

POWERTECH PLUS

5STEP

- A Unique Battery Charger
- Fully Automatic
- Electronically safe against user errors!
- Smart Option for computerized battery charging and management!

SWITCH MODE BATTERY CHARGER



MCU controlled, fully INTERACTIVE



Charges WET/Flooded, GEL, AGM type Lead-Acid Rechargeable Batteries



Fully automatic from Charge to Maintenance!!



Returns to last selected Mode when restarted



Automatically Diagnoses, Recovers, Charges & Maintains batteries for months....



3.8 Amp
1.2-120 Ah



MB-3604

Product Features

All major starter battery manufacturers recommend to keep your battery fully charged during idle period.



Rescues drained batteries over 3.5V



Standby feature- Monitors current drawn by battery



No risk of over-charging



Electronically safe against user errors



Spark-proof



Overheat protection



Fully protected against short circuit & wrong connections

Bulk Charging Time

Battery size (Ah)	Mode	For About 80% Charge (hours)
2		2
8		8
20		4.5
60		14
100		23
120		28

POWERTECH PLUS MB-3604 is a 5-Step fully automatic switch mode battery charger and maintainer, designed for charging a variety of lead-acid rechargeable batteries, widely used in motorbikes, cars, several other vehicles, RF industrial, UPS, information technology equipments, scientific, medical equipments etc. The batteries may be of various types i.e. WET/Flooded (Liquid Electrolyte), GEL (Gelatin type Electrolyte, absorbed into the plates), AGM (Absorbed Glass Mat) batteries. Their capacity range from 12V/1.2 Ah to 12V/120 Ah. The **POWERTECH PLUS MB-3604** battery charger also charges batteries in cold conditions. Using state-of-the art technology, the charger enables the recharging of the batteries to almost 100% of their original capacity. It recovers slightly sulphated batteries. It diagnoses and rescues deep drained battery as low as 3.0V. It provides trickle charge and maintenance charging which increases battery life and gives superb performance. It also features low back current drain and low ripple.

Memory Function

The charger has unique memory function. The charger returns to last selected mode automatically when power is switched on. For repetitive charging process, this is a very useful feature. However different charging mode could be selected by pressing the "MODE" button.

Product Safety Feature

- Electronically safe against user errors. The charger will not damage vehicle electronics. It is totally safe for months-long connections and maintenance of irregularly or seasonally used batteries even while the charger is still connected to the vehicle. It provides optimal condition without damage. **No risk of over-charging!**
- Full protection against wrong connection and against short circuit ensures safe charging operation.
- Provided with Spark protection mechanism. The charger will not begin operation upon connection to the battery unless charging mode has been selected. This embedded feature eliminates the possibility of a spark that often appears during connections.
- Fully controlled by internal MCU (Micro-Computer-Unit), which makes it faster, powerful, reliable and smarter. It detects the state of charge of the battery plugged into it and initiates charging.
- Dust and splash proof (IP65) approval. Indoor use.
- Double insulated

Battery Type & Settings

The following recommendations should only be referred to as guidelines. For precise details, you must refer to battery manufacturer for instructions.

SYMBOL	MODE	SETTINGS	DETAILS
	1	14.4V/0.8A	This mode is normally suitable for batteries <14 Ah batteries
	2	14.4V/3.8A	This mode is normally used for WET, MF and most GEL batteries
	3	14.7V/3.8A	This mode is recommended for several AGM batteries. This mode is also suitable for charging batteries in sub-zero temperatures.

Rescuing Drained Battery

When charger is connected to a battery, before the start of charging process, the charger automatically detects the voltage of the battery. If voltage is below 3.0V the **POWERTECH PLUS MB-3604** charger will not start due to its internal safety circuit. It initiates pulse charging mode if the voltage is in the range of 3.0V±0.5 to 10.5V±0.5V. Once voltage of battery rises to 10.5V±0.5V, charger changes over to previously selected normal charging mode. Now the battery can be charged faster and safely. Most drained batteries can be charged and used again using this procedure.

Abnormality Protection

In case of short-circuit, open circuit, reversed polarity connection or battery voltage below 3.0V±0.5, the charger will turn-off the electronic system and will immediately reset the system back to basic position to avoid damage to battery and charger.

Overheating Protection

POWERTECH PLUS MB-3604 charger is protected by NTC control. During the charging process, if the charger becomes too hot, the power output is automatically reduced to protect itself from damage. The charger continues to work trickle charge. Charger increases power automatically when the ambient temperature drops.

Technical Data

MODEL	MB-3604
Input Voltage AC	220-240VAC, 50/60Hz
Output Voltage	Nominal: 12V
Starting Current	<25 A
Input Current	0.6A RMS max
Efficiency	75%
Charging Voltage	14.4V±0.25V or 14.7V±0.25V
Charging Current	3.8A±10% or 0.8A±10%
Back Current Drain*	1 mA
Ripple**	Max 150mV
Ambient Temperature	-20°C to 50°C, Reduced output power at higher temperature
Type of Charger	Five step, fully automatic, switch mode with maintenance charging
Type of Batteries	12V Lead-acid rechargerable batteries (WET, MF, AGM and GEL)
Battery Capacity	1.2-120Ah
Dimensions (LxWxH)	172x62x42mm
Housing Protection	IP65 (Dust and Splash proof) Indoor use
Weight	0.557kg
Noise Level	<50 dB (Tested from a distance of 50cm)

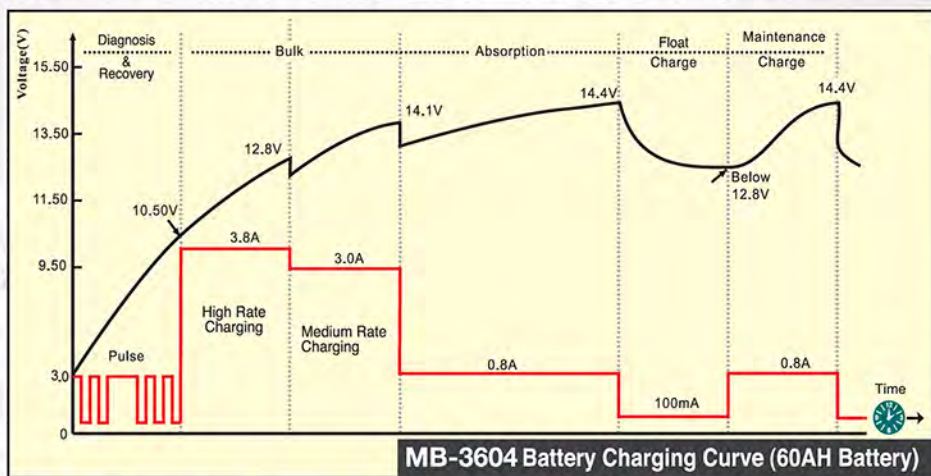
* = Back current drain is the amount of current drawn by the charger from battery, when the charger is connected to the battery, without power cord connected. **POWERTECH PLUS MB-3604** has extremely low back current drain which corresponds to 0.7 Ah per month (1mA/hr)

** = Ripple refers to interference of current and voltage. A high current ripple heats up battery and reduces life of battery. Against a linear charger, which has a current ripple of upto 400%, **POWERTECH PLUS MB-3604** charger's current ripple is below 2% (0.15/12V battery voltage), which is much lower than the max 5% for a sealed acid battery. Equipments connected to the battery could be damaged by high voltage ripple.

Charging Phases

POWERTECH PLUS MB-3604 charger performs 5-step fully automatic charging cycle.

MODE	SETTINGS	SYMBOL
1	14.4V/0.8A	
2	14.4V/3.8A	
3	14.7V/3.8A	



Control Panel



1) Diagnosis & Recovery

As soon charging instruction is given to the charger, the unique diagnostic function automatically checks status of battery (detects voltage). If a deeply discharged battery's voltage is over $3.0V \pm 0.5$, charger begins pulse charging with small current to recover it, which terminates when voltage reaches to $10.5V \pm 0.5V$. If battery voltage is over $10.5V \pm 0.5V$, charger skips pulse charging and switches over to pre-selected charging mode.

2) Bulk

80% of energy is returned in this phase of charging. Here charger performs in two-stages-

a) High Rate Charging : Charger delivers constant current of 3.8A until the voltage reaches to 12.8V

b) Medium Rate Charging : Charger delivers constant current of 3.0A until the voltage reaches to 14.1V at which point the charger switches to Absorption phase. Since current is not delivered at highest constant level, **POWERTECH PLUS**

MB-3604 charger will minimize the heating up of the battery, and hence will eliminate the build up of gases. This ensures more efficient and safer performance.

3) Absorption

Use of a constant current of 3.8A for extended periods of time risks gassing the battery. Therefore a constant low charging current is given at 0.8A to raise voltage from 14.1V to 14.4V. In this phase complete charging up to almost 100% is achieved. Charger switches to trickle charge phase after sensing that the battery is truly fully charged.

4) Battery Capacitance verification stage

Battery is fully charged and ready to use. The battery will signal to the charger and will only take enough current to sustain small loads such as alarms etc or current leaks in the vehicle wiring circuit. Very low current of 100mA is given to the battery. When voltage drops below 12.8V, monitoring circuit senses that battery needs more current to maintain its charge than available in trickle charge phase. The Charger switches to Maintenance Charge phase.

5) Maintenance Charge

As charger continuously monitors the terminal voltage in order to determine if a maintenance charging should be initiated. If the battery is loaded and/or terminal voltage falls below 12.8V, the charger starts a maintenance charging pulse at constant 0.8A until voltage reaches to 14.4V. The maintenance charging is discontinued. Cycle of trickle charging and maintenance charging is repeated indefinitely to keep battery in good condition when it is not in use and enables charger to be left connected indefinitely.

Standby feature

When battery remains connected with vehicle's wiring system, during the trickle mode, circuits continuously monitor the current drawn by the battery.

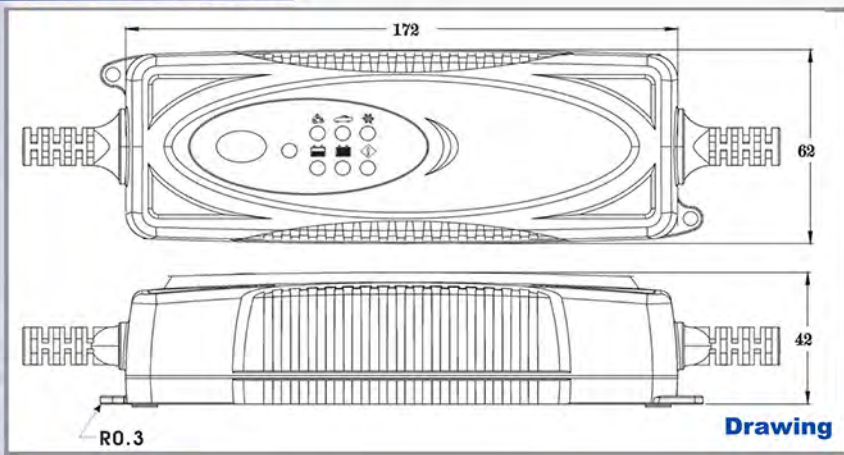
POWERTECH PLUS MB-3604 is fully interactive

charger which adjusts itself to changing current requirement to charge and maintain the battery.

Mounting & Product dimensions

The charger is easy to fix using two screws. Please refer to product drawing.

Product Dimensions



Packing Illustration

Equipment

POWERTECH PLUS MB-3604 charger is supplied with two detachable and interchangeable colour coded lead sets- one with clamps for bench charging and other with eyelet terminals (Ø6.3mm) with in-line battery protection plug-in fuse (10A) for permanent attachment to the battery posts to allow quick connection/disconnection through snap-connector.



Application



Declaration of Compliance

Tested and approved by and conforms to AN/NZS 60335.2.29 2004, with certificate of approval SAA100983EA

POWERTECH PLUS

Distributed by: Electus Distribution Pty. Ltd.
320 Victoria Road Rydalmere NSW 2116 Australia
Phone: 1300 738 555 Facsimile: 1300 738 500
www.electusdistribution.com.au
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