

12V 2A LEAD-ACID (CAN-BUS CHARGE PROGRAM INCLUDED) AND LiFePo4 CHARGE PROGRAMS

BATTERY CHARGER / MAINTAINER FOR LEAD ACID BATTERIES (STANDARD, GEL AND AGM) & LiFePo4 BATTERIES

with CAN-bus mode (For batteries mounted in vehicles with CAN-bus)

SAFETY INSTRUCTIONS

FOR MOTOBATT MODELS: PDCFB (For 12 Volt Lead-acid batteries and LiFePo4 Batteries)

THIS MANUAL CONTAINS IMPORTANT SAFETY AND OPERATING INSTRUCTIONS. PLEASE SAVE THESE INSTRUCTIONS. KEEP WITH OR NEAR CHARGER AT ALL TIMES.

- WARNING – RISK OF EXPLOSIVE GASES.**
 - Working in the vicinity of a lead-acid battery can be dangerous. Batteries generate explosive gases during normal battery operation.
 - For this reason it is of the utmost importance that prior to each use of your charger, you read and follow the instructions provided exactly.
 - The appliance is not intended for use by young children or infirm persons without supervision. Young Children should be supervised to ensure that they do not play with the appliance.
 - To reduce risk of a battery explosion, follow these instructions and those marked on the battery.
 - NEVER smoke or allow an open spark or flame in the vicinity of the battery or engine.
 - CAUTION** – To reduce the risk of injury, use the charger for charging a rechargeable lead-acid battery only. It is not intended to supply power to a low-voltage electrical system or to charge dry-cell batteries. Charging dry-cell batteries may cause them to burst and cause injury to persons and damage to property.
 - Do not expose the charger to moisture, rain or snow. For indoor use only.
 - Use of an attachment not recommended or sold by the battery charger manufacturer may result in a risk of fire, electric shock, or injury to persons.
 - To reduce risk of damage to electric plug and cord, pull by plug rather than cord when disconnecting the charger.
 - Make sure cord is located so that it cannot be stepped on, tripped over, or otherwise subjected to damage or stress.
 - Study all the battery manufacturers' specific precautions such as removing or not removing cell caps while charging and recommended rates of charge.
 - Do not use the battery charger unless the battery voltage matches the output voltage rating of the charger.
 - Do not operate the charger in a closed-in area or restrict ventilation in any way.
 - An extension cord should not be used unless absolutely necessary. Use of improper extension cord could result in a risk of fire and electric shock. If extension cord must be used, make sure:
 - That pins on the plug of extension cord are the same number, size and shape as those of plug on charger;
 - That extension cord is properly wired and is in good electrical condition;
 - That wire size is as specified below.
- | | | | | |
|-----------------------|-----|-----|------|------|
| Length of Cord (Feet) | 25' | 50' | 100' | 150' |
| AWG Size of Cord | 18 | 18 | 18 | 16 |
- Do not operate the charger with damaged cord or plug. If the supply cord cannot be replaced and the cord is damaged, the appliance should be scrapped.
 - Do not operate the charger if it has received a sharp blow, been dropped, or otherwise damaged in any way. Take it to a qualified repair station or MOTOBATT dealer.
 - Do not disassemble the charger. Take it to a qualified repair station or MOTOBATT dealer when service or repair is required. Incorrect reassembly may result in a risk of electric shock or fire.
 - To reduce risk of electric shock, unplug the charger from an outlet before attempting any maintenance or cleaning.

PERSONAL PRECAUTIONS:
a. Someone should be within range of your voice or close enough to come to your aid when you work near a

MOTOBATT	Power On (Yellow)	A.C. power is connected with the wall socket properly Motobatt Logo will be glowing.
LiFePO	LiFePO charging (Blue)	The charger is switched to Lithium battery charge mode.
+	PCM Activation (Red)	PCM Activation processes will commence once the charger has been plugged into a live AC power source and the battery has been properly connected. Once PCM Activation is complete, normal charge processes will begin.
⚡	Charging (Red)	Normal charge processes are commenced. The Charger is delivering constant current to the battery. To charge large capacity batteries the charger may remain in this mode for several hours.
⚡	Absorption (Yellow)	The Battery Charger has determined that the battery has greater than 80% of its capacity available for use. At this stage of charge, the battery could be returned to service if absolutely necessary. It is recommended, however, that the battery remains connected to charger until the charge is completed and the full charged icon is glowing green.
✓	Fully Charged (Green)	Charging is complete and battery can be put into service or left safely on the charger indefinitely.
⊖	Bad Battery (Red)	The battery is worn out or is possibly defective. Suggest replacing battery with a MOTOBATT battery.

LED Indication	MOTOBATT Yellow	LiFePO Blue	+ Red	⚡ Red	⚡ Red	+ Yellow	✓ Green	⊖ Red
Power On	√	√	X	X	X	X	X	X
PCM Activation	√	√	X	√	X	X	X	X
Charging	√	√	X	√	√	X	X	X
Absorption	√	√	X	√	√	√	X	X
Full Charge/ Maintenance	√	√	X	√	√	√	√	X

Remark : "√"Light on ; "X" Light off

TROUBLE SHOOTING / MESSAGE LIGHTS CHECKLIST:

NO indicator lights are on.	A. Disconnect the charger from the AC outlet. Check connections to battery and ensure they are good. B. Check to ensure that there is power at the AC outlet by plugging in a table lamp or power meter.
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- lead-acid battery.
- Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing, or eyes.
- Wear complete eye protection and clothing protection. Avoid touching eyes while working near battery.
- If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters an eye, immediately flood eye with running cold water for at least 10 minutes and get medical attention immediately.
- NEVER smoke or allow a spark or flame in vicinity of battery or engine.
- Be extra cautious to reduce risk of dropping a metal tool onto battery. It might spark or short-circuit battery and/or electrical part that may cause an explosion.
- Remove personal metal items such as rings, bracelets, necklaces, and watches when working with a lead-acid battery. A lead-acid battery can produce a short-circuited current high enough to weld a ring or like to metal, causing a severe burn.
- It is not intended to supply power to a low-voltage electrical system or to charge dry-cell batteries. Charging dry-cell batteries may cause them to burst and cause injury to persons and/or damage to property.
- NEVER charge a frozen battery.

PREPARING TO CHARGE

- If it is necessary to remove battery from vehicle to charge it, always remove grounded terminal from battery first. Make sure all accessories in the vehicle are off in order to prevent an arc.
- Be sure area around battery is well ventilated while battery is being charged. Explosive gas can be forcefully blown away by using a piece of cardboard or other nonmetallic material as a fan.
- Clean battery terminals. Be careful to keep corrosion from coming in contact with eyes.
- If battery is not sealed, add distilled water in each cell until battery acid reaches level specified by battery manufacturer. This helps purge excessive gas from cells. Do not overfill. For a sealed battery or a battery without cell caps, carefully follow manufacturers' recharging instructions.
- Study all battery manufacturers' specific precautions such as removing or not removing cell caps while charging and recommended rates of charge.
- Determine voltage of battery by referring to vehicle owner's manual and make sure it matches output rating of the battery charger.

LOCATE CHARGER

- Locate the charger as far away from battery as the DC cables permit.
- Never place the charger directly above or below the battery being charged. Gases or fluids from the battery will corrode and damage the charger.
- Never allow battery acid to drip on the charger when reading gravity or filling battery.
- Do not operate charger in a closed-in area or restrict ventilation in any way.
- Do not set a battery on top of charger.

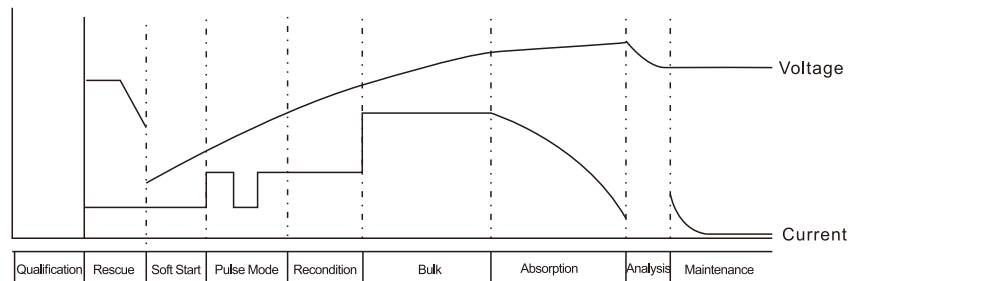
CONNECTION PRECAUTIONS

Connect and disconnect DC output clips only after setting the charger switches to off position and removing AC cord from the electric outlet. Never allow clips to touch each other.

- Follow these steps when battery is installed in a vehicle.** A spark near battery may cause a battery explosion. To reduce risk of a spark near battery:
 - Position AC and DC cords to reduce risk of damage by hood, door or any moving engine parts.
 - Stay clear of fan blades, belts, pulleys, and other parts that can cause injury to persons.
 - Check polarity of battery posts. A positive (pos, +) battery post may have a larger diameter than a negative (neg, -) post.
 - Determine which post of battery is grounded (connected) to the chassis. If negative post is grounded to the chassis (as in most vehicles), see item (e). If positive post is grounded to the chassis, see item (f).
 - For a negative-grounded vehicle, connect the positive (red) clip from the battery charger to the positive (pos, +) post of battery first. Connect the negative (black) clip from the battery charger to the vehicle chassis or engine block remote from the battery and fuel line. Do not connect the clip to carburetor, fuel lines, or sheet-metal body parts. Connect to a heavy gauge metal part of the frame or engine block.
 - For a positive-grounded vehicle, connect the negative (black) clip from the battery charger to negative (neg, -) post of battery first. Connect the positive (red) clip from the battery charger to the vehicle chassis or engine block remote from the battery and fuel line. Do not connect clip to carburetor, fuel lines, or sheet-metal body parts. Connect to a heavy gauge metal part of the frame or engine block.
 - If using permanently mounted eyelet lead SAE connector, simply connect to charger output lead.
 - Connect charger AC supply cord to an electric outlet.
 - When disconnecting the charger, disconnect AC cord, remove clip from vehicle chassis, and then remove clip from battery terminal.
 - See operating instructions for length of charge information.
- Follow these steps when battery is outside the vehicle.** A spark near the battery may cause a battery explosion. To reduce risk of a spark near battery:
 - Check polarity of battery posts. A positive (pos, +) battery post may have a larger diameter than a negative (neg, -) post.
 - Attach at least a 1.8m long 0.75mm² insulated battery output cable of charger to the negative (neg, -)

Pb Charging mode (Lead-Acid Battery Charging Mode)

Motobatt 9 Stage Charge, Conditioning and Maintenance Process Map



Qualification: Rescue: Soft Start: Pulse Mode: Recondition: Bulk: Absorption: Analysis: Maintenance

- battery post.
- Connect the positive (red) clip from the battery charger to the positive (pos, +) post of battery.
- Position yourself and the free end of cable as far away from battery as possible, then connect negative (black) clip from the battery charger to free end of cable.
- Do not face battery when making final connection.
- Connect charger AC supply cord to an electric outlet.
- When disconnecting the charger, always do so in reverse sequence of connecting procedure and break first connection while standing as far away from battery as practical.
- A marine (boat) battery must be removed and charged on shore. To charge it on boat requires equipment specially designed for marine use.

OPERATING INSTRUCTIONS:

AUTOMATIC MONITORING – Your new MOTOBATT battery charger is completely automatic and can be left on whenever input power is made available to the charger. The charger output depends on the condition of the battery it is charging. When the battery is fully charged, the indicating light will turn green and the charger will switch itself to a storage charge mode and will automatically monitor and maintain the battery at full charge.

CABLE CONNECTIONS – Your new MOTOBATT battery charger is equipped with two output leads, a red positive lead, and a black negative clip lead and a permanent mount eyelet lead with a 2 pin SAE connector. Always connect or disconnect the output leads before plugging into AC power.

For all battery types: Connect the red positive (+) lead to the positive terminal of the battery. Connect the black negative (-) lead to the negative terminal of the battery.

NOTE: If the charger is left connected to a lead acid battery for long periods of time, check water levels periodically as directed by the battery manufacturer to ensure electrolyte is maintained at proper level.

ATTENTION: THE BATTERY CHARGER HAS A SPARK FREE AND REVERSE POLARITY PROTECTION CIRCUITRY BUILT IN - BUT ONLY WHEN IN LEAD ACID (Pb) CHARGING MODE. The clips will not spark when touched together. However, when the charger is in LiFePo4 battery charging mode the Spark Free AND Reverse Polarity features are turned off and the clips will spark if the charger is turned on and the clips are touched together or connected in reverse. Why? The internal discharge protection circuitry that is built into some LiFePo4 batteries will not allow the charger to sense voltage at the posts. Therefore the Spark Free and Reverse Polarity feature built into the charger for charging lead acid (Pb) batteries is disabled to allow the charger to commence charging when the charger is in LiFePo4 charge mode. As a good practice, never allow the two clips touch each other.

The Battery Charger will not produce voltage (turn on) until it recognizes at least two volts from the battery. The battery charger clips must be clipped to a battery in the correct polarity to initiate output voltage and begin charging when in Lead Acid (Pb) charge mode.

When in Lead Acid (Pb) charge mode if the charger is hooked up in reverse polarity, the red "Reverse Polarity" light will flash indicating that the connection has been made in reverse of the polarity of the battery and a charge has not been initiated. The clips must be re-connected in the proper polarity to start the charger, Red to Positive (+ to +) and Black to Negative (- to -).

NOTE: DO NOT TURN YOUR BATTERY CHARGER ON AND OFF REPEATEDLY (Plug and Unplug) WITHIN A SHORT PERIOD. IF THIS HAPPENS, UNPLUG BATTERY CHARGER FROM AC POWER, WAIT FOR ONE MINUTE AND THEN CONNECT THE CHARGER AGAIN TO RESTART CHARGING CYCLE.

TIME TO CHARGE ESTIMATION (Lead Acid Charge Mode):

$$\text{(BATTERY CAPACITY) } \times \text{ (CHARGER CURRENT) } = \text{ HOURS or (AMP HOURS) } \div \text{ (AMPS) } = \text{ EST. HOURS TO CHARGE}$$

Suppose you have a 15 Amp-Hour Battery. Now let's say you have a 1.25 Amps Charger that will deliver 1.25 Amps for as long as it takes to get the battery voltage up to it's recharged level. So, how long will it take to actually charge the battery?? You can make a pretty good guess by just dividing two numbers:

$$\text{e.g.: (15 AMP HOURS) DIVIDED BY (1.25AMPS) = 12 HOURS}$$

Some large capacity batteries may take up to 24 hours or even days to fully charge. Note: it is recommended that only one battery be charged at a time.

FULLY DISCHARGED BATTERIES - Lead Acid (Pb) Charge Mode.

If your battery is totally discharged (below 2 volts), the BATTERY CHARGER circuitry will not start due to its internal safety circuit. The internal safety circuit of the battery charger must sense more than 2 volts in the battery before it

MOTOBATT 9 Stage Lead Acid Charge, Conditioning and Maintenance Process

- Qualification Phase:**
Initially ensures the battery is in good condition prior to launch of normal charge processes, as a safety measure charge processes will not begin if battery is below 2 volts.
- Battery Rescue Phase:**
MOTOBATT Battery Rescue starts if battery voltage has risen unusually high in the early portion of the recharge cycle. This is usually caused by plate sulfation. Once the battery rescue phase has succeeded in getting the battery to accept power, normal battery charging will begin.
- Soft Start Phase:**
Soft Start is applied when the charger has detected a battery at a very low initial state of charge. Voltage and current are delivered at a specified rate to help the battery to recover prior to entering pulse charge mode.
- Pulse Mode Phase:**
Motobatt Pulse mode provides a pulse charge to help the newly recovered battery to continue to accept charge as it enters the Reconditioning phase. To maintain the battery at a full state of charge
- Recondition Phase:**
The MotoBatt Recondition phase follows when the Pulse Mode is completed, charging at a slightly higher voltage and amperage to "re-activate" the battery plates allowing for an improved charge acceptance and depth of charge.
- Bulk Charge Phase:**
With the battery now having gone through Qualification and Recovery phases as needed the MOTOBATT Bulk Charge phase gives the battery constant current, taking the battery up to 80% of its full capacity.
- Absorption Phase:**
In the MOTOBATT Absorption phase the battery is given constant voltage while current is reduced based on actions taken from ongoing battery monitoring until the battery is 100% charged.
- Analysis (Check) Phase:**
The Battery will now be checked to ensure that it is holding a charge properly and the charger will determine if the battery is ready for use or not.
- Maintenance Phase:**
The battery can be left safely connected to the charger indefinitely. The charger will constantly monitor the battery and "turn-on" again as needed to maintain the battery at a full state of readiness.
**Asterisk denotes a phase in Motobatt Battery Recovery Processing*

LiFePO Charging Mode (Lithium Battery Charge Mode)

Motobatt 4 Stage Charge, Conditioning and Process Map

will allow the charging circuit to turn on. Otherwise, the charger is inoperable. In this case, the Bad Battery Indicator Light will flash, which means charging has not been initiated. To initiate charge on a battery that is below 2 volts, you must fool the battery charger circuitry by momentarily jumping the discharged battery to a known charged battery (above 2 volts). This will trick the charger into initializing the charging sequence.

72-HOUR SAFETY FEATURE:
A 72 hour Safety Times will commence anytime the charger is on. This feature is designed to protect marginal batteries from over charging. If the battery voltage reaches the proper level within 72 hours, the charger will automatically switch to float mode. If your battery is marginal or defective, the Battery Charger will stop all the charging processes in order to protect the marginal battery from over charging. Please check battery condition as it could also indicate that a very large (high capacity) but good battery is simply not yet fully charged. When this happens, the bad battery indicator will be flashing. If this is the case, please contact your local MOTOBATT dealer and have the battery tested.

SELECTION FOR BATTERY TYPE

A.C. power is connected with the wall socket properly

Press for battery charge mode selection before you connect the charger to the battery terminals.

LED Signal	Explanation	Description
Pb	Lead Acid charging (Red)	12V lead – acid battery charge mode
+	CANBUS Mode (Red)	12V lead – acid battery charge mode
LiFePO	LiFePO charging (Blue)	Lithium battery charge mode

LIGHT INDICATION:

1) Pb Charging mode (Lead-acid battery charging mode)

LED signal	Explanation	Indication
MOTOBATT	Power On (Yellow)	A.C. power is connected with the wall socket properly Motobatt Logo will be glowing.
Pb	PB charging status (Red)	The charger is switched to 12V lead –acid (Pb) battery charging mode.
+	Recovery / Can-Bus (Red)	Battery Recovery processes will commence if the charger detects any charge acceptance problems. MotoBatt Recovery processes include: Battery Rescue Phase, Soft Start Phase, Pulse Mode Phase and Recondition Phases. Once the Recovery processes are complete, normal charge will commence immediately. Can-Bus Mode :the charger will send a signal to detect & activate a CAN-bus controlled 12V outlet once the supplied 12V outlet connector has been plugged in and red light will be flash during this period. After activating process and the charge will be commence and red light on .

	Charging (Red)	Normal charge processes are commenced. The Charger is delivering constant current to the battery. To charge large capacity batteries the charger may remain in this mode for several hours or even days.
	Absorption (Yellow)	The Battery Charger has determined that the battery has greater than 80% of its capacity available for use. At this stage of charge, the battery could be returned to service if absolutely necessary. It is recommended, however, that the battery remains connected to charger until the charge is completed and the full charged icon is glowing green.
	Fully Charged / Maintenance (Green)	The charging process is completed and the battery is in maintenance mode, it can be returned to service if necessary or left safely connected to the charger indefinitely. (Maintenance function in effect for Lead - acid charging mode only)
	Bad Battery (Red)	The battery is worn out or is possibly defective. Suggest replacing battery with a MOTOBATT battery.
	Reverse Polarity (Red)	Battery is connected in reverse polarity, please check the battery connection(s) and correct reverse polarity condition. (Make sure Red to "+" and Black to "-") (Reverse polarity function in effect for Lead - acid charging mode only)

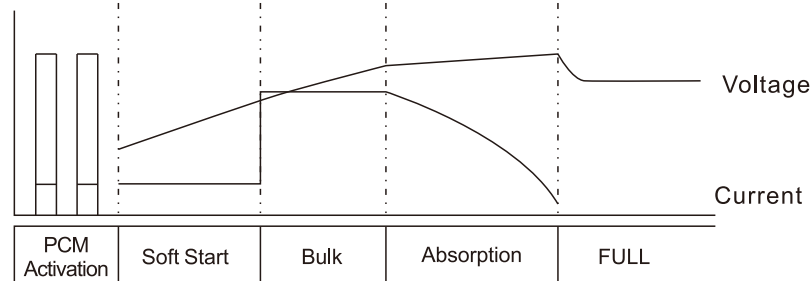
LED Indication	MOTOBATT Yellow	LiFePO Blue	+ Red	⚡ Red	⚡ Red	+ Yellow	✓ Green	⊖ Red	⊖ Red
Power On	√	X	X	X	X	X	X	X	X
Recovery / Can-Bus Mode	√	X	√	√	√	X	X	X	X
Charging	√	X	√	√	√	X	X	X	X
Absorption	√	X	√	√	√	√	X	X	X
Full Charge/ Maintenance	√	X	√	√	√	√	√	X	X
Reverse Polarity	√	X	√	X	X	X	X	X	√

Remark : "√"Light on ; "X" Light off

2) LiFePO Charging Mode (Lithium battery charge mode)

Note : 1) Due to internal discharge protection associated with some LiFePo4 batteries when in LiFePO charging mode the spark free and reverse polarity protection features are turned off, please be sure to not touch clips together and make sure to connect the red positive (+) lead to the positive terminal of the battery and the black negative (-) lead to the negative terminal of the battery, otherwise battery or charger damage and/or personal injury may occur.
2) If the LiFePO charging mode has been selected and the blue light is flashing you must connect your battery within 5 minutes. If this does not happen, the "Bad Battery" light will begin flashing. If this is the case you must reset the charger by unplugging the charger from the AC power source for a few seconds and then and plug it in again. Then you can re-select to desired charging mode for charging.

LED signal	Explanation	Indication
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MOTOBATT 4 Stage LiFePO4 Charge, Conditioning Process

PCM Activation: Once the charger has been properly connected to the battery it will deliver a constant pulse frequency to activate the PCM before it enters into the charge program.

- Soft Start Phase:**
Soft Start is applied when the charger has detected a battery at a very low initial state of charge. Voltage and current are delivered at a specified rate to help the battery to recover prior to bulk charge.
- Bulk Charge Phase:**
With the battery now having been activated and gone through the Soft Start phase as needed the MOTOBATT Bulk Charge phase gives the battery constant current, taking the battery up to 80% of its full capacity.
- Absorption Phase:**
In the MOTOBATT Absorption phase the battery is given constant voltage while current is reduced based on actions taken from ongoing battery monitoring until the battery is 100% charged.
- Full Charge**
Charging is complete and the battery can be returned to service or left safely on the charger indefinitely.

Technical Specifications:

- Model : PDCFB
- Input: Auto-switching 100V-240VAC 50/60Hz
- Input Cable: 6' / 18AWG
U.S. SPT-2
EU – H03VV
Aust/NZ – H03VV
- Output: 12VDC 2A
Max Charge Current: 2 A
Max. Voltage: 14.9V (Lead –Acid (Pb) Battery charging)
14.6V (LiFe Po4 Battery charging)
- Output Cable: 5'/18AWG SPT-2
- Lug/Clamp Cable Length/AWG: 21'/18AWG SPT-2
- Fuse Protected Cables: 7.5A
- Overcharge Protection: Yes

- Reverse Polarity Protection:** Yes (For Lead –Acid battery charging only)
- Battery Capacity:** Charging 4-100 Ah Maintenance – all sizes (For Lead –Acid Battery charging only)
Charging 2-20 Ah For LiFePo4 batteries
- Short Circuit Protection:** Yes (For Lead –Acid Battery charging only)
- Spark Proof:** Yes (For Lead-Acid Battery charging only)

***Charger Selection and Use**

Charge and maintenance capacity ranges are suggested only as a guide for battery charger selection and application based on varied customer charging and maintenance requirements. Please be sure to follow safety and use information in user guide for correct product application and use.