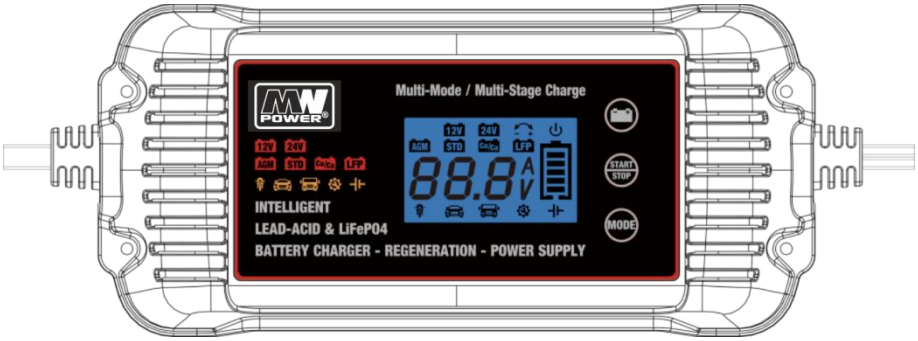


SMART Lead-acid and LiFePO4 BATTERY CHARGER

Model No.: **MW-SC10E**

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.

Contents

1. 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.

2. Technical data

Model	**MW-SC10E**
Input Voltage	220 - 240VAC 50/60Hz
Input Power	175W MAX
Charging Voltage	14.4-16VDC (12V), 28.8-32VDC (24V)
Min Battery Voltage	1.5VDC
Charging Current	10A (12V) / 5A (12V & 24V) / 2A (12V & 24V) (Output current is reduced automatically at high temperatures)
Charger Type	Multi-Stage, Fully Automatic
Battery Type	12V & 24V Lead-Acid Battery (Wet, MF, Gel, AGM, Calcium), 12V & 24V Lithium Battery (LiFePO4, LFP)
Battery Capacity	4 - 300Ah (12V Lead-Acid Battery), 2 - 100Ah (12V Lithium Battery) 4 - 150Ah (24V Lead-Acid Battery), 2 - 50Ah (24V Lithium Battery)
Maintenance Capacity	Up to 400Ah (12V Lead-Acid Battery), 150Ah (12V Lithium Battery) Up to 200Ah (24V Lead-Acid Battery), 75Ah (24V Lithium Battery)
Recondition Voltage	16VDC (12V), 32VDC (24V)
Power Supply Voltage	13.6VDC (12V) 8A Max, 27.2VDC (24V) 4A Max
Housing Protection	IP20, Fan Cooling

3. 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.

4. Using the connect cable accessories

4.1. Using battery clamps

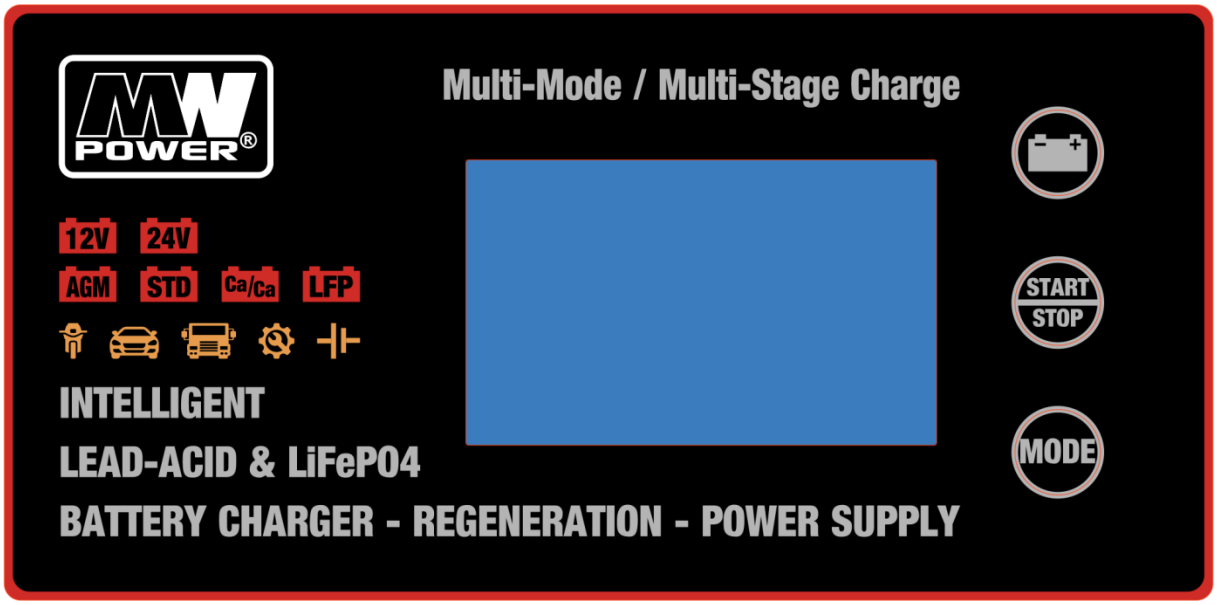
- Connect the positive pole clamp (red) of the charger to the positive pole of the battery, and connect the negative pole clamp (black) to the negative pole of the battery or to the car body. However well away from fuel pipes.
- Connect the charger output cable to the cable with battery clamps.
- Connect the power cord to supply mains.

4.2. Using ring connectors

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

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

5. Control Panel



LCD DISPLAY

The LCD display shows the status of the battery and charger.

Symbol	Explanation
⏻	Charger is in Standby mode.
-+	Reverse polarity. Check the connection of the battery and reverse it.
88.8V	Battery voltage display.
	Battery charge status display
AGM	Used for charging at low temperatures and for power AGM batteries.
STD	Used for Wet Cell, Maintenance-Free, Gel Cell batteries and many AGM batteries.
Ca/Ca	Used for Calcium, Ca/Ca batteries.
LFP	Used for Lithium batteries (Lithium Iron Phosphate, LiFePO4, LFP batteries).
	Recover Lead-acid battery capacity.
⊣⊢	Power the DC devices.

The table explains the different charging programs:

Battery Voltage	Battery Type				Charge Current			Recondition	Supply
	AGM	STD	Ca/Ca	LFP					
12V	14.7V	14.4V	16V	14.5V	2A	5A	10A	16V, 2A Max	13.6V, 8A Max
24V	29.4V	28.8V	32V	29V	N/A	2A	5A	32V, 2A Max	27.2V, 4A Max

BATTERY BUTTON

Can activate the selection of the Battery Voltage and Battery Type.

MODE BUTTON

Can activate the selection of Charge Rate, Recondition and Power Supply.

START/STOP BUTTON

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

6. Operation 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.

NOTE: NEVER CONNECT THE BATTERY CHARGER TO 32VDC AND ABOVE BATTERIES.

CHARGING

a. Connect the positive pole clamp (red) of the charger to the positive pole of the battery, and connect the negative pole clamp (black) to the negative pole of the battery or to the car body. However well away from fuel pipes.

b. Connect the charger to supply mains.

c. Press the BATTERY BUTTON to select the Battery Voltage and 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.

NOTE: When the Lead-acid battery voltage is lower than 1.5V, the battery is recognized to be sulfated and the charge cannot be started. Use the RECONDITION MODE to recover the Lead-caid battery.

When the charging begins, the charging voltage and current will show, 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.

RECONDITION MODE FOR LEAD-ACID BATTERY ONLY

Recondition mode is an advanced battery recovery mode for repairing sulfated Lead-acid batteries.

Recondition mode will fully charge the battery, and then recover battery capacity by applying a specialized high voltage to soften down sulfate from the battery plates for 2 hours.

NOTE: The battery is recognized to be defective if the voltage still falls below 12V for 12V modes or 24V for 24V modes in 3 minutes after the Recondition Mode. Have the battery checked by a speciality repair shop.

This mode can charge the battery with a voltage lower than 1.5V for 1 minutes max. When the battery voltage is charged more than 1.5V, it will enter into the recondition mode.

POWER SUPPLY MODE

NOTE: USE THIS MODE WITH CARE. Both the spark proof and reverse polarity safety features are disabled. Pay close attention to the polarity. Do not allow the positive and negative battery clamp to touch or connect to each other as the battery charger could generate sparks. Check the polarity of the battery terminals before using this mode, and reverse connection will cause the battery charger severely damaged.

Power supply mode is used to power the DC devices, tire inflators, seat heaters and more, and it can also be used to retain a vehicle's on-board computer settings during battery repair or replacement.

Power supply mode can provide 13.6V at 8A below and 27.2V at 4A below, and its output voltage will drop if the load exceeds the current limit.

Power supply mode will provide a maintenance charging of an already fully charged battery (Float maintenance). It is not recommended to charge a completely discharged battery in POWER SUPPLY mode, since this will not result in a completely charged battery.

TESTING

NOTE: Supply mains is not required. If the battery voltage is 9V below, the voltage on the LCD is NOT correct or nothing on the LCD.

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
12V Battery	24V Battery	
Below 12.4V	Below 24.8V	The battery need to be recharged immediately.
12.4V - 12.6V	24.8V - 25.2V	The battery need to be recharged as soon as possible.
Above 12.6V	Above 25.2V	The battery is at a good state of charge.

7. Features

MULTI-STAGE AUTOMATIC CHARGE FOR LEAD-ACID BATTERY

The charger uses a proprietary multi-stage charging process designed to optimally charge and maintain Lead-acid 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 Pulse Charge Mode to refresh the battery.

Stage 2: Gentle Charge

Starts the charging process with 1/2 value of current you select if the battery is below 12V for 12V modes or 24V for 24V, which can warm up the batteries and avoid the battery suddenly bulk charged. For 2A mode, the gentle charge rate is 2A.

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 2A mode, the CC charge's output rate will keep 2A 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 at float charge voltage.

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.

PULSE CHARGE MODE FOR LEAD-ACID BATTERY

Achieves the recovery process of deeply discharged or sulfated batteries by pulsing small current. If the battery voltage is below 10.5V for 12V modes or 21V for 24V modes, the charger changes over to pulse charge 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 9V for 12V mode or 18V for 24V mode after pulse charge and 30-minute gentle charge. Have the battery checked by a speciality repair shop.

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 12V for 12V modes or 24V for 24V 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 12V for 12V modes or 24V for 24V modes in 3 minutes after the Desulfation Mode. Have the battery checked by a speciality repair shop.

MULTI-STAGE AUTOMATIC CHARGE FOR LITHIUM (LiFePO4, LFP) BATTERIES

The charger uses a proprietary multi-stage charging process designed to optimally charge and maintain Lithium (LiFePO4, LFP) batteries.

This charger should only be used with Lithium (LiFePO4, LFP) batteries that have a built-in battery management system (BMS). Lithium batteries are made and constructed in different ways and some may or may not contain a battery management system (BMS). Consult the Lithium battery manufacturer before charging.

Stage 1: Initialization

Checks the battery's condition. This stage charges the battery with the nominal current for a maximum of 30 seconds until 11V for 12V modes or 22V for 24V modes is reached. This stage prevents that charging proceeds with a defective battery.

Stage 2: Constant Current (CC) Charge

Returns 90% of the battery capacity by charging up to 13.8V for 12V modes or 27.6V for 24V modes with the nominal current.

Stage 3: Constant Voltage (CV) Charge

Brings the charge level to 95% at constant voltage 13.8V for 12V modes or 27.6V for 24V by gradually decreasing the current. Stage 2 and 3 takes a maximum of 40 hours.

Stage 4: Analysis

It will cut off the output and analyze whether the battery can hold the capacity. The battery is recognized to be defective if the voltage falls below 12V for 12V modes or 24V for 24V modes in 3 minutes. Have the battery checked by a speciality repair shop.

Stage 5: Supplement

Continues to charge the battery up to 14.5V for 12V modes or 29V for 24V with a maximum of 2A charging current.

Stage 6: Optimization

Brings the charge level to 100% at constant voltage 14.5V for 12V modes or 29V for 24V by gradually decreasing the current. Stage 5 and 6 takes a maximum of 2 hours.

Stage 7: Float Charge

Finalizes the charging process and brings the battery to maximum capacity at float charge voltage of 13.6V. This stage takes a maximum of 10 days. If the voltage falls, the charger restarts the charge.

Stage 8: Maintenance

Maintains the battery at 95 - 100% capacity. The charger monitors the battery voltage and keep the battery voltage at 13.4V-13.8V for 12V modes or 26.8V-27.6V for 24V

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 the reverse connection of battery on the clamps, and no power will be sent to output cables. The symbol − + will show on LCD display.

SHORT CIRCUIT PROTECTION

This protection is triggered if the charger detects short circuit on 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 DIAGNOTICS 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 owner batteries and shorten the setting time for the users' convenience. It also can restart the charge after restoration of supply mains.

8. 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 16V for 12V mode or 32V for 24V 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 too low before charging.	The battery is defective.	Replace the battery.
	The battery cannot be detected correctly.	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 Lead-acid battery voltage is below 9V for 12V mode or 18V for 24V mode after 1-hour charge. The Lithium battery voltage is below 11V for 12V mode or 22V for 24V mode after 30-second 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 Lithium battery	The battery is defective.	Replace the battery.

CODE	CONDITION	POSSIBLE CAUSE	SOLUTION
	voltage still falls below 12V for 12V modes or 24V for 24V modes in 3 minutes after Constant Voltage charged.		
	The battery cannot be recovered successfully.	The battery is sulfated beyond reconditioning.	Replace the battery.
F04	The charge time is beyond the limits.	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.

9. 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.