

## INTRODUCTION

Your rectifier is fully controlled by a microprocessor and is suitable for automatic recharging of lead batteries. The recharging cycle is  $W_a$  (decreasing current). For best results and safety, the user is required to read, follow and keep these instructions carefully. This device is to be used exclusively for recharging lead batteries of the voltage and capacity indicated in the paragraph entitled BATTERY. The manufacturer is not responsible for any damage due to improper use. This device is designed for use only in environments that are protected from any atmospheric disturbance.

## BATTERY

This rectifier should be used to charge batteries that have the following characteristics:

- battery type: lead, unsealed
- rated voltage: see rating data on rectifier (e.g. 12V)
- capacity: the optimum value can be calculated on the basis of rated rectifier current  $I_n$  (see rating plate):  $C = I_n \times 6$

Example:  $I_n = 30A$  capacity will be  $C = 180 Ah \pm 10\%$

## INSTALLATION

To ensure maximum safety, the installation has to be carried out as indicated by the manufacturer. Installation and any work on the rectifier must be carried out by qualified technical personnel. Install only after disconnecting the supply cable from the mains power supply and the output cables from the battery. After unpacking, ascertain that the device is in perfect condition. In case of doubt, do not use the device and contact the supplier. Install the rectifier in a protected place; do not install it:

- outdoors or in open sheds
- in any damp or dusty place or in presence of acids.
- in any place with temperatures below 0 and above 40° C (32 and 104°F)
- in any place that is in any way unsuitable for electronic devices.

Do not obstruct the ventilation apertures. Do not place against a wall (leave at least 10 cm all around). Do not cover during operation.

## POWER SUPPLY

Ascertain that the rating plate values are compatible with your mains power supply (voltage, frequency, power). Plug it into a tap that is equipped with protection that complies with standard regulations. If you have to use an extension cable, contact the manufacturer for correct technical information. The supply cable must be replaced only by qualified personnel.

## INITIAL CALIBRATION

To adapt the rectifier to the normal variations of voltage in the mains power supply ( $\pm 10\%$  with respect to the rated value) open the rectifier (see Fig. 1) and move the BLUE wires on the terminal to the correct position shown on the table.

This operation is fundamental for correct operation and should be performed only when installing the rectifier.

## CONNECTION TO BATTERY

When connecting to the battery respect polarity (red wire to +, black wire to -). Incorrect connection will immediately blow fuse F2 inside the rectifier. This will have to be replaced with another fuse (see Fig. 1) of the same value.

## SWITCHING ON (PAN. 1)

Connect the rectifier to the battery: four LEDs will light up for 2 seconds only. If that doesn't happen, check either fuse F2 inside the rectifier and the battery connection. If everything is OK, PHASE 1 begins. Otherwise, check input fuse F1 (see Fig. 1).

## PHASE 1 (PAN. 2)

This is the first recharging phase. The rectifier supplies current to the battery and battery voltage increases. The PHASE 1 LED lights up to show exactly which phase is active and also in order to show that the rectifier is supplying current. The initial value of the current (with the battery completely discharged, 2 V/1) is the same as the rated value of the rectifier and will tend to decrease over time. With partially discharged batteries the current is lower. When the voltage in the battery reaches 2.40 V/1 (gasification) the microprocessor activates PHASE 2 (normally within 6 - 8 hours).

## STOP PHASE 1 (PAN. 3)

If the battery voltage does not reach 2.40 V/1 within 9 hours the microprocessor interrupts charging and the first 3 LEDs start to flash (except for LED 'E'). This may happen because of a problem with the battery (too old or with a broken element) or because of a problem with the power supply. This situation indicates an existing anomaly. If it happens often, inform the supplier.

## PHASE 2 (PAN. 4)

This phase is also called the final phase, and enables the battery to be 100% recharged. The microprocessor calculates the time necessary (minimum 15 min, maximum 3 hours), depending on the behaviour of the battery.

### STOP PHASE 2 (PAN. 5)

After the calculated time, the microprocessor stops charging and the stop LED lights up. The battery is ready for use. If it is necessary to stop charging, switch off the rectifier by keeping the STOP button pressed for at least 3 seconds. Never disconnect the battery when the rectifier is switched on and is recharging. For best recharging results, never interrupt the automatic cycle but wait until the microprocessor signal a stop status.

### PAUSE FOR EQUALIZATION

Both in STOP PHASE 1 and in STOP PHASE 2 the microprocessor waits 24 hours before activating the EQUALIZATION phase. During this time you can disconnect the recharged battery. For obvious reasons of time, EQUALIZATION can only take place on weekends.

### EQUALIZATION

The equalization phase (also known as impulse charging) consists of a sequence of 12 charging impulses (active phase) separated by pauses (passive phase). Active phase: for 10 minutes the rectifier supplies current and LED 'E' comes on (see PAN. 6). Passive phase: for 50 minutes the rectifier pauses and LED 'E' flashes (see PAN. 7). After 12 impulses, the rectifier stops and LEDs 'E' + 'STOP' light up (see PAN. 8). The purpose of this type of charging is to re-balance all battery elements.

### BUFFER

If you leave the rectifier connected even during long inactive periods, you can maintain the battery charged at 100%. At the end of the equalization phase, the BUFFER charge goes into operation. This consists of alternating an active and a passive phase without any time limit. Active phase: the rectifier supplies current for 5 minutes (see PAN. 6). Passive phase: the rectifier does not supply any current for 8 hours (see PAN. 7). In this situation you can leave the rectifier connected for months and it will compensate battery self-discharge.

### POWER FAILURE

Any power failure (either because the mains power supply fails or because of a panel fuse) will switch off all LEDs. When power is restored, the microprocessor will resume charging from the point at which it was interrupted.

### SPECIAL SIGNALS (PAN. 9 - PAN. 10 - PAN. 11)

- STOP ON + PHASE 1 flashing = incorrect battery voltage: too low

- STOP ON + PHASE 2 flashing = incorrect battery voltage: too high

These signals warn of unmatched battery/rectifier (e.g. 12V battery with 24V rectifier) that can be dangerous. If it occurs, switch off, disconnect the battery immediately and contact the supplier.

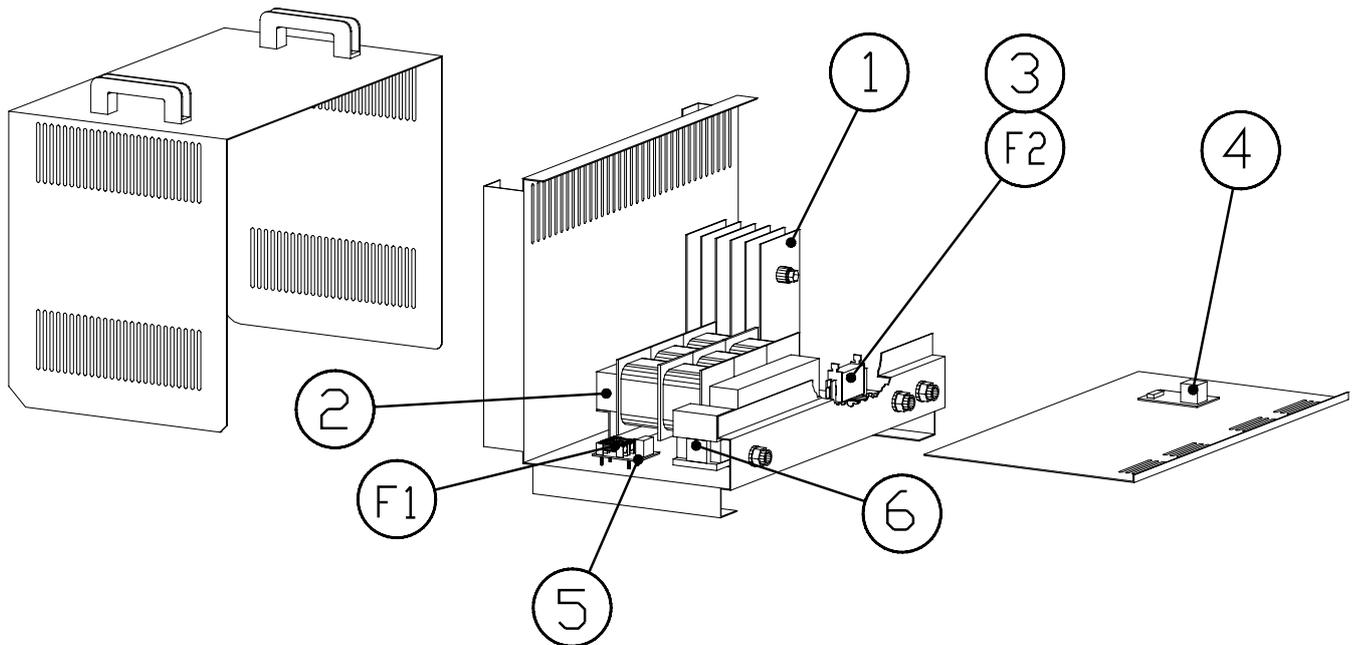
- STOP ON + flashing EQUALIZATION = faulty battery voltage (insufficient initial increase) This indicates a potential battery fault: contact the supplier.

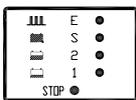
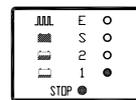
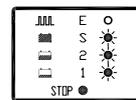
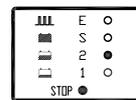
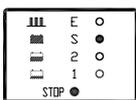
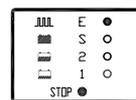
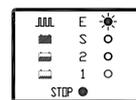
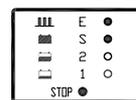
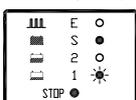
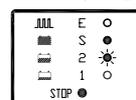
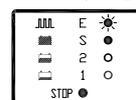
### GENERAL RECOMMENDATIONS

Do not let the battery run down completely. If recharged when only partially discharged, the battery will last longer and the rectifier will do a better job. Prevent oxidation of the battery contacts. Never disconnect the battery if the rectifier is supplying current as the break-off spark could ignite the gases produced by the battery. Keep the charging area ventilated.

### MAINTENANCE

The rectifier does not require any maintenance. For cleaning the outside, use a damp cloth. Use only manufacturer approved spare parts.



<p>PAN. 1</p>  <p>2 SEC.</p>	<p>PAN. 2</p> 	<p>PAN. 3</p> 	<p>PAN. 4</p> 
<p>PAN. 5</p> 	<p>PAN. 6</p> 	<p>PAN. 7</p> 	<p>PAN. 8</p> 
<p>PAN. 9</p> 	<p>PAN. 10</p> 	<p>PAN. 11</p> 	<p>LED</p> <p>○ OFF</p> <p>● ON</p> <p>⊛ FLASH</p>