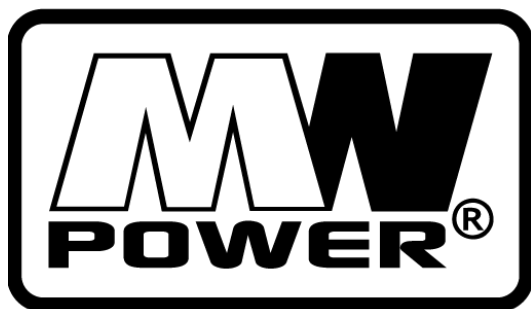




SMART Lead-acid and LiFePO₄ BATTERY
CHARGER

Model No.: **MW-SC4E**

INSTRUCTION MANUAL

Please save these instructions. This manual contains important safety and operating instructions.
Read all instructions and follow them with each use of this product.

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SYMBOLS



Class II



For indoor use only



Before charging, read the instructions



Correct Disposal of this product

This marking indicates that this product should not be disposed with other household wastes throughout the EU. To prevent possible harm to the environment or human health from uncontrolled waste disposal, recycle it responsibly to promote the sustainable reuse of material resources. To return your used product, please use the return and collection systems or contact the retailer where the product was purchased. They can take this product for environmental safe recycling.

TECHNICAL DATA

Model	
Input Voltage	220 - 240VAC 50/60Hz
Input Power	70W MAX
Charging Voltage	6V STD: 7.2VDC 12V STD/AGM/ Lithium (LiFePO4): 14.4/14.7/14.4VDC
Charging Current	4A / 1A (output current is reduced automatically at high temperatures)
Charger Type	Multi-Stage, Fully Automatic
Battery Type	6V & 12V Lead-Acid (Wet, MF, Gel, AGM) 12V Lithium (12V LiFePO4)
Battery Capacity	1.2 - 120Ah (Lead-Acid) 1.2 - 50Ah (Lithium)
Maintenance Capacity	Up to 160Ah (Lead-Acid) Up to 100Ah (Lithium)
Housing Protection	IP65

WARNING

- For indoor use only.
- Do not recharge the non-rechargeable batteries.
- Please check prior use if output voltage and current of the battery charger is suitable for the charging battery.
- Do not use the battery charger in the circumstances that the output polarity does not match the load polarity.
- If the supply cord is damaged, it must be replaced by the manufacturer or its service agent or a similar qualified person in order to avoid a hazard.
- The cover may under no circumstances be opened. If the cover is damaged, then battery charger may no longer be used.
- Disconnect supply mains before connecting or disconnecting the battery.
- This product 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 product in a safe way and understand the hazards involved.
- Children shall not play with the product.
- Cleaning and user maintenance shall not be made by children without supervision.
- Do not use the battery charger as jump start.
- Warning: Explosive gases. Prevent flames and sparks. Provide adequate ventilation during charging.
- Provide adequate ventilation during charging.
- 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 supply mains.
- After using, disconnect the battery charger from supply mains. Then remove the chassis connection and the battery connection in this order.

USING THE CONNECT CABLE ACCESSORIES

USING BATTERY CLAMPS

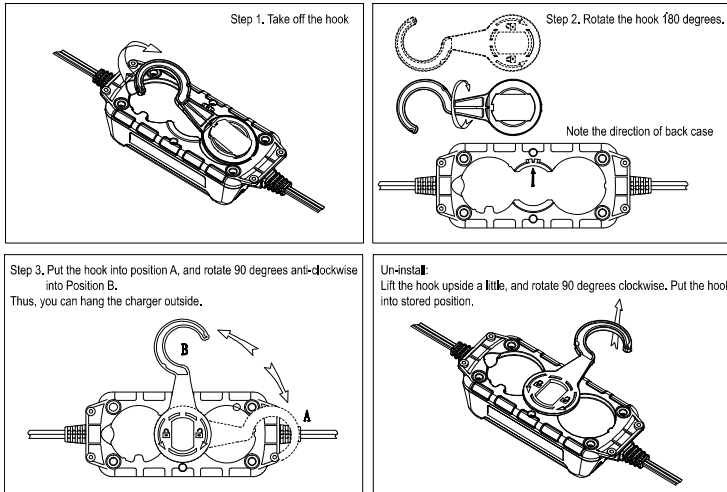
- a. Connect the battery clamps to the battery per the above instructions.
- b. Connect the charger output cable to the cable with battery clamps.
- c. Connect the power cord to supply mains.

USING RING CONNECTORS

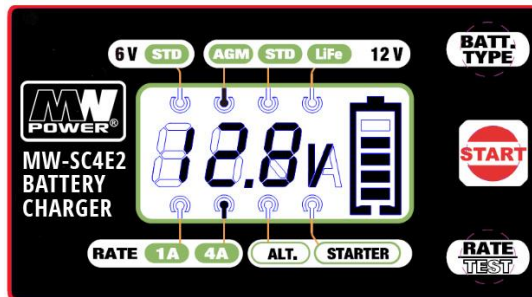
The cable with ring connectors permanently attaches to the battery, providing easy access to quickly connect the charger to your battery.

- a. Loosen and remove each nut from the bolt at the battery terminal.
- b. Connect the red POSITIVE ring connector to the POSITIVE battery terminal.
- c. Connect the black NEGATIVE ring connector to the NEGATIVE battery terminal.
- d. Replace and tighten the nuts to secure.
- e. Connect the charger output cord to the cable with ring connectors.
- f. Connect the power cord to supply mains.

USING THE HOOK ATTACHMENT



CONTROL PANEL



LCD DISPLAY

The LCD display shows the status of the battery and charger, as well as the result of the test.

NOTE: During normal operation, the display's back light will turn off for saving energy after no action for 3 minutes. To turn the back light on, press the any 3 button **ONLY ONCE**.

① The Top 4 Indication Bars will indicate which Battery Type is selected: 6V or 12V battery; STD (Standard), AGM or Lithium (LiFePO4) Batteries. STD is used for Wet Cell, Maintenance-Free, Gel Cell batteries and many AGM batteries. AGM is used for charging at low temperatures and for power AGM batteries. Lithium is used for Lithium-ion batteries which use LiFePO4 technology **ONLY**.

NOTE: Do not use the charger for Lithium-ion batteries which use any other battery technology.

NOTE: If you are unsure of the type of your battery, consult for your battery manufacturer.

② The Bottom Left 2 Indication Bars will indicate the Charge Rate: 1A or 4A. 1A Charge Rate is used for charging the small capacity batteries used in motorcycle, ATV, snowmobile, personal watercraft, garden tractor and golf car. 4A Charge Rate is used for faster charging of small-to-large capacity automotive, marine,

deep cycle and farm tractor batteries.

③ The Bottom Right 2 Indication Bars will indicate which Vehicle Test Type is selected: CHARGING SYSTEM (ALT., Alternator) or STARTING SYSTEM TEST.

NOTE: These 2 test functions are used for the vehicles using 12V Lead-Acid batteries ONLY.

④ The Battery Icon will indicate the charging process.

⑤ The Numbers or Characters will indicate battery voltage, fault code or vehicle test reading.

BATTERY BUTTON

Can activate the selection of the Battery Type.

MODE BUTTON

Can activate the selection of Charge Rate or Vehicle Test Type.

START/STOP BUTTON

Can start and pause the charge process. You can change the charge rate when pause.

OPERATING INSTRUCTIONS

NOTE: Before using the charger, please review all safety and connection directions. Failure to do so can damage battery and cause serious injury or death.

CHARGING

a. Connect the charger to the battery per the above instructions.

b. Connect the charger to supply mains.

c. Press the BATTERY BUTTON to select the Battery Type that you will charge.

d. Press the MODE BUTTON to select the Charge Rate.

e. Press the START/STOP BUTTON to start the charge. If you want to stop the charge or change the setting anytime, press START/STOP BUTTON again.

NOTE: If the charger does not detect a properly connected battery anytime, the LCD display's back light will flash and the Fault Code will appear on LCD display, and charging process will stop.

f. The battery charger can be left connected to the battery at all times to provide maintenance charging.

However, it is good practice to check the battery periodically.

g. When charging is completed, disconnect the charger from supply mains first and then disconnect the batteries with charger.

When the charging begins, the charging voltage and current will show alternatively, and the charging percent will show on the Battery Icon. There are 5 bars totally on the battery icon, and every bar represents 20%. The filled bars show the existing capacity, whilst the flashing bar shows the charging capacity.

TESTING

NOTE: The test functions and standard are used for the vehicles using 12V Lead-Acid batteries ONLY.

NOTE: SUPPLY MAINS IS NOT REQUIRED. IF SUPPLY MAINS IS DETECTED, IT WILL AUTOMATICALLY ENTER INTO CHARGING MODE.

TESTING THE 12V BATTERY

a. Ensure the battery has not been charged for at least an hour before testing, otherwise the voltage is not accurate.

- b. Connect the charger to the battery per the above instructions. If the LCD display does not work, it means the battery is not correctly connected or needs to be recharged immediately.
- c. Check the battery's voltage reading on LCD display, and find the test result on the following chart.

VOLTAGE READING	TEST RESULT
Below 12.4V	The battery need to be recharged immediately.
12.4V - 12.6V	The battery need to be recharged as soon as possible.
Above 12.6V	The battery is at a good state of charge.

TESTING THE CHARGING SYSTEM OF 12V VEHICLES

- a. Make sure the battery is fully charged.
- b. Connect the charger to the battery per the above instructions. If the LCD display does not work means the battery is not correctly connected or need to be recharged immediately.
- c. Press the MODE BUTTON to select CHARGING SYSTEM TEST(ALT.).
- d. Start the engine, and hold it at 2000 RPM for 15 seconds.
- e. Press the START/STOP BUTTON and check the test result on LCD display, and refer to the following chart for the test result. The test result and highest average charging voltage reading show alternatively.

TEST READING	TEST RESULT
ok	The highest average charging voltage is between 13.3V and 15.5V. The charging system is OK.
bAd	The highest average charging voltage is less than 13.3V or greater than 15.5V, which indicates a charging system problem. Check the connections, wiring, alternator and regulator.

TESTING THE STARTING SYSTEM OF 12V VEHICLES

- a. Make sure the battery is fully charged.
- b. Connect the charger to the battery per the above instructions. If the LCD display does not work, it means the battery is not correctly connected or needs to be recharged immediately.
- c. Press the MODE BUTTON to select STARTING SYSTEM TEST.
- d. Crank the engine over as soon as possible. Continue cranking for a few seconds, or until the engine starts.
- e. Check the test result on LCD display, and refer to the following chart for the test result. The test reading and cranking voltage show alternatively.

TEST READING	TEST RESULT
ok	The cranking voltage is greater than 9.6V. The starting system is OK.
bAd	The cranking voltage is less than 9.6V which indicates a starting system problem. Check the battery, connections, wiring and starter.

FEATURES

MULTI-STAGE AUTOMATIC CHARGE

The charger uses a proprietary multi-stage charging process designed to optimally charge and maintain batteries.

Stage 1: Initialization

Checks the battery's condition to determine the charge process. If the battery is deeply discharged, it will enter into the Recovery Mode to refresh the battery. This stage is used for Lead-Acid batteries ONLY.

Stage 2: Gentle Charge

Starts the charging process with 1/2 value of current you select if the battery is below 6V for 6V modes or 12V for 12V modes, which can warm up the batteries and avoid the battery suddenly bulk charged. For 1A mode, the gentle charge rate is 1A.

Stage 3 - 6: Constant Current (CC) Charge

Returns 85% of the battery capacity by charging at 4 different output rates, which can charge the battery more full. For 1A mode, the CC charge's output rate will keep 1A ONLY.

Stage 7: Constant Voltage (CV) Charge

Brings the charge level to 95% by gradually decreasing the current, which limits battery gassing and prolong battery life.

Stage 8: Float Charge

Finalizes the charging process and brings the battery to maximum capacity. This stage is used for Lead-Acid batteries ONLY.

Stage 9: Analysis

It will cut off the output and analyze whether the battery can hold the capacity. It may enter into the Desulfation Mode to deeply recover the battery.

Stage 10: Maintenance

Monitors battery condition. If battery voltage falls below its threshold, the charger restarts the charge, which effectively & efficiently ensures the battery at full charge and without the risk of overcharge.

Recovery Mode

Achieves the recovery process of deeply discharged or sulfated batteries by pulsing small current. If the battery voltage is below 5.3V for 6V modes or 10.5V for 12V modes, the charger changes over to Recovery Mode and it will continue 30 minutes at most, and enters into normal charge.

NOTE: The battery is recognized to be defective if the voltage is still below 4.5V for 6V mode or 9V for 12V mode after 1-hour charge. Have the battery checked by a speciality repair shop.

NOTE: This mode is used for Lead-Acid batteries ONLY.

Desulfation Mode

Recover battery capacity from a sulfated battery by applying a specialized high voltage to soften down sulfate from the battery plates. If the battery voltage falls below 6V for 6V modes or 12V for 12V modes in 3 minutes after fully charged, the charger changes over to Desulfation Mode and it will continue up to 2 hours.

NOTE: The battery is recognized to be defective if the voltage still falls below 6V for 6V modes or 12V for 12V modes in 3 minutes after the Desulfation Mode. Have the battery checked by a speciality repair shop.

OVER-VOLTAGE PROTECTION

When the charger is set to charge in a voltage lower than the detected voltage of the battery, this protection will be engaged. Refer to Fault Code of 'F01' in the section of TROUBLESHOOTING FAULT CODES.

REVERSE POLARITY PROTECTION

This protection is triggered if the charger detects less than 0.5V across the clamps, and no power will be sent to output cables. Refer to Fault Code of 'F02' in the section of TROUBLESHOOTING FAULT CODES.

SHORT CIRCUIT PROTECTION

This protection is triggered if the charger detects less than 0.5V across the clamps, and no power will be sent to output cables. Refer to Fault Code of 'F02' in the section of TROUBLESHOOTING FAULT CODES.

BATTERY RECONDITIONING FUNCTION

If a battery is discharged deeply, it could become sulfated and unable to accept a charge. Reconditioning Function may help reverse the effects of sulfation and restore a batteries ability to accept a charge. If the charger detects a sulfated battery, it will automatically activate Recovery Mode and Desulfation Mode. If successful, normal recharging will resume after the battery is desulfated. If unsuccessful at desulfating the battery, refer to Fault Code of 'F03' in the section of TROUBLESHOOTING FAULT CODES.

BATTERY DIAGNOSTICS FUNCTION

The charger continuously monitors battery condition and may report certain charging failures as fault codes. Refer to Fault Code of 'F01-F05' in the section of TROUBLESHOOTING FAULT CODES. Conditions that cause the faults include: if the maximum charge time has been exceeded, etc.

OVERHEAT PROTECTION

The charger is designed to decrease the charging current and even shut itself off if overheating is detected. Once the charger cools down, it will resume charging automatically. Refer to Fault Code of 'F05' in the section of TROUBLESHOOTING FAULT CODES.

CHARGE-SETTING MEMORY FUNCTION

The microprocessor inside the charger has charge-setting memory function, which means the charger can directly enter into the charge-mode the users set last time. This function can erase the users' worry about forgetting the setting for their own batteries and shorten the setting time for the users' convenience. It also can restart the charge after restoration of power supply.

TROUBLESHOOTING

If the LCD display' back light flashes and the FAULT CODE occurs during using the charger, please refer to the following and fix the solution according to the fault code. REMEMBER DISCONNECT FROM SUPPLY MAINS FIRST AND THEN OPERATE.

CODE	CONDITION	POSSIBLE CAUSE	SOLUTION
F01	The battery voltage is above 8V for 6V mode or above 16V for 12V mode.	The battery voltage is not matched with the selected mode.	Confirm that battery voltage is matched with the selected mode.
F02	The battery voltage is less than 0.5V before charging. The battery cannot be detected corrected.	The battery is defective.	Replace the battery.
		The battery is connected reversed.	Check the connection of the battery and reverse it.
		The battery clamps are disconnected with the battery.	Connect the battery firmly and correctly.
		The battery clamps are connected each other.	Connect the battery firmly and correctly.
F03	The battery voltage is less than 4.5V for 6V mode or 9V for 12V mode after 1-hour charge.	The battery voltage is not matched with the selected mode.	Confirm that battery voltage is matched with the selected mode.
		The battery is defective.	Replace the battery.
	The battery cannot be recovered successfully.	The battery is sulfated beyond reconditioning.	Replace the battery.
F04	The charge time is beyond 50 hours	The battery is defective.	Replace the battery.
		A load may be connected to the battery.	Disconnect the load and attempt to charge again.
		The charge current is too low.	Select a higher charge rate.
F05	The temperature of the charger is too high.	High ambient temperature.	Ensure adequate ventilation. The charger will resume charging after cooling.

MAINTENANCE AND SERVICING

- The product may be stored not in damp environment or in places with corrosive gases, but at a dry place outside of the range of children.
- Cleaning the surface of the product and wipes it off only with a dry cloth.
- The product may not be dismantled. If the product is damaged, contact the supplier or manufacturer.
- Maintenance and servicing are not required under normal conditions.