

# DUSTTRAK™ AEROSOL MONITOR

## SOLAR POWER KIT

### MODEL 854060

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(USED FOR POWERING ENVIRONMENTAL ENCLOSURE MODELS  
MODELS 854030, 8535 AND 8537)

OPERATION AND MAINTENANCE MANUAL

P/N 6008416, REVISION C  
JUNE 2017



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# Safety Information

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## WARNINGS

- Use of components other than those specified by TSI may impair the safety features provided by the equipment.
- The instrument has been design to be used with batteries supplied by TSI. Do **not** use a substitute  
  
Old batteries must be properly recycled in accordance with the local environmental regulations.
- Do **not** use non-rechargeable batteries in this instrument. Fire, explosions, or other hazards may result.
- If the solar power kit is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
- Do **not** connect the Solar Panels **directly** to the 854030 Environmental Enclosure as this may result in damage. The Solar Panels **must** be connected to the Solar Battery Enclosure Box so they can be regulated by the Solar Charge Controller.



## Caution

The enclosure is designed to be water resistant to rain or spray. It has a NEMA rating of 3R. It is not designed to be waterproof when immersed. Setting it in a pool of water will result in flooding the inner compartment with water. This will severely damage the battery pack. **Do NOT** set the Battery Enclosure in **water!**

## Description of Caution/Warning Symbols

Appropriate caution/warning statements are used throughout the manual and on the instrument that require you to take cautionary measures when working with the instrument.

### Caution



#### Caution

Failure to follow the procedures prescribed in this manual might result in irreparable equipment damage. Important information about the operation and maintenance of this instrument is included in this manual.

### Warning






#### WARNING

Warning means that unsafe use of the instrument could result in serious injury to you or cause damage to the instrument. Follow the procedures prescribed.

## Caution and Warning Symbols

The following symbols may accompany cautions and warnings to indicate the nature and consequences of hazards:

	Warns that the instrument contains a laser and that important information about its safe operation and maintenance is included in the manual.
	Warns that the instrument is susceptible to electrostatic discharge (ESD) and ESD protection should be followed to avoid damage.
	Indicates the connector is connected to earth ground and cabinet ground.

## Reusing and Recycling



As part of TSI Incorporated's effort to have a minimal negative impact on the communities in which its products are manufactured and used:

- Do **not** dispose of used batteries in the trash. Follow local environmental requirements for battery recycling.
- If instrument becomes obsolete, return to TSI for disassembly and recycling.

## Product Overview

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The solar power kit provides power to allow continuous monitoring of Model 854030 Environmental Enclosure.

## Setting Up

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### WARNING

Refer to Solar charger manual for further installation and operation instructions.

The setup of the Environmental Enclosure is an important part in allowing reliable and accurate sampling of aerosols in a wide range of conditions. TSI cannot ensure accurate measurements if any of the components are set up incorrectly. Failure to follow these procedures could result in damage to the enclosure or its components.

### NOTE

Prior to using the Battery Pack for the first time, a full recharge is recommended. **Recharging Battery Pack(s) immediately after use (within one hour maximum) is critical to obtaining optimal recharge time, battery health, and battery life.**



The full Solar Power System is shown in Figure 1. The following section details the setup of this system.

### Important

Make all Solar Panel Power System electrical connections in the order outlined below. Damage to the system can occur if connections are not made in this order.



**Figure 1: Solar Panel Power System**

1. Remove the Solar Battery from its packaging and place it in the Solar Battery Enclosure. Make sure that the battery positive (+) terminal is on the right (the positive terminal is noted on the battery with a RED marking).
2. Remove the battery terminals using an adjustable wrench and connect the ring terminal ended wires from the solar charge controller to the battery terminals (see Figure 2).

### Note

There are two wires coming from the charge controller: one is **BLACK** and is labeled **(+)**; the other is **WHITE** and is labeled **(-)**.

The **BLACK (+)** wire should be connected to the battery positive **(+)** terminal, which has a red marking on the top of the battery.

The **WHITE (-)** wire should be connected to the battery negative **(-)** terminal.



**Figure 2: Install the Solar Battery and Connect to Controller**

3. The next step is to attach the two power cables (see Figure 3) to each Solar Panel.



**Figure 3: Attach Power Cables**

4. Remove the Solar Panel from its packaging and access the junction box on the end of the panel.
5. Remove the screws, cover and sealing strip from the box and set aside (see Figure 5).
6. Remove one of the access holes that is labeled  $\frac{1}{2}$ " (see Figure 4).

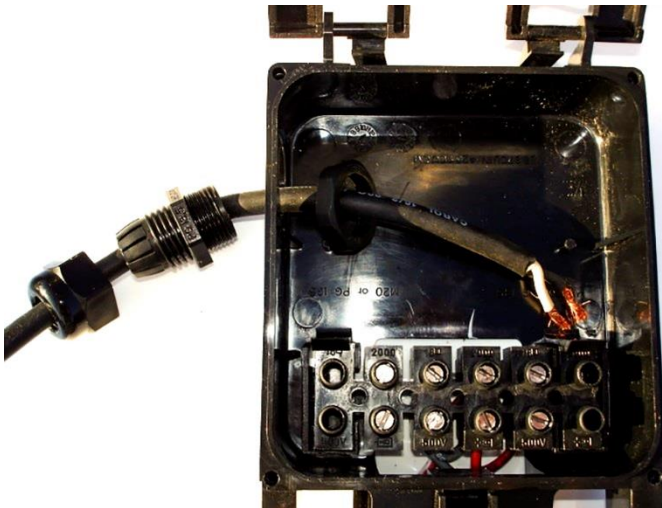


**Figure 4: Prior to removing the center piece labeled  $\frac{1}{2}$ "**

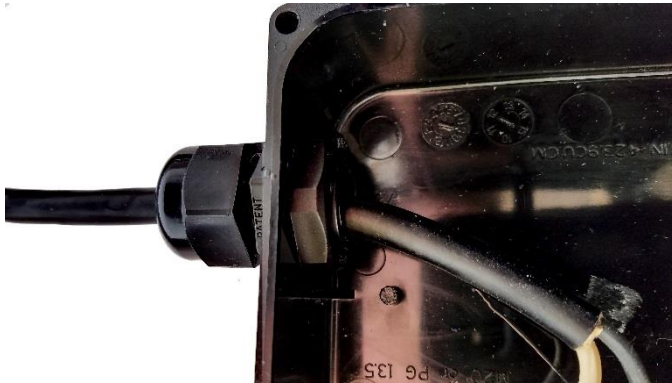


**Figure 5: Remove Screws, Cover, and Sealing Strip**

7. Pass the power cable through the  $\frac{1}{2}$ " diameter access hole while attaching the individual pieces of the cable strain relief to the junction box (see Figure 6 and Figure 7).



**Figure 6: Strain Relief and Power Cable through Access Hole**



**Figure 7: Strain Relief and Power Cable through Access Hole**

8. Tighten the nut to create the proper seal with the cable (see Figure 8). Be sure to not overtighten as this could cause damage to the cable.



**Figure 8: Tighten Nut to Create Proper Seal with the Cable**

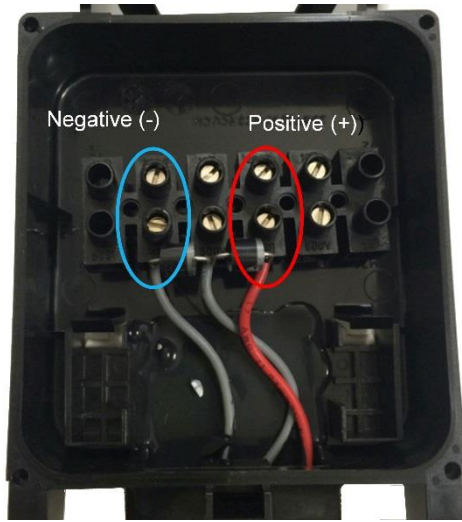
9. Next, attach the power cable (polarity shown in Figure 9) to the Solar Panel screw terminals as shown in Figure 10.

**Note**

Make sure the wires are connected as shown below. Connecting the wires incorrectly can cause severe damage to the Solar Power System. Refer to the Solar Cell manufacturer's specification sheet for additional details.

**BLACK** power cable wire connected to **RED** Solar Term.  
This is the **POSITIVE (+)** connection.

**WHITE** power cable wire connected to **GREY** Solar Term.  
This is the **NEGATIVE (-)** connection.



**Figure 9: Solar Panel Terminal Polarity.**  
(Supplier part number 90J. See solar panel instructions for details).



**Figure 10: Attach Power Cable to Screw Terminals**

10. With the wires tightened, secure the terminal block in its retaining clips as shown in Figure 11.



**Figure 11: Secure Terminal Block and Tighten Strain Relief**

11. Next, install the sealing strip to the inside of the junction box cover, as shown in Figure 12.



**Figure 12: Apply Sealing Strip to Junction Box Cover**

12. Attach the cover to the junction box using the supplied screws, as shown in Figure 13.

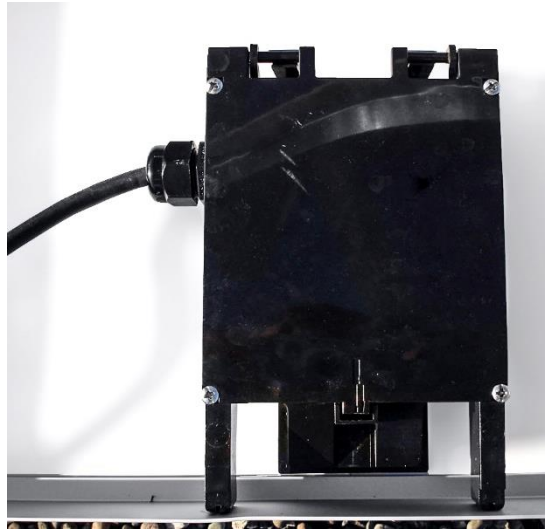


Figure 13: Attach Junction Box Cover

13. Attach the **two** structural angle pieces to the solar panels using the supplied hardware. Fasten each angle piece in 4 locations as indicated by the red circles (see Figure 14).



Figure 14: Assemble the Solar Panels on the Mounting Frame

14. Attach the two shorter structural angles to the angle pieces installed in the previous step (see Figure 15).



**Figure 15: Attach Shorter Structural Angles**



15. Complete the frame, by fastening the two flat bar pieces and mounting feet to the structural angles (see Figure 16 and Figure 17).

**NOTE**

Additional fastening locations are present in the flat bar and angle pieces, which can be used to adjust the solar panel angle.



**Figure 16: Fasten Two Flat Bar Pieces**



Figure 17: Fasten Mounting Feet

#### NOTE

For best results, mount the solar panels at an angle directly pointed at the path of the sun, allowing for maximum energy to be collected by the solar panels. **Reference the solar panel manufacturer's instructions for angle recommendations.**



#### WARNING

It is highly recommended that you secure the frame to a flat surface. The secured structure should be heavy enough to prevent large gusts of wind from moving the panel assembly. The mounting feet can be used to fasten the assembly to a heavy structure.

16. Connect the other end of solar panel cables to the Solar Battery Enclosure as shown in Figure 18. The Green LED on the Solar Charge Controller will illuminate when solar energy is available, and the Solar Battery is charging.



### WARNING

Do **not** connect the Solar Panels **directly** to the 854030 Environmental Enclosure as this may result in damage. The Solar Panels **must** be connected to the Solar Battery Enclosure Box so they can be regulated by the Solar Charge Controller.



Figure 18 Connect Solar Panels to Battery Enclosure Box

17. Connect the third power cable (Figure 19) to the Solar Battery Enclosure, as shown in Figure 20.



Figure 19: Power Cable



**Figure 20: Connect Power Cable to the Environmental Enclosure**

18. Insert the power cable into the connector assembly as shown in Figure 21.



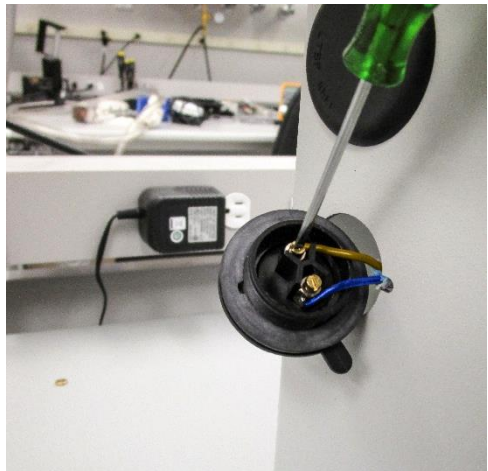
**Figure 21: DC Cable Preparation**

19. Remove bottom left rubber plug from the Environmental Enclosure and insert the cable through the hole as shown in Figure 22.



**Figure 22: DC Cable Preparation**

20. Using a small screwdriver, connect the bare wires to the front panel connector outside of the enclosure as shown in Figure 23. The blue wire to terminal “N” and the brown wire to terminal “L”.



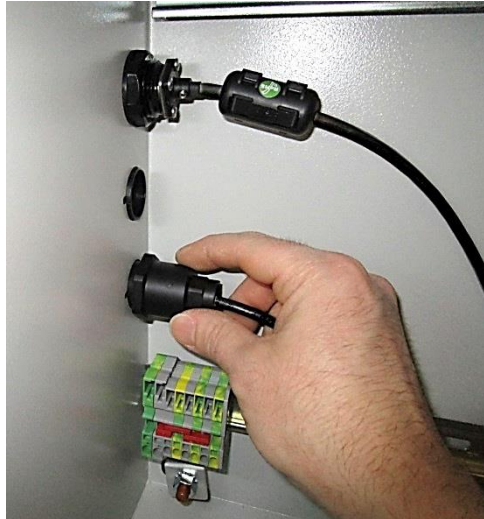
**Figure 23: DC Cable Preparation**

21. Rotate connector to align tab on the connector to the notch in the enclosure hole (Figure 24).



**Figure 24: DC Cable Connector**

22. While holding the connector in the enclosure notch, tighten the back-shell onto the connector as shown in Figure 25.



**Figure 25: DC Cable Backshell**

23. Tighten the gland nut into the back-shell as shown in Figure 26.



**Figure 26: DC Cable Gland Nut**

24. Connect the gray Phoenix connector to the power input on the DIN rail as shown in Figure 27.



**Figure 27: DC Cable to DIN Rail**

25. Connect the power cord to the environmental enclosure as shown in Figure 288.

**NOTE**

Optional Heated Inlet Temp Sensor also shown in Figure 28.



**Figure 28: Power Cord from Solar Battery to Environmental Enclosure**



# Operation

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## Overview

Prior to using the Solar Power System for the first time, a full recharge of the Solar Battery is recommended. Simply allow the battery to charge for a day with sunlight energy from the connected Solar Panels.

The Solar Charge Controller has built-in low voltage cutout protection for the Solar Battery. If extended non-sunlight conditions occur, causing the Solar Battery to become deeply discharged, the Solar Charge Controller temporarily cuts off output power. The Red LED on the Solar Charge Controller will illuminate when this condition occurs. Once sunlight returns, and the Solar Battery has been recharged to an appropriate level, the Red LED will turn off and the Solar Charge Controller will re-enable the power output.

The Green LED on the Solar Charge Controller will illuminate when sunlight power is available, and the Solar Battery is charging.

# Specifications

*Specifications are subject to change without notice.*

<b>Power Requirements</b>	
Solar System Run-time	Continuous (with adequate sunlight)
Rated Maximum Cell Power	90 watts (per panel)
Power Tolerance	±5%
Nominal Voltage	12 Volts
Solar System Battery	12 VDC, 120 Ah
Battery Run-time	90 to 120 hours (typical, full-charge to power cutoff, when no sunlight for charging)
Battery Charge Time	<10 hours at 72°F (22°C) (New battery, deep discharge to 95% charge, with adequate sunlight)
Operating Temperature	32 to 120°F (0 to 50°C)
Storage Temperature	-4 °F to 140°F (-20 to 60°C)

<b>Physical (Solar Panels)</b>	
Dimensions (HWD)	2 x 21 x 48 in. (5 x 53 x 122 cm) each
Weight	17 lbs (7.7 kg) each

<b>Physical (Battery and Case)</b>	
Dimensions (HWD)	8.5 x 15.3 x 17 in. (22 x 39 x 43 cm)
Weight	85 lbs (38.3 kg)



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