Introduction

Besides connecting one of the Victron Energy Lithium battery systems to a Multi or Quattro, it is also possible to connect a system from another manufacturer. In most installations, the Battery Management Systems (BMS) that comes with a type of lithium battery systems will need to have control over the charging and discharging of the battery. In general they will want to stop the charging process when the maximum cell voltage increases above a threshold, and also they will want to switch off loads that are discharging the battery when the minimum cell voltage drops below its threshold.

Passive versus active balancing

Depending on the type of balancing, active or passive, and also other features of the BMS and Lithium batteries, the signal to stop the charger can have different causes. In a typical passive balancing system, it might only occur when there is a -too high- imbalance between the cells. An active balancing system could give this signal every time the battery is full. Consult the documentation and/or manufacturer of the used system on how to use the different settings of this assistant and the voltages on the charger tab.

Cell overvoltage and/or battery full condition

On a signal from the BMS, the Multi can be configured to do two things:
- Switch to float
- Disable charger

The appropriate action depends on the type of BMS used, presence of a master BMS safety contactor, and other specifics of the batteries and BMS. Consult the Lithium Battery and BMS supplier for the appropriate settings.

When using the 'switch to float' option, configure the float voltage on a level where the batteries are no longer being charged. The advantage of switching to float instead of completely switching the charger off is that this reduces unnecessary cycling of the battery.

When using the 'disable charger' option, make note of the following: depending on the model, the Multi will draw a small current from the battery, even when AC input is available and passed through to the loads. This current is drawn by the internal power supply of the control circuitry.

Cell under voltage and/or battery empty condition

When the BMS signals to the Multi that the battery is empty, the inverter in the Multi will be disabled.

Requirements

BMS

Above mentioned signals need to be two separate potential free contacts that can be wired to the Multi. On the side of the Multi this is an analogue voltage measurement non-isolated with pullup resistor.
Drawing 1 mA is enough for a 'closed'- signal. Since there is no isolation in the Multi, there needs to be isolation on the BMS side. The recommended and most easy way to implement this is with a small potential free relay contact. Alternatively it is also possible to use an opto-coupler.

Multi or Quattro

The Multi or Quattro needs to be updated to the latest firmware version. (19xx2xx/20xx2xx or 26xx4xx/27xx4xx)
See the VEConfigure3 Requirements document available on our webpage:
http://www.victronenergy.com/support-and-downloads/software/

The Multi or Quattro needs to be of a recent type that has auxiliary inputs.

Add the assistant "Two-Signal BMS Support" and configure it, and the rest of the VEConfigure3 settings, as required.

Take extra care when running a parallel or three-phase system. The BMS needs to be wired to one Multi only. The assistant needs to be programmed into all Multis in the system. Follow instruction in the assistant.

Wiring diagram
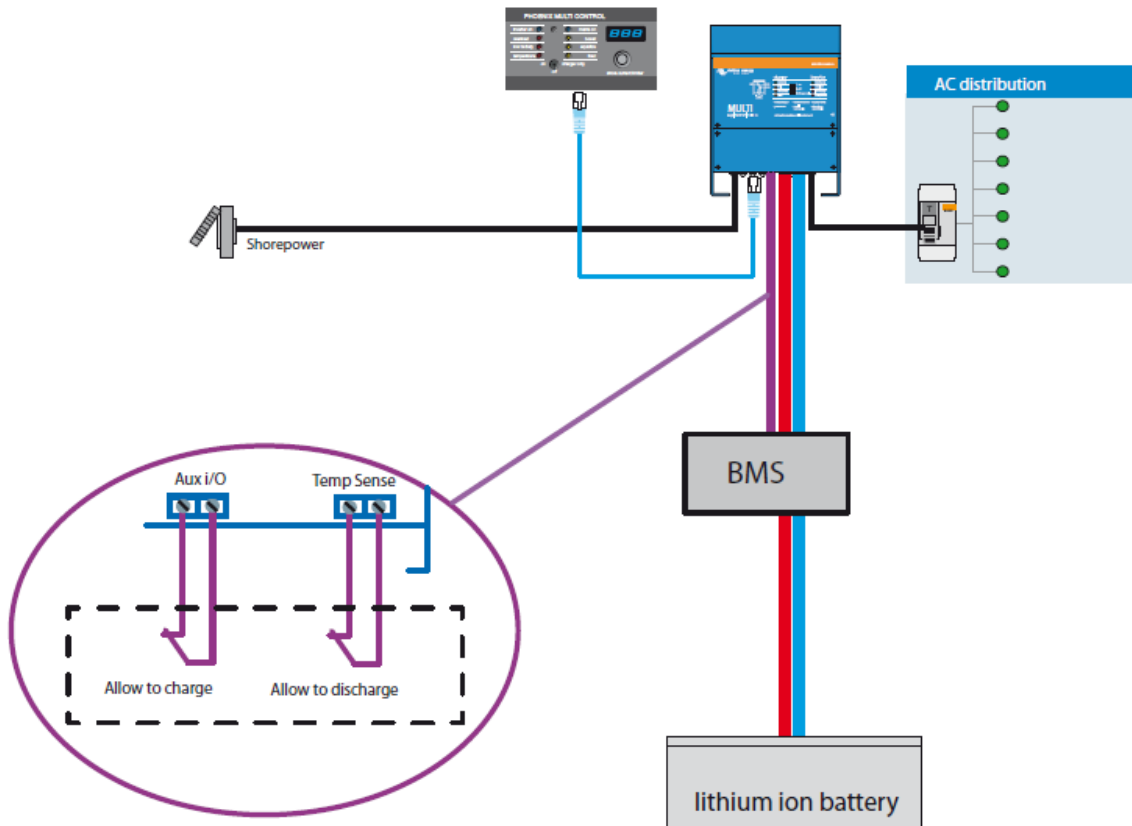
Note; contacts functionality only in combination with Lithium assistant

Charger tab

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Screenshots of the Assistant

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Two-signal BMS support

BMS options
Select the option corresponding to the BMS used.

- ◉ The BMS has separate contacts for high-cell/battery full and low-cell conditions
- ○ The BMS has one contact which switches only on a high-cell condition
- ○ The BMS has one contact which switches only on a low-cell condition
- ○ The BMS has one contact which switches on low- and high-cell conditions

[✕ Cancel] [<<] [>>]

Two-signal BMS support

Battery state inputs
Specify the conditions which indicate high-cell/battery full and empty.
(Note: Some models have no auxiliary inputs, some have 1 and others have 2)

The battery is full when [Auxiliary input 1 ▼] is [open ▼] and
the battery is empty when [Temperature sense input ▼] is [open ▼] .

[✕ Cancel] [<<] [>>]

Two-signal BMS support

Action
Specify the action to perform depending on high-cell/battery full.

[Force to float ▼] and [set SOC to 100% ▼] when battery full and switch to
┌─────────────────┐
│ Force to float │ ttery empty.
│ Disable charger │
└─────────────────┘

[✕ Cancel] [<<] [>>]

Two-signal BMS support

Action
Specify the action to perform depending on high-cell/battery full.

[Force to float ▼] and [set SOC to 100% ▼] when battery full and switch to
charger only when battery ┌─────────────────────┐
                         │ do not adapt SOC   │
                         │ set SOC to 100%   │
                         └─────────────────────┘

[✕ Cancel] [<<] [>>]

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