Install Enphase IQ 7 Series Micros with EN4 Bulkhead

To install Enphase IQ Series Microinverters, read and follow all warnings and instructions in this guide and in the Enphase IQ 7 and IQ 7+ and IQ 7X Microinverter Installation and Operation Manual at: enphase.com/support. Safety warnings are listed on the back page of this guide.

The Enphase Microinverter models listed in this guide do not require grounding electrode conductors (GEC), equipment grounding conductors (EGC), or grounded conductor (neutral). The microinverter has a Class II double-insulated rating, which includes ground fault protection (GFP). To support GFP, use only PV modules equipped with DC cables labeled PV Wire or PV Cable.

IMPORTANT: The Enphase IQ Series EN4 Bulkhead Microinverters include AC and DC connectors integrated into the microinverter bulkhead. The AC port of the Enphase EN4 bulkhead connects to an Enphase Q Cable or Enphase Field Wireable Connector. The DC port of the EN4 Bulkhead has been evaluated by UL for intermatability with TE PV4-S SOLARLOK connectors.

PREPARATION

A ) 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 Enphase IQ Envoy to track system installation progress. To download, go to enphase.com/toolkit or scan the QR code at right.

B ) Refer to the following table and check PV module electrical compatibility at: enphase.com/en-us/support/module-compatibility.

<table>
<thead>
<tr>
<th>Model</th>
<th>DC connector</th>
<th>PV module cell count</th>
</tr>
</thead>
<tbody>
<tr>
<td>IQ7-60-E-US</td>
<td>EN4 locking</td>
<td>Pair only with 60-cell modules</td>
</tr>
<tr>
<td>IQ7PLUS-72-E-US</td>
<td>EN4 locking</td>
<td>Pair only with 60-72-cell modules</td>
</tr>
<tr>
<td>IQ7X-96-E-US</td>
<td>EN4 locking</td>
<td>Pair only with 96-cell modules</td>
</tr>
</tbody>
</table>

C ) In addition to the Enphase Microinverters, PV modules and racking, you will need these Enphase items:

- Enphase IQ Envoy (model ENV-IQ-AM1-240) communications gateway or IQ Combiner (model X-IQ-AM1-240-B, X-IQ-AM1-240-2, X-IQ-AM1-240-3, X-IQ-AM1-240-3C): is required to monitor solar production.
- If your PV modules have TE PV4S SOLARLOK connectors, or other connectors Listed and identified for intermatability with the Enphase EN4 bulkhead connector, you may plug them directly into the IQ 7 Series microinverter with EN4 bulkhead. For other connector combinations, Enphase bulkhead adapters are required. Instructions on intermatable connectors can be viewed, downloaded, and printed at https://enphase.com/sites/default/files/downloads/support/IQ7-7plus-7X-Micro-Manual-EN-US.pdf.

D ) Check that you have these other items:

- Enphase Q Aggregator or AC junction box.

E ) Protect your system with lightning and/or surge suppression devices. It is also important to have insurance that protects against lightning and electrical surges.

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

<table>
<thead>
<tr>
<th>Maximum* number of microinverters per AC branch</th>
<th>IQ 7 Micros (208V single phase)</th>
<th>IQ 7 Micros (240V single phase)</th>
<th>IQ 7X Micros (240V single phase)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>13</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>11</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

G ) Size the AC wire gauge to account for voltage rise. Select the correct wire size based 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 these sections. Refer to the Voltage Rise Technical Brief at enphase.com/support for more information.

Best practice: Center-feed the branch circuit to minimize voltage rise in a fully-populated branch. Using the Q Aggregator is a good way to do this.

- Enphase Q Cable (as listed in the following table):

<table>
<thead>
<tr>
<th>Cable model</th>
<th>Connector spacing</th>
<th>PV module orientation</th>
<th>Connectors per box</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q-12-10-240</td>
<td>1.3m</td>
<td>Portrait (all)</td>
<td>240</td>
</tr>
<tr>
<td>Q-12-17-240</td>
<td>2.0m</td>
<td>Landscape (60- and 96-cell)</td>
<td>240</td>
</tr>
<tr>
<td>Q-12-20-200</td>
<td>2.3m</td>
<td>Landscape (72-cell)</td>
<td>200</td>
</tr>
</tbody>
</table>

*Allows for 30cm of cable slack

- Tie wraps or cable clips (Q-CLIP-100)
- Enphase Sealing Caps (Q-SEAL-10): for any unused connectors on the Enphase Q Cable
- Enphase Terminator (Q-TERM-10): one needed at the end of each AC cable segment
- Enphase Disconnect Tool (Q-DISC-10)
INSTALLATION

1 Position the Enphase Q Cable
   A) Plan each cable segment to allow connectors on the Enphase Q Cable to align with each PV module. Allow extra length for slack, cable turns, and any obstructions.
   B) Mark the approximate centers of each PV module on the PV racking.
   C) Lay out the cabling along the installed racking for the AC branch circuit.
   D) Cut each segment of cable to meet your planned needs.

   WARNING: When transitioning between rows, secure the cable to the rail to prevent cable or connector damage. Do not count on the connector to withstand tension.

2 Position the Enphase Q Aggregator or Junction Box
   A) Verify that AC voltage at the site is within range:

<table>
<thead>
<tr>
<th>Service Type and Voltage: L1 - L2</th>
<th>Voltage Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>240 V single phase</td>
<td>211 to 264 VAC</td>
</tr>
<tr>
<td>208 V single phase</td>
<td>183 to 229 VAC</td>
</tr>
</tbody>
</table>

   B) Install an Enphase Q Aggregator or junction box at a suitable location on the racking. See Enphase Q Aggregator Quick Install Guide.
   C) Provide an AC connection from the Enphase Q Aggregator or junction box back to the electricity network connection using equipment and practices as required by local jurisdictions.

3 Mount the Microinverters
   A) Mount the microinverter bracket side up (as shown) and under the PV module, away from rain and sun. Allow a minimum of 1.9 cm (0.75 inches) between the roof and the microinverter. Also allow 1.3 cm (0.50 inches) between the back of the PV module and the top of the microinverter.

   WARNING: 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.

   B) Torque the mounting fasteners (1/4-inch or 5/16-inch) as follows. Do not over torque.
   - 6 mm (1/4 inches) mounting hardware: 5 N m (45 to 50 in-lbs)
   - 8 mm (5/16 inches) mounting hardware: 9 N m (80 to 85 in-lbs)
   - When using UL 2703 mounting hardware, use the manufacturer’s recommendedtorque value

4 Create an Installation Map
   Create a paper installation map to record microinverter serial numbers and position in the array.
   A) Peel the removable serial number label from each microinverter and affix it to the respective location on the paper installation map.
   B) Peel the label from the IQ Envoy and affix it to the installation map.
   C) Always keep a copy of the installation map for your records.

5 Manage the Cabling
   A) Use cable clips or tie wraps to attach the cable to the racking. The cable must be supported at least every 1.8 m (6 feet).
   B) Dress any excess cabling in loops so that it does not contact the roof. Do not form loops smaller than 12 cm (4.75 inches) in diameter.

6 Connect the Microinverters
   A) Connect the microinverter. Listen for a click as the connectors engage.
   B) Cover any unused connectors on the AC cable with Enphase Sealing Caps. Listen for a click as the sealing caps engage.

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

   To remove a sealing cap or AC connector, you must use an Enphase disconnect tool.
7 Terminate the Unused End of the Cable

A) Remove 13 mm (1/2") of the cable sheath from the conductors. Use the terminator loop to measure.

B) Slide the hex nut onto the cable. There is a grommet inside of the terminator body that should remain in place.

C) Insert the cable into the terminator body so that each of the two wires land on opposite sides of the internal separator.

D) Insert a screwdriver into the slot on the top of the terminator to hold it in place, and torque the nut to 7 Nm.

E) Hold the terminator body stationary with the screwdriver and turn only the hex nut to prevent the conductors from twisting out of the separator.

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

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

8 Complete Installation of the Enphase Q Aggregator or Junction Box

A) Connect the Enphase Q Cable into the Enphase Q Aggregator or junction box.

B) Use the ground lug on the Q Aggregator for module, rack, and balance of system grounding, if needed.

The Q Cable uses the following wiring color code:

<table>
<thead>
<tr>
<th>Wire Colors</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black – L1</td>
<td></td>
</tr>
<tr>
<td>Red – L2</td>
<td></td>
</tr>
</tbody>
</table>

9 Connect the PV Modules

A) If required, attach the Enphase DC bulkhead adapters to the microinverters. Make sure they are fully sealed. Do not reverse the adapter connections.

B) Connect the DC leads of each PV module to the DC input connectors or adapters of the microinverter.

C) Check the LED on the connector side of the microinverter. The LED flashes six times when DC power is applied.

D) Mount the PV modules above the microinverters.

WARNING: If adapters are used, ensure they are installed in the correct orientation.

10 Energize the System

A) Turn ON the AC disconnect or circuit breaker for the branch circuit.

B) Turn ON the main utility-grid AC circuit breaker. Your system will start producing power after a five-minute wait time.

C) Check the LED on the connector side of the microinverter:

<table>
<thead>
<tr>
<th>LED</th>
<th>Indicates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flashing green</td>
<td>Normal operation. AC grid function is normal and there is communication with the IQ Envoy</td>
</tr>
<tr>
<td>Flashing orange</td>
<td>The AC grid is normal but there is no communication with the IQ Envoy</td>
</tr>
<tr>
<td>Flashing red</td>
<td>The AC grid is either not present or not within specification</td>
</tr>
<tr>
<td>Solid red</td>
<td>There is an active &quot;DC Resistance Low, Power Off&quot; condition. To reset, refer to the Enphase IQ Envoy Installation and Operation Manual at: <a href="http://www.enphase.com/support">http://www.enphase.com/support</a></td>
</tr>
</tbody>
</table>

ACTIVATE MONITORING AND CONTROLS

After you have installed the microinverters, follow the procedures in the Enphase IQ Envoy Quick Install Guide to activate system monitoring, set up grid management functions, and complete the installation.

- Connecting the IQ Envoy and detecting devices
- Connecting to Enlighten, registering the system, and building the virtual array

Enphase Connector Rating

Enphase Connectors on the cable assemblies in the following table have a maximum current of 20 A, a maximum OCPD of 20 A, and maximum ambient temperature of -40° to +79° C (-40° to +174.2° F) and are rated for disconnection under load.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Model</th>
<th>Maximum Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>840-00387</td>
<td>Q-12-10-240</td>
<td>250 VAC</td>
</tr>
<tr>
<td>840-00388</td>
<td>Q-12-17-240</td>
<td>250 VAC</td>
</tr>
<tr>
<td>840-00389</td>
<td>Q-12-20-200</td>
<td>250 VAC</td>
</tr>
<tr>
<td>840-00385</td>
<td>Q-DCC-2</td>
<td>100 VDC</td>
</tr>
<tr>
<td>840-00386</td>
<td>Q-DCC-5</td>
<td>100 VDC</td>
</tr>
<tr>
<td>860-00311</td>
<td>ECA-EN4-S22</td>
<td>80 VDC</td>
</tr>
<tr>
<td>860-00315</td>
<td>ECA-EN4-S22-L</td>
<td>80 VDC</td>
</tr>
</tbody>
</table>
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 a warning label. The label shall be prominently visible, do not obstruct any equipment, and contain 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 text printed in white on red background.

IMPORTANT SAFETY INSTRUCTIONS

SAFETY

General Safety, continued

- WARNING: Risk of electrical shock. Risk of fire. Only qualified equipment members approved for wet locations.
- WARNING: Risk of electrical shock. Risk of fire. Only qualified personnel should troubleshoot, install, or replace microinverters or the Enphase Q Cable and Accessories.
- WARNING: Risk of electrical shock. Risk of fire. Only qualified personnel may connect the Enphase Microinverter to the utility grid.
- WARNING: Risk of equipment damage. Ensure that all AC junction boxes are properly closed.
- WARNING: Risk of electrical shock. Risk of fire. Do not exceed the maximum number of microinverters in an AC branch circuit as listed in this guide. You must prevent AC branch circuits with a 20A maximum breaker or fuse, as required.
- WARNING: Risk of electrical shock. Risk of fire. Only qualified personnel may connect the Enphase Microinverter to the utility grid.
- WARNING: Risk of equipment damage. Enphase male and female connectors must only be mated with the matching male/female connector.

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 product packaging.

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 text printed in white on red background.

Microinverter Safety, continued

- WARNING: Risk of electric shock. Risk of fire. 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 fire. The DC conductors of the PV module must be labeled "PV Wire" or "PV Cable" when paired with the Enphase Microinverter.
- WARNING: You must match the DC operating voltage range of the PV module with the allowable input voltage range of the Enphase Microinverter.
- WARNING: The maximum open circuit voltage of the PV module must not exceed the specified maximum input DC voltage of the Enphase Microinverter.
- 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 bracket side up. Do not mount the microinverter upside down or expose the AC or DC connectors (on the Enphase Q Cable Connection, PV module, or the microinverter) to rain or condensation without the sealing cap.
- WARNING: Risk of equipment damage. The Enphase Microinverter is not protection from damage due to moisture trapped in cable systems. Do not install the Enphase Microinverter to cables that have been left disconnected and exposed to wet conditions. This voids the Enphase warranty.

Enphase Customer Support: enphase.com/en-us/support/contact

SAFETY IMPORTANT SAFETY INSTRUCTIONS SAVE THIS INFORMATION. This guide contains important instructions to follow during installation of the Enphase IQ 7 and IQ 7+ Microinverter.

WARNING: Hot surface.

WARNING: Refer to safety instructions.

DANGER: Risk of electric shock. Refer to manual.

DANGER: Risk of electric shock. Double-insulated

Safety Symbols

DANGER: Indicates a hazardous situation, which, if not avoided, will result in death or serious injury.

WARNING: 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: Indicates a situation where failure to follow instructions may result in burns or injury.

NOTE: Indicates information particularly important for optimal system operation.

General Safety

- 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.
- DANGER: Risk of electric shock. Be aware that installation of this equipment includes risk of electric shock.
- DANGER: Risk of electric shock. The DC conductors of this photovoltaic system are ungrounded and may be energized.
- DANGER: Risk of electric shock. Always de-energize the AC branch circuit before servicing. Never disconnect the DC connectors under load.

Microinverter Safety

- WARNING: Risk of electric shock. Risk of fire. Do not install the Enphase Q Cable terminator while power is connected.
- DANGER: Risk of electric shock. Risk of fire. When stripping the sheath from the Enphase Q Cable, make sure the conductors are not damaged. If the exposed wires are damaged, the system may not function properly.
- DANGER: Risk of electric shock. Risk of fire. Do not leave AC connectors on the Enphase Q Cable uncovered or exposed for an extended period. You must cover any unused connector with a sealing cap.
- WARNING: Do not feed PV cables to the Enphase Q Cable with a flexible conduit or cable. Make sure the sealing cap is installed on all unused AC connectors. Unused AC connectors are live when the system is energized.
- WARNING: Use the terminator only once. If you open the terminator, discard it. Do not attempt to use the terminator more than once. If the latching mechanism is damaged, do not reuse the terminator. If the latching mechanism is defective, do not use the terminator. Do not circumvent or manipulate the latching mechanism.
- WARNING: When installing the Enphase Q Cable, secure any loose cable to minimize tripping hazard.
- NOTE: If the Enphase Q Cable is damaged, do not attempt to repair the Enphase Q Cable. Only qualified personnel should troubleshoot, install, or replace the Enphase Q Cable and Accessories. Use only the Enphase Q Cable, no other method is acceptable.
- NOTE: If you need to remove a sealing cap, you must use the Enphase disconnect tool.
- WARNING: When installing the Enphase Q Cable and accessories, adhere to the following:
  - Do not expose the terminator or cable to high temperatures (e.g., tension due to pulling or bending the cable near the connection).
  - Do not expose the terminator or cable connections to continuous tension (e.g., tension due to pulling or bending the cable near the connection).
  - Do not expose the terminator or cable connections to extended periods of wet (e.g., immersion).
  - Do not expose the terminator or cable connections to continuous tension (e.g., tension or bending). Use only the connectors and cables provided.
  - Do not allow contamination or debris in the connectors.
  - Use the terminator and cable connections only when all parts are present and intact.
  - Do not store or use in potentially explosive environments.
  - Do not allow the terminator to come into contact with open flames.
  - Do not install the terminator using only the provided tools and in the prescribed manner.
  - Use the terminator to seal the conduit end of the Enphase Q Cable; no other method is allowed.

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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.

Envoy Serial Number Label / Número de serie de Envoy