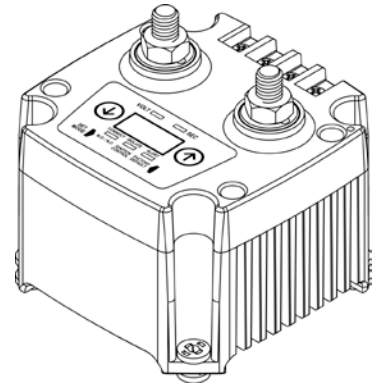


# SSB- 6113

## 120Amp, 12V/24V Programmable Battery Protector



### Operation Manual

*Keep this manual in a safe place for quick reference at all times.*

*This manual contains important safety and operation instructions for correct use of the battery protector. Read through the manual and pay special attention to the markings and labels of the protector, battery and equipment connected to the battery system.*

*Pay special attention to these two types of notices used in this manual.*

#### **WARNING:**

*Failure to heed this warning may cause injury to persons and damage to Equipment.*

#### **CAUTION:**

*Failure to observe this warning may result in damage to equipment and improper functioning of the protector.*

#### **Warning and Precautions**

- *The protector is not designed for any life saving application.*
- *The protector is not designed for environments that would allow water to come in contact with terminals on the housing which would result a short circuit.*
- *Install the protector in environments with sufficient ventilated space around the unit to allow dissipation of heat at the surface, a minimum of 50mm surrounding space is required.*
- *Wear protective goggles and turn your face away when connecting or disconnecting the battery.*
- *Never smoke, use an open flame, or create sparks near battery or protector during normal operation as batteries may give out explosive gas.*
- *Do not use the protector if it has been dropped or damaged.*
- *Do not remove casing of the protector, there is no user -serviceable parts inside.*
- *If the protector does not work properly or if it has been damaged, unplug all DC connections.*

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## Cable Sizes and Fuses

Cables used at each positive terminal must be of sufficient rating, under sized cables would affect the performance of the unit and shortens the life span. Wires connected to control or signal ports ① ② ③ ④ carry less than 0.5 Amp.

Fuses or circuit breakers of appropriate rating must be installed at positive terminal of the house battery and main battery. These fuses are for the safety and protection of the vehicle's electrical system in case of a short to the negative ground.

## Using with inductive load

When inductive load (such as DC motor, solenoid & etc.) is **directly** connected to isolator terminal, a diode (400V 3A, bundle with unit) must be connected across the load.

### 1. General description

This advanced programmable battery protector is designed to protect all types batteries from over discharged and also safe guard your load .

The limited settings of ordinary battery protector cannot cover all discharging conditions because of large combinations of battery type, capacity, versus types of load, size of load and loading conditions such as slow bleeding load or short large starting load such as high inductive or capacitive load .Unintended or unexpected "chattering" quick on-off operations, and premature or belated on off are the common defects which sometimes not only harmful to your valuable battery but also to the load.

The reliable and efficient Mosfet switching has minimal voltage loss resulting much less generated heat than diode based protectors. Microprocessor Controlled circuit provides accurate monitoring, finer tuning of voltage, delay timer set points and more fail safe protection with diagnostic display.

### 2. Advanced Features

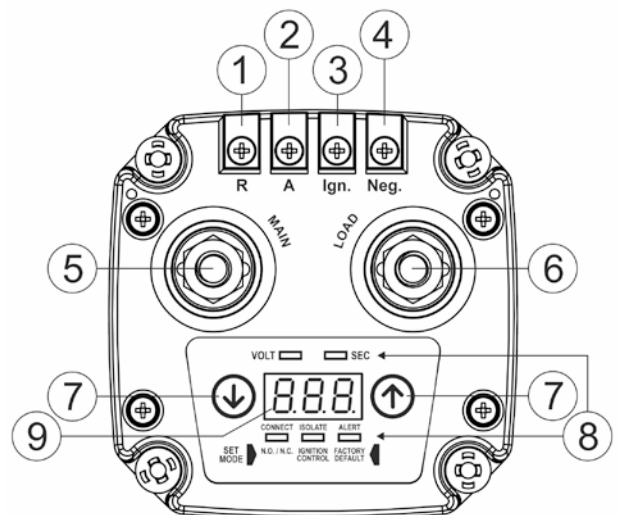
- Alert Voltage:  
The additional Alert Voltage setting is to monitor the main battery voltage even when the unit in isolated mode and when the main battery voltage drops below the set Alert Voltage, the Remote LED Module will out slow flashes to alert end user.
- Remote LED Module with Over-Ride  
With the supplied Remote LED module w Over-Ride accessory, end user is constantly informed about the status of the Protector whether it is in Connection Mode, Isolation Mode, Main Battery is above or at Alert low level and Protector is in Protection Mode.
- Selectable 12V or 24V system
- Selectable Ignition Control
- Wide range of programmable threshold voltages (connect, isolate, alert) with high resolution and respective delay time.
- Monitoring of Main battery voltage.

### 3. Intended Applications:

To protect starting, house or site batteries and equipment for caravan, SUV, boat, with DC loads such as DC motors, inverter, communication equipment, fridge, and etc. against damage, and over discharging.

When battery is connected to a charging source such as solar, wind, battery charger, it can conserve the battery power by allowing the load to draw power from the charging dc source when the battery is full according to your presets of LVR and LVD.

- ① R = Remote Over-ride Port for manual connection of the main and house terminal
- ② A = Remote Alert Signal Port (System Voltage, 100mA max.)
- ③ Ign. = Ignition Control Port
- ④ Neg. = Negative (Ground) Port
- ⑤ Main battery positive
- ⑥ Load positive
- ⑦ Control buttons
- ⑧ LED indicators (to indicate the setting status)
- ⑨ 3 digits LED display - to display batteries voltage  
- status (ON/OFF)  
- set voltage and delay time  
- set menu



#### 4. Programming Operation of SSB-6113

There are 3 types of Set Menu Mode:

Mode 1 is for selection of 12V or 24V when the unit is first activated.

Mode 2 is for adjusting the threshold values of voltages and the related delay time.



Mode 3 is to confirm change of system state such as normal open/ close, ignition control and return to default factory setting.

Unit will automatically exit with the new settings or return to the last set values after 10 seconds for mode 1 and 20 seconds for mode 2 and 3.

First activate the unit by connecting Main Terminal ⑤ to Positive and Neg. ④ to Negative of a 12V battery for 12V system and 24V battery for 24V system.

##### 4.1 Set Menu Mode 1 ----- Setting of 12V or 24 V system

Press the  /  button to toggle 12V or 24V shown on Display.

Confirm your selection by pressing the  button for 12V system to  button for 24V system for a few seconds.

Display will show the *software version* to confirm setting then the battery voltage.




If no selection is done within 10sec., unit will go back to last set system voltage.

Remark: You have about 10 seconds to confirm your setting otherwise the SSB-6113 will go to the last set system voltage or factory default setting.



##### 4.2 Set Menu Mode 2 ----- Viewing the Connect Voltage/ Isolate Voltage/ Alert Voltage/ Delay Time

This is the most used Set Menu Mode.

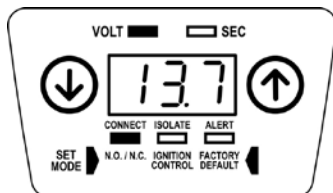
You have to pair the top led “VOLT”, “SEC” with the bottom led “connect”, “isolate” & “alert” to interpret the reading on the Display as shown in the following diagrams.

To enter into this mode Press both  and  button simultaneously until display shows  then the factory default Connect Voltage.

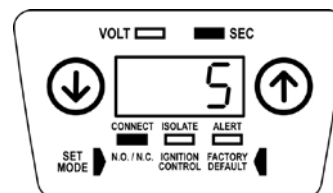
You can review the last set values of Connect, Isolate, Alert Voltages, Delay Times and etc.

by toggle the  (forward) or  (back) buttons and take note the pair of lit up LEDs

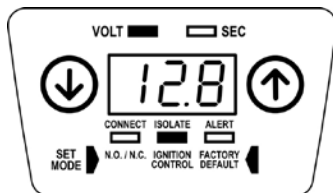
##### Connect Voltage (Default 13.7V for 12V system)



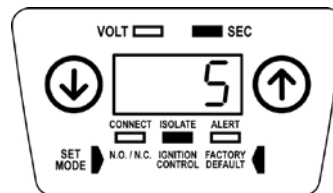
##### Connect Delay Time (Default 5sec)



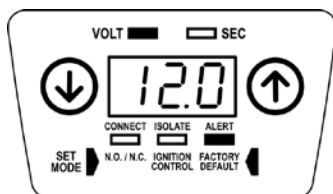
##### Isolate Voltage (Default 12.8V for 12V system)



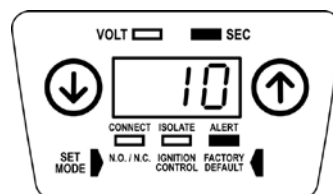
##### Isolate Delay Time (Default 5sec)



##### Alert Voltage (Default 12.0V for 12V system)



##### Alert Delay Time (Default 10sec)







### 4.3 Set Menu Mode 2 ----- Setting the Connect Voltage / Isolate Voltage / Alert Voltage /Delay Time

The procedure is same for setting and adjusting all the above parameters.

Example: Setting Connect Voltage

During the Review stage as in 4.2, toggle the  or  button to get to Connect Voltage position.

To set the Connect Voltage press both  and  button simultaneously again so that the displayed connect voltage **flashes**.

Press  or  button to increase or decrease the connect voltage to your desired voltage level.

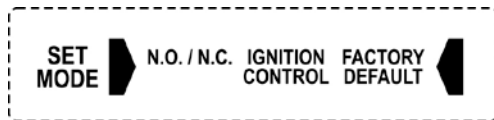
Press both buttons simultaneously until display becomes solid to confirm new setting.

Continue to do other new setting in the same way.



*Unit will return to exit from Set Mode 2 automatically after 20 seconds with the new settings.*

### 4.4 Set Mode 3 for change of system controls as indicated in the (yellow imprints)

**N.O. / N.C. (Normally Open / Normally Close), IGNITION CONTROL, FACTORY DEFAULT**





Get to the Set Mode 2 first then press  button until Display shows **SET**

Press both  &  button simultaneously to get to SET MODE 3

Display shows **888** first, then **n.o.** or **n.c.**, **ign**, **FLY** as Up button is pressed.

Return to the Factory Default Example:

**FLY** Press both Up & Down button simultaneously

Flashing **YES** / **no** toggle by  or  button to **YES**

Confirm by Press both  &  button simultaneously

**FLY** become solid to confirm return to the factory default setting has been done.

*Unit will return to exit from Set Mode 2 automatically after 20 seconds with the new settings.*

#### N.O. / N.C. Application

**n.o.** MODE (Normally Open) This is the factory default mode.

The two terminals are normally isolated, (disconnected, open) when the unit is powered up.

The two terminals will be connected when the voltage at the main battery terminal is detected to be at the programmed "Connect Voltage" level (LVR) and after the set programmed DELAY TIME.

**n.c.** MODE (Normally Close) This mode is selectable.

The two terminals are normally connected, close when the unit is powered up.

The two terminals will be disconnected, isolated, opened when the voltage at the main and after the set programmed DELAY TIME.

This mode is commonly used for battery protector application. The load will be on until the voltage of battery or other dc source drops below the set isolated voltage level.

#### Ignition Control application **ign**

When the ignition control is set to **YES**, the unit only can be operated with car ignition switched ON.

The factory default setting of Ignition Control is at OFF mode, that is the unit is in operation all the time even when car ignition is switched off.

When the ignition control is set to **YES**, the unit can only be operated with car ignition is switched on and when the car is switched off the unit is also off.

See wiring diagram in section 6 for connection from Ignition Control Port (3) to the car's electrical point which has current when the car is switched on.


**Remark: over-ride switch will connect main and house terminal irrespective ignition control is on or off.**

## 5. Operation of SSB-6113

The LED display and Remote Alert signal port

Normally the display is turned off to conserve energy, press any one of the two buttons to wake up the display.

When unit is in isolated (disconnect) mode, the display shows **OFF**.

Press  Button to view Main (battery) terminal voltage





Press  Button to view House (battery) terminal voltage.

When unit is in Connected mode, the display shows **ON**.

Only one voltage (shared by both terminals) is shown on the display.

**Status of the unit such as Connect, Isolate, Protection can also be remotely indicated by the supplied accessory Remote LED Module connected to the Remote Alert signal port.**

### 5.1 Protection Diagnosis Table

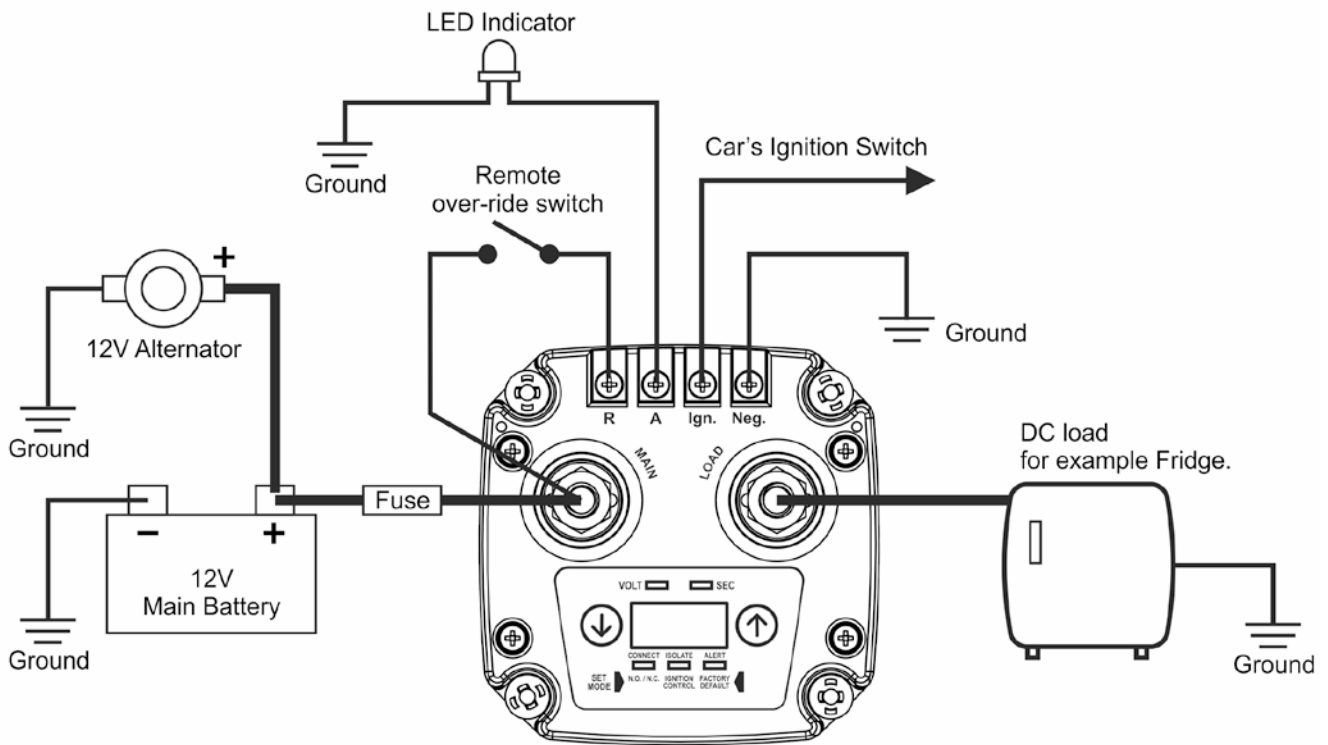
Display Icon	Protection	Causes	Suggested Solution	Self-Recoverable or Manual Reset
<b>OV<sub>P</sub></b>	Over Voltage Protection	Main Terminal  Voltage >16V	Check DC source voltage to main terminal  Check load at terminal 	Unit is self-recoverable when main battery voltage lower than 15.5V
<b>OC<sub>P</sub></b>	Over Current / Over Load Protection	Over Current >120Amp	Check house battery level too low. Look for possible intermittent short circuit in the wiring.	Unit is self-recoverable after 1 minute. In case of <b>OC<sub>P</sub></b> occurs 3 times in a row, a final protection will lock up the unit until complete reset by disconnect and reconnect the battery.
<b>OT<sub>P</sub></b>	Over Temperature Protection	Unit Over Temperature 90°C	Check location of unit is well ventilated. Check cable size is sufficiently rated.	Unit is self-recoverable when internal temperature cool down to below 70°C
<b>LV<sub>P</sub></b>	Low Voltage Protection	Main Terminal  Voltage <8V	Check main battery status and alternator.	Unit is self-recoverable when the main battery voltage >10V.

**Remark: The above voltage setting in the table is only for 12V system, the voltage setting is double for 24V system.**

### 6. Installation notes:

- 6.1 The unit is factory default as Normal Open **NO**. In case you want to use the unit as Normal Close, please go to the set mode and set the unit to **NC**.
- 6.2 The Ignition Control feature is factory default as OFF. In case you want to control the unit by car ignition switch, please go to the set mode and set the Ignition control to **YES**.
- 6.3 The recommended cable size is AWG#5 with 1M in length and 3% acceptable loss.
- 6.4 Always double check the tightness of all connections by wiggling the connected terminals and etc. Connectors and fasteners are prone to vibration loosening in a moving vehicle.  
Loosen connections cause sparks.
- 6.5 It is recommended to install a fuse with suitable rating connected to the battery positive terminal for safety.  
**!! CAUTION: Surface is hot during operation**

## 7. Installation (Example for 12VDC system)



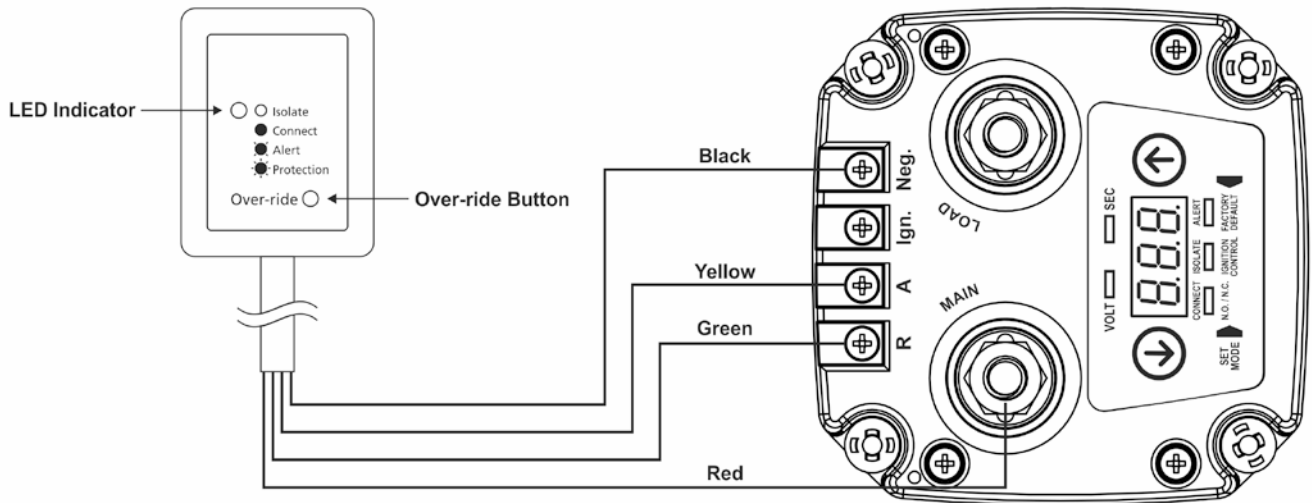
- 7.1 The selection of Isolate Voltage and Connect Voltage are very much affected by the type of load and relative battery capacity. Select a higher Isolate Voltage for relatively smaller load; for high initial draw load such as Motor, choose a lower Isolate Voltage.
- 7.2 Check the battery's specifications for suitable Connect Voltage and Isolate Voltage and in cycling or standby applications.

## 8. MANUAL FOR WIRING AND OPERATION OF THE CONTROL TERMINALS

Functions of the 4 Control terminals

- [Neg] **Negative terminal:** Connect this to the chassis ground of the negative grounded vehicle or negative terminal of battery for off vehicle application..
- [Ign] **Ignition control:** To let end user to ON/OFF the isolator synchronized with car ignition switch. Connect this to the spot which is powered up when the Ignition switch is on.
- [A] **External Alert/Alarm port:** An external signal voltage to indicate the operation status of the unit. It synchronizes with the Alert Voltage and delay time setting. It gives out warning signal when unit is under protection.
- On = The unit is connected  
 Off = The unit is isolated  
 Slow flash = to alert you the main battery voltage lower than default 12.0V or your set alert voltage.  
 Fast flash = Protection signal, the unit is isolated
- [R] **Remote Override terminal:** Use the supplied accessory Remote LED indicator w Override button which has a momentary contact switch. To manually connect the Main and House terminal via a momentary contact switch or toggle switch. [see wiring diagram in section 7] After one 'make' as in the case of momentary contact switch, the connection of Main and House battery will last for about 20 seconds. Use normal switch for continuous on/off operation. During Remote Override On condition, display shows `ron` to indicate connection

**8.1 Connection of the supplied accessory “Remote LED indicator w Override button” to the above control port [Neg.], [A], [R]**



Black wire to [Neg.]	Negative ground
Red wire to Main terminal	Remote Override function
Green wire to [R]	Remote Override function
Yellow wire to [A]	LED indicator

**Remark: If no intention to use Remote Over-ride Connection, then do not wire up Main terminal and [R] port.**

## 9. SPECIFICATIONS

Battery Voltage System	12V System		24V System	
	Default	Range	Default	Range
Isolator Setting				
Connect Voltage	13.7VDC	9.2 - 16VDC	27.4VDC	18.4 - 32VDC
Isolate Voltage	12.8VDC	9 - 15.8VDC	25.6VDC	18 - 31.6VDC
Alert Voltage	12.0VDC	9 - 15.9VDC	24.0VDC	18 - 31.8VDC
Connect Delay	5 seconds	1 - 250 seconds	5 seconds	1 - 250 seconds
Isolate Delay	5 seconds	1 - 250 seconds	5 seconds	1 - 250 seconds
Alert Delay	10 seconds	1 - 250 seconds	10 seconds	1 - 250 seconds
Isolator Setting Accuracy	±0.2V			
Resolution	0.1V 1 seconds			
<b>Operating Voltage</b>				
	9 - 17VDC Nominal		18 - 34VDC Nominal	
Continuous Contact Current	120Amp			
Current draw in Isolate Mode	Less than 30mA (add approx. 20mA when LED display is active)			
Current draw in Combine Mode	Less than 50mA (add approx. 20mA when LED display is active)			
Voltage drop with 120A (Main battery to Aux. battery)	130mV			
<b>Protections</b>				
System Under Voltage	Disconnect (Auto reconnect when condition returns to normal)			
System Over Voltage	Disconnect (Auto reconnect when condition returns to normal)			
System Overload and Short Circuit	Disconnect (complete reset by disconnect and reconnect the battery)			
Unit Over Temperature	Disconnect (Auto reconnect when condition returns to normal)			
<b>Advance Feature</b>				
Ignition Control	Yes (Default as OFF)			
Normal Open/Close (N.O./N.C.)	Yes (Default as normal open)			
Remote Alert Provision for LED Indication	Yes (System Voltage, 100mA Max.)			
Conditional Manual Over-ride (connect) Mode	Yes (Remote Input +12VDC)		Yes (Remote Input +24VDC)	
<b>Operating Temperature Range</b>				
	-20°C to +60°C			
<b>Operating Humidity</b>				
	10% to 90% RH non-condensing			
<b>Environmental Protection (Internal Component only)</b>				
	IP67			
<b>Approval</b>				
	CE			
<b>Supplied Accessory</b>				
	Remote LED Module with Over-Ride and 2M Cable, one 400V 3A Diode			
<b>Dimensions (L x W x H)</b>				
	90 x 90 x 85 mm (3.5 x 3.5 x 3.4 inch)			
<b>Weight</b>				
	0.6kg (1.3lbs)			