

Battery Conditioner and Charger

- Inverter Technology
- MCU Controlled operations
- 7- Stage Auto Switching Mode
- Reverse Polarity Protection
- Temperature controlled Cooling Fan
- Light weight and Compact



Instruction Manual

Version 7/10

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1.1-The Product:



Battery Conditioner and Charger Unit

Unlike traditional chargers, this battery conditioner and charger is using the latest inverter technology (high frequency switching circuitry which convert incoming AC input to 12V DC outputs) that allows easy handling because of its light weight and compactness without sacrificing its performance. Its built-in microprocessor chip constantly senses the condition of the battery during operation and controls the whole charging process in providing the right Amperage and Voltage to the battery basing on the designated charging stages.

The built-in automatic 7-stages charging processes (Desulphation, Soft Start, Bulk Charge, Absorption, Battery Test, Recondition and Float) makes it the most valuable charger to most battery types like Calcium, GEL, AGM and normal batteries.

The automated process protects the battery from being overcharged even it is left connected to the charger indefinitely. Also batteries charged by this conditioner and charger give longer life and better performances as compared to traditional chargers.

1.2 Specifications: (Model: BCC 1205 & BCC 1210)

12 V Battery Conditioner and Charger - Technical Data

	BCC 1205	BCC 1210
Model	BCC 1205	BCC 1210
Output Current	5 Amps	10 Amps
Output Voltage	12 Volts DC	12 Volts DC
Minimum Start Voltage	2.0 VDC	
Input Voltage	220 ~ 240 VAC, 50/60 Hz or 110 VAC, 50/60 Hz	
Input Power	154 Watts	307 Watts
Current Fuse Rating	250VAC, T 3.15 A	250VAC, T 3.15 A
Charging Control:		
Desulphation	Pulse up to 11.0 VDC	
Soft Start	Half the rated set current up to 12.0 VDC	
Bulk Absorption	5.0 A (up to 14.4 V) Constant Volt until Current drops to 0.75A	10 A (up to 14.4 V) Constant Volt until Current drops to 1.5 A
Battery Test Recondition	Monitors Voltage for 90 seconds	
	Constant Current 0.75A up to 16 V for 4 hours	Constant Current 1.5A up to 16 V for 4 hours
Float	Pulsing at 13.8 VDC	
Efficiency	Approximately 85%	
Safety	Short circuit protection	
Polarity protection	Reverse polarity circuit protected	
Non battery link	Circuit protection	
Wrong battery type link	Circuit protection	
Voltage protection	Trigger at 17.5 VDC	
Thermal protection	Trigger at 65°C ± 5°C	
Cooling Fan	Automatic temperature controlled	
Ambient Temperature	-20°C to +50°C, Output is reduced at high temperature.	
Battery Range:		
Deep Cycle	38 ~ 100 AH	70 ~ 200 AH
Battery Types	Most Lead Acid including GEL, AGM and Calcium Batteries	
Size / Weight:		
Dimensions (LxWxH)	195 mm x 115 mm x 62 mm.	
Weight	1.03 kg	1.07 kg

1.3 Specifications: (Models BCC 1215 & BCC 1220)

12 V Battery Conditioner and Charger - Technical Data

Model	BCC 1215	BCC 1220
Output Current	15 Amps	20 Amps
Output Voltage	12 Volts DC	12 Volts DC
Minimum Start Voltage	2.0 VDC	
Input Voltage	220 ~ 240 VAC, 50/60 Hz or 110 VAC, 50/60 Hz	
Input Power	415 Watts	554 Watts
Current Fuse Rating	250VAC, T 3.15 A	250VAC, T 5.0 A
Charging Control:		
Desulphation	Pulse up to 11.0 VDC	
Soft Start	Half the rated set current up to 12.0 VDC	
Bulk	15 A (up to 14.4 V)	20 A (up to 14.4 V)
Absorption	Constant Volt until Current drops to 2.25A	Constant Volt until Current drops to 3.0 A
Battery Test	Monitors Voltage for 90 seconds	
Recondition	Constant Current 2.25A up to 16 V for 4 hours	Constant Current 3.0A up to 16 V for 4 hours
Float	Pulsing at 13.8 VDC	
Efficiency	Approximately 85%	
Safety	Short circuit protection	
Polarity protection	Reverse polarity circuit protected	
Non battery link	Circuit protection	
Wrong battery type link	Circuit protection	
Voltage protection	Trigger at 17.5 VDC	
Thermal protection	Trigger at 65°C ± 5°C	
Cooling Fan	Automatic temperature controlled	
Ambient Temperature	-20°C to +50°C, Output is reduced at high temperature.	
Battery Range:		
Deep Cycle	100 ~ 300 AH	134 ~ 400 AH
Battery Types	Most Lead Acid including GEL, AGM and Calcium Batteries	
Size / Weight:		
Dimensions (LxWxH)	215 mm x 115 mm x 62 mm.	
Weight	1.25 kg	1.3 kg

1.4 Charging Characteristics:

Stage 1: Desulphation:

This first stage helps to break down sulphation that occurs in battery which has been left flat for extended periods of time or when lead sulphate hardens and clog up the battery cells. This helps to restore sulphated batteries back to its best state.

Stage 2: Soft Start:

This second stage is the preliminary charge process that gently introduces power to the battery. The charging starts with a reduced current until voltage reaches 10 volts. This is very important for charging severely drained or discharged batteries.

Stage 3: Bulk Charge (Constant Current):

This charging mode uses constant current at its maximum rate to charge the battery to approximately 80% charge by putting a large amount of power in a short amount of time until the voltage reaches 14.4 volts.

The charging will continue if the battery terminal voltage has risen above the set limit. If the terminal voltage has not passed the voltage limit within the stipulated time, the charger will switch to fault mode (Fault LED lit up). In this case, the battery is either faulty or its capacity is too large.

Stage 4: Absorption (Constant Voltage):

At this stage the charging voltage remains constant at 14.4 volts and the current gradually reduces until the battery reached 100% charged (no more power can be introduced thus without overcharging the battery).

Stage 5: Battery Test:

This automatic test conducts immediately after the Absorption stage. It monitors the voltage for a period of 90 seconds to determine if the charging is successful.

Criteria for testing:

- Voltage above 13.2V will pass the test. It will immediately proceed to Float process (Stage 7).
- Voltage below 13.2V will fail the test. The charger will initiate the Recondition process (Stage 6).

Stage 6: Recondition:

This process is initiated automatically if the battery fails the battery test (Stage 5). When the battery failed the test, it indicates that during the Absorption stage it was unable to fully charge the battery.

This reconditioning mode will then begin to introduce a low constant current at high voltage (16V) charge for a period of 4 hours before it begins another test.

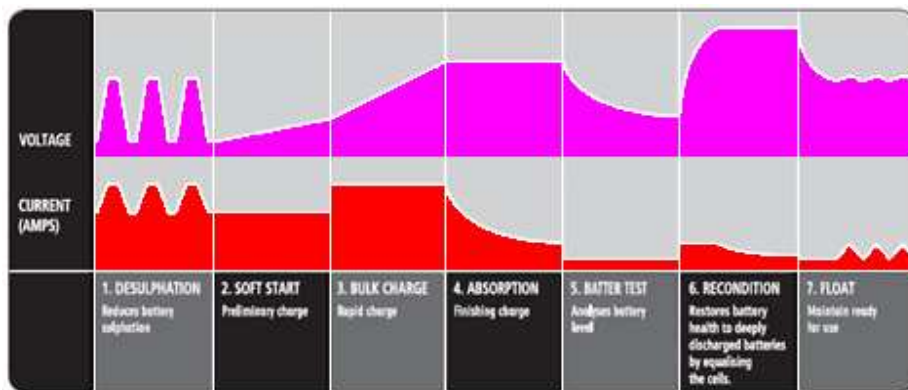
Note:

This mode is used to recover deeply discharged flooded batteries where you could expect a stratified acid (high acid content at the bottom and low on top). Check with battery manufacturer when in doubt.

Use this mode with care, because the high voltage (16V) will cause some water loss. Normally this high voltage will cause no problem for electronics in 12V system. Consult your supplier when in doubt. Life of light bulbs will be shortened at higher voltage. Try to disconnect them from the battery during this phase. Maximum effect and minimum risk for electronics is achieved by charging a disconnected battery.

Stage 7: Float:

This final stage maintains the battery at 100% charge without overcharging or damage the battery. This means that the battery can be left connected to the charger indefinitely. The battery charger has a 7-step fully automatic charging cycle, the cycle is repeated infinitely. If the terminal voltage drops below a lower limit, the charger automatically goes back to the beginning of the charging curve.



Various stages of Voltage and Amperage Wave Forms during charging operation.



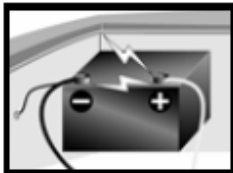
2.0 – Safety Measures

For safety reasons, read this manual thoroughly before operating the Charger. Always refer to and follow the safety instructions and procedures provided by the car or equipment manufacturer. The safety messages presented below and throughout this user's manual are reminders to the operator to exercise extreme care while operating.

2.1 Safety Precautions:



**Fuel and battery vapors are highly flammable.
DO NOT SMOKE NEAR THE VEHICLE DURING CHARGING.**



Never lay tools on vehicle battery. You may short the terminals together causing harm to yourself, the tools or the battery.



To protect your eyes from propellant object such as caustic liquids, always wear safety eye protection.



Engine parts become very hot when engine is running or after it has been stopped awhile. To prevent severe burns, avoid contact with hot engine parts.



2.2 Other Precautions:

- Explosive gases may escape from the battery during charging. Prevent flames and sparks around the charging area. Provide adequate ventilation.

- Before charging, read the instructions carefully.
- The charger is intended for indoor use. Do not expose to rain.
- Disconnect the 110V / 220 ~ 240V AC mains supply before making or breaking the connections to the battery.
- The battery charger must be plugged into an earthed socket-outlet.
- Connection to supply mains is to be in accordance your country National wiring rules.
- Use the correct input power current (Amp) fuse rating.
- Do not attempt to charge non rechargeable batteries.
- Never charge a frozen battery.
- If the AC cord is damaged do not attempt to use. It must be replaced or repaired by a qualified person.
- Corrosive substances may escape from the battery during charging and damage delicate surfaces. Store and charge in a suitable area.
- Ensure all vehicle accessories including lights, heaters, appliances etc are turned off prior to charging.
- This appliance is not intended for use by young children or persons unfamiliar with the charger unless they have been adequately supervised by a responsible person to ensure that they can use the charger safely.
- Do not attempt to open up the charger; there are no serviceable parts inside.
- Young children should be supervised to ensure that they do not play with the charger.

3.0 Working with Batteries



Lead-acid batteries contain a sulfuric acid electrolyte, which is a highly corrosive poison and will produce gasses when recharged and explode if ignited. It can hurt you badly.

When working with batteries, make sure you have plenty of ventilation, remove your hand jewelry, watch and wear protective eyewear (safety glasses), clothing, and exercise caution.

Do not allow battery electrolyte to mix with salt water. Even small quantities of this combination will produce chlorine gas that can KILL you!

Whenever possible, please follow the manufacturer's instructions for testing, jumping, installing, charging and equalising batteries.



- Never disconnect a battery cable from a vehicle with the engine running because the battery acts like a filter for the electrical system.
- Unfiltered (pulsating DC) electricity can damage expensive electronic components, e.g., emissions computer, radio, charging system, etc.

Turn off all electrical switches and components; turn off the ignition before disconnecting the battery.

- For non-sealed batteries, check the electrolyte level. Make sure it is covering the plates, and it is not frozen before starting to recharge (especially during winters).
- Do not add distilled water if the electrolyte is covering the top of the plates because during the recharging process, it will warm and expand. After recharging has been completed, recheck the level.
- Reinstall the vent caps BEFORE recharging, recharge ONLY in well-ventilated areas, and wear protective eyewear (safety goggle). Do NOT smoke or cause sparks or flames while the battery is being recharged because batteries give off explosive gasses.
- Follow the battery and charger manufacturer's procedures for connecting and disconnecting cables and other steps to minimize the possibility of an explosion or incorrectly charging the battery.
- You should turn the charger OFF before connecting or disconnecting cables to a battery.

- Do not wiggle the cable clamps while the battery is recharging, because a spark might occur, and this could cause an explosion. Good ventilation or a fan is recommended to disperse the gasses created by the recharging process.
- If a battery becomes hot, over 110°F (43.3°C), or violent gassing or spewing of electrolyte occurs, turn the charger off temporarily or reduce the charging rate.
- When charging the battery in the car with an external MANUAL charger, make sure that it will not damage the vehicle's electrical system or components with high voltages.
- Even if this is a remote possibility, it is best to disconnect the vehicle's battery cables from the battery BEFORE connecting the charger.

4.0 - The Battery Conditioner and Charger

4.1 Functions of Individual Components

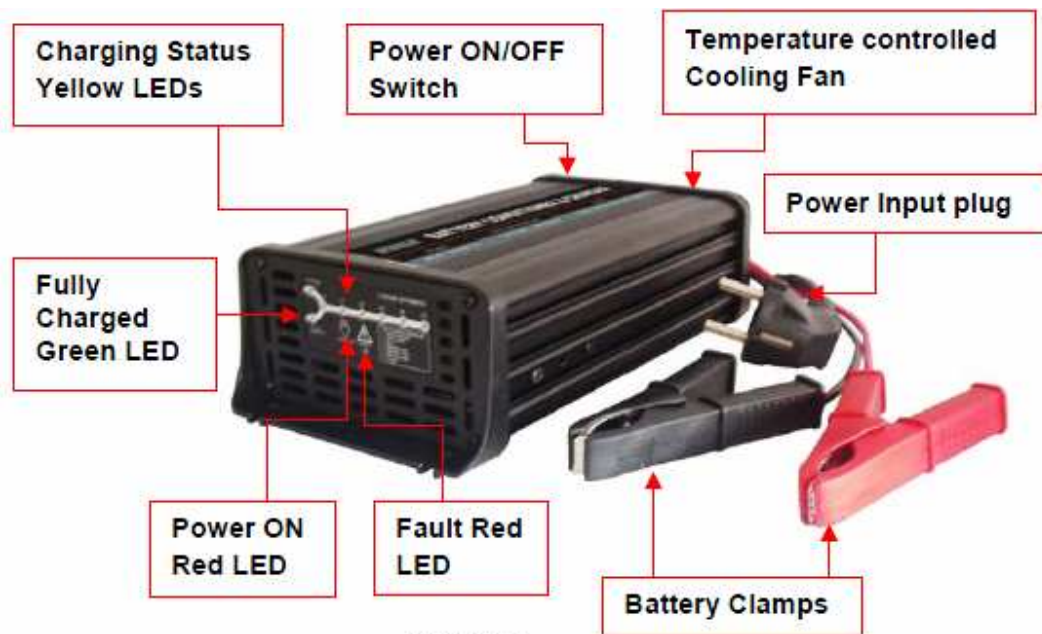


Figure 1

Power ON: Its Red LED illuminates (Stays ON) when power is on.

Charging: The Yellow LED in individual stage will flash respectively depending on the charging mode it is currently in.

Fully Charged: Its Green LED illuminates (Stays ON) when the charging has completed.

Fault: Its Red LED will illuminate and flashes when a fault is detected depending on the following conditions:

1. Reverse connection between positive and negative of the DC lead.
2. Battery charger output shorted.
3. Non battery link.
4. When the charging has a voltage higher than 17.5V.
5. Charger's internal temperature is higher than 70°C.
6. When Red LED flashes and Yellow LED illuminates (Stays ON) means bulk charging has timed out and stopped after 24 hours.

The LEDs will illuminate and flash in various patterns to indicate the different stages of charging. See below for their indication patterns.

Operation		Power ON	Charging	Fully Charged	Fault
		Red LED	Yellow LED	Green LED	Red LED
Power Off		—	—	—	—
Power On		●	—	—	—
Charging	1.Desulphation	●	✱	—	—
	2.Soft Start	●	✱	—	—
	3.Bulk	●	✱	—	—
	4.Absorption	●	✱	—	—
	5.Battery Test	●	✱	—	—
	6.Recondition	●	✱	—	—
	7.Float	●	✱	—	—
Fully Charged		●	—	●	—
Non Battery Link Protection		●	—	—	✱
Output Polarity Reverse Protection		●	—	—	✱
Output Short Protection		●	—	—	✱
Over Voltage Protection		●	—	—	✱
Faulty Battery		●	●	—	✱
Thermal Protection		●	—	—	●

Indication: ○: Stays ON ✱: Flashing —: Extinguish

4.2 Protective Features:

Reverse Polarity Protection:

It prevents the charging output leads from sparking due to accidental reverse connection or short circuit, making the charger safer to use around batteries.

Output Short Protection:

Short circuit connection of the clips: Check clips are not touching each other OR Check the clips are correctly connected to the battery.

Non Battery Link Protection:

If the battery charger connects with non battery lead, it will go into protection state.

Faulty Battery Alarm:

Bulk charging has timed out feature built-in and it will stop charging after 24 hours. This indicates that the battery is faulty and may need to be replaced.

Over Voltage Protection:

The charger will automatically goes into protection stage if the voltage is higher than 17.5V.

Over Temperature Protection:

If temperature is above $65^{\circ}\text{C} \pm 5^{\circ}\text{C}$, the over temperature protection circuit will trigger in to cause the Fault LED to lit up.

Cooling Fan:

The charger is fitted with a temperature controlled fan to cool its internal electronics in order to maintain the charging performance. The cooling fan will engage automatically when there is a high load on the battery or there is sufficient heat buildup to trigger it.

5.0 – Charging Batteries

STEP 1

CHECK THE BATTERY ELECTROLYTE LEVEL:

Prior to charging the battery, remove the vent caps and check the electrolyte level (not required on sealed & maintenance free batteries). The electrolyte should be 6.0 mm (1/4") above the battery's plates. If it is low, top up with distilled water to the correct level and refit the vent caps.

STEP 2

1. BATTERY OUT OF THE VEHICLE CONNECTION:

Connect the RED lead (battery clip) from the charger to the Positive (+) battery post.
Connect the BLACK lead (battery clip) from the charger to the Negative (-) battery post.

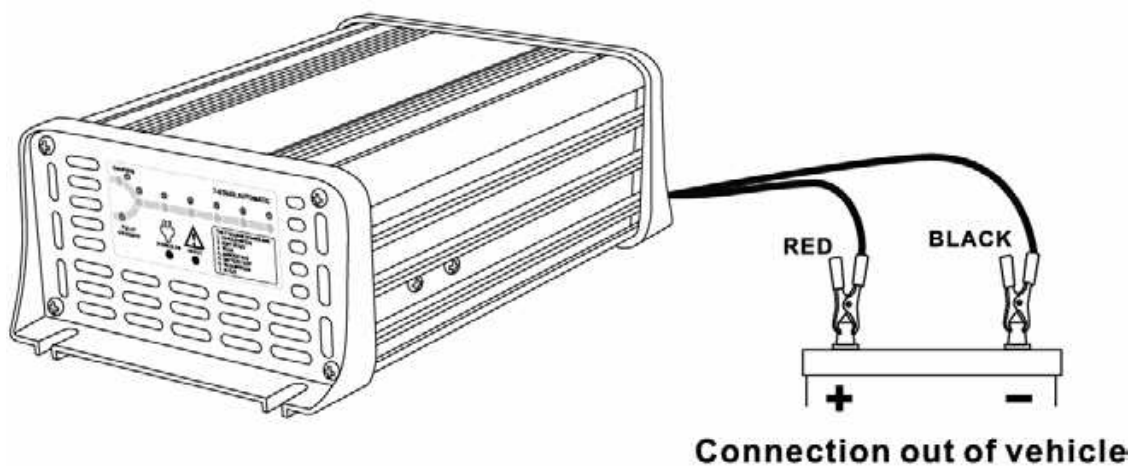


Figure 2

BATTERY IN VEHICLE CONNECTION:

Determine if the vehicle is positively (+) or negatively (-) earthed. Negatively earthed vehicles have a cable (usually black) from the Negative battery terminal to the vehicle's chassis.

For Negatively Earthed Vehicles (Most common):

Connect the RED lead (battery clip) from the charger to the Positive (+) battery terminal. Connect the BLACK lead (battery clip) from the charger to the vehicle's chassis. Keep away from the fuel line or moving parts.

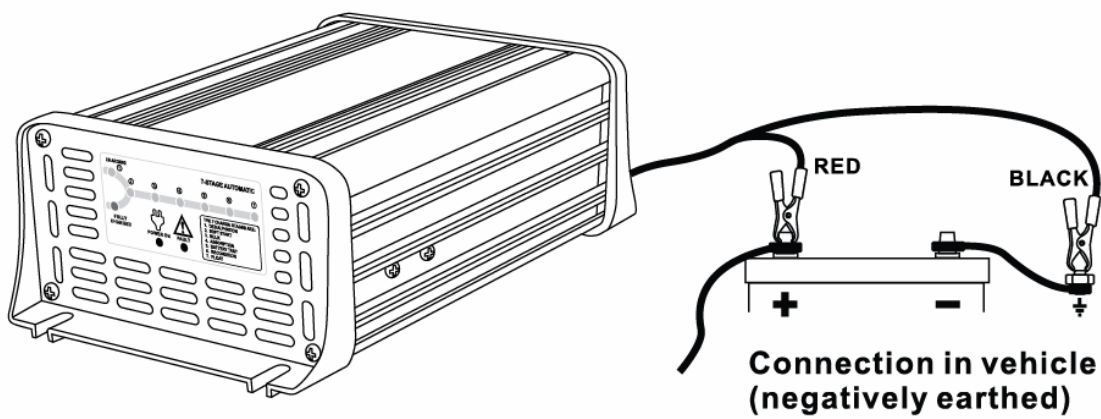
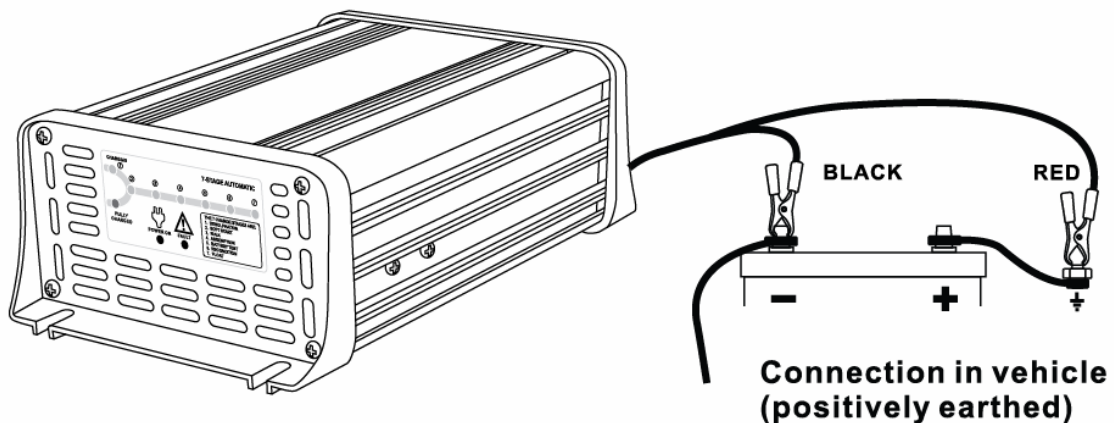


Figure 3

For Positively Earthed Vehicles:

Connect the BLACK lead (battery clip) from the charger to the Negative (-) battery terminal.

Connect the RED lead (battery clip) from the charger to the vehicle's chassis. Keep away from the fuel line or moving parts.



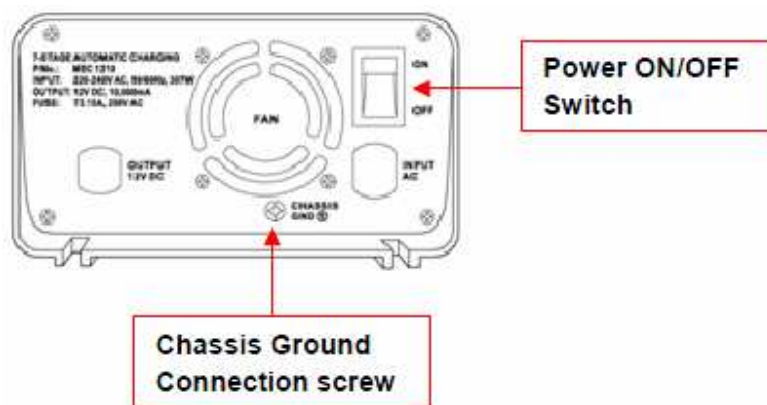
Chassis Ground (Earth):

The chassis grounding lug should be connected to grounding point which will be depending on where the battery charger is installed.

In a vehicle, connect the chassis ground lug to the chassis of the vehicle.

In a boat, connect to the boat's grounding systems.

In a fixed location usually indoor, connect it to the building earth.



Rear view of the Charger

Figure 5

STEP 3

CONNECT TO 110V/220-240VAC MAINS POWER:

Connect the battery charger to the 110V/220-240V AC mains powered socket and turn ON the mains power

STEP4

CHARGING:

Turn the power on by switching the Main Power Switch (See Figure 5) to ON position. Immediately the charger will enter into Self-Test mode and you will notice that all the LEDs will light up and flashes twice before the yellow LEDs start to light up for a fraction of a second, one after another from stage 1 to stage 7.

After that only the Power LED will light up and remains on. The rest of the LEDs are OFF. At this moment the charger analyses the battery condition and determine at which stage it should start to charge the battery.

Once it had decided, the yellow LED at the stage where it starts will flash indicating the current process. The charging process will continue after completing one stage and move to the other stage automatically (indicated by the flashing yellow LED) until it has fully charged the battery (indicated by the Fully Charged – Green LED lights up).

If there is a fault detected, the Red Fault LED will flash indicating the charging cannot be continued. Please refer to the LED functions and flashing pattern indication on page 13 and 14.

STEP 5

DISCONNECTION:

First, turn OFF the main power input 110V/220-240V AC mains switch.

1. BATTERY OUT OF VEHICLE CONNECTION:

Remove the BLACK lead (battery clip) from the battery first and then remove the RED lead (battery clip) from battery. See Figure 2.

2. BATTERY IN VEHICLE CONNECTION:

Remove the chassis connection first and then remove the battery terminal connection. See Figure 3 and 4.

6.0 – Installation

This battery conditioner and charger are designed for indoor and sheltered area where it cannot come in contact with the rain use.

Ensure that both charger and battery are in a well-ventilated space during charging. The charger end plates include mounting flanges which are designed for easy mounting.

If there is a need to permanently fix the charger, it should be mounted on a suitable horizontal or vertical panel, with at least 10cm clearance from the end plates to the wall to provide adequate ventilation for the cooling fan.

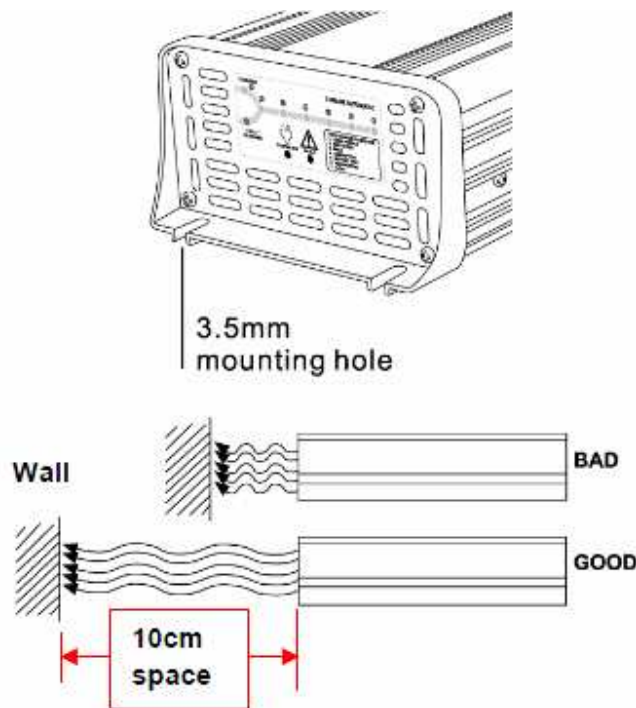


Figure 6

It is possible to hard wire the DC charging leads to the battery for permanent installations (see Figure 7). Do not plug the charger into the main 110V/220V-240V AC supply first.

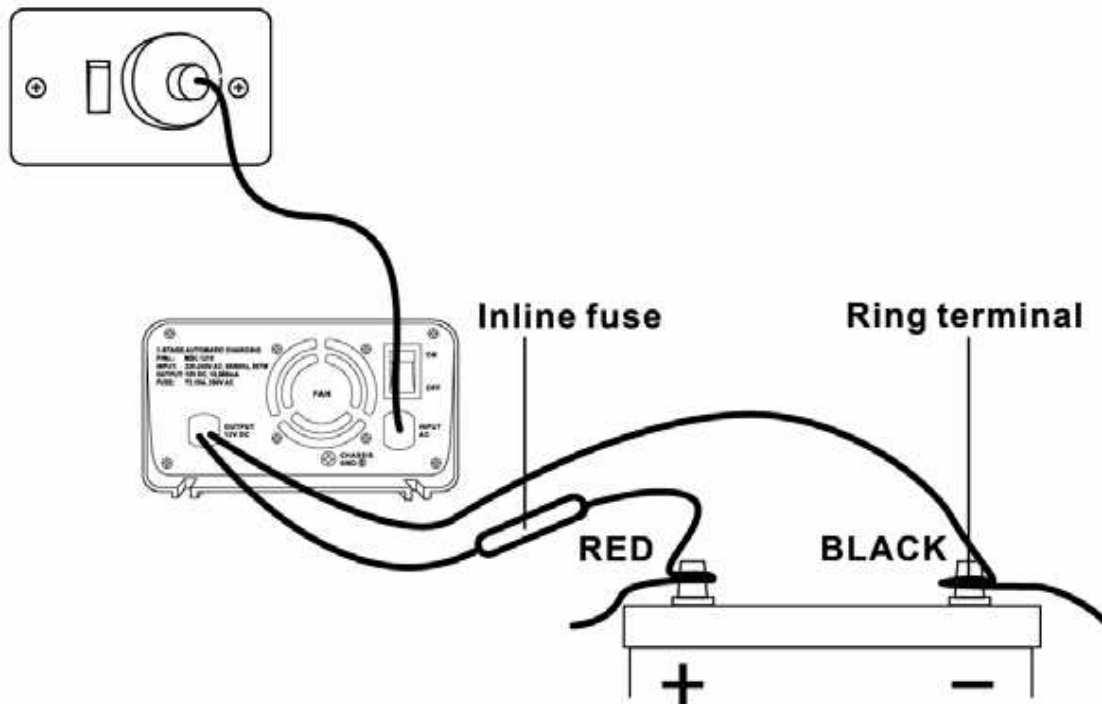


Figure 7

You will need 2 pieces ring terminals (cable lugs), an inline fuse holder and a fuse with a rating equal to or more than twice of the chargers output. (See below):

- 5A Charger use 10 Amp fuse
- 10A Charger use 20 Amp fuse
- 15A Charger use 30 Amp fuse
- 20A Charger use 40 Amp fuse

Connection: (Refer Figure 7)

1. Cut off the supplied battery clips and ensured that you leave sufficient cable to reach the battery terminals.
(DO NOT extend the charger DC cables, as the added voltage drop may cause incorrect charging).
2. Fit a ring terminal (cable lug) to the BLACK Negative (-) wire.
3. Connect the inline fuse to the RED Positive (+) wire.
4. Connect a ring terminal (cable lug) to the other end of the inline fuse.
5. Connect the RED lead (with inline fuse and ring terminal) to the Positive (+) battery post.
6. Connect the BLACK lead (with ring terminal) to the Negative (-) battery post.
7. Fit the correctly rated fuse.
8. When everything is in order, plug the charger to the main 110V/220V-240V power supply and switch ON to start the charging operation.
If the charger is used in a Permanent / Hard Wired application, it is best to leave the charger connected to mains power (turned 'On') so that it can maintain the battery fully charged.

Ensure any modification to the 110V/220-240V AC mains lead is carried out by a qualified person and that connection to supply mains is in accordance with your country National wiring rules.

7.0 – Charging rates:

Charge Rate for 12 V Deep Cycle Batteries Charger	Deep Cycle Battery (AH)	Charging Time (Hrs)
5 Amps	35 ~ 100 Amps	7 ~ 24
10 Amps	70 ~ 200 Amps	7 ~ 24
15 Amps	100 ~ 300 Amps	7 ~ 24
20 Amps	134 ~ 400 Amps	7 ~ 24

8.0 – Troubleshooting Guide:

Problem Encountered	LED Display			Causes	Remedy
	Charging LED	Fully Charged LED	Fault LED		
Polarity reversed or output shorted	–	–	✘	Charger clip is reversed or short circuit.	Check clips are not touching each other OR Check the clips are correctly connected to the battery.
Non Battery Link	–	–	✘	Non battery link	Please choose the right battery type for connection.
Faulty Battery	● Bulk LED	–	✘	Bulk charging has timed out and stopped after 24 hours.	Battery is faulty and may need to be replaced.
Over Voltage	–	–	✘	The 12V battery voltage is above 17.5V.	Disconnect the charger and check the battery voltage. This charger is suitable for 12V batteries
Over Temperature	–	–	●	Internal temperature is above 65°C ± 5°C.	Turn off charger and allow it to cool.

Indication: ○: Stays ON ✘: Flashing –: Extinguish

9.0 – Frequently Asked Questions:

Q. How do I know if the battery is charged?

A. The charger's FULLY CHARGED LED (Green LED) will illuminate (stays ON). Alternatively use a digital multi-meter set in DC range to measure the battery voltage, it should show 13.2V for a fully charged battery.

Q. I have connected the charger properly but the 'CHARGING LED' does not come on.

A. In some cases batteries can be flattened to the point where they have very little or no voltage. This can occur if a small amount of power is used for a long time, for example a map reading light is left on for a week or more.

This Battery Conditioner and Charger is designed to charge from as little as 2.0 Volts. If the voltage is lower than 2.0 Volts, use a pair of booster cables to connect between two batteries to provide more than 2.0 Volts to the battery being charged. The charger can then start to charge the battery and the booster cables can be removed.

Q. Can the charger be used as a power supply?

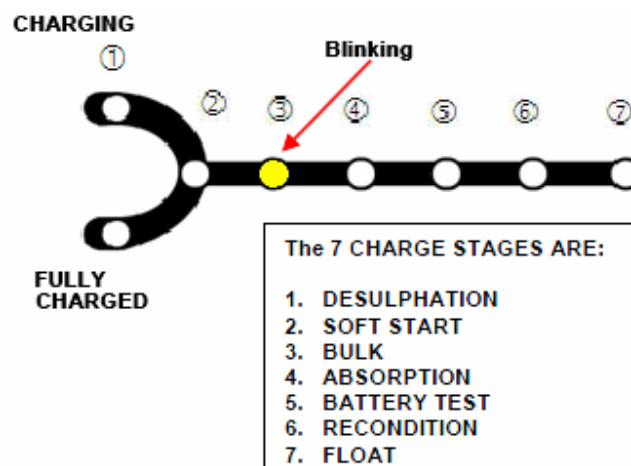
A. The charger is designed only to supply power to the battery clips when they are connected correctly to a battery. It also prevent sparks during connection to the battery or if connected incorrectly by mistake.

This safety feature prevents the charger from being used as a 'Power Supply'. There will be No Voltage present at the clips until it is connected to the battery.

Q. How can I know what stage the battery charger is in?

A. At the front panel of the charger, look for the blinking yellow LED at the charging bar graph (see below).

For example: No.3 is blinking, that means it is in Bulk charging stage. Refer to the table for which stage the charger is in when the LED is blinking.



10. Disclaimer

All information, illustrations, and specifications contained in this user manual are based on the latest information available at the time of printing. The right is reserved to make any changes at any time without obligation to notify any person or organization of such revisions or changes.

Furthermore, the manufacturer or its sales agents are not liable for errors contained herein or for incidental or consequential damages (including lost profits) in connection with the furnishing, performance or use of this material.

This instruction manual tells how to use and perform the required procedures on charging the batteries. Safe and effective use of this Battery Conditioner and Charger is very much dependant on the user following the normal practices and procedures outline in this manual.

11.0 – Warranty Information

11.1 – Limited Warranty

This limited warranty cover defects in materials and workmanship for a period of twelve (12) months which begins from the date the product is purchased by the end user and is subjected to the following terms and conditions:

1. Within the warranty period, the manufacturer will repair or replace, at their options, any defective parts and return to the owner in good working condition.
2. Any repaired or replaced parts will be warranted for the balance of the original warranty or three months (3) months from the date of repair, whichever is longer.
3. This warranty only extends to the first owner and not assignable or transferable to any subsequent owner.
4. Cost of delivery charges incurred for the repair of the product (to and from the manufacturer) will be borne by the owner.
5. This limited warranty covers only those defects that arises as a result of normal use and does not cover those that arises as a result of:
 - Unauthorized modifications and repair.
 - Improper operation or misuse.
 - Accident or neglect such as dropping the unit onto hard surfaces.
 - Contact with water, rain or extreme humidity.
 - Contact with extreme heat.
 - Cables that have broken, bent contact pins or subject to extreme stress or wear.
 - Physical damage to the product surface including scratches, cracks or other damage to other externally exposed parts.

11.2 - Limitations of Warranty

Other than the foregoing limited warranty, the manufacturer does not make any other warranty or condition of any kind, whether express or implied.

Any implied warranty of merchantability, or fitness for use shall be limited to the duration of the foregoing limited warranty.

Otherwise, the foregoing limited warranty is the owner's sole and exclusive remedy and is in lieu of all other warranties whether express or implied.

The manufacturer or any of its exclusive sales agents shall not be liable for any consequential or incidental damages or losses arising of the loss of uses of this product.

All warranty information, product features and specifications are subjected to change without prior notice.

