

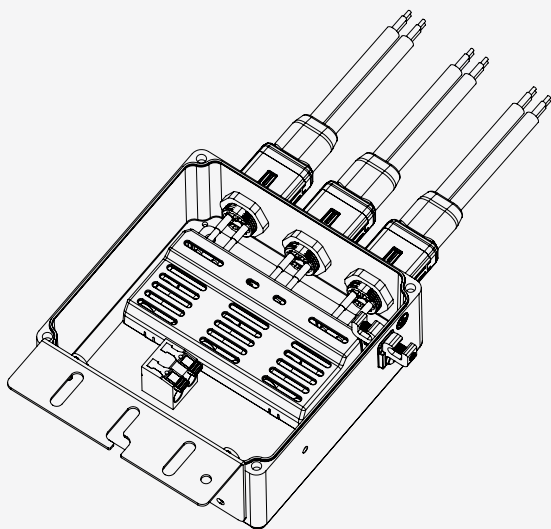
# Installing the Enphase Q Aggregator

To install the Enphase Q Aggregator, read and follow all warnings and instructions in this Guide and in the *Enphase IQ Series Microinverter Installation and Operation Manual* at [enphase.com/support](http://enphase.com/support). If you do not fully understand any of the concepts, terminology, or hazards outlined in these instructions, refer installation to a qualified electrician or installer. These instructions are not meant to be a complete explanation of a renewable energy system. All installations must comply with national and local electrical codes. Professional installation is recommended.

**IMPORTANT:** Enphase IQ Series Microinverters require the Q Cable and are not compatible with previous Enphase cabling. An IQ Envoy is required to monitor performance of the IQ Microinverters. The Q Accessories work only with Enphase IQ Series Microinverters.

## How It Works

Use the Enphase Q Aggregator to bring together up to three branches of microinverters, center feed branch connections, or connect a remote part of the array using Enphase Q Field Wireable Connectors.



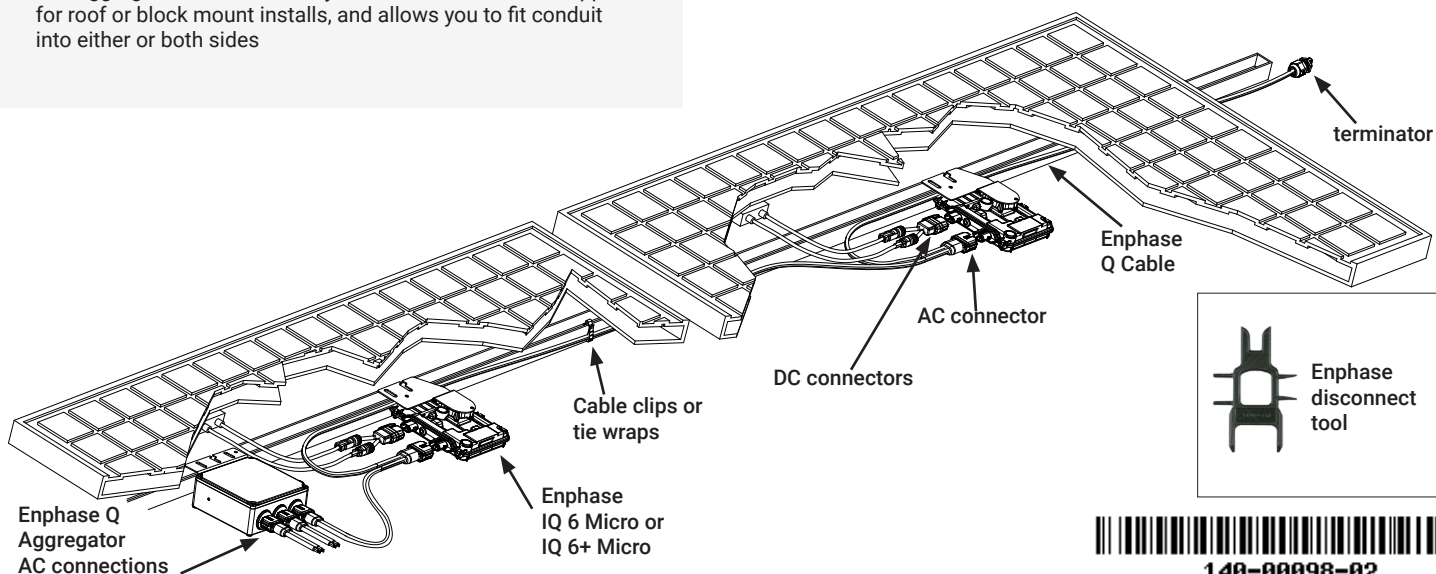
## Features

- Lets you install systems up to 11.5 kW with only two line conductors and a ground coming from the roof
- Usable in any position up to 45 degrees from horizontal (NEMA 3R, includes drain holes)
- The aggregator bracket is ready to install on rail, can be flipped for roof or block mount installs, and allows you to fit conduit into either or both sides

## PREPARATION

- Check the box for the following items:
  - Enphase Q Aggregator
  - One bulkhead connector cap (Q-BA-CAP). You may need to order an extra cap if you connect only one branch circuit to the aggregator.
  - *Quick Install Guide* (this document)
- Check that you have these **required** items:
  - Enphase Q Aggregator(s) for multiple branch arrays
  - Drill with an appropriately sized hole saw for conduit entry
  - Wet/dry-rated conduit gland and conduit for home run entry
  - Screwdrivers
  - Wire stripping tool
  - Torque wrench and sockets for mounting hardware
  - 75°C to 90°C copper conductors for connections between the Q Aggregator and main PV breaker
  - Enphase disconnect tool
- Protect your system with lightning and/or surge suppression devices at the sub or main panel.
- Protect the Q Aggregator with a maximum 60-amp over-current protection device (OCPD).
- Size the AC wire gauge to account for voltage rise. Select the correct wire size based on OCPD size and on the distance from the beginning of the Enphase Q Cable to the breaker in the load center. Design for a voltage rise total of less than 2% for the sections from the Enphase Q Cable to the breaker in the load center. Refer to the Voltage Rise Technical Brief at [enphase.com/support](http://enphase.com/support) for more information.
 

**Best practice:** Use a Q Aggregator and Enphase Q Field Wireable Connectors to center-feed each branch circuit to minimize voltage rise in a fully-populated branch.
- Plan to install the Q Aggregator in a location that will be under the modules when the array is complete.



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# INSTALLATION

## 1 Plan the Connections

- A) Plan for the following connections:
- One maximum 60 A home run: Pass the home run cable through wet/dry-rated conduit gland, and secure in the cage clamp lugs to the terminal connectors. Use standard home run conduit size (1/2, 3/4, or 1-inch).
  - Up to three 20 A branch circuits: Three bulkhead mounted connectors allow for the direct connection of the Q Cable.
  - PV Array ground: The ground lug connection that passes through the enclosure allows you to connect racking and module ground to the main panel ground. The Aggregator contains no parts requiring a ground.

## 2 Plan the Location

- A) Select a location that will be under the modules when the array is complete, but that will also be accessible for making connections later.
- B) Ensure that you can bring conduit into the Q Aggregator from the upper left or right side where indicated by pilot hole indents.

**BEST PRACTICE:** Lay out your cable runs before determining the Q Aggregator location.

**⚠ WARNING:** Ensure the conduit does not enter from an uphill direction and that moisture does not enter the Aggregator. **Water ingress will void the warranty for the Aggregator.**

## 3 Drill a Hole for Conduit

- A) Prep conduit with an offset to approximate area and position the Q Aggregator to double check your drill location.
- B) Remove the Q Aggregator cover and drill a hole for up conduit: Typical openings are 2.2 cm, 2.8 cm, or 3.5 cm (0.885", 1.115", or 1.362"), but check the conduit fittings you are using to verify size.

**⚠ WARNING:** Take care not to damage the circuit board.

- C) Dump or blow out any debris from this drilling operation.

## 4 Attach the Q Aggregator to the PV Rail

**⚠ WARNINGS:**

- Install the Q Aggregator under the PV module to avoid direct exposure to rain, UV, and other harmful weather events.
  - Mount the Q Aggregator with adequate clearance from the roof surface for rain and snow resistance.
  - Always install the Q Aggregator with the label side up. Do not mount it upside down. You can flip the bracket for roof or block mounting.
  - When transitioning between rows, secure the cable to the nearest rail to prevent cable damage.
- A) Install Q Aggregator on rail in a location that does not conflict with the module frame and module mounting hardware. Allow a minimum of 1.9 cm (0.75") between the roof and the Q Aggregator. Also allow 1.3 cm (0.50") between the back of the PV module and the top of the Q Aggregator.
- B) Install the Q Aggregator on the rail and mount loosely.
- C) Use a fittings rated for outdoor use to secure the conduit or Q cable to the Q Aggregator.
- D) Provide an AC connection (home run) from the Enphase Q Aggregator back to the electricity network connection using equipment and practices as required by local jurisdictions.
- E) Tighten rail connections to 80 in-lbs (9 N m), and make sure that conduit fittings are secured and water tight.
- F) Secure and check all connections.

## 5 Wire the Q Aggregator

- A) Pull the line conductors and ground up to the Q Aggregator.
- B) Strip the two line conductors (18 mm/0.7" strip length) using the guide on the upper surface of the cage clamp style main lugs.
- C) Secure the conductors (12 AWG to 4 AWG max) in these lugs and make sure that the orange handles are in the fully down position.
- D) Strip and bring the ground wire inside the Q Aggregator to the ground lug. This ground lug passes through to outside for use in grounding the rack and modules as needed.
- E) Secure racking ground to the ground lug.
- F) Torque the ground connections as follows:
- 14-10 AWG: 2.25 N m (20 in-lbs)
  - 8 AWG: 2.82 N m (25 in-lbs)
  - 6-4 AWG: 3.95 N m (35 in-lbs)
- G) Check your connections for soundness.

You have completed the wiring for up to three plug and play branch circuits in your system.

## 6 Replace the Cover

- A) Make sure that the drain holes on the bottom of the Q Aggregator are free from debris.
- B) Check the seal on all sides for trapped debris. Remove any debris, if needed.
- C) Replace the cover on the Q Aggregator and torque screws to 1.1 N m (9.7 in-lbs).
- D) Check that the Q Aggregator is properly sealed.
- E) Cap any unused branch circuit connections.
- The Q Aggregator is now ready for branch circuit connections.


**⚠ DANGER!** Never connect a single branch circuit to multiple branch circuit connections on the Q Aggregator.

To remove a sealing cap or AC connector, you must use an Enphase disconnect tool.

Each Q Aggregator includes one bulkhead connector cap. You can purchase additional caps from your distributor.

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## TROUBLESHOOTING

 **DANGER!** Risk of electric shock. Some tasks are done with live circuits in an outdoor rooftop environment. Always wear proper personal protective equipment (PPE) for electrical and rooftop tasks.

### One or More Branches Not Generating

Without removing the cover:

- A) Verify that voltage is within range at the PV breaker at the main panel when measuring from L1 to L2.
- B) Power off the PV circuit (aggregated ac circuit) and use a voltmeter to verify that the circuit is turned off. Use Lockout/Tagout procedures.
- C) On the roof, disconnect the Q Cable connectors from all (up to three) of the branch circuit bulkhead connectors on the Q Aggregator and seal connectors.
- D) Turn the PV circuit on at the main panel and again verify that 240V is present from L1 to L2.
- E) Using PPE, and taking care not to short the L1, L2 pins within each connector, use a voltage meter to determine if each connector on the Q Aggregator has 240V present from L1 to L2.
- F) If all connectors show proper voltage then the Q Aggregator is working correctly.
- G) If some connectors exhibit proper voltage, but, after repeated testing, other connectors do not exhibit proper voltage, continue to the Q Aggregator board removal and replacement procedures.
- H) If all connectors do not show voltage and the main PV circuit from the main panel is active per step D, continue with the following troubleshooting procedure.
- I) Reconnect, secure, and check all connections.

### All Circuits Appear Non-Functioning

- A) Verify that the PV breaker at the main panel reads 240V when measuring from L1 to L2.
- B) Power off the PV circuit (aggregated ac circuit) and verify with voltmeter that the circuit is turned off. Use Lockout/Tagout procedures.
- C) At the Aggregator, open the Q Aggregator using a standard screwdriver blade on the four captured screws on the cover.
- D) Use a voltmeter or electrical tester to verify that the circuit coming to the main lug of the Q Aggregator is not live.
- E) Inspect the Q Aggregator for evidence of loose connections at the main lug or look for evidence of multiple blown fuses. Keep in mind that fuse ends may be coated. It is best to test from the main lugs to the spade terminals.
- F) Remove tools and/or screws from the Q Aggregator, reactivate the PV circuit (aggregated ac circuit), and test for voltage on the conductors coming from main panel.
- G) If no voltage is coming from the main panel check your electrical wiring from the main panel.
- H) If there is voltage at Q Aggregator main lug, and if the wires appear to be stripped appropriately and terminated with orange handles down, continue to the Q Aggregator board removal and replacement procedures.

# SAFETY

## IMPORTANT SAFETY INSTRUCTIONS.

**SAVE THIS INFORMATION.** This guide contains important instructions to follow during installation of the Enphase Q Aggregator.



**WARNING:** Hot internal surfaces.



**WARNING:** Refer to safety instructions.



**DANGER:** Risk of electric shock.

### Safety Symbols

	<b>DANGER:</b> This indicates a hazardous situation, which if not avoided, will result in death or serious injury.
	<b>WARNING:</b> This indicates a situation where failure to follow instructions may be a safety hazard or cause equipment malfunction. Use extreme caution and follow instructions carefully.
	<b>WARNING:</b> Risk of burn. Failure to follow instructions may result in burn injury.
	<b>NOTE:</b> This indicates information particularly important for optimal system operation.

### Safety Instructions

	<b>DANGER:</b> 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.
	<b>DANGER:</b> Risk of electric shock. Be aware that installation of this equipment includes risk of electric shock. Do not open without first removing AC power from the Enphase System. Disconnect the power coming from the photovoltaics before servicing or installing.
	<b>DANGER:</b> Risk of electric shock. Risk of fire. Before making any connections verify that the circuit breakers are in the off position. Double check all wiring before applying power.
	<b>DANGER:</b> Risk of electric shock. Risk of fire. Only use electrical system components approved for wet locations, including but not limited to conduit fittings.
	<b>DANGER:</b> Risk of electric shock. Risk of fire. Use the circuit in the Enphase Q Aggregator only for connecting Enphase Q Cable and Microinverters. No other loads or sources are allowed.
	<b>DANGER:</b> Risk of electric shock. Risk of fire. Only qualified personnel should install, troubleshoot, or replace the Enphase Q Aggregator.
	<b>DANGER:</b> Risk of electric shock. Improper servicing of the Q Aggregator or its components may result in a shock, fire or explosion. To reduce these risks, disconnect all wiring before attempting any maintenance.
	<b>DANGER:</b> Risk of electric shock. Risk of fire. Ensure that all AC and DC wiring is correct and that none of the AC wires are pinched, shorted, or damaged.
	<b>DANGER:</b> Risk of electric shock. Risk of fire. Protect the Q Aggregator with a 60 A maximum over current protection device (OCPD).
	<b>DANGER:</b> Risk of electric shock. Risk of fire. Do not attempt to repair the Enphase Q Aggregator, other than to replace parts only as directed in this guide. Tampering with the board or damaging the conformal coating will void the warranty.
	<b>DANGER:</b> Risk of electric shock. Risk of fire. Make sure the conductors are not damaged. If the exposed wires are damaged, the system may not function properly.
	<b>DANGER:</b> Risk of electric shock. Risk of fire. Do not leave AC connectors on the Enphase Q Cable uncovered for an extended period. You must cover any unused connector with a sealing cap.
	<b>DANGER!</b> Risk of electric shock. Some tasks are done with live circuits in an outdoor rooftop environment. Always wear proper personal protective equipment (PPE) for electrical and rooftop tasks.

	<b>WARNING:</b> Ensure the conduit does not enter from an uphill direction and that moisture does not enter the Aggregator. Water ingress will void the warranty for the Aggregator.
	<b>WARNING:</b> Do not expose any connectors to rain or condensation before the connectors are mated.
	<b>WARNING:</b> Install the Q Aggregator under the PV module to avoid direct exposure to rain, UV, and other harmful weather events; mount the Q Aggregator off of the roof surface for rain and snow resistance; and always install the Q Aggregator with the label side up. Do not mount it upside down.
	<b>WARNING:</b> Risk of equipment damage. This product is intended for operation in an environment having a maximum ambient temperature of 55°C (131°F).
	<b>WARNING:</b> When installing the Enphase Q Cable, secure any loose cable to minimize tripping hazard.
	<b>WARNING:</b> Before installing or using the Enphase Q Aggregator, read all instructions and cautionary markings in the technical description, on the Enphase System, and on the photovoltaic (PV) equipment.
	<b>WARNING:</b> Risk of skin burn. The Enphase Q Aggregator may have very hot interior surfaces. To reduce risk of burns, use caution when working with the Q Aggregator.
	<b>NOTE:</b> For problems other than a blown fuse or physical damage, contact Enphase customer service to obtain an RMA (return merchandise authorization) number and start the replacement process.
	<b>NOTE:</b> Install the Q Aggregator in the field with 75°C or 90°C copper conductors sized per local code requirements and voltage drop/rise considerations.
	<b>NOTE:</b> Using unapproved attachments or accessories may result in damage or injury.
	<b>NOTE:</b> Use Class 1 wiring methods for field wiring connections to terminals of a Class 2 circuit. Use only 14 to 4 gauge wire. Select the wire gauge used based on the protection provided by the circuit breakers/fuses. Overcurrent protection must be installed as part of the system installation.
	<b>NOTE:</b> When looping the Enphase Q Cable, do not form loops smaller than 4.75 inches (12 cm) in diameter.
	<b>NOTE:</b> Perform all electrical installations in accordance with all applicable local electrical codes: the Canadian Electrical Code, part 1; the National Electrical Code (NEC); ANSI requirements; and NFPA 70.
	<b>NOTE:</b> To ensure optimal reliability and to meet warranty requirements, install the Enphase Microinverters and Enphase Q Cable according to the instructions in this guide.
	<b>NOTE:</b> Protection against lightning and resulting voltage surge must be in accordance with local standards.