victron energy
BLUE POWER

Manual

EN

miniBMS

1. General Description

A simple and low cost alternative to the VE.Bus BMS
The miniBMS can replace the VE.Bus BMS in several applications. It is however not suitable for use with VE.Bus MultiPlus and Quattro inverter/chargers: it has no VE.Bus interface.
The miniBMS is intended for use with Victron Smart LiFePo4 batteries with M8 circular connectors.
The miniBMS has two outputs, similar to the VE.Bus.BMS.

Load Disconnect output
The Load output is normally high and becomes free floating in case of imminent cell under voltage. Maximum current: 1A. The Load output is not short-circuit protected.
The Load output can be used to control:
A high current relay or contactor.
The remote on/off input of a Battery Protect, inverter or DC-DC converter or other loads.
(a non inverting or inverting on/off cable may be required, please consult the manual)

Charge disconnect output
The Charger output is normally high and becomes free floating in case of imminent cell over voltage or over temperature.
Maximum current: 10mA.
The Charger output is not suitable to power an inductive load such as a relay coil.
The Charger output can be used to control:

- The remote on/off of a charger.
- A Cyrix-Li-Charge relay.
- A Cyrix-Li-ct Battery Combiner.

System on/off input
The system on/off input controls both outputs. When off, both outputs will be free floating so that loads and chargers are turned off.
The System on/off consists of two terminals: Remote L and Remote H.
A remote on/off switch or relay contact can be connected between L and H.
Alternatively, terminal H can be switched to battery plus, or terminal L can be switched to battery minus.

Protects 12V, 24V and 48V systems
Operating voltage range: 8 to 70V DC.

LED indicators

- Load ON (blue): Load output high (cell voltage >2.8V, adjustable on the battery).
- Temp or OVP (red): Charger output free floating (due to cell over temperature (>50°C), cell under temperature (<5 °C) or cell over voltage).

2. Safety instructions

Installation must strictly follow the national safety regulations in compliance with the enclosure, installation, creepage, clearance, casualty, markings and segregation requirements of the end-use application. Installation must be performed by qualified and trained installers only. Switch off the system and check for hazardous voltages before altering any connection.

1. Do not open the Lithium Ion Battery.
2. Do not discharge a new Lithium Ion Battery before it has been fully charged first.
3. Charge only within the specified limits.
4. Do not mount the Lithium Ion Battery upside down.
5. Check if the Li-Ion battery has been damaged during transport.
6.

3. Things to consider

3.1 Important warning

Li-ion batteries are expensive and can be damaged due to over discharge or over charge.
Damage due to over discharge can occur if small loads (such as: alarm systems, relays, standby current of certain loads, back current drain of battery chargers or charge regulators) slowly discharge the battery when the system is not in use.
In case of any doubt about possible residual current draw, isolate the battery by opening the battery switch, pulling the battery fuse(s) or disconnecting the battery plus when the system is not in use.

A residual discharge current is especially dangerous if the system has been discharged completely and a low cell voltage shutdown has occurred. After shutdown due to low cell voltage, a capacity reserve of approximately 1Ah per 100Ah battery capacity is left in the battery. The battery will be damaged if the remaining capacity reserve is drawn from the battery. A residual current of 10mA for example may damage a 200Ah battery if the system is left in discharged state during more than 8 days.

3.3 DC loads with remote on/off terminals

DC loads must be switched off or disconnected in case of imminent cell under voltage.
The Load Disconnect output of the VE.Bus BMS can be used for this purpose.
The Load Disconnect is normally high (equal to battery voltage) and becomes free floating (= open circuit) in case of imminent cell under voltage (no internal pull down in order to limit residual current consumption in case of low cell voltage).

DC loads with a remote on-off terminal that switches the load on when the terminal is pulled high (to battery plus) and switches it off when the terminal is left free floating can be controlled directly with the Load Disconnect output.
See appendix for a list of Victron products with this behavior.

For DC loads with a remote on/off terminal that switches the load on when the terminal is pulled low (to battery minus) and switches it off when the terminal is left free floating, the **Inverting remote on-off cable** can be used. See appendix.

Note: please check the residual current of the load when in off state. After low cell voltage shutdown a capacity reserve of approximately 1Ah per 100Ah battery capacity is left in the battery. A residual current of 10mA for example may damage a 200Ah battery if the system is left in discharged state during more than 8 days.

3.4 DC load: disconnecting the load with a BatteryProtect

A Battery Protect will disconnect the load when:
input voltage (= battery voltage) has decreased below a preset value, or when
the remote on/off terminal is pulled low. The miniBMS can be used to control the remote on/off terminal
Contrary to a Cyrix or contactor, a BatteryProtect can start a load with a large input capacitor such as an inverter or a DC-DC converter.

3.5 Charging the $LiFePO_4$ battery with a battery charger

Battery charging must be reduced or stopped in case of imminent cell over voltage or over temperature.

The Charge Disconnect output of the VE.Bus BMS can be used for this purpose.
The Charge Disconnect is normally high (equal to battery voltage) and switches to open circuit state in case of imminent cell over voltage.

Battery chargers with a remote on-off terminal that activates the charger when the terminal is pulled high (to battery plus) and deactivates when the terminal is left free floating can be controlled directly with the Charge Disconnect output.
See appendix for a list of Victron products with this behavior.

Battery chargers with a remote terminal that activates the charger when the terminal is pulled low (to battery minus) and deactivates when the terminal is left free floating, the **Inverting remote on-off cable** can be used. See appendix.

Alternatively, a **Cyrix-Li-Charge** can be used:
The Cyrix-Li-Charge is a unidirectional combiner that inserts in between a battery charger and the $LiFePO_4$ battery. It will engage only when charge voltage from a battery charger is present on its charge-side terminal. A control terminal connects to the Charge Disconnect of the BMS.

3.6 Charging the $LiFePO_4$ battery with an alternator

See figure 6.
The **Cyrix-Li-ct** is recommended for this application.
The microprocessor controlled Cyrix-Li-ct includes a timer and voltage trend detection. This will prevent frequent switching due to a system voltage drop when connecting to a discharged battery.

3.7 Battery

In case of several batteries in parallel and or series configuration, the two M8 circular connector cord sets of each battery should be connected in series (daisy chained).
Connect the two remaining cords to the BMS.

4. System examples

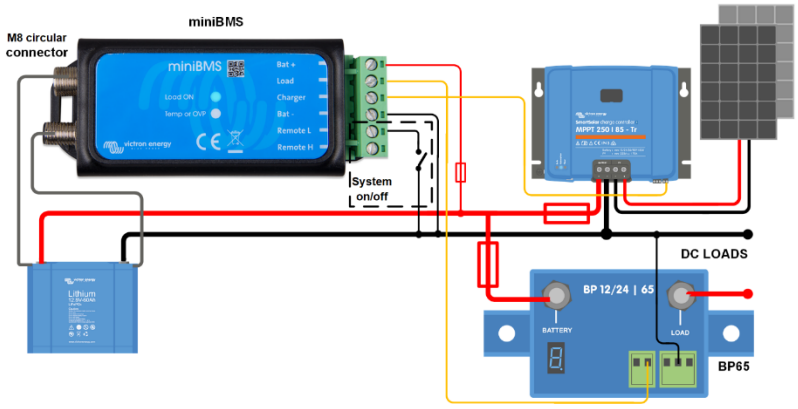

Figure 1: Application example for a DC off-grid system, with on/off switch between L and battery negative

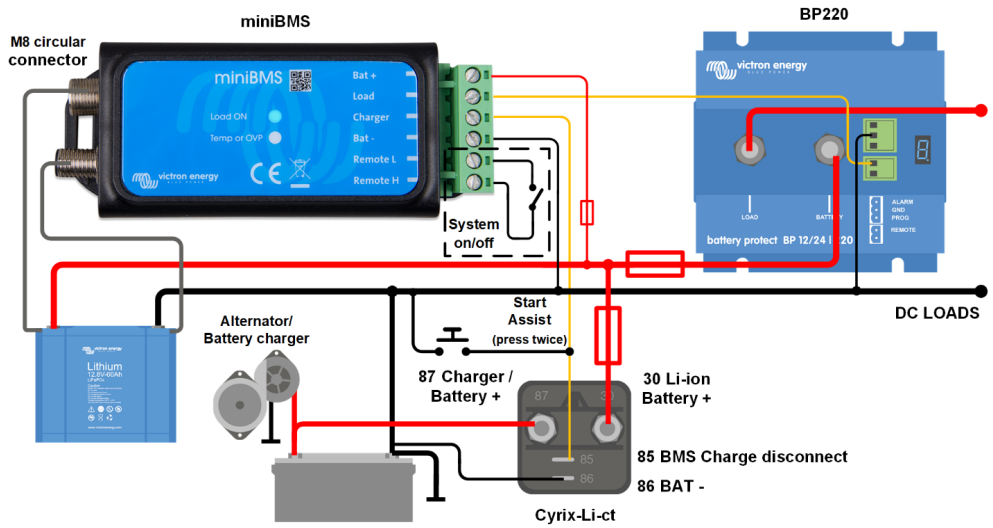

Figure 2: Application example for a vehicle or boat, with on/off switch between H and L

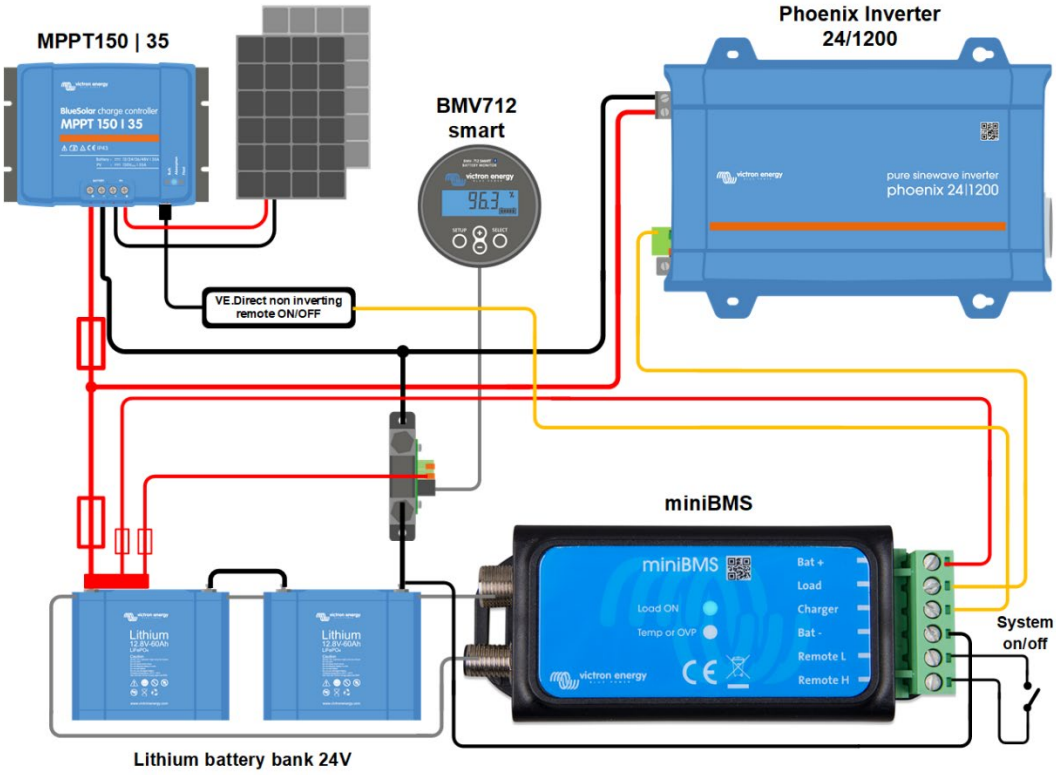

Figure 3: Application example for a vehicle or boat, with on/off switch between H and L

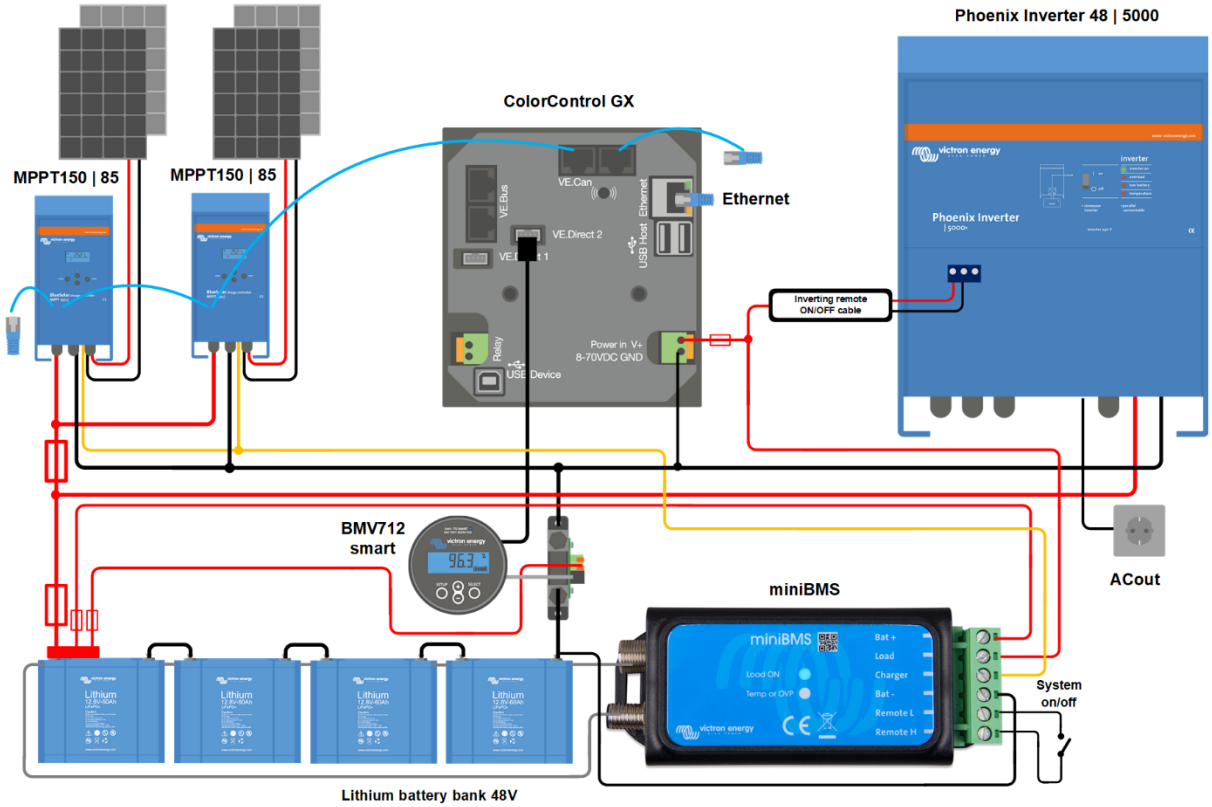

Figure 4: Solar application with two MPPT 150/85 CAN-bus
The MPPT 150/85 CAN-bus has a remote on-off port which can be be controlled directly by the VE.Bus BMS

8. Specifications

miniBMS	
Normal operating Input voltage range (Vbat)	8 – 70V DC
Current draw, normal operation	2.7 mA (excluding Load output and Charger output current)
Current draw, low cell voltage	2mA
Current draw, remote off	1,5 mA
Load output	Normally high (Vbat – 0.1V) Source current limit: 1A (not short circuit protected) Sink current: 0A (output free floating)
Charger output	Normally high (Vbat –o.6V) Source current limit: 10mA (short circuit protected) Sink current: 0A (output free floating)
System on/off: Remote L and Remote H	Use modes of the system on-off: a. ON when the L and H terminal are interconnected (switch or relay contact) b. ON when the L terminal is pulled to battery minus (V< 3.5V) c. ON when the H terminal is high (2.9V < V_H < Vbat) d. OFF in all other conditions
GENERAL	
Operating temperature	-20 to +50°C 0 - 120°F
Humidity	Max. 95% (non-condensing)
Protection grade	IP20
ENCLOSURE	
Material and colour	ABS, matt black
Weight	0.1kg
Dimensions (h x w x d)	106 x 42 x 23mm
STANDARDS	
Standards: Safety Emission Immunity Automotive	EN 60950 EN 61000-6-3, EN 55014-1 EN 61000-6-2, EN 61000-6-1, EN 55014-2 Regulation UN/ECE-R10 Rev.4

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Appendix:

1. Loads which can be controlled directly by the Load Disconnect output of the BMS

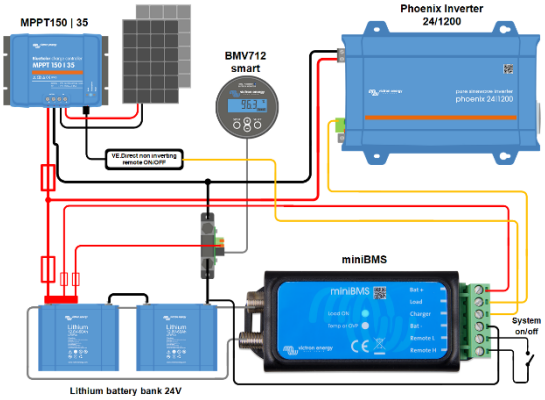
Inverters:
All Phoenix inverters VE.Direct
Connect to the **left** hand terminal of the 2 pole connector

Phoenix 12/800; 24/800; 48/800
Phoenix 12/1200; 24/1200; 48/1200
Connect to the right hand terminal of the 2 pole connector

DC-DC converters:
All Tr type DC-DC converters with remote on/off connector, and Orion 12/24-20; 24/12-25; 24/12-40; 24/12-70
Connect to the right hand terminal of the 2 pole connector

Battery Protect and Smart Battery Protect
Connect to the right hand terminal of the 2 pole connector

Cyrix -Li-Load
Connect to the control input



2. Loads for which an inverting remote on-off cable is needed (article number ASS030550100)

Phoenix 12/180; 24/180; 12/.250; 24/350
All Phoenix VE.Bus inverters rated at 3kVA and more

3. Solar charge controllers which can be controlled directly by the Charge Disconnect output

BlueSolar MPPT 150/70 and 150/80 CAN-bus
Connect to the **left** hand terminal of the 2 pole connector (B+)

SmartSolar MPPT 150/45 and higher, 250/60 and higher
Connect to the right hand terminal (marked + or H) of the 2 pole connector

4. Solar charge controllers for which a VE.Direct non inverting remote on-off cable is needed

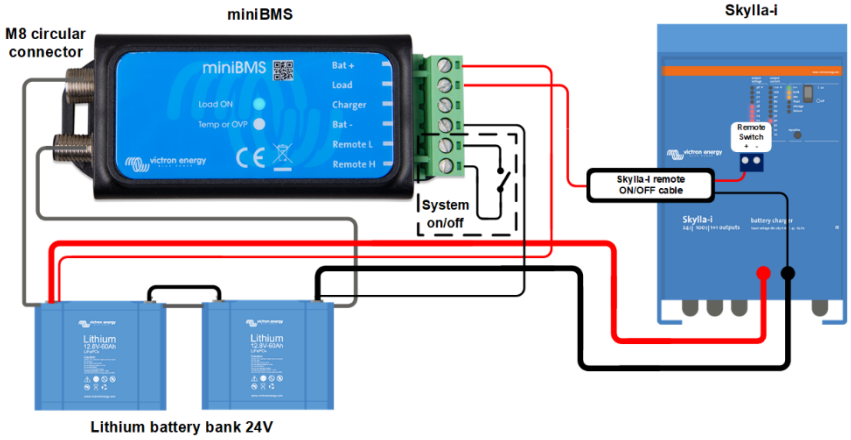
(article number ASS030550310)
All BlueSolar models, except the two CAN-bus models
SmartSolar MPPT up to 150/35

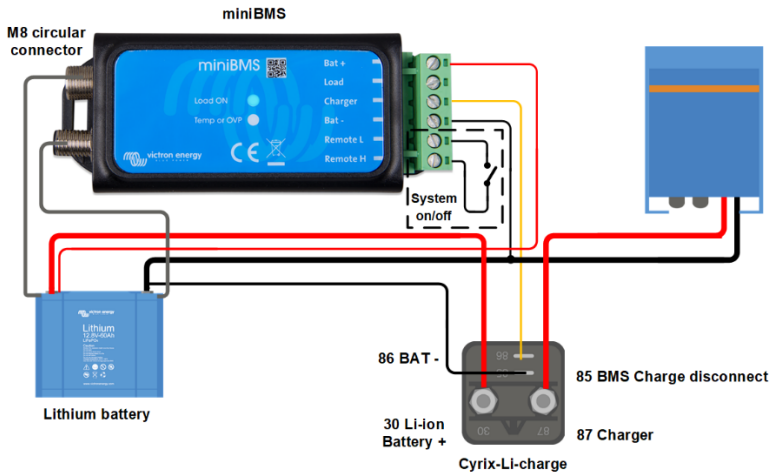
5. Battery Chargers

For Skylla TG battery chargers a
Non inverting remote on-off cable is needed
(article number ASS030550200)

For Skylla-i battery chargers a
Skylla-i remote on-off cable is needed
(article number ASS030550400)

Other battery chargers:
Use a Cyrix-Li-Charge





Victron Energy Blue Power

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