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***PV and load shedding configuration in Enphase Energy System***

Contents

**Applicable countries**.....2

**Overview**.....2

**PV and load shedding using external normally open (NO) contactor on Enphase Energy System** .....2

**Contactors selection** .....4

**Contactors wiring**.....4

**Energize DER (distributed energy resource- battery and PV)** .....5

**Commissioning the PV and load shedding control logic** .....5

**Electrical safety check** .....7

**Revision history**.....8

## Applicable countries

- Australia
- New Zealand

## Overview

The PV and load shedding is an application on the Enphase Energy System that provides control over the microinverter circuit or any specified load. The IQ System Controller 3 INT has an I/O board with four dry contacts configured for PV or load shedding.

## PV and load shedding using external normally open (NO) contactor on Enphase Energy System

The microinverter shedding is done for specifically supported microinverters with the Enphase Energy System (S230, S270, IQ7, IQ7A, IQ7+ Microinverters) that must be OFF during the off-grid state. This function provides a greater microinverter capacity to charge the battery and use it to supply loads or export energy to the grid during the on-grid state.

For load shedding, set up the control as per the following table:

Mode	On-grid	Off-grid	Examples
Basic	Powered	Not powered	Aircon, pool pump, third-party inverters
Scheduled	Powered	Powered between specified time intervals	Hot water heater, sprinklers, pump
Advanced	Powered	Powered when the battery charge is above the specified % SOC	Aircon, small loads (non-essential)
Manual	Remote powered on/off by the Enphase Installer App		Aircon, pool pump



**NOTE:** For PV shedding of IQ7 and S Series Microinverters, ensure the total PV power capacity in kVA is not more than 1.5x (150%) of the battery capacity (kVA). The remaining microinverters above 150% can be put on PV shedding contactors. The serial numbers of microinverters that are controlled and turned off during backup (off-grid) operation must be noted.

The following table shows examples of Enphase Energy System configurations with IQ Microinverters and IQ Battery connected to the IQ System Controller on the L1 phase.

Connect the IQ Batteries to the L1 phase for initial release.

The IQ Microinverters and IQ Battery circuits are connected to the same DER relay inside the IQ System Controller 3 INT, which can support a maximum continuous current of 80 A passing through the combined circuits of IQ PV and IQ Battery per phase. Up to 4 units of the IQ Battery 5P can be supported per phase in the Enphase Energy System.

IQ Battery 5P units	IQ Battery energy capacity	IQ Battery power	Max PV capacity supported on L1 phase with IQ Battery	IQ Battery L1 line current	IQ PV L1 line current	Total DER system L1 line current	Maximum number of microinverters on L1 in backup					
	(kWh)	(kWac)	(kWac)	(A)	(A)	(A)	S230	S270	IQ7	IQ7+	IQ7X	IQ7A
1	5	3.84	5.76	17	25	42	24	21	24	19	18	16
2	10	7.68	11.52	33	50	83	49	42	48	39	36	33
3	15	11.52	17.28	50	75	125	74	63	72	58	54	49
4	20	15.36	17.28	67	75	142	74	63	72	58	54	49

Table 1: Maximum power of IQ Microinverter for Enphase Energy System for backup operation



**WARNING:** Under-sizing or oversizing the power and energy capacity of the storage system may lead to a poor user experience and failures in the system. User education and setting reasonable system performance expectations are essential for backup storage systems. In case of complexity or a query not covered in this document, installers must contact the Enphase field application engineering team.

- Allowable as per the total DER circuit on L1 phase capacity.
- The oversizing of the DER circuit on the L1 phase is acceptable. However, reduce the PV and storage power output through software control, also known as generation limiting, if this is acceptable by the local DNSP in accordance with section 6 of AS4777.2 grid standard. Alternatively, reduce the number of IQ Microinverters or IQ Battery 5P connected to the L1 phase.
- The oversizing of the DER circuit on the L1 phase is exceedingly high. Reduce the PV and storage power output through software control, also known as generation limiting, if this is acceptable by the local DNSP in accordance with section 6 of AS4777.2 grid standard. It is also recommended to reduce the number of IQ Microinverters and IQ Battery 5P connected to the L1 phase.

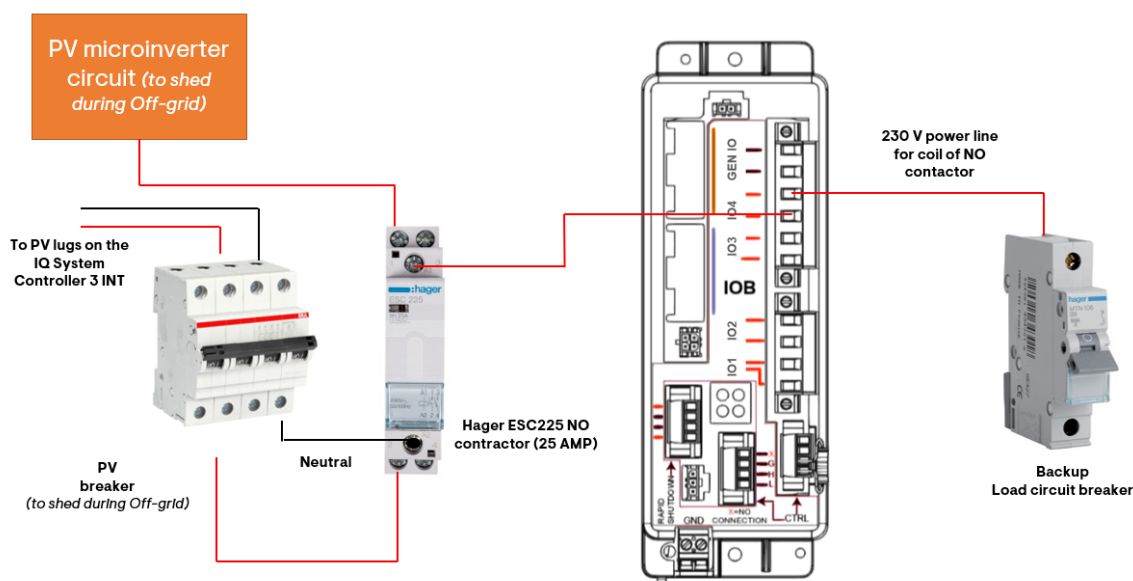


Figure 1: Block diagram of PV shedding on NO contactor setup

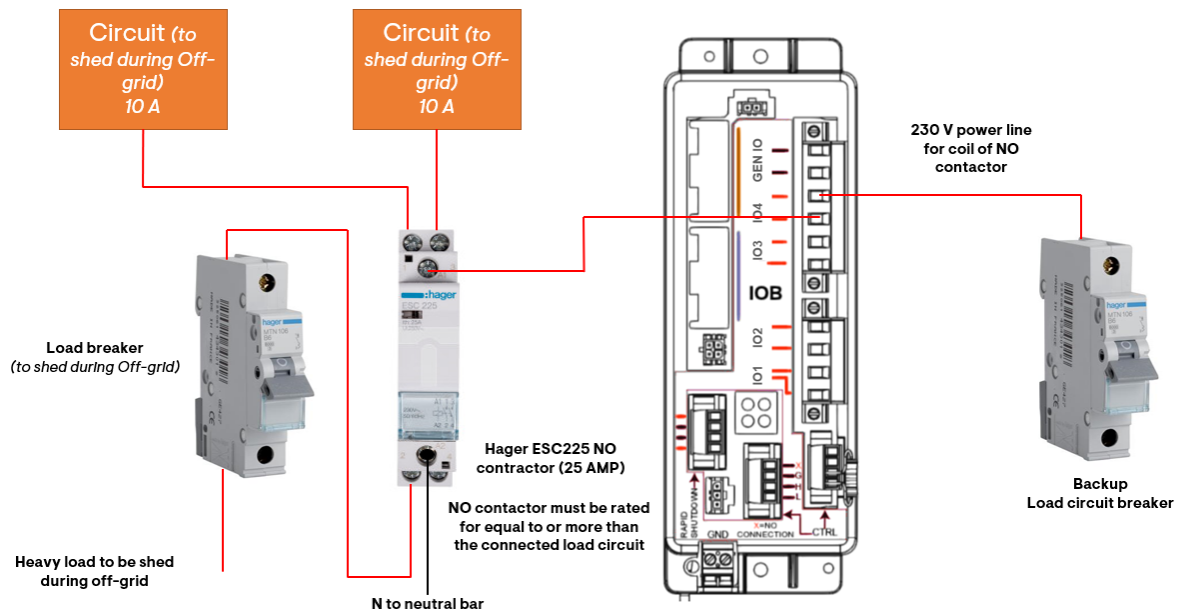


Figure 2: Block diagram for Load shedding on NO contactor setup



**DANGER:** Risk of electric shock. When energizing equipment, check that IQ Battery units are correctly wired as prompted. Miswiring can result in a safety hazard. Ensure the IQ Battery ground connection does not have an L1 or L2 connection, which introduces a safety hazard.

## Contactor selection

Type:	Normally open (NO)
Rated current:	25 A (based on the total capacity of the microinverter circuit and PV MCB).
Example:	For 13 × IQ7A on PV shedding contactor, it is recommended to use a NO contactor that is HAGER ESC225 NO (25 AMP).

## Contactor wiring

Follow the steps to set up PV/load shedding on NO contactor.

1. Connect the PV/load shedding circuit breaker to the NO contactor and connect the microinverter/load circuit to the output of the NO contactor, as shown in Figures 1 and 2.
2. Connect the wire for energizing the contactor from the NO contactor to a slot/pin on any of the I/O terminals (IO1, IO2, IO3, and IO4) on the I/O board located on the IQ System controller and note the I/O terminal label slot/pin, as you will need to program the PV/load shedding logic in the Installer App.
3. Connect the other slot/pin of the same I/O terminal used in step 2 to the backup load circuit breaker (I/O power supply).

## Energize DER (distributed energy resource- battery and PV)

Ensure the microinverters branch circuit and IQ Battery breakers are turned ON in IQ System Controller 3 INT in the following order:

1. Ensure the System Shutdown (SSD) switch is wired to the I/O board of the IQ System Controller 3 INT as per the QIG and the SSD is in the ON position.
2. Turn ON the main circuit breaker and any breakers on the line side of the IQ System Controller 3 INT.
3. Turn ON all PV circuit breakers.
4. Turn ON the IQ Battery circuit breaker. If an AC isolator is installed, switch the AC isolator ON.
5. Turn ON the DC switch on each IQ Battery.
6. Wait 30-60 seconds for DER to energize and the MID relay to close.

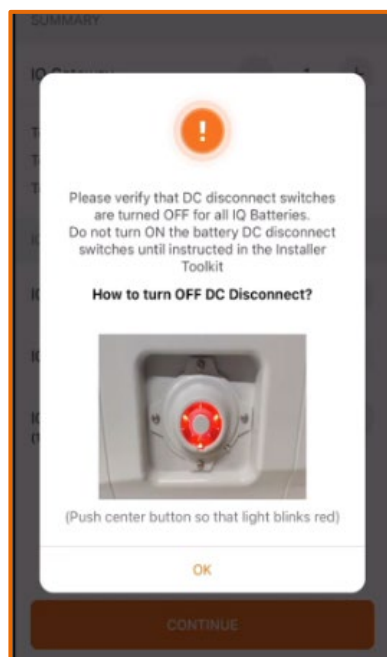
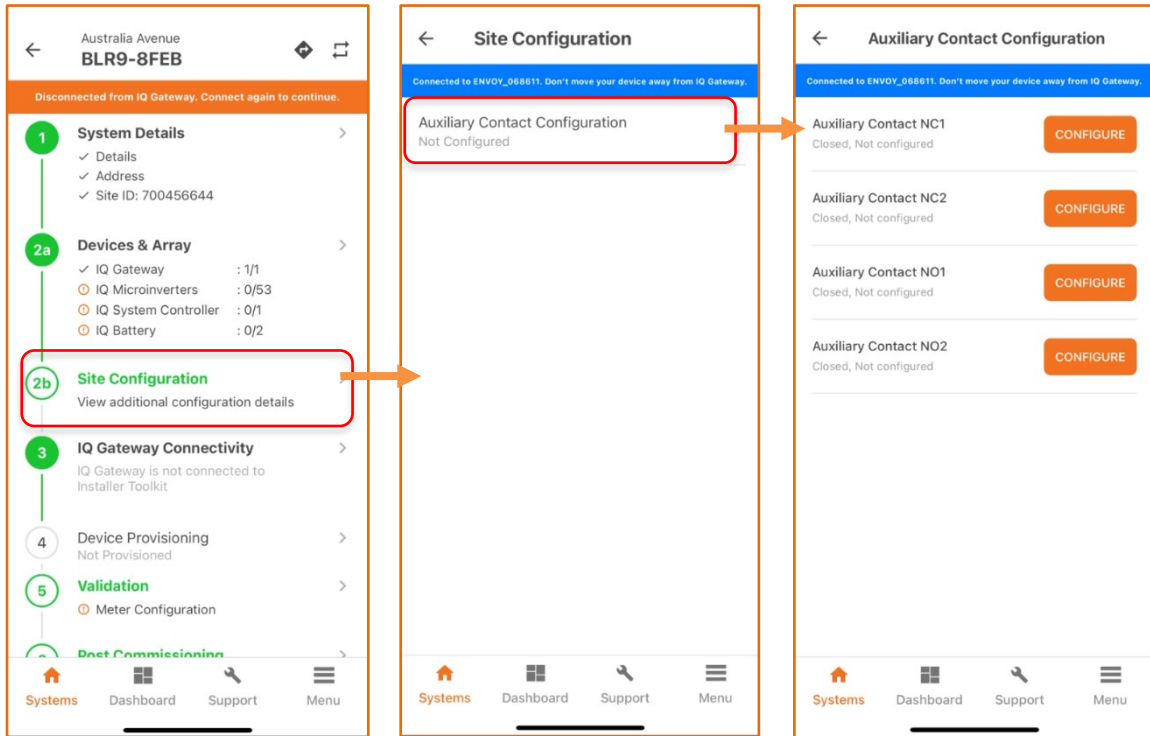


Figure 3: Battery DC switch indicator and button

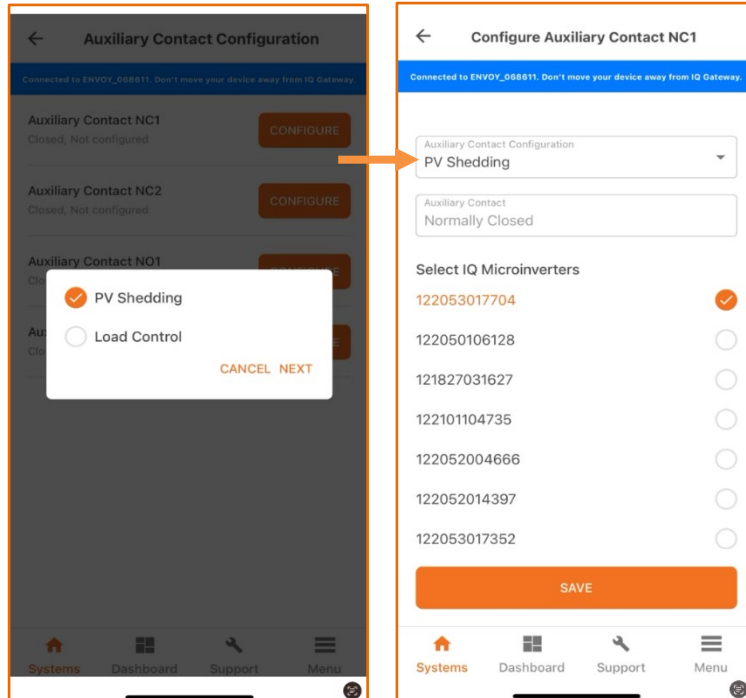
## Commissioning the PV and load shedding control logic

Follow the steps to commission the PV and load shedding control logic:

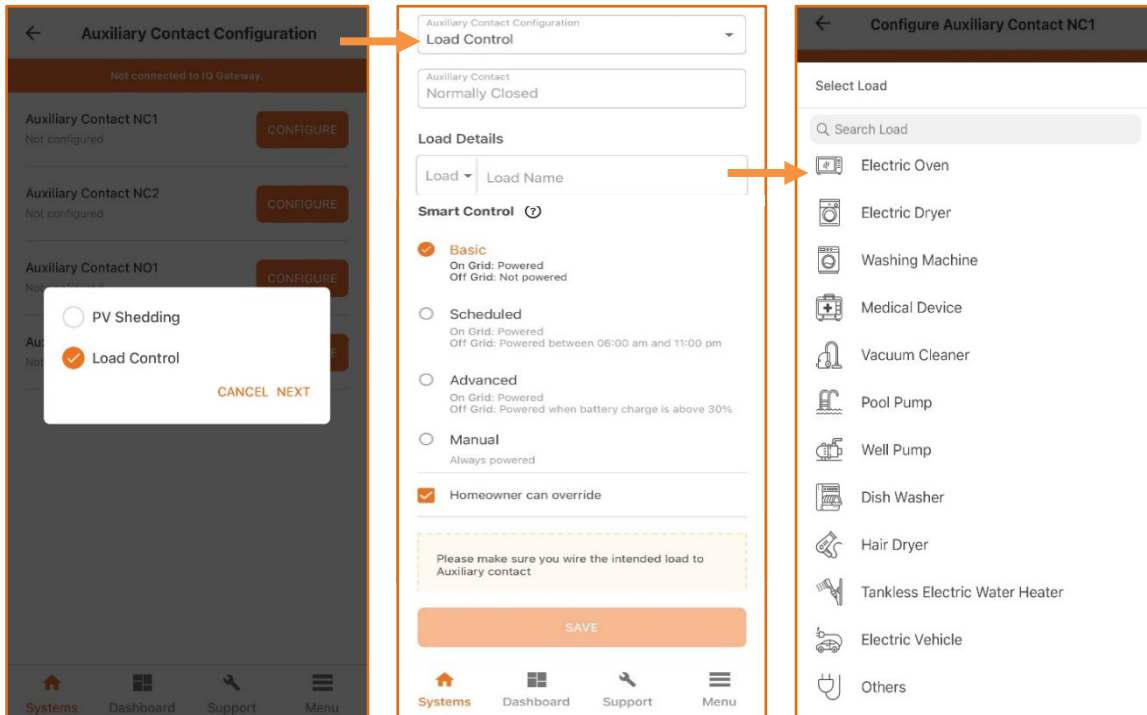
1. Open the Enphase Installer App and connect your smart device to the IQ Gateway Wi-Fi access point.
2. On the “Systems” tab, select “2b Site Configuration”.
3. Select “Auxiliary Contact Configuration”. Choose the correct contact’s name per the wiring done in the IQ System Controller.



3.1 For PV shedding, select “PV Shedding”, then choose the branch circuit microinverters connected to the NO contactor.



- 3.2 For Load shedding, enter the load name or select from the “Load” drop-down menu, then select the required smart control settings for a particular load.



## Electrical safety check

1. Ensure that AC power is supplied to the IQ Battery. Ensure the breaker inside IQ System Controller 3 INT is closed and any AC breakers between IQ System Controller 3 INT and IQ Battery (if there is a battery combiner panel).
2. Using a voltmeter, measure the IQ Battery chassis metal to Earth (grounded conduit) and ensure no AC voltage source is present. If there is incorrect wiring, a ground fault may exist, and the AC voltage may read ~230 VAC. If voltage is present, DO NOT touch the chassis. Immediately remove AC power from the IQ Battery circuits and turn OFF the DC switch ON the IQ Battery.
3. Correct the wiring before proceeding. Ensure all AC sources are removed and the DC switches on all IQ Battery units are turned OFF.
4. Ensure the DC switches are turned OFF on all IQ Battery units.

If you have questions, contact Enphase Support at (1800) 006-374 (AU), (09) 887-0421 (NZ), or email [support\\_au@enphaseenergy.com](mailto:support_au@enphaseenergy.com)

## Revision history

Revision	Date	Description
TEB-00048-1.0	July 2023	Initial release

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