

# Enphase Engage Cable and Accessories



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## 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 (<http://www.enphase.com/support>) for the latest information.

For Enphase patent information refer to <http://enphase.com/company/patents>.

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# Table of Contents

Important Safety Information .....	4
Read this First .....	4
Safety Instructions.....	4
Audience .....	4
The Enphase Engage Cable and Accessories .....	5
Compatibility.....	5
Parts and Tools Required .....	5
Enphase Equipment.....	5
Other Items.....	5
Lightning Surge Protection.....	5
Selecting Cable Type.....	6
Connector Spacing Options .....	6
Voltage Types and Conductor Count.....	7
Racking Compatibility.....	7
Cabling Length Options.....	7
Planning for Cable Lengths and Type.....	8
About the Disconnect Tool.....	9
Enphase Engage Cable and Accessories Installation.....	10
Installation Procedure .....	10
Step 1: Connect the Envoy .....	11
Step 2: Install the AC Branch Circuit Junction Box.....	12
Step 3: Plan, Cut, and Position the Engage Cable .....	13
Step 4: Attach the Microinverters to the Racking.....	14
Step 5: Dress the Engage Cable .....	15
Step 6: Terminate the Unused End of the Engage Cable.....	16
Attaching the Terminator.....	16
Replacing or Removing the Terminator .....	17
Step 7: Connect the Engage Cable to Junction Box(es) .....	18
Step 8: Connect the PV Modules.....	19
Step 9: Verify and Commission.....	19
Technical Data .....	20
Appendix – Sample Wiring Diagram.....	21

# Important Safety Information

## Read this First

To reduce the risk of electrical shock, and to ensure the safe installation and operation of the Enphase System, the following safety indications appear throughout this document.



**Danger!** Indicates a hazardous situation, which if not avoided, will result in death or serious injury.



**Warning!** Indicates an electrical hazard, which if not avoided, **could** result in death or serious injury.



**Warning!** Indicates a hazardous situation, which if not avoided, **could** result in death or serious injury.



**Note:** Follow instructions closely to avoid damage or malfunction to the device and/or damage to surrounding property.

## Safety Instructions



**Danger! Risk of Electrical Shock.** Do NOT connect or disconnect the photovoltaic module from the Enphase Microinverter without first removing AC power from the photovoltaic system.



**Warning!** Be aware that only trained solar professionals should install and/or replace the Engage Cabling System or connect the Enphase Microinverter to the electrical utility grid.



**Warning!** Perform all electrical installations in accordance with all local electrical codes and the National Electrical Code (NEC), ANSI/NFPA 70.



**Warning!** The AC connectors on the cabling are rated as a disconnect only when used with an Enphase Microinverter.



**Warning!** Connect the Enphase Microinverter to the electrical utility grid only after receiving prior approval from the utility company and any applicable AHJ (authority having jurisdiction).



**Warning!** 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.



**Note:** Before installing the cabling, read all instructions and cautionary markings in the user manual, on the Enphase equipment, and on the all other photovoltaic equipment.

## Audience

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

# The Enphase Engage Cable and Accessories

The Engage™ Cable is a continuous length of 2.5 mm<sup>2</sup> (12 AWG), outdoor-rated cable with integrated connectors for Enphase® Microinverters. These connectors are preinstalled along the Engage Cable at intervals to accommodate PV module widths. The microinverters plug directly into the cable connectors.

## Compatibility

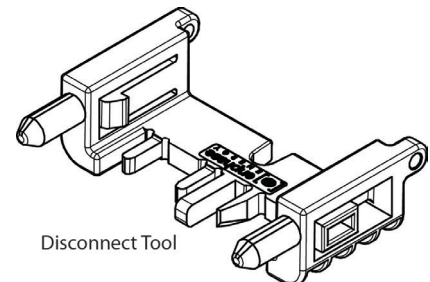
The cabling is compatible with a variety of PV racking systems. Refer to the PV Racking Compatibility document on the Enphase website (<http://www.enphase.com/support>) for details.

## Parts and Tools Required

In addition to the Enphase Microinverters, Enphase Envoy® Communications Gateway, PV modules, racking, and associated hardware, you will need the following items.

### Enphase Equipment

- Enphase Engage Cable. See page 6 for options.
- Sealing caps, as needed (for any unused drops on the cable)
- Terminators, as needed (for AC branch circuit cable ends)
- Cable clips
- Enphase disconnect tool (number 2 and 3 Phillips screwdrivers can be substituted). See “About the Disconnect Tool” on page 9 for more information.



Disconnect Tool

### 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, S23, or S24. Not required for M215-60-2LL-S22-IG, S23-IG, or S24-IG, or M250-60-2LL-S22, S23, or S24.

- Torque wrench, sockets, wrenches for mounting hardware
- Adjustable wrench or open ended wrench (for terminators)

## Lightning Surge Protection

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. In addition to having some level of surge suppression, it is important to have insurance that protects against lightning and electrical surges.

Install these devices per vendor instructions.

Residential	Commercial
<ul style="list-style-type: none"> <li>• Citel DS72-RS-120 surge protector; <a href="#">data sheet</a></li> <li>• Delta LA-302 lightning arrestor; <a href="#">website</a></li> <li>• Leviton 51110 or 51110-001; whole house surge protection panel; <a href="#">website</a></li> <li>• Midnight solar surge protection device MNSPD-300 or MNSPD-300FM (with flush mount box); <a href="#">website</a></li> </ul>	<ul style="list-style-type: none"> <li>• Citel DS73-RS-G surge protector; <a href="#">data sheet</a></li> <li>• Delta LA-303 lightning arrestor; <a href="#">website</a></li> </ul>

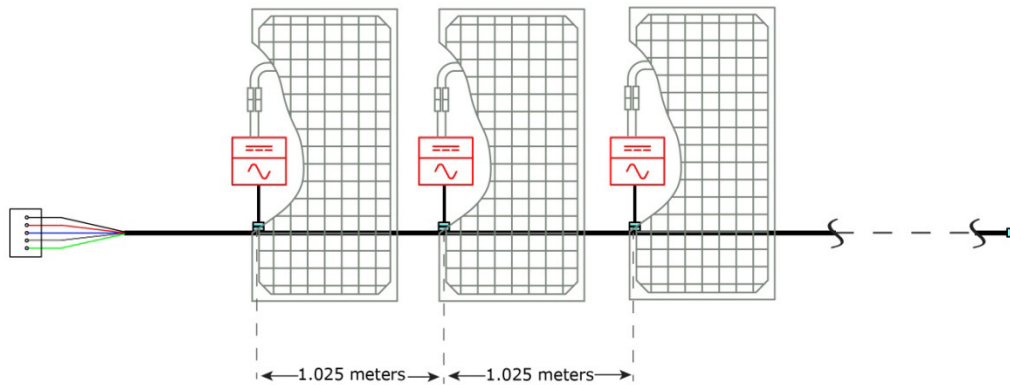
## Selecting Cable Type

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.

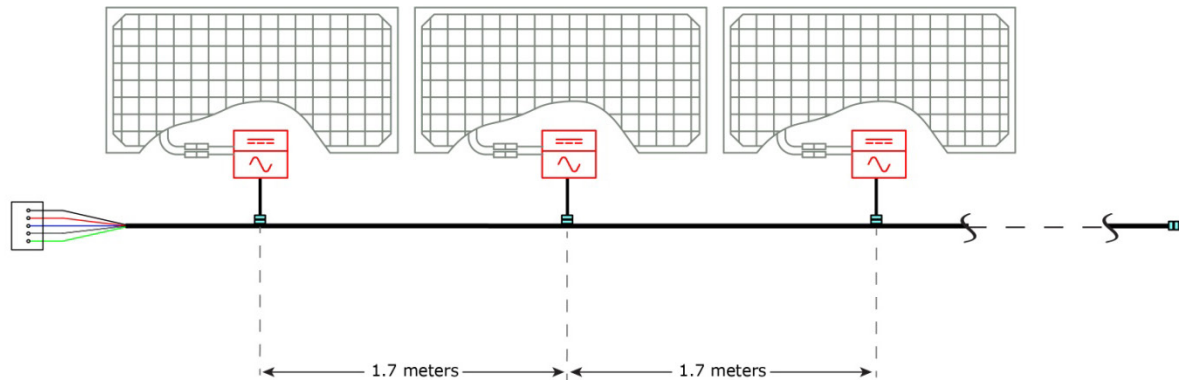
### Connector Spacing Options

The gap between connectors on the cable can be either 1.025 meters (40") or 1.7 meters (67"). The 1.025 meter spacing is best suited for connecting PV modules installed in portrait orientation, while the 1.7 meter gap is best suited to PV modules installed in landscape orientation.

Cabling with connectors spaced at 1.025 meter (40") for PV modules in portrait orientation

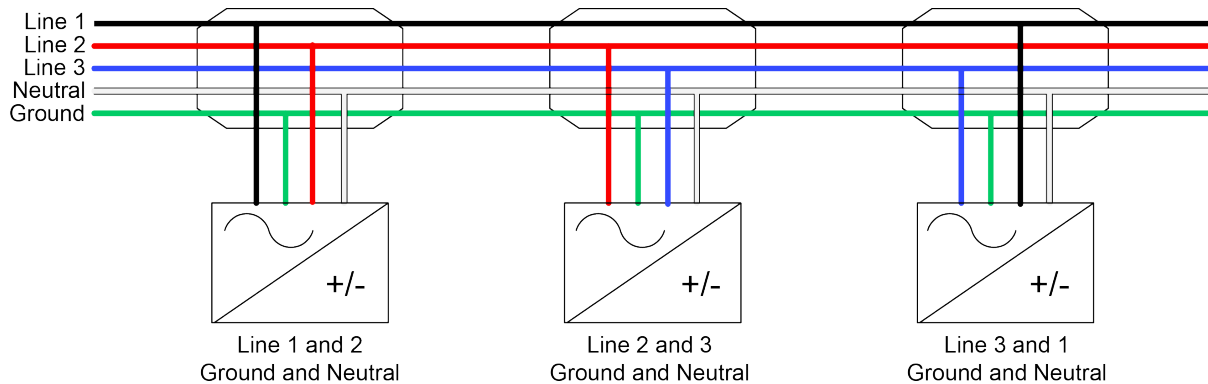


Cabling with connectors spaced at 1.7 meters (67") for PV modules in landscape orientation



### Voltage Types and Conductor Count

The voltage types are either 240 VAC split phase or 208 VAC three phase. **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 in the following diagram.



### Racking Compatibility

Engage Cabling is compatible with a variety of racking systems. For a list of approved PV module racking types, refer to the Racking Compatibility document at (<http://www.enphase.com/support>).

### Cabling Length Options

Engage Cabling is available in shorter lengths with 30-40 connectors, depending upon voltage type. Longer lengths can be ordered and cut to suit per order. Ordering options include:

Model Number	Voltage type/ conductor #	Connector count	Connector spacing	PV module orientation	Approx. weight
ET10-240-40	240 VAC, 4 conductor	40	1.025 m (40")	Portrait	18.1 kg (40 lbs)
ET17-240-40	240 VAC, 4 conductor	40	1.7 m (67")	Landscape	20.4 kg (45 lbs)
ET10-208-30	208 VAC, 5 conductor	30	1.025 m (40")	Portrait	13.6 kg (30 lbs)
ET17-208-30	208 VAC, 5 conductor	30	1.7 m (67")	Landscape	15.9 kg (35 lbs)
ET10-240-BULK	240 VAC, 4 conductor	240	1.025 m (40")	Portrait	over 90 kg (200 lbs)
ET17-240-BULK	240 VAC, 4 conductor	240	1.7 m (67")	Landscape	over 90 kg (200 lbs)
ET10-208-BULK	208 VAC, 5 conductor	240	1.025 m (40")	Portrait	over 90 kg (200 lbs)
ET17-208-BULK	208 VAC, 5 conductor	240	1.7 m (67")	Landscape	over 90 kg (200 lbs)

## 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 Engage Couplers. 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:
  1. Make use of leftover lengths of Engage Cable
  2. Transition between portrait and landscape Engage Cable
- Engage Cable to Field Cable (#12 TC-ER):
  3. Transition between sub-arrays on the same circuit
  4. 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 following documents to maintain AC voltage rise at less than 2%:
  - *Applications of the Engage Coupler*
  - *Circuit Calculations for the M250 Microinverter* (also available for M215)
  - *Calculating AC Line Voltage Drop for M250 Microinverters with Engage Cables* (also available for M215)
- **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 bend radius.** When planning cabling turns or loops, you must account for a minimum bend radius of 4.75 inches (12 cm).
- **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,

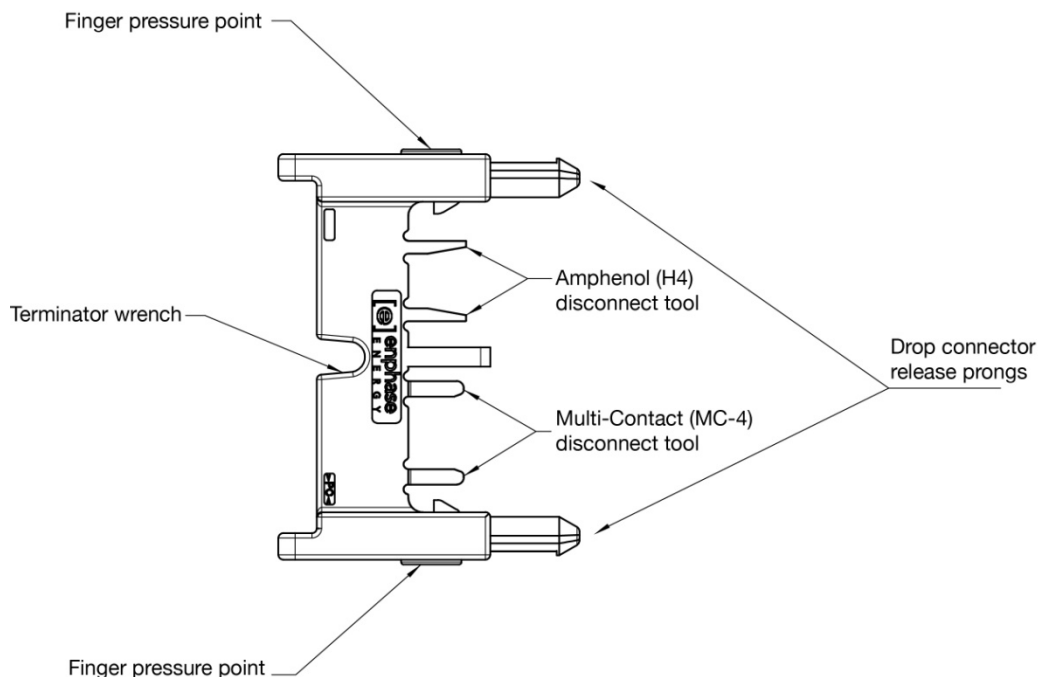


cut the cable to service each smaller array, and connect the sub-arrays together using appropriately rated lengths of conduit. Accomplish the transition from cable to conduit using an outdoor rated AC junction box, as required by the NEC and local code. Cover unused connectors with Enphase sealing caps.

- **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 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 1.025 and 1.7 meter spacing cable options using an outdoor-rated junction box. Install this junction box to the PV racking.

## About the Disconnect Tool

The Enphase disconnect tool is a multi-function PV tool as shown. Enphase AC connectors are tool-removable only. For instructions on how to disconnect an Enphase Microinverter, refer to the manual for the specific microinverter at <http://www.enphase.com/support>.



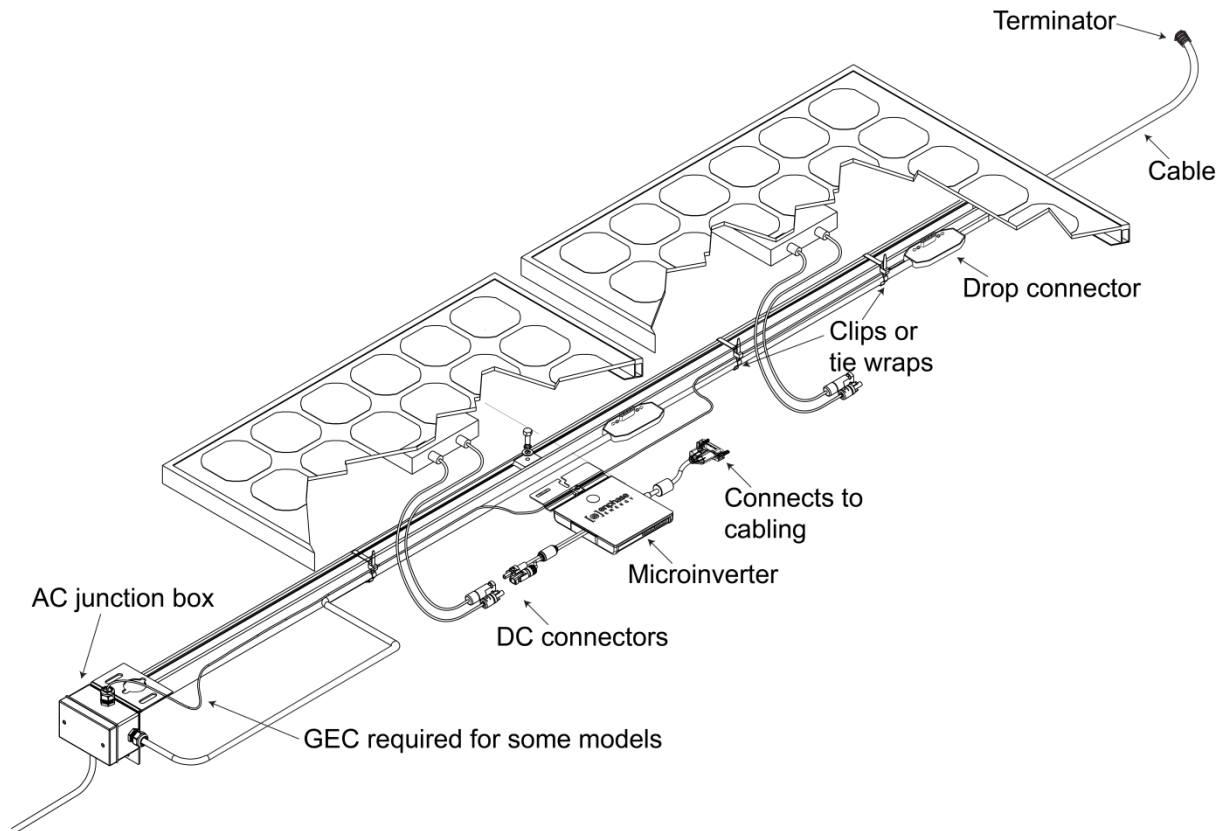
**Danger: Risk of Electrical Shock.** When disconnecting an Enphase Microinverter, do not leave the drop connector uncovered for an extended period. If you do not plan to replace the microinverter immediately, you must cover any unused connector with a watertight sealing cap. Listen for two clicks as the connectors engage.

# Enphase Engage Cable and Accessories Installation

To install Engage Cable, roll out the desired length of cable and cut it to size. Wire one end directly into the junction box at the head of the branch circuit. Seal the other end from the environment using an Enphase Branch Terminator. The microinverter AC cable connectors then plug into the regularly-spaced connectors as shown.

Follow the detailed instructions in this section.

For information on microinverter installation, refer to the manual for specific microinverters at <http://www.enphase.com/support>.



## Installation Procedure

Installing the Engage Cable and Accessories involves several key steps:

1. Connect the Envoy
2. Install the AC Branch Circuit Junction Box
3. Plan, Cut, and Position the Engage Cable
4. Attach the Microinverters to the Racking
5. Dress the Engage Cable
6. Terminate the Unused End of the Engage Cable
7. Connect the Engage Cable to Junction Box(es)
8. Connect the PV Modules
9. Verify and Commission



**Danger: Risk of Electrical Shock.** Due to presence of exposed conductors, DO NOT connect the Enphase Microinverters to the utility grid or energize the AC circuit(s) until you have completed all installation procedures as described in the following sections.

## Step 1: Connect the Envoy

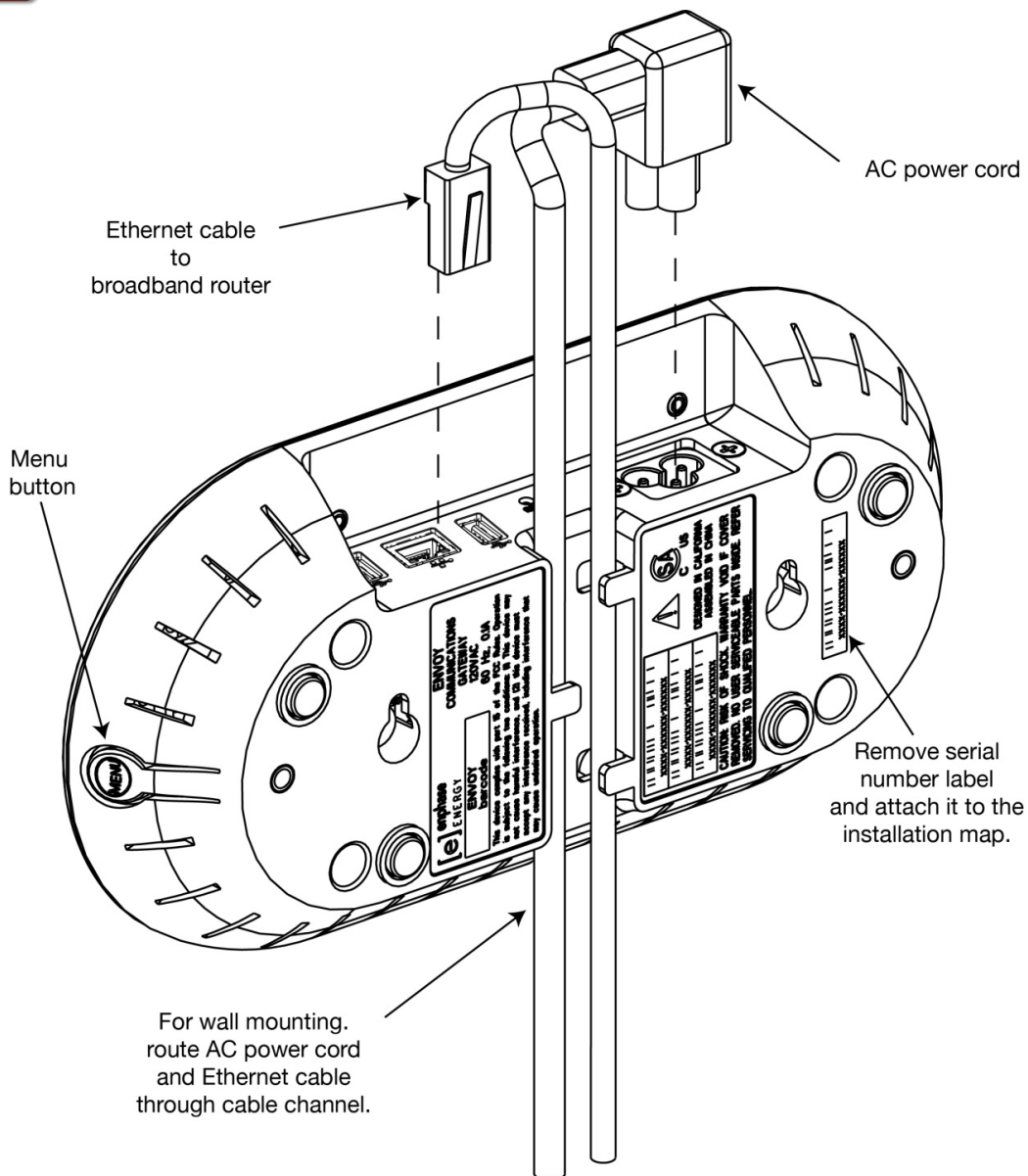
- Connect the Envoy to power and Internet according to the Envoy Quick Install Guide.
- Wait for the “+Web” indication on the Envoy’s LCD screen.
- Leave the Envoy running while you install the microinverters so that any required Envoy software upgrade completes.



**Best Practice:** When powered up and connected for the first time, the Envoy may retrieve an automatic upgrade from Enphase. Because this upgrade may take up to 20 minutes, connect the Envoy first at the site (connect to both AC power and the broadband router) so that it performs the upgrade well before the solar module installation is complete.



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



## Step 2: Install the AC Branch Circuit Junction Box



**DANGER:** 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.



**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 microinverter manual. You must protect each microinverter AC branch circuit with a 20 amp maximum breaker.

- a. Measure AC line voltage at the electrical utility connection to confirm that it is within the ranges shown:

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 neutral	106 to 132 VAC	L1, L2, L3 to neutral	106 to 132 VAC

- 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.

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.

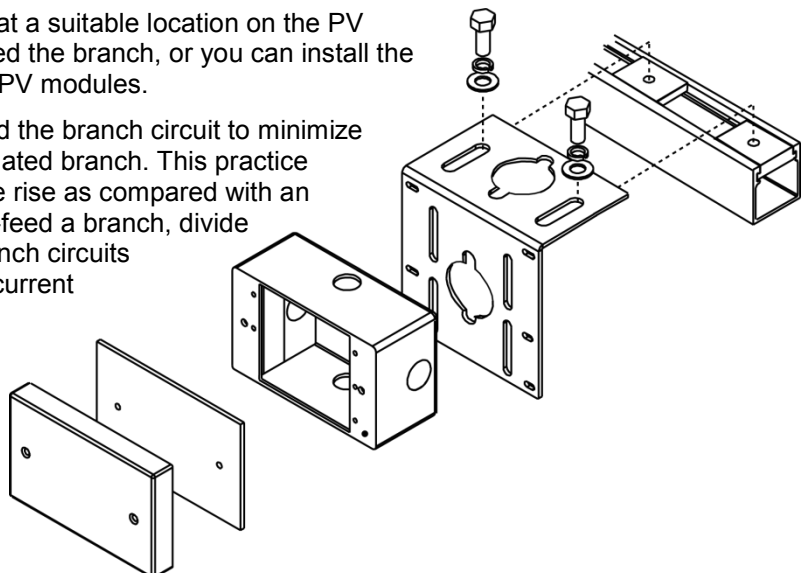
Standard guidelines for voltage rise on feeder and AC branch circuit conductors might not be sufficient for microinverter AC branch circuits that contain the maximum allowable microinverters. This is due to high inherent voltage rise on the AC branch circuit.

For more information, refer to our Technical Brief on Voltage Drop Considerations, <http://www.enphase.com/support>.

- c. Install an appropriate junction box 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:** 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 overcurrent protection device (OCPD).



- d. 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: Plan, Cut, and Position the Engage Cable

The Engage Cable is a continuous length of 12 AWG (2.5 mm<sup>2</sup>), outdoor-rated cable with integrated connectors for microinverters. These connectors are preinstalled along the Engage Cable at intervals to accommodate 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.

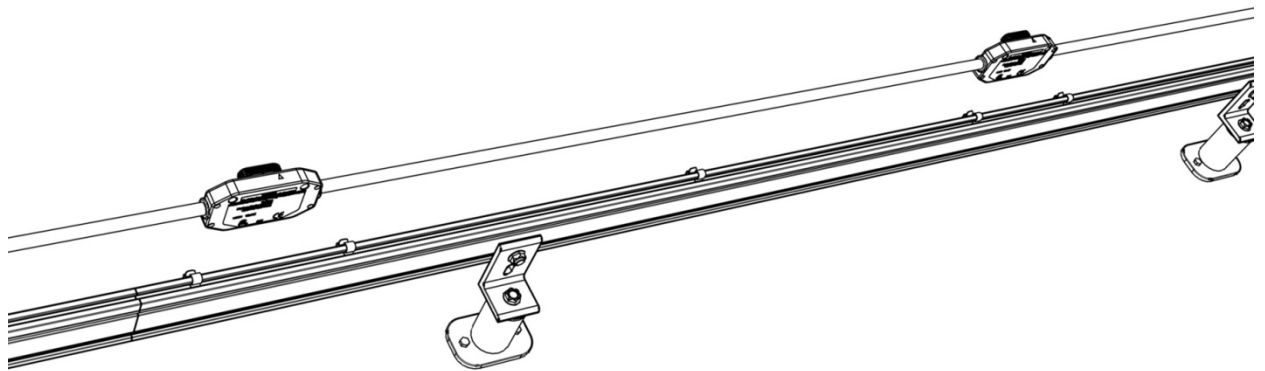


**NOTE: Make sure you are using the correct cable type.** Installers must order Engage Cable for either 240 VAC single phase, typical for residential applications or 208 VAC three phase, typical for commercial installations. All drop connectors on the Engage Cable bear labels indicating the cable type.

- a. Confirm that the cable matches the electrical utility service at the site per the following:
  - 208 VAC (three-phase) Engage Cable at sites with three-phase 208 VAC service.
  - 240 VAC Engage Cable at sites with 240 VAC single-phase service.
- b. Plan the cable route so that the drop connectors on the Engage Cable align with each PV module. Allow extra length for slack, cable turns and any obstructions.
- c. Measure the path of the AC branch circuit and cut a length of Engage Cable to meet your needs.
- d. Lay the Engage Cable along the route it will travel, positioning the connectors so that they align with the PV modules. Allow extra length for slack, cable turns and any obstructions.



**WARNING:** Plan the AC branches so that they do not exceed the maximum number of microinverters in an AC branch circuit as listed in the Enphase Microinverter manual. You must protect each microinverter AC branch circuit with a 20 A maximum breaker.



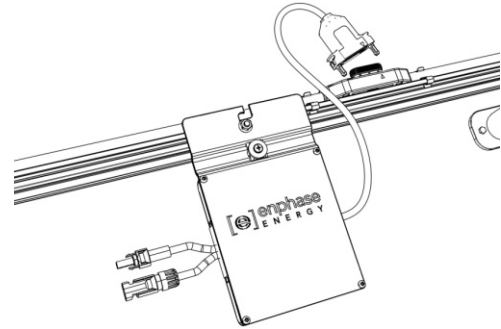
**NOTE:** Many PV modules have a central stiffening brace. In these cases, do **not** position the connector and microinverter at the exact center of the PV module. Instead, position the drop connectors so that the connectors do not conflict with the braces.

- e. 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.

## Step 4: Attach the Microinverters to the Racking

- a. **Mount the microinverters according to the microinverter manual.** Ensure both that the microinverter does not interfere with the PV module frames or stiffening brace, and that the drop cable from the microinverter can easily reach the connector on the cable.
- b. If required, connect a GEC according to the microinverter manual. See the following table. Documentation is available at <http://www.enphase.com/support>.

Enphase Microinverters M215-60-2LL-S22, S23, or S24, require a GEC or other compliant grounding method.



GEC Required?	
M215 Microinverter Model Number	
M215-60-2LL-S22	Yes
M215-60-2LL-S23	Yes
M215-60-2LL-S24	Yes
M215-60-2LL-S22-IG*	No
M215-60-2LL-S23-IG*	No
M215-60-2LL-S24-IG*	No
M250 Microinverter Model Number	
M250-60-2LL-S22*	No
M250-60-2LL-S23*	No
M250-60-2LL-S24*	No

\* The M215-60-2LL-S22-IG, S23-IG, S24-IG, M250-60-2LL-S22, S23, and S24 do not require a GEC because the DC circuit within these models is isolated and insulated from ground. Ground fault protection (GFP) is integrated into these microinverters. As a result, these models take less time to install than other microinverters, saving money, and increasing safety.



**Note:** When mixing microinverter models on a single branch, you must:

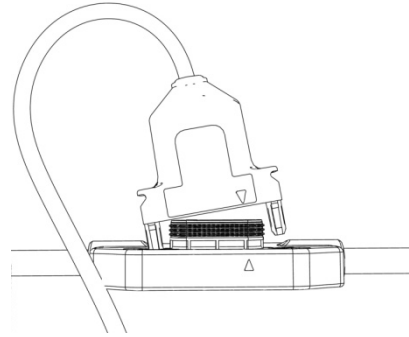
- Adhere to the smaller branch limit.
- Use a GEC if one or more of the microinverters in the branch requires it.

## Step 5: Dress the Engage Cable

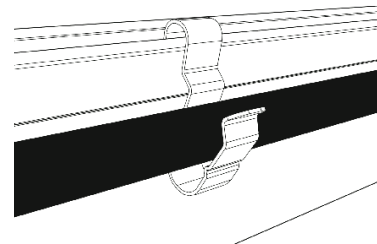


### Adhere to the following requirements:

- Do not expose the connection to directed, pressurized liquid (water jets, etc.).
- Do not expose the connection to continuous immersion.
- Do not hang any weight from the cable system.
- 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.
- Fit the connection using only the prescribed tools.
- There are two release holes in the cable connector. These holes are used to disconnect the connector. **Keep these release holes clear and accessible.**



- a. Attach the Engage Cable to the rack using the included clips, or you may use tie wraps. The cable clips are designed so that the drop cable from the microinverter can also be dressed into the clip underneath the cable.
- b. Dress any excess cabling in loops so that cabling does not contact the roof.



**Warning: Tripping Hazard.** Do not leave the cabling to rest on the roof. Loose cables might become a tripping hazard. Secure all cables.

- c. Place tie wraps or clips on either side of the drop connector. Use one or two additional clips, tie wraps, or other support scheme to secure the cable between connectors.
- d. Remove the temporary shipping cap from the Engage Cable.
- e. Connect the microinverter and listen for two clicks as the two prongs engage. Ensure that **both** latching mechanisms have engaged.



**Note:** The connector has not been designed for repeated linking and unlinking.

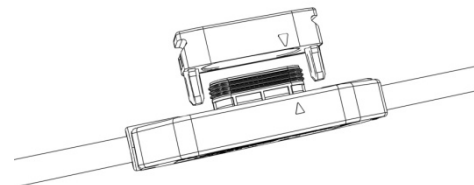
- f. Repeat steps **a** through **e** for all microinverters in the branch.
- g. Cover any unused connector with a watertight sealing cap. Listen for two clicks as the connectors engage. Ensure that **both** latching mechanisms have engaged.



**Note:** Make sure watertight sealing caps are installed on **all** unused AC connectors. Unused AC connectors are live when the system is energized by the utility.



**Note:** Do not use the shipping cap to cover unused connectors. The shipping cap does not provide an adequate environmental seal. Enphase watertight sealing caps are required for protection against moisture ingress.





**Note:** Enphase watertight 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.



**Note:** If you need to remove a watertight sealing cap, you must use the Enphase disconnect tool or a #3 Phillips screwdriver.

## Step 6: Terminate the Unused End of the Engage Cable

### Attaching the Terminator



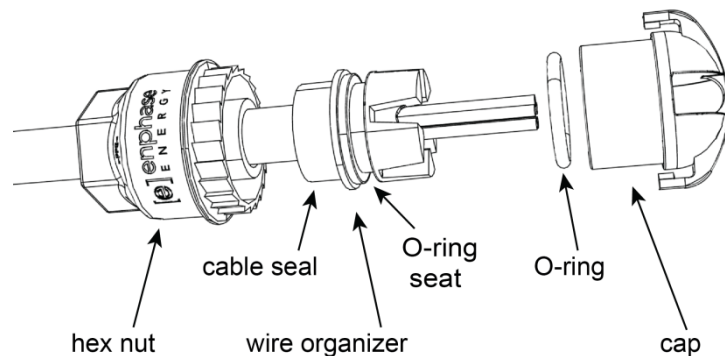
**Note:** The terminator is intended for one-time use only. If you open the terminator following installation, the latching mechanism is destroyed and the terminator cap cannot be used again. If the latching mechanism is defective, the terminator must not be used. The latching mechanism must not be circumvented or manipulated.



**Adhere to the following requirements:**

- Use only the terminator assembly to seal the conductor end of the trunk.
- If the latching mechanism is defective, do not use the terminator.
- Do not circumvent or manipulate the latching mechanism.
- Use the terminator and no other method to seal the conductor end of the trunk.
- Do not expose the terminator cap to directed, pressurized liquid (water jets, etc.).
- Do not expose the terminator to continuous immersion.
- Do not expose the terminator to continuous tension (e.g., tension due to pulling or bending the cable near the terminator)
- Do not install or use in potentially explosive environments.
- Do not allow the terminator to come into contact with open flame.
- Use the terminator cap assembly only when all parts are present and intact.
- Fit the terminator cap using only the prescribed tools.
- Make sure that all seals are seated correctly in the wire organizer.
- When stripping off the cable sheath, make sure that the conductors are not damaged. If the conductors are damaged, proper system function cannot be assured.

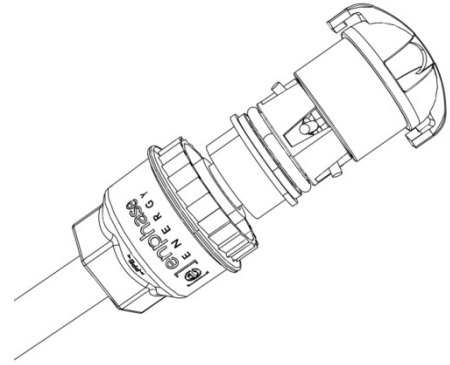
- a. Remove 60 mm (2.5 inches) of the cable sheath from the conductors.
- b. Slide the hex nut onto the Engage Cable.
- c. Insert the Engage Cable all the way into the wire organizer (up to the stop).
- d. Bend the individual wires back into the recesses in the wire organizer so that they angle back toward the cable.



- e. 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.



- f. Screw the hex nut onto the cap. **Never unscrew the hex nut** as this can twist and damage the cable.
- g. Hold the cap with an Enphase disconnect tool, or insert a #2 Phillips screwdriver.
- h. 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.
- i. 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.
- j. Ensure that all cabling is located underneath the PV module.



### Replacing or Removing the Terminator

If the terminator must be replaced or removed, observe the following.



**Danger: Risk of Electrical Shock.** Never open, remove or replace the terminator while it is connected to the power supply.



**Note:** The terminator is intended for **one-time use only**.

If you open the terminator again following the installation, you destroy the latching mechanism, and the unit **cannot** be used again. Damage to the latching mechanism **cannot** be seen with the naked eye. Label the opened terminator and dispose of it immediately to ensure that it cannot be reused accidentally.

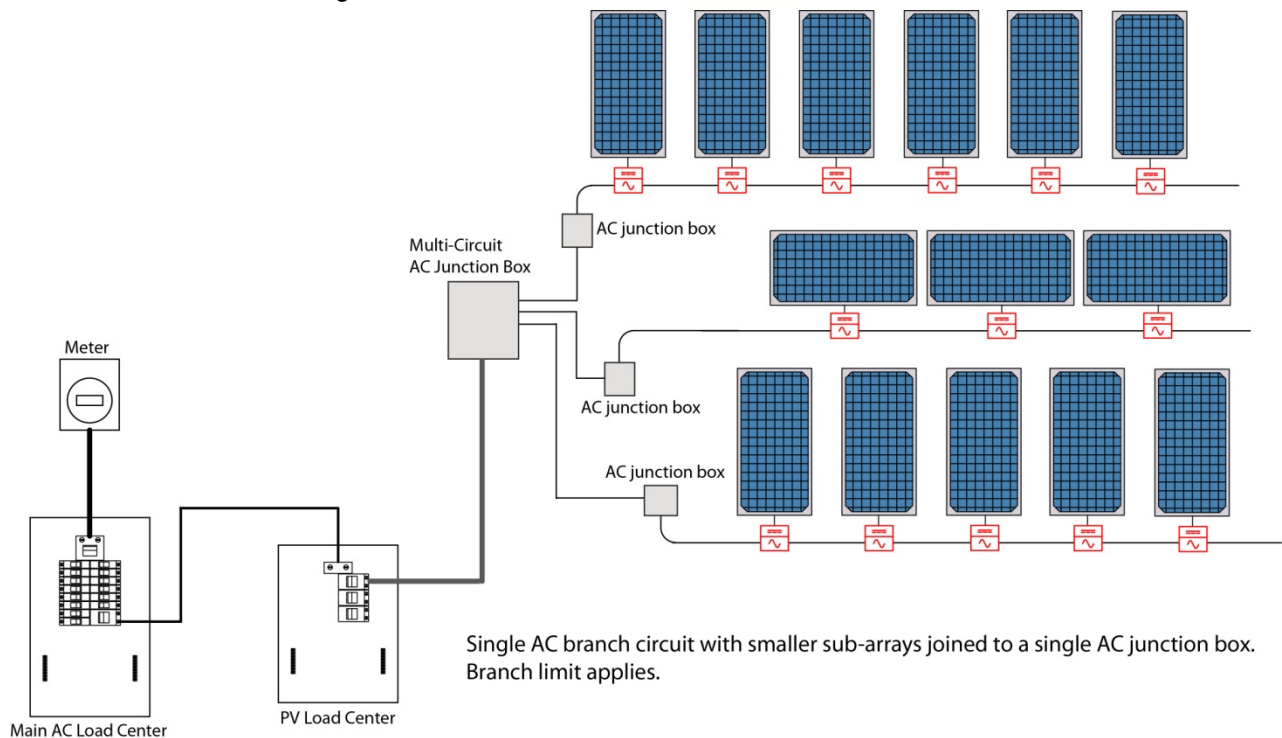
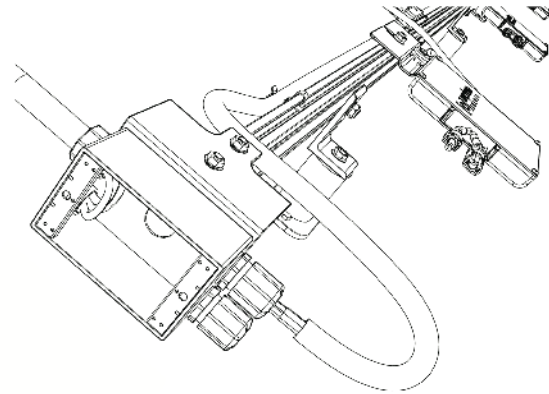
- a. Remove the terminator by cutting it off with a diagonal cutter set flush against the end of the cable.
- b. Replace the terminator as described in the previous steps, beginning on page 16.

## Step 7: Connect the Engage Cable to Junction Box(es)

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



**Note:** The Engage Cable is stranded with Class K wire. Use appropriate connectors when transitioning to field cable.



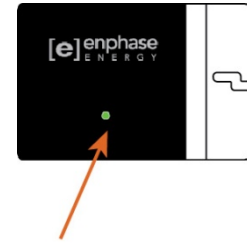
Refer to the wiring diagram located in the Appendix of this manual for more information.

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

The green wire acts as equipment ground. Depending on the Enphase Microinverter model used, a continuous GEC for system ground may also be required as described in “Step 4: Attach the Microinverters to the Racking.”

## Step 8: Connect the PV Modules

- a. Mount the 60-cell PV modules above the microinverters.
- b. Connect the DC leads of each 60-cell PV module to the DC input connectors of their corresponding microinverter.
- c. The status LED on the underside of each microinverter lights green 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. This is because the system is not yet energized.



LED on underside  
of Enphase Microinverter

## Step 9: Verify and Commission



**Note:** Prior to final connection to the utility grid, ensure that all AC and DC wiring is correct.

- a. Ensure that none of the AC and DC wires are pinched or damaged.
- b. Ensure that all junction boxes are properly closed.
- c. Ensure that all unused connectors are capped.
- d. Ensure that all connectors are properly seated.
- e. Commission (energize) the system as instructed by the Enphase Microinverter installation and operation manual.

## Technical Data

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 type	TC-ER
Cable conductor insulator rating	THWN-2
Cable stranding	Class K
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	1.25 cm (0.49")
Minimum bend radius	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")

# Appendix – Sample Wiring Diagram

For information on microinverter installation, refer to the manual for the specific microinverter at <http://www.enphase.com/support>.

