Eaton AbleEdge Smart Breakers for the Lunar System



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Summary

The Lunar System, when paired with Eaton AbleEdge smart breakers, offers a flexible and cost-effective solution to extend backup and expand existing solar systems. Installed inside or near the Lunar Bridge, these breakers dynamically manage loads and solar production when off-grid via a dedicated Wi-Fi network. The Lunar App also allows customers to monitor and control individual loads remotely, providing advanced insights into circuit-level home energy patterns.

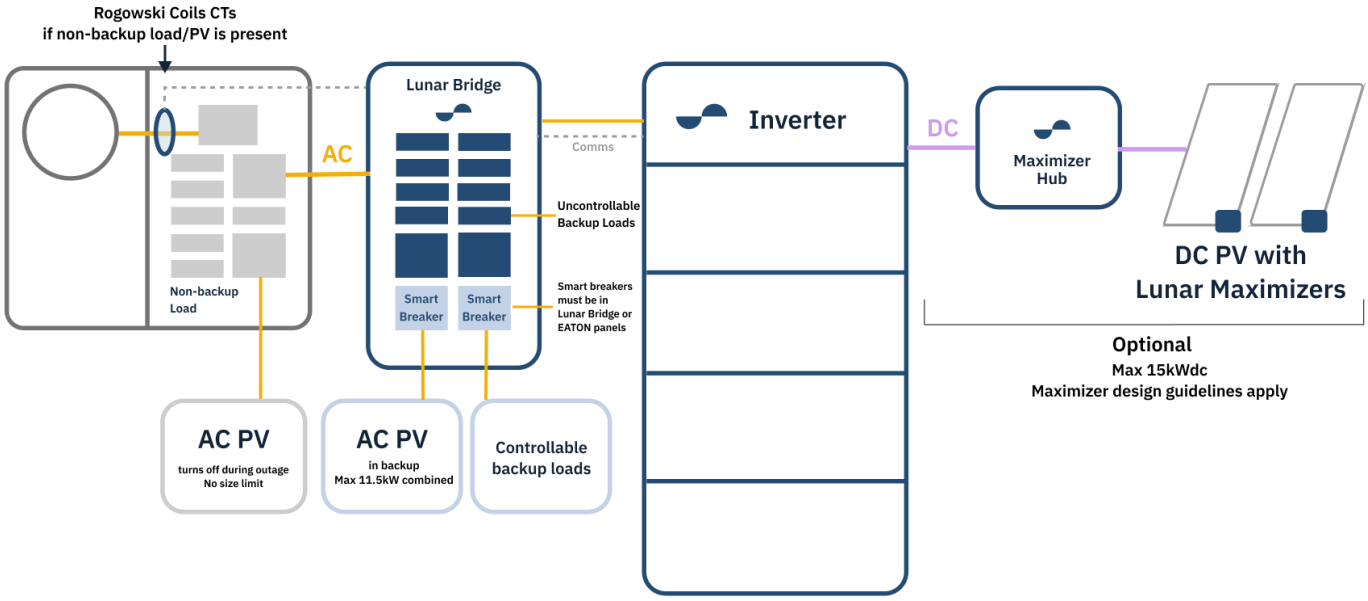


Figure 1. EATON Integration Diagram

AC PV Install Conditions	Description
Maximum AC PV in backup	11.5 kW combined of non-Lunar AC PV
Maximum AC PV outside of backup	Unlimited
Lunar DC PV	DC PV is not required for the Lunar System. DC PV size is independent of AC PV size. Maximizer stringing rules apply.
Additional CTs for PV	No additional CTs required for PV.
Line side tap	Install breaker between fused disconnect and AC PV

Table 1. Key AC PV requirements. See details in Table 3.

Installation Requirements

Eaton AbleEdge smart breakers come in 15A, 20A, 30A, 40A, 50A, and 60A sizes. These 2-pole circuit breakers offer GFCI protection and revenue grade metering. See detailed product specifications for Eaton AbleEdge smart breakers.

The Lunar System supports up to **8** smart breakers in total.

Smart breakers communicate wirelessly with the Lunar Bridge or Lunar Meter Socket Adapter Controller (MSA Controller). They can be installed inside the Lunar Bridge or in any compatible EATON subpanel with maximum distances as detailed below.

Configuration	Free air	Through 1 wall (wood / drywall)	Through 1 wall (concrete / brick)
Maximum Distance	75 ft (23 m)	30 ft (9 m)	10 ft (3 m)

Table 2. Wifi communication ranges from subpanel to Lunar Bridge or MSA Controller.

Note: Communication over greater distances and more walls are achievable if the Eaton subpanel door can remain open (only applicable to interior subpanels)

Incorrect breaker installation can lead to nuisance GFCI tripping. When installing, ensure the load neutral wire (if present) is terminated directly on the breaker, not on the neutral terminal bar. The neutral pigtail from the breaker should then connect to the neutral terminal bar, as shown below.

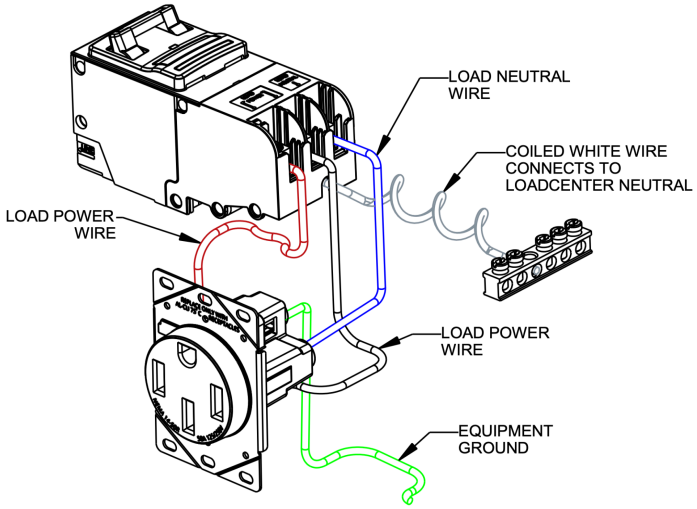


Figure 2. Smart Breaker Wiring Diagram

Smart Breaker Functionality

Eaton AbleEdge smart breakers are controlled using an internal relay, which is electronically and remotely actuated to open or close the breaker's internal contacts without affecting the mechanical handle. Eaton AbleEdge smart breakers must be commissioned with the Lunar Installer App to ensure a fully integrated load management experience with the Lunar System. The behaviors, functions, and end user controls are detailed below.

Manual Control

With Manual Control, customers turn on or off the breaker anytime using the Lunar App (whether they are on-grid or off-grid). The breaker state transitions only when toggled via the app. Customers may remotely shed non-essential loads with a single tap on the Lunar App to preserve battery capacity, curtail peak load, and extend backup power duration.

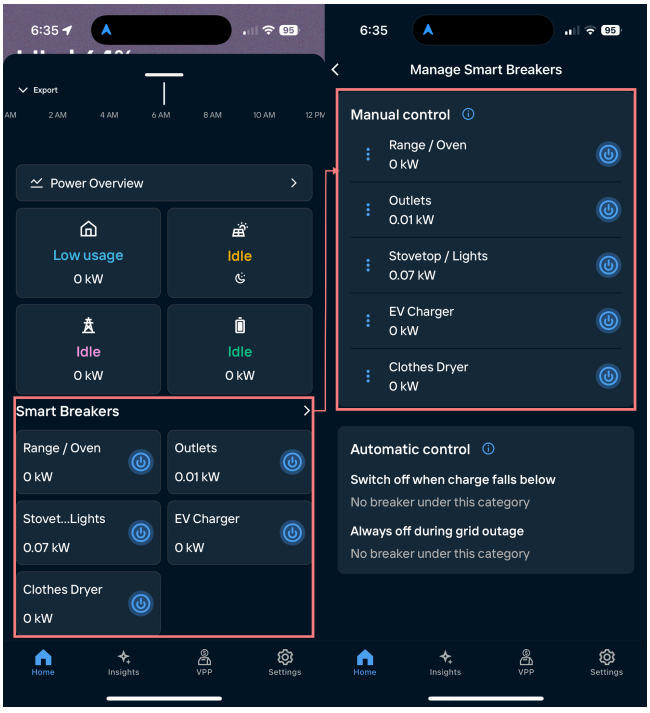


Figure 3. Manual control on the Lunar App

✔ **Note**: Manual control does not change the breaker physical state (open vs closed) when the system transitions from on to off-grid, nor off to on-grid.

✔ **Note**: If the breaker handle is in the OFF or tripped position, the customer cannot remotely reset or turn the breaker ON through the App or use automated controls. The breaker handle must be physically moved to the ON position to resume manual control.

Automatic Control

With Automatic Control, the breaker can be programmed either to (1) turn off immediately when off-grid, or (2) below a user-set battery state-of-charge (SOC) when off grid. Upon restoration of grid power, breakers in Automatic Control will revert to the pre-outage state.

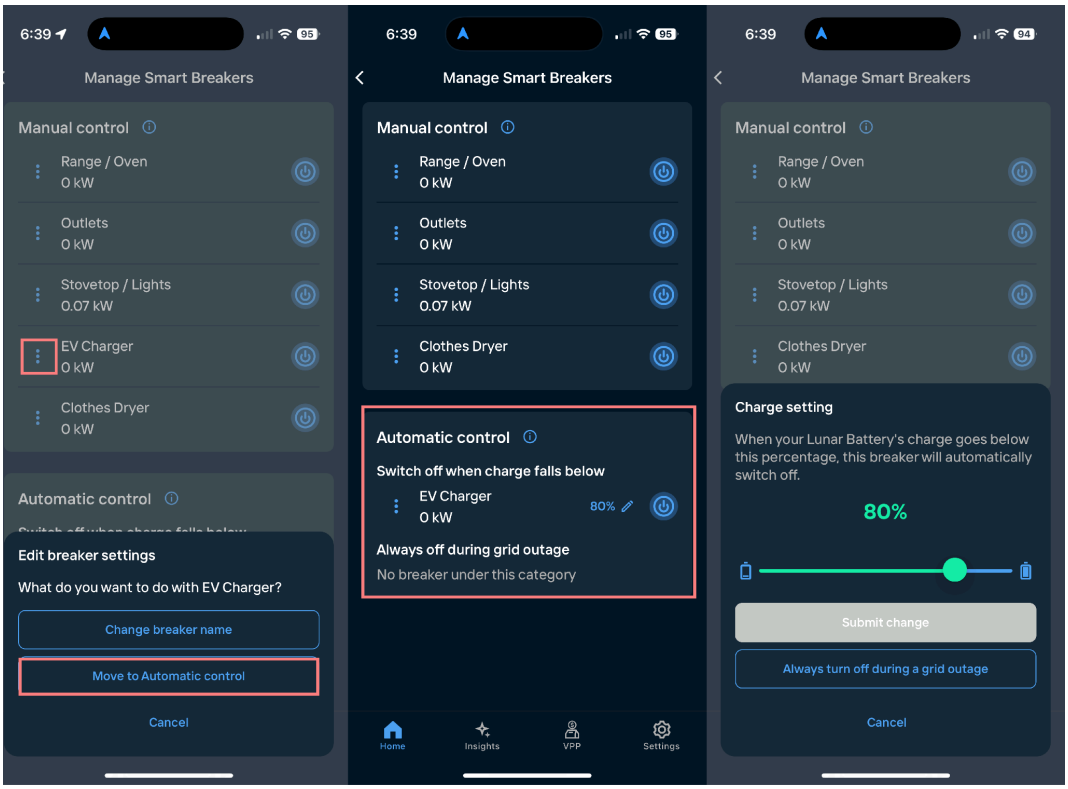


Figure 4. Automatic control on the Lunar App

Note: If the breaker handle moves from the ON to the OFF or tripped position, the breaker will be reset from Automatic to Manual Control in the Lunar App after the handle is physically moved back to the ON position. Customers can move breakers from Manual Control to off-grid Automatic Control settings after the breaker handle is at ON position.

Solar Inverter AC Coupling

The Lunar System with smart breakers offers a flexible solution to homeowners who wish to add more battery and solar to their existing PV systems. Multiple solar inverters (up to 11.5kW AC combined) can be connected to the Lunar System regardless of whether DC PV is present. This section details requirements and behaviors of Lunar sites with AC-coupled solar inverters.

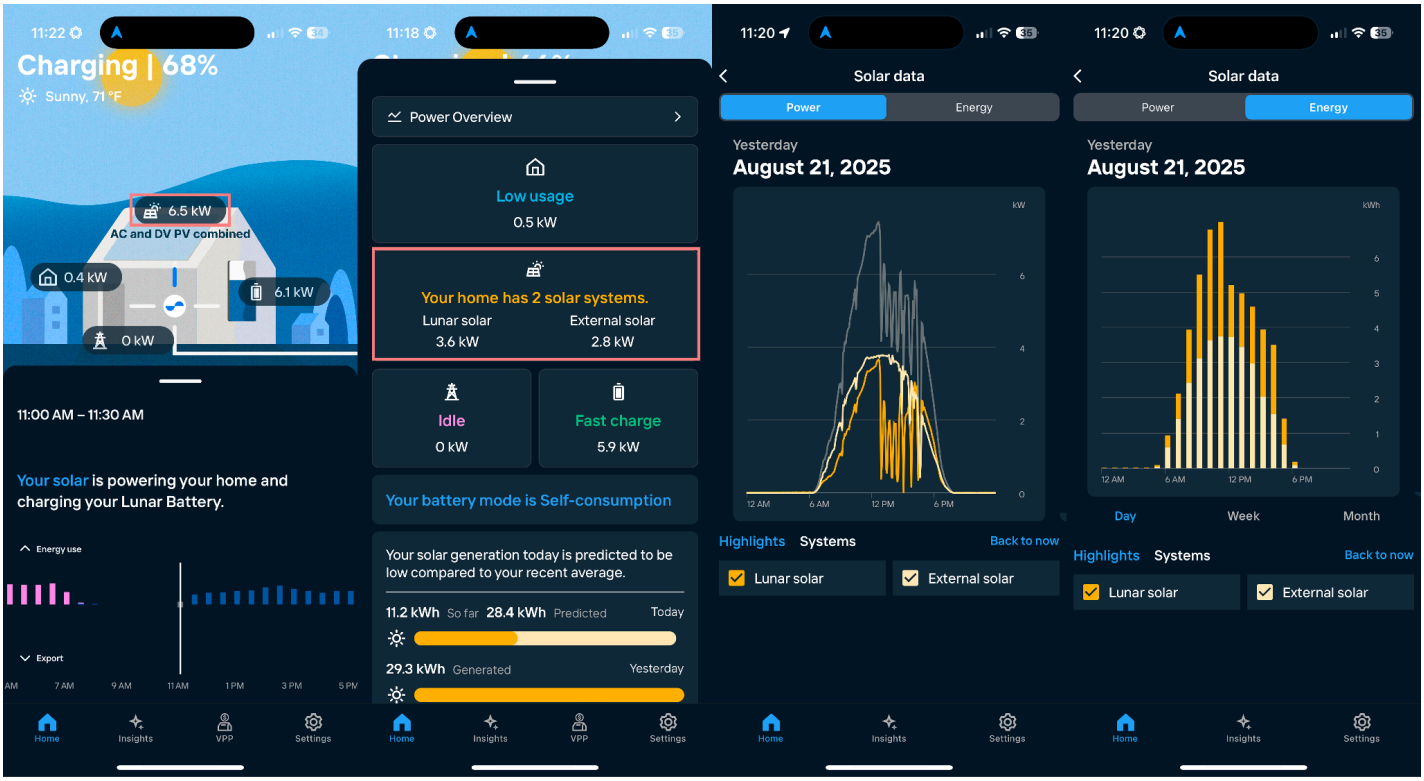


Figure 5. Real-time AC PV production on the Lunar App.

AC PV Installation Requirements	Description
Maximum AC PV in backup	11.5 kW combined of non-Lunar AC PV **Examples** (1) 1 x 7.6kW Solar inverter and 1 x 3.8kW Solar inverter (2) 3 x 3.8kW Solar inverters ✓ **Note**: Up to **8** smart breakers can be used to support multiple AC PV connections. For improved inverter-level monitoring and to prevent ground faults from shutting down all PV, a dedicated smart breaker per AC PV system is recommended. A PV combiner subpanel with a single smart breaker is allowed, but not recommended.
Maximum AC PV in non-backup	Unlimited ✓ **Note**: All non-backup loads and non-backup AC PV must be on the load side of the Lunar Rogowski Coils, along with the backup loads and backup AC PV. Refer to the Rogowski Coil (CTs) for the Lunar System Application Note.
Compatible Solar inverters	All CEC-listed models and makes.
Lunar DC PV size	0 - 15kWdc. DC PV is not required for the Lunar System. DC PV size is independent of AC PV size. Maximizer stringing rules apply.
Additional AC PV Metering	Smart breaker acts as a metering device for AC PV. No additional CT for PV circuits. ✓ **Note**: Rogowski coils may still be required to monitor site import and export for partial home backup (i.e. AC PV in non-backup)
Line side tap	Install breaker between fused disconnect and AC PV, by (1) turning the fused disconnect OFF (2) splicing the inverter output wires inside the inverter enclosure (3) splicing there and back to an adjacent 2-space subpanel with an smart breaker ✓ **Note**: Utility coordinated disconnect is not required. It does not touch or modify the tap, nor touch the wires between the tap and the fused disconnect.

Table 3. Detailed AC PV Requirements

✓ **Note**: Do not use an Eaton smart breaker on the 50A Lunar ESS backfeed breaker.
✓ **Note**: Do not use an Eaton smart breaker on non-solar generation sources, including batteries, diesel generators, or hydro-electric generators.

Off-grid Behavior

The Lunar system charges from AC PV, and curtails or turns off the AC PV as needed.

On-grid Behavior

The Lunar system does not turn OFF or curtail the AC PV. If AC PV production exceeds instantaneous home load, the battery may attempt to charge from the excess AC PV. Future software updates will ensure the battery discharges to cover home consumption, while allowing all AC PV generation to be exported to the grid.

California NEM 1 and NEM 2

For customers who wish to remain on California's Net Energy Metering (NEM) 1.0 or 2.0 programs, the new Lunar system must be set up as a non-export system to retain NEM status. Recommended operation settings are outlined below to ensure regulatory compliance.

- Set **Export Limit from the Lunar System** to **0 W**
- Select **Import Only** PCS mode, which prevents the battery from discharging to the grid at the point of common coupling and limits its ability to participate in VPPs or earn export credits.
- Select **Lunar AI** as post-PTO operation mode.
- Select the NEM rate plan on the Lunar App or Gridshare fleet management portal.

California Net Billing Tariff (NEM 3)

- Any or no export limit
- Select **Export Only** PCS mode. The battery can export to the grid and fully participate in VPP.
- Select **Lunar AI** as post-PTO operation mode.

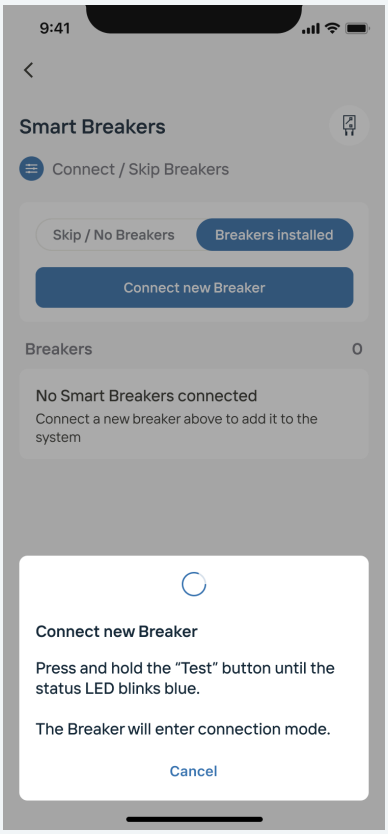
Smart breaker feature summary

Load Type	Breaker Behavior	Description
Regular Load Configurable by Lunar App and Installer App	Manual control	The breaker can be remotely turned on or off at all times, regardless if the system goes on grid or off grid.
	Turn off when off grid	The breaker automatically turns off when the system goes off-grid and reverts to its previous state when back on grid.
	Turn off at low state of charge when off grid	When off-grid and battery state-of-charge (SOC%) falls below a user-selected threshold, the breaker automatically turns off. It reverts to its previous state when back on-grid or when SOC rises above the threshold.
Solar Inverter Configurable by Installer App only	Solar Inverter AC coupling	AC PV powers home and charges the battery when off grid. AC PV is curtailed as needed by the Lunar system when off-grid.

Table 4. Feature summary

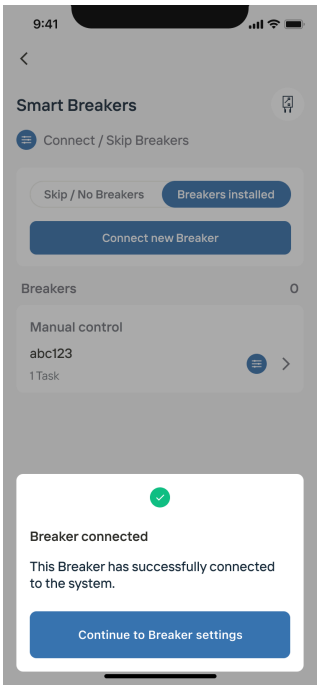
Commissioning Smart Breakers in Lunar Installer App

	Step Description
1	Follow initial commissioning steps 1-3 to connect to the Lunar system via Install App. Detailed instructions may be found in the Installer App Commissioning Guide
2	Navigate into the Smart Breakers screen within the Devices section
3	Tap “Connect New Breaker” to initiate the connection process via Bluetooth
4	Follow the prompt and stand in front of the Eaton Abledge smart breaker to press and hold the “Test” button until the blinking status LED from purple to blue. LED Light Indicator: Blinking **Purple** Light - Available to Connect Blinking **Blue** Light - Connection in process Blinking to **Green** Light - Connection Successful

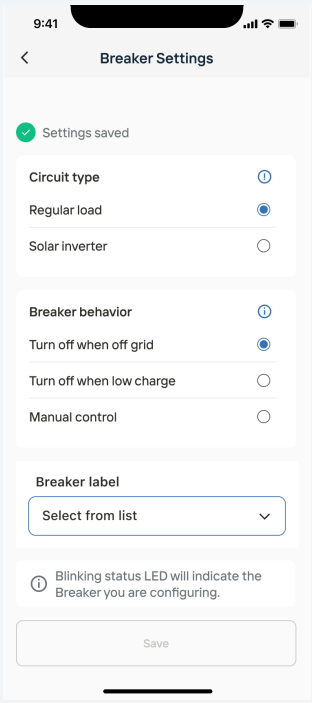


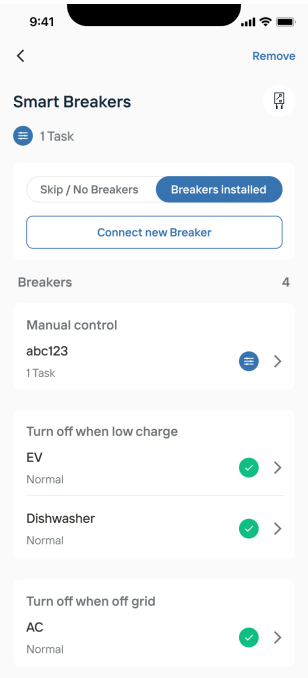
✓ **Note**: If pairing is unsuccessful or the syncing process times out, reattempt steps 4-5.

✓ **Note**: Upon successful pairing of the breaker, a single audible click may be heard following the LED indicator turning solid green.

5	Keep the phone near the Smart Breaker until the connection is successful. Then continue to the Breaker Settings screen.	

✔ **Note**: The Installer App requires a Wi-Fi connection to the Inverter to commission each breaker. If the breaker location and the Inverter are far apart, the installer must bring the Installer App phone back within range of the Inverter to finish connecting each one.

6	On the Breaker Settings screen, configure the following parameters, as described in the Smart Breaker Functions above: A. Circuit Type: Regular Load or Solar Inverter B. Breaker Behavior: Turn off when grid, Turn off when low charge, or Manual Control C. Breaker Label: Select from drop down menu or configure manual label ✔ **Note**: The status LED will blink white to indicate the Breaker being configured.	

7	Once configured, the breaker will be fully operational. Additional Eaton AbleEdge Smart Breakers can then be added and configured as needed.	

Troubleshooting

The Lunar Installer App provides live troubleshooting and fault guidance while connected to the system. Follow any on-screen instructions to address installation or commissioning issues.

Eaton AbleEdge smart breakers communicate their current state on the branch power and trip code LED indicators. For a complete explanation of these LED patterns, refer to the EATON AbleEdge smart breaker LED descriptions.

Ground Fault Circuit Interruption

Eaton AbleEdge smart breakers have built in ground fault circuit interrupters that sense current on the load circuit neutral. These protections may be a cause of breaker tripping at the time of first installation. The wiring condition causing the fault will need to be identified and remedied.

To troubleshoot:

1. Verify the load neutral wire is correctly terminated on the breaker (not the neutral bar).
2. Use a clamp meter to measure current on the load neutral and ground wires, and identify the source of the errant current.

Example of issues:

- Older 3 wire dryer outlets do not have a separate neutral and ground
- Incorrectly terminated neutral
- Incorrectly mixed neutral and grounds

Revision History

Revision	Description of Change	Effective Date
1	Initial Release	07/09/2025
2	Add AC coupling	08/27/2025
3	Update diagrams	10/1/2025
4	Minor updates	12/1/2025
5	Minor updates	11/6/2026