

Enphase IQ 7, IQ 7+, IQ 7A and IQ 7X Microinverters for ACM Applications

Corporate Headquarters Contact Information

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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 only by Enphase partners to develop instructional material for the AC Module.

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Important Safety Information

Read this First

This manual contains important instructions for use during installation and maintenance of IQ microinverters.

IMPORTANT: Enphase IQ Envoy and IQ Microinverter for ACM do not communicate with, and should not be used with, previous generation Enphase Microinverters and Envoys.

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.



Refer to manual



Double-insulated

Safety and Advisory Symbols

To reduce the risk of electric shock, and to ensure the safe installation and operation of the Enphase IQ System, 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.

IQ 7 Microinverter Safety Instructions

General Safety

	DANGER: Risk of electric shock. Risk of fire.	<p>Only use electrical system components approved for wet locations.</p> <p>Only qualified personnel should install, troubleshoot, or replace Enphase Microinverters or Enphase Q Cable and Accessories.</p> <p>Ensure that all AC and DC wiring is correct and that none of the AC or DC wires are pinched, shorted or damaged. Ensure that all AC junction boxes are properly closed.</p> <p>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 or fuse as appropriate.</p>
	DANGER: Risk of electric shock.	<p>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.</p> <p>Be aware that installation of this equipment includes risk of electric shock.</p> <p>The DC conductors of this photovoltaic system are ungrounded and may be energized.</p> <p>Always de-energize the AC branch circuit before servicing. Enphase does not recommend disconnecting the DC connectors under load.</p>
	WARNINGS:	<p>Before installing or using the Enphase Microinverter, read all instructions and cautionary markings in the technical description, on the Enphase equipment and on the photovoltaic (PV) equipment.</p> <p>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 approval from the electrical utility company.</p> <p>When the PV array is exposed to light, DC voltage is supplied to the power conversion equipment (PCE).</p> <p>Risk of equipment damage. Enphase male and female connectors must only be mated with the matching male/female connector.</p>
	NOTES:	<p>To ensure optimal reliability and to meet warranty requirements, install the Enphase equipment according to the instructions in this manual.</p> <p>The AC and DC connectors on the cabling are rated as a disconnect only when used with an Enphase Microinverter.</p> <p>Protection against lightning and resulting voltage surge must be in accordance with local standards.</p> <p>Perform all electrical installations in accordance with all applicable local electrical codes, such as: the Canadian Electrical Code, Part 1; ANSI requirements; and NPFA 70 (NEC).</p>

Microinverter Safety

	WARNING: Risk of skin burn.	<p>The body of the Enphase Microinverter is the heat sink. Under normal operating conditions, the temperature could be 20° C above ambient, but under extreme conditions the microinverter can reach a temperature of 90° C. To reduce risk of burns, use caution when working with microinverters.</p>
	DANGER: Risk of electric shock. Risk of fire.	<p>Only qualified personnel may connect the Enphase Microinverter to the utility grid.</p> <p>Do not attempt to repair the Enphase Microinverter; it contains no user-serviceable parts. If it fails, contact Enphase customer service to obtain a return merchandise authorization (RMA) number and start the replacement process. Tampering with or opening the Enphase Microinverter will void the warranty.</p>
	WARNING: Risk of equipment damage	<p>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.</p>
	NOTES:	<p>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.</p>

Enphase Q Cable and Accessory Safety



DANGER: Risk of electric shock.

Do not install the Enphase Q Cable terminator while power is connected.



WARNING: Risk of electric shock. Risk of fire.

When stripping the sheath from the Q 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 Q Cable uncovered for an extended period. You must cover any unused connector with a sealing cap.

Make sure protective sealing caps have been 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 following installation, the latching mechanism is destroyed. If the latching mechanism is defective, do not use the terminator. Do not circumvent or manipulate the latching mechanism.

When installing the Enphase Q Cable, secure any loose cable to minimize tripping hazard.



NOTES:

When looping the Enphase Q Cable, do not form loops smaller than 4.75" (12 cm) in diameter.

If you need to remove a sealing cap, you must use the Enphase disconnect tool.

When installing the Enphase Q 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 or cable 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 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.
 - Fit the terminator cap using only the prescribed tools and in the prescribed manner.
 - Use the terminator to seal the conductor end of the Enphase Q Cable; no other method is allowed.
-

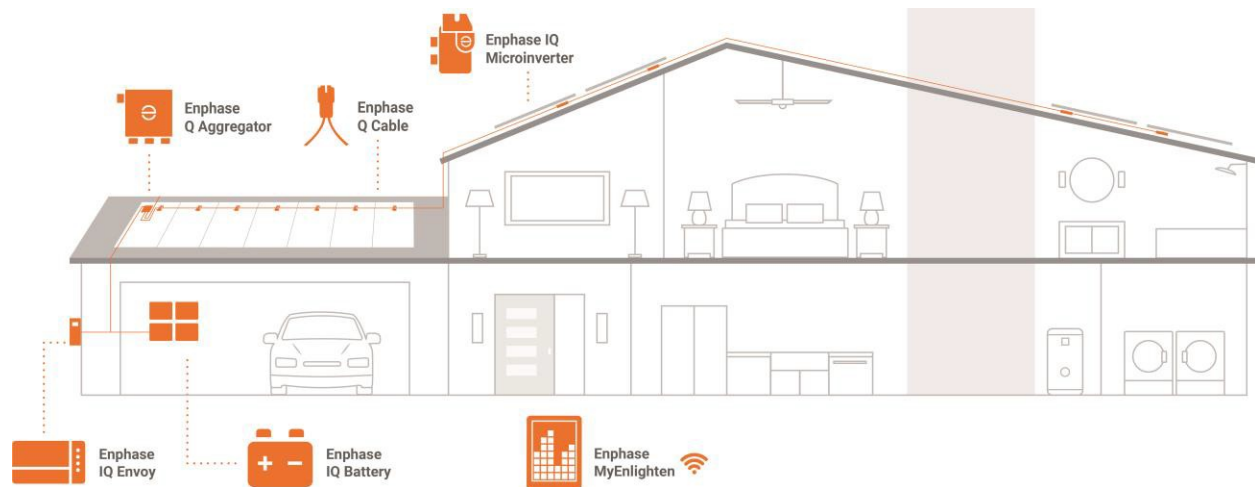
The Enphase IQ System

The Enphase IQ System includes:

- **Enphase IQ Microinverters for AC Module Application** (IQ7-60-ACM-INT, IQ7PLUS-72-ACM-INT, IQ7X-96-ACM-INT, IQ7PLUS-72-E-ACM-INT, IQ7A-72-E-ACM-INT). The smart grid ready IQ 7, IQ 7+, and IQ 7X Micros convert the DC output of the PV module into grid-compliant AC power.
- **Enphase IQ Envoy™** (ENV-IQ-AM1-240) The Enphase IQ Envoy is a communication device that provides network access to the PV array. The IQ Envoy collects production and performance data from the Enphase IQ Microinverters over on-site AC power lines and transmits the data to Enlighten through an Internet or cellular modem connection. The IQ Envoy is capable of monitoring up to 600 Enphase IQ Microinverters and up to 39 Enphase IQ Batteries. For details, refer to *Enphase IQ Envoy Installation and Operations Manual*.
- **Enphase Enlighten™** web-based monitoring and management software. Installers can 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 use the app to:
 - Connect to the IQ Envoy over a wireless network for faster system setup and verification
 - View and email a summary report that confirms a successful installation
 - Scan device serial numbers and sync system information with Enlighten monitoring software
- **Enphase IQ Battery™** Coming soon.
- **Enphase Field Wireable Connectors** (Q-CONN-10F and Q-CONN-10M)
Use Enphase Field connectors with Enphase Q-Cable or field cable to:
 - Easily connect Q cables on the roof without complex wiring
 - Use female connectors to make connections from any Q Cable open connector
 - Make a jumper to connect with a remote part of the array: Use female to female for cable-to-cable connections
 - Use a mated pair of connectors to splice two cut ends of cable

How the Enphase IQ Microinverter for ACM Works

The Enphase Microinverter maximizes energy production by using a sophisticated Maximum Power Point Tracking (MPPT) algorithm. Each Enphase Microinverter is individually connected 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 Enphase IQ Envoy and provide an internet connection through a broadband router or modem, the Enphase IQ 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).

Ease of Design

PV systems using Enphase Microinverters are very simple to design and install. You will not need string calculations or cumbersome traditional inverters. 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 microinverter housing is designed for outdoor installation and complies with the IP67 Outdoor environmental enclosure rating standard:



IP67 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.

The Enphase Q Cable is available with connector spacing options to accommodate installation of PV modules in portrait or landscape orientation. For Enphase Q Cable ordering information, see “Enphase Q Cable Planning and Ordering” on page 28.

Planning the Racking

Plan the racking position with the Microinverter in mind. Ensure that the racking does not interfere with the microinverter and its connectors.

Grounding Considerations

The Enphase Microinverter models listed in this guide do not require grounding electrode conductors (GEC), equipment grounding conductors (EGC), or grounded conductor (neutral). Your Authority Having Jurisdiction (AHJ) may require you to bond the mounting bracket to the racking. If so, use UL2703 hardware or star washers. The microinverter itself has a Class II double-insulated rating, which includes ground fault protection (GFP).

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).

Maximum* IQ Microinverters per AC branch circuit				
Microinverter model	IQ 7	IQ 7+	IQ 7X	IQ 7A
Single-phase	16	13	12	11
Multiphase	48	39	36	39 (25 A OCPD)



NOTE: *Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

Utility Service Requirements

The Enphase IQ Microinverter for ACM work with single-phase service. Measure AC line voltages at the electrical utility connection to confirm that it is within the ranges shown:

Single-Phase Service		Three-Phase Service	
L1 to N	207 to 253 VAC	L1 to L2 to L3	360 to 440 VAC
		L1, L2, L3 to N	207 to 253 VAC (most models) 219 to 264 (IQ 7A models)

Wire Lengths and Voltage Rise

When planning the system, you must select the appropriate AC conductor size to minimize voltage rise. Select the correct wire size based on the distance from the beginning of the 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 AC branch circuit to the breaker in the load center.

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 Enphase Q Cables and on how to calculate voltage rise in other wire sections of the system.

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.



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 OCPD.

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 a lightning and/or surge suppression device. In addition to having some level of surge suppression, it is also important to have insurance that protects against lightning and electrical surges. Enphase has tested the devices in the following tables.

Residential	Commercial
<ul style="list-style-type: none"> • Citel DS72-RS-120 surge protector; data sheet • Delta LA-302 lightning arrester; website • Midnite solar surge protection device MNSPD-300 or MNSPD-300FM (with flush mount box); website 	<ul style="list-style-type: none"> • Citel DS73-RS-G surge protector; data sheet • Delta LA-303 lightning arrester; website



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

Parts and Tools Required

In addition to the AC Modules, you will need the following:

Enphase Equipment

- Enphase IQ Envoy communications gateway (ENV-IQ-AM1-240) **required** to monitor solar production. For installation information, refer to the **Enphase IQ Envoy Installation and Operations Manual**.
- Enphase Installer Toolkit
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 IQ Envoy to track system installation progress. To download, go to enphase.com/toolkit or scan the QR code at right.
- Enphase Sealing caps (Q-SEAL-10) for any unused drops on the Enphase Q Cable
- Enphase Terminator (Q-TERM-10) typically two needed per branch circuit
- Enphase Disconnect Tool (Q-DISC-10)
- Field Wireable Connectors (male and female: Q-CONN-10M and Q-CONN-10F) (optional)
- Enphase Q Cable:



Cable Model	Connector Spacing	PV Module Orientation	Connector Count per box
Single-phase			
Q-25-10-240 Q-25-10-240-A*	1.3m	Portrait	240
Q-25-17-240 Q-25-17-240-A*	2.0m	Landscape (60- and 96-cell)	240
Q-25-20-200 Q-25-20-200-A*	2.3m	Landscape (72-cell)	200
Multiphase			
Q-25-10-3P-200	1.3m	Portrait (all)	200
Q-25-17-3P-160	2.0m	Landscape (60- and 96-cell)	160
Q-25-20-3P-160	2.3m	Landscape (72-cell)	160

Other Items

- Number 2 and 3 Phillips screwdrivers
- Wire cutters, voltmeter
- Torque wrench, sockets, wrenches for mounting hardware
- Crimp tool PV-CZM-18100, -019100, or -22100 for field wireable connectors
- Compatible cable clips, including:

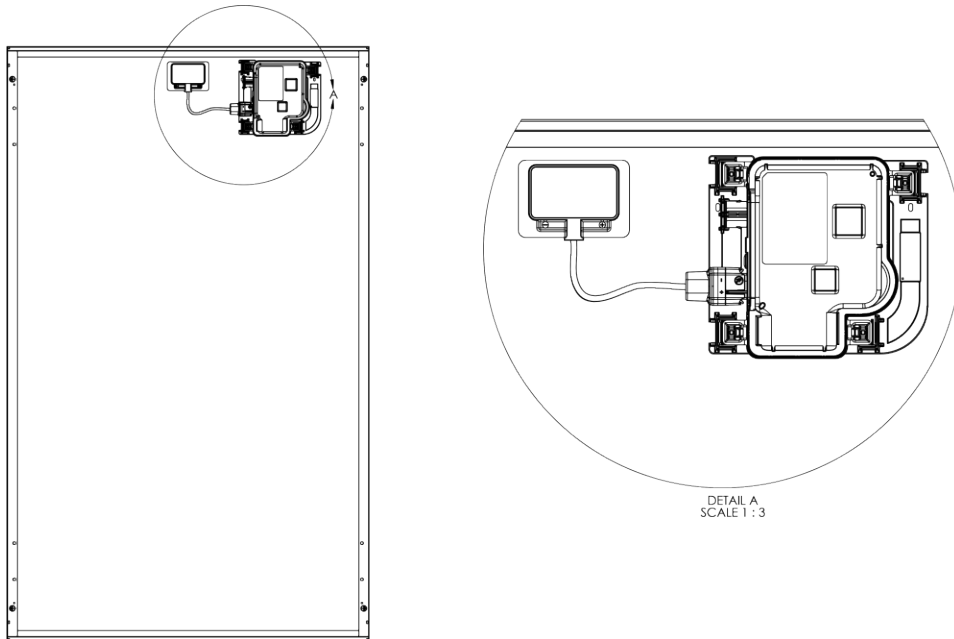
Wire management options for Q-Cable attached to module frames	
Standard /parallel to frame	90°/perpendicular to frame
Nine Fasteners Inc. NFI-1306	Nine Fasteners Inc. NFI-1306-V90
Burndy/Wiley Acme ACC	Burndy/Wiley ACC-F90
Heyco Sunrunner-2	
Hellermann Tyton MSC2	

* Due to variances in module frame thickness, these wire clips may not work for all modules

Enphase Microinverter Installation

Installing the Enphase IQ Microinverter for ACM involves several key steps. Each step listed here is detailed in the following pages.

- Step 1: Install a Junction Box**
- Step 2: Position the Enphase Q Cable**
- Step 3: Terminate the Unused End of the Q Cable**
- Step 4: Prepare the ACMs**
- Step 5: Create the Installation Map**
- Step 6: Mount the ACMs**
- Step 7: Connect The Microinverters**
- Step 8: Manage the Cabling**
- Step 9: Ground the ACMs**
- Step 10: Energize the System**
- Step 11: Set Up and Activate Monitoring**



Step 1: Install a Junction Box

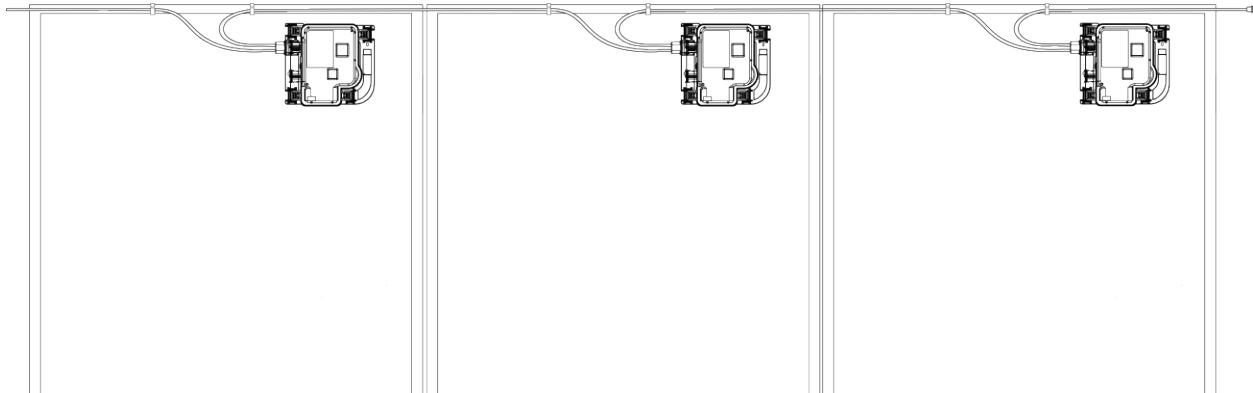
- A. Verify that AC voltage at the site is within range.

Single-Phase Service		Three-Phase Service	
L1 to N	207 to 253 VAC	L1 to L2 to L3	360 to 440 VAC
		L1, L2, L3 to N	207 to 253 VAC (most models) 219 to 264 (IQ 7A models)

- B. Install a junction box at a suitable location on the racking.
 C. Provide an AC connection from the junction box back to the electricity network using equipment and practices as required by local jurisdictions.

Step 2: Position the Enphase Q Cable

- A. Plan each cable segment to allow drop connectors on the Enphase Q Cable to align with each AC 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 loosely on the roof for the AC branch circuit. Make sure the cable is positioned in a way that allows you to connect it to the microinverter.

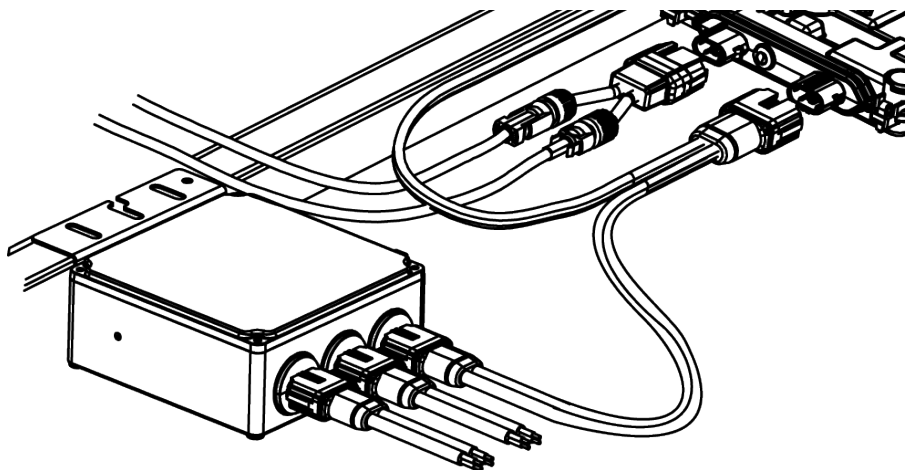


- D. Cut each segment of cable to meet your planned needs.



WARNING: Do not install the modules in a way that creates continuous tension on the Q Cable.

- E. Connect the Enphase Q Cable into the AC junction box. The Q Cable uses the following wiring color code: Black = L1, Red = L2. Refer to the wiring diagrams on page 40 for more information.



Step 3: Terminate the Unused End of the Cable

Place sealing caps on unused connectors and terminate the unused end of the Enphase Q Cable as follows.

- A. Cover any unused connectors with Enphase Sealing Caps. Listen for a click as the connectors engage.

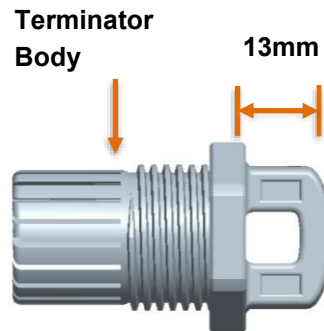


WARNING: Risk of electric shock. Risk of fire. Install sealing caps on all unused AC connectors as these connectors become live when the system is energized. Sealing caps are required for protection against moisture ingress.

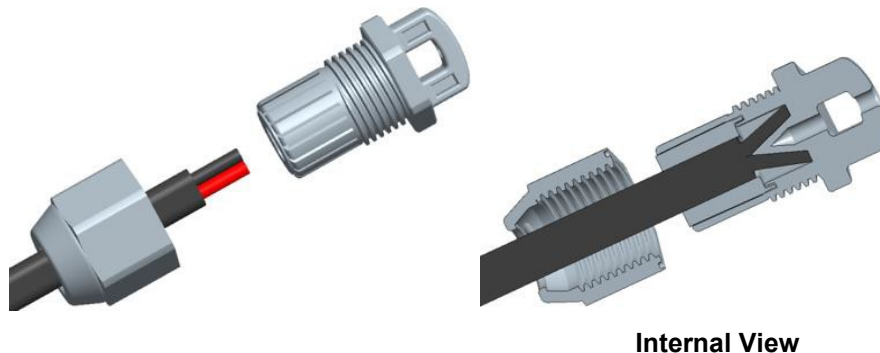


NOTE: If you need to remove a sealing cap, you must use the Enphase Disconnect Tool. See “Remove and Replace a Microinverter” on page 26.

- B. Remove 13 mm ($\frac{1}{2}$ inch) of the cable sheath from the conductors. Use the terminator loop to measure 13 mm.



- C. Slide the hex nut onto the cable. There is a grommet inside of the hex nut that should remain in place.
- D. Insert the cable into the terminator body so that each of the two wires land on opposite sides of the internal separator.



- E. Insert a screwdriver into the slot on the top of the terminator to hold it in place and torque the nut to 7 Nm.
- F. Hold the terminator body stationary with the screwdriver and turn only the hex nut to prevent conductors from twisting out of the separator.



NOTE: Turn only the hex nut to prevent conductors from twisting out of the separator.

- G. 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.

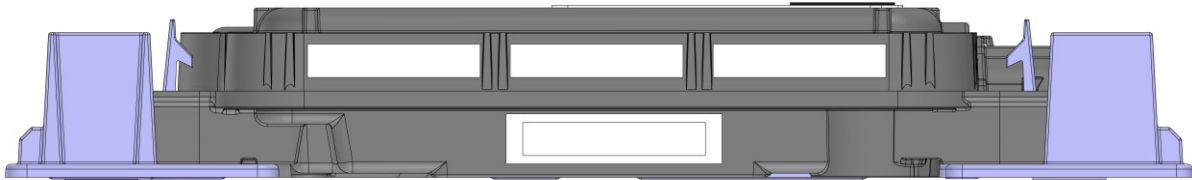


WARNING: The terminator cannot be re-used. If you unscrew the nut, you must discard the terminator.

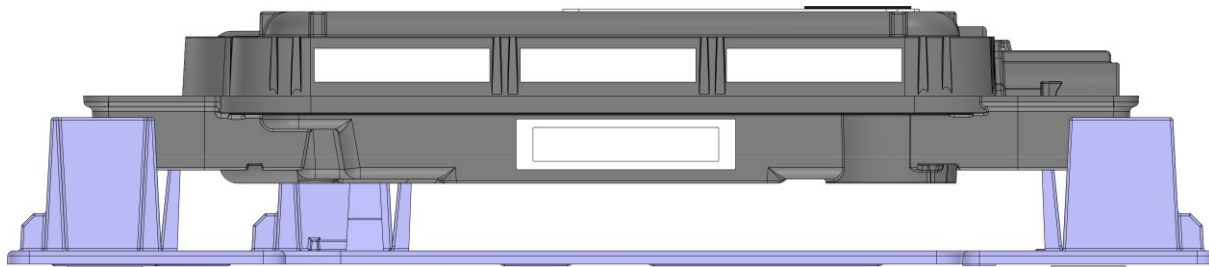


Step 4: Prepare the AC Modules

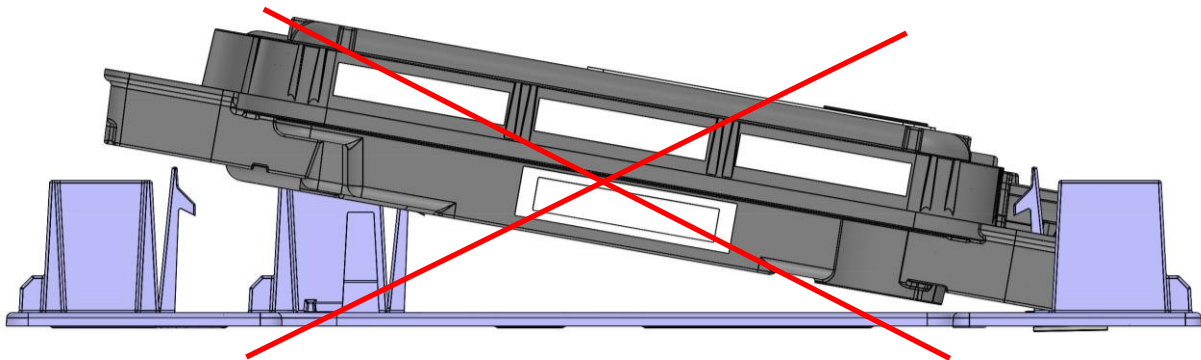
- A. Before installing the AC module, the microinverters must be lifted from the shipping position. On the ground, turn the AC Module so that the microinverter faces you. Using both hands, lift the microinverter up. You will hear four clicks as the microinverter locks into the installation position. Ensure the four latches are locked, and the microinverter is not tilted.



The Microinverter is in the shipping position.



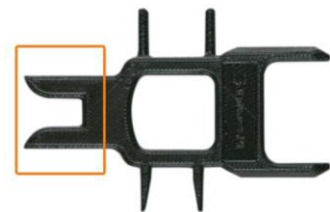
The Microinverter is lifted and ready for installation.



Make sure the microinverter is not tilted.

NOTE: If you need to move the module, you can return the microinverter to the shipping position using the Enphase Disconnect Tool. Use the tool to depress the four locking mechanisms on each corner of the microinverter to return it to the shipping position.

- B. Position the AC Modules as planned on the rail.



Use this end of the Disconnect Tool to depress the locking mechanisms.

Step 5: Use the Serial Number Labels to Create the Installation Map

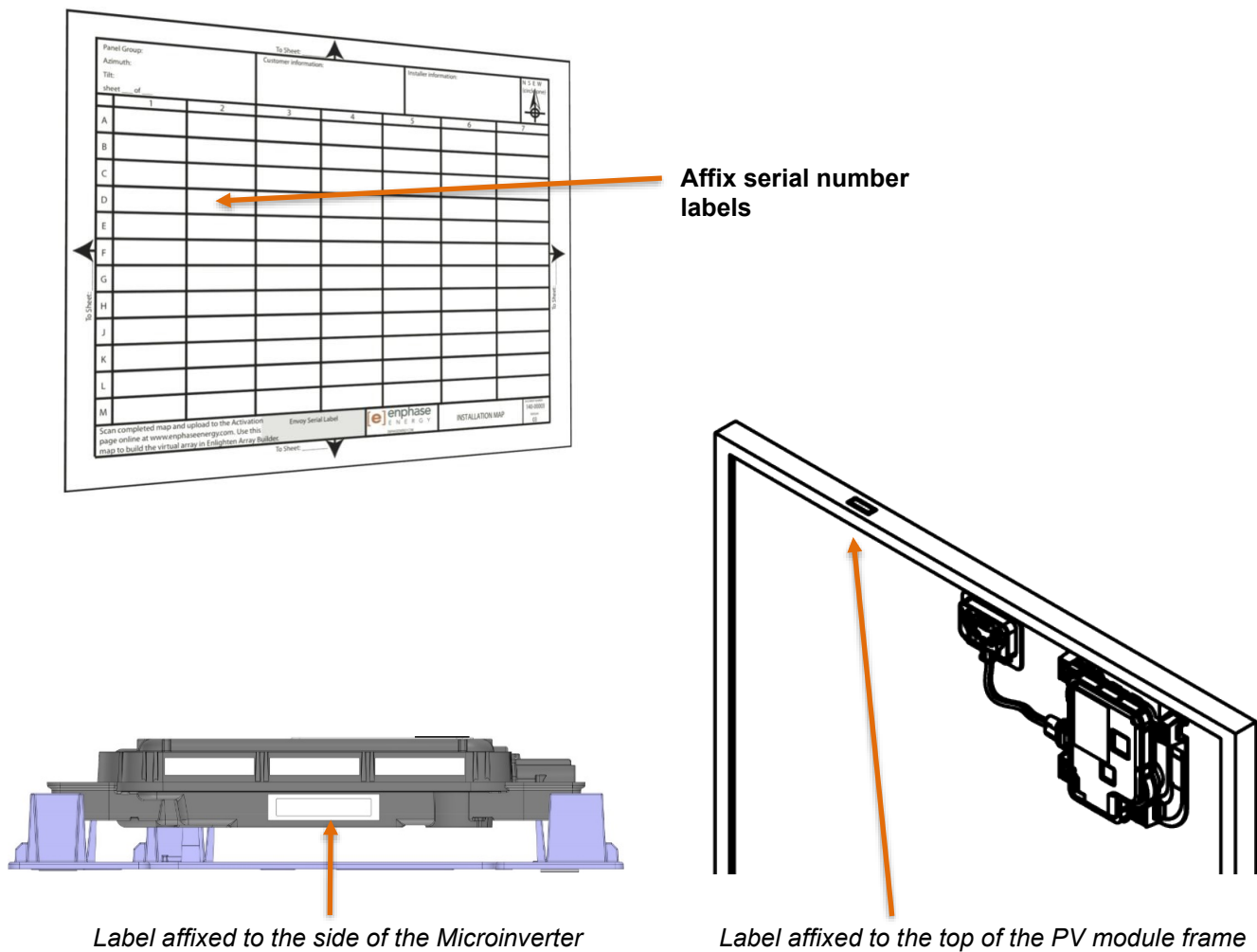
The Enphase Installation Map is a diagram of the physical location of each module in your PV installation. Copy or use the blank map on page 38 to record module placement for the system, or provide your own layout if you require a larger or more intricate installation map.

Each AC Module, Enphase Envoy, and Enphase Battery have a removable serial number label. Build the installation map by peeling the serial number labels from the modules and placing the labels on the map. You will also place the Enphase IQ Envoy (required) and IQ Battery (optional) serial numbers on the map after installation.

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

For more information, refer to “Detect the Microinverters” in the help topics of the Installer Toolkit app.

- A. **Remove the label from each module before passing it up to the roof. Apply the label to the proper position on the installation map.**
- B. Peel the label from the IQ Envoy (and Enphase IQ Battery, if installed) and affix it to the installation map.
- C. Always keep a copy of the installation map for your records.



Label affixed to the side of the Microinverter

Label affixed to the top of the PV module frame

Step 6: Mount the ACMs

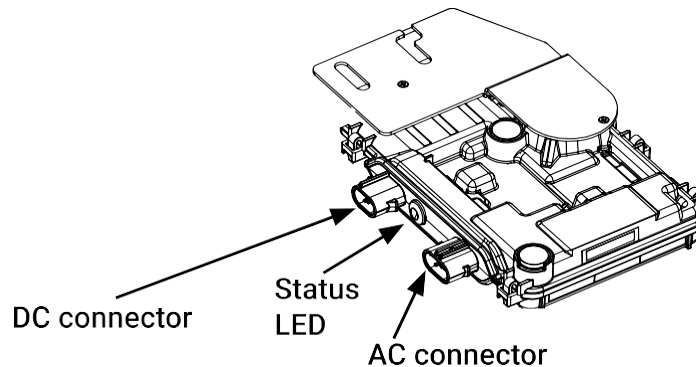
- Install the ACM with a clearance of at least 10 cm (4 in.) from the roof. Also, make sure that the microinverter on the underside of the ACM is at least 1.9 cm (0.75 in.) away from the roof or installation surface.
- Do not place the ACMs in such a way that places pressure on the microinverter. Minimum distance from the top edge of the module to the rail should be about 30 cm (12 in.).
- Make sure that the minimum gap between modules is 10 mm (0.4 in.) or greater.
- Check that rails and clamps are clear of the microinverter by at least 3.8 cm (1.5 in.). Do not obstruct module drain holes.

Step 7: Connect the Microinverters as you Install the ACMs

- Check again that the ACMs are not placing pressure on the microinverter. Minimum distance from the top edge of the module to the rail should be about 30 cm (12 in.).
- As you install each ACM, connect the Q Cable to the microinverter. Listen for a click as the connectors engage.
- Cover any unused connectors on the AC cable with Enphase Sealing Caps. Listen for a click as the sealing caps engage.

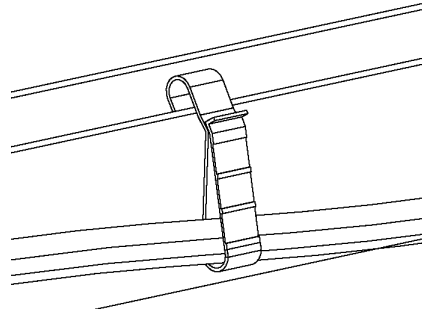


WARNING: Risk of electric shock. Risk of fire. Install sealing caps on all unused AC connectors as these connectors become live when the system is energized. Sealing caps are required for protection against moisture ingress.



Step 8: Manage the Cabling

- A. Use cable clips to attach the cable to the module frame. Leave no more than 1.8 m (six feet) between cable clips.



Cable clip

- B. Dress any excess cabling in loops so that it does not contact the roof. Do not form loops smaller than 12 cm (4¾ ") in diameter.



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



NOTE: Some modules do not include framing on their shortest side. Cable clips cannot attach to the frameless side for cable management. Plan to use the longer, framed side for cable management when this is the case.

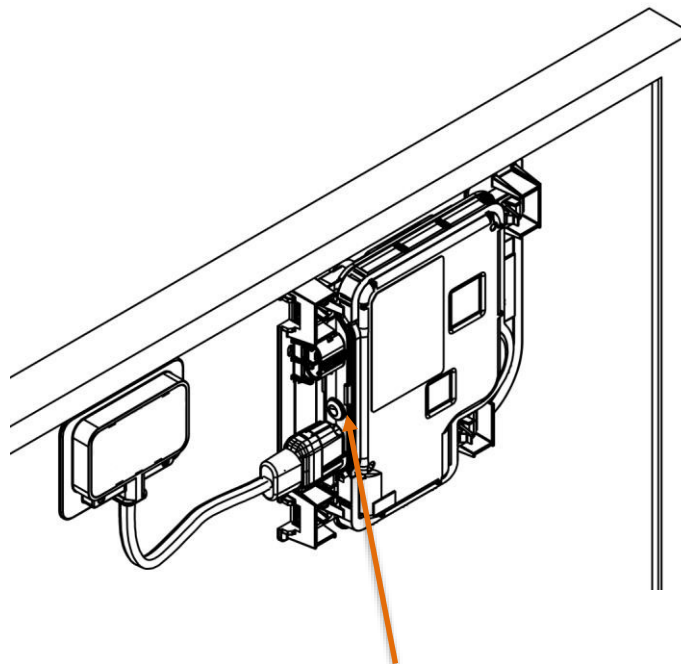
Step 9. Ground the ACMs

Ground the ACMs per module manufacturer instruction.

Step 10: Energize the System

- A. If applicable, turn ON the AC disconnect or circuit breaker for the branch circuit.
- B. Turn ON the main utility-grid AC circuit breaker. Your system starts producing power **after a five-minute wait time.**
- C. Check the LED on the connector side of the microinverter:

LED color	Indicates
Flashing green	Normal operation. AC grid function is normal there is communication with the IQ Envoy.
Flashing orange	The AC grid is normal but there is no communication with the IQ Envoy.
Flashing Red	The AC grid is either not present or not within specification.
Solid Red	There is an active “DC Resistance Low, Power Off Condition.” To reset, refer to “DC Resistance Low – Power Off Condition” on page 23.



The Microinverter LED

Step 11: Set Up and Activate Monitoring

Refer to the *Enphase IQ Envoy Quick Install Guide* to install the IQ Envoy and set up system monitoring and grid management functions. This guide leads you through the following:

- Connecting the Envoy
- Detecting devices and scanning the installation map
- Connecting to Enlighten
- Registering the system
- Building the virtual array



NOTE: When the utility requires a profile other than the default EN 50549-1 or AS/NZS4777.2 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 *Enphase IQ Envoy Installation and Operation Manual* at enphase.com/support.

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 section describes LED indications.

LED Operation

LED color	Indicates
Flashing green	Normal operation. AC grid function is normal there is communication with the Envoy.
Flashing orange	The AC grid is normal but there is no communication with the Envoy.
Flashing red	The AC grid is either not present or not within specification.
Solid red	There is an active “DC Resistance Low, Power Off” condition or “GFDI” fault. To reset, refer to “DC Resistance Low – Power Off Condition”

The status LED on 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.

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

DC Resistance Low – Power Off Condition

For **all IQ Microinverter for ACM models**, 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 a similar problem. Although the cause may be temporary, this microinverter condition persists until the sensor is manually reset.

An IQ Envoy is required to clear this condition. The condition clears on operator command unless its cause is still present.

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

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

Follow the instructions in the *Enphase IQ Envoy 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 *Enphase IQ Envoy 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.

- A. Make sure AC breakers and disconnects are closed.
- B. Check the connection to the utility grid and verify that the utility voltage is within allowable ranges.
- C. 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.
- D. Verify that AC line voltage at the junction box for each AC branch circuit is within the ranges shown in the following table:

Single-Phase Service		Three-Phase Service	
L1 to N	207 to 253 VAC	L1 to L2 to L3	360 to 440 VAC
		L1, L2, L3 to N	207 to 253 VAC (most models) 219 to 264 (IQ 7A models)

- E. Using an Enphase disconnect tool, disconnect the AC cable for the microinverter in question from the Enphase Q Cable.
- F. Verify that utility power is present at the microinverter by measuring line to line and line to ground at the Enphase Q Cable connector.
- G. Visually check that the AC branch circuit connections (Enphase Q Cable and AC connections) are properly seated. Reseat if necessary. Check also for damage, such as rodent damage.
- H. 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.
- I. Disconnect and re-connect the Enphase DC 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 23 for normal LED operation.
- J. 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.
- K. Verify the PV module DC voltage is within the allowable range shown in “Specifications” on page 30 of this manual.
- L. Following the steps in *Remove and Replace a Microinverter*, remove the PV panel from the roof, and swap out the microinverter with one from a known good, adjacent AC 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 original microinverter. Contact [Enphase Customer Support](#) for help in reading the microinverter data and for help in obtaining a replacement microinverter, if needed

- M. 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.
- N. Verify with your utility that line frequency is within range.
- O. If the problem persists, contact Customer Support at enphase.com/en-us/support/contact.

Remove and Replace 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:

- A. De-energize the AC branch circuit breaker.
- B. Enphase AC connectors are tool-removable only. To disconnect the microinverter from the Enphase Q Cable, insert the disconnect tool and remove the connector.
- C. Remove the AC Module from the roof per manufacturer instructions.
- D. Once on the ground, disconnect the PV module DC connector from the microinverter using the Enphase disconnect tool.
- E. Press each of the four clips to free the microinverter.
- F. Snap new replacement microinverter into place.
- G. Connect the PV Module DC connectors to the microinverter.
- H. Scan the new serial number.



NOTE: The serial number of the replacement microinverter will differ from the serial number on the AC Module frame.

- I. Bring the AC Module back onto the roof or other mounting location.
- J. Connect the AC Module AC connector and DC Connector to the Q Cable.
- K. Energize the AC branch circuit breaker, and verify operation of the replacement microinverter by checking the Status LED on the connector side of the microinverter.

- L. On the ground, use the Installer Toolkit mobile app to delete the old microinverter serial number from the Enphase IQ Envoy database. In Installer Toolkit, once connected to the Envoy:
- Tap **Micros > Manage**.
 - Tap the checkbox  to the right of the microinverter serial number that you replaced.
 - Tap  to delete the microinverter from the Envoy-S database.
- M. Add the new microinverter serial number to the Envoy database by initiating a device scan using one of the following methods:
- Method 1: Initiate a scan using the Installer Toolkit mobile app**
 - In Installer Toolkit, once connected to the IQ 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 IQ 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 IQ Envoy, you must use the Installer Toolkit scanning tool to provision them on the IQ Envoy, rather than using the IQ Envoy's device scanning function to discover them. If this is not possible and you need to enable device scanning on the IQ Envoy, contact Enphase Customer Support at enphase.com/en-us/support/contact.
 - Method 2: Use an IQ Envoy**
 - Press the **Device Scan** button on the IQ Envoy. The IQ Envoy begins a 15-minute scan to identify all of the microinverters deployed at the site. The Microinverter Communications LED  flashes green during the scan.



- N. Log in to Enlighten to use Enlighten's Array Builder to add the newly detected microinverter to the virtual array.
- O. Ship the old microinverter to Enphase using the supplied return-shipping label.

Enphase Q Cable Planning and Ordering

The Enphase Q Cable is a continuous length of 12 AWG, double insulated, outdoor-rated cable with integrated connectors for microinverters. These connectors are preinstalled along the Q 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.

Connector Spacing Options

Q Cable is available in three connector spacing options. The gap between connectors on the cable can be 1.3 meters, 2.0 meters, or 2.3 meters. The 1.3 meter spacing is best suited for connecting PV modules installed in portrait orientation, while the 2.0 meter and 2.3 meter spacing allows you to install 60-cell and 72-cell PV modules in landscape orientation, respectively.

Cabling Options

Ordering options include:

Cable Model	Connector spacing	PV module orientation	Connector count per box
Q-25-10-240 / Q-25-10-240-A*	1.3m (50")	Portrait	240
Q-25-17-240 / Q-25-17-240-A*	2.0m (78")	Landscape (60-cell)	240
Q-25-20-200 / Q-25-20-200-A*	2.3m (90")	Landscape (72-cell)	200

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

- When mixing PV modules in both portrait and landscape orientation, you may need to transition between cable types. See the preceding table for available cable types.
- To transition between cable types, install a field wireable connector.
- In situations where portrait modules are widely spaced, you may need to use landscape spaced cables for the portrait-oriented PV modules and create loops of excess cable, if needed.



WARNING: Do not form loops smaller than 12 cm (4.75") in diameter.

Grid Interconnection Details

Enphase IQ7 series Microinverters are grid support interactive inverters.

Grid Profiles

IQ 7 series Microinverters have field-adjustable voltage and frequency trip points. Trip points are input voltage and frequency values that trigger the microinverters to shut down when the values are exceeded. If local regulations require adjustments to these trip points, or if the grid profile was not set up during registration, the installer can set up the system to use an alternate Grid Profile (set of trip points).



NOTE: Only an authorized installer, following the requirements of the local electrical utility, is allowed to make Grid Profile adjustments.



NOTE: Grid profile changes are applied only after a microinverter is detected.

In some regions and in some situations, microinverter trip points may be adjusted to account for high grid voltage or for local conditions.

Grid profile management tasks include:

- Set the grid profile for your region
- View or verify current trip point settings
- Generate a report for confirmation of site settings to the utility or other authority

To modify the grid profile or the parameters within the grid profile, installers must log in to their Enlighten account using their credentials.

The following tables show the parameter settings for the grid profiles available for IQ 7 series International Microinverters:



NOTE: Simultaneous use of Fixed Power Factor and Volt/VAr is not supported.

Manufacturer's Stated Accuracy

Measurement	Default Tolerance of Measurement
Volts	+/- 1%
Amps	+/- 2%
Watts	+/- 5%
VAr	+/- 3%
Displacement power factor	+/- 2%
Hz	+/- 0.1 Hz
Time	The greater of +/- 2 cycles or 0.1% of total clearing time

Specifications

See specifications in the following tables for:

- IQ7-60-ACM-INT
- IQ7PLUS-72-ACM-INT, IQ7PLUS-72-E-ACM-INT
- IQ7X-96-ACM-INT
- IQ7A-72-E-ACM-INT

IQ7-60-ACM-INT Microinverter Specifications

Enphase IQ7-60-ACM-INT Microinverter Parameters				
Topic	Unit	Min	Typical	Max
DC Parameters				
Commonly used module pairings ¹		235 W – 350+ W		
Peak power tracking voltage	V	27		37
Operating voltage range	V	16		48
Maximum input DC voltage	V			48
Minimum / maximum start voltage	V	22		48
Maximum operating PV input current	A			10
Maximum DC input short circuit current (module I _{sc})	A			15
Overvoltage class DC port			II	
DC Port backfeed under single fault	A			0
PV array configuration	1x1 ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit			
AC Parameters				
Maximum continuous AC output power (-40°C to +65°C)	VA	240		
Rated output apparent power	VA	240		
Peak output power	VA	250		
Power factor (adjustable)		0.8 leading 0.8 lagging		
Nominal AC output voltage range ² 230 VAC (single phase)	V _{rms}	184		276
Nominal output current 230 VAC (single phase)	A _{rms}		1.04	
Rated AC output current	A		1.04	
Maximum Output fault current	A		0.784	
Current (Inrush)	A		0	
Nominal frequency	Hz		50	

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Extended frequency range	Hz	45		55
Maximum AC output over current protection device	A		20	
Protective class (all ports)			II	
Overvoltage class AC port			III	
AC port backfeed under single fault	A		0	
Power factor setting			1.0	

¹ No enforced DC/AC ratio. See the compatibility calculator at [module-compatibility](#).

² Nominal Voltage Range can be extended if required by the utility.

Enphase IQ7-60-ACM-INT Microinverter Parameters				
Miscellaneous Parameters				
Maximum ³ microinverters per 20A (max) AC branch circuit 230 VAC			16 (single-phase) 48 (multiphase)	
EN 50530 (EU) weighted efficiency 230 VAC (single phase)	%		96.5	
Static MPPT efficiency (weighted, ref EN 50530)	%		99.5	
Inverter topology			Isolated (HF Transformer)	
Total harmonic distortion	%			5
Ambient temperature range	°C	-40		+65
Night tare loss	mW			50
Storage temperature range	°C	-40		+85
Features and Specifications				
Compatibility	Pairs with most 60-cell PV modules			
Dimensions not including mounting bracket	219 mm x 191 mm x 37.9 mm			
Connector type	Enphase DC Connector			
Weight	1.3 kg (2.86 lbs.)			
Environmental category / UV exposure rating	IP67 / outdoor			
Maximum Altitude	< 2,000 metres			
Cooling	Natural convection - no fans			
Relative humidity range	4% to 100% condensing			
Approved for wet locations	Yes			
Pollution degree	PD3			
Standard warranty term	enphase.com/warranty			
Compliance	NRS-097-2-1:2017, AS/NZS 4777.2, RCM, IEC/EN 61000-6-3, IEC/EN 62109-1, IEC/EN 62109-2			
Grounding	The DC circuit meets the requirements for ungrounded PV arrays. Ground fault protection (GFP) is integrated into the class II double insulated microinverter.			
Monitoring	Enlighten Manager and MyEnlighten monitoring options require an Enphase Envoy-S			
Communication	Power line			

Integrated DC disconnect	The DC connector has been evaluated and approved for use as the load-break disconnect.
Integrated AC disconnect	The AC connector has been evaluated and approved for use as the load-break disconnect.

³ Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

Enphase IQ7PLUS-72-E-ACM-INT & IQ7PLUS-72-ACM-INT Specifications

IQ7PLUS-72-E-ACM-INT & IQ7PLUS-72-ACM-INT Microinverter Parameters				
Topic	Unit	Min	Typical	Max
DC Parameters				
Commonly used module pairings ⁴	W	235 W - 440+ W		
Peak power tracking voltage	V	27		45
Operating range	V	16		60
Maximum DC input voltage	V			60
Minimum / maximum start voltage	V	22		60
Maximum operating PV input current	A			12
Maximum DC input short circuit current (module I _{sc})	A			15
Overvoltage class DC port			II	
DC Port backfeed under single fault	A			0
PV array configuration	1 x 1 ungrounded array; No additional DC side protection required; AC side protection requires max 20 A per branch circuit			
AC Parameters				
Maximum continuous AC output power (-40 to +65°C)	VA	290		
Rated output apparent power	VA	290		
Peak output power	VA	295		
Power factor (adjustable)		0.8 leading 0.8 lagging		
Nominal AC output voltage range ⁵ 230 VAC (single phase)	V _{rms}	184		276
Nominal output current 230 VAC (single phase)	A _{rms}		1.26	
Rated AC output current	A		1.26	
Maximum Output fault current	A		0.784	
Current (Inrush)	A		0	
Nominal frequency	Hz		50	
Extended frequency range	Hz	45		55
Maximum AC output over current protection device	A	20		
Protective class (all ports)		II		
Overvoltage class AC port			III	
AC port backfeed under single fault	A		0	
Power factor setting			1.0	

IQ7PLUS-72-E-ACM-INT & IQ7PLUS-72-ACM-INT Microinverter Parameters				
Miscellaneous Parameters				
Maximum ⁶ microinverters per 20A (max) AC branch circuit 230 VAC (single phase)		13 (single-phase) 39 (multiphase)		
EN 50530 (EU) weighted efficiency 230 VAC (single phase)	%	96.5		
Static MPPT efficiency (weighted, ref EN 50530)	%	99.5		
Inverter topology		Isolated (HF Transformer)		
Total harmonic distortion	%			5
Ambient temperature range	°C	-40		+65
Night tare loss	mW			50
Storage temperature range	°C	-40		+85
Features and Specifications				
Compatibility	Pairs with most 60 and 72-cell PV modules			
Dimensions not including mounting bracket	219 mm x 191 mm x 37.9 mm (approximate)			
Connector type	Enphase EN-4 DC Connector			
Weight	1.5 kg (3 lbs.)			
Environmental category / UV exposure rating	IP67 / outdoor			
Maximum Altitude	< 2,000 metres			
Cooling	Natural convection - no fans			
Relative humidity range	4% to 100% condensing			
Approved for wet locations	Yes			
Pollution degree	PD3			
Communication	Power line			
Standard warranty term	enphase.com/warranty			
Compliance	NRS-097-2-1:2017, AS/NZS 4777.2, RCM, IEC/EN 61000-6-3, IEC/EN 62109-1, IEC/EN 62109-2			
Grounding	The DC circuit meets the requirements for ungrounded PV arrays. Ground fault protection (GFP) is integrated into the class II double insulated microinverter.			
Monitoring	Enlighten Manager and MyEnlighten monitoring options require an Enphase Envoy-S			
Integrated DC disconnect	The DC connector has been evaluated and approved for use as the load-break disconnect.			
Integrated AC disconnect	The AC connector has been evaluated and approved for use as the load-break disconnect.			

⁴ No enforced DC/AC ratio. See the compatibility calculator at [module-compatibility](#).

⁵ Nominal Voltage Range can be extended if required by the utility

⁶ Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

Enphase IQ7X-96-ACM-INT Specifications

IQ7X-96-ACM-INT Microinverter Parameters				
Topic	Unit	Min	Typical	Max
DC Parameters				
Commonly used module pairings ¹⁰	W	320 W - 460+ W		
Peak power tracking voltage	V	53		64
Operating range	V	25		79.5
Maximum DC input voltage	V			79.5
Minimum / maximum start voltage	V	33		79.5
Maximum operating PV input current	A			6.5
Maximum DC input short circuit current (module I _{sc})	A			10
Overvoltage class DC port			II	
DC Port backfeed under single fault	A			0
PV array configuration	1 x 1 ungrounded array; No additional DC side protection required; AC side protection requires max 20 A per branch circuit			
AC Parameters				
Maximum continuous AC output power (-40 to +65°C)	VA		315	
Rated output apparent power	VA		315	
Peak output power	VA		320	
Power factor (adjustable)			0.8 leading 0.8 lagging	
Nominal AC output voltage range ¹¹ 230 VAC (single phase)	V _{rms}	184		276
Nominal output current 230 VAC (single phase)	A _{rms}		1.37	
Rated AC output current	A		1.37	
Maximum Output fault current	A		0.784	
Current (Inrush)	A		0	
Nominal frequency	Hz		50	
Extended frequency range	Hz	45		55
Maximum AC output over current protection device	A		20	
Protective class (all ports)			II	
Overvoltage class AC port			III	
AC port backfeed under single fault	A		0	
Power factor setting			1.0	

IQ7X-96-ACM-INT Microinverter Parameters				
Miscellaneous Parameters				
Maximum ¹² microinverters per 20A (max) AC branch circuit - 230 VAC (single-phase)			12 (single-phase) 39 (multiphase)	
EN 50530 (EU) weighted efficiency 230 VAC (single phase)	%	96.5		
Static MPPT efficiency (weighted, ref EN 50530)	%	99.5		
Inverter topology		Isolated (HF Transformer)		
Total harmonic distortion	%			5
Ambient temperature range	°C	-40		+60
Night tare loss	mW			50
Storage temperature range	°C	-40		+85
Features and Specifications				
Compatibility	Pairs with 96-cell PV modules only			
Dimensions not including mounting bracket	219 mm x 191 mm x 37.9 mm (approximate)			
Connector type	Enphase DC Connector			
Weight	1.5 kg (3 lbs.)			
Environmental category / UV exposure rating	IP67 / outdoor			
Maximum Altitude	< 2,000 metres			
Cooling	Natural convection - no fans			
Relative humidity range	4% to 100% condensing			
Approved for wet locations	Yes			
Pollution degree	PD3			
Communication	Power line			
Standard warranty term	enphase.com/warranty			
Compliance	NRS-097-2-1:2017, AS/NZS 4777.2, RCM, IEC/EN 61000-6-3, IEC/EN62109-1, IEC/EN 62109-2			
Grounding	The DC circuit meets the requirements for ungrounded PV arrays. Ground fault protection (GFP) is integrated into the class II double insulated microinverter.			
Monitoring	Enlighten Manager and MyEnlighten monitoring options require an Enphase Envoy-S			
Integrated DC disconnect	The DC connector has been evaluated and approved for use as the load-break disconnect.			
Integrated AC disconnect	The AC connector has been evaluated and approved for use as the load-break disconnect.			

¹⁰ No enforced DC/AC ratio. See the compatibility calculator at [module-compatibility](#).

¹¹ Nominal Voltage Range can be extended if required by the utility.

¹² Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

IQ7A-72-E-ACM-INT Specifications

IQ7A-72-E-ACM-INT Microinverter Parameters				
Topic	Unit	Min	Typical	Max
DC Parameters				
Commonly used module pairings ⁷	W	295 W - 460+ W		
Peak power tracking voltage	V	18		58
Operating range	V	18		58
Maximum DC input voltage	V			58
Minimum / maximum start voltage	V	33		58
Maximum operating PV input current	A			10.2
Maximum DC input short circuit current (module I _{sc})	A			15
Overvoltage class DC port			II	
DC Port backfeed under single fault	A			0
PV array configuration	1 x 1 ungrounded array; No additional DC side protection required; AC side protection requires max 20 A (single-phase) / 25 A (multiphase) per branch circuit			
AC Parameters				
Maximum continuous AC output power (-40 to +60°C)	VA	349		
Rated output apparent power	VA	349		
Peak output power	VA	366		
Power factor (adjustable)		0.8 leading 0.8 lagging		
Nominal AC output voltage range ⁸ 230 VAC (single phase)	V _{rms}	219		264
Nominal output current 230 VAC (single phase)	A _{rms}		1.52	
Rated AC output current	A		1.52	
Maximum Output fault current	A		0.784	
Current (Inrush)	A		0	
Nominal frequency	Hz		50	
Extended frequency range	Hz	45		55
Maximum AC output over current protection device	A	20 A (single-phase) / 25 A (multiphase) per branch circuit		
Protective class (all ports)		II		
Overvoltage class AC port			III	
AC port backfeed under single fault	A		0	
Power factor setting			1.0	

IQ7A-72-E-ACM-INT Microinverter Parameters				
Miscellaneous Parameters				
Maximum ⁹ microinverters per 20A (max) AC branch circuit - 230 VAC		11 (single-phase) 39 (multiphase, requires 25 A OCPD)		
EN 50530 (EU) weighted efficiency 230 VAC (single phase)	%	96.5		
Static MPPT efficiency (weighted, ref EN 50530)	%	99.5		
Inverter topology		Isolated (HF Transformer)		
Total harmonic distortion	%			5
Ambient temperature range	°C	-40		+60
Night tare loss	mW			50
Storage temperature range	°C	-40		+85
Features and Specifications				
Compatibility	Pairs with 72-cell PV modules			
Dimensions not including mounting bracket	219 mm x 191 mm x 37.9 mm (approximate)			
Connector type	Enphase EN-4 DC Connector			
Weight	1.5 kg (3 lbs.)			
Environmental category / UV exposure rating	IP67 / outdoor			
Maximum Altitude	< 2,000 metres			
Cooling	Natural convection - no fans			
Relative humidity range	4% to 100% condensing			
Approved for wet locations	Yes			
Pollution degree	PD3			
Communication	Power line			
Standard warranty term	enphase.com/warranty			
Compliance	NRS-097-2-1:2017, AS/NZS 4777.2, RCM, IEC/EN 61000-6-3, IEC/EN 62109-1, IEC/EN 62109-2, EN 50549, G98/G99, VDE-AR-N-4105			
Grounding	The DC circuit meets the requirements for ungrounded PV arrays. Ground fault protection (GFP) is integrated into the class II double insulated microinverter.			
Monitoring	Enlighten Manager and MyEnlighten monitoring options require an Enphase Envoy-S			
Integrated DC disconnect	The DC connector has been evaluated and approved for use as the load-break disconnect.			
Integrated AC disconnect	The AC connector has been evaluated and approved for use as the load-break disconnect.			

⁷ No enforced DC/AC ratio. See the compatibility calculator at [module-compatibility](#).

⁸ Nominal Voltage Range can be extended if required by the utility.

⁹ Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

Q Cable Specifications

Specification	Value
Voltage rating	600V
Voltage withstand test (kV/1min)	AC 3.0
Max DC conductor resistance (20°C) (Ω /km)	5.433
Insulation resistance (20°C)	$\geq 20M$ (Ω /km)
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	DG
Certification	UL 3003, TC-ER equivalent
Flame test rating	FT4
Cable conductor insulator rating	THHN/THWN-2
Environmental protection rating	IEC 60529 IP67 NEMA 6
UV resistance	720h
Compliance	RoHS, OIL RES I, CE, UV Resistant, combined UL for Canada and United States
Conductor size	12 AWG
Maximum loop size	12 cm (4.75 ")
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 Connector Ratings

Enphase connectors in the following table have a maximum current of 20A, a maximum OCPD of 20 A, and an ambient temperature range of -40° to +79° C (-40° to +174.2° F).

Part Number	Model	Maximum Voltage
840-00387	Q-12-10-240	277 VAC
840-00388	Q-12-17-240	277 VAC
840-00389	Q-12-20-200	277 VAC
840-00800	Q-DCC-7	300 VDC
840-00385	Q-DCC-2	100 VDC
840-00386	Q-DCC-5	100 VDC

Enphase Installation Map

To Sheet / A la hoja de: ↑

Panel Group/Grupo de los paneles: Azimuth/Azmut: Tilt/Inclinación: Sheet/Hoja ____ of/de ____	Customer/Ciente:	Installer/Instalador:	N S E W N S E O 
1	2	3	3
A			
B			
C			
D			
E			
F			
G			
H			
J			
K			
L			
M			

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

To Sheet / A la hoja de: _____



Sample Wiring Diagram:

