

Tech Brief on Enphase System Shut down

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Please Note: We recently simplified our product and services naming across the Enphase Energy System. For a quick reference chart to map old names to new, please visit [this article](#).

The intent of this article is to illustrate the different methods to override the Enphase Energy Systems. This article does not deal with the Rapid Shutdown requirements which is required by the 2014 NEC. To understand the Rapid shutdown requirement please refer to the FAQ in the Enphase webpage <https://community.enphase.com/s/article/Rapid-Shutdown-FAQs>

Manual over ride is a way of bypassing the Enphase Energy systems in order to carry out maintenance of the home, grid or to shut down the Enphase energy systems.

There are 3 ways of doing manual override supported by Enphase Energy Systems. They are

1. Enphase Energy System Shutdown switch for bypass
2. System Controller Manual over ride procedure
3. Manual Transfer switch for bypass.

Each of these methods are different and will not shut down the Enphase Energy Systems or the grid power. Those must be switched off separately. The Manual Override will assure that the Enphase energy systems no longer connected to the home and the home is safely connected to the grid.

Before doing any maintenance, the technicians should understand if there is power flowing in from any other systems which might be connected outside of the Enphase Energy systems and take adequate precautions for disconnecting the right circuits and wearing protective gear before starting the maintenance work.

1. Use Enphase System Shutdown for Bypass

When the Enphase storage system needs service, installer or homeowner can choose to bypass the Enphase storage system to connect the home to the grid. System shutdowns could be done in order to achieve any one of the 3 following use cases

1. Conduct maintenance / repair activities for the home, during which there should not be any power supply from any source (Grid/Solar/Storage/Generator)
2. Conduct maintenance of the grid when there should not be any back feed
3. Maintenance of the Enphase systems components.

The first 2 maintenance are likely to involve technicians who are not trained to operate Enphase systems. For this reason, there is a need to have a very simple, single point shut down which will be easily accessible and identifiable for 3rd party technicians to use to disconnect the Enphase systems from the home and the grid. This will involve disconnecting all the energy sources and connecting the home to the grid directly.

In the current generation of the System Controller the process of shutting down the Enphase system to enable servicing has been made easier than ever before.

The System Controller will now enable wiring Enphase Energy System Shut down switch, which goes with the SKU name EP200G-NA-02-RSD which will be a single point Enphase System Shut down switch.

a) Working of the Enphase System Shut down

The overall system layout with an Enphase Energy System Shutdown will look like below with a full home back up solution

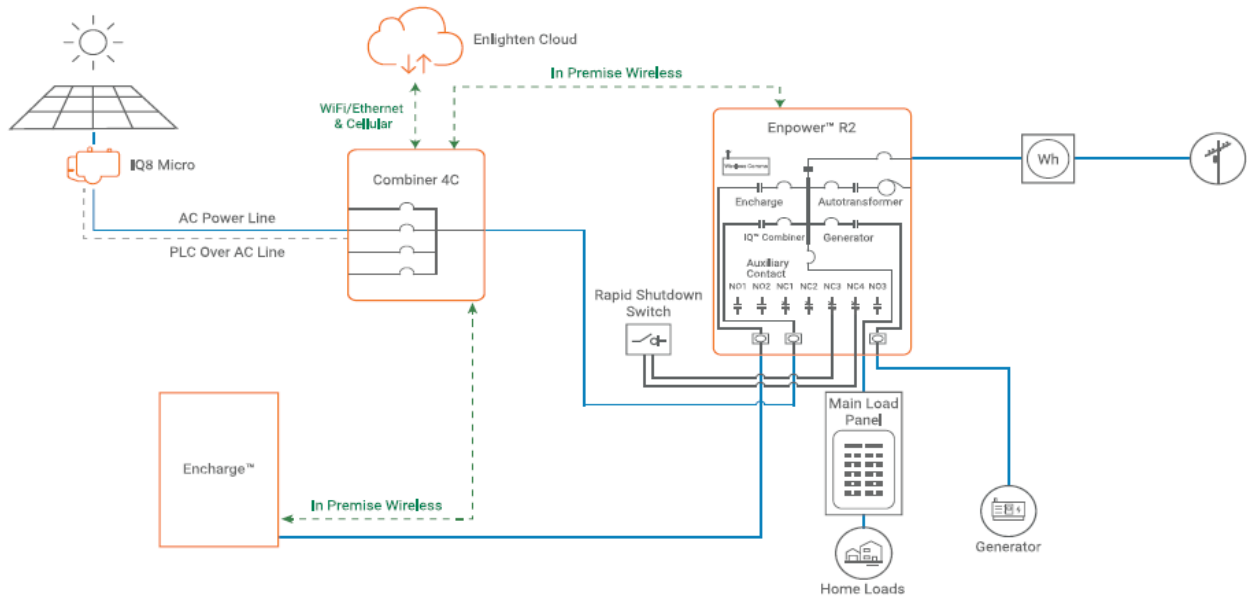


Figure 1: Full home back up with system shut down switch

When the Enphase Energy System shutdown switch is activated, the IQ System Controller opens the relays controlling the IQ Battery, Solar, Generator, and auto transformer and only keeps the MID relay closed.

This effectively isolates the home from the Enphase Energy system and connects it directly with the grid.

b) Wiring the Enphase System Shut down

The wiring and installation of the Enphase Energy System shutdown switch is straightforward. Upon purchasing the SKU EP200G-NA-02-RSD, the kit contains a DPST switch along with a detailed quick installation guide for wiring the switch.

The Switch needs to be wired to the NC aux contacts of the IQ system controller as indicated in figure 2

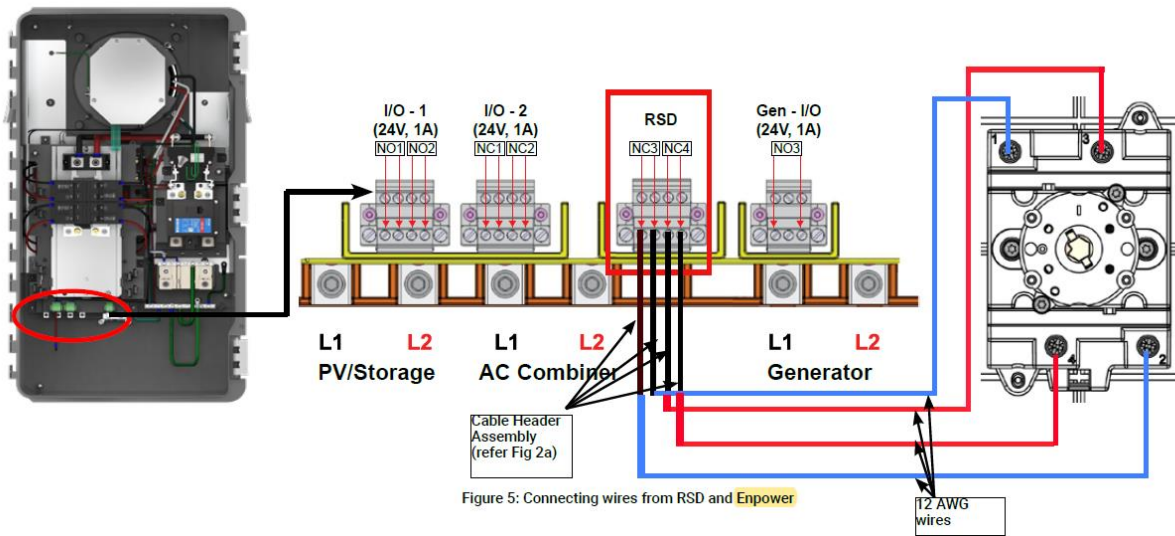


Figure 5: Connecting wires from RSD and Enpower

Figure 2: Wiring of Enphase Energy System Shutdown switch to NC contacts

c) Enphase Energy System Shut down as Rapid Shutdown for PV

As per the NEC requirement every PV installation should have a visible and single point of disconnection which will shut down the PV arrays and deenergize the cables to make it safe for firefighters in the event of an emergency and also to help electrical technicians to carry out maintenance activities safely.

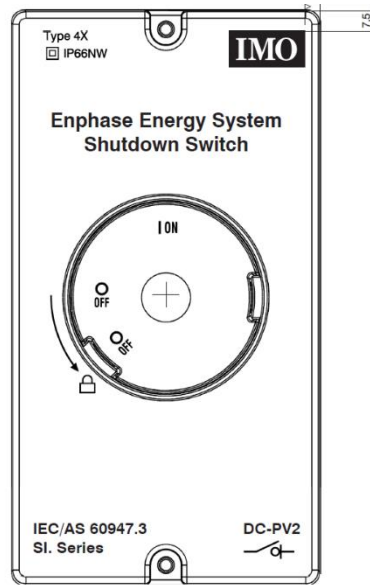
The Enphase System Shutdown switch provides the functionality of Rapid shutdown as mandated by NEC when it is used with IQ System Controller 2 which has a IQ8 micro inverter connected to it. For more information on Rapid shutdown please refer to the Rapid Shutdown FAQ

<https://community.enphase.com/s/article/Rapid-Shutdown-FAQs>

In order to help identify the Rapid Shut down switch/ Enphase Energy System Shutdown labels are provided in the SKU EP200G-NA-02-RSD. 2 labels need to be affixed and both of these need to be within 3ft (1m) from the IQ System Controller or a distance specified by the Authorities having Jurisdiction.

d) Activating Enphase System Shutdown

The Enphase System Shutdown switch looks as shown in Figure X



By simply moving the rotary handle from ON position to OFF position the Enphase Energy System shutdown is activated. This acts as a Rapid shutdown too as mandated by the NEC standards.

Technicians also have the safety option of locking the Enphase System Shutdown switch in OFF position to ensure no one inadvertently turns the switch to ON position.

The system can be grid tied or in grid independent micro grid mode in order to activate the system shutdown.

e) Deactivating Enphase System Shutdown

On completion of the maintenance the technicians need to bring the Enphase System Shutdown switch back to the ON position.

On deactivation of the Enphase Energy System shutdown the System Controller tries to connect to the main grid and if the main grid is absent then it will initiate necessary steps in order to form a microgrid from the Enphase Energy System products, if it is applicable or from the Generator if it is present.

2. System Controller Manual Override Procedure for servicing Enphase Energy systems components

The Enphase Energy system shutdown activation is adequate to isolate the Enphase Energy systems from the grid and the home.


In order to do maintenance of the Enphase products (IQ System Controller, IQ Battery and IQ Combiner) this step will not be adequate. To completely de-energize the Enphase products there are a few more steps which will be needed. These steps are to be performed by an Enphase Trained Technician only.

When the Enphase storage system needs service, installer or homeowner can choose to bypass the Enphase storage system to connect the home to the grid. The current method of bypassing the Enphase storage system consists of a few steps, including opening of all the breakers in the IQ System Controller smart switch, turning off the DC switch on the IQ Battery units, disabling generator – if applicable, turning the “manual override” toggle in IQ System Controller, and closing back all breakers.

Refer to the label below for the complete instructions on how to initiate manual override and how to exist manual override. We recommend that you download the label from this link and apply to the IQ System Controller deadfront, above the manual override section. Please note there are separate manual over ride instructions for System Controller 1 and 2.

The process for Manual over ride with System Controller 1 (Enpower R1) can be found in the image below,

Manual Override Instructions:

 Contact Enphase customer support at (877) 797-4743 and confirm before following instructions below.

Steps for Initiating Manual Override (Tied to Grid)

1. OPEN the breakers for Encharge, Mains, and Auto Transformer in Enpower (The mains breaker could be located inside the main service panel).
Note: No need to open PV combiner and load side breaker inside Enpower.
2. Turn OFF all Encharge units by turning OFF the DC switches on each Encharge base unit.
3. Disable the generator. Turn off generator output breaker inside the generator. Ensure your generator is turned off.
4. Wait for 2 minutes.
5. Remove the sticker from the manual override section of the Enpower. Use a Phillips head screwdriver to remove the screw on the plastic cover. Then remove the plastic cover to make the small manual override toggle visible.
6. Turn the toggle to the left to manually CLOSE the MID relay.
7. CLOSE the mains breaker.


The Enpower system is now in manual override mode and grid tied.

Steps for Exiting Manual Override:

1. OPEN the breakers for Encharge, Mains, and Auto Transformer in Enpower.
2. Turn OFF all Encharge units by turning OFF their DC switches.
3. Wait for 2 minutes.
4. Turn the manual override toggle to the right to manually OPEN the MID relay.
5. CLOSE all the breakers in sequence:
 - a. NFT breaker inside Enpower
 - b. Mains breaker (In Enpower or main panel)
 - c. Encharge breaker inside Enpower
6. Turn ON all Encharge units by turning ON their DC switches.


The Enpower system is now no longer in manual override mode and is fully fuctional.

Scan QR code to view instruction videos



The steps for initiating Manual override for System Controller 2 (Enpower R2) can be found in the image below.

Manual Override Instructions:

 Contact Enphase customer support at (877) 797-4743 and confirm before following instructions below.

Steps for Initiating Manual Override (Tied to Grid)

1. Put the remote rapid shutdown switch to OFF state.
2. OPEN the breakers for PV, Encharge, Generator, and NFT in Enpower.
3. OPEN the cover of the manual override switch in Enpower, and turn the manual override toggle to the LEFT to manually CLOSE the MID relay.

The Enpower system is now in manual override and grid only mode.

Steps for Exiting Manual Override:

1. Put the remote rapid shutdown switch to ON state.
2. Turn the manual override toggle in Enpower to the RIGHT to manually OPEN the MID relay.
3. CLOSE the PV, Encharge, Generator, and NFT breakers in Enpower.

The Enpower system is now no longer in manual override mode and is fully fuctional.

3. Manual Transfer Switch for Bypass

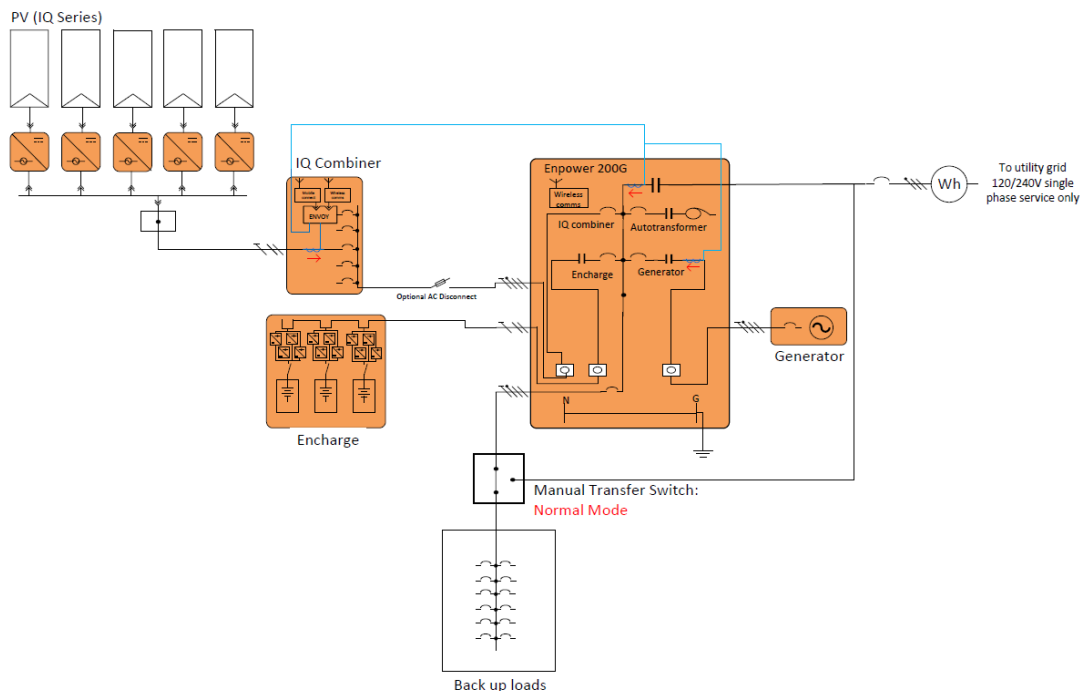
Some homeowners and installers may find this manual override sequence too complicated and cumbersome. We are working on simplifying this process on next generation of our IQ System Controller smart switch that is currently under development.

If installer wants a one-step manual override to connect home to grid with the existing ie., 1st revision of the IQ System Controller smart switch, a manual transfer switch can be used as a bypass for IQ System Controller. Manual transfer switches occupy a large amount of space physically, but they offer a single step electrical bypass procedure. The manual transfer switch is installed on the load side of IQ System Controller; it allows the backed-up loads power supply to be switched between the IQ System Controller's load lugs/breaker and the direct supply from the grid. Since the manual transfer switch ensures that the power is only available to the backed-up loads via a single current path, there are no parallel current paths in the system that would violate code requirements.

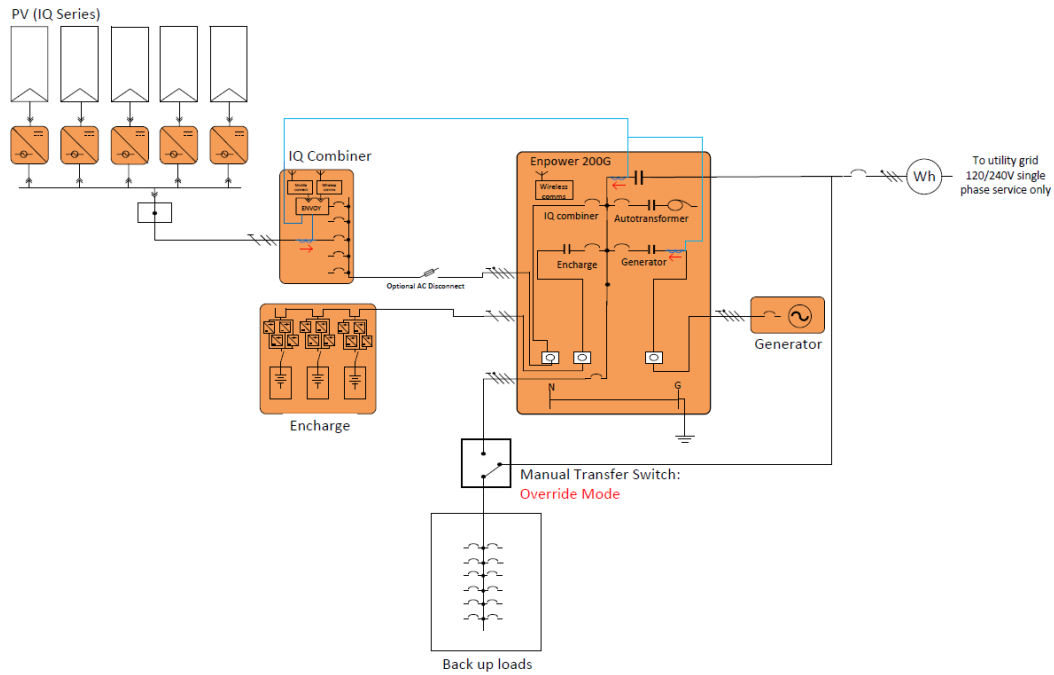
With the manual transfer switch, there is no need to perform any other steps to turn off IQ Battery or IQ System Controller. The installer or homeowner needs to simply move the lever of the manual transfer switch to the position that connects the backed-up loads to the grid while breaking the current path from backed-up loads to IQ System Controller. Note that IQ System Controller is still connected to the utility grid hence the IQ System Controller stays powered, even though from the perspective of the homeowner the IQ System Controller and therefore the Enphase storage system have been bypassed.

As shown in the diagrams below, in the Normal mode, the manual transfer switch has IQ System Controller connected to the main or sub panel. When IQ System Controller needs service (Override mode), homeowner can turn the manual transfer switch to connect the grid to the main or sub panel.

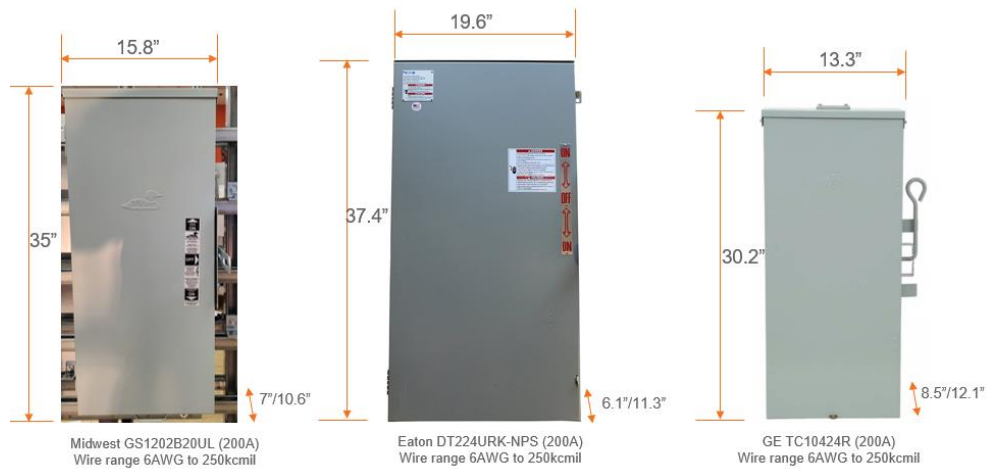
Normal mode:



Override mode:



Enphase recommends a list of manual transfer switches. The 200A options are shown in the image below.



The list of recommended manual transfer switches with 200A and 100A ratings are shown in the table below. The links for their purchases are embedded with the model numbers in the table.

Models	Amp	Wire Range	Dimensions
GE TC10323R	100A	12-1AWG	15.1" x 7.2" x 5.2"/8.5"
Eaton DT223URH-N	100A	14-1/0AWG	24.6" x 11.9" x 5.4"/9.9"
Midwest GS1101B12UL	100A	14-1/0AWG	26" X 13" X 6.8"/10.6"
GE TC10424R	200A	6AWG-250kcmil	30.2" x 13.3" x 8.5"/12.1"
Eaton DT224URK-NPS	200A	6AWG-250kcmil	37.86" x 19.6" x 6.1"/11.3"
Midwest GS1202B20UL	200A	6AWG-250kcmil	35" x 15.75" x 7"/10.6"

4. Scenarios for using different switches

Enphase Energy

	Enphase Energy System Shutdown Switch/ Rapid shutdown	Manual Over ride switch	Manual Transfer Switch
Applicable System Controller Version	System controller 2	System Controller 1 ,2	All versions of System Controller
To be used by	Enphase Technicians, Utility Technicians, Fire fighters/Emergency first responders & Electricians	Enphase Installers or Technicians	
Scenarios to be used in	Home Maintenance, Grid Maintenance	Enphase Energy System Service	Home Maintenance, Grid Maintenance