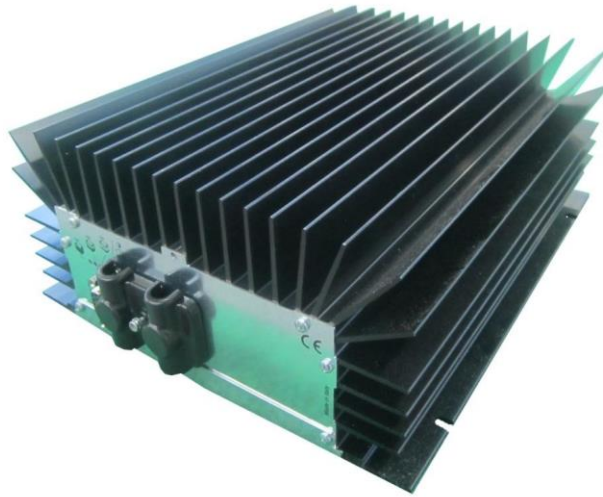




S.P.E. ELETTRONICA
INDUSTRIALE

TORO1000



ON-BOARD Battery Charger series

User Manual



WARNING!

Surface may be hot. To avoid risk of burns, DO NOT TOUCH.

Only qualified electrical personnel only to open equipment.

Carefully read the operating instructions before using the battery charger

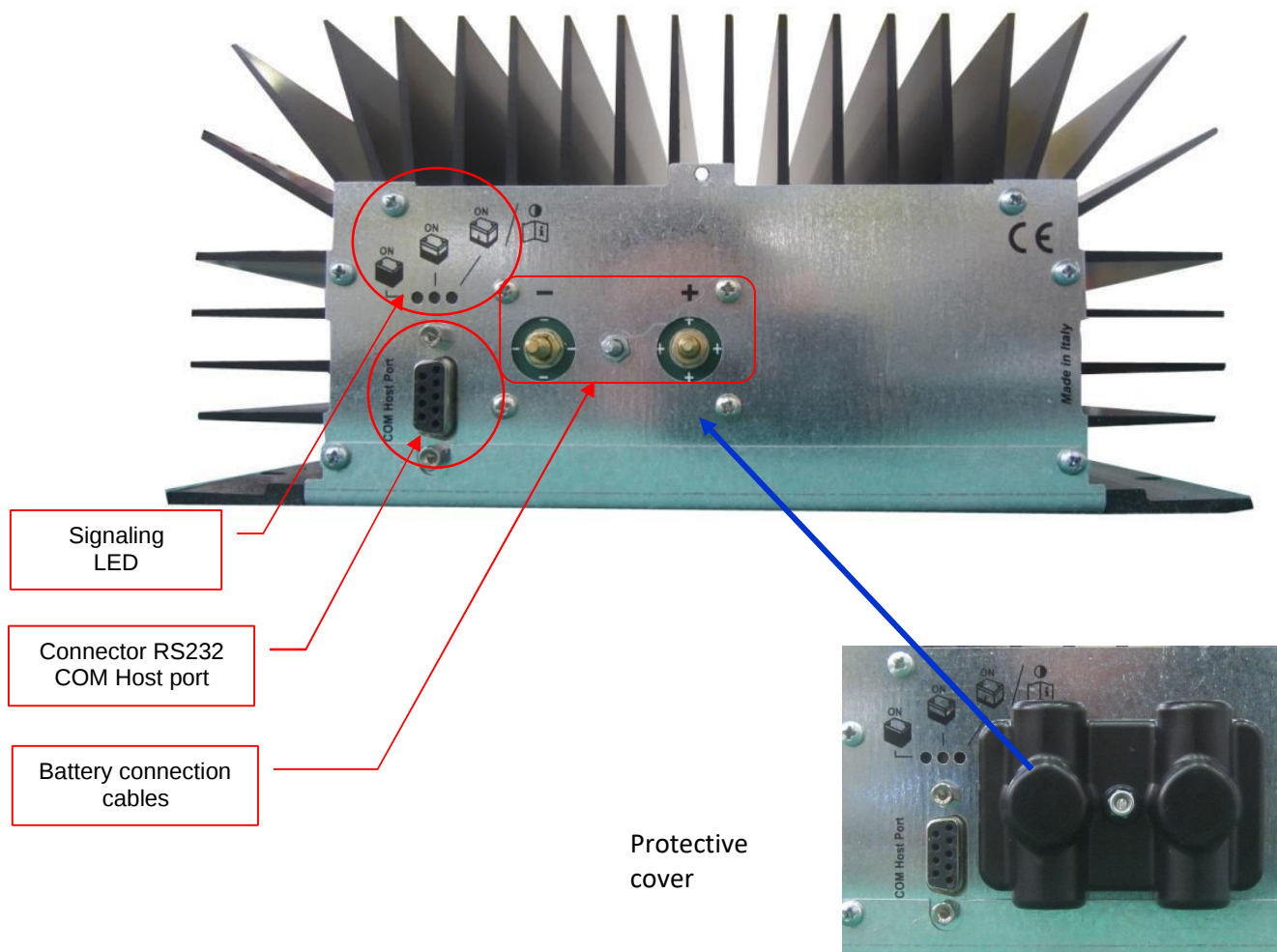
INSTALLATION AND SAFETY WARNINGS

- Installation errors and the misuse of the battery charger can damage the battery charger and harm the operator.
- **Only specialized personnel authorized can carry out operations that require the battery charger to be opened.**
- If its safe operation cannot be ensured, stop the battery charger and make sure it cannot be put back into operation.
- Before operating the battery charger, the insulation of mains connection cables and of the battery connectors must be verified.
- Disconnect the mains connection before connecting or disconnecting the battery.
- In order to prevent accidents, only charge Acid Lead, Gel or AGM batteries (ensure that the selected charging curve is suited to the type of battery). Do not charge any other type of batteries, either rechargeable or nonrechargeable, since they could explode, causing serious damages and injuries.
- **CAUTION!!** The battery generates explosive gases during the charge. Therefore, in the vicinity of the battery it is prohibited to smoke and use naked flames and sparks.
- Do not place the battery charger near the battery to be charged; any gas produced/emitted by the battery during the charge can corrode or damage the battery charger. Place the battery charger as far away as possible from the battery as permitted by the battery cables.
- DO NOT place or fasten the battery charger on flammable surfaces (such as shelves and/or wooden walls).
- In order to optimise the battery charger's heat exchange, and, therefore, ensure its reliability, it is important to place it so as to allow heat exchange with the environment. It must be installed in vertical position (using the 4 fastening holes)
- To prevent electrocution risks, the battery charger **must be connected to an earthed socket**. Moreover, the socket must be proportionate to the battery charger's power consumption and must be protected by adequate electrical equipment (fuse or automatic cut-out) set for a current that is at least 10% higher than the absorbed current stated on the device's serial plate.
- **CAUTION!!** Ensure compatibility of the mains plug provided with the battery charger: Do not use adaptors; should the socket not be earthed, a suitable plug must be installed by qualified personnel before using the device.
- The charging appliance is maintenance-free, except for routine cleaning that must be performed regularly and periodically according to the type of work environment. Before starting to clean the appliance, disconnect the power supply cable from the mains and the connection cables to the battery.
- The outer surface of the battery charger may overheat during operation and remain hot even after it's been switched off.
- The battery charger must not be used as a critical component in life support devices or systems without express written consent.
- Failure to comply with the installation and use instructions may compromise the protection provided by the device and make the guarantee void.
- This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.
- The specifications contained in this manual are subject to changes without prior notice.
- This publication supersedes and replaces all previous information.

TECHNICAL FEATURES

- Universal input voltage: 100 - 240Vac ; 50 - 60Hz
- Maximum input current: 13A (rms) at 110V / 6 A at 230V
- High frequency system with advanced technology
- Charging process fully managed by microprocessor
- Efficiency: 91% at full load (120Vac, 48VDC) 92% at full load (230Vac, 48VDC)
- Thermal protection against overheating (Derating of the charging current)
- Environmental protection class **IP65**
- Maximum relative humidity >95% (non condensing)
- Operating room temperature: from -20 to +45°C
- CE Conformity
- Block relay (1A-30VAC/DC max) with NC contact for on-board installations
- Charge curves for Pb-acid, Gel and AGM batteries
- Remote signal (on request) of the charge status (red/yellow/green) and any faults
- Dimensions W 280 D 230 H 105 mm
- Centre distance for fixing: 220 x 205 mm
- Weight: 4.6 kg

INSTALLATION



The battery charger can be assembled in any position;

However, it is advisable to fix it on a flat surface and away from heat sources.

TECHNICAL FEATURES

From the battery charger to the battery: The cable inserted in the screw with the symbol '+' to the positive terminal of the battery.

The cable inserted in the screw with the symbol '-' to the negative terminal of the battery.

Remote LED signal (if any):

Insert the remote LED cable in the 9-pole connector on the front of the battery charger (COM Host Port).

Block relay cables (if any):

Insert the block relay cables (if any) in the 9-pole connector on the front of the battery charger (COM Host Port); they provide an open contact when the battery charger is connected to the mains socket to prevent the operation of the vehicle.

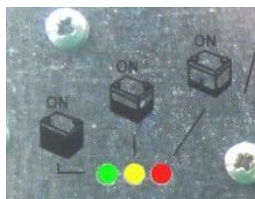


From the battery charger to the mains socket:

- Use a 3xAWG16 (for 100-120Vac) network cable
- Use a 3x1.5mm² (for 220-240Vac) network cable
- Insert the network cable in the wall mains socket, properly earthed • Connect the network cable in the IEC320 socket in the battery charger.



For optimal performances, we recommend fixing the battery charger to the vehicle's metal frame. IMPORTANT
The TORO1000 battery charger is set up to operate with batteries always connected and reset by network.
If the battery charger is always connected to the network, you must disconnect the network (once charge is completed) and reconnect it before starting a new charge.
At least 10-15 seconds must pass for a correct "reset", to allow the internal capacitors to discharge (SR indicator completely off).

VISUAL SIGNALS

Messages reported	RED LED	YELLOW LED	GREEN LED
Power supply from Mains only	OFF	OFF	OFF
	OFF	OFF	3 x Blink (24V)
	OFF	OFF	4 x Blink (36V)
	OFF	OFF	5 x Blink (48V)
Charging Phase 1	ON	OFF	OFF
Phase 2 or subsequent	OFF	ON	OFF
Charge end or Equalization OFF	OFF	OFF	ON
Equalization ON	OFF	OFF	BL
Failure	Blink	OFF	OFF

Where: OFF = Led off

ON = LED permanently on

BL = LED blinking

Blink = number of blinks of LED

OPERATION

Once all connections are made, charging occurs automatically and the charge cycle will be determined by the type of battery (if Pb, GEL or AGM), by its capacity (Ah) and its degree of discharge.

NOTES

- The battery charger can perform one charging profile only, which is the one stored inside it.
- Should it be necessary to vary the charging profile, you will need the sfw to access the battery charger programming **Consult the Assistance Service**

FAULTS

Any faults detected are displayed **by the Red LED (blinking)**;

The number of blinks (as shown in the table below) identifies the fault.

RED LED	Type of Fault	Description	Solution
1 x Blink	BATTERY DISCONNECTION	Battery disconnected while the battery charger was still charging	
2 x Blink	BATTERY VOLTAGE ERROR	Voltage of the connected battery incorrect or out of range.	-Check the rated voltage of the connected battery -Check whether the battery voltage is too high or low
3 x Blink	INTERNAL TEMP. HIGH	High internal temperature, the battery charger has gone into thermal protection mode	Wait for the temperature to go back to the correct value, charge will automatically restart
4 x Blink	MOSFET TEMP. HIGH	High power components temperature, the battery charger has gone into thermal protection mode	Wait for the temperature to go back to the correct value, charge will automatically restart
8 x Blink	MAINS VOLTAGE	Power supply voltage outside the permitted range	-Check if the power supply voltage is within the permitted range
9 x Blink	TIME OUT	Phase 1 safety timer expired, the necessary conditions to continue charging did not occur	-Check the state of the battery. - Check that the charging current of the battery charger is suited to the battery capacity
11 x Blink	I MIN	Charging current below the minimum level	-Check the state of the battery.

GUARANTEE

- The charger is guaranteed for 12 months from the date of installation.
- The guarantee covers all proven defects in components, assembly, and construction.
- Any incorrect installation or use of the machine NULLIFIES the guarantee.
- Any unauthorised tampering NULLIFIES the guarantee.
- In case of difficulties please contact the LOCAL DEALER.