



# SAFETY, INSTALLATION, AND OPERATIONS MANUAL (United States and Canada)

## Solaria PowerXT®-R-AC Module



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## FCC Compliance

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications not expressly approved by the party responsible for compliance may void the user's authority to operate the equipment.

## Other Information

Product information is subject to change without notice. All trademarks are recognized as the property of their respective owners.

User documentation is updated frequently; Check the Solaria website ([solaria.com](http://solaria.com)) for the latest information.

To ensure optimal reliability and to meet warranty requirements, the Solaria PowerXT®-R-AC must be installed according to the instructions in this manual. For warranty text refer to [solaria.com/additional-product-information/](http://solaria.com/additional-product-information/)

For Solaria patent information refer to [solaria.com/patents/](http://solaria.com/patents/)

For Enphase patent information refer to [enphase.com/company/patents/](http://enphase.com/company/patents/).

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# Important Safety Information, Save These Instructions

## Read this First

This document provides safety and installation information for Solaria AC Module; PowerXT®-R-AC. The module consists of a PV Module and a Smart Grid-Ready Microinverter. The module converts incident solar energy into AC power and seamlessly integrates into Enphase Enlighten energy monitoring and analysis system.

Read this document before installing, wiring, or using this product. Failure to comply with these instructions will invalidate the Solaria Limited Warranty and may cause loss, damage, injury, or death.

Module limited warranty is described in The Solaria Corporation PowerXT® Warranty document. This document is available at [www.solaria.com](http://www.solaria.com).

**IMPORTANT:** The Enphase IQ Envoy and IQ Microinverter for PowerXT®-R-AC Modules do not communicate with, and should not be used with, previous generation Enphase Microinverters and Envoys.

## Safety Instructions

Before installing AC modules, read all safety instructions in this document.

## Product Labels

The following symbols appear on the product label and are described here:



**WARNING: Hot surface.**



**Refer to manual**



**DANGER: Refer to safety instructions.**



**Double-insulated**



**DANGER: Risk of electrical shock.**

## Safety and Advisory Symbols

To reduce the risk of electric shock, and to ensure the safe installation and operation of the Solaria PowerXT®-R-AC Module System, the following safety symbols appear throughout this document to indicate dangerous conditions and important safety instructions.

	<b>DANGER</b>	This indicates a hazardous situation, which if not avoided, will result in death or serious injury.
	<b>WARNING</b>	This indicates a situation where failure to follow instructions may be a safety hazard or cause equipment malfunction. Use extreme caution and follow instructions carefully.
	<b>WARNING</b>	This indicates a situation where failure to follow instructions may result in burn injury.
	<b>FIRE HAZARD</b>	This indicates a situation where failure to follow instructions may result in fire.
	<b>NOTE</b>	This indicates information that is very important for optimal system operation. Follow instructions closely.



## DANGER

Installation of this equipment carries risk of electrical shock. Use insulated tools to reduce risk of electric shock. Do not touch terminals with bare hands.

Do not disconnect modules while under load. Do not disconnect cables while the system is in operation.

Only qualified personnel should install, troubleshoot, or replace Solaria PowerXT®-R-AC Modules or Enphase Q Cable and Accessories.

Always de-energize AC branch circuit before performing service.

Ensure that all AC junction boxes are properly closed.

Do not install or handle modules when they are wet or during periods of high wind.

Do not install or use equipment in a manner not specified by the manufacturer.

Only use electrical system components approved for wet locations.

Ensure that all AC and DC wiring is correct and that none of the AC or DC wires are pinched, shorted or damaged. Ensure that all AC junction boxes are properly closed.

Do not exceed the maximum number of microinverters in an AC branch circuit as listed in the manual. You must protect each microinverter AC branch circuit with a 20 A maximum breaker or fuse as appropriate.



## DANGER: Risk of electric shock.

Installation must be performed in accordance with the local and national electrical codes.

Avoid all electrical hazards when installing, wiring, operating, and maintaining a module or module array.

The system must be installed, commissioned and maintained by a licensed electrician unless local electrical codes determine otherwise.

Do not use modules of different electrical or physical configurations in the same circuit or system.

Measure AC voltage of the grid at the distribution panel and ensure it matches with the rating of the module being installed.

Metal clips specifically designed to be used for the AC cable is to be used in accordance with the manufacturer's instructions.

Module junction boxes or junction box cables should not be used to attach other wiring or other components.

Match the polarities of the cables and terminals when making connections; failure to do so may result in damage to the modules and other electrical equipment.

A properly rated and certified over-current device must be connected in each branch circuit.

All Solaria modules are factory supplied with bypass diodes located in the junction box.

The microinverter and junction box are not designed or certified to be field accessible or maintainable and should under no circumstances be opened. Opening the microinverter or the junction box will void the module warranty.

Do not use Enphase equipment in a manner not specified by the manufacturer. Doing so may cause death or injury to persons, or damage to equipment.

Be aware that installation of this equipment includes risk of electric shock.

The DC conductors of this photovoltaic system are ungrounded and may be energized.

Always de-energize the AC branch circuit before servicing. Enphase does not recommend disconnecting the DC connectors under load.



## WARNINGS

Before installing or using the Solaria PowerXT®-R-AC Module, read all instructions and cautionary markings in the technical description, on the Enphase equipment and on the photovoltaic (PV) equipment.

All installations must be performed in compliance with local, regional, national and international statutory regulations, guidelines, norms and code requirements.



## WARNINGS

There are no serviceable parts in the module including the junction box and the microinverter. Removing covers will void the warranty.

Installation should be performed by trained and authorized personnel only.

Use heavy duty gloves to reduce risk of injury from sharp edges or corners.

Module support structures should be snow and wind load rated per local code and approved for use by the local authorities.

Do not artificially expose additional high intensity sunlight on the module.

Inspect modules before installing. Do not install modules that have been damaged during transportation or handling.

Check that the available electrical systems meets requirements of the module being installed.

Grounding holes on the PV module frame are for grounding. Module frames should be electrically connected to an earth ground for safety and protection from lightning in accordance to the National Electric Code (NEC). See Section 3.1 for ground hole location and marking.

Do not connect Solaria PowerXT®-R-AC Modules to the grid or energize the AC circuit(s) until you have completed all of the installation procedures and have received approval from the electrical utility company.

When the PV array is exposed to light, DC voltage is supplied to the power conversion equipment (PCE).

Risk of equipment damage. Enphase male and female connectors must only be mated with the matching male/female connector.



## CAUTION

Do not stand on, drop, or allow objects to fall on modules.

Module surface may be hot. Do not touch during operation.

Do not make additional holes in the frame or anywhere else on the module.

Do not remove warning labels.

Follow the instructions provided in this document in its entirety. Contact Solaria to obtain written approval of installation methods not covered in this document.

Inspect all parts for any damage caused by transportation and handling. Check integrity of glass, frame, backsheet, junction box, microinverter, and the cable connecting the junction box to the micro-inverter.

To reduce the risk of fire, connect only to a circuit provided with 20 Amperes maximum branch-circuit overcurrent protection in accordance with the National Electrical Code, ANSI/NFPA 70.

## CONFORMANCE TO STANDARDS

Before installing the solar system, contact local authorities to determine necessary permit, installation and inspection requirements.

All installations must be performed in compliance with local, regional, national and international statutory regulations, guidelines, norms and code requirements.

The solar system, its components, and installation should be approved by the authorities having jurisdiction in the area.

For projects in Canada, the installations shall be performed in accordance with CSA C22.1, Safety Standard for Electrical Installations, Canadian Electrical Code, Part 1

## COMPANION DOCUMENTS

Solaria AC Module Datasheet: <http://www.solaria.com/residential-commercial>

Enphase IQ7+ for AC Module Applications Datasheet:  
<https://enphase.com/en-us/products-and-services/microinverters>



## NOTES

To ensure optimal reliability and to meet warranty requirements, install the Enphase equipment according to the instructions in this manual.

The AC and DC connectors on the cabling are rated as a disconnect only when used with an Solaria PowerXT®-R-AC Module.

Protection against lightning and resulting voltage surge must be in accordance with local standards.

Perform all electrical installations in accordance with all applicable local electrical codes, such as: the Canadian Electrical Code, Part 1; ANSI requirements; and NPFA 70 (NEC).

## MICROINVERTER SAFETY



**WARNING:**  
Risk of skin burn.

The body of the Enphase Microinverter is the heat sink. Under normal operating conditions, the temperature could be 20° C above ambient, but under extreme conditions the microinverter can reach a temperature of 90° C. To reduce risk of burns, use caution when working with microinverters.



**WARNING:**  
Risk of electric shock.  
Risk of fire.

Only qualified personnel may connect the Solaria PowerXT®-R-AC Module to the utility grid.

Do not attempt to repair the Enphase Microinverter; it contains no user-serviceable parts. If it fails, contact Enphase customer service to obtain a return merchandise authorization (RMA) number and start the replacement process. Tampering with or opening the Enphase Microinverter will void the warranty.



**WARNING:**  
Risk of equipment damage.

The Enphase Microinverter is not protected from damage due to moisture trapped in cabling systems. Never mate microinverters to cables that have been left disconnected and exposed to wet conditions. This voids the Enphase warranty.



## NOTES

The Enphase Microinverter has field-adjustable voltage and frequency trip points that may need to be set, depending upon local requirements. Only an authorized installer with the permission and following requirements of the local electrical authorities should make these adjustments.

## ENPHASE Q CABLE AND ACCESSORY SAFETY



**DANGER:**  
Risk of electric shock.

Do not install the Enphase Q Cable terminator while power is connected.



**WARNING:**  
Risk of electric shock.  
Risk of fire.

When stripping the sheath from the Q Cable, make sure the conductors are not damaged. If the exposed wires are damaged, the system may not function properly.

Do not leave AC connectors on the Q Cable uncovered for an extended period. You must cover any unused connector with a sealing cap.

Make sure protective sealing caps have been installed on all unused AC connectors. Unused AC connectors are live when the system is energized.



## WARNING

Use the terminator only once. If you open the terminator following installation, the latching mechanism is destroyed. If the latching mechanism is defective, do not use the terminator. Do not circumvent or manipulate the latching mechanism.

When installing the Enphase Q Cable, secure any loose cable to minimize tripping hazard.

When looping the Enphase Q Cable, do not form loops smaller than 4.75" (12 cm) in diameter.

If you need to remove a sealing cap, you must use the Enphase disconnect tool.





## NOTES

When installing the Enphase Q Cable and accessories, adhere to the following:

- Do not expose the terminator cap or cable connections to directed, pressurized liquid (water jets, etc.).
- Do not expose the terminator or cable to continuous immersion.
- Do not expose the terminator cap or cable connections to continuous tension (e.g., tension due to pulling or bending the cable near the connection).
- Use only the connectors provided.
- Do not allow contamination or debris in the connectors.
- Use the terminator cap and cable connections only when all parts are present and intact.
- Do not install or use in potentially explosive environments.
- Do not allow the terminator to come into contact with open flame.
- Fit the terminator cap using only the prescribed tools and in the prescribed manner.
- Use the terminator to seal the conductor end of the Enphase Q Cable; no other method is allowed.

## PV Rapid Shutdown Equipment (PVRSE)

This product is UL Listed as PV Rapid Shut Down Equipment and conforms with NEC-2014 and NEC-2017 section 690.12 and C22.1-2015 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according to the following requirements:

- Microinverters and all DC connections must be installed inside the array boundary. Enphase further requires that the microinverters and DC connections be installed under the PV module to avoid direct exposure to rain, UV, and other harmful weather events.
- The array boundary is defined as 305 mm (1 ft.) from the array in all directions, or 1 m (3 ft.) from the point of entry inside a building.

This rapid shutdown system must be provided with an initiating device and (or with) status indicator which must be installed in a location accessible to first responders or be connected to an automatic system which initiates rapid shutdown upon the activation of a system disconnect or activation of another type of emergency system.

The initiator shall be listed and identified as a disconnecting means that plainly indicates whether it is in the “off” or “on” position. Examples are:

- Service disconnecting means
- PV system disconnecting means
- Readily accessible switch or circuit breaker

The handle position of a switch or circuit breaker is suitable for use as an indicator. Refer to NEC or CSA C22.1-2015 for more information.

Additionally, in a prominent location near the initiator device, a placard or label must be provided with a permanent marking including the following wording:

‘PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN’ The term ‘PHOTOVOLTAIC’ may be replaced with ‘PV.’

The placard, label, or directory shall be reflective, with all letters capitalized and having a minimum height of 9.5 mm (3/8”) in white on red background.

# The Enphase IQ System

The Enphase IQ System includes:

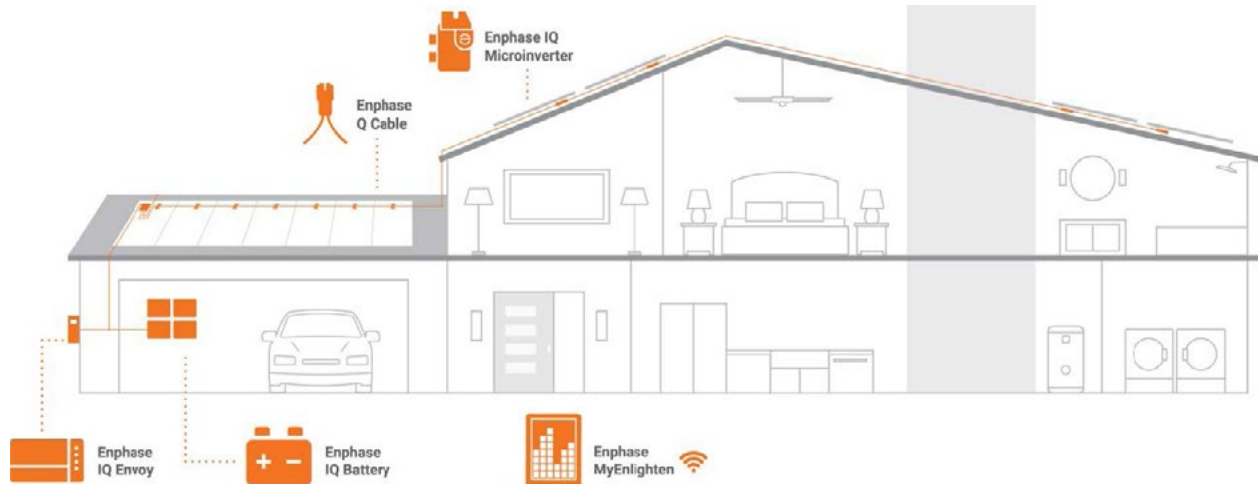
- **Enphase IQ Microinverters for PowerXT®-R-AC Module Application** (IQ 7+) The smart grid ready IQ 7+ Micros convert the DC output of the PV module into grid-compliant AC power.
- **Enphase IQ Envoy™** (ENV-IQ-AM1-240) The Enphase IQ Envoy is a communication device that provides network access to the PV array. The IQ Envoy collects production and performance data from the Enphase IQ Microinverters over on-site AC power lines and transmits the data to Enlighten through an Internet or cellular modem connection. The IQ Envoy is capable of monitoring up to 600 Enphase IQ Microinverters and up to 39 Enphase IQ Batteries. For details, refer to Enphase IQ Envoy Installation and Operations Manual.
- **Enphase Enlighten™** web-based monitoring and management software. Installers can use Enlighten Manager to view detailed performance data, manage multiple PV systems, and remotely resolve issues that might impact system performance. Find out more at [enphase.com/enlighten](https://enphase.com/enlighten).
- **Enphase Installer Toolkit™** mobile app for iOS and Android devices. It allows installers to configure the system while onsite, eliminating the need for a laptop and improving installation efficiency. You can use the app to:
  - ◆ Connect to the IQ Envoy over a wireless network for faster system setup and verification
  - ◆ View and email a summary report that confirms a successful installation
  - ◆ Scan device serial numbers and sync system information with Enlighten monitoring software
- Enphase IQ Battery™ Coming soon.
- Enphase Field Wireable Connectors (Q-CONN-10F and Q-CONN-10M)

Use Enphase Field connectors with Enphase Q-Cable or field cable to:

- ◆ Easily connect Q cables on the roof without complex wiring
- ◆ Use female connectors to make connections from any Q Cable open connector
- ◆ Make a jumper to connect with a remote part of the array: Use female to female for cable-to-cable connections
- ◆ Use a mated pair of connectors to splice two cut ends of cable

## How the Enphase IQ Microinverter for PowerXT®-R-AC Module Works

The Solaria PowerXT®-R-AC Module maximizes energy production by using a sophisticated Maximum Power Point Tracking (MPPT) algorithm. Each Enphase Microinverter is individually connected to one PV module in your array. This configuration enables an individual MPPT to control each PV module, ensuring that maximum power available from each PV module is exported to the utility grid regardless of the performance of the other PV modules in the array. While an individual PV module in the array may be affected by shading, soiling, orientation, or PV module mismatch, each Enphase Microinverter ensures top performance for its associated PV module.



## System Monitoring

Once you install the Enphase IQ Envoy and provide an internet connection through a broadband router or modem, the Enphase IQ Microinverters automatically begin reporting to Enlighten. Enlighten presents current and historical system performance trends and informs you of PV system status.

## Optimal Reliability

Microinverter systems are inherently more reliable than traditional inverters. The distributed nature of a microinverter system ensures that there is no single point of system failure in the PV system. Enphase Microinverters are designed to operate at full power at ambient temperatures as high as 65° C (150° F).

## Ease of Design

PV systems using Solaria PowerXT®-R-AC Modules are very simple to design and install. You will not need string calculations or cumbersome traditional inverters. Low voltage DC wires are pre-connected from the PV module directly to the co-located microinverter, eliminating the risk of personnel exposure to dangerously high DC voltage.

# Planning for PowerXT®-R-AC Module Installation

The microinverter housing is designed for outdoor installation and complies with the NEMA 250, type 6 environmental enclosure rating standard:



**NEMA 6 rating definition:** Indoor or outdoor use primarily to provide a degree of protection against hose-directed water, the entry of water during occasional temporary submersion at a limited depth, and damage from external ice formation.

The Enphase Q Cable is available with connector spacing options to accommodate installation of PV modules in portrait or landscape orientation. For Enphase Q Cable ordering information, see “Enphase Q Cable Planning and Ordering” on page 37.

## Planning the Racking

Plan the racking position with the Microinverter in mind. Ensure that the racking does not interfere with the microinverter and its connectors.

## Grounding Considerations

The Enphase Microinverter models listed in this guide do not require grounding electrode conductors (GEC), equipment grounding conductors (EGC), or grounded conductor (neutral). Your Authority Having Jurisdiction (AHJ) may require you to bond the mounting bracket to the racking. If so, use UL2703 hardware or star washers. Refer Module Installation: Step 10 for details. The microinverter itself has a Class II double-insulated rating, which includes ground fault protection (GFP).

## Branch Circuit Capacity

Plan your AC branch circuits to meet the following limits for maximum number of microinverters per branch when protected with a 20 amp (maximum) over current protection device (OCPD).



**NOTE:** \* Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

**MAXIMUM\* IQ 7+ MICROS  
PER AC BRANCH CIRCUIT (240 VAC)**

13

**MAXIMUM\* IQ 7+ MICROS  
PER AC BRANCH CIRCUIT (208 VAC)**

11

## Utility Service Requirements

The Enphase IQ Microinverter for ACM work with single-phase service. Measure AC line voltages at the electrical utility connection to confirm that it is within the ranges shown:

### 240 VOLT AC, SINGLE PHASE

L1 to L2	211 to 264 VAC
----------	----------------

L1, L2 to ground	106 to 132 VAC
------------------	----------------

### 208 VOLT AC, SINGLE PHASE

L1 to L2	183 to 229 VAC
----------	----------------

L1, L2 to ground	106 to 132 VAC
------------------	----------------

## Wire Lengths and Voltage Rise

When planning the system, you must select the appropriate AC conductor size to minimize voltage rise. Select the correct wire size based on the distance from the beginning of the AC branch circuit to the breaker in the load center. Enphase recommends a voltage rise total of less than 2% for the sections from the AC branch circuit to the breaker in the load center.

Enphase provides guidance about choosing wire size and maximum conductor lengths in the Voltage Rise Technical Brief at [enphase.com/support](https://enphase.com/support). Refer to this brief for voltage rise values in Enphase Q Cables and on how to calculate voltage rise in other wire sections of the system.

Standard guidelines for voltage rise on feeder and AC branch circuit conductors might not be sufficient for microinverter AC branch circuits that contain the maximum allowable microinverters. This is due to high inherent voltage rise on the AC branch circuit.



**Best practice:** Center-feed the branch circuit to minimize voltage rise in a fully-populated branch. This practice greatly reduces the voltage rise as compared with an end-fed branch. To center-feed a branch, divide the circuit into two sub-branch circuits protected by a single OCPD.

## Lightning and Surge Suppression

Enphase Microinverters have integral surge protection greater than most traditional inverters. However, if the surge has sufficient energy, the protection built into the microinverter can be exceeded, and the equipment can be damaged. For this reason, Enphase recommends that you protect your system with a lightning and/or surge suppression device. In addition to having some level of surge suppression, it is also important to have insurance that protects against lightning and electrical surges. Enphase has tested the devices in the following tables.

RESIDENTIAL	COMMERCIAL
<ul style="list-style-type: none"><li>• Citel DS72-RS-120 surge protector; <a href="#">data sheet</a></li><li>• Delta LA-302 lightning arrestor; <a href="#">website</a></li><li>• Midnite solar surge protection device MNSPD-300 or MNSPD-300FM (with flush mount box); <a href="#">website</a></li></ul>	<ul style="list-style-type: none"><li>• Citel DS73-RS-G surge protector; <a href="#">data sheet</a></li><li>• Delta LA-303 lightning arrestor; <a href="#">website</a></li></ul>



**NOTE:** Protection against lightning and resulting voltage surge must be in accordance with local standards.

## Parts and Tools Required

In addition to the AC Modules, you will need the following:

### Enphase Equipment

- Enphase IQ Envoy communications gateway (ENV-IQ-AM1-240) required to monitor solar production. For installation information, refer to the Enphase IQ Envoy Installation and Operations Manual.
- Enphase Installer Toolkit Download the Enphase Installer Toolkit mobile app and open it to log in to your Enlighten account. With this app, you can scan microinverter serial numbers and connect to the IQ Envoy to track system installation progress. To download, go to [enphase.com/toolkit](https://enphase.com/toolkit) or scan the QR code at right.
- Enphase Sealing caps (Q-SEAL-10) for any unused drops on the Enphase Q Cable
- Enphase Terminator (Q-TERM-10) typically two needed per branch circuit
- Enphase Disconnect Tool (Q-DISC-10)
- Field Wireable Connectors (male and female: Q-CONN-10M and Q-CONN-10F) (optional)
- Enphase Q Cable:



CABLE MODEL	CONNECTOR SPACING	PV MODULE ORIENTATION	CONNECTOR COUNT PER BOX
Q-12-10-240	1.3m	Portrait	240
Q-12-17-240	2.0m	Landscape	240

### Other Items

- Number 2 and 3 Phillips screwdrivers
- Wire cutters, voltmeter
- Torque wrench, sockets, wrenches for mounting hardware
- Crimp tool PV-CZM-18100, -019100, or -22100 for field wireable connectors
- Compatible cable clips, including:

#### Wire management options for Q-Cable attached to module frames

STANDARD /PARALLEL TO FRAME	90°/PERPENDICULAR TO FRAME
Nine Fasteners Inc. NFI-1306	Nine Fasteners Inc. NFI-1306-V90
Nine Fasteners Inc. NFI-1306	Burndy/Wiley ACC-F90
Heyco Sunrunner-2	
Hellermann Tyton MSC2	

\* Due to variances in module frame thickness, these wire clips may not work for all modules

# Solaria PowerXT®-R-AC Module Installation

Installing the ACM involves several key steps. Each step listed here is detailed in the following pages.

**Step 1: Install an AC Junction Box**

**Step 2: Position the Enphase Q Cable**

**Step 3: Connect to AC Junction Box**

**Step 4: Terminate the Unused End of the Cable**

**Step 5: Prepare the AC Modules**

**Step 6: Mount the AC Modules**

**Step 7: Create the Installation Map**

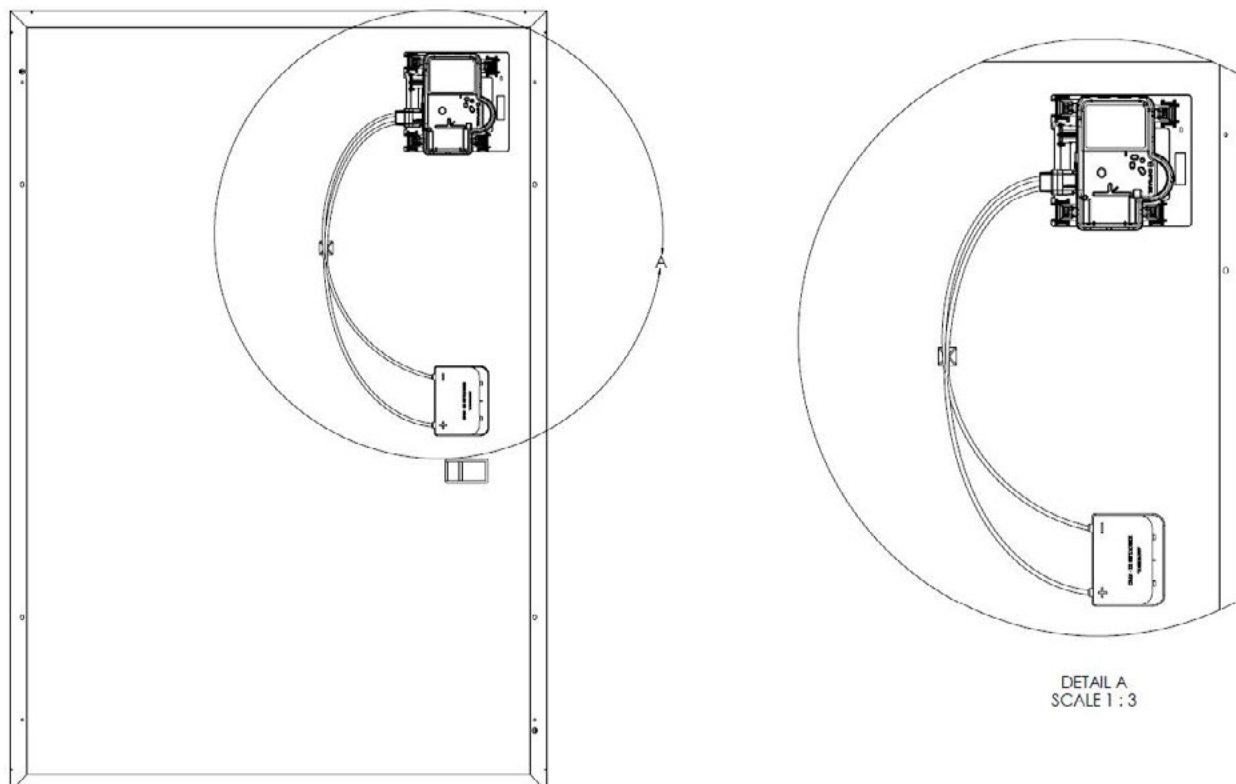
**Step 8: Connect the AC Modules**

**Step 9: Manage the Cabling**

**Step 10: Ground the system**

**Step 11: Energize the system**

**Step 12: Set Up and Activate Monitoring**





## Step 1: Install an AC Junction Box

- A.** Verify that AC voltage at the site is within range.

SERVICE TYPE AND VOLTAGE: L1-L2	
240 V Split-Phase	211 to 264 VAC
208 V Single-Phase	183 to 229 VAC

- B.** Provide an AC connection back to the electricity network using equipment and practices as required by local jurisdictions.

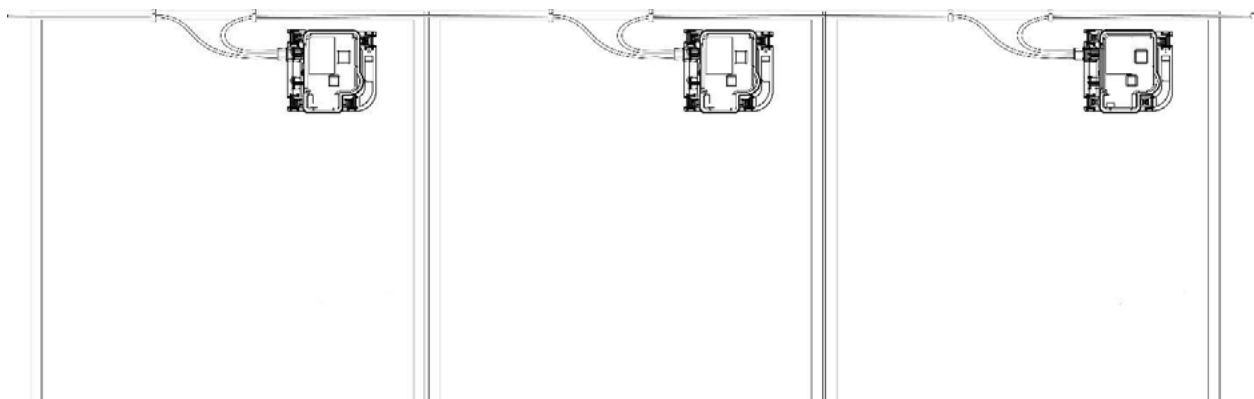
## Step 2: Position the Enphase Q Cable

- A.** Plan each cable segment to allow drop connectors on the Enphase Q Cable to align with each AC Module. Allow extra length for slack, cable turns, and any obstructions.
- B.** Mark the approximate centers of each PV module on the PV racking.
- C.** Lay out the cabling loosely on the roof for the AC branch circuit. Make sure the cable is positioned in a way that allows you to connect it to the microinverter.
- D.** Cut each segment of cable to meet your planned needs.



**WARNING: Do not install the modules in a way that creates continuous tension on the Q Cable.**

- E.** Once the cables are laid out per steps C & D, secure the cable to the rails before installing the modules.
- F.** Connect the Q Cable.



***Position the Q Cable along the edge of the module***

### Step 3: Connect to a Junction Box

- A. Connect the Enphase Q Cable into the junction box.
- B. Refer to the wiring diagrams on page 44 for more information. Wire colors are listed in the following table.

WIRE COLORS
L1 – Black
L2 – Red

### Step 4: Terminate the Unused End of the Cable

Place sealing caps on unused connectors and terminate the unused end of the Enphase Q Cable as follows.

- A. Cover any unused connectors with Enphase Sealing Caps. Listen for a click as the connectors engage.

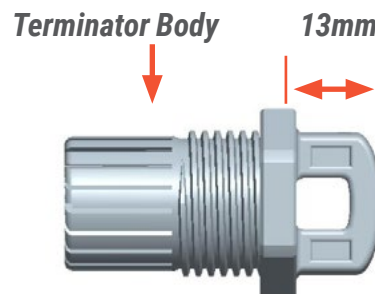


**WARNING: Risk of electric shock. Risk of fire. Install sealing caps on all unused AC connectors as these connectors become live when the system is energized. Sealing caps are required for protection against moisture ingress.**



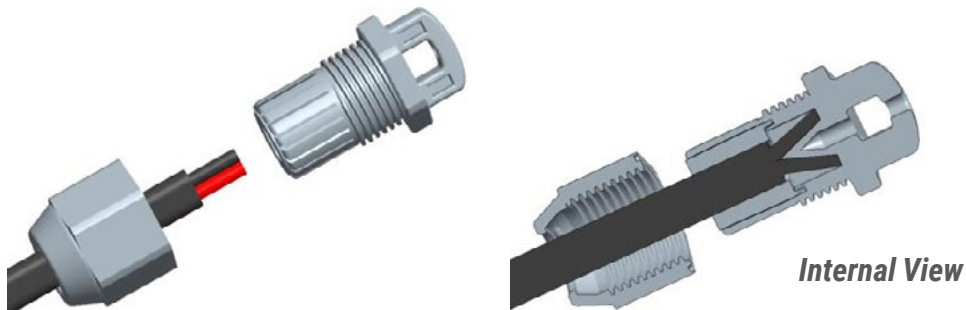
**NOTE:** If you need to remove a sealing cap, you must use the Enphase Disconnect Tool. See “Remove and Replace a Microinverter” on page 35.

- B. Remove 13 mm (½ inch) of the cable sheath from the conductors. Use the terminator loop to measure 13 mm.



- C. Slide the hex nut onto the cable. There is a grommet inside of the hex nut that should remain in place.

- D.** Insert the cable into the terminator body so that each of the two wires land on opposite sides of the internal separator.

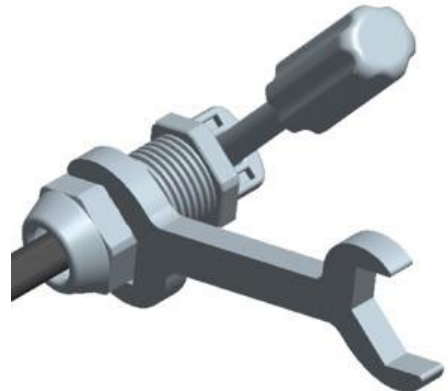


- E.** Insert a screwdriver into the slot on the top of the terminator to hold it in place and torque the nut to 7 Nm.
- F.** Hold the terminator body stationary with the screwdriver and turn only the hex nut to prevent conductors from twisting out of the separator.



**NOTE:** Turn only the hex nut to prevent conductors from twisting out of the separator.

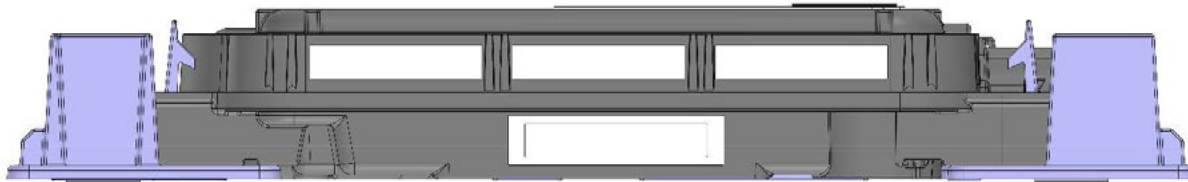
- G.** Attach the terminated cable end to the PV racking with a cable clip or tie wrap so that the cable and terminator do not touch the roof.



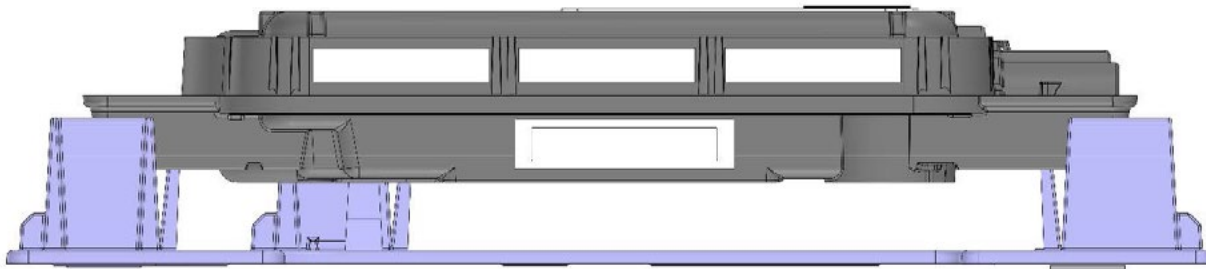
**WARNING:** The terminator cannot be re-used. If you unscrew the nut, you must discard the terminator

## Step 5: Prepare the AC Modules

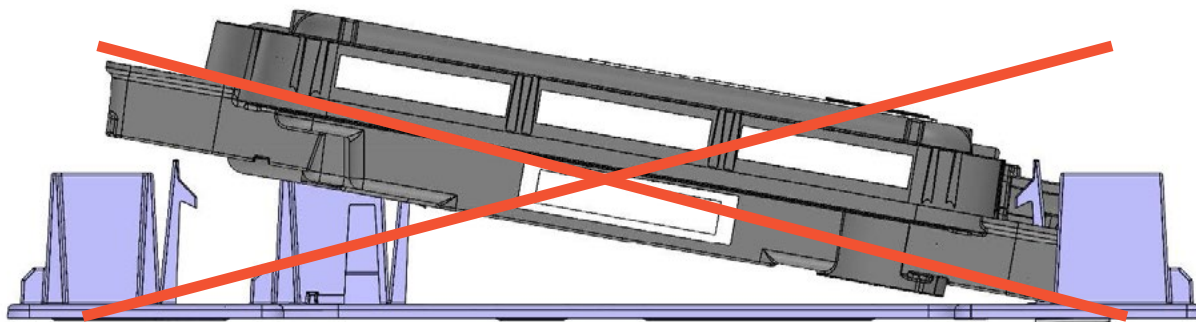
- A.** Before installing the AC module, the microinverters must be lifted from the shipping position. On the ground, turn the AC Module so that the microinverter faces you. Using both hands, lift the microinverter up. You will hear four clicks as the microinverter locks into the installation position. Ensure the four latches are locked, and the microinverter is not tilted.



*The Microinverter is in the shipping position.*



*The Microinverter is lifted and ready for installation.*



*Make sure the microinverter is not tilted.*



**NOTE:** If you need to move the module, you can return the microinverter to the shipping position using the Enphase Disconnect Tool. Use the tool to depress the four locking mechanisms on each corner of the microinverter to return it to the shipping position.

- B.** Position the AC Modules as planned on the rail.

*Use this end of the Disconnect Tool to depress the locking mechanisms.*



## Step 6: Module Mounting

The Solaria Corporation PowerXT® Warranty is contingent upon modules being mounted in accordance to the requirements described in this section.

### 6.1 Site Considerations

Solaria modules should be mounted in locations that meet the following requirements.

- Module should not be mounted in locations where it will be in direct contact with salt water or ammonia.
- When choosing a site, avoid obstructions that could cast shadows on the modules as much as possible.

### 6.2 Mechanical Installation

Solaria module mounting configurations must meet the following requirements:

#### Installation Requirements:

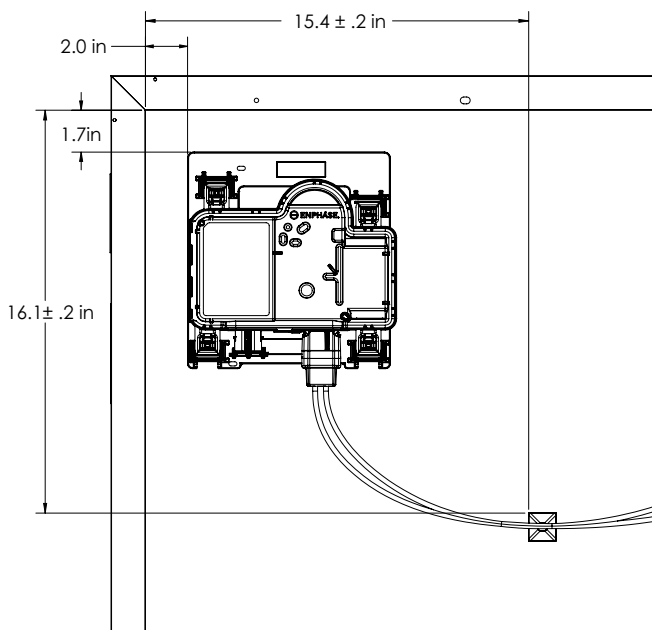
- Do not remove or alter the module frame. Creating additional mounting holes may damage the module and reduce the strength of the frame.
- For roof mounting, the modules should be mounted over a fire-resistant covering rated for the application.
- Clearance of 7 mm or more between modules is required to allow for thermal expansion of the frames.
- Clearance of 100 mm or more is recommended between the modules and the rooftop or nearest surface.
- Always keep the back surface of the module free from any foreign objects or structural elements which could come into contact with the module.
- Ensure that the modules are not subject to wind or snow loads in excess of the maximum permissible loads and are not subject to excessive forces due to thermal expansion of the support structure.
- Modules have been tested to Mechanical Loading Test requirements of UL1703.
- The fire rating of this module is valid only when mounted in the manner specified in the mechanical mounting instructions.
- The module is considered to be in compliance with UL1703 only when the module is mounted in the manner specified by the mounting instructions.
- A module with exposed conductive parts is considered to be in compliance with UL1703 only when it is electrically grounded in accordance with the instructions presented in this document and the requirements of the National Electrical Code.

## Mounting Requirements:

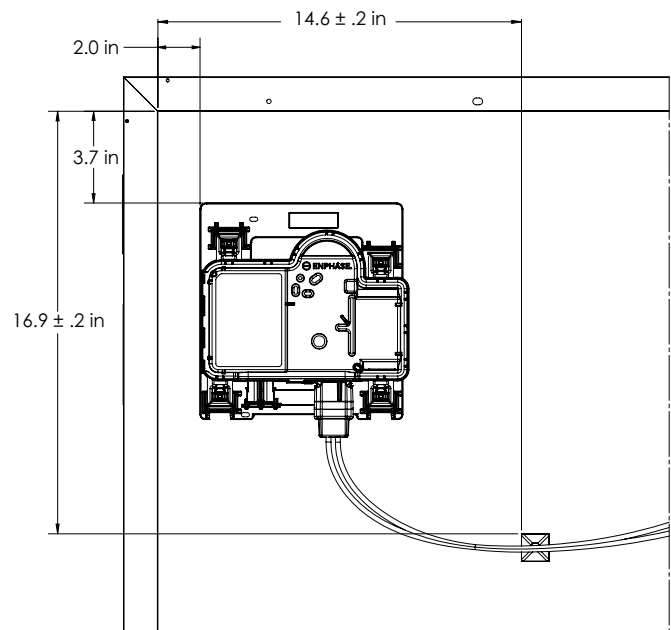
Modules can be secured with bolts or clamps.

### • Mounting Using Bolts at Mounting Slot Locations:

- ♦ Use the four 7.0mm [0.28in] x 10.0mm [0.39in] "MOUNTING SLOTS" shown on the diagram below and on module drawing in section 8. Use M6 (1/4"-20) stainless steel bolts, with nuts, two washers, and a locking washer, tightened to a minimum torque of 13.6-16.3 N-m (10-12 ft-lb).
- ♦ When bolts are used for mounting, maximum allowed loading is 5400Pa (front) and 3600Pa (rear).
- ♦ Note, rails supporting the bolted connections should run perpendicular to the length of the module so as to not interfere with the AC unit (see diagram on next page)



**OPTION 1**  
POWERXT-355R-PDX-AC  
MICROINVERTER  
AND CABLE BASE POSITION



**OPTION 2**  
POWERXT-365R-PDX-AC  
MICROINVERTER  
AND CABLE BASE POSITION

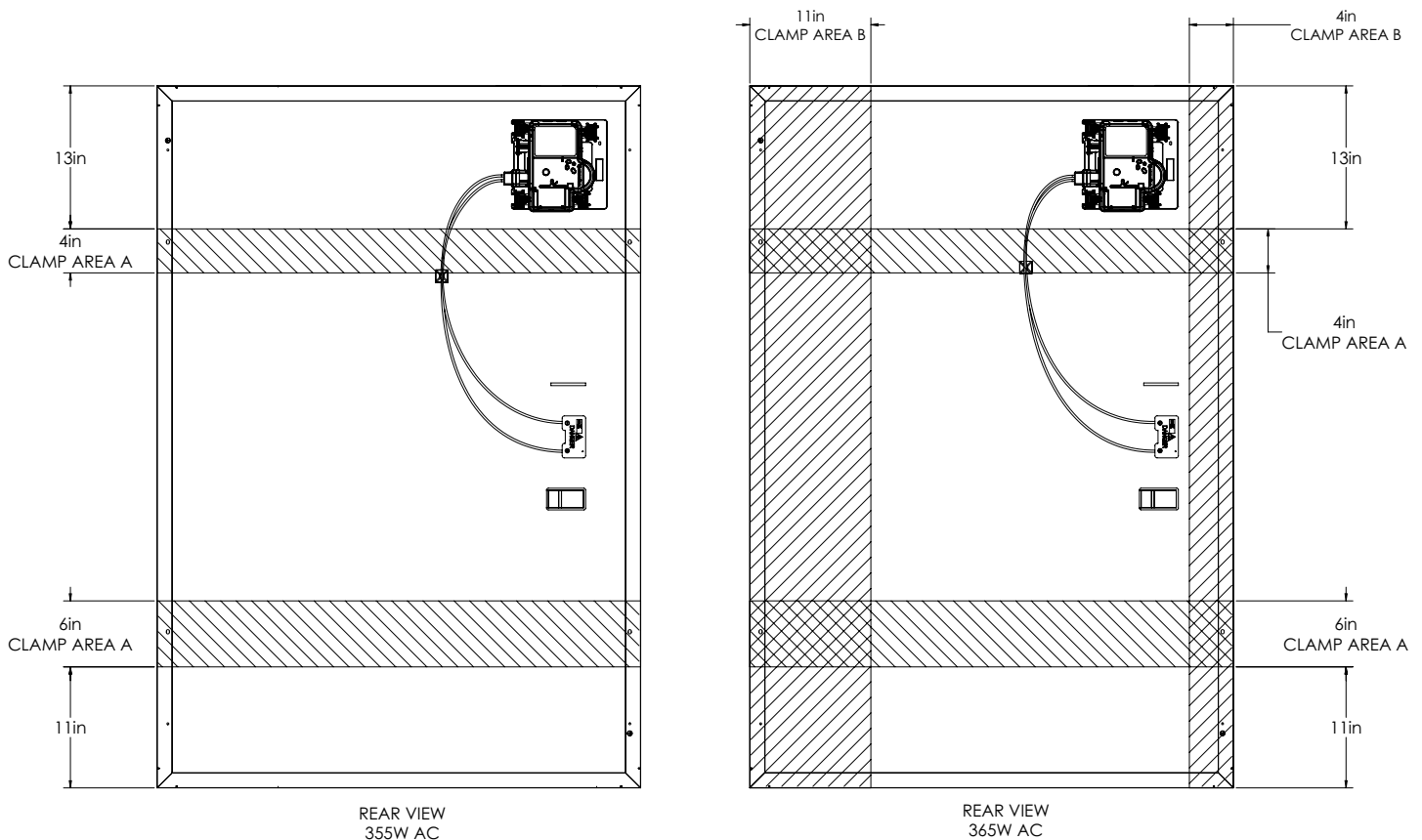
## • Mounting Using Clamps:

- ◆ When using clamps, place clamps within the allowable clamping areas identified in the table and diagrams below. Follow clamp manufacturer's recommended hardware and torque requirements for solar installations. Various clamp systems specifically designed for PV module mountings are available and compatible with Solaria PowerXT®. In the absence of manufacturer's recommendations for clamp size, Solaria recommends minimum clamp size of 40mm (1.57").

- ◆ Maximum Allowed Loading:

	355Wp	365Wp	365Wp
Clamping Area	Clamp Area A	Clamp Area A	Clamp Area B
Front Load	5400Pa	5400Pa	2400Pa
Rear Load	3600Pa	3600Pa	2400Pa

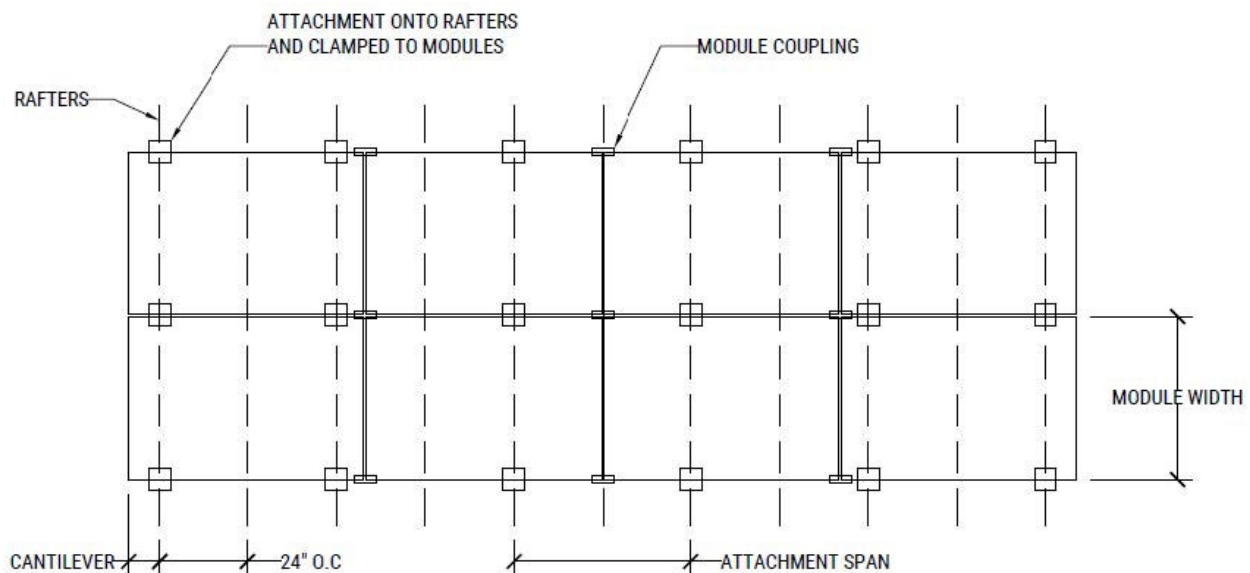
- ◆ Note, rails supporting the clamped connections should always run perpendicular to the length of the module.
- ◆ Rails and clamps should be clear of the microinverter by at least 1 ½" when following these guidelines.



**Allowable rail locations, top view (left) and example of typical rail configuration, back view (right)**

## • Mounting Using Rail-less Racking Systems:

- ◆ Typical rail-less racking system layout is shown in the diagram below.
- ◆ Attachments are to be made on the long side of the module with maximum attachment span of 48 inches and maximum cantilever of 17 inches.
- ◆ Follow racking system manufacturer's recommendations for coupling clamps at the module corners, torques, and bonding methods.
- ◆ For rail-less systems, maximum allowed loading is 2400Pa (front) and 2400Pa (rear).
- ◆ Clamps should be clear of the microinverter by at least 1 ½".



## 6.3 Module Direction and Tilt Angle

- Modules produce maximum energy when they are pointed directly to the Sun. Modules get maximum sunlight throughout the year if they face South in Northern Hemisphere and they face North in Southern Hemisphere.

## 6.4 Module Orientation

- Modules can be mounted in either "portrait" or "landscape" orientation relative to the roof but the **mounting rails must always run perpendicular to the long side of the module so as to not interfere with the AC unit.**



## Step 7: Use the Serial Number Labels to Create the Installation Map

The Enphase Installation Map is a diagram of the physical location of each module in your PV installation. Copy or use the blank map on page 42 to record module placement for the system or provide your own layout if you require a larger or more intricate installation map.

Each AC Module, Enphase Envoy, and Enphase Battery have a removable serial number label. Build the installation map by peeling the serial number labels from the modules and placing the labels on the map. You will also place the Enphase IQ Envoy (required) and IQ Battery (optional) serial numbers on the map after installation.

After you have created the installation map, use the Enphase Installer Toolkit mobile app to record serial numbers and configure the system.

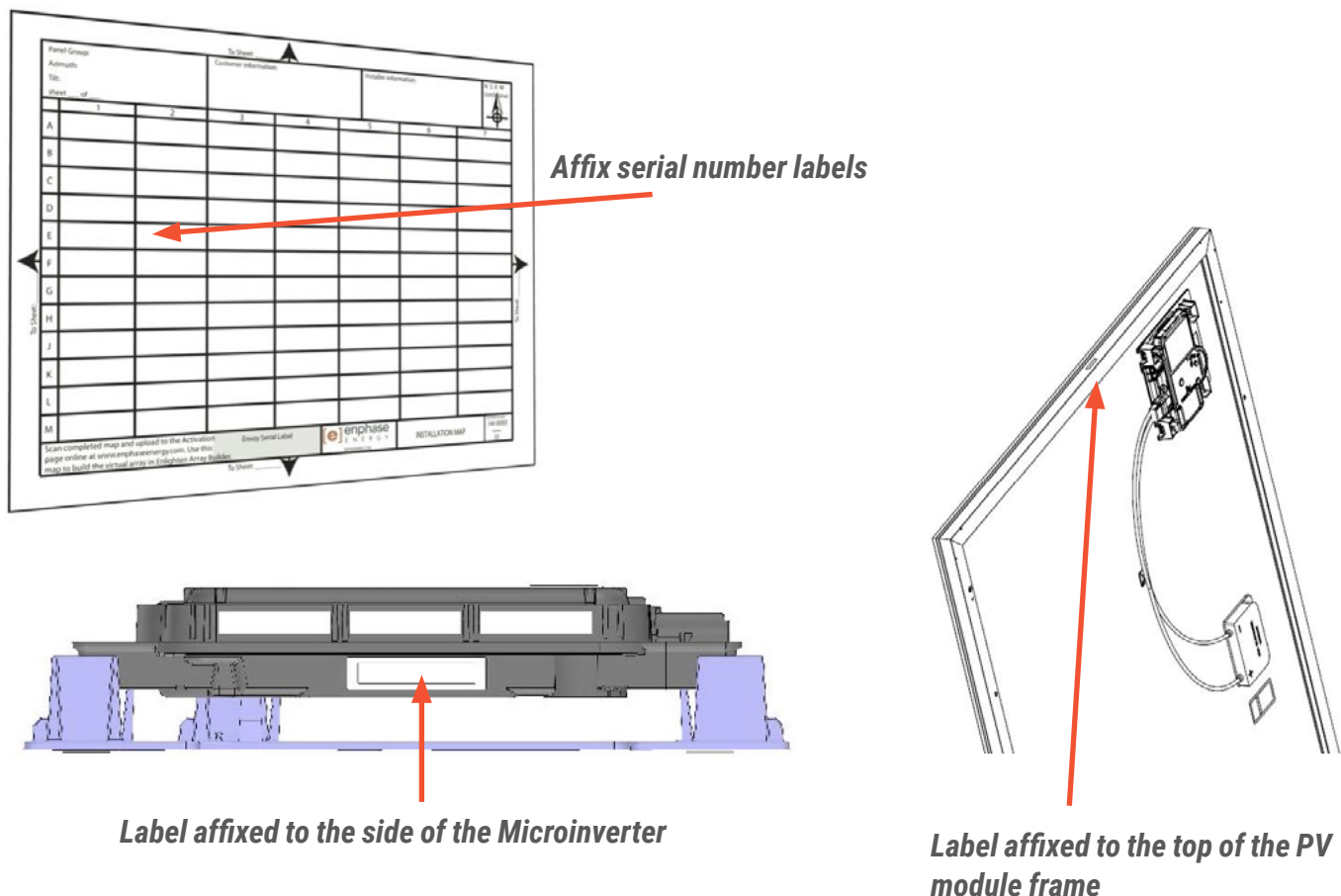
For more information, refer to “Detect the Microinverters” in the help topics of the Installer Toolkit app.

### A. Remove the label from each module before passing it up to the roof.

**Apply the label to the proper position on the installation map.**

### B. Peel the label from the IQ Envoy (and Enphase IQ Battery, if installed) and affix it to the installation map.

### C. Always keep a copy of the installation map for your records.

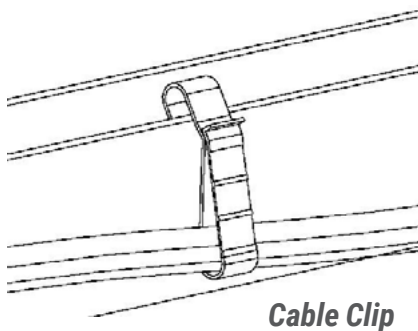


## Step 8: Connect the Microinverters as the AC Modules are Installed

- A.** Place the modules on the roof. Do not place the modules in such a way that places pressure on the microinverter. Minimum distance from the top edge of the module to the rail should be about 12 inches.
- B.** As each module is installed, connect the Q Cable to the microinverter. Listen for a click as the connectors engage.
- C.** Do not allow the rail to press on the microinverter.

## Step 9: Manage the Cabling

- A.** Use cable clips to attach the cable to the module frame. Leave no more than 1.8 m (six feet) between cable clips.



- B.** Dress any excess cabling in loops so that it does not contact the roof. Do not form loops smaller than 12 cm (4¾") in diameter.



**WARNING: Tripping Hazard. Loose cables can become a tripping hazard. Dress the Enphase Q Cable to minimize this potential.**



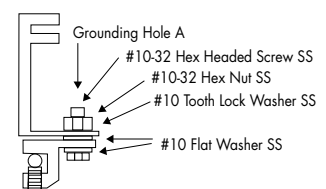
**NOTE:** Some modules do not include framing on their shortest side. Cable clips cannot attach to the frameless side for cable management. Plan to use the longer, framed side for cable management when this is the case.

## Step 10: Grounding

- Before installing the solar system, contact local authorities to determine the necessary system hardware grounding requirements.
- The AC cable has no neutral conductor. For neutral grounding, refer to the diagram in section 9.0.
- Module frames should be electrically connected to an earth ground for safety and protection from lightning in accordance to the National Electric Code (NEC).
- Solaria PowerXT® solar modules may be installed on a mounting system certified to UL 2703 with approval of the mounting system manufacturer.
- When using a mounting system, grounding of modules must be accomplished by the method prescribed by the mounting system manufacturer.
- Where common grounding hardware (nuts, bolts, star washers, split-ring lock washers, flat washers and the like) are used to attach the solar module to a listed grounding/bonding device, the attachment must be made in conformance with the grounding device manufacturer's instructions.
  - ♦ Common hardware items such as nuts, bolts, star washers, lock washers, and the like have not been evaluated for electrical conductivity or for use as grounding devices and should be used only for maintaining mechanical connections and holding electrical grounding devices in the proper position for electrical conductivity. Such devices, where supplied with the module and evaluated through the requirements in UL1703, may be used for grounding connections in accordance with the instructions provided with the module.
- Follow these instructions to ground the module.







- ♦ The module frame has four 4.5 mm grounding holes ('A') that are shown on the module drawing. Ground marks are located next to the grounding holes. Attach a 10 AWG (2.588 mm diameter) bare copper ground conductor to a grounding lay-in lug mounted at one of the four grounding holes on the module frame. Use a grounding lug with tin plating and stainless-steel hardware (#10-32 hex head screw at 4 mm diameter, flat washers, tooth lock washer and nut).
- ♦ A #10 flat washer must be used between the screw head and the grounding lug to prevent damage to the tin plating on the lug. Insert a #10 flat washer between the grounding lug and the module frame. A #10 tooth lock washer must be inserted between the nut and the module frame to break the anodized layer of the frame. This mechanical bond between the tooth lock washer and the frame of the module will ensure a good electrical bonding path.
- ♦ The #10-32 assembly attachment screw must be tightened between 20-25 inch-pound. A 10 AWG bare copper ground conductor must be attached to the ground lug using the stainless-steel set screw provided by the lug manufacturer. Tighten the set screw between 10-15 inch-pound to ensure a strong mechanical and electrical bond.

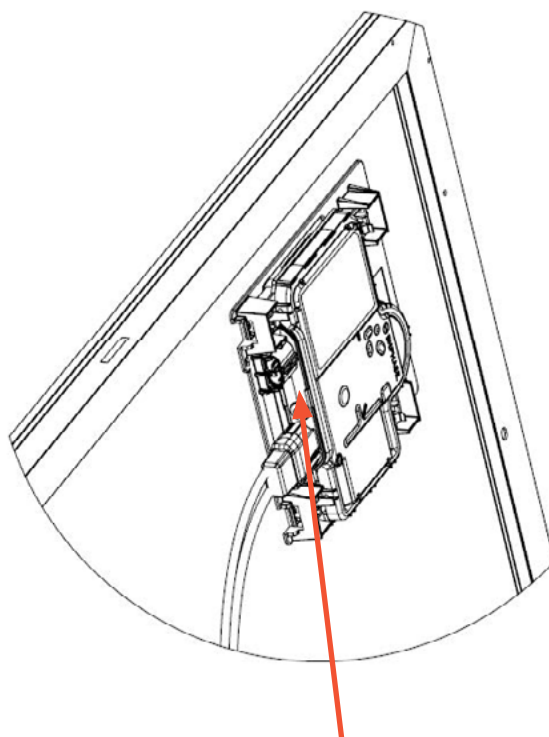


**Recommended stainless steel hardware and assembly**

## Step 11: Energize the System

- A. If applicable, turn ON the AC disconnect or circuit breaker for the branch circuit.
- B. Turn ON the main utility-grid AC circuit breaker. Your system starts producing power **after a five-minute wait time**.
- C. Check the LED on the connector side of the microinverter:

LED COLOR	INDICATES
 Flashing green	Normal operation. AC grid function is normal there is communication with the IQ Envoy.
 Flashing orange	The AC grid is normal but there is no communication with the IQ Envoy.
 Flashing red	The AC grid is either not present or not within specification.
 <b>SOLID RED</b>	There is an active "DC Resistance Low, Power Off Condition." To reset, refer to "DC Resistance Low – Power Off Condition" on page 32.



*The Microinverter LED light*

## Step 12: Set Up and Activate Monitoring

Refer to the **Enphase IQ Envoy Quick Install Guide** to install the IQ Envoy and set up system monitoring and grid management functions. This guide leads you through the following:

- Connecting the Envoy
- Detecting devices and scanning the installation map
- Connecting to Enlighten
- Registering the system
- Building the virtual array



**NOTE: When the utility requires a profile other than the default IEEE 1547 (for example grids managed by Hawaii Electric Industries [HEI] including HECO) you must select an appropriate grid profile for your installation.** You can set the grid profile through Enlighten, during system registration, or through Installer Toolkit at any time. You must have an Enphase Envoy communications gateway to set or change the grid profile. For more information on setting or changing the grid profile, refer to the Enphase IQ Envoy Installation and Operation Manual at [enphase.com/support](https://enphase.com/support).

## Maintenance

- Solaria modules are virtually maintenance free. Following simple maintenance steps will ensure reliable production electric power for the expected life of the product.
- Inspect electrical and mechanical connections for safety and corrosion once every year.
- Under most weather conditions, normal rainfall is sufficient to keep the module glass surface clean.
  - ♦ Modules that are mounted at a small tilt angle will not self-clean as easily as modules that are mounted at large tilt angles. If dirt build-up becomes excessive, clean glass surface with water and soft cloth. Do not use harsh cleaning materials.
- Cleaning the back surface of the module is not necessary for proper operation.

### Disclaimer of Liability

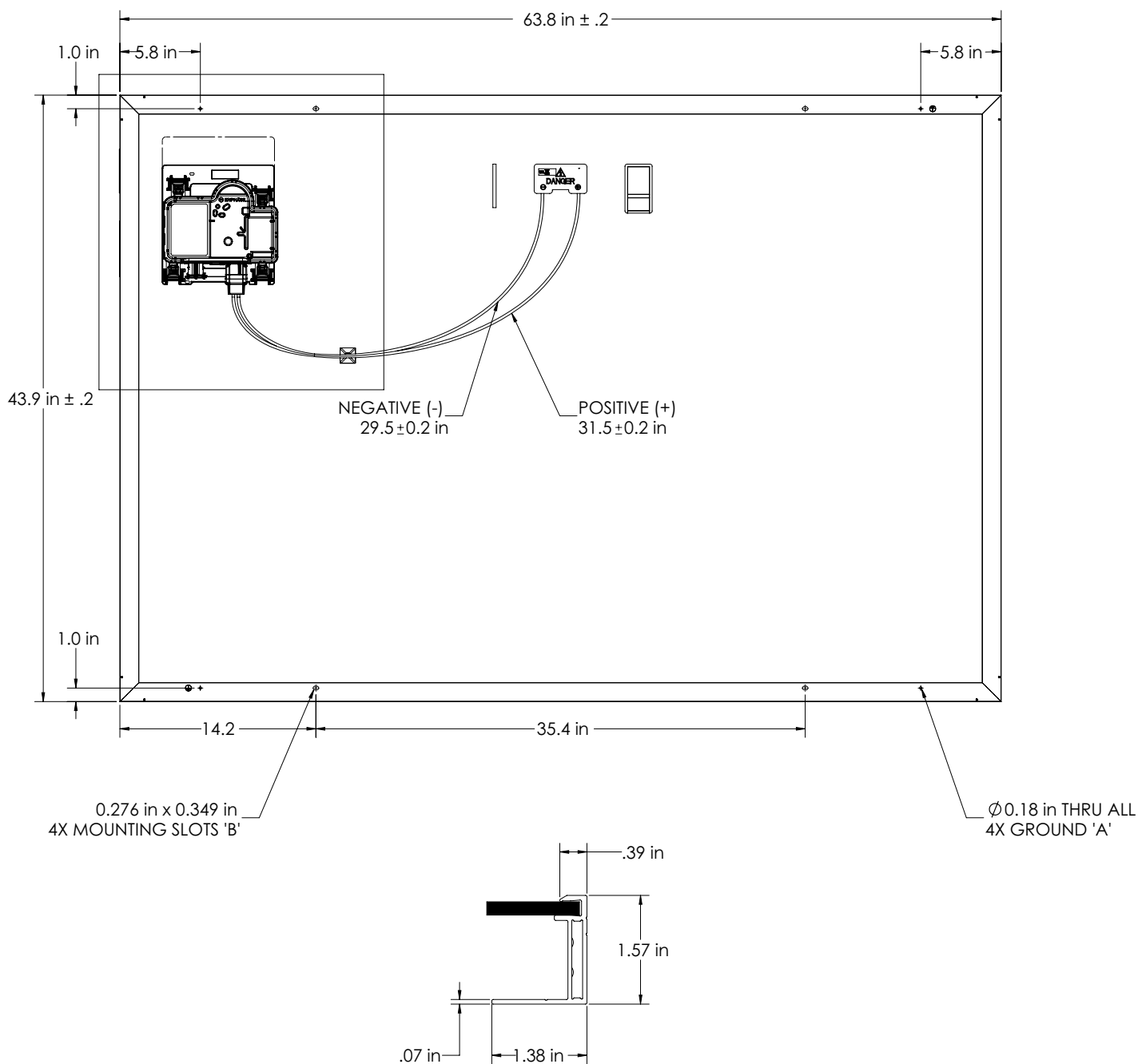
- Since the use of this Safety, Installation and Operation Manual and the conditions or methods of installation, operation, use and maintenance of the module are beyond The Solaria Corporation control, The Solaria Corporation does not assume responsibility and expressly disclaims liability for loss, damage, injury or expense arising out of or in any connection with such installation, operation, use or maintenance of the module.
- The Solaria Corporation assumes no responsibility for any infringement of patents or other rights of third parties that may result from the use of the module. No license is granted by implication or otherwise under any patent or patent rights.
- The information in this Manual is based on The Solaria Corporation knowledge and experience and is believed to be reliable; but such information, including the product specifications (without limitations) and suggestions, do not constitute a warranty, expressed or implied. The Solaria Corporation reserves the right to make changes to the product specifications or this manual without prior notice.
- This document may be provided in multiple languages. If there is a conflict among versions, the English language version dominates.

### Electrical Specifications

Please refer to the Solaria PowerXT®-R-AC module datasheet for electrical specifications. Rated electrical characteristics are within 10% of STC values. The datasheet is available at [www.solaria.com](http://www.solaria.com).

## Mechanical Dimensions

### Solaria PowerXT®-xxxR-AC



- Nominal dimensions in millimeters and [inches] – Not Drawn to Scale
- 4x 4.5mm [0.18in] Grounding Holes 'A'
- 4x 7.0mm [0.28in] x 10.0mm [0.39in] Mounting Slots 'B'
- Module Weight: 22 kg (48.4 lbs.).

# Troubleshooting

Follow all the safety measures described throughout this manual. Qualified personnel can use the following troubleshooting steps if the PV system does not operate correctly.







**WARNING: Risk of electric shock. Do not attempt to repair the Solaria® PowerXT®-R-AC Module; it contains no user-serviceable parts. If it fails, contact Enphase customer service to obtain an RMA (return merchandise authorization) number and start the replacement process.**

## Status LED Indications and Error Reporting

The following section describes LED indications.

### LED Operation

LED COLOR	INDICATES
 Flashing green	Normal operation. AC grid function is normal there is communication with the Envoy.
 Flashing orange	The AC grid is normal but there is no communication with the Envoy.
 Flashing red	The AC grid is either not present or not within specification.
 <b>SOLID RED</b>	There is an active “DC Resistance Low, Power Off” condition or “GFDI” fault. To reset, refer to “DC Resistance Low – Power Off Condition” below.

The status LED on each microinverter lights green about six seconds after DC power is applied. It remains lit solid for two minutes, followed by six green blinks. After that, red blinks indicate that no grid is present if the system is not yet energized.

Any short red blinks after DC power is first applied to the microinverter indicate a failure during microinverter startup.

### DC Resistance Low – Power Off Condition

For **all IQ Microinverter for ACM models**, a solid red status LED when DC power has been cycled indicates the microinverter has detected a DC Resistance Low – Power Off event. The LED will remain red and the fault will continue to be reported by the Envoy until the error has been cleared.

An insulation resistance (IR) sensor in the microinverter measures the resistance between the positive and negative PV inputs to ground. If either resistance drops below a threshold, the microinverter stops power production and raises this condition. This may indicate defective module insulation, defective wiring or connectors, moisture ingress, or a similar problem. Although the cause may be temporary, this microinverter condition persists until the sensor is manually reset.

**An IQ Envoy is required to clear this condition.** The condition clears on operator command unless its cause is still present.

If a microinverter registers a “DC Resistance Low - Power Off” condition, you can attempt to clear this condition. If the condition does not clear after you perform the following procedure, contact Enphase Energy customer support at [enphase.com/en-us/support/contact](https://enphase.com/en-us/support/contact).

There are two ways to send a clear message to the microinverter. Note that the condition will not clear after sensor reset if the cause of the failure is still present. If the condition persists, contact your installer.



## Method 1: Clear this Error Using Enlighten

- A. Log in to Enlighten and access the system.
- B. Click the **Events** tab. The next screen shows a current “DC Resistance Low - Power Off” condition for the system.
- C. Click **DC Resistance Low - Power Off**.
- D. Where “n” is the number of affected devices, click n devices (show details).
- E. Click the serial number of the affected microinverter.
- F. Click **Reset DC Resistance Low - Power Off Sensor**.  
The system displays, “A DC Resistance Low- Power Off reset task was issued on [date and time] for this microinverter and is still pending.”

## Method 2: Use Installer Toolkit to Clear the Condition

Follow the instructions in the *Enphase IQ Envoy Installation and Operation Manual* at [enphase.com/support](https://enphase.com/support) to clear this condition.

## Other Faults

All other faults are reported to the Envoy. Refer to the *Enphase IQ Envoy Installation and Operation Manual* at [enphase.com/support](https://enphase.com/support) for troubleshooting procedures.

## Troubleshoot an Inoperable Microinverter

To troubleshoot an inoperable microinverter, follow the steps in the order shown.



**WARNING: Risk of electric shock. Always de-energize the AC branch circuit before servicing. Never disconnect the DC connectors under load.**



**WARNING: The Enphase Microinverters are powered by DC power from the PV modules. Make sure you disconnect the DC connections and reconnect DC power and then watch for the solid green about six seconds after connection to DC power.**

- A.** Make sure AC breakers and disconnects are closed.
- B.** Check the connection to the utility grid and verify that the utility voltage is within allowable ranges.
- C.** Verify that AC line voltages at all solar power circuit breakers at the load center and subpanels are within the ranges shown in the following table.
- D.** Verify that AC line voltage at the junction box for each AC branch circuit is within the ranges shown in the following table:

240 VOLT AC, SINGLE PHASE	
L1 to L2	211 to 264 VAC
L1, L2 to ground	106 to 132 VAC
208 VOLT AC, SINGLE PHASE	
L1 to L2	183 to 229 VAC
L1, L2 to ground	106 to 132 VAC

- E.** Using an Enphase disconnect tool, disconnect the AC cable for the microinverter in question from the Enphase Q Cable.
- F.** Verify that utility power is present at the microinverter by measuring line to line and line to ground at the Enphase Q Cable connector.
- G.** Visually check that the AC branch circuit connections (Enphase Q Cable and AC connections) are properly seated. Reseat if necessary. Check also for damage, such as rodent damage.
- H.** Make sure that any upstream AC disconnects, as well as the dedicated circuit breakers for each AC branch circuit, are functioning properly and are closed.
- I.** Disconnect and re-connect the Enphase DC connectors. The status LED of each microinverter will light solid green a few seconds after connection to DC power and then blink green six times to indicate normal start-up operation about two minutes after connecting to DC power. The LED subsequently resumes normal operation if the grid is present. See page 32 for normal LED operation.
- J.** Attach an ammeter clamp to one conductor of the DC cables from the PV module to measure microinverter current. This will be under one amp if AC is disconnected.

- K.** Verify the PV module DC voltage is within the allowable range shown in “Specifications” on page 39 of this manual.
- L.** Following the steps in Remove and Replace a Microinverter, remove the PV panel from the roof, and swap out the microinverter with one from a known good, adjacent AC module. If after checking Enlighten periodically (this may take up to 30 minutes), the problem moves to the adjacent module, this indicates that the PV module isn’t functioning correctly. If it stays in place, the problem is with the original microinverter. Contact Enphase Customer Support for help in reading the microinverter data and for help in obtaining a replacement microinverter, if needed
- M.** Check the DC connections between the microinverter and the PV module. The connection may need to be tightened or reseated. If the connection is worn or damaged, it may need replacement.
- N.** Verify with your utility that line frequency is within range.
- O.** If the problem persists, contact Customer Support at [enphase.com/en-us/support/contact](https://enphase.com/en-us/support/contact).

## Remove and Replace a Microinverter


If problems remain after following the troubleshooting steps listed previously, contact Enphase at [enphase.com/en-us/support/contact](https://enphase.com/en-us/support/contact). If Enphase authorizes a replacement, follow the steps below. To ensure the microinverter is not disconnected from the PV modules under load, follow the disconnection steps in the order shown:

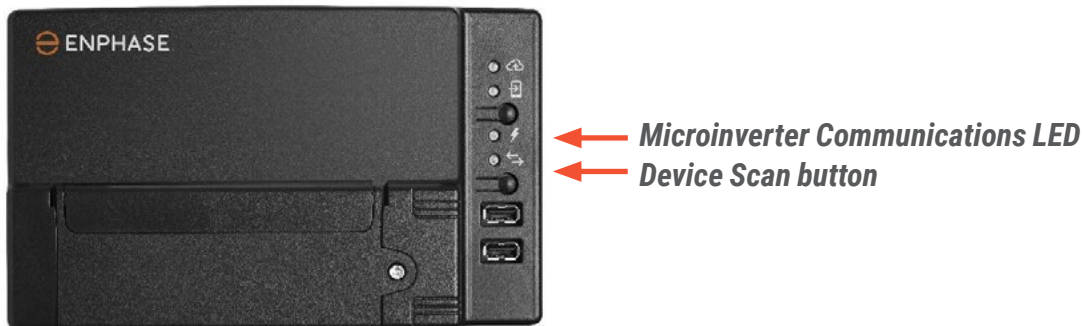
- A.** De-energize the AC branch circuit breaker.
- B.** Enphase AC connectors are tool-removable only. To disconnect the microinverter from the Enphase Q Cable, insert the disconnect tool and remove the connector.
- C.** Remove the AC Module from the roof per manufacturer instructions.
- D.** Once on the ground, disconnect the PV module DC connector from the microinverter using the Enphase disconnect tool.
- E.** Press each of the four clips to free the microinverter.
- F.** Snap new replacement microinverter into place.
- G.** Connect the PV Module DC connectors to the microinverter.
- H.** Scan the new serial number.



**NOTE:** The serial number of the replacement microinverter will differ from the serial number on the AC Module frame.

- I.** Bring the AC Module back onto the roof or other mounting location.
- J.** Connect the AC Module AC connector and DC Connector to the Q Cable.
- K.** Energize the AC branch circuit breaker, and verify operation of the replacement microinverter by checking the Status LED on the connector side of the microinverter.

- L.** On the ground, use the Installer Toolkit mobile app to delete the old microinverter serial number from the Enphase IQ Envoy database. In Installer Toolkit, once connected to the Envoy:
- Tap **Micros > Manage**.
  - Tap the checkbox ☐ to the right of the microinverter serial number that you replaced.
  - Tap to  delete the microinverter from the Envoy-S database.
- M.** Add the new microinverter serial number to the Envoy database by initiating a device scan using one of the following methods:
- Method 1: Initiate a scan using the Installer Toolkit mobile app**
    - In Installer Toolkit, once connected to the IQ Envoy, navigate to the Overview screen.
    - From the Overview screen, tap **Detected > Start Device Scan** to start a new 30-minute device scan.
    - If device scanning on the IQ Envoy is inhibited, the app displays **Scan Inhibited**. If you need to add more microinverters to the system when device scanning is inhibited on the IQ Envoy, you must use the Installer Toolkit scanning tool to provision them on the IQ Envoy, rather than using the IQ Envoy's device scanning function to discover them. If this is not possible and you need to enable device scanning on the IQ Envoy, contact Enphase Customer Support at [enphase.com/en-us/support/contact](https://enphase.com/en-us/support/contact).
  - Method 2: Use an IQ Envoy**
    - Press the **Device Scan** button on the IQ Envoy. The IQ Envoy begins a 15-minute scan to identify all of the microinverters deployed at the site. The Microinverter Communications LED flashes green during the scan.



- N.** Log in to Enlighten to use Enlighten's Array Builder to add the newly detected microinverter to the virtual array.
- O.** Ship the old microinverter to Enphase using the supplied return-shipping label.

## Enphase Q Cable Planning and Ordering

The Enphase Q Cable is a continuous length of 12 AWG, double insulated, outdoor-rated cable with integrated connectors for microinverters. These connectors are preinstalled along the Q Cable at intervals to accommodate varying PV module widths. The microinverters plug directly into the cable connectors.

The cabling is compatible with a variety of PV racking systems. For a list of approved PV racking systems, refer to the PV Racking Compatibility document on the Enphase website at [enphase.com/support](https://enphase.com/support).

### Connector Spacing Options

Q Cable is available in three connector spacing options. The gap between connectors on the cable can be 1.3 meters, 2.0 meters, or 2.3 meters. The 1.3 meter spacing is best suited for connecting PV modules installed in portrait orientation, while the 2.0 meter and 2.3 meter spacing allows you to install 60-cell and 72-cell PV modules in landscape orientation, respectively.

### Cabling Options

Ordering options include:

CABLE MODEL	CONNECTOR SPACING	PV MODULE ORIENTATION	CONNECTOR COUNT PER BOX
Q-12-10-240	1.3m (50")	Portrait	240
Q-12-17-240	2.0m (78")	Landscape (60-cell)	240
Q-12-20-200	2.3m (90")	Landscape (72-cell)	200

The Cabling System is flexible enough to adapt to almost any solar design. To determine the cable type you need, apply the following considerations:

- When mixing PV modules in both portrait and landscape orientation, you may need to transition between cable types. See the preceding table for available cable types.
- To transition between cable types, install a field wireable connector.
- In situations where portrait modules are widely spaced, you may need to use landscape spaced cables for the portrait-oriented PV modules and create loops of excess cable, if needed.



**WARNING: Do not form loops smaller than 12 cm (4.75") in diameter.**

## Grid Interconnection Details

Both the Enphase IQ 7 and the IQ 7+ Microinverter are grid support interactive inverters. This type of inverter is also known as a Grid Support Utility Interactive Inverter (GSUII). The IQ 7 and IQ 7+ also comply with California Rule 21 - 2016 and Hawaii Rule 14H - 2017.

### Grid Profiles

IQ 7 and IQ 7+ Microinverters have field-adjustable voltage and frequency trip points. Trip points are input voltage and frequency values that trigger the microinverters to shut down when the values are exceeded. If local regulations require adjustments to these trip points, or if the grid profile was not set up during registration, the installer can set up the system to use an alternate Grid Profile (set of trip points).



**NOTE:** Only an authorized installer, following the requirements of the local electrical utility, is allowed to make Grid Profile adjustments.



**NOTE:** Grid profile changes are applied only after a microinverter is detected.

In some regions and in some situations, microinverter trip points may be adjusted to account for high grid voltage or for local conditions.

Grid profile management tasks include:

- Set the grid profile for your region
- View or verify current trip point settings
- Generate a report for confirmation of site settings to the utility or other authority

To modify the grid profile or the parameters within the grid profile, installers must log in to their Enlighten account using their credentials.

The following tables show the parameter settings for the grid profiles available for North America:



**NOTE:** Simultaneous use of Fixed Power Factor and Volt/VAr is not supported.

### Manufacturer's Stated Accuracy

MEASUREMENT	DEFAULT TOLERANCE OF MEASUREMENT
Volts	+/- 1%
Amps	+/- 2%
Watts	+/- 5%
VAr	+/- 3%
Displacement power factor	+/- 2%
Hz	+/- 0.1 Hz
Time	The greater of +/- 2 cycles or 0.1% of total clearing time

# Specifications

See specifications in the following tables for:

- IQ7+
- Enphase Q Cable

## Enphase IQ7+

IQ7+ MICROINVERTER PARAMETERS				
TOPIC	UNIT	MIN	TYPICAL	MAX
DC PARAMETERS				
Peak Power Tracking Voltage	V	27	36	45
Operating range	V	16		62
Maximum DC input voltage	V			62
Minimum / Maximum start voltage	V	22		62
Maximum DC input short circuit current (module Isc)	A			15
Overvoltage class DC port			II	
DC Port backfeed under single fault	A			0
PV array configuration	1 x 1 ungrounded array; No additional DC side protection required; AC side protection requires max 20 A per branch circuit			
AC PARAMETERS				
Maximum Continuous AC output Power (-40 to +65°C)	VA	280		
Peak output power	VA	290		
Power factor (adjustable)		1/0.7 leading, 0.7 lagging		
Nominal AC output voltage range	Vms Vms	211 183	240	264 229
240 VAC (single phase)				
208 VAC (single phase)				
Maximum continuous output current	A A		1.21 1.39	
240 VAC (single phase)				
208 VAC (single phase)				
Nominal frequency	Hz		60	
Extended frequency range	Hz	47		68
Maximum AC output over current protection device	A	20		
Maximum AC output fault current & duration	Arms over 3 cycles	5.8		
High AC Voltage trip limit accuracy	%	±1.0		
Low AC Voltage trip limit accuracy	%	±1.0		
Frequency trip limit accuracy	%	±1.0		
Trip time accuracy	milliseconds	±33		
Overvoltage class AC port			III	
AC port backfeed under single fault	A		0	

IQ7+ MICROINVERTER PARAMETERS				
TOPIC	UNIT	MIN	TYPICAL	MAX
Power factor at rated power			1.0	
MISCELLANEOUS PARAMETERS				
Maximum microinverters per 20 amp (max) AC branch circuit				13
240 VAC (single phase)				11
208 VAC (single phase)				
CEC weighted efficiency	%			
240 VAC (single phase)		97.0		
208 VAC (single phase)		96.5		
Static MPPT efficiency (weighted, ref EN 50530)	%	99.5		
Total harmonic distortion	%			5
Ambient temperature range	°C	-40		+65
Night tare loss	mW			50
Storage temperature range	°C	-40		+85
FEATURES AND SPECIFICATIONS				
Dimensions not including mounting bracket (approximate)	219 mm x 191 mm x 37.9 mm			
Connector type	MC-4 or Amphenol UTX			
Weight	1.5 kg (3 lbs.)			
Environmental Category / UV Exposure rating	Outdoor NEMA 250, type 6 (IP67)			
Cooling	Natural convection - no fans			
Relative humidity range	4% to 100% condensing			
Approved for wet locations	Yes			
Pollution Degree	PD3			
Maximum altitude	2000 meter (6561 feet)			
Communication	Power line			
Compliance	UL1741/IEEE1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01			
Grounding	The DC circuit meets the requirements for ungrounded PV arrays in NEC. Ground fault protection (GFP) is integrated into the class II double insulated microinverter.			
Monitoring	Enlighten Manager and MyEnlighten monitoring options require an Enphase IQ Envoy			
Integrated DC disconnect	The DC connector has been evaluated and approved for use as the load-break disconnect required by NEC 690.			
Integrated AC disconnect	The AC connector has been evaluated and approved for use as the load-break disconnect required by NEC 690.			



## Q Cable Specifications

SPECIFICATIONS	VALUE
Voltage rating	600V
Voltage withstand test (kV/1 min)	AC 3.0
Max DC conductor resistance (20°C) (Ω/km)	5.433
Insulation resistance (20°C)	≥20M (Ω/km)
System temperature range (ambient)	-40°C to +65°C (-40°F to 149°F)
Cable temperature rating	90°C Dry / 90°C Wet
Cable rating	DG
Certification	UL 3003, TC-ER equivalent
Flame test rating	FT4
Cable conductor insulator rating	THHN/THWN-2
Environmental protection rating	IEC 60529 IP67 NEMA 6
UV resistance	720h
Compliance	RoHS, OIL RES I, CE, UV Resistant, combined UL for Canada and United States
Conductor size	12 AWG
Maximum loop size	12 cm (4.75")
Drop connector dimensions	11.8 cm x 6.0 cm x 3.2 cm (4.64" x 2.36" x 1.25")
Terminator cap dimensions	3.6 cm diameter x 5.1 cm tall (1.4" x 2")

## Enphase Connector Ratings

Enphase connectors in the following table have a maximum current of 20A, a maximum OCPD of 20 A, and an ambient temperature range of -40° to +79° C (-40° to +174.2° F).

PART NUMBERS	MODEL	MAXIMUM VOLTAGE
840-00387	Q-12-10-240	277 VAC
840-00388	Q-12-17-240	277 VAC
840-00389	Q-12-20-200	277 VAC
840-00800	Q-DCC-7	300 VDC
840-00385	Q-DCC-2	100 VDC
840-00386	Q-DCC-5	100 VDC

Enphase Installation Map

To Sheet / A la hoja de: ↑

Panel Group/Grupo de los paneles:  
Azimuth/Azmut:  
Tilt/Inclinación:  
Sheet/hoja \_\_\_\_\_ of/de \_\_\_\_\_

Customer/Cliente:

Installer/Instalador:

N S E W  
N S E O

1

2

3

A			
B			
C			
D			
E			
F			
G			
H			
J			
K			
L			
M			

To Sheet / A la hoja de: ↓

Enphase

Scan completed map and upload it to Enphase. Click "Add a New System" at <https://enlighten.enphaseenergy.com>. Use this map to build the virtual array in Enlighten's Array Builder.

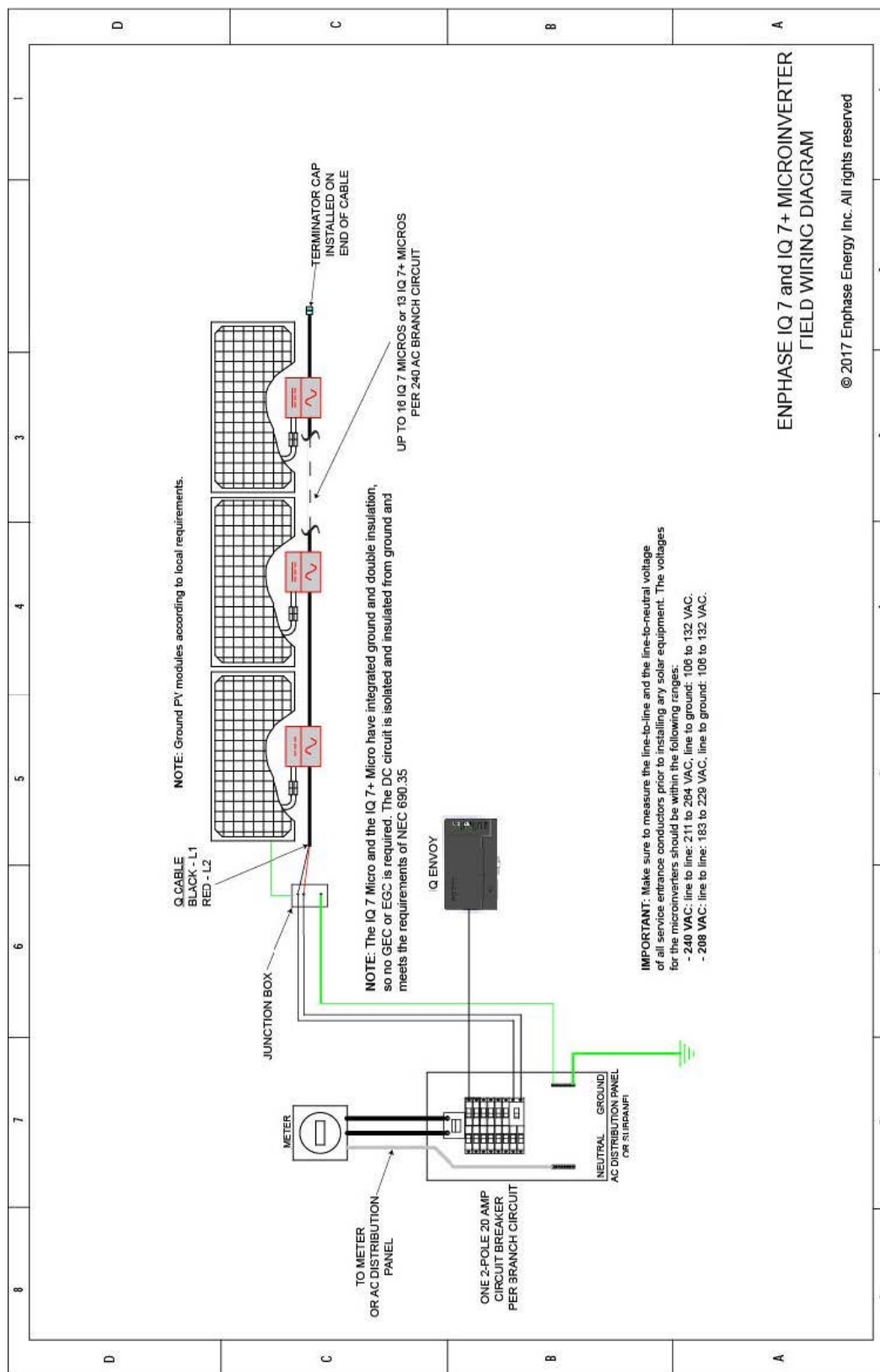
Escanea al mapa completo y carguelo en Enphase. Haga clic en "Añadir nuevo sistema" en <https://enlighten.enphaseenergy.com>. Utilice esta mapa para crear el conjunto de paneles virtual en el Creador de conjuntos de paneles de Enlighten.

Enphase Serial Number Label / Número de serie de Enphase

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## Sample Wiring Diagram



# SOLARIA<sup>®</sup>

Power Unlocked by Design

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