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EBL70 - 12 Smart Charger

For 12V lead based Wet, Sealed, GEL & AGM Batteries

-Short User's Manual-

Introduction

The EBL70-12 is a switch mode trickle charger for battery care, with MCU controlled constant current Bulk, pulse Absorption and pulse Float / Maintenance charge. It is suitable for all types of 12V lead acid batteries including GEL and AGM. It can recondition lightly sulphated lead acid battery. It is not suitable for long-term charging and long-term applications.Though it is primarily designed for indoor use, it has a splash proof sealed polycarbonate casing.

Please read this manual carefully and follow the instructions.

Features

1. Multiple Stage Charge / consecutive charging phase
   - **A.** Check and Qualifying battery to Desulphate Charging
   - **B.** If required: Desulphate Charging
   - **C.** Constant current Bulk charge
   - **D.** Absorption / Pulse charge
   - **E.** Float / Maintenance charge
2. Motorcycle battery, Car battery or Car battery at low surrounding temperature (< +10°C)
3. Select-and-forget operation and can be connected to battery for months
4. Auto recover to last selected Charge Mode on return from AC power blackout
5. Electronic protections against wrong battery connection, short circuit and sparks
6. Over Temperature Protection from decrease in output current to shut down.
7. Splash proof sealed polycarbonate casing
8. The Microprocessor unit (MCU) controls charging and monitors battery state of charge with advanced charging program which makes it faster and saver charge your battery without overcharging or undercharging.

Contents

- Smart charger with lead terminals
- Detachable leads with protection cover & crocodile clips
- Connecting leads with protection cover & ring terminals

Warning!

- This trickle charger is designed for only charging 12V lead acid batteries of 5 to 120Ah.
- Do not use this trickle charger for any other purpose
- For indoor use only
- Explosion hazard: A battery being charged could emit explosive gases.
- Avoid smoking or open sparks or naked flames in the vicinity of the battery.
- Do not cover the trickle charger while charging, allow good ventilation to the charger .
- Danger of chemical burns: battery acid is highly corrosive.
- If your skin or eyes come into contact with acid, immediately rinse the affected part with excessive water and seek medical attention.
- Do not charge a frozen battery.
- Do not charge a damaged battery
- Disconnect battery from trickle charger which is not connected to AC mains socket.
- Do not recharge non-rechargeable batteries
- When install in caravans and similar vehicles, the connection to the AC mains is to be in accordance with the national wiring regulations.
- If the cord is damaged, the trickle charger should be scrapped.
- Check trickle charger has reached Float Phase if it is intended to leave trickle charger connected for a long period of time.
- For safety reasons, it is recommended to check the charging operation from time to time, when it is intended to keep the trickle charger connected for longer period of time.

When charging mounted automotive battery:

- The battery terminal not connected to the chassis must be connected first.
- Then make the next connection to the part of chassis away from the fuel line or Battery.
- After charging, disconnect the trickle charger from the supply mains. Then remove the chassis connection first followed by the battery connection.

Important hint concerning regeneration phase:

EBL70 starts with a battery check sequence at the beginning of operation. If the battery is a little bit sulphated, the trickle charger starts with regeneration phase (LED on). According to the batteries state the voltage can increase to more than 16V in regeneration phase! Before starting the regeneration phase, disconnect the battery from the car in order to avoid damage to the car electronic system!

After a successful regeneration phase the trickle charger continues with normal bulk charge. Regeneration phase will be aborted for safety reasons after max. 8 hours, if the batteries state is not improving - it is then considered to be defective (LED flashes).

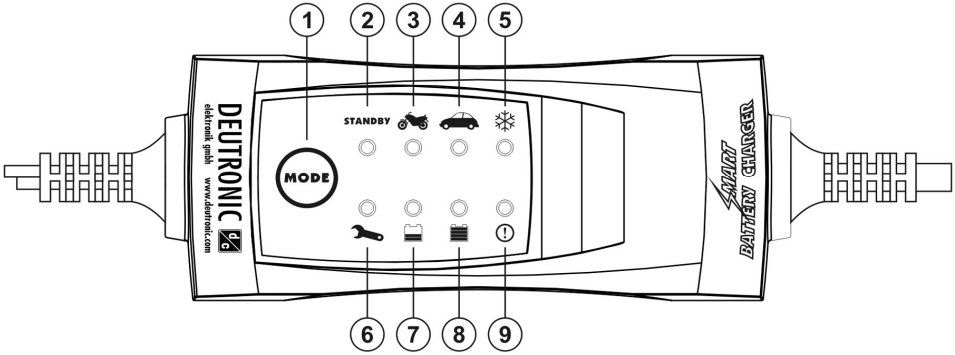
Attention: For safety reasons regeneration or charge procedure has to be done under surveillance!

Note according to electromagnetic compatibility (EMC):

Emission to EN55011, Group 1, Class A

This device is released for use in industrial environments only.

Control Panel



LED / BUTTON	FUNCTION
MODE	**① Activate & Mode Select:** Motorcycle, Car and Low Temperature Modes
STANDBY	**② Standby Mode** ***Steady light on :*** AC mains connected but trickle charger is not yet connected to battery. ***Blinking light on :*** Battery is connected, 1 minute to select charge mode before trickle charger enters to last selected Charge Mode.
	③ Motorcycle Battery Charging Mode 14.4V / 1.5A max.: Battery capacities of 5 - 14 Ah
	④ Car Battery Charging Mode 14.4V / 5A max : Battery capacities of 16 - 120 Ah
	⑤ Car Battery Charging Mode at low surrounding temperature 14.7V / 5A max: Battery capacities of 16 – 120Ah - Recommended for temperature below +10°C - Not recommended for long term maintenance when temperature exceeds +10°C at times

LED / BUTTON	FUNCTION
	**⑥ Check-Phase** ***Steady light on :*** For a few seconds initially for normal battery, charger checking battery. (Attention – note the important hint concerning regeneration phase ***Steady light on :*** For longer time, trickle charger in *desulphate phase. ***Blinking light on :*** When connected to battery showing the battery is not suitable for charge. ***Blinking light on :*** After unit in charging phase for long time (max. 40 hrs.), or desulphating charge (max.8 hrs.), battery still cannot hold charge or cannot be desulphated. Remove battery.
	**⑦ Charging-Phase** ***Steady light on :*** Charging in progress (desulphate and bulk or absorption charge stage)
	**⑧ Float / Maintenance Charge-Phase** ***Steady light on :*** Battery is fully charged and trickle charger in Float / Maintenance Pulse Phase
	**⑨ Alarm** The blinking alarm indicates charging fault; check following faults: - Output connectors short circuit - Output connectors in wrong polarity to the battery - Over temperature Protection activated, charging has stopped.

Operation

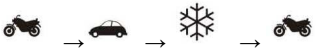
Plug in the trickle charger to AC mains (100 - 240V) wall socket.

The indicators light up one by one as trickle charger goes through a series of self checks. Then all lights are on together and off except the operation “Standby” indicator, to indicate the end of checks.

Connect the red output lead to the positive terminal of the battery and the black lead to the chassis or in case of an disconnected battery to the negative battery terminal. (Blinking Standby LED)

The “Standby” blinks to indicate that trickle charger is ready for selection of charge phase.
The user has 1 minute to select the desired charge phase or the trickle charger will automatically enter into the last selected charge phase at the end of 1 minute.

Select the appropriate charge phase by pressing the Mode button MODE one or more times within 1 minute.

The Charge Mode indicator changes with each press from:  in one cycle.
The Mode button MODE will also be locked in 10 seconds after selection of Charge Mode.

If no pressing on the Mode button MODE has been done after 1 minute, the trickle charger will automatically enter into the last selected charging mode.

If by mistake a wrong mode selected and activated the lock, revisiting the negative terminal to be disconnected. The permanent lighting of the standby LED signals once again the willingness of the trickle charger.

Check Phase and Normal Charging

The trickle charger first checks the battery’s condition , for normal battery this indication  extinguishes after a few seconds and charger enters into “Charge Phase” and finally to the “Float/maintenance Phase” when the battery is fully charged.

Charging Phases

Bulk : Here, the battery is charged up to about 80% fully.
MODE: Car battery / Low temperature mode
Here, the battery is charged with a constant charging current of 5A until the battery voltage rises to a preset value. If the trickle charger overheated during the charging procedure, the charging current is initially reduced to 4.2A. In a further temperature increase, the output current is reduced to less than 4A in order to prevent undue overheating of internal components.

MODE: Motorcycle Battery
Here, the battery is charged with a constant charge current of 1.5 A until the battery voltage rises to a preset value.

Absorption : Here, the battery is charged up to about 100% fully.
The terminal voltage is kept constantly at a set level. The trickle charger provides current pulses to the battery with varying pulse periods. When the rise time of pulses decreases to a set value, trickle charger switches to Float (maintenance) phase. The maximum total charging time of Bulk and Absorption is 40 hours, at which the trickle charger will abort the charging phase.

Float : Maintenance charging.
If battery voltage is above a fixed threshold, the trickle charger will not supply the load. If the battery voltage drops below a preset level, the battery is being charged with a constant current of 1.25 A until the upper threshold is reached.

This is to assure that the battery will not be overcharged and be kept filled up when its voltage drops due to self discharge or other light discharging by external equipment of the vehicle.
The trickle charger can be connected to a battery for months in this phase without any safety problems.

In the case of battery voltage drops more than 12,2V, due to external load or otherwise, the trickle charger will start a new charging cycle of Bulk, absorption and Float.

Check-Phase and Regeneration Phase (Desulphate Phase)

The desulphate charging can recondition only slightly sulphated battery.
A. In the case of the LED is lit longer, the trickle charger is in desulphate charging. After some time, if desulphation of the battery is successful, the trickle charger will switch to normal charging and the LED is extinguished.
B. If the desulphate charge fails to recondition the battery within 8 hours, the trickle charger will abort this desulphate phase (LED blinks). The battery should be disposed.

Check-Phase and unchargeable battery

A. If the LED blinks before or after pressing the Mode button (MODE) then the battery is not suitable for charging. Check the battery connections, clean battery terminals to double confirm that the battery is really not suitable for charging.
B. The LED also blinks after 40 hours Bulk and Absorption charging period until the battery is removed. This safety time feature is to avoid charging a defect battery which cannot hold the charge.

Alarm and Faults

The blinking Alarm (!) indicates faulty connections or charge condition so that the trickle charger does not provide any power to the output. Once the fault has been corrected the trickle charger will continue to operate normally.
The following faults are detected:
A. Wrong connection of Positive and Negative terminal to the battery.
B. Shorting the output cable terminals (crocodile clamps or ring connectors).
C. Over Temperature Protection has been activated and the charging has stopped.

Interrupting the charging process

When there is a power interruption, the trickle charger will continue to charge at its last selected Charging Mode on the return of mains AC power.
The trickle charger automatically completes the charging process when the charging end voltage is reached and switches to float / maintenance charge phase.

Safety Features / important notes

Spark prevention:
The trickle charger will not begin operation after connection to the battery unless charging phase has been selected.

Reverse polarity protection:
If the polarity is reversed, then the trickle charger cuts off its power and the alarm LED (!) blinks. Once the terminals are re-connected correctly, the charger resumes charging.

Short circuit protection:
If the trickle charger is short circuited on the output terminals, the alarm LED (!) blinks.

Over temperature protection:
When the trickle charger gets too hot in active charging operation, the trickle charger will reduce output current to less than 4A to prevent overheat of the components. If temperature continues to increase above the preset threshold limit, the charger will abort the charging phase and the alarm LED (!) blinks.

Safety limiting time period at Active Charge
The maximum active charging time is 40 hours at which the charger will abort the charging phase and the LED is blinking until battery is removed. The Float phase is not active charging and is not affected by the safety time limit.

Specifications

AC Input	100-240V, 50/60Hz~, 1.5A
Maximum Output Charging Current	5A
Max. Power	70W
Efficiency	>78%
Maximum Output Charging Current for Car/Low Temp. Mode	5A
Maximum Output Charging Current for Motorcycle Mode	1.5A
Absorption Voltage (Motor cycle/Car Mode)	14.4V
Absorption Voltage (Low Temperature Mode)	14.7V
Housing	Splash-proof polycarbonate case
Accessories	Detachable leads with crocodile clips and leads with ring terminals
Protection:	Overload, short circuit, over temperature, reverse polarity, no spark at battery connection or short circuit at the output terminals
Cooling System	Natural convection
Standards/Approvals	CE, EN60335, EN55011 gr. 1 cl. A, EN61000-6-1, EN61000-3-2
Dimensions (LxWxH)	150x60x30mm

SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT PRIOR NOTICE

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