IQ9N Microinverter installation and operation manual

Applicable regions: Australia and New Zealand

Contents

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Other information

Product information is subject to change without notice. All trademarks are recognized as the property of their respective owners.

User documentation is updated frequently; check the Enphase website for the latest information https://enphase.com/en-au/installers/resources/documentation.

To ensure optimal reliability and to meet warranty requirements, the Enphase microinverter must be installed according to the instructions in this manual and the quick install guide for IQ9N Microinverters. For warranty text, refer to https://enphase.com/installers/resources/warranty.

For Enphase patent information, refer to https://enphase.com/patents.

Safe transport and handling guidelines for microinverters

- Always transport microinverters in their original Enphase packaging, which is designed to protect against shock, vibration, and moisture, and complies with ISTA guidelines.
- Avoid stacking heavy items on top of microinverter boxes.
- Never transport microinverters while connected to any power source or PV module.

Audience

This manual is intended for use by competent personnel for the installation and maintenance of IQ9N Microinverters.

Compliance with EU directives

- Electro Magnetic Compatibility (EMC) directive 2014/30/EU[1]
- Low Voltage Directive (LVD) 2014/35/EU
- Restriction of Hazardous Substances (RoHS) 2011/65/EU

[1] To comply with DC port emission requirements, the DC cable length from the PV module to the microinverter must not exceed 3 meters (total DC cable loop length of 6 meters).

The full text of the EU Declaration of Conformity (DoC) is available at https://enphase.com/en-au/installers/resources/documentation.

Product marking

Important safety information

Read this first

This manual contains important instructions for use during the installation, operation, and maintenance of the IQ9N Microinverter.

IMPORTANT: Enphase IQ9N Microinverter listed in this manual requires the IQ Cable. An IQ Gateway, IQ Combiner, or IQ System Controller is required to monitor the performance and, where required, provide control of the IQ9N Microinverter.

NOTE: Installations in the United Kingdom do not require the use of the IQ Relay for grid operator compliance.

Product labels

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

	Risk of electric shock. Energy storage timed discharge.
	Risk of electric shock
	Hot surface
	Refer to safety instructions
	Refer to manual
	Double insulated

Safety Instructions

IMPORTANT SAFETY INSTRUCTIONS. KEEP THIS DOCUMENT FOR FUTURE REFERENCE. To reduce the risk of electric shock and to ensure the safe installation, operation, and maintenance of the IQ9N Microinverter system, the following safety symbols appear throughout this document to indicate dangerous conditions and important safety instructions.

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 burn 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 the installation of this equipment includes the risk of electric shock.

DANGER: Risk of electric shock. The DC conductors of this photovoltaic system are ungrounded and may be energised.

DANGER: Risk of electric shock. Always de-energise the AC branch circuit before servicing. Never disconnect the AC or DC connectors under load.

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

DANGER: Risk of electric shock. Risk of fire. Only competent personnel should troubleshoot, install, or replace Enphase microinverters or the IQ Cable and accessories.

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

DANGER: Risk of electric shock. Risk of fire. Do not exceed the maximum number of microinverters in an AC branch circuit as listed in this guide. You must protect each microinverter AC branch circuit with a 20 A (single-phase and multi-phase) or 25 A (multi-phase) maximum breaker or fuse, as appropriate.

DANGER: Risk of electric shock when the solid red light is flashing from the microinverter's LED.

WARNING: Risk of equipment damage. Enphase male and female connectors must only be mated with the matching male/female connector.

WARNING: Before installing or using the Enphase microinverter, read all instructions and cautionary markings in the technical description, on the Enphase microinverter System, and on the photovoltaic (PV) equipment.

WARNING: Do not connect Enphase microinverters to the grid or energise the AC circuit(s) until you have completed all of the installation procedures and have received prior approval from the electrical utility company/grid operator.

WARNING: When the PV array is exposed to light, DC voltage is supplied to the microinverter.

DC cable safety

NOTE: Ensure the following precautions:

- Ensure proper routing of the PV module DC cable using the clips to prevent the leads from resting on the roof. Do not wrap an excess DC cable around the microinverter.
- Avoid direct exposure to sunlight.
- Avoid sharp edges on racking.
- Avoid cable contacting rough surfaces or moving parts within the racking system.
- Avoid overly tight bending radii. The minimum bend radius for DC cable is eight times the cable's outer diameter.
- Avoid overly tightly sized cable clips for routing.

Microinverter safety

DANGER: Risk of electric shock. Risk of fire. Do not attempt to repair an Enphase microinverter; it contains no user-serviceable parts. If it fails, contact Enphase customer service to obtain a Return Merchandise Authorisation (RMA) number and start the replacement process. Tampering with or opening an Enphase microinverter will void the warranty.

WARNING: The maximum open circuit voltage of the PV module must not exceed the specified maximum input DC voltage of the Enphase microinverter. Refer to the Enphase Compatibility Calculator to verify PV module electrical compatibility with the microinverter. Use IQ9N Microinverters only with compatible PV modules as per the Enphase Compatibility Calculator. Using an electrically incompatible PV module voids Enphase warranty.

WARNING: Risk of equipment damage. 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. Use the connector and microinverter sealing caps as required to prevent moisture ingress.

WARNING: Risk of equipment damage. The Enphase microinverter functions only with a standard, compatible PV module with appropriate fill factor, voltage, and current ratings. Unsupported devices include smart PV modules, fuel cells, wind or water turbines, DC generators, non-Enphase batteries, etc. These devices do not behave like standard PV modules, so operation and compliance are not guaranteed. These devices may also damage the Enphase microinverter by exceeding its electrical rating, making the system potentially unsafe.

WARNING: Risk of skin burn. The chassis of the Enphase microinverter is the heat sink. Under normal operating conditions, the temperature could be 20°C to 40°C above ambient, but under extreme conditions, the microinverter can reach a temperature of 100°C. To reduce the risk of burns, use caution when working with microinverters.

NOTE: The Enphase microinverter has field-adjustable voltage and frequency trip points that may need to be set, depending upon local requirements. Depending on the electricity network operator, a grid profile other than the profile set on the microinverter might be needed to set up. Only an authorized installer with permission and following the requirements of the local electrical authorities should make adjustments.

IQ Cable safety

DANGER: Risk of electric shock. Do not install the IQ Terminator while the power is connected.

DANGER: Risk of electric shock. Risk of fire. When stripping the sheath from the IQ 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 IQ Cable uncovered for an extended period. You must cover any unused connector with a sealing cap.

WARNING: Use the terminator only once. If you open the IQ Terminator following installation, the latching mechanism is destroyed. Do not reuse the terminator. If the latching mechanism is defective, do not use the IQ Terminator. Do not circumvent or manipulate the latching mechanism.

WARNING: When installing the IQ Cable, secure any loose cables to minimise tripping hazards.

NOTE: If you need to remove a sealing cap, you must use the Enphase IQ Disconnect Tool.

NOTE: When installing the IQ Cable and accessories, adhere to the following:

- Do not expose the terminator or cable connections to directed, pressurised liquid (water jets, and so on).
- Do not expose the terminator or cable connections to continuous immersion.
- Do not expose the terminator or cable connections to continuous tension (for example, tension due to pulling or bending the cable near the connection).
- Use only the connectors and cables provided.
- Do not allow contamination or debris, or moisture in the connectors.
- Use the terminator 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 an open flame.
- Fit the terminator using only the prescribed tools and in the prescribed manner.
- Use the terminator to seal the conductor end of the IQ Cable; no other method is allowed.

Note for third-party products: Any third-party manufacturer or importer product(s) used to install or commission Enphase product(s) shall comply with the applicable EU Directive(s) and requirements in the European Economic Area (EEA). It is the responsibility of the installer to confirm that all such products are labelled correctly and have the required compliant supporting documentation.

1. Preparing for installation

1. Check the microinverter manufacturing date to ensure the installation date is within one year of the manufacturing date. The manufacturing date can be found using the serial number associated with the microinverter through the following format:

   Serial number format—LLYYWWNNNNNN
   LL—manufacturing location
   YY—year
   WW—work week
   NNNNNN—serial number
2. Check PV module compatibility[2] with our microinverter using our module compatibility calculator using the link https://enphase.com/en-au/installers/microinverters/calculator or QR code.

   WARNING: You must match the DC operating voltage range of the PV module with the allowable input voltage range of the Enphase microinverter. Using an electrically incompatible PV module voids Enphase warranty.
3. IQ9N Microinverters require the IQ Cable and IQ accessories.

   IMPORTANT: IQ9N Microinverters include AC and DC connectors integrated into the bulkhead. The AC port connects to the IQ Cable or the IQ Field Wireable Connector. TÜV has evaluated the DC port for intermateability with Stäubli MC4 connectors, whose cable coupler models are **PV-KST4/...-UR, PV-KBT4/...-UR, PV-KBT4-EVO2/...-UR, and PV-KST4-EVO2/...-UR**. The DC port of the inverter must only be mated with Stäubli MC4 connectors.
4. IQ9 Microinverters must be connected to an IQ Gateway to ensure functionality. The system software periodically verifies this connection, and if an IQ Gateway is not connected, the microinverters may stop functioning. Additionally, an IQ Gateway is required to manage, monitor, and control the system, and receive software updates.
5. The system's functionality may be impacted if the IQ Gateway, IQ Combiner, or IQ System Controller is not installed on-site or remains disconnected from the internet or microinverters. A flashing orange LED on the microinverter may indicate a communication issue with the IQ Gateway.
6. The microinverter has a Class II double-insulated rating, which includes ground fault protection (GFP). Refer to DC Resistance Low – Power Off condition on page 17. To support GFP, use only PV modules equipped with DC cables labeled PV wire or PV cable. Refer to local electrical codes and standards for grounding requirements of the PV array and racking.
7. Check the compatibility when expanding an IQ7 or IQ8 system with IQ9N Microinverters:
   - IQ9N Microinverters can be added to the existing IQ7 or IQ8 systems on the same IQ Gateway/IQ Combiner/IQ System Controller only in the following configurations:
     - Solar Only
     - Solar Plus Battery (IQ Battery 5P or IQ Battery 5P with FlexPhase) grid-tied or Solar Plus Battery (IQ Battery 5P or IQ Battery 5P with FlexPhase) with backup, with IQ System Controller 3 INT.

[2] IQ9N Microinverters are compatible with bifacial PV modules, if the temperature-adjusted electrical parameters (open circuit voltage (V_{OC}), short circuit current (I_{SC})) of the modules, considering the electrical parameters, including the bifacial gain, are within the allowable microinverter input parameters range. In evaluating the amount of bifacial gain, follow the recommendations of the module manufacturers.

- The IQ7 Microinverters or IQ8 Series Microinverters cannot be added to a site with the existing IQ9N Microinverters on the same gateway.
- The mixed system of IQ7, IQ8, and IQ9N will not support the microinverter Sunlight Jump Start feature. However, the mixed system of IQ8 and IQ9N will support the microinverter Sunlight Jump Start feature.
- The combined peak power output of IQ7 Microinverters, IQ8 Microinverters, and IQ9N Microinverters in the system must not exceed 150% of the IQ Battery's rated power output. If this ratio is exceeded, PV shedding must be implemented to shed excess PV when the system switches to the off-grid mode. However, in systems using a mix of IQ8 Microinverters and IQ9N Microinverters, the allowable PV-to-battery (PV/ESS) ratio increases to 200%.

8. Download the Enphase Installer App and log in to your Enphase Account. To download, go to https://enphase.com/en-au/installers/apps or scan the QR code.

NOTE: After you log in to your Enphase Account from the Enphase Installer App, scan the microinverter serial numbers (standard 1D bar code) and connect to the IQ Gateway to track the system installation progress. Ensure you are using the latest version of the Enphase Installer App.

9. Plan your AC branch circuits to meet the following limits for a maximum number of microinverters per circuit.

Circuit breaker	IQ9N
20 A single-phase	9
20 A multi-phase	27 (9 per phase)
25 A multi-phase (not applicable in Europe)	33 (11 per phase)

NOTE: Refer to local regulations for circuit breaker sizing and define the number of microinverters per branch in your area. 25 A multi-phase breaker option is not applicable in Europe.

NOTE: For a system containing a mix of IQ7, IQ8, IQ9N or IQ8, IQ9N Microinverters on the same branch, ensure that the total output current of all microinverters on the branch does not exceed 16 A (20 A circuit breaker) or 20 A (25 A circuit breaker).

10. Size AC conductors to account for the voltage rise. Select the correct conductor size based on the distance from the last microinverter in the circuit to the breaker in the electrical panel/AC switchboard. Center-feed the branch to minimize voltage rise.
11. Enphase microinverters have integral surge protection, greater than most conventional 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 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. For more details, see https://support.enphase.com/s/article/Surge-Protection-for-Enphase-Microinverter-Systems.

NOTE: Protection against lightning and resulting voltage surges must be in accordance with local electrical standards and best practice.

12. Verify that the AC voltage[3] on-site is within range:

Single-phase service	Multi-phase service
L1 to N: 184 to 276 VAC	• L1 to L2 to L3: 319 to 478 VAC • L1, L2, L3 to N: 184 to 276 VAC

13. The IQ Cable insulation colours codes for single-phase are Brown—L1 and Blue—N, and multi-phase are Brown—L1, Black—L2, Grey—L3, and Blue—N.

WARNING: Incorrect termination may irreparably damage any connected microinverters.

NOTE: Multi-phase IQ Cable internally rotates L1, L2, and L3 to provide balanced 400 VAC (multi-phase), thus alternating phases between microinverters.

NOTE: Minimise the number of unused multi-phase IQ Cable connectors with multi-phase systems. When cable connectors are left unused on a multi-phase system, they create a phase imbalance on the branch circuit. If multiple cable connectors are skipped over multiple branch circuits, the imbalance can multiply.

2. Additional components and tools

No.	Component	SKU details
1	IQ Gateway or IQ Combiner	To manage and monitor solar production, ENV-S-EM-230, or ENV-S-WM-230, or ENV-S-WB-230, or X-IQ-EURO-230-3P-4-2. This is required to apply the grid profile to microinverters. An IQ Gateway or IQ Combiner can manage and monitor up to 300 IQ9N Microinverters. Refer to https://enphase.com/en-au/installers/resources/documentation/communication for specifications and installation information.
2	IQ System Controller 3 INT	Only required to enable the backup functionality along with the IQ Battery 5P or IQ Battery 5P with FlexPhase. It consolidates interconnection equipment and a communication gateway into a single enclosure and streamlines grid-independent capabilities of PV and storage installations SC100G-M230ROW. Refer to https://enphase.com/en-au/installers/resources/documentation/storage for specifications and installation information.
3	IQ Battery	All-in-one AC-coupled storage solution that integrates seamlessly with your solar energy for maximum performance and energy savings. IQ Battery 3T/10T, IQ Battery 5P, or IQ Battery 5P with FlexPhase. Refer to https://enphase.com/en-au/installers/resources/documentation/storage for specifications and installation information.
4	IQ Relay[4, 5]	Physical disconnection relay.

[3] Nominal voltage range can be extended beyond nominal if required by the utility.
[4] In Germany only, for PV systems greater than 30 kVA, an off-the-shelf DIN VDE V 0124-100 compliant central protection relay must be added to the system.
[5] In the UK only, use a G99-approved third-party network protection relay for PV systems with a system size above 17 kW per phase.

<table>
<tr><th>No.</th><th>Component</th><th>SKU details</th></tr>
<tr><td></td><td></td><td>Q-RELAY-1P-INT, single-phase or Q-RELAY-3P-INT, multi-phase.

For Italy, Q-RELAY-2-3P-ITA or IQ-RELAY-2-3P-ITA for single-phase and multi-phase applications.

The multi-phase IQ Relay also provides phase coupling to allow microinverters on all phases to communicate with the IQ Gateway. Use a Phase Coupler for a multi-phase system for phase coupling if an IQ Relay is not installed in the multi-phase system.

An IQ Gateway or IQ Combiner can manage and monitor up to 10 IQ Relays.

Refer to https://enphase.com/en-au/installers/resources/documentation/accessories for specifications and installation information.</td></tr>
<tr><td>5</td><td>Raw IQ Cable</td><td>Continuous 300 m cable.

Q-25-RAW-300, single-phase or

Q-25-RAW-3P-300, multi-phase</td></tr>
<tr><td>6</td><td>Tie wraps or cable clips</td><td>Stainless steel cable clips to fasten the IQ Cable.

ET-CLIP-100</td></tr>
<tr><td>7</td><td>IQ Sealing Caps</td><td>For any unused connectors on the IQ Cable Q-SEAL-10.</td></tr>
<tr><td>8</td><td>IQ Microinverter Sealing Caps</td><td>Use IQ Microinverter Sealing Caps (Q-BA-CAP-10) to protect microinverters against moisture or water damage if the AC connector of the microinverter is not connected to the IQ Cable overnight. Remove the sealing cap and connect the IQ Cable when ready for cabling.</td></tr>
<tr><td>9</td><td>IQ Terminator</td><td>Cap for unused IQ Cable ends.
Q-TERM-R-10 for single-phase or Q-TERM-3P-10 for multi-phase: Typically, one IQ Terminator (End-feeding branch circuit) or two IQ Terminators (Centre-feeding branch circuit) required per branch circuit.</td></tr>
<tr><td>10</td><td>IQ Disconnect Tool</td><td>To disconnect the IQ Cable Connectors.

Q-DISC-10</td></tr>
<tr><td>11</td><td>IQ Field Wireable Connectors (optional)</td><td>Connect IQ Cables without complex wiring.

Q-CONN-R-10M and Q-CONN-R-10F for single-phase IQ Cable or Q-CONN-3P-10M and Q-CONN-3P-10F for multi-phase IQ Cable.</td></tr>
<tr><td>12</td><td>IQ Cable</td><td>2.5 mm² cable with pre-installed connectors for IQ Microinverters
<table>
<tr><th>Cable model</th><th>Connector spacing[6]</th><th>PV model orientation</th><th>Connectors per box</th></tr>
</table></td></tr>
</table>

No.	Component	SKU details			
		Single-phase			
		Q-25-10-240	1.3 m	Portrait (all)	240
		Q-25-17-240	2.0 m	Landscape	240
		Q-25-20-200	2.3 m	Landscape	200
		Multi-phase			
		Q-25-10-3P-200	1.3 m	Portrait (all)	200
		Q-25-17-3P-160	2.0 m	Landscape	160
		Q-25-20-3P-160	2.3 m	Landscape	160

Additional materials and tools for installation:

- An AC junction box or AC isolator
- Screwdrivers, wire cutter, voltmeter, torque wrench, sockets, and wrenches for mounting hardware
- Crimp tool Multi-Contact PV-CZM-18100, -19100, or -22100 for single-phase IQ Field Wireable Connector
- Screwdriver blade width 4 mm–3.2 mm (⅛") (recommended tool to torque the screw on the contact carrier and to disconnect the multi-phase IQ Field Wireable Connector)

3. Installing IQ9N Microinverters

Install IQ9N Microinverters as follows. (See figure IQ9N Microinverter installation).

1. **Position the IQ Cable.**
   a. Count the required IQ Cable connectors for the branch circuit (considering voltage rise and branch circuit) and cut the cable accordingly, leaving at least 15 cm after the last connector for termination.
   b. Mark the microinverter positions at fixed intervals along the PV racking, based on their connection sequence. The maximum spacing between two microinverters depends on the IQ Cable variant (as specified in its SKU), PV module DC cable lengths, and module dimensions.
   c. Align the IQ Cable along the rack, matching connector locations to the marked positions. Leave slack for individual IQ Cable drops, cable bends, and potential obstructions. Secure the cable using tie-wraps or IQ Cable Clips to avoid tension on the connector.

   WARNING: When transitioning between rows, secure the cable to the rail to prevent cable/connector damage. Do not put any connectors on the microinverter under tension.
2. **Position the junction box/AC isolator.**
   a. Install the junction box at a suitable location and provide an AC connection from the junction box/AC isolator or field wireable to the electricity network.
   b. For three-phase installations, verify the cable insulation colours.

   WARNING: The blue conductor in the IQ Cable must only be used for neutral connection. Incorrect termination may irreparably damage any connected microinverters.
3. **Mount the microinverters.**

[6] Allows for 0.3 m of cable slack.

a. Mount microinverters under the PV module, either horizontally (bracket facing towards the rear of the PV module is recommended) or vertically or in-plane with vertical facade PV modules, while maintaining the necessary clearances. Microinverters must be protected from direct exposure to rain or directed, pressurized liquid (water jets). It is recommended to avoid direct exposure to sunlight/UV.

   i. When mounted horizontally or in-plane with a vertical facade PV module, allow a minimum of 19 mm (¾") between the roof/wall (for facade) and the microinverter. Also, allow 13 mm (½") between the rear of the PV module and the top of the microinverter.
   ii. When mounted vertically to the roof, maintain at least 300 mm (12") clearance from the edges of the PV module to protect the microinverter from direct exposure to rain, UV, and other harmful weather events.

b. Torque the mounting fasteners.

   - 6 mm mounting hardware: 5 N m or
   - 8 mm mounting hardware: 9 N m

WARNING: Do not mount the microinverter with connectors oriented upwards.

4. **Create an installation map.**
   a. Peel the removable serial number label from each microinverter and IQ Gateway and apply them to the respective locations on the paper installation map.
   b. Keep a copy of the 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 30 cm.
   b. Dress any excess cable in loops so that it does not contact the roof. Do not form loops smaller than 12 cm in diameter.
6. **Connect the microinverters.**
   a. Connect each microinverter. Listen for a click as the connectors engage.
   b. To remove a sealing cap or AC connector, use the IQ Disconnect Tool.

i. Cover any unused connectors on the IQ Cable with the IQ Sealing Caps (Q-SEAL-10). Listen for a click as the IQ Sealing Caps engage.	
ii. Use IQ Microinverter Sealing Caps (Q-BA-CAP-10) to protect microinverters against moisture or water damage if the AC connector of the microinverter is not connected to the IQ Cable overnight. Remove the IQ Sealing Cap and connect the IQ Cable when ready for cabling.	

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

DANGER: Risk of electric shock. Risk of fire. Only competent personnel may connect the Enphase microinverter to the utility grid.

7. **Terminate the unused end of the cable**: See Additional information for installation on page 15, on how to terminate the cable for single-phase or multi-phase installations.
8. **Complete the installation of the junction box/AC isolator/IQ Field Wireable Connectors**: Connect the IQ Cable to the junction box/AC isolator/IQ Field Wireable Connectors.

WARNING: To prevent irreversible damage to the system, confirm cable insulation colours at connections before energising the AC Supply. Incorrect termination may irreparably damage any connected microinverters.

9. **Connect the PV modules.**
   a. Connect the DC leads of each PV module to the DC input connectors of the microinverter.
   b. Check the LED on the connector side of the microinverter. The LED flashes green six times when DC power is applied.
   c. Mount the PV modules above the microinverters.
10. **Energise the system.**
   a. Before energizing the system, verify impedance across all conductors: Phase-to-phase (L1-L2, L2-L3, L3-L1) and each phase to neutral (L1-N, L2-N, L3-N) to confirm correct phase sequencing and to avoid miswiring.
   b. Turn on the AC disconnect or circuit breaker for the branch circuit.
   c. Turn on the main utility grid AC circuit breaker.
   d. Check the LED on the connector side of the microinverter.

LED	Indicates
Flashing green	Normal operation. The AC grid function is normal, and there is communication with the IQ Gateway. IQ9N Microinverter's LED will flash green only after provisioning.
Flashing orange	The AC grid is normal, but there is no communication with the IQ Gateway.
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 17. If the problem persists, measure resistance between PV DC+ to EARTH and then PV DC– to EARTH at the PV module MC4 connectors and then at the microinverter MC4 connectors. Anything less than ~7 kΩ will trigger the **DC Resistance Low, Power Off** condition. Usually, this value is in MΩ for both the microinverter and the PV module. Where the measurement is lower, the faulty PV module or microinverter must be replaced.

WARNING: For shutting down the system, always de-energize the AC branch circuit breaker. Never disconnect the DC or AC connectors under load. For the Enphase Energy Systems that include IQ System Controller 3 INT and IQ Battery 5P, turn the System Shutdown Switch to the OFF position. Wait for at least a minute and use a multimeter to measure the AC voltage on all the following terminals—PV, IQ Battery, mains, and load. Ensure no voltage is detected on any of these terminals.

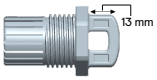
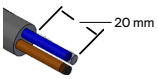
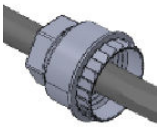
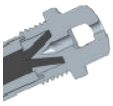
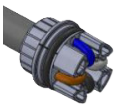
4. Commissioning the system

1. Open the Enphase Installer App and register a new system.
2. Scan the barcodes to add devices and set up the array.
3. Set the appropriate grid profile based on utility requirements.
4. Connect the IQ Gateway to the internet using the wizard in the Enphase Installer App.
5. Provision the devices and complete the commissioning flow.

Once provisioned, the system will ramp up to full producing power after grid profile propagation is completed. It may take 20-30 minutes for full power production based on the number of microinverters in the system.

5. Additional information for installation

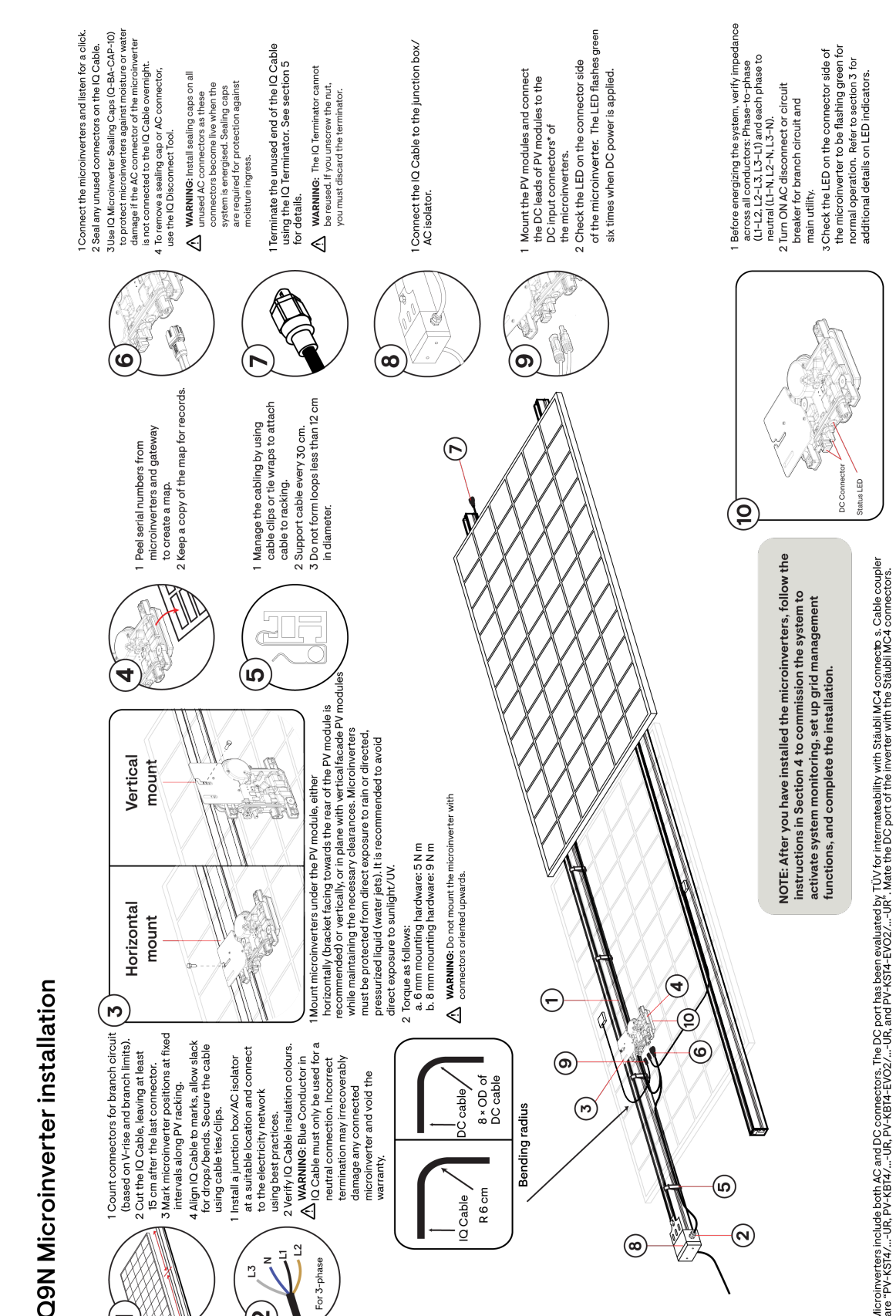
Terminate the unused end of the IQ Cable as follows.

Single-phase IQ Cable		Multi-phase IQ Cable	
Step 1: Remove 13 mm of the cable sheath from the conductors. Use the IQ Terminator body loop to measure.		**Step 1:** Remove 20 mm of cable sheath from the conductors.	
Step 2: Slide the hex nut onto the cable.		**Step 2:** Slide the hex nut onto the cable.	
Step 3: Insert the cable into the IQ Terminator body so the two wires land on opposite sides of the internal separator. The grommet inside the IQ Terminator body must remain in place.		**Step 3:** Insert the cable into the IQ Terminator body so the four wires land on separate sides of the internal separator. The grommet inside the IQ Terminator body must remain in place.	
Step 4: Insert a screwdriver into the slot on the top of the IQ Terminator to hold it in place. Hold the IQ Terminator body stationary with the screwdriver and turn only the hex nut to prevent the conductors from twisting out of the separator. Torque the nut to 7 N m.		**Step 4:** Bend the wires down into the recesses of the IQ Terminator body and trim as needed. Place the cap over the IQ Terminator body. Insert a screwdriver into the slot on the IQ Terminator cap to hold it in place. Rotate the hex nut with your hand or a wrench until the latching mechanism meets the base. Do not over-torque.	
Step 5: Attach the terminated cable end to the PV racking with a cable clip or tie wrap so that the cable and IQ Terminator cannot contact the roof.			

WARNING: Use the IQ Terminator only once. If you open the IQ Terminator following installation, the latching mechanism is destroyed. Do not reuse the IQ Terminator.

6. Quick visual installation overview

IQ9N Microinverter installation



* IQ9N Microinverters include both AC and DC connectors. The DC port has been evaluated by TÜV for intermateability with Stäubli MC4 connectors. Cable coupler models are *PV-KST4/...-UR, PV-KBT4/...-UR, PV-KBT4-EVO2/...-UR, and PV-KST4-EVO2/...-UR*. Mate the DC port of the inverter with the Stäubli MC4 connectors.

6.1 Set up and activate monitoring

See the *IQ Gateway Metered quick install guide* at https://enphase.com/en-au/installers/resources/documentation/communication to install the gateway and set up system monitoring and grid management functions. This guide leads you through the following:

- Connecting the gateway
- Detecting devices
- Connecting to the Enphase Installer App
- Registering the system
- Building the virtual array

NOTE: When the electricity network operator requires a grid profile, you must select an appropriate grid profile for your installation. Your system will ramp up to full power after grid profile propagation and device provisioning are completed. It may take 20–30 minutes for full power production based on the number of microinverters in the system.

You can set the grid profile anytime through the Enphase Installer Platform, during system registration, or through the Enphase Installer App. An IQ Gateway is required to set or change the grid profile. For more information on setting or changing the grid profile, see the *IQ Gateway quick install guide* at https://enphase.com/en-au/installers/resources/documentation/communication.

7. Troubleshooting

Follow all the safety measures described in this manual. Competent 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 Support at https://enphase.com/contact/support to obtain an RMA number and start the replacement process.

7.1 Status LED indications and error reporting

The following section describes the microinverter LED indications.

7.1.1 LED operation

See the LED table. 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 flashes. After that, red flashes indicate that no grid is present and the system is not energized.

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

7.1.2 DC Resistance Low – Power Off condition

For the IQ9N Microinverter, 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 gateway will continue to report the fault 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 the ground. If either resistance drops below a threshold of 7 kΩ, the microinverter stops power production and raises this condition. This may indicate a 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 reset manually.

An IQ Gateway 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, clearing can be attempted manually. Refer to the following method. If the condition does not clear, contact Enphase Support at https://enphase.com/contact/support.

Perform the following steps to send a clear message to the microinverter. Note that the condition will not clear after the sensor reset if the cause of the failure is still present.

Method: Clear this error using the Enphase Installer Platform

1. Log in to the Enphase Installer Platform and access the system.
2. Click the **Events** tab. The next screen shows the current **DC Resistance Low - Power Off** condition of the system.
3. Click **DC Resistance Low - Power Off**.
4. Click the serial number of the affected microinverter.
5. Click **Tasks and Clear GFI** to clear the event.

7.1.3 Other faults

All other faults are reported to the gateway. Refer to the *IQ Gateway Metered quick install guide* at https://enphase.com/en-au/installers/resources/documentation/communication for troubleshooting procedures.

7.2 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 or AC connectors under load. For the Enphase Energy Systems that include IQ System Controller 3 and IQ Battery 5P, turn the System Shutdown Switch to the OFF position. Wait for at least a minute and use a multimeter to measure the AC voltage on all the following terminals: PV, IQ Battery, mains, and load. Ensure no voltage is detected on any of these terminals.

WARNING: The Enphase microinverters are powered by DC power from the PV modules. Make sure you disconnect the DC connections and reconnect the DC power, and then watch for the solid green for about six seconds after connecting to the DC power.

1. Ensure AC circuit breakers and isolator switches are closed.
2. Check the connection to the grid and verify that the grid voltage is within allowable ranges.
3. Verify that AC line voltages at all PV circuit breakers in the electrical panel and subpanels are within the ranges shown in the following table.
4. Verify that the AC line voltage at the junction box for each AC branch circuit is within the ranges shown in the following table.

Single-phase service		Multi-phase service	
L1 to N	184 to 276 VAC[7]	L1 to L2 to L3	319 to 478 VAC[7]
		L1, L2, L3 to N	184 to 276 VAC [7]

5. Using an IQ Disconnect Tool, disconnect the AC cable for the microinverter in question from the IQ Cable.
6. Verify that the grid is present at the microinverter by measuring line-to-line voltage and line-to-ground voltage at the IQ Cable connector.
7. Check that the AC branch circuit connections (IQ Cable and AC connections) are properly seated. Reset if necessary. Check for any damage, such as rodent damage.
8. Ensure that any upstream AC disconnects and the dedicated circuit breakers for each AC branch circuit are functioning properly and are closed.
9. Disconnect and reconnect the DC PV module connectors. The status LED of each microinverter will light solid green for a few seconds after connection to DC power and then flash green six times to indicate normal startup operation, about two minutes after connecting to DC power. The LED subsequently resumes normal operation if the grid is present. See the LED table for details.
10. Connect a clamp meter (set to DC mode) to one of the conductors of the DC cables from the PV module to measure the microinverter current. This will be under 1 A if the AC is disconnected.
11. Verify the PV module DC voltage is within the allowable range shown in Specifications on page 21. To verify PV module electrical compatibility with the microinverter, see https://enphase.com/en-au/installers/microinverters/calculator.
12. Swap DC leads with a known good, adjacent PV module. If the problem moves to the adjacent module after periodically checking the Enphase Installer Platform (this may take up to 30 minutes), it indicates that the PV module is not functioning correctly. If it stays in place, the problem is with the original microinverter. Contact Enphase Support at https://enphase.com/contact/support for help in reading the microinverter data and for assistance in obtaining a replacement microinverter, if needed.
13. Check the DC connections between the microinverter and the PV module. The connection may need to be tightened or reseated. If the connection is worn or damaged, it may need replacement.
14. Verify with your electricity network operator or with a multi-meter measuring frequency at the point of supply that the line frequency is within the range. If the problem persists, contact Enphase Support at https://enphase.com/contact/support.

7.3 Disconnect a microinverter

If problems remain after following the troubleshooting steps listed in the previous section, contact Enphase Support at https://enphase.com/contact/support. If Enphase authorises a replacement, perform the following steps. To ensure the microinverter is not disconnected from the PV modules under load, follow the disconnection steps in the following order:

1. De-energize the AC branch circuit breaker. Never disconnect the DC or AC connectors under load. For the Enphase Energy Systems that include IQ System Controller 3 and IQ Battery 5P, turn the System Shutdown Switch to the OFF position. Wait for at least a minute and use a multimeter to measure the AC voltage on all the following terminals: PV, IQ Battery, mains, and load. Ensure no voltage is detected on any of these terminals.
2. The IQ Cable AC connectors are tool-removable only. To disconnect the microinverter from the IQ Cable, insert the IQ Disconnect Tool and remove the connector.
3. Cover the PV module with an opaque cover.

[7] Nominal voltage range can be extended beyond nominal if required by the electricity network operator.

4. Using a clamp meter (set to DC mode), verify that no current flows through the DC cables between the PV module and the microinverter. If the current continues to flow, check that you have completed the preceding steps.

   NOTE: Take care when measuring the DC, as most clamp meters must be zeroed first, as these tend to drift with time.
5. Disconnect the PV module DC cable connectors from the microinverter using the IQ Disconnect Tool.
6. If present, loosen and/or remove any bonding hardware.
7. Remove the microinverter from the PV racking.

   WARNING: Risk of electric shock. Risk of fire. Do not leave any connectors on the PV system disconnected for an extended period. If you do not plan to replace the microinverter immediately, you must cover any unused connector with an IQ Sealing Cap.

7.4 Install a replacement microinverter

1. When the replacement microinverter is available, verify that the AC branch circuit breaker is de-energized. For the Enphase Energy Systems that include the IQ System Controller 3 and the IQ Battery 5P, turn the system shutdown switch to the OFF position. Wait for at least a minute and use a multimeter to measure the AC voltage on all the following terminals: PV, IQ Battery, mains, and load. Ensure no voltage is detected on any of these terminals.
2. To install a replacement microinverter, refer to Installing IQ9N Microinverters on page 12 for mounting instructions.
3. Connect the microinverter to the IQ Cable connector. Listen for a click as connectors engage.
4. Connect the DC leads of each PV module to the DC input connector of the microinverter.
5. Re-mount the PV module above the microinverter.
6. Energize the AC branch circuit breaker and verify the operation of the replacement microinverter by checking the status LED on the connector side of the microinverter.
7. Use the Enphase Installer App to retrieve the old microinverter serial number from the IQ Gateway database. In the Enphase Installer App, once connected to the IQ Gateway:
   a. Tap **Devices & Array** > **IQ Microinverters & Array** > **IQ Microinverter Serial Number**.
   b. Tap **RETIRE** to retire the old microinverter serial number from the IQ Gateway database.
   c. Add the new microinverter serial number to the gateway database by scanning the barcode using the Enphase Installer App and your device camera.
   d. Tap **Devices & Array > IQ Microinverters & Array > Add Devices**. Scan the IQ9N Microinverter's barcode and assign it to the array.

      or

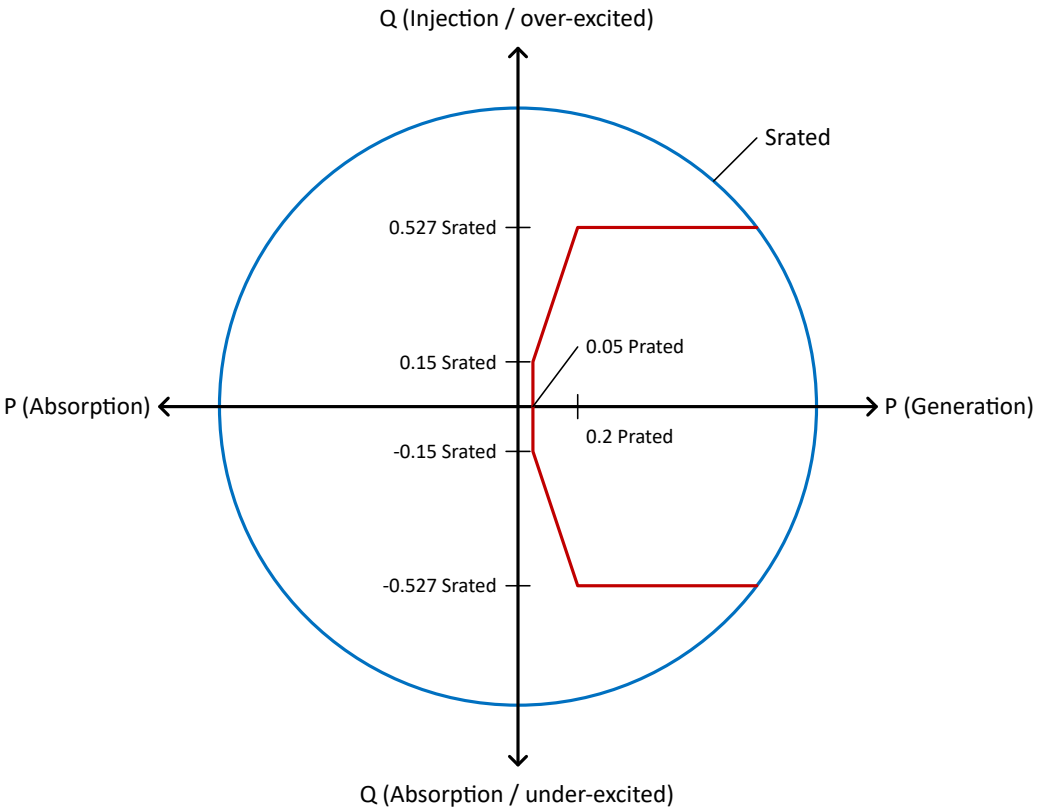
      Go to **Service > Request return and install replacement > Install replacement**. Enter the original device serial number and the replacement device serial number, and submit.
8. Start the provisioning process for the newly added microinverter using the Enphase Installer App and by connecting the Enphase Installer App to the IQ Gateway in AP mode. You can then **Start Provisioning Devices** through the Enphase Installer App.
9. Ship the old microinverter to Enphase using the supplied return shipping label.

8. Technical data

8.1 Anti-islanding

The microinverter detects islanding through reactive power injection using a frequency bias. It complies with anti-islanding certification requirements under IEC 62116, AS 4777.2 , EN 50549-1 , G98/G99, CEI-021.

8.2 PQ capability curve



9. Specifications

The IQ9N-A-INT specifications are provided in the following table.

Input data (DC)	Parameters	Units	IQ9N-A-INT
Typical module compatibility	–	–	No enforced DC/AC ratio and the maximum input power. Modules can be paired as long as the maximum

Input data (DC)	Parameters	Units	IQ9N-A-INT
			input voltage is not exceeded and the maximum input current of the inverter at the lowest and highest temperatures is respected. See the module compatibility calculator at https://enphase.com/en-au/installers/microinverters/calculator.
Minimum/Maximum voltage	Udcmin/ Udcmax	V	18/60
Startup input voltage	Udcstart	V	21
Rated input voltage	Udc,r	V	36.5
Minimum/Maximum MPP voltage	Umppmin/ Umppmax	V	28/45
Minimum/Maximum operating voltage	Uopmin/ Uopmax	V	18/58
Maximum input current	Idcmax	A	16
Maximum short-circuit DC input current	Iscmax	A	25 Maximum short circuit current for modules (Isc) allowed to be paired with IQ9N Microinverters: 20 A (calculated with 1.25 safety factor as per IEC 62548).
Maximum input power[8]	Pdcmax	W	560
Maximum inverter backfeed current to array	Irms	A	0

Output data (AC)	Parameters	Units	IQ9N-A-INT
Maximum apparent power	Sac,max	VA	427
Rated apparent power	Pac,r	VA	427
Nominal grid voltage	Uacnom	V	230
Minimum/Maximum grid voltage	Uacmin/ Uacmax	V	184/276
Rated/Max. output current	Iacmax	A	1.86
Nominal frequency	fnom	Hz	50
Minimum/Maximum frequency	fmin/fmax	Hz	45/55

[8] The installer must not exceed the small-scale technology certificate (STC) wattage limit for PV modules when claiming the STC. Pairing PV modules with wattage above the limit may result in additional clipping losses. See the compatibility calculator at https://enphase.com/en-au/installers/microinverters/calculator.

Output data (AC)	Parameters	Units	IQ9N-A-INT
Max. units per single-phase 20 A circuit/per multi-phase 25 A circuit	—	—	9 (L+N)/33 (3L+N) For IQ Cable with 2.5 sq mm stranded conductors and using a 1.20 safety factor. The safety factors applied may vary based on local regulations or best practices, as well as upon the characteristics of the OCPD selected.
Recommended maximum units per single/multi-phase IQ Cable section to reduce voltage rise in IQ Cable	—	—	7 (L+N)/15 (3L+N) Centre feeding is the best practice. These design limits ensure voltage rise and line conductor resistance on the IQ Cable are maintained within acceptable limits. In locations with a risk of high grid voltage at the point of connection, it may be necessary to decrease the maximum number of microinverters on the IQ Cable section by as much as 50%.
Protective class (all ports)	—	—	II
Total harmonic distortion	—	%	<3
Power factor setting	—	—	1.0
Power factor range	cos phi	—	0.8 leading ... 0.8 lagging
Inverter maximum efficiency	ηmax	%	97.95
European weighted efficiency	ηEU	%	97.44
Maximum output fault current	Irms	A	2.32
Inverter topology	—	—	Isolated (HF transformer)
Night-time power loss	—	mW	40

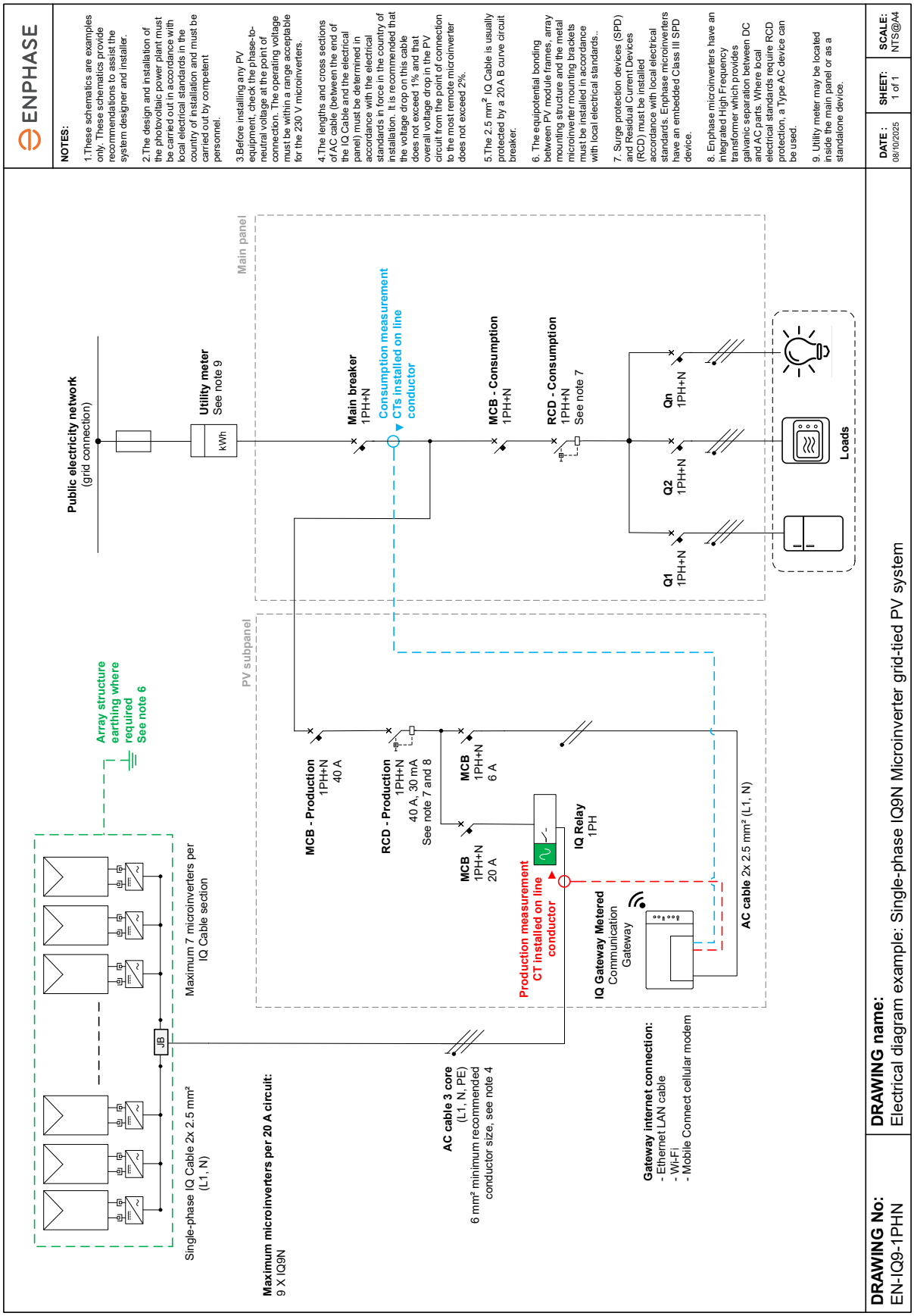
Mechanical data	Units	IQ9N-A-INT
Ambient air temperature range	—	–40°C to 65°C
Relative humidity range	%	4 to 100 (condensing)
Decisive voltage class (DVC)	—	AC: DVC C | DC: DVC B
Decisive voltage class (DVC)	—	AC: DVC C | DC: DVC B
Number of input DC connectors (pairs) per single MPP tracker	—	1
AC connector type	—	IQ Cabling (refer to the IQ Cable and accessories data sheet)
DC connector type	—	Stäubli MC4

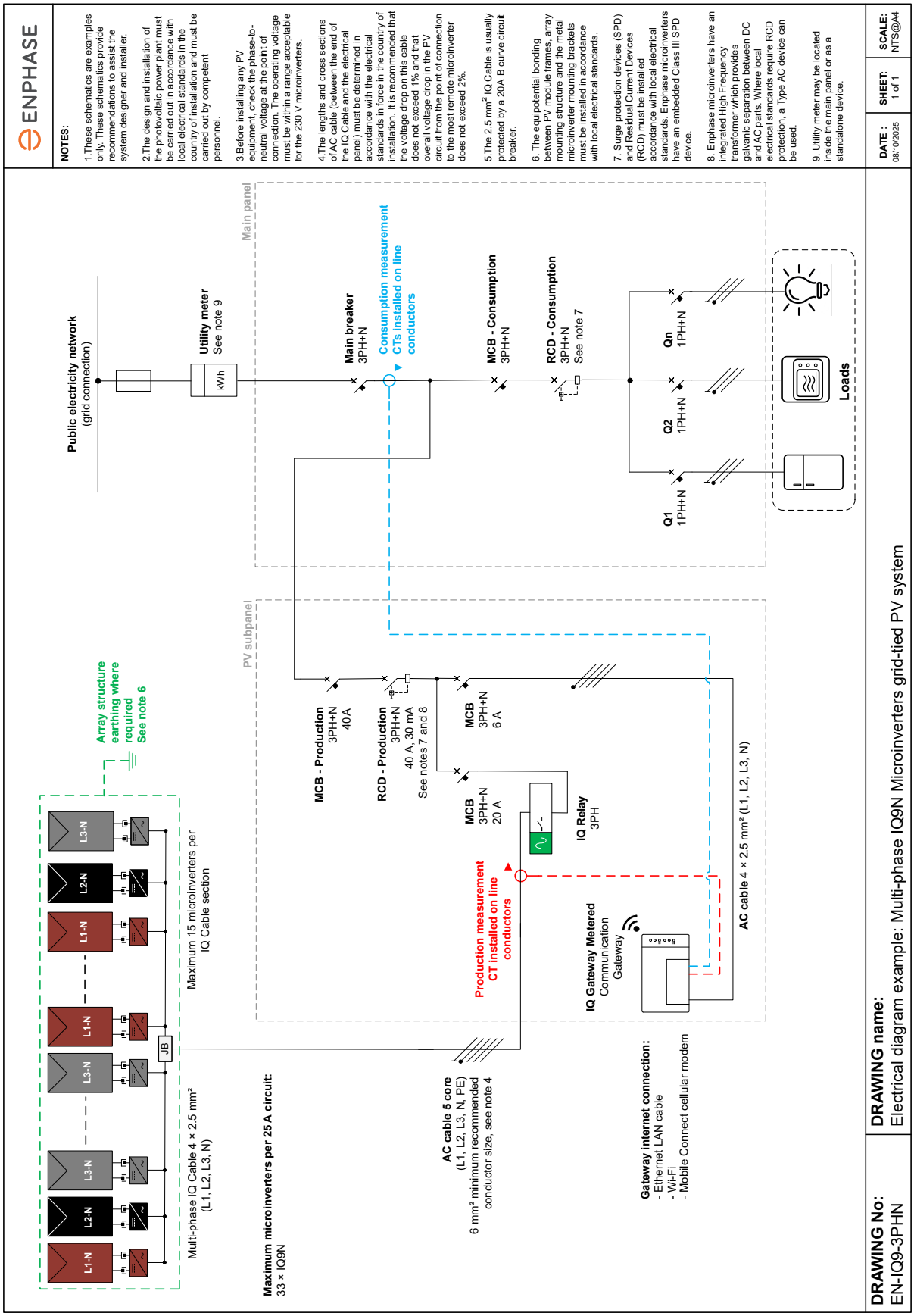
Mechanical data	Units	IQ9N-A-INT
Dimensions (H × W × D)	mm	214 × 176 × 30.8 (without mounting brackets)
Weight (with mounting plate)	kg	1.1
Cooling	—	Natural convection – no fans
Enclosure	—	Class II double-insulated, corrosion-resistant polymeric enclosure
IP rating	—	Outdoor - IP67
Suitable for wet locations	—	Yes
Altitude	m	<3000
Calorific value	MJ/unit	15.0
Noise level	dBA	<25
AC overvoltage category	—	III
Pollution degree	—	PD3

Standards	IQ9N-A-INT
Grid compliance (with IQ Relay)	AS/NZS 4777-2:2020 +A2
Safety	EN IEC 62109-1, EN IEC 62109-2
EMC	EN IEC 61000-3-2, 61000-3-3, 61000-6-2, 61000-6-3, EN IEC 50065-1, 50065-2-2, EN 55011[9]
Product labelling	CE, RCM
Advanced grid functions[10]	Power export limiting (PEL), phase imbalance management (PIM), loss of phase detection (LOP), power factor control Q (U), cos (phi) (P)
Microinverter communication	Power line communication (PLC) 110–120 kHz (Class B), narrowband 200 Hz

[9] At STC within the MPP range.
[10] Some of these functions require an IQ Gateway Metered with current transformers and/or an IQ Relay installed.

10. Enphase wiring diagram





11. Revision history

Revision	Date	Description
IOM-00134-2.0	March 2025	Updated “Additional components and tools” section.
IOM-00134-1.0	September 2025	Initial release.