Instruction Manual

PRO-x60 IR compensation
Applies to PRO-100/160/360

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1. Description

IR compensation was introduced in release V2.5.3 of the PRO-x60 firmware.

It automatically takes account of the current being drawn when deciding when to show a B2 low battery alert, or operate the B1 low battery cut-off.

A setting has been introduced in the menu for the user to enter the internal resistance of the battery and the battery wires, this value is then used together with the current being drawn to calculate what voltage drop is expected. This voltage drop is then applied to the low battery settings.

2. Internal resistance

What is internal resistance? For this software, we consider internal resistance to be made up of two parts;

1. Each individual battery will have a small resistance internally which governs the maximum current that it can supply. Small batteries tend to have higher internal resistances, larger capacity batteries tend to have lower internal resistances.
2. For this software we also include the resistance of the wires that run from the battery to the controller.

3. How do I know what the IR of my batteries is?

- The manufacturer may give this figure in a data sheet.
- If the manufacturer only gives a CCA figure [cold cranking amps], then for a 12V battery divide 5.6 by the CCA number.
- A typical 12V 100Ah AGM battery will be around 5 – 10 milliohm.
- A typical 12V 200Ah AGM battery will be around 2 – 7 milliohm.

4. How do I know what the resistance of my battery wires is?

- 4mm CSA wire is around 4.6 milliohms per metre.
- 6mm CSA wire is around 3 milliohms per metre.
- 10mm CSA wire is around 1.8 milliohms per metre.

There are tables for other sizes online.

5. A typical calculation

- Two 12V 100Ah batteries in series, each of 5 milliohm = 10 milliohm.
- Two metres of 6mm CSA battery wire = 6 milliohm
- Total IR is 10+6 = 16 milliohm.

6. Turning IR compensation on

IR compensation is managed in the General settings / Low battery section of the menu. There is the option to set a value in milliohms.

- **IR Comp**

The default value is 5, this can be increased up to 100.

If IR Comp is set to 0, IR compensation is disabled.

7. LiFePo4 lithium batteries.

LiFePo4 batteries are fitted with internal battery management systems [BMS] that will disconnect the battery if the battery voltage is taken too low. For this reason, great care should be taken if using IR compensation with this type of battery. If it is used, then very low values of IR should be set to prevent the BMS tripping.