





## Warnings and Precautions

The following symbols indicate important safety warnings and precautions throughout this manual. They are defined as follows:



**NOTE** suggests optimal conditions under which the equipment will operate effectively and safely, or provides additional information to the reader.



**CAUTION** indicates that damage to equipment may result if the instructions are not followed.



**WARNING** indicates that serious bodily harm or death may result from failure to adhere to the precautions.

## Warranty Disclaimer

This manual will familiarize you with the features, operation standards, and installation of Carmanah's R247-G & R829-G Flashing Beacon series. Failure to comply with the use, storage, maintenance, installation or placement instructions detailed in this manual could void the warranty.

## Standards

Perform all installation, wiring and maintenance in conformance with local building and electrical codes.

## Safety and Usage Precautions



Batteries are shipped fully charged. Use extreme caution when handling the batteries as they are capable of generating hazardous short-circuit currents. Remove all jewelry (bracelets, metal-strap watches, etc.) before handling the batteries.

Solar panels produce DC electricity when exposed to light and can, therefore, produce an electrical shock or burn. To render solar panels inoperative, remove them from sunlight, or fully cover their front surface with an opaque material.

Before lifting any heavy or bulky equipment, ensure the load is secured so moving parts do not shift, and that it can be lifted as far as needed without back strain or loss of grip. Installation may require more than one person.

Ensure the equipment is not powered during installation and wiring of the system.

Recheck all completed wiring for proper polarity prior to energizing the system.



Changes or modifications to Carmanah equipment not expressly approved by Carmanah could void the user's authority to operate the equipment.



R829-G with dual flashing beacons



R247-G with dual flashing beacons

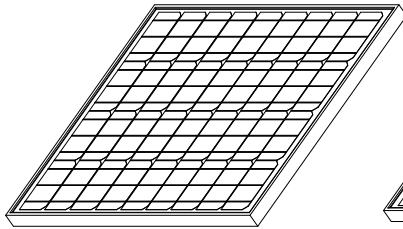
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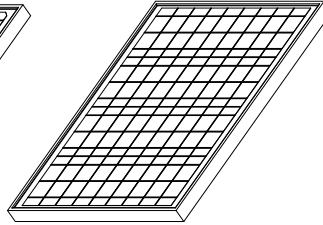


## System Components

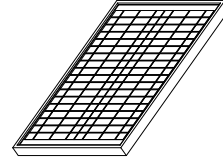
80W Solar Panel



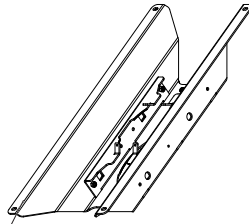
50W Solar Panel



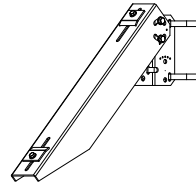
20W Solar Panel



Top of pole mount  
80W or 50W

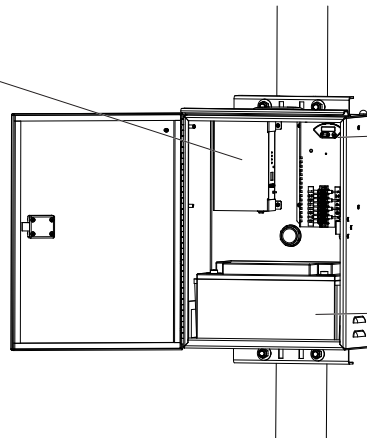


Side of pole mount  
50W or 20W



### Time Switch Options

- FCU-500-070B
- FCU-500-071
- RTC AP22 + Modem
- RTC AP22

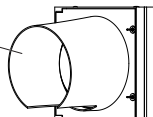


On-Board User Interface (OBU)

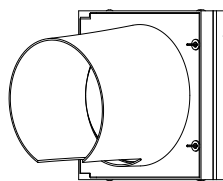
### Battery Size Options

- 33 AHr
- 75 AHr
- 100 AHr

8" Beacon



12" Beacon  
(includes LED module and signal head)





## Introduction

R247-G & R829-G Flashing Beacon products are ideal for a wide range of warning flashing beacon applications.

## Components

The R247-G & R829-G series can be configured to meet a variety of requirements. The following components make up each of these configurations:

- Cabinet, consisting of:
  - Energy Management System (EMS)
  - Terminal Block
  - Battery (33 Ahr, 75 Ahr, 100 Ahr)
- Solar Panel (20W, 50W or 80W)
- Top of Pole Mounting Adaptor for Solar Panel
- Side of Pole Mounting Adapter for Solar Panel
- 8" or 12" Stop or Warning Beacons (Red or Yellow)
- #2 Pelco lock with keys

The solar panel and EMS work together to charge the battery during the day. The EMS controls the flow of power from the battery to the flashing beacons.

## R829-G System Configurations

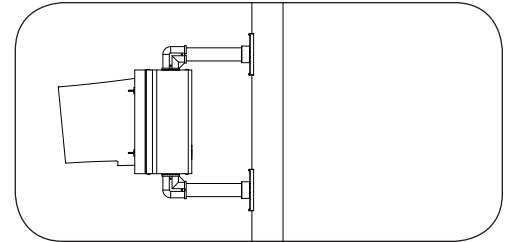
The R829-G series can be configured to use the following time switch options (sold separately). The mount kit is provided by Carmanah at time of order.

1. Applied Information FCU-500-070B Integrated Time Switch & Modem (not available in Florida)
2. Applied Information FCU-500-071 (only available in Florida)
3. RTC AP22 Time Switch & RTC Cellular Modem
4. RTC AP22 Time Switch

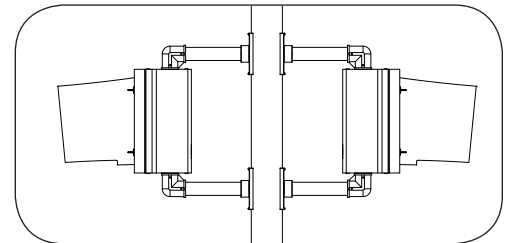
Other time switches may be compatible. Please consult with Carmanah.

## Flashing Beacon Mounting Options

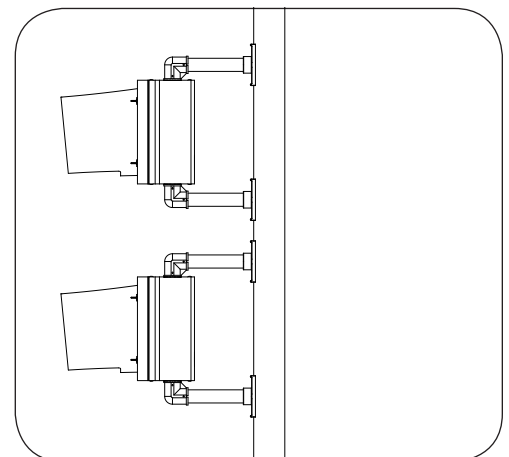
Single Beacon



Dual Horizontal Beacon



Dual Vertical Beacon





## Installation

\* The top of pole and side of pole solar panel mounts are designed to mount to 4.5" Outer Diameter poles only.

\* The cabinet uses a 1 1/4" trade size pipe nipple fitting.

## Summary

Basic steps to install R247-G & R829-G Solar Flashing Beacons:

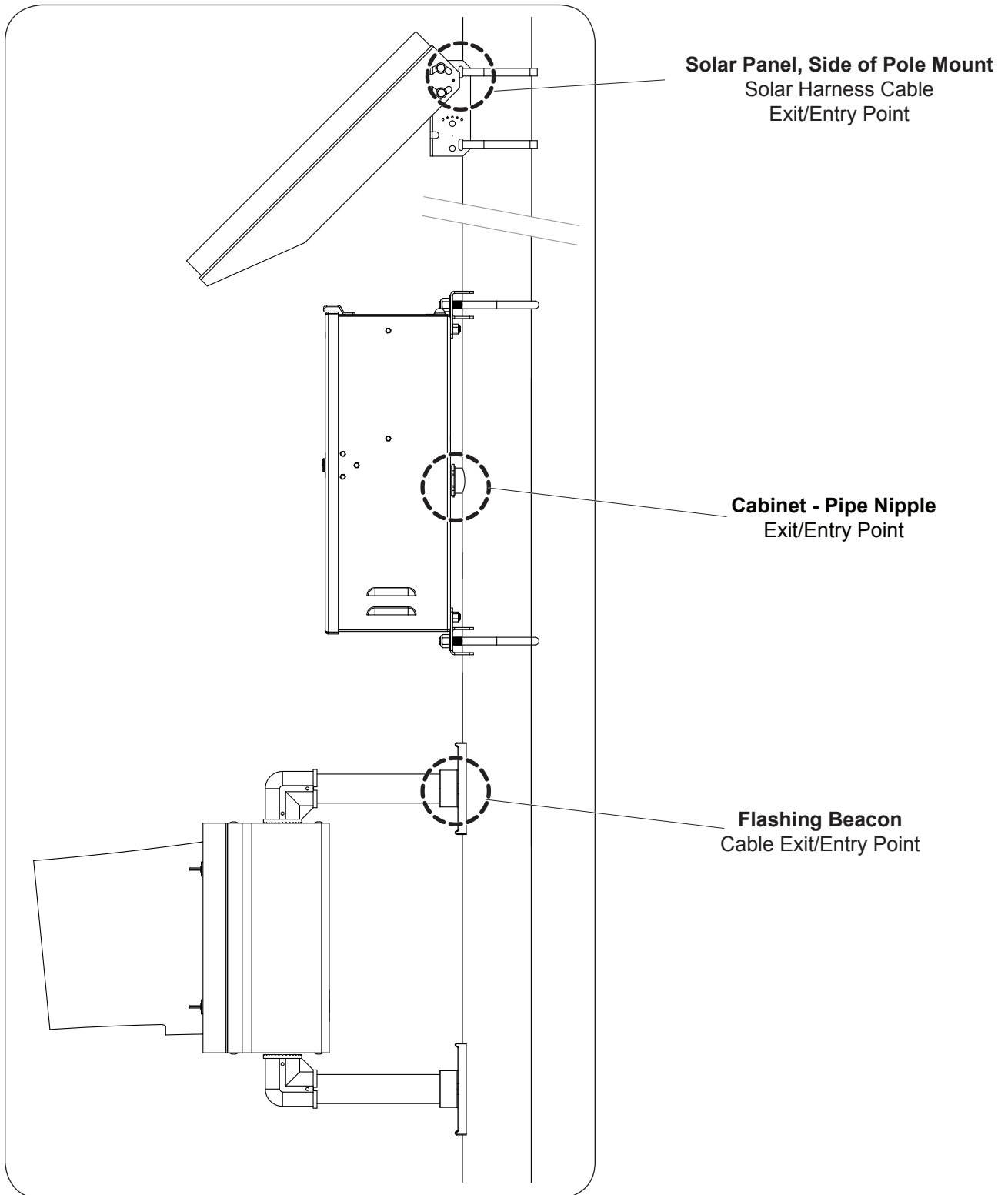
1. Mark the positions of the flashing beacons, cabinet and side of pole mount (if required) onto the pole. Drill the holes for the cable exit/entry points for the flashing beacons, cabinet and side of pole solar panel mount (if required).
2. Feed the solar panel harness through the pole.
3. Mount the solar panel to the pole using the top of pole mount or side of pole mount option.
4. Feed the flashing beacon harness(es) through the pole.
5. Mount the signal head assembly(s) to the pole.
6. Mount the cabinet with the EMS to the pole.
7. Connect the solar panel and flashing beacon harness(es) to the terminal block.
8. Place the battery into the cabinet, connecting the battery harness.
9. Close and lock the cabinet.



## Step by Step Instructions

1

Mark the positions of the flashing beacon(s), cabinet and side of pole solar panel mount (if required) onto the pole. Drill the holes for the cables and pipe nipple exit/entry points as shown below.

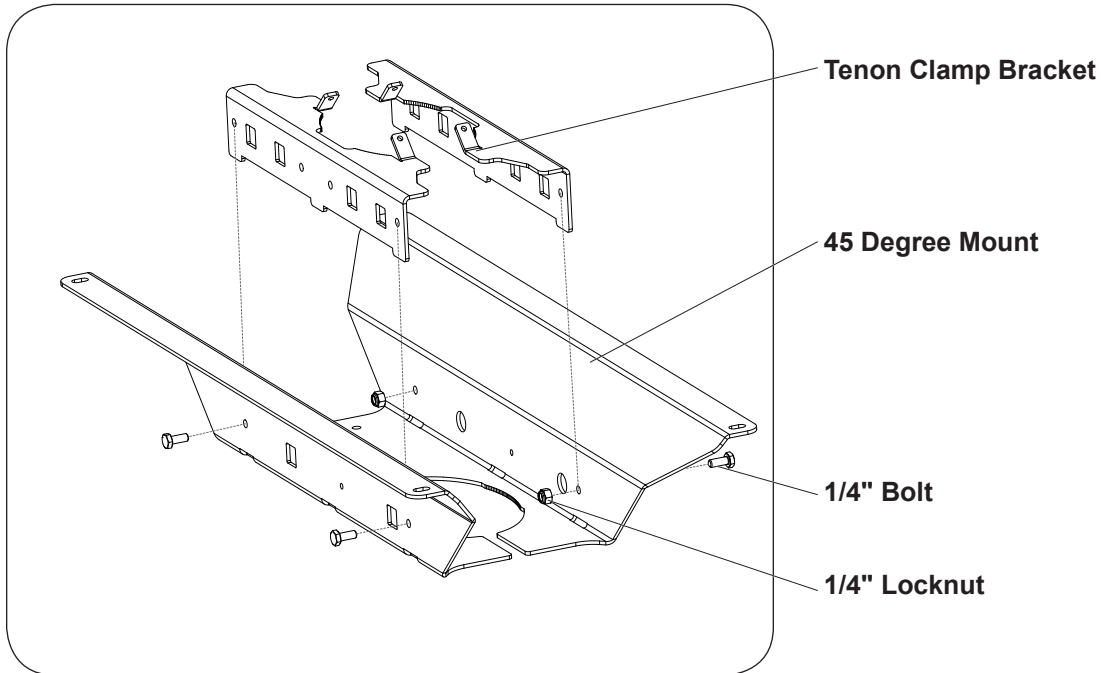




## Step by Step Instructions

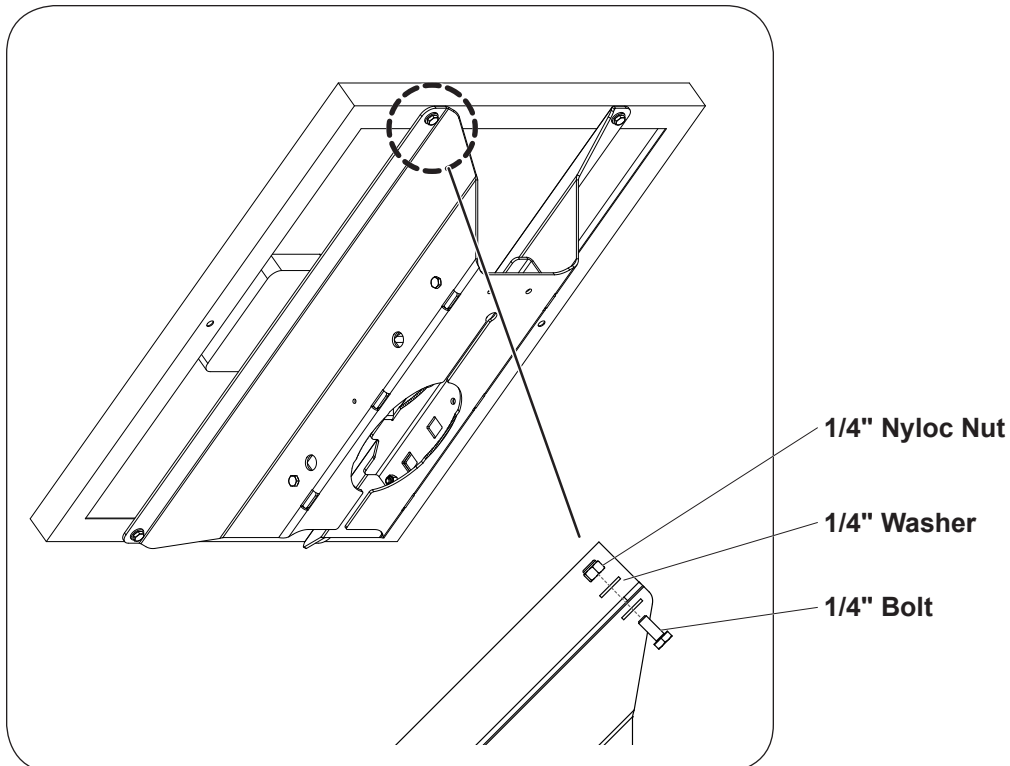
2

For **top of pole mount**, attach the tenon clamp brackets to the 45 degree mount. Use the 1/4" bolts and 1/4" locknuts supplied. Tighten the nuts and bolts securely.



3

Attach the solar panel (80W or 50W) to the 45 degree mount. Use the 1/4" Bolts, 1/4" Washers and 1/4" Locknuts supplied. Tighten the nuts and bolts loosely - **DO NOT FULLY TIGHTEN** at this stage.

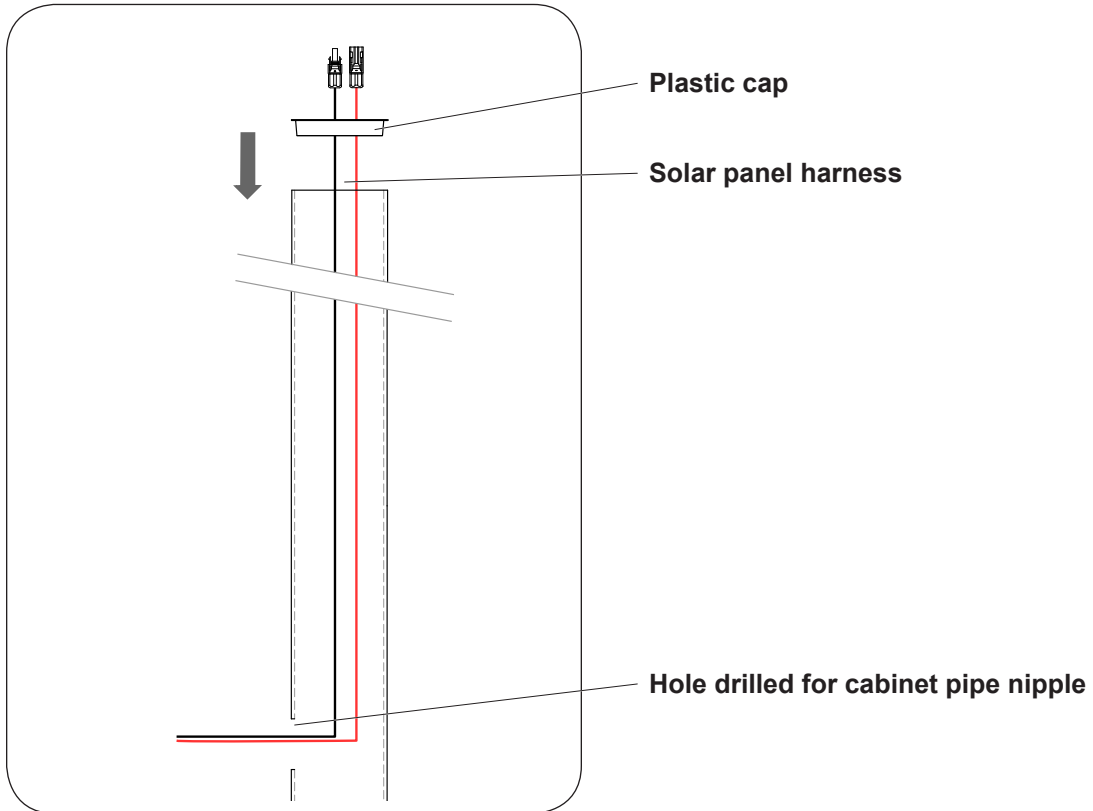






4

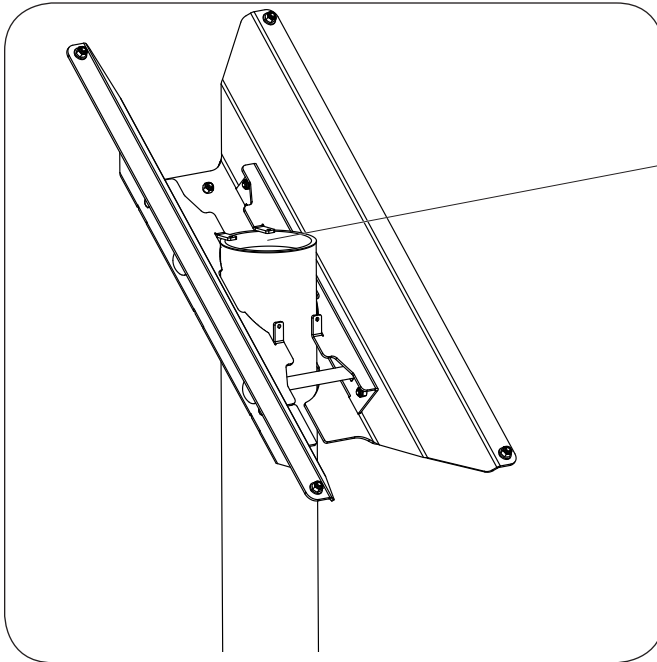
Feed the solar panel harness through the plastic cap, down the pole and through the hole drilled for the cabinet pipe nipple.





5

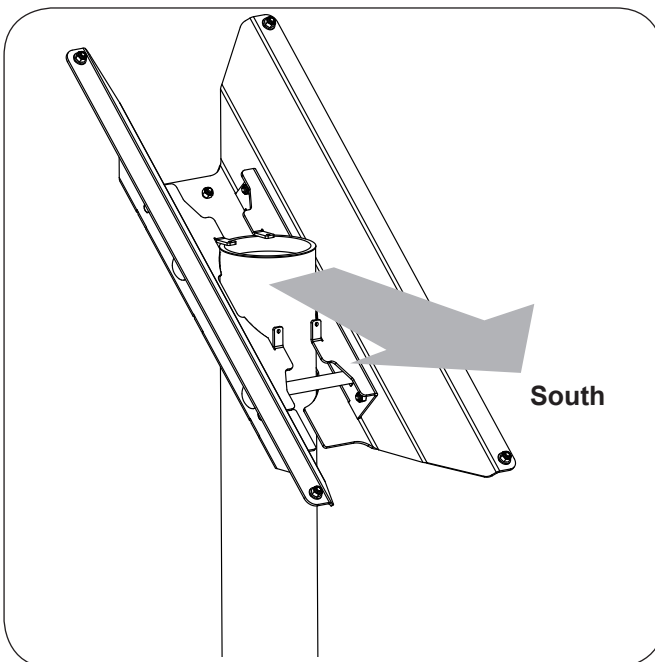
Lower the solar panel and top of pole bracket down onto the pole, make sure the panel mount sits securely on the top of pole cap, as shown below (solar panel removed for illustration purposes).



Top of pole, cap

6

Orient the mount so it is facing the equator (pointing South if you are in the Northern hemisphere).

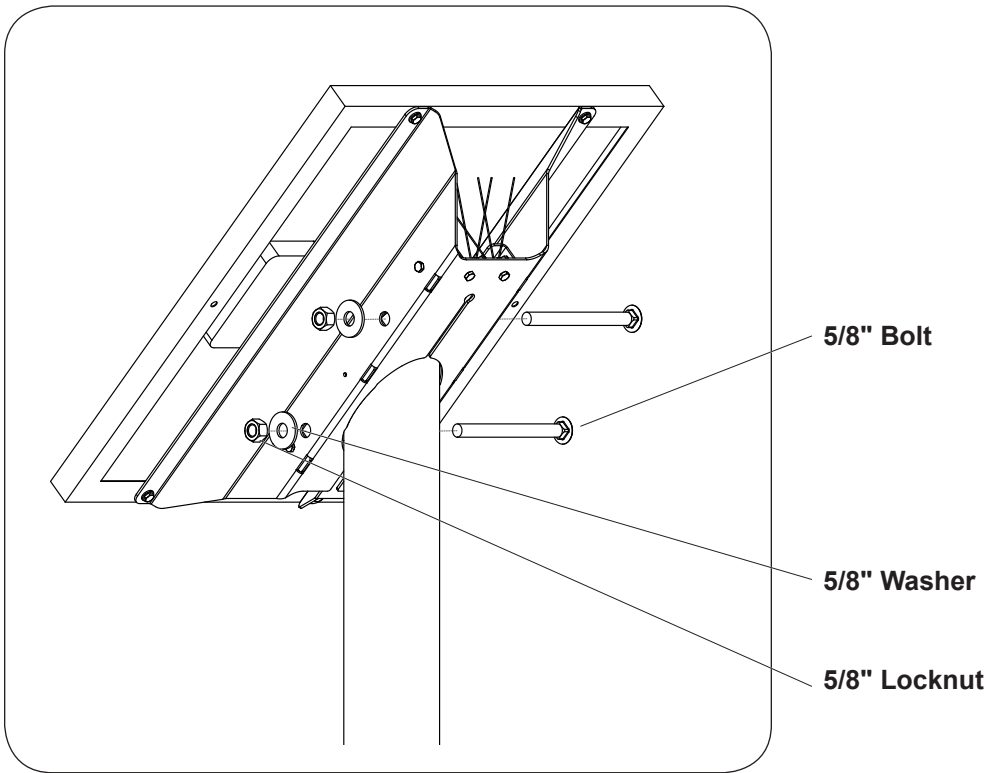


South



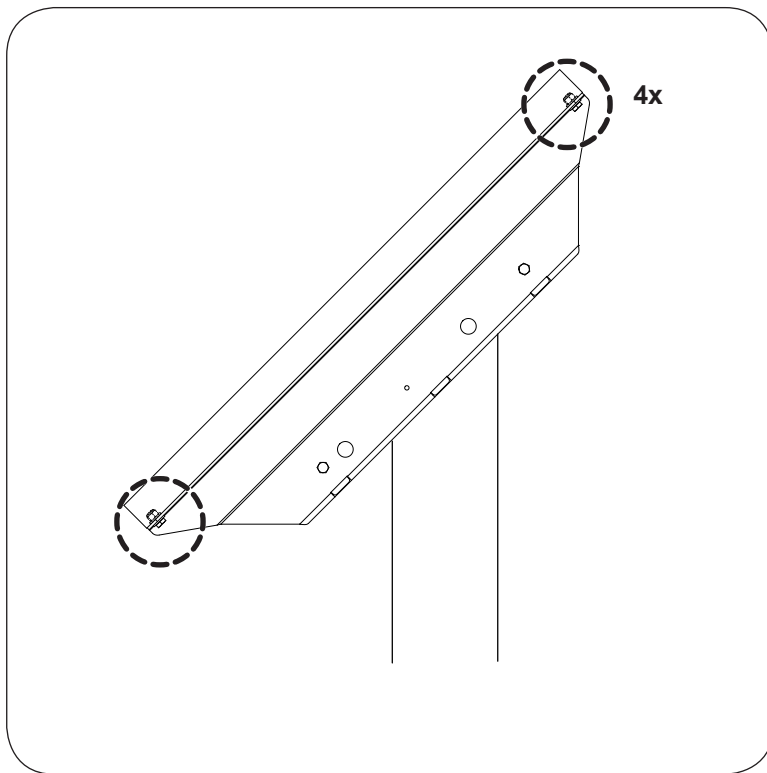
7

Use the 5/8" locknuts, bolts & washers to secure the top of pole bracket to the pole.



8

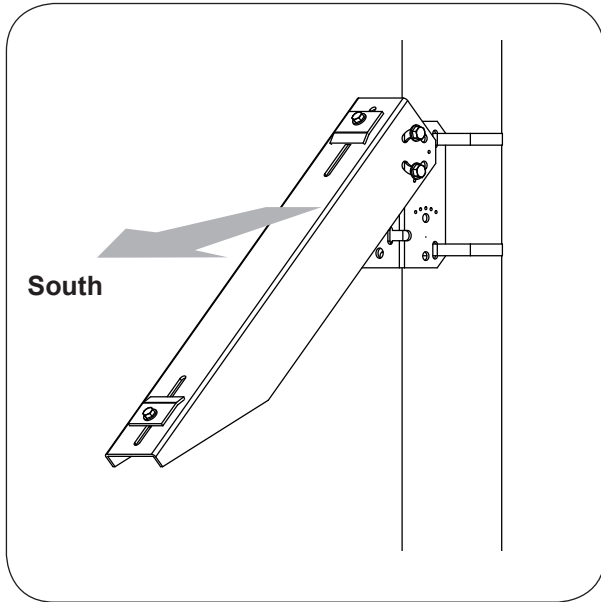
Fully tighten the four nut and bolt assemblies securing the solar panel to the top of pole mount bracket.





9

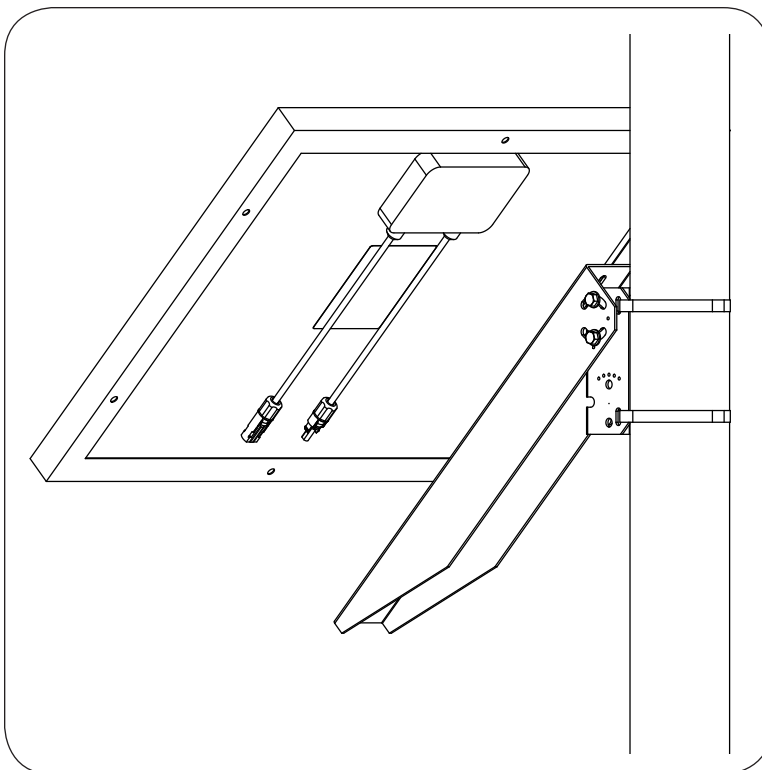
For **Side of Pole Mount**, orient the mount so it is facing the equator (pointing South if you are in the Northern hemisphere). Secure the mount to the pole using stainless steel banding. Note: The side of pole mount must be used in the 45° angle only.



Torque to 11.1 ft lbs (15.05 Nm) for 150 mph (241 km/h) wind zones.

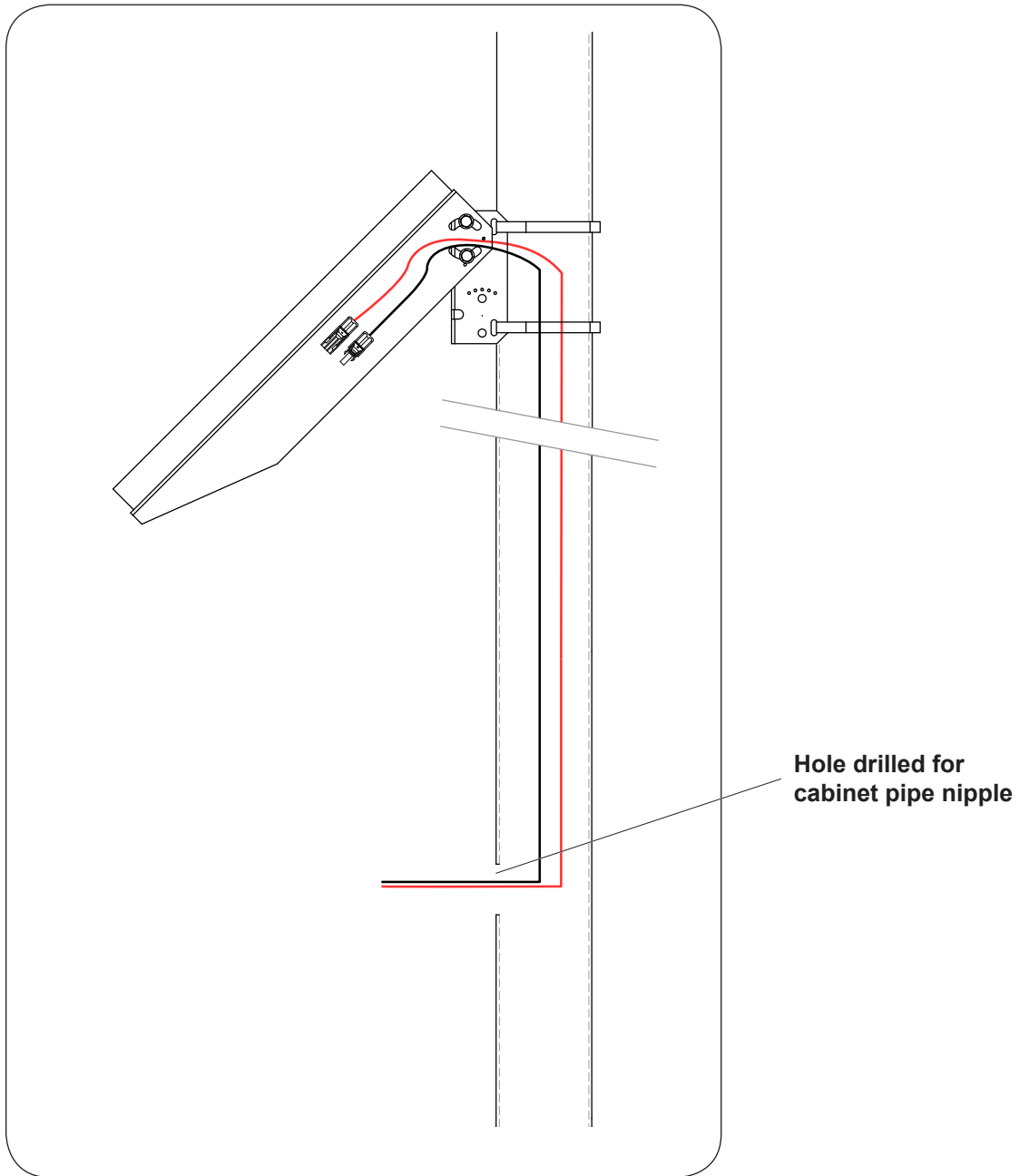
10

Attach the solar panel (50W or 20W) to the mount using the direct bolt option or using the clamps provided with the side of pole mount kit.





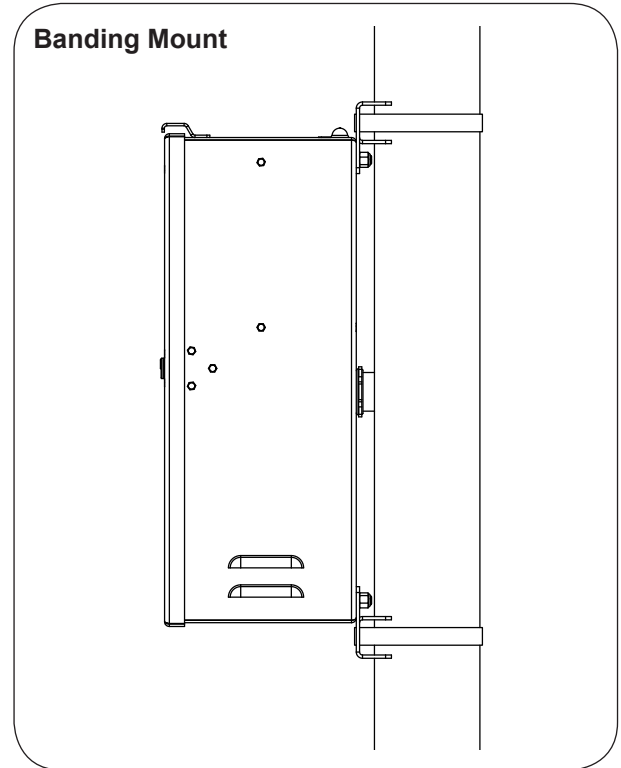
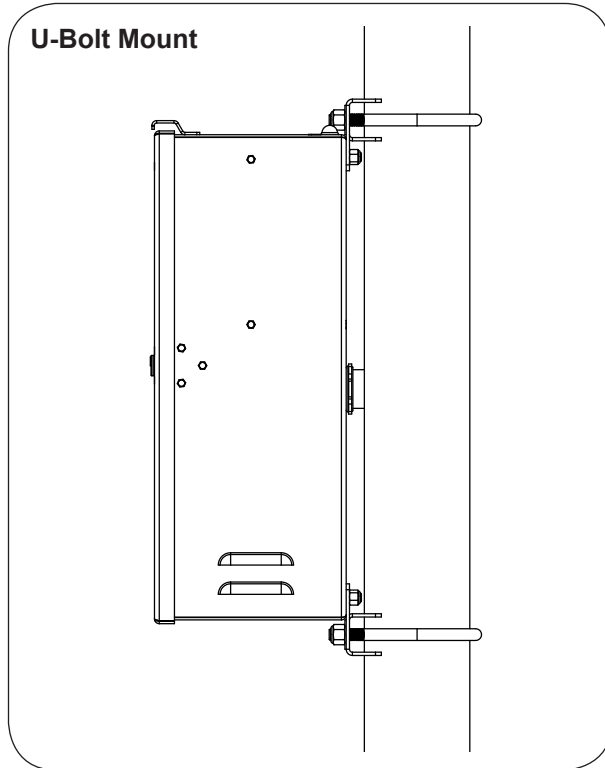
- 11 Feed the solar panel harness through the previously drilled hole, down the pole and through the hole drilled for the cabinet pipe nipple. Seal the hole at the solar panel mount with appropriate sealant.





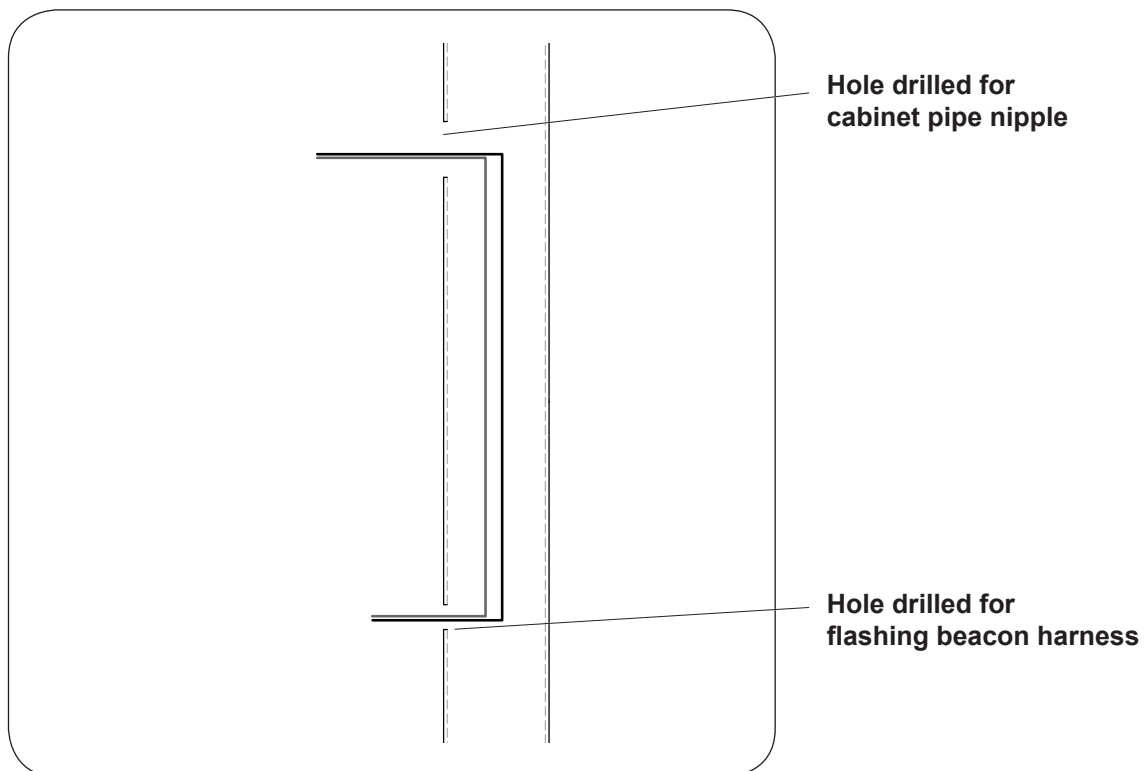
12

Feed the solar panel harness and flashing beacon harness(es) through the cabinet pipe nipple, then securely attach the cabinet to the pole using the U Bolt Mount Kit (optional) or 1/2" 301 stainless steel (cold worked) banding (not supplied).



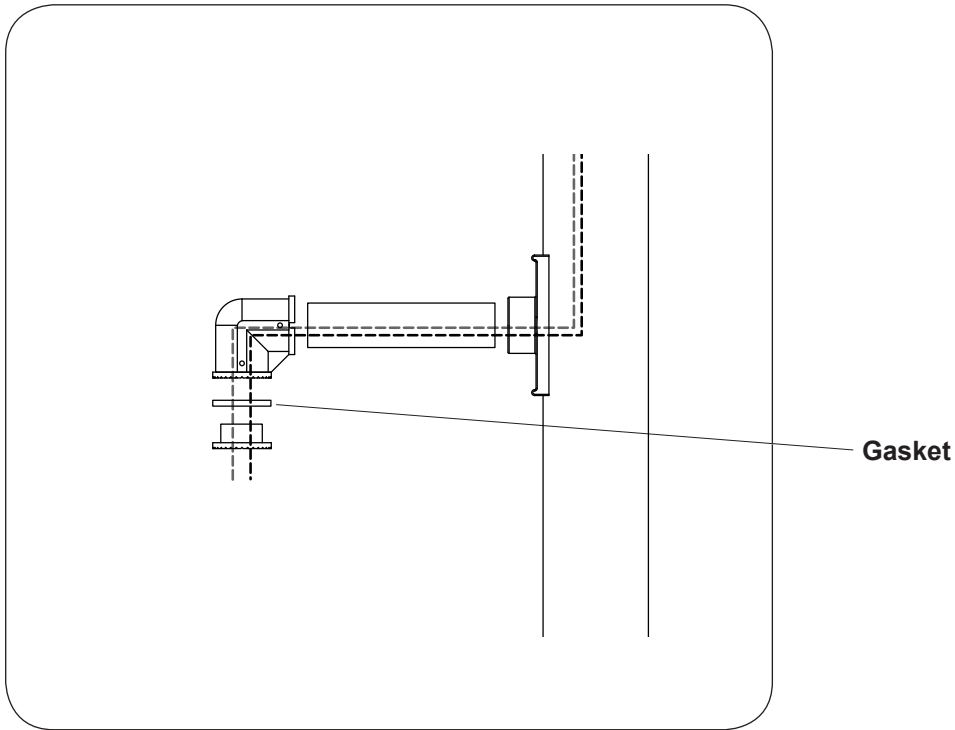
13

Feed the flashing beacon harness(es) through the cabinet pipe nipple.

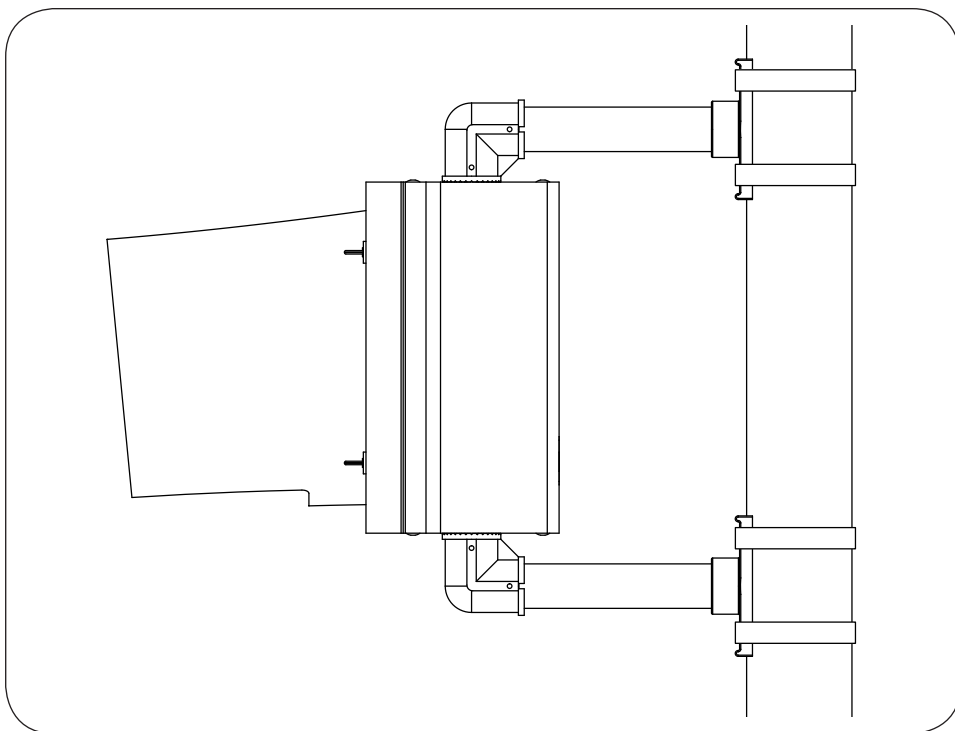




- 14 Thread the flashing beacon harness through the beacon arms. Then, mount the top flashing beacon arm to the pole using stainless steel banding or bolts (not supplied).

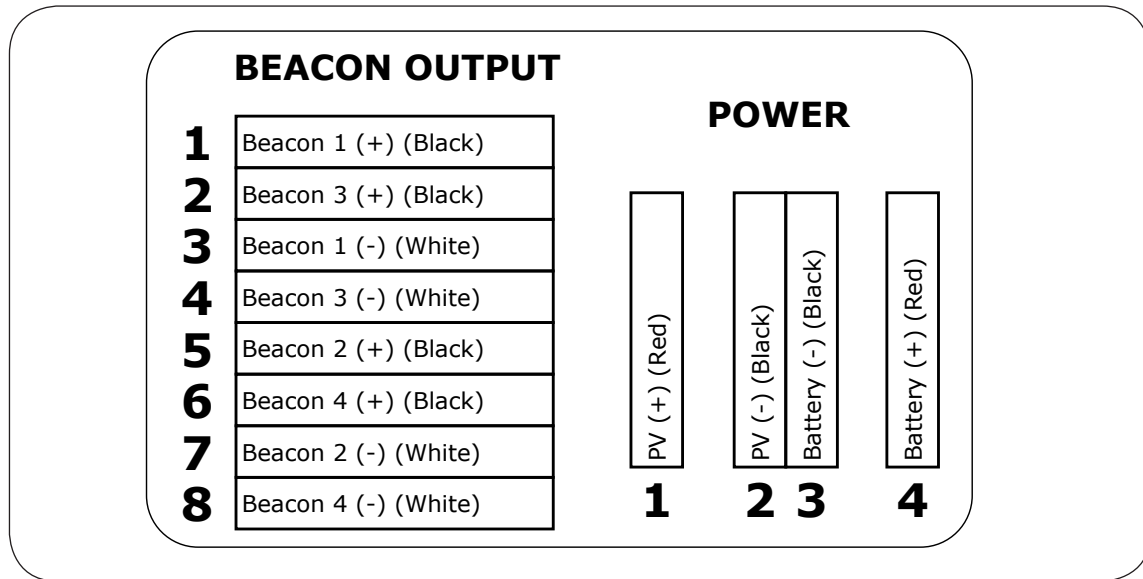


- 15 Connect the flashing beacon harness to the terminal block inside beacon housing. Complete the flashing beacon assembly and attach the bottom arm mount to the pole using stainless steel banding or bolts (not supplied).





16 Connect the solar panel harness and flashing beacon harness(es) to the correct terminal block labels as detailed in the diagram below



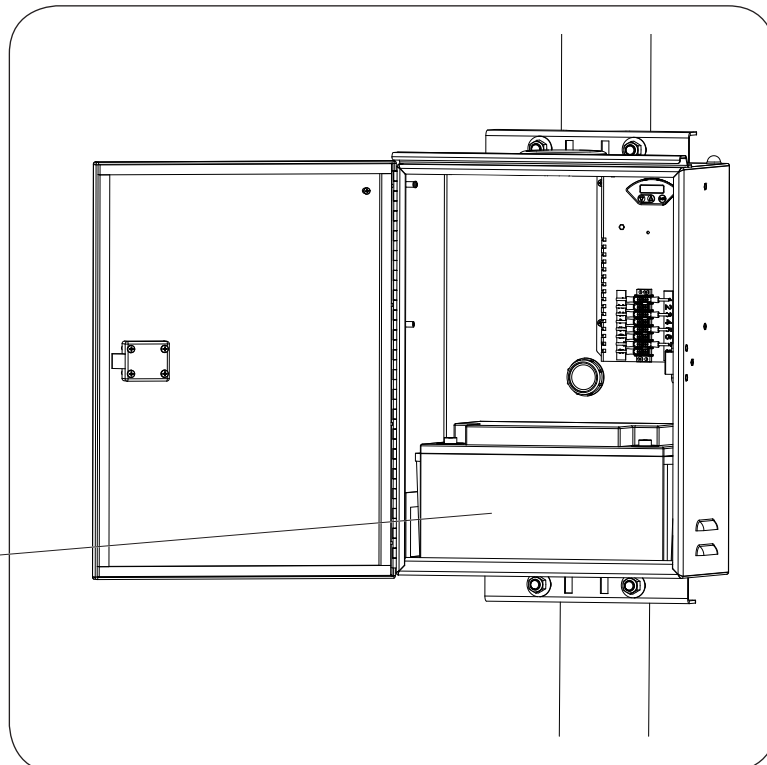
17 Install the battery, connecting each battery terminal to the correct polarity: red to red (positive), black to black (negative).



ELECTRICAL SHOCK HAZARD

**NOTE**

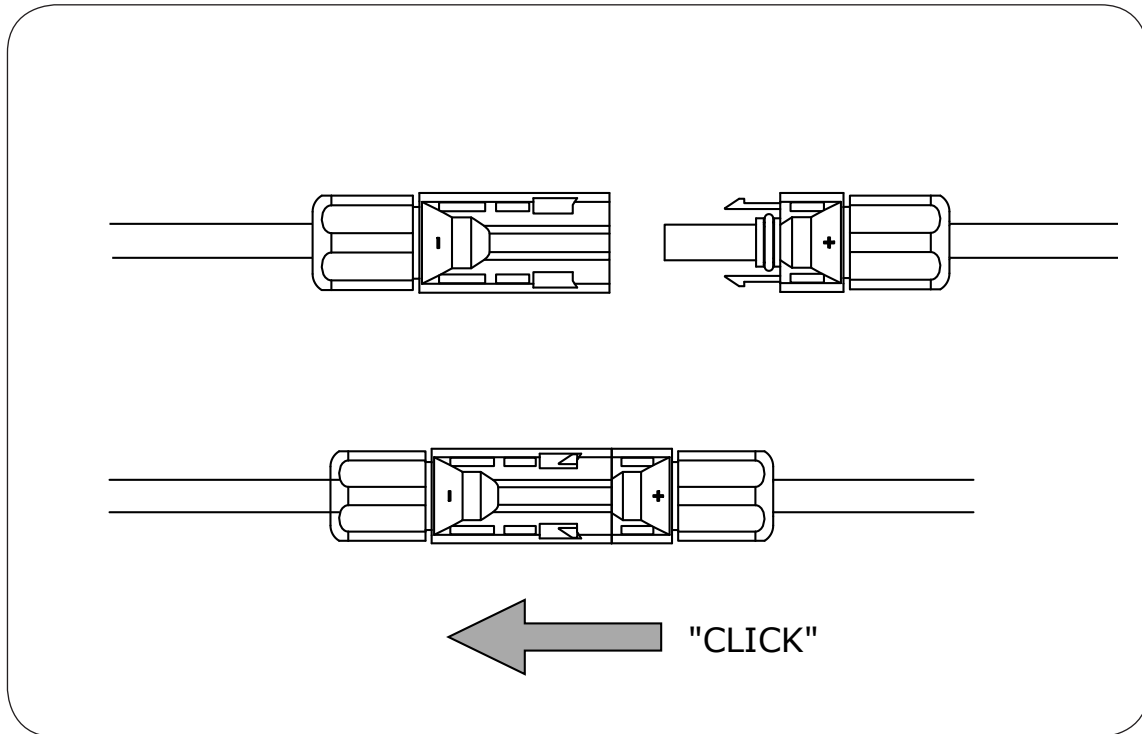
Battery should be installed with the terminals facing outward.







- 18 Connect the solar power harness to the solar panel.

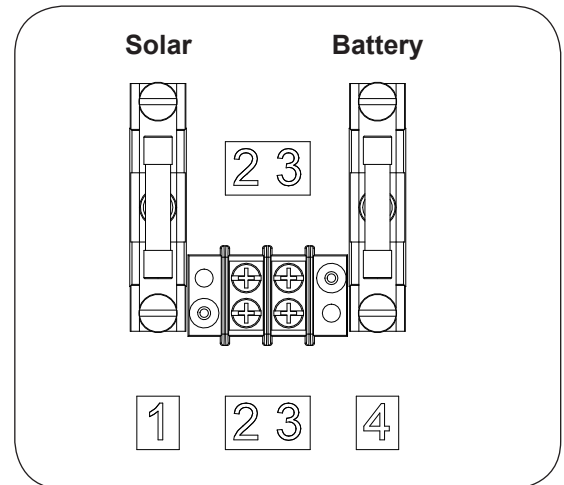


- 19 Close and secure the cabinet door. As the door gasket gets older and compresses, or if the door ever seems loose, you can adjust the latch to keep the door secure.

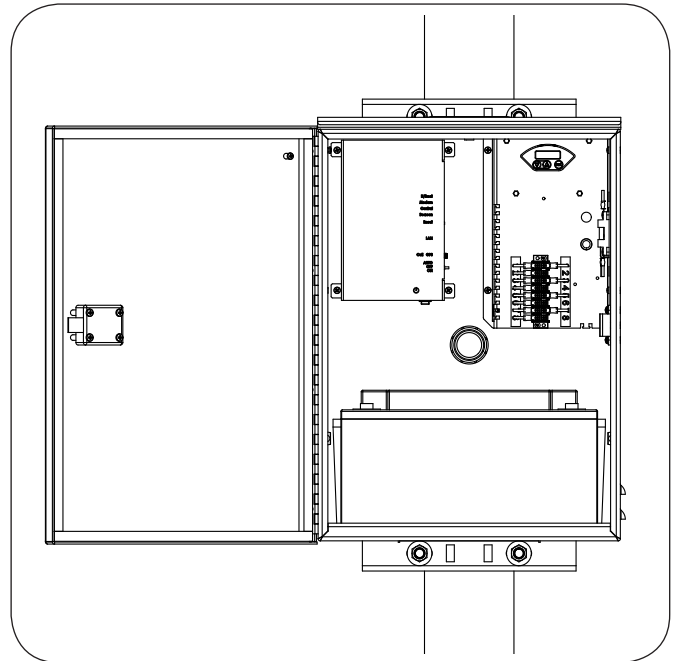
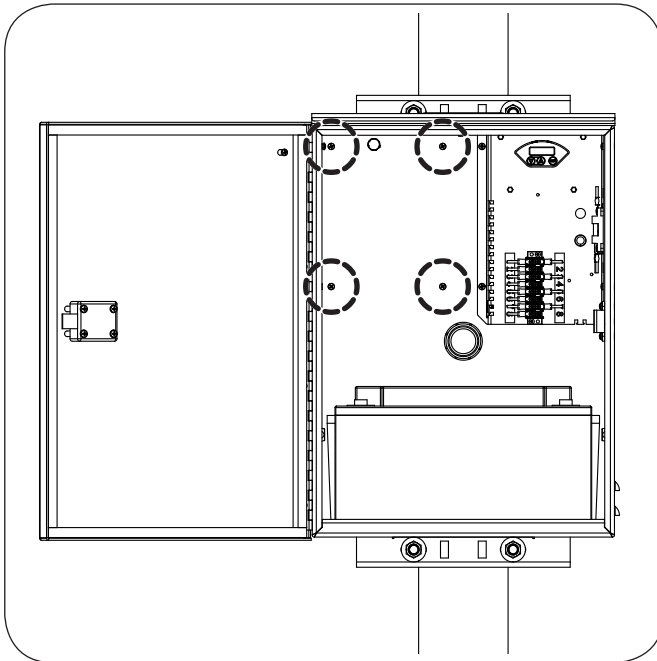


## Applied Information FCU-500-070B and FCU-500-071 Time Switch Installation

01 Remove the solar panel fuse, followed by the battery fuse.

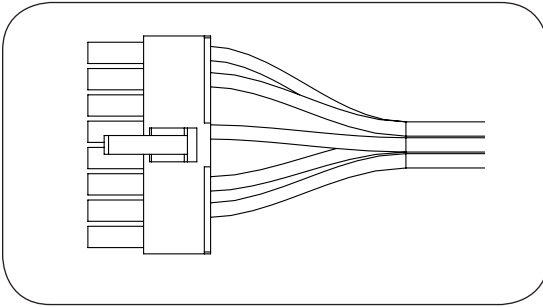


02 Remove the four screws shown below. Install the time switch, aligning the four holes with the threaded standoffs on the back of the cabinet. Install the four screws and tighten securely.

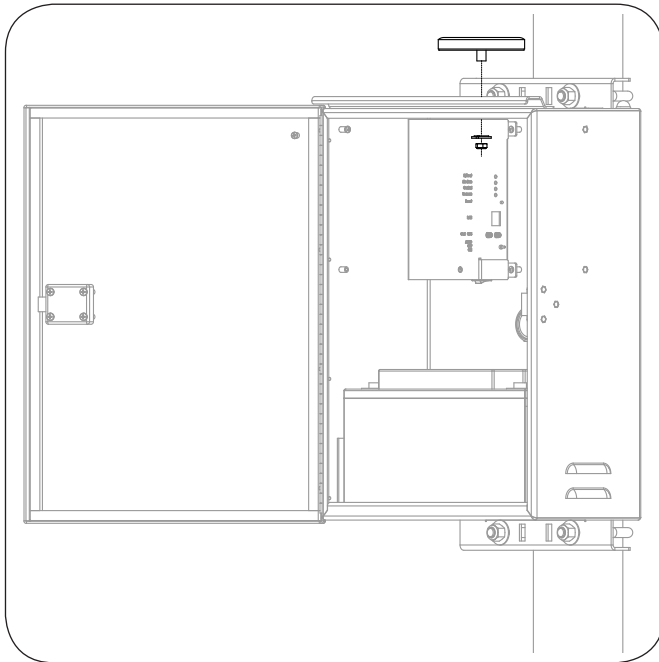




- 03 Locate the time clock harness connector (factory installed) and plug it into the bottom of the time clock.



- 04 Install the antenna in the hole in the top of the enclosure, removing the backing tape from the gasket if present. Install and tighten the antenna nut on the inside of the cabinet.



- 05 Noting the labels on the antenna harness and time switch, plug the antenna connectors into the corresponding connectors on the time switch.

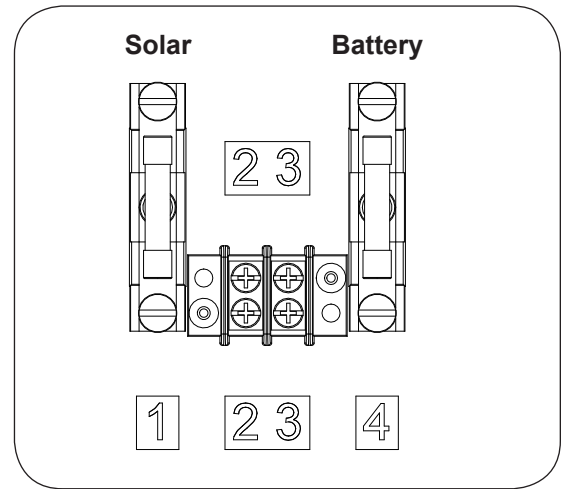
- 06 Use the supplied tie wraps and adhesive bases to secure the harnesses. Install the battery fuse and then the solar panel fuse.

- 07 Configure the time switch by following the manufacturer's instructions. Close the cabinet door - ensure it latches snugly and isn't loose - adjust latch as required.

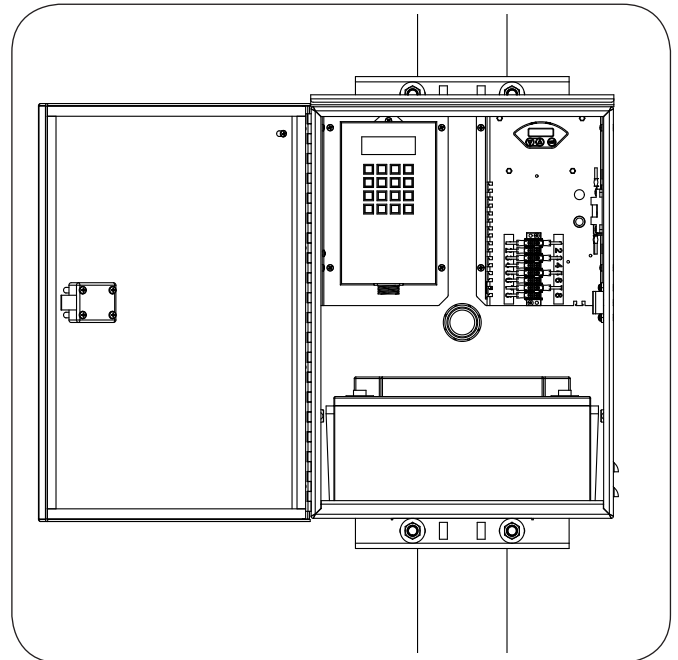
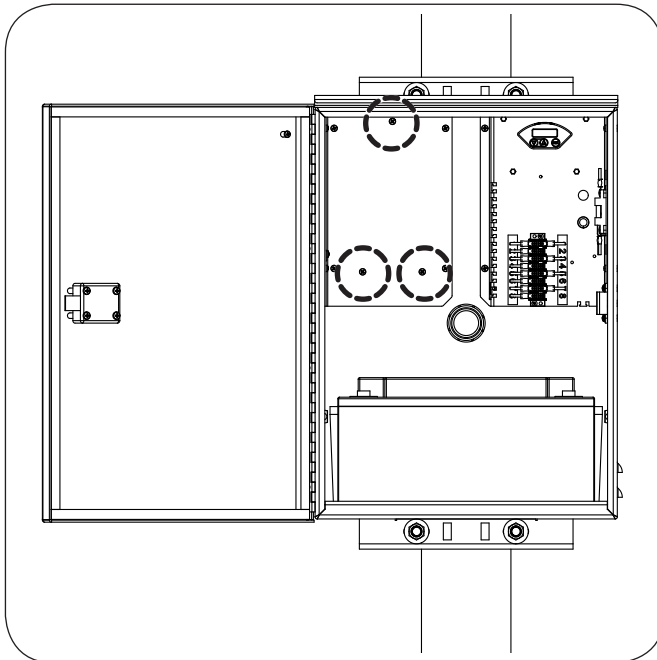


## RTC AP22 (+ Modem) Time Switch Installation

01 Remove the solar panel fuse, followed by the battery fuse.



02 Remove the two bottom screws from the time switch mounting bracket. Loosen the top screw on the time switch mounting bracket. Align the keyhole at the top of the time switch with the top screw on the mounting bracket and install the time switch.



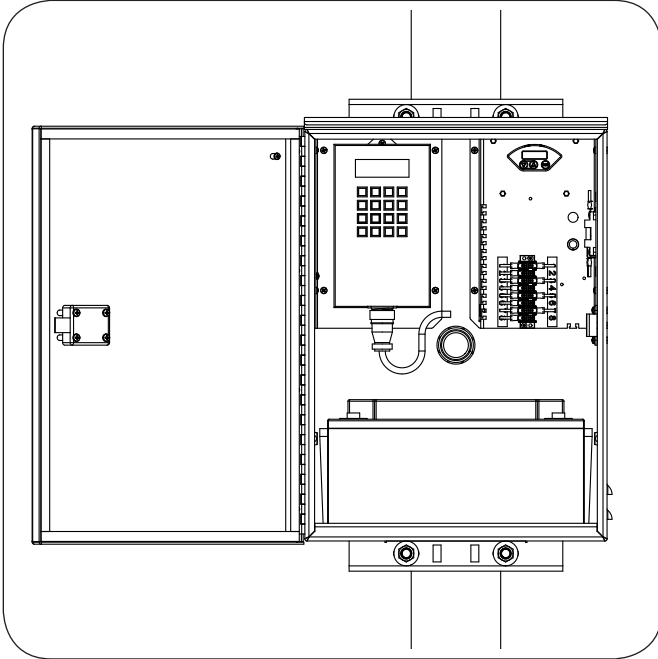
03 Remove the two screws from the front of the AP22 unit and open the unit. Align the two internal holes in the time switch with the mounting bracket holes and install the two remaining bracket screws.

04 Tighten the three screws holding the time switch to the bracket. Reassemble the front of the time switch and tighten the two front screws.



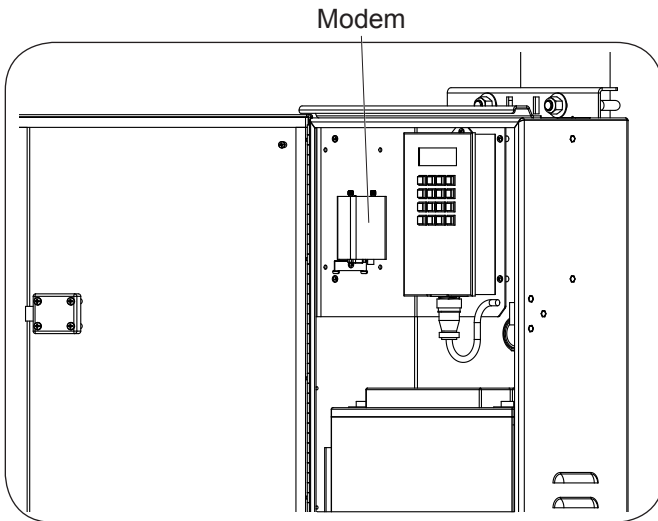
05

Locate the time clock harness connector (factory installed) and plug it into the bottom of the time clock.



06

Install the antenna in the hole in the top of the enclosure, removing the backing tape from the gasket if present. Install and tighten the antenna nut on the inside of the cabinet.



07

Install the modem to the left side of the cabinet with the one screw supplied, noting the labels on the antenna harness and time switch. Plug the antenna connectors into the corresponding connectors on the time switch.

08

Use the supplied tie wraps and adhesive bases to secure the harnesses. Install the battery fuse and then the solar panel fuse.

09

Configure the time switch by following the manufacturer's instructions. Close the cabinet door - ensure it latches snugly and isn't loose - adjust latch as required.



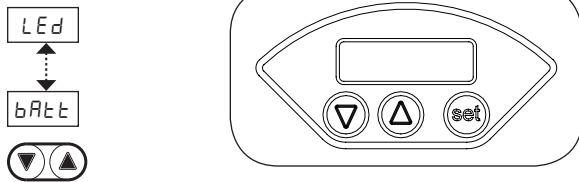
## EMS Programming and Testing

The Energy Management System (EMS) has several programming functions and settings. These are accessed through the On-Board User Interface (OBUI). This section discusses the various functions, settings and operation.

### EMS Onboard User Interface Operation

The EMS OBUI has three buttons to navigate and change settings and activate functions as required. The up button, down button and set button are used to scroll through menus, access and change settings, and accept new settings.

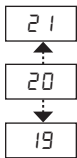
Use the up and down buttons to scroll through the menu.



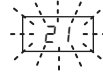
Press and hold the set button to edit a setting. The display will blink when the setting is ready to edit.



Use the up and down buttons to adjust the setting when in edit mode.



Press and hold the set button to accept the new setting. The display will flash 3 times to indicate the setting has been accepted.



### Functions and Settings

The functions and settings are accessed through the OBUI via a menu system. On the next page is the menu hierarchy and a description of the function or setting.

**NOTE**

Only these items in the menu system are adjustable settings: tYPE, LoAd, nItE, FLAS, tEnP, FACT, blSt



<p>Use Arrow buttons to scroll through the menu.</p> <p>tYPE FACT</p> <p>▼ ▲</p>	<p>Press and hold the Set button to edit a setting. Display will blink when ready to edit.</p> <p>10</p> <p>Set</p>	<p>Use Arrow buttons to adjust the setting.</p> <p>20 15 10</p> <p>▼ ▲</p>	<p>Press and hold the Set button to accept new setting. Display will flash 3 times.</p> <p>20</p> <p>Set</p>	<p>Adjustable settings: <b>tYPE, LoAd, nItE, FLAS, tEmP, FACt, bISt</b></p> <p><b>See manual for more details.</b></p>
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Any adjustments to factory brightness settings will void battery warranty. Contact Carmanah.

**ALERT!**

<p>LEd</p> <p>SHrt oPEn</p>	<p><b>LEd:</b> LED flasher fault alert. Only appears if there is a problem with the LED flasher(s).</p> <p><b>SHrt:</b> LED flasher is shorted.</p> <p><b>oPEn:</b> LED flasher has an open circuit.</p>
<p>bAtt</p> <p>gOod chAr Lo bAd</p> <p>00.00</p>	<p><b>bAtt:</b> Battery status and voltage.</p> <p><b>gOod:</b> Battery is charged.</p> <p><b>chAr:</b> Battery requires charging.</p> <p><b>Lo:</b> Battery has very low voltage.</p> <p><b>bAd:</b> Battery needs replacing.</p> <p><b>00.00:</b> Battery voltage.</p>
<p>SoLr</p> <p>nItE dAY</p> <p>00.00</p>	<p><b>SoLr:</b> Solar sensor status.</p> <p><b>nItE:</b> Solar sensor is not detecting light (nighttime).</p> <p><b>dAY:</b> Solar sensor is detecting light (daytime).</p> <p><b>00.00:</b> Solar panel voltage.</p>
<p>tYPE</p> <p>r247</p>	<p><b>tYPE:</b> Product operation</p> <p><b>r247:</b> 24/7 operation.</p> <p><b>r829:</b> Time switch operation.</p>
<p>LoAd</p> <p>1</p>	<p><b>LoAd:</b> Factory Set Number of LED Signals</p> <p><b>1:</b> LED signals range from 1 to 4</p>
<p>nItE</p> <p>30</p>	<p><b>nItE:</b> Nighttime dimming level.</p> <p><b>30:</b> Percent of daytime level set to 10, 30 or off</p>
<p>FLAS</p> <p>Uni</p>	<p><b>FLAS:</b> Flash: Select the desired flash pattern.</p> <p><b>Uni:</b> Unison or Alternating.</p>
<p>tEmP</p> <p>rEd</p>	<p><b>tEmP:</b> Temperature: Select the color of the bulb attached to the system.</p> <p><b>rEd:</b> The temperature options are Red, Yellow, Off.</p>
<p>FACt</p> <p>20</p>	<p><b>FACt:</b> Factory Set LED brightness depending on solar location.</p> <p><b>20:</b> LED brightness range from 20mA to 700mA</p>
<p>bISt</p> <p>YES no</p>	<p><b>bISt:</b> Built in system test.</p> <p><b>YES:</b> Activates the built-in system test.</p> <p><b>no:</b> Skips the built-in system test.</p>
<p>vEr</p> <p>0000</p>	<p><b>vEr:</b> Firmware version number.</p> <p><b>0.0.0.0:</b> The firmware version number.</p>



## System Testing

### **Built-in System Test**

The OBUI has a built-in system test function (bISt, see previous section). Activating this function through the OBUI, as described in the previous section, performs the system test. After the test completes, it will display any errors or 'PASS' if no error is detected. **Note:** No error codes available for time switch errors.

Possible errors include:

Code	Error
0002	Severe temperature detected
0004	Onboard processor has failed
0008	Battery issue detected
0010	There is a problem with the supply voltage
0020	Keypad failure detected
0040	Internal communication failure
0080	There is a problem with the ambient brightness sensor
0100	There is a problem with the charging circuit
0200	There is a problem with the flashing beacons

## Maintenance & Product Care

The R247-G & R829-G solar systems are designed to operate reliably for years with virtually no need for maintenance. Carmanah recommends routine inspections of the solar panel to ensure that they are unobstructed by anything that may prevent effective solar charging, including:

- dirt and dust
- snow
- leaves
- debris
- shade that may have developed after installation due to adjacent plant growth.

The frequency of the inspections depends on location and local weather patterns. A yearly visual inspection of the R247-G & R829-G is typically sufficient. The R247-G & R829-G are designed to be maintenance free; however, maximum system performance will be achieved when the LED lenses and solar panels are clean.

## Fuse Replacement

A wiring fault during installation or maintenance can sometimes cause the battery and/or solar panel fuses to blow. To replace the fuse:

1. Make sure you're not wearing any metal jewelry, or holding any tools or other conductive objects.
2. Disconnect the batteries.
3. Check all wiring for any faults that may have caused the fuse to blow.
4. Check the fuse.
5. Replace blown fuse - Type: 3AG 1/4" x 1-1/4", Ratings: 15A-125VDC.

## EMS Replacement

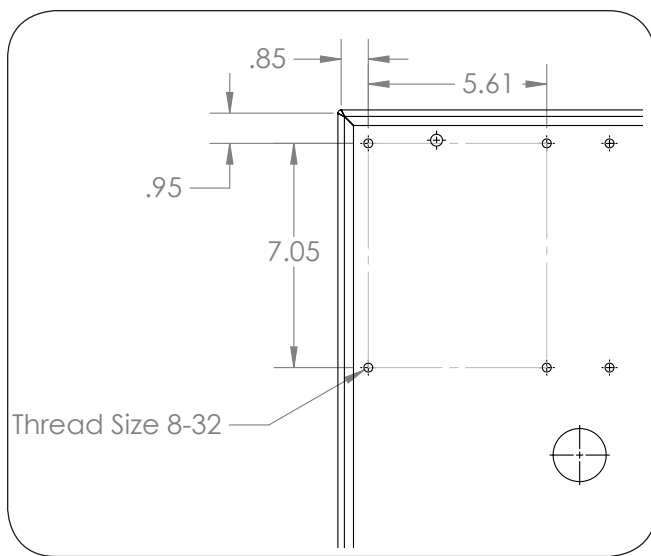
1. Open cabinet, and cover solar panel if working in bright sunlight.
2. Disconnect the battery.
3. Remove the 4 screws securing the EMS PCB (Energy Management System Printed Circuit Board) enclosure.
4. Review the wire positions on the existing EMS. Photograph the existing setup if necessary.
5. Remove the wires from all terminal block connectors by pressing the wire release button with a small screwdriver or other suitable small tool to pull the wires out of the connectors. Remove the solar panel wires last. Insulate the solar panel wires with tape. The solar panel wires may still have voltage on them that could damage the electronics if they make contact with the circuit board.
6. Remove the 4 screws securing the EMS to the metal housing and set the EMS aside.





7. Remove the new EMS from its antistatic bag and secure it to the metal housing with the 4 screws previously removed.
8. Beginning with the solar panel wires, check that the wire strands are straight and that all of the strands will go into the terminal. This will avoid short circuits. Twist the wire strands as necessary to keep the strands together.
9. Reconnect the solar panel power wires in the correct polarity as they were originally found. The wire can be pushed directly into the terminal without use of a tool. If this seems difficult, the terminal can be opened with the help of a tool as before.
10. Reconnect the remaining wires as they were originally found.
11. Secure the EMS enclosure into the cabinet with the supplied screws.
12. Reconnect and reinstall the battery and remove any coverings from the solar panel.

## Factory Standard Mounting Points



## Battery Replacement

When the R247-G & R829-G system's battery requires replacement, it is recommended that the equivalent R247-G & R829-G battery be used. If there is more than one system at the installation site, it is recommended to replace all the batteries at the same time.

When installing a new battery, press and hold the Set button on the EMS as you insert the battery fuse. Continue to hold the Set button until Zero is displayed briefly on the display. This resets the unit Battery Pack health monitor. Do not hold the Set button while reconnecting a used battery.



Battery replacement procedure should not be carried out in windy conditions. In all cases, the area at the base of the pole must be roped off to prevent potential injury from falling components.

## EMS and Battery Recycling

Production of the EMS required the extraction and use of natural resources. The EMS may contain substances that could be harmful to the environment or human health if improperly handled at the product's end of life. In order to avoid release of such substances into the environment and to reduce the use of natural resources, we encourage you to recycle the EMS in an appropriate way that will ensure most of the materials are reused or recycled appropriately. Check your local municipality for electronics recyclers.

All lead acid batteries can be recycled. Please ensure used batteries are properly recycled. Check your local municipality for battery recycling. When in doubt, please contact Carmanah directly with any recycling questions.



## Troubleshooting

Symptom	Possible Cause - What to Check
The EMS does not activate, does not display any information, or the system does not activate.	<p>This is typically caused by low or no voltage from the batteries.</p> <p>Check both of the fuses. See the maintenance section of this manual for fuse information.</p> <p>Using a volt meter, measure the battery voltage. It should have a reading of 12.0 V or greater. If the voltage is very low, charge or replace the batteries and monitor the system for proper operation. Ensure that the solar panel is clean, clear of debris, and is not shaded by buildings or vegetation. If the solar panel is covered or shaded, this will prevent proper battery charging. Once the batteries have proper voltage, check the EMS for error codes and run the 'bISt' function. See the 'EMS Programming and Testing' section of this manual.</p> <p>Check solar panel polarity at the terminal block.</p>
The flashing beacon will not flash	<p>This can be caused by either a wiring issue, low battery voltage, or the unlikely event of an EMS failure.</p> <p>Check the wiring to the flashing beacon and make sure the wires are not pinched anywhere along their length. Also check the correct polarity is observed.</p> <p>If the EMS is in 'r829' mode check the time switch configuration.</p> <p>Check the OBUI for errors. See the 'EMS Programming and Testing' section of this manual.</p>
The flashing beacons are dim when flashing	<p>The battery voltage may be too low. Check the OBUI and battery voltage. See the 'EMS Programming and Testing' section of this manual. Ensure that the solar panel is clean, clear of debris, and is not shaded by buildings or vegetation. If the solar panel is covered or shaded, this will prevent proper battery charging.</p> <p>Check for debris covering the ambient light sensor on top of the solar engine. Check the OBUI Solar (SoLr) setting to ensure it is detecting light ("dAY" not "nItE").</p> <p>Check the factory set flashing beacon brightness setting (FACT). Consult Carmanah prior to changing this setting as the flashing beacon brightness is set based on the solar location.</p> <p>See the 'EMS Programming and Testing' section of this manual.</p>
The flashing beacons appear too bright when flashing	<p>Settings on the EMS can affect the apparent brightness of the flashing beacons.</p> <p>See the 'EMS Programming and Testing' section of this manual.</p>

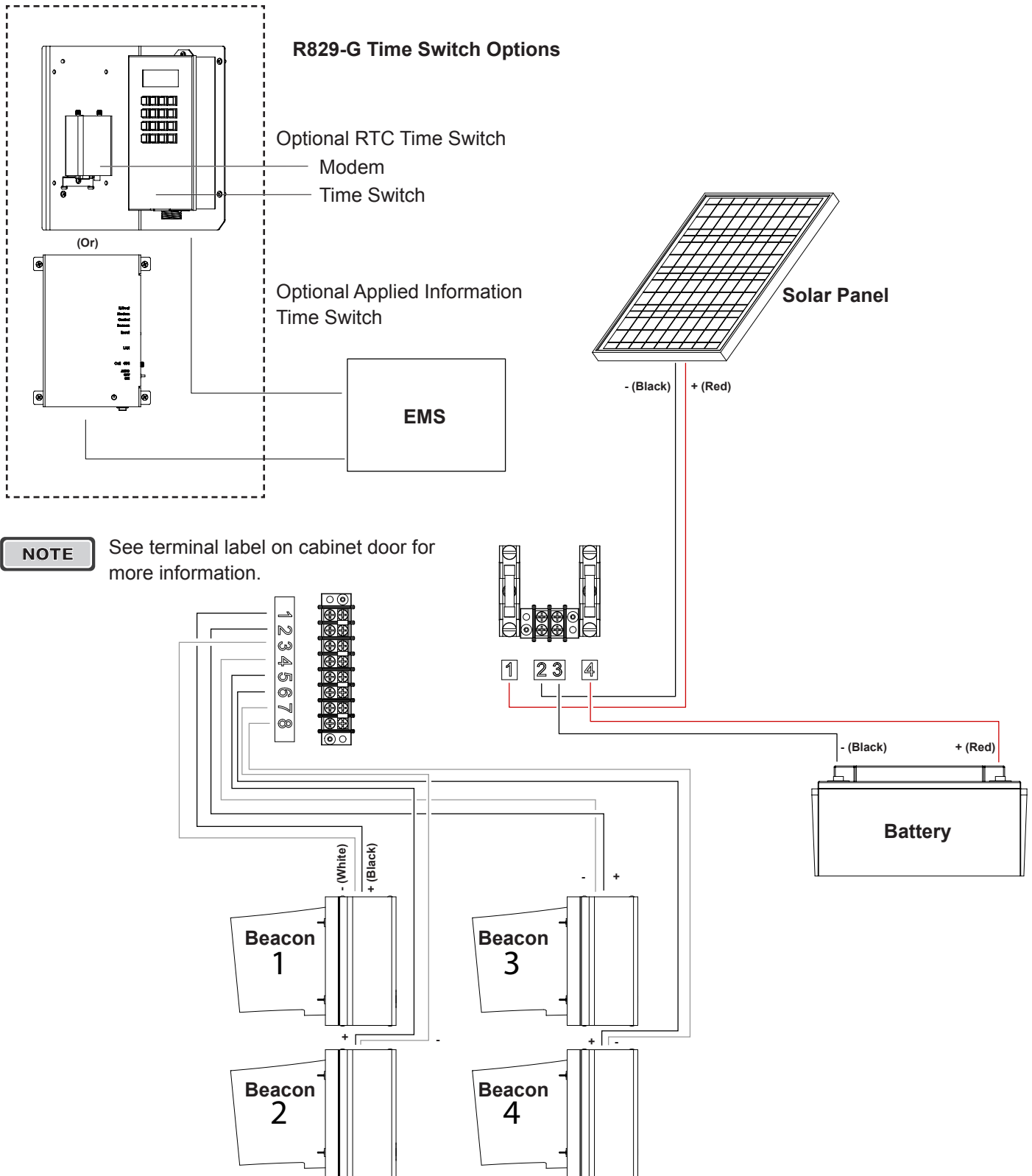


## Specifications

Mechanical Specifications			
<b>Cabinet Outer Dimensions</b>			
	<b>Width</b>	16" (399 mm)	
	<b>Depth (not including mount)</b>	8" (208 mm)	
	<b>Height</b>	21" (534 mm)	
	<b>Weight</b>	39.6 lbs (18 kg) without battery	
Electrical Specifications			
<b>System and Battery</b>			
	<b>System and battery voltage</b>	12V (nominal)	
	<b>Battery capacity</b>	33 Ah, 75 Ah, 100Ah	
	<b>Battery quantity</b>	1	
<b>Overcurrent Protection</b>			
	<b>Fuse</b>	2 x 15 A	
	<b>Type</b>	Type: 3AG 1/4" x 1-1/4", Ratings: 15A-125VDC	
<b>Solar Charge Controller</b>			
	<b>Type</b>	Maximum Power Point Tracking (MPPT) 3 stage temperature compensated	
<b>Solar Panel</b>			
<b>Power</b>	20 W	50 W	80W
<b>Voc</b>	21.6V	21.9V	22.8V
<b>Vmp</b>	17.5V	18.4V	18.4V
<b>Imp</b>	1.14A	2.72A	4.35A
<b>Isc</b>	1.21A	2.88A	4.60A
<b>Dimensions</b>	19" x 14" x 1" (470 x 345 x 25 mm)	26" x 21" x 1" (668 x 538 x 35 mm)	26" x 31" x 1" (672 x 780 x 35 mm)
<b>LED Driver</b>			
	<b>Type</b>	Constant current, buck - boost	
	<b>Max output voltage</b>	33 Vdc	
	<b>Max output current</b>	1400mA	
Environmental			
	<b>Maximum wind zone deployment</b>	150 mph	
	<b>System operating temperature range (excluding battery)</b>	-40 to 122° F (-40 to 80° C)	
	<b>Battery Temperature Range</b>	-22 to 122° F (-30 to 50° C)	



## Wiring Layout





## Warranty

This product is covered by the Carmanah warranty.  
Visit [www.carmanah.com](http://www.carmanah.com) for additional information or  
contact the customer service department.

Before contacting Carmanah's customer service  
department, please have the serial number of your  
system available, a brief description of the problem,  
as well as all details of the installation.

To contact Carmanah's customer service  
department:

**Mail:** Carmanah Technologies Corporation  
250 Bay Street  
Victoria, BC Canada V9A 3K5

**Phone:** 1.250.380.0052  
877.722.8877 (Toll Free in U.S. and Canada)

**Fax:** 1.250.380.0062

**Email:** [customerservice@carmanah.com](mailto:customerservice@carmanah.com)

**Website:** [carmanah.com/traffic](http://carmanah.com/traffic)

