

POWERTECH

MB3910

10 Step Intelligent Lead Acid and Lithium Battery Charger











Instruction Manual

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INTRODUCTION:

The following pictograms are used in these operating instructions / on the device:			
	Read instruction manual!	W	Watts (Effective power)
	Observe caution and safety notes!	V ~	Volt (AC)
	Caution - electric shock! Danger to life!		Safety class II
	Risk of explosion!		Keep children away from electrical devices!
	Risk of fire!		Check that the device, mains lead and plug are in good condition!

Please read these instructions for use carefully and completely, and take note of all instructions and specifications.

SAVE THESE INSTRUCTIONS FOR FUTURE REFERENCE

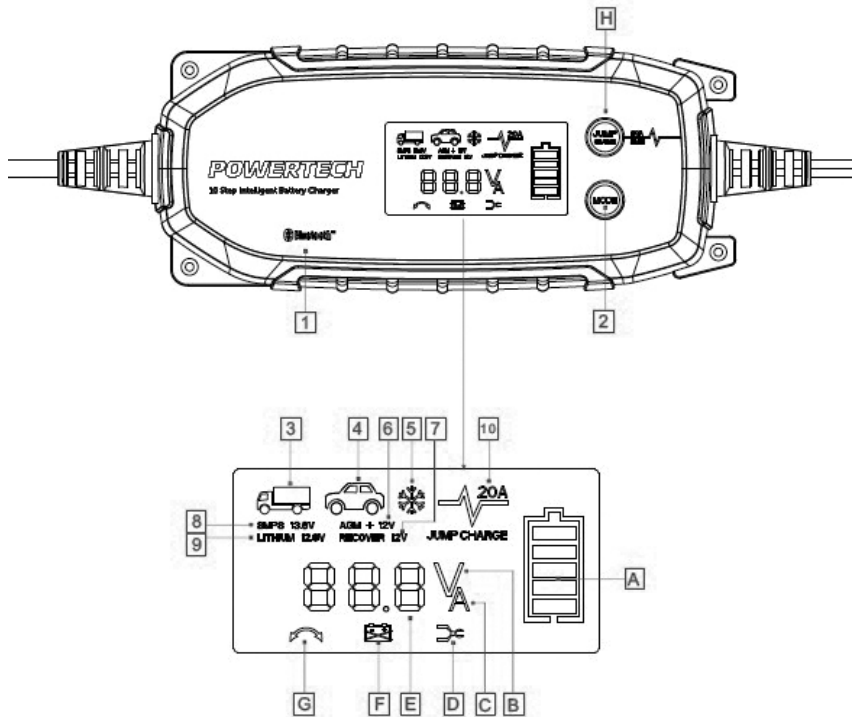
Use for the intended purpose

The MB3910 is a battery charger with a pulse trickle charge mode and is suitable for charging and maintenance charging of the following 12 V or 24 V lead rechargeable batteries with Wet, Gel, AGM and 12.8V 4-cells LiFePO4:

- 12 V: with a capacity of 50 - 400 Ah
- 24 V: with a capacity of 25 - 200 Ah
- Lithium (12.8V 4-cells LiFePO4): with a capacity of 30 - 200 Ah

You can also use it to regenerate completely discharged batteries. The battery charger has protective circuits to prevent sparking and overheating. Any incorrect or improper use leads to loss of the warranty. The manufacturer takes no responsibility for damage(s) arising out of usage that is contrary to the instructions laid down. The appliance is not meant for commercial use.

PART DESCRIPTION:



1	Bluetooth Logo
2	MODE selection button
3	Mode 1 (24V/7.5A)
4	Mode 2 (12V/15A)
5	Mode 3 (12V or 24V cool situation)
6	Mode 4 AGM + 12V (12V/15A)
7	Mode 5 RECOVER 12V (12V/15A)
8	Mode 6 SMPS 13.6V (Switch Mode Power Supply 13.6V/5.0A)
9	Mode 7 LITHIUM 12.8V (12.8V 4-cells LiFePO4/15A)
10	Mode 8 JUMP CHARGE (12V/20A)

A	Charging battery level: 1 bar (20%), 2 bars (40%), 3 bars (60%), 4 bars (80%), 5 bars (90%), Stops flashing fully charged.
B	VOLT: The current voltage of connected battery
C	AMP: The charging current when mode is selected
D	If flashing: "Battery is not connected"
E	Numbers: Shows value of the current and voltage.
F	If flashing: "Battery Fault"
G	If flashing: "Incorrect Polarity"
H	JUMP CHARGE Button (12V/20A)

PRODUCT SPECIFICATIONS:

Input Voltage:	220 - 240 V ~ 50/60 Hz, 2A
Power consumption:	300 W Max
Reverse current*:	< 10 mA (no AC input)
Nominal output voltage:	12 VDC / 24 VDC / 12.8 VDC/ 13.6 VDC
Nominal output current:	15 A / 7.5 A / 15 A / 5.0 A
Charging voltage:	14.5V / 14.7V for 12V battery, 29 V / 29.4V for 24V battery, 14.5V for Lithium (12.8V 4-cells LiFePO4), 13.6V for SMPS.
Charging current:	15 A \pm 10 %, 7.5 A \pm 10 %, 5.0 A \pm 10 %
Battery type:	12V lead-acid battery 50Ah - 400Ah 24V lead-acid battery 25 Ah - 200Ah Lithium (12.8V 4-cells LiFePO4): capacity of 30 - 200Ah
Housing protection type:	IP 65 (dust-proof, water-proof)
Safety class:	II

*Reverse current is the current used by the charging station battery, when no mains current is connected.

BOX CONTENTS:

Check the appliance and all accessories for damage immediately after unpacking. Do not put a defective appliance or parts into operation.

- MB3910 Charger
- Clamps Cable
- Eyelet M10 Cable
- Instruction Manual

SAFETY INFORMATION:



DANGER!

Avoid danger to life and limbs caused by improper use!



CAUTION! Do not operate the appliance with a damaged cable, power cord or plug.

Avoid danger to life and limbs caused by improper use!



PROTECT YOURSELF FROM AN ELECTRIC SHOCK!

When connecting the charging station, use a screwdriver and a spanner with an insulated handle!

DANGER FROM ELECTRIC SHOCK!

- Do not operate the vehicle if you are charging a battery while it is still in the vehicle! Switch off the ignition and park the vehicle. Apply the parking brake (e.g. in cars) or secure with a mooring rope (e.g. electric boat)!
- Disconnect the battery charger from the mains before you make or break the connections to the battery.
 1. First connect the positive/+ clamp to the positive/+ terminal of the battery, then connect the other clamp to the vehicle chassis at a point away from the battery and the fuel line. After this is done, you can connect the battery charger to the mains.
 2. After charging, disconnect the battery charger from the mains. Then disconnect the negative/black clamp before you disconnect the positive/+ clamp from the battery.
- Handle the connecting cables (- and +) by their insulated areas only!
- Ensure that there is complete protection from moisture at the connections to the battery and at the mains outlet socket!
- Carry out the mounting, maintenance and cleaning of the battery charger only when it is disconnected from mains!

SAFETY INFORMATION:



Do not leave small children unattended with the battery charger!

- Children are too young to assess the possible dangers associated with electrical devices. Children should be supervised in order to ensure that they do not play with the device.
- Children or persons who lack the knowledge or experience to use the device or whose physical, sensory or intellectual capacities are limited must never be allowed to use the device without supervision or instruction by a person responsible for their safety.



EXPLOSION HAZARD! Protect yourself from a highly explosive oxyhydrogen gas reaction!

Gaseous hydrogen can leak from the battery during the charging and discharging process. Oxyhydrogen gas is an explosive mixture of gaseous hydrogen and oxygen. The result is the so-called oxyhydrogen reaction upon contact with open fire (flames, embers or sparks)! Carry out the charging or discharging procedure in a well ventilated room protected from the weather. Make sure that there are no sources of open fire (flames, embers or sparks) in the vicinity when charging or discharging batteries!



RISK OF EXPLOSION OR FIRE!

Ensure that the use of the battery charger cannot ignite any explosive or combustible substances, e.g. petrol or solvents!



EXPLOSIVE GASES! AVOID FLAMES AND SPARKS!

Ensure that there is adequate ventilation during the charging process.

- Stand the battery on a well ventilated surface while charging. Otherwise the device could be damaged.
- **DANGER OF EXPLOSION!** Ensure that the positive terminal connection cable does not come into contact with a fuel line (e.g. petrol line)!

SAFETY INFORMATION:



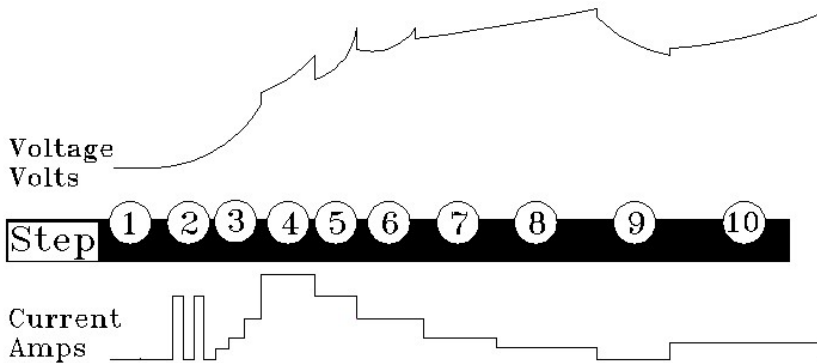
DANGER OF CHEMICAL BURNS! Protect your eyes and skin against chemical burns caused by acid (sulphuric acid) upon contact with the battery!

Wear: Acid-resistant glasses, clothing and gloves! If your eyes or skin come into contact with sulphuric acid, rinse the affected part of the body with plenty of clear running water and seek immediate medical assistance!

- Avoid causing an electrical short-circuit when connecting the battery charger to the battery. Connect the minus pole connecting cable only to the minus pole of the battery or to the car body. Connect the plus pole connecting cable only to the plus pole of the battery!
- Before connecting to the mains, make sure that the mains current is equipped with standard 230 V ~ 50 Hz, PEN conductor, a 16 A fuse and a residual-current circuit-breaker! Otherwise the device could be damaged.
- Do not place the battery charger near fire, heat, or subject it to prolonged temperatures of over 50 °C! The output from the battery charger drops automatically in high temperatures.
- Avoid damaging any lines carrying fuel, electricity, brake fluid, hydraulic oil or water. Be particularly careful not to cause damage when mounting the charger in place with screws! Failure to observe this advice risks loss of life or injury!
- Use only the supplied original manufacturer's parts with the battery charger!
- Do not allow any objects to cover the battery charger! Otherwise the device could be damaged.
- Protect the electrical contacts of the battery against short-circuiting!
- Use the battery charger only for charging and maintenance charging of undamaged 6 V / 12 V lead batteries (wet cell or gel electrolyte)! Otherwise damage to property could occur.
- Do not use the battery charger for charging or maintenance charging of disposable batteries. Otherwise damage to property could occur.
- Do not use the battery charger for charging or maintenance charging of damaged or frozen batteries! Otherwise damage to property could occur.
- Before connecting the charging station, read the information on battery maintenance in the operating instructions of the battery! Otherwise personal injury and / or damage to the device could occur.
- Before connecting the charging station to a battery permanently installed in a vehicle, read the information on electrical safety and maintenance in the operating instructions of the vehicle! Otherwise personal injury and / or damage to the device could occur.
- Unplug the charger from the mains supply when not being used! This also benefits the environment. Consider how much electricity is consumed, even in standby mode.
- Remain alert at all times and always watch what you are doing. Always proceed with caution and do not use the battery charger if you cannot concentrate or feel unwell.
- **Do not charge non-rechargeable batteries**
- **Max. operation temperature: 40°C**

PRODUCT FEATURES:

This appliance has been designed for charging a variety of SLA batteries (sealed lead acid batteries), as mainly used in cars, motorbikes and several other vehicles. They may be of types e.g. WET (with liquid electrolyte), GEL (with mit gel-type electrolyte) or AGM (absorbed glass mat) batteries. A special design of the appliance (also named „ten-phase-charging strategy“) enables the recharging of the battery to almost 100 % of its original capacity. Connecting the battery for a long period to the battery charger is also a good way of ensuring that your battery is kept in optimum condition. The “ten-phase-charging strategy” as follows:



Step 1: Check

Checks the battery voltage to make sure battery connections are good and the battery is in a stable condition before beginning the charge process.

Step 2: Recovery

Initializes the Recovery process, if needed, for deeply discharged or sulfated (desulfation) batteries by pulsing small amounts of current.

Step 3: Soft Start

Slow charge and protect for deeply discharged or sulfated (desulfation) batteries by multi -phase of current.

Step 4-7: Bulk

The Bulk charging process continues using both a High Rate and Medium Rate charge and returns 80% of battery capacity, Indicated by the 20%, 40%, 60%, 80% and 100% LCD.

Step 8: Absorption

Brings the charge level to 80%, The battery charger will deliver small amounts of current to provide a safe, efficient charge and limit battery gassing.

PRODUCT FEATURES:

Step 9: Analyse

Tests if the battery can hold charge. Batteries that cannot hold charge may need to be replaced.

Step 10: Maintenance

Continuously monitors the battery voltage to determine if a maintenance charge should be initiated. If the terminal voltage falls below 12.8V (12V) and 25.6V (24V), the charger will start the Maintenance cycle until voltage reaches 13.6V (12V) and 27.2V (24V) and then discontinues the charge cycle. The cycle between Trickle and Maintenance is repeated indefinitely to keep the battery at full charge, without overcharging. The battery charger can be left connected indefinitely.

OPERATION:



WARNING!

Before you carry out any work on the battery charger always pull the mains plug out of the mains socket.



WARNING!

DANGER OF ELECTRIC SHOCK! DANGER OF DAMAGE TO PROPERTY! DANGER OF INJURY!

Ensure that you do not strike electrical cables, gas or water pipes when you are drilling into the wall. If necessary, check the wall using a suitable detector before you drill.

CONNECTION:

- Before starting the charging or discharging procedure on a permanently installed battery in a vehicle, first disconnect the minus pole connecting cable (black) of the vehicle from the minus pole of the battery. The minus pole of the battery is usually connected to the car body.
- Then disconnect the plus pole connecting cable (red) of the vehicle from the plus pole of the battery.
- First attach the “+” quick-release clamp (red) of the battery charger to the “+” terminal of the battery.
- Attach the “-” quick-release clamp (black) of the battery charger to the “-” terminal of the battery.
- Connect the mains lead of the battery charger to an electrical power outlet socket.

DISCONNECTING:

- Disconnect the appliance from the power supply.
- Detach the “-” quick-release clamp (black) from the “-” terminal of the battery.
- Detach the “+” quick-release clamp (red) from the “+” terminal of the battery.
- Reconnect the plus pole connecting cable of the vehicle to the plus pole of the battery.
- Reconnect the minus pole connecting cable of the vehicle to the minus pole of the battery.

SELECT CHARGING MODE:

You can select different charging modes for charging different batteries at different ambient temperatures. In comparison with conventional battery charging stations, this appliance has a special function for reusing an empty battery or rechargeable battery. You can recharge an empty battery / rechargeable battery. Safe charging is ensured by means of a protection function against incorrect connection and short circuiting. Due to the installed electronics, the charging station does not begin operation directly after connecting the battery, but only starts after a charging mode has been selected.

This avoids sparking, which often occurs when connecting. The battery charger is controlled by an internal MCU (Micro-Computer Unit).

NOTE: It is important to understand the differences and purpose of each charge mode. Do not operate the charger until you confirm the appropriate charge mode for your battery.

MEMORY FUNCTION / RESET:

After connection to mains, the charger automatically returns to the last charge mode used. If the charger stays on "STANDBY" press the mode key.

SWITCHING BETWEEN MODES:

NOTE: Long press 3sec. the MODE selection button at no battery connected status. The device switches between charging modes in the following order:

Standby > MODE 6 **SMPS 13.6V** > then repeats the cycle.

Press the MODE selection button the appropriate number of times. The device switches between charging modes in the following order for 12V battery:

Standby > MODE 2  > MODE 2 & 3  and  > then repeats the cycle.

The device switches between charging modes in the following order for 24V battery:

Standby > MODE 1  > MODE 1 & 3  and  > then repeats the cycle.

Long press 3 sec. the MODE selection button the appropriate number of times. The device switches between charging modes in the following order:


Standby > MODE 4 **AGM + 12V** > MODE 7 **LITHIUM 12.8V** > MODE 5 **RECOVER 12V** > then repeats the cycle.

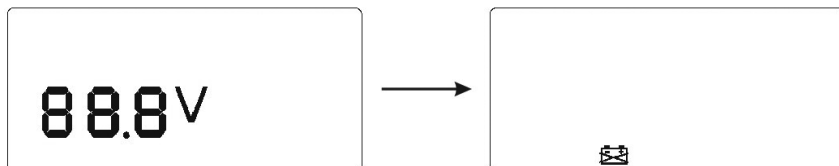
NOTE:

- MODE 7 **LITHIUM 12.8V**: If voltage of the battery is out of 11.6-13.8V, Mode 7 is not available, will go to MODE 5 **RECOVER 12V** directly.
- MODE 5 **RECOVER 12V**: Repair & Recover and charging the deeply discharged or sulfated (desulfation) 12V batteries.
- If you press the selector button, charging mode automatically switches over to the next mode and begins operation in that mode.

AUTOMATIC DETECTION OF BATTERY:

As soon as the battery charger has been connected to the mains, the charger recognizes the battery based on the following criteria: If the battery voltage is lower than 2.0 V or higher than 14 V, the battery is not suitable or defective.

The error message  appears and flashing on the display.




NOTE:

Depending on the charging condition of the battery, the charger adapts the charging currents to ensure optimum charging of the battery. Only during the main charging phase, the battery is charged with the maximum charging current. Shortly before the maximum charging capacity has been reached the charging current is reduced. This ensures a gentle and best possible charging up to the battery's maximum capacity.

12 V Battery:

If the battery voltage is between 2.0 and 14.0 V, the battery is identified as a 12 V battery. By pressing the MODE key the 12 V charging program is started.


24 V battery:

If a battery voltage of between 14.0 V and 21 V is measured, this indicates a critical range as at the lower voltage end. It is not clear whether it is a fully charged 12 V battery (which could have a voltage of 14 V) or a deep-discharged 24 V battery, the Step 2 Recovery will start by pulsing small amounts of current. If the battery voltage does not rise to 21 V within 2 hours, the error message  appears and flashing on the display and returning to the standby mode.

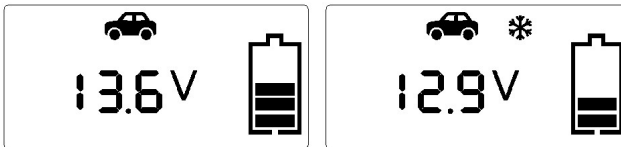
RECOVER 12V MODE (14.7V 15A): REACTIVATION OF DEEP-DISCHARGED 12 V BATTERIES USING PULSE CHARGING




This mode is mainly suitable for charging 12 V lead-acid batteries with a capacity greater than 50 Ah. Long press 3 sec. the MODE selection button, if the measured voltage is between 2.0 V and 14 V the battery is identified as a 12V battery to activate **RECOVER 12V** mode.

Then if you do not take any further action, the electronic system will automatically start the charging process together with the LCD display will flash at (with a current of) 2.6A. If the process runs without any problems, the LCD display will show the battery charging (bars will start flashing) until the battery is charged. When the battery is fully charged, the battery icon should be full and will stop flashing. The device now switches automatically into maintenance charging mode. The battery voltage has not risen to 12V within 4 hours, The error message  appears and flashing on the display and returning to the standby mode.

OR MODES (14.5V 15A / 14.7V 15A):



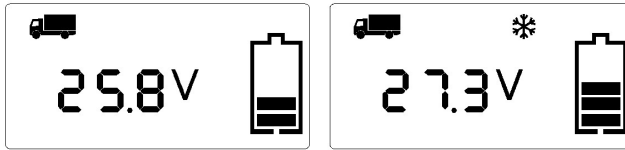
This mode is mainly suitable for charging 12V lead-acid batteries with a capacity greater than 50 Ah.

Press the MODE selection button to select MODE  or  .




After doing so, the corresponding LCD display  or   lights up.




Then if you do not take any further action, the electronic system will automatically start the charging process together with the LCD display will flash at (with a current of) 15A. If the process runs without any problems, the LCD display will show the battery charging (bars will start flashing) until the battery is charged. When the battery is fully charged, the battery icon should be full and will stop flashing. The device now switches automatically into maintenance charging mode.

 OR   **MODES (29V 7.5A / 29.4V 7.5A):**



This mode is suitable for charging 24 V lead-acid batteries with a capacity less than 25 Ah.

Press the MODE selection button to select MODE  or  .

After doing so, the corresponding LCD display  or   lights up.

Then if you do not take any further action, the electronic system will automatically start the charging process together with the LCD display will flash at (with a current of) 7.5A. If the process runs without any problems, the LCD display will show the battery charging (bars will start flashing) until the battery is charged. When the battery is fully charged, the battery icon should be full and will stop flashing. The device now switches automatically into maintenance charging mode.

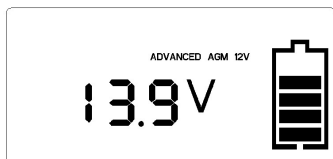
LITHIUM 12.8V MODE (14.5V 15A):



Long press 3sec. the MODE selection button, if the measured voltage is between 11.6 V and 13.8 V the battery is identified as a Lithium (12.8V 4-cells LiFePO4) to activate **LITHIUM 12.8V** mode.

Then if you do not take any further action, the electronic system will automatically start the charging process together with the LCD display will flash at (with a current of) 15A. If the process runs without any problems, the LCD display will show the battery charging (bars will start flashing) until the battery is charged. When the battery is fully charged, the battery icon should be full and will stop flashing. The device now switches automatically into maintenance charging mode.

AGM + 12 MODE (15V 15A):



This mode is mainly suitable for charging 12V lead-acid batteries with a capacity greater than 18 Ah. It can be used to the maximum charge voltage 15V of the special AGM battery such as calcium battery; however battery manufacturers may recommend the maximum charge voltage for charging their batteries. Please check battery specifications.

Press the MODE selection button to select MODE **AGM + 12V**.

After doing so, the corresponding LCD display **AGM + 12V** lights up.

Then if you do not take any further action, the electronic system will automatically start the charging process together with the LCD display will flash at (with a current of) 15A. If the process runs without any problems, the LCD display will show the battery charging (bars will start flashing) until the battery is charged. When the battery is fully charged, the battery icon should be full and will stop flashing. The device now switches automatically into maintenance charging mode.

JUMP CHARGE MODE (15V 20A):

To operate JumpCharge, the charger must be connected to a 12V battery with the battery clamp connectors connected. If the battery voltage is between 2.0 V and 15 V, and go to charging mode after user presses the **JUMP CHARGE** Button.

Charging Program: Begin 2.6A current charging, 270 seconds, then 20A charging, 30 seconds. After that go to Stand-by mode. JumpCharge completes after a five minute charge.

NOTE: Use the mode with care. This mode is for 12V Lead-Acid batteries only.

SMPS 13.6V MODE (13.6V 5A):



This mode is adaptor, it can be used to as a 13.6V 5.0A DC power supply, and it can be used to float charging for 12V battery also.

Long press 3sec. the MODE selection button **at no battery connected status** after doing so, the corresponding LCD display **SMPS 13.6V** lights up.

Then if you do not take any further action, the electronic system will automatically start the power supply output process as adaptor function together with the LCD display the output is 13.6V DC 5.0A.

NOTE: DO NOT short-circuit the output terminals after the MODE **SMPS 13.6V** has started.

SPECIAL FUNCTIONS:

0V battery charging.

This feature is used for zero volt batteries; it uses a very small pulse current to sense the connection of the battery. This function is used in lithium batteries, as lithium battery pack has Protection Circuit Modules (PCM), the battery pack output is 0V when the PCM have actioned.

Overheating protection

If the appliance becomes too hot during charging, the power output is automatically reduced. This protects the appliance from damage.

Trickle charging

Once the battery has been fully charged, the charger automatically changes to trickle charging. Depending on the measured voltage, the charging is interrupted or the battery is maintained in a fully charged condition with low voltage currents (1.3A or 0.9A / 0.08A).

NOTE: a battery can remain permanently connected to the charger without damage or adverse effect on its performance. The trickle charge can be used to maintain a battery.

CLEANING AND MAINTENANCE:



CAUTION:

Disconnect from mains prior to carrying out any cleaning work. Danger of electrocution! Never immerse the charger in water as entering water can damage the charger.

When necessary, clean charger with a soft, dry, lint-free cloth. Only when heavily soiled use a damp, well wrung-out cloth and mild, non-abrasive cleaning agent. After cleaning, thoroughly dry charger.

Distributed by:
Electus Distribution Pty. Ltd.
320 Victoria Rd, Rydalmere
NSW 2116 Australia

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