

Wiring Method for Combiner Box in Photovoltaic Power Station



Overview

A solar combiner box wiring diagram shows how multiple PV strings connect through the combiner box to the inverter.

Key Takeaways

A PV combiner box wires multiple solar panel strings through individual fuses or breakers to a common busbar, with proper grounding and surge protection, before connecting to the inverter.

A photovoltaic combiner box consolidates the outputs of multiple solar panel strings into a single DC output for the inverter, simplifying wiring, enhancing safety, and providing overcurrent and surge protection. Each string connects to the combiner box via dedicated input terminals, typically through DC fuses or miniature circuit breakers, which isolate individual strings in case of faults.

Wiring Steps

- String Connections
- Connect the positive (+) conductor from each solar string to the line side of its respective fuse or breaker.
- Connect the load side of the fuse or breaker to the positive busbar inside the combiner box.
- Connect all negative (-) conductors directly to the negative busbar without fusing, following NEC 690.9(B) guidelines.

- Busbar and Output Wiring
- The positive and negative busbars combine the strings into a single output.
- From the busbars, run appropriately sized conductors to the inverter input, ensuring voltage and current ratings are not exceeded .
- Grounding and Bonding
- Connect the equipment grounding conductor (EGC) to the combiner box metal enclosure.
- Install bonding jumpers to maintain an equipotential plane, ensuring fault currents have a safe path to ground .
- SPD (surge protection devices) modules should be connected between positive/negative busbars and ground to protect against transient overvoltages .
- Wire Sizing and Routing
- Use conductors sized according to the ampacity of each string and the total combined current.
- Maintain proper separation of positive and negative wires, avoid sharp bends, and secure cables to prevent mechanical stress .
- Final Checks
- Verify all connections are tight and correctly oriented.
- Ensure fuses or breakers are rated for the string current.
- Confirm grounding continuity and SPD connections.
- Follow the wiring diagram for your specific combiner box model to ensure compliance with IEC 60364-7-712 and NEC Article 690 .

Key Considerations

- Install the combiner box in a well-ventilated, weather-protected location with at least IP65/66 protection.
- Each string should be individually fused to isolate faults without affecting the entire array.
- Proper wiring reduces the risk of short circuits, ground faults, and overcurrent damage, ensuring long-term reliability . By following this wiring method, a PV combiner box safely integrates multiple solar strings, provides overcurrent and surge protection, and ensures efficient, maintainable operation of the photovoltaic system.

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