

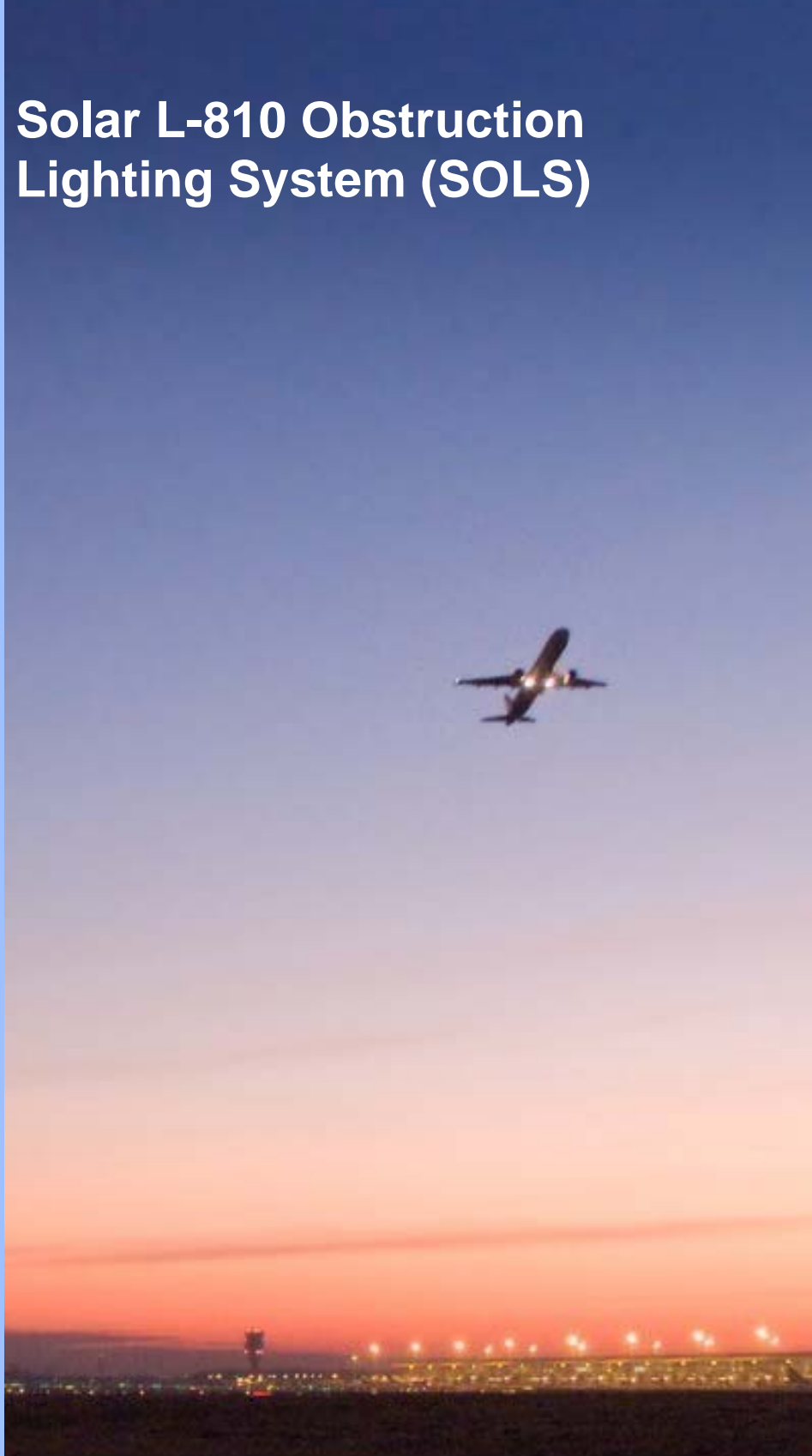
# Solar L-810 Obstruction Lighting System (SOLS)

Operation Manual

96A0413

**Retain for future use.**

Rev. B, 10/10/11



**ADB**  
Airfield Solutions

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## 1.0 Safety

### 1.1 To use this equipment safely:

This section contains general safety instructions for installing and using ADB Airfield Solutions equipment. Some safety instructions may not apply to the equipment in this manual. Task- and equipment-specific warnings are included in other sections of this manual where appropriate.



#### WARNING

Read installation instructions in their entirety before starting installation.

- Refer to the FAA Advisory Circular AC 150/5340-26, Maintenance of Airport Visual Aids Facilities, for instructions on safety precautions.
- Observe all safety regulations. To avoid injuries, always disconnect power before making any wiring connections or touching any parts. Refer to FAA Advisory Circular AC 150/5340-26.
- Become familiar with the general safety instructions in this section of the manual before installing, operating, maintaining or repairing this equipment.
- Read and carefully follow the instructions throughout this manual for performing specific tasks and working with specific equipment.
- Make this manual available to personnel installing, operating, maintaining or repairing this equipment.
- Follow all applicable safety procedures required by your company, industry standards and government or other regulatory agencies.
- Install all electrical connections to local code.
- Use only electrical wire of sufficient gauge and insulation to handle the rated current demand. All wiring must meet local codes.
- Route electrical wiring along a protected path. Make sure they will not be damaged by moving equipment.
- Protect components from damage, wear, and harsh environment conditions.
- Allow ample room for maintenance, panel accessibility, and cover removal.
- Protect components from damage, wear, and harsh environment conditions.
- Allow ample room for maintenance, panel accessibility, and cover removal.
- Protect equipment with safety devices as specified by applicable safety regulations.
- If safety devices must be removed for installation, install them immediately after the work is completed and check them for proper functioning prior to returning power to the circuit.

#### 1.1.1 Additional Reference Materials:

- NFPA 70B, Electrical Equipment Maintenance.
- NFPA 70E, Electrical Safety Requirements for Employee Workplaces.
- ANSI/NFPA 79, Electrical Standards for Metalworking Machine Tools.
- OSHA 29 CFR, Part 1910, Occupational Health and Safety Standards.
- National and local electrical codes and standards.

#### 1.1.2 Qualified Personnel

The term **qualified personnel** is defined here as individuals who thoroughly understand the equipment and its safe operation, maintenance and repair. Qualified personnel are physically capable of performing the required tasks, familiar with all relevant safety rules and regulations and have been trained to safely install, operate, maintain and repair the equipment. It is the responsibility of the company operating this equipment to ensure that its personnel meet these requirements.

Always use required personal protective equipment (PPE) and follow safe electrical work practices.

#### 1.1.3 Intended Use



#### WARNING

Using this equipment in ways other than described in this manual may result in personal injury, death or property and equipment damage. Use this equipment only as described in this manual.

ADB Airfield Solutions cannot be responsible for injuries or damages resulting from nonstandard, unintended applications of its equipment. This equipment is designed and intended only for the purpose described in this manual. Uses not described in this manual are considered unintended uses and may result in serious personal injury, death or property and equipment damage. Unintended uses may result from taking the following actions:

- Making changes to equipment that are not recommended or described in this manual or using parts that are not genuine ADB Airfield Solutions replacement parts.
- Failing to make sure that auxiliary equipment complies with approval-agency requirements, local codes and all applicable safety standards.
- Using materials or auxiliary equipment that are inappropriate or incompatible with ADB Airfield Solutions equipment.
- Allowing unqualified personnel to perform any task.

#### 1.1.4 Storage



#### CAUTION

If equipment is to be stored prior to installation, it must be protected from the weather and kept free of condensation and dust.

**Failure to follow this instruction can result in injury or equipment damage.**

#### 1.1.4.1 Operation



##### WARNING

- Only qualified personnel, physically capable of operating the equipment and with no impairments in their judgment or reaction times, should operate this equipment.
- Read all system component manuals before operating this equipment. A thorough understanding of system components and their operation will help you operate the system safely and efficiently.
- Before starting this equipment, check all safety interlocks, fire-detection systems, and protective devices such as panels and covers. Make sure all devices are fully functional. Do not operate the system if these devices are not working properly. Do not deactivate or bypass automatic safety interlocks or locked-out electrical disconnects or pneumatic valves.
- Protect equipment with safety devices as specified by applicable safety regulations.
- If safety devices must be removed for installation, install them immediately after the work is completed and check them for proper functioning.
- Route electrical wiring along a protected path. Make sure they will not be damaged by moving equipment.
- Never operate equipment with a known malfunction.
- Do not attempt to operate or service electrical equipment if standing water is present.
- Use this equipment only in the environments for which it is rated. Do not operate this equipment in humid, flammable, or explosive environments unless it has been rated for safe operation in these environments.
- Never touch exposed electrical connections on equipment while the power is ON.

#### 1.1.4.2 Material Handling Precautions



##### CAUTION

This equipment may contain electrostatic sensitive devices.

- Protect from electrostatic discharge.
- Electronic modules and components should be touched only when this is unavoidable e.g. soldering, replacement.
- Before touching any component of the cabinet you should bring your body to the same potential as the cabinet by touching a conductive earthed part of the cabinet.
- Electronic modules or components must not be brought in contact with highly insulating materials such as plastic sheets, synthetic fiber clothing. They must be laid down on conductive surfaces.
- The tip of the soldering iron must be grounded.
- Electronic modules and components must be stored and transported in conductive packing.

#### 1.1.4.3 Action in the Event of a System or Component Malfunction



##### WARNING

- Do not operate a system that contains malfunctioning components. If a component malfunctions, turn the system OFF immediately.
- Disconnect and lock out electrical power.
- Allow only qualified personnel to make repairs. Repair or replace the malfunctioning component according to instructions provided in its manual.

#### 1.1.4.4 Maintenance and Repair



##### WARNING

Allow only qualified personnel to perform maintenance, troubleshooting, and repair tasks.

- Only persons who are properly trained and familiar with ADB Airfield Solutions equipment are permitted to service this equipment.
- Disconnect and lock out electrical power.
- Always use safety devices when working on this equipment.
- Follow the recommended maintenance procedures in the product manuals.
- Do not service or adjust any equipment unless another person trained in first aid and CPR is present.
- Connect all disconnected equipment ground cables and wires after servicing equipment. Ground all conductive equipment.
- Use only approved ADB Airfield Solutions replacement parts. Using unapproved parts or making unapproved modifications to equipment may void agency approvals and create safety hazards.
- Check interlock systems periodically to ensure their effectiveness.
- Do not attempt to service electrical equipment if standing water is present. Use caution when servicing electrical equipment in a high-humidity environment.
- Use tools with insulated handles when working with electrical equipment.

## 2.0 Solar L-810 Obstruction Lighting System (SOLS)

Solar Obstruction Lighting System (SOLS) manual.

### 2.1 About this manual

The manual shows the information necessary to:

- Install
- Carry Out Maintenance
- Carry Out Troubleshooting on the SOLS.

#### 2.1.1 How to work with the manual

1. Become familiar with the structure and content.
2. Carry out the actions completely and in the given sequence.



#### 2.1.2 Record of changes

PAGE	REV	DESCRIPTION	EC NO.	CHECKED	APPROVED	DATE
All	A	New Manual				8/17/10
All	B	Updated schematics and format				

#### 2.1.3 Icons used in the manual

For all WARNING symbols see the Safety section.

Carefully read and observe all safety instructions in this manual, which alert you to safety hazards and conditions that may result in personal injury, death or property and equipment damage and are accompanied by the symbol shown below.

	<b>WARNING</b> <ul style="list-style-type: none"><li>• Failure to observe a warning may result in personal injury, death or equipment damage.</li></ul>
	<b>CAUTION</b> <ul style="list-style-type: none"><li>• Failure to observe a caution may result in equipment damage.</li></ul>

## 2.2 Introduction

The LED Solar Obstruction Lighting System (SOLS) is a FAA- and ICAO-compliant modular, stand-alone, self-contained solar-powered obstruction warning lighting system for towers and other structures. See Figure 1. During the daytime, the solar module charges the battery. At dusk, the photocell automatically activates the LED obstruction light until dawn. Dusk-to-dawn light control is activated by ambient solar lighting levels (Turn On at 35 foot candles / Turn Off at 52 foot candles) via a FAA-approved photocell.

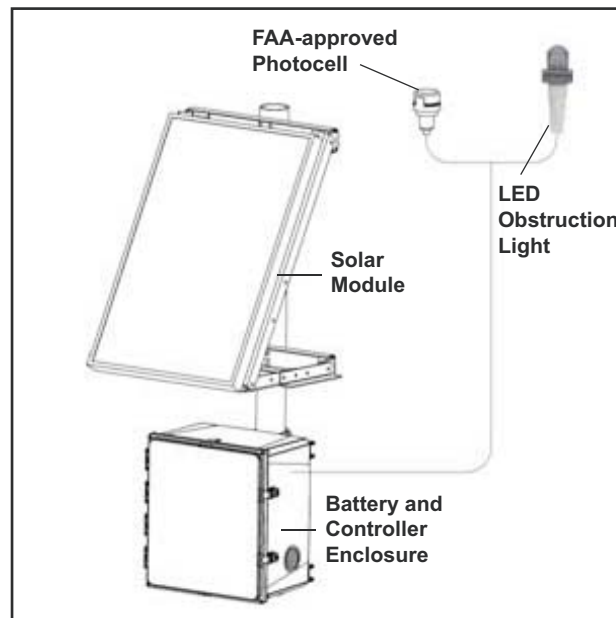
- The system is designed to require very low maintenance for long periods, while operating in harsh environments.
- The system includes a steady burning red light fixture marking fixed obstructions to eliminate navigational hazards. See catalog sheet 2063 for more information about ADB's L-810 LED Obstruction Light.
- High-efficiency high-flux LED obstruction light
- Weather- and corrosion-resistant light assembly and housing (IP66)
- 32.5 cd brightness
- FAA certification AC 150/5345-43F for L-810 LED fixture
- L-810 obstruction light is ETL certified to FAA Engineering Brief No. 76 "Using Solar Power for Airport Obstruction Lighting"
- FAA-approved photocell
- Minimum 5-year battery life

### 2.2.1 Operation

The LED Solar Obstruction Light operates as follows:

- Solar modules supply DC current to charge the deep cycle battery operating at 12 V.
- Battery charging is regulated by the pre-installed and wired charge controller in the outdoor-rated battery and controller (NEMA 4X / IP66) enclosure.
- The LED fixture is powered by the energy stored in the battery. System design is based on monthly site climate data such that the average solar module output is greater than the average loading.

**Figure 1: Typical System Layout**





## 2.2.2 Theory of Operation

The SOLS operates automatically with no need for operator interaction under normal conditions. With normal daylight illumination, the solar module is capable of producing sufficient current to charge the battery. The green charging light indicates the battery is being charged by the solar module.

If the battery discharges to the pre-set load disconnect voltage due to long periods of poor weather, the low voltage disconnect (LVD) relay is activated, the controller's red LED turns on, and the solar obstruction LED fixture is disconnected. Disconnecting the LED fixture prevents battery damage associated with complete discharge of the battery. The controller's red LED will turn off when the battery recovers to about 50% of its rated capacity and the light fixture is automatically reconnected.

**Figure 2: Ordering Codes**

Ordering Code	SPS-X000
<b>Solar Panel Size*</b>	
1 = 50W, 12V, 105 Ahr	
2 = 80W, 12V, 139 Ahr	

**NOTE:** See solar sizing map Figure 2.1 to determine the size of the solar panel required for specific locations.

Ordering Code	SBOL-XXXX
<b>Color</b>	
1 = Obstruction Light Red, FAA	
2 = Obstruction Light Red, ICAO, Type A <sup>1</sup>	
<b>Mounting</b>	
1 = Single, bottom mount 1 inch-11.5 inch NPT	
<b>Power</b>	
4 = 12V DC	
<b>Arctic Option</b>	
0 = Without arctic option	

1. **Note:** Not ETL Certified. Not CE Certified.

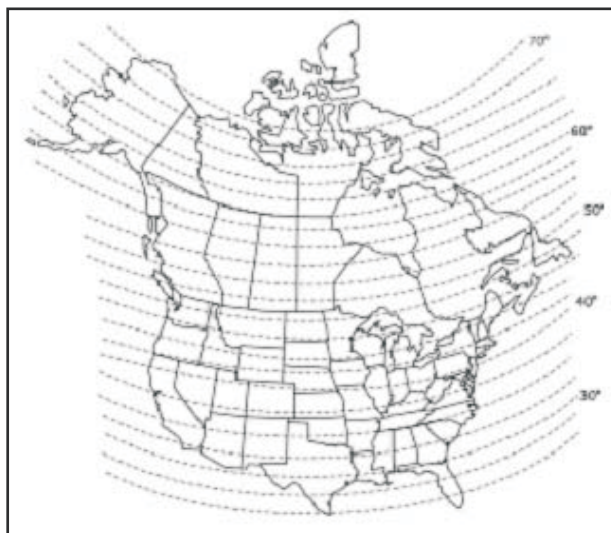
## 2.2.3 Solar Module Orientation

Full solar exposure is critical to the performance of the LED obstruction light. Ensure that the solar panel installation location has year-round, unrestricted sun exposure throughout the day. If required, the solar panel may be attached remotely to the battery using an appropriately-sized transmission cable. The bottom edge of the solar panels should be installed at a minimum height to clear growing vegetation and snow at the site.

**NOTE:** Shading even a small portion of the solar panel will significantly reduce the output of the LED fixture.

Solar panels should be installed facing the equator – within 10° of due south in northern latitudes and within 10° of due north in southern latitudes (See Latitudes: North America). The optimum inclination angle varies depending on the latitude. Most solar panels are installed at a fixed inclination angle. The inclination angle is the angle between the back of the solar panel and the horizon (See Table , Figure 3 and Figure 4).

**Figure 3: Latitudes: North America**



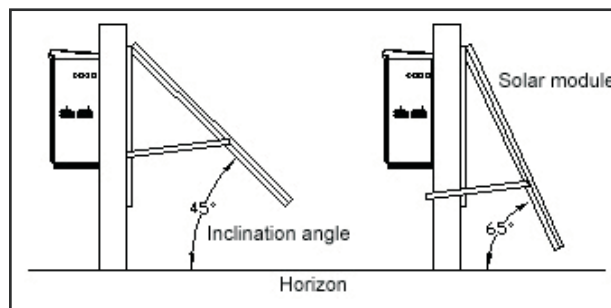
**Table 1: Inclination**

Site Latitude	Near-Optimum Solar Module Inclination Angle
0 – 9°	15°
10 – 20°	Latitude + 5°
21 – 45°	Latitude + 10°
45 – 55°	Latitude + 15°

**Notes:**

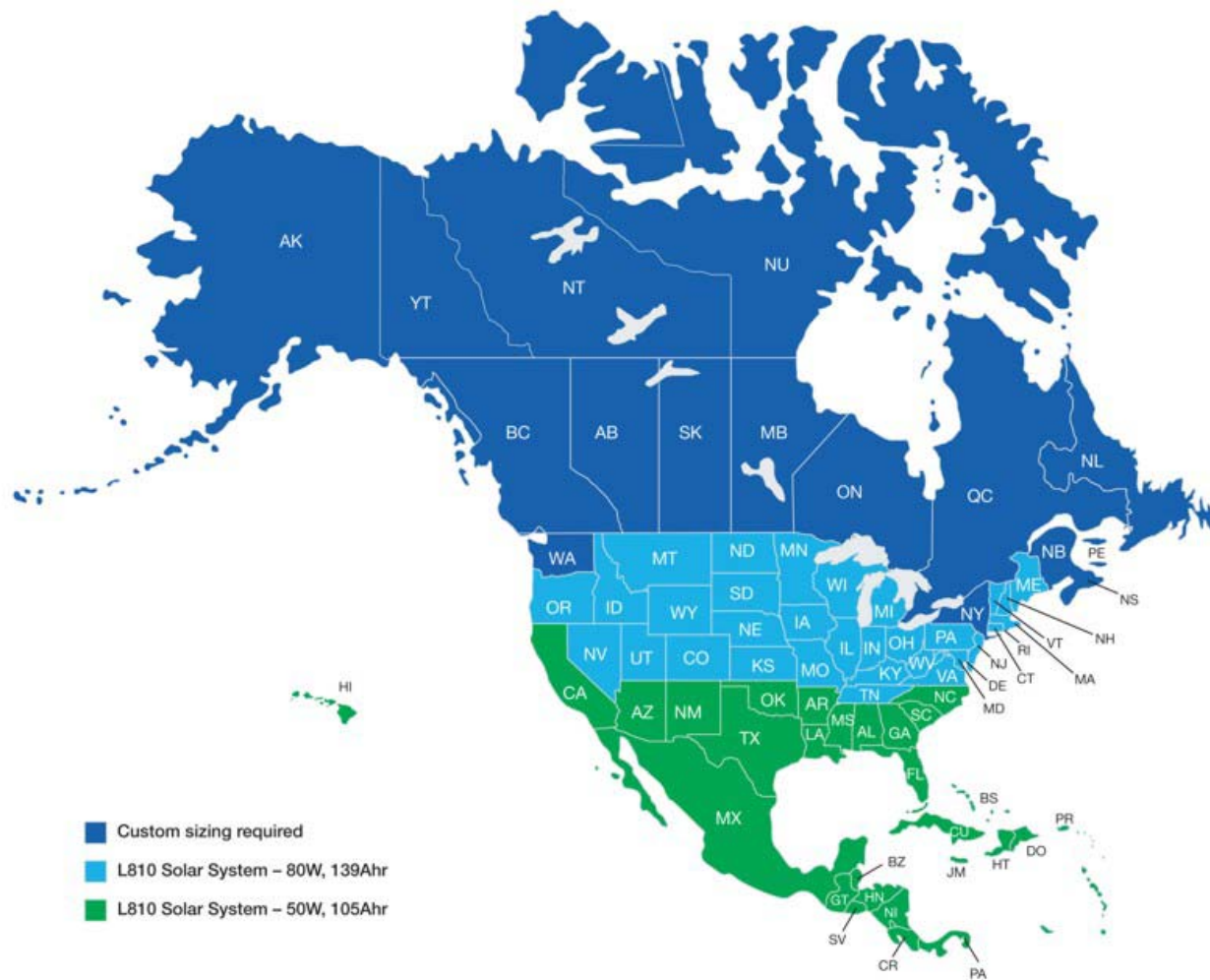
- This table assumes the module will remain at a fixed inclination angle throughout the year and is, therefore, optimized for winter. For further information, or if seasonal adjustment of the module is desired, contact ADB.
- SOLS systems installed at a latitude greater than 55° are subject to special design considerations due to lower levels of solar radiation during the winter months.
- Do not use inclination angles below 15° unless you are able to inspect and wash the solar modules frequently. At high latitudes where snow or ice build-up is an issue, the solar module should be installed at vertical or near vertical if winter performance is critical.
- The solar Module was designed to work in a specific location. See Figure 2.1.

**Figure 4: Solar Module Inclination Angle**



**Figure 2.1.**

Use the above map to determine the size of the solar module required for specific locations.



## 2.2.4 Battery and Control Enclosure

### Enclosure Description

The SOLS enclosure houses the battery and pre-installed control panel.

**NOTE:** This product is designed for use with the ADB L-810 luminaire only. Using other manufacturer's obstruction light may cause a reduction in the number of days of autonomy or lead to system failure and will result in voiding ADB's product warranty.

Depending on the mounting options chosen, the user can mount the enclosure to the side of a pole, wall, or base foundation. *Figure 19.*

### Enclosure Preparation

Prior to mounting the enclosure, prepare all conduit and wiring requirements as described below.

### Enclosure Preparation Instructions

1. Drill appropriate hole for the solar module and the L-810 luminaire wires.
2. Attach the enclosure mounting options.
3. Secure all wires and remove loose objects from inside the enclosure. Close the door prior to mounting.

## Mounting the Enclosure

The enclosure should be lifted and mounted by two people. When pre-installing the battery, ensure that it is strapped down to prevent it from shifting or falling out. Attachment clamps for a standard 4" pipe (out diameter 4.5"/114mm, schedule 40) are provided with the enclosures for attaching to a circular pole.

**NOTE:** User supplied hardware is required if the enclosure is attached to a square pole or other structure. If the enclosure is mounted at ground level, there may be local regulations which specify certain conditions for installation. For more information, consult with the relevant local governing bodies before installation.

The following is the recommended torques for fasteners:

**Table 2: Torques for Fasteners**

Fastener Size	Torque Imperial	Torque Metric
#10 – 16	3 – 4 lbf·in	(34 – 45 N·m)
1/4 – 20	40 – 50 lbf·in	(4.5 – 5.6 N·m)
5/16 – 18	8 – 10 lbf·ft	(10.8 – 13.6 N·m)

### 2.2.4.1 Components

The L-810 package includes the following components:

- Rigid framed photovoltaic solar panel
- Aluminum solar panel mounting structure
- Polycarbonate NEMA 4X / IP66 enclosure
- Charge Controller
- Sealed deep cycle AGM battery
- Complete wiring kits for solar panel and battery
- Wiring from the enclosure to the L-810 light/photocell
- FAA-approved photocell
- FAA-approved L-810 light

#### Customer supplied components:

- Mounting pole or attachment to a structure

### 2.2.4.2 Enclosure Dimensions

Table lists the height, width, depth, and weight of the battery and controller enclosure, not including the solar panel and its mount.

**Table 3: Enclosure Dimensions**

	Height <sup>1</sup>	Width <sup>1</sup> (front)	Depth <sup>1</sup> (side)	Weight <sup>2</sup> (bare)
Enclosure	19.00" (482.6 mm)	18.5" (469.9 mm)	11.25" (285.75 mm)	14 lb (6.35 kg)

1. Outside dimensions including the enclosure and protrusions.
2. The estimated weight of the bare enclosure, without control panel and cabling.

## 2.2.5 Acronyms

Term	Description
AGM	Absorbed Glass Mat
CEC	Canadian Electrical Code
CSA	Canadian Standards Association
DC	Direct Current
FC	Foot-candle
LVD	Low Voltage Disconnect
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NPT	National Pipe Thread
UL	Underwriters Laboratories Incorporated

## 2.3 Installation



### WARNING

Read the instructions in their entirety before starting installation.

### 2.3.1 Standards and Cautions for Installations

#### Standards

Installation and wiring must be in strict conformance with local building and electrical codes. Adherence to the National Electrical Code (NEC) or Canadian Electrical Code (CEC) is mandatory to comply with the UL, CSA, or any other certification markings. Non-adherence to code may void the warranty. Qualified, licensed professionals should perform all installation work.

**NOTE:** This owner's manual is provided to assist your certified installer. The use of this manual and the conditions or methods of installation, operation, use and maintenance of the equipment are beyond the control of ADB; therefore, ADB does not assume responsibility and expressly disclaims liability for loss, damage, or expense arising out of or any way connected with such installation, operation, use, or maintenance.

### 2.3.2 Cautions

1. Before lifting any heavy or bulky equipment, ensure that the load is secured so that moving parts do not shift and it can be lifted as far as needed without back strain or loss of grip. It is recommended that two or more persons be employed in performing the installation tasks.
2. The battery is shipped fully charged; therefore, care must be taken to avoid shorting out the positive and negative terminals of the battery.
3. Solar modules produce DC electricity when exposed to light and can produce an electrical shock or burn. Modules can be rendered inoperative by removing them from sunlight, or by fully covering their front surface with an opaque material.
4. Remove all metallic jewelry before performing electrical wiring or testing.
5. Circuit breakers should be turned off and fusing disconnected before installation and wiring until the system is ready for start-up.
6. Re-check all completed wiring for proper design voltage and polarity prior to energizing the system.

### 2.3.3 Tools and Materials

#### Recommended Tools

ADB does not supply tools with the SOLS. The following tools are recommended to complete the installation:

- 6" and 10" crescent wrenches
- Compass
- Digital voltmeter
- Level
- Marker
- Socket Set (Imperial)
- Tape measure
- #8 – #12 wire cutters
- Flat head screwdriver
- Phillips screwdriver
- Tongue and groove pliers
- Hammer
- Utility knife

#### 2.3.3.1 Additional Materials Required

The following list of additional materials and hardware are required by the installer to complete the installation:

- Foundations, masts, poles, etc., to support the solar module mounting structure and the battery and controller enclosure
- Hardware to attach the solar module mounting structure, battery, control enclosure and, L-810 luminaire/photocell to the pole or other mounting structure. Standard mounting hardware for assembly to 4" pipe is provided by ADB, but additional hardware may be required.
- Wiring from the enclosure to the L-810 luminaire/photocell
- Ground rod and clamps

This is a general list and additional items may be required at specific sites.

#### 2.3.4 Solar Array and Mounting Structure

##### Array Orientation

Full solar exposure is critical to the performance of the SOLS. Ensure that the solar module installation location has year-round, unrestricted sun exposure throughout the day. If required, the solar module may be attached remotely to the battery using an appropriately sized transmission cable. The bottom edge of the solar modules should be installed at a minimum height to clear growing vegetation and snow at the site.

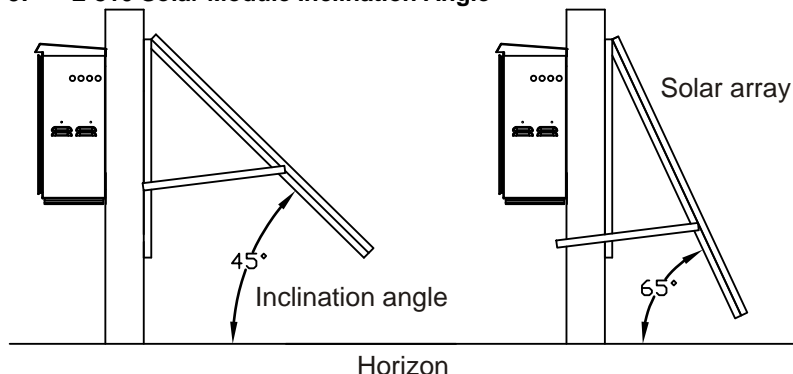
**NOTE:** Shading even a small portion of the solar module will significantly reduce the output of the L-810.

Solar modules should be installed facing the equator – within 10° of due south in northern latitudes and within 10° of due north in southern latitudes; see Latitude (North America) for a map of latitudes in North America. The optimum inclination angle varies depending on the latitude. Most arrays are installed at a fixed inclination angle. The inclination angle is the angle between the back of the solar module and the horizon; see Figure 5.

The module inclination angle is typically optimized for performance during the time of year with the lowest amount of solar activity. Use Latitude (North America) to determine the optimum inclination angle for your solar module. See Table . This table assumes the module will remain at a fixed inclination angle throughout the year and is, therefore, optimized for winter. For further information, or if seasonal adjustment of the module is desired, contact ADB.

Do not use inclination angles below 15° unless you are able to inspect and wash the solar modules frequently. At high latitudes where snow or ice build-up is an issue, the array should be installed at vertical or near vertical if winter performance is critical.

**Figure 5: L-810 Solar Module Inclination Angle**



**Figure 6: Latitude (North America)**



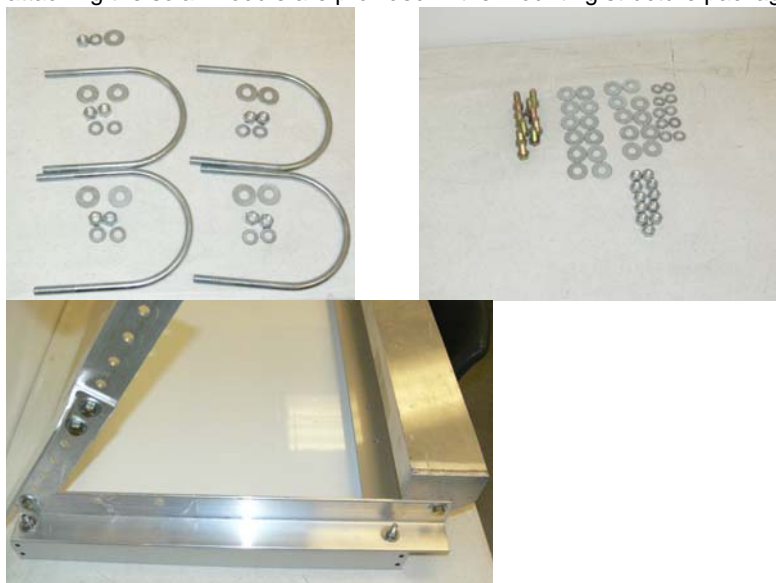
**Table 4: Inclination**

Site Latitude	Near-Optimum Solar Module Inclination Angle
0 – 9°	15°
10 – 20°	Latitude + 5°
21 – 45°	Latitude + 10°
45 – 55°	Latitude + 15°

L-810 system installed at a latitude greater than 55° are subject to special design considerations due to lower levels of solar radiation during the winter months. See Figure 5.

#### 2.3.4.1 Solar Module Assembly and Mounting

A solar module mounting structure is provided for attaching the solar module to an appropriate support structure or foundation. Instructions for assembling the mount and attaching the solar module are provided in the mounting structure package.





If heavy lifting equipment is available, the module and mounting structure may be pre-assembled and wired on the ground and lifted into place.

The module and enclosure mounting kits are both designed to a standard 4" pipe (outer diameter 4.5" / 114 mm), having a wall thickness which is at least schedule 40 (0.237" / 6 mm). A short section of pipe (not supplied) can be used to mount the module and enclosure. The pipe can be attached to the obstruction structure or other location. You can also mount the units to pipes with sizes as small as 3" (outer diameter 3.5" / 89mm), having a wall thickness which is at least schedule 40 (0.237" / 6 mm). Additional fasteners (u-bolts) will be required. The solar modules may be mounted at whatever height is deemed safe.

**NOTE:** The module and mount are designed to specific wind loads. Mounts are rated to 150mph, Exposure category C, at 33'. Modules are rated at 50psf from the manufacturer. Actual wind loads will vary depending on the installation angle. Increasing the height can cause the assembly to experience increased wind loading. Consult local professionals for evaluation.

The following is the recommended torques for fasteners:

Fastener Size	Torque Imperial	Torque Metric
1/4 – 20	40 – 50 lbf-in	(4.5 - 5.6 N·m)
5/16 – 18	8 – 10 lbf-ft	(10.8 – 13.6 N·m)
3/8 – 16	14 – 16 lbf-ft	(19.0 – 21.7 N·m)

#### Solar Module Wiring

1. Refer to the included Wiring Diagram, Figure 15 for the type of solar module for your system.
2. All wiring must be performed according to NEC or CEC code requirements.
3. To ensure compliance with local electrical code, use the conduit, connectors and wire from the supplied wiring kit.
4. Tighten wire connection screws in the solar module junction box to 1.7 lb-ft (2.3 N·m).
5. Tighten junction box lid screws to 0.33 – 0.50 lb-ft (0.45 – 0.68 N·m). Do not over tighten the lid screws.

The solar modules are provided with conduit-ready junction boxes. The diagrams in "Wiring Diagrams and Wiring Schematic" on page 23 contain generic junction box schematics to illustrate the typical interconnections and wire routing. Some modules have different arrangements of positive, negative, and floating terminals; see "*Junction Box and Module Wiring*" on page 23 for specific internals and external wiring details. Do not connect more than two wires to any module terminal.

2.3.4.2 Grounding and  
Lightning Protection

Installation

**NOTE:** Failure to install and connect an appropriate grounding system will greatly increase the risk of system damage by lightning strikes.

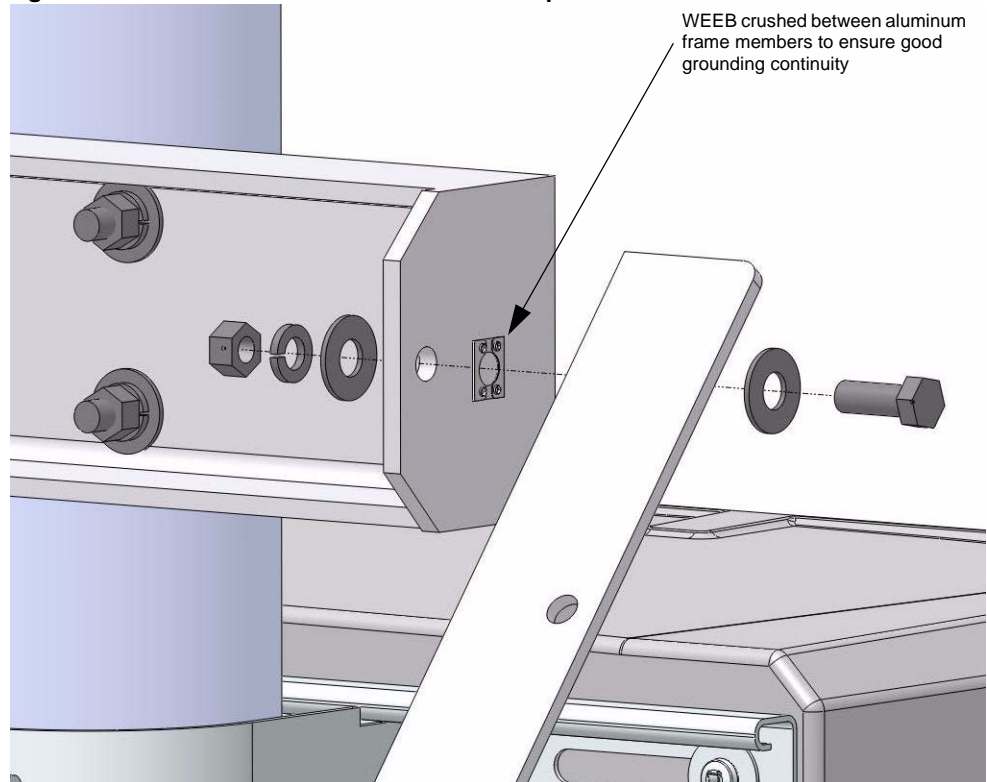
Surges resulting from lightning strikes in the proximity of the installation are one of the most common causes of solar system failure. Installation of a proper ground system allows the static electricity that accumulates in the solar panel and mounting structure to discharge. In addition to preventing the attraction of lightning, a properly grounded installation may divert the surge associated with lightning from electrical circuitry, limiting the potential for damage.

The system grounding is designed such that:

- Solar panel and mount are grounded together using surface-cutting hardware, commonly known as a “WEEB” see Figure 7 and Figure 8;
- Ground wire attaches to the mount, passes through the solar panel junction box and into the electrical cable running to the battery and control enclosure;
- L-810 and photocell are grounded together and this cable then enters the battery and control enclosure;
- Inside the enclosure, the solar panel and mount ground, L-810 and photocell ground, electrical back plane and battery negative terminal are all connected as a system ground.
- System grounding is the responsibility of the installer and a terminal block and exit cable fitting is supplied.

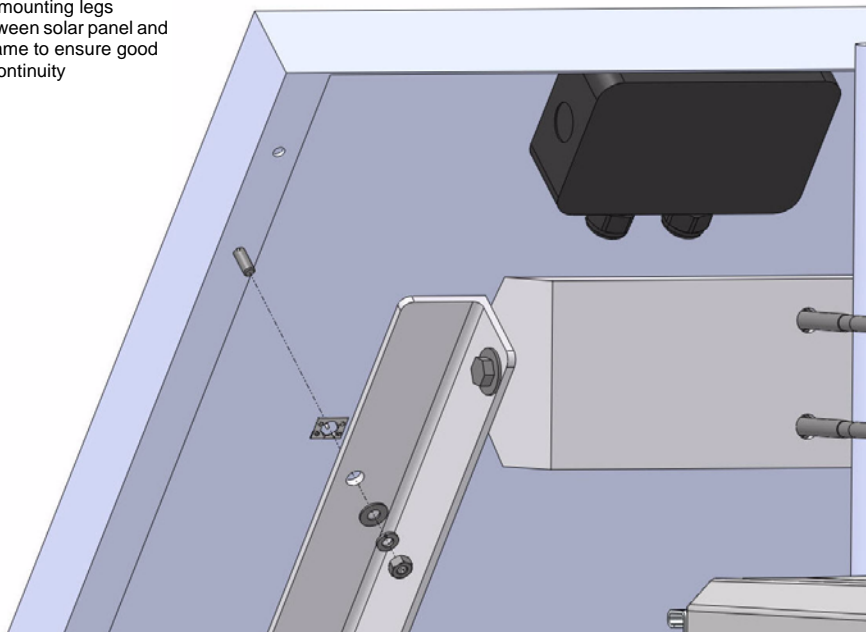
See Figure 9

**Figure 7: Solar Panel Mount Hardware Example 1**

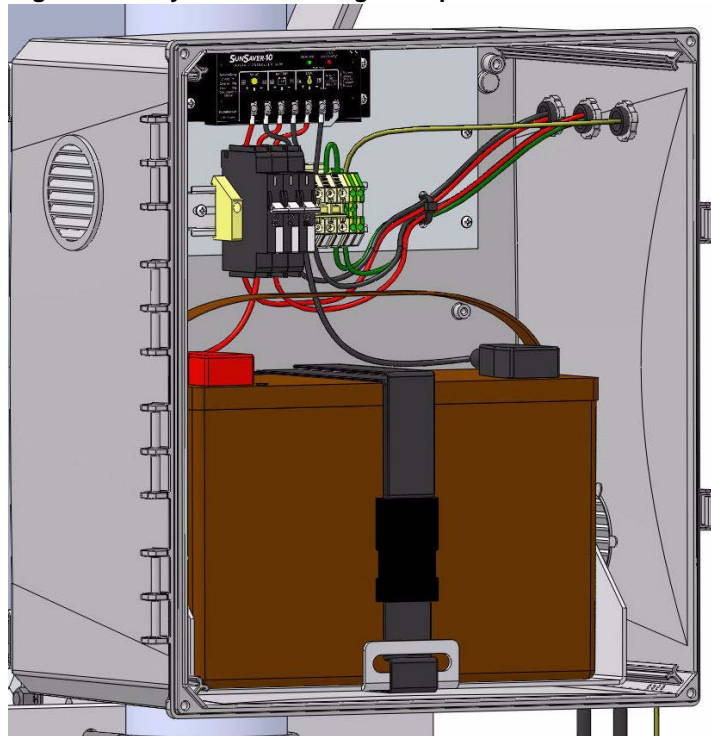


**Figure 8: Solar Panel Mount Hardware Example 2**

WEEB with mounting legs  
crushed between solar panel and  
mounting frame to ensure good  
grounding continuity



**Figure 9: System Grounding Example**



System Ground (yellow wire)  
entering through supplied  
cable fitting and attaching to  
supplied grounding terminal  
block

Grounding techniques vary depending on site specifics and local electrical authorities. Consultation with a local grounding expert is recommended.

### 2.3.4.3 Installation – Battery & Control Enclosure

#### Enclosure Mounting

The enclosure should be lifted and mounted by two people. When pre-installing the battery, ensure that it is strapped down to prevent it from shifting or falling out. Attachment clamps for a standard 4" pipe (out diameter 4.5"/114mm, schedule 40) are provided with the enclosures for attaching to a circular pole.

**NOTE:** User supplied hardware is required if the enclosure is attached to a square pole or other structure. If the enclosure is mounted at ground level, there may be local regulations which specify certain conditions for installation. For more information, consult with the relevant local governing bodies before installation. See local regulations.

The following is the recommended torques for fasteners:

Fastener Size	Torque Imperial	Torque Metric
#10 – 16	3 – 4 lbf·in	(34 – 45 N·m)
1/4 – 20	40 – 50 lbf·in	(4.5 – 5.6 N·m)
5/16 – 18	8 – 10 lbf·ft	(10.8 – 13.6 N·m)

**Figure 10: Enclosure Mounting**



### 2.3.5 Battery Installation

#### Installing the Battery

Install the battery and battery strap in the enclosure.


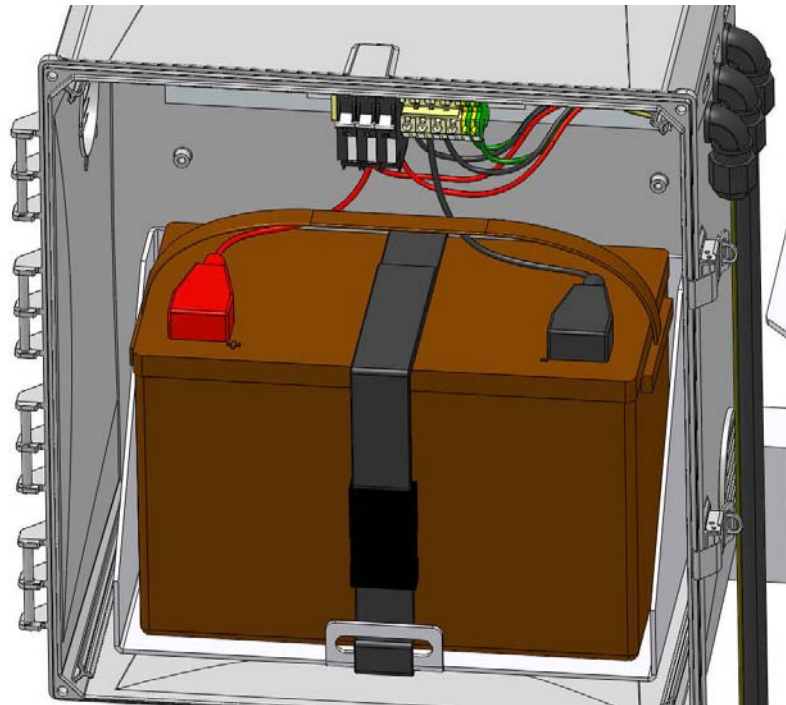
	<b>CAUTION</b> Batteries are heavy, use caution when lifting them to prevent injury.
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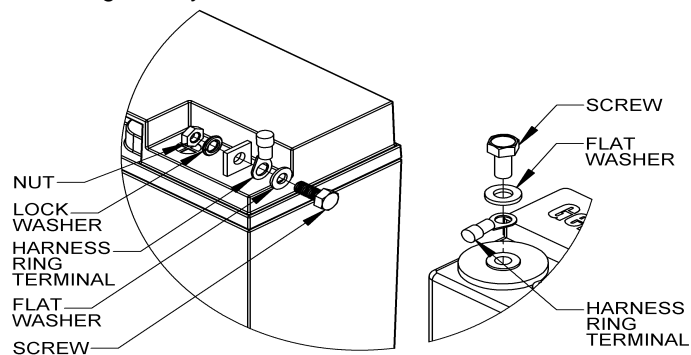
Figure 11: Battery Installation



#### 2.3.5.1 Wiring the Battery

1. Attach the ring terminals of the battery cables from the control panel to the battery terminals, as shown in Figure 2.1.
2. Tighten to 12 lb-ft (16 N·m).

Figure 2.1. Connecting Battery Cables

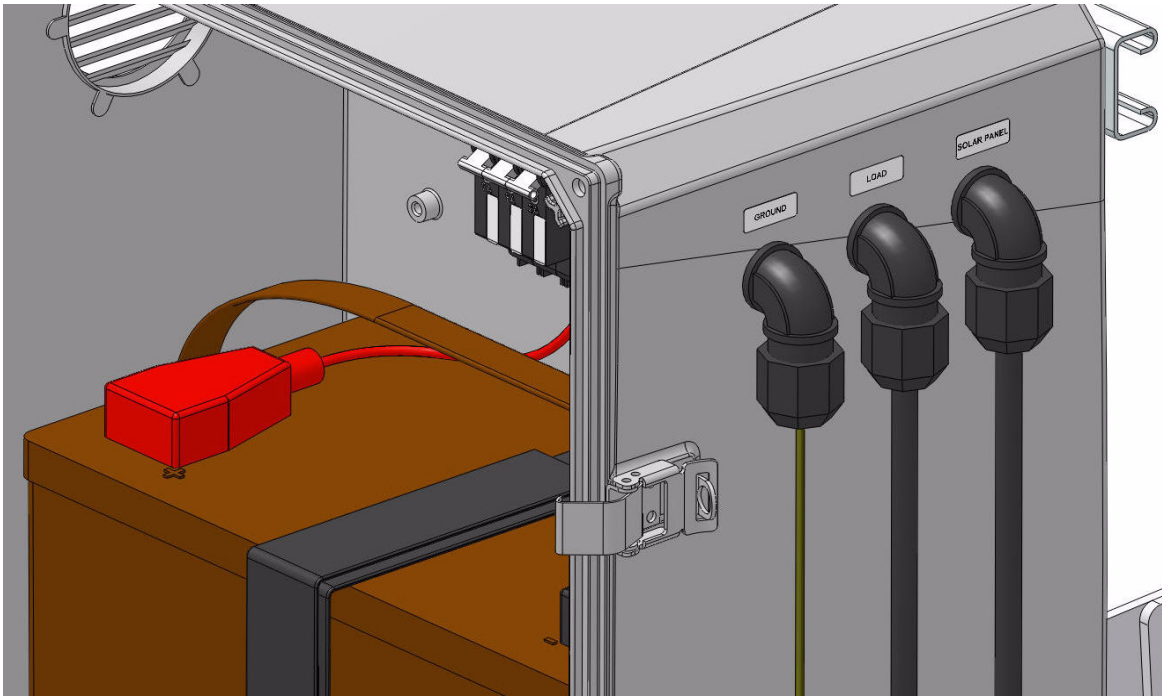


#### HARNESS APPLICATION

### 2.3.6 Luminaire and Photocell Installation

Electrical wiring for the system ground, solar panel, and load exits from the side of the control enclosure. See Figure 12. The L-810 and photocell are connected to the wire labeled "LOAD". See Figure 15.

Figure 12: Control Enclosure External Wiring



2.3.6.1 Mounting the Light

The L-810 light comes with a bottom hub which has a 1" (25.4 mm) NPT port. The L-810 light must be mounted vertically; failure to do so will result in the light not meeting optical requirements.

2.3.6.2 Height Restrictions

The distances listed in Table are the maximum recommended distances from the luminaire to the enclosure with the recommended minimum wire gauge to ensure proper operation of the L-810 luminaire.

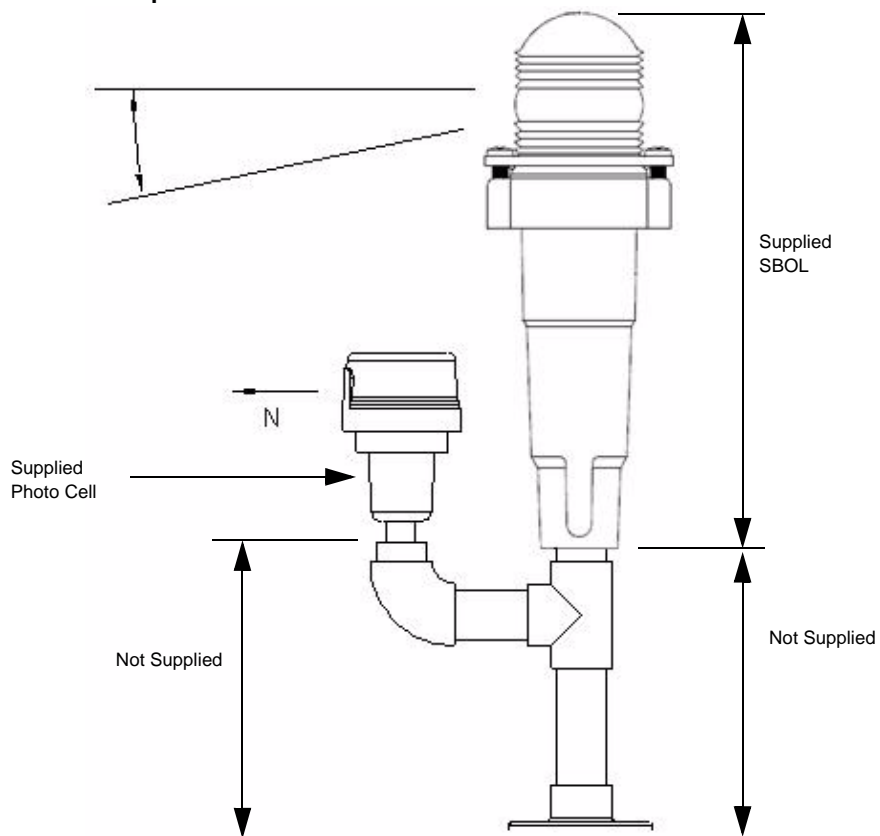
Table 5: Distance and Wire Gauge

Distance between luminaire and enclosure	Minimum wire gauge
375 to 450 ft (114 to 137 m)	#8 (8 AWG)
250 to 375 ft (76 to 114 m)	#10 (10 AWG)
0 to 250 ft (0 to 76 m)	#12 (12 AWG)

### 2.3.6.3 Installing the Photocell

The photocell must be oriented due north in the northern hemisphere. The photocell can be mounted in the same location as the luminaire, but must not block the light from the luminaire. If needed, rotate photocell receptacle so that photocell window does not face artificial light.

**Figure 13: Example of Luminaire and Photocell**

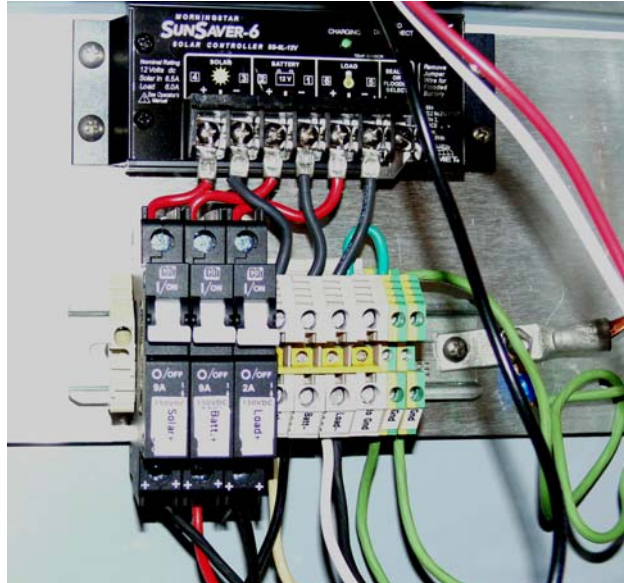


### 2.3.7 Control Panel Wiring

Ensure that the terminal block connections (except the ground terminal) are tightened to 1.67 lb-ft (2.26 N·m). Tighten the ground terminal block connection to 0.6 lb-ft (0.8 N·m).

See Figure 16 for the control panel wiring diagram.

Figure 14:



#### 2.3.7.1 Wiring the Control Panel

1. To avoid equipment damage, ensure all circuit breakers are in the OFF position.
2. Connect the solar module wires to the control panel Solar terminals of the control panel. See Figure 16.
3. Route the L-810 luminaire/photocell wires into the battery and control enclosure using conduit and strain relief connectors. Connect the luminaire/photocell wiring to the LOAD terminals of the control panel; see Figure 16.
4. Connect the bare copper ground wire to the ground terminal on the control panel.

**NOTE:** This product is designed for use with an ADB L-810 luminaire only. Use of any other loads or fixtures may cause a reduction in the number of days of autonomy or lead to system failure which will void the system warranty.



## 2.4 Solar Unit Maintenance



### WARNING

Allow only qualified personnel to perform maintenance, troubleshooting, and repair tasks.

- Only persons who are properly trained and familiar with ADB Airfield Solutions equipment are permitted to service this equipment.
- Disconnect and lock out electrical power.
- Always use safety devices when working on this equipment.
- Follow the recommended maintenance procedures in your equipment manuals.
- Do not service or adjust any equipment unless another person trained in first aid and CPR is present.
- Connect all disconnected equipment ground cables and wires after servicing equipment. Ground all conductive equipment.
- Use only approved ADB Airfield Solutions replacement parts. Using unapproved parts or making unapproved modifications to equipment may void agency approvals and create safety hazards.
- Check interlock systems periodically to ensure their effectiveness.
- Do not attempt to service electrical equipment if standing water is present. Use caution when servicing electrical equipment in a high-humidity environment.
- Use tools with insulated handles when working with electrical equipment.

### 2.4.1 System Check and Start-up

Prior to turning the system on, check all wiring and connections to ensure the wires are correctly placed, the polarities are correct, and wires are secured. Check the attachments of the mounting structure and battery enclosure to the pole or mounting surface.

Energize the system by turning on the circuit breakers in the following order:

1. Battery
2. Solar Panel
3. Load

The green charging LED of the charge controller should turn on. Although the charging current falls to very low levels when the battery reaches full charge, the light will continue to stay on all day. This is to indicate that the controller is working and that energy is available from the solar panel for charging (the light will turn off at night). The Low Voltage Disconnect light should be off. If it is on, indicating the controller is in LOAD DISCONNECT, disconnect the load, and disconnect the battery then reconnect the battery circuit to reset the load relay and turn off the LOW VOLTAGE DISCONNECT light. If the Low Voltage Disconnect light remains on, the battery charge state is low and should be recharged before completing the installation. If the charging light does not turn on at all, refer to the troubleshooting section of the controller manual. Turn on the load equipment as required.

### 2.4.2 Principles of Operation

The L-810 operates automatically with no need for operator interaction under normal conditions. With normal daylight illumination, the solar panel is capable of producing sufficient current to charge the battery. The charging light indicates the battery is being charged by the solar panel.

If the battery discharges to the pre-set load disconnect voltage due to long periods of poor weather, the low voltage disconnect (LVD) relay is activated, the red LED turns on, and the L-810 light is disconnected. Disconnecting the L-810 light prevents battery damage associated with complete discharge of the battery. The Red LED will turn off when the battery recovers to about 50% of its rated capacity and the L-810 light is automatically reconnected.

### 2.4.3 Maintenance of the Solar Unit

Proper maintenance of this system is vital for long term, reliable operation. A quarterly inspection (once every four months) is recommended for the solar panels, battery, L-810 light & photocell and controls.

Maintenance should include a general inspection to check for any wear due to the elements, for example, sun, wind, rain, etc. All connections should be checked to ensure that they are secure.

Depending on local conditions, the solar panels may require periodic cleaning. Solar panels with tilt angles less than 20° may require more frequent cleaning. Dust, if allowed to accumulate, will reduce the power output of the solar panels.

Sealed AGM batteries require no maintenance, but the user should inspect the battery for bulging or cracks.

Check the enclosure and electronic components for signs of water intrusion or condensation damage. No significant water should accumulate in the sealed control compartment.

Annually, all electrical and mechanical connections should be tightened to the proper torque specification, even if they appear sound.

## 2.4.4 Wiring Diagrams and Figure 15: Junction Box and Module Wiring

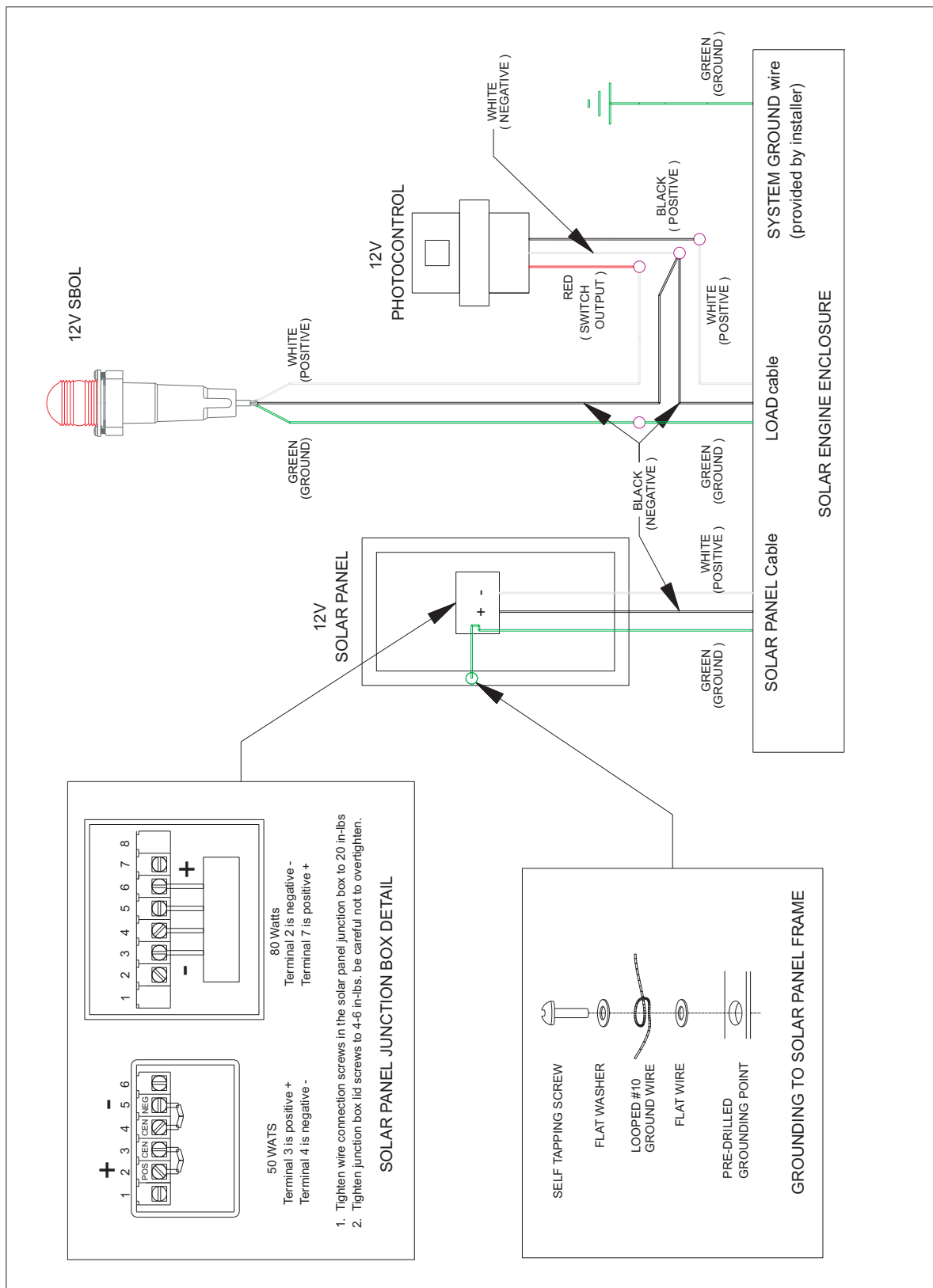
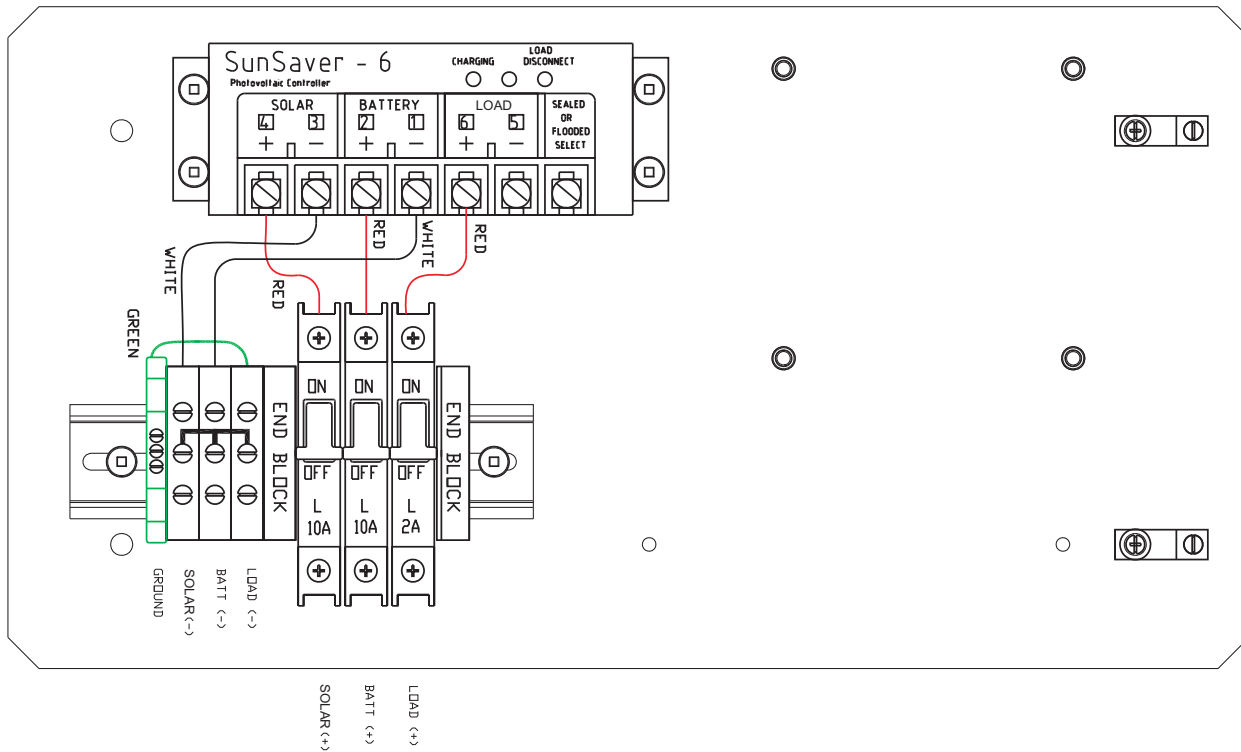


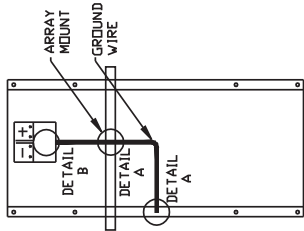
Figure 16: Control Panel Wiring Detail



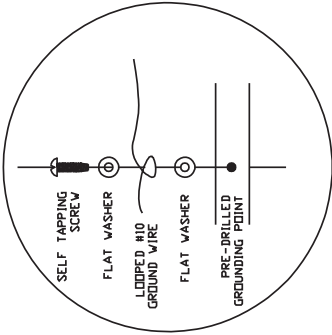
**Notes:**

1. Ensure that the terminal blocks (except ground terminal), circuit breakers and charge controller connections are tightened to 1.67 lbf.ft (2.26 N.M)
2. Ensure that the Ground terminal block connections is tightened to 0.6 lbf.ft (0.8 N.M)

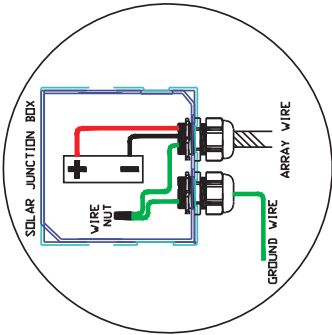
Figure 17: Grounding Kit - 1 module



GROUNDING EXAMPLE ONLY.  
GROUNDING LOCATIONS AND ARRAY LAYOUT WILL VARY



GROUNDING DETAIL A



GROUNDING DETAIL B

1. AS SHOWN IN "GROUNDING DETAIL A", ATTACH GROUNDING WIRE AT ONE POINT TO THE SOLAR MODULE AND AT ONE POINT ON THE SOLAR ARRAY MOUNTING STRUCTURE.
2. MOST SOLAR MODULES HAVE PRE-DRILLED GROUNDING HOLES.
3. MAKE SURE EACH GROUND CONNECTION IS TIGHT.
- NOTES:
1. GROUNDING LOCATIONS AND ARRAY LAYOUT WILL VARY.
2. GROUNDING CODE MAY VARY - CONSULT A PROFESSIONAL.
3. FOR SMALLER SYSTEMS WITH AN ACCESSIBLE SOLAR MODULE JUNCTION BOX REFER TO "GROUNDING DETAIL B".

Figure 18: Battery Wiring and Layout

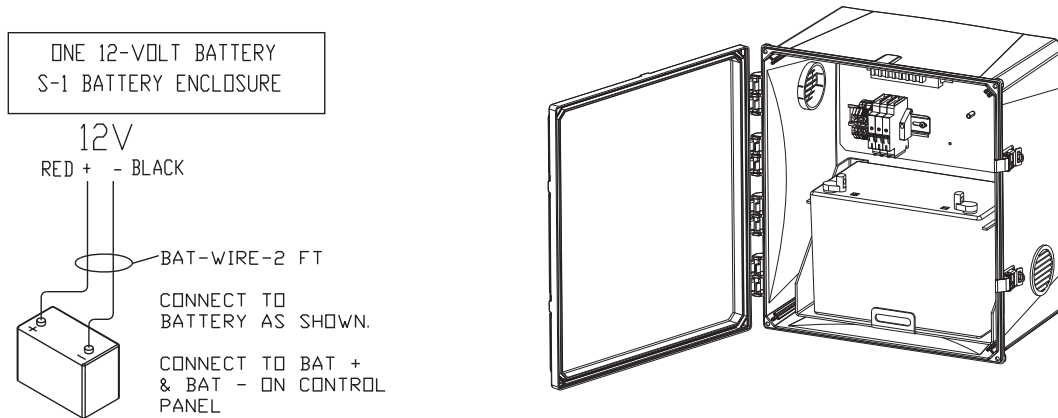
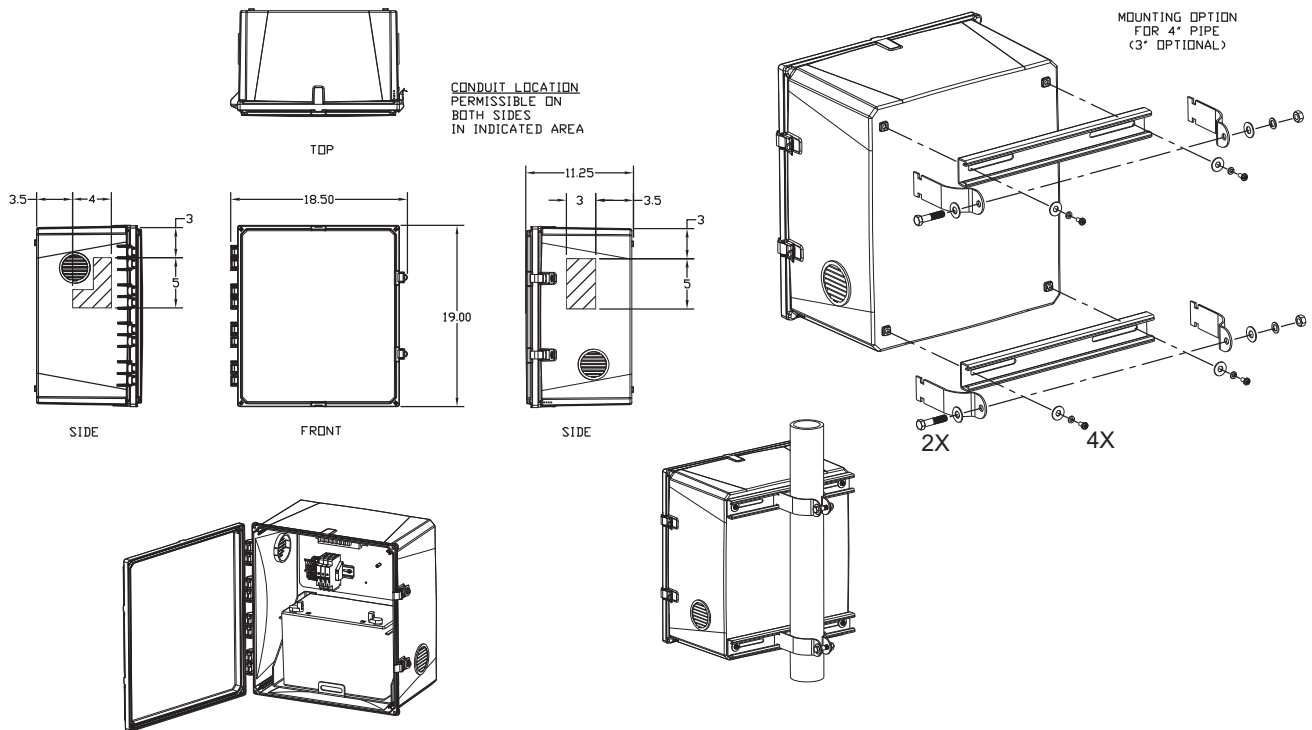


Figure 19: Mechanical Layout of the Battery and Controller Enclosure



NOTE:  
1. MAT'L IS POLYCARBONATE.  
2. APPROX. WEIGHT 14 LBS  
(WITHOUT BATTERY)



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