# Application Note:
# Q.HOME SMART – AC Coupling with Tesla Powerwall 3 for TPO Financing

## Purpose

The purpose of this document is to provide an overview of connecting the Qcells Q.TRON AC Modules to the Tesla Powerwall 3. The products included have been lab and field tested for compatibility by Qcells.

AC Coupling with other ESS platform solutions not tested for compatibility may invalidate the warranty.

**NOTE**

Some available power control features should not be supported with TPO financing due to potential production impacts affecting Performance Guarantees which cannot be appropriately accounted for in performance modeling.

## Summary Table

| | Max AC Coupled PV per ESS unit (kW - AC) | Max AC Module Count per ESS unit |
|---|---|---|
| Tesla Powerwall 3 | 7.68 / 10.0 | 22 / 28 |

### NOTE

The Tesla Powerwall 3 platform will monitor and display PV production values, but the values displayed may be slightly different due to line losses in power transmission depending on the distance between the Q.HOME COMBINER (G3) and the measured point of PV input to the Powerwall 3 system.

Especially with TPO Financing, appropriate means should be taken to minimize $V_{rise}$ line losses. Please review the **Solar Configuration Design Guide** (section 7.3) for details.

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Document Revision 1.2, 9/2/25

# AC Coupling with Tesla Powerwall 3

## PV System Sizing w/ Tesla Powerwall 3

The Tesla Powerwall 3 (PW3) system supports AC Coupling with parallel operation and has a maximum AC Coupling PV value of 7.68 kW AC per connected PW3[1], meaning a maximum of 22 Q.TRON AC Modules can be added per PW3 battery module (up to 4). The PW3 system supports AC Coupling and DC Coupling PV at the same time (up to 20kW DC per PW3), and the relevant limits are exclusive of one another.

An individual PW3's AC Coupling capacity is expanded to 10kW with the addition of one or more Powerwall 3 Expansion units[2]. As of 4/28/25, Tesla supports parallel operation of up to four PW3 units, with up to three Powerwall 3 Expansion units connected to the primary PW3, making the maximum AC Coupled PV system size 32.8 kW AC.

NOTE

AC Coupling limits and operations are not affected by system designs incorporating use of the Tesla Backup Switch (meter socket collar), Backup Gateway 2, or Backup Gateway 3. However, monitoring AC Coupled PV production on systems utilizing the Backup Switch or Backup Gateway 3 require the use of Tesla's Remote Energy Meter, configured as "**Solar (1CTx2)**". The PW3 platform is not compatible with Neurio Remote Energy Meters.

For more details on system design and installation, please refer to Tesla's Energy Library, linked here: **Powerwall 3 Install Information**, especially the **Powerwall 3 System Design Guide**.

[1] The 7.68kW PV to Powerwall ratio was put in place to protect the Powerwall system from excessive PV during a grid outage. 7.68kW is used because it is a common solar inverter size, allowing more PV system to be fully backed up without needing to be split apart, and inverters don't always produce their maximum power. This ratio does not prevent all issues; Powerwall's maximum charge rate is 5kW under ideal conditions (notably operating temperature). If there is more than 5kW of excess PV per Powerwall, the system will frequency shift to try to reduce PV power, and may have to shut PV production down completely.

[2] The 10kW AC Coupled PV limit per PW3 with one or more Powerwall 3 Expansion units is based on the maximum charge rate of 8kW under ideal conditions, as prefaced in the footnote above.

## Standard Power Control and Advanced PCS Functionality

When AC Coupling with Tesla Powerwall 3, the Q.HOME COMBINER grid interconnection CTs may be installed to support Advanced PCS functionality of Busbar Overload Control. However, consumption data collected & displayed on the Q.OMMAND portal will be erroneous due to the inability to monitor the battery system's operation.

- **Back Feed Power Limitation (BFPL) [NOT SUPPORTED FOR TPO]:** This standard power control feature of the Q.TRON AC Modules **will work** when AC Coupling, and limits the output of the combined AC Module system to a value defined in commissioning.

  **However, this function would lead to power curtailment that cannot be appropriately accounted for in Performance Guarantee production modeling.**

- **Busbar Overload Control (BBOC) [SUPPORTED]**: The Q.TRON AC Modules support the BBOC feature in the Solar Configuration. Tesla's PW3 system is certified to perform this feature (called "Panel Limits"), but the systems are not capable of coordinating this function.

  **This protection mechanism should not impact system production on an appropriately sized service connection. However, excess panel loading may lead to periods of non-operation if the customer's home loads routinely exceed their main service's busbar rating.**

  **Appropriate validation should be made in the design phase of project development to ensure that the customer's utility service and service entry equipment are appropriately sized for the customer's energy needs.**

  - To align the system's operation and ensure the PV and ESS systems do not exceed the required overcurrent rating of the service panel, the Q.HOME COMBINER settings should be set with a value determined by subtracting the full panel rating (or lower if desired) by the (combined) OCPD rating of the PW3 battery(s).
    - Example: 200A Service Panel w/ 2 PW3 units on 60A breakers.
      - 200A – (60A + 60A) = **80A** → BBOC setting for ACM System
    - Based on this operation, over current protection for systems with > 2 PW3 units should be addressed by other means (downsizing MCB, line-side tap, etc.)
    - This feature will require the installation of the Q.HOME COMBINER grid interconnection CTs.

- **Dual Feed-In-Limit (Dual FIL, AKA "Zero Export" from PV & ESS) [NOT SUPPORTED]**: While the Telsa PW3 system supports Zero Export from an uncontrolled AC Coupled PV system (Tesla's "Solar Export Limitation" feature), due to the distributed production of the Q.TRON AC Module microinverter system, this feature will not operate correctly and is therefore not supported.

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| | Date | Notes | Author |
|---|---|---|---|
| v1.2 | 9/2/25 | Updated to reflect release of BBOC functionality. | JP |
| v1.1 | 4/28/25 | Updated Dual FIL as "NOT SUPPORTED" | JP |
| v1.0 | 3/19/25 | Released document. | JP |