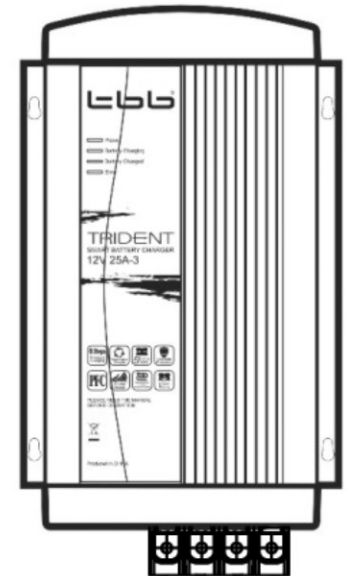


TRIDENT

SMART BATTERY CHARGER

Manual



TBB[®]
pursuit of perfection

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About This Manual

Purpose and Scope

This manual describes TBB battery charger's features, explains how they charge batteries, and provides procedures for their installation and gives some tips for the troubleshooting. But it does not mention the details of the particular brands of batteries. Please consult the battery manufacturer for this information.

Audience

The manual is for anyone intending to install and operate a TBB TRIDENT series battery charger.

Warning



This charger is not designed for any life retaining equipment.

About TBB

TBB Power Co.,Ltd is a professional advanced power electronics manufacturer for marine, recycle energy applications, products of which includes battery charger, pure sine wave inverter etc. With belief of "pursuit of perfection", we will keep supplying high quality products with innovations.

Disclaimer

Unless specially agreed in writing, TBB Power Co.,Ltd
a> Take no warranty as to the accuracy, sufficiency of suitability of any technical or other information provided in this manual or other documentation
b> Assumes no responsibility or liability for loss or damage, whether direct, indirect, consequential or incidental, which might arise out of the use of such information.

Date and Revision

DEC. 2008, Revision 3.0

Contact Information

Phone/Fax: please contact our local distributor

Email: service@tbbpower.com

Web: www.tbbpower.com

General Safety Information

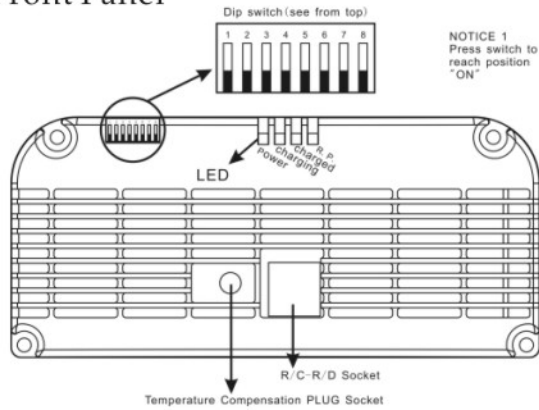
1. Before using the charger, read all instructions and cautionary markings on the charger, the batteries, and all appropriate sections of this manual.
2. Use TRIDENT battery charger only for its use as intended.
3. Use TRIDENT battery charger only in well ventilated rooms. Do not expose the charger to rain, snow, spray, or bilge water. To reduce risk of fire hazard, do not cover or obstruct the ventilation openings. Do not install the charger in a zero-clearance compartment.
4. Always interrupt the power supply when doing repair work on the unit.
5. Recommend that all wiring be done by a certified technician or electrician to ensure adherence to the local and national electrical codes applicable in your application.
6. Always checking that existing wiring is in good condition and that wire is not undersized. Do not operate the charger with damaged or substandard wiring.
7. Always use socket which are earthed and secured by earth leakage circuit breaker.
8. Batteries contain aggressive acids. Avoid the contact with the battery fluid agent. If a contact with battery fluid agent should occur, then rinse the affected parts of the body or clothing etc. with plenty cold water. It is imperative to seek medical treatment from a doctor with injuries caused by acid.
9. DO NOT disassemble the charger by yourself, which may result in a risk of electrical shock or fire. Always refer to professional electrician or our local distributor for support.

10. ALWAYS interrupt both the AC and DC connect when doing repair work.
11. DO NOT expose lead acid batteries to a lit cigarette, sparks or flames because they produce flammable gasses and could explode.
12. TRIDENT charger was designed to charge rechargeable lead acid battery, Freedom, Flooded, GEL, AGM. NEVER charge other type battery or NON-rechargeable battery.
13. Never try to charge a frozen battery. There is danger of explosion. In this case, place the battery at a frost resistant location and wait until the battery has adapted to the ambient temperature. Only by then, start the charging process.
14. This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
15. Children should be supervised to ensure that they do not play with the appliance.
16. If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.

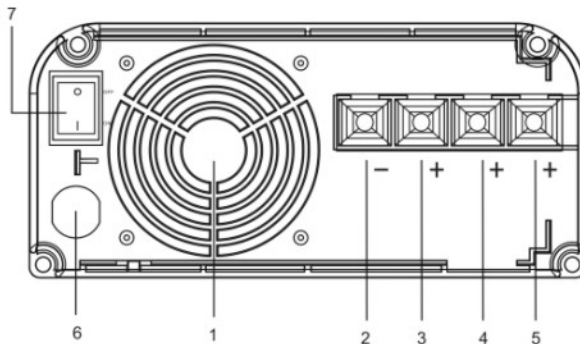
INTRODUCTION

2.1 Description

2.1.1 Front Panel



2.1.2 Rear Panel



No. Description

- | | |
|----------------|-------------------|
| 1 Fan | 2 Bat '-' (minus) |
| 3 Bat 1 | 4 Bat 2 |
| 5 Bat 3 | 6 AC power Cord |
| 7 Power Switch | |

2.1.3 Accessories

Temperature Sensor



The Temperature Sensor (TS) automatically adjusts the charge according to the temperature of one of the batteries. With a TS installed, the unit provides a more accurate temperature-compensated charge for the battery connected.

2.2 TRIDENT Features

TRIDENT is a smart battery charger designed specifically for following batteries: Freedom, Flooded, GEL, AGM. By using high frequency technology, it has compact structure and can be installed or stored in small compartments. It has AC to DC isolation, a surge protector, automatic multi stage charging, and many other safety features which reduce potential shock and fire hazards.

2.2.1 Automatic Multi-stage Charging Curve

TRIDENT battery charger has automatic max 6 steps charging curve and delivers nominal current for approximately 75% of the charging cycle. It ensures to give your battery and full, fast and safe charging.

2.2.2 Inside Timer Set

TRIDENT battery charger will switch from absorption stage to floating stage according to either the current drop to the nominal level or the timer exceed the setting value.

2.2.3 Dip Switches

TRIDENT battery charger has dip switches for you to choose: charge mode, battery type and to support R/C or R/D.

Please refer to 4.1 for detail setting.

2.2.4 Recycle Charging

TRIDENT battery charger is designed to permanently connect to the battery. In order to get rid of possible sulphation in case of long term floating, the charger will automatically go into recycle charging in 14 days time.

2.2.5 Simultaneous Multi-battery Bank Charging

TRIDENT battery charger has multi separate Dc positive terminals (12A has two banks, 20A, 25A and 40A has three banks) which allow charging multi batteries simultaneously. The total current into the batteries is a maximum of either 12A, 20A, 25A or 40A, depending on the model, which is divided amongst the batteries according to their state of discharge.



WARNING

The multi outputs are not independently voltage regulated so it is important to avoid systems with mixed types of batteries.

2.2.6 Isolated Design

The output banks are isolated by the electronically design in the circuit. It prevents the current flow between the banks and the flow backwards from battery to battery charger.

2.2.7 Special Silent Design

User-friendly special silent design. The fan of charger will stop working after the charging current drop to small amount for a period of them. And it will also automatic turn to work condition if inner temperature increased.

2.2.9 Parallel design for recharging and power supply.

Trident smart battery charger can be used to supply your DC load and charge your battery simultaneously. Specially designed software is being programmed to avoid overcharging your battery at this circumstance.



WARNING

If your DC load is voltage sensitive and did not permit high input over 14.5VDC, do not connect DC load while charging if you are charging your FREEDOM batteries.

If the ambient temperature is below 80F (26.7°C), the voltage will increase as result of the temperature compensation. The compensate rate is 3.3mv/cell, please add it above the voltage you selected, then you'll have the correct output voltage of charger.

2.2.10 Power Supply Choice

Easy to choose, the TRIDENT can work as a power supply by dip switch. It is meant that the output of the battery charger is a fixed voltage. It is not meant for charging batteries. The battery type and battery temperature are ignored in this mode. The remote battery temperature sensor does not compensate the voltage, but the battery over-temperature shutdown is still active. Through this mode, the charger can output neat DC at 13.5V(12V models) and 27V(24v models)

2.2.11 Built-in Safety

TRIDENT battery charger provides the following protection features:

- 1) Unit shutdown if there is a short circuit on output;
- 2) Electronic protection for reversed polarity;
- 3) Unit shutdown in event of battery over voltage;
- 4) Unit reduces output in event of battery charger over temp, and maintain the temp at a balance level;
- 5) Unit shutdown in event of battery over temp, and automatic operation reset once the temp comes down.

2.2.12 Automatic Temperature Compensation

The remote battery temperature sensor is a standard accessory with TRIDENT battery charger. With it is plugged to the battery charger, the unit provides a more accurate temperature-compensated charge for the battery to which the sensor is attached automatically.

2.2.13 High Ambient Temperature Rated

TRIDENT charger was designed to work at full load up to 40°C.

2.2.14 Protective Lacquer on Each PCB

To protect the PCB from the moisture and corrosion, each TRIDENT battery charger has been sprayed by protective lacquer on PCB.

2.2.15 Optional remote controller or remote display available.

Easy to switch the signal between remote controller and remote displayer by dip switch. Please read the chapter 7 for the details setting and content.

2.3 Indicator Lights and Settings on the Front Panel

LED	Sign	Reason
"Power"	OFF	Battery charger disconnected
		Power supply failure
		Incorrect power supply connection
	FLASHING	Mains voltage too low
		Mains fuse blown
		Battery connection not good
"Charging"	ON	Batteries charging(constant current stage)
	FLASHING	Batteries charging(constant voltage stage)
"Charged"	ON	Batteries charged (Floating)
"Reverse Polarity"	ON	Polarity inversion on output
	FLASHING	Charger over tem, charger will reduce the output power
"Charging" and "Charged"	FLASHING	will reduce the output power, then shut off.

INSTALLING GUIDE

3.1 Material List

The Unit is packed with the following materials:

- 1) User's Manual
- 2) Temperature Sensor

Please confirm the series number on the color box and the back of the product is the same.

3.2 Preparing for Installation

3.2.1 Location

Please install TRIDENT battery charger in a location that meets the requirements as following:

- *Dry: The unit is intended for use in a dry location. Do not allow water or other fluids to drip or splash on it. Do not mount the charger in an area subject to rain, spray or splashing bilge water.
- *Clean: Do not expose the unit to metal filings or any other form of conductive contamination. The presence of conductive contamination can cause damage and void your warranty.
- *Cool: For best performance, the ambient air temperature should be between 32F (0°C) and 95F (30°C), the cooler the better. At higher ambient temperature, TRIDENT battery charger can work, but the output current will be automatically reduced to protect the charger from high internal temperatures.
- *Ventilated: Allow at least 4 inches (10cm) of clearance around all sides of the battery charger for air flow. Ensure the ventilation openings on the unit are not obstructed. If

mounting in a compartment, ventilate the compartment with louvers or cut-outs to prevent overheating.

- * Safe: Not to install in areas containing gasoline tanks or fittings.
- * Close to AC junction box: Avoid the use of extended wire lengths if possible.
- * Close to batteries: Avoid excessive cable lengths and use the recommended wire lengths and sizes. Undersized or overly long cables may affect charging accuracy.

3.2.1 DC Wiring

The DC wiring must meet the following requirements:

Recommend sections for battery cables:

12A ---- 4mm² minimum (AWG 11)

20A/25A ---- 8mm² minimum (AWG 8)

40A ---- 13mm² minimum (AWG 6)

3.3 Installing TRIDENT



WARNING Shock and Energy Hazards

Be sure to read the safety guidelines and pay attention to all cautions and warnings throughout the installation procedure. The installer is responsible for ensuring compliance with the installation codes for your particular application.

Disconnect all source of AC and DC power before proceeding.



CAUTION Reverse Polarity

Before making the final DC connection, check the cable polarity at both the battery and the charger. Positive must be connected to positive; negative must be connected to negative.

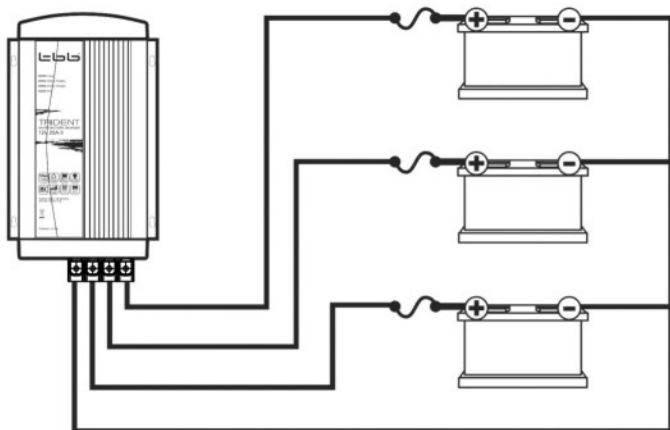


Figure 3.1 installation guide for connecting BC and batteries

Mounting: Mount the battery charger on a vertical surface, using the mounting holes provided. Mounting hardware should be corrosion resistant. Recommend to use all four mounting holes.

Connecting DC Wiring for Batteries



WARNING

All the batteries you are charging must be the same type, that is, should be all flooded, or gel, or AGM.

- * Plan the route the DC wires will follow trying to make it as short as possible.
- * Install the DC circuit breaker or fuses in the battery positive circuits close to the battery.
- * Fully insert each positive wire into the positive terminal on the charger. Tighten the connector and test that the wire is secure.

*Connect the positive cable from the positive wire terminals on the charger to the battery fuse or breaker, which should be installed on the battery positive terminals. Leave the DC disconnects or breakers in the OFF position until installation is complete. Leaving them off helps prevent sparking when you actually make the connection.

Connect AC Wiring

Make sure the AC source circuit is disconnected by turning off the breaker feeding the circuit, unplugging from shore power and disconnecting any other power sources such as a generator.

Grounding

- *Do not make an ungrounded connection. Improper connection can result in risk of an electric shock.
- *Battery charger must be grounded to reduce the risk of electrical shock. The AC input ground wire must be properly connected to ground in accordance with all applicable electrical codes. Meeting electrical codes is achieved by connecting the ground conductor of the AC input cable to a properly grounded ground terminal in the AC distribution panel.

3.4 Installing Battery Temperature Sensor

Strongly recommend to install the temperature sensor which is offered together with the battery charger for a pro- per charging of your batteries.

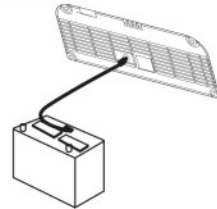


Figure 3.2 plug in the TS

OPERATION

4.1 Dip Switch Setting

Switch 1: Default is OFF

OFF: battery charger function

ON: Power supply function.

Output voltage:DC13.5V+/-0.6V(12V models),

DC27V+/-0.6V(24V models).

Switch 2-4: Output voltage setting:

12V MODELS

Battery type	Switch 2	Switch 3	Switch 4	Absorption volt	Floating volt
Flooded	OFF	OFF	OFF	14.4V	13.3V
Freedom	OFF	OFF	ON	14.8V	13.8V
GEL	OFF	ON	OFF	14.4V	13.8V
AGM	OFF	ON	ON	14.4V	13.6V

24V MODELS

Battery type	Switch 2	Switch3	Switch 4	Absorption volt	Floating volt
Flooded	OFF	OFF	OFF	28.8V	26.6V
Freedom	OFF	OFF	ON	29.6V	27.6V
GEL	OFF	ON	OFF	28.8V	27.6V
AGM	OFF	ON	ON	28.8V	27.2V

Please read your manual of battery or consult the battery manufacture to set the output voltage accordingly.

Switch 5-8: Choose R/C or R/D:

Type	Switch 5	Switch 6	Switch 7	Switch 8
R/C	ON	ON	OFF	OFF
R/D	OFF	OFF	ON	ON

4.2 Charging Batteries

Before you start to charge batteries, please read the "General safety information" and take all safety precautions when working with batteries.

- ◆ Read the section 4.1 to set the dip switch at proper situation.
- ◆ Check the manual or manufacturer of your battery and set the dip switch 2-4 at the proper situation according to the recommended absorption and floating voltage.
- ◆ Plug in the temperature sensor to the battery charger and fasten the sensor head directly to the battery.
- ◆ To assure the right charging and avoid the chance of over-temp in battery, it is strongly recommended the temperature sensor should be connected during charging.
- ◆ When the charging is completed, the battery charger enters into Floating Mode, and the "charged" light is ON.
- ◆ Recharging: TRIDENT battery charger will begin a charging cycle 14 days after the last cycle.



WARNING

The battery charger is designed to have no output if no battery is connected.

4.3 Simultaneously Recharging and Power Supply

It is strongly recommended to check your DC load requirement if you are connecting DC load while charging.



WARNING

If your DC load is voltage sensitive and did not permit high input over 14.5VDC (12V models) and 29VDC (24V models), do not connect DC load while charging if you are charging your FREEDOM batteries.

4.4 Using A Generator as Source Power

Many generators provide output voltage that is modified sine wave (MSW) rather than the true sine wave (TSW) that your utility provides. TBB does not permit the use of TRIDENT + with modified sine wave generator due to increased heating of the charger.

TECHNICAL SPECIFICATION

5.1 Physical Specifications

Dimensions	12V12A-2 W PFC	300 × 190 × 80mm
	12V12A-2 W/O PFC	300 × 190 × 80mm
	24V12A-3W/OPFC	300 × 190 × 80mm
	12V25A-3 W PFC	350 × 190 × 80mm
	12V25A-3 W/O PFC	300 × 190 × 80mm
	12V40A-3 W/O PFC	350 × 190 × 80mm
	24V20A-3W/OPFC	350 × 190 × 80mm
	12V40A-3WPFC	330 × 210 × 85mm
Weight	12V12A-2 W PFC	2.5kg
	12V12A-2 W/O PFC	2.6kg
	24V12A-3W/OPFC	2.6kg
	12V25A-3 W PFC	3.0kg
	12V25A-3 W/O PFC	2.7kg
	12V40A-3 W/O PFC	3.3kg
	24V20A-3W/OPFC	3.3kg
	12V40A-3WPFC	3.2kg
Enclosure	Aluminum with anodized, flame proof plastic	
Assembly	Wall-mounted	
Fixture	Screws	

5.2 Electrical Specifications

Number of battery bank outputs	12V12A,24V06A — 2 isolated 12V25A,24V12A&12V40A, 24V20A — 3 isolated
Nominal battery voltage	12VDC for 12V models 24VDC for 24V models
Rated DC output current (total)	12V12A 12ADC; 12V25A 25ADC; 12V40A 40ADC; 24V12A 12ADC; 24V20A 20ADC
Charge Algorithms	Automatic 6 steps charging curves. Soft start, bulk, compensation, absorption, floating, recycle.
Nominal input voltage	185-265VAC 50Hz,
Charge algorithms	Automatic max 6 steps
Battery temperature compensation	Automatic active when temperature sensor plug in
Absorption and Float voltage	4 options, please check "4.1 dip switch setting"
Power supply mode nominal output voltage	12V : 13.5 ⁺ / _{-0.6} VDC 24V : 27 ⁺ / _{-0.6} VDC
Efficiency	0.85
PFC	>95%

5.3 Protection Features

Reverse Polarity	Electronic protect
Battery charger over temperature	Reduce output power while charger in overtemp condition
Battery over temperature	Battery temperature as sensed by the battery temperature sensor (if installed) results in charger shutdown at a battery temperature of 50c
Battery over voltage limits	Will not start charging if any battery voltage is greater than 15.0VDC (12V models) and 30VDC(24V models) Will not continue charging if any battery voltage is greater than 16.0VDC (12V models) and 32VDC(24V models)

5.4 Approvals

LVD	EN60335-1, EN60335-2-29
EMC	EN55014-1,EN55014-2,EN61000-3-2,EN61000-3-3

MAINTENANCE AND TROUBLESHOOTING

6.1 Maintenance



WARNING Risk of Electrical Shock

TRIDENT battery charger contains no user serviceable components. Do not attempt servicing unless you are a qualified technician or electrician. Contact your dealer or the manufacturer for service information.

Cleaning: TRIDENT battery charger contains solid-state electronic components that require no maintenance. The best care you can give the unit is to protect it from contact with liquids, spray, or fumes which may cause corrosion.

Disconnect all AC and DC power and clean the outside of the case and wiring with a damp cloth if you suspect it has come in contact with battery fluid, salt water, gasoline or oil, or other corrosive material.

Corrosion on the battery terminal posts may be removed with a solution of water and baking soda.

Routing check: Periodically, check all wiring connections, Dc and AC, to be sure they have not loosened or deteriorated. Also check all cable clamps to ensure they are tightly fastened.

6.2 Troubleshooting

Display	Condition
"Power" indicator light is OFF	Battery charger disconnected Power supply failure Incorrect power supply connection Mains voltage too low Mains fuse blown
"Power" indicator light is flashing	Battery connection not good Wrong voltage battery connected (24V to 12V battery charger)
"Reverse polarity" indicator light ON	Polarity reversion on output
"Reverse polarity" indicator light flashing	Charger over temp. charger will reduce the output power
"Charging" & "Charged" indicator light flashing	will reduce the output power, then shut off.

Remote controller and remote display are available for Trident battery charger. You can buy them from the local distributor separately.

REMOTE CONTROLLER

7.1 Brief Introduction,

For your convenience, remote controller of Trident smart battery charger offers plenty of information and powerful function. It has user friendly setting and design:

- 55x18mm LCD displayer
 - All parameter of charger is visible and settable through remote controller
 - Battery condition is visible
 - Output power can be limited to avoid main switch to be tripped in case of small shore power available only
- Together with the remote controller, 3 meters cable was Supplied.

7.2 LCD Message Explanation



1. LED indicator:
 - a) **Power**: light on when the battery charger is power on and it is set to communicate to R/C by dip switch.
 - b) **Fault**: error alarm and LCD display the fault content.
2. Buttons:
 - a) **Set**: Set the parameter
 - b) **Enter**: Page Switch and switch on/off the background light.
 - c) **OutputPower**: Setting the output power of the battery charger
 - d) **RST**: Reset R/C to the original setting.

* How to change the output power:

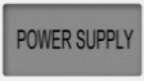



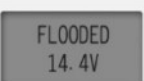







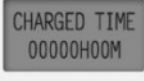

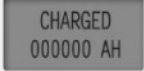
1> Press Enter to switch the page until it shows "OUTPUT POWER xxx%"

2> Press the "OutputPower" button for several seconds until the percentage on the screen is flashing.

3> Press the "Set" button to choose your setting for the output power. (5 options are available: 20%, 40%, 60%, 80% and 100%.

The default setting is 100%)

3. Message explanation:

	Battery charger power supply function.		Shows output voltage and current at power supply function.
	Shows the current output amps		The output power setting
	Shows the battery type setting and the present charging voltage.		Charger over temp.
	Shows the present charging stage		Battery over temp
	Shows the battery temperature		Battery over voltage.
	Shows the charged cycles. The value will be accumulated until it is reset manually		Battery low voltage
	Shows the charged time since the battery charger is power on		Reverse polarity error.
	Shows the charged amps hour since the battery charger is power on		

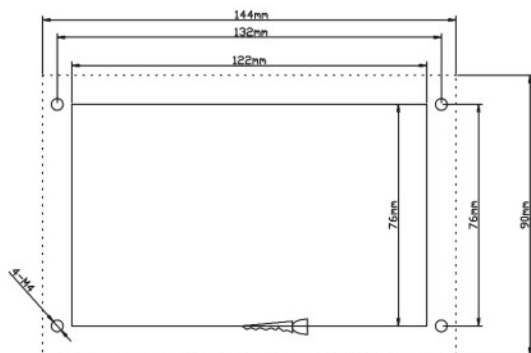
7.3 Installation Guide

1. It is not a water proof type. Please locate a position of which water is not accessible.
2. Please cutting the hole as per size offered by following
Pic A: 122mm × 76mm
3. Connect cable to remote controller and battery charger.
4. Put the dip switch on correct position on the battery charger:

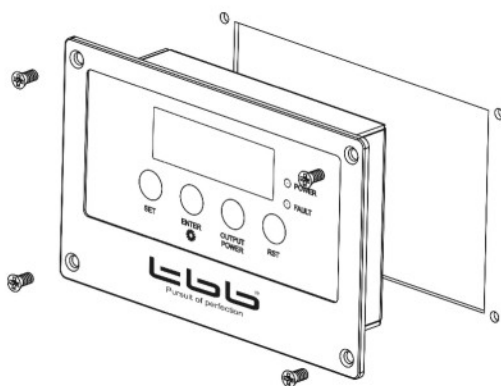
Switch 5	Switch 6	Switch 7	Switch 8
ON	ON	OFF	OFF

5. Please use screw (M4) to fix the remote controller onto dashboard, please refer to pic B.

PIC A:



PIC B:



REMOTE DISPLAY

For your convenience, remote display of Trident smart battery charger offers the same LED display as the ones on the battery charger.

Together with the remote display, 3 meters cable was supplied.

8.1 Brief Introduction



LED indicator:

Please refer the manual 2.3 and 6.2 for the details.

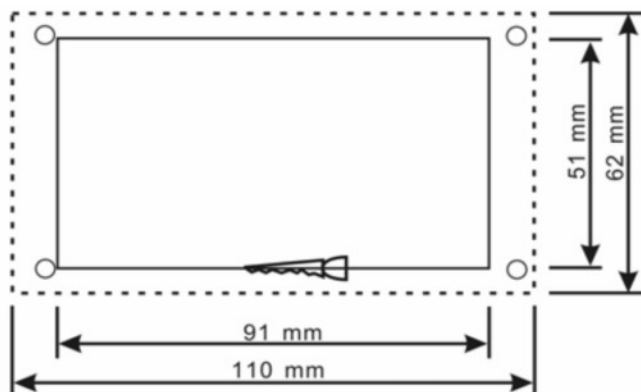
8.2 Installation Guide

1. It is not a water proof type. Please locate a position of which water is not accessible.
2. Please cutting the hole as per size offered by following Pic C: 91mm×51mm
3. Connect cable to remote display and battery charger.
4. Put the dip switch on correct position on the battery charger:

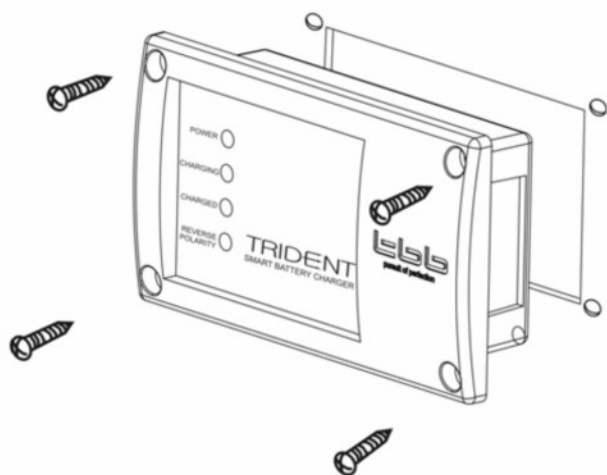
Switch 5	Switch 6	Switch 7	Switch8
OFF	OFF	ON	ON

5. Please use screw (M4) to fix the remote display onto dashboard, please refer to Pic D.

PIC C:



PIC D:



DECLARATION EC OF CONFORMITY

Contact: 2F Xinye Building, Pioneering Park, Torch Hi-Tech
Industrial Development Zone, Xiamen
China 361009
Tel: (86) - 592-5212299
Fax: (86) - 592-5796070

Description of the product

Name: TRIDENT SMART CHARGER

Type : BP1212:12V/12A

BP1225:12V/25A

BP1240:12V/40A

BP2412:24V/12A

BP2420:24V/20A

The products identified above are declared in conformity with the provisions of:

- The Council Directive of the European Union of May 3, 1989, concerning the approximation of the laws of the Member States relating to electromagnetic compatibility (2004/108/CEE)
- The directive of the European union of modified February 19, 1973 on July 22, 1993, concerning the approximation of the laws of the Member States relating to the electric materials intended to be employed in certain limits of tension 2006/95/CEE which retranscribes (73/23/CEE modified by 93/68/CEE)

This conformity is supposed by the reference to the following specifications:

- Standard NF EN 55014-1 (2000) + A1 (2001) + A2 (2002)/generic Standard emission
- Standard NF EN 55014-2 (1997) + A1 (2001)/generic Standard immunity
- Standard NF EN 60335-1 (2003) + A1 (2005) + A11 (2004) + A11 (2005), NF EN 60335-2-29 (2004)/Safety of the apparatuses electrodomestic and similar.

Place: Xiamen

Dates: June, 2007

Name of the signatory:

James Qian

