paco®

8-STAGE 12V AUTOMATIC LITHIUM (LiFePO4)

BATTERY CHARGER

MCU CONTROLLED & HIGH FREQENCY SWITCHMODE

P/No. LBC1205、LBC1207、LBC1210、LBC1212、LBC1215、LBC1220

Instruction Manual

Please read user manual carefully before use.

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1. WARNING

- Explosive gases may escape from the battery during charging. Prevent flames and sparks. Provide adequate ventilation.
- Before charging, read the instructions.
- For indoor use. Do not expose to rain.
- For charging 12 Volt lithium-ion with LiFePO4 batteries ONLY.
- 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 with National wiring rules.
- 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 infirm persons unless they have been adequately supervised by a responsible person to ensure that they can use the appliance safely.
- Young children should be supervised to ensure that they do not play with the appliance.

2. FEATURES

12V AUTOMATIC LITHIUM BATTERY CHARGER

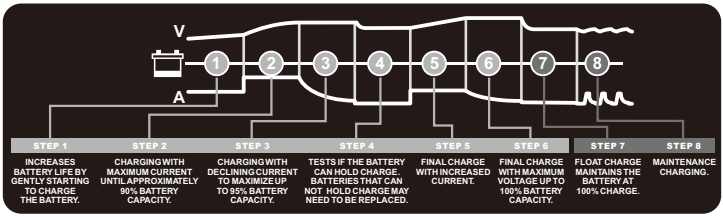
This is a fully automatic lithium battery charger with 8 charge stages.

Automatic charging protects your battery from being overcharged. So you can leave the charger connected to the battery indefinitely.

8-stage charging is a very comprehensive and accurate charging process that gives your battery longer life and better performance compared to using traditional chargers.

The 8-stage chargers is designed for Lithium-ion batteries using LiFePO4 technology only.

The 8 stages are:
Soft Start, Bulk, Absorption, Analyse, Completion, Maximization, Float And Maintain.



		LIMIT
STEP 1 SOFT START	25% Current until 11V	Max 30s
STEP 2 BULK	100% Current until 13.8V	Max 10h
STEP 3 ABSORPTION	Constant 13.8V until current drops to15%	30 minutes
STEP 4 ANALYSE	Checks if voltage drops to 12V	3 minutes
STEP 5 COMPLETION	30% Current until 14.5V	
STEP 6 MAXIMIZATION	Constant 14.5V until current drops to15%	30 minutes
STEP 7 FLOAT	13.6V， 100% Current	10 days Charge cycle restarts if voltage drops*
STEP 8 MAINTAIN	During 13.4V-13.8V , the current control at 100%~20%	Charge cycle restarts if voltage drops

STEP 1 SOFT START
A preliminary charge processes that gently introduces power to the battery. This protects the battery and increases battery life.

STEP 2 BULK
Charging with maximum current until approximately 90% battery capacity.

Bulk mode for the charging cycle. The start phase continues until the battery's terminal voltage has risen above the set limit, at which point the charger switches to bulk charging. If the terminal voltage has not passed the voltage limit within the time limit, the charger switches to fault mode (Step 2 lamp solid) and discontinues the charging. If so, the battery is faulty or its capacity is too large.

STEP 3 ABSORPTION
Charging with declining current to maximize up to 95% battery capacity.

STEP 4 ANALYSE
Tests if the battery can hold charge. Batteries that can not hold charge may need to be replaced.

STEP 5 COMPLETION
Final charge with increased current.

STEP 6 MAXIMIZATION
Final charge with maximum voltage up to 100% battery capacity.

STEP 7 FLOAT
The Float stage maintains the battery at 100% charge without overcharging or damaging the battery. This means the charger can be left connected to the battery indefinitely.

STEP 8 MAINTAIN
Maintaining the battery at 95 - 100% capacity. The charger monitors the battery voltage and gives a maintain when necessary to keep the battery fully charged.

The 12V AUTOMATIC LITHIUM BATTERY CHARGER has an 8-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.

3. SWITCHMODE TECHNOLOGY

Using the latest technology in battery chargers, switch mode chargers convert 110V/220-240V AC power to 12V power using electronic components unlike traditional battery chargers that rely on heavy transformers. This allows the charger to be light weight and compact without sacrificing on performance.

PROTECTIVE FEATURES

POLARITY PROTECTION

Prevents the 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 battery charger connects with non battery load, it will go into protection state.

DISCONNECT PROTECTION

The charger has entered the energy save mode. This happens if the charger isn′t connected to the battery in 2 minutes.

OVER VOLTAGE PROTECTION

The 12V lithium battery charger will automatically protection if the voltage is higher than 15.5V.

OVER TEMPERATURE PROTECTION

Internal temperature is above 65+/-5oC

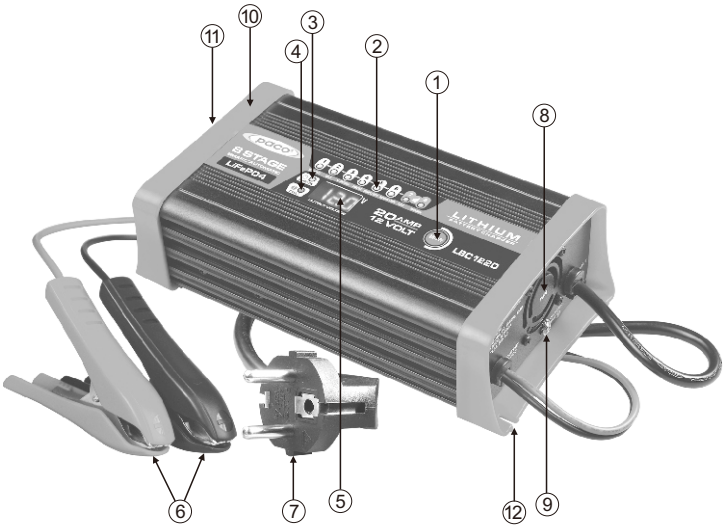
COOLING FAN

The charger is fitted with a thermostatically controlled fan to cool onboard electronics and maintain charging performance. The cooling fan will engage automatically when there is a high load on the battery or there is sufficient heat build up.

4. PRODUCT OVERVIEW

The 8-stage 12V automatic lithium battery charging consists of the following components:

1.ON/OFF button
2.Stage lamp status display indicates power, charging and fully charged.
3.Power lamp
4.Fault Led
5.Output voltage meter
6.DC leads.
7.Power Cord
8.Thermostatically controlled cooling fan.
9.Ground terminal
10.Mounting flange.
11.5.0mm mounting hole.
12.Ventilation hole



5. CHARGE STATUS INDICATOR

The 12V AUTOMATIC LITHIUM BATTERY CHARGING and STAGE LAMP will illuminate and flash in various patterns to indicate the different stages of charging. See below for flash / steady patterns.

		Power on lamp	Stage lamp	Fault lamp	LED display
Power Off					
Power On		●			00.0
Stage	1.Soft Start	●	☀ / ●		Out volt
	2.Bulk	●	☀ / ●		
	3.Absorption	●	☀ / ●		
	4.Analyse	●	☀ / ●		
	5. Completion	●	☀ / ●		
	6.Maximization	●	☀ / ●		
	7.Float	●	☀ / ●		
	8.Maintain	●	☀ / ●		
Non Battery Link Protection		●			00.0
Output Short Protection		●			
Output Polarity Reverse Protection		●			
Disconnect Protection		☀			
Over Voltage Protection		●		●	- U -
Not accept charge		●	☀ (Step 1 Lamp)	●	Battery volt
Faulty Battery		●	☀ (Step 2 Lamp)	●	
can not keep charge		●	☀ (Step 4 Lamp)	●	
Battery Charge Fully		●	● (Step 7 Lamp)		
Thermal Protection		●		☀	- t -

Note: ● : Solid ☀ : Flashing

STAGE LAMP: illuminates and flashes when 8-stage charging process.
STAGE LAMP: illuminates solid when fully charged.

POWER ON LAMP

If the power lamp is lit with a:
1. STEADY LIGHT
The mains cable is connected to the wall socket.
2. FLASHING LIGHT
The charger has entered the energy save mode. This happens if the charger isn't connected to the battery in 2 minutes.

FAULT LAMP STEADY LIGHT

If the fault lamp is lit solid , check the following:
Has charging been interrupted in STEP 1, 2, or 4?
Restart the charger by pressing the ON/OFF-button. If charging is still being interrupted, the battery.
STEP 1: ...can not accept charge and may need to be replaced.
STEP 2: ... battery is faulty and may need to be replaced. (Bulk charging has timed out and stopped after 10 hours.)
STEP 4: ...can not keep charge and may need to be replaced.

FAULT LAMP FLASHING LIGHT

★ Charger's internal temperature is higher than 65°C +/-5°C

6. SPECIFICATIONS

P/No.	LBC 1205	LBC 1207	LBC 1210
Charger Type	8-Stage automatic		
Input Voltage	☐ 220-240V~, 50/60Hz	☐ 110V~, 60Hz	
Input Power	154W	215W	307W
Output Voltage	12V DC	12V DC	12V DC
Output Current	5A	7A	10A
Minimum Start Voltage	1.0V	1.0V	1.0V
Back Drain	4mA	4mA	4mA
Current Fuse Rating	250VAC, T3.15A	250VAC, T3.15A	250VAC, T3.15A
CHARGE CONTROL			
Soft Start	25% Current until 11V		
Bulk	5A up to 13.8V	7A up to 13.8V	10A up to 13.8V
Absorption	Constant voltage until current drops to 0.75A	Constant voltage until current drops to 1.05A	Constant voltage until current drops to 1.5A
Analyse	Monitors voltage for 3 minutes		
Completion	1.5A Current until 14.5V	2.1A Current until 14.5V	3A Current until 14.5V
Maximization	Constant 14.5V until current drops to 0.75A	Constant 14.5V until current drops to 1.05A	Constant 14.5V until current drops to 1.5A
Float	13.6V， 100% Current		
Maintain	13.4V-13.8V , 5-1A	13.4V-13.8V , 7-1.4A	13.4V-13.8V , 10-2A
Efficiency	App.85%		
Thermal Protect	65°C +/-5°C		
Cooling Fan	Automatic temperature controlled		
Ambient Temperature	-20°C to +50°C , output power is reduced automatically at high temperatures		
Over Voltage Protection	The 12V lithium battery charger will automatically protection if the voltage is higher than 15.5V.		
BATTERY RANGE			
Deep Cycle	10-50Ah	14-70Ah	20-100Ah
Types of Batteries	12V Lithium-ion LiFePO4 batteries		
Dimension (L×W×H)	197x116x62mm	197x116x62mm	197x116x62mm
Weight	1.05Kg	1.05Kg	1.1Kg

*** Internal fuses should only be replaced by qualified electrical appliance repairer.**

7. SPECIFICATIONS

P/No.	LBC 1212	LBC 1215	LBC 1220
Charger Type	8-Stage automatic		
Input Voltage	☐ 220-240V~, 50/60Hz	☐ 110V~, 60Hz	
Input Power	332W	415W	554W
Output Voltage	12V DC	12V DC	12V DC
Output Current	12A	15A	20A
Minimum Start Voltage	1.0V	1.0V	1.0V
Back Drain	4mA	4mA	4mA
Current Fuse Rating	250VAC, T3.15A	250VAC, T3.15A	250VAC, T5A
CHARGE CONTROL			
Soft Start	25% Current until 11V		
Bulk	12A up to 13.8V	15A up to 13.8V	20A up to 13.8V
Absorption	Constant voltage until current drops to 1.8A	Constant voltage until current drops to 2.25A	Constant voltage until current drops to 3A
Analyse	Monitors voltage for 3 minutes		
Completion	3.6A Current until 14.5V	4.5A Current until 14.5V	6A Current until 14.5V
Maximization	Constant 14.5V until current drops to 1.8A	Constant 14.5V until current drops to 2.25A	Constant 14.5V until current drops to 3A
Float	13.6V， 100% Current		
Maintain	13.4V-13.8V , 12-2.4A	13.4V-13.8V , 15-3A	13.4V-13.8V , 20-4A
Efficiency	App.85%		
Thermal Protect	65°C +/-5°C		
Cooling Fan	Automatic temperature controlled		
Ambient Temperature	-20°C to +50°C , output power is reduced automatically at high temperatures		
Over Voltage Protection	The 12V lithium battery charger will automatically protection if the voltage is higher than 15.5V.		
BATTERY RANGE			
Deep Cycle	24-120Ah	30-150Ah	40-200Ah
Types of Batteries	12V Lithium-ion LiFePO4 batteries		
Dimension (L×W×H)	197x116x62mm	217x116x62mm	217x116x62mm
Weight	1.1Kg	1.28Kg	1.28Kg

*** Internal fuses should only be replaced by qualified electrical appliance repairer.**

8. CHARGING INSTRUCTIONS

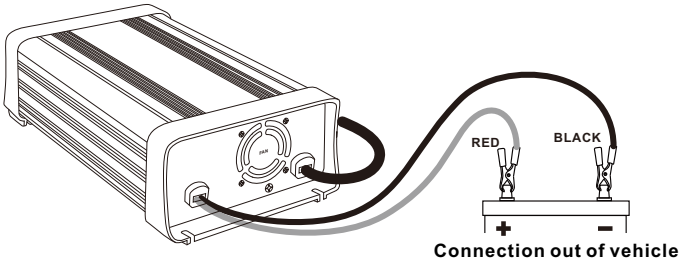
1. When the charging process is interrupted, press the ON/OFF button, and then restart the charger.
2. To turn off the charger by pressing and holding the ON/OFF button for 3 seconds.
3. To restart the charger by pressing and holding the ON/OFF button for 3 seconds.

STEP 1 – CHECK THE 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 6mm (1/4”) above the battery’s plates. If low, top up with distilled water to the correct level and refit the vent caps.

STEP 2A – CONNECTION OUT OF THE VEHICLE

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.



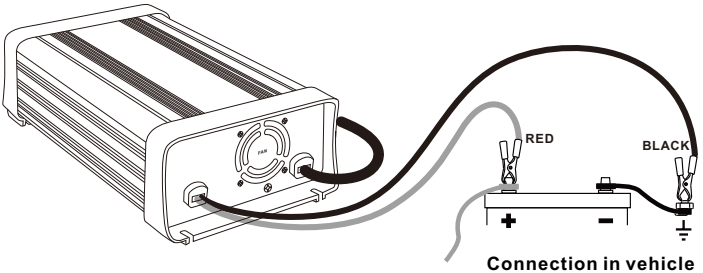
Connection out of vehicle

STEP 2B – CONNECTION IN VEHICLE

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.

9. Negatively earthed (most vehicles)

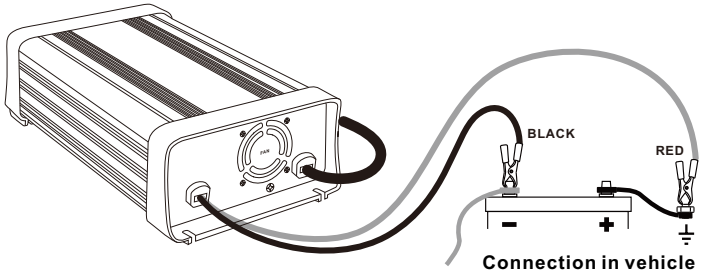
Connect the RED lead (battery clip) from the charger to the Positive (+) battery terminal.
Connect the BLACK lead (battery clip) from the charger to the vehicle's chassis away from the fuel line or moving parts.



Connection in vehicle (negatively earthed)

10. Positively earthed

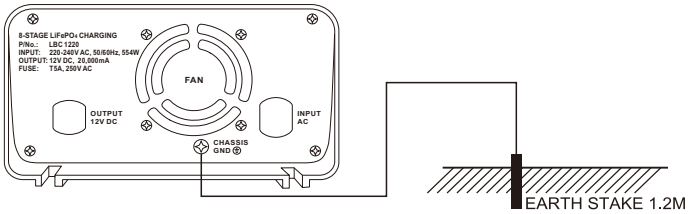
Connect the BLACK lead (battery clip) from the charger to the Negative (-) battery terminal.
Connect the RED lead (battery clip) from the charger to the vehicle's chassis away from the fuel line or moving parts.



Connection in vehicle (positively earthed)

11. CHASSIS EARTHING

The chassis earthing lug should be connected to an earting 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, connect to earth.



STEP 3 – CONNECT TO 110V/220-240V AC MAINS POWER

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

STEP 4 – CHARGING

During the charge process, the CHARGING and STAGE LAMP will flash various patterns. This is normal and indicates the various charge stages. Refer to "How can I know what stage the battery charger is in" in the charge status indicator section, page 6.

When the STAGE LAMP remains on, this is known as the float stage and the charger can be left connected to the battery without over charging.

If the POWER ON LAMP is flashing, there is fault; refer to "Fault Codes" explanation on page 16 of this manual.

STEP 5 – DISCONNECTION

Ensure the 110V/220-240V AC mains switch is turned off and the charger is disconnected from the 110V/220-240V AC mains power.

Battery out of vehicle

Remove the BLACK lead (battery clip) from the battery.

Remove the RED lead (battery clip) from battery.

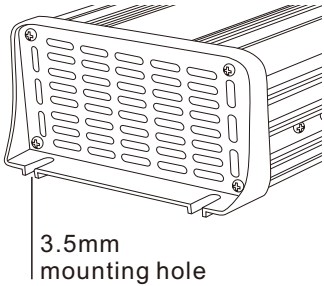
Battery in vehicle

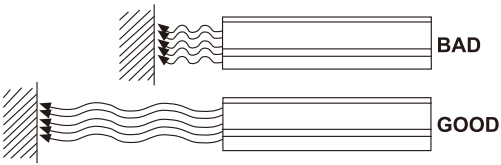
Remove the chassis connection.

Remove the battery terminal connection.

12. MOUNTING INSTRUCTIONS

8-stage chargers are designed for indoor, out of weather use only. Ensure that both charger and battery are in a well-ventilated space during charging.
The battery charger end plates include a mounting flange for easy mounting. If permanently fixed the charger should be mounted to a suitable horizontal or vertical panel, with at least 10cm clearance from the end plates to provide adequate ventilation for the cooling fan.





13. PERMANENT WIRING TO BATTERY

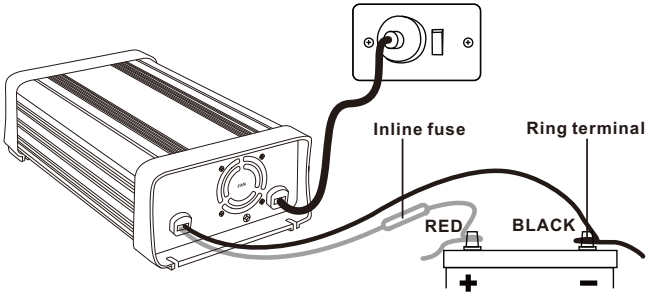
It is possible to hard wire the DC charging leads to the battery for permanent installations.

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

5A = 10 Amp fuse 7A = 15 Amp fuse 10A = 20 Amp fuse
12A = 25 Amp fuse 15A = 30 Amp fuse 20A = 40 Amp fuse

Connection:

1. Cut off the supplied battery clips; ensure you leave sufficient cable to reach the battery terminals. (DO NOT extend the battery charger DC cables, as the added voltage drop will cause incorrect charging).
2. Fit a ring terminal to the BLACK Negative (-) wire.
3. Connect the inline fuse to the RED Positive (+) wire.
4. Connect a ring terminal 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.

If the charger is used in a Permanent / Hard Wired application and the vehicle will not be used for some time, 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 National wiring rules.

14. ADJUSTABLE CHARGE RATES: 12 VOLT LiFePO4 BATTERY

CHARGE RATE	BATTERY SIZE (12V)	
	Battery size (Ah)	Charger time (hours)
5Amp	10-50	2-14
7Amp	14-70	2-14
10Amp	20-100	2-14
12Amp	24-120	2-14
15Amp	30-150	2-14
20Amp	40-200	2-14

15. FAULT CODES

There are error codes that may be displayed. These will be displayed in the following way:

Error Code	Power on lamp	Stage lamp	Fault lamp	Cause	Remedy
Polarity Reverse / Output Short	●			Short circuit or reverse connection of the clips.	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	●	☀ **(Step 2 lamp)**	●	Bulk charging has timed out and stopped after 10 ours.	Battery is faulty and may need to be replaced.
Over Voltage	●		●	The 12V lithium battery voltage is above 15.5V.	Disconnect the charger and check the battery voltage. This charger is suitable for 12V Batteries only.
Over Temperature	●		☀	Internal temperature is above 65°C +/-5°C.	Turn off charger and allow to cool.

CAUTION

ALWAYS PLACE THE12V AUTOMATIC LITHIUM BATTERY CHARGER IN AN ENVIRONMENT WHICH IS:

A. WELL VENTILATED.
B. NOT EXPOSED TO DIRECT SUNLIGHT OR HEAT SOURCE.
C. OUT OF REACH FROM CHILDREN.
D. AWAY FROM WATER / MOISTURE, OIL OR GREASE.
E. AWAY FROM ANY FLAMMABLE SUBSTANCE.
F. SECURE NO RISK OF FALLING.

SAFETY

◆The charger is designed for charging 12V Lithium-ion batteries with $LiFePO_4$ batteries . Do not use the charger for any other purpose.

◆Check the charger cables prior to use. Ensure that no cracks have occurred in the cables or in the bend protection. A charger with damaged cables must not be used. A damage cable must be replaced by a professional representative.

◆Never charge a damaged battery.

◆Never charge a frozen battery.

◆Never place the charger on top of the battery when charging.

◆Always provide for proper ventilation during charging.

◆Avoid covering the charger.

◆A battery being charged could emit explosive gasses. Prevent sparks close to the battery. When batteries are reaching the end of their lifecycle internal sparks may occur.

◆All batteries fail sooner or later. A battery that fails during charging is normally taken care of by the chargers advanced control, but some rare errors in the battery could still exist. Don′ t leave any battery during charging unattended for a longer period of time.

◆Ensure that the cabling does not jam or comes into contact with hot surfaces or sharp edges.

◆This appliance is not designed for use by young children or people who cannot read or understand the manual unless they are under the supervision of a responsible person to ensure that they can use the battery charger safely. Store and use the battery charger out of the reach of children, and ensure that children cannot play with the charger.

◆Connection to the mains supply must be in accordance with the national regulations for electrical installations.