INSTALLATION MANUAL

Q.HOME COMBINER

Q.HOME COMBINER 80 G1

qcells

Table of Contents

1 Safety

IMPORTANT SAFETY INSTRUCTIONS. SAVE THESE INSTRUCTIONS: This manual contains important instructions for Q.HOME COMBINER that shall be followed during installation and maintenance.

IMPORTANT: This product should not be used for any purpose other than the purpose described in this installation manual.

1.1 Intended Use

Q.HOME COMBINER is designed for residential use only and should not be used for commercial or industrial use.

Q.HOME COMBINER performs the following tasks for the AC modules connected to the input/output terminals installed inside the device:

- Collects/distributes AC current generated from the AC modules
- Monitors the power generation of individual AC modules and provides information.

This device should not be used for any purpose other than the ones described in this installation manual. Any substitute use of this device, random change in any of its parts and use of components other than sold or recommended by Qcells will nullify the product's warranty.

For example, Qcells' gateway may not be replaced by other manufacturer's gateway. For further information on proper use of this device, contact the Qcells Customer Support Team.

1.2 Safety Precautions

The following safety precautions and the warning messages described in this section must be observed. If any of the following precautions are not fully understood or if you have any questions, contact the Qcells Customer Support Team for guidance.

WARNING

- These servicing instructions are for use by qualified personnel only.
- Electrical installations must be done in accordance with local standards, national electrical safety standards and the manufacturer's instructions.
- To reduce the risk of electric shock, do not perform any servicing other than that specified in the operating instructions unless you are qualified to do so.
- Install the product at a height that prevents water ingress in areas where flooding is possible. Do not put the product or components in water or liquid.
- Do not touch the terminals when powered and wait a few minutes after switching off the breaker. It may be energized in the open position.
- Do not touch uninsulated part of the wires when the product cover is removed.
- To reduce the risk of accidents, install the Q.HOME COMBINER in mild weather. Electric shock hazard exists if installed in rainy or snowy weather.
- Do not work alone. Someone should be in the range of your voice or close enough to come to your aid when you work with or near electrical equipment.
- To reduce the risk of fire, do not allow or place flammable, sparking or explosive items near the product.
- This unit is not provided with a GFDI device. This inverter or charge controller must be used with an external GFDI device as required by the Article 690 of the National Electrical Code for the installation location.
- A potentially hazardous circumstance such as excessive heat or electrolyte mist may occur due to improper operating conditions, damage, misuse and/or abuse.
- Do not sit on, step on or place heavy objects on this product. It may cause deformation or fracture.
- Disconnect all wiring before attempting maintenance or cleaning and always disconnect the AC branch circuit before servicing.
- Never disconnect a current carrying conductor while the circuit is energized.
- Do not wire unused terminals or terminal block to the GEM Board (Gateway) or EMS.
- Check all wiring again before powering on.
- Wear rubber gloves and protective clothing (including protective glasses and boots) when working on the Q.HOME COMBINER.
- Waste, electrical components, bolts, nuts, conductors or other debris must be removed after installation.
- Do not use any damaged, cracked or grayed electrical cables or connectors. Protect the electrical cables from physical or mechanical abuse, such as being twisted, kinked, pinched, closed in a door or stepped on. Periodically examine the electrical cables of your product. If the appearance indicates damage or deterioration, discontinue use of this product and have the cables replaced with an exact replacement part by qualified personnel.
- Do not use any kind of oil or lubricant on the parts inside the product.
- All circuit breakers in the Q.HOME COMBINER should be in the off position. Make sure the AC power source to the combiner is disconnected prior to connecting the main cables.

CAUTION

- Use proper equipment, connectors, wires and buttresses for the installation of the Q.HOME COMBINER.
- You must install the product only on a suitable wall using the provided wall-mount bracket.
- Before installing or using the product, read all instructions and cautionary markings in this guide and on the equipment.
- Do not install or use the product if it has been damaged in any way.
- Do not drop the product. It must be gently handled and placed down with care.
- Make sure that there are no water sources, such as faucets or sprinklers, near the installation site.
- Do not scratch the surface of the internal component (ex. busbar, GEM Board (Gateway), EMS). It may increase chance of corrosion.
- Adding unnecessary holes may reduce the strength and integrity of the product.
- Store the product in its original package until installation.
- Use the circuit breakers in the product only for serving Qcells equipment. No other loads are allowed.
- Bonding between conduit connections is not automatic and must be provided as part of the installation.

FCC Guideline

You are cautioned that changes or modifications to this unit not expressly approved by Qcells could void the warranty.

FCC Statement 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 instruction, may cause harmful interference to radio communication. 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, the user is 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 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.

1.3 Product Safety Labels

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


Wear eye protection at all times (installation, maintenance, etc.)


Follow the instructions in this manual for service and replacement.


Risk of electric shock


CAUTION: Hot Surface


This product should not be disposed of with other household waste.
Local and national electronic waste disposal regulations should be observed.


CAUTION, risk of DANGER

UL Certified

1.4 Circuit Symbols


Alternating Current Supply


Equipment Grounding Conductor

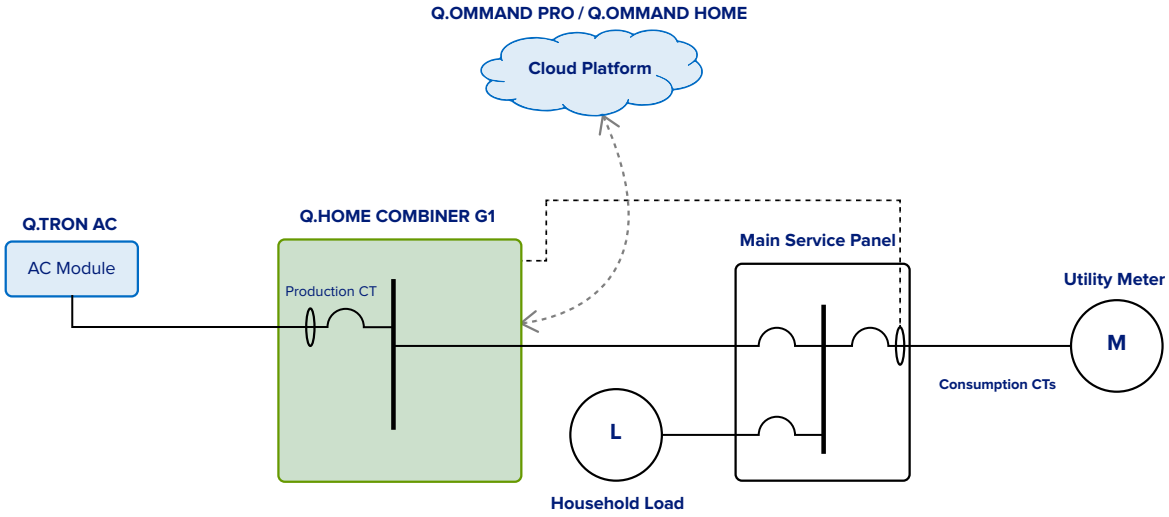
1.5 Disposal

When the product reaches the end of its service life or is defected beyond repair, dispose of it according to your local area's electronic waste regulations. Product disposal must be carried out by qualified personnel only. Contact your authorized dealer or seller for details on handling disposal.

- All electrical products should be disposed of separately from the municipal waste stream via designated collection facilities appointed by the government or the local authorities.
- The correct disposal of your old appliance will help prevent potential negative consequences to the environment and human health.
- For more detailed information about disposal of your old appliance, please contact your city office, waste disposal service or the shop where you purchased the product.

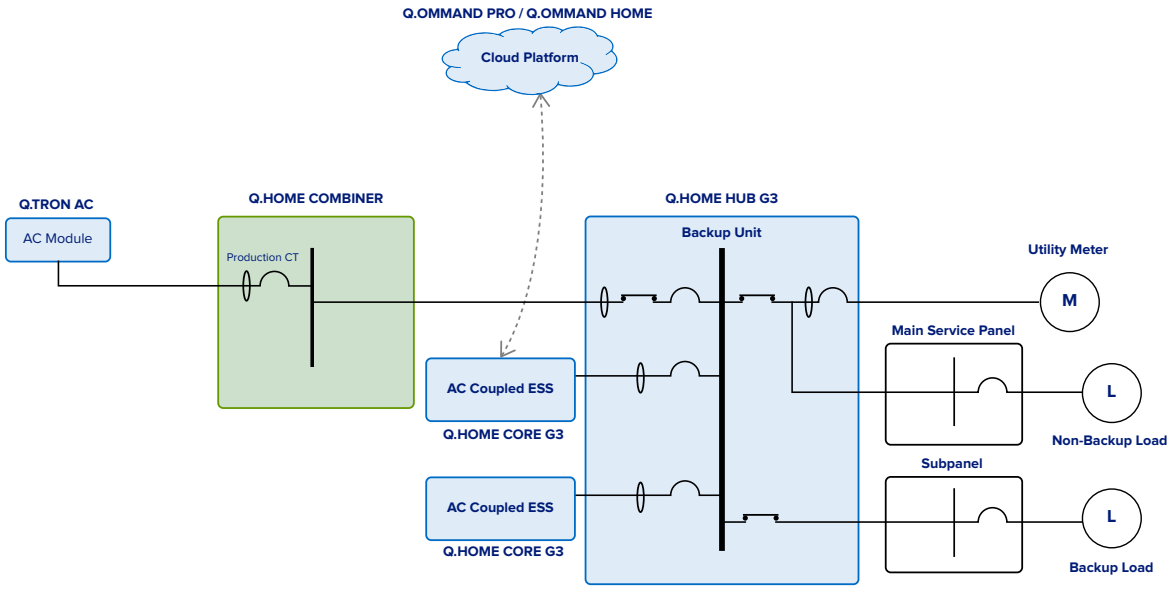
2 System Configuration

2.1 Solar Configuration



The Solar Configuration is comprised of an AC module (microinverter integrated solar module) and combiner, which consolidates solar modules into a single output. This configuration is ideal for the homeowner wishing to minimize their utility bill and carbon footprint without having a backup power source. Installers can easily upgrade the system in the future by adding energy storage.

2.2 Backup Configuration



The Backup Configuration is comprised of an AC module (microinverter integrated solar module), AC combiner, battery system and the backup unit (HUB). This configuration is ideal for the homeowner who wants complete energy independence. It is also the most powerful configuration option available, and ensures that a home can remain powered even when the utility grid shuts down. With care regarding energy utilization, and depending on the size of the solar and battery installed, a backed up home can remain powered during grid outages for several days, or even weeks.

3 Information in this Manual

3.1 About this Manual

This is the installation manual for Q.HOME COMBINER. Please read this manual carefully before installing and operating Q.HOME COMBINER. It contains important safety instructions, and the warranty will be void if you do not follow instructions in this manual precisely. All installations must comply with national and local electrical codes and standards. Only qualified electricians may install, troubleshoot or replace the product.

3.2 Target Group

This manual is written for electricians and qualified technicians who are allowed to install and connect electrical systems.

3.3 Symbols Used in this Manual

To reduce the risk of electric shock and to ensure a safe installation and operation of the Q.HOME COMBINER, the following safety symbols appear throughout this document to indicate dangerous conditions and important safety instructions.

 **WARNING**	This indicates a hazardous situation, which if not avoided, will result in death or serious injury.
 **CAUTION**	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.
	Prohibited.
Note	This indicates information particularly important for optimal system operation. Follow instructions carefully.

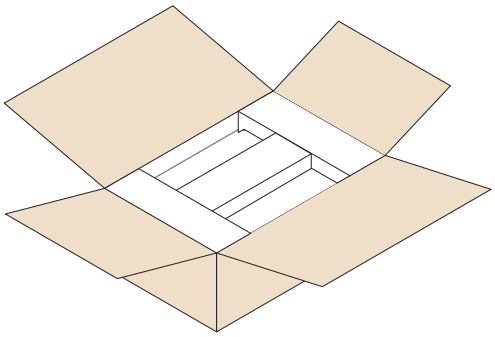
4 Product Overview

4.1 Unpacking

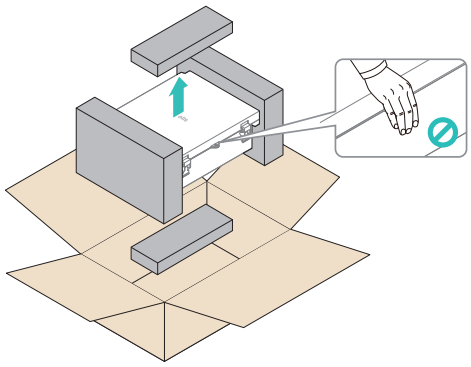
CAUTION

- When removing the product, do not apply excessive force so as to avoid damage.
- Using sharp tools may damage the product.
- Wear protective gloves to avoid injury.

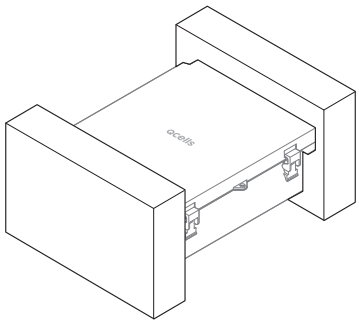
1 Open the box and check for internal damage.

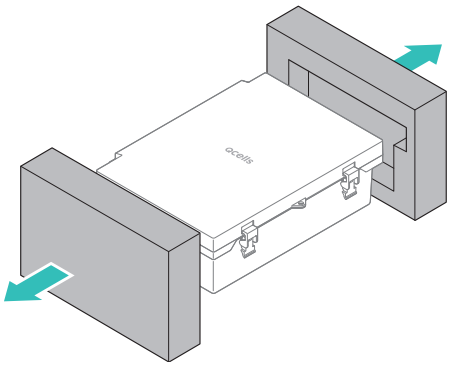


2 Remove the shock absorbing packaging foam on the Q.HOME COMBINER and carefully take the product out of the box.



3 Carefully remove the foam on the left and right sides.



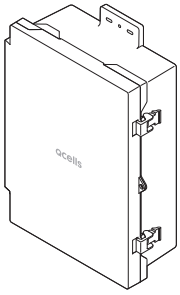


4.2 Package Contents

Check for any damage that may have occurred during transportation. If there is any damage to the product or packaging, please contact your supplier immediately.

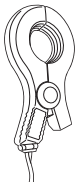
CAUTION

Do not operate with other components not approved by Qcells. Connecting with products outside the Qcells ecosystem may result in abnormal operation.

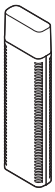


Q.HOME COMBINER 80 G1: 1EA

Quick Start Guide: 1EA

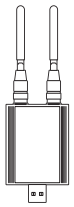


Clamp CT: 2EA
(CT-JS-CLAMP-200A-5.2m)

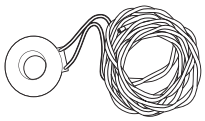


Wi-Fi Dongle: 1EA
(WIFI-HQ-GD-USB)

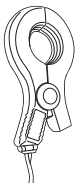
Optional Accessories



Cellular Modem
(LTE-MT-MODEM-CAT4-TN)



External Production CT
(CT-HQ-SOLID-200A-2m)



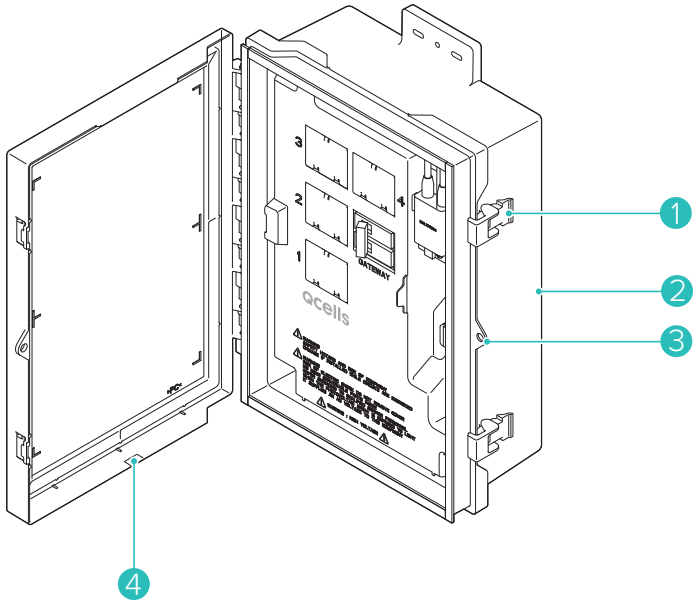
Extension Clamp CT (pair)
(CT-JS-CLAMP-200A-25m)

5-year data plan extension for customers previously using celluar option
(LTE-TN-DP-5Y)

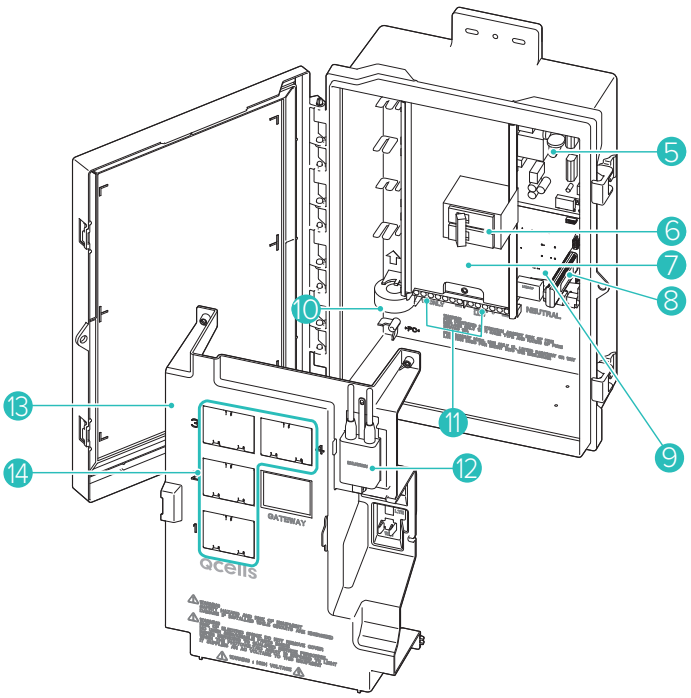
The items in the below table are not provided by Qcells, but can be easily purchased elsewhere.

Off-the-Shelf Items	Manufacturer	Model	Specification	Details
Circuit Breakers (OCPD)	Eaton	2-pole BR series	BR210 ~ BR260	Select the appropriate circuit breaker size based on the rating of the PV/ESS branch.

4.3 Q.HOME COMBINER Overview



1 Door Clasp
2 Enclosure
3 Padlock Staple
4 Front Cover



5 GEM Board (Gateway)
6 Circuit Breaker
7 Main Busbar
8 Wi-Fi Dongle
9 EMS Board
10 Production CT
11 GND / Neutral Bar
12 Cellular Modem (optional accessory)
13 Deadfront
14 Breaker Position Cover

4.4 Specifications

Technical Specifications

For additional information, see the relevant datasheet provided at www.qcells.com/us

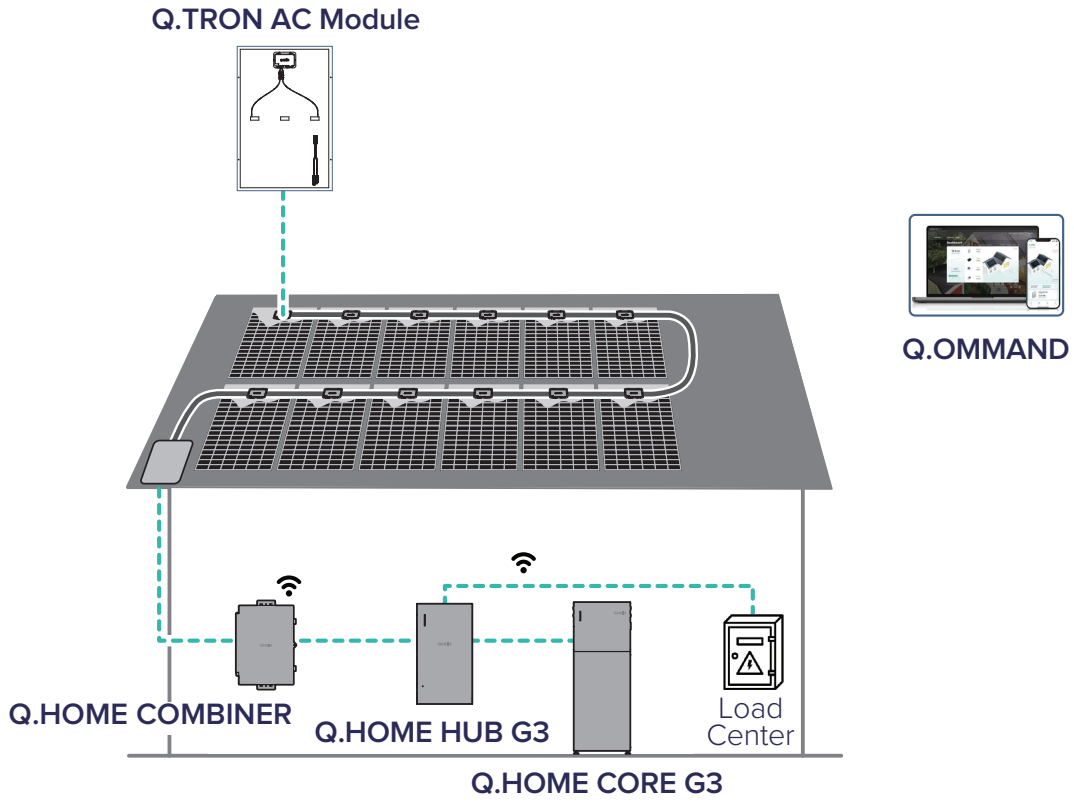
General Product Information	
Model	Q.HOME COMBINER 80 G1
Manufacturer	Hanwha Solutions Corporation
Product Warranty	5 years
Country of Manufacture	Vietnam
Accessories And Replacement Parts	
Supported AC Modules (Microinverter included)	Q.TRON BLK M-G2+/AC
LTE MODEM (LTE-MT-MODEM-cat4-5TN)	4G based LTE-CAT4 (+5year data plan)
Wi-Fi Dongle (WIFI-HQ-DG-USB)	FCC Part 15 Subpart C/2412.0 - 2462.0 MHz **
Circuit Breakers	Supports Eaton BR210, BR215*, BR220, BR230, BR240, BR250, and BR260 circ uit breakers
Consumption Monitoring CT (CT-JS-CLAMP-200A-5.2m)	A pair of 200 A clamp type current transformers ** * pre-assembled/** included in the package (Others are not included, need to be ordered separately)

Electrical Specifications	Unit	
System Voltage	[V]	120/240 VAC, 60 Hz
Eaton BR Series Busbar Rating	[A]	125
Max. Continuous Current Rating (input from PV/storage)	[A]	64
Branch Circuits (Solar or Solar + Storage)	[pcs]	Up to four 2-pole Eaton BR series Distributed Generation (DG) breakers only (not included)
Max. Total Branch Circuit Breaker Rating (input)	[A]	80 A of distributed generation/95 A with GEM Board (Gateway) breaker included
Gateway Circuit Breaker	[A]	15 A rating Eaton BR215 included
Consumption Monitoring	[A]	Revenue Grade Metering with a pair of 200 A split core current transformers (accuracy ±2.0 %)
Production Metering	[A]	Metering with 200 A solid core current transformer pre-wired to GEM Board (accuracy ±0.5%)
Over Voltage Class		IV

Mechanical Data	Unit	
Max. AC Module Connection Quantity	[pcs]	▪ Up to 44 AC Modules in 1 combiner (11 in series × 4 strings) ▪ Up to 144 AC Modules using 1 combiner with external subpanel
Dimensions (W × H × D)	[inch]	14.6 × 19.3 × 6.3 / height is 21.7 with mounting brackets (37.0 × 49.0 × 16.0 cm / height is 55.1 cm with mounting brackets)
Weight (without connection cables)	[lb]	11.5 (5.2 kg)
Operating Temperature Range	[°F]	−40 to 140 (−40 to 60 °C)
Storage Temperature Range	[°F]	−40 to 140 (−40 to 60 °C)
Enclosure Enironmental Rating		Outdoor, NRTL-certified, NEMA type 3R
Wire Sizes		- 20 A breaker inputs: 12 to 8 AWG copper conductors - Main lug combined output: 10 to 2 / 0 AWG copper conductors - Neutral and ground: 8 to 6 copper conductors - Always follow local code requirements for conductor sizing.
Cooling		Natural convection
Altitude	[ft]	Up to 6,561 (2,000 m)
Pollution Degree		2
Internet Connection Options		
Wi-Fi		IEEE 802.11b / g / n
Cellular		CELLMODEM-CAT4 (4G based LTE-CAT4)
Ethernet		Optional, IEEE 802.3, CAT5E (or CAT6) STP Ethernet cable
Compliance		
AC Combiner		UL1741 FCC Part 15.B ANSI C 12.20 (production meter) NEMA type 3R IEEE 2030.5 / CSIP Compliant
Monitoring Board		UL 61010-1 / UL 61010-2-030 CSA 22.2 No. 61010-1-12 / CSA 22.2 No. 61010-2-030
CT Sensor		UL 2808 (XOBA)

4.5 System Diagram

Q.HOME SMART



- The Q.HOME COMBINER internally combines Q.TRON AC modules up to four AC branch circuits into a single output.
- Q.HOME CORE G3 can be installed together with Q.TRON AC modules and Q.HOME COMBINER. As a residential energy storage system (ESS), Q.HOME CORE G3 stores energy generated by the AC modules.
- The GEM Borad (Gateway)/EMS boards are placed inside the Q.HOME COMBINER which communicates over the AC power line with the AC modules, providing production and consumption metering for monitoring via Q.OMMAND monitoring app.
- The Q.HOME COMBINER provides Ethernet, Wi-Fi, cellular connectivity to the Q.OMMAND monitoring app.

*EMS: Energy Management System

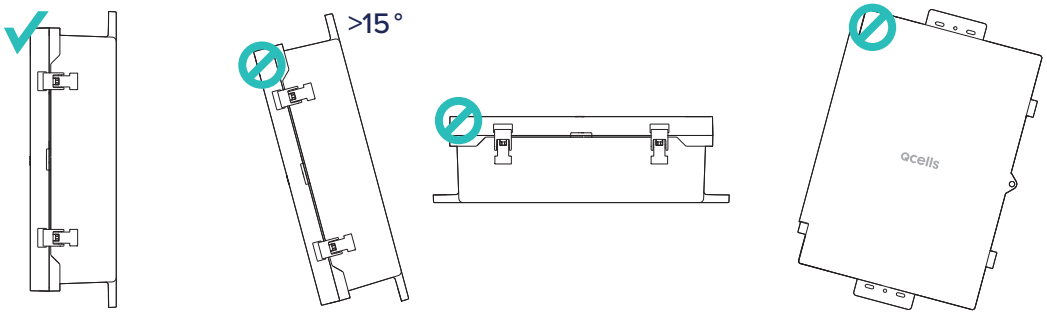
5 Installation Requirements

5.1 Installation Environment

CAUTION

Although Q.HOME COMBINER meets NEMA 3R requirements, it is recommended to install the unit in an area where it will not be exposed to direct sunlight, rain and snow.

- Install the Q.HOME COMBINER at least 3 feet (91 cm) away from the ground and in an easily accessible location.
- When selecting the installation location, consider the dimensions of the Q.HOME COMBINER, ease of access, box height and cable length.
- Mount the Q.HOME COMBINER on a vertical surface.
- Q.HOME COMBINER must be installed within 15 degrees vertically.
- Install under good ventilation conditions.



5.2 Safety Gear

WARNING

All tasks regarding the Q.HOME COMBINER must be performed by qualified personnel. Wear safety gloves and protective clothing while working.

Wear the following safety gear when installing the product. Installers must abide by international standards, including IEC 60364, as well as any applicable national standards.

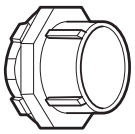

Insulated Gloves


Safety Goggles


Safety Shoes

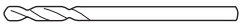
5.3 Tools

These tools are required to install Q.HOME COMBINER.



Conduit
(with fittings and fitting tools)

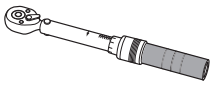
Drill



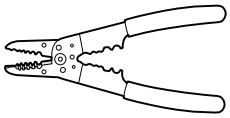
5/32 inch Pilot Bit
(or metric equivalent)

Screwdrivers
(Cross head driver (large and small),
Flat head driver (large and small))

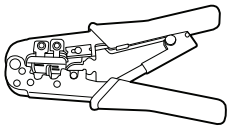
Socket Wrench



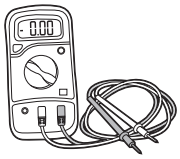
Torque Wrench



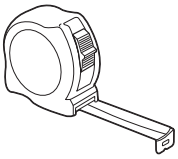
Wire Stripper



Cable Crimper

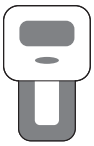


Multimeter



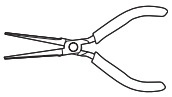
Tape Measure

Level



Stud Finder
(if installing on studs)

Step-drill



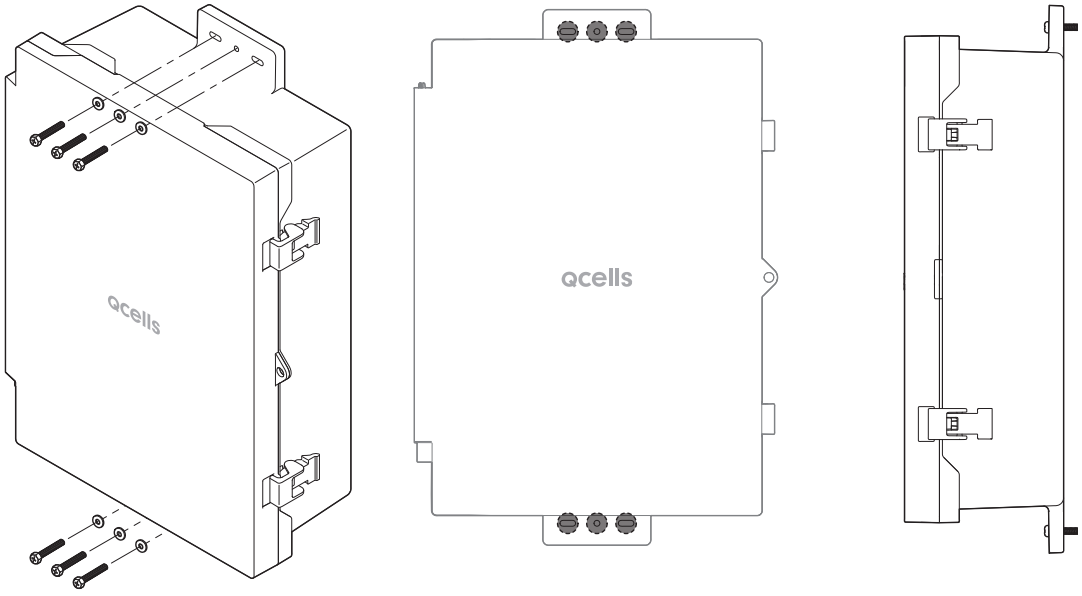
Needle Nose Plier

6 Mounting Q.HOME COMBINER

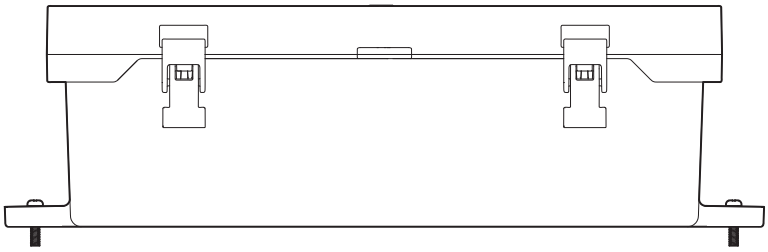
6.1 Wall Mount

1. Prepare the tools needed for installation in advance.
   - Includes: Screwdriver, Stud Finder (if installing on studs), Bolts and Screws
2. Six total bolts or screws (three on top and three on bottom) are required to install Q.HOME COMBINER.
   - Three bolts or screws 5.0 cm long (or more, depending on attachment wall), for each single-wide wall-mount bracket. (less than Φ 6 mm)
   - Washers for use between screws and mounting bracket.

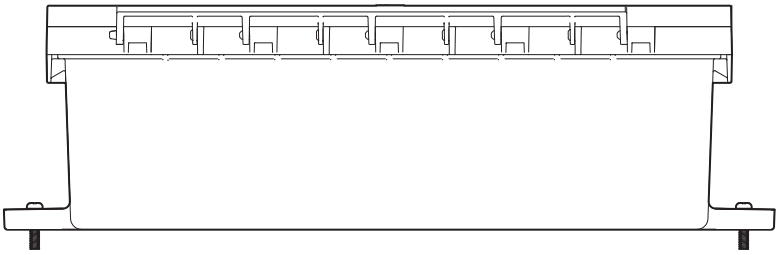
Front Side



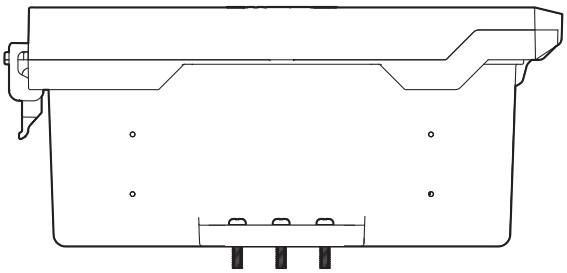
Right Side



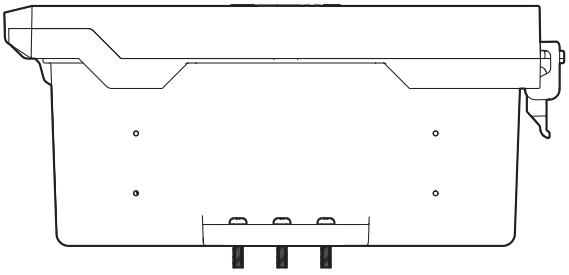
Left Side



Top Side



Bottom Side

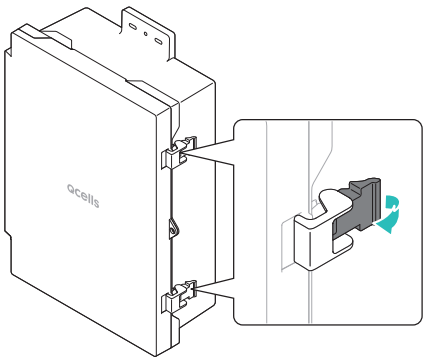


7 Opening / Closing the Covers

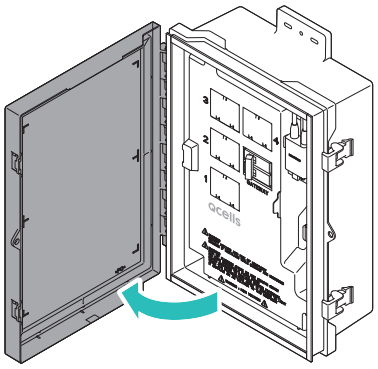
7.1 Opening the Front Cover

To open the front cover of Q.HOME COMBINER:

1 Pull the latches out and forward to release the front cover.



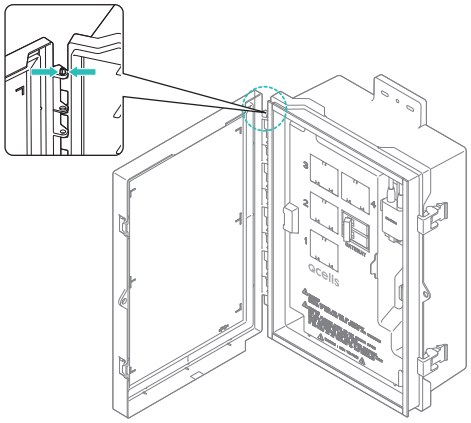
2 Swing the front cover to the left to open it.



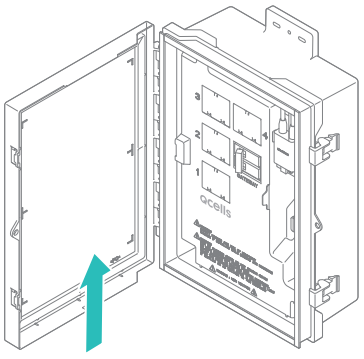
7.2 Detaching the Front Cover

If desired, the front cover may be removed during installation for convenience.

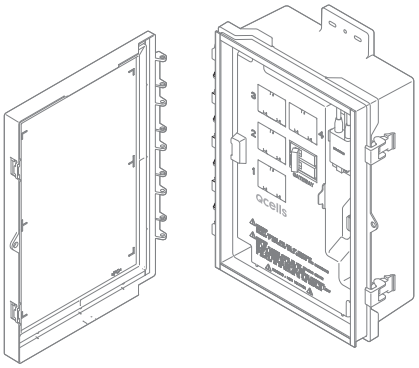
1 Use needle nose pliers to pinch the top of the hinge rod.



2 Slide the front cover up and remove it.



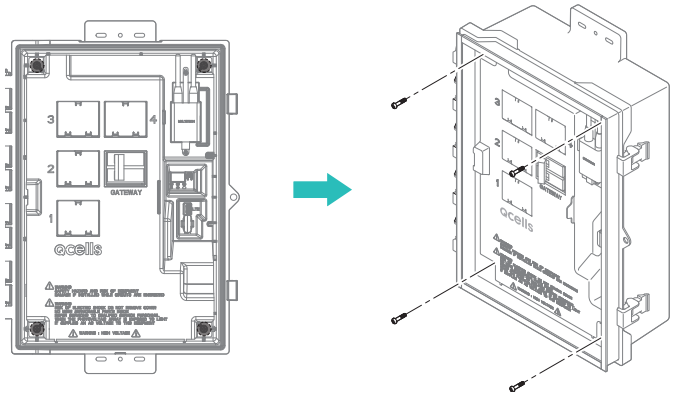
3 Set aside the front cover for re-attachment after installation.



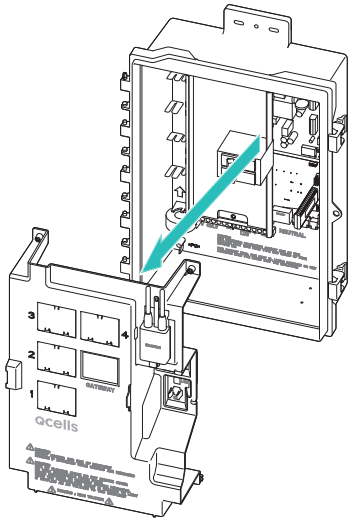
7.3 Opening the Deadfront Cover

To remove the deadfront cover from Q.HOME COMBINER:

1 Loosen the four screws at each corner of the deadfront cover to remove (it is not necessary to completely remove the screws from the deadfront cover itself).



2 Pull the deadfront to remove the part and set aside.



WARNING

Risk of Electric Shock!
To maintain the warranty, do not make changes to the deadfront unless there is a specific reason to. (e.g. removing or replacing the breaker position covers)

7.4 Closing the Deadfront and Front Cover

CAUTION

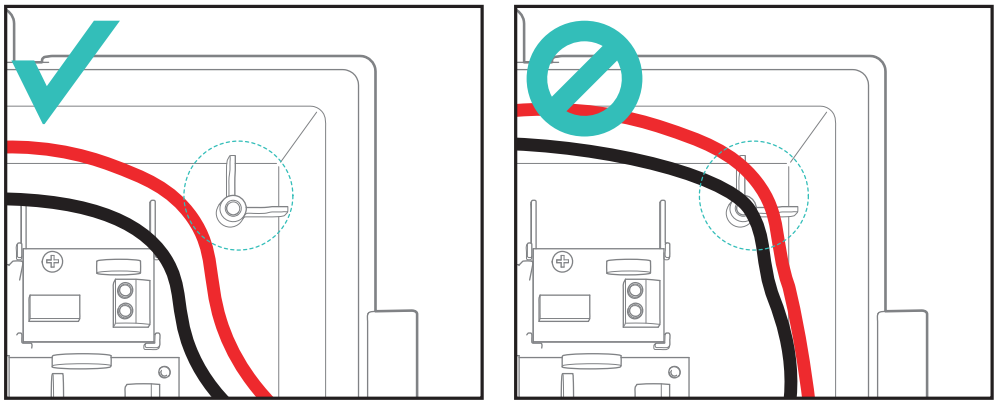
Before energizing for the first time, ensure the deadfront cover is restored and the front cover is restored and closed.

To close the deadfront cover:

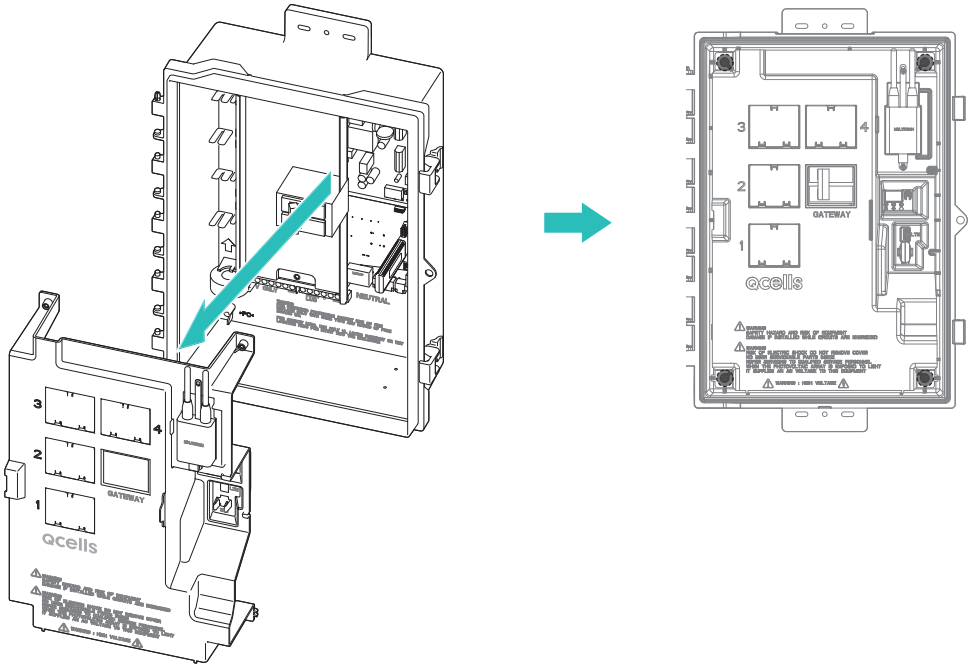
1 Set all the cables going around the edge of the enclosure aside of the deadfront cover assembly hole.

WARNING

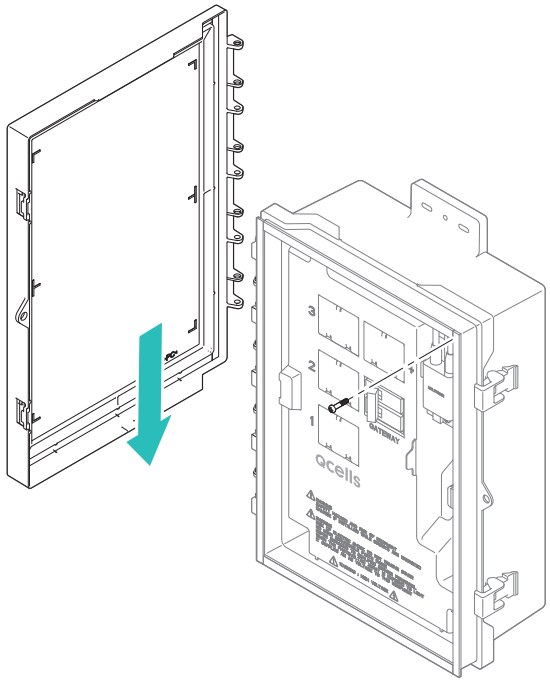
Risk of electric shock!
Please refer to the figure below. The cables can be damaged when they are stuck in screws. This can lead to Q.HOME COMBINER malfunction.



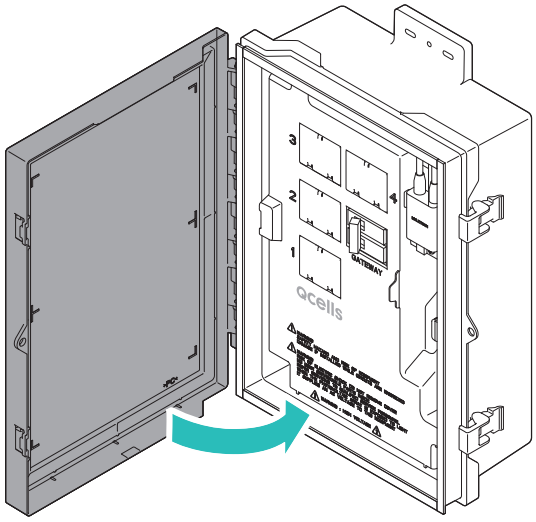
2 Restore the deadfront to the enclosure and secure in place with the four retained screws.

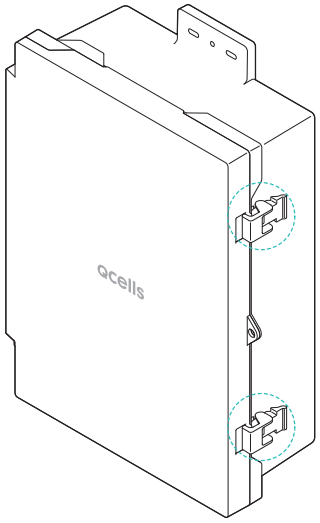


3 Reattach the front cover.



4 Restore, close and fully latch the front cover.





8 Connections

CAUTION

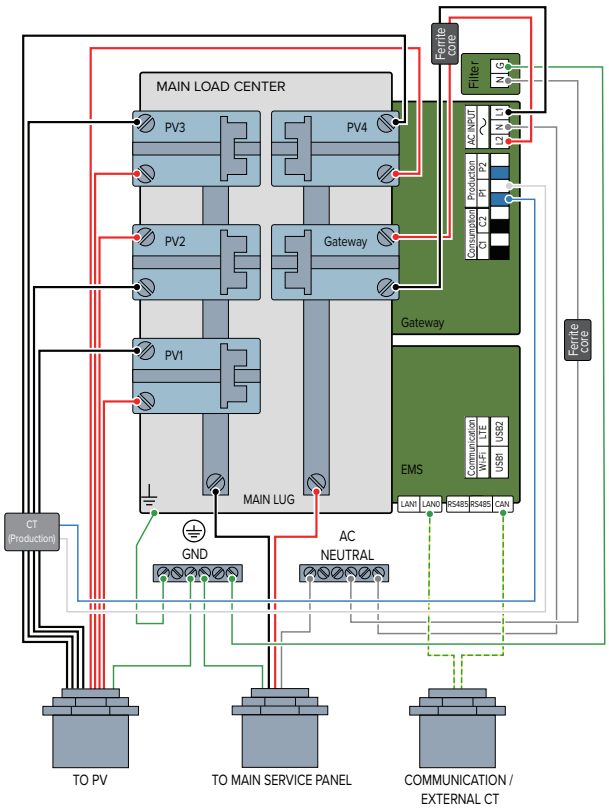
- Make sure to align the phase of the cables properly when installing. Failure to ensure L1/L2 relationship is maintained correctly throughout the system installation process will prevent the system from operating and displaying information on the monitoring portal correctly.
- Work on energized equipment in this system is never required. Always ensure the system is properly shut down and circuits are deenergized before performing work.

Note

Perform all wiring in accordance with all applicable local electrical codes, with the National Electrical Code (NEC) and ANSI/NFPA 70.

8.1 Connectors and Ports Layout

Internal Components



WARNING! FIRE RISK!

Only the AC output conductors should ever come into contact with the AC lugs.

WARNING

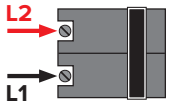
BONDING BETWEEN CONDUIT CONNECTIONS IS NOT AUTOMATIC AND MUST BE PROVIDED AS A PART OF THE INSTALLATION

Cable Coding Chart

	L1
	L2
	GND
	Neutral
	Positive (P_CT) Positive (C_CT)
	Negative (CT)
	Optional Comm. Channels

Note

The wiring connection of PV2 should be as follows.



※ The layout is also demonstrated in the label attached to the front cover inside the combiner.

8.2 Power Conductor Specifications

The power conductors must correspond to the AC input and output specifications for this product.

Note

Perform all wiring in accordance with all applicable local electrical codes, with the National Electrical Code (NEC) and ANSI/NFPA 70.

Connection		Wire Size [AWG]	Torque [Nm/in-lbs]
20 A Circuit Breaker (PV 1 - 4)		12 - 10 8	4.0/35.0 4.5/40.0
40 A Circuit Breaker		6 - 4	5.1/45.0
60 A Circuit Breaker		4	5.1/45.0
Ground Bar/Neutral Bar		8 6	2.8/25.0 4.0/35.0
Main Lug (to grid connection)	20 A	10 - 8	4.5/40.0
	40 A	6 - 4	5.1/45.0
	60 A	4 - 2	5.6/49.5
	80 A	3 - 2/0	5.6/49.5
Gateway (CT Sensor)		20 - 18	0.4/3.5

Copper conductors only, rated 75 - 90˚C.
Follow NFPA 70 (NEC) and all local code requirements.

- You can install AC branch circuit breakers up to 80 A total (sum of breaker ratings, excluding the 10 A/15 A gateway breaker). With individual branch circuits, you will typically use up to four 20 A breakers.
- It is recommended to use 20 A breakers for solar branches and a 40 A breaker for connecting an ESS (Q.HOME CORE G3) unit through the AC Combiner.
- The breaker size of the branch circuits should be properly distributed to avoid exceeding the maximum capacity of 80 A.
- Refer to the case below to avoid exceeding 80 A capacity.
  - Case 1. When installing 44 AC Modules 20 A breakers × 4ea (Solar)
  - Case 2. When installing 22 AC Modules and 1 ESS 20 A breakers × 2ea (Solar) + 40 A breaker × 1ea (ESS)

8.3 Mounting the Circuit Breakers

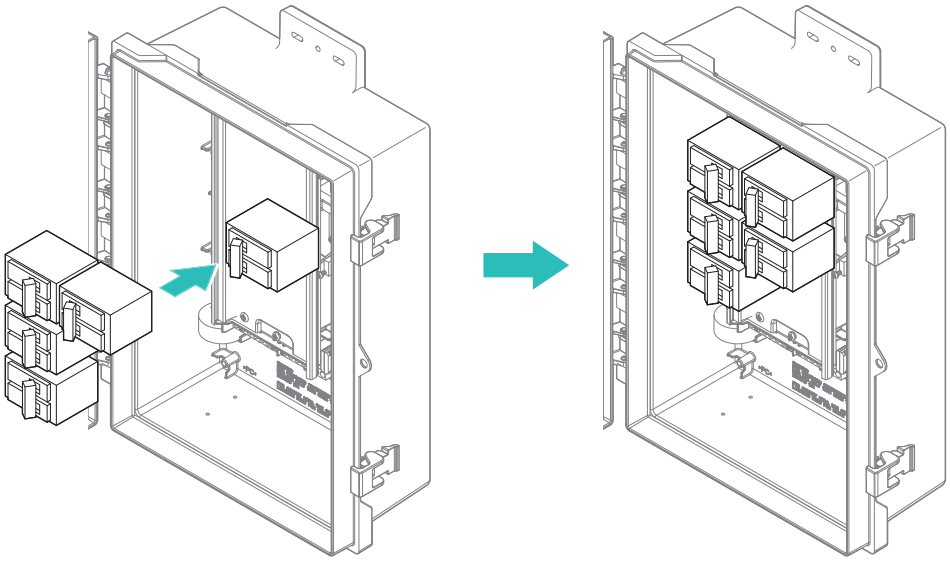
Q.HOME COMBINER contains one two-pole 15 A breaker that supplies the gateway. Additional breakers are required in order to connect each PV string independently.

Ensure all relevant legal and jurisdictional requirements are followed.

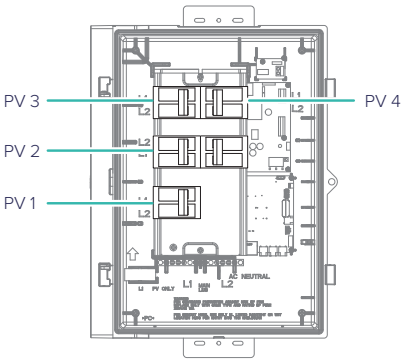
Follow the installation standards to install a circuit breaker satisfying the voltage and current specification of the AC conductor.

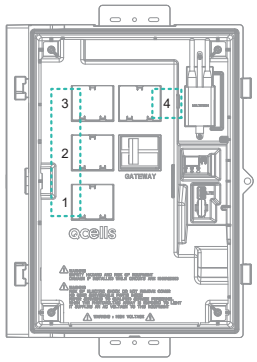
Circuit	OCPD Rating	Short Circuit Current Rating
PV 1 - 4	20 A	10 kAIC
Gateway (pre-installed)	15A	10 kAIC

1. With the front and deadfront covers removed, connect the the breakers onto the busbar in order as indicated on the deadfront. (PV 1~4)
2. Remove the breaker position cover on the deadfront by slightly pressing the single latch inwards and gently sliding the covers. This should be done only for the breaker positions being used.
3. Restore the deadfront cover after connecting all the required conductors.



Refer to the circuit breaker numbering below.



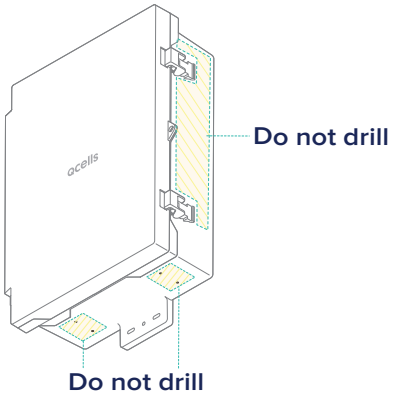


8.4 Drilling Holes for Conduit

Note
Perform all wiring in accordance with all applicable local electrical codes, with the National Electrical Code (NEC) and ANSI/NFPA 70.

Drilling Holes to Install Conduit

Conduit entries are made easily in the Q.HOME COMBINER. Using the guides provided on the following page, locate and mark the desired conduit entry points. Carefully use the pilot and step drill bits to make the desired conduit entry penetrations.



Note
When making conduit entry locations, consider the following:

- Only make conduit entry penetrations in designated locations.
- When making the conduit entry penetrations, drill carefully to avoid cracking the enclosure housing.
- Evaluate appropriate clearance before drilling to ensure no internal hardware is in the path of the penetrating equipment.
- When connecting, ensure the conduit entry point is appropriately sealed against moisture intrusion and is properly bonded.
- Use only UL Listed rain-tight conduit fittings for wire entry penetrations into the enclosure.
- Do not drill or make conduit entry penetrations by blocking any of the four draining holes.

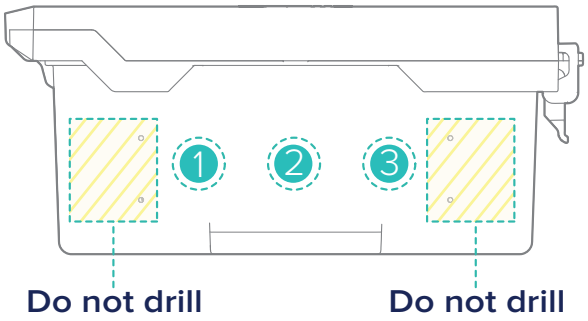
WARNING

- Once drilling is complete, thoroughly clean all debris generated in this process.
- Ensure finishing work is performed using conduit fittings and other necessary components to make sure the product is waterproof and dustproof.

CAUTION

Risk of equipment damage.
Warranty may be voided if installation guidance is not followed.

Bottom

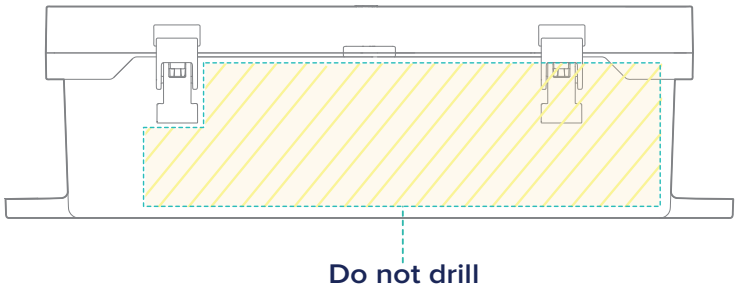


Recommended locations for conduit
[Bottom side of Q.HOME COMBINER]

Note
It is recommended to drill three holes on the bottom side.

1. For DER (PV or battery)
2. For main service panel (or Q.HOME HUB)
3. For other cables (external CT, communication)

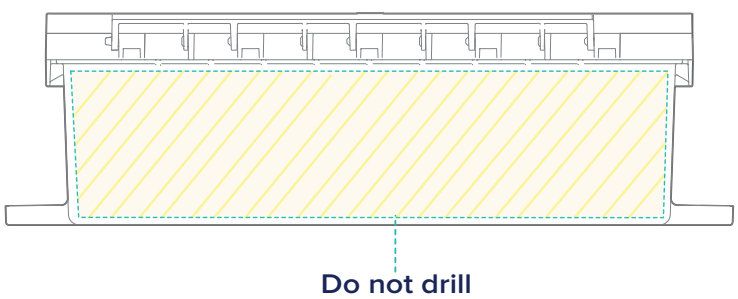
Right Side



Note
Only make side-penetrations if absolutely necessary.

- If installation location requires the use of side-penetrations, consider creating a drip loop to help prevent water intrusion.

Left Side

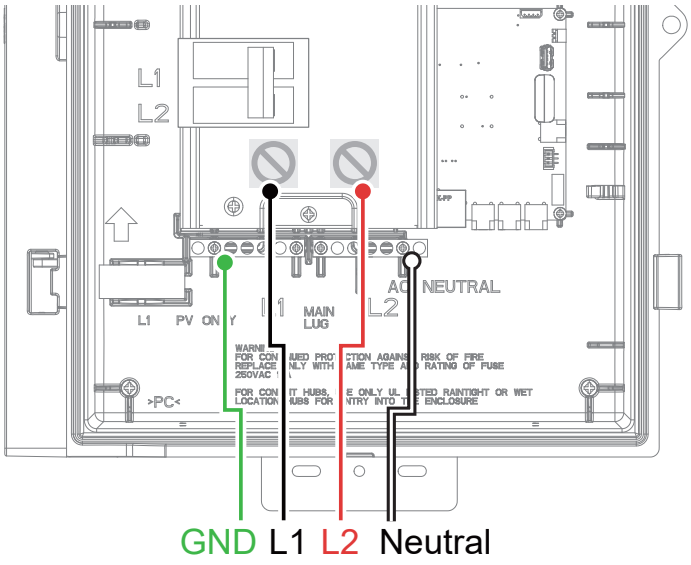


8.5 Wiring DER and Grid Conductors

To connect the Grid Conductors:

1. Use conductors sized per local code requirements, taking into consideration the voltage drop/rise and the upstream breaker or fuse.

2. Connect the L1, L2 grid cables on the main lug. It should be tightened with appropriate amount of torque indicated in the table in 8.2 Power Conductor Specifications section.

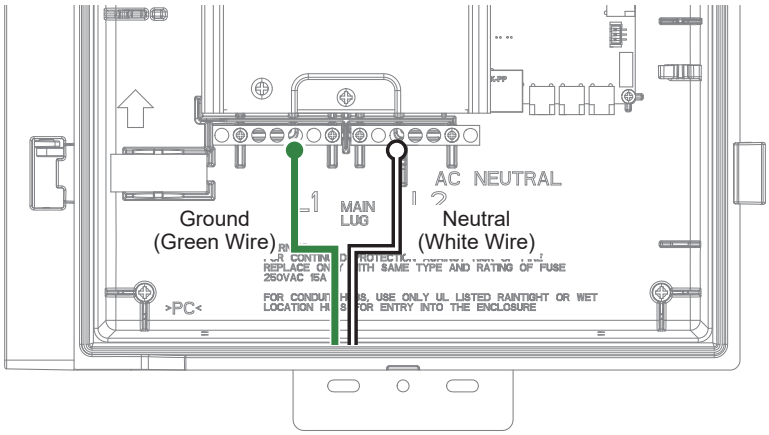


Note

- Qcells AC modules use a two-wire system and do not use a Neutral. However, the GEM Board (Gateway) in the combiner still requires a Neutral.
- When securing the deadfront cover, make sure there is no interference with internal cables.

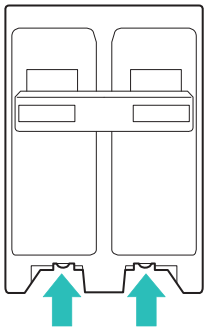
3. Connect the neutral (white) to the neutral bus bar.

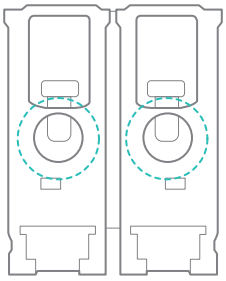
4. Connect the ground (yellow & green) to the ground bus bar.



To connect the AC PV Conductors:

1. Use conductors taking into consideration the voltage drop/rise and upstream breaker or fuse.
2. Bring in the wires from each AC branch circuit.
3. Check L1, L2 phase location indicated on the enclosure and select the appropriate cable color.



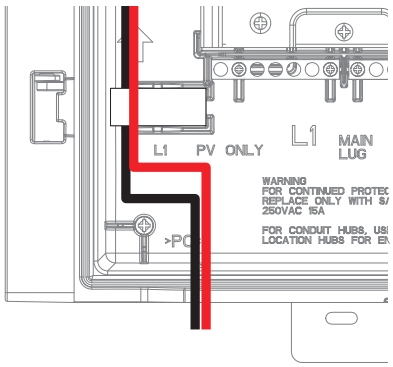


[Bottom side of circuit breaker]

Note

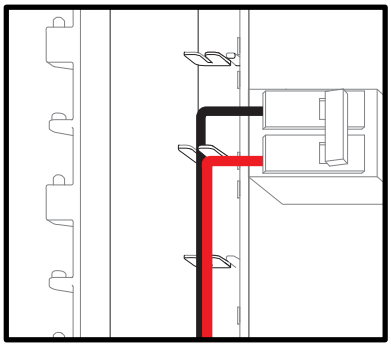
Notice that PV input location #2 L1/L2 locations are flipped as compared to the other PV input circuit locations.

4. Pass the L1 conductor from each PV branch circuit through the Production CT. Each L1 conductor must pass through the pre-installed CT from the bottom.



Note

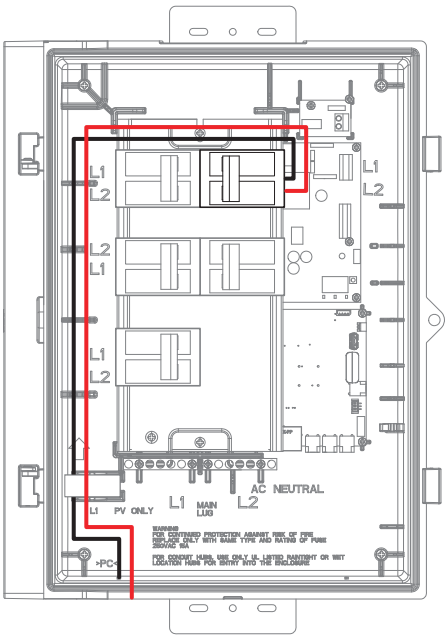
Wire guides are provided along the inside of the enclosure to assist in arranging and guiding conductors.



WARNING

Risk of fire. All wires must be positioned and secured so that they do not come into contact with the main lug or an uninsulated conductor.

5 #4 PV input circuit breaker is located on the other side of the main lug. The L1, L2 conductors should be placed as in the figure below.



6 Connect L1 and L2 (usually one black and one red) from each AC branch circuit to the circuit breaker(s).

Note

Notice that PV input location #2 L1/L2 locations are flipped as compared to the other PV input circuit locations.

8.6 Communication Connection

LAN/CAN Connection

Note

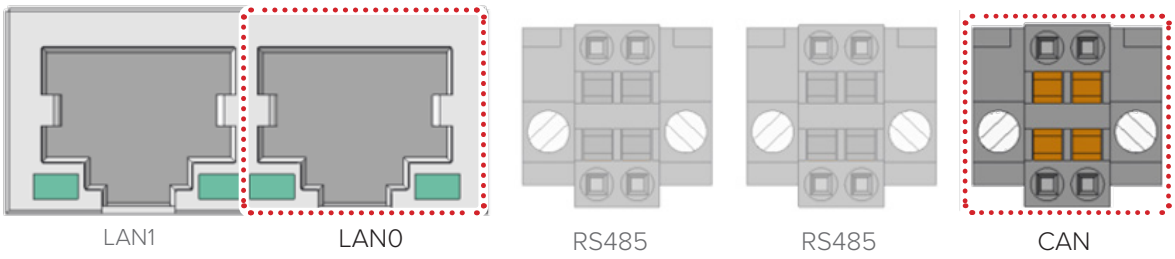
The Q.HOME SMART solution is intended for use with an internet connection. Losing connection will prevent monitoring system operation, and an extended outage (>25 days) will void the product warranty.

Connect LAN, CAN

LAN and CAN communication connectors are located on the bottom side of the EMS board.

Note

RS485 communication ports are not used.



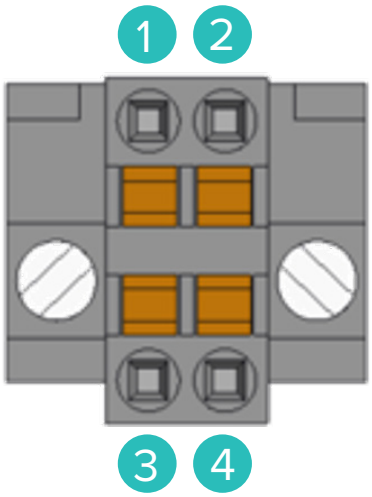
Note

- The ethernet cable should always be connected to 'LAN0' port if there is only 1 ethernet cable connected to the EMS board.
- When connecting two Ethernet cables, refer to the table below for the correct connection option(s) in each system configuration.

Configuration	LAN1	LAN0
Solar		to LAN (router)
Grid Support	*to Q.HOME CORE G3	to LAN (router)
Backup		*to Q.HOME CORE G3

* Connection for network bridge

CAN Communication Connector



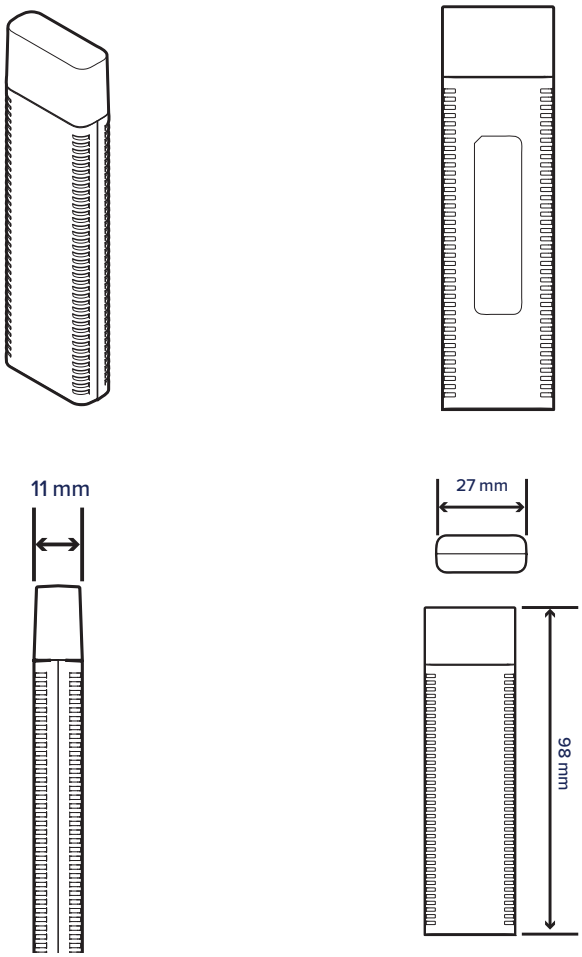
1. Signal (High)
2. Signal (Low)
3. Ground (Not used)
4. Ground (Not used)

Note

CAN high / low signal should be connected to pin 1 and 2. Pin 3 and 4 are not in use.

Wi-Fi Connection

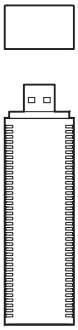
(WIFI-HQ-DG-USB)



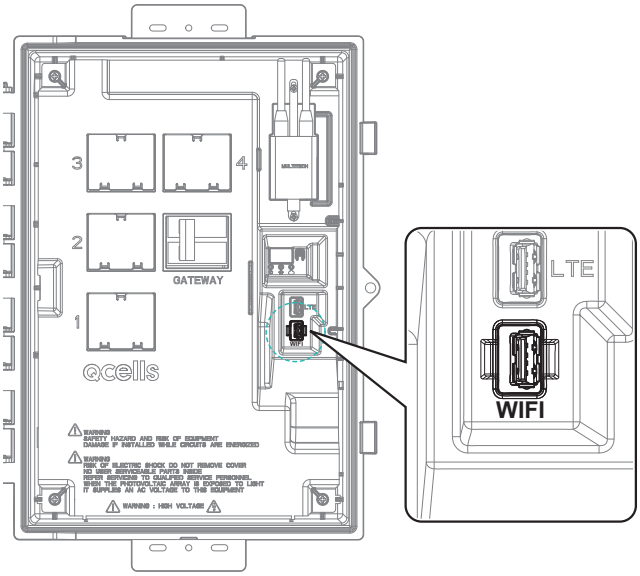
Specifications	Description
Input Voltage	USB 5.0 V (Nominal voltage)
Ambient Temperature	−40 to +65 ˚C
Ambient Humidity	95 % or less
Size	77.05(W) mm × 50.15(L) mm × 8.7(T) mm (±0.2 mm)
Weight	9.1 ± 0.9 g

Install Wi-Fi Dongle

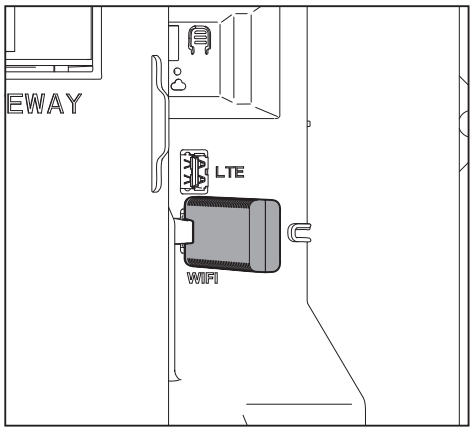
1 Remove the Wi-Fi dongle protective cap.



2 Ensure the deadfront cover is restored, and locate the Wi-Fi Dongle USB port marked "WIFI".



3 Insert the Wi-Fi dongle into the USB port.



8.7 Installing the Consumption CTs

Install CTs for Consumption Metering

For consumption metering purposes, a pair of clamp CTs are provided. These will be needed for consumption monitoring in the Solar and Grid Support Configurations.

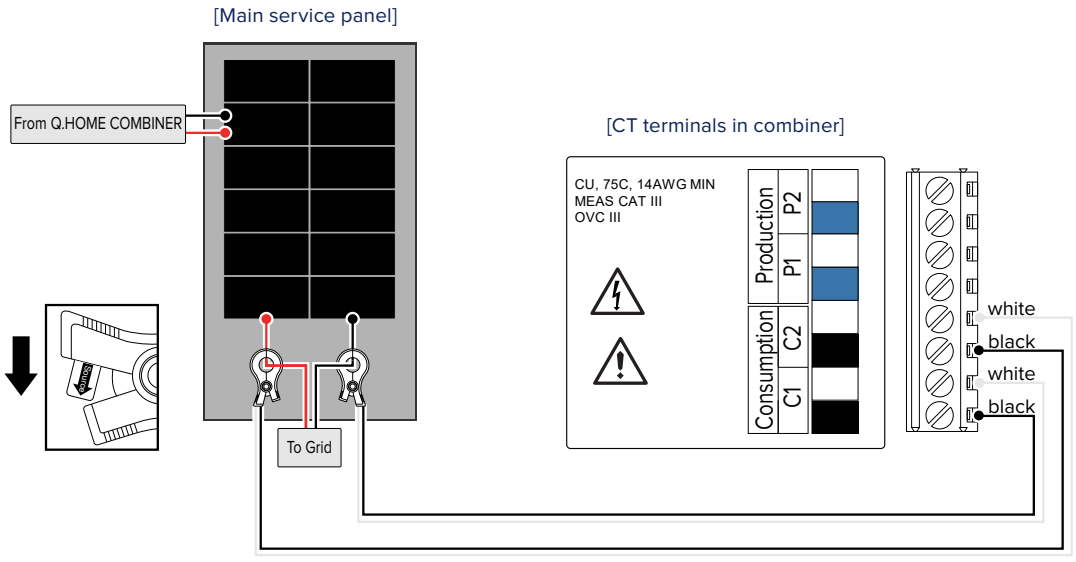
To connect the CTs to the Q.HOME COMBINER, follow the steps provided in the procedure below.

Note

- The L1/L2 relationship is defined by the connection of the Grid Conductors to the Q.HOME COMBINER grid terminals, and applies to the connection of each PV string, as well as the placement of the consumption CTs. Continuity checks should be done throughout the installation process to ensure the L1/L2 relationship is maintained.
- The CT conductors should not be run in the same conduit as power carrying conductors to ensure the highest possible accuracy, especially when installed as part of a Power Control System (PCS).
- Power should always be disconnected from the MSP by opening the Main Service Breaker (MSB) before making conduit intrusions.
- Never place CTs around energized conductors in the Main Service Panel before connecting the CT conductors into the CT inputs on the GEM board.

Procedure

- Establish an independent conduit path from the Q.HOME COMBINER to the MSP.
- Before passing the CT wires through the conduit, mark one set of CT's conductors with colored tape (or some other appropriate means) to ensure that the L1/L2 relationship is maintained. It is recommended to mark both ends to ensure the CTs do not dangle and become confused.
- Connect the L1 CT conductors to the black and white "C1" Consumption CT inputs on the GEM board.
- Connect the L2 CT conductors to the black and white "C2" Consumption CT inputs on the GEB board.
- Tighten all connections to 3.5 pounds.
- Clamp the L1 CT on the load center feed wire Line 1 (matching the Gateway's "L1" voltage terminal) with the CT arrow pointing toward the load (away from the grid).
- Clamp the L2 CT on the load center feed wire Line 2 (matching the Gateway's "L2" voltage terminal) with the CT arrow pointing toward the load (away from the grid).



Extending CT Lead Wires

The wires of the consumption current transformers (CTs) can be extended up to 100 meters for installation in panels located away from the Q.HOME COMBINER by splicing lead wires. To maintain accuracy, the total length of the lead wires must not exceed 100 meters. If the wires extend beyond this limit, the operation modes related to the grid, such as Zero Export mode, cannot be guaranteed.

Recommended cable requirements are as follows.

- Maximum cable length: 100 meters
- Voltage Rating: 300 V or higher for single phase grid installation
- Wire Size: 18 ~ 20 [AWG]
- Number of Core: 2C (2 wire twisted cable)

Installation Locations for Consumption CTs

- **At service entrance (measuring load + PV):** The consumption CTs are installed at the grid interconnection point. From this position the Q.HOME COMBINER is able to measure all current coming and going from the grid, and allows the system to calculate the current being used by household loads. Installing the CTs at the service entrance is strongly recommended at sites where power control settings are required.
- **At household load (measuring load only):** If the CTs cannot be installed upstream of all loads in the Main Service Panel, they may be placed around the current-carrying conductors servicing the home's loads. If the provided CTs cannot enclose all required conductors, they can be connected in parallel at the Gateway terminals.

Note

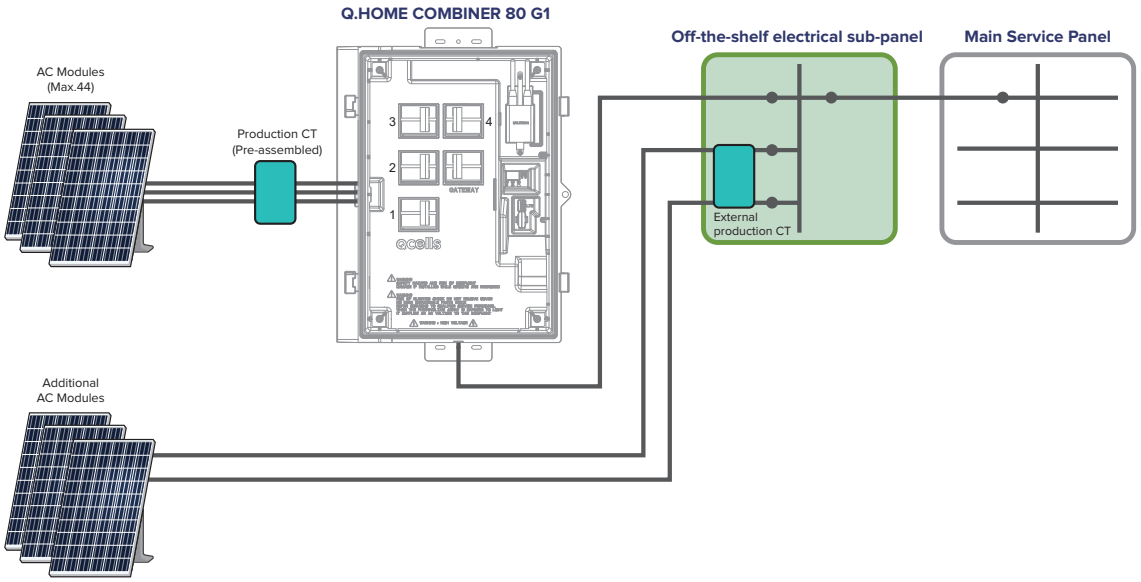
- In case a pair of consumption CTs cannot clamp on all the branches of household loads, 2 pairs of CTs can be installed by connecting the cables in parallel on the gateway terminals. The gateway will sum the measured values and show the total consumption data in Q.OMMAND.
- Only matching CTs (models: CT-JS-CLAMP-200A-25m, CT-JS-CLAMP-200A-5.2m) provided by Qcells may be paralleled. If additional CTs are required, refer to accessory list in Q.HOME COMBINER datasheet.

8.8 Installing a Larger PV System

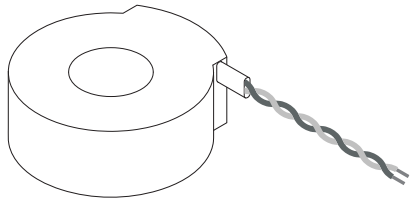
Note

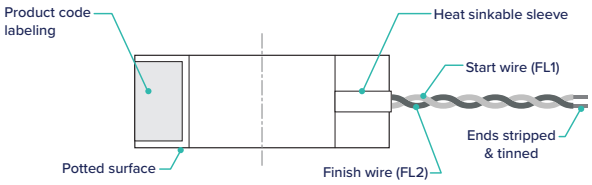
- The Q.HOME COMBINER product can support monitoring PV systems larger than 44 AC Modules (15kW), however the additional strings must be combined in an external sub-panel, separate from the AC Combiner or Main Service Panel.
- Determine the number of breakers considering the capacity of additional AC modules to be installed.
- The External Production CT accessory (CT-HQ-SOLID-200A-2m) is required to meter production of the additional AC modules combined outside of the Q.HOME COMBINER.
- All conduits, fittings and conductors must comply with installation regulations.
- Main lug must be:
  - Have enough spaces to accommodate the number of two-pole breakers required for installing AC modules over 15 kW.
  - Have a total ampacity rating sufficient for the design an off-the-shelf electrical sub-panel.
  - Provide the proper over current protection per code requirements.
- Breaker(s) must be:
  - A two-pole, up to 20 A circuit breaker for connecting additional AC module branch circuits.

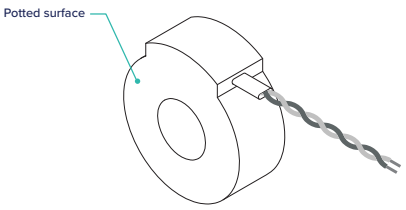
Configuration

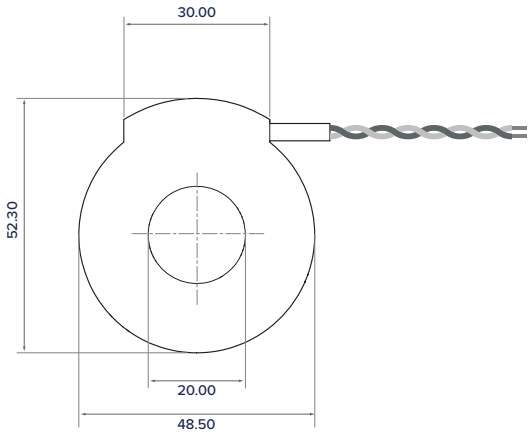


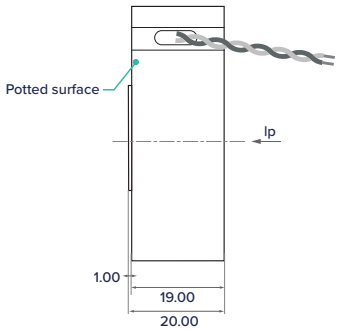
External Production CT (CT-HQ-SOLID-200 A – 2 M)





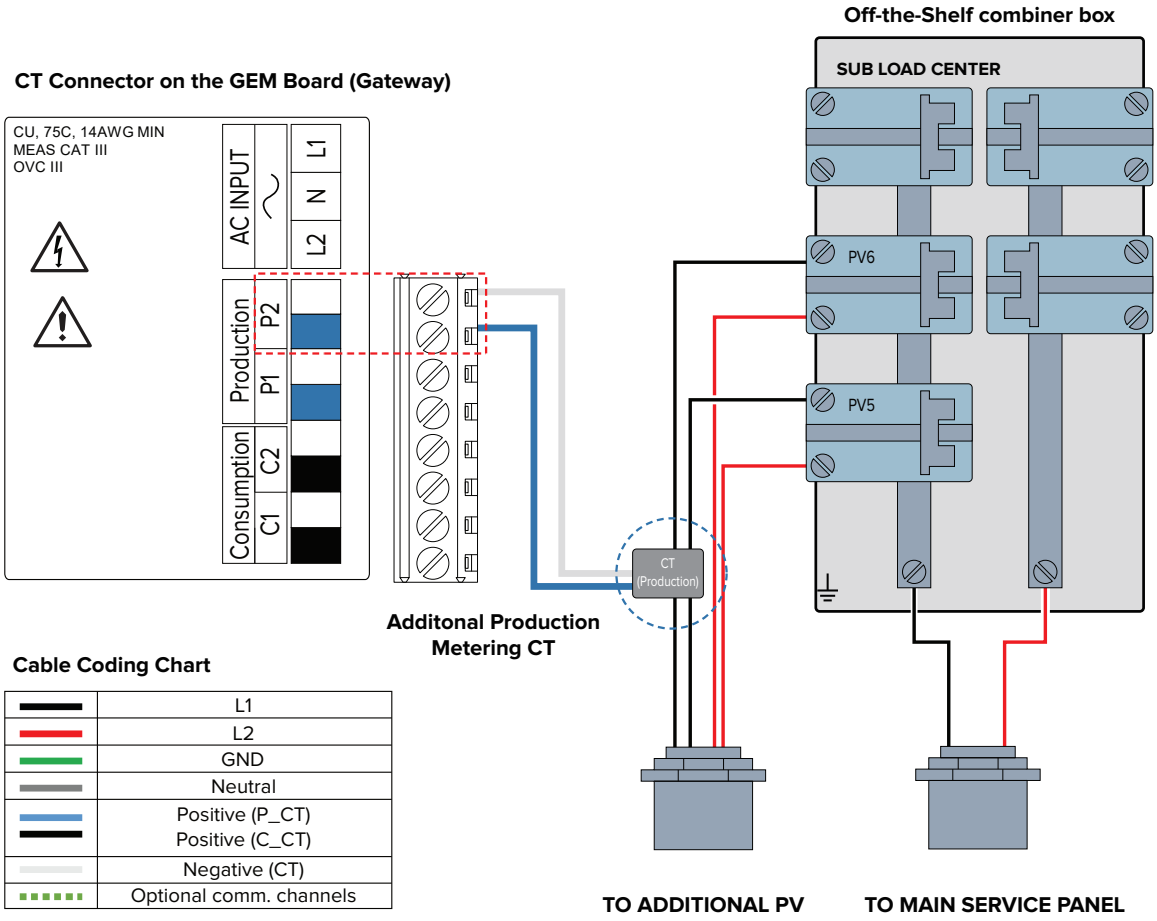






Parameters	Symbol	Value	Unit
Primary Current Range	-	200	A
Secondary Turns	Ns	2500	-
Amplitude Error	AE	±0.1	%
Operating Temperature Range	Topr	−40 to 85	˚C
Certificate		UL2808 (XOBA, XOBA7)	

Details for Wiring of Added Production Metering CT



Cable Coding Chart

	L1
	L2
	GND
	Neutral
	Positive (P_CT) Positive (C_CT)
	Negative (CT)
	Optional comm. channels

9 Power On

9.1 Turning on Q.HOME COMBINER

To turn on the Q.HOME COMBINER:

1. Once all CTs are installed and conductors are connected between the MSP and the Q.HOME COMBINER, re-energize the MSP by closing the MSB.
2. Close the circuit breaker power source to Q.HOME COMBINER (from the Main Service Panel, Q.HOME HUB, or upstream Sub-panel).
3. Close the Gateway and PV Branch Circuit Breakers in the Q.HOME COMBINER. Once all CTs are installed and conductors are connected between the MSP and the Q.HOME COMBINER, reenergize the MSP by closing the MSB.

9.2 Checking the LED Indicator

After turning on the Q.HOME COMBINER, check the status of the LED indicator on the front.
The significance of the LEDs by color and behavior is as follows :

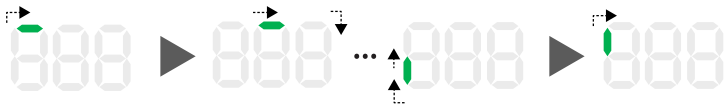
Interface / Indication				Meaning
				User Interface Button: - Turns on display, starts & stops AC module scanning
LED Indications	All LEDs	RED	Blinking	Powering up
		GREEN	Blinking	Power up complete, ready to operate
		RED	Solid	At least one paired AC module is not reporting
		GREEN	Solid	All paired AC modules are reporting
			Blinking	AC module scan is in progress
		OFF	-	No paired AC modules are communicating (low light or night time)
		RED	Solid	At least one paired AC module is not producing power
		GREEN	Solid	All paired AC modules are producing power
			Blinking	AC module firmware update in progress
		OFF	-	No paired AC modules are communicating (low light or night time)
		RED	Solid	No connection to Qcells server
		GREEN	Solid	Connection established with Qcells server
		OFF	-	No network connection

- The FND indicator provides simplified production and reporting indications to allow system operation to be indicated without needing to check the monitoring portal.

When the combiner is powered on, the display turns on for 1 hour and then turns off automatically.
Pressing the button will perform different functions as outlined below.
Display ON: Press shortly to start AC module scanning.
※ If the modules are all scanned within a few minutes, press the button once again to complete scanning. Otherwise, it will run for 15 minutes and then automatically complete scanning. Rescanning will not affect power generation.
Display OFF status: Press shortly to turn on the display.
※ it will turn on for 30 minutes and then turn off automatically.

Display/LED during initialization

Powering Up



All LEDs Blinking

Power Up Completed, Ready to Operate

All LEDs Blinking

Example of display/LED during operation

Scanning

Counting up the number of scanned AC modules (starting from zero)

LED1 Blinking

Display Legend	
P	Power (kW)
E	Error

Scan Completed

The total number of scanned AC modules blinking

※ 3 LEDs will operate within a few minutes after scanning has been completed

Steady State

The display will cycle back and forth between the number of paired AC Modules reporting and the current power being generated.

Error State

The display will cycle repeatedly through the number of AC Modules reporting, the current power being generated, and an error code.

If fault occurs, RED LED will illuminate. Refer to the table on the previous page.

(ex) Assuming 44 AC modules installed

10 Maintenance

10.1 Q.HOME COMBINER Maintenance

CAUTION

- Risk of safety. Do not open the Q.HOME COMBINER unnecessarily.
- Q.HOME COMBINER can present a risk of electrical shock if used inappropriately.
- Remove all conductive accessories (rings, watches, etc.) before servicing.
- Use tools with insulated handles and wear rubber gloves, eye protection glasses and boots when working with the Q.HOME COMBINER systems.
- Do not rest tools or metal parts on top of Q.HOME COMBINER as they may scratch or damage the enclosure.

All maintenance work or service on the Q.HOME COMBINER must be performed by qualified personnel of the authorized service center.

Note

- If an AC Module is replaced, or additional AC Modules are added, rerun the PLC Scan function to ensure all connected AC Modules are paired to the Q.HOME COMBINER's Gateway.
- Any time the number of installed AC modules changes, or an AC Module is replaced, re-commissioning through the Q.OMMAND PRO App (or Web portal) is required.
- Remove the unused AC modules from the Q.OMMAND PRO App/Web following the 'Changes' menu.

11 Commissioning the System

If you do not yet have an account, you will need to register as an installer and generate an account prior to commissioning the system via Q.OMMAND PRO.

11.1 Q.OMMAND PRO App

To commission the product via mobile device (phone/tablet), search and install the Q.OMMAND PRO app in the Apple App Store or Google Play Store. Scan the QR code below to access to Q.OMMAND PRO manual.

Android iOS

11.2 Q.OMMAND PRO Web

To commission the product via computer web browser, visit: qommand.qcells.com

11.3 Q.OMMAND PRO Manual

Scan the QR code below the access to Q.OMMAND PRO manual.

12 Troubleshooting

WARNING

Only qualified personnel may service this equipment.

This section contains information and procedures for troubleshooting Q.HOME COMBINER, and provides tips to identify and solve most problems that could occur with the system.

This section will help narrow down the source of any problem you may encounter. Please read the following troubleshooting steps.

Be aware that the error codes described in the table below will be shown in both the FND display indicator and Q.OMMAND PRO, and other error codes not included in the table below will only be shown in Q.OMMAND PRO. On the FND display, an indication starting with 'E' is the error code. In the normal operation state, no error code is displayed and the number of paired AC modules and generated power are alternately displayed. If there is a fault in the operation, the number of paired AC modules, generated power and error code are all alternately displayed.

* Qcells Microinverter (Q.MI.349B-G1 (Model Name))

Q.OMMAND PRO App	Description	Recommended Actions
M001	Microinverter not powered (Link voltage error)	1. Check the connection status. 2. Disconnect the DC (PV) connector (wait for 10 seconds) and reconnect it. 3. If error persists, replace microinverter.
M002	Microinverter not powered (Temp error)	1. Check the connection status. 2. Disconnect the DC (PV) connector (wait for 10 seconds) and reconnect it. 3. If error persists, replace microinverter.
M003	Grid frequency out of range of operation	1. Check the Grid profile setting. 2. Check Grid voltage and Frequency in monitoring. 3. If the system frequency is 0Hz, Check the circuit breaker and AC connector wiring. (Check microinverter to distribution box connection) 4. Check the utility meter grid voltage and frequency. 5. If there is no problem with the system, replace microinverter.
M004	Grid voltage out of range of operation	1. Check the Grid profile setting. 2. Check Grid voltage and Frequency in monitoring. 3. If the system voltage is 0V, Check the circuit breaker and AC connector wiring (check the microinverter to distribution box connection). 4. Check the utility meter grid voltage and frequency. 5. If there is no problem with the system, replace microinverter.
M005	Microinverter not powered (Memory error)	1. Check the connection status. 2. Disconnect the DC (PV) connector (wait for 10 seconds) and reconnect it. 3. If error persists, replace the microinverter.
M006	Microinverter not powered (Ouput current over)	1. Check the connection status. 2. Disconnect the DC (PV) connector (wait for 10 seconds) and reconnect it. 3. If the error persists, replace the microinverter.

Q.OMMAND PRO App	Description	Recommended Actions
M007	Microinverter not powered (Internal diagnosis error)	1. Check the connection status. 2. Disconnect the DC (PV) connector (wait for 10 seconds) and reconnect it. 3. If error persists, replace the microinverter.
M008	PV voltage out of range of operation	1. Check PV Module status and PV connector connection. 2. Check PV voltage. 3. If there is a problem with PV status, replace the AC module. 4. If PV is working as expected, replace the microinverter.
M009	Microinverter not powered (Input current over)	1. Check the connection status. 2. Disconnect the DC(PV) connector (wait for 10 seconds) and reconnect it. 3. If error persists, replace the microinverter.
M010	Microinverter not powered (Temp sensor error)	1. Check the connection status. 2. Disconnect the DC(PV) connector (wait for 10 seconds) and reconnect it. 3. If error persists, replace the microinverter.
M011	Microinverter not powered (Unintentional islanding)	1. If error persists, Check Grid status. 2. Check the circuit breaker and AC connector wiring. 3. Disconnect the DC(PV) connector (wait for 10 seconds) and reconnect it. 4. If there is no problem with the system, replace the microinverter.
M012	Microinverter not powered (ADC error)	1. Check the connection status. 2. Disconnect the DC(PV) connector (wait for 10 seconds) and reconnect it. 3. If error persists, replace the microinverter.
M013	Microinverter not powered (Over surge detection)	1. Check the connection status. 2. Disconnect the DC(PV) connector (wait for 10 seconds) and reconnect it. 3. If error persists, replace the microinverter.
M014	Microinverter not powered (Fucntion check error)	1. Check the connection status. 2. Disconnect the DC(PV) connector (wait for 10 seconds) and reconnect it. 3. If error persists, replace the microinverter.
M015	Microinverter not reporting	1. Check AC/DC connector wiring. 2. Disconnect the DC(PV) connector (wait for 10 seconds) and reconnect it. 3. If there is no problem with AC/DC connector wiring, replace the microinverter.

Display Indication / Q.OMMAND PRO App	Description	Recommended Actions
E01/A001	AC Modules Count Mismatch: The number of AC Modules scanned by the Q.OMMAND PRO App does not match the intended total number of AC Modules set in the app during commissioning.	1. Check that the number of AC modules entered in the Q.OMMAND PRO app PLC Scan menu is same as the number of installed AC modules. 2. Check that all PV string breakers in Q.HOME COMBINER are closed. 3. Check the serial number of scanned AC modules in the Q.OMMAND PRO app, find the module that is not scanned and check the cable connection status. After checking the cable connection status, try PLC scan again. 4. Check all the AC/DC cabling and try scanning again. 5. Check if time out has not occurred with PLC scan with the Q.OMMAND PRO app, and scan for a longer time by increasing the PLC scanning time in the app. 6. If the fault still occurs, contact Qcells Customer Support for further guidance.
E21/E22 /A002	Negative Production Power Value: Production/External Production metering value is negative	1. Check L1/L2/N connection in Q.HOME COMBINER main busbar or MSP/Hub. 2. Check the cable direction of Production CT. L1 cables should pass through the Production CT in the same direction as the arrow on the side of the CT. 3. Check all L1 cables are installed to pass Production CT. 4. Check the L2 cables are not installed to pass through the Production CT.
E03/A003	Internal PLC Chipset Error: Unable to communicate with the AC modules over the power line.	1. Turn the circuit breaker off and on. 2. If the error persists, replace the GEM Board (Gateway).
E04/A004	Internal Meter Chipset Error: Unable to perform metering.	1. Turn the circuit breaker off and on. 2. If the error persists, replace the GEM Board (Gateway).
E05 / A005	Internal Memory Error: Access failed to EEPROM or Flash memory.	1. Turn the circuit breaker off and on. 2. If the error persists, replace the GEM Board (Gateway).
E06/A006	RGM Meter Error: Production metering AC voltage or current value is either too low or too high.	1. Check L1/L2/N connection in Q.HOME COMBINER main busbar or MSP/Hub. 2. Check all L1 cables are installed to pass through the Production CT. 3. Check the L2 cables are not installed to pass through the Production CT. 4. Turn the circuit breaker off and on. 5. If the error persists, replace the GEM Board (Gateway).
E07/A007	AC module firmware Update Error: Download failed to AC module for software upgrade.	1. Firmware update will be retried automatically, and the error will clear once the AC module firmware upgrade is complete. 2. If the error code persists for more than 3 days, contact customer service for further support.
U08/A008	Q.HOME COMBINER Firmware GEM Board (Gateway) Updating	1. Firmware update will be completed automatically, and the error will clear once the Q.HOME COMBINER firmware upgrade is complete. 2. If the error code persists for more than 3 days, contact customer service for further support.

Q.OMMAND PRO App	Description	Recommended Actions
E003	GEM Board (Gateway) Connection Error	1. Check the gateway product setting value for communication. 2. Check gateway connection setting throught installer app or web. 3. Check the RS485 cable or Ethernet cable between EMS and gateway product. If there is any damage to the cable, replace the cable. 4. Update the product with stable software through the installer app. 5. If the gateway product is broken, replace it. 6. If the problem persists, replace the EMS board.
E004	Internet Connection Error	1. Check the network environment of the installation location. 2. Check whether the network type (Ethernet, Wi-Fi, LTE) is set appropriately through the installer app or web. 3. Replace Ethernet, Wi-Fi dongle, or LTE modem. 4. If the problem persists, replace the EMS board.
E014	Board Temperature High	1. This code will be automatically removed. 2. If the error persist, update the product with software through the installer app. 3. Check and adjust whether there are any problems in the actual installation environment.
E017	Cloud Disconnection	1. Check the network environment of the installation location. 2. Check whether the network type (Ethernet, Wi-Fi, LTE) is set appropriately through the installer app or web. 3. Replace Ethernet, Wi-Fi dongle, or LTE modem. 4. If the problem persists, replace the EMS board.

MEMO

MEMO

MEMO

qcells

Hanwha Q CELLS America Inc.
300 Spectrum Center Drive, Suite 500, Irvine, CA 92618

TEL 1-(888) 249-7750 **WEB** www.qcells.com/us
EMAIL na.support@qcells.com