



PCS Certificate of Compliance

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Subject: UL3141 PCS NEM Integrity Mode Testing for the Enphase PV + Battery Energy storage system

Dear Mr. Baligar

This test report represents the results of our evaluation/testing of the PV + Battery Energy Storage System to the requirements contained in following standards:

UL3141 Issue 2 Outline of Investigation for Power Control Systems (PCS) Dated Oct 9th, 2024

Compliance includes management, control, and limitation of power exchange between Energy Storage Systems and Area EPS/AC utility systems.

The PCS evaluation was conducted on a representative Enphase Energy System 4.0 and the certification applies to the following configurations which were part of the tested system in the PCS modes defined below.

PCS Modes ¹	PV Model ²	ESS Model ²	Max PV Ratings	Max ESS Ratings	Max PV+ESS Rating	Max Legacy PV Rating	Additional Devices needed for PCS functionality	Measured Average/ Maximum OLRT	Average Settling Time
NEM Integrity Mode	IQ8/IQ 9 PV	None	80A/ 19.20kVA	N/A	80A/ 19.20kVA	64A/ 15.36kVA	IQ Combiner 6C / CTs / Meter Collar	1.22s / 1.85s	2.07s
	IQ8/IQ 9 PV	IQ Battery 10C	80A/ 19.20kVA	118A/ 28.32kVA	198A/ 47.52kVA				

¹Tested with PCS eSW 1.4.0

² Please see System configuration table further for exact variations of SKU model numbers.

NEM Integrity Mode:

This is a PCS mode where the PV and storage system was evaluated for its ability to control export levels to the grid, in the presence of a Legacy System. In this mode, the output power of the PV and Battery are controlled such that the instantaneous power being exported by the combined system never exceeds the power being generated by the Legacy System. Export levels and power being generated by the PV and energy storage were monitored. Test verified that when system load levels were subjected to step changes, the instantaneous power exported to the grid never exceeded what the Legacy system was producing over varying Legacy system and Load power levels.

NEM Integrity mode was tested with ESS Battery Mode set to Export-only. Other certified Battery modes like Import-only maybe set, and are expected to perform equivalently as NEM integrity is a system level export limit which runs independently of battery mode set

The table below describes the System configuration and SKUs associated with tested PCS mode(s)

System Component	Product SKUs	Equipment required in PCS mode?
Enphase PV	IQ8H-240-72-2-US, 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, IQ8MC-72-M-US, IQ8AC-72-M-US, IQ8HC-72-M-US, IQ8X-80-M-US, IQ9N-A-US, IQ9N-A-DOM-US, IQ9N-A-DOM-US-CPA, IQ9N-A-DOM-US-CPB, IQ9N-A-DOM-US-HPA, IQ9N-A-DOM-US-HPB, IQ8PLUS-72-M-DOM-US, IQ8HC-72-M-DOM-US, IQ8MC-72-M-DOM-US, IQ8AC-72-M-DOM-US, IQ8X-80-M-DOM-US	Required
Enphase Battery	Enphase IQ Battery 10C (Encharge battery 4th generation): IQBATTERY-10C-1P-NA, IQBATTERY-10CS-1P-NA, B05-C01-US00-1-3-RMA rated at 120/240Vac	Optional
Enphase IQ Combiner 6C	X-IQ-AM1-240-6C	Required
CTs	For legacy PV monitoring: Internal Load Controller CTs in Combiner 6C or 2 units of CT-200-SPLIT or CT-200-CLAMP For Monitoring consumption ¹ : At least 2 units of CT-200-SPLIT or CT-200-CLAMP PV and battery monitoring CTs are integrated into the IQ Combiner 6C	Required
Meter Collar	For Monitoring consumption: At least 1 unit of MC-200-011-V01	Required ¹

¹Either Meter Collar (OR) Consumption CTs placed at the Point of Common Coupling (PCC) is required for operation in this mode. Both are not required

This PCS supports:

- Up to 3 circuit inputs, one PV aggregate breaker input and two ESS, each with up to 4 daisy-chained IQ Battery 10C units

Each ESS circuits' charge/discharge current with IQ Battery 10C can be limited from 64 Amps to 8 Amps continuous.

- PV inverter breakers on the combiner box must be properly sized.
 - The maximum breaker size for each PV inverter branch in the combiner PV Bus is 20A.
 - The maximum breaker size for PV aggregate breaker circuit in the combiner is 100A.
- Battery inverter breakers on the combiner box must be properly sized.
 - The maximum breaker size for a single IQ Battery 10C-based branch in a combiner box is 40A.
 - The maximum breaker size for each battery branch in the combiner is 80A per circuit.
- Please refer to the equipment installation instructions for system configuration details.

If there are any questions regarding the results contained in this report, please contact me or any Bureau Veritas CPS customer service representative.

Sincerely,

Dishant Patel

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		None.