EG4 ELECTRONICS

BUSBAR PCS EXPLAINED

INTRODUCTION TO BUSBAR PCS

Busbar PCS is a new feature designed to comply with NEC 705.13, allowing users to oversize inverters without the need to upgrade their electrical service. This innovative solution enhances flexibility for residential and commercial solar installations, ensuring compliance with safety regulations while maximizing energy production. By utilizing Busbar PCS, users can avoid expensive service upgrades while still having the option to expand their solar capacity in a safe and controlled manner.

WHAT PROBLEM DOES IT SOLVE?

The NEC 120% rule restricts the maximum inverter back-feed current in a main panel with 200A Busbar to 32A, limiting the wattage of inverters that can be installed in a system. This 32A output maximum is largely insufficient for modern household and commercial energy demands, especially with the increasing prevalence of electric vehicles, battery storage, and high-power appliances.

To address this, NEC permits Energy Management Systems (EMS) to electronically regulate the total current in the main panel, ensuring that electrical demand does not exceed safe operating limits. The Busbar PCS feature functions as an automated EMS, dynamically adjusting inverter output to prevent overloading while maintaining compliance with electrical codes. This approach ensures the panel is not subject to excessive current, so fire hazards are prevented. Larger systems can be installed without expensive and time-consuming upgrades, and grid-tied solar or battery systems can function efficiently within existing electrical service constraints.

HOW IT WORKS

The EG4 inverter continuously monitors the total current drawn from the grid. Whenever the combined total of grid current and inverter output current exceeds 80% of the busbar rating, the inverter initiates a controlled reduction in output power to maintain safe operating conditions. The process works as follows:

1. **Monitoring:** The inverter constantly measures real time current flowing into the main electrical panel from the grid and inverter.
2. **Threshold Trigger**: If the 80% busbar rating threshold is exceeded, the inverter waits 20 seconds before starting to reduce its output. The 20 second delay prevents spurious reductions in inverter output during normal transient events.
3. **Shutdown Condition**: Within 30 seconds from the beginning of the overcurrent condition, if current is still above 80%, the inverter completely stops exporting power. This safeguards the connected electrical panel by allowing all load current to flow through the panel Over Current Protection Device (OCPD) and perform its designed overcurrent trip function.
4. **Resumption**: Once the current falls below 80% of the busbar rating for 30 seconds, the inverter resumes normal operation while continuing to actively monitor and regulate output.

RECOVERY

The Busbar PCS feature includes a built-in recovery process to prevent sudden surges when reactivating inverter output:

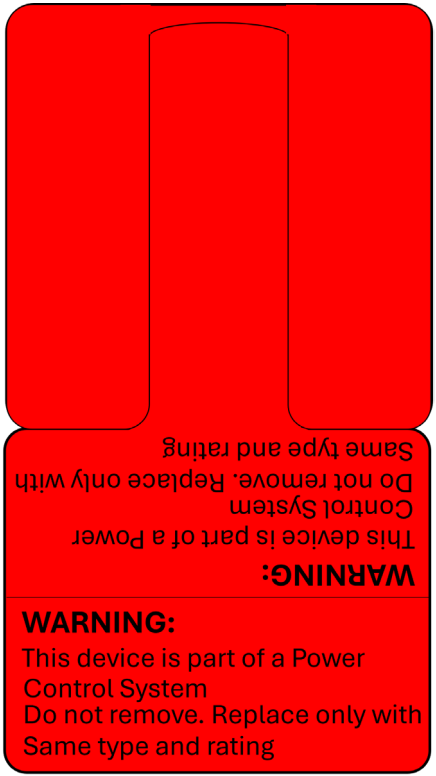
- If the total current remains below 80% of the busbar rating for 30 seconds, the inverter will gradually restore power output.
- This controlled restoration prevents overloading the system and ensures a smooth transition between inverter and grid power.

INSTALLATION

Proper installation helps to ensure accurate monitoring and regulation of inverter output. Follow these steps to correctly set up Busbar PCS:

1. **Install the Inverter CTs**: Place the inverter Current Transformers (CTs) on the main electrical panel, positioning them on top of the Main service entrance breaker.

2. **Place stickers on the CTs**: Label the CTs accordingly to ensure proper identification and compliance.



3. **Affix Stickers on the Main Panel & Master Inverter**: Apply the necessary labeling on the main panel (or PCS protected conductor or busbar) and master inverter as required for identification and safety compliance.

> PCS Controlled Current Setting: _____ A
> The maximum output current from this system toward the main panel is controlled electronically. Refer to the manufacturer's instructions for more information.

4. **Connect the CTs to the Inverter**: Ensure proper wiring and secure connection of the CTs to the inverter.
5. **Go to the Monitor Website and Login**: Access the inverter's monitoring platform.
6. **Navigate to the "Maintenance" tab**: Scroll down and find the "Busbar PCS rating" setting.
7. **Enter the Busbar Rating**: Input the panel's current rating or service rating of the system.
8. **Fill In Stickers/Labels**: Write the PCS controlled current setting on the labels on the panel and master inverter.
9. **Apply the Setting**: Press "set," and a confirmation should appear stating "Set Successfully." If this message does not appear, repeat the process.

NOTE:

See the relevant inverter manual for detailed instructions on CT installation.

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LABEL PLACEMENT INSTRUCTIONS FOR BUSBAR PCS CONFIGURATION

When using the Busbar PCS (Power Control System) function, proper labeling is essential for safety, code compliance, and future system servicing. Two labels are required during system setup – one on the master inverter, and one on each of the CT cables. These labels communicate the system's current limit and must be placed clearly and correctly.

Master Inverter Label

Place the following label on the outside of the Master inverter, in a clearly visible location:

PCS Controlled Current Setting: _____ A
The maximum output current from this system toward the main panel is controlled electronically. Refer to the manufacturer's instructions for more information.

- Do **NOT** cover existing product labels, warnings, or certifications.
- The amperage listed on the label should reflect the actual PCS-limited current, which is **0.8x the values entered in the inverter** settings (per NEC continuous current guidelines).

These steps ensure that installers, inspectors, and maintenance personnel are aware of the system's electronically controlled current limit at a glance.

CT Cable Labels

Apply a wire label to each CT cable as follows:

- Wrap the narrow(tail) portion of the label securely around the cable so that it adheres to itself at or under the perforation.

NOTE:

Improper or missing labels may result in failed inspections or operational issues. Label visibility and accuracy are essential for NEC compliance and long-term system serviceability. See the relevant inverter manual for detailed instructions on CT installation.

- Fold the label at the perforated line so that the printed text is clearly visible on both sides of the label.
- Do **NOT** place the labels on terminals or inside enclosures where they are not easily and clearly visible.

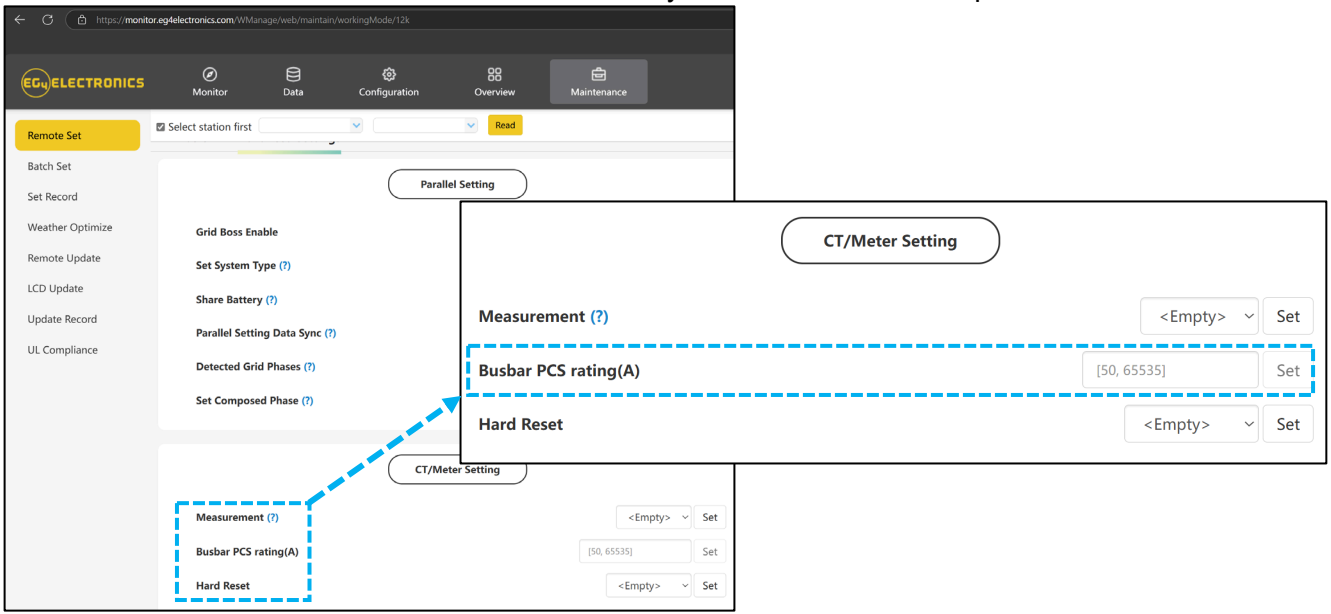
NOTE:

This feature is set to 240A rating by default; this feature can only be accessed by installers.

SETTINGS TO CONFIGURE

- **Busbar PCS Rating:** Enter the panel current rating or service rating and select “set.”
- **Per NEC Guidelines**: The system will automatically begin to limit output current once it reaches 80% (0.8x) of the entered busbar rating. This behavior aligns with NEC requirements for continuous current ratings, which commonly apply the 80% rule for long-term loading.

- **Sticker Labeling:** The stickers or labels physically applied to the busbar and master inverter should reflect this 80% limit. This helps ensure that on-site personnel, inspectors, or future installers are aware of the actual functional limit of the system under standard operation.



CONCLUSION

Busbar PCS is a game-changer for NEC compliance, allowing users to install larger systems while ensuring safe electrical service operations. By dynamically adjusting inverter output based on real-time current measurements, EG4®'s Busbar PCS feature eliminates the need for costly electrical upgrades and prevents system overload. This technology provides a smart, compliant, and cost-effective solution for residential and commercial solar installations looking to expand their energy capacity and independence while maintaining safety and efficiency.

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