

# Replacing the E3 PCBA from the IQ System

To replace IQ System Controller, read and follow all warnings and instructions in this guide. Safety warnings are listed on the back 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 national and local electrical codes and standards. Only qualified electricians shall install, troubleshoot, or replace the IQ System Controller.

All service or maintenance operations on the IQ System Controller unit should be performed only by trained and qualified personnel who understands and follows the required safety codes and use adequate Personal Protective Equipment (PPE).

- ⚠ WARNING!** The following procedure is to be performed only when the grid is functional and the Enphase system has not formed a microgrid.
- ⚠ WARNING!** Failure to follow this warning could cause personal injury or death. Before performing service or maintenance operations on unit, always turn off main power switch to unit and install lockout tag. Unit may have more than one power switch.

## Tools and parts to be used:

S.No	Component	Qty	Source of part
1	E3 replacement PCB	1	Provided in kit
2	Zip tie	2	Provided in kit
3	Serial number label- for E3	1	Provided in kit
4	Serial number label- for IQ System Controller	1	Provided in kit
5	Spare Zigbee antenna assembly	1	Provided in kit
6	Philips Screwdriver (Size #2)	1	Arranged by installer
7	Flat head Screwdriver (any size)	1	Arranged by installer
8	Multimeter	1	Arranged by installer
9	Sharpie	1	Arranged by installer
10	Wire cutter	2	Arranged by installer
11	Step Ladder	1	Arranged by installer
12	ESD Protective hand gloves	1 pair	Arranged by installer

## PROCEDURE

### 1 De-energizing the IQ System Controller

- A) Turn DC switches in IQ Batteries to OFF. ( For instruction on opening IQ Battery cover please refer to the following document [https://enphase.com/sites/default/files/2021-04/IQ\\_Battery3-10-OIG-EN-US.pdf](https://enphase.com/sites/default/files/2021-04/IQ_Battery3-10-OIG-EN-US.pdf)).
- B) Open IQ Battery breaker in IQ System Controller.
- C) Open PV breaker in IQ System Controller.
- D) Open the mains breaker.
- E) Disconnect the grid source power supply (breaker in main panel).
- F) Open generator breaker.
- G) Use multi meter to measure AC voltage on all the following terminals – PV, IQ Battery, Grid, Load and Generator. It is safe to work on IQ System Controller only when no voltage is detected on any of these terminals and you have ensured that all IQ Battery units have DC powered off.

### 2 Open the IQ System Controller and remove the Dead-front

- A) Open the three latches that lock the enclosure door. To release the latch, pull the latch handle forward and then to the right. With all the latches opened, swing open the enclosure door.
- B) Use a Phillips Size #2 screw driver to loosen the six screws along the periphery of the deadfront. Support the deadfront to keep it from falling while performing the next step.
- C) While supporting the deadfront, use a blade screwdriver to disconnect the deadfront ground wire from the grounding bar before removing the deadfront.
- D) Use the two tabs on the front to assist handling the deadfront during dismantling.
- E) Remove deadfront from the IQ System Controller unit and place it aside safely.

### 3 Open the Controller PCBA Cover

- A) Locate the Zigbee antenna cable zip tied to right side of the E3 cover (metal cover) as shown in **Figure 1**. Using the small wire cutter cut the zip-tie tied between E3 Cover and Zigbee antenna cable.



Figure 1: Zigbee Antenna tied to the side of the E3 cover

**NOTE:**

- 1. Mark the zip tie location on antenna cable using a sharpie for easy locating while reinstalling zip-tie.
- 2. Pay attention to only cut zip tie, do not cut or damage the antenna cable or the EMI sheet wrapped around the cable.

- B) Unscrew the 4 screws on top of E3 cover. Do not remove the ground (green) cable (indicated in **Figure 2a**) connected on the left side of E3 cover. Remove and secure the E3 cover on left side empty space as shown in **Figure 2b**.

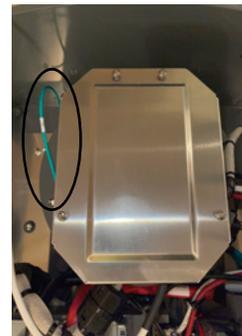


Figure 2a: E3 cover with ground wire indicated



Figure 2b: E3 cover after being removed

- NOTE:** Do not disconnect ground wire connection to E3 cover.



#### 4 Remove the E3 PCBA and Insulator

- A) Make sure to wear ESD protection gloves before handling the connectors on E3 board.
- B) Ensure the following steps are performed 120 seconds after the IQ System Controller has been powered off.
- C) Cut the zip tie on E3 board with the cutter (Zip tie location indicated in **Figure 3**).
- D) Disconnect the red connector from E3 board (indicated in **Figure 3**).
- E) Disconnect the Zigbee antenna (indicated in **Figure 3**).
- F) Disconnect the white connector from E3 board (Indicated in **Figure 3**)
- G) Unscrew the 5 screws with Torx screwdriver T10 (Indicated in **Figure 3** with red circles).
- H) Remove the E3 controller PCBA. If the insulator below the PCBA does not stay in place, remove the insulator and keep it handy as it will have to be reinstalled while installing the new PCBA.

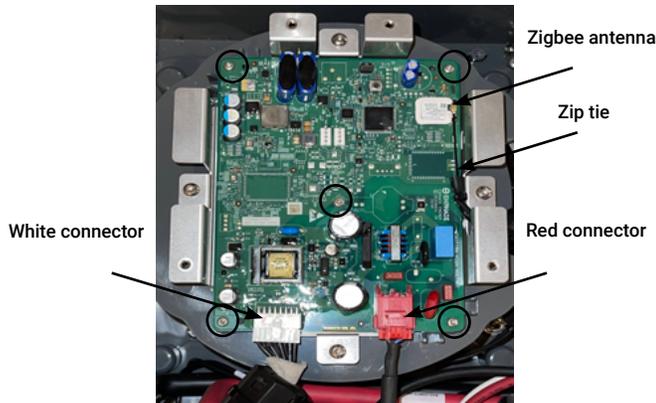


Figure 3: Connections and screws on E3 board

#### 5 Replace the Controller PCBA and Cover

- A) Remove the new PCBA from its packaging.
- B) Insert the new cable tie on the new board in the cable tie slot provided in the board, this will be used to route the Zigbee antenna cable.
- C) If the insulator was removed, retrieve the insulator and align it with the new PCBA so that the insulator is on the bottom and the screw holes on both insulator and PCBA are aligned.
- D) Place the assembled PCBA and insulator in position, align the screw holes on the IQ System Controller.
- E) Loosely screw the board with 5 screws with Torq screwdriver, T10. Leave the screws loose until the zip tie is tightened.
- F) Reconnect the white connector to the E3 board.
- G) Reconnect the Zigbee antenna, and route the cable through the zip tie which had been attached to E3 board in step B. Be sure to insert antenna onto chip in top right corner. The lower chip does not receive an antenna. Trim the zip tie once the antenna is routed.
- H) Reconnect the red connector to the E3 board
- I) Using a hand screw driver, finish tightening the T10 Torq screws to attach the board. Do not use a power tool as this can damage the board. The approximate Torque needed is 0.7 N.m (6.2 lb.in).
- J) Insert another cable tie through the hole on the right side of the E3 cover.
- K) Secure the Zigbee antenna cable to the E3 cover as shown in **Figure 4**.



Figure 4: Zip tie pulled through E3 Cover

- L) Place the cover in the right position while being careful to route the Zigbee cable wire through the conduit provided in the cover.
- M) Loosely install all 4 screws on E3 cover and then go back over them and tighten fully. The torque rating for the 4 screws is 1 N.m (8.8 lb.in).
- N) Install the dead front carefully without causing any push/damage to antenna cable as shown in **Figure 5**.

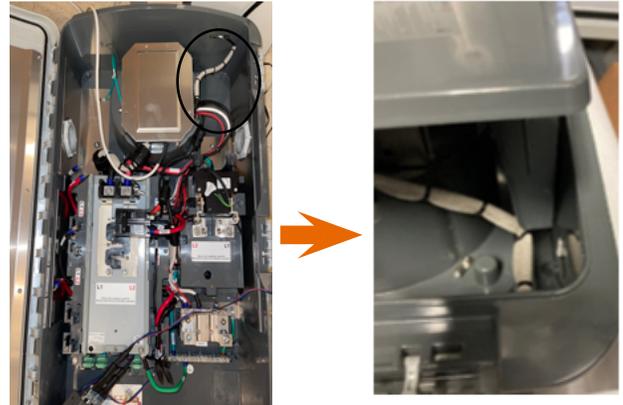


Figure 5: Antenna cable position in IQ System Controller

#### 6 Steps to be followed in case of damage to zigbee antenna

- A) Take a new fresh antenna which is provided in E3 replacement kit.
- B) Position the new antenna beside the present antenna as shown below and paste the adhesive tape as shown in **Figure 6**.



Figure 6: Pasting new Zigbee antenna adjacent to existing one

- C) Remove the adhesive tape holding the existing antenna as shown in **Figure 7**.



Figure 7: Removing damaged Zigbee antenna

- D) Follow the steps from section 5 ( Replace the Controller PCBA and Cover ).

## 7 Close and Energize IQ System Controller

- A) Reconnect the deadfront ground cable to the grounding bar, torque as shown in **Table 1**.

Neutral and Ground bars	Torque (N.m / lb.in)
Large holes (5/16 -24 UNF)	5.6/50
	5.1/45
	4.5 /40
	4.0/35
Small Holes (10-32UNF)	2.8 /25
	1.7 /15

**Table 1: Torque value for Neutral and ground bar**

- B) Replace the dead front using the six captive screws. Tighten the cover screws using a PH#2 screw driver. The torque for the screws are 1.2 Nm (10.6 lb.in).
- C) Before energizing the IQ System Controller check the Manual override position. Toggle the manual override to the "RIGHT"/ OFF position. If the manual override switch had not been engaged (it is already in the "RIGHT"/ OFF position, do not disturb the manual override toggle) replace cover and sticker if available.
- D) Do not Turn on the DC switch on the IQ Battery
- E) You must ensure that all electrical circuits external to IQ System Controller are completed and safe before energizing IQ System Controller in the following order:
- NFT breaker
  - Main breaker
  - PV breaker
  - IQ Battery breaker
  - Generator breaker
  - Load breaker
- F) After IQ Battery breaker is turned ON wait and observe if the IQ Battery red LEDs flash 3 times continuously. Wait for 90 seconds, with the red LED flashing , before turning on the DC switch on IQ Battery.
- G) The IQ Battery LED should change to blue or green based on SOC of battery.
- H) For closing the cover of the IQ Battery please refer to the IQ Battery QIG ([https://enphase.com/sites/default/files/2021-04/IQ\\_Battery3-10-QIG-EN-US.pdf](https://enphase.com/sites/default/files/2021-04/IQ_Battery3-10-QIG-EN-US.pdf)).
- I) Energize the circuit feeding the IQ System Controller. If installed, turn the breaker feeding the IQ System Controller to ON position.
- H) Close and secure the door of the IQ System Controller.
- I) The E3 PCBA replacement kit comes with stickers which will have new serial numbers for the IQ System Controller. Please remove the older serial numbers and paste the new ones in its place.

## 8 Steps for Retiring the IQ System Controller and registering the new IQ System Controller in Enphase Installer App

- A) In order to complete the E3 PCBA replacement the IQ System Controller needs to be retired and the new IQ System Controller serial number needs to be registered using Enphase Installer App.
- B) In order to do this please refer to the Technical Brief for Enphase Energy System Commissioning using Enphase Installer App 3.0. It can be found in this link: [https://support.enphase.com/s/article/IQ\\_System\\_Controller-RMA-Instructions](https://support.enphase.com/s/article/IQ_System_Controller-RMA-Instructions).

# SAFETY

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

## In Case of Fire or Other Emergency

### In all cases:

- If safe to do so, switch off the AC breaker for the IQ System Controller circuit, and 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 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 in the venting area on top of the IQ System Controller.

## Safety and Advisory Symbols

	<b>DANGER:</b> This indicates a hazardous situation, which if not avoided, will result in death or serious injury.
	<b>WARNING:</b> 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.
	<b>NOTE:</b> This indicates information particularly important for optimal system operation. Follow instructions carefully.

## Safety Instructions

	<b>DANGER:</b> Risk of electric shock. Risk of fire. Only qualified electricians should install, troubleshoot, or replace the IQ System Controller.
	<b>DANGER:</b> 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 Customer Support for assistance at <a href="https://enphase.com/en-us/support/contact">enphase.com/en-us/support/contact</a> .
	<b>DANGER:</b> 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.
	<b>DANGER:</b> 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 Enphase IQ Batteries are off. Disconnect the power coming from the photovoltaics and ensure that the DC switch on the IQ Batteries are off before servicing or installing.
	<b>DANGER:</b> 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.
	<b>DANGER:</b> Risk of fire. Do not allow or place flammable, sparking, or explosive items near the IQ System Controller.
	<b>DANGER:</b> Risk of electric shock. In areas where flooding is possible, install the IQ System Controller at a height that prevents water ingress.
	<b>WARNING:</b> Risk of equipment damage. IQ System Controller is shipped and stored on its back. The upright position is only needed when installed.
	<b>WARNING:</b> You must install the IQ System Controller only on a suitable wall using an Enphase wall-mount bracket.
	<b>WARNING:</b> Before installing or using the IQ System Controller, read all instructions and cautionary markings in this guide and on the equipment.
	<b>WARNING:</b> Do not install or use the IQ System Controller if it has been damaged in any way.
	<b>WARNING:</b> Do not sit on, step on, place objects on, or insert objects into the IQ System Controller.

## Safety Instructions, continued

	<b>WARNING:</b> Do not place beverages or liquid containers on top of the IQ System Controller. Do not expose the IQ System Controller to flooding.
	<b>NOTE:</b> Perform installation and wiring, including protection against lightning and resulting voltage surge, in accordance with all applicable local electrical codes and standards.
	<b>NOTE:</b> Because IQ Battery is grid forming, you must install signage in accordance with NEC articles 705, 706, and 710.
	<b>NOTE:</b> Using unapproved attachments or accessories could result in damage or injury.
	<b>NOTE:</b> Install properly rated over current protection as part of the system installation.
	<b>NOTE:</b> 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.
	<b>NOTE:</b> The IQ System Controller is compatible only with the IQ Gateway or Envoy S-metered communications gateway properly fitted with USB hub, USB radios, and production and Consumption/PCS CTs. The Envoy is required for operation of the IQ System Controller. Earlier versions of the Enphase Envoy communications gateway are incompatible.
	<b>NOTE:</b> The Enphase IQ System Controller is intended to operate with an Internet connection through the Envoy. Failure to maintain an Internet connection may have an impact on the warranty. See Limited Warranty for full terms and services ( <a href="https://enphase.com/warranty">enphase.com/warranty</a> ).
	<b>NOTE:</b> When replacing an Enphase IQ System Controller, you must replace it with an IQ System Controller of the same type, with the same AC current rating.
	<b>NOTE:</b> Properly mount the IQ System Controller. Ensure that the mounting location is structurally suited to bearing the weight of the IQ System Controller.
	<b>NOTE:</b> During use, storage, and transport, keep the IQ System Controller: <ul style="list-style-type: none"> <li>• Properly ventilated</li> <li>• Away from water, other liquids, heat, sparks, and direct sunlight</li> <li>• Away from excessive dust, corrosive and explosive gases, and oil smoke</li> <li>• Away from direct exposure to gas exhaust, such as from motor vehicles</li> <li>• Away from falling or moving objects, including motor vehicles. If mounted in the path of a motor vehicle, we recommend a 91cm (36-inch) minimum mounting height.</li> <li>• In a location compliant with fire safety regulations</li> <li>• In a location compliant with local building codes and standards</li> </ul>
	<b>NOTE:</b> 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.