

Enphase M250 and M215 Microinverters



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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 Enphase website (enphase.com/support) for the latest information.

To ensure optimal reliability and to meet warranty requirements, the Enphase Microinverter must be installed according to the instructions in this manual. For warranty text refer to enphase.com/warranty.

For Enphase patent information refer to enphase.com/company/patents/.

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Audience

This manual is intended for use by professional installation and maintenance personnel.

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Important Safety Information

Read this First

This manual contains important instructions for use during installation and maintenance of the Enphase M-Series Microinverter™ (including the M215 Microinverter™ and the M250 Microinverter™).

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.) in white on red background.

Product Labels

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



WARNING: Hot surface.



DANGER: Refer to safety instructions.



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 Enphase M-Series Microinverter™, the following safety symbols appear throughout this document to indicate dangerous conditions and important safety instructions.

	DANGER:	This indicates a hazardous situation, which if not avoided, will result in death or serious injury.
	WARNING:	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.
	WARNING:	This indicates a situation where failure to follow instructions may result in burn injury.
	NOTE:	This indicates information that is very important for optimal system operation. Follow instructions closely.

Safety Instructions

General Safety

	DANGER: Risk of electric shock. Risk of fire.	Only use electrical system components approved for wet locations.
		Only qualified personnel should install, troubleshoot, or replace Enphase Microinverters or the Engage Cable and Accessories.
		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.
		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.
	DANGER: Risk of electric shock.	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. Do not install the AC junction box without first removing AC power from the Enphase System.
		The DC conductors of this photovoltaic system are ungrounded and may be energized.
		Always de-energize the AC branch circuit before servicing. Never disconnect the DC connectors under load.
	WARNING: Risk of equipment damage.	Before installing or using the Enphase Microinverter, read all instructions and cautionary markings in the technical description, on the Enphase Microinverter System, and on the photovoltaic (PV) equipment.
		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. Only qualified personnel should connect this system to the utility grid.
	NOTES:	To ensure optimal reliability and to meet warranty requirements, the Enphase Microinverter System must be installed 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 Enphase Microinverter.
		Protection against lightning and resulting voltage surge must be in accordance with local standards.
		Many PV modules have a central stiffening brace. In these cases, do not 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.
		Completely install all microinverters and all system AC connections prior to installing the PV modules.

Microinverter Safety

	DANGER: Risk of skin burn.	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. To reduce risk of burns, use caution when working with microinverters.
	DANGER: Risk of fire.	Risk of fire. Modules paired with the M250 or M215 must be labeled “PV Wire” or “PV Cable”.
	DANGER: Risk of electric shock. Risk of fire.	If the AC cable on the microinverter is damaged, do not install the unit. 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 authorization) number and start the replacement process. Tampering with or opening the Enphase Microinverter will void the warranty.
	WARNING: Risk of equipment damage.	Install the microinverter under the PV module to avoid direct exposure to rain, UV, and other harmful weather events. Do not mount the microinverter upside down or in a vertical position that allows water to collect in the DC connector recess as it may have a harmful effect on the long-term endurance of the unit. Do not expose the AC or DC connectors (on the Engage Cable connection, PV module, or the microinverter) to harmful weather events before the connectors are mated as it may result in weather rated damage to the connection. 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. The maximum open circuit voltage of the PV module must not exceed the specified maximum input DC voltage of the Enphase Microinverter. You must match the DC operating voltage range of the PV module with the allowable input voltage range of the Enphase Microinverter. The Enphase Microinverter functions only with a standard, compatible PV module with appropriate fill-factor, voltage, and current ratings. Unsupported devices include smart PV modules, fuel cells, wind or water turbines, DC generators, and non-Enphase batteries, etc. These devices do not behave like standard PV modules, so operation and compliance is not guaranteed. These devices may also damage the Enphase Microinverter by exceeding its electrical rating, making the system potentially unsafe.
	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 adjustments. The Enphase Microinverter works with single-phase or three-phase electrical service.

Engage Cable and Accessory Safety

	DANGER: Risk of electric shock. Risk of fire.	The Engage Cable terminator cap must not be installed while power is connected. When stripping the sheath from the Engage 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 Engage Cable uncovered for an extended period. If you do not replace the microinverter immediately, you must cover any unused connector with a sealing cap. Do not reuse sealing caps. 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. Do not reuse sealing caps.
	WARNING:	Use the terminator only once. If you open the terminator following installation, the latching mechanism is destroyed. Do not reuse the terminator. Do not circumvent or manipulate the latching mechanism.
	NOTES:	When installing the Engage Cable, secure any loose cable to minimize tripping hazard. 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 Engage Cable at sites with three-phase service, or use 240 VAC Engage Cable at sites with single-phase service. 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. When looping the Engage Cable, do not form loops smaller than 4.75 in. (12 cm) in diameter. If you need to remove a sealing cap, you must use the Enphase disconnect tool or a screwdriver. Do not reuse sealing caps. 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. When installing the Engage 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 cap or cable connections 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 and cables 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.
 - Make sure that all terminator cap seals are seated correctly in the wire organizer.
 - Fit the terminator cap using only the prescribed tools and in the prescribed manner.
 - Use the terminator to seal the conductor end of the Engage Cable; no other method is allowed.
-

The Enphase Microinverter System

This manual details the safe installation and operation of the Enphase Microinverter. The Enphase Microinverter System is the world's most technologically advanced inverter system for use in utility-interactive (grid-connected) applications. It maximizes energy harvest, increases system reliability, and simplifies design, installation and management.

The productive, reliable, smart, and safe Enphase Microinverter System includes the:

- Enphase M-Series Microinverter
- Enphase Envoy™ or Enphase Envoy-S™. The Envoy is a communication device that provides network access to the PV array. The Envoy collects production and performance data from the microinverters over on-site AC power lines and transmits the data to Enlighten through an Internet or cellular modem connection. The Envoy collects production and performance data from the microinverters, and then forwards that data to Enlighten. The Envoy is capable of monitoring up to 600 Enphase Microinverters. For details, refer to the **Envoy Installation and Operations Manual** or the **Envoy-S Installation and Operations Manual**.
- Enphase Enlighten™ web-based monitoring and management software. 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.
- 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 find details in the *Installer Toolkit Operation Manual*. You can use the app to:
 - Connect to the Envoy or Envoy-S over a wireless network for faster system setup and verification
 - View and email a summary report that confirms a successful installation
 - Scan microinverter serial numbers and sync system information with Enlighten monitoring software

With the Enphase M-Series Microinverters, the DC circuit within the microinverter is isolated and insulated from ground. Ground fault protection (GFP) is integrated into the microinverter. Because of this, the fourth generation microinverters do not require a grounding electrode conductor (GEC). As a result, it takes less time to install than other microinverters, saves money, and increases safety

If you are installing the original M215 (M215-60-2LL-S22), this microinverter requires a GEC or other compliant grounding method as described in “Grounding Considerations” on page 11.



NOTE: To ensure optimal reliability and to meet warranty requirements, the Enphase Microinverter must be installed according to the instructions in this manual.

How the Enphase Microinverter Works

The Enphase Microinverter converts the DC output of the PV module into grid-compliant AC power. In addition, the Enphase Microinverter maximizes energy production by using a sophisticated Maximum Power Point Tracking (MPPT) algorithm. Each Enphase Microinverter individually connects 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 Envoy and provide an Ethernet connection to a broadband router or modem, the Enphase 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). The microinverter housing is designed for outdoor installation and complies with the NEMA 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.

Ease of Design

PV systems using Enphase Microinverters are very simple to design and install. You will not need string calculations, and you can install individual PV modules in any combination of PV module quantity, type, age and orientation. You won't need to install cumbersome traditional inverters. Each microinverter quickly mounts on the PV racking, directly beneath each PV module. Low voltage DC wires connect from the PV module directly to the co-located microinverter, eliminating the risk of personnel exposure to dangerously high DC voltage.

Planning for Microinverter Installation

The Enphase Microinverter is compatible with most 60-cell PV modules and installs quickly and easily. It ships with integrated DC and AC cables and connectors. The DC connectors attach to the PV module, while the AC connector attaches directly to the Engage Cable. No additional cabling is needed.

The Engage Cable is available in two connector spacing options and two voltage types to meet varying site requirements. For Engage Cable ordering information, see “Engage Cable Planning and Ordering” on page 35.

Compatibility

The Enphase M250 and M215 Microinverters are **electrically compatible** with PV modules as listed in the following table. For specifications, see “Technical Data” on page 38 of this manual. You can refer to the Enphase Compatibility Calculator at: enphase.com/en-us/support/module-compatibility to verify PV module electrical compatibility. To ensure **mechanical compatibility**, be sure to order the correct connector type for both microinverter and PV module from your distributor.



WARNING: Risk of fire. The PV module DC conductors must be labeled “PV Wire” or “PV Cable” to comply with NEC 690.35(D) for Ungrounded PV Power Systems.

Model Number	Works with PV Module Type	PV Module Connector Type
M250-72-2LL-S22	60-cell or 72-cell modules	MC-4 locking connector
M250-72-2LL-S25	60-cell or 72-cell modules	Amphenol H4 connector
M250-72-2LL-S22-US	60-cell or 72-cell modules	MC-4 locking connector
M250-60-2LL-S22 ¹	60-cell modules	MC-4 locking connector
M250-60-2LL-S25 ¹	60-cell modules	Amphenol H4 connector
M215-60-2LL-S22-IG ¹	60-cell modules	MC-4 locking connector
M215-60-2LL-S22 ²	60-cell modules	MC-4 locking connector

Grounding Considerations

With Enphase’s fourth generation, integrated ground (IG) microinverters, the DC circuit within the microinverter is isolated and insulated from ground. Ground fault protection (GFP) is integrated into the microinverter. Because of this, the fourth generation microinverters do not require a GEC, take less time to install than other microinverters, save money, and increase safety.

If you are installing the original M215 (M215-60-2LL-S22), a GEC or other compliant grounding method is required.



TIP: If installing a mix of IG (Integrated Ground) and non-IG microinverters, install the non-IG microinverters closer (electrically) to the junction box to minimize GEC use.

¹ This model does not require a GEC. Paired modules must use PV (photovoltaic) Wire.

² This model requires use of a Grounding Electrode Conductor (GEC).

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).

Service type	Maximum M250s per AC branch circuit	Maximum M215s per AC branch circuit
Single phase 240 VAC	16	17
Three phase 208 VAC ³	24	25

Utility Service Requirements

M-Series Microinverters work with single-phase 240 VAC service or with three-phase 208 VAC service. Measure AC line voltages at the electrical utility connection to confirm that it is within the ranges shown:

240 Volt AC, Single 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 neutral	106 to 132 VAC	L1, L2, L3 to neutral	106 to 132 VAC

Wire Lengths and Voltage Rise

When planning the system, you must size the AC wire gauge to account for voltage rise. Select the correct wire size based on the distance from the beginning of the microinverter 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 microinverter AC branch circuit to the breaker in the load center.

All components of system wiring must be considered, including internal voltage rise within the length of Engage Cable. Typically, three wire sections and several wire terminations must be quantified. There is also some resistance associated with each circuit breaker. As all of these resistances are in series, they add together. Since the same current is flowing through each resistance, the total voltage rise is total current times the total resistance. For a single-phase system, the total resistance is equal to two times the one-way resistance. For a three-phase system, each of the three line currents and resistances must be calculated.

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.

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



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 over current protection device (OCPD).

³ To avoid potential phase imbalance, minimize the number of unused connectors with three-phase systems. See “Engage Cable Planning and Ordering” on page 28 for more information.

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 lightning and/or surge suppression devices (see table). In addition to having some level of surge suppression, it is also important to have insurance that protects against lightning and electrical surges.

Residential	Commercial
• Citel DS72-RS-120 surge protector; data sheet • Delta LA-302 lightning arrestor; website • Leviton 51110 or 51110-001; whole house surge protection panel; website • Midnight solar surge protection device MNSPD-300 or MNSPD-300FM (with flush mount box); website	• Citel DS73-RS-G surge protector; data sheet • Delta LA-303 lightning arrestor; website



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

Parts and Tools Required

In addition to the microinverters, PV modules, and racking, you will need the following.

Enphase Equipment

- Enphase Envoy-S or Envoy communications gateway for (required to monitor solar production). For installation information, refer to the **Envoy** *Installation and Operations Manual* or the **Envoy-S** *Installation and Operations Manual*.
- Enphase Installer Toolkit (optional, but strongly recommended).
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 Envoy-S to track system installation progress. To download, go to enphase.com/toolkit or scan the QR code at right.
- Enphase Engage Cable, as needed. (See “Engage Cable Planning and Ordering” on page 35.)



NOTE: Order the correct Engage Cable type. Installers must order Engage Cable for either single-phase 240 VAC, typical for residential applications, or three-phase 208 VAC, typical for commercial installations. All drop connectors on the Engage Cable bear labels indicating the cable voltage designation.

- Tie wraps or cable clips
- Enphase Sealing caps, as needed (for any unused drops on the Engage Cable)
- Enphase Terminators, as needed (one needed at the end of each AC branch circuit)
- Enphase Disconnect Tool (you can substitute number 2 **and** 3 Phillips screwdrivers)

Other Items

- Outdoor-rated, weather-proof AC junction box(es)
- Gland or strain relief fitting (one per AC junction box)
- Continuous GEC (grounding electrode conductor). **Required only for M215-60-2LL-S22.**
- Number 2 **and** 3 Phillips screwdrivers
- Torque wrench, sockets, wrenches for mounting hardware
- Adjustable wrench or open-ended wrench (for terminators)
- Handheld mirror (to view LEDs on the undersides of the microinverters)
- iOS (v7.0 or later) or Android (v4.0 or later) mobile device installed with Enphase Installer Toolkit

Enphase Microinverter Installation

Installing the Enphase Microinverter System involves several key steps. Each step listed here is detailed in the following pages. Follow the instructions in this section to install Enphase Microinverters.

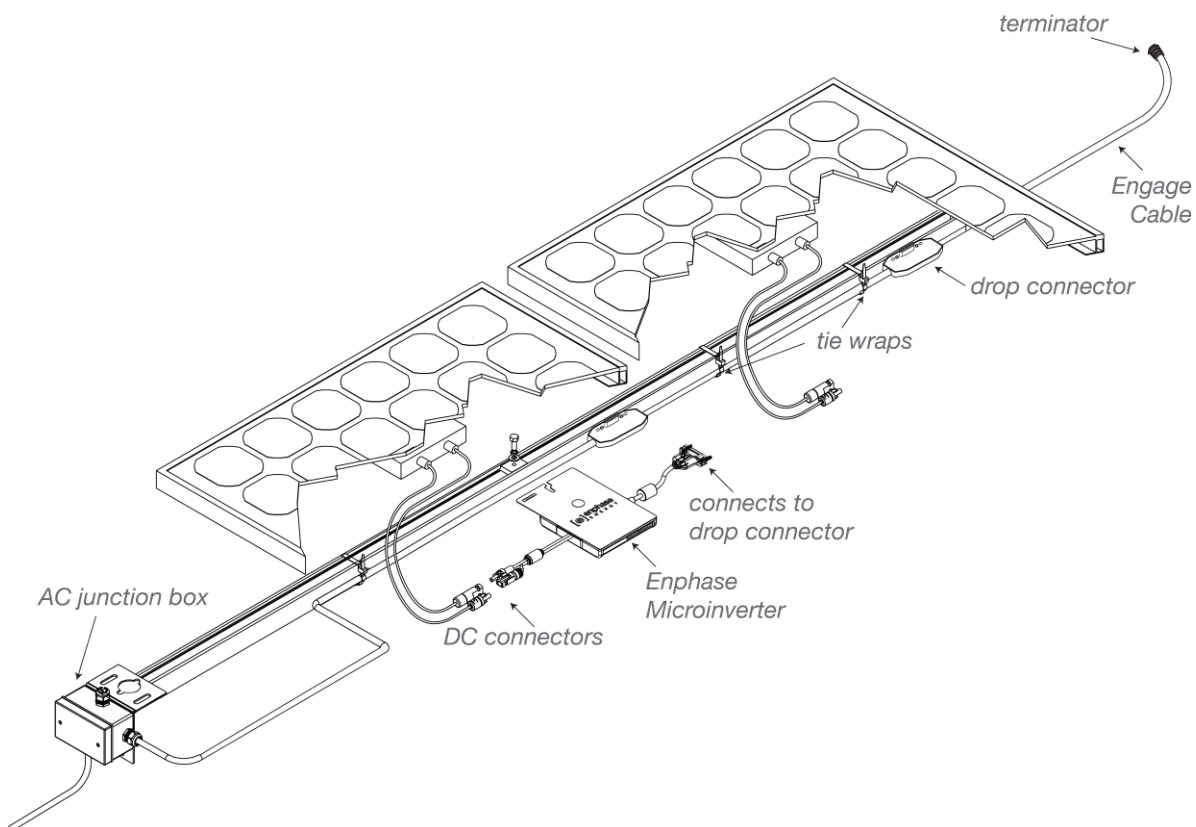
- Step 1:** Position the Enphase Engage Cable
- Step 2:** Install an AC Branch Circuit Junction Box / Isolator
- Step 3:** Attach the Microinverters to the PV Racking
- Step 4:** Create an Installation Map
- Step 5:** Ground the Microinverters (if required)
- Step 6:** Dress the Enphase Engage Cable
- Step 7:** Connect the Microinverters
- Step 8:** Terminate the Unused End of the Engage Cable
- Step 9:** Connect the Cable to AC Branch Circuit Junction Box / Isolator
- Step 10:** Connect the PV Modules
- Step 11:** Energize the System
- Step 12:** Set Up and Activate System Monitoring



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



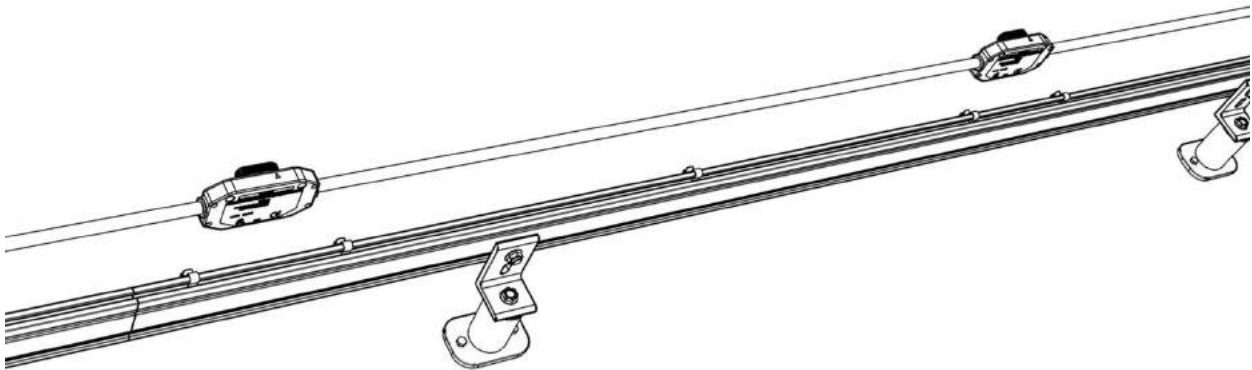
WARNING: DO NOT connect Enphase Microinverters to the utility grid or energize the AC circuit(s) until you have completed all of the installation procedures as described in the following sections.



Step 1: Position the Enphase Engage Cable

The Engage Cable is a continuous length of outdoor-rated cable with integrated connectors for microinverters. These connectors are preinstalled along the Engage Cable at intervals to accommodate horizontal or vertical PV module widths. The microinverters plug directly into the connectors, and the Engage Cable is terminated into the junction box that feeds electricity back to the system AC disconnect. For more information, see “Engage Cable Planning and Ordering” on page 35.

- a. **Make sure you are using the correct cable type.** Use 208 VAC Engage Cable at sites with three-phase service, or use 240 VAC Engage Cable at sites with single-phase service. Check the labelling on the drop connectors to verify the voltage type.



- b. Plan the cable length to allow drop connectors on the Engage Cable to align with each PV module. Allow extra length for slack, cable turns, and any obstructions.
- c. Many PV modules have a central stiffening brace. In these cases, do **not** 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.
- d. Cut a length of Engage Cable to meet your needs.
- e. Lay out the cabling along the installed racking for the AC branch circuit.



WARNING: Risk of fire. Plan the AC branches so that they do not exceed the maximum number of microinverters in an AC branch circuit. You must protect each microinverter AC branch circuit with a 20 A maximum breaker.

Service type	Maximum M250s per AC branch circuit	Maximum M215s per AC branch circuit
Single phase 240 VAC	16	17
Three phase 208 VAC	24	25 ⁴

PV module widths vary by manufacturer. On the Engage Cable, connectors are spaced at intervals to allow for the widest PV modules compatible with Enphase Microinverters. If narrower PV modules are used, it may be necessary to account for excess cable by looping the cable at suitable intervals.



NOTE: When looping the Engage Cable, do not form loops smaller than 12 cm (4.75 inches) in diameter.

⁴ To avoid potential phase imbalance, minimize the number of unused connectors with three-phase systems. See “Engage Cable Planning and Ordering” on page 28 for more information.

Step 2: Install an AC Branch Circuit Junction Box / Isolator



DANGER: Risk of electric 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.



WARNING: Risk of electric shock. Risk of fire. Only use electrical system components approved for wet locations.



WARNING: Risk of fire. Do NOT exceed the maximum number of microinverters in an AC branch circuit as listed on page 43 of this manual.

- a. Install an appropriate junction box or isolator at a suitable location on the PV racking system. You can center feed the branch, or you can install the junction box at the end of a row of PV modules.

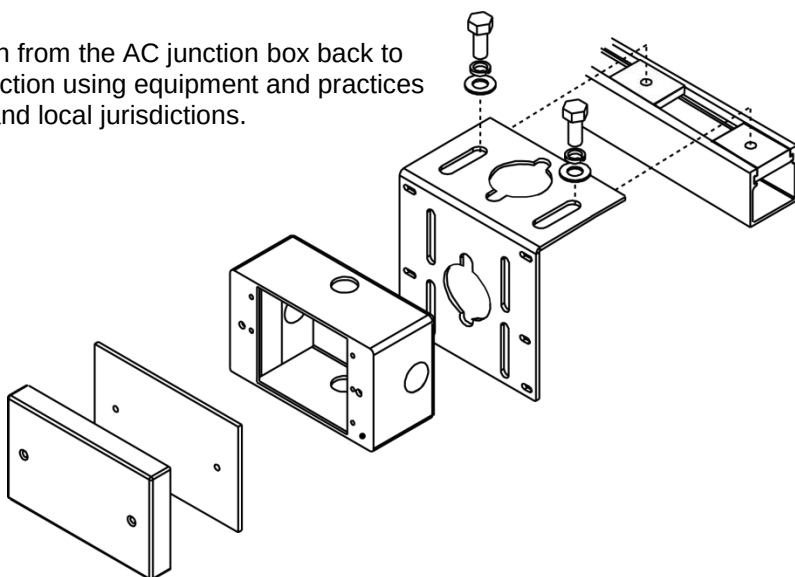


Best Practice: Make sure you have considered all components of system wiring, including internal voltage rise within the length of Engage Cable. Enphase provides guidance about choosing wire size and maximum conductor lengths in the voltage rise Technical Brief at enphase.com/support. Refer to this brief for voltage rise values in Engage Cables and on how to calculate voltage rise in other wire sections of the system.



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 over current protection device (OCPD). You can find out more in the Voltage Rise technical briefs at enphase.com/support

- b. Size the AC wire gauge to account for voltage rise. Select the correct wire size based on the distance from the beginning of the microinverter AC branch circuit to the breaker in the load center.
- c. Provide an AC connection from the AC junction box back to the electrical utility connection using equipment and practices as required by the NEC and local jurisdictions.



Step 3: Attach the Microinverters to the PV Racking

- a. Mark the approximate centers of each PV module on the PV racking.
- b. Evaluate the location of the microinverter with respect to the PV module DC junction box or any other obstructions.
- c. Ensure that the microinverter does not interfere with the PV module frame or stiffening braces.
- d. Ensure that the connector from the microinverter can easily reach the connector on the Engage Cable.
- e. Allow a minimum of 1.9 cm (0.75 inches) between the roof and the bottom of the microinverter. Also allow 1.3 cm (0.50 inches) between the back of the PV module and the top of the microinverter.



WARNING: Risk of equipment damage. Mount the microinverter under the module, away from rain and sun.

- Install the microinverter under the PV module to avoid direct exposure to rain, UV, and other harmful weather events.
 - Do not mount the microinverter upside down or in a vertical position that allows water to collect in the DC connector recess as it may have a harmful effect on the long-term endurance of the unit.
 - Do not expose the AC or DC connectors (on the Engage Cable connection, PV module, or the microinverter) to harmful weather events before the connectors are mated as it may result in weather rated damage to the connection.
- f. Mount one microinverter at each location using suitable hardware. The indicator light on the underside of the microinverter will be facing the roof.

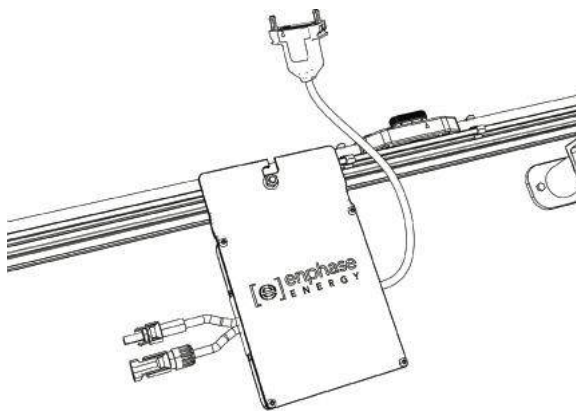


NOTE: Installing the microinverter upside down or vertically, with the DC connectors facing up, is not permitted.

- g. Torque the microinverter fasteners to the values shown. Do not over torque.
 - 6 mm (1/4") mounting hardware: 5 N m (45 to 50 in-lbs.)
 - 8 mm (5/16") mounting hardware: 9 N m (80 to 85 in-lbs.)



NOTE: Because of the risk of thread galling, do not use an impact driver to tighten the mounting hardware.



Step 4: Create an Installation Map

The Enphase Installation Map is a diagrammatic representation of the physical location of each microinverter in your PV installation. Copy or use the blank map on page 47 to record microinverter placement for the system, or provide your own layout if you require a larger or more intricate installation map.

Each Enphase Microinverter has a removable serial number label located on the mounting plate. Build the installation map by peeling the serial number labels from the microinverters and placing the labels on the map. You will also place the Envoy-S serial number on the map after Envoy-S installation.

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

For Installer Toolkit details refer to “Detect the Microinverters” in the *Installer Toolkit Operation Manual* at enphase.com/support.

- a. Copy or use the blank map on page 47 to record microinverter placement for the system, or provide your own layout if a larger or more intricate installation map is required.
- b. Each Enphase Microinverter has a removable serial number label located on the mounting plate. Peel the removable serial number label from each microinverter and affix it to the respective location on the installation map.
- c. Peel the removable serial number label from the Envoy and affix it to the installation map.
- d. Always keep a copy of the installation map for your records.

Step 5: Ground the Microinverters (if required)

This step is required only for M215-60-2LL-S22.

Each **M215-60-2LL-S22** comes with a grounding cleat that can accommodate a 6-8 AWG GEC (grounding electrode conductor). Check local requirements for allowable grounding conductor sizes.



NOTE: Ground the system, if required, in accordance with all applicable local electrical codes and the National Electrical Code (NEC), ANSI/NFPA 70.



NOTE: CSA has evaluated and approved the Wiley Electronics “WEEB” grounding washers for use with the Enphase Microinverter. Compatible grounding washer part numbers and installation guidelines are included in the [Racking Compatibility List](#).



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

- a. Route a continuous GEC through each of the microinverters to the NEC-approved AC grounding electrode.
- b. You can ground the PV racking and PV module to this conductor using a listed wire connector approved for the purpose.
- c. Torque the 10/32 grounding cleat screw to 2 N m (20 to 25 in-lbs.). Do not over torque.



NOTE: Using a power screwdriver to tighten the grounding clamp screw is not recommended due to the risk of thread galling.



Step 6: Dress the Engage Cable



NOTE: Adhere to the following requirements:

- Do not expose the cable connections to directed, pressurized liquid (water jets, etc.).
- Do not expose the cable connections to continuous immersion.
- Do not expose the AC connector to continuous tension (e.g., tension due to pulling or bending the cable near the connection)
- Use only the connectors and cables provided.
- Do not allow contamination or debris in the connectors.
- Use the cable and connectors only when all parts are present and intact.

- a. Attach the Engage Cable to the PV racking using cable clips tie wraps. The cable clips are designed so that the cable from the microinverter can also be dressed into the clip underneath the Engage Cable.



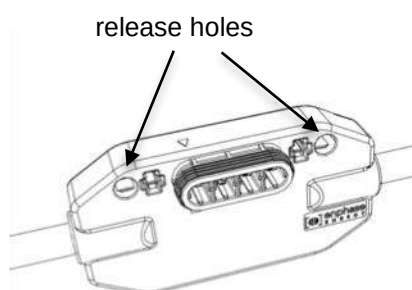
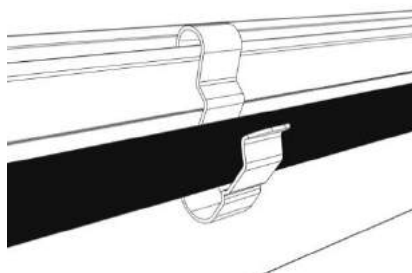
NOTE: There are two release-holes in the drop connector on the cable. These are **not** for mounting but are used to disconnect the connector. **Keep these release holes clear and accessible.**

- b. Dress the Engage Cable so that it does **not** contact the roof. Do not form loops smaller than 12 cm (4.74 inches) in diameter.

There are several ways to support the cable. One method is to place tie wraps or clips on either side of the connector. Use one or two additional clips, tie wraps, or other support scheme to secure the cable between connectors.

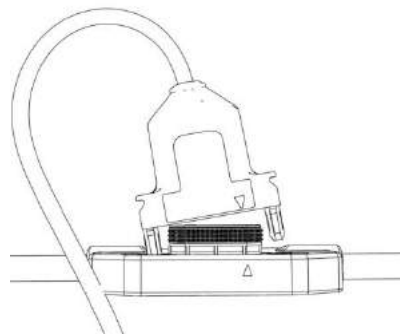


WARNING: Tripping Hazard. Loose cables can become a tripping hazard. Dress the Engage Cable to minimize this potential.

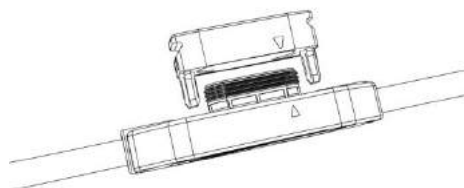


Step 7: Connect the Microinverters

- a. Remove and discard the temporary shipping caps from the Engage Cable and connect the microinverter. There are two latching mechanisms within the connectors. Listen for **two** clicks as the connectors engage. Ensure that **both** latching mechanisms have engaged.
- b. Repeat for all microinverters in the AC branch circuit.
- c. Cover any unused connector with a sealing cap. Listen for two clicks as the sealing cap engages. Ensure that **both** latching mechanisms have engaged.



NOTES: Do not use the temporary 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.



Enphase sealing caps are IP67 rated. Within the term “IP67”, “IP” indicates an Ingress Protection (IP) rating against dust and liquids. This specific rating of IP67 indicates that this connector protects against all dust particles and immersion in liquid.

- d. Avoid skipping Engage Cable connectors. Instead, use an Engage Coupler to connect two Engage Cables or to connect Engage Cable to field cable



NOTE: On a three-phase system, unused cable connectors create a phase imbalance on the branch circuit. If you skip multiple cable connectors over multiple branch circuits, the imbalance can multiply.



WARNING: Risk of electric shock. Risk of fire. 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 utility system. **Do not reuse sealing caps.**



NOTE: If you need to remove a sealing cap, you must use the Enphase disconnect tool or a #3 Phillips screwdriver. See “Disconnect a Microinverter” on page 31. Do not reuse sealing caps.

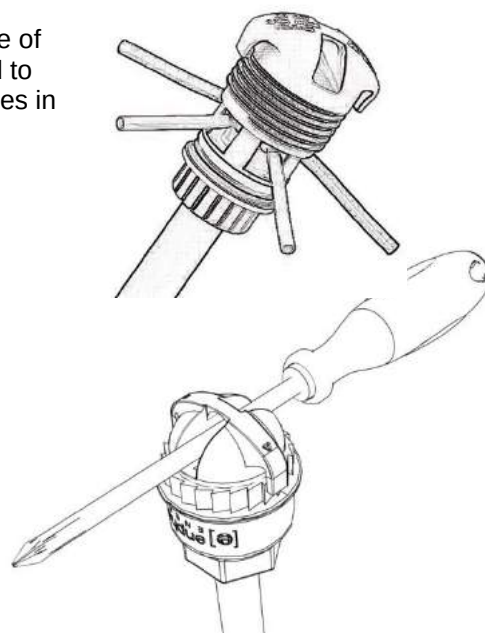
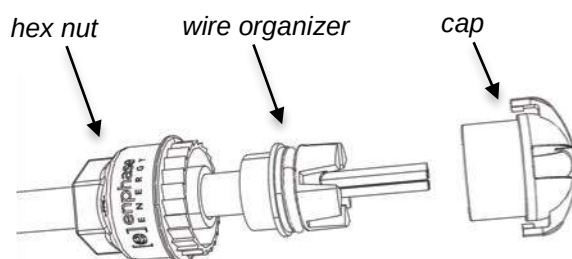
Step 8: Terminate the Unused End of the Engage Cable



WARNING: Risk of Electrical Shock. Do not install the terminator cap while power is connected.

Terminate the far end of the Engage Cable as follows.

- a. Remove 60 mm (2.5 inches) of the shielding from the conductors.
- b. Check that all terminator parts are present.
- c. Slide the hex nut onto the Engage Cable.
- d. Insert the Engage Cable all the way into the wire organizer (up to the stop).
- e. Bend the individual wires back into the recesses in the wire organizer so that they angle back toward the cable.
- f. Cut the individual wires so that no excess extends outside of the wire organizer. The portions that angle back will need to extend enough to fit neatly into the 0.5 cm (0.2 in) recesses in the wire organizer and flush with the edge of the cap.
- g. Place cap over the wire organizer.
- h. Hold the cap stationary with an Enphase disconnect tool, or insert a #2 Phillips screwdriver.
- i. Use a 22 mm (7/8 inch) wrench to tighten the hex nut until the latching mechanism is screwed all the way to the base. Do not over torque. **Never unscrew the hex nut. This action can twist and damage the cable.**
- j. Use a tie wrap or cable clip to attach the cable to the PV racking, so that the Engage Cable and terminator do not touch the roof.
- k. Ensure that all cabling is located underneath the PV module.



Step 9: Connect the Engage Cable to AC Junction Box



DANGER: Risk of electric 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.

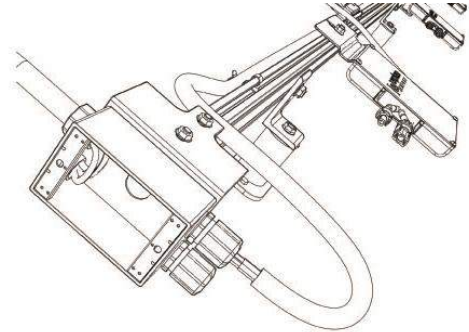


WARNING: Risk of electric shock. Risk of fire. Only use electrical system components approved for wet locations.



WARNING: Risk of fire. Do NOT exceed the maximum number of microinverters in an AC branch circuit as listed on page 12 of this manual.

- a. Connect Engage Cable into the AC branch circuit junction box using an appropriate gland or strain relief fitting. The Engage Cable requires a strain relief connector with an opening of 1.3 cm (0.5 inches) in diameter.
- b. Connect the Engage Cable into additional AC junction boxes as needed to transition to conduit between smaller sub-arrays.



Refer to the wiring diagrams on page 48 for more information. Wire colors are listed in the following table.

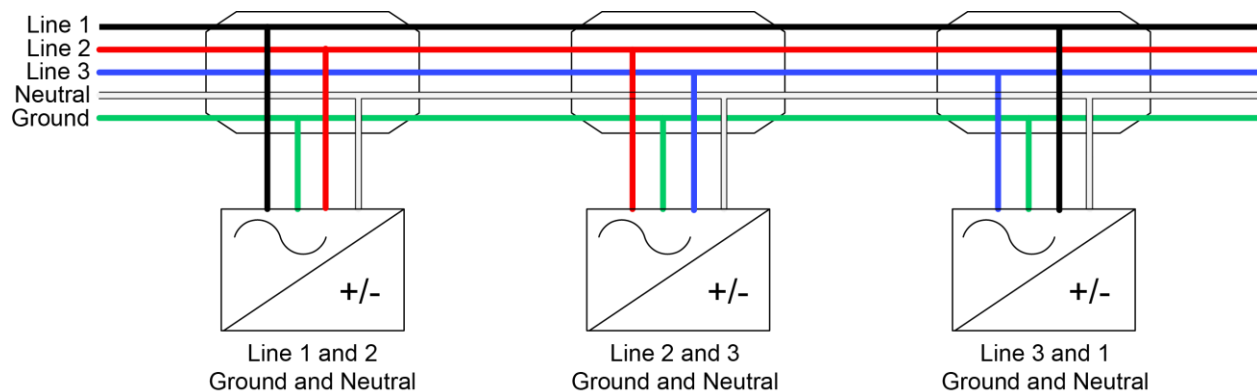
240 VAC single-phase	208 VAC three-phase
L1 – Black	L1 – Black
L2 – Red	L2 – Red
(not present)	L3 – Blue
Neutral – White	Neutral – White
Ground – Green	Ground – Green
acts as equipment ground (EGC)	acts as equipment ground (EGC)



NOTE: With the fourth generation Enphase Microinverters, the DC circuit within the microinverter is isolated and insulated from ground. Ground fault protection (GFP) is integrated into the microinverter. Because of this, the fourth generation microinverters do not require a GEC.

However, if you are installing the original M215 (M215-60-2LL-S22), it requires a GEC or other compliant grounding method as described in “Grounding Considerations” on page 11.

Balanced 208 VAC (three-phase) is achieved by alternating phases between microinverters as shown:



Step 10: Connect the PV Modules



WARNING: Electrical shock hazard. The DC conductors of this photovoltaic system are ungrounded and may be energized.



WARNING: PV modules must have DC conductors that are labeled "PV Wire" or "PV Cable" to be compliant with NEC 690.35(D) for Ungrounded PV Power Systems.



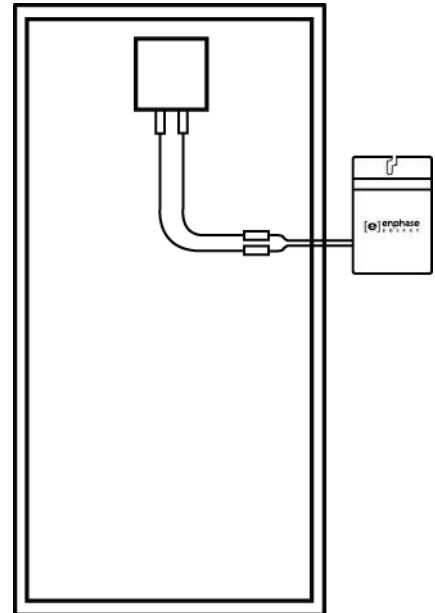
NOTE: Completely install all microinverters and all system AC connections prior to installing the PV modules.

To connect the modules:

- Mount compatible PV modules above the microinverters.
- Mate the microinverters and PV modules as required. Repeat for all remaining PV modules using one microinverter for each PV module.
- Check the LED on the underside of the microinverter for normal start up.

The status LED on the underside of 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.

LED color	State	Meaning
Green	Solid	Normal startup
	Flashing	Transition to post start up state
Red	Flashing	No grid present (AC breaker is not turned on)
	Solid	Failed microinverter start up
Red/Green	Flashing	Upgrade needed. Connect the system to an Envoy that is connected to Enlighten.



Step 11: Energize the System



WARNING: Risk of electric shock. Risk of fire. Only qualified personnel may connect the Enphase Microinverter to the electricity network.



WARNING: Risk of electric shock. Risk of fire. Ensure that all AC and DC wiring is correct. Ensure that none of the AC and DC wires are pinched or damaged. Ensure that all AC junction boxes are properly closed.

- If applicable, turn ON the AC disconnect or circuit breaker for each microinverter AC branch circuit.
- Turn ON the main utility-grid AC circuit breaker. Your system starts producing power **after a five-minute wait** time.

The Enphase Microinverters begin communicating over the power lines to the Envoy (if installed). The time required for the Envoy to discover all of the microinverters varies with the number of microinverters in the system and quality of the power line communications.

Step 12: Set Up and Activate Monitoring

After you have installed the microinverters, refer to the Envoy or Envoy-S *Installation and Operation Manual* to install the Envoy and set up system monitoring to complete the PV installation.

The high-level steps to complete the PV installation are:

1. Connect and energize the Envoy.
2. Detect the microinverters.
3. Connect to Enlighten.
4. Register the system in Enlighten.



NOTE: When inter-connecting to 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 Envoy or Envoy-S *Installation and Operation Manual* at enphase.com/support.

5. Build the virtual array.

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.



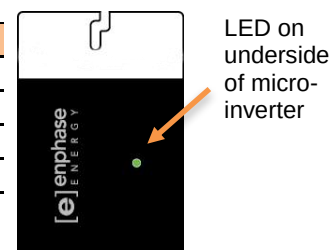
WARNING: Risk of electric shock. Do not attempt to repair the Enphase Microinverter; it contains no user-serviceable parts. If it fails, contact Enphase customer service to obtain an RMA (return merchandise authorization) number and start the replacement process.

Status LED Indications and Error Reporting

The following sections describe start up and post-start up LED operation.

Startup LED Operation

LED color	State	Meaning
Green	Solid	Normal startup
	Flashing	Transition to post start up state
Red	Flashing	No grid present (AC breaker is not turned on)
	Solid	Failed microinverter start up
Red/Green	Flashing	Upgrade needed. Connect the system to an Envoy that is connected to Enlighten.



The status LED on the underside of 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.

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

Post-Startup LED Indications

LED color	State	Meaning
Green	Flashing	Normal operation. The AC grid function is normal and there is communication with an Envoy
Orange	Flashing	The AC grid is normal, but there is no communication with an Envoy
Red	Flashing	The AC grid is either not present or not within specification
	Solid	There is an active fault requiring intervention. See following sections.

Use a handheld mirror to view indicator lights on the undersides of the microinverters. LED states are:

- **Flashing Green:** Indicates normal operation. The microinverter is receiving messages from the Envoy and senses that the utility grid is within voltage/frequency specifications.
- **Flashing Orange:** Indicates that the microinverter is not receiving messages from the Envoy, but is otherwise operating normally. The microinverter senses that the utility grid is within voltage/frequency specifications.
- **Flashing Red:** Indicates that the microinverter is **not operating normally**. The microinverter does not sense that the utility grid is within voltage/frequency specifications. The microinverter cannot produce power until this is resolved. See “Troubleshoot an Inoperable Microinverter” on page 29.
- **Solid Red:** For **all M250 models** and for **M215-60-2LL-S22-IG**, this indicates a “DC Resistance Low – Power Off” fault. Troubleshoot as described in the following sections.
- **Solid Red:** For **M215-60-2LL-S22**, this indicates a GFDI fault. Troubleshoot as described in the following sections.

DC Resistance Low – Power Off Condition

For **all M250 models** and for **M215-60-2LL-S22-IG**, 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 similar problem. Although the cause may be temporary, this microinverter condition persists until the sensor is manually reset.

An Envoy is required to clear this condition. The condition usually clears with operator intervention unless conditions causing the event have not been remedied or if the failure is permanent.

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.

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

- Log in to Enlighten and access the system.
- Click the **Events** tab. The next screen shows that there is a current “DC Resistance Low - Power Off” condition for the system.
- Click **DC Resistance Low - Power Off**.
- Where “n” is the number of affected devices, click **n devices (show details)**.
- Click the serial number of the affected microinverter.
- 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 the Envoy or Installer Toolkit to Clear the Condition

Depending on which model Envoy you are using, follow the instructions in the Envoy or Envoy-S *Installation and Operation Manual* at enphase.com/support to clear this condition.

GFI Tripped Condition



WARNING: Risk of electric shock. Normally grounded conductors may be ungrounded and energized when a ground fault is indicated.

For **M215-60-2LL-S22**, a solid red status LED when DC power has been cycled indicates the microinverter has detected a ground fault (GFDI) error. The LED will remain red and the fault will continue to be reported by the Envoy until the error has been cleared.

This may indicate defective module insulation, defective wiring or connectors, moisture ingress, or similar problem. Although the cause may be temporary, this microinverter condition persists until the sensor is manually reset.

An Envoy is required to clear this condition. The condition usually clears with operator intervention unless conditions causing the event have not been remedied or if the failure is permanent.

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

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

Method 2: Use the Envoy or Installer Toolkit to Clear the Condition

Depending on which model Envoy you are using, follow the instructions in the Envoy or Envoy-S *Installation and Operation Manual* at enphase.com/support to clear this condition.

Other Faults

All other faults are reported to the Envoy. Refer to the Envoy or Envoy-S *Installation and Operation Manual* at 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.

1. Make sure AC breakers and disconnects are closed.
2. Check the connection to the utility grid and verify that the utility voltage is within allowable ranges.
3. 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.
4. 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		208 Volt AC, Three Phase	
L1 to L2	211 to 264 VAC	L1 to L2 to L3	183 to 229 VAC
L1, L2 to neutral	106 to 132 VAC	L1, L2, L3 to neutral	106 to 132 VAC

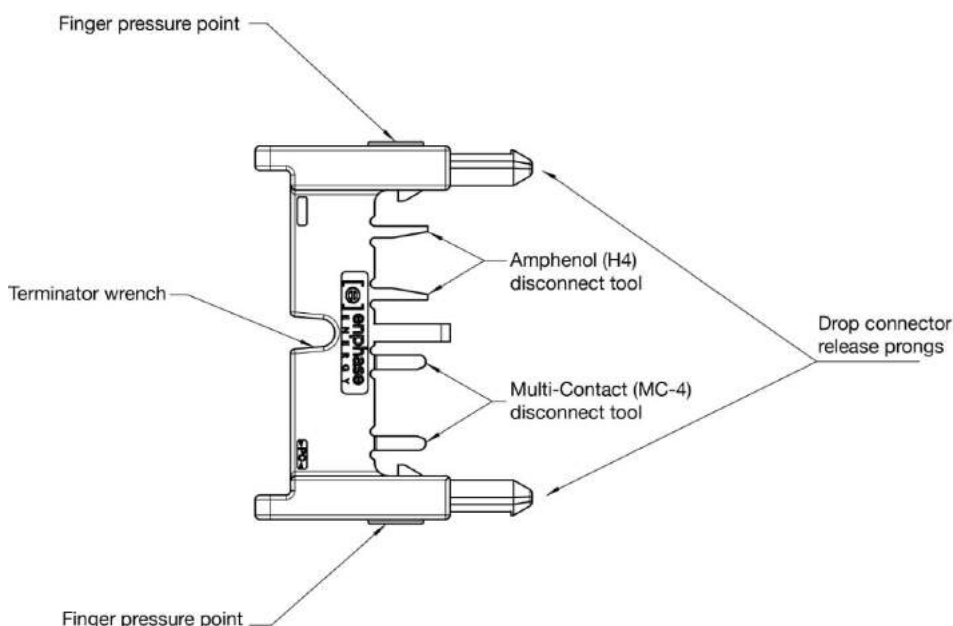
5. Using an Enphase disconnect tool, disconnect the AC cable for the microinverter in question from the Engage Cable.

6. Verify that utility power is present at the microinverter by measuring line to line and line to neutral at the Engage Cable connector.
7. Visually check that the AC branch circuit connections (Engage Cable and AC connections) are properly seated. Reseat if necessary. Check also for damage, such as rodent damage.
8. 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.
9. Disconnect and re-connect the DC PV module 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 27 for normal LED operation.
10. 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.
11. Verify the PV module DC voltage is within the allowable range shown in “Specifications” on page 38 of this manual.
12. Swap DC leads with a known good, adjacent PV 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 microinverter. Call Enphase Customer Support for help in reading the microinverter data and for help in obtaining a replacement microinverter, if needed.
13. 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.
14. Verify with your utility that line frequency is within range.
15. If the problem persists, contact Customer Support at enphase.com/en-us/support/contact.

Disconnect a Microinverter

If problems remain after following the troubleshooting steps listed previously, contact Enphase at 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:

1. De-energize the AC branch circuit breaker.
2. Enphase AC connectors are tool-removable only. To disconnect the microinverter from the Engage Cable, insert the two large prongs of the disconnect tool (see illustration) into the two holes in the drop connector. Rock the connector back and forth while pulling gently to disengage.



If the disconnect tool is not available, insert a #3 Phillips screwdriver into one hole, and rock that side of the drop connector out. Then, insert the screwdriver into the other hole and pull the connector out entirely.

3. Cover the PV module with an opaque cover.
4. Using a clamp-on meter, verify there is no current flowing in the DC wires between the PV module and the microinverter. If current is still flowing, check that you have completed steps one and two above.



NOTE: Take care when measuring DC current as most clamp-on meters must be zeroed first and tend to drift with time.

5. Disconnect the PV module DC wire connectors from the microinverter using the Enphase disconnect tool.
6. If present, loosen the ground cleat screw and remove the grounding electrode conductor.
7. Remove the microinverter from the PV racking.



WARNING: Risk of electric shock. Risk of fire. 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. **Do not reuse sealing caps.**

Install a Replacement Microinverter

If problems remain after troubleshooting, contact Enphase at enphase.com/en-us/support/contact. If Enphase authorizes a replacement (RMA), replace the microinverter as follows:

1. When the replacement microinverter is available, verify that the AC branch circuit breaker is de-energized.
2. Attach the replacement microinverter to the PV racking using hardware recommended by your PV racking vendor.



WARNING: Risk of equipment damage. Mount the microinverter under the module, away from rain and sun.

- Install the microinverter under the PV module to avoid direct exposure to rain, UV, and other harmful weather events.
 - Do not mount the microinverter upside down or in a vertical position that allows water to collect in the DC connector recess as it may have a harmful effect on the long-term endurance of the unit.
 - Do not expose the AC or DC connectors (on the Engage Cable connection, PV module, or the microinverter) to harmful weather events before the connectors are mated as it may result in weather rated damage to the connection.
3. Torque the microinverter fasteners to the values shown. Do not over torque.
 - 6 mm (1/4") mounting hardware: 5 N m (45 to 50 in-lbs.)
 - 8 mm (5/16") mounting hardware: 9 N m (80 to 85 in-lbs.)



NOTE: Using a power screwdriver to tighten the fasteners is not recommended due to the risk of thread galling.

4. If you are using grounding washers (e.g., WEEB), the old grounding washer should be discarded, and a new grounding washer must be used when installing the replacement microinverter.
5. If you are using a grounding electrode conductor, attach it to the microinverter ground cleat. Torque the 10/32 grounding cleat screw to 2 N m (20 to 25 in-lbs.). Do not over torque.

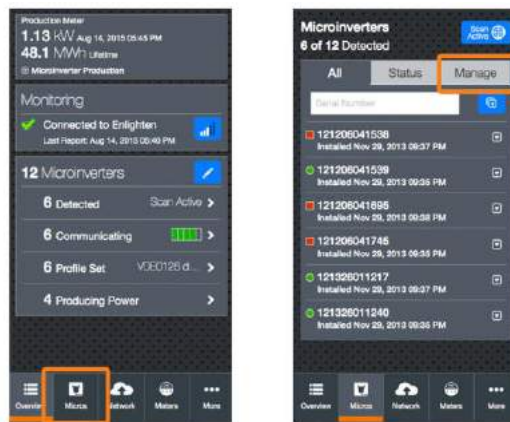


NOTE: Using a power screwdriver to tighten the grounding screw is not recommended due to the risk of thread galling.

6. Connect the microinverter to the Engage Cable drop connector. There are two latching mechanisms within the connectors. Listen for two clicks as the connectors engage. Ensure that **both** latching mechanisms have engaged.
7. Mount the PV module above the microinverter.
8. Mate the microinverter and PV module as required.
9. Energize the AC branch circuit breaker, and verify operation of the replacement microinverter by checking the indicator light on the underside of the microinverter. You may need a handheld mirror to see the indicator light.

10. Use the Installer Toolkit mobile app to delete the old microinverter serial number from the Envoy-S database. In Installer Toolkit, once connected to the Envoy:

- a. Tap **Micros > Manage**.



- b. Tap the checkbox ☐ to the right of the microinverter serial number that you replaced.

- c. Tap  to delete the microinverter from the Envoy-S database.



11. Add the new microinverter serial number to the Envoy database by initiating a device scan using one of the following methods:

- a. **Method 1: Initiate a scan using the Installer Toolkit mobile app**

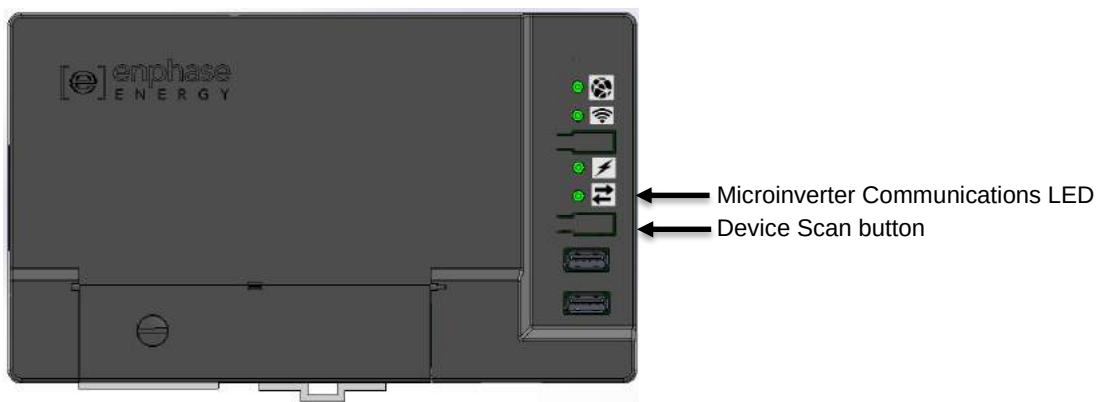
- In Installer Toolkit, once connected to the Envoy, navigate to the Overview screen.
- From the Overview screen, tap **Detected > Start Device Scan** to start a new 30-minute device scan.



- If device scanning on the 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 Envoy, you must use the Installer Toolkit scanning tool to provision them on the Envoy, rather than using the Envoy's device scanning function to discover them. If this is not possible and you need to enable device scanning on the Envoy, contact Enphase Customer Support at enphase.com/en-us/support/contact.

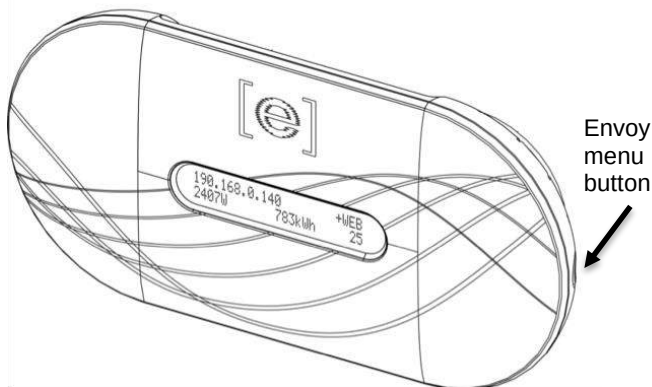
b. Method 2: Use an Envoy-S

- If you have an **Envoy-S**, press the **Device Scan** button on the Envoy-S. The Envoy-S begins a 15-minute scan to identify all of the microinverters deployed at the site. The Microinverter Communications LED  flashes green during the scan.



c. Method 3: Use an Envoy

- If you have an **Envoy**, press and hold the Menu button on the Envoy for two seconds to bring up the Envoy menu on the LCD window.
- When the LCD window displays **Enable Device Scan**, release the Menu button. This starts a 30-minute scan at the Envoy to discover the new microinverter.



12. Log in to Enlighten to use Enlighten's Array Builder to add the newly detected microinverter to the virtual array.

13. Ship the old microinverter to Enphase using the supplied return-shipping label.

Engage Cable Planning and Ordering

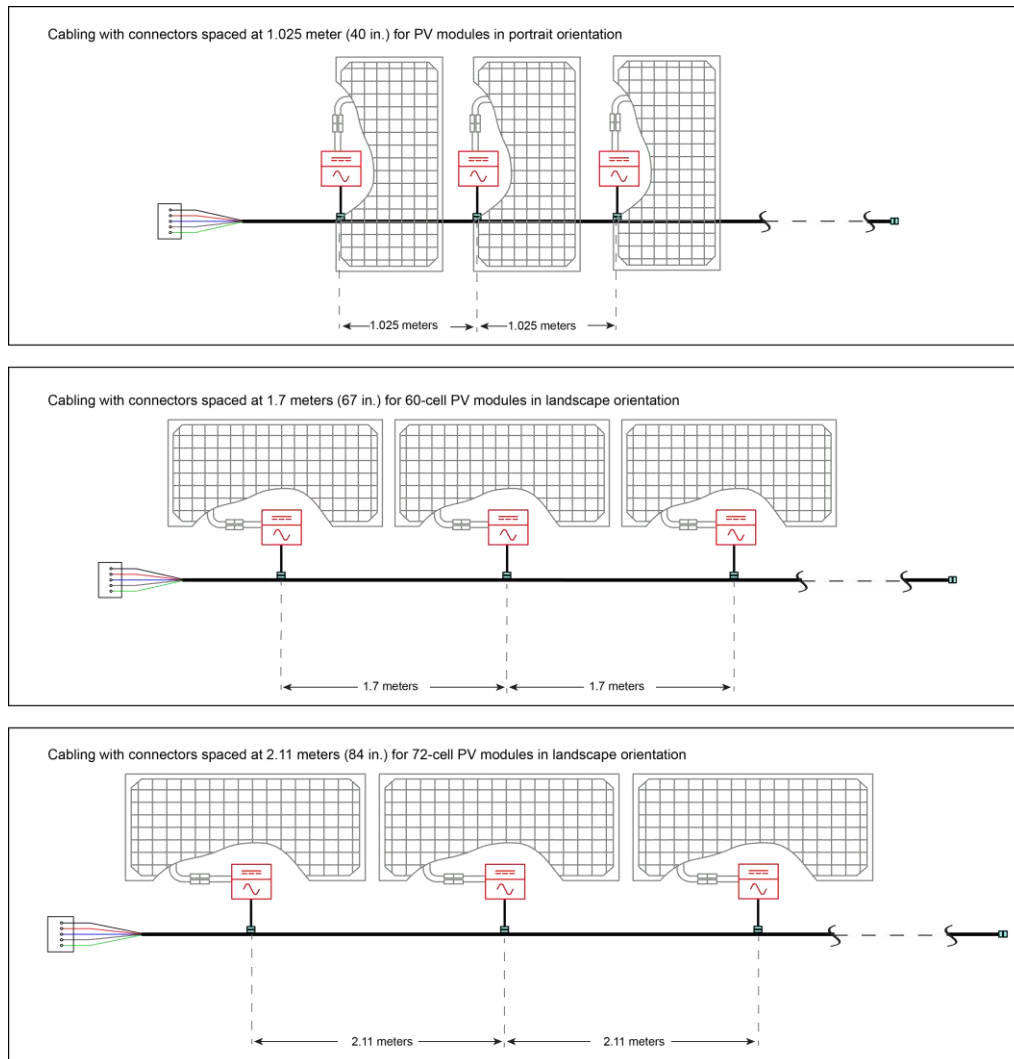
The Enphase Engage Cable is a continuous length of 12 AWG, outdoor-rated cable with integrated connectors for microinverters. These connectors are preinstalled along the Engage Cable at intervals to accommodate varying PV module widths. The microinverters plug directly into the cable connectors.

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.

Enphase Engage Cable is available in two different voltage types and two connector spacing options. Depending upon installer needs, the cable is also available in different lengths.

Connector Spacing Options

Engage Cable for is available in three connector spacing options. The gap between connectors on the cable can be 1.025 meters (40"), 1.7 meters (67"), or 2.11 meters (84"). The 1.025 meter spacing is best suited for connecting PV modules installed in portrait orientation, while the 1.7 meter and 2.11 meter spacing allows you to install 60-cell and 72-cell PV modules in landscape orientation.



Voltage Type and Conductor Count Options

The voltage types are either single-phase 240 VAC or three-phase 208 VAC. **All cable connectors bear labels indicating the cable voltage designation.** Typically used for residential applications, 240 VAC includes four conductors. Three-phase 208 VAC cabling includes five conductors, and is used for most commercial installations. Because Enphase microinverters output onto two phases, three phase cabling balances the phases by rotating conductor use from one microinverter to the next as shown on page 24.

Cabling Length Options

Ordering options include:

Model Number	Voltage type/ conductor #	Connector count	Connector spacing	PV module orientation
ET10-240-BULK	240 VAC, 4 conductor	240	1.025 m (40")	Portrait
ET17-240-BULK	240 VAC, 4 conductor	240	1.7 m (67")	Landscape
ET21-240-192-12AWG	240 VAC, 4 conductor	192	2.11 m (84")	Landscape
ET10-208-BULK	208 VAC, 5v conductor	240	1.025 m (40")	Portrait
ET17-208-BULK	208 VAC, 5 conductor	240	1.7 m (67")	Landscape
ET21-208-192-12AWG	208 VAC, 5v conductor	192	2.11 m (84")	Landscape

Planning for Cable Lengths and Type

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

- **Account for the number of Enphase Microinverters to be installed on the AC branch circuit.** Make sure to allocate the correct number of connectors, including extra connectors for gaps and turns.
- **Plan for additional cable length to reach from the AC branch circuit junction box to the first microinverter.** If greater than half a connector interval is needed, you may need to allow for one (or more) unused connectors in order to span this distance. You must cover unused connectors with Enphase watertight sealing caps.
- **Minimize the number of unused Engage Cable connectors** with three-phase systems. When cable connectors are left unused on a three-phase system, it creates a phase imbalance on the branch circuit. If multiple cable connectors are skipped over multiple branch circuits, the imbalance can multiply.

You can sometimes avoid skipping Engage Cable connectors with the use of an Engage Coupler (ET-SPLK-05). Use the Engage Coupler to connect two Engage Cables or to connect Engage Cable to field cable. There are many possible scenarios for each type of connection, but they generally fall into four categories:

Engage Cable to Engage Cable:

- Make use of leftover lengths of Engage Cable
- Transition between portrait and landscape Engage Cable

Engage Cable to Field Cable (#12 TC-ER):

- Transition between sub-arrays on the same circuit
- Create wiring extensions for Engage Cable



NOTE: The Engage Coupler only supports #12 TC-ER, which may not be sufficient for homerun wiring. Enphase Energy recommends maintaining less than 2% voltage drop across all wiring.

In situations where you cannot use an Engage Coupler, you can use an electrical junction box to transition between cable types.

- **Account for additional lengths of cable** when calculating total voltage rise. Refer to the Technical Brief on Voltage Drop at enphase.com/support.
- **Plan for additional length to reach from one row of PV modules to the next.** If the PV modules are laid out in multiple rows, the distance from one row to the next often requires additional cabling length.
- **Account for loop size.** When looping the Engage Cable, do not form loops smaller than 12 cm (4.75 in.) in diameter.
- **Consider additional cabling when installing multiple sub-arrays.** Often, an AC branch circuit may be composed of several smaller sub-arrays across more than one roof plane. In this case, cut the cable to service each smaller array, and connect the sub-arrays together using appropriately rated lengths of conduit. Accomplish the transition from cable to conduit using an outdoor rated AC junction box, as required by the NEC and local code. Cover unused connectors with Enphase sealing caps.
- **Account for any mixture of PV modules in both portrait and landscape orientation.** When PV modules are installed in mixed orientation (both portrait and landscape orientation), there are three choices for cabling:
 1. Cabling with 1.025-meter spacing between connectors results in cleanest install for the PV modules in portrait orientation. For PV modules placed in landscape orientation, plan for an unused connector between each PV module to accommodate the required additional distance. Cover unused connectors with Enphase watertight sealing caps.
 2. Cabling with 1.7-meter or 2.11-meter spacing between connectors results in cleanest install for PV modules in landscape orientation, but requires that any additional cable length between PV modules in portrait orientation be coiled and dressed so that cabling does not contact the roof. Cover unused connectors with Enphase watertight sealing caps.
 3. Transition between portrait and landscape Engage Cable using an Enphase Engage Coupler or an outdoor-rated junction box. Secure the coupler or junction box to the PV racking.

Technical Data

Technical Considerations

Be sure to apply the following when installing M215 Microinverters and/or M250 Microinverters:



WARNING: Risk of equipment damage. You must match the DC operating voltage range of the PV module with the allowable input voltage range of the Enphase Microinverter.



WARNING: Risk of equipment damage. The maximum open circuit voltage of the PV module must not exceed the specified maximum input voltage of the Enphase Microinverter.

- PV modules must have conductors labeled "PV Wire" or "PV Cable" to comply with NEC 690.35(D) for Ungrounded PV Power Systems.
- Verify that the voltage and current specifications of the PV module match those of the microinverter.
- The maximum short circuit current rating of the PV module must be equal to or less than the maximum input DC short circuit current rating of the microinverter.

The output voltage and current of the PV module depends on the quantity, size and temperature of the PV cells, as well as the insolation on each cell. The highest PV module output voltage occurs when the temperature of the cells is the lowest and the PV module is at open circuit (not operating).

Specifications

See specifications in the following tables for:

- M250-72-2LL-S22, S22-US, or -S25 Microinverter
- M250-60-2LL-S22 or -S25 Microinverter
- M215-60-2LL-S22-IG Microinverter
- M215-60-2LL-S22 Microinverter
- Engage Cable

M250-72-2LL-S22, S22-US, and -S25 Microinverter Specifications

Enphase M250-72 Microinverter Parameters				
Topic	Unit	Min	Typical	Max
DC Parameters				
MPPT voltage range	V	27		48
Operating range	V	16		60
Maximum DC input voltage	V			48
Minimum / Maximum start voltage	V	22		48
Maximum DC input short circuit current	A			15
Maximum input source backfeed current to input source	A			0

Enphase M250-72 Microinverter Parameters				
Topic	Unit	Min	Typical	Max
AC Parameters				
Rated (continuous) AC output power (-40°C to +65°C)	W	240		
Peak AC output power	W	250		
Output power factor		0.95	0.99	1
Nominal AC output voltage range				
240 VAC (split phase)	Vrms	211	240	264
208 VAC (three phase)	Vrms	183	208	229
Maximum AC output current at nominal voltage				
240 VAC (split phase)	Arms		1.0	
208 VAC (three phase)	Arms		1.15	
Nominal AC output frequency range	Hz	57	60	61
Extended AC output frequency range	Hz	57		62.5
Maximum AC output over current protection device	A	20		
Maximum AC output fault current & duration	mA rms for 6 cycles	850		
High AC Voltage trip limit accuracy	%	±2.5		
Low AC Voltage trip limit accuracy	%	±4.0		
Frequency trip limit accuracy	Hz	±0.1		
Trip time accuracy	cycles	±2		
Miscellaneous Parameters				
Maximum microinverters per 20 amp (max) AC branch circuit				
240 VAC (split phase)				16
208 VAC (three phase)				24 ⁵
Peak inverter efficiency	%	96.5		
CEC weighted efficiency	%	96.5		
Static MPPT efficiency (weighted, ref EN 50530)	%	99.4		
Total harmonic distortion	%		3.0	5
Ambient temperature range	°C	-40		+65
Night tare loss	mW			65
Storage temperature range	°C	-40		+65

⁵ To avoid potential phase imbalance, minimize the number of unused connectors with three-phase systems. See “Engage Cable Planning and Ordering” on page 28 for more information.

Enphase M250-72 Microinverter Parameters				
Topic	Unit	Min	Typical	Max
Features and Specifications				
Compatibility	Pairs with most 60-cell PV modules (the PV module DC conductors must be labeled "PV Wire" or "PV Cable" to be compliant with NEC 690.35(D) for Ungrounded PV Power Systems)			
Dimensions not including mounting bracket (approximate)	171 mm x 173 mm x 30 mm			
Weight	3.4 Lbs. (1.6 Kg)			
Enclosure environmental rating	NEMA 6			
Torque specifications for fasteners (Do not over torque.)	6 mm (1/4") mounting hardware: 5 N m (45 to 50 in-lbs.) 8 mm (5/16") mounting hardware: 9 N m (80 to 85 in-lbs.)			
Cooling	Natural convection: no fans			
Communication	Power line			
Standard warranty term	enphase.com/warranty			
Compliance	UL1741, IEEE1547, FCC Part 15 Class B CAN/CSA-C22.2 No. 0-M91, 0.4-04, and 107.1-01			
Integrated ground (no GEC required)	The DC circuit meets the requirements for ungrounded PV arrays in NEC 690.35. Ground fault protection (GFP) is integrated into the microinverter.			
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.			

M250-60-2LL-S22 and -S25 Microinverter Specifications

Enphase M250-60 Microinverter Parameters				
Topic	Unit	Min	Typical	Max
DC Parameters				
MPPT voltage range	V	27		39
Operating range	V	16		48
Maximum DC input voltage	V			48
Minimum / Maximum start voltage	V	22		48
Maximum DC input short circuit current	A			15
Maximum input source backfeed current to input source	A			0

Enphase M250-60 Microinverter Parameters				
Topic	Unit	Min	Typical	Max
AC Parameters				
Rated (continuous) AC output power (-40°C to +65°C)	W	240		
Peak AC output power	W	250		
Output power factor		0.95	0.99	1
Nominal AC output voltage range				
240 VAC (split phase)	Vrms	211	240	264
208 VAC (three phase)	Vrms	183	208	229
Maximum AC output current at nominal voltage				
240 VAC (split phase)	Arms		1.0	
208 VAC (three phase)	Arms		1.15	
Nominal AC output frequency range	Hz	57	60	61
Extended AC output frequency range	Hz	57		62.5
Maximum AC output over current protection device	A	20		
Maximum AC output fault current & duration	mA rms for 6 cycles	850		
High AC Voltage trip limit accuracy	%	±2.5		
Low AC Voltage trip limit accuracy	%	±4.0		
Frequency trip limit accuracy	Hz	±0.1		
Trip time accuracy	cycles	±2		
Miscellaneous Parameters				
Maximum microinverters per 20 amp (max) AC branch circuit				
240 VAC (split phase)				16
208 VAC (three phase)				24 ⁶
Peak inverter efficiency	%	96.5		
CEC weighted efficiency	%	96.5		
Static MPPT efficiency (weighted, ref EN 50530)	%	99.4		
Total harmonic distortion	%		3.0	5
Ambient temperature range	°C	-40		+65
Night tare loss	mW			65
Storage temperature range	°C	-40		+65

⁶ To avoid potential phase imbalance, minimize the number of unused connectors with three-phase systems. See “Engage Cable Planning and Ordering” on page 28 for more information.

Enphase M250-60 Microinverter Parameters				
Topic	Unit	Min	Typical	Max
Features and Specifications				
Compatibility	Pairs with most 60-cell PV modules (the PV module DC conductors must be labeled "PV Wire" or "PV Cable" to be compliant with NEC 690.35(D) for Ungrounded PV Power Systems)			
Dimensions not including mounting bracket (approximate)	171 mm x 173 mm x 30 mm			
Weight	3.4 lbs. (1.6 Kg)			
Enclosure environmental rating	NEMA 6			
Torque specifications for fasteners (Do not over torque.)	6 mm (1/4") mounting hardware: 5 N m (45 to 50 in-lbs.) 8 mm (5/16") mounting hardware: 9 N m (80 to 85 in-lbs.)			
Cooling	Natural convection: no fans			
Communication	Power line			
Standard warranty term	enphase.com/warranty			
Compliance	UL1741, IEEE1547, FCC Part 15 Class B CAN/CSA-C22.2 No. 0-M91, 0.4-04, and 107.1-01			
Integrated ground (no GEC required)	The DC circuit meets the requirements for ungrounded PV arrays in NEC 690.35. Ground fault protection (GFP) is integrated into the microinverter.			
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.			

M215-60-2LL-S22-IG Microinverter Specifications

M215-60-2LL-S22-IG Microinverter Parameters				
Topic	Unit	Min	Typical	Max
DC Parameters				
MPPT voltage range	V	27		39
Operating range	V	16		48
Maximum DC input voltage	V			48
Minimum / Maximum start voltage	V	22		48
Maximum DC input short circuit current	A			15
Maximum input source backfeed current to input source	A			0

M215-60-2LL-S22-IG Microinverter Parameters				
Topic	Unit	Min	Typical	Max
AC Parameters				
Rated (continuous) AC output Power (-40 to +65°C)	W	215		
Peak AC output power	W	225		
Output power factor		0.95	0.99	1
Nominal AC output voltage range				
240 VAC (single phase)	Vrms	211	240	264
208 VAC (three phase)	Vrms	183	208	229
Maximum AC output current at nominal voltage				
240 VAC (single phase)	Arms		0.9	
208 VAC (three phase)	Arms		1.03	
Nominal AC output frequency range	Hz	57	60	61
Extended AC output frequency range	Hz	57		62.5
Maximum AC output over current protection device	A	20		
Maximum AC output fault current & duration	mA rms for 6 cycles	850		
High AC Voltage trip limit accuracy	%	±2.5		
Low AC Voltage trip limit accuracy	%	±4.0		
Frequency trip limit accuracy	Hz	±0.1		
Trip time accuracy	cycles	±2		
Miscellaneous Parameters				
Maximum microinverters per 20 amp (max) AC branch circuit				17
240 VAC (single phase)				25
208 VAC (three phase)				
Peak inverter efficiency	%	96.5		
CEC weighted efficiency	%	96.5		
Static MPPT efficiency (weighted, ref EN 50530)	%	99.4		
Total harmonic distortion	%		3.0	5
Ambient temperature range	°C	-40		+65
Night tare loss	mW			65
Storage temperature range	°C	-40		+65

M215-60-2LL-S22-IG Microinverter Parameters				
Topic	Unit	Min	Typical	Max
Features and Specifications				
Compatibility	Pairs with most 60-cell PV modules (the PV module DC conductors must be labeled "PV Wire" or "PV Cable" to be compliant with NEC 690.35(D) for Ungrounded PV Power Systems)			
Dimensions not including mounting bracket (approximate)	171 mm x 173 mm x 30 mm			
Weight	3.4 lbs. (1.6 Kg)			
Enclosure environmental rating	NEMA 6			
Torque specifications for fasteners (Do not over torque.)	6 mm (1/4") mounting hardware: 5 N m (45 to 50 in-lbs.) 8 mm (5/16") mounting hardware: 9 N m (80 to 85 in-lbs.)			
Cooling	Natural convection: no fans			
Communication	Power line			
Standard warranty term	enphase.com/warranty			
Compliance	UL1741, IEEE1547, FCC Part 15 Class B CAN/CSA-C22.2 No. 0-M91, 0.4-04, and 107.1-01			
Integrated ground (no GEC required)	The DC circuit meets the requirements for ungrounded PV arrays in NEC 690.35. Ground fault protection (GFP) is integrated into the microinverter.			
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.			

M215-60-2LL-S22 Microinverter Specifications

M215-60-2LL-S22 Microinverter Parameters				
Topic	Unit	Min	Typical	Max
DC Parameters				
MPPT voltage range	V	22		36
Operating range	V	16		36
Maximum DC input voltage	V			45
Minimum / Maximum start voltage	V	22		45
Maximum DC input short circuit current	A			15
Ground fault protection	mA			1000
Maximum input source backfeed current to input source	A			0

M215-60-2LL-S22 Microinverter Parameters				
Topic	Unit	Min	Typical	Max
AC Parameters				
Rated (continuous) AC output Power (-40 to +65°C)	W	215		
Output power factor		0.95	0.99	1
Nominal AC output voltage range				
240 VAC (single phase)	Vrms	211	240	264
208 VAC (three phase)	Vrms	183	208	229
Extended AC output voltage range				
240 VAC (single phase)	Vrms	206		269
208 VAC (three phase)	Vrms	179		232
Maximum AC output current at nominal voltage				
240 VAC (single phase)	Arms		0.9	
208 VAC (three phase)	Arms		1.0	
Nominal AC output frequency range	Hz	59.3	60	60.5
Extended AC output frequency range	Hz	57	60	60.5
Maximum AC output over current protection device	A			20
Maximum AC output fault current & duration	Arms/cycles	1.05 Arms over 3 cycles 1.04 Arms over 5 cycles		
High AC Voltage trip limit accuracy	%	±2.5		
Low AC Voltage trip limit accuracy	%	±4.0		
Frequency trip limit accuracy	Hz	±0.1		
Trip time accuracy	cycles	±2		
Miscellaneous Parameters				
Maximum inverters per 20 amp (max) AC branch circuit				
240 VAC (single phase)				17
208 VAC (three phase)				25
Peak inverter efficiency	%	96.3		
CEC weighted efficiency	%	96.0		
Static MPPT efficiency (weighted, ref EN 50530)	%	99.6		
Total Harmonic Distortion	%		3.0	5
Ambient temperature range	°C	-40		65
Night Tare Loss	mW		46	
Storage temperature range	°C	-40		65

M215-60-2LL-S22 Microinverter Parameters				
Topic	Unit	Min	Typical	Max
Features and Specifications				
Compatibility	Pairs with most 60-cell PV modules			
Dimensions not including mounting bracket (approximate)	173 mm x 164 mm x 25 mm			
Weight	3.4 lbs. (1.6 Kg)			
Enclosure environmental rating	NEMA 6			
Torque specifications for fasteners (Do not over torque.)	6 mm (1/4") mounting hardware: 5 N m (45 to 50 in-lbs.) 8 mm (5/16") mounting hardware: 9 N m (80 to 85 in-lbs.)			
Torque specification for 10/32 ground cleat	2 N m (20 to 25 in-lbs.). Do not over torque.			
Cooling	Natural convection: no fans			
Communication	Power line			
Standard warranty term	enphase.com/warranty			
Compliance	UL1741, IEEE1547, FCC Part 15 Class B CAN/CSA-C22.2 No. 0-M91, 0.4-04, and 107.1-01			
Integrated DC disconnect	The DC connector has been evaluated and approved for use as the load-break disconnect required by the NEC.			
Integrated AC disconnect	The AC connector has been evaluated and approved for use as the load-break disconnect required by the NEC.			

Engage Cable Specifications

Specification	Value
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	TC-ER
Cable conductor insulator rating	THWN-2
Environmental protection rating	IEC 60529 IP67
UV exposure rating: terminator, engage coupler, and drop connector body	UL 746 C, F1
Sunlight resistance (cable)	UL 1277
Compliance	UL486A/B, UL 514C, UL6703, UL 9703, IEC 60529 IP67, CAN/CSA 22.2 No. 21, 182.3
Conductor size	12 AWG
Cable diameter	208 VAC: 11.75mm (0.463") 240 VAC: 10.75mm (0.425")
Minimum loop size	4.75 inches (12 cm)
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 Installation Map

To Sheet / A la hoja de:

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	4	5	6	7			
A										
B										
C										
D										
E										
F										
G										
H										
J										
K										
L										
M										

To Sheet / A la hoja de:

To Sheet / A la hoja de:

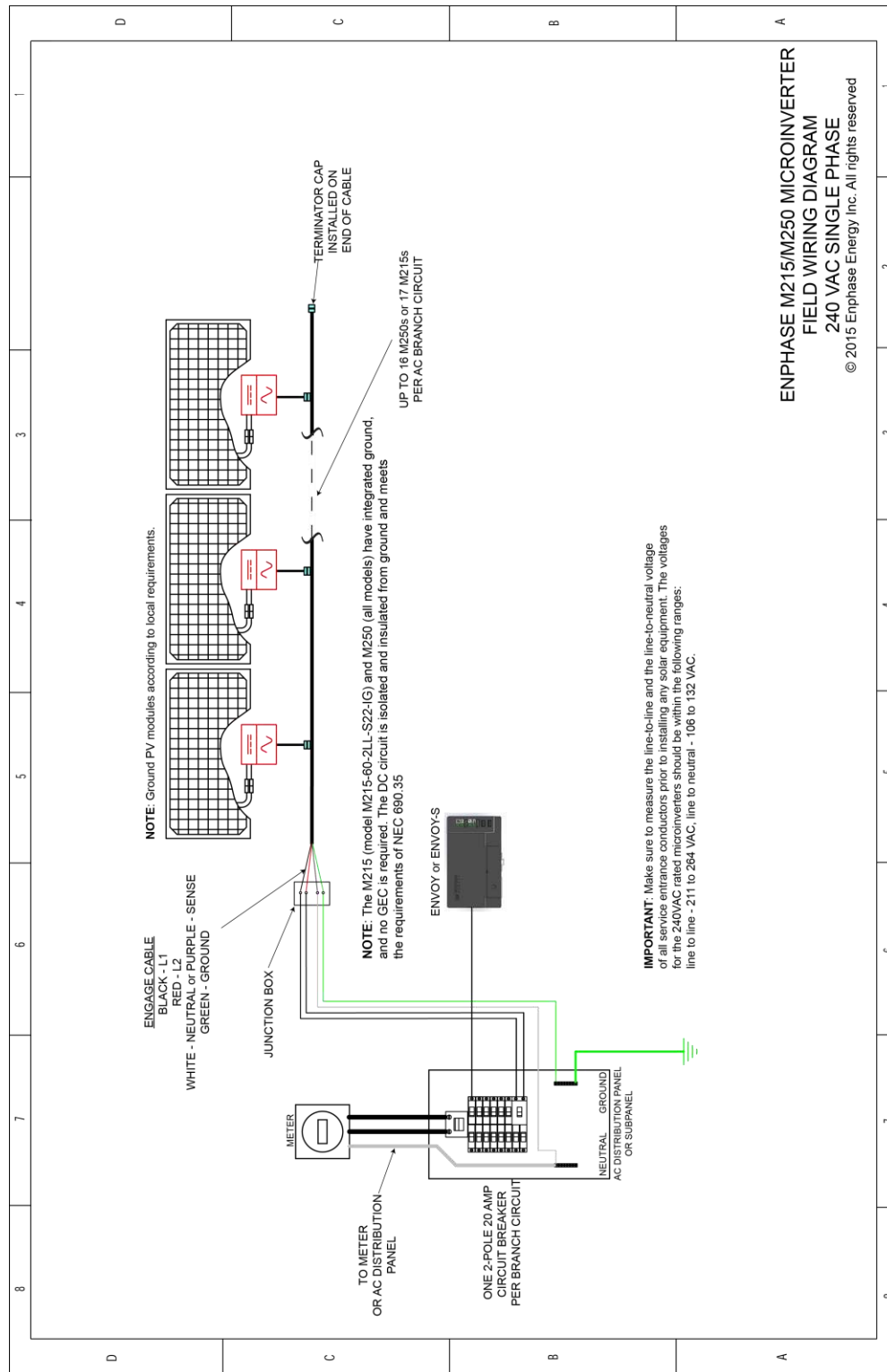
Scan completed map and upload it to Enphase. Click "Add a New System" at <https://enlighten.enphaseenergy.com>. Use this map to build the virtual array in Enlighten's Array Builder.

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

Envoy Serial Number Label /
Número de serie de Envoy

ENPHASE.

Sample Wiring Diagram: 240 VAC, Single-Phase



Sample Wiring Diagram: 208 VAC, Three-Phase

