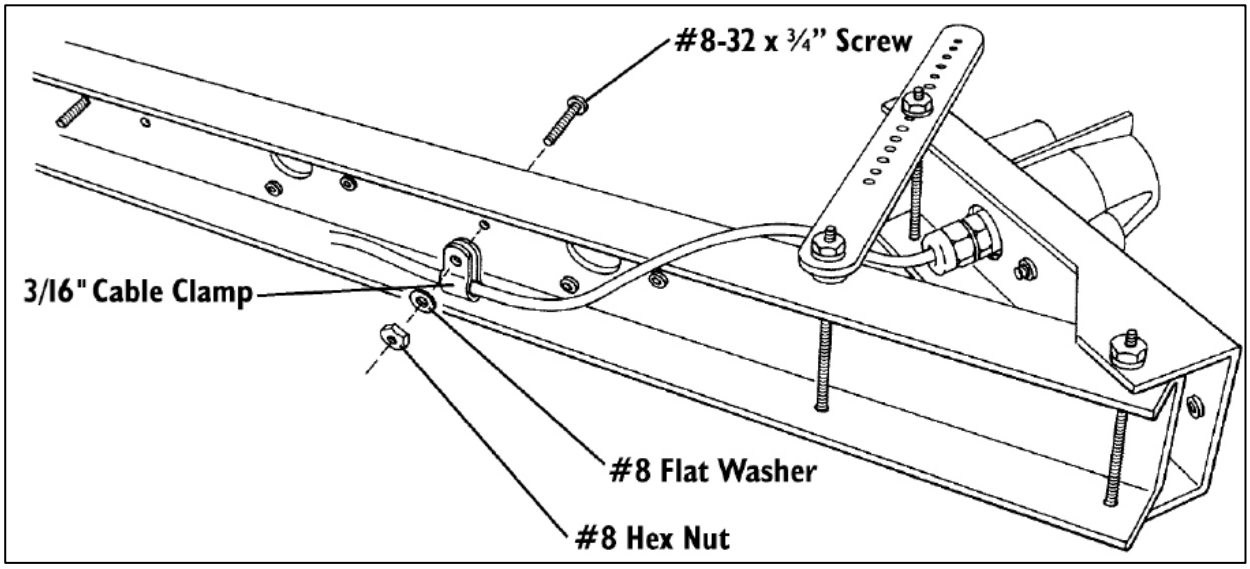
If you are installing both the solar radiation and the UV sensor on the sensor tilting bracket, make sure you mount the solar radiation sensor on the sensor tilting bracket before attaching to the sensor mounting arm.

8. If necessary, adjust the position of the sensor by tightening or loosening the levelling screws.

When pointed directly at the sun, the shadows from the alignment fins should appear as shown in the illustration below.

Step #1: Adjust side screws until fin shadows are equal	Step #2: Adjust back screw to minimize fin shadows.
	
Final sensor positioning	

9. Secure the sensor cable to the underside of the mounting arm using the 3/16" cable clamp, #8-32 x 3/4" screw, #8 hex nut, and #8 flat washer as shown below



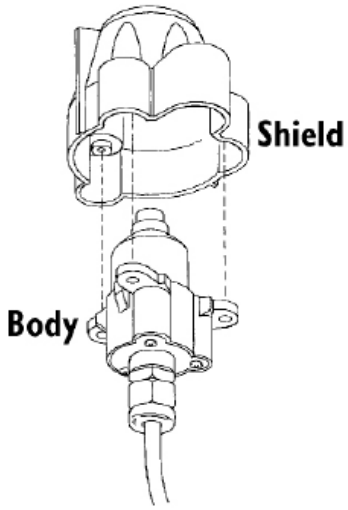
Securing Sensor Cable

3.2.4 MOUNTING THE SENSOR ON A WOOD SURFACE

Follow the instructions below to mount the sensor on a wood surface.

1. Using the template printed at the bottom of this page, mark the location of the necessary pilot holes.
2. Using a drill with a #36 (2.7 mm) drill bit, drill pilot hole in the marked locations. If necessary, bore a hole through the mounting surface using a 7/8" (22 mm) drill bit so the bottom of the sensor can sit inside of it and the sensor cable can run to the other side.
3. Route the sensor cable through the hole in the wood if desired.

4. Place the shield onto the body as shown below.

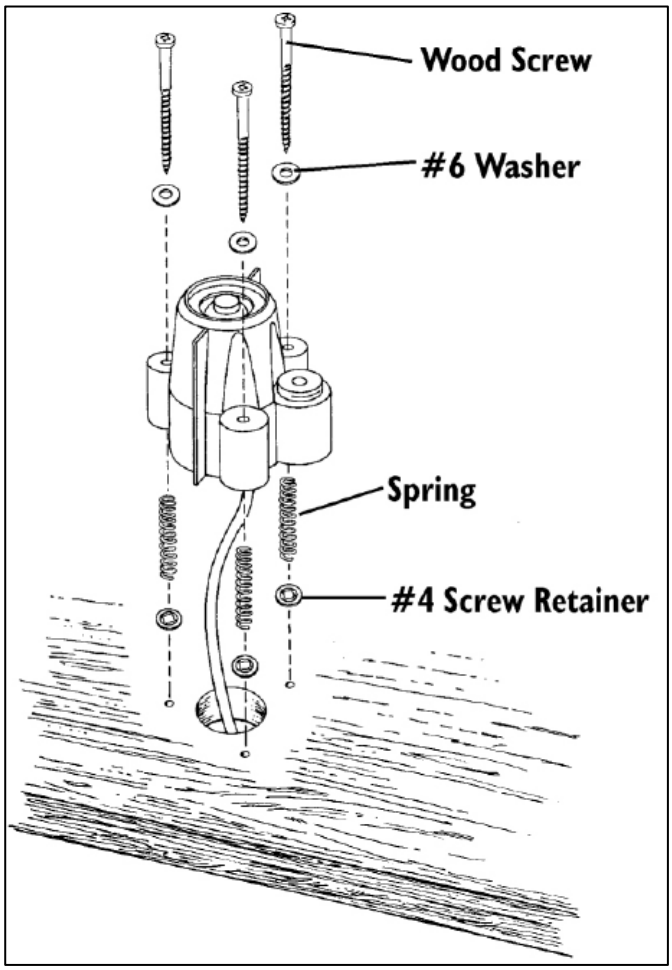


Placing shield onto body

5. Place a flat washer over the end of each screw and insert it into the body.

6. Place a spring over the end of each screw and hold the springs in place using a #4 screw retainer.

7. Secure the sensor to the mounting surface by driving the screws into the appropriate holes as shown below.



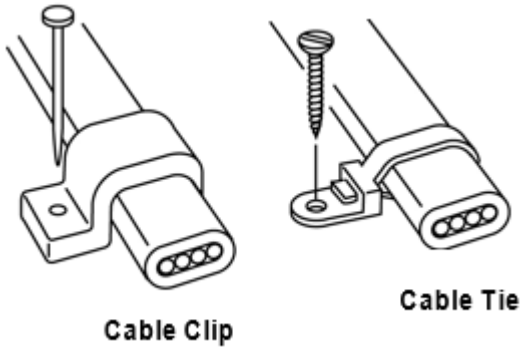
Mounting The Solar Radiation Sensor On A Wood Surface

8. Using the bubble level on the sensor as a guide, adjust the sensor until it is level by tightening or loosening the levelling screws as necessary.

9. Secure the sensor cable to the mounting surface. You may use the provided 3/16" cable clamp, #8-32 x 3/4" screw, #8 hex nut, and #8 flat washer if possible.

3.2.5 Routing Sensor Cable

To prevent fraying or cutting of the cable where it is exposed to weather, secure it so it doesn't whip about in the wind. Use cable clips or weather resistant cable ties to secure the cable. Place clips or ties approximately every 3 to 5 feet (1 to 1.6 m). Do NOT use metal staples or a staple gun to secure cables. Metal staples, especially when installed with a staple gun- have a tendency to cut the cables.



NOTE *Try not to tug on the cable in such a way as to loosen the connections between cables. Also, make sure the sensor cable is not so taut that connections loosen or pull free due to the strain. Many sensor problems occur because cable connections come loose.*

4 Maintaining the Sensor

For the most accurate readings, clean the diffuser after mounting, and then periodically. Use ethyl alcohol (NOT rubbing alcohol) or water with a little detergent in it.

Due to the sensitivity of solar radiation sensors it is common practice for manufacturers to recommend re-calibration after a period of time. Here at Davis Instruments we have seen approximately 2% drift per year on the readings from these sensors. For applications demanding higher accuracy, the sensors should be calibrated once every year.

5 Specifications

5.1 General

Sensor Type	Silicon Photodiode
Spectral range (10% points)	400 to 1100 nanometers
Cosine response	
• Percent of reading	±3% (0° to ±70° incident angle); ±10% (70° to ±85° incident angle)
• Percent of full scale	±2% (0° to ±90°)
Attached cable length Maximum cable length	40 feet (12 m) 330 feet (100 m)
Cable type	4-conductor, 26 AWG
Connector	Modular connector (RJ-11)
Housing material	UV-resistant plastic
Dimensions	2" x 2.75" x 2.25" (51mm x 70mm x 57mm)
Weight	12 oz. (340g)
Range	
• Solar radiation intensity • Solar energy	0 to 1500 W/m² 0 to 1999 Langleys
Accuracy	
• Solar global radiation intensity • Solar energy	±5% ±5%
Resolution	
• Solar radiation intensity • Solar energy	1 W/m² 0.1 Langleys

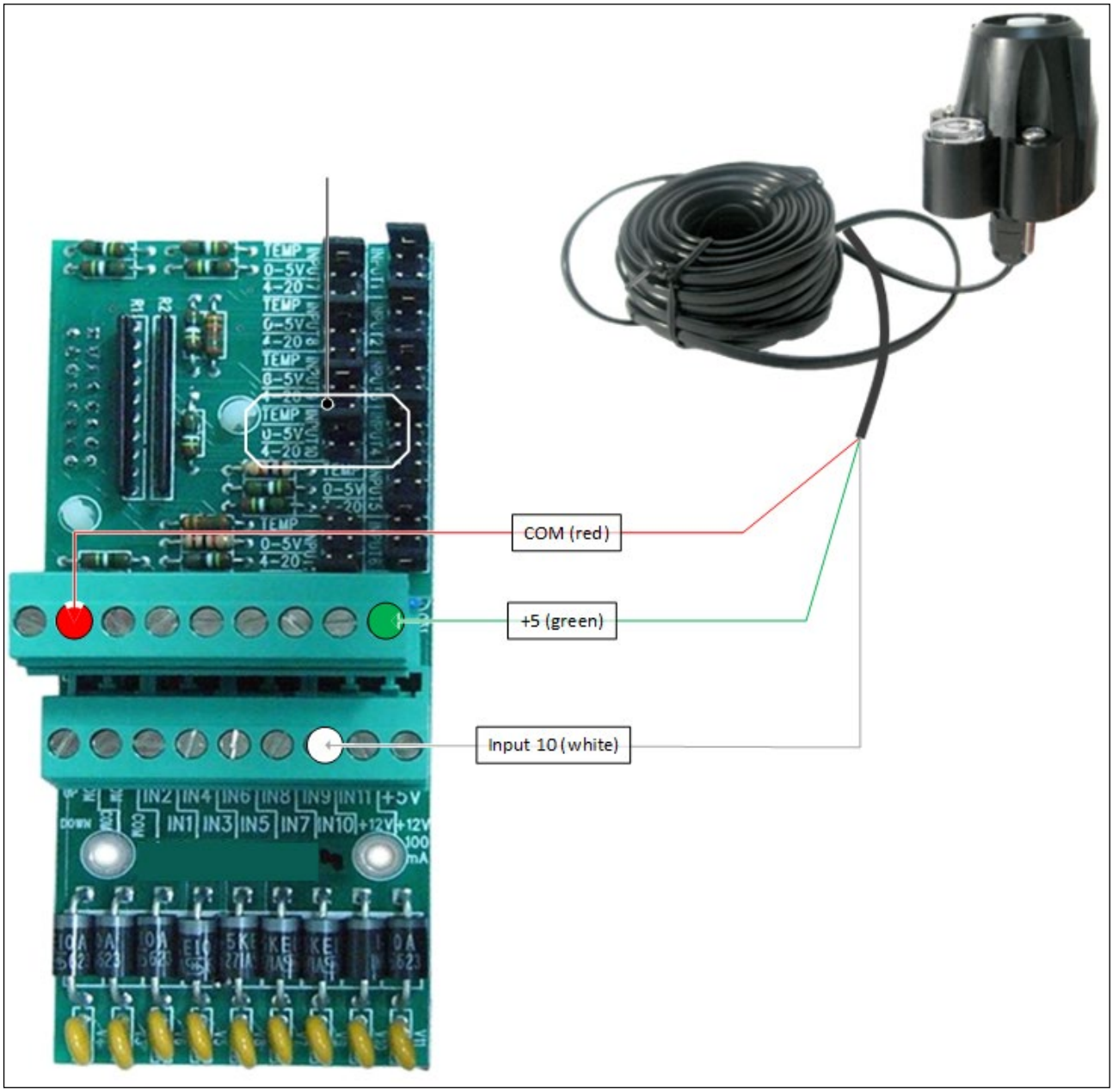
5.2 Input / Output

Connections	
• White • Red • Green	Output (0 to +3VDC); 1.67 mV per W/m² Ground +5V DC ±10%; 3mA (typical)
Temperature coefficient	0.034% per degree F(-0.063% per degree C); reference temperature = 72° F (22°C)

6 Wiring Diagram

In this wiring example, the radiation sensor is connected to INPUT 10 of the Analog Input Card.

- Set the jumper to **0-5V** of the corresponding input.



7 Warranty

Warranty and technical assistance

Munters products are designed and built to provide reliable and satisfactory performance but cannot be guaranteed free of faults; although they are reliable products they can develop unforeseeable defects and the user must take this into account and arrange adequate emergency or alarm systems if failure to operate could cause damage to the articles for which the Munters plant was required: if this is not done, the user is fully responsible for the damage which they could suffer.

Munters extends this limited warranty to the first purchaser and guarantees its products to be free from defects originating in manufacture or materials for one year from the date of delivery, provided that suitable transport, storage, installation and maintenance terms are complied with. The warranty does not apply if the products have been repaired without express authorisation from Munters, or repaired in such a way that, in Munters' judgement, their performance and reliability have been impaired, or incorrectly installed, or subjected to improper use. The user accepts total responsibility for incorrect use of the products.

The warranty on products from outside suppliers fitted to SRS, (for example cables, weights, etc.) is limited to the conditions stated by the supplier: all claims must be made in writing within eight days of the discovery of the defect and within 12 months of the delivery of the defective product. Munters has thirty days from the date of receipt in which to take action, and has the right to examine the product at the customer's premises or at its own plant (carriage cost to be borne by the customer).

Munters at its sole discretion has the option of replacing or repairing, free of charge, products which it considers defective, and will arrange for their despatch back to the customer carriage paid. In the case of faulty parts of small commercial value which are widely available (such as bolts, etc.) for urgent despatch, where the cost of carriage would exceed the value of the parts, Munters may authorise the customer exclusively to purchase the replacement parts locally; Munters will reimburse the value of the product at its cost price.

Munters will not be liable for costs incurred in demounting the defective part, or the time required to travel to site and the associated travel costs. No agent, employee or dealer is authorised to give any further guarantees or to accept any other liability on Munters' behalf in connection with other Munters products, except in writing with the signature of one of the Company's Managers.

WARNING: In the interests of improving the quality of its products and services, Munters reserves the right at any time and without prior notice to alter the specifications in this manual.

The liability of the manufacturer Munters ceases in the event of:

- dismantling the safety devices;
- use of unauthorised materials;
- inadequate maintenance;
- use of non-original spare parts and accessories.

Barring specific contractual terms, the following are directly at the user's expense:

- preparing installation sites;
- providing an electricity supply (including the protective equipotential bonding (PE) conductor, in accordance with CEI EN 60204-1, paragraph 8.2), for correctly connecting the equipment to the mains electricity supply;
- providing ancillary services appropriate to the requirements of the plant on the basis of the information supplied with regard to installation;
- tools and consumables required for fitting and installation;
- lubricants necessary for commissioning and maintenance.

It is mandatory to purchase and use only original spare parts or those recommended by the manufacturer.

Dismantling and assembly must be performed by qualified technicians and according to the manufacturer's instructions.

The use of non-original spare parts or incorrect assembly exonerates the manufacturer from all liability.

Requests for technical assistance and spare parts can be made directly to the nearest Munters office.

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