




## M215 (M215-60) Safety




### Important Safety Information

This document contains important instructions to use during installation and maintenance of the Enphase M215 Microinverter™. To reduce the risk of electrical shock, and to ensure the safe installation and operation of the Enphase Microinverter, follow these instructions. The following safety symbols and information indicate dangerous conditions and important safety instructions.











### Product Labels








	Warning hot surface.
	<b>DANGER:</b> Risk of electrical shock.
	Refer to product instructions.

### Safety and Advisory Symbols

	<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>NOTE:</b> This indicates information particularly important for optimal system operation. Follow instructions closely.

### Safety Instructions

	<b>DANGER:</b> Before installing or using the Enphase Microinverter, read all instructions and cautionary markings in the technical description and on the Enphase Microinverter System and the photovoltaic (PV) equipment.
	<b>DANGER:</b> 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.
	<b>DANGER:</b> Risk of Electrical Shock. Be aware that installation of this equipment includes risk of electric shock. Do not install the AC junction box without first removing AC power from the Enphase System.
	<b>DANGER:</b> The Engage Cable terminator cap must not be installed while power is connected.
	<b>WARNING:</b> Normally grounded conductors may be ungrounded and energized when a ground fault is indicated.
	<b>WARNING:</b> Always disconnect AC power before disconnecting the PV module wires from the Enphase Microinverter. The AC connector of the microinverter is suitable as a disconnecting means.
	<b>WARNING:</b> If the AC cable on the microinverter is damaged, do not install the unit.
	<b>WARNING:</b> You must match the DC operating voltage range of the PV module with the allowable input voltage range of the Enphase Microinverter: 16-36V.
	<b>WARNING:</b> The maximum open circuit voltage of the PV module must not exceed the specified maximum input voltage of the Enphase Microinverter: 45V DC.
	<b>WARNING:</b> The M215 may be paired only with a 60-cell PV module.

	<b>WARNING:</b> The M215 has field-adjustable voltage and frequency trip points that you may need to set depending upon local requirements. Only an authorized installer with the permission and following requirements of the local electrical authorities should make adjustments.
	<b>WARNING:</b> The body of the Enphase Microinverter is the heat sink. Under normal operating conditions, the temperature is 15°C above ambient, but under extreme conditions the microinverter can reach a temperature of 80°C (176°F). To reduce risk of burns, use caution when working with microinverters.
	<b>WARNING:</b> Only use electrical system components approved for wet locations.
	<b>WARNING:</b> Only qualified personnel should troubleshoot, install, or replace Enphase Microinverters or the Engage Cable and Accessories.
	<b>WARNING:</b> Never disconnect the DC wire connectors under load. Ensure that no current is flowing in the DC wires prior to disconnecting. If necessary, use an opaque covering to cover the PV module prior to disconnecting the PV module.
	<b>WARNING:</b> Make sure protective sealing caps have been installed on all unused AC connectors. Unused AC connectors are live when the system is energized by the grid. Sealing caps may not be reused.
	<b>WARNING:</b> Ensure that all AC and DC wiring is correct and that none of the AC or DC wires are pinched or damaged. Ensure that all AC junction boxes are properly closed.


**140-00053-01**

⚠	<b>WARNING:</b> The microinverter must be installed under the module, out of rain and sun. Do not mount the microinverter in a position that allows long-term exposure to direct sunlight or in a vertical orientation that allows water to collect in the DC connector recess.						
⚠	<b>WARNING:</b> Installing the microinverter black side up or vertically, with the DC connectors facing up, is not permitted.						
⚠	<b>WARNING:</b> Do not leave AC connectors on the Engage Cable uncovered for an extended period. If you do not plan to replace the microinverter immediately, you must cover any unused connector with a sealing cap. Sealing caps may not be reused.						
⚠	<p><b>WARNING:</b> Do NOT exceed the maximum number of microinverters in an AC branch circuit as listed in the table below. Each branch circuit must be protected by a dedicated circuit breaker of 20 A or less.</p> <table> <tr> <th>Service type</th><th>Max M215s per branch</th></tr> <tr> <td>240 VAC split phase</td><td>17</td></tr> <tr> <td>208 VAC three phase</td><td>25</td></tr> </table>	Service type	Max M215s per branch	240 VAC split phase	17	208 VAC three phase	25
Service type	Max M215s per branch						
240 VAC split phase	17						
208 VAC three phase	25						
⚠	<b>WARNING:</b> DO NOT connect Enphase Microinverters to the grid or energize the AC circuit(s) until you have completed all of the installation procedures and have received prior approval from the electrical utility company.						
⚠	<b>WARNING:</b> Do not attempt to repair the Enphase Microinverter; it contains no user-serviceable parts. If it fails, contact Enphase customer service to obtain an RMA (return merchandise authorisation) number and start the replacement process. Tampering with or opening the Enphase Microinverter will void the warranty.						
⚠	<b>WARNING:</b> Be aware that only qualified personnel must connect the Enphase Microinverter to the utility grid.						
⚠	<b>WARNING:</b> The Engage Cable terminator cap is intended for one-time use only. If you open the terminator after initial installation, the latching mechanism is destroyed and the terminator cap cannot be used again. If the latching mechanism is defective, the terminator must not be used. The latching mechanism must not be circumvented or manipulated.						
⚠	<b>WARNING:</b> When stripping the sheath from the Engage Cable, make sure that the conductors are not damaged. If the exposed wires are damaged, the system may not function properly.						
⚠	<b>WARNING:</b> Perform all electrical installations in accordance with all applicable local electrical codes and the National Electrical Code (NEC), ANSI/NFPA 70.						
✓	<b>NOTE:</b> Check the labeling on the Engage Cable drop connectors to be sure that the cable matches the electrical utility service at the site. Use 208 VAC (208 VAC three-phase) Engage Cable at sites with three-phase 208 VAC service, or use 240 VAC Engage Cable at sites with 240 VAC single-phase service.						
✓	<p><b>NOTE:</b> When installing the Engage Cable and accessories, adhere to the following:</p> <ul style="list-style-type: none"> <li>Do not expose the connection to directed, pressurized liquid (water jets, etc.).</li> <li>Do not expose the connection to continuous immersion.</li> <li>Do not expose the AC connector to continuous tension (e.g., tension due to pulling or bending the cable near the connection).</li> <li>Use only the connectors and cables provided.</li> <li>Do not allow contamination or debris in the connectors.</li> <li>Use the cable and connectors only when all parts are present and intact.</li> <li>Fit the connections using only the prescribed tools.</li> <li>Use the terminator to seal the conductor end of the Engage Cable; no other method is allowed.</li> </ul>						

✓	<b>NOTE:</b> When installing the Engage Cable, secure any loose cable to minimize tripping hazard.
✓	<b>NOTE:</b> Using a power screwdriver to tighten the fastener and/or the grounding cleat screw is not recommended due to the risk of thread galling.
✓	<b>NOTE:</b> There are two release-holes in the drop connector on the cable. These are not for mounting but are used to disconnect the connector. Keep these release holes clear and accessible.
✓	<b>NOTE:</b> The status LED on the underside of each microinverter will blink green six times to indicate normal start-up operation approximately one minute after DC power is applied.
✓	<b>NOTE:</b> The AC output neutral is not bonded to ground inside the microinverter.
✓	<b>NOTE:</b> Protection against lightning and resulting voltage surge must be in accordance with local standards.
✓	<b>NOTE:</b> Many PV modules have a central stiffening brace. In these cases, do <b>not</b> position the connector and microinverter at the exact center of the PV module. Instead, position the drop connectors so that the connectors do not conflict with the braces.
✓	<b>NOTE:</b> If you need to remove a sealing cap, you must use the Enphase disconnect tool or a #3 Phillips screwdriver. Sealing caps may not be reused.
✓	<b>NOTE:</b> The M215-60-2LL works with split phase 240 VAC utility service or with three phase 208 VAC utility service
✓	<b>NOTE:</b> Do not use the shipping cap to cover unused connectors. The shipping cap does not provide an adequate environmental seal. Enphase sealing caps are required to protect against moisture ingress.
✓	<b>NOTE:</b> Completely install all microinverters and all system AC connections prior to installing the PV modules.



## Installation Map

You can build the system map manually, or you can use the ArrayGun feature from the Enphase Installer Toolkit to easily build and configure a system. For more information, refer to <http://enphase.com/products/arraygun/>.

To manually build the Installation Map:

- Peel the removable serial number label from each microinverter and affix it to the respective location on the installation map.
- Peel the label from the Envoy and affix it to the installation map.
- Log in to Enlighten.
- Scan the installation map and upload it to the Activation form online.
- Use Array Builder to create the virtual array using the installation map as your reference.
- To see the array builder demo, refer to <http://enphase.com/support/videos>.

To Sheet: \_\_\_\_\_ ↗

Panel Group: Azimuth: Tilt:		Customer information:				Installer information:			N S E W (circle one)	
sheet _____ of _____		1	2	3	4	5	6	7		
A										
B										
C										
D										
E										
F										
G										
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Scan completed map and upload it to Enphase. Click  
“Add New Activation” at [www.enlighten.enphaseenergy.com](http://www.enlighten.enphaseenergy.com).  
Use this map to build the virtual array in Enlighten’s Array Builder.

Envoy Serial Label



INSTALLATION MAP

DOCUMENT NUMBER:  
140-00003  
REVISION:  
04

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## Installing the M215 Microinverter (M215-60)

Read and follow all warnings and instructions in the *M215 Installation and Operation Manual* at <http://www.enphase.com/support> before installing the M215 Microinverter™.

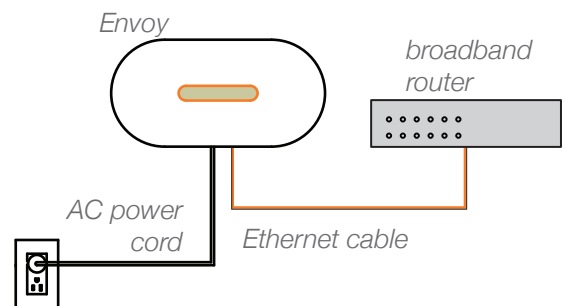
**1**

### Install the Envoy Communications Gateway

Install according to the steps in the *Envoy Quick Install Guide*. Leave the Envoy running while you install the microinverters so that any required Envoy software upgrade completes.



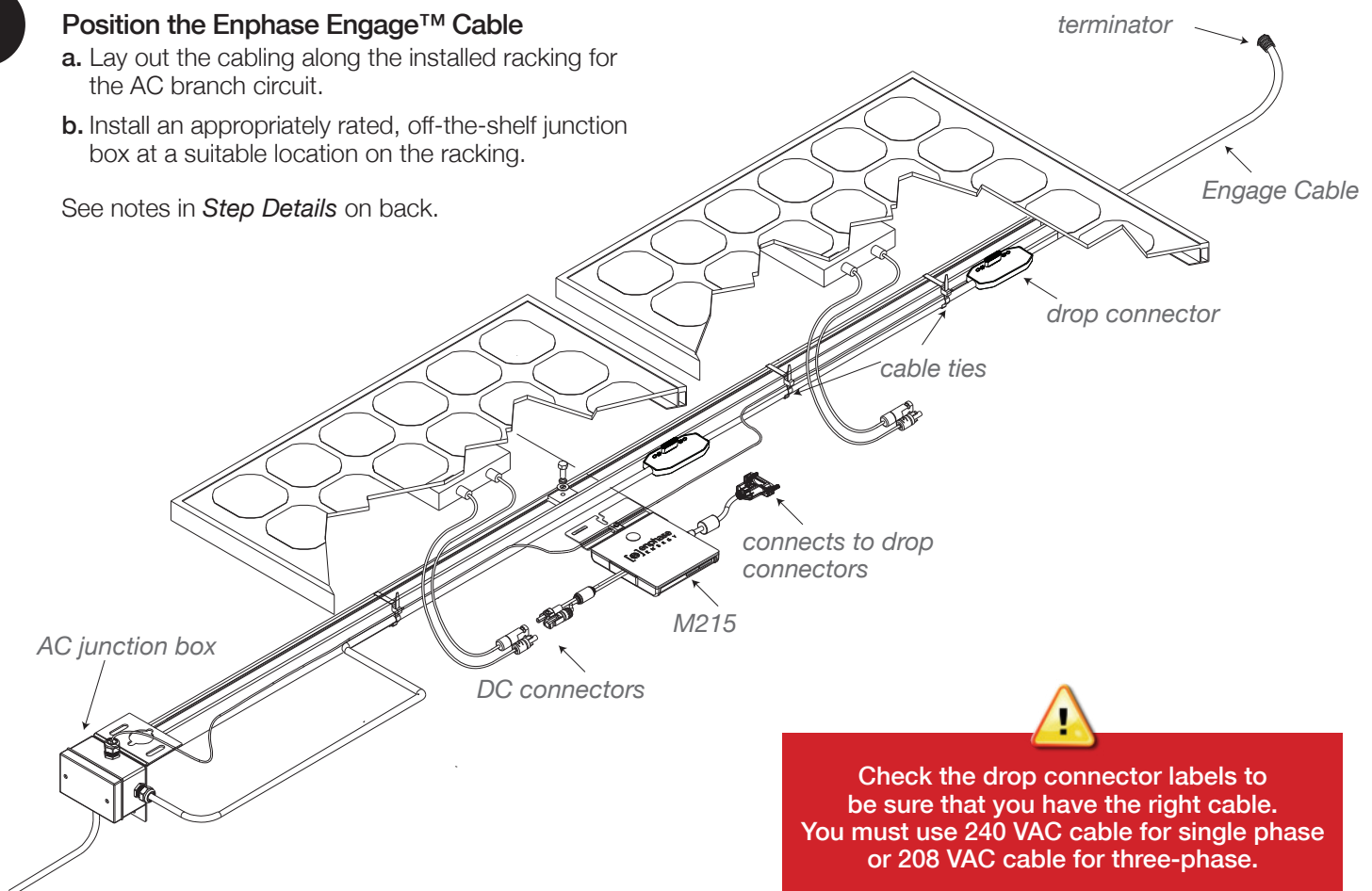
**Warning:** Do not remove power from the Envoy if the LCD displays: "Upgrading. . . Do Not Unplug."

**2**

### Position the Enphase Engage™ Cable

- Lay out the cabling along the installed racking for the AC branch circuit.
- Install an appropriately rated, off-the-shelf junction box at a suitable location on the racking.

See notes in *Step Details* on back.

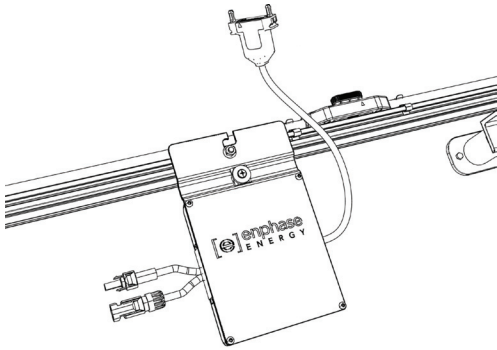


Check the drop connector labels to be sure that you have the right cable. You must use 240 VAC cable for single phase or 208 VAC cable for three-phase.

# M215 Microinverter Quick Install Guide

## 3 Attach the Microinverters to the PV Racking

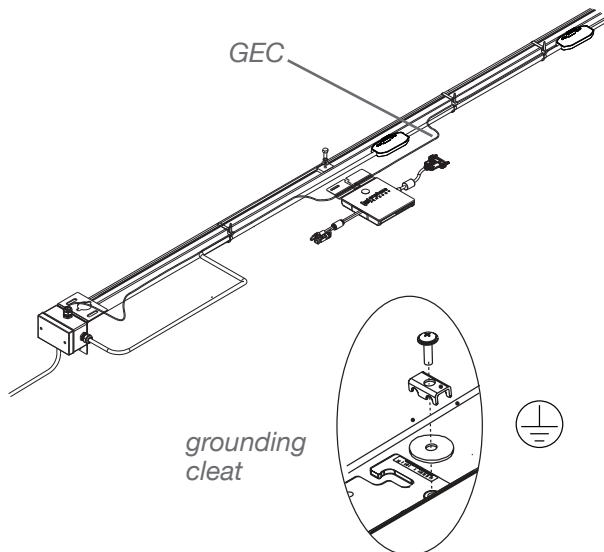
- a. Mark the approximate centers of each PV module on the PV racking. See notes in *Step Details* on back.



- b. Mount the microinverters under the PV module, away from rain and sun. Do not mount the microinverter in a position that allows long-term exposure to direct sunlight or in a vertical orientation that allows water to collect in the DC connector recess.
- c. Torque the microinverter fasteners as follows:
- 5 N m (45-50 in-lbs) for 6 mm (1/4") hardware
  - 9 N m (80-85 in-lbs) for 8 mm (5/16") hardware

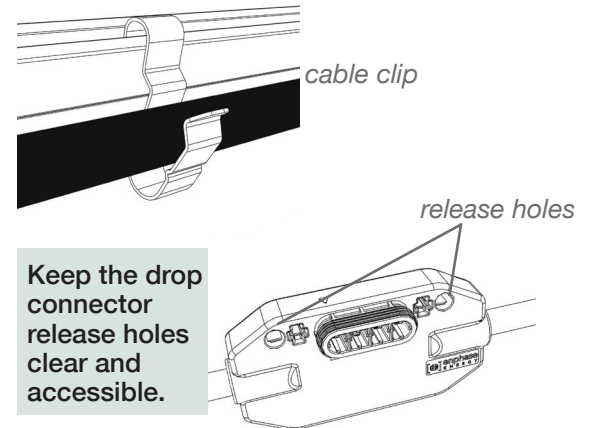
## 4 Ground the System

- a. Route a continuous GEC (grounding electrode conductor) through each of the microinverters to the NEC-approved AC grounding electrode. See notes in *Step Details* on back.
- b. Torque each 10/32 grounding cleat screw to 2 N m (20-25 in-lbs).



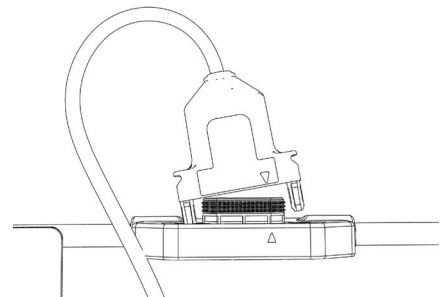
## 5 Dress the Cable

- a. Attach the cabling to the rack using cable clips or tie wraps.
- b. Dress any excess cabling in loops so that it does not contact the roof.

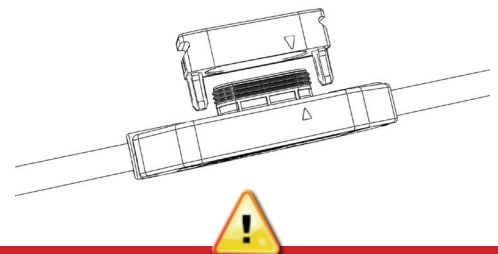


## 6 Connect the Microinverters

- a. Remove and discard the temporary shipping cap from the cable connector and connect the microinverter. Listen for two clicks as the connectors engage.



- b. Cover any unused connectors with sealing caps. Listen for two clicks as the connectors engage. See notes in *Step Details* on back.

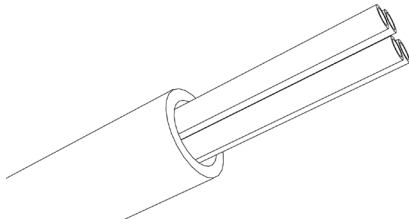


**Do not use shipping caps to cover unused connectors. The shipping cap does not provide an adequate environmental seal.**

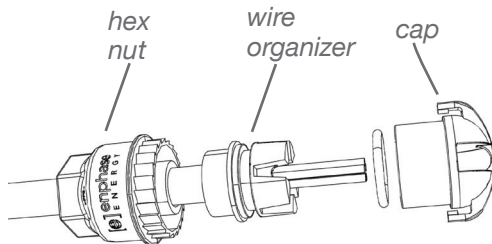
7

## Terminate the Unused End of the Cable

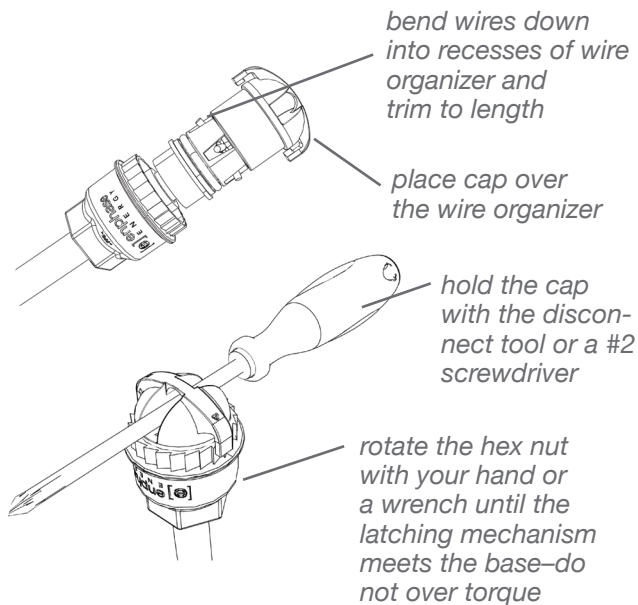
- Remove 60 mm (2.5") of the cable sheath from the conductors.



- Check that all terminator parts are present.



- Slide the hex nut onto the cable.
- Insert the cable end all the way into the wire organizer (up to the stop).
- Attach the cap.



- Attach the terminated cable end to the PV racking with a cable clip or tie wrap.

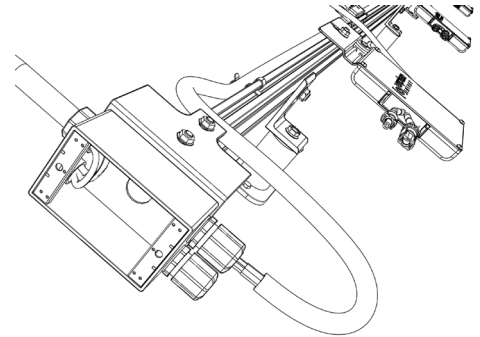


Never unscrew the hex nut. This action can twist and damage the cable.

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## Connect the Cable to the AC Junction Box

Connect the cable into the AC branch circuit junction box. See notes in **Step Details** on back.

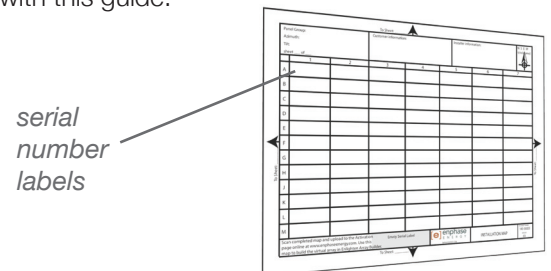


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## Complete the Installation Map

Build the map manually, or you can use the ArrayGun feature from the Enphase Installer Toolkit to build the system. For more information, go to <http://enphase.com/products/arraygun/>.

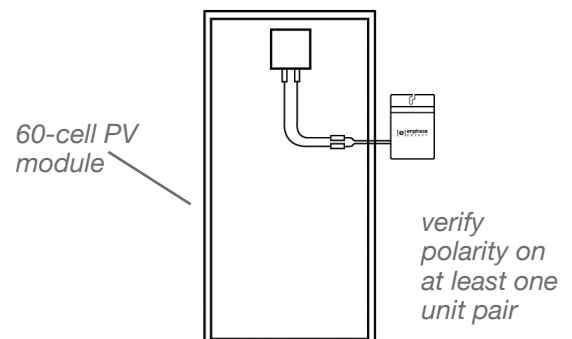
To manually build the map, peel the removable serial number label from each microinverter and affix it to the respective location on the map included with this guide.



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## Connect the PV Modules

- Mount the PV modules above the microinverters.
- Connect the DC leads of each PV module to the DC input connectors of their corresponding microinverter.





## 11

## Energize the System

- Turn ON the AC disconnect or circuit breaker for the branch circuit.
- Turn ON the main utility-grid AC circuit breaker. Your system will start producing power **after a five-minute wait time**.



status LED

One minute after DC power is applied, the status LED on the underside of each M215 will blink green six times to indicate normal start up.

## 12

## Next Step

Refer to the *Envoy Communications Gateway Quick Install Guide* for information on Envoy® installation and Enlighten® access.

## Step Details

2

**NOTE:** Verify that AC voltage at the site is within range:

240 Volt AC Split Phase		208 Volt AC Three Phase	
L1 to L2	211 to 264 VAC	L1 to L2 to L3	183 to 229 VAC
L1, L2, to N	106 to 132 VAC	L1, L2, L3 to N	106 to 132 VAC

**WARNING:** Only use electrical system components approved for wet locations.

**WARNING:** Do NOT exceed the maximum number of microinverters in an AC branch circuit as listed in the table below. Each branch circuit must be protected by a dedicated circuit breaker of 20 A or less.

Service type	Max M215s per branch
240 VAC split phase	17
208 VAC three phase	25

**WARNING:** Size the AC wire gauge to account for voltage drop for both the branch circuit and all upstream conductors leading back to the PCC. See *Circuit Calculations for M215* at <http://www.enphase.com/support>.

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**WARNING:** Allow a minimum of 1.9 cm (0.75") between the roof and the microinverter. Also allow 1.3 cm (0.50") between the back of the PV module and the top of the microinverter.

**NOTE:** Torque the microinverter fasteners to the values shown. Do not over torque:

- 6 mm (1/4") mounting hardware – 5 N m (45-50 in-lbs)
- 8 mm (5/16") mounting hardware – 9 N m (80-85 in-lbs)

Using a power screwdriver is not recommended due to the risk of thread galling.

4

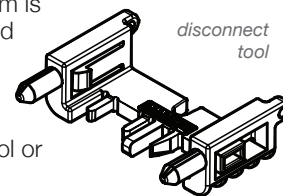
**NOTE:** The AC output neutral is not bonded to ground inside the microinverter.

**NOTE:** The M215 grounding cleat can accommodate a 6 to 8 AWG conductor. Torque the 10/32 grounding cleat screw to 2 N m (20-25 in-lbs). Do not over torque. Using a power screwdriver is not recommended due to the risk of thread galling.

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**WARNING:** Install sealing caps on all unused AC connectors as these become live when the system is energized by the utility. The IP67-rated sealing caps are required for protection against moisture ingress.

**NOTE:** To remove a sealing cap, you must use the Enphase disconnect tool or a #2 Phillips screwdriver.



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**NOTE:** The Engage Cable uses the following wiring scheme.

240 Volt AC, Split Phase Wiring	208 Volt AC, Three Phase Wiring
Black – L1 Red – L2 White – Neutral Green – Ground	Black – L1 Red – L2 Blue – L3 White – Neutral Green – Ground

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