ENPHASE

IQ System Controller 3M

Quick install guide

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VERSION 3.0
JANUARY 2025

140-00404-03

The new third-generation variant of the IQ System Controller features IQ System Controller 3M (SC200D111CMC1US01).

IQ System Controller 3M is not interchangeable with IQ System Controller 3 and IQ System Controller 3G in the field.

The IQ System Controller 3M supports one PV and one IQ Battery 5P port. It supports additional IQ Battery 5P or PV on the third DER port. It does not support generator integration.

To install the IQ System Controller and wall-mount bracket, read and follow all warnings and instructions in this guide and documents at https://enphase.com/support.

Enphase customer support can provide a digital copy of production line test results upon request with the equipment's serial number. Requests can be raised through http://www.enphase.com/support.

Safety warnings are listed at the end of this guide. These instructions are not meant to be a complete explanation of how to design and install an energy storage system. All installations must comply with the national and local electrical codes and standards. Only qualified electricians shall install, troubleshoot, or replace the IQ System Controller 3M.

The Enphase IQ System Controller 3M supports a 240 V L-L/ 120 V L-N split-phase supply (i.e., two phases that have a phase angle of 180°). For use with grid supplies other than a split-phase, an appropriate external transformer must be provided to convert the incoming supply from the utility to a split-phase supply. Sizing of the transformer must be done per system requirements and must be sufficient to cover the load and distributed energy resource (DER) requirements. Local and national electrical codes, as well as utility interconnection requirements, must be met by the installer when using an external transformer.

⚠ **WARNING:** Before installing, it is crucial to carefully follow the instructions provided. To guarantee maximum reliability and comply with warranty requirements, it is essential to install the IQ System Controller according to the instructions in this guide.

Table of contents

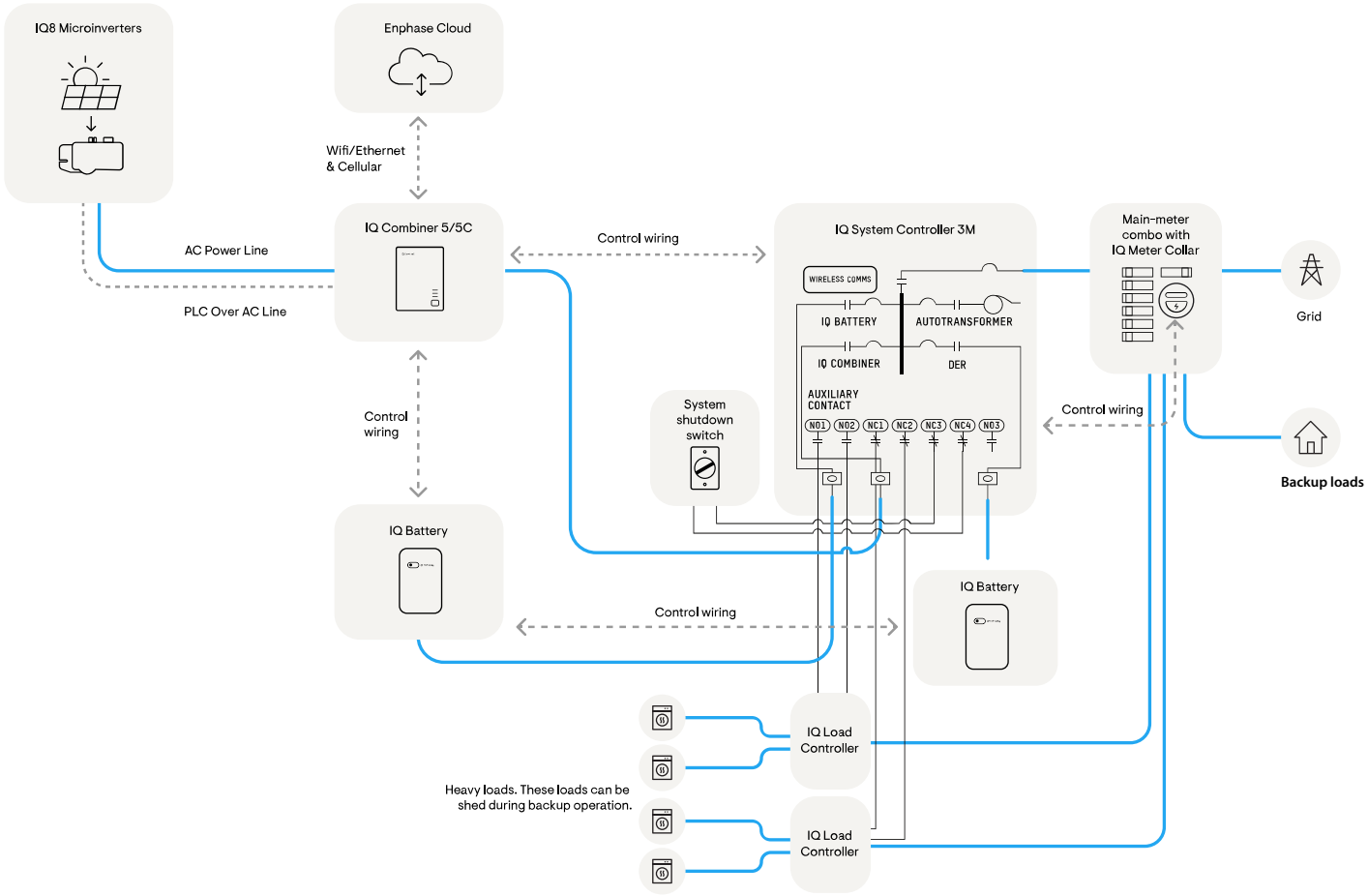
Whole home backup with the IQ System Controller 3M

For whole home backup, this is the preferred configuration for the backup of the main load panel. This configuration supports up to 1 × 80 A breaker for PV and up to 1 × 80 A breaker for the IQ Batteries. In addition, the third DER port can be used with an additional 80 A breaker for either the IQ Batteries or PV.

The microinverter ranges supported in this configuration are IQ8, IQ7, or IQ6 Series.

Check for Compatibility.

NOTE: This configuration provides whole home backup since it is back-feeding the meter main combo panel with all loads. The IQ Meter Collar placed behind the meter performs the functionality to isolate the grid and enables backup when the grid is down. However, as shown in the figure below, the IQ Load Controller can be used to shed heavy loads while off-grid if the battery power and energy are insufficient for such loads.



NOTE: The System Shutdown Switch is not used for IQ6 and IQ7 Series systems. Refer to the System Shutdown wiring section for details.

NOTE: This figure shows the system configuration. For wiring, follow the details in the wiring section.

Compatibility

SYSTEM CONTROLLER	MICRO INVERTER	COMBINER	LOAD CONTROLLER	COMMS-KIT-2 (CK2)	PRODUCTION CT (CT-200-SOLID)	IQ METER COLLAR (MC200011V01) WITH INTEGRATED CONSUMPTION METERING	BATTERY CT (CT-200-SPLIT OR CT-200-CLAMP)
IQ System Controller 3M	IQ8 or Q7/IQ6 Series	IQ Combiner 5/5C	Recommended one or two units	Integrated into IQ Combiner 5/5C	One unit included with IQ Combiner 5/5C[1]	One IQ Meter Collar (mandatory with IQ System Controller 3M)	One unit included with IQ Combiner 5/5C
IQ System Controller 3M	IQ8 or IQ7/IQ6 Series	IQ Combiner 4/4C	Recommended one or two units	Order one unit of COMMS-KIT-02	One unit included with IQ Combiner 4/4C[1]	One IQ Meter Collar (mandatory with IQ System Controller 3M)	One unit is included with COMMS-KIT-02
IQ System Controller 3M	IQ8 or IQ7/IQ6 Series	IQ Gateway	Recommended one or two units	Order one unit of COMMS-KIT-02	One unit included with the IQ Gateway[1]	One IQ Meter Collar (mandatory with IQ System Controller 3M)	One unit is included with COMMS-KIT-02

[1]If PV is connected to the DER port:

- Additional Production CT may need to be purchased to capture L1 lines of PV landing on both the IQ Combiner port and DER port in the IQ System Controller 3M,

  OR

- The existing Production CT in the IQ Combiner 5/5C, IQ Combiner 4/4C, or IQ Gateway can also be extended into the IQ System Controller 3M and used to capture L1 lines of PV landing on the PV and the DER port.

NOTE: Revenue grade ANSI C12.20 Class 0.5 compliant metering accuracy is not supported when extending PV Production CT.

NOTE: Busbar PCS is not supported when IQ7/IQ6 are used.

Specifications

Electrical specifications

DESCRIPTION	VALUE	
Nominal voltage/range (L–L)	240 VAC/(192 V–288 V)	
Nominal frequency/range	60 Hz/56–63 Hz	
Frequency measurement accuracy	±0.1 Hz	
Internal busbar rating	200 A	
	BACK-FED BREAKER[1, 2]	LOAD CENTER BRANCH CIRCUIT BREAKER
Maximum input/output continuous current	160 A	3 × 64 A
Maximum input/output overcurrent protection device	200 A	3 × 80 A[3]
Short circuit interrupt rating	22 kA	10 kA

[1] Back-fed breaker can be in the electrical panel and/or in the Internal Point-of-Connection breaker spot.

[2] Only the CSR breaker can be used in the Internal Point-of-Connection breaker spot if required.

[3] DER Port can be used for PV or Battery up to 64 A.

Utility interconnection voltage and frequency trip limits and trip times

TRIP POINT	DEFAULT SETTINGS	
	SETTING	TRIP TIME
Fast overvoltage	288 V L-L 144 V L-N	0.160 s
Slow overvoltage	264 V L-L 132 V L-N	13 s
Slow undervoltage	211.2 V L-L 105.6 V L-N	21 s
Fast undervoltage	120 V L-L 60 V L-N	2 s
Overfrequency	60.5 Hz	0.160 s
Underfrequency	59.3 Hz	0.160 s

DESCRIPTION	VALUE
Output power derating with operating ambient temperature	No derating
Neutral-forming transformer (NFT)	
Breaker rating (pre-installed)	40 A between L1 and Neutral; 40 A between L2 and Neutral
Continuous rated power	3,600 VA
Maximum continuous unbalanced current	30 A @ 120 V
Peak unbalanced current	80 A @ 120 V for two seconds

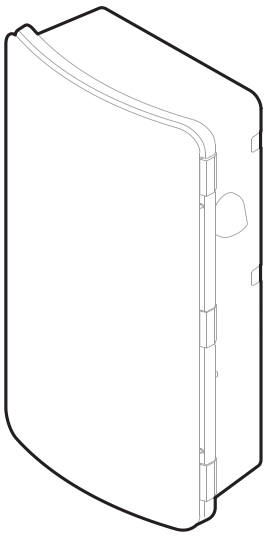
Mechanical specifications

DESCRIPTION	VALUE
Dimensions (W × H × D)	50 cm × 91.6 cm × 24.6 cm (19.7 in × 36 in × 9.7 in)
Weight	40.2 kg (88.6 lb)
Normal operation temperature range	-40°C to 50°C (-40°F to 122°F)
Maximum altitude	2,500 meters (8,200 feet)
Enclosure type	3R or rainproof

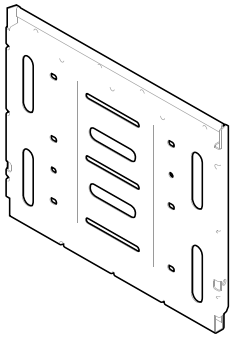
For outdoor or wet locations, for conduit hubs, use only UL listed raintight or wet location hubs of type 3R for entry into the enclosure.

What’s in the box

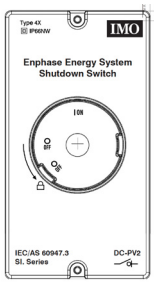
IQ System Controller 3M



Wall-mounting bracket



System Shutdown Switch



Comes pre-wired with 4 × 20 ft. color-coded wires.

Accessory kit

ITEM NAME	ITEM CATEGORY	DESCRIPTION	QUANTITY
Filler Cover Mounting BKT-L 200G Enpower	Plastic part	Filler Cover Mounting BKT-L 200G	2
Filler Cover Mounting BKT-R 200G Enpower	Plastic part	Filler Cover Mounting BKT-R 200G	2
Screw, Pan Hd, Phillips #3, M6 × 25 mm Long (5 mm Shank - 20 mm Thread), Machine, 304 SS	Fastener	Screw, Pan Hd, Phillips #3, M6 × 25 mm Lg (5 mm Shank - 20 mm Thread), Machine, 304 SS	2
Screw, Pan Hd, Torx ×20, Machine, #8-32 UNC, 0.63" Lg, A2-70	Fastener	Screw, Pan Hd, Torx X20, Machine, #8-32 UNC, 0.63" Lg, A2-70	1
Lit Kit Label, Enpower 200G	Label	Lit Kit Label, IQ System Controller 200G	1
Label, Enpower, CT Field	Label	—	6
Label, Enpower, PCS Field	Label	—	2
Feed-through header with Cable Assy Header Enpower 200G R2	Cable assembly	System Shutdown feed-through header with cable assembly	1
NEC Labels for Rapid Shutdown	Label	Labels required as per NEC for Rapid Shutdown	2

Tools/additional items required

S. NO	ITEM NAME	QUANTITY	SOURCE
1	CT-200-CLAMP or CT-200-SPLIT (for IQ Battery)	1	Included with IQ Combiner and/or COMMS-KIT-02
2	IQ Meter Collar	1	Enphase store
3	EP200G-HNDL-R1 (lifting handle)	1	Enphase Store
4	Breakers, different ratings	4	Enphase Store/retail outlets
5	Conduits (with fittings and fitting tools)	As required	Provided by installer
6	Drill	1	Provided by installer
7	5/32" pilot bit	1	Provided by installer
8	Screwdriver	1	Provided by installer
9	Wrench	1	Provided by installer
10	Adjustable wrench	1	Provided by installer
11	Torque wrench	1	Provided by installer
12	Level tool	1	Provided by installer
13	5/32" Allen key	1	Provided by installer
14	Conductor stripper	1	Provided by installer
15	Electrician's hole saw (2") or punch set	1	Provided by installer
16	Stud finder (if required)	1	Provided by installer
17	Conduit ground hub rings	1	Provided by installer
18	#10,1/4" or 5/16" lag bolts or screw 3" long (depending on attaching wall) for each wall-mount bracket	As required	Provided by installer
19	Control wire	As required	Distribution/Enphase Store**

** Enphase SKU for control cable: CTRL-SC3-NA-01

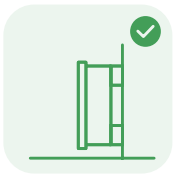
⚠ **WARNING:** Do not use power tools for electrical connections.

Section A

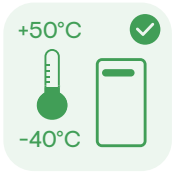
Mounting the product

Plan a location for the IQ System Controller

- IQ System Controller is NEMA type 3R rated and can be mounted indoors and outdoors.[1]
- Install this product where cables from the PV/IQ Combiner, grid, and IQ Battery are easily accessible and can be terminated at the IQ System Controller.



- This product is designed to be installed on a vertical wall only. Do not install this product flat on the ground.
- The mounting surface must be able to support 87 lb.
- Follow all local standards and regulations during installation.



- The product operates within an ambient temperature range from -40°C to 50°C (-40°F to 122°F).
- Do not install the product in a place exposed to direct sunlight throughout the day[2].
- Do not install the product in a very dusty environment.

- This product must not be installed at altitudes above 8,200 ft (2,500 m).

- In flood-prone areas, ensure that the clearance from the ground is sufficient to avoid water ingress.

[1] The enclosure is indoor or outdoor rated and designed to withstand exposure to moisture, rainfall, and harsh environmental conditions. It is not recommended to install the unit directly under any downspouts, faucets, or similar water sources.

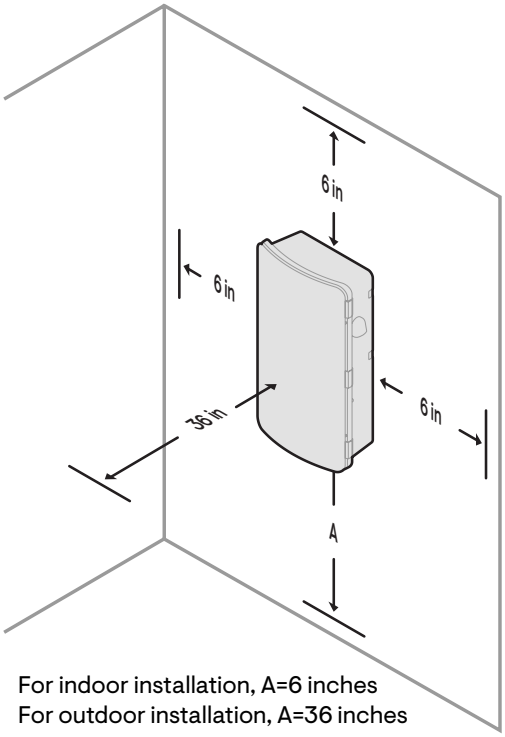
[2] It is safe to install the IQ System Controller in direct sunlight. The product is designed to operate at an ambient temperature of -40°C to 50°C, even under direct sunlight. Extended exposure to direct sunlight in higher ambient temperature conditions may cause the internal breakers to trip when operating at full load.

Section A - Mounting the product

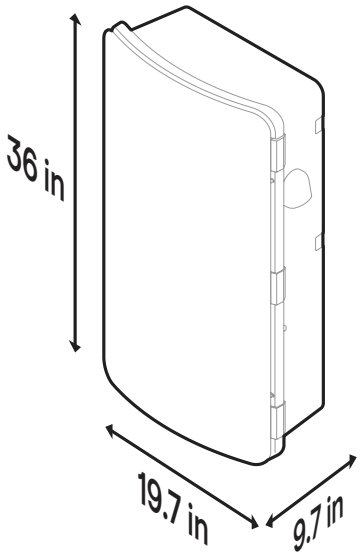
Step 1:
Minimum clearance

This product must be installed with clearance at the left, right, top, bottom, and front of the product, as shown in the figure.

Follow all local standards and regulations related to mounting an IQ System Controller.



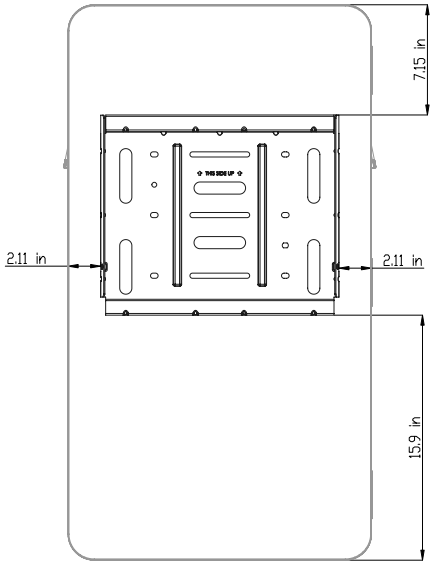
For indoor installation, A=6 inches
For outdoor installation, A=36 inches

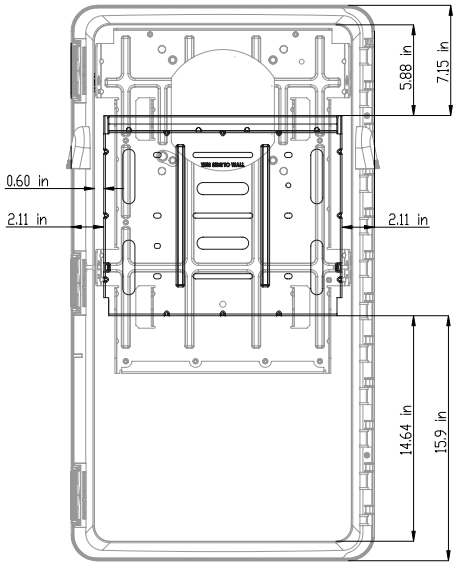


NOTE: The IQ System Controller 3M does requires at least 6 in of clearance from other electrical panels and IQ Batteries to ensure proper ventilation and safety. This helps prevent overheating and allows for easier maintenance.

NOTE: Confirm the structure's load capacity to support 89 lb.

NOTE: Conduits are allowed to be installed within the 6 in clearance zone along the sides and bottom of the enclosure.

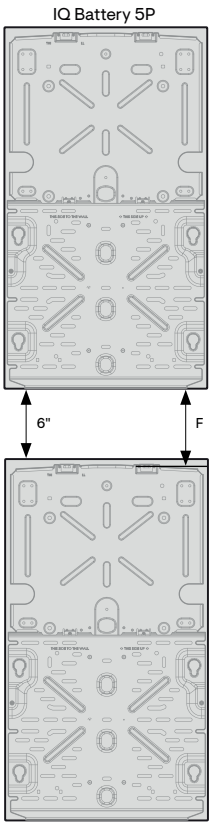


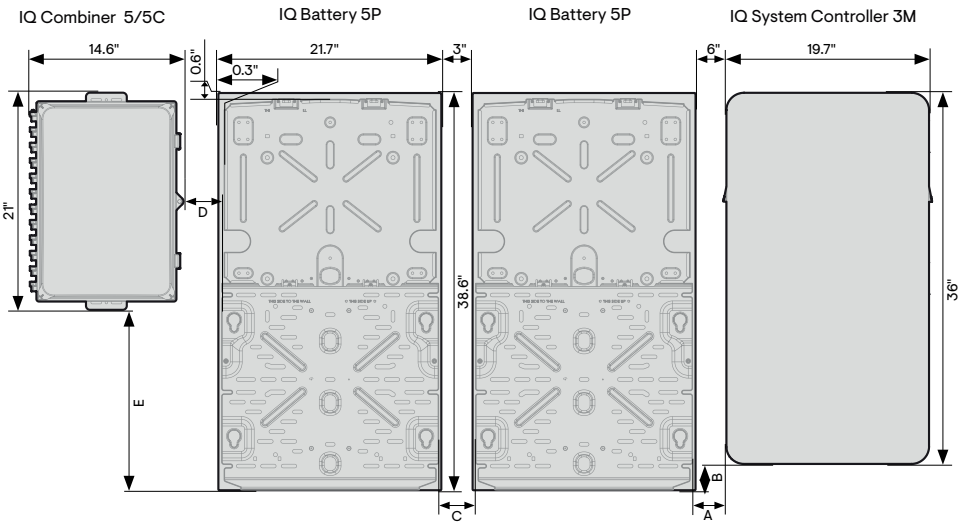


Section A - Mounting the product

Spacing requirements

Follow the clearances mentioned below to plan the system installation layout.





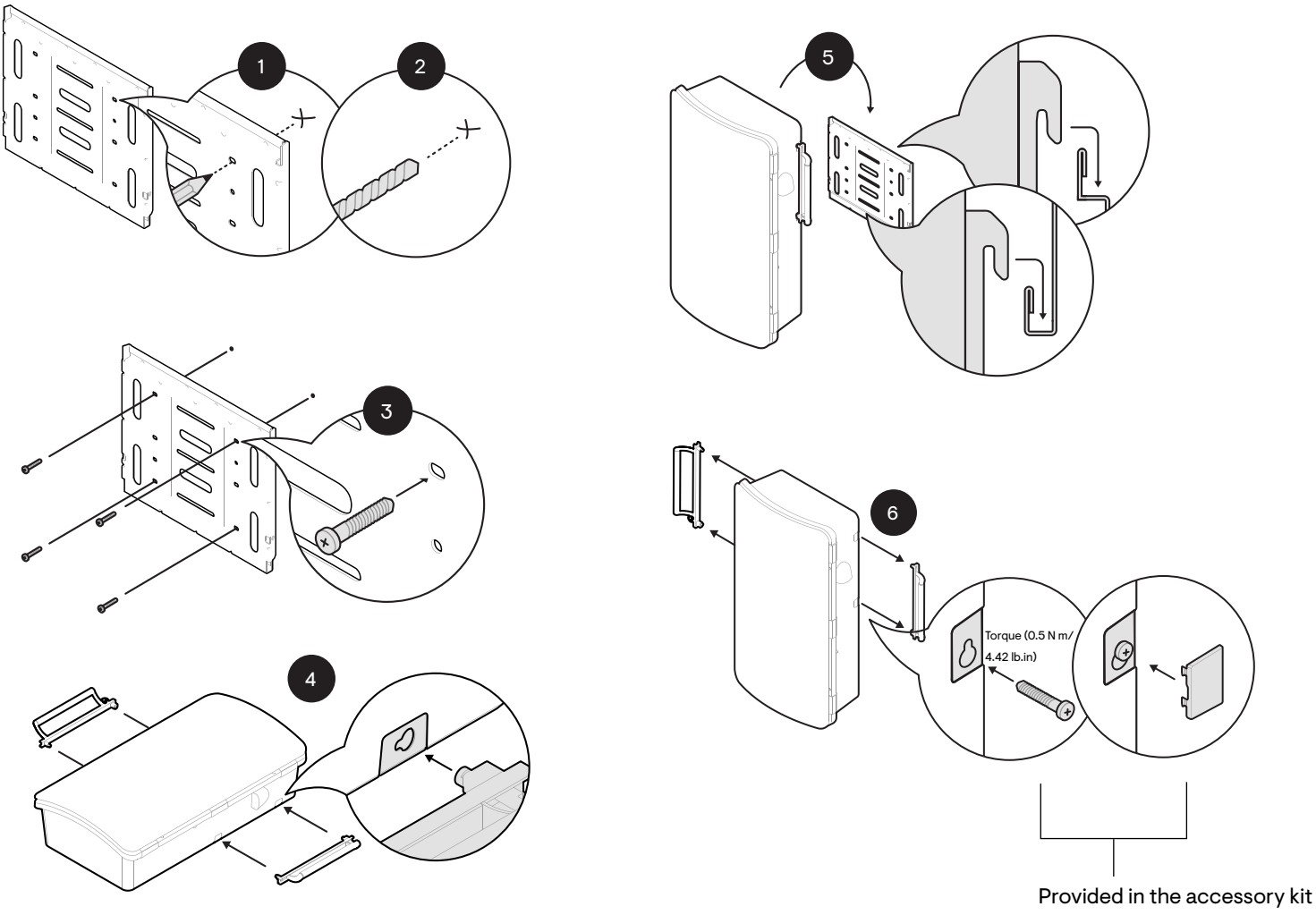
DIMENSION	DESCRIPTION	RECOMMENDED MINIMUM
A	IQ System Controller 3M and IQ Battery 5P wall bracket horizontal spacing	6.3 in
B - Bottom aligned	IQ System Controller 3M bottom to IQ Battery 5P wall mount bracket bottom	0 in
B - Center aligned	IQ System Controller 3M bottom to IQ Battery 5P wall mount bracket bottom	1.3 in
B - Top aligned	IQ System Controller 3M bottom to IQ Battery 5P wall mount bracket bottom	2.6 in
C	IQ Battery 5P wall bracket horizontal spacing	3.6 in
D	IQ Battery 5P wall bracket to IQ Combiner horizontal spacing	3.6 in
E - Bottom aligned	IQ Combiner 5/5C bottom to IQ Battery 5P wall mount bracket bottom	0.00 in
E - Center aligned	IQ Combiner 5/5C bottom to IQ Battery 5P wall mount bracket bottom	8.7 in
E - Top aligned	IQ Combiner 5/5C bottom to IQ Battery 5P wall mount bracket bottom	17.5 in
F	IQ Battery 5P wall bracket vertical spacing	6.6 in

Note: IQ Battery 5P must be installed at least 6 inches above the ground. IQ System Controller 3M must be installed at least 6 inches above floor for indoor installation and 36 inches above the ground for outdoor installation. IQ Combiner 5/5C must be installed at least 36 inches above ground for installation.

Step 2:
Install the mounting bracket

Install the mounting bracket and mount the IQ System Controller as per the following instructions:

- Use 3" long wood screw #10, 1/4", or 5/16" (depending on the attachment wall) or masonry attachments if installed in masonry to attach the IQ System Controller bracket. Use one screw and washer for each slot. The slot size of the IQ System Controller wall mount bracket is 8.5 mm.
- Check with a structural engineer and local standards for local requirements. Use an appropriately sized washer for each of the screws.
- The IQ System Controller weighs 40.2 kg (88.6 lb) and will require two people to lift the unit.
- Risk of injury and equipment damage. Avoid dropping the IQ System Controller. Doing so may create a hazard, cause serious injury, and/or damage the equipment.
- Risk of injury and equipment damage. Do not release the IQ System Controller until you ensure that the IQ System Controller is fully seated in the wall-mount bracket shelf.

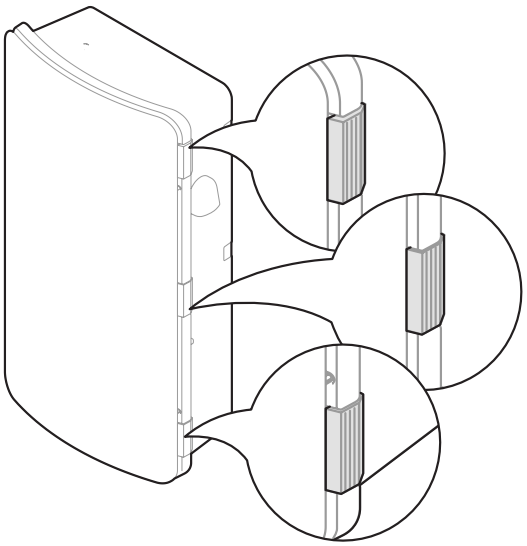


Step 3: Remove the door

- Pinch the lock pin on the top hinge section.
- Lift the door upside down to remove it.

⚠ **WARNING:** Equipment damage if a recommended practice is not followed. Risk of equipment damage. Do not wire the IQ System Controller when it is energized.

1



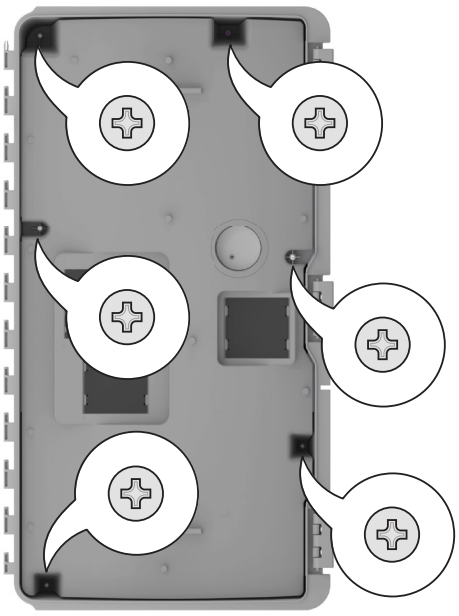
Open the dead front

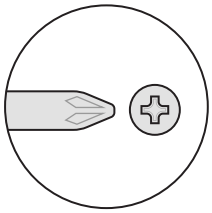
Before removing the dead front, ensure the IQ System Controller is completely de-energized.

⚠ **WARNING:** Risk of equipment damage. Do not remove the pre-installed solar shield attached to the enclosure door.

- Risk of equipment damage. Do not wire the IQ System Controller when it is energized.
- Risk of electric shock. Do not modify the dead front other than to remove or replace filler plates, as needed. The product warranty can be affected in case of modification.

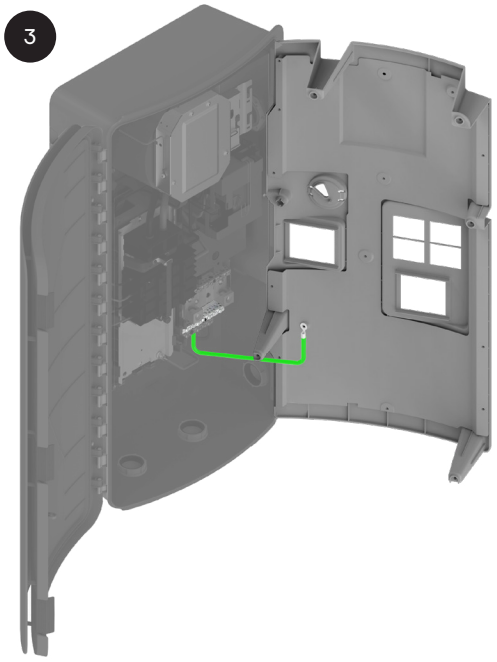
2





Phillips screw #2

3



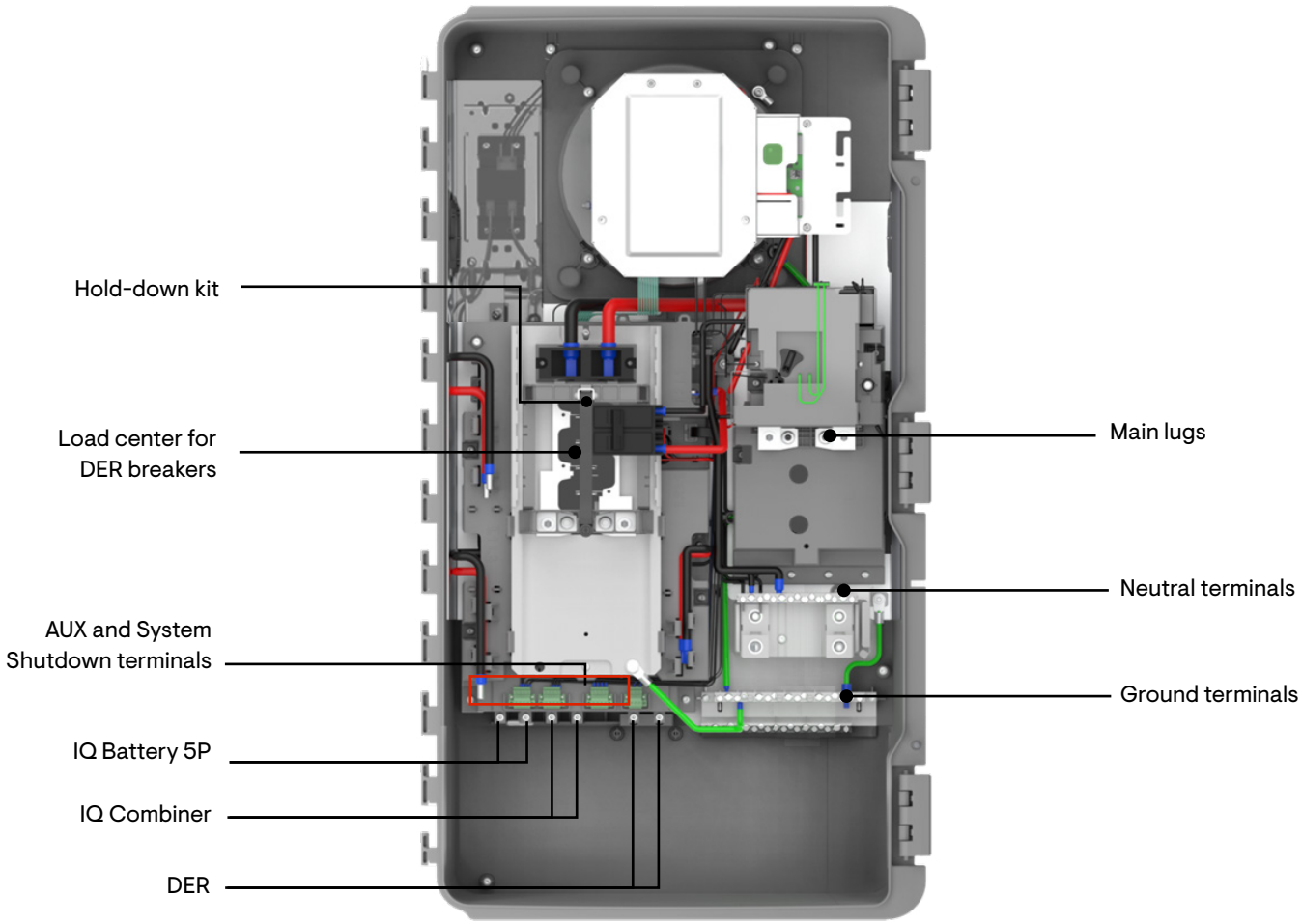
The ground connection to the dead front needs to be carefully disconnected before the dead front can be dismantled from the IQ System Controller.

Section B

Mounting the breakers

Internal view of IQ System Controller 3M

The following figure shows the IQ System Controller 3M after the dead front is removed. It comes with an inbuilt neutral forming transformer, microgrid interconnection device, and a panel board to mount plug-in type breakers.

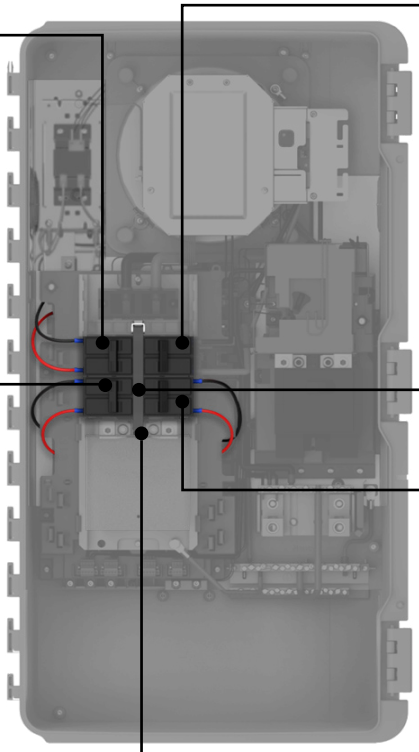


Section B - Mounting the breakers

Breakers for IQ8 Systems

The IQ System Controller 3M comes pre-installed with a quad breaker for the neutral forming transformer (NFT) and IQ Gateway.

The hold-down kit for the breakers is factory-installed in the IQ System Controller 3M. Loosen the screw (use Phillips head screwdriver #1) and pull the hold-down kit arm up to install the breakers. After the breaker installation, pull down the hold-down kit arm and tighten the screw with torque 1.7 lb.in (0.6 N m).



Storage breaker
Use the factory-installed hold-down kit along with a correctly sized breaker

Solar breaker
Use the factory-installed hold-down kit along with a correctly sized breaker

Pre-wired red and black wires
Connect to storage and solar breakers

Hold-down kit screw

NFT and IQ Gateway breaker
Factory installed quad breaker (Siemens or Eaton). NFT pre-wired to 40 A terminal of the quad breaker. Connect IQ Gateway L1 and L2 to 20 A L1, L2 terminals of the quad breaker respectively

Hold-down kit arm

Solar or storage breaker
Use the factory-installed hold-down kit, along with a correctly sized breaker

Pre-wired red and black wires
Connect to DER breaker

ENPHASE BREAKER PART	EATON BREAKER PART	TORQUE
BRK-20A-2P-240V	BR220	27 lb.in
BRK-40A-2P-240V	BR240	
BRK-60A-2P-240V	BR260	
BRK-80A-2P-240V	BR280	
BRK-20A40A-4P-240V	BQC220240	

The following alternate breakers are approved for use in the Eaton load center:

MANUFACTURER	MODEL SERIES	CURRENT RATING
GE/ABB	THQL21xx	20/40/60/80 A
Siemens	Q2xx	20/40/60/80 A
Siemens (quad breaker)	Q24020CT2	20/40 A

Refer to the breaker manufacturer's manual for torque values.

Section B - Mounting the breakers

Install main breakers

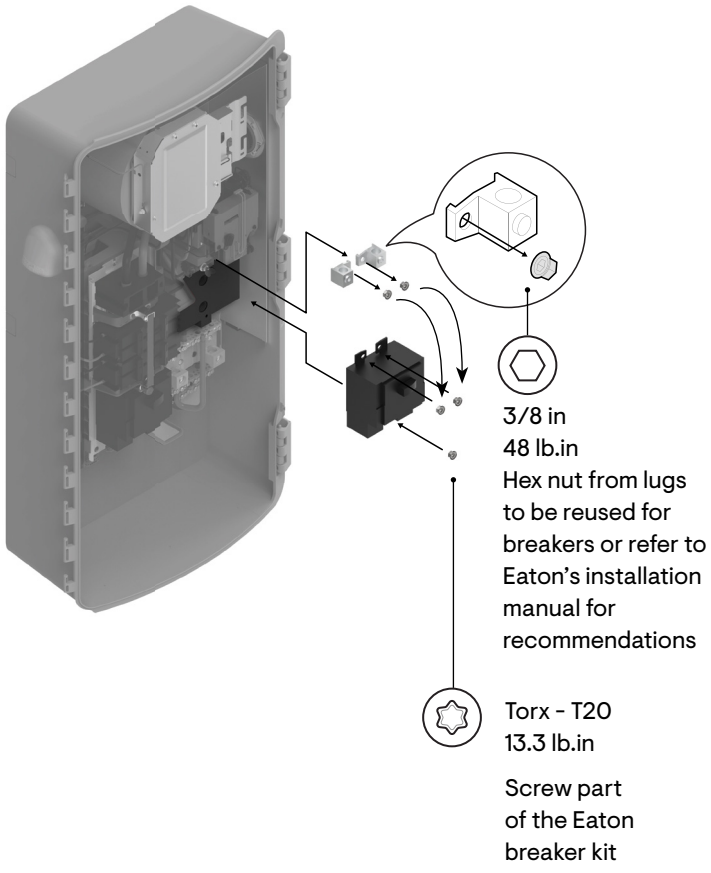
If breakers are being installed for main connections, the lugs should be removed, and the breakers should be installed.

Only Eaton CSR range breakers with ratings between 100 A and 200 A can be used for the main connections.

⚠ **WARNING:** Risk of equipment damage. Do not wire the IQ System Controller when it is energized.

ENPHASE BREAKER SKU	EATON BREAKER PART
BRK-100A-2P-240V	CSR2100N
BRK-125A-2P-240V	CSR2125N
BRK-150A-2P-240V	CSR2150N
BRK-175A-2P-240V	CSR2175N
BRK-200A-2P-240V	CSR2200N

Main connection



⚠ **WARNING:** Tighten the Hex nut ⬡ and recheck the torque before every wire installation.

⚠ **WARNING:** Do not use power tools for electrical connections.

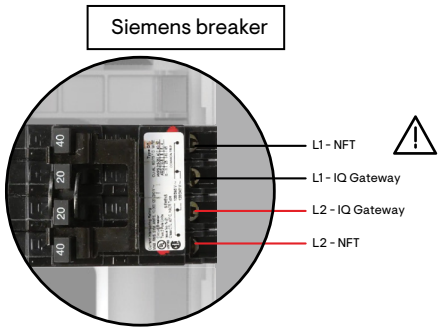
Section B - Mounting the breakers

Breaker for NFT and IQ Gateway

The IQ System Controller 3M comes pre-installed with a quad breaker (Siemens or Eaton) for the neutral forming transformer (NFT) and IQ Gateway.

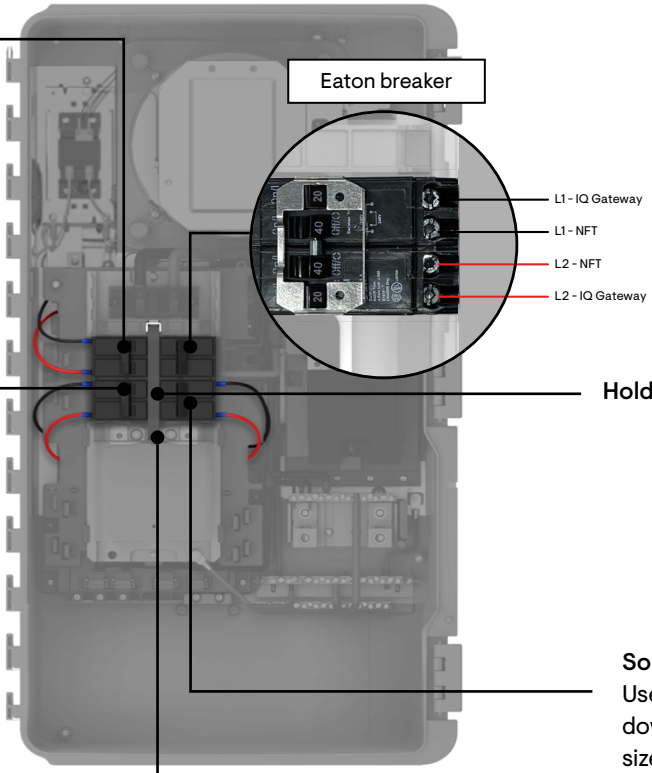
NFT pre-wired to 40 A terminal of the quad breaker. Connect IQ Gateway L1 and L2 to the 20 A L1 and L2 terminals of the quad breaker, respectively.

NOTE: The cable used to connect IQ Gateway power terminals to the quad breaker must adhere to local electrical codes.



WARNING: IQ System Controller with 8 AWG wire on NFT L1 & L2 can be used with either the Eaton or Siemens quad breaker.
IQ System Controller with 6 AWG wires on NFT L2 can be used with only the Eaton quad breaker.

Storage breaker
Use the factory-installed hold-down kit along with a correctly sized breaker



Solar breaker
Use the factory-installed hold-down kit along with a correctly sized breaker

Hold-down kit arm

Pre-wired red and black wires
Connect to storage and solar breakers

Solar or storage breaker
Use the factory-installed hold-down kit, along with a correctly sized breaker

Hold-down kit screw

ENPHASE BREAKER PART	EATON BREAKER PART	TORQUE
BRK-20A-2P-240V	BR220	27 lb.in
BRK-40A-2P-240V	BR240	
BRK-60A-2P-240V	BR260	
BRK-80A-2P-240V	BR280	
BRK-20A40A-4P-240V	BQC220240	

The following alternate breakers are approved for use in the Eaton load center:

MANUFACTURER	MODEL SERIES	CURRENT RATING
GE/ABB	THQL21xx	20/40/60/80 A
Siemens	Q2xx	20/40/60/80 A
Siemens (quad breaker)	Q24020CT2	20/40 A

Section C

Wiring

Drill conduits

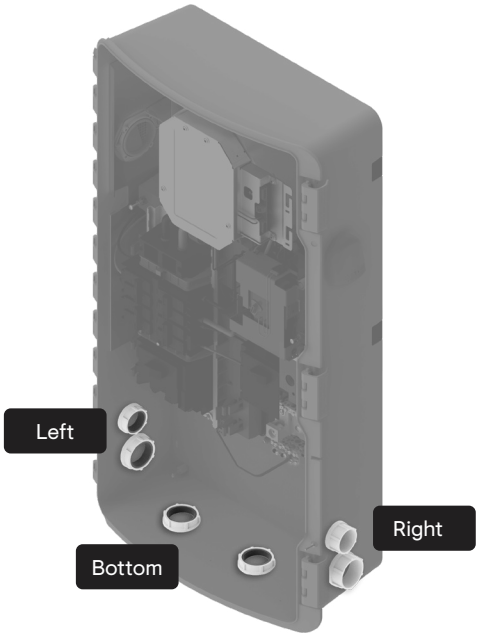
Drill conduit entry holes as needed and install the conduit grounding lugs for each opening. Be sure to reseal any unused conduit entry holes with the sealing plugs.

Main supply conductors may enter the IQ System Controller from the bottom or bottom-left side.

IQ Battery, IQ Combiner, and PV conductors may enter from the bottom, bottom-left, or bottom-right sides.

The size of the conductors (line, neutral, and ground) depends on the service or breaker rating and voltage rise requirements according to local codes.

Refer to the conductor rating table on the door of the IQ System Controller.



Recommended conduit drill locations*

CONDUIT LOCATION	MAIN	DER
Bottom	✓	✓
Left wall	✓	✓
Right wall	✓	✓

* The recommendation is applicable for 200 A-rated wire with a bending radius as per NEC codes.

NOTE: Drilling on the rear wall of the IQ System Controller for conduit entry is not supported.

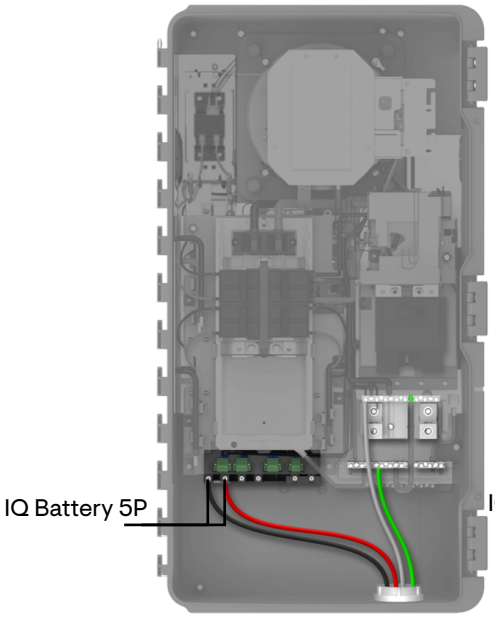
Section C - Wiring

DER wiring

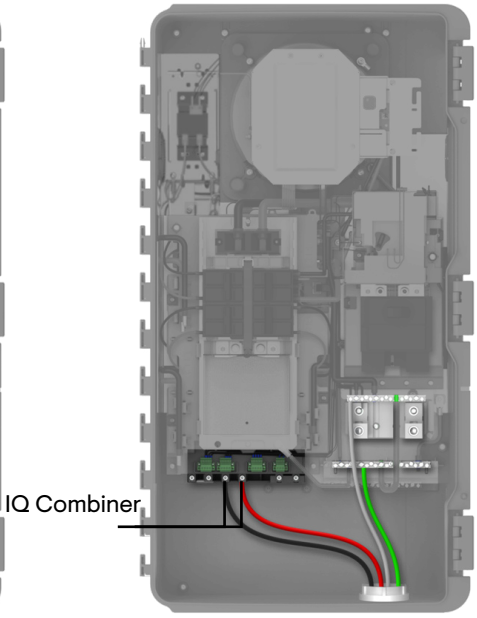
Connect the DER (IQ Battery, IQ Combiner, and PV) wires to the lugs at the bottom, as indicated in the following images.

Refer to the wiring table and torque recommendation before connecting the wires. Refer to local codes for any specific local requirements.

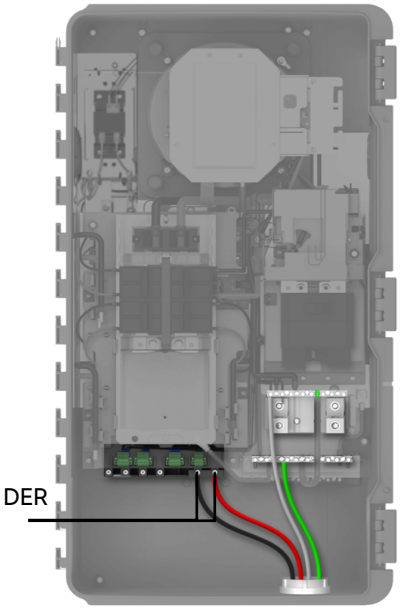
IQ Battery wiring



PV wiring



Additional IQ Battery/ PV wiring



1/8"

2–14 AWG

300 kcmil–14 AWG

1/0–14 AWG

WARNING: Use only high-quality machined (milled) hex form bit with 0.2+ inch (5+ mm) length and 0.139 inch (3.53 mm) minimum across hex points.

WARNING: Do not use power tools for electrical connections.

PV/IQ Battery connections

AWG	TORQUE (LB.IN)
14–10	25
8	30
4–6	35
2–3	40

NEUTRAL AND GROUND CONNECTIONS	AWG	TORQUE (LB.IN)	
Neutral and ground bar – large holes	1/0–3	50	
	4–6	45	
	8	40	5/16"-24 UNF
	10–14	35	
Neutral and ground bar – small holes	6–8	25	
	10–14	15	#10-32 UNF
Neutral lugs	300 kcmil–6	275	3/8"

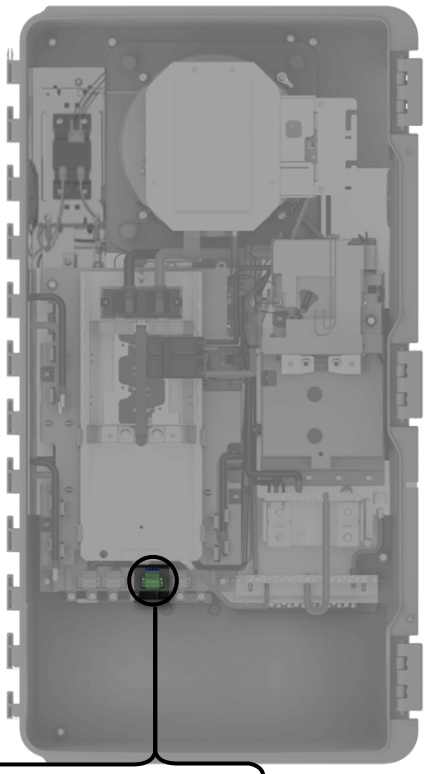
NOTE: The ground bar does not support cables higher than 1/0 to be compliant with the bending radius as per the standards.

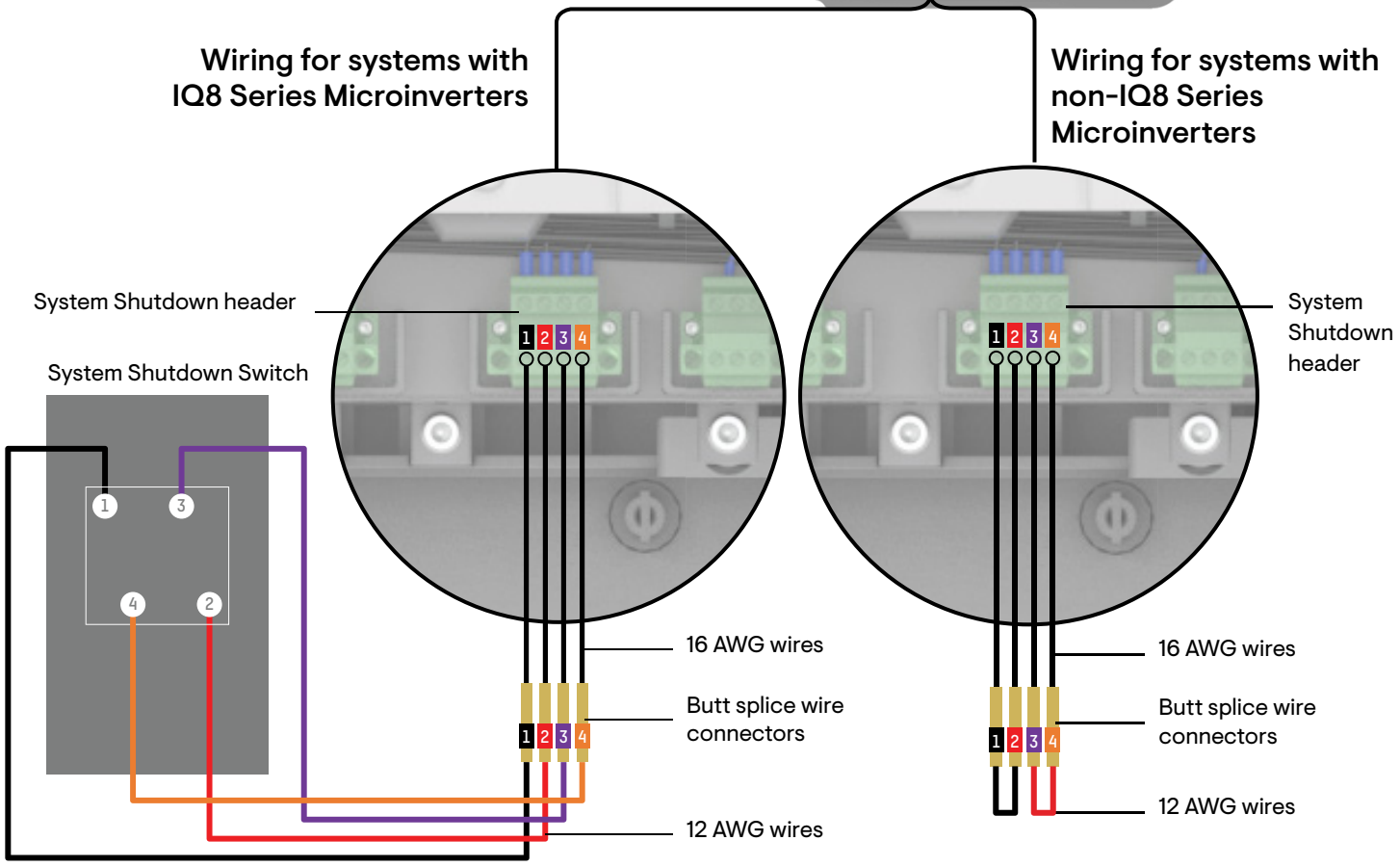
Section C - Wiring

Aux wiring: System Shutdown Switch

Enphase System Shutdown (SSD) Switch wiring (compliance requirement)

The IQ System Controller meets UL1741 PV RSE and NEC Rapid Shutdown requirements for IQ8 Microinverters. The System Shutdown Switch is the rapid shutdown initiator. The System Shutdown Switch ensures a single point of initiation per NEC 2020. The System Shutdown Switch, when turned off, also disconnects the battery from the system.





NOTE: Control lines to headers support 28 AWG and 16 AWG wire gauges.

NOTE: Do not use cables more than 20 ft. long for connections between the System Shutdown Switch and the System Shutdown header.

Aux wiring: System Shutdown Switch

NOTE: An improved SSD header kit allows for the co-location of SSD wiring and AC power conductors in a single conduit, eliminating the need for separate conduits.

WARNING: To prevent water ingress, do not use the top conduit entry on System Shutdown Switch.

Section C - Wiring

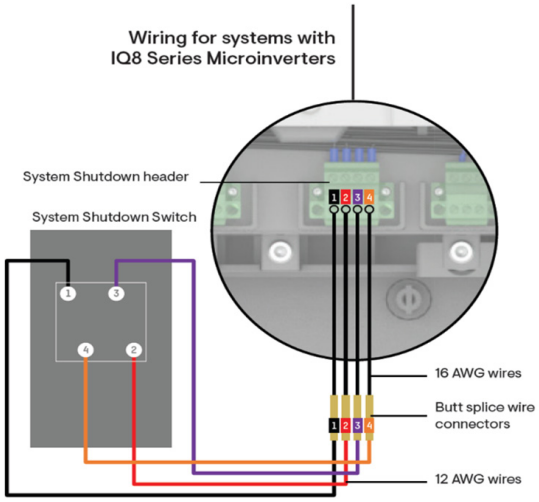
Aux wiring: System Shutdown Switch

IQ System Controller 3M units may get stuck in a system shutdown or rapid shutdown state, preventing system provisioning. Either follow the wiring tests for the SSD Switch in the ON position or the wiring tests for the SSD Switch in the OFF position.

Wiring test for SSD Switch in the ON position

a. Ensure the SSD Switch is in the ON position.

b. Set the multimeter to test for continuity.



c. Measure the terminal test points:

- 1 and 2 at the SSD Switch
- 1 and 2 at the SSD header
- 3 and 4 at the SSD Switch
- 3 and 4 at the SSD header

The multimeter should show positive continuity in all cases.

d. Verify the connections and rewire them if required.

Section C - Wiring

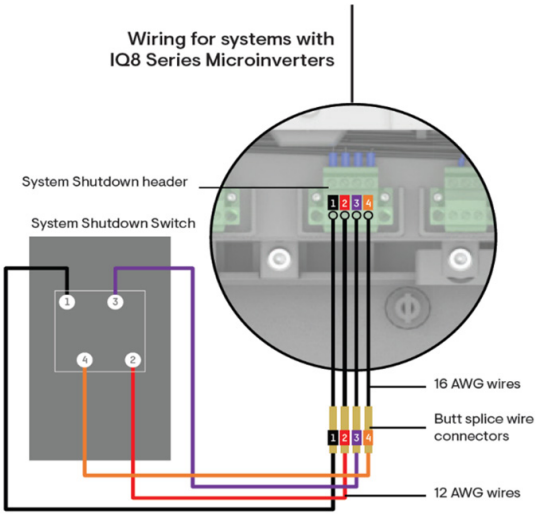
Aux wiring: System Shutdown Switch

Wiring test for SSD Switch in the OFF position

a. Ensure the SSD Switch is in the OFF position.

b. Ensure the IQ System Controller is powered ON from any of the sources.

c. Set the multimeter to measure the DC voltage.



d. Measure the terminal test points:

- 1 and 2 at the SSD Switch
- 1 and 2 at the SSD header
- 3 and 4 at the SSD Switch
- 3 and 4 at the SSD header

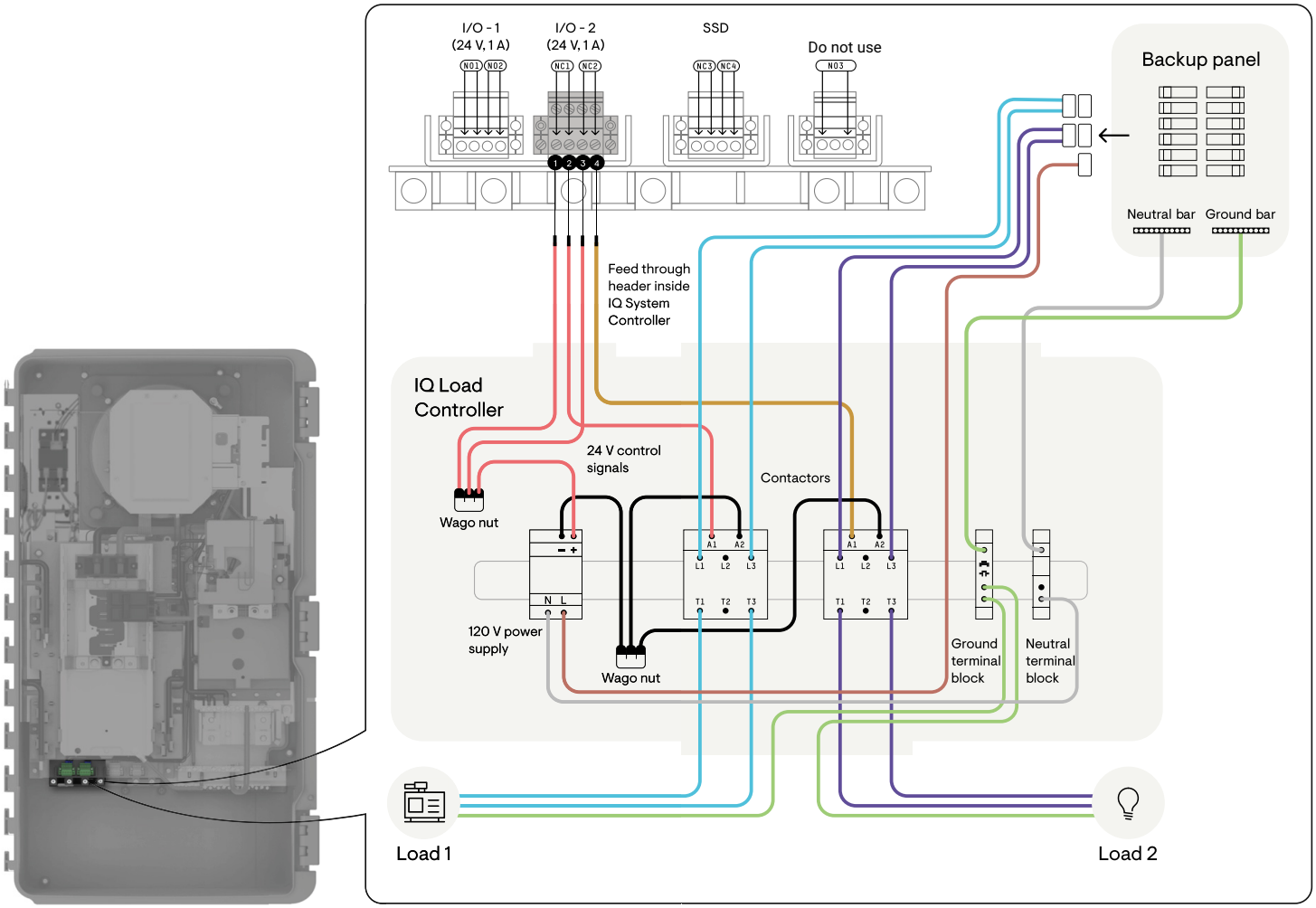
The multimeter should show a value between 2.7 VDC to 3.3 VDC in all cases.

e. Verify the connections and rewire them if needed.

Aux wiring: IQ Load Controller

Up to two IQ Load Controllers, each enabling fine-grained, circuit-level control for 2 × 240 V or 4 × 120 V essential load circuits, can be integrated with IQ System Controller. Each 240 V load can be controlled independently, but the 120 V loads can be controlled in groups of up to two loads.

For detailed wiring instructions, refer to the IQ Load Controller quick install guide.

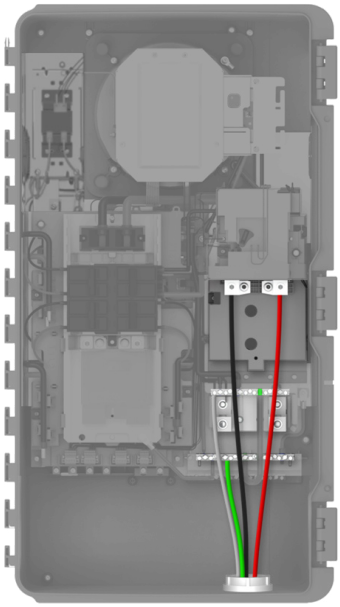


NOTE: Control lines to headers support 28 AWG and 16 AWG wire gauges.

Main/supply side wiring

The main wiring is the final step in the installation process.

When using a back-fed breaker in the electrical panel



300 kcmil-2 AWG

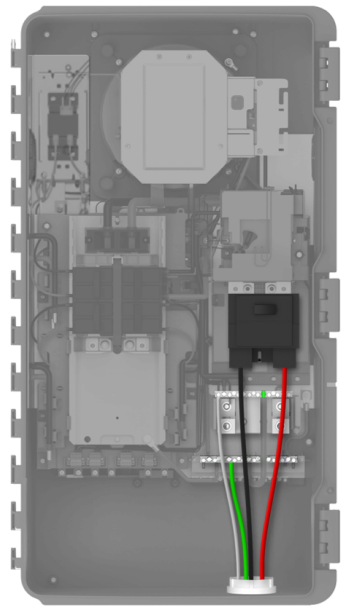
300 kcmil-14 AWG

1/0-14 AWG

1/4"

AWG	TORQUE (LB.IN)
300 kcmil-2	250

When using the Eaton CSR main breaker



300 kcmil-6 AWG

300 kcmil-14 AWG

1/0-14 AWG

3/8"

AWG	TORQUE (LB.IN)
300 kcmil-6	275

NEUTRAL AND GROUND CONNECTIONS	AWG	TORQUE (LB.IN)	
Neutral and ground bar – large holes	1/0–3	50	
	4–6	45	
	8	40	5/16"–24 UNF
	10–14	35	
Neutral and ground bar – small holes	6–8	25	
	10–14	15	#10–32 UNF
Neutral lugs	300 kcmil–6	275	3/8"

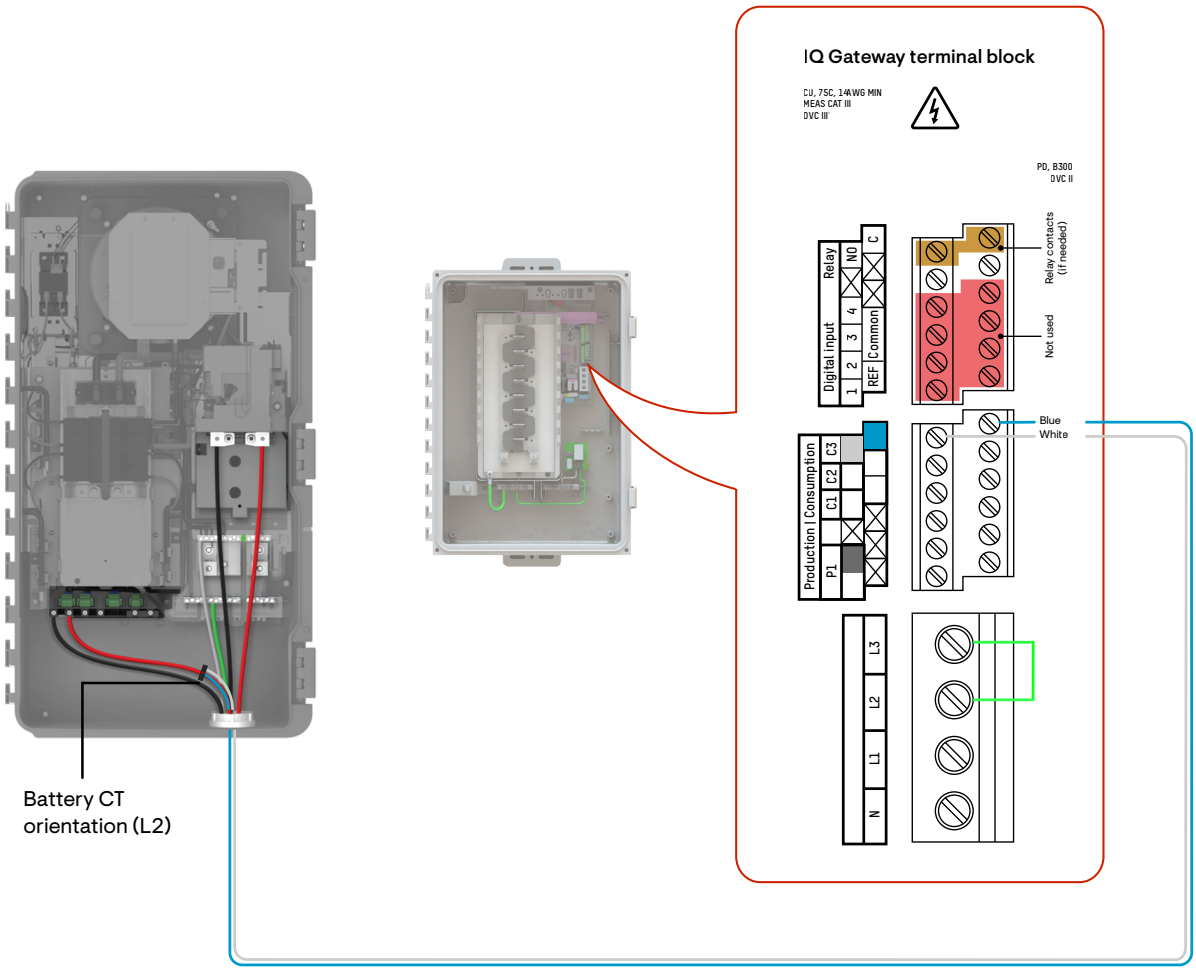
WARNING: Tighten the Hex nut and recheck the torque (48 lb. in) before every wire installation.

NOTE: The ground bar doesn't support cables higher than 1/0 to be compliant with the bending radius as per the standards.

CT wiring

There are multiple scenarios for CT wiring. Refer to CT wiring scenarios. For more description, refer to the IQ Gateway quick install guide.

For PCS setup, refer to the PCS section.

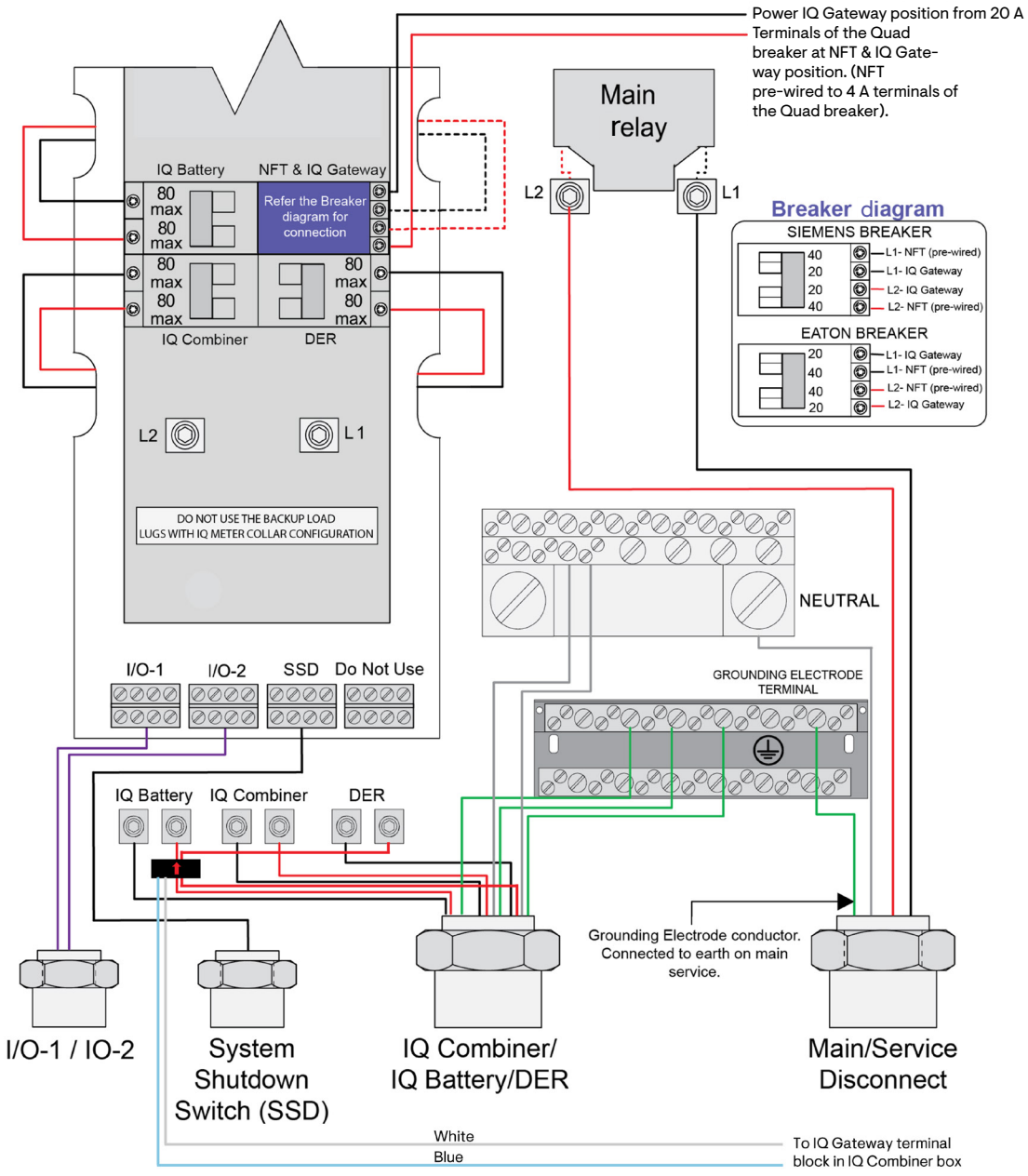


- Battery CT shall be placed on L2 of all IQ Battery circuits.
- IQ Meter Collar has integrated Consumption CTs and the CTRL cable connection to the IQ Meter Collar handles integrated Consumption CT data connection to system.

Section C - Wiring

CT wiring scenarios

Scenario 1: CT wiring for IQ Battery on both IQ Battery and DER ports

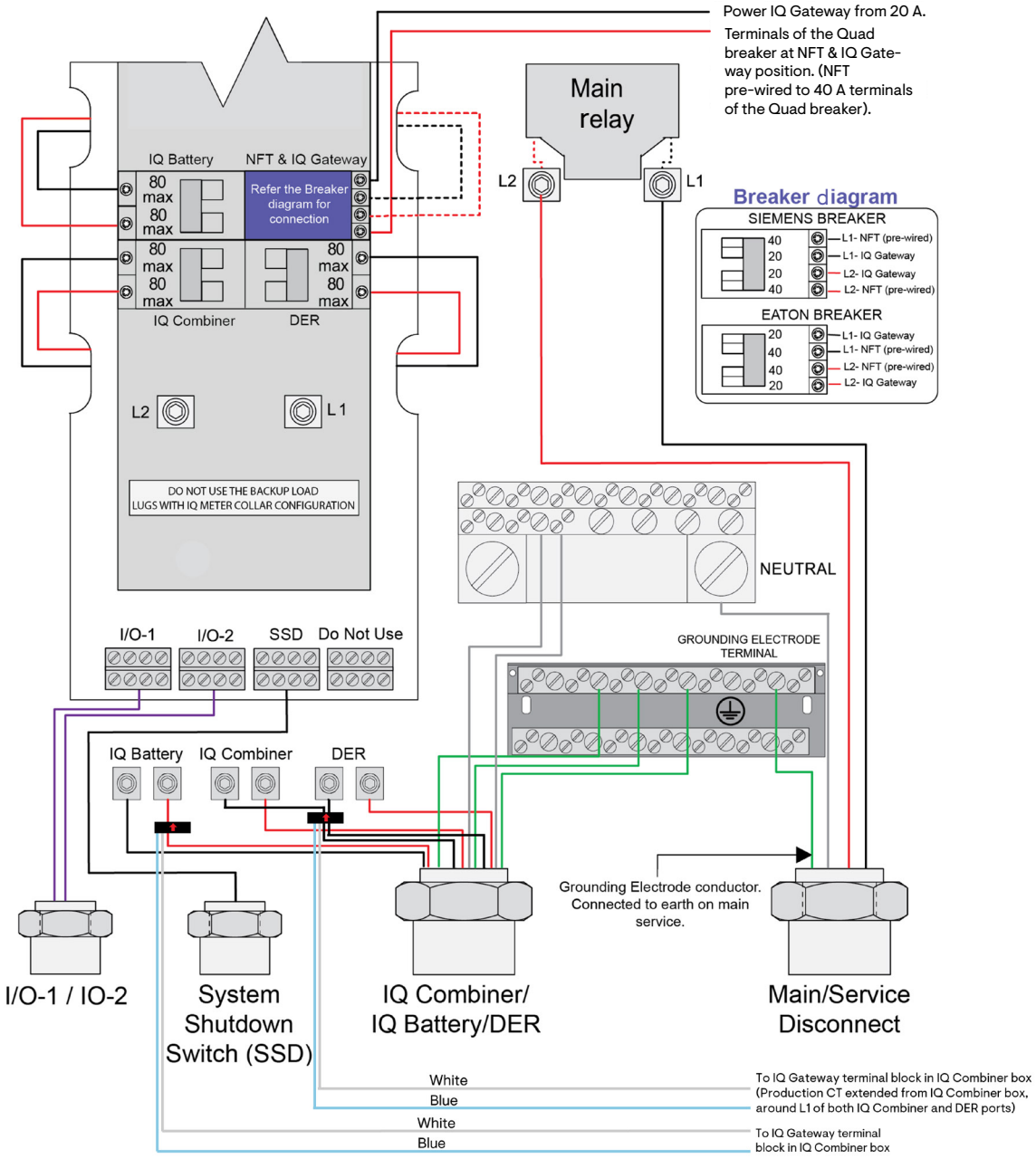


Section C - Wiring

Battery CT will be placed on the L2 wire from the IQ Battery port and the DER port. L2 of IQ Battery and DER port shall be paralleled using one battery CT.

Scenario 2: CT wiring for PV on both IQ Combiner and DER ports

When Production CT is added to capture L1 lines of PV landing on both the IQ Combiner port and DER port in IQ System Controller 3M or when the Production CT in the IQ Combiner is extended to L1 wires of PV on both the IQ Combiner port and DER port.



NOTE: When wiring the Production CT in the above configuration, ensure that the wire length of the Production CT does not exceed 16.4 feet.

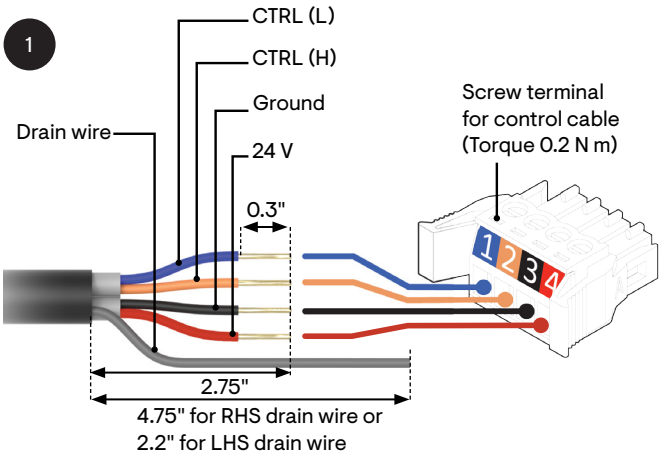
Section C - Wiring

Wiring control (CTRL) cable to headers

NOTE: IQ System Controller supports control wiring and will not support wireless communication.

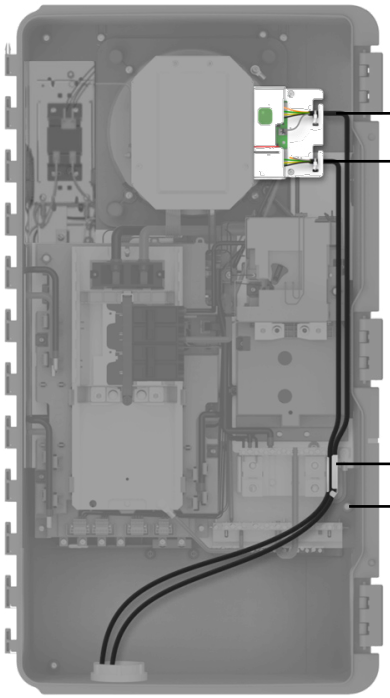
Enphase SKU for control cable: CTRL-SC3-NA-01

1



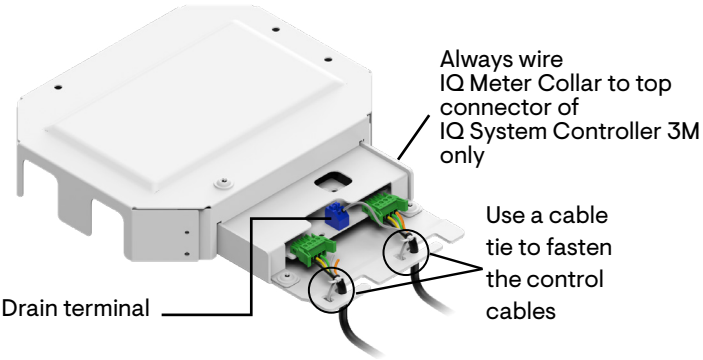
Control cable to be stripped to recommended dimensions and connected to the header.

2



Control cable routing inside IQ System Controller.
Do not use side conduits for control cable routing.

3



IQ System Controller is not the terminal node for the wired control network. Use a control cable of length of 40 inches plus a conduit length on each side.

Connect the drain wire to the drain terminal only at one end of a CTRL cable. Do not connect drain wires at both ends of a CTRL cable.

NOTE:
1) 24 V is available in the upper connector only.
2) 24 V must be connected for the IQ Meter Collar to operate correctly.

NOTE: The control cable required for IQ Battery 5P, IQ Combiner 5/5C, and IQ System Controller 3M must be compliant with UL 3003, UL 1277, and UL 83 standards. The Enphase control cable (SKU: CTRL-SC3-NA-01) with optimal impedance to ensure control communication has been validated for optimal system performance. Third-party cables may not have the correct characteristic impedance and consequently may not work for reliable control communication.

Control (CTRL) wiring between system components

Control wiring guidance for the Enphase Energy System:

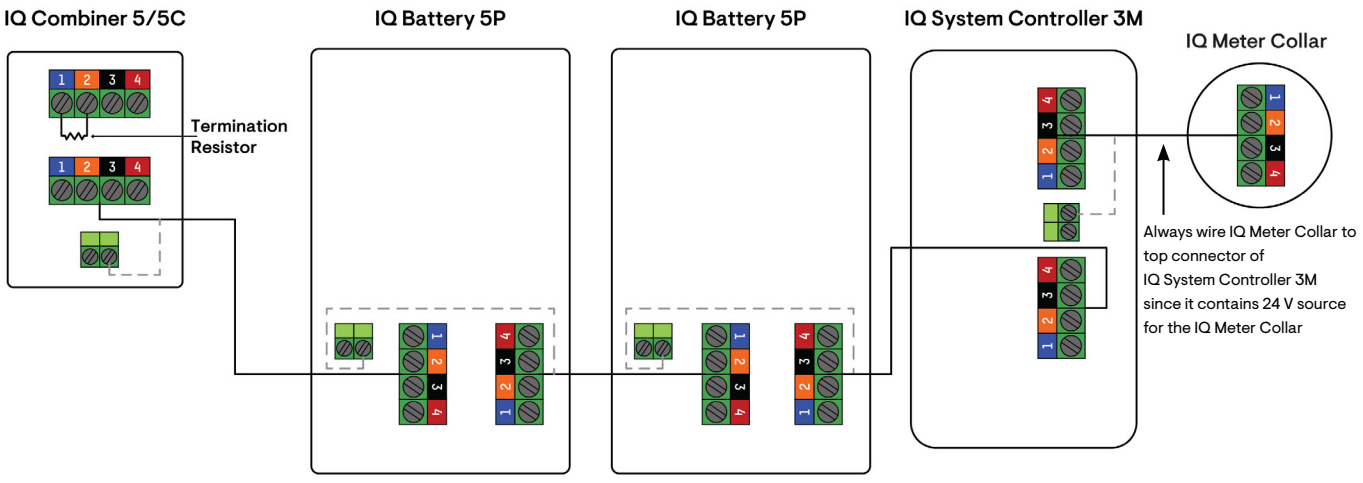
Refer to the following wiring sequences to understand the position of the header with termination resistor, wiring order, and drain wire termination location.

NOTE: Ensure the following guidelines are followed to avoid failures during system commissioning:

- The drain wire should only be terminated on one end of the control wiring between system components.
- It is recommended that the drain wire be terminated at the component from which the control wiring for the section is initiated.
- The same conduits can be used for power and control wire routing only when using an Enphase CTRL cable, that is, CTRL-SC3-NA-01.

The following are the common wiring sequences:

Sequence 1: IQ Combiner 5/5C → IQ Battery(s) 5P → IQ System Controller 3M → IQ Meter Collar

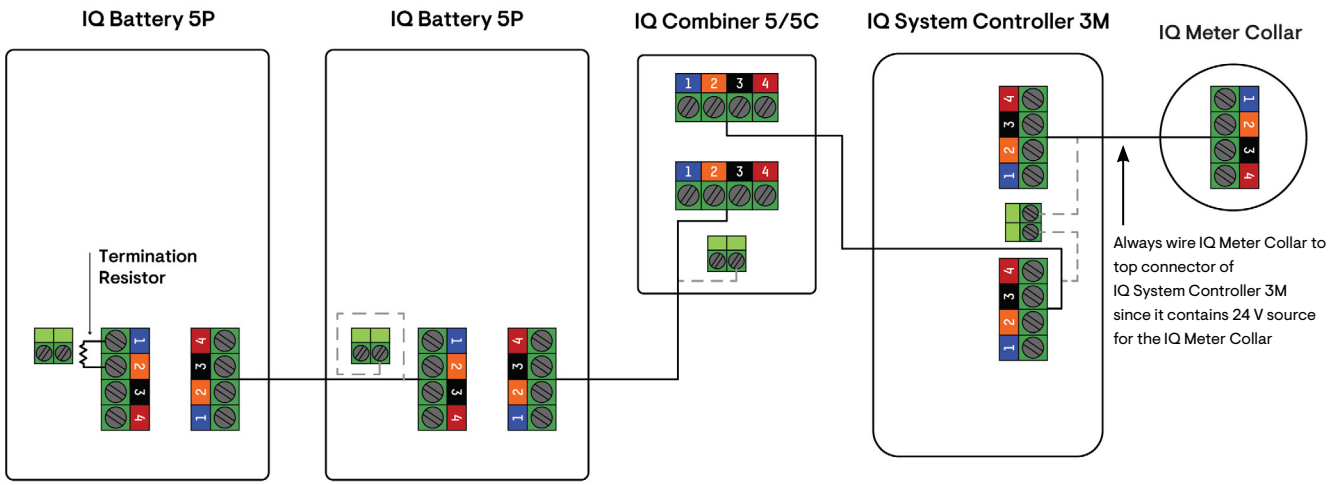


NOTE: The total length of CTRL wiring across the system cannot exceed 250 feet to ensure the system operates as per specifications.

WARNING: The drain wire should only be terminated on one end of the control wiring between the system components to prevent ground loops.

Section C - Wiring

Sequence 2: IQ Battery 5P → IQ Combiner 5/5C → IQ System Controller 3M → IQ Meter Collar



NOTE: The total length of CTRL wiring across the system cannot exceed 250 feet to ensure the system operates as per specifications.

WARNING: The drain wire should only be terminated on one end of the control wiring between the system components, to prevent ground loops.

Here is a table providing termination resistor locations for the above sequences:

CONTROL WIRING SEQUENCE	TERMINATION RESISTOR LOCATION
IQ Combiner 5/5C → IQ Battery(s) 5P → IQ System Controller 3M → IQ Meter Collar	• IQ Combiner 5/5C • IQ Meter Collar
IQ Battery(s) 5P → IQ Combiner 5/5C → IQ System Controller 3M → IQ MeterCollar	• IQ Meter Collar • Last IQ Battery 5P in the daisy chain

Section D

Power Control System (PCS)

Introduction

The Enphase Energy System supports four Power Control System (PCS) use cases:

1. **Main panel upgrade (MPU) avoidance mode**: This feature limits the backfeed current to the main panel based on either the breaker limit (or) the sum of current sources entering into the busbar of the main panel.

   When **MPU avoidance with Busbar Overload control** is enabled, the Enphase Energy System limits backfeed current by controlling the sum of current into the busbar as per National Electric Code (NEC) 2020 705.13 (A) through (E). Busbar overload control monitors backfeed current to the main panel by DERs and current flowing in from the grid and ensures the sum of both at all times is less than the rating of the main panel busbar.

   When **MPU avoidance using the NEC 120% rule**, the Enphase Energy System limits only the backfeed current, as per 705.12, Section (B) (3). In this case, the most common rule as shown below is applicable: ((120% of busbar rating) - Ampacity of the overcurrent protection device protecting the busbar)/125%.

   Enphase recommends using MPU Avoidance with Busbar Overload control to maximize the renewable energy available and minimize any draw from the grid.

2. **Battery import-only or export-only mode:** IQ Battery 5P can be configured in either one of two battery modes: Battery import-only mode or Battery export-only mode.

   Battery import-only mode ensures the IQ Battery 5P never exports any power to the grid. Without this mode, some utilities may require the installation of an additional Net-generation output meter (NGOM) for sites with battery sizes above 10 kW. This feature reduces the cost of installation for the homeowner. Battery import-only, after configuration, applies regardless of the configured battery smart profile, i.e., self-consumption, full backup, or savings (time of use) with optimization.

   Battery export-only mode allows Enphase IQ Battery 5P to export to the grid but ensures it never imports from the grid. Homeowners can benefit from a lower payback period by storing excess PV power during off-peak hours and discharging the stored energy to the grid during the time when it is most beneficial to the homeowner based on the import and export tariff rates.
   Export-only mode is the recommended mode for Net Billing Tariff (NBT) or Net Energy Metering 3.0 (NEM3.0) sites.

3. **Aggregate power export limit mode:** This feature ensures that the aggregate power exported to the grid is limited to the aggregate power export limit (PEL) defined by the installer.

4. **IQ Battery oversubscription mode:** This feature allows for more IQ Batteries to be installed against a given IQ Battery breaker in the IQ System Controller by ensuring that the total continuous output current from the IQ Batteries on the battery port does not exceed 80% of the battery breaker rating.

IQ SYSTEM CONTROLLER SKU	MAX NO. OF IQ BATTERY 5P	PORTS SUPPORTED	MAXIMUM ENERGY (KWH)	MAXIMUM POWER (KW)
SC200D111CMC1US01	16*	IQ Battery and DER	80 kWh	30.72 kW

*Maximum of eight each on IQ Battery port and additional IQ Battery port (DER port).

Section D - Power Control System (PCS)

Setting up PCS on-site during commissioning

1. Ensure the availability of the following Enphase products as required on-site to implement PCS.

PRODUCT	SKU
IQ System Controller 3M	SC200D111CMC1US01
IQ Combiner 5/5C	X-IQ-AM1-240-5, X-IQ-AM1-240-5C, X-IQ-AM1-240-5-HDK, X-IQ-AM1-240-5C-HDK
IQ Battery 5P	IQBATTERY-5P-1P-NA
Microinverters	IQ8 Series
IQ Meter Collar	MC200011V01

2. Installation of the CTs

   The current transformer (CT) placement for each of the features is shown in the following table:

ENPHASE POWER CONTROL FEATURE	CURRENT TRANSFORMER(S) UTILIZED	CT PLACEMENT
Main Panel Upgrade (MPU) avoidance	Production CT, Battery CT, and IQ Meter Collar	Production CT is placed inside the IQ Combiner. IQ Meter Collar is placed in the meter socket between the main panel busbar and utility meter. Battery CT is to be placed inside the IQ System Controller.
IQ Battery oversubscription	Battery CT1	Battery CT is to be placed inside the IQ System Controller.[1]
Battery import only	Production CT and IQ Meter Collar	Production CT is placed inside the IQ Combiner. IQ Meter Collar is placed in the meter socket between the main panel busbar and utility meter.
Battery export only	Production CT, Battery CT, and IQ Meter Collar	Production CT is placed inside the IQ Combiner. IQ Meter Collar is placed in the meter socket between the main panel busbar and utility meter. Battery CT is to be placed inside the IQ System Controller.
Aggregate power export limit	IQ Meter Collar	IQ Meter Collar is placed in the meter socket between the main panel busbar and utility meter.

[1] Battery CT is not utilized for IQ Battery oversubscription, but it is required for other functionality of IQ Battery 5P.

NOTE: Refer to the CT Wiring section for details.

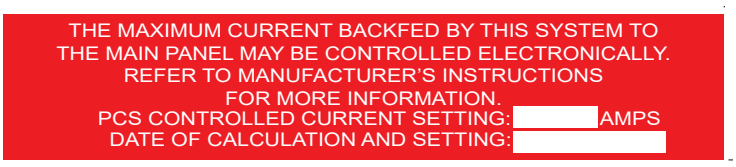
3. Ensure all PCS-controlled busbars and/or conductors are protected with suitably rated overcurrent devices that are appropriately sized for the busbar rating or conductor ampacity.

4. For sites with **main panel upgrade (MPU)** avoidance mode enabled, indicate this with the label.

   Record the maximum operating current value on the label.

   The label is provided as part of the IQ System Controller Literature kit.

MPU avoidance label



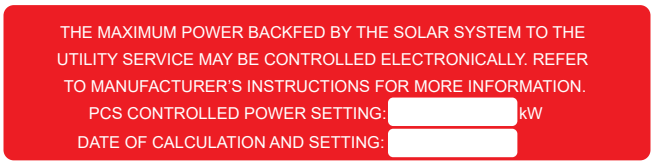
Recommended area to affix - On the dead front below the transparent breaker, position the cover for the main breaker.

Section D - Power Control System (PCS)

5. For sites with aggregate export power limit (PEL) enabled, indicate this with the label. Record the maximum operating kW value on the label.

   The label is provided as part of the IQ System Controller Literature kit.

   AGGREGATE POWER EXPORT LIMIT LABEL:



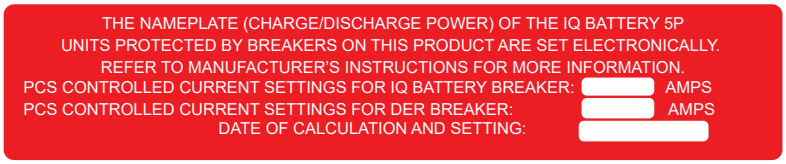
   Recommended area to affix: On the dead front, below the transparent breaker, position the cover for the main breaker.

6. For sites with IQ Battery Oversubscription enabled, indicate this with the label.

   Record the maximum operating current value on the label.

   The label is provided as part of the IQ System Controller Literature kit.

   IQ BATTERY OVERSUBSCRIPTION LABEL



   Recommended area to affix: On the dead front, below the transparent breaker, position the cover for the main breaker.

7. For sites with PCS enabled, indicate with following label on the wired current transformers.
   When using IQ Meter Collar, the label is already present on the product and need not be applied.

   The label is provided as part of the IQ System Controller Literature kit.

   CT LABEL

   Recommended area to affix: On the CTs. When using the IQ Meter Collar for consumption metering, this label is already present and need not be applied to the IQ Meter Collar.

8. Use the site configurations section in the Enphase Installer App to define the PCS settings for the site.

Close and energize IQ System Controller

⚠ **WARNING!** Connect the AC wires of the IQ Combiner and IQ Batteries to the terminal lugs at the bottom of the IQ System Controller load center on the left.
Do not connect the AC wires directly to the breakers.
The AC wires go into the terminal lugs, as shown on the label.

A. Before energizing, make sure that all IQ System Controller wiring is complete.

⚠ **WARNING!** If not commissioning the system, you must ensure that the DC switches on all IQ Batteries are turned off to avoid the depletion of charge on the IQ Batteries.

B. Reconnect the dead front ground cable to the grounding bar. Place the dead front using the five reserved screws. Tighten the cover screws using a Phillips screwdriver.

⚠ **WARNING!** Risk of equipment damage. Ensure that no conductors are pinched before placing the dead front.

⚠ **WARNING!** If either solar or storage circuits are not used in an installation, their respective red and black colored conductors should remain stowed in the clips on the plastic frame supporting the panel board interior, and their end caps should not be removed.

⚠ **DANGER**: Risk of electric shock. There are many potential sources of voltage. Check any IQ Battery, PV, or other sources for voltage.

⚠ **WARNING!** Risk of equipment damage. Do not wire the IQ System Controller when it is energized.

C. If you work on an IQ6 or IQ7 Series retrofit system, and you plan to energize the IQ System Controller and connect the PV without commissioning the system on the same day, follow the sequence below:

   a. Leave the IQ Combiner breaker in the load panel where it was originally placed instead of connecting the IQ Combiner L1 and L2 circuits to the terminal lugs in the IQ System Controller. This way, your PV systems can still be functional before commissioning.

   b. Turn off the DC switches on all batteries.

   c. Open the IQ Battery breaker in the IQ System Controller.

   d. Close breakers in the following order:

      1. Main breaker
      2. Load breaker

⚠ **WARNING!** At commissioning, you must reconnect the IQ Combiner L1 and L2 circuits back to the terminal lugs in the IQ System Controller.

D. If you plan to commission the system, follow the instructions in the Enphase Installer App to provision and energize the Enphase Energy System.

E. Once connected to the IQ Gateway, refer to the Enphase Installer App help topics for more information.

F. If you do not see the IQ System Controller information in the Enphase Installer App, check if the IQ Gateway AP mode light is green. If not, press the AP mode button and follow the instructions in the Enphase Installer App to connect the phone to the IQ Gateway's Wi-Fi network.

G. Remember to close and secure the door of the IQ System Controller before leaving the site.

Safety

IMPORTANT SAFETY INSTRUCTIONS. SAVE THESE INSTRUCTIONS. This guide contains important instructions that you must follow during the installation and maintenance of the IQ System Controller 3M. Failing to follow any of these instructions may void the warranty (enphase.com/warranty).

In case of fire or other emergency

In all cases:

- If safe to do so, turn off all the DC switches on each IQ Battery.
- Turn off the PV breaker and battery breakers inside the IQ System Controller.
- Turn off the AC breaker for the IQ System Controller circuit.
- If an isolator switch is present, switch off the AC isolator for the IQ System Controller circuit.
- Contact the fire department or other required emergency response team.
- Evacuate the area.

In case of fire:

- When safe, use a fire extinguisher. Suitable types are A, B, and C dry chemical fire extinguishers. Additional extinguishing media include carbon dioxide or alcohol-resistant foams.

In case of flooding:

- Stay out of the water if any part of the IQ System Controller or wiring is submerged.
- If possible, protect the system by finding and stopping the source of the water and pumping it away.
- If water has contacted the unit, call your installer to arrange an inspection. If you are sure that water has never contacted the battery, let the area dry completely before use.

In case of unusual noise, smell, or smoke:

- Ensure nothing is in contact with the IQ System Controller or the venting area on top of the IQ System Controller.
- Ventilate the room.
- Contact Enphase Support at enphase.com/en-us/support/contact.

Safety and advisory symbols

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

WARNING: This indicates a situation where failure to follow instructions may be a safety hazard or cause equipment malfunction. Use extreme caution and follow instructions carefully.

NOTE: This indicates information particularly important for optimal system operation. Follow instructions carefully.

Safety instructions

DANGER: Risk of electric shock. Risk of fire. Only qualified electricians should install, troubleshoot, or replace the IQ System Controller.

DANGER: Risk of electric shock. Risk of fire. Do not attempt to repair the IQ System Controller. Tampering with or opening the IQ System Controller will void the warranty. If the IQ System Controller fails, contact Enphase Support for assistance at enphase.com/en-us/support/contact.

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. Do not install the IQ System Controller without first removing AC power from the photovoltaic system and ensuring that the DC switch on the IQ Batteries is off. Disconnect the power coming from the photovoltaics and ensure that the DC switch on the IQ Batteries is off before servicing or installing.

DANGER: Risk of electric shock. Risk of fire. 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.

DANGER: Risk of fire. Do not allow or place flammable, sparking, or explosive items near the IQ System Controller.

DANGER: Risk of electric shock. In areas where flooding is possible, install the IQ System Controller at a height that prevents water ingress.

WARNING: Risk of equipment damage. IQ System Controller is shipped and stored on its back. The upright position is only needed when installed.

WARNING: You must install the IQ System Controller only on a suitable wall using an Enphase wall-mount bracket.

WARNING: Before installing or using the IQ System Controller, read all instructions and cautionary markings in this guide and on the equipment.

WARNING: Do not install or use the IQ System Controller if it has been damaged in any way.

WARNING: Do not sit on, step on, place objects on, or insert objects into the IQ System Controller.

WARNING: Do not place beverages or liquid containers on top of the IQ System Controller. Do not expose the IQ System Controller to flooding.

NOTE: Perform installation and wiring, including protection against lightning and resulting voltage surges, in accordance with all the applicable local electrical codes and standards.

NOTE: Because IQ Battery is grid forming, you must install signage in accordance with NEC articles 705, 706, and 710.

NOTE: Using unapproved attachments or accessories could result in damage or injury.

NOTE: Install properly rated over current protection as part of the system installation.

NOTE: To ensure optimal reliability and to meet warranty requirements, the IQ System Controller must be installed and/or stored according to the instructions in this guide.

NOTE: The IQ System Controller is compatible only with the IQ Combiner 5/5C with CTRL cable wiring terminals, Production CT, and IQ Meter Collar with Integrated Consumption CTs. The IQ Combiner with the IQ Gateway inside is required for the operation of the IQ System Controller. Earlier versions of the IQ Gateway communications gateway are incompatible.

NOTE: The Enphase IQ System Controller is intended to operate with an internet connection through the IQ Gateway. Failure to maintain an internet connection may have an impact on the warranty. See limited warranty for full terms and services (enphase.com/warranty).

NOTE: When replacing an IQ System Controller, you must replace it with an IQ System Controller of the same type with the same AC current rating.

NOTE: Properly mount the IQ System Controller. Ensure that the mounting location is structurally suited to bearing the weight of the IQ System Controller.

NOTE: During use, storage, and transport, keep the IQ System Controller:

- Properly ventilated
- Away from the water, other liquids, heat, sparks, and direct sunlight
- Away from excessive dust, corrosive and explosive gases, and oil smoke
- Away from direct exposure to gas exhaust, such as from motor vehicles
- Away from falling or moving objects, including motor vehicles. If mounted in the path of a motor vehicle, we recommend a 91 cm (36 in) minimum mounting height
- In a location compliant with fire safety regulations
- In a location compliant with local building codes and standards

NOTE: IQ System Controller is not suitable for use as service equipment in Canada.

Environmental protection

ELECTRONIC DEVICE: DO NOT THROW AWAY. Waste electrical products should not be disposed of with household waste. Refer to your local codes for disposal requirements.

Addendum A: Wire sizes and tightening torque

CIRCUIT	TIGHTENING TORQUE (N*M/IN*LB)	WIRE SIZE (AWG/KCMIL/MCM)	WIRE TYPE	WIRE MINIMUM TEMP RATING
Main lugs	31.1/275	300 kcmil-6	Cu/Al	75°C
Main/backup lugs hex nut	5.4/48	—	—	75°C
CSR breakers' bottom wiring lugs	28.2/250	300 kcmil-2	Cu/Al	75°C
BR breakers (pre-installed wires)	3.1/27	6 AWG	Cu	75°C
IQ Combiner lugs	2.8/25 3.4/30 3.9/35 4.5/40	10–14 AWG 8 AWG 4–6 AWG 2–3 AWG	—	75°C
IQ Battery lugs	2.8/25 3.4/30 3.9/35 4.5/40	10–14 AWG 8 AWG 4–6 AWG 2–3 AWG	—	75°C
DER lugs	2.8/25 3.4/30 3.9/35 4.5/40	10–14 AWG 8 AWG 4–6 AWG 2–3 AWG	—	75°C
Neutral (large lugs)	31.1/275	300 kcmil-6 AWG	Cu/Al	75°C
Neutral and ground bars/ large holes (5/16–24 UNF)	5.6/50 5.1/45 4.5/40 4.0/35	1/0–3 AWG 4–6 AWG 8 AWG 10–14 AWG	Cu	75°C
Neutral and ground bars small holes (10–32 UNF)	2.8/25 1.7/15	6–8 AWG 10–14 AWG	Cu	75°C
CTRL cable	0.2/1.77	18 AWG	—	75°C

NOTE: Use copper wire only except where indicated.

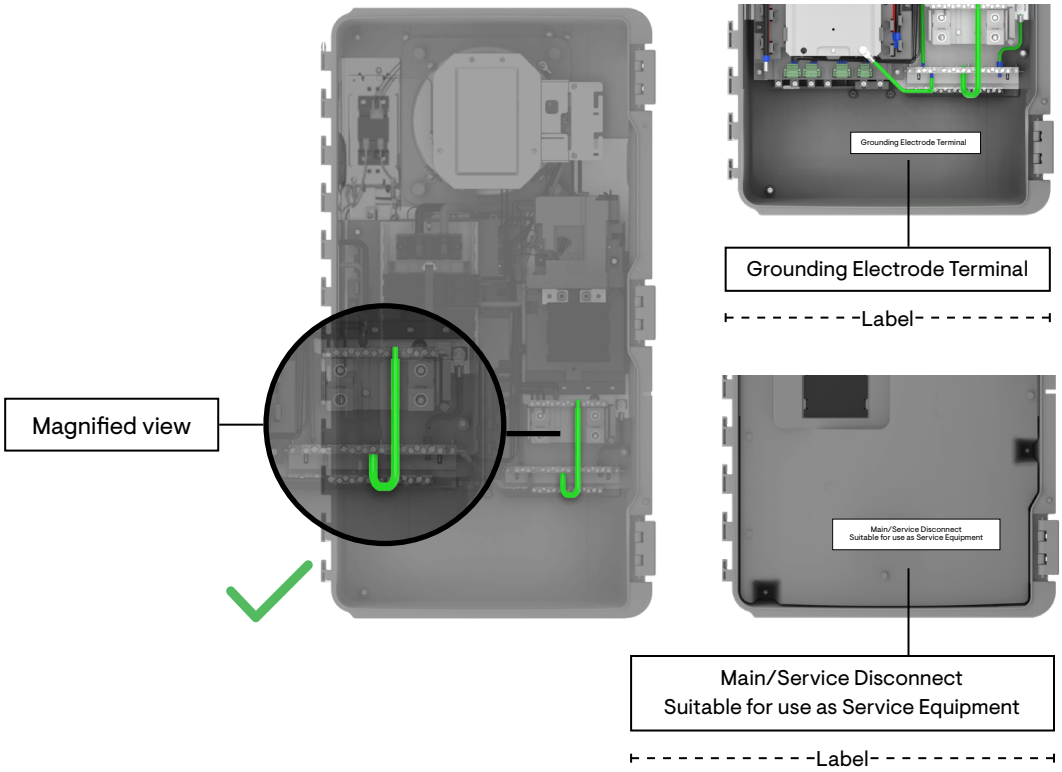
Addendum B: Wiring the system bonding jumper wire

The IQ System Controller 3M is typically not used as a service entrance.

However, If the IQ System Controller 3M is being tapped on the grid side of the main panel, then,

1. Connect a suitable system-bonding jumper between the neutral and ground bars.

2. Paste labels provided in the accessory kit.



Revision history

REVISION	DATE	DESCRIPTION
140-00404-03	January 2025	Added steps for minimum clearance and the spacing requirements.
140-00404-02	November 2024	Added Addendum B.
140-00404-01	August 2024	Initial release.

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