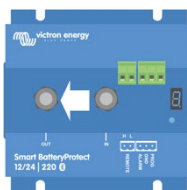


Smart BatteryProtect 12/24V
ENGLISH
Installation

1. The Smart BatteryProtect (SBP) must be installed in a well-ventilated area and preferably close (max 50 cm) to the battery (but, due to possible corrosive gasses not above the battery!). **Voltage drop over a long or undersized cable between the battery plus and the SBP may result in a short circuit alarm when starting-up the load, or unexpected shutdown.**
2. A properly sized fuse must be inserted according to local regulations in the cable between the battery and the SBP.
3. The SBP is designed to allow current to flow from IN (battery) to OUT (load) terminals only. Reverse currents from OUT to IN terminals are strictly forbidden, and will damage the device. If you wish to use the SBP as a disconnection for a charge source, you must orient the unit in the system so that the current is flowing in the intended direction, IN to OUT.
4. The short circuit protection of the SBP will be activated if you try to directly connect loads with capacitors on their input (eg inverters). For that use case, please use the SBP to control the remote on/off switch on the inverter, instead of disconnecting the higher power DC line.
5. Use a 1,5mm² wire (included) for the GND connection, which should be connected directly to the battery negative terminal (or the chassis of a vehicle). No other equipment should be connected to this wire.
6. The SBP automatically detects the system voltage **once only** during initial power up. The selected voltage (12 or 24V) is stored, and further automatic detection is disabled. See **d** in the programming table for how to reset it when re-using the SBP in a different installation or use Bluetooth.
7. Do not connect the load output until the SBP has been fully programmed.
8. A remote on-off switch can be connected between Remote H and Remote L (see figure 1). Alternatively, terminal H can be switched high (to battery positive), or terminal L can be switched low (to battery negative).
9. A buzzer, LED or relay can be connected between the alarm output terminal and the battery positive (see figure 1). Maximum load on the alarm output: 50 mA (short circuit proof).

**Load disconnect events and alarm output options**

Buzzer or LED mode (buzzer or LED connected to the alarm output):

- In case of under voltage, a continuous alarm will start after 12 seconds. The SBP will disconnect the load after 90 seconds and the alarm will stop. Reconnect delay: 30 seconds.
- In case of over voltage, the load will be disconnected immediately and an intermittent alarm will remain on until the overvoltage problem has been corrected. There is no reconnect delay.

Relay mode (relay connected to the alarm output):

- In case of under voltage, the relay will engage after 12 seconds. The SBP will disconnect the load after 90 seconds and the relay will disengage.
- In case of over voltage, the load will be disconnected immediately and the alarm output will remain inactive.

Li-ion mode:

- Connect the load disconnect output of the VE.Bus BMS to Remote H terminal. The load is disconnected immediately when the load-disconnect output of the VE.Bus BMS switches from 'high' to 'free floating' (due to battery cell under voltage, over voltage or over temperature). The under voltage thresholds and alarm output of the SBP are inactive in this mode.

Operation

There are 9 possible error modes and 2 warning modes, indicated by the 7 segment display and within VictronConnect when using a Bluetooth enabled smartphone or tablet:

- E 0 Calibration failure
- E 1 Short circuit
- E 2 Over temperature / P2 Over temperature warning
- E 3 Under voltage / P3 Under voltage warning
- E 4 Over voltage
- E 5 Configuration Failure
- E 6 Reference Voltage Failure
- E 7 BMS Lockout
- E 8 Reverse current

After 5 minutes the error is no longer displayed to reduce current consumption.

Please refer to the Appendix for more info on each error.

The decimal point of the 7 segment display is used for status indication:

- On solid: the SBP attempts to activate the output
- Flash every 5s: output is active
- Flashing every 2s in Li-ion mode: output 'connecting'

Remote control and short circuit

- The SBP will connect the load 1 second after closing the remote contact.
- The SBP will disconnect the load immediately when the remote contact is opened.
- When in Li-ion mode the SBP will observe a dead period of 30 seconds after the remote input of the SBP has become free floating. See the note under figure 4 for a detailed description.
- In case of a short circuit, the SBP will attempt to connect the load every 5 seconds. After two attempts the display will show E 1 (short circuit detected).

Programming

When switched off (remote open), the SBP can be programmed by connecting the PROG pin to ground. Alternatively, it can be programmed with a Bluetooth enabled smartphone or tablet using VictronConnect.

The 7-segment display will first step through the shutdown and restart voltages. Disconnect the PROG pin when the desired voltage is displayed.

The display will confirm the chosen voltage and default mode (**A**) twice.

Reconnect the PROG pin to ground if another mode (**b**, **C** or **d**) is required. Disconnect when the required mode is displayed.

The display will confirm the chosen voltage and mode twice.

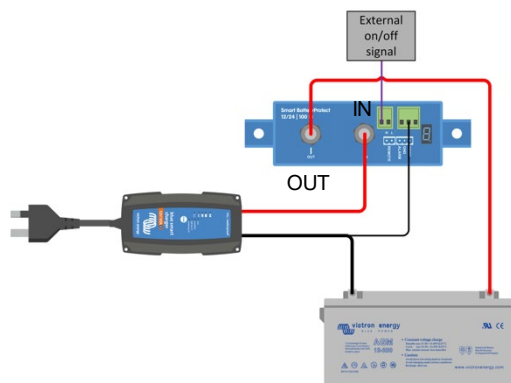
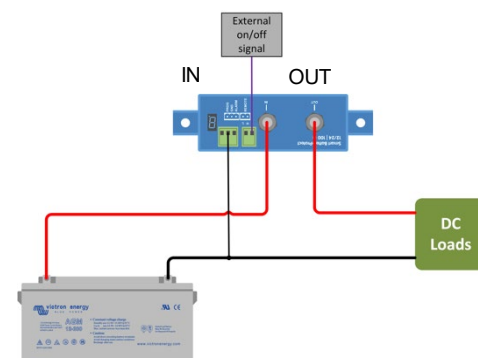
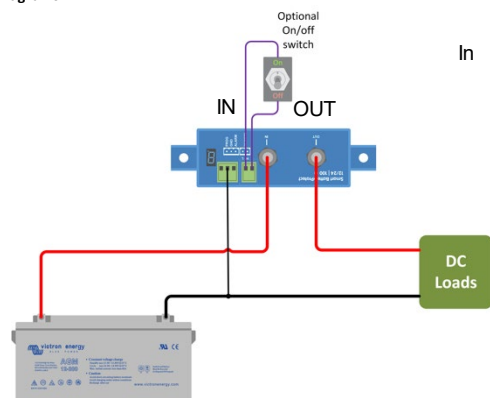
Bluetooth can be disabled/re-enabled with the VictronConnect app or by connecting the PROG pin to ground and selecting **F** (enable) or **h** (disable). See table below

Programming table

| 7 segment display | Under voltage shut down 12V / 24V system | Under voltage restart 12V / 24V system |
|-------------------|---|---|
| 0 | 10.5V / 21V | 12V / 24V |
| 1 | 10V / 20V | 11.5V / 23V |
| 2 | 9.5V / 19V | 11.5V / 23V |
| 3 | 11.25V / 22.5V | 13.25V / 26.5V |
| 4 | 11.5V / 23V | 13.8V / 27.6V |
| 5 | 10.5V / 21V | 12.8V / 25.6V |
| 6 | 11.5V / 23V | 12.8V / 25.6V |
| 7 | 11.8V / 23.6V | 12.8V / 25.6V |
| 8 | 12V / 24V | 13V / 26V |
| 9 | 10V / 20V | 13.2V / 26.4V |
| - | User defined settings with Bluetooth | |
| A | Buzzer or LED mode | |
| b | Relay mode | |
| C | Li-ion mode | |
| d | Detect system voltage | |
| F | Bluetooth Enable | |
| h | Bluetooth Disable | |

Specifications

| Smart BatteryProtect | | SBP-65 | SBP-100 | SBP-220 |
|-----------------------------|---------|---|--|---|
| Maximum cont. load current | | 65A | 100A | 220A |
| Peak current | | 250A | 600A | 600A |
| Operating voltage range | | 6 – 35V | | |
| Current consumption | BLE On | When on: 1.4 mA When off or low voltage shutdown: 0.9 mA | | |
| | BLE Off | When on: 1.2 mA When off or low voltage shutdown: 0.7 mA | | |
| Alarm output delay | | 12 seconds | | |
| Max. load on alarm output | | 50mA (short circuit proof) | | |
| Load disconnect delay | | 90 seconds (immediate if triggered by the VE.Bus BMS) | | |
| Load reconnect delay | | 30 seconds | | |
| Default thresholds | | Disengage: 10,5V or 21V Engage: 12V or 24V | | |
| Operating temperature range | | Full load: -40°C to +40°C (up to 60% of nominal load at 50°C) | | |
| Connection | | M6 | M8 | M8 |
| Weight | | 0.2kg 0.5 lbs | 0.5kg 1.1 lbs | 0.8kg 1.8 lbs |
| Dimensions (hxxwxd) | | 40 x 48 x 106 mm 1.6 x 1.9 x 4.2 inch | 59 x 42 x 115 mm 2.4 x 1.7 x 4.6 inch | 62 x 123 x 120 mm 2.5 x 4.9 x 4.8 inch |

Example Wiring Diagrams

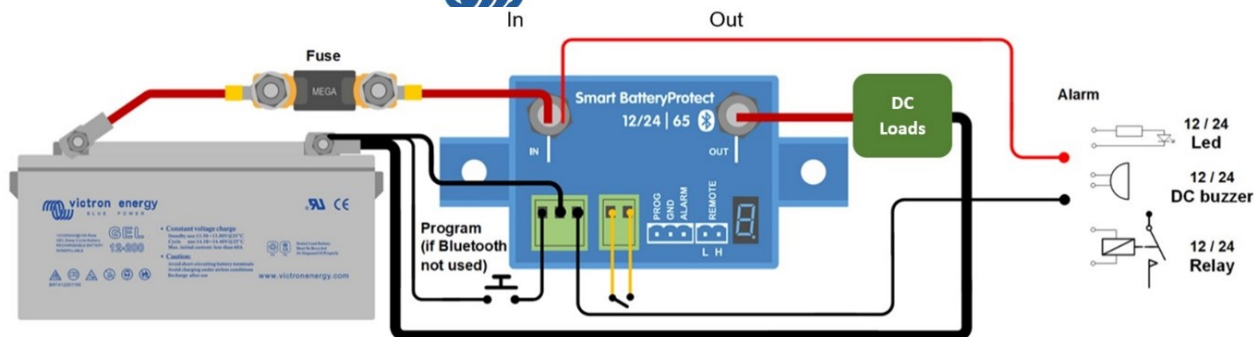


Figure 1: Connection diagram of the SBP-65 (use the remote input for system on/off functionality)

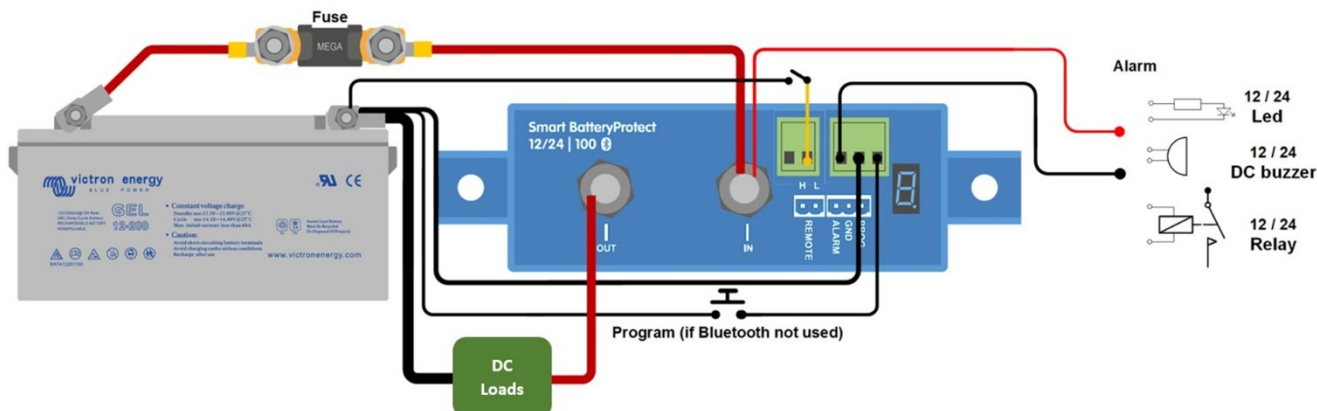


Figure 2: Connection diagram of the SBP-100 and SBP-220 (use the remote input for system on/off functionality)

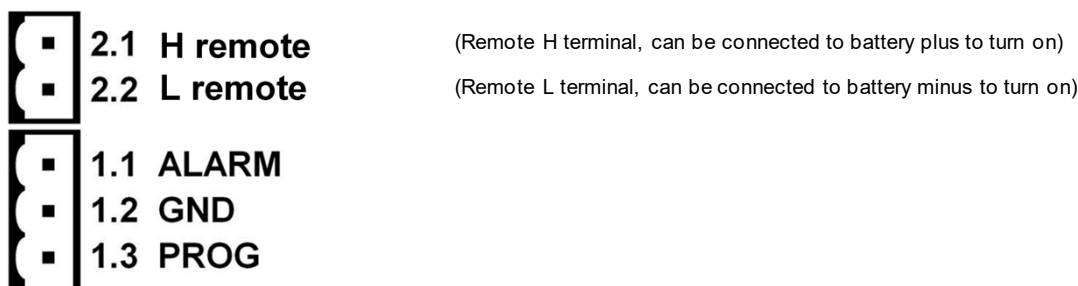


Figure 3: Connectors and pin numbering

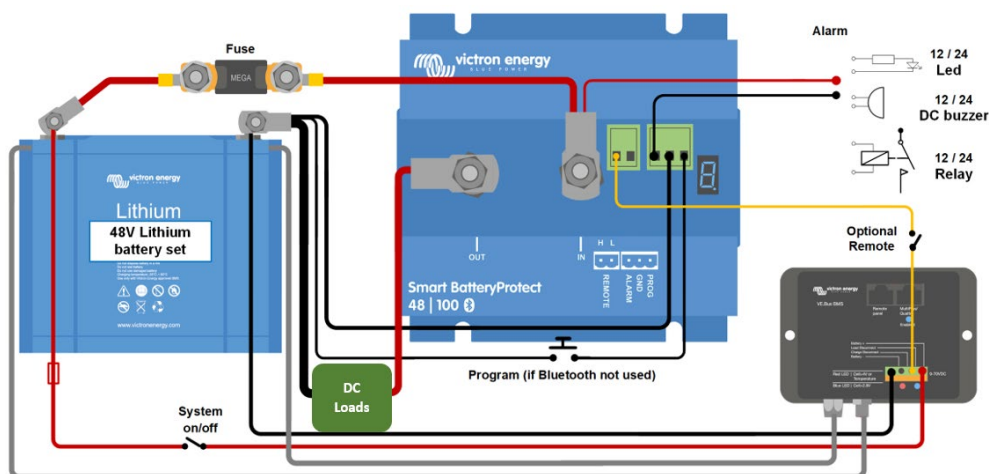


Figure 4: System with Li-ion battery (applicable with VE.Bus BMS or smallBMS)

Note: When in Li-ion mode, the SBP will disengage when the H input becomes free floating, and will remain disengaged for 30 seconds even if it receives a re-engage signal within that time period. After 30 seconds it will respond immediately to a re-engage signal. Therefore, there will normally be no waiting time if the SBP is used as a system on-off switch (wire the System on/off switch in the positive supply of the BMS for this purpose).

Similarly, if a system shut down occurred due to low cell voltage, the SBP will remain disengaged for 30 seconds even if it receives a re-engage signal within that time period (which will happen when no other loads are connected to the battery). After 3 attempts to re-engage, the SBP will remain disengaged until battery voltage has increased to more than 13V (resp. 26V) during at least 30 seconds (which is a sign that the battery is being recharged). The under voltage thresholds and alarm output of the SBP are inactive in this mode.

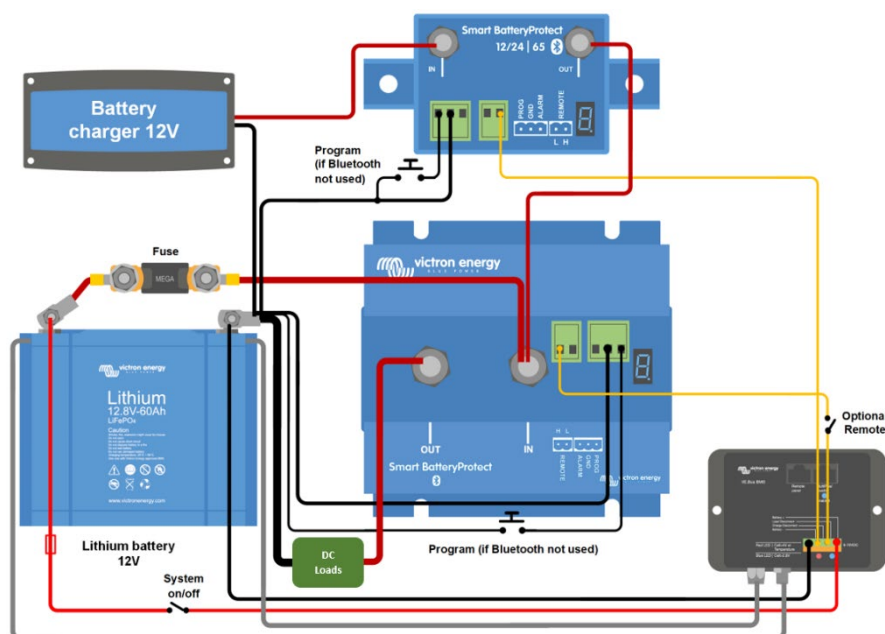


Figure 5: Second Smart BatteryProtect in between a battery charger or MPPT solar charge controller and a Li-ion battery (applicable with VE.Bus BMS or smallBMS)

The second SBP replaces a Cyrix-Li-charge relay (advantages: lower power consumption, alarm relay).

(not applicable if the charger has remote on-off contacts and can be controlled with an interface cable between the BMS and the charger)

Choose program **L** for this application.

Caution: uncontrolled reverse current will flow through a Smart BatteryProtect if $V_{out} > V_{in}$. Therefore, never use a Smart BatteryProtect for battery to battery charging.

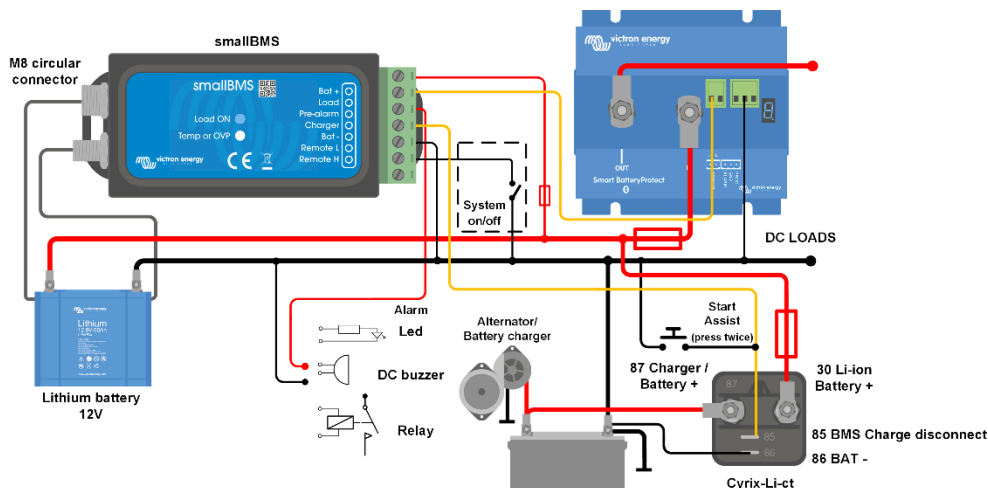


Figure 6: Application example for a vehicle or boat, with on/off switch between H and L (applicable with VE.Bus BMS or smallBMS)

APPENDIX**Error/ Warning Codes****E0: Calibration failure**

Internal malfunction – calibration data failure/missing



Contact dealer for support – Fault is not user correctable and SBP requires replacement

E1: Short circuit

Short circuit protection is activated in the event of a short circuit, an overload condition or excessive inrush current - such as when attempting to directly power an inverter



- 1- Check for a potential short circuit condition
- 2- Confirm that the load current draw does not exceed the SBP current rating
- 3- Use the SBP to control the remote on/off switch on loads with high inrush currents, rather than directly powering/disconnecting the DC supply
- 4- Check for loose/high resistance connections and ensure that appropriate gauge wiring is used in the installation

P2: Over temperature warning**Urgent intervention required to prevent load disconnection**

Internal temperature close to the limit. Over temperature protection will be activated if temperature continues to rise

E2: Over temperature

Over temperature protection is activated in the event of excessive internal temperature



- 1- Confirm that the load current draw does not exceed the SBP current rating
- 2- Check for loose/high resistance connections and ensure that appropriate gauge wiring is used in the installation
- 3- Do not install the SBP unit in a location exposed to high temperature or radiant heat - relocate SBP to a cooler position or provide additional active cooling

P3: Under voltage warning**Urgent intervention required to prevent load disconnection**

Under voltage protection will be activated in 90 seconds if no action is taken

E3: Under voltage

Under voltage protection is activated in the event that the input voltage drops below the under voltage limit selected for 90 seconds



- 1- Switch off/disconnect loads and recharge the battery
- 2- Check charging system and battery for proper operation

E4: Over voltage

Over voltage protection is activated in the event that the input voltage exceeds 16V (for 12V systems) or 32V (for 24V systems)



- 1- Confirm the configuration of all charging devices in the system - particularly system voltage and charge voltage settings
- 2- Check charging system for proper operation
- 3- Confirm SBP system voltage configuration is correct

E5: Configuration failure

Internal malfunction - configuration data failure/missing



- To recover the SBP from this condition;
- 1- Reset the unit to factory defaults under - Settings > More options > Reset to defaults
 - 2- Disconnect all power and wait 3 minutes before reconnecting
 - 3- Reconfigure the unit as required

E6: Reference voltage failure

Internal malfunction - reference voltage failure/missing



Contact dealer for support - Fault is not user correctable and SBP requires replacement

E7: BMS lockout

BMS lockout protection is activated in the event the external BMS requests the SBP to consecutively disengage and then re-engage 3 times (typical behaviour during a shut down due to low cell voltage)

Once E7 is activated the SBP will remain disengaged until input voltage exceeds 13V (for 12V systems) or 26V (for 24V systems)



- 1- Check BMS error codes/log to identify the cause of shut-down and rectify issue
- 2- Switch off/disconnect loads and recharge the battery
- 3- Check wiring between BMS and SBP Remote terminal
- 4- Check BMS for proper operation

E8: Reverse current

Reverse current protection is activated in the event that reverse current flow is detected

CAUTION: SBP is designed to allow or prevent current flow from IN to OUT terminals ONLY. Reverse current flow is strictly forbidden and may permanently damage the SBP.



- 1- Check that the SBP installation orientation is correct - current flow must be from IN to OUT (refer to example wiring diagrams)
- 2- Confirm that no charging sources are inadvertently connected to the SBP OUT terminal/circuit
- 3- If the SBP is used to disconnect a charge source, confirm that no loads are inadvertently connected to the SBP IN terminal/circuit