

**MASHIN<sup>®</sup>**

# PROGRAMMING BATTERY CHARGER



# TK-45

## USER GUIDE



## MASHIN ELECTRIC CORP.

Established in 1996 in Madou District, Tainan City, Mashin Electric Corp. begins as a manufacturer of car chargers. Over the years, Mashin becomes a professional battery charger manufacturer for Automotive, Motorcycle, Industry, Jump Starter and functional battery chargers. Especially the car chargers stand the first selling position in domestic market. Recently, we have committed into more and more product lines for battery chargers.

We specialized in Battery Charger, Adaptor, Transformer, Switching Power, DC to AC Inverter, LiFePO4 Lithium Battery Pack, Battery Analyzer, Booster Cable, Jump Starter and related electronic products. With more than 20 years' factory experiences, we received customers' reliance for automotive market around the world. Mashin can do OEM services and also has the capability for ODM. Our products are followed by high SOP standards throughout the whole production process. Besides, we put into the newest equipment and focus on employees training in order to provide the best service and products to our customers.

Creativity and experiences are our advantages to receive customers' trust. Besides, our engineers have decades of experiences and contributed in developing our own battery chargers. Every year, we will have more than 5% R&D developing fees for our new products. What we want is to provide our customers a more convenient life.

We take the four policies, "Total Quality Assurance, Quality First, Service First, Customer Satisfy" as our company goals. From R&D, purchasing, production to the sales and delivery, we all have completely Quality Management System. In addition, most of our products obtained UL, CE, CB, FCC, PSE, SAA, RoHs, and CEC certifications and safety regulations. Strict company policy and management obtain the certification of French (ANFOR) ISO-9001 and be the Japan PSE and U.S. UL certified factory.

Since the factory established, Mashin has actively built up our own brand and strives to develop the best products on a daily basis. It wasn't easy to keep the faith after several decades, but we did. In the future, we will maintain our creativity, keep developing new types of chargers and extend the international market. It's our responsibility to feed back to the world.





## ● Features

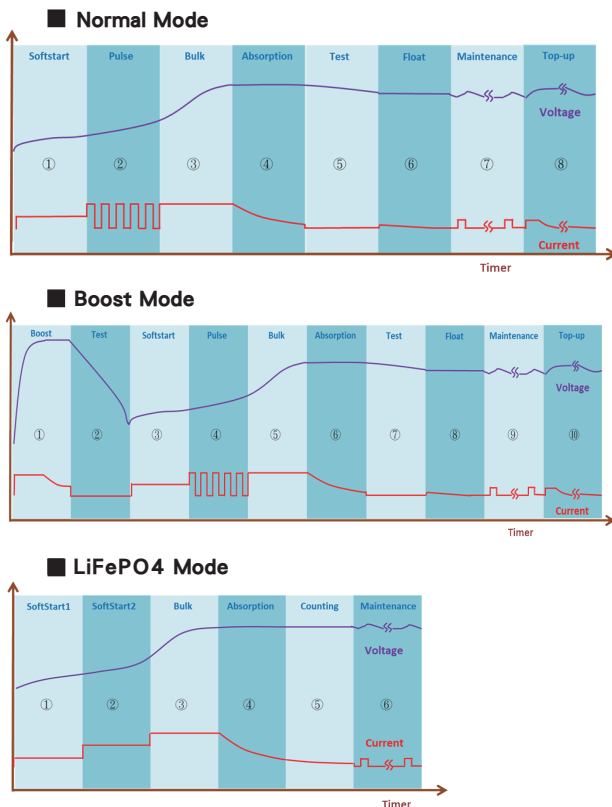
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# Features

## 8 Stages Charging Mode



- ① **Soft start:**  
Tests if the battery can accept charge, charging will commence if battery is okay.  
\* Boost Mode will charge by high voltage.
- ② **Pulse:**  
Pulsing current removes sulphates from the battery plates and restores battery efficiency and capacity.
- ③ **Bulk Charge:**  
Charging with maximum constant current until approximately 80% of capacity.
- ④ **Absorption:**  
Charging with constant voltage and declining current to equalize and maximize up the battery capacity.
- ⑤ **Test:**  
Tests if the battery can hold charge. If the battery voltage drops below 12.3V within 2 minutes, battery is faulty.
- ⑥ **Float:**  
Keep the battery voltage at maximum level by providing a constant voltage charge.
- ⑦ **Maintenance:**  
Battery maintenance mode active when the battery voltage is lower than 12.6V/25.2V, the charger will begin maintenance charging automatically.
- ⑧ **Cycle Recharge:**  
A continuation of the Maintenance mode that monitors battery voltage and will gently pulse current and increase voltage. It will charge automatically every 15 days.

- ① **Pre-Charge 1**  
This stage activates only if the battery is severely discharged and help to protect and precondition the cells against the damage.
- ② **Pre-Charge 2**  
Soft start, moderately charging in the beginning to avoid the peak current damages the cells.
- ③ **Bulk**  
Charging with maximum current, the current is fixed according to the maximum capability of the charger.
- ④ **Absorption**  
The current will decline to charge in order to maximize the battery capacity.
- ⑤ **Testing / Cutoff**  
Test if the battery is in the normal condition.
- ⑥ **Low Voltage Auto Re-Charge**  
Re-charge automatically if it detects the voltage is dropped off.

## Safety Instructions

- Before removing the battery from the vehicle, please check your codes for audio, security systems...etc.
- Before removing the battery from the vehicle, please make sure to disconnect the earth (ground) terminal first. All accessories in the vehicle must be turned off to avoid sparks.

### Warning:

- It is dangerous to work near a lead-acid battery. A battery will generate explosive gases during normal operation and gases increase when charging.
- Make sure working area is well ventilated.
- Make sure there is no possibility to cause gases being ignited. Must be no naked flames, cigarettes, flame heaters, blowtorches...etc. near the battery or working area.
- The gases can be ignited by sparks, please disconnect the chargers from the mains before disconnecting the leads from the battery.
- Must wear approved safety eyewear when connecting or disconnecting battery / battery charger leads.
- Avoid touching eyes while working with batteries.
- Do not smoke near the battery or engine.

# Safety Notes

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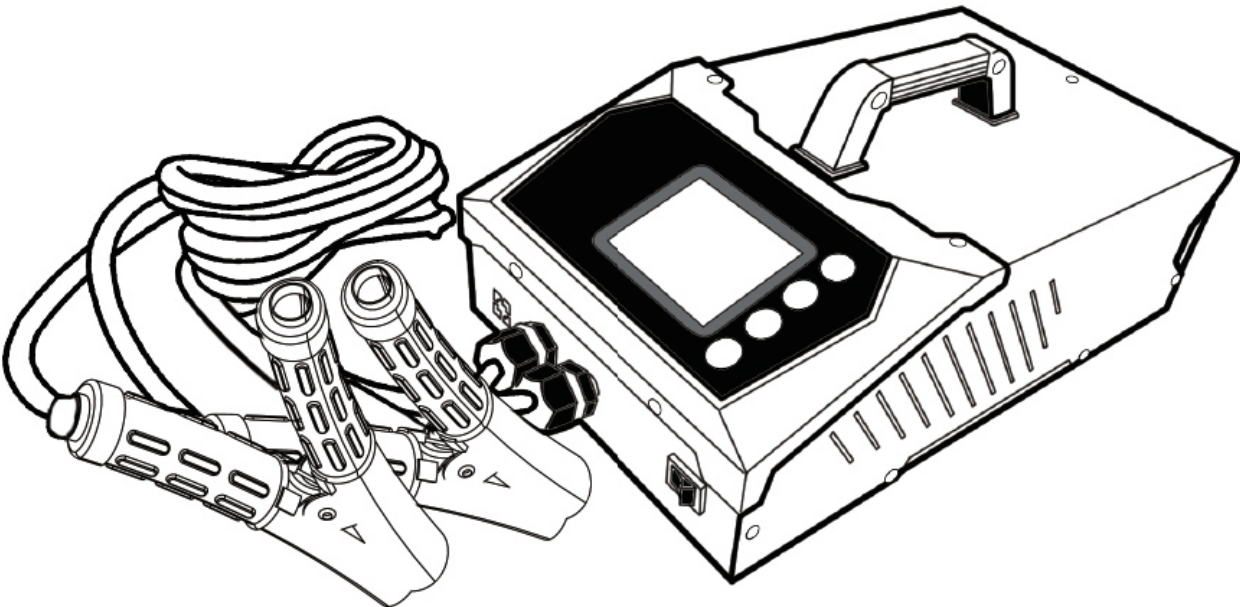
- This charger is designed for charging lead-acid battery of vehicles, do not charge the battery of home appliances.
- This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities or lack of experience and knowledge. Unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.  
(The EN variation to this instruction is not the same as it redefines the meaning of children).
- Place chargers as far away from the battery as the charger cables permit.
- When working with or near a lead-acid battery, make sure there is someone nearby to come to your aid if necessary.
- If battery acids contacts skin or clothing, wash immediately with soap and plenty of fresh water.
- If acids enter an eye, flushing eyes immediately with plenty of cold, clean water and get medical attention.
- When working with lead-acid battery, make sure to remove personal metal items, such as watch straps, rings, bracelets, necklaces...etc. A short circuit across from one of above will cause severe burns.
- Do not put the battery on top of the charger.
- Never touch the clamps when the charger is working.
- Never allow the clamps to touch each other or to contact a piece of metal that could bridge them.
- If you need to remove a battery, always remove the ground terminal from the battery first. Make sure all accessories are off to minimize the potential of a spark.

## **It is the operator's responsibility to comply with the following:**

- Do not disassemble the charger without qualified professional when service or repair is required.
- Inspect all power supply leads, plugs and all electrical connections for wear and /or damage.
- Before use, inspect the insulation on the charger cable and check the charger and plug before connecting to the mains supply.
- Also regularly inspect power supply sockets, extension leads and connectors.
- Ensure that the mains voltage marked on the charger is the same as the electrical power supply to be used.
- Do not carry the charger by its power lead.
- Do not pull the power plug from the socket by the power lead.
- Extension lead reels: when a cable extension lead reel is used it should be fully unwound before connection. We recommend the cable reel has an RCD fitted. Be sure that the capacity of the cable reel is suitable for the product.
- Disconnect equipment from power supply before cleaning. Do not use any liquid or aerosol cleaner. Use only moisture cloth.
- 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.

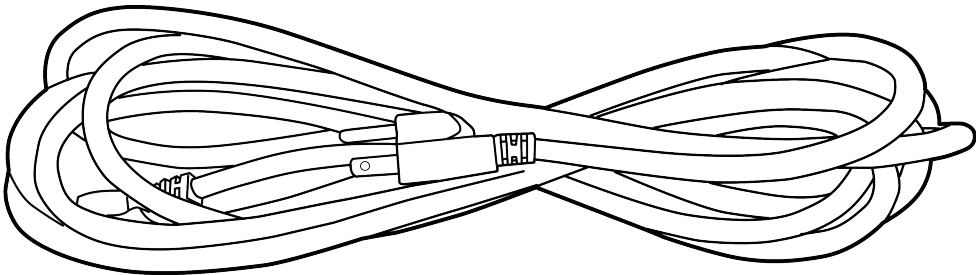


# Accessory



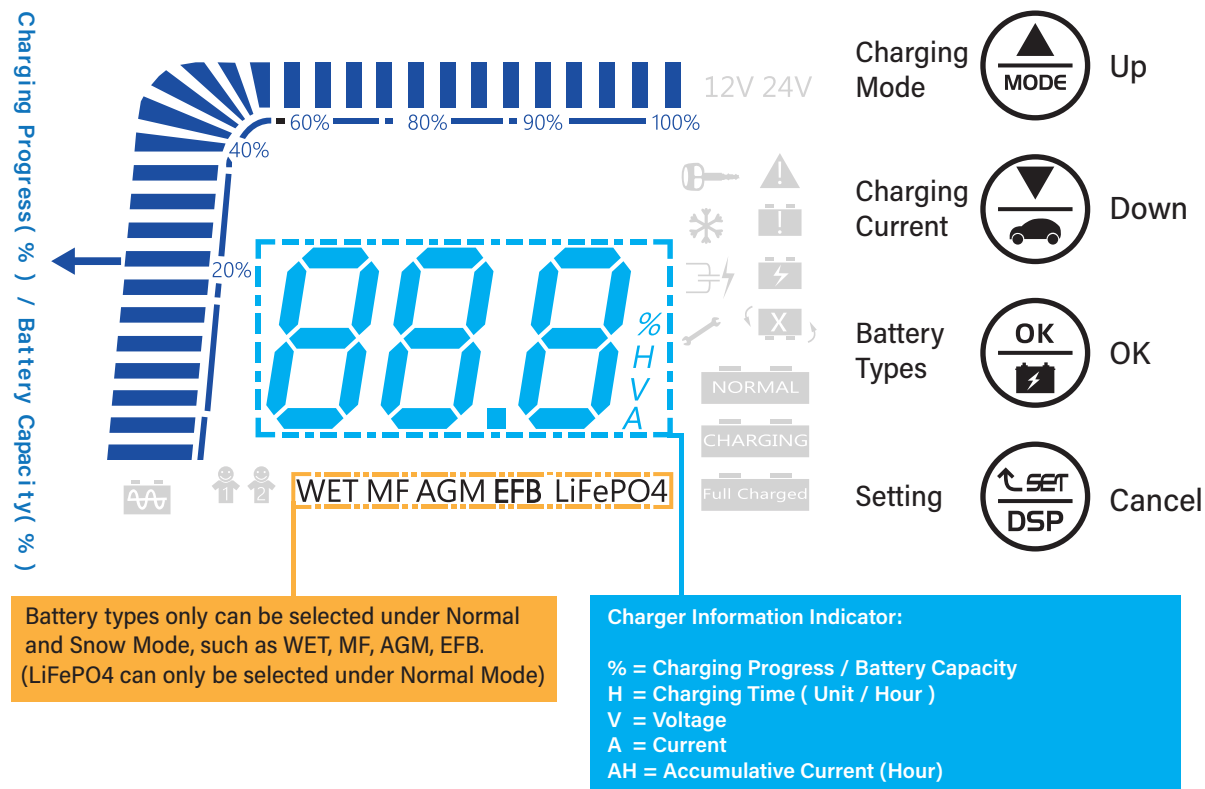
Charger

User Manual



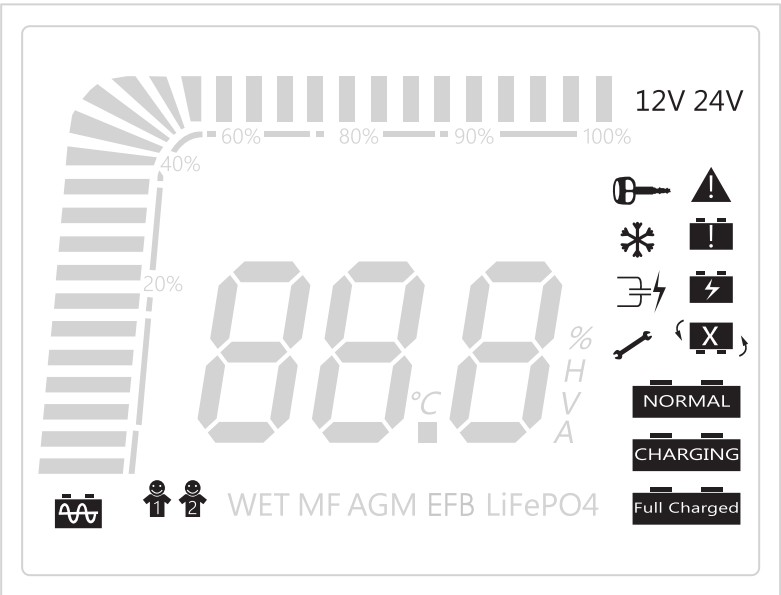
AC Cable

# LCD Display Panel and Function



## Icon Indicator

	ISS Mode
	Snow Mode
	Supply Mode
	Advanced Setting
	Charger Error
	Battery Error
	Boost Mode
	Reverse Polarity
	Normal Mode
	Charging
	Charging Completed
	Battery Check
	Advanced Mode
12V 24V	Battery Voltage

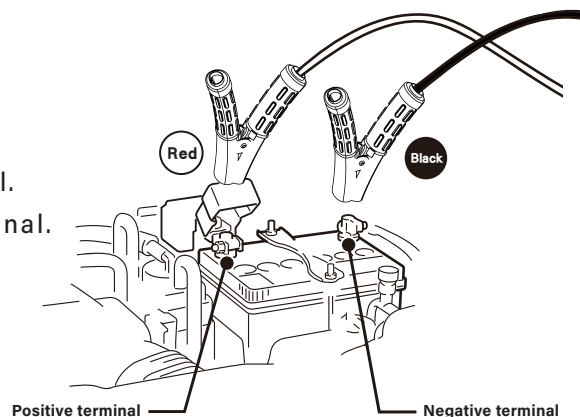


## Before Connecting

- Please make sure battery types and capacity of your vehicles before selecting charging current and mode.
- Please clean the battery vent tube before using.
- If acids enter an eye, flushing eyes immediately with plenty of cold, clean water and get medical attention.
- Make sure working area is well ventilated.
- Please make sure the battery electrolyte is within the range.
- When removing the battery from the car, please disconnect the negative terminal first.
- Please make sure all the electronic devices are in OFF position.
- Please identify the correct polarity of your clamps before using LifePO4 forced on charging. Must not reverse polarity or it may cause the damage for battery or charger.
- Do not bind the cable to use.
- Connect the red clamps with positive terminal first.
- Do not use the other cables instead of Mashin's standard when connecting.
- Ensure there is no cracks or dirt on the clamps.
- The battery terminals might get rusty, please clean the terminals before charging.
- Never touch the cables and battery in wet hands.

## Before Charging

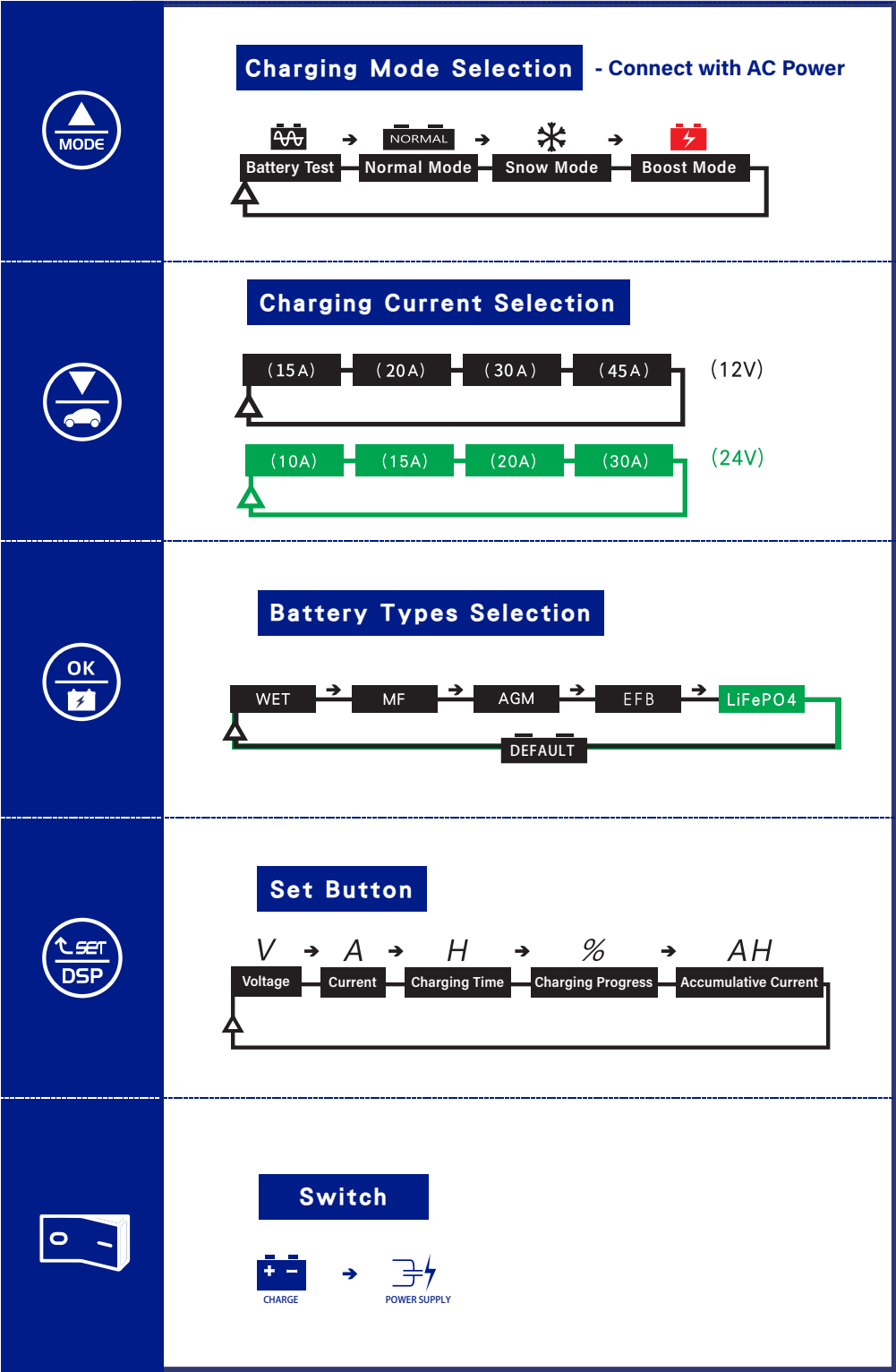
- ① Please identify the correct polarity of your battery.
- ② Connect the red clamp with positive terminal.
- ③ Connect the black clamp with negative terminal.



※ Please make sure clamps and battery are well-connected.

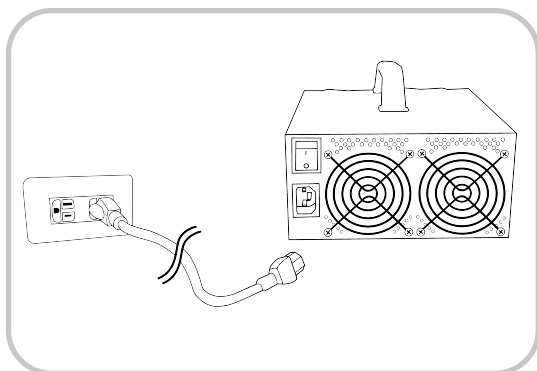


# Button Indicator

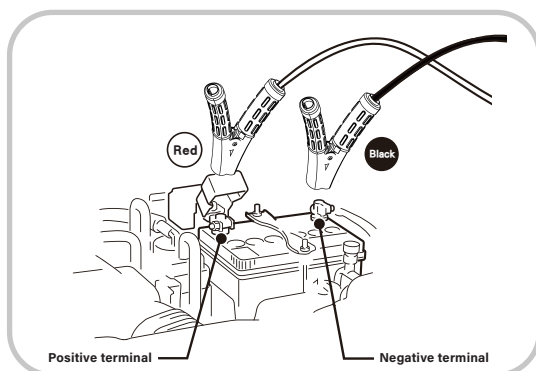


# Easy Operation

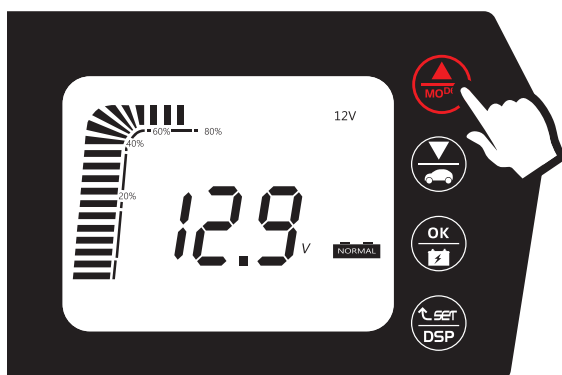
- ① Connect with AC power.




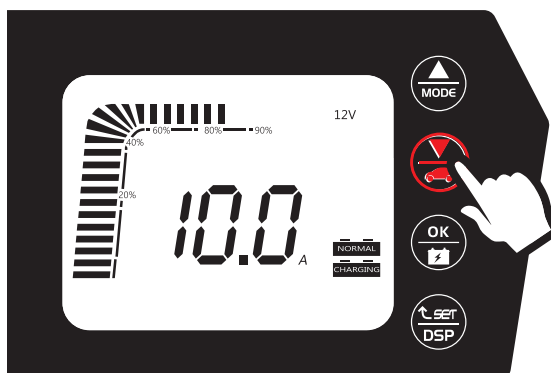
- ② Connect clamps with car battery positive and negative terminals.





- ③ Press button  to the Normal Mode .



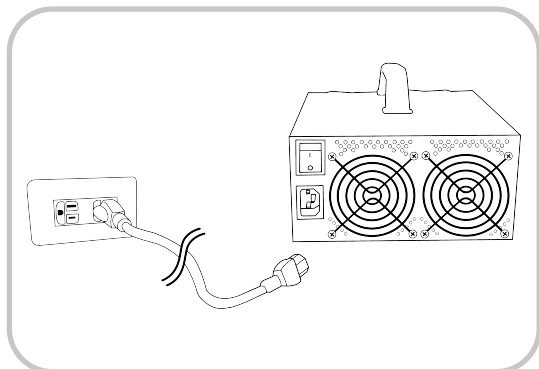
- ④ Press button  to select your charging current 15A/20A/30A/45A (12V), 10A/15A/20A/30A (24V). If there is no action for 3 seconds, it will back to last display.



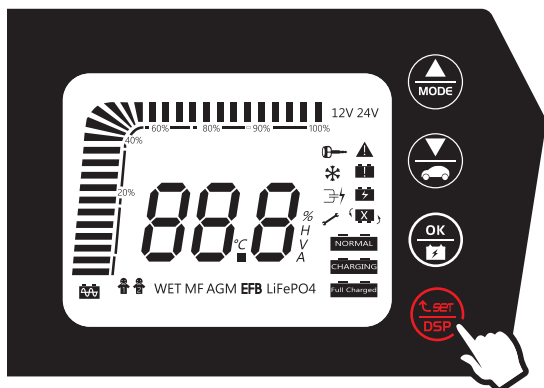
- ⑤ The icon  lights when charging begins and charging progress will display on the screen.
- ⑥ When charging is completed, the icon  will light on.

# 1 2 / 2 4 V Auto-detecting and Switch

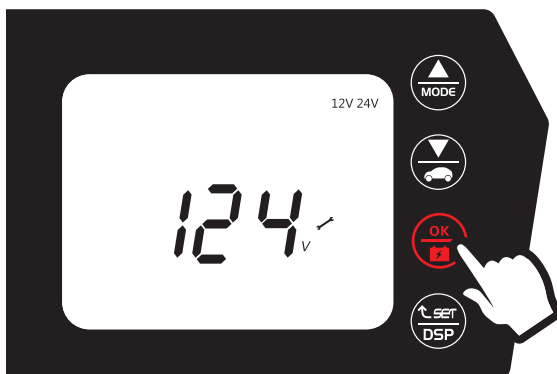
- ① Connect with AC power and connect clamps with car positive and negative terminal. The charger will detect 12 or 24V automatically.



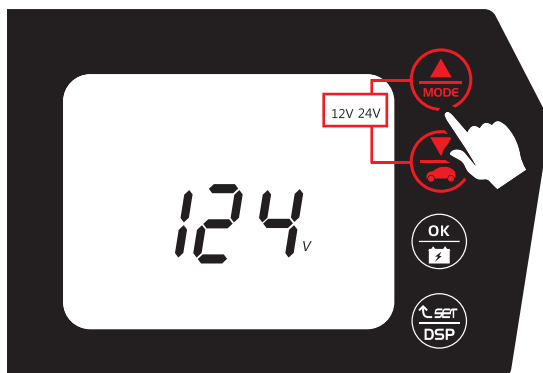
- ② If you would like to change the settings, please long press button  for 3-5 seconds until hearing "Bi" sound.




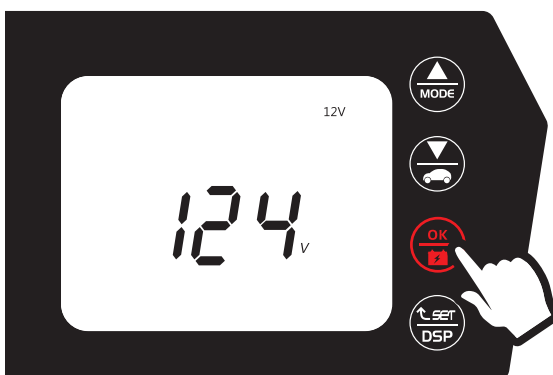
- ③ Press button  to get into settings.



- ④ Press button   to select battery voltage, 12V or 24V.





- ⑤ Press button  to confirm your settings.

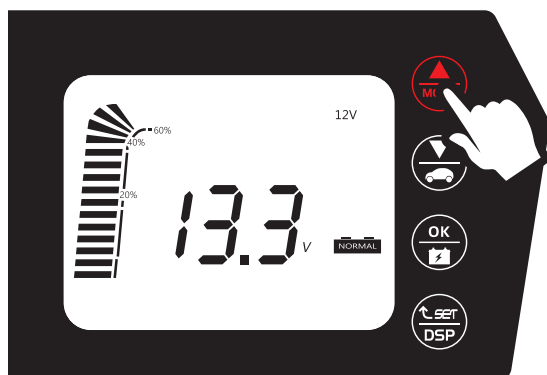





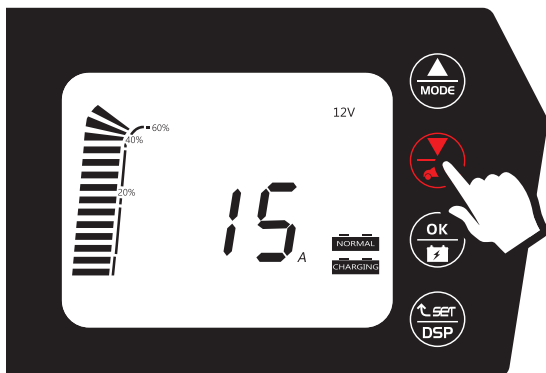
# Charging Function - Normal Mode

## Normal Mode Charging


- ① Press button  to the Normal Mode , then charging will begin automatically.



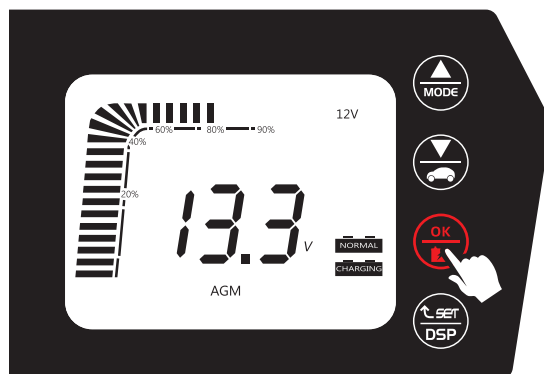
- ② Press button  to select your charging current 15A/20A/30A/45A (12V), 10A/15A/20A/30A (24V). If there is no action for 3 seconds, it will back to last display.



※ This charger will save your last charging procedure automatically.

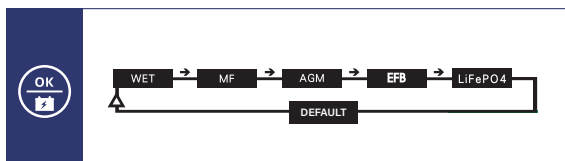
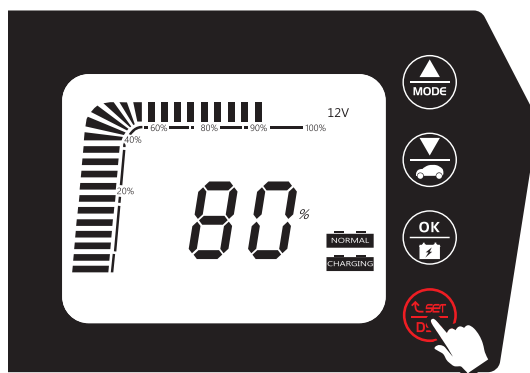
- ③ Press button  to select your battery types, WET, MF, AGM, EFB or LiFePO4 to go into charging.

※ If unsure on what types of battery you have, please leave it without choosing.



- ④ Press button  to check the following information.



V : Voltage                      A : Current  
H : Charging Time              % : Charging Progress  
AH : Accumulative Current

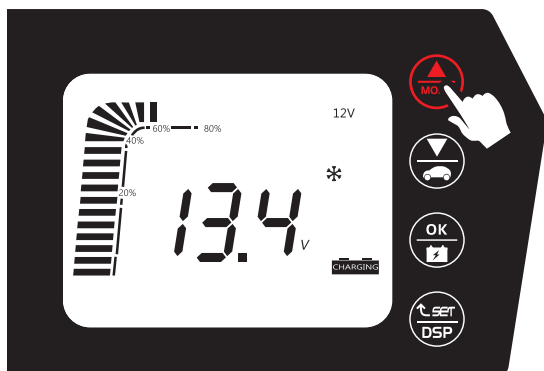



# Charging Function - Snow Mode

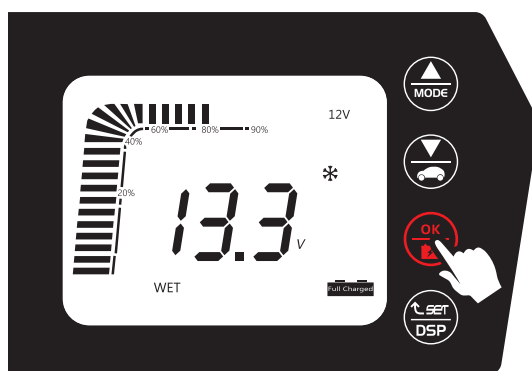
## Snow Mode Charging


※ Snow Mode is recommended to charge in low temperature.

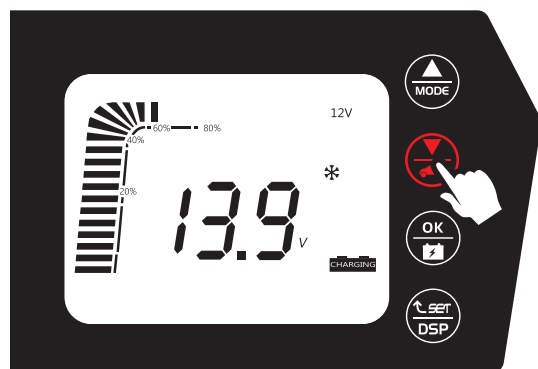
- ① Press button  to the Snow Mode , then charging will begin automatically.



- ③ Press button  to select your battery types, WET, MF, AGM or EFB to go into charging.

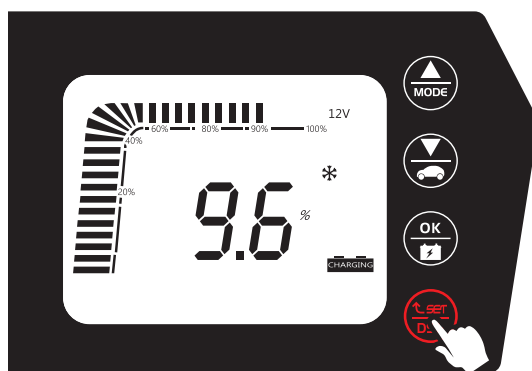


- ② Press button  to select your charging current 15A/20A/30A/45A (12V), 10A/15A/20A/30A (24V). If there is no action for 3 seconds, it will back to last display.

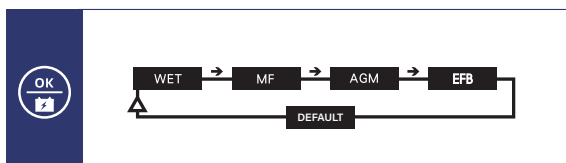


- ④ Press button  to check the following information.

V : Voltage  
H : Charging Time  
AH : Accumulative Current  
A : Current  
% : Charging Progress



※ Snow Mode is only available for lead-acid battery, LiFePO4 battery cannot be selected in this mode.





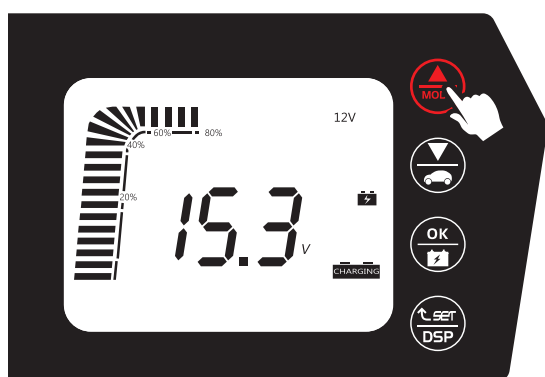
# Charging Function - Boost Mode

## Boost Mode Charging


- ※ Please remove the battery from the car before using Boost Mode charging.
- ※ Boost Mode is only for 12V Lead-acid battery.

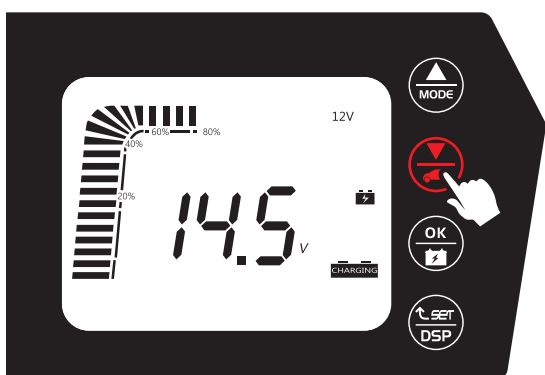
- ① Boost Mode is used when battery can not work in a normal charging condition. Boost charging involves a high voltage for short period of time to charge the battery. It is generally if the battery has been discharged heavily. It enables the quick charging of depleted batteries.


Press the button , to go into Boost Mode .



- ※ Only available for lead-acid battery.
- ※ Cannot assure the battery will back to normal condition.
- ※ Battery types are unselectable.
- ※ The percentage of charging process is unavailable.
- ※ The Boost Mode will do four times boost charging, if the battery is recovered, the charger will back to Normal Mode Charging. Otherwise, the charger will stop charging and the Error icon lights.

- ② Press Button  to select your charging current 12A/16A/24A/36A. If there is no action for 3 seconds, it will back to last display.




- ③ It will do the the boost charging by 16.5V at most for four times. If the battery is still not working after four times, the icon will light on .

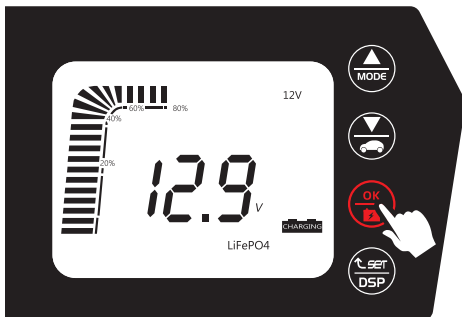



# Charging Function - LiFePO4 Mode

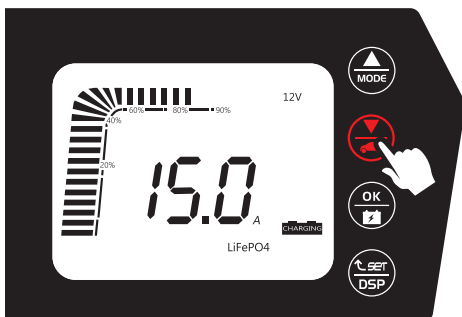
## LiFePO4 Mode


- ※ This is designed for charging LiFePO4 battery.
- ※ If you would like to use 24V LiFePO4 Mode. Please check page 9 to adjust the voltage to 24V.

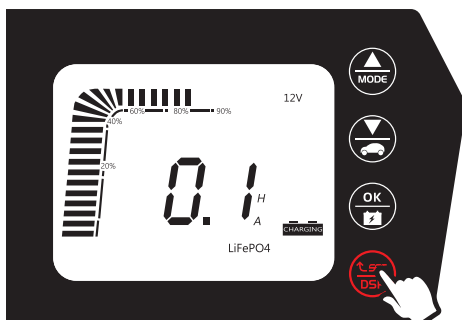
- ① Press button  under Normal Mode **NORMAL** and select LiFePO4 to go into charging.



- ② Press button  to select your charging current 15A/20A/30A/45A (12V) 10A/15A/20A/30A(24V). If there is no action for 3 seconds, it will back to last display.







- ③ Press button  to check the following information.  
 V : Voltage                      A : Current  
 H : Charging Time            % : Charging Progress  
 AH : Accumulative Current

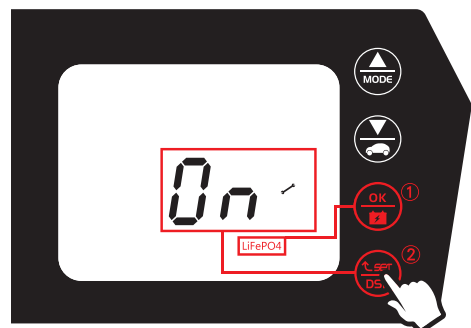



- ※ To get out of LiFePO4 mode, please press .

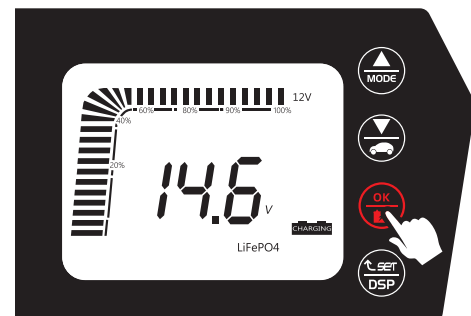
## Forced On Charging


- ※ The BMS of LiFePO4 battery will cut off the output automatically when it is over discharged. To solve this situation, you could use the forced on charging.  
**Must not reverse polarity when using this mode or it might cause damage to battery or charger.**

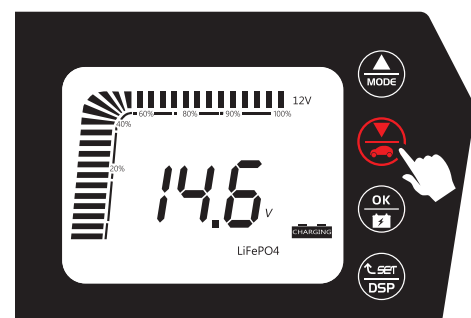
- ① Press button  under Normal Mode **NORMAL** and select LiFePO4.
- ② Long press button  at least 3 seconds, two icons  and  will display on the screen.



- ③ Press button  to go into charging, it will do a forced on charging by 14.6V(12V) 29.2V(24V) for only 60 seconds. After then, it will back to LiFePO4 normal charging.

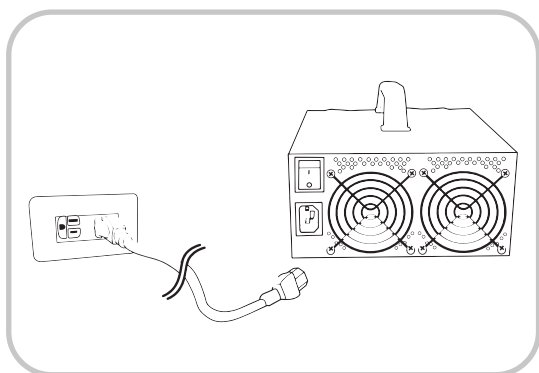


- ④ Press button  to select charging current.

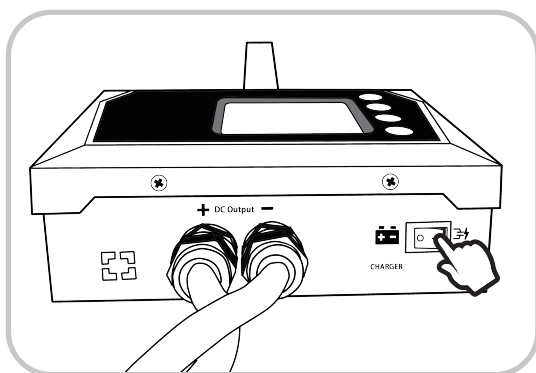


# Power Supply Mode

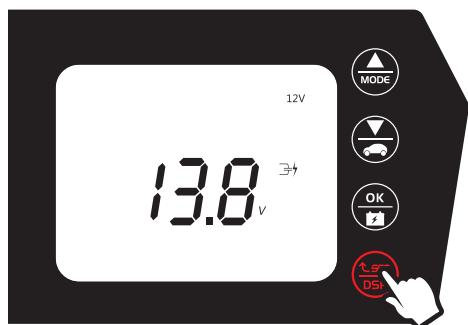
- ① Connect with AC Power.



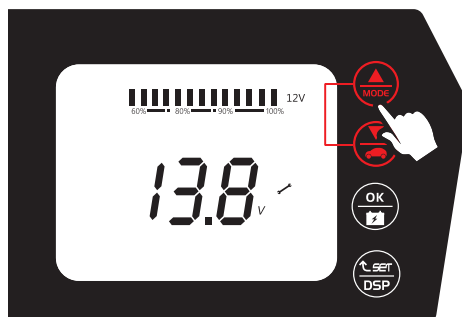
- ② Turn the switch to POWER SUPPLY.




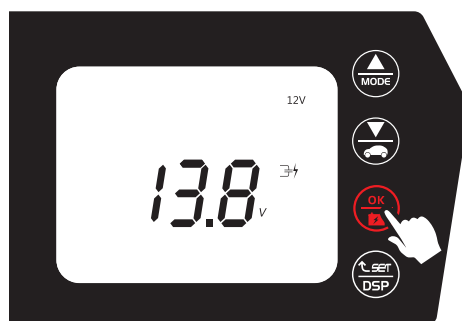
- ③ Long press button  for 3 seconds, you will hear a "Bi" sound.



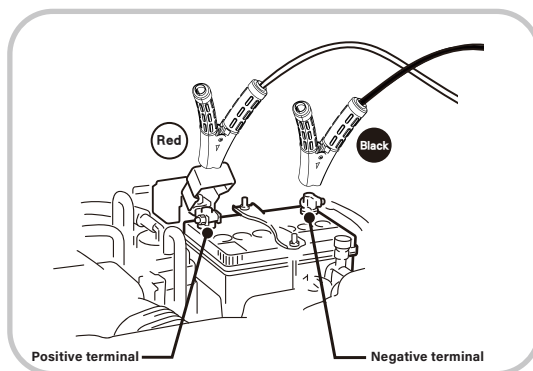
- ④ Press button   to adjust voltage 13.8V~14.8V (12V), 27.6~29.6V (24V).



- ⑤ After adjusting, press button , it will supply power by selecting voltage.

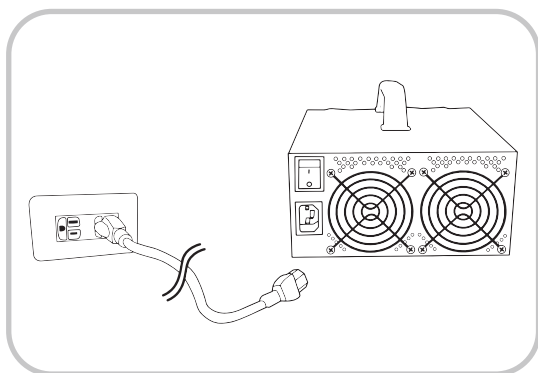




- ⑥ Connect the clamps with car positive and negative terminals. (Please connect correctly)

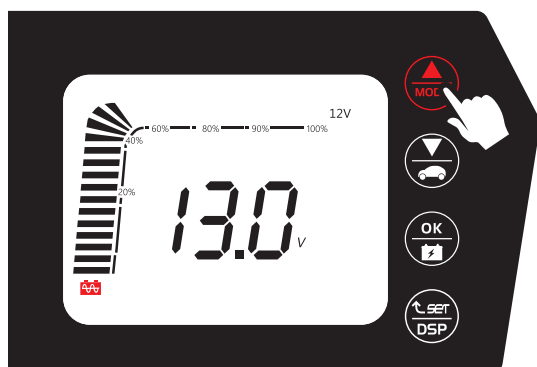


# Testing Function - Battery Test

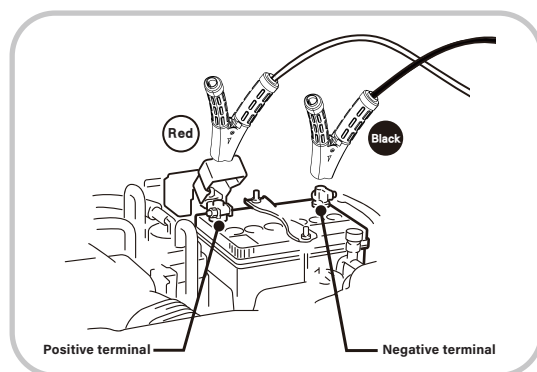
- ① Connect with AC Power.



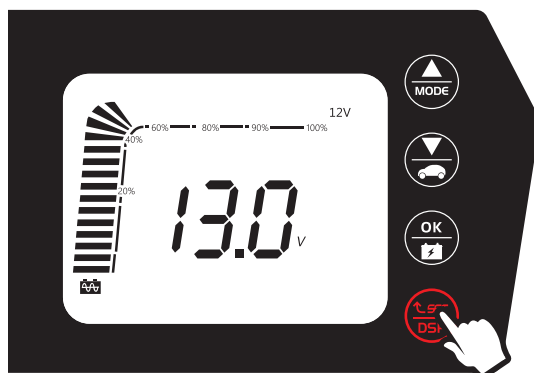
- ② Please check if there is  icon on it. Otherwise, press button  to select.



- ③ Connect the clamps with car positive and negative terminals. (Please connect correctly)

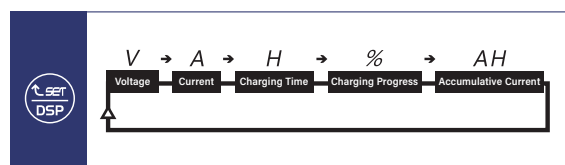
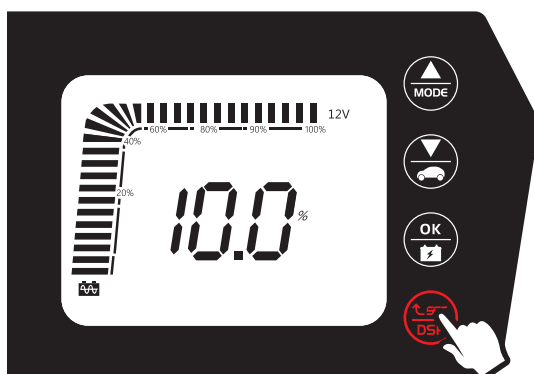


- ④ The battery voltage will display on the screen. (Measuring range is 2V-30V)



- ⑤ Press button  to check the following information.

V : Voltage                      A : Current  
H : Charging Time              % : Charging Progress  
AH : Accumulative Current



# Specification

## Spec. Chart

TK-45			
Output (Charging Mode)	Input Power	AC100V ~ AC240V 50 / 60HZ	
	Normal Voltage	DC 12V	DC 24V
	Charging Voltage	Normal Mode = max.DC14V~15.5V Snow Mode = max.DC14.6V~15.7V Boost Mode = max.DC16.5V LiFePO4 Mode = max. DC14.6V	Normal Mode = max.DC28.8V~30V Snow Mode = max.DC29.2V~30V LiFePO4 Mode = max. DC29.2V
	Charging Current (Current Selection)	15A/20A/30A/45A	10 A/15A/20A/30 A
Output (Supply Mode)	Output voltage	DC 13.8V ~ 14.8V	DC 27.6V ~ 29.6V
	Output current	45A	
	Max.Power	828W	
	Protection	1. Short Circuit Protection      5. Over-voltage Protection 2. Over-temperature Protection    6. Reverse Polarity Protection 3. Spark Protection                7. Disconnecting Protection 4. Over-charge Protection        8. Over-current Protection	
	Efficiency	>85%	
	Compatible Battery	WET / MF / AGM / EFB / LiFePO4	
	Operating Temperature	-20~40°C, Humidity 90%	
	Dimensions ( L * W * H )	330 x 206 x 153 mm	
	Weight	5 kgs	

## Compatible Battery

### ◆ Battery Voltage DC12V/DC24V

### ◆ Battery Types

- Lead-acid battery for vehicles
- EFB battery
- VRLA battery
- AGM battery
- WET battery
- MF battery
- Others

Non starter lead-acid batteries,  
please select **NORMAL** to charge your battery.

- LiFePO4 Battery
- EFB ( ISS ) Battery

### ◆ Battery Charging Battery Capacity

- 12V 50Ah ~ 450Ah
- 24V 30Ah ~ 280Ah

### ■ Warning

- This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved.
- Children shall not play with the appliance
- Cleaning and user maintenance shall not be made by children without supervision
- This appliance can not be used for non-rechargeable batteries
- Disconnect equipment from power supply before cleaning.
- Do not use any liquid or aerosol cleaner. Use only moisture cloth.
- If the supply cord is damaged, it must be replaced by the manufacturer.
- The battery terminal not connected to the chassis has to be connected first. The other connection is to be made to the chassis, remote from the battery and fuel line. The battery charger is then to be connected to the supply mains.
- After charging, disconnect the battery from the supply mains. Then remove the chassis connection and then the battery connection.

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