

## Technical Note

### XW MPPT Charge Controller: Installations in Positive-Grounded Battery Systems

**Xantrex Technology Inc.**

8999 Nelson Way

Burnaby, BC

V5A 4B5

Canada

[www.xantrex.com](http://www.xantrex.com)

This application note provides the procedure for installing the XW MPPT60-150 Solar Charge Controller in applications that require a negative voltage reference, such as in telecom applications where the voltage reference is -48V.

The XW MPPT Charge controller internal design has a built-in fuse, rated at 1A, 600V, which grounds both the PV negative and Battery negative conductors and provides PV ground-fault protection (PV-GFP) to the system. In order to avoid a short circuit, the ground fault protection must be disabled before grounding the positive Battery terminal for negative voltage reference. Disabling the PVGFP circuit in this way opens the negative-to-ground bond within the unit allowing for a positive battery ground connection. If PVGFP is required, install an external protection circuit that is compatible with a positive grounded battery system.

PV array terminals and Auxiliary terminals must not be grounded in the installed system.

Note that since there is no isolation between the battery and the PV array, this positive grounded battery configuration will bias the PV array terminals and the internal Auxiliary lines to -Batt V with respect to chassis ground. For example, using a 150Voc PV array and a 60V battery bank, grounding the Battery positive terminal will make PV(-) sit at -60V and PV(+) at +90V; Aux(-) will be biased at -60V and Aux(+) at +45V. This voltage levels on both Battery and Auxiliary outputs are considered safe extra-low voltages and do not present a hazard as long as the PV terminals are kept floated or ungrounded.

Follow the XW MPPT owner's manual for instruction on making the PV array and battery connections to the unit. Follow the next steps in order for a safe negative voltage reference connection:

1. Disable the internal PVGFP circuit as instructed in this application note
2. PV array terminals (positive and negative) MUST be ungrounded
3. Auxiliary lines (positive and negative) MUST be ungrounded
4. Ground the positive terminal of the battery only

#### **Disabling the Charge Controller Internal PVGFP Circuit**

Before grounding the positive Battery terminal to obtain a negative reference voltage the unit's internal PVGFP circuit must be disabled. To disable the charge controller PVGFP circuit, remove the small jumper connector located on the circuit board within the wiring compartment of the unit. See Figure 1 for the jumper location of the XW MPPT60-150.

#### **Warning: Shock Hazard**

Disconnect PV and battery circuits before accessing the charge controller wiring compartment.

After removal, the jumper may be stored on a single pin of the 2 pin connector, or moved into the location marked for units with a 3-pin connector.

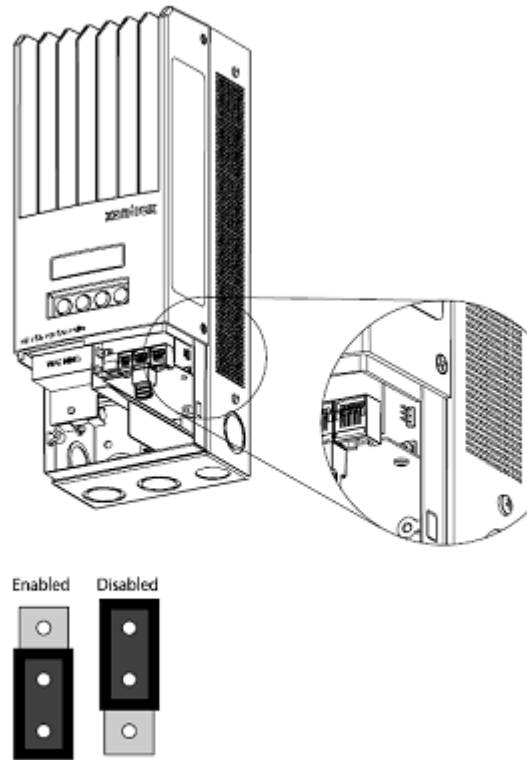


Figure 1: MPPT60-150 Jumper Location (CE Marked Model)

### PV Connection and Auxiliary lines

The PV array must not be grounded in either its positive or negative terminal. Do not attempt to ground PV+ terminal to have a common ground with the battery. A positive ground connection at the PV array will bias both Battery and Aux terminals to -PV voltage with respect to chassis ground. This would present shock hazardous voltages at the Battery terminals and the Auxiliary lines.

The internal Auxiliary lines must not be grounded in either its positive or negative terminal. Grounding the negative terminal of the Auxiliary lines will create a short on the battery side outside the reach of the unit's over-current protection.

#### **Warning: Shock Hazard**

Disconnect PV and battery circuits before accessing the charge controller wiring compartment. After removal, the jumper may be stored on a single pin of the 2 pin connector, or moved into the location marked for units with a 3-pin connector.

#### **Warning: High hazardous voltages**

Do not ground the PV positive terminal as this will bias the Battery and Auxiliary lines to shock hazardous voltages (>60Vdc) with respect to chassis ground.

#### **Warning: Short circuit**

-PVGFP should be disabled BEFORE grounding the Battery positive terminal. Not doing so will create a short across the 1 Amp fuse and blow it instantly.

-Do not ground the negative terminal of the Auxiliary lines since that would create a short across the battery bank outside the reach of the unit's over-current protection.