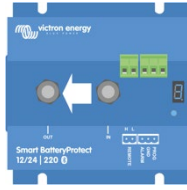


Smart BatteryProtect 12/24V
 ENGLISH

Installation

- 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.**
- A properly sized fuse must be inserted according to local regulations in the cable between the battery and the SBP.
- 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.
- 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.
- Use a 1,5mm² wire (included) for the minus connection, which should be connected directly to the battery minus (or the chassis of a vehicle). No other equipment should be connected to this wire.
- The SBP automatically detects the system voltage **one time only** after connection of plus and minus to the battery. 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.
- Do not connect the load output until the SBP has been fully programmed.
- A remote on-off switch can be connected between Remote H and Remote L (see figure 1). Alternatively, terminal H can be switched to battery plus, or terminal L can be switched to battery minus.
- A buzzer, LED or relay can be connected between the alarm output and the battery plus (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 6 possible error modes, indicated by the 7 segment display and on a Bluetooth enabled device:

- E 1 Short circuit detected
- E 2 Over load or over temperature / P2 over temperature warning
- E 3 Under voltage / P3 under voltage warning
- E 4 Over voltage
- E 5 Settings Failure
- E 6 Reference Voltage Failure
- E 7 BMS Lockout

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

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 regardless of the remote status.

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.

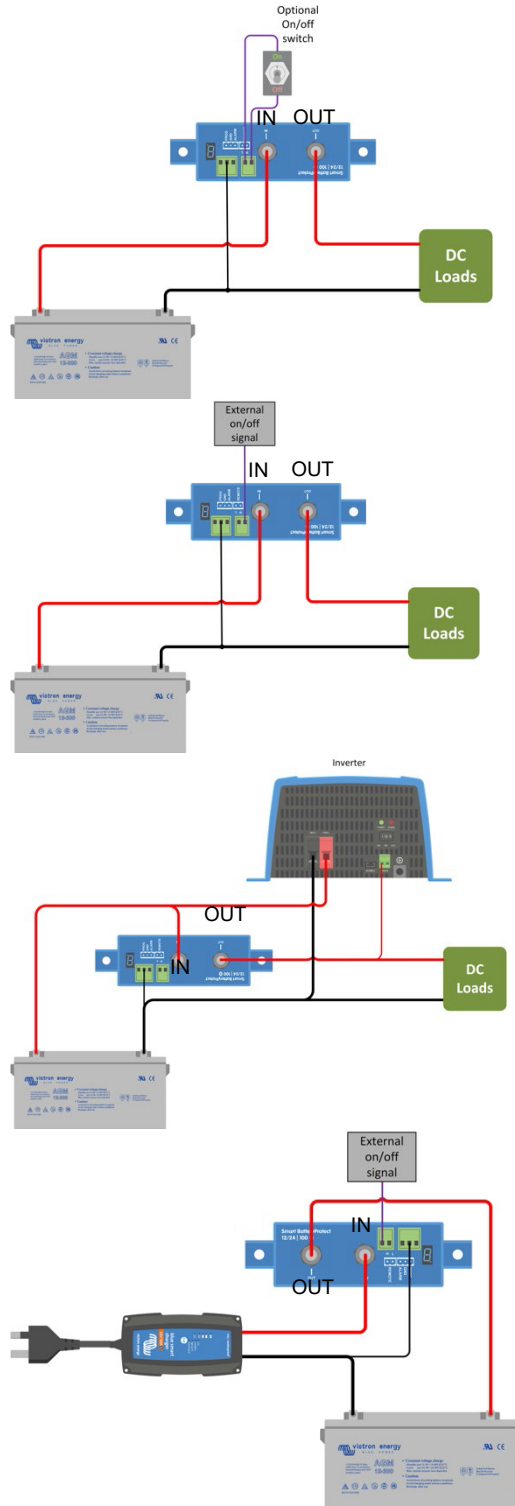
 Bluetooth can be disabled/re-enabled with the VictronConnect app or by connecting the PROG pin to ground and selecting **F** (enable) or **h** (disable). See table below

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 0,6 lbs	0,8kg 1,8 lbs
	40 x 48 x 106 mm	59 x 42 x 115 mm	62 x 123 x 120 mm
Dimensions (hwxwd)	1,6 x 1,9 x 4,2 inch	2,4 x 1,7 x 4,6 inch	2,5 x 4,9 x 4,8 inch

Example Wiring Diagrams


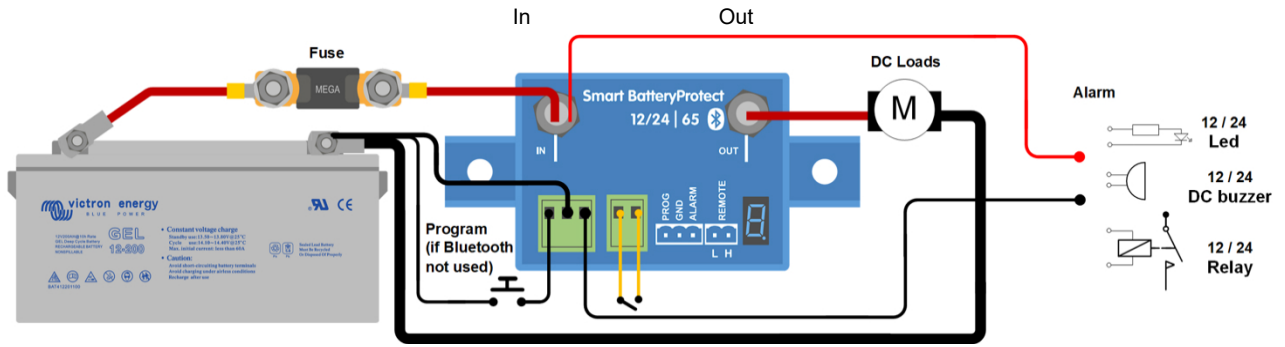


Figure 1: Connection diagram of the SBP-65 (use the remote input for system on/off functionality)

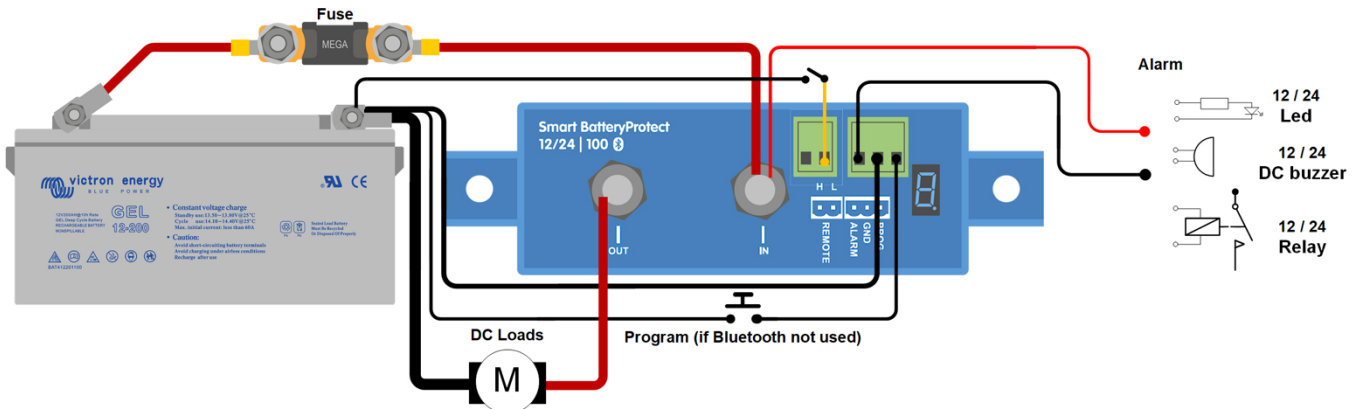


Figure 2: Connection diagram of the SBP-100 and SBP-220 (use the remote input for system on/off functionality)

- 2.1 H remote (Remote H terminal, can be switched to battery plus to turn on)
 - 2.2 L remote (Remote L terminal, can be switched to battery minus to turn on)
- 1.1 ALARM
 - 1.2 GND
 - 1.3 PROG

Figure 3: Connectors and pin numbering

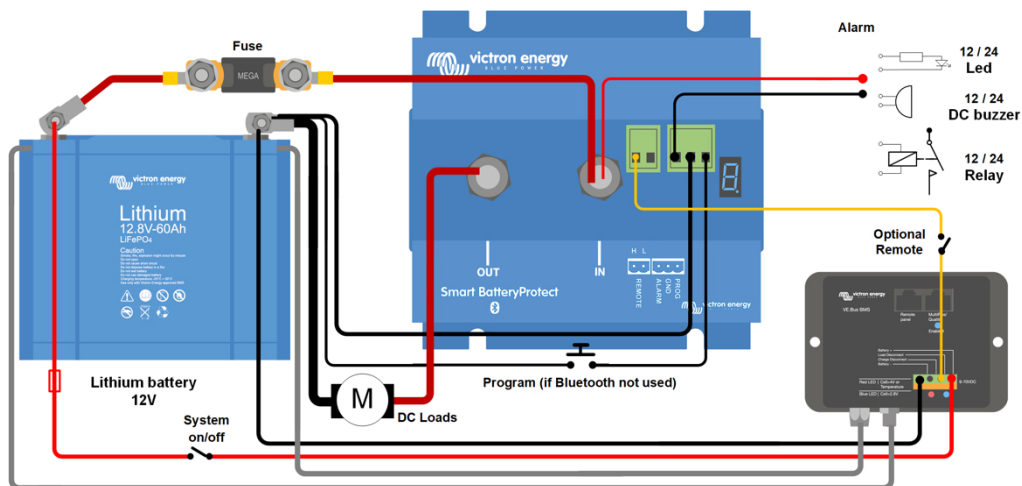


Figure 4: System with Li-ion battery (applicable with VE.Bus BMS or miniBMS)

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.

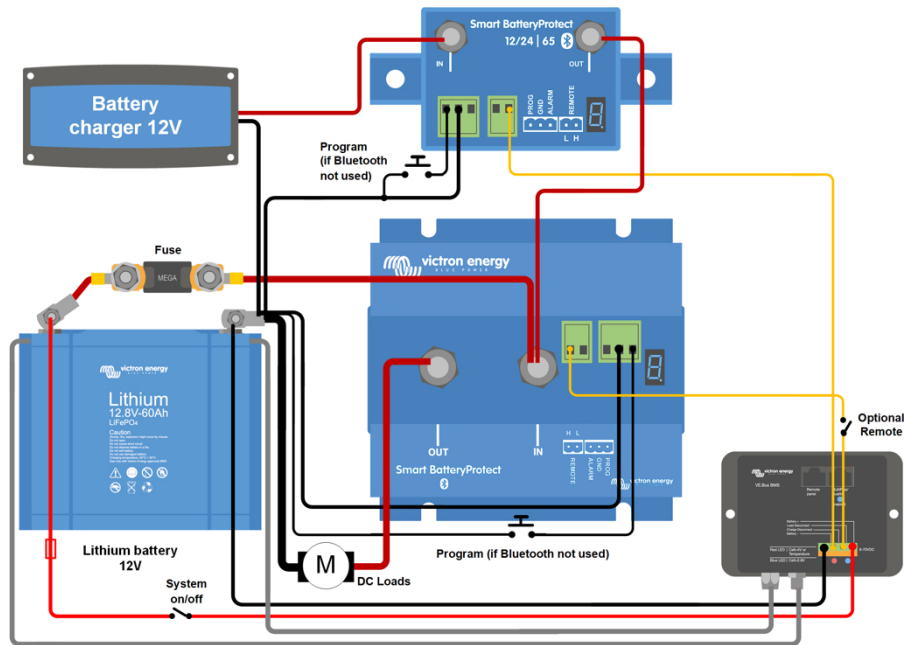


Figure 5: Second Smart BatteryProtect in between a battery charger or MPPT solar charge controller and a Li-ion battery (applicable with VE.Bus BMS or miniBMS)

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.

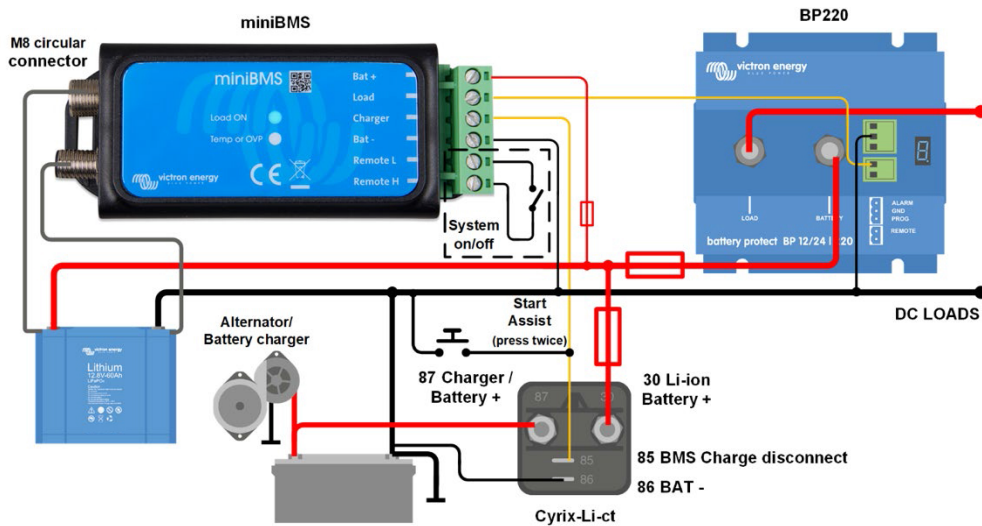
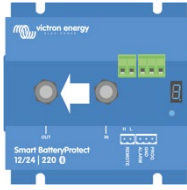


Figure 6: Application example for a vehicle or boat, with on/off switch between H and L (applicable with VE.Bus BMS or miniBMS)

Smart BatteryProtect 48/100
 ENGLISH

Installation

- 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.**
- A properly sized fuse must be inserted according to local regulations in the cable between the battery and the SBP.
- 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.
- 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.
- Use a 1,5mm² wire (included) for the minus connection, which should be connected directly to the battery minus (or the chassis of a vehicle). No other equipment should be connected to this wire.
- The SBP automatically detects the system voltage after connection of plus and minus to the battery. During the voltage detection the 7 segment display shows a series of flashes between the top and lower part.
- Do not connect the load output until the SBP has been fully programmed.
- A remote on-off switch can be connected between Remote H and Remote L (see figure 1). Alternatively, terminal H can be switched to battery plus, or terminal L can be switched to battery minus.
- A buzzer, LED or relay can be connected between the alarm output and the battery plus (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. Overvoltage trip level: 65.2V

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 6 possible error modes, indicated by the 7 segment display and on a Bluetooth enabled device:

- E1 Short circuit detected
- E2 Over load or over temperature / P2 over temperature warning
- E3 Under voltage / P3 under voltage warning
- E4 Over voltage
- E5 Settings Failure
- E6 Reference Voltage Failure
- E7 BMS Lockout

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

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 E1 (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 regardless of the remote status.

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 (R) twice.

Reconnect the PROG pin to ground if another mode is (b or L) is required. Disconnect when the required mode is displayed.

The display will confirm the chosen voltage and mode twice.

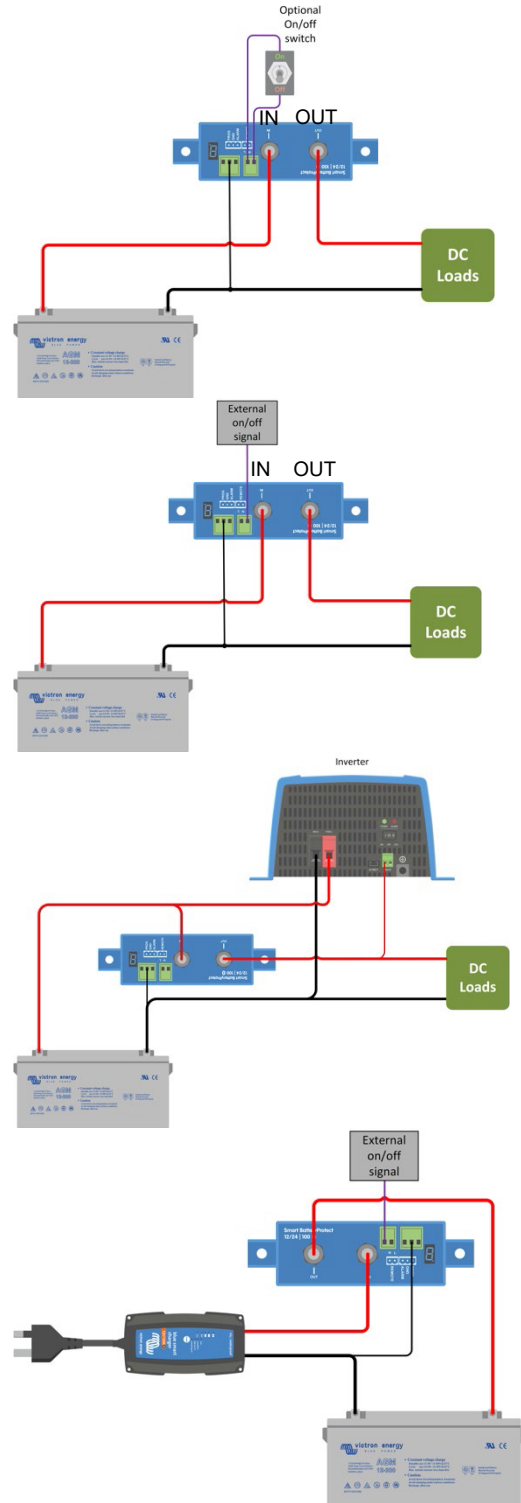
Bluetooth can be disabled/re-enabled with the VictronConnect app or by connecting the PROG pin to ground and selecting F (enable) or h (disable). See table below

Programming table

7 segment display	Under voltage shut down 48V system	Under voltage restart 48V system
0	42V	48V
1	40V	46V
2	38V	46V
3	45V	53V
4	46V	55,2V
5	42V	51,2V
6	46V	51,2V
7	47,2V	51,2V
8	48V	52V
9	40V	52,8V
-	User defined settings with Bluetooth	
R	Buzzer or LED mode	
b	Relay mode	
L	Li-ion mode	
F	Bluetooth Enable	
h	Bluetooth Disable	

Specifications

Smart BatteryProtect		SBP 48 100
Maximum cont. load current		100A
Peak current		250A
Operating voltage range		24 – 70V
Current consumption	BLE on	When on: 1,9mA When off or low voltage shutdown: 1,7mA
	BLE off	When on: 1,7mA When off or low voltage shutdown: 1,6mA
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)
Default thresholds		Disengage: 42V Engage: 48V
Operating temperature range		Full load: -40°C to +40°C (up to 60% of nominal load at 50°C)
Connection		M8
Weight		0,8kg 1.8 lbs
Dimensions (hwxwd)		62 x 123 x 120 mm
		2.5 x 4.9 x 4.8 inch

Example Wiring Diagrams


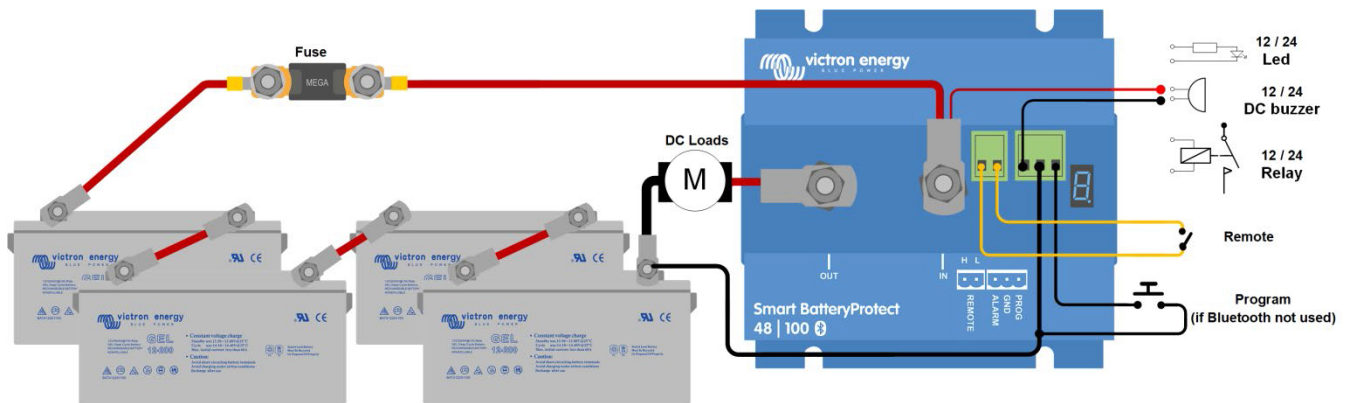


Figure 1 Connection diagram of the SBP 48|100 (use the remote input for system on/off functionality)

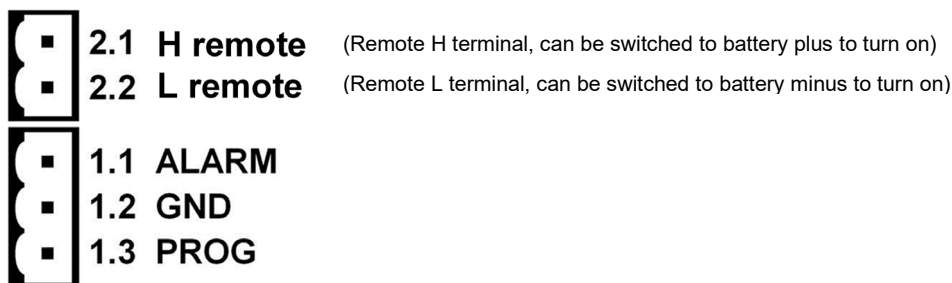


Figure 2: Connection diagrams and pin numbering

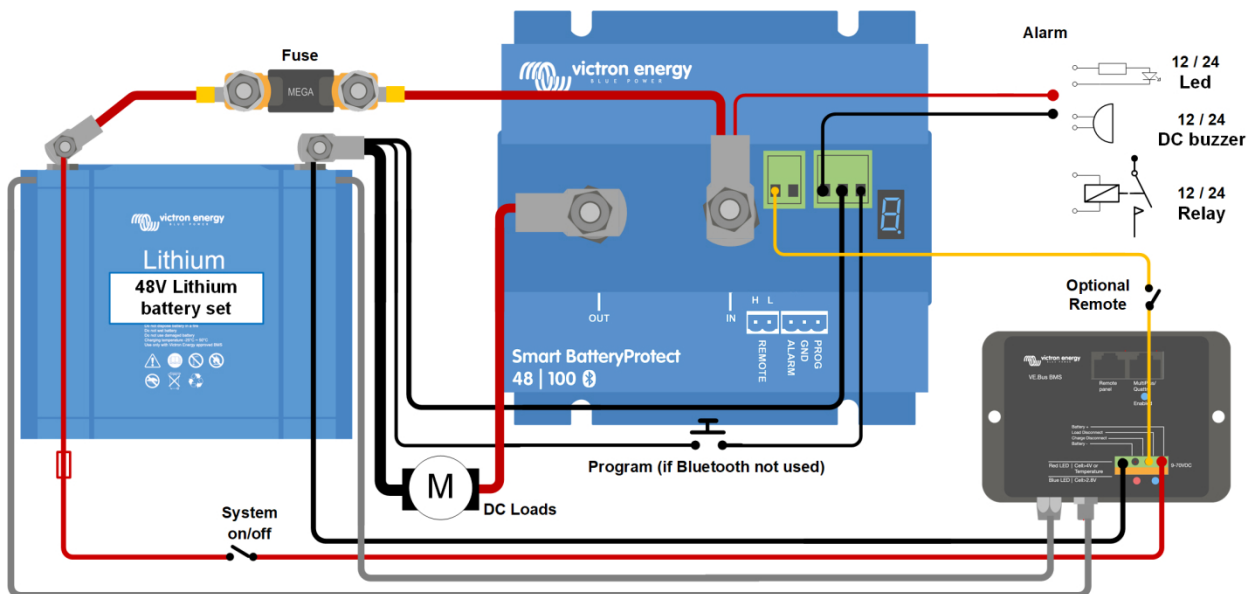


Figure 3: System with 48V Li-ion battery set (applicable with VE.Bus BMS or miniBMS)

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 (use 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 52V 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.

To manually make it start again, briefly disconnect and reconnect the remote on/off terminal or switch the BMS off and on again.

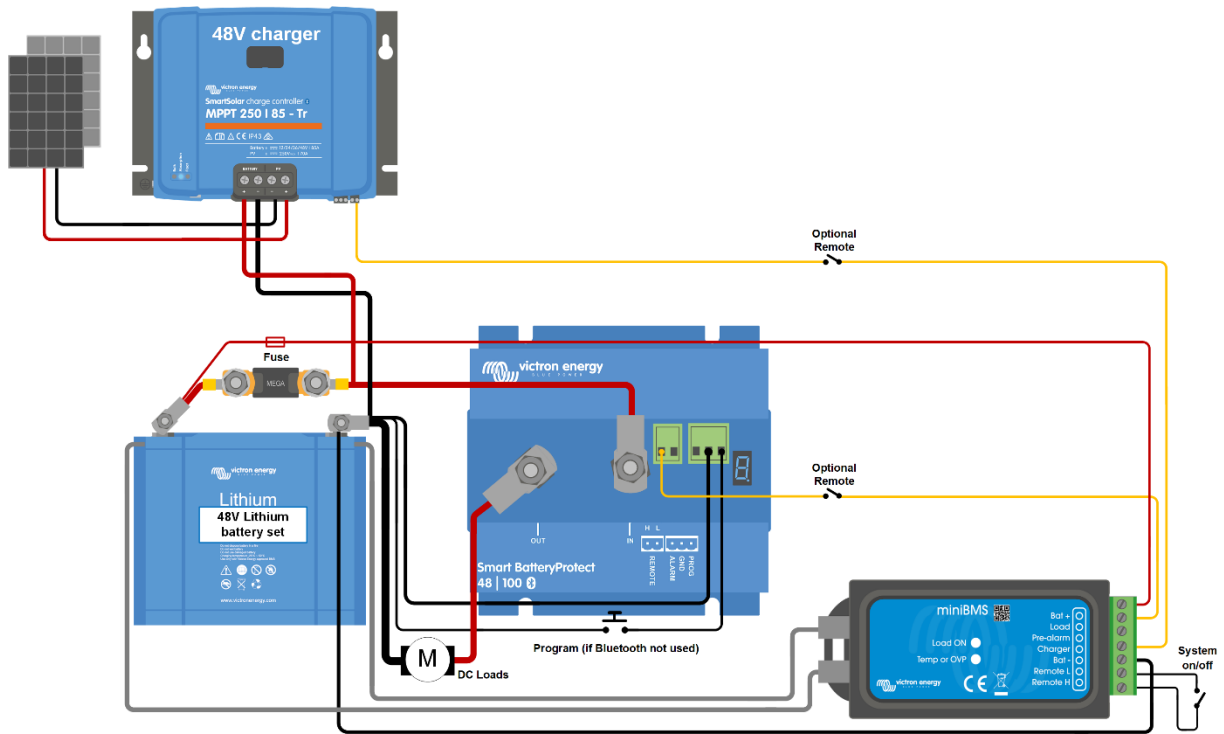


Figure 4: DC solar system with Lithium battery (applicable with VE.Bus BMS or miniBMS)

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.