Enphase Energy System 3.0 with third-party DC string inverters (grid-connected)

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Introduction

This technical brief explains how to integrate any third-party DC string inverters (grid-connected) into the Enphase Energy System with IQ System Controller 3 INT and IQ Battery 5P.

NOTE: In addition to using third-party DC string inverters (grid-connected), PV capacity can be increased by adding additional Enphase microinverters on the PV lugs into the IQ System Controller 3 INT. However, note that IQ7 Series and S Series Microinverters cannot be mixed with IQ8 Series Microinverters on the same IQ Gateway; this requires a second IQ Gateway. Refer to the Expanding the Enphase Energy System technical brief for more information.

The total combined non-IQ8 Series Microinverters must be kept at 150% or less of the total installed IQ Battery 5P continuous power rating. Refer to the Enphase Energy System PV and storage power limiting technical brief for more information.

Method 1 (preferred): Third-party DC string inverter (grid-connected) into the PV input lug through the contactor

Primary use case: This is the preferred method when the installer is able to modify the existing installation.

- Terminate the third-party DC string inverters (grid-connected) sub-mains through a contactor into the PV lugs of the IQ System Controller 3 INT.
- Ensure there is adequate PLC filtering for the third-party DC string inverters (grid-connected) by installing some ferrite core rings to block any noise from the inverters. Refer to the tech brief Ferrite Core Installation to suppress site noise issues.
- The contactor needs to be controlled by the IQ System Controller 3 INT auxiliary relay located at the IO Board.
- Follow the PV and load shedding configuration in the Enphase Energy System to program the IQ Battery of the IQ System Controller 3 INT to open the contactor when transitioned to backup mode. The third-party DC string inverters (grid-connected) will only operate on the grid to charge the battery; it will not currently operate in backup mode.
- There is no need to extend any Production CT as the third-party DC string inverters (grid-connected) production is measured by the embedded Production CT in the IQ System Controller 3 INT.

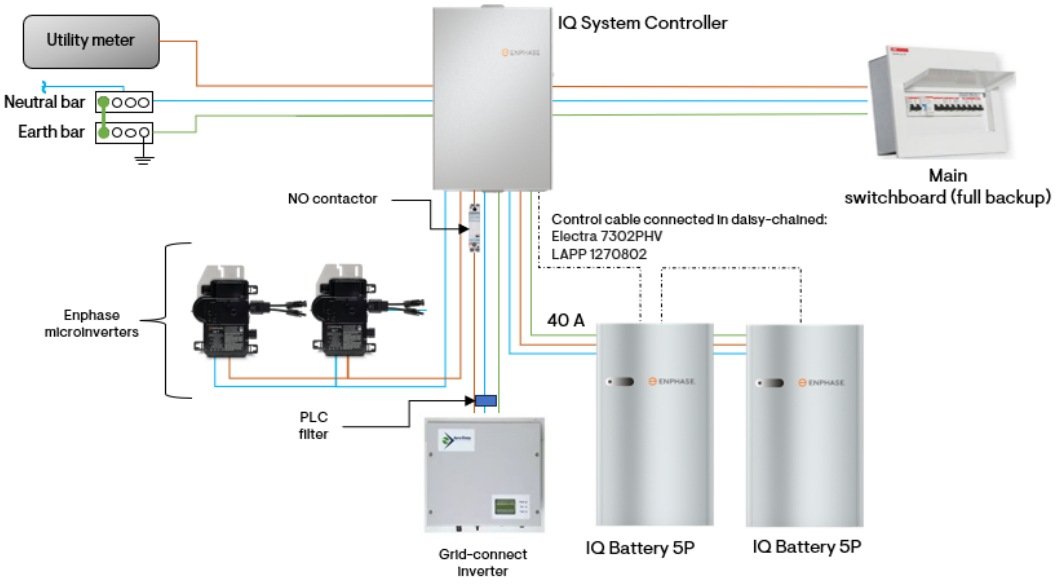

Figure 1: Method 1 (preferred) - third-party DC string inverters (grid-connected) into the PV input lug through the contactor

With this method, the third-party DC string inverters (grid-connected) will function normally in on-grid mode and will be disconnected when the IQ System Controller 3 INT transitions into backup mode.

In the future, Enphase will develop additional settings to allow the third-party DC string inverters (grid-connected) to work up to a set point of state of charge (to be determined) of the IQ Battery 5P in backup mode.

Method 2: Third-party DC string inverter (grid-connected) on the non-backup lugs using external CT(s)

Primary use case: When the installer is not able to modify the existing installation.

- The third-party DC string inverters (grid-connected) are on the non-backup side of the IQ System Controller 3 INT, and a Production CT is extended on the correct phase of the inverters; that is, the red phase (phase A) has an extended CT into the L1 Production CT terminal of the IQ Gateway inside the IQ System Controller 3 INT.
- Additional Enphase Production CT(s) must be purchased separately, one for every phase of the inverter.

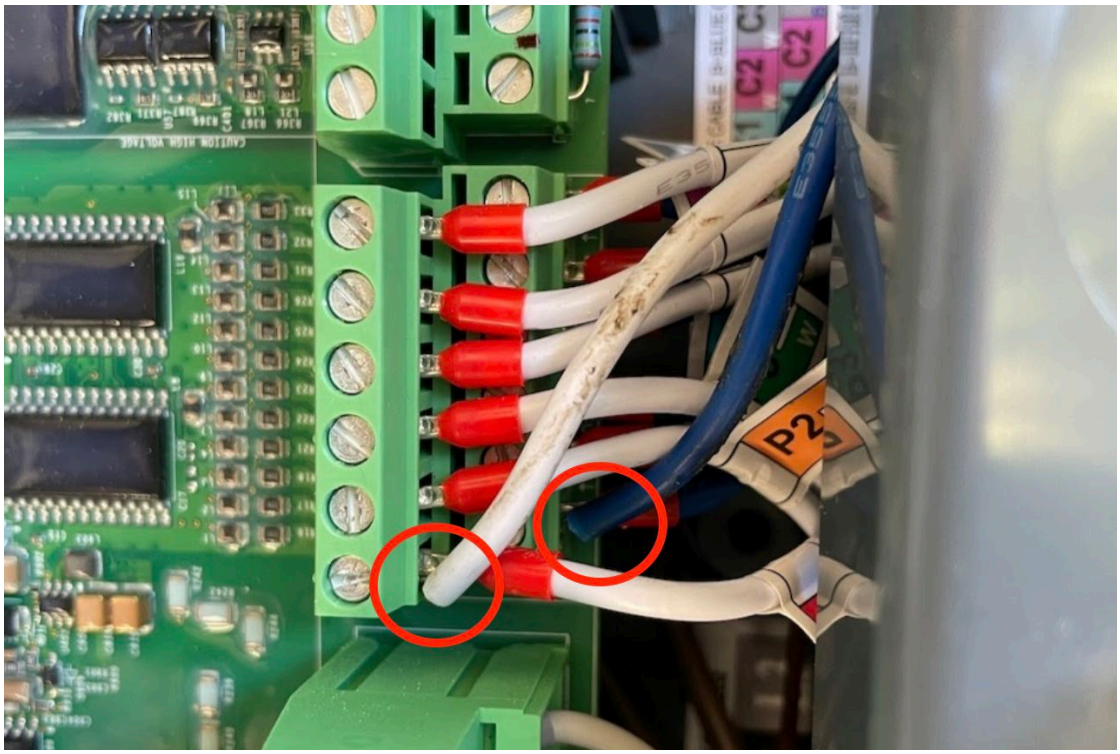

Figure 2: Method 2 - third-party DC string inverters (grid-connected) on the non-backup lugs using external CT(s)

Figure 2 describes the general connection of the method 2 setup. The IQ Batteries 5P charge from any excess generated by the third-party DC string inverters (grid-connected).

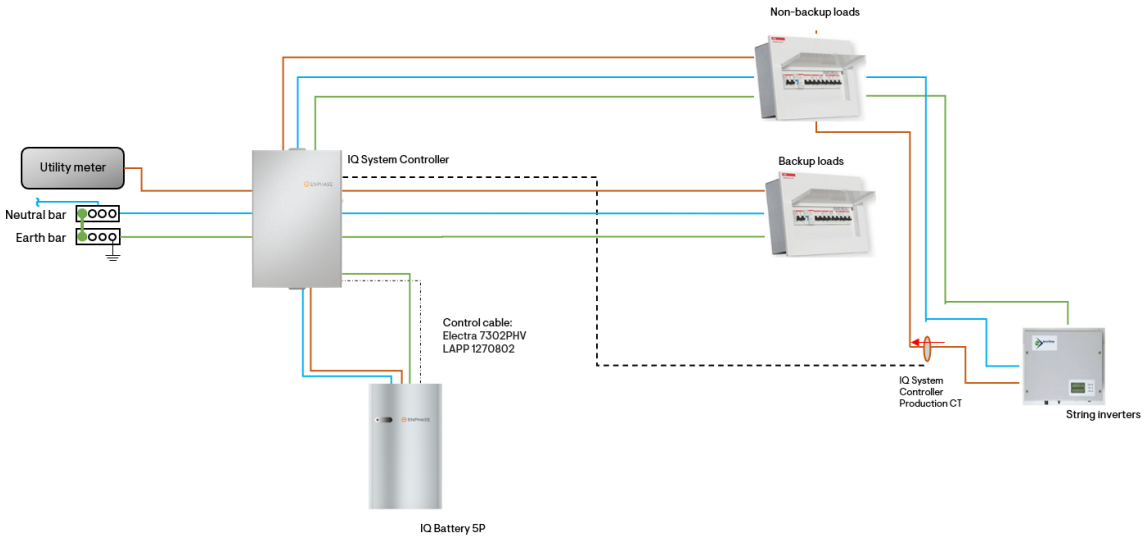

Figure 3: Method 2 - Third-party DC string inverters (grid-connected) on the non-backup lugs using external CT(s)

The extended Production CT is required to display the data correctly on Enphase monitoring platforms. It is also required to enable the battery to charge with PV, as the production CTs determine how much PV is available. Figure 4 shows the data reading with and without the extended Production CT.

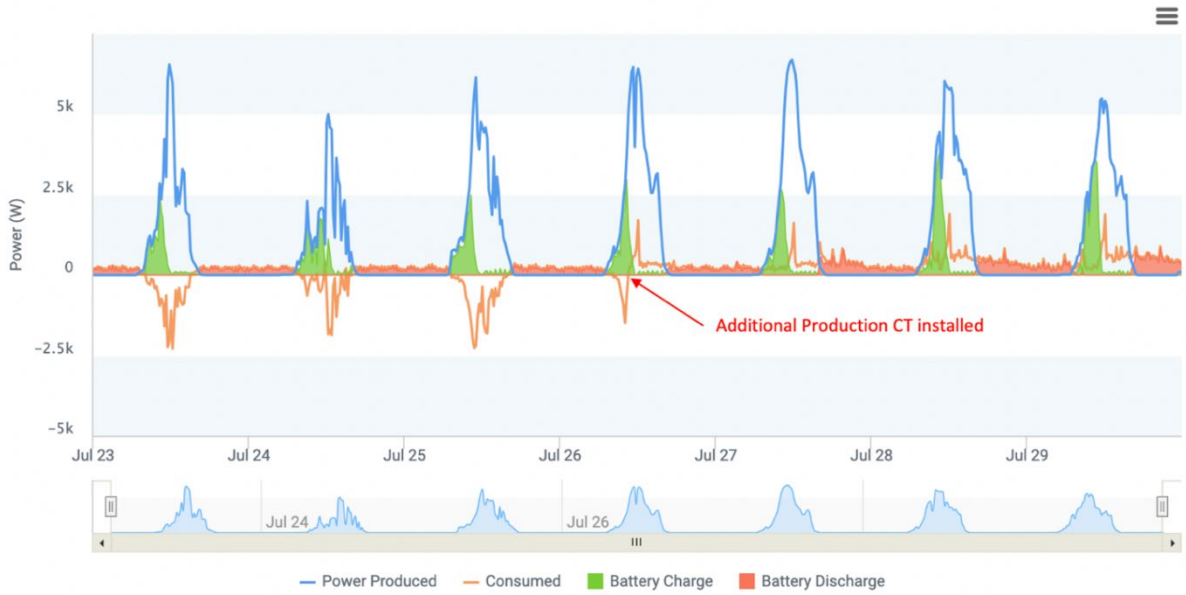

Figure 4: Data reading with and without the extended Production CT.

With this method, the third-party DC string inverters (grid-connected) will only operate in on-grid mode and get disconnected in backup mode.

Revision history

Revision	Date	Description
TEB-00107-1.0	December 2023	Initial release.