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 & Q.PEAK DUO 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

Update: 11/17/2025 – Exceeding the AC Coupling Limit

To promote a higher AC Coupling ratio between Qcells' AC Modules and Tesla's Powerwall 3, an alternative method of connection has been tested and approved by Qcells and Tesla, which involves connecting additional branch circuits upstream of the Tesla Backup Gateway 3 Microgrid Interconnection Device [MID]. **Please review Appendix A, starting on page 5 for more details.**

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.

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 Qcells' 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 11/17/25, 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 33.04 kW AC (7.68kW*3 + 10kW), in addition to the possible 80kW of DC coupled PV as outlined above.

NOTE

Except as outlined in Appendix A, 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**.

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.

[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 the Advanced PCS functionality of Busbar Overload Control. However, consumption data collected & displayed on the Q.OMMAND portal will be mathematically incorrect due to the inability to monitor the battery system's operations. Homeowners should be made aware of this to avoid unnecessary support calls, and support teams should not use the values for troubleshooting.

- **Back Feed Power Limitation (BFPL) [NOT SUPPORTED FOR TPO]:** This standard power control feature of Qcells' 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]**: Qcells' 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.
    - Per the UL 3141 certification of this feature, use is limited to ≤44 AC Modules.

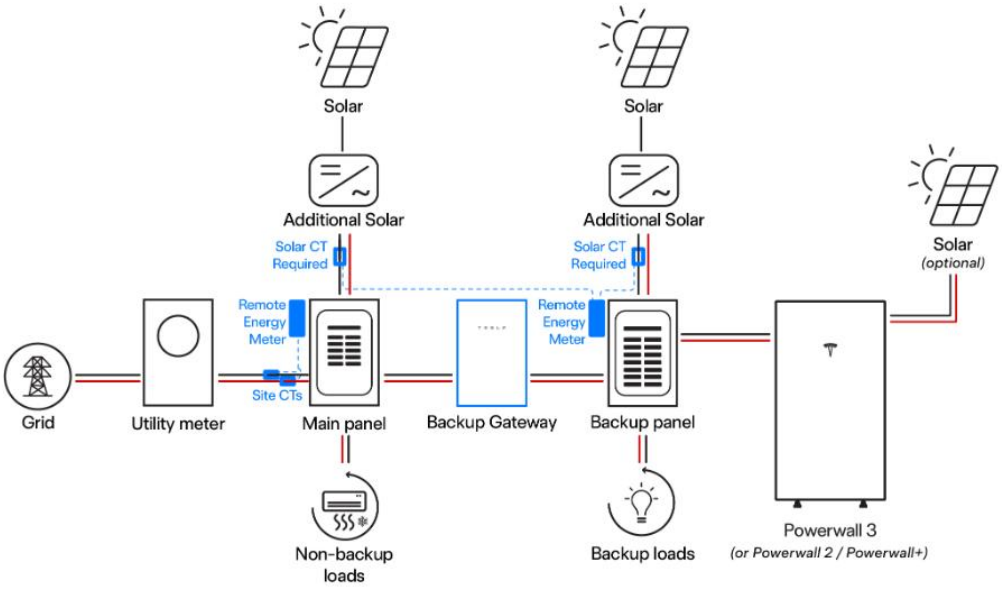
- **Dual Feed-In-Limit (Dual FIL, AKA "Zero Export" from PV & ESS) [NOT SUPPORTED]**: While the Telsa PW3 system supports Zero Export from an uncontrolled AC Coupled PV system (Tesla's "Solar Export Limitation" feature), due to the distributed production of Qcells' AC Module microinverter system, this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

Appendix A – Exceeding the AC Coupling Limit

It is critical to strictly follow AC Coupling limits when combining outputs of DERs (distributed energy resources) to operate off-grid, even for temporary backup. If a grid outage occurs when the ESS is at 100% SOC (state of charge) and the connected PV cannot curtail fast enough, or below 100% SOC whenever excess PV power exceeds the batteries' available charge power, a sudden disconnection can trigger a high-voltage excursion that damages the battery, PV inverter(s), or home loads.

Configuration

In October 2025, Tesla updated their **Residential Energy Product Metering Guide** to include a new alternate metering configuration, "Metering Multiple Solar Inverters"; found in the "Metering Options / Solar Metering for Standalone Solar" section of their guide linked above. This configuration supports connecting multiple PV sources upstream and downstream of the Tesla Backup Gateway 3 MID, and it requires the use of two Tesla Remote Energy Meters for grid and PV production monitoring. This will allow the additional PV to be disconnected when the system goes into backup mode.



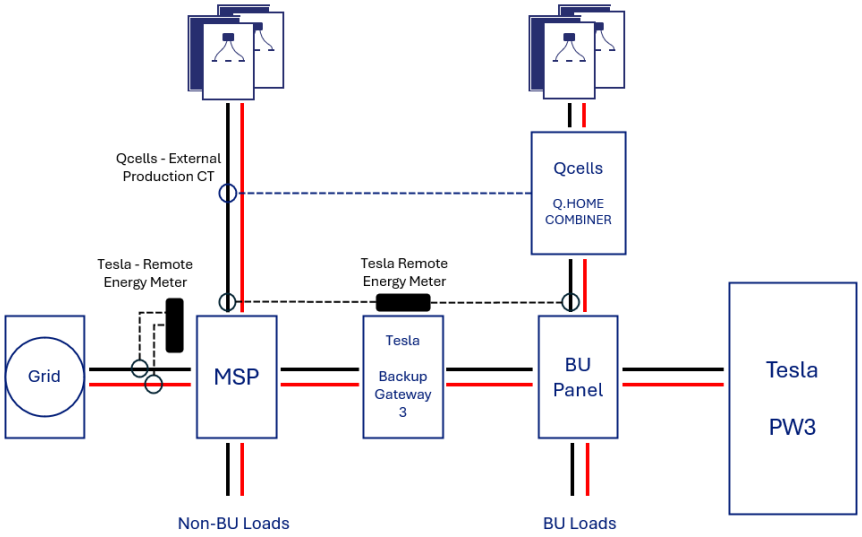
Tesla's "Metering Multiple Solar Inverters" illustration.

NOTES

Due to the UL 3141 certification limitations of Qcells' BBOC feature, the maximum number of AC Modules which can be connected in this configuration is 44 total when the BBOC feature is used.

This connection plan will only work when the PW3 system is installed with the Backup Gateway 3, because it requires connecting an additional branch circuit (or circuits) on the grid-side of the MID. This is not possible with a system design utilizing the Tesla Backup Switch (meter-socket-collar [MSC]).

In this configuration, the additional branch circuit(s) of Qcells' AC Modules (exceeding the AC Coupling limits of the backed-up system) may be connected upstream of the Tesla Backup Gateway 3 at the home's main service panel as illustrated below. Qcells' External Production CT is used to monitor the production of the additional branch circuits connected upstream of the MID, and supports Revenue Grade data reporting. However, to retain Revenue Grade accuracy, the External Production CT leads may not be altered in length (extended or shortened) which will require rather close installation as the CT's leads are 2 meters long (~6.5 feet).



This will require one Qcells External Production CT (PN: CT-HQ-SOLID-200A-2m), and two Tesla Remote Energy Meters (PN: 2045796-00-x); each Tesla Remote Energy Meter comes with two 200A CTs.

Metering Considerations

The configurations illustrated above require the use of two Tesla Remote Energy Meters. Up to three Remote Energy Meters may be connected to a PW3 system, one by RS-485 and up to two wireless.

If desired, the Tesla RS-485 harness for directly connecting the Tesla Remote Energy Meter to the PW3 is not included with the Remote Energy Meter, so must be ordered separately (PN: 2045794-00-x).

An installer encountering difficulties with wireless communication between the PW3 and the Remote Energy Meter should review Tesla's **Powerwall 3 Application Note: Connecting Out-of-Range Tesla Remote Energy Meters**.

When configuring the Tesla system, the PW3 will automatically detect the Backup Gateway, and it will automatically configure the Gateway's internal CTs as "Site" CTs. Connecting and configuring one of the Tesla Remote Energy Meter's CTs as the "Site" CTs will not automatically disable the Gateway's CT configuration, so they must be manually changed to "None". Failure to disable the Gateway's CTs will produce contradictory PV/site data and will prevent the system from operating correctly.

MLPE Monitoring Acknowledgement

Qcells' AC Module system utilizes Power Line Communication [PLC] to communicate individual AC Module telemetry information (voltage, current, etc.) from the AC Modules back to the Q.HOME COMBINER for reporting to the Q.OMMAND monitoring portal & apps. Lab and field testing have not encountered this issue, but it may be possible for a home's dynamic power quality, or specific loads, to have a negative effect on this PLC signal strength.

If this kind of signal loss is detected, either by the Q.HOME COMBINER not being able to detect the additional AC Modules during commissioning, or by occasional gaps in MLPE data available from the Q.OMMAND monitoring platform, the only way to address this gap in information is to add an additional Q.HOME COMBINER to monitor the externally connected branch circuit(s). However, the Q.OMMAND monitoring platform cannot support more than one Q.HOME COMBINER on a monitoring portal site, so if that fix is required, it will also require monitoring the PV system production and MLPE data from two separate monitoring portal sites within Q.OMMAND. However, by using the Tesla Remote Energy Meters as indicated above, the PV production data displayed on the Tesla monitoring portal/app will be inclusive of the PV production for the whole site.

If loss of MLPE data is not a concern, the extraneous branch circuits may be connected directly to the Q.HOME COMBINER during the commissioning process, then moved upstream of the MID after commissioning is complete.

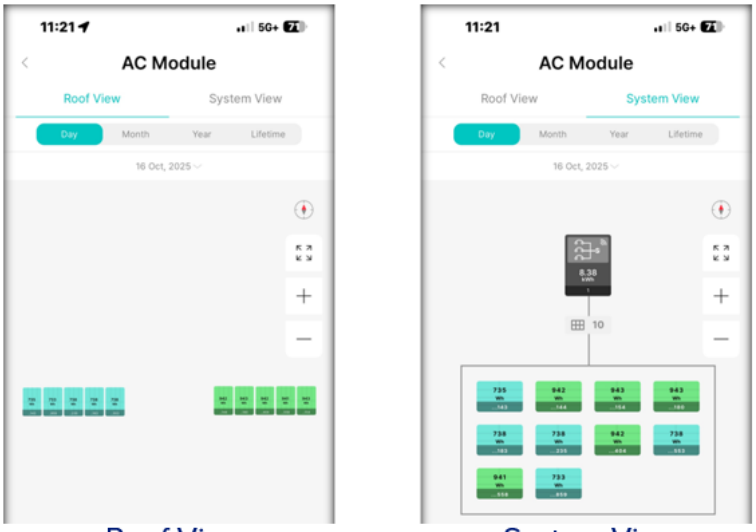
Indications

When configured to work with the PW3, the Q.HOME COMBINER can detect when the PW3 system goes off-grid and will report an error to the Q.OMMAND platform. In addition, on a loss of signal from an AC Module an error message will be received indicating that the microinverter (MI) is not reporting.

Serial No.	Error Code	Description
XXXXXXXXXXXXXXXXXX	A008	Detected Tesla Powerwall 3 Off-Grid Mode
XXXXXXXXXXXXXXXXXX	M015	MI Not Reporting
XXXXXXXXXXXXXXXXXX	M015	MI Not Reporting
XXXXXXXXXXXXXXXXXX	M015	MI Not Reporting

These errors should be expected, and will only be visible to installers via the Q.OMMAND Pro mobile app, the Q.OMMAND Web monitoring portal interface, and from Qcells' Fleet Manager portal. They will clear when the system goes back on-grid, but upon grid-recovery it should be expected that other error indications (specifically "grid frequency/voltage out of range" errors) will also come in and clear.

The Q.OMMAND Home app for homeowners will not display any error indications for this operation. However, if the homeowner has access to view the AC Module page (access can be enabled/disabled by the installer in System Settings), they may notice significant mismatch in module level production. To avoid undesired service calls, homeowners should be informed that this is an expected indication during a grid-outage, or their view of the AC Module page may be disabled.



Roof View vs. System View

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	Date	Notes	Author
v1.4	3/11/26	Updated "Q.PEAK" to "Q.PEAK DUO"	JP
v1.3	3/4/26	Added Appendix A & Q.PEAK AC Module type	JP
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