

## PCS NOTICE OF COMPLETION

October 26, 2023  
Mr. Sangam Baligar  
Enphase Energy Inc.  
1420 N. McDowell Blvd  
Petaluma, CA 94954-6515

Our Reference: File E341165, Vol. (new) Sec. 1, Project 4790945668

Project Scope: Evaluation of Enphase System 3.0 for Power Control System Functionality.

Dear Mr. Baligar:

Congratulations! UL's investigation of your product has been completed under the above Reference Number and the product was determined to comply with the applicable requirements of the UL 1741 (3<sup>rd</sup> Edition CRD on Power Control Systems (PCS), issued on April 8, 2023 – (UL1741 3<sup>rd</sup> edition CRD is considered equivalent to the UL1741 2<sup>nd</sup> Edition CRD for PCS dated March 8<sup>th</sup>, 2019). Compliance with the CRD includes the protection of current overload for specific Enphase system circuits and busbars

The PCS evaluation was conducted on a representative Enphase Energy System 3.0 and the certification applies to the following products which were part of the tested system in the single Main Panel Upgrade Avoidance PCS mode defined below.

This PCS supports up to 3 branch circuit inputs, one PV and two ESS, each with up to 8 daisy-chained IQ Battery 5P or 12 daisy-chained IQ Battery 3T units. Each ESS branch's charge/discharge current can be limited from 64 Amps to 8 Amps continuous.

System backup protection from current overload with Listed branch circuit breakers is as defined below:

1. PV inverter breakers on the combiner box and system controller must be properly sized.
  - a. Maximum breaker size for the PV inverter branch in a combiner box is 20A.
  - b. Maximum breaker size for the PV inverter branch in the system controller is 80A.
2. Battery inverter breakers on the combiner box or system controller must be properly sized.
  - a. Maximum breaker size for a single IQ Battery 5P-based or IQ Battery 3T-based branch in a combiner box is 60A
  - b. Maximum breaker size for the battery in the system controller input is 80A.
3. Main Panel breaker has to be sized properly based on the main panel busbar and grid breaker, maximum breaker size of 80A is tested with the test setup.
4. Please refer to the certification report and Enphase PCS installation instructions for system configuration details.

## Supplemental PCS Overcurrent Protection with Power Limiting at Output of PV & Battery Connection (PoC)

PCS model Enphase Energy System 3.0 in this mode enables the per-phase back feed current to the panelboard on the non-utility side of the system to be controlled for grid-interactive systems. This mode controls and limits the combined output power of PV and Battery power going into a main panel.

The Enphase Energy System 3.0 configured for this mode of operation, includes the specific equipment listed below.

1. UL (Listed), Enphase IQ Gateway (the PCS controller)
  - a. Model number X-IQ-AM1-240-4C
  - b. Firmware version v08.02.103, checksum 604a79 with PCS-eSW v1.1.0, checksum a7c85379f9.
    - i. Envoy and PCS software versions are tied together and treated as one Software.
    - ii. Based on similarity in construction and firmware versions, the following models are also considered covered: ENV-IQ-AM1-240, ENV2-IQ-AM1-240, X-IQ-AM1-240-3, X-IQ-AM1-240-3C, X-IQ-AM1-240-3-ES, X-IQ-AM /1-240-3C-ES, X-IQ-AM1-240-4, X2-IQ-AM1-240-4, X2-IQ-AM1-240-4C, X-IQ-AM1-240-5, X-IQ-AM1-240-5C
      1. For this function, each model listed above shall have firmware version v08.02.103, checksum 604a79 with PCS-eSW v1.1.0, checksum a7c85379f9.
2. UL (Listed) IQ8 Series PV Inverter(s) rated 120/240Vac, 1.6A per unit. PCS was tested for a maximum PV current contribution of 64 Amps total.
  - a. Model IQ8H-240-72-2-US
    - i. Based on similarity in construction and firmware versions, the following models are also considered covered: IQ8-60-2-US, IQ8PLUS-72-2-US, IQ8M-72-2-US, IQ8A-72-2-US, IQ8-60-M-US, IQ8PLUS-72-M-US, IQ8M-72-M-US, IQ8A-72-M-US, IQ8H-240-72-M-US
3. UL (Listed), Current Transformers, Enphase model numbers:
  - a. For solar production monitoring: At least 1 unit CT-200-SOLID
  - b. For consumption monitoring: At least 2 units of CT-200-SPLIT or CT-200-CLAMP
  - c. For battery monitoring: At least 1 unit of CT-200-SPLIT or CT-200-CLAMP
4. A UL(Listed) Enphase IQ Battery System. PCS was tested for a maximum battery contribution of 64 Amps total.
  - a. UL (Listed), Enphase IQ Battery 5P (Encharge battery 3<sup>rd</sup> generation): IQBATTERY-5P-1P-NA, B05-T02-US00-1-3-RMA  
OR
  - b. UL (Listed), Enphase IQ Battery 3T/10T (Encharge battery 2<sup>nd</sup> generation): ENCHARGE-3T-1P-NA, ENCHARGE-10T-1P-NA.
5. Optionally a UL (Listed), Enphase IQ System Controller 3/3G (Enpower smart switch), model numbers:
  - a. SC200D111C240US01 and SC200G111C240US01
    - i. The “D” and “G” differences refer to the 3<sup>rd</sup> input which may be a DER or a Generator
      1. Generator input is NOT included in PCS functionality
      2. Enphase PCS does not control the generator current and is not impacted by the presence of the generator
    - ii. Based on similarity in construction and firmware versions, the following models are also considered covered: EP200G101-M240US01

The Enphase Energy System 3.0 system was evaluated for its ability to control up to and cannot exceed 64 Amps of PV nameplate rated inverter output (as described in list above) and 64 Amps of Battery nameplate output to limit the per-phase back feed levels to the main panel to a setting of up to a maximum of 64 Amps.

Export levels and power output from the PV and Battery were monitored. Tests verified that when step changes in load or generation occurred, the output level was adjusted by the PCS to limit of 64 Amps or below.

This PCS mode limits the combined PV and Battery export currents to the main panel. The open loop response time was 10 seconds.

The Enphase Energy System 3.0 PCS was evaluated and found to comply with its ratings for each of the configurations and operation modes described in this letter and certification report. The testing under this project demonstrated that this PCS which was able to control, limit and or cease the current flow to the set level for the specific configuration and mode of operation before the rated open loop response time had expired.

A UL certification is a valuable marketing tool meaning your product or company has successfully met stringent requirements. We encourage you to use your product certification in your marketing activities. You can find information on how to accurately promote your UL certification at <https://www.ul.com/marketing>. If you have any questions, please contact me or any of our customer service representatives.

Sincerely,

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